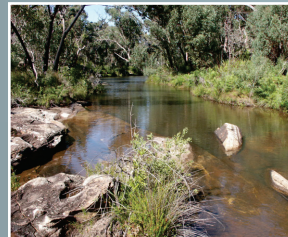


METROPOLITAN COAL LONGWALL 304

COAL RESOURCE RECOVERY PLAN





METROPOLITAN COAL

METROPOLITAN COAL

LONGWALL 304

COAL RESOURCE RECOVERY PLAN

Revision Status Register

Section/Page/ Annexure	Revision Number	Amendment/Addition	Distribution	DP&E Approval Date
All	CRRP-R01-A	Original	DP&E, DRG	-

April 2019

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Attachment 2 Risk Assessment on Geological Features with Potential to Affect Water Quantity Available to Woronora Reservoir

1 INTRODUCTION

Metropolitan Coal is a wholly owned subsidiary of Peabody Energy Australia Pty Ltd (Peabody). Metropolitan Coal was granted approval for the Metropolitan Coal Project (the Project) under section 75J of the New South Wales (NSW) *Environmental Planning and Assessment Act, 1979* (EP&A Act) on 22 June 2009. A copy of the Project Approval is available on the Peabody website (<http://www.peabodyenergy.com>).

The Project comprises the continuation, upgrade and extension of underground coal mining operations (Longwalls 20-27 and Longwalls 301-317) and surface facilities at Metropolitan Coal (Figure 1). Longwall 304 is situated to the west of Longwalls 301-303, and defines the next mining sub-domain within the Project underground mining area (Figures 1 to 3). Longwall 305 on will be subject to future Extraction Plans.

1.1 PURPOSE AND SCOPE

In accordance with Condition 6(e), Schedule 3 of the Project Approval, this Coal Resource Recovery Plan (CRRP) has been prepared as a component of the Metropolitan Coal Longwall 304 Extraction Plan to demonstrate effective recovery of the available resource.

The relationship of this CRRP to the Metropolitan Coal Environmental Management Structure and to the Metropolitan Coal Longwall 304 Extraction Plan is shown on Figure 4.

The following graphical plans (Attachment 1) have been prepared in accordance with Department of Planning and Environment (DP&E) and Division of Resources and Energy (DRE) (2015) *Guidelines for the Preparation of Extraction Plans*:

- Plan 1 Existing, Proposed and Future Workings.
- Plan 2 Longwall 304 Surface Features.
- Plan 3 Geological and Seam Data.
- Plan 5 Mining Titles and Land Ownership.
- Plan 6 Geological Section and Geotechnical Logs.

As there are currently no existing and/or planned future workings in seams above and/or below the proposed workings, Plan 4 referred to in the DP&E and DRE (2015) *Guidelines for the Preparation of Extraction Plans* has not been included in this CRRP. Plan 7 (Subsidence Monitoring Locations) is included in the Metropolitan Coal Longwall 304 Subsidence Monitoring Program.

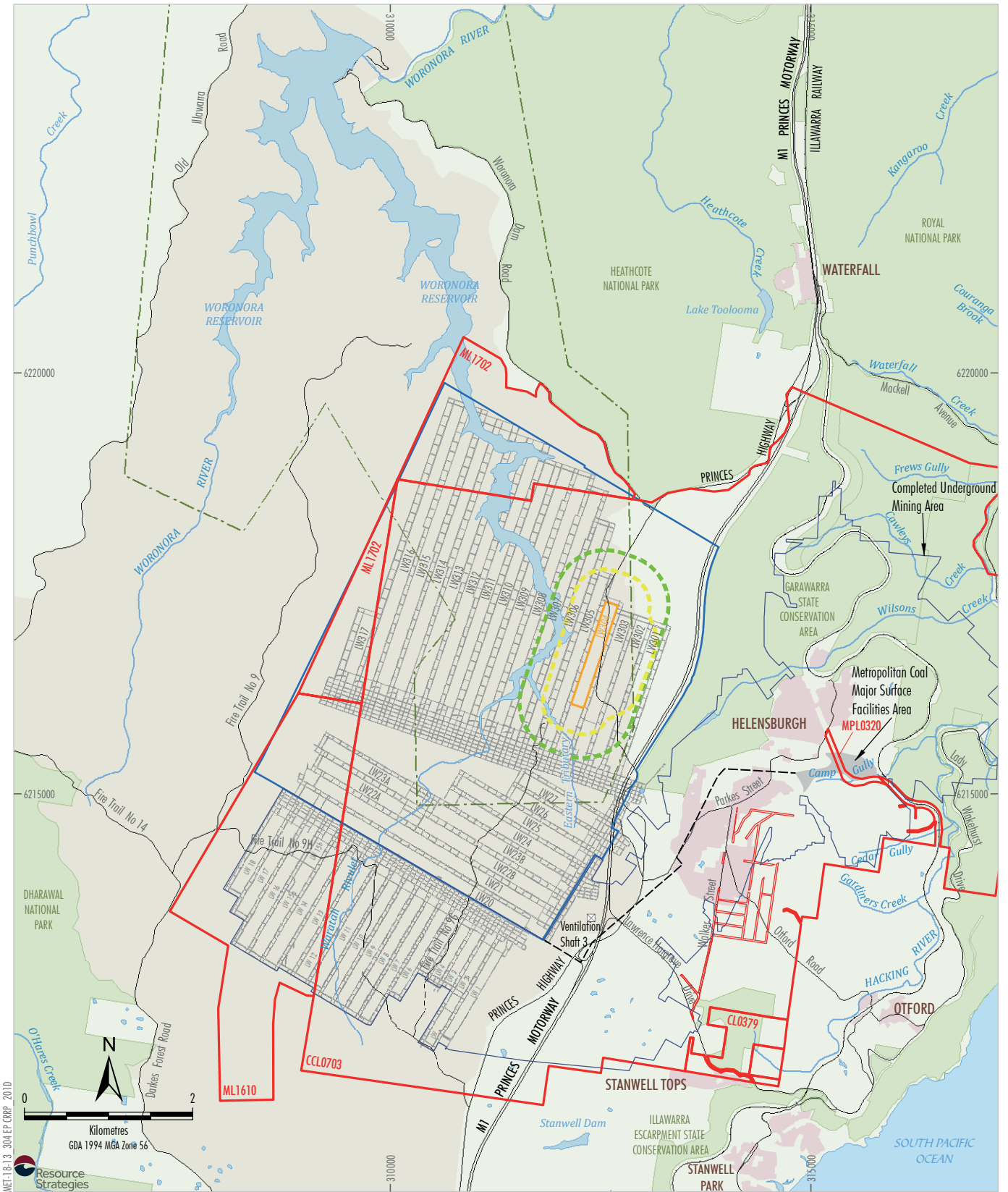
2 COAL RESOURCE RECOVERY PLAN REVIEW AND UPDATE

In accordance with Condition 4, Schedule 7 of the Project Approval, this CRRP will be reviewed within three months of the submission of:

- an audit under Condition 8, Schedule 7;
- an incident report under Condition 6, Schedule 7;
- an annual review under Condition 3, Schedule 7; and

if necessary, revised to the satisfaction of the Director-General (now Secretary) of the DP&E.

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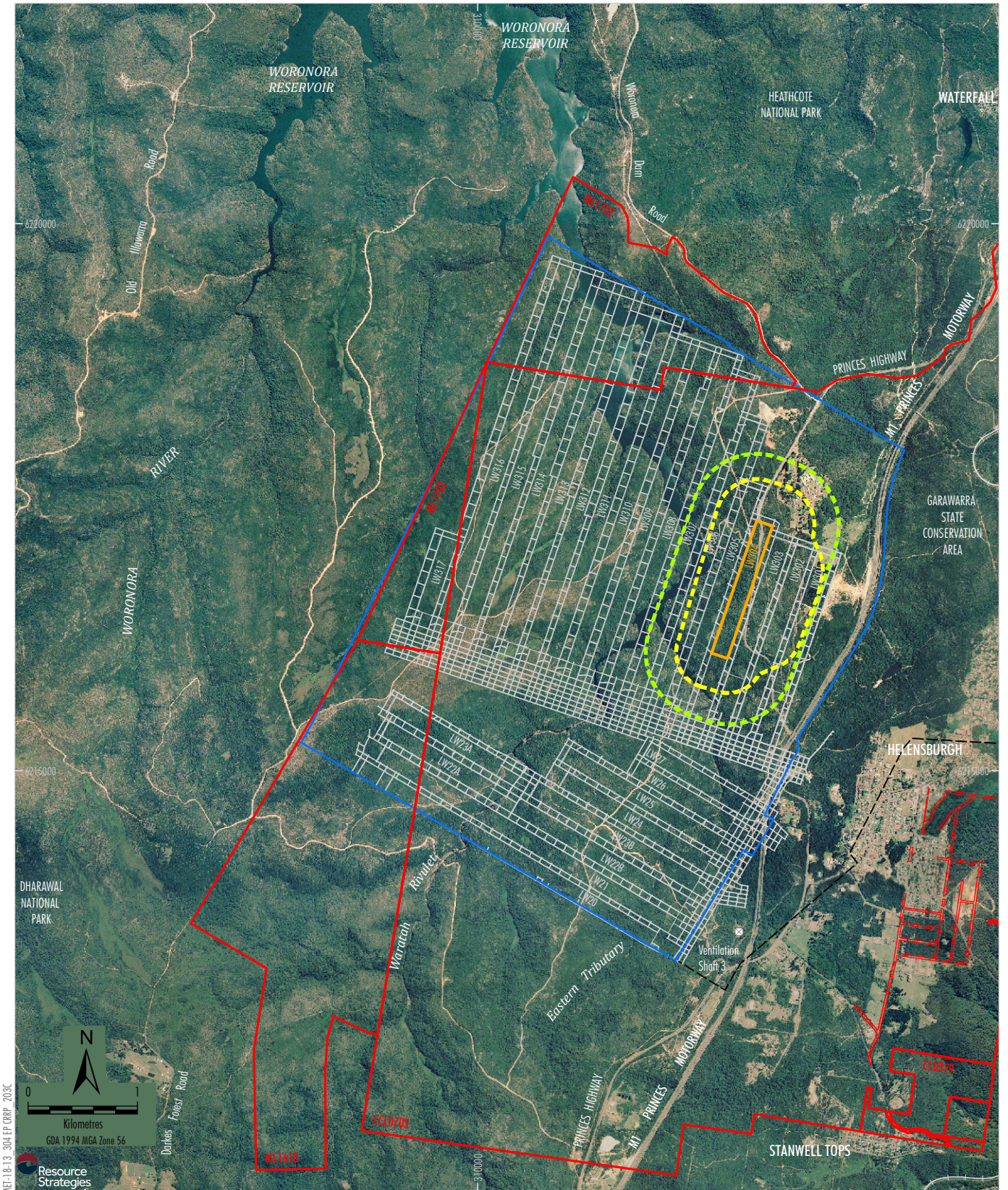


- LEGEND**
- Mining Lease Boundary
 - Woronora Special Area
 - Railway
 - Project Underground Mining Area
 - Longwalls 20-27 and 301-317
 - Longwall 304 Secondary Extraction
 - 35° Angle of Draw and/or Predicted 20 mm Subsidence Contour
 - 600 m from Secondary Extraction of Longwall 304
 - Woronora Notification Area
 - Existing Underground Access Drive (Main Drift)

Source: Land and Property Information (2015); Department of Industry (2015); Metropolitan Coal (2019); MSEC (2019)

Peabody
 METROPOLITAN COAL
 Longwall 304 and
 Project Underground Mining Area

Figure 1



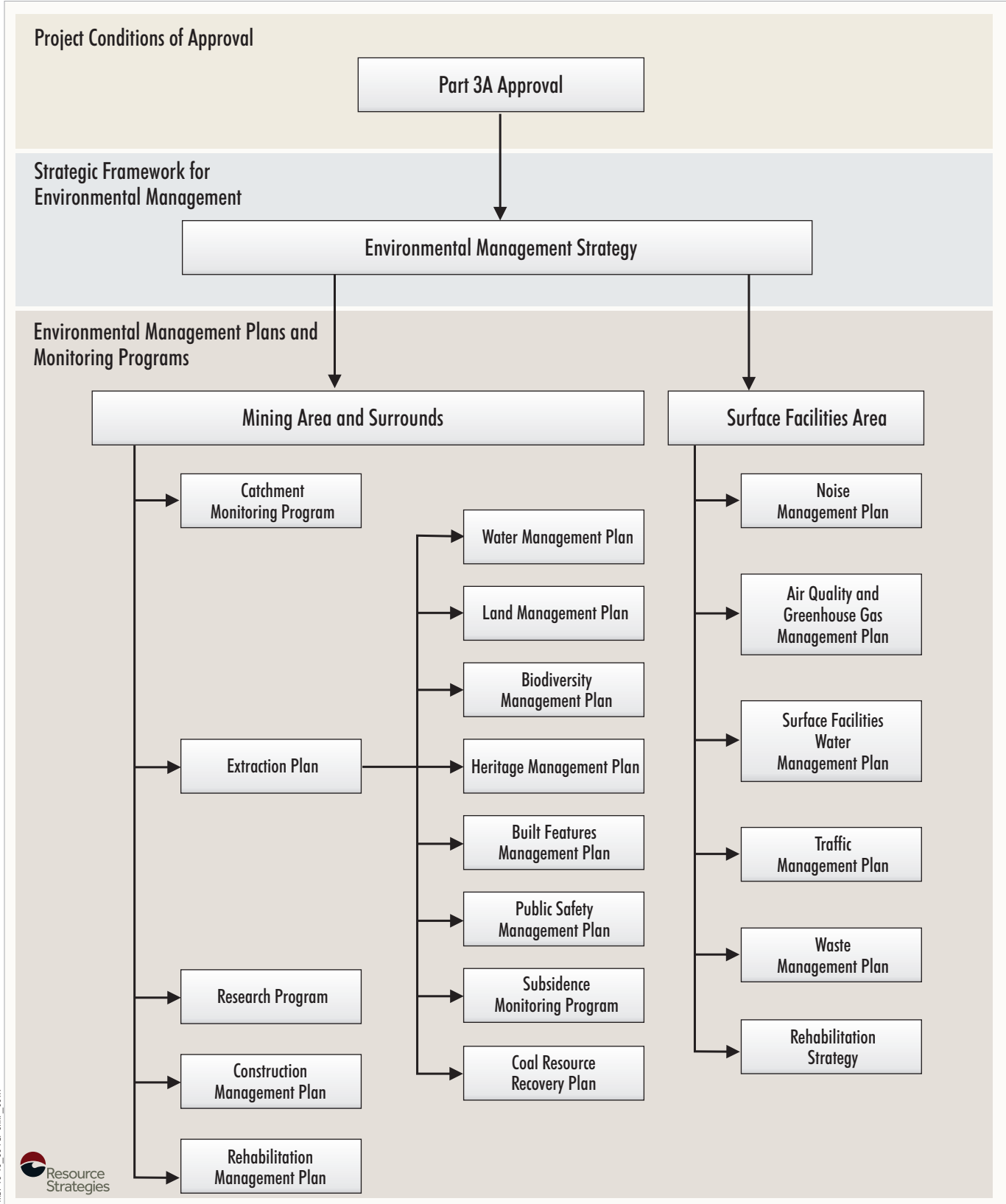
MEF-18-13-304 EP CRP, 203C

- LEGEND**
- Mining Lease Boundary
 - Railway
 - Project Underground Mining Area
Longwalls 20-27 and 301-317
 - Longwall 304 Secondary Extraction
 - 35° Angle of Draw and/or Predicted
20 mm Subsidence Contour
 - 600 m from Secondary Extraction of
Longwall 304
 - Existing Underground Access Drive (Main Drift)

Source: Land and Property Information (2015); Date of Aerial Photography 1998;
Department of Industry (2015); Metropolitan Coal (2019); MSEC (2019)

Peabody
METROPOLITAN COAL
Longwall 304 and
Project Underground Mining Area -
Aerial Photograph

Figure 3



MEF-18-13_30-4 EP CRP_001A

Figure 4

The CRRP will also be reviewed within three months of approval of any Project modification and if necessary, revised to the satisfaction of the DP&E.

The revision status of this CRRP is indicated on the title page of each copy. The distribution register for controlled copies of the CRRP is described in Section 2.1.

Revisions to any documents listed within this CRRP will not necessarily constitute a revision of this document.

2.1 DISTRIBUTION REGISTER

In accordance with Condition 10, Schedule 7 of the Project Approval 'Access to Information', Metropolitan Coal will make this CRRP publicly available on the Peabody website. A hard copy of the CRRP will also be maintained at the Metropolitan Coal site.

Metropolitan Coal recognises that various regulators have different distribution requirements, both in relation to whom documents should be sent and in what format.

An Environmental Management Plan and Monitoring Program Distribution Register has been established in consultation with the relevant agencies and infrastructure owners that indicates:

- to whom the Metropolitan Coal plans and programs, such as this CRRP, will be distributed;
- the format (i.e. electronic or hard copy) of distribution; and
- the format of revision notification.

Metropolitan Coal will make the Distribution Register publicly available on the Peabody website.

Metropolitan Coal will be responsible for maintaining the Distribution Register and for ensuring that the notification of revisions is sent by email or post as appropriate.

In addition, Metropolitan Coal employees with local computer network access will be able to view the controlled electronic version of this CRRP on the Metropolitan Coal local area network. Metropolitan Coal will not be responsible for maintaining uncontrolled copies beyond ensuring the most recent version is maintained on Metropolitan Coal's computer system and the Peabody website.

3 DESIGN PRINCIPLES

3.1 APPROVAL CONSIDERATIONS

During the NSW Government's assessment phase of the Metropolitan Coal Project Environmental Assessment (Project EA) (Helensburgh Coal Pty Ltd [HCPL], 2008), and in recognition of concerns raised by key stakeholders during the formal Planning Assessment Commission (PAC) assessment process, Metropolitan Coal (previously HCPL) considered it appropriate to reduce the proposed extent of the original Project longwall mining area (i.e. Longwalls 20-44).

Metropolitan Coal was granted Project Approval (08_0149) by the Minister for Planning on 22 June 2009. The Project Approval included a layout for Longwalls 301 to 317 referred to as the Preferred Project Layout (as described in the Preferred Project Report [HCPL, 2009]). Longwalls 301-317 included in the Preferred Project Layout (PPL) comprised 163 metres (m) panel widths (void) with 45 m pillars (solid) beyond 500 m from the Woronora Reservoir, and 138 m panel widths (void) with 70 m pillars (solid) within 500 m of the Woronora Reservoir.

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3.2 LAYOUT OPTIMISATION FOR 300 SERIES LONGWALLS

Following further mine planning investigations, Metropolitan Coal identified that significant operational efficiencies and consequently a significant economic benefit would be achieved by rotating the first workings of Longwalls 301-317 to be square with the 300 Mains (a rotation of approximately six degrees). The Secretary of the DP&E approved the revised first workings in accordance with Condition 5, Schedule 3 of the Project Approval in April 2015.

Subsequently, Metropolitan Coal proposed to consolidate the panel and chain pillar widths of Longwalls 301-304 to 163 m (void) panel widths and 45 m wide pillars (solid). Changes to the first workings of Longwalls 301-303 and Longwall 304 were approved by the DP&E in May 2016 and November 2018, respectively.

3.3 LONGWALL 304 EXTENT

3.3.1 Commencing Position – Northern Extent

During the stakeholder consultation phase for the Metropolitan Coal Longwalls 301-303 Extraction Plan an agreed subsidence parameter was developed with Garrawarra (NSW Health) to keep the active dementia care buildings at or below the 20 millimetres (mm) vertical subsidence contour and minimise the chance of cracking to these health facilities. This design principle has been applied to the Longwall 304 northern starting position. The commencing end position represents a reduction of 1,145 m of coal, (~850 kilotonnes [kt]), from the PPL.

3.3.2 Finishing Position – Southern Extent

The finishing end of Longwall 304 was determined based on an environmental standoff from the Eastern Tributary to avoid further impacts to this stream following impacts greater than predicted from the extraction of Longwall 27. The finishing end position represents a reduction of 553 m of coal (~346 kt) from the PPL (in this case the southern end of the PPL was narrowed).

3.3.3 Longwall Width

Longwall 304 has been significantly shortened at both the northern and, in particular the southern end, such that it would not extend beneath the Woronora Reservoir and the Eastern Tributary. The mining width has been set at 163 m and Metropolitan Coal considers the mine plan addresses concerns raised by DP&E, the Independent Expert Panel into Mining in Catchments, WaterNSW and the Dams Safety Committee.

3.3.4 Longwall Length

The first workings layout that sets the extraction geometry for Longwall 304 was reviewed by all stakeholders and approved by the Secretary of the DP&E and Dams Safety Committee in November 2018.

The proposed layout of Longwall 304 is shown on Plan 1 in Attachment 1. Longwall extraction will occur from north to south. A summary of the longwall dimensions for Longwall 304 is provided in Table 1. The longwall layout includes a 163 m panel width (void) and 45 m pillars (solid).

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Table 1
Summary of Longwall Dimensions for Longwall 304

Longwall	Longwall Length (m)	Total Void Width (m)	Tailgate Chain Pillar Width (m)
LW304	1,286	163	45

m = metres.

Plan 1 in Attachment 1 shows existing Metropolitan Coal longwalls located within 500 m of Longwall 304, as well as future longwalls (i.e. Longwall 305 on).

Longwall 304 and the area of land within 600 m of Longwall 304 secondary extraction is shown on Figures 1 to 3. Plan 2 in Attachment 1 shows the natural and man-made surface features proximal to Longwall 304.

4 GEOLOGICAL DETAILS

4.1 SYDNEY BASIN AT METROPOLITAN COAL

Metropolitan Coal is located within the Southern Coalfield, within the southern part of the Sydney Basin, which is infilled with sedimentary rocks of Permian age (<270 million years ago) and of Triassic age (<225 million years ago) (HCPL, 2008).

Underlying the Sydney Basin sedimentary rocks is the Palaeozoic granite basement rock. A borehole located at Metropolitan Coal by the Australian Oil and Gas (AOG) Corporation in 1963, *AOG Woronora PDH and RDH 1* (Figure 5), intersected the Bulli Coal Seam at 1,710 feet (0.5 kilometres [km]) and the granitic basement rock at 7,470 feet (2.3 km) (AOG Corporation, 1963). At Metropolitan Coal the inter-burden between the Bulli Coal Seam and the basement rock is 1.8 km, and the total depth of Sydney Basin sedimentation is 2.3 km.

Three formally named coal seams of the Illawarra Coal Measures are present in the Southern Coalfield, namely the Bulli, Balgownie and Wongawilli Seams (HCPL, 2008). High-precision Thermal Ionisation Mass Spectrometry (TIMS) dating of a tuff from the lower part of the Bulli Coal in the Metropolitan Colliery has yielded an age of 252.60 ± 0.04 million years (Fielding, 2019).

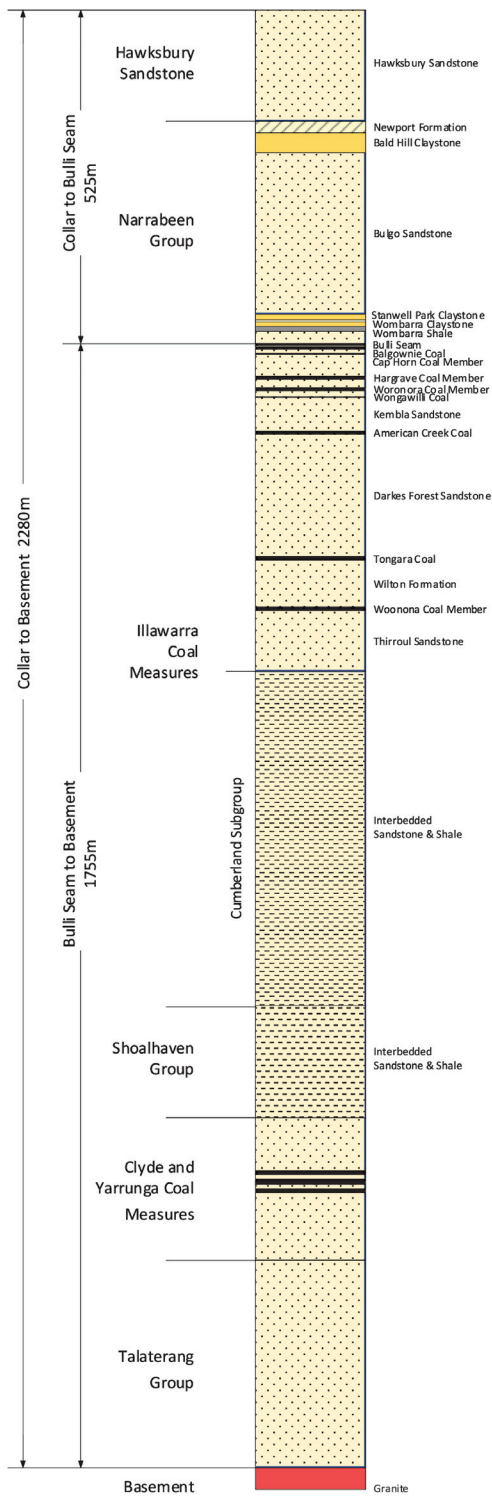
Immediately overlying the Bulli Coal unit of the Illawarra Coal Measures are sandstones and claystones of the Narrabeen Group. The Narrabeen Group contains the Newport Formation (sometimes referred to as the Gosford Formation), the Bald Hill Claystone (also referred to as Chocolate Shale and formed as a result of laterite weathering Gerringong Volcanics), the Bulgo Sandstone, the Stanwell Park Claystone/Shale, the Scarborough Sandstone, the Wombarra Shale and the Coal Cliff Sandstone. At the top of the sequence in the area of interest is the Hawkesbury Sandstone.

4.2 STRATIGRAPHIC SECTION

The sedimentary stratigraphic section at Borehole S225 is shown on Plan 6 in Attachment 1. The location of the borehole is also shown on Plan 6 in Attachment 1. The sandstone and shale units vary in thickness from a few metres to over 160 m. The major sandstone units are interbedded with other rocks and, though shales and claystones are quite extensive in places, the sandstone predominates. A generalised stratigraphic column of the Southern Coalfields is provided in Figure 6 with geological epochs.

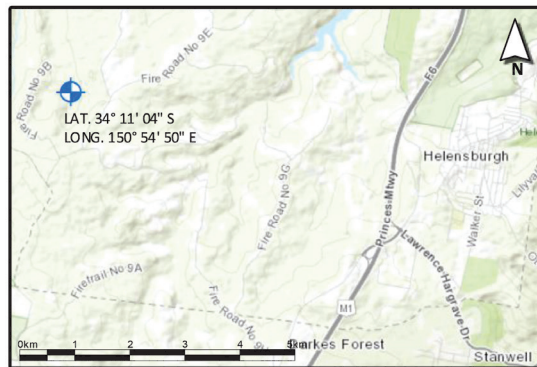
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Metropolitan Colliery – Depth of Basement Rock



County: Cumberland
 Parish: Heathcote
 District: Wollongong
 Hole Name: AOG Woronora PDH & RDH 1
 Collar: R.L. 355.092
 Total Depth: 2315.52m
 Date Commenced: 9-6-1963
 Logged By: A.O.G. Geologists

BORE HOLE LOCATION



ME1-18-13_30-4 EP CRP_002A

Source: after Australian Oil and Gas Corporation Ltd (1963)



METROPOLITAN COAL

Depth to Basement
 (2.3 km at Metropolitan Colliery),
 AOG Woronora Hole

Figure 5

AGE	GROUP	SUB-GRP	CODE	FORMATION & MEMBERS			
TRIASSIC	WIANAMATTA GROUP		WMSH	BRINGELLY SHALE			
				MINCHINBURY SANDSTONE			
				ASHFIELD SHALE			
						MITTAGONG FORMATION	
			HBSS			HAWKSBURY SANDSTONE	
	NARRABEEN GROUP	GOSFORD		GRFM		NEWPORT FORMATION	
						GARIE FORMATION	
		CLIFTON		BACS		BALD HILL CLAYSTONE	
				BGSS		BULGO SANDSTONE	
				SPCS		STANWELL PARK CLAYSTONE	
				SBSS		SCARBOROUGH SANDSTONE	
				WBCS		WOMBARRA CLAYSTONE	
		CCSS	COAL CLIFF SANDSTONE				
PERMIAN	ILLAWARRA COAL MEASURES		BUSM	BULLI COAL			
			UNM1	LODDON SANDSTONE			
			BASM	BALGOWNIE COAL			
			LRSS	LAWRENCE SANDSTONE			
				BURRAGORANG CLAYSTONE			
			CHSM	ECKERSLEY FORMATION		CAPE HORN UNNAMED MEMBER 2 HARGRAVE COAL WORONORA COAL NOVICE SANDSTONE	
			UNM2				
						WW01-11	WONGAWILLI COAL
						KBSS	KEMBLA SANDSTONE
						ACSM	ALLANS CREEK FORMATION
						APFM	DARKES FOREST SANDSTONE (APPIN FORMATION)
							BARGO CLAYSTONE
						TGSM	TONGARRA COAL
						WTFM	WILTON FORMATION
				WOONONA COAL MEMBER			
				ERINS VALE FORMATION			
		CUMBERLAND		PHEASANTS NEST FORMATION	FIGTREE COAL UNANDERRA COAL BERKELEY LATITE MINNAMURRA LATITE CALDERWOOD LATITE FIVE ISLANDS LATITE		
		SHOALHAVEN GROUP		BROUGHTON FORMATION BERRY SILTSTONE NOWRA SANDSTONE WANDRAWANDIAN SILTSTONE SNAPPER POINT FORMATION PEBBLEY BEACH FORMATION			
		TALATERANG		CLYDE COAL MEASURES			
	UNDIFFERENTIATED PALAEOZOIC (DEVONIAN, SILURIAN & ORDOVICIAN)						
ROCKS OF THE BASIN BASEMENT							
Information Sourced From - "Geological Survey Report No. GS1998/277 - R.S. Moffitt"							

ME1-18-13_30-4 EP CRP_002A

Source: Moffitt, R.S and Geological Survey of New South Wales (1998)

Peabody

METROPOLITAN COAL

Generalised Stratigraphic Column of
Southern Coal Field

Figure 6

4.3 BULLI SEAM

The seam floor within the Longwall 304 35 degree (°) angle of draw and/or 20 mm subsidence contour area generally dips from the south-east to the north-west. The Bulli Seam thickness within the Longwall 304 goaf area varies between 2.7 m to 2.9 m. Longwall 304 will extract the full height of the seam, with localised extraction up to 3.2 m around development headings and longwall install and takeoff points. The seam floor contours and seam thickness contours are shown on Plan 3 in Attachment 1.

4.4 TOPOGRAPHY

The topography consists of Hawkesbury Sandstone dip slopes falling to the north-west. The southern slopes tend to be more rugged, consisting of joint controlled escarpments of Hawkesbury Sandstone. These plateau areas are deeply incised by the Woronora River, Waratah Rivulet and other unnamed streams.

4.5 DEPTH OF COVER

The surface level contours and depth of cover contours to the Bulli Seam are shown on Plan 3 in Attachment 1. The depth of cover within the Longwall 304 35 degree (°) angle of draw and/or 20 mm subsidence contour varies between a minimum of 400 m and a maximum of 555 m at the northern end of Longwall 304.

4.6 LINEARS

Surface lineaments are linear features in the surface landscape, preferentially eroded, that may be the surface expression of an underlying geological structure, fault or dyke or simply a result of surface joint sets. Lineaments are identified from aerial photography, LiDAR and from digital topographic sets. By far the most common linears are features developed on the prevailing joint sets in the surface rock (Doyle and Newland, 2008). Lineament analysis aims to identify features that may be of greater geological significance, recognised by association with known geology or focussed field investigation.

Lineaments mapped by Metropolitan Coal over Longwall 304 and surrounds are shown on Figure 7. The lineament that runs north-south across Longwalls 20-27 extends over Longwall 304. Over Longwalls 20-27, this lineament is associated with an underground fault (F-008) and it is possible that this fault extends over Longwall 304. Longwalls 20-27 mined through this fault structure and did not intercept water (i.e. the fault did not act as a conduit at depth).

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4.7 IGNEOUS INTRUSIONS

The presence of igneous plugs at Metropolitan Coal has not been detected at the surface. Examination of linears and residuals on the topographic surface has failed to identify any such features. Similarly, aeromagnetic surveys made no positive identification of igneous plugs. Aeromagnetic surveys have identified the Maddocks Diatreme to the south of Longwall 1 in 1995 and a possible zone of dykes loosely associated with the Madden Fault zone on the western edge of the Metropolitan Coal lease boundary. A diatreme is an explosive igneous vent that has little or no igneous material associated with the vent. At coal level the diatreme may be represented by an igneous plug, a dyke, sill or induration of the coal by steam and other vapours. No diatremes have been identified in the Metropolitan Coal 300 series longwall area (Doyle and Newland, 2008).

4.8 SYNCLINE/ANTICLINE

The general Bulli Seam structure in the Metropolitan Coal area is a broad syncline trending north to north-west. Geological structures in synclinal areas in the Southern Coalfield are typically more benign than in anticlinal areas (Doyle and Newland, 2008).

4.9 FAULTS

The major geological features at seam level are shown on Plan 3 in Attachment 1.

Longwall 304 is located approximately 900 m south-west of the Metropolitan Fault. The Metropolitan Fault is a normal fault trending with other regional faults in a north-northwest to south-southeast strike. Displacement in the historical workings is 70 to 90 m, downthrow to the east. Seismic investigations have identified a series of reverse faults, 900 m northeast of Longwall 304, projecting in line from the known position of the Metropolitan Fault. The displacement at Bulli Seam level has reduced to 18 to 20 m with limited vertical extension and the Bald Hill Claystone is not displaced (Velseis, 2018).

A strike slip fault, F0008, with up to 1.2 m vertical displacement occurs over Longwalls 20-27, and it is possible that this fault extends through Longwall 304. This fault is associated with a surface linear that aligns with the Eastern Tributary and then passes east of the Woronora Reservoir full supply level dissipating into the landscape. Longwall 20 through 27 were extracted through this feature directly under the Eastern Tributary with no moisture evident at seam level and no change in mine water balance during the seven years of extraction in the area.

A strike slip fault, F0027, with zero vertical displacement, has been mapped in the Longwall 304 maingate roadway trending with a surface linear located approximately 250 m west of the end of the Eastern Tributary arm of Woronora Reservoir full supply level. No underground expression of this linear or fault has been mapped in the roadways around Longwall 303.

A 20 mm wide minor strike-slip fault, F0021, with zero vertical displacement, has been mapped to the south of Longwall 303. This fault is associated with a surface linear that aligns with the Eastern Tributary at the waterfall at downstream end of rock bar ETAU. No moisture has been evident at seam level where it crosses 300 mains or in the Longwall 303 maingate.

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4.10 RISK ASSESSMENT ON GEOLOGICAL FEATURES WITH POTENTIAL TO AFFECT WATER QUANTITY AVAILABLE TO WORONORA RESERVOIR

The Independent Expert Panel for Mining in the Catchment (IEPMC)¹ Initial Report recommended that the potential implications for water quantity of faulting, basal shear planes and lineaments be carefully considered, and risk assessed at all mining operations in the Catchment Special Areas (IEPMC, 2018).

In relation to the Metropolitan Coal Mine, the IEPMC Initial Report concluded (pg 127):

In the case of Metropolitan Mine:

-
- *the potential for water be diverted out of Woronora Reservoir and into other catchments through valley closure shear planes and geological structures including lineaments will require careful assessment in the future because it is planned that most of the remaining longwall panels in the approved mining area will pass beneath the reservoir.*

A risk assessment workshop was held on 20 February 2019 to assess the potential for mining effects on geological features to impact on the quantity of water available to the Woronora Reservoir. The workshop participants² identified and assessed the potential for mining effects on lineaments, joints, faulting, basal shear planes and dykes to impact on the quantity of water to the Woronora Reservoir, including the potential for water to be diverted out of Woronora Reservoir and into other catchments.

Additional controls arising from the risk assessment workshop include targeted surface mapping above Longwall 304 to define characteristics of F0008 linear and F0027 linear and dissipation points, correlation of updated linear mapping with underground geological mapping and a specific underground water monitoring program for F0008 and F0027 (Metropolitan Coal, 2019).

The participants considered the risk control measures and procedures to be reasonable to manage the identified risks.

The outcomes of the risk assessment are provided in Attachment 2.

¹ The IEPMC was established in November 2017 by the NSW Government to provide expert advice to the DP&E on the impact of mining activities in the Greater Sydney Water Catchment Special Areas, with a particular focus on risks to the quantity of water in the catchment.

² Participants included Professor Bruce Hebblewhite (B. K. Hebblewhite Consulting), Dr Noel Merrick (HydroSimulations, Groundwater), Mr Peter DeBono (Mine Subsidence Engineering Consultants, Subsidence), Mr Shane Kornek (Metropolitan Coal, Senior Geotechnical Engineer), Mr Jon Degotardi (Metropolitan Coal, Technical Services Manager), Mr Tim Kendrick (Peabody, Water Specialist) and Ms Stacey Gromadzki (Resource Strategies). The risk assessment was facilitated by Mr Mick Allen (Peabody, Safety Superintendent).

5 RESOURCE RECOVERY

5.1 MINING METHOD

Longwall 304 will be extracted using retreating longwall mining methods for secondary extraction of a panel with a 163 m void width. The longwall panel will be formed by driving two sets of gate roads (the tailgate and maingate roads). Each gate road requires two roadways (headings) to be driven parallel to each other. The two roadways will be used for ventilation purposes, with one of the roadways utilised as a transport road and the other roadway used to convey the coal that will be mined back to the main conveyors. Construction of development main headings and gate roads are mined using continuous miners.

The dimensions of the headings will be approximately 5.2 m wide and 3.2 m in height. The headings are connected approximately every 130 m by driving a cut-through from one heading to another which forms pillars of coal along the length of the gate road. The tailgate and maingate roads are separated by the 158 m wide longwall panel (measured between roadway centrelines). The maingate roads and tailgate roads are then linked together by driving an installation road and bleeder road at the top end of the longwall panels. Run-of-mine (ROM) coal will be conveyed by the maingate conveyor to the main conveyor which will carry coal to the surface of the mine.

5.2 MINE PLAN

5.2.1 Justification

As described in Section 3.2, the seam thickness within the Longwall 304 goaf area varies from 2.7 m to 2.9 m. Longwall 304 will extract the full height of the seam. Using the proposed mining method, the recovery of ROM coal from the Bulli Seam in Longwall 304 is estimated to be 52 percent. The total amount of ROM coal anticipated to be extracted is estimated to be approximately 1.2 million tonnes (Mt).

Metropolitan Coal considers the layout of Longwall 304 to provide the most efficient resource recovery given the constraints.

5.2.2 Mining Schedule

Metropolitan Coal operates seven days a week, 24 hours a day on a rotating shift basis. The extraction of Longwalls 1 to 302 is complete, with extraction of Longwall 303 underway.

Longwall 304 is scheduled to commence in July 2019 and be completed in December 2019.

5.2.3 Future Mine Plans

The current layout of Longwalls 305-317 is shown on Figures 1 and 3, on Plan 1 in Attachment 1 and includes narrow longwalls (138 m wide) beneath and within 500 m of the Woronora Reservoir.

The layouts of Longwalls 305-317 will however be subject to further review for future Extraction Plans in consideration of potential subsidence impacts and environmental consequences.

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5.2.4 Effects on Future Resource Recovery

The Bulli Seam is the upper seam of the Illawarra Coal Measures of the Southern Coalfields. The interburden thickness between the base of the Bulli Seam and the top of the seam below (Balgownie Seam) varies between 7.9 m and 13.9 m. The planned mining of Longwall 304 is not expected to impede on any future mining of the lower seams. Currently there are no plans for mining of these seams within the Longwall 304 mining area.

6 REFERENCES

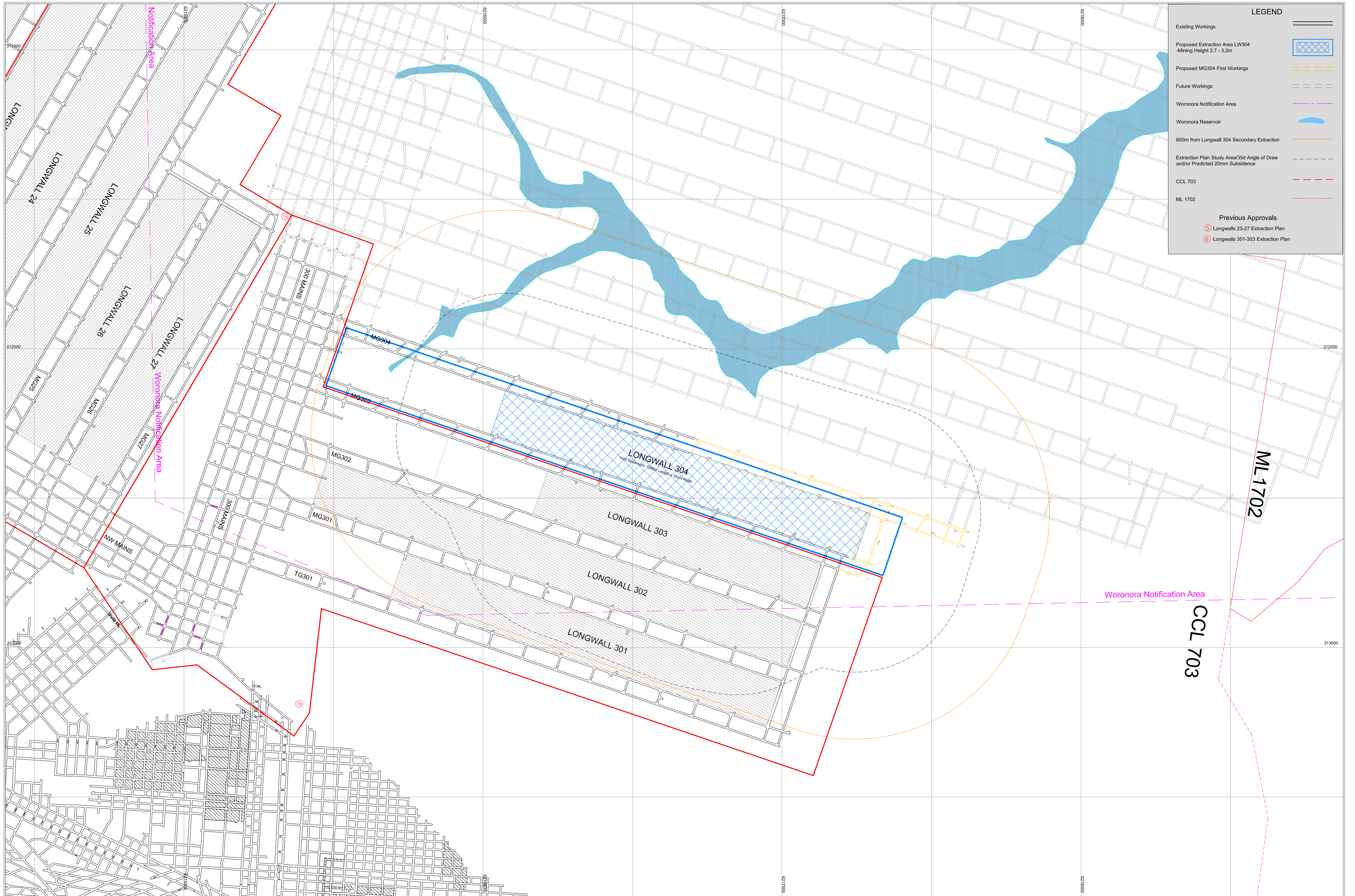
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Metropolitan Coal – Coal Resource Recovery Plan		
Revision No. CRRP-R01-A		Page 15
Document ID: Coal Resource Recovery Plan		

ATTACHMENT 1

PLANS 1, 2, 3, 5 AND 6 IN ACCORDANCE WITH THE
DEPARTMENT OF PLANNING AND ENVIRONMENT AND
DIVISION OF RESOURCES AND ENERGY (2015)
GUIDELINES FOR THE PREPARATION OF EXTRACTION PLANS

Metropolitan Coal – Coal Resource Recovery Plan		
Revision No. CRRP-R01-A		
Document ID: Coal Resource Recovery Plan		



LEGEND	
Existing Workings	
Proposed Extraction Area LW304 -Mining Height 2.7 - 3.2m	
Proposed MG304 First Workings	
Future Workings	
Woronora Notification Area	
Woronora Reservoir	
600m from Longwall 304 Secondary Extraction	
Extraction Plan Study Area/35d Angle of Draw and/or Predicted 20mm Subsidence	
CCL 703	
ML 1702	
Previous Approvals	
	Longwalls 23-27 Extraction Plan
	Longwalls 301-303 Extraction Plan

MCA Mining Engineering Manager Date
 Registered Mine Surveyor Date

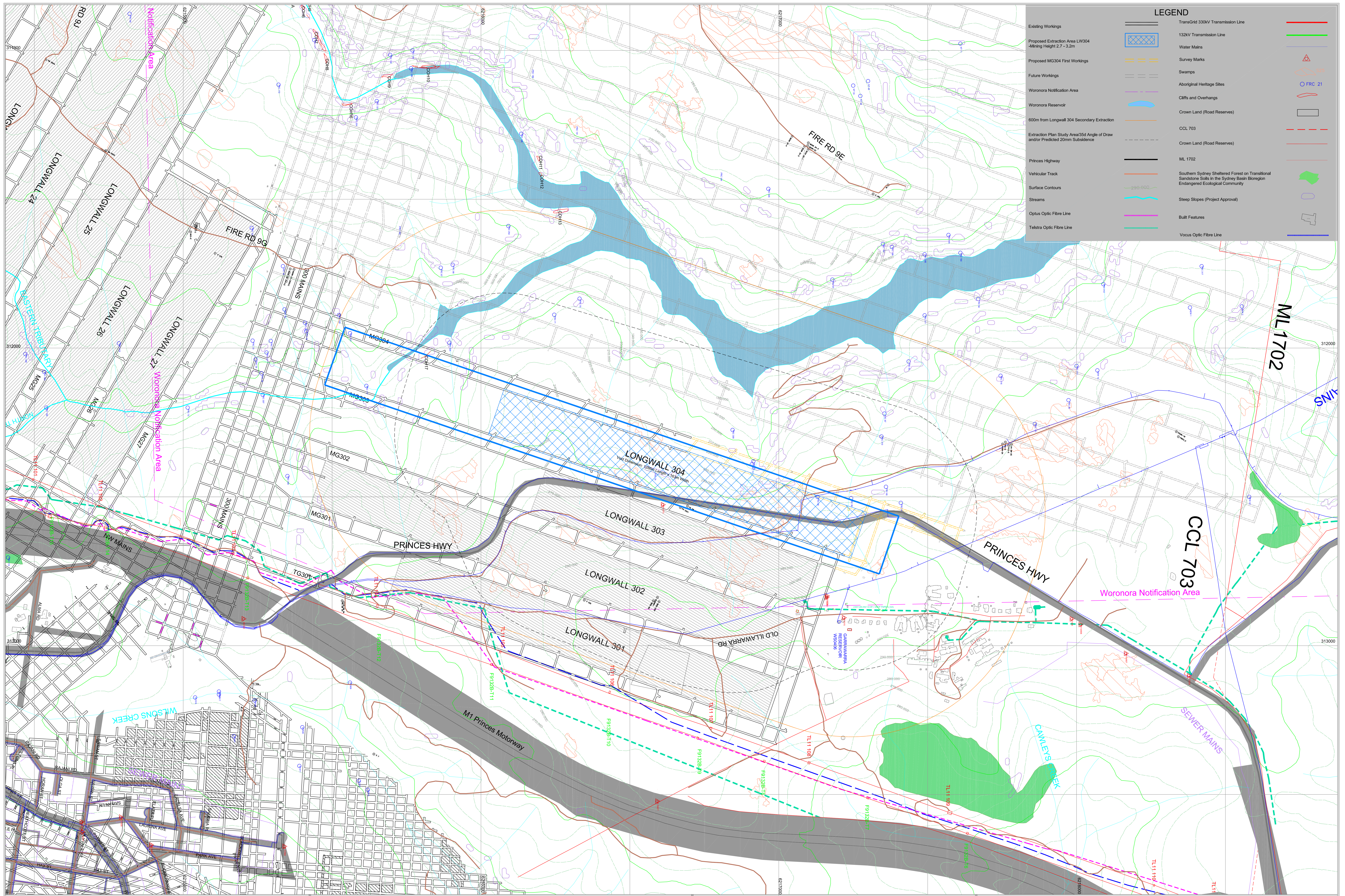
CLIENT/PROJECT
Peabody METROPOLITAN COAL PTY LTD
 METROPOLITAN MINE
 PO BOX 402
 HELLSBURGH 2509

SURV'D/DES'G'D CHECKED AUTHORIZED

DRAWING No M190129 PA Rev1

DATE	DRAWN	SHEET	OF	SCALE
29/01/2019	Survey Dept.	1	1	1:4000

METROPOLITAN MINE
 Longwall 304 Extraction Plan:
 Plan 1 - Existing, Proposed and Future Workings



LEGEND

Existing Workings	TransGrid 330kV Transmission Line	
Proposed Extraction Area LW304 -Mining Height 2.7 - 3.2m	132kV Transmission Line	
Proposed MG304 First Workings	Water Mains	
Future Workings	Survey Marks	
Woronora Notification Area	Swamps	
Woronora Reservoir	Aboriginal Heritage Sites	
600m from Longwall 304 Secondary Extraction	Cliffs and Overhangs	
Extraction Plan Study Area 35d Angle of Draw and/or Predicted 20mm Subsidence	Crown Land (Road Reserves)	
Princes Highway	CCL 703	
Vehicular Track	Crown Land (Road Reserves)	
Surface Contours	ML 1702	
Streams	Southern Sydney Sheltered Forest on Transitional Sandstone Soils in the Sydney Basin Bioregion Endangered Ecological Community	
Optus Optic Fibre Line	Steep Slopes (Project Approval)	
Telstra Optic Fibre Line	Built Features	
	Vocus Optic Fibre Line	

MCA 314000
 Mining Engineering Manager Date

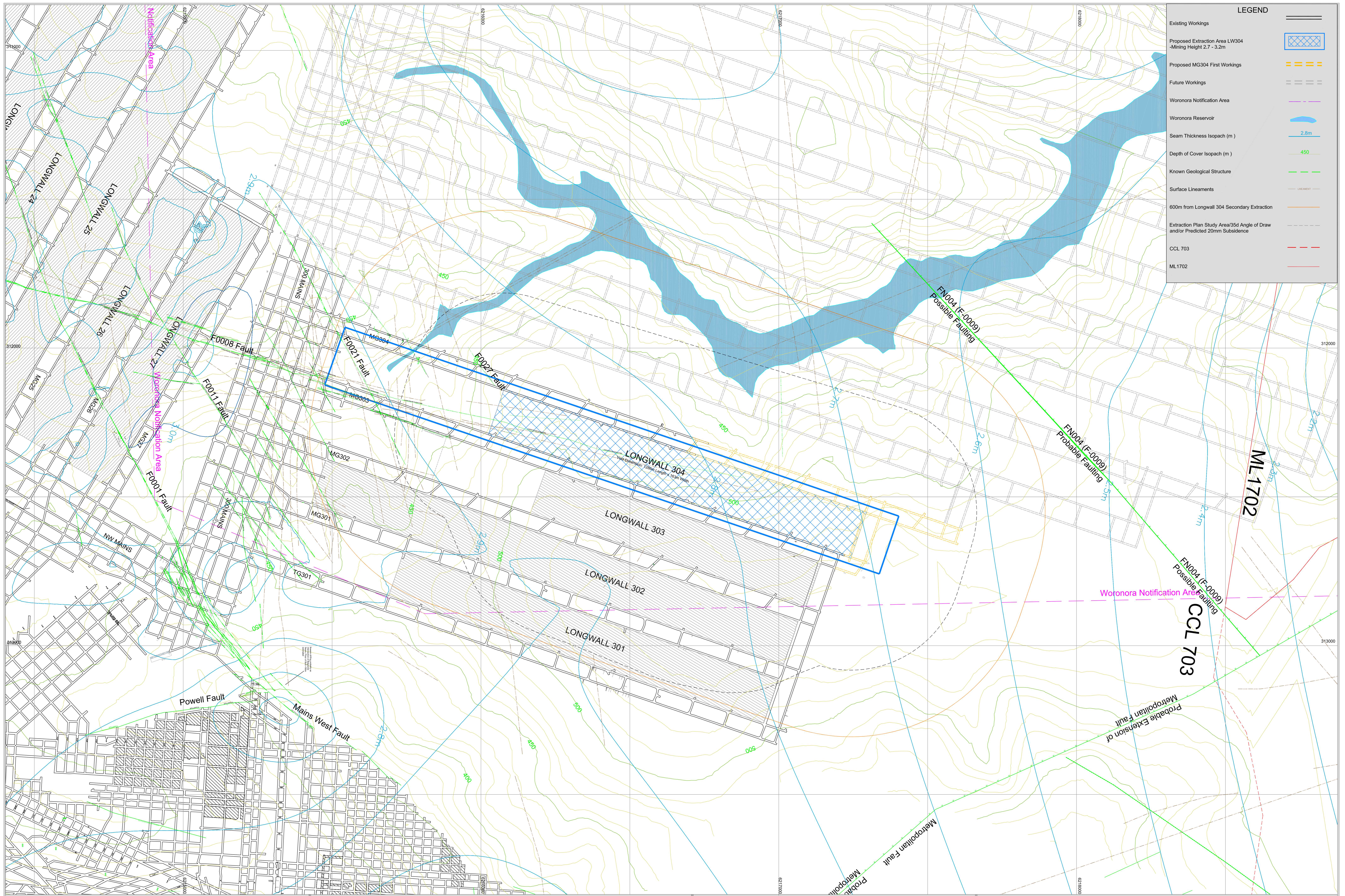
CLIENT/PROJECT
Peabody
METROPOLITAN COAL PTY LTD
 METROPOLITAN MINE
 PO BOX 402
 HELLSBURGH 2509

SURV'D/DES'G'D
 CHECKED
 AUTHORISED

DRAWING No M190129 P2 Rev1

DATE	DRAWN	SHEET	OF	SCALE
29/01/2019	Survey Dept.	1	1	1:4000

METROPOLITAN MINE
Longwall 304 Extraction Plan:
Plan 2 - Longwall 304 Surface Features



LEGEND

- Existing Workings
- Proposed Extraction Area LW304
-Mining Height 2.7 - 3.2m
- Proposed MG304 First Workings
- Future Workings
- Woronora Notification Area
- Woronora Reservoir
- Seam Thickness Isopach (m) 2.8m
- Depth of Cover Isopach (m) 450
- Known Geological Structure
- Surface Lineaments
- 600m from Longwall 304 Secondary Extraction
- Extraction Plan Study Area/35d Angle of Draw and/or Predicted 20mm Subsidence
- CCL 703
- ML1702

Mining Engineering Manager Date

SURV'D/DES'G'D



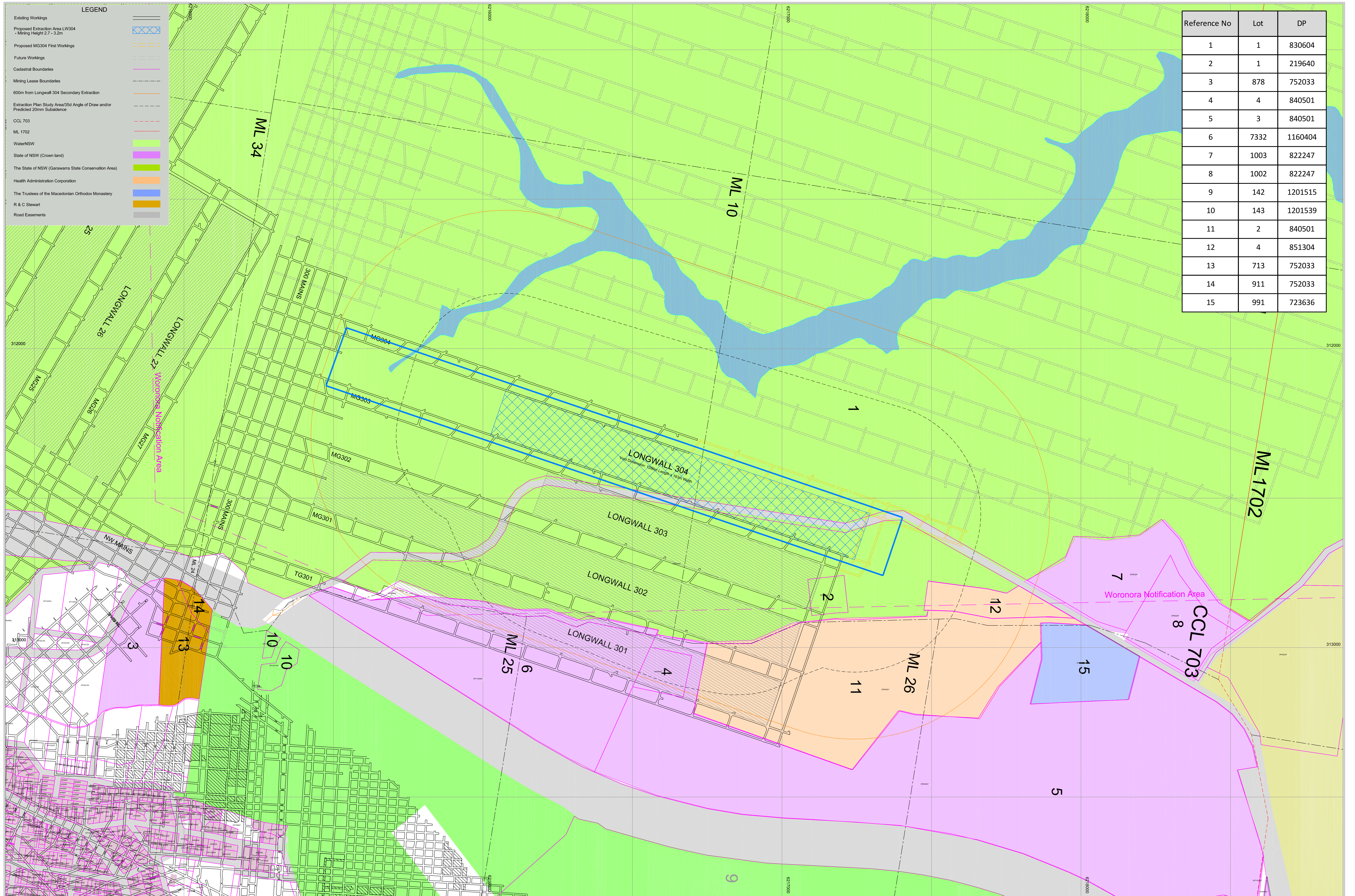
METROPOLITAN COAL PTY LTD
METROPOLITAN MINE

PO BOX 402
HELLENBURGH 2509

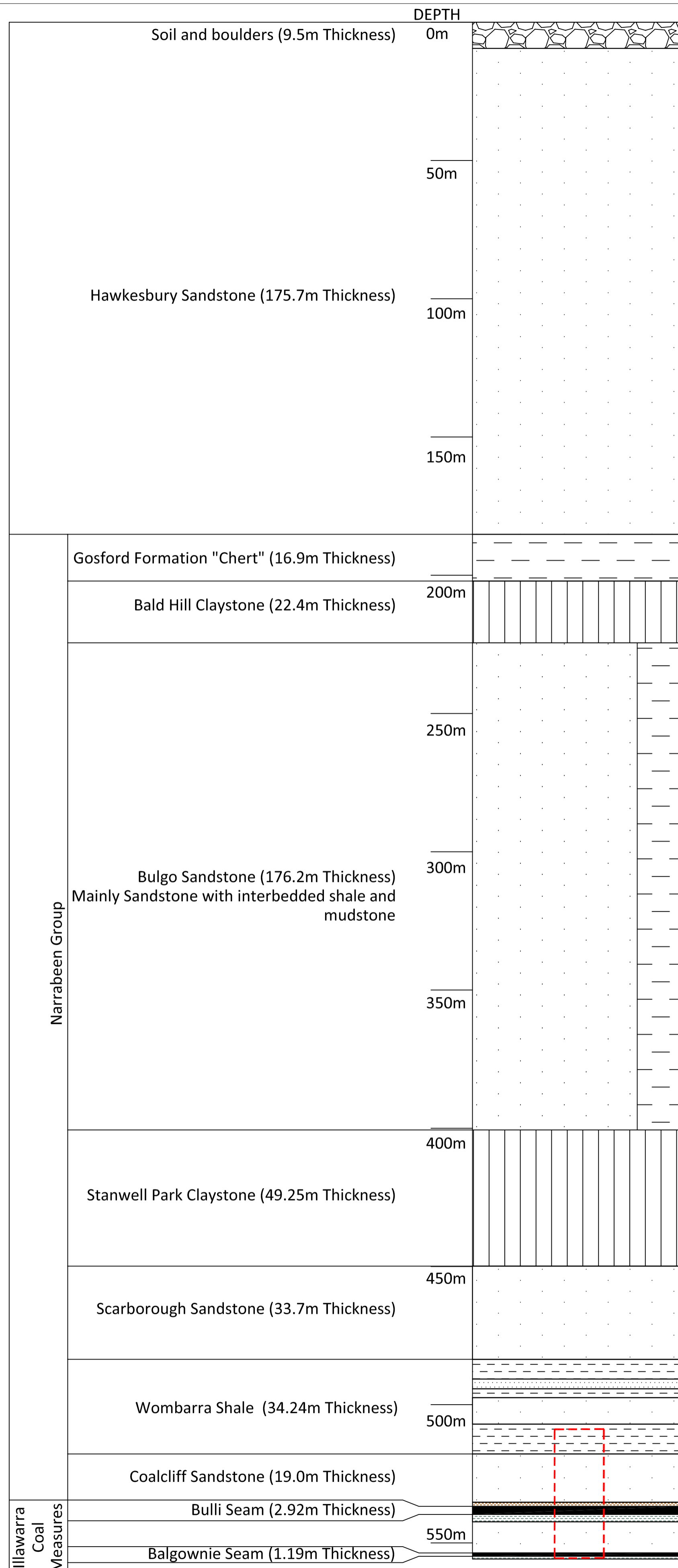
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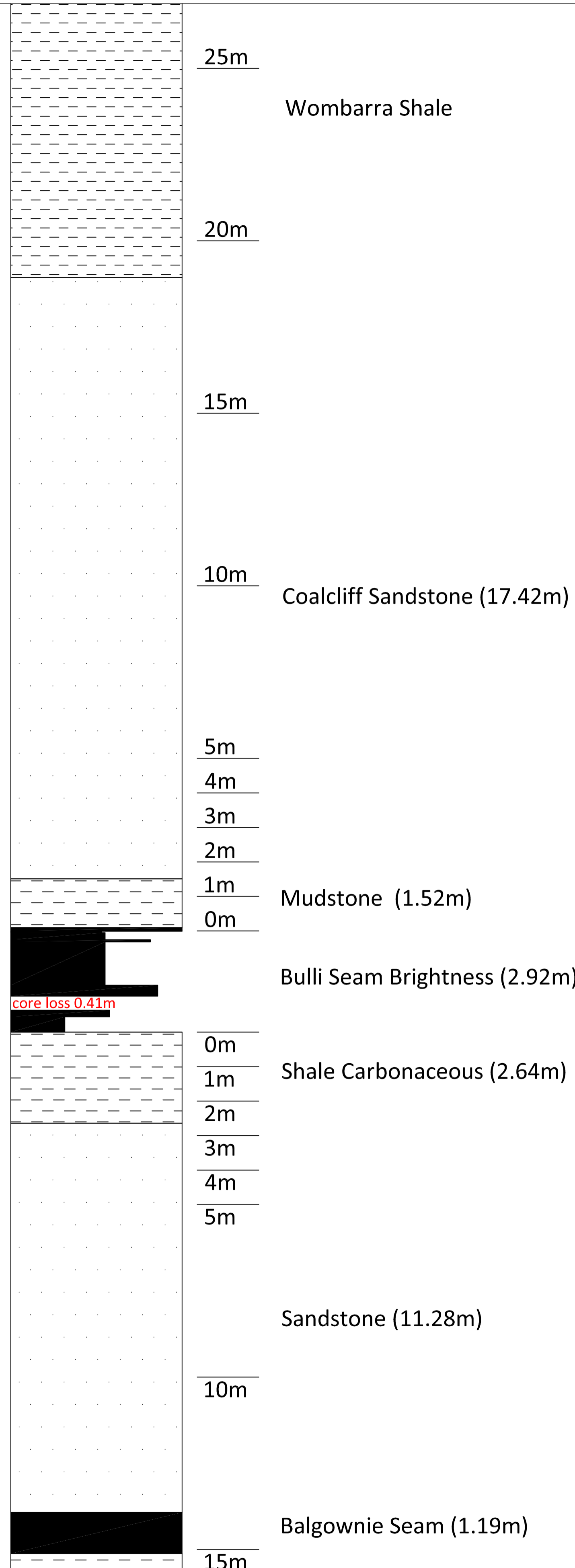
METROPOLITAN MINE
Longwall 304 Extraction Plan:
Plan 3 - Geological and Seam Data



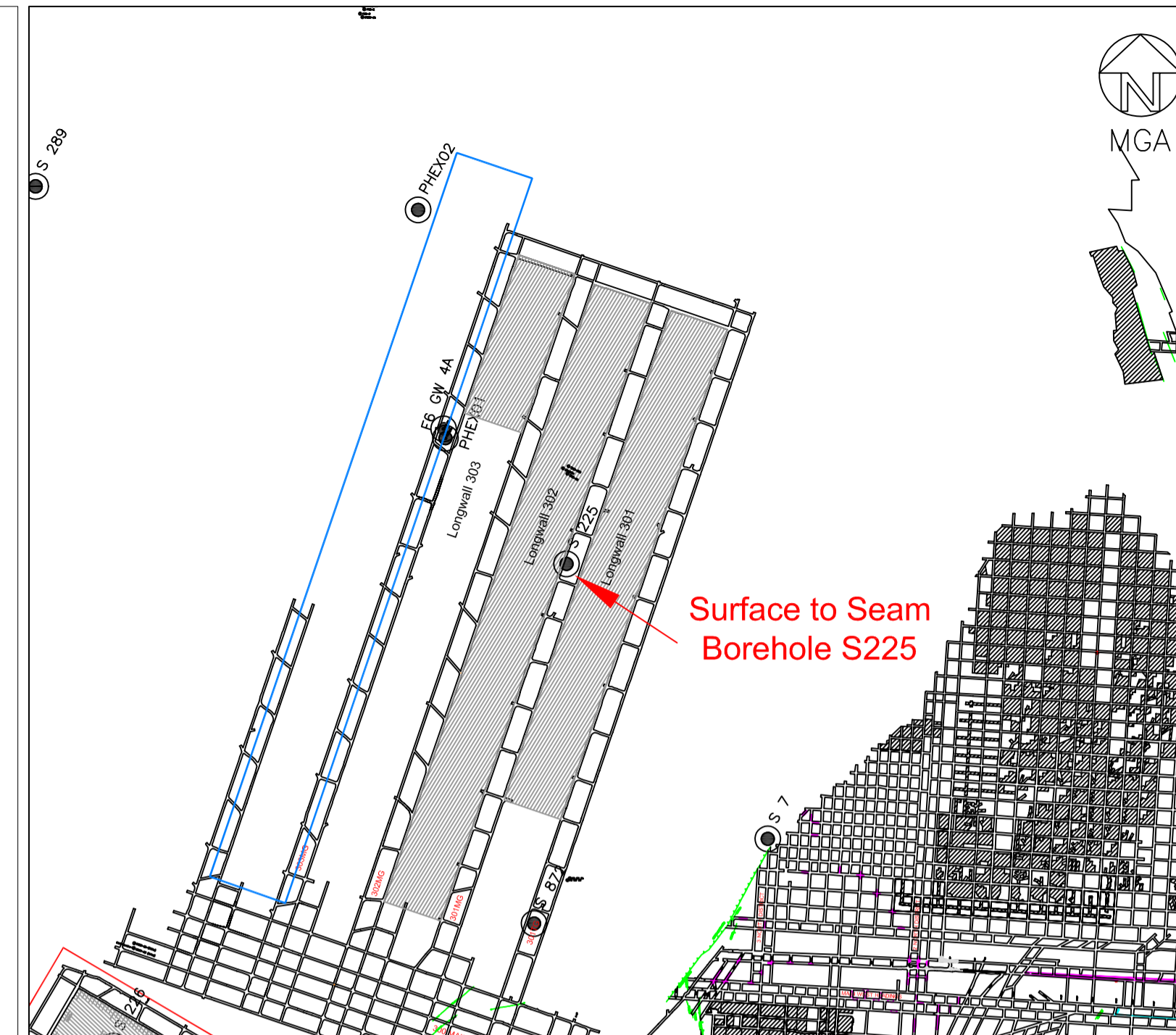
Vertical Log of Bore S225



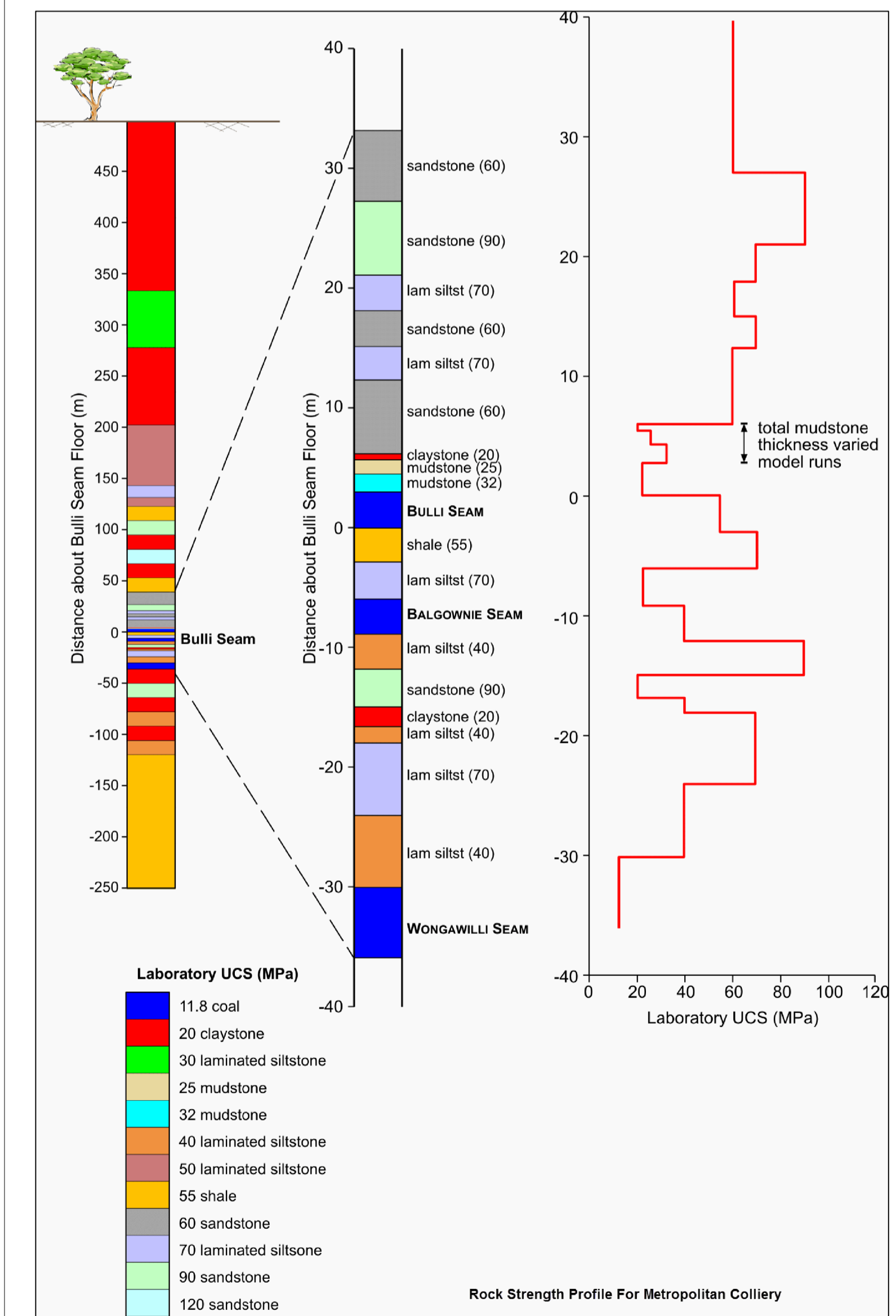
Inset of Vertical Log Bore S225



Location Plan

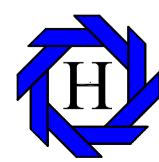


Geotechnical Log



Mining Engineering Manager Date

CLIENT/PROJECT



METROPOLITAN COAL PTY LTD
METROPOLITAN MINE
PO BOX 402
HELENSBURGH 2508

DRAWING No M190129 P6 Rev1

DATE	DRAWN	SHEET	OF	SCALE
29/01/2019	S.Kornek	1	1	nts

METROPOLITAN MINE

Longwall 304 Extraction Plan
Plan 6 - Geological Section and Geotechnical Logs

ATTACHMENT 2

RISK ASSESSMENT ON GEOLOGICAL FEATURES WITH POTENTIAL TO AFFECT WATER
QUANTITY AVAILABLE TO WORNORA RESERVOIR

Metropolitan Coal – Coal Resource Recovery Plan		
Revision No. CRRP-R01-A		
Document ID: Coal Resource Recovery Plan		

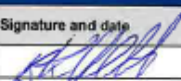




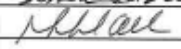


WORKPLACE RISK ASSESSMENT AND CONTROL (WRAC)



Title / ID number	ME-ENV-RSK-0333 Longwall 304 Extraction Plan - Potential for geological features in study area to affect water quantity available to Woronora Reservoir.		
Site	Metropolitan Coal	Date	20th February 2019
Purpose and objectives	Examine the geological features that may be effected by mining of Longwall 304 and assess the risks and hazards to water quantity available to Woronora Reservoir and/or loss of ground water from the catchment		
Scope / context	<p>This risk assessment follows on from a recommendation of the Independent Expert Panel for Mining in the Catchment (<i>Report Terms of Reference - 1, 2018</i>), IEPMC, that all future Extraction Plans be accompanied by a Risk Assessment considering potential implications for water quantity from geological features.</p> <p><i>Major recommendations, mine design: "The potential implications for water quantity of faulting, basal shear planes and lineaments need to be very carefully considered and risk assessed at all mining operations in the Catchment Special Areas" IEPMC 2018</i></p>		
Activity	This Risk Assessment was carried out in the offices of the Australian Institute of Company Directors (AICD) - 18 Jamison St, Sydney NSW 2000		
Assumptions	<p>The following assumptions and limitations were applied to this risk assessment:</p> <ul style="list-style-type: none"> - Current mine plan for LW304, not underneath the Full supply level - minimum standoff >230m, depth of cover 420-500m, extraction width 163m void - Existing natural ground water systems. - SharePoint Document Kiosk is available and provides access to site documentation and procedures - Supervision Arrangements are in place for all activities carried out at the operation - All existing Management Plans, Systems and Procedures are available and understood - Pre-shift and toolbox talks are completed at the start of every shift - Job Hazard Analysis are performed for all tasks where procedures are not available or when changes to the task occur - SLAM process is utilised for tasks - Incident and Hazard Reporting Procedure exist - Defect Management System is used for all defect reporting - Cardinal Rules have been developed and are communicated to the workforce and contractors - All personnel performing tasks have completed all relevant inductions - All personnel performing tasks are trained and competent in their field of expertise - All monitoring equipment is maintained to acceptable levels as determined by the mine site and the OEM - Personal Protective Equipment (PPE) is available and is worn as required - Housekeeping standards exist and are followed 		
Reference / related documents <i>(including Change Management number reference if applicable)</i>	<p>IEPMC Report - Terms of Reference 1 Metropolitan Geological Plan as of 20/2/19 [ME-TSE-HMP-0011] Subsidence [ME-MIN-HMP-0006] Inundation or inrush of a substance PHMP [ME-TSE-HMP-0031] Ground or Strata Failure [ME-TSE-MNP-0002] Survey and drafting arrangements [ME-MIN-HMP-0013] Outburst Prevention [ME-MIN-HMP-0063] Contingency Mine Water Sealing MDG1010 - Risk Management Handbook for the Mining Industry. Dated. May 1997 MDG1014 - Guide to Reviewing a Risk Assessment of Mine Equipment and Operations Dated. July 1997 AS NZS ISO 31000-2009 - Risk management - Principles and guidelines Work Health and Safety Act 2011 Work Health and Safety Regulation 2017 New South Wales - Work Health and Safety (Mines and Petroleum Sites) Act 2013 New South Wales - Work Health and Safety (Mines and Petroleum Sites) Regulation 2014</p>		

Approved by:	Name		Signature		Date	
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Participants - ME-ENV-RSK-0333					
Name	Title	Company	Experience (years / detail)	Consensus (Qtd)	Signature and date
Bruce Hebbelwhite	Professor	B.K.Hebblewhite Consulting	40 + (Mining / Geotech)		
Peter DeBono	Subsidence Engineer	MSEC	13		
Shane Kornek	Geotechnical Engineer	Peabody	20		
Noel Merrick	DR (Hydrogeologist)	Hydrosimulations	45 (G'water)		
Tim Kendrick	water Specialist	PEA	12		
Jon Degotardi	Technical Services Manager	Peabody	18		
Stacey Gromadzki	Senior Environmental Manager	Resource Strategies	20		
Mick Allen	Facilitator / Safety Superintendent	Peabody	25		

Participants - ME-ENV-RSK-0333					
Name	Title	Company	Experience (years / detail)	Consensus (Qld)	Signature and date
BRUCE HEDDERLEY	Professor	B.K. HEDDERLEY CONSULTING	40+ yrs Mining Practice		 20/2/19
Peter Jelenc	Subsidence Engineer	MSEC	13 yrs.		 20/2/19
Shane Kornek	Geotechnical Engineer	Peabody	20 yrs		 20/2/19
NBEL MERRICK	DR (Hydrogeologist)	HYDROSIMULATIONS	45 YRS G/WATER		 20/2/19
TIM KENDRICK	WATER SPECIALIST	PEA	12 yrs GW/SW		 20/2/19
JOE DECATARDI	TECHNICAL SERVICES MANAGER	PEABODY	18 Years		 20/2/19
Stacey Gramadzki	Senior Environmental Manager	Resource Strateges	20 year environmental experience		 20/2/19
MICK ALLEN	Facilitator / Safety Superintendent	Peabody	25		 20/2/19

*Workplace risk assessment and control (WRAC)
 Document number: PA-SAH-TMP-0328 Version: 12 June 2019

WORKPLACE RISK ASSESSMENT AND CONTROL (WRAC)



Site	Metropolitan Coal
Date	20th February 2019
Title	ME-ENV-RSK-0333 Longwall 304 Extraction Plan - Potential for geological features in study area to affect water quantity available to Woronora Reservoir.

Treatment plan					
Ref ID	Additional controls	Action to address	SAP action no:	Responsible person	Due date
1	Act - Targeted surface mapping above LW304 of known lineaments	Geologist to conduct field inspections and mapping of known lineaments above longwall 304 and provide summary of mapping.		Shane Kornek	30/04/2019
2	Act - Review/map/assess surface topography above LW304 for presence of unknown lineaments	Geologist to review existing surface topography data sets (LIDAR) and assess if unknown or further lineaments are present above Longwall 304.		Shane Kornek	30/04/2019
3	Act - Correlation of surface lineaments with potential underground structures	Geologist to correlate field inspections of known lineaments and additional surface review for unknown lineaments with possible, probable and known underground structures.		Shane Kornek	31/05/2019
4	Seismic Survey - only clear zone in 300 Area not subject to seismic investigation is the base of Woronora Reservoir. With reservoir levels low, an access track could possibly be constructed along the floor of the dam. Determine with WaterNSW potential for a Seismic survey along floor of reservoir to investigate for structures.	Determine potential with WaterNSW for a Seismic survey along floor of reservoir to infill existing seismic investigations for CCL703		Jon Degotardi	5/04/2019
5	Act - Review in seam drilling information for Longwall 304	Geologist to review in seam drilling logs for any additional information on structures around Longwall 304		Shane Kornek	31/03/2019
6	Act - Underground water make monitoring specific to F0027 during mining, and further delineation with roadway advancement and in-seam drilling.	Technical Services Manager to include specific monitoring for any water make of structure F0027 during mining		Jon Degotardi	1/04/2019
7	Act - Further delineation of structures with roadway advancement and in-seam drilling.	Geologist to further delineate structures with roadway advancement, in particular F0027 if evident in Main Headings to west of existing workings.		Shane Kornek	31/10/2019
8					
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