

Groundwater quality at Mangrove Mountain poultry burial sites

May 2017

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 20) was completed in October 2016, and results are reported in this information sheet.
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 2015 = 29,340 litres and, to 31 December 2016 = 28,455 litres).
4. Routine site maintenance, including minor landscaping and grass mowing.
5. Service contracts continue (Groundwater Monitoring Services 2015-2018 and Waste-water services 2017).
6. Bloodtree Road in-pit leachate monitoring/contingency extraction well installed.

Groundwater monitoring results

Preliminary results for Event 20 (sampled October 2016) were received in February, 2017.

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.

The aluminium concentration exceeds the ADWG (2011) (aesthetic) level in some bores. No health-based guideline level has been established for acidic waters.

Bloodtree Road site

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

[Nickel](#) concentration exceeded the ANZECC (2000) trigger value in all bores

on the site, and the ADWG (2011) level was exceeded in BH1B, BH2 and the up-gradient bore BH3.

The ANZECC (2000) trigger value was exceeded for nitrate in all bores. The level is comparatively low, has increased slightly, and seems to reflect a regional trend.

George Downes Drive site

Calculated groundwater flow direction is to the north-west.

The ANZECC (2000) trigger value and the ADWG (2011) (health) level for [nickel](#) were exceeded in all bores on the site. Variability in nickel concentration has increased in bores at this site since 2012. 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 BH5, BH6 and BH7.

[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, but levels are well below the ADWG (2011) (health) level.

Waratah Road site

Calculated groundwater flow direction remains generally east-south-east

The ANZECC (2000) trigger value and the ADWG (2011) (health) level for [nickel](#) were exceeded in all monitoring bores on the site, aside from BH12W. The level in all bores increased in this round.

The [lead](#) level in down-gradient bores BH5W and BH13W exceeded the ANZECC (2000) trigger value, and the concentration in BH5W continues to slightly exceed the ADWG (2011) (health) level.

The ADWG (2011) (aesthetic) level for [manganese](#) was exceeded in the down-gradient bores BH5W and BH12W in this event. The concentration reported in BH5W continues to also exceed the ADWG (2011) (health) level and the ANZECC (2000) trigger value for manganese.

[Aluminium](#) exceeds the ADWG (2011) (aesthetic) level in down-gradient bores BH5W, BH9W and BH12W.

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 on the site. The ADWG (2011) (health) level for [nitrate](#) was exceeded in down-gradient bores BH5W and BH9W. The concentrations in BH5W and BH9W have increased slightly since GME19 (June 2016).

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 (GME21) was completed in March, 2017). Results will be summarised when received and noted in the next project information sheet.
- Site maintenance actions such as grass mowing 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 in 2017 include installing a continuous waste-water extraction system and on-site storage tank site, and 2 new down-gradient monitoring bores.

More information

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

(02) 49398958; 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 on the project web-page.](#)

© State of New South Wales through the Department of Trade and Investment, Regional Infrastructure and Services, 2017. You may copy, distribute and otherwise freely deal with this publication for any purpose, provided that you attribute the NSW Department of Primary Industries as the owner.

Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing (May 2017). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of the Department of Primary Industries or the user's independent adviser.

Published by the Department of Primary Industries. INT17/49590 (Editing copy) (<http://www.dpi.nsw.gov.au/content/agriculture/>)