



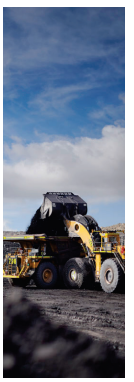


MTW / HVO
Lemington Underground Mine
Water Storage Project

Modification Report

APPENDIX B

Site Water Balance Review – Mount Thorley Warkworth

YANCOAL
兖煤澳大利亚有限公司

Lemington Mod - MTW Site Water Balance Review 0605-16-B3

Site Water Balance Review

Yancoal Australia Ltd
0605-16-B3, 16 September 2021

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1 Introduction

1.1 BACKGROUND

Hunter Valley Operations (HVO) and Mount Thorley Warkworth (MTW) Operations are neighbouring open cut coal mining operations situated in the Sydney Basin within the Singleton Local Government Area, in the Hunter Valley region of New South Wales (NSW) (see Figure 1.1).

HVO is a joint venture between subsidiaries of Yancoal Australia Ltd (Yancoal) and Glencore. HV Operations Pty Ltd is the appointed manager of the joint venture and operator of HVO. While HVO is managed as one operation, HVO North and HVO South each have separate planning approvals. HVO North operates under Development Consent DA 450-10-2003 and HVO South operates under Project Approval 06_0261.

MTW comprises the Mount Thorley Operation (MTO) and Warkworth Mine. MTW is majority owned and operated by Yancoal. While MTW is managed as one operation, MTO and Warkworth Mine each have separate planning approvals. MTO operates under State Significant Development (SSD) 6465 and Warkworth Mine operates under SSD-6464.

Due to the proximity of the two operations and history of related ownership and management, HVO and MTW have a number of interactions, including water management, that enable (for example) surplus water at MTW to be stored within disused HVO South open cut voids.

Mining operations at HVO and MTW are constrained by water management. During higher-than-average rainfall periods they are constrained by available surface water storage capacity and strict discharge rules resulting in surplus water being directed to active pits causing significant interruption to mining operations and potential adverse environmental outcomes. Similarly, during lower-than-average rainfall (drought) periods, there is greater demand from external water supplies, such as the Hunter River, to support operations.

HVO and MTW have approvals and infrastructure in place to transfer water between the sites, share certain water storages and extract water from the former Lemington Underground Mine void. The current water sharing interactions between the two sites have helped alleviate some of the water management constraints. Notwithstanding, water storage capacity and availability at both sites remains an ongoing operational constraint.

1.2 PROPOSED MODIFICATIONS

To provide greater flexibility in site water management, MTW and HVO are seeking to augment their existing water management infrastructure to enable the transfer and temporary storage of water into the existing Lemington Underground Mine void, and extraction and use of this water at MTW and HVO.

The Modifications would include (Figure 1.2):

- construction of three new bore sites and duplication of the existing Lemington Underground bore (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 intention of this Modification is to use the former Lemington Underground Mine void as a water storage, similar to storing water in an open cut void, thereby supplementing existing pit water storages (e.g. Riverview Void and South Lemington Pit), which are planned to be mined through (or impacted by planned mining) in the progression of the approved HVO South mine plan.

To allow for ease of management between the HVO and MTW operations, duplicate bores and infrastructure may be constructed at each location.

MTW are also seeking to modify the Warkworth Mine's SSD-6464 to allow for the construction of a new Ultra Class Truck Workshop adjacent to their existing workshop (see Figure 1.3).

Development associated with the Modifications would be limited to areas of existing or historic disturbance and no additional disturbance is expected.

WRM Water & Environment (WRM) was engaged by Yancoal to undertake a site water balance review to assess the potential impacts of the proposed Modification on the surface water management system and site water balance for MTW.

A similar assessment for HVO is being undertaken as part of a separate study (by others).

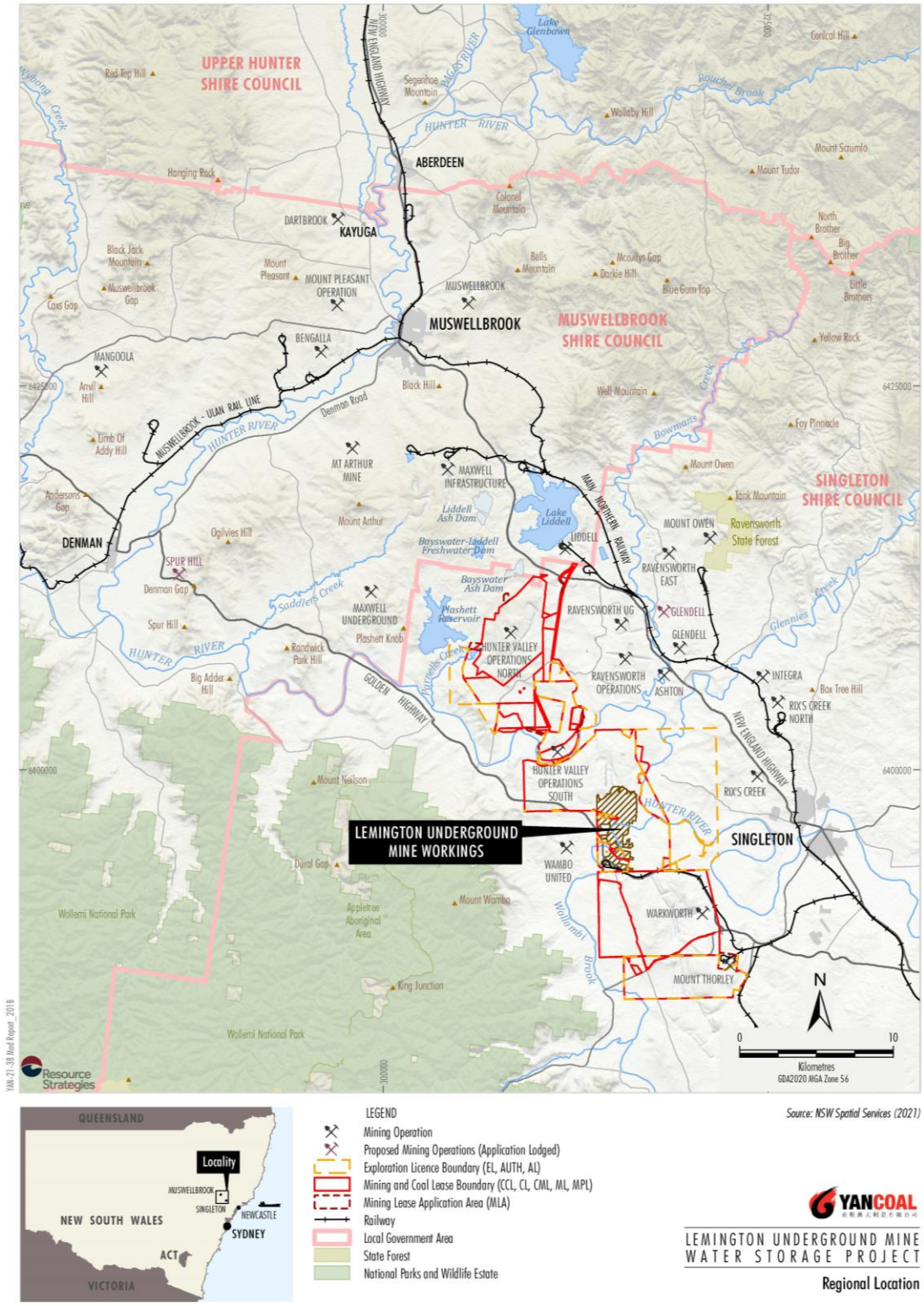

Figure 1.1 – Regional locality plan

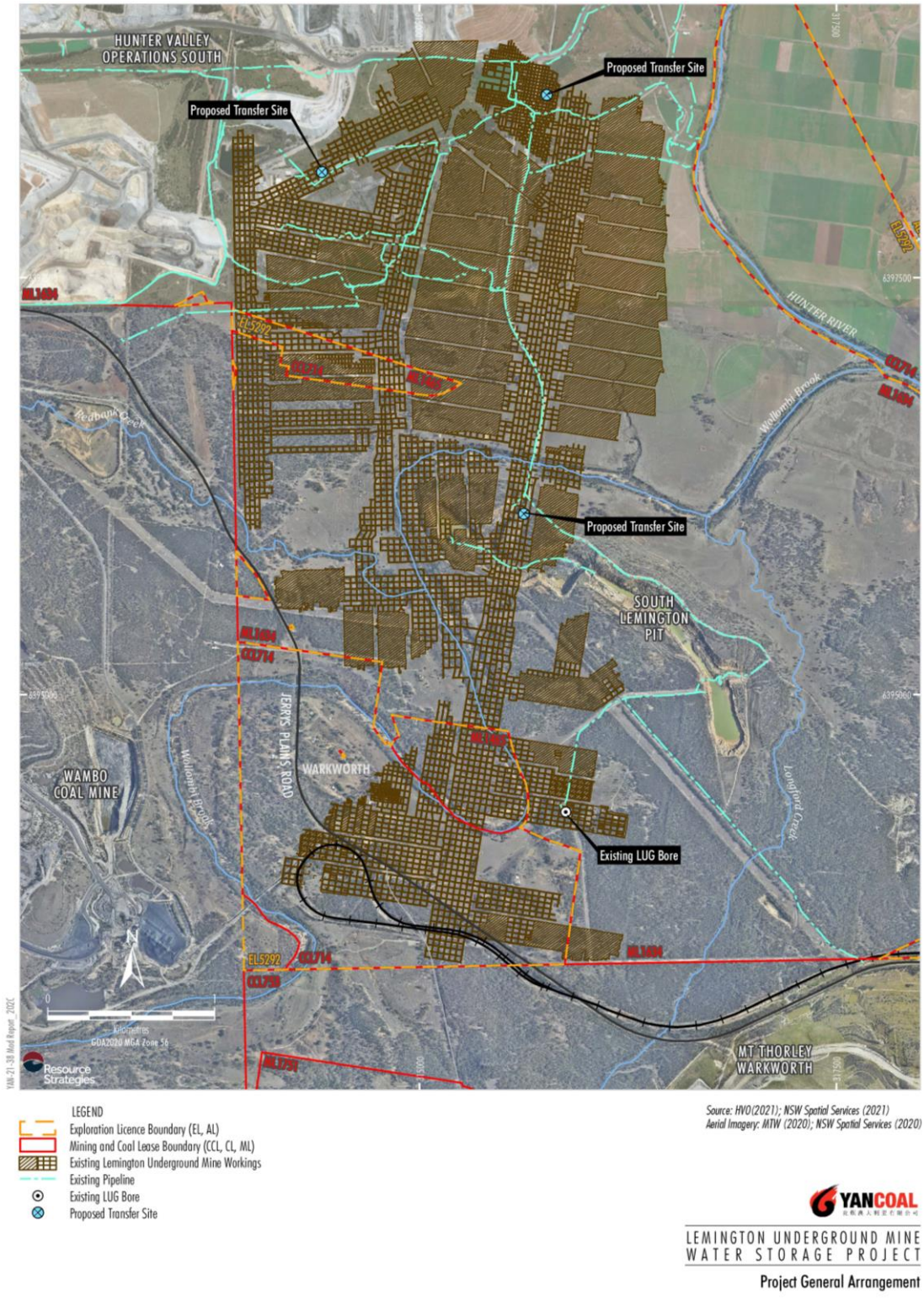

Figure 1.2 – Project general arrangement

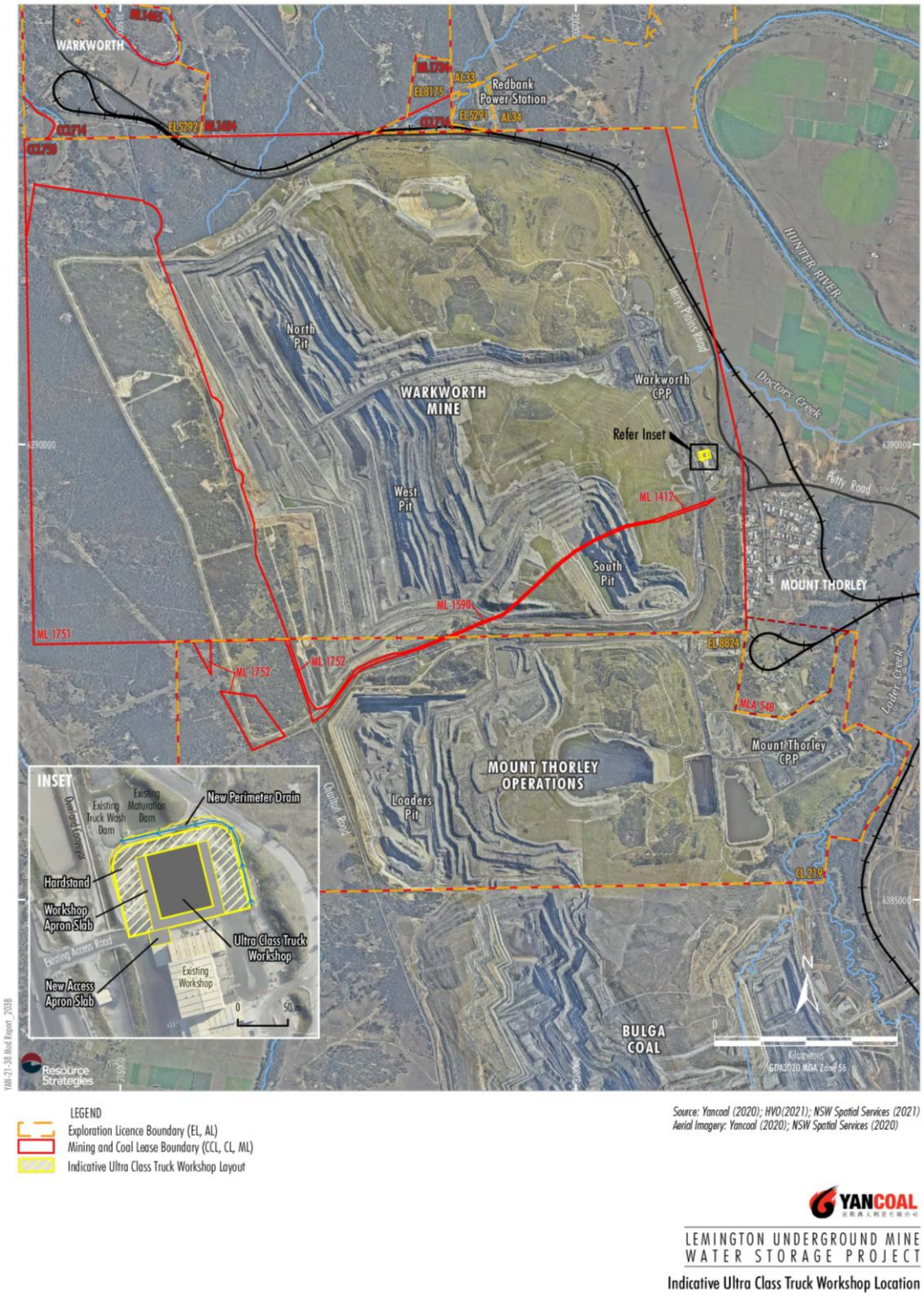

Figure 1.3 – Indicative Ultra Class Truck Workshop location

2 Lemington Underground Void

The Lemington Underground Mine operated from 1971 to 1992 using bord and pillar mining methods in the Mount Arthur Seam, with areas of secondary extraction. The former Lemington Underground Mine was acquired and merged into HVO South in 2001. The underground workings are located south-east of the current HVO South mine, below the South Lemington Pit 1, and north-west of Warkworth Mine (see Figure 1.2).

The Mount Arthur Seam floor in the former workings ranges from approximately 40 metres Australian Height Datum (mAHD) to approximately 200 mAHD, generally dipping from the north-east to the south-west.

MTW and HVO currently extract water from the Lemington Underground Mine void via the existing licensed LUG bore, which is supported by a network of pipelines and pumping infrastructure (including access tracks and powerlines) (see Figure 1.2).

Preliminary information relating to the geometry, capacity and current water level (and volume) of water stored in the Lemington Underground Mine void has been provided by AGE Consultants, and is summarised as follows:

- The Lemington Underground Mine void has a full supply capacity of around 9,200 megalitres (ML).
- The Lemington Underground Mine void is currently holding around 6,800 ML of water, at a water level of around - 22 mAHD.
- There is around 2,400 ML of available capacity within the Lemington Underground Mine void, up to a maximum water level of 30 mAHD.

3 MTW Water Management System

3.1 WATER MANAGEMENT PLAN

A description of the water management system (WMS) at MTW is provided in the latest Water Management Plan (WMP) (Yancoal, 2020). It includes details of the following aspects of the MTW WMS:

- Water management classification;
- Water management infrastructure;
- Management of tailings water;
- Management of clean catchments;
- Extraction of water under the Mount Thorley Joint Venture (MJTV) supply scheme;
- Environment Protection Licence (EPL) release conditions;
- The site water balance; and
- The Surface Water Management Plan (SWMP).

Refer to the MTW WMP (Yancoal, 2020) for details of the various components for the MTW WMS.

3.2 SITE WATER BALANCE – 2020 ANNUAL REVIEW

Every year, an Annual Review report by Yancoal is prepared to summarise the environmental performance of the operations over a calendar year. The latest Annual Review was prepared in 2021 for the 2020 calendar year (Yancoal, 2021).

Section 6.7 of the 2020 Annual Review shows the annual water balance for the 2020 calendar year. For ease of reference, it has been reproduced in Table 3.1.

Table 3.1 shows that, in 2020:

- The major sources of water to the site include rainfall runoff and the Hunter River water accessed under licence via the MTJV Supply Scheme.
- The total of water inputs (not including return from tailings) was 11,199 ML over the year.
- The major uses of water include dust suppression, washing of coal (tailings moisture entrainment, water in the product coal) and evaporation from the mine water dams.
- The total of water outputs was 8,600 ML over the year.
- In 2020, the total water inputs exceeded total outputs, resulting in a net increase in stored water of 2,599 ML.

The annual water balance for 2020 shows that the water management system was a net gaining system during that year (Table 3.1).

A total of 828.5 mm of rainfall was recorded in 2020, producing a calculated 7,657 ML of runoff from developed, disturbed and mining catchments. Water falling on clean water catchments is diverted off site into natural systems where possible. Rainfall runoff was the largest input to the site mine water balance in 2020 (68%).

In the meteorological context, 2020 was a wet year. The annual rainfall total of 828.5 mm is greater than the median annual long term rainfall (644 mm) recorded at the BOM Jerry's Plains rainfall gauge (Station No. 061086) between 1884 and 2013 (this station closed in 2014).

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**

3.3 WATER CONTAINMENT AND SUPPLY SECURITY AT MTW

3.3.1 Water Containment

At MTW, mine water is primarily stored in the following mine water storages:

- Dam 6S (SOOP) – 2,255 ML capacity;
- Dam 9S – 76 ML capacity;
- Dam 15S – 70 ML capacity;
- Coal Loader (52ML) Dam – 52 ML capacity;
- Dam 1N – 347 ML capacity; and
- Dam 27S (Lemington South) – 627 ML capacity.

The combined mine water storage capacity at MTW is around 3,250 ML. However, to maintain adequate storm buffer within the storages, the combined target inventory is around 2,000 ML.

Excess mine water at MTW can be stored in-pit, primarily in South Pit South and Loders Pit.

The latest water level surveys at MTW (25 June 2021) show the following:

- Around 1,440 ML of mine water is stored in the mine water storages;
- Around 2,750 ML of mine water is stored in the pits; and
- A total sitewide mine water inventory of around 4,190 ML.

3.3.2 Water Supply Security

Under Yancoal's existing approvals and licences, water can be imported to MTW from the following sources:

- The MTJV supply scheme (pumped from the Hunter River);
- The LUG bore; and
- Other mining operations (including the neighbouring HVO operation).

During periods of low rainfall, additional water from these sources may be required to supplement on-site water supplies.

In 2020, 1,455 ML was imported from the Hunter River for use at the site. MTW hold 4,409 ML of High Security Regulated Hunter River Water Access Licence entitlements and 1,400 ML of General Security Regulated Hunter River Water Access Licence entitlements.

In 2020, MTW also extracted 565 ML from the LUG bore under its North Coast Fractured and Porous Rock Water Access Licence entitlements.

No water was imported from other mining operations in 2020.

4 Potential Impacts and Benefits of the Modification

This section assesses the potential impacts and benefits of the proposed Modification on the MTW water management system. The two key potential impacts are:

- Impact on water containment; and
- Impact on water supply security.

4.1 IMPACT ON WATER CONTAINMENT

The Lemington Underground Mine void data provided in Section 2 indicates that there is approximately 2,400 ML of available water storage capacity within the Lemington Underground Mine void. This volume of available storage capacity would be shared between MTW and HVO, and would provide capacity to considerably reduce the volume of mine water currently stored in-pit at MTW (around 2,750 ML).

Moving some or all of the water currently stored in MTW pit storages would have the following impacts on water containment:

- Provides additional storm buffer volume for future rainfall events and wet seasons. The provision of this additional storage capacity would improve the overall site water balance for MTW. As shown in Section 3.2, the MTW WMS was a gaining system during 2020, which had a rainfall total of around 28% higher than the long term median annual rainfall. Any additional storage capacity would improve the containment risk profile of the MTW operations.
- Significantly reduces the risk of active pits being required to temporarily store excess mine water following heavy rainfall periods, which can cause significant interruptions to mining operations.
- Reduce the likelihood of licenced discharges to the Hunter River under the HRSTS being required in the future.

4.2 IMPACT ON WATER SUPPLY SECURITY

Moving some or all of the water currently stored in MTW pit storages would have the following impacts on water supply security:

- Storing excess mine water in a centralised location would make water accessible for both MTW and HVO operations and improve water supply security at both sites.
- Storing water in the Lemington Underground Mine void avoids evaporative losses that would have occurred if the water was stored in surface storages/pits. This increases long-term water availability for MTW and HVO.
- Having additional stored water in the Lemington Underground Mine void reduces the reliance of the water management system on water extraction from the Hunter River (via the MTJV supply scheme).

4.3 IMPACT OF PROPOSED WORKSHOP

The proposed Ultra Class Truck Workshop will be located adjacent to the existing workshop, and is located within the existing/approved disturbance footprint. Any potential impacts associated with runoff from the workshop (quantity or quality) would be negligible.

5 Summary

The proposed Modification will make tangible improvements to the MTW WMS (and the neighbouring HVO WMS) through the following mechanisms:

- *Water containment* - Provides additional storm buffer volume for future rainfall events and wet seasons, significantly reducing the risk of interruptions to the active pits and the likelihood of licenced discharges to the Hunter River being required in the future.
- *Water supply security* – Provides more accessible water for both MTW and HVO operations, increasing long-term water availability for MTW and HVO and reducing the WMS's reliance on extraction of water from the Hunter River.

The proposed Ultra Class Truck Workshop will be located within the existing/approved disturbance footprint, and any potential impacts associated with runoff from the workshop (quantity or quality) would be negligible.

There have been no negative impacts identified to the MTW surface water management system (and surface receiving environment) as part of this assessment.