

Groundwater quality at DPI Mangrove Mountain poultry burial sites project

Project information sheet No.20 – January 2020

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.

Routine project activities also include:

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

Key actions (2019)

1. Key results from Groundwater Monitoring Events (GME25 – June 2019) 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 to 01 Jan to 31 Dec 2019 = 39,930 litres).
4. Completion of Bloodtree Road poultry burial pit renovation (re-capping with very low permeability surface liners, near-surface landfill gas vents, liner layer surface drainage and re-turfing surface).
5. Routine site maintenance, including minor landscaping and grass mowing.

Monitoring results

Initial results for June 2019 Groundwater Monitoring Event (GME25) were received in September 2019.

General comments

Zinc 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 and the

ADWG (2011) (health) level in down-gradient bore BH5 at the George Downes Drive site and BH5W, BH10W and BH15W at Waratah Road. Levels exceeded the ANZECC (2000) trigger value in some bores at the Bloodtree Road and Waratah Road sites, but levels did not exceed the ADWG (2011) level in this round.

The ANZECC (2000) trigger value for total nitrogen was exceeded in all project monitoring bores, aside from BH5 and BH6 at the George Downes Drive site.

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 concentrations of aluminium and nickel increased from GME24 but were below the ADWG (2011) level. Aluminium was below the ANZECC (2000) freshwater trigger value and it was exceeded for nickel in BH2, BH3 and BH1B.

The ANZECC (2000) trigger value was exceeded for nitrate in all bores. The level is comparatively low and slightly higher than GME24. The highest level is in up-gradient bore BH3 and seems to reflect a regional trend.

Phosphorus was below detection limits in Bloodtree Rd monitoring bores.

George Downes Drive site

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

The iron level is above the ADWG (2011) (aesthetic) level in BH8 and aluminium concentration exceeds the ADWG (2011) (aesthetic) level in BH5, BH6 and BH8.

The manganese level exceeds the ADWG (2011) (aesthetic) level in BH5, BH6, BH7 and BH8. Levels reported were below the ADWG (2011) (health) level and ANZECC (2000) trigger value.

The nitrate level exceeds the ANZECC (2000) trigger value in BH4 and BH7. Levels are well below the ADWG (2011) (health) level. Levels in BH4 (up-gradient) and BH7 continue to show some trend of increase with time.

Phosphorus was below detection limits in George Downes Drive monitoring bores.

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, BH11W and BH12W. Reported levels were above the ADWG (2011) (health) level in BH5W and BH15W.

The lead level in down-gradient bore BH5W exceeds the ANZECC (2000) trigger value but not the ADWG (2011) (health) level.

The ADWG (2011) (health) level for manganese was exceeded in the down-gradient bores BH5W, BH10W and BH15W in this event. The concentrations in BH5W and BH15W also exceed the (higher) ANZECC (2000) trigger value for manganese.

Aluminium exceeds the ADWG (2011) (aesthetic) level in down-gradient bores BH5W, BH10W, BH12W and BH15W. Levels in BH5W and BH9W remain very high.

The ANZECC (2000) trigger value and ADWG (2011) (aesthetic) level for ammonia is exceeded in the down-gradient groundwater monitoring bore, BH15W.

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 and BH15W.

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 (GME26) (November 2019).
- Re-cap and re-vegetate the surface of the Bloodtree Road poultry burial pit is proposed in 2019.

More information

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¹The ANZECC (2000) trigger values for protection of freshwater aquatic ecosystems (95% level)(superseded); ANZECC (2018) ANZ freshwater guidelines 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 can be viewed on-line or downloaded at [Australian Drinking Water Guidelines \(2011; updated 2018\)](#) Fact sheets provide background regarding health considerations of key water quality parameters.*

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