

# NSW Government groundwater investigations into Werris Creek Mine

December 2015

Water management at Werris Creek Mine, in the State's north-west, has been subject to extensive investigations and ongoing review by the NSW Government.

The investigations have been undertaken independently from the company and have included a range of desktop and hydrogeological reviews, as well as multiple site inspections by experts and compliance staff from Department of Primary Industries – Water division (DPI Water), and the Department of Planning & Environment.

These investigations are part of ongoing management and compliance activities and follow reports by nearby landholders that their alluvial water bores have been impacted by the mine.

The investigations by the NSW Government found that there is no evidence to support claims that the mine has impacted on the alluvial bores and confirmed that the mine is compliant with the conditions of its water licence.

The Government's investigations confirmed that there has been a drop in groundwater levels in the Quipolly Creek alluvium. However, the investigations found no evidence that the declines are due to the mine and point to climatic conditions as the likely cause for the drops.

The NSW Government will continue to strictly monitor and regulate all mining activities across the State based on scientific evidence and all available data.

## NSW Government investigations

The Department of Planning & Environment and DPI Water have investigated claims that the mine has impacted on the alluvial bores.

Field investigations and observations have been supplemented by desktop investigations and hydrogeological review.

### What did the investigations find?

The Government's investigations confirmed that there has been a drop in groundwater levels in the Quipolly Creek alluvium. However, the investigations found no evidence that the declines are due to the mine and point to climatic conditions as the likely cause for the drops.

### What has caused declining groundwater levels?

It is likely that declining groundwater levels are due to climatic conditions and declining rainfall. There has been a significant dry period in the area from early 2013 to this year. The alluvial aquifer at Quipolly Creek is dependent on rainfall to recharge its levels, and the observed groundwater declines in the Quipolly Creek alluvium closely reflect the rainfall trend. DPI Water's own bores, up to 15 km away from the mine, have shown a similar drop in water level.

### Has the alluvial aquifer been 'breached' or 'pierced'?

No. The alluvial aquifer is approximately 2 kilometres from the mine pit. There is no evidence that this aquifer has been 'breached' or 'pierced' by the mine.

### How did the Government reach its conclusions?

The Government reached its conclusions based on known and verifiable facts:

- The recent period has been very dry, and observed groundwater declines are consistent with rainfall patterns.
- The mine activity and the landholder bores are in separate aquifer systems.
- There is significant distance (around 2 km) between the mine pit and the alluvial aquifer.
- Groundwater monitoring by DPI Water in the same alluvial system, but further from the mine (between 7-15 km) shows a comparable decline in groundwater levels.
- The shallow depth and shallow water-bearing zones of the alluvial system in this location means it is susceptible to depletion.
- The volume of groundwater taken by the mine is relatively small compared to the cumulative use in the area.

### **What evidence supports the Government's conclusions?**

Evidence collected from an extensive and ongoing groundwater monitoring program supports the Government's conclusions. Observations from monitoring bores are supplemented by additional on-ground and desktop investigations, as well as comprehensive groundwater modelling.

The mine monitors groundwater at 31 locations around the mine. This information is made publicly available in the mine's Annual Environmental Management Report.

DPI Water also collects groundwater data, which is available online in real time at [www.water.nsw.gov.au](http://www.water.nsw.gov.au)

### **Does the mine require a water licence?**

Yes, the mine is required to hold and pay for a groundwater licence for the groundwater it takes, just like any other groundwater user. The NSW Government's investigations have found the mine is compliant with its licence conditions for its groundwater take.

### **Why is the mine evaporating water?**

The mine has relatively small water storages on site, and most of the water captured by the mine is from surface water runoff. Until recently the mine was a "zero discharge" mine, which means that it is designed not to discharge any water off site.

As a result, the mine uses evaporation through water cannons to reduce the volume of excess water.

In November 2015, the mine received approval from the Department of Planning & Environment to provide some of this water to nearby irrigators, with strict conditions.

### **Has the NSW Government considered additional reviews into the mine?**

Yes. The NSW Government has considered additional external reviews in making its findings – and will continue to monitor the mine's operations.

As part of ongoing monitoring efforts, DPI Water continues to draw on additional memorandums and new information. This includes a recent memorandum by the UNSW Water Research Laboratory which was commissioned earlier this year by the Caroon Coal Action Group.

DPI Water did not reach the same conclusions as the UNSW memorandum and as such commissioned further expert advice. The peer review, undertaken by Dr Noel Merrick, confirmed DPI Water's earlier observations that the mine hasn't contributed to the impacts currently being observed at landholder bores.

The NSW Government notes that the UNSW memorandum has not yet completed its internal technical review process, and intends to work further with both UNSW and Dr Merrick to provide the clearest possible information to the community.

Both of these reviews provide valuable observations and recommendations which will assist the NSW Government in ensuring that water management at Werris Creek Mine continually improves, and are welcomed by the Government.

## **Ongoing monitoring and future actions**

The NSW Government is committed to considering the best available information in water management practices and ensuring that any new developments in science and best practice water management are considered as part of the ongoing management of Werris Creek Mine.

Based on its own investigations and further information that has come light, DPI Water remains confident that the mine has not impacted on the alluvial bores and that the mine remains compliant with the conditions of its water licence.

The NSW Government will continue to welcome ongoing analysis by the scientific community and community groups of any mine operations in NSW.

Based on recent reviews, the NSW Government will liaise with community members, mining representatives and groundwater experts, including the authors of existing reviews of groundwater levels at Quipolly Creek, to discuss existing data on groundwater levels, the causes of observed declines in groundwater, and appropriate actions that can be taken to ensure that all interested parties have a good understanding of water management at Werris Creek Mine.

The NSW Government will continue to update this information as necessary.

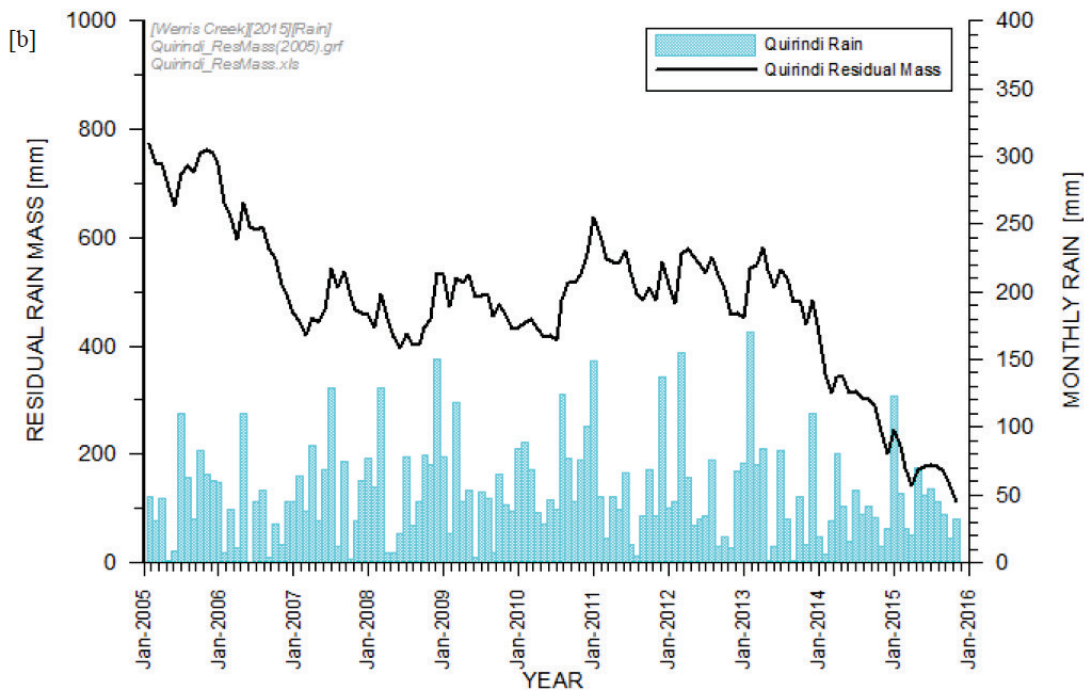
### Comparison of groundwater levels with climate data

The graph (Figure 1), below, is a commonly used tool in hydrogeological analysis known as a “rainfall residual mass” graph, and relies on rainfall and climatic data to calculate when groundwater levels are expected to increase (during wet periods) and when they are expected to decline (during dry periods).

Figure 2, below, shows the observed water levels at the two alluvial monitoring bores closest to the mine (MW21A and MW26), compared with the rainfall residual mass. The other two lines (MW6 and MW17B) are monitoring bores within basalt.

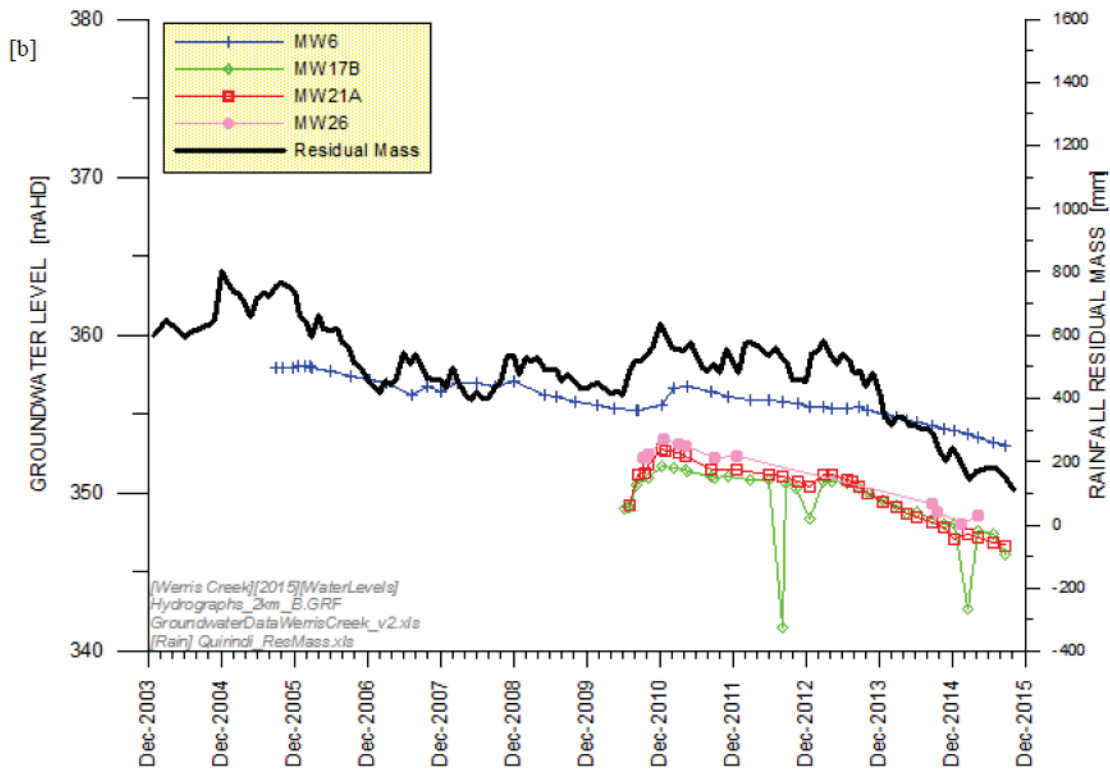
These figures are excerpts from Peer Review of Memo titled *Groundwater Declines at Quipolly Creek – Overview* (Merrick, 2015).

Figure 1 – Rainfall and rainfall residual mass at Quirindi Post Office.



The declining black line indicates a period of below average rainfall.

Figure 2 – Observed bore hydrographs within 1-2 km of Werris Creek Mine compared with rainfall residual mass curve



MW21A and MW26 are both alluvial monitoring bores, and are the nearest alluvial monitoring bores to the mine. These show good correlation with the rainfall residual mass, which is consistent with the groundwater decline being climatic.

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