

# Application for a licence to take and use groundwater and to operate works

## Privacy collection statement:

The information from this form is collected under the Water Act 1989 in order to process this transaction in the Victorian Water Register. The information is collected and used in line with the Information Privacy Principles in the Privacy and Data Protection Act 2014 for the purpose of maintaining the Register and for providing statistical water market information. Most of the information in the Water Register is available to the public.

## What is this form used for?

Use this form to apply for or to modify a licence to take and use groundwater / operate works. This is a requirement under sections 51,62,67 & 74 of the Water Act 1989.

## Talk to us first

Please contact us prior to sending your application. We would like to discuss your licensing needs and offer our assistance with the application process. Our phone number is 1300 139 510

## What do I need to do?

To lodge your application you need to:

- Fill in all details on the form (the form can also be downloaded from our website [www.srw.com.au](http://www.srw.com.au) and completed on your computer; however it must be printed and signed)
- Supply any required documentation
- Sign the form - all licence holders / applicants must sign

## What other documents do I need to provide?

Apart from the completed and signed application form, you also need to give us:

- A copy of land title(s) where bores are located and where water is to be used
- A map to show us where bores are located and where water is to be used

## How much does the application cost and how do I pay?

Cost will vary depending on your application.

Our fee schedule can be downloaded from our website [www.srw.com.au](http://www.srw.com.au) (Customer information / Forms and fees)

We accept :

- Cheque
- Money Order
- Credit Card

If you are posting or emailing your application to us and prefer to pay with a credit card, we will send you an email or a SMS for you to contact us on 1300 139 510 for payment.

## Where do I send the application?

When the form has been completed and signed by all parties, please send:

- The form
- Copy of title(s)
- Map &
- Payment

To: Southern Rural Water, PO Box 153, Maffra, VIC, 3860 or email to [srw@srw.com.au](mailto:srw@srw.com.au)

## Notes

- Illegible or incomplete applications will be returned.

## This application is to

<input type="checkbox"/> Create a new licence Licence volume required _____ megalitres	<input type="checkbox"/> Modify an existing licence Licence number _____
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If you are modifying your licence, please tell us here what needs to change. (Then continue to complete the form in full)

## Your declaration

I/we the undersigned certify that the information provided in this application is true and correct.  
 I/we understand that this information may be referred to other organisations and/or advertised as part of the application and assessment process.  
 Application details may also be released if reasonably required by government business, requested by lawful orders, or in the public interest; particularly in regard to open disclosure of generally collected water entitlements.

## Your contact details

AGL Loy Yang Pty Ltd is the only applicant (see applicant company details below). Please use the below contact details for Dwayne McAlpine for correspondence regarding this application.

Given name(s)	Surname	Signature
Given name(s)	Surname	Signature
Residential address (Including postcode)		
Postal address (if different from residential)		
Telephone	Mobile	Fax
Email		
Dated:     /     /20	If there are more than two applicants, please complete Annexure 1. All applicants must sign the declaration	

## If you are a company

Name of company:			ABN:
Given name(s)	Surname	Signature	Position
Given name(s)	Surname	Signature	Position
Postal address (Including postcode)			
Telephone	Mobile	Fax	
Email			
Dated:     /     /20	If there is more than one applicant company, please complete Annexure 1. All applicants must sign the declaration		

Note that the person(s) who signs on behalf of a company must be authorised to do so, for example, a company secretary or director. We will not accept liability if this form is signed by a person who is not authorised to do so.

## Use of water

Tell us what the water will be used for (tick one)

- Dairy                       Urban Supply                       De-watering  
 Commercial or industrial use (please provide details) \_\_\_\_\_  
 Irrigation                      Area to be irrigated \_\_\_\_\_ Ha                      Type of crop \_\_\_\_\_

## Land details

See attached Mining Licence MIN5189 map and supporting documents

Attach a current copy of the Land Title of each parcel where water is used and where bores are located. The land title must clearly show volume and folio numbers and land owners details.

If an up to date land title is not available, please supply a Notice of Acquisition for each land parcel to be included on the licence.

- I have attached a copy of land title / Notice of Acquisition for each parcel where water is used and where bores, pumps and dams are located.

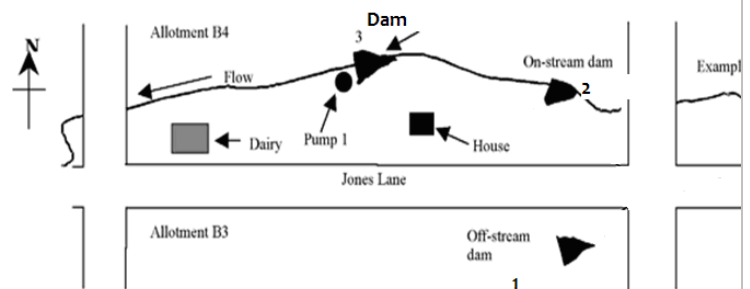
## Bore details

See attached supporting documents.

- Provide a sketch, or photocopy of a locality plan on a separate A4 sheet showing the locations of ALL bores, pumps and dams on the property. Please show a minimum of two named roads on your map.
- Tell us in the table below how much water you want to take from each bore

Property address:

Example of sketch



Bore number	Use	Annual volume (ML)	Max daily pump capacity (ML/d)	Maximum daily volume (ML)
Example WRK021321	Irrigation	10.0	n/a	0.5

If you are removing bores from an existing licence, which bore numbers are they?

1.                      2.                      3.                      4.

If you are adding bores to your licence please tell us: (Use the area above to tell us the use, and extraction rates proposed)

Bore construction licence number	Bore number	Year drilled

## Irrigation development guidelines

Please tick the best statement for your application

- The water will be used on land where there has never been an irrigation licence in the past
- The application proposes to increase the current licence entitlement on the land that is being irrigated
- This application proposes to increase the area allowed to be irrigated on my current licence
- None of these statements apply to my application

## Notes

1. We suggest that you speak to one of our assessment officers if you have any questions while completing this application form.
2. An up to date copy of land title or Notice of Acquisition or Disposition is to be provided for each land parcel where water is to be used and where works are located
3. Licences to take and use water belong to the person and not the property. Therefore SRW is unable to formally register interests by any third party, including mortgages.
4. Application fees received with this application may be non refundable or only partially refundable should you decide to opt out of the process at any time after we receive this application form. We recommend that you discuss this proposal with an SRW Assessment Officer before submitting your application.
5. Incomplete applications will be returned to the licence holder. No action will commence until a complete application is received by us.
6. If your application is approved, your water usage may be metered. SRW will supply a water meter at cost and you can choose to have it installed by a SRW contractor or by a contractor of your choice. As licensee, you pay installation costs. SRW must inspect the completed installation for compliance to standards and specifications. All meters remain the property of SRW. Please contact SRW on 1300 139 510 for further information on metering.

Purpose	Description
Domestic and Stock	Domestic and stock use - as well as general non-irrigation farm use.
Irrigation	Irrigation - as well as domestic and stock use, dairy use, and general non-irrigation farm use
Dairy	Dairy use - as well as domestic and stock use and general non- irrigation farm use
Intensive animal husbandry	Intensive animal husbandry use - as well as domestic and stock use and general non-irrigation farm use
Industrial or commercial	Industrial or commercial use - as well as domestic and stock use
Environmental	Environmental use
Urban water supply	Urban water supply
Power generation	Power generation
Aquaculture	Aquaculture use - as well as domestic and stock use
Seepage and evaporation	Seepage and evaporation

### **Southern Rural Water's Privacy Statement**

Southern Rural Water (SRW) is a Victorian Government Rural Water Corporation.

SRW values and protects the personal information it collects from customer water entitlement or related applicants in line with our business responsibilities, and has always demonstrated a strong culture of protecting the confidentiality of personal information. SRW only collects the information necessary to conduct our business or provide a service to the customer, and essential personal information such as a customer name, address or telephone number is not released outside SRW without customer consent unless reasonably required for related government business such as council rate processes or requested by lawful orders.

Our responsibilities demand sustainable management of water resources and nurturing of the businesses, communities and environments that support and depend on them. In this regard, SRW adopts a transparent approach to the management of water resources and entitlements that balance the open disclosure of generally collected customer related water entitlements (such as usage types, waterway, area and volume details) with the non-disclosure of personal information.

SRW will take all reasonable steps to ensure that the management of personal information collected and disclosed complies with the Water Act 1989 requirements and privacy principles. Any individual is able to gain access to their information.

### **Privacy Complaints**

If you consider that your privacy has been breached or interfered with, you should contact the SRW Privacy Officer at PO Box 153, Maffra Vic 3860, or phone SRW on **1300 139 510**.

### **More Information**

If you want help with your application or more information on Surface Water Licences, visit our website at [www.srw.com.au](http://www.srw.com.au) or phone Southern Rural Water on 1300 139 510 and ask for the Surface Water Fact Sheet or speak to an Assessment Officer.

### **Disclaimer**

Southern Rural Water will use the information provided in this Application Form to act on and/or make a Surface Water Licence decision. Should this information be incorrect or change, we may take steps to revoke any licence granted and require you to submit a new application together with the applicable fee.

# Annexure 1

Copy this annexure and attach to application if there are more applicants than provided for.

Please print name(s) in full and in capital letters. Illegible applications will be returned. All applicants must sign. All notices will be sent to the postal address of the first named party in the State Water Register.

I/we the undersigned certify that the information provided in this application is true and correct.

I/we understand that this information may be referred to other organisations and/or advertised as part of the application and assessment process or released if reasonably required by government business, requested by lawful orders, or in the public interest; particularly in regard to open disclosure of generally collected water entitlements

## Individual applicant(s)

Given name(s):	Surname:	Signature
Given name(s):	Surname:	Signature
Given name(s):	Surname:	Signature
Given name(s):	Surname:	Signature
Given name(s):	Surname:	Signature
Given name(s):	Surname:	Signature
Dated:     /     /20	If there are more applicants, please copy this annexure and attach to application. All applicants must sign the declaration	

## If applicant is a company

Name of company:			ABN:
Position	Given names(s):	Surname:	Signature:
Position	Given names(s):	Surname:	Signature:
Postal address (Including postcode)			
Telephone	Mobile	Fax	
Email			
Dated:     /     /20	If there are more applicant companies, please copy this annexure and attached to application. All applicants must sign the declaration.		

Note that the person(s) who signs on behalf of a company must be authorised to do so, for example, a company secretary or director. We will not accept liability if this form is signed by a person who is not authorised to do so.



## AGL Loy Yang Licence Renewal – Licence condition compliance

Document no: IA314900-GWL-01  
Revision: FINAL

AGL  
AGL Loy Yang  
AGL Loy Yang

AGL Loy Yang Licence Renewal  
26 May 2026



## AGL Loy Yang Licence Renewal – Licence condition compliance

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## Distribution of copies

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### Jacobs Group (Australia) Pty Ltd

Floor 13, 452 Flinders Street  
Melbourne, VIC 3000  
PO Box 312, Flinders Lane  
Melbourne, VIC 8009  
Australia

T +61 3 8668 3000  
F +61 3 8668 3001  
[www.jacobs.com](http://www.jacobs.com)

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## Executive summary

This document demonstrates compliance with the licence conditions of the groundwater licence 9012311. Longstanding structures, operating practices, and monitoring networks are already in place to ensure ongoing compliance should the groundwater licence be renewed.

The key points of compliance are

- All groundwater extraction has been metered and volumes have complied with the specified licence allocation amount.
- Regional monitoring partnership shows strong collaboration with DEECA, SRW and the other open cut mine operators.
- Annual monitoring reports and 5-year comprehensive reviews have been completed as required and been endorsed by DEECA and SRW.
- The 5-year comprehensive reviews have included numerical modelling of groundwater and subsidence conditions.

## ***📌 Important note about this report***

*The sole purpose of this report is to provide information to support the AGL Loy Yang groundwater licence renewal application. This report was produced in accordance with and is limited to the scope of services set out in the contract between Jacobs and AGL Loy Yang ('the Client').*

*The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the project and subsequent data analysis, and re-evaluation of the data, findings, observations and conclusions expressed in this report.*

*In preparing this report, Jacobs has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Client and from other sources. Except as otherwise stated in the report, Jacobs has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.*

*Jacobs has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.*

*This report should be read in full, and no excerpts are to be taken as representative of the findings. No responsibility is accepted by Jacobs for use of any part of this report in any other context. This report has been prepared on behalf of, and for the exclusive use of, the Client, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and the Client. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party.*

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## 1. Introduction

The AGL Loy Yang held groundwater licence 9012311 was first issued in 1996 and was amended in 2019. The licence contains 17 licence authorisation conditions. The licence also contains an attached regional monitoring program for the Latrobe valley open cut coal mines. The regional monitoring program contains 26 separate conditions and is directed at

- Maintaining an appropriate regional monitoring and assessment program
- Providing mechanisms to cooperatively adjust and refine the regional program to account for
  - o Results generated by the program
  - o Changes in mining and depressurising activity
  - o Emerging regional issues, associated with depressurising activities
  - o Advances in technology, and
- Maintaining a cost effective program

## 2. Licence Authorisation Conditions

The licence authorisation conditions are presented in Table 1. This table lists the conditions and provides comment of the level of compliance. Supporting information for condition 3 and 8 are presented in section 2.1

**Table 1 Licence authorisation conditions**

Number	Licence authorisation conditions	Level of compliance
1	The licence is valid for a period of thirty years from 1 September 1996	Noted. Current Licence expires on 31 August 2026
2	The licensee is authorised to take and use groundwater to facilitate mining for coal and generation of electrical energy and purposes incidental thereto.	Groundwater extraction has been used for this nominated purpose as demonstrated in annual reporting
3	The licensee is authorised to extract groundwater from the aquifers at quantities and during the times specified in the First Schedule or on application by the licensee such other quantities and during such other times as from time to time approved by the Minister or his delegate.	Groundwater has been extracted in accordance with the quantities and timing specified, except for a small number of monthly variances described further in section 2.1.
4	The licensee may vary the maximum monthly rate of extraction from any particular aquifer or the maximum annual volume to be extracted from any particular aquifer provided that the total monthly rate of extraction and the total annual volume from all aquifers is not exceeded and shall report at monthly intervals such variations as they occur to the Minister or his delegate	Monthly variances are described further in section 2.1.
5	The licensee may only take and use groundwater under this licence on the land with respect to which the licensee holds a mining licence for the Loy Yang open cut mine	Noted and complied with. The area of the mining licence is shown in Appendix C
6	Annual fee at date of issue \$19,300.	Noted and complied with
7	The licensee shall pay annual charges for the forthcoming year due under the licence in quarterly instalments or on an annual basis as agreed between the licensee and the Minister or his delegate.	Noted and complied with
8	The licensee shall meter all groundwater extractions and shall keep an accurate record of the quantity of groundwater taken or used under this licence and allow the Minister or his delegate to inspect this record during normal	Noted and complied with. See summary of annual extractions in section 2.1.

	business hours and to provide a copy of such record to the Minister or his delegate within seven days of a notice given by post to the licensee at the address contained in this licence	
9	The licensee shall provide to the Minister or his delegate annually details of the location of each bore from which groundwater is extracted under this licence.	Complied. Details are provided in Annual reports from Regional Monitoring Committee.  Summary of annual extractions provided in section 2.1.
10	By the issue of this licence the Minister or his delegate in no way accepts any liability for injury to any party arising as a consequence of any adverse effects that may be deemed to have been caused by the extraction of groundwater under the licence.	Noted
11	The licensee shall compensate any person whose existing authorised use of water is adversely and materially affected by the taking of water under this licence. The compensation may be either financial or may be constituted by the making available of, or granting access to, water. If the licensee is unable to or unwilling to make compensation by the making available of or granting access to water in the quantities previously enjoyed by the person so affected then the amount of financial compensation payable shall be that as determined by a Valuer nominated by the President of the Victorian Division of The Australian Institute of Valuers and Land Economists (Inc)	Noted. No cases of compensation have been required over the life of the licence.
12	The licensee shall undertake a regional monitoring program of the nature scope and extent as that previously undertaken by the State Electricity Commission of Victoria as detailed in the approved work plan and the information is to be provided on request to the Minister or his delegate and as required under the work plan. The details as required to be incorporated in the work plan are as set out in Attachment A to this licence and form part of the requirements under this licence until incorporated into the mining licence.	See section 3.
13	All information obtained from the regional monitoring program belongs to the generation companies, the State Electricity Commission of Victoria and the Minister jointly"	Noted

14	The licensee must maintain the existing data bases, and undertake additional work that may be required from time to time by the Minister or his delegate to maintain the effectiveness of the regional monitoring program.	Complied. Databases maintained and fit for purpose
15	If the licensee fails to provide the information required under condition 12 the Minister or his delegate may undertake any necessary work to obtain the information and recover the costs of such work from the licensee.	Noted. Information under condition 12 has been available to Minister or delegate and additional work has not been required.
16	The regional monitoring program and any remedial measures must be incorporated in the approved work plan and the rehabilitation plan to the satisfaction of the Minister or his delegate.	Noted and complied with
17	The licensee shall comply with the provisions in its mining licence, approved work plan and the rehabilitation plan dealing with the regional monitoring program and remedial action.	Noted and complied with

## 2.1 Supporting information for Conditions 3, 4 and 8

The history of groundwater extraction is presented in the figures below, which show substantial compliance with the licence allocation amounts across the term of the licence.

### 2.1.1 Annual extraction

Annual aggregate groundwater extraction from all aquifers is presented in Figure 1, which shows that extraction has been below the total allocation volume every year over the term of the licence.

The annual extraction from each aquifer is presented in Figure 2, Figure 3, Figure 4 and Figure 5. Individual aquifer extraction has also been below the annual allocation amount, with the exception of the M2C aquifer which exceeded the annual amount prior to the allocation amendment in 2018. The exceedance in the M2C however did not result in an exceedance of the total licence allocation in each year.

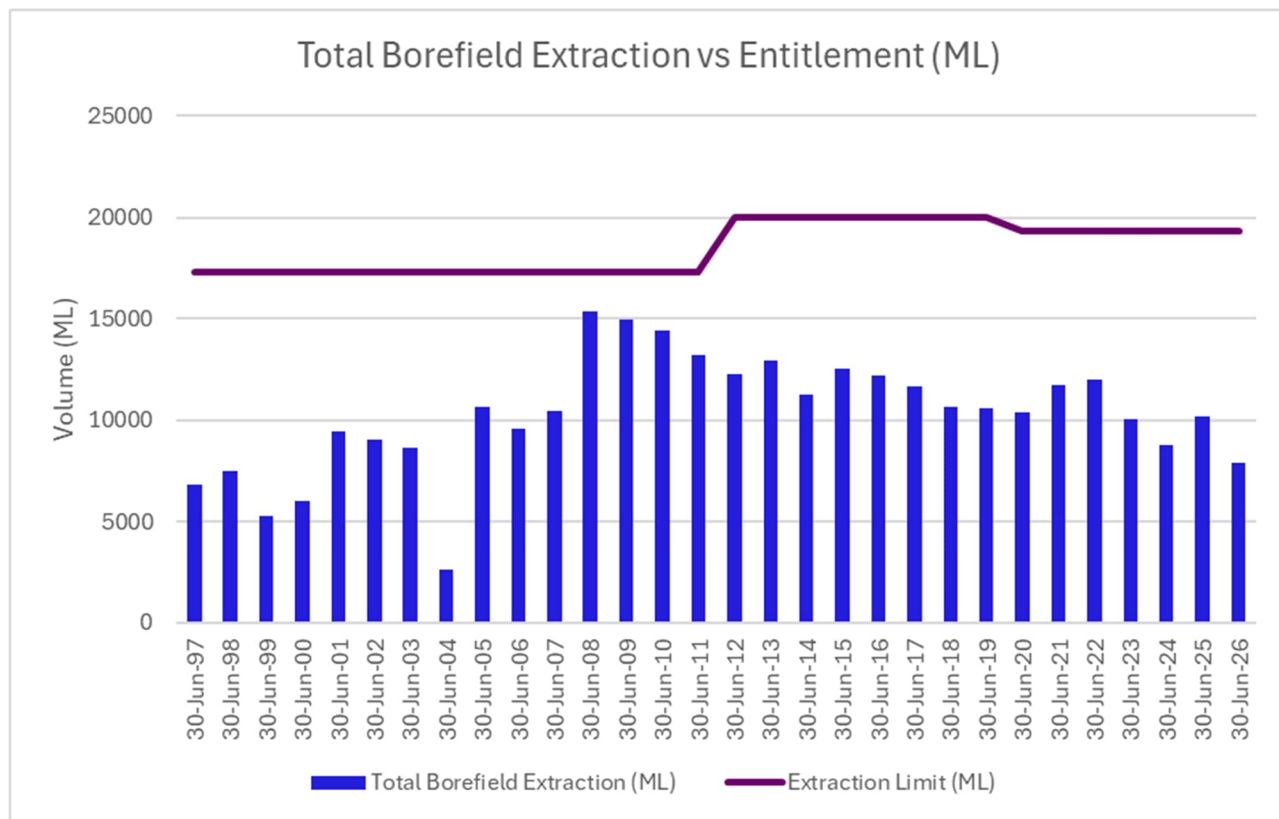


Figure 1 Annual aggregate groundwater extraction from all licensed aquifers

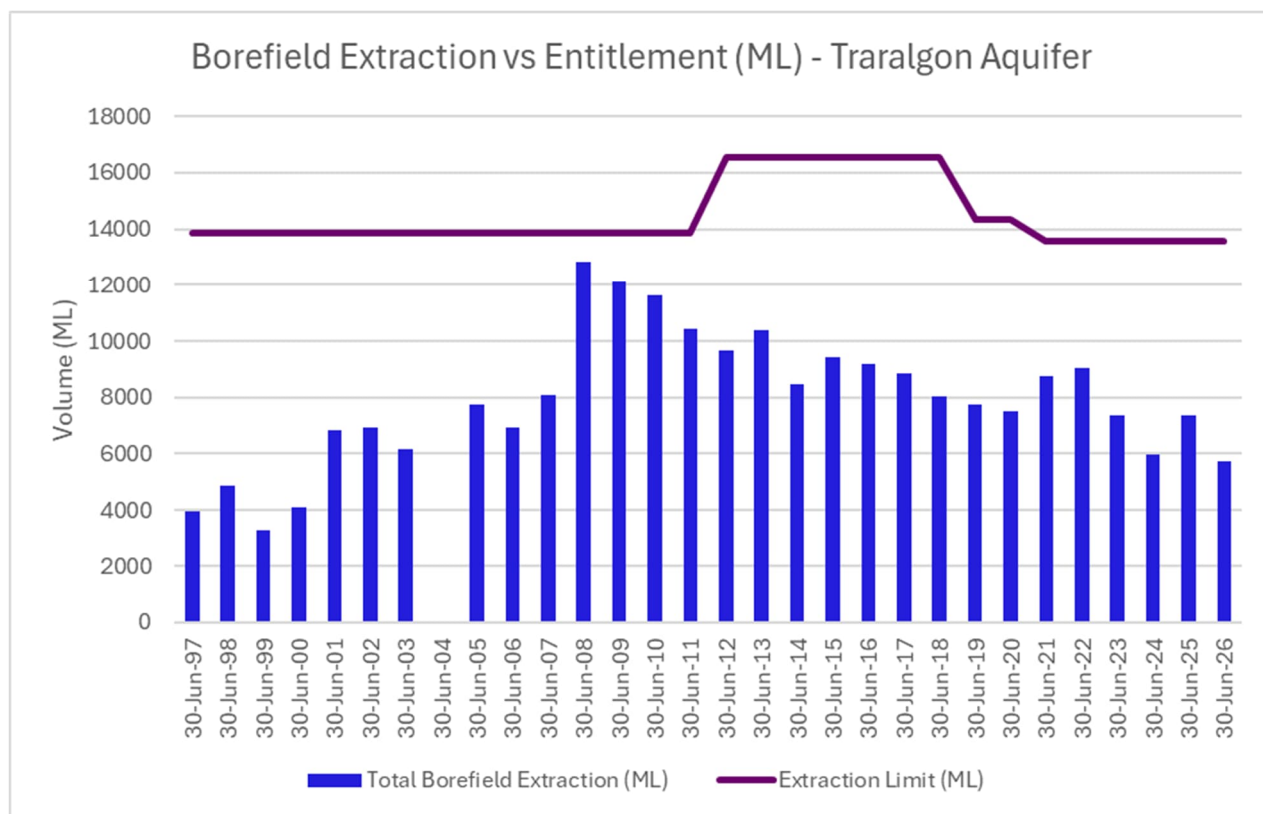


Figure 2 Annual groundwater extraction from Traralgon Aquifer

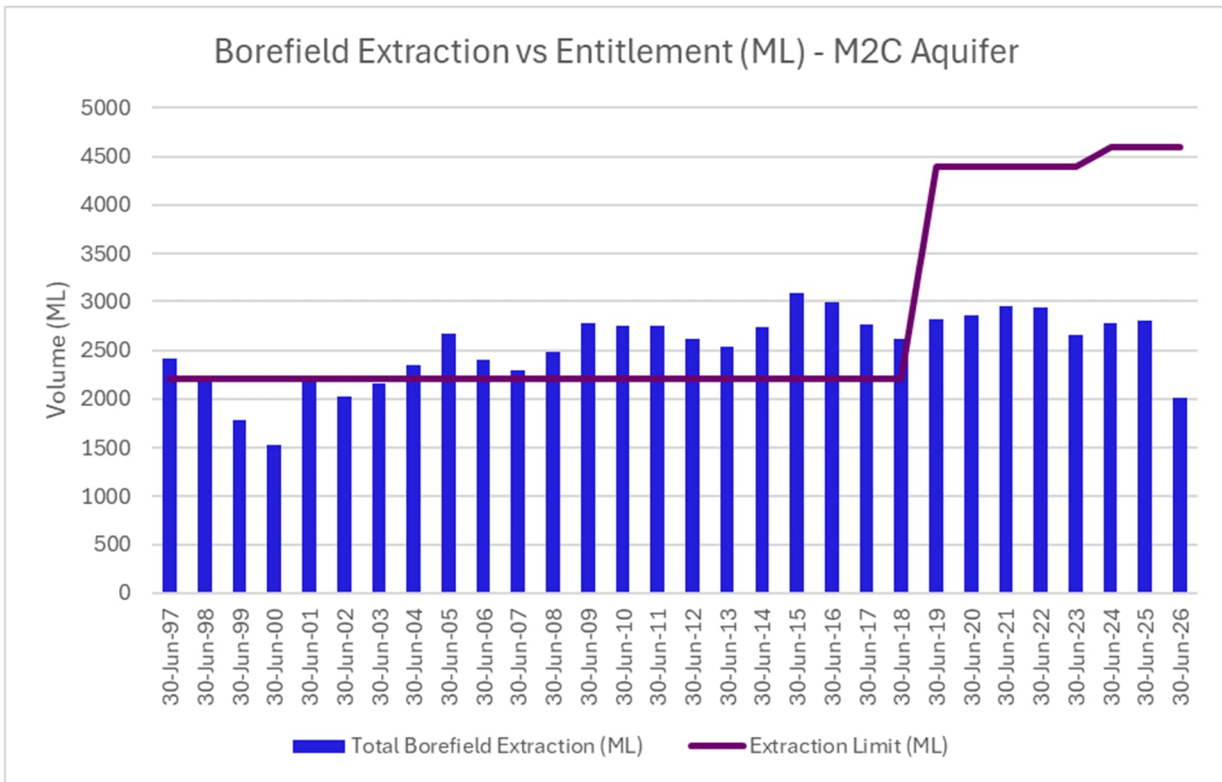


Figure 3 Annual groundwater extraction from M2C aquifer

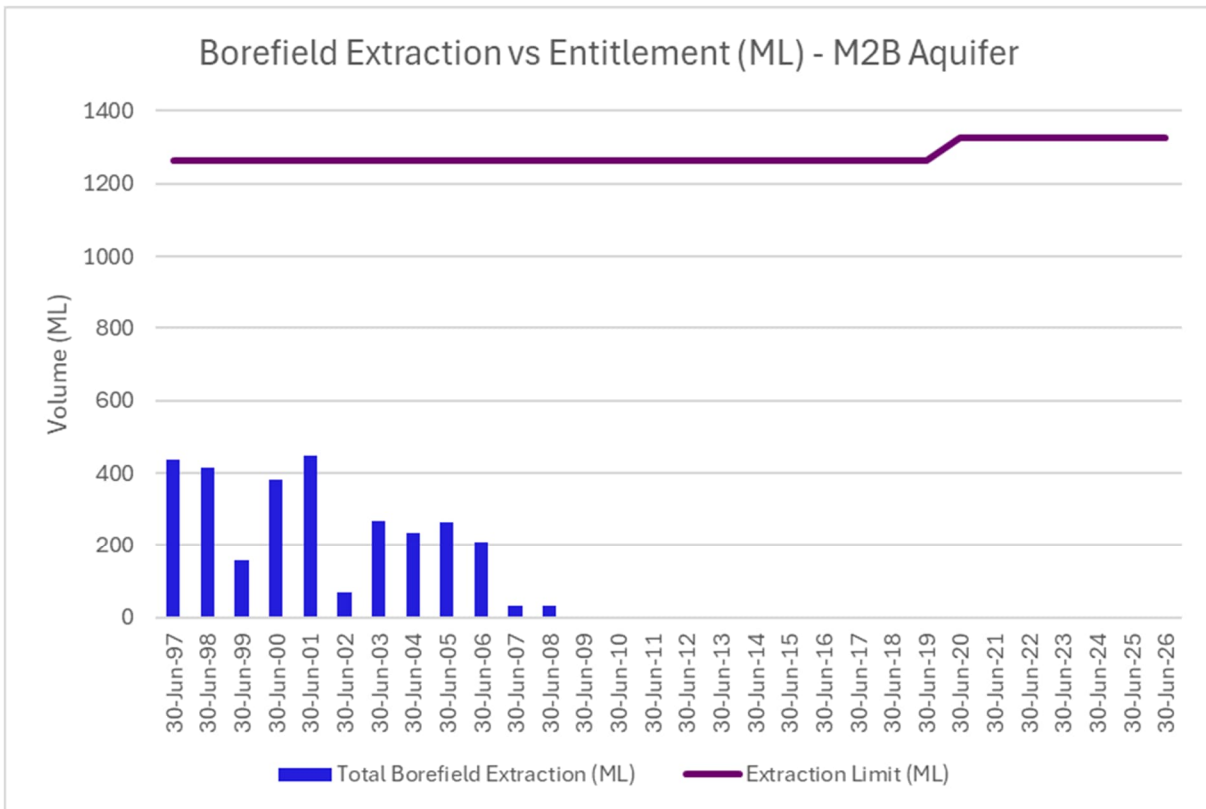


Figure 4 Annual groundwater extraction from M2B aquifer

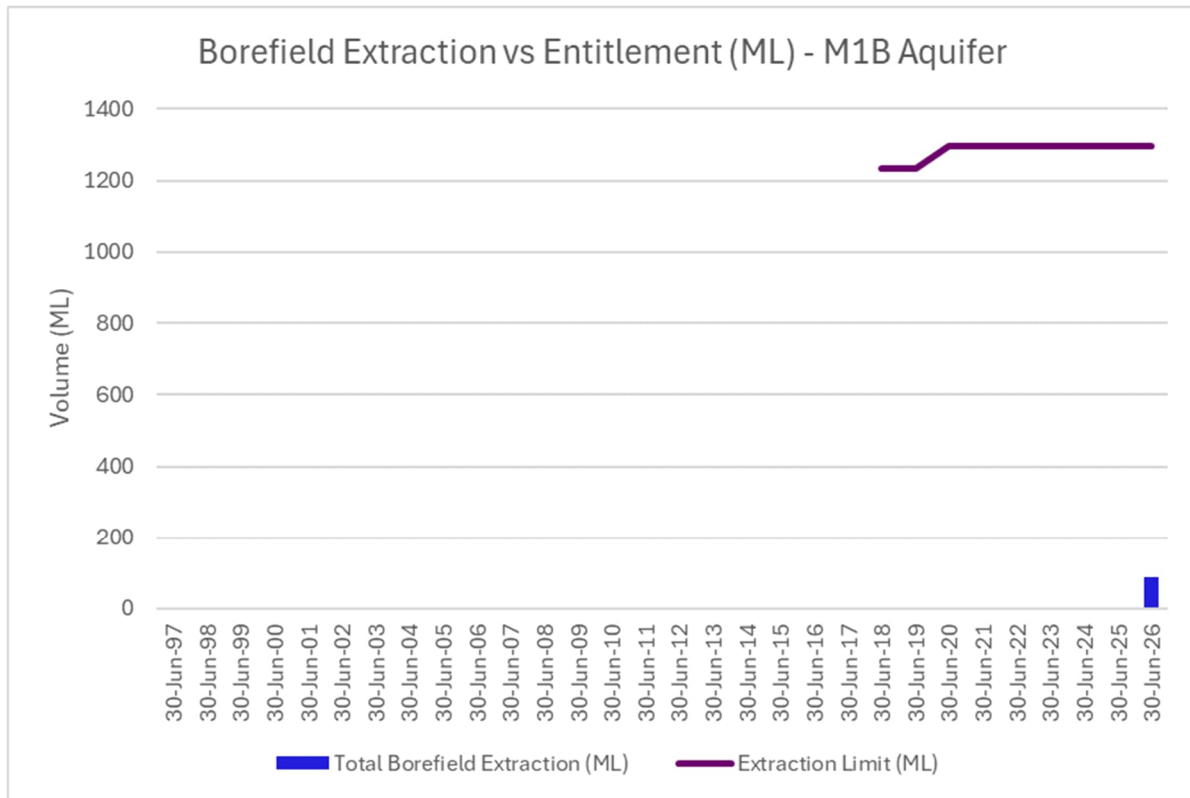


Figure 5 Annual groundwater extraction from the M1B aquifer

### 2.1.2 Monthly extraction

While annual groundwater extraction has complied with the total allocation volume every year, there has been a small number of variances on a monthly basis.

Condition 4 allows variances above the maximum monthly rate of extraction from any particular aquifer, subject to two provisos: (i) the total monthly rate of extraction from all aquifers is not exceeded, and (ii) such variances are reported to SRW as the Minister's delegate.

Regarding the first proviso, monthly aggregate groundwater extraction from all aquifers is presented in Figure 6, which shows that extraction has been below the maximum monthly rate in every month since April 2010 and five months (out of 238 months since July 2007) where the monthly rate from all aquifers was exceeded. As shown in Figure 1 above, in those years with monthly exceedances, there was no exceedance of the total licence allocation in each year. Prior to 2007, extraction data was recorded on an annual basis and monthly data is not available, however as shown in Figure 1 the annual extraction prior to 2007 was significantly lower than subsequent years and therefore monthly exceedances are less likely to have occurred.

The monthly extraction from each aquifer is presented in Figure 7, Figure 8, Figure 9 and Figure 10. These show exceedances above the monthly rate of extraction from three aquifers individually. However, as presented in Figure 6, since April 2010 these monthly exceedances from particular aquifers have not resulted in the maximum monthly extraction rate being exceed from all aquifers. There are 5 monthly exceedances presented in Figure 6 (August 2007, September 2008, January 2009, January 2010, and April 2010). Three of these reported exceedances (September 2008, January 2010, and April 2010) resulted from manual meter readings being recorded at time intervals that resulting in a longer than normal (1 month) reading

period. When the data from these months is adjusted for the 1 month period, the monthly totals fall below the monthly entitlement.

Regarding the second proviso, all monthly exceedances since 2019 from individual aquifers – as shown in Figures 6, 7 and 8 – have been notified to SRW as the Minister's delegate. Prior to 2019 reporting was done based extraction from aquifer systems - the Morwell formation aquifer system and the Traralgon aquifer system

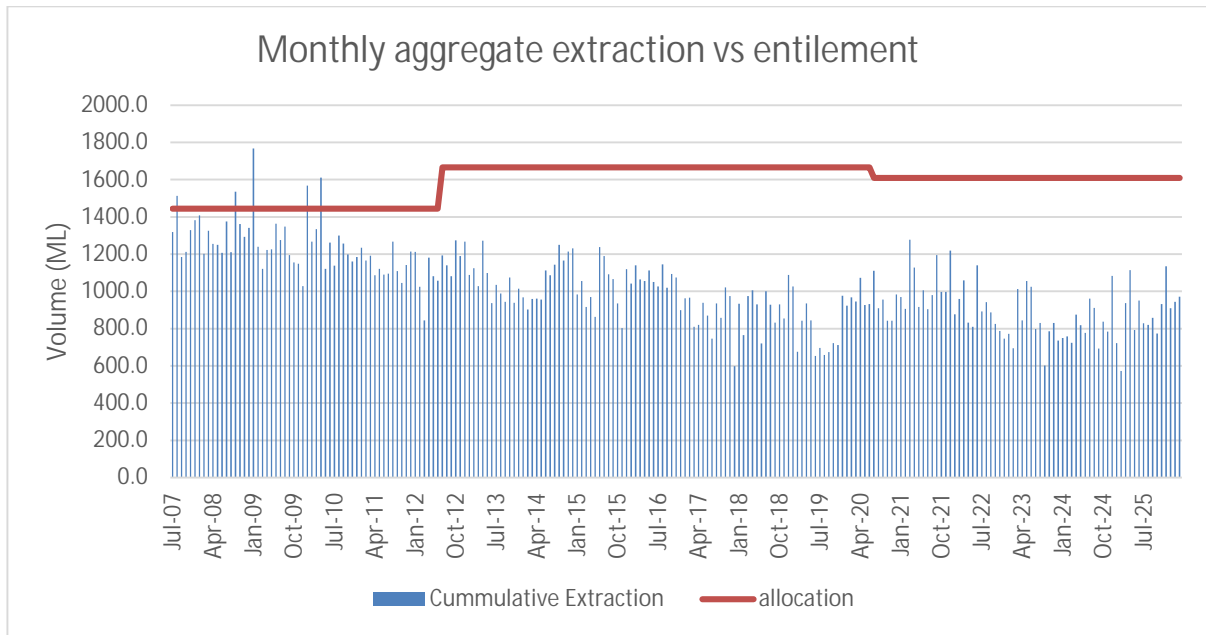


Figure 6 Monthly aggregate groundwater extraction from all licensed aquifers

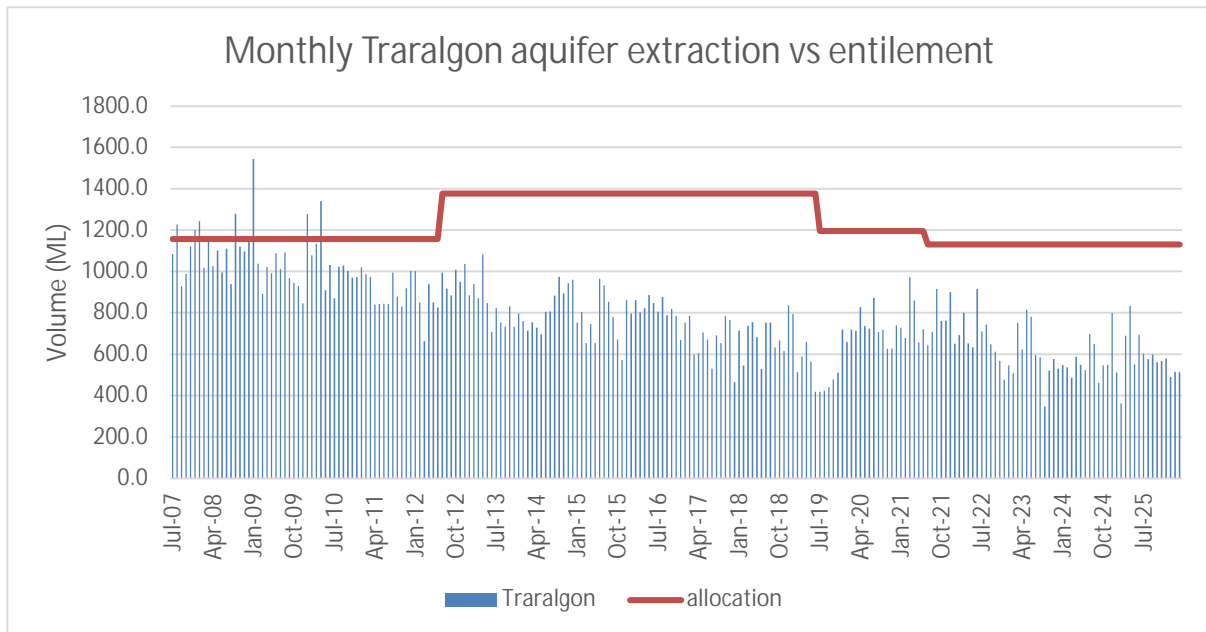


Figure 7 Monthly groundwater extraction from Traralgon Aquifer

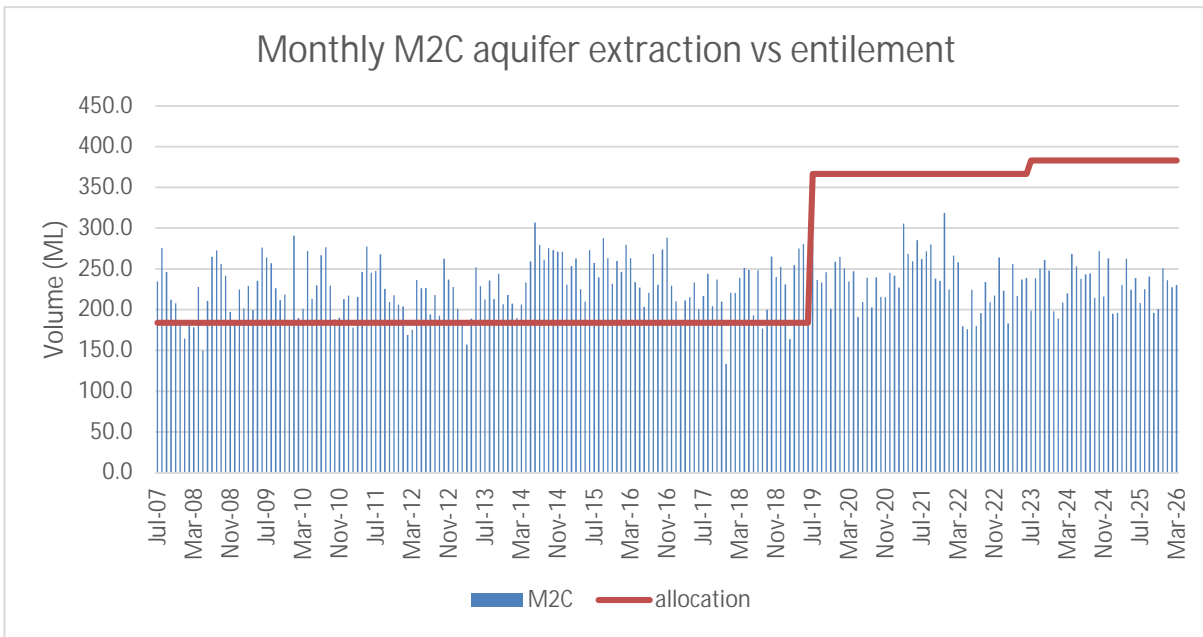


Figure 8 Monthly groundwater extraction from M2C Aquifer

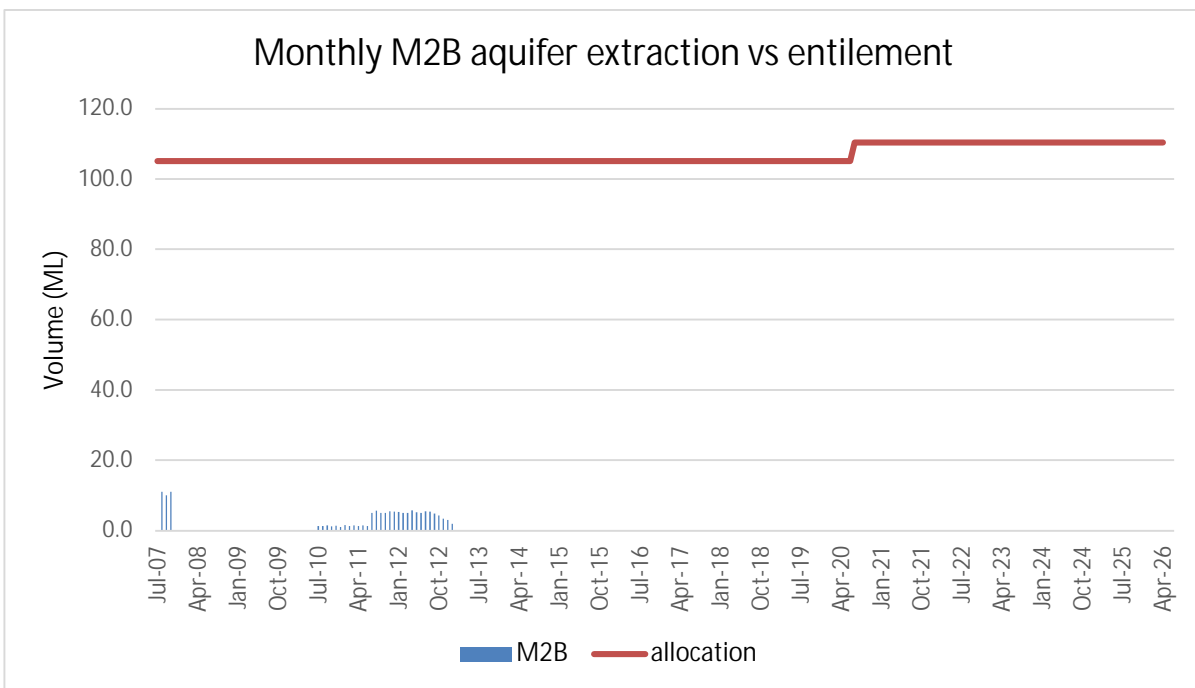


Figure 9 Monthly groundwater extraction from the M2B aquifer

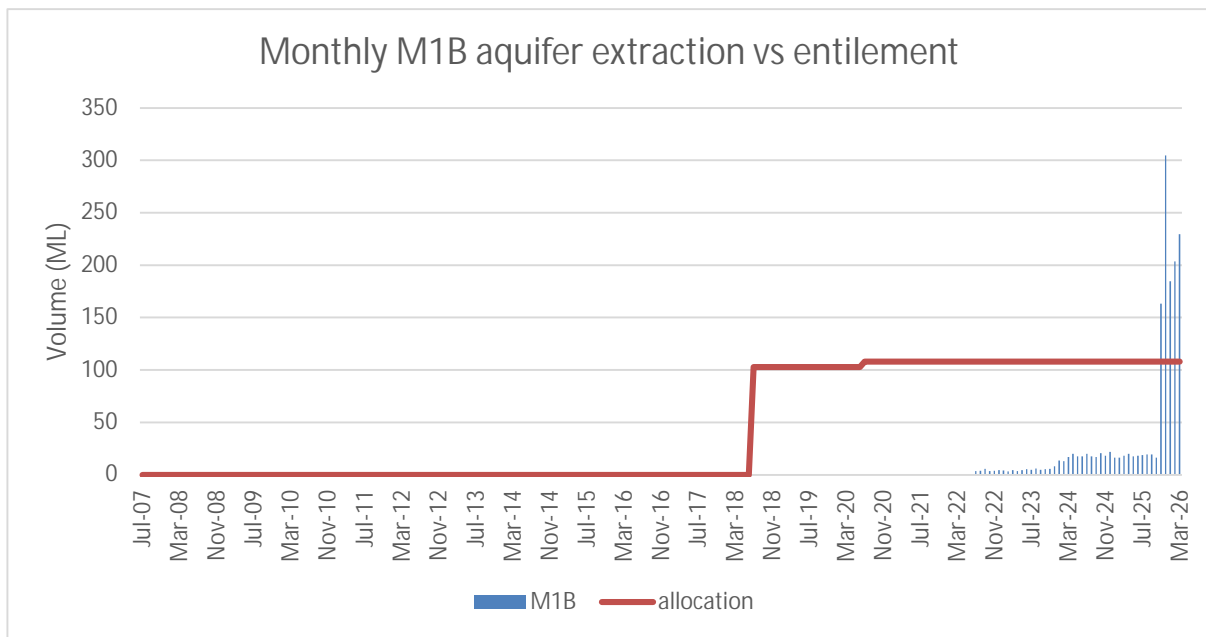


Figure 10 Monthly groundwater extraction from M1B Aquifer

Table 2 Example for meter use data collected from all groundwater extraction wells for 2022/23 year.

Loy Yang							
54997 / LY4997	Morwell (M1B)	Rosedale Zone 2	465492.4	5769963.8	0.0		
55132 / LY5132	Morwell (M1B)	Rosedale Zone 2	465350.2	5770121.4	0.0		
55196 / LY5196	Morwell (M1B)	Rosedale Zone 2	465902.7	5770039.1	0.0		
55197 / LY5197	Morwell (M1B)	Rosedale Zone 2	466197.6	5769946.9	0.0		
55284 / LY5284	Morwell (M1B)	Rosedale Zone 2	466545.5	5769892.3	0.0		
Seepage	Morwell (M1B)	Rosedale Zone 1			49.7		49.7
53993 / LY3993	Morwell (M2C)	Stratford Zone 1	461724.5	5768497.0	146.8		
54346 / LY4346	Morwell (M2C)	Stratford Zone 1	462174.8	5768825.0	1.3		
54421 / LY4421	Morwell (M2C)	Stratford Zone 1	462927.9	5768788.0	393.8		
54462 / LY4462	Morwell (M2C)	Stratford Zone 1	463053.8	5768500.4	388.1		
54665 / LY4665	Morwell (M2C)	Stratford Zone 1	462978.1	5769646.5	379.7		
54667 / LY4667	Morwell (M2C)	Stratford Zone 1	461254.0	5768454.2	349.6		
54808 / LY4808	Morwell (M2C)	Stratford Zone 1	462921.2	5769460.5	66.4		
54985 / LY4985	Morwell (M2C)	Stratford Zone 1	463332.8	5769433.4	630.1		
55173 / LY5173	Morwell (M2C)	Stratford Zone 1	463605.0	5768779.0	284.2		
55066 / LY5066*	Morwell (M2C)	Stratford Zone 1	463653.3	5769573.6	14.4		2,654.5
53980 / LY3980	Traralgon Fm	Stratford Zone 1	461874.5	5768559.4	2,737.4		
54184 / LY4184	Traralgon Fm	Stratford Zone 1	461458.8	5768384.8	2,294.3		
54395 / LY4395	Traralgon Fm	Stratford Zone 1	462452.9	5767783.8	559.5		
55000 / LY5000	Traralgon Fm	Stratford Zone 1	462591.0	5769241.8	1,661.7		
55103 / LY5103	Traralgon Fm	Stratford Zone 1	463906.2	5768362.5	0.0		
53085 / LY3085*	Traralgon Fm	Stratford Zone 1	463311.6	5769865.0	522.5		7,775.5
<b>Loy Yang Total Annual Flow (ML)</b>							<b>10,479.7</b>

### 3. Regional Monitoring Program

The following conditions are specified in Attachment A to Groundwater Extraction Licence 9012311

**Table 3 Regional Monitoring Program Conditions**

Condition	Licence condition	Level of compliance	Supporting information
1.	<p>A regional monitoring will be undertaken to record and ascertain the changes in groundwater levels and land levels. The programs shall include:-</p> <ul style="list-style-type: none"> <li>• Groundwater Monitoring;</li> <li>• Groundwater Modelling;</li> <li>• Land Level Surveying; and</li> <li>• Land Level Modelling.</li> </ul>	Complied	Section 3.1
2.	<p>For the purposes of this attachment, the region that shall be observed comprises the area bounded by the coordinates (AMG 436000E, 5742000N and 4250000E, 5754000N and 447000E5785500N and 521000E, 5801000N and 521000E, 5766000N and 4/6000E, 5/54000N and 450000E, 5753000N) as shown on the attached plan.</p>	Complied	Section 3.2
3.	<p>A groundwater monitoring network will be maintained in the region. Sufficient data will be collected to reliably monitor and predict regional groundwater levels and trends. Databases will be maintained to store and retrieve data related to those activities.</p>	Complied	Section 3.3
4	<p>The bores included in the regional groundwater monitoring network together with the monitoring frequency are listed Table A.</p>	Complied	Section 3.4
5	<p>Standing water levels shall be measured according to standard operating procedures.</p>	Complied	Section 3.5
6	<p>All data shall be verified before submitting for storage. Measurements shall be checked against previous measurements for that bore to detect anomalies such as:</p> <ul style="list-style-type: none"> <li>• incorrect recording of data;</li> <li>• the casing has collapsed or become perforated;</li> <li>• the screen or slots have become blocked.</li> </ul>	Complied	Section 3.6
7	<p>The occurrence and cause of data anomalies shall be recorded and procedures instituted to prevent their recurrence.</p>	Complied	Section 3.7

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8	Preventative maintenance shall be carried out to all surface fittings, bores shall be kept secure from illegal use, vandalism or contamination.	Complied	Section 3.8
9	The structural condition of the bores shall be verified to ascertain if:-  • the casing has collapsed or become perforated;  • the screen or slots have become blocked.	Complied	Section 3.9
10	All damaged or malfunctioning bores shall be repaired substituted or replaced,	Complied	Section 3.10
11	All unwanted damaged or failed bores shall be decommissioned.	Complied	Section 3.11
12	Bore condition and the works carried out to repair and replace bores shall be reported.	Complied	Section 3.12
13	The regional potentiometric surface levels for the main aquifers shall be reported as contour maps.	Complied	Section 3.13
14	Groundwater modelling of the region shall be performed to assist in predicting the effects of mine depressurising on regional groundwater levels.	Complied	Section 3.14
15	Reports and results of modelling runs shall contain the predictions, previous predictions and actual values for groundwater extractions and potentiometric levels of groundwater.	Complied	Section 3.15
16	Land Level Surveys of the region shall be undertaken to determine the extent of land subsidence associated with mine depressurising.	Complied	Section 3.16
17	Survey intervals and reports of survey results shall be carried out at no greater than 5 year intervals and more frequently where significant subsidence is being recorded. The next program will be completed by the year 2019/2020	Complied	Section 3.17
18	Surveys shall be undertaken to not less than third order accuracy.	Complied	Section 3.18
19	Land level modelling of the region shall be performed to assist in predicting the effects of groundwater depressurisation on land subsidence.	Complied	Section 3.19
20	The conduct of the monitoring, modelling and reporting is to be reviewed by the Regional Monitoring Committee having representatives of mine operators, (Energy Australia, Engie and AGL Loy Yang), The Department of	Complied	Section 3.20

	<p>Economic Development, Jobs, Transport &amp; Resources and the Minister responsible for the Water Act 1989 or his delegate. The Committee may make recommendations to the Minister responsible for the Water Act 1989 or his delegate to amend the regional program in order to:</p> <p>a. maintain and/or enhance the regional monitoring and assessment program; and</p> <p>b. to adjust and refine the regional program to take account of:</p> <ul style="list-style-type: none"> <li>• results generated by the program;</li> <li>• changes in mining and depressurizing activity;</li> <li>• emerging regional issues associated with depressurizing activities;</li> <li>• advances in technology; and</li> </ul> <p>c. maintaining a cost effective program.</p>		
21	<p>The program shall be consistent with the programs previously carried out by the State Electricity Commission of Victoria to determine the impacts of dewatering/depressurisation both on site and regionally and must be maintained to the satisfaction of the Director of Compliance, Earth Resources Regulation and the Minister responsible for the Water Act 1989 or his delegate.</p>	Complied	Section 3.21
22	<p>The licensee shall ensure that results of the regional monitoring program are reported to the Minister responsible for the Water Act 1989 or his delegate and the Environmental Review Committee annually and at any other times as required under the Groundwater Licence.</p>	Complied	Section 3.22
23	<p>An annual report shall be prepared each September detailing:</p> <p>a. the monitoring activity undertaken in the past year;</p> <p>b. any amendments to the monitoring network;</p> <p>c. any issues arising from the monitoring results including significant variations to predicted trends.</p>	Complied	Section 3.23
24	<p>The annual report shall be made available to members of the public on request.</p>	Complied	Section 3.24
25	<p>A comprehensive review shall occur at not less than at 5 yearly intervals, or more frequently if circumstances change or as deemed necessary by the Regional Monitoring Committee.</p>	Complied	Section 3.25

26	<p>The comprehensive review shall include:</p> <ul style="list-style-type: none"> <li>a. detailed analysis of measured regional groundwater levels and trends;</li> <li>b. detailed analysis of measured regional land subsidence and trends;</li> <li>c. contour maps of regional potentiometric surface levels for the main aquifers;</li> <li>d. contour maps of regional land subsidence;</li> <li>e. results from groundwater and land subsidence models;</li> <li>f. based on the modelling, detailed predictions of future regional groundwater levels and land level trends;</li> <li>g. any issues arising from the monitoring results including significant variations to previously predicted trends;</li> <li>h. recommendations to amend and enhance the regional monitoring program;</li> <li>i. where necessary, recommendations to manage regional issues resulting from mme depressurisation.</li> </ul>	Complied	Section 3.26
27	<p>The licensee shall ensure that results of the comprehensive review are reported to the Minister responsible for the Water Act 1989 or his delegate.</p>	Complied	Section 3.27
28	<p>The next review will be completed in 2022/2021</p>	Noted and complied	

### 3.1 Condition 1

A regional monitoring will be undertaken to record and ascertain the changes in groundwater levels and land levels. The programs shall include:

- Groundwater monitoring;
- Groundwater modelling;
- Land level surveying; and
- Land level modelling.

#### 3.1.1 Response

- **Groundwater monitoring** of the regional observation bore network is completed biannually with a summer and winter monitoring round. The licensed monitoring boundary extends from Moe to east of Sale. Groundwater monitoring results are documented in the annual regional groundwater monitoring reports, which we have been endorsed by the regional monitoring partnership which includes DEECA and SRW. Maps of the existing monitoring bore network coverage are presented in Figure 11, Figure 12 and Figure 13

- Modelling Regional **groundwater modelling** has been undertaken using the MODFLOW Latrobe Valley Regional Groundwater Model (LVRGM) as part of the previous Five-Year Review which included groundwater scenario modelling to 2040 to predict aquifer pressure trends beyond the term of the current licence (refer “Latrobe Valley Regional Groundwater and Land Level Monitoring Report, Five Year Review” (GHD, 2022). Further updates to LVRGM have been completed within each of the mining licences to include groundwater extractions and each of the mine’s closure and rehabilitation planning.
- **Land level surveying** of the region is conducted at 5-year intervals and more frequently if significant subsidence is being recorded. Previous survey results are contained in the report “Latrobe Valley Regional Groundwater and Land Level Monitoring Report, Five Year Review” (GHD, 2022). Recently surveys were conducted in 2025 and the results will be presented in the upcoming 5 year review which is due in mid 2026. The survey result will be used to produce subsidence contour plans (cumulative to 2025 and for the 2020 to 2025 period) and inform generation of tilt plots. A Map of the land survey locations is presented in Figure 14
- **Land level modelling** was completed in 1987 and 1994 using COMPAC which is a one-dimensional model used to predict land level changes at discrete sites. A summary of the past COMPAC modelling and predictions, can be found in the 2000 Five Year Review (Geo-Eng, 2000). In 2010 subsidence modelling was completed using the LVRGM and the MODFLOW Subsidence and Aquifer Compaction (SUB) Package. Subsidence modelling was further developed as outlined in the GHD 2016 modelling report that described the parameters, model configuration and calibration. Subsidence modelling has been undertaken in the previous Five-Year Review using the MODFLOW LVRGM and the SUB software packages. The model calibration was updated against the extensive network of land level survey marks to include the 2019 and 2020 survey results. The subsidence prediction to 2025 and 2040 are reported in GHD 2022. The future regional subsidence modelling requirements will be confirmed when the extended groundwater extraction licences are issued. Future subsidence modelling is likely to include model calibration against the 2024 and 2025 survey results and other available data and subsidence predictions for the extended groundwater licence period.

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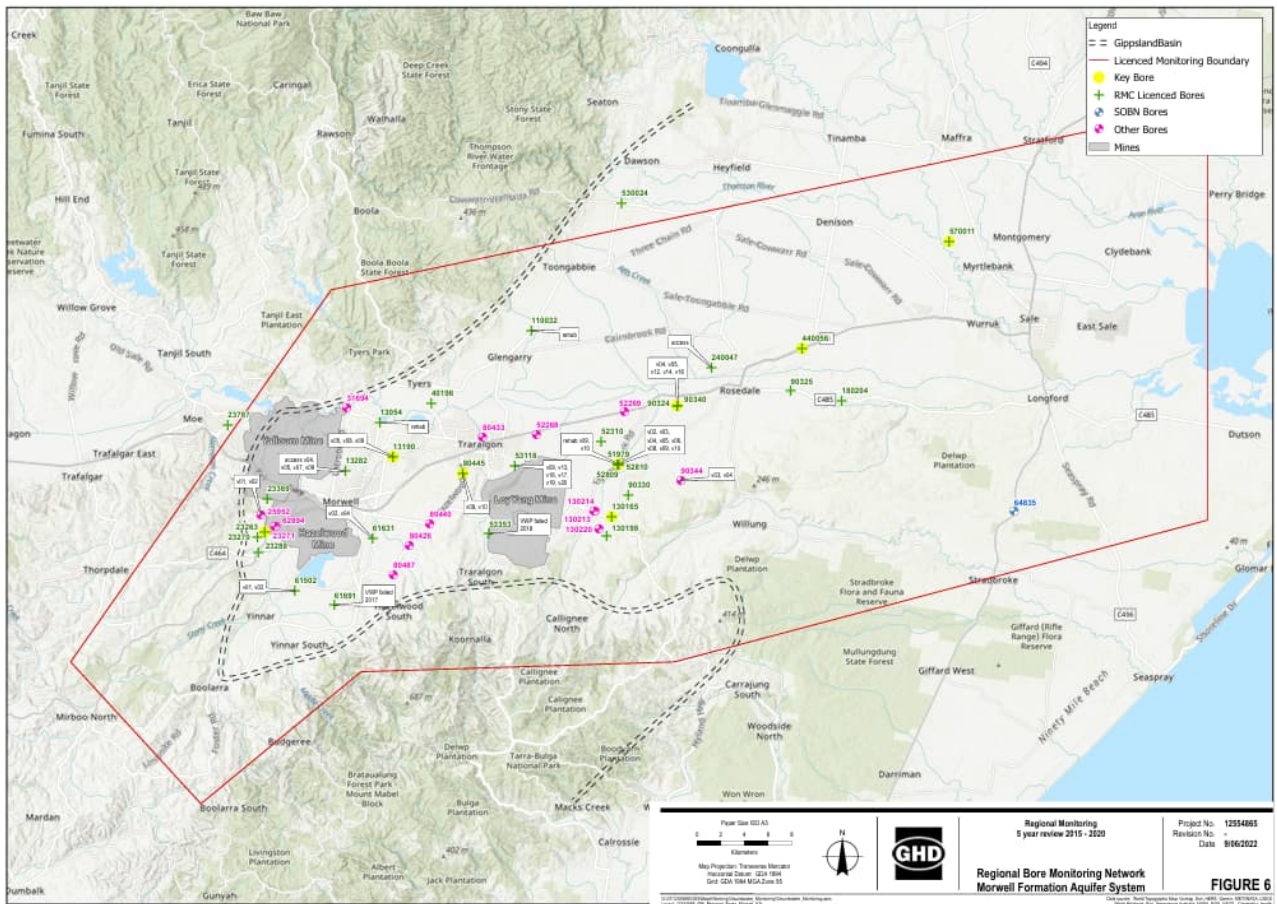


Figure 11 Monitoring bore network within MFAS

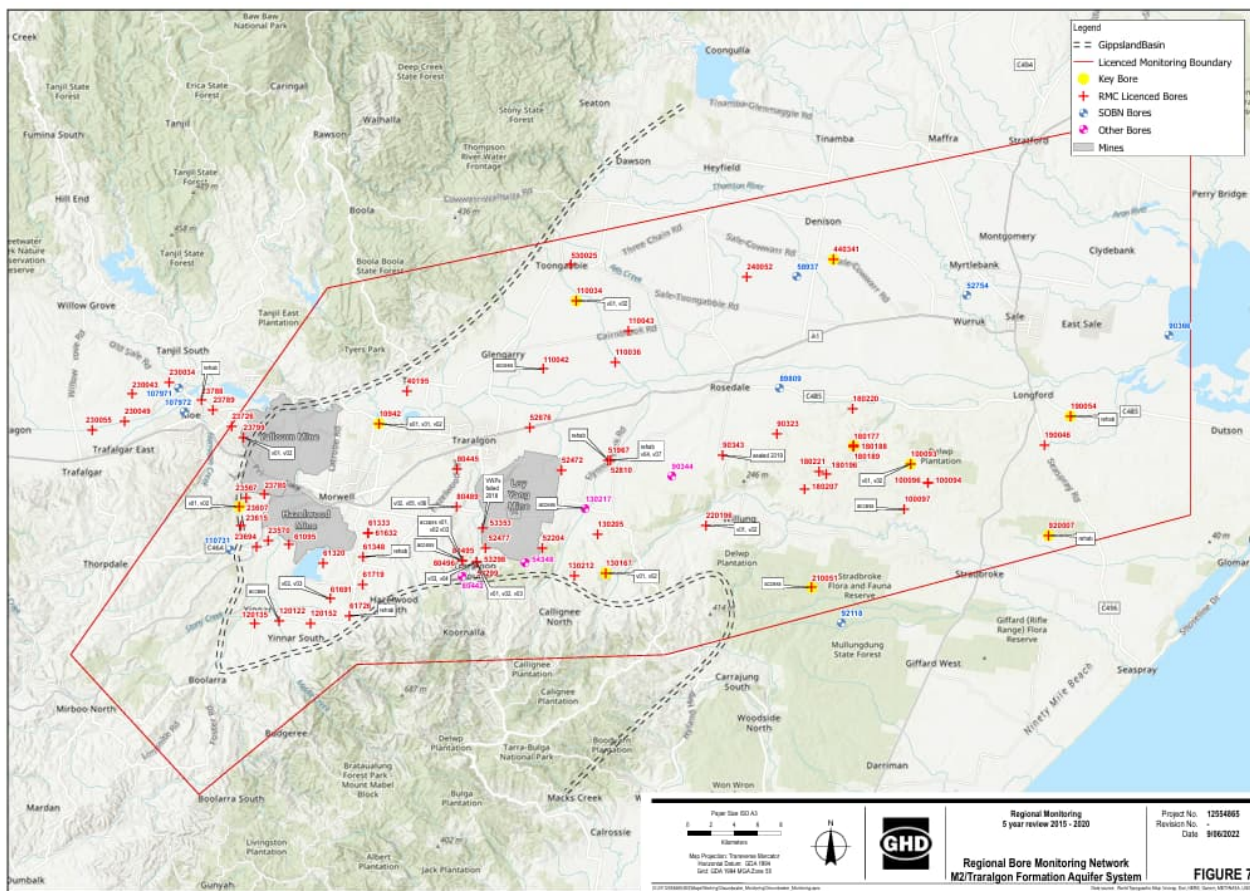


Figure 12 Monitoring Bore Network within the M2/TFAS

# AGL Loy Yang Licence Renewal – Licence condition compliance

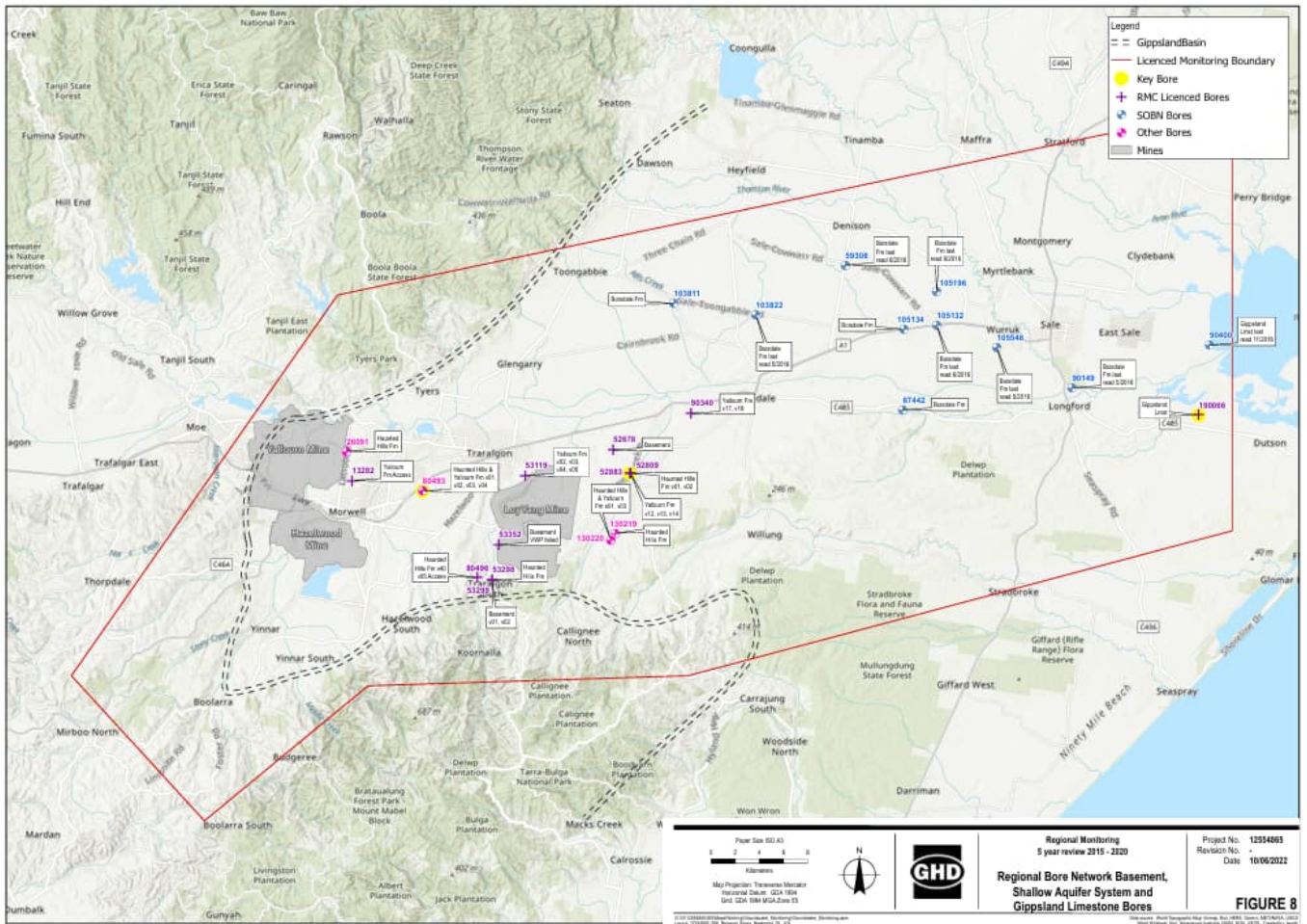


Figure 13 Monitoring bore Network (shallow aquifer, Gippsland limestone, basement aquifers)

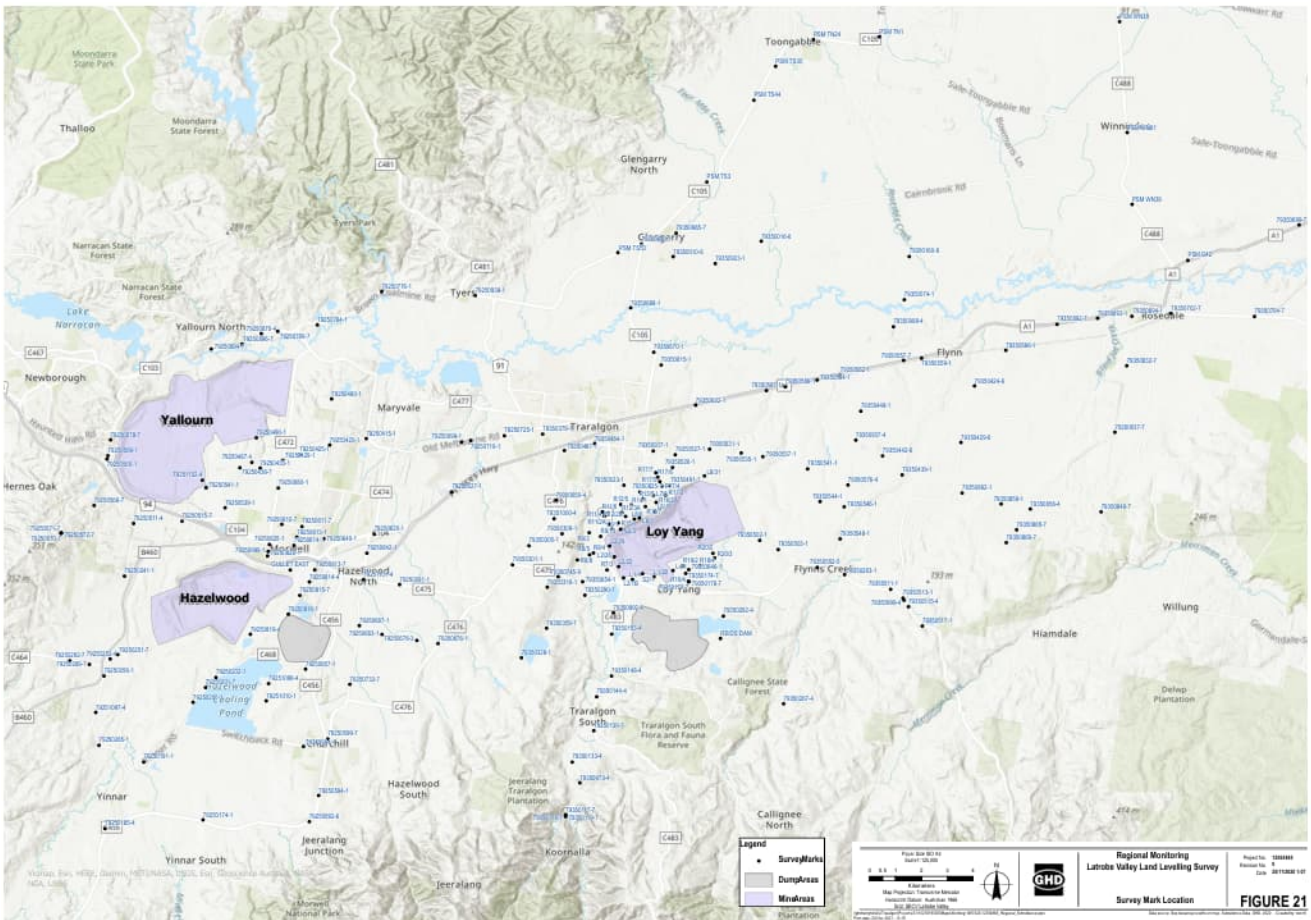


Figure 14 Regional Monitoring land level survey mark locations

## 3.2 Condition 2

For the purposes of this attachment, the region that shall be observed comprises the area bounded by the coordinates (AMG 436000E, 5742000N and 4250000E, 5754000N and 447000E 5785500N and 521000E, 5801000N and 521000E, 5766000N and 476000E, 5754000N and 450000E, 5753000N) as shown on the attached plan.

### 3.2.1 Response

Complied. The area of interested is shown by the red polygon in Figure 11, Figure 12, and Figure 13

## 3.3 Condition 3

A groundwater monitoring network will be maintained in the region. Sufficient data will be collected to reliably monitor and predict regional groundwater levels and trends. Databases will be maintained to store and retrieve data related to those activities.

### 3.3.1 Response

The regional monitoring management plan has been developed in consultation with the regional monitoring partnership. The plan documents in detail how the groundwater monitoring network is maintained, operated and data managed. Further detail on monitoring network management and data management is provided in the following sections.

### **3.3.1.1 Network management**

Monitoring Network Asset management is in accordance with the Regional Monitoring Management Plan. This plan was developed to manage the observation bore network and land level survey assets so that they provide reliable aquifer pressure and land level data for the assessment of potential environmental impacts caused by depressurisation. Monitoring of the regional observation bore network is biannual and is an appropriate frequency for both assessing monitoring trends in the aquifer pressures and for asset management to indicate potential problems in individual bore performance. The acquisition of field aquifer pressure data accords with standard procedures. All regional aquifer pressure information is the Latrobe Valley borehole database and prior to entry, a quality assurance procedure verifies new data.

Groundwater level monitoring data is reviewed to assess bore performance. The results of the bore performance review provide input to the bore maintenance program and the rehabilitation priorities ranked in accordance with the management plan procedures. For example, key bores are assigned as a high priority in the bore maintenance program to provide continuity of monitoring at these key sites. All bore data is reviewed individually and by aquifer and region to assess the consistency of responses and the assigned geological formation. Figure 15 presents a summary flow chart of the tasks that are completed annually for network asset maintenance and linkages with the bore rehabilitation program, data management and reporting requirements.

### **3.3.1.2 Data management**

Prior to input to the database, a Quality Assurance procedure is followed to verify the data. The aquifer pressure data is verified by comparison with previous readings to determine significant fluctuation that may indicate either changes in bore performance or in aquifer conditions. Comparison of aquifer pressure readings with other bores in the same area provides an additional check on reading accuracy. Scanned copies of all field records are retained on file. Bore data from a failed bore is flagged with a failed status in the monitoring network records until the bore is sealed or rehabilitated. Bores identified as requiring rehabilitation or with private landowner access issues are marked on the bore location plans.

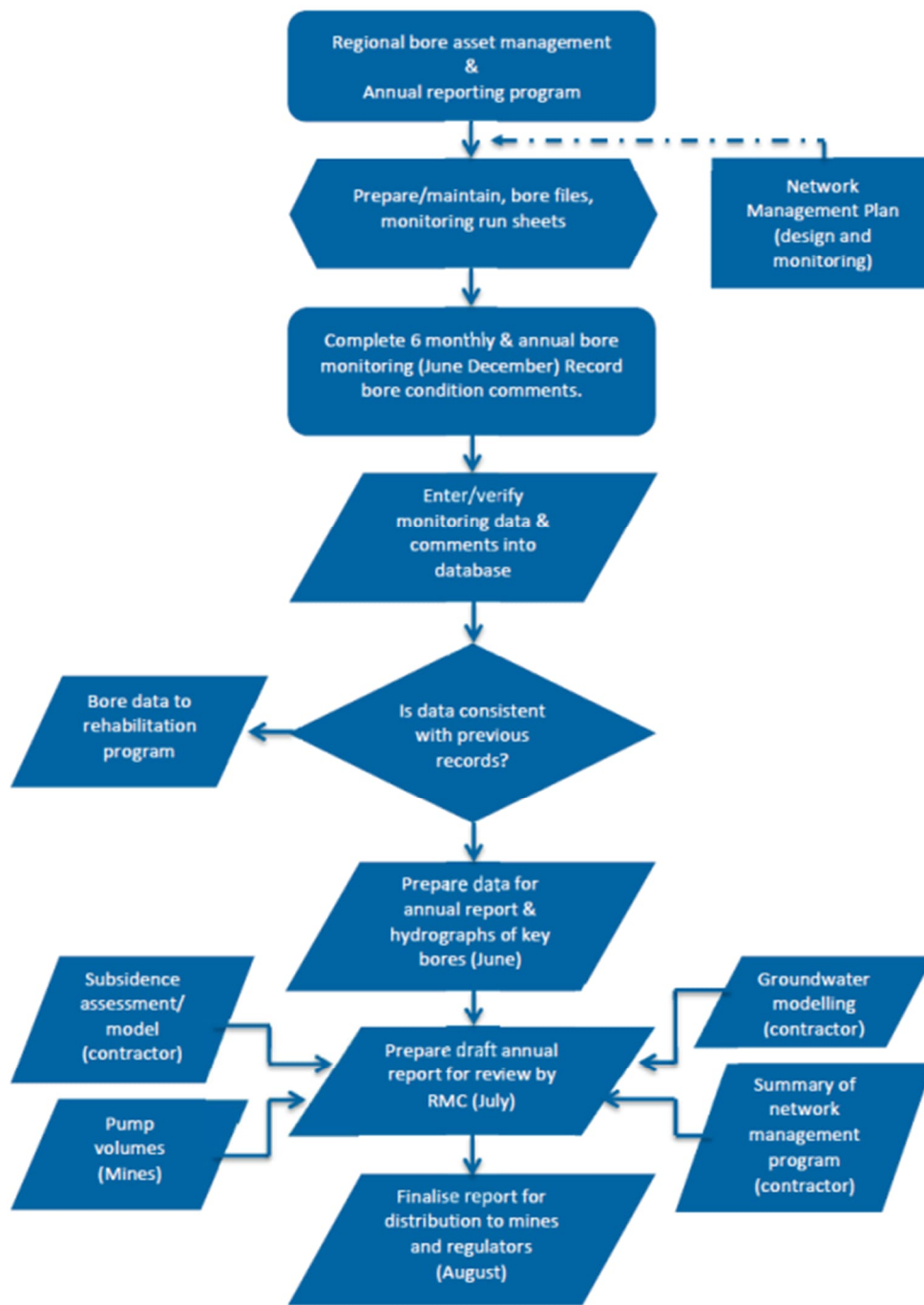


Figure 15 Monitoring Network Management process

### 3.4 Condition 4

The bores included in the regional groundwater monitoring network together with the monitoring frequency are listed Table A.

### 3.4.1 Response

Appendix A presents the full list of monitoring bores in the licence and their current status. Table 4 below is a summary of the original prescribed monitoring bores and the number still active and the number of additional substitute bores added to the network. Where possible all bores have been monitored. However in some cases bores may no longer be usable due to problems with the bore condition or access. In these cases replacement monitoring bores have been sought, and any changes have been communicated and endorsed with the regional monitoring partnership.

**Table 4 Status of bores prescribed for monitoring in the groundwater licence**

	Basement	M2/Traralgon	Morwell	Yallourn	Haunted Hills	
Original licence bores	3	81	53	10	5	152
Licensed bores still Active	3	67	35	6	5	116
Substituted bores Active		5	12	1	2	20

### 3.5 Condition 5

Standing water levels shall be measured according to standard operating procedures.

#### 3.5.1 Response

The acquisition of field standing water level data is carried out under standard procedures documented in Appendix D of the Latrobe Valley Regional Monitoring Management Plan (GHD 2013). All regional aquifer pressure information is stored in the Latrobe Valley regional borehole database.

### 3.6 Condition 6

All data shall be verified before submitting for storage. Measurements shall be checked against previous measurements for that bore to detect anomalies such as:

- incorrect recording of data;
- the casing has collapsed or become perforated;
- the screen or slots have become blocked.

#### 3.6.1 Response

Prior to input to the database, a Quality Assurance procedure is followed to verify the data. The aquifer pressure data is verified by comparison with previous readings to determine significant fluctuation that may indicate either changes in bore performance or in aquifer conditions. Comparison of aquifer pressure readings

with other bores in the same area provides an additional check on reading accuracy. All field records are retained on file. Bore data from a failed bore is flagged with a failed status in the database until the bore is sealed or rehabilitated.

Records of water levels, construction details, bore status and maintenance are kept and reviewed to assist in the casing condition assessment and hydrograph analysis.

### 3.7 Condition 7

The occurrence and cause of data anomalies shall be recorded and procedures instituted to prevent their recurrence.

#### 3.7.1 Response

Anomalous data has been recorded in each annual report produced for the regional monitoring partnership. Key M2/TFAS and MFAS bores which are noted as showing anomalous trends are included in a bore rehabilitation program. The program outlines procedures instituted to prevent their recurrence. Bores on the rehabilitation program are prioritised for work based on:

- A bore failure occurs, particularly in a key area
- It is artesian
- A bore failure occurs on private land where there may be access constraints

Table 5 shows a 2025 example of how anomalous data and prescribed works are reported in the annual report.

**Table 5 Anomalous data reported in the Annual Report 2025**

Location	Reported	Procedures proposed	Procedures implemented
190054	Anomalous RWL trends following headworks damage from roadworks	Key Bore standpipe rehabilitation, piezometer installation, or sealing	-
440341	Anomalous water level trend has been confirmed and requires assessment	Key Bore standpipe rehabilitation, piezometer installation, or sealing	-
440056	Considered to be unreliable with an anomalous trend and requires assessment	Key Bore standpipe rehabilitation, piezometer installation, or sealing	-
100096	Anomalous trend	Inspection and assessment.	-
130205	Anomalous trend		-
180221	Anomalous trend		Site inspections and replacement / repair completed October 2025
23270	Anomalous trend		-

51979	Anomalous trend requires rehab		-
52472	Reclassifies TR intraseam 2013 anomalous		-
61320	Anomalous trend		-
61348	Anomalous trend requires rehab		-

### 3.8 Condition 8

Preventative maintenance shall be carried out to all surface fittings, bores shall be kept secure from illegal use, vandalism or contamination.

#### 3.8.1 Response

Management of the monitoring network assets is outlined in the Regional Monitoring Management Plan (GHD, 2013).

The bore maintenance program focuses on:

- Securing bores against illegal use, vandalism, and contamination.
- Verifying the structural integrity of bore casings and screens.

Routine monitoring includes condition assessments of bore headworks and vibrating wire piezometer (VWP) connections. Due to the age and poor casing materials of standpipe bores, a rehabilitation method has been implemented to install VWPs into failed GI standpipes, extending bore life. Bores are sealed and decommissioned only when all rehabilitation options have been exhausted.

During the 2015–2020 review period, rehabilitation efforts concentrated on assessing vibrating wire terminal boxes to determine the status of downhole instruments. Headworks and cables were inspected to identify whether instrument failure or corrosion in terminal boxes caused the decline in operational piezometers. Where feasible, terminal boxes were repaired or scheduled for replacement under the rehabilitation program.

Additionally, Engie completed condition assessments of licensed RMC monitoring bores within the Hazelwood mine lease in 2016.

### 3.9 Condition 9

The structural condition of the bores shall be verified to ascertain if:

- the casing has collapsed or become perforated;
- the screen or slots have become blocked.

### 3.9.1 Response

Bore conditions have been outlined in each annual report.

As an example, in the most recent FY25 report the following bore conditions were presented:

- The standing water level at M2/TFAS bores 120122 and 210051 are below 100 m depth and are difficult to monitor using a dipmeter tape. Installation of VWP's are required to enable ongoing monitoring. The access track to 210051, is not suitable for rig access and would require significant work for bore rehabilitation to be completed.
- M2/TFAS and MFAS bore 53353 last monitored in 2018 as part of the Loy Yang annual monitoring run has been assessed and all VWP cables failed and is to be removed from the monitoring network.
- Artesian M2/TFAS bores 230049 has been damaged by roadworks and is seeping from the collar and the headworks valve at bore 23788 has seized and cannot attach a pressure gauge for monitoring. Bore 23726 is artesian and the headworks has failed and requires sealing (see Section 7.1)
- The GI standpipes at M2/TFAS bores 61348 and 61726 are considered to have failed and M2/TFAS bore 920007 has been damaged by vandalism.
- The headworks and GI carrier pipe at M2/TFAS and MFAS bore 52810 has corroded resulting in the VWP cables being inaccessible. This bore was assessed and is unable to be rehabilitated and is to be decommissioned.
- The headworks at MFAS bore 52809 at the same site have partially failed in August 2023 and repair and replacement of the headworks is planned.
- MFAS bores 13054 and 110032 have been damaged by roadworks and require rehabilitation.

Former SECV bore 23271 was previously monitored by the Regional Monitoring Committee (RMC) but is located within the Hazlewood mining lease. The bore is blocked and planned to be sealed by ENGIE. This bore has been replaced by nearby Engie bore 62894 which monitors the MFAS (M1 aquifer).

Other blockages reported in FY25 are listed as follows:

Location	Reported	Action
23271	Blocked inside mining lease and not a licence bore	The bore is blocked and planned to be sealed by ENGIE. This bore has been replaced by nearby Engie bore 62894
31694	Bore assessed 2018, blocked 2022	sealed
80256	Sealed 2002 blocked 113m unable to clear	sealed
80454	Sealed 2005 blocked 156m unable to clear	sealed
920007	Standpipe blocked / damaged by vandalism	Bore assessment / requires rehabilitation

### 3.10 Condition 10

All damaged or malfunctioning bores shall be repaired, substituted or replaced,

### 3.10.1 Response

The annual reports document the works done each year to repair, substitute or replace bores on the prescribed monitoring list. Table 6 give an example of how works are reported in the annual report. Bore rehabilitation programs are reported in the 5-year reviews. An example of the reported bore rehabilitation works provided in the last 5 year review is shown in Table 7

Appendix A shows the details of the prescribed licence monitoring bores, including their status. Appendix B shows the additional monitoring bores that are not on the original prescribed licence bore list. These bores have been added add extra coverage to the monitoring network and in some cases substitute or replace the original licence bores that are no longer usable.

**Table 6 Reported works in 2023/24 annual report**

Bore Number	Completed Work	Current Status
23726	Site Inspection temporary sleeve installed	Artesian bore. Planning permit for access track clearance obtained work to be scheduled in agreement with adjacent landowner.
52179	Site Inspection	Artesian bore, permits obtained work completed and bore sealed and decommissioned 31/10/2023.
52810	Site Inspection / assessment	Site inspected and camera inspection to 170m depth. Bore to be decommissioned.

**Table 7 Summary of bore rehabilitation works 2015-2020**

Bore	Date	Work completed	Status	Action
22491	FY16	Engie completed condition assessment	22491 in active mining area 23271 23750 and 61095	22491 removed from monitoring network 23271, 23750 61095 continued monitoring
90340	FY16	Terminal box repairs and VWP's assessed	VWP v16, v17 v18 assessed and operational. v01 failed	Continued monitoring v16, v17 v18 remove v01
90344	FY16	Terminal box repairs and VWP's assessed	VWP v01 assessed and operational.	Continued monitoring
52809	FY17	Terminal box repairs and VWP's assessed	VWP v11 assessed and operational.	Continued monitoring
53118	FY17	Terminal box and cables assessed	VWP v17 assessed and operational.	Continued monitoring

Bore	Date	Work completed	Status	Action
53119	FY17	Terminal box and cables assessed	VWP v02 and v03 assessed and operational.	Continued monitoring
53352	FY17	Terminal box and cables assessed	VWP v02 and v03 assessed and operational.	Continued monitoring
61691	FY17	Terminal box and cables assessed	VWP v04 assessed unstable readings failed instrument	Remove VWP from monitoring network
80445	FY17	Terminal box and cables assessed	VWP v10 assessed and operational.	Continued monitoring
52810	FY18	Inspection and attempt to retrieve VWP cables as headworks damaged	Unable to retrieve cables	Plan rig to retrieve /replace headwork
80495 & 80496	FY18	Inspection and attempted located bores dumping and clearing of rubbish.	Unable to locate bore or piezometers	Surveying to locate cables and standpipe
51967	FY18	Bore inspected attempted	Found to be blocked	Plan rig to remove blockage/ install VWPs
13282	FY19	Terminal box repairs and VWPs assessed	VWP v09 and v10 assessed operational.	Continued monitoring
80489	FY19	Terminal box repairs and VWPs assessed	VWP v02, v05 & v06 operational, v03 failed, v04 data anomalous	Continued monitoring of operational instruments
31694	FY19	Standpipe located/inspection	Bore s01 assessed trend good, operational.	Add to monitoring network
90343	FY18 & FY19	Attempted removal of pump lodged in bore and unable to push into sump.	Casing failure at pump blockage and unable to rehabilitate and install VWPs	Bore Sealed remove from monitoring network
13282	FY20	Terminal box repairs and VWPs assessed VWP	VWP v04, v05 and v07 assessed and operational.	Continued monitoring
52809	FY20	Terminal box repairs and VWPs assessed	VWP v05 assessed and operational.	Continued monitoring
53119	FY20	Terminal box repairs and VWPs assessed	VWP v05 assessed and operational.	Continued monitoring
53352	FY20	Terminal box and cables assessed	VWP v01 and v02 cables tested not reading	Remove from monitoring network and headworks
53353	FY20	Terminal box and cables assessed	VWP v01 to v06 cables tested not reading	Remove from monitoring network and headworks
80493	FY20	Terminal box repairs and VWPs assessed	VWPs v01 to v04 assessed and operational	Continued monitoring
80494	FY20	Terminal box repairs and VWPs assessed	VWP v01 to v11 cables tested and not reading VWPs confirmed as failed	Remove from monitoring network and headworks

### 3.11 Condition 11

All unwanted damaged or failed bores shall be decommissioned.

#### 3.11.1 Response

All unwanted or damaged bores are placed on a decommissioning program, with bores prioritised for works based on risk. Generally this means that artesian bores are given the highest priority for decommissioning works. The following section lists the bores decommissioned in recent years under the current licence.

##### 3.11.1.1 Decommissioned Bores

- 100093 – s01 - sealed and decommissioned
- 110034 – s01 - sealed and decommissioned
- 110037 – s01 - sealed and decommissioned
- 110038 – s01 -sealed and decommissioned
- 110040 - s01 - sealed and decommissioned
- 130165 – s01 - sealed and decommissioned
- 130167 – s01 - sealed and decommissioned

130176 – s01 -sealed and decommissioned  
13101 – s01 -sealed and decommissioned  
220196 - s01 - Sealed and decommissioned  
220197 - s01 -sealed and decommissioned same site as 220196  
23369 - s01 -sealed and decommissioned  
23607 – s01 -sealed and decommissioned  
23780 – s01 -sealed and decommissioned  
23799 – s01 -sealed and decommissioned  
440058 – s01 - sealed and decommissioned  
61502 – s01 - sealed and decommissioned  
90343 – s01 – sealed and decommissioned  
130213 – s01- decommissioned – not original licence  
130219 – s01 – decommissioned – not original licence  
130220 – s01 – decommissioned - not original licence

### **3.12 Condition 12**

Bore condition and the works carried out to repair and replace bores shall be reported.

#### **3.12.1 Response**

Works carried out to assess bore condition and repair and replace bores is reported in annual reports. Table 6 and Table 7 provide an example of the type of works undertaken and reported on.

### **3.13 Condition 13**

The regional potentiometric surface levels for the main aquifers shall be reported as contour maps.

#### **3.13.1 Response**

The potentiometric surface maps are produced for the 5-year review reports. Figure 16 and Figure 17 show examples of potentiometric surface maps produced in the last 5-year review.

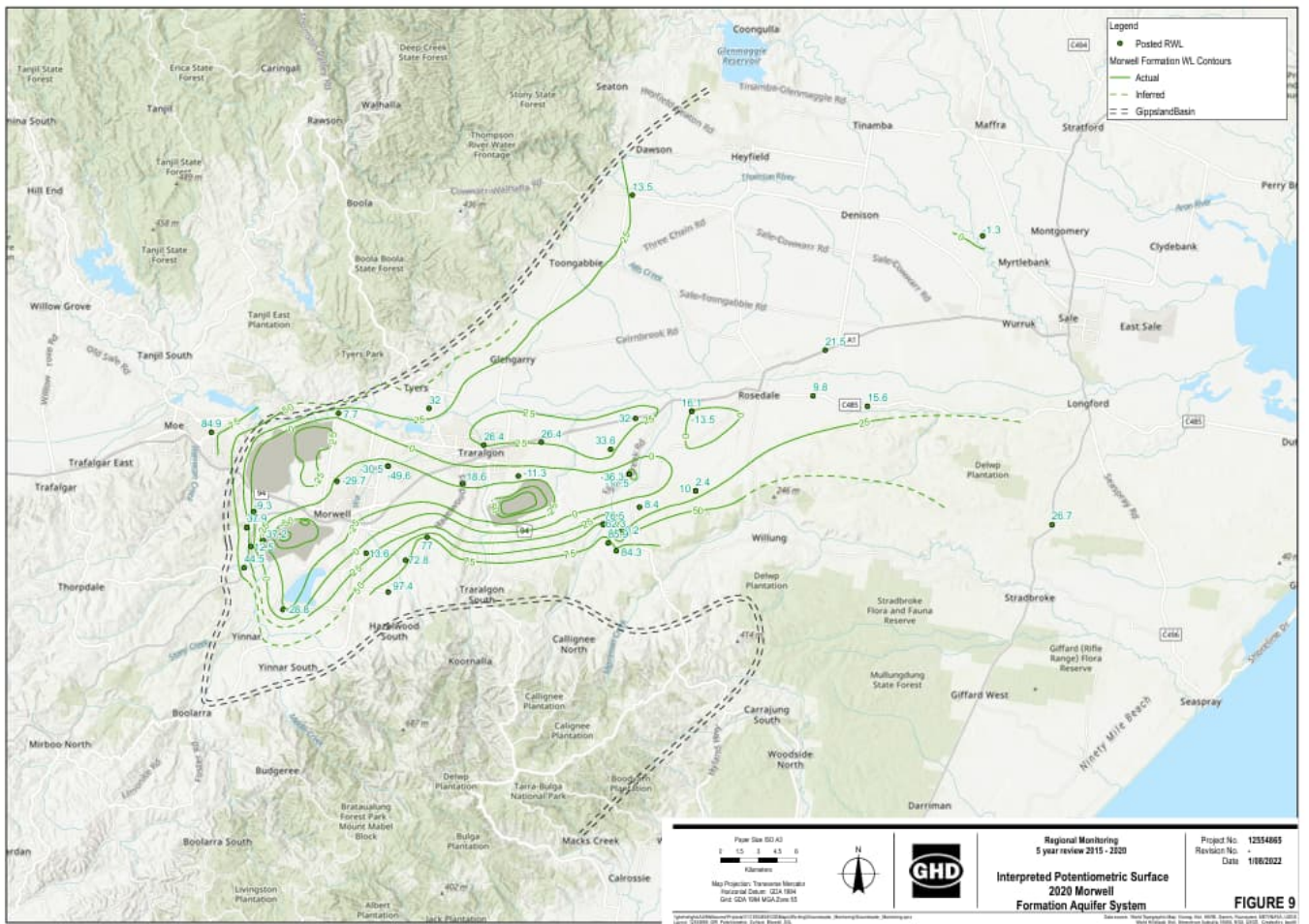


Figure 16 Potentiometric Surface maps for MFAS

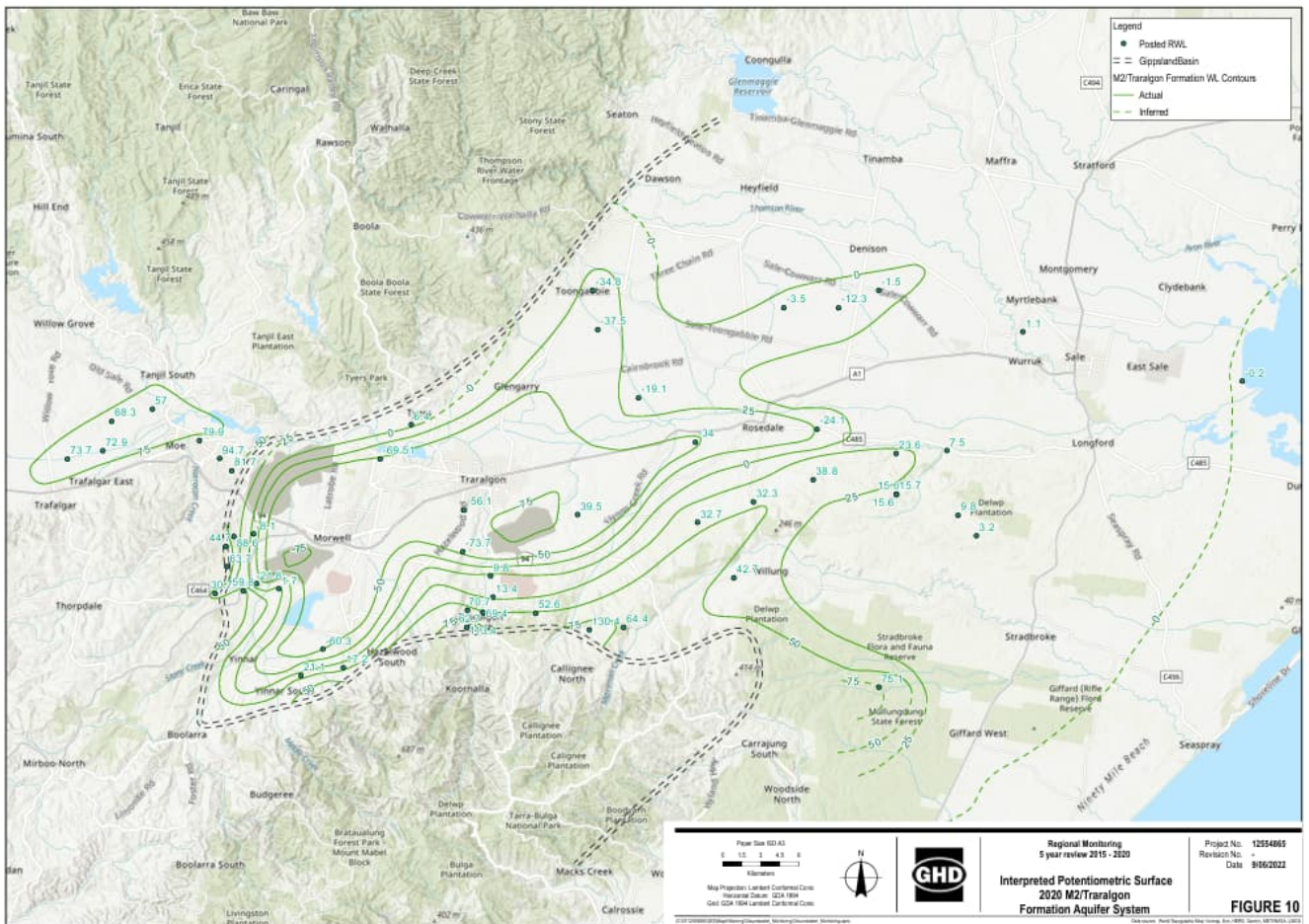


Figure 17 Regional Potentiometric surface maps for M2/Traralgon

### 3.14 Condition 14

Groundwater modelling of the region shall be performed to assist predicting the effects of mine depressurising on regional groundwater levels.

#### 3.14.1 Response

A comprehensive groundwater assessment that includes groundwater modelling is completed every 5 years. The groundwater modelling is completed to assist in predicting the effects of mine depressurisation on regional groundwater levels.

MODFLOW Latrobe Valley Regional Groundwater Model (LVRGM) was used to perform regional groundwater modelling for the previous Five-Year Review which included groundwater scenario modelling to 2040, predicting aquifer pressure trends beyond the term of the current licence. LVRGM has been updated further within each of the mining licences. The updates include groundwater extractions and each of the mine's closure and rehabilitation planning.

The LVRGM was first used in 2005 has been progressively developed since then by the three mine operators to complete the RMC regional groundwater and subsidence modelling requirements. The mines' scale models have been nested within the larger domain of the LVRGM since the release of an unstructured grid version of MODFLOW in 2013. This has allowed the model to be used for mine development, closure and rehabilitations investigations. The LVRGM modelling is supported by a detailed groundwater modelling report. The detailed

groundwater modelling report described the hydrogeological conceptual model, numerical model development and calibration and predictive modelling scenarios and results. The model was peer reviewed in 2005 with the first peer reviews focussing on the data analysis, conceptualisation and model design. In 2010, a second round of peer reviews was commissioned by SRW.

Since the 2015 Five Year Review, the following studies have contributed significant changes and updates to the LVRGM:

- Support the Latrobe Valley Regional Water Study
- Closure studies for the Hazelwood mine
- Ongoing operation and closure studies for Loy Yang mine

To inform the Latrobe Valley Regional Water Study (LVRWS) for DELWP and to examine the potential long-term effects of different closure scenarios on groundwater levels, fluxes and subsidence, the updated model and its outputs were used.

A discussion paper on the option for the predictive modelling was prepared and reviewed at the September 2020 RMC meeting, in preparation for the 2020 modelling program. The RMC agreed to align the predictive modelling time frames with the maximum licence extension of 15 years which can be issued by SRW to potentially support future licence renewal studies. The agreed groundwater and subsidence predictive modelling include:

- The Loy Yang predicted groundwater flows are based on the 2048 mine plan
- The Yallourn pump bores are assumed to be operating at flow rates like current rates until 2040
- The predicted pumping schedules for Hazelwood is based on the actual and predicted flows from the external pumping bore network
- Predictions to 2025 which corresponds to end the end of current licences
- Predictions to 2040 which corresponds to the end of the maximum licence extension of 15 years

### **3.15 Condition 15**

Reports and results of modelling runs shall contain the predictions, previous predictions and actual values for groundwater extractions and potentiometric levels of groundwater.

#### **3.15.1 Response**

In the 5 year review report predictive modelling outputs are presented with reference to drawdown contour plans and hydrographs of piezometric heads at key monitoring locations. The following text is an example of the modelling prediction produced from the 5-year review, and the predictive contour map outputs are shown in Figure 18 and Figure 19.

Predicted MFAS drawdown to 2040 comprises:

- Up to 70 m of drawdown along the eastern boundary of the Loy Yang mine, associated with commissioning and operation of perimeter M1B aquifer pump bores to enable depressurisation prior to completion of mine base development in areas of moderate transmissivity.
- Approximately 20–25 m of drawdown adjacent to the Hazelwood mine.

- Approximately 25–30 m of drawdown east of the Yallourn mine and 35–40 m to the south of Maryvale Field, associated with pumping to manage pressures during the rehabilitation phase.
- Up to 15 m of drawdown west of Rosedale.
- Predicted M2/TFAS drawdown to 2040 comprises:
  - Up to 80 m of drawdown to the south and east of the Loy Yang mine, associated with pump bore commissioning ahead of eastward mine expansion and decommissioning of western pump bores.
  - Up to 55 m of drawdown south of the Hazelwood mine and up to 50 m to the north, associated with operation of perimeter pump bores.

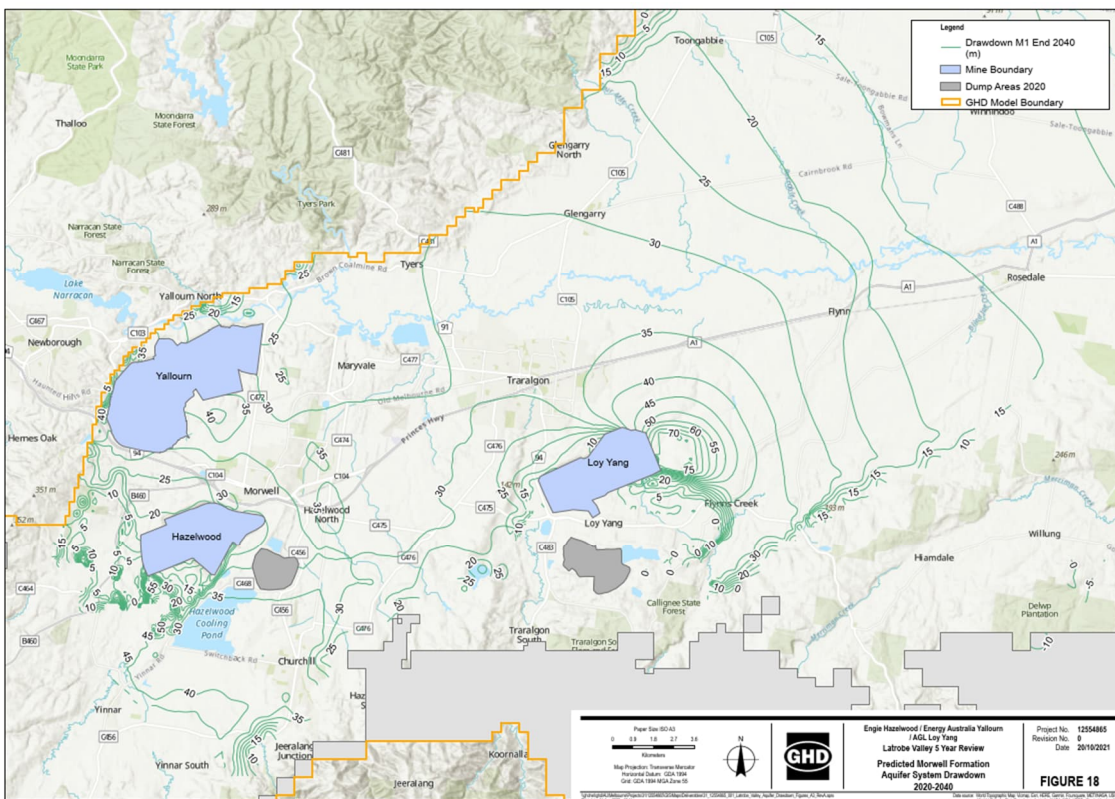


Figure 18 Predictive drawdown in MFAS 2020-2040

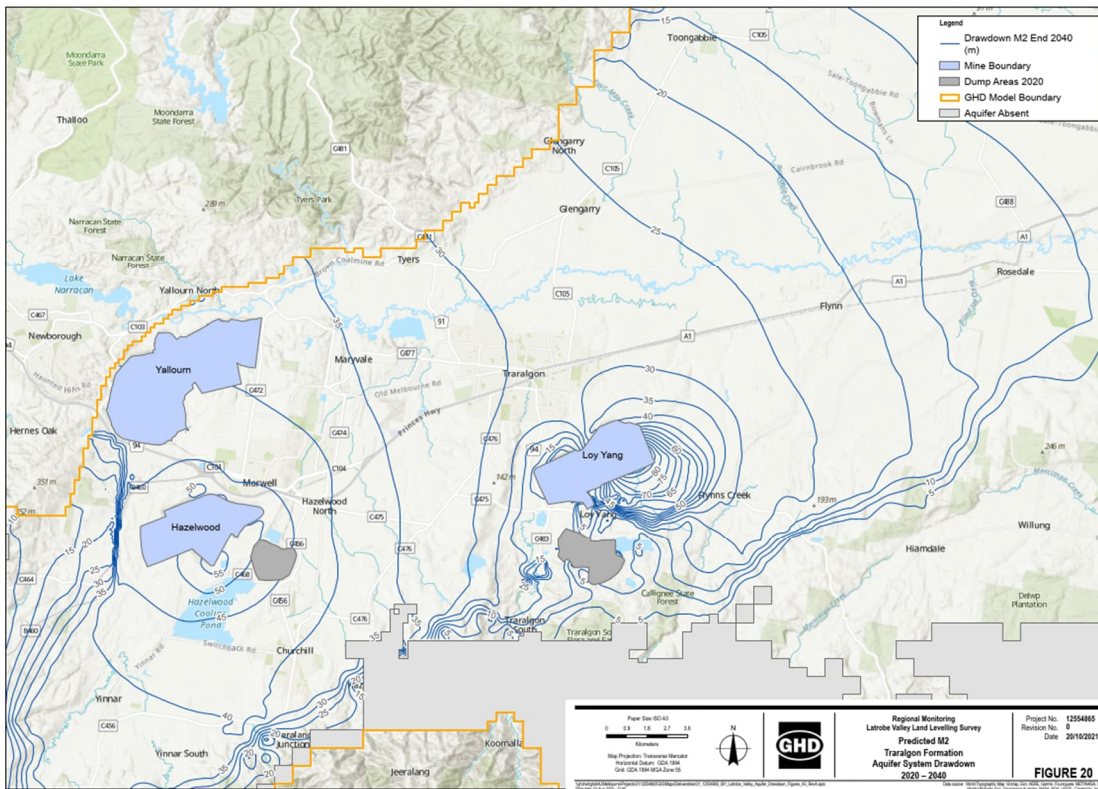


Figure 19 Predictive drawdown TFAS 2020-2040

### 3.16 Condition 16

Land level surveys of the region shall be undertaken to determine the extent of land subsidence associated with mine depressurising

#### 3.16.1 Response

Regional land level surveying is undertaken to assess the extent of land subsidence associated with mine depressurisation. Surveys are to be conducted at intervals not exceeding five years.

The regional subsidence survey was conducted using Global Positioning System (GPS) methodologies, supplemented by digital levelling where required. Static GPS observations were undertaken at suitable survey marks. Where access or site conditions restricted GPS use, eccentric stations were established and levels were transferred using conventional levelling techniques. A Map of the land survey locations is presented in Figure 14.

The survey network was designed to comply with ICMS standards, incorporating up to four stable reference marks for level control. GPS observation durations and occupation times were consistent with ICMS requirements for Class B and Order 2 surveys. Differential levelling, where required, was completed in accordance with ICMS Class LB standards.

Analysis of regional subsidence measurements and trends has been undertaken in accordance with the requirements of Licence Attachment A. Contour mapping of regional land subsidence has been prepared to support the 5-year comprehensive reviews.

The Surveyor-General Victoria, within the Department of Transport and Planning (DTP), has extended the Interferometric Synthetic Aperture Radar (InSAR) study area inland to include the Latrobe Valley mines. In 2023, a network of 26 survey marks (comprising both new and existing locations across the Latrobe Valley) was established, and two high-precision GNSS surveys were undertaken in October 2023 and 2024. Annual surveys are planned to continue, with results to be provided following data analysis. Twelve DTP monitoring sites have been designated to host InSAR reflectors, with corner reflectors installed at seven locations in 2024.

The planned trial to acquire and process two years of InSAR data has not progressed due to funding constraints. However, an InSAR-derived Global Velocity Model (GVM) has been obtained for the Latrobe Valley, incorporating approximately eight years of velocity data (2017–2024). While the GVM can be used to identify areas of ground motion, it is not considered sufficiently reliable for quantifying subsidence.

Mine representatives periodically review the requirements and outputs of remote survey methods, including InSAR, and assess their potential application within the regional surveying program.

### **3.17 Condition 17**

Survey intervals and reports of survey results shall be carried out at no greater than 5 year intervals and more frequently where significant subsidence is being recorded. The next program will be completed by the year 2019/2020

#### **3.17.1 Response**

Survey intervals have been undertaken at leave every 5 years. Surveys were completed in 2019/20 for the previous 5 year review, and have been completed in 2024/25 for the upcoming 5 year review.

### **3.18 Condition 18**

Surveys shall be undertaken to not less than third order accuracy.

#### **3.18.1 Response**

Survey data has been compiled to meet the licence conditions on accuracy.

### **3.19 Condition 19**

Land level modelling of the region shall be performed to assist in predicting the effects of groundwater depressurisation on land subsidence.

#### **3.19.1 Response**

Land subsidence modelling for the region has been undertaken to support the assessment of groundwater depressurisation impacts on land subsidence. The outcomes of land level modelling are incorporated into the comprehensive Five-Year Review. Historical subsidence modelling was completed in 1987 and 1994 using the SECV COMPAC code, a one-dimensional model applied to predict land level changes at discrete locations. A summary of these modelling outcomes is provided in the 2000 Five-Year Review.

Subsidence is currently simulated within the LVRGM using the Subsidence (SUB) package of MODFLOW-USG. This package simulates time-dependent drainage and compaction of interbeds and confining units in response to modelled changes in piezometric head. Key parameters, including elastic specific storage (Sske) and inelastic specific storage (Sskv), are derived from published interpretations, bore log analyses, and

geological models of the mining areas. These parameters have been refined through an automated calibration process applying model-wide multipliers.

The subsidence calibration has been achieved through comparison of observed and modelled subsidence from 1960 through to 2020 at the extensive network of regional survey marks in the Latrobe Valley. The calibration period for the model has been extended to the end of 2020. This is so that the most recent measurements of subsidence collected in 2019 and 2020 can be incorporated.

Drawdown arising from the future groundwater extraction was used for the prediction of regional subsidence. The latest 5 year review results indicate continued expansion of subsidence contours in line with the previously recorded subsidence trends. The predicted groundwater subsidence for the last five year review is presented in Figure 20 and Figure 21.

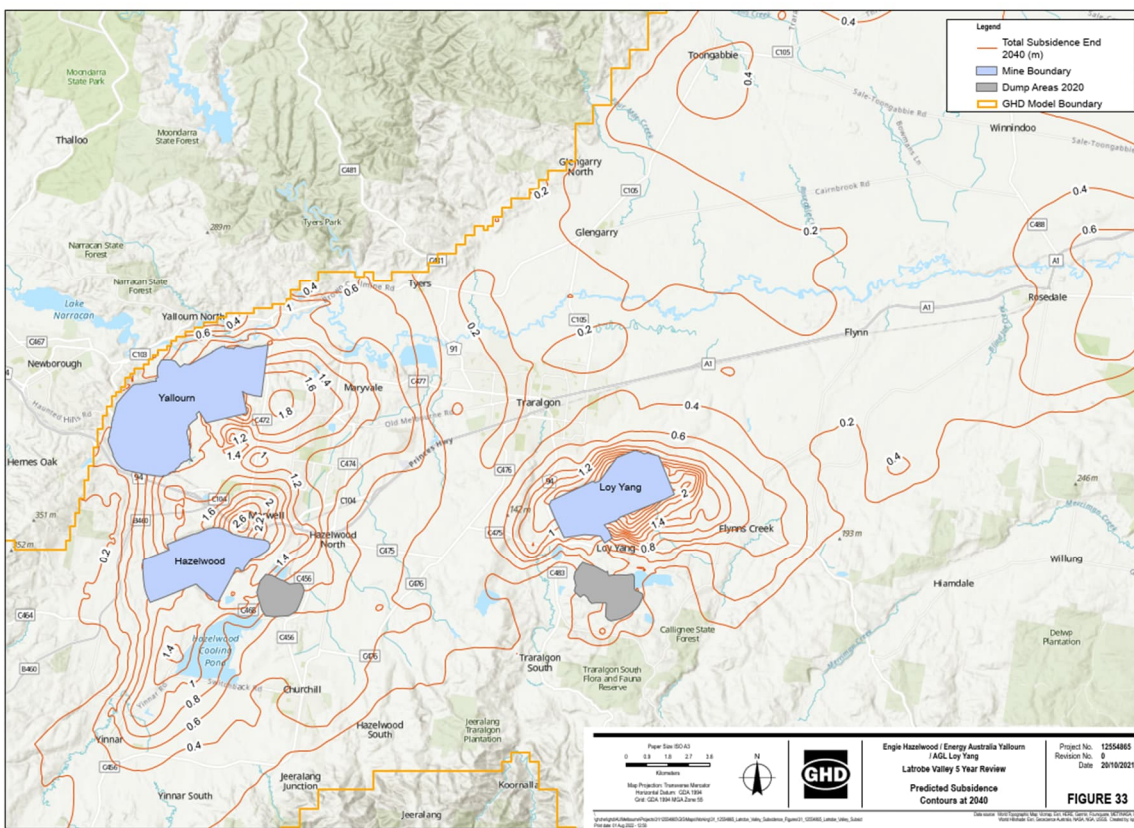


Figure 20 Predicted subsidence contours 2040

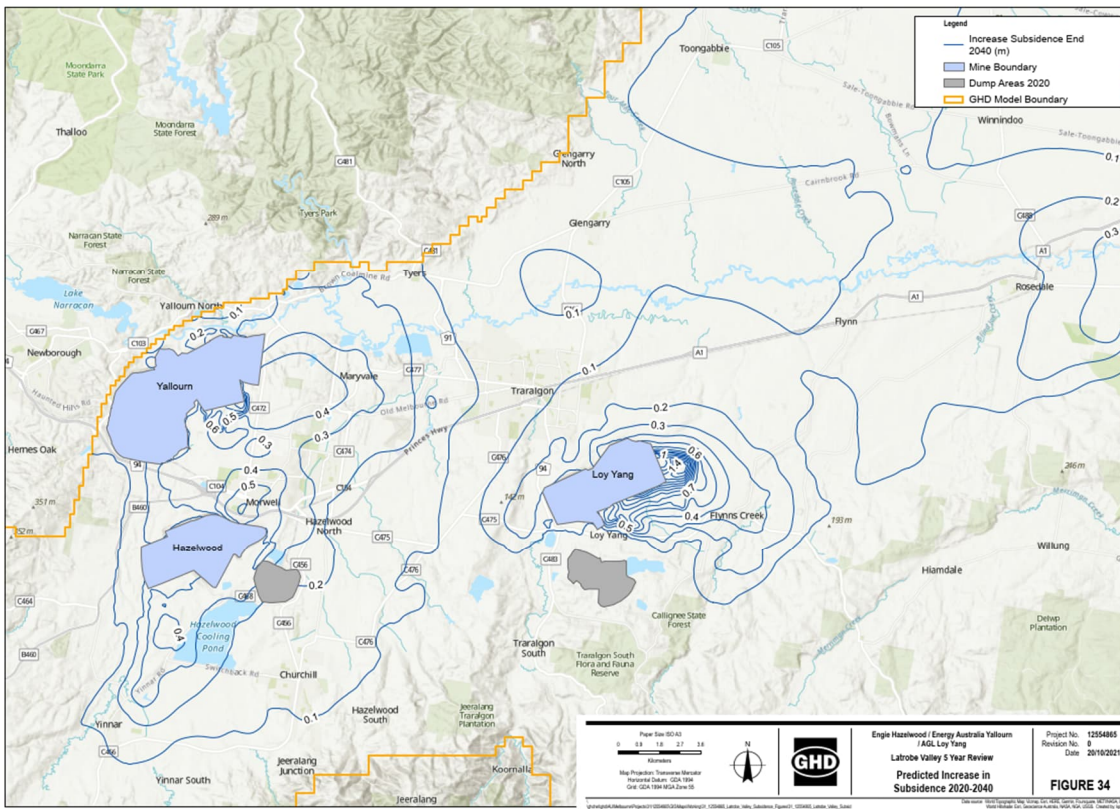


Figure 21 Predicted subsidence increase 2020-2040

### 3.20 Condition 20

The conduct of the monitoring, modelling and reporting is to be reviewed by the Regional Monitoring Committee having representatives of mine operators, (Energy Australia, Engie and AGL Loy Yang), The Department of Economic Development, Jobs, Transport & Resources and the Minister responsible for the Water Act 1989 or his delegate. The Committee may make recommendations to the Minister responsible for the Water Act 1989 or his delegate to amend the regional program in order to:

- maintain and/or enhance the regional monitoring and assessment program; and
- to adjust and refine the regional program to take account of:
  - results generated by the program;
  - changes in mining and depressurizing activity;
  - emerging regional issues associated with depressurizing activities;
  - advances in technology;
- maintaining a cost effective program

#### 3.20.1 Response

Regional Monitoring Committee holds annual meetings and performs the functions outlined in the licence condition.

Evidence of the function being performed is within the annual meeting agenda and minutes, and in reviews of the annual reports and 5-year comprehensive reviews.

### **3.21 Condition 21**

The program shall be consistent with the programs previously carried out by the State Electricity Commission of Victoria to determine the impacts of dewatering/depressurisation both on site and regionally and must be maintained to the satisfaction of the Director of Compliance, Earth Resources Regulation and the Minister responsible for the Water Act 1989 or his delegate.

#### **3.21.1 Response**

The monitoring program incorporates data and monitoring programs previously carried out by the State Electricity Commission. Annual Monitoring reports and 5-year reviews that incorporate these programs have been endorsed by DEECA and SRW.

### **3.22 Condition 22**

The licensee shall ensure that results of the regional monitoring program are reported to the Minister responsible for the Water Act 1989 or his delegate and the Environmental Review Committee annually and at any other times as required under the Groundwater Licence.

#### **3.22.1 Response**

The results of the regional monitoring program are reported annually and monitoring data is stored in a secure database which can be accessed at any time for reporting if required at other times.

### **3.23 Condition 23**

An annual report shall be prepared each September detailing:

- a. the monitoring activity undertaken in the past year;
- b. any amendments to the monitoring network;
- c. any issues arising from the monitoring results including significant variations to predicted trends.

#### **3.23.1 Response**

The Annual report is produced every year and presented to the Regional Monitoring Committee for review.

Figure 22 below is an example of the table of contents from an annual report in 2022.

<b>1.</b>	<b>Introduction</b>	<b>1</b>
1.1	Limitations	2
<b>2.</b>	<b>Regional Hydrogeology</b>	<b>3</b>
	Shallow Aquifer System (SAS)	3
	Morwell Formation Aquifer System (MFAS)	3
	M2/Traralgon Formation Aquifer System (M2/TFAS)	4
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Appendix B	Recent Gippsland Basin Hydrogeological Reports
Appendix C	Annual Groundwater Extractions
Appendix D	Latrobe Valley Groundwater Monitoring Bore Details
Appendix E	Key Bore Hydrographs
Appendix F	Annual Asset Maintenance & Reporting Program

Figure 22 Table of Contents from Annual report

### **3.24 Condition 24**

The annual report shall be made available to members of the public on request.

#### **3.24.1 Response**

There has not been any requests from the public for the annual reports, however they have been available to be supplied if required.

### **3.25 Condition 25**

A comprehensive review shall occur at not less than at 5 yearly intervals, or more frequently if circumstances change or as deemed necessary by the Regional Monitoring Committee.

#### **3.25.1 Response**

Annual reports have been produced at 5 yearly intervals as required by the licence condition.

### **3.26 Condition 26**

The comprehensive review shall include:

- a. detailed analysis of measured regional groundwater levels and trends;
- b. detailed analysis of measured regional land subsidence. and trends;
- c. contour maps of regional potentiometric surface levels for the main aquifers;
- d. contour maps of regional land subsidence;
- e. results from groundwater and land subsidence models;
- f. based on the modelling, detailed predictions of future regional groundwater levels and land level trends;
- g. any issues arising from the monitoring results including significant variations to previously predicted trends;
- h. recommendations to amend and enhance the regional monitoring program;
- i. where necessary, recommendations to manage regional issues resulting from mme depressurisation.

#### **3.26.1 Response**

The comprehensive review has covered all the items outlined in the licence condition. Figure 23 below is an example of the table of contents from the 5-year comprehensive review produced for 2015-2020 period.

<b>1. Introduction</b>	<b>1</b>
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Appendix F	Predicted key bore hydrographs
Appendix G	Predicted subsidence hydrographs
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Figure 23 Table of content from the 5-year comprehensive review

### **3.27 Condition 27**

The licensee shall ensure that results of the comprehensive review are reported to the Minister responsible for the Water Act 1989 or his delegate.

#### **3.27.1 Response**

The 5 year comprehensive review has been provided to the relevant Minister or delegate in line with the licence condition.

## **Appendix A. Prescribed licence monitoring bore**

## AGL Loy Yang Licence Renewal – Licence condition compliance

Bore ID	MGA E	MGA N	Install No	RL collar	Screen	Screen to	VWP RL	Monitoring Unit	RWL (mAHD)	Active (in last 24 months)	Latest reading date	Comments
100093	497011	5770397	v01	129.5			7	Traralgon Fm	10.12	Active	5/03/2025	
100093	497011	5770397	v02	129.5			9.5	Traralgon Fm	10.99	Active	5/03/2025	
100094	498503.5	5768810	s01	142	196.5	211.5		Traralgon Fm	16.3	Not Active	23/07/2008	Same site as 100096 (duplication)
100096	498489.7	5768825	s01	143.7	196.5	202.5		Traralgon Fm	24.95	Active	5/03/2025	Anomalous trend
100097	496466.3	5766494	s01	119.8	228	234		Traralgon Fm	54.33	Not Active	21/08/2013	Track Access Issue
10942	451444.5	5773871	s01	39				M2/TFAS	-53.6	Active	11/10/2024	APM 1 pump bore - VWP installed 2011
10942	451444.5	5773871	v01	39			-455	M2/TFAS	-84.48	Active	11/10/2024	APM 1 pump bore - assumed fully slotted standpipe
110032	463905.4	5782025	s01		413	419		Morwell Fm	36.75	Not Active	29/07/2020	Headworks damaged requires rehab
110034	468355.4	5784414	v01	52.1			-347.9	Traralgon Fm	-42.28	Active	5/03/2025	Reclassified TR Fm 2013
110034	468355.4	5784414	v02	52.1			-350.9	Traralgon Fm	-30.83	Active	5/03/2025	Reclassified TR Fm 2013
110036	471670.9	5779113	s01	24.5	701.3	704.3		Traralgon Fm	-21.08	Active	5/03/2025	

## AGL Loy Yang Licence Renewal – Licence condition compliance

110042	465511.3	5778540	s01	32.1	585.5	595		Traralgon Fm	21.7	Not Active	5/01/2011	Private property - not accessible
110043	472800.4	5781791	s01	29	604	617		Traralgon Fm	22.07	Active	5/03/2025	
120122	442874.1	5756893	s01	70.5	280	299.5		Traralgon Fm	3.38	Not Active	4/07/2013	SWL > 100m VWP to be installed
120135	440780.3	5756663	s01	70.6	320	323		Traralgon Fm	63.51	Active	5/02/2025	Re-classified to Tr Fm 2013, increasing trend
120152	445568.4	5756683	s01	93.5	632.4	638.4		Traralgon Fm	90.72	Active	5/02/2025	Possible casing failure
130165	470693	5766298	v01	113.5			-140.7	Morwell Fm	-4.97	Active	5/03/2025	
130167	470881.5	5761013	v01	216.1			41.3	Traralgon Fm	62.67	Active	5/03/2025	
130167	470881.5	5761013	v02	216.1			42.5	Traralgon Fm	63.6	Active	5/03/2025	
130198	470244.8	5764670	s01	156.6	70	73		Morwell Fm	84.35	Active	5/03/2025	
130205	470168.9	5764330	s01	158.5	158.5	170.5		Traralgon Fm	102.43	Active	5/03/2025	Anomalous trend
130212	468186.6	5760776	s01	172.3	157	163		Traralgon Fm	129.65	Active	5/03/2025	
13054	451119.4	5774301	s01	50.3	324.5	344		Morwell Fm	11.51	Not Active	13/02/2013	Headworks damaged required rehab
13190	452215.4	5771376	v05	44.7			-326.1	Morwell Fm	-52.37	Active	5/02/2025	

## AGL Loy Yang Licence Renewal – Licence condition compliance

13190	452215.4	5771376	v08	44.7			-282.5	Morwell Fm	-35.23	Active	5/02/2025	
13190	452215.4	5771376	v09	44.7			-265.3	Morwell Fm	-37.2	Active	5/02/2025	
13282	448189.9	5770169	v04	75.3			-134.9	Morwell Fm	-31.28	Not Active	18/10/2021	Private land - No access from landowner
13282	448189.9	5770169	v05	75.3			-105.4	Morwell Fm	-29.76	Not Active	18/10/2021	Private land - No access from landowner
13282	448189.9	5770169	v07	75.3			-76.4	Morwell Fm	-26.58	Not Active	18/10/2021	Private land - No access from landowner
13282	448189.9	5770169	v09	75.3			-34.4	Morwell Fm	12.4	Not Active	18/10/2021	Private land - No access from landowner
13282	448189.9	5770169	v10	75.3			-9.4	Yallourn Fm	16.43	Not Active	18/10/2021	Private land - No access from landowner
180177	492116.9	5771969	s01	137.5	172.5	179		Traralgon Fm	13.16	Active	5/03/2025	
180188	492128.1	5771939	s01	138.6	196.9	199.1		Traralgon Fm	13.26	Active	5/03/2025	
180189	492131.4	5771920	s01	139	196	202		Traralgon Fm	13.3	Active	5/03/2025	
180196	489765.4	5769576	s01	165.9	312.5	319		Traralgon Fm	89.54	Active	5/03/2025	
180204	490094	5776112	s01	16	298	304.5		Morwell Fm	16.08	Active	5/03/2025	
180207	487919.4	5768264	s01	164	351.4	354.5		Traralgon Fm	103.81	Active	5/03/2025	Fluctuating trend

## AGL Loy Yang Licence Renewal – Licence condition compliance

180220	492038.8	5775160	s01	37.4	218	301.5		Traralgon Fm	22.5	Active	5/03/2025	
180221	489155.2	5769765	s01	160.1	301	311		Traralgon Fm	88.39	Active	5/03/2025	anomalous trend
190046	508487.9	5772006	s01	62.7	190.2	196.2		Traralgon Fm	19.53	Active	5/03/2025	
210051	488524.7	5759788	s01	194.2	329.4	335.2		Traralgon Fm	11.11	Not Active	29/08/2011	Access issues SWL>200 m required VWP
220196	479470.1	5765096	v01	133.8			-229.2	Traralgon Fm	40.74	Active	5/03/2025	
220196	479470.1	5765096	v02	133.8			-221.2	Traralgon Fm	17.63	Active	5/03/2025	
230034	433441	5777418	s01	67.4	52	55		Traralgon Fm	57.4	Active	5/02/2025	
230043	430259.2	5776387	s01	67.3	144	156		Traralgon Fm	69.73	Active	5/02/2025	
230049	429607.6	5774060	s01	56.3	210	219		Traralgon Fm	72.69	Not Active	29/03/2022	GI broken at ground level
230055	426835.7	5773342	s01	58	176	180		Traralgon Fm	72.88	Active	5/02/2025	
23263	441386.9	5765022	s01	70.73	84.6	91.5		Morwell Fm	17.98	Active	5/02/2025	Increasing trend since 2021
23270	440767.3	5764580	s01	65.8	45.7	46.3		Morwell Fm	55.55	Active	5/02/2025	anomalous trend
23288	440848	5763326	s01	69.8	46.9	48.5		Morwell Fm	43.62	Active	5/02/2025	

## AGL Loy Yang Licence Renewal – Licence condition compliance

2336 9	44161 3.4	576777 4	v01	78.2			-58.8	Morwell Fm	-12.68	Active	5/02/2025	
2356 7	44005 4.7	576752 3	s01	138.9	124	130		M2/TFAS	90.89	Active	5/02/2025	
2357 0	44192 9.4	576385 8	s01	59.8	181	187		M2/TFAS	-21.22	Active	21/01/2025	Monitored by Engie
2360 7	43944 7.4	576673 7	v01	135.5			44.2	M2/TFAS	44.08	Active	5/02/2025	
2360 7	43944 7.4	576673 7	v02	135.5			48.2	M2/TFAS	45.13	Active	5/02/2025	
2361 5	43957 5.6	576514 5	s01	89.4	59.1	66.1		M2/TFAS	63.22	Active	5/02/2025	
2369 4	44091 7.3	576324 4	s01	69.9	65.6	66.6		M2/TFAS	59.7	Active	5/02/2025	
2372 6	43881 3.6	577365 2	s01	92.7	185	194		Traralgon Fm	96.16	Not Active	26/08/2023	Failed headworks artesian
2378 0	44161 2.2	576776 2	v01	78.2			-95.8	M2/TFAS	-8.83	Active	13/06/2024	Requires survey
2378 7	43826 3.2	577405 4	s01	81.8	209	215		Morwell Fm	83.73	Active	5/02/2025	
2378 8	43621 2.4	577585 3	s01	55.4	96.5	98		Traralgon Fm	56.2	Not Active	7/05/2007	Valve siezed cant read pressure
2378 9	43719 6.5	577501 1	s01	72	158. 5	164.5		Traralgon Fm	78	Active	5/02/2025	
2379 9	43978 6.3	577268 9	v01	155.1			-56.9	Traralgon Fm	81.72	Active	5/02/2025	

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2379 9	43978 6.3	577268 9	v02	155.1			-57.9	Traralgon Fm	84.76	Active	5/02/2025	
2400 47	47911 0.7	577894 9	s01	44.1	426	439		Morwell Fm	29.5	Not Active	5/01/2011	Access issues
2400 52	48295 5.2	578644 6	s01	25.4	568. 8	577.8		Traralgon Fm	-3.44	Not Active	25/08/2023	Requires survey
4019 5	45383 1.3	577663 7	s01	41.1	449. 5	452.5		Traralgon Fm	5.84	Active	5/03/2025	
4019 6	45545 6.5	577594 5	s01	35	331	334		Morwell Fm	31.84	Active	5/03/2025	
4400 56	48675 8.4	578055 6	s01	40.2	392	401.5		Morwell Fm	20.61	Active	5/03/2025	Anomalous trend requires rehab
4403 41	49039 7.2	578797 3	s01	23	660	666		Traralgon Fm	3.02	Active	5/03/2025	Anomalous trend requires assessment
5196 7	47105 0.7	577076 7	s01	71.1	569. 5	591.5		Traralgon Fm	49.28	Active	5/03/2025	Increasing trend
5197 9	47117 5.2	577076 2	s01	70.5	374	380.5		Morwell Fm	49.79	Active	5/03/2025	Anomalous trend requires rehab
5220 4	46543 9.7	576318 2	s01	172.8	357	360		Traralgon Fm	153.99	Active	11/08/2025	
5231 0	46979 5.1	577270 2	s01	61.4	320	333		Morwell Fm	32.76	Active	5/03/2025	
5247 2	46707 0	576982 2	s01	56.4	466. 1	479		Traralgon Fm	46.76	Active	5/03/2025	Reclassifies TR intraseam 2013 anomalous
5247 7	46055 4.2	576319 1	s01	87.1	171	177		Traralgon Fm	13.09	Active	11/08/2025	Stabilised since 2012

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5267 6	46435 3.9	577351 0	s01	44.9	672. 5	692		Traralgon Fm	24.32	Active	5/03/2025	
5267 8	46979 3.5	577269 3	s01	61.6	694	694		Basement	5.93	Active	5/03/2025	
5280 9	47124 9.1	577074 8	v02	70.4			- 359.6	Morwell Fm	-98.02	Not Active	8/12/2022	Headworks damage required rehab
5280 9	47124 9.1	577074 8	v03	70.4			- 334.9	Morwell Fm	-7.2	Not Active	8/12/2022	Headworks damage required rehab
5280 9	47124 9.1	577074 8	v04	70.4			- 322.2	Morwell Fm	-20.42	Not Active	8/12/2022	Headworks damage required rehab
5280 9	47124 9.1	577074 8	v05	70.4			- 279.7	Morwell Fm	-0.9	Not Active	8/12/2022	Headworks damage required rehab
5280 9	47124 9.1	577074 8	v06	70.4			- 249.5	Morwell Fm	12.47	Not Active	8/12/2022	Headworks damage required rehab
5280 9	47124 9.1	577074 8	v07	70.4			- 219.3	Morwell Fm	17.64	Not Active	8/12/2022	Headworks damage required rehab
5280 9	47124 9.1	577074 8	v08	70.4			- 185.3	Morwell Fm	17.64	Not Active	8/12/2022	Headworks damage required rehab
5280 9	47124 9.1	577074 8	v09	70.4			- 174.6	Morwell Fm	23.12	Not Active	8/12/2022	Headworks damage required rehab
5280 9	47124 9.1	577074 8	v10	70.4			- 160.4	Morwell Fm	20.26	Not Active	8/12/2022	Headworks damage required rehab
5280 9	47124 9.1	577074 8	v12	70.4			- 109.7	Yallourn Fm	33.67	Not Active	8/12/2022	Headworks damage required rehab
5280 9	47124 9.1	577074 8	v13	70.4			-79.5	Yallourn Fm	34.37	Not Active	8/12/2022	Headworks damage required rehab

## AGL Loy Yang Licence Renewal – Licence condition compliance

52809	471249.1	5770748	v14	70.4			-54.8	Yallourn Fm	37.8	Not Active	8/12/2022	Headworks damage required rehab
52810	471265.2	5770745	v04	70.4			-524.9	Traralgon Fm	-107.51	Not Active	9/08/2017	Headworks failed to be sealed
52810	471265.2	5770745	v07	70.4			-473.3	Traralgon Fm	-93.35	Not Active	11/08/2016	Headworks failed to be sealed
52810	471265.2	5770745	v09	70.4			-409.8	Morwell Fm	-36.28	Not Active	9/08/2017	Headworks failed, seal remove from network
52810	471265.2	5770745	v10	70.4			-387.8	Morwell Fm	-37.59	Not Active	9/08/2017	Headworks failed, seal remove from network
52883	471182.1	5770759	v01	70.6			0.8	Haunted Hills Fm	46.37	Active	5/03/2025	
52883	471182.1	5770759	v02	70.6			34.6	Haunted Hills Fm	49.23	Active	5/03/2025	
530024	471521	5792813	s01	60.2	234	240		Morwell Fm	11.2	Active	5/03/2025	
530025	467896.9	5787491	s01	68	407.2	413		Traralgon Fm	-36.3	Active	5/03/2025	Re-classified to TFAS 2013
53118	462511.7	5770590	v09	85.8			-321.3	Morwell Fm	-33.9	Active	5/03/2025	
53118	462511.7	5770590	v13	85.8			-250.9	Morwell Fm	48.95	Active	5/03/2025	Reading stable since 2018
53118	462511.7	5770590	v16	85.8			-203.2	Morwell Fm	-13.49	Active	5/03/2025	
53118	462511.7	5770590	v17	85.8			-177.3	Morwell Fm	30.43	Active	5/03/2025	

AGL Loy Yang Licence Renewal – Licence condition compliance

5311 8	46251 1.7	577059 0	v20	85.8			-93.2	Morwell Fm	-4.25	Active	5/03/2025	
5311 9	46252 3.1	577058 8	v02	85.8			-35.8	Yallourn Fm	40.67	Active	5/03/2025	
5311 9	46252 3.1	577058 8	v03	85.8			-32.6	Yallourn Fm	41.49	Active	5/03/2025	
5311 9	46252 3.1	577058 8	v04	85.8			-24.9	Yallourn Fm	44.91	Active	5/03/2025	
5311 9	46252 3.1	577058 8	v05	85.8			-4.1	Yallourn Fm	46.2	Active	5/03/2025	
5329 8	45979 5.1	576194 7	v01	83.8			-141	Basement	42.26	Active	11/08/2025	
5329 8	45979 5.1	576194 7	v02	83.8			-100.6	Basement	47.38	Active	11/08/2025	
5329 8	45979 5.1	576194 7	v03	83.8			-86.3	Traralgon Fm	48.43	Active	11/08/2025	
5329 8	45979 5.1	576194 7	v04	83.8			-54.4	Traralgon Fm	48.53	Active	11/08/2025	
5329 9	45979 6.7	576195 1	v01	83.8			-26.2	Traralgon Fm	69.92	Active	11/08/2025	
5329 9	45979 6.7	576195 1	v02	83.8			4.1	Traralgon Fm	72.25	Active	11/08/2025	
5329 9	45979 6.7	576195 1	v03	83.8			31.5	Traralgon Fm	75.07	Active	11/08/2025	
5329 9	45979 6.7	576195 1	v04	83.8			56.3	Haunted Hills Fm	76.31	Active	11/08/2025	

## AGL Loy Yang Licence Renewal – Licence condition compliance

61095	44370 1.4	576348 6	s01	59.79	99.6	100.8		Traralgon Fm	1.75	Active	21/01/2025	Monitored by Engie
61320	44664 4.6	576184 2	s01	83.9	427.9	434		Traralgon Fm	67.19	Active	5/03/2025	Anomalous trend
61333	45049 9.9	576446 8	s01	81	587.3	593.6		Traralgon Fm	26.48	Active	5/03/2025	
61348	45006 5.1	576245 6	s01	105.4	550.4	557.4		Traralgon Fm	41.15	Not Active	25/09/2019	Trend anomalous required rehab
61502	44390 6.9	576001 7	v01	73.6			-265.4	Morwell Fm	-32.86	Active	5/02/2025	
61502	44390 6.9	576001 7	v02	73.6			-266.1	Morwell Fm	-33.4	Active	5/02/2025	
61631	45049 1.8	576449 2	v02	80.7			-201	Morwell Fm	30.64	Active	5/02/2025	
61631	45049 1.8	576449 2	v04	80.7			-181.5	Morwell Fm	28.62	Active	5/02/2025	
61632	45049 0	576447 7	s01	81	635.5	647.5		Traralgon Fm	46.32	Active	5/02/2025	
61691	44725 4.1	575881 1	v02	96.8			-289.6	Traralgon Fm	-67.12	Active	5/02/2025	
61691	44725 4.1	575881 1	v03	96.8			-264.9	Traralgon Fm	-63.01	Active	5/02/2025	
61719	45002 4.6	576005 5	s01	105.7	306	309		Traralgon Fm	70.43	Active	5/02/2025	
61726	44889 6.5	575738 3	s01	155.5	321	347		Traralgon Fm	17.2	Not Active	5/08/2012	requires rehab

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8044 5	45811 8.8	576997 9	v03	84.4			- 440.6	Traralgon Fm	-51.56	Active	7/02/2024	Requires survey
8044 5	45811 8.8	576997 9	v09	84.4			- 266.4	Morwell Fm	-24.57	Active	7/02/2024	Requires survey
8044 5	45811 8.8	576997 9	v10	84.4			- 239.2	Morwell Fm	-20.47	Active	7/02/2024	Requires survey
8048 9	45809 0.1	576671 5	v02	124			- 465.5	Traralgon Fm	-75.89	Active	24/07/2024	Requires survey
8048 9	45809 0.1	576671 5	v05	124			-408	Traralgon Fm	-86.37	Active	24/07/2024	Requires survey
8048 9	45809 0.1	576671 5	v06	124			- 393.7	Traralgon Fm	-76.12	Active	24/07/2024	Requires survey
8049 5	45856 6.9	576211 0	s01	113.4	236	239		Traralgon Fm	62.34	Active	11/08/2025	
8049 6	45856 7.3	576211 2	v01	113.3			-19.5	Traralgon Fm	69.8	Active	11/08/2025	
8049 6	45856 7.3	576211 2	v02	113.3			3.3	Traralgon Fm	68.94	Active	11/08/2025	
8049 6	45856 7.3	576211 2	v03	113.3			30.7	Traralgon Fm	70.92	Active	24/07/2024	
8049 6	45856 7.3	576211 2	v04	113.3			61.2	Haunted Hills Fm	66.24	Active	11/08/2025	
8049 6	45856 7.3	576211 2	v05	113.3			86.8	Haunted Hills Fm	84.74	Active	11/08/2025	Dry (RWL< VWP RL)
9032 3	48555 4.2	577295 7	s01	113.2	211	214		Traralgon Fm	36.24	Active	5/03/2025	

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9032 4	47619 4.2	577572 2	s01	31.4	377	384		Morwell Fm	15.96	Active	5/03/2025	
9032 5	48579 3.3	577693 0	s01	13.5	344. 5	351		Morwell Fm	8.6	Active	5/03/2025	
9033 0	47207 6.8	576812 5	s01	74.3	478	481		Morwell Fm	5.63	Active	5/03/2025	
9034 0	47622 3.3	577571 0	v04	31.3			- 444.4	Morwell Fm	-37.21	Active	5/03/2025	
9034 0	47622 3.3	577571 0	v05	31.3			- 419.7	Morwell Fm	-27.4	Active	5/03/2025	
9034 0	47622 3.3	577571 0	v12	31.3			-269	Morwell Fm	-15.35	Active	5/03/2025	
9034 0	47622 3.3	577571 0	v14	31.3			- 214.1	Morwell Fm	-3.88	Active	7/02/2024	unstable reading
9034 0	47622 3.3	577571 0	v16	31.3			- 153.1	Morwell Fm	-6.96	Active	5/03/2025	
9034 0	47622 3.3	577571 0	v17	31.3			- 112.8	Yallourn Fm	-26.12	Active	5/03/2025	
9034 0	47622 3.3	577571 0	v18	31.3			-98.6	Yallourn Fm	-21.94	Active	5/03/2025	
9200 07	50883 8.5	576425 4	s01	50.1	725	737		Traralgon Fm	5.6	Not Active	5/01/2011	Vandalised - required rehab



## Appendix B. Additional groundwater monitoring bores (not prescribed on licence)

Bore ID	MGA E	MGA N	Install No	RL collar	Screen	Screen to	VWP RL	Monitoring Unit	RWL (mAHD)	RWL date	Comments
130213	469298.9	5766777	s01	82.42	16	18		Morwell Fm	77.52	19/10/2021	Decommissioned March 2022
130214	469183.9	5766777	v01	94.99			-20.11	Morwell Fm	59.62	8/03/2022	Flynn Bore Road Reserve
130215	469436.6	5766571	s01	88.35	6	13		Haunted Hills Fm			Flynn Bore private property
130217	469106.7	5766623	v01	83.41			-315.59	Traralgon Fm			Flynn Bore private property
130217	469106.7	5766623	v02	83.41			-176.59	Morwell Fm			Flynn Bore private property
130218	468246.2	5765484	v01	92.11			-25.89	Morwell Fm			Flynn Bore private property
130219	469971.3	5765798	s01	111.76	21	27		Haunted Hills Fm	96.46	8/03/2022	Decommissioned April 2022
130220	469599.7	5765283	s01	110.42	19	21		Haunted Hills Fm	97.12	8/03/2022	Decommissioned April 2022
130220	469599.7	5765283	v01	110.42			-120.58	Morwell Fm			Failed VWP
130220	469599.7	5765283	v02	110.42			-14.58	Morwell Fm	85.69	8/03/2022	Flynn Bore Road Reserve
130220	469599.7	5765283	v03	110.42		DRAFT	45.42	Yallourn Fm	95.64	8/03/2022	Flynn Bore Road Reserve
190054	510717.2	5774505	s01	49.6	205	211.5		Traralgon Fm	16.07	5/03/2025	Anomalous trend, assess bore
190066	518206.8	5775571	s01	5.2	634	801		Gippsland Lst	5.17	5/03/2025	Private land intermittent access issues
23271	442220.9	5765473	s01	61	112.5	113.1		Morwell Fm	42.57	29/01/2020	Blocked inside mining lease & not a licensed bore.
240051	474520	5779237	s01	18.8	655.6	675.2		Traralgon Fm			Never monitored by RMC
25952	441054.3	5766504	v01	91.15			-41.85	Morwell Fm	29.36	5/02/2025	Exergen bore Roadside reserve
25952	441054.3	5766504	v02	91.15			-16.45	Morwell Fm	41.9	5/02/2025	Exergen bore Roadside reserve

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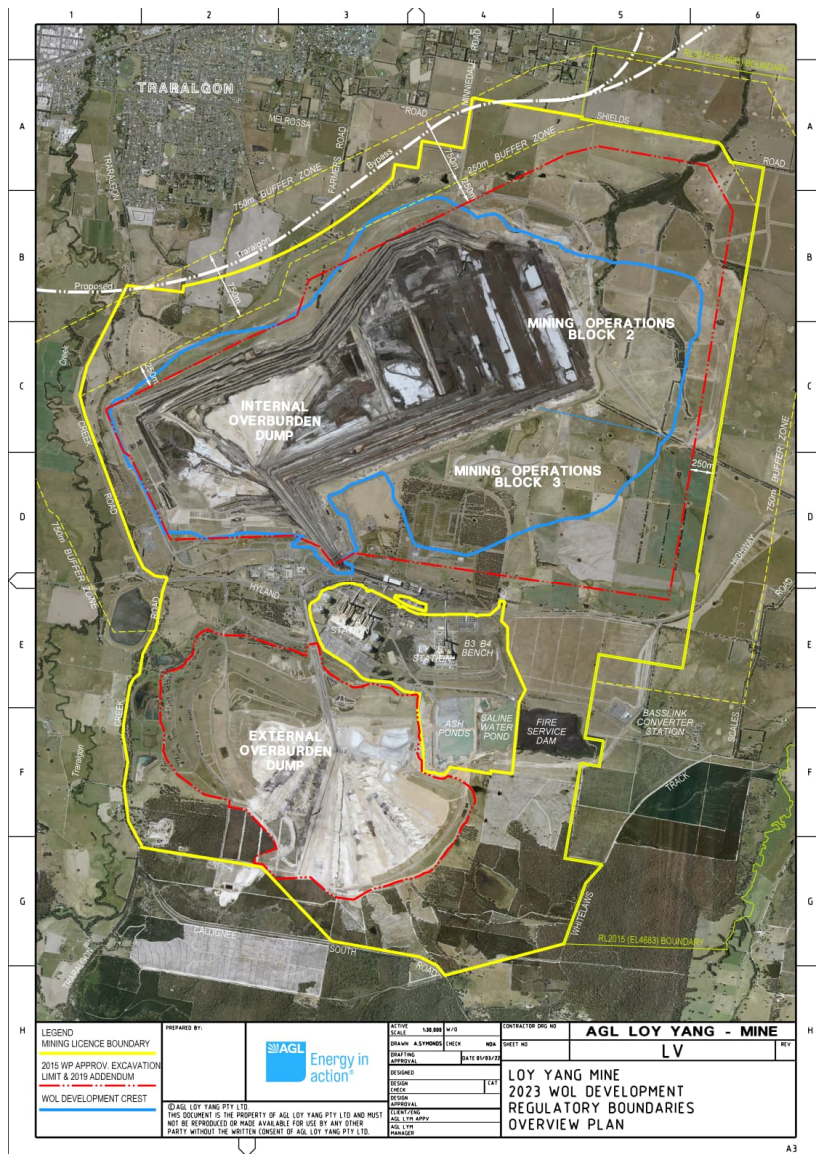
26091	447736	5772598	s01	100.27	46	49		Haunted Hills Fm	54.67	3/04/2025	Monitored by Yallourn (13282 replacement)
31694	448305.2	5775545	s01	36.2	217.1	220.1		Morwell Fm	7.06	29/03/2022	Bore assessed 2018, blocked 2022
52268	464326.4	5773271	s01	46.9	428.9	431.9		Morwell Fm	28.01	5/03/2025	
52269	471767.9	5775143	s01	39.1	367.3	376.8		Morwell Fm	31.05	5/03/2025	
54348	463942.8	5761977	v01	218.49			49	Traralgon Fm	62.83	11/08/2025	
570011	499185.7	5789590	s01	12.4	642	648		Morwell Fm	-2.44	5/03/2025	
62894	395650.2	258930.3	v02	58.43			-56.06	Morwell Fm	-26.45	28/02/2025	Monitored by Engie (23271 replacement)
80256	456778.7	5763769	s01	161.1	382	383		Traralgon Fm	66.3	23/07/2001	Sealed 2002 blocked 113m unable to clear
80426	453595.2	5763924	s01	102.6	154	157		Morwell Fm	99.91	11/08/2025	
80433	459785.8	5773044	s01	34.5	340	343		Morwell Fm	33.18	5/03/2025	
80440	455303.3	5765748	s01	97.5	164.5	170.5		Morwell Fm	79.09	7/02/2024	Requires survey
80442	458533.5	5760754	s01	129.2	142.5	149		Traralgon Fm	112.11	11/08/2025	Monitored by Loy Yang (six monthly run)
80454	455281.7	5765750	s01	96.7	551	557.5		Traralgon Fm	74.5	15/12/2005	Sealed 2005 blocked 156m unable to clear
80466	458165.1	5770369	s01	78.4	696	702		Traralgon Fm	-14.5	19/06/1998	Never monitored by RMC
80485	457613.5	5773973	s01	46.8	614	617		Traralgon Fm	-35.2	15/06/2004	Sealed 2004 - house built on land
80487	452231.7	5761418	s01	129	280	286		Morwell Fm	98.16	11/08/2025	
80493	454046.4	5769293	v01	59			-167.8	Yallourn Fm	31.92	7/02/2024	Requires survey
80493	454046.4	5769293	v02	59			-53	Hazelwood Fm	36.04	7/02/2024	Requires survey
80493	454046.4	5769293	v03	59			-21.1	Hazelwood Fm	40.37	7/02/2024	Requires survey

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80493	454046.4	5769293	v04	59			12.8	Haunted Hills Fm	50.95	7/02/2024	Requires survey
80494	454046.4	5769293	v04	59			-576.4	Traralgon Fm	-57.7	19/12/1995	Instrument failed
80494	454046.4	5769293	v05	59			-564.6	Traralgon Fm	-68.5	7/04/1995	Instrument failed
80494	454046.4	5769293	v06	59			-536.6	Traralgon Fm	-68.9	19/12/1995	Instrument failed
80494	454046.4	5769293	v07	59			-500.3	Morwell Fm	-53.6	7/04/1995	Instrument failed
80494	454046.4	5769293	v08	59			-460	Morwell Fm	-72	2/10/2000	Instrument failed
80494	454046.4	5769293	v09	59			-405	Morwell Fm	-59.69	5/12/2007	Cables checked not reading remove
80494	454046.4	5769293	v11	59			-276	Morwell Fm	19.84	23/07/2001	Instrument failed
90344	476518.6	5769420	v01	61			-371.4	Traralgon Fm	28.93	5/03/2025	
90344	476518.6	5769420	v02	61			-369.4	Traralgon Fm	29.92	5/03/2025	
90344	476518.6	5769420	v03	61			-222.7	Morwell Fm	-0.83	5/03/2025	
90344	476518.6	5769420	v04	61			-113.3	Morwell Fm	6.12	5/03/2025	
90345	469501.6	5766920	s01	83.57	6	11		Haunted Hills Fm			Flynn Bores private property
90345	469501.6	5766920	v01	83.57			-64.83	Morwell Fm			Flynn Bores private property

## **Appendix C. Licenced area and general site layout**

# AGL Loy Yang Licence Renewal – Licence condition compliance



## AGL Loy Yang Groundwater licence renewal application – Considerations under Water Act 1989

Document no: IA314900-GWL-02  
Revision: FINAL

AGL  
AGL Loy Yang

Loy Yang Groundwater licence renewal application  
26 May 2026



## AGL Loy Yang Groundwater licence renewal application – Considerations under Water Act 1989

**Client name:** AGL  
**Project name:** Loy Yang Groundwater licence renewal application  
**Client reference:** AGL Loy Yang **Project no:** IA314900  
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#### Jacobs Group (Australia) Pty Ltd

Floor 13, 452 Flinders Street  
Melbourne, VIC 3000  
PO Box 312, Flinders Lane  
Melbourne, VIC 8009  
Australia

T +61 3 8668 3000  
F +61 3 8668 3001  
[www.jacobs.com](http://www.jacobs.com)

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## 1. Introduction

This document addresses the considerations under section 40 and section 53 of the Water Act 1989 (Vic) (Water Act), which the Minister for Water must have regard to when considering this groundwater licence renewal application.

The response to the considerations in this report have been largely informed by numerical modelling of groundwater and land surface changes up to 2040, under a licence renewal scenario. The numerical modelling takes into account cumulative changes resulting from dewatering from the three mines in the area (Loy Yang, Hazelwood, Yallourn), and also climate change.

The document also considers the alignment of the renewal application with the purposes of the Water Act 1989, which are set out in section 1 of the Act.

In particular the following purposes have been addressed (Table 1-1) with reference to relevant section of the report.

**Table 1-1 Water Act Purposes**

Water Act Purpose		Section addressed
1 c	to promote the orderly, equitable and efficient use of water resources	4.4, 4.8, 4.13
1 d	to make sure that water resources are conserved and properly managed for sustainable use for the benefit of present and future Victorians	4.3, 4.4, 0, 4.6, 4.7, 4.8
1 h	to foster the provision of responsible and efficient water services suited to various needs and various consumers	4.6
1 k	to provide for the protection of catchment conditions	4.11, 4.13

## 2. Overview

The following sections provide a summary of the renewal licence, surface water and groundwater resources that are relevant to this licence application.

### 2.1 Regional Hydrogeology

The Latrobe Valley Depression (LVD), located at the western end of the Gippsland Basin, contains three major lignite-bearing formations: the Traralgon, Morwell and Yallourn Formations. These belong to the Latrobe Valley Group, which grades eastward into the marine Seaspray Group. The Balook Formation forms a transitional sand body separating largely non-marine coal sequences in the west from marine carbonates in the east. Beneath these units lie the Lower Cretaceous Strzelecki Group and Palaeozoic basement. Local volcanic units (Thorpdale and Carrajung Volcanics) are interbedded within the Morwell and Traralgon Formations. Interseam sediments, composed of sand, silt, and clay, form both local and regionally extensive aquifers depending on their continuity and hydraulic properties. Overall, the valley hosts three major groundwater systems separated by lower-permeability coal and clay aquitards (Figure 2-1).

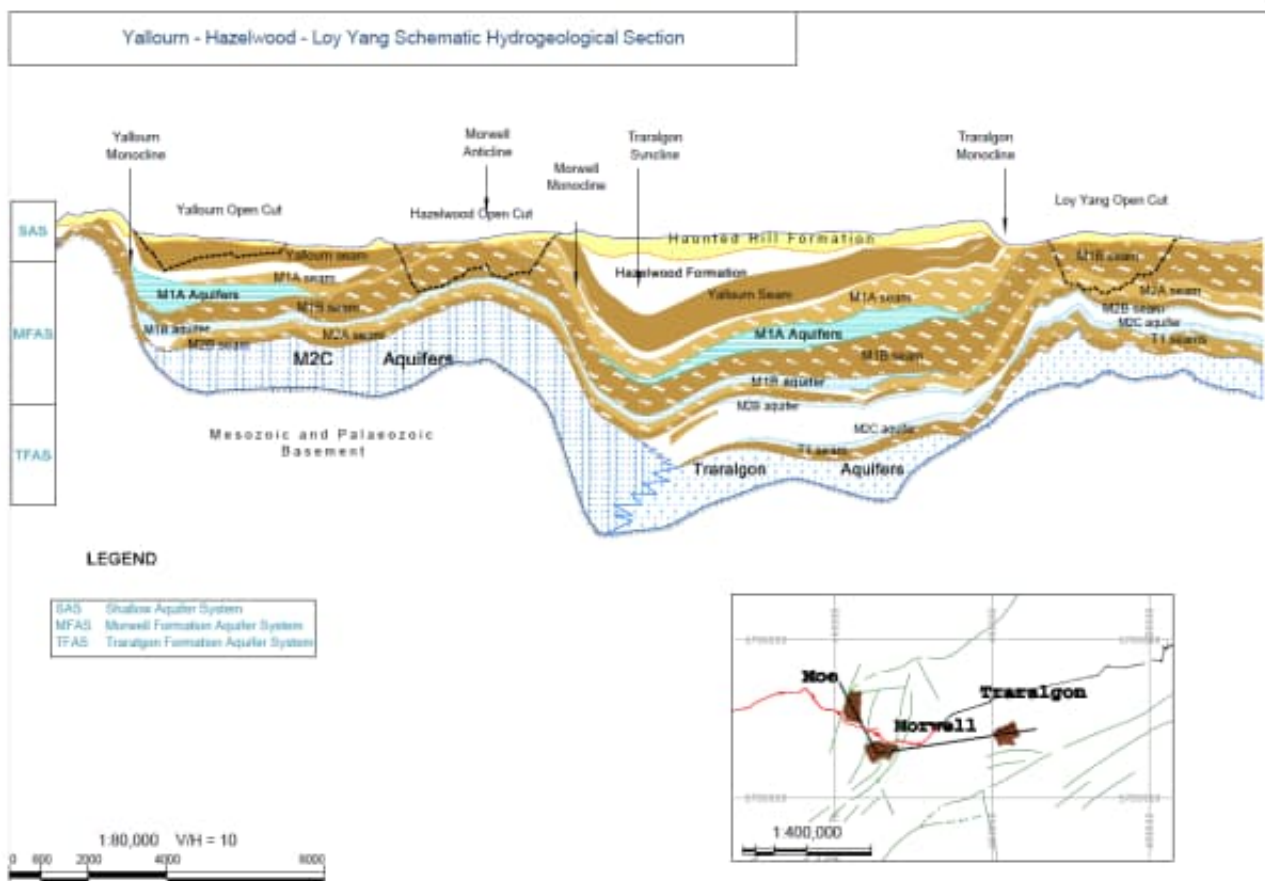


Figure 2-1 Yallourn – Hazelwood – Loy Yang Hydrogeological Cross Section

Figure 2-1 Hydrogeological section (GHD 2022)

#### 2.1.1 Shallow Aquifer System (SAS)

The SAS includes the Haunted Hills gravels, alluvial sediments, and upper interseam sands. It is generally unconfined, hosts the water table, and provides low-yield supplies for domestic and agricultural use. Dewatering of the SAS is only periodically required at Yallourn mine. At Loy Yang the SAS is mostly dry except for some areas in the vicinity of the external overburden dump. It is not actively dewatered. It functions

as a local-scale aquifer and is considered the only aquifer to be hydraulically connected to surface water bodies, which occurs in low elevation parts of the wider catchment and near larger streams (GHD 2022).

### **2.1.2 Morwell Formation Aquifer System (MFAS)**

This intermediate-scale, mostly confined system comprises several interbedded sand and clay aquifers (M1, M1A, M1B, M2A, M2B, M2C). It occurs between ~100–500 m depth and extends east to the Balook Formation. Groundwater is extracted for mining and more regionally for irrigation, stock, and domestic use. It falls within the Rosedale and Stratford Groundwater Management Areas (Zone 1).

### **2.1.3 Traralgon Formation Aquifer System (TFAS)**

This regional-scale confined aquifer system spans the entire Gippsland Basin onshore and offshore. Onshore it consists of interbedded sands, clays, coals, and basalts; offshore it forms part of the deeper Latrobe Group. Depths range from ~150 m to >1500 m. This aquifer is utilised for mine dewatering locally at Loy Yang and Hazelwood, with more regional uses for agricultural supply in southern Gippsland, and oil and gas extraction offshore. This aquifer falls under the Stratford Groundwater Management Area (Zone 1).

## **2.2 Surface Waters**

Hydraulic interaction between surface waters and groundwater at the Loy Yang site is expected to be limited to the SAS. The Gippsland bioregional assessment notes that there are significant contrasts in trends between hydrographs of the shallow aquifers and the deeper confined aquifers (Yates et al 2015). The contrasting hydrographs and intervening low-permeability strata indicate that the deeper aquifers are hydraulically isolated from the shallow aquifers and local waterways. The nearest surface water bodies fall under the Central Foothills & Coastal Plains of the Latrobe River System and include the following:

- Traralgon Creek – ~1 km west
- Flynn's Creek – ~3.2 km east
- Sheepwash Creek – Portions are included within the Mine Licence Area

These streams are tributaries of the Latrobe River, which discharges to the Lower Latrobe Wetlands (Sale Common, Heart Morass and Dowds Morass) and Gippsland Lakes.

### 3. Groundwater Licence Renewal

The licence allocation at Loy Yang is used to authorise groundwater take and use to provide safe and stable mine conditions. The existing groundwater licence permits a total extraction volume of 19,303 ML (per annum), with 13,578 ML allocation from the Traralgon formation aquifer, 4,600 from the M2C aquifer, 1,325 ML from the MB2 aquifer, and 1,295 ML from the MB1 aquifer. The aquifers labelled MB1 and MB2 in the licence are known by AGL Loy Yang and the Regional Monitoring Committee (RMC) as M1B and M2B. The remainder of this document uses the latter naming convention, and AGL Loy Yang requests that the renewed licence reflects this naming convention.

The primary purpose of the groundwater extraction is to provide safe and stable mine conditions. All of the extracted groundwater is re-used as plant process water for the Loy Yang A and Loy Yang B power plants, and as fire-fighting water supply. Further information on this water use is provided in section 4.14.

#### 3.1 Renewal licence volume

Since the first licence was issued 30 years ago the mine has become more developed and the dewatering requirements of the mine have evolved. Therefore, for this licence renewal application, updated modelling and analysis have been used to assess the ongoing groundwater extraction requirements to maintain safe and stable mine conditions over the 15 year licence period.

Based on this analysis AGL Loy Yang requires a small increase (14.2%) in the allocation volume for the purpose of ensuring safe and stable ground conditions in the Mine in line with the current mine staging plan, with a total extraction volume of 22,051 ML. This will consist of 10,095 ML extracted from the Traralgon formation aquifer, 2967 from the M2C aquifer, and 8988 ML from the M1B aquifer. The reasoning for the renewal licence volume is the discussed in the following section.

Over the future 15 year licence renewal period the Loy Yang mine pit will expand in an easterly direction (and south easterly). This easterly expansion has implications on groundwater dewatering requirements.

The M1B aquifer increases in thickness to the east of the mining pit (Figure 3-1). The easterly expansion of the pit will expose a greater extent of the M1B aquifer on the pit floor and pit wall. The pit floor will also be exposed to areas where the M1B is up to 16m thick below the floor ( Figure 3-2). The 16m thickness is an increase from the 1-2m thickness previously exposed. The M1B aquifer is predicted to be unconfined where

it is exposed in the mine floor, while to the east and northeast of this exposure, the aquifer will be semi confined to confined below the M1B coal (GHD 2025)

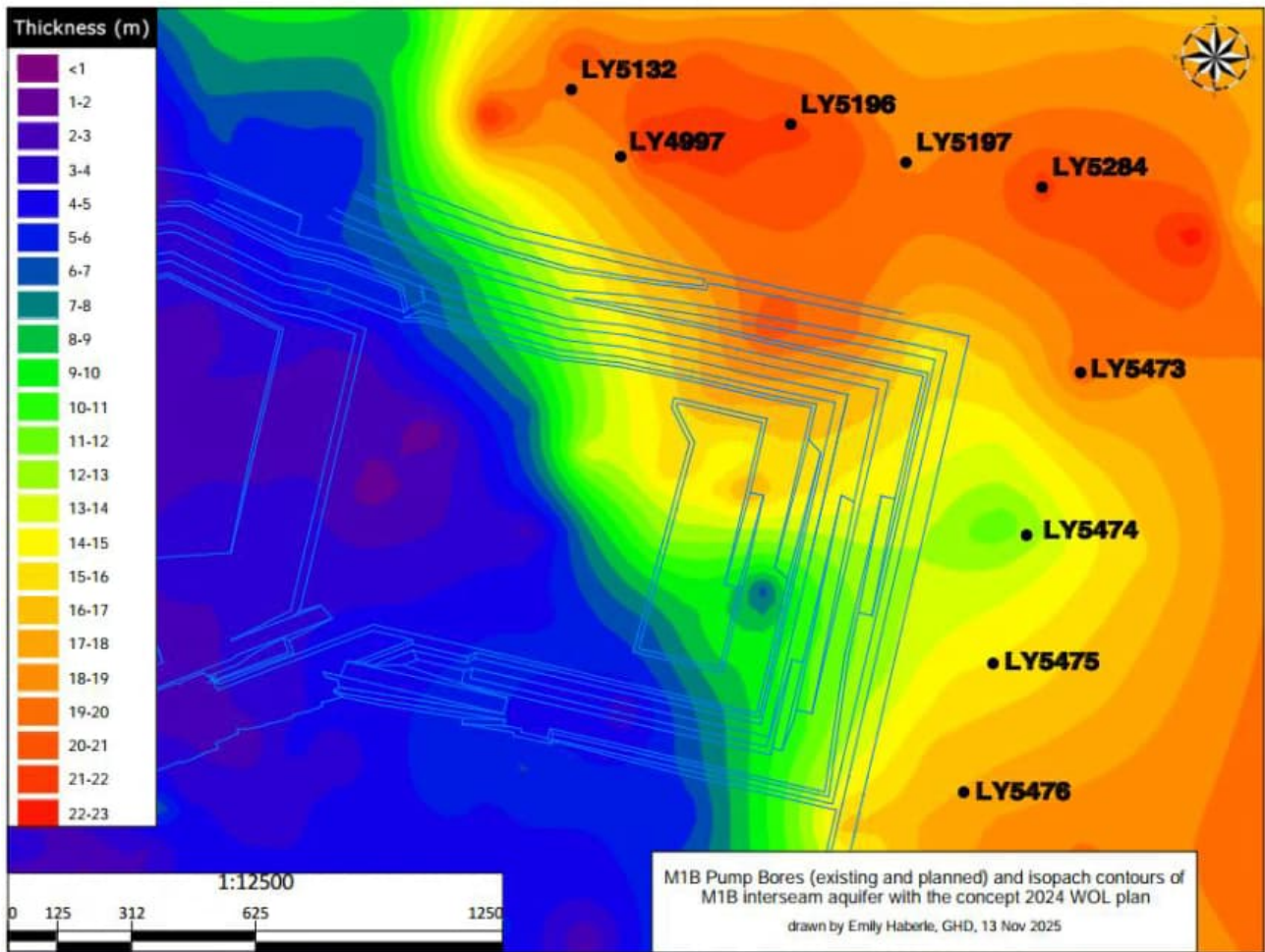


Figure 3-1. M1B aquifer isopachs (contours of thickness) with mine pit outline and are current and planned pump bores.

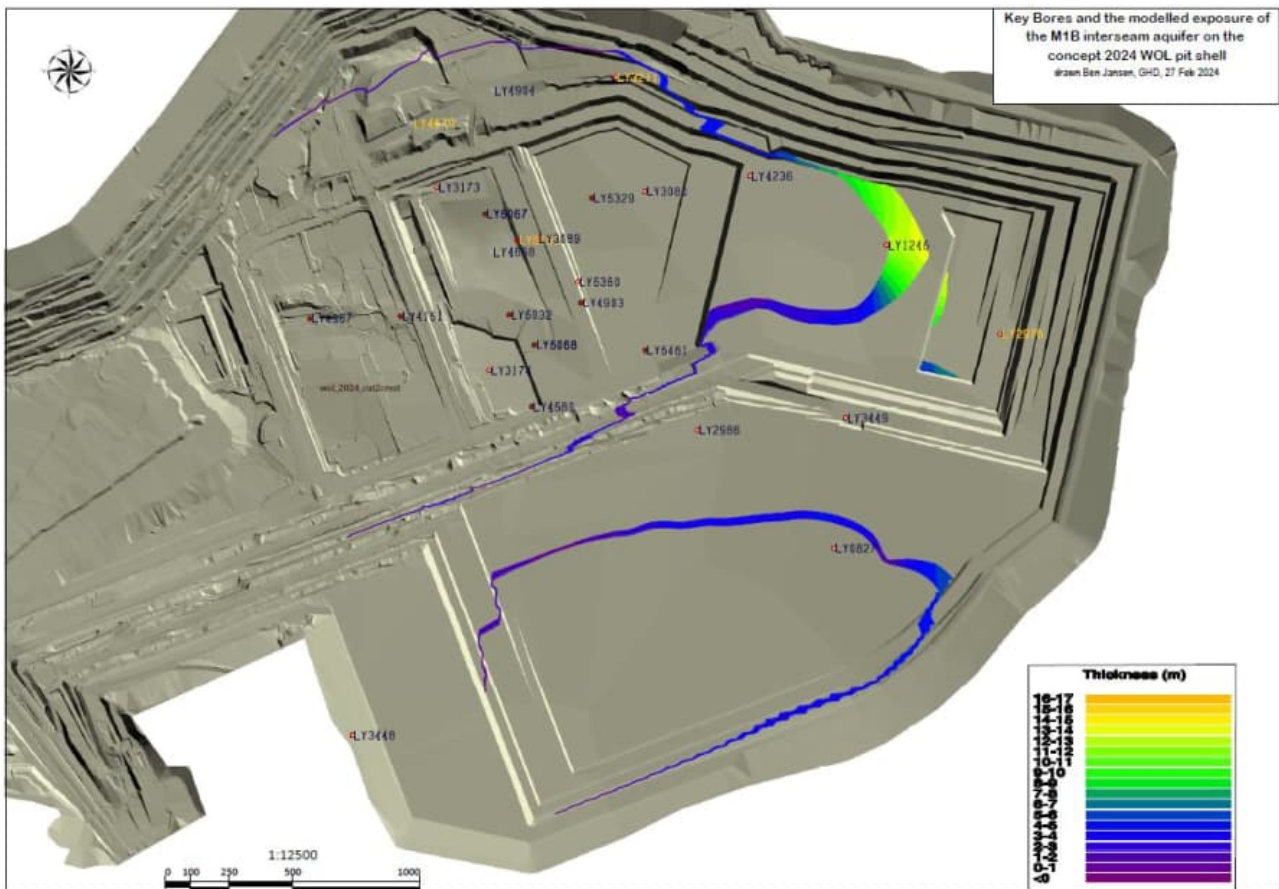


Figure 3-2. M1B aquifer exposure based on work plan, and aquifer thickness isopachs

The eastward expansion of the mine pit produces the following hydrogeological risks which need to be managed:

1. Uncontrolled seepage where the aquifer is exposed in the mine floor and batters and has a high permeability. Groundwater modelling has predicted seepage flows in excess of 100 L/sec. High seepage volumes and flow velocity associated with high hydraulic gradients as mining exposes the aquifer have the potential to cause washing out of the sands resulting in undercutting and batter instability.
2. Floor heave due to high aquifer pressures where the aquifer is present below the mine floor. The expansion of the pit will increase the size of the pit floor and therefore the risk of floor heave due to the pressure within underlying confined aquifers.

A risk assessment of these two risks has been undertaken using the following methods:

- Critical hydraulic gradient - Critical hydraulic gradient is defined as the hydraulic gradient at which particles outflows from the soil samples (Xie et al., 2018). The critical hydraulic gradient is a key factor influencing erosion mechanisms of backward erosion piping and suffusion erosion, which can cause batter instability.
- Weight balance / hydrostatic pressure assessment - The aquifer pressures that are equal to the weight of the overlying material is referred to as the weight balance or equilibrium level. If the hydrostatic pressure at the upper surface of a confined aquifer exceeds the weight of the remaining

overlying coal and sediments, then the weight balance is exceeded and uncontrolled floor heave can occur.

The risk assessment has informed a Trigger Action Response Plan (TARP) for managing risks associated with the M1B aquifer pressures as mining progresses eastwards. The TARP includes M1B trigger groundwater levels for safe mine operation based on the weight balance and critical hydraulic gradient assessments (Table 3-1).

**Table 3-1. M1B aquifer TARP trigger levels**

Bore	Install	Aquifer	Seam ID	Weight Balance mAHD	TL1 m AHD
LY4446	v01	M1B	602	0.03	-12.18
LY4523	v01	M1B	602	-59.97	-61.53
LY5002	s01	M1B	602	39.48	23.95
LY5004	s01	M1B	602	32.13	12.29
LY5465	v05	M1B	602	-55.87	-59.06
LY5489	v07	M1B	602	-51.44	-54.93
LY5490	v07	M1B	602	-21.89	-26.93
LY5491	v06	M1B	602	1.61	-5.99
LY5534	v05	M1B	602	60.04	36.61

In Table 3-1 the weight balance column is the equilibrium pressure which includes a factor of safety of 1.1. In the table the TL1 level column is the calculated level at which M1B seepage has potential to impact slope stability

The Loy Yang groundwater numerical model has been used to determine what scope of dewatering is required for the mine to stay within these trigger levels. The model was updated with new information collected from field investigations into the M1B aquifer, including a 7-day pumping test. The aquifer properties from the 2019 pumping test were used to recalibrate the M1B aquifer properties in the Loy Yang groundwater model and assess the M1B aquifer pumping requirements.

Table 3-2 shows the predicted extraction volumes from modelling. The predicted extraction volumes vary between aquifers over the 15 year licence term and the table below shows the high and low yearly ranges and overall average yearly amount. This average has been used as the basis of the application volume. The extraction volume from the M1B will start at 6310 ML/yr and then increase to a peak of 9300ML/yr in 2031. Extraction from the M2C aquifer will peak in the first year of the licence at 3565ML/yr, and then decline to a low point of 2745ML/yr in 2032. The Traralgon aquifer will remain consistent at 10095ML/yr over the 15 years.

**Table 3-2. Predicted extraction volumes from aquifers**

Aquifer	Low (ML)	year	High (ML)	year	Average over 15 years (ML)
M1B	6310	FY 2027	9300	FY 2031	8988
M2C	2745	FY 2032	3565	FY 2027	2967

Traralgon	10095	All years	10095	All years	10095
Aggregate total					22051

The original Loy Yang Groundwater extraction licence was issued on 9th May 1997 for a 30 year period from 1st Sept 1996. The 1997 licence did not consider future groundwater extractions from the M1B aquifer and an application to vary the licence was submitted to Southern Rural Water (SRW) in July 2015. After discussions with SRW the licence modification request was re-issued in August 2017 to include assigned groundwater management areas based on depth boundaries. The modified groundwater extraction licence was issued by SRW on 15th May 2019.

The Loy Yang groundwater numerical model indicated that the previous M1B Aquifer allocation in the 2019 Groundwater Extraction Licence update was not sufficient to maintain M1B groundwater levels within the trigger levels to avoid instability and floor heave over the next 15 years. The higher rates of pumping from the M1B relative to the 2019 allocation is due to the

- higher than previously recognised hydraulic conductivity in the M1B aquifer based on pumping test results,
- increased exposure of the M1B aquifer based on easterly expansion

The proposed increase in M1B aquifer groundwater pumping volumes are offset to some degree by a predicted reduction in the pumping requirements from the Traralgon (-25%) and M2C (-35%) aquifers. The reduction in pumping from M2C aquifer is due to the aquifer thinning to the east and becoming less transmissive. The Traralgon aquifer will have reduced pumping due to the development of an ‘internal dump’ which will lead to greater overburden weight and reduced floor heave risk and reduced depressurisation trigger levels in that aquifer.

In addition, the M2B aquifer is not predicted to require any allocation. This aquifer has not been extracted from since 2012.

## 4. Water Act Considerations

To guide the assessment of this groundwater licence renewal, Table 4-1 summarises the key decision-making considerations under sections 40(1) and 53 of the Water Act 1989 (Vic). These provisions set out the statutory matters the Minister must consider or give effect to when evaluating a renewal application to take and use groundwater, including environmental, resource availability, aquifer impact and policy considerations. The remainder of this report is structured to address each of these legislative requirements in turn, demonstrating how the proposed extraction activities comply with the Act and its associated decision-making framework.

**Table 4-1 Decision-making considerations for groundwater licence renewal – the Water Act 1989 (Vic)**

<b>Matters mentioned in paragraphs (b) to (m) of section 40(1) to which the Minister must have regard under section 53(1)(b)</b>	
40(1)(b)	the existing and projected availability of water in the area;
40(1)(ba)	the permissible consumptive volume, if any, for the area;
40(1)(c)	the existing and projected quality of water in the area;
40(1)(d)	any adverse effect that the allocation or use of water under the entitlement is likely to have on— (i) existing authorized uses of water; or (ii) a waterway or an aquifer; or (iii) the drainage regime within the meaning of section 12(1) (iv) the maintenance of the environmental water reserve in accordance with the environmental water reserve objective;
40(1)(e)	any water to which the applicant is already entitled;
40(1)(g)	the need to protect the environment, including the riverine and riparian environment;
40(1)(i)	the conservation policy of the government;
40(1)(j)	government policies concerning the preferred allocation or use of water resources;
40(1)(jaa)	any environment reference standard within the meaning of the <b>Environment Protection Act 2017</b> and any Order made by the Governor in Council under section 156 of the <b>Environment Protection Act 2017</b> ;
40(1)(ja)	whether the proposed source of water is within a heritage river area or natural catchment area within the meaning of the <b>Heritage Rivers Act 1992</b> and whether there is any restriction on the use of the area under that Act;
40(1)(k)	if appropriate, the proper management of the waterway and its surrounds or of the aquifer;
40(1)(l)	the purposes for which the water is to be used;
40(1)(m)	the needs of other potential applicants;
<b>Other matters to which the Minister must have regard under section 53(1)</b>	
53(1)(a)	the report of any panel appointed under section 50;
53(1)(ab)	any advice and comments received within the period of 30 days referred to in section 51C(1);
53(1)(e)	any other matter that the Minister thinks fit to have regard to
<b>Matters to which the Minister must give effect under section 53(2)</b>	
53(2)(a)	any relevant Order under section 52A

53(2)(b)	any relevant order made by the Governor in Council under section 49A of the <b>Groundwater Act 1969</b> specifying an annual reserve volume of groundwater;
53(2)(c)	any relevant prescription made under section 62(1) of the <b>Groundwater Act 1969</b> in respect of a groundwater conservation area declared under section 61 of that Act;
53(2)(e)	an approved management plan for any relevant water supply protection area.

#### 4.1 53(1)(a) - the report of any panel appointed under section 50

The Minister has not appointed a panel to consider submissions.

#### 4.2 53(1)(ab) - any advice and comments received within the period of 30 days referred to in section 51C(1)

The period of 30 days referred to in section 51C(1) does not apply renewal applications.

#### 4.3 40(1)(b) - the existing and projected availability of water in the area

### Overall assessment

The licence renewal allocation is not anticipated to impact surface water availability within the Latrobe catchment over the life of the licence. The groundwater extraction is occurring from aquifers not hydraulically connected to the surface water features. The Latrobe catchment surface water allocation is around 33% of the long term predicted inflows, and current surface water usage is only around 45% of allocation.

The licence renewal will be a continuation of long-term groundwater usage within the Rosedale and Stratford Groundwater Management Areas (GMAs). Both GMAs are fully allocated; however usage is around 49% in Rosedale GMA and 62% in Stratford GMA. The current groundwater licence holders within the PCV for each GMA will continue to have access to groundwater if this licence renewal application is approved.

### Analysis

#### 4.3.1 Surface water

The Victorian water accounts contain information on surface water availability within the La Trobe catchment up to the 2023/24 financial year. The long term water availability in the Latrobe River system based on the 1975–2024 data is 845,200ML per annum. In recent years (2022/23, and 2023/24) inflows to the catchment have been higher than the long-term average (Table 4-2). In 2023/24 the La Trobe catchment had 280,750 ML of available allocation, and of this 127,172 ML (45%) was taken by users (Table 4-3).

In the financial years 2022/23, and 2023/24, between 89-94% of the inflows to the La Trobe catchment flowed into Gippsland lakes without being diverted (Table 4-4). During 2022/23 and 2023/24 100% of high and low reliability water shares were issued in the Thompson/Macalister water system (Table 4-5).

Table 4-2 La Trobe catchment water availability

Catchment	Long-term average annual inflows (ML)	2022/2023		2023/2024	
		Inflows (ML)	% LTA	Inflows (ML)	% LTA
La Trobe	845,200	1,358,896	161%	972,945	115%

Table 4-3 Surface Water Use

Catchment	Available water					Water Taken (ML)	% taken of available
	Opening carryover (ML)	Allocation issued (ML)	Net trade in / (out)	Spillable write-off	Total water available (ML)		
La Trobe	18,739	262,011	0	-	280,750	127,172	45

Table 4-4 Surface Water leaving the catchment

Catchment	Outflow to	2022/2023			2023/2024		
		Total flow if no diversions (ML)	Volume leaving the basin (ML)	Proportion of total flow leaving the basin (%)	Total flow if no diversions (ML)	Volume leaving the basin (ML)	Proportion of total flow leaving the basin (%)
La Trobe	Gippsland Lakes	1,358,896	1,274,187	94%	972,945	869,696	89%

Table 4-5 Water share allocation

Water system	Water shares	2022/2023 (% entitlement allocated)	2023/2024 (% entitlement allocated)
Thompson/Macalister	High Reliability	100	100
	Low reliability	100	100

### 4.3.2 Groundwater

The Loy Yang mine interacts with two groundwater management areas (GMA). The Rosedale GMA directly overlies the deeper Stratford GMA. Both GMA have a sub-zones (zone 1 and a zone 2). The boundary between these GMA subzones passes through the Loy Yang mine pit (Figure 4-1).



Figure 4-1. GMA zone boundary. divide between GMA subzones is shown with pink line.

To the south west of the divide is zone 1 where the depth boundary between the two GMAs is 150m. To the north-east of the divide is zone 2 where the depth boundary between the two GMAs is 350m. The proposed pumping bores will be drawing water from the Rosedale and Stafford GMA in zone 1 and from only the Rosedale GMA in Zone 2 (Figure 4-2).

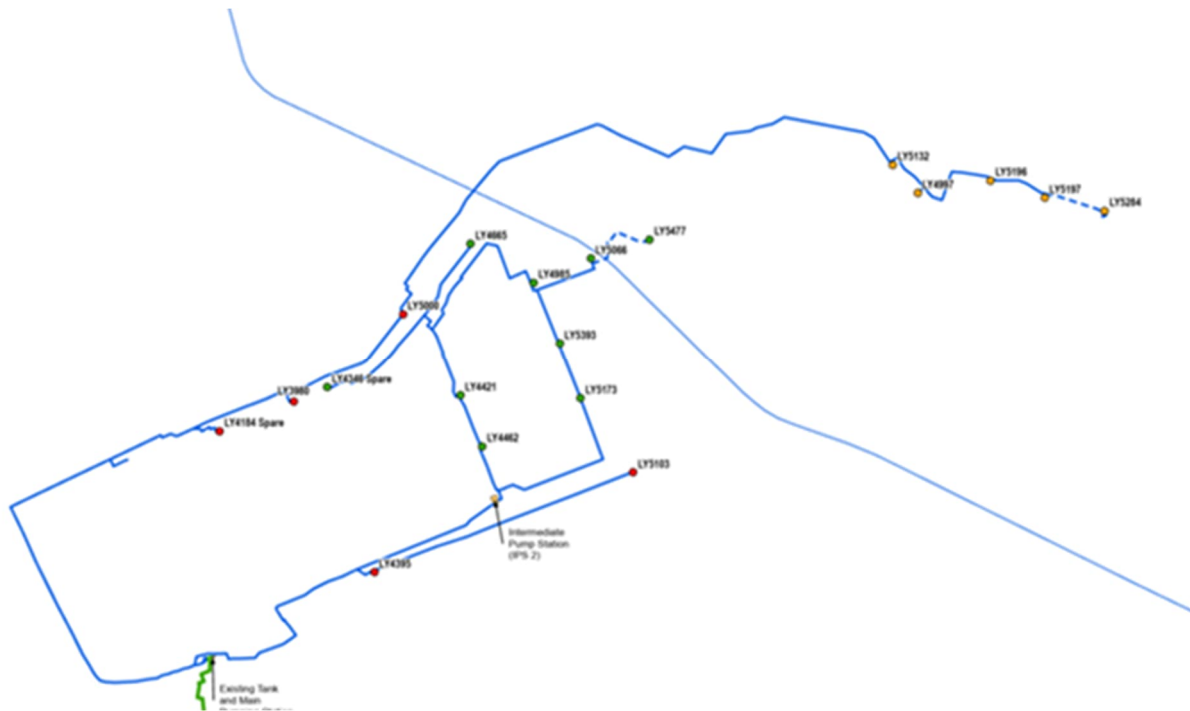


Figure 4-2. Location of extraction bores relative to the GMA zone divide

The permissible consumptive volume (PCV) for the Rosedale GMA is 22,373 ML, with current allocation of 23,365 ML. Latest usage is 10,979 ML in 2023/24, which is 49% of the PCV and 47% of the entitlement (Table 4-6).

The Stratford PCV is 27,686 ML, and the licensed entitlement is 31,863 ML. Latest Usage is 17,142 ML, which is 61% of the PCV and 54% of allocation (Table 4-6).

Stock and domestic use which is not included in the PCV or licensed entitlements, is estimated to be 228 ML within Rosedale GMA and 26 ML from the Stratford GMA (Table 4-6).

Within the Rosedale GMA 45% of the groundwater allocation is used for power generation and 55% for commercial/industrial use. Within the Stratford GMA 96% of groundwater allocation is for power generation and 4% for commercial industrial use (Table 4-7).

Table 4-6 Groundwater availability and usage

GMU	Entitlement volume (ML)		Water available and taken under licences (ML)					PCV comparison			Domestic and stock		TOTAL
	PCV	Licensed entitlement	Carryover	Water allocated	Net trade	Total water available	Water taken under licences	Water taken as % of PCV	Water taken as % of licensed entitlement	Licence volume available under PCV (ML)	No. of domestic and stock bores 2	Estimated use (ML)	Total use (licensed + domestic and stock) (ML)
Rosedale GMA	22,373	23,365	-	23,565	(200)	23,365	10,979	49%	47%	(993)	152	228	11,207
Stratford GMA	27,686	31,863	-	31,513	-	31,513	17,142	62%	54%	(3827)	13	26	17,168

Table 4-7 Groundwater use

GMU	Power Generation (ML)	Irrigation/Commercial (ML)	Total (ML)
Rosedale GMA	10,597	12,768	23,365
Stratford GMA	30,646	1,217	31,863
Sum	41,243	13,985	

The condition of groundwater levels within each GMA is reported on a quarterly basis on the Victorian water accounts (Table 4-8). General reported trends over the last two years of reporting indicate a rising groundwater trend within the Stratford GMA and a declining trend within the Rosedale GMA. The last two quarters within the Rosedale GMA have had insufficient data available to report on groundwater trends.

Table 4-8 Groundwater level conditions

GMU	2022/2023				2023/2024			
	Sep-22	Dec-22	Mar-23	Jun-23	Sep-23	Dec-23	Mar-24	Jun-24
Rosedale	Declining	Declining	Declining	Declining	Declining	Declining	Ins-Data	Ins-Data
Stratford	Rising	Rising	Rising	Rising	Rising	Rising	Rising	Rising

### 4.3.3 Projected water availability

Latrobe System Water Availability Technical Report produced for The Latrobe Valley Regional Rehabilitation Strategy (LVRRS), modelled future surface water availability for the Latrobe river system. The future projections were produced in accordance with DELWP's 'Guidelines for Assessing the Impact of Climate Change on Water Availability in Victoria'.

The modelled projections were:

(a) Under a low (wet) projection, water availability is projected to be 950 GL per annum in 2035, reducing to 890 GL per annum in 2065.

(b) Under a medium projection, water availability is projected to be 740 GL per annum in 2035, reducing to 660 GL per annum in 2065.

(c) Under a high (dry) projection, water availability is projected to be 580 GL per annum in 2035, reducing to 410 GL per annum in 2065.

Numerical modelling has been completed as part of the regional monitoring program to predict future groundwater levels in 2040 as a result cumulative groundwater use from the Loy Yang, Hazelwood, and Yallourn mines. The climate change projections were incorporated in the modelling. The results of the numerical modelling are presented in section 4.6.

The recent Groundwater Sustainable Yield Assessment (DEECA 2026) estimated long term sustainable groundwater yields within the Stratford and Rosedale groundwater management areas to meet sustainable yield targets. The sustainable yield assessment accounted for climate change through reduced groundwater recharge resulting from changes in rainfall, in line with the LVRRS projections.

In Rosedale the sustainable yield was assessed by developing a statistical drawdown-use relationship and modelling the usage required to meet a 10m aquifer drawdown target from pre-development levels

(Figure 4-3). The statistic model predictions were then verified with historical use-drawdown data. The sustainable yield predictions were then adjusted to meet the requirement for stabilised groundwater levels by 2040 (Figure 3-4)

In Stratford the GMA the use-drawdown relationship was not deemed appropriate for estimating sustainable yield. For Stratford GMA the sustainable yield was estimated based on the yield required to meet a target of 30% of pre-development aquifer through-flow flux.

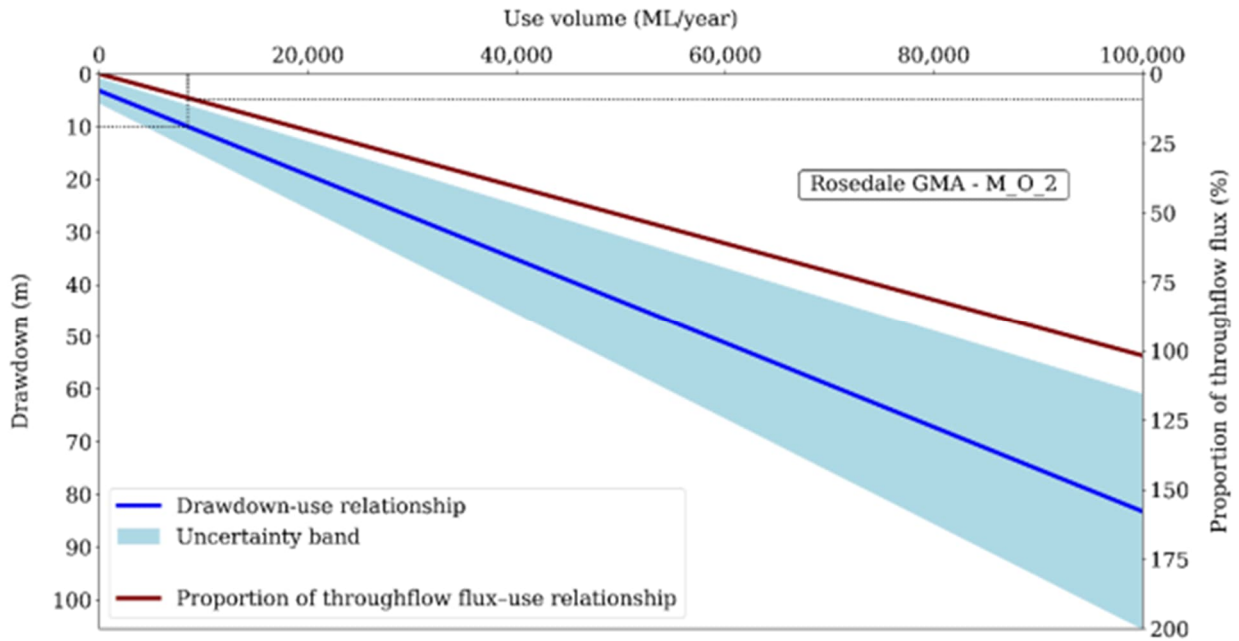


Figure 4-3. Rosedale drawdown-use relationship

### Rosedale GMA

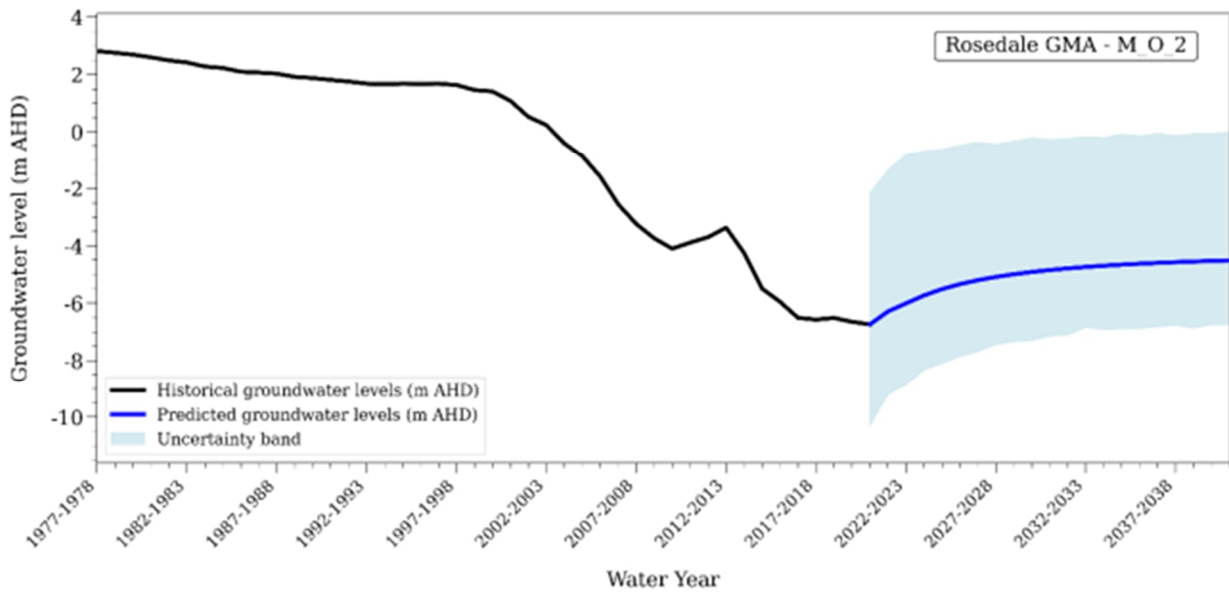


Figure 4-4. Groundwater levels projection with sustainable yield

The results of the sustainable yield assessment are presented in Table 4-9

**Table 4-9. Results of sustainable yield assessment for Rosedale and Stratford GMAs.**

GMU	Statistical model based 10m drawdown volume (ML/yr) (uncertainty band in ML/yr)	10m drawdown based on historical average use and drawdown (ML/yr)	Stabilised volume (ML/yr)	Comparing statistical model based 10m drawdown volume with historical one and stabilised volume	Sustainable yield (uncertainty band in ML/yr)
Rosedale	8,480 (4521-15,096)	6,270	5,700	Historical 10 m drawdown volume aligns with lower band of statistical model-based 10 m drawdown volume  Stabilised volume aligns with lower band of statistical model-based 10 m drawdown volume	5,700 (3,000-10,100)
Stratford	Historical 10 m drawdown volume does not align with statistical model-based 10 m drawdown volume. Therefore, the developed use-drawdown relationship is not used to estimate the sustainable yield volume, which is instead estimated based on predevelopment throughflow flux. The throughflow flux is 36,873 (22,082-50,588) ML/year, with 30% of this volume, equating to 11,100 (6,600-15,200) ML/year, considered as the SY volume.				11,100 (6,600-15,200)  (percentage of throughflow flux)

#### 4.4 40(1)(ba) - the permissible consumptive volume, if any, for the area

The current licence volume of 19,303 ML has 1,325 ML allocated from the Rosedale GMA PCV (22,373 ML) and 17,978 ML allocated from the Stratford GMA PCV (27,686 ML).

The new licence application is for 22,051 ML, with a proposed 9238.3ML allocated to the Rosedale GMA and 12812.7 ML allocated to the Stratford GMA.

Both the Stratford and Rosedale GMA have current allocation higher than the PCV Table 4-10. The proposed licence allocation will result in the Stratford allocation falling below the PCV, while the Rosedale allocation excess of PCV will increase (Table 4-10).

Table 4-10 PCV and allocations implications

GMA	Current licence allocation	Proposed licence allocation	Difference	Current Licence PCV ML-allocation ML	Proposed licence PCV -allocation
Rosedale	1,325	9238	+7913	-993	-8906
Stratford	17,978	12812	-5166	-3,827	+1339
Sum	19,303	22051	+2748		

The changes in the proportion of licenced groundwater extraction between the Rosedale and Stratford GMAs are not expected to have a significant impact to the management of groundwater. This is because the two GMAs are closely connected in the Loy Yang area. The Rosedale GMA sits directly above the Stratford GMA in the area of the Loy Yang mine, and there is no significant aquitard separating the two GMAs. The changes in depth boundaries between zone 1 and zone 2 (Figure 4-1) mean that at a local scale the depth of aquifers don't align with the GMA depth boundaries. To the west of the zone boundary pumping from the M2C aquifer is assigned to the Stratford GMA (zone 1) while to the east of the boundary pumping from the same aquifer is assigned to the Rosedale GMA (zone 2). The DEECA Victorian water accounts acknowledge this complexity with the following note around assessing extraction compliance within the Rosedale GMA *'Some licences are located in the footprint of the Rosedale GMA, however due to a lack of clarity about the inter-aquifer behaviour of resources it is not possible to assign or assess licence volume and extraction against the GMA'*.

#### 4.5 40(1)(c) - the existing and projected quality of water in the area

##### Overall Assessment

The groundwater pumping required to dewater/depressurise the Loy Yang mine has been occurring over a long period of time and water quality of extracted water has been stable as evidenced by comparison of the most recent data from the previous 2 years, with that of the preceding 10-year period. The data for each aquifer unit undergoing depressurisation is presented and discussed in the following sections, with no indication that any significant changes in water quality have occurred or are likely to occur in the immediate future under current operations.

## Analysis

### 4.5.1 Existing water quality

Existing groundwater quality data at the Loy Yang Mine is presented within the draft “Groundwater Chemistry Biennial Review July 2023 to June 2025” (GHD,2026). This groundwater quality monitoring report summarises the results of water quality monitoring undertaken from July 2023 to June 2025.

#### 4.5.1.1 Aquifer physical chemistry

Depressurisation of the M1B aquifer commenced in November 2025 after a period of inactive pumping. During the 2023 to 2025 review period, sampling was completed on three M1B pumping bores to assess the groundwater quality and suitability for inclusion in supply water for the power station. Physical characteristics are summarised in Table 4-11.

Table 4-11 Groundwater Physical Statistics for M1B Aquifer (GHD, 2026)

Parameter	No of samples (2023–2025)	Minimum (2023–2025)	Maximum (2023–2025)	Average (2023–2025)
Field Temperature (°C)	21	34	40.5	38.7
Field pH	21	4.18	5.91	5.1
Lab TDS (mg/L)	20	270	320	293.5
Field Conductivity (uS/cm)	21	285.1	513	461.7
Field Redox (mV)	19	14.4	126.1	87.0

At the time of reporting the M2B aquifer was not undergoing depressurisation, and no sampling had been undertaken since 2007. Historical data relating to the M2B aquifer has been summarised in the November 2006 Groundwater Quality Report (GHD, 2006).

Physical characteristics of the M2C aquifer are summarised in Table 4-12 .There has been no significant change in the physical parameters of the M2C aquifer in the past 2 years comparative to the previous 10 years of historical monitoring record.

Table 4-12 Groundwater Physical Statistics for M2C Aquifer

Parameter	No of samples (2023–2025)	Minimum (2023–2025)	Maximum (2023–2025)	Average (2023–2025)	Average (2015–2023)
Field Temperature (°C)	45	35.1	49.8	44.0	41.7
Field pH	45	4.3	5.33	4.7	5.0
Lab TDS (mg/L)	45	150.0	450.0	228.0	227.8
Field Conductivity (uS/cm)	40	268	791.8	450.2	402.5
Field Redox (mV)	45	21.4	162.8	124.7	123.1

Physical characteristics of the TR aquifer are summarised in Table 4-13. There has been no significant change in the physical parameters of the M2C aquifer in the past 2 years comparative to the previous 10 years of historical monitoring record

**Table 4-13 Groundwater Physical Statistics for TR Aquifers**

Parameter	No of samples (2023–2025)	Minimum (2023–2025)	Maximum (2023–2025)	Average (2023–2025)	Average (2015–2025)
Field Temperature (°C)	18	33.0	51.6	43.9	45.4
Field pH	18	4.24	6.05	5.0	5.3
Lab TDS (mg/L)	18	120	170	151.7	154.4
Field Conductivity (uS/cm)	13	210	320.1	272.0	284.3
Field Redox (mV)	18	53.3	144.1	108.9	102.9

#### 4.5.1.2 Aquifer time series data

Figure 4-5 shows historical time series data for M1B aquifer. M1B aquifer time series water quality data is limited compared to the other aquifers. No trends can be identified due to the limited water quality data.

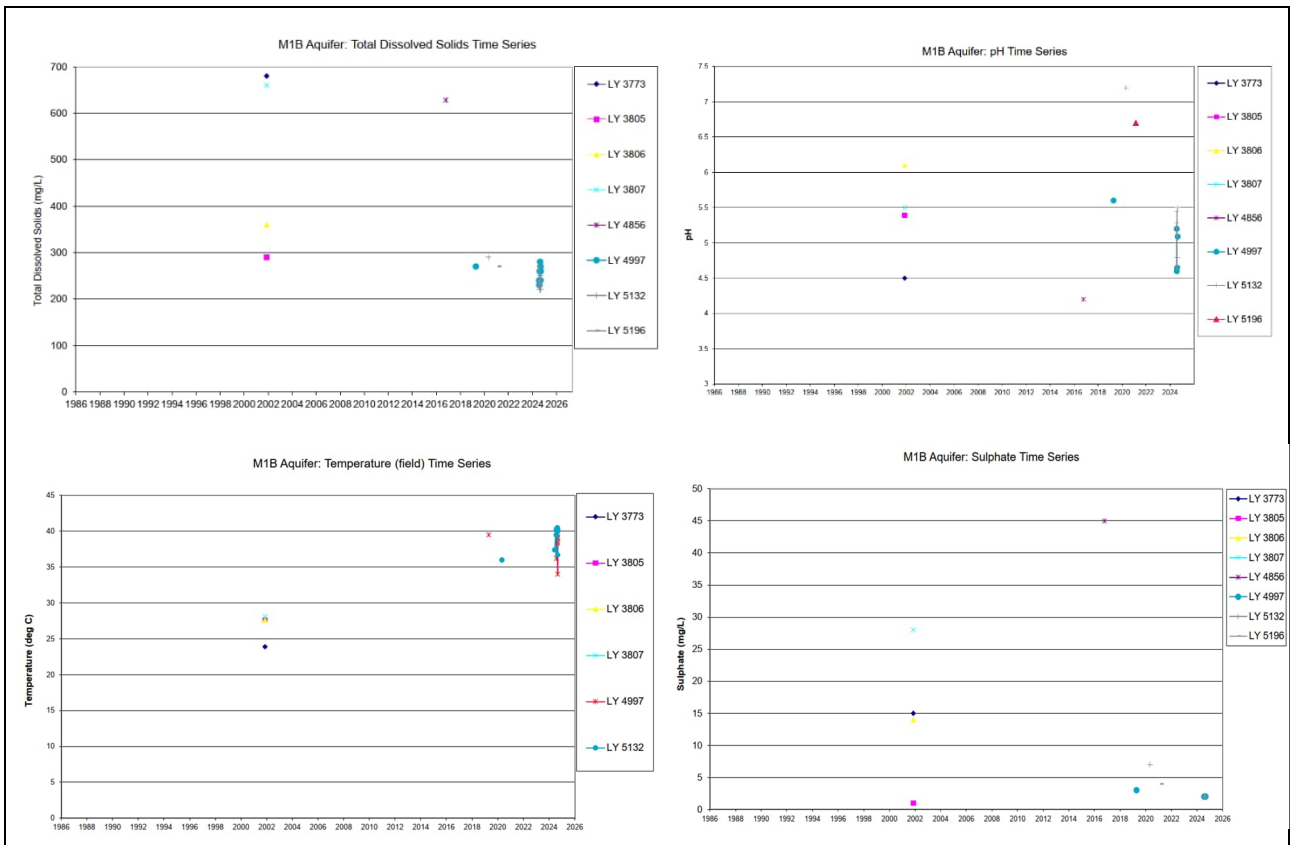
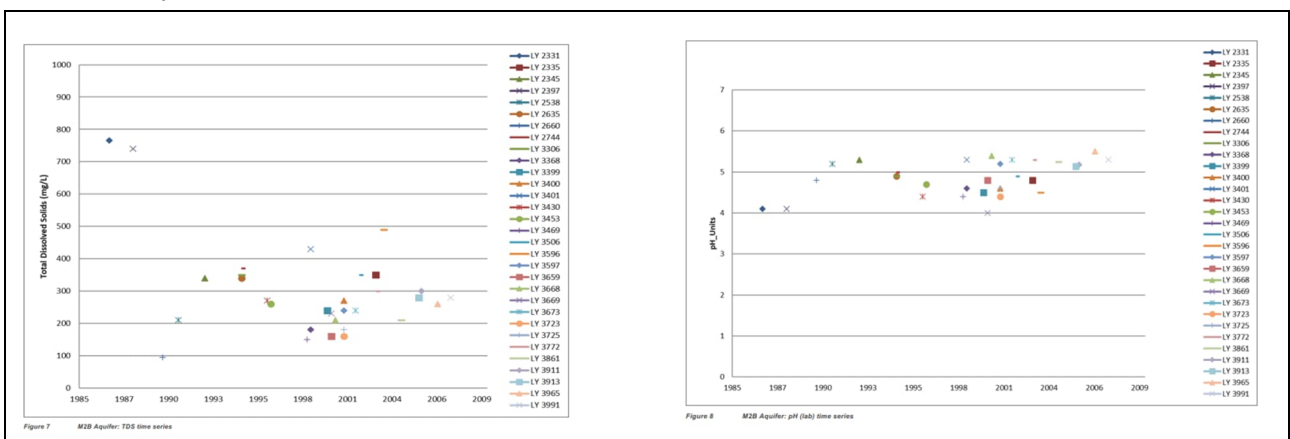


Figure 4-5 Historical time series data for TDS, pH, temperature and sulphate

Figure 4-6 shows historical time series data for M2B aquifer. At the time of reporting, the M2B aquifer pressures were below target levels and ongoing groundwater pumping is not required. As mentioned above, M2B bores have not been sampled since 2007 however, historical trends for TDS and pH were stable, whereas an increasing historic trend for temperature is evident. This increasing trend for temperature appears to be related to the mine progression to the east as active pump bores are replaced with newer deeper bores closer to the mine operations.



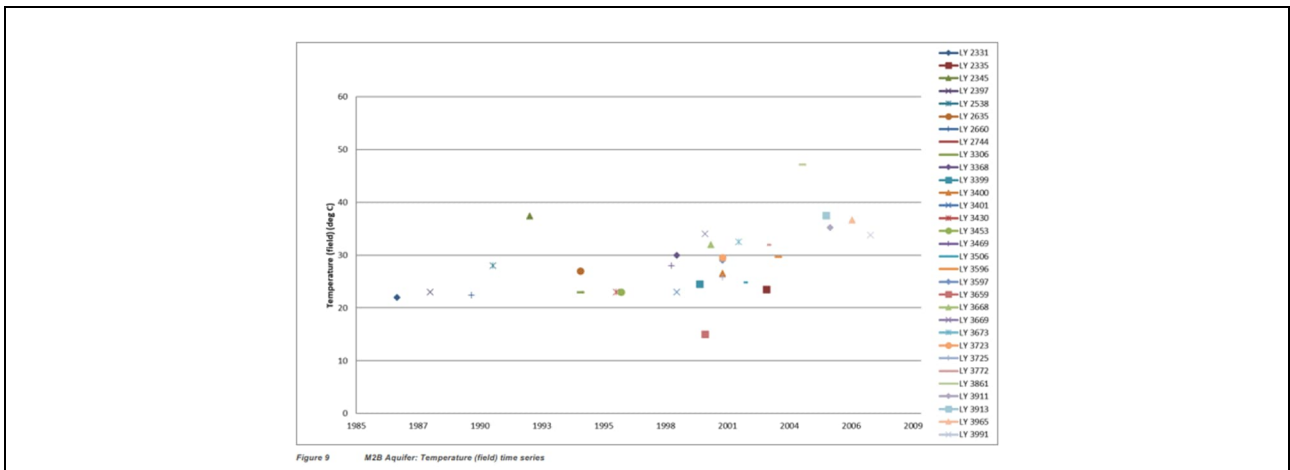


Figure 4-6 Historical time series for M2B aquifer, TDS (top left), pH (top right) and temperature (bottom)

Figure 4-7 shows historical time series data for M2C aquifer. TDS concentrations within the M2C aquifer fall predominantly within the range of 100 to 500 mg/L. Recent water quality data indicates overall TDS for the M2C is stable and the TDS concentrations remained within the historic range. pH values within the M2C aquifer are variable, within a range of 4 to 7 but remain consistent with long-term averages. Historically, temperatures have been lower and overall temperatures in the M2C aquifers have shown an increasing trend due to increasing aquifer depth; however, in recent years this trend has become more stable. Sulphate concentrations for the period 2021 to 2023 have been relatively stable at less than 20 mg/L.

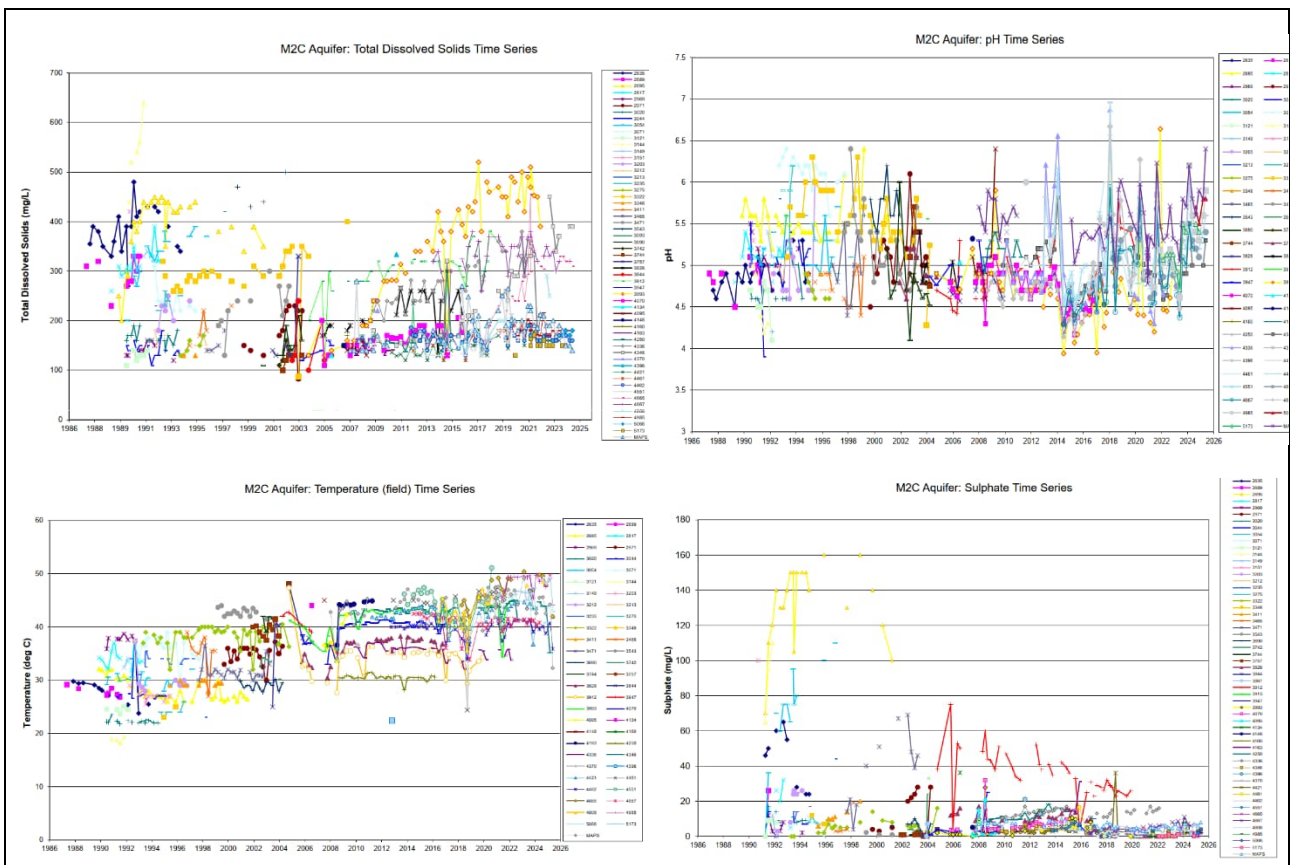


Figure 4-7 Historical time series for M2C aquifer, TDS (top left), pH (top right), temperature (bottom left) and sulfate (bottom right)

Figure 4-8 shows historical time series data for TR aquifer. Historically the TDS concentration of the TR aquifer has remained relatively consistent, with TDS for the majority of samples falling within the range 100 to 200 mg/L. TR aquifer pH data has been relatively consistent over the review period 2021 to 2023. The pH values have tended to be in the range between pH 4.5 – 6.5. The TR aquifer continues to be warmer than M2C aquifer as temperature increases with depth. Temperature has also shown an increasing trend in bores towards the northern batters and towards the eastern mine area. The Upper TR aquifer pump bores situated on the northern batters of the mine LY3752, LY3980, LY4184 and LY5000, consistently show higher temperatures due to greater aquifer depth compared to the Lower TR aquifer pump bores LY3238, LY3684 and LY4395 located on the western and southern batters.



Figure 4-8 Historical time series for TR aquifer, TDS (top left), pH (top right) and temperature (bottom)

#### 4.5.1.3 Aquifer piper plots

Piper plots from the aquifer units surrounding the Loy Yang mine are generally characteristic of sodium-chloride type groundwater with some natural variation present as see in Figure 4-9, with a few samples indicating:

- Carbonate dominance in the M1B aquifer,
- Some higher ratios of sulphate within the M2B and M2C aquifers

Overall, the groundwater across the MFAS and TFAS has consistently indicated sodium chloride type groundwater of relatively low salinity. A greater sensitivity to changes in ion composition is also recognised in lower salinity groundwater systems, with any variance in ion composition likely attributed to the heterogenous nature of the aquifer matrix.

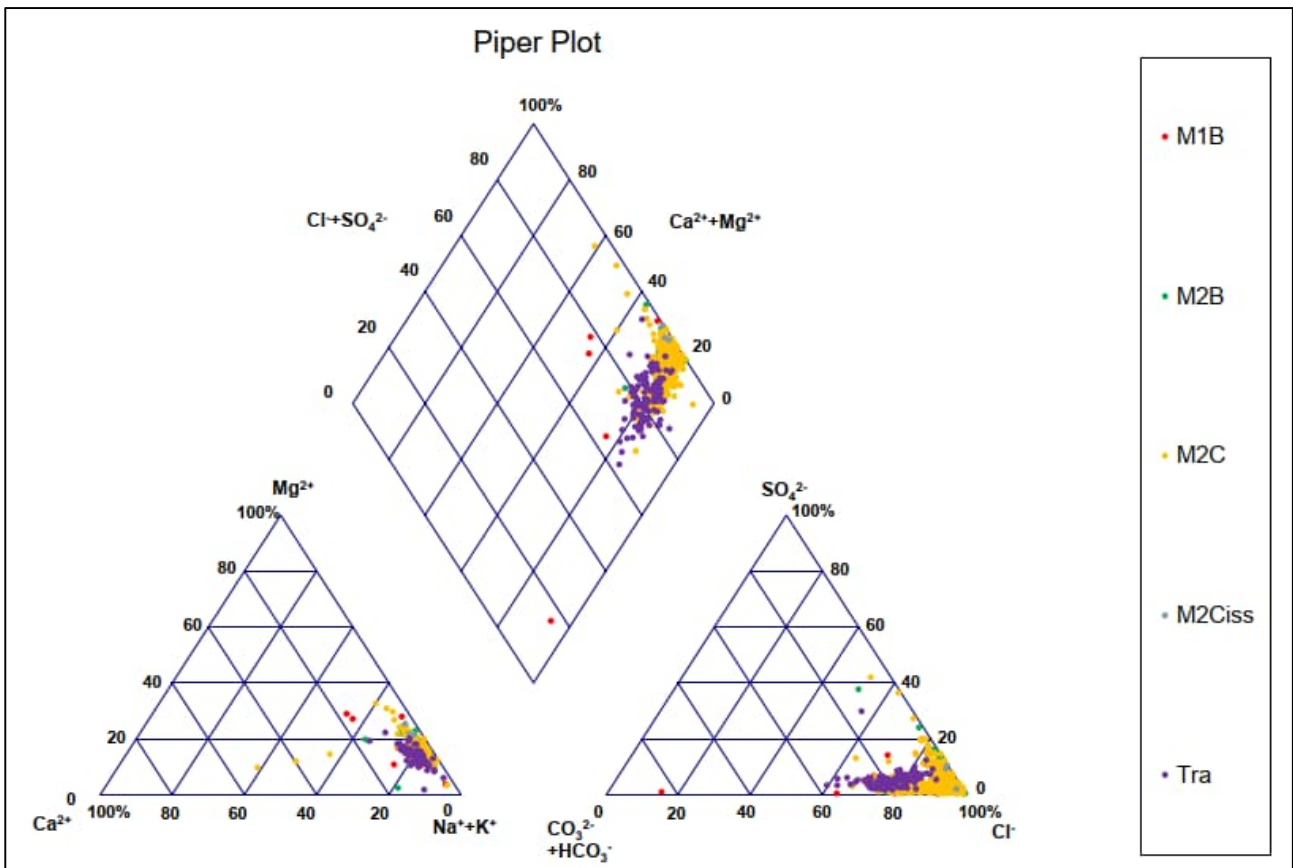


Figure 4-9 All aquifers Piper plot

#### 4.5.1.4 Aquifer ion ratios

Figure 4-10 illustrates sodium to chloride ratios of the entire historical LYM groundwater chemistry database for all aquifers. The figure indicates a linear trend with a ratio of close to 1 for the majority of samples across all aquifer units. This ratio and relative concentration for each aquifer unit appears to be consistent across the entire dataset for all aquifer units.

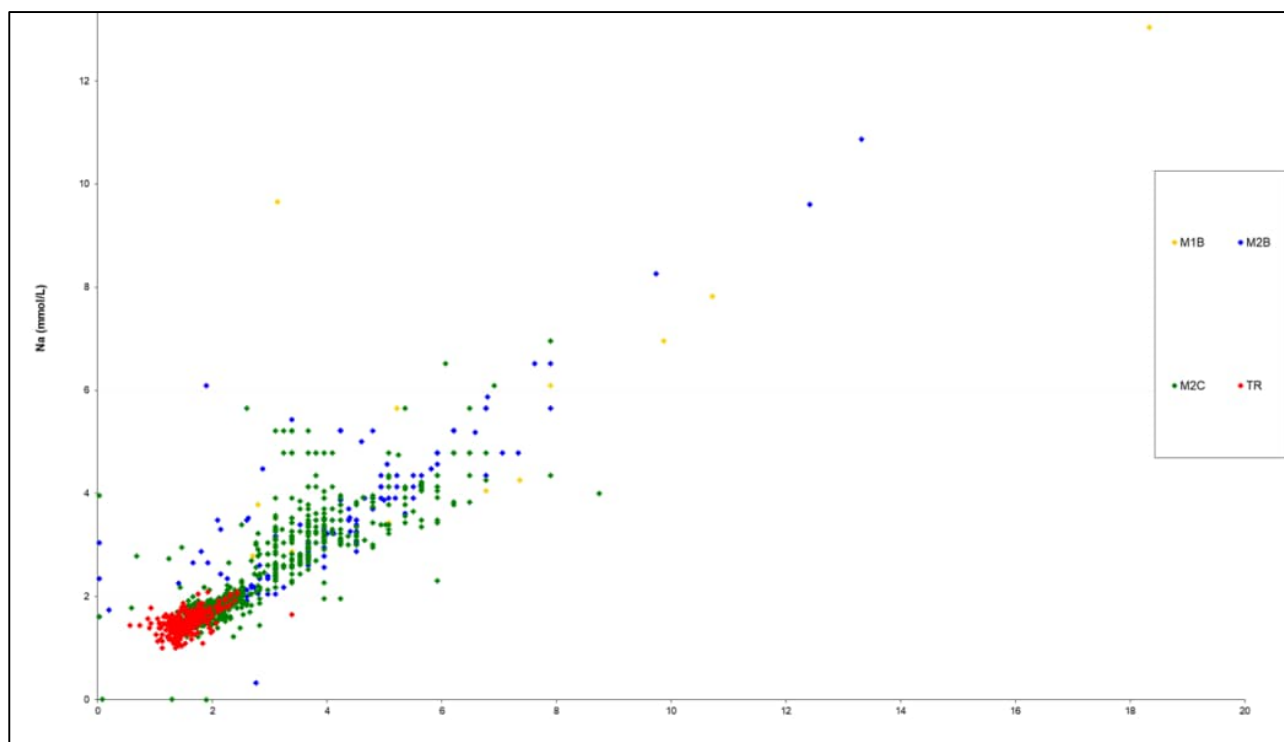


Figure 4-10 All aquifer ion ratios

#### 4.5.1.5 Projected water quality

Future groundwater extraction is expected to remain consistent with historical extraction rates. As demonstrated by the long-term groundwater quality record presented in Section 4.5.1, water quality parameters have remained stable over time, with no discernible trends indicating deterioration. Accordingly, under a future extraction scenario that aligns with historical conditions, groundwater quality is expected to remain stable, consistent with observed data.

#### 4.6 **40(1)(d) - any adverse effect that the allocation or use of water under the entitlement is likely to have on existing authorized uses of water; a waterway or an aquifer; the drainage regime within the meaning of section 12(1); and the maintenance of the environmental water reserve in accordance with the environmental water reserve objective.**

Numerical groundwater modelling completed for the 5-year review (GHD 2022), has informed the assessment of potential adverse impacts. The numerical model was developed using MODFLOW, with relevant packages for both groundwater and subsidence modelling, utilising stratigraphic information from the steady state regional model developed by Schaeffer (2008). The previous model was presented in the last 5-year review (GHD 2016) and has been updated to include the following:

- 3 additional years monitoring data incorporating 73 new bores.
- R and PET rates derived by running PERFECT on daily rainfall and PET data from local weather stations.
- At Loy Yang revised pumping schedules from aquifer based on the approved mine plan for easterly expansion of the mine. In particular the increase in pumped volumes from the M1B aquifer.

- The hydrogeological properties of the M1B Aquifer (model layer 7), where it becomes thicker and more transmissive (higher sand content) in the eastern part of the Loy Yang mine, were updated subsequently based on the calibration against data from a 7-day constant rate pumping test (at 30 L/s) undertaken in early 2019. This resulted in a 3-fold increase in the hydraulic conductivity of the M1B Aquifer
- Pumping rates were extended based on the average metered pumping rates for years observed, the current PCV up to 2026, and increased PCV from 2026 to 2040.
- Streamflow targets were used to improve the representation of surface water-groundwater interactions within the footprint of the mines.

The current model utilised data from 21370 bores over a period from 1960 to 2020 and run over a predictive modelling scenario from 2021 to 2040. Parameter estimation was run using PEST\_HP (Doherty 2017) and utilised over 2000 iterative model runs to estimate approximately 250 model parameters to achieve a satisfactory calibration of under 5% as seen in Figure 4-11

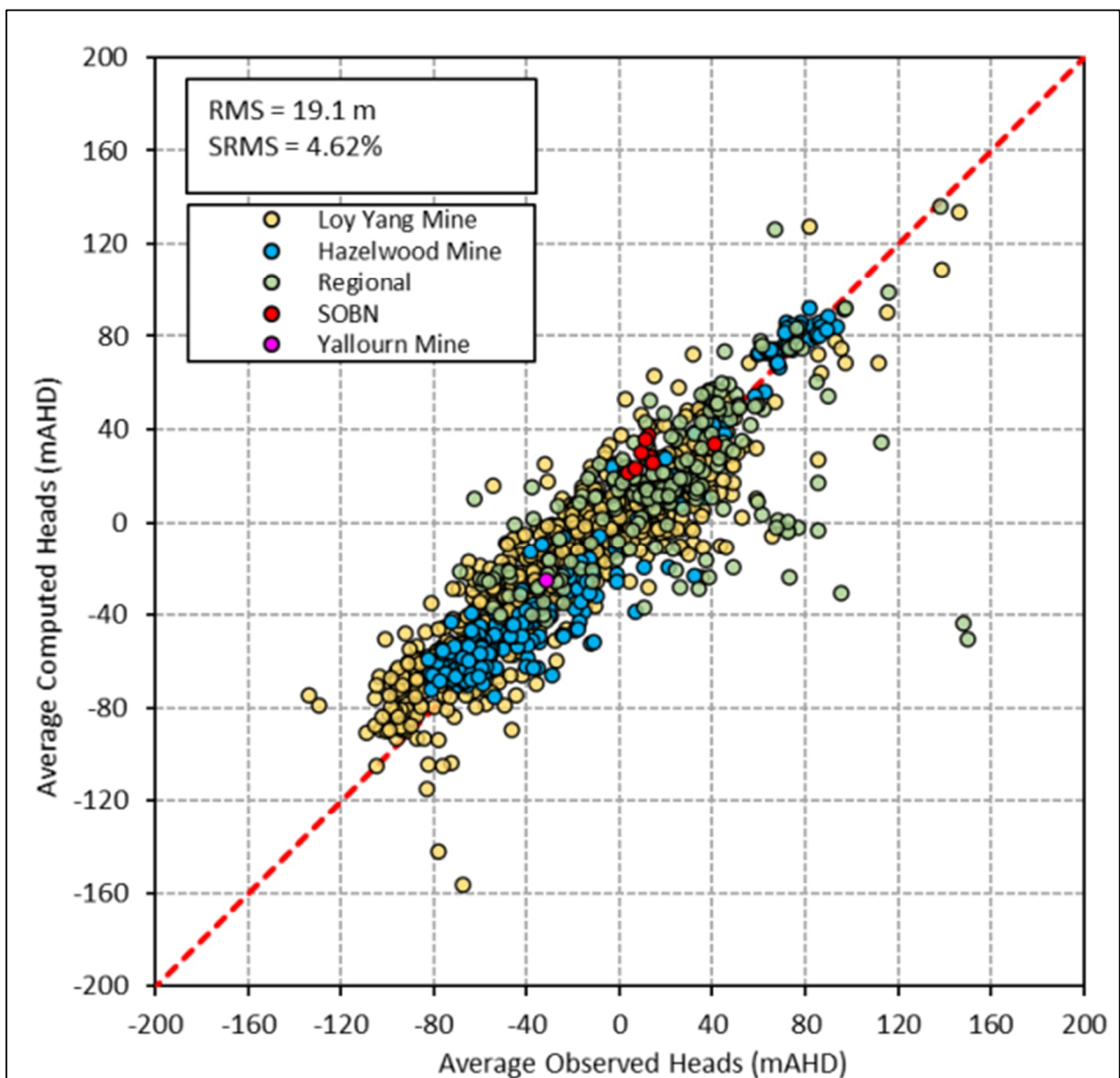


Figure 4-11 Observed head vs modelled head with RMS of 4.62% (GHD 2022)

Results of modelled head indicate a Root Mean Squared (RMS) error of less than 5% and are considered well calibrated for a regional scale groundwater model (GHD 2022). The modelled results predict drawdown for the following aquifer systems by 2040 at the Loy Yang mine:

- MFAS: Up to 70 m drawdown on the eastern boundary of the existing mine. Due to commissioning a new bore within M1B to depressurise the aquifer prior to mine expansion.
- M2/TFAS: Up to 80 m drawdown along the southern and eastern boundary of the mine.

### Appropriateness of the model to evaluate adverse impacts from renewal licence volume

The regional groundwater model that has been used to assess the impacts of continued groundwater extraction is the best available assessment tool for this purpose. Groundwater modelling for mine operations is conducted for each site and then a coordinated regional model is developed to assess the combined effects. This regional model is also used and coordinated through the Regional Monitoring Committee (RMC). The RMC includes agency representation from Southern Rural Water and the results of the regional model are provided to DEECA for evaluation. The RMC has indicated through the committee process that the regional model is acceptable for the purposes of evaluating and tracking regional effects. DEECA officers have also indicated in meetings that the current regional model is an appropriate basis for assessing groundwater impacts.

Key assumptions of the model are relatively conservative in nature with the maximum groundwater extraction rates modelled against the proposed full allocation associated with licences for each of the 3 mines. Metered extraction at the Loy Yang mine were used for the 2021 modelled year, with the full allocation modelled from 2022 to 2026 at 13,579 M/yr from the Traralgon formation, 4630 ML/yr from the M2C aquifer and M2B aquifer, and 1,295 ML/yr from the M1B. After 2026 the predicted groundwater extraction volumes were used based on Loy Yang modelled dewatering requirements under the mine plan. The predicted groundwater dewatering volumes were produced at the time of the modelling in 2021, and included improved knowledge of the M1B aquifer properties, the revised mine plan and easterly expansion of the mine. The current predicted dewatering volume has not changed significantly since 2021 predictions, The model used an average Loy Yang groundwater extraction of 22,216 ML/yr over the 15 year licence term (Figure 4-12) compared to the slightly lower allocation volume proposed in this application of 22,051 ML/year.

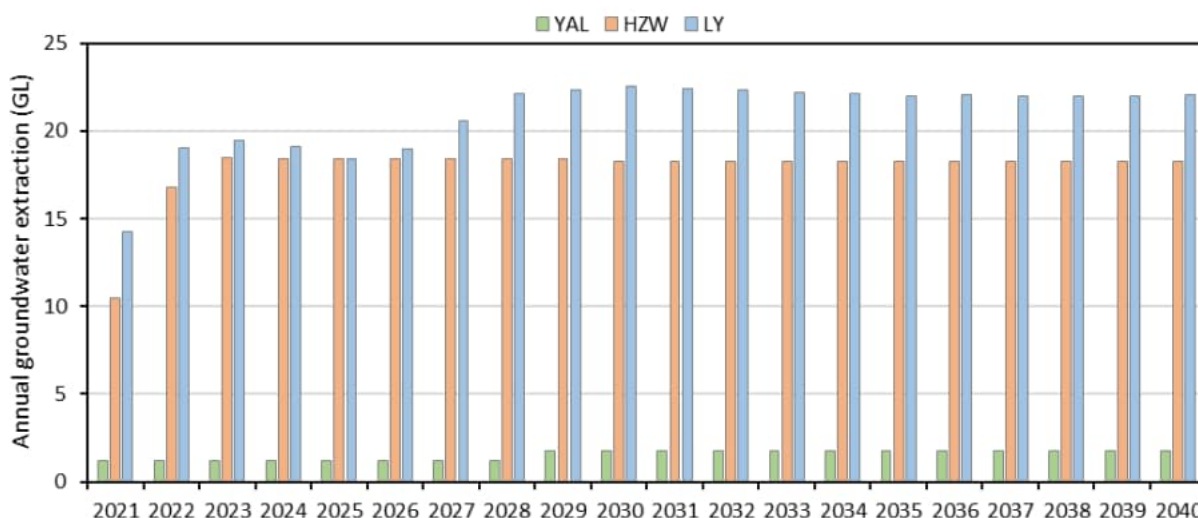


Figure 4-12 Modelled annual groundwater extraction (GL) at the maximum licensed volume (GHD 2022)

Table 4-14 shows the division of groundwater allocation between the aquifers; on the current licence; the 2022 groundwater model; and this groundwater licence renewal application. The modelled overall allocation (22,216 ML/yr) is similar to the renewal application allocation (22,051 ML/yr), however the model has a higher component of extraction from the M1B aquifer, and lower extraction component from the Traralgon aquifer relevant to this renewal application. The implication of this difference on the modelling results, is that the model may potentially overestimate drawdowns in the shallower MFAS and potentially underestimate drawdowns in the deeper TFAS. The shallower MFAS is more likely to be connected to receptors such as groundwater bores, than the deeper TFAS. The model impacts on receptors may therefore be considered conservative.

**Table 4-14 Comparison of aquifer allocation within the current licence, modelled scenario, and renewal application**

Aquifer	Current licence (ML/yr)	2022 Modelled allocation over renewal licence term (ML/yr)	2026 Renewal licence application (ML/yr)
M1B	1295	11,194	8988
M2B	1325	0	0
M2C	4600	2733	2967
Traralgon	13578	8289	10095
<b>TOTAL</b>	<b>19303</b>	<b>22,216</b>	<b>22,051</b>

## Overview

The renewal of the groundwater licence is not expected to cause adverse effects with predictive modelling and long-term monitoring consistently showing that groundwater behaviour under the existing extraction regime remains stable, and within already-assessed limits. Forecasts to 2040 indicate that drawdown will continue to be confined largely to the deeper MFAS and M2/TF aquifers required for mine depressurisation, with no measurable propagation into the shallow aquifer systems used by the majority domestic and agricultural users which are considered to largely rely on the shallow aquifer systems which remain hydraulically disconnected from the MFAS and TFAS (GHD 2022). Hydrographs confirm that shallow groundwater levels have remained stable over multiple decades, demonstrating that pumping does not influence surface-connected aquifers or alter hydraulic gradients toward waterways. As a result, there is no evidence of reduced water availability, bore interference, or altered surface-groundwater interactions.

There are no predicted groundwater bores that will go dry as result of the proposed extraction. There are 14 licensed bores that may experience a reduction in available water column by 2040. In 8 of the bores the reduction is less than 10% and is considered minor. In 4 bores the reduction may be between 10-30%, and in 2 cases the reduction is predicted to be above 50% by 2040.

The confined aquifers subject to depressurisation have no significant hydraulic connection to the shallow aquifer system (Yates et al 2015). The depressurised aquifers are therefore not connected to nearby creeks or the Latrobe River, and monitoring shows that surface water systems and baseflow conditions remain unchanged. Drainage patterns and near-surface hydrology are similarly unaffected, with no observed changes to shallow groundwater needed to sustain natural drainage functions. Existing environmental water

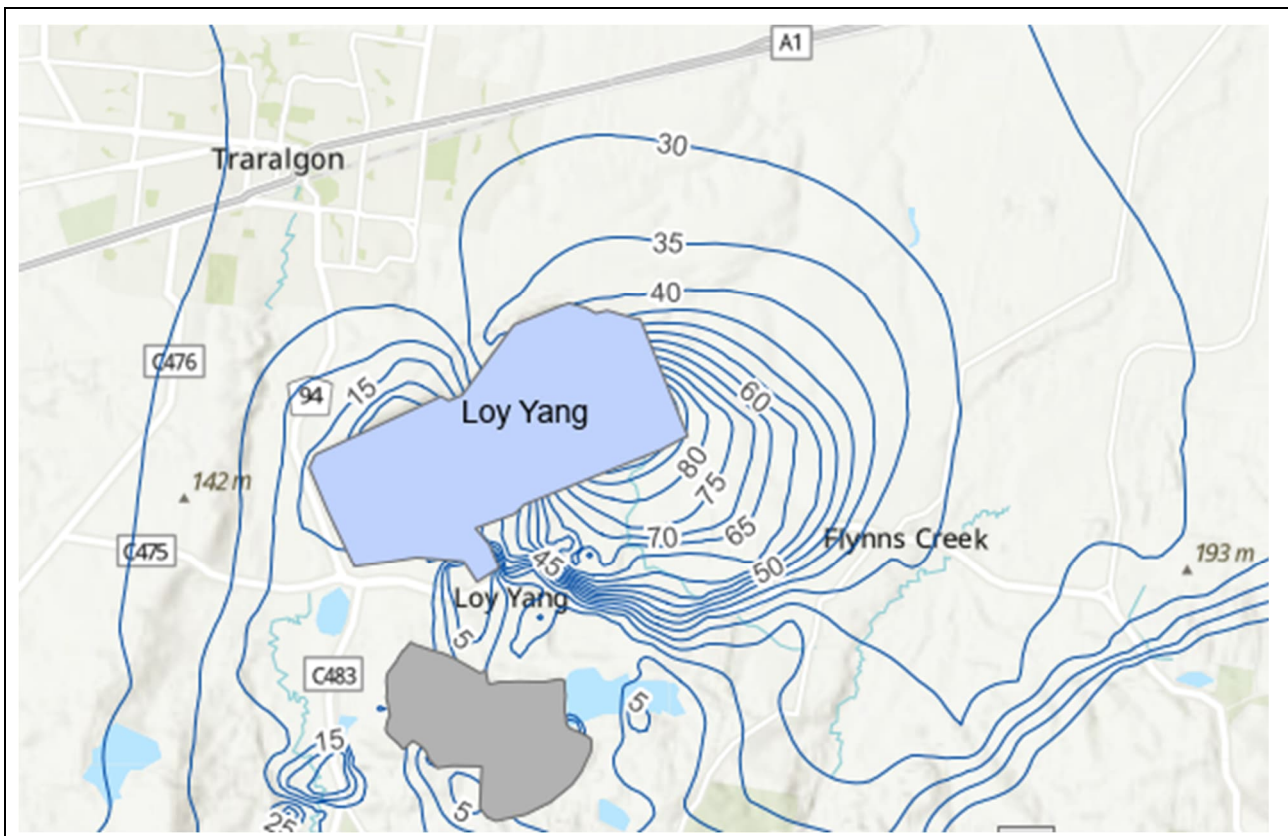
entitlements in the Latrobe system continue to be met, and the renewal does not significantly increase extraction volumes or introduce new risks. The licence renewal continues an established and well-monitored extraction regime with no evidence of emerging impacts to streamflow, drainage lines. There is predicted to be 14 licensed groundwater bores that will experience drawdown in groundwater levels by 2040, however there is not expected to be any cut-off of supply.

## Analysis

This assessment draws on the predictive modelling undertaken as part of the existing licence conditions, which extends to the year 2040, provides forecasts of groundwater levels, and land subsidence under authorised extraction scenarios. Using these established model outputs allows the assessment to determine whether future water use under the entitlement is expected to have adverse effects. The most recent Five Yearly Report (GHD, 2022) provides details of the regional groundwater and land surface monitoring and modelling completed in the five year period July 2015 to June 2020.

The results show the drawdown cone is predicted to be centred around the eastern boundary at the Loy Yang mine. At 2040 the total predicted drawdown east of Loy Yang mine increases to the following for each aquifer as depicted in Figure 4-13:

- MFAS drawdown approximately 70 m.
- TFAS drawdown approximately 80 m.



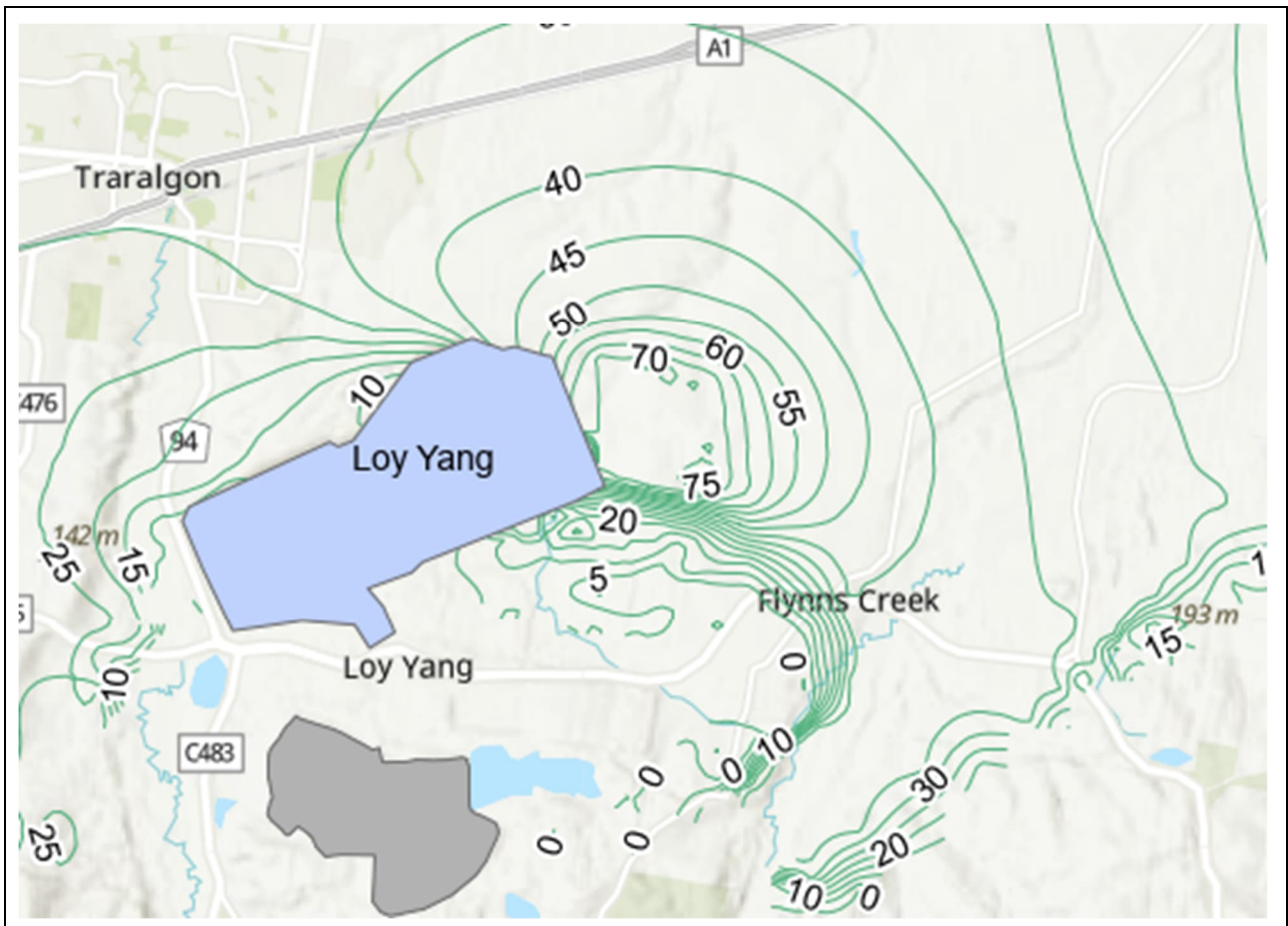


Figure 4-13 Modelled drawdown in MFAS (blue) and TFAS (green)

#### 4.6.1 (i) existing authorized uses of water

Groundwater drawdown associated with extraction can adversely affect existing authorised users (domestic and agricultural activities) by reducing the availability and reliability of their licensed supplies. As outlined above, groundwater modelling predicts groundwater drawdown of up to 80 m by 2040. As groundwater levels decline, users may experience diminished bore yields, reduced pumping efficiency, or the need to deepen bores or upgrade infrastructure to maintain access to water. Significant drawdown can also alter hydraulic gradients, leading to interference between bores and potential redistribution of available water away from neighbouring licence holders.

##### 4.6.1.1 Licensed groundwater production bores

The licensed bore data was sourced from the Victorian Water Register in October 2025. There are 101 licensed groundwater bores within the Rosedale and Stratford GMA (Table 4-15). The size of licence allocation from individual bores range from 1-900 ML, with an average or 143 ML (Table 4-15). Figure 4-14 shows the location of the closest 32 licensed bores that lie within the modelled drawdown extent. The bores have been assigned an aquifer based their constructed depth relative to the Victorian Aquifer Framework units.

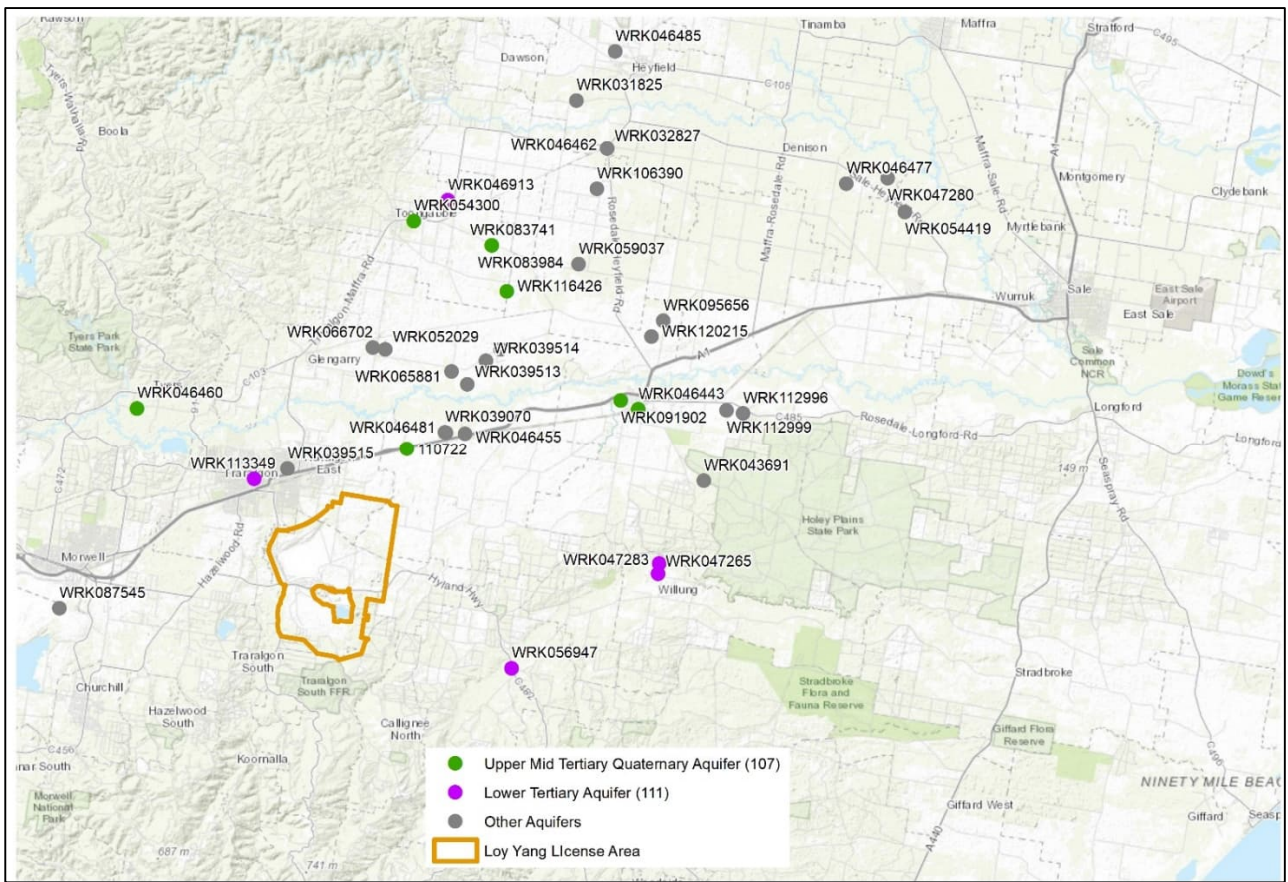


Figure 4-14 Location of Licensed bores.

**Table 4-15 Licensed bores within the Rosedale and Stratford GMUs with Allocation volume.**

Works ID	GMU	WRK creation date	Bore Depth (m)	Eastings	Northings	Zone	Allocation volume (ML)
WRK031825	Rosedale (GMU)	29/08/2009	100.77	477588.4	5794384	55	1.2
WRK032400	Rosedale (GMU)	29/08/2009	11.3	504493.4	5812164	55	10
WRK032698	Rosedale (GMU)	29/08/2009	74	501838.4	5810879	55	328.3
WRK032702	Rosedale (GMU)	29/08/2009	95	503658.4	5809619	55	85
WRK032736	Rosedale (GMU)	29/08/2009	90	503113.4	5803524	55	120
WRK032827	Rosedale (GMU)	29/08/2009	340	479371.4	5791635	55	425.2
WRK032916	Rosedale (GMU)	29/08/2009	75	442069.3	5758118	55	113.1
WRK037570	Stratford (GMU)	29/08/2009	442	575438.5	5807409	55	164
WRK038387	Rosedale (GMU)	29/08/2009	4	499740	5811050	55	261.3
WRK038392	Stratford (GMU)	29/08/2009	353.7	559313.5	5810144	55	30
WRK039070	Rosedale (GMU)	29/08/2009	31	470005.4	5775275	55	140.1
WRK039513	Rosedale (GMU)	29/08/2009	33.5	471284.4	5778042	55	73
WRK039514	Rosedale (GMU)	29/08/2009	37.5	472373	5779403	55	120
WRK039515	Rosedale (GMU)	29/08/2009	70	460894	5773128	55	12
WRK043691	Rosedale (GMU)	29/08/2009	0	484958	5772434	55	2
WRK046440	Rosedale (GMU)	29/08/2009	30	473213.4	5780044	55	120
WRK046441	Rosedale (GMU)	29/08/2009	54	501383.4	5811074	55	328.3333
WRK046442	Rosedale (GMU)	29/08/2009	129.1	498308	5801943	55	12
WRK046443	Rosedale (GMU)	29/08/2009	305.8	481163.4	5776604	55	120
WRK046444	Rosedale (GMU)	29/08/2009	52	504473.4	5812164	55	10
WRK046445	Rosedale (GMU)	29/08/2009	171	495553.4	5803714	55	111
WRK046446	Rosedale (GMU)	29/08/2009	78	499720	5810950	55	261.3
WRK046449	Rosedale (GMU)	29/08/2009	74.7	501018.4	5808444	55	40
WRK046450	Rosedale (GMU)	29/08/2009	76	499883.4	5811504	55	261.3
WRK046452	Rosedale (GMU)	29/08/2009	99.8	444046.3	5753823	55	120
WRK046453	Rosedale (GMU)	29/08/2009	98	504913.4	5811794	55	328.3
WRK046455	Rosedale (GMU)	29/08/2009	81	471161	5775180	55	202.2
WRK046456	Rosedale (GMU)	29/08/2009	72.95	501048.4	5812419	55	150
WRK046457	Rosedale (GMU)	29/08/2009	158.5	495213.4	5802094	55	363.2
WRK046458	Rosedale (GMU)	29/08/2009	81	497808.4	5808069	55	385
WRK046459	Rosedale (GMU)	29/08/2009	84	503203.4	5802434	55	270.6
WRK046460	Rosedale (GMU)	29/08/2009	61	452198.3	5776654	55	120
WRK046461	Rosedale (GMU)	29/08/2009	62.4	498473.4	5812084	55	29

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Works ID	GMU	WRK creation date	Bore Depth (m)	Eastings	Northings	Zone	Allocation volume (ML)
WRK046462	Rosedale (GMU)	29/08/2009	39	479371.4	5791635	55	425.2
WRK046463	Rosedale (GMU)	29/08/2009	87	499303.4	5812244	55	300
WRK046464	Rosedale (GMU)	29/08/2009	95	498993.4	5809504	55	85
WRK046465	Rosedale (GMU)	29/08/2009	76	501060	5809725	55	152.75
WRK046468	Rosedale (GMU)	29/08/2009	99	505153.4	5811304	55	328.3
WRK046469	Rosedale (GMU)	29/08/2009	46	507112.4	5801875	55	3
WRK046470	Rosedale (GMU)	29/08/2009	85	501313.4	5805244	55	220
WRK046471	Rosedale (GMU)	29/08/2009	95	502693.4	5809534	55	120
WRK046472	Rosedale (GMU)	29/08/2009	71.5	503174.3	5809682	55	130
WRK046473	Rosedale (GMU)	29/08/2009	97	502813.4	5806144	55	100
WRK046474	Rosedale (GMU)	29/08/2009	171	496907.4	5801197	55	140
WRK046475	Rosedale (GMU)	29/08/2009	74.4	499813.4	5811274	55	261.3
WRK046477	Rosedale (GMU)	29/08/2009	306	493184	5789599	55	380
WRK046478	Rosedale (GMU)	29/08/2009	104	498126	5807012	55	385
WRK046479	Rosedale (GMU)	29/08/2009	80	506463	5812141	55	200
WRK046480	Rosedale (GMU)	29/08/2009	88	504213.4	5809335	55	105
WRK046481	Rosedale (GMU)	29/08/2009	0	470056	5775245	55	140.1
WRK046482	Rosedale (GMU)	29/08/2009	70	500492	5811989	55	261.3
WRK046483	Rosedale (GMU)	29/08/2009	114	503643	5809762	55	85
WRK046484	Rosedale (GMU)	29/08/2009	0	503615	5809621	55	85
WRK046485	Rosedale (GMU)	29/08/2009	170	479836	5797210	55	50
WRK046486	Rosedale (GMU)	29/08/2009	0	501435	5811007	55	328.3
WRK046597	Rosedale (GMU)	29/08/2009	66	508535	5803166	55	10
WRK046883	Rosedale (GMU)	29/08/2009	83	500432	5805593	55	13
WRK046913	Rosedale (GMU)	29/08/2009	350	470166	5788643	55	70
WRK046925	Rosedale (GMU)	29/08/2009	79	501014	5809820	55	152.75
WRK047201	Rosedale (GMU)	29/08/2009	100	506437	5810933	55	5
WRK047265	Stratford (GMU)	29/08/2009	168	482310	5767060	55	34.5
WRK047280	Rosedale (GMU)	29/08/2009	230	495578	5789914	55	601.2
WRK047283	Stratford (GMU)	29/08/2009	165	482373.4	5767644	55	34.5
WRK047296	Stratford (GMU)	29/08/2009	344.4	558344.5	5812165	55	210
WRK047297	Stratford (GMU)	29/08/2009	353.7	559200	5809960	55	60
WRK052029	Rosedale (GMU)	12/10/2009	106	466538	5780057	55	25
WRK053707	Rosedale (GMU)	11/12/2009	170	478632	5800458	55	10

Works ID	GMU	WRK creation date	Bore Depth (m)	Eastings	Northings	Zone	Allocation volume (ML)
WRK054300	Rosedale (GMU)	23/12/2009	99	468204	5787441	55	8.2
WRK054419	Rosedale (GMU)	7/01/2010	568	496570	5787970	55	900
WRK056947	Stratford (GMU)	3/05/2010	173	473857	5761609	55	3
WRK057060	Rosedale (GMU)	10/05/2010	86	500268	5812508	55	261.3
WRK057240	Rosedale (GMU)	14/05/2010	90	503688	5810254	55	25
WRK059037	Rosedale (GMU)	1/10/2010	70	477721	5784957	55	14
WRK061708	Rosedale (GMU)	29/03/2011	147	497137	5805646	55	10
WRK065346	Rosedale (GMU)	26/07/2011	80	443840	5760002	55	8
WRK065881	Rosedale (GMU)	29/08/2011	60	470370	5778773	55	3.3
WRK066702	Rosedale (GMU)	18/10/2011	73.5	465830	5780150	55	18.5
WRK077522	Rosedale (GMU)	11/12/2013	80	508335	5803151	55	40
WRK083741	Rosedale (GMU)	22/01/2015	120	472695	5786031	55	55
WRK083984	Rosedale (GMU)	9/02/2015	120	472695	5786031	55	55
WRK086361	Rosedale (GMU)	26/05/2015	100	504740	5801290	55	110
WRK087545	Stratford (GMU)	24/06/2015	157	447720	5765067	55	190
WRK088915	Rosedale (GMU)	8/09/2015	0	504087	5810654	55	18.5
WRK091902	Rosedale (GMU)	28/01/2016	262	480157	5777106	55	10
WRK095656	Rosedale (GMU)	19/08/2016	161.7	482598	5781700	54	125
WRK105962	Stratford (GMU)	17/04/2018	328	532060	5811102	55	0
WRK106390	Rosedale (GMU)	12/05/2018	320	478777	5789295	55	425.2
WRK112996	Rosedale (GMU)	1/04/2019	125	487212.5	5776363	55	50
WRK112999	Rosedale (GMU)	1/04/2019	108	486265.1	5776533	55	50
WRK113349	Stratford (GMU)	17/04/2019	616	458966	5772534	55	350
WRK114636	Rosedale (GMU)	27/06/2019	103	505565.5	5811637	55	328.3
WRK116426	Rosedale (GMU)	15/10/2019	355	473566.1	5783402	55	85
WRK120215	Rosedale (GMU)	27/03/2020	117	481932.3	5780796	55	29
WRK125967	Stratford (GMU)	9/04/2021	524	573346	5806823	55	0
WRK127704	Stratford (GMU)	19/07/2021	0	573363	5806819	55	0
WRK141137	Rosedale (GMU)	11/10/2023	104	507205.8	5811281	55	120
WRK142255	Rosedale (GMU)	19/12/2023	0	497485	5803290	55	5
WRK142310	Rosedale (GMU)	3/01/2024	80	503592	5804341	55	270.6
WRK143581	Rosedale (GMU)	10/04/2024	144.5	496743.9	5804918	55	50

#### 4.6.1.2 Stock and Domestic Bores

There are a total of 767 stock and domestic bores within the vicinity of the Loy Yang mine. The location of these bores is shown in Figure 4-15.

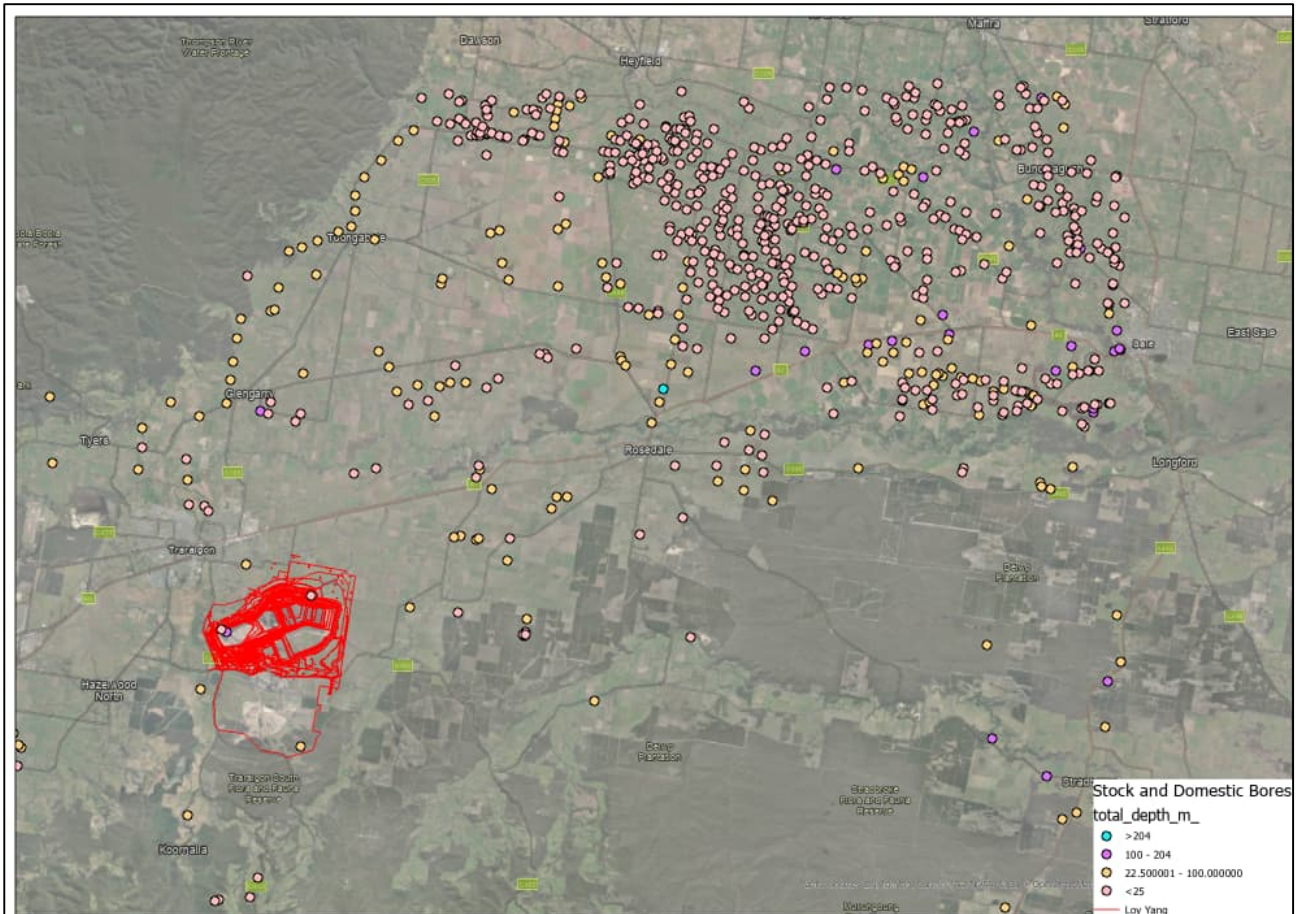


Figure 4-15 Location of all stock and domestic bores

Figure 4-16 below shows the stock and domestic bores greater than 50m depth, and identifies the stock and domestic bores screened within the 107 and 111 aquifers. The stock and domestic bores screened within the 107 and 111 aquifers are the most likely to be impacted due to groundwater extraction. Note that bore 76131 located within the Loy Yang mine licence area is unlikely to still be in use as it was constructed in 1970. Bore 54375 is plotted outside of the modelled extent of the 111 aquifer, and is close to the mapped outcropping bedrock. However the VAF layers on VVG have the bore screened within the 111 aquifer. This bore may therefore require further investigation.

The renewal licence allocation is not predicted to produce any drawdown impacts in stock and domestic bores. This is because the bores screened in shallow aquifers are separated from the deeper pumped aquifers by a thick aquitard. The stock and domestic bores screened in the 107 and 111 aquifers are located outside of the modelled drawdown zone. Bores 54375 and 76131 are not predicted to be impacted due to the discussed points above.



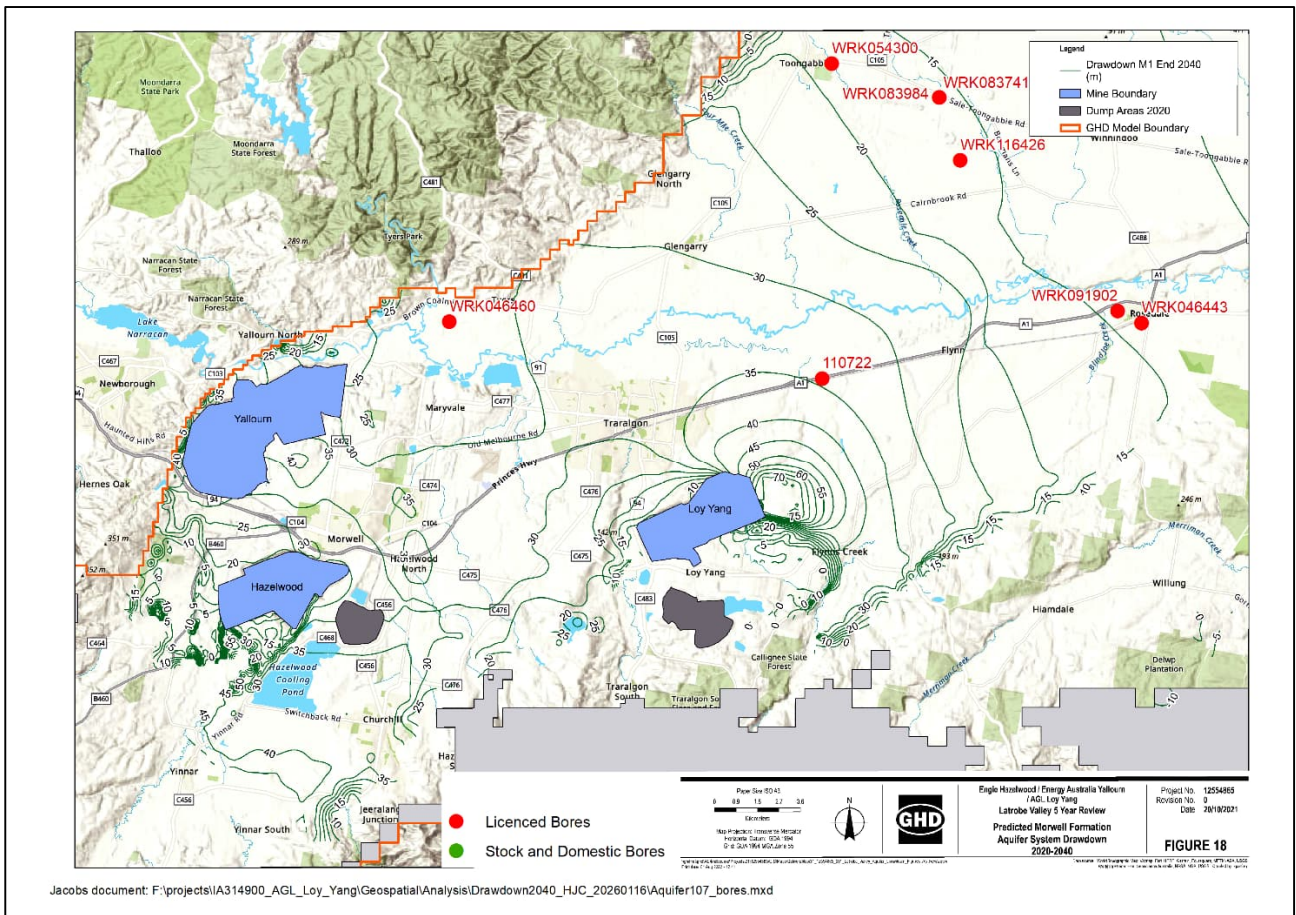


Figure 4-17 Projected drawdown in bores screened within the 107 Aquifer (Morwell Formation Aquifer System).

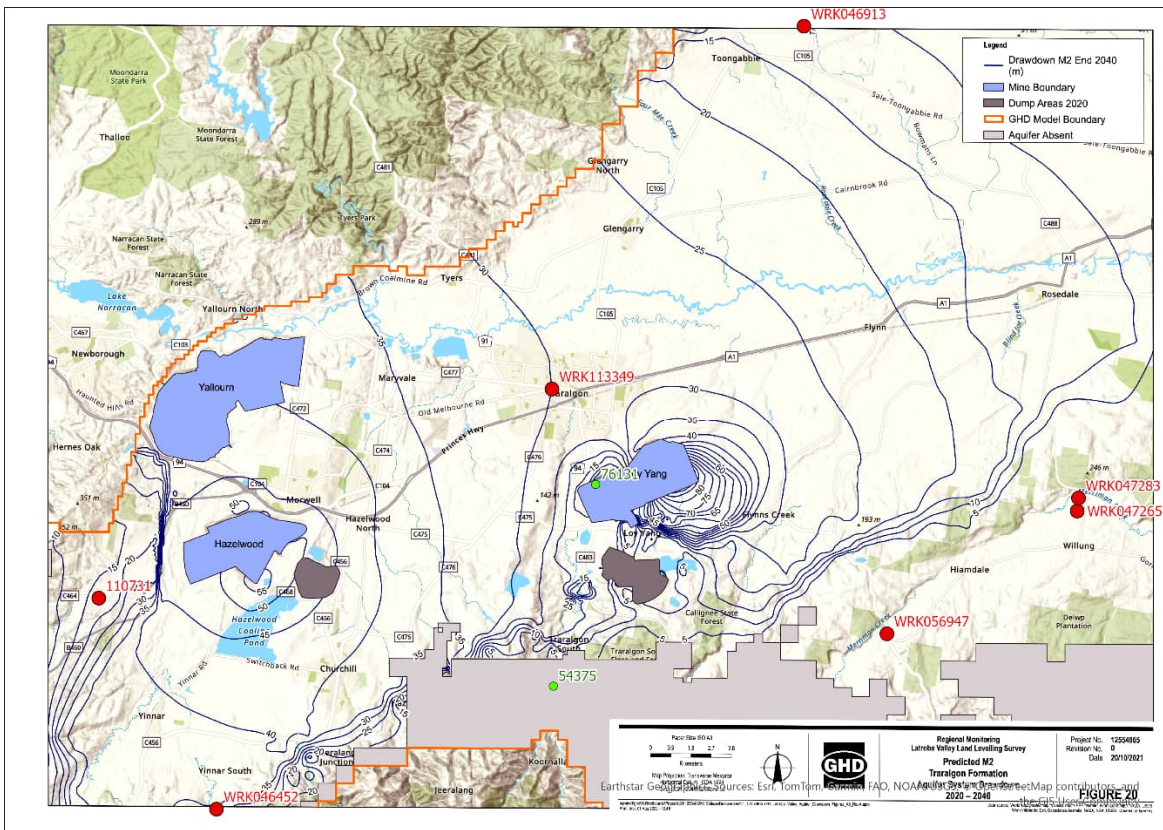


Figure 4-18 Projected 2040 drawdown within the 111 Aquifer (Traralgon Formation Aquifer system).

The predicted drawdown at each bore site was assessed against the potential reduction in water column within the bore considering the individual bore construction. The bore water column was determined by assuming a pump setting depth 5 m above the top of the bore screen, or 10 m above base of bore, if bore screen depths were not available. Standing water level within the bores was estimated from potentiometric surfaces presented on VVG. The drawdown was considered as a percentage of water column reduction in each bore. The outcome of the assessment of all bores is presented in Table 4-16 and a condensed list of impacted bores is presented Table 4-17.

Table 4-16 Impact assessment on licensed groundwater bores

Bore	GMU	Allocation Volume (ML)	Elevation (mAHD)	Depth (m)	Screen from (mbgl)	Screen to (mbgl)	Nominal pump setting depth	Nominal depth to water table (m)	Water column above pump (m)	Predicted drawdown (m)	Drawdown % of bore water column	Remaining water column (m)	Aquifer - using VVG data	Aquifer name	Aquitard thickness between bore depth at top of 107 (m)
WRK032916	Rosedale (GMU)	113.1	67.62	75	49	52	44	5	39	0	0	39	Upper Tertiary Quaternary Aquifer (102)	Haunted Hills formation	45
WRK039070	Rosedale (GMU)	140.1	22.37	31	27	30.79	22	5	17	0	0	17	Upper Tertiary Quaternary Aquifer (102)	Haunted Hills formation	161
WRK039513	Rosedale (GMU)	73	20.49	33.5	-	-	23.5	5	18.5	0	0	19	Upper Tertiary Quaternary Aquifer (102)	Haunted Hills formation	203
WRK039514	Rosedale (GMU)	120	23.98	37.5	30	37.5	25	5	20	0	0	20	Upper Tertiary Quaternary Aquifer (102)	Haunted Hills formation	238
WRK039515	Rosedale (GMU)	12	39.1	70	-	-	60	10	50	0	0	50	Upper Tertiary Aquitard (106)	Hazelwood / Yallorn fm	132
WRK043691	Rosedale (GMU)	2	-	0	-	-									
WRK046440	Rosedale (GMU)	120	22.09	30	-	-	20	5	15	0	0	15	Upper Tertiary Quaternary Aquifer (102)	Haunted Hills formation	257
WRK046443	Rosedale (GMU)	120	17.4	305.8	290.81	296.87	285.81	5	280.81	14	5	267	Upper Mid Tertiary Quaternary Aquifer (107)	Morwell formation	
WRK046452	Rosedale (GMU)	120	93.04	99.8	64	99.8	59	5	54	30	56	24	Lower Tertiary Aquifer (111)	Traralgan formation	
WRK046455	Rosedale (GMU)	202.2	26.88	81	57	69.2	52	5	47	0	0	47	Upper Tertiary Quaternary Aquifer (102)	Haunted Hills formation	106
WRK046460	Rosedale (GMU)	120	34.01	61	46	61	41	5	36	27	75	9	Upper Tertiary Aquitard (107)	Morwell formation	
WRK046481	Rosedale (GMU)	140.1	20.3		-	-									
WRK046913	Rosedale (GMU)	70	64.07	350	-	-	340	20	320	0	0	320	Lower Tertiary Aquifer (111)	Traralgan formation	
WRK047265	Stratford (GMU)	34.5	109.96	168	-	-	158	5	153	1	1	152	Lower Tertiary Aquifer (111)	Traralgan formation	
WRK047283	Stratford (GMU)	34.5	105.9	165	71.3	74	66.3	5	61.3	1	2	60	Lower Tertiary Aquifer (111)	Haunted Hills formation	
WRK052029	Rosedale (GMU)	25	42.4	106	-	-	96	20	76	0	0	76	Upper Tertiary Aquitard (106)	Hazelwood / Yallorn fm	46
WRK054300	Rosedale (GMU)	8.2	66.4	99	86.3	92.3	81.3	20	61.3	18	29	43	Upper Mid Tertiary Aquifer (107)	Morwell formation	
WRK056947	Stratford (GMU)	3	140.21	173	-	-	163	10	153	1	1	152	Lower Tertiary Aquifer (111)	Traralgan formation	
WRK059037	Rosedale (GMU)	14	35.42	70	-	-	60	20	40	0	0	40	Upper Tertiary Aquitard (106)	Hazelwood / Yallorn fm	132

Bore	GMU	Allocation Volume (ML)	Elevation (mAHD)	Depth (m)	Screen from (mbgl)	Screen to (mbgl)	Nominal pump setting depth	Nominal depth to water table (m)	Water column above pump (m)	Predicted drawdown (m)	Drawdown % of bore water column	Remaining water column (m)	Aquifer - using VVG data	Aquifer name	Aquitard thickness between bore depth at top of 107 (m)
WRK065346	Rosedale (GMU)	8	75.21	80	-	-	70	20	50	0	0	50	Upper Tertiary Quaternary Aquifer (102)	Haunted Hills formation	150
WRK065881	Rosedale (GMU)	3.3	25.3	60	48.5	56.5	43.5	10	33.5	0	0	34	Upper Tertiary Aquitard (106)	Hazelwood / Yallorn fm	169
WRK066702	Rosedale (GMU)	18.5	39.9	73.5	68.5	72.5	63.5	20	43.5	0	0	44	Upper Tertiary Aquitard (106)	Hazelwood / Yallorn fm	70
WRK083741	Rosedale (GMU)	55	48.3	120	-	-	110	20	90	16	18	74	Upper Mid Tertiary Aquifer (107)	Morwell formation	
WRK083984	Rosedale (GMU)	55	55.4	120	-	-	110	20	90	16	18	74	Upper Mid Tertiary Aquifer (107)	Morwell formation	
WRK087545	Stratford (GMU)	190	-	157	-	-	147		147		0	147			
WRK091902	Rosedale (GMU)	10	20.3	262	240	252	235	5	230	14	6	216	Upper Mid Tertiary Aquifer (107)	Morwell formation	
WRK095656	Rosedale (GMU)	125	-	161.7	150.5	161.7	145.5		145.5		0	146			
WRK113349	Stratford (GMU)	350	45.2	616	562	610	557	5	552	30	5	522	Lower Tertiary Aquifer (111)	Traralgan formation	
WRK116426	Rosedale (GMU)	85	41.8	355	334	350	329	10	319	17	5	302	Upper Mid Tertiary Aquifer (107)	Morwell formation	
WRK120215	Rosedale (GMU)	29	38.6	117	74.4	117	69.4	50	19.4	0	0	19	Upper Tertiary Quaternary Aquifer (102)	Haunted Hills formation	49
110731	Rosedale (GMU)		92.28	199.5	-		189.5	5	184.5	20	11	165	Lower Tertiary Aquifer (111)	Traralgan formation	
110722	Stratford (GMU)		27.1	429	-		419	5	414	35	8	379	Upper Mid Tertiary Aquifer (107)	Morwell formation	

Results from the analysis shown in Table 4-17 indicate the following potential impacts

- There are no bores that are predicted to 'run dry' as a result of proposed groundwater extraction
- There are 14 licensed bores that may experience drawdown in the available water column.
- These bores range in depth from 61 m to 429 m
- The extent of drawdown in these bores ranges from 1 m to 35 m.

The impacts have been ranked based on % change in bore water column.

- 8 bores have less than 10% change in water column
- 4 bores have between 10-30% change in water column
- 2 bores have >50% change in water column

The combined entitlement volume of the impacted bores is 995 ML.

The entitlement volume of the 2 highest impacted bores is 240 ML.

The results above are based on a desktop assessment of changes in bore water levels arising from the cumulative impacts of groundwater extraction from the three Latrobe Valley mines. The degree to which bore water level changes impact water availability of licence holders can be influenced by several local factors specific to individual sites and this information is not available to AGL LY. These local factors include the size and type of pump being used, the pump installation, the aquifer conditions in the vicinity of the bore, and the usage compared to entitlement. As the results are based on cumulative impacts from the three Latrobe Valley mines, these drawdown impacts are not solely the result of Loy Yang groundwater extraction.

Some of the impacted bores may require further investigation

- Bore WRK046460 is likely to be drawdown as a result of other mines, not Loy Yang
- Bore WRK046452 may not be screened in the Traralgon aquifer. It is very close to the bedrock outcropping
- Bores 110731 and 110722, are unlikely to be used for groundwater extraction. They are former SOBN bores.

**Table 4-17 Potentially impacted licensed bores**

Works_ID	GMU	Volume (ML)	Elevation (mAHD)	Depth (m)	Screen from (mbgl)	Screen to (mbgl)	Nominal pump depth <sup>1</sup>	Nominal depth to water table (m)	Water column above pump (m)	Predicted drawdown (m)	Drawdown % of bore water column	Remaining water column (m)
WRK046443	Rosedale (GMU)	120	17.4	305.8	290.81	296.87	285.81	5	280.81	14	5	267
WRK046452	Rosedale (GMU)	120	93.04	99.8	64	99.8	59	5	54	30	56	24
WRK046460	Rosedale (GMU)	120	34.01	61	46	61	41	5	36	27	75	9
WRK047265	Stratford (GMU)	34.5	109.96	168	-	-	158	5	153	1	1	152
WRK047283	Stratford (GMU)	34.5	105.9	165	71.3	74	66.3	5	61.3	1	2	60
WRK054300	Rosedale (GMU)	8.2	66.4	99	86.3	92.3	81.3	20	61.3	18	29	43
WRK056947	Stratford (GMU)	3	140.21	173	-	-	163	10	153	1	1	152
WRK083741	Rosedale (GMU)	55	48.3	120	-	-	110	20	90	16	18	74
WRK083984	Rosedale (GMU)	55	55.4	120	-	-	110	20	90	16	18	74
WRK091902	Rosedale (GMU)	10	20.3	262	240	252	235	5	230	14	6	216
WRK113349	Stratford (GMU)	350	45.2	616	562	610	557	5	552	30	5	522
WRK116426	Rosedale (GMU)	85	41.8	355	334	350	329	10	319	17	5	302
110731	Rosedale (GMU)		92.28	199.5	-		189.5	5	184.5	20	11	165
110722	Stratford (GMU)		27.1	429	-		419	5	414	35	8	379

Notes: 1. 5 m above screen or 10 m from base of bore

## 4.6.2 (ii) a waterway or an aquifer

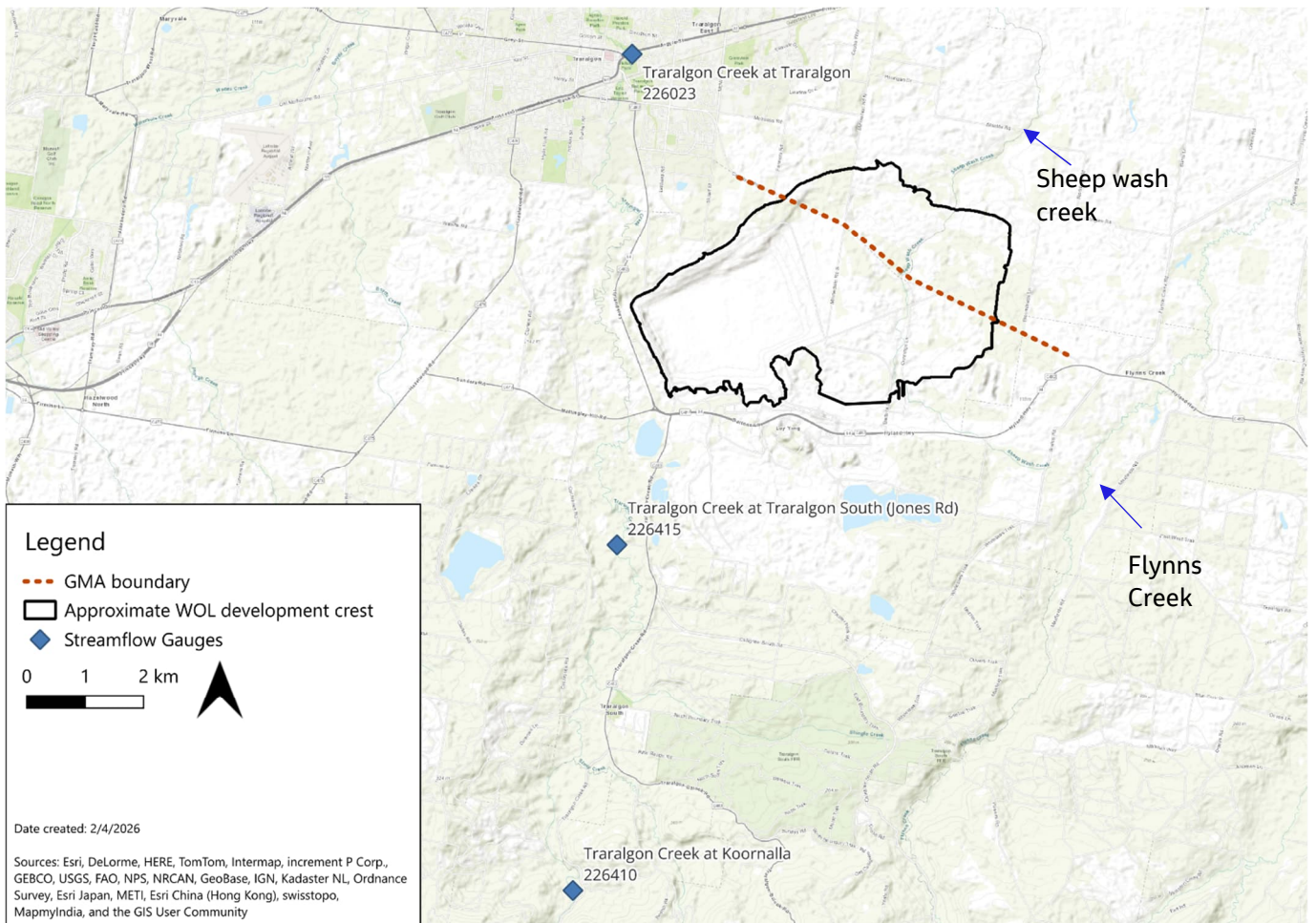
Loy Yang Mine lies within the Traralgon Creek, Sheepwash Creek and Flynnns Creek catchments. Traralgon Creek and Flynnns Creek are tributaries of the Latrobe River. Sheepwash Creek discharges to Loy Yang Creek which flows into the Latrobe River downstream of Traralgon.

### 4.6.2.1 Traralgon Creek, Sheepwash Creek, Flynnns Creek

Sheepwash Creek and Flynnns Creek have stream gauges located several kilometres downstream from the mine. Traralgon Creek has two stream gauges located upstream of the mine (Traralgon Creek at Kootnalla 226410, and Traralgon Creek at Traralgon South 226415), and one stream gauge downstream (Traralgon Creek at Traralgon). Details on the stream gauges is presented in Table 4-18 and Figure 4-19

Table 4-18. surface water stream gauges

Stream gauge	Number	Active / inactive	Data range stream flow
Sheepwash Creek at Traralgon	226416	Inactive	1974-1981
Flynnns Creek at Flynn	226411	Inactive	1954-1985
Traralgon Creek at Kootnalla	226410	active	1953-2026
Traralgon Creek at Traralgon South	226415	inactive	1997-2018
Traralgon Creek at Traralgon	226023	active	1960-2026



**Figure 4-19. Stream gauges close to Loy Yang mine**

Flynn's Creek and Sheepwash Creek stream flow data is presented in Figure 4-20. The creeks have historically ceased to flow during low flow conditions, and may be considered ephemeral (not receiving groundwater baseflow). Note that monitoring stopped at Sheepwash Creek in 1981, and stopped at Flynn's Creek in 1985. This monitoring was and is not conducted by AGL.

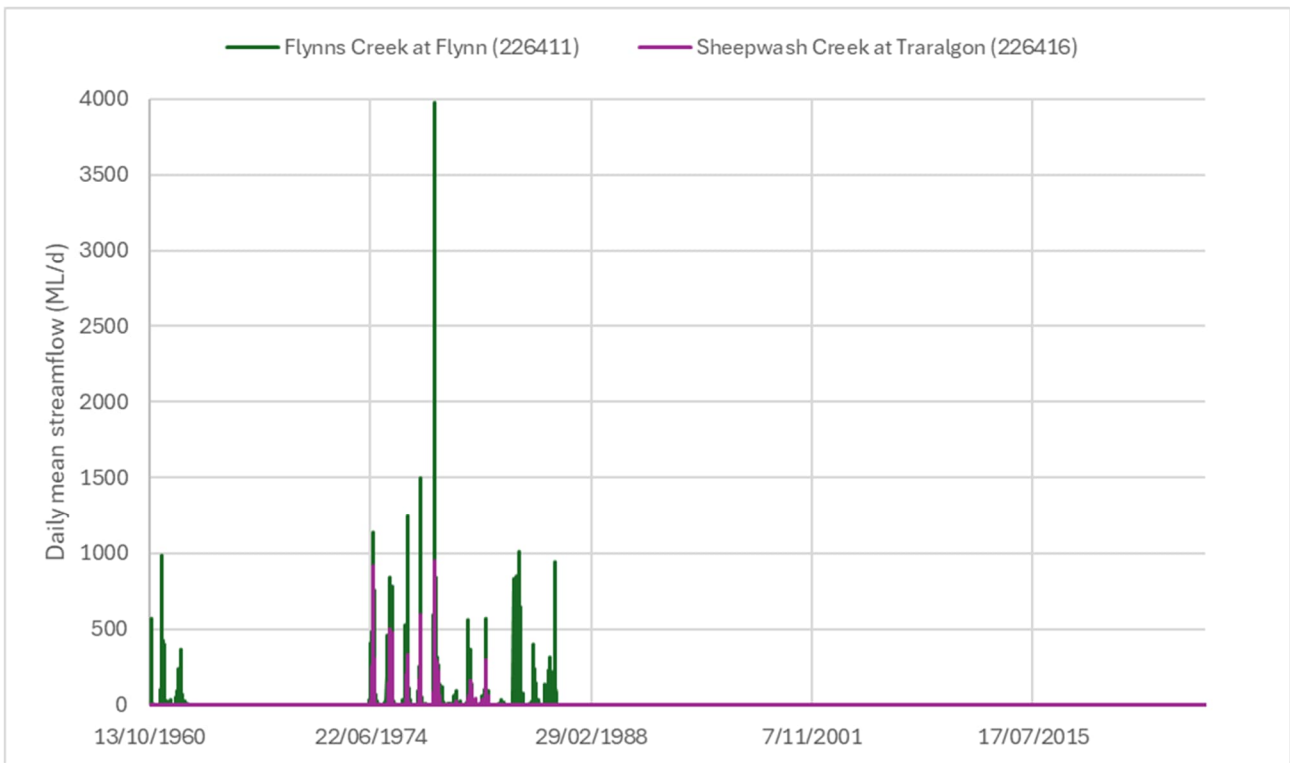


Figure 4-20. Historic streamflow from Flynn's Creek and Sheepwash creek

Traralgon Creek stream flow data is presented in Figure 4-21 and selected low flow conditions presented in Figure 4-22 and Figure 4-23. Stream flow data shows that under low flow conditions Traralgon Creek continues to flow indicating it is receiving groundwater baseflow. The stream reach between Kootmalla and Traralgon South shows relatively neutral gaining/losing stream conditions. Between Traralgon South and Traralgon there is an increase in stream flow under low flow conditions, which may be due groundwater inflows or the Loy Yang site discharges of water to Traralgon Creek. The mine discharge flows to Traralgon Creek follow seasonal patterns and are estimated to be 18% of natural flows in Traralgon Creek. (LVRWS).

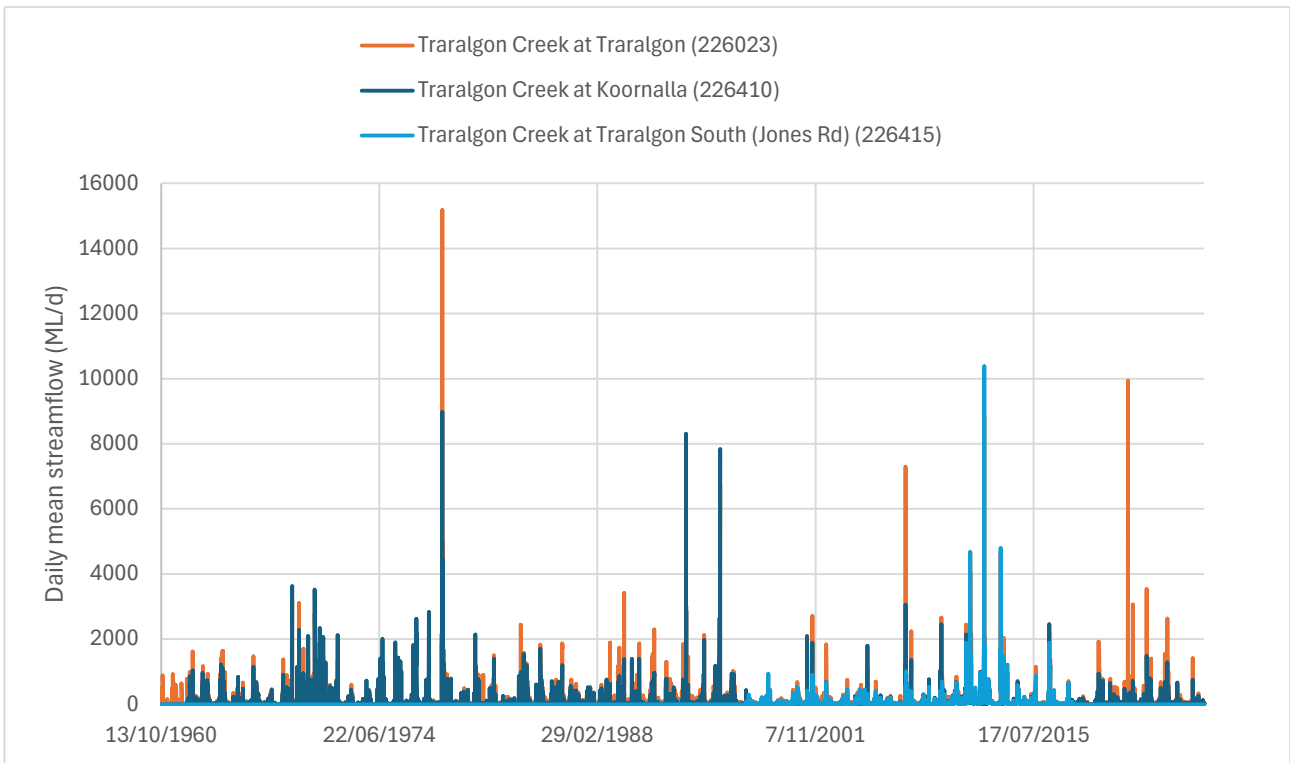


Figure 4-21. Historic streamflow from Traralgon Creek

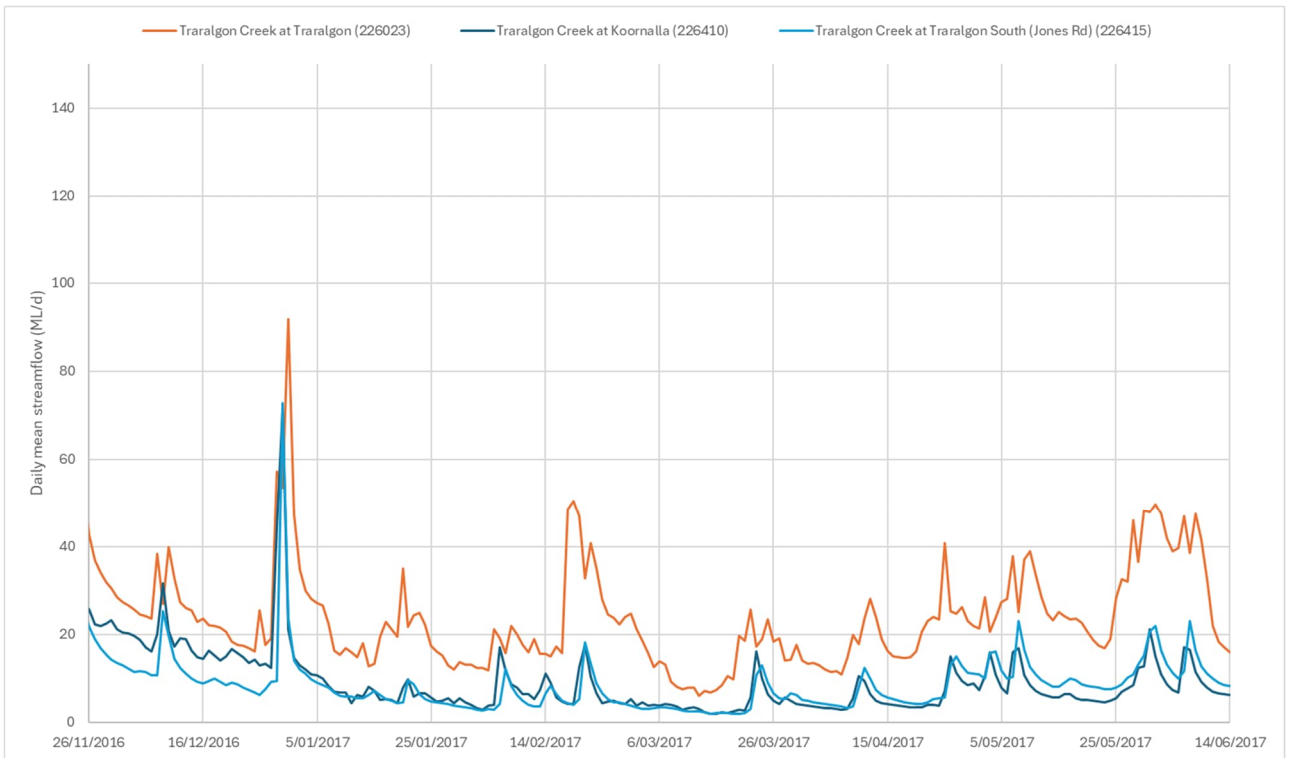
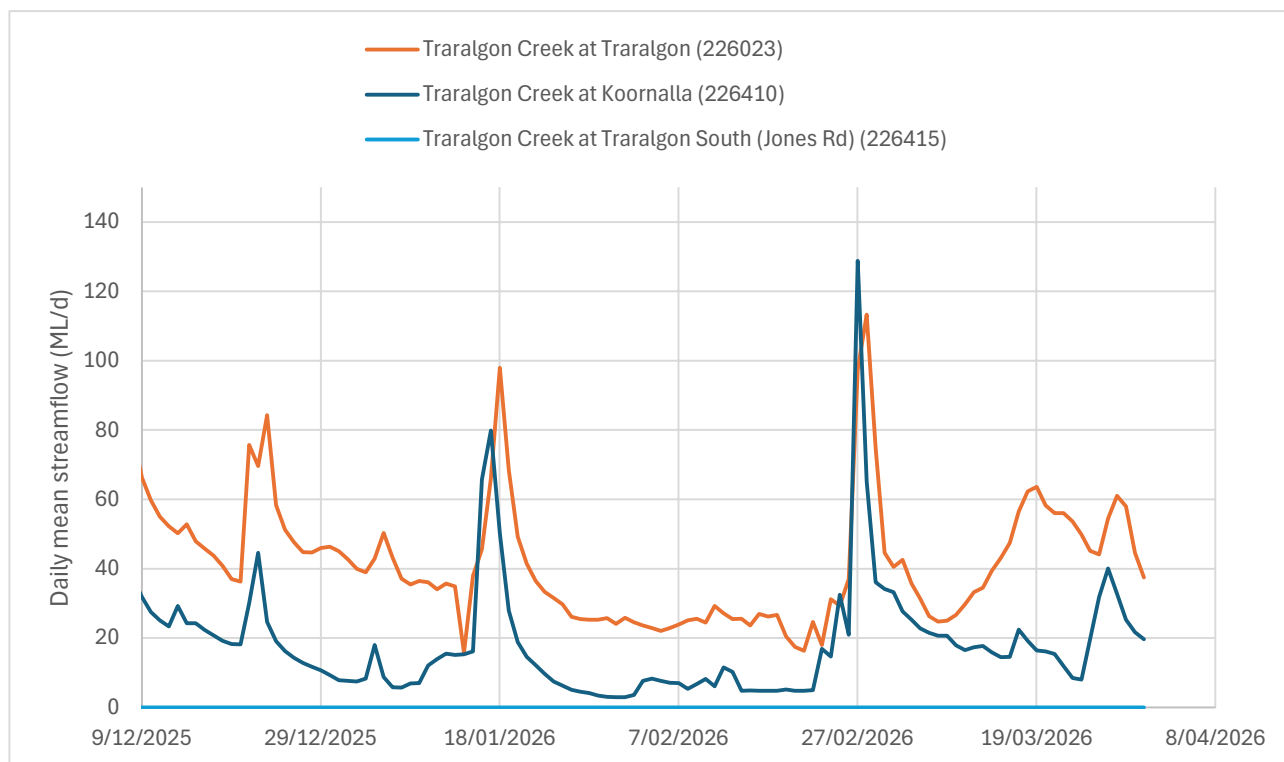


Figure 4-22. Traralgon Creek under low conditions 2016/17



**Figure 4-23. Traralgon Creek under low flow conditions 2025/26**

The potential impacts on waterways of groundwater extraction are expected to be minimal due to the maintenance of shallow aquifer water levels and existing groundwater surface-water interactions. Hydrographs from water table monitoring bores located within the SAS show relatively stable groundwater levels over more than 30 years of groundwater extraction from the deeper aquifers. This is supported by the findings of the Gippsland Basin bioregional assessment that noted 'Hydrographs for the various aquifer systems show significant contrasts in trends between the deeper confined aquifers of the lower aquifer system and those of the shallower aquifers' (Yates et 2015). It was also noted that 'aquifer depressurisation for coal mining and oil and gas development is not considered to have affected the groundwater levels of the Quaternary aquifers and the aquifers of the Haunted Hills Gravel' (Nicol, 2010).

The hydraulic gradients between the relative waterways and the connected shallow aquifer have therefore remained largely unchanged. Long term hydrographs support this understanding by indicating stable groundwater elevation trends from bores located within the SAS (i.e. Haunted Hills Formation) are presented in Figure 4-24 and Figure 4-25.

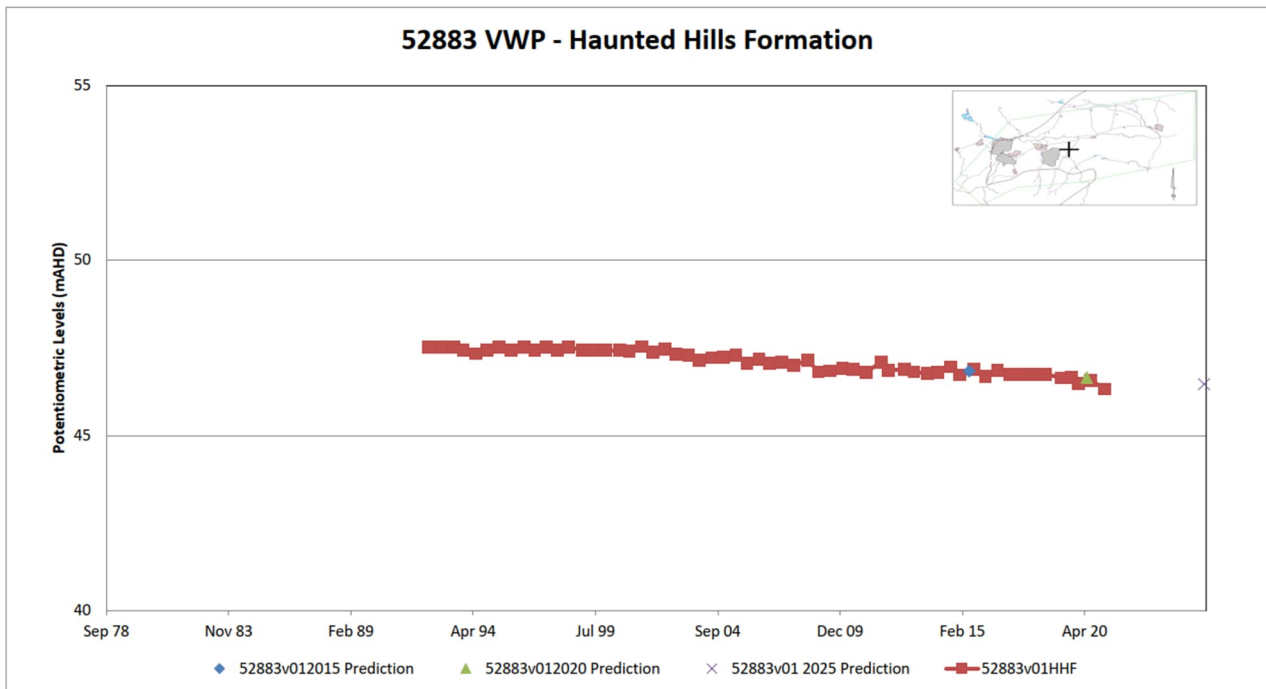


Figure 4-24 Bore 52883 hydrograph

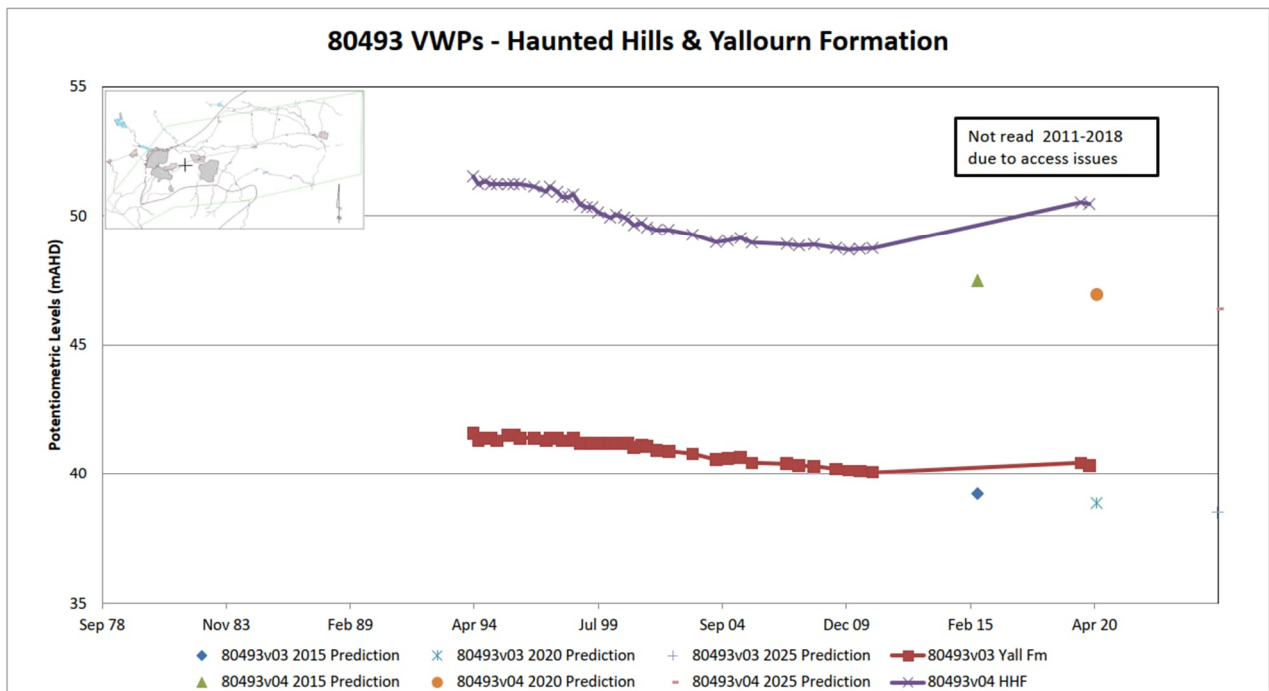


Figure 4-25: Bore 80493 hydrograph

#### 4.6.2.2 Latrobe River

In the location of the Latrobe River the pumped aquifers occur at depths greater than 200m, with at least 150m of this depth consisting of low permeability Upper Tertiary aquitard (Figure 4-26). The aquitard prevents the drawdown impacts within the deeper aquifers from impacting on the shallow aquifer. Similar to the tributaries (Traralgon Creek, Sheepwash Creek, and Flynn's Creek) the stable groundwater levels recorded over the past 30 years provide confidence that there will be limited impacts to baseflow to the river (Figure

4-24 and Figure 4-25).

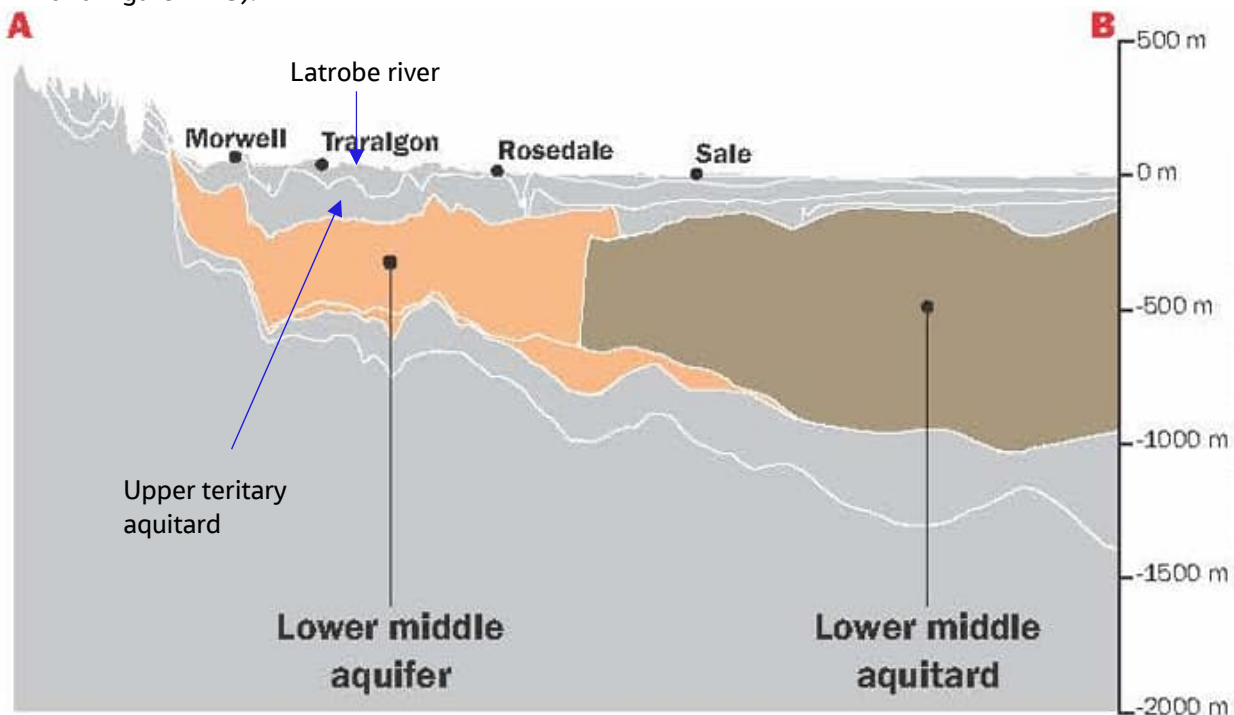


Figure 4-26. Morwell to Sale hydrogeological cross section (SRW 2012, Gippsland Groundwater Atlas)

The closest active stream gauge on the Latrobe river downstream of the Loy Yang mine is gauge 226228 Latrobe River at Rosedale (main stream). This gauge has 90 years of continuous stream flow data from 1936 to 2026 (Figure 4-27). Under dry 'low-flow' conditions the flow in the river will predominantly be coming from groundwater inflows to the Latrobe river and tributaries, or from water releases from storages. Overall, low flow conditions in the river have remained relatively stable over the 30 years of the licence with at least 300 ML/day flow (Figure 4-28). Some changes in the low flows in the river are aligned to changes in the annual rainfall totals, which are available from rainfall gauge 085072 at East Sale (Figure 4-29). In the mid 1990s river 'low flows' were higher flowing 8 consecutive years of above average rainfall (Figure 4-32) Then following this period reduced low flow stream conditions occurred during the millennium draught between 1998-2010, and since then low flow conditions have slightly increased. If continuous groundwater extraction was creating a reduction in baseflow to the Latrobe river and tributaries it would be expected to show as a long term decline in low flow conditions in the river. However this long term trend is not seen in the river flow data. The river low flows have shown some change in response to climate variations, however there is not a long term decline as a result of 30 years of continuous pumping from the Loy Yang mine, and other upstream mines.

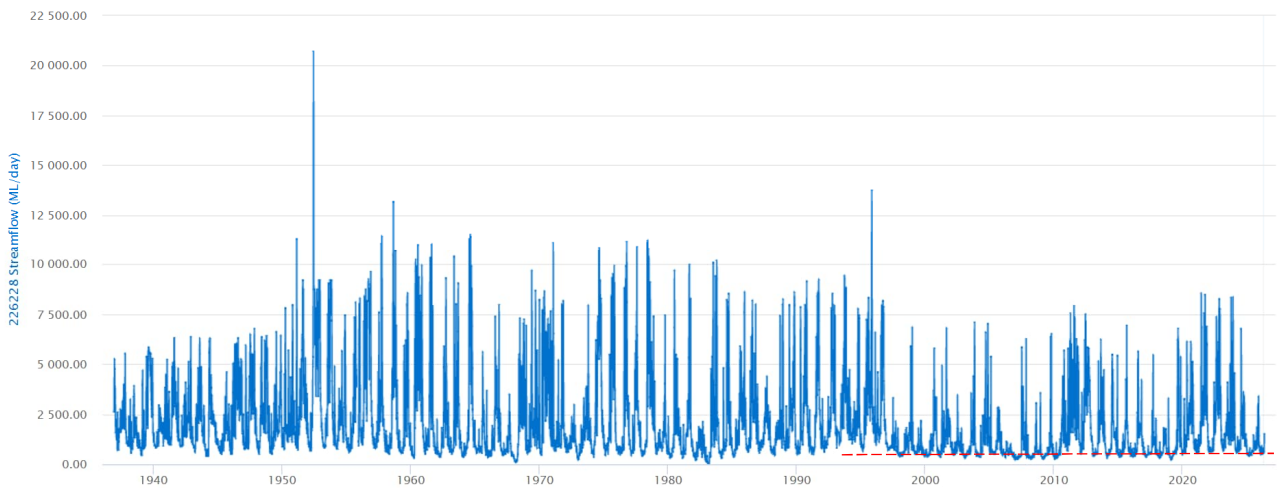


Figure 4-27. River flow from gauge 226228 Latrobe River at Rosedale (main stream). Low flow conditions are highlighted by dashed red line.

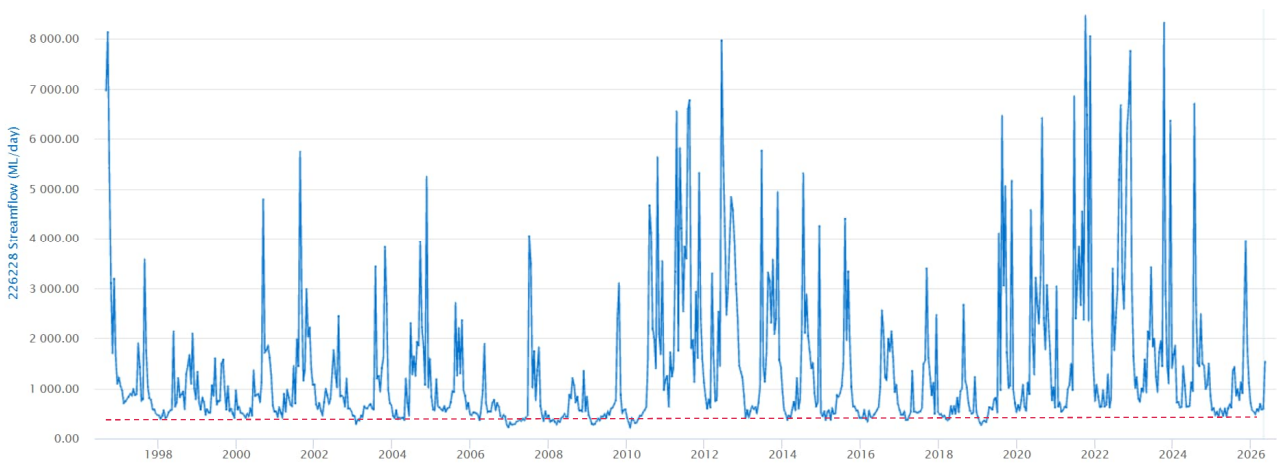


Figure 4-28. River flow from gauge 226228 over previous 30 year licence term. Low flow conditions are highlighted by dashed red line.

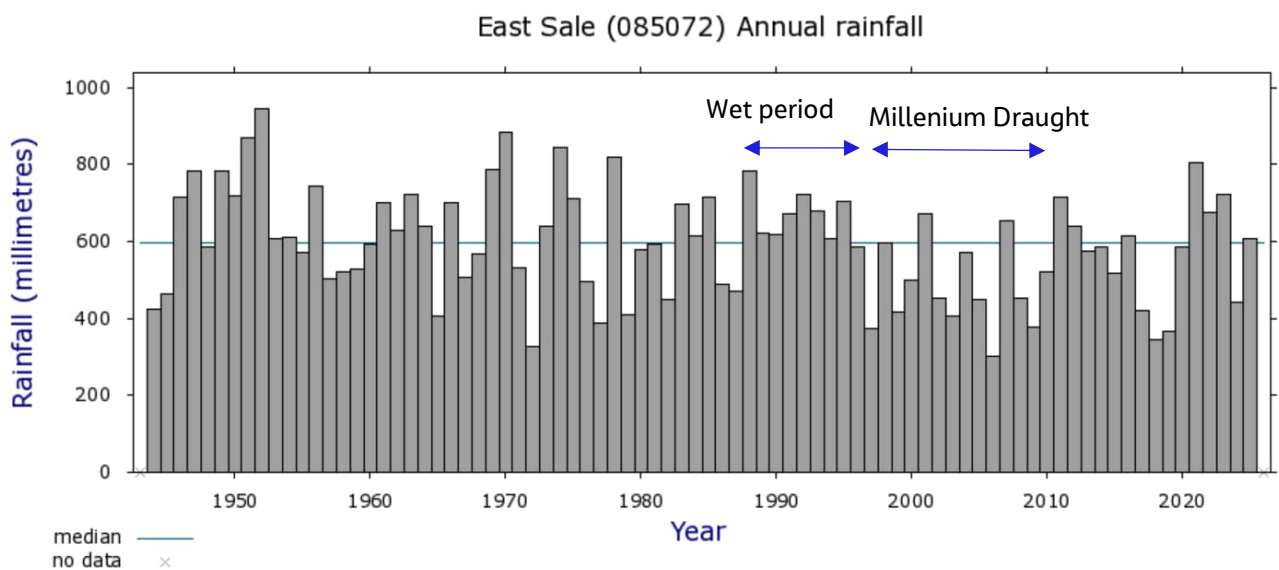


Figure 4-29. Annual Rainfall totals from rainfall gauge 085072 at East Sale

### 4.6.3 (iii) the drainage regime within the meaning of section 12(1)

The drainage regime in section 12(1) of the Water Act means "*all physical and hydrological circumstances that may affect drainage in a catchment, including the use of land but not including any circumstances arising from works that are unlawfully carried out or from any unlawful use of the land*".

As outlined in Section 4.6.2, the shallow aquifer systems are expected to remain stable and unaffected by drawdown, therefore any potential impacts on the catchment's drainage regime are expected to be limited and primarily associated with deeper system behaviour rather than surface-water interactions.

Subsidence modelling was completed for the 2015-2020 - 5 year review and the results are presented in Figure 4-30. Within the Loy Yang mine area in 2040 the largest degree of subsidence that interacts with a waterway is Traralgon Creek to the west of the Loy Yang mine. In this area Traralgon Creek flows from a unimpacted area into a zone of between 0.2-0.3m subsidence, and then flows back into an unimpacted area. Across the subsidence impacted area of Traralgon Creek, the surface elevation falls by 16m (59.2-43.2mAHD). It is therefore assumed that minor subsidence will not create pooling and prevent the drainage of Traralgon Creek. Further away from the Loy Yang mine the Latrobe River is predicted to have subsidence between 0.2-0.3 close to the Yallourn mine, and between 0.3-0.4m between Rosedale and Sale which is potentially due to groundwater drawdown in the Latrobe formation due to offshore oil and gas operations. On a regional scale the modelling shows that the subsidence impacts due to the coal mine groundwater extractions are concentrated around the three mines and are unlikely to cause significant impacts to regional surface water drainage. This is because very little differential settlement is recorded or forecast as a result of drawdown and so the overall drainage pattern is preserved.

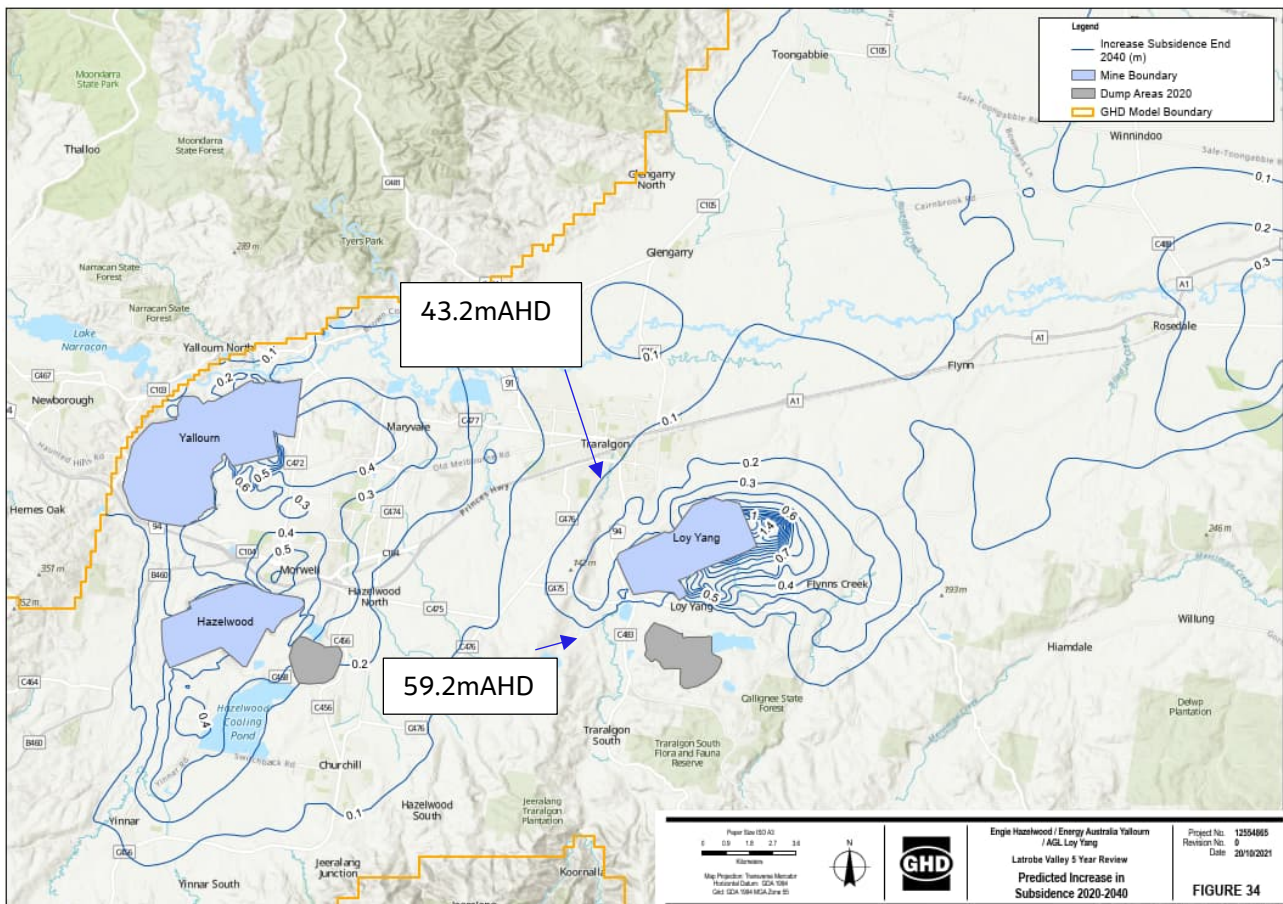


Figure 4-30. Modelled predicted increase in subsidence 2020-2040

#### 4.6.4 (iv) the maintenance of the environmental water reserve in accordance with the environmental water reserve objective

The proposed licence renewal is not likely to adversely affect the maintenance of the environmental water reserve.

The environmental water reserve objective is “...that the environmental water reserve be maintained so as to preserve the environmental values and health of water ecosystems, including their biodiversity, ecological functioning and quality of water and the other uses that depend on environmental condition”.

The environmental water reserve for Durt-Yowan (Latrobe River) is 667GL per annum. The reserve has decreased by 48GL per annum (a 3% reduction) since 2011 due to current water sharing arrangements and climate conditions. The reserve is held in three entitlements:

- Latrobe Reserve
- Blue Rock Environmental Entitlement
- Lower Latrobe Wetlands

The proposed licence renewal represents continuation of an existing water use that has historically operated within the environmental water planning framework for Durt-Yowan (Latrobe River). Under current extraction levels, key environmental water reserve objectives, including maintaining endangered riparian vegetation communities, supporting Lower Latrobe Wetlands ecological functions, and delivering seasonal environmental flows, have been met. Although the proposed renewal will involve an increase in annual

licensed extraction of 2,748 ML, this represents only 0.41% of the environmental water reserve. Because the renewal does not significantly increase water extraction, alter operating conditions, or reduce protected environmental entitlements, it is reasonable to conclude that the proposed licence renewal is unlikely to compromise the environmental water reserve objective.

## **4.7 40(1)(e) - any water to which the applicant is already entitled**

### **Overall Assessment**

For the purposes of s 40(1)(e), AGL Loy Yang holds existing authorisations to take and use groundwater for mine depressurisation from the MFAS and the TFAS supporting associated mine operations and reviewed through an established regional monitoring and reporting framework. The FY25 regional monitoring program indicates that groundwater extraction remains below licensed allocations on an annual basis, with Loy Yang extracting 10,357 ML against a licensed 19,303 ML in July 2024 to June 2025.

A new BWE has been issued for the purpose of mine rehabilitation from 2035. Subject to necessary approvals being obtained, it is intended that this BWE and some groundwater entitlement will be used to fill a mine void to create safe and stable conditions on the site.

### **Analysis**

AGL Loy Yang's existing water entitlements relevant to this renewal comprise the groundwater extraction licence issued under section 51 of the Water Act, which authorises groundwater extraction to support mine depressurisation and stable geotechnical conditions, subject to monitoring, reporting and compliance obligations. The FY25 annual report provides the most current regional compliance context, indicating total extraction across the Latrobe Valley mines of 25,889.7 ML against a licensed total of 41,060.5 ML (36.9% unused), with Loy Yang's annual extraction similarly below the licensed volume (10,357 ML extracted vs 19,303 ML licensed).

The longer-term Five-Year Review (July 2015 to June 2020) shows the same pattern at a broader temporal scale, with Loy Yang extracting 55,579.2 ML over the review period compared with a licensed 99,289.3 ML (approximately 44% unused over five years). This provides additional support that actual take has historically been below licensed volumes and that the entitlement has operated as a managed upper bound rather than a routinely utilised limit.

In relation to the Loy Yang surface water allocation, this is a matter best supported by the specific groundwater–surface water interaction results from the relevant model scenario(s). The regional modelling framework described in the Five-Year Review includes a calibrated regional groundwater model and explicitly incorporates surface water–groundwater interaction processes, suggesting minimal impacts on surface water bodies from the dewatering operations at Loy Yang as described above in Section 4.6.

## **4.8 40(1)(g) - the need to protect the environment, including the riverine and riparian environment**

### **Overall Assessment**

For the purposes of section 40(1)(g), the renewal of AGL Loy Yang's groundwater extraction entitlement supports the continued management of mine depressurisation in a manner that maintains safe and stable geotechnical conditions while managing potential environmental impacts through an established regional monitoring and reporting framework. Current reporting indicates that groundwater extraction remains within the licensed envelope and is supported by routine groundwater level monitoring and land level (subsidence) monitoring, providing an ongoing basis to identify and respond to any emerging risks to environmental values.

Available monitoring evidence indicates that trends in the principal regional aquifers remain broadly consistent with predicted behaviour and that depressurisation impacts to the Shallow Aquifer System are typically limited by low-permeability coals and clays. On this basis, and subject to confirmation via the relevant model outputs for connected receptors, the renewed groundwater take is not expected to give rise to unacceptable adverse impacts on riverine and riparian environmental values beyond those already managed under the existing operational and monitoring regime.

## Analysis

The Latrobe River system supports environmental values of high conservation significance, including riverine, riparian and wetland ecosystems that are sensitive to changes in hydrology and water quality. In the groundwater licence context, protection of these values is primarily addressed through (a) maintaining a robust evidence base to understand aquifer responses and any connected-system effects, and (b) implementing monitoring, reporting and adaptive management measures that enable early detection and response where risks emerge.

The FY25 Regional Monitoring annual report confirms that the regional monitoring program continues to operate, including biannual groundwater level monitoring and completion of land level surveys across 2024 and 2025 to inform updated subsidence contours and tilt assessment (GHD 2026). The report also indicates that total groundwater extraction remains below licensed volumes on an annual basis across the mines, and that observed groundwater level trends in the M2/TFAS are generally consistent with 2025 predictions and continue to show steady regional declines, with a small number of localised exceptions where pressures have stabilised or shifted trend direction.

In relation to the Shallow Aquifer System, which is considered most relevant for direct interaction with near-surface environmental receptors, the FY25 report states that mining-related depressurisation impacts are typically limited by the low permeability of underlying coals and clays, and that observed long-term trends include a slight decline at one key bore and an increasing trend at another in the surficial unit, interpreted as being influenced by seasonal/climatic variability, while deeper SAS units appear less climatically responsive. This is consistent with the Five-Year Review, which indicates that the greatest extraction volumes occur at depth (from the confined regional aquifers) and that thick low-permeability sequences limit vertical hydraulic connection to shallow systems and associated groundwater dependent ecosystems.

Subsidence is a further pathway by which groundwater extraction can influence environmental values by altering surface gradients, drainage patterns, and wetland or watercourse hydraulics. The Five-Year Review reports that maximum subsidence is concentrated adjacent to the mines, reducing rapidly away from the mining areas, and that predictive subsidence modelling indicates continued expansion of subsidence contours in line with historical trends. FY25 confirms that 2024 and 2025 subsidence monitoring has been completed and that the results are being processed to update contours and tilt plots, with further integration of GNSS/InSAR-derived datasets being explored to strengthen regional deformation assessment over time.

### **4.9 40(1)(i) - the conservation policy of the government**

This matter is addressed as part of sections 4.10 and 4.11 below regarding government policies concerning the preferred allocation or use of water resources, and the Environment Reference Standard, respectively.

### **4.10 40(1)(j) - government policies concerning the preferred allocation or use of water resources**

## Overall Assessment

The renewal of AGL Loy Yang's groundwater extraction entitlement is consistent with Victorian Government policy that prioritises sustainable and transparent water resource management, protection of environmental values, and increased recognition of Traditional Owner values in water planning and decision-making. In the

Central & Gippsland Region Sustainable Water Strategy (CGRSWS), Government commits to shifting the region away from reliance on rivers toward manufactured water and to returning water to Traditional Owners and the environment without diminishing existing users; regulated MFAS/TFAS dewatering within established Groundwater Management Areas (GMAs) aligns with these directions.

This renewal supports those objectives by efficiently reusing all of the pumped groundwater for process water or firefighting purposes. This reuse of groundwater reduces the Loy Yang mine's reliance on river water. The efficient use of groundwater as proposed in the renewal application has helped create conditions that enabled 16 gigalitres of bulk water entitlement (Latrobe 3-4 bench allocation) in 2025 to be reallocated from coal fired power generation to traditional owners, agriculture, and the environment. The licence renewal will enable continued, regulated depressurisation under a mature regional program (metering, six-monthly monitoring, QA/QC and reporting to the Regional Monitoring Committee), maintaining the evidence base required for regional water planning as the Latrobe Valley transitions through closure and rehabilitation.

## Analysis

### Policy context relevant to allocation and use

Victorian policy in Gippsland and the Latrobe Valley emphasises long-term water security, efficient and equitable use, and the protection of environmental and Traditional Owner values alongside consumptive uses. The CGRSWS sets out a 50-year pathway to increase use of manufactured water (recycled, stormwater, desalination) so that river water can be made available for returning to Traditional Owners and the environment without taking water from farmers or other users. These policy settings are implemented through entitlement/licensing frameworks that rely on robust monitoring, transparent reporting and adaptive management to manage cumulative and long-term risks.

### Consistency with regional water governance and planning

Groundwater extraction for mine depressurisation is managed within a structured regional program overseen by the Regional Monitoring Committee (RMC), with biannual (six-monthly) monitoring, QA/QC, asset maintenance, and reporting. This program includes MFAS and TFAS observation networks and is administered with Southern Rural Water (Minister's delegate) participation—demonstrating transparent, adaptive management consistent with State policy. The MFAS and TFAS aquifer systems are administered within the Rosedale GMA – Zone 1 and Zone 2 and Stratford GMA – Zone 1, depending on depth, aligning the licence with established preferred-use settings for groundwater in the region.

### Consistency with environmental protection and Traditional Owner policy directions

The Water is Life: Traditional Owner Access to Water Roadmap (2022) sets Government commitments to increase Traditional Owner access and decision-making in water management. Recent returns in Gippsland include a cultural aquifer licence at Buchan Munji (200 ML) and additional cultural surface-water licences for the Tambo River, evidencing the active program of returns. Because MFAS/TFAS dewatering operates within groundwater allocation settings and does not seek additional surface water, it is compatible with the Roadmap's pathways and does not constrain these returns.

In parallel, the LVRRS Amendment (Oct 2023) clarifies timing and principles for water access for mine rehabilitation (primarily a surface-water pathway), including that access must not diminish existing users and values. The present groundwater renewal sits alongside, not in conflict with, those surface-water settings and maintains the monitoring platform needed to assess environmental and connected-system risks (e.g., subsidence) through time.

### Operational efficiency and prudent use within entitlement settings

Government policy regarding preferred use of water resources also implicitly supports the principle that take and use should be managed efficiently and within authorised limits. The FY25 annual report indicates that total groundwater extraction remained below licensed volumes on an annual basis across the mines, with

36.9% of the total licensed allocation unused during the reporting period (noting minor monthly exceedances at Yallourn’s MFAS in May and June 2025 associated with pump configuration testing). This supports a policy-consistent narrative that the entitlement functions as an upper bound within which operations are actively managed, monitored and optimised to meet safety and operational requirements while limiting unnecessary extraction.

Accordingly, the renewal is consistent with government policies concerning the preferred allocation and use of water resources by supporting continued regulated depressurisation for mine safety and stability, while maintaining the monitoring, reporting and adaptive management mechanisms required to protect environmental and Traditional Owner values and to inform broader regional planning as the Latrobe Valley transitions through closure and rehabilitation.

#### **4.11 40(1)(jaa) - any environment reference standard within the meaning of the Environment Protection Act 2017 and any Order made by the Governor in Council under section 156 of the Environment Protection Act 2017**

Groundwater at the site has been assessed under the Environment Reference Standard (ERS) to determine the environmental values associated with each aquifer system, based on their assigned TDS segments. Only the MFAS and TFAS aquifers are influenced by licensed dewatering, with the SAS remaining hydraulically disconnected and functioning independently as the shallow system that supports surface-water interactions and most nearby groundwater users. Given the limited extent of drawdown deeper confined aquifers, ongoing extraction is unlikely to adversely affect environmental values or existing groundwater users within the region.

##### **4.11.1 Analysis**

Assessment of groundwater under the Environmental Protection Act 2017 is carried out under the ERS (VicGov 2021) by assessing the groundwater resource for its current and potential environmental values. The ERS sets out the environmental values of groundwater, the indicators required to assess them, and the reference standards to be applied across different groundwater segments. Groundwater segments are defined according to background Total Dissolved Solids (TDS), and the relevant beneficial uses to be protected for each segment are outlined in Table 4-19.

Segment assignment remains based on the background TDS concentration, with lower-salinity groundwater considered to have a broader range of environmental values. Background TDS for the SAS, MFAS, and TFAS has previously been assessed in Environmental Audit reports for the site (Out Task Environmental 2019; EY 2017), with most recent determinations considering the following groundwater segments are applicable to aquifers underlying the site:

- SAS: Segment B
- MFAS: Segment A2
- TFAS: Segment A2

These segment assignments are based on both background measurements and TDS values from the site’s groundwater monitoring network and reflect the salinity ranges published in the ERS as depicted in Table 4-19 below.

Table 4-19 TDS segments

Environmental value	TDS Segment (mg/L)						
	A1 (<600)	A2 (601-1,200)	B1 (1,201-3,000)	C (3,101-5,400)	D (5,401-12,000)	E (12,101-20,000)	F (>20,000)
Water dependent ecosystems and species	✓	✓	✓	✓	✓	✓	
Potable water supply (desirable)	✓						
Potable water supply (acceptable)		✓					
Potable mineral water supply	✓	✓	✓				
Agriculture and irrigation (irrigation)	✓	✓	✓	✓	✓		
Agriculture and irrigation (stock watering)	✓	✓	✓	✓	✓	✓	✓
Industrial and commercial use	✓	✓	✓	✓	✓	✓	✓
Water-based recreation (primary contact)	✓	✓	✓				
Traditional Owner cultural values	✓	✓	✓	✓	✓	✓	✓
Buildings and structures	✓	✓	✓	✓	✓	✓	✓
Geothermal properties	✓	✓	✓	✓	✓	✓	✓

For the assessment of groundwater extraction and in the context of this document, environmental values pertain to assessing:

- whether groundwater yield is sufficient to sustain a given use
- whether background groundwater quality is suitable for a given use
- whether the use is practicable considering soil or geological constraints
- existing and future land uses on-site and in the surrounding area

For the purposes of this groundwater licence renewal, assessment of environmental values focuses only on those groundwater systems influenced by licensed extraction. At Loy Yang, dewatering activities are confined to the MFAS and the TFAS. The SAS is interpreted to be hydraulically disconnected from MFAS and TFAS depressurisation, based on local stratigraphy and the presence of intervening low-permeability interseam units (GHD 2022). As a result, SAS groundwater levels are not expected to be materially affected by continued extraction from the deeper aquifers.

Surface water interactions are also restricted to the SAS and therefore continued dewatering of MFAS and TFAS is unlikely to influence surface-water-dependent environmental values. Groundwater users in the surrounding district predominantly utilise the SAS for stock and domestic purposes, further reducing the likelihood of any impact on existing beneficial uses.

Given the physical separation between the SAS and the deeper aquifers, existing groundwater users within the MFAS and TFAS are unlikely to experience any adverse impact from ongoing dewatering associated with Loy Yang operations.

#### **4.12 40(1)(ja) - whether the proposed source of water is within a heritage river area or natural catchment area within the meaning of the Heritage Rivers Act 1992 and whether there is any restriction on the use of the area under that Act**

None of the waterways relevant to the MFAS or TFAS groundwater systems (including the Latrobe River, Tanjil River, Traralgon Creek, Sheepwash Creek and Flynns Creek) are declared heritage river areas or natural catchment areas under Schedules 1 and 2 of the Heritage Rivers Act 1992 (Vic); accordingly, that Act places no restrictions on taking and using water associated with these deeper aquifers.

Licensed dewatering is confined to the MFAS and TFAS aquifer systems. The SAS is interpreted to be hydraulically disconnected from MFAS/TFAS depressurisation due to intervening low-permeability interseam units; therefore, SAS water levels and any SAS-linked surface-water interactions (e.g., baseflow to local creeks) are not expected to be materially influenced by ongoing extraction from the deeper systems. Because the Heritage Rivers Act listings do not include the surrounding waterways and the MFAS/TFAS do not hydraulically interact with those rivers, there are no heritage-river constraints applicable to the proposed continued dewatering of MFAS/TFAS.

#### **4.13 40(1)(k) - if appropriate, the proper management of the waterway and its surrounds or of the aquifer**

The MFAS and TFAS, relevant to the licensed dewatering, are managed within the Rosedale Groundwater Management Area (Zone 1) and the Stratford Groundwater Management Area (Zone 1), depending on depth and aquifer, providing the statutory framework for allocations, metering and oversight. Routine metering, biannual regional monitoring and reporting via the Regional Monitoring Committee (RMC) collectively demonstrate that extraction remains controlled and aquifer responses are actively tracked, satisfying the requirement for the proper management of the aquifer under s 40(1)(k).

##### **4.13.1 Evidence of proper aquifer management (annual/RMC program)**

- GMA administration: Extraction occurs from Rosedale GMA – Zone 1 and Zone 2 and Stratford GMA – Zone 1.
- Metering & audits: All mine dewatering bores are metered, with telemetry/SCADA and pump-hour cross-checks; Southern Rural Water's 2018 audit identified no immediate metering issues (GHD 2022).
- Monitoring discipline: A regional network focused on MFAS/TFAS is monitored biannually (i.e. ~38 MFAS and ~56 TFAS installations measured), with QA/QC and an ongoing asset rehabilitation program to maintain data reliability.
- Adaptive governance: An RMC, (comprising the mine operators, Southern Rural Water and government representative from DEECA and DJRP) oversees monitoring, modelling and reporting, and recommends program adjustments.

#### **4.13.2 Five-Year Review (July 2015–June 2020): management outcomes relevant to s 40(1)(k)**

- **Conservative utilisation:** Total extraction (122,831 ML) remained well below licensed allocations (224,670 ML), leaving ~45% of the licensed volume unused, indicating prudent operation within GMA settings.
- **Observed aquifer behaviour:** MFAS and TFAS pressures generally declined at <1 m/yr across the region, with higher localised rates adjacent to mine areas. The SAS showed lower, more variable trends, consistent with limited vertical connectivity and low yields.
- **Model-based predictions:** A calibrated MODFLOW-USG model predicts drawdown cones centred on the mines, e.g., MFAS up to ~40 m east of Loy Yang and TFAS up to ~25–30 m around Loy Yang/Hazelwood by 2025 which remains consistent with planned operations and includes GMA oversight.
- **Program robustness:** The regional plan includes six-monthly monitoring, annual reporting and five-yearly comprehensive reviews (groundwater and subsidence), with recommendations to update the network and priorities, providing evidence of an adaptive management loop aligned to proper aquifer management.

#### **4.14 40(1)(l) - the purposes for which the water is to be used**

The primary purpose of taking water under the renewed groundwater entitlement is to depressurise the MFAS and TFAS aquifer systems to maintain safe and stable geotechnical conditions at the Loy Yang Mine during operations, transition, and into rehabilitation. Depressurisation of the major regional aquifers is an established requirement for managing slope and stability risks at the Latrobe Valley mines and has long been undertaken under groundwater licences for this purpose.

Once groundwater is extracted it is 100% reused on the mine site. The water is used for two purposes.

1. Process Water – predominantly used for cooling water at Loy Yang A and Loy Yang B power plants.
2. Fire Fighting water supply – pumped and store in the fire service pond.

The water pumped from all aquifers is used for the same purpose. The water quality is similar between the aquifers and there is no differentiation between how or when the water is used between aquifers.

Water is stored and pumped via the Low Quality Water (LQW) network, where flows from mine bore pumps are routed to an artesian collection tank and the Main Artesian Pump Station, then piped to high-level storage and distribution within the plant as depicted in Figure 4-31 below.

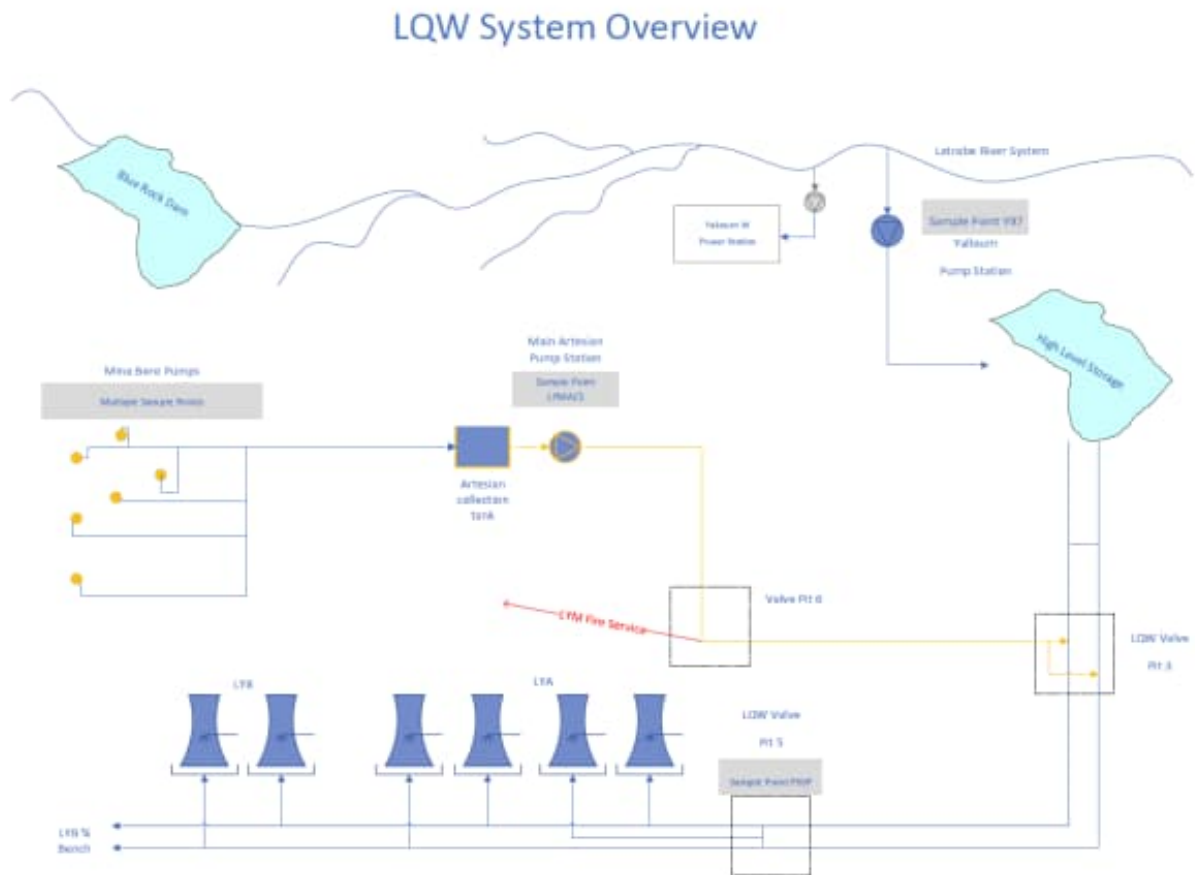


Figure 4-31 LQW System Overview

## Analysis

### Groundwater dewatering

The Latrobe Valley mines must depressurise the major confined aquifers beneath the mines to maintain geotechnical stability. At Loy Yang, this is achieved by licensed pumping from MFAS and TFAS, supported by regional monitoring, modelling and reporting under a structured program (GHD 2022).

Depressurisation is implemented through a metered network of bores with telemetry where applicable, QA/QC of data, and six-monthly monitoring and reporting to the Regional Monitoring Committee, ensuring the take remains targeted to the safety purpose and transparently managed.

At Loy Yang, MFAS and TFAS are the only aquifers dewatered for stability management; there is no SAS extraction. Regional evidence shows the SAS is shallow, lower-yielding and not materially influenced by deeper depressurisation, reinforcing that the licence purpose is confined to the deeper systems.

Regional monitoring and calibrated modelling show cones of depressurisation centred on the mines, with predicted drawdown to 2025 managed around mine development and closure planning—i.e., extraction is fit-for-purpose (stability) and spatially focused.

### Industrial Process water

Following depressurisation, groundwater is captured and reused on site. Flows from the mine bore pumps are routed to the artesian collection tank and the Main Artesian Pump Station (MPS), then piped to high-level storage and distributed through the LQW network to Loy Yang A and B for process duties and the site fire

service. This arrangement minimises wastage and reduces reliance on external supplies, while the primary purpose of the licence remains geotechnical stability.

As shown in Figure 4-32, the majority of the dewatered groundwater volume (blue bars) have been utilised for plant process water via the LQW (red bars). The plant process water is used for Loy Yang A and Loy Yang B. The remaining water (gap between the blue bars and red bars) is mostly directed to water storages such as the fire service pond. Overall, the Loy Yang groundwater is extracted for the primary purpose of safe and stable mining conditions with beneficial secondary on-site reuse.

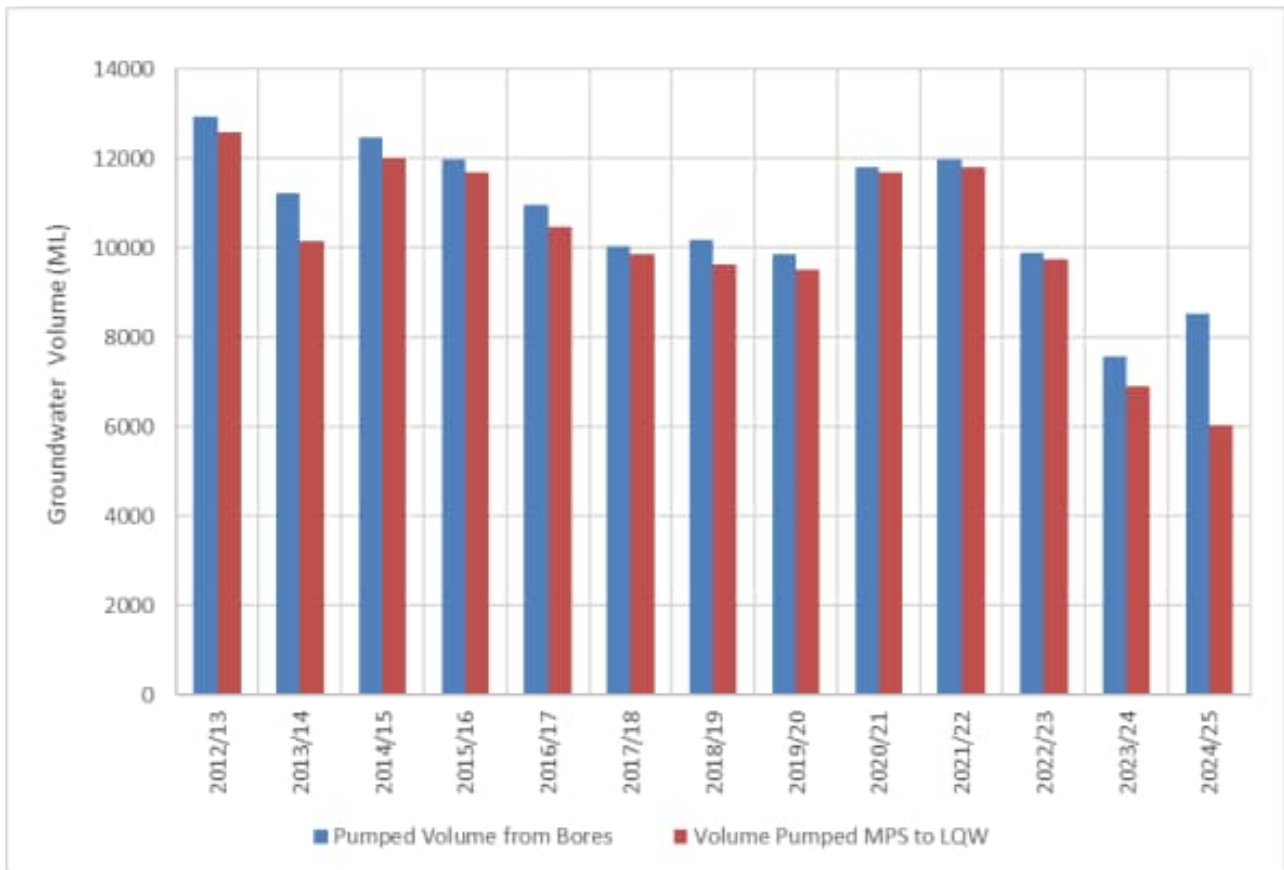


Figure 4-32 Annual volume from bores vs volume utilised for plant operations (2012/13–2024/25)

#### 4.15 40(1)(m) - the needs of other potential applicants

The future requirements of Yallourn and Hazelwood coal mines in the La Trobe valley have been accounted for in the numerical modelling conducted for the 5-year review. The licence renewal for Loy Yang is not expected to limit the access to groundwater of the other mines.

The Traralgon aquifer has temperatures above 30 degrees Celsius and potential as a geothermal resource. Long term monitoring data indicates that temperatures in the Traralgon aquifer bores have remained stable and the potential use as a geothermal resource has not been impacted Figure 4-8. The demand for groundwater in the deep aquifers in the La Trobe valley may be limited by high drilling costs and the fully allocated PCV which requires trading to access water.

## SECTION 53

### **4.16 53(1)(e) - any other matter that the Minister thinks fit to have regard to**

This item has not been addressed in the licence application. It is at the discretion of the Minister.

### **4.17 53(2)(a) - any relevant Order under section 52A**

There is not considered to be any current relevant orders under section 52A.

### **4.18 53(2)(b) - any relevant order made by the Governor in Council under section 49A of the Groundwater Act 1969 specifying an annual reserve volume of groundwater;**

There is not considered to be any current orders under section 49A of the Groundwater Act 1969.

### **4.19 53(2)(c) - any relevant prescription made under section 62(1) of the Groundwater Act 1969 in respect of a groundwater conservation area declared under section 61 of that Act**

There is not considered to be any relevant prescription made under section 62(1) of the Groundwater Act 1969.

### **4.20 53(2)(e) - any approved management plan for the relevant water supply protection area.**

The extraction falls within the Stratford and Rosedale groundwater management areas. There are no water supply protection areas that are impacted by the extraction.



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