



MIDDLEMOUNT COAL MINE

**SOUTHERN EXTENSION PROJECT
Original EPBC Referral Submission 18/03/2021
(EPBC 2021/8920)**

Environmental Values Assessment



MIDDLEMOUNT COAL MINE
SOUTHERN EXTENSION PROJECT
ENVIRONMENTAL VALUES ASSESSMENT



PREPARED BY
RESOURCE STRATEGIES PTY LTD

NOVEMBER 2020
Project No. MCPL-03
Document No. 1059519

EXECUTIVE SUMMARY

ES.1 INTRODUCTION

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

Middlemount Coal Pty Ltd (MCPL) is seeking approval of the Project through a major amendment of Environmental Authority (EA) EPML00716913 in accordance with Chapter 5, Part 7 of the Qld *Environmental Protection Act, 1994* (EP Act).

On 14 April 2020, MCPL lodged a draft Project description and proposed environmental assessment scope to the Department of Environment and Science (DES). On 16 April 2020, DES confirmed that the level of environmental assessment proposed to be undertaken for the Project would be adequate.

On 4 September 2020, MCPL lodged a draft of this Environmental Values Assessment (EVA) to the DES. DES subsequently provided comments on the draft EVA on 21 October 2020.

This EVA describes the outcomes of the environmental assessment undertaken for the Project, consistent with the scope provided to DES in April 2020. This EVA has been updated to address DES's comments on the draft EVA provided in October 2020. This EVA addresses the requirements of sections 226 and 226A of the EP Act.

This EVA provides a detailed description of the Project, an assessment of the potential environmental impacts, as well as proposed management measures and mitigation strategies.

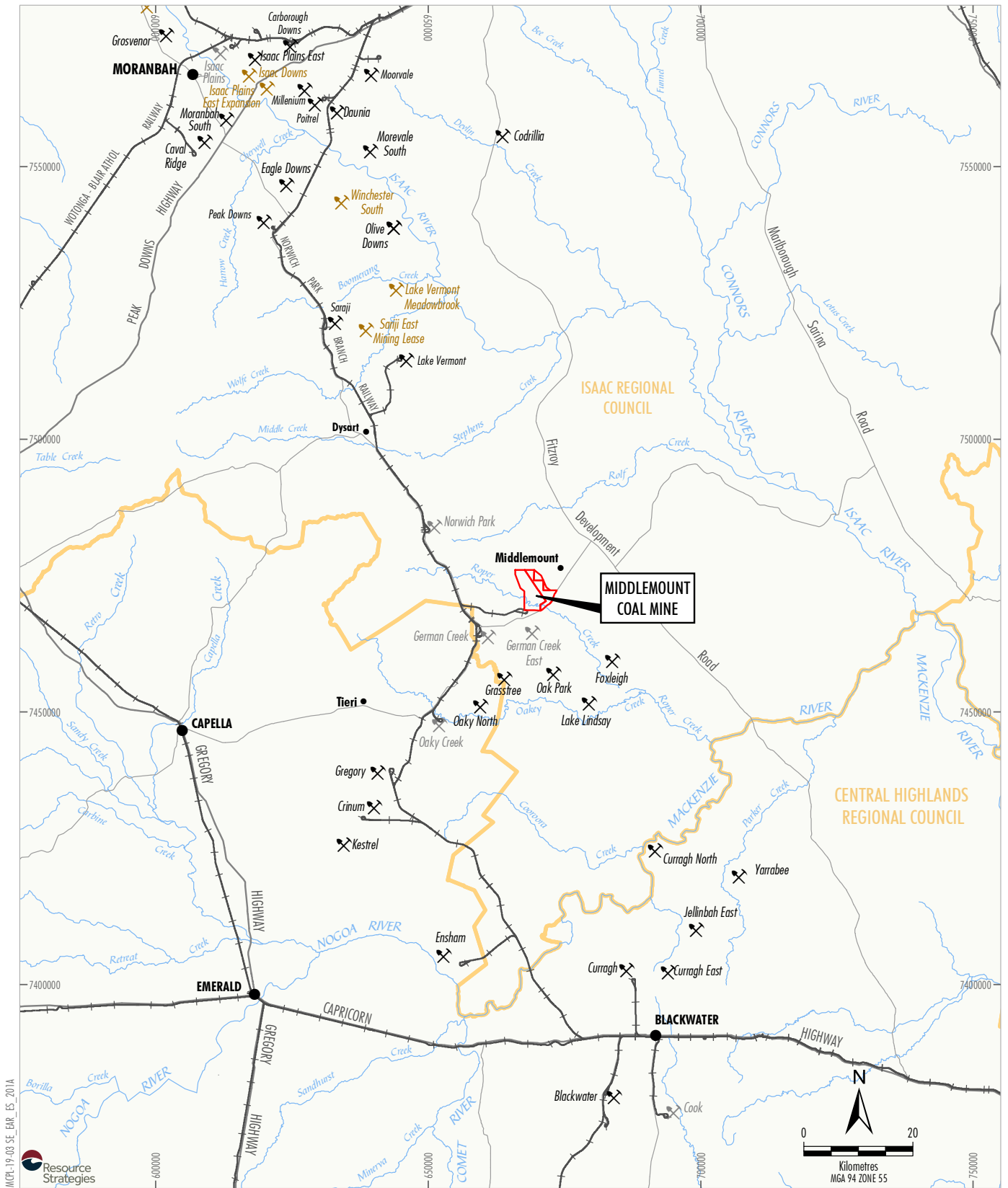
ES.2 PROJECT OVERVIEW

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*.

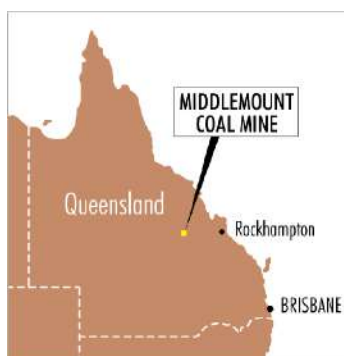
On 28 April 2020, the Department of Natural Resources, Mine and Energy (DNRME) approved the variation application, which resulted in the extension of ML 70379 into an area previously associated with ML 1998.

The Project involves extension of operations within ML 70379 and ML 70417 to the south and extension of waste rock emplacement areas within ML 700014, ML 700027 and ML 70417 (Figure ES-3). The main activities associated with the development of the Project would include:

- extension of the open cut pit to the south within MLs 70379 and 70417;
- continued extraction of ROM coal up to approximately 5.7 Mtpa using conventional open cut mining equipment;
- minor extensions to waste rock emplacement footprints;
- placement of waste rock in existing emplacements, expanded emplacements (West Dump and East Dump) and within the mined out void;
- progressive development of sediment dams, pipelines and other water management equipment and structures;
- re-positioning of the approved southern flood levee and water management infrastructure;
- realignment and extension of the approved (but not yet constructed) eastern diversion of Roper Creek (Roper Creek Diversion 2) inside the MLs;
- progressive development of new haul roads and internal roads;
- continued development of soil stockpiles, laydown areas and borrow areas;



AMPL-19-03 SE EAC ES 201A
Resource Strategies



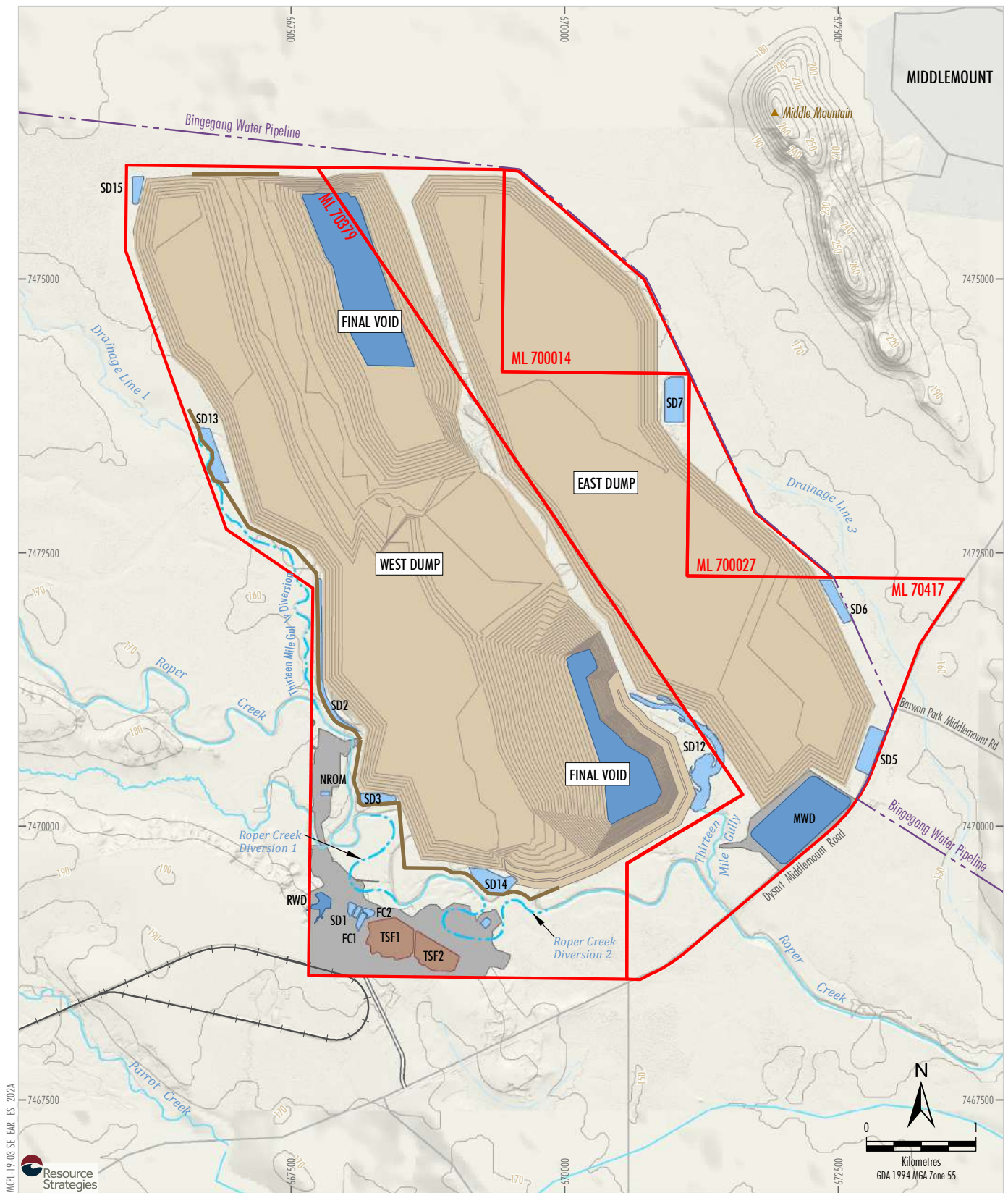
- LEGEND**
- Mining Lease Boundary
 - Local Government Area Boundary
 - Approved/Operating Coal Mine
 - Under Care and Maintenance
 - Proposed Mining Operation

Source: The State of Queensland (2020)



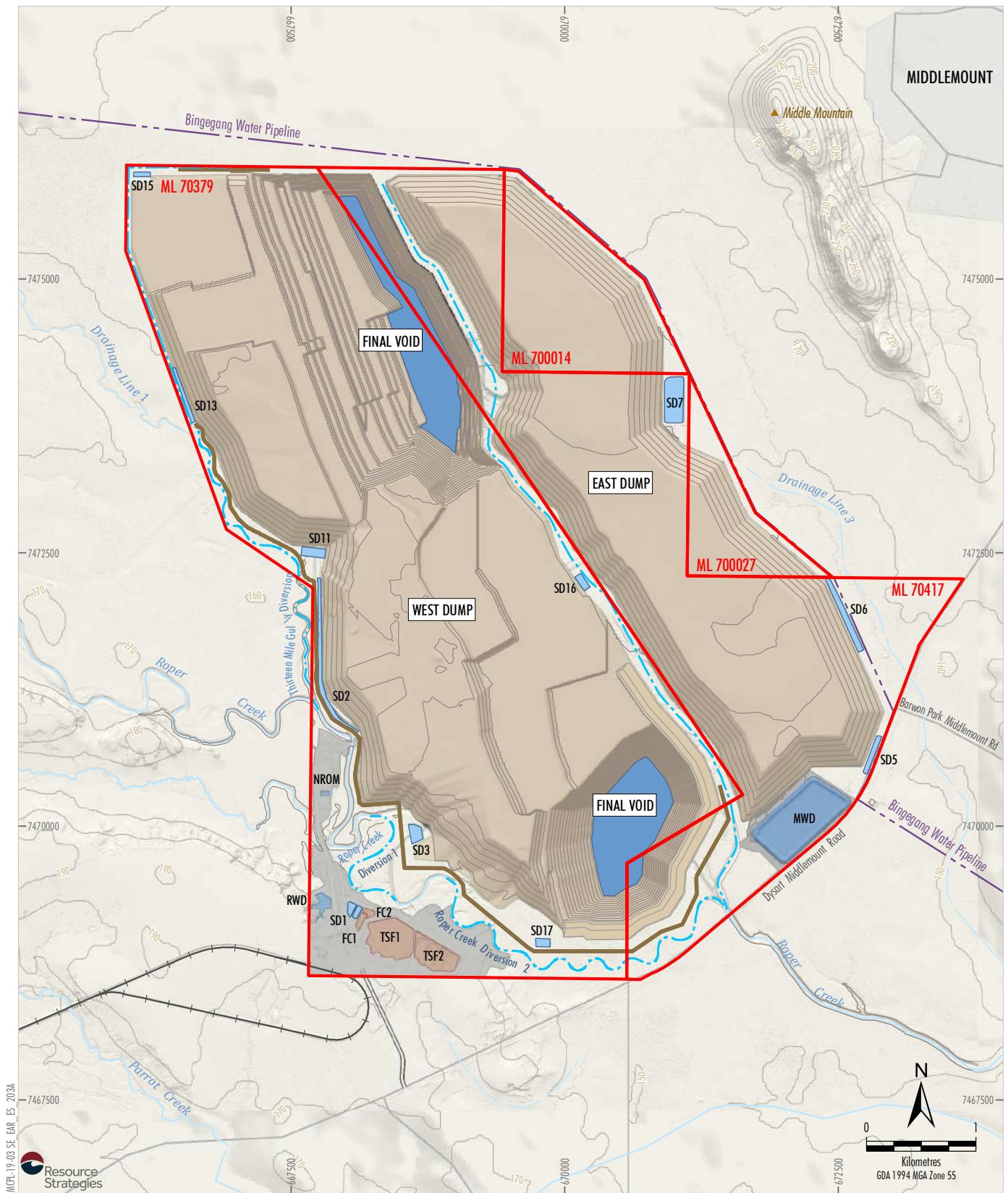
SOUTHERN EXTENSION PROJECT
Regional Location

Figure ES-1



middlemount coal
SOUTHERN EXTENSION PROJECT
Existing/Approved Middlemount Coal Mine
General Arrangement

Figure ES-2



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



SOUTHERN EXTENSION PROJECT
Project General Arrangement

Figure ES-3

- continued use of existing and approved supporting mine infrastructure;
- extension of the approved mine life by approximately seven years (to 2044); and
- a change to the final landform for the end of the mine life.

ES.3 ENVIRONMENTAL ASSESSMENT

A number of environmental assessment studies were completed to assess the potential environmental impacts of the Project.

A summary of the key findings of these studies and key commitments with respect to managing potential impacts is provided in Table ES.1.

Table ES-1
Key Outcomes of the Project Environmental Assessment

Summary of Environmental Assessment Conclusions	Key Management, Mitigation or Monitoring Measures for the Project
Land	
• The Project would alter the landforms and topography within the Project area. Some topographic changes would be temporary (e.g. temporary infrastructure) and some would be permanent (e.g. final mine landforms). However, these landforms would be similar in elevation to the existing/approved mine landform and existing surrounding topography. • Potential impacts to soils would relate to direct disturbance of soil resources, erosion and sediment movement due to construction activities and alteration of physical, chemical and biological soil properties due to soil stripping and stockpiling. • The Project would result in the disturbance or alteration of approximately 233 ha of existing low intensity grazing areas. • The Project is not likely to potentially disturb areas where evidence of contamination or historical contaminating activities exists. • The development of the Project would alter the visual landscape of the Project area similar to the impacts associated with the existing/approved Middlemount Coal Mine. The impacts to visual amenity are not anticipated to be significant given the limited number of sensitive public viewpoints in the vicinity of the Project landforms.	• The Project would be rehabilitated to be safe, stable and non-polluting and able to support and sustain the proposed post-mining land use of low density beef cattle grazing or native ecosystem as similar as possible to the original ecosystem. Progressive rehabilitation (with selected tree and pasture species) of Project landforms would reduce the contrast between the Project landforms and the surrounding environment. • Continued implementation of soil resource management measures to maximise soil resources available for rehabilitation. • On-site consumable storage areas would be operated, where applicable, in compliance with the requirements of AS 1940-2017 The Storage and Handling of Flammable and Combustible Liquids and AS 2187.1 Explosives – Storage, Transport and Use – Storage. • Off-site light emissions from the Project would be minimised by select placement, configuration and direction of lighting.
Surface Water	
• A contemporary surface water assessment has been prepared. • Generally, the existing water management system objectives and principles at the Middlemount Coal Mine would remain unchanged as a result of the Project, with revisions undertaken progressively over the life of the mine. • Based on the site water balance prepared for the Project, the following conclusions were made: – The overall water management system alternates between generating a net gain or loss of water. – Average annual external water supply requirements vary between 560 to 870 ML/year over the life of the Project. – The net CHPP demand (based upon forecast CHPP output numbers) is generally consistent, with a reduction towards the end of the Project life. – There were no modelled spillway overflows from the mine water system over the life of the Project. • For the 2% and 1% AEP events, peak flood levels are generally unchanged upstream of Roper Creek Diversion 2. The Project 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.	• Site water management and monitoring would continue to be conducted in accordance with the Water Management Plan (WRM, 2019a), which would be updated to incorporate the Project. • If required, controlled releases would continue to be undertaken for the Project in accordance with the EA criteria. • Routine surface water quality monitoring would continue to be undertaken for receiving waters and additional locations monitored. • Incorporation of the flood protection levee that would exist during mining operations into the waste rock emplacement to form a stable and self sustaining final landform that does not require long-term maintenance. This final landform would be designed to be considerably higher (approximately 6.5 m) than the probable maximum flood (PMF) Level. • An operation and monitoring plan would be developed for Roper Creek Diversion 2 as part of detailed design.

Table ES-1 (Continued)
Key Outcomes of the Project Environmental Assessment

Summary of Environmental Assessment Conclusions	Key Management, Mitigation or Monitoring Measures for the Project
Surface Water (Cont.)	
- For the 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 would overflow and drain across Middlemount Road for this event, which is not predicted to occur for pre-mining or approved conditions. - The proposed management approach for mine affected water from the Project is expected to have negligible cumulative impact on surface water quality and associated environmental values when compared to the approved Middlemount Coal Mine.	See above.
Groundwater	
- A contemporary groundwater assessment has been prepared. - The predicted groundwater inflow rates are typically in line with the inflow rates previously predicted and experienced at the Middlemount Coal Mine. - The predicted drawdown extents due to the Project are similar to the approved drawdown extents, and no landholder water supply bores are located within the predicted drawdown/depressurisation extents. - Groundwater levels are generally in excess of 25 m below ground level at the Middlemount Coal Mine and separated from surface waters, limiting potential to support Groundwater Dependant Ecosystems (GDEs). There are no surface expressions of these deep confined aquifers within the Project area or surrounds that would support GDEs.	- Ongoing groundwater level and quality monitoring within and surrounding the mine site. - Continued installation of water level loggers in select monitoring bores to record groundwater level measurements at regular intervals. - Review of the groundwater monitoring program throughout the life of the Project to determine any updates required to the monitoring network as monitoring bores are mined through.
Biodiversity	
- Terrestrial Ecology and Aquatic Ecology assessments have been prepared, based on contemporary field surveys in accordance with State and Commonwealth relevant guidelines. - Relevant Matters of State Environmental Significance (MSES) and Matters of National Environmental Significance have been identified. - The Project has the potential to result in a significant impact on MSES, including the Greater Glider, Koala, RE's 11.3.1, 11.3.2, 11.3.2b and 11.3.25, and Brigalow TEC. Potential impacts on these MSES would be mitigated and offset. - The Project is not predicted to impact any aquatic or terrestrial GDEs since GDEs are assessed as being unlikely to occur within and surrounding the Project area. - The Project is unlikely to result in a significant cumulative impact to the aquatic flora and fauna of the Mackenzie River system (downstream of Roper Creek), given the limited potential impacts associated with the Project	- Continued implementation of land clearance measures to minimise impacts on fauna. - Continued implementation of the Species Management Program under section 332 of the <i>Nature Conservation [Wildlife Management] Regulation 2006</i>. - Continued implementation of weed and feral animal control measures and vegetation management measures in accordance with the Environmental Management Plan. - Establishment of a biodiversity offset (in addition to the existing offsets for the existing/approved Middlemount Coal Mine) for the additional surface disturbance area associated with the Project.
Air Quality	
- The estimated dust emissions for the Project would generally be lower than those predicted for the Stage 2 Project EIS, North-Eastern Extension Project and Western Extension Project. - Air quality impacts at nearby sensitive receptors are therefore not anticipated to be greater than the impacts approved for the Stage 2 Project EIS, North-Eastern Extension Project and Western Extension Project. - The Project Greenhouse gas emissions have been estimated.	- Continued implementation of dust management and mitigation measures such as watering of haul roads and stockpiles, and progressive rehabilitation. - In the event of an air quality-related complaint, air quality monitoring would be conducted at the relevant sensitive place to validate the model predictions and inform the implementation of air quality mitigation measures, if required.

Table ES-1 (Continued)
Key Outcomes of the Project Environmental Assessment

Summary of Environmental Assessment Conclusions	Key Management, Mitigation or Monitoring Measures for the Project
Air Quality (Continued)	
See above.	Continued implementation of measures to minimise the generation of GHG emissions including procurement policies that require the selection of energy efficient equipment and vehicles, monitoring and maintenance of mobile equipment and optimisation of diesel consumption through logistics analysis and planning.
Noise and Vibration	
- Operational noise levels for Years 2037 and 2043 under adverse weather conditions are predicted to comply with the noise criteria for daytime, evening and night time periods. - The nearest receiver "Tralee 2" (located on mine-owned land), was modelled to have a possible noise exceedance of up to 8 dB(A) under adverse weather conditions. This is consistent with the maximum noise level predicted at Tralee 2 in the Western Extension Project Noise Assessment.	- Continued implementation of noise management and mitigation measures including maintaining all equipment in good order. - In the event of a noise-related complaint, noise monitoring would be conducted to validate the model predictions and inform the implementation of noise mitigation measures, if required, where noise objectives are exceeded. In this instance, noise mitigation measures would be investigated in consultation with the noise sensitive receptor. - Material impacts at the mine-owned receiver "Tralee 2" would be avoided with the continued implementation of simple operational modifications (e.g. the use of noisy equipment may be limited) as required (e.g. consistent with the approved Middlemount Coal Mine).
Social (Community) Values	
- The Project would provide continued employment for the existing workforce for the life of the Project. A workforce of approximately 400 personnel is expected but may fluctuate over the life of the mine to over 500 personnel during particular mining or processing activities, shut downs or maintenance activities. - Potential impacts to the community such as the demand for housing and community resources are not expected to increase as a result of the Project, given that no significant increase to the existing workforce is proposed for the Project.	MCPL would continue to engage with community and track consultation activities in a Consultation and Complaint/Incident Register.
Aboriginal Cultural Heritage	
- Management of Aboriginal cultural heritage would continue to be conducted as per the existing 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). - As the Project will extend further south than the current extent of the CHMP's for the Middlemount Coal Mine, MCPL would seek to develop a CHMP with the Barada Kabalbara and Yetimarla People (the native title claimants over this area).	Potential impacts to indigenous cultural heritage would be managed in accordance with the CHMPs.

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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 1-1 and 1-2).

MCPL proposes to seek approval for changes to the approved Middlemount Coal Mine, herein referred to as the Southern Extension Project (the Project). The Project provides for the continuation of open cut coal mining operations at the Middlemount Coal Mine.

MCPL is seeking approval of the Project through a major amendment of Environmental Authority (EA) EPML00716913 (the EA) in accordance with Chapter 5, Part 7 of the Qld *Environmental Protection Act 1994* (EP Act).

On 14 April 2020, MCPL lodged a draft Project description and proposed environmental assessment scope to the Department of Environment and Science (DES). On 16 April 2020, DES confirmed that the level of environmental assessment proposed to be undertaken for the Project would be adequate.

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This EVA provides a detailed description of the Project, an assessment of the potential environmental impacts, as well as proposed management measures and mitigation strategies.

1.1 PROJECT PROPONENT

MCPL is the proponent for the Project. MCPL is an incorporated joint venture between Peabody Energy Australia Pty Ltd (50.003%) and Yancoal Australia Ltd (49.997%).

The registered address for the proponent is:

Middlemount Coal Pty Ltd
Level 17, 444 Queen St,
BRISBANE CITY Qld 4000

1.2 DESCRIPTION OF THE EXISTING MIDDLEMOUNT COAL MINE

1.2.1 Development History

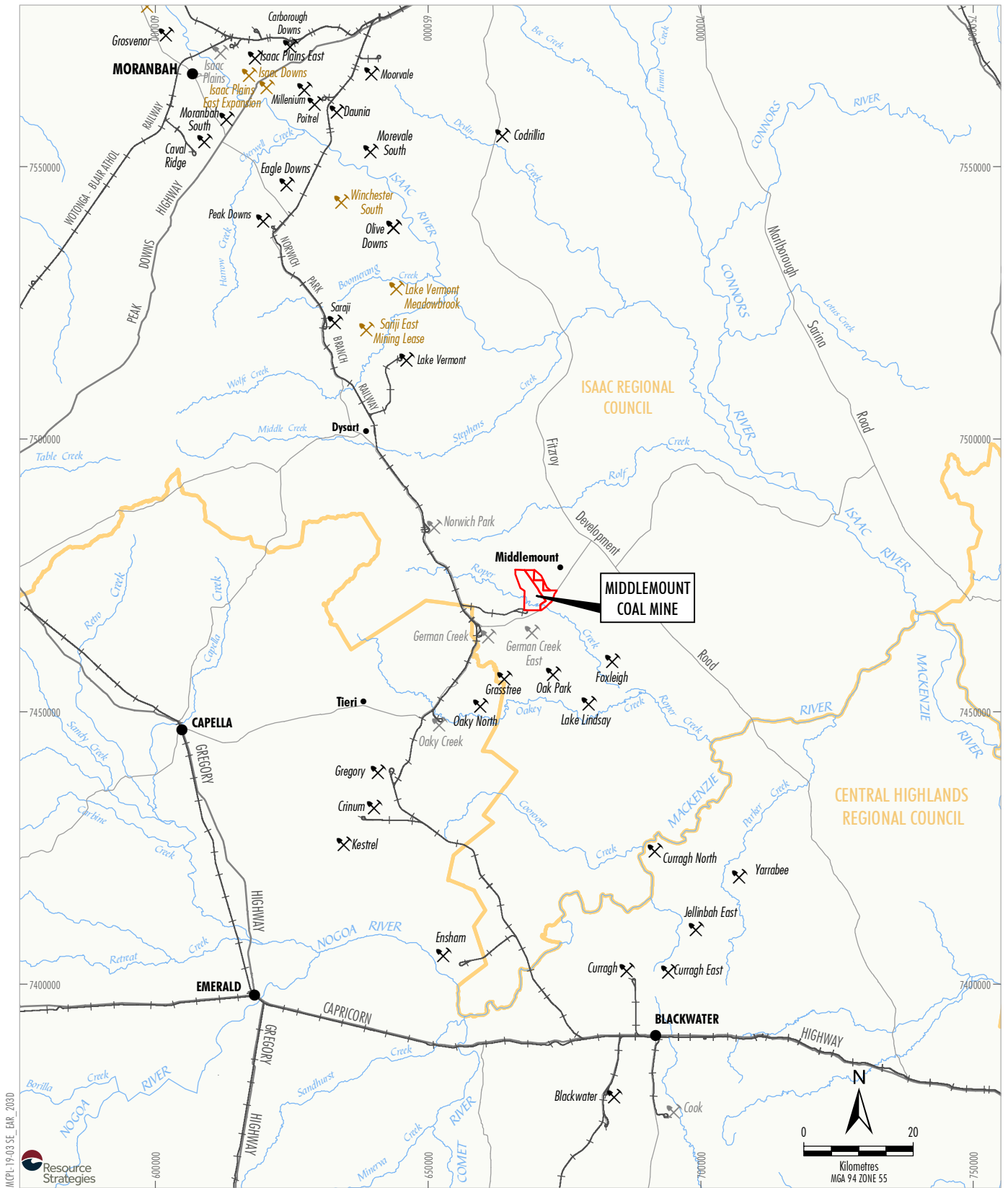
Stage 1 of the Middlemount Coal Mine was initially approved for the production of 1.8 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal, designated under Mining Lease (ML) 70379, and an amended EA (Mining Activities) Non-Code Compliant Level 1 MIN100646307 – Middlemount Coal Mine, effective from 24 November 2009.

Full scale operations at the Middlemount Coal Mine commenced in July 2011.

On 29 June 2012, the EA was amended to approve the expansion of open cut mining operations within ML 70379 and ML 70417 (referred to as "Stage 2" of the Middlemount Coal Mine), including a ROM coal production rate increase from 1.8 to 5.4 Mtpa. On 7 September 2012, Middlemount Coal Project Stage 2 was approved under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Subsequent minor amendments to the EA were made on the 8 February and 12 July 2016 for various minor changes, including an increase in the ROM coal production rate from 5.4 to 5.7 Mtpa.

On 23 September 2016, the EA was amended for the North-eastern Extension, involving an extension of the East Dump into ML 700014. On 29 March 2017, the North-eastern Extension was approved under the EPBC Act.



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Resource Strategies



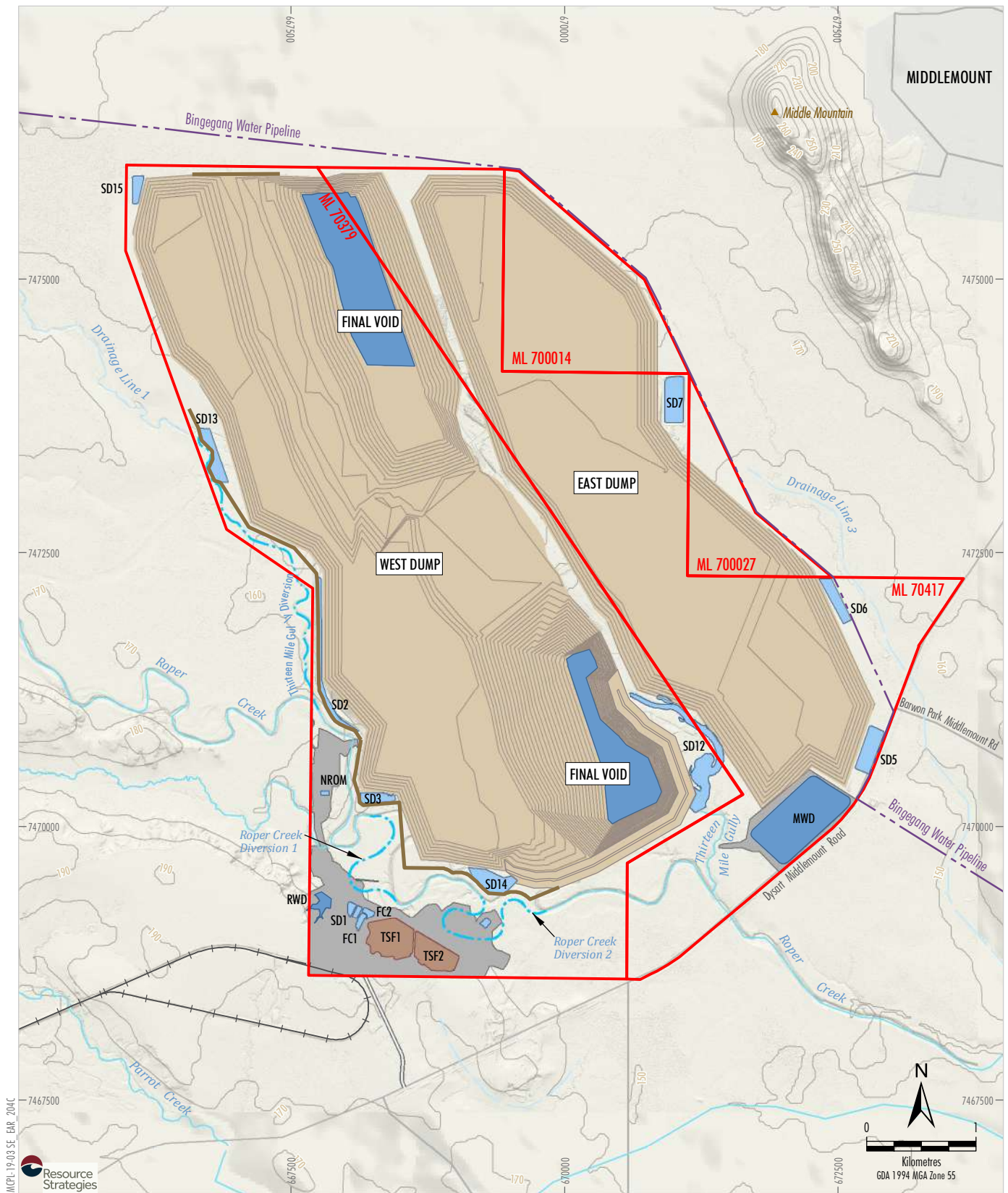
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- Mining Lease Boundary
 - Local Government Area Boundary
 - Approved/Operating Coal Mine
 - Under Care and Maintenance
 - Proposed Mining Operation

Source: The State of Queensland (2020)



SOUTHERN EXTENSION PROJECT
Regional Location

Figure 1-1



middlemount coal

SOUTHERN EXTENSION PROJECT
Existing/Approved Middlemount Coal Mine
General Arrangement

Figure 1-2

Minor amendments to the EA were made on 22 August 2017 and 21 May 2018 for various minor changes, including conditions to enable exploration activities in the extended north-west portion of ML 70379.

On 5 September 2019, the EA was amended for the Middlemount Coal Mine Western Extension, involving an extension to the open cut pit in the north-west portion of ML 70379 and ML 70417.

Minor amendments to the EA were made on 26 February 2020 to adjust two watercourse diversions of Roper Creek within ML 70379 and incorporate changes to groundwater monitoring bore conditions.

A further EA amendment was made on 6 October 2020 to include a 'release contaminant trigger investigation level' for Sodium.

1.2.2 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 target coal seams 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.

1.2.3 General Arrangement

The existing/approved general arrangement of the Middlemount Coal Mine is shown on Figure 1-2.

1.2.4 Mining Operations

Mining at the Middlemount Coal Mine is by conventional open cut strip mining methods, and generally progresses from the shallowest coal in the west toward the east.

Approved operations include open cut mining of ROM coal up to 24 hours per day, seven days per week, using a conventional truck and shovel fleet supported by dozer mining at a rate of up to 5.7 Mtpa.

Vegetation Clearing and Topsoil Salvage

Vegetation is progressively cleared ahead of the active open cut and waste rock emplacement areas. Topsoil is stripped prior to excavation of underlying overburden or emplacement of waste rock. Where the topsoil cannot be directly used for progressive rehabilitation it is stockpiled for use at a later date.

Waste Rock Removal and Handling

Upper unconsolidated overburden is removed using excavators, trucks and dozer mining. The remaining overburden and interburden (weathered Tertiary and upper Permian material) is drilled and blasted prior to removal by the same methods.

The overburden and interburden is emplaced in both out-of-pit and in-pit waste rock emplacements.

Coal Rejects Management

Coarse reject material from the coal handling and processing plant (CHPP) is placed within in-pit waste emplacements. Fine rejects are temporarily stored in existing tailings storage facility (TSF) cells TSF1 and TSF2 (Figure 1-2) for drying and reclaim for in-pit co-disposal.

Mobile Equipment

An indicative list of major mobile equipment at the Middlemount Coal Mine is provided in Table 1-1.

Table 1-1
Indicative List of Approved Major Mobile Equipment

Mining Equipment	Indicative Fleet
Excavators	12
Trucks	50
Drills	3
Dozers	17
Graders	7
Water Trucks	5
Total	94

1.2.5 Coal Handling and Transport

ROM coal is excavated then transported by truck for stockpiling or direct loading to the crusher before being conveyed to the existing CHPP for processing.

Product coal (both coking and pulverised coal injection [PCI] coal), and small amounts of thermal coal, is stockpiled and reclaimed into a train loading bin for rail transport to the Dalrymple Bay Coal Terminal, Abbot Point Port or Wiggins Island Coal Export Terminal for export.

1.2.6 Water Management

A suite of existing management plans and protocols are used during operations at the Middlemount Coal Mine for the purposes of water management including:

- Environmental Management Plan (MCPL, 2018a);
- Water Management Plan (WRM, 2019a);
- Water Balance Modelling Report (WRM, 2018);
- Receiving Environment Monitoring Program (REMP) (DPM Envirosciences [DPM], 2019);
- Erosion and Sediment Control Plan (WRM, 2019b); and
- Mining Waste Management Plan (MCPL, 2019a).

The general principles to manage surface water for the site include (WRM, 2019a):

- 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 Average Recurrence Interval (ARI) immunity from Thirteen Mile Gully and Roper Creek floods.

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 1-2). 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 Qld *Water Act 2000* (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 1-2. Roper Creek Diversion 1 will be constructed during the second half of 2020. Roper Creek Diversion 2 is not yet constructed, and is proposed to be realigned and extended as part of the Project (Section 2.6).

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. The approved sediment dams are listed in Table 1-2.

Smaller sediment control structures are constructed as required in accordance with the Erosion and Sediment Control Plan (WRM, 2019b).

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.

Flood Management

A flood protection levee is progressively constructed at the Middlemount Coal Mine as mining advances (Figure 1-2). 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.

Table 1-2
Approved Sediment Dams

Name	Easting (MGA94)	Northing (MGA94)	Receiving Waters
SD1	668,008	7,469,218	Roper Creek
SD2	668,093	7,470,858	Roper Creek
SD3	668,457	7,470,213	Roper Creek
SD5	672,771	7,470,669	An unnamed drainage feature
SD6	672,488	7,472,021	An unnamed drainage feature
SD7	671,125	7,474,067	An unnamed drainage feature
SD8	671,725	7,471,727	An unnamed drainage feature
SD9	669,506	7,473,118	Thirteen Mile Gully
SD10	670,870	7,472,707	An unnamed drainage feature
SD12	671,261	7,470,516	Thirteen Mile Gully
SD13	666,826	7,473,281	Thirteen Mile Gully Diversion
SD14	669,367	7,469,428	Roper Creek
SD15	666,116	7,475,874	Thirteen Mile Gully Diversion

Note: Grey shading indicates sediment dam is constructed.

The flood protection levee provides sufficient flood protection capacity (i.e. for a 1000 year ARI flood event).

Tailings Water Management System

There are two approved TSFs at the Middlemount Coal Mine (TSF1 and TSF2) (Figure 1-2). TSF2 has been divided into four cells with a further two tailings flocc cells (TFCs) (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 Raw Water Dam (RWD) for reuse.

Mine Affected Water Release Points, Sources and Receiving Waters

Mine affected water release points, sources and receiving waters are listed in Table 1-3.

Table 1-3
Mine Affected Water Release Points, Sources and Receiving Waters

Release Point ¹	Source	Receiving Waters
RP 1	Raw Water Dam	Roper Creek
RP 2	Mine Water Dam	Thirteen Mile Gully
SD1	Sediment Dam 1	Roper Creek
SD2	Sediment Dam 2	Roper Creek
SD3	Sediment Dam 3	Roper Creek
SD7	Sediment Dam 7	Roper Creek
NROM	North ROM Dam	Roper Creek

Note:

¹ Eastings and northings are listed in Table C1 of the EA.

Mine affected water is released in accordance with water quality and flow requirements in the EA.

Transfer dams (such as the Southern Transfer Dam [STD]) are located in the vicinity of the mining pit and used to transfer mine water to the RWD or Mine Water Dam (MWD) (Figure 1-2), 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.

1.2.7 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.

MCPL has a Water Supply Agreement with Anglo Coal Pty Limited (Anglo Coal) for water to be supplied from the German Creek Mine located south of the Middlemount Coal Mine. Water is pumped from the German Creek Mine on an 'as needed' basis and placed in the RWD, STD and MWD, up to a limit of 250 megalitres (ML) per month and 1,800 ML per year (ML/year).

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

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

1.2.8 Rehabilitation and Post-Mining Land Use

All land subject to mining activities will be rehabilitated to a safe, stable and non-polluting landform with a self-sustaining vegetation cover in accordance with Condition F10 of the EA. Rehabilitation and revegetation of the post mine landforms is undertaken progressively in accordance with Condition F13 of the EA.

Residual Voids

The nature of open cut mining results in the formation of voids when the open cut reserve is fully extracted. There are two residual voids approved at the Middlemount Coal Mine, located in the northern and southern area of the mine pit (Figure 1-2). The north void will be approximately 373 hectares (ha) in area, and the south void area will be approximately 222 ha.

The residual voids will be left in a geotechnically stable condition upon completion of mining activities in accordance with Condition F10 of the EA.

Flood Protection

At the completion of mining the flood protection levee in place during operation of the mine will be incorporated into the final landform to provide flood immunity up to the probable maximum flood (PMF) level from Roper Creek, in accordance with Condition F22 of the EA. The PMF is defined as the largest flood that could conceivably occur at a particular location and is estimated from probable maximum precipitation.

Flood protection is not required around the northern residual void as it will be located well beyond the current floodplain of Roper Creek.

The rehabilitated final landform will be a self-sustaining structure that does not require long term maintenance.

1.2.9 Waste Management

General waste minimisation principles are implemented in accordance with the Qld *Waste Reduction and Recycling Act 2011* waste management hierarchy to minimise the quantity of wastes that require off-site disposal. In accordance with the Qld *Environmental Protection (Waste Management) Regulation 2000*, MCPL monitors all trackable wastes.

1.2.10 Workforce

The Middlemount Coal Mine provides continued employment for a workforce of approximately 400 personnel. The workforce may fluctuate over the life of the mine to over 500 personnel during particular mining or processing activities, shut downs or maintenance activities.

1.3 PROJECT OVERVIEW

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, Mine and Energy (DNRME) approved the variation application, which resulted in the extension of ML 70379 into an area previously associated with ML 1998.

The Project involves extension of operations within ML 70379 and ML 70417 to the south and extension of waste rock emplacement areas within ML 700014, ML 700027 and ML 70417 (Figure 1-3). The main activities associated with the development of the Project would include:

- extension of the open cut pit to the south within MLs 70379 and 70417;
- continued extraction of ROM coal up to approximately 5.7 Mtpa using conventional open cut mining equipment;
- minor extensions to waste rock emplacement footprints;
- placement of waste rock in existing emplacements, expanded emplacements (West Dump and East Dump) and within the mined-out void;
- progressive development of sediment dams, pipelines and other water management equipment and structures;
- re-positioning of the approved southern flood levee and water management infrastructure;
- realignment and extension of the approved (but not yet constructed) eastern diversion of Roper Creek (Roper Creek Diversion 2) inside the MLs;
- progressive development of new haul roads and internal roads;
- continued development of soil stockpiles, laydown areas and borrow areas;
- continued use of existing and approved supporting mine infrastructure;
- extension of the approved mine life by approximately seven years (to 2044); and
- a change to the final landform for the end of the mine life.

The approximate extent of additional surface disturbance associated with the Project is shown on Figure 1-3. The approximate extent of the Project open cut mining components (including open cut pits, waste rock emplacements, coal rejects emplacement structures and residual voids) are shown on Figure 1-4.

MCPL owned land and mining and exploration tenements in the Project area are shown on Figure 1-5.

A detailed description of the Project is provided in Section 2.

1.4 CONSULTATION

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

Department of Environment and Science

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

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

As described in Section 1, the environmental assessment undertaken for the Project (and described in this EVA) is consistent with the scope provided to DES in April 2020. This EVA also addresses the requirements of sections 226 and 226A of the EP Act (Attachment 1).

On 4 September 2020, MCPL lodged a draft of this Environmental Values Assessment (EVA) to DES. DES subsequently provided comments on the draft EVA on 21 October 2020.

This EVA has been updated to address DES's comments on the draft EVA provided in October 2020.

Department of Natural Resources, Mines and Energy

On 7 November 2019, MCPL submitted an application to the DNRME 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 Project 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.

Commonwealth Department of Agriculture, Water and the Environment

Consultation with the Commonwealth Department of Agriculture, Water and the Environment (DAWE) regarding the Project will be undertaken following the submission of this EVA to DES.

Isaac Regional Council

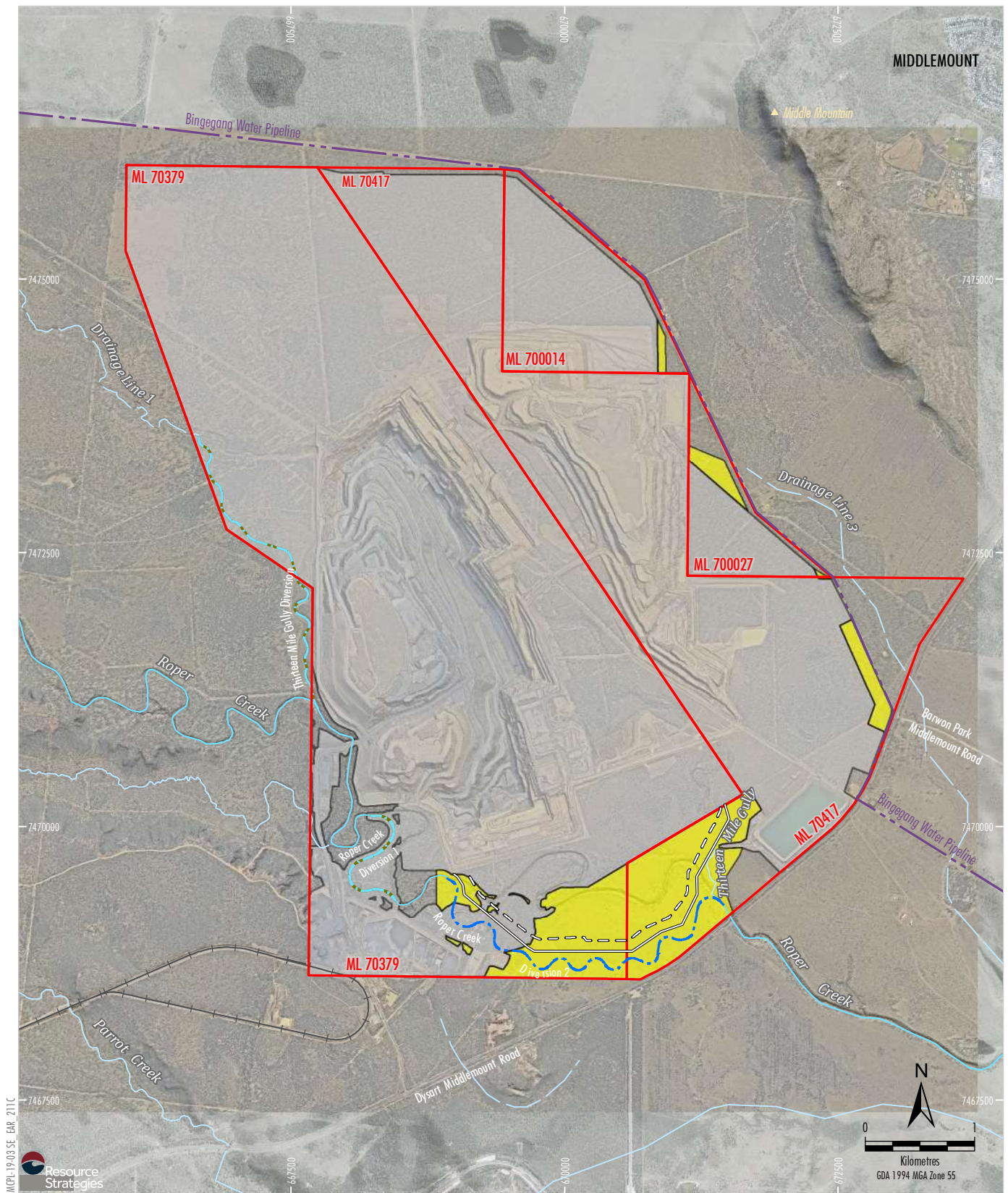
MCPL held a meeting with the Isaac Regional Council to discuss the Project on 12 October 2020. Consultation with the Isaac Regional Council will continue to be undertaken during the assessment of this EVA by the Qld Government.

Aboriginal Community

Consultation with the Aboriginal Community regarding the Project has been undertaken during the preparation of this EVA, and will continue to be undertaken during the assessment of this EVA by the Qld Government.

Surrounding Landholders and Local Community

MCPL distributed a newsletter to the surrounding landholders and local community in October and November 2020. The newsletter provided a brief update on the Middlemount Coal Mine operations, and an overview of the Project. Consultation with the surrounding landholders and local community will continue to be undertaken during the assessment of this EVA by the Qld Government.



- LEGEND**
- 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

Source: MCPL (2020); The State of Queensland (2020)
Orthophoto: MCPL (September 2019)



SOUTHERN EXTENSION PROJECT
Approximate Project Footprint

Figure 1-3

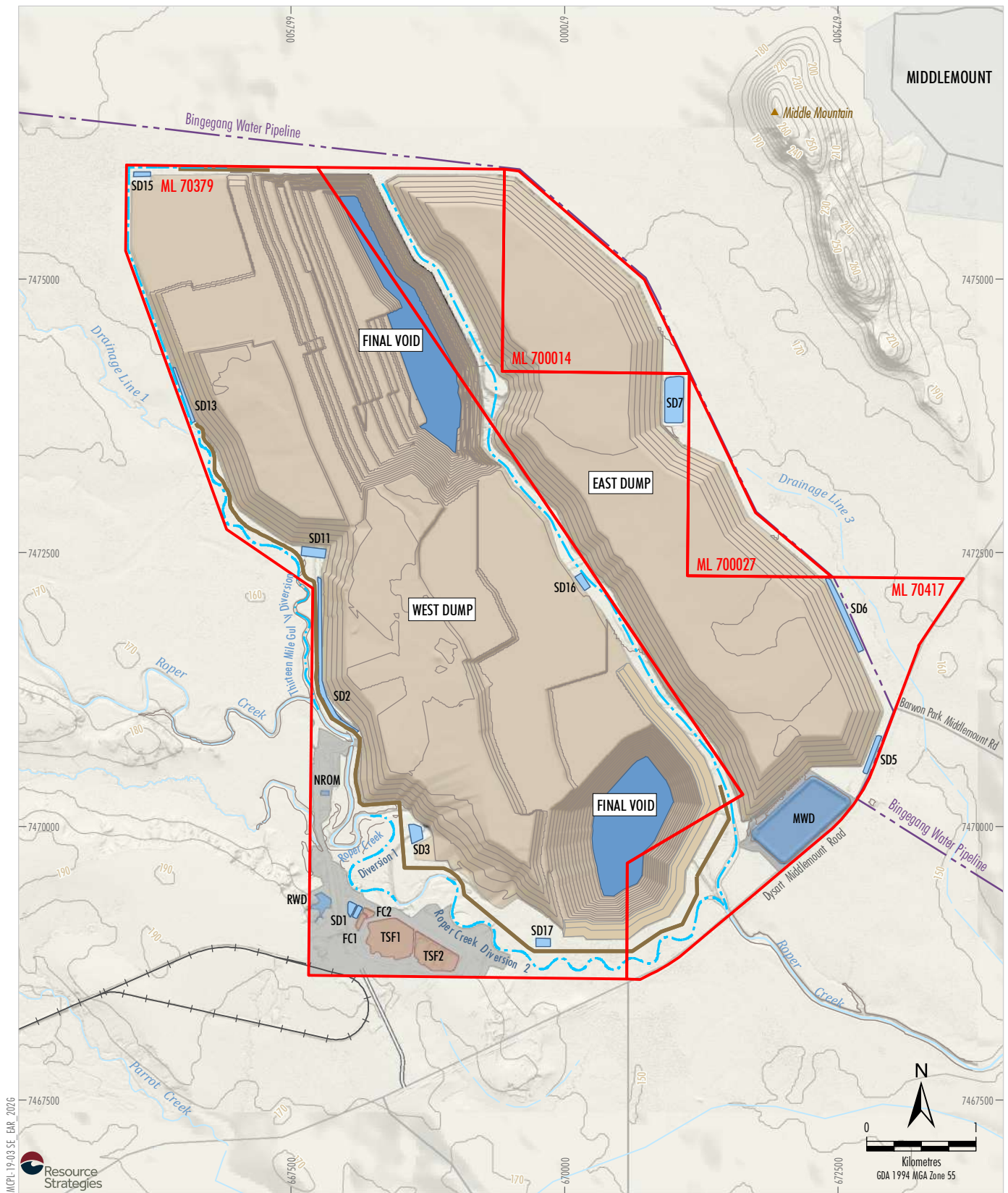


Figure 1-4



Figure 1-5

1.5 RELEVANT LEGISLATION AND POLICY REQUIREMENTS

Table 1-4 describes the principal statutory approvals relevant to mining projects and establishes their relevance to the Project. The list of approval requirements in Table 1-4 is confined to principal approval requirements and is not an exhaustive list of all approval requirements for the Project.

As described in Section 1, MCPL is seeking approval of the Project through a major amendment of the EA in accordance with Chapter 5, Part 7 of the EP Act. Under section 230 of the EP Act, the administering authority (DES) may require public notification of the EA Amendment Application (for the Project), if:

- (a) *there is likely to be a substantial increase in the risk of environmental harm under the amended environmental authority; and*
- (b) *the risk is the result of a substantial change in-*
 - (i) *the quantity or quality of contaminant permitted to be released into the environment; or*
 - (ii) *the results of the release of a quantity or quality of contaminant permitted to be released into the environment.*

MCPL does not consider that the Project would result in a substantial increase in the risk of environmental harm, given the Project would:

- be an extension of the existing/approved Middlemount Coal Mine operations into existing MLs 70379 and 70417;
- not increase the maximum approved mining rate;
- not result in any change to the approved mining method;
- not result in any changes to the EA criteria or limits; and
- not result in any substantial change to the quantity or quality of potential contaminants being released into the environment.

Given the above, MCPL considers that public notification under Chapter 5, Part 4 of the EP Act is not required.

1.6 DOCUMENT STRUCTURE

This EVA comprises a main text component and supporting appendices. An overview of the main text is presented below.

Section 1 Introduction

Provides an introduction to the approved Middlemount Coal Mine, the Project and the function of this EVA as part of the assessment and approvals process.

Section 2 Project Description

Describes the various components and stages of development of the Project.

Section 3 Environmental Assessment

Details the environmental assessment undertaken for the Project.

Section 4 Rehabilitation and Biodiversity Offset Strategy

Describes the rehabilitation and offset strategy for the Project.

Section 5 Summary of Environmental Management Commitments

Provides a consolidated description of the commitments to implement management measures for the Project.

Section 6 References

Lists the documents referenced in Sections 1 to 5 of the EVA.

Appendices A to F contain the supporting documentation referred to throughout this EVA, including a number of specialist/technical reports:

Appendix A	Surface Water Assessment
Appendix B	Groundwater Assessment
Appendix C	Terrestrial Ecology Assessment
Appendix D	Aquatic Ecology Assessment
Appendix E	Air Quality and Greenhouse Gas Assessment
Appendix F	Noise Assessment

Table 1-4
Principal Statutory Approvals

Legislation	Administering Authority	Approval Trigger	Approval	Relevance to the Project
State Legislation				
EP Act	DES	The EP Act regulates Environmentally Relevant Activities (ERAs) and provides the mechanism for authorising activities which cause or may cause environmental harm.	EA	Approval to carry out an ERA which is a mining activity. The existing EA would be amended as necessary to authorise the Project.
MR Act	DNRME	The MR Act regulates mining activities in Qld and provides the mechanism for securing mining tenements, including Exploration Permits for Coal (EPCs), Mineral Development Licences and MLs.	ML	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 MR Act. 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.
Qld <i>Regional Planning Interests Act 2014</i> (RPI Act)	DES	The RPI Act regulates resource activities in areas of regional interest, including Priority Agricultural Areas, Priority Living Areas, Strategic Cropping Areas and Strategic Environmental Areas.	Regional Interests Development Approval (RIDA)	The Project is not located within any Priority Agricultural Areas, Priority Living Areas, Strategic Cropping Areas or Strategic Environmental Areas and is therefore not anticipated to require a RIDA.
Planning Act	Department of State Development, Tourism and Innovation	The Planning Act is the principal legislation in Qld for the co-ordination and integration of planning at the local, regional and state levels.	Development permit	No Project components are located outside of a ML, as such development approval under the Planning Act is not required for the Project.
Water Act	DNRME	The Water Act regulates the taking of and/or interference with water within the State.	Water permit Water licence Riverine protection permit	No approvals under the Water Act would be required for the Project. In particular, the section 1283 of the Water Act provides that the holder of a mining lease may take or interfere with underground water (referred to as 'associated water') in the area of the lease if the taking or interference happens during the course of, or results from, the carrying out of an authorised activity for the lease.

Table 1-4 (Continued)
Principal Statutory Approvals

Legislation	Administering Authority	Approval Trigger	Approval	Relevance to the Project
State Legislation (Cont.)				
Qld <i>Aboriginal Cultural Heritage Act, 2003</i> (ACH Act)	DES	The ACH Act aims to provide effective recognition, protection and conservation of Aboriginal cultural heritage in Qld. The ACH Act establishes a duty of care for activities that may harm Aboriginal cultural heritage, and requires the development of an approved Cultural Heritage Management Plan (CHMP).	CHMP/s	Management of Aboriginal cultural heritage would continue to be conducted as per the existing 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). As the Project will extend further south than the current extent of the CHMP's for the Middlemount Coal Mine, MCPL would seek to develop a CHMP with the Barada Kabalbara and Yetimarla People (the native title claimants over this area).
Qld <i>Nature Conservation Act 1992</i> (NC Act)	DES	The NC Act regulates the disturbance of listed and protected flora and fauna.	Licences/Permits/ Approvals	The Project area includes habitats containing species listed under the NC Act. MCPL would comply with the NC Act requirements by operating in accordance with the Species Management Program (MCPL, 2019d) approved by the DES.
VM Act	DES	The VM Act regulates the clearing of native vegetation.	Development Permit	No approvals under the VM Act are required for the Project as any vegetation cleared as part of the Project would be within a ML.
Commonwealth Legislation				
EPBC Act	DAWE	The objective of the EPBC Act is to provide for the protection of those aspects of the environment that are of national environmental significance.	EPBC Approval	MCPL will submit an EPBC referral for the Project to the DAWE following submission of this EVA to the DES.
Commonwealth <i>Native Title Act 1993</i>	Attorney General's Department	The Commonwealth <i>Native Title Act 1993</i> provides for the recognition and protection of native title rights in Australia. The Act provides a mechanism to determine whether native title rights exist and what the rights and interests are that comprise those native title rights.	Indigenous Land Use Agreements or right to negotiate processes.	Native Title has been extinguished over the Project area and is therefore not relevant. Notwithstanding, Indigenous Land Use Agreements or right to negotiate processes will be undertaken with relevant native title claimants where applicable

2 PROJECT DESCRIPTION

Table 2-1 provides a comparative summary of the existing Middlemount Coal Mine and the Project.

2.1 GEOLOGY AND COAL RESOURCE

The target coal seams for the Project would continue to be the Middlemount and Pisces coal seams of the Rangal Coal Measures.

The additional target coal resource for extraction for the Project has been estimated at approximately 24 Mt of ROM coal.

2.2 PROJECT GENERAL ARRANGEMENT

The general arrangement of the Project is shown on Figure 1-4.

Indicative general arrangements for Year 3 (2023), Year 8 (2028), Year 17 (2037) and Year 23 (2043) of the Project are shown on Figures 2-1 to 2-4, respectively (herein referred to as Stages 1 to 4). These indicative general arrangements are based on planned maximum production and mine progression.

Table 2-1
Comparison of the Existing Middlemount Coal Mine and the Project

Component	Existing Middlemount Coal Mine	The Project
Mine Life	Mining operations until 2037.	Extension by approximately seven years to 2044.
Tenements	MLs 70379, 70417, 700014 and 700027.	Variation to ML 70379 to accommodate the extension of the open cut pit to the south (complete).
Surface Disturbance Area	Approximately 3,072 ha.	Increase in surface disturbance area to approximately 3,303 ha (i.e. an increase of approximately 233 ha).
Mining Operations	Open cut mining of ROM coal using a conventional truck and shovel fleet supported by dozer mining at a rate of up to 5.7 Mtpa.	No change.
Geology and Coal Resource	Middlemount and Pisces coal seams of the Rangal Coal Measures.	No change.
Coal Handling and Transport	Excavated then transported by truck for stockpiling or direct loading to the crusher before being conveyed to the existing CHPP for processing.	No change.
Water Management	- Water management principles described in Section 1.2.6. - Diversions of Thirteen Mile Gully and Roper Creek.	- No change to water management principles. - Realignment and extension of Roper Creek Diversion 2. - Re-positioning of the approved southern flood levee and water management infrastructure.
Water Supply	Water supply arrangements described in Section 1.2.7.	No change.
Workforce	Continued employment for a workforce of approximately 400 personnel, which may fluctuate to over 500 personnel.	No change.
Rehabilitation and Post-Mining Land Use	- Progressive rehabilitation and revegetation of the post mine landforms. - Two residual voids located in the northern and southern area of the open cut extent.	- No change to rehabilitation strategy. - Minor changes to the location and design of the residual voids. - Minor changes to the final landform.
Waste Management	Waste management principles described in Section 1.2.9.	- No change to waste management principles. - On site processing of waste oil on-site for re-use.

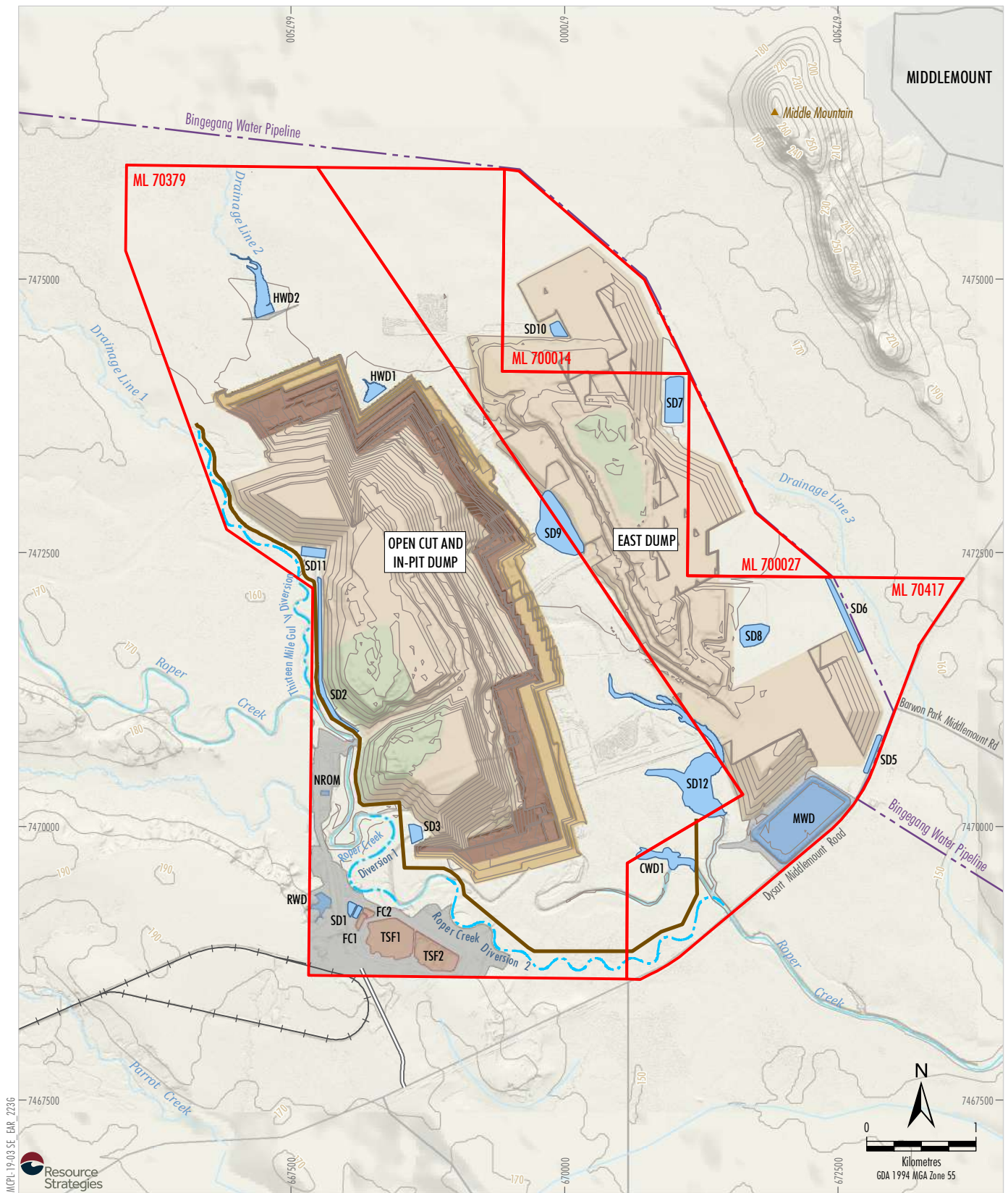
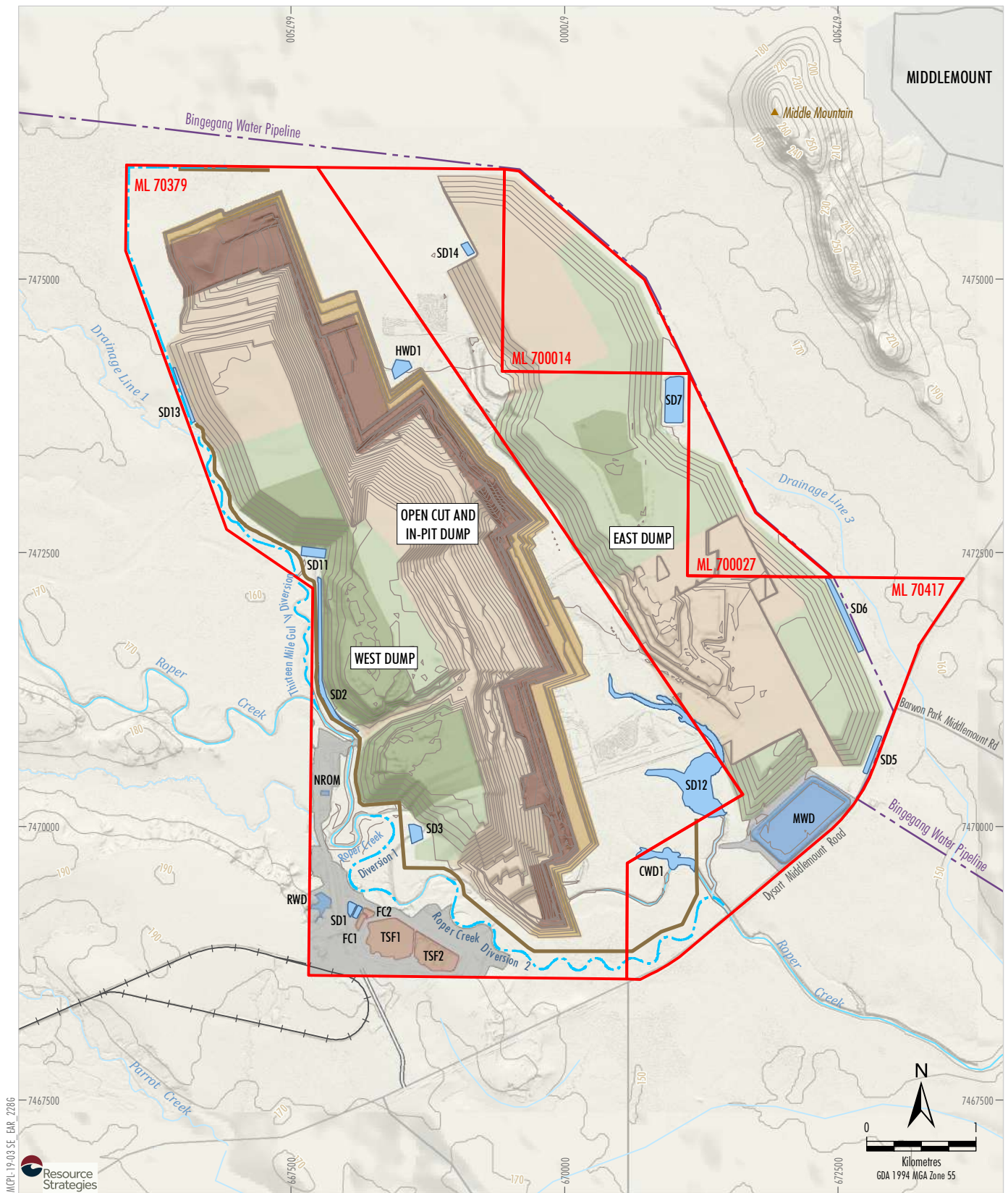


Figure 2-1



LEGEND

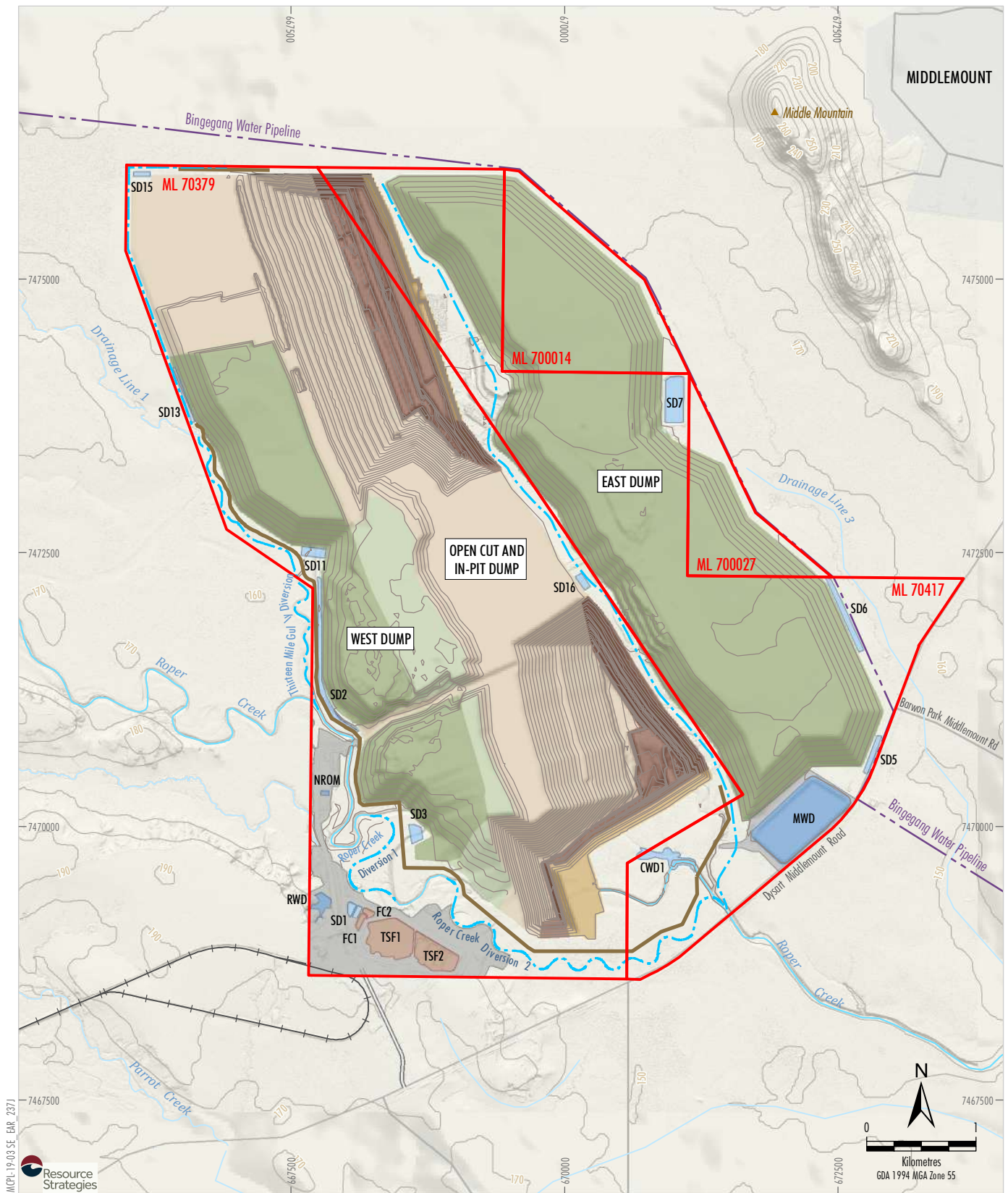
- Mining Lease Boundary (ML)
- Topsoil Stripped
- Active Open Cut Mining Area
- Active Waste Rock Emplacement
- Initial Rehabilitation
- Established Rehabilitation
- Mine Infrastructure Area
- Tailings Storage Facility
- Sediment Dam
- Water Storage
- Diversion Structure
- Levee
- Mine Access Road
- Middlemount Rail Spur and Loop

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



SOUTHERN EXTENSION PROJECT
Conceptual General Arrangement
Year 8 (2028)

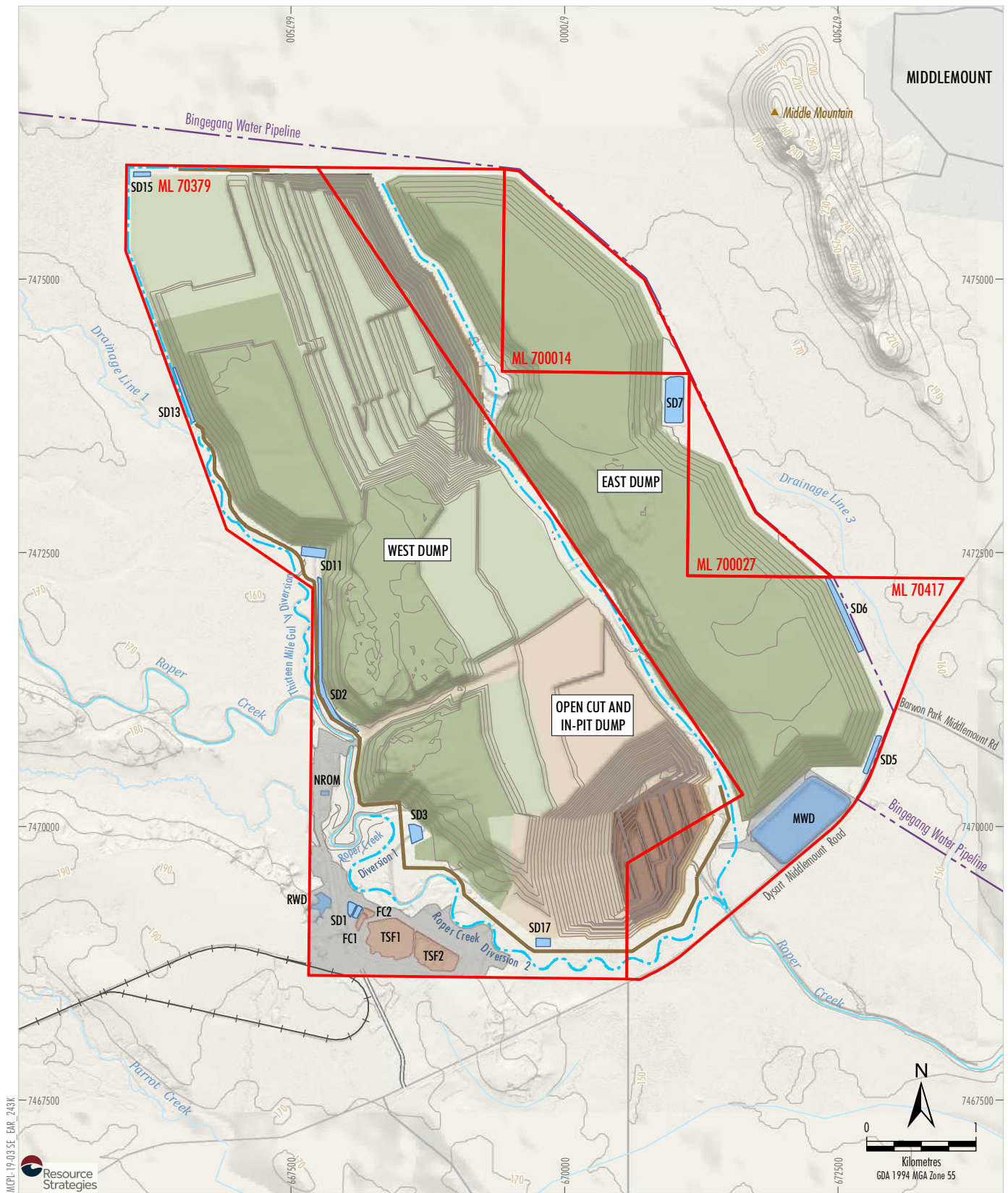
Figure 2-2



- LEGEND**
- Mining Lease Boundary (ML)
 - Topsoil Stripped
 - Active Open Cut Mining Area
 - Active Waste Rock Emplacement
 - Initial Rehabilitation
 - Established Rehabilitation
 - Mine Infrastructure Area
 - Tailings Storage Facility
 - Sediment Dam
 - Water Storage
 - Diversion Structure
 - Levee
 - Mine Access Road
 - + + Middlemount Rail Spur and Loop

SOUTHERN EXTENSION PROJECT
Conceptual General Arrangement
Year 17 (2037)

Figure 2-3



- LEGEND**
- Mining Lease Boundary (ML)
 - Topsoil Stripped
 - Active Open Cut Mining Area
 - Active Waste Rock Emplacement
 - Initial Rehabilitation
 - Established Rehabilitation
 - Mine Infrastructure Area
 - Tailings Storage Facility
 - Sediment Dam
 - Water Storage
 - Diversion Structure
 - Levee
 - Mine Access Road
 - Middlemount Rail Spur and Loop

SOUTHERN EXTENSION PROJECT

Conceptual General Arrangement

Year 23 (2043)

Figure 2-4

2.3 PROJECT SCHEDULING

An indicative mine schedule for the Project is provided in Table 2-2. The mining layout, sequence and coal extraction rates may be adjusted during the mine life to take account of localised geological features, coal market volume and quality requirements and mining economics.

2.4 MINING OPERATIONS

The Project would not result in any changes to the following approved mining operations at the Middlemount Coal Mine (Section 1.2.4):

- open cut mining methods;
- maximum annual ROM coal extraction rate;
- maximum production rate;

- vegetation clearing and topsoil salvage;
- waste rock removal and handling;
- coal reject management;
- processing plant and mine infrastructure; or
- rehabilitation strategy.

The Project would however include minor changes to the waste rock emplacements, including minor extensions to the footprint of the West and East Dumps (Figures 1-3 and 1-4).

Mobile Equipment

The existing mobile equipment used at the Middlemount Coal Mine would continue to be used, with some replacement and additional fleet items as required throughout the Project life.

**Table 2-2
Indicative Mine Schedule**

Project Year	Waste Rock (Mbcm)	ROM Coal (Mt)	Rejects (Mt)	Product Coal (Mt)
Year 1 (2021)	58.5	5.4	1.2	4.2
Year 2 (2022)	59.8	5.4	1.3	4.1
Year 3 (2023)	60.1	5.4	1.3	4.1
Year 4 (2024)	59.8	5.4	1.4	4.0
Year 5 (2025)	61.4	5.4	1.4	4.0
Year 6 (2026)	74.4	5.4	1.4	4.0
Year 7 (2027)	72.0	5.4	1.3	4.1
Year 8 (2028)	71.0	5.4	1.5	4.0
Year 9 (2029)	71.5	5.4	1.4	4.0
Year 10 (2030)	70.0	5.4	1.5	3.9
Year 11 (2031)	67.4	5.4	1.3	4.1
Year 12 (2032)	70.2	5.4	1.4	4.0
Year 13 (2033)	76.3	5.4	1.3	4.1
Year 14 (2034)	79.8	5.1	1.2	3.9
Year 15 (2035)	80.4	5.4	1.1	4.3
Year 16 (2036)	81.9	5.4	1.0	4.4
Year 17 (2037)	69.8	4.8	1.1	3.7
Year 18 (2038)	66.8	4.7	1.2	3.4
Year 19 (2039)	44.0	3.5	0.9	2.6
Year 20 (2040)	45.4	3.8	0.9	2.9
Year 21 (2041)	46.6	3.5	0.9	2.6
Year 22 (2042)	41.1	1.9	0.4	1.6
Year 23 (2043)	47.4	3.2	0.5	2.7
Year 24 (2044)	8.9	1.3	0.2	1.1
Total	1,484.4	112.7	27.2	85.5

Mbcm = Million bank cubic metres.

2.5 COAL HANDLING AND TRANSPORT

The Project would not result in a change to the approved method of coal handling and transport (Section 1.2.5).

2.6 WATER MANAGEMENT

The Project would not result in any changes to the general surface water management principles described in Section 1.2.6.

The Thirteen Mile Gully and Roper Creek 1 Diversions would also remain unchanged as a result of the Project.

The suite of existing management plans and protocols relating to water management used during operations at the Middlemount Coal Mine would continue to be implemented for the Project.

Roper Creek Diversion 2

As part of the Project, Roper Creek Diversion 2 would need to be realigned and extended to allow for the southern extension of the open cut within ML 70379. The realigned Roper Creek Diversion 2 is shown on Figure 1-3.

Thirteen Mile Gully

The Project 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) (Figure 1-4).

Drainage Line 1 Diversion

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

Sedimentation Control

The Project would not result in any changes to the approved sediment control measures described in Section 1.2.6.

The Project would involve the construction of additional sediment dams, and changes to some approved (but not constructed) sediment dams (Table 2-3).

**Table 2-3
Project Sediment Dams 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 (Figure 1-4).
- ² Although SD12 is an existing sediment dam (Table 1-3), SD12 is associated with a natural depression (i.e. is not a 'constructed' sediment dam).

Flood Management

The southern portion of the existing flood protection levee would be realigned to accommodate the open cut pit extension for the Project (Figures 1-2 and 1-4).

The realigned portion of the flood protection levee would be designed to prevent clean floodwater from Roper Creek and Thirteen Mile Gully from entering the mine water management system and open cut mining areas, and provide sufficient flood protection capacity during mining operations (i.e. for a 1000 year ARI flood event).

The realigned portion of the flood protection levee would be designed and constructed in accordance with accepted engineering standards, and hazard assessed by a Registered Professional Engineer of Queensland (RPEQ).

Tailings Return Water Management System

The Project would not result in any changes to the approved tailings return water management system.

Mine Affected Water Release Points, Sources and Receiving Waters

The Project would not change the mine affected water release points, sources and receiving waters described in Section 1.2.6. Mine affected water would continue to be released in accordance with water quality and flow requirements of the EA for the Project.

2.7 WATER SUPPLY

The Project would not result in any changes to the approved water supply arrangements described in Section 1.2.7.

2.8 REHABILITATION AND POST-MINING LAND USE

All land subject to mining activities would be rehabilitated to a safe, stable and non-polluting landform with a self-sustaining vegetation cover. Rehabilitation and revegetation of the post mine landforms would continue to be undertaken progressively for the Project (Figures 2-1 to 2-4) (Section 4).

Residual Voids

The Project would result in minor changes to the location and design of the northern and southern voids (Figures 1-2 and 1-4).

The southern void would be located further to the south due to the extension of the open cut pit (Figure 1-4). The surface area and depth of the southern void would be reduced as part of the Project, as follows:

- surface area from 222 ha to 163 ha; and
- depth from 240 m to 199 m.

The location of the northern void would not change for the Project, notwithstanding minor changes to the extent of the void footprint (Figure 1-4). The surface area and depth of the northern void would change as part of the Project, as follows:

- surface area from 373 ha to 358 ha; and
- depth from 120 m to 235 m.

The proposed residual void arrangement is generally consistent with the *Residual Void Study* (MCPL, 2014a) submitted to the Department of Environment and Heritage Protection (DEHP) (now DES) in January 2015.

The residual voids would be designed to operate as per the currently approved residual voids.

The residual voids are described further in Section 4.

Flood Protection

As described in Section 2.6, the southern portion of the existing flood protection levee would be realigned to accommodate the open cut pit extension for the Project. The southern portion of the realigned flood protection levee would be located on the pre-mine floodplain of Roper Creek.

Consistent with the existing/approved mine, the southern portion of the realigned 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 (Figure 2-5). The rehabilitated final landform (in place of the flood protection levee) would provide flood immunity to the southern void up to the PMF level from Roper Creek.

Further details of the final landform are provided in Section 4.2.3.

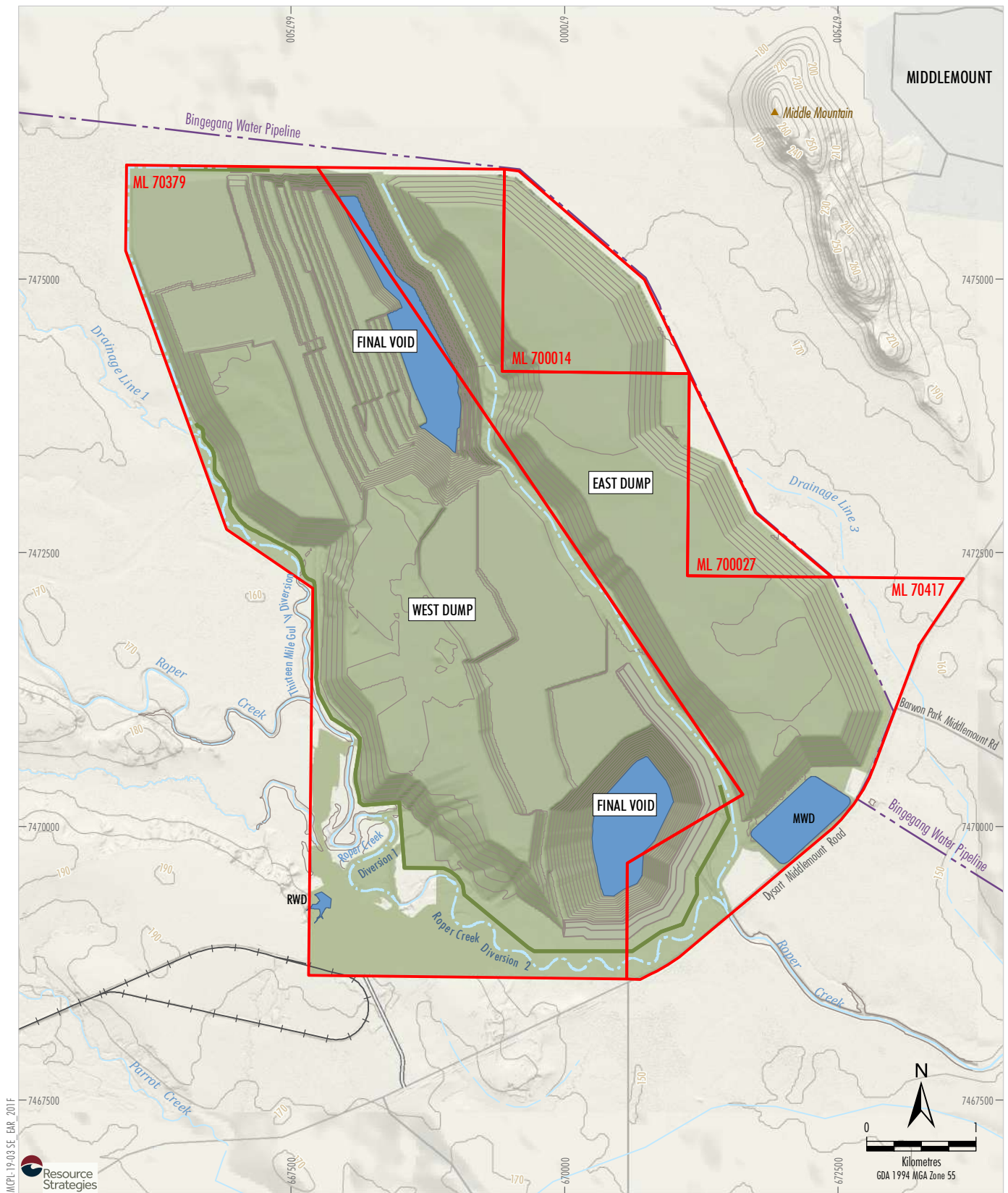


Figure 2-5

2.9 WASTE MANAGEMENT

The general waste minimisation principles described in Section 1.2.9 would continue to be implemented for the Project.

As part of the Project, waste oil is proposed to be collected from site for processing on site in a small modular unit (20 foot shipping container). The blend unit would be positioned adjacent to the existing site re-load facility. Waste oil would be collected from the waste oil tanks on site at the workshop and used as a feedstock for the reprocessing facility. The processed waste oil product would then be used as a diesel substitute in blasting mixture. The excess waste oil would continue to be removed from site by a regulated waste contractor.

Approximately 450 kilolitres per year of recycled waste oil product would be produced on site which would displace the same amount of diesel per year from the blast mix. This would result in cost savings and reduction in waste removed from site.

2.10 WORKFORCE

The Project would result in an extension of the approved mine life by approximately seven years (to 2044) providing job security for local mine employees and contractors. The Project would not result in any significant additional employees/contractors.

2.11 JUSTIFICATION FOR THE PROJECT

On 28 April 2020, ML 70379 was extended to the south of currently approved mining operations at the Middlemount Coal Mine (Section 1.3), providing an opportunity for MCPL to access additional coal resources within the same coal seams targeted by approved mining operations.

The Project 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 (which would not be recovered by operations at the German Creek Mine due to Dysart-Middlemount Road);
- provide job security for local mine employees and contractors;
- result in an incremental net benefit of approximately \$77 million (M) (in net present value [NPV] terms);
- result in additional tax revenue to the State of Qld of approximately \$43 M (in NPV terms);
- provide ongoing demand in the local and regional economy;
- reduce the surface area of the residual voids at the cessation of mining; and
- result in the establishment of additional biodiversity offset areas.

The Project would include the implementation of mitigation and management measures to minimise potential impacts on the environment.

Were the Project not to proceed, the following consequences are inferred:

- The existing Middlemount Coal Mine would continue to operate as approved until 2037, and the additional coal resources would not be recovered.
- 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 M (in NPV terms) to MCPL would be foregone.
- Additional tax revenue to the State of Qld of approximately \$43 M (in NPV terms) would not be generated.

- The surface area of the residual voids at the end of mining would be larger than proposed as part of the Project.
- The additional potential environmental impacts for the Project described would not occur.
- The additional surface disturbance area would not be disturbed and therefore the additional biodiversity offset areas would not be established.

3 ENVIRONMENTAL ASSESSMENT

This section summarises the outcomes of the environmental assessment undertaken for the Project, consistent with scope provided to DES in April 2020 (Section 1).

3.1 LAND

Section 3.1.1 provides a description of the relevant environmental values, including a description of the existing environment relating to land. Section 3.1.2 describes the potential impacts of the Project on land and Section 3.1.3 outlines the proposed management practices and mitigation strategies.

3.1.1 Environmental Values

The environmental values relevant to land in the Project area have been identified with consideration of the DES Guideline *Application Requirements for Activities with Impacts to Land (ESR/2015/1839)* (DES, 2017a).

Landforms and Topography

The natural topography is relatively flat, with an elevation ranging from approximately 160 to 170 metres Australian Height Datum (AHD). Approximately 1.5 km to the east of the Project, Middle Mountain rises to an elevation of approximately 280 m AHD (Figure 1-4).

Land Use

The majority of the Project is located on freehold land owned by MCPL which is currently used for low intensity cattle grazing under an agistment agreement (Figure 1-5). A small portion of the additional disturbance area associated with the Project is located within Lot 11, TT443, which is owned by Anglo Coal (Figures 1-5 and 3-1).

The land within the Project area is considered to be agricultural land “Class C”, which represents pasture land (i.e. land that is suitable only for improved or native pastures due to limitations which preclude continuous cultivation for crop production) (MCPL, 2011; DES, 2020a).

No Strategic Cropping Land (SCL) is mapped within, or in the vicinity of the Project (DNRME, 2020).

Barwon Park - Middlemount Road, an unformed road mapped as a travelling stock reserve, traverses the Project area (Figure 3-1). MCPL has previously reached compensation agreements with the Isaac Regional Council to close part of the travelling stock reserve within the Middlemount Coal Mine ML's. The portion of the Project area located within the travelling stock reserve (which is within ML 70417) has therefore been accounted for as part of the existing compensation agreement with the Isaac Regional Council.

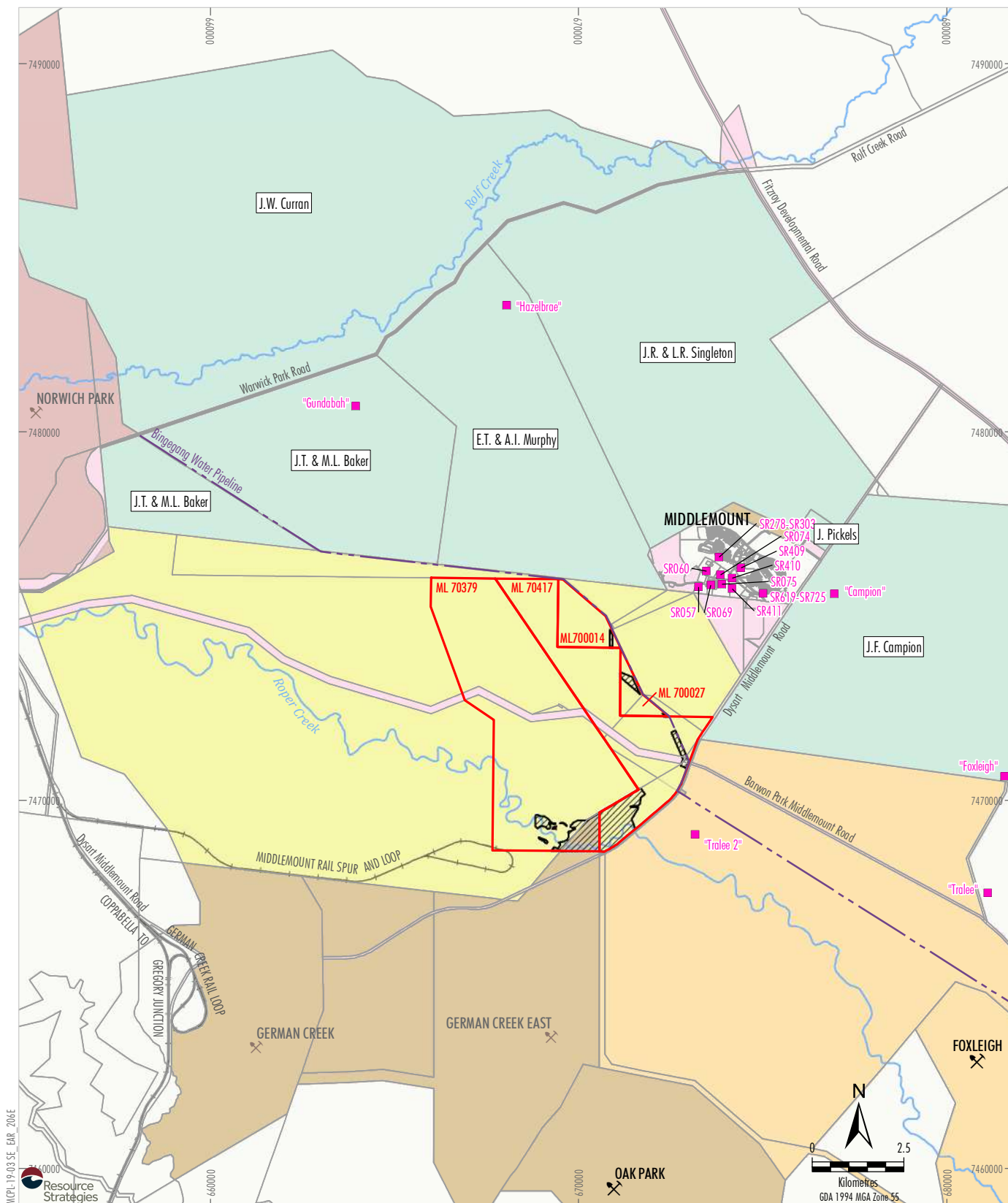
The Bingegang Pipeline, a water supply pipeline between the Bingegang Weir and the town of Dysart and nearby mining operations, has been realigned around the Middlemount Coal Mine and is located adjacent to the east of the Project area (Figure 1-4).

Soils

The geology in the vicinity of the Middlemount Coal Mine comprises a Quaternary and Tertiary age sequence overlying older Permian age coal measures (Figure 3-2, Section 3.3.1).

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 Project 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.

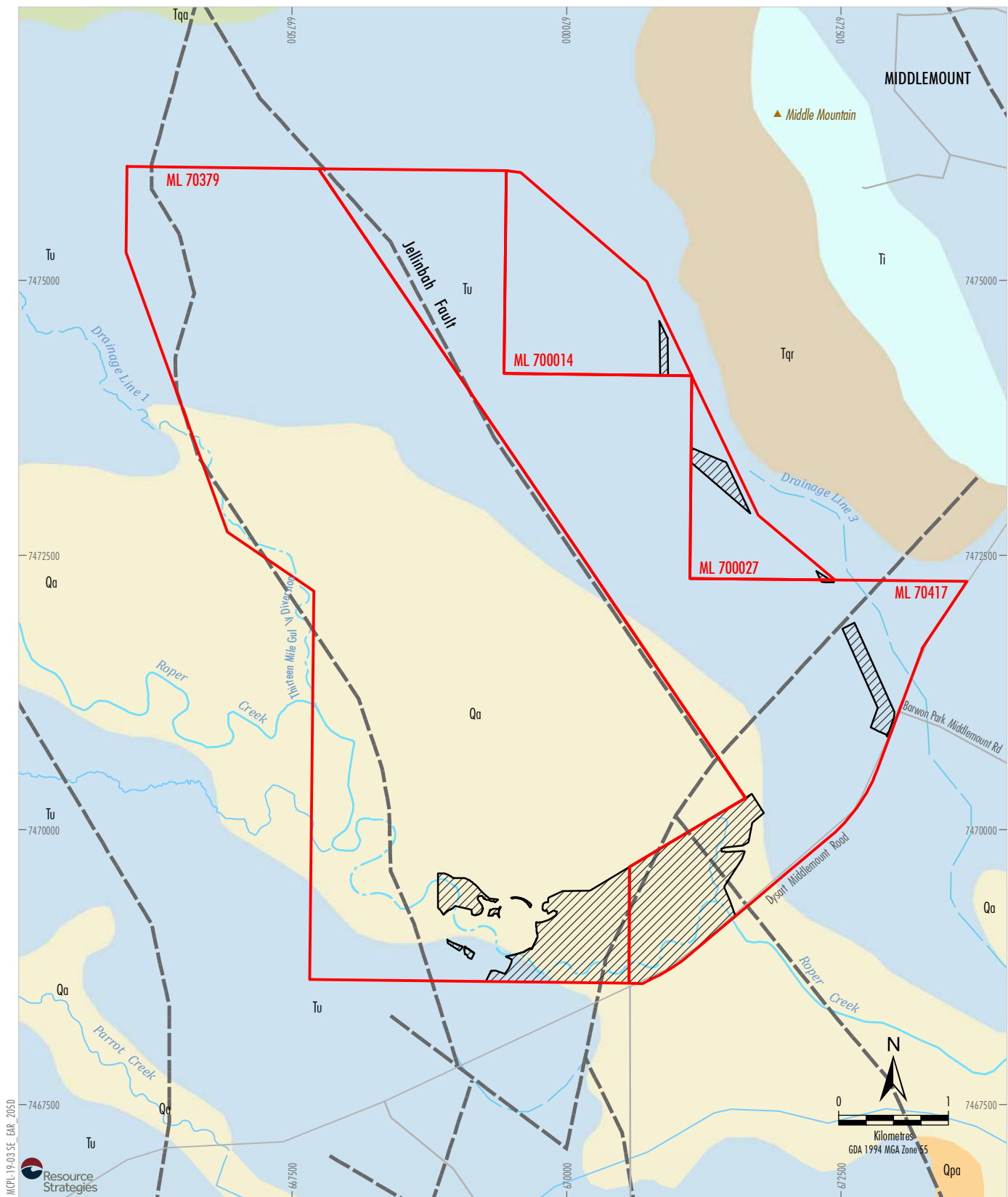


SENSITIVE PLACES	
Receiver	Location
SR075	Accommodation Village 1
SR074	Accommodation Village 2
SR410	Accommodation Village 3
SR411	Accommodation Village 4
SR278-SR303	Alfred Quinn Drive Residences
SR619-SR725	Centenary Drive South Residences
SR069	Industrial Estate
SR409	Middlemount Community School
SR060	Norm Blache Oval
SR057	Treatment Plant

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


SOUTHERN EXTENSION PROJECT
Land Ownership and
Potential Sensitive Receivers

Figure 3-1



LEGEND

- Mining Lease Boundary (ML)
- Approximate Extent of Additional Disturbance

GEOLOGY MAPPING

- Bowen Basin Structure

Lithology Summary

- | | |
|---|---|
| <ul style="list-style-type: none"> Qa Qpa Tqa Tqr Ti Tu | <ul style="list-style-type: none"> Mud, sand and minor gravel; alluvium Clay, silt, sand, gravel; flood plain alluvium on high terraces Clay, silt, sand and gravel; high-level alluvium and colluvium Clay, silt, sand, gravel, soil; colluvial and residual deposits Intrusive rhyolite, trachyte and microsyenite Mudstone, sandstone, conglomerate, siltstone, oil shale, lignite, basalt |
|---|---|

Age

- QUATERNARY
- PLEISTOCENE
- TERTIARY - QUATERNARY
- LATE TERTIARY - QUATERNARY
- EARLY TERTIARY
- EARLY TERTIARY

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



SOUTHERN EXTENSION PROJECT
Surface Geology and Structures

Figure 3-2

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.

Contaminated Land

Lot 3, SP282156 and Lot 2, SP248577, which partially overlap the Project area, are listed on the Environmental Management Register (EMR) (DES, 2018a) as having livestock dips or spray races. However, plans of these lots indicate that the Project is not likely to potentially disturb areas where evidence of contamination or historical contaminating activities occur as the closest record (a dip site) is located approximately 2 km west of the Project area (DES, 2018a).

Lot 5, SP210524 which partially overlaps the Project area, is listed on the EMR as having a livestock dip or spray race.

A review of aerial photography, historical registered plans and conversations with land owners shows that the cattle dips associated with these lots are not located within the Project area (Parsons Brinkerhoff, 2010b).

Lot 11, TT 443, which also partially overlaps the Project area, is listed on the EMR as having mine wastes related to (DES, 2018a):

- storing hazardous mine or exploration wastes, including, for example, tailings dams, overburden or waste rock dumps containing hazardous contaminants; or
- exploring for, or mining or processing, minerals in a way that exposes faces, or releases groundwater, containing hazardous contaminants.

During site inspections carried out by MCPL, no mine wastes were identified in the portion of Lot 11, TT 443 which overlaps the Project area.

Visual Amenities

The Project area comprises a number of distinct land use types and landscape units including grazing on unimproved pasture, the existing Middlemount Coal Mine, rural residences, drainage lines and remnant and regrowth vegetation.

The visual character of the Project area and surrounds reflects these distinct land use types and landscape units.

3.1.2 Potential Impacts

Landforms and Topography

The Project would alter the landforms and topography within the Project area. Some topographic changes would be temporary (e.g. temporary infrastructure) and some would be permanent (e.g. final mine landforms). However, these landforms would be similar in elevation to the existing/approved mine landform and existing surrounding topography.

Land Use

The Project would result in the disturbance or alteration of approximately 233 ha of existing low intensity grazing areas.

Soils

Potential impacts to soils would relate to direct disturbance of soil resources, increased erosion and sediment movement due to construction activities and alteration of physical, chemical and biological soil properties due to soil stripping and stockpiling.

Contaminated Land

The Project is not likely to potentially disturb areas where evidence of contamination or historical contaminating activities have occurred.

Land uses that may result in land becoming contaminated are known as ‘Notifiable Activities’ and are listed in Schedule 3 of the EP Act. The following Notifiable Activities are listed in the current Plan of Operations, and would continue to be undertaken during the Project (MCPL, 2019c):

- Notifiable Activity 1 – Abrasive blasting;
- Notifiable Activity 7 – Chemical storage;
- Notifiable Activity 14 – Engine reconditioning works;
- Notifiable Activity 15 – Explosives production and storage;
- Notifiable Activity 24 – Mine wastes; and
- Notifiable Activity 29 – Petroleum product or oil storage.

Visual Amenities

The development of the Project (e.g. vegetation clearance and extension of the open cut pit) would alter the visual landscape of the Project area similar to the impacts associated with the existing/approved Middlemount Coal Mine.

Land ownership, homesteads and mines in the wider locality are shown on Figure 3-1.

It is anticipated that potential visual amenity impacts at receivers at the Middlemount township would be minimal considering the distance from the Middlemount Coal Mine (approximately 3 km) and the presence of intervening topography (i.e. Middle Mountain).

Generally, potential impacts to visual amenity are not anticipated to be significant given the limited number of sensitive public viewpoints in the vicinity of the Project area (i.e. the open cut pit extension and the minor extensions to the waste emplacements).

It is anticipated, however, that views of the open cut mining operations (including lighting for night time operations) and subsequent final landform would be more apparent from Dysart-Middlemount Road due to the Project, as it would result in a decrease in the distance between these Project components, and Dysart-Middlemount Road. Given the proximity of Dysart-Middlemount Road to the approved Middlemount Coal Mine, the associated potential impacts to visual amenity are expected to be negligible.

3.1.3 Management Practices and Mitigation Strategies

Land Use

The Project area would be rehabilitated to land suitable for low density beef cattle grazing, or native ecosystem as similar as possible to the original ecosystem (Section 4.2.2), consistent with the final land use described in Condition F10 of the EA.

Soils

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, 2019c) would continue to be implemented for the Project, 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, 2019c), in addition to the land resource aspects of the Erosion and Sediment Control Plan (WRM, 2019b) would be reviewed, and if necessary, revised for the Project.

Contaminated Land

The general waste minimisation principles described in Section 1.2.9 would continue to be implemented for the Project.

Any potential contamination risks associated with the 'Notifiable Activities' (Section 3.1.2) would be managed in accordance with the relevant best practice guidelines and/or policies, where relevant.

On-site consumable storage areas would be operated, where applicable, in compliance with the requirements of AS 1940-2017 *The Storage and Handling of Flammable and Combustible Liquids* and AS 2187.1 *Explosives – Storage, Transport and Use – Storage*.

Visual Amenity

Rehabilitation and revegetation of the post mine landforms (including the landform located in proximity of Dysart-Middlemount Road) would continue to be undertaken progressively in accordance with Condition F13 of the EA. Progressive rehabilitation of Project landforms reduces the contrast between the Project landforms and the surrounding environment.

Whilst ensuring that operational safety is not compromised, MCPL would minimise light emissions from the Project by select placement, configuration and direction of lighting so as to reduce off-site nuisance effects where practicable.

3.2 SURFACE WATER

A Surface Water Assessment has been prepared for the Project by WRM (2020) and is presented in Appendix A. This section summarises the findings of WRM (2020).

Section 3.2.1 provides a description of the relevant environmental values and regional and local hydrology.

Section 3.2.2 describes the potential impacts of the Project on surface water resources (including potential releases to the receiving environment and flooding impacts) and describes updates to the surface water management system and water balance model.

Section 3.2.3 outlines the proposed management practices and mitigation strategies, including conceptual designs of the drainage feature diversions.

3.2.1 Environmental Values

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 (WQGs) and water quality objectives (WQOs) to enhance or protect the environmental values.

Environmental values are the qualities of waterways to be protected from activities in the catchment. Protecting environmental values aims to ensure healthy aquatic ecosystems and waterways that are safe and suitable for community use. Environmental values reflect the ecological, social and economic values and uses of the waterway (such as stock water, swimming, fishing and agriculture).

The environmental values relevant to surface water at the Project area have been identified with consideration of the DES Guideline *Application requirements for activities with impacts to water (ESR/2015/1837)* (DEHP, 2017) and include (Appendix A):

- aquatic ecosystem protection: Level 2 – disturbed ecosystems (Queensland Water Quality Guidelines [DEHP, 2009]);
- stock watering;
- human consumption;
- primary, secondary and visual recreation;
- drinking water;
- industrial use; and
- cultural and spiritual values.

Surface water quality results at the Middlemount Coal Mine are compared to the site specific trigger levels provided in the EA, which are based on environmental values, WQGs and WQOs relevant to the Project. Surface water release point monitoring locations are shown on Figure 3-3.

Regional and Local Hydrology

The Project is located within the Roper Creek catchment, within the Mackenzie River sub-basin of the greater Fitzroy Basin. The Project 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 Project includes (Figure 3-3):

- Roper Creek and its approved (but not fully constructed) diversions;
- the Thirteen Mile Gully Diversion (including associated upstream drainage features, namely Drainage Lines 1 and 2) which diverts the upstream sub-catchments of Thirteen Mile Gully to Roper Creek; and
- an unnamed tributary of Roper Creek located immediately east of the Project, which joins Roper Creek about 4.2 km downstream of Dysart Middlemount Road (designated 'Drainage Line 3' on Figure 3-3).

Roper Creek is an ephemeral watercourse that flows for short periods following rainfall. The catchment commences about 35 km to the west of the Project area. Roper Creek flows into the Mackenzie River some 40 km to the south-east of the Project 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 square kilometres (km²).

The upstream sub-catchments of Thirteen Mile Gully were diverted along the western boundary of ML 70379 in late 2014. The Thirteen Mile Gully Diversion is authorised under a Water Licence (No. 608025) under the Water Act and two Development Permits under the Planning Act (Section 1.2.6). The existing Thirteen Mile Gully Diversion is shown on Figure 3-3.

Upstream of the diversion, the sub-catchments of Thirteen Mile Gully drain via two drainage features; Drainage Line 1 (to the north-west) and Drainage Line 2 (to the north) (Figure 3-3). The DNRME has confirmed that these drainage lines are not watercourses, but rather drainage features defined under the Water Act that facilitate overland flow (DNRME, 2017).

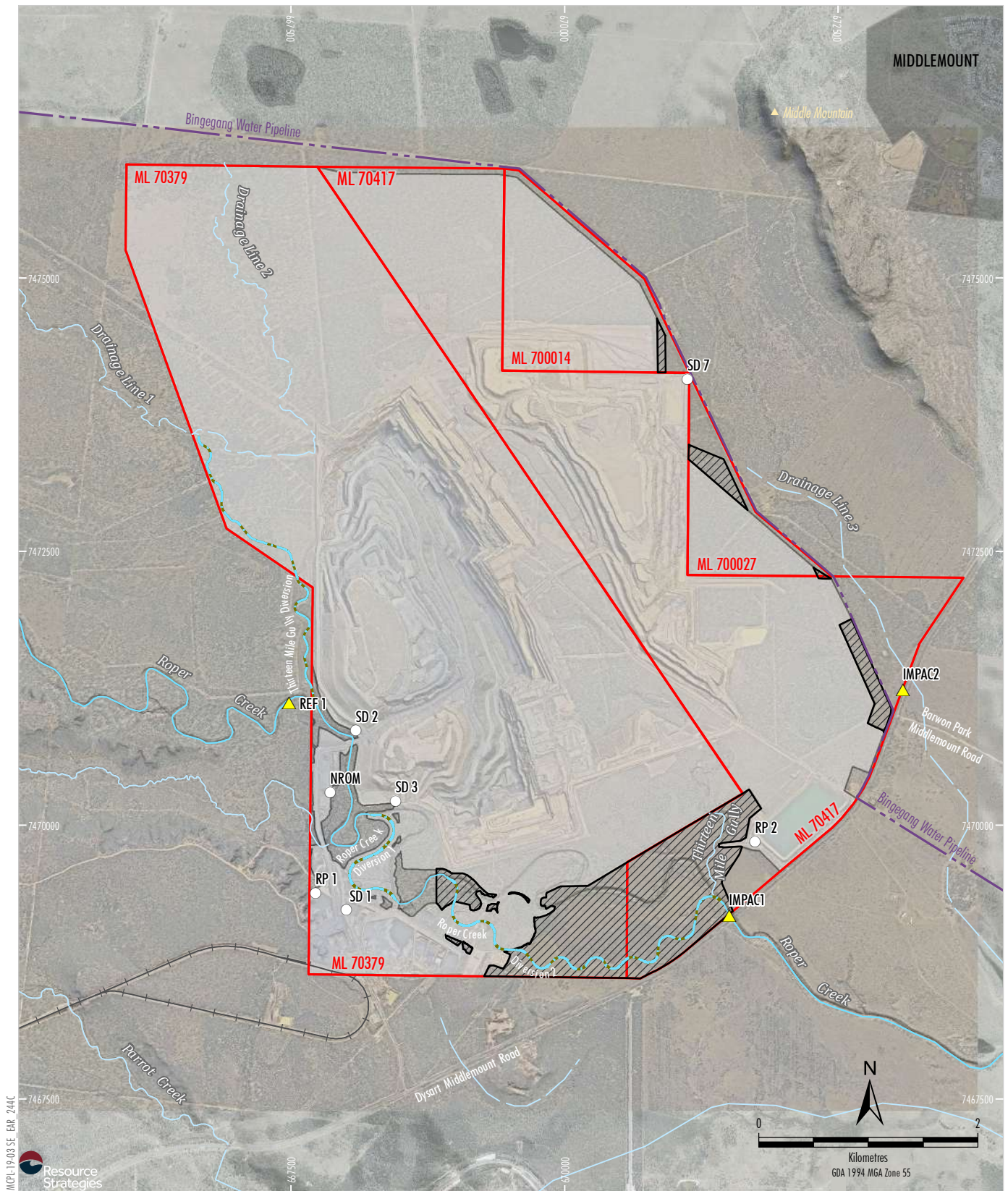
A small portion of Thirteen Mile Gully (approximately 1 km) remains in its pre-mining location to the south-east of the Project, which drains south to Roper Creek (Figure 3-3).

No water resource developments, such as dams or major irrigation infrastructure, are located within the Roper Creek catchment.

DES (2020a) mapping indicates that no wetlands of high ecological significance occur in the Project area. Flora surveys by Biodiversity Australia (2020) confirmed this (Section 3.4.1).

Surface Water Quality

The background water and sediment quality data for Roper Creek and the downstream catchment is described in the REMP (DPM, 2019).



- LEGEND**
- Mining Lease Boundary (ML)
 - Middlemount Rail Spur and Loop
 - Approved Disturbance Footprint
 - Diversion Structure
 - Approximate Extent of Additional Disturbance
 - ▲ Surface Water Reference Site
 - Surface Water Release Point

Source: MCPL (2020); The State of Queensland (2020)
Orthophoto: MCPL (Sept 2019)



SOUTHERN EXTENSION PROJECT
Local Drainage Characteristics
and Surface Water Monitoring Locations

Figure 3-3

Based on sampling conducted since 2010, 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 (DPM, 2019).

During sampling conducted in 2019, 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).

As there have been no discharges to Roper Creek since 2014, the elevated metal concentrations at the reference and impact sites (Figure 3-3) are unlikely to be attributable to operations at the Middlemount Coal Mine (Appendix A).

Given the ephemeral nature of the upstream sub-catchments of Thirteen Mile Gully, no water quality data is available for Drainage Line 1 and Drainage Line 2 (Appendix A).

Surface Water Management System

The overall objective of the mine water management system is to manage all types of water on site to meet operational, social and environmental objectives encapsulated by the EA (Appendix A).

The existing principles to manage surface water at the Middlemount Coal Mine are described in Section 1.2.6.

A comparison of surface water monitoring results from individual water storages at the Middlemount Coal Mine against the water quality release criteria in the EA is provided in Appendix A.

3.2.2 Potential Impacts

Surface Water Management System

Some minor updates to the existing water management system are proposed for the Project, including construction of additional sediment dams, and changes to some approved (but not constructed) sediment dams (Section 2.6).

Site Water Balance Model Updates

The existing Middlemount Coal Mine OPSIM water balance model was reviewed and updated to incorporate the Project to assess the performance of the proposed mine affected water management system.

The updated OPSIM model was used to predict the performance of the following (Appendix A):

- 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.

Key outcomes from the overall water balance are (Appendix A):

- The overall water management system alternates between generating a net gain or loss of water.
- Average annual external water supply requirements vary between 560 to 870 ML/year over the life of the Project.
- The net CHPP demand (based upon forecast CHPP output numbers) are generally consistent, with a reduction towards the end of the Project life.
- There were no modelled spillway overflows from the mine water system over the life of the Project.

Surface Water Flow Regimes

The Project 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. A detailed breakdown of captured catchment areas is provided in Appendix A, and summarised below for the incremental change (Project alone) and final landform.

The additional surface disturbance area associated with the Project alone would excise a maximum of 110 ha during operations from the catchment area of the former Thirteen Mile Gully. 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) (Appendix A). This 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 Project is considered negligible (Appendix A).

It is also noted that no water resource developments, such as dams or major irrigation infrastructure, are located within the Roper Creek catchment.

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 and rehabilitated areas would be allowed to drain back to Roper Creek.

Conceptual Design of Roper Creek Diversion 2

The Project would require realignment and extension of Roper Creek Diversion 2. The new alignment is shown in Figure 1-4 and would likely be constructed prior to 2023.

The realigned Roper Creek Diversion 2 aims to achieve the following key objectives (Appendix A):

- be self-sustaining and include geomorphic and vegetation features of regional watercourses and the surrounding landscape;
- where possible, positively contribute to river health values for the system; and
- not impose liability on the State, MCPL or the community to maintain the watercourse diversion and its associated components.

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 (DNRME, 2019) (Appendix A).

The proposed diversion realignment is expected to perform in a similar manner to the existing Roper Creek for in-channel flows (Appendix A).

External Water Supply

The Project's water supply arrangements are described in Section 1.2.7. Modelling results from WRM (2020) indicate 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).

Releases to the Receiving Environment

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 Project 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 (Appendix A).

If required, controlled releases would continue to be undertaken at Middlemount Coal Mine for the Project in accordance with the EA. Controlled release points are shown on Figure 3-3.

Flooding Impacts

An URBS hydrological model and a TUFLOW two-dimensional 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 Project.

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. 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 food levels, extents and depths were determined for the 50%, 5%, 2%, 1% and 0.1% annual exceedance probability (AEP) events and the PMF event, for the approved and proposed mine conditions models to assess the flood impacts of the Project. 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 (Section 3.2.3).

The flood modelling results for the operations scenario indicate that (Appendix A):

- For the 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 would overflow and drain across Middlemount Road for this event, which is not predicted to occur for pre-mining or approved conditions.
- For the 2% and 1% AEP events, peak flood levels are generally unchanged upstream of Roper Creek Diversion 2. The Project 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.

As described in Section 2.8, the southern portion of the realigned flood protection levee would be decommissioned to widen the post-mining Roper Creek floodplain at the cessation of mining (Figure 2-5), with the rehabilitated final landform providing flood immunity to the southern void up to the PMF level from Roper Creek. The post-mining flood modelling results indicate that (Appendix A):

- For the 5% AEP event, Middlemount Road would remain trafficable. The removal of the haul road crossing of Roper Creek and widening of the floodplain would reduce the flows overtopping the Roper Creek Diversion predicted for the operations scenario.
- For the 2% and 1% AEP events, peak flood levels along Roper Creek Diversions 1 and 2 would reduce from approved conditions due to the additional conveyance capacity of the widened floodplain.

Cumulative Impacts

The Project 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 (Appendix A).

The Project 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 (Appendix A).

WRM (2020) 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 Project is expected to have negligible cumulative impact on surface water quality and associated environmental values when compared to the approved Middlemount Coal Mine.

3.2.3 Management Practices and Mitigation Strategies

The existing surface water management practices for the Middlemount Coal Mine are described in Section 1.2.6 and WRM (2020). The minor changes to these surface water management practices as part of the Project are described in Section 2.6.

In summary, the Project would require:

- the realignment and extension of Roper Creek Diversion 2;
- the construction of additional sediment dams, and changes to some approved (but not constructed) sediments dams; and
- the realignment of the southern portion of the approved flood protection levee

Final Landform

Once mining operations cease, groundwater inflows to the northern and southern residual voids (Section 2.8) 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 incident 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. More details regarding the residual voids is provided in Section 4.2.3.

A GOLDSIM model was used to assess the likely long-term water level behaviour of the residual voids. 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.

Consistent with the approved/existing mine, the flood protection levee that would exist during mining operations (including the realigned southern portion) would be decommissioned and incorporated into the final landform at the cessation of mining to form a stable landform that does not require long-term maintenance.

This final landform would be designed to be higher than the PMF level. Further details on the final landform are provided in Section 4.2.3.

Final landform stability has been determined by considering the bed shear at the toe of the landform during a 0.1% AEP flood event. This assessment has been undertaken in consideration of vegetation thresholds that protect against scour (e.g. native vegetation thresholds). The outcomes of this final landform modelling indicate bed shear against the toe of the landform is below the native vegetation threshold at all locations (Appendix A).

Accordingly, the incorporation of erosion resistant material (e.g. rock gabion) is not anticipated to be required.

Surface Water Monitoring

Surface water quality monitoring for receiving waters would continue to be undertaken in accordance with the EA.

Sediment Dam Monitoring

Sediment dam monitoring would be used to validate the anticipated quality of water runoff reporting to sediment dams.

Initially, sediment dam monitoring would occur on a regular (e.g. quarterly) basis to demonstrate the water quality of stored waters is consistent with the relevant operating parameters to allow releases from sediment dams to occur when required.

Subject to demonstrating the water quality objectives can be met, the frequency of monitoring and suite of parameters for the sediment dam monitoring would be reviewed and updated accordingly (e.g. to be sampled only when releases are required).

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.

Surface Water Management Plan

The Water Management Plan (WRM, 2019a) would be updated to reflect any changes to the water management system and monitoring locations resulting from the Project.

3.3 GROUNDWATER

A Groundwater Assessment has been prepared for the Project by AGE (2020a) and is presented in Appendix B. This section summarises the findings of AGE (2020a).

Section 3.3.1 provides a description of the relevant groundwater environmental values and a description of the hydrogeological systems and groundwater users.

Section 3.3.2 describes the calibrated numerical groundwater model used to predict the potential impacts of the Project and cumulative impacts.

Section 3.3.3 outlines the proposed management practices and mitigation strategies, including the proposed groundwater monitoring network and trigger values.

3.3.1 Environmental Values

The environmental values relevant to groundwater within the Project area and surrounds have been identified with consideration of the EPP Water.

The EPP Water provides a framework to protect and enhance the environmental values and hence suitability of Qld waters (including groundwater) for various beneficial uses.

Groundwater resources within the Project area lie within the Mackenzie River Sub-basin (DEHP, 2011), in which the environmental values for groundwaters that need to be considered include:

- aquatic ecosystem;
- irrigation;
- farm supply/use;
- stock water;
- drinking water;
- industrial use; and
- cultural and spiritual values.

The Mackenzie River Sub-basin Environmental Values and Water Quality Objectives

(DEHP, 2011) provides general WQOs to support and protect the various environmental values identified for waters. The WQOs are long-term goals for water quality management. Each of the environmental values listed above are discussed below to identify those that are relevant to the Project. WQOs for the broader Fitzroy Basin groundwaters are also provided in the Groundwater Assessment (Appendix B).

Environmental Values – Aquatic Ecosystem

Regionally, groundwater flow within the underlying aquifers is towards the south-east of the Project. Groundwater levels are generally in excess of 25 m below ground level (mbgl) and separated from surface waters, limiting potential to support GDEs. There are no surface expressions of these deep confined aquifers within the Project area or surrounds that would support GDEs (Appendix B).

Environmental Values – Irrigation and Farm Supply/Use

Groundwater is not used for irrigation or farm supply within the Project area or neighbouring properties. There are no known irrigation bores located within 10 km of the Project area. During the course of the bore census, it was noted that dryland cropping activities in the vicinity of the Project do not rely upon groundwater as the quality is considered brackish to saline (4T, 2017).

Environmental Values – Stock Water

There is no significant groundwater usage within the Project area or neighbouring properties. The primary agricultural purpose of land within and surrounding the Project area has been low intensity stock (cattle) grazing (Appendix B).

The WQOs for Mackenzie River Sub-basin groundwaters are provided for tolerances of livestock to total dissolved solids (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 salinity (Appendix B).

Environmental Values – Drinking Water

Groundwater quality data collected from the site monitoring bores indicates that groundwater quality in the Project area is brackish to saline and not suitable for human consumption (Appendix B).

Environmental Values – Industrial Use

Groundwater inflows reporting to the open cut pit during mine operations would be pumped to holding dams/sumps, where it would then be preferentially used as an input to the mine water balance.

No WQOs are provided for industrial use as water quality requirements for industry vary within and between industries.

Groundwaters intercepted and used for the Project would provide a beneficial industrial use.

Environmental Values – Cultural and Spiritual Values

There are no known environmental values in relation to cultural and spiritual values of groundwater within the Project area (Appendix B).

Hydrogeological Systems

The geology in the vicinity of the Middlemount Coal Mine comprises a Quaternary and Tertiary age sequence overlying older Permian age coal measures (Figure 3-2). These geological units can be separated into three key hydro-stratigraphic units based on their hydraulic properties and lithology (Appendix B):

- 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.

The summary of the physical and chemical properties of each of the above hydrogeological units are described in the following sub-sections. Further details are provided in the Groundwater Assessment (Appendix B).

Quaternary Sediments

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.

Where saturated, recharge to the alluvium would occur either:

- 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 in the Quaternary alluvium would be expected to be generally from northwest to southeast, following the regional topography and drainage network (Appendix B).

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 (Appendix B).

The Quaternary alluvium is not targeted by landholders in the vicinity of the Middlemount Coal Mine as a groundwater supply, which supports the general understanding that the Quaternary alluvium is not a productive aquifer within and surrounding the Project area (Appendix B).

Tertiary Sediments

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

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 and saturated. However, recharge is expected to be low due to the predominately clayey nature of the formation (Appendix B).

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 (Appendix B).

Permian Sediments

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 (Appendix B).

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 (Appendix B).

Private landholder bores do not commonly access the Permian aquifer due to the increased depth to water bearing strata and the typical high salinity of the contained water. (Appendix B).

Monitoring bores have been installed by MCPL to monitor groundwater drawdown in the Permian at the Middlemount Coal Mine (Figure 3-4).

Groundwater Users

4T undertook a bore census of nearby groundwater users on privately owned lands surrounding the Project in September 2017 (4T, 2017). Review of the contemporary DNRME groundwater database indicates that no additional landholder bores have been established since the bore census was undertaken (Appendix B).

The bore census identified that there is limited groundwater use of brackish to saline groundwater in the locality.

The bore census assessed six privately-owned properties, the Middlemount landfill and the Middlemount Jockey Club in a study area covering approximately 457 km² surrounding the Middlemount Coal Mine.

The bore census indicated a total of five landholder water supply bores on two of the privately-owned properties (Figure 3-4). All five bores are located in excess of 5 km from the Middlemount Coal Mine (including the Project 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).

3.3.2 Potential Impacts

Calibrated Numerical Groundwater Model

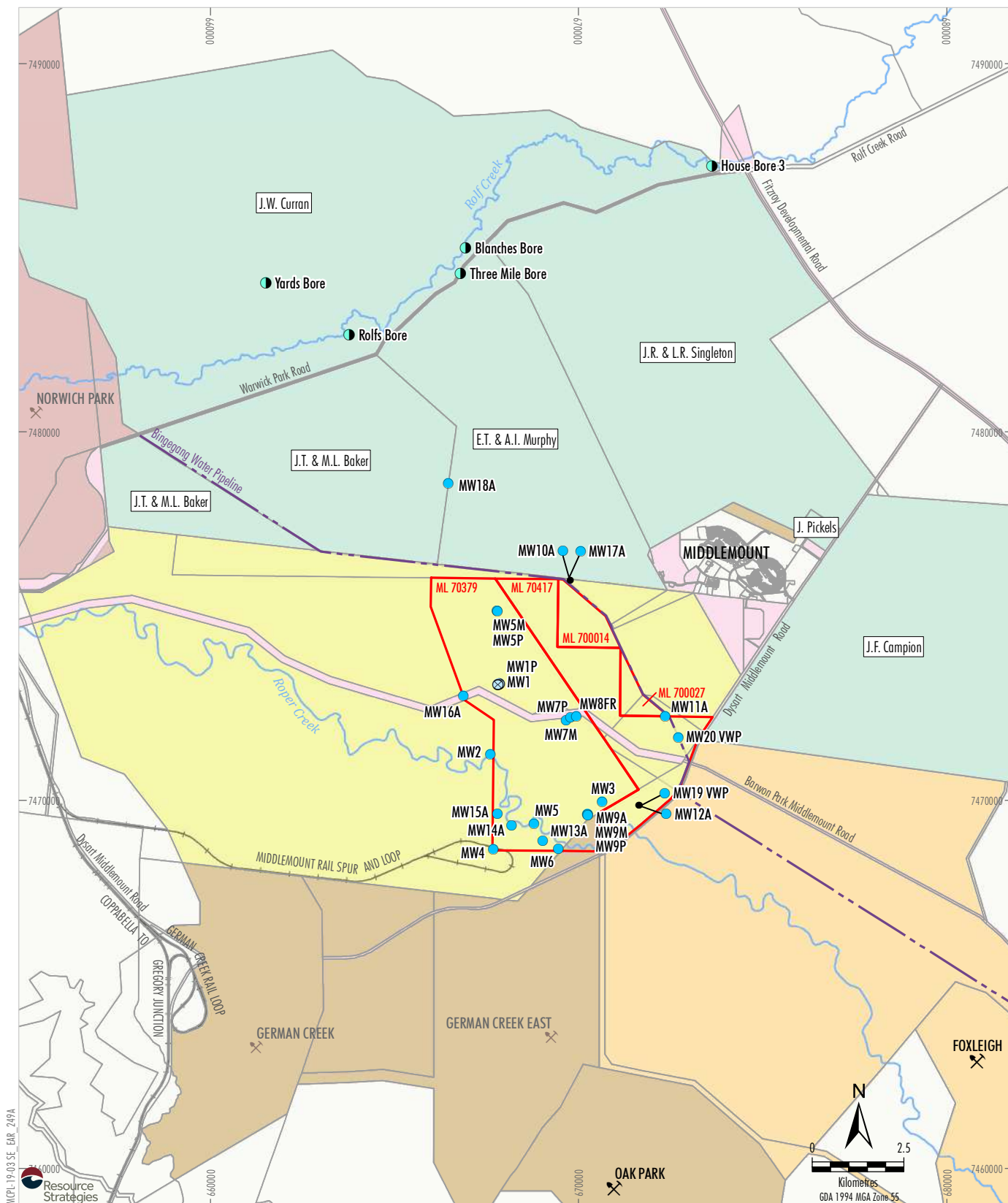
A contemporary numerical groundwater model was developed for the Middlemount Coal Mine as part of the Middlemount Western Extension Project (AGE, 2018). This 2018 groundwater model prepared for the Western Extension Project has been utilised as the basis for the Groundwater Assessment (Appendix B).

The 2018 groundwater model used for the Project was previously peer reviewed by Dr Noel Merrick of HydroAlgorithmics Pty Ltd as part of the Western Extension Project. The peer review letter is included in Attachment 2.

Dr Noel Merrick concluded the Groundwater Assessment addressed the objectives satisfactorily, the model underpinning the groundwater assessment is "fit for purpose", and the proposed mitigation and monitoring measures are satisfactory (Attachment 2).

The model has been designed to account for the current and proposed mine plan and potential for cumulative impact from nearby operational mines such as German Creek East, Foxleigh, Foxleigh Plains and Norwich Park. Coal Seam Gas (CSG) production as part of the Bowen Gas Project (Arrow Energy Pty Ltd [Arrow Energy], 2012) within the Rangal Coal Measures approximately 7 km to the north of the Project is also incorporated into the groundwater model.

The model represents the key geological units within the model domain as 17 layers, and extends approximately 30 km from northwest to southeast, and 21 km from northeast to southwest, and was divided into variable sized cells comprising up to 19,412 cells per layer.



Source: MCPL (2020); AGE (2018); The State of Queensland (2020)

- 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 Ltd; BHP Queensland Coal Investments Pty Ltd; Umal Consolidated Pty Ltd; QCT Resources Pty Limited
 - Foxleigh Land Pty Ltd
 - Crown Land
 - Relevant Private Landholder
 - Owner not Referenced

- Private Landholder Bores**
- Bore Identified During Bore Census
 - Middlemount Coal Groundwater Monitoring Bores
 - Existing Bore
 - ⊗ Bore Abandoned/Destroyed



SOUTHERN EXTENSION PROJECT
Groundwater Bores

Figure 3-4

The model also incorporates the Jellinbah Fault, a thrust fault in the Project area that dips towards the east and truncates the Middlemount, Tralee and Pisces coal seams near the north-eastern limit of the approved open cut (Figure 3-2). More detail on the Jellinbah Fault and how it is considered in the groundwater model is provided in AGE (2020a).

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 (Appendix B).

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.

Groundwater Inflow Predictions

The average predicted pit inflow rate for the Middlemount Coal Mine (incorporating the Project) is approximately 1.8 ML/day, and ranges between approximately 0.7 ML/day and 3.5 ML/day (244 ML/annum and 1,269 ML/annum) (Appendix B).

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

Groundwater Levels (Predicted Drawdown/Depressurisation)

The predicted drawdown extents due to the Project in the shallow Tertiary and Weathered Permian layers in the groundwater model is shown on Figure 3-5. 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 (Appendix B).

The zone of depressurisation within the deeper Rangal Coal Measures and Fort Cooper Coal Measures from the Project is predicted to extend beyond the ML boundaries to a maximum of up to 1.7 km to the north-west and south-east of the Project (Appendix B). The extent of drawdown within the Rangal Coal Measures (Middlemount and Pisces Seams) is constrained by the limited lateral extents of the coal measures.

Drawdown contours for each of the groundwater model layers are presented in the Groundwater Assessment (Appendix B).

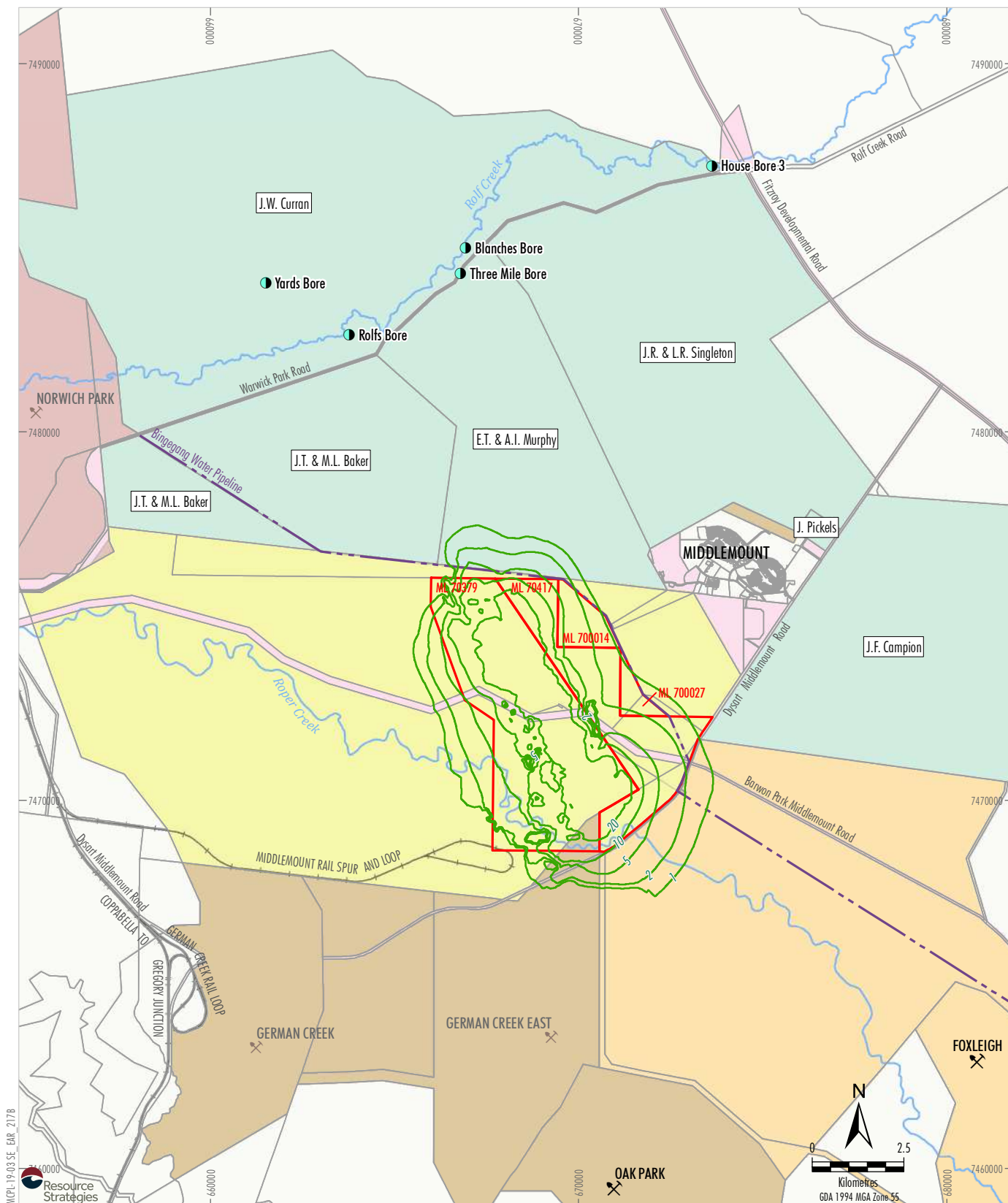
Overall, the predicted drawdown extents due to the Project are similar to those previously predicted for the Western Extension Project (see AGE [2018]).

Groundwater Quality

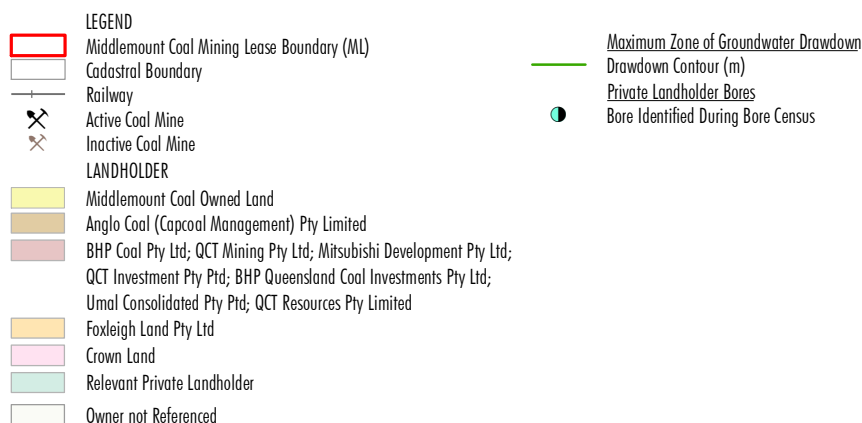
Although the majority of overburden could be managed as non-acid forming material, there is a risk that some of the coal rejects may have a capacity to generate acid over time if not appropriately managed or co-disposed with overburden during mining operations (RGS Environmental, 2016). Therefore, coal 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 (Appendix B).

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 (Appendix B).



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



SOUTHERN EXTENSION PROJECT
Maximum Zone of Groundwater Drawdown
(Tertiary and Weathered Permian)

Figure 3-5

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 (Appendix B).

Groundwater Users

No landholder water supply bores are located within the predicted drawdown/depressurisation extents attributable to the proposed mine plan for the Project (Appendix B) (Figures 3-4 and 3-5).

Groundwater Dependent Ecosystems

The Project is not predicted to impact any aquatic or terrestrial GDEs since GDEs are assessed as being unlikely to occur within and surrounding the Project area on the basis that:

- the majority of the terrestrial vegetation associated with Roper Creek also occurs more widely across the landscape and is not restricted to areas where it could potentially access groundwater;
- Roper Creek is ephemeral and the depth to groundwater in this area is typically around 20 mbgl;
- the depth to groundwater within the palustrine wetlands north of ML 70417 and ML 70379 is in excess of 12 m depth; and
- there is no evidence of vegetation dieback resulting from existing operations at the Middlemount Coal Mine.

Stygofauna

The presence of stygofauna in groundwater within the Project area was assessed from a desktop review of optimal conditions for stygofauna habitat and results of sampling. 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 $\mu\text{S}/\text{cm}$, and the average depth to groundwater in the Permian aquifer is greater than 30 mbgl (Appendix B).

Stygofauna sampling in 2011 (4T, 2012) found a naturally low diversity of stygofauna (taxa from two Families). Stygofauna from the same two Families were found in bores that were located both in and outside the maximum zone of drawdown associated with the approved mine and Project (e.g. some 5 to 7 km north-west and south-east).

However, a subsequent wet and dry season sampling program undertaken for the Project in selected monitoring bores in late 2019 and early 2020 found no stygofauna in any of the sampled bores (DPM, 2020).

The Project is not predicted to significantly impact stygofauna considering the Project 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 (Appendix B).

Post-Mining Recovery

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 residual voids are predicted to reach pit lake equilibrium levels of approximately between 6.5 m AHD and 13 m AHD in the North Void and 32 m AHD and 37 m AHD in the South Void (Section 3.2.3).

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).

Cumulative Impacts

The numerical groundwater model was used to assess the cumulative impact between the Project 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 (Appendix B). There are no private groundwater bores located in these areas of overlapping depressurisation/drawdown.

3.3.3 Management Practices and Mitigation Strategies

Groundwater Monitoring Network

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 3-4.

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

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

- Tertiary/Weathered Permian strata west of the Project 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 Project 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 DES (2018b).

Groundwater level monitoring would continue to be undertaken at an appropriate frequency (e.g. quarterly or as defined in the EA conditions), 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 3-1 presents groundwater trigger level thresholds as defined in Table C10 of the EA for the existing monitoring bores, outside of normal seasonal fluctuations. These are provided either as a change in water level per year, or as a total change in the groundwater elevation (m AHD) as determined from the total predicted drawdown from the pre-mining baseline groundwater level in bores MW3, MW5 and MW9A.

AGE's (2020) review of the maximum drawdown levels for the monitoring bores listed in the EA concluded:

- The trigger level thresholds for bores MW6 and MW9A would need to be revised to reflect the predicted change in groundwater elevation (m AHD) at these locations.
- Bore MW5 should be removed from the EA as this bore has become dry. This is in line with the groundwater model predictions for the Pisces coal seam becoming dry in this part of the mine between 2020 and 2025. Since MW5 is located at the western extents of the Pisces coal seam sub-crop, consideration for a replacement bore should be to the south where the Pisces coal seam is likely to be saturated.

In addition to the above, and as recommended in the Western Extension Project Groundwater Assessment (AGE, 2018), bore MW4 should be removed from the EA as this bore should not be subject to groundwater level change restrictions as it is not screened in the Tertiary unit.

AGE's recommended amendments to Table C10 of the EA are described in Table 3-1.

Table 3-1
Proposed Groundwater Level Investigation Trigger Threshold Amendments

Monitoring Location	Trigger Level Threshold*	Predicted Maximum Drawdown (m)*	Proposed Amendment to Trigger Level Threshold
MW2	> 2 m per year	4.17	No change
MW3^	Total groundwater level of < 115.39 m AHD	11.9	No change
MW4	> 2 m per year	0.0	No change to trigger or remove from EA
MW5	Total groundwater level of < 116.9 m AHD	15.1	Bore is currently dry in line with model predictions - remove from EA
MW6	> 2 m per year	11.6	Total groundwater level of < 122.15 m AHD
MW9A^	Total groundwater level of < 118.17 m AHD	13.6	Total groundwater level of < 113.17 m AHD
MW10A	> 2 m per year	0.0	No change
MW11A	> 2 m per year	0.0	No change
MW12A	> 2 m per year	7.7	No change
MW13A	> 2 m per year	0.0	No change
MW16A	Total groundwater level of < 129.2 m AHD	3.0	No change
MW17A	Total groundwater level of < 135.6 m AHD	2.1	No change
MW18A	> 2 m per year	0.1	No change
MW19 VWP-VW3	Total groundwater level of < 130.8 m AHD	10.2	No change
MW19 VWP-VW2	> 2 m per year	5.8	No change
MW19 VWP-VW1	> 2 m per year	5.8	No change
MW20 VWP-VW2	> 3 m per year	0.4	No change

* 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 was installed as a replacement well for MW3.

Groundwater Quality

Groundwater quality sampling of the existing monitoring bores would continue in accordance with Condition C33 of the EA in order to provide long-term groundwater quality dataset, and to detect any changes in groundwater quality during and post mining.

Groundwater Triggers – Quality

Table 3-2 presents the groundwater quality investigation trigger levels as defined in Table C8 of the EA.

Previously, and as described in the Western Extension Project Groundwater Assessment (AGE, 2018), review of the EA triggers by AGE identified several inappropriate or unsuitable conditions in the EA in relation to the groundwater triggers, and recommended changes that would ensure a greater level of compliance, while maintaining the protection of environmental values.

More recently, AGE (2020b) provided the following recommendations based on their review of the 2019/2020 monitoring results:

- increasing the trigger value for selenium to 0.05 mg/L, which is equivalent to the limit of reporting for samples that require a five-fold dilution due to high salinity;
- amending the EC and TDS to “median-type” and pH to maximum and minimum of the median values; and
- revisiting the triggers for EC, bicarbonate, and sodium after two full years of data becomes available from the expanded water quality monitoring regime.

AGE’s recommended amendments to Table C8 of the EA are described in Table 3-2.

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.

Annual Reporting

Annual monitoring reports would continue to be prepared for the Project 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.

Water License

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

Table 3-2
Proposed Groundwater Quality Investigation Trigger Level Amendments

Parameter	Unit	Trigger value	Limit type	Proposed Amendment to Trigger/Limit Type
pH	pH units	6.5-8.5	Minimum/Maximum	Minimum of median/ Maximum of median
Electrical Conductivity	µS/cm	35,000	Maximum	Change to median limit type
Total Dissolved Solids	mg/L	23,550	Maximum	Change to median limit type
Calcium	mg/L	1,000	Median	No change
Magnesium	mg/L	2,000	Median	No change
Sodium	mg/L	6,700	Median	No change
Potassium	mg/L	43	Median	No change
Chloride	mg/L	12,700	Median	No change
Sulfate (SO ₄)	mg/L	2,000	Median	No change
Carbonate (CO ₃)	mg/L	7.7	Median	No change
Bicarbonate (HCO ₃)	mg/L	800	Median	No change
Iron	mg/L	14	Maximum	Change to median limit type
Mercury	mg/L	0.002	Maximum	Change to median limit type
Selenium	mg/L	0.034	Maximum	Change trigger value to 0.05 Change to median limit type
Total Petroleum Hydrocarbons (C10-C14)	µg/L	50	Maximum	Change to median limit type
Total Petroleum Hydrocarbons (C15-C28)	µg/L	185	Maximum	Change to median limit type
Total Petroleum Hydrocarbons (C29-C36)	µg/L	90	Maximum	Change to median limit type

3.4 BIODIVERSITY

Terrestrial Ecology and Aquatic Ecology Assessments have been prepared for the Project by Biodiversity Australia (2020) and DPM (2020), and are presented in Appendices C and D, respectively. This section summarises the findings of Biodiversity Australia (2020) and DPM (2020).

Background information relevant to biodiversity is provided in Section 3.4.1. Section 3.4.2 describes the potential impacts of the Project on biodiversity, while Section 3.4.3 outlines relevant management practices and mitigation strategies. An overview of the offset strategy is provided in Section 4.5.

3.4.1 Environmental Values

Regional and Local Setting

The Project 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.

The nearest protected area is Junee National Park which is located approximately 30 km to the east of the Project area. Bundoora State Forest is located approximately 25 km to the south-west of the Project area.

Locally, the Project is situated predominantly in the Roper Creek catchment within the Fitzroy Basin (Section 3.2.1). Clearing for cattle grazing in the region has been extensive, and, as such, the Project 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 Project area (Appendix C).

Terrestrial Ecology Surveys

The terrestrial flora and fauna in the Project area and surrounds has been subject to multiple studies since 2009. The first surveys were undertaken by Parsons Brinkerhoff (2010b) 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 offset areas undertaken by Ecology and Heritage Partners (2012) in July and August 2012, and across the Middlemount Coal Mine area and adjacent offset areas by Naturecall Environmental (Naturecall) (2014a; 2015a).

More recently, Biodiversity Australia (2018a) undertook flora and fauna surveys in the Western Extension Project area and surrounds.

Naturecall (2013, 2014b, 2015b, 2016, 2017) and Biodiversity Australia (2018b; 2019) have also conducted annual monitoring in the existing MCPL offset areas to the west of the Middlemount Coal Mine, which provides additional information on the likely occurrence of flora and fauna in the Project area.

In 2020, Biodiversity Australia (2020) conducted additional flora and fauna surveys of the Project area and surrounds.

The flora surveys were conducted in accordance with the Qld Herbarium vegetation survey methods described in Neldner *et al.* (2020). Survey techniques included a combination of secondary and quaternary surveys, ground-truthing of regional ecosystems (RE's), identification of threatened ecological communities under the EPBC Act, targeted searches for conservation significant species listed under the 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, 2020b).

The fauna surveys were conducted in consideration of the relevant Qld and Commonwealth survey guidelines (Eyre *et al.*, 2018; Department of Sustainability, Environment, Water, Populations and Communities [DSEWPac], 2011a, 2011b, 2011c; Department of the Environment, Water, Heritage and the Arts [DEWHA], 2010a, 2010b; Department of the Environment [DotE], 2014).

Survey methods included spotlighting, microbat call recording and analysis, herpetofauna surveys, diurnal bird surveys, passive infrared camera stations, koala surveys and scat, track and secondary evidence searches (Appendix C).

Targeted searches for threatened fauna species listed under the NC Act and EPBC Act were also conducted (Appendix C).

The results of the Project Terrestrial Ecology Assessment are described in Section 3.4.2.

Aquatic Ecology Surveys

Previously, FRC Environmental (FRC) (2010) undertook an Aquatic Ecology Assessment for the Stage 2 Project EIS (MCPL, 2011). Aquatic habitat, flora and fauna was assessed over the early wet season of 2009 and the late wet season of 2010 at sites both upstream and downstream of the Project area.

Annual monitoring of the watercourses and drainage features relevant to the Project area, including Roper Creek, commenced in 2010 as part of MCPL's REMP (DPM, 2019) and included:

- water quality measurements;
- physical habitat assessment; and
- macroinvertebrate sampling.

In addition, DPM (2020) conducted an assessment of aquatic habitat, and aquatic flora and fauna surveys, for the Project area and surrounds (Appendix D).

Aquatic ecology surveys were undertaken in accordance with the Australian River Assessment System (AusRivAS) protocols for Queensland streams. The surveys were undertaken in the dry season (October 2019) and in the wet season (February 2020) (Appendix D).

The results of the Project Aquatic Ecology Assessment (Appendix D) are described in Section 3.4.2.

Regional Ecosystems

Due to past and ongoing agricultural activities (e.g. clearing, grazing, logging, thinning), the Project area predominantly comprises non-remnant vegetation (Plate 3-1) and cleared land (approximately 165 ha) with patches of remnant vegetation (approximately 68 ha) (Figure 3-6) (Appendix C).

A total of eight individual RE's were ground-truthed within the Project area (Table 3-3; Figure 3-6), represented by Eucalypt woodlands (mostly Poplar Box woodlands) and small occurrences of Acacia dominated woodlands (Appendix C). Examples of each RE identified within the Project area are shown on Plates 3-2 to 3-9.



Plate 3-1 – Example of Regrowth Vegetation within the Project Area



Plate 3-2 – Example of RE 11.3.1 within the Project Area



Plate 3-3 – Example of RE 11.3.2 within the Project Area



Plate 3-4 – Example of RE 11.3.2b within the Project Area



Plate 3-7 – Example of RE 11.5.3 within the Project Area



Plate 3-5 – Example of RE 11.3.25 within the Project Area



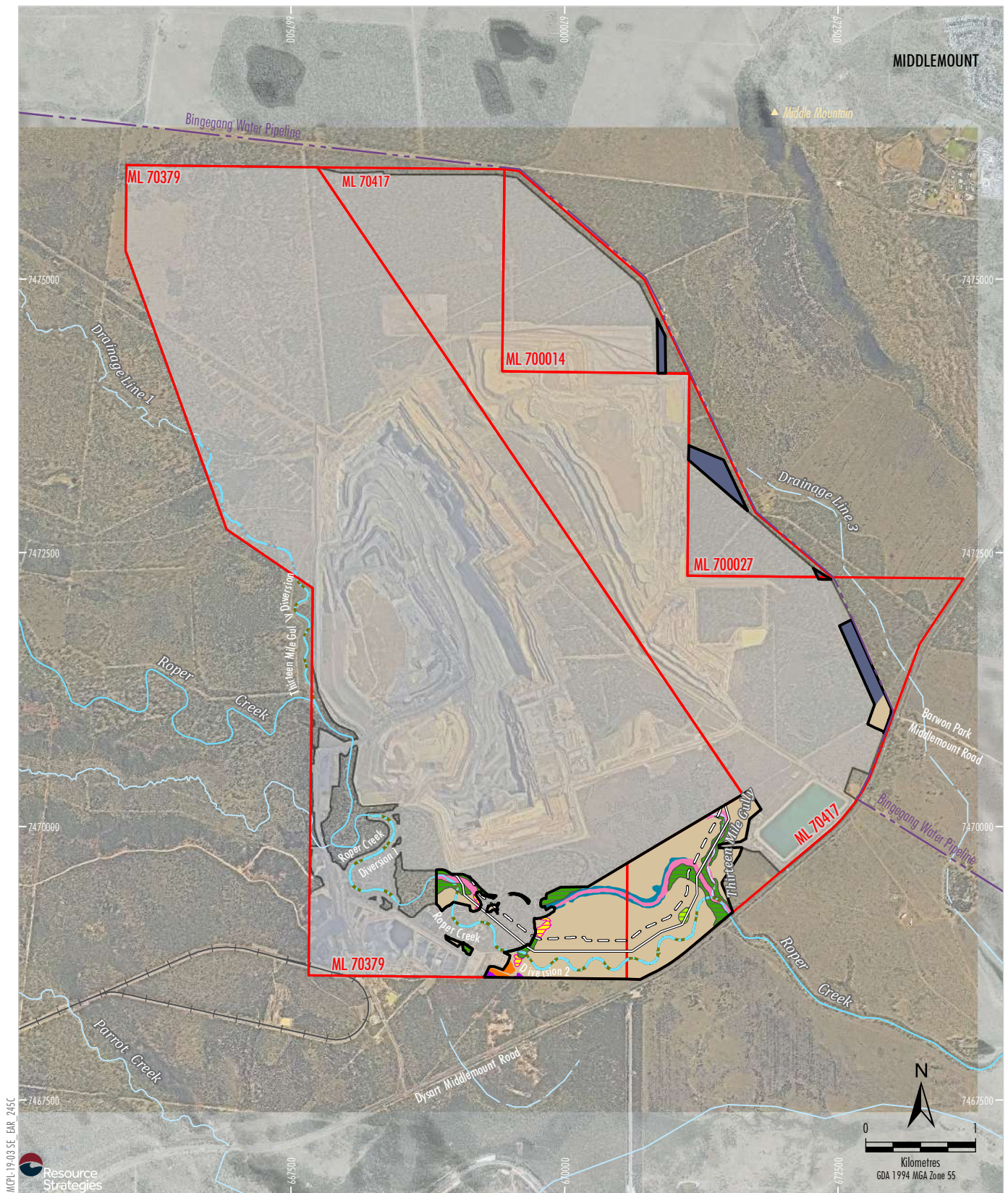
Plate 3-8 – Example of RE 11.7.2 within the Project Area



Plate 3-6 – Example of RE 11.3.7 within the Project Area



Plate 3-9 – Example of RE 11.7.4 within the Project Area



Source: MCPL (2020); Biodiversity Australia (2020);
The State of Queensland (2020)
Orthophoto: MCPL (Sept 2019)



SOUTHERN EXTENSION PROJECT

Ground-truthed Regional Ecosystems

Figure 3-6

Table 3-3
Regional Ecosystems

Regional Ecosystem	Short Description	BVG	VM Act Status
RE 11.3.1*	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on alluvial plains	25a	Endangered
RE 11.3.2	<i>Eucalyptus populnea</i> woodland on alluvial plains	17a	Of Concern
RE 11.3.2b	<i>Eucalyptus camaldulensis</i> (sometimes <i>E. populnea</i> and or <i>E. tereticornis</i>) woodland in drainage depressions.	17a	Of Concern
RE 11.3.25	<i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines.	16a	Least Concern
RE 11.3.7	<i>Corymbia</i> spp. woodland on alluvial plains.	9e	Least Concern
RE 11.5.3	<i>Eucalyptus populnea</i> ± <i>E. melanophloia</i> ± <i>Corymbia clarksoniana</i> woodland on Cainozoic sand plains and/or remnant surfaces.	17a	Least Concern
RE 11.7.2	<i>Acacia</i> spp. woodland on Cainozoic lateritic duricrust. Scarp retreat zone.	24a	Least Concern
RE 11.7.4	<i>Eucalyptus decorticans</i> and/or <i>Eucalyptus</i> spp., <i>Corymbia</i> spp., <i>Acacia</i> spp., <i>Lysicarpus angustifolius</i> woodland on Cainozoic lateritic duricrust	12a	Least Concern

Source: Appendix C.

* Listed as *Brigalow* (*Acacia harpophylla* Dominant and Co-dominant) Threatened Ecological Community under the EPBC Act.

BVG = Broad Vegetation Group

The most predominant remnant RE in the Project area is RE 11.5.3 (Poplar Box and Bloodwood Woodland) (Appendix C).

A detailed description of each vegetation community is provided in Appendix C.

Endangered and Of Concern Regional Ecosystems

Of the eight RE's within the Project area, one has a conservation status of 'Endangered' and two have a conservation status of 'Of Concern' under the VM Act (Table 3-3) (Appendix C).

Groundwater Dependent Ecosystems

Desktop Groundwater Dependent Ecosystem (GDE) mapping over the Project area (Bureau of Meteorology [BoM], 2020) indicates (Appendix C):

- Terrestrial vegetation associated with part of Roper Creek 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 Project area is mapped as a potential GDE (Appendix C).

The accuracy of the desktop GDE mapping (BoM, 2020) of the Project locality has been reviewed by AGE (2020a) and Biodiversity Australia (2020), 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 this 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 located along Roper Creek contains Qld 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.
- 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 Project has experienced any impacts (i.e. dieback) from the existing operations to the north and west of the Project area.

Terrestrial Fauna Habitat

Native fauna habitats within the Project area were categorised and mapped into six broad habitat types by Biodiversity Australia (2020). The native fauna habitat types present in the Project area are:

- Eucalypt woodland/forest;
- Riparian Eucalypt woodland;
- *Acacia harpophylla* woodland/forest;
- *Acacia shirleyi* forest;
- Regrowth vegetation; and
- Cleared grassland.

A detailed description of each fauna habitat type is provided in Appendix C, along with a description of habitat values and photos.

Aquatic Ecology

No aquatic flora or fauna species listed under the EPBC Act and/or NC Act were recorded during the aquatic ecology surveys (Appendix D).

The section of Roper Creek within the Project area was rated as having moderate aquatic ecology values based on four survey sites, while the section of the old Thirteen Mile Gully within the Project area was rated as having low aquatic ecology values based on one survey site (Appendix D).

Further, due to highly variable stream flows, and pooled water which is unlikely to remain longer than a few months without follow-up rainfall and runoff, the physical attributes, water quality, and the composition of aquatic flora and fauna communities are highly variable over time (Appendix D).

In addition to the above, the results of the annual monitoring undertaken as part of the REMP (DPM, 2019) indicate that operations at the Middlemount Coal Mine are not impacting on the aquatic macroinvertebrate community within Roper Creek (GHD, 2019).

Conservation Significant Species listed under the NC Act

A total of two conservation significant fauna species have been recorded within the Project area during the previous and more recent fauna surveys, namely (Appendix C):

- Greater Glider (*Petauroides volans*) – listed as ‘Vulnerable’ under the NC Act; and
- Koala (*Phascolarctos cinereus*) – listed as ‘Vulnerable’ under the NC Act.

The Greater Glider and Koala records are shown on Figure 3-7.

In addition to the above the Ornamental Snake (*Denisonia maculata*) and Squatter Pigeon (southern) (*Geophaps scripta scripta*), both listed as ‘Vulnerable’ under the NC Act, have been recorded in the approved surface disturbance area (Figure 3-7).

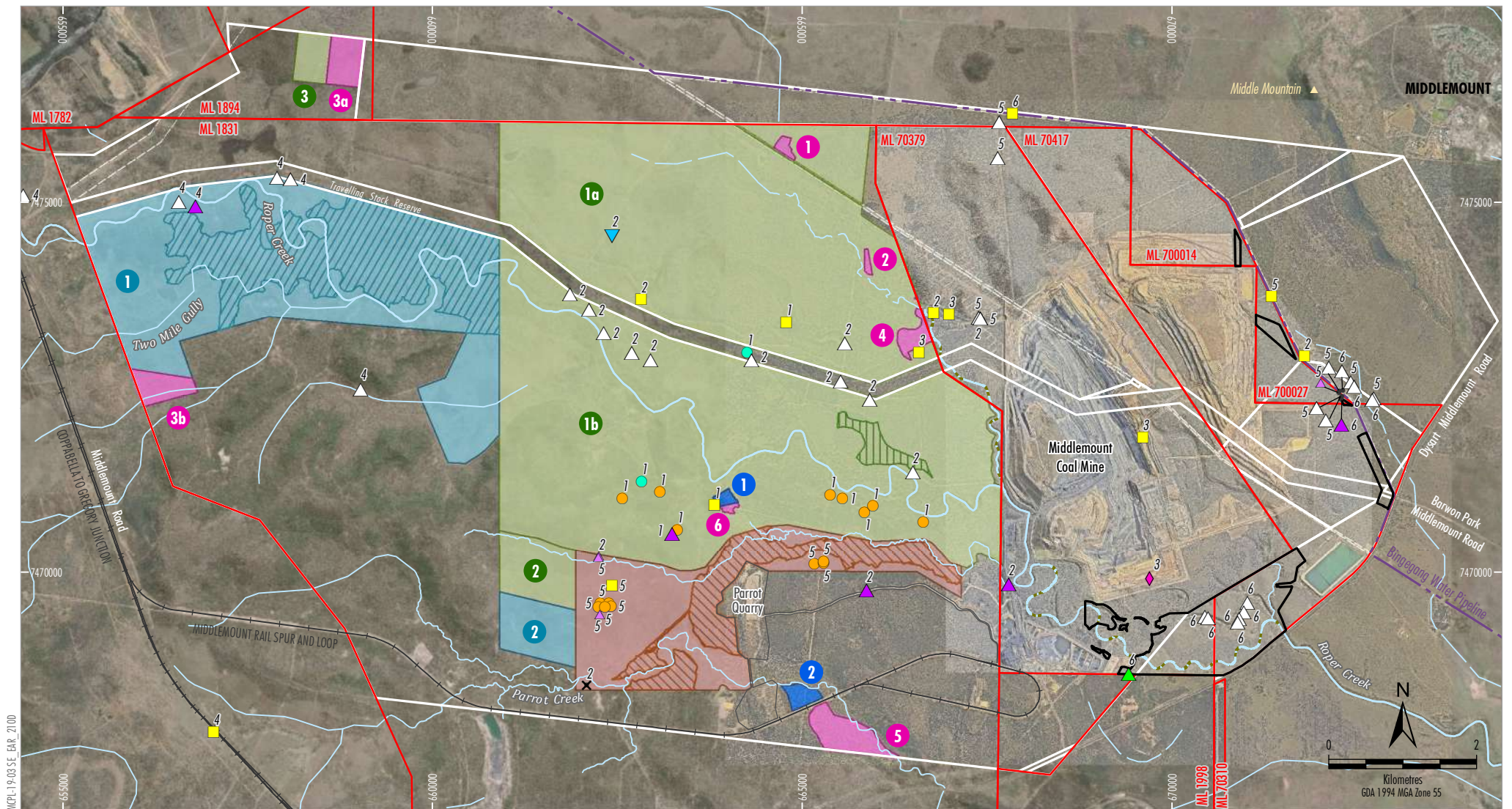
Although not recorded in the Middlemount Coal Mine area or surrounds, the White-throated Needletail (*Hirundapus caudacutus*), listed as ‘Vulnerable’ under the NC Act was considered as having a low potential of occurrence in the Project area (Appendix C).

The above species are Matters of State Environmental Significance (MSES) and are further discussed below.

No conservation significant flora species have been recorded within the Project area during any previous or more recent flora surveys (Appendix C).

Matters of State Environmental Significance

MSES prescribed under the *Environmental Offsets Regulation 2014* are listed in Table 3-4 along with an assessment of the relevance to the Project area. MSES, specifically regulated vegetation and connectivity areas, and protected wildlife habitat areas, are shown on Figures 3-8a and 3-8b, respectively.



LEGEND

- Mining Lease Boundary (ML)
- Middlemount Coal Owned Land
- Railway
- Approximate Extent of Additional Disturbance

Existing Offset Areas

- North-eastern Extension Commonwealth Offset Area (EPBC 2016/7717)
- North-eastern Extension State Offset Area
- Parrot Quarry Offset Area (Declared Area Map 2013/3919)
- Thirteen Mile Gully Diversion Offset Area (Declared Area Map 2013/3919)
- Middlemount Coal (Stage 2) Project Commonwealth Offset Area (EPBC 2010/5394)
- Rail Loop and Spur Offset Area
- Western Extension Commonwealth Offset Area (EPBC 2017/8130)
- Western Extension State Offset Area

Threatened Species Records

- Native Frangipani
- Large-podded Trefail
- Squatter Pigeon (southern)
- ◆ Ornamental Snake
- ▼ South-eastern Long-eared Bat
- ▲ Short-beaked Echidna
- ▲ Greater Glider
- ▲ Koala
- ▲ Koala Scrats
- × Koala Scratches

- 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)

Source: MCPL (2020); State of Queensland (2020)
 Orthophoto: MCPL (Sept 2019); Esri, DigitalGlobe (2019)



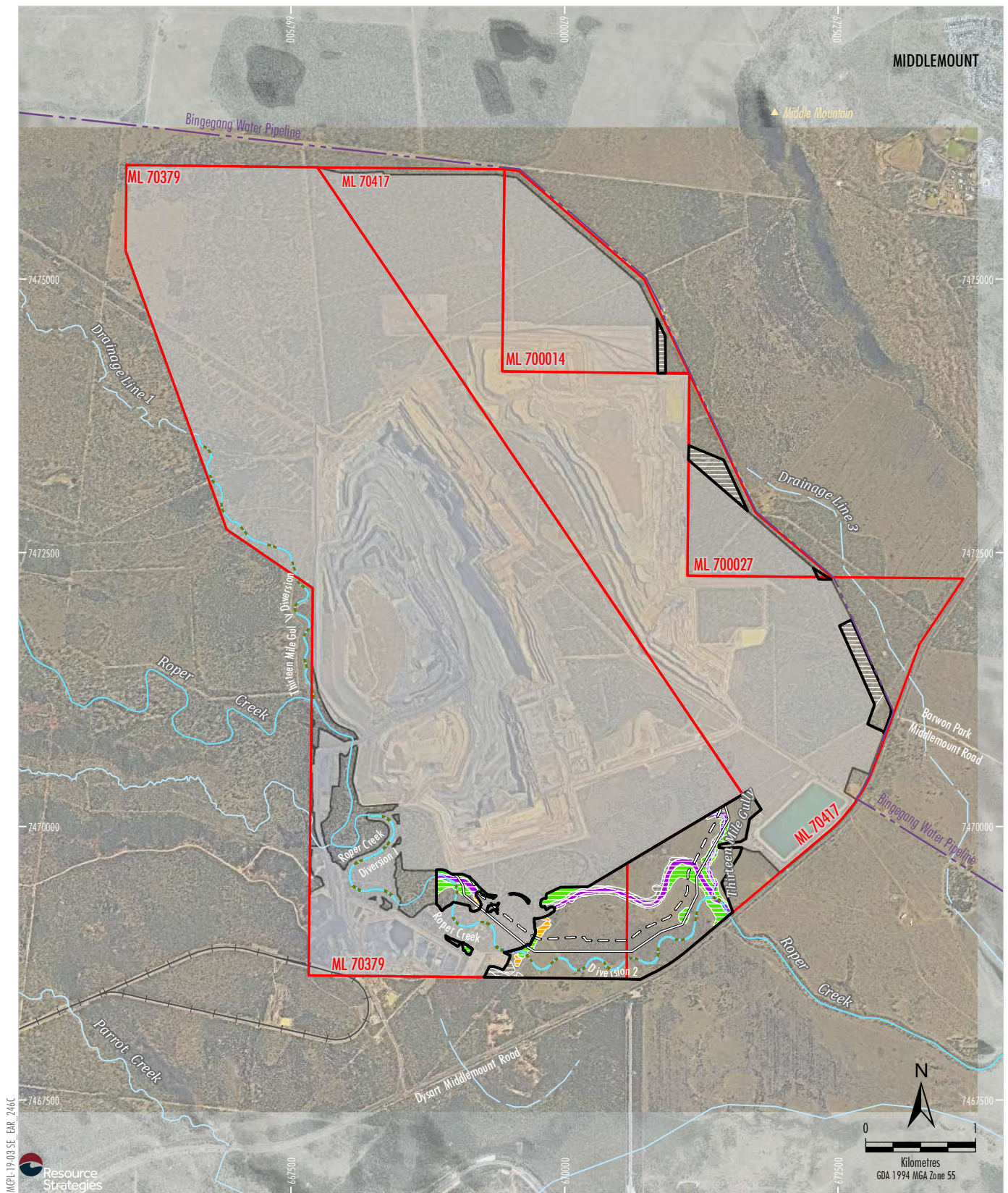
SOUTHERN EXTENSION PROJECT Threatened Species Records

Figure 3-7

Table 3-4
Relevance of Matters of State Environmental Significance to the Project

Matters of State Environmental Significance			Relevance to the Project area
Regulated Vegetation	'Endangered' or 'Of Concern' RE's	RE 11.3.1 'Endangered' ¹	Approximately 2.2 ha of RE 11.3.1 (remnant) occurs in the west of the Project area (Figure 3-8a)
		RE 11.3.2 'Of Concern'	Approximately 19.5 ha of RE 11.3.2 (remnant) occurs in the Project area (Figure 3-8a)
		RE 11.3.2b 'Of Concern'	Approximately 1 ha of RE 11.3.2b (remnant) occurs in a single patch within the Project area (Figure 3-8a)
	RE's within the defined distance of a vegetation management watercourse	RE's 11.3.2 and 11.3.25	Approximately 3.7 ha of RE 11.2.25/11.3.2 occur along Roper Creek.
Connectivity Areas			The <i>Landscape Fragmentation and Connectivity Tool</i> (DES, 2020d) was applied to the Project area and concluded that the Project exceeded the threshold for an impact on connectivity and fragmentation (Appendix C) (Figure 3-8a).
Wetlands and Watercourses			No wetlands or watercourses of high ecological value are mapped or were located within the Project area (Appendix C).
Designated Precinct in a Strategic Environmental Area			The Project area is not in a designated precinct in a strategic environmental area.
Protected Wildlife Habitat	Ornamental Snake ¹		A single Ornamental Snake was recorded by Parsons Brinkerhoff (2010b) approximately 400 m north of the Project area (Figure 3-8b). Potential habitat for the Ornamental Snake is shown on Figure 3-8b.
	Squatter Pigeon (southern) ¹		The Squatter Pigeon (southern) has been recorded at a number of locations outside the Project area (Figure 3-8b). Potential habitat for the Squatter Pigeon (southern) is shown on Figure 3-8b.
	Greater Glider ¹		The Greater Glider has been recorded at a number of locations within the Project area (Figure 3-8b). Potential habitat for the Greater Glider is shown on Figure 3-8b.
	Koala ¹		The Koala has been recorded at one location within the Project area (Figure 3-8b). Potential habitat for the Koala is shown on Figure 3-8b.
	Short-beaked Echidna		The Short-beaked Echidna has been recorded within the Project area (Appendix C).
Protected Areas			There are no protected areas in the Project area.
Highly Protected Zones of State Marine Parks			There are no State marine parks in the Project area.
Fish Habitat Areas			There are no areas of declared fish habitat in the Project area.
Waterways Providing for Fish Passage			There are no Waterways Providing for Fish Passage in the Project area.
Marine Plants			Marine plants do not occur in the Project area.
Legally Secured Offset Area			There are no legally secured offset areas located within the Project area.

¹ Indicates that this MSES is also identified as Matters of National Environmental Significance (MNES) listed under the EPBC Act.



- 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

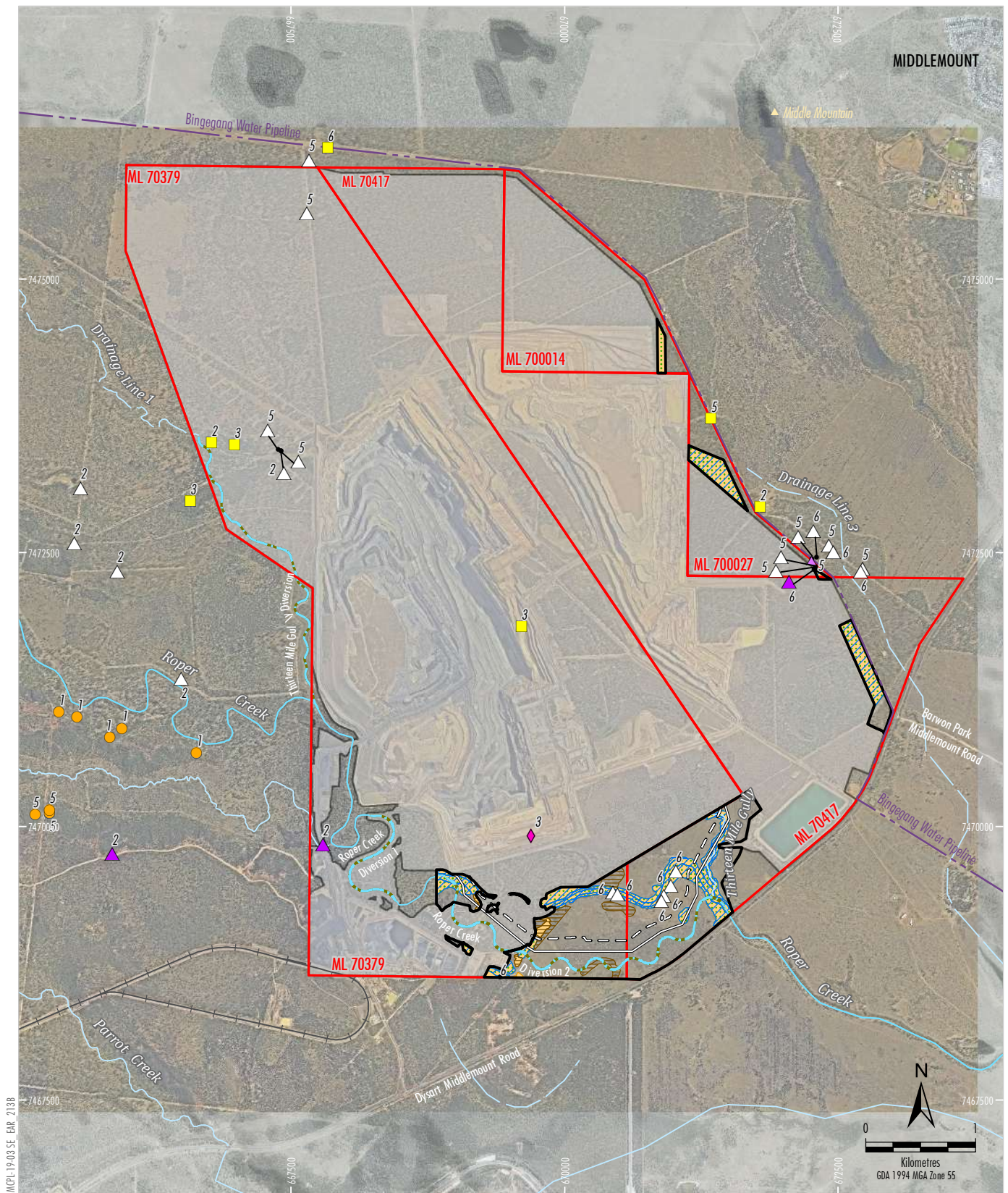
- Regulated Vegetation**
- Regional Ecosystem within 5 m of the Defining Banks of a Relevant Watercourse
 - Endangered Regional Ecosystem (RE 11.3.1)
 - Of Concern Regional Ecosystem (RE 11.3.2, 11.3.2b)
 - Connectivity Area

Source: MCPL (2020); Biodiversity Australia (2020); The State of Queensland (2020)
Orthophoto: MCPL (Sept 2019)



SOUTHERN EXTENSION PROJECT
Matters of State Environmental Significance
- Regulated Vegetation and Connectivity Areas

Figure 3-8a



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
- Protected Wildlife Habitat Areas
- Ornamental Snake Important Habitat
- Greater Glider Habitat
- Koala Habitat
- Squatter Pigeon (Southern) Potential Habitat

Threatened Species Records

- Native Frangipani
- Squatter Pigeon (southern)
- ◆ Ornamental Snake
- △ Greater Glider
- ▲ 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)

Source: MCPL (2020); Biodiversity Australia (2020);
The State of Queensland (2020)
Orthophoto: MCPL (Sept 2019)



SOUTHERN EXTENSION PROJECT
Matters of State Environmental Significance
Mine Site
- Protected Wildlife Habitat Areas

Figure 3-8b

Matters of National Environmental Significance

Two threatened species and two ecological communities listed under the EPBC Act have been recorded in the Project area (Appendix C) (Figures 3-7 and 3-8a):

- Koala;
- Greater Glider;
- Brigalow (*Acacia harpophylla* dominant and co-dominant) Endangered Ecological Community (Brigalow TEC); and
- Poplar Box Grassy Woodland on Alluvial Plains Endangered Ecological Community (Poplar Box TEC).

In addition to the above the Ornamental Snake (*Denisonia maculata*) and Squatter Pigeon (southern) (*Geophaps scripta scripta*), both listed as 'Vulnerable' under the EPBC Act, have been recorded in the approved surface disturbance area (Figure 3-7).

Environmentally Sensitive Areas

The Environmentally Sensitive Areas (ESA) mapping tool (DES, 2020c) does not identify any Category A or C ESAs within the Project area, however it shows a small patch of Category B ESA within the Project area.

Recent ground-truthing of the RE's within the Project area by Biodiversity Australia (2020) confirmed the presence of one 'Endangered' RE (classified as Category B ESA) in the Project area (i.e. RE 11.3.1) (Figure 3-8a) (Appendix C).

The two patches of RE 11.3.1 within the Project area have been confirmed to meet the criteria to be mapped as Brigalow TEC listed under the EPBC Act (Figure 3-6) (Appendix C).

3.4.2 Potential Impacts

The Terrestrial Ecology Assessment (Appendix C) and Aquatic Ecology Assessment (Appendix D) provide an assessment of the potential impacts on biodiversity associated with the Project. The Terrestrial Ecology Assessment was prepared in consideration of the DES *Guideline (EM961) Application Requirements for Activities with Impacts to Land* (DES, 2017). The Aquatic Ecology Assessment was prepared in consideration of the AusRivAS protocols for Queensland streams (DNRM, 2001).

Potential impacts on biodiversity were considered in terms of land clearance, aquatic ecology, GDEs, surface water impacts, weeds and pest animals, noise, dust and artificial lighting, vehicular traffic, interaction with the residual void, impacts to ESAs and MSES, and cumulative impacts, as described below.

Land Clearance

MCPL has minimised potential Project impacts associated with land clearance through the use of existing infrastructure and facilities (where possible) and minimising out-of-pit waste emplacements via backfilling of the open cut pit extent. Further detail regarding avoidance of land clearance is provided in Section 3.4.3. After consideration of avoidance and impact minimisation measures, the Project area would primarily consist of non-remnant vegetation and cleared land (approximately 165 ha), with patches of remnant vegetation (approximately 68 ha) (Table 3-5, Figure 3-6) (Appendix C).

All of the native vegetation communities/RE's to be cleared occur more widely in the surrounding landscapes and subregions (Appendix C). Of note, all remnant vegetation would be offset as part of the Project as described in Section 4.

Table 3-5
Clearance of Regional Ecosystems

Regional Ecosystem	Short Description	VM Act Status	Clearance [^] (ha)	
			Remnant	Non-remnant
RE 11.3.1*	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on alluvial plains	Endangered	2.2	52.8
RE 11.3.2	<i>Eucalyptus populnea</i> woodland on alluvial plains	Of Concern	19.5	29.3
RE 11.3.2b	<i>Eucalyptus camaldulensis</i> (sometimes <i>E. populnea</i> and or <i>E. tereticornis</i>) woodland in drainage depressions.	Of Concern	1.0	0
RE 11.3.25	<i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines.	Least Concern	14.1	0
RE 11.3.7	<i>Corymbia</i> spp. woodland on alluvial plains.	Least Concern	6.2	0
RE 11.5.3	<i>Eucalyptus populnea</i> ± <i>E. melanophloia</i> ± <i>Corymbia clarksoniana</i> woodland on Cainozoic sand plains and/or remnant surfaces.	Least Concern	22.7	10.2
RE 11.7.2	<i>Acacia</i> spp. woodland on Cainozoic lateritic duricrust. Scarp retreat zone.	Least Concern	0.8	1.0
RE 11.7.4	<i>Eucalyptus decorticans</i> and/or <i>Eucalyptus</i> spp., <i>Corymbia</i> spp., <i>Acacia</i> spp., <i>Lysicarpus angustifolius</i> woodland on Cainozoic lateritic duricrust	Least Concern	1.6	0
-	Cleared land	-	-	71.6
Total			68.1	164.9

Source: Appendix C

* Listed as *Brigalow* (*Acacia harpophylla* Dominant and Co-dominant) Threatened Ecological Community under the EPBC Act.

[^] Values have been rounded to the one decimal point.

Aquatic Habitat Removal

The Project would remove a small section of ephemeral drainage features (i.e. through the realignment and extension of Roper Creek Diversion 2, and removal of an old section of Thirteen Mile Gully) (Figure 3-3).

As described in Section 3.4.1, Roper Creek was rated as having moderate aquatic values based on four survey sites, while the Thirteen Mile Gully was rated as having low aquatic values based on one survey site (Appendix D).

In addition, the Project would not remove aquatic habitat that is expected to support aquatic species of conservation significance listed under the NC Act or EPBC Act (Appendix D).

Groundwater Dependent Ecosystems

The Project is not predicted to impact any aquatic or terrestrial GDEs since GDEs are assessed as being unlikely to occur within and surrounding the Project area as described in Section 3.4.1. Further, there is no evidence that any vegetation surrounding the Project area has experienced impacts (i.e. dieback) from the existing operations (Appendix C).

As detailed in Section 3.3.2, the potential for stygofauna habitat at Middlemount Coal Mine is unlikely given the average salinity in both the Tertiary and Permian groundwater aquifers is in excess of 20,000 µS/cm, and the average depth to groundwater in the Permian aquifer is greater than 30 mbgl.

Changes to Hydrology

Changes to surface water quality and quantity can have an indirect impact on ecosystems surrounding a development site. A decrease in the quality of surface water to habitats surrounding the Project could occur if runoff from disturbed areas, stockpiles and/or waste emplacements is uncontrolled or through accidental release of contaminants.

The Project would result in changes to the natural flow regimes of the local drainage features due to the capture and re-use of drainage from operational disturbance areas. The Project water management system would generally be based on the existing water management system with revisions undertaken progressively over the life of the Project (Appendix A).

As described in Section 3.2.3, no measurable impacts on surface water quality are likely to occur from the Project (Appendix A).

In addition, the diversion of Roper Creek Diversion 2 is expected to perform in a similar manner to the existing Roper Creek during for in channel flows (Appendix A).

Based on the implementation of management strategies and measures described in WRM (2020), it is unlikely that the Project would result in significant hydrological regime changes that would adversely impact native flora and/or fauna within, or downstream of the Project area.

MCPL would continue to conduct annual monitoring of the water quality, habitat characteristics and macroinvertebrate diversity of the receiving waters as described in the REMP (DPM, 2019).

Weeds and Animal Pests

Biodiversity Australia (2020) describes that weed invasion is common throughout the Project area, especially in disturbed areas. Prickly Pear (*Opuntia stricta*), Velvety Tree Pear (*Opuntia tomentosa*) and Harrisia Cactus (*Harrisia martinii*) which are identified as restricted matters under the Qld *Biosecurity Act 2014* were recorded in the Project area (Appendix C).

MCPL would aim to restrict or reduce existing infestations and avoid introducing new weeds to the Project area.

There is a low likelihood of weeds spreading into adjoining native woodland/forest vegetation as a result of the Project because MCPL currently implements weed control measures at the existing operations in accordance with the Environmental Management Plan (MCPL, 2018a) that would be continued for the Project (Appendix C).

A number of animal pests have been recorded in the Project area, such as the Feral Cat (*Felis catus*), European Rabbit (*Oryctolagus cuniculus*), Cane Toad (*Rhinella marina*), Wild Dog (*Canis lupis*) (Appendix C). Each of these are listed as restricted matters under the Qld *Biosecurity Act 2014*.

Feral pests that are already present in the Project area are likely to displace into adjoining areas during construction, however, the number of feral pests that would be displaced would be reduced by controlling feral pests. As outlined in Section 3.4.3, the control of feral pests is an existing measure that would be continued for the Project.

Noise, Dust and Artificial Lighting

The Project may result in an increase in noise, dust and artificial lighting on habitats within the Project and surrounding habitats.

The indirect noise impacts on the woodland habitat outside the Project area would likely be localised and minor given fauna often readily habituate to continuous noise and sudden noises from blasting would only occur in intervals (Appendix C). This has been evidenced during the current, and previous, survey work surrounding the existing operations through sightings of fauna using habitat adjacent to active mining areas (Biodiversity Australia, 2018).

While the potential dust impacts on flora and/or fauna in surrounding habitats associated with the Project may increase in comparison to the existing operations, it is expected that the Project would result in comparable potential dust impacts in comparison to the existing Middlemount Coal Mine operations (Katestone Environmental Pty Ltd [Katestone], 2020).

The Project would result in an increase (relative to the existing operations) in the use of artificial lighting within the Project locality. The incremental impact of this additional night-lighting is expected to be minor (Appendix C).

Given the potential incremental noise, dust and artificial lighting impacts associated with the Project are anticipated to be minor, there is not expected to be any significant impact on the native vegetation and fauna habitat within the existing offset areas located adjacent the Project.

Vehicle Strike

The Project would contain new haul roads. However, all roads in the Project area would be limited to 60 kilometres per hour (km/h) which would reduce the risk of any potential vehicle strike.

Interaction with the Residual Void

Owen Foley (2014) prepared a *Residual Void Flora and Fauna Capability Study* for the *Residual Void Study* (MCPL, 2014a). As per the approved residual voids, the residual voids would gradually begin to fill with water and increase in salinity over time (Appendix A).

Consistent with the approved final land use in the EA, the residual voids would not have a post-mining land use, and a safety bund wall consisting of competent rock and/or fencing and would be constructed to limit human and livestock/animal access to the residual voids (Section 4.2.2).

Environmentally Sensitive Areas

As described in Section 3.4.1, RE 11.3.1 is equivalent to a Category B ESAs (Figure 3-5). The clearance of this 'Endangered' RE would therefore be offset as part of the Project (Section 4). RE 11.3.1 has been confirmed to meet the criteria to be mapped as Brigalow TEC listed under the EPBC Act (Appendix C).

Matters of State Environmental Significance

Biodiversity Australia (2020) conducted an assessment of potential impacts to MSES, and determined that the Project has the potential to result in a significant impact on the Greater Glider, Koala, RE's 11.3.2, 11.3.2b and 11.3.25, and Brigalow TEC (Table 3-6). As such, potential impacts on these MSES would be mitigated and offset.

The Project is not considered to result in a significant residual impact on the Squatter Pigeon (southern), due to its highly mobile nature and the large extent of suitable habitat in the wider area that is readily accessible.

The impact of the Project on the Ornamental Snake is unlikely to be significant given the small area of potential habitat to be cleared relative to the wider extent of habitat (including habitat in the offset areas) (Appendix C).

The Project is unlikely to have an impact on White-throated Needletail given this species is almost exclusively aerial.

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 Project added to other existing impacts.

Table 3-6
Matters of State Environmental Significance – Significant Residual Impacts

Matters of State Environmental Significance			Area of Clearance (ha)	Residual Significant Impact Test ¹	Significant Residual Impact
Regulated Vegetation	'Endangered' or 'of concern' RE's; or	RE 11.3.1 'Endangered' ²	2.2	> 0.5 ha (where in a dense to mid-dense [structural category] RE)	Yes
		RE 11.3.2 'Of Concern'	19.5	> 0.5 ha (where in a dense to mid-dense [structural category] RE)	Yes
		RE 11.3.2b 'Of Concern'	1	> 0.5 ha (where in a dense to mid-dense [structural category] RE)	Yes
	RE's within the defined distance of a vegetation management watercourse	RE's 11.3.2 and 11.3.25	3.7	> 0.5 ha (where in a dense to mid-dense [structural category] RE)	Yes
Connectivity Areas			68	Refer to footnote 3	Yes
Protected Wildlife Habitat	Ornamental Snake ²		12.8	Project likely to result in any of the significant impact criteria outlined in DEHP (2014a)	No
	Squatter Pigeon (southern) ²		233		No
	Greater Glider ²		63.3		Yes
	Koala ²		63.3		Yes

¹ As outlined in DEHP (2014a).

² This MSES is also identified as MNES listed under the EPBC Act.

³ Application of the DES (2020d) *Landscape Fragmentation and Connectivity Tool* showed that the Project exceeded the threshold for an impact on connectivity and fragmentation (Appendix C).

Terrestrial Ecology

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

- Oak Park – located approximately 9 km south of the Project area;
- Foxleigh – located approximately 12 km south-east of the Project area;
- Grasstree – located approximately 15 km south-west of the Project area; and

At a site level, the proposed clearance associated with the Project would result in an increase in remnant vegetation clearance of approximately 10% when compared to the existing/approved Middlemount Coal Mine (Appendix 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 in accordance with the relevant State and Commonwealth legislation (Appendix C).

On a larger scale, the native vegetation communities/RE's to be cleared during the life of the Project all occur more widely in surrounding landscapes and subregions (after Accad *et al.*, 2017). The Project would result in the loss of approximately 0.015% of the remnant vegetation remaining within the Isaac Comet Dows Subregion (Accad *et al.*, 2017) (Appendix C).

The progressive rehabilitation of mining areas over the life of the Project would provide habitat in the medium to long term (Appendix C).

Given the above, Biodiversity Australia (2020) concluded that the additional clearance associated with the Project is considered to represent only a minor increase in cumulative vegetation loss. Accordingly, the Project is not anticipated to have a significant cumulative impact on terrestrial ecology (Appendix C).

Aquatic Ecology

DPM (2020) found that the Project is unlikely to result in a significant cumulative impact to the aquatic flora and fauna of the Mackenzie River system (downstream of Roper Creek), given the limited potential impacts associated with the Project (Appendix D).

3.4.3 Management Practices and Mitigation Strategies

Refinement of the Mine Design to Avoid Land Clearance

The following refinements to the mine design have resulted in minimising additional land disturbance:

- use of existing infrastructure and facilities at the Middlemount Coal Mine, where possible, to avoid the need for additional clearance works;
- optimising the backfilling of the open cut pit to minimise the overall mine footprint (i.e. reduce the size of the out-of-pit waste emplacement); and
- locating the proposed waste emplacements to be continuous with the existing/approved waste emplacements to minimise the total disturbance footprint.

Land Clearance Procedures

The following measures described in the Environmental Management Plan (MCPL, 2018a) would continue to be implemented to manage land clearing required for the Project:

- The clearing limit would be clearly marked (e.g. via pegging, temporary plastic mesh fencing or flagging tape) before clearing in order to prevent any inadvertent clearance beyond what is required and has been assessed.
- The area of clearing work is to be inspected for fauna by a fauna spotter immediately prior to commencement of any vegetation removal. Pre-clearing checks would include searches of habitat and bird nests.

- A fauna spotter is to remain on site to supervise clearing to retrieve any fauna detected during works and undertake appropriate action.

Management of Conservation Significant Species

The Project would potentially disturb animal breeding places and therefore MCPL would continue to implement the Species Management Program (MCPL, 2019e) under section 332 of the *Nature Conservation [Wildlife Management] Regulation 2006*, as required (Appendix C). Measures described in the Species Management Program (MCPL, 2019d) include vegetation clearance procedures and use of a fauna spotter catcher during clearing works, as described above.

Invasive Plant Prevention and Control

MCPL currently implements weed control measures at the existing operations in accordance with the Environmental Management Plan (MCPL, 2018a). These measures would be continued for the Project and include spot spraying of *Biosecurity Act 2014* listed weed species (Appendix C).

Invasive Animal Prevention and Control

MCPL currently implements feral animal control measures at the existing operations in accordance with the Environmental Management Plan (MCPL, 2018a). These measures would be continued for the Project and include wild dog and cat control (Appendix C).

Dust Management

Management of dust is detailed in Section 3.5 and Appendix E.

Erosion and Sediment Controls

Management of erosion and sediment is detailed in WRM (2020) and the Erosion and Sediment Control Plan (WRM, 2019b).

Bushfire Prevention and Management

MCPL would aim to maintain vegetation structure and composition, protect mine assets and safeguard human life through the implementation of bushfire management techniques, including (Appendix C):

- physical protection of assets through clean firebreaks;
- active fire suppression of unplanned and potentially destructive fires (to vegetation and built assets); and
- pro-active fuel and ecosystem management to sustain ecological fire regimes as much as possible.

Project Rehabilitation

Project rehabilitation is described in Section 4.

Biodiversity Offset Strategy

The biodiversity offset strategy is described in Section 4.5. With the impact avoidance, mitigation and offset measures proposed there not expected to be a significant residual impact on biodiversity from the Project (Appendices C and D).

3.5 AIR QUALITY AND GREENHOUSE GAS

An Air Quality and Greenhouse Gas Assessment for the Project was undertaken by Katestone Environmental Pty Ltd (Katestone) (2020) and is presented in Appendix E. This section summarises the findings of Katestone (2020).

The environmental values for air quality are provided in Section 3.5.1. Section 3.5.2 describes the potential air quality impacts of the Project, and Section 3.5.3 outlines the proposed management practices and mitigation strategies. Estimated greenhouse gas (GHG) contributions as a result of the Project are discussed in Section 3.5.4.

3.5.1 Environmental Values

The environmental values relevant to air quality at the Project area have been identified with consideration of the DES Guideline *Application requirements for activities with impacts to air* (ESR/2015/1840) (DES, 2019a).

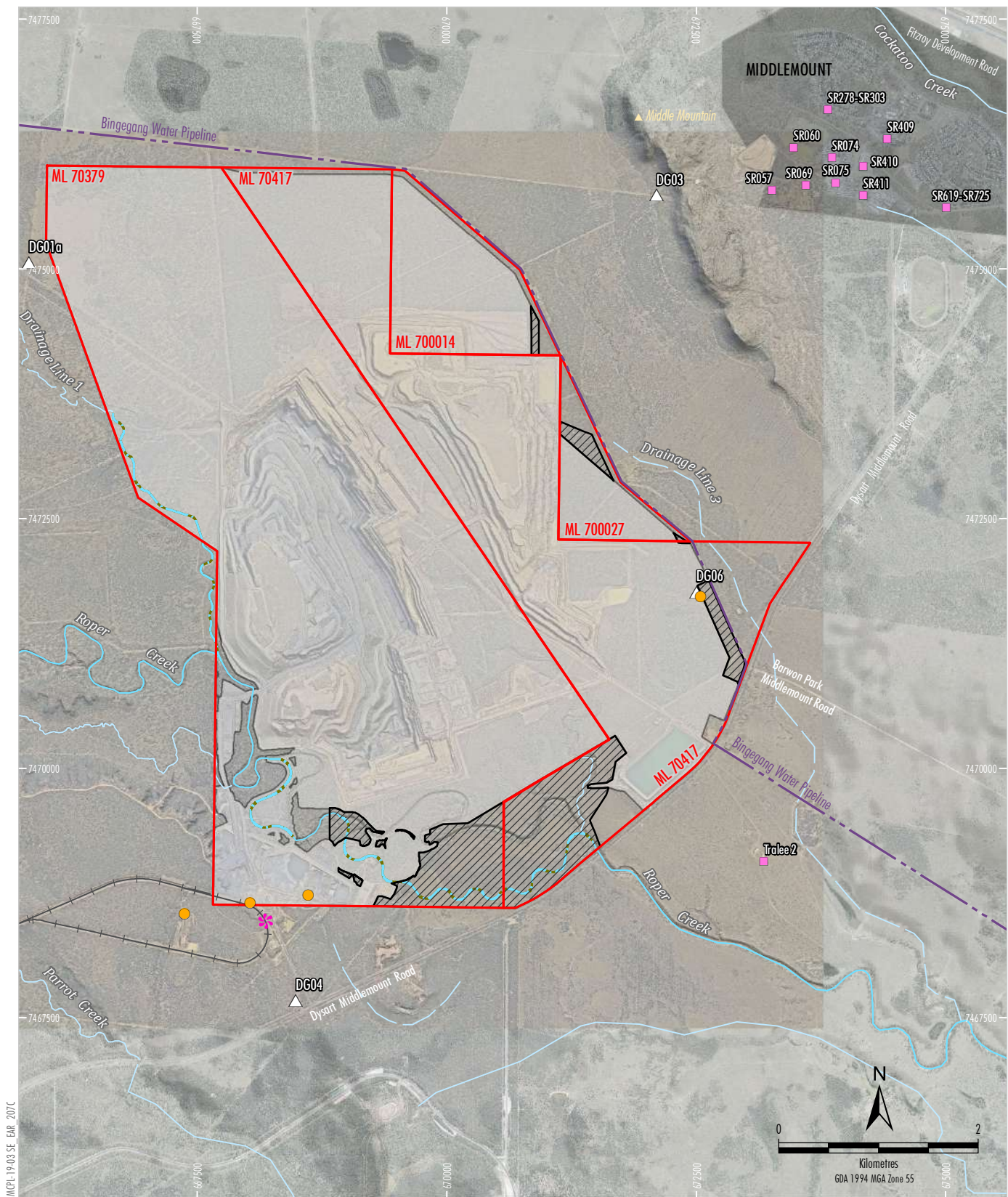
The Project area experiences a sub-humid to semi-arid climate, with annual average rainfall in the order of 600 millimetres (mm) per year and significantly higher evaporation levels, in the order of 2,000 to 2,400 mm per year (DPM, 2019).

Easterly to north-easterly winds prevail during spring and summer, with calmer winds from the south to south-east being dominant during winter and autumn (i.e. prevailing winds are away from Middlemount township).

A meteorological station has been established at the Middlemount Coal Mine in accordance with Condition B8 of the EA. The real-time meteorological station records wind speed, wind direction, temperature, rainfall and relative humidity continuously (Figure 3-9).

The nearest sensitive places to the Middlemount Coal Mine are within the Middlemount township, approximately 3 km to the east of the Project, with some scattered homesteads outside of the township (the closest being on mine-owned land [owned by Foxleigh Land Management Pty Ltd] approximately 1.25 km south-east of the Project) (Figure 3-1).

The *Environmental Protection (Air) Policy, 2019* (EPP [Air]) lists the environmental values and the air quality objectives to enhance or protect the environmental values. As described in the EPP (Air), environmental values for air have been developed to protect the health and biodiversity of ecosystems, human health and wellbeing, aesthetics and agricultural use.



MCPL 19-03 SE EBR 207C

- LEGEND**
- Mining Lease Boundary (ML)
 - Middlemount Rail Spur and Loop
 - Approved Disturbance Footprint
 - Diversion Structure
 - Approximate Extent of Additional Disturbance
 - Sensitive Receiver
 - Monitoring Sites
 - Dust Gauge
 - PM₁₀ Monitor
 - ✱ Meteorological Station

Receiver	Location
SR075	Accommodation Village 1
SR074	Accommodation Village 2
SR410	Accommodation Village 3
SR411	Accommodation Village 4
SR278-SR303	Alfred Quinn Drive Residences
SR619-SR725	Centenary Drive South Residences
SR069	Industrial Estate
SR409	Middlemount Community School
SR060	Norm Blache Oval
SR057	Treatment Plant

Source: MCPL (2020); The State of Queensland (2020)
Orthophoto: MCPL (Sept 2019, 2014)



SOUTHERN EXTENSION PROJECT
Air Quality and Noise Monitoring Locations

Figure 3-9

The EPP (Air) specifies objectives for air pollutants. Mining activities during the life of the Project have the potential to generate particulate matter (i.e. dust) emissions in the form of:

- total suspended particulate matter (TSP);
- particulate matter with an equivalent aerodynamic diameter of 10 micrometres (μm) or less (PM_{10}) (a subset of TSP); and
- particulate matter with an equivalent aerodynamic diameter of $2.5 \mu\text{m}$ ($\text{PM}_{2.5}$) (a subset of TSP and PM_{10}).

Portable, real-time PM_{10} air quality monitors and a network of dust deposition gauges (Figure 3-9) are available to monitor air quality impacts in accordance with the EA.

Table 3-7 summarises the air quality objectives in the EPP (Air) that are relevant to the Project.

Table 3-7
Ambient Air Quality Objectives

Pollutant	Environmental Value	Averaging Period	Objective ¹
PM_{10}	Health and wellbeing	24 hours	$50 \mu\text{g}/\text{m}^3$
		Annual	$25 \mu\text{g}/\text{m}^3$
$\text{PM}_{2.5}$	Health and wellbeing	24 hours	$25 \mu\text{g}/\text{m}^3$
		Annual	$8 \mu\text{g}/\text{m}^3$
TSP	Health and wellbeing	Annual	$90 \mu\text{g}/\text{m}^3$

¹ Each objective is for total impacts (i.e. including background levels) and applies to sensitive locations and does not apply to locations within the ML.

$\mu\text{g}/\text{m}^3$ = micrograms per cubic metre.

The air quality objectives typically relate to the total dust burden in the air and not just the dust generated from the Project. Background particulate matter levels therefore need to be considered when using these goals to assess potential cumulative impacts.

Although the EPP (Air) does not specify an objective for deposited matter, the DES has adopted an objective for deposited dust, relevant to coal dust, of 120 milligrams per square metre per day ($\text{mg}/\text{m}^2/\text{day}$) (DES, 2018b).

The Middlemount Coal Mine currently operates in accordance with the EA. Condition B3 of the EA includes the following criteria for air quality at sensitive or commercial places:

- 24 hour average PM_{10} concentration – $50 \mu\text{g}/\text{m}^3$ (with five allowable exceedances recorded each year); and
- dust deposition – $120 \text{mg}/\text{m}^2/\text{day}$, averaged over a month.

Monitoring at the Middlemount Coal Mine to date indicates general compliance with the EA and EPP (Air) conditions. One complaint has been received related to dust from a blast reaching a sensitive place. Complaints would continue to be managed in accordance with the existing Complaints and Incidents Management Plan (MCPL, 2014b).

3.5.2 Potential Impacts

The dust emissions inventory for the Project has been prepared using the same methodology as the Stage 2 Project EIS (MPCL, 2011), the *Middlemount Coal Mine - North-eastern Extension Project Air Quality Assessment* (Katestone, 2015) and the *Middlemount Coal Mine - Western Extension Project Air Quality and Greenhouse Gas Assessment* (Katestone, 2018).

Dust emissions have been calculated using emission factors published by the US Environmental Protection Agency (US EPA) in its *Compilation of Air Pollution Emission Factors Volume 1 (AP-42)* (US EPA, 1998; 2004; 2006a; 2006b) and by the DAWE in its *National Pollutant Inventory Handbooks* (NPI, 2012).

Dust inventories have been estimated for Year 2037 and 2043 of the Project. These scenarios were selected in consideration of material extraction and handling rates, proximity of mining activities to sensitive places and other parameters that affect the potential for dust generation (Appendix E).

The Year 2037 scenario conservatively adopts the Project maximum material extraction and handling rates (which would occur in Year 2036), with a layout that would involve mining activity located physically closer to sensitive places (i.e. the Year 2037 layout) (Appendix E).

The Year 2043 scenario represents a year when the entire mine fleet would be located within the Project's southern open cut pit extension, with the highest material extraction and handling rates during that period of the mine life (Appendix E).

The dust emission inventories determined based on the scenarios selected are generally consistent with dust emissions inventories assessed for the Stage 2 Project EIS (MPCL, 2011), North-eastern Extension Project (Katestone, 2015) and the Western Extension Project (Katestone, 2018).

Detailed breakdowns and comparisons of the dust emissions inventories (TSP, PM₁₀ and PM_{2.5}) for Years 2037 and 2043 of the Project and relevant scenarios from the Stage 2 Project EIS, North-eastern Extension Project and the Western Extension Project are provided in Appendix E.

The estimated dust emissions inventories for the Project detailed in Appendix E indicate dust emissions in the conservative Year 2037 scenario would be expected to be approximately 2% to 14% lower than those previously assessed and approved for the Stage 2 Project EIS, as the material (overburden) extraction rates would be lower for the Project than the relevant Stage 2 EIS scenario (Appendix E).

The estimated dust emissions inventory for the Year 2043 scenario indicates emissions would be expected to be significantly lower than the key scenarios assessed in the Stage 2 Project EIS, North-eastern Extension Project and the Western Extension Project (Appendix E).

Given the above, and noting the Project would not decrease the distance between mining activities at the Middlemount Coal Mine and the nearest sensitive place, air quality impacts at nearby sensitive places are not anticipated to be greater than the approved impacts described in the air quality assessments for the Western Extension Project, North-eastern Extension Project and Stage 2 Project (Appendix E).

3.5.3 Management Practices and Mitigation Strategies

Dust control measures would continue to be implemented at the Middlemount Coal Mine for the Project in accordance with the Plan of Operations (MCPL, 2019b), including:

- watering of haul roads;
- watering of stockpiles;
- dust collectors during drilling activities;
- watering of material transfer areas; and
- progressive rehabilitation of exposed areas following the completion of mining operations.

In the event of an air quality-related complaint, air quality monitoring would be conducted at the relevant sensitive place to validate the model predictions and inform the implementation of air quality mitigation measures, if required, where objectives are exceeded. In this instance, air quality mitigation measures would be investigated in consultation with the landholder, and could include modification of Project operations or at-receiver mitigation measures.

MCPL would continue to conduct air quality and meteorological monitoring at Middlemount Coal Mine using (Figure 3-9):

- Portable PM₁₀ monitoring (DustTraks) – monitoring locations may change as the mine develops.
- Four dust deposition gauges.
- One meteorological monitoring station.

3.5.4 Greenhouse Gas

The Commonwealth *National Greenhouse and Energy Reporting Act, 2007* (NGER Act) established a national framework for corporations to report GHG emissions and energy consumption.

The *National Greenhouse and Energy Reporting Regulation 2008* (NGER Regulation) recognises Scope 1 and Scope 2 emissions as follows:

- Scope 1 emissions – in relation to a facility, means the release of GHG into the atmosphere as a direct result of an activity or series of activities (including ancillary activities) that constitute the facility.
- Scope 2 emissions – in relation to a facility, means the release of GHG into the atmosphere as a direct result of one or more activities that generate electricity, heating, cooling or steam that is consumed by the facility but that do not form part of the facility.

Other indirect GHG emissions are classified as Scope 3 emissions. National GHG reporting requires the quantification of Scope 1 and Scope 2 emissions only. As such, for the purpose of this assessment, emissions generated in Scopes 1 and 2 have been quantified (Appendix E). Therefore Scope 3 emissions, including those associated with the end-use of product coal, have not been considered.

Estimating Greenhouse Gas Emissions

The methodologies used to estimate the GHG emissions resulting from the Project are consistent with:

- The *National Greenhouse and Energy Reporting (Measurement) Determination 2008*.
- The *National Greenhouse and Energy Reporting (Measurement) Amendment (2019 Update) Determination 2019*.
- The *National Greenhouse Accounts Factors* (Department of Environment and Energy [DEE], 2019a).

Estimated quantities of material contributing to GHG emissions for the Project are presented in Appendix E.

Contribution of Greenhouse Gas Emissions

The estimated annual average Scope 1 and 2 GHG emissions for the life of the Project is 283 kilotonnes of carbon dioxide equivalent. The estimated maximum annual contribution represents approximately 0.06% of the annual Australia GHG emissions for the year ending 30 June 2019 (DEE, 2019b) and approximately 0.22% of the estimated annual Qld GHG emissions for 2017 (DEE, 2019c) (Appendix E).

Management, Mitigation and Monitoring

MCPL would continue to implement measures to minimise the generation of GHG emissions including regular assessment of GHG reduction opportunities, procurement policies that require the selection of energy efficient equipment and vehicles, monitoring and maintenance of mobile equipment and optimisation of diesel consumption through logistics analysis and planning (e.g. review of the mine plan to optimise haul lengths and road gradients).

3.6 NOISE

A Noise Impact Assessment for the Project was undertaken by Renzo Tonin & Associates (Renzo Tonin) and is presented in Appendix F. This section summarises the findings of Renzo Tonin (2020).

The environmental values relevant to noise are provided in Section 3.6.1. Section 3.6.2 describes the potential noise impacts of the Project, and Section 3.6.3 outlines the proposed management practices and mitigation strategies.

3.6.1 Environmental Values

The environmental values relevant to noise at the Project area have been identified with consideration of the DES Guideline *Application requirements for activities with noise impacts* (ESR/2015/1838) (DES, 2020d).

As described in Section 3.5.1, easterly to north-easterly winds prevail during spring and summer, with calmer winds from the south to south-east being dominant during winter and autumn (i.e. the prevailing wind direction is typically away from the nearest sensitive receivers).

The nearest sensitive places to the Middlemount Coal Mine are within the Middlemount township, approximately 3 km to the east of the Project, with some scattered homesteads outside of the township (the closest being on mine-owned land [owned by Foxleigh Land Management Pty Ltd] approximately 1.25 km south-east of the Project) (Figure 3-1).

The *Environmental Protection (Noise) Policy, 2019* (EPP [Noise]) lists the environmental values and the acoustic quality objectives to enhance or protect the environmental values. As described in the EPP (Noise), environmental values of the acoustic environment have been developed to protect the health and biodiversity of ecosystems, human health and wellbeing and community amenity.

The noise criteria for the Project were selected based on the relevant legislation and guidelines, and the background noise monitoring data collected as part of the Stage 2 Project EIS (MCPL, 2011) noise assessment and additional monitoring conducted in 2013. Table 3-8 presents a summary of the noise criteria and the adopted Project Noise Criteria for dwellings and other noise sensitive receivers.

3.6.2 Potential Impacts

Potential noise impacts of the Project were predicted using a CadnaA noise prediction model (Appendix F).

Two operational scenarios have been selected for noise modelling purposes, Year 2037 and Year 2043. These scenarios were selected in consideration of the scale of mining operations in each year of the Project, number of major mobile equipment and proximity of operations to sensitive receivers.

Table 3-8
Project Noise Criteria

Location	Period	Project Noise Criteria (dBA)
Dwellings	Daytime	32 – 38*
	Evening	32 – 41*
	Night-time	30 – 36*
Schools	Operating Hours	40
Parks [^]	Daytime	42
Community Buildings [#]	Operating Hours	50

Source: After Appendix F.

* Based on the Rating Background Level determined at various locations +5 dBA.

[^] Due to higher measured background noise levels, the amenity level has been adopted.

[#] Assumed equivalent to commercial or retail receiver.

Similar to the Year 2037 scenario assessed for potential air quality impacts (Section 3.5.2), the Year 2037 scenario assessed for potential noise impacts conservatively adopted the maximum mining fleet for the Project (which would occur in 2036), with a layout that would involve mining activity located physically closer to sensitive places (i.e. the Year 2037 layout) (Appendix F).

A summary of the potential noise impacts at sensitive places under adverse weather conditions (worst case scenario) is provided in Table 3-9.

Table 3-9 shows operational noise levels for Years 2037 and 2043 under adverse weather conditions are predicted to comply with the noise criteria for daytime, evening and night-time periods. The exception is the nearest receiver, “Tralee 2” – located on mine-owned land, with a possible noise exceedance of up to 8 dBA (in Year 2043) under adverse weather conditions (Appendix F).

The maximum predicted noise level at the mine-owned receiver “Tralee 2” of 38 dBA is consistent with the maximum noise level predicted at that receiver in the *Middlemount Mine Western Extension Project Noise Impact Assessment for Proposed Mine Extension* (Renzo Tonin Ron Rumble, 2018).

Table 3-9
Potential Noise Impacts at Sensitive Receivers

Receiver ID	Receiver	Project Noise Criteria (dBA)			Predicted Noise Level (dBA)	
		Day	Evening	Night	Year 2037 Adverse Weather	Year 2043 Adverse Weather
SR075	Accommodation Village 1	36	38	34	31	31
SR074	Accommodation Village 2	36	38	34	31	30
SR410	Accommodation Village 3	36	38	34	31	30
SR411	Accommodation Village 4	36	38	34	31	31
SR278-SR303	Alfred Quinn Drive Residences	36	38	34	30	30
SR619-SR725	Centenary Drive South Residences	36	38	34	31	30
SR069	Industrial Estate	50	50	50	31	31
SR409	Middlemount Community School	40	40	40	30	30
SR060	Norm Blanche Oval	50	50	50	31	30
SR057	Treatment Plant	50	50	50	31	31
Gundabah	Gundabah	32	36	35	30	24
Hazelbrae	Hazelbrae	32	36	35	26	22
Campion	John Frederick Campion	33	32	30	28	27
Foxleigh	Foxleigh	33	32	30	23	22
Tralee	Tralee	33	32	30	21	22
Tralee 2	Tralee 2 (mine-owned)	33	32	30	37	38

Source: After Appendix F.

1 Refer Figure 3-1 for receiver locations.

2 Noise level predictions in **bold** typeface indicate levels above the Project noise criteria.

This result is due to (Appendix F):

- the Project not increasing the maximum mining fleet in comparison to that assessed for the Western Extension Project;
- the Project not decreasing the distance between mining activities and “Tralee 2”; and
- mining activities being undertaken closest to “Tralee 2” when they are reducing in scale overall, as production ramps down for the Project.

Note the noise predictions assume the worst-case scenario with all plant operating simultaneously in each period. One exception is topsoil management plant, which would typically not be operated at night and is therefore assumed to not be operating during adverse (i.e. temperature inversion) conditions.

3.6.3 Management Practices and Mitigation Strategies

Noise mitigation and management measures for the Middlemount Coal Mine would continue to be implemented for the Project, including:

- all equipment will be well maintained;
- all non-vexatious noise complaints will be investigated expeditiously and a response will be provided to the complainant;
- all complaints will be recorded into the site Complaints Register; and
- any noise monitoring carried out in response to any non-vexatious noise complaint will be undertaken in accordance with the requirements of DES's *Noise Measurement Manual* (DES, 2020e), and the results of the noise monitoring will be assessed against the relevant noise criteria.

In the event of a noise-related complaint, noise monitoring would be conducted to validate the model predictions and inform the implementation of noise mitigation measures, if required, where noise objectives are exceeded. In this instance, noise mitigation measures would be investigated in consultation with the noise sensitive receptor.

Material impacts at the mine-owned receiver “Tralee 2” would be avoided with the continued implementation of simple operational modifications (e.g. the use of noisy equipment may be limited) as required (e.g. consistent with the approved Middlemount Coal Mine).

3.7 SOCIAL (COMMUNITY) VALUES

The Project would provide continued employment for the existing workforce of 400 personnel for the life of the Project. The workforce may fluctuate over the life of the mine to over 500 personnel during particular mining or processing activities, shut downs or maintenance activities (MCPL, 2011).

Middlemount was established as a mining town in the 1980s and is primarily supported by the surrounding mining operations to this day.

Potential impacts to the community such as the demand for housing and community resources are not expected to increase as a result of the Project, given that no significant increase to the existing workforce is proposed for the Project.

MCPL would continue to engage with the local community and track consultation activities in a Consultation and Complaint/Incident Register.

3.8 ABORIGINAL CULTURAL HERITAGE

Management of Aboriginal cultural heritage would continue to be conducted as per the existing 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 would be reviewed and amended where required to include the Project.

As the Project will extend further south than the current extent of the CHMP's for the Middlemount Coal Mine, MCPL would seek to develop a CHMP with the Barada Kabalbara and Yetimarla People (the native title claimants over this area).

Further, cultural heritage surveys would be conducted in accordance with the CHMP's ahead of any disturbance in the Project area. Any potential impact to indigenous cultural heritage would be managed in accordance with the CHMP's.

In a hierarchy of cultural heritage management options, the first and best strategy is to avoid impact on sites. However, given that the majority if not all sites would be or are likely to be directly impacted by the Project, relevant mitigation measures described in the CHMP's would be implemented.

4 REHABILITATION AND BIODIVERSITY OFFSET STRATEGY

This section provides a description of the:

- relevance of the *Progressive rehabilitation and closure plans* guideline (DES, 2019b) (Section 4.1);
- mine site rehabilitation relevant to the existing/approved Middlemount Coal Mine (Section 4.2);
- proposed mine site rehabilitation relevant to the Project (Section 4.3);
- proposed general mine site rehabilitation practises and measures (Section 4.4); and
- existing and proposed biodiversity offset strategy (Section 4.5).

4.1 PROGRESSIVE REHABILITATION AND CLOSURE PLAN GUIDELINES

MCPL has reviewed the current rehabilitation strategy to incorporate the Project in consideration of MCPL's rehabilitation experience to date at the Middlemount Coal Mine, and considered leading guidelines and standards (Section 4.3).

The rehabilitation strategy for the Middlemount Coal Mine (including the Project) would generally be consistent with the approved rehabilitation strategy described in the Western Extension Project (Sections 4.2 and 4.3).

Notwithstanding the above, and in accordance with the requirements of the EP Act, MCPL will undertake a comprehensive review of the rehabilitation and mine closure aspects of the Middlemount Coal Mine (including the Project) during the development of a Progressive Rehabilitation and Closure Plan (PRC Plan). This would include a comprehensive review of the landform design criteria, final land use and rehabilitation schedules, and rehabilitation indicators and requirements included in Schedule F and Attachment F of the EA.

4.2 REHABILITATION AT THE MIDDLEMOUNT COAL MINE

The Plan of Operations (MCPL, 2019b), Rehabilitation Management Plan (MCPL, 2012) and Rehabilitation Management Plan Addendum (GT Environmental, 2018) describe the strategy for progressing towards the rehabilitation outcomes required under the EA. A summary of the current rehabilitation strategy for the Middlemount Coal Mine is provided below.

4.2.1 Rehabilitation Goal

The rehabilitation goal for the existing Middlemount Coal Mine is to rehabilitate all land subject to mining activities to a safe, stable and non-polluting landform with a self-sustaining vegetation cover, in accordance with Condition F10 of the EA.

4.2.2 Post-Mining Land Use

The Middlemount Coal Mine is surrounded by land primarily used for grazing livestock and mining (with the exception of the MCPL biodiversity offset areas). In accordance with Condition F10 of the EA, the post mining land use of all post-mine landforms, except the residual voids, will be low density beef cattle grazing, or native ecosystem as similar as possible to the original ecosystem.

The residual voids will be a safe, stable, non-polluting saline groundwater sink. Further discussion on the proposed residual void arrangement is provided in Section 4.3.3.

4.2.3 Final Landform

In accordance with Condition F10 and Table F2 of the EA, the approved Middlemount Coal Mine final landform consists of the following:

- in-pit and out-of-pit waste rock emplacements (slopes and upper surface);
- low wall spoil (above natural ground level);
- two residual voids;
- water storage/water management dams;

- rehabilitated infrastructure areas (including mine infrastructure area [MIA], CHPP and roads);
- rehabilitated Roper Creek Diversions;
- rehabilitated Thirteen Mile Gully Diversion; and
- rehabilitated TSF and TFCs (FC1 and FC2).

A description of each of these landforms is provided below.

In-Pit and Out-of-Pit Waste Rock Emplacements

The upper surface of the waste rock emplacements will be topsoiled (at least 0.2 m layer) and seeded (GT Environmental, 2018). The upper surface of the waste rock emplacements will be revegetated with species characteristic of RE 11.5.3 in accordance with Condition F10 of the EA.

In accordance with Table F1 of the EA, the slopes of the waste rock emplacements will be contoured to a slope of <18.5%, with the use of rock mulch for greater stability (MCPL, 2014a) and revegetated with native grass. The slope of the waste rock emplacement adjacent to the Roper Creek floodplain would however be revegetated with species characteristic of RE 11.5.3 in accordance with Condition F10 of the EA.

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 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.

Low Wall Spoil (Above Natural Ground Level)

The low wall spoil (above natural ground level, and above the residual void) will be designed to be safe, non-polluting and stable. The benches of the low wall spoil will be revegetated with species characteristic of RE 11.5.3 in accordance with Condition F10 of the EA.

Residual Voids

Two residual voids are approved at the Middlemount Coal Mine in the northern and southern areas of the open cut extent (Figure 1-2). 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 Condition F21 of the EA.

The residual voids would partly fill with water (i.e. groundwater recovery and incident 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.

Water Storage/Water Management Dams

In accordance with Condition F10 of the EA, water storage/water management dams will be:

- rehabilitated; or
- retained for beneficial reuse, conducive to the surrounding land use, if the post-mining landholder agrees and the dam complies with the limits detailed in ANZECC and ARMCANZ (2000, or its revision) for a period of at least 5 years post mining.

Infrastructure Areas

Infrastructure areas will be rehabilitated in accordance with outcomes outlined in Condition F9 of the EA:

All infrastructure, constructed by or for the environmental authority holder during the licensed activities including water storage structures, must be removed from the site prior to surrender, except where agreed in writing by the post-mining landowner/holder and where there is a demonstrated benefit to the post-mining landowner/holder.

The mine infrastructure (e.g. CHPP, buildings) will be removed and the sites rehabilitated as required. Some infrastructure may be retained for alternate post-mining uses (e.g. roads) subject to the agreement of the post mining land owner / holder.

The maximum slope of the rehabilitated infrastructure areas will be <5% in accordance with Table F1 of the EA.

Rehabilitated Roper Creek Diversions

Two diversions of Roper Creek are approved at the Middlemount Coal Mine. The locations of the approved (but yet to be constructed) Roper Creek diversions are shown on Figure 1-2. The diversions of Roper Creek will be revegetated with species characteristic of RE 11.3.25 (*Eucalyptus tereticornis* or *Eucalyptus camaldulensis* woodland fringing drainage features) in accordance with Condition F10 of the EA.

Rehabilitated Thirteen Mile Gully Diversion

The rehabilitation requirements for the Thirteen Mile Gully Diversion are described in the *Middlemount Coal Thirteen Mile Gully Diversion Design Report* (Parsons Brinkerhoff, 2012).

The Thirteen Mile Gully Diversion will be revegetated with species characteristic of RE 11.3.1b (Open forest dominated by *Acacia harpophylla* and/or *Casuarina cristata*), RE 11.3.2c (*Eucalyptus populnea* woodlands on floodplains) and RE 11.3.25 (*Eucalyptus tereticornis* or *Eucalyptus camaldulensis* woodland fringing drainage features) in accordance with Condition F10 of the EA.

Rehabilitated TSFs and TFCs

The TSFs and TFCs will be revegetated with species characteristic of RE 11.7.2 (*Acacia* spp. Woodland on Cainozoic lateritic duricrust. Scarp retreat zone) in accordance with Condition F10 of the EA.

4.2.4 Existing Rehabilitation Management and Monitoring

Monitoring and assessment of progressive rehabilitation will continue to be undertaken throughout the construction, operational and decommissioning phases of the Middlemount Coal Mine in accordance with the Rehabilitation Management Plan (MCPL, 2012), Topsoil Management Plan (MCPL, 2019c) and Post Closure Management Plan (to be developed) as required by the EA.

Rehabilitation progress and rehabilitation activities will be regularly re-evaluated and the results used to inform future rehabilitation initiatives and refinement, and amendment to the practices and measures in the Rehabilitation Management Plan (MCPL, 2012).

4.2.5 Rehabilitation Status

Rehabilitation at the Middlemount Coal Mine is undertaken progressively within 2 years of areas becoming available within the operational land as far as practically possible. Rehabilitation commenced at the Middlemount Coal Mine in 2015. As of August 2020, approximately 98.5 ha is under rehabilitation on top of the East and West Dumps, and sections of the West Dump batter slopes.

Rehabilitation of the Thirteen Mile Gully Diversion commenced in 2013 and was completed in July 2020, with approximately 35.8 ha under rehabilitation. Revegetation was undertaken in accordance with the post-mining land use described in Table F2 of the EA (i.e. a combination of REs 11.3.1b, 11.3.2c and 11.3.25).

Rehabilitation of Roper Creek Diversion 1 (to be constructed during the second half of 2020) will occur progressively during and following construction of the diversion.

4.2.6 Rehabilitation Hierarchy

As described in the Western Extension Project (MCPL, 2018b), the rehabilitation strategy for the Middlemount Coal Mine would achieve the rehabilitation hierarchy detailed in the *Rehabilitation Requirements for Mining Resource Activities* (DEHP, 2014b).

4.3 REHABILITATION OF THE PROJECT

MCPL has reviewed the current rehabilitation strategy to incorporate the Project. The review has made use of MCPL's rehabilitation experience to date at the Middlemount Coal Mine and considered leading guidelines and standards including:

- *Rehabilitation Requirements for Mining Resource Activities* (DEHP, 2014b);
- *Integrated Mine Closure Good Practice Guide* (International Council on Mining and Metals, 2019);
- *Strategic Framework for Mine Closure* (Australian and New Zealand Minerals and Energy Council and Minerals Council of Australia, 2000); and
- *Leading Practice Sustainable Development Program for the Mining Industry – Mine Closure* (Department of Industry, Innovation and Science, 2016).

Figure 4-1 provides the Project conceptual general arrangement post mining and Figures 4-2a and 4-2b provide conceptual cross-sections through the final landform.

4.3.1 Rehabilitation Goals

The rehabilitation goals at the Middlemount Coal Mine (Section 4.2.1) would remain unchanged for the Project. All land subject to mining activities would be rehabilitated to a safe, stable and non-polluting landform with a self-sustaining vegetation cover.

MCPL will undertake a comprehensive review of the rehabilitation and mine closure aspects of the Middlemount Coal Mine, including completion criteria (Attachment F of the EA), during the development of a PRC Plan (Section 4.1).

4.3.2 Post-Mining Land Use

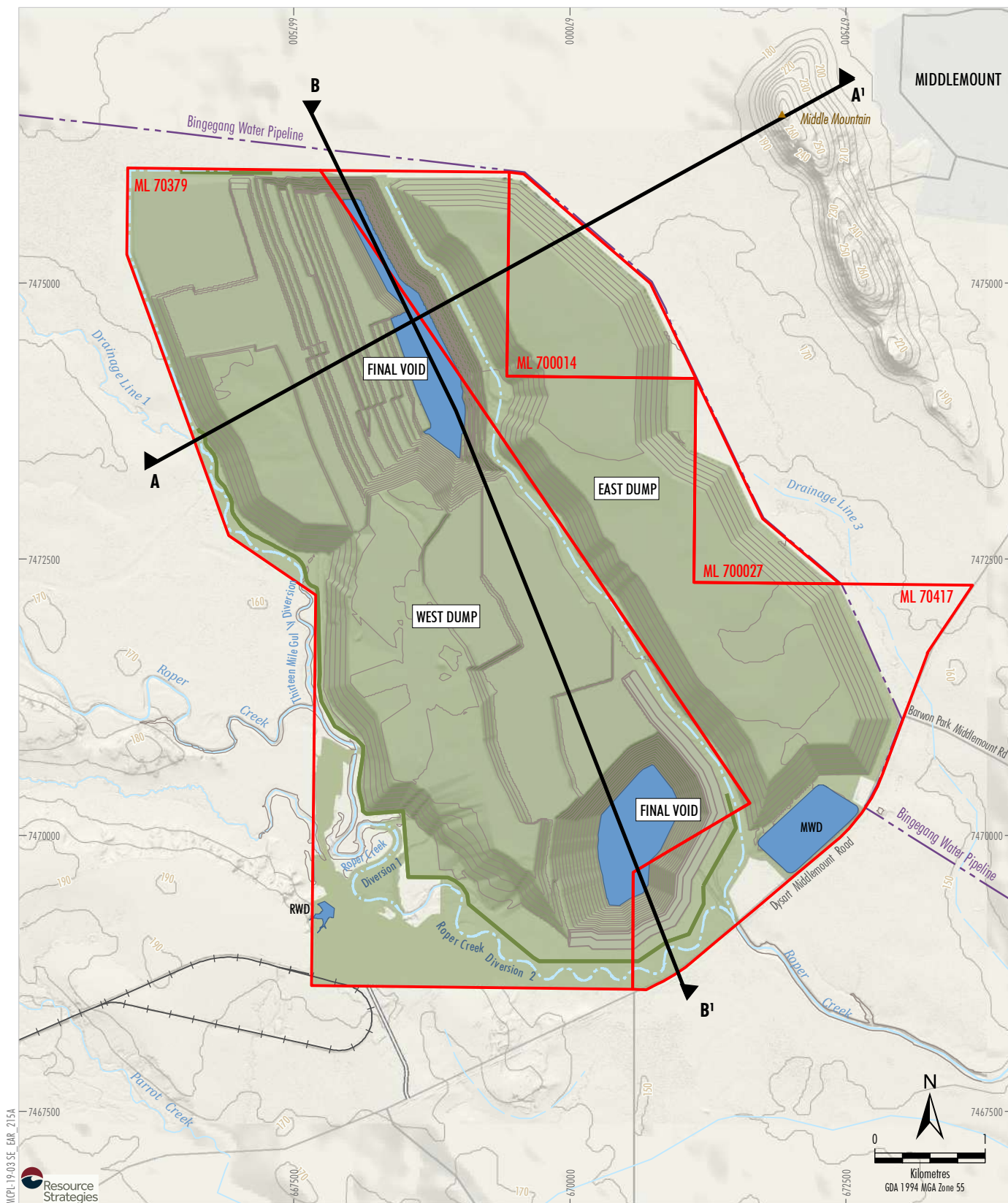
The intended post mining land use at the Middlemount Coal Mine (Section 4.2.2) would remain unchanged for the Project. Specifically, the post mining land use of all post-mine landforms, except the residual voids, would be low density beef cattle grazing, or native ecosystem as similar as possible to the original ecosystem.

Due to the additional surface disturbance area required for the Project, the 'maximum surface area' associated with the rehabilitation domains listed in Table F2 of the EA would change (Table 4-1).

**Table 4-1
Project Rehabilitation Domain Surface Areas**

Mine Domain	Approved Maximum Surface Area (ha)	Revised Maximum Surface Area (ha)
MIA and CHPP area	105	111
Roads including haul roads*	48	46
Creek diversion and levee banks	286	371
In-pit and out-of-pit overburden spoil dumps (slopes)	495	691
In-pit and out-of-pit overburden spoil dumps (upper surface)	1,250	1,458
Low wall spoil (above natural ground level)	229	60
North residual void	373	358
South residual void	222	163
Water storage/ water management dams	85	68
TSF and TFC	24	24

* Roads and haul roads are not an 'additional' area, as they are located within the other domains.



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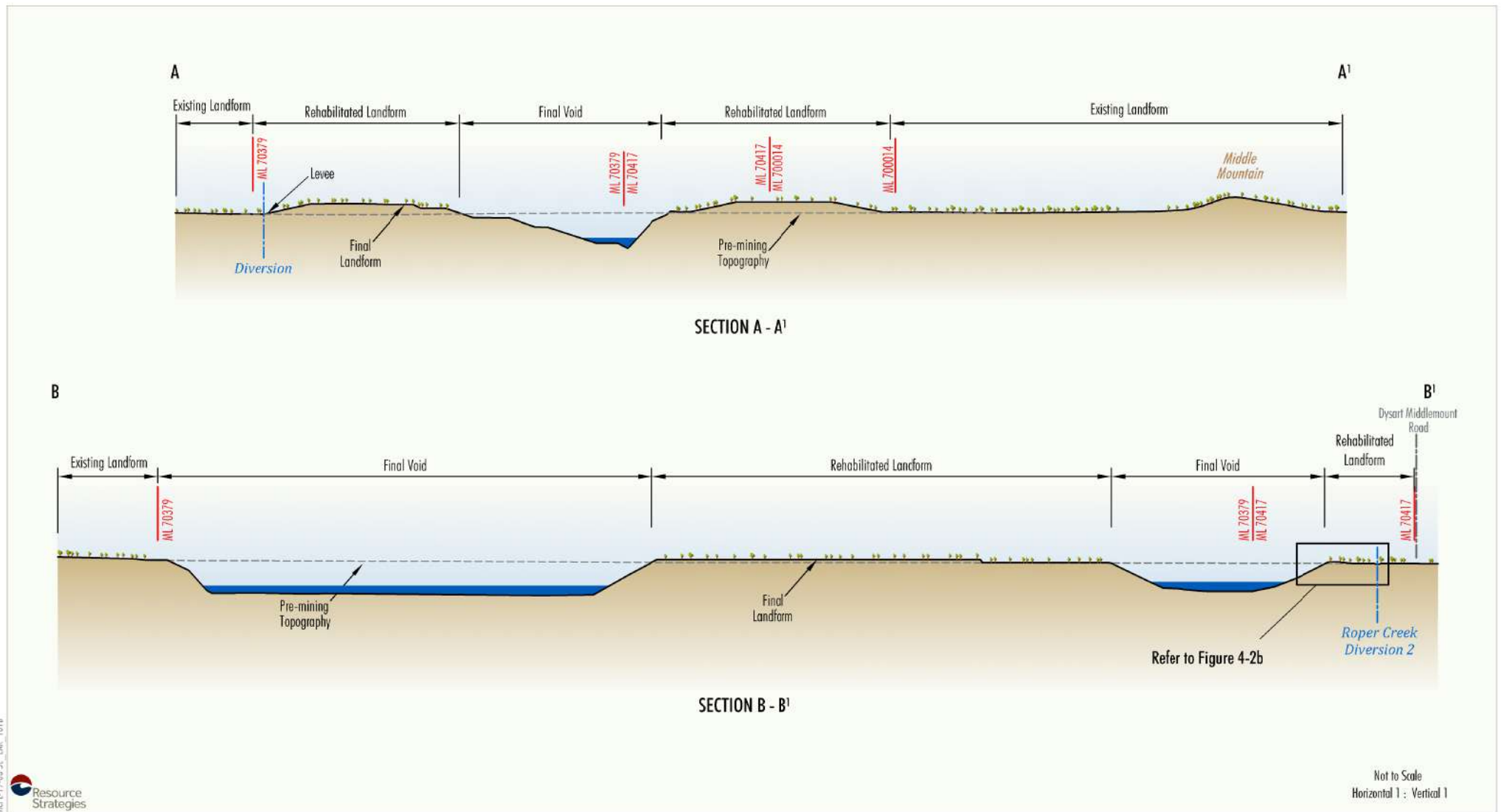
SOUTHERN EXTENSION PROJECT

Conceptual General Arrangement

Post-mining

- Cross Section Locations

Figure 4-1



Source: MCPL (2020); AGE (2020)

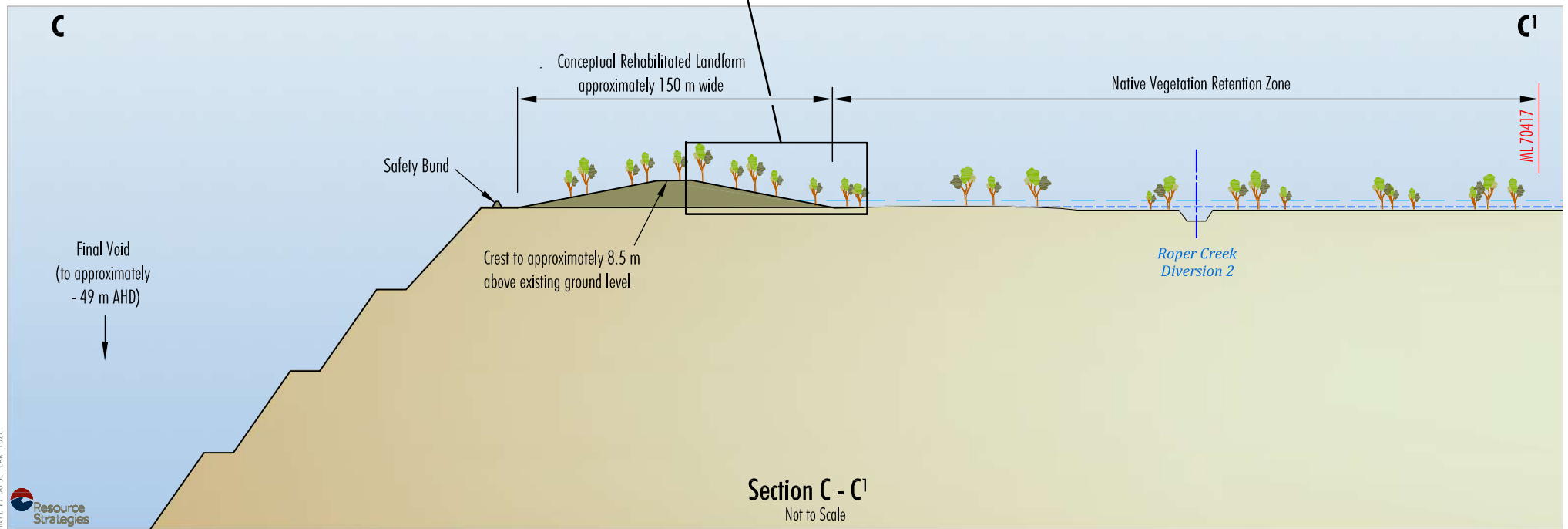
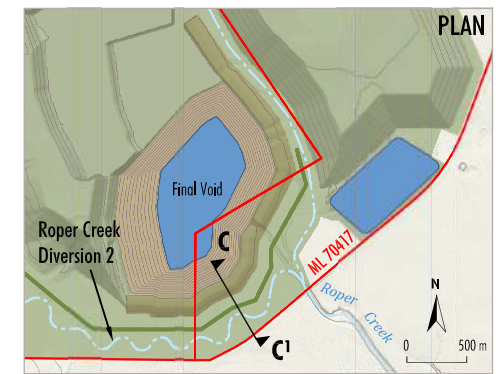
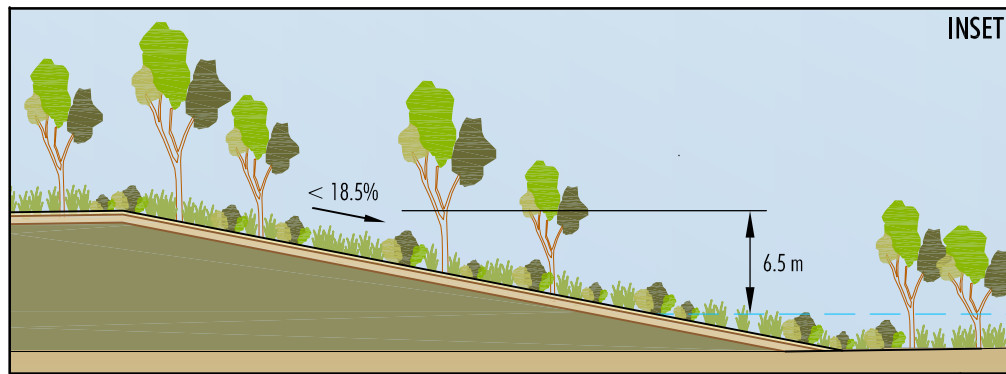
Refer Figure 4-1 for Cross Section locations.

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SOUTHERN EXTENSION PROJECT

**Conceptual Cross Sections of the
Rehabilitated Mine Landform**

Figure 4-2a



- LEGEND
- 0.1% AEP Flood Level (approximately 155 m AHD) (WRM, 2020)
 - Probable Maximum Flood (PMF) Level (approximately 156.5 m AHD) (WRM, 2020)

Source: MCPL (2020); WRM (2020); AGE (2020)



SOUTHERN EXTENSION PROJECT

Conceptual Final Landform Design
Relative to the Roper Creek Floodplain

Figure 4-2b

4.3.3 Conceptual Final Landform

The conceptual final landform would remain generally consistent with the approved final landform for the Project (Section 4.2.3). A description of each of the proposed conceptual final landforms is provided below.

Notwithstanding, further detailed mine planning may result in minor changes to the conceptual final landform during development of a PRC Plan (Section 4.1).

In-Pit and Out-of-Pit Waste Rock Emplacements

The Project waste rock emplacements (i.e. East and West Dumps) would be rehabilitated consistent with the description in Section 4.2.3.

Consistent with the approved mine, the flood protection levee (including the realigned southern portion) would be decommissioned and incorporated into the final landform at the cessation of mining to widen the post-mining Roper Creek floodplain.

A conceptual final landform design of the waste emplacement relative to the southern residual void and the Roper Creek floodplain is shown on Figure 4-2b. In this location, the final landform would be designed to be considerably higher (approximately 6.5 m) than the PMF level in accordance with Condition F22 of the EA (Appendix A). This conceptual final landform would be at least 8.5 m high and 150 m wide with a batter slope of <18.5%.

As described in Section 3.2.3, final landform stability has been determined by considering the bed shear at the toe of the final landform during a 0.1% AEP flood event, which found that bed shear against the toe of the landform is below the native vegetation threshold at all locations (Appendix A).

Low Wall Spoil (Above Natural Ground Level)

The Project low wall spoil areas would be rehabilitated consistent with the description provided in Section 4.2.3.

Residual Voids

The Project residual voids would be designed to operate as per the currently approved residual voids described in Section 4.2.3.

The design of the Project final landform (including the residual voids) has taken into consideration the disposal of waste rock in-pit to minimise the size of the residual 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 residual voids would be prohibitive; and
- rehandling spoil material from the out of pit emplacements to the residual voids would delay rehabilitation.

The Project would result in minor changes to the location and design of the northern and southern voids (Section 2.8) (Figures 1-2 and 1-4). Table 4-2 provides the approved and revised residual void design characteristics.

The Project would not however change the slope angle of the residual void high walls and low walls listed in Table F3 of the EA.

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.

Residual Void Hydrology

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

Table 4-2
Approved and Proposed Residual Void Design Characteristics

Void	Approved			Proposed		
	Maximum Surface Area (ha)	Maximum Depth (m)	Volume (m ³)*	Maximum Surface Area (ha)	Maximum Depth (m)	Volume (m ³)
North Void	373	120	15,770,000	358	235	285,870,000
South Void	222	240	12,100,000	163	199	157,960,000

* The volume of the residual voids calculated for the Western Extension Project, and subsequently included in Table F3 of the EA, are incorrect. The correct volumes are approximately 204,430,000 m³ and 277,460,000 m³ for the north void and south void, respectively.

Water Quality

Residual void water recovery analyses have been conducted as part of the Surface Water Assessment, which included simulations of the long-term salinity of the residual void waterbodies (Appendix A). 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 [Appendix A]).

Water Level

Once mining operations cease, groundwater inflows to the 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 incident 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. The catchment area of the residual voids is shown in the Surface Water Assessment (Appendix A).

Residual void water recovery analyses have been conducted as part of the Surface Water Assessment (Appendix A) based on predicted groundwater inflows developed as part of the Groundwater Assessment (Appendix B). The residual void waterbodies are not predicted to spill under any of the simulated climatic sequences, and the voids would remain as long-term groundwater sinks (Appendix A).

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 (Appendix A). As described in Section 4.2.2, 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 Condition F22 of the EA.

Residual Void Pit Wall Stability

The *Residual Void Study* (MCPL, 2014b) included a *Residual Void Slope Stability Study* by Geotechnical Consulting Services (2014). 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.

Post Closure Management

Consistent with the approved residual voids, a safety bund wall consisting of competent rock and/or fencing would be constructed to limit human and livestock/animal access. 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 Conditions F28 and F29 of the EA, a Post Closure Management Plan would be prepared prior to final coal processing and implemented for at least 30 years. The Post Closure Management Plan would include monitoring the integrity and stability of the residual void.

Water Storage/Water Management Dams

The water storage/water management dams would be rehabilitated consistent with the description in Section 4.2.3.

Infrastructure Areas

The infrastructure areas would be rehabilitated consistent with the description in Section 4.2.3.

Rehabilitated Roper Creek Diversions

The Roper Creek Diversions would be rehabilitated consistent with the description in Section 4.2.3.

Rehabilitated Thirteen Mile Gully Diversion

The Thirteen Mile Gully Diversion would be rehabilitated consistent with the description in Section 4.2.3.

Rehabilitated TSFs and TFCs

The TSFs and TFCs would be rehabilitated consistent with the description in Section 4.2.3.

4.3.4 Rehabilitation Management and Monitoring

The Project would not result in any changes to the rehabilitation management and monitoring strategy described in Section 4.2.4.

MCPL will undertake a comprehensive review of the rehabilitation and monitoring strategy during the development of a PRC Plan (Section 4.1), which will include identification of any potential improvements to this strategy.

In addition, the information included in the Rehabilitation Management Plan (MCPL, 2012) and Topsoil Management Plan (MCPL, 2019c) (Section 4.2.4) would be transitioned to the PRC Plan.

4.3.5 Rehabilitation Hierarchy

The rehabilitation strategy for the Middlemount Coal Mine would achieve the rehabilitation hierarchy detailed in the *Rehabilitation Requirements for Mining Resource Activities* (DEHP, 2014b) (Section 4.2.6).

4.4 GENERAL REHABILITATION PRACTICES AND MEASURES

General rehabilitation practices and measures that would be implemented for the Project are described in the following sub-sections. Rehabilitation progress and rehabilitation activities would regularly be re-evaluated and the results would inform future rehabilitation initiatives, and refinement or amendment to the practices and measures described below.

4.4.1 Vegetation Clearance Procedures

As described in Section 3.4.3, consistent with the approach currently in place at the Middlemount Coal Mine, the following measures would be implemented to manage clearing on site:

- The clearing limit would be clearly marked before clearing in order to prevent any inadvertent clearance beyond what is required and has been assessed.
- The area of clearing work is to be inspected for fauna by a fauna spotter immediately prior to commencement of any vegetation removal.
- A fauna spotter is to remain on site to supervise clearing to retrieve any fauna detected during works and undertake appropriate action.

Measures described in the Middlemount Coal Species Management Program (MCPL, 2019e) would continue to be followed.

4.4.2 Topsoil Management

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 inventory is provided in the Plan of Operations (MCPL, 2019b), which would be revised to include the Project.

4.4.3 Overburden Management

Geochemical testwork has found that there is a low to negligible risk of acid mine drainage from overburden at the Middlemount Coal Mine. Notwithstanding, laboratory characterisation of overburden material during operations would be conducted to confirm acid generation potential, consistent with existing operations. Any material that is found to be potentially acid forming will not be used as capping material and would continue to be buried within the overburden dump with material that has some acid neutralising capacity (MCPL, 2011).

Overburden at the Middlemount Coal Mine has been found to be susceptible to dispersion and is erosion prone. Consistent with existing operations, testing of overburden would be conducted to identify material with a high susceptibility for dispersion and slaking. Less dispersive material would be used as capping material, where possible.

The management, placement and monitoring of mining by-products at the Middlemount Coal Mine (including overburden, tailings and other mining wastes) is undertaken in accordance with the existing Mining By-Products Management Plan (MCPL, 2020).

4.4.4 Erosion and Sediment Control

Operational sediment and erosion control works would be maintained during the establishment of revegetation. However, once self-sustaining stable final landforms have been achieved within an area, key elements of the operational sediment control structures would either be retained for beneficial use or would be removed and the area would become free-draining.

4.4.5 Revegetation Program

All post-mining landforms, except the residual voids, would have a self-sustaining vegetation cover. RE's proposed to be established on the post-mining landforms are described in Sections 4.2.3.

Native species to be planted in revegetation areas would be selected on a site by site basis depending on soil types, aspect and site conditions. The list of suitable plant species to be used in the revegetation of disturbance areas would be documented in the Rehabilitation Management Plan (MCPL, 2012).

The post mining land use of all Project post-mining landforms, except the residual voids, would be low density beef cattle grazing, or native ecosystem as similar as possible to the original ecosystem. (Section 4.2.2).

4.4.6 Land Contamination Management

Investigations would be undertaken at mine closure to identify and remediate any contaminated soil materials that may exist in accordance with the requirements under Part 8 of Chapter 7 of the EP Act or equivalent statutory provision in force at the time.

4.4.7 Rehabilitation Management

The existing Rehabilitation Management Plan (MCPL, 2012) would be reviewed and revised to incorporate the Project.

4.4.8 Invasive Plant and Animal Management

Project invasive plant and animal control measures are described in Section 3.4.3. The revised Rehabilitation Management Plan (MCPL, 2012) would include invasive plant and animal control measures.

4.4.9 Bushfire Management

Bushfire management measures for the Project are described in Section 3.4.3. The revised Rehabilitation Management Plan (MCPL, 2012) would include bushfire management measures.

4.4.10 Post-closure Maintenance

Consistent with Conditions F28 and F29 of the EA, a Post Closure Management Plan would be prepared for the site prior to final coal processing and implemented for at least 30 years.

4.5 BIODIVERSITY OFFSET STRATEGY

4.5.1 Existing Offset Areas

MCPL currently has a number of existing offset areas on company-owned land which were established for various components of the Middlemount Coal Mine, including the following (Figure 4-3):

- Middlemount Coal (Stage 2) Project.

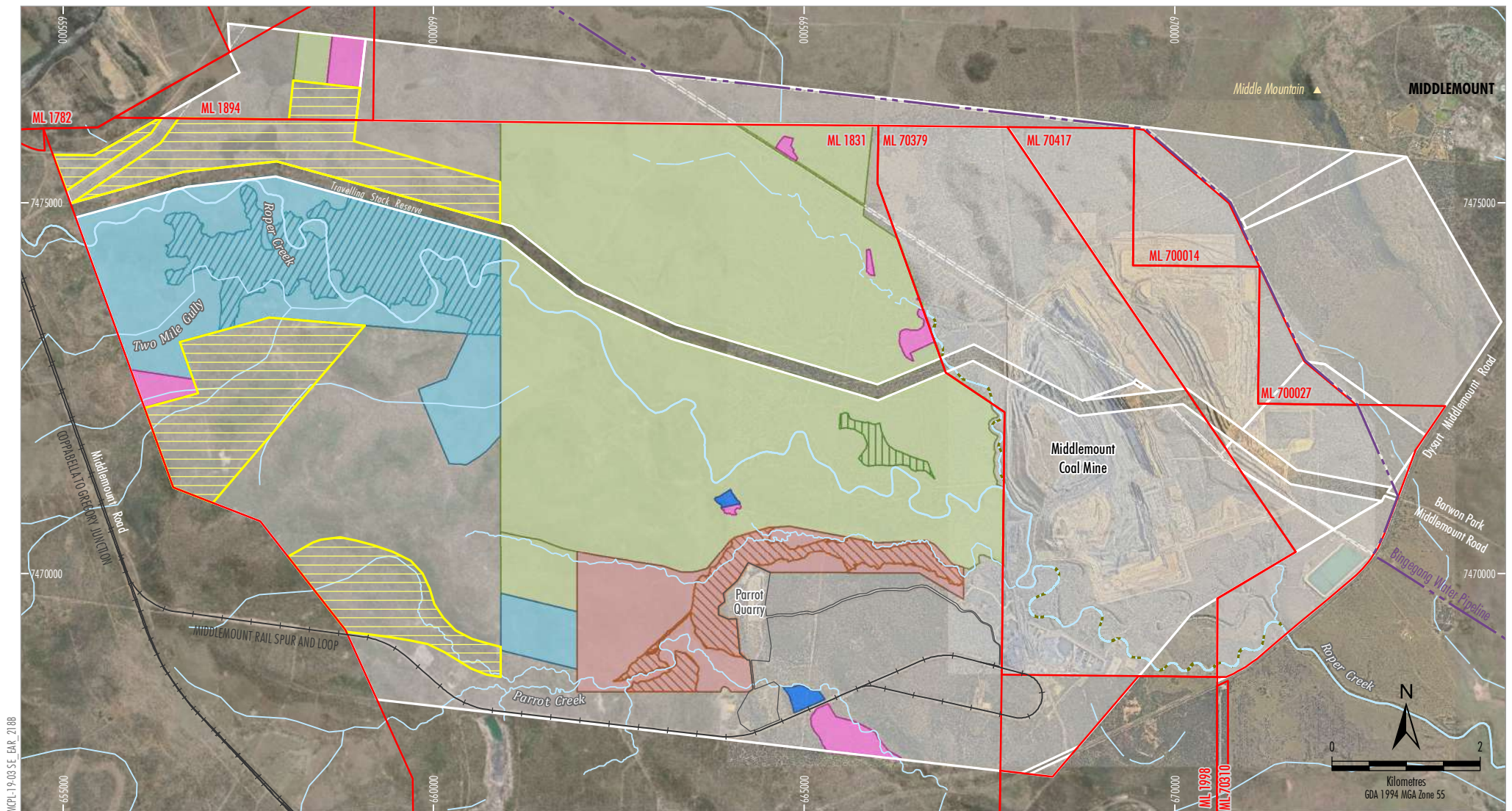
- Middlemount Coal Mine Rail Loop and Spur.
- Parrot Quarry.
- Thirteen Mile Gully Diversion.
- Middlemount North-eastern Extension.
- Middlemount Coal Mine Western Extension Project.

These existing offsets cover an area of approximately 5,861 ha (Table 4-3). The Middlemount Coal (Stage 2) Project (EPBC 2010/5394) Offset Area is located adjacent to, and to the west of, the Middlemount Coal Mine and is comprised of two designated areas totalling approximately 3,318 ha.

The Middlemount Coal Mine Rail Loop and Spur Offset Area is comprised of seven separate patches of land, five of which are connected to, or surrounded by, the Middlemount Coal (Stage 2) Project (EPBC 2010/5394) Offset Area, with the remaining two located to the south and west (Figure 4-3). These seven areas total approximately 110 ha (Table 4-3).

Table 4-3
Existing Middlemount Coal Mine Offset Areas

Offset Area (Figure 4-3)	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	SPA 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



LEGEND

- | | | | |
|---|---|--|--|
| | Mining Lease Boundary (ML) | | Existing Offset Areas |
| | Middlemount Coal Owned Land | | North-eastern Extension Commonwealth Offset Area (EPBC 2016/7717) |
| | Middlemount Coal Owned Land | | North-eastern Extension State Offset Area |
| | Railway | | Parrot Quarry Offset Area (Declared Area Map 2013/3919) |
| | Proposed Southern Extension Offset Investigation Area | | Thirteen Mile Gully Diversion Offset Area (Declared Area Map 2013/3919) |
| | | | Middlemount Coal (Stage 2) Project Commonwealth Offset Area (EPBC 2010/5394) |
| | | | Rail Loop and Spur Offset Area |
| | | | Western Extension Commonwealth Offset Area (EPBC 2017/8130) |
| | | | Western Extension State Offset Area |

Source: MCPL (2020); State of Queensland (2020)
 Orthophoto: MCPL (Sept 2019); Esri, DigitalGlobe (2019)



SOUTHERN EXTENSION PROJECT
 Existing Offset Areas

Figure 4-3

Similarly, the Parrot Quarry Offset Area is comprised of two separate areas totalling approximately 15.4 ha (Table 4-3) of land and the Thirteen Mile Gully Offset Area is located wholly within the Middlemount Coal (Stage 2) Project (EPBC 2010/5394) Offset Area (Figure 4-3).

The North-eastern Extension Offset Areas are located directly to the south of the Middlemount Coal (Stage 2) Project (EPBC 2010/5394) Offset Area and comprises 532 ha of land (including 181 ha of non-remnant vegetation within the North-eastern Extension State Offset Area) (Table 4-3 and Figure 4-3).

The Western Extension Offset Area (EPBC 2017/8130) is comprised of two patches totalling approximately 1,220 ha (including approximately 454 ha of State Offset Area), and is located to the west and south of the existing Middlemount Coal (Stage 2) Project Commonwealth Offset Area (EPBC 2010/5394) (Figure 4-3).

4.5.2 Proposed Biodiversity Offset Strategy

An environmental offset is required for the Project to address significant residual impacts on MSES (i.e. Regulated Vegetation, Connectivity Areas and Protected Wildlife Habitat [habitat for the Greater Glider and Koala]) as determined by the *Queensland Environmental Offsets Policy – Significant Residual Impacts Guideline* (DEHP, 2014a).

Accordingly, MCPL will offset all MSES that would be residually impacted by the Project. Residual impacts to MSES that are associated with the Project have been summarised in Table 4-4.

4.5.3 Offset Approach

A land-based offset is proposed to address all impacts associated with the Project. All efforts would be made to identify and secure offsets that would provide the same or similar vegetation/habitat characteristics as the matters in the Project area. Preliminary surveys of potential offset areas for the Project were undertaken on MCPL owned land in June 2020.

The Project offset area would:

- For Regulated Vegetation:
 - contain vegetation of the same broad vegetation group as the impacted RE.
 - contain vegetation of the same RE status.
 - be located within the same bioregion.
- For Connectivity Areas:
 - contain an equivalent area of non-remnant ecosystem that will be revegetated to remnant status.
 - be located within the same subregion.
- For Protected Wildlife Habitat (Koala and Greater Glider):
 - contain or be capable of containing a self-sustaining population of the same impacted species.

4.5.4 Offset Timing

In accordance with Condition F32 of the EA, MCPL would provide a Notice of Election for a Project offset area to the DES no less than three months before the commencement of the Project.

4.5.5 Offset Security

Consistent with the existing offset areas (Section 4.5.1), MCPL would seek to secure the proposed offset area through a Voluntary Declaration under the VM Act.

Table 4-4
Matters of State Environmental Significance – Significant Residual Impacts

Matters of State Environmental Significance			Area of Clearance (ha)	Residual Significant Impact Test ¹	Significant Residual Impact
Regulated Vegetation	'Endangered' or 'of concern' RE's; or	RE 11.3.1 'Endangered' ²	2.2	> 0.5 ha (where in a dense to mid-dense [structural category] RE)	Yes
		RE 11.3.2 'Of Concern'	19.5	> 0.5 ha (where in a dense to mid-dense [structural category] RE)	Yes
		RE 11.3.2b 'Of Concern'	1	> 0.5 ha (where in a dense to mid-dense [structural category] RE)	Yes
	RE's within the defined distance of a vegetation management watercourse	RE's 11.3.2 and 11.3.25	3.7 ha	> 0.5 ha (where in a dense to mid-dense [structural category] RE)	Yes
Connectivity Areas			68	Refer to footnote 3	Yes
Protected Wildlife Habitat	Greater Glider ²		63.3	Project likely to result in any of the significant impact criteria outlined in DEHP (2014a)	Yes
	Koala ²		63.3		Yes

¹ As outlined in DEHP (2014a).

² This MSES is also identified as MNES listed under the EPBC Act.

³ Application of the DES (2020d) *Landscape Fragmentation and Connectivity Tool* showed that the Project exceeded the threshold for an impact on connectivity and fragmentation (Appendix C).

5 SUMMARY OF ENVIRONMENTAL MANAGEMENT COMMITMENTS

This section provides a consolidated summary of proposed environmental management commitments, including mitigation, monitoring and reporting for the Project.

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, 2018);
- Risk Management System;
- Emergency Response/Contingency Plan;
- Plan of Operations (MCPL, 2019b);
- Mining By-products Management Plan (MCPL, 2020);
- Mining Waste Management Plan (MCPL, 2019a);
- Topsoil Management Plan (MCPL, 2019c);
- Rehabilitation Management Plan (MCPL, 2012);
- Residual Void Study (MCPL, 2014a);
- Water Management Plan (WRM, 2019a);
- Receiving Environment Monitoring Program (DPM, 2019);
- Erosion and Sediment Control Plan (WRM, 2019b);
- Offset Management Plan/Vegetation Management Plan (MCPL, 2019e);
- Species Management Program (MCPL, 2019d);
- Complaints and Incidents Management Plan (MCPL, 2014b); and
- CHMPs.

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 associated reporting is provided in Table 5-1.

**Table 5-1
Summary of Management, Monitoring and Reporting Commitments**

Proposed Management, Monitoring and Reporting	EVA Section Reference
Land	
- Rehabilitation of land to be safe, stable and non-polluting and able to support and sustain the proposed post-mining land use of low density beef cattle grazing or native ecosystem. - Continued implementation of soil resource management measures to maximise soil resources available for rehabilitation. - On-site consumable storage areas would be operated, where applicable, in compliance with the requirements of AS 1940-2017 The Storage and Handling of Flammable and Combustible Liquids and AS 2187.1 Explosives – Storage, Transport and Use – Storage. - Off-site light emissions from the Project would be minimised by select placement, configuration and direction of lighting.	Section 3.1.3
Surface Water	
- Site water management and monitoring would continue to be conducted in accordance with the Water Management Plan (WRM, 2019a), and would be updated to incorporate the Project. - If required, controlled releases would continue to be undertaken for the Project in accordance with the EA criteria. - Routine surface water quality monitoring would continue to be undertaken for receiving waters and additional locations monitored. - Incorporation of the flood protection levee that would exist during mining operations into the waste rock emplacement to form a stable and self-sustaining final landform that does not require long-term maintenance. This final landform would be designed to be considerably higher (approximately 6.5 m) than the probable maximum flood (PMF) Level. - An operation and monitoring plan would be developed for Roper Creek Diversion 2 as part of detailed design.	Sections 3.2.3 and 4.3.3

Table 5-1 (Continued)
Summary of Management, Monitoring and Reporting Commitments

Proposed Management, Monitoring and Reporting		EVA Section Reference
Groundwater		
- Ongoing groundwater level and quality monitoring within and surrounding the mine site. - Continued installation of water level loggers in select monitoring bores to record groundwater level measurements at regular intervals. - Review of the groundwater monitoring program throughout the life of the Project to determine any updates required to the monitoring network as monitoring bores are mined through.		Section 3.3.3
Biodiversity		
- Continued implementation of land clearance measures to minimise impacts on fauna. - Continued implementation of the Species Management Program (MCPL, 2019d) under section 332 of the <i>Nature Conservation [Wildlife Management] Regulation 2006</i> as required. - Continued implementation of weed and feral animal control measures and vegetation management measures in accordance with the Environmental Management Plan (MCPL, 2018a). - Establishment of a biodiversity offset (in addition to the existing offsets for the existing/approved Middlemount Coal Mine) for the additional surface disturbance area associated with the Project.		Sections 3.4.4 and 4.5
Air Quality		
- Continued implementation of dust management and mitigation measures such as watering of haul roads and stockpiles, and progressive rehabilitation. - In the event of an air quality-related complaint, air quality monitoring would be conducted at the relevant sensitive place to validate the model predictions and inform the implementation of air quality mitigation measures, if required. - Continued implementation of measures to minimise the generation of GHG emissions including procurement policies that require the selection of energy efficient equipment and vehicles, monitoring and maintenance of mobile equipment and optimisation of diesel consumption through logistics analysis and planning.		Section 3.5.3
Noise and Vibration		
- Continued implementation of noise management and mitigation measures including maintaining all equipment in good order. - In the event of a noise-related complaint, noise monitoring would be conducted to validate the model predictions and inform the implementation of noise mitigation measures, if required, where noise objectives are exceeded. In this instance, noise mitigation measures would be investigated in consultation with the noise sensitive receptor. - Material impacts at the mine owned receiver "Tralee 2" would be avoided with the continued implementation of simple operational modifications (e.g. the use of noisy equipment may be limited) as required (e.g. consistent with the approved Middlemount Coal Mine).		Section 3.6.3
Aboriginal Cultural Heritage		
Any potential impacts to indigenous cultural heritage would be managed in accordance with the CHMPs.		Section 3.8
Community		
MCPL would continue to engage with community and track consultation activities in a Consultation and Complaint/Incident Register.		Section 1.4

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ATTACHMENT 1

ENVIRONMENTAL PROTECTION ACT REQUIREMENTS – RECONCILIATION TABLE

Table A-1
Environmental Protection Act – Section 226 Requirements

Section 226, Clause 1 Requirement	EVA Section/Appendix Addressed
(a) <i>be made to the administering authority; and</i>	The EA Amendment Application for the Project will be made to the Department of Environment and Science (DES).
(b) <i>be in the approved form; and</i>	The EA Amendment Application for the Project will be made using the DES form <i>Application to amend an environmental authority—ESR/2015/1733</i> , and will be supported by this Environmental Values Assessment (EVA).
(c) <i>be accompanied by the fee prescribed by regulation; and</i>	The EA Amendment Application will be accompanied by the appropriate fee as prescribed by the <i>Environmental Protection Regulation 2019</i> .
(d) <i>describe the proposed amendment; and</i>	Section 2
(e) <i>describe the land that will be affected by the proposed amendment; and</i>	Section 3.1
(f) <i>include any other document relating to the application prescribed by regulation.</i>	This EVA provides a detailed description of the Project, an assessment of the potential environmental impacts of the Project, as well as proposed management measures and mitigation strategies.

Table A-2
Environmental Protection Act – Section 226A Requirements

Section 226A, Clause 1 Requirement	EVA Section/Appendix Addressed
(a) <i>describe any development permits in effect under the Planning Act for carrying out the relevant activity for the authority; and</i>	N/A
(b) <i>state whether each relevant activity will, if the amendment is made, comply with the eligibility criteria for the activity; and</i>	N/A
(c) <i>if the application states that each relevant activity will, if the amendment is made, comply with the eligibility criteria for the activity—include a declaration that the statement is correct; and</i>	N/A
(d) <i>state whether the application seeks to change a condition identified in the authority as a standard condition; and</i>	N/A
(e) <i>if the application relates to a new relevant resource tenure for the authority that is an exploration permit or GHG permit—state whether the applicant seeks an amended environmental authority that is subject to the standard conditions for the relevant activity or authority, to the extent it relates to the permit; and</i>	N/A
(f) <i>include an assessment of the likely impact of the proposed amendment on the environmental values, including—</i>	Section 3 Appendices A to F
(i) <i>a description of the environmental values likely to be affected by the proposed amendment; and</i>	Section 3 Appendices A to F
(ii) <i>details of emissions or releases likely to be generated by the proposed amendment; and</i>	Sections 3.2, 3.5 and 3.6 Appendices A, E and F
(iii) <i>a description of the risk and likely magnitude of impacts on the environmental values; and</i>	Section 3 Appendices A to F
(iv) <i>details of the management practices proposed to be implemented to prevent or minimise adverse impacts; and</i>	Section 3
(v) <i>if a PRCP schedule does not apply for each relevant activity—details of how the land the subject of the application will be rehabilitated after each relevant activity ends; and</i>	Section 4.3
(g) <i>include a description of the proposed measures for minimising and managing waste generated by amendments to the relevant activity; and</i>	Section 2.9
(h) <i>include details of any site management plan or environmental protection order that relates to the land the subject of the application.</i>	N/A