



MTW / HVO Lemington Underground Mine Water Storage Project Modification Report

APPENDIX B Site Water Balance Review - Hunter Valley Operations



HUNTER VALLEY OPERATIONS

26 August 2021

Hunter Valley Operations
1011 Lemington Road
Liddell NSW 2333

Attention: Andrew Speechly – Environment and Community Manager

Dear Andrew,

RE: HVO Site Water Balance Review for MTW/HVO Lemington Underground Water Storage Modification

INTRODUCTION

Mt Thorley Warkworth (MTW) and Hunter Valley Operations (HVO) currently manage their site water inventories and demands by transferring water between the sites, in accordance with their planning approvals and approved Water Management Plans. To provide greater flexibility in site water management, MTW and HVO are seeking a modification to their approved water management systems to allow for the transfer of water to and from the existing Lemington Underground Mine void (the Modification).

This HVO Site Water Balance Review has been prepared by Engeny Water Management (Engeny) on behalf of HVO to support an application for this Modification.

MODIFICATION

The Modification is seeking approval from the NSW Minister for Planning and Public Spaces or their delegate for a modification to the HVO South (PA 06_0261) and MTW (SDD 6464) planning approvals. This Modification is sought under section 4.55 of the Environmental Planning and Assessment Act 1979 (EP&A Act) and would include the following (Figure 1):

- Construction of three new bore sites and duplication of the existing LUG bore to access the Lemington Underground Mine void.
- Use of these four bore sites to transfer water from HVO and MTW into the former Lemington Underground Mine void and/or extract water from the void and transfer back to HVO and MTW; and,
- Development of supporting infrastructure (e.g. pipelines and powerlines).

The proposed Modification general arrangement is presented conceptually in Figure 1.

The Lemington Underground Mine void is expected to provide an estimated additional 2.4 gigalitres (GL) of available storage capacity for use between HVO and MTW (AGE, 2021). For the purpose of this assessment, it is assumed that HVO has access to 1.2 GL of this storage. The proposed transfer of water to and extraction from the Lemington Underground Mine void will provide additional water storage within the HVO and MTW water management systems (WMS).

EXISTING AGREEMENT

A water sharing agreement is currently in place between HVO and MTW which allows water to be transferred between the two sites via Dam 27S (South Lemington Void). This Modification is not proposing to impact this existing agreement.

SITE WATER BALANCE REVIEW

OVERVIEW / AVAILABLE DATA

Comprehensive site water balance modelling is regularly undertaken for HVO as part of annual reporting, the Water Accounting Framework (WAF) reporting as well as internal site operational water balance reviews.

As part of HVO's internal documentation, a study on the operational water management system (WMS) was undertaken in 2019 (Engeny, 2019). For this study, the HVO water balance model (WBM) was expanded and refined to represent the site 2019 WMS. This model is used by HVO in their operational water planning and is regularly updated to reflect the latest mine operations plan.

Results from the following sources form the basis of this Site Water Balance Review for HVO:

- HVO Operational Water Management System studies (Engeny, 2019).
- WAF Reporting for 2020, undertaken by Engeny (December 2020).
- HVO 2020 Annual Environmental Review (HVO, 2021).

EXISTING WATER MANAGEMENT SYSTEM

The existing approved HVO WMS is managed according to water type, as determined by catchment source quality and use. The water types at HVO include:

- Mine water (saline).
- Sediment water (dirty).
- Clean water (raw).

These water types and associated management systems are further described in the HVO Water Management Plan (HVO, 2018).

The HVO site is divided into four discrete 'operational areas', as follows:

- HVO West, including Howick Coal Preparation Plant (HCPP).
- HVO North, including Hunter Valley Coal Preparation Plant (HVCPP).
- HVO South.
- Newdell, including the Newdell Load Point and Hunter Valley Load Point (HVLP).

HVO West consists of the active West Pit and Mitchell Pit. Carrington Pit at HVO North is currently inactive and used for tailings storage. Mining activities south of the Hunter River at HVO South consist of open-cut mining of coal reserves in Cheshunt Pit and Riverview Pit, and the inactive Riverview Void, the largest mine water storage for HVO.

Water is pumped between HVO North and HVO West via pipelines between Dam 9W (Parnells Dam) and Dam 9N. Water transfers between HVO South and HVO North are via pipelines across the Hunter River haul road bridge. The Newdell Load Point and HVLP water management systems currently do not interact with the rest of HVO water management system.

HVO has the ability to extract water from the Lemington Underground Mine void via the existing LUG Bore, which is supported by a network of pipelines and pumping infrastructure (including access tracks and powerlines). HVO also has approval to transfer water between neighbouring mines, including MTW and Wambo Mine.

The key mine water storages at HVO and estimated volumes are summarised in Table 1.

Table 1: HVO Key Mine Water Storages

Area	Storage	Maximum Operating Volume (ML ¹)	Estimated Total Volume (ML)
HVO North	Dam 9N	23.2	28.9
	Dam 15N	34.6	66.6
	Dam 16N	20.1	35.2
	Dam 17N	19.1	31.0
	Dam 18N	21.7	23.6
	Dam 11N	79.9	83.9
	Dam 21N (SE Sump)	320.0	320.0 (spill into Alluvium)
	TOTAL	518.6	589.2
HVO West	Dam 9W	551.9	656.6
	Dam 4W & 5W	20.0	81.0
	TOTAL	571.9	737.6
HVO South	Dam 15S	638.4	684.4
	Dam 16S	65.4	262.5
	Dam 17S	26.7	73.4
	Dam 18S	57.0	166.2
	Dam 19S	1.0	91.9
	Riverview Void ²	729.0	729.0
	South Lemington Void (Dam 27S)	858.0	858.0 (spill into Alluvium)
	TOTAL	2,376	2,865
Newdell and HVLP	Dam 14W	25.9	49
	Dam 32N	121.7	152.9
	Dam 33N	29.6	40.2
	TOTAL	117.2	242.1
SITE STORAGE CAPACITY		3,643	4,434

¹ ML = Megalitres

² Riverview Void Capacity is based on current operating levels (45 mAHD).

The key storages on site provide approximately 3,643 ML of available storage capacity before impacting pit operability. This volume allows for an additional 791 ML of freeboard storage during significant rainfall events (i.e., the difference between the Maximum Operating Volume and the Estimated Total Volume).

The available storage capacity in Riverview Void will decrease as the Cheshunt Pit and Riverview South progress further south. This reduction in storage capacity is required to prevent seepage from Riverview Void into the open cut workings. Riverview Void is currently operating at a maximum of 45 mAHd (729 ML) and is expected to reduce to 0 ML operating capacity over the next four years. This assessment assumes 729 ML of storage is available in Riverview Void before impacting mining operations.

EXISTING SITE WATER BALANCE

A summary of the forecast average annual water balance has been extracted from the 2019 Operational Water Management System study (Engeny, 2019) and is provided in Table 2.

Table 2: Average Annual HVO Water Balance

Water Stream	Volume (ML/yr)
INPUTS	
Fresh Water (Hunter River Raw Water Supply)	1,305
Groundwater Inflow	1,302
Rainfall Runoff	7,448
Imported (Liddell/Ravensthorpe (via Cummock))	0
Total Inputs	10,055
OUTPUTS	
Dust Suppression	2,577
Evaporation – Mine Water & Tailings Dams	1,905
Howick CPP Supply	539
Hunter Valley CPP Supply	2,139
Discharges (HRSTS & Sediment Dam overflows)	1,818
Vehicle Wash-down	309
Miscellaneous Industrial Use	350
Total Outputs	9,637
Inputs – Outputs	417
Change in Storage	417 (increase)

Table 2 indicates that HVO is generally in a surplus of water as the average annual inflows exceed the average annual outflows. These results are supported by the HVO 2020 Annual Environmental Review, which reported that the total site inventory at HVO increased during 2020.

PROPOSED MODIFICATION

With the Modification, the total available storage volume at HVO will increase by 1.2 GL, due to availability of storage within the Lemington Underground Mine void. Other than the additional storage, the Modification does not propose to change the operational management of water at HVO.

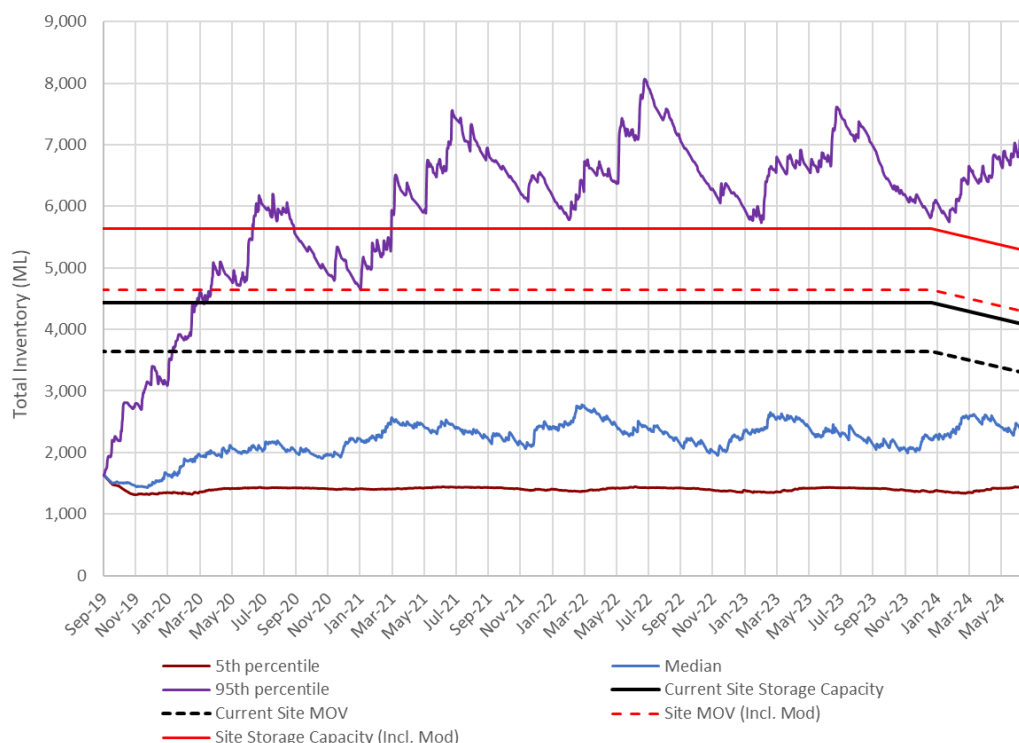
The operational site WBM is used to forecast the total site water inventory, with the average site water balance presented in Table 2. The forecast total site inventory is presented for the 5th percentile climate scenario (drought forecast), the median climate scenario, and the 95th percentile climate scenario (flood forecast) in Figure 2.

Figure 2 indicates that HVO is at risk of exceeding the site Maximum Operating Volume (MOV) and total storage capacity during the 95th percentile climate scenario (i.e., flood forecast) under both existing conditions and with the proposed Modification. However, the severity and duration of predicted exceedances is reduced with the proposed Modification. During the flood forecast climate scenario, it is expected that excess mine water could be preferentially stored in the Lemington Underground Mine void to avoid or reduce potential disruption of mining operations associated with the inundation of the active open pits. The Modification will therefore ensure there is less reliance on in-pit storage during high rainfall/runoff years as well as provide HVO with greater flexibility to store mine water during normal rainfall climate scenarios.

The Modification will improve water management by enabling more water to be stored on-site for later reuse, reducing the reliance on off-site discharges to the Hunter River during periods of higher rainfall. The storage of water in the Lemington Underground Mine void would also avoid the loss of water through evaporation that occurs in open water storages.

The additional water storage capacity provided by Modification would increase water supply security for HVO and reduce the reliance on external water supplies such as the Hunter River.

Figure 2: Total Site Inventory - Forecast¹



¹ Based on the calibrated 2019 OWMP WBM and forecast.

CONCLUSIONS AND RECOMMENDATIONS

MTW and HVO are seeking approval to modify their approved water management systems to allowing them to store water in the existing Lemington Underground Mine void. The Modification proposes to provide an additional 2.4 GL of available storage capacity within the Lemington Underground Mine void for use between MTW and HVO. The existing total site storage capacity at HVO is approximately 3,643 ML and is made up of several key storages.

This Site Water Balance Review focused on how the Modification would impact the HVO water management system. It is assumed that half of the additional volume available in the Lemington Underground Mine void (1.2 GL) will be available for use by HVO.

The outcomes of this Site Water Balance Review indicate that the additional storage available within the Lemington Underground Mine void will:

- Increase the total site water storage volume, reducing the risk of operational interruptions to active pits.
- Increase water supply security and reduce the reliance on external water supplies such as extraction from the Hunter River; and,
- Avoid the loss of water through evaporation that occurs in open water storages.

There have been no negative impacts identified to the HVO surface water management system (and surface receiving environment) as a result of the proposed Modification.

Regards,



Susan Shield

Principal Engineer

DISCLAIMER

This letter has been prepared on behalf of and for the exclusive use of Hunter Valley Operations and is subject to and issued in accordance with Hunter Valley Operations instruction to Engeny Water Management (Engeny). The content of this letter was based on previous information and studies supplied by Hunter Valley Operations

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