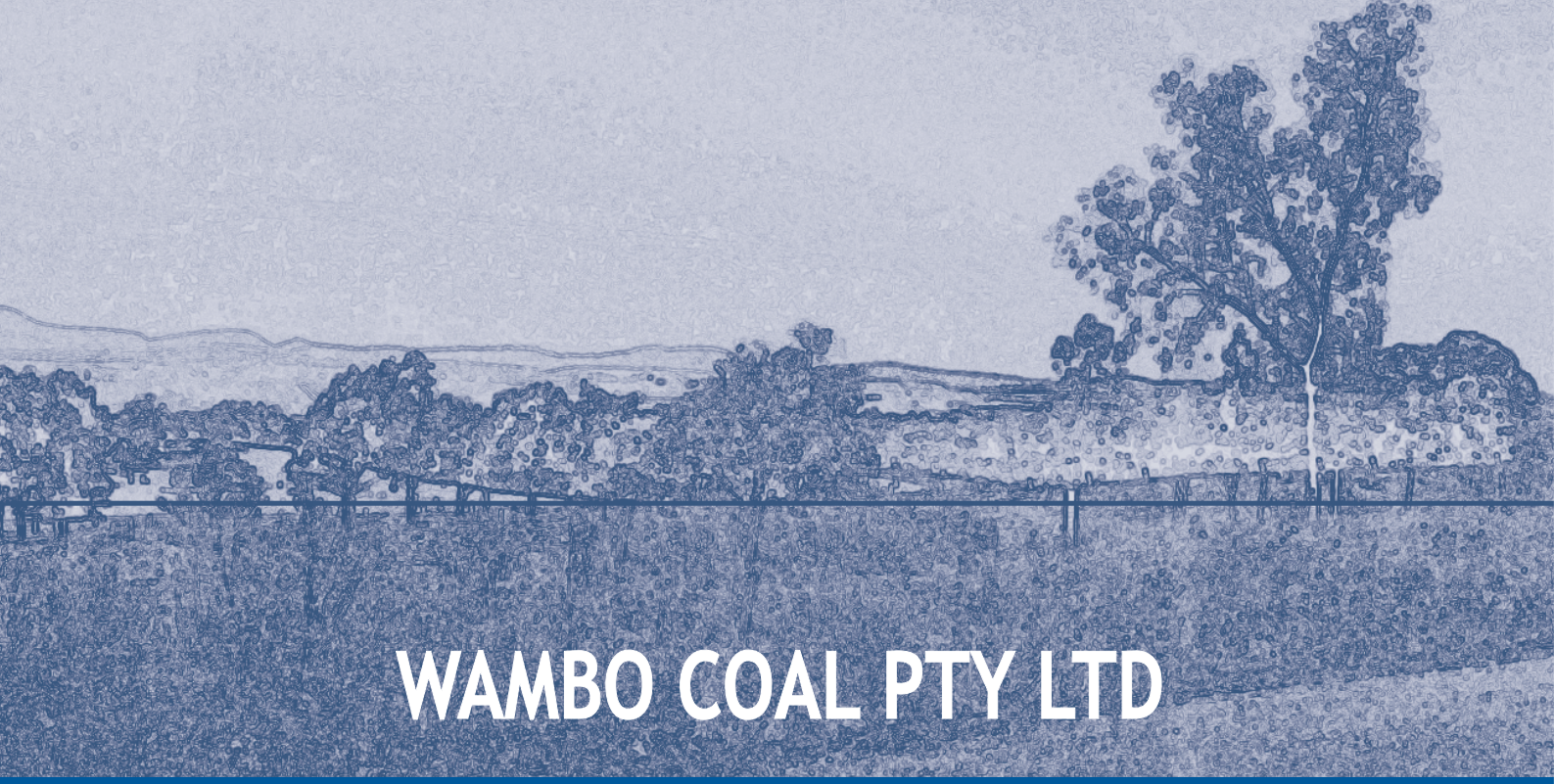

WAMBO COAL PTY LTD

NORTH WAMBO UNDERGROUND MINE

EXTRACTION PLAN
LONGWALLS 8 TO 10A

REPORT 2

GROUNDWATER IMPACT ASSESSMENT REVIEW

Peabody ENERGY

Date: 9 April 2015

To: Micheal Alexander
Director Projects and Technical Services
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From: Dr Noel Merrick

Re: **North Wambo Extraction Plan Longwalls 8 to 10A – Groundwater Impact Assessment Review**

Ref: Report HC2015/17

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This report has been prepared by HydroSimulations to support the Extraction Plan for North Wambo Underground Mine Longwalls 8 to 10A and provides a review of the predicted groundwater impacts as a result of changes reflected in the Extraction Plan layout.

In September 2014 HydroSimulations (2014) completed a groundwater assessment, including numerical groundwater modelling, in support of an application to modify DA 305-7-2003 to enable extraction of an additional longwall panel (Longwall 10A).

The layout of Longwall 10A has been revised to shorten the commencing end by 245 metres (m). This revised layout of Longwall 10A will be presented in the North Wambo Underground Mine Extraction Plan for Longwalls 8 to 10A.

For the purposes of this report, the "Previous Layout" refers to the longwall layout presented in HydroSimulations (2014). The "Extraction Plan Layout" refers to the Longwall 10A with the shortened commencing end. The revised layout of Longwall 10A is shown on **Figure 1**.

CONCLUSIONS OF HYDROSIMULATIONS (2014)

The conclusions of HydroSimulations (2014) included:

- Longwall 10A would have no discernible impact on stream baseflow or natural river leakage for Wollombi Brook, North Wambo Creek or Stony Creek stream systems, beyond the effects of approved mining. There would be minor changes to the volume of baseflow to (South) Wambo Creek due to Longwall 10A (<0.01 ML/d) while the cumulative impact would be greater (0.02 ML/d). In both cases (incremental and cumulative), the predominantly gaining nature of this creek would not be altered.
- Longwall 10A would cause less than 1 m additional drawdown in the alluvium overlying the Longwalls 9 to 10A compared with Longwalls 1 to 10. Much of that predicted drawdown is simulated as being generated by the dewatering system operated in the Whybrow Seam.
- A reassessment of likely fractured zone heights confirms that connective fracturing is likely to reach land surface or the surficial zone of tensile cracking where the Wambo Seam is mined beneath a 400 m long section of Homestead Longwall 9.

- Elsewhere, the reassessment of likely fractured zone heights confirms that adopted connective fracturing heights in the groundwater model are conservative.
- Longwall 10A could not be considered to have a significant impact on the recovery of groundwater levels.
- Longwall 10A could not be considered to have a significant impact on the quality of groundwater around Wambo. The modelling shows no potential for increased flux of more saline water from the Permian strata to the alluvium for the full recovery simulation of 200 years.

INDEPENDENT PEER REVIEW

An independent peer review of the groundwater assessment was conducted by Hugh Middlemis of Hydrogeologic Pty Ltd in March 2015. This review was commissioned by the Department of Planning and Environment and determined "that the Wambo model is a good example of best practice in design and execution, and is fit for mining project impact prediction purposes" (Hydrogeologic, 2015).

REVIEW OF PREDICTED GROUNDWATER IMPACTS

The Extraction Plan Layout differs from the Previous Layout by leaving *in situ* 245 m of coal at the commencing (south-west) end of Longwall 10A. Necessarily, all predicted groundwater impacts for the Extraction Plan Layout must be less than, or similar to, those predicted by the HydroSimulations (2014) groundwater model for the Previous Layout. In commencing Longwall 10A 245 m to the north-east, the longwall no longer passes beneath Stony Creek or (South) Wambo Creek. The modified commencing face would be 60 m from (South) Wambo Creek and 180 m from Stony Creek. As the two creeks are not to be undermined, the already minor changes to the volume of baseflow due to Longwall 10A (<0.01 ML/d) would be even lower.

Mine Subsidence Engineering Consultants (MSEC) (2015) have assessed the expected changes to subsidence parameters due to shortening of the longwall panel. They conclude that "the maximum predicted mine subsidence parameters for the natural and built features, based on the Extraction Plan Layout, are in all cases similar to or less than those predicted based on the Previous Layout". In the excised area, the depth of cover (for the Wambo Seam) ranges from 205 to 220 metres. Fracturing, therefore, would not have reached ground surface had the Previous Layout been mined. The maximum total subsidence would reduce from 900 to 50 mm at (South) Wambo Creek and from 450 to 50 mm at Stony Creek, for the Extraction Plan Layout in the excised area.

The effect of shortening the longwall panel is to effectively shift the subsidence profiles by 245 m to the north-east. A similar shift in groundwater drawdown contours, by at most 245 m, would be expected at the level of the Wambo Seam, but no significant shift would be expected at greater depths when Arrowfield and Bowfield Seams are mined. Similarly, no significant shift in drawdown contours would be expected at the level of the Whybrow Seam or in the overlying overburden or in the alluvium, as dewatering of the Whybrow Seam goaf is the major near-surface stress on groundwater levels. Accordingly, the predicted impacts in HydroSimulations (2014) on alluvial water levels and third party bores are unlikely to change.

Nor is any change expected on the waters of Wollombi Brook or its associated alluvium. The modified commencing face is to be 1.3 km from Wollombi Brook and 0.9 km from the edge of the Wollombi Creek alluvium.

MONITORING AND MANAGEMENT MEASURES

Consistent with the conclusion of HydroSimulations (2014), groundwater levels and quality should continue to be monitored at Wambo in accordance with the currently approved *Groundwater Monitoring Program* (WCPL, 2014).

The activities near Longwall 10A are already well covered by groundwater monitoring at the following sites:

- Alluvium: P114, P116, P109, GW08, GW11, GW02
- Interburden: P206
- Multi-formation: MG09
    - VWP depths (m): 9, 30, 60, 103, 130, 153, 170, 192.

Consistent with the currently approved *Surface and Groundwater Response Plan* (WCPL, 2014), in the event that a groundwater quality or level trigger level specified in the *Groundwater Monitoring Program* is exceeded, an investigation should be conducted in accordance with the *Surface and Groundwater Response Plan*.

REFERENCES

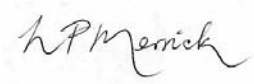
Hydrogeologic Pty Ltd, 2015, Independent review of groundwater model for Wambo longwall panel 10A expansion. Independent Review Report for Department of Planning and Environment, March 2015.

HydroSimulations, 2014, North Wambo Underground Mine Longwall 10A Modification Groundwater Assessment. Report HC2014/020 for Wambo Coal Pty Ltd, September 2014.

MSEC, 2015, North Wambo Underground Mine Revised Subsidence Assessment. Report MSEC754 for Wambo Coal Pty Ltd, March 2015.

WCPL, 2014, North Wambo Underground Mine Water Management Plan Longwalls 7-10. Document No. 00566492, Revision E, February 2014.

Yours sincerely



Dr Noel Merrick

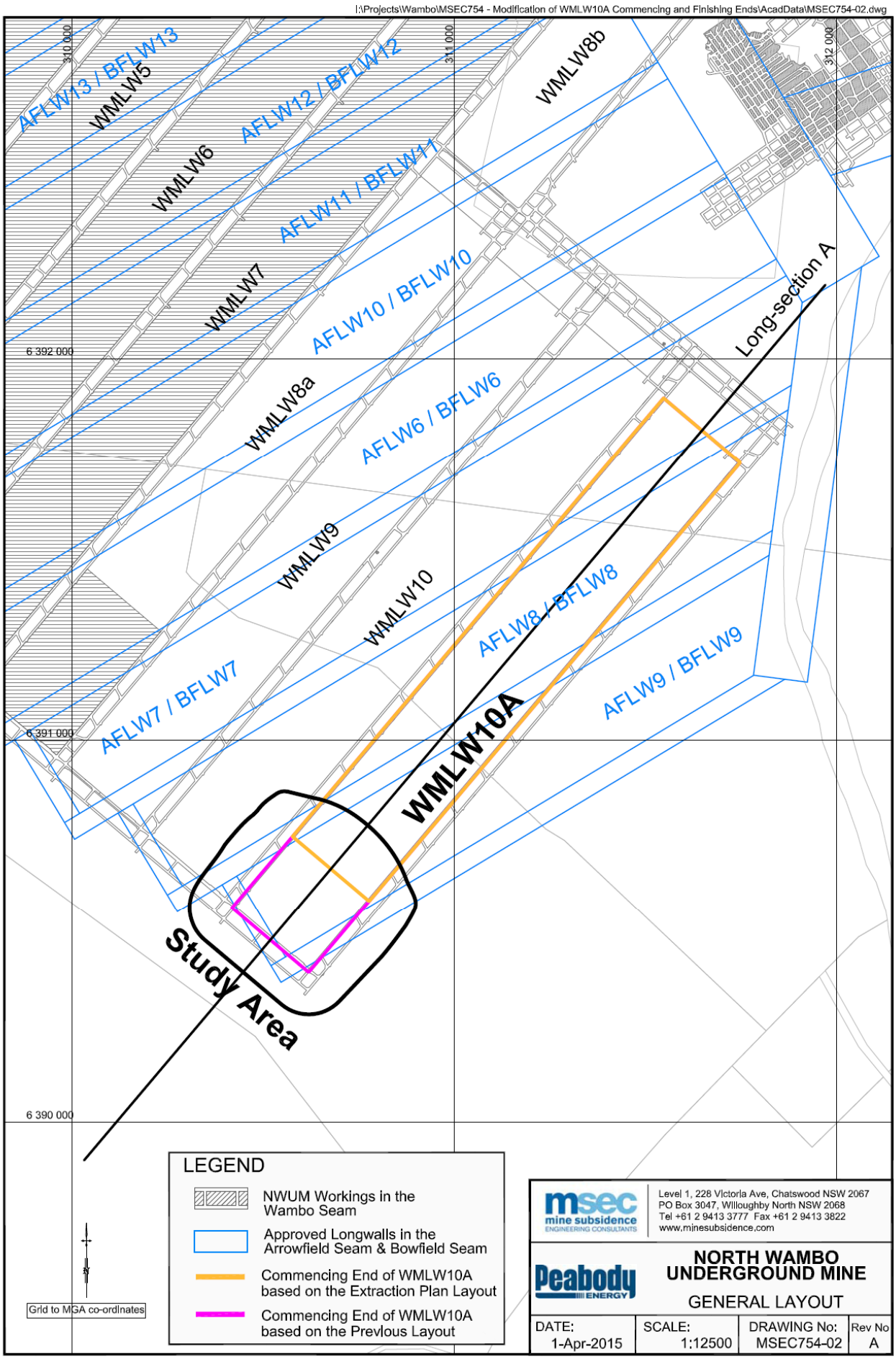


Figure 1. Previous Layout and Extraction Plan Layout