Longwalls 205 to 208

Water Management Plan Addendum

October 2020

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1 INTRODUCTION AND SCOPE

This Water Management Plan – Addendum has been prepared to cover Longwalls 205 to 208 for Ashton Coal Operations Limited (ACOL). A separate Water Management Plan covers the Ashton Coal Project (ACP).

2 PREDICTED IMPACTS

This Water Management Plan - Addendum addresses potential subsidence impacts to water management potentially affected by underground mining (secondary extraction) of Longwalls 205-208 in the Upper Lower Liddell (ULLD) Seam only.

2.1 PREDICTED SUBSIDENCE

Section 4 of the Extraction Plan Main Text provides a detailed description of predicted subsidence impacts.

In summary, SCT (2020) predicts that:

- incremental subsidence will range from 2.2 metres (m) to 2.8 m;
- cumulative subsidence will range from 3.1 m to 5.8 m;
- incremental tilts will range from 33 millimetres per metre (mm/m) to 56 mm/m and from 73 mm/m to 106 mm/m on stacked edges;
- cumulative tilts are predicted to range from 44 mm/m to 94 mm/m, and from 103 mm/m to 219 mm/m on stacked edges;
- incremental strains are predicted to range from 21 mm/m to 30 mm/m and from 37 mm/m to 53 mm/m on stacked edges; and
- cumulative strains are predicted to range from 22 mm/m to 47 mm/m and from 52 mm/m to 110 mm/m on stacked edges.

The maximum values of cumulative vertical subsidence forecast for the Longwalls 205 to 208 Extraction Plan are consistent with forecasts in previous assessments for approval modification or for extraction plans (SCT, 2020). The values of tilt and strain forecast for Longwalls 205 to 208 are consistent with those forecast for two and three seams of mining in DA 309-11-2001i (MOD6) for the *Bowmans Creek Diversion Modification Environmental Assessment* (EA) (Evans and Peck, 2009).

SCT (2020) concluded that, in general, the subsidence impacts from the forecast subsidence effects are expected to be similar in nature and magnitude to those forecast for the mining of Longwalls 105 to 107 in the Upper Liddell Seam. Similar management strategies to those used for Longwalls 105 to 107 and Longwalls 201 to 204 are expected to be effective to mitigate and remediate subsidence impacts and environmental consequences from the planned mining of Longwalls 205 to 208 (SCT, 2020).

2.2 PREDICTED IMPACTS TO WATER

2.2.1 Groundwater Impacts as Drawdown

SCT (2020) indicated that the alluvium associated with Bowmans Creek, Glennies Creek and the Hunter River is within the footprint of the existing panels but sufficiently remote from Longwalls 205-208 for there to be any significant additional impacts from these longwalls.

AGE (2020) has undertaken a review of the potential groundwater level impacts attributable to the mining of Longwalls 205-208. Key impacts are summarised as follows (AGE, 2020):

- Longwalls 205 to 208 drawdown in the majority of the Bowmans Creek Alluvium resulting directly from the extraction panels Longwall 205 – 208 is negligible. Areas of drawdown greater than 1 m are localised and limited to the very edges of the alluvium boundary.
- Longwalls 205 to 208 drawdown in the Glennies Creek Alluvium (GCA) is approximately 1 m. Drawdown along the eastern margin of Longwall 1 is increased as the model cells representing the fine grained alluvium become unsaturated. Drawdown directly from the extraction of longwall panels Longwalls 205 to 208 is negligible.
- Drawdown in the Hunter River Alluvium is predicted to 1m or less. A small localised area of increased drawdown is present in the fine grained alluvium to the south of panel Longwall 3 and Longwall 4. Direct drawdown from extraction panels Longwalls 205 to 208 is negligible.
- Additional drawdown in the Pike's Gully seam is minimal, as most drawdown took place during previous mining.
- Up to 20 m of drawdown is expected in the ULD centred over panels Longwall 206 and Longwall 207. These panels were not mined in the Upper Liddel seam, therefore it is not in a completely dewatered state leading to predicted drawdown impacts from the dewatering of the ULLD seam below.
- A maximum of 100 m drawdown is predicted to occur at the start of panel Longwall 205 in the ULLD Seam. By the end of Longwall 208 there is predicted to be a maximum of 200 m of drawdown along the southern boundary of each of the panels with up to 100 m directly attributed to Longwalls 205 to 208.

AGE (2020) also predicted the following impacts to stream baseflow in Bowmans Creek, Glennies Creek and the Hunter River:

- Negligible predicted change (< 0.005 ML/day) to the Hunter River baseflow gain rate attributable to mining Longwall 205 to Longwall 208.
- The reduction in baseflow gain rate for Bowmans Creek attributable to the mining of Longwall 205 to Longwall 208 is estimated as 0.013 ML/year.
- The reduction in baseflow gain rate for Glennies Creek attributable to the mining of Longwall 205 to Longwall 208 is estimated as 0.008 ML/year.

Hydro Engineering and Consulting Pty Ltd (HEC) (2020) reviewed the potential impacts to surface water flows as a result of the reductions to baseflow predicted by AGE (2020) and concluded that:

- Based on the incremental baseflow loss for Bowmans Creek (0.013 megalitres per day [ML/d]), the greatest effect would occur for a flow rate of 0.7 ML/day, where the probability that flow would be greater than this would reduce from 66% to 65% of days. This level of change would be imperceptible and very small compared to natural variability in catchment conditions and was therefore considered to be negligible.
- The impact of baseflow loss on low flows in Glennies Creek and the Hunter River is expected to be indistinguishable from natural variability in catchment conditions based on the low rates of predicted baseflow loss and the effect of regulated flow releases from Glenbawn and Glennies Creek Dams.

2.2.2 Water Quality

AGE (2020) predicts the increase in salinity due to potential mixing of fresher water and alluvium groundwater with saline groundwater from the Permian strata is unlikely to be due to the Permian strata being depressurised by subsidence.

Mining activities at Ashton Coal Mine are not expected to cause an increase in the groundwater salinity of creeks and alluvial aquifers; however, there may be a slight decrease in salinity due to the reduced discharge from the Permian strata. Other risks to water quality, including acid forming potential and heavy metal precipitation have not been observed as a potential issue (HLA, 2001).

HEC (2020) also reviewed the potential impacts to surface water quality and concluded that, consistent with previous assessments, mining of Longwalls 205-208 is not expected to result in detrimental impacts to surface water quality in the vicinity of the Ashton Coal Project.

2.2.3 Groundwater Dependent Ecosystems

AGE (2020) found that the predicted groundwater drawdown after extraction of Longwall 208 does not appear to significantly impact the River Red Gums (*Eucalyptus camaldulensis*) on Glennies Creek.

River Red Gums (*E. camaldulensis*) are known to be an adaptable species and will respond to water availability by using a combination of groundwater, surface water and soil moisture (Jones et. al. 2020). Since the preparation of the EA, updated mapping of GDEs for the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009* (NSW) shows there are no high priority GDEs within and surrounding the Extraction Plan area. Therefore, ELA (2020) concluded there would be minimal impact on any GDEs or other vegetation communities occurring on the alluvium outside of the direct subsidence impact areas.

2.2.4 Existing Groundwater Users

AGE (2020) noted that there are no non-ACOL registered bores in surrounding areas that will be impacted by the underground mine. The reason for this is that most of the drawdown resulting from the underground mine occurs in close proximity to the mined area, and that the drawdown generated by Ashton is not predicted to extend far enough to impact on private extraction bores in surrounding areas.

2.2.5 Existing Surface Water Users

The limited streamflow impacts, combined with ACOL groundwater take estimation and reporting, and the regulated nature of the Water Access Licences (i.e. water is released from the upstream regulating storages for extraction by the licence holders) mean that the impacts on licensed water users should be negligible.

As per the existing ACOL Water Management Plan, if it was established that the ACP mining activities have adversely affected flows in Bowmans Creek, thereby affecting licensed private water users in the lower reaches of the creek, ACOL would negotiate provision of an alternative water resource with the affected users.

2.2.6 Ponding

Changes to the natural landform over Longwalls 205-208, were predicted by SCT (2020) to cause some ponding in the northern and southern parts of Longwalls 205 and 206A and over most of Longwall 207A. Runoff is expected to pond in the two existing natural billabongs and a section of the main channel of Bowmans Creek excised by the eastern diversion channel. Areas on either side of the northern culvert on Lemington road are also likely to experience ponding.

Infrastructure that may be inundated by potential ponding includes powerlines, pipelines and roads including the alternative right of way to Property 130 and the south access road on AGLM land. Relocation of this infrastructure, filling, or local regrading of the landform was considered likely to be required to manage these impacts (SCT, 2020).

HEC (2020) recommended that monitoring of undermined areas should be undertaken following rainfall events to identify any significant areas of ponding, with further management activities to be determined based on the location and size of the ponding.

3 WATER MANAGEMENT GAP ANALYSIS

The following gap analysis demonstrates where the requirements of the Extraction Plan Guidelines are covered within the existing approved Water Management Plan.

Table 1 has been completed rather than repeating information in a separate Management Plan document.

Table 1 Water Management Plan – Gap Analysis

Aspect	Section/Comment
Overview of all landscape features, heritage sites, environmental values, built features or other values to be managed under the component plan;	**Section 2** of ACOL Water Management Plan. **Section 3** of the SCT Subsidence Assessment (2020). **Section 2** of the AGE Groundwater Assessment (2020). **Section 3** of the HEC Surface Water Assessment (2020).
Setting out all performance measures included in the development consent relevant to the features or values to be managed under the component plan;	**Section 2** of ACOL Water Management Plan.
Setting out clear objectives to ensure the delivery of the performance measures and all other relevant statutory requirements (including relevant safety legislation);	Surface Water Management Objective – **Section 6** of the Water Management Plan. Groundwater Management Objective – **Section 7** of the Water Management Plan.
Proposing performance indicators to establish compliance with these performance measures and statutory requirements;	Surface Water Impact Assessment Criteria – **Section 6.2** of the Water Management Plan. Groundwater Impact Assessment Criteria – **Section 7.2** of the Water Management Plan.
Describing the landscape features, heritage sites and environmental values to be managed under the component plan, and their significance. It should be noted that a full description of such features, sites and values would commonly have been provided and considered in a recent environmental impact assessment. Consequently, this section can be relatively brief, and focus on the presentation of appropriate figures and/or graphical plans;	**Section 2** of ACOL Water Management Plan. **Section 3** of the SCT Subsidence Assessment (2020). **Section 2** of the AGE Groundwater Assessment (2020). **Section 3** of the HEC Surface Water Assessment (2020).
Fully describing all currently-predicted subsidence impacts and environmental consequences relevant to the features, sites and values to be managed under the component plan;	Summarised in this document, **Section 2.1 and 2.2**. **Section 4** and **Section 5** of the SCT Subsidence Assessment (2020). **Section 5** of the AGE Groundwater Assessment (2020). **Section 6** of the HEC Surface Water Assessment (2020).
Fully describing all measures planned to remediate these impacts and/or consequences, including any measures proposed to ensure that impacts and/or consequences comply with performance measures and/or the Applicant's commitments;	**Section 8** of ACOL Water Management Plan.

Aspect	Section/Comment
Describing the existing baseline monitoring network and the current baseline monitoring results, including pre-subsidence photographic surveys of key landscape features and key heritage sites which may be subject to significant subsidence impacts (such as significant watercourses, swamps and Aboriginal heritage sites);	Baseline Surface Water Monitoring Data – **Section 6.1** of the ACOL Water Management Plan. Baseline Groundwater Monitoring Data – **Section 7.1** of the ACOL Water Management Plan.
Fully describing the proposed monitoring of subsidence impacts and environmental consequences;	Surface Water Monitoring Program – **Section 6.3** of the ACOL Water Management Plan. Groundwater Monitoring Program – **Section 7.3** of the ACOL Water Management Plan.
Describing the proposed monitoring of the success of remediation measures following implementation;	Surface Water Monitoring Program – **Section 6.3** of the ACOL Water Management Plan. Groundwater Monitoring Program – **Section 7.3** of the ACOL Water Management Plan.
Fully describing adaptive management proposed to avoid repetition of unpredicted subsidence impacts and/or environmental consequences;	Surface and Groundwater Response Plan - **Section 8** of the ACOL Water Management Plan.
Fully describing contingency plans proposed to prevent, mitigate or remediate subsidence impacts and/or environmental consequences which Substantially exceed predictions or which exceed performance measures;	Surface Water Exceedances – **Section 8.2** of the Water Management Plan. Groundwater Exceedances – **Section 8.3** of the ACOL Water Management Plan.
Listing responsibilities for implementation of the plan; and	**Section 8.6** of ACOL Water Management Plan.
An attached Trigger, Action, Response Plan (effectively a tabular summary of most of the above).	**Section 8** of ACOL Water Management Plan.

4 REFERENCES

Australasian Groundwater and Environmental Consultants Pty Ltd (2020) *Yancoal Ashton Longwalls 205-208 Extraction Plan Surface and Groundwater Impact Assessment*.

Eco Logical Australia (2020) *Longwall 205-208 Extraction Plan Flora and Fauna Assessment*.

HLA Envirosciences (2001) *Environmental Impact Statement – Ashton Coal Project*, Project reference U842.

Hydro Engineering and Consulting Pty Ltd (2020) *Ashton Coal Mine Longwalls 205-208 Extraction Plan Surface Water Technical Report*.

Jones, C., Stanton, D., Hamer, N., Denner, S., Singh, K., Flook, S., and Dyring, M., (2020) Field investigation of potential terrestrial groundwater-dependent ecosystems within Australia's Great Artesian Basin. *Hydrogeology Journal*. Vol 28, pp. 237-261.

Strata Control Technology (2020) S*ubsidence Assessment for the Extraction Plan for Longwalls 205 – 208 in the Upper Lower Liddell Seam*, Report Number ASH4927.