

# Groundwater quality at Mangrove Mountain poultry burial sites

September 2014

## Background

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

In 2001 a project commenced to monitor any potential impact from the sites on groundwater quality. Routine project activities may also include:

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

## Key 2014 actions

1. Full-round groundwater sampling (Event 15 was completed in March 2014).
2. Monitoring of pit surface soils for evidence of cracks, surface slumping or subsidence.
3. Extraction of around 14,350 litres of wastewater (leachate) at the Waratah Road site during routine de-watering.
4. Routine site maintenance, including minor landscaping and grass mowing.
5. Existing contracts continue (Groundwater Monitoring Services 2012-2015; Waratah Rd Future Site Management Options Business Case; and Bloodtree Rd leachate monitoring/contingency extraction well).
6. Central Coast Public Health Unit sampled domestic groundwater supplies on a neighbouring property at landowner's request (February, 2014).

## Current groundwater monitoring results

Final analysis results from Event 15 were received in May, 2014.

**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 OE&H (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 noted analyte on page 2.

## Bloodtree Road site

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

Exceedance of the ANZECC (2000) trigger value for zinc and copper detected in all bores, except for copper in BH1B (down-gradient bore). The ANZECC (2000) trigger value for cadmium is exceeded in BH2 (a down-gradient bore) but is well below the Australian Drinking Water Guideline (2011) level.

The ANZECC (2000) trigger value was exceeded for nickel in all monitoring bores and the level exceeded the Australian Drinking Water Guideline (2011) level in

BH3 (the up-gradient bore). 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 is generally to north-east.

The ANZECC (2000) trigger value for copper was exceeded in all bores but levels were well below the Australian Drinking Water Guideline (2011) level. The ANZECC (2000) trigger value for lead was exceeded in BH6 but the level was below the Australian Drinking Water Guideline (2011).

The level of zinc has increased markedly and exceeds the ANZECC (2000) trigger value in all bores in this monitoring round. The levels are well below the Australian Drinking Water Guideline (2011) aesthetic level.

The ANZECC (2000) trigger value and the Australian Drinking Water Guideline (2011) level for [nickel](#) was exceeded in all bores in this monitoring round and levels will be monitored closely in Event 16.

The level of [manganese](#) exceeds the Australian Drinking Water Guideline (2011) aesthetic level in BH5 and BH6. The concentration exceeds the Australian Drinking Water Guideline (2011) level in BH7 but has declined since Event 14.

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

The nitrate level exceeded the ANZECC (2000) trigger value in BH4 and BH7 but levels are well below the Australian Drinking Water Guideline (2011) level.

### Waratah Road site

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

The ANZECC (2000) trigger value for copper and zinc was exceeded in all eight bores (except for copper in BH5W). Cadmium levels have declined and only exceeding the ANZECC (2000) trigger value in BH10W. Levels for these metals were below the Australian Drinking Water Guideline (2011) level.

The ANZECC (2000) trigger value for nickel was exceeded in BH9W and for lead in BH5W (down-gradient bores). The [nickel](#) level in BH7W (up-gradient), BH9W and BH13W (both

down-gradient) exceeded the Australian Drinking Water Guideline (2011) level. The [lead](#) level in BH5W exceeded the Australian Drinking Water Guideline (2011) level.

The Australian Drinking Water Guideline (2011) level for [manganese](#) was exceeded in the down-gradient bores BH5W, BH9W and BH12W in this event. The ANZECC (2000) trigger value was also exceeded in BH5W. Manganese levels will continue to be monitored in Event 16.

The ANZECC (2000) trigger value and Australian Drinking Water Guideline Level (2011; aesthetic, only) 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 but the level in three of the down-gradient bores is much higher.

The Australian Drinking Water Guideline (2011) level for [nitrate](#) continues to be exceeded in BH5W and in BH9W (near to BH5W).

Potential contaminant sources are the liquid seepage from the poultry shed litter containment pit, along with the nutrient legacy from previous land use on this site (intensive piggery).

### Next steps

- Regular waste-water extraction to reduce liquid content will continue at Waratah Road
- A further 6-monthly full-round groundwater quality monitoring event (Event 16) is proposed in September 2014
- Activities scheduled for the Waratah Rd Future Site Management Options Business Case and Bloodtree Rd leachate monitoring/contingency extraction well projects will be undertaken, pending contractor availability
- Site maintenance actions will be scheduled, as required

### More information

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

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