

# Groundwater quality at Mangrove Mountain poultry burial sites

June 2016

## 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.

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

Routine project activities may also include:

- Landfill gas monitoring;
- Design, installation and supervision of maintenance works; and
- Decision-support for impact mitigation options.

## Key actions (2016)

1. Full-round groundwater monitoring (Event 18) was completed in November 2015 and results are reported in this information sheet.
2. Groundwater Monitoring Event 19 was completed by the groundwater monitoring service provider in June 2016.
3. Monitoring of pit surface soils for evidence of cracks, surface slumping or subsidence.
4. Extraction of waste-water (leachate) at the Waratah Road site (Total 2015 = 29,340 litres and, to June 2016 = 14,025 litres).
5. Routine site maintenance, including minor landscaping and grass mowing.
6. Service contracts continue (Groundwater Monitoring Services 2015-2018; Waste-water services 2016; and Bloodtree Rd leachate monitoring/contingency extraction well).

## Groundwater monitoring results

Preliminary results from Event 18 (sampled November 2015) were received in May, 2016.

**Note 1:** The [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). The EPA guidelines also state that 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.

**Note 2:** 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 3:** The National Health and Medical Research Council's Australian Drinking Water Guidelines are not specifically for regulation of groundwater quality. However, they are an excellent source regarding the health issues related to drinking water. They can be viewed on-line or downloaded at [Australian Drinking Water Guidelines \(2011\)](#). Fact sheets provide background regarding health considerations of key water quality parameters. Access the relevant Factsheet at the web hyperlink for each analyte where exceedance is noted.

## General comments

Exceedance of the ANZECC (2000) trigger value for zinc and copper occurs in all groundwater monitoring bores at the sites, but levels are well below the Australian Drinking Water Guideline (ADWG, 2011) levels.

Aluminium, barium and boron are now included in the metal analysis suite. All bores reported barium and boron concentrations well below guideline levels.

[Aluminium](#) concentration in bores BH5, BH6 and BH8H (George Downes Drive), and down-gradient bores BH5W, BH9W and BH12W (Waratah Road), exceeded the ADWG (2011) (aesthetic) level.

### Bloodtree Road site

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

Nickel concentration has declined to below guideline levels in all bores on the site.

The ANZECC (2000) trigger value was exceeded for nitrate in all bores and seems to reflect a regional trend.

### George Downes Drive site

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

The ANZECC (2000) trigger value and the ADWG (2011) (health) level for [nickel](#) were exceeded in BH5, BH6 and BH8H. The concentration in BH7 was at the ANZECC (2000) trigger value, while the level in BH4 has declined below guideline levels.

The [manganese](#) level exceeds the ADWG (2011) (aesthetic) level in BH5 and BH6. The concentration in BH7 continues to exceed the ADWG (2011) (health) level, but has declined.

The Australian Drinking Water Guideline (2011) (aesthetic) level for [iron](#) was exceeded in BH5 and BH7.

The nitrate level exceeds the ANZECC (2000) trigger value in BH4 and BH7 but levels are well below the ADWG (2011) (health) level.

The phosphorus concentration in BH8H exceeded the ANZECC (2000) trigger value.

### Waratah Road site

Calculated groundwater flow direction remains generally east-south-east

The ANZECC (2000) trigger value for nickel was exceeded in BH5W and BH9W (down-gradient bores) and BH7W (up-gradient bore). The [nickel](#) level in BH9W (down-gradient bore) also exceeded the ADWG (2011) (health) level.

The [lead](#) level in down-gradient bores BH9W and BH5W exceeded the ANZECC (2000) trigger value, and the concentration in BH5W continues to exceed the ADWG (2011) (health) level.

The ADWG (2011) (aesthetic) level for [manganese](#) was exceeded in the down-gradient bores BH9W and BH12W in this event. The

concentration reported in down-gradient bore BH5W continues to exceed the ADWG (2011) (health) level and the ANZECC (2000) trigger value for manganese.

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

The ANZECC (2000) trigger value for nitrate is exceeded in all bores on the site. The ADWG (2011) (health) level for [nitrate](#) was exceeded in down-gradient bores BH5W and BH9W. The concentration in BH5W continues to decline, but has increased in BH9W after a period of decline.

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

- A 6-monthly full-round groundwater quality monitoring event (GME20) is scheduled in September/October, 2016).
- Site maintenance actions will be scheduled, as required.
- Regular waste-water extraction and transport off-site for treatment and recycling will continue at the Waratah Road site.
- Activities scheduled for the Waratah Rd site include installing a continuous waste-water extraction system and on-site storage tank site, and 2 new down-gradient monitoring bores.
- The Bloodtree Rd leachate monitoring/contingency extraction well installation project will occur, pending contractor availability.

### More information

**For further information, please contact Ms Glenda Briggs, Regional Director**

**(02) 49398958; [glenda.briggs@dpi.nsw.gov.au](mailto:glenda.briggs@dpi.nsw.gov.au)**

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

**[Note: Groundwater summary site status reports \(2013-2015\) are now on the project web-page.](#)**

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