Environment Protection Authority

Wheeny Creek investigation

On 3 July 2024, the NSW Environment Protection Authority (EPA) took surface water and sediment samples from two creeks and a wetland in the valley below an alleged unlawful dumping site in the Wheeny Creek locality, west of Sydney. This report summarises the sampling results.

Background

The EPA has been investigating alleged unlawful dumping at property 903C Blaxland Ridge Road, Wheeny Creek since October 2020.

As part of this investigation, the EPA sampled water and sediment from an unnamed creek that runs off this property and the wetland downstream on 3 July 2024. This followed sampling that was taken on 31 August 2022.

Approach taken

Surface water and sediment samples were collected from four sites in Wheeny Creek, NSW on 3 July 2024.

1. Wheeny Creek, upstream of the alleged source property
2. Unnamed creek that runs down into a valley from the alleged source property, approximately 330 metres from the alleged source site
3. Wetland, at the confluence of the unnamed creek
4. Wetland, approximately 150m south-east from the confluence with the unnamed creek

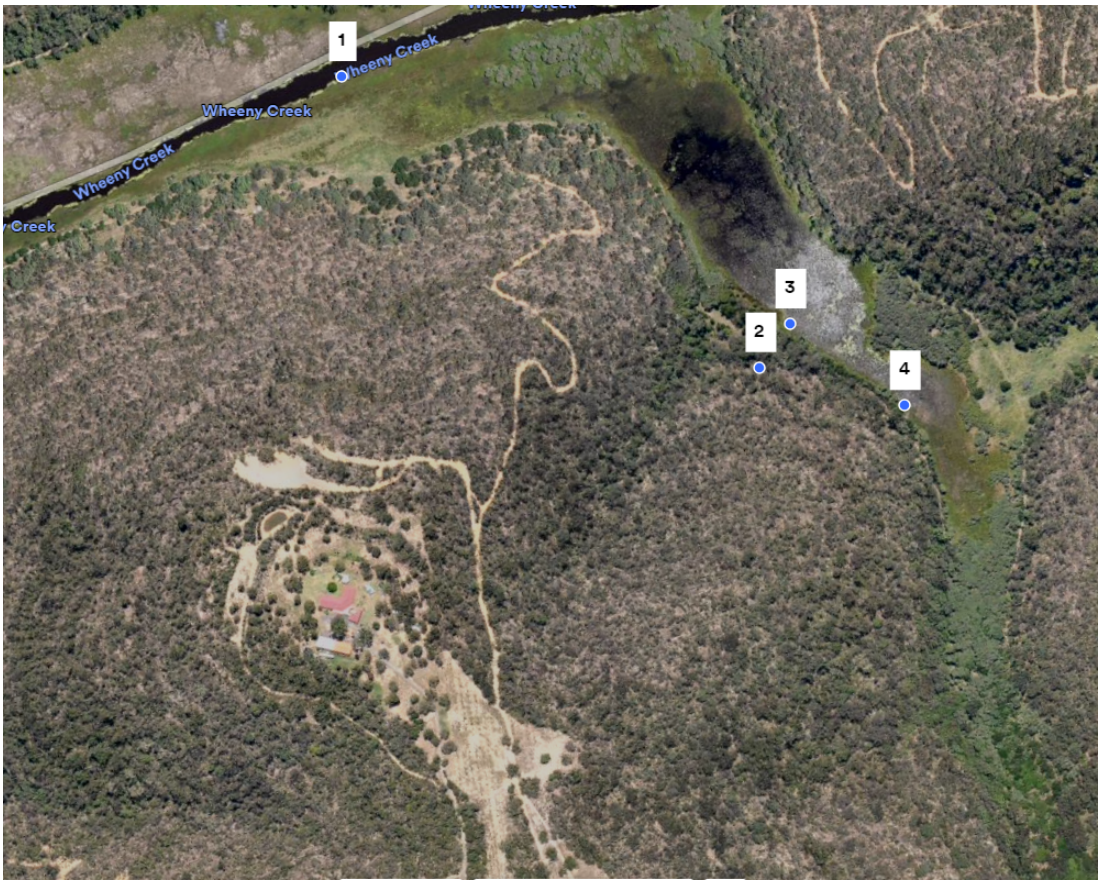

Figure 1. Sampling sites at Wheeny Creek, NSW (3 July 2024)

Water and sediment samples were collected from each site for chemical analysis and a water quality meter was used to record pH, electrical conductivity, dissolved oxygen, temperature, and turbidity at the time of collection. The samples were analysed for pesticides, total and dissolved metals, nutrients, hydrocarbons, per- and polyfluoroalkyl substances (PFAS) and semi-volatile organic compounds at a National Association of Testing Authorities accredited laboratory.

We compared the results to the Australian water quality guidelines for aquatic ecosystem protection where available (ANZECC and ARMCANZ 2000, ANZG 2018, PFAS NEMP 2.0 2020). These guidelines recommend deriving site-specific guideline values for physicochemical stressors using reference site data. In the absence of suitable long-term reference site data, we have compared our results to the relevant ANZECC (2000) default guideline values for lowland slightly-to-moderately disturbed rivers. For toxicants, the guideline values for 95% species protection for slightly-to-moderately disturbed freshwater ecosystems were used, where available. Adverse ecological effects are unlikely when concentrations are below the sediment default guideline values. Adverse ecological effects are expected to happen when concentrations are above the high guideline values.

Summary of results

The water and sediment results are summarised in Tables 1 and 2 below (Report of Analysis 20240218). Any exceedances to the guidelines for aquatic ecosystem protection have been bolded.

Electrical conductivity was elevated in the unnamed creek relative to Wheeny Creek upstream but was within the default water quality guidelines. There are no wetland ecosystem-type water quality guidelines to draw comparisons with sites 3 and 4. The pH, electrical conductivity and nitrogen oxides were outside the water quality guideline ranges at the Wheeny Creek upstream site.

Dissolved aluminium and zinc concentrations were above water quality guideline values in the receiving unnamed creek (site 2) and at the wetland downstream of the alleged source site (site 3), respectively. All other metals were below water quality guideline values.

Default guideline values provide a starting point for managing water quality but do not account for the large spatial or temporal variation in natural water quality. This includes variation in environmental variables that influence the bioavailability and toxicity of contaminants. The concentration of aluminium (140 µg/L) exceeded the default water quality guideline (55 µg/L for pH>6.5, low reliability) by 2.5 times. The reliability of the aluminium guideline when pH<6.5 (0.8 µg/L) is unknown because it was derived using the assessment factor approach and therefore not used for comparison in this study. The uptake and toxicity of aluminium in freshwater organisms generally decreases with increasing water hardness and organic carbon. The very high water hardness (calcium and magnesium content) in the unnamed creek sample is likely to reduce any potential toxicity of aluminium found in this creek.

The concentration of zinc (12 µg/L) exceeded the default water quality guideline (8 µg/L, very high reliability) by 1.5 times. Following hardness correction, the dissolved zinc concentrations do not exceed the current water quality guideline value.

The concentration of major ions (calcium, magnesium, potassium, and sodium), sulfur and barium were higher in the unnamed creek compared to the concentrations at the other sites.

Lead and nickel concentrations were above sediment quality guideline values at the wetland downstream of the alleged source site (site 3) and the Wheeny Creek upstream site (site 1), respectively. All other metals are below sediment quality guidelines.

No polychlorinated biphenyls or pesticides were detected in water or sediments.

No polycyclic aromatic hydrocarbons were detected in water. PAHs were detected in sediment but below sediment quality guidelines.

PFAS were detected at very low concentrations in sediments from the receiving unnamed creek, wetland and upstream (sites 1, 2 and 3). There are currently no sediment quality guidelines for PFAS. PFAS was not detected in any water samples.

Table 1 – Physicochemical water quality, nutrient and dissolved metal concentrations compared to water quality default guideline value (ANZG 2018 and ANZECC & ARMCANZ 2000).

Parameter	Unit	Water quality DGV	Site 1	Site 2	Site 3*	Site 4*
Physicochemical						
pH	pH	6.5 – 8.0	**6.0**	6.8**	5.7	5.3
Electrical conductivity	µS/cm	125 – 2200	**120**	700**	251	210
Dissolved oxygen	mg/L	-	7.27	nm	6.18	5.46
Turbidity	NTU	50	40.5	nm	17.6	32.4
Nutrients						
Total Phosphorus	µg/L	50	<50	<50	60	<50
Total Nitrogen	µg/L	500	200	200	300	300
Oxides of Nitrogen	µg/L	40	**90**	9	6	<5
Ammonia (as N)	µg/L	900	40	<5	16	<5
Metals						
Aluminium (pH >6.5)	µg/L	55	<40	**140**	<40	<40
Arsenic (AsV)	µg/L	13	<1	<1	<1	<1
Barium	µg/L	-	20	63	47	37
Calcium	µg/L	-	1,900	47,000	3,500	1,500
Chromium (CrVI)	µg/L	1.0	<1	<1	<1	<1
Cobalt	µg/L	-	0.4	1.6	4.2	4.5
Copper	µg/L	1.4	<0.5	<0.5	<0.5	<0.5
Iron	µg/L	-	400	200	300	1,900
Lead	µg/L	3.4	<0.1	<0.1	<0.1	<0.1
Lithium	µg/L	-	0.7	<0.5	<0.5	<0.5
Magnesium	µg/L	-	3,200	20,000	11,000	5,600
Manganese	µg/L	1900	60	140	300	480
Mercury	µg/L	0.06	<0.05	<0.05	<0.05	<0.05
Nickel	µg/L	11	<0.5	1.7	2.0	1.6
Potassium	µg/L	-	1,600	4,000	1,800	2,300
Sodium	µg/L	-	17,000	59,000	34,000	31,000
Sulfur	µg/L	-	1,000	59,000	16,000	400
Titanium	µg/L	-	<10	<10	<10	<10
Zinc	µg/L	8.0	2.0	6.0	**12**	4.0

nm = not measured
* = there is no data available for a wetlands ecosystem type to make comparisons to guideline values.
** = data point not measured in the field. Data based on laboratory analysis instead.

Table 2 – Comparison of EPA sediment sampling results with sediment quality guidelines for the protection of aquatic ecosystems.

Toxicant	Unit	ANZG 2018 protection DGV	ANZG 2018 GV-high	Site 1	Site 2	Site 3	Site 4
Metals							
Aluminium	mg/kg dw	-	-	18,000	6,400	11,000	10,000
Arsenic	mg/kg dw	20	70	<8	5	9	<14
Barium	mg/kg dw	-	-	220	150	160	100
Calcium	mg/kg dw	-	-	520	3,100	780	130
Chromium	mg/kg dw	80	370	22	13	19	11
Cobalt	mg/kg dw	-	-	17	7	7	6
Copper	mg/kg dw	65	270	21	18	33	<14
Iron	mg/kg dw	-	-	29,000	19,000	48,000	30,000
Lead	mg/kg dw	50	220	37	34	**58**	20
Lithium	mg/kg dw	-	-	10	3	5	<5
Magnesium	mg/kg dw	-	-	640	2,000	1,400	760
Manganese	mg/kg dw	-	-	190	320	72	37
Mercury	mg/kg dw	0.15	1.0	0.066	0.016	0.12	0.057
Nickel	mg/kg dw	21	52	**22**	10	11	<9
Potassium	mg/kg dw	-	-	1,500	960	1,500	1,100
Sodium	mg/kg dw	-	-	170	260	260	1,000
Sulfur	mg/kg dw	-	-	1,300	160	1,400	3,000
Titanium	mg/kg dw	-	-	25	68	33	21
Zinc	mg/kg dw	200	410	100	65	100	28
Organics							
Total PAHs*	µg/kg dw, 1% OC	10,000	50,000	50	625	653	nd
TOC	mg/kg	-	-	98,000	12,000	38,000	220,000

* = Total PAHs concentrations have been normalised to 1% organic carbon content within the limits of 0.2 to 10% for comparison with sediment quality guidelines. The default guideline value and GV-high values for total PAHs (sum of PAHs) include the 18 parent PAHs. Total PAHs in this study has been calculated on 17 of these 18 PAHs, with benzo[e]pyrene not analysed.
nd = nil detected. All of the analysed PAHs were below their detection limit at site 4.
dw = dry weight

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