MIDDLEMOUNT COAL MINE

SOUTHERN EXTENSION PROJECT
EPBC Act Preliminary Assessment Documentation (EPBC 2021/8920)

Main Text
Middlemount Southern Extension Project
Preliminary Documentation

middlemount coal PTY LTD

MIDDLEMOUNT COAL MINE

SOUTHERN EXTENSION PROJECT (EPBC 2021/8920)
EPBC ACT PRELIMINARY ASSESSMENT DOCUMENTATION

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EXECUTIVE SUMMARY

Middlemount Coal Pty Ltd (MCPL) owns and operates the Middlemount Coal Mine, an existing open cut coal mine located approximately 3 kilometres to the south-west of the Middlemount Township, Queensland (Qld). The Southern Extension Project (the Action) provides for the continuation of open cut coal mining operations at the Middlemount Coal Mine.

The Middlemount Coal Mine operates under Environmental Authority (EA) EPML00716913. A major amendment of EA EPML00716913 for the Action was approved on 19 April 2021, in accordance with Chapter 5, Part 7 of the Qld *Environmental Protection Act 1994* (EP Act).

MCPL is now seeking approval of the Action under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (EPBC 2021/8920) and on 17 June 2021 the Commonwealth Minister declared the Action to be a controlled action with the following controlling provisions:

- Listed threatened species and communities (sections 18 and 18A).
- A water resource, in relation to coal seam gas development and large coal mining development (sections 24D and 24E).

The purpose of this preliminary documentation is to enable the Commonwealth Minister and interested parties to understand the environmental consequences of the Action on Matters of National Environmental Significance.

Listed Threatened Species and Communities

Due to past and ongoing agricultural activities (e.g. clearing, grazing, logging, thinning), the Action area predominately comprises cleared land and vegetation in the early stage of regrowing from past clearance (approximately 65 per cent, 164.19 hectares [ha]). The Action area contains approximately 86.03 ha of remnant woodland, represented by Eucalypt woodlands (mostly Poplar Box woodlands) and small occurrences of Acacia dominated woodlands.

The native vegetation and habitat within the Action area and surrounding land has been surveyed on multiple occasions. Most recently, Biodiversity Australia Pty Ltd undertook flora surveys in the Action area during June 2020 and fauna surveys in the Action area during March and June 2020.

The flora and fauna surveys by Biodiversity Australia were undertaken in accordance with relevant Qld and Commonwealth survey guidelines, and in consideration of, relevant listing advice and information on the *Species Profile and Threats Database*. All threatened species and communities listed under the EPBC Act which are known to be present, likely to be present or for whom suitable habitat existing in the Action area, were targeted during the surveys. Habitat assessments were undertaken to describe the quantity and quality of habitat for relevant threatened species and communities.

One threatened species and two threatened ecological communities listed under the EPBC Act have been recorded in the Action area (Attachment C):

- Greater Glider (southern and central) (*Petauroides volans*) (listed as 'Vulnerable' under the EPBC Act and NC Act at the time of the controlled action decision (17/06/2021) and is therefore assessed as 'Vulnerable' not 'Endangered');
- Brigalow (*Acacia harpophylla* dominant and co-dominant) Threatened Ecological Community (Brigalow TEC) (listed as 'Endangered' under the EPBC Act and NC Act); and
- Poplar Box Grassy Woodland on Alluvial Plains Threatened Ecological Community (Poplar Box TEC) (listed as 'Endangered' under the EPBC Act and NC Act).

In addition to the above suitable habitat is present for the Ornamental Snake (*Denisonia maculata*) and Squatter Pigeon (southern) (*Geophaps scripta scripta*), both listed as 'Vulnerable' under the EPBC Act and NC Act, and the Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) (*Phascolarctos cinereus*) (listed as 'Vulnerable' under the EPBC Act and Nature Conservation Act 1992 [NC Act] at the time of the controlled action decision (17/06/2021) and is therefore assessed as 'Vulnerable' not 'Endangered') and has been previously recorded in the existing/approved Middlemount Coal mine surface disturbance footprint.

MCPL would minimise land clearance through the use of existing infrastructure and facilities (where possible) and minimising out-of-pit waste rock emplacements via backfilling of the open cut pit void. The existing environmental management systems at the Middlemount Coal Mine include environmental management plans and programs that have been developed and implemented since operations commenced. For example, relevant impact mitigation measures include the use of a licensed spotter-catcher and/or carer during clearing activities and progressive rehabilitation of disturbance areas.

MCPL currently has a number of existing biodiversity offset areas on company-owned land which were established for various components of the Middlemount Coal Mine. A new biodiversity offset area is proposed for the Action (i.e. the proposed Southern Extension Offset Area). The proposed Southern Extension Offset Area adjoins existing and other proposed offset areas.

The proposed Southern Extension Offset Area has been developed in accordance with the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy* (and the EPBC Act *Offsets Assessment Guide*). The proposed offset area is approximately 1,554.7 ha in size, comprising approximately 1,303.76 ha of remnant vegetation and approximately 250.94 ha of non-remnant/regrowth vegetation. The biodiversity offset area provides for the enhancement and conservation of Brigalow and Poplar Box TECs as well as habitat for the Ornamental Snake, Squatter Pigeon (southern), Koala and Greater Glider (southern and central).

Water Resources

The existing/approved Middlemount Coal Mine has effects on surface water and groundwater resources, for example through diversions of Thirteen Mile Gully and Roper Creek and groundwater drawdown associated with the open cut mining operations. Impacts on water resources are currently authorised under the Middlemount Coal Project Stage 2 Commonwealth approval (EPBC 2010/5394) and regulated under the Qld EP Act (Middlemount Coal Mine operates under EA EPML00716913) and Qld *Water Act 2000* (water licences). The Action provides for the continuation of open cut coal mining operations at the Middlemount Coal Mine, including a small realignment of the Roper Creek Diversion and an incremental increase in groundwater drawdown associated with the open cut extension.

Water-dependent assets (i.e. entities with characteristics having value and which can be linked directly or indirectly to a dependency on water quantity or quality) have been identified and the potential for the Action to impact water-dependent assets has been assessed. The assessment of potential surface water impacts from the Action is supported by the Surface Water Impact Assessment (Attachment D). The assessment of potential groundwater impacts from the Action is based on the modelling and assessment conclusions presented in the Groundwater Impact Assessment (Attachment E). The 2018 groundwater model was previously peer reviewed by Dr Noel Merrick of HydroAlgorithmics Pty Ltd as part of the Western Extension Project. The Groundwater Impact Assessment was supported by a contemporary bore census of the surrounding locality by 4T Consultants Pty Ltd (2017) and a Biodiversity Assessment by Biodiversity Australia.

The hydrogeological regime of the Middlemount Coal Mine comprises a Quaternary and Tertiary age sequence overlying older Permian age coal measures. In summary, groundwater levels within the major aquifer units (i.e. Permian coal measures) are generally in excess of 25 m below ground surface and separated from surface waters, limiting potential to support Groundwater Dependent Ecosystems. Further, the groundwater quality within the major aquifer units in the locality is brackish to saline and not suitable for stock or human consumption.

As part of the Action, MCPL proposes to realign and extend the diversion approved under EPBC 2010/5394 (but not yet constructed), eastern diversion of Roper Creek (Roper Creek Diversion 2) to allow for the southern extension of the open cut within Mining Lease 70379. The diversion realignment is expected to perform in a similar manner to the existing Roper Creek for in-channel flows.

As described above, the existing environmental management systems at the Middlemount Coal Mine include environmental management plans and programs that have been developed and implemented since operations commenced. Mitigation measures relevant to water resources, include site water management, surface water monitoring and groundwater level and quality monitoring.

1 INTRODUCTION

Middlemount Coal Pty Ltd (MCPL) owns and operates the Middlemount Coal Mine, an existing open cut coal mine located approximately 90 kilometres (km) north-east of Emerald and approximately 3 km to the south-west of the Middlemount Township, Queensland (Qld) (Figures 1, 2 and 3). The Southern Extension Project (the Action) provides for the continuation of open cut coal mining operations at the Middlemount Coal Mine (Figure 4).

The Middlemount Coal Mine operates under Environmental Authority (EA) EPML00716913. In April 2021, the Action was approved under Chapter 5, Part 7 of the Qld *Environmental Protection Act 1994* (EP Act) through a major amendment of EA EPML00716913. MCPL is also seeking approval of the Action under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (EPBC 2021/8920).

On 20 May 2021, MCPL lodged a referral for the Action with the Department of Agriculture, Water and the Environment (DAWE) (now the Commonwealth Department of Climate Change, Energy, the Environment and Water [Cth DCCEEW]) to determine whether the Action needed formal assessment and approval under the EPBC Act (Attachment A). An action requires approval under the EPBC Act if the action is likely to have a significant impact on Matters of National Environmental Significance (MNES). On 17 June 2021, a delegate of the Commonwealth Minister declared the Action to be a controlled action for the purposes of the EPBC Act, with the following controlling provisions:

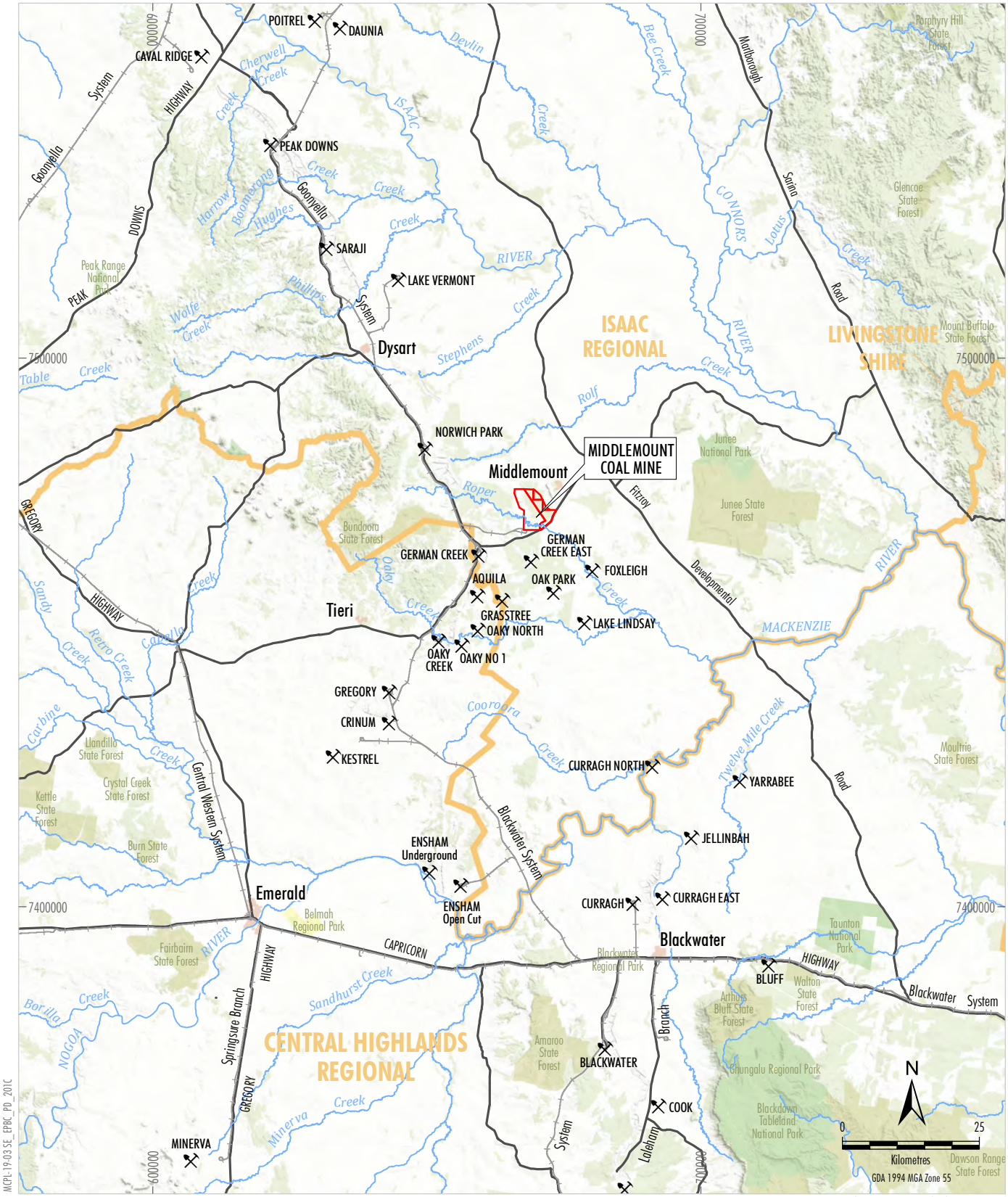
- Listed threatened species and communities (sections 18 and 18A).
- A water resource (sections 24D and 24E).

The delegate of the Commonwealth Minister also determined the Action is to be assessed by preliminary documentation and further information was requested on 23 July 2021 pursuant to section 95A of the EPBC Act. A copy of the request for preliminary documentation is provided in Attachment B.

The purpose of the preliminary documentation is to enable the Commonwealth Minister and interested parties to understand the environmental consequences of the Action on MNES.

This preliminary document is structured as follows:

Section 1	Provides background to the Action and the assessment requirements.
Section 2	Provides the further information requested by Cth DCCEEW in regard to threatened species and ecological communities.
Section 3	Provides the further information requested by Cth DCCEEW in regard to water resources.
Section 4	Provides the environmental outcomes.
Section 5	Provides the further information requested by Cth DCCEEW in regard to consolidated existing and proposed mitigation measures.
Section 6	Provides the further information requested by Cth DCCEEW in regard to ecologically sustainable development.
Section 7	Provides the further information requested by Cth DCCEEW in regard to economic and social impacts.
Section 8	Provides a summary of MCPL's environmental record.
Section 9	Provides a conclusion of the information provided in this document.
Section 10	Lists the references cited in this document.



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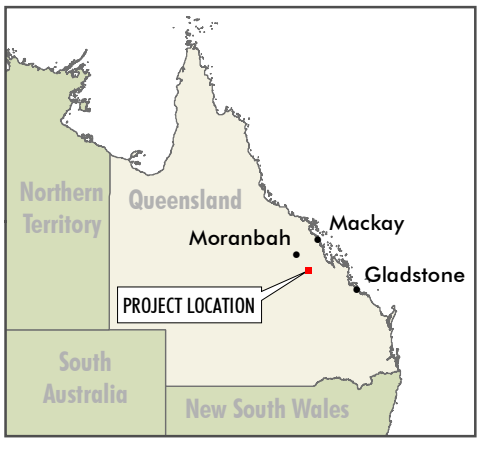

LEGEND
- Middlemount Mining Lease Boundary
- Local Government Area Boundary
- Road
- Railway
- National Park
- State Forest
- Conservational Park
- Mine Site

Source: Geoscience Australia (2025); Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024)

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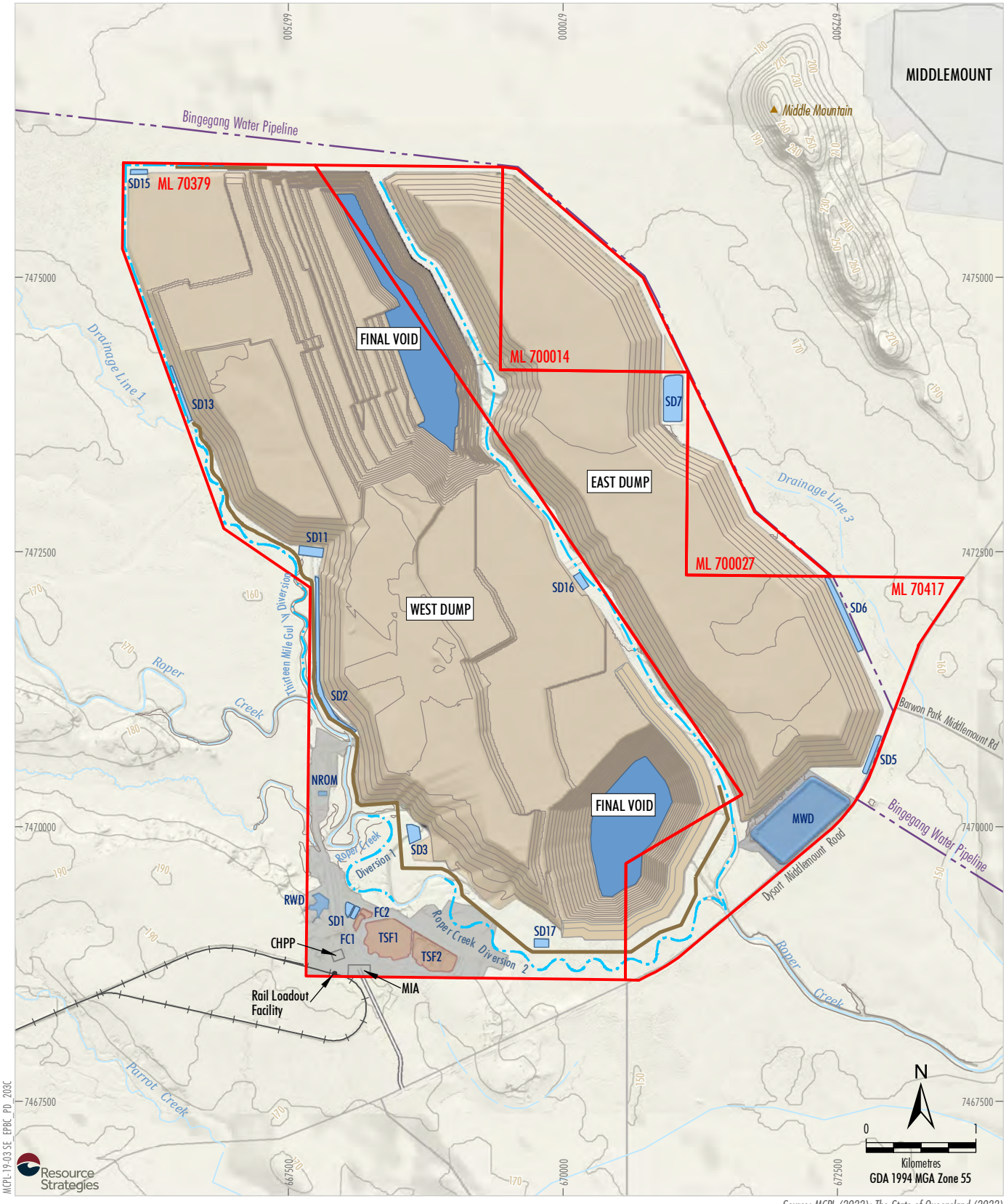
SOUTHERN EXTENSION PROJECT

Regional Location

Figure 1



Source: MCPL (2022); The State of Queensland (2022)

LEGEND

- Middlemount Coal Mining Lease Boundary (ML)
- Mine Pit and Spoil
- Mine Infrastructure Area
- Tailings Storage Facility
- Sediment Dam
- Water Storage
- Diversion Structure
- Levee
- Mine Access Road
- Middlemount Rail Spur and Loop

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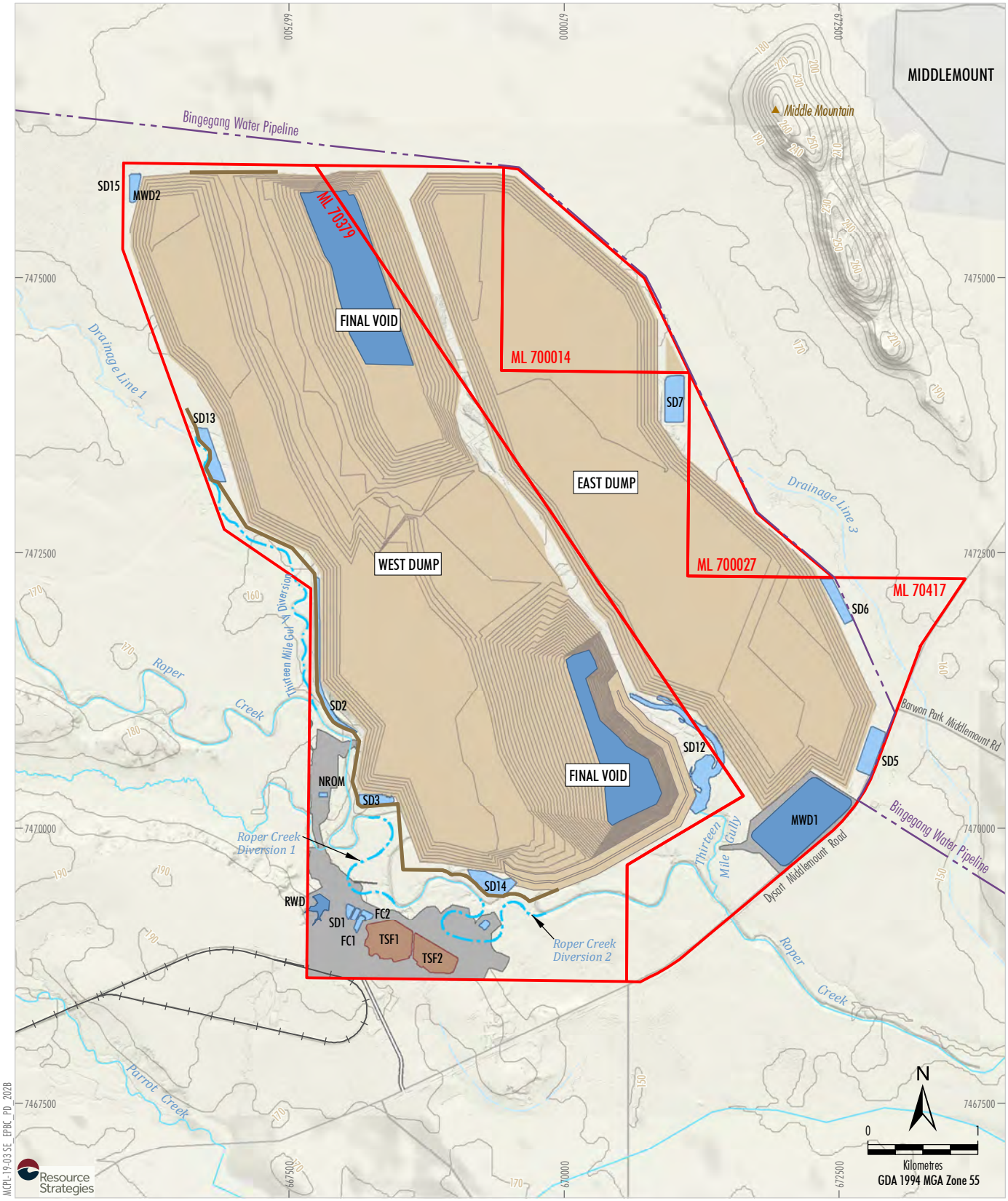
SOUTHERN EXTENSION PROJECT

Existing/Approved General Arrangement under State Approval EA EPML00716913

Figure 2



Source: MCPL (2020); The State of Queensland (2020)

LEGEND

- Middlemount Coal Mining Lease Boundary (ML)
- Mine Pit and Spoil
- Mine Infrastructure Area
- Tailings Storage Facility
- Sediment Dam
- Water Storage
- Levee
- Diversion Structure
- Mine Access Road
- Middlemount Rail Spur and Loop

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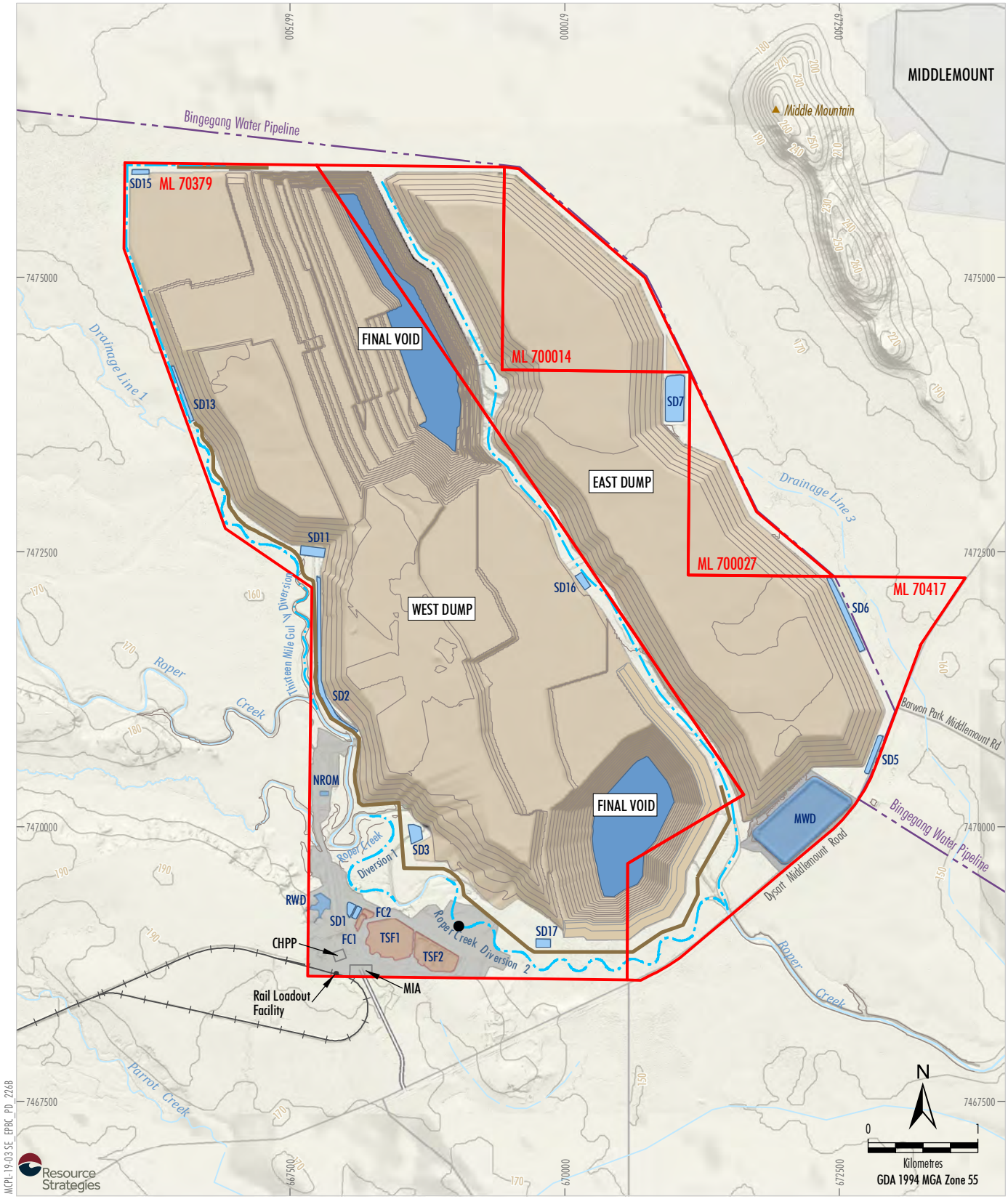
SOUTHERN EXTENSION PROJECT

Existing/Approved General Arrangement under Commonwealth EPBC Act Approvals

Figure 3



Source: MCPL (2022); The State of Queensland (2022)

LEGEND

- Middlemount Coal Mining Lease Boundary (ML)
- Mine Pit and Spoil
- Mine Infrastructure Area
- Tailings Storage Facility
- Sediment Dam
- Water Storage
- Diversion Structure
- Levee
- Mine Access Road
- Middlemount Rail Spur and Loop
- Middlemount Roper Creek Diversion 2
- Haul Road Crossing (Retained or Rehabilitated)

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SOUTHERN EXTENSION PROJECT

Proposed General Arrangement under EPBC 2021/8920

Figure 4

1.1 THE EXISTING MIDDLEMOUNT COAL MINE

Full scale operations at the Middlemount Coal Mine commenced July 2011. Middlemount Coal Mine extracts run-of-mine (ROM) coal using a conventional truck and shovel fleet supported by dozer mining.

As described earlier, the Action was approved under the EP Act through a major amendment of EA EPML00716913. The currently approved general arrangement of the mine under EA EPML00716913 is shown on Figure 2.

The Middlemount Coal Mine also has three current EPBC Act approvals:

- EPBC 2010/5394.
- EPBC 2016/7717.
- EPBC 2017/8130.

MCPL lodged a referral for the Middlemount Coal Project Stage 2 on 10 March 2010 (EPBC 2010/5394). On 16 April 2010, a delegate of the Commonwealth Minister declared Stage 2 to be a controlled action for the purposes of the EPBC Act, with the controlling provisions of listed threatened species and communities (sections 18 and 18A). On 7 September 2012, Middlemount Coal Project Stage 2 was approved under the EPBC Act with conditions relating to Brigalow (*Acacia harpophylla* dominant and co-dominant) Threatened Ecological Community (Brigalow TEC), Squatter Pigeon (southern) (*Geophaps scripta scripta*) and Ornamental Snake (*Denisonia maculata*).

MCPL lodged a referral for the North-eastern Extension on 6 June 2016 (EPBC 2016/7717). On 7 July 2017, a delegate of the Commonwealth Minister declared the North-eastern Extension to be a controlled action, with the controlling provisions of listed threatened species and communities (sections 18 and 18A). On 29 March 2017, the North-eastern Extension was approved under the EPBC Act with conditions relating to Squatter Pigeon (southern) and South-eastern Long-eared Bat (also referred to as Corben's Long-eared Bat) (*Nyctophilus corbeni*).

MCPL lodged a referral for the Western Extension on 21 December 2017 (EPBC 2017/8130). On 8 February 2018, a delegate of the Commonwealth Minister declared the Western Extension to be a controlled action, with the controlling provisions of listed threatened species and communities (sections 18 and 18A) and a water resource, in relation to coal seam gas (CSG) development and large coal mining development (sections 24D and 24E). On 8 October 2019, the Western Extension was approved under the EPBC Act with conditions relating to Brigalow TEC, Ornamental Snake, Squatter Pigeon (southern), Greater Glider (southern and central) (*Petauroides volans*) and Koala (*Phascolarctos cinereus*).

The existing EPBC Act approvals provide for mining within Mining Leases (MLs) 70379 and 70417. The existing/approved general arrangement under Commonwealth EPBC Act approvals is shown on Figure 4. Overburden and interburden material is emplaced in both out-of-pit and in-pit waste rock emplacements behind the advancing open cut operations, within the East and West Dump, located within ML 70417.

ROM coal is processed through a coal handling and preparation plant (CHPP) to produce approximately 4.1 million tonnes per annum (Mtpa) of pulverised coal injection and coking coal for the export market. Product coal is transported by rail to the Dalrymple Bay Coal Terminal, Abbot Point Port or Wiggins Island Coal Export Terminal.

The existing environmental management systems at the Middlemount Coal Mine include environmental management plans and programs that were developed and implemented when operations commenced and since been revised and updated commensurate with more recent approvals.

MCPL has also established three Commonwealth Offset Areas for the Middlemount Coal Project Stage 2 (EPBC 2010/5394), North-eastern Extension (EPBC 2016/7717) and Western Extension (EPBC 2017/8130) (Section 2.9.1).

1.2 PROPOSED ACTIONS AND ALTERNATIVES

1.2.1 Proposed Action

On 7 November 2019, MCPL submitted an application to vary the boundaries of ML 70379 (associated with the Middlemount Coal Mine) and ML 1998 (associated with the German Creek Coal Mine) under section 295 (1)(b) of the *Qld Mineral Resources Act 1989* (MR Act). On 28 April 2020, the Department of Natural Resources, Mines and Energy (DNRME) (now Department of Resources [DoR]) approved the variation application, which resulted in the extension of ML 70379 into an area previously associated with ML 1998.

The existing/approved general arrangement under Commonwealth EPBC Act approvals is shown on Figure 3. The proposed general arrangement for the Action under EPBC 2021/8920 is shown on Figure 4. The Action involves extension of operations within MLs 70379 and 70417 to the south and extension of waste rock emplacement areas within ML 70417 (Figure 5). The main activities associated with the development of the Action include:

- extension of the open cut pit to the south within MLs 70379 and 70417;
- realignment and extension of the approved (but not yet constructed) eastern diversion of Roper Creek (Roper Creek Diversion 2) within ML 70379;
- realignment of Roper Creek within ML 70417;
- minor extensions to the East Dump within ML 70417;
- re-positioning of the approved southern flood levee and associated water management infrastructure within ML 70379;
- extension of the southern flood levee and associated water management infrastructure within ML 70417;
- continued development of sediment dams and other water management equipment and structures;
- continued development of haul roads and internal roads;
- continued development of soil stockpiles, laydown areas and borrow areas;
- a change to the final landform for the end of the mine life; and
- continued extraction of ROM coal up to approximately 5.7 Mtpa using conventional open cut mining equipment.

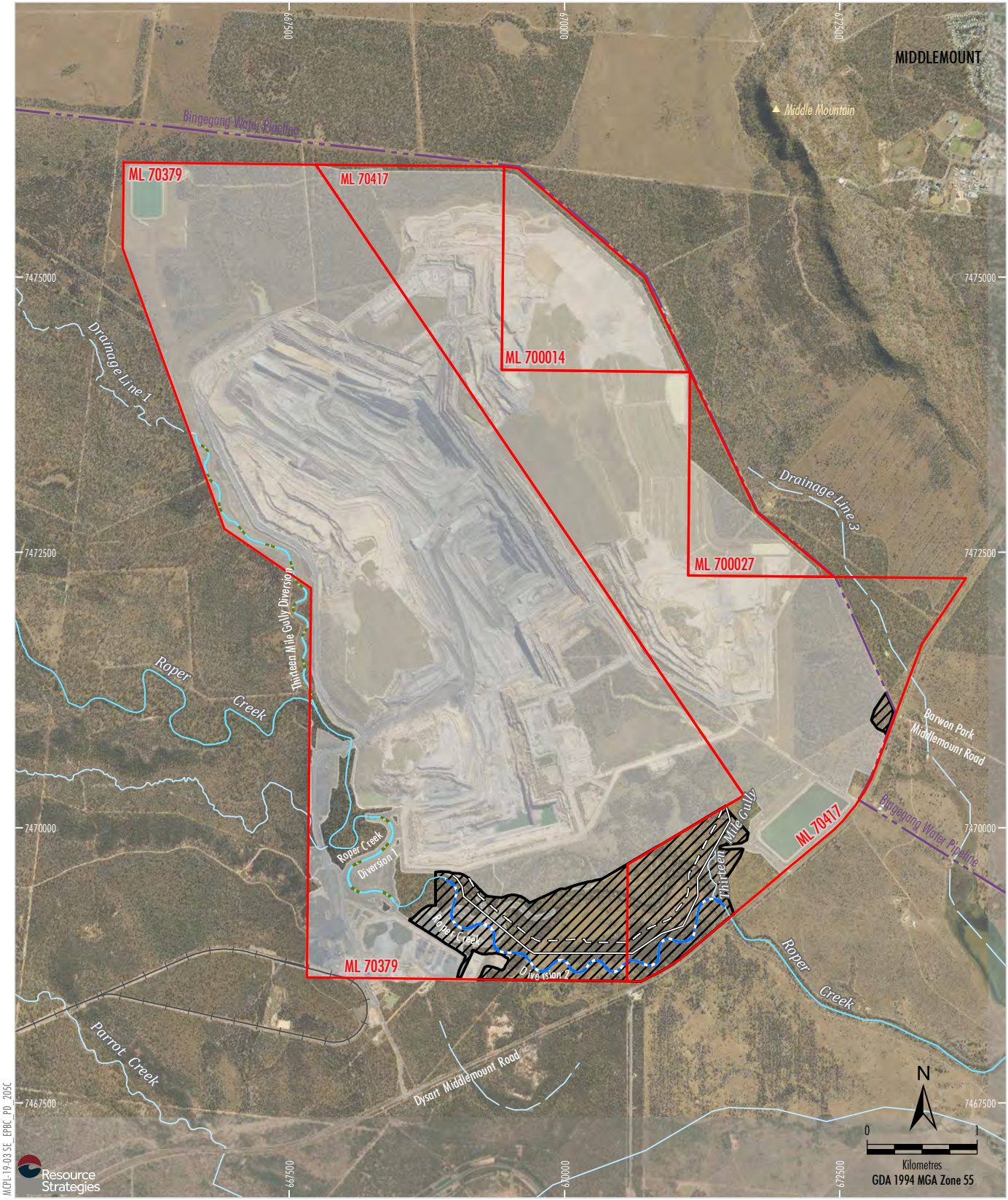
The Action also includes, but not limited to, the following key activities within the approved disturbance footprint of the Middlemount Coal Mine:

- placement of waste rock in existing waste rock emplacements and within the mined out void; and
- use of existing and approved supporting mine infrastructure.

In addition to the above, the Action includes an extension to the extraction of coal from 2037 to 2044.

The ownership of land in the Action area and immediate surrounds is shown on Figure 6. The conceptual general arrangement post-mining is shown on Figure 7.

The EPBC Act referral for the Action is provided in Attachment A.



Source: MCPL (2025); The State of Queensland (2023)
Orthophoto: MCPL (June 2025); ESRI Basemap (2024)

LEGEND

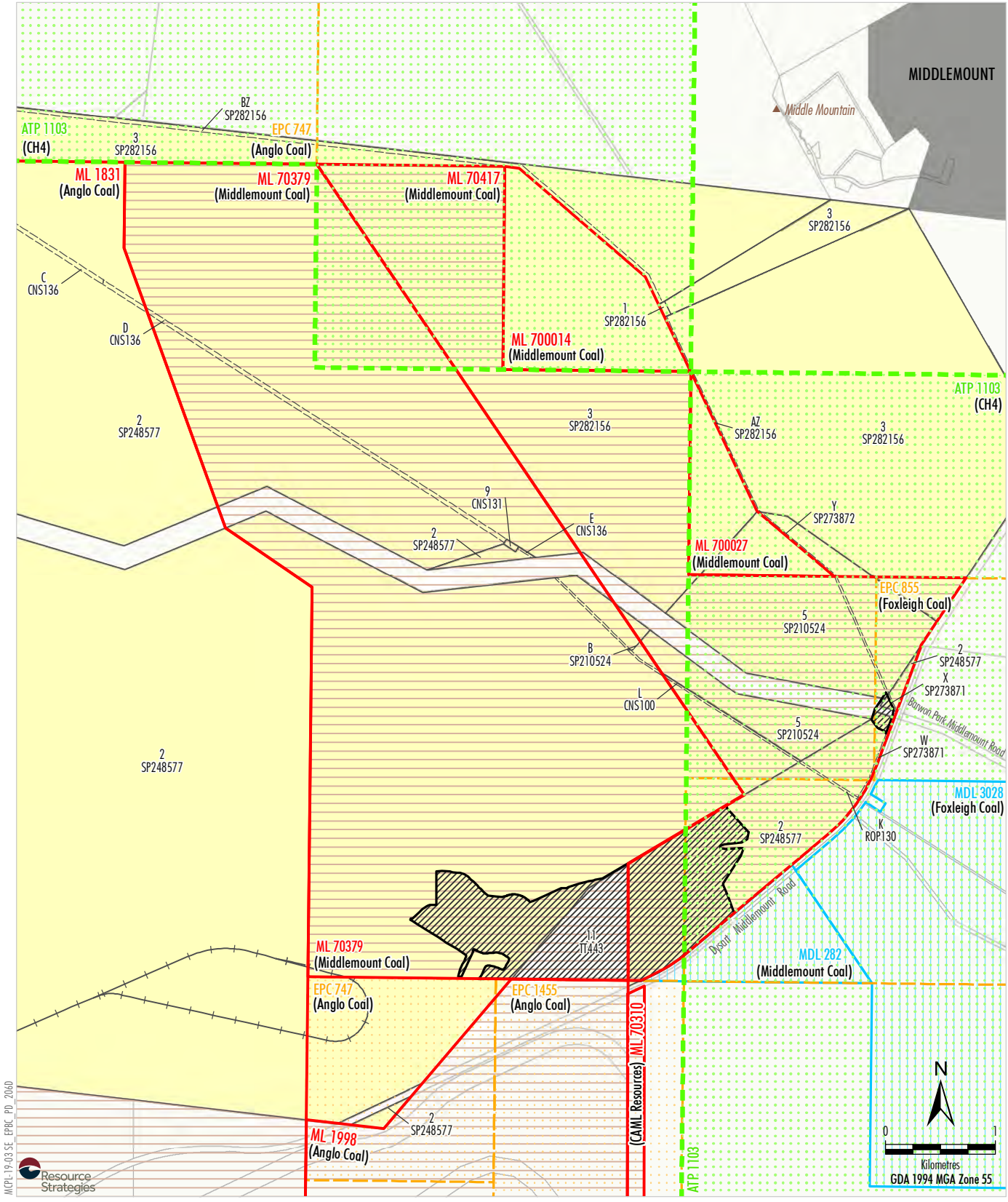
- Middlemount Coal Mining Lease Boundary (ML)
- Middlemount Rail Spur and Loop
- Approved Disturbance Footprint
- Approved Diversion Structure
- Realigned Diversion
- Levee
- Open Cut Pit Extension
- Approximate Extent of Additional Disturbance Associated with the Action

middlemount coal PTY LTD

SOUTHERN EXTENSION PROJECT

Action Area Footprint Extent

Figure 5



Source: MCPL (2025); The State of Queensland (2025)

LEGEND

- Mining Lease Boundary (ML)
- Authority to Prospect (ATP)
- Exploration Permit for Coal (EPC)
- Mineral Development Licence (MDL)
- Mining Lease Surface Area
- Middlemount Coal Owned Land
- Easement
- Middlemount Rail Spur and Loop
- Approximate Extent of Additional Disturbance Associated with the Action

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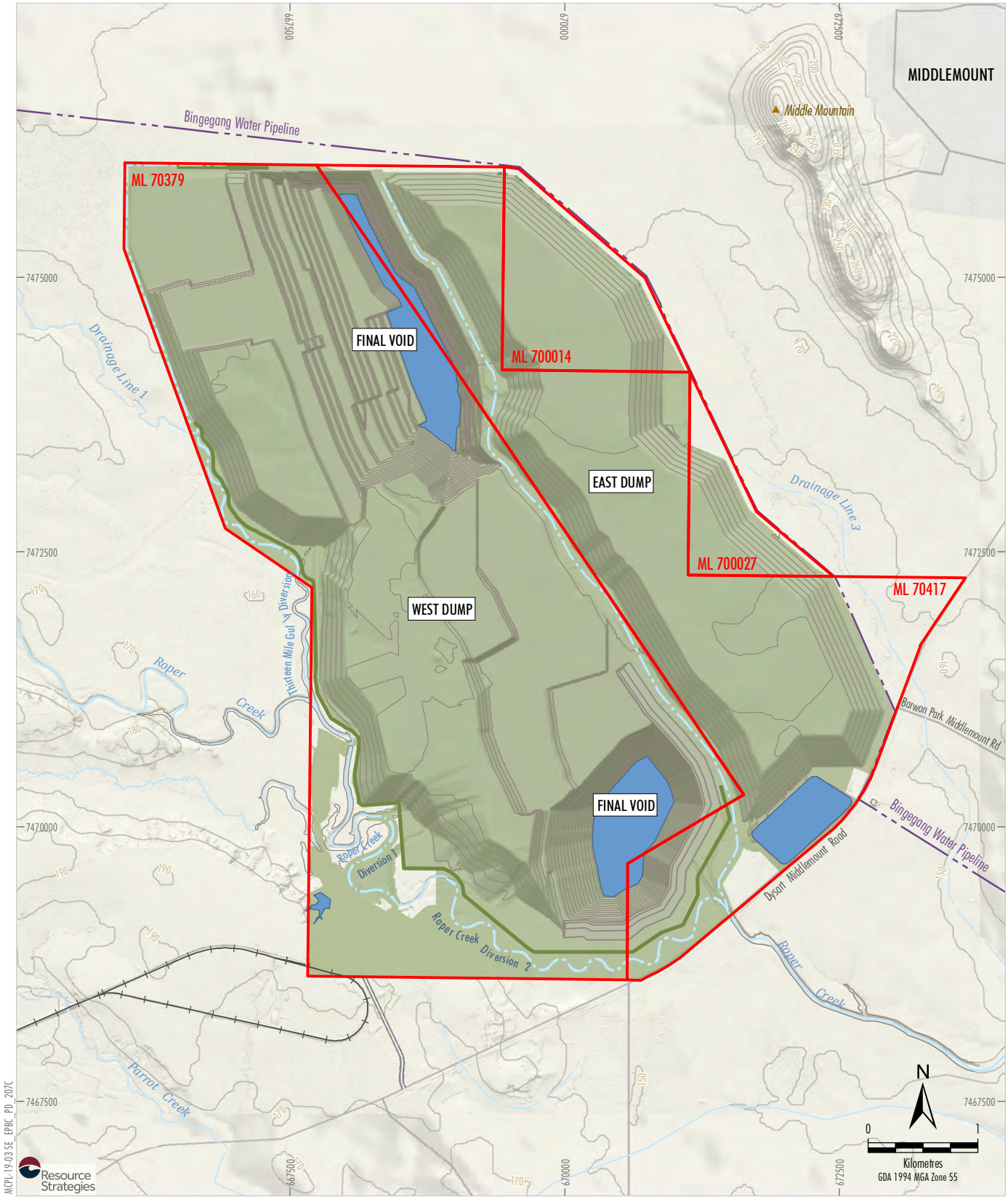
SOUTHERN EXTENSION PROJECT

Relevant Mining and Exploration Tenements and Land Tenure

Figure 6



LEGEND

- Middlemount Coal Mining Lease Boundary (ML)
- Established Rehabilitation
- Water Storage
- Diversion Structure
- Removed Levee (Rehabilitated)
- Mine Access Road (Retained or Rehabilitated)
- Middlemount Rail Spur and Loop (Retained or Rehabilitated)

Source: MCPL (2022); AGE (2018); The State of Queensland (2022)

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SOUTHERN EXTENSION PROJECT

Conceptual General Arrangement
Post-mining

Figure 7

1.2.2 Alternatives Considered

There are no alternatives sought as part of the Action proposed. Alternatives to the proposed Action including the location and design elements were considered by MCPL, along with the option of not proceeding with the Action. An overview of some considerations is provided below:

- **Action location** – The presence of the existing open cut mining area, the extent of current mining tenements, land tenure and the presence of existing approved offset areas to the west of the Middlemount Coal Action determines the location of the Action.
- **Design elements –** The Action would result in minor changes to the location and design of the approved residual voids (Figure 2). This proposed residual void arrangement is generally in accordance with the MCPL Residual Void Study (MCPL, 2014) submitted to the Department of Environment and Heritage Protection (DEHP) (now Department of Environment and Science [DES]) in January 2015. Filling the residual voids was considered, however, the cost to rehandle spoil material from the out of pit emplacements to the residual voids would be prohibitive and delay rehabilitation, and as such, it is not proposed as part of the Action (consistent with the approved Western Extension [EPBC 2017/8130]).
- **No Action** – MCPL has considered not undertaking the Action. However, in the event that the Action is not developed, MCPL would forgo opportunities to improve mining efficiency and rehabilitation outcomes at the Middlemount Coal Mine. Were the Action not to proceed, the following consequences are inferred:
  - The existing Middlemount Coal Mine would continue to operate, as approved, until 2037.
  - Operating costs at the Middlemount Coal Mine would remain higher due to the higher strip ratio associated with the approved mine plan.
  - An incremental net benefit of approximately $77 million (M) (in net present value [NPV] terms) to MCPL would be foregone.
  - The surface area of the residual voids at the end of mining would be larger than proposed as part of the Action.
  - The additional potential environmental impacts for the Action described would not occur.
  - The additional surface development area would not be disturbed and therefore the additional biodiversity offset areas (Section 2.9) would not be established.

1.3 ASSESSMENT REQUIREMENTS

This section provides a reconciliation of the assessment requirements against this document.

1.3.1 Department of Agriculture, Water and the Environment Information Request

Table 1 provides the assessment requirements provided by the then DAWE (now Cth DCCEEW) (23 July 2021) (Attachment B) and the corresponding section in this document where the information is provided.

Table 1
Middlemount Coal – Department of Agriculture, Water and the Environment
Information Request

Information Request	Section/Appendix Reference
1. DESCRIPTION OF THE ACTION *The preliminary documentation must include:* • *Inclusion of updated information if any changes have been made to the project since the referral documentation was submitted.*	Section 1.2.1
2. HABITAT ASSESSMENT – LISTED THREATENED SPECIES AND COMMUNITIES ***Background*** *Based on the information provided in your referral, and other available information, the department considers that the listed species and communities identified below may be significantly impacted by the proposed action.* • *Greater Glider (Petauroides volans) - Vulnerable* • *Koala (combined populations of Qld, NSW and the ACT) (Phascolarctos cinereus) - Vulnerable* • *Squatter Pigeon (southern) (Geophaps scripta scripta) - Vulnerable* • *Ornamental snake (Denisonia maculata) - Vulnerable* • *Brigalow (Acacia harpophylla dominant and co-dominant) - Endangered* • *Poplar Box Grassy Woodland on Alluvial Plains - Endangered* *It is the proponent's responsibility to be aware of any changes to listed threatened species and ecological community distributions and the information available in the SPRAT Database. The proponent must ensure that a recent PMST has been generated and considered before finalising the draft preliminary documentation.* *The habitat assessments must be informed by desktop and field surveys (in accordance with departmental guidelines or as defined by best practice surveys), and with reference to relevant departmental documents (e.g. approved Conservation Advices, Recovery Plans, draft referral guidelines and Listing Advices), including the Species Profile and Threats (SPRAT) Database, published research, and other relevant sources.*	Section 2, Appendix A of Attachment G
General information required • *Habitat mapping for areas surrounding the proposed action area, particularly to the south of the project area where downstream impacts of the Roper Creek diversion may occur. Mapping must be for all relevant listed threatened species and communities listed above and follow habitat descriptions (derived from the SPRAT database) outlined in Table 1.* *Please note: the department does not accept the consideration of only Queensland Regional Ecosystem (RE) mapping to determine habitat for listed threatened species.*	Figures 8, 9, 12, 14, 16, 18 and Appendix A of Attachment G
• *Attach all relevant ecological surveys referenced in the referral and preliminary documentation as supporting documents to the preliminary documentation.*	Attachments C, D, E, G and Appendix A of Attachment G
Specific information required *The preliminary documentation must address the following matters in addition to the general considerations listed above.*	
Koala (Phascolarctos cinereus) (combined populations of Qld, NSW and the ACT) – Vulnerable • *Provide an updated habitat assessment for the Koala consistent with EPBC Act referral guidelines for the vulnerable koala. The habitat assessment must include regrowth vegetation with emergent koala food trees and must not be based on Queensland Regional Ecosystem (RE) mapping.*	Section 2.5, Attachment C
Squatter Pigeon (Southern) (Geophaps scripta scripta) – Vulnerable • *Discuss breeding, foraging and dispersal habitat requirements, including total area (in hectares) of each breeding, foraging and dispersal habitat type. Ensure disturbed (non-remnant vegetation) areas are considered.* • *Update mapping to reflect the above changes.*	Section 2.4, Table 6, Attachment C
Ornamental Snake (Denisonia maculata) – Vulnerable • *Discuss habitat use requirements (e.g. shelter/refuge, foraging, dispersal, etc.), including consideration of known important habitat and suitable habitats. Include total area (in hectares) of each identified habitat type (e.g. shelter/refuge, foraging, dispersal, etc.).* • *Provide details and locations (including a map) of known food sources (i.e. frog species).*	Section 2.3, Table 5, Attachment C

<table>
<tr><th>Information Request</th><th>Section/Appendix Reference</th></tr>
<tr><td>
Table 1: Habitat descriptions for listed threatened species and communities likely to be impacted by the proposed action.
<table>
<tr><th>MNES habitat</th><th>Habitat Description</th></tr>
<tr><td>Koala</td><td>Any forest or woodland (including remnant, regrowth and modified vegetation communities) containing species that are Koala food trees or any shrubland with emergent Koala food trees.</td></tr>
<tr><td>Greater Glider</td><td>Eucalypt forests and woodlands with trees containing hollows.</td></tr>
<tr><td>Squatter Pigeon (southern)</td><td><u>Breeding habitat</u>: Any remnant or regrowth open-forest to sparse, open-woodland or scrub dominated by Eucalyptus, Corymbia, Acacia or Callitris species, on sandy or gravelly soils (including but not limited to areas mapped as Queensland land zones 3, 5 or 7) and within 1 kilometre of a suitable, permanent or seasonal waterbody.

<u>Foraging habitat</u>: Any remnant or regrowth open-forest to sparse, open-woodland or scrub dominated by Eucalyptus, Corymbia, Acacia or Callitris species, on sandy or gravelly soils (including but not limited to areas mapped as Queensland land zones 3, 5 or 7) and within 3 kilometres of a suitable, permanent or seasonal waterbody.

<u>Dispersal habitat</u>: Any forest or woodland occurring between patches of foraging or breeding habitat that facilitates movement between patches of foraging habitat, breeding habitat and/or waterbodies, and areas of cleared land less than 100 metres wide linking areas of suitable breeding and/or foraging habitat.</td></tr>
<tr><td>Ornamental Snake</td><td>Gilgai mounds and depressions with cracking-clay soils and moist areas (particularly within, or close to, habitat that is known to be favoured by its prey [frogs]) with microhabitat features (i.e. logs, woody debris and leaf litter), and Brigalow threatened ecological community.</td></tr>
<tr><td>Brigalow TEC</td><td>The key diagnostic characteristics and condition thresholds in the Approved Conservation Advice for the Brigalow (Acacia harpophylla dominant and co-dominant) ecological community (2013a), or subsequent revision.</td></tr>
<tr><td>Poplar Box TEC</td><td>The key diagnostic characteristics and condition thresholds in the Conservation Advice (including listing advice) for the Poplar Box Grassy Woodland on Alluvial Plains (2019), or subsequent revision.</td></tr>
</table>
</td><td>Sections 2.3.4 (Table 5), 2.4.4 (Table 6), 2.5.2, 2.6.3 (Table 7), and Attachment C</td></tr>
<tr><td>
3. IMPACT ASSESSMENT

Background

The project is considered likely to have impacts to the above listed threatened species and/or their habitat and impacts to a water resource. The preliminary documentation must include an assessment of direct, indirect and consequential impacts as a result of the proposed action using the most up-to-date data available, and must be assessed in accordance with relevant departmental policies and guidelines, including the SPRAT Database.

In addition to impacts from direct clearance, the department notes the potential for impacts to downstream environmental water users through changes in hydrology, water quality and groundwater drawdown. In providing information in the preliminary documentation, specific consideration should be given to the impact of land clearance including habitat fragmentation, the impact of groundwater drawdown and the possible indirect impact of this on nearby wetlands, the potential for GDEs to occur in the action area and downstream, and the impacts of increased surface water flow and sedimentation along Roper Creek.

The department notes that the IESC has already assessed water modelling and provided comments as part of previously referred actions. Considering documentation on the Southern Extension Project will be sent to the IESC as part of the assessment process, consider addressing any outstanding IESC recommendations in the preliminary documentation.
</td><td>Sections 2.1.3, 2.2.3, 2.3.3, 2.4.3, 2.5.3, 2.6.3, 3.6.1, 3.6.2, 3.8.1, 3.8.2, 3.9, 3.10, 3.11, and Attachments D and E</td></tr>
<tr><td>
Information required

<u>Listed Species and Communities:</u>

• Revise the impact assessment based on changes requested in section 2.
</td><td>Section 2</td></tr>
<tr><td>
• Include an assessment of the impacts of fragmentation on habitat in the proposed action area and surrounding areas, including consideration of species' movement patterns.
</td><td>Sections 2.1.3, 2.2.3, 2.3.3, 2.4.3, 2.5.3, 2.5.5, 2.6.3, Appendix A of Attachment G</td></tr>
<tr><td>
• Justify, with supporting evidence, how the proposed action will not be inconsistent with:

a) Australia's obligations under the Biodiversity Convention, the Convention on Conservation of Nature in the South Pacific (Apia Convention), and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); and

b) A recovery plan or threat abatement plan.
</td><td>Section 2</td></tr>
</table>

Information Request	Section/Appendix Reference
<u>*Water Resource:*</u> ***Groundwater*** • *Provide further justification that the proposed Roper Creek diversion is unlikely to impact on shallow groundwater (Groundwater Assessment p80).*	Section 3.3, and 3.8.1, 3.8.2, and Attachment E
• *Justify your assertion that potential terrestrial GDEs are not accessing groundwater (Groundwater Assessment p53-55), addressing the discrepancy in simulated and observed groundwater levels (p67 and Appendix F).*	Sections 3.4, 3.6.2, 3.7.3 and Attachments E and F
• *Conduct ground-truthing of desktop analysis conducted on terrestrial GDEs and provide justification that vegetation are not GDEs. Consider that many species have been shown to have root systems of 22 mbgl (IESC 2018-097 p7), which is deeper than groundwater depth indicated.*	Section 3.6.2, Attachment C
• *Assessment of wetlands in the vicinity of the project is limited. Describe potential impacts on wetland areas classed as High Ecological Significance to the North and East of the project (Aquatic Ecology Assessment Figure 11), including any proposed future groundwater monitoring.*	Section 3.6.2
Surface water • *Clarify whether discharges from the mine water dam are proposed. The water balance model does not simulate discharge but water release points are noted on Table 3.2 and Tables 5.2-5.4 of the Surface Water Assessment (p30,49). If discharges are proposed, provide a discussion on discharge triggers.*	Section 3.8.1, and Tables 5.2-5.4 of Attachment D
• *Discuss the potential impacts of increasing salinity of voids on aquifers and surface water resources surrounding the project area (Surface Water Assessment p67) and justify why increasing salinity levels do not pose a risk.*	Sections 3.9.1 and 3.11.2 and Section 7.6.2 of Attachment D
• *Considering the likelihood of increased sediment load in Roper Creek due to higher stream velocities (Surface Water Assessment p96), conduct further analysis on sediment transport potential in the final landform and predicted downstream sediment loads. Include clarification of how disturbed sediment transport over several years may impact on the final landform floodplain.*	Section 3.11.1, and Sections 9.2.2 and 9.5.3.4 of Attachment D
• *Further discuss likely impacts to fish movement in Roper Creek (Aquatic Ecology Assessment p89).*	Section 3.8.1
4. PROPOSED AVOIDANCE, MITIGATION AND MANAGEMENT MEASURES ***Background*** *Avoidance and mitigation measures are the primary methods of eliminating and reducing significant impacts on MNES. Where possible and practicable, it is best to avoid impacts. If impacts cannot be avoided, then they should be minimised or mitigated as much as possible. Avoidance and mitigation measures must be investigated thoroughly as part of the assessment and be supported by evidence to demonstrate likely success.* *Management commitments by the person proposing to take the action must be clearly distinguished from recommendations or statements of best practice made by the document author or other technical expert.* *The SPRAT Database, and associated statutory documents, may provide relevant mitigation measures for listed threatened species and ecological communities.* *All proposed measures for MNES must be drafted to meet the 'S.M.A.R.T' principle:* • *S – Specific (what and how)* • *M – Measurable (baseline information, number/value, auditable)* • *A – Achievable (timeframe, money, personnel)* • *R – Relevant (conservation advices, recovery plans, threat abatement plans)* • *T – Time-bound (specific timeframe to complete)*	Sections 2.1.4, 2.2.4, 2.3.4, 2.4.4, 2.5.4, and 2.6.4 are summarised in Table 8, and in Section 4 of Attachment C
Information required <u>*General:*</u> • *Include a detailed summary of the measures proposed to be undertaken to avoid, mitigate and manage relevant impacts of the proposed action on MNES listed in Section 2.* – *The proposed measures must be based on best available practices, appropriate standards, evidence of success for other similar actions, and supported by published scientific evidence.* – *Supply information on the timing, frequency and duration of the proposed avoidance, mitigation, management and monitoring measures, and corrective actions to be implemented.* – *All commitments must be drafted using committed language (e.g. 'will' and 'must') when describing the proposed measures.*	Section 2.8 and Section 4 of Attachment C

Information Request	Section/Appendix Reference
• *Supply plans associated with the above measures, e.g. the Middlemount Coal Species Management Program, as an appendix to the Preliminary Documentation.*	Section 2.8
• *Include details of specific and measurable environmental outcomes to be achieved for relevant MNES.*	Section 4
• *Provide an assessment of the expected or predicted effectiveness of the proposed measures.*	Section 4
• *Discuss how avoidance, mitigation and management measures have been developed with reference to the SPRAT Database and relevant approved conservation advice, and how the proposed measures are not inconsistent with relevant recovery plans and threat abatement plans.*	Section 2.8
• *Provide details of ongoing management, including monitoring programs to support an adaptive management approach. This includes validation of the effectiveness of proposed measures and overall demonstration that the environmental outcomes will be achieved.*	Sections 3.11 and 5, Attachment G
• *Include details of tangible, on-ground corrective actions that will be implemented in the event the monitoring programs indicate that the environmental outcomes have not or will not be achieved.*	Attachment G
Action: • *Regarding the expansion to waste rock emplacement areas to the east of the mine site, justify the necessity of this expansion and demonstrate impacts have been avoided to the greatest extent possible.*	Section 3.8.1
• *Provide detail on how fauna will be facilitated to move off-site during clearing and construction.*	Section 2.8
Water Resource: • *Noting the potential for increased erosion risk associated with construction of the Roper Creek diversion, provide management and mitigation plans to address increased erosion to newly constructed banks and surrounding riparian areas. Include consideration of erosion of highly dispersive soils for flow rates above 40 Pa (Surface Water Assessment p109), deposition in downstream environments, and associated impacts on GDEs.*	Section 3.11.1
• *Provide details of sediment load monitoring of Roper Creek that will occur before and after flow events to ascertain background sediment load before the waterway is diverted. Provide a discussion on future sediment load monitoring that will occur near the proposed diversion and in downstream waterways. Include trigger action response plans to manage any increase in sediment load to reduce impacts on downstream waterways and GDEs.*	Section 3.11.1, and Sections 9.2.2 and 9.5.3.4 of Attachment D
• *Identify the frequency of sediment dam cleaning and where the collected sediment will be disposed of (Surface Water Assessment p118).*	Section 3.11.1
• *Considering the conditions put in place for the Western Extension Project (EPBC 2017/8130) regarding aquatic ecology, and that this project will be 2.6km longer than the already approved diversion, discuss potential impacts to aquatic ecology and provide mitigation and management measures if necessary.*	Sections 3.6.2, 3.8.1 and 3.11.1
• *Supply avoidance, mitigation and management measures if any impact to fish movement in Roper Creek is predicted.*	Section 3.8.1
• *Provide timeframes for undertaking investigation or to implement response actions should groundwater quality trigger levels be exceeded (Groundwater Assessment p93-96).*	Section 3.11.4, and Section 9.4 of Attachment E
5. REHABILITATION REQUIREMENTS *The preliminary documentation must include details on the proposed rehabilitation activities for all disturbed areas associated with the proposed action. At a minimum, the preliminary documentation must include details on:* • *Rehabilitation acceptance criteria, including for the restoration of habitat for relevant listed threatened species and communities, including koala, greater glider and squatter pigeon.*	Sections 2.8 and 4, Attachment H
• *A summary of the procedures, including contingency measures that will be undertaken to achieve the rehabilitation acceptance criteria, including consideration of flooding and sediment loads.*	Section 2.9 and 3.11.1, and Sections 9.2.2 and 9.5.3.4 of Attachment D
• *A summary of a monitoring program to determine the success of the rehabilitation activities implemented by the proponent. Include estimations for when the rehabilitated ecosystem will be self-sufficient.*	Section 5 and 2.8.2
• *Details of how the conditions of the permit issued by the Department of Environment and Science (Rehabilitation requirements of the Environmental Authority EPML00716913) will be followed. Attach this permit as a supporting document to the preliminary documentation.*	Section 4 and Attachment H

Information Request	Section/Appendix Reference
6. ENVIRONMENTAL OFFSETS – RESIDUAL SIGNIFICANT IMPACTS *Environmental offsets are measures that compensate for the residual significant impacts of an action on the environment. Offsets provide environmental benefits to counterbalance the impacts that remain after avoidance and mitigation measures. It is important to consider environmental offsets early in the assessment process and correspondence with the department regarding offsetting is highly encouraged.* *The referral documentation for the Southern Extension Project states an intention to base offset requirements on MSES and to use existing offset areas identified for previous stages of the Middlemount Coal Mine. This does not currently align with the requirements of the department's EPBC Act Environmental Offsets Policy.* *The department's EPBC Act Environmental Offsets Policy (2012) (Offsets Policy), available at: www.environment.gov.au/epbc/publications/epbc-act-environmental-offsets-policy, states that offsets must deliver a conservation gain for residual significant impacts associated with MNES additional to what is already required by environmental planning laws at any level of government. It also states that, if a piece of land has already been set aside for conservation activities, the offset must be for further activities that achieve additional conservation gain.* *The preliminary documentation must include an assessment of the likelihood of residual significant impacts occurring on relevant MNES, after avoidance, mitigation and management measures have been applied. If it is determined that a residual significant impact is likely, include a summary of the proposed environmental offset and key commitments in the preliminary documentation that align with requirements of the department's EPBC Act Environmental Offsets Policy.*	Section 2.9 and Attachment G
Include a draft Offset Management Strategy (OMS) or a draft Offset Area Management Plan (OAMP) as an appendix in the preliminary documentation for assessment and approval. If an offset area has been nominated, then provide an OAMP. If not, provide an OMS. Further, the department is likely to recommend to the Minister (or delegate) that the conditions of approval require the environmental offset/s or the OAMP be approved and implemented prior to the commencement of the proposed action.	Attachment G
Information required in an OMS *Include a draft OMS as an appendix to the preliminary documentation that provides, at a minimum:* • *specific details of the nature of the conservation gain to be achieved for relevant MNES, including the creation, restoration and revegetation of habitat in the proposed offset area/s;*	Section 2.9 An OMS is not required as an offset area has been nominated for the Action and an OAMP provided in Attachment G.
• *details of the environmental offset/s (in hectares) to compensate for the residual significant impacts of the proposed action on relevant MNES, and/or their habitat;*	Section 2.9, Table 11
• *details of the potential offset area/s (including a map) to compensate for the residual significant impacts of the proposed action on relevant MNES, and/or their habitat;*	Section 2.9, Figures 10a, 10b, 11a, 11b, 13a, 13b, 15a, 15b, 17a, 17b, 19a, 19b, and 20
• *the methodology, with justification and supporting evidence, used to inform the inputs of the Offsets Assessment Guide in relation to the project site for each relevant MNES, including:* – *total area of habitat (in hectares)* – *habitat quality (e.g. using the Queensland Government Guide to determining terrestrial habitat quality: A toolkit for assessing land based offsets under the Queensland Environmental Offsets Policy [2020])*	Appendix A of Attachment G
• *the methodology, with justification and supporting evidence, used to inform the inputs of the Offsets Assessment Guide in relation to each potential offset area/s for each relevant MNES, including:* – *time over which loss is averted (max. 20 years)* – *time until ecological benefit* – *risk of loss (%) without offset* – *risk of loss (%) with offset* – *confidence in result (%)*	Appendix A of Attachment G
• *evidence that the relevant MNES, and/or their habitat, can be present in the potential offset area/s;*	Appendix A of Attachment G
• *information about how the potential offset area/s provides connectivity with other relevant habitats and biodiversity corridors; and*	Sections 1.1 and 2 of Attachment G

Information Request	Section/Appendix Reference
• *details and execution timing of the mechanism to legally secure the environmental offset/s (under Queensland legislation or equivalent) to provide enduring protection for the potential offset area/s against development incompatible with conservation.*	
Information required in an OAMP *Include a draft OAMP as an appendix to the preliminary documentation which provides:* • *specific, committal and measurable environmental outcomes which detail the nature of the conservation gain to be achieved for relevant MNES, including the creation, restoration and revegetation of habitat in the proposed offset area/s;*	Attachment G
• *details, with supporting evidence, to demonstrate how the environmental offset/s compensate for residual significant impacts of the proposed action on relevant MNES, and/or their habitat, in accordance with the principles of the Offsets Policy and all requirements of the Offsets Assessment Guide including:* – *time over which loss is averted (max. 20 years)* – *time until ecological benefit* – *risk of loss (%) without offset* – *risk of loss (%) with offset* – *confidence in result (%)*	Appendix A of Attachment G
• *a description of the offset area/s, including location, size, condition, environmental values present and surrounding land uses;*	Section 2 of Attachment G
• *baseline data and other supporting evidence that documents the presence of the relevant MNES, and the quality of their habitat within the offset area/s;*	Appendix A of Attachment G
• *an assessment of the site habitat quality for the offset area/s (e.g. using the Queensland Government Guide to determining terrestrial habitat quality: A toolkit for assessing land based offsets under the Queensland Environmental Offsets Policy [2020]);*	Appendix A of Attachment G
• *details of how the offset area/s will provide connectivity with other habitats and biodiversity corridors and/or will contribute to a larger strategic offset for the relevant MNES;*	Sections 1.1 and 2 of Attachment G
• *maps and shapefiles to clearly define the location and boundaries of the offset area/s, accompanied by the offset attributes (e.g. physical address of the offset area/s, coordinates of the boundary points in decimal degrees, the relevant MNES that the environmental offset/s compensates for, and the size of the environmental offset/s in hectares);*	Figures 10a, 10b, 11a, 11b, 13a, 13b, 15a, 15b, 17a, 17b, 19a, 19b and 20 and Section 2 of Attachment G
• *specific offset completion criteria derived from the site habitat quality to demonstrate the improvement in the quality of habitat in the offset area/s over a 20 year period;*	Section 4 of Attachment G
• *details of the management actions, and timeframes for implementation, to be carried out to meet the offset completion criteria;*	Section 3 of Attachment G
• *interim milestones that set targets at 5-yearly intervals for progress towards achieving the offset completion criteria;*	Section 4 of Attachment G
• *details of the nature, timing and frequency of monitoring to inform progress against achieving the 5-yearly interim milestones (the frequency of monitoring must be sufficient to track progress towards each set of milestones, and sufficient to determine whether the offset area/s are likely to achieve those milestones in adequate time to implement all necessary corrective actions);*	Section 5 of Attachment G
• *proposed timing for the submission of monitoring reports which provide evidence demonstrating whether the interim milestones have been achieved;*	Section 8 of Attachment G
• *timing for the implementation of tangible, on-ground corrective actions to be implemented if monitoring activities indicate the interim milestones have not been achieved;*	Section 6 of Attachment G
• *risk analysis and a risk management and mitigation strategy for all risks to the successful implementation of the OAMP and timely achievement of the offset completion criteria, including a rating of all initial and post-mitigation residual risks in accordance with a risk assessment matrix;*	Appendix C of Attachment G
• *evidence of how the management actions and corrective actions take into account relevant approved conservation advices and are consistent with relevant recovery plans and threat abatement plans;*	Section 3.1 of Attachment G
• *details and execution timing of the mechanism to legally secure the proposed offset area/s, such that legal security remains in force over the offset area/s for at least 20 years to provide enduring protection for the offset area/s against development incompatible with conservation; and*	Section 1.2 of Attachment G
• *the use of committed language (e.g. 'will' and 'must') when describing the proposed management actions, monitoring approach and corrective actions.*	Attachment G

Information Request	Section/Appendix Reference
The draft OAMP must be prepared by a suitably qualified ecologist and in accordance with the department's Environmental Management Plan Guidelines (2014a), available at: www.environment.gov.au/epbc/publications/environmental-management-plan-guidelines. *Note: Supporting evidence must be included in the draft OAMP to justify how proposed management action/s are additional to the existing requirements of the landholder in managing their land (e.g. weed and pest management requirements under the Queensland Biosecurity Act 2014, existing grazing regimes, etc.) as required by the Offsets Policy. This may include, but not be limited to historical grazing regimes, satellite imagery and written statements from landholders.*	Attachment G and I
7. ECOLOGICALLY SUSTAINABLE DEVELOPMENT (ESD) *The preliminary documentation must provide a description of how the proposed action meets the principles of ESD, as defined in section 3A of the EPBC Act.* *More information on ESD is available at www.environment.gov.au/about-us/esd/publications/national-esd-strategy*	Section 6
8. ECONOMIC AND SOCIAL MATTERS *The economic and social impacts of the action, both positive and negative, must be analysed, including:*	Section 7
• *Details of any public consultation activities undertaken and their outcomes.*	Section 7.2
• *Details of any consultation with Indigenous stakeholders.*	Section 7.2
• *Projected economic costs and benefits of the project, including the basis for their estimate through cost/benefit analysis or similar studies.*	Section 7.1
• *Employment opportunities expected to be generated by the project (including construction and operational phases).*	Section 7.1
9. ENVIRONMENTAL RECORD OF THE PERSON PROPOSING TO TAKE THE ACTION *The preliminary documentation must include details of any past or present proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against:* • *the person proposing to take the action;* • *for an action for which a person has applied for a permit, the person making the application;* • *if the person is a body corporate—the history of its executive officers in relation to environmental matters;* • *if the person is a body corporate that is a subsidiary of another body or company (the parent body)—the history in relation to environmental matters of the parent body and its executive officers; and*	Section 8
If the person proposing to take the action is a corporation, details of the corporation's environmental policy and planning framework must also be included.	Environment and Cultural Heritage Policy is available on the Middlemount Coal Mine website

1.3.2 Independent Expert Scientific Committee Guideline Cross Reference Table

This report also provides a reference list of the requirements outlined in the *Information Guidelines for the Independent Expert Scientific Committee Advice on Coal Seam Gas and Large Coal Mining Development Proposals* (Independent Expert Scientific Committee [IESC], 2018) and the corresponding section of this report where the requirements are addressed (Table 2).

Table 2
IESC Guideline Cross Reference Table

Specific Information Needs	Section Addressed
Description of the Proposal	
Provide a regional overview of the proposed project area including a description of the: • *geological basin;*	Section 3.2, Attachment E
• *coal resource;*	Section 3.2
• *surface water catchments;*	Section 3.1, Attachment D
• *groundwater systems;*	Section 3.3, Attachment E
• *water-dependent assets; and*	Section 3.4, Attachments D and E
• *past, present and reasonably foreseeable coal mining and CSG developments.*	Section 3.5
Describe the statutory context, including information on the proposal's status within the regulatory assessment process and any applicable water management policies or regulations.	Section 3
Describe the proposal's location, purpose, scale, duration, disturbance area, and the means by which it is likely to have a significant impact on water resources and water-dependent assets.	Sections 1.1 and 1.2, Attachments C and D
Describe how impacted water resources are currently being regulated under state or Commonwealth law, including whether there are any applicable standard conditions.	Sections 3 and 3.1
Risk Assessment	
Identify and assess all potential environmental risks to water resources and water-related assets, and their possible impacts. In selecting a risk assessment approach consideration should be given to the complexity of the project, and the probability and potential consequences of risks.	Sections 3.4, 3.8 and 3.9, Attachments D, E and F
Assess risks following the implementation of any proposed mitigation and management options to determine if these will reduce risks to an acceptable level based on the identified environmental objectives.	Sections 3.8 and 3.9, Attachments D and E
Incorporate causal mechanisms and pathways identified in the risk assessment in conceptual and numerical modelling. Use the results of these models to update the risk assessment.	Section 3.7, Attachments D and E
The risk assessment should include an assessment of: • *all potential cumulative impacts which could affect water resources and water-related assets; and* • *mitigation and management options which the proponent could implement to reduce these impacts.*	Sections 3.8 to 3.11, Attachments D and E
Groundwater – Context and Conceptualisation	
Describe and map geology at an appropriate level of horizontal and vertical resolution including: • *definition of the geological sequence(s) in the area, with names and descriptions of the formations and accompanying surface geology, cross-sections and any relevant field data.* • *geological maps appropriately annotated with symbols that denote fault type, throw and the parts of sequences the faults intersect or displace.*	Section 3.2, Attachment E
Define and describe or characterise significant geological structures (e.g. faults, folds, intrusives) and associated fracturing in the area and their influence on groundwater – particularly groundwater flow, discharge or recharge. • *Site-specific studies (e.g. geophysical, coring / wireline logging etc.) should give consideration to characterising and detailing the local stress regime and fault structure (e.g. damage zone size, open/closed along fault plane, presence of clay/shale smear, fault jogs or splays).* • *Discussion on how this fits into the fault's potential influence on regional-scale groundwater conditions should also be included.*	Sections 3.2, 3.3 and 3.8, Attachment E

Specific Information Needs	Section Addressed
Provide site-specific values for hydraulic parameters (e.g. vertical and horizontal hydraulic conductivity and specific yield or specific storage characteristics including the data from which these parameters were derived) for each relevant hydrogeological unit. In situ observations of these parameters should be sufficient to characterise the heterogeneity of these properties for modelling.	Sections 3.3, 3.6 and 3.7.3, Attachment E
Provide time series level and water quality data representative of seasonal and climatic cycles.	Section 3.6, Attachments D and E
Provide data to demonstrate the varying depths to the hydrogeological units and associated standing water levels or potentiometric heads, including direction of groundwater flow, contour maps, and hydrographs. All boreholes used to provide this data should have been surveyed.	Section 3.7.3, Attachment E
Provide hydrochemical (e.g. acidity/alkalinity, electrical conductivity, metals, and major ions) and environmental tracer (e.g. stable isotopes of water, tritium, helium, strontium isotopes, etc.) characterisation to identify sources of water, recharge rates, transit times in aquifers, connectivity between geological units and groundwater discharge locations.	Sections 3.6 and 3.7, Attachments D and E
Describe the likely recharge, discharge and flow pathways for all hydrogeological units likely to be impacted by the proposed development.	Section 3.7, Attachments D and E
Assess the frequency (and time lags if any), location, volume and direction of interactions between water resources, including surface water/groundwater connectivity, inter-aquifer connectivity and connectivity with sea water.	Section 3.7, Attachments D and E
Groundwater – Analytical and Numerical Modelling	
Provide a detailed description of all analytical and/or numerical models used, and any methods and evidence (e.g. expert opinion, analogue sites) employed in addition to modelling.	Section 3.7, Attachments E and F
Undertaken groundwater modelling in accordance with the Australian Groundwater Modelling Guidelines (Barnett et al. 2012), including independent peer review.	Section 3.7.3, Attachment E
Calibrate models with adequate monitoring data, ideally with calibration targets related to model prediction (e.g. use baseflow calibration targets where predicting changes to baseflow).	Section 3.7, Attachment E
Describe each hydrogeological unit as incorporated in the groundwater model, including the thickness, storage and hydraulic characteristics, and linkages between units, if any.	Section 3.7.3, Attachment E
Describe the existing recharge/discharge pathways of the units and the changes that are predicted to occur upon commencement, throughout, and after completion of the proposed project.	Sections 3.7 and 3.8, Attachment E
Describe the various stages of the proposed project (construction, operation and rehabilitation) and their incorporation into the groundwater model. Provide predictions of water level and/or pressure declines and recovery in each hydrogeological unit for the life of the project and beyond, including surface contour maps for all hydrogeological units.	Section 3.8, Attachment E
Identify the volumes of water predicted to be taken annually with an indication of the proportion supplied from each hydrogeological unit.	Section 3.8, Attachment E
Undertake model verification with past and/or existing site monitoring data.	Section 3.7, Attachment E
Provide an explanation of the model conceptualisation of the hydrogeological system or systems, including multiple conceptual models if appropriate. Key assumptions and model limitations and any consequences should also be described.	Sections 3.6 and 3.7, Attachment E
Consider a variety of boundary conditions across the model domain, including constant head or general head boundaries, river cells and drains, to enable a comparison of groundwater model outputs to seasonal field observations.	Section 3.7, Attachment E
Undertake sensitivity analysis and uncertainty analysis of boundary conditions and hydraulic and storage parameters, and justify the conditions applied in the final groundwater model (see Middlemis and Peeters [in press]).	Section 3.7, Attachment E
Provide an assessment of the quality of, and risks and uncertainty inherent in, the data used to establish baseline conditions and in modelling, particularly with respect to predicted potential impact scenarios.	Sections 3.6 and 3.7, Attachment E
Undertake an uncertainty analysis of model construction, data, conceptualisation and predictions (see Middlemis and Peeters [in press]).	Section 3.7, Attachment E
Provide a program for review and update of models as more data and information become available, including reporting requirements.	Section 3.11, Attachment E
Provide information on the magnitude and time for maximum drawdown and post-development drawdown equilibrium to be reached.	Section 3.8, Attachment E

Specific Information Needs	Section Addressed
Groundwater – Impacts to Water Resources and Water-dependent Assets	
Provide an assessment of the potential impacts of the proposal, including how impacts are predicted to change over time and any residual long-term impacts. Consider and describe: • *any hydrogeological units that will be directly or indirectly dewatered or depressurised, including the extent of impact on hydrological interactions between water resources, surface water/groundwater connectivity, interaquifer connectivity and connectivity with sea water.* • *the effects of dewatering and depressurisation (including lateral effects) on water resources, water-dependent assets, groundwater, flow direction and surface topography, including resultant impacts on the groundwater balance.* • *the potential impacts on hydraulic and storage properties of hydrogeological units, including changes in storage, potential for physical transmission of water within and between units, and estimates of likelihood of leakage of contaminants through hydrogeological units.* • *the possible fracturing of and other damage to confining layers.* *For each relevant hydrogeological unit, the proportional increase in groundwater use and impacts as a consequence of the proposed project, including an assessment of any consequential increase in demand for groundwater from towns or other industries resulting from associated population or economic growth due to the proposal.*	Sections 3.8 and 3.10, Attachment E
Describe the water resources and water-dependent assets that will be directly impacted by mining or CSG operations, including hydrogeological units that will be exposed/partially removed by open cut mining and/or underground mining.	Sections 3.4, 3.8 and 3.10, Attachment E
For each potentially impacted water resource, provide a clear description of the impact to the resource, the resultant impact to any water-dependent assets dependent on the resource, and the consequence or significance of the impact.	Sections 3.4, 3.8 and 3.10, Attachment E
Describe existing water quality guidelines, environmental flow objectives and other requirements (e.g. water planning rules) for the groundwater basin(s) within which the development proposal is based.	Sections 3.6, 3.7, 3.9 and 3.11, Attachment E
Provide an assessment of the cumulative impact of the proposal on groundwater when all developments (past, present and/or reasonably foreseeable) are considered in combination.	Section 3.10.2, Attachment E
Describe proposed mitigation and management actions for each significant impact identified, including any proposed mitigation or offset measures for long-term impacts post mining.	Section 3.11, Attachment E
Provide a description and assessment of the adequacy of proposed measures to prevent/minimise impacts on water resources and water-dependent assets.	Section 3.11, Attachment E
Groundwater – Data and Monitoring	
Provide sufficient data on physical aquifer parameters and hydrogeochemistry to establish pre-development conditions, including fluctuations in groundwater levels at time intervals relevant to aquifer processes.	Section 3.6, Attachment E
Develop and describe a robust groundwater monitoring program using dedicated groundwater monitoring wells – including nested arrays where there may be connectivity between hydrogeological units – and targeting specific aquifers, providing an understanding of the groundwater regime, recharge and discharge processes and identifying changes over time.	Section 3.11.4, Attachment E
Develop and describe proposed targeted field programs to address key areas of uncertainty, such as the hydraulic connectivity between geological formations, the sources of groundwater sustaining GDEs, the hydraulic properties of significant faults, fracture networks and aquitards in the impacted system, etc., where appropriate.	Sections 3.6, 3.7 and 3.11, Attachment E
Provide long-term groundwater monitoring data, including a comprehensive assessment of all relevant chemical parameters to inform changes in groundwater quality and detect potential contamination events.	Section 3.6, Attachment E
Ensure water quality monitoring complies with relevant National Water Quality Management Strategy (NWQMS) guidelines (ANZECC/ARMCANZ 2000) and relevant legislated state protocols (e.g. Qld Government 2013).	Section 3.6, Attachment E
Surface Water – Context and Conceptualisation	
Describe the hydrological regime of all watercourses, standing waters and springs across the site including: • *geomorphology, including drainage patterns, sediment regime and floodplain features;* • *spatial, temporal and seasonal trends in streamflow and/or standing water levels;* • *spatial, temporal and seasonal trends in water quality data (such as turbidity, acidity, salinity, relevant organic chemicals, metals, metalloids and radionuclides); and* • *current stressors on watercourses, including impacts from any currently approved projects.*	Sections 3.1, 3.6 and 3.7, Attachment D
Describe the existing flood regime, including flood volume, depth, duration, extent and velocity for a range of annual exceedance probabilities. Provide flood hydrographs and maps identifying peak flood extent, depth and velocity. This assessment should be informed by topographic data that has been acquired using lidar or other reliable survey methods with accuracy stated.	Sections 3.1 and 3.7, Attachment D

Specific Information Needs	Section Addressed
Surface Water – Analytical and Numerical Modelling	
Provide conceptual models at an appropriate scale, including water quality, stores, flows and use of water by ecosystems.	Section 3.7, Attachment D
Use methods in accordance with the most recent publication of Australian Rainfall and Runoff (Ball et al. 2016).	Section 3.7.2, Attachment D
Develop and describe a program for review and update of the models as more data and information becomes available.	Section 3.11, Attachment D
Describe and justify model assumptions and limitations, and calibrate with appropriate surface water monitoring data.	Section 3.7, Attachment D
Provide an assessment of the risks and uncertainty inherent in the data used in the modelling, particularly with respect to predicted scenarios.	Section 3.11.2, Attachment D
Provide a detailed description of any methods and evidence (e.g. expert opinion, analogue sites) employed in addition to modelling.	Sections 3.7.1, Attachment D
Surface Water – Impacts to Water Resources and Water-dependent Assets	
Describe all potential impacts of the proposed project on surface waters. Include a clear description of the impact to the resource, the resultant impact to any assets dependent on the resource (including water-dependent ecosystems such as riparian zones and floodplains), and the consequence or significance of the impact. Consider: • *impacts on streamflow under the full range of flow conditions.* • *impacts associated with surface water diversions.* • *impacts to water quality, including consideration of mixing zones.* • *the quality, quantity and ecotoxicological effects of operational discharges of water (including saline water), including potential emergency discharges, and the likely impacts on water resources and water-dependent assets.* • *landscape modifications such as subsidence, voids, post rehabilitation landform collapses, on-site earthworks (including disturbance of acid-forming or sodic soils, roadway and pipeline networks) and how these could affect surface water flow, surface water quality, erosion, sedimentation and habitat fragmentation of water-dependent species and communities.*	Sections 3.3, 3.9 and 3.10, Attachment D
Discuss existing water quality guidelines, environmental flow objectives and requirements for the surface water catchment(s) within which the development proposal is based.	Section 3.4, Attachment D
Identify processes to determine surface water quality guidelines and quantity thresholds which incorporate seasonal variation but provide early indication of potential impacts to assets.	Sections 3.4 and 3.11, Attachment D
Propose mitigation actions for each identified significant impact.	Section 3.11, Attachment D
Describe the adequacy of proposed measures to prevent or minimise impacts on water resources and water-dependent assets.	Section 3.11, Attachment D
Describe the cumulative impact of the proposal on surface water resources and water-dependent assets when all developments (past, present and reasonably foreseeable) are considered in combination.	Section 3.10, Attachment D
Provide an assessment of the risks of flooding (including channel form and stability, water level, depth, extent, velocity, shear stress and stream power), and impacts to ecosystems, project infrastructure and the final project landform.	Section 3.8.1, Attachment D
Surface Water – Data and Monitoring	
Identify monitoring sites representative of the diversity of potentially affected water-dependent assets and the nature and scale of potential impacts, and match with suitable replicated control and reference sites (BACI design) to enable detection and monitoring of potential impacts.	Section 3.6, Attachment D
Ensure water quality monitoring complies with relevant National Water Quality Management Strategy (NWQMS) guidelines (ANZECC/ARMCANZ 2000) and relevant legislated state protocols (e.g. Qld Government 2013).	Section 3.6, Attachment D
Identify data sources, including streamflow data, proximity to rainfall stations, data record duration and describe data methods, including whether missing data have been patched.	Sections 3.6 and 3.7, Attachment D
Develop and describe a surface water monitoring program that will collect sufficient data to detect and identify the cause of any changes from established baseline conditions, and assess the effectiveness of mitigation and management measures. The program will: • *include baseline monitoring data for physico-chemical parameters, as well as contaminants (e.g. metals);* • *comparison of physico-chemical data to national/regional guidelines or to site-specific guidelines derived from reference condition monitoring if available; and,* • *identify baseline contaminant concentrations and compare these to national guidelines, allowing for local background correction if required.*	Sections 3.6 and 3.11, Attachment D

Specific Information Needs	Section Addressed
Develop and describe a plan for ongoing ecotoxicological monitoring, including direct toxicity assessment of discharges to surface waters where appropriate.	Not Required
Identify dedicated sites to monitor hydrology, water quality, and channel and floodplain geomorphology throughout the life of the proposed project and beyond.	Sections 3.6 and 3.11, Attachment D
Water-dependent Assets – Context and Conceptualisation	
Identify water-dependent assets, including: • *water-dependent fauna and flora and provide surveys of habitat, flora and fauna (including stygofauna) (see Doody et al. [2019]).* • *public health, recreation, amenity, Indigenous, tourism or agricultural values for each water resource.*	Section 3.4, Attachment D
Identify GDEs in accordance with the method outlined by Eamus et al. (2006). Information from the GDE Toolbox (Richardson et al. 2011) and GDE Atlas (CoA 2018) may assist in identification of GDEs (see Doody et al. [2019]).	Sections 3.6.2 and 3.8.2, Attachments D and E
Describe the conceptualisation and rationale for likely water-dependence, impact pathways, tolerance and resilience of water-dependent assets. Examples of ecological conceptual models can be found in Commonwealth of Australia (2015).	Sections 3.4 and 3.8.2, Attachments D and E
Estimate the ecological water requirements of identified GDEs and other water-dependent assets (see Doody et al. [2019]).	Sections 3.6.2 and 3.8.2, Attachments D and E
Identify the hydrogeological units on which any identified GDEs are dependent (see Doody et al. [2019]).	Sections 3.6.2 and 3.8.2, Attachments D and E
Provide an outline of the water-dependent assets and associated environmental objectives and the modelling approach to assess impacts to the assets.	Sections 3.4 and 3.8.2, Attachments D and E
Describe the process employed to determine water quality and quantity triggers and impact thresholds for water-dependent assets (e.g. threshold at which a significant impact on an asset may occur).	Sections 3.4, 3.6 and 3.11, Attachments D and E
Water-dependent Assets – Impacts, Risk Assessment and Management of Risks	
Provide an assessment of direct and indirect impacts on water-dependent assets, including ecological assets such as flora and fauna dependent on surface water and groundwater, springs and other GDEs (see Doody et al. [2019]).	Sections 3.4, 3.6 and 3.9, Attachments D and E
Describe the potential range of drawdown at each affected bore, and clearly articulate of the scale of impacts to other water users.	Section 3.8.2, Attachments D and E
Indicate the vulnerability to contamination (e.g. from salt production and salinity) and the likely impacts of contamination on the identified water-dependent assets and ecological processes.	Section 3.9.2, Attachment E
Identify and consider landscape modifications (e.g. voids, on-site earthworks, and roadway and pipeline networks) and their potential effects on surface water flow, erosion and habitat fragmentation of water-dependent species and communities.	Sections 3.8 and 3.9, Attachments D and E
Provide estimates of the volume, beneficial uses and impact of operational discharges of water (particularly saline water), including potential emergency discharges due to unusual events, on water-dependent assets and ecological processes.	Sections 3.8 and 3.9, Attachments D and E
Assess the overall level of risk to water-dependent assets through combining probability of occurrence with severity of impact.	Sections 3.9 and 3.10
Identify the proposed acceptable level of impact for each water-dependent asset based on leading-practice science and site-specific data, and ideally developed in conjunction with stakeholders.	Sections 3.4, 3.6, 3.8 and 3.9, Attachments D and E
Propose mitigation actions for each identified impact, including a description of the adequacy of the proposed measures and how these will be assessed.	Section 3.11, Attachments D and E
Water-dependent Assets – Data and Monitoring	
Identify an appropriate sampling frequency and spatial coverage of monitoring sites to establish pre-development (baseline) conditions, and test potential responses to impacts of the proposal (see Doody et al. [2019]).	Sections 3.6 and 3.11, Attachments D and E
Consider concurrent baseline monitoring from unimpacted control and reference sites to distinguish impacts from background variation in the region (e.g. BACI design, see Doody et al. [2019]).	Sections 3.6 and 3.11, Attachments D and E
Develop and describe a monitoring program that identifies impacts, evaluates the effectiveness of impact prevention or mitigation strategies, measures trends in ecological responses and detects whether ecological responses are within identified thresholds of acceptable change (see Doody et al. [2019]).	Sections 3.6 and 3.11, Attachments D and E

Specific Information Needs	Section Addressed
Ensure ecological monitoring complies with relevant state or national monitoring guidelines (e.g. the DSITI guideline for sampling stygofauna (Qld Government 2015)).	Sections 3.6 and 3.11, Attachments D and E
Water and Salt Balance, and Water Quality	
Provide a quantitative site water balance model describing the total water supply and demand under a range of rainfall conditions and allocation of water for mining activities (e.g. dust suppression, coal washing etc.), including all sources and uses.	Section 3.7.1, Attachment D
Describe the water requirements and on-site water management infrastructure, including modelling to demonstrate adequacy under a range of potential climatic conditions.	Section 3.7.1, Attachment D
Provide estimates of the quality and quantity of operational discharges under dry, median and wet conditions, potential emergency discharges due to unusual events and the likely impacts on water-dependent assets.	Section 3.8, Attachment D
Provide salt balance modelling that includes stores and the movement of salt between stores, and takes into account seasonal and long-term variation.	Section 3.9, Attachment D
Cumulative Impacts – Context and Conceptualisation	
Provide cumulative impact analysis with sufficient geographic and temporal boundaries to include all potentially significant water-related impacts.	Section 3.10, Attachments D and E
Consider all past, present and reasonably foreseeable actions, including development proposals, programs and policies that are likely to impact on the water resources of concern in the cumulative impact analysis. Where a proposed project is located within the area of a bioregional assessment consider the results of the bioregional assessment.	Section 3.10, Attachments D and E
Cumulative Impacts – Impacts	
Provide an assessment of the condition of affected water resources which includes: • *identification of all water resources likely to be cumulatively impacted by the proposed development;* • *a description of the current condition and quality of water resources and information on condition trends;* • *identification of ecological characteristics, processes, conditions, trends and values of water resources;* • *adequate water and salt balances; and,* • *identification of potential thresholds for each water resource and its likely response to change and capacity to withstand adverse impacts (e.g. altered water quality, drawdown).*	Sections 3.4, 3.6, 3.8, 3.9, 3.10 and 3.11, Attachments D and E
Assess the cumulative impacts to water resources considering: • *the full extent of potential impacts from the proposed project, (including whether there are alternative options for infrastructure and mine configurations which could reduce impacts), and encompassing all linkages, including both direct and indirect links, operating upstream, downstream, vertically and laterally;* • *all stages of the development, including exploration, operations and post closure / decommissioning;* • *appropriately robust, repeatable and transparent methods;* • *the likely spatial magnitude and timeframe over which impacts will occur, and significance of cumulative impacts; and,* • *opportunities to work with other water users to avoid, minimise or mitigate potential cumulative impacts.*	Sections 3.8 to 3.11, Attachments D and E
Cumulative Impacts – Mitigation, Monitoring and Management	
Identify modifications or alternatives to avoid, minimise or mitigate potential cumulative impacts. Evidence of the likely success of these measures (e.g. case studies) should be provided.	Sections 3.10 and 3.11, Attachments D and E
Identify measures to detect and monitor cumulative impacts, pre and post development, and assess the success of mitigation strategies.	Sections 3.10 and 3.11, Attachments D and E
Identify cumulative impact environmental objectives.	Sections 3.10 and 3.11, Attachments D and E
Describe appropriate reporting mechanisms.	Section 3.11, Attachments D and E
Propose adaptive management measures and management responses.	Section 3.11, Attachments D and E

Specific Information Needs	Section Addressed
Subsidence – Underground Coal Mines and Coal Seam Gas	Not applicable.
Final Landforms and Voids – Coal Mines	
Identify and consider landscape modifications (e.g. voids, on-site earthworks, and roadway and pipeline networks) and their potential effects on surface water flow, erosion, sedimentation and habitat fragmentation of water-dependent species and communities.	Section 3.8.3, Attachments D and E
Assess the adequacy of modelling, including surface water and groundwater quantity and quality, lake behaviour, timeframes and calibration.	Sections 3.7 to 3.9, Attachments D, E and F
Provide an evaluation of stability of void slopes where failure during extreme events or over the long term (for example due to aquifer recovery causing geological heave and landform failure) may have implications for water quality.	Section 3.8.3, Attachment E
Evaluate mitigating inflows of saline groundwater by planning for partial backfilling of final voids.	Section 3.8.3, Attachment E
Provide an assessment of the long-term impacts to water resources and water-dependent assets posed by various options for the final landform design, including complete or partial backfilling of mining voids. Assessment of the final landform for which approval is being sought should consider: • *groundwater behaviour – sink or lateral flow from void.* • *water level recovery – rate, depth, and stabilisation point (e.g. timeframe and level in relation to existing groundwater level, surface elevation).* • *seepage – geochemistry and potential impacts.* • *long-term water quality, including salinity, pH, metals and toxicity.* • *measures to prevent migration of void water off-site.* *For other final landform options considered sufficient detail of potential impacts should be provided to clearly justify the proposed option.*	Sections 3.4, 3.8 and 3.9, Attachments D and E
Assess the probability of overtopping of final voids with variable climate extremes, and management mitigations.	Section 3.8.3, Attachment D
Acid-forming Materials and Other Contaminants of Concern	
Identify the presence and potential exposure of acid-sulphate soils (including oxidation from groundwater drawdown).	Section 3.9, Attachments D and E
Identify the presence and volume of potentially acid-forming waste rock, fine-grained amorphous sulphide minerals and coal reject/tailings material and exposure pathways.	Section 3.9, Attachments D and E
Identify other sources of contaminants, such as high metal concentrations in groundwater, leachate generation potential and seepage paths.	Section 3.9, Attachments D and E
Describe handling and storage plans for acid-forming material (co-disposal, tailings dam, and encapsulation).	Section 3.9, Attachments D and E
Assess the potential impact to water-dependent assets, taking into account dilution factors, and including solute transport modelling where relevant, representative and statistically valid sampling, and appropriate analytical techniques.	Sections 3.4 and 3.9, Attachments D and E
Describe proposed measures to prevent/minimise impacts on water resources, water users and water-dependent ecosystems and species.	Section 3.9 and 3.11, Attachments D and E
CSG Well Construction and Operation	Not applicable

1.4 DEVELOPMENT OF THE PRELIMINARY DOCUMENTATION

Please see below Table 3 which describes the development of the Middlemount Coal Mine Southern Extension Project (EPBC 2021/8920) EPBC Act Preliminary Assessment Documentation. Following determination by the delegate of the Minister for the Environment on 17 June 2021 that the Middlemount Southern Extension Project is likely to have significant impacts on listed threatened species and communities, and a water resource, it was determined that the proposed action would be assessed by preliminary documentation (PD).

The Middlemount Southern Extension Project PD was prepared to include the information contained in the original referral; further information on the impacts of the action, proposed strategies to avoid, mitigate and offset those impacts, and any other relevant information on the matters protected by the EPBC Act. The Southern Extension Project PD was initially provided as a draft to the then DAWE (now Cth DCCEEW) on 8 March 2022 for review. Table 3 below provides a summary of the revision process following submission of the draft.

Table 3
EPBC 2021/8920 Chronology

ID	Date	Event
1	20 May 2021	EPBC referral submitted.
2	17 June 2021	Controlled Action decision.
3	23 July 2021	Request for information issued to MCPL by the then DAWE (now Cth DCCEEW).
4	8 March 2022	Draft Preliminary Documentation submitted to Cth DCCEEW.
5	8 Aprill 2022	Cth DCCEEW comments provided to MCPL.
6	21 April 2022	Additional Squatter Pigeon Offset offered to Cth DCCEEW.
7	7 June 2022	IESC comments provided to MCPL.
8	5 September 2022	Response to Cth DCCEEW and IESC comments submitted by MCPL.
9	November 2022 to March 2023	Responses to Cth DCCEEW Comments.
10	22 March 2024	Request to vary EPBC referral submitted by MCPL to Cth DCCEEW.
11	22 April 2024	Request for further information issued to MCPL by Cth DCCEEW.
12	7 February 2025	Response to request for further information submitted by MCPL to Cth DCCEEW.
13	5 March 2025	Variation to EPBC proposal accepted by Cth DCCEEW.

Since the controlled Action decision was made, MCPL has been in regular consultation with Cth DCEEW to discuss aspects of the draft PD including:

- EPBC Act Offsets Assessment Guide calculator inputs;
- threatened species habitat mapping; and
- discussion of the extension footprint with consideration of previous approved project footprints.

As part of a variation to the Action, MCPL reassessed impacts to the approved Roper Creek Diversion 2 corridor (approved under EPBC 2010/5394) and adjusted the referred Action to include the approved Roper Creek Diversion 2 corridor.

In addition, recent mine planning undertaken since the referral also identified parts of the referred Action within ML 700027 and ML 70417 that are no longer required for development of the mine (approximately 26 ha) which were removed from the varied Action. It was also identified that a small area (approximately 3 ha) of disturbance within ML 700014 was approved as part of the North-eastern Extension EPBC Act Approval (EPBC 2016/7717). Accordingly, this area was removed from the varied Action.

The varied Action was accepted by Cth DCCEEW in March 2025.

1.5 EXHIBITION OF THE PRELIMINARY DOCUMENTATION

In accordance with section 95A(3) of the EPBC Act, the Preliminary Documentation and supporting information were publicly notified with an invitation for comment for an extended period from 16 October 2025 to 13 November 2025.

A summary of the comments received and MCPL's responses to these comments are provided in Attachment M.

No changes or additions to the Action have been made following the public notification of the Preliminary Documentation.

2 LISTED THREATENED SPECIES AND ECOLOGICAL COMMUNITIES

Regional and Local Setting

The Action area is located in the Isaac-Comet Downs subregion of the Brigalow Belt North Bioregion. This bioregion extends from Townsville in Qld to the south of Dubbo in central-western New South Wales (NSW). The nearest protected area is Junee National Park which occurs approximately 30 km to the east. Bundoora State Forest is located approximately 25 km to the south-west of the Action area (Figure 1).

In a local context, the Action area is situated predominantly in the Roper Creek catchment within the Fitzroy Basin, which drains an area of approximately 150,000 square kilometres (km^2) (Section 3.1). Clearing for cattle grazing in the region has been extensive, and, as such, the Action area contains cleared areas that are currently grazed or have been grazed in the past. Cattle grazing has also resulted in the establishment of fences and stock dams within the Action area (Attachment C).

Terrestrial Ecology Surveys

The terrestrial flora and fauna in the Action area and surrounds has been subject to multiple studies since 2009. The first surveys were undertaken by Parsons Brinkerhoff (2010a) for the Middlemount Coal Mine Stage 1 Project in November 2009 and February/March 2010. These surveys have since been supplemented by surveys over the existing biodiversity offset areas undertaken by Ecology and Heritage Partners (2012) in July and August 2012, and across the approved Middlemount Coal Mine footprint and adjacent offset areas by Naturecall Environmental (Naturecall) (2014; 2015a; 2017a) and Biodiversity Australia (2019a; 2019b). Naturecall (2013, 2014, 2015b, 2016a, 2017b) and Biodiversity Australia (2018; 2019c; 2020; 2025a; 2025b) have also conducted annual monitoring in the existing MCPL offset areas to the west of the Action, which provides additional information on the likely occurrence of flora and fauna in the Action area.

Most recently, Biodiversity Australia (2025a) undertook additional flora and fauna surveys in the Action area and surrounds in March and June 2020 (Attachment C).

A comprehensive desktop study was carried out prior to the field survey as detailed in Attachment C which identified potentially occurring threatened species and communities under the EPBC Act.

The flora surveys were undertaken in accordance with the Qld Herbarium vegetation survey methods described in Neldner *et al.* (2017). Survey techniques included a combination of secondary and quaternary surveys, ground-truthing of regional ecosystems (REs), identification of threatened ecological communities (TECs) under the EPBC Act, targeted searches for conservation significant species listed under the *Nature Conservation Act 1992* (NC Act) and EPBC Act and random meanders. Terrestrial habitat quality data was also collected in accordance with the *Guide to Determining Terrestrial Habitat Quality Version 1.3* (DES, 2020a).

The fauna surveys were conducted in consideration of the relevant Qld and Commonwealth survey guidelines. Survey methods included: bat detection devices, herpetofauna surveys, passive infrared detection cameras, spotlighting, diurnal bird surveys, active searches, call playback, Koala surveys, searches for scats and other secondary evidence searches and habitat assessments (Attachment C). Targeted searches for threatened fauna species listed under NC Act and EPBC Act were also conducted (Attachment C).

Fauna surveys were conducted in accordance with the following guidelines:

- *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland v3* (Eyre *et al.*, 2018).
- *Survey Guidelines for Australia's Threatened Reptiles* (Department of Sustainability, Environment, Water, Population and Communities [DSEWPaC], 2011a).

- *Survey Guidelines for Australia's Threatened Mammals* (DSEWPaC, 2011b).
- *Survey Guidelines for Australia's Threatened Birds* (Department of the Environment, Water, Heritage and the Arts [DEWHA], 2010a).
- *Survey Guidelines for Australia's Threatened Bats* (DEWHA, 2010b).
- *EPBC Act Referral Guidelines for the Vulnerable Koala (Combined Qld, NSW and the Australian Capital Territory)* (Department of the Environment [DotE], 2014b).
- *EPBC Act Draft Referral Guidelines for the Nationally listed Brigalow Belt Reptiles* (DSEWPaC, 2011c).
- *Species Profile and Threats Database* (Cth DCCEEW, 2025).

The Action area is located immediately adjacent to the existing Middlemount Coal Mine and the Action will result in approximately 250.22 hectares [ha] of additional surface disturbance. Due to past and ongoing agricultural activities (e.g. clearing, grazing, logging, thinning), the Action area predominately comprises cleared land and non-remnant vegetation (approximately 65 per cent [%], 164.19 ha). The remaining approximately 86.03 ha comprises remnant (woodland) vegetation (Attachment C).

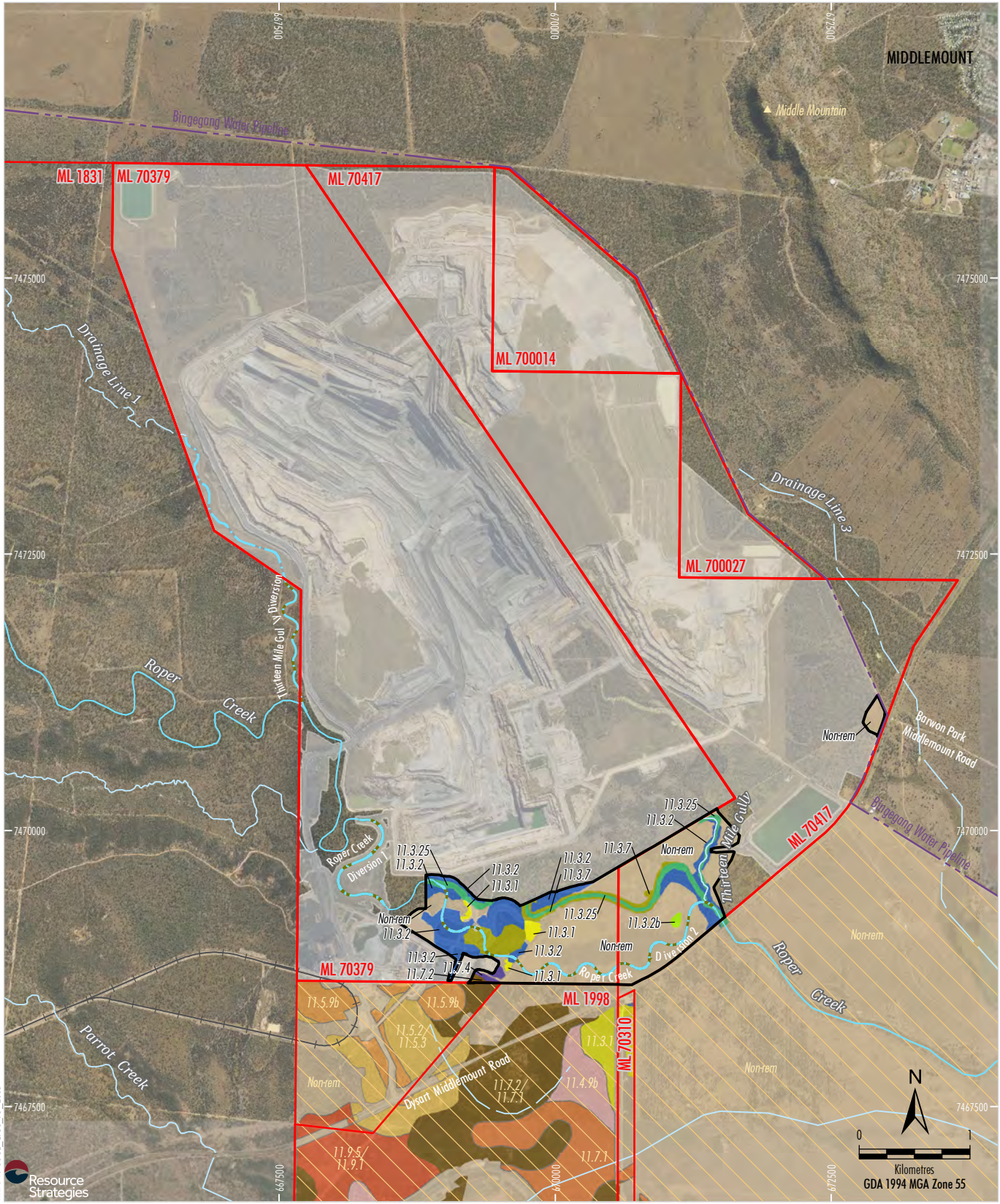
A total of seven individual vegetation communities were ground-truthed within the Action area (Figure 8; Table 4), represented by Eucalypt woodlands (mostly Poplar Box woodlands) and small occurrences of Acacia dominated woodlands (Attachment C). A detailed description of each vegetation community is provided in Attachment C (Biodiversity Australia, 2025a).

One threatened species and two TECs listed under the EPBC Act have been recorded in the Action area (Attachment C):

- Greater Glider (southern and central) (listed as 'Vulnerable' under the EPBC Act and NC Act at the time of the controlled action decision (17/06/2021) and is therefore assessed as 'Vulnerable' not 'Endangered');
- Poplar Box Grassy Woodland on Alluvial Plains TEC (Poplar Box TEC) (listed as 'Endangered' under the EPBC Act and NC Act); and
- Brigalow TEC (listed as 'Endangered' under the EPBC Act and NC Act).

In addition to the above, suitable habitat is present for the Ornamental Snake and Squatter Pigeon (southern), both listed as 'Vulnerable' under the EPBC Act and NC Act, and the Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) (*Phascolarctos cinereus*) (listed as 'Vulnerable' under the EPBC Act and Nature Conservation Act 1992 [NC Act] at the time of the controlled action decision (17/06/2021) and is therefore assessed as 'Vulnerable' not 'Endangered') and has been previously been recorded in the existing/approved Middlemount Coal mine surface disturbance footprint. The Middlemount Coal Project Stage 2 (EPBC 2010/5394), North-Eastern Extension (EPBC 2016/7717) and Western Extension (EPBC 2017/8130) were approved under the EPBC Act with conditions relating to the Ornamental Snake and Squatter Pigeon (southern) among other matters (Section 1.1).

The above listed threatened species and threatened ecological communities are known to be present, likely to be present, or suitable habitat has been identified within the Action area (Sections 2.1 to 2.5).



LEGEND

- Mining Lease Boundary (ML)
- Middlemount Rail Spur and Loop
- Approved Disturbance Footprint
- Approximate Extent of Additional Disturbance Associated with the Action
- Government Regional Ecosystem Mapped Area (V12)

Regional Ecosystem

- 11.3.1 - *Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains
- 11.3.2 - *Eucalyptus populnea* woodland on alluvial plains
- 11.3.2b - *Eucalyptus camaldulensis* (sometimes *E. populnea* and/or *E. tereticornis*) woodland in drainage depressions. Ground layer of grasses or sedges
- 11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines
- 11.3.7 - *Corymbia spp.* open woodland on alluvial plains
- 11.4.9b - *Acacia harpophylla, Eucalyptus thozetiana* (sometimes *E. cambageana*) open forest to woodland
- 11.5.2 - *Eucalyptus crebra, Corymbia spp.*, with *E. moluccana* woodland on lower slopes of Cainozoic sand plains and/or remnant surfaces
- 11.5.9b - *Eucalyptus crebra, E. tenuipes, Lysicarpus angustifolius* +/- *Corymbia spp.* woodland
- 11.7.1 - *Acacia harpophylla*> and/or *Casuarina cristata* and *Eucalyptus thozetiana* or *E. microcarpa* woodland on lower scarp slopes on Cainozoic lateritic duricrust
- 11.7.2 - *Acacia spp.* woodland on Cainozoic lateritic duricrust. Scarp retreat zone
- 11.7.4 - *Eucalyptus decorticans* and/or *Eucalyptus spp., Corymbia spp., Acacia spp., Lysicarpus angustifolius* woodland on Cainozoic lateritic duricrust
- 11.9.5 - *Acacia harpophylla* and/or *Casuarina cristata* open forest to woodland on fine-grained sedimentary rocks
- Non-remnant (cleared)

Source: MCPL (2025); Biodiversity Australia (2025); The State of Queensland (2022)
Orthophoto: MCPL (2025); ESRI Basemap (2024)

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SOUTHERN EXTENSION PROJECT

Ground-truthed and Government Mapped Regional Ecosystems - Action Area

Figure 8

Table 4
Proposed Clearance of Regional Ecosystems for the Action

Regional Ecosystem	Short Description	Area of Each RE that Provides Habitat for the Relevant MNES				
		Vegetation Clearance (ha)	Ornamental Snake Habitat	Squatter Pigeon (southern) Habitat	Koala Habitat	Greater Glider (southern and central) Habitat
RE 11.3.1[1] (BVG 25a)	*Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains.	3.48	3.48	3.48	-	-
RE 11.3.2[2] (BVG 17a)	*Eucalyptus populnea* woodland on alluvial plains.	43.88	-	43.88	43.88	43.88
RE 11.3.2b (BVG 17a)	*Eucalyptus camaldulensis (sometimes E. populnea* and/or *E. tereticornis)* woodland in drainage depressions.	1.03	-	1.03	1.03	1.03
RE 11.3.25 (BVG 16a)	*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	16.22	-	16.22	16.22	16.22
RE 11.3.7 (BVG 9e)	*Corymbia* spp. woodland on alluvial plains.	18.41	-	18.41	18.41	18.41
RE 11.7.2 (BVG 24a)	*Acacia* spp. woodland on Cainozoic lateritic duricrust. Scarp retreat zone.	0.85	-	0.85	-	-
RE 11.7.4 (BVG 12a)	*Eucalyptus decorticans* and/or *Eucalyptus* spp., *Corymbia* spp., *Acacia* spp., *Lysicarpus angustifolius* woodland on Cainozoic lateritic duricrust.	2.16	-	2.16	2.16	2.16
Sub-total		**86.03**	**3.48**	**86.03**	**81.7**	**81.7**
Vegetation in the early stage of regrowing from past clearance (i.e. regrowth)		164.19	13.73	164.19	101.3	0
Total		**250.22**	**17.21**	**250.22**	**183**	**81.7**

Source: Appendix C.

[1] Brigalow TEC.

[2] Poplar Box TEC.

BVG = Broad Vegetation Group.

Summary of Conservation Advice, Recovery Plans or Threat Abatement Plans for EPBC Listed Species

The relevant policy statements, guidelines and conventions which are available for the threatened species and ecological communities within the Action area or surrounds are listed below:

- *Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles* (DSEWPaC, 2011c).
- *Conservation Advice for Phascolarctos cinereus (Koala) Combined Populations of Queensland, New South Wales and the Australian Capital Territory* (DAWE, 2022a).
- *National Recovery Plan for the Koala Phascolarctos cinereus (Combined Populations of Queensland, New South Wales and the Australian Capital Territory)* (DAWE, 2022b).
- *Conservation Advice for Petauroides volans (Greater Glider (Southern and Central))* (Cth DCCEEW, 2022).

The Action will not be inconsistent with the Convention on Conservation of Nature in the South Pacific or Convention on International Trade in Endangered Species of Wild Fauna and Flora as potential impacts will be avoided, mitigated and offset as described in this document.

2.1 BRIGALOW (*ACACIA HARPOPHYLLA* DOMINANT AND CO-DOMINANT)

2.1.1 Targeted Survey Effort

Biodiversity Australia (2025a) undertook targeted surveys for the Brigalow (*Acacia harpophylla* dominant and co-dominant) Ecological Community (Brigalow TEC) (DotE, 2013a) in the Action area. Brigalow communities identified were then assessed against the *Approved Conservation Advice for the Brigalow TEC* (DotE, 2013a) and the *Species Profile and Threats Database* (Cth DCCEEW, 2025) to determine if they qualify as Brigalow TEC (Attachment C). Brigalow TEC identified within the Action area is associated with RE 11.3.1 (*Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains) (Attachment C).

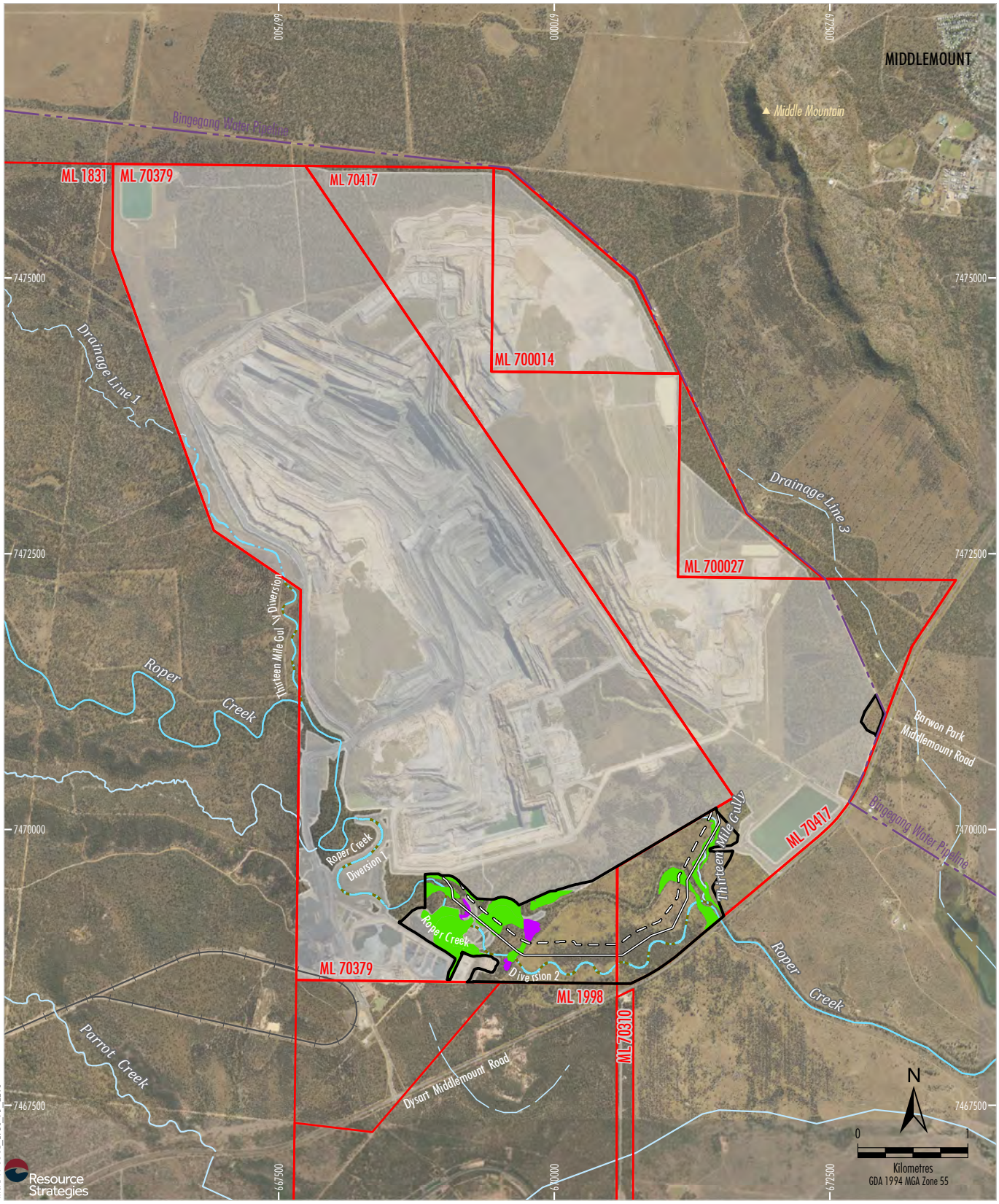
Biodiversity Australia (2025b) performed a habitat quality assessment using the survey methodology outlined in the *Guide to Determining Terrestrial Habitat Quality Version 1.3* (DES, 2020a) and assessed the key diagnostic characteristics and condition thresholds as they appear in the *Approved Conservation Advice for the Brigalow (Acacia harpophylla dominant and co-dominant) ecological community* (DotE, 2013a). The condition data was used to justify the inputs to the EPBC Act *Offsets Assessment Guide* (DSEWPaC, 2012a) applied by Biodiversity Australia (2025b) (Appendix A of Attachment G).

2.1.2 Presence of Brigalow TEC in the Action Area and Surrounds

The extent of Brigalow TEC in the Action area and immediate surrounds has been mapped by Biodiversity Australia (2025a) (Attachment C) and is shown on Figure 9. There is approximately 3.48 ha of Brigalow TEC in the Action area (represented by RE 11.3.1 [Plate 1]), which occurs in three small and isolated patches in the south-western corner of the Action area.

The Brigalow TEC in the Action area has been fragmented by past clearance for agricultural activities as can be seen on Plate 1, and is in poor condition due to small patch sizes which experience high edge effects and weed invasion (Attachment C).

Brigalow TEC also occurs more widely in the locality of the Action, for example there is approximately 244.5 ha of Brigalow TEC in the approved Middlemount Coal Project Stage 2 and Western Extension Commonwealth offset areas (Section 2.1.5) (Figures 10a and 10b). There is also an additional 84.93 ha of Brigalow TEC in the proposed Southern Extension Offset Area (Figures 11a and 11b).



LEGEND

- Mining Lease Boundary (ML)
- Middlemount Rail Spur and Loop
- Approved Disturbance Footprint
- Diversion Structure
- Levee
- Open Cut Pit Extension
- Approximate Extent of Additional Disturbance Associated with the Action

Threatened Ecological Communities

- Brigalow (*Acacia harpophylla* dominant and co-dominant)
- Poplar Box Grassy Woodland on Alluvial Plains

Source: MCPL (2025); Biodiversity Australia (2025); The State of Queensland (2022)
Orthophoto: MCPL (2025); ESRI Basemap (2024)

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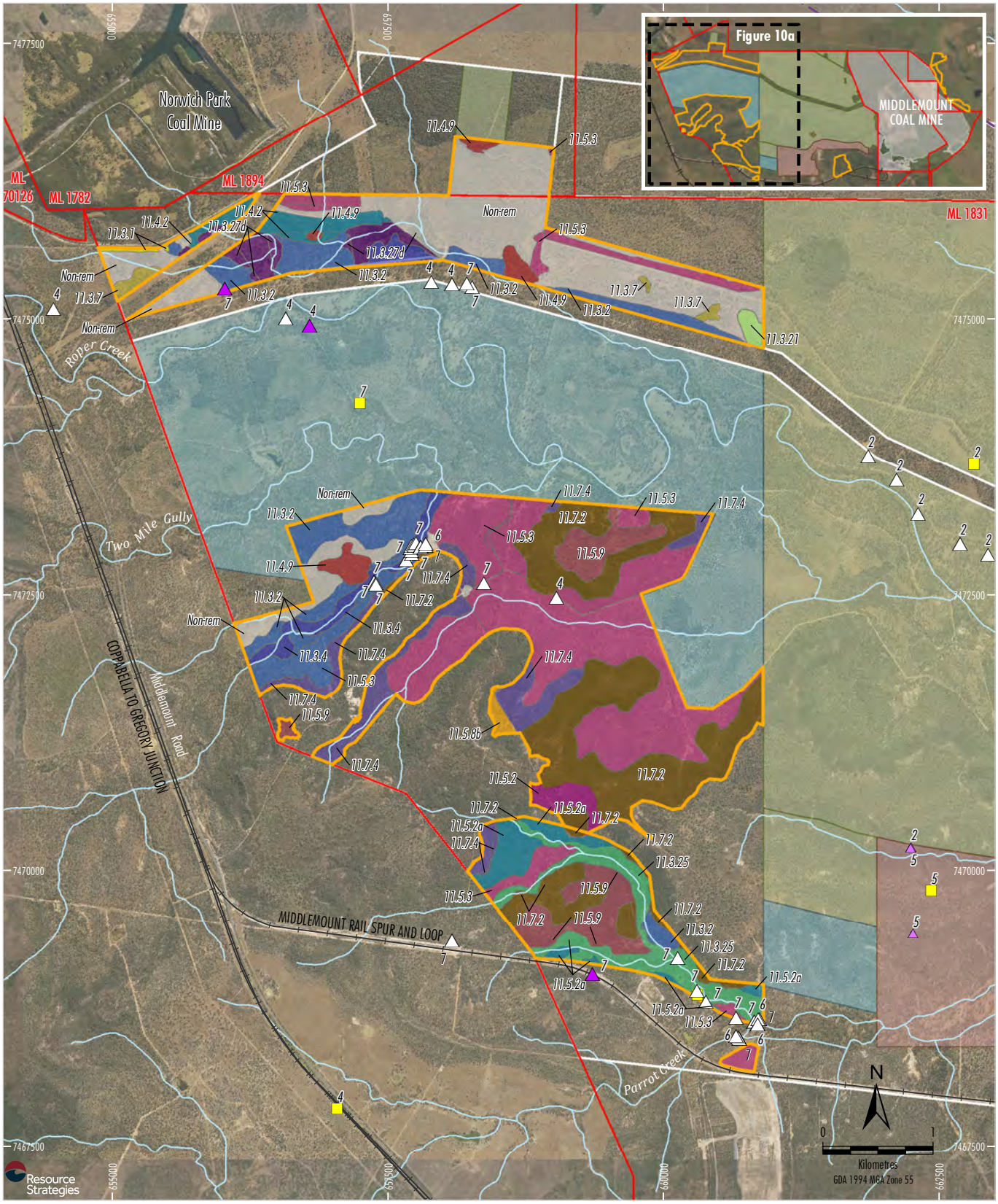
SOUTHERN EXTENSION PROJECT

Ground-truthed Threatened Ecological Communities - Action Area

Figure 9



MCPL-19-03 SE_EPBC_PD_209F

LEGEND

- Mining Lease Boundary (ML)
- Middlemount Coal Owned Land
- Proposed Southern Extension Commonwealth Offset Area (EPBC 2021/8920)

Existing Offset Areas

- North-eastern Extension Commonwealth Offset Area (EPBC 2016/7717)
- Middlemount Coal (Stage 2) Project Commonwealth Offset Area (EPBC 2010/5394)
- Western Extension Commonwealth Offset Area (EPBC 2017/8130)

Ground-truthed Regional Ecosystems

11.3.1	11.4.9	Non-remnant	
11.3.2	11.5.2		
11.3.21	11.5.2a		
11.3.25	11.5.3		
11.3.27d	11.5.8b		
11.3.4	11.5.9		
11.3.4a	11.7.2		
11.3.7	11.7.4		
11.4.2			

Threatened Species Records

- Squatter Pigeon (Southern)
- Greater Glider (Southern and Central)
- Koala
- Koala Scats

Source: MCPL (2025); Biodiversity Australia (2025); The State of Queensland (2022)
Orthophoto: MCPL (June 2025); ESRI Basemap (2024)

Reference:
1 *Ecology and Heritage Partners (2012)*
2 *Naturecall Environmental (2014)*
3 *Parsons Brinkerhoff (2010)*
4 *Biodiversity Australia (2018)*
5 *Naturecall Environmental (2017)*
6 *Biodiversity Australia (2020)*
7 *Biodiversity Australia (2021)*

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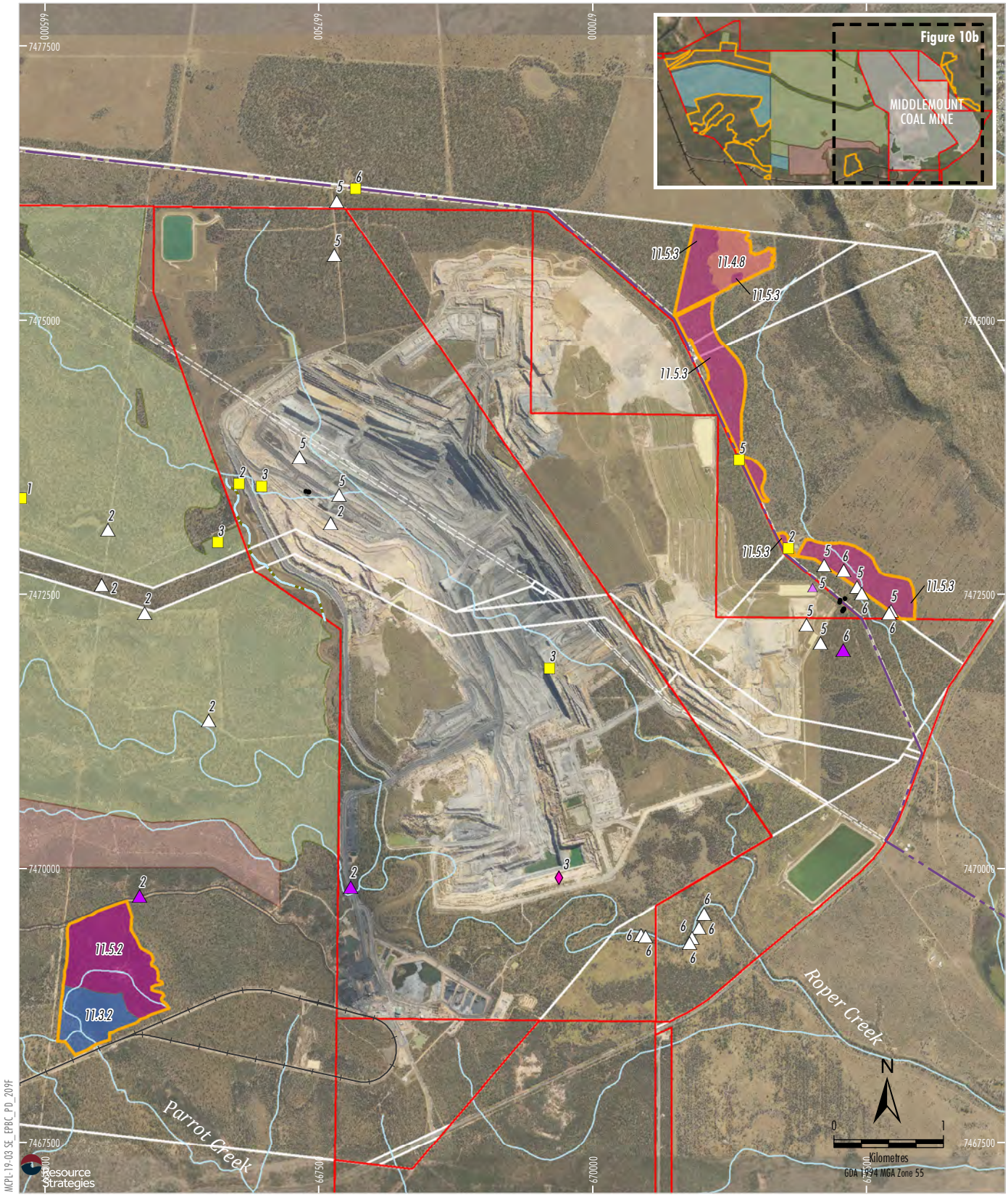
SOUTHERN EXTENSION PROJECT

Regional Ecosystem Mapping - Proposed Offset Areas

Figure 10a



LEGEND

- Mining Lease Boundary (ML)
- Middlemount Coal Owned Land
- Proposed Southern Extension Commonwealth Offset Area (EPBC 2021/8920)

Existing Offset Areas

- North-eastern Extension Commonwealth Offset Area (EPBC 2016/7717)
- Middlemount Coal (Stage 2) Project Commonwealth Offset Area (EPBC 2010/5394)

Ground-truthed Regional Ecosystems

- 11.3.2
- 11.4.8
- 11.5.2
- 11.5.3

Threatened Species Records

- Squatter Pigeon (Southern)
- Ornamental Snake
- Greater Glider (Southern and Central)
- Koala
- Koala Scats

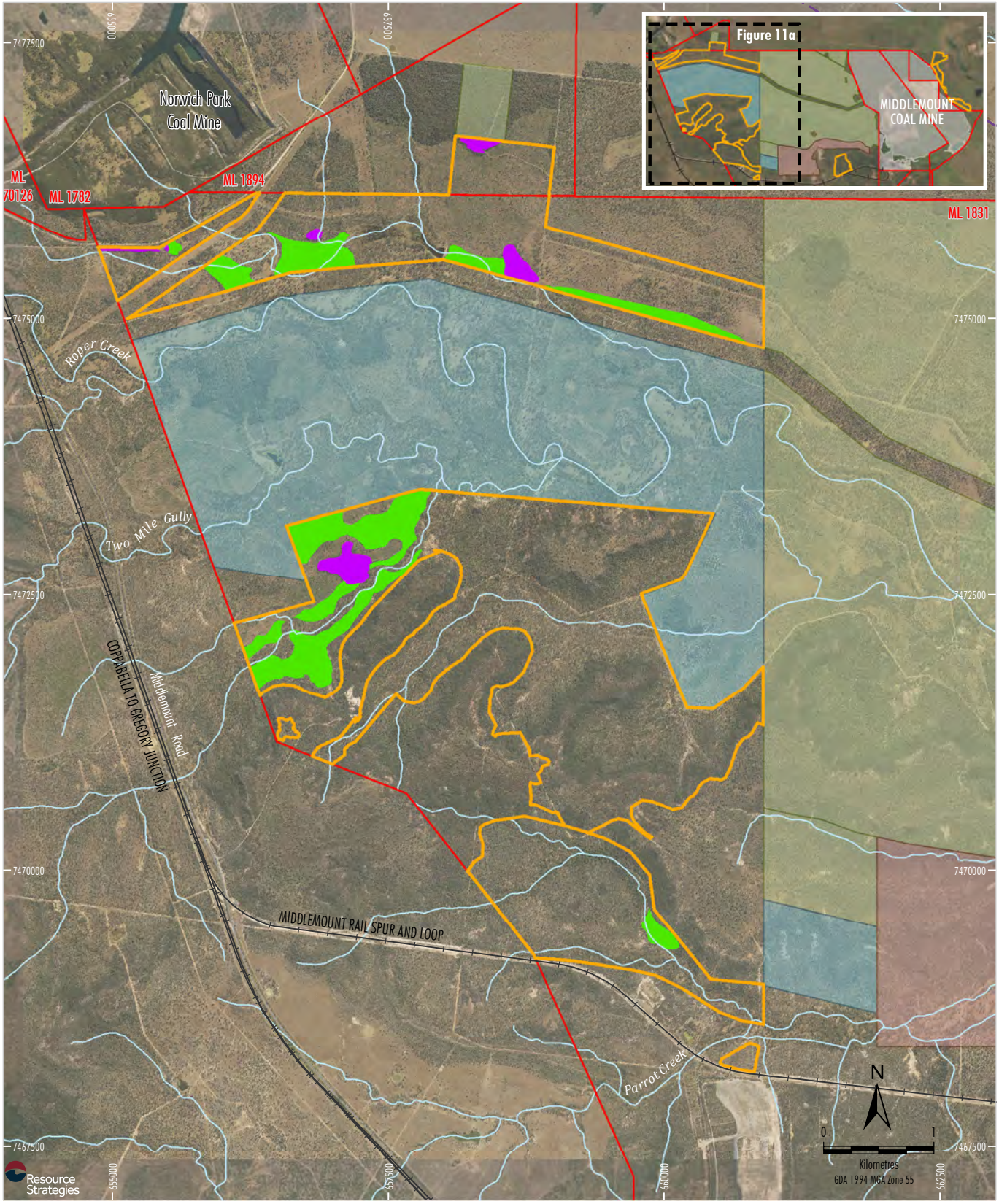
Source: MCPL (2025); Biodiversity Australia (2025); The State of Queensland (2022)
Orthophoto: MCPL (June 2025); ESRI Basemap (2024)

SOUTHERN EXTENSION PROJECT

Regional Ecosystem Mapping - Proposed Offset Areas

Reference:
1 *Ecology and Heritage Partners (2012)*
2 *Naturecall Environmental (2014)*
3 *Parsons Brinkerhoff (2010)*
4 *Biodiversity Australia (2018)*
5 *Naturecall Environmental (2017)*
6 *Biodiversity Australia (2020)*
7 *Biodiversity Australia (2021)*

Figure 10b



MCPL-19-03 SE_EPBC_PD_211E

LEGEND

Mining Lease Boundary (ML)

Proposed Southern Extension Commonwealth Offset Area (EPBC 2021/8920)

Existing Offset Areas

North-eastern Extension Commonwealth Offset Area (EPBC 2016/7717)

Middlemount Coal (Stage 2) Project Commonwealth Offset Area (EPBC 2010/5394)

Western Extension Commonwealth Offset Area (EPBC 2017/8130)

Threatened Ecological Communities

Brigalow (*Acacia harpophylla* dominant and co-dominant)

Poplar Box Grassy Woodland on Alluvial Plains

Source: MCPL (2025); Biodiversity Australia (2025); The State of Queensland (2022)
Orthophoto: MCPL (June 2025); ESRI Basemap (2024)

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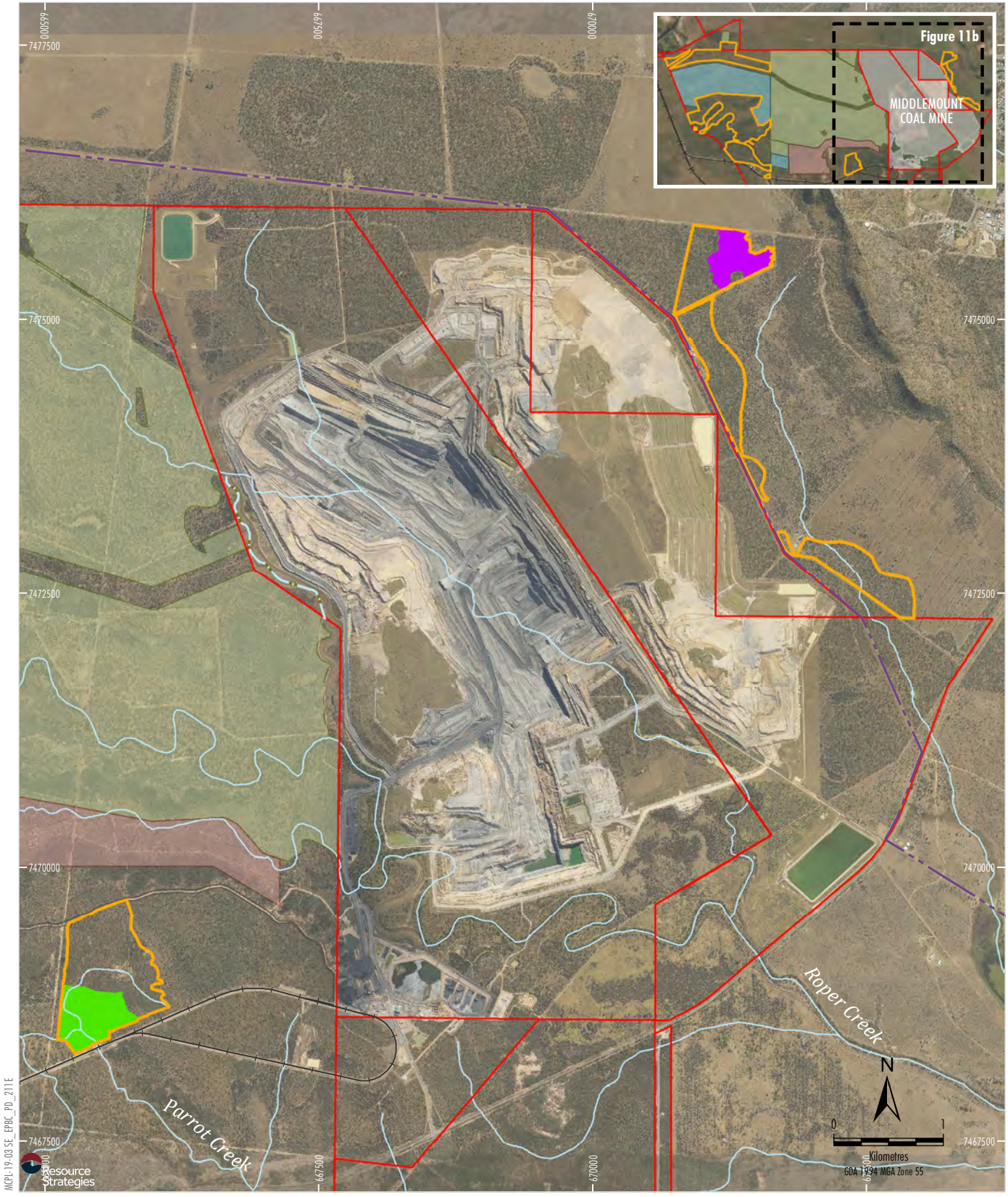
SOUTHERN EXTENSION PROJECT

Threatened Ecological Community - Proposed Offset Areas

Figure 11a



LEGEND

Mining Lease Boundary (ML)

Proposed Southern Extension Commonwealth Offset Area (EPBC 2021/8920)

Existing Offset Areas

North-eastern Extension Commonwealth Offset Area (EPBC 2016/7717)

Middlemount Coal (Stage 2) Project Commonwealth Offset Area (EPBC 2010/5394)

Threatened Ecological Communities

Brigalow (*Acacia harpophylla* dominant and co-dominant)

Poplar Box Grassy Woodland on Alluvial Plains

Source: MCPL (2025); Biodiversity Australia (2025); The State of Queensland (2022)
Orthophoto: MCPL (June 2025); ESRI Basemap (2024)

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SOUTHERN EXTENSION PROJECT

Threatened Ecological Community - Proposed Offset Areas

Figure 11b

Plate 1 Brigalow TEC (RE 11.3.1) Source: Attachment C

2.1.3 Direct, Indirect and Cumulative Impacts

The Action would result in the direct clearance of approximately 3.48 ha of Brigalow TEC in the Action area. The Brigalow TEC would be cleared to enable the realignment of Roper Creek (i.e. Roper Creek Diversion 2) and extension of the open-cut pit.

As the small isolated patches of Brigalow TEC in the Action area are not part of contiguous patches of Brigalow TEC, and are located adjacent to the approved surface disturbance footprint of the Middlemount Coal Mine (i.e. all surrounding vegetation is approved to be cleared under the previous EPBC Act approvals for the Middlemount Coal Mine [Section 1.1]), no indirect impacts on Brigalow TEC (e.g. edge effects) would occur.

Further, given that the small patches of Brigalow TEC in the Action area are already isolated, the Action would only marginally increase fragmentation in an already highly fragmented landscape.

The Middlemount Coal Mine is currently approved to remove approximately 26 ha of Brigalow TEC (of which approximately 6.5 ha is regrowth) as part of the Middlemount Coal Project Stage 2 (EPBC 2010/5394) and Western Extension (EPBC 2017/8130). The Action (inclusive of EPBC 2010/5394, EPBC 2017/8130 and 2021/8920) would therefore result in the cumulative total clearance of approximately 29.48 ha of Brigalow TEC. This is, however, offset by a greater area of Brigalow TEC as described in Section 2.1.5.

2.1.4 Avoidance, Safeguards and Mitigation Measures

The Brigalow TEC in the Action area is not able to be avoided due to the requirement to access the additional coal resources within the Action area. The following measures will be implemented to minimise the potential impacts to Brigalow TEC:

- Boundaries of Brigalow TEC areas to be cleared, and those not to be cleared, would be clearly defined before and during clearing activities.
- Weed management techniques would continue to be implemented within the MLs (e.g. weed control [spraying] and washdown of machinery when moving from weed infested areas). Appendix E of Attachment G outlines the standard landholder and state requirements for weed management of the offset areas and proposed management measures that are additional to these standard obligations.
- The revegetation species list for the Middlemount Coal final landform would include species characteristic of the Brigalow TEC (in addition to the offset areas).

2.1.5 Offset

The proposed Southern Extension Offset Area would contain approximately 84.93 ha of Brigalow TEC (represented by remnant RE 11.3.1 and non-remnant REs 11.3.1 and 11.4.9) (Figures 11a and 11b) (Biodiversity Australia, 2025b). The condition of the Brigalow TEC in the offset areas is generally good (Appendix A of Attachment G).

Considering the clearance required for the Action, the Middlemount Coal Mine (inclusive of EPBC 2010/5394, EPBC 2017/8130 and EPBC 2021/8920) would result in the cumulative total clearance of approximately 29.48 ha of Brigalow TEC and the cumulative conservation of approximately 329.43 ha of Brigalow TEC.

2.1.6 Conclusion/Consequential Impact

The Action would result in the clearance of approximately 3.48 ha of Brigalow TEC in the Action area (Figure 9). Indirect impacts would be minimised through mitigation measures. Overall, a greater area of Brigalow TEC (approximately 84.93 ha) would be enhanced and conserved in the proposed Southern Extension Offset Area (Figures 11a and 11b).

2.2 POPLAR BOX GRASSY WOODLAND ON ALLUVIAL PLAINS

2.2.1 Targeted Survey Effort

Biodiversity Australia (2025a) undertook targeted surveys for Poplar Box TEC in the Action area in consideration of the approved *Conservation Advice (including listing advice) for the Poplar Box Grassy Woodland on Alluvial Plains EEC* (Department of Environment and Energy [DEE], 2019) and the *Species Profile and Threats Database* (Cth DCCEEW, 2025).

A habitat quality assessment was undertaken using the survey methodology outlined in the *Guide to Determining Terrestrial Habitat Quality Version 1.3* (DES, 2020a) The condition data was used to justify the inputs to the EPBC Act *Offsets Assessment Guide* (DSEWPaC, 2012a) applied by Biodiversity Australia (2025b) (Appendix A of Attachment G).

2.2.2 Presence of Poplar Box TEC in the Action Area and Surrounds

The extent of Poplar Box TEC in the Action area and immediate surrounds has been mapped by Biodiversity Australia (2025a) (Attachment C) and is shown on Figure 9 (Biodiversity Australia, 2025a). There is approximately 43.88 ha of Poplar Box TEC in the Action area (represented by RE 11.3.2 [Plate 2]).

The Poplar Box TEC in the Action area has been fragmented by past clearance for agricultural activities as can be seen on Plate 2 and is of moderate quality due to the prevalence of exotic species in the ground layer (Attachment C). The Poplar Box TEC in the Action area is located adjacent to Roper Creek.

The Poplar Box TEC was listed under the EPBC Act more recently than the mapping in the existing offset areas. However, communities typically comprising Poplar Box also occur more widely in the locality. There is also an additional 238.49 ha of Poplar Box TEC in the proposed Southern Extension Offset Area (Section 2.2.5) (Figures 11a and 11b).

Plate 2 Poplar Box TEC (RE 11.3.2) Source: Attachment C

2.2.3 Direct, Indirect and Cumulative Impacts

The Action would result in the direct clearance of approximately 43.88 ha of Poplar Box TEC in the Action area. The Poplar Box TEC would be cleared to enable the realignment of Roper Creek (i.e. Roper Creek Diversion 2) and provide additional surface footprint for extension of the open-cut pit.

As described above, the Poplar Box TEC in the Action area is of moderate quality due to the prevalence of exotic species in the ground layer. It is expected that the clearance of Poplar Box TEC in the Action area would also result in negligible indirect impacts on any adjacent Poplar Box TEC (from threats such as weeds [DEE, 2019]) to the west of the Action area. The remainder of the Poplar Box TEC in the Action area is located adjacent to the approved surface disturbance footprint of the Middlemount Coal Mine (Figure 9).

The Terrestrial Ecology Assessment (Biodiversity Australia, 2025a) and Groundwater Impact Assessment (Australasian Groundwater and Environmental Consultants Pty Ltd [AGE], 2020a) conducted for the Action concluded that the vegetation associated with Roper Creek and Thirteen Mile Gully (e.g. comprising Poplar Box TEC) is unlikely to be dependent on groundwater and would therefore not be adversely impacted by changes to local hydrology (Attachments C and E).

The Action would result in the removal of Poplar Box TEC, which would further increase fragmentation between remaining Poplar Box TEC patches in the locality.

2.2.4 Avoidance, Safeguards and Mitigation Measures

The Poplar Box TEC in the Action is not able to be avoided due to the requirement to access the additional coal resources within the Action area. Potential impacts to Poplar Box TEC would be minimised through implementation of the following mitigation measures:

- Boundaries of Poplar Box TEC areas to be cleared, and those not to be cleared, would be defined before and during clearing activities.
- Weed management techniques would continue to be implemented within the MLs (e.g. weed control [spraying] and washdown of machinery when moving from weed infested areas). Appendix E of Attachment G outlines the standard landholder and state requirements for weed management of the offset areas and proposed management measures that are additional to these standard obligations.
- The revegetation species list for the Middlemount Coal final landform would include species characteristic of the Poplar Box TEC (in addition to the offset areas).

2.2.5 Offset

The proposed Southern Extension Offset Area would contain approximately 238.49 ha of Poplar TEC (represented by remnant and non-remnant RE 11.3.2) (Figures 11a and 11b). The condition of the Poplar Box TEC in the offset areas is generally good (average condition) (Appendix A of Attachment G).

2.2.6 Conclusion/Consequential Impact

The Action would result in the clearance of approximately 43.88 ha of Poplar Box TEC in the Action area (Figure 9). Indirect impacts would be minimised through mitigation measures. Overall, a greater area of Poplar Box TEC (approximately 238.49 ha) would be enhanced and conserved in the proposed Southern Extension Offset Area (Figures 11a and 11b).

2.3 ORNAMENTAL SNAKE

The Ornamental Snake is listed as 'Vulnerable' under the EPBC Act. The general distribution and habitat requirements for the Ornamental Snake are described in Attachment C.

2.3.1 Targeted Survey Effort

Biodiversity Australia (2025a) undertook targeted surveys for the Ornamental Snake and assessed potential habitat for the species in accordance with the *Survey Guidelines for Australia's Threatened Reptiles* (DSEWPaC 2011a), *EPBC Act Draft Referral Guidelines for the Nationally listed Brigalow Belt Reptiles* (DSEWPaC 2011c) and the *Species Profile and Threats Database* (Cth DCCEEW,2025). The survey methods used to detect the Ornamental Snake were spotlighting and active searching (herpetofauna searches) (Attachment C).

A habitat quality assessment was undertaken using the survey methodology outlined in the *Guide to Determining Terrestrial Habitat Quality Version 1.3* (DES, 2020a). The condition data was used to justify the inputs to the EPBC Act *Offsets Assessment Guide* (DSEWPaC, 2012a) applied by Biodiversity Australia (2025a) (Attachment C). Further to this, the predicted future habitat quality scores with and without the offset is also provided in Appendix A of Attachment G.

2.3.2 Presence of the Species and its Habitat in the Action Area and Surrounds

The Ornamental Snake has not been recorded in the Action area, despite targeted searches (Figure 12). However, the Ornamental Snake has been previously recorded by Parsons Brinkerhoff (2010a) in the Middlemount Coal Mine Stage 1 Project area in Brigalow Woodland (RE 11.3.1) so it has been conservatively considered as potentially occurring within the Action area.

Table 5 provides a detailed description of potential habitat for the Ornamental Snake in the Action area (Figure 12) and the proposed Southern Extension Offset Area (Figures 13a and 13b).

2.3.3 Direct, Indirect and Cumulative Impacts

The Ornamental Snake has not been recorded in the Action area. The Action would result in the direct clearance of approximately 17.21 ha of potential habitat for the Ornamental Snake comprising 3.48 ha of remnant and 13.73 ha of regrowth Brigalow habitats. The potential habitat would be cleared to enable the realignment of Roper Creek (i.e. Roper Creek Diversion 2) and provide additional surface footprint for extension of the open-cut pit.

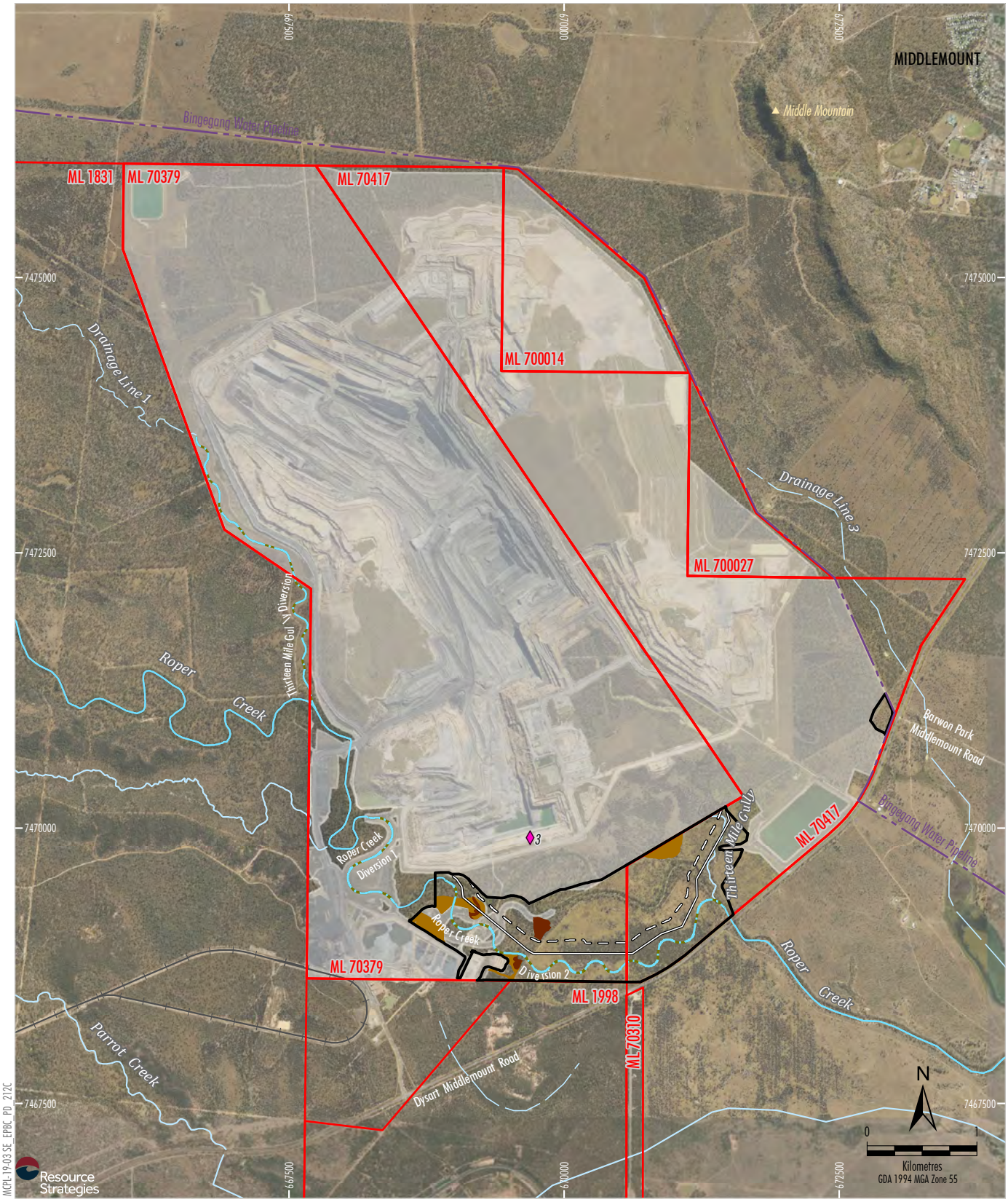
Although some potential habitat for this species would be cleared, the area to be cleared is not considered material nor crucial to the viability of the local population of this species. Biodiversity Australia (2025a) (Attachment C) consider that the Action is unlikely to have a significant impact on the Ornamental Snake (after DEWHA, 2013) as there is a low chance of the snake occurring in the Action area given disturbance history and lack of preferred habitat.

The Action is not likely to indirectly impact this species through an increase in feral animals, weeds or adverse alteration of hydrology in potential habitat. Further, the vibrations from blasting associated with the Action (for the additional seven years of the mine life) is not likely to impact the Ornamental Snake due to the occasional and short period of blasts.

The Action is not likely to result in significant impacts from edge effects on potential habitat for this species outside of the Action area given the majority of the potential habitat in the Action area is located adjacent to the approved disturbance footprint. Other newly exposed edges created by clearing works may be subject to higher levels of weed invasion, however, weed management measures will continue to be undertaken in the offset areas and MLs. Further, Roper Creek Diversion 2 and adjacent floodplain areas would be established and revegetated early in the Action life, thus limiting the time the habitat edges are exposed.

In regard to fragmentation impacts, the potential habitat for this species within the Action area is patchy and fragmented and does not provide strong connectivity to adjacent habitats. The Action would not isolate any external habitats and only marginally increases fragmentation in an already highly fragmented landscape.

The Middlemount Coal Mine is currently approved to remove approximately 62.5 ha of potential habitat for the Ornamental Snake as part of the Middlemount Coal Project Stage 2 (EPBC 2010/5394) and Western Extension (EPBC 2017/8130). Considering the clearance required for the Action, the Middlemount Coal Mine (inclusive of EPBC 2010/5394, EPBC 2017/8130 and EPBC 2021/8920) would result in the cumulative total clearance of approximately 79.71 ha of habitat for the Ornamental Snake.



LEGEND

- Mining Lease Boundary (ML)
- Middlemount Rail Spur and Loop
- Approved Disturbance Footprint
- Diversion Structure
- Levee
- Open Cut Pit Extension
- Approximate Extent of Additional Disturbance Associated with the Action

Species Habitat

- Potential Remnant Ornamental Snake Habitat
- Potential Non-remnant Ornamental Snake Habitat
- Ornamental Snake Recorded Location

Reference: 3 Parsons Brinkerhoff (2010)

Source: MCPL (2025); Biodiversity Australia (2025); The State of Queensland (2022)
Orthophoto: MCPL (2025); ESRI Basemap (2024)

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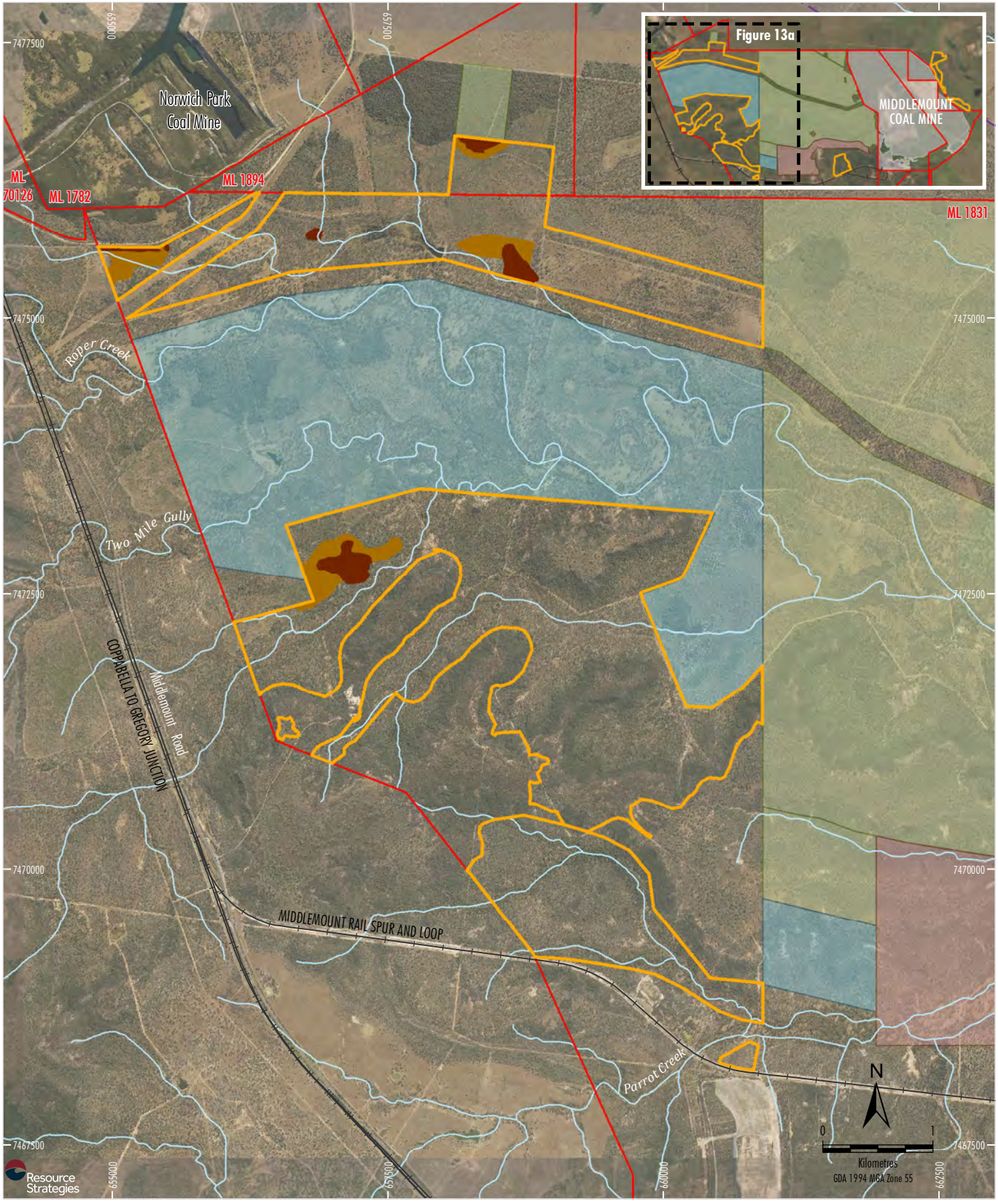
SOUTHERN EXTENSION PROJECT

Ornamental Snake Habitat - Action Area

Figure 12



LEGEND

Mining Lease Boundary (ML)

Proposed Southern Extension Commonwealth Offset Area (EPBC 2021/8920)

Existing Offset Areas

North-eastern Extension Commonwealth Offset Area (EPBC 2016/7717)

Middlemount Coal (Stage 2) Project Commonwealth Offset Area (EPBC 2010/5394)

Western Extension Commonwealth Offset Area (EPBC 2017/8130)

Listed Threatened Species

Potential Remnant Ornamental Snake Habitat

Potential Non-remnant Ornamental Snake Habitat

Reference: 3 Parsons Brinkerhoff (2010)

Source: MCPL (2025); Biodiversity Australia (2025); The State of Queensland (2022)
Orthophoto: MCPL (2025); ESRI Basemap (2024)

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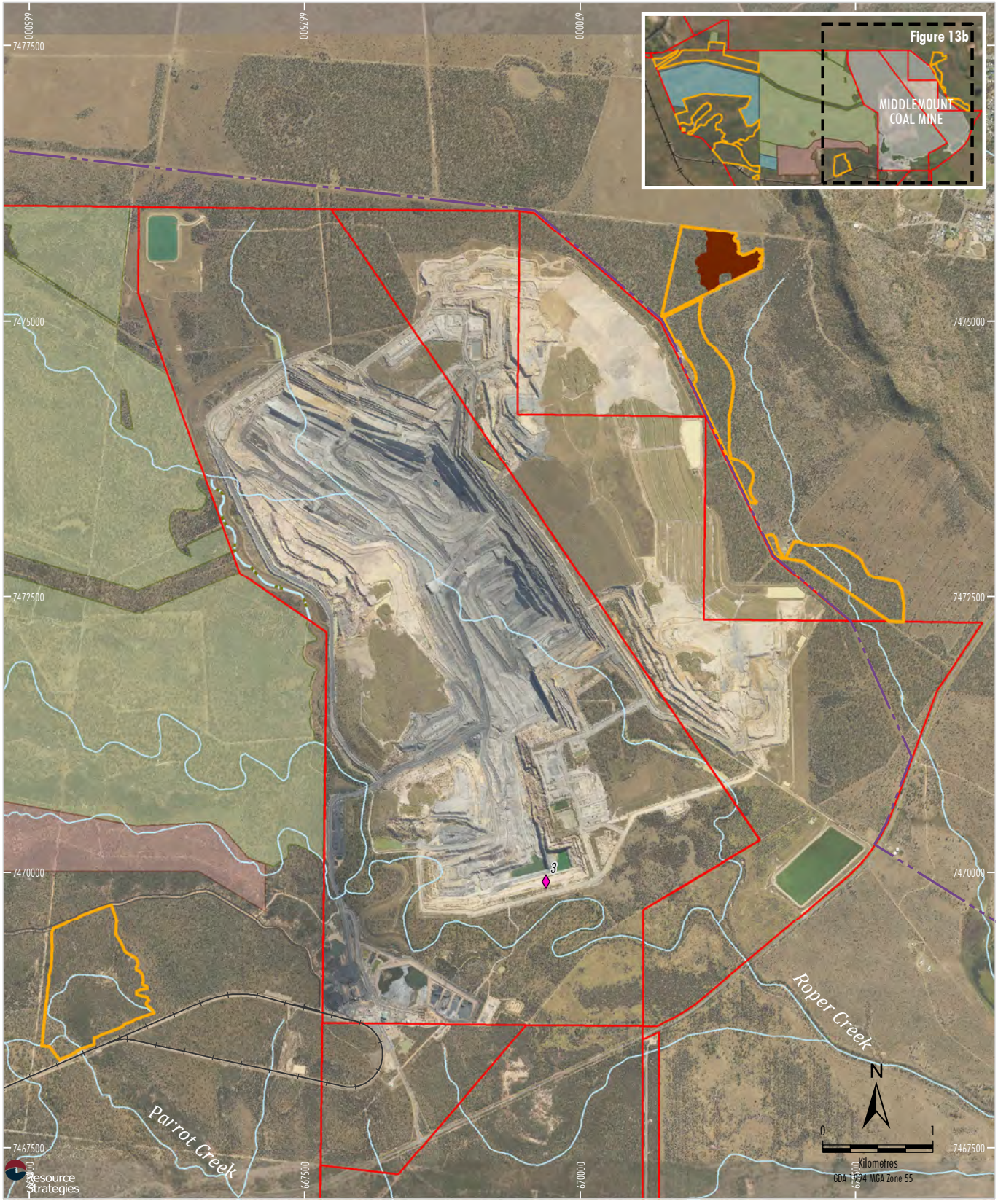
SOUTHERN EXTENSION PROJECT

Ornamental Snake Habitat - Proposed Offset Areas

Figure 13a



LEGEND

Mining Lease Boundary (ML)

Proposed Southern Extension Commonwealth Offset Area (EPBC 2021/8920)

Existing Offset Areas

North-eastern Extension Commonwealth Offset Area (EPBC 2016/7717)

Middlemount Coal (Stage 2) Project Commonwealth Offset Area (EPBC 2010/5394)

Listed Threatened Species

Potential Remnant Ornamental Snake Habitat

Threatened Species Records

Ornamental Snake Record

Reference: 3 *Parsons Brinkerhoff (2010)*

Source: MCPL (2025); Biodiversity Australia (2025); The State of Queensland (2022)
Orthophoto: MCPL (2025); ESRI Basemap (2024)

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SOUTHERN EXTENSION PROJECT

Ornamental Snake Habitat - Proposed Offset Areas

Figure 13b

Table 5
Ornamental Snake Habitat within the Action Area and the Proposed Southern Extension Offset Area

Habitat Component	Description	Action Area	Offset Area
Potential Habitat	Ornamental Snake habitat is defined by Cth DCCEEW as (Attachment B) *Gilgai mounds and depressions with cracking-clay soils and moist areas (particularly within, or close to, habitat that is known to be favoured by its prey [frogs]) with microhabitat features (i.e. logs, woody debris and leaf litter), and Brigalow threatened ecological community.*	The Action area provides small patches of potential habitat for the Ornamental Snake totalling approximately 17.21 ha in the form of Brigalow habitats (RE 11.3.1) with gilgai and drainage depressions which provide habitat for preferred prey species (i.e. frogs) (Figure 12) (Attachment C). The habitats in the Action area have, however, been substantially modified as a result of clearing, weed invasion and cattle grazing. This has reduced the quality of habitat available for the Ornamental Snake and has led to fragmentation and isolation of habitats (Attachment C). It is unlikely that this potential habitat would constitute ecologically significant locations for this species due to the marginal habitat present and its isolation from areas of higher quality habitat (Attachment C).	The proposed Southern Extension Offset Area would contain approximately 84.93 ha of potential suitable habitat for the Ornamental Snake (represented by remnant REs 11.3.1, 11.4.2 and 11.4.9, and also non-remnant REs 11.3.1 and 11.4.9) (Figures 13a and 13b). The larger patches of remnant Brigalow were found to be in good condition and contained the necessary microhabitat features for the Ornamental Snake, such as leaf litter, fallen timber, cracking clay soils and gilgai (Attachment G).
Preferred Habitat	The *Species Profile and Threats Database* (Cth DCCEEW, 2025) states: '*The species is known to prefer woodlands and open forests associated with moist areas, particularly gilgai (melon-hole) mounds and depressions in Queensland Regional Ecosystem Land Zone 4, but also lake margins and wetlands'*	The Action area provides preferred habitat for the Ornamental Snake in the form of Brigalow woodlands and gilgai nearby ephemeral drainage lines which provide habitat for preferred prey species i.e., frogs. However, these habitats have been disturbed as a result of cattle grazing and weed invasion.	RE 11.4.9 within the proposed Southern Extension Offset Area are preferred habitat.
Suitable Habitat	The *EPBC Act Draft Referral Guidelines for the Nationally listed Brigalow Belt Reptiles* (DSEWPaC, 2011c) recognises suitable habitat as: *'open-forests to woodlands associated with gilgai formations and wetlands. These are commonly mapped as QLD REs 11.3.3, 11.4.3, 11.4.6, 11.4.8, 11.4.9, 11.5.16 or mapped as cleared but where the above REs formerly occurred.*	All of the potential habitat in the Action area (described above) is suitable habitat for this species.	All of the potential habitat in the proposed Southern Extension Offset Area (described above) is suitable habitat for this species.

Table 5 (Continued)
Ornamental Snake Habitat within the Action Area and the Proposed Southern Extension Offset Area

Habitat Component	Description	Action Area	Offset Area
Known Important Habitat	As defined by the *EPBC Act Draft Referral Guidelines for the Nationally listed Brigalow Belt Reptiles* (DSEWPaC 2011c), suitable habitat for any one of the listed Brigalow Belt reptiles is considered important if it is: • habitat where the species has been identified during a survey; • near the limit of the species' known range; • large patches of contiguous, suitable habitat and viable landscape corridors (necessary for the purposes of breeding, dispersal or maintaining the genetic diversity of the species over successive generations); or a habitat type where the species is identified during a survey, but which was previously thought not to support the species.	No suitable habitat in the Action area is considered important as defined by the *EPBC Act Draft Referral Guidelines for the Nationally listed Brigalow Belt Reptiles* (DSEWPaC 2011c) as: • the species has not been recorded in the habitat in the Action area, despite targeted surveys; • the Action area is not near the limit of the species' known range (after DSEWPaC 2011c); • the Action area does not contain large patches of contiguous, suitable habitat and viable landscape corridors as the habitat is instead small and fragmented (Figure 12); and/or • the Action area does not contain a unique habitat type containing known records of the species.	No suitable habitat in the Action area is known to be important as defined by the *EPBC Act Draft Referral Guidelines for the Nationally listed Brigalow Belt Reptiles* (DSEWPaC 2011c) as: • the species has not been recorded in the habitat in the proposed Southern Extension Offset Area; • the proposed Southern Extension Offset Area is not near the limit of the species' known range (after DSEWPaC 2011c); • the proposed Southern Extension Offset Area does not contain large patches of contiguous, suitable habitat and viable landscape corridors as the habitat is instead small and fragmented (Figures 13a and 13b); and • the proposed Southern Extension Offset Area does not contain a unique habitat type containing known records of the species.
	Conclusion	The proposed Southern Extension Offset Area is suitably offsetting the impact in the Action area as the offset would provide: • the equivalent type of habitat to that within the Action area (i.e. potentially suitable habitat for the Ornamental Snake); and • a greater area of potential habitat (approximately 17.21 ha in the Action area verse 84.93 ha in the offset area); and larger patches of potential habitat (refer Figures 12, 13a and 13b).	

2.3.4 Avoidance, Safeguards and Mitigation Measures

Potential impacts to the Ornamental Snake would be minimised through implementation of the following mitigation measures:

- Education of staff, including contractors, in relation to the risks to fauna and how to manage animals which are injured or displaced, including this species.
- MCPL will use a licensed spotter-catcher and/or carer during clearing activities.
- All roads in the Action area will be limited to a 60 kilometres per hour (km/h) speed limit which would reduce the risk of vehicle strike.
- Weed management techniques will continue to be implemented within the MLs (e.g. weed control [spraying] and washdown of machinery when moving from weed infested areas). Appendix E of Attachment G outlines the standard landholder and state requirements for weed management of the offset areas and proposed management measures that are additional to these standard obligations.
- Continuation of the feral animal control measures within the MLs, including the control of European Red Fox and Feral Cat (recognised threats to this species), biannually for the life of the mine.
- Progressive rehabilitation of disturbance areas to progressively provide habitat resources during and post-mining (e.g. the revegetation species list for Roper Creek Diversion 2 and the adjacent floodplain would include species characteristic of the Brigalow TEC [potential habitat for this species]).

A National or State recovery plan has not been prepared for this species. The above measures are predicted to be effective in reducing potential adverse impacts on the Ornamental Snake because they are focused on addressing the recognised threats to the species that would occur (e.g. clearing) or could otherwise occur (e.g. feral animal incursion) as a result of the Action.

2.3.5 Offset

Table 5 provides a detailed description of potential habitat for the Ornamental Snake in the Action area and the proposed Southern Extension Offset Area.

In relation to cumulative impact, the Middlemount Coal Mine (inclusive of EPBC 2010/5394, EPBC 2017/8130 and EPBC 2021/8920) would result in the cumulative clearance of approximately 79.71 ha of habitat for the Ornamental Snake and the cumulative conservation of approximately 1,853.43 ha of habitat for the Ornamental Snake in relevant Commonwealth Offset Areas[1].

2.3.6 Conclusion/Consequential Impact

The Ornamental Snake has not been recorded in the Action area and it is considered unlikely to be significantly impacted by the Action (Attachment C). The Action would require the clearance of approximately 17.21 ha of potential habitat for this species (Figure 12) and the proposed Southern Extension Offset Area would contain approximately 84.93 ha of potential habitat for this species (Figures 13a and 13b).

[1] Approximately 1,692.5 ha in the Modified Middlemount Coal (Stage 2) Project Commonwealth Offset Area, approximately 76 ha in the Western Extension Commonwealth Offset Area and approximately 84.93 ha in the Southern Extension Commonwealth Offset Area.

2.4 SQUATTER PIGEON (SOUTHERN)

The Squatter Pigeon (southern) is listed as 'Vulnerable' under the EPBC Act. The general distribution and habitat requirements for the Squatter Pigeon (southern) are described in Attachment C.

2.4.1 Targeted Survey Effort

Biodiversity Australia (2025a) undertook targeted surveys for the Squatter Pigeon (southern) and assessed potential habitat for the species in accordance with the *Survey Guidelines for Australia's Threatened Birds* (DEWHA, 2010a) and the *Species Profile and Threats Database* (Cth DCCEEW, 2025). The survey methods used to detect the Squatter Pigeon (southern) were diurnal bird surveys (Attachment C). Biodiversity Australia (2025a) did not detect the Squatter Pigeon (southern) within the Action area.

A habitat quality assessment was undertaken using the survey methodology outlined in the *Guide to Determining Terrestrial Habitat Quality Version 1.3* (DES, 2020a). The condition data was used to justify the inputs to the EPBC Act *Offsets Assessment Guide* (DSEWPaC, 2012a) applied by Biodiversity Australia (2025b) (Appendix A of Attachment G). Further to this, the predicted future habitat quality scores with and without the offset is also provided in Appendix A of Attachment G.

2.4.2 Presence of the Species and its Habitat in the Action Area and Surrounds

The Squatter Pigeon (southern) has not been recorded in the Action area, despite targeted searches (Figure 14). Table 6 provides a detailed description of habitat for the Squatter Pigeon (southern) in the Action area (Figure 14) and the proposed Southern Extension Offset Area (Figures 15a and 15b).

2.4.3 Direct, Indirect and Cumulative Impacts

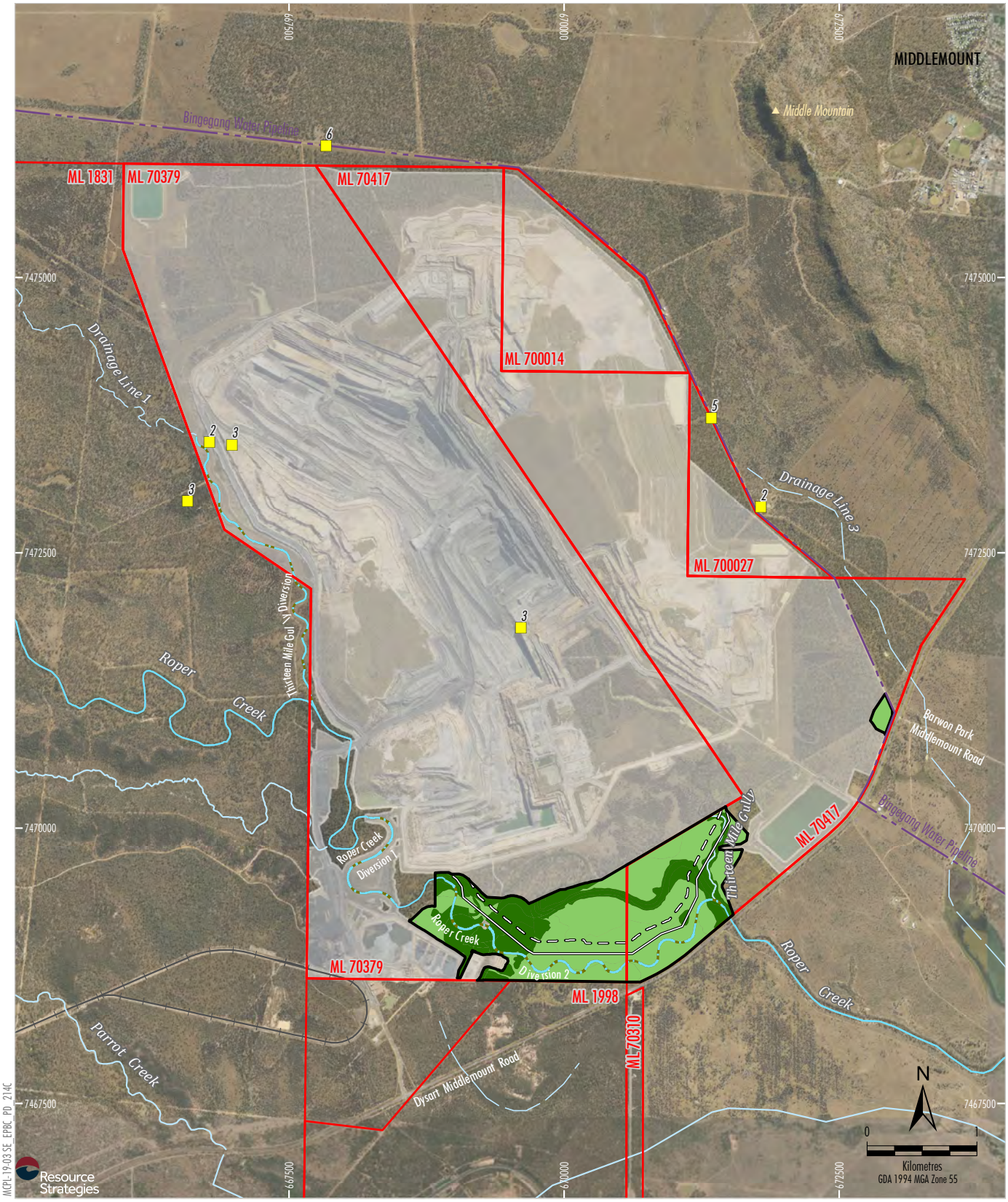
The Action would result in the direct clearance of approximately 250.22 ha of known and potential habitat for the Squatter Pigeon (southern), comprising approximately 86.03 ha of remnant breeding habitat (RE 11.3.1, RE 11.3.2/11.3.2b, RE 11.3.25, RE 11.3.7, RE 11.7.2 and RE 11.7.4) and 164.19 ha of non-remnant foraging habitat (Figure 14).

The area to be cleared is not considered material nor crucial to the viability of the local population of this species. Biodiversity Australia (2025a) (Attachment C) consider that the Action is unlikely to have a significant impact on the Squatter Pigeon (southern) (after DEWHA, 2013) given large home range of this species, its high mobility and the presence of extensive alternative habitat in the locality.

The Action is not likely to result in significant impacts from edge effects on potential habitat for this species outside of the Action area given the majority of potential habitat in the Action area is located adjacent to the approved disturbance footprint.

In regard to fragmentation impacts, the potential habitat for this species is patchy and fragmented and so does not provide strong connectivity to adjacent habitats. The Action would not isolate any external habitats and only marginally increase fragmentation in an already highly fragmented landscape. The Squatter Pigeon (southern) is a highly mobile species and known to be capable of crossing human modified habitat. The Action would therefore create no barriers to the species movement and would not fragment the existing population. Post-mine landforms are proposed to be progressively rehabilitated to include woodland habitat, ultimately resulting in a greater coverage of woodland habitat.

The Middlemount Coal Mine is currently approved to remove approximately 1,669.5 ha of potential habitat for the Squatter Pigeon (southern) as part of the Middlemount Coal Project Stage 2 (EPBC 2010/5394), North-eastern Extension (EPBC 2016/7717) and Western Extension (EPBC 2017/8130). Considering the clearance required for the Action, the Middlemount Coal Mine (inclusive of EPBC 2010/5394, EPBC 2016/7717 and EPBC 2017/8130) would result in the cumulative total clearance of approximately 1,919.72 ha of habitat for the Squatter Pigeon (southern).



LEGEND

- Mining Lease Boundary (ML)
- Middlemount Rail Spur and Loop
- Approved Disturbance Footprint
- Diversion Structure
- Levee
- Open Cut Pit Extension
- Approximate Extent of Additional Disturbance Associated with the Action

Species Habitat

- Squatter Pigeon (Southern) Potential Breeding and Foraging Habitat
- Squatter Pigeon (Southern) Potential Foraging Habitat
- Squatter Pigeon (Southern) Recorded Location

Reference: 2 *Naturecall Environmental (2014)*
3 *Parsons Brinkerhoff (2010)*
5 *Naturecall Environmental (2017)*
6 *Biodiversity Australia (2020)*

Source: MCPL (2025); Biodiversity Australia (2025); The State of Queensland (2022)
Orthophoto: MCPL (2025); ESRI Basemap (2024)

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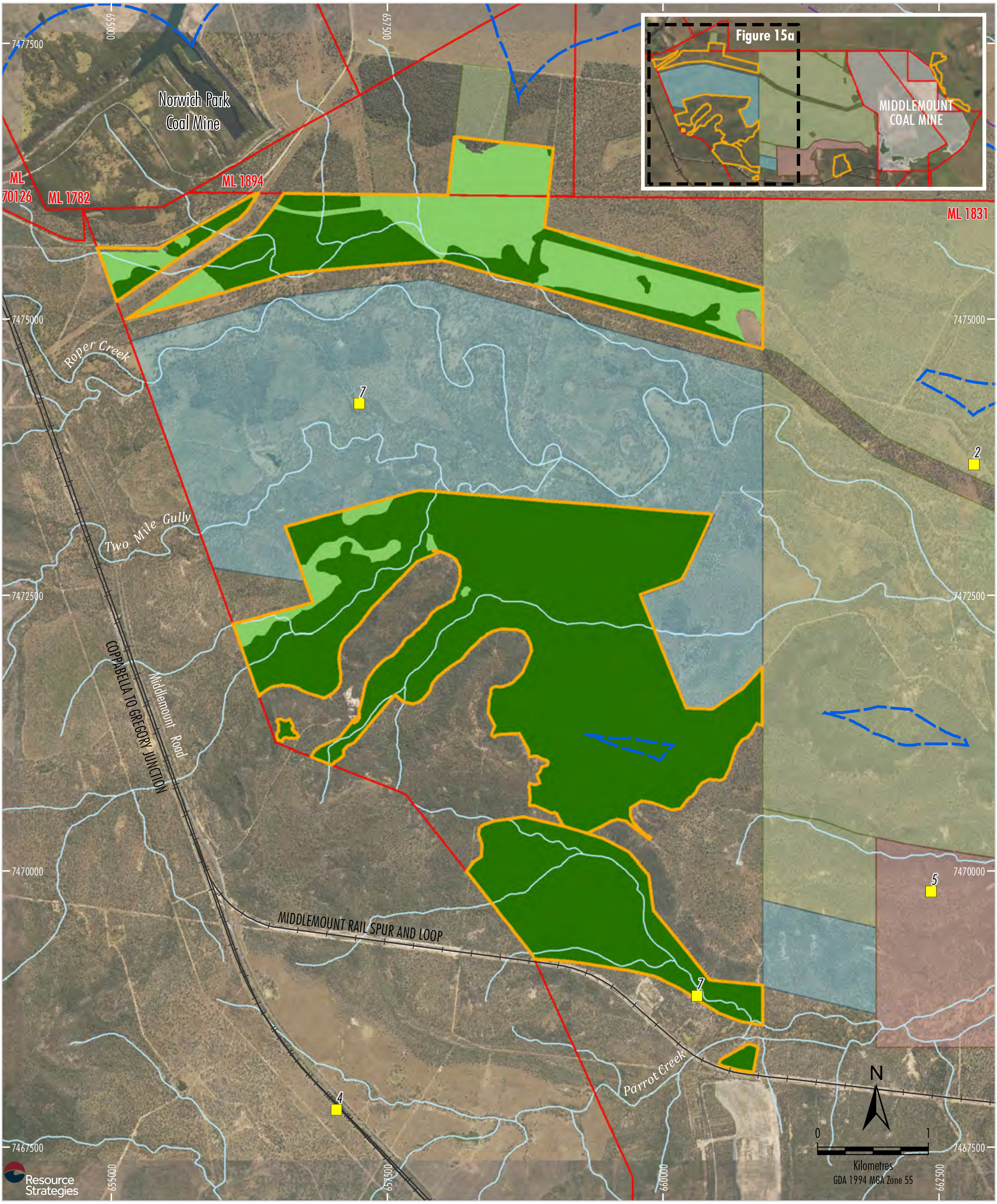
SOUTHERN EXTENSION PROJECT

Squatter Pigeon (Southern) Habitat - Action Area

Figure 14



LEGEND

- Mining Lease Boundary (ML)
- Proposed Southern Extension Commonwealth Offset Area (EPBC 2021/8920)

Existing Offset Areas

- North-eastern Extension Commonwealth Offset Area (EPBC 2016/7717)
- Middlemount Coal (Stage 2) Project Commonwealth Offset Area (EPBC 2010/5394)
- Western Extension Commonwealth Offset Area (EPBC 2017/8130)
- Seasonal Watercourse (VM Act)
- 1 km Buffer from a Seasonal Watercourse or Wetland

Listed Threatened Species

- Squatter Pigeon (Southern) Potential Breeding and Foraging Habitat
- Squatter Pigeon (Southern) Potential Foraging Habitat
- Squatter Pigeon (Southern) Recorded Location

Reference: 1 Ecology and Heritage Partners (2012)
2 Naturecall Environmental (2014)
3 Parsons Brinkerhoff (2010)
5 Naturecall Environmental (2017)
6 Biodiversity Australia (2020)

Source: MCPL (2025); Biodiversity Australia (2025); The State of Queensland (2022)
Orthophoto: MCPL (June 2025); ESRI Basemap (2024)

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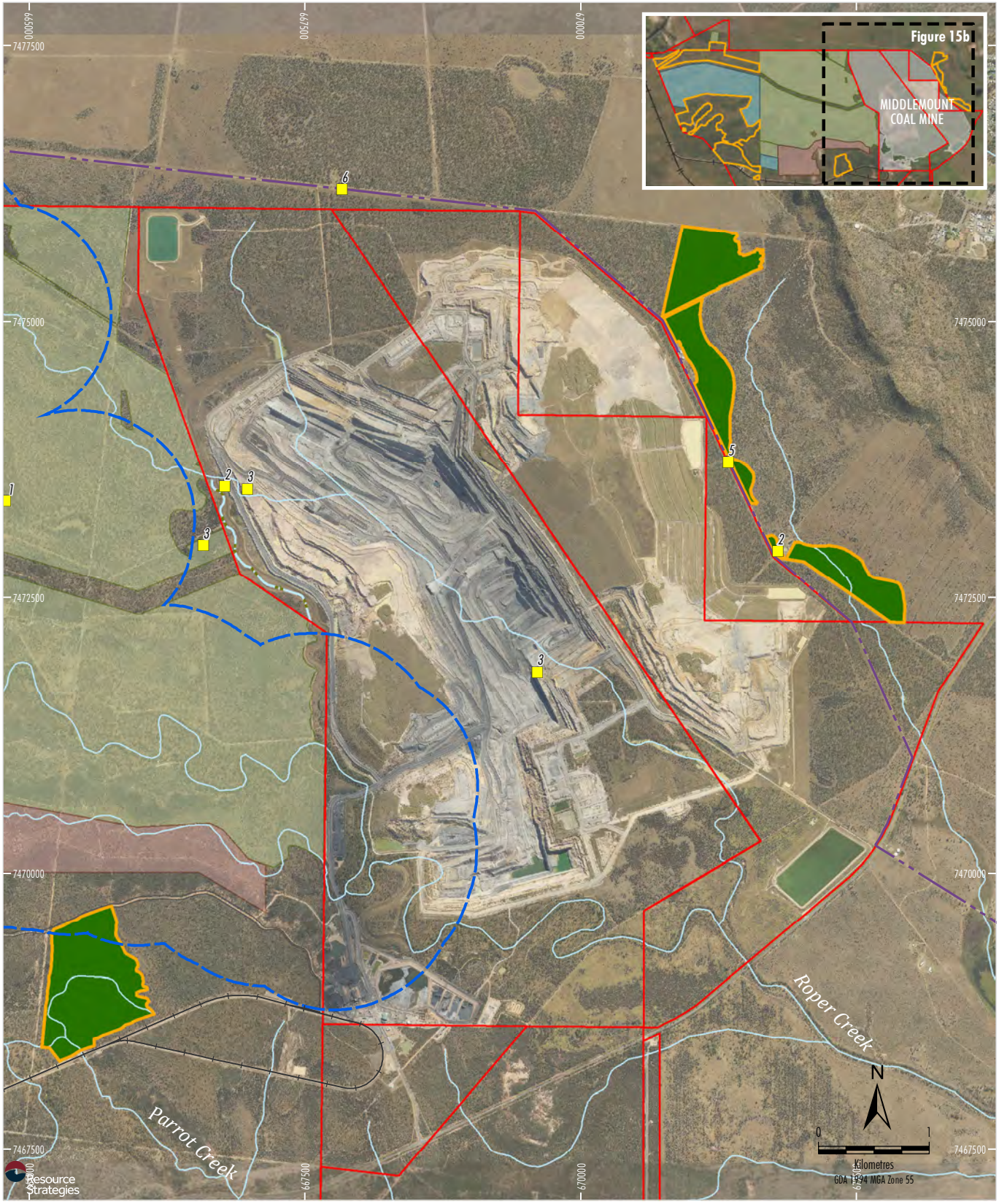
SOUTHERN EXTENSION PROJECT

Squatter Pigeon (Southern) Habitat - Proposed Offset Areas

Figure 15a



LEGEND

- Mining Lease Boundary (ML)
- Proposed Southern Extension Commonwealth Offset Area (EPBC 2021/8920)

Existing Offset Areas

- North-eastern Extension Commonwealth Offset Area (EPBC 2016/7717)
- Middlemount Coal (Stage 2) Project Commonwealth Offset Area (EPBC 2010/5394)
- Seasonal Watercourse (VM Act)
- 1 km Buffer from a Seasonal Watercourse or Wetland

Listed Threatened Species

- Squatter Pigeon (Southern) Potential Breeding and Foraging Habitat
- Squatter Pigeon (Southern) Recorded Location

Reference:
1 *Ecology and Heritage Partners (2012)*
2 *Naturecall Environmental (2014)*
3 *Parsons Brinkerhoff (2010)*
5 *Naturecall Environmental (2017)*
6 *Biodiversity Australia (2020)*

Source: MCPL (2025); Biodiversity Australia (2025); The State of Queensland (2022)
Orthophoto: MCPL (June 2025); ESRI Basemap (2024)

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SOUTHERN EXTENSION PROJECT

Squatter Pigeon (Southern) Habitat - Proposed Offset Areas

Figure 15b

2.4.4 Avoidance, Safeguards and Mitigation Measures

Potential impacts to the Squatter Pigeon (southern) would be minimised through implementation of the following mitigation measures:

- Education of staff, including contractors, in relation to the risks to fauna and how to manage animals which are injured or displaced, including this species.
- MCPL will use a licensed spotter-catcher and/or carer during clearing activities.
- Continuation of the feral animal control measures within the MLs, including the control of European Red Fox (*Vulpes vulpes*) and Feral Cat (*Felix catus*), biannually for the life of the Middlemount Coal Mine.
- All roads in the Action area will be limited to a 60 kilometres per hour (km/h) speed limit which would reduce the risk of vehicle strike.
- Progressive rehabilitation of disturbance areas to progressively provide habitat resources during and post-mining (e.g. overburden revegetated with species characteristic of Poplar Box Woodland).

A National or State recovery plan has not been prepared for this species. The above measures are predicted to be effective in reducing potential adverse impacts on the Squatter Pigeon (southern) because they are focused on addressing the recognised threats to the species that would occur (e.g. clearing) or could otherwise occur (e.g. feral animal incursion) as a result of the Action.

In addition, disturbed land within the Action area would be rehabilitated to a Post-Mining Land Use (PMLU) of native ecosystem (with non-native grasses) and include regional ecosystems such as RE 11.3.25 and RE 11.5.3, which are potential habitat for the Squatter Pigeon (southern).

2.4.5 Offset

Table 6 provides a detailed description of habitat for the Squatter Pigeon (southern) in the Action area and the proposed Southern Extension Offset Area.

In relation to cumulative impacts, the Middlemount Coal Mine (inclusive of EPBC 2010/5394, EPBC 2016/7717, EPBC 2017/8130 and EPBC 2021/8920) would result in the cumulative clearance of approximately 1,919.72 ha of habitat for the Squatter Pigeon (southern) and the cumulative conservation of approximately 6,502.42 ha of habitat for the Squatter Pigeon (southern) in the Commonwealth Offset Areas[2].

2.4.6 Conclusion/Consequential Impact

The Squatter Pigeon (southern) is commonly recorded in fragmented landscapes in the Brigalow Belt South Bioregion. Habitat resources for the Squatter Pigeon (southern) (e.g. drinking sources, woodland and vegetation in the early stage of regrowing from past clearance for potential foraging and breeding habitat) would remain outside of the Action area, such that the species is likely to persist in the landscape. An outcome of the Action would be approximately 1,497.42 ha of potential habitat for the Squatter Pigeon (southern) would be enhanced and conserved as part of the proposed Southern Extension Offset Area.

[2] Approximately 3,318 ha in the Modified Middlemount Coal (Stage 2) Project Commonwealth Offset Area, approximately 532 ha in the North-eastern Extension Commonwealth Offset Area, approximately 1,155 ha in the Western Extension Commonwealth Offset Area and approximately 1,497.42 ha in the Southern Extension Commonwealth Offset Area.

Table 6
Squatter Pigeon (southern) Habitat within the Action Area and the Proposed Southern Extension Offset Area

Habitat Component	Description	Action Area	Offset Area
Known Habitat		The Squatter Pigeon (southern) was recorded in the Action area by Naturecall (2017a, 2014) and Parsons Brinkerhoff (2010a). Habitat for the Squatter Pigeon (southern) in the Action area is considered to comprises all remnant and regrowth habitat with a suitable groundcover. The Action area contains approximately 250.22 ha of potential habitat for the Squatter Pigeon (southern), comprising approximately 86.03 ha of remnant and 164.19 ha of regrowth (Figure 14).	The Squatter Pigeon (southern) has been recorded adjacent to the proposed offset areas (Figures 15a and 15b) in habitat which is contiguous with the proposed offset areas. Given the nearby records, the presence of potential habitat and nature of the species, it is highly likely that the Squatter Pigeon (southern) would use habitat in the proposed offset area. Habitat for the Squatter Pigeon (southern) in the Action area is considered to be all remnant and regrowth habitat with a suitable groundcover. The proposed Southern Extension Offset Area would contain approximately 1,497.42 ha of potential habitat for the Squatter Pigeon (southern), comprising approximately 1,256.5 ha of woodland and approximately 240.92 ha of vegetation in the early stage of regrowing from past clearance (Figures 15a and 15b). The offset area is suitably located (on the same property) to benefit the same local population of this species that would use habitat within the Action area.
Breeding Habitat	• ***Land Zones 5 & 7 and 3, 4 & 10)*** ○ *Remnant or regrowth open-forest to sparse, open-woodland or low-woodland dominated by Eucalyptus, Corymbia, Acacia or Callitris species within one kilometre of a suitable, permanent or seasonal waterbody. It is distinguished by ground-layer vegetation that:* ▪ *consists of patchy, native, perennial tussock grasses, or a mix of perennial tussock grasses and low shrubs or forbs; and* ▪ *does not cover more than 33% of the ground.* ○ *These preferred ground-layer vegetation conditions tend to occur on well-draining, sandy or gravelly soils low, gently sloping, flat to undulating plains and foothills, lateritic (duplex) soils on low 'jump-ups' and escarpments.*	The habitat in the Action area is within 1 km of seasonal waterbodies (ephemeral unnamed drainage lines) and therefore all of the potential habitat mapped on Figure 14 is considered to be potentially used for breeding. Noting, however, this species has not been observed breeding in the Action area.	As shown in Figures 15a and 15b, Roper Creek and Two Mile Gully traverse the proposed Southern Extension Offset Area such that most of the potential habitat for this species is within 1 km of these watercourses and therefore potential breeding habitat. The proposed Southern Extension Offset Area is providing the equivalent type of habitat to that within the Action area. Note that RE 11.7.2 was excluded as potential habitat for this species due to the presence of very rocky or bare ground with low native grass cover.

Table 6 (Continued)
Squatter Pigeon (Southern) Habitat within the Action Area and Offset Area

Habitat Component	Description	Action Area	Offset Area
Foraging Habitat	• ***Land Zones 5 & 7 and 3, 4 & 10)*** ○ *Remnant or regrowth open-forest to sparse, open-woodland or low-woodland dominated by Eucalyptus, Corymbia, Acacia or Callitris species within three kilometres of a suitable, permanent or seasonal waterbody. It is distinguished by ground-layer vegetation that:* ▪ *consists of patchy, native, perennial tussock grasses, or a mix of perennial tussock grasses and low shrubs or forbs; and* ▪ *does not cover more than 33% of the ground.* ○ *These preferred ground-layer vegetation conditions tend to occur on well-draining, sandy or gravelly soils low, gently sloping, flat to undulating plains and foothills, lateritic (duplex) soils on low 'jump-ups' and escarpments.*	The breeding habitat described above would also provide foraging resources for this species (Figure 14).	The breeding habitat described above would also provide foraging resources for this species (Figures 15a and 15b).
Dispersal Habitat	○ *Dispersal habitat is any forest or woodland occurring between patches of foraging or breeding habitat which facilitates movement between patches of foraging habitat, breeding habitat and/or waterbodies.* ○ *Dispersal habitat includes vegetation where the groundcover layer has been thinned through current land-use practices in a way that suits the species (e.g. light cattle grazing). The species does disperse into highly modified or degraded habitats, including cleared areas which are within 100 metres of remnant trees or patches of habitat.*	The breeding habitat described above would also provide dispersal habitat for this species. There are no additional areas of forest or woodland which would specifically aid the dispersal of the Squatter Pigeon (southern). There are very small areas of cleared land between patches of habitat (less than 100 metres [m] apart) as mapped on Figure 14. These largely comprise of cleared tracks and a pipeline easement. Hence, these areas are not considered 'dispersal habitat' for the species.	The breeding habitat described above would also provide dispersal habitat for this species. There are no additional areas of forest or woodland which would specifically aid the dispersal of the Squatter Pigeon (southern). There are very small areas of cleared land between patches of habitat (less than 100 m apart) as mapped on Figures 15a and 15b. These are not considered 'dispersal habitat' for the species.
	Conclusion	The proposed Southern Extension Offset Area is suitably offsetting the impact in the Action area as the offset would provide: • the equivalent type of habitat to that within the Action area (i.e. potentially suitable habitat for the Squatter Pigeon [southern]); • a greater area of potential habitat (approximately 250.22 ha in the Action area verse 1,497.42 ha in the offset area); and • larger patches of potential habitat (refer Figures 14, 15a and 15b).	

2.5 KOALA

The Koala was listed as 'Vulnerable' under the EPBC Act at the time of the controlled action decision (17/06/2021) and is therefore assessed as 'Vulnerable' not 'Endangered' (refer section 158A of the EPBC Act). The 'Vulnerable' listing of the Koala under the EPBC Act applied to populations of Qld, NSW and the Australian Capital Territory. The new *Conservation Advice for Phascolarctos cinereus (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory* (DAWE, 2022a) and the new *National Recovery Plan for the Koala Phascolarctos cinereus* (*combined populations of Queensland, New South Wales and the Australian Capital Territory*) (DAWE, 2022b) are now in effect. The general distribution and habitat requirements for the Koala are described in Attachment C.

2.5.1 Targeted Survey Effort

Biodiversity Australia (2025a) undertook targeted surveys for the Koala and assessed potential habitat for the species in accordance with the *EPBC Act Referral Guidelines for the Vulnerable Koala (combined Qld, NSW and the Australian Capital Territory)* (DotE, 2014b) and the *Species Profile and Threats Database* (DAWE, 2020). The survey methods used to detect the Koala were spotlighting, call playback, SAT surveys, and scat and sign searches (Attachment C). However, no individuals were recorded within the Action area.

A habitat quality assessment was undertaken using the survey methodology outlined in the *Guide to Determining Terrestrial Habitat Quality Version 1.3* (DES, 2020a). The condition data was used to justify the inputs to the EPBC Act *Offsets Assessment Guide* (DSEWPaC, 2012a) applied by Biodiversity Australia (2025b) (Appendix A of Attachment G).

Further to this, the predicted future habitat quality scores with and without the offset is also provided in Appendix A of Attachment G.

2.5.2 Presence of the Species and its Habitat in the Action Area and Surrounds

The Koala has been recorded adjacent to the Action area during previous surveys by contractors and MCPL staff members (Naturecall, 2014; 2016b) (Attachment C).

Furthermore, according to local graziers and landholders, Koalas are not usually seen along the highly disturbed Roper Creek, but more are seen in RE 11.5.2 and 11.5.9. These ecosystems are dominated by *E. crebra* which is a preferred and primary food source for Koala.

Given the limited number of survey records in the wider locality, it appears that a very low density Koala population may be present in the habitat surrounding the Action area. Given the low nutrient soils and scarcity of preferred foraging trees, Koala home ranges would be very large (Attachment C).

Despite the above, it is recognised that the habitat present meets the definition of 'Critical Habitat' for the Koala as defined in the *Conservation Advice for Phascolarctos cinereus (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory* (DAWE, 2022a) (Attachment C).

2.5.3 Direct, Indirect and Cumulative Impacts

The Action would remove approximately 183.0 ha of known and potential habitat for the Koala, comprising approximately 81.7 ha of remnant (RE 11.3.2/11.3.2b, RE 11.3.25, RE 11.3.7 and RE 11.7.4) and 101.3 ha of non-remnant habitat (Figure 16). Biodiversity Australia (2025a) (Attachment C) consider that lower quality habitat would be removed that would only form part of the marginal home range of a Koala due to limited abundance of preferred food trees (secondary foraging habitat) and poor soils. The habitat within the Action area is unlikely to support Koala breeding given the low density of preferred food trees and existing habitat fragmentation (Attachment C). The remaining vegetation within the Action area consists of exotic grassland without known Koala food trees and therefore does not constitute suitable foraging or dispersal habitat for the Koala (Biodiversity Australia, 2025a).

Although preferred Koala food trees were common throughout the Eucalypt woodland/forest communities within the Action area, these communities were sparse and open, providing an overall scarcity of foraging resources (Attachment C).

Additionally, the realignment and extension of the diversion approved under EPBC 2010/5394 (but not yet constructed), Roper Creek Diversion 2 would result in disruption of connectivity prior to revegetation of the diversion. Whilst it is acknowledged that connectivity would be temporarily impacted, previous surveys did not identify Koalas along the section of the proposed creek diversion, and Koalas as a species are not dependent on vegetation in this area for movement.

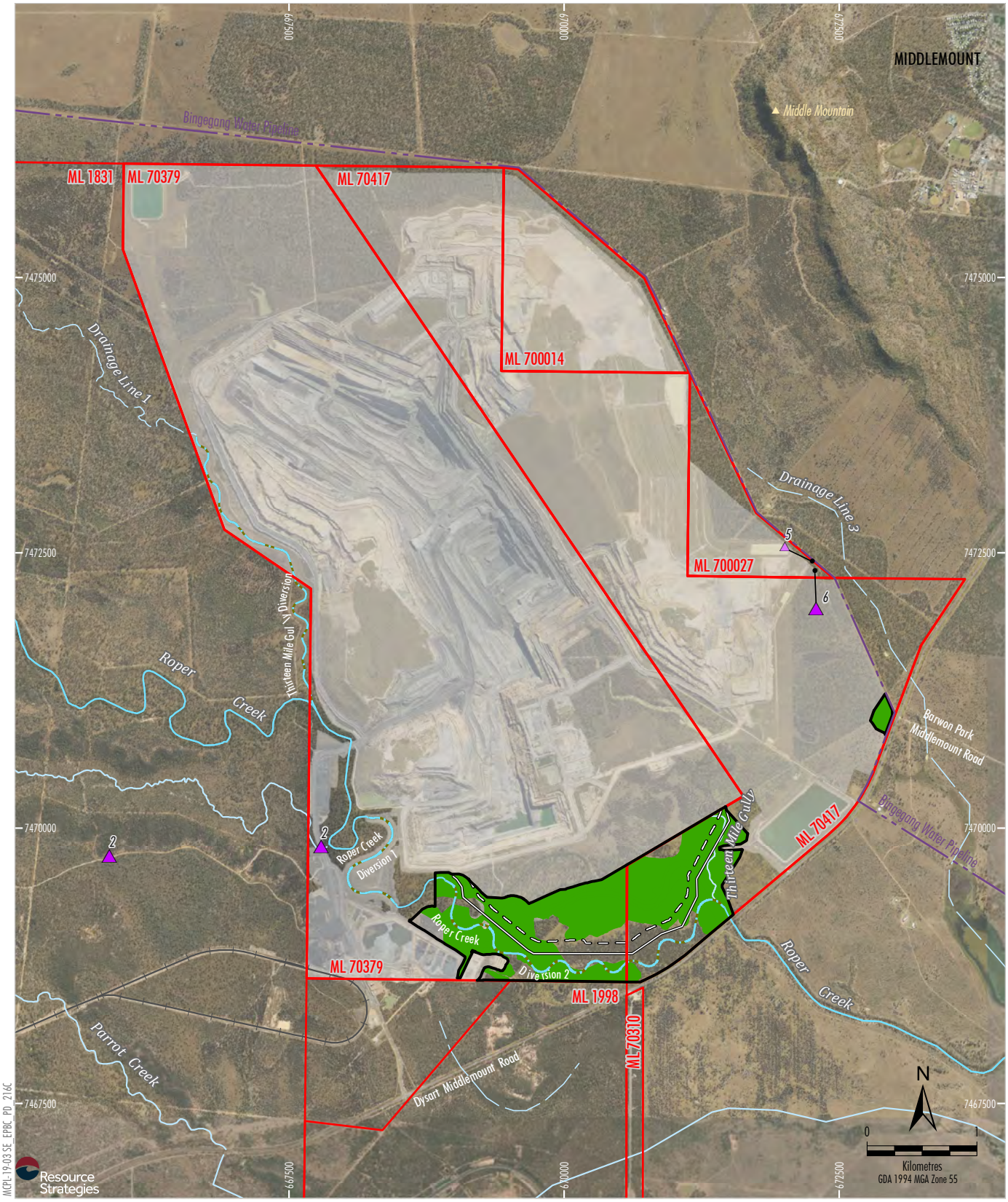
The potential indirect impacts on the Koala associated with the Action (e.g. vehicle strike, noise, vibration, artificial lighting and/or the introduction of introduced species) are considered to be minimal and would only incrementally increase the likelihood of existing indirect impacts associated with the existing mining operations.

The change in cumulative impact on the Koala in the locality as a result of the Action (considering impacts from other surrounding developments and the Action) is considered to be minimal because of the localised nature of the Action compared to the wider distribution of this species, especially when considering the biodiversity offsets which have been (or will be) provided.

2.5.4 Avoidance, Safeguards and Mitigation Measures

Potential impacts to the Koala will be minimised through implementation of the following mitigation measures:

- Education of staff, including contractors, in relation to the risks to fauna and how to manage animals which are injured or displaced, including this species.
- MCPL will use a licensed spotter-catcher and/or carer during clearing activities. If a Koala is present in the proposed clearing area, it will be left to move away from the clearance area on its own accord.
- Continuation of the feral animal control measures within the MLs, including the control of Wild Dog (which is a recognised threat to the Koala [DAWE, 2022b]), biannually for the life of the Middlemount Coal Mine.
- The haul road crossing will be limited to a 40 km/h speed limit which will further reduce the risk of vehicle strike.
- All other roads in the Action area will be limited to a 60 km/h speed limit which will reduce the risk of vehicle strike.
- Progressive rehabilitation of disturbance areas to progressively provide habitat resources and beneficial movement corridors during and post-mining (e.g. overburden revegetated with species characteristic of Poplar Box Woodland).



LEGEND

- Mining Lease Boundary (ML)
- Middlemount Rail Spur and Loop
- Approved Disturbance Footprint
- Diversion Structure
- Levee
- Open Cut Pit Extension
- Approximate Extent of Additional Disturbance Associated with the Action

Species Habitat

- Koala Potential Habitat
- Koala Recorded Location
- Koala Scats

Reference: 2 *Naturecall Environmental (2014)*
5 *Naturecall Environmental (2017)*
6 *Biodiversity Australia (2020)*

Source: MCPL (2022); Biodiversity Australia (2021); The State of Queensland (2022)
Orthophoto: MCPL (2025); ESRI Basemap (2024)

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SOUTHERN EXTENSION PROJECT

Koala Habitat - Action Area

Figure 16

- MCPL will include the installation of additional fauna infrastructure as required to facilitate species movements (e.g. glider poles and fauna culverts with Koala furniture) along the diversion during the revegetation process when vegetation is in the early stages of development.

In addition, disturbed land within the Action area would be rehabilitated to a PMLU of Native Ecosystem (with non-native grasses) and include regional ecosystems such as RE 11.3.25 and RE 11.5.3, which are potential habitat for the Koala.

2.5.5 Offset

Approximately 1,178.29 ha of known and potential habitat for the Koala, comprising 980.27 ha remnant vegetation and 198.02 ha of regrowth vegetation, would be enhanced and conserved as part of the proposed Southern Extension Offset Area (Figures 17a and 17b). The following REs in the proposed Southern Extension Offset Area represent potential habitat for the Koala: RE 11.3.2, RE 11.3.25, RE 11.3.7, RE 11.5.2a, RE 11.5.3, and regrowth RE 11.3.2, RE 11.3.27d, and RE 11.5.3.

Similar to the Action area, the vegetation in the early stages of regrowing from past clearance in the proposed Southern Extension Offset Area is not suitably advanced to be current foraging or dispersal habitat for the Koala (Figures 17a and 17b). However, these areas would continue to regrow as part of the offset such that the current level of fragmentation would decrease overtime.

The proposed Southern Extension Offset Area is suitably located to benefit the same local population of this species that would use habitat within the Action area. A Koala has been recorded near the proposed Southern Extension Offset Area (Figures 17a and 17b).

Ephemeral drainage features draining to Roper Creek and Parrot Creek traverse the proposed Southern Extension Offset Area, which contain riparian vegetation comprising Queensland Blue Gum (a primary feed tree for the Koala) (RE 11.3.25) (Figures 17a and 17b).

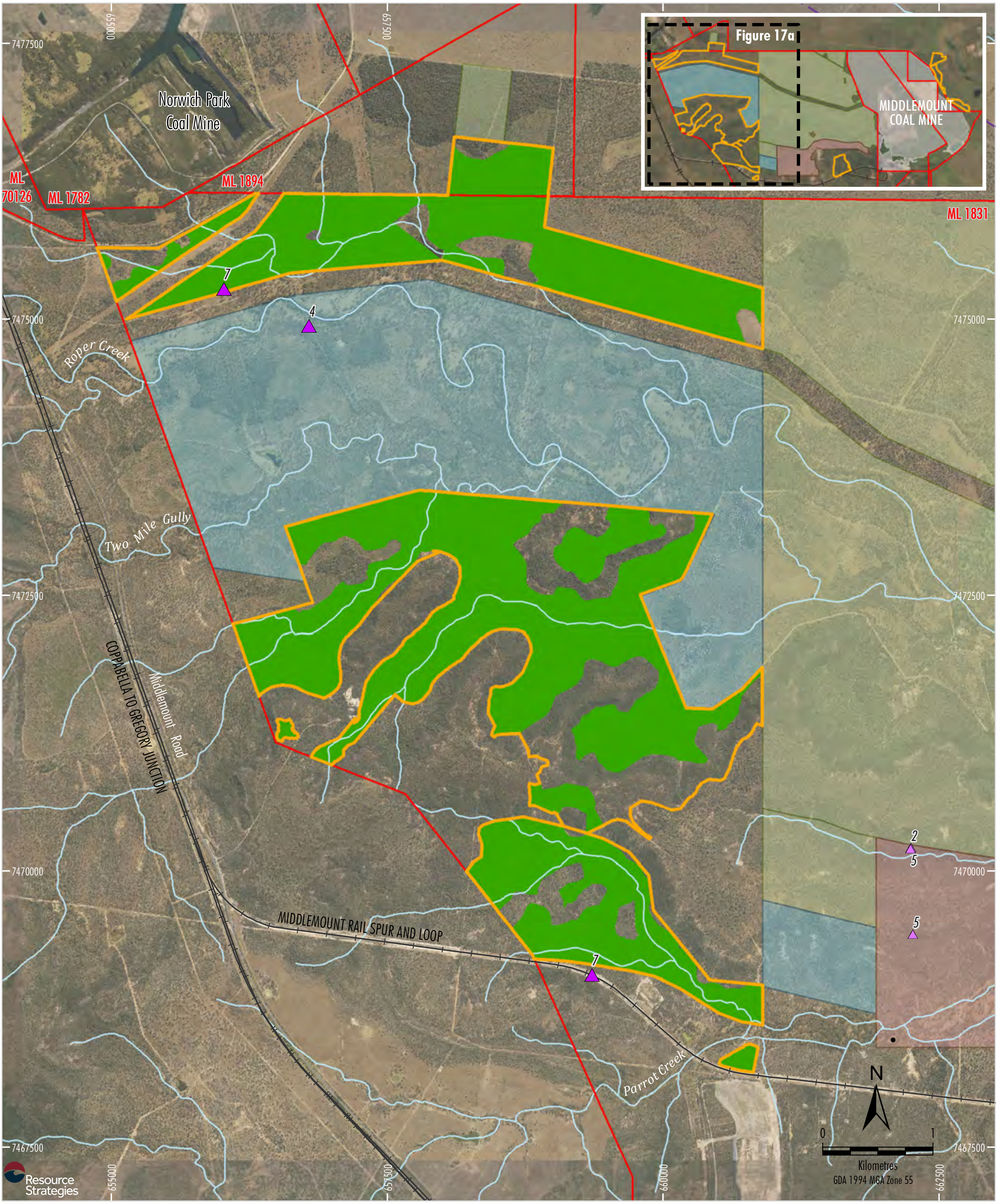
The habitat for the Koala in the proposed Southern Extension Offset Area would also meets the definition of 'Critical Habitat' for the Koala as defined in the *Conservation Advice for Phascolarctos cinereus (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory* (DAWE, 2022a) (Attachment C).

2.5.6 Conclusion/Consequential Impact

The Action would remove approximately 183.0 ha of known/potential habitat for the Koala. An outcome of the Action would be approximately 1,178.29 ha of known and potential habitat for the Koala would be enhanced and conserved as part of the proposed Southern Extension Offset Area. The proposed regeneration of habitat in the offset area would provide a net gain in habitat for this species.

2.6 GREATER GLIDER (SOUTHERN AND CENTRAL)

The Greater Glider (southern and central) was listed as 'Vulnerable' under the EPBC Act at the time of the controlled action decision (17/06/2021) and is therefore assessed as 'Vulnerable' not 'Endangered' (refer section 158A of the EPBC Act). The new *Conservation Advice for Petauroides volans (Greater Glider (Southern and Central))* (Cth DCCEEW, 2022) is now in effect. The general distribution and habitat requirements for the Greater Glider (southern and central) are described in Attachment C (Biodiversity Australia, 2025a).



MCPL-19-03 SE_EPBC_PD_217E

LEGEND

- Mining Lease Boundary (ML)
- Proposed Southern Extension Commonwealth Offset Area (EPBC 2021/8920)

Existing Offset Areas

- North-eastern Extension Commonwealth Offset Area (EPBC 2016/7717)
- Middlemount Coal (Stage 2) Project Commonwealth Offset Area (EPBC 2010/5394)
- Western Extension Commonwealth Offset Area (EPBC 2017/8130)

Listed Threatened Species

- Koala Potential Habitat
- Koala Recorded Location
- Koala Scats

Reference: 2 Naturecall Environmental (2014)
6 Biodiversity Australia (2020)
5 Naturecall Environmental (2017)

Source: MCPL (2025); Biodiversity Australia (2025); The State of Queensland (2022)
Orthophoto: MCPL (June 2025); ESRI Basemap (2024)

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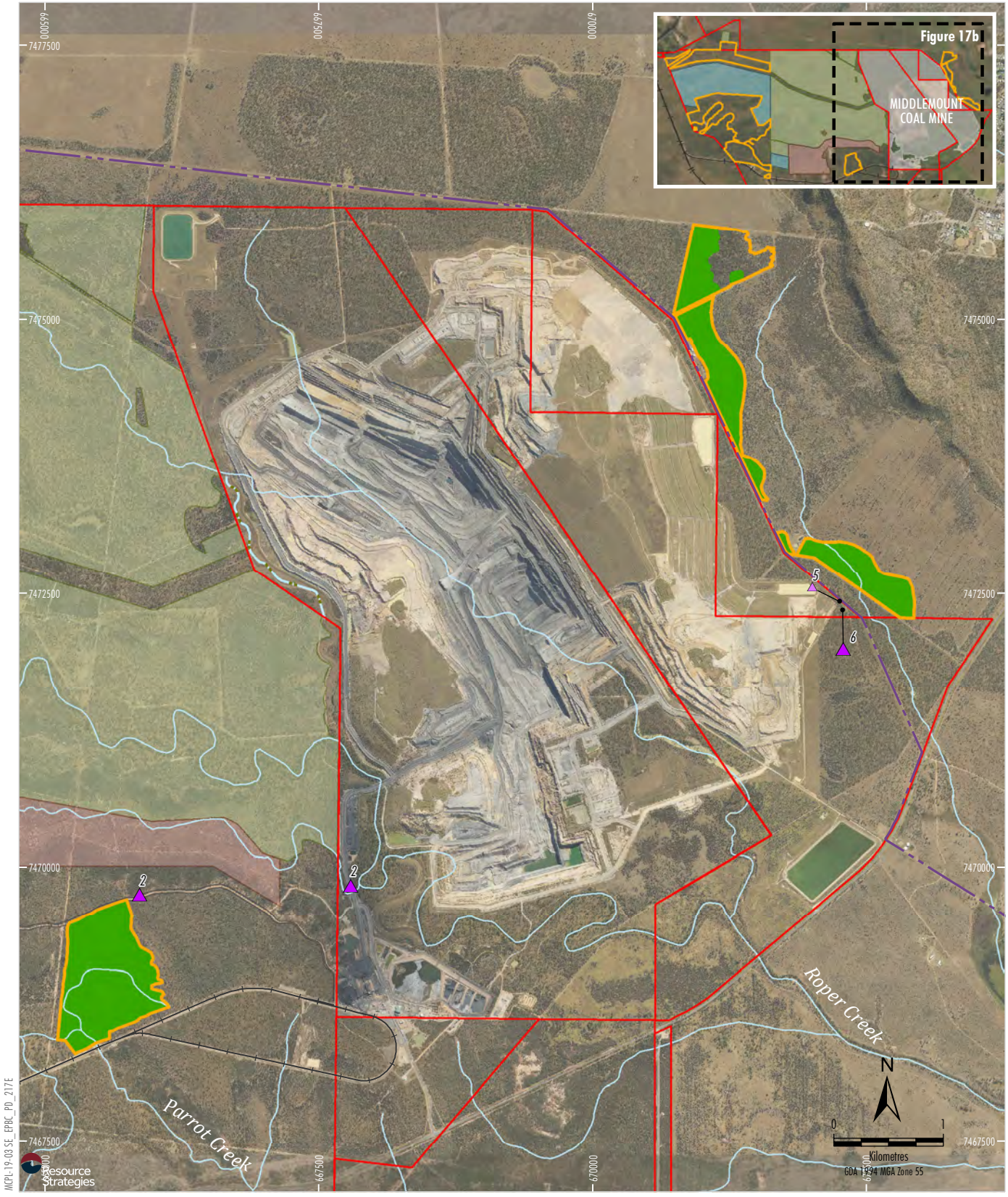
SOUTHERN EXTENSION PROJECT

Koala Habitat - Proposed Offset Areas

Figure 17a



LEGEND

- Mining Lease Boundary (ML)
- Proposed Southern Extension Commonwealth Offset Area (EPBC 2021/8920)

Existing Offset Areas

- North-eastern Extension Commonwealth Offset Area (EPBC 2016/7717)
- Middlemount Coal (Stage 2) Project Commonwealth Offset Area (EPBC 2010/5394)

Listed Threatened Species

- Koala Potential Habitat
- Koala Recorded Location
- Koala Scats

Reference: 2 *Naturecall Environmental (2014)*
6 *Biodiversity Australia (2020)*
5 *Naturecall Environmental (2017)*

Source: MCPL (2025); Biodiversity Australia (2025); The State of Queensland (2022)
Orthophoto: MCPL (June 2025); ESRI Basemap (2024)

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SOUTHERN EXTENSION PROJECT

Koala Habitat - Proposed Offset Areas

Figure 17b

2.6.1 Targeted Survey Effort

Biodiversity Australia (2025a) undertook targeted surveys for the Greater Glider (southern and central) and assessed potential habitat for the species (in consideration of Threatened Species Scientific Committee [2016]). The survey methods used to detect the Greater Glider (southern and central) were spotlighting, call playback, passive infrared cameras, and scat and sign searches (Attachment C). These methods successfully detected the species within the Action area.

A habitat quality assessment was undertaken using the survey methodology outlined in the *Guide to Determining Terrestrial Habitat Quality Version 1.3* (DES, 2020a). The condition data was used to justify the inputs to the EPBC Act *Offsets Assessment Guide* (DSEWPaC, 2012a) applied by Biodiversity Australia (2025b) (Appendix A of Attachment G). Further to this, the predicted future habitat quality scores with and without the offset is also provided in Appendix A of Attachment G.

2.6.2 Presence of the Species and its Habitat in the Action Area and Surrounds

The Greater Glider (southern and central) was recorded on numerous occasions within the Action area by Biodiversity Australia (2025a) during spotlighting (Figure 18). This species is locally common and has also been recorded on numerous occasions within the wider locality (Naturecall, 2014; Parsons Brinkerhoff, 2010a) (Figure 18).

Table 7 provides a detailed description of habitat for the Greater Glider (southern and central) in the Action area and the proposed Southern Extension Offset Area.

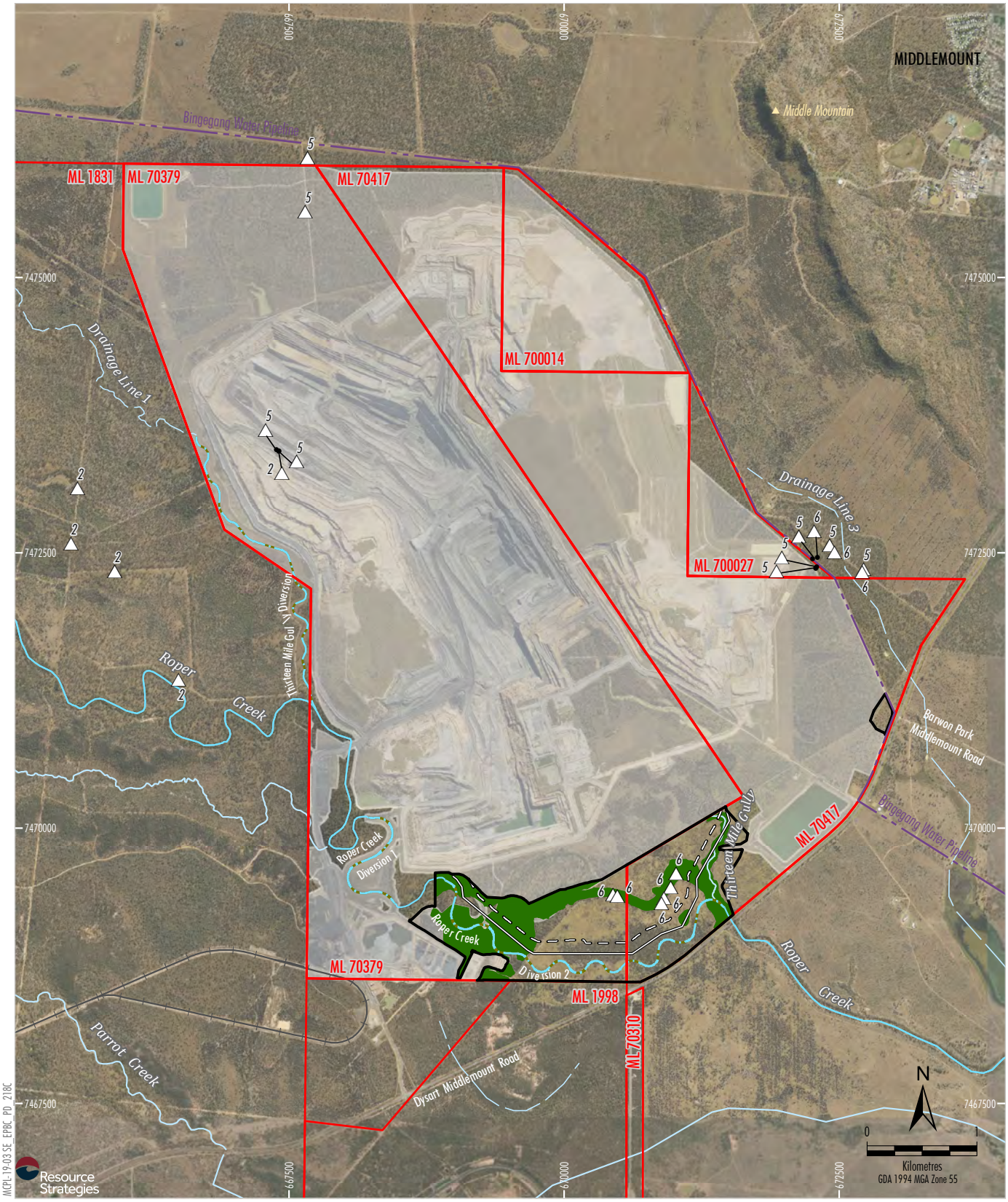
2.6.3 Direct, Indirect and Cumulative Impacts

The Action would remove approximately 81.7 ha of known/potential habitat for the Greater Glider (southern and central), comprising open woodlands RE 11.3.2/11.3.2b, RE 11.3.25, RE 11.3.7 and RE 11.7.4 (Figure 18). The condition of the habitat is reduced by past disturbances (e.g. logging), but the Greater Glider (southern and central) is likely to use the habitat for both foraging and denning/breeding within remaining hollow-bearing trees. Similar and better habitat known to be used by the Greater Glider (southern and central) is more widespread in the landscape outside the Action area. The records within the existing Middlemount Coal Mine offset areas are shown on Figures 19a and 19b.

The potential indirect impacts on the Greater Glider (southern and central) associated with the Action (e.g. vehicle strike, noise, vibration, artificial lighting and/or the introduction of introduced species) are considered to be minimal and would only incrementally increase the likelihood of existing indirect impacts associated with the existing mining operations. Additionally, the realignment and extension of the diversion approved under EPBC 2010/5394 (but not yet constructed), Roper Creek Diversion 2 would result in disruption of connectivity prior to revegetation of the diversion. Whilst it is acknowledged that connectivity would be temporarily impacted, mitigation and management measures to address connectivity concerns would be implemented to reduce these impacts (Biodiversity Australia, 2025c) (Attachment I).

The Action is not likely to result in significant impacts from edge effects on potential habitat for this species outside of the Action area given the potential habitat is poorly connected to the Action area due to the existing fragmentation.

In regard to fragmentation impacts, the potential habitat for this species in the Action area is patchy and fragmented and does not provide strong connectivity to adjacent habitats. as the Action area is primarily encompassed by the approved Middlemount Coal Mine surface disturbance footprint. The action has potential for some fragmentation of Greater Glider (southern and central) habitats, especially those which occur along Roper Creek (Attachment C). Notwithstanding, Roper Creek Diversion 2 would be constructed and riparian vegetation would be established along its alignment which would have the effect of re-connecting the potential Greater Glider (southern and central) habitat along the creek.



LEGEND

- Mining Lease Boundary (ML)
- Middlemount Rail Spur and Loop
- Approved Disturbance Footprint
- Diversion Structure
- Levee
- Open Cut Pit Extension
- Approximate Extent of Additional Disturbance Associated with the Action

Species Habitat

- Greater Glider (Southern and Central) Habitat
- Greater Glider (Southern and Central) Recorded Location

Reference: 2 *Naturecall Environmental (2014)*
5 *Naturecall Environmental (2017)*
6 *Biodiversity Australia (2020)*

Source: MCPL (2025); Biodiversity Australia (2025); The State of Queensland (2022)
Orthophoto: MCPL (2025); ESRI Basemap (2024)

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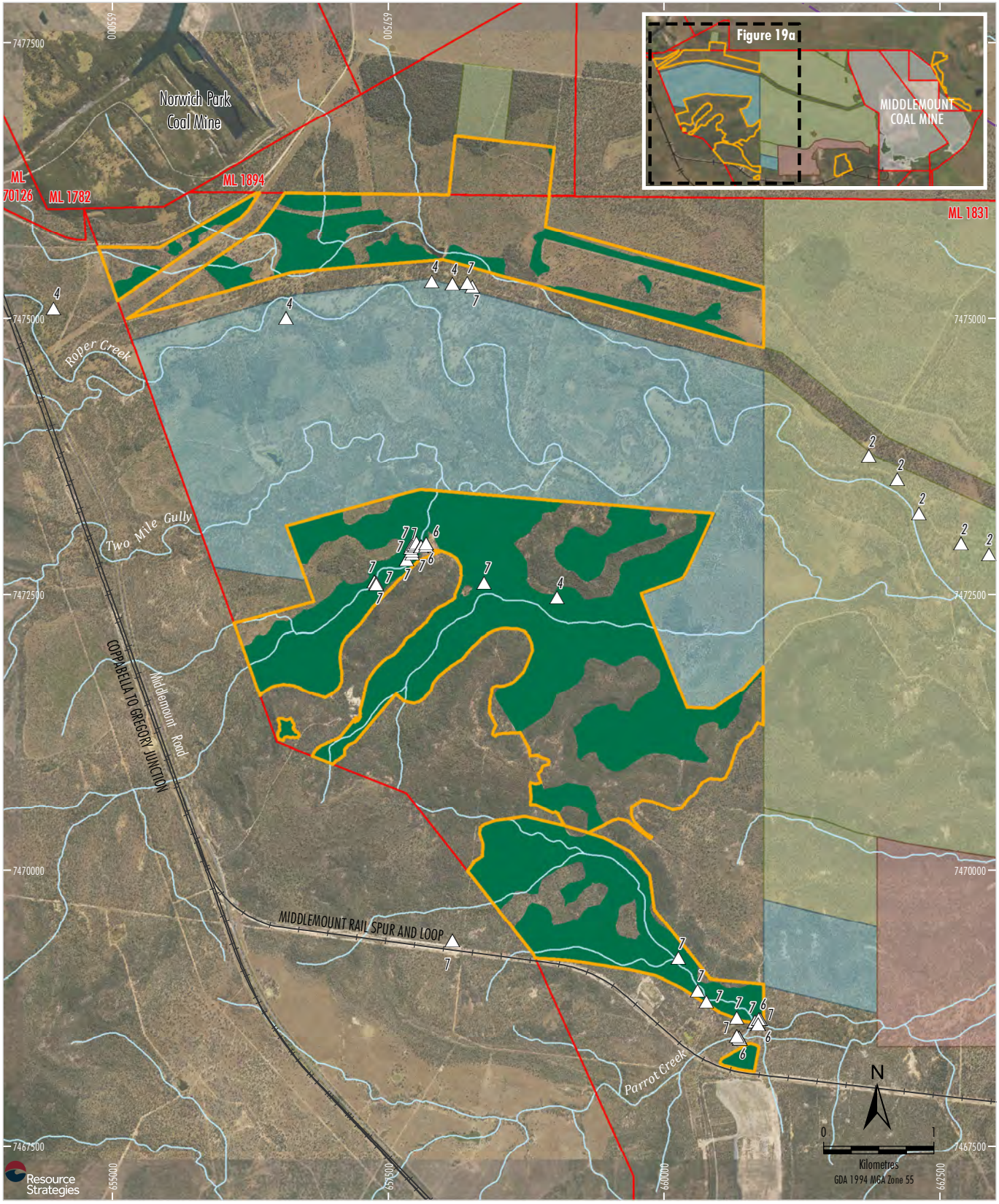
SOUTHERN EXTENSION PROJECT

Greater Glider (Southern and Central) Habitat - Action Area

Figure 18



MCPL-19-03 SE_EPBC_PD_219E

LEGEND

Mining Lease Boundary (ML)

Proposed Southern Extension Commonwealth Offset Area (EPBC 2021/8920)

Existing Offset Areas

North-eastern Extension Commonwealth Offset Area (EPBC 2016/7717)

Middlemount Coal (Stage 2) Project Commonwealth Offset Area (EPBC 2010/5394)

Western Extension Commonwealth Offset Area (EPBC 2017/8130)

Listed Threatened Species

Greater Glider (Southern and Central) Habitat

Greater Glider (Southern and Central) Recorded Location

Reference: 2 *Naturecall Environmental (2014)*
5 *Naturecall Environmental (2017)*
6 *Biodiversity Australia (2020)*

Source: MCPL (2025); Biodiversity Australia (2025); The State of Queensland (2022)
Orthophoto: MCPL (2025); ESRI Basemap (2024)

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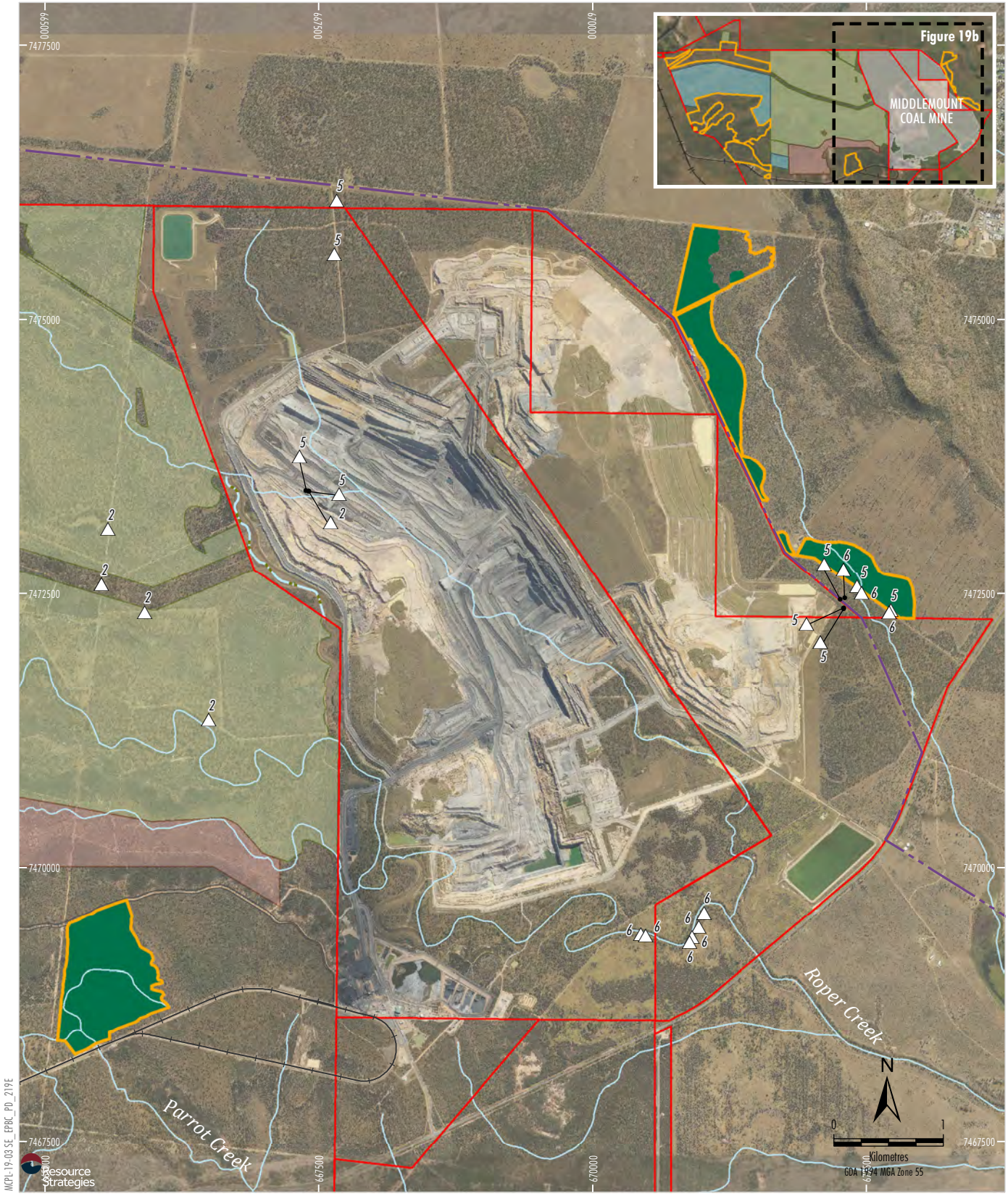
SOUTHERN EXTENSION PROJECT

Greater Glider (Southern and Central) Habitat - Proposed Offset Areas

Figure 19a



LEGEND

Mining Lease Boundary (ML)

Proposed Southern Extension Commonwealth Offset Area (EPBC 2021/8920)

Existing Offset Areas

North-eastern Extension Commonwealth Offset Area (EPBC 2016/7717)

Middlemount Coal (Stage 2) Project Commonwealth Offset Area (EPBC 2010/5394)

Listed Threatened Species

Greater Glider (Southern and Central) Habitat

Greater Glider (Southern and Central) Recorded Location

Reference: 2 *Naturecall Environmental (2014)*
5 *Naturecall Environmental (2017)*
6 *Biodiversity Australia (2020)*

Source: MCPL (2025); Biodiversity Australia (2025); The State of Queensland (2022)
Orthophoto: MCPL (2025); ESRI Basemap (2024)

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SOUTHERN EXTENSION PROJECT

Greater Glider (Southern and Central) Habitat - Proposed Offset Areas

Figure 19b

The change in cumulative impact on the Greater Glider (southern and central) as a result of the Action will be high at the local scale, however in consideration of the wider distribution of the species, extent of remaining habitat and the biodiversity offsets which have been (or would be provided), the cumulative impact in the locality is likely to be minimal.

2.6.4 Avoidance, Safeguards and Mitigation Measures

Potential impacts to the Greater Glider (southern and central) would be minimised through implementation of the following mitigation measures:

- Education of staff, including contractors, in relation to the risks to fauna and how to manage animals which are injured or displaced, including this species.
- MCPL will use a licensed spotter-catcher and/or carer during clearing activities.
- Where possible, timing of clearing habitat for this species will avoid the breeding season (i.e. April to June).
- Progressive rehabilitation of disturbance areas to progressively provide habitat resources during and post-mining (e.g. species characteristic of Poplar Box Woodland).
- MCPL will include the installation of additional fauna infrastructure as required to facilitate species movements (e.g. glider poles) along the diversion during the revegetation process when vegetation is in the early stages of development.

A National or State recovery plan has not been prepared for this species. The above measures are predicted to be effective in reducing potential adverse impacts on the Greater Glider (southern and central) because they are focused on addressing the recognised threats to the species that would occur as a result of the Action (e.g. clearing).

In addition, disturbed land within the Action area would be rehabilitated to a PMLU of Native Ecosystem (with non-native grasses) and include regional ecosystems such as RE 11.3.25 and RE 11.5.3, which are potential habitat for the Greater Glider (southern and central).

2.6.5 Offset

Six Greater Gliders (southern and central) were observed during a spotlighting survey within the proposed Southern Extension Offset area. The Greater Gliders (southern and central) were recorded in open woodland habitats adjacent ephemeral drainage features, in vegetation comprising RE 11.3.25 and RE 11.3.4.

Table 7 provides a detailed description of habitat for the Greater Glider (southern and central) in the Action area and the proposed Southern Extension Offset Area.

2.6.6 Conclusion/Consequential Impact

The Greater Glider (southern and central) is commonly recorded in wider locality, including existing and proposed offset areas. Habitat resources for the Greater Glider (southern and central) would remain outside of the Action area, such that the species is likely to persist in the landscape. An outcome of the Action would be approximately 975.14 ha of known and potential habitat for the Greater Glider (southern and central) would be enhanced and conserved as part of the proposed Southern Extension Offset Area (Figures 19a and 19b).

Table 7
Greater Glider (southern and central) Habitat within the Action Area and the Proposed Southern Extension Offset Area

Habitat Component/ Description*	Action Area	Offset Area
• *Eucalypt forests and woodlands containing trees with hollows suitable for denning.* • *Any additional vegetation communities the Greater Glider has been recorded from at the project site.*	The Greater Glider (southern and central) was recorded on numerous occasions during spotlighting (Figure 18). This species is locally common and has also been recorded on numerous occasions within the wider locality (Naturecall, 2014; Parsons Brinkerhoff, 2010a). Approximately 81.7 ha of known and potential habitat for the Greater Glider (southern and central) occurs in the Action area represented by all Eucalypt forests and woodlands present as these contain trees with hollows suitable for denning. Hollow-bearing trees and stags are common and a range of hollow-sizes are present (i.e. <5 centimetre [cm] to >20 cm diameter cavities). In the Action area, the Greater Glider (southern and central) was recorded within Poplar Box Woodland (RE 11.3.25, RE 11.3.2 and RE 11.5.3). Previous observations of this species on MCPL owned-land have noted that it prefers Eucalypt woodlands and open forest associated with major creeks (which do not occur in the Action area) and drainage lines, equivalent to RE types 11.3.25, 11.3.2, 11.3.4 and 11.3.7. It has also been occasionally noted in Poplar Box woodland equivalent to RE 11.5.3. Based on these previous observations, preferred forage species appear to be Moreton Bay Ash (*E. tessellaris*), Silver-leaved Ironbark (*E. melanophloia*) and Poplar Box.	Six Greater Gliders (southern and central) were observed during spotlighting surveys within the proposed Southern Extension Offset area (Figures 19a and 19b). The Greater Gliders (southern and central) were recorded in open woodland habitats near Roper Creek in REs 11.3.25 and RE 11.3.4. Approximately 975.14 ha of known and potential habitat for the Greater Glider occurs in the proposed Southern Extension Offset Area. Habitat for the Greater Glider (southern and central) comprises of 975.14 ha remnant vegetation representing all Eucalypt forests and woodlands present as these contain trees with hollows suitable for denning (Figures 19a and 19b). Hollow-bearing trees and stags are common and a range of hollow-sizes are present (i.e. <5 cm to >20 cm diameter cavities). Note that RE 11.5.2a and 11.5.9 were excluded as potential habitat for this species as the tree canopy was generally sparse, the community was exposed and very dry and hollow-bearing trees were rare.
Conclusion	The proposed Southern Extension Offset Area is suitably offsetting the impact in the Action area as the offset would provide: • the equivalent type of habitat to that within the Action area (i.e. potentially suitable habitat for the Greater Glider [southern and central]); • a greater area of potential habitat (approximately 81.7 ha in the Action area verse 975.14 ha in the offset area); and • larger patches of potential habitat (refer Figures 18, 19a and 19b).	

* Habitat Descriptions Provided by the Department of the Environment and Energy.

2.7 CUMULATIVE IMPACTS

Cumulative impacts are considered to be the total impact (direct and indirect) on the environment that would result from the incremental impacts of the Action added to other existing impacts.

Removal of vegetation and habitat for the Action would add to cumulative loss of vegetation from past landuses and clearing associated with the existing/approved Middlemount Coal Mine. The Action would also contribute to the cumulative impacts of vegetation clearance associated with a number of operational mines within the wider locality, these include:

- German Creek East – located approximately 5 km south of the Action area;
- Foxleigh – located approximately 12 km south-east of the Action area;
- Lake Lindsay – located approximately 15 km south south-east of the Action area; and
- Norwich Park – located approximately 20 km north-west of the Action area.

At a site level, the proposed clearance associated with the Action would result in an increase in native vegetation clearance of approximately 10% when compared to the existing/approved Middlemount Coal Mine (Attachment C). Approximately 630 ha of native vegetation is approved to be cleared for the Middlemount Coal Mine, however, the loss of vegetation associated with the approved mining operations has already been offset.

On a larger scale, the native vegetation communities to be cleared during the life of the Action all occur more widely in surrounding landscapes and subregions (after Accad *et al.,* 2017). The Action would result in the loss of approximately 0.015% of vegetation remaining within the Isaac-Comet Downs Subregion (Accad *et al.,* 2017) (Attachment C).

The proposed Southern Extension Offset Area for the Action would significantly increase the area of protected habitat that would be managed for conservation (bringing the total to 7,416.1 ha). The existing and proposed offset areas provide habitat for a number of common and threatened species as demonstrated from monitoring surveys (Appendix A of Attachment G) and their continued regeneration would help offset biodiversity losses from the Middlemount Coal Mine.

Evidence of natural regeneration present at the proposed offset areas is discussed further in Section 3.3 of Attachment G. In addition, the progressive rehabilitation of mining areas over the life of the Action would provide habitat in the medium to long term. The cumulative impacts and offsets for the Ornamental Snake, Squatter Pigeon (southern), Koala and Greater Glider (southern and central) are described in Sections 2.3 to 2.6, respectively.

Given the above, Biodiversity Australia (2025a) concluded that the additional clearance associated with the Action is considered to represent only a minor increase in cumulative vegetation loss. Accordingly, the Action is not anticipated to have a significant cumulative impact on terrestrial ecology.

2.8 AVOIDANCE, SAFEGUARDS AND MITIGATION MEASURES FOR THREATENED SPECIES AND COMMUNITIES

MCPL would minimise land clearance through the use of existing infrastructure and facilities (where possible) and minimising out-of-pit waste rock emplacements as far as practically possible. The existing environmental management systems at the Middlemount Coal Mine include environmental management plans and programs that have been developed and implemented since operations commenced. For example, relevant impact mitigation measures include the use of a licensed fauna spotter-catcher and/or carer during clearing activities and progressive rehabilitation of disturbance areas. The proposed mitigation measures follow the ‘S.M.A.R.T’ principle.

2.8.1 Fauna Connectivity

MCPL would mitigate impacts to connectivity, specifically impacts to Koala and Greater Glider (southern and central) movement, as a result of the realignment and extension of the diversion approved under EPBC 2010/5394 (but not yet constructed), Roper Creek Diversion 2 (Biodiversity Australia, 2025c) (Attachment I).

Fragmentation of Koala and Greater Glider (southern and central) habitat along Roper Creek is authorised within the approved disturbance footprint (Drawing 1). However, staged pit development and clearance of Roper Creek vegetation is proposed which provides the opportunity for MCPL to mitigate initial connectivity impacts through the installation of glider poles between remaining riparian vegetation. Drawing 1 provides an indication of the progressive extension of the open cut pit. Vegetation clearance will also occur progressively in line with the pit extent and therefore there would not be an immediate total impact to connectivity.

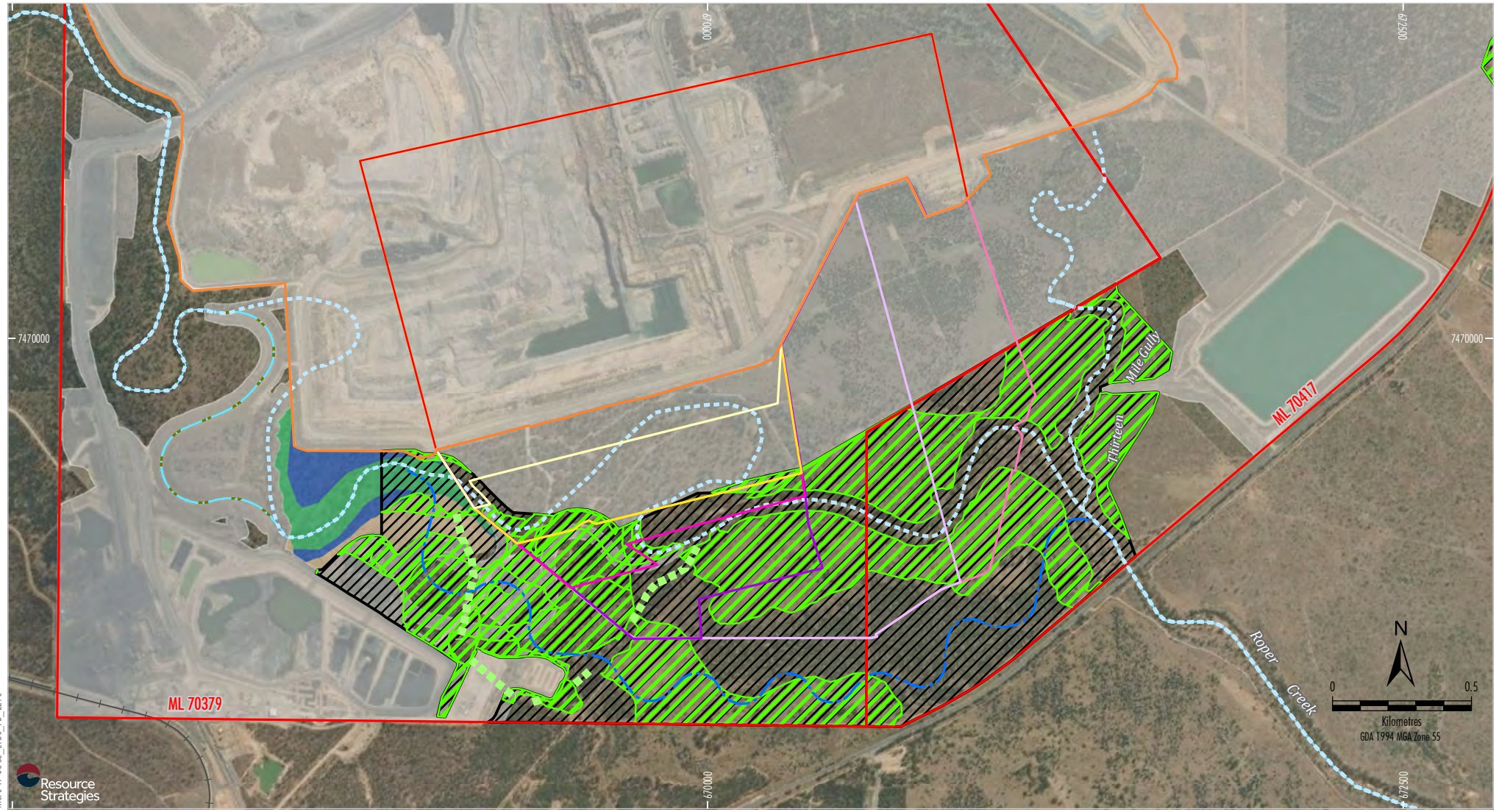
Following construction of the Roper Creek Diversion 2, immediate revegetation activities would occur which would involve planting effective stabilising ground species and tree species that will, once established, provide suitable habitat for the Koala and Greater Glider (southern and central). MCPL understand that trees take time to establish (approximately 10-15 years), therefore in the meantime, MCPL propose to incorporate connectivity mitigation measures such as glider poles to maintain connectivity of potential habitat between Roper Creek Diversion 1 and 2 until the pit has extended too far for this to be practicable, and mining activities require removal of the poles (approximately Year 4) (Drawing 1).

However, from approximately Year 4 there will be temporary loss of connectivity until the vegetation along the Roper Creek Diversion 2 has established and can provide suitable habitat for the Koala and Greater Glider (southern and central).

In addition to the above, MCPL would commit to installing fauna crossing infrastructure at the proposed haul road crossing along the Roper Creek Diversion 2, such as fauna culverts with Koala furniture and glider poles, to facilitate movement across the haul road (Biodiversity Australia, 2025c) (Attachment I). This would include survey effort and performance criteria requirements to:

- monitor fauna crossing infrastructure throughout the revegetation of Roper Creek Diversion 2, in accordance with the revegetation milestone criteria for treatment zone 3 outlined in Table 10 of the *Revegetation Management Plan*; and
- monitor the establishment of suitable tree canopy height to facilitate glider movements along Roper Creek.

A standalone *Roper Creek Diversion 2 Fauna Connectivity Management Plan* has been prepared (Biodiversity Australia, 2025c) (Attachment I). This plan has been designed in consideration of the state prescribed *Revegetation Management Plan* and *Progressive Rehabilitation Closure Plan* (PRCP) and includes more detail of proposed rehabilitation measures to mitigate the impacts to connectivity such as the installation of fauna infrastructure, and feasibility of retaining remnant vegetation along the Roper Creek Diversion 2 to facilitate connectivity within the disturbance area.



MCPL-19-03-SE_EPBC_PD_227C

LEGEND

- Middlemount Coal Mining Lease Boundary (ML)
- Middlemount Rail Spur and Loop
- Rpper Creek Diversion 1
- Roper Creek Diversion 2
- Approximate Extent of Additional Disturbance Associated with the Action
- Approved Disturbance Footprint
- Indicative Connectivity Mitigation Measure
- Existing Watercourse Alignment

Species Habitat

- Koala and Greater Glider Habitat

Indicative Open Cut Extent (Years)

- Year 1
- Year 2
- Year 3
- Year 4
- Year 7
- Year 11
- Year 16

Regional Ecosystem

- 11.3.2 - Eucalyptus populnea woodland on alluvial plains
- 11.3.25 - Eucalyptus tereticornis or E. camaldulensis woodland fringing drainage lines
- Non-remnant (cleared)

Source: MCPL (2022); The State of Queensland (2022)
Orthophoto: ESRI Basemap (2021)

SOUTHERN EXTENSION PROJECT

Indicative Development of Open Cut Extent within the Action Area

Drawing 1

2.8.1.1 Koala Connectivity

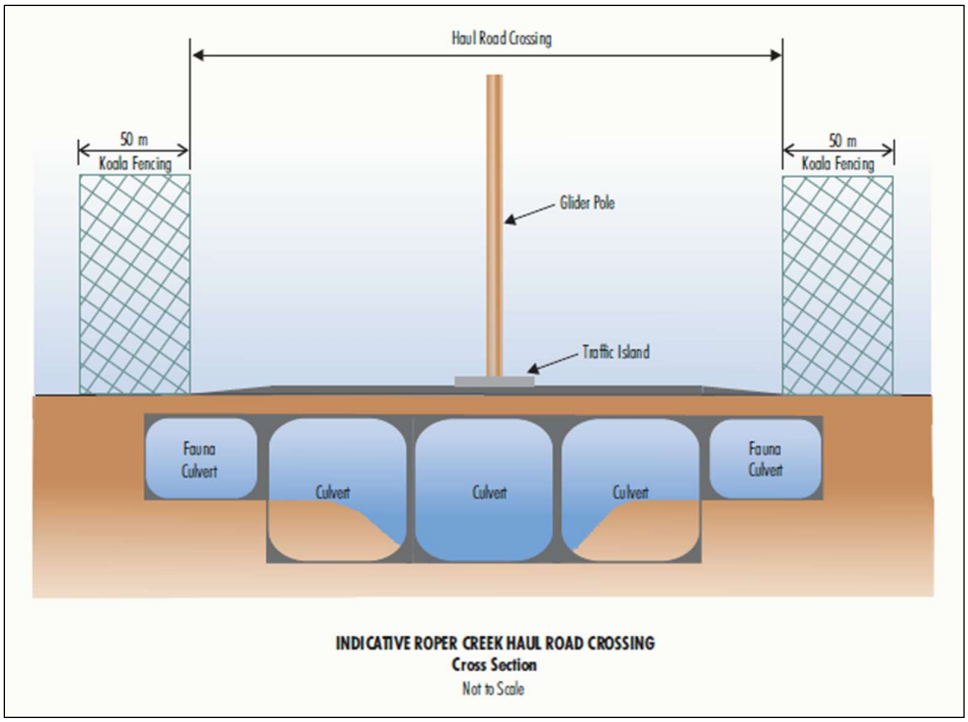
MCPL has considered what measures would be appropriate to achieve the best outcome for maximising Koala safety and habitat connectivity in the vicinity of the realignment and extension of the diversion approved under EPBC 2010/5394 (but not yet constructed), Roper Creek Diversion 2 haul road.

It is anticipated that the haul road would experience very low traffic flows, comprising predominantly of light vehicles and some heavy vehicles. Koala crossing infrastructure is recommended when traffic flows present a high risk to Koala safety and should be incorporated alongside exclusion fencing to separate Koalas and traffic.

Despite the likely low density of Koalas and low traffic, as requested by Cth DCCEEW, MCPL would incorporate fauna crossing design features within the detailed design of the proposed realigned Roper Creek Diversion 2 to allow Koalas to cross safely between habitat on either side of the proposed haul road during normal water flow events (Drawing 2).

The design would be informed by best practice guidelines and would accommodate flow events by incorporating features such as Koala furniture/ledges (e.g. timber posts, rails) to provide a dry path for movement. Potential underpass designs would include Koala exclusion fencing installed either side of the culverts, to funnel Koalas towards the fauna culverts and away from traffic, as well as features to enhance natural lighting (e.g. skylights) to encourage fauna usage.

MPCL incorporated specific design details of the fauna crossing infrastructure as well as the feasibility of retaining remnant vegetation along Roper Creek Diversion 2, to facilitate connectivity within the disturbance area, within the *Roper Creek Diversion 2 Fauna Connectivity Management Plan* (Biodiversity Australia, 2025c) (Attachment I) as advised by specialist inputs during detailed design.



Drawing 2 Indicative Schematic Design of the Proposed Haul Road Diversion Crossing

2.8.1.2 Greater Glider (southern and central) Connectivity

As Greater Gliders (southern and central) inhabit trees and avoid travelling across the ground, it is not expected they would make use of proposed fauna culverts. Therefore, MCPL would commit to installing a series of glider poles to facilitate Glider connectivity across the haul road crossing (Drawing 3). As the proposed width of the haul road is 40 m, the glider poles would be installed either side of the crossing within extended traffic islands in the centre of the crossing (which would increase the overall width of the haul road), to provide an opportunity for gliders to cross between riparian habitat either side of the haul road.

Drawing 3 Examples of Glider Poles (left) and Koala Furniture in Culverts (right)
Source (Fauna Crossings, 2021)

2.8.2 Summary Of Avoidance, Safeguards and Mitigation Measures for Threatened Species And Communities

Table 8 provides a summary of avoidance, safeguards and mitigation measures for threatened species and communities. The measures are predicted to be effective in reducing potential adverse impacts on the threatened species, Brigalow TEC and Poplar Box TEC because they are focused on addressing the recognised threats to each species and relevant TECs in consideration of the following best practise sources such as threat abatement plans (DotE, 2015; DEWHA, 2008) and Qld Government species management program under section 332 of the *Nature Conservation [Wildlife Management] Regulation 2006*. The Species Management Program as viewable here: https://environment.des.qld.gov.au/licences-permits/plants-animals/species-management-program.

Table 8
Summary of Avoidance, Safeguards and Mitigation Measures for Threatened Species and Communities

Species/Community	Avoidance, Safeguards and Mitigation Measures
Brigalow TEC and Poplar Box TEC	Potential impacts to Brigalow TEC and Poplar Box TEC would be minimised through implementation of the following measures: • Boundaries of areas to be cleared, and those not to be cleared, would be defined before and during clearing activities. • Weed management techniques would continue to be implemented annually within the MLs (e.g. weed control [spraying] and washdown of machinery when moving from weed infested areas). • The revegetation species list for Roper Creek Diversion 2 and surrounds would include species characteristic of Brigalow TEC and Poplar Box TEC, where possible. Rehabilitation criteria is included in Attachment H. A monitoring programme will be included in the PRCP.
Ornamental Snake (*Denisonia maculata)*	Potential impacts to the Ornamental Snake would be minimised through implementation of the following measures: • Education of staff, including contractors, in relation to the risks to fauna and how to manage animals which are injured or displaced, including this species. • MCPL would use a licensed spotter-catcher and/or carer during clearing activities. • Continuation of the feral animal control measures annually within the MLs, including the control of European Red Fox and Feral Cat, biannually for the life of the mine. • Progressive rehabilitation of disturbance areas to progressively provide habitat resources during and post-mining (the revegetation species list for Roper Creek Diversion 2 and surrounds would include species characteristic of the Brigalow TEC [potential habitat for this species]). Rehabilitation criteria is included in Attachment H. A monitoring programme will be included in the PRCP.
Squatter Pigeon (southern) (*Geophaps scripta scripta)*	Potential impacts to the Squatter Pigeon (southern) would be minimised through implementation of the following measures: • Education of staff, including contractors, in relation to the risks to fauna and how to manage animals which are injured or displaced, including this species. • MCPL would use a licensed spotter-catcher and/or carer during clearing activities. • Continuation of the feral animal control measures annually within the MLs, including the control of European Red Fox and Feral Cat, biannually for the life of the mine. • All roads in the Action area would be limited to a 60 km/h speed limit which would reduce the risk of vehicle strike. • Progressive rehabilitation of disturbance areas to progressively provide habitat resources during and post-mining (e.g. overburden revegetated with species characteristic of Poplar Box Woodland). Rehabilitation criteria is included in Attachment H. A monitoring programme will be included in the PRCP.
Greater Glider (southern and central) (*Petauroides volans*)	Potential impacts to the Greater Glider (southern and central) would be minimised through implementation of the following measures: • Education of staff, including contractors, in relation to the risks to fauna and how to manage animals which are injured or displaced, including this species. • MCPL would use a licensed spotter-catcher and/or carer during clearing activities. • Where possible, timing of clearing habitat for this species would avoid the breeding season (i.e. April to June). • Progressive rehabilitation of disturbance areas to progressively provide habitat resources during and post-mining (e.g. overburden revegetated with species characteristic of Poplar Box Woodland). Rehabilitation criteria is included in Attachment H. A monitoring programme will be included in the PRCP. • The PRCP will outline the objective to establish habitat connectivity values capable of supporting fauna through the increase of riparian habitat connectivity and safe fauna movement. • MCPL would install additional fauna infrastructure (e.g. glider poles) as required to facilitate species movements along the diversion when vegetation is in the early stages of establishment.

Table 8 (continued)
Summary of Avoidance, Safeguards and Mitigation Measures for Threatened Species and Communities

Species/Community	Avoidance, Safeguards and Mitigation Measures
Koala (*Phascolarctos cinereus)*	Potential impacts to the Koala would be minimised through implementation of the following measures: • Education of staff, including contractors, in relation to the risks to fauna and how to manage animals which are injured or displaced, including this species. • MCPL would use a licensed spotter-catcher and/or carer during clearing activities. If a Koala is present in the proposed clearing area, it would be left to move away from the clearance area on its own accord. • Continuation of the feral animal control measures annually within the MLs, including the control of Wild Dogs, biannually for the life of the mine. • The haul road crossing will be limited to a 40 km/h speed limit which will further reduce the risk of vehicle strike. • All other roads in the Action area would be limited to a 60 km/h speed limit which would reduce the risk of vehicle strike. • Progressive rehabilitation of disturbance areas to progressively provide habitat resources during and post-mining (e.g. overburden revegetated with species characteristic of Poplar Box Woodland). Rehabilitation criteria is included in Attachment H. A monitoring programme will be included in the PRCP. • The PRCP will outline the objective to establish habitat connectivity values capable of supporting fauna through the increase of riparian habitat connectivity and safe fauna movement. • MCPL would install additional fauna infrastructure (e.g. fauna culverts with Koala furniture) as required to facilitate species movements across the proposed haul road crossing whilst vegetation is in the early stages of establishment.

2.9 PROPOSED BIODIVERSITY OFFSET PACKAGE

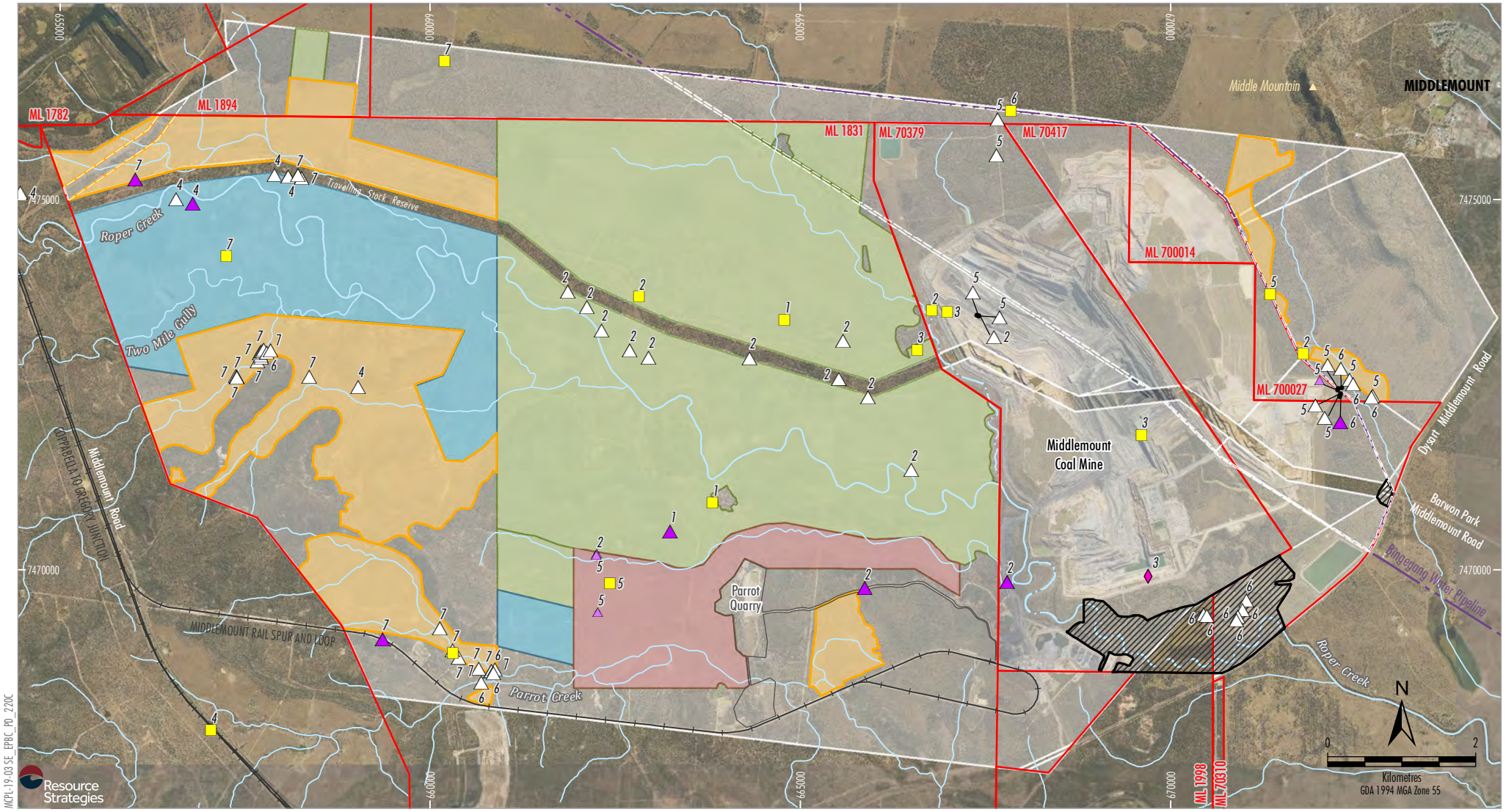
2.9.1 Existing Offset Areas

MCPL currently has a number of existing biodiversity offset areas on company-owned land which were established for various components of the Middlemount Coal Mine (Figure 20). All of the existing biodiversity offset areas are secured via a voluntary declaration (VDec) of an area of high nature conservation value under the Qld *Vegetation Management Act 1999* (VM Act) (Declared Area Map 2019/004056).

A summary of the area of each of these existing biodiversity offset areas is provided in Table 9.

Table 9
Existing Middlemount Coal Mine Offset Areas

Offset Area	Source of Offset Requirement	Size (ha)
Middlemount Coal (Stage 2) Project Commonwealth Offset Area	EPBC 2010/5394	3,318
Rail Loop and Spur Offset Area	Decision Notice IC0410MKY003 Deed of Agreement	110
Parrot Quarry Offset Area	DERM Permit number: 2010/003611 Deed of Agreement	15.4
Thirteen Mile Gully Diversion Offset Area	*Sustainable Planning Act 2009* and EPBC 2010/5394*	31
North-eastern Extension Commonwealth Offset Area	EPBC 2016/7717	532
North-eastern Extension State Offset Area	EPML00716913	181
Western Extension Commonwealth Offset Area	EPBC 2017/8130	1,220
Western Extension State Offset Area	EPML00716913	454
Total		**5,861.4**



LEGEND

- Mining Lease Boundary (ML)
- Middlemount Coal Owned Land
- Railway
- Approximate Extent of Additional Disturbance Associated with the Action
- Proposed Southern Extension Commonwealth Offset Area (EPBC 2021/8920)

Existing Offset Areas

- North-eastern Extension Commonwealth Offset Area (EPBC 2016/7717)
- Middlemount Coal (Stage 2) Project Commonwealth Offset Area (EPBC 2010/5394)
- Western Extension Commonwealth Offset Area (EPBC 2017/8130)

Threatened Species Records

- Squatter Pigeon (Southern)
- Ornamental Snake
- Greater Glider (Southern and Central)
- Koala
- Koala Scats

Reference:
1 *Ecology and Heritage Partners (2012)*
2 *Naturecall Environmental (2014)*
3 *Parsons Brinkerhoff (2010)*
4 *Biodiversity Australia (2018)*
5 *Naturecall Environmental (2017)*
6 *Biodiversity Australia (2020)*
7 *Biodiversity Australia (2022)*

Source: MCPL (2024); State of Queensland (2024)
Orthophoto: MCPL (2025); ESRI Basemap (2024)

middlemount coal PTY LTD

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Extent of Approved and Proposed Offsets Under the EPBC Act and Threatened Species Records

Figure 20

2.9.2 Proposed Biodiversity Offset Strategy

A proposed biodiversity offset strategy to address residual significant impacts from the Action (and impacts of the Action on Matters of State Environmental Significance [MSES]) is described in the subsections below.

2.9.2.1 Proposed Southern Extension Offset Areas

The proposed Southern Extension Offset Areas, comprising of three separate sub-areas, are proposed approximately 10 km south-west of the Middlemount township (Figure 10). The proposed offset areas occur within the Isaac-Comet Downs subregion of the North Brigalow Belt Bioregion, within the Fitzroy catchment and are adjacent to the existing biodiversity offset areas (Table 9). The closest State Government reserves are Bundorra State Forest located approximately 10 km south-west and Junee National Park located approximately 20 km north-east (Figure 1).

MCPL has a registered interest in the land on which the offset areas are proposed (Table 10) and there are no other relevant parties with registered interests under the Qld *Land Act 1994* or the Qld *Land Title Act 1994*.

Table 10
Relevant Offset Area Details

Reference	Landholder Details
Registered Owner on Title	Middlemount Coal Pty Ltd
Real Property Description	Lot 2, SP 210524 [part of] Lot 3, SP 282156 [part of]

Biodiversity Australia (2025b) undertook flora and fauna surveys in accordance with contemporary Qld and Commonwealth survey guidelines to assess the suitability of the proposed offset areas. Field surveys were undertaken in October 2020 and November 2023.

The flora surveys were undertaken in accordance with the Qld Herbarium vegetation survey methods described in Neldner *et al.* (2017). Survey techniques included a combination of secondary and quaternary surveys, identification of TECs, targeted searches for conservation significant species and random meanders (Attachment C).

Habitat Quality Assessments were also conducted across the offset areas in accordance with the *Guide to Determining Terrestrial Habitat Quality Version 1.3* (DES, 2020a), including an assessment of required number of sampling sites, site condition assessment, site context assessment and fauna species habitat assessment. The field survey methodologies are further described in detail in the *Southern Extension Project Offset Baseline Assessment* (Biodiversity Australia, 2025b) (Appendix A of Attachment G).

2.9.2.2 Southern Extension Commonwealth Offset Area (EPBC 2021/8920)

The proposed Southern Extension Offset Area is located to the north and south of the existing Western Extension Commonwealth Offset Area (EPBC 2017/8130), thus provides connectivity to existing conserved habitat (Figure 20). The proposed Southern Extension Offset Area is approximately 1,554.7 ha in size, comprising approximately 1,303.76 ha of woodland vegetation and approximately 250.94 ha of derived grassland and vegetation in the early stage of regrowing from past clearance.

The proposed Southern Extension Offset Area would offset the clearance of 3.5 ha of Brigalow TEC (represented by 3.5 ha of RE 11.3.1). The proposed Southern Extension Offset Area would contain approximately 84.93 ha of Brigalow TEC (represented by non-remnant RE 11.3.1) (Figure 11).

The proposed Southern Extension Offset Area would also offset the clearance of 43.88 ha of Poplar Box TEC. The proposed Southern Extension Offset Area would contain approximately 238.49 ha of Poplar Box (represented by remnant and non-remnant RE 11.3.2) (Figure 11).

The proposed Southern Extension Offset Area provides a suitable offset for the four threatened species identified. Two of these threatened species, the Squatter Pigeon (southern) and Greater Glider (southern and central), were recorded by Biodiversity Australia (2025b) within the proposed Southern Extension Offset Area (Figure 20). The other two threatened species, the Ornamental Snake and Koala have both been recorded in the general locality and both are considered likely to occur within the proposed Southern Extension Offset Area (Figure 20).

Table 11 provides a reconciliation of the area (in ha) of each MNES being impacted by the Action and the area of land which would be included in the proposed Southern Extension Offset Area. The EPBC Act *Offsets Assessment Guide* (DSEWPaC, 2012a) was applied by Biodiversity Australia (2025b) (Appendix A of Attachment G).

Table 11
Suitability of the Proposed Southern Extension Offset Area for Relevant MNES

Species/Community	Clearance Area (ha)	Component in the Offset Area	Habitat available within the Proposed EPBC Act Offset Area (ha)	Percentage (%) of Total Impact that is Offset
Ornamental Snake	17.21 (3.48 ha remnant and 13.73 ha regrowth)	Woodland/Forest Habitat	42.03	135.36
		Vegetation in the Early Stage of Regrowing from Past Clearance	42.9	68.23
		Total	**84.93**	**203.59**
Squatter Pigeon (southern) Breeding and Foraging Habitat	250.22 (86.03 ha remnant and 164.19 ha regrowth)	Woodland/Forest Habitat	1,256.5	162.92
		Regrowth Habitat	240.92	51.26
		Total	**1,497.42**	**214.18**
Koala	183 (81.7 ha remnant and 101.3 ha regrowth)	Woodland/Forest Habitat	980.27	149.1
		Vegetation in the Early Stage of Regrowing from Past Clearance	198.02	58.85
		Total	**1,178.29**	**207.95**
Greater Glider (southern and central)	81.7	Woodland/Forest Habitat	975.14	149.7
		Vegetation in the Early Stage of Regrowing from Past Clearance	-	-
		Total	**975.14**	**149.7**
Brigalow Woodland TEC	3.48	Woodland/Forest Habitat	42.03	151.4
		Vegetation in the Early Stage of Regrowing from Past Clearance	42.90	-
		Total	**84.93**	**151.4**
Poplar Box TEC	43.88	Woodland/Forest Habitat	166.61	81.64
		Vegetation in the Early Stage of Regrowing from Past Clearance	71.88	35.22
		Total	**238.49**	**116.86**

Regional Ecosystems ground-truthed by Biodiversity Australia (2025b) within the proposed Southern Extension Offset Area are listed in Table 12 and shown on Figures 10a and 10b.

Table 12
Regional Ecosystems – Proposed Southern Extension Offset Area

Regional Ecosystem	Short Description	Vegetation (ha)	Ornamental Snake Habitat	Squatter Pigeon (southern) Habitat	Koala Habitat	Greater Glider (southern and central) Habitat
11.3.1	*Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains	2.21	2.21	-	-	-
11.3.2	*Eucalyptus populnea* woodland on alluvial plains	166.61	-	166.61	166.61	166.61
11.3.4	*Eucalyptus tereticornis* and/or *Eucalyptus spp.* woodland on alluvial plains; and *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines	35.84	-	35.84	35.84	35.84
11.3.4a	*Eucalyptus tereticornis* and/or *Eucalyptus spp.* woodland on alluvial plains; *Corymbia tessellaris* woodland on alluvial sandridges	0.23	-	0.23	0.23	0.23
11.3.7	*Corymbia spp.* woodland on alluvial plains	8.47	-	-	-	-
11.3.21	*Dichanthium sericeum* and/or *Astrebla* spp. grassland on alluvial plains. Cracking clay soils	5.95	-	-	-	-
11.3.25	*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines	66.18	-	66.18	66.18	66.18
11.3.27d	*Eucalyptus camaldulensis* and/or *E. tereticornis* woodland. A range of sedges and grasses occur in the ground layer including *Fimbristylis vagans, Myriophyllum striatum, Nitella pseudoflabellata and Pseudoraphis sp.* Occurs fringing large lakes. Palustrine wetland (e.g. vegetated swamp)	30.63	-	-	-	-
11.4.2	*Eucalyptus spp.* and/or *Corymbia spp.* grassy or shrubby woodland on Cainozoic clay plains	26.53	-	26.53	26.53	26.53
11.4.8	*Eucalyptus cambageana* woodland to open forest with *Acacia harpophylla* or *A. argyrodendron* on Cainozoic clay plains	18.62	18.62	18.62	-	-
11.4.9	*Acacia harpophylla* shrubby open forest to woodland with *Terminalia oblongata* on Cainozoic clay plains	21.2	21.2	21.2	-	-
11.5.2	*Eucalyptus crebra, Corymbia spp.,* with *E. moluccana* woodland on lower slopes of Cainozoic sand plains and/or remnant surfaces	73.15	-	73.15	73.15	73.15
11.5.2a	*Allocasuarina luehmannii* low tree layer with or without emergent woodland	32.57	-	32.57	32.57	32.57
11.5.3	*Eucalyptus populnea +/- E. melanophloia +/- Corymbia clarksoniana* woodland on Cainozoic sand plains and/or remnant surfaces	425.44	-	425.44	425.44	425.44

Table 12 (continued)
Regional Ecosystems – Proposed Southern Extension Offset Area

Regional Ecosystem	Short Description	Vegetation (ha)	Ornamental Snake Habitat	Squatter Pigeon (southern) Habitat	Koala Habitat	Greater Glider (southern and central) Habitat
11.5.8b	*Melaleuca* spp., *Eucalyptus crebra, Corymbia intermedia* woodland on Cainozoic sand plains and/or remnant surfaces	5.13	-	5.13	5.13	-
11.5.9	*Eucalyptus crebra* and other *Eucalyptus* spp. and *Corymbia* spp. woodland on Cainozoic sand plains and/or remnant surfaces	71.42	-	71.42	71.42	71.42
11.7.2	*Acacia spp.* woodland on Cainozoic lateritic duricrust. Scarp retreat zone	236.41	-	236.41	-	-
11.7.4	*Eucalyptus decorticans* and/or *Eucalyptus spp.*, *Corymbia spp.*, *Acacia spp.*, *Lysicarpus angustifolius* woodland on Cainozoic lateritic duricrust	77.17	-	77.17	77.17	77.17
	Sub-total[1]	**1,303.76**	**42.03**	**1,256.5**	**980.27**	**975.14**
	Regrowth	**250.94**	**42.9**	**240.92**	**198.02**	**-**
	Total[1]	**1,554.7**	**84.93**	**1,497.42**	**1,178.29**	**975.14**

[1] Value is rounded

Source: Biodiversity Australia (2025b)

A reconciliation of the proposed Southern Extension Offset Area against the Commonwealth offset principles is presented in Table 13.

Table 13
Reconciliation of the Proposed Southern Extension Offset Area against the Commonwealth Offset Principles

Offset Principles[1]	Elements of the Proposed Biodiversity Offset Package that Address these Requirements
Deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environmental law and affected by the action.	The proposed offset area is specifically tailored to the relevant protected matters (i.e. Brigalow TEC, Poplar Box TEC, Ornamental Snake, Squatter Pigeon [southern], Koala and Greater Glider [southern and central]) and to deliver an overall conservation outcome that improves or maintains the viability of each protected matter.
Be built around direct offsets but may include other compensatory measures.	The Commonwealth offset requirements would be satisfied by the proposed Southern Extension Offset Area (Figure 20).
Be in proportion to the level of statutory protection that applies to protected matters.	The size and scale of the proposed Southern Extension Offset Area provides for greater than 100% of the offset requirements for each protected matter relevant to the Action. This was determined by applying the EPBC Act *Offsets Assessment Guide* (DSEWPaC, 2012a).
Be of a size and scale proportionate to the impacts on the protected matter.	The size and scale of the proposed Southern Extension Offset Area provides for greater than 100% of the offset requirements for each protected matter relevant to the Action. This was determined by applying the EPBC Act *Offsets Assessment Guide* (DSEWPaC, 2012a). Given this, it is determined that the proposed Southern Extension Offset Area is of a suitable size and scale proportionate to the impacts of each protected matter.
Effectively account for and manage the risks of the offset not succeeding.	The EPBC Act *Offsets Assessment Guide* (DSEWPaC, 2012a), which was applied to the Action accounts for the risk of the offset not succeeding. In addition, measures to manage the proposed Southern Extension Offset Area would provide for ongoing adaptive management in the unlikely event that the offset is not succeeding. The implementation of the offset strategy is likely to be a condition of Environmental Approval (Attachment B).

Table 13 (continued)
Reconciliation of the Proposed Southern Extension Offset Area against the Commonwealth Offset Principles

Offset Principles[1]	Elements of the Proposed Biodiversity Offset Package that Address these Requirements
Be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs.	The implementation of the offset strategy is beyond existing requirements, in that it is not part of any private conservation reserve system. The enduring protection that would be applied to the proposed Southern Extension Offset Area are new and additional under duty of care or any environmental planning laws.
Be efficient, effective, transparent, proportionate, scientifically robust and reasonable.	The proposed Southern Extension Offset Area would efficiently and effectively compensate for the impacts on the protected matters and help maintain the viability of the protected matters. Flora and fauna surveys of the proposed Southern Extension Offset Area have already been undertaken to determine: • the area of the offset in comparison to the area of impact; • the nationally threatened fauna and flora species present (or predicted to occur) and their conservation status; and • the connectivity and condition of the native vegetation/fauna habitat; and management actions and security for the proposed Southern Extension Offset Area.
Have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.	Consistent with the existing offset areas, MCPL would seek to secure the proposed offset area through a VDec under the VM Act.

[1] From DSEWPaC (2012b).

2.9.3 Offset Security

Consistent with the existing offset areas, MCPL would seek to secure the proposed offset area through a VDec under the VM Act. It is intended that the VDec would cover the proposed offset areas.

2.9.4 Offset Management

Consistent with the existing/approved offset areas, the primary method for regenerating the proposed offset area would be through the management of threatening processes that inhibit natural regeneration. In this regard, the likely management measures that would be developed for the proposed offset area include (but are not limited to) the following:

- On-ground set up of the proposed offset area (e.g. fencing where relevant, installing locked gates, signage, access tracks).
- Weed Management Strategy.
- Vertebrate Pest Management Strategy.
- Fire management.
- Management of livestock.

In the unlikely event that natural regeneration is not readily occurring or species composition is poor, active seeding/planting would be undertaken as needed.

2.10 OFFSET MANAGEMENT PLAN

The approved *Middlemount Coal Mine Offset Management Plan/Vegetation Management Plan* (MCPL, 2019a) covers all existing/approved offset areas.

MCPL has prepared the *Middlemount Coal Mine Southern Extension Offset Management Plan/Vegetation Management Plan Addendum* (the Southern Extension Offset Management Plan) (MCPL, 2025) for the Southern Extension Commonwealth and State offset areas (Section 2.9.2).

The Southern Extension Offset Management Plan is provided in Attachment G. The revised plan provides the following for the proposed Southern Extension Commonwealth Offset Area:

- details of the location of the Southern Extension Commonwealth Offset Area (Section 2 of Attachment G);
- a description of the current condition (prior to any management activities) of the Southern Extension Commonwealth Offset Area, including existing vegetation (the baseline condition) and value as habitat for listed threatened species (Section 2 of Attachment G);
- a map to clearly define the location and boundaries of the Southern Extension Commonwealth Offset Area (Figure 4 of Attachment G);
- details of how the Southern Extension Commonwealth Offset Area provide connectivity with the other existing/approved offset areas (Section 2 of Attachment G);
- a description of the management measures that would be implemented for the Southern Extension Commonwealth Offset Area, including a timeline for when management measures would be implemented (Section 3 of Attachment G and the management schedule in Section 3.13 of Attachment G);
- a program to monitor and report on the effectiveness of these measures, and progress against the performance and completion criteria (Section 5 of Attachment G); and
- details of the tenure proposed for the Southern Extension Commonwealth Offset Area (i.e. Vdec) (Section 1.3 of Attachment G).

Shapefiles of the boundaries of the Southern Extension Commonwealth Offset Area can be provided separately to Cth DCCEEW.

3 WATER RESOURCES

As described in Section 1, the Middlemount Coal Mine is an existing mine and full-scale operations commenced in July 2011. The existing/approved Middlemount Coal Mine already impacts surface water and groundwater resources, for example through diversions of Thirteen Mile Gully and Roper Creek and groundwater drawdown associated with the open cut mining operation. These impacts are authorised under the Middlemount Coal Project Stage 2 (EPBC 2010/5394), North-eastern Extension (EPBC 2016/7717) and Western Extension (EPBC 2017/8130) EPBC Commonwealth approvals.

The Action provides for the continuation of open cut coal mining operations at the Middlemount Coal Mine, including the realignment and extension of the diversion approved under EPBC 2010/5394 (but not yet constructed), Roper Creek Diversion 2 and a minor incremental increase in groundwater drawdown associated with the open cut extension to the south of the authorised open cut mine extents.

Authorised impacts on water resources are currently being regulated under the Qld EP Act (Middlemount Coal Mine operates under EA EPML00716913) and Qld *Water Act 2000* (Water Act) (water licences). The water resource conditions from EA EPML00716913 are provided in Attachment H. Importantly, the Action was approved by the DES under Chapter 5, Part 7 of the Qld EP Act through a major amendment of EA EPML00716913 in May 2021. The water resource conditions in Attachment H have therefore been updated by the Qld Government to incorporate the activities associated with the Action.

The assessment of potential surface water impacts from the Action is supported by the Surface Water Impact Assessment (WRM Water and Environment Pty Ltd [WRM], 2020) and is included in Attachment D. The assessment of potential groundwater impacts from the Action is based on the modelling and assessment conclusions presented in the Groundwater Impact Assessment (AGE, 2020a), and is included in Attachment E.

The Surface Water Impact Assessment (WRM, 2020) (Attachment D) relevantly includes:

- an assessment of the site water management system (including site water balance modelling and final void recovery modelling) (Sections 5 and 6 in Attachment D);
- design and assessment of the realigned and extended Roper Creek Diversion 2 (including hydraulic and geomorphic characteristics) (Section 9 in Attachment D);
- flood modelling and assessment (including levees and final landforms) (Section 9 in Attachment D); and
- assessment of cumulative impacts and consideration of mitigation and management measures (Section 10 in Attachment D).

The Groundwater Impact Assessment (AGE, 2020a) (Attachment E) relevantly includes:

- a conceptual groundwater model, based on available geological and topographical maps, geological information from exploration bores, groundwater level and quality data and results from previous hydrogeological investigations (Section 6, and Appendices D and E in Attachment E);
- a bore census report, prepared by 4T Consultants Pty Ltd (4T) (2017) (Appendix C in Attachment E);
- a numerical modelling report (Appendix F in Attachment E), including:
  - model confidence level classification;
  - model calibration and verification;
  - groundwater fate modelling; and
  - uncertainty analysis.
- groundwater dependent ecosystems (GDE) assessment (Section 6.8 in Attachment E);

- stygofauna assessment (Section 6.9 in Attachment E); and
- groundwater monitoring strategy/program (Section 9 in Attachment E).

The 2018 groundwater model used for the Action was previously peer reviewed by Dr Noel Merrick of HydroAlgorithmics Pty Ltd as part of the Western Extension Project and the peer review letter is included in Attachment F. Dr Noel Merrick concluded the Groundwater Impact Assessment addressed the objectives satisfactorily and the model underpinning the Groundwater Impact Assessment is "fit for purpose (HydroAlgorithmics, 2018) (Attachment F).

The following subsections have been largely re-produced based on these assessments, considering the impact of the Action on water resources, and if these impacts are significant according to the *Significant impact guidelines 1.3: Coal seam gas and large coal mining developments – impacts on water resources* (DotE, 2013b). A detailed reconciliation against the IESC Information Guidelines (IESC, 2018) checklist of specific information needs relating to groundwater and surface water resources is presented in Section 1.3.2, as well as the Surface Water Impact Assessment (WRM, 2020) and Groundwater Impact Assessment (AGE, 2020a).

Following Cth DCCEEW's approval of the variation to the Action in March 2025, WRM (2025) and AGE (2025) prepared addendum reports, which are provided in Attachments K and L respectively. These addendum reports assess the validity of the Surface Water Impact Assessment and Groundwater Impact Assessment, regarding the increased disturbance footprint from the original disturbance footprint applied for in 2020. The addendum reports concluded that there have been no changes to the conclusions of the original Surface Water and Groundwater Impact Assessments.

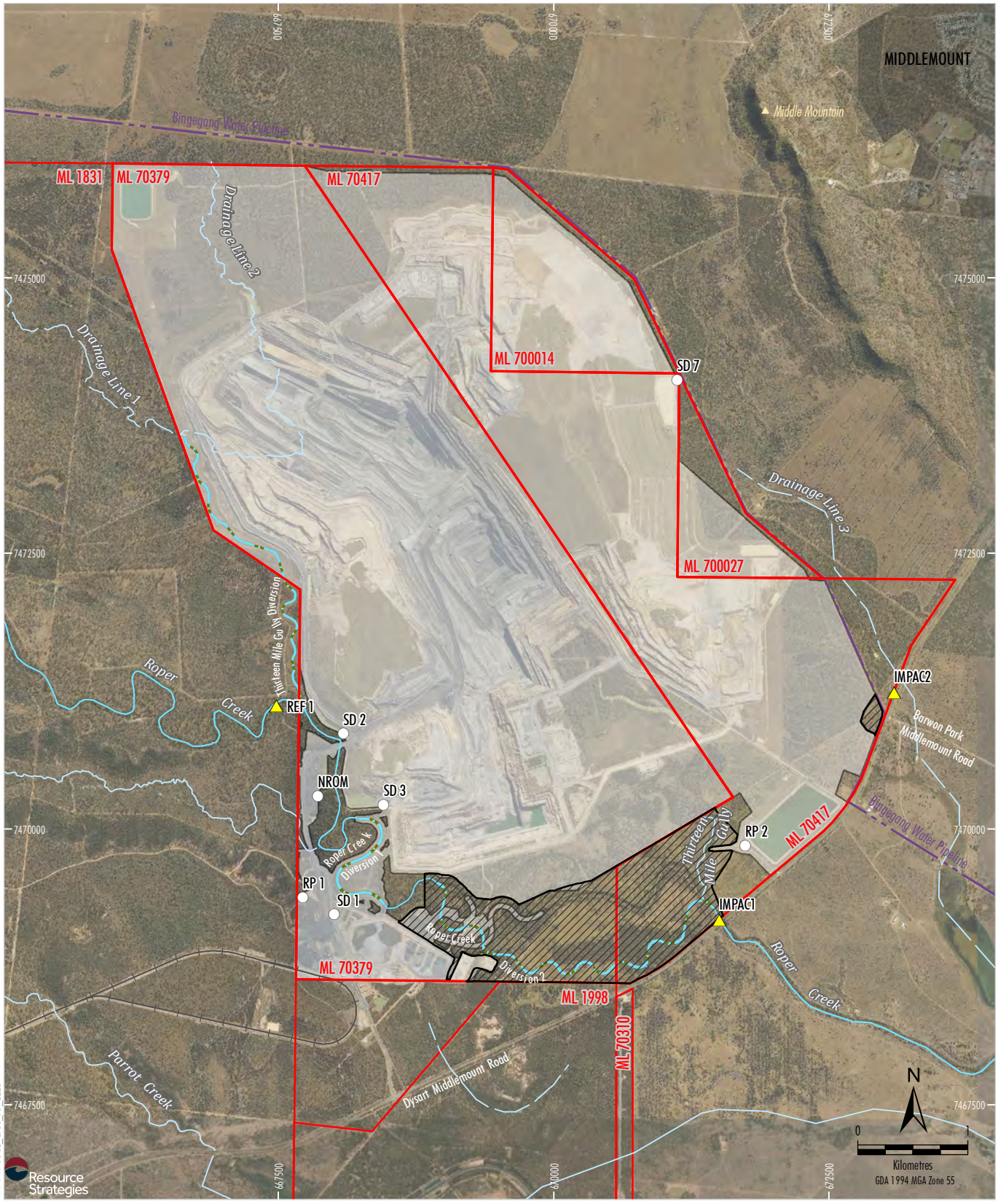
3.1 TOPOGRAPHY, LANDFORM AND SURFACE WATER CATCHMENTS

The natural topography is relatively flat, with an elevation ranging from approximately 160 to 170 m Australian Height Datum (AHD). Approximately 1.5 km to the east of the Action, Middle Mountain rises to an elevation of approximately 280 m AHD (Figure 4). The Action is located within the Roper Creek catchment, within the Mackenzie River Sub-basin of the greater Fitzroy Basin. The Action area lies within the plan area of the *Water Plan (Fitzroy Basin) 2011* (within the Upper Mackenzie Sub-catchment). Local drainage in the vicinity of the Action includes (Figure 21):

- Roper Creek including its approved diversions;
- the Thirteen Mile Gully Diversion (including associated upstream drainage features) which diverts the upstream sub-catchments of Thirteen Mile Gully (north and west of the ML 70379 boundary) to Roper Creek; and
- an unnamed tributary of Roper Creek located immediately east of the Action, which joins Roper Creek about 4.2 km downstream of Dysart Middlemount Road.

Roper Creek is a fourth order, ephemeral watercourse that flows for short periods following rainfall. The catchment commences about 35 km to the west of the Action area. Roper Creek flows into the Mackenzie River some 40 km to the south-east of the Action area.

The total catchment area of Roper Creek to the downstream boundary of the Middlemount Coal Mine tenements, including the Thirteen Mile Gully catchment, is approximately 389 km^2



LEGEND

- Mining Lease Boundary (ML)
- Middlemount Rail Spur and Loop
- Approved Disturbance Footprint
- Diversion Structure
- Approximate Extent of Additional Disturbance Associated with the Action
- Surface Water Reference Site
- Surface Water Release Point

Source: MCPL (2022); The State of Queensland (2022)
Orthophoto: MCPL (2025); ESRI Basemap (2024)

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SOUTHERN EXTENSION PROJECT

Local Drainage Characteristics and Surface Water Monitoring Locations

Figure 21

Roper Creek is characterised by an incised main channel that is perched above a wide, flat floodplain. The creek channel generally has the following characteristics:

- 7 m to 8 m deep;
- 6 m to 8 m wide sandy bed;
- 1:2 vertical to horizontal ratio (V:H) and then graduating to 1:5 V:H side slopes; and
- a bed slope of 0.11%.

The upstream sub-catchments of Thirteen Mile Gully were diverted along the western boundary of ML 70379 in late 2014. A licence to divert the flow of water of Thirteen Mile Gully was issued under the Water Act in May 2013 and a Qld *Sustainable Planning Act 2009* approval was granted in June 2013. The existing Thirteen Mile Gully Diversion is shown on Figure 21.

Upstream of the diversion, the sub-catchments of Thirteen Mile Gully are drained via two drainage features: Drainage Line 1 (to the north-west); and Drainage Line 2 (to the north) (Figure 21). The DNRME confirmed that these drainage lines are not watercourses, but rather drainage features defined under the Water Act that facilitates overland flow (Department of Natural Resources and Mines [DNRM], 2017).

A small portion of Thirteen Mile Gully (approximately 1 km) remains in its pre-mining location to the south-east of the Action, which drains south directly to Roper Creek.

3.2 GEOLOGY AND COAL RESOURCE

The coal resource at the Middlemount Coal Mine is located within the Permian age Rangal Coal Measures of the Bowen Basin. The Rangal Coal Measures form a relatively narrow (approximately 3 km wide) structure, striking from the north-northwest to south-southeast within and adjacent to the mine tenements. In the locality, a veneer of more recent Tertiary geology and Quaternary geology typically overlies the Bowen Basin strata.

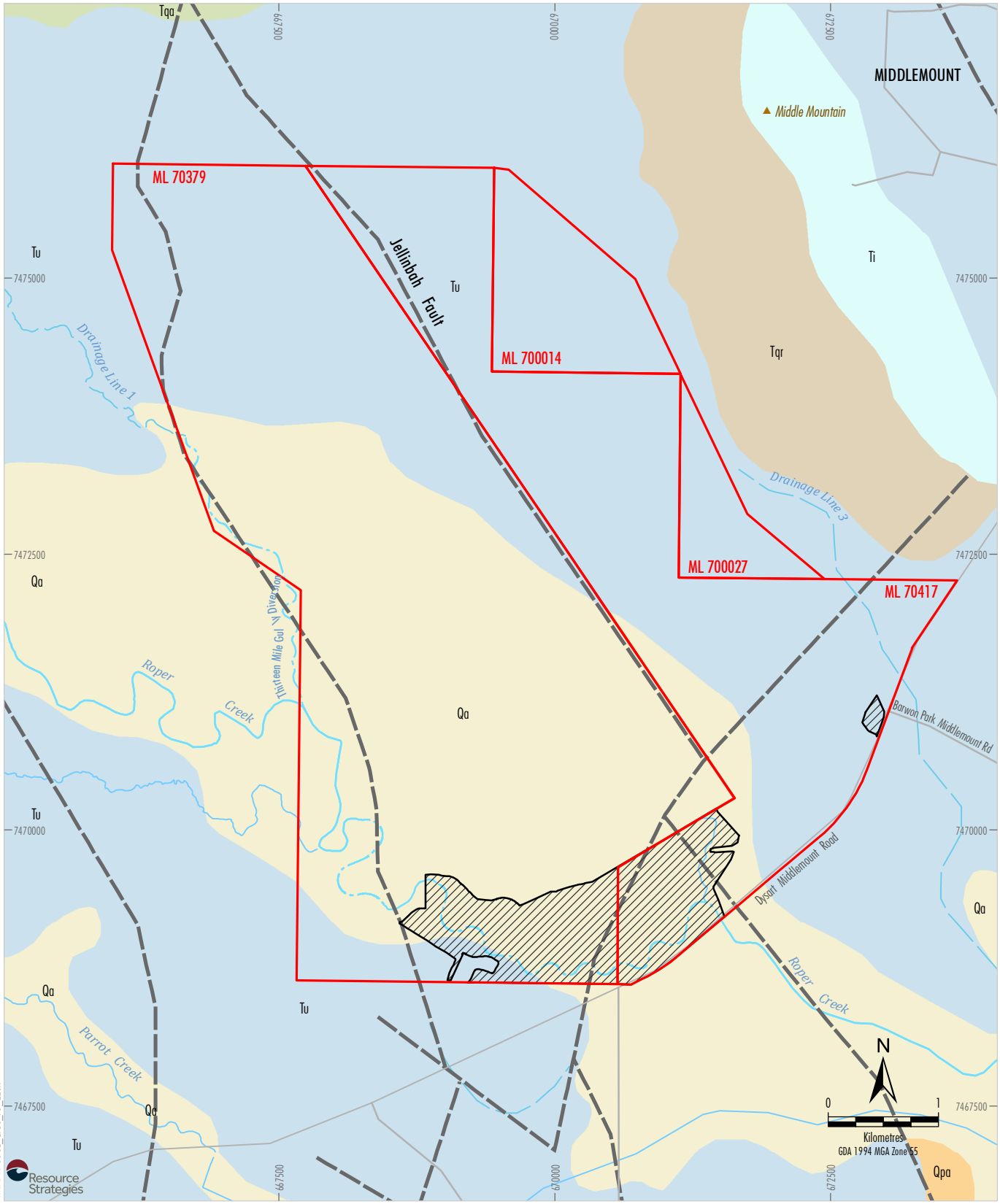
The geological understanding has been informed by the following data sources:

- geological logs, geophysical logs, and data compiled from exploration drilling across the Middlemount Coal Mine area;
- geological model surfaces for the Middlemount Coal Mine;
- geological data from registered bores held on the DNRME groundwater database (GWDB); and
- publicly available geological mapping (St Lawrence 1:250,000 map sheet) and geological reports.

MCPL has undertaken exploration drilling across the Middlemount Coal Mine tenements. However, targeted exploration continues to be undertaken to better define product coal structure and quality within the proposed expansion area. Exploration drilling has confirmed the geological units present in the ML areas and in the surrounds. MCPL has developed geological models from the exploration drilling data, which has been used to interpolate the stratigraphy and distribution of geological units across the Middlemount Coal Mine and immediate vicinity.

The target coal seams for the Action are the Middlemount and Pisces coal seams of the Rangal Coal Measures. These coal seams dip to the east-northeast at between 3 and 7 degrees, where they are truncated by the Jellinbah Fault, which is mapped to be generally coincident with the north-eastern boundary of ML 70379 (Figure 22). More detail on delineation of the Jellinbah Fault and how it is considered in the groundwater model is provided in Section 6.13 of Attachment E (AGE, 2020a).

The additional target coal resource for the Action (in the south-east of ML 70379) has been estimated at approximately 24 million tonnes (Mt) of ROM coal.



LEGEND

Middlemount Coal Mining Lease Boundary (ML)

Approximate Extent of Additional Disturbance Associated with the Action

GEOLOGY MAPPING

Bowen Basin Structure

Lithology Summary		Age
Qa	Mud, sand and minor gravel; alluvium	QUATERNARY
Qpa	Clay, silt, sand, gravel; flood plain alluvium on high terraces	PLEISTOCENE
Tqa	Clay, silt, sand and and gravel: high-level alluvium and colluvium	TERTIARY - QUATERNARY
Tqr	Clay, silt, sand, gravel, soil; colluvial and residual deposits	LATE TERTIARY - QUATERNARY
Ti	Intrusive rhyolite, trachyte and microsyenite	EARLY TERTIARY
Tu	Mudstone, sandstone, conglomerate, siltstone, oil shale, lignite, basalt	EARLY TERTIARY

Source: MCPL (2022); The State of Queensland (2022)

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SOUTHERN EXTENSION PROJECT

Surface Geology and Structures

Figure 22

The geology in the vicinity of the Middlemount Coal Mine comprises a Quaternary and Tertiary age sequence overlying older Permian age coal measures (Figure 22).

Soil types at the Middlemount Coal Mine (within MLs 70379, 70417, 700014 and 700027) were described by Parsons Brinkerhoff (2010a). Based on the soil mapping presented in Parsons Brinkerhoff (2010a), three soil units have been identified in the Action area:

- Yellow Duplex - sandy loam or sand soils on the flat plains away from drainage lines and on very gently inclined slopes with neutral to moderate acidity, very low salinity and very low organic carbon content.
- Grey-Brown Duplex – sandy to clay loam soils on the flat plains and on very gently inclined slopes with neutral to slight acidity, very low salinity and low organic carbon content. The subsoils of Grey Brown Duplex soils are saline.
- Alluvial Soils – clay loam soils along drainage features with very low salinity and medium organic carbon content.

The Yellow Duplex and Grey-Brown Duplex soils have moderate alkalinity, sodicity within the subsoils and are moderately to highly dispersive. The Alluvial soils are neutral, have very low salinity and are considered to have a negligible potential for dispersion (Parsons Brinkerhoff, 2010a).

Parsons Brinkerhoff (2010a) concluded that there is a low to negligible risk of acid mine drainage from the overburden at the Middlemount Coal Mine.

Topsoil would be stripped prior to excavation of underlying overburden or emplacement of waste rock. Where the topsoil cannot be directly used for progressive rehabilitation, it would be stockpiled for use at a later date.

The Topsoil Management Plan (MCPL, 2019b) would continue to be implemented for the Action, and provides:

- topsoil stripping timing and conditions (e.g. after seed set where possible and soil maintained in a slightly moist condition during stripping);
- topsoil stripping depths based on consideration of the soil units;
- topsoil stripping planning for direct placement or stockpiling;
- topsoil stockpiling methods (e.g. soil transport, stockpile height, management of stockpiles); and
- topsoil reapplication methods (e.g. weed management, topsoil respreading depths and water flow paths).

The Topsoil Management Plan (MCPL, 2019b), in addition to the land resource aspects of the Erosion and Sediment Control Plan (Engeny, 2024a) would be reviewed, and if necessary, revised for the Action.

3.2.1 Hydraulic Influence of Faults on Groundwater Flow

The regional tectonic setting of the Bowen Basin is largely compressive and as a consequence faults and folds are more likely to be hydraulic barriers than conduits to lateral groundwater flow (Arrow Energy, 2012). Some faults may also limit flow by vertical displacement of strata (aquifers with aquitards) or by infilling within the fractures. The Stage 2 Environmental Impact Statement (EIS) (MCPL, 2011) surmised the Jellinbah Fault as being a barrier to groundwater flow east of the fault (and mining area) as a result of the 300 metres (m) displacement.

Fault delineation drilling by MCPL in 2017 included 36 boreholes drilled along the Jellinbah Fault which intersected sedimentary units from both the Rangal Coal Measures and Fort Cooper Coal Measures. Groundwater was intersected at 17 sites within either the base of the Tertiary sediments or the underlying Permian coal measures. Generally minor groundwater flows were intersected with measurable flows up to 0.2 litres per second (L/s). Two boreholes that did intersect higher groundwater yields (0.4 L/s and 1.8 L/s) were considered to be associated with localised fracture zones of limited groundwater storage.

It is generally agreed amongst hydrogeologists that faults should not necessarily be represented in a groundwater flow model if there is evidence that they do not act as a barrier to groundwater flow. In the natural groundwater system, for example, a fault may appear to act as a barrier to groundwater flow where the vertical offset results in coal seams (i.e. the main groundwater conduit) being truncated against lower-permeability interburden. However, where the vertical offset results in one coal seam being fully or partially connected to another coal seam, the hydraulic connection across the fault may be unimpeded with the potential for groundwater seepage (hydraulic loading) from the adjacent offset coal measures.

Hence, groundwater flow within the Permian coal measures may, or may not, be influenced by the hydraulic parameters of the Jellinbah Fault and the associated secondary faulting to the east and west as part of this thrust complex. These faults are orientated northwest-southeast, with the Middlemount Coal Mine open pit located south-west of the Jellinbah Fault.

Based on the above, it is assessed that vertical displacements along the Jellinbah Fault alignment has resulted in the Rangal Coal Measures coal seams being truncated against lower permeability Fort Cooper Coal Measures interburden. That is, groundwater flow/movement to the east across the Jellinbah Fault is not halted, rather it is slowed as a result of the lower permeability Fort Cooper Coal Measures sediments (AGE, 2018) (Attachment E). As described in Section 3.7.3, the numerical groundwater model provides for a lateral, horizontal hydraulic connection across the Jellinbah Fault where different layers are juxtaposed on the eastern and western sides of the fault plane. The groundwater modelling results demonstrate that drawdown propagates up to 3 km north and north-east of the mining lease, east of the Jellinbah Fault.

3.2.2 Hydraulic Influence of Jellinbah Fault on Roper Creek Diversion 2

The Jellinbah Fault is mapped below the existing alignment of Roper Creek, and below the realignment and extension of the diversion approved under EPBC 2010/5394 (but not yet constructed), Roper Creek Diversion 2. The Jellinbah Fault is overlain by the weathered Rangal Coal Measures and the Tertiary formation which is several hundred metres thick at the Middlemount Coal Mine, as shown on Figure 5.3 of the Groundwater Impact Assessment (Attachment E). Geotechnical investigations conducted as part of the Roper Creek Diversion 1 design show that the Tertiary formation above the Jellinbah Fault in the vicinity of the proposed diversion contains low permeability clays and sands which would be a barrier to any vertical movement of water from the diversion into the much deeper underlying fault structure.

These materials have been found to have vertical hydraulic conductivities of 1×10^{-8} metres per second (m/s) and 1×10^{-5} m/s, respectively, during geotechnical investigations for the Roper Creek Diversion 1 and Roper Creek Diversion 2 detailed designs (Cartledge Mining and Geotechnics, 2019 and Engeny, 2022a). Accordingly, given the significant vertical separation between the Jellinbah Fault and the low permeability materials in the Tertiary formation above the Jellinbah Fault, it is unlikely that there would be a material loss of water from the Roper Creek Diversion 2 to the fault structure.

3.3 GROUNDWATER SYSTEM

A conceptual hydrogeological model of the groundwater regime was developed by AGE (2020a) based on publicly available geological and topographical maps, geological information from exploration bores drilled in the vicinity of the mine, groundwater level and quality data from monitoring bores and results from previous hydrogeological investigations.

The hydrogeological regime of the Middlemount Coal Mine comprises a Quaternary and Tertiary age sequence overlying older Permian age coal measures. These geological units can be separated into three key hydro-stratigraphic units based on their hydraulic properties and lithology. From youngest to oldest, these units are (AGE, 2020a):

- Quaternary aged units:
  - Alluvial aquifer: consists of localised stream channel deposits and associated flood plain deposits. These units comprise a temporary (rainfall dependent) aquifer that is limited to the immediate vicinity of Roper Creek, Thirteen Mile Gully and drainages within the mining tenements. Neither Roper Creek nor Thirteen Mile Gully is targeted for water supply within the near vicinity of the Middlemount Coal Mine.
- Tertiary aged units:
  - Duaringa Formation: consists of thick clay-rich laterite which is sourced from highly weathered Permian sandstones and siltstones, and occasional basalt. The Duaringa Formation is not typically targeted for agricultural water supply and is (at best) a low yielding aquifer that would more commonly be regarded as an aquitard.
- Permian aged units:
  - Interburden/overburden: the bulk of the Permian coal measure strata is sandstone, siltstone and mudstone that typically have low permeability and generally form aquitards.
  - Coal seams (principally the Middlemount and Pisces Seams): form low to moderate yielding aquifers confined by interburden/overburden units.

Each of the hydrogeological units are described further in Sections 3.6.2 and 3.7.3. Additional details are provided in AGE (2020a) (Attachment E).

3.4 WATER-DEPENDENT ASSETS

Water-dependent assets are entities with characteristics that provide value, and can be linked directly or indirectly to a dependency on water quantity or quality (IESC, 2018).

No water resource development, such as dams or major irrigation infrastructure, is located within the Roper Creek catchment (WRM, 2020). The Qld Government water entitlement viewer indicates that there are no licensed surface water users along Roper Creek. That is, there are no users with an extraction volume issued under the provisions of the Water Act (WRM, 2020). Further discussion of surface water users in the vicinity of the Middlemount Coal Mine is provided in Section 3.6.1 and Section 3.1 of Attachment D (WRM, 2020).

Groundwater levels are generally in excess of 25 m below ground level (mbgl) and separated from surface waters, limiting potential to support GDEs. Further, the groundwater quality in the locality is brackish to saline and not suitable for stock or human consumption (AGE, 2020a). Further discussion of groundwater users in the vicinity of the Middlemount Coal Mine is provided in Section 3.6.2 and Section 6.4.2 of Attachment E (AGE, 2020a).

The EP Act seeks to protect Qld's water resources while allowing ecologically sustainable development through the *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* (EPP Water). The EPP Water achieves this within a framework that includes:

- identifying environmental values for aquatic ecosystems and for human uses; and
- determining water quality guidelines and water quality objectives (WQOs) to enhance or protect the environmental values.

The environmental values relevant to surface water and groundwater within the Action area and surrounds have been identified with consideration of the EP Act Guideline *Application requirements for activities with impacts to water (ESR/2015/1837)* (DES, 2018a). The relevant environmental values relevant to the Action are summarised below and more detail is provided in Attachment D (WRM, 2020) and Attachment E (AGE, 2020a).

Environmental Values – Surface Water

Environmental values for surface waters are the qualities of water that make it suitable for supporting aquatic ecosystems and human water uses. Roper Creek is located within the Mackenzie River north-western tributaries region and is classified as a 'fresh' water source (DEHP, 2011). As discussed above, the Qld Government water entitlement viewer indicates that there are no licensed surface water users along Roper Creek. That is, there are no users with an extraction volume issued under the provisions of the *Water Act 2000* (WRM, 2020).

Notwithstanding, the environmental values identified for protection include (WRM, 2020):

- aquatic ecosystem protection: Level 2 – disturbed ecosystems *Queensland Water Quality Guidelines* (DEHP, 2009);
- irrigation;
- farm supply/use;
- stock watering;
- primary, secondary and visual recreation;
- drinking water;
- industrial use; and
- cultural and spiritual values.

Environmental Values – Groundwater

Environmental Values – Aquatic Ecosystems

Regionally, groundwater flow within the underlying aquifers is towards the south-east of the Action. Groundwater levels are generally in excess of 25 mbgl and separated from surface waters, limiting potential to support GDEs. There are no springs from these deep confined aquifers within the Action area or surrounds that would support GDEs (AGE, 2020a).

Water quality in Roper Creek is characterised by high and variable turbidity, moderate and variable electrical conductivity (EC) and low dissolved oxygen concentrations at times (WRM, 2020).

Environmental Values – Irrigation and Farm Supply/Use

4T undertook a bore census of nearby groundwater users on privately owned lands surrounding the Action in September 2017 (4T, 2017). Groundwater is not used for irrigation or farm supply within the Action area or neighbouring properties. There are no known irrigation bores located within 10 km of the Action area. During the course of the bore census, it was noted that dryland cropping activities in the vicinity of the Action do not rely upon groundwater as the quality is considered brackish to saline (4T, 2017). Review of the contemporary DNRME GWDB indicates that no additional landholder bores have been established since the bore census was undertaken.

Environmental Values – Stock Water

There is no significant groundwater usage within the Action area or neighbouring properties. The primary agricultural purpose of land within and surrounding the Action area has been low intensity stock (cattle) grazing (AGE, 2020a). The WQOs for Mackenzie River Sub-basin groundwaters are provided for tolerances of livestock to total dissolved solids (TDS) (salinity) in drinking water. The existing groundwater quality data recorded at the site monitoring bores identifies this water would be unsuitable for stock watering based on the naturally elevated TDS (AGE, 2020a).

Environmental Values – Drinking Water

Groundwater is not used for drinking water purposes within the Action area or neighbouring properties, and this was confirmed during the bore census (4T, 2017). Groundwater quality data collected from the site monitoring bores indicates that groundwater quality in the Action area is brackish to saline and not suitable for human consumption (AGE, 2020a).

Environmental Values – Industrial Use

Groundwaters intercepted and used for the Action would provide a beneficial industrial use at the mine (AGE, 2020a).

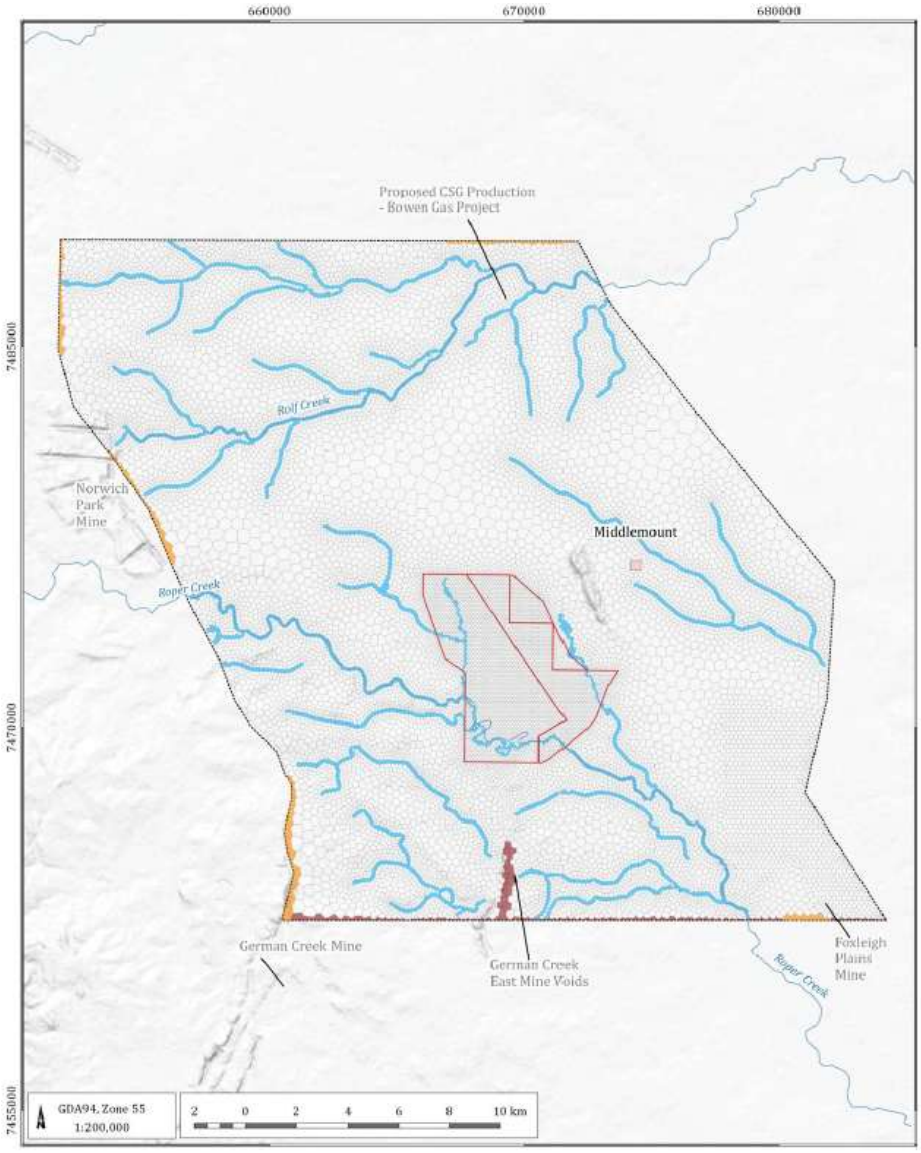
Environmental Values – Cultural and Spiritual Values

There are no known environmental values in relation to cultural and spiritual values of groundwater within the Action area (AGE, 2020a).

3.5 OTHER COAL MINING AND COAL SEAM GAS DEVELOPMENTS

The numerical groundwater model developed by AGE (2020a) (Attachment E) was used to assess the cumulative impact between the Action and nearby operational and closed mines which include German Creek East, Foxleigh, Foxleigh Plains, and Norwich Park Mine as well as CSG production as part of the Bowen Gas Project (Arrow Energy, 2012). The approximate locations of the surrounding mines and gas project cumulatively modelled are shown on Figure 23.

WRM (2020) (Attachment D) considered the Capcoal Complex (e.g. German Creek), Foxleigh Mine, Norwich Park Mine and Oaky Creek Mine in the cumulative assessment of surface water impacts for the Action.



Source: AGE (2020a)

Figure 23 Extent of the Modelling Domain- model grid

3.6 BASELINE DATA AND WATER USERS

3.6.1 Surface Water

Catchment Water Quality

The background water and sediment quality data for Roper Creek and the downstream catchment is described in the *Receiving Environment Monitoring Plan* (DPM Enviroscience [DPM], 2019). Water quality in Roper Creek is characterised by high and variable turbidity, moderate and variable EC and low dissolved oxygen concentrations at times (DPM, 2019).

The concentrations of most metals were very low within Roper Creek and did not exceed the EA trigger values, with the exception of aluminium and iron, which were recorded at high concentrations across all sites (DPM, 2019).

DPM (2019) found that the macroinvertebrate community of Roper Creek exhibited signs of stress. Given the ephemeral nature of Roper Creek, changes in metrics over time associated with macroinvertebrate communities are to be expected. Given the lack of discharges from Middlemount Coal Mine, there had been no indication of impacts from Middlemount Coal Mine operations on the macroinvertebrate community of Roper Creek (WRM, 2020).

Given the ephemeral nature of the upstream sub-catchments of Thirteen Mile Gully, no water quality data is available for the minor drainage lines (WRM, 2020).

On-Site Water Quality

Water quality data has been collected from the on-site water storages since May 2010. The locations of the existing monitoring of on-site water storages are shown on Figure 21.

The monitoring parameters tested have been defined by the Qld Government to cover the range of constituents that could impact the environmental values of the receiving waters (WRM, 2020).

Summaries of water quality results for the on-site water storages at the Middlemount Coal Mine, including supporting discussion of the water quality results, are provided in Section 4.4 of Attachment D (WRM, 2020).

Surface Water Flow

From 1971 to 1988, the Qld Government operated a streamflow gauge on Roper Creek at Barwon Park (Station No. 130107A), located approximately 28 km downstream of the Action. The total catchment area draining to the Barwon Park stream flow gauge is 2,126 km^2. The maximum recorded flow rate at this station was 922 cubic metres per second (m^3/s) in December 1973 (WRM, 2020). The data from the Barwon Park gauge station is summarised below (WRM, 2020):

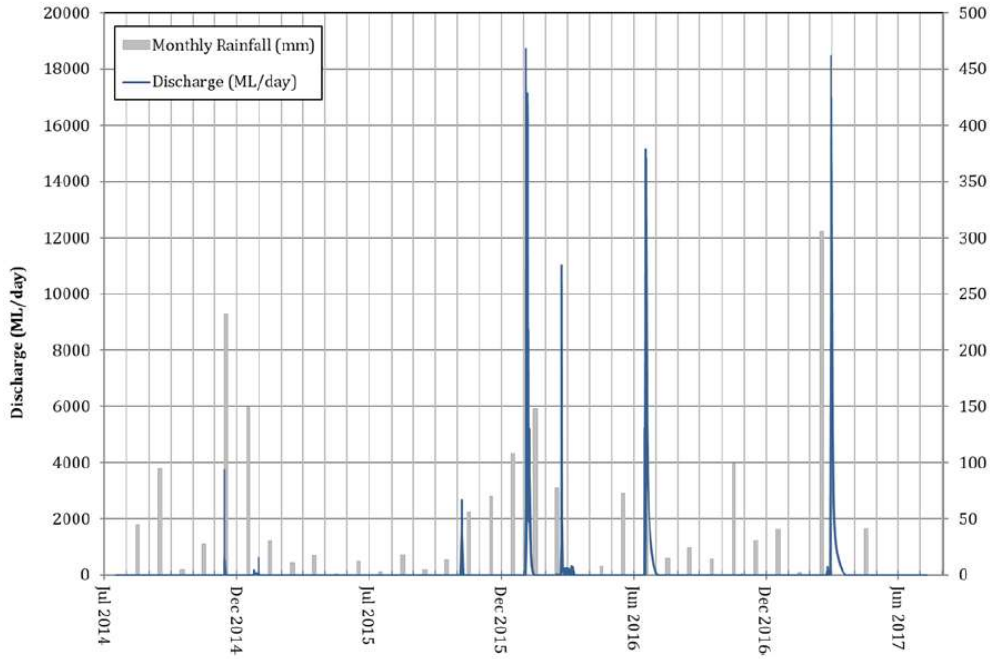
- Maximum recorded flow rate was 922 m^3/s in December, 1973.
- Annual volumetric runoff coefficient is low, ranging from 0.3% to 14.6% with an average of 3.7% meaning the system is highly ephemeral.
- Very little runoff is generated by the catchment for monthly rainfall below 100 millimetres.
- Stream flows are ephemeral, with flows recorded on 34% of all days.

MCPL operates a gauging station (Ref 1) in Roper Creek, located just upstream of the confluence with the Thirteen Mile Gully Diversion (Figure 21). The Ref 1 gauging station was installed in December 2012. Stream flow data from this gauging station is presented for the period between July 2014 and August 2017 on Figure 24. This shows only periodic flows are recorded in Roper Creek which are in response to rainfall runoff flow events. These flows are then separated by long periods up to 11 months, of essentially zero flow within the creek (AGE, 2020a).

Surface Water Users

As described in Section 3.4, the Qld Government water entitlement viewer indicates that there are no licensed surface water users along Roper Creek. That is, there are no users with an extraction volume issued under the provisions of the Water Act (WRM, 2020).

There are two registered Self-Assessed Riparian Access Works located on Roper Creek which authorise stock and domestic supplies only. Section 20 of the Water Act provides that an owner of land adjoining a watercourse may take water for domestic and stock purposes without the need for a permit or licence (WRM, 2020).



Source: AGE (2020a).

Figure 24 MCPL Roper Creek Gauging Station (Ref 1)

Release Events

Water quality monitoring of three release events from sediment dams has occurred in the months:

- January 2013 – SD1 (uncontrolled release);
- January 2013 – SD3 (controlled release); and
- February 2014 – SD2 (controlled release).

Further details of the release events are provided in the Surface Water Impact Assessment (WRM, 2020) and in letters provided by MCPL to the DEHP (now the DES) following these events (MCPL, 2013a; 2013b; 2014).

A permit to take water from Roper Creek, Connors River, Murray Creek, Lotus Creek, Clive Creek and an unnamed tributary of Isaac River (Eungy Waterhole) has also been issued under the provisions of the Water Act. Such permits are typically granted to a corporate entity, such as local government, for temporary supply of water to construction or similar projects. A total entitlement of 8.5 megalitres (ML) per water year is attached to this permit. The above information indicates that there is currently minimal use of surface water from Roper Creek (WRM, 2020).

3.6.2 Groundwater

Groundwater Levels, Pressure, Pathways and Quality

Quaternary Alluvium

The Quaternary alluvium in the Action area is comprised of clay, silt, and sand. Where it occurs in the Action area, the alluvium is thin, usually less than 5 m. Groundwater levels at the site are typically deeper than 10 mbgl, which is below the base of the Quaternary alluvium, indicating that the Quaternary alluvium is typically unsaturated within the Action area (AGE, 2020a).

Within the Action area, the Quaternary alluvial floodplain deposits unconformably overlie the Duaringa Formation. The alluvial flood plain deposits are confined to present day stream alignments and floodplains (AGE, 2020a).

The Quaternary alluvium is estimated to have a highly variable range of hydraulic conductivity values owing to its variable lithology of sand, clay, and occasional gravel bands. The sandy to gravelly creek beds are expected to have higher values of hydraulic conductivity compared to the floodplain deposits, because the latter would be expected to have a more clayey nature (AGE, 2020a).

Where saturated, recharge to the alluvium would occur either (AGE, 2020a):

- via direct rainfall on to the alluvium; or
- via seepage through the stream bed, when the creeks are flowing.

Stream gauging data for Roper Creek indicates surface water flow dissipates quickly after flow events. Therefore, recharge from stream flow would occur over short time periods as the water infiltrates relatively rapidly into the alluvium. When saturated, the groundwater flow direction in the Quaternary alluvium would be expected to be generally from north-west to south-east, following the regional topography and drainage network (AGE, 2020a).

In the vicinity of the Middlemount Coal Mine, discharge could occur from the alluvium via seepage to the underlying Tertiary sediments. However, this would only occur in areas where the alluvium is saturated and a downward vertical hydraulic gradient to the underlying strata occurs (AGE, 2020a).

The Quaternary alluvium is not targeted by landholders as a groundwater supply within the Action area which supports the general understanding that the Quaternary alluvium is not a productive aquifer in the vicinity of the Action area (AGE, 2020a) (Attachment E).

Groundwater quality data is not available for the Quaternary alluvium within the vicinity of the Middlemount Coal Mine, as it is understood the regional groundwater table is below the depth of the alluvial sediments (i.e. greater than 10 mbgl) within the Middlemount Coal Mine MLs (AGE, 2020a).

Further details of the Quaternary alluvial aquifer are provided in Section 5.4.1 of Attachment E (AGE, 2020a).

Tertiary Duaringa Formation

Tertiary sediments of the Duaringa Formation cover large areas of the Middlemount Coal Mine and surrounds. The Duaringa Formation consists of deeply weathered mudstone, sandstone, pebbly sandstone/conglomerate and siltstone, gravel, and some interbedded oil shale and basalt. This formation unconformably overlies the Permian coal measures.

The thickness of the Duaringa Formation in the study area ranges from 0 m to 60 m and generally ranges between 25 m and 35 m within the MLs (Parsons Brinkerhoff, 2010b). Within the south-west portion of ML 70379, the Duaringa Formation is lateritised with a hard caprock that forms a topographic high in this area.

Recharge to the Tertiary formation occurs via direct infiltration from rainfall in areas where the unit crops out and via seepage from the overlying Quaternary where present. However, recharge is expected to be low due to the predominately clayey nature of the formation (AGE, 2020a).

The regional groundwater flow direction in the Tertiary Duaringa Formation is expected to be coincident with the regional surface drainage, being towards the southeast (AGE, 2020a).

Middlemount Coal Mine monitoring bores installed within the Duaringa Formation indicate depth to water in the monitoring bores ranges from 7.7 mbgl (MW14A) to 28.9 mbgl (MW9A), with an average depth of 17.3 mbgl (AGE, 2020a).

Monitoring data indicates that the Tertiary aquifer water quality is (AGE, 2020a):

- slightly acidic to alkaline with field pH values ranging from 6.3 to 8.5;
- dominated by sodium and chloride; and
- brackish to saline with total dissolved solids ranging from 920 milligrams per litre (mg/L) to 31,100 mg/L, with the majority of samples being saline.

The results of the bore census (4T, 2017) (Appendix C in Attachment E) indicate that no other registered or existing bores are screened within the Duaringa Formation within the 10 km search radius of the Middlemount Coal Mine MLs (AGE, 2020a).

Further details of the Tertiary formation aquifer/aquitard are provided in Section 5.5 of Attachment E (AGE, 2020a).

Triassic Rewan Formation

The Triassic Rewan Formation does not outcrop within the Action area, but does sub-crop within the study area beneath the Tertiary cover east of the Middlemount township, and south-east of the current mine footprint. Details of the Rewan Formation are provided in Section 5.6 of Attachment E (AGE, 2020a).

Permian Coal Measures

The Permian strata includes coal seams interbedded with less permeable rock units such as sandstone, siltstone, and mudstones that are typically ‘tight’ and low yielding (AGE, 2020a).

The target seams at the Middlemount Coal Mine are the Middlemount, Tralee, and Pisces coal seams of the Rangal Coal Measures, a faulted and folded Permian sequence of calcareous sandstone, shale, mudstone, and coal. In the mine area, the Rangal Coal Measures dip gently to the north-east, underlain conformably by the Permian Fort Cooper Coal Measures/Burngrove Formation (herein referred to as the Fort Cooper Coal Measures). The Fort Cooper Coal Measures are Late Permian age sedimentary rocks that comprise feldspathic and lithic sandstone, siltstone, carbonaceous mudstone, siliceous siltstone, banded coal seams, and tuff. These rocks do not outcrop within the site and have only been encountered in the exploration boreholes.

Recharge of the Permian coal measures occurs in areas where they sub-crop beneath the Tertiary cover. The coal seams all sub-crop within the western portions of the Middlemount Coal Mine MLs.

Private landholders bores do not commonly access the Permian aquifer due to the depth of water bearing strata and the typical high salinity of this type of water. However, where more attractive shallower aquifers do not exist, bores are installed on occasion into the Permian coal measures where yield and water quality meet the intended purpose (AGE, 2020a).

Monitoring bores have been installed by MCPL to monitor groundwater drawdown in the Permian to the Middlemount Coal Mine (AGE, 2020a).

Further details of the Permian Coal Measures are provided in Section 5.7 of Attachment E (AGE, 2020a).

Groundwater Users

The bore census (4T, 2017) (Appendix C in Attachment E) identified that there is limited groundwater use of brackish to saline groundwater in the locality. The bore census (4T, 2017) assessed six privately-owned properties, the Middlemount landfill and the Middlemount Jockey Club in a study area covering approximately 457 km^2 surrounding the Middlemount Coal Mine.

The bore census indicated a total of five landholder water supply bores on two of the privately-owned lands. All five bores are located in excess of 5 km from the Middlemount Coal Mine (including the Action area) and are located at depths of more than 30 mbgl. The bore census also confirmed three groundwater monitoring bores located at the Middlemount Landfill established for the landfill operation. All three monitoring bores were dry when assessed for the bore census (4T, 2017).

No landholder water supply bores are located within the predicted drawdown/depressurisation extents attributable to the proposed mine plan for the Action (refer to Section 3.8.2).

Groundwater Dependent Ecosystems

The Action is not predicted to impact any aquatic or terrestrial GDEs since GDEs are assessed as being unlikely to occur within and surrounding the Action area. GDE mapping across the Action area (Bureau of Meteorology [BoM], 2020) indicates:

- Terrestrial vegetation associated with part of Roper Creek (Drainage Lines) is mapped as a low potential Terrestrial GDE.
- Woodland areas adjacent to the Bingegang Water Pipeline are mapped as a low potential Terrestrial GDE.

No other terrestrial vegetation in the Action area is mapped as a potential GDE (BoM, 2020). DES (2020b) mapping indicates that no wetlands of high ecological significance occur in the Action area. Flora surveys by Biodiversity Australia (2020) confirmed this.

The accuracy of the desktop GDE mapping (BoM, 2020) of the Action area locality has been reviewed by AGE (2020a) (Attachment E) and Biodiversity Australia (2025a) (Attachment C), with the following conclusions made in relation to the presence/absence of GDEs based on detailed site surveys and assessments:

- The majority of the terrestrial vegetation associated with Roper Creek and Thirteen Mile Gully is unlikely to be dependent on groundwater. Given the vegetation also occurs more widely across the landscape and is not restricted to areas where it could potentially access groundwater. There are small areas of RE 11.3.25 along Roper Creek which contains Queensland Blue Gum (*Eucalyptus tereticornis*) and River Oak (*Casuarina cunninghamiana*) which are sometimes reliant on access to groundwater, however, the groundwater levels adjacent to Roper Creek are generally around 20 mbgl (AGE, 2020a). Based on the depth to groundwater surrounding Roper Creek, and its ephemeral nature, it is unlikely that these communities would be reliant on access to groundwater (Attachment C).
- Aquatic habitat associated with Roper Creek and Thirteen Mile Gully is unlikely to be dependent on groundwater given the ephemeral nature of these drainage features.
- All other terrestrial vegetation is unlikely to be dependent on groundwater given that there is no evidence that any vegetation surrounding the Action area has experienced any impacts (i.e. dieback) from the existing operations to the north and west of the Action area.

Stygofauna

The presence of stygofauna in groundwater within the Action area was assessed from a desktop review of optimal conditions for stygofauna habitat and results of sampling. Monitoring data indicates that the Permian aquifer water quality is similar to the Tertiary aquifers in that it is (AGE, 2020a):

- slightly acidic to alkaline with field pH values ranging from 6.4 to 10.5;
- dominated by sodium and chloride; and
- brackish to saline with TDS ranging from 503 mg/L to 25,700 mg/L, with the majority of samples being saline.

The review concluded that the potential for optimal stygofauna habitat at Middlemount Coal Mine is unlikely given the average salinity in both the Tertiary and Permian aquifers is in excess of 20,000 microSiemens per centimetre (µS/cm), and the average depth to groundwater in the Permian aquifer is greater than 30 mbgl (AGE, 2020a) (Attachment E).

The Action is not predicted to significantly impact stygofauna considering the Action would only incrementally increase the groundwater drawdown from the approved mine, the groundwater aquifer (similar stygofauna habitat) is extensive outside of the maximum zone of drawdown, and the sampling to date indicates there is either a low diversity of stygofauna or no stygofauna present in and outside the maximum zone of drawdown (AGE, 2020a).

3.7 NUMERICAL MODELLING

3.7.1 Site Water Balance

Some minor updates to the existing water management system are proposed for the Action, including construction of additional sediment dams, and changes to some approved (but not yet constructed) sediment dams. The existing Middlemount Coal Mine operational simulation (OPSIM) water balance model was reviewed and updated to incorporate the Action to assess the performance of the proposed mine affected water management system (WRM, 2020).

Calibration of the Middlemount Coal Mine water balance model was undertaken against recorded site data (including water storage volumes) over the period from January 2014 to May 2020. The model was configured to reflect the site operations during this period, with appropriate transfer rates, system configuration and water inflows and outflows (WRM, 2020).

Calibration of the site water balance model was undertaken against the recorded combined inventory for the Mine Water Dam (MWD) and the mining pit. To achieve a satisfactory calibration outcome, changes to a number of the Action parameters were undertaken (WRM, 2020). Further details of the water balance model calibration are provided in WRM (2020) (Attachment D).

The updated OPSIM model was used to predict the performance of the following (WRM, 2020):

- overall water balance – the average inflows and outflows of the water management system for a number of representative realisations;
- mine water inventory – the risk of accumulation (or reduction) of the overall mine water inventory;
- in-pit storage – the risk of accumulation of water in the mining pit, and the associated water volumes;
- external water demand – the risk and associated volumes of requiring imported external water (via the Anglo Coal pipeline) to supplement site mine water supplies;
- uncontrolled spillway discharges – the risk of uncontrolled discharge from the site storages to the receiving environment; and
- controlled releases – the risk and associated volumes of controlled release water to the receiving environment.

3.7.2 Calibrated Flood Model

A Unified River Basin Simulator (URBS) hydrological model and a two-dimensional unsteady flow (TUFLOW) hydraulic model was developed by WRM (2020) to simulate the flood behaviour of Roper Creek (including the proposed realignment and extension of Roper Creek Diversion 2) and Thirteen Mile Gully in the vicinity of the Action.

The URBS and TUFLOW models were calibrated to recorded water levels and surveyed peak flood levels for the January 2013 ex-tropical Cyclone Oswald flood event. Descriptions of the development and calibration of the models and the design discharges and flood levels under existing conditions are given in WRM (2020) (Attachment D).

The calibrated existing conditions TUFLOW model was reconfigured to represent:

- pre-mining conditions;
- approved (Stage 2) mine conditions;
- proposed mine conditions; and
- final landform conditions (post-mining).

Peak flood levels, extents and depths were determined for the 50%, 5%, 2%, 1% and 0.1% annual exceedance probability (AEP) events and the Probable Maximum Flood event, for the approved and proposed mine conditions models to assess the flood impacts of the Action.

These events were also used to define the crest height of the flood protection levee during operations and final landform design surrounding the residual voids, post-mining (WRM, 2020).

3.7.4 Calibrated Numerical Groundwater Flow Model

A contemporary three-dimensional numerical groundwater flow model developed for the Western Extension at the Middlemount Coal Mine was reviewed and updated to account for the proposed mine plan. The objective of modelling this groundwater system was to simulate the progressive development of the proposed open pit and provide a tool to predict potential groundwater level drawdown, aquifer depressurisation, and groundwater inflow to the open cut pits. The groundwater model has also been used to simulate the cumulative progression of the Action and the existing Middlemount Coal Mine, and the neighbouring mines. The numerical groundwater flow model is described in detail in Appendix F of Attachment E (AGE, 2020a).

The predictive groundwater flow model scenarios have been designed to estimate:

- ranges of groundwater inflow to the Project (including the Action) area as a function of mine position and timing, for operational and post-mining phases for each aquifer;
- the extent of the zone of aquifer depressurisation due to:
  - the incremental impacts associated with the Project (including the Action); and
  - the combined impacts associated with the Project (including the Action), CSG operations and nearby existing mines.
- the level and rate of groundwater level drawdown (incremental and cumulative) surrounding the residual voids; and
- incremental and cumulative impacts to the interaction of groundwater with surface water such as baseflow within Roper Creek.

Barnett et al. (2012) developed a system to classify the confidence level for groundwater models. Models are classified as Class 1, Class 2 or Class 3 in order of increasing confidence based on key indicators such as available data, calibration procedures, consistency between calibration and predictive analysis and level of stresses. Under these guidelines, the numerical groundwater model used to assess the Action would be classified between a Class 2 and Class 3 groundwater model (AGE, 2020a).

A pseudo Null-space Monte Carlo uncertainty analysis was also undertaken to quantify the magnitude of uncertainty in the future impacts predicted by the model. The results of the uncertainty analysis are detailed in Appendix F of Attachment E (AGE, 2020a) (Appendix F of Attachment E).

Model Design and Hydraulic Parameters

Where appropriate, natural hydrogeological boundaries such as geological units and regional catchment boundaries, have been adopted in the groundwater model. The groundwater model was developed to include the proposed mine plan and potential for cumulative impact from nearby operational mines such as German Creek East, Foxleigh, Foxleigh Plains, and Norwich Park Mine (Figure 23). CSG production as part of the Bowen Gas Project (Arrow Energy, 2012) within the Rangal Coal Measures approximately 7 km to the north of the Action in 2034 is also incorporated into the groundwater model.

The groundwater model represents the key geological units within the model domain as 17 layers (Table 14), and extends approximately 30 km from north-west to south-east, and 21 km from north-east to south west, and was divided into variable sized cells comprising up to 19,412 cells per layer (AGE, 2020a) (Figure 23).

Table 14
Summary of Numerical Groundwater Model Layers

Layer	Layer name	Hydraulic conductivity (K) (m/day)			Specific storage (m^{-1})	Specific yield
		Horizontal (Kh)	Vertical (Kv)	Depth dependency		
Model Domain						
1	Alluvium	0.75	6.37E-02	No	1.30E-05	2.00E-02
2	Tertiary	0.75	5.47E-02	No	1.30E-05	2.00E-02
3	Weathered Zone (Rangal Coal Measures)	0.1	1.30E-02	No	1.30E-05	1.00E-02
Permian Geology West of Jellinbah Fault						
4	Rangal Coal Measures – overburden	1.00E-04	2.10E-05	No	1.00E-06	1.00E-02
5	Rangal Coal Measures – Middlemount coal seam	0.22 to 1.00E-05[#]	1.48E-01	Yes	1.00E-06	1.00E-02
6	Rangal Coal Measures – interburden	6.03E-06	3.24E-08	No	1.00E-06	1.00E-02
7	Rangal Coal Measures – Permian Pisces coal seam	0.09 to 1.00E-05[#]	1.29E-01	Yes	1.00E-06	1.00E-02
8	Rangal Coal Measures – strata underlying Pisces coal seam	5.43E-05	4.18E-06	No	1.00E-06	1.00E-02
9	Fort Cooper Coal Measures – Burngrove Formation	7.20E-05	6.48E-05	No	1.30E-05	1.00E-02
10	Fort Cooper Coal Measures – Fair Hill Formation	3.59E-04	2.06E-05	No	1.30E-05	1.00E-02
11	Rewan Formation	1.00E-04	2.10E-05	No	1.00E-06	1.00E-02
12	Rangal Coal Measures – Leichhardt coal seam	0.18 to 1.00E-05[#]	1.48E-01	Yes	1.00E-06	1.00E-02
13	Rangal Coal Measures – interburden	6.03E-06	3.24E-08	No	1.00E-06	1.00E-02
14	Rangal Coal Measures – Vermont coal seam	0.06 to 1.00E-05[#]	1.29E-01	Yes	1.00E-06	1.00E-02
15	Rangal Coal Measures – strata underlying the Vermont coal seam	5.43E-05	4.18E-06	No	1.00E-06	1.00E-02
16	Fort Cooper Coal Measures – Burngrove Formation	7.20E-05	6.48E-05	No	1.30E-05	1.00E-02
17	Fort Cooper Coal Measures – Fair Hill Formation	3.59E-04	2.06E-05	No	1.30E-05	1.00E-02

Source: AGE (2020a).

[#] Range of horizontal hydraulic conductivity (Kh) values based on the depth dependence equations used for each coal seam.
Note: m^{-1} = per metre, m/day = metres per day

The model cell dimensions have been optimised to replicate the historical and future mining progressions and associated groundwater level responses. Grid spacing across the model domain is variable, with refinement around the mine site and locations of groundwater level observations. The model cell size becomes larger away from these key areas. The model domain was discretised into 19,412 cells per layer, and a total of 109,147 cells for the whole model. Layers 4 to 17 pinch out where these layers sub-crop beneath the weathered zone, or are truncated by the Jellinbah Fault. Cell sizes range from 100 m by 100 m within the mining area and up to 700 m by 700 m outside the Project area (AGE, 2020a).

The vertical discretisation of the model is described by the geological layers. Geological surfaces have been developed for the Middlemount Coal mining area from the mine geology model, and have been extrapolated across the entire proposed numerical model extent from interpretation of the regional geological mapping and layering for the Bowen Gas Project (Arrow Energy, 2012).

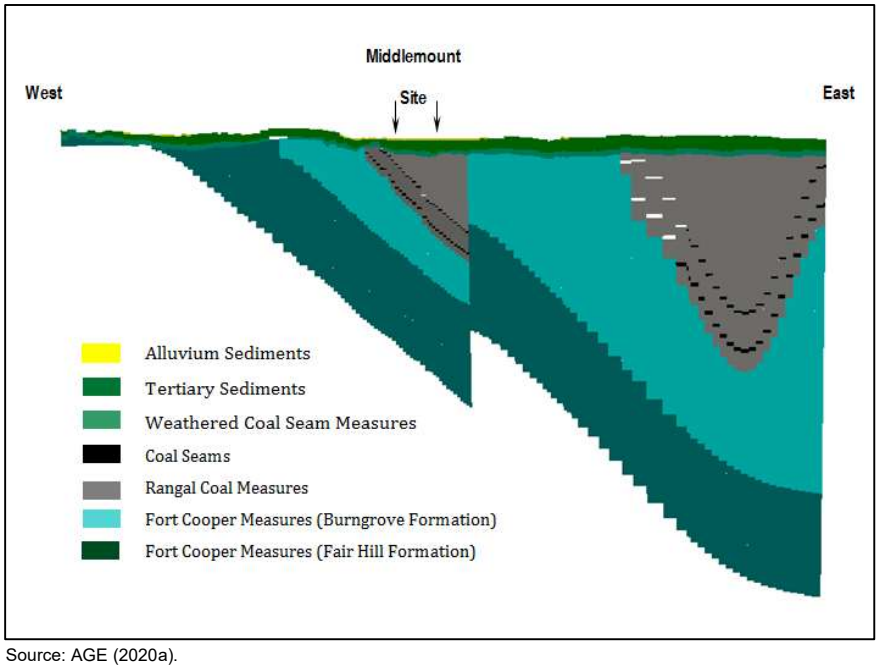
The model layering is similar to the 2010 numerical model, and includes the Quaternary alluvium as a separate layer to represent recharge from ephemeral surface water flows and rainfall in these areas (AGE, 2020a).

Jellinbah Fault

Layers 1 to 3 occur stratigraphically above the geology displaced by the Jellinbah Fault and as such are not assessed to be impacted by this fault, and are therefore consistent across the model domain. However, Layers 4 to 17 includes replicated layers to represent strata (i.e. Rangal Coal Measures and Fort Cooper Coal Measures) displaced east and west of the Jellinbah Fault northwest–southeast strike alignment (AGE, 2020a).

The Jellinbah Fault is the main structural feature within the model domain, and is represented by offsetting the Rangal Coal Measures against the underlying Fort Cooper Coal Measures where this geology strata has been vertically displaced east of the Middlemount Mine area. Whilst there is likely to be other minor faults within the model domain, the nature of these faults is unknown and therefore have not been incorporated into the groundwater model to slow or halt groundwater flow/movement. This approach in conjunction with the available model inputs, has necessitated simplifications to the numerical model that are considered to create conservative predictions of the impacts from groundwater depressurisation. This simplified conceptualisation and representation of the groundwater model is presented in the cross section in Figure 25.

Hence, the numerical model provides for a lateral, horizontal hydraulic connection across the Jellinbah Fault where different layers are juxtaposed on the eastern and western sides of the fault plane as represented in Figure 25. This was achieved using the Algomesh software to provide non-neighbour connections which hydraulically connect model cells (nodes) within the different model layers positioned on either side of the Jellinbah Fault (AGE, 2020a).



Source: AGE (2020a).

Figure 25 Section through Groundwater Model Showing Layer Design

Further details regarding how the Jellinbah Fault is considered in the numerical groundwater model is provided in Appendix F of Attachment E (AGE, 2020a). A summary of the influence of hydraulic faults on groundwater flow is provided in Section 3.2.

Calibration

The model was calibrated and verified to existing groundwater levels, using reliable measurements from representative bores within the model domain. A detailed description of the calibration method is provided in Attachment E (AGE, 2020a).

The objective of the calibration was to replicate the observed groundwater levels in accordance with the modelling guidelines developed by Barnett *et al.,* (2012). The transient calibration successfully achieved a 9.1% scaled root mean square (SRMS) error, which is less than the 10% SRMS error (maximum) suggested by the modelling guidelines as constituting a calibrated model.

Comparison of the predicted and observed hydrographs (refer to Appendix F1 in Attachment E) shows a good qualitative match in groundwater level trends (AGE, 2020a).

3.7.5 Residual Voids Recovery Modelling

A GOLDSIM model was prepared by WRM (2020) and used to assess the likely long-term water level behaviour of the residual voids. Model predicted groundwater inflows (post-mining) to the north and south voids were provided in Attachment E (AGE, 2020a). Further details of the final void modelling configuration are provided in Attachment D (WRM, 2020).

Further details regarding the final voids are provided in Section 3.8.3.

3.8 PREDICTED CHANGES TO WATER RESOURCES

3.8.1 Surface Water

Surface Water Management System and Releases to the Receiving Environment

As described in Section 3.7.1, the existing Middlemount Coal Mine OPSIM water balance model was reviewed and updated to incorporate the Action to assess the performance of the proposed mine affected water management system. The key outcomes from the revised water balance are (WRM, 2020):

- The overall management system alternates between generating a net gain or loss of water.
- The groundwater inflows which are based on the calibrated model predictions by AGE (2020a) are generally consistent, with a reduction towards the end of the Project (including the Action).
- Average annual external water supply requirements vary between 560 to 870 Megalitres per year (ML/year) over the life of the Project (including the Action).
- The net CHPP demand (based on forecast CHPP output numbers) is generally consistent, with a reduction towards the end of the Project (including the Action).
- There were no modelled spillway overflows from the mine water system over the life of the Project.
- An external water supply source (i.e. the Anglo Coal pipeline[3]) is required in almost all years to satisfy demand.

The water balance model prepared by WRM (2020) (Attachment D) shows that there are no modelled uncontrolled discharges from the mine affected water storages over the simulation period. Therefore, the Action would continue to achieve the assessment criteria objective of a less than 10% chance of uncontrolled offsite discharges from the mine affected water dams (WRM, 2020).

[3] The supply of water via the Anglo Coal pipeline ceased in 2022 and was replaced by water supplied from the Nogoa Mackenzie Scheme.

Due to the salinity of water currently stored in MWD, and the high salinity of the groundwater inflows and external water supply, the water balance modelling indicates that no controlled releases from site would occur over the life of the Action. As such, there would be no impacts on downstream water quality or environmental values of the downstream waterway associated with controlled releases of mine affected water.

Controlled discharges may continue, in accordance with Condition C5 of EPML00716913, if the salinity of water held in on site water storages decreases. When the Surface Water Impact Assessment (WRM, 2020) was prepared, MCPL had a water offtake agreement with Anglo American plc to supply water from the German Creek Mine. However, this agreement ceased in 2022 and was replaced with a third-party agreement with BHP for water supplied from the Nogoa Mackenzie Scheme. The freshwater supplied from the Nogoa Mackenzie Scheme should reduce salt loads on site, when compared to the highly-saline water supplied from German Creek Mine (WRM, 2025). This would reduce the potential for downstream impacts from controlled releases.

The Middlemount Coal Mine Water Management Plan was updated following preparation of the Surface Water Impact Assessment (WRM, 2020) to incorporate the Action. It provided MCPL with a forecast of future water management system performance and determined the infrastructure and operational strategies required to minimise impacts to operations and environmental compliance (Engeny, 2022b). Although there were minor changes to sediment dam locations and their associated catchments, this did not have a significant impact on the performance of the mine water management system or result in different conclusions from the Surface Water Impact Assessment (WRM, 2020). The Water Management Plan (Engeny,2022b) recommended an additional out-of-pit Mine Water Dam (MWD2) and an additional sediment dam (SD6.5), which have since been constructed.

Existing surface water trigger levels presented in the EA (Attachment H) would continue to be used for the Action.

Surface Water Flow Regimes

The Action would result in changes to flows in local creeks due to the progressive extension of open cut mining operations to the south and associated subsequent capture and re-use of drainage from operational catchment areas.

The additional surface disturbance area associated with the Action would excise an additional 110 ha (maximum during operations) from the catchment area of the former Thirteen Mile Gully and other associated drainage features. This represents approximately 2% of the total catchment area of the former Thirteen Mile Gully (approximately 5,600 ha) (of which the majority has already been diverted to Roper Creek by the existing/approved Thirteen Mile Gully Diversion).

The loss also represents less than 0.3% of the Roper Creek catchment to the downstream boundary of the Middlemount Coal Mine. The loss of catchment flows in Roper Creek would be indiscernible, and as such the potential impact on water quantity in Roper Creek due to the Action is considered negligible (WRM, 2020).

The findings of the groundwater impact assessment for the Project indicate that the Jellinbah fault already intersects the natural reach of Roper Creek (AGE, 2020a). Where the fault has been mapped the fault is capped by low permeability sediment, it is unlikely the fault will interact with the diversion. Therefore, it is reasonable to assume that the Jellinbah fault will not reduce streamflows or alter downstream flow regimes in the diversion as it already interacts with the natural reach of Roper Creek.

At the completion of mining, permanent drainage of waste rock emplacement areas would be installed to minimise capture of surface runoff into the residual voids at the Middlemount Coal Mine. The majority of the disturbed area would be rehabilitated and allowed to drain back to Roper Creek (WRM, 2020).

There have been no changes to the proposed Stage 2 Roper Creek Diversion or the levee system for both the operational phase and final landform phases of the Project since the preparation of WRM (2020), including as a result of the variation to the Action. Therefore, the findings presented in WRM (2020), that impacts on stream flows would be negligible, remain unchanged (WRM, 2025).

Conceptual Design of Drainage Feature Diversions

The Action would require realignment and extension of Roper Creek Diversion 2 (shown on Figures 3 and 4). The new alignment is shown in Figure 4 and would be constructed prior to 2023. The realigned Roper Creek Diversion 2 has been designed generally in accordance with the key principles and outcomes outlined in the *Queensland Watercourse Diversion Guidelines* (WRM, 2020). The proposed diversion realignment is expected to perform in a similar manner to the existing Roper Creek for in-channel flows (WRM, 2020).

The proposed realignment and extension of the Roper Creek diversions is unlikely to impact on shallow groundwater or terrestrial vegetation as the alluvium is largely unsaturated, and Roper Creek is ephemeral with no existing baseflow in the vicinity of the Middlemount Coal Mine (AGE, 2020a).

The diversion for Roper Creek would be designed to maintain its ecological function, including for fish habitat and passage. The diversion would be constructed and commissioned prior to impacting the affected reach of Roper Creek. Consequently, the Action is not expected to result in a significant impact on fish passage (DPM, 2020) (Attachment J).

The Action would result in removal of an old section of Thirteen Mile Gully, the upstream catchment of which has been diverted along the western boundary of ML 70379 (i.e. the Thirteen Mile Gully Diversion) (Figures 2, 3 and 4).

The Action would result in a minor change to the Drainage Line 1 diversion approved as part of the Western Extension Project (MCPL, 2018a), due to a minor extension to the waste rock emplacement footprint (Figures 2, 3 and 4).

There are no changes to proposed drainage feature diversions as a result of the variation to the Action.

Geology of Drainage Feature Diversions

As the Roper Creek Diversion 2 is expected to encounter similar substrate materials to the current creek alignment and infiltration is expected to be lower than existing reach there is expected to be no net reduction in streamflow volume or duration to the downstream environment. Due the presence of the lower permeability substrate, material longitudinal connectivity of sub-surface baseflow is proposed to be maintained by inclusion of a hyporheic layer as part of the design.

As there is expected to be no reduction in the streamflow volume or duration as a result to the Roper Creek Diversion 2 due the nature of substrate materials encountered. The construction of the creek diversion does not directly result in any change in the catchment area that impact the hydrological regime of Roper Creek.

There will be a minor reduction in the overall Roper Creek catchment area due to creation of residual voids resulting in an area of approximately 6.8 km^2 (approximately 2% of the existing 389 km^2 Roper Creek catchment) that will drain to these voids. This small reduction in catchment is not expected to result in any discernible impact to the hydrological regime.

As part of the detailed design process for the Roper Creek Diversion 2 the cross section of the diversion has been designed to include a hyporheic layer. This will enable longitudinal continuity for of sub-surface baseflow particularly where lower permeability substrate materials are encountered.

This hyporheic layer will be established by over excavating the base of the channel below the ultimate design bed level. A temporary rock riffle structure will be constructed at the downstream end to assist in promoting sediment deposition. As the Roper Creek system is transport limited and has a large bed load sediment supply this infilling is expected to occur quickly resulting in the creation of the hyporheic zone. This same approach was adopted in the construction for the Stage 1 Roper Creek diversion with infilling occurring following a single flow event.

The substrate geology along the proposed Roper Creek Diversion 2 alignment is similar to that of the current alignment of Roper Creek. As a result, the bank sediments are expected to be reflective of the current diversion. These bank sediments and clay dominated have high potential for mobilisation without adequate stabilisation. As part of the proposed construction works the diversion channel any adjacent disturbance will be rehabilitated will include the followings aspects to mitigate the risk if bank sediment mobilisation:

- Sub-soil amelioration.
- Topsoil placement and amelioration including the application of gypsum, fertiliser, and humisoil compost material.
- Seed application via hydromulch with the seed mix including a sterile cover crop for rapid establishment along with native grass, understory and overstory riparian species reflective of the existing reach of Roper Creek.

MCPL developed this approach to revegetation having now successfully constructed and revegetated the Thirteen Mile Gully and Roper Creek Stage 1 diversions.

The sediment transport regime of the Roper Creek system is transport limited whereby transport capacity generally exceeds sediment supply. This large sediment supply is a result of historical upstream clearing and grazing activities. This results in a mobile sand bed throughout the system. The diversion has been designed to replicate the existing geomorphic characteristics of the reach that will be replaced. This replication includes a similar longitudinal grade and cross section area to provide sediment transport continuity throughout the diverted reach. As part of the Functional Design (WRM, 2020) hydraulic modelling was undertaken including stream power analysis as a surrogate for sediment transport capacity. The results of this stream power analysis indicate the diverted reach replicates the hydraulic behaviour of the existing reach. Therefore, it is expected that this bed load transport will continue and also act as the hyporheic zone. This approach has been observed to be successful as part of the Stage 1 Roper Creek diversion identified through annual monitoring.

The Roper Creek Diversion 2 has been designed to replicated the hydraulic characteristics of the existing reach of Roper Creek to be replaced with hydraulic modelling utilised to demonstrate similar hydraulic behaviour. This hydraulic modelling has also been compared against published values for stream bed and bank stability (Australian Coal Association Research Program [ACARP], 2002; ACARP, 2014; DNRME, 2019). Therefore, the risk of sediment mobility is not expected to materially change beyond what would naturally providing the diversion is adequately rehabilitated. Ongoing monitoring will be undertaken to assess rehabilitation success and identify areas for intervention if required.

As part of the Project geotechnical investigation soil sampling and analysis has been completed on topsoils and sub-soils over the entire depth and extent of the proposed Roper Creek Diversion 2 (Landloch, 2022). The findings of this investigation are summarised below:

- A surface soil stripping depth of 0.1 m was recommended for the Project area. Soils below 0.1 m have high exchangeable sodium content and dispersive properties, and therefore would not be beneficial for reuse as a growing medium (Landloch, 2022).
- Soils occurring at depths between 0.3 and 1 m are highly sodic, and in some instances high in chloride. If these subsoils are intended to be used as fill, it is critical that they are ameliorated. Gypsum application was recommended to address sodicity (Landloch, 2022).

- Soils occurring below 1 m are dispersive, and in some instances alkaline. Salinity is also an issue in some areas. Where subsoils are either exposed as cut surfaces or stripped and replaced, gypsum application was recommended to address dispersive properties (Landloch, 2022).
- To ensure vigorous initial plant growth, ameliorants and fertiliser should be applied prior to planting. Ameliorants and fertiliser is recommended to address soil chemical properties and nutrient deficiencies (Landloch, 2022).
- All ameliorant and fertiliser application should be incorporated into soils to the appropriate depth (Landloch, 2022).
- Applying gypsum is recommended as it will address sodicity and help reduce dispersion that is present at the site. In all cases, once gypsum is spread, it should be mixed into the soil (or subsoil) by tillage to a depth of 0.1 m (Landloch, 2022).
- Gypsum is to be applied to surface soil 0 – 0.1 m at a rate of 1.5 tonnes per hectare (t/ha). Application of gypsum prior to stripping is recommended, as the process of surface soil stripping will provide some mixing and aid in incorporating gypsum into the soil (Landloch, 2022).
- For subsoil at depth between 0.3 and 1 m, a gypsum application rate of 10 t/ha is recommended (Landloch, 2022).
- All recommendations from this investigation will be incorporated into construction works for the Project.

An extensive geotechnical investigation for the Roper Creek Diversion 2 has been undertaken to inform design and future construction works with a geological model developed to understand ground conditions along the existing and proposed alignment. The current alignment of Roper Creek which is proposed to be diverted is incised into residual clay overlying weathered rock.

Findings from the geochemical report conducted by RGS Environmental (2013) indicated that materials encountered and depth of the diversion excavation are non-acid forming (NAF). This is supported by the findings from the soil investigation conducted by Parsons Brinkerhoff (Parsons Brinckerhoff, 2010b), which stated that there is a low to negligible risk of development of acid mine drainage from the residual clay and weathered rock.

Further details of the existing and proposed diversions are provided in Section 3.11.1 and Attachment D (WRM, 2020).

External Water Supply

Runoff captured in the mine water management system is preferentially used within the CHPP or used for haul road and stockpile dust suppression.

To supplement the water supply requirements, MCPL previously had a Water Supply Agreement with Anglo Coal to supply excess water from the German Creek Mine located south of the Middlemount Coal Mine. Water was pumped from the German Creek Mine on an ‘as needed’ basis and placed in the Raw Water Dam (RWD), Southern Transfer Dam (STD) and MWD, up to a limit of 250 ML per month and 1,800 ML/year.

Modelling results from WRM (2020) showed that the existing mine water management system (including the external water supply via the Anglo Coal pipeline from the German Creek Mine) could meet all mine site demands over the mine life.

The water balance modelling results indicated that:

- an external water supply source (i.e. the Anglo Coal pipeline) is required in almost all years to satisfy demand;
- there is a 50% chance that between 460 ML/year and 1,330 ML/year water would be required from an external water source over the Project life; and
- there is less than a 1% chance that the Project would require more than 1,800 ML/year of external water (i.e. the maximum amount of water allocated to MCPL under the current Water Supply Agreement with Anglo Coal).

The Water Supply Agreement with Anglo Coal ceased in 2022 and was replaced by a third-party agreement with BHP for water supplied from the Nogoa McKenzie Scheme. The water taken under this scheme is managed under the *Water Plan (Fitzroy Basin) 2011*, which was developed under the Water Act to sustainably manage and allocate water resources in Queensland. That is, the take of water has been approved as being acceptable by the Queensland Government (WRM, 2025).

Flooding

Flood modelling results (WRM, 2020) indicate that for the 100 year Average Recurrence Interval (ARI) event, there are no significant changes to flood levels and velocities from approved conditions for the 50% AEP event with the exception of the change due to Roper Creek Diversion 2 relocation.

The results show that 5% AEP event flood levels would be unchanged from approved conditions upstream of Roper Creek Diversion 1 and moderately reduce peak flood levels within Roper Creek Diversion 1. Roper Creek Diversion 2 would overflow and drain across Middlemount Road for this event, which is not predicted to occur for pre-mining or approved conditions. The depth of flooding on Middlemount Road for this event is predicted to be 0.4 m and therefore likely impassable. The floodwater is confined to the old flood channel downstream of Middlemount Road.

In addition, 2% and 1% AEP peak flood levels are generally unchanged upstream of Roper Creek Diversion 2. The Action will increase flows on Middlemount Road and further downstream above approved and pre mining conditions. Peak flood levels (and flows) would reduce within the Roper Creek channel. The impact extent goes beyond the available topographic data. However, a review of the aerial imagery shows the flood channel that conveys this floodwater drains back into Roper Creek about 4.6 km downstream of Middlemount Road. The impact is not expected to extend further downstream of this location.

The flood protection levee in place during operations will be decommissioned and incorporated into the final landform at the cessation of mining to widen the post-mining Roper Creek floodplain. The rehabilitated final landform will provide flood immunity to the southern void up to the probable maximum flood (PMF) level from Roper Creek, and form a stable and self-sustaining landform that does not require long-term maintenance.

The stability of the final landform in the vicinity of the Roper Creek floodplain will be enhanced by incorporating erosion resistant material (e.g. rock gabion) into the batter slope to approximately 2 m height (the PMF Level). Native vegetation cover between the final landform and Roper Creek will be retained.

There have been no changes to the approved or proposed levee locations since preparation of WRM (2020) and the flood model results presented in WRM (2020) remain unchanged (WRM, 2025).

Aquatic Ecology

The transient flow, lack of pools and lack of dry season refuge in the Project area limits the ability of Roper Creek and Thirteen Mile Gully to provide sustained habitat for native fish and turtles. These habitats are not expected to support aquatic species of conservation significance listed under the NC Act or EPBC Act, given the lack of suitable habitat features. However, the Project would still remove or otherwise interfere with aquatic habitat in the Project area, comprising ephemeral watercourses and drainage lines (DPM, 2020) (Attachment J).

Direct impacts as a result of the Project would include the removal of aquatic and riparian habitat within an approximate 4.5 km reach of Roper Creek and development of a diversion for this section of Roper Creek, which would be approximately 3.8 km long. It is noted however that the approved Roper Creek Diversion 2 will remove approximately 1.9 km of aquatic and riparian habitat (i.e. the Project would result in an additional 2.6 km of Roper Creek being diverted).

A detailed rehabilitation plan has been developed (Alluvium Consulting, 2014) and will be implemented following earthworks construction activities. The rehabilitation plan includes the establishment of species that reflect the current riparian vegetation on Roper Creek. This approach to revegetation is that same as what has been successfully implemented on the 13 Mile Gully Diversion and Stage 1 Roper Creek diversion.

Clearing of the natural reach of Roper Creek will only occur in a staged manner alongside the gradual mine plan expansion. As the mine plan extends to the south, the natural reach of Roper Creek will gradually be cleared, giving substantial time for existing vegetation along the diversion reach to establish.

The Project would also include removal of a small section (approximately 1 km) of the old Thirteen Mile Gully, the upstream catchment of which has previously been diverted along the western boundary of ML 70379 (DPM, 2020) (Attachment J).

The variation of the Action would not change the impacts to aquatic ecology from the Action nor the assessment completed (DPM, 2020) (Attachment J).

3.8.2 Groundwater

Direct Groundwater Inflows/Interception (Water Licensing)

The average predicted pit inflow rate for the Project (including the Action) is approximately 1.8 Megalitres per day (ML/day) and ranges between approximately 0.7 ML/day and 3.5 ML/day (244 ML/annum and 1,269 ML/annum) (AGE, 2020a).

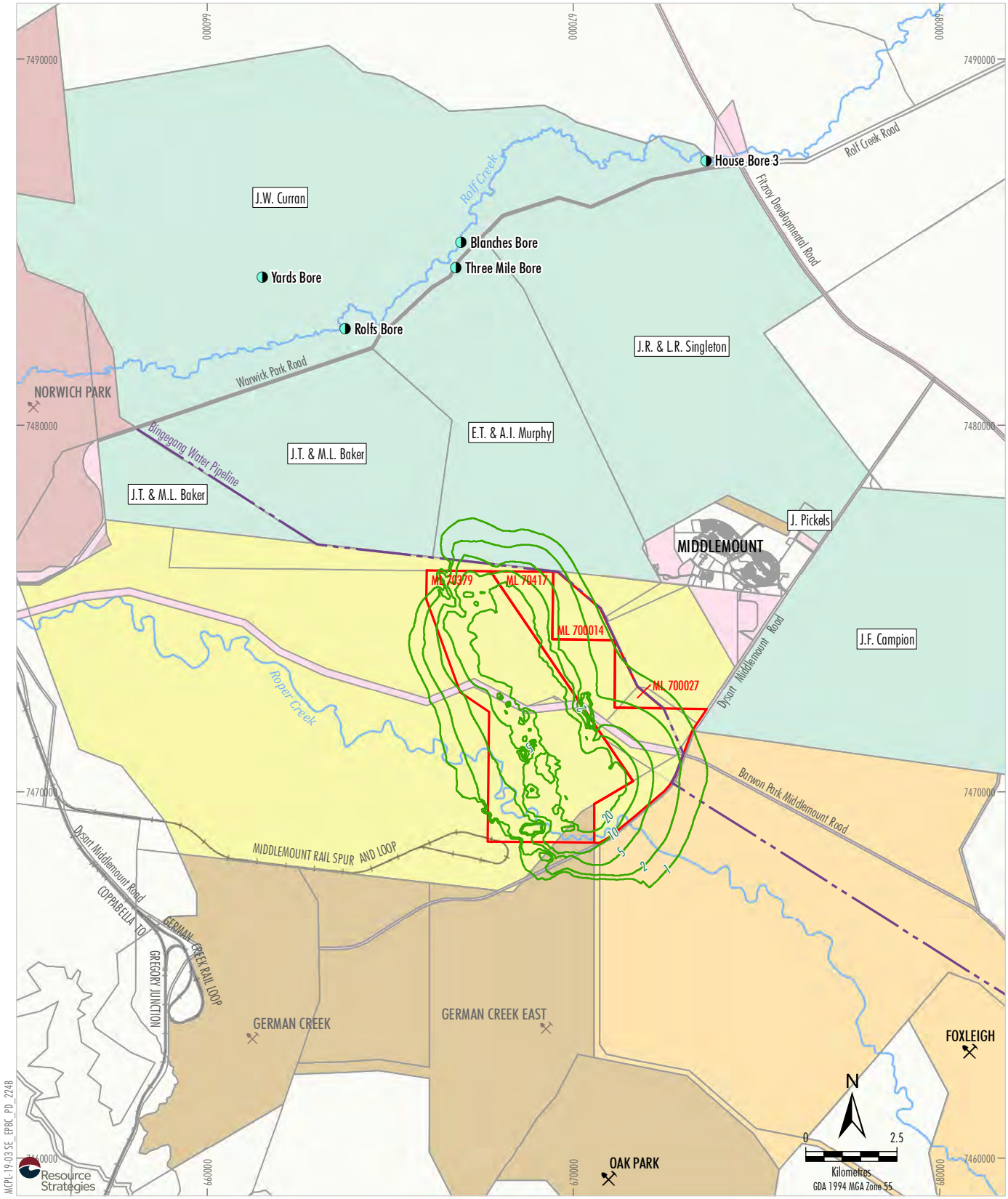
Overall, the predicted inflow rates are typically in line with the inflow rates previously predicted and experienced at the mine (WRM, 2020).

Groundwater Drawdown (Impacts on Groundwater Users)

No landholder water supply bores are located within the predicted drawdown/depressurisation extents attributable to the proposed mine plan for the Action (AGE, 2020a).

The predicted drawdown extents due to the Action in the shallow Tertiary and Weathered Permian layers in the groundwater model is shown on Figure 26. The drawdown extent generally decreases within the underlying layers, which is not unexpected given the presence of lower permeability interburden strata (aquitards) between these geological units (AGE, 2020a).

Drawdown contours for each of the groundwater model layers are presented in Section 8.3 and 8.4 of Attachment E (AGE, 2020a).



Source: MCPL (2022); AGE (2020); The State of Queensland (2022)

LEGEND

- Middlemount Coal Mining Lease Boundary (ML)
- Cadastral Boundary
- Railway
- Active Coal Mine
- Inactive Coal Mine

LANDHOLDER

- Middlemount Coal Owned Land
- Anglo Coal (Capcoal Management) Pty Limited
- BHP Coal Pty Ltd; QCT Mining Pty Ltd; Mitsubishi Development Pty Ltd; QCT Investment Pty Ptd; BHP Queensland Coal Investments Pty Ltd; Umal Consolidated Pty Ptd; QCT Resources Pty Limited
- Foxleigh Land Pty Ltd
- Crown Land
- Relevant Private Landholder
- Owner not Referenced

Maximum Zone of Groundwater Drawdown

- Drawdown Contour (m)

Private Landholder Bores

- Bore Identified During Bore Census

middlemount coal PTY LTD

SOUTHERN EXTENSION PROJECT

Maximum Zone of Groundwater Drawdown (Tertiary and Weathered Permian)

Figure 26

Overall, the predicted drawdown extents due to the Action are similar to those previously predicted for the Western Extension Project (see AGE [2018]).

AGE (2025) assessed that the findings of the Groundwater Impact Assessment (AGE, 2020), in relation to impacts on landholder water supply bores, have not changed.

3.8.3 Residual Voids

Residual Void Design

Two residual voids are approved at the Middlemount Coal Mine in the northern and southern areas of the open cut extent (Figures 2 and 3). The residual voids are to be designed to not cause any serious environmental harm to land, surface water or groundwaters outside of the void in accordance with the approved PRCP (MCPL, 2023).

The proposed north void is 358 ha in area and the south void area is 163 ha. The basement rock in the void would be the same as the approved residual voids (i.e. base of the extracted coal seams) with the differences in void depth reflecting the change in position in the landscape.

The residual voids would partly fill with water (i.e. groundwater recovery and incidental rainfall and runoff) and be subject to evapo-concentration effects which would result in the salinity gradually increasing over time.

A safety bund wall consisting of competent rock and/or fencing would be constructed to limit human and livestock/animal access to the residual voids. The bund wall would have a minimum height of 2 m, with a minimum base width of 4 m and be located at least 10 m beyond the area potentially affected by any instability of the open cut pit edge.

A summary of water quality in the final voids is provided in Section 3.9.2 and further detail is provided in AGE (2020a). The influence of hydraulic faults on groundwater flow is summarised in Section 3.2 and provided in Attachment E (AGE, 2020a).

Once mining operations cease, groundwater inflows to the northern and southern residual voids would no longer be collected and pumped out, and as a result, the residual voids would gradually begin to fill with groundwater.

Inflows into the residual voids would comprise incidental rainfall, runoff within the residual void catchment area and groundwater (including spoil dump infiltration). The catchment area of the residual voids would be minimised and is defined by the surrounding landform including safety bunds and/or upslope diversion channels.

Residual void water recovery analyses have been conducted as part of the Surface Water Impact Assessment, which included simulations of the long-term salinity of the residual void waterbodies (Attachment D). The salinity of the residual voids would gradually increase over time, however as described further below would be contained within the voids (i.e. the voids would remain as long-term groundwater sinks and would not spill [Attachment D]).

The design of the final landform has taken into consideration the disposal of waste rock in-pit to minimise the size of the final voids where reasonable and practicable. It is not reasonable or practical to further fill in the voids because:

- the cost to rehandle spoil material from the out of pit emplacements to the final voids (to fill the voids or make them smaller) would be prohibitive; and
- rehandling spoil material from the out of pit emplacements (e.g. East Dump) to the final voids (to fill the voids or make them smaller) would delay rehabilitation.

Flood Protection

The northern residual void would be located well beyond the current floodplain of Roper Creek. The southern residual void is located partially on the pre-mine floodplain of Roper Creek (Attachment D). As described in Section 3.8.1, at the completion of mining, the operational flood protection levee would be decommissioned and incorporated into the final landform at the cessation of mining to widen the post-mining Roper Creek floodplain, and the final landform would be designed to provide flood immunity up to the PMF level from Roper Creek consistent with approved PRCP (MCPL, 2023).

Residual Void Pit Wall Stability

The *Residual Void Study* (MCPL, 2014) included a *Residual Void Slope Stability Study* by Geotechnical Consulting Services (2014) which was included in the approved Southern Extension Project EA Application. The study included an investigation of geotechnical stability of highwall and low wall slopes, environmental stability and provides an indication of the remedial measures needed to achieve geotechnical stability.

The target coal seams are truncated by the Jellinbah Fault, which is mapped to be generally coincident with the north-eastern boundary of ML 70379. It is recognised that geological faults, such as the Jellinbah Fault, can create instability where the highwall is cut in proximity to the Jellinbah Fault (Geotechnical Consulting Services, 2014). For this reason, MCPL would stand off mining from the Jellinbah Fault leaving a sufficiently thick buttress of undisturbed material.

Residual Void Hydrology

WRM has prepared a residual void water balance (including groundwater input by AGE [2020a]) to assess the water quality, long-term risk of discharge and flooding as part of the Surface Water Impact Assessment (Appendix A).

A description of the final void water level recovery and final void flood protection is provided below in the 'Final Void Recovery Modelling Results' section. A description of the predicted water quality of the water accumulating within the final voids is provided in Section 3.9.2.

Post Closure Management

A safety bund wall consisting of competent rock and/or fencing would be constructed to limit human and livestock/animal access to the final void. The bund wall would have a minimum height of 2 m, with a minimum base width of 4 m and be located at least 10 m beyond the area potentially affected by any instability of the open cut pit edge. Consistent with the PRCP (MCPL, 2023), post-closure works and rehabilitation would be carried out at the site.

Final Void Recovery Modelling Results

Post closure conditions were simulated for a period of 500 years by WRM (2020) to predict the void lake level recovery following cessation of mining The final voids configuration and contributing catchments (which were minimised with the use of upslope diversions), were used for the simulation along with model predicted groundwater inflows provided by AGE (2020a), varying with depth/recovery heights.

Based on the modelled predictions, the North and South voids would gradually fill over time from direct rainfall occurring across each void and groundwater seepage before reaching an equilibrated level well below the pre-mining groundwater levels. The modelling demonstrates that the voids would act as permanent sinks and therefore any potential acid generation from emplaced coal rejects or elevated salt concentration within the void water bodies would not migrate beyond the limit of the voids and would therefore not pose a contamination risk to surrounding groundwater sources (Appendix B).

The residual void modelling indicates the following for the north void (WRM, 2020):

- The water level reaches equilibrium between 6.5 m AHD and 13 m AHD and varies between these levels throughout the simulation.
- The maximum modelled water level is around 150 m below the final rehabilitated north void crest level.

The residual void modelling indicates the following for the south void (WRM, 2020):

- The water level reaches equilibrium between 32 m AHD and 37 m AHD and generally remains at these levels throughout the simulation.
- The maximum modelled water level is around 122 m below the south void crest level.

Given the water levels that would recover within the final voids would be at least 120 m below the void crest levels, and the final landform has been designed to provide flood immunity up to the Probable Maximum Flood (PMF) level, there is considered to be no opportunity for water to either spill from the voids to the receiving environment, or water to enter the voids from a flood event. Under the alternative climate scenarios modelled by WRM (2020), final void water levels are predicted to equilibrate lower than the base case scenario, and remain in the order of 100 m below the pre-mining groundwater level (Section 7.8.2.2 of WRM [2020]). Accordingly, using alternative climate change scenarios is not expected to change the conclusion that the final voids would remain groundwater sinks in perpetuity, with no leakage of stored void water.

Surface Water and Groundwater Addendum Reports

WRM (2025) and AGE (2025) have reviewed the previous findings in relation to the final voids. WRM (2025) concludes that, as there have been no changes to the final void locations or configurations, the results presented in WRM (2020) remain the same. AGE (2025) similarly concludes that the variation to the Action is administrative and does not change the conclusions of AGE (2020a) in relation to the final voids.

3.9 PREDICTED CHANGES TO WATER QUALITY

3.9.1 Surface Water

Uncontrolled Releases

The water balance model prepared by WRM (2020) shows that there are no modelled uncontrolled discharges from the mine affected water storages over the simulation period. Therefore, the Action would continue to achieve the assessment criteria objective under the *Regulated Dams Operational Management Plan* of a less than 10% chance of uncontrolled offsite discharges from the mine affected water dams.

If required, controlled releases would continue to be undertaken at Middlemount Coal Mine for the Action in accordance with the EA.

Controlled Releases

The water balance model simulates that no controlled releases from the MWD to Roper Creek would occur based on the conditions of the EA. This is due to the high initial salinity of the MWD and the high salinity of the groundwater, runoff parameters and from the external water supply pipeline. Although controlled releases can be made from other storages, it is only made from the MWD under the current mine affected water management system (WRM, 2020; 2025).

There are no proposed changes to the current releases conditions as prescribed in Condition C2 of EA EPML00716913 (Attachment H).

Geochemistry (Drainage and Seepage)

The overburden and interburden within the Action area includes the same types of sedimentary units that occur within the current Middlemount Coal Mine area, and as such are considered to have the same geochemistry characteristics. Therefore, no additional geochemical assessment has been undertaken for the Action area, with the existing geochemical assessments considered valid for the overburden and interburden sequences that will be mined in the Action portion of the site (AGE, 2020a).

Although the majority of overburden could be managed as NAF material, there is a risk that some of the coal rejects may have a capacity to generate acid over time if not appropriately managed or co-disposed with overburden during mining operations (RGS Environmental, 2016). Therefore, coal rejects would continue to be emplaced with overburden within the open cut pits and progressively rehabilitated during mining.

Surface water runoff and accumulated rainfall seepage would drain towards the voids, and local groundwater would flow from the surrounding geological units towards the voids (RGS Environmental, 2016). Evaporation from the void lake surfaces would maintain a water level below the surrounding groundwater levels, forming a groundwater sink in the local environment. Evaporation from the lake surfaces would also slowly concentrate salts in the pit lake over time. The increasing salinity would not pose a risk to other aquifers and surface water features as the residual voids would remain a permanent sink (AGE, 2020a).

Water quality of the residual voids is discussed in Section 3.9.2.

3.9.2 Alteration of Groundwater Quality

There is limited potential for groundwater contamination to occur as a result of hydrocarbon and chemical contamination with provision for immediate clean-up of spills. All chemicals would be transported, handled and stored in accordance with relevant Australian Standards. These controls represent standard practice and a legislated requirement at mine sites for preventing the contamination (AGE, 2020a).

The Groundwater Impact Assessment predicts the final voids will act as long-term groundwater sinks post mining, with pit void water levels expected to recover to a quasi-equilibrium level that are below the pre-mining groundwater level for the north and south voids respectively. This will result in the long-term water quality within the final voids being affected by evaporative concentration and becoming more saline. However, flow of this water into the groundwater systems will be prevented as a consequence of the lower water level within the voids (AGE, 2020a).

Given the final voids are predicted to remain groundwater sinks, with the recovered water levels in the final voids remaining well below the surrounding regional groundwater level, the void water bodies will continue to accumulate salt over time due to evapoconcentration (WRM, 2020). The voids are predicted to become hypersaline (around 33,000 mg/L) after around 200-300 years following mining (WRM, 2020).

AGE (2025) has concluded that the variation to the Action does not change the findings of AGE (2020a) in relation to groundwater quality.

3.10 CUMULATIVE IMPACTS ON WATER RESOURCES

As described in Section 3.5, the Surface Water Impact Assessment (WRM, 2020) (Attachment D) and the Groundwater Impact Assessment (AGE, 2020a) (Attachment E) considered surrounding operational and closed mines, as well as CSG production as part of the Bowen Gas Project (Arrow Energy, 2012).

3.10.1 Surface Water

The Action does not require any additional raw water allocations and therefore does not contribute to cumulative impacts in relation to extraction of surface water resources from the catchment (WRM, 2020).

The Action would locally impact flows in Roper Creek and its minor tributaries due to water being captured within the site water management system. No other existing or proposed projects have been identified which would further increase these local impacts.

WRM (2020) (Attachment D) also concluded that given the Middlemount Coal Mine affected water releases are being managed within an overarching strategic framework for management of cumulative impacts of mining activities, the proposed management approach for mine affected water from the Action is expected to have negligible cumulative impact on surface water quality and associated environmental values when compared to the approved Middlemount Coal Mine.

WRM (2025) concluded that the findings of WRM (2020) remain the same. Therefore, the previously assessed cumulative impacts to surface water resources are unchanged.

3.10.2 Groundwater

The numerical groundwater model was used to assess the cumulative impact between the Action and nearby operational and closed mines which include German Creek East, Foxleigh, Foxleigh Plains, and Norwich Park as well as CSG production as part of the Bowen Gas Project (Arrow Energy, 2012).

Modelling indicates that depressurisation/drawdown in the Tertiary and Weathered Permian and deeper Middlemount and Pisces seams has some (albeit limited) interaction with depressurisation/drawdown effects from other mines and proposed future CSG production activities. There are no private groundwater bores located in these areas of overlapping depressurisation/drawdown. The cumulative drawdown extents are presented in the Groundwater Impact Assessment (AGE, 2020a) (Attachment E).

The findings of AGE (2020a) in regard to cumulative impacts to groundwater resources are considered to be unchanged due to the variation to the Action (AGE, 2025).

3.11 SUMMARY OF AVOIDANCE, SAFEGUARDS AND MITIGATION MEASURES FOR WATER RESOURCES

3.11.1 Surface Water Management System

The existing environmental management systems at the Middlemount Coal Mine include environmental management plans and programs that have been developed and implemented since operations commenced. Existing management plans and programs include:

- Environmental Management Plan (MCPL, 2018b);
- Operational Water Management Plan (Engeny, 2022b);
- Receiving Environment Monitoring Program (DPM, 2019);
- Erosion and Sediment Control Plan (Engeny, 2024a); and
- Site Water Balance (Engeny, 2021) (revised by Engeny [2024b]).
- The general principles to manage surface water for the site include (WRM, 2020):
- The separation of clean, sediment-laden, mine affected, tailings and contaminated water runoff.
- Minimise the area of surface disturbance, thus minimising the volume of sediment laden or contaminated runoff.

- Collect and contain on site all potential mine affected water pumped from the open cut pits in dedicated mine water storages.
- Retain and reuse on site any sediment laden water runoff that has high sediment concentrations whenever possible.
- Release any sediment-laden water runoff that has high sediment concentrations (not able to be retained and reused on site) in a controlled manner in accordance with the EA.
- Maximise the use of on-site water and thus minimise the need for importing external water.
- Prioritise the use of poorer quality water over better quality water.
- Flood mitigation works to provide a minimum of 1,000 year ARI immunity from Thirteen Mile Gully and Roper Creek floods.

The existing water management systems at the existing/approved Middlemount Coal Mine would be progressively augmented as water management requirements change over the life of the Action. The updated water management system is described below and further detail is provided in WRM (2020) (Attachment D).

Up-Catchment Runoff Control

Up-catchment runoff controls divert runoff from undisturbed areas around mining activities (where possible), while runoff from disturbed catchments is captured in the mine water management system and stored for release, used within the CHPP, or used for haul road and stockpile dust suppression.

The up-catchment runoff control system includes two dams, namely Highwall Dam 1 (HWD1) (to be constructed towards the end of 2020) and Highwall Dam 2 (HWD2) (constructed), designed to capture overland flows which would otherwise enter the open cut pit. The water captured in HWD2 is free drained to the Thirteen Mile Gully Diversion. Once constructed, water captured in HWD1 will be pumped to HWD2.

Thirteen Mile Gully Diversion

The Thirteen Mile Gully Diversion diverts water from Drainage Line 1 (upstream of Thirteen Mile Gully) to Roper Creek (Figure 3). The Thirteen Mile Gully Diversion inside ML 70379 is authorised under the EA. The Thirteen Mile Gully Diversion outside ML 70379 is authorised under a Water Licence (No. 608025) under the Water Act and two Development Permits under the Qld *Planning Act 2016* (Planning Act).

Roper Creek Diversions

Two diversions of Roper Creek (Roper Creek Diversions 1 and 2) are approved under the EA. The locations of the Roper Creek diversions are shown on Figure 2. Roper Creek Diversion 1 was constructed during the second half of 2020. Roper Creek Diversion 2 (approved under EPBC 2010/5394 approval but not yet constructed) is proposed to be realigned and extended as part of the Action (WRM, 2020) (Figures 3 and 4).

Roper Creek Diversion 2 has been designed in consideration of the Queensland Guideline: *Works that interfere with water in a watercourse for a resource activity— watercourse diversions authorised under the Water Act* (the diversion Guideline). The outcomes identified in this guideline are consistent with findings of ACARP projects undertaken in the Bowen Basin, as reported in *Project C8030_9068 Maintenance of Geomorphic Processes in Bowen Basin River Diversions* (Hardie and White, 2002).

Outcome 4 of the diversion Guideline requires (emphasis added): A sediment transport regime that allows the watercourse diversion to be self-sustaining and not result in material or serious environmental harm on upstream and downstream reaches. As described in Section 9.5.3.4 of the Surface Water Impact Assessment (Attachment D), the proposed diversion would mimic the Roper Creek channel stream power for the 50% AEP (in channel) event. The post mining stream power is within 6% of pre-mining conditions stream power. On this basis, the sediment transport regime of the diversion should be self-sustaining and would satisfy Outcome 4.

MCPL will update the Waterway Diversion Monitoring and Evaluation Program (2020) prepared for the Roper Creek Diversion 1 and Thirteen Mile Gully Diversion to include Roper Creek Diversion 2. The Waterway Diversion Monitoring and Evaluation Program will be updated to include potential measures that could be implemented if the monitoring identifies that the diversions are not operating effectively (e.g. diversion bank/bed repairs following erosion, installation of erosion and sediment control structures [if required], additional tree planting or cover crop seeding where vegetation is not establishing, repair of instream structures). The Erosion and Sediment Control Plan (Engeny, 2024a) explains that where significant erosion is observed, remedial works may involve construction of additional erosion controls including the re-establishment of vegetative cover, installation of erosion blanket or rock armouring.

Monitoring of Roper Creek Diversion 2 is proposed to be consistent with the Roper Creek Diversion 1 requirements described in the Waterway Diversion Monitoring and Evaluation Program (2020) (to be updated to include Roper Creek Diversion 2). Monitoring will include visual inspections of instream structures (such as erosion protection and vegetation) and photographs from established monitoring points to identify erosion occurrences or if vegetation is not establishing. These direct visual inspections will be supplemented with reviews of aerial imagery and survey data (cross & long sections) of the entire length of the diversion.

As described in Table 2.4 of the Waterway Diversion Monitoring and Evaluation Program (2020), the visual inspections of the diversion and its upstream and downstream reaches will be assessed against the ACARP Index of Diversion Controls assessment methodology (ACARP, 2014). This inspection would include an assessment of:

- bank condition;
- piping;
- bed condition;
- recovery;
- proximity of spoil pipes from bank;
- stability of instream structures;
- structural intactness of vegetation;
- regeneration of vegetation; and
- longitudinal conductivity of vegetation.

In addition to the above, MCPL is required to rehabilitate the final landform in accordance with the requirements of the PRCP (MCPL, 2023). Specifically, the PRCP Schedule (2023) defines a set of completion criteria which must be met in order to minimise erosion rates and soil loss across the final landform (including Roper Creek Diversion 2).

For example, MCPL are required to achieve the following “completion criteria” under the PRCP Schedule (2023) for the in-pit and out-of-pit overburden spoil dumps (slopes) to minimise erosion. MCPL will follow the completion criteria as stated in the PRCP Schedule (2023).

In consideration of the above, erosion rates of the post-mining landform are not expected to be considerably different to pre-mining, and MCPL therefore do not propose to undertake any sediment transport or load analysis for the Action. Notwithstanding, and as requested by the then DAWE (now Cth DCCEEW), sediment monitoring will be undertaken along Roper Creek to determine the background sediment loads, prior to commissioning of Roper Creek Diversion 2.

Sedimentation Control

Sedimentation control for the existing Middlemount Coal Mine involves the construction of sediment dams to manage runoff from waste rock emplacements. Runoff collected in the sediment dams is pumped back into the mine water system to maintain capacity, or released to the downstream environment in accordance with the conditions of the EA. Smaller sediment control structures are constructed as required in accordance with the Erosion and Sediment Control Plan (Engeny, 2024a). De-silting of sediment dams is undertaken in accordance with MCPL's Erosion and Sediment Control Plan as the sediment storage zone approaches capacity.

Sediment generation is also controlled by timely progressive rehabilitation and vegetation establishment on disturbed areas (e.g. completed sections of waste rock emplacements) to minimise the area exposed to erosion.

The Action would involve the construction of additional sediment dams, and changes to some approved (but not constructed) sediments dams (Table 15; Figure 4).

Table 15
Sediment Dam Changes

Sediment Dam	Project Change	Receiving Waters
SD3	Location	Roper Creek
SD5	Layout	An unnamed drainage feature
SD6	Layout	An unnamed drainage feature
SD10[1]	New	An unnamed drainage feature
SD11	New	Thirteen Mile Gully Diversion
SD12[2]	Layout	Thirteen Mile Gully
SD13	Layout	Unnamed Diversion
SD14	Location	An unnamed drainage feature
SD15	Location	Unnamed Diversion
SD16	New	Roper Creek
SD17	New	Roper Creek

Notes:

[1] Would adopt the name 'SD10' following the decommissioning of existing SD10.

[2] Although SD12 is an existing sediment dam, SD12 is associated with a natural depression (i.e. is not a 'constructed' sediment dam).

Flood Management

A flood protection levee is progressively constructed at the Middlemount Coal Mine as mining advances (Figure 2). The flood protection levee is designed to prevent floodwater from Roper Creek and Thirteen Mile Gully from entering the mine water management system and open cut mining areas.

Tailings Water Management System

There are two approved Tailing Storage Facilities (TSFs) at the Middlemount Coal Mine (TSF1 and TSF2) (Figure 2). TSF2 has been divided into four cells with a further two tailings floc cells (FC1 and FC2) providing emergency capacity, which have not been required to date. All tailings facilities are constructed with earthen embankments on all sides and do not receive runoff from external catchments.

Fine rejects from the CHPP are comprised mostly of fine silt, clay, water and coal material. The fine rejects are pumped to the TSF cells and flocculant is added prior to deposition. Decant water is pumped to TSF1 then returned to the CHPP and RWD for reuse. The Action would not result in any changes to the approved tailings return water management system.

Mine Affected Water Release Points, Sources and Receiving Waters

The Action would not change the mine affected water release points, sources and receiving waters described in this section. Mine affected water would continue to be released in accordance with water quality and flow requirements of the EA for the Action.

Mine affected water is released in accordance with water quality and flow requirements in the EA (Attachment H).

Transfer dams (such as the STD) are located in the vicinity of the mining pit and used to transfer mine water to the RWD or MWD (Figure 2), and as a source of water for dust suppression. The transfer dams are of turkey's nest or sump type construction with no external catchment area. The transfer dams discharge to the mining pit.

The mine affected water release points, sources and receiving waters would remain unchanged for the Action.

Aquatic Ecology

The following measures would be implemented to avoid and/or minimise impacts on aquatic ecology:

- There is sufficient area for a meandering diversion of Roper Creek within the ML to replicate natural features and provide similar conditions to the original waterway, including stream hydraulics, geomorphology, instream habitat, bank profiles and bank vegetation.
- The location of the mine and pits are informed by geological surveys and largely determined by the location of the natural resource, as a result the location of mine impacts are relatively inflexible. The Roper Creek diversion, however, has been avoided in the mine design and a minimum buffer of 200 m between the open cut pit extension and the Roper Creek diversion (defined bank) has been implemented.

Additional mitigation measures proposed to be implemented for the Action in relation to aquatic habitat, are:

- Clearing of native vegetation would be undertaken progressively over the life of the mine and only in areas required for mining activities within the following year. This would have the effect of minimising the area of exposed land.
- The diversion of Roper Creek would be designed to replicate natural features where possible and provide similar conditions to the original waterway.
- A Diversion Monitoring Program for Roper Creek would be implemented, including:
  - monitoring of bed conditions following flow events; and
  - measures to monitor the success of the diversion channel design and construction, including post-construction survey of aquatic and riparian vegetation composition to demonstrate that effective cover has been achieved.
- Use of existing infrastructure and facilities to avoid the need for additional clearance works.

- Update and implement the Environmental Management Plan (EMP) (MCPL 2018b) to include vegetation management measures, including:
  - demarcate exclusion zones to protect areas of vegetation to be retained prior to clearing; and
  - clearing of native vegetation to be undertaken progressively.
- Implement the Erosion and Sediment Control Plan (Engeny, 2024a), and:
  - where possible, construction works to be undertaken in the drier months of the year when rainfall and runoff is less likely.
- Update and implement the EMP (MCPL 2018b) to include fauna species management measures, including:
  - use of licenced fauna spotter-catchers for relocation of animals;
  - habitat retention and replacement, where possible; and
  - salvage of microhabitat features (e.g. boulders and logs) from the impacted reach of Roper Creek for use in the Roper Creek diversion channel.
- Temporarily clearing native vegetation, excavating, or placing fill in a watercourse necessary for and associated with mining operations would be undertaken in accordance with DNRM's (2012) *Guideline – Activities in a Watercourse, Lake or Spring Associated with Mining Operations.*

3.11.2 Surface Water Monitoring and Management Plan Updates

Surface water quality monitoring for receiving waters would continue to be undertaken in accordance with the EA. The development of any site-specific surface water contaminant trigger investigation levels in the EA would consider the guidelines *How to Derive Site-specific Guideline Values for Physical and Chemical Parameters: IESC Information Guidelines Explanatory Note* (Huynh and Hobbs, 2018).

An operation and monitoring plan would be developed for the proposed realignment and extension of the Roper Creek Diversion 2 as part of detailed design. This plan would be consistent with the monitoring programme previously developed for the existing Thirteen Mile Gully Diversion.

3.11.3 External Water Supply

The results of the updated Middlemount Coal Mine OPSIM water balance model concluded the existing water management system (including the external supply via the Anglo Coal Pipeline) can meet all mine site demands over the mine life (WRM, 2020).

Potable water is supplied via truck from Middlemount township to the Middlemount Coal Mine.

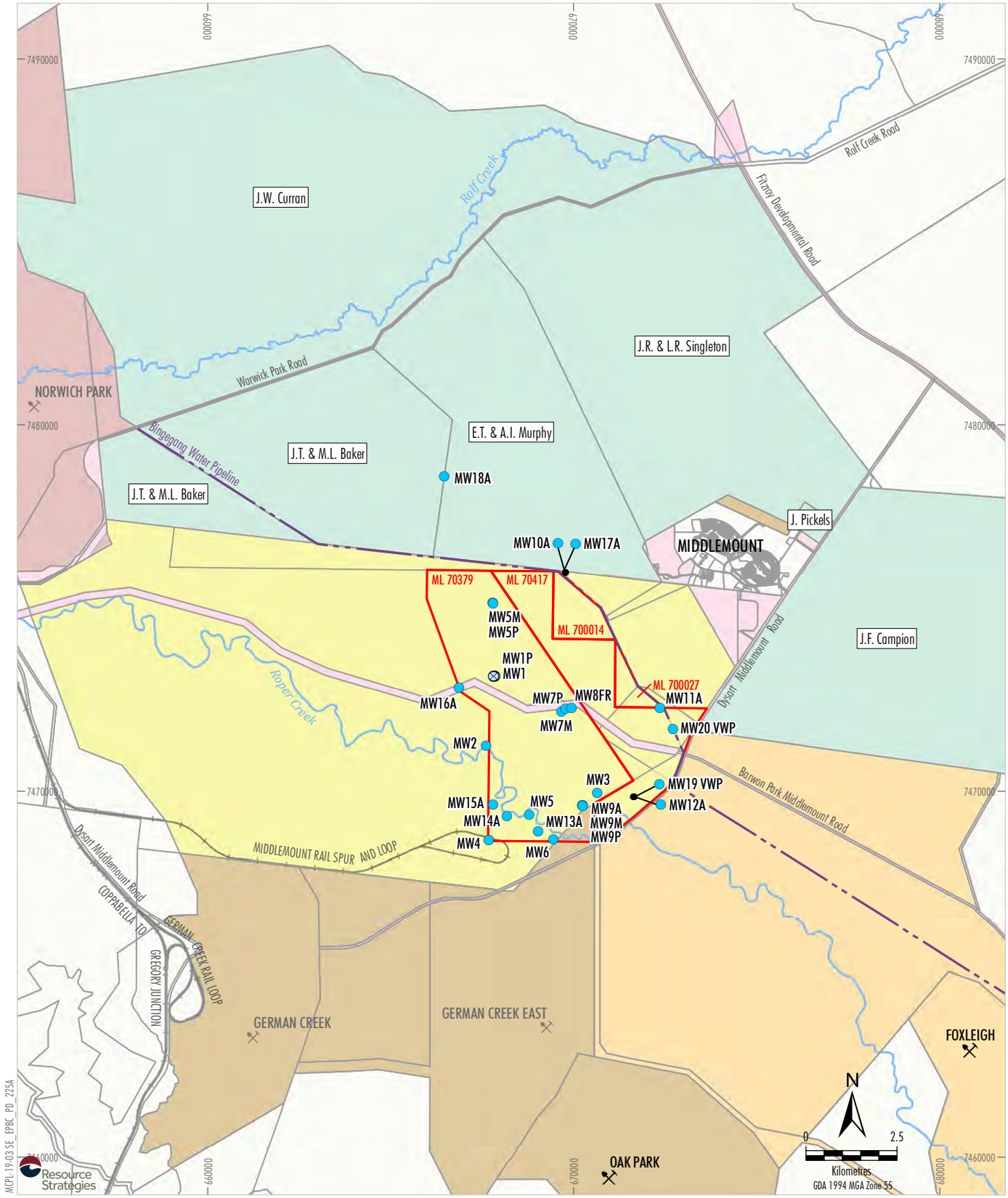
In addition to the above, if required, MCPL also have water allocations from the Bingegang Pipeline (Figure 2), which runs between the Bingegang Weir and the town of Dysart.

As described, in Section 3.8.1, the external supply of water via the Anglo Coal Pipeline ceased in 2022 and was replaced by water supplied from the Nogoa Mackenzie Scheme. Water take associated with the Nogoa Mackenzie Scheme has been approved as being acceptable by the Queensland Government (WRM, 2025).

The existing water supply arrangements would continue for the Action.

3.11.4 Groundwater Monitoring Network and Trigger Values

A groundwater monitoring network has been established at the Middlemount Coal Mine, which includes groundwater level and quality monitoring locations within and surrounding the mine site, in accordance with the EA. The locations of groundwater monitoring bores are shown on Figure 27.



LEGEND

- Middlemount Coal Mining Lease Boundary (ML)
- Cadastral Boundary
- Railway
- Active Coal Mine
- Inactive Coal Mine

LANDHOLDER

- Middlemount Coal Owned Land
- Anglo Coal (Capcoal Management) Pty Limited
- BHP Coal Pty Ltd; QCT Mining Pty Ltd; Mitsubishi Development Pty Ltd; QCT Investment Pty Ptd; BHP Queensland Coal Investments Pty Ltd; Umal Consolidated Pty Ptd; QCT Resources Pty Limited
- Foxleigh Land Pty Ltd
- Crown Land
- Relevant Private Landholder
- Owner not Referenced

Middlemount Coal Groundwater Monitoring Bores

- Existing Bore
- Bore Abandoned/Destroyed

Source: MCPL (2022); AGE (2018); The State of Queensland (2022)

middlemount coal PTY LTD

SOUTHERN EXTENSION PROJECT

Groundwater Monitoring Bores

Figure 27

With the updates to the mine plan, some of the monitoring bores would be destroyed over the life of the Action. Nonetheless the existing bores would provide an indication of groundwater response to mining and would be monitored while they are accessible.

MCPL established additional monitoring bores (MW16A, MW17A, MW18A, MW19VWP and MW20VWP) in response to recommendations from the Western Extension Project Groundwater Assessment (AGE, 2018). These monitoring sites provide groundwater data within the:

- Tertiary/Weathered Permian strata west of the proposed extension area (MW16A);
- Tertiary/Weathered Permian strata adjacent to MW10A where groundwater levels have declined below the base of MW10A (MW17A);
- Tertiary/Weathered Permian strata to the north-west of the proposed extension area overlying the deeper coal measures subject to depressurisation (MW18A); and
- Fort Cooper Coal Measures east of the Jellinbah Fault (MW19VWP and MW20VWP).

All groundwater monitoring, water level measurements and sample collection, storage and transportation would continue to be undertaken in accordance with the procedures outlined by the Murray Darling Basin Commission (1997) and the DES (2018b).

Groundwater Levels

Groundwater level monitoring would continue to be undertaken at an appropriate frequency (e.g. quarterly or as defined in the EA conditions [Attachment H]), to develop a long-term dataset.

Water level loggers would also continue to be installed in select monitoring bores to record groundwater level measurements at regular intervals. These would also enable continuous measurement of groundwater level fluctuations for determining to what extent groundwater level changes are attributable to rainfall recharge or from potential water level declines from depressurisation resulting from open cut mining.

Groundwater Triggers – Levels

Table 16 presents groundwater trigger level thresholds as defined in Table D4 of the EA for the existing monitoring bores, outside of normal seasonal fluctuations.

Table 16
Groundwater Level Trigger Thresholds

Monitoring Location	Trigger Level Threshold*
MW2	> 2 m per year
MW3^	total groundwater level of < 115.39 m AHD
MW4	> 2 m per year
MW6	Observation only
MW9A	total groundwater level of < 113.17 m AHD
MW10A	> 2 m per year
MW11A	> 2 m per year
MW12A	> 2 m per year
MW16A	total groundwater level of <129.2 m AHD
MW17A	total groundwater level of <135.6 m AHD
MW18A	> 2 m per year
MW19VWP-VW3	total groundwater level of <130.8 m AHD
MW19VWP-VW2	> 2 m per year
MW19VWP-VW1	> 2 m per year

Table 16
Groundwater Level Trigger Thresholds

Monitoring Location	Trigger Level Threshold*
MW20VWP-VW3	> 3 m per year

* *The level trigger threshold is equal to the groundwater level drawdown observed within each monitoring bore measured from the commencement of mining.*

^ *MW3 will continue to be monitored until mine progression prevents monitoring. MW9A installed as a replacement well for MW3.*

Groundwater Quality

Groundwater quality sampling of the existing monitoring bores would continue in accordance with Condition D7 of the EA in order to provide a long-term groundwater quality dataset, and to detect any changes in groundwater quality during and post-mining.

Groundwater quality triggers are defined in Table D2 of the EA and presented in Table 17.

Table 17
Groundwater Quality Investigation Trigger Levels

Parameter	Unit	Trigger Value	Limit Type
pH	pH units	6.0-8.5	Minimum/Maximum
Electrical Conductivity	µS/cm	35,000	Maximum
Total Dissolved Solids	mg/L	23,550	Maximum
Calcium Magnesium Sodium Potassium Carbonate (CO_3) Bicarbonate (HCO_3)	mg/L	No triggers or limit set for these parameters. Analysis is conducted for groundwater quality interpretation only.	
Chloride	mg/L	12,700	Median
Sulfate (SO_4)	mg/L	2,000	Median
Iron	mg/L	14	Maximum
Mercury	mg/L	0.002	Maximum
Selenium	mg/L	0.05	Maximum
Total Petroleum Hydrocarbons (C10-C14)	µg/L	50	Maximum
Total Petroleum Hydrocarbons (C15-C28)	µg/L	185	Maximum
Total Petroleum Hydrocarbons (C29-C36)	µg/L	90	Maximum

Note: µg/L = micrograms per litre

Mine Groundwater Inflows

MCPL currently assesses groundwater pit inflows through review of pumping records of pit de-watering and the site water balance model to identify inflow/seepage rates.

The groundwater pit inflow monitoring program would include:

- recording of any unexpected or significantly increased groundwater inflows directly to the pits;
- measurement of water pumped from the pits;
- sampling of water quality pumped from the pits;
- monitoring of rainfall (to allow for correlation with pumping/pit inflow records); and
- records of ROM and product coal moisture content.

3.11.5 Annual Groundwater Reporting

Annual monitoring reports would continue to be prepared for the Action and would include:

- records of groundwater levels and quality in the monitoring bores of the approved groundwater monitoring network; and
- details of any review undertaken of the groundwater model since the previous annual monitoring report.

3.11.6 Water Licensing

MCPL has a water licence authorising the taking of, or interfering with, underground water for the Middlemount Coal Mine in accordance with section 1283 of the Water Act (Table 1-4).

The Action would continue to be carried out within existing mining tenements, and therefore MCPL would not require any further approvals under the Water Act.

4 ENVIRONMENTAL OUTCOMES

MCPL are not requesting outcomes-based conditions, yet as required by the request for preliminary documentation, this section describes the outcomes that would be achieved for MNES. The outcomes are described in consideration of the DEE *Outcomes-based Conditions Policy 2016* (DotE, 2016a) and *Outcomes-based Conditions Guidance 2016* (DotE, 2016b). MCPL discussed the information required to be included in this document with DEE during May 2018 and the below information is a result of that discussion.

Threatened Species and Communities Outcomes

An outcome of the Action would be the enhancement and security of the proposed Southern Extension Offset Area (as described in Section 2.9) to address the potentially significant residual impacts on threatened species and communities. The desired outcome of the proposed offset is that the extent and condition of the habitat values of threatened species and communities within the offset areas are protected and enhanced. The land in the offset areas will be enhanced so as the currently degraded areas reach remnant status[4] through increasing the structural integrity and extent of vegetation in the area.

As described in Section 2.9, MCPL currently has a number of existing biodiversity offset areas on company-owned land which were established for various components of the Middlemount Coal Mine, which demonstrates MCPL's willingness and capability to achieve the outcome.

Water Resource Outcomes

Authorised impacts on water resources are currently being regulated under the Qld EP Act (Middlemount Coal Mine operates under EA EPML00716913) and Water Act (water licences). The water resource conditions from EA EPML00716913 are provided in Attachment H. Noting, however, that MCPL is seeking approval of the Action through a major amendment of EA EPML00716913 in accordance with Chapter 5, Part 7 of the EP Act so it is anticipated that the water resource conditions in Attachment H will be updated by the Qld Government to incorporate the Action (which would cover the Action activities).

Rehabilitation Outcomes

The rehabilitation goal for the existing Middlemount Coal Mine is to rehabilitate all land subject to mining activities to a non-polluting, safe, stable and self-sustaining landform in accordance with EA EPML00716913.

[4] For non-remnant vegetation to achieve woody vegetation remnant status the dominant canopy must have greater than 70% of the height and greater than 50% of the cover relative to the undisturbed height and cover of that stratum and is dominated by species characteristic of the vegetation's undisturbed canopy.

5 CONSOLIDATED MITIGATION MEASURES AND ENVIRONMENTAL MANAGEMENT PLAN OUTLINE

This section provides a consolidated summary of proposed environmental management commitments, including mitigation measures and relevant management plans.

The existing environmental management systems at the Middlemount Coal Mine include environmental management plans and programs that have been developed and implemented since operations commenced.

Existing management plans and programs include:

- Environmental Management Plan (MCPL, 2018b);
- PRCP (MCPL, 2023);
- Operational Water Management Plan (Engeny, 2022b);
- Offset Management Plan/Vegetation Management Plan (MCPL, 2019a); and
- Species Management Program (MCPL, 2019c).

MCPL would continue to implement the existing plans and programs and where necessary, review, revise and build on them. A summary of these measures and the management plans is provided in Table 18.

Table 18
Summary of Mitigation Measures and Management Plans

Mitigation Measures	Management Plans	Source of Management Plan Requirement
Threatened Species and Communities		
Education of staff, including contractors, in relation to the risks to fauna and how to manage animals which are injured or displaced, including threatened species.	Environmental Management Plan	Company commitment.
The haul road crossing would be limited to a 40 km/h spend limit, with all other roads in the Action area limited to a 60 km/h speed limit which would reduce the risk of vehicle strike.	Environmental Management Plan	
Boundaries of areas to be cleared, and those not to be cleared, would be defined before and during clearing activities.	Environmental Management Plan	
Weed management techniques would continue to be implemented within the MLs (e.g. weed control [spraying] and washdown of machinery when moving from weed infested areas).	Environmental Management Plan	
MCPL would use a licensed spotter-catcher and/or carer during clearing activities.	Environmental Management Plan and Species Management Program	NC Act
Progressive rehabilitation of disturbance areas.	PRCP	Middlemount Coal Mine EA EPML00716913 (7 June 2024)
Management of the existing and proposed offset areas.	Offset Management Plan/Vegetation Management Plan	Various (Section 2.10)

Table 18 (continued)
Summary of Mitigation Measures and Management Plans

Mitigation Measures	Management Plans	Source of Management Plan Requirement
Water Resources		
Site water management and monitoring would be conducted in accordance with a revised Water Management Plan.	Water Management Plan	Middlemount Coal Mine EA EPML00716913 (7 June 2024)
Surface water quality monitoring would continue to be undertaken for receiving waters when applicable and additional locations monitored.	Water Management Plan	
Ongoing groundwater level and quality monitoring within and surrounding the mine site.	Water Management Plan	
Expansion of existing groundwater level and quality monitoring program to include additional bores outside of the current mine area.	Water Management Plan	

6 ECOLOGICALLY SUSTAINABLE DEVELOPMENT

6.1 OVERVIEW

The concept of sustainable development came to prominence at the World Commission on Environment and Development (1987), in the report titled *Our Common Future*, which defined sustainable development as:

> *Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.*

In recognition of the importance of sustainable development, the Commonwealth Government developed a *National Strategy for Ecologically Sustainable Development* (NSESD) (Commonwealth of Australia, 1992) that defines Ecologically Sustainable Development (ESD) as:

> *using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased.*

The NSESD was developed with the following core objectives:

- enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations;
- provide for equity within and between generations; and
- protect biological diversity and maintain essential processes and life support systems.

In addition, the NSESD contains the following goal:

> *Development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.*

In accordance with the core objectives and a view to achieving this goal, the NSESD presents private enterprise in Australia with the following role:

> *Private enterprise in Australia has a critical role to play in supporting the concept of ESD while taking decisions and actions which are aimed at helping to achieve the goal of this Strategy.*

In accordance with the DES Preliminary Documentation Information Request (Attachment B), an assessment of the consistency of the Action with section 3A of the EPBC Act has been undertaken. The principles of ESD as outlined in section 3A of the EPBC Act are as follows:

> *(a) decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations;*
>
> *(b) if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;*
>
> *(c) the principle of inter-generational equity--that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations;*
>
> *(d) the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making;*
>
> *(e) improved valuation, pricing and incentive mechanisms should be promoted.*

The design, planning and assessment of the Action has been carried out applying the principles of ESD, through:

- incorporation of risk assessment and analysis at various stages in the detailed design, environmental assessment and decision-making processes;
- adoption of high standards for environmental and workplace health and safety performance;
- consultation with relevant regulatory and community stakeholders; and
- consideration of social and economic benefits to the community arising from the development of the Action.

In addition, it can be demonstrated that the Action can be operated in accordance with ESD principles through the application of mitigation and management measures to minimise environmental impacts of the Action. The following sub-sections describe the consideration and application of the principles of ESD to the Action.

6.2 LONG-TERM AND SHORT-TERM CONSIDERATIONS

The integration of long-term and short-term economic, environmental, social and equitable considerations is recognised as a principle of ESD in section 3A(a) of the EPBC Act.

Assessment of potential short and long-term impacts of the Action have been carried out during the preparation of this assessment on aspects of land, surface water and groundwater, ecology, air quality, noise emissions and socio-economics.

The Action also includes offset measures to maintain or improve biodiversity values in the surrounding region in the medium to long-term (Section 2.10).

The assessments undertaken for the Action also included other environmental considerations (Section 4), socio-economic considerations (Section 7) and social equity considerations (Section 6.4).

6.3 PRECAUTIONARY PRINCIPLE

The precautionary principle (i.e. where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation) is recognised as a principle of ESD in section 3A(b) of the EPBC Act.

Environmental assessment involves predicting what the environmental outcomes of a development are likely to be. The precautionary principle reinforces the need to take risk and uncertainty into account, especially in relation to threats of irreversible environmental damage.

A range of mitigation measures have been adopted as components of the Action design to minimise the potential for serious impacts to the environment, including the continuation of environmental management and monitoring programmes and compensatory measures.

Minimal uncertainty regarding the information used in these specialist assessments is expected given:

- the number of site-based surveys and assessments conducted at the Middlemount Coal Mine, surrounding offset areas and for the Action;
- the comprehensive nature of the assessments; and
- the consultation process conducted with key stakeholders (Section 7.2).

6.4 SOCIAL EQUITY

Social equity is defined by inter-generational and intra-generational equity. Inter-generational equity is the concept that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations, while intra-generational equity is applied within the same generation.

The principles of social equity are addressed through:

- assessment of the social and economic impacts of the Action, including the distribution of impacts between stakeholders (Section 7);
- management measures to be implemented in relation to the potential impacts of the Action on relevant MNES (Section 2);
- implementation of environmental management and monitoring programmes (Sections 2.8, 2.9 and 2.10) to minimise potential environmental impacts (which include environmental management and monitoring programmes covering the life of the Action); and
- implementation of compensatory measures over the life of the Action to compensate for potential localised impacts that have been identified for the development, such as the offset strategy described in Section 2.9.2.

In addition, the Action would benefit current and future generations through the maintenance of employment. It would also provide continued significant stimulus to local and regional economies, thus contributing to future generations through social welfare, amenity and infrastructure.

6.5 CONSERVATION OF BIOLOGICAL DIVERSITY AND ECOLOGICAL INTEGRITY

The consideration of the conservation of biological diversity and ecological integrity in decision-making is recognised as a principle of ESD in section 3A(d) of the EPBC Act.

Biological diversity or 'biodiversity' is considered to be the number, relative abundance, and genetic diversity of organisms from all habitats (including terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are a part) and includes diversity within species and between species as well as diversity of ecosystems (Lindenmayer and Burgman, 2005). For the purposes of this assessment, ecological integrity has been considered in terms of ecological health and ecological values.

A range of impact avoidance, mitigation and offset measures would be implemented for the Action to maintain or improve the biodiversity values of the surrounding region in the medium to long-term, as described below.

Section 2.9 summarises a number of measures that would assist in maintaining the biodiversity of the region. A biodiversity offset package has been developed to address the potential residual impacts on biodiversity values associated with the Action (Section 2.9).

In addition, the disturbance areas associated with the Action would be progressively rehabilitated to land suitable for low density beef cattle grazing. The rehabilitation goal for the existing Middlemount Coal Mine is to rehabilitate all land subject to mining activities to a non-polluting, safe, stable and self-sustaining landform in accordance with EA EPML00716913.

6.6 VALUATION

The adoption and promotion of improved valuation, pricing and incentive mechanisms is recognised as a principle of ESD in section 3A(e) of the EPBC Act.

One of the common broad underlying goals or concepts of sustainability is economic efficiency, including improved valuation of the environment. Resources should be carefully managed to maximise the welfare of society, both now and for future generations.

In the past, some natural resources have been misconstrued as being free or underpriced, leading to their wasteful use and consequent degradation. Consideration of economic efficiency, with improved valuation of the environment, aims to overcome the underpricing of natural resources and has the effect of integrating economic and environment considerations in decision making, as required by ESD.

While historically, environmental costs have been considered to be external to development costs, improved valuation and pricing methods attempt to internalise environmental costs and include them within development costing. The economic benefit associated with the Action has, where possible, considered the environmental costs (e.g. biodiversity offset costs) associated with the Action.

7 ECONOMIC AND SOCIAL IMPACTS

7.1 COSTS AND BENEFITS ASSOCIATED WITH THE ACTION AND EMPLOYMENT OPPORTUNITIES

The Action would:

- extend the approved mine life by approximately seven years (to 2044) to recover an additional 24 Mt of coal from the Middlemount and Pisces seams;
- provide job security for local mine employees and contractors;
- result in an incremental net benefit of approximately $77 M (in NPV terms);
- result in additional tax revenue to the State of Qld of approximately $43 M (in NPV terms);
- stimulate demand in the local and regional economy; and
- result in the establishment of additional biodiversity offset areas.

7.2 STAKEHOLDER CONSULTATION

Consultation has been conducted with relevant stakeholders during the preparation of this document. A summary of this consultation is provided below. It is anticipated that consultation with these stakeholders will continue during the assessment of the Action by the Qld and Commonwealth Governments.

Department of Environment and Science

MCPL held initial meetings to discuss the Action with DES in October 2019 and January 2020, and discussed the Action via teleconference in February 2020.

An additional teleconference with DES was held in April 2020 to discuss the Action description and scope of environmental assessments.

As described in Section 1, an environmental assessment was undertaken for the Action (MCPL, 2022) is consistent with the scope provided to DES in April 2020. This Environmental Assessment also addresses the requirements of section 226 of the EP Act.

A follow-up meeting with DES was held in September 2020 following lodgement of the environmental assessment to discuss the findings.

Department of Natural Resources, Mines and Energy

MCPL has existing approved Qld and Commonwealth approved biodiversity offset areas under an existing VDec under the VM Act (Declared Area Map 2013/003919), and new biodiversity offset areas are proposed as part of the Action.

On 7 November 2019, MCPL submitted an application to the DNRME (now DoR) to vary the boundaries of ML 70379 and ML 1998 (Section 1.3). This application included a brief description of the activities proposed to be undertaken as part of the Action within ML 70379.

On 28 April 2020, the DNRME approved the variation application, which resulted in the extension of ML 70379 into an area previously associated with ML 1998.

Isaac Regional Council

MCPL held a meeting with the Isaac Regional Council to discuss the Action on 12 October 2020. Consultation with the Isaac Regional Council will continue to be undertaken during the assessment of this EVA by the Qld Government.

Aboriginal Community

Management of Aboriginal cultural heritage will continue to be conducted as per the existing Cultural Heritage Management Plans (CHMPs) in place with the Barada Barna People, the Barada Barna Aboriginal Corporation (as the prescribed body corporate for the Barada Barna People) and the Barada Barna Kabalbara and Yetimarla People #4 (BBKY #4). These existing CHMP's will be reviewed and amended as the Action extends further south than the current extent of the CHMP's for the Middlemount Coal Mine.

8 MCPL'S ENVIRONMENTAL RECORD

There are no past or present proceedings under a Commonwealth or State law for the protection of the environment or the conservation and sustainable use of natural resources against the person proposing to take the action, or for an action for which a person has applied for a permit, the person making the application.

MCPL has a strong record of compliance with its environmental obligations. MCPL has established and is committed to continuing open and constructive dialogue with the local community and stakeholders regarding environmental management as part of their operations.

Our Aim

At Middlemount Coal, we are committed to maintaining a sustainable balance between economic development and the protection of the natural environment. Our goal is to not only meet our environmental and cultural heritage obligations, but strive to exceed in all facets, therefore ensuring the protection of our environmental values within the Middlemount Mine as well as our surrounding communities.

Our Objectives

Our Environment and Cultural Heritage Management System includes but is not limited to:

- Planning work activities so as to meet all environmental, sustainability and cultural heritage legislation and guidelines.
- Operating an environmentally sound and culturally aware business.
- Reporting and recording environmental practices, including greenhouse gas emissions, as part of our environmental and quality management system.
- Reviewing and auditing our environmental procedures to enable continual improvement.

Our Commitment

Middlemount Coal is committed to:

- Comply with legislation concerned with the production, minimisation and disposal of waste and the control of hazardous substances, dust and industrial noise.
- Comply with government acts and requirements for the protection of our cultural heritage.
- Comply with legislation and regulations concerned with energy efficiency and greenhouse gas emissions.
- Act with due regard for the requirements and expectations of our key stakeholders.
- Encourage employee education and participation in improving environmental awareness and practice.
- Encourage employee education in cultural heritage awareness.
- Implement an environmental audit and reporting system, to continually improve our environmental management system.
- Minimise waste generation and dispose of waste responsibly.
- Identify opportunities to reduce energy use and greenhouse gas emissions and the subsequent implementation of operational changes in response to opportunities that have been identified.
- Rehabilitate areas no longer required for mining processes.

A copy of the Middlemount Coal Mine Environment and Cultural Heritage Policy is available on the Middlemount Coal Mine website.

9 CONCLUSION

This Preliminary Documentation addresses the information requirements of the DES, to enable assessment and approval of the Action under the EPBC Act.

Listed Threatened Species and Communities

One threatened species and two TECs listed under the EPBC Act have been recorded in the Action area, namely the, Greater Glider (southern and central), Brigalow TEC and Poplar Box TEC. Further, habitat for the Ornamental Snake, Squatter Pigeon (southern) and Koala was recorded within the Action area and have been previously recorded in the existing/approved mine area.

Potential impacts on these MNES as a result of the Action have been investigated within this document.

MCPL would minimise potential impacts on threatened species and TECs through the use of existing infrastructure and facilities (where possible) and minimising out-of-pit waste rock emplacements. The existing environmental management systems at the Middlemount Coal Mine include environmental management plans and programs that have been developed and implemented since operations commenced. Relevant impact mitigation measures include the use of a licensed fauna spotter-catcher and/or carer during clearing activities and progressive rehabilitation of disturbance areas.

A new offset area is proposed which provides for the enhancement and conservation of Brigalow TEC, Poplar Box TEC and habitat for the Ornamental Snake, Squatter Pigeon (southern), Koala and Greater Glider (southern and central). The proposed Southern Extension Offset Area is approximately 1,554.7 ha in size, comprising approximately 1,303.76 ha of woodland vegetation and approximately 250.94 ha of derived grassland and regrowth vegetation.

Water Resources

The existing/approved Middlemount Coal Mine has effects on surface water and groundwater resources, for example through diversions of Thirteen Mile Gully and Roper Creek and groundwater drawdown associated with the open cut mining operation. Impacts on water resources are currently authorised under the Middlemount Coal Project Stage 2 Commonwealth approval (EPBC 2010/5394) and being regulated under the EP Act (Middlemount Coal Mine operates under EA EPML00716913) and Water Act (water licences). The Action provides for the continuation of open cut coal mining operations at the Middlemount Coal Mine, including a small realignment of the Thirteen Mile Gully Diversion and an incremental increase in groundwater drawdown associated with the open cut extension to the south-east of the authorised open cut mine extents.

Water-dependent assets (i.e. entities with characteristics having value and which can be linked directly or indirectly to a dependency on water quantity or quality) have been identified and the potential for the Action to impact water-dependent assets has been assessed. In summary, groundwater levels are generally in excess of 25 m below ground surface and separated from surface waters, limiting potential to support GDEs. Further, the groundwater quality in the locality is brackish to saline and not suitable for stock or human consumption.

The realigned section of the Thirteen Mile Gully Diversion would still divert runoff following rainfall events from an unnamed drainage feature to Roper Creek as per the approved Thirteen Mile Gully Diversion. The southern portion of the Thirteen Mile Gully Diversion would remain unchanged.

As described above, the existing environmental management systems at the Middlemount Coal Mine include environmental management plans and programs that have been developed and implemented since operations commenced. Mitigation measures relevant to water resources, include site water management, surface water monitoring and groundwater level and quality monitoring.

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ATTACHMENT A

EPBC ACT REFERRAL FOR THE MIDDLEMOUNT COAL MINE SOUTHERN EXTENSION PROJECT

ATTACHMENT B

REQUEST FOR PRELIMINARY DOCUMENTATION

ATTACHMENT C

COMMONWEALTH THREATENED SPECIES AND COMMUNITIES ASSESSMENT REPORT

ATTACHMENT D

SURFACE WATER IMPACT ASSESSMENT

ATTACHMENT E

GROUNDWATER IMPACT ASSESSMENT

ATTACHMENT F

GROUNDWATER ASSESSMENT PEER REVIEW LETTER

ATTACHMENT G

MIDDLEMOUNT COAL MINE OFFSET MANAGEMENT PLAN/VEGETATION MANAGEMENT PLAN

ATTACHMENT H

MIDDLEMOUNT COAL MINE
ENVIRONMENTAL AUTHORITY EPML00716913

ATTACHMENT I

SOUTHERN EXTENSION PROJECT ROPER CREEK DIVERSION 2 FAUNA CONNECTIVITY MANAGEMENT PLAN

ATTACHMENT J

AQUATIC ECOLOGY ASSESSMENT

ATTACHMENT K

SURFACE WATER ASSESSMENT ADDENDUM REPORT

ATTACHMENT L

GROUNDWATER ASSESSMENT ADDENDUM REPORT

ATTACHMENT M

RESPONSES TO PUBLIC COMMENTS