

# Mangrove Mountain groundwater monitoring

DPI Mangrove Mountain groundwater monitoring project – November 2011

## Background

- Poultry carcasses and shed materials were buried in three separate disposal pits during the 1999 Newcastle Disease Virus emergency response at Mangrove Mountain on the Central Coast Plateau
- A groundwater monitoring project comprising three to four monitoring bores surrounding each disposal pit was commenced in 2001 to monitor potential impact from the disposal sites on groundwater quality
- A second stage of the groundwater monitoring project commenced in 2006. In addition to undertaking the Mangrove Mountain Groundwater Monitoring Project, the hydro-geological consultants employed by NSW Department of Primary Industries undertook the following tasks:
  - » Landfill gas monitoring;
  - » Design, installation and supervision of disposal pit maintenance works; and
  - » Decision-support for impact mitigation options

## Key Actions 2011

1. Routine 12-monthly monitoring of all groundwater monitoring bores (Event 10 – April 2011) and supplementary (quarterly) groundwater monitoring at down-gradient bores and at bores where changes in levels of key analytes require confirmation (Event G – January 2011, Event H – July 2011 and Event I – October 2011)
2. Monitoring of pit surface soils for evidence of cracks, surface slumping or subsidence
3. Project Technical Committee teleconference in March 2011, and meetings in June and November 20 to review quarterly groundwater monitoring results, progress and future actions

4. Extraction of around 8000 litres of waste-water from the in-pit leachate well at the Waratah Road site
5. Pump-testing and collection of waste-water samples for analysis from the Waratah Road site (June and September, 2011)
6. Routine maintenance at all sites such as minor landscaping, mowing or slashing, and herbicide application
7. Extraction of liquid samples from the Bloodtree Road pit (September 2011) to inform assessment of future risks

## Groundwater Monitoring Results

Results from the quarterly down-gradient bore monitoring (Event H; July 2011) were received in August 2011.

**Note:** The ANZECC (2000) *Trigger Values for the Protection of Freshwater Aquatic Ecosystems* (95% level of protection) were developed for surface waters, not groundwater. However the NSW OE&H “*Guidelines for the Assessment and Management of Groundwater Contamination*” indicate that these trigger values should be used as Groundwater Investigation Levels (GILs). The OE&H guidelines also state that exceedances 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.

### • Bloodtree Road Site

- » Calculated groundwater flow direction from the Standing Water Level of monitoring bores is to the west-south-west
- » Levels of all metals in bore BH1B have declined below the ANZECC (2000) trigger values
- » An exceedance of the ANZECC (2000) trigger value for nitrate likely reflects a

- » regional trend and is well below the Australian Drinking Water Guideline level
- » Samples of fluid taken from the in-pit methane vents were analysed. The samples varied but found high concentrations of ammonia, iron, chloride, sulphate and potassium in the deeper vent. Total Petroleum Hydrocarbons were also found, which may relate to fats and oils from the carcasses and their breakdown products. Some persistent but common bacteria were also detected in the deeper vent. Newcastle Disease Virus was not detected.
- » There is no indication that leakage is occurring from the pit, based on water quality in the down-gradient bore at the site

- **George Downes Drive Site**

- » Calculated groundwater flow direction is generally to the north
- » The down-gradient bore BH5 was sampled for analysis and slight exceedance of the ANZECC (2000) trigger values for copper and zinc were reported. Zinc is not regarded as a threat to human health and is subject to dilution before any likely discharge to surface waters
- » The pit surface is now mostly vegetated with short-grass and shallow-rooted herbs
- » An additional down-gradient bore will be located more to the north of the pit to increase down-gradient sampling and confirm groundwater flow direction

- **Waratah Road Site**

- » Calculated groundwater flow direction is generally to the east-south-east
- » All six monitoring bores at the site were sampled in the quarterly round events
- » The exceedance of the Australian Drinking Water Guideline for lead in the down-gradient bore (BH5W) continues and its source remains unknown
- » Lead was not detected in numerous samples of liquid leachate from within the pit taken at different stages of pumping in December 2010, June 2011 and September 2011.
- » The ANZECC (2000) trigger value for zinc was exceeded in all of the monitoring bores. Zinc is not regarded as a threat to human health and is subject to dilution before any likely discharge to surface waters.
- » The Australian Drinking Water Guideline levels for ammonia and nitrate continue to be exceeded in the down-gradient bore (BH5W) and to a lesser degree in a nearby monitoring bore (BH9W)

- » The ANZECC (2000) trigger value for nitrate is exceeded in all bores on the site. The level in four of the six bores is much lower than observed in BH5W and BH9W.
- » The very high concentration of nitrate and ammonia in the down-gradient bore BH5W is presumed the result of seepage from the litter pit, along with the legacy of nutrient contamination from previous land use on the site (intensive piggyery).
- » Extraction of waste-water from within the pit and disposal to a treatment facility will continue in order to minimise groundwater impacts.

- **General**

- » Further options to reduce the current and potential future environmental impacts from the three burial pit sites are being considered.

## Next Steps

- Groundwater sampling and analysis will continue
- Maintenance actions, including:
  - \* earthworks to repair the landfill cap at Bloodtree Road;
  - \* install new down-gradient monitoring bores at George Downes Drive (1) and Waratah Road (2 or 3); and
  - \* install an in-pit leachate monitoring well at Bloodtree Rd;
 will be scheduled, as required, depending on the availability of contractors and resources
- **For further information, please contact Ms Susan Rowe, Assistant Regional Director, on (02) 4908 7341**  
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- <http://www.dpi.nsw.gov.au/agriculture/livestock/poultry/health-disease/newcastle-disease/mmgm>

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