



## SuDS Water Quality Criteria

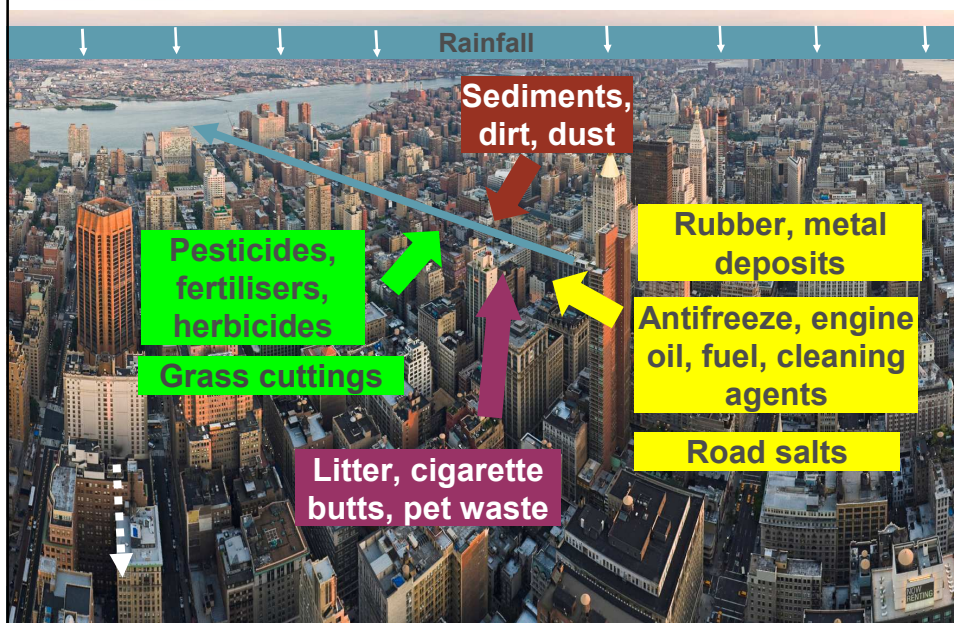
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## This presentation

- > Why are we concerned about water quality ?
- > Where is the evidence that SuDS can help ?
- > Design objectives ?
- > The future ?



## What is the problem ?



## What can happen ?

### > Soil, dust, sediments

Blankets plants, fish, smaller organisms, breeding sites. Morphological change

### > Heavy metals, oils, PAHs

Toxic: interfere with photosynthesis, respiration, growth, reproduction

### > Road salts

High levels of Na and Cl. Fish kills

## What can happen ?

- > Pet waste, food waste, gardening waste, fertilisers, herbicides, pesticides

**Algal blooms, excessive plant growth (eutrophication). Toxic**

- > Raised stream temperatures

**Thermal shock, biodiversity shifts, lower oxygen levels, early eutrophication**

- > Litter

**Aesthetic degradation, risks to mammals/birds/fish, toxic materials**

## What urban pollution looks like



## Managing quality at source

- > Green roofs
- > Permeable pavements
- > Roadside swales, trenches
- > Bioretention systems

## How can we remove contaminants?

- > **Metals**  
(dissolved, precipitated, sediment-adsorbed forms) **Sedimentation, filtration, retention**
- > **Nutrients**  
(primarily Phosphorous and Nitrogen) **P: sedimentation, filtration  
Organic N: aerobic biological activity  
Nitrate: best under anoxic conditions**
- > **Sediments** **Coarse: Settlement, vegetated filtration  
Medium: Biofiltration, detention  
Fine: Water-based residence**
- > **Hydrocarbons / PAHs** **Drying cycles, ultraviolet light, infiltration**

## Conveyance systems

- > Aim to 'treat' up to the 1 year return period event
- > Constrain the velocity and depth of the 1 year, 30 minute event to  $< 0.3$  m/s at a depth below 100 mm ('normal' veg height)

## Retention systems

- > Aim to 'treat' up to the 1 year return period event (15 mm of permanent storage)
- > Maximise inlet-outlet distance, multi-depth storage zones, aquatic planting



## National Standards

- > Intercept the first 5 mm (Standard B)
- > Appropriate level of treatment (Standard C)
  - Greater protection for sensitive receptors (high consequence)
  - Greater protection from more polluted areas (high hazard)

**Risk-based approach**

## Standard C: Water Quality

- > High hazard → EA consult → **Risk assessment**
- > SPZ1/designated resource → **Risk assessment**

Based on:  
Likelihood of occurrence,  
Vulnerability of receptor,  
Sensitivity of receptor

**Acceptable to discharge?**

- > Medium hazard → **Yes** → **Adequate Treatment**
  - > Low hazard = Roof drainage → **Adequate Treatment**
- No** → (dashed arrow) → EA consult → Risk assessment

## Standard C: Water Quality

- > Greater number of treatment components for high hazard sites and sensitive receptors
- > If discharging to combined sewers, demonstrate adequate control of oils and sediments



Hazard	Table C1: Level of hazard
Low	Roof drainage
Med	Residential, amenity, commercial, industrial uses includes car parking and roads
High	Areas used for handling and storage of chemicals and fuels, handling and storage of waste. This includes scrap-yards. Lorry, bus or coach parking or turning areas

## Standard C: Water Quality

Table C2. Minimum number of treatment stages		low	med	high
G1	Source Protection Zone I, within 50m of a well, spring or borehole that supplies potable water.	1	3	Consult the EA (C6)
G2	Into or immediately adjacent to a sensitive receptor that could be influenced by infiltrated water. Includes designated nature conservation, heritage and landscape sites – including Biodiversity Action Plan (BAP) habitats and Protected Species.	1	3	
G3	Source Protection Zone II or III or Principal Aquifer	1	3	
G4	Secondary Aquifer	1	2	
G5	Unproductive strata	1	2	



## Water Quality Criteria ..where next....?

> **From:**

- Numbers of components

> **Towards:**

- Numerical performance standards (catchment targeted protection)

> **Needs:**

- Tools... MUSIC, Sustain...



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