

Groundwater quality at DPI Mangrove Mountain poultry burial sites project

Project information sheet No.18 – October 2018

Background

Poultry carcasses and shed materials were buried in three containment pits in response to the Newcastle Disease Virus of Poultry Emergency at Mangrove Mountain on the Central Coast Plateau in 1999.

A project comprising three to four monitoring bores surrounding each pit to monitor potential impact from the sites on groundwater quality commenced in 2001.

Key actions (2018)

1. Key results from Groundwater Monitoring Events (GMEs) are reported in the project information sheet. *Combined event reporting is required in this case, but reduced frequency of routine reporting or monitoring (ie. less than twice annually) is not planned.*
2. Monitoring of pit surface soils for evidence of cracks, surface slumping or subsidence.
3. Extraction of waste-water (leachate) at the Waratah Road site (Total 01 Jan 2017 to 31 Jul 2018 = 34,235 litres).
4. Routine site maintenance, including minor landscaping and grass mowing.

Monitoring results

Results for November 2017 Groundwater Monitoring Event (GME22) results were received in May 2018, and GME23 in June 2018.

General comments

Zinc and copper concentrations reported in all project monitoring bores exceed the ANZECC (2000) trigger values for protection of freshwater aquatic ecosystems.¹ Concentrations are well below the Australian Drinking Water Guideline (ADWG, 2011) levels.¹

The nickel concentration exceeds the ANZECC (2000) trigger value in nearly all bores. Some bores at the George Downes Drive and Waratah Road sites exceed both guideline levels (ANZECC 2000 & ADWG 2011).

The aluminium concentration exceeds the ADWG (2011) (aesthetic) level in some bores at the George Downes Drive and Waratah Road sites. No health-based guideline level has been established for acidic waters. ¹See notes on page 3 for background information relating to water quality guideline levels.

Bloodtree Road site

Groundwater flow direction (calculated from the Standing Water Level of monitoring bores) is generally west-north-west.

The nickel concentration in down-gradient bore BH3 exceeded the ANZECC (2000) trigger value in GME23 (Mar 2018), and was not detected in any bores on the site in GME22 (Nov 2017). The ADWG (2011) level was not exceeded in any bore in either Event.

The ANZECC (2000) trigger value was exceeded for nitrate in all bores. The level is comparatively low and fairly constant. The highest level is in up-gradient bore BH3 and seems to reflect a regional trend.

George Downes Drive site

Calculated groundwater flow direction in this round is to the west-north-west.

Chromium was detected at the ANZECC (2000) trigger value (1µg/L) in bores BH4, BH5 and BH7. Levels are well below the ADWG (2011) (health) level.

The ANZECC (2000) trigger value for nickel was exceeded in bores BH4, BH5 and BH6. The ADWG (2011) (health) level was exceeded in BH4 and BH5. Variability in nickel concentration has increased in bores at this site since 2012 and levels increased between GME22 (Nov 2017) and GME23 (Mar 2018). Similar variability in copper and zinc has been seen in all bores since monitoring began.

The manganese level remains above the ADWG (2011) (aesthetic) level in BH4, BH5 and BH6. The level in BH7 exceeds the ADWG (2011) (health) level.

Aluminium exceeds the ADWG (2011) (aesthetic) level in bores BH5, BH6 and BH8H.

The nitrate level exceeds the ANZECC (2000) trigger value in BH4 and BH7. Levels are well below the ADWG (2011) (health) level and declined between GME22 (Nov 2017) and GME23 (Mar 2018). Levels in BH4 and BH7 show some trend of increase with time.

Waratah Road site

Calculated groundwater flow direction remains generally east-south-east to south-east.

The ANZECC (2000) trigger value for nickel was exceeded in BH5W, BH9W, BH10W, BH13W and new down-gradient bore BH14W. The level also exceeded the ADWG (2011) (health) level in BH9W and BH10W.

The lead level in down-gradient bore BH9W exceeds the ANZECC (2000) trigger value. The level reported in BH5W exceeds both the ANZECC (2000) trigger value, and the ADWG (2011) (health) level.

The ADWG (2011) (health) level for manganese was exceeded in the down-gradient bores BH5W and BH12W in this event. The level reported in BH9W exceeds the ADWG (2011) (aesthetic) level, only. The concentration in BH5W also exceeds the (higher) ANZECC (2000) trigger value for manganese.

Aluminium exceeds the ADWG (2011) (aesthetic) level in down-gradient bores BH5W, BH9W, BH12W and BH14W. Although declining between GME22 (Nov 2017) and GME23 (Mar 2018), levels in BH5W and BH9W are very high.

The ANZECC (2000) trigger value and ADWG (2011) (aesthetic) level for ammonia is exceeded in the down-gradient groundwater monitoring bores, BH5W and BH12W.

The ANZECC (2000) trigger value for nitrate is exceeded in all bores at this site.

The ADWG (2011) (health) level for nitrate was exceeded in down-gradient bore BH5W. The concentration in BH9W declined between GME22 (Nov 2017) and GME23 (Mar 2018).

Liquid seepage from the poultry shed litter containment pit, along with the nutrient legacy from previous land use on this site (intensive piggery), are potential sources of the contaminants reported.

Next steps

- Groundwater Monitoring Event (GME24) (October 2018).
- Re-capping and re-vegetating the surface of the Bloodtree Road poultry burial pit is proposed in 2018/19.

More information

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Or via DPI web-site [Mangrove Mountain groundwater monitoring](#)

¹The [ANZECC \(2000\) Trigger Values for the Protection of Freshwater Aquatic Ecosystems \(95% level of protection\)](#) were developed for surface waters, not groundwater. NSW EPA *Guidelines for the Assessment and Management of Groundwater Contamination* indicate that the trigger values should be used as Groundwater Investigation Levels (GILs). Exceedance of GILs indicates a need for detailed assessment. This is because natural background concentrations, diffuse regional

contamination, the fate and transport of contaminants in groundwater and potential exposure pathways must all be considered. For example, there is diffuse regional contamination by nitrate in the Mangrove Mountain area.

Revisions to the Australian and New Zealand Guidelines for Fresh and Marine Water Quality Toxicant default guideline values for water quality in aquatic ecosystems (revised 2018) can be viewed at:

<http://waterquality.gov.au/anz-guidelines/guideline-values/default/water-quality-toxicants/toxicants>

Note 1: *An increase in soluble metals is often associated with a decline in groundwater pH. Minor increase or exceedance of GILs for metals is not assumed to relate to contamination from the burial pits. Seepage from the pits would likely also result in a significant increase in ammonia, nitrate, Total Dissolved Solids and electrical conductivity, for example.*

Note 2: *The National Health and Medical Research Council's Australian Drinking Water Guidelines are not specifically for regulation of groundwater quality. They are an excellent source regarding the health issues related to drinking water. They have recently been reviewed (August 2018) can be viewed on-line or downloaded at <https://nhmrc.gov.au/about-us/publications/australian-drinking-water-guidelines>. Fact sheets provide background regarding health considerations of key water quality parameters.*

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