

1 May 2019

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From: Dr Noel Merrick
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Re: Metropolitan Mine – 9EGW2A Investigation Report

Our Ref: HS2019/22 : 665.MET36-R02-v1.0

1. Introduction

Metropolitan Coal has requested that Dr Noel Merrick (SLR Consulting, formerly HydroSimulations) undertake an investigation into an exceedance of the Level 3 groundwater trigger level measured at piezometer 9EGW2A. The investigation below provides an assessment against the relevant performance measure in Project Approval 08_0149 and provides recommendations in relation to the groundwater triggers.

2. Background

Groundwater monitoring results at the Metropolitan Mine are assessed against performance indicators using the Trigger Action Response Plan (Table 19) detailed in the Longwalls 301-303 Water Management Plan (Version F).

An exceedance of the Level 3 trigger performance indicator, “the hydraulic gradient to the Woronora Reservoir at full supply level from Bore 9EGW2A is reduced by no more than 20% from that measured to 30 June 2017”, was identified for bore 9EGW2A on 31 March 2019.

This performance indicator is monitored at the 108 m piezometer at Bore 9EGW2A (Figure 1).

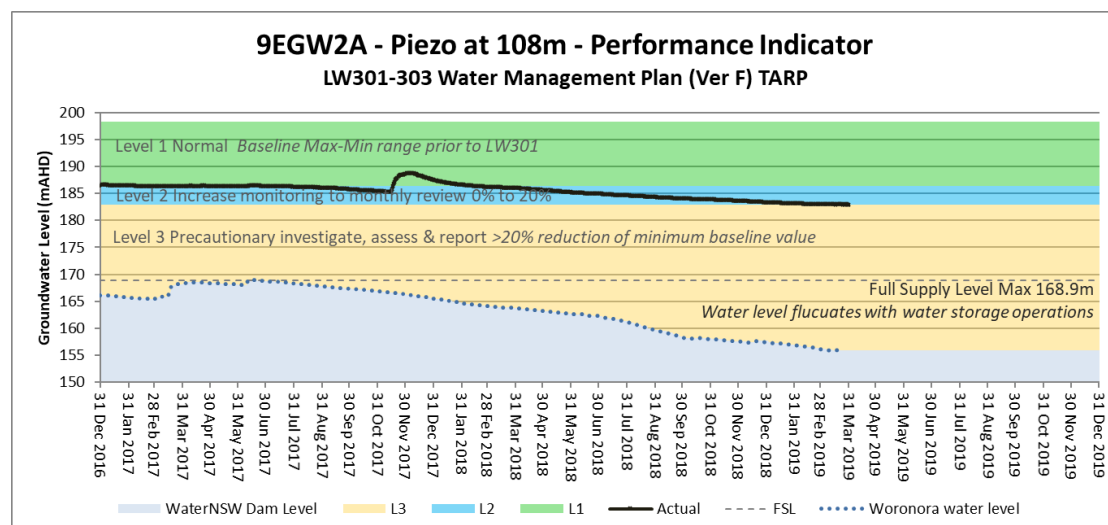


Figure 1 Groundwater Levels at 9EGW2A-108 since 1 January 2017

3. Performance Measure Assessment

In accordance with the Trigger Action Response Plan, an investigation has been conducted and an assessment has been made against the following performance measure:

Negligible leakage from the Woronora Reservoir.

The performance indicator is designed to provide an early warning for assessment of potential exceedances of the performance measure above.

Leakage from the Woronora Reservoir to the surrounding groundwater environment would occur if there is a reversal of hydraulic gradient (i.e. when the water table in surrounding piezometers is below the water level in the Woronora Reservoir). There has not been a reversal of gradient from 9EGW2A to the Woronora Reservoir as the water level at 9EGW2A has remained approximately 14 metres above the full supply level and approximately 27 metres above the water level at 31 March 2019. Accordingly, there has not been an exceedance of the performance measure for negligible leakage from the Woronora Reservoir.

This is confirmed by the water levels at piezometers east of the Woronora Reservoir (e.g. PHGW2A) remaining at the relevant Level 1 trigger levels. Bore 9EGW2A is about 0.5 km west of the reservoir, opposite the side where mining is currently occurring, and is a substantial distance of about 1.3 km from Longwall 303.

The reduction in piezometric head observed at 9EGW2A (108 m) of 3.5 m is considered to be a response to climatic conditions and the reduced water level in the Woronora Reservoir (**Figure 1**). This is confirmed by comparison to the piezometric head observed at 9EGW2A (432 m), which has reduced by only 1.7 m over the same time period. Given 9EGW2A is located on the opposite side of the reservoir to the current longwall mining operations, a mining effect would show a greater response at the deeper piezometer than the shallower piezometer.

This suggests the trigger levels adopted in the Water Management Plan are too sensitive, as they are being exceeded at a bore that has not been impacted by any recent mining at the Metropolitan Mine.

4. Conclusion and Recommendations

The Longwalls 301-303 Water Management Plan requires Metropolitan Coal to consider the need for management measures following the exceedance of a performance indicator. No specific management measures are considered to be required.

The over-sensitivity of the trigger levels to climatic effects and the fluctuating water level in the Woronora Reservoir has been identified during preparation of the Longwall 304 Extraction Plan.

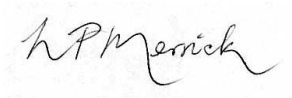
When gradient triggers were first defined in December 2016, no allowance was made for the effect of fluctuating reservoir level or the predicted impact from mining. A Level 2 gradient threshold of 20% had the effect of permitting groundwater levels at key sites to vary by no more than 2.5 m to 6.2 m, whereas the actual fluctuation in reservoir water level has been about 13 m since January 2017. The Level 2 band has proved unnecessarily conservative, and has led to a false trigger at 9EGW2A, as discussed in Section 3.

A 20% trigger also means that the Level 3 zone has a band that is 80% of the baseline height above reservoir full supply level. As the reservoir level drops, the Level 3 band effectively widens but the Level 2 band remains the same. Similarly, as the reservoir level drops, the hydraulic gradient to actual reservoir level becomes more stringent than 20%. As the intent of the trigger is to provide an early warning of pronounced flattening of the hydraulic gradient, a modified gradient threshold of 40% is recommended. This still provides a substantial Level 3

buffer that is 60% of the baseline height above reservoir full supply level, but partly counteracts the complications introduced by fluctuating reservoir level. It is still considered to be a conservative performance indicator.

The Longwall 304 Water Management Plan was updated to include revised trigger levels that reflect the modified gradient threshold of 40%.

Yours sincerely

A handwritten signature in black ink, appearing to read 'N Merrick', written over a light blue rectangular background.

Noel Merrick

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