

# essentialfacts

## Stormwater pollution

The quality of stormwater has a direct impact on the water quality in our rivers, creeks and bays and Melbourne Water is committed to reducing the impacts of stormwater pollution.

### Sources of pollution

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Contaminants passing into our rivers, creeks and bays come from either:

- a specific site (*point source*), such as a pipe or factory; or
- many diffuse sources (*non-point source*), such as houses or roads in a suburb.

Since the 1970s, EPA Victoria has required factory discharges to be connected to the sewerage system.



There are now very few of these point source discharges to the rivers, creeks or bays, and their contribution to pollution has declined significantly. Most of the remaining point sources are discharges from local sewage treatment plants operated by the retail water companies, and these are subject to licence control by EPA Victoria.

Non-point source discharges result from millions of actions, at thousands of locations, within the catchment. Many result from road and transport use and vehicle emissions. Some result from deliberate polluting behaviour such as littering but most are the byproduct of day to day living and working.

The characteristics of non-point-source pollution make it difficult to manage. When it rains, contaminants are flushed from the land into drains, then into local rivers and creeks and into the bays. The Yarra River is the largest of the 17 waterways that discharge to Port Phillip Bay. Nearly 400 drains discharge directly to this bay, with a further 600 or more discharging into urban rivers and creeks.

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## Types of pollutants

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### Pathogens

Pathogens are microscopic organisms and include viruses, bacteria, fungi and parasites. They are common and widespread. Pathogens can cause disease in plants and animals, including humans. Some pathogens occur naturally in soil and water and many are present in faeces.

Water quality measurements use the bacterium *Escherichia coli*, or *E. coli*, which is present in faeces as an indicator of the potential presence of pathogens. *E. coli* is not a pathogen, nor is it harmful, but compared with pathogens it is relatively easy to detect and count. *E. coli* levels are therefore used as the primary indicator of the presence of pathogens in water.

Faecal contamination, as inferred by numbers of *E. coli*, is a primary concern for contact recreation, such as swimming. Beach closures generally follow heavy rain, when stormwater run-off containing high levels of *E. coli* discharges into the bay.

Sources of *E. coli*:

- the faeces of dogs, cats, horses, cows, pigs, birds, rats, wildlife, humans and other animals
- garden fertilisers and manure
- septic tanks and unsewered premises
- sewer overflows and damaged sewers.

### Nutrients

As organic waste breaks down in a river or creek, natural compounds such as nitrogen and phosphorus, which are essential to plant and animal life, are released. In their natural state, Australian soils and waterways are generally low in nutrient content, and consequently, the organisms living in Australian waterways have adapted to low nutrient conditions. Australian stream biota are therefore especially susceptible to excess nutrients in waterways.

Problems associated with nutrients include:

*Excessive plant growth:* an excess of nitrogen (in marine systems) or phosphorus (in freshwater systems) can stimulate aquatic life to the extent that plant growth becomes a major problem for a waterbody. Excessive plant growth can choke river and creeks and lead to large fluctuations in dissolved oxygen levels, which threatens fish and other animals. During the day, the production of oxygen more than compensates for the oxygen consumed by organisms, including useful bacteria. However, during the night, the oxygen consumed by aquatic plants and animals can

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deplete oxygen to a level that can be dangerous to fish and other organisms. Eventually, plants die in massive quantities, resulting in a further drop in oxygen levels as the dead plants decompose.

*Blue-green algal blooms:* Algae (microscopic plants) occur naturally in rivers and lakes. Some types of algae are harmless, even when present in high concentrations. Other types, such as cyanobacteria (or blue-green algae), affect water supplies and can cause significant and costly water quality problems. Many blue-green algae release toxins that can be fatal to wildlife, stock and domestic animals and affect human health.

## Sources of nutrients

- human or other animal wastes
- plant matter (cuttings, leaves, whole plants)
- organic wastes
- fertilisers
- detergents
- kitchen wastes
- nitrous oxides produced by car exhausts
- ash following forest fires
- landfill leachate.

Fertilisers such as blood and bone, superphosphate, seaweed and animal manure are used widely on private gardens and on the many parks and golf courses that are close to rivers and creeks that drain to Port Phillip Bay and Western Port. Stormwater run-off from these areas contributes phosphorus and nitrogen to our rivers and creeks. In the rural areas of catchments, commercial fertilisers (e.g. superphosphate) are applied widely to support intensive agriculture such as market gardens, feedlots, crops and orchards.

Washing cars and boats on pavements and driveways with detergents containing phosphates also contributes to the amount of phosphorus entering our rivers and creeks.

Eroding soil surfaces in both urban and rural areas are a further source of nutrients, particularly phosphorus.

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## Toxicants

Toxicants are substances that at certain concentrations are poisonous. They include:

- manufactured substances such as petroleum products, industrial byproducts, biocides (pesticides and herbicides) and some household chemicals
- substances such as mercury, copper and arsenic, which occur naturally in the environment but usually in low concentrations.

Accumulation of toxic metals in shellfish and fish could threaten commercial and recreational fishing through impacts on human health. Some toxins can accumulate hundreds or thousands of times in fish, shellfish and fish-eating birds, even though the concentration in water is not directly toxic or even detectable. Toxicants can kill organisms, weaken an organism's ability to fight or interfere with life-cycle development and reproduction. However, it should be noted that the effect of toxicants on aquatic organisms is far more significant than its effect on human health.

Many products used outside the house contain toxins. These include:

- oil and petrol
- treated pine
- paints and primers
- solvents
- spray can propellant
- rust
- garden pesticides
- garden fertilisers
- galvanised metal (fences, roofs)
- anti-freeze
- caulking compounds
- herbicides and pesticides
- septic tank cleaners.

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These contaminants can be transferred into the stormwater system through practices such as:

- emptying paint down the drain
- washing cars or boats on the driveway
- disposing of car oil down the drain
- excessive use of aerosols
- careless use of pesticides and herbicides
- leaving galvanised surfaces unpainted.

## Litter

Litter is the most visible form of water pollution. Most litter discarded on suburban streets is washed into gutters and then into the stormwater system, which discharges to rivers, creeks and the bays.

Sources of litter include:

- overflowing bins, particularly in shopping and commercial centres
- rubbish thrown onto streets and from cars and trains
- items left out for recycling being carelessly stacked or collected
- material blowing or washing off industrial or landfill sites.

## Suspended Solids

Water is often turbid or muddy in appearance because a large number of very fine particles are suspended within the water. As the number of particles in suspension rises, the water becomes opaque and may be coloured by the suspended materials. The muddy appearance of most Australian rivers and creeks is due to high levels of suspended solids. Contaminants such as *E coli*, heavy metals and organic substances, such as phosphorus, can adhere to the surface of suspended materials. Suspended solids thus have a lot to do with the behaviour of other water-borne contaminants.

Suspended solids in water include fine particles of:

- soil from erosion, especially clays
- dirt from streets, households and buildings
- organic matter, including sewage, from plants and animals
- bacteria and other microorganisms.

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Problems associated with suspended solids include turbidity and sedimentation:

- Turbidity retards plant growth and lowers dissolved oxygen, which greatly affects invertebrate and fish populations. Turbidity also reduces the aesthetic appeal of rivers and creeks.
- Sedimentation can smother and choke bottom-dwelling plant and animal life and reduces the variety of habitat available to fish and invertebrates. It can also have a significant effect on the capacity of rivers and can cause flooding and problems with navigation. Sediment removal is a major and costly exercise.

## Further information

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If you would like further information on any other aspect of Melbourne Water's role in managing our water resources, please contact us on 131 722 or visit [melbournewater.com.au](http://melbournewater.com.au)

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