Department of Primary Industries

Groundwater quality at DPI Mangrove Mountain poultry burial sites project

Project information sheet No.23 – April 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 (GME28 – Dec 2021) 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 31 Dec 2021 = 49,200 litres) (Total 01 Jan to 20 Apr 2022 = 18,975 litres).
4. Waste-water pump service and replacement of down-well waste-water level sensor at Waratah Rd.
5. Routine site maintenance, including slashing and grass mowing.

Monitoring results

Initial results for December 2021 Groundwater Monitoring Event (GME28) were received in February 2022.

General comments

Zinc concentrations reported in most 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 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 at the George Downes Drive site, BH1B at the Bloodtree Road site, and BH6W, BH10W and BH17W at the Waratah Rd site.

Copper was only detected in two monitoring bores. Exceeding the ANZECC (2000) trigger values in BH10W and BH14W, concentrations are well below the ADWG (2011) (health) level.

[1]See 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.

While aluminium levels were higher in most bores this round, concentrations remain well-below the ADWG (2011) aesthetic level. Nickel and copper were not detected.

The ANZECC (2000) trigger value was exceeded for nitrate in all bores, aside from down-gradient bore BH1B. The highest level is in up-gradient bore BH3, reflecting an apparent regional trend.

Phosphorus was below detection limits in all Bloodtree Rd monitoring bores.

George Downes Drive site

Calculated groundwater flow direction in this round is generally to the north-north-west, noting the level BH4 was not able to be measured or samples taken due to a hazardous overhanging tree.

The iron concentration exceeds the ADWG (2011) (aesthetic) level in BH5 and BH8. Concentrations increased again since GME27 and was also recorded in BH7.

The manganese concentration exceeds the ADWG (2011) (aesthetic) level in BH5 and BH7. The levels reported in BH6 is at the ADWG (2011) (health) level in this round.

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

Phosphorus was below detection limit in BH6 and exceeds the ANZECC (2000) trigger value in 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 is 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.

The ADWG (2011) (health) level for manganese was exceeded in the down-gradient bores BH5W and BH12W. The concentrations reported were less than the (higher) ANZECC (2000) trigger value. The ADWG (2011) (aesthetic) level was exceeded in BH11W and BH16W.

Aluminium exceeds the ADWG (2011) (aesthetic) level in bores BH11W, BH12W, BH14W, BH15W, BH16W and BH17W. Levels in BH14W remain very high.

The ANZECC (2000) trigger value and ADWG (2011) (aesthetic) level for ammonia is exceeded in the down-gradient groundwater monitoring bores, BH5W and BH12W, and also in up-gradient bore BH11W.

The ANZECC (2000) trigger value for nitrate is exceeded in all bores, aside from down-gradient bores BH10W, BH14W and BH17W. The ADWG (2011) (health) level for nitrate was exceeded in down-gradient

bore BH16W and BH15W approaches that threshold.

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 (GME29) (June/July 2022).

More information

Dr Warwick Dougherty, Director Soil and Water
warwick.dougherty@dpi.nsw.gov.au

Or via DPI web-site Mangrove Mountain groundwater monitoring

[1]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 March 2021) Fact sheets provide background regarding health considerations of key water quality parameters.*

Reference number: INT22/55176