

## PFAS AND ENVIRONMENTAL JUSTICE

Why the burden of forever chemicals falls hardest on communities least able to bear it

PFAS SERIES — ARTICLE 6 OF 6

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PFAS SERIES — ARTICLE 6 OF 6 — SERIES FINALE

# PFAS and Environmental Justice

Why the burden of forever chemicals falls hardest on communities least able to bear it

The contamination of drinking water with PFAS is not randomly distributed across the population. The communities most exposed to PFAS are frequently those with the least political power, the fewest financial resources, and the greatest pre-existing health vulnerabilities. This is not coincidence. It is the result of decades of decisions about where to site polluting industries, how to regulate them, and how to allocate the resources needed to respond when contamination occurs.

Environmental justice — the principle that no community should bear a disproportionate share of environmental harm — sits at the heart of PFAS policy. And by that measure, the current situation fails badly.

***"The sociodemographic groups that are often stressed by other factors, including marginalization, racism, and poverty, are also more highly exposed to PFAS in drinking water." — Jahred Liddie, Harvard T.H. Chan School of Public Health, Environmental Science & Technology, 2023***

**Figure 1: Who Bears the Burden — Four Vulnerable Community Profiles**  
The groups disproportionately exposed to PFAS in drinking water and why

| LOW-INCOME COMMUNITIES<br>Below poverty threshold                    | COMMUNITIES OF COLOR<br>Black & Hispanic/Latino                                         | MILITARY COMMUNITIES<br>Bases & surrounding towns                             | SMALL & RURAL SYSTEMS<br>Under 10,000 connections                             |
|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| <b>3–5×</b><br>vs affluent communities<br>Higher PFAS exposure       | <b>10–108%</b><br>more per facility (Harvard)<br>Industrial PFAS sources near watershed | <b>723</b><br>US installations (DoD 2025)<br>Military sites assessed for PFAS | <b>2031</b><br>deadline for PFOA/PFOS<br>EPA compliance extension offered     |
| <b>filtration</b><br>home treatment options<br>Less likely to afford | <b>20–34%</b><br>more PFOS in water<br>Military fire training areas nearby              | <b>586</b><br>proceeding to remediation<br>Sites requiring further action     | <b>Highest</b><br>limited rate base to spread<br>Treatment cost per household |
| <b>Limited</b><br>to challenge siting<br>Political capacity          | <b>Sited near</b><br>disproportionately<br>Airports & landfills                         | <b>PFOA/PFOS &gt;4 ppt</b><br>at 55+ installations<br>Off-base wells affected | <b>Often limited</b><br>to plan & execute<br>Technical & managerial capacity  |

Sources: Harvard Chan School / Liddie et al. EST 2023, DoD March 2025, EPA 2025, AWWA, American Bar Association 2025 · TheWaterNetwork.com / AquaSPE 2026

Figure 1: Four community profiles disproportionately burdened by PFAS contamination. Each group faces distinct exposure pathways and response barriers.

The evidence for disproportionate exposure

The Harvard Chan School study published in Environmental Science & Technology (Liddie, Schaider & Sunderland, 2023) analysed 7,873 US community water systems across 18 states. It is the most comprehensive peer-reviewed evidence of sociodemographic PFAS disparities to date.

**Key finding 1** — community water systems serving higher proportions of Black and Hispanic/Latino residents are more likely to detect PFAS at harmful concentrations. This association holds after controlling for other variables.

**Key finding 2** — each additional industrial PFAS facility within a watershed was associated with a 10–108% increase in PFOA concentrations in drinking water. Each military fire training area was associated with a 20–34% increase in PFOS.

**Key finding 3** — the siting of PFAS pollution sources is not random. Communities of colour represent the path of least resistance for industrial location decisions — a pattern reinforced by historical segregation and limited political power.

**Key finding 4** — even at identical PFAS exposure levels, pre-existing health stressors common in marginalised communities amplify adverse health outcomes. The toxic burden compounds.

## Figure 2: Why Vulnerable Communities Face Greater PFAS Risk

Three reinforcing factors that compound the burden

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DISPROPORTIONATE SITING</b><br>Industrial sources located near marginalized communities <ul style="list-style-type: none"><li>• Factories, airports &amp; military bases more often sited near communities of color</li><li>• Historical segregation shaped where PFAS sources were built</li><li>• Limited political power = "path of least resistance" for industrial siting</li><li>• Each industrial facility adds 10–108% more PFOA in nearby water systems</li></ul> | <b>REDUCED CAPACITY TO RESPOND</b><br>Fewer resources to detect, treat and advocate <ul style="list-style-type: none"><li>• Small systems lack engineers &amp; managers for PFAS compliance planning</li><li>• Low rate base means treatment cost per household is highest for smallest systems</li><li>• Private well owners have no utility to mandate or fund treatment</li><li>• Limited access to legal &amp; advocacy resources to challenge contamination</li></ul> | <b>COMPOUNDED HEALTH BURDEN</b><br>Same exposure — worse outcomes in vulnerable populations <ul style="list-style-type: none"><li>• Pre-existing stressors reduce physiological resilience to PFAS toxicity</li><li>• Children: developmental effects, immune disruption, behavioral impacts at low doses</li><li>• Cumulative exposure from multiple environmental stressors amplifies PFAS risk</li><li>• Economic barriers to accessing bottled water or home filtration during contamination</li></ul> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Sources: Liddie et al. EST 2023, Harvard Chan School, IJERPH 2025, American Bar Association 2025 · TheWaterNetwork.com / AquaSPE 2026

Figure 2: Three compounding factors explaining why PFAS burden falls disproportionately on marginalised communities.

### The military community: a special case

More than 700 US military installations are known or likely to have discharged PFAS, primarily through the use of aqueous film-forming foam (AFFF) in firefighting training. As of March 2025, the Department of Defense has assessed 723 installations and determined that 586 require further remedial action.

The communities most affected are often those immediately adjacent to bases — communities that grew up around military employment and have limited alternative sources of economic and political support. PFOS and PFOA were found above health-based limits in off-base drinking water at 55 installations. Veterans seeking disability claims for PFAS-related illness face additional barriers: the VA does not automatically concede PFAS exposure, requiring veterans to prove individual exposure — a burden of proof that disproportionately affects those with less access to legal support.

**The regulatory reversal risk:** proposed changes to the National Defense Authorization Act for FY2026 include extending the phaseout deadline for PFAS-containing AFFF and lifting a moratorium on incinerating PFAS-contaminated foam — decisions that would extend exposure for communities already waiting for cleanup.

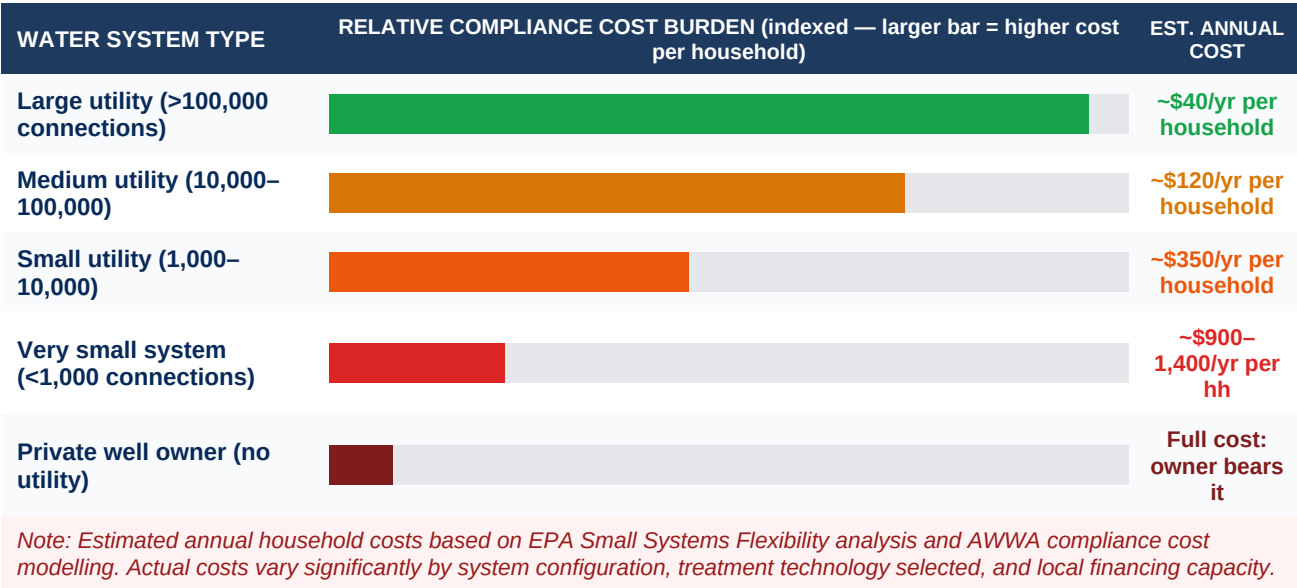
### Small systems and private wells: the invisible gap

The EPA's PFAS National Primary Drinking Water Regulation applies to public water systems. It does not apply to private wells, which serve approximately 13% of the US population — disproportionately concentrated in rural and low-income communities. Private well owners receive no regulatory protection, no monitoring requirements, and bear the full cost of testing and treatment themselves.

For small public water systems the burden is severe. Treatment cost scales inversely with system size: a large utility serving 100,000 connections might add ~\$40 per household per year; a very small system serving 500 connections may face \$900–1,400 per household. These are precisely the communities with the lowest household incomes and least capacity to access state and federal funding programmes.

### Figure 3: Compliance Cost Burden by System Size

Why small and rural systems face the highest per-household cost of PFAS compliance



Sources: EPA Small Systems Flexibility analysis, AWWA compliance cost modelling, Water Research Foundation 2025 · TheWaterNetwork.com / AquaSPE 2026

Figure 3: Estimated annual per-household PFAS compliance costs by system size. Smallest systems — serving rural and low-income communities — bear the highest burden.

### The regulatory picture: who is protected and who is not

The regulatory landscape for PFAS in drinking water varies dramatically across jurisdictions — and the pattern of who receives protection and who does not tracks closely with existing inequalities.

**United States** — the May 2025 EPA decision to rescind drinking water standards for four PFAS chemicals (PFHxS, PFNA, GenX, and PFBS) and extend the PFOA/PFOS compliance deadline to 2031 was widely criticised by environmental justice advocates. The 2024 rule, which environmental justice organisations estimated would protect over 105 million people, was developed with explicit EJ commitments. The current administration's framing centres on "small, rural communities" requiring additional compliance time — a legitimate concern, but one that critics argue is being used to weaken protections for all rather than fund targeted support.

**European Union** — the Drinking Water Directive requires member states to consider vulnerable groups in implementation. The universal restriction approach — banning aqueous PFAS across industry rather than managing them through end-of-pipe treatment — is widely seen as the most EJ-aligned framework globally, as it reduces exposure at source rather than requiring vulnerable communities to install treatment systems they may not be able to afford.

**United Kingdom** — private well owners and residents served by small private supplies remain outside the regulatory net. With 34 enforcement notices issued to water companies in 2025, the DWI is applying pressure — but communities on private supplies, often in rural and lower-income areas, receive no equivalent protection.

**Australia** — the \$807M+ defence remediation programme is the primary response mechanism. Communities adjacent to military bases — including Indigenous communities in remote areas — face the longest waits and the most limited access to alternative water supplies during the remediation process.

## Figure 4: Regulatory Status and Environmental Justice — Global Comparison

What protections exist and where the gaps fall

| JURISDICTION   | CURRENT STANDARD      | DEADLINE          | EJ STATUS & NOTES                                                                                                                                                                                                                                   |
|----------------|-----------------------|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| United States  | PFOA/PFOS: 4 ppt MCL  | 2031 (extended)   | EPA rescinded 4 PFAS standards (May 2025); PFOA/PFOS deadline extended; EJ no longer a stated priority under current administration<br>► <b>47% of affected at 4ppt live in EJ communities</b>                                                      |
| European Union | 10 ng/L sum-of-20     | 2026 (parametric) | Drinking Water Directive requires MS consider vulnerable groups; REACH restriction to ban aqueous PFAS in industry — strongest global EJ-aligned framework<br>► <b>Precautionary approach protects all — no explicit EJ carve-out</b>               |
| United Kingdom | 100 ng/L (interim)    | Under review      | DWI issued 34 enforcement notices to water companies 2025; private well owners and small systems remain outside regulatory net<br>► <b>Private well users — rural &amp; low-income — excluded from protections</b>                                  |
| Australia      | 70 ppt PFOS (interim) | State-by-state    | AUD \$807M+ for military site cleanup; civilian communities near bases often await state action; Indigenous communities in remote areas face longest waits<br>► <b>Defence-adjacent communities prioritised; remote Indigenous communities last</b> |

Sources: EPA May 2025, EU Drinking Water Directive 2020/2184, UK DWI 2025, Australian DoD 2025, Harvard EELP 2025, Earthjustice 2025

Figure 4: Regulatory comparison across four jurisdictions. The EJ column identifies where gaps disproportionately affect vulnerable communities.

### What this means for water utilities and water professionals

The environmental justice dimension of PFAS contamination has direct operational and strategic implications for water utilities.

- 1. Identify your EJ communities first.** Before prioritising treatment investments, map the sociodemographic profile of your service area. Communities with lower incomes, higher proportions of people of colour, or lower political engagement should be at the front of the treatment queue — not the back.
- 2. Engage private well owners proactively.** If your service area includes households on private wells in PFAS-affected zones, utilities have an advocacy role even where they have no regulatory obligation. Outreach, testing support, and partnership with county health departments can close the gap.
- 3. Pursue EJ-designated funding pathways.** The EPA's Water Infrastructure Finance and Innovation Act (WIFIA), Drinking Water State Revolving Fund (DWSRF), and the Bipartisan Infrastructure Law's PFAS provisions all contain EJ-priority criteria. Utilities serving disadvantaged communities may qualify for enhanced grant (not loan) funding — but must explicitly apply under EJ designations.

**4. Communicate risk equitably.** PFAS risk communications written in technical English and distributed only through utility billing channels will fail to reach communities with language barriers, lower digital access, or distrust of official communications. Multilingual outreach, community liaison partnerships, and trusted-intermediary communication strategies are not optional extras — they are central to effective public health response.

**5. Track who benefits from your compliance investments.** Utilities should monitor whether PFAS compliance spending is reaching their highest-risk communities first, or whether it is being directed toward easier-to-serve areas with less contamination. The distribution of investment matters as much as its total volume.

***Safe drinking water is not a privilege that should be distributed according to zip code, income, or race. The PFAS crisis is, among other things, a stress test of that principle. Water professionals are not bystanders in that test.***

## Looking ahead: the series in context

This is the sixth and final article in TheWaterNetwork's PFAS series. Across the six articles, a consistent pattern has emerged: PFAS contamination is not an isolated technical problem with a simple engineering solution. It is a systemic challenge that spans funding, regulation, industrial practice, disposal, and — as this article has shown — fundamental questions of equity and justice.

The communities most burdened by PFAS are frequently those with the fewest resources to respond. The technologies to treat and destroy PFAS exist and are becoming commercially available. The regulatory frameworks to prevent future contamination are being written and rewritten. Whether those frameworks are strong enough, and whether their benefits are distributed equitably, will define the next decade of PFAS policy.

***Water professionals — utilities, engineers, regulators, and researchers — are not outside this political question. The choices made about where to direct compliance investments, which communities to prioritise, and which regulatory frameworks to support or challenge are themselves choices about who the water sector serves.***

### PFAS Series — complete

- [Article 1 — Funding PFAS Compliance: A Global Guide for Water Utilities](#) ✓ Published
- [Article 2 — Why Your Jurisdiction Matters More Than the National Regulator](#) ✓ Published
- [Article 3 — Europe's PFAS Crackdown: Source Bans, Treatment Standards & What They Mean](#) ✓ Published
- [Article 4 — The Hidden PFAS Pipeline: Industrial Discharge & What's Coming in 2026](#) ✓ Published
- [Article 5 — The Disposal Dilemma: What Happens to PFAS After You Remove It?](#) ✓ Published
- [Article 6 — PFAS and Environmental Justice: Why the Burden Falls Hardest on Vulnerable Communities](#) ✓ Published

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