Cadia region surface water PFAS testing – 22 and 23 October

On 22 and 23 October 2024, the NSW Environment Protection Authority (EPA) conducted sampling in the Belubula River catchment area to investigate potential sources of per- and polyfluoroalkyl substances (PFAS) contamination. This report summarises the results from that sampling.

Background

Land-use in the Belubula River catchment is dominated by agriculture but also contains some industry, including quarries, a decommissioned abattoir, Blayney Sewage Treatment Plant, the Newmont Cadia gold mine, the current and former Cadia dewatering facilities, Blayney landfill and a composting and waste storage facility. There are some townships on the Belubula River, including Blayney and Carcoar.

Earlier in 2024, the community raised concerns regarding water quality of the creeks surrounding the Cadia gold mine and the Belubula River. In response to this, the EPA collected water samples from the Belubula River catchment in May, July and August of 2024. These results have identified the need for a more thorough investigation into potential per- and polyfluoroalkyl substances (PFAS) contaminant sources within the catchment.

Reports summarising those sampling results are available on the EPA's website.

Approach taken

In October 2024, the EPA collected surface water samples from 20 locations along the Belubula River and surrounding locations to investigate potential sources of PFAS contamination in the Belubula River catchment. Site selection focused on key locations both upstream and downstream of potential contamination sources (where access was possible) and some sites sampled previously (see Figure 1).

A water sample was collected from each site and sent to the NSW Environmental Forensics laboratory and analysed for PFAS. As well as the water samples, a foam sample was collected from the Belubula River at Burnt Yards Bridge and analysed for PFAS.

Natural and synthetic foams can concentrate chemicals from the surrounding water. Due to this behaviour, chemical levels in foam can be significantly higher than in the surrounding water. It is therefore not appropriate to compare the foam results with water quality guidelines.

Perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) were compared to ecological water quality guidelines in the PFAS National Environmental Management Plan (PFAS NEMP 2.0). The 99% species protection guideline has been used for comparison, as advised by the Water Quality Guideline framework (ANZG 2018) for bioaccumulative contaminants. A concentration above the 99% guideline value indicates the potential for harm to the most sensitive aquatic life. There are no livestock and irrigation water guidelines for PFAS.

Sample locations

The aim of this sampling was to further investigate potential sources of PFAS contamination in the Belubula River. Sampling locations were chosen based on locations of community concern, accessibility for sampling, previous testing and proximity to potential industrial sources of pollution. See the full list of sampling locations in Table 1 below.

The Newmont Cadia gold mine (EPL 5590) is surrounded by Cadiangullong Creek to the west and Flyers Creek to the east where they feed into the Belubula River located south of the mine. These creeks have been part of the previous sampling events in the area. As well as the mine site, the current and former Cadia dewatering facilities are located in Blayney. The current facility is located on Newbridge Rd adjacent to small unnamed creeks that feed into the Belubula River near Goose Park and the former facility was situated just north of Blayney train station adjacent to Abattoir Creek.

The Blayney landfill, located at 4165 Mid Western Highway, operates under an Environmental Protection Licence (EPL 6180), and is subject to environmental monitoring as part of its operations. The landfill is adjacent to Mackenzies Waterholes Creek, which flows into Cowriga Creek, and then the Belubula River.

The sewage treatment plant located at 3502 Hobbys Yard Road, supports the town of Blayney in the treatment and management of wastewater. It sits adjacent to the Belubula River, upstream of Carcoar Dam. It holds an environmental protection licence (1647) allowing discharge of up to 950kL of treated effluent per day.

The Blayney Abattoir, which is located at the north end of Blayney adjacent to Abattoir Creek which flows into the Belubula River, is not operational and was closed more than 20 years ago.

Two quarries are located in the upper reaches of Abattoir Creek.

There is a composting and waste storage facility located adjacent to Cowriga Creek.

Other diffuse sources of pollution in the catchment include runoff from agricultural lands and small townships (such as Blayney and Carcoar).

Sites with no known potential contamination sources were sampled for comparison.

Table 1 – Sample site and location descriptions for surface water samples collected in the Belubula River catchment on 22 and 23 October 2024.

Sampling site	Waterway	Location description	Potential contamination sources
SW 1	Belubula River	Upstream of Blayney at Dungeon Road	No known sources
SW 2	Abattoir Creek	Upstream of old abattoir and the Belubula River at Blayney	Adjacent to quarries
SW 3	Belubula River	Off Newbridge Road, Goose Park, within township of Blayney	Old abattoir, former and current dewatering facility

SW 4	Belubula River	~1 km downstream of Blayney Sewage Treatment Plant off Hobbys Yards Road	Sewage treatment plant, old abattoir, dewatering facility
SW 5	Mackenzies Waterholes Creek	~1 km downstream of Blayney landfill	Landfill
SW 6	Belubula River	~100 m upstream of Cowriga Creek junction with Belubula River, downstream of Carcoar dam	Sewage treatment plant, old abattoir, dewatering facility
SW 7	Cowriga Creek	~15 km downstream of Blayney landfill; ~50 m upstream of the Belubula and Cowriga Creek junction, near Carcoar	Landfill, composting facility
SW 8 **Not sampled this round**	Belubula River	Immediately upstream of Ashburton Bridge, off Errowanbang Road	Landfill, old abattoir and sewage treatment plant, composting facility
SW 9	Belubula River	Immediately downstream of Ashburton Bridge off Errowanbang Road	Landfill, old abattoir, sewage treatment plant, composting facility, dewatering facility
SW 10 **Not sampled this round**	Coombing Creek	~100 m upstream of Coombing Creek junction with the Belubula River, off Midwestern Highway	No known sources
SW 11	Belubula River	Burnt Yards Road Bridge	Landfill, old abattoir, sewage treatment plant, composting facility, dewatering facility
SW 12	Belubula River	Bakers Shaft Reserve	Landfill, old abattoir, sewage treatment plant, composting facility, dewatering facility
SW 13	Flyers Creek	~10 km upstream of junction with Belubula River, off Old Errowanbang Road	Mining
SW 14	Cadiangullong Creek	Off Panuara Road, directly west of Cadia mine.	Mining
SW 15	Limestone Creek	~8 km upstream of junction with Belubula River at Boonderoo	No known sources

Not sampled this round			
SW 16	Belubula River	Off Malongulli Road	Landfill, old abattoir, sewage treatment plant, composting facility and mining, dewatering facility
SW17	Cowriga Creek	At Browns Creek Rd, upstream of the composting facility.	No known sources
SW18	Cowriga Creek	~1km downstream of the composting facility	Composting facility
SW19	Cowriga Creek	~6km downstream of the composting facility	Composting facility
SW20	Mackenzies Waterholes Creek	Upstream of Blayney landfill	No known sources
SW21	Belubula River	Dakers Oval, ~150m upstream of the confluence with Abattoir Creek	No known sources
SW22	Cadiangullong Creek	Off Four Mile Creek Rd, immediately downstream of confluence with Soldiers Creek	No known sources
SW23	Flyers Creek	Off Long Swamp Rd	No known sources

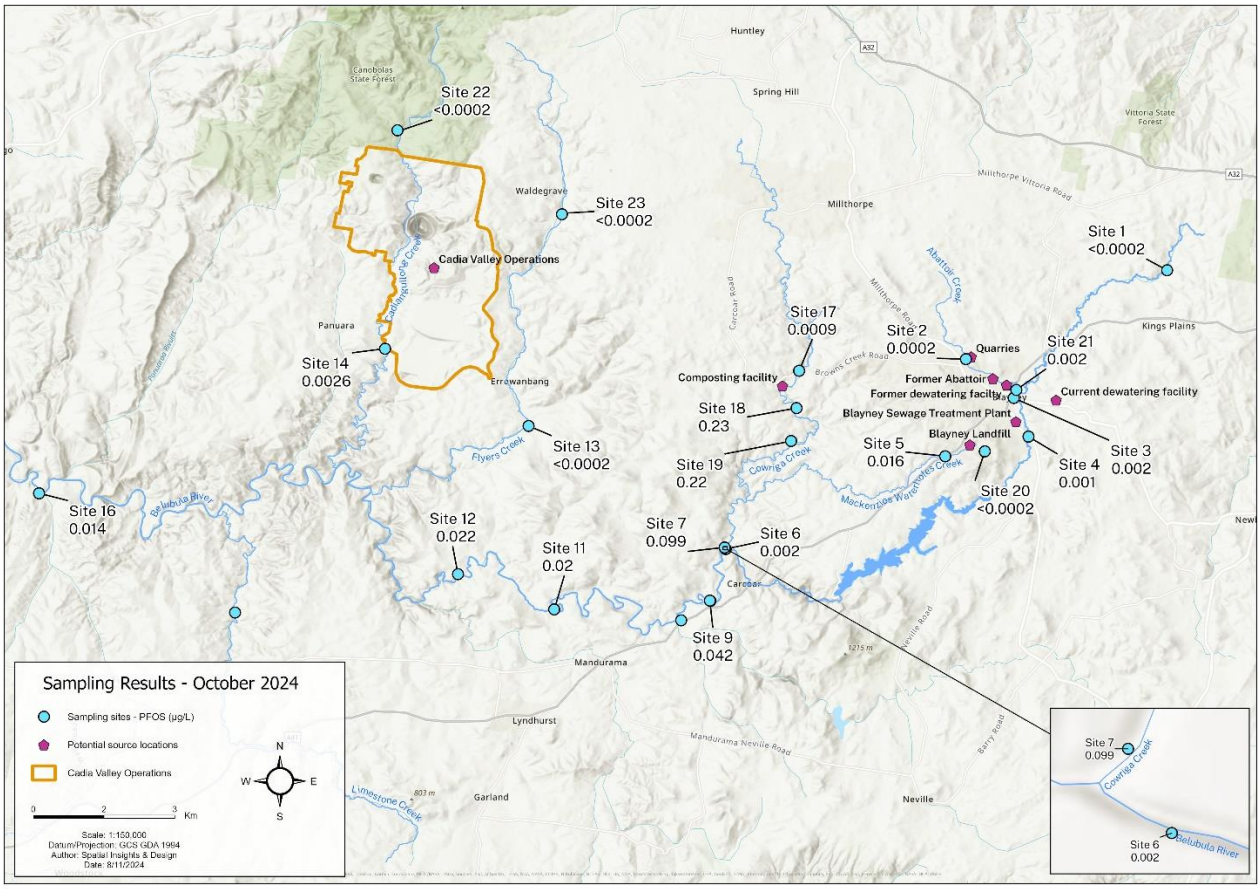

Figure 1 – Overview of the sampling sites

Sampling results

Sampling and analysis results for PFAS are described below in Table 2.

The widespread presence of PFAS in the environment in Australia and around the world is a result of its unique properties, which have led to it being widely used for many decades. For example, PFAS are persistent and highly resistant to physical, chemical and biological degradation. Consequently, PFAS are found in humans, animals and the environment around Australia (PFAS NEMP 2.0 2020).

Figure 1 displays the PFOS concentrations measured in the Belubula River catchment. The map includes local industry locations, including the Cadia gold mine, Cadia dewatering facilities (current and former), Blayney landfill, Blayney Sewage Treatment Plant, a decommissioned abattoir, quarries and a composting and waste storage facility.

PFAS substances, including PFOS (perfluorooctanesulfonic acid), PFOA (perfluorooctanoic acid) and PFHxS (perfluorohexanesulfonic acid) were detected in 16 of the 20 sites sampled, with PFOS detected above the ecological water quality guidelines (NEMP 2020) at 14 sites (Table 2). The presence of PFOS in water samples does not necessarily mean there is a risk to human health or livestock. Sampling locations in Cowriga Creek immediately downstream of the composting facility had the highest PFOS concentrations (0.22 – 0.23 µg/L). These elevated levels continued into the

Belubula River down to the furthest sampling point downstream (0.014 – 0.042 ug/L). PFOS concentrations were also elevated in the Mackenzies Waterholes Creek downstream of the Blayney landfill (0.016 µg/L). These are above ambient concentrations measured in Victorian agricultural catchments (up to 0.003 µg/L, VIC EPA 2022).

PFOS concentrations in samples collected from the Belubula River on 22-23 October 2024 (highest concentration 0.042 ug/L) were lower those collected in May and July (highest concentration 0.06 and 0.071) but higher than those collected in August (highest concentration 0.013 ug/L).

PFAS was detected in the foam sample, including PFOS and PFHxS (Table 1). The sample collected was a concentrated sample of the collapsed foam mixture, not representative of the Belubula River and therefore not appropriate to compare with water quality guidelines. The properties of PFAS make it accumulate in foam and therefore the higher concentration of PFAS measured in the foam sample is expected.

Table 2 – PFAS concentrations compared to ecological water quality guidelines (PFAS NEMP 2.0 2020).

Parameter	Ecological water quality guideline (µg/L)	Site 1 Belubula River	Site 2 Abattoir Creek	Site 3 Belubula River	Site 4 Belubula River	Site 5 Mackenzies Waterholes Creek	Site 6 Belubula River	Site 7 Cowriga Creek
PFHxS	-	<0.0002	0.001	0.004	0.0075	0.064	0.0049	0.041
PFOA	19	<0.0002	0.0008	0.0008	0.0021	0.05	0.0009	0.0062
PFOS	0.00023	<0.0002	0.0002	**0.002**	**0.001**	**0.016**	**0.002**	**0.099**
Parameter	Ecological water quality guideline (µg/L)	Site 9 Belubula River	Site 11 Belubula River	Site 12 Belubula River	Site 13 Flyers Creek	Site 14 Cadiangullong Creek	Site 16 Belubula River	Site 17 Cowriga Creek
PFHxS	-	0.023	0.012	0.011	<0.0002	0.001	0.014	0.0044
PFOA	19	0.0032	0.001	0.001	<0.0002	0.0003	0.001	0.001
PFOS	0.00023	**0.042**	**0.02**	**0.022**	<0.0002	**0.0026**	**0.014**	**0.0009**
Parameter	Ecological water quality guideline (µg/L)	Site 18 Cowriga Creek	Site 19 Cowriga Creek	Site 20 Mackenzies Waterholes Creek	Site 21 Belubula River	Site 22 Cadiangullong Creek	Site 23 Flyers Creek	Foam Site 11 Belubula River
PFHxS	-	0.087	0.058	0.0008	0.0026	<0.0002	<0.0002	0.021
PFOA	19	0.014	0.011	0.001	0.0008	<0.0002	<0.0002	<0.01
PFOS	0.00023	**0.23**	**0.22**	<0.0002	**0.002**	<0.0002	<0.0002	26

Any guideline exceedances have been **bolded**.

What happens next

This sampling provides a snapshot of PFAS levels at a point in time and does not capture variability over time, limiting how the data is interpreted and the conclusions that can be drawn. Sampling to date has shown elevated PFAS levels in the Belubula River catchment.

The EPA will continue its sampling program and engage with local industries to further investigate and understand the potential source of PFAS detections and measures that can be put in place to mitigate the risks. The EPA is focusing on the local industry sites where PFAS has been detected immediately downstream of the premises including the landfill, a composting facility and the mine.

The presence of PFAS in the environment does not necessarily mean there is a health risk. However, identifying sites that need investigating is an important precaution to reduce the risk of community exposure to PFAS. We have shared the results of our sampling in the region with the NSW PFAS Technical Advisory Group for advice.

The group includes representatives from NSW Health, Department of Primary Industries and the NSW Department of Climate Change, Energy, the Environment and Water. NSW Health advises that water from rivers and creeks should not be used for drinking or cooking without appropriate treatment. Untreated water may contain disease causing micro-organisms, chemical contaminants or algal blooms.

The results to date indicate the risk to livestock is low, but as a precaution, the EPA will be taking soil samples for testing at select properties where livestock graze adjacent to impacted waterways.

The EPA is continuing to review and monitor surface water quality in the region. We will provide ongoing updates to the community as new data becomes available. If any situation involving the water quality changes, the EPA will immediately inform the community.

References

ANZG (2018), Australian and New Zealand Guidelines for Fresh and Marine Water Quality: Guideline Framework, Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at https://www.waterquality.gov.au/anz-guidelines/framework

PFAS NEMP 2.0 (2020), National Environmental Management Plan Version 2.0, Heads of EPA Australia and New Zealand. Available at https://www.dcceew.gov.au/environment/protection/publications/pfas-nemp-2

VIC EPA (2022), Summary of PFAS concentrations detected in the environment in Victoria. Victorian Government, Melbourne.