MIDDLEMOUNT COAL MINE

SOUTHERN EXTENSION PROJECT
Environmental Values Assessment

November 2020

middlemount coal PTY LTD
ABN 49 122 348 412

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.

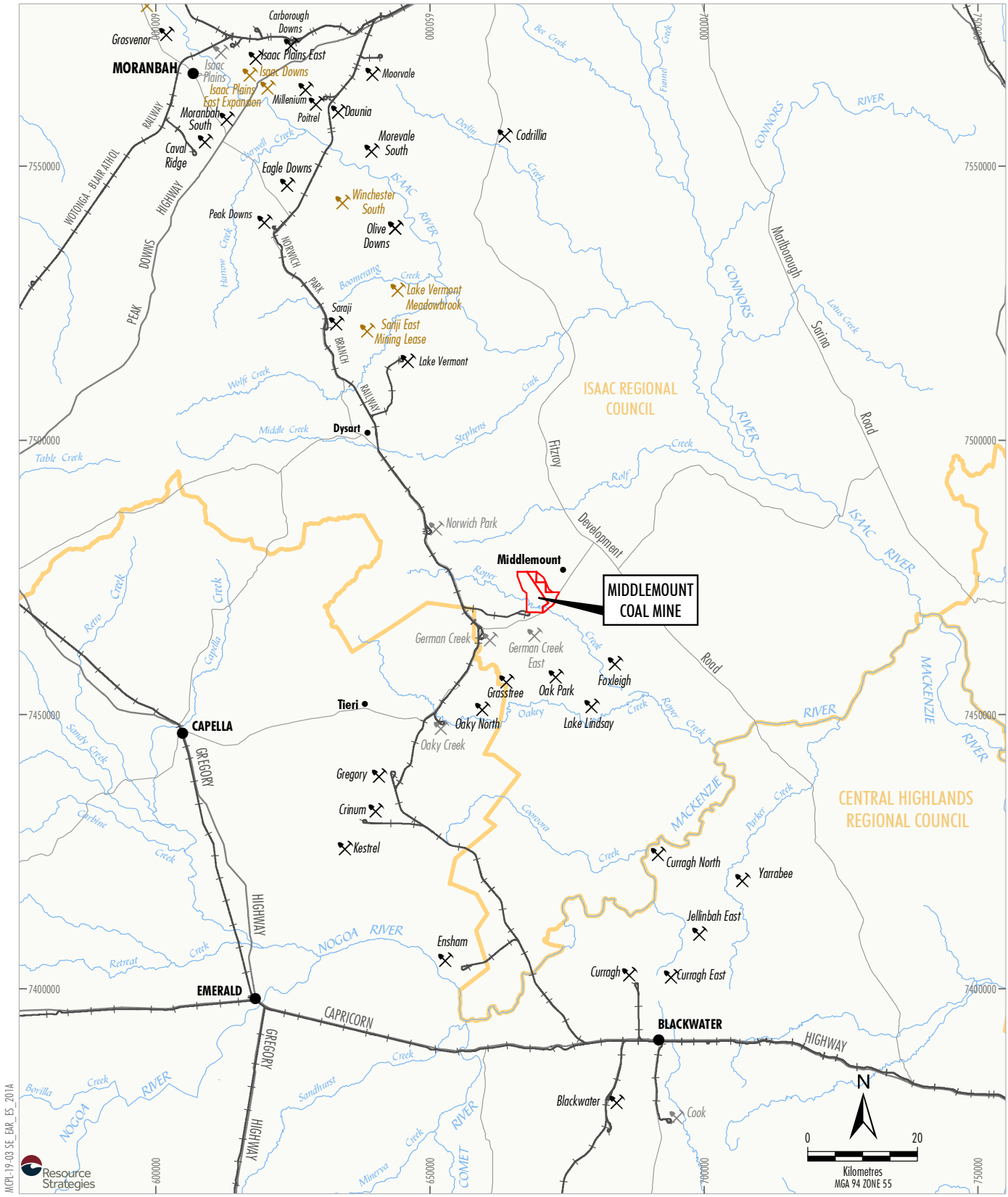
ES.2 PROJECT OVERVIEW

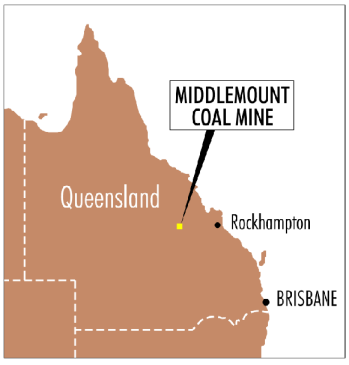
On 7 November 2019, MCPL submitted an application to vary the boundaries of ML 70379 (associated with the Middlemount Coal Mine) and ML 1998 (associated with the German Creek Coal Mine) under section 295 (1)(b) of the Qld *Mineral Resources Act 1989*.

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;





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)

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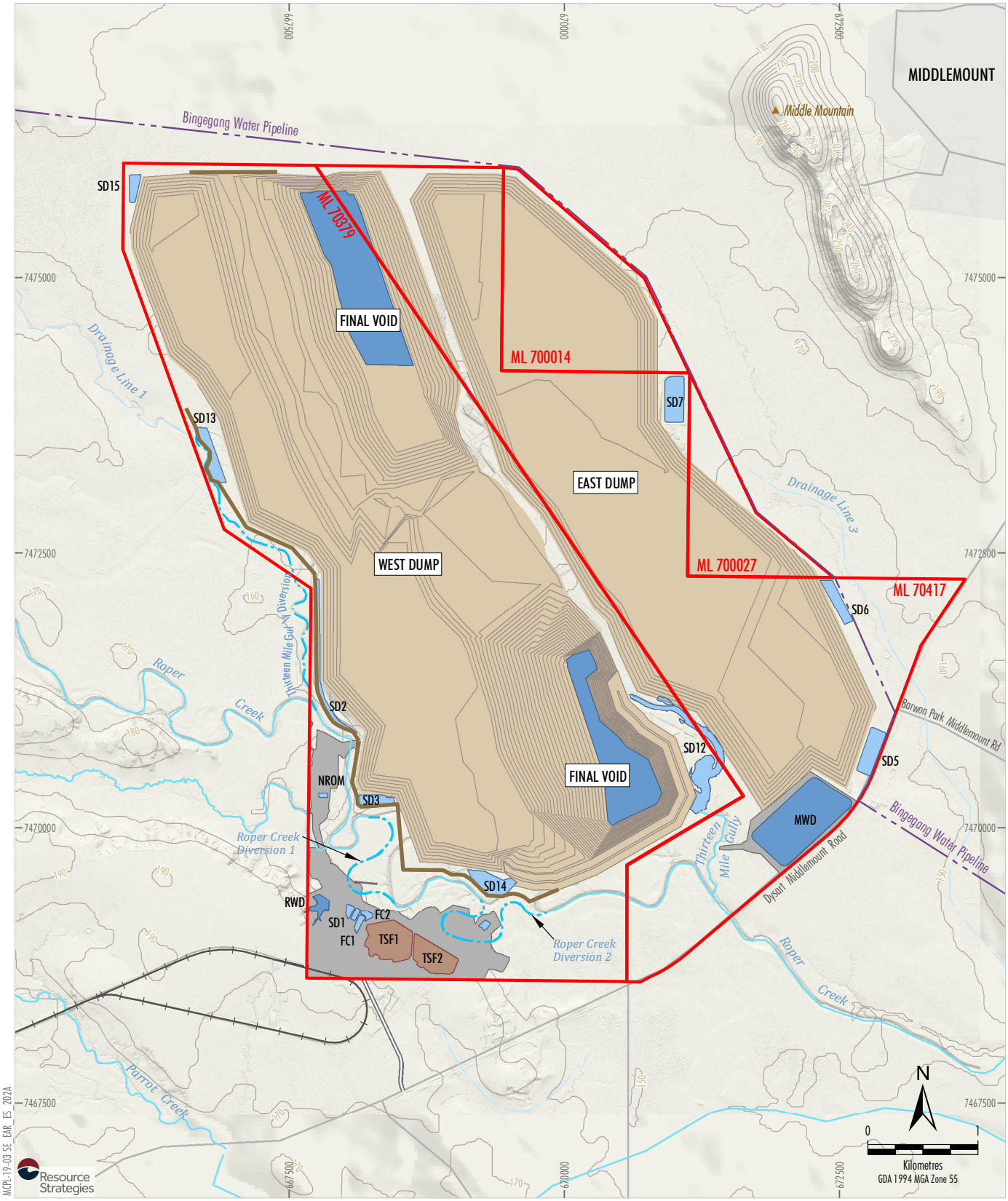
SOUTHERN EXTENSION PROJECT

Regional Location

Figure ES-1



LEGEND

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

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

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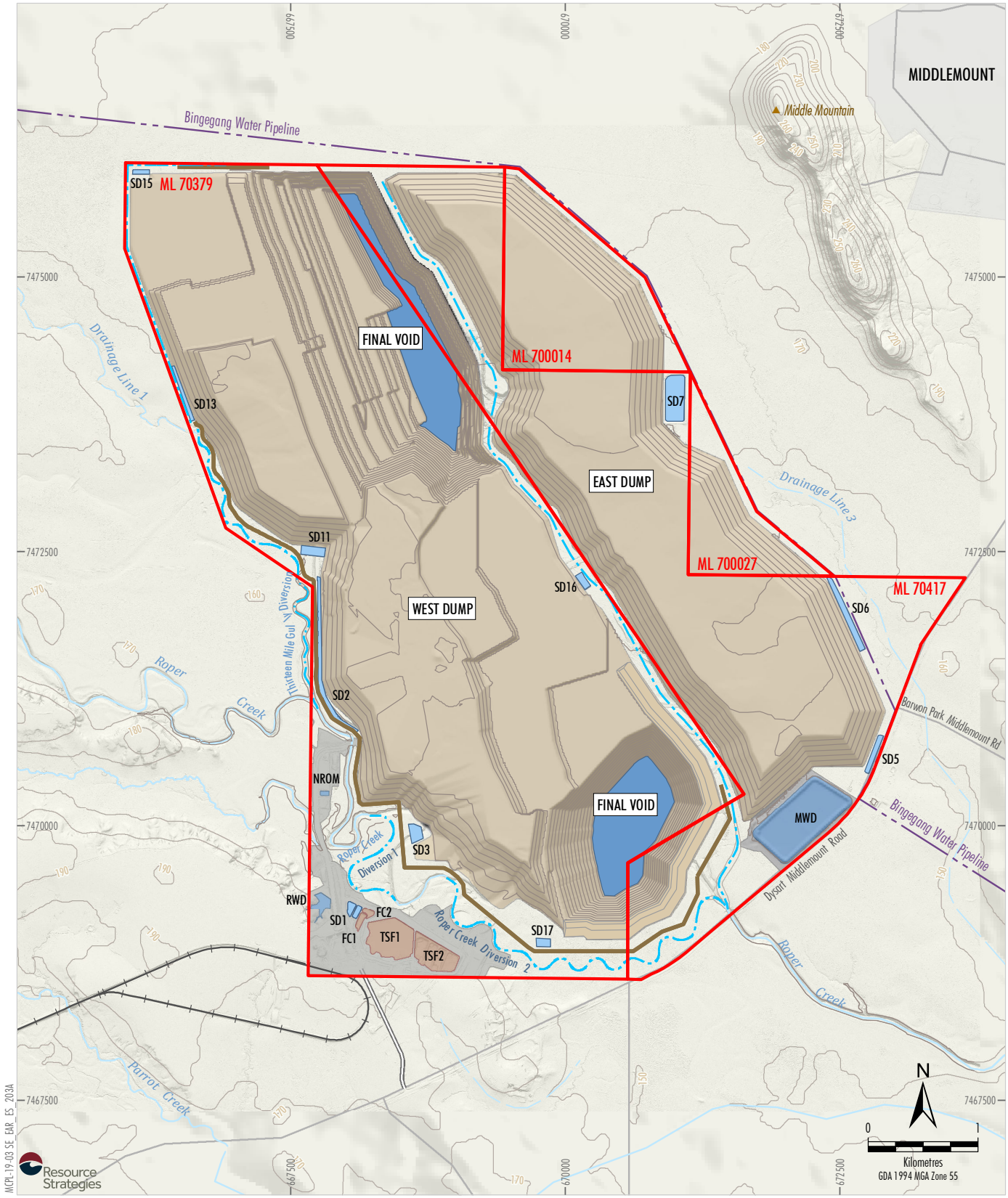
SOUTHERN EXTENSION PROJECT

Existing/Approved Middlemount Coal Mine General Arrangement

Figure ES-2



LEGEND

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- Levee
- Mine Access Road
- Middlemount Rail Spur and Loop

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

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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 *Nature Conservation [Wildlife Management] Regulation 2006*. • 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

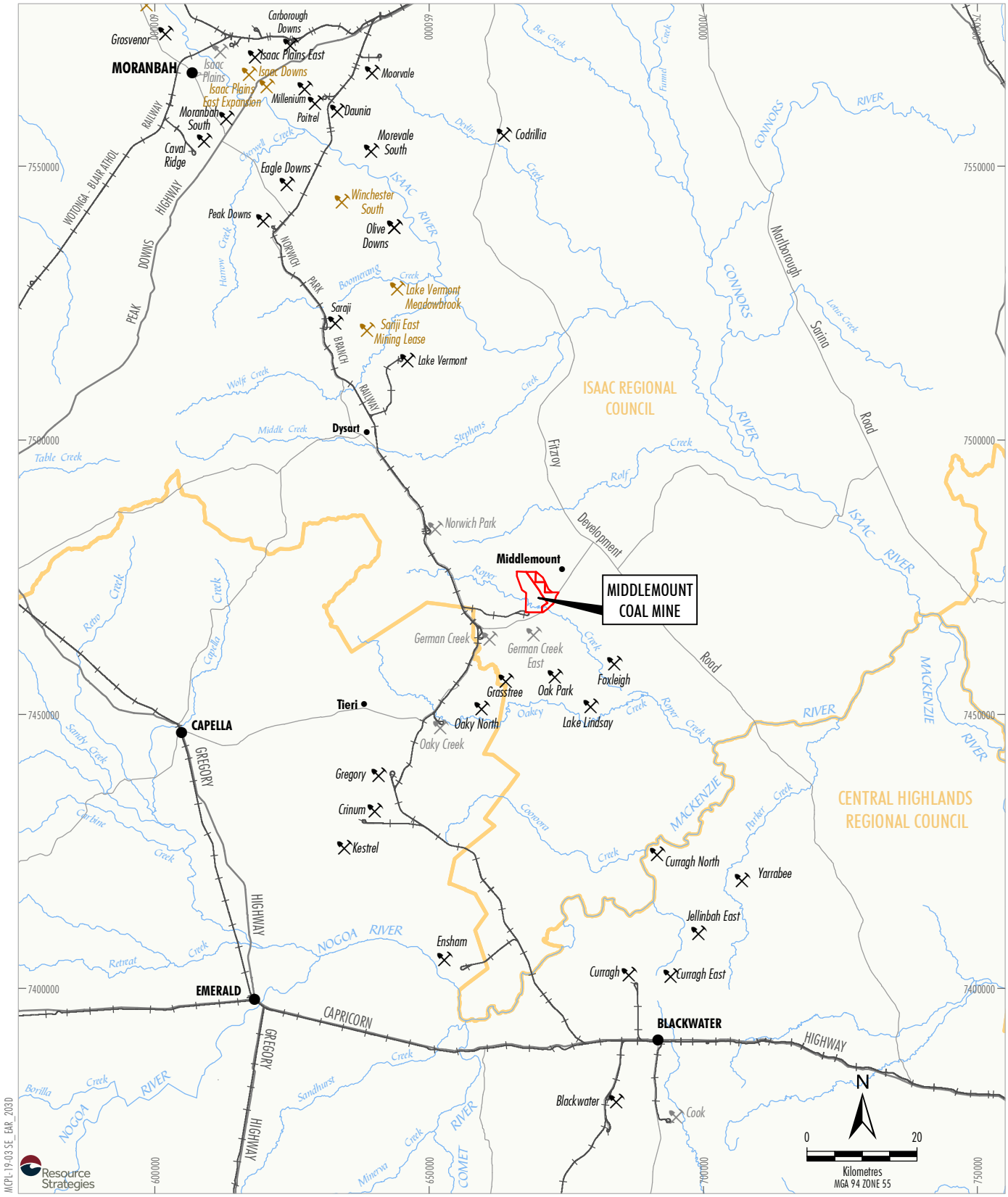
Stage 1 of the Middlemount Coal Mine was initially approved for the production of 1.8 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal, designated under Mining Lease (ML) 70379, and an amended EA (Mining Activities) Non-Code Compliant Level 1 MIN100646307 – Middlemount Coal Mine, effective from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

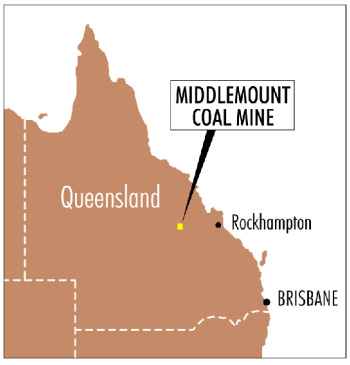
Full scale operations at the Middlemount Coal Mine commenced in July 2011.

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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Source: The State of Queensland (2020)

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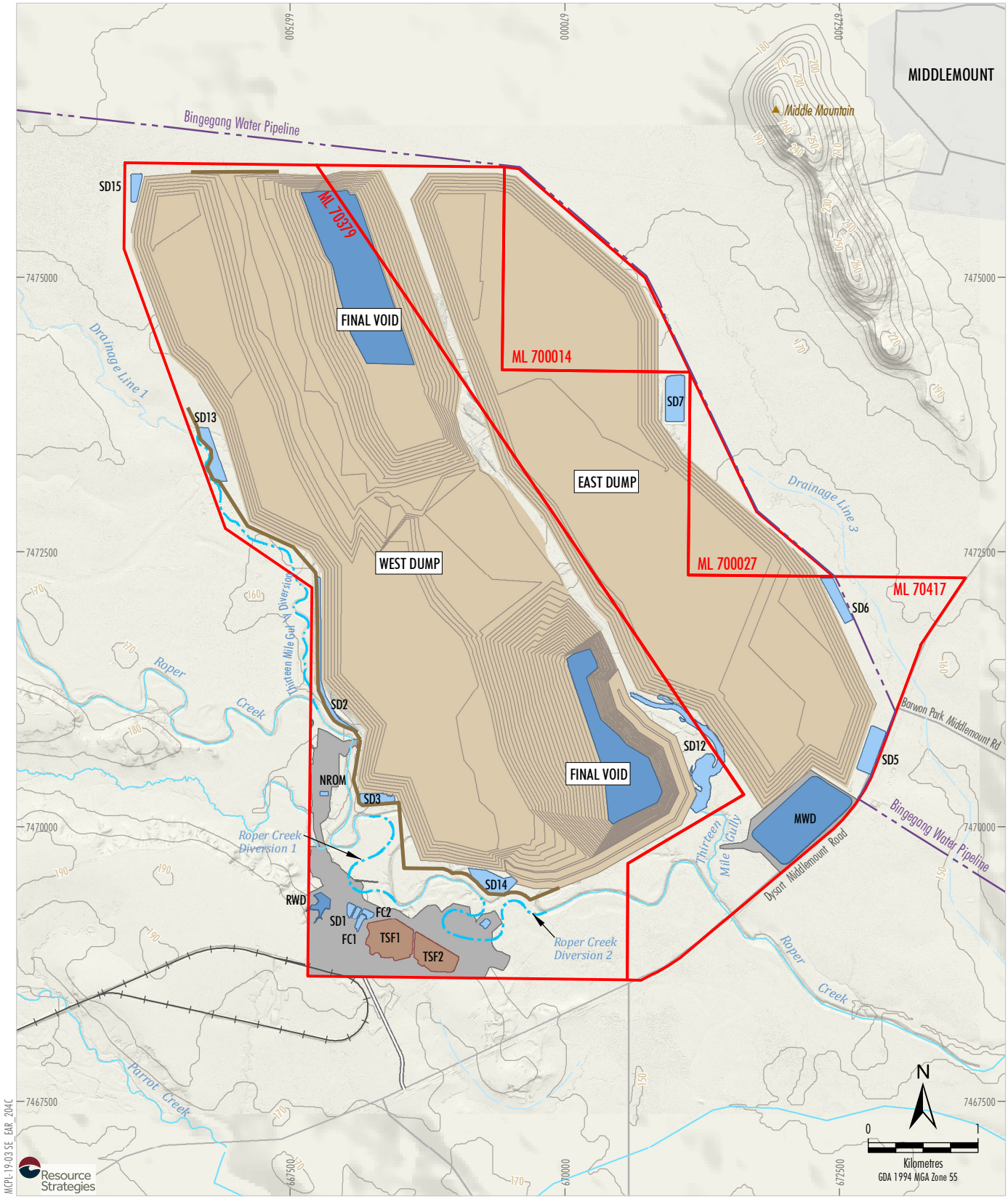
SOUTHERN EXTENSION PROJECT

Regional Location

Figure 1-1



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

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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 Enviroscience [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

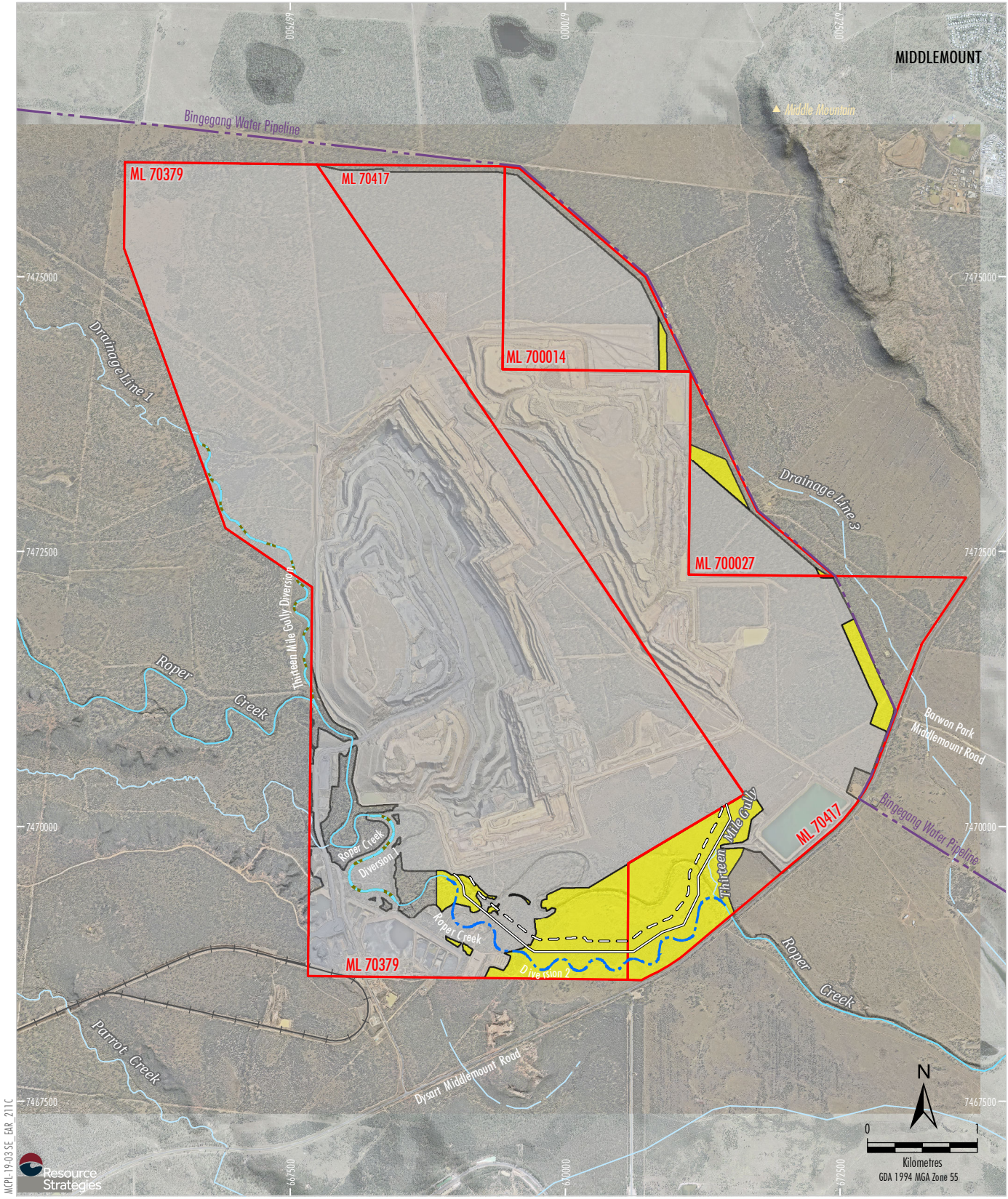
MCPL held a meeting with the Isaac Regional Council to discuss the Project on 12 October 2020. Consultation with the Isaac Regional Council will continue to be undertaken during the assessment of this EVA by the Qld Government.

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)

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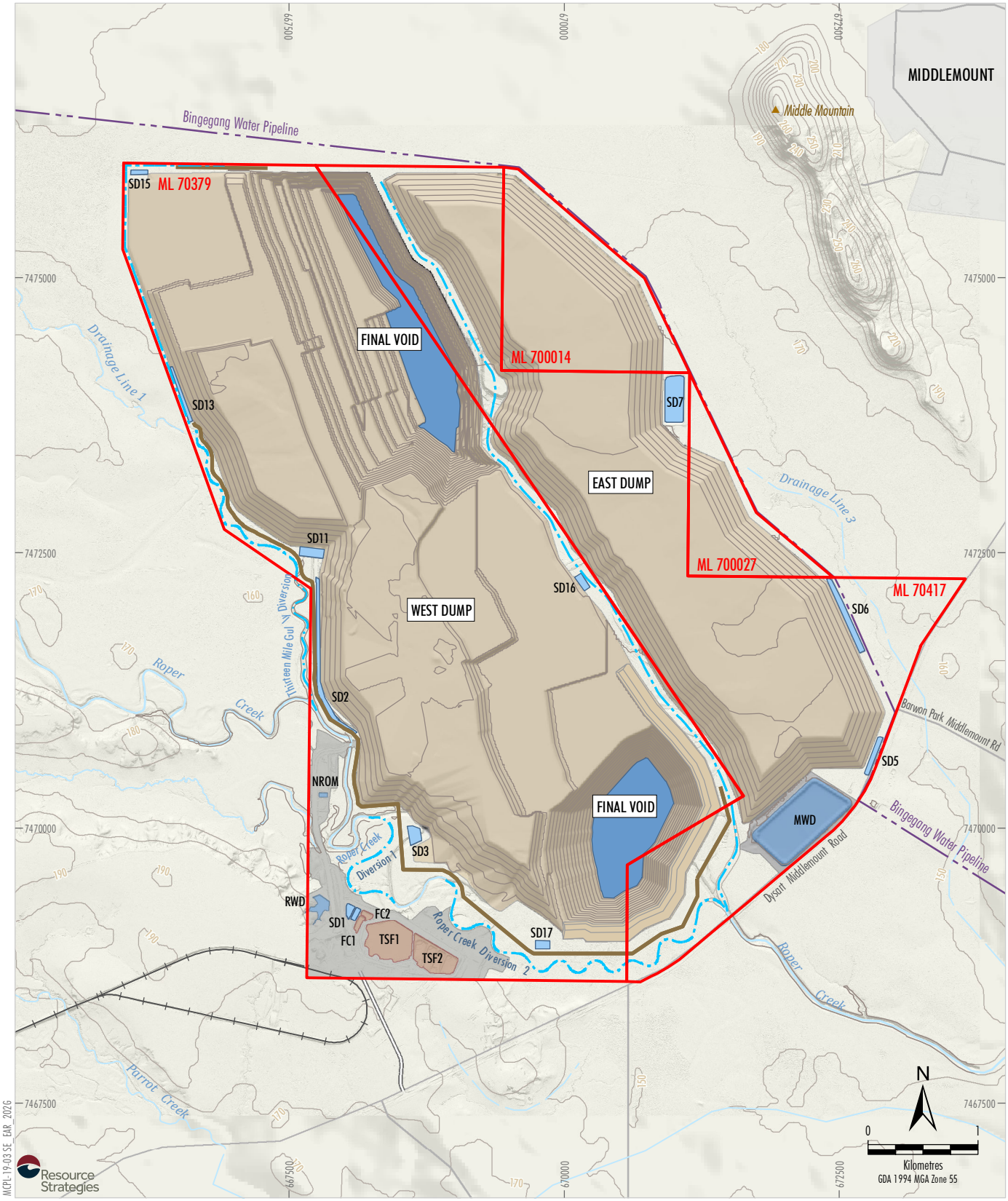
SOUTHERN EXTENSION PROJECT

Approximate Project Footprint

Figure 1-3



LEGEND

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

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

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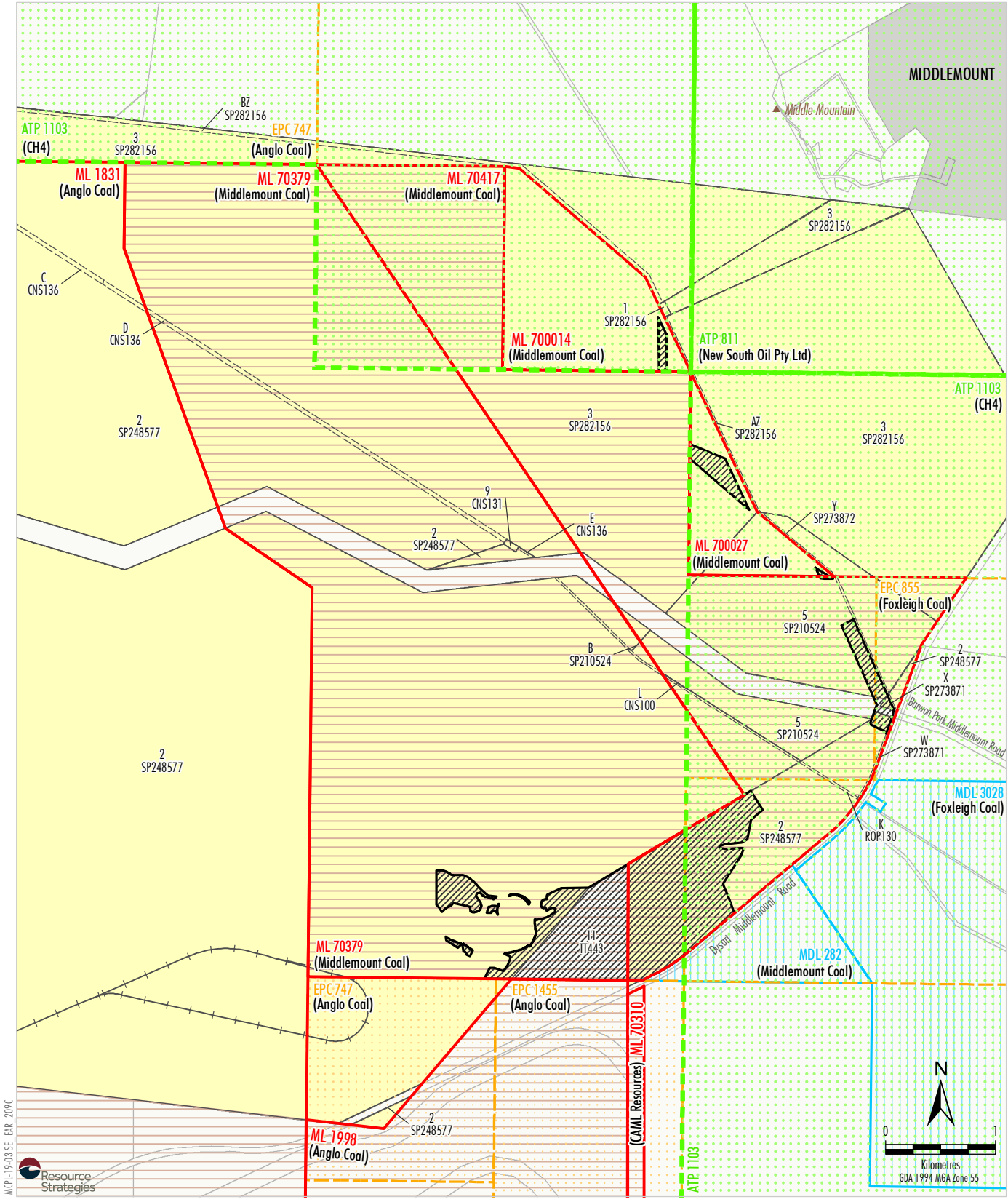
SOUTHERN EXTENSION PROJECT

Project General Arrangement

Figure 1-4



LEGEND

- Mining Lease Boundary (ML)
- Exploration Permit for Petroleum (EPP)
- Exploration Permit for Coal (EPC)
- Mineral Development Licence (MDL)
- Mining Lease Surface Area
- Middlemount Coal Owned Land
- Easement
- Middlemount Rail Spur and Loop

Southern Extension Project

- Approximate Extent of Proposed Additional Disturbance

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

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SOUTHERN EXTENSION PROJECT

Mining and Exploration Tenements and Relevant Land Tenure

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 *Regional Planning Interests Act 2014* (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 *Aboriginal Cultural Heritage Act, 2003* (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 *Nature Conservation Act 1992* (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 *Native Title Act 1993*	Attorney General's Department	The Commonwealth *Native Title Act 1993* 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.

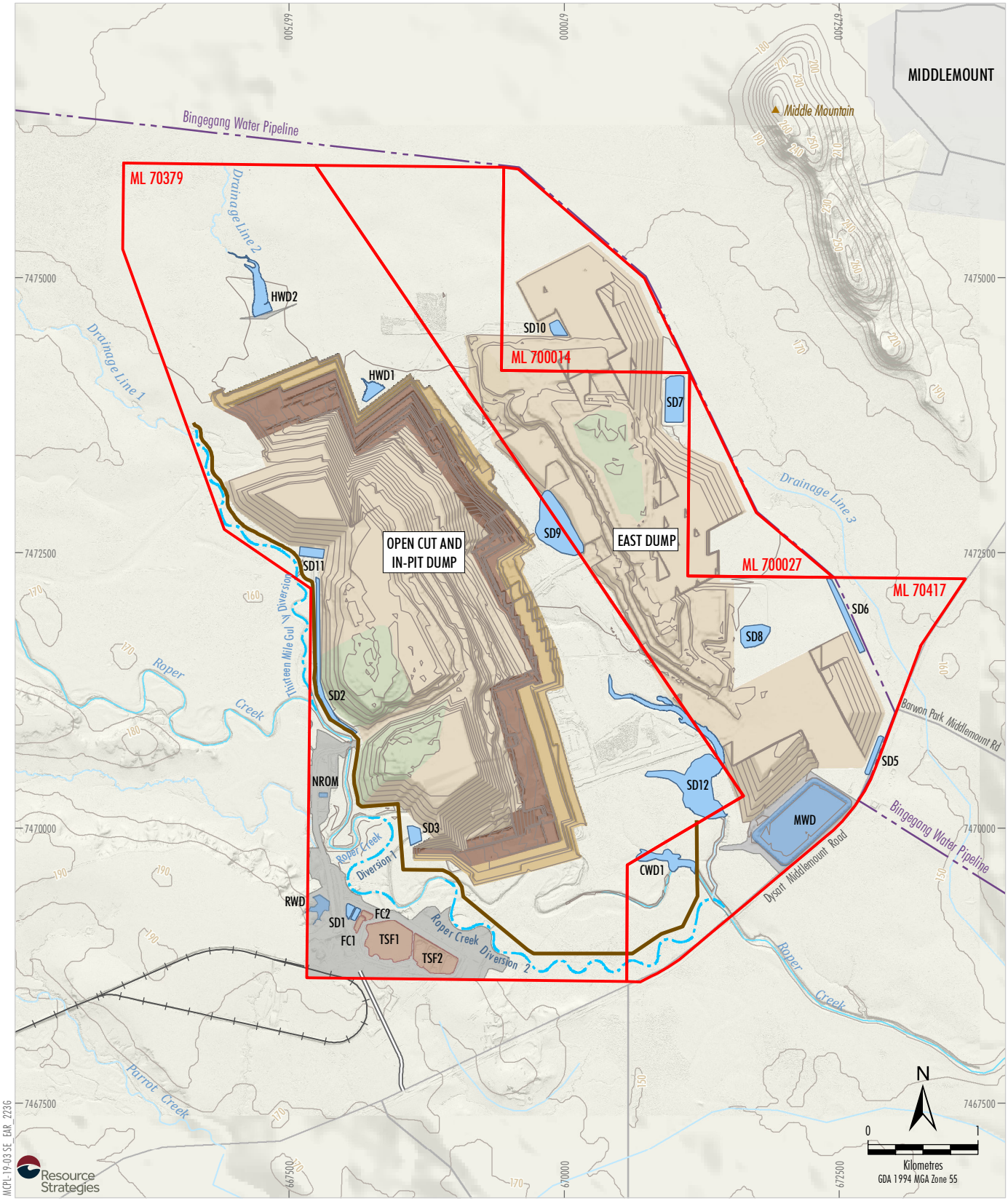
2.2 PROJECT GENERAL ARRANGEMENT

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.



LEGEND

- Mining Lease Boundary (ML)
- Topsoil Stripped
- Active Open Cut Mining Area
- Active Waste Rock Emplacement
- Initial 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)

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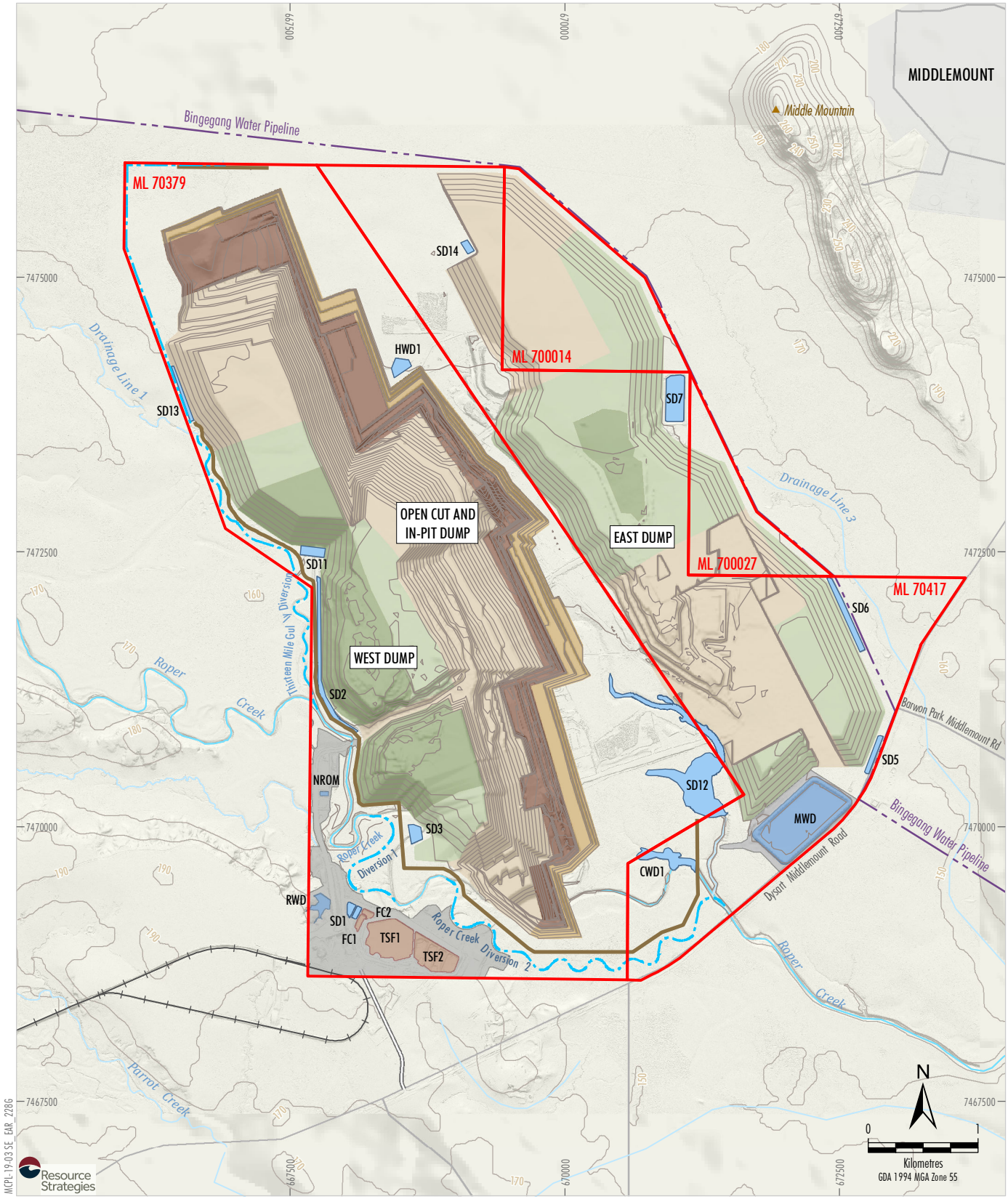
SOUTHERN EXTENSION PROJECT

Conceptual General Arrangement
Year 3 (2023)

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)

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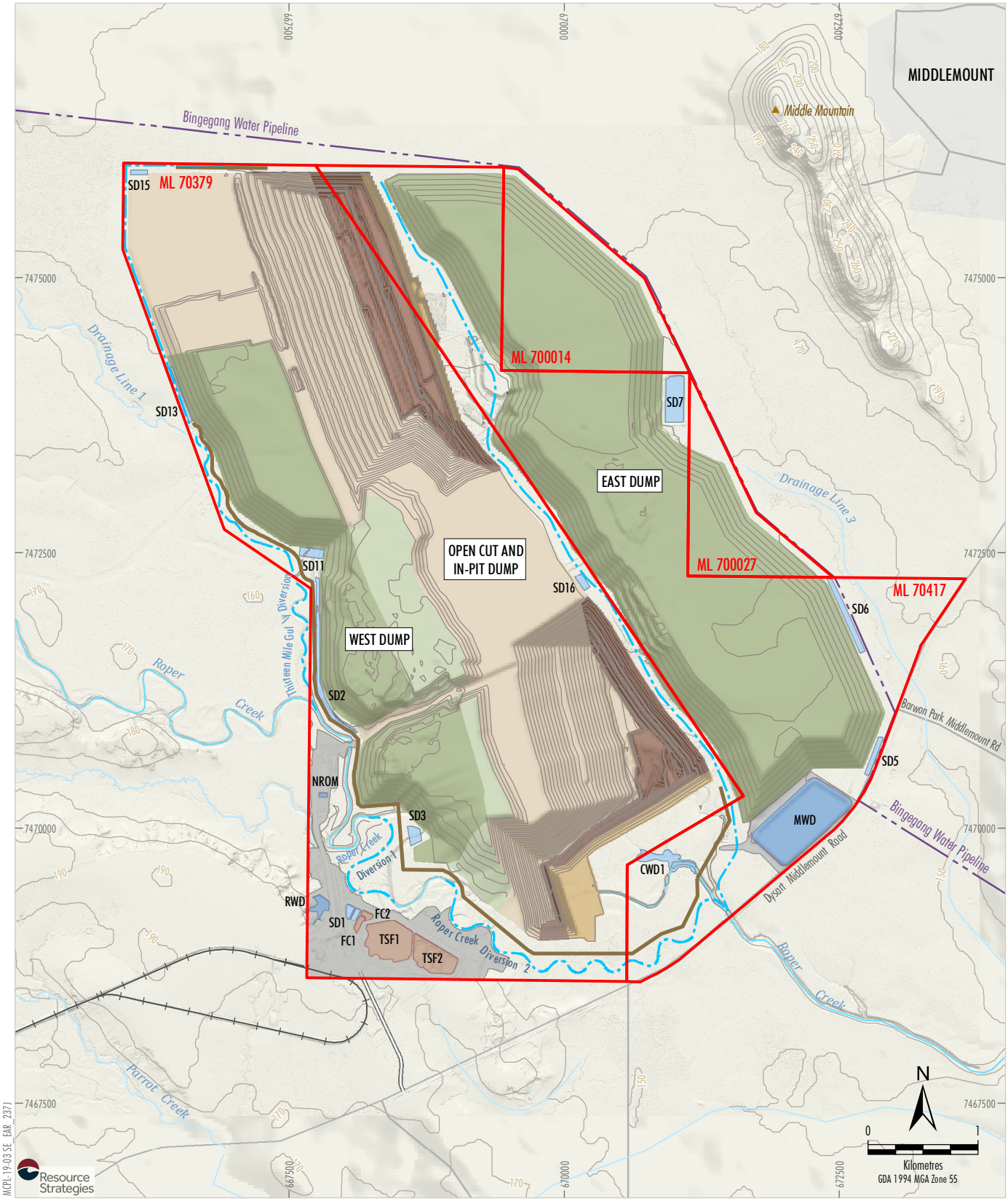
SOUTHERN EXTENSION PROJECT

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

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

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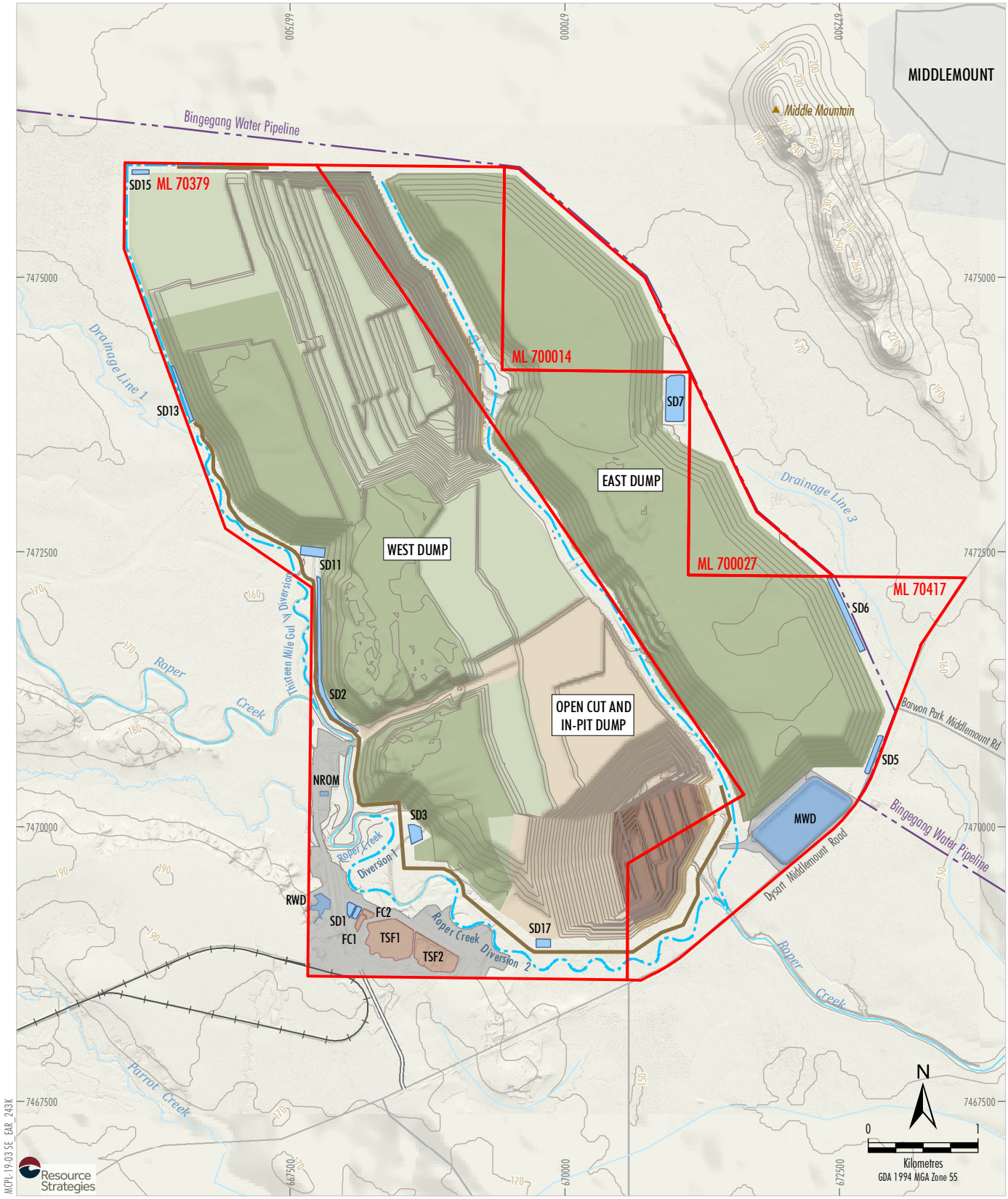
SOUTHERN EXTENSION PROJECT

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

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

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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) sediments 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.

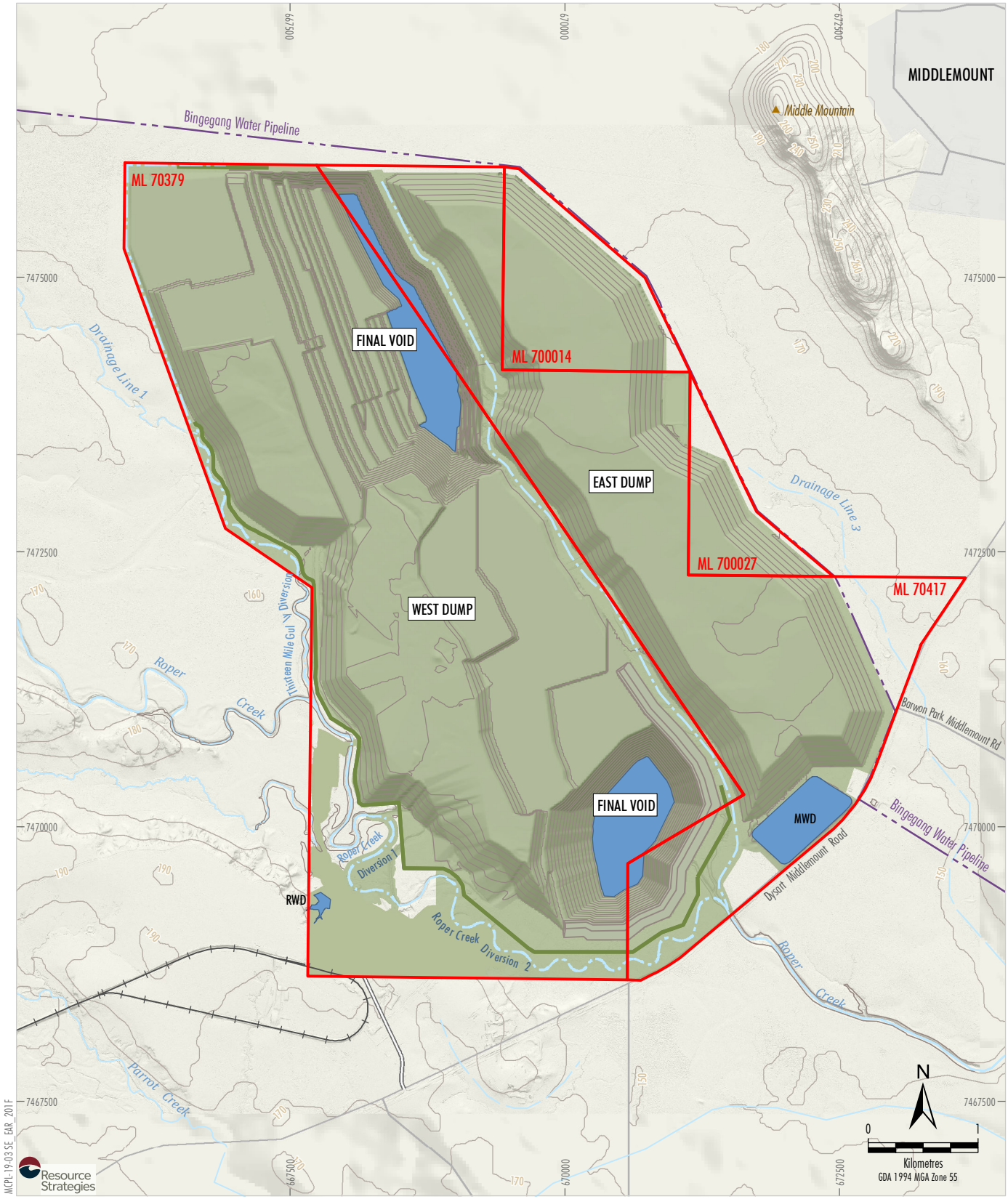
The residual voids are described further in Section 4.

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.



LEGEND

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

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

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SOUTHERN EXTENSION PROJECT

Conceptual General Arrangement
Post-mining

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.

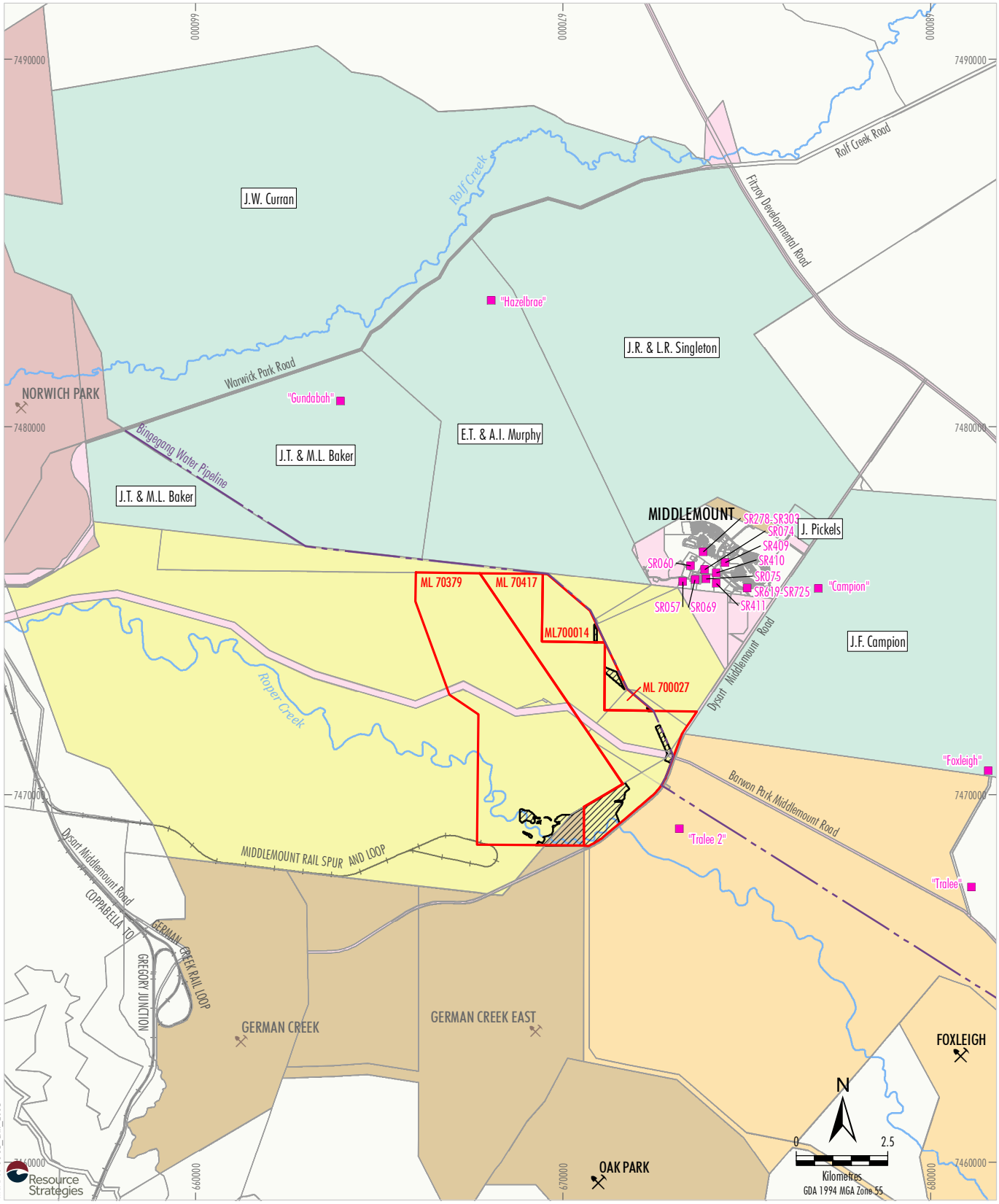
The Bingegang Pipeline, a water supply pipeline between the Bingegang Weir and the town of Dysart and nearby mining operations, has been realigned around the Middlemount Coal Mine and is located adjacent to the east of the Project area (Figure 1-4).

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.



LEGEND

- Middlemount Coal Mining Lease Boundary (ML)
- Approximate Extent of Additional Disturbance
- Cadastral Boundary
- Railway
- Active Coal Mine
- Inactive Coal Mine

LANDHOLDER

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

Sensitive Receiver

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)

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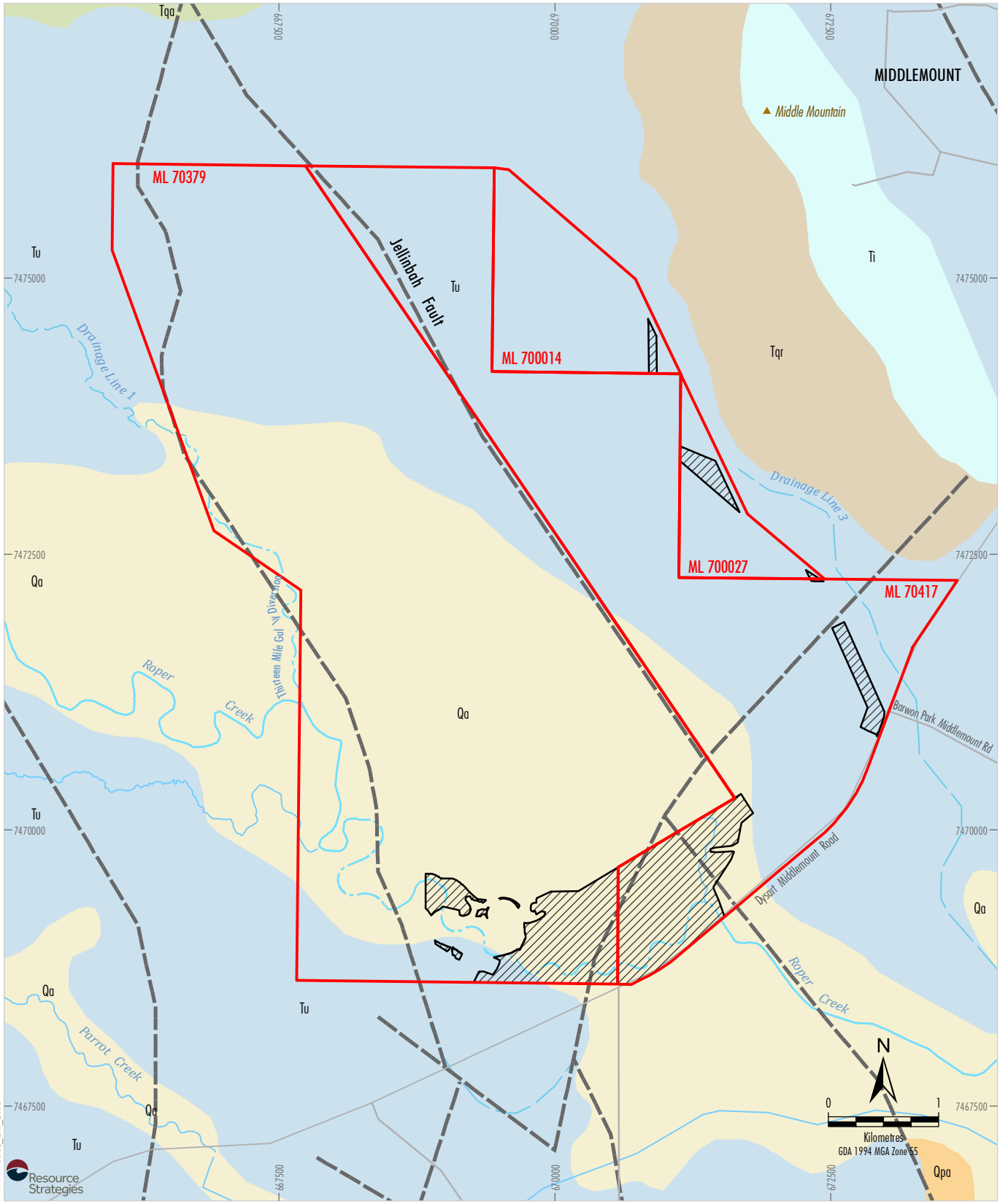
SOUTHERN EXTENSION PROJECT

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

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

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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 Amenity

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 Amenity

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 (km^2).

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 (DNRM, 2017).

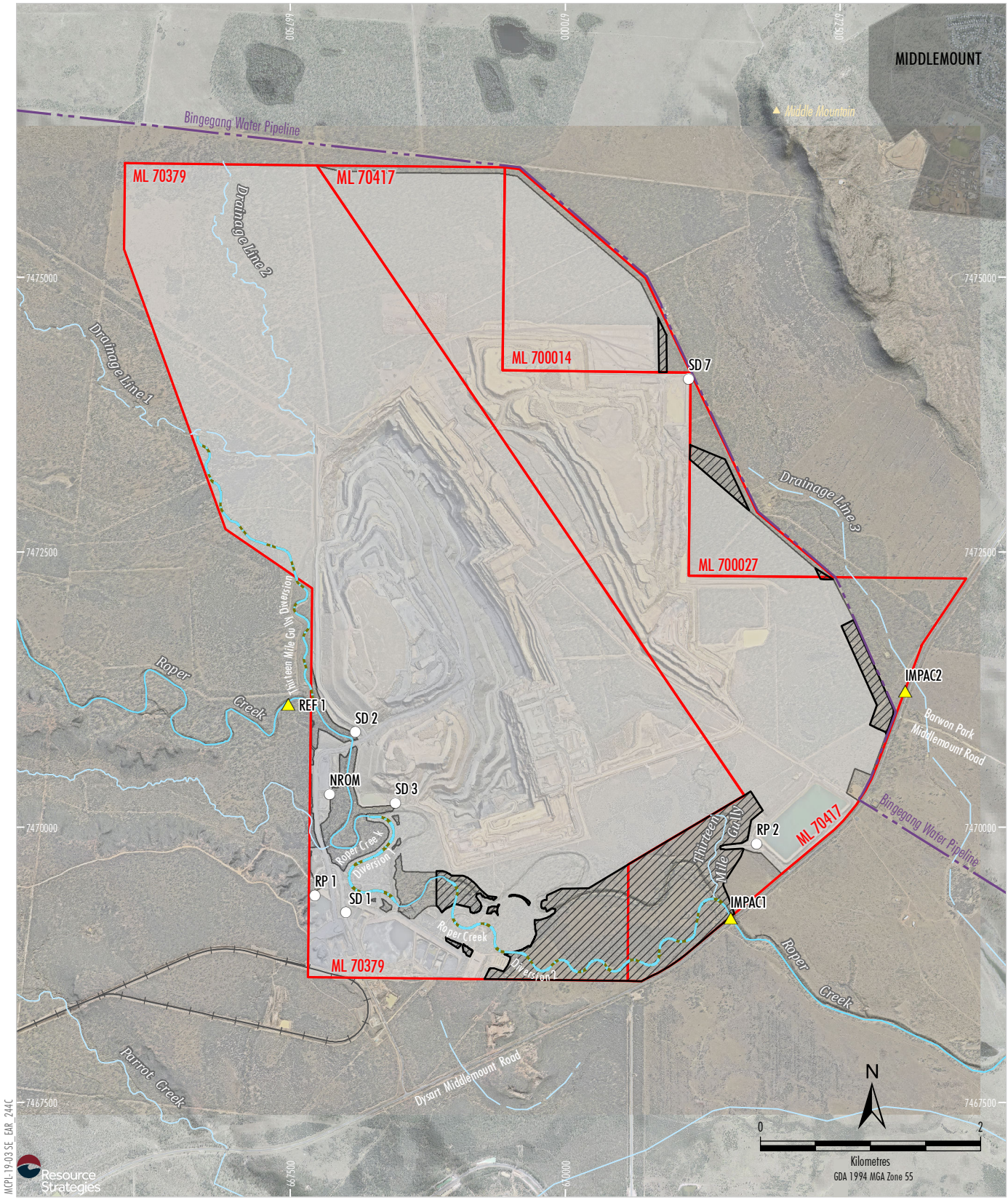
A small portion of Thirteen Mile Gully (approximately 1 km) remains in its pre-mining location to the south-east of the Project, which drains south to Roper Creek (Figure 3-3).

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)

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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 km^2 surrounding the Middlemount Coal Mine.

The bore census indicated a total of five landholder water supply bores on two of the privately-owned 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

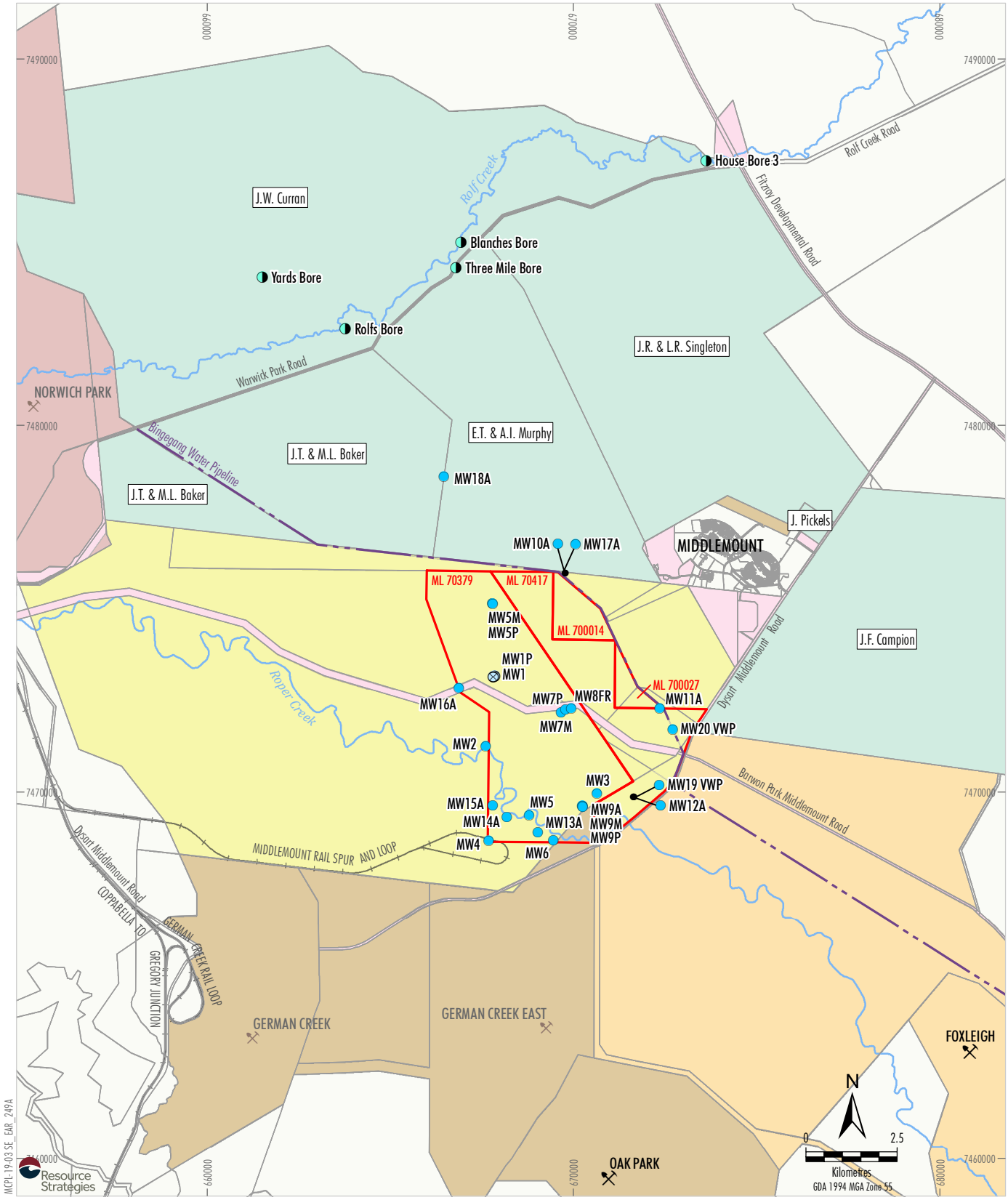
A contemporary numerical groundwater model was developed for the Middlemount Coal Mine as part of the Middlemount Western Extension Project (AGE, 2018). This 2018 groundwater model prepared for the Western Extension Project has been utilised as the basis for the Groundwater Assessment (Appendix B).

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.



LEGEND

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

LANDHOLDER

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

Private Landholder Bores

- Bore Identified During Bore Census

Middlemount Coal Groundwater Monitoring Bores

- Existing Bore
- Bore Abandoned/Destroyed

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

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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).

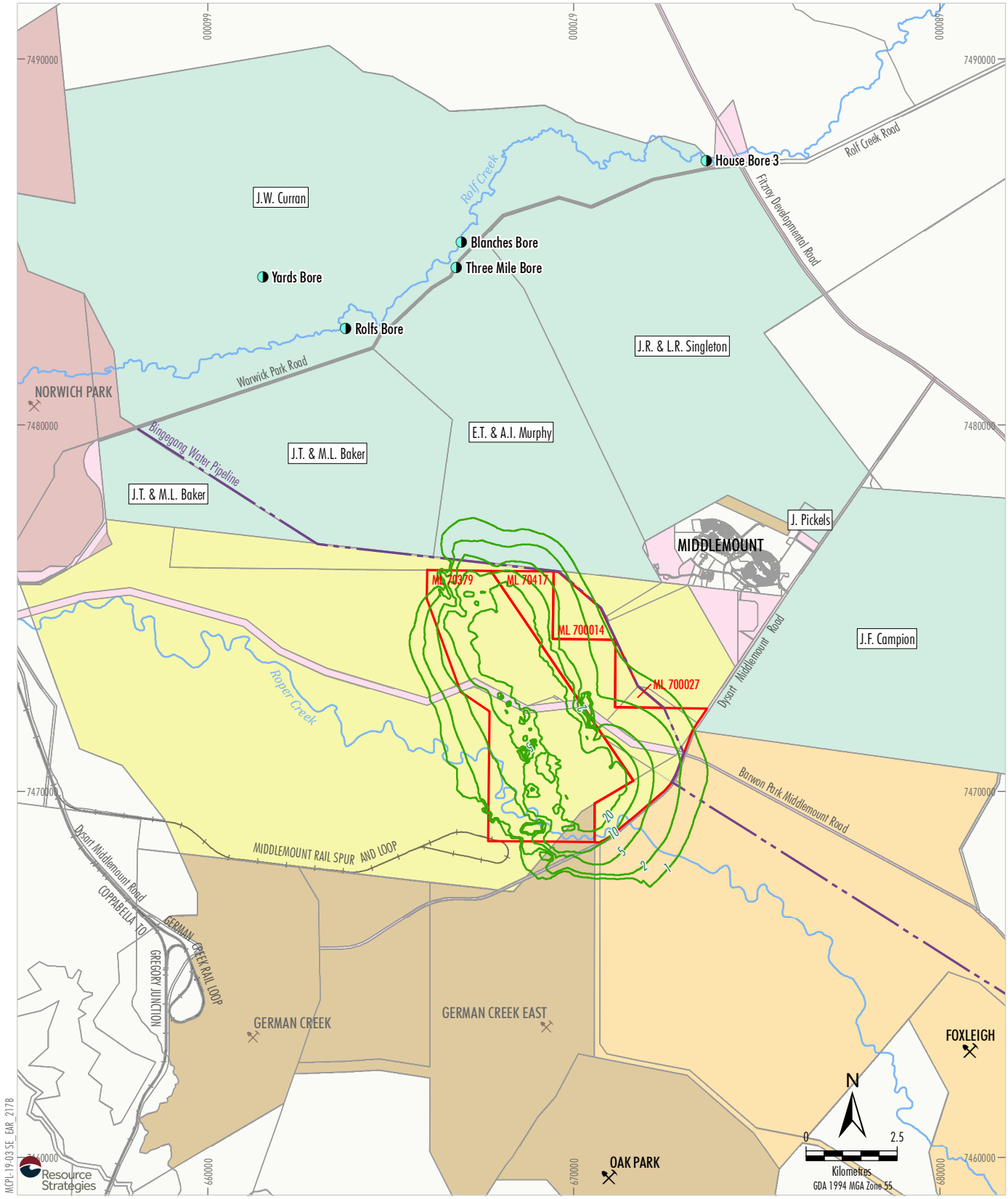
Overall, the predicted drawdown extents due to the Project are similar to those previously predicted for the Western Extension Project (see AGE [2018]).

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).



LEGEND

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

LANDHOLDER

- Middlemount Coal Owned Land
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- Foxleigh Land Pty Ltd
- Crown Land
- Relevant Private Landholder
- Owner not Referenced

Maximum Zone of Groundwater Drawdown

- Drawdown Contour (m)

Private Landholder Bores

- Bore Identified During Bore Census

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

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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 µS/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.