

Groundwater quality at DPI Mangrove Mountain poultry burial sites project

Project information sheet No.24 – October 2022

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 (2021-22)

1. Key results from Groundwater Monitoring Events (GME29 – May 2022) 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 01 Jan to 30 Sep 2022 = 49,475 litres).
4. Routine site maintenance, including slashing and grass mowing.

Monitoring results

Initial results for May 2022 Groundwater Monitoring Event (GME29) were received in August 2022.

General comments

Zinc concentrations reported in most project monitoring bores exceed the ANZECC (2000) trigger values for protection of freshwater aquatic ecosystems¹. Concentrations are well below the Australian Drinking Water Guideline (ADWG, 2011) levels.¹

The nickel concentration did not exceed the ADWG (2011) level or the ANZECC (2000) trigger value in any monitoring bore in this round.

The ANZECC (2000) trigger value for total nitrogen was exceeded in the majority of project monitoring bores, aside from BH5 and BH6 at the George

Downes Drive site, and BH17W at the Waratah Rd site.

Copper was not detected in any monitoring bores in this round.

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.

The ANZECC (2000) trigger value was exceeded for nitrate in all bores. Levels remain below the ADWG (2011) (health) level.

Phosphorus exceeded the ANZECC (2000) trigger value in down-gradient monitoring bores BH2 and BH1B.

The ANZECC (2000) trigger value and ADWG (2011) (aesthetic) level for ammonia is exceeded in the down-gradient groundwater monitoring bores, BH1B.

Aluminium levels remain below the ADWG (2011) aesthetic level, aside from BH1B. Nickel and copper were not detected.

George Downes Drive site

Calculated groundwater flow direction in this round is generally to the north-north-west, noting the level BH4 was not available for inclusion in calculations.

Aluminium exceeds the ADWG (2011) (aesthetic) level in bores BH5 and BH6.

The iron concentration exceeds the ADWG (2011) (aesthetic) level in BH4, BH7 and BH8. Concentrations increased in these bores since GME28.

The manganese concentration exceeds the ADWG (2011) (aesthetic) level in BH5, BH6 and BH7.

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

Phosphorus was below detection limit in BH5 and exceeds the ANZECC (2000) trigger value in BH4, BH7 and BH8.

Waratah Road site

Calculated groundwater flow direction in this round was east-north-east.

The lead level in down-gradient bore BH14W exceeds the ANZECC (2000) trigger value and remains just below the ADWG (2011) (health) level. Lead was reported at low levels in BH12W and BH15W and was below the detection limit in other bores on the site.

Manganese concentration in down-gradient bores BH5W and BH9W increased, significantly exceeding the ADWG (2011) (health) level. While the ANZECC (2000) trigger value is also exceeded, levels are within the range of previous monitoring events. The ADWG (2011) (aesthetic) level is also exceeded in BH12W and BH16W.

Aluminium significantly exceeds the ADWG (2011) (aesthetic) level in bores BH5W and BH9W. Concentrations are also above the aesthetic level in BH14W, BH15 and BH16W.

The iron concentration exceeds the ADWG (2011) (aesthetic) level in BH11W, BH14W and BH16W.

The ANZECC (2000) trigger value and ADWG (2011) (aesthetic) level for ammonia is exceeded in a number of down-gradient bores. There are very high levels in BH5W and BH12W. Concentrations slightly exceeding the

aesthetic level were reported in BH9W and up-gradient bore BH11W.

The ANZECC (2000) trigger value for nitrate is exceeded in all bores, aside from down-gradient bore BH14W. The ADWG (2011) (health) level for nitrate was exceeded in down-gradient bore BH16W and is approaching the health level in BH15W. A very high concentration was reported in BH9W, remaining within the range of previous monitoring events. Total nitrogen exceeds the ANZECC (2000) trigger value in all bores aside from up-gradient bore BH17W.

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 (GME30) (Sept/Oct 2022).

More information

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

[†]The [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 \(updated September 2022\)](#) Fact sheets provide background regarding health considerations of key water quality parameters.*

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