
Appendix D

Water licensing strategy

HVO Continuation Project

Water licensing strategy

Prepared for Hunter Valley Operations Ltd

November 2023

HVO Continuation Project

Water licensing strategy

Hunter Valley Operations Ltd

H190408 RP#1

November 2023

Version	Date	Prepared by	Reviewed by	Comments
1	25 August 2023	Vanessa O'Keefe, Kate Holder	Vanessa O'Keefe	Draft
2	30 October 2023	Kate Holder	Vanessa O'Keefe	Updated draft for final review
3	7 November 2023	Vanessa O'Keefe, Kate Holder	Vanessa O'Keefe	Final

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1 Introduction

1.1 Background

Hunter Valley Operations (HVO) is a multi-pit open cut mining complex approximately 24 kilometres (km) north-west of Singleton in the Hunter Valley of New South Wales (NSW). HVO comprises two mine sites separated by the Hunter River, HVO North (approved under development consent DA 450-10-2003) and HVO South (operating under Project Approval 06_0261). While the two mine sites are approved under separate development consents, they are operated as one complex with fully integrated environmental management systems.

The HVO Continuation Project (the Project) broadly comprises the continuation of mining at HVO North and HVO South, extending the current approved mining completion dates of 2025 and 2030 respectively to the end of 2050 at HVO North and 2045 at HVO South. The continuation of mining across the HVO Complex will increase resource recovery from the existing operation, predominantly by mining through previously mined areas and to the extent of existing mining tenements and extracting coal from deeper seams at HVO North. At HVO South an extension to the life of the mine is proposed to facilitate improved mine sequencing outcomes and reduction in mining rate. The Project proposes a reduced mining disturbance area at HVO South compared to what is approved for extraction, with the previously approved coal extraction in the Riverview South East Extension area and South Lemington Pits 1 and 2 proposed to be removed from mine plan (and future approvals) for the Project.

1.2 Purpose of the document

Given that the two mine sites operate as one complex, one environmental impact statement (EIS) was prepared by EMM Consulting Pty Limited (EMM) on behalf of HVO to support the two SSD applications, being:

- SSD-11826681 – HVO North Open Cut Coal Continuation Project
- SSD-11826621 - HVO South Open Cut Coal Continuation Project.

The EIS was prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs) issued for HVO North and South on 11 March 2021, and the State significant development guidelines – preparing an environmental impact statement (DPIE 2022a). The EIS was placed on public exhibition for a period of four weeks from Monday 30 January 2023 through to Monday 27 February 2023.

On 9 March 2023, HVO received a submission from the Department of Planning and Environment – Water (DPE Water) which contained, inter alia, recommendations relating to water take and licensing. This document responds to water licensing related recommendations from DPE Water, which are outlined below, along with further explanation from DPE-Water regarding their recommendation. The Submissions Report provides a full response to all recommendations provided by DPE Water on the EIS.

1.1 Recommendation – Prior to Determination

That the proponent provides Water Access Licence numbers that are to be used to account for water take due to the project and that the corresponding points of water take are defined.

Explanation

The documentation has included totals of entitlements held, however details of the specific Water Access Licences and which is to be used to account for what component of water take has not been provided. This is required to understand the adequacy of the water licensing approach.

1.2 Recommendation – Prior to Determination

That a consolidated water balance be provided for a range of climatic scenarios during the project life and post closure until equilibrium is reached for all relevant sources (both surface and groundwater) including any direct and indirect take.

Explanation

The water balance figures provided are generally for median/average take which is insufficient to determine the maximum water take (surface and groundwater) for the project. This is also required for the post mining period and includes the need to revise the groundwater inflow data which is currently presented as stabilised inflow estimates. Further to this, variable water volumes were presented for some areas of water take in different sections of the documentation which require clarification, e.g. Groundwater inflows of 1,136 megalitres per year (ML/yr) in one section and in excess of 2,000 ML/yr in another.

The water balance is also expected to clearly define the source of water volumes held or captured in storages or excavations, the storages capacities, whether this water requires licensing or is exempt, and its movement and use around the site. Baseflow losses also need to be quantified in the water balance.

1.3 Recommendation – Prior to Determination

That the proponent demonstrate sufficient entitlement can be acquired in all relevant water sources to account for the maximum predicted water take.

Explanation

A review of the site water balance following an assessment against a range of climatic scenarios is recommended to confirm the maximum water take. Should these predictions exceed the water entitlement currently held, the ability to obtain the necessary entitlement will need to be demonstrated and/or to confirm if any take is covered by relevant exclusions/exemptions.

Water held or captured in storages on minor streams (first and second order watercourses) can be considered under the Maximum Harvestable Rights Dam Capacity (MHRDC), or potentially as an excluded dam under Schedule 1 of the Water Management (General) Regulation 2018. Further information can be accessed from the factsheet, "Interpreting excluded works dams (DPE 2022) available at the following link: https://water.nsw.gov.au/data/assets/pdf_file/0008/554444/excluded-workexemption-fact-sheet.pdf

When interpreting the presence of a watercourse and its stream order for licensing purposes the hydroline layer available from the Departments website is the appropriate tool to use. This is accessible at the following link: <https://www.dpie.nsw.gov.au/water/licensing-and-trade/hydro-line-spatial-data>. Please note no exemptions were deemed relevant to the water take associated with Lake James.

Both Lake James and Parnell Dam are located on third order watercourses and need to be considered for licensing purposes. Water runoff captured and used from dams constructed on third or higher order watercourses, or harvestable rights dams that exceed the MHRDC need to be quantified and accounted for by holding sufficient water entitlement.

Baseflow losses must also be accounted for.

2 Water regulatory framework

2.1 Water Management Act 2000 and Regulation

The [Water Management Act 2000](#) (WM Act) is founded on the principles of ecologically sustainable development and the need to share and manage water resources for future generations. The WM Act recognises that water management decisions must consider economic, environmental, social, cultural and heritage factors. It recognises that sustainable and efficient use of water delivers economic and social benefits to the state of NSW. The WM Act provides for water sharing between different water users, including environmental, basic landholder rights and licence holders. The licensing provisions of the WM Act apply to areas where a statutory WSP has commenced, with WSPs in force in all but a very few small coastal areas of the state.

The key regulation made under the WM Act is the [Water Management \(General\) Regulation 2018](#) (WM Regulation). The regulation specifies important procedural and technical matters related to the administration of the WM Act and also specifies exemptions from licence and approval requirements under the WM Act.

2.2 Water Sharing Plans

Water sharing plans (WSPs) are statutory documents that apply to one or more water sources, which may also be sub-divided into management zones. They define the rules for sharing and managing water resources within water source areas. WSPs describe the basis for water sharing and document the water available and how it is shared between environmental, extractive and other uses. The WSPs establish environmental water rules, the long term average annual limits on water extraction from each water source, and how water is made available for different categories of extractive uses such as local water utilities, domestic and stock, basic landholder rights, irrigation and industrial uses. WSPs also establish trading rules and mandatory conditions that apply to licences and approvals.

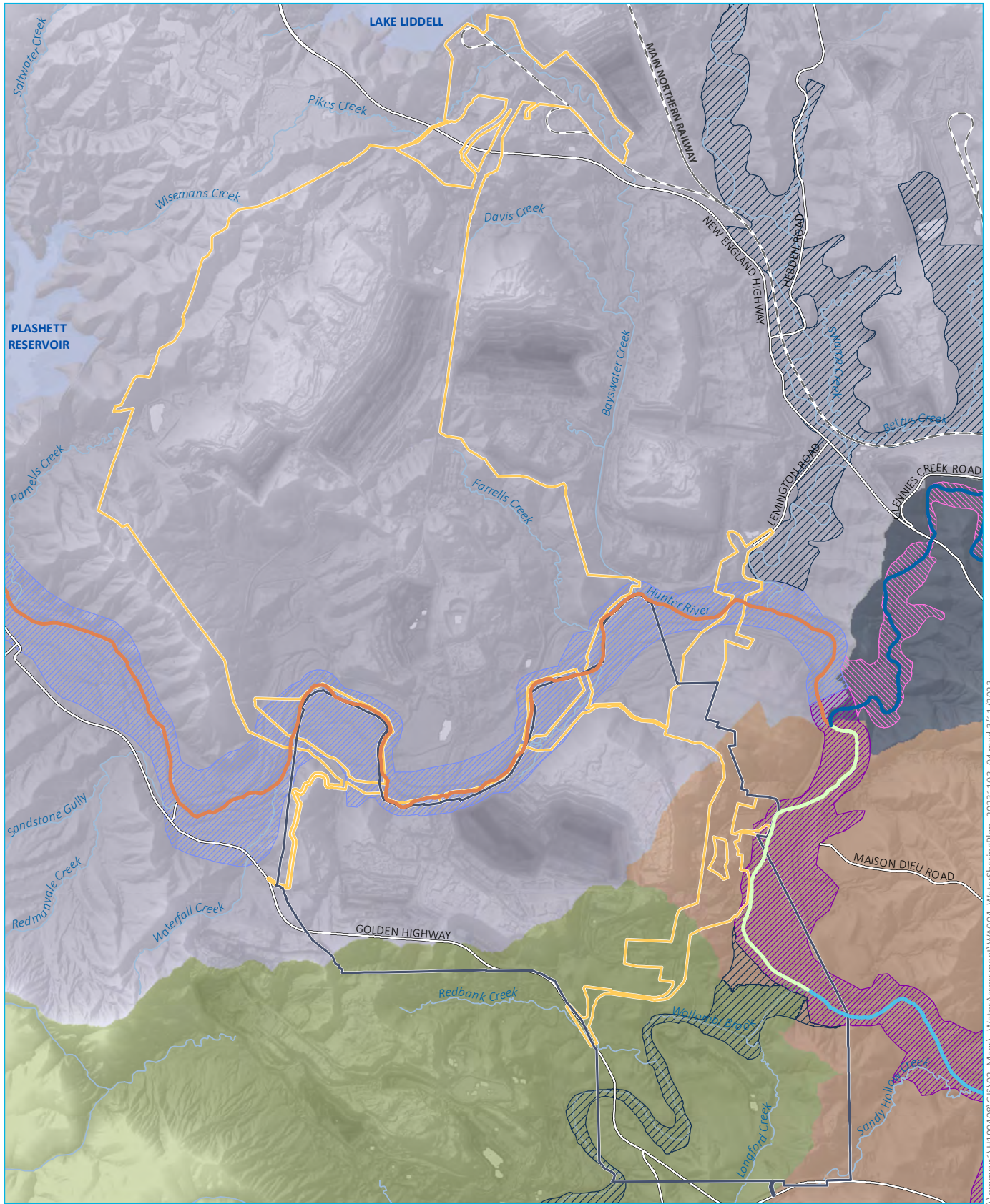
Table 2.1 shows the WSPs, water sources and management zones relevant to the Project area, and the water access licences (WALs) held by HVO in each. The surface water sources and management zones are also shown in Figure 2.1, noting that the Sydney Basin-North Coast Groundwater Source underlies the entire area.

Table 2.1 **Applicable water sharing plans and management zones**

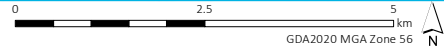
Water sharing plan	Relevant water source	Relevant management zone
Hunter Regulated River Water Source 2016	Hunter Regulated River Water Source	Zone 1B (From Glenbawn Dam to Goulburn River Junction)
		Zone 2A (From Glennies Creek junction to Wollombi Brook junction)
		Zone 2B (From Wollombi Brook junction to Oakhampton rail bridge)
Hunter Unregulated and Alluvial Water Sources 2022	Hunter Regulated River Alluvial Water Source	Upstream (U/S) Glennies Creek
		Downstream (D/S) Glennies Creek
		Glennies Creek
	Jerrys Water Source	Jerrys
	Lower Wollombi Brook Water Source	

Table 2.1 **Applicable water sharing plans and management zones**

Water sharing plan	Relevant water source	Relevant management zone
	Singleton Water Source	
	Glennies Water Source	
North Coast Fractured and Porous Rock Groundwater Sources 2016	Sydney Basin-North Coast Groundwater Source	



Source: EMM (2023); HVO (2023); DPIE (2021); DFSI (2017); WSP (2016, 2022)



KEY

- HVO North proposed development consent boundary
- HVO South proposed development consent boundary

Hunter Unregulated and Alluvial Water Sources 2022 WSP

Unregulated River Water Sources

- Glennies Water Source
- Jerrys Water Source
- Lower Wollombi Brook Water Source
- Singleton Water Source

Hunter Regulated River Alluvial Water Source Management Zone

- Downstream Glennies Creek

- Glennies Creek
- Upstream Glennies Creek
- Other alluvium

Hunter Regulated River 2016 WSP

- Management Zone 1B (Hunter River from Goulburn River Junction to Glennies Creek Junction)
- Management Zone 2A (Hunter River from Glennies Creek Junction to Wollombi Brook Junction)
- Management Zone 2B (Hunter River from Wollombi Brook Junction to downstream extent of the Hunter River)
- Management Zone 3A (Glennies Creek)

- Existing environment
- Rail line
- Major road
- Named watercourse
- Named waterbody

Project area WSPs, water sources and management zones

HVO Continuation Project Water Licensing Strategy
Figure 2.1



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2.3 Water access rights and exemptions

The WM Act establishes two fundamental types of rights to 'take' surface water and groundwater:

- A basic landholder right, being the right to take water without an access licence:
 - from any river, estuary or lake to which the land has frontage or from any aquifer underlying the land for domestic consumption and stock watering, but not for any other purpose
 - to construct and use one or more water supply works for the purpose of capturing and storing water of a kind specified by the harvestable rights order, and to take and use that water.
- An access licence, which entitles its holder to:
 - specified shares in the available water within a specified water management area or from a specified water source (the share component)
 - take water at specified times, at specified rates or in specified circumstances, or in any combination of these, and in specified areas or from specified locations.

It is an offence to take water from a water source other than pursuant to one of these rights, unless exempt from the requirement for an access licence under the WM Act or WM Regulation (Clauses 21 and Schedule 4). Of relevance, WALs are not required for the taking of water from 'excluded works' – that is, *dams that are located on minor streams*:

- from which no water is reticulated or pumped, and are for the purpose of control or prevention of soil erosion, or for flood detention and mitigation
- that are solely for the capture, containment and recirculation of drainage and/or effluent, consistent with best management practice or required by a public authority to prevent the contamination of a water source, or from which water is used solely for environmental management purposes
- that exceed the harvestable rights capacity, and were constructed before 1 January 1999, and that are used solely for domestic consumption and stock watering, or that do not result in the extraction of water.

DPE-Water recently published [fact sheet](#) providing further explanation of the excluded works exemptions provisions.

The NSW [Aquifer Interference Policy](#) (AIP) (NOW 2012) further clarifies that a WAL is required under the WM Act (unless an exemption applies or water is being taken under a basic landholder right) where any act by a person carrying out an aquifer interference activity (such as a mine void that intercepts groundwater) causes the removal of water from a water source; or the movement of water from one part of an aquifer to another part of an aquifer; or the movement of water from one water source to another water source. In addition, the AIP states that 'the post- closure continued take of water until an aquifer system reaches equilibrium may extend from months to centuries after cessation, depending on the scale of the activity, recharge relationships and aquifer characteristics. Where there is ongoing take of water, the licence holder must retain a water licence for the period until the system returns to equilibrium or surrender it to the Minister'.

2.4 Harvestable rights

Harvestable rights allow landholders in NSW to capture and store a proportion of the rainfall runoff from their landholding in one or more harvestable rights dams on minor streams without a WAL, water supply work approval or water use approval under the WM Act.

The proportion of rainfall runoff that may be captured under harvestable rights depends upon where a landholding is located. At the Project site this is 30%, although use of that water is highly restricted if the dam capacity exceeds the 10% rainfall runoff equivalent and is discounted for any exempt dams on the landholding (as defined in Section 2.3 above). Therefore, in practice, the harvestable right at the Project site would be restricted to 10% of rainfall runoff.

HVO has 13,343 hectares (ha) of contiguous landholdings. This equates to 934 megalitres (ML) of 10% harvestable right dam capacity.

2.5 Minor streams and the Regulation hydroline

The [‘hydroline’ spatial dataset](#) contains mapped information about watercourses and waterbodies in NSW. The purpose of the hydroline spatial data is to determine the Strahler stream order of a stream (Figure 2.2), which in turn identifies ‘minor streams’ for the purpose of determining:

- whether certain exemptions to the requirement for WALs and approvals apply under the WM Regulation
- dams that may be considered (or constructed) as harvestable rights dams or mixed rights dams
- where infrastructure is located in relation to mapped watercourses and waterbodies.

The term "minor stream" is defined under clause 3(1) of the WM Regulation as:

- a) any stream or part of a stream:
 - i) the location of which is specified in the hydroline spatial data, and
 - ii) that is identified as a first or second order stream, or part of such a stream, as determined in accordance with the system set out in Schedule 2 [to the WM Act], and
 - iii) that does not maintain a permanent flow of water, being a visible flow that occurs on a continuous basis, or would so occur if there were no artificial abstractions of water or obstruction of flows upstream, and
 - iv) that does not at any time carry flows emanating from a third or higher order stream as determined in accordance with the system set out in Schedule 2 [to the WM Act], or
- b) any stream or part of a stream the location of which is not specified in the hydroline spatial data.

For the purposes of paragraphs (a) (i) and (b), a stream is specified in the hydroline spatial data if it is identified as a watercourse (however described) in accordance with the legend or terms of that data.

The [‘regulation’ hydroline dataset](#) on which water management decisions are based is static and does not necessarily align with the more dynamic NSW Hydro Line dataset held and administered by Spatial Services (Department of Finance, Services & Innovation). Both datasets have evolved over the years, originally from the digitisation of hard copy maps from the 1980s.

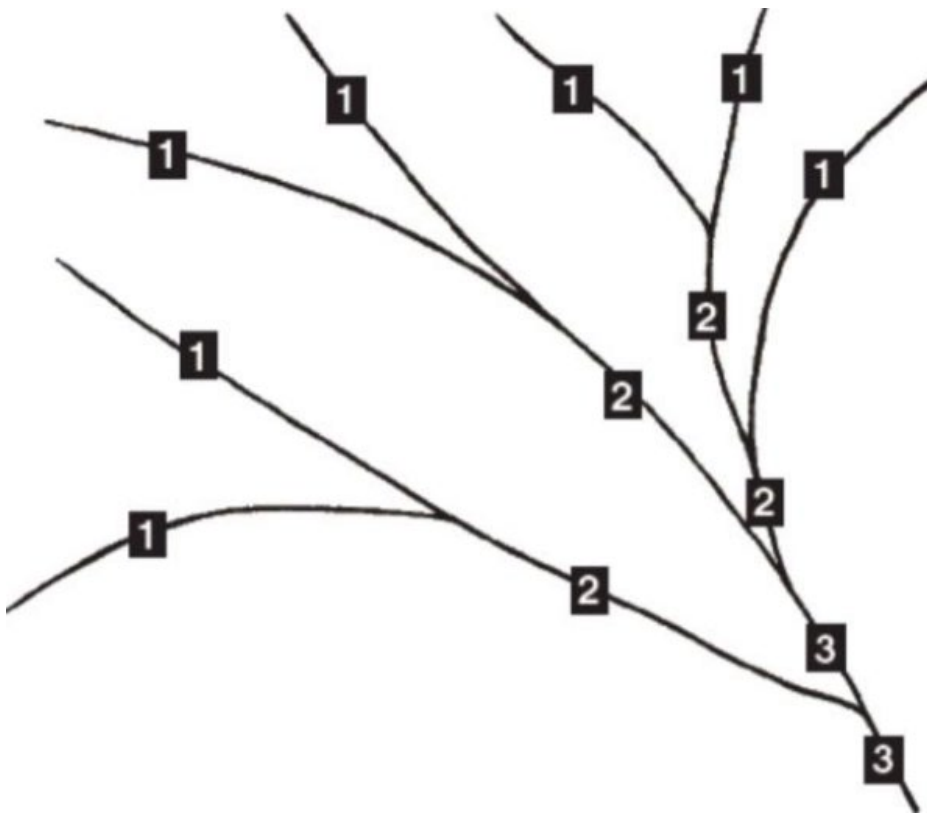


Figure 2.2 The Strahler method for assigning stream order to watercourses

3 HVO Continuation Project

3.1 Water access licences

Table 3.1 is a summary of water access licence entitlements held by HVO by WSP, water source, management zone and licence category. Appendix A details all HVO WAL holdings and associated work approvals, which are also reported in the HVO Water Management Plan.

Table 3.1 HVO water access licence entitlements by water source and management zones

	Domestic and stock	General security	High security	Supplementary	Aquifer	Unregulated river
Hunter Regulated River						
Zone 1B (U/S Glennies Ck)	8	5,244	3,180	98		
Zone 2A (D/S Glennies Ck)		1,393	1,506	301.5		
Zone 2B (D/S Wollombi Bk)	16	613		128.4		
Hunter Unregulated River and Alluvial						
Regulated river alluvial – U/S Glennies Creek MZ					568 ¹	
Regulated river alluvial – D/S Glennies Creek MZ					289	
Regulated river alluvial – Glennies Creek MZ					-	
Jerrys					-. ¹	705
Glennies					-	-
Lower Wollombi Brook					144	88
Singleton					225	
North Coast fractured and porous rock						
Sydney Basin North					5,560	

Notes: 1. The Water Assessment Report (Appendix K to the EIS) listed 448 unit shares in the Regulated River Alluvial Water Source – Upstream Glennies Creek and 120 shares in the Jerrys Water Source; however, following review of the NSW Water Register, that WAL actually relates to the Regulated River Alluvial Water Source – Upstream Glennies Creek Management Zone.

HVO holds multiple work approvals and WALs for the HVO Complex. To reduce the administrative demand on HVO and NSW Government, and following approval of the Project, HVO proposes to consolidate WALs and consolidate works into a Miscellaneous Work approval each for HVO South and HVO North.

3.2 Water take

Water ‘take’ by the Project as a whole, as defined under the WM Act and AIP includes:

- groundwater inflows to mining areas, which may be a combination of groundwater and surface water
- reduction in baseflow to watercourses due to watertable drawdown – this is groundwater take
- increase in surface water leakage to groundwater due to watertable drawdown – this is surface water take
- runoff captured by the WMS – this is surface water take
- water taken for operational requirements from the Hunter Regulated River Water Source.

Baseflow is the component of streamflow that is sourced from groundwater. Some of the watercourses (or sections of watercourses) in the Project area are classified as gaining streams, which gain water from inflow of groundwater through the stream bed (baseflow) where/when the groundwater table level is higher than the height of water in the watercourse. This concept is illustrated on Figure 3.1(A) below.

Where groundwater extraction occurs through dewatering of the mine, the depressurised groundwater system causes drawdown effects for connected surface water systems. Where the watercourse(s) is gaining (receiving groundwater discharge), groundwater drawdown can result in reduction in groundwater baseflow to the stream (the source of this take is groundwater). This concept is illustrated on Figure 3.1(B) below.

Watercourses can also be losing systems, where water from the stream seeps through the streambed to groundwater (termed “river leakage”). This occurs where the groundwater table is at a lower elevation than the height of water in the watercourse.

Groundwater drawdown induced by dewatering/extraction can lead to a gaining stream changing to a losing stream, or can increase the natural rate of river leakage (to groundwater). Induced river leakage (i.e. via lowering of the groundwater table below the height of the stream bed) is considered as take from the surface water source. This concept is illustrated on Figure 3.1(C) below.

Table 3.2 lists the approach used to estimate each of these elements of water take.

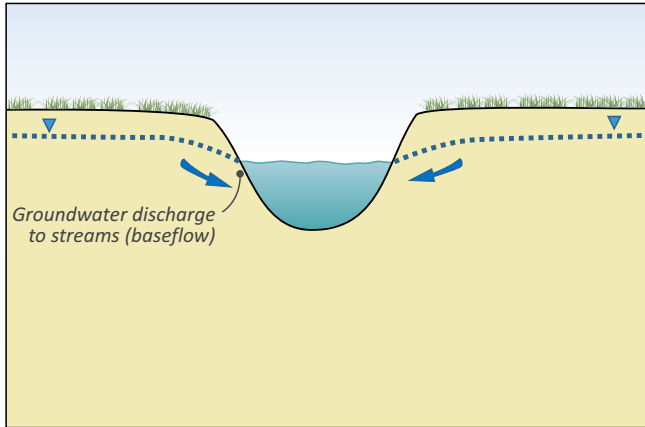
Table 3.2 Summary of methods used to estimate take

Type of take	Surface water or groundwater take	Method used to estimate take	WAL category needed for take (where not exempt)
Surface water (river) leakage to groundwater (indirect take)	Surface water	Groundwater flow model developed by AGE (2022)	<ul style="list-style-type: none"> • High Security or General Security WAL if indirect take is from the Hunter Regulated River Water Source, or • Unregulated River WAL if take is from: <ul style="list-style-type: none"> – Jerrys Water Source – Lower Wollombi Brook Water Source – Singleton Water Source – Glennies Water Source.
Water extracted from the Hunter Regulated River Water Source to meet operational requirements	Surface water	Water balance model developed by Engeny (2022), noting actual take will be metered	High Security or General Security WAL for take from the Hunter Regulated River Water Source.

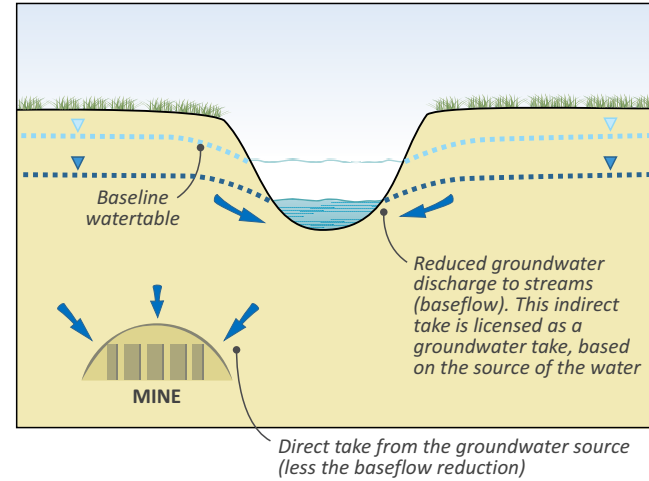
Table 3.2 Summary of methods used to estimate take

Type of take	Surface water or groundwater take	Method used to estimate take	WAL category needed for take (where not exempt)
Runoff captured by the water management system under a range of climate scenarios	Surface water	Water balance model developed by Engeny (2022)	Unregulated River WAL if take is from: <ul style="list-style-type: none"> • Jerrys Water Source • Lower Wollombi Brook Water Source • Singleton Water Source.
Reduction in baseflow (groundwater discharge to surface water) (indirect take)	Groundwater	Groundwater flow model developed by AGE (2022)	Aquifer access licence if take is from: <ul style="list-style-type: none"> • Hunter Regulated River Alluvial Water Source (various management zones) • Jerrys Water Source • Glennies Water Source • Lower Wollombi Brook Water Source • Singleton Water Source.
Groundwater inflow to mining areas	Groundwater	Groundwater flow model developed by AGE (2022)	Aquifer access licence from: <ul style="list-style-type: none"> • Sydney Basin-North Coast Groundwater Source. And from other water sources if indirect take: <ul style="list-style-type: none"> • Jerrys Water Source • Glennies Water Source • Lower Wollombi Brook Water Source • Singleton Water Source.

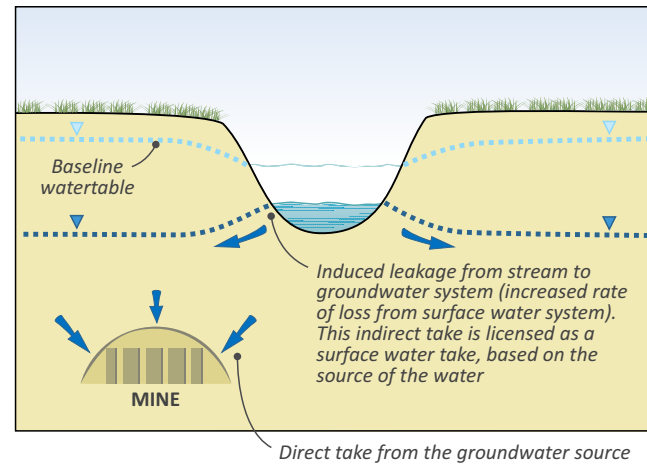
A) PRE-MINING CONDITIONS



B) MINING CONDITIONS – GAINING STREAMS



C) MINING CONDITIONS – CONNECTED LOSING STREAMS



NOT TO SCALE

This diagram is a conceptual representation of the difference between surface water take and groundwater take adjacent to or below a stream, induced by watertable drawdown.

Licensing by the source – surface water–groundwater interaction

HVO Continuation Project

Water licensing strategy

Figure 3.1

3.2.1 Groundwater take

The predicted peak and post-mining groundwater take from each groundwater source and management zone associated with the Project is summarised in Table 3.3, together with the HVO entitlement held in the corresponding area. Charts of the predicted take over time (during operations) for each water source are presented in Figure 3.2 to Figure 3.5.

Table 3.3 Groundwater take

Water Source/Zone	Peak take (Mining year) – ML/yr	Ongoing (post closure) take – ML/yr	Aquifer access licence entitlement held – ML/yr
Sydney Basin-North Coast Groundwater Source	2,133 ¹ (17)	1,200–1,300	5,560
Hunter Regulated River Alluvial Water Source – U/S Glennies Creek management zone	277 (12)	468	568
Hunter Regulated River Alluvial Water Source – D/S Glennies Creek management zone	15 (27)	33	289
Hunter Regulated River Alluvial Water Source – Glennies Creek management zone	0	3	-
Jerrys Water Source	5 (27)	12–18	-
Lower Wollombi Brook Water Source	26 (2)	22–27	144
Singleton Water Source	1 (7–27)	2	255

Notes: 1. This total is broken down by area/voids in Table D 15 of the [Groundwater Impact Assessment Appendix](#) to the EIS.

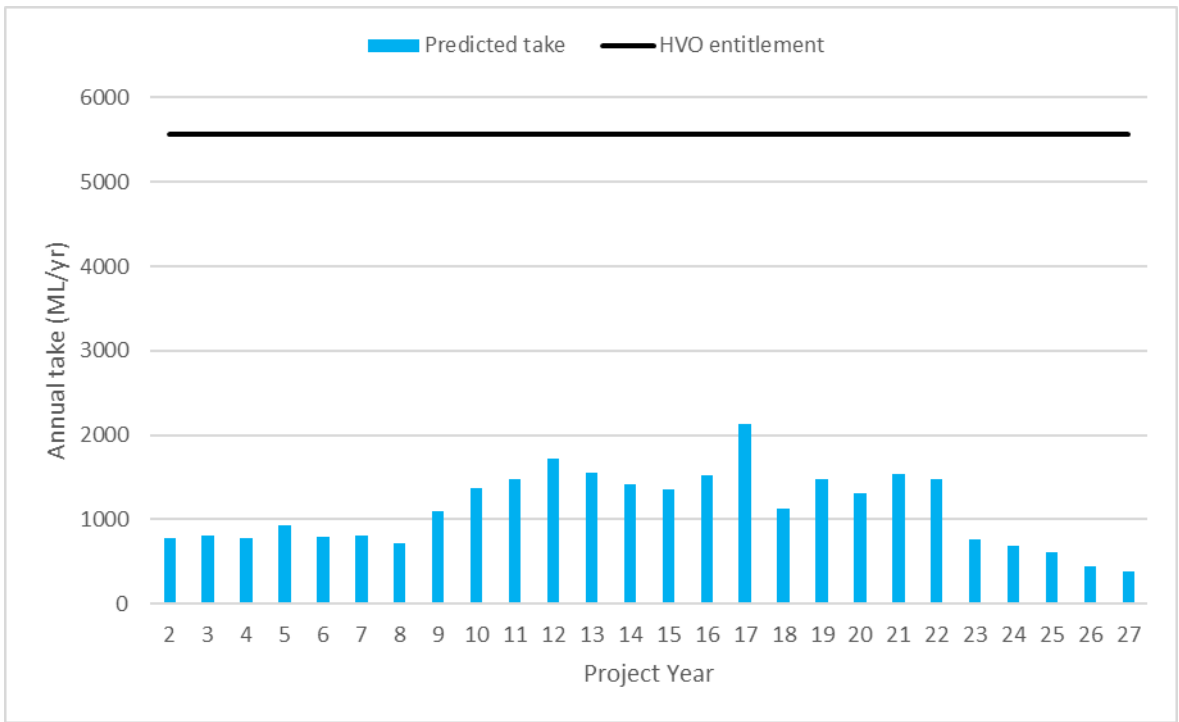


Figure 3.2 Groundwater take from the Sydney Basin-North Coast Groundwater Source (during operations)

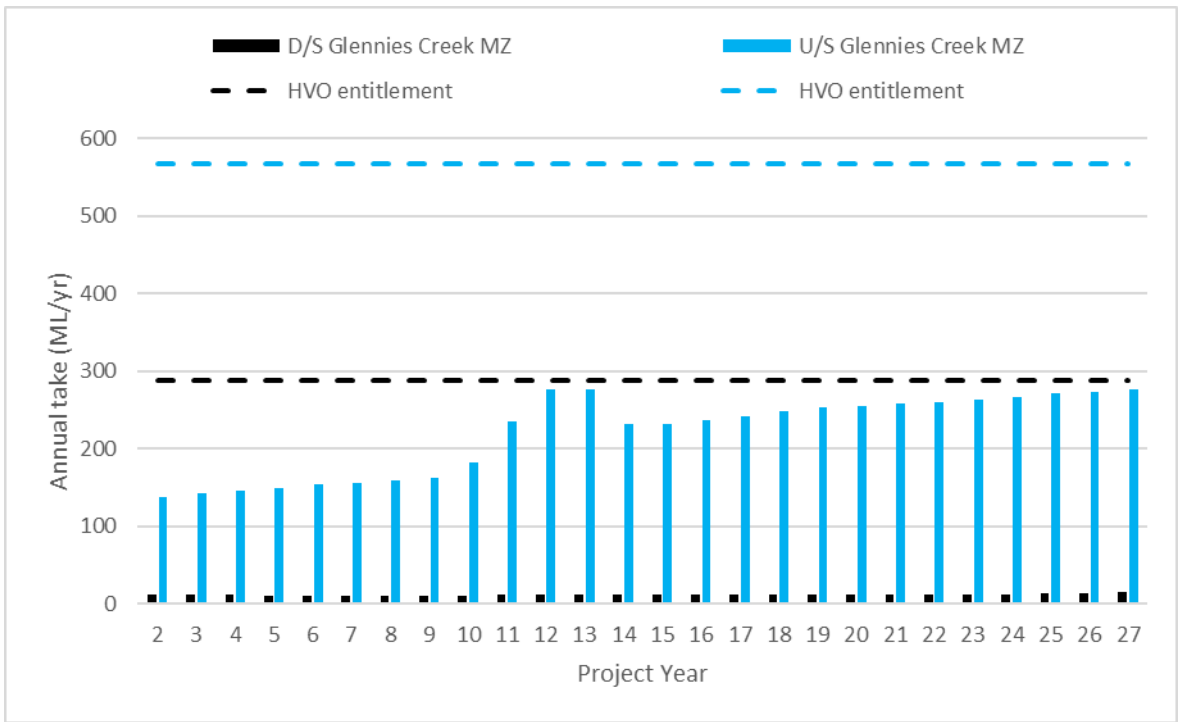


Figure 3.3 Groundwater take during operations from the Hunter Regulated River Alluvial Water Source (downstream and upstream management zones)

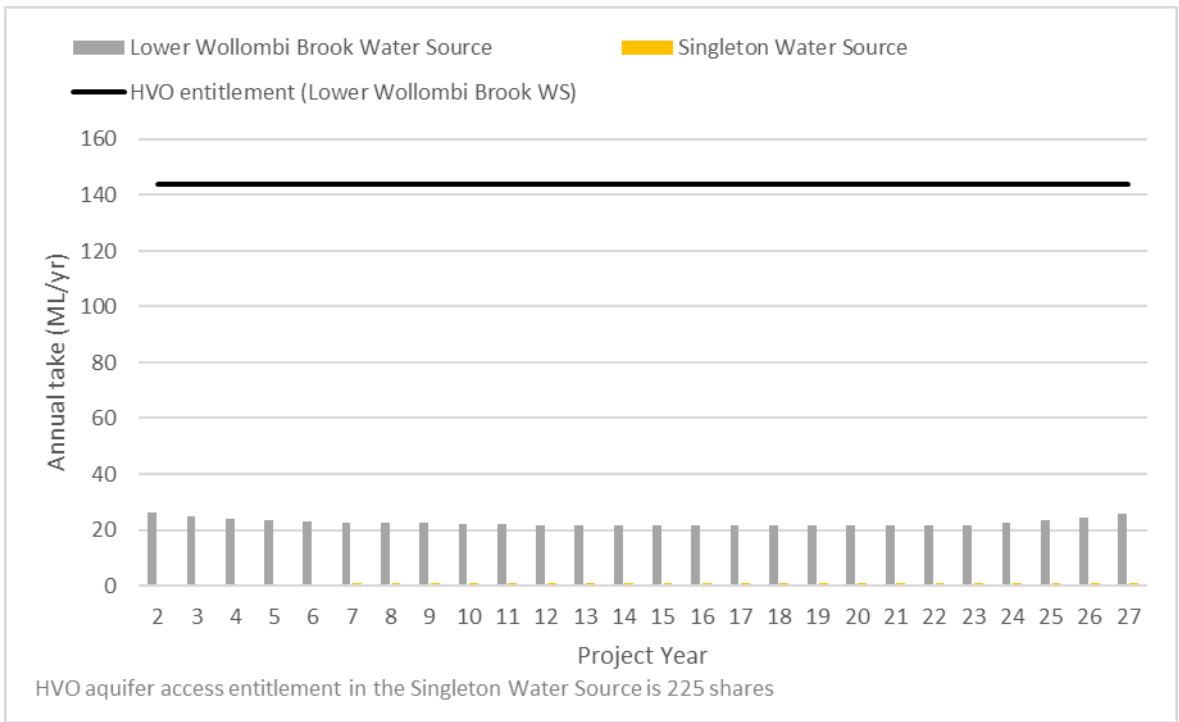


Figure 3.4 Groundwater take from the alluvium associated with the Lower Wollombi Brook and Singleton Water Sources (Hunter Unregulated River)

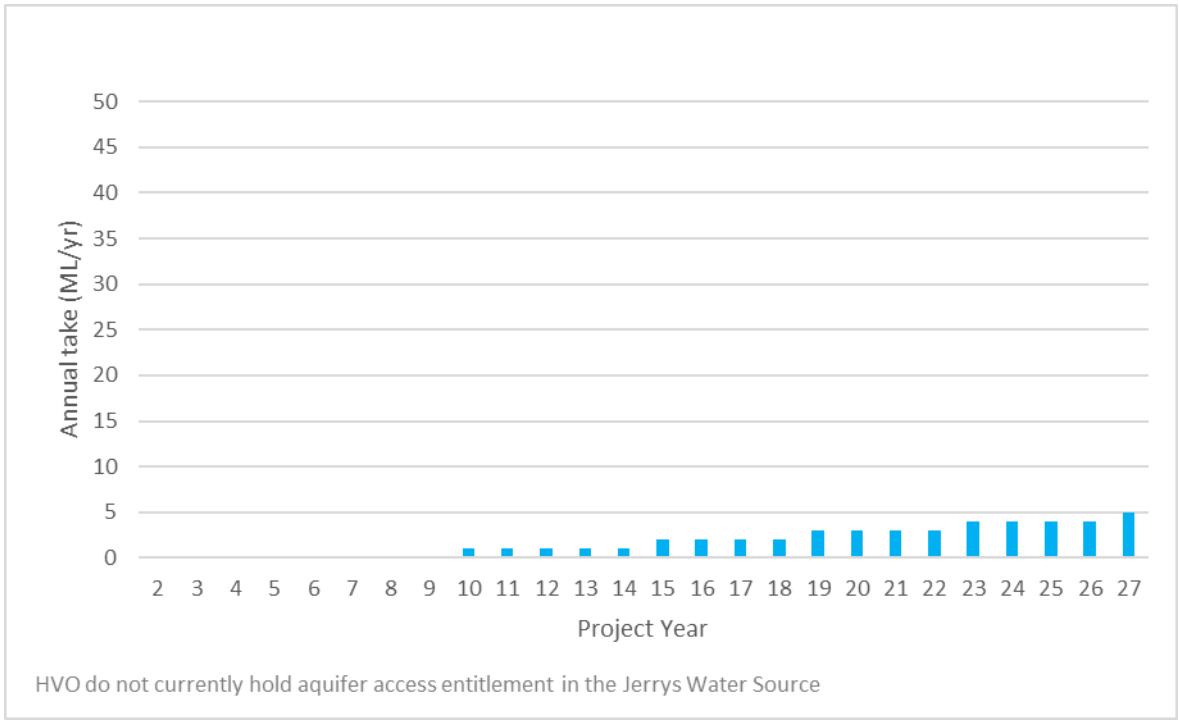


Figure 3.5 Groundwater take from the alluvium associated with the Jerrys Water Source (Hunter Unregulated River)

3.2.2 Surface water take

i Overview

A very detailed description of the Project water management system is provided in the [Surface Water Impact Assessment](#) at Appendix K to the EIS (SWIA; Engeny 2022). This shows all existing and proposed surface water infrastructure - dams, levees, drains - during life of mine and at closure. The SWIA details the source of water volumes held or captured in storages or excavations, the capacities of the storages, and its movement and use around the site. In short, the water management system:

- diverts clean catchment water around mine infrastructure and disturbed land through catchment drains
- contains mine affected runoff in storages for reuse
- captures and treats sediment water runoff
- minimises external catchment runoff reporting to the mine pits
- preferentially re-uses mine and sediment water for operational water demands and supplements this with water from the regulated river as required
- protects infrastructure and open cut pits with flood protection levees.

ii Operational demands

As indicated above, mine and sediment water is preferentially used to meet Project operational demands. Where required, shortfalls are met from the Hunter Regulated River Water Source. This is detailed in the SWIA and its Appendix G and shown in Figure 3.6 for a range of rainfall scenarios over the Project life. The current HVO high security regulated river licence of 4,686 shares is sufficient to meet all predicted demands except for during very dry years (95th percentile) over the middle years of the Project. During any shortfall years, HVO can use its significant general security regulated river licence of 7,250 shares to make up any shortfall.

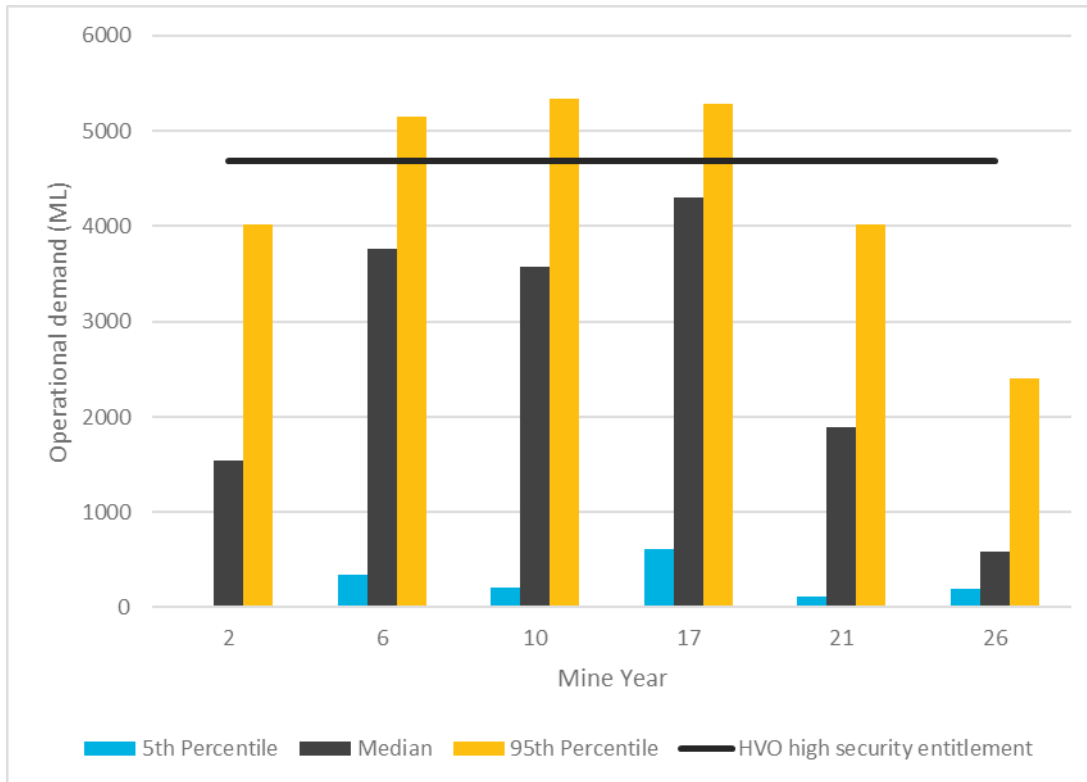


Figure 3.6 HVO predicted external water demands for operations

iii River leakage

Tables D16 and D17 of Appendix D to the [Groundwater Impact Assessment](#) (Appendix K to the Project EIS) outline the predicted surface water leakage (to groundwater) during and post mining (out 128 years) from each surface water source and management zone associated with the Project. The mechanism of this take is associated with watertable decline (drawdown) inducing leakage from surface water to groundwater.

The predicted peak takes are summarised in Table 3.4.

Table 3.4 River leakage by water source and management zone

	Peak take (Mining year) – ML/year	Year 128 take – ML/yr
Hunter Regulated River – Zone 1B (U/S Glennies Creek)	288 (Yr 12)	63
Hunter Regulated River – Zone 2A (D/S Glennies Creek)	8 (Yr 27)	3
Hunter Regulated River – Zone 2B (D/S Wollombi Brook)	1 (Yr 14 and 15)	0
Hunter Unregulated River – Jerrys	0	0
Hunter Unregulated River – Glennies	0	0
Hunter Unregulated River – Lower Wollombi Brook	1 (various years)	0
Hunter Unregulated River – Singleton	0	0

As described above, the Project water management system, including dams and diversions, is provided in the SWIA at Appendix K to the EIS. Figures 3-1 and 3-2 in the SWIA show the existing water management system and Figures 3-3 to 3-20 show the proposed water management system for the Project (during operations and at closure). Section 3.1.3.1 and 3.1.3.2 of the SWIA describes the design criteria (sourced from the Blue Book (DECC 2008)) for the clean water drains and sediment water drains, respectively, and is reproduced in Table 3.5 and Table 3.6 below.

Table 3.5 Clean water drain design criteria (Engeny 2022)

Criteria	Adopted value
Design flow	Peak flow generated by the 1% AEP, critical duration (tc) design storm event with 150 mm freeboard
Minimum base width	Typically 3.0 m (for constructability)
Minimum depth (including freeboard)	Typically 0.7 m
Batter slopes	Typically 1V:3H

Notes: As reported in the Surface Water Impact Assessment (Engeny 2022), in Appendix K to the EIS.
AEP = annual exceedance probability.

Table 3.6 Sediment water drain design criteria (Engeny 2022)

Criteria	Adopted value
Design flow	Peak flow generated by the 5% AEP, critical duration (tc) design storm event with 150 mm freeboard
Minimum base width	Typically 3.0 m (for constructability)
Minimum depth (including freeboard)	Typically 0.7 m
Batter slopes	Typically 1V:3H

Notes: As reported in the Surface Water Impact Assessment (Engeny 2022), in Appendix K to the EIS.
AEP = annual exceedance probability.

A list of the dams in the water management system, including capacity, mapped hydroline and exemption eligibility is provided in Appendix B.

Appendix B shows that:

- Five existing dams (that will also form part of the Project water management system) are located on non-minor streams, according to the current Regulation hydroline.
- There are five small clean water dams on minor streams. While these do not meet the excluded works purpose definitions in Schedule 1 of the WM Regulation, take associated with these can be accounted for under the landholdings harvestable right.

¹ Catchment runoff excludes rainfall on the surface of a dam

- All other dams (27) are on minor streams and meet the excluded works purpose definitions in Schedule 1 of the WM Regulation and accompanying fact sheet. These are exempt from requiring a WAL for any associated take in accordance Schedule 4 of the WM Regulation.

The five dams on non-minor streams according to the current Regulation hydroline dataset are detailed in Table 3.7. Four additional sediment dams on non-minor streams in the Jerrys water source were proposed in the EIS. The design of these has been altered to move them off any mapped streams. They are:

- DP3N – 3 year life then mined though in mining year 26.
- DP10N – 3 year life then mined though in mining year 10.
- DP11N – 3 year life then mined though in mining year 17.
- DP14N – Proposed (from mining year 17).

Table 3.7 Dams on non-minor streams (as currently mapped)

Dam name	Status	Year constructed	Purpose	Current capacity (ML)	Proposed (Project) capacity (ML)	Diversions in place or proposed?	Catchment reporting to dam (Ha)		Water source (MZ)	WAL (ML) and Approval No.	Peak take – 50 th /80 th percentile (ML/yr)	
							Current	Proposed (Project)			Current	Proposed (Project)
Dam 15S (Lake James)	Existing – to be modified	<1990	Mine water, HRSTS discharge	730	2,020	Yes, and modification proposed	0	0	Singleton		0/0	0/0
Dam 14W	Existing	<1983	Mine water	49	45	Yes	0	0	Jerrys (Jerrys)	No WAL 20WA211427 (Pikes Gully stream diversion)	0/0	0/0
Dam 9W (Parnells)	Existing – to be augmented and combined with Dam 18W	1993	Mine water, HRSTS discharge	487	4,300	Yes, and modification proposed	0	0	Jerrys (Jerrys)		0/0	0/0
Dam 18W	Existing – to become part of 9W	~2005	Mixed	91	600	Not currently but proposed	259	0	Jerrys (Jerrys)	WAL 18307 (500) 20WA210991 (Bywash dam and diversion)	182/440	0/0
Dam 35S	Existing	2017	Sediment	17.5		Yes	3.5	3.5	Jerrys (Jerrys)		18/48	18/48

Notes: ML = megalitres; HA = Hectares; MZ = Management Zone; WAL = water access licence.

4 Licensing strategy

4.1 Regulated river take

Figure 3.6 shows the operational water demands for the Project under a dry, median and wet conditions. Demand peaks in the 2030–2040 period at about 4,300 ML/yr (median conditions) or 5,350 ML/yr (95th percentile dry conditions).

Table 3.4 outlines the regulated river leakage that results from groundwater drawdown associated with the Project. This is slightly less than 300 ML/yr in total at its peak and reduces to under 70 ML/yr post closure and as the groundwater system re-equilibrates.

Table 3.1 lists the regulated river WALs held by HVO (with the full list provided in Appendix A). HVO's existing high security regulated river entitlement (total) of 4,686 shares is sufficient to meet all predicted demands and river leakage except for during very dry years over the middle years of the Project. During any shortfall years (e.g. very dry conditions), HVO can use its significant general security regulated river entitlement of 7,250 shares to make up any shortfall. Therefore, HVO has sufficient entitlement for this take.

4.2 Groundwater

Table 3.3 summarises the predicted peak and post mining groundwater take from each groundwater source and management zone associated with the Project and the associated aquifer access entitlement held by HVO in these. HVO holds more than sufficient entitlement to account for the predicted groundwater take over the Project life and beyond in most water sources.

Groundwater modelling predicts a small indirect take from the Jerrys water source from Mining Year 10 (1 ML/yr) and a peak at 5 ML/yr in Mining Year 27. HVO will purchase entitlement via the open market to account for the small predicted take in the Jerrys Water Source (prior to the take occurring).

As part of closure planning, HVO will review the post-closure entitlement requirements. If entitlements are required, HVO will purchase entitlement via the open market for the small predicted take in the Hunter Regulated River Alluvial Water Source – Glennies Creek management zone (3 ML/yr) and Jerrys Water Source (18 ML/yr), prior to closure.

4.3 Unregulated river take

As described in Section 3.2, watertable decline (drawdown) can induce leakage from surface water to groundwater – this is surface water take and is predicted using the groundwater model developed for the Project. The results of the groundwater modelling (summarised in Table 3.4) predicts very small surface water take from the unregulated rivers in the Project area associated with watertable drawdown.

Take from unregulated rivers is mainly limited to incidental take of rainfall runoff into the Project's water management system infrastructure, with minor indirect take associated with groundwater drawdown. Note that the mine water management system is designed to exclude capture and take of clean water from undisturbed catchments. HVO wants to exclude clean water from pits, mine water dams and sediment dams as the clean water diminishes the utility of these structures.

As discussed, there are five mine water management system structures that, according to the current Regulation hydroline dataset, are on non-minor streams (Table 3.7). There are a further five small clean water dams on minor streams that do not meet the excluded works purpose definitions in Schedule 1 of the WM Regulation. **All other structures are exempt from requiring WALs as they are either not on mapped streams or are on minor streams and meet the definition of excluded works in the WM Regulation.**

The Regulation hydroline dataset does not reflect the on-ground reality at the Project site. Mine plans and water management infrastructure, and associated landform and drainage line (hydroline) changes have been approved by Government under the *Environmental Planning and Assessment Act 1979* (EP&A Act) development consents and modifications over time. As the mine operations have progressed consistent with the approved activities, the Regulation hydroline has not been updated. The status of the hydroline in relation to mine infrastructure seems to be based on the original 1980s topographic map-based stream delineation.

HVO is seeking an amendment of the Regulation hydroline to reflect the approved water management system, including approved stream diversions, and to have any residual licensing liability for captured rainfall runoff based on this amended drainage configuration. Specific details on each of the five structures, and a licensing pathway for each are discussed below.

4.3.1 Lake James (15S)

Lake James (15S) was constructed prior to 1990 and well before the WM Act and WSP came into being. It appears the Regulation hydroline is based on mapping undertaken prior to this. Lake James is a mine water dam and approved for discharge location to the Hunter River under EPL 640 as part of the HRSTS.

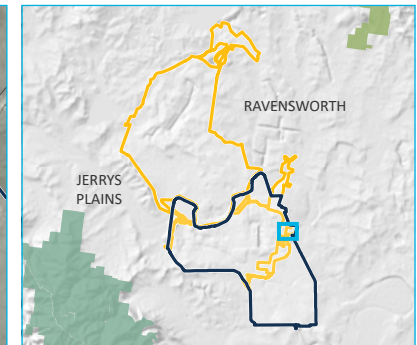
A 2009 modification increased the capacity of Lake James from 300 ML to 730 ML and realigned the southern clean water diversion ([MP 06 0261 MOD 1](#)). The diversion in the south channels clean water from upstream catchments around the dam to join the natural watercourse downstream (Figure 4.1). There is also a northern diversion channel that directs sediment laden water to a small dam (located on a minor stream) downstream of Lake James (15S), which is then pumped into Lake James until water can be discharged to the Hunter River at a later date under the HRSTS. The small dam that captures runoff drained by the northern diversion channel is on a minor stream and meets the excluded works purpose definitions in Schedule 1 of the WM Regulation, as the purpose is to *prevent the contamination of a water source*.

It is clear that the Regulation hydroline as mapped does not align with the current approved drainage configuration. It is HVO's view that there is currently no effective catchment draining to Lake James. This is supported by the assessment of the then Department responsible for water of the 2009 modification application, that noted "... increasing the footprint/capacity of Lake James would not result in the interception of any natural watercourses or significant catchment drainage lines."

The Project under assessment (SSD 11826621 (HVO North) and 11826681 (HVO South)) proposes a slight modification of drainage lines to the north of Lake James as part of the proposed upgrade works. The northern diversion will channel clean water around Lake James and the small dam to join the natural watercourse downstream.

HVO is seeking an amendment of the Regulation hydroline to reflect the approved diversions – both already approved, and again as altered if the Project is approved and Lake James alterations are constructed. Doing so would render Lake James either an 'offstream' storage, or at most on a minor stream and therefore exempt from the requirement for a WAL.

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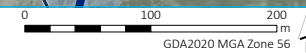
- KEY**
- HVO North proposed development consent boundary
 - HVO South proposed development consent boundary
 - Lake James existing diversion
 - HVO dam (existing)
- Strahler stream order**
- 1st order
 - 2nd order
 - 3rd order
 - 10th order
- Existing environment**
- Minor road
 - Vehicular track
 - Named waterbody
- INSET KEY**
- NPWS reserve
 - State forest

Lake James- hydroline and current drainage configuration

HVO Continuation Project
Water Licensing Strategy
Figure 4.1



Source: EMM (2023); HVO (2023); DCSSS (2023); DPI (2015); GA (2009)



4.3.2 Dam 14W

Dam 14W is a mine water dam that was constructed prior to 1983 and it appears that the hydroline was mapped after the dam was constructed as it ceases at the upstream extent of the dam (Figure 4.2). Obviously, the natural watercourse (Pikes Creek) would have continued to join Bayswater Creek to the north-west. The diversion was approved prior to the commencement of the WM Act, and a separate approval is held for this – 20WA211427. There is no WAL associated with this approval, as clearly the free-flowing diversion does not take any water, and no undisturbed catchment reports to the dam. The Project under assessment proposes a modification to Dam 14W, but this will not affect the drainage configuration which will be retained. HVO is seeking an amendment of the Regulation hydroline to reflect the approved diversion. Doing so would render Dam 14W an ‘offstream’ storage and no WAL would be required.

4.3.3 Dams 18W and 9W (Parnells)

Parnells dam (9W) and its upstream 18W bywash dam were constructed prior to the commencement of the WM Act in the area, but clearly after the Regulation hydroline mapping. Currently, Parnells Creek flows into the bywash dam as a third order stream. A WAL of 500 unit shares in the Jerrys water source (WAL18307) is held for the bywash dam take and there is an associated approval (20WA210991).

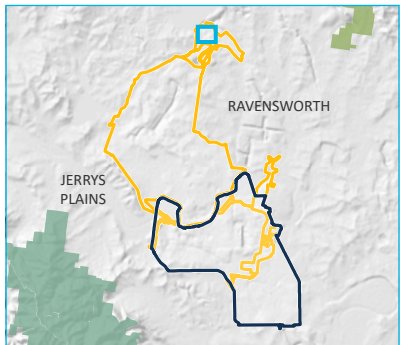
The Project that is under assessment proposes combining and augmenting these dams and diverting the third order stream around the structure to the south-west (Figure 4.3). There will no longer be any take associated with these structures.

Once approved HVO will seek an amendment of the Regulation hydroline to reflect the diversion proposed as part of the Project (once approved) and as Parnells dam is augmented and new drainage works are constructed. Doing so would render the new Parnells dam an ‘offstream’ storage, and no WAL would be required. In the interim, the existing WAL and approval will authorise the continued use of the bywash dam and diversion works.

4.3.4 Dam 35S

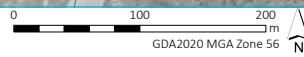
Dam 35S was constructed in 2017, after the Regulation hydroline mapping (1980s topography maps). The mapped hydroline shows the dam sitting on a fourth order stream (Figure 4.5). The figure shows that the diversions in place divert all hydrolines away from the dam. HVO is seeking an amendment of the Regulation hydroline to reflect the approved diversion. Doing so would make Dam 35S an ‘offstream’ storage and no WAL would be required.

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- KEY**
- ▭ HVO North proposed development consent boundary
 - HVO South proposed development consent boundary
 - Dam 14W diversion
 - HVO dam (existing)
 - Strahler stream order
 - 3rd order
 - 10th order
 - Existing environment
 - Minor road
- INSET KEY**
- ▭ NPWS reserve
 - ▭ State forest

Source: EMM (2023); HVO (2023); DCSSS (2023); DPI (2015); GA (2009)

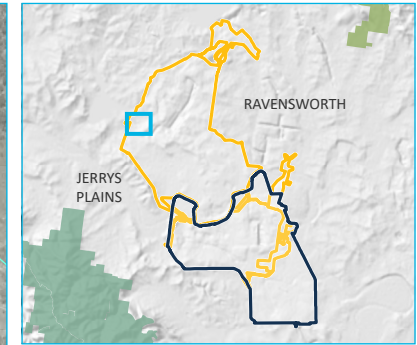
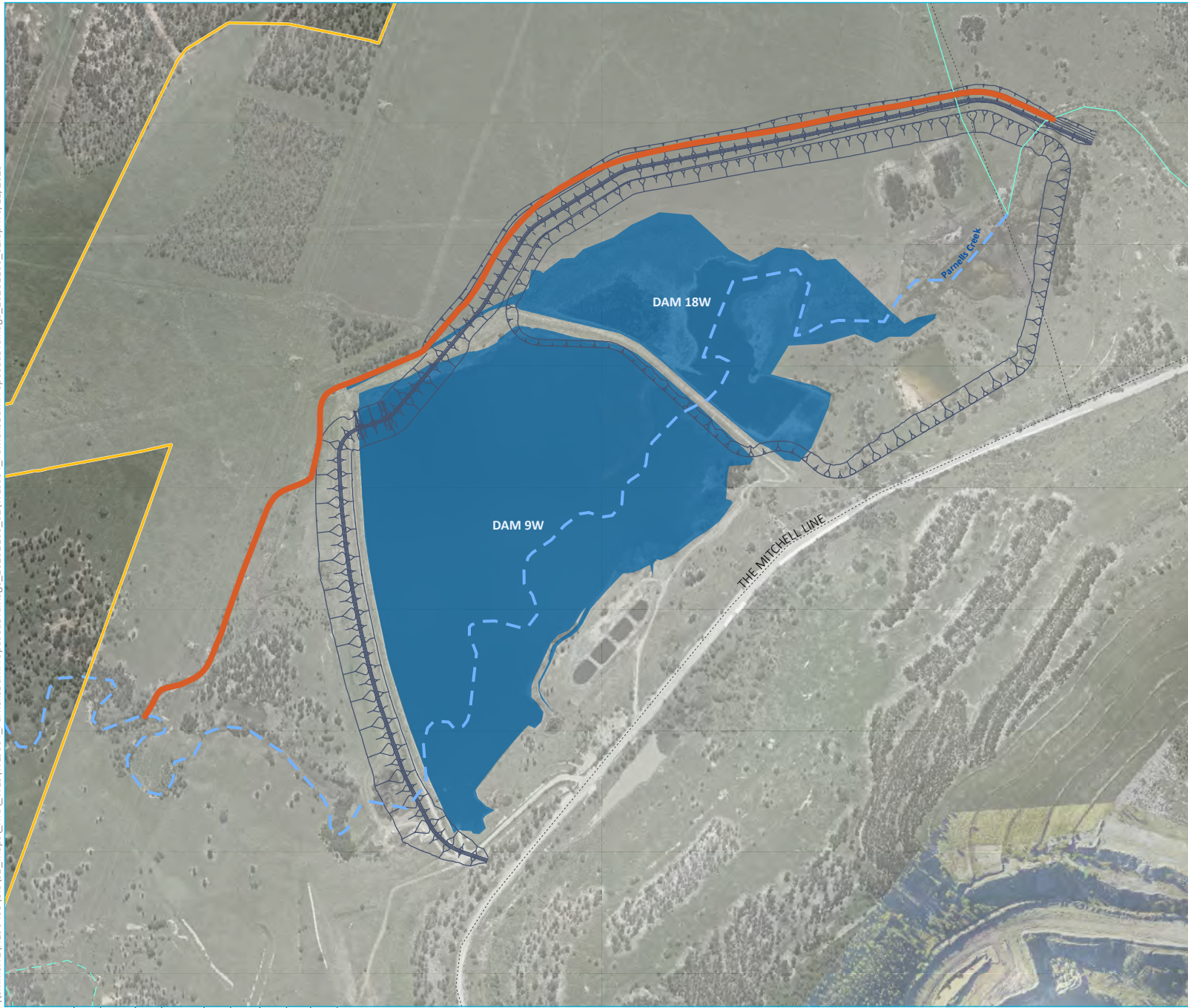


Dam 14W- hydroline and drainage configuration

HVO Continuation Project
Water Licensing Strategy
Figure 4.2



\\lemmsvr\H190408\GIS\02_Maps\RTS\WLS\WLS004_ParnellsDamProposedDrainage_20231106_02.aprx 6/11/2023



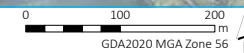
- KEY**
- HVO North proposed development consent boundary
 - HVO South proposed development consent boundary
 - Proposed Parnells Dam upgrade
 - Parnells Dam proposed diversion
 - HVO dam (existing)
- Strahler stream order
- 1st order
 - 2nd order
 - 3rd order
- Existing environment
- Vehicular track
- INSET KEY**
- NPWS reserve
 - State forest

Parnells Dam (upgrade) proposed drainage configuration

HVO Continuation Project
Water Licensing Strategy
Figure 4.3



Source: EMM (2023); HVO (2023); DCSSS (2023); DPI (2015) GA (2009)





Source: EMM (2023); HVO (2023); DCSSS (2023); DPI (2015); GA (2009)

KEY

- ▬ HVO North proposed development consent boundary
- HVO South proposed development consent boundary
- ▬ Dam 35S diversion drainage
- DAM 35S HVO dam (existing)
- Strahler stream order
- - - 1st order
- - - 2nd order

- ▬ 3rd order
- ▬ 4th order
- ▬ 10th order
- Existing environment
- ▬ Minor road
- ⋯ Vehicular track
- Named waterbody

INSET KEY

- NPWS reserve
- State forest

Dam 35S- hydroline and current drainage configuration

HVO Continuation Project
Water Licensing Strategy
Figure 4.4



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5 Summary

HVO holds sufficient entitlement for the Project predicted surface water take (from regulated river and unregulated river water sources) and holds more than sufficient entitlement to account for the predicted groundwater take over the Project life and beyond in most water sources. Prior to the take occurring, HVO will purchase entitlement via the open market to account for the small predicted take in the Hunter Regulated River Alluvial Water Source – Glennies Creek management zone and the Jerrys Water Source (due to long-term indirect take due to watertable equilibration).

Table 5.1 summarises the proposed licensing pathways for water take associated with the Project (refer Chapter 4 and Appendix B for more detail).

Table 5.1 Summary of water licensing pathways

Take type	Take volume (peak year 50 th /80 th) - ML	Licensing pathway	Entitlement held (shares ¹)
Hunter Regulated River Water Source			
Regulated river operation demands	4,306/5,345	Current entitlements	High security 4,686 General security 7,250
Regulated river losses	300	Current entitlements	
Hunter Unregulated River Water Sources²			
Jerrys (non-minor streams)	Current: 200/488 Project: 18/48 ³	Current entitlements	705
Jerrys (minor streams)	~40 (ML dam capacity)	Harvestable rights	934 (ML dam capacity)
Lower Wollombi Brook	1	Current entitlements	88
Singleton	0	-	-
Alluvial groundwater sources			
Regulated river alluvial (U/S Glennies Creek)	468	Current entitlements	568
Regulated river alluvial (D/S Glennies Creek)	33	Current entitlements	289
Regulated river alluvial (Glennies Creek)	3	Market purchase – review post-closure entitlement as part of closure planning. If entitlement required, market purchase prior to closure	-

Table 5.1 Summary of water licensing pathways

Take type	Take volume (peak year 50 th /80 th) - ML	Licensing pathway	Entitlement held (shares ¹)
Jerrys	18	Market purchase of 1–5 unit shares before take occurs (noting peak take is predicted to occur in year 27). Review post-closure entitlement as part of closure planning. If entitlement required, market purchase prior to closure	-
Lower Wollombi Brook	27	Current entitlements	144
Singleton	2	Current entitlements	255
North Coast fractured and porous rock			
Sydney Basin-North Coast	2,133	Current entitlements	5,560

1. Unless otherwise expressed.

2. Assumes Regulation hydroline correction.

3. Reduces to 18/48 ML once Parnells dam and 18W bywash are upgraded.

Note: Drawdown induced take is reported as the peak and does not vary seasonally like rainfall runoff, and as such 50th and 80th percentile data is not applicable.

References

Australasian Groundwater and Environmental Consultants (AGE) 2022, *HVO Continuation Project: Groundwater Impact Assessment*, prepared for EMM Consulting Pty Limited.

DECC 2008, *Managing Urban Stormwater - Soils and Construction*, Volume 2E Mines and Quarries.

Engeny Water Management (Engeny) 2022, *HVO Continuation Project - Surface Water Impact Assessment*, prepared for EMM Consulting Pty Ltd on behalf of HV Operations Pty Ltd

NOW 2012, *NSW Aquifer Interference Policy, NSW Government Policy for the licensing and assessment of aquifer interference activities*, NSW Department of Primary Industries - Office of Water.

Appendix A

Project access licences and works approvals

A.1 HVO access licences and works approvals

Table A.1 HVO water access licences and associated works approvals

Water source	Mgt zone	Category	WAL	Shares	Work approval	Use
Hunter Regulated River Water Source						
Hunter Regulated	1B	D&S	947	8	20CA201190	-
	1B	GS	900	402	20CA201091	Op water
	1B	GS	945	240	20CA201187	Op water
	1B	GS	946	681	20CA201190	Op water
	1B	GS	964	243	20CA201245	Op water
	1B	GS	965	51	20CA201247	Op water
	1B	GS	969	39	20CA201255	Op water
	1B	GS	976	216	20CA201266	Op water
	1B	GS	977	180	20CA201271	Op water
	1B	GS	991	888	20CA201295	Op water
	1B	GS	1003	405	20CA201329	Op water
	1B	GS	1007	99	20CA201340	Op water
	1B	GS	1051	200	20CA201456	Op water
	1B	GS	1142	59	20CA201672	Op water
	1B	GS	1228	159	20CA201898	Op water
	1B	GS	8965	95	20CA201446	Op water
	1B	GS	9054	541	20CA201904	Op water
	1B	GS	10546	99	20CA201269	Op water
	1B	GS	11933	207	20CA201192	Op water
	1B	GS	13387	20	20WA201685	Op water
	1B	GS	13391	420	20CA201896	Op water
	1B	HS	944	3	20CA201187	Op water
	1B	HS	962	3165	20WA201238	Op water
	1B	HS	990	3	20CA201295	Op water
	1B	HS	1002	3	20CA201329	Op water
	1B	HS	9053	3	20CA201904	Op water
	1B	HS	10545	3	20CA201269	Op water
	1B	Supp	1289	62	20CA201091	Op water
	1B	Supp	1372	12	20CA201672	Op water

Table A.1 HVO water access licences and associated works approvals

Water source	Mgt zone	Category	WAL	Shares	Work approval	Use
	1B	Supp	9056	24	20CA201904	Op water
	2A	GS	627	204	20CA200424	Op water
	2A	GS	867	486	20CA201015	Op water
	2A	GS	9989	250	20CA203193	Op water
	2A	GS	10540	453	20CA200810	Op water
	2A	HS	866	3	20CA201015	Op water
	2A	HS	970	500	20WA201257	Op water
	2A	HS	1006	500	20WA201338	Op water
	2A	HS	1070	500	20WA201501	Op water
	2A	HS	10539	3	20CA200810	Op water
	2A	Supp	1333	84	20CA200424	Op water
	2A	Supp	10557	217.5	20CA200810	Op water
	2B	D&S	756	8	20CA200730	-
	2B	D&S	6560	8	20CA200552	-
	2B	GS	755	20	20CA200730	Op water
	2B	GS	894	444	20CA201080	Op water
	2B	GS	941	99	20CA201176	Op water
	2B	GS	6559	50	20CA200552	Op water
	2B	Supp	1228	98.4	20CA201080	Op water
	2B	Supp	1302	30	20CA201176	Op water
Hunter Unregulated and Alluvial Water Sources						
Hunter RR Alluvial	D/S Glennies	Aquifer	18060	7	20WA207823	
	D/S Glennies	Aquifer	18070	184	20CA207845	
	D/S Glennies	Aquifer	18190	98	20CA208031	
	U/S Glennies	Aquifer	18158	65	-	
	U/S Glennies	Aquifer	18127	383	-	
	U/S Glennies	Aquifer	36190 ²	120	20CA212713	
Jerrys	Jerrys	Unreg river	18307	500	20WA210991	

² There appears to be an error on the Water Register in relation to this licence. It specifies the Management Zone as 'Jerrys'. There is no such management zone in the Hunter Regulated River Alluvial water source. Aquifer access licences in the Lot/DP specified on the approval are in the Upstream Glennies Management Zone. HVO will seek a correction of the Register under s. 71I of the WM Act.

Table A.1 HVO water access licences and associated works approvals

Water source	Mgt zone	Category	WAL	Shares	Work approval	Use
	Jerrys	Unreg river	18318	55	20CA210989	
	Jerrys	Unreg river	18327	150	20WA210985	
Lower Wollombi Br		Unreg river	18483	32	20CA208626	
		Unreg river	18560	56	20CA208644	
Singleton		Aquifer	19019	225	20CA209896	
North Coast Fractured and Porous Rock Groundwater Sources						
Sydney Basin- NC		Aquifer	39798	1800	20MW065020	Pit inflows
		Aquifer	40462	2400	20MW065020	Pit inflows
		Aquifer	40463	180	20MW065020	Pit inflows
		Aquifer	40466	460	20MW065020	Pit inflows
		Aquifer	41527	700	20MW065020	Pit inflows
		Aquifer	41533	20	20MW065020	Pit inflows

Appendix B

Catalogue of HVO Project dams and licensing strategy

Table B.1 Catalogue of HVO Project dams and licensing strategy

ID	Name	Water source	Purpose/type of water	Stream order	Capacity (ML)	Exempt/bot exempt (current hydroline)	Comments and strategy
1	Dam 16N	Jerrys	Mine water	1	21.7	Exempt	No WAL required.
2	Dam 9W	Jerrys	Mine water	3	487.2	Not exempt	Hydroline change and no WAL required. No catchment water currently taken given approved diversions. When combined with 18W and new diversions are in place, no take and hydroline diverted – essentially offstream.
8	Dam 18W	Jerrys	Mixed	3	91.3	Not exempt	Existing configuration: WAL 18307 (500 shares). Project configuration as proposed: Hydroline change and no WAL required. Catchment reduces to 0 when combined with 9W and diverted as part of project. Under project implementation, no take and hydroline diverted upstream – essentially offstream. Becomes a mine water dam with no clean water capture.
10	Dam 15N	Jerrys	Mine water	2	66.6	Exempt	No WAL required.
11	Dam 14W	Jerrys	Mine water	3	48.8	Not exempt	Hydroline change and no WAL required. Regulation hydroline amendment to reflect the approved diversion. Doing so would render Dam 14W an ‘offstream’ storage and no WAL would be required. Proposed dam alteration would not affect this status.
12	Dam 15S (Lake James)	Singleton	Mine water	3	700.1	Not exempt	Hydroline change and no WAL required. Regulation hydroline amendment to reflect the approved diversions – both already approved, and again as altered if the Project is approved and Lake James alterations are constructed. Doing so makes Lake James either an ‘offstream’ storage, or at most on a minor stream and therefore exempt from the requirement for a WAL.

Table B.1 Catalogue of HVO Project dams and licensing strategy

ID	Name	Water source	Purpose/type of water	Stream order	Capacity (ML)	Exempt/bot exempt (current hydroline)	Comments and strategy
15	Dam 35S	Jerrys	Sedimentation – runoff from rehabilitation area	4	17.5	Not exempt	Hydroline change and no WAL required.
22	Dam 25S	Lower Wollombi Brook	Sedimentation – runoff from disturbed and rehabilitation areas	1	8	Exempt	No WAL required.
24	Dam 1W	Jerrys	Clean	1	9	Not exempt	Harvestable right.
25	Dam 2W	Jerrys	Mine water	1	11.4	Exempt	No WAL required.
26	Parnells Farm Dam	Jerrys	Clean	1	Not available	Not exempt	Harvestable right.
27	Dam 12S	Jerrys	Sedimentation – runoff from rehabilitation area	1	20	Exempt	No WAL required.
28	Dam 12S (B)	Jerrys	Sedimentation – runoff from rehabilitation area	1	Not available	Exempt	No WAL required.
29	Dam 13S	Jerrys	Sedimentation – runoff from rehabilitation area	1	10	Exempt	No WAL required.
30	Dam 26N	Jerrys	Clean	1	4	Not exempt	Harvestable right.
31	Farm Dam 1	Jerrys	Sedimentation – runoff from disturbed area	1	Not available	Exempt	No WAL required.
32	Farm Dam 2	Jerrys	Sedimentation – runoff from disturbed area	1	Not available	Exempt	No WAL required.
33	SW SD 2	Jerrys	Sedimentation – runoff from disturbed area	1	Not available	Exempt	No WAL required.

Table B.1 Catalogue of HVO Project dams and licensing strategy

ID	Name	Water source	Purpose/type of water	Stream order	Capacity (ML)	Exempt/bot exempt (current hydroline)	Comments and strategy
34	Southern Diversion Dam B (39S)	Singleton	Sedimentation – runoff from rehabilitation area	1	34.5	Exempt	No WAL required.
35	Dam 22W TD	Jerrys	Tailings	1	Not available	Exempt	No WAL required.
36	Dam 28S DS	Singleton	Sedimentation – runoff from disturbed area	1	Not available	Exempt	No WAL required.
37	Dam 28S US	Singleton	Sedimentation – runoff from disturbed area	1	Not available	Exempt	No WAL required.
38	Dam 20W	Jerrys	Tailings	1	1080	Exempt	No WAL required.
39	Dam 24S	Singleton	Mine water	1	22.4	Exempt	No WAL required.
40	Dam 37S	Lower Wollombi Brook	Sedimentation – runoff from rehabilitation area	1	18.1	Exempt	No WAL required.
41	Dam 5N	Jerrys	Sedimentation – runoff from rehabilitation area	1	11.4	Exempt	No WAL required.
43	Dam 2N	Jerrys	Sedimentation – runoff from rehabilitation area	2	13.5	Exempt	No WAL required.
46	Dam 25N	Jerrys	Clean	2	16	Not exempt	Harvestable right.
47	Dam 34S (Barrys Dam)	Jerrys	Sedimentation – runoff from rehabilitation area	1	42.1	Exempt	No WAL required.
48	Dam 4S	Jerrys	Sedimentation – runoff from rehabilitation area	2	9.3	Exempt	No WAL required.
49	Dam 3W	Jerrys	Mine water	2	57	Exempt	No WAL required.

Table B.1 Catalogue of HVO Project dams and licensing strategy

ID	Name	Water source	Purpose/type of water	Stream order	Capacity (ML)	Exempt/bot exempt (current hydroline)	Comments and strategy
50	Dam 4W	Jerrys	Mine water	2	15	Exempt	No WAL required.
52	Dam 5W (B)	Jerrys	Mine water	2	47.3	Exempt	No WAL required.
53	Truck Wash Dam 1	Jerrys	Clean	2	8	Not Exempt	Harvestable right. Truck Wash Dam 1 capacity represents aggregate for all truck wash dams.
54	Truck Wash Dam 2	Jerrys	Mine water	2	N/A	Exempt	No WAL required.
55	Truck Wash Dam 3	Jerrys	Mine water	2	N/A	Exempt	No WAL required.
56	Truck Wash Dam 4	Jerrys	Mine water	2	N/A	Exempt	No WAL required.
57	Dam 32N	Jerrys	Mine water	2	153	Exempt	No WAL required.
58	Dam 23S	Singleton	Mine water	2	11	Exempt	No WAL required.

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