



MIDDLEMOUNT COAL MINE

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

Attachment L Groundwater Assessment Addendum Report





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Attention: Michael Moore, Manager – Approvals
via email: Michael.Moore@yancoal.com.au

Dear Michael,

Middlemount Southern Extension Addendum

1 Introduction

In 2020 Australasian Groundwater and Environmental Consultants (AGE) undertook a groundwater assessment to support the (then) proposed Southern Extension Project (SEP) for the Middlemount Coal Mine (Middlemount). As part of that development Middlemount Coal Pty Ltd (MCPL) has requested a change in the disturbance area originally applied for in 2020 and subsequent changes applied for since then. This letter addendum is to discuss the groundwater impact assessment considering the proposed changes to the disturbance area.

2 Proposed changes to disturbance area

Figure 1 shows the varied disturbance area. From a groundwater perspective the change is largely an administrative change, with the disturbance area not a specific input into the groundwater impact assessment.

Things that are not changing for SEP due to the revised disturbance area are:

- the proposed mine footprint for SEP;
- the proposed mining depth for SEP;
- the proposed end of mine life timing for SEP;
- the alignment of the diversion; and
- the design of the levee.

The first three of these are critical for determining the groundwater impacts from SEP; as these are not changing, the previously predicted impacts (including the range of extent of uncertainty) (AGE, 2020) are still relevant to the SEP assessment.

3 Current groundwater conditions

3.1 Water levels

Monitoring of groundwater at Middlemount has continued since the 2020 SEP assessment (AGE, 2020) with some of the bores installed during the 2020 assessment work now having more useful data due to a greater period of monitoring.

Figure 2, Figure 3, and Figure 4 show the groundwater monitoring bore hydrographs for the Tertiary, Pisces / Middlemount coal seams, and the Fort Cooper Coal Measures (FCCM) respectively. Groundwater elevation is displayed in metres Australian Height Datum (mAHD) and cumulative rainfall departure in millimetres (mm) in Figure 2, Figure 3, and Figure 4.

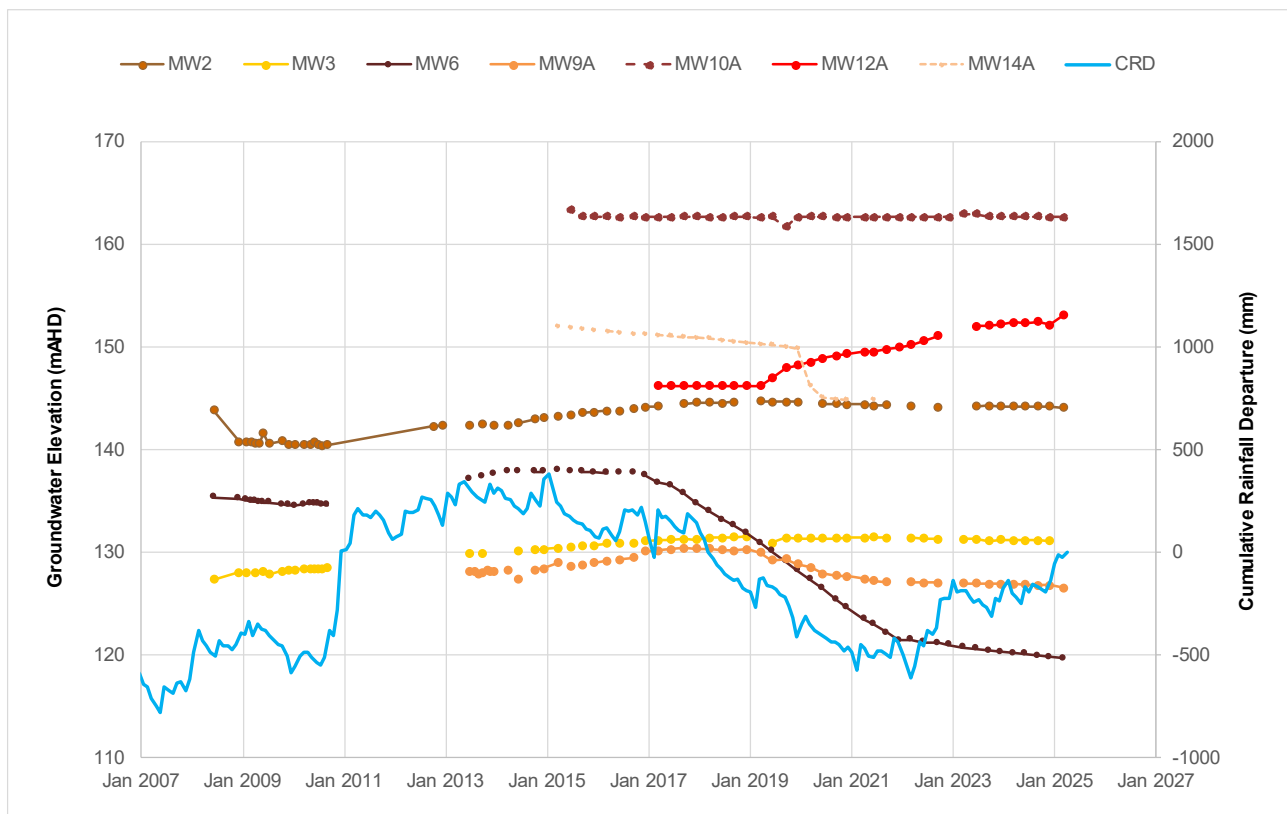


Figure 2 Tertiary groundwater monitoring

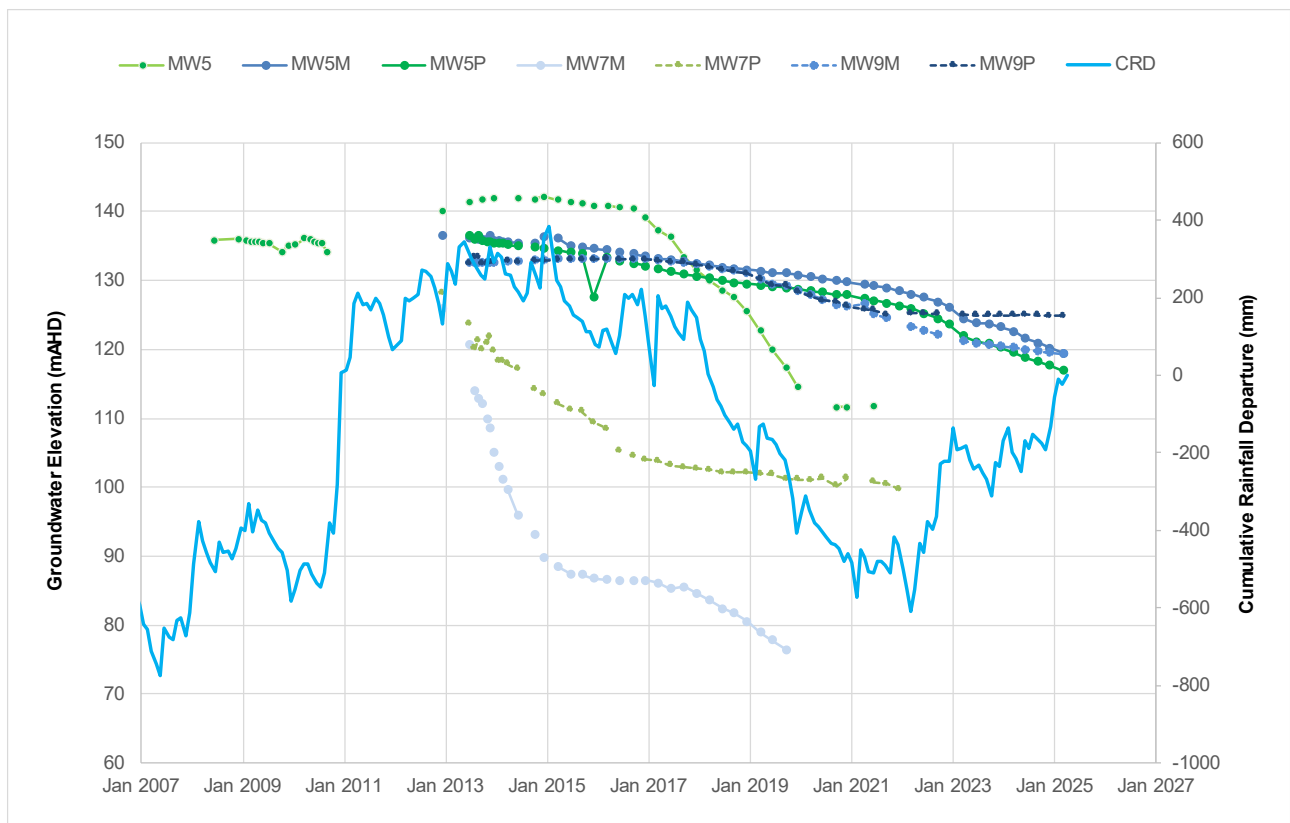


Figure 3 Middlemount and Pisces coal seam groundwater monitoring

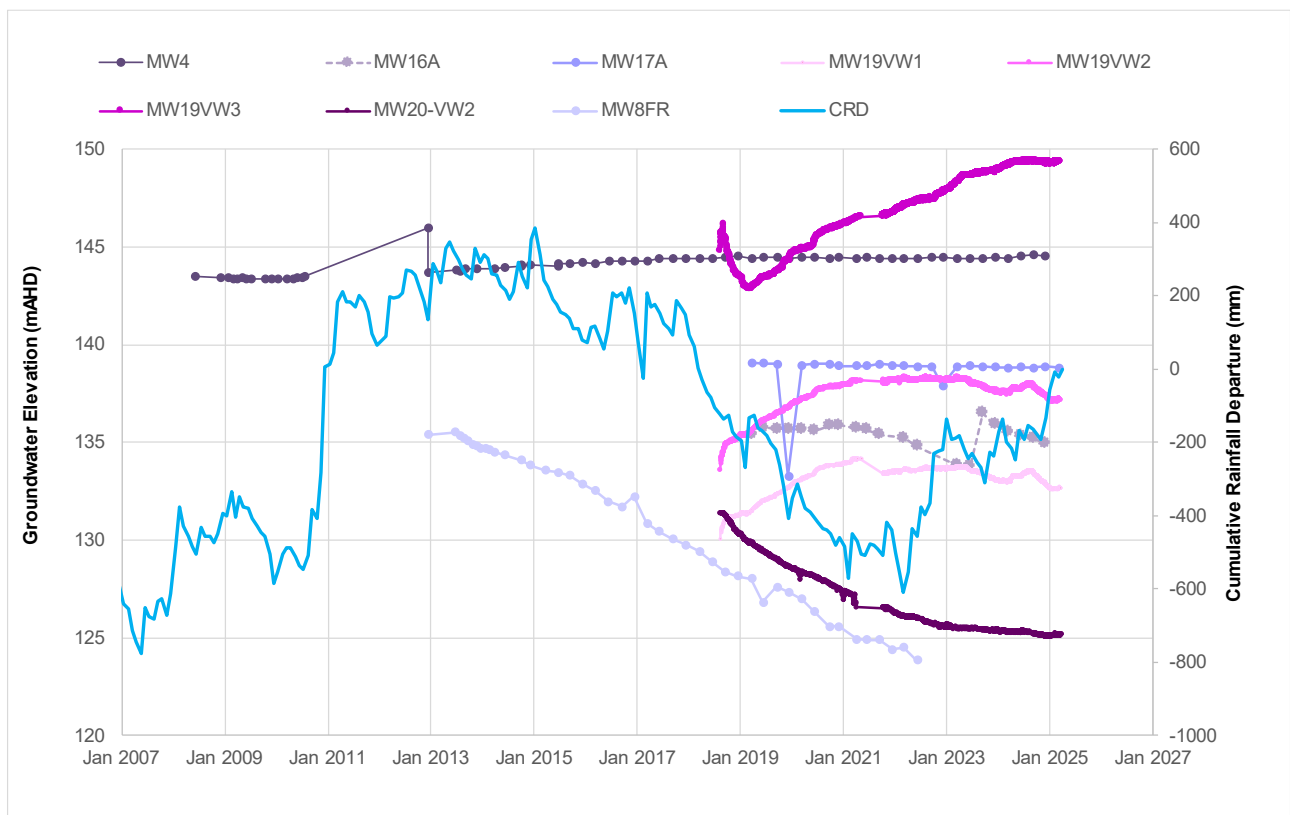


Figure 4 Fort Cooper Coal Measures groundwater monitoring

Groundwater monitoring since 2020 indicates that generally bore water levels have trended as expected.

Bores that are declining while the cumulative rainfall departure is rising indicate that the decline is most likely due to mining, and these appear in the coal seams and coal measures. Those close to (and within) the mining area (such as MW7P and MW7M) have more drawdown observed than those further way from current mining (such as MW9P and MW9M).

Shallow monitoring in the Tertiary sediments (Figure 2) show limited response to mining to date as expected. The variability in saturation through the Tertiary sediments is likely the cause here.

The only aspect of the groundwater system that was not apparent at 2020 is the rising shallow water levels local and adjacent to the mine water dam (MWD). This can be seen with MW12A (Figure 2) and WM19-VW3 (Figure 4). AGE has been investigating this rise through recent annual reviews of the monitoring data and consider it was likely due to seepage from the MWD and /or mechanical loading causing a reduction in pore space and a displacement of groundwater under the MWD. These impacts are local to the MWD and remain inside of the approved disturbance area. This conceptual update will be added to the numerical model at the next model update, and is not expected to have any significant impact on the regional maximum drawdown extent already predicted in the coal seams.

3.2 Water quality

Water quality over the last five years has remained relatively consistent with the pre-2020 sampled data, with perhaps a slight rise for most parameters listed in the post 2020 period. Review of the data indicates that this slight rise is due to the addition of MW12A, MW16A, and MW17A data that were only available post-2020 dataset (that have higher than average values for EC, TDS, sulphate and iron), and removal of MW1 data post-2020 (that increases the statistics for iron). When reviewing the data it was also identified that the minimum total dissolved solids (TDS) and electrical conductivity (EC) values reported in the groundwater impact assessment for the pre-2020 sampled data (AGE, 2020) included some anomalous data points for both the Tertiary and Permian records. The revised water quality summary statistics are provided below for the Tertiary (Table 1) and Permian (Table 2) aquifers.

Table 1 Water quality summary – Tertiary aquifers

Parameter	May 2013 to December 2019			March 2020 to March 2025		
	Min	Max	Average	Min	Max	Average
Laboratory EC (µS/cm)	2,880	33,400	18,592	4,590	35,200	23,512
Laboratory pH	6.9	8.6	7.6	6.9	8.6	7.7
TDS (mg/L)	1,620	25,700	13,972	2,660	27,100	16,627
Iron (mg/L)	<0.05	9.7	0.89	0.05	14.4	1.83
Sulfate (mg/L)	23	2,060	510	59	1,970	648.1

Note: µS/cm = microsiemens per centimetre, mg/L = milligrams per litre.

Table 2 Water quality summary – Permian aquifers

Parameter	May 2013 to December 2019			March 2020 to March 2025		
	Min	Max	Average	Min	Max	Average
Laboratory EC (µS/cm)	5,550	32,400	18,919	7,390	34,400	19,159
Laboratory pH	6.9	8.4	7.6	6.9	9.4	7.9
TDS (mg/L)	3,980	23,100	11,884	4,060	23,400	12,468
Iron (mg/L)	<0.05	13.2	2.32	0.05	17	3.77
Sulfate (mg/L)	1	682	224	1	1,100	161.3

4 Changes to groundwater conditions due to proposed disturbance area change

The key aspects to determining the extent and magnitude of groundwater impacts arising from the SEP are the mine footprint, depth of the mining (and subsequent dewatering), and the mine timing. These aspects are among those that were listed as not changing due to the disturbance area change, therefore there is no variation expected over the predicted changes from the 2020 groundwater impact assessment for SEP (AGE, 2020).

The 2020 assessment used the most recent alignment of the proposed Roper Creek, however it was also noted that the impact on Roper Creek is not expected due to the water table being measured around 20 m below the creek. The proposed realignment and extension of the Roper Creek diversions assessed in the groundwater impact assessment (AGE, 2020) is unlikely to impact on shallow groundwater or terrestrial vegetation as the alluvium is largely unsaturated, and Roper Creek is ephemeral with no existing baseflow in the vicinity of Middlemount.

From a groundwater perspective the change in disturbance area is administrative and does not change the previous groundwater impact assessment of SEP which concluded (AGE, 2020):

- *The primary groundwater units impacted by the Project are the Tertiary Duaringa Formation and weathered Permian Rangal Coal Measures where these sediments are saturated.*
- *There are no landholder water supply bores located within the predicted drawdown extents attributable to the proposed mine plan for the Project.*
- *The bore census undertaken for the previous groundwater assessment for the Western Extension Project identified no use of groundwater from both the Tertiary Duaringa Formation and Permian Rangal Coal Measures surrounding the Project. This is due to the aquifers being either unsaturated or partially unsaturated in the vicinity of the Middlemount Coal Mine (as is the case with the shallower groundwater hosted within the Tertiary Duaringa Formation and weathered Permian Rangal Coal Measures), or saline as is the case for both the Tertiary Duaringa Formation and Permian Rangal Coal Measures.*
- *Assessment of the cumulative impacts with other nearby operating mines and the Bowen Gas Project CSG activities predicts cumulative drawdown within the Tertiary and weathered Permian between the Project and Foxleigh Mine, and the Middlemount Seam (1 m contour), Pisces Seam (5 m contour), and Fort Cooper Coal Measures (1 m contour) intersecting roughly midway between the Project and the German Creek East voids.*
- *There are no watercourses with associated productive alluvial aquifers within the Project area and there will be no impact from mining on localised shallow alluvial or perched aquifers that may be associated with minor surface drainage features within the Project area.*

- *The residual voids will act as long-term groundwater sinks post mining, this will result in the long-term water quality within the residual voids being affected by evaporative concentration and becoming more saline. However, flow of this water into the groundwater systems will be prevented as a consequence of the lower water level within the voids.*
- *Although the overburden consists primarily of non-acid forming material, coal rejects and overburden material will be contained within in-pit storage emplacements, which will act as a sink to groundwater flow. As such, any resultant impact to void water quality will be contained at the site.*

... Accordingly, the Project would have a negligible incremental impact on groundwater resources.

Further to this, the ongoing monitoring and periodic model updates will build an understanding of the groundwater system and this will reduce uncertainty in the model results over time.

Yours faithfully,



Andrew Durick

Director / Senior Principal Modeller
Australasian Groundwater and
Environmental Consultants Pty Ltd



5 References

Australasian Groundwater and Environmental Consultants Pty Ltd, 2020, *Middlemount Coal Mine Southern Extension Project Groundwater Impact Assessment*, Project G1840P, November 2020.