



OUT21/15267

Tegan Cole
Planning and Assessment Group
NSW Department of Planning, Industry and Environment

Tegan.Cole@planning.nsw.gov.au

Dear Ms Cole

**Warkworth Mine (Mod 2) - Lemington Underground (SSD 6464)
Modification Report**

I refer to your email of 1 October 2021 to the Department of Planning, Industry and Environment (DPIE) Water and the Natural Resources Access Regulator (NRAR) about the above matter.

This Modification is to enable the transfer and temporary storage of water into the existing Lemington Underground Mine void, and extraction and use of this water at Mount Thorley Warkworth and Hunter Valley Operations.

DPIE Water and NRAR have reviewed the Modification Report and require further information on water entitlement and any potential works on waterfront land. Further detail can be found in **Attachment A**.

Any further referrals to DPIE Water and NRAR can be sent by email to water.assessments@dpie.nsw.gov.au or to the following coordinating officer within DPIE Water:

Alistair Drew – Project Officer
E: Alistair.drew@dpie.nsw.gov.au

Yours sincerely

Liz Rogers
Manager, Assessments, Knowledge Division
Department of Planning, Industry and Environment: Water
24 November 2021

Attachment A

Detailed advice to DPIE Planning & Assessment regarding the Warkworth Mine (Mod 2) - Lemington Underground (SSD 6464)

1.0 Water Entitlement

1.1 Explanation

Page 11 pdf of Appendix A - Groundwater Assessment states: The modification proposes to transfer site water into the former underground workings and then extract water as required to meet make-up water demands. Extraction of water over and above that transferred into the underground storage would be accounted for against a relevant Water Access Licence (WAL) in any relevant reporting period (i.e. only if the total annual extraction of water out of the underground mine water storage is greater than the total volume transferred in the void of storage)...Other than natural groundwater inflows no water is currently transferred into the underground void for storage or other purpose.

This is not correct as once water is put into the void it becomes groundwater as there are no return flows policy. Therefore, water taken from the void must be appropriately licenced from the North Coast Fractured and Porous Rock Groundwater Source 2016 part of the Sydney Basin-North Coast Groundwater Source. As seen below there are currently 67,443.5 entitlements held under WALs. There are 79,660 shares listed to be available in the source.

Access Licence Category	No. of WAL(s)	Total Share Component	Total IDEC (Daily flow shares)	Cumulative AWD	Cumulative AWD Unit	Share Component Unit	Water made Available (ML)	Usage YTD (ML)
AQUIFER	172	67443.5	N/A	1	1	ML per share	67432.5	0
LOCAL WATER UTILITY	9	1300	N/A	1	100	% of Share Component	1300	0

23 Share components of aquifer access licences

It is estimated that at the time of commencement of this Plan the share components of aquifer access licences authorised to take water from these groundwater sources total 112,029 unit shares, distributed as follows:

- (a) 5,835 unit shares in the Alstonville Basalt Plateau Groundwater Source,
- (b) 0 unit shares in the Bulahdelah Sandstone Groundwater Source,
- (c) 2,190 unit shares in the Clarence Moreton Basin Groundwater Source,
- (d) 748 unit shares in the Comboyne Basalt Groundwater Source,
- (e) 279 unit shares in the Dorrigo Basalt Groundwater Source,
- (f) 1,871 unit shares in the Gloucester Basin Groundwater Source,
- (g) 3,324 unit shares in the Kulnura Mangrove Mountain Groundwater Source,
- (h) 4,268 unit shares in the Liverpool Ranges Basalt Coast Groundwater Source,
- (i) 102 unit shares in the Lorne Basin Groundwater Source,
- (j) 11,023 unit shares in the New England Fold Belt Coast Groundwater Source,
- (k) 2,505 unit shares in the North Coast Volcanics Groundwater Source,
- (l) 224 unit shares in the Oxley Basin Coast Groundwater Source,
- (m) 79,660 unit shares in the Sydney Basin-North Coast Groundwater Source.

Additionally, an extraction bore was installed and screened into the Lemington Underground (LUG) void in 2008 as a supplementary operational water source – the LUG Bore. Extraction from this bore commenced in October 2013. From 2013 to 2020, a total of 5,520 ML was extracted via the LUG Bore at varying rates, depending on mine make-up water requirements, with a maximum of 1,730 ML extracted in 2019. A search of registered works shows no active licences at the LUG bore site from which extraction is already occurring.

1.2 Recommendation – Prior to Determination

That the proponent:

- Provide evidence that groundwater entitlements can be obtained to account for any water take from the Lemington Underground void.
- Provide details of the Water Access Licence (WAL) linked to the water take at the LUG Bore.

2.0 Works on Waterfront Land

2.1 Explanation

The modification includes development of access tracks, powerlines and pipelines. The location of these works have not specifically been detailed in the Modification Report, therefore NRAR is unable to confirm if the works are in accordance with the Guidelines for Controlled Activities on Waterfront Land (NRAR 2018).

2.2 Recommendation – Prior to Determination

That the proponent:

- provide location of works and ensure they are in accordance with the Guidelines for Controlled Activities on Waterfront Land (NRAR 2018).

3.0 Site Water Balance

3.1 Explanation

Below is the site water balance from 2020. Modifications should increase storage by up to 2400ML which reduce what is currently stored in the pit at Mount Thorley Warkworth. Should the modification go ahead the water balance would need to be updated to include the groundwater take.

Table 3.1 - Water balance results for 2020 (Yancoal, 2021)

Water Stream	Volume (ML) % Total
Inputs	
Rainfall Runoff	7,657 (68%)
Hunter River (MTJV supply scheme)	1,455 (13%)
Potable (Singleton Shire Council/trucked)	20 (<1%)
Groundwater	428 (4%)
Recycled to CHPP from tailings (not included in total)	5,529
Imported (LUG bore)	565 (5%)
Imported (Hunter Valley Operations)	0 (0%)
Water from ROM Coal	1,075 (10%)
Total Inputs	11,199
Outputs	
Dust Suppression	3,030 (35%)
Evaporation - mine water dams	1,402 (16%)
Entrained in process waste	2,265 (26%)
Sharing with other mines	0 (0%)
Discharged (HRSTS)	0 (0%)
Water in coarse reject	580 (8%)
Water in product coal	1,213 (14%)
Miscellaneous use (wash-down etc.)	110 (1%)
Total Outputs	8,600
Change in storage (increase)	2,599

3.2 Recommendation – Post Determination

That the proponent:

- provide an updated site water balance including the groundwater take expected from storage within Lemington Underground void.

4.0 Maximum Fill Level

4.1 Explanation

The proponent has nominated a maximum 30 metres Australian Height Datum (mAHD) as the storage fill level. The nominal level is presented as the threshold that will prevent seepage from the LUG water storage to the Hunter River alluvium and with that the conclusion that the modification is not expected to lead to any significant impacts on the Hunter River or the Wollombi Brook.

Whilst the conceptual geology cross sections present a base level of around 40 mAHD for the alluvium, it is noted that there are no observation points with drill logs in proximity to the site, nor an inferred mapped extent of the sub-cropping coal seams to reconcile with confidence a buffer separation between the base of the alluvium and nominal fill level.

The thickness of the Hunter River Regulated alluvium is variable and the LUG Bore site abuts a large alluvial meander at the confluence of the Wollombi Brook and Hunter River. The thickness of the alluvium may be greater than conceptualised. There is negligible spatial information on alluvial base in AHD. DPIE Water recommends a conservative fill level be set that maintains at least a 10 m vertical separation to account for spatial variability. The final figure can be revised upon completion of the additional drilling along the north-east corner that informs on the base of the Hunter Regulated River Alluvial Aquifer in proximity to the site and the vertical buffer separation between the alluvial base and the nominal fill level that manages risk of seepage from the LUG water storage to the Hunter River.

4.2 Recommendation – Post Determination

That the proponent:

- set the proposed maximum fill level at 30 mAHD, and/or a minimum 10 m buffer separation between the base of the alluvium and fill level, whichever gives the greater vertical separation. Final reference level can be revised after the additional drilling is completed.

5.0 Revised Water Management Plan

5.1 Explanation

The longwall mining sections of the mine cover an area of around 3.14km², and the bord and pillar sections around 4.35 km², with total void volume in the workings estimated at 9,200 ML. The current groundwater level in the Mount Arthur coal seam is around -20 mAHD towards the north of the LUG workings which equates to a current estimated storage volume of 6,800 ML. This leaves around 2,400 ML of additional storage available in the workings.

Extrapolated recovery rates over the course of a year suggests that natural inflow to the workings could cause levels to rise by around 4.0 to 4.75 metres per year, equivalent to around 500 ML of storage per year

The conceptual model for underground storage doesn't consider potential losses and assumes 1:1 input/output is maintained. However, as the water levels approximate an equilibrated state, and given the significant extent of workings, there is the likelihood of points of discharge i.e. losses. If

there are losses occurring, there is potential for the proponent to draw more water from storage than credited.

This SSD proposal is comparable with a managed aquifer recharge scheme. Whilst monitoring of relative storage is proposed, the Water Management Plan (WMP) needs to have a process in place that evaluates water efficiencies around the presumed 1:1 ratio of input/outputs. The water balance between operational inputs/outputs and the existing induced annual inflow all contribute to changes in LUG water storage level.

The WMP should be revised to include a process that reports on LUG bore credits and debits (inputs/outputs) that is consistent with licensing requirements.

5.2 Recommendation – Post Determination

That the proponent:

- revise the Water Management Plan to include a reporting process that:
 - accounts for the inflows and outflows via the LUG bore; and
 - informs on both water level recovery efficiency (inputs) and water level decay (extraction) so that 1:1 presumption of inflow/outflow can be reconciled.

6.0 Monitoring Points

6.1 Explanation

Additional monitoring points have been proposed by the proponent comprising:

- two further locations within the workings to monitor operational groundwater levels and water quality; and
- additional monitoring bores into the Hunter River alluvium; one or more underlying coal seams close to the northeast corner of the workings, and to the west of the Hunter River as there is currently no monitoring in this area.

6.2 Recommendation – Post Determination

That the proponent:

- install additional monitoring points as proposed in the Modification Report.

End Attachment A