

Water availability and Latrobe Valley coal mine rehabilitation



Image: Loy Yang mine pit

The current proposed solution to rehabilitate Latrobe Valley open-cut coal mines is to fill them with water. But newly released government studies and documents obtained under freedom of information laws reveal major concerns about water availability, ecological impacts and groundwater pollution.

OVERVIEW

The 2014 Hazelwood mine fire showed the dangers open-cut coal mines in the Latrobe Valley can pose to local community health. As coal power stations in the Valley inevitably close, owners have a legal responsibility to ‘rehabilitate’ the mine sites to reduce the risk of future environmental disasters.

Mine rehabilitation is the process of repairing the damage done by mining activity. This can involve simply making the site safe and stable, but global best practice strives to create a landscape that can support

future uses of the land – such as returning it to an agricultural landscape or identifying new beneficial uses.

At a practical level, coal mine rehabilitation typically involves flattening the steep sides of the mine, covering exposed coal with soil and clay and re-vegetating the area with trees and grasses. In the case of the Latrobe Valley mine sites, the government’s *Latrobe Valley Regional Rehabilitation Strategy (LVRRS)* released in June 2020 sets out a number of principles for how to achieve “safe, stable and sustainable” outcomes.

All mine operators currently intend to fill their mine pit with water. However, the technical reports underpinning the LVRRS have now been released, and they reveal major concerns about this pit lake solution.



Figure 1. As a guide for scale, the image above shows the Hazelwood mine overlaid onto central Melbourne. The mines vary from approximately 80 metres deep (Yallourn) to 200 metres deep (Loy Yang). Hazelwood is on average 100 metres deep. (Source: Environment Victoria)

HOW MUCH WATER IS NEEDED TO FILL THE MINES?

The second installment of the Hazelwood Mine Fire Inquiry in 2015/16 found that pit lakes were likely to be the easiest final “landform” for the mines, owing to the absence of sufficient overburden (rock and dirt) that could be returned to the mines to even partially fill the holes left by decades of coal extraction.

Since that inquiry, significant research and analysis has been done on whether there is likely to be enough water available to convert the mines into pit lakes.

Filling or partially filling the mines would require enormous volumes of water (see the table below, figures taken from LVRRS technical documents). For comparison, Sydney Harbour holds approximately 500 GL of water.

Mine	Scheduled closure date	Volume required for stability (GL)	Volume required for full pit lake (GL)
Hazelwood	Closed	530	638
Yallourn	2032	0	725
Loy Yang	2048	1,111	1,418

WHAT NEW INFORMATION IS AVAILABLE?

In June 2020, the Victorian government released its *Latrobe Valley Regional Rehabilitation Strategy*, accompanied by summaries of various technical documents.

The full technical documents were not made public during consultation on the draft Strategy, despite requests from Environment Victoria. We then lodged a Freedom of Information request to obtain these documents, and as a result these have now been made public. Key documents covered in this briefer include:

- *Latrobe System Water Availability – Technical Report*
- *Latrobe Valley Regional Water Study: Ecological Effects Assessment*

These documents shine more light on how problematic it would be to allow mine operators to draw water from the Latrobe River system to fill or even partly fill coal mines.

You can find these technical documents at <https://earthresources.vic.gov.au/projects/lvrrs/reports>. Key findings are discussed on the following pages.

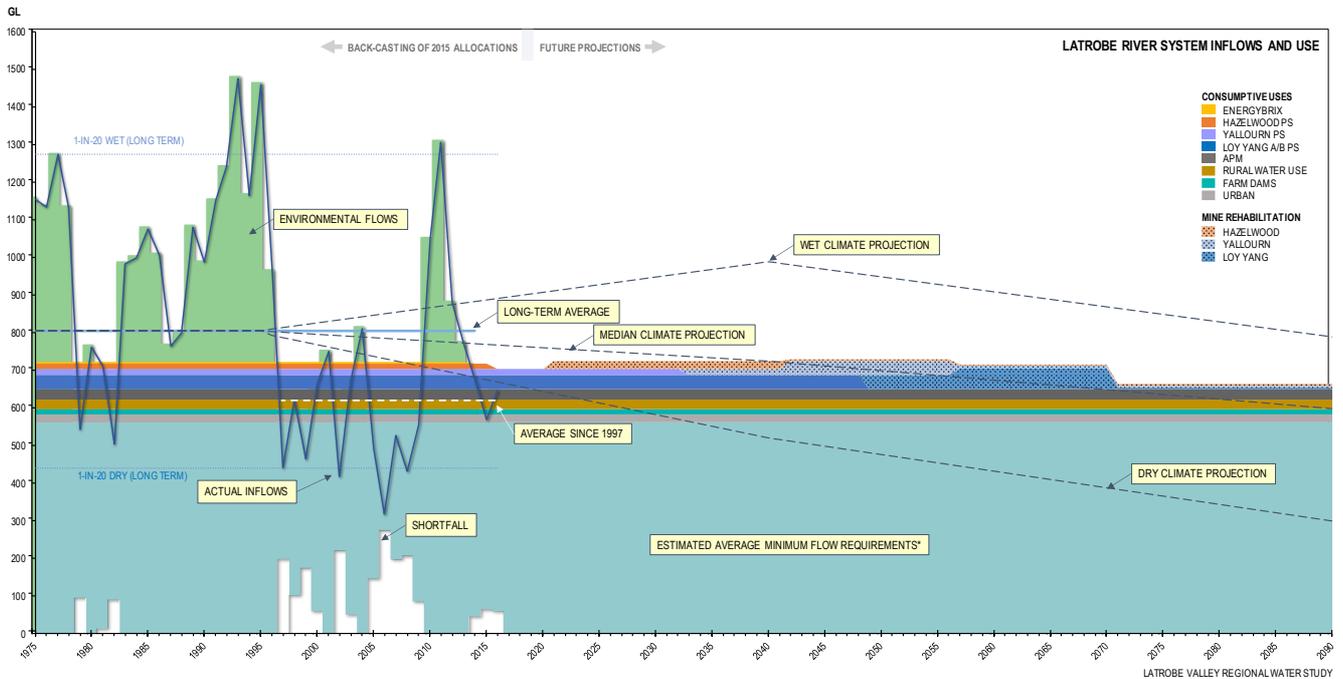


Figure 2. Historical inflows, projected average annual inflows and surface water use under planned mine closure and filling of mine voids with water from the Latrobe System (Scenario 01 – max fill, planned closure). Source: Latrobe System Water Availability Technical Report, p.31

Latrobe System Water Availability – Technical Report

A critical chart from the Water Availability Technical Report is shown as Figure 2 above.

It reveals that:

- Under a dry climate scenario, by the early 2030s there will be less water available in the Latrobe River system than is required for minimum environmental flow requirements, even ignoring existing human uses of water.
- That means any water taken from the river system (for urban use, agriculture, power generation or mine rehabilitation) would be having a negative environmental impact on the health of the river system.
- Under a median climate scenario, by the early 2040s the additional water consumption that would be used for mine rehabilitation will exceed average water availability. More than half the water required to fill Loy Yang will not be available under median climate projections for the 2050s and 2060s.

It is worth noting that Victoria is already tracking towards the drier end of climate projections (as per the Victorian government's 2019 Climate Science report, Figure 3 below). This suggests that the median climate scenario in the water availability chart is likely to overstate the availability of water.

Observed winter rainfall in Victoria is tracking towards the drier end of projections

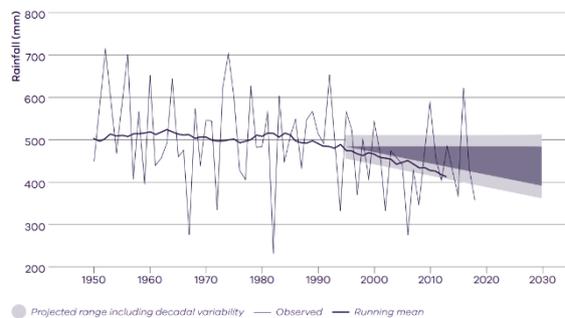


Figure 3. Observed rainfall averaged over Victoria (Australian Water Availability Project; thin black line) plus the 10-year running mean (thicker line), and the projected rainfall change to 2030 across climate models and emissions scenarios. (Source: Victoria's Climate Science Report 2019, p.30)

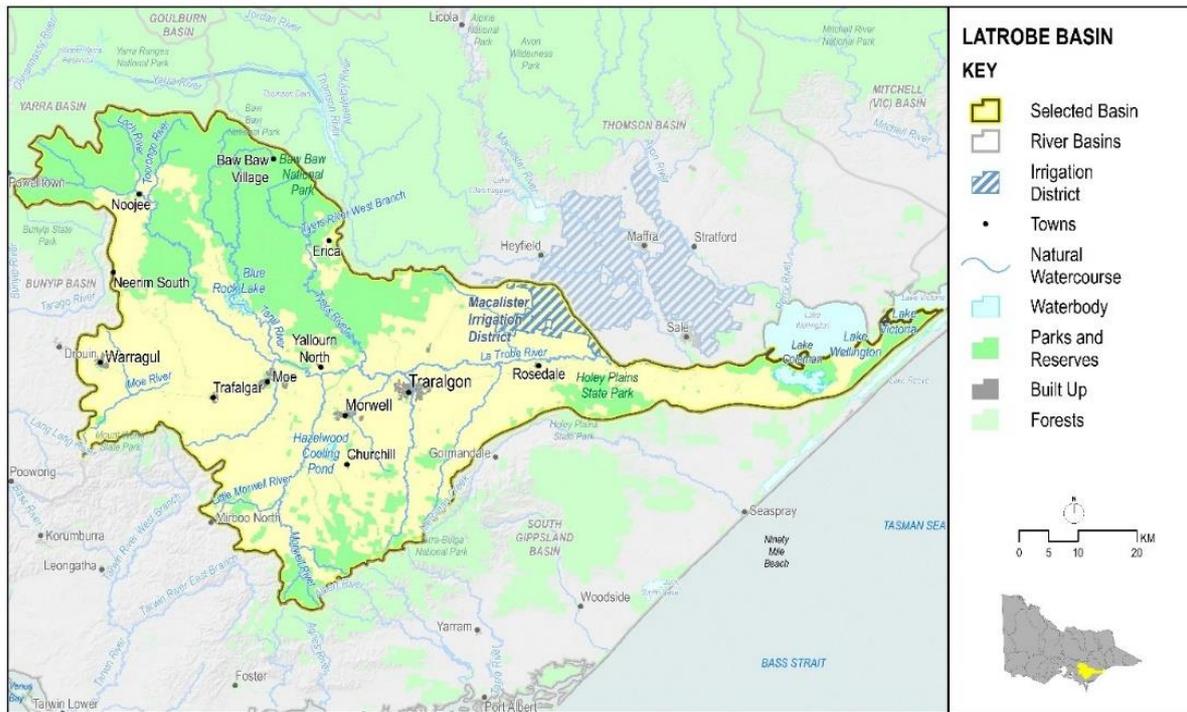


Figure 4. This map from the Victorian Department of Environment, Land, Water and Planning shows the catchment of the Latrobe River and its eventual path to the Gippsland Lakes. (Source: DWELP 2018)

Ecological effects assessment

This report assesses the expected ecological consequences of allowing mine operators to use water from the Latrobe River system to fill the mines.

Key points from the report include (emphasis added):

- “Hydrological modelling indicates that climate change and continued water use at current levels will have further highly adverse impacts on hydrological regimes, and that **a full uptake of water entitlements for mine rehabilitation would exacerbate the effects of insufficient flows in this heavily flow-stressed river system.**”
- “It is expected that a continued decline in water availability for the ecologically important components of the flow regime (e.g. baseflows, freshes and bankfull/overbank flows) **will have escalating impacts on the ecological condition of the system.**” That is, rivers and wetlands still need water at the right times, including floods, to maintain ecosystem health. Simply taking water from the river system during particularly wet years still presents problems.
- “To maintain freshwater dependent values and meet the management objectives for the Latrobe River, more freshwater for the environment is required – not less.”
- “Decreases in water availability in the Latrobe system will result in **multiple and interconnected threats resulting in loss of ecosystem and social values from the Latrobe River, its estuary and the Lakes.**”
 - This will include decreased breeding of native fish, waterbirds, frogs, turtles.
 - Specific threatened species include the Australasian bittern, green and golden bell frog, growling grass frog, and the Australian grayling.
- “The predicted impacts from reduced inflows in the Latrobe River to the aquatic ecosystems of the Lower Latrobe Wetlands, Lake Wellington and the Latrobe Estuary have implications with respect to Australia’s obligations under the Ramsar Convention.”

HOW THESE INFORMED THE LATROBE VALLEY REGIONAL REHABILITATION STRATEGY (LVRRS)

Key points from the LVRRS (emphasis added):

- The LVRRS states “any water used for mine rehabilitation should not negatively impact on Traditional Owners’ values, environmental values of the Latrobe River system or the rights of other existing water users”.
- The LVRRS also states that water is needed as weight balance to prevent floor heave i.e. to keep the mine floor stable.
- The LVRRS assumes closure dates for the Latrobe Valley mines remain the same and largely avoids overlapping fill needs.
- **The LVRRS reveals that 15 GL of water would need to be added to the pit lakes per year just to offset evaporation. “In comparison, water supplied to towns (excluding industry) across Central Gippsland totaled approximately 13 GL per year in 2017–18.”**
- The LVRRS acknowledges that under a dry climate scenario **“water from the Latrobe River system would not be available for mine rehabilitation because it would have unacceptable impacts on other existing entitlement holders and minimum environmental flows.”**

Costs of alternative water

- The LVRRS states that alternative sources of water include desalinated water, recycled water and stormwater.
 - The Victorian government’s order for 125 GL of water from the desalination plant in March 2020 is expected to cost around \$76 million, or \$0.6 million per GL.
 - On that basis, Environment Victoria has calculated the estimated cost to mine operators of using desalinated water, outlined in the table below.
- These figures assume the mines reach their final size at the currently planned closure dates. If the mines were to close earlier and therefore be smaller, the volume of water needed to fill the pit would be less – especially for Loy Yang, which is projected to grow by the greatest proportion.
- **Our calculations indicate that by closing in 2030 rather than 2048, AGL could avoid up to \$261 million in water costs for filling the Loy Yang mine.**

Mine	Cost of desalinated water to partly fill for stability	Cost of desalinated water to fill
Hazelwood	\$318 million	\$382 million
Yallourn	-	\$435 million
Loy Yang	\$667 million	\$851 million

REHABILITATION BONDS

Mine rehabilitation bonds for each of the Latrobe Valley coal mines were updated in the wake of the Hazelwood Mine Fire Inquiry.

The findings of the water availability study show that full pit lakes using water from the Latrobe River system are unviable. This is especially so for Yallourn and Loy Yang which, theoretically, will not close until the drying impact of climate change has become more pronounced.

This is likely to increase the cost of rehabilitation.

Earthworks and covering exposed areas with clay is a major cost in rehabilitation. Either these earthworks need to go deeper into the mine or more water will need to be purchased. Both outcomes would add to the cost.

The Victorian government has previously made it clear that they intend for the mine rehabilitation bonds to [reflect the full cost of rehabilitation works](#). But the existing bonds are unlikely to be sufficient to cover the likely rehabilitation works needed at each mine and should therefore be increased.

This will serve to protect the public purse from having to cover the cost and will give confidence to the community that there are funds available and that the rehabilitation work will be done.

GROUNDWATER POLLUTION

Coal ash is the toxic waste material created from the burning of brown coal and contains heavy metals including lead, mercury and arsenic. The rehabilitation of coal ash storage dams is currently not included in the *Latrobe Valley Regional Rehabilitation Strategy*.

Environment Victoria recently obtained “clean up notices” that the EPA issued to Hazelwood’s owners in October 2020. These show that a coal ash dam on the floor of Hazelwood mine pit, called the HARA ash dam, has known to be polluting groundwater since 2005.

If water (sourced from outside the Latrobe River system) is used to fill the mines, it is crucial that any pollution from coal ash is properly cleaned up and fully rehabilitated prior to any water being added so further groundwater and/or surface water contamination cannot occur.

We understand that local group Friends of Latrobe Water (FLOW) are still waiting on the results of an EPA investigation into coal ash contamination at Hazelwood.

RECOMMENDATIONS

Rehabilitation of the Latrobe Valley mines needs to leave a positive post-mining legacy. This means it must achieve a net community benefit that contributes to the future social and economic prosperity of the region. Rehabilitation needs to be done in a manner that safeguards and protects people’s health and the surrounding environment, including waterways such as the Latrobe River that contribute vital freshwater flows to the Gippsland Lakes.

The use of fresh water from the Latrobe River system for mine rehabilitation should be explicitly ruled out.

An Environmental Effects Statement should be required for whatever rehabilitation option is proposed by each of the mines to ensure proper consultation, transparency and independent scrutiny.

The rehabilitation bonds for the mines in the Latrobe Valley were re-assessed in 2017 and are coming up for their five-year liability assessment in 2021. Given the likely additional costs of rehabilitation if alternative water sources are required or landforms other than pit lakes are pursued, these bonds should be increased to help ensure that mine operators bear the cost of rehabilitation and the risk is not left with the community and/or state government.

Full rehabilitation and clean-up of coal ash dams must be required by the EPA and LVRRS before mine operators can move ahead with further mine rehabilitation, particularly when these coal ash dams are located within the mine voids.