Department of Primary Industries

Groundwater quality at Mangrove Mountain poultry burial sites

April 2014

Background

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

A project commenced in 2001 comprising three to four monitoring bores surrounding each pit to monitor 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 actions (2013)

1. Full-round groundwater sampling (Events 13 and 14) is complete for 2013
2. Monitoring of pit surface soils for evidence of cracks, surface slumping or subsidence
3. Extraction of around 37000 litres of waste-water (leachate) at the Waratah Road site
4. Routine site maintenance, including minor landscaping and grass mowing
5. Service contracts continue (Groundwater Monitoring Services 2012-2015; Waratah Rd Future Site Management Options Business Case; and Bloodtree Rd leachate monitoring/contingency extraction well)
6. Departmental staff visited neighbouring properties to confirm location and license details of bores within around 500 metres of the Bloodtree Road and George Downes Drive sites (other properties near the Waratah Road and George Downes Drive sites were attended in 2012)

Groundwater monitoring results

Preliminary results from Event 13 (sampled June 2013) were received in August, 2013.

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 nitrates 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 occurs in all bores and also for nickel in BH2 and BH3 (the up-gradient bore). There was an exceedance for cadmium in BH1B (down-gradient bore)

The ANZECC (2000) trigger value was exceeded for nitrate in all bores and seems to reflect a regional trend. Metal and nitrate levels are below the Australian Drinking Water Guideline (2011) levels

George Downes Drive site

Calculated groundwater flow direction is generally north to north-east

Metal levels will be confirmed in the next monitoring event (Event 14). There was an exceedance of the ANZECC (2000) trigger value for copper, nickel and zinc in all bores (although nickel in BH4 was below the trigger value). Cadmium was at the trigger value in BH7. Levels are generally below the Australian Drinking Water Guideline (2011) level, except for nickel in bores BH4, BH5, BH6 and BH8H; and also for iron (aesthetic, only) in BH4 and BH7 (at the Guideline level)

For the nutrients, there was an exceedance of the ANZECC (2000) trigger value for phosphorus in bores BH5 and BH7, and for nitrate in BH4, BH7 and BH8H. 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. Cadmium was at the trigger value in down-gradient bores BH5W, BH9W and BH12W. Levels for these metals were below the Australian Drinking Water Guideline (2011) level

The ANZECC (2000) trigger value was exceeded for nickel and lead in the down-gradient bores BH5W and BH9W and also in up-gradient bore BH11W. The nickel level in BH9W and lead level in BH5W also exceed the Australian Drinking Water Guideline (2011) levels. To date, no source of lead has been found on the site

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).

The relative nitrate concentrations between the adjacent down-gradient monitoring bores east of the pit supports the presumption of a generally easterly groundwater flow direction. Liquid seepage from the poultry shed litter containment pit, along with the nutrient legacy from previous landuse on this site (intensive piggery), are potential contaminant sources

The Australian Drinking Water Guideline (2011) level for manganese was exceeded in the down-gradient bores BH5W and BH12W in this event and exceeded the aesthetic level in BH9W. The ANZECC (2000) trigger value was also exceeded in BH5W. Manganese levels will continue to be monitored in Event 14

Next steps

- Regular waste-water extraction will continue at Waratah Road
- As sampling for Event 14 (September 2013) has been completed, a further 6-monthly full-round groundwater quality monitoring event (Event 15) is proposed in March 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

For further information, please contact
Ms Susan Rowe, Regional Director

(02) 49398958; susan.rowe@dpi.nsw.gov.au

Or via Mangrove Mountain groundwater monitoring **on the DPI web-site**

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