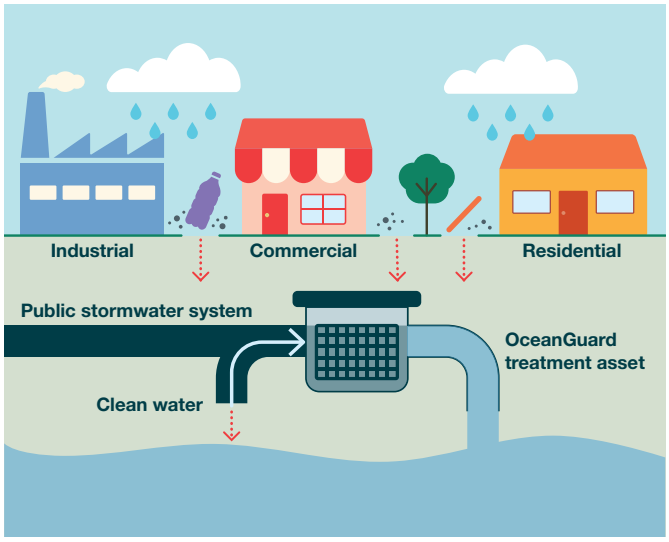
Understanding Microplastics:

Microplastic Sampling, Separation, and Identification from Industrial, Commercial, and Residential Catchment Areas

Why study microplastics in stormwater?

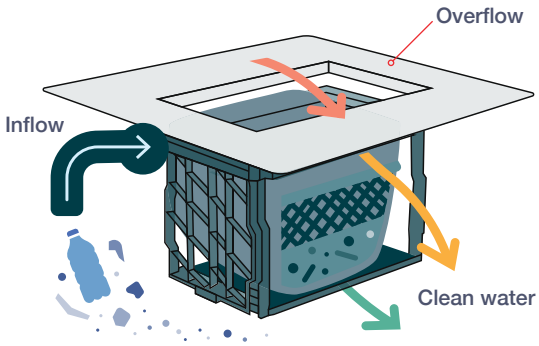
Urban stormwater systems are a major pathway through which plastics and microplastics enter rivers, estuaries, and the ocean. Plastics discarded or degraded on land are mobilised by rainfall, transported through drains, and ultimately released into aquatic environments. Once released, microplastics persist for decades, interact with contaminants, and pose risks to ecosystems and potentially human health. Stormwater treatment assets like OceanGuards, installed by Ocean Protect, prevent microplastics from entering the public stormwater network and eventually reaching waterways.



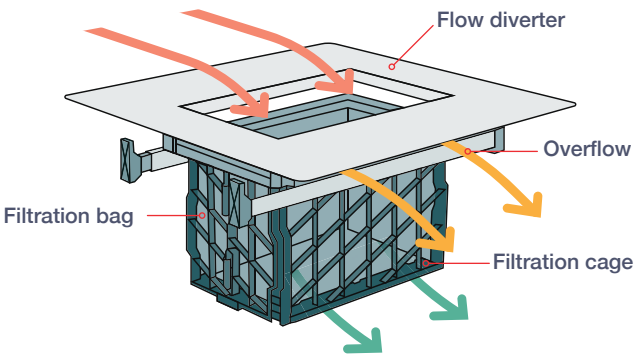
What did we study?

Sampling was carried out using stormwater treatment assets, OceanGuards, in collaboration with Ocean Protect, from industrial, commercial, and residential areas, focusing on plastics across a wide size range- from visible macroplastics (>5 mm) to fine microplastics (<500 µm). The OceanGuards were chosen from different locations, like loading docks, carparks, hardstands, gardens, and a variety of roads, like truck stops, near entry points, slow roads and strata roads, ensuring consistent, real-world capture of pollutants under operational conditions.

How OceanGuard Captures Microplastics



OceanGuard



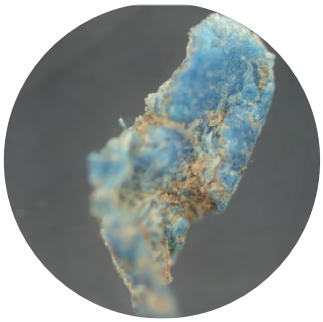
Key Findings

1. A clear pollution gradient across land uses

Commercial catchments had the highest plastic and microplastic loads due to intensive human activity, vehicle movement, and packaging waste. Industrial sites contributed large macroplastics that fragment into microplastics, while residential areas contained less total plastic but a greater share of fine, mobile, and persistent microplastics.

2. Size matters: fragmentation is already happening

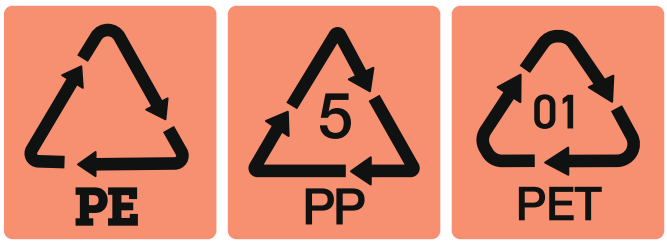
Across all catchments, 1–5 mm particles dominated, indicating advanced fragmentation, fine particles (<500 µm) were common in residential roads and industrial hardstands, and larger plastics (>5 mm) were concentrated in industrial and commercial areas.



3. Common urban polymers dominate

The most frequently identified polymers were: Polyethylene (PE), Polypropylene (PP), Polyester (PET/PBT).

These polymers are widely used in packaging, textiles, and consumer products, confirming that everyday plastic use directly translates into possible stormwater pollution.



4. Stormwater treatment assets are a critical defence

OceanGuard systems captured substantial amounts of fine microplastics (>200 µm), medium fragments (500–1000 µm), and larger debris that would otherwise enter downstream waterways, making source capture far more effective and cost-efficient than downstream clean-up.

Why does this matter?

Fine microplastics are highly mobile, persistent, and bioavailable.

Urban land use shapes their generation and transport, and stormwater infrastructure plays a crucial role in pollution prevention, not just water flow management.

The study offers baseline evidence for stronger stormwater regulation, improved asset placement and maintenance, and inclusion of microplastics in urban water quality frameworks.

Key take-home messages

- Microplastics are widespread in urban stormwater systems.
- Commercial areas are the largest accumulation hotspots.
- Industrial areas generate macroplastics that fragment into microplastics.
- Residential areas contribute finer, more mobile microplastics.
- Stormwater treatment assets are essential to prevent plastics reaching waterways.

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To view the full report, visit the project page for Impact Priority 2.

Sustainable Communities and Waste
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