



## **Submission to the Senate Community Affairs References Committee**

### **Inquiry into the Impact of Microplastics, Toxics and Forever Chemicals on Human Health**

**Submitted by:**

**Robert Manning**

Founder & Chairman

**SA Water Innovation Pty Ltd (SAWI)**

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## 1. Executive Summary

Microplastics and associated persistent chemicals are now ubiquitous across Australia's freshwater, stormwater and marine environments, with increasing international evidence suggesting plausible links to adverse human health outcomes including inflammation, endocrine disruption and chronic disease pathways (1–5). However, Australia currently lacks a coordinated, standardised national evidence base capable of linking environmental concentrations to exposure pathways and health risk.

This submission is made by Robert Manning, Founder and Chairman of SA Water Innovation Pty Ltd (SAWI), a company focused on integrated water quality monitoring, interception and treatment across the full urban-to-coastal water cycle.

Three structural gaps are evident:

1. **Evidence gap** – Inconsistent methods and fragmented datasets limit comparability and policy relevance.
2. **Pathway gap** – Insufficient focus on stormwater and catchment transport pathways that dominate microplastic loading (9–11).
3. **Action gap** – Monitoring is rarely coupled to practical interception and mitigation infrastructure.

SAWI, in collaboration with SORR Pty Ltd, has developed gyroid-structured filtration media and systems designed for high-surface-area, low-head-loss interception of microplastics, particulates, algal biomass and co-transported contaminants such as PFAS (1,2,6–8). This platform enables integration of **measurement, interception and performance verification** in real-world environments.

This submission recommends:

- A nationally coordinated monitoring framework across fresh, storm and marine waters,
- Development of Australian standards for microplastics measurement and reporting,
- Integration of environmental monitoring with health and ecological surveillance, and
- Establishment of a National Pilot Program combining monitoring with interception and treatment trials.



## 2. About the Author and SA Water Innovation

I am the Founder and Chairman of SA Water Innovation Pty Ltd, an Australian environmental technology company focused on:

- Multi-matrix water quality assessment (freshwater, stormwater, marine),
- Interception and treatment of particulates, microplastics and associated contaminants,
- Scalable, field-deployable remediation systems, and
- Decision-grade data platforms for government and industry.

SAWI operates on the principle that **human and ecological exposure is driven by connected systems**, not isolated environments.

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## 3. Context: Microplastics as a Systems Risk

Microplastics function simultaneously as:

- A **physical contaminant**,
- A **chemical vector** for persistent pollutants, and
- A **biological interface** with living systems (3–8).

They are transported through urban runoff, stormwater, wastewater, rivers, estuaries and coastal waters, and have been detected in drinking water and food chains (5,14). This necessitates a **whole-of-system** response spanning source control, interception, monitoring and risk assessment.

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## 4. Response to the Inquiry's Terms of Reference

### 4.1 Human Health Impacts and Evidence Gaps

International studies indicate associations between microplastics and inflammatory responses, oxidative stress, endocrine disruption and potential translocation across biological barriers (1–5). However, Australia lacks harmonised datasets linking environmental exposure to population health indicators.

**Recommendation:** Establish coordinated national programs linking environmental monitoring, biomonitoring and health research cohorts.

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### 4.2 Scale, Sources and Pathways of Exposure

Major sources include tyre wear, synthetic fibres, packaging and urban dust. Stormwater is a dominant transport pathway delivering microplastics to receiving waters (9–11).



**Recommendation:** Prioritise catchment-to-coast source apportionment and load accounting.

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#### **4.3 Adequacy of Monitoring and Standards**

Australia currently lacks:

- Standardised sampling protocols,
- Harmonised analytical methods,
- Baseline or guideline values for microplastics.

**Recommendation:** Develop national guidance and a central data repository.

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#### **4.4 Vulnerable Communities and Ecosystems**

Coastal and inland communities reliant on fisheries, recreation and local water supplies may face disproportionate exposure risks, while estuarine ecosystems act as early warning indicators.

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#### **4.5 Public Education and Risk Communication**

Public messaging should be evidence-based, transparent and linked to practical source-reduction actions.

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#### 4.6 National and International Frameworks

Australia should align with WHO, UNEP and OECD frameworks while adapting methods to local hydrology and urban form (12–14).

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#### 5. SA Water Innovation and SORR Gyroid™ Capabilities

SAWI, in collaboration with SORR Pty Ltd, has developed **gyroid-structured porous filtration media** based on triply periodic minimal surface geometries (1,2). These structures provide:

- Extremely high surface-area-to-volume ratios,
- Continuous interconnected flow paths,
- High mechanical stability with tunable pore sizes.

These properties are well suited to **interception and adsorption of microplastics, fine particulates, algal biomass and particle-bound contaminants** (3–8).

Microplastics are now widely recognised as vectors for persistent organic pollutants, PFAS and metals due to strong sorption behaviour and long environmental residence times (6–8). Removing the particle fraction therefore directly contributes to **reducing chemical exposure pathways**.

The SORR Gyroid™ platform is designed for deployment in:

- Stormwater drains and outfalls,
- Freshwater systems (lakes, rivers, wetlands),
- Estuarine and nearshore marine environments,

using modular, low-energy configurations suitable for real infrastructure constraints.

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## 6. Integration of Monitoring, Interception and Evidence Generation

SAWI's approach integrates:

1. Standardised monitoring,
2. Source-pathway analysis, and
3. Targeted interception using gyroid media,

into a **closed-loop evidence system** where interception performance and downstream risk reduction can be quantified. This aligns with international best-practice pollution management frameworks (12–14).

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## 7. Proposal: A National Pilot Program

A National Pilot Program should include:

- 3–5 representative catchments,
- Monitoring across fresh, storm and marine waters,
- Standardised analytical methods,
- Deployment of interception systems (including gyroid platforms),
- Health and ecological indicator linkage.

This would deliver Australia's first comparable national dataset and a defensible basis for standards, regulation and infrastructure investment.

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## 8. Conclusion

Microplastics and associated persistent chemicals represent a **whole-of-system risk**. Australia now has the opportunity to move from fragmented measurement to an integrated, evidence-driven national response that protects both ecosystems and public health.

SA Water Innovation stands ready to support this effort.

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