

The challenges of point source pollution

using passive samplers to identify point sources

**Clearwater-Living Rivers Capacity Building Partnership
-- Point-Source Stormwater Pollution Forum --**

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Point source pollution

- Single identifiable source of pollution
- Often the result of accidental discharge or deliberate disposal
- Isolated or consistent - consistent pollution events are the most serious
 - Stormwater pipes (discharge into creek)
 - Businesses (discharge into pipes)
 - Illegal discharges
 - Structural or waste fires



Multiple
scales

Stormwater point source pollution

Types of pollutants:

- Heavy metals
- Petroleum hydrocarbons
- Polyaromatic hydrocarbons
- Pathogens (bacteria, viruses)
- Pesticides
- Persistent organic pollutants (dioxins, PCBs)
- Suspended and dissolved solids

Impacts of Point source pollution

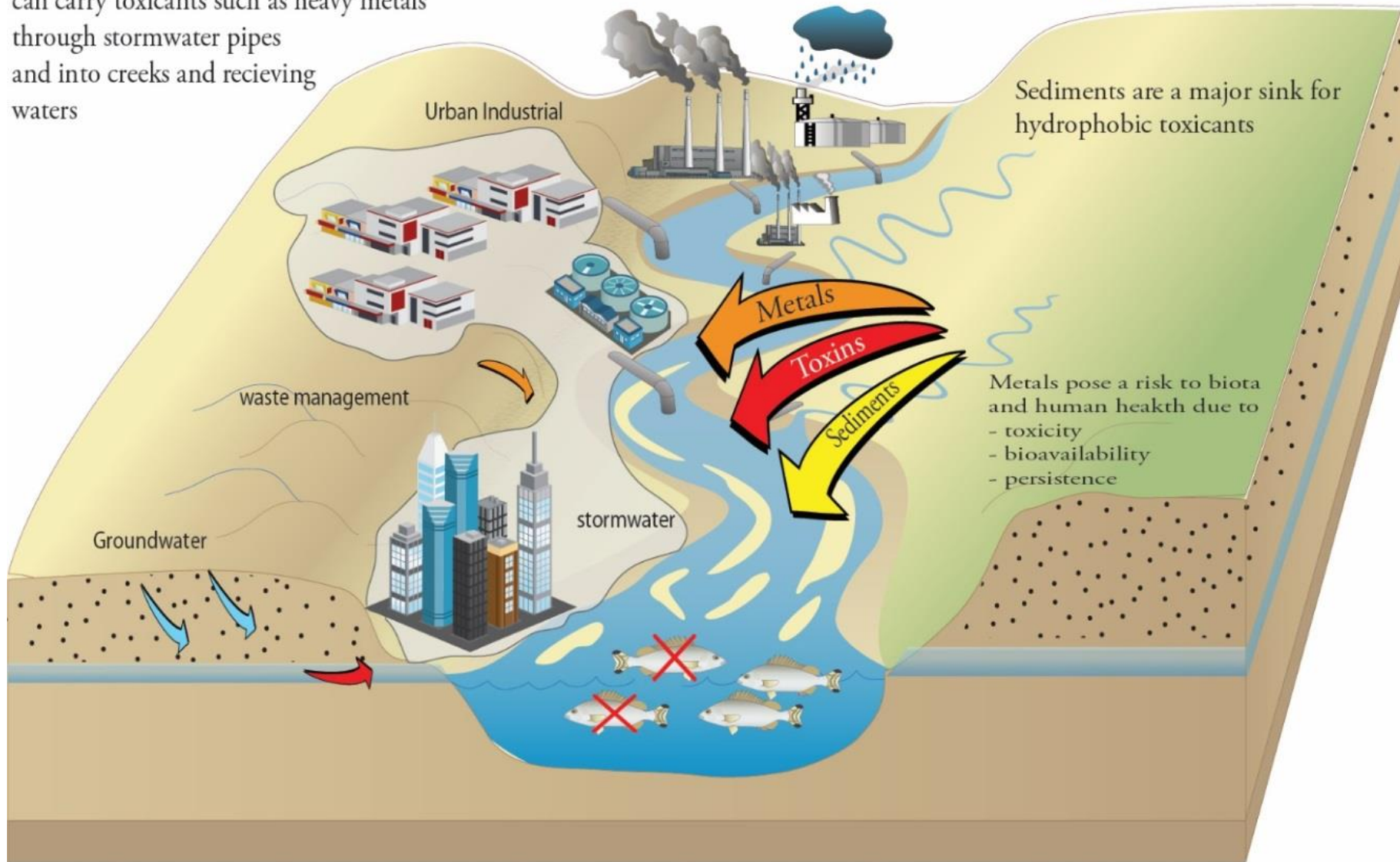
Point source pollution can lead to both acute and chronic impacts:

- Ecological
- Human
- Economic
- Social



Stormwater originating from industrial areas can carry toxicants such as heavy metals through stormwater pipes and into creeks and receiving waters

Industrial Pollution

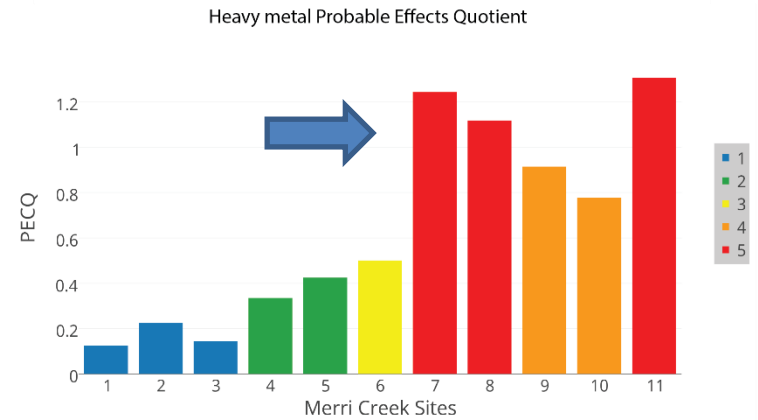
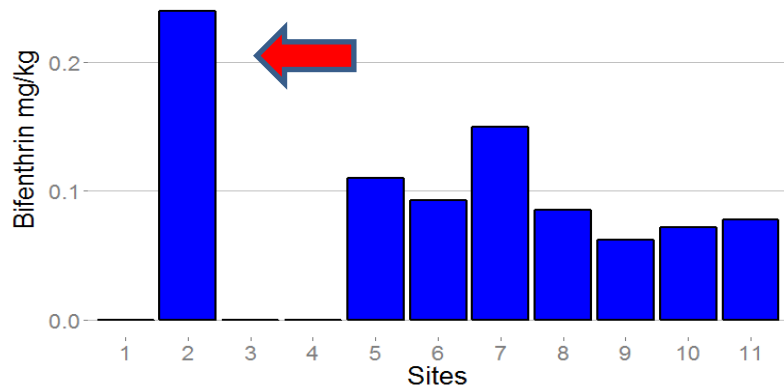


Ecological Impact

- Local stress on aquatic fauna
 - Loss of species
 - Changes in aquatic communities
 - Bioaccumulation within fish
 - Fish deaths
- Sub-lethal effects
 - Fecundity or reproductivity
 - Growth
 - Fish lesions

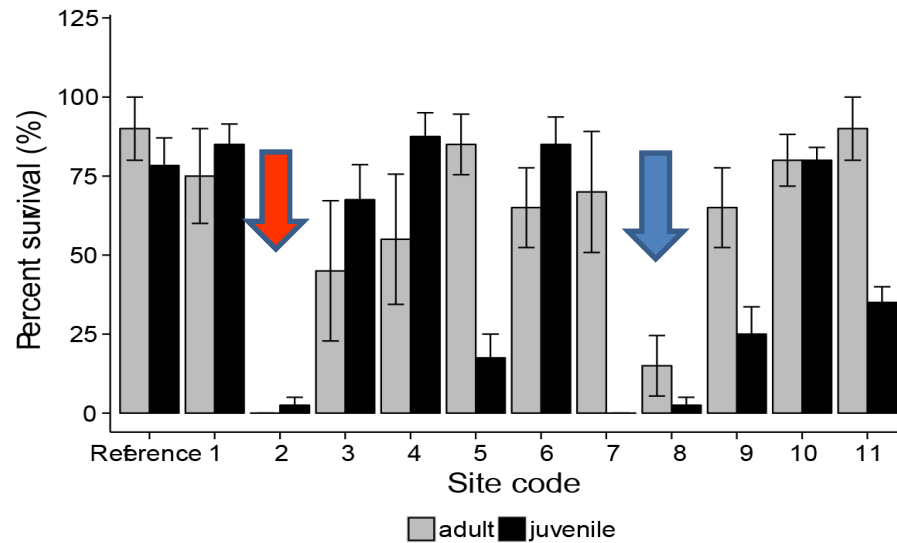


Drains along an urban creek



Amphipods

Creek sediment
Ecotoxicological
results



Health Impacts



Economic

- Contaminated sediment clean up costs
 - Wetland sediment contamination
 - Estimated to be \$500 m over 20 years
- Infrastructure maintenance and repairs
 - Pipe corrosion
 - Blocked drains



Social

- Recreational water use
 - Beach closures
 - Fishing
- Aesthetics
 - Litter
 - Hydrocarbons
 - Odours



Traditional Stormwater Sampling

- Contaminant concentrations vary over time
- Analysis expensive when taking numerous grab samples
- Pollutants often have low water solubility – not detected in stormwater
- Costly equipment for auto-sampling



Subterranean Stormwater Drains

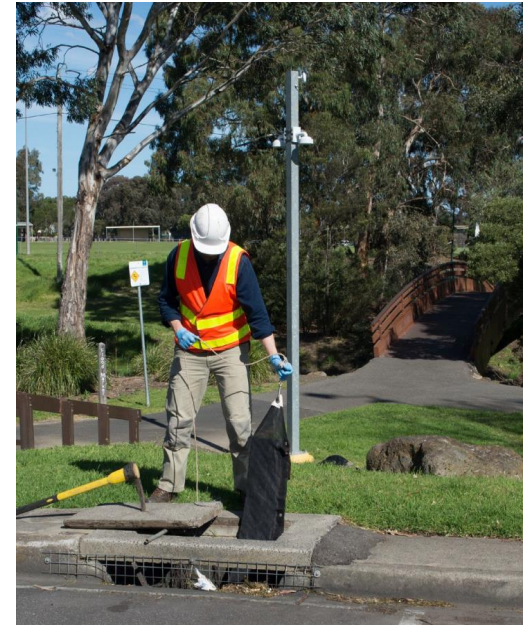
The subterranean nature of stormwater drains pose further difficulties

- confined space
- dangerous
- expensive
- deep
- sporadic flows



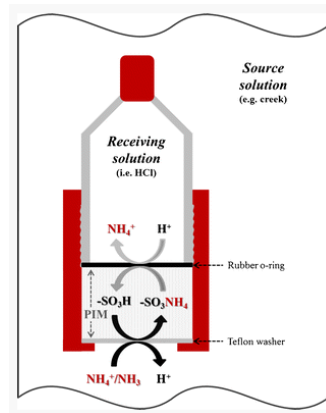
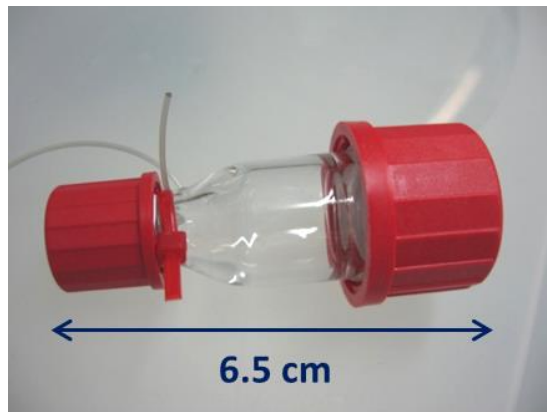
Passive Sampling Solutions

- Allow episodic events to be captured
- No power required
- Cost-effective
- Allow multiple samplers to be deployed across a catchment at the one time.



Stormwater Passive Sampling

PIMs based passive sampling device can measure ammonia in water – microbial pollution



Granular Activated Carbon (GAC) for metals and hydrocarbons in stormwaters.

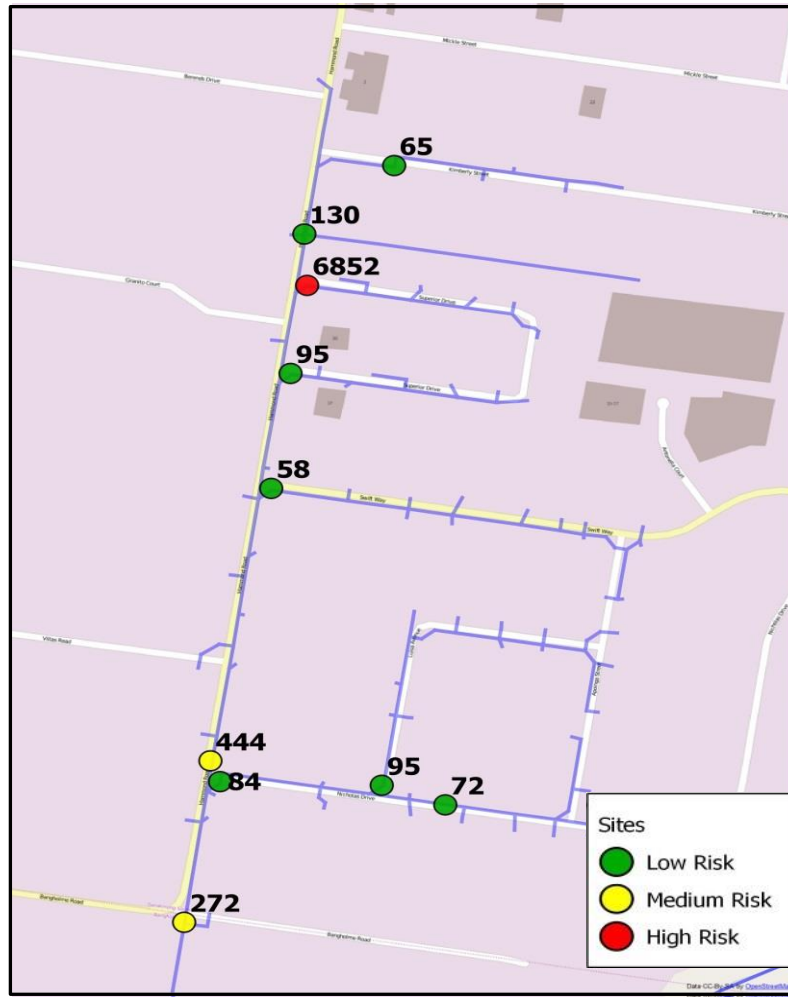


In drain suspended particle sampler – pesticides, and POP's in stormwater



Passive Sampling Network

Chromium
point source



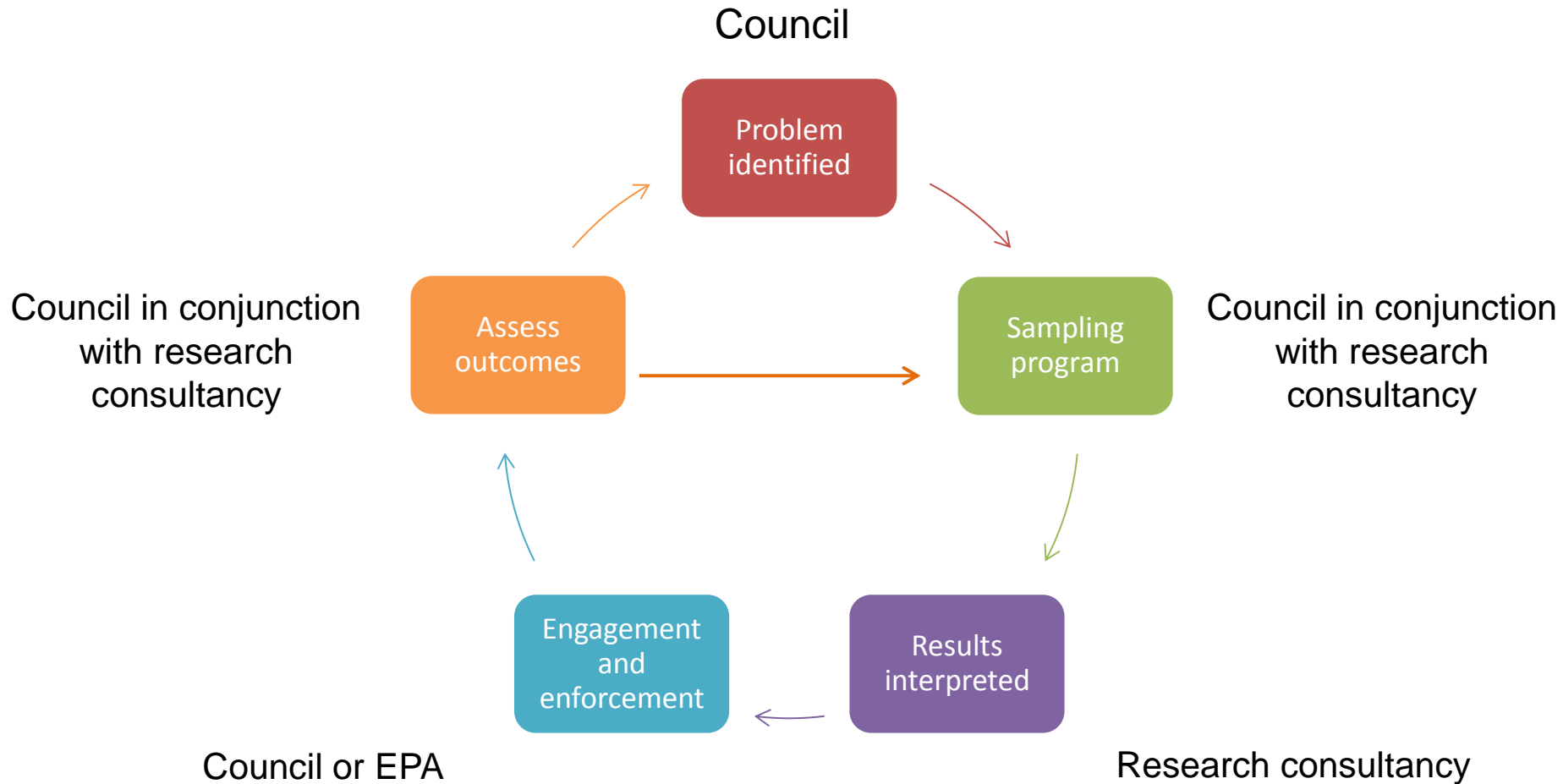
Passive sampling locations



Stormwater drains

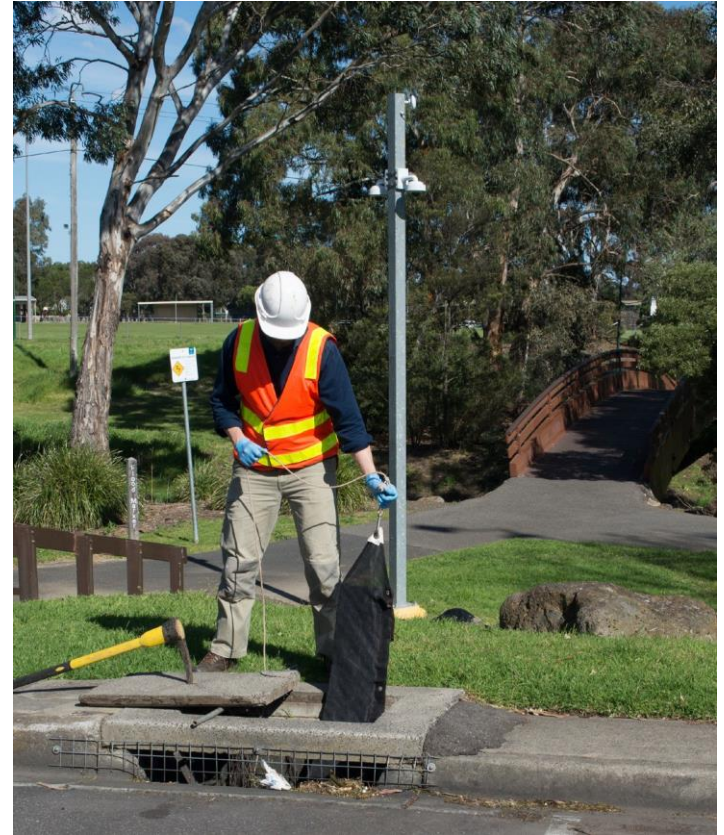


Pollution Identification Work Flow



Research consultancy support

- Point source sampling design
 - how many samplers
 - Where in the catchment
- Upskilling or training of council staff
- Provision of passive sampling devices
- Analysis of samples
- Interpretation of results
- Reporting and recommendations



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