Water quality

Concept

The permeable/or filtering areas of the GrowGreen demonstrators were analysed through a sampling and comparative water quality analysis:

1. Runoff from the street – Conventional gully
2. Permeable pavement underdrain outflow
3. Filter drain underdrain outflow

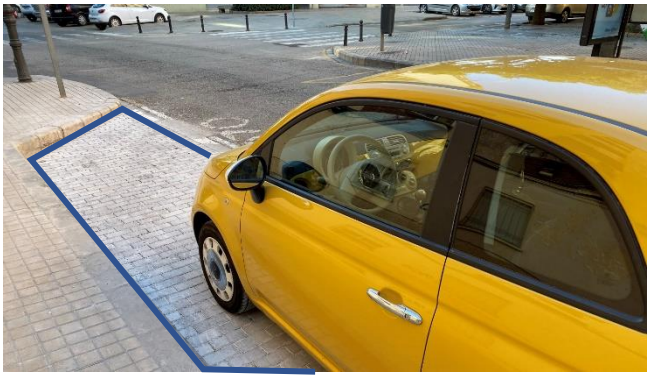

Figure 1: Permeable pavement

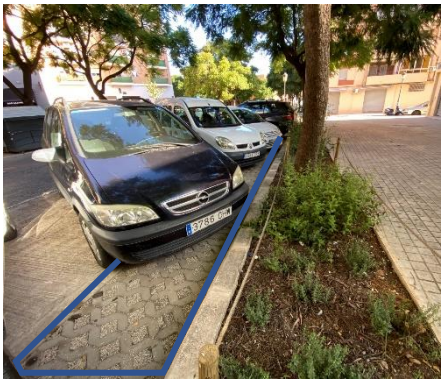

Figure 2: Filter drain

Figure 3: Water collecting chamber with flow measurement

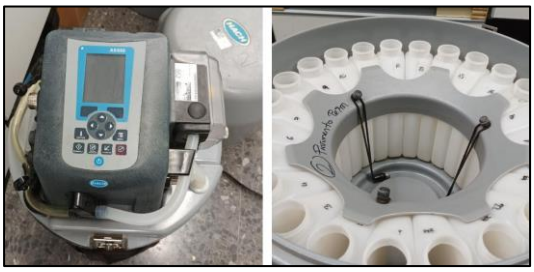

Figure 4: Pollutant concentration

Water quality analysis parameters: PHYSICAL (turbidity, suspended solids [TSS]) ; BIOLOGICAL (biochemical oxygen demand [BOD]); CHEMICAL (Nutrients: [N] and [P] ; Organic pollutants: Total Hydrocarbons [TPH], Polycyclic Aromatic Hydrocarbons [PAHs] ;

Heavy metals: 22 elements [Chromium (Cr), Iron (Fe), Mercury (Hg),…] ; Other: dissolved oxygen [DO], chemical oxygen demand [COD], salinity).

Key data

	Permeable pavement			Filtering drain		
Rain event date	**TSS**	**COD**	**BOD**	**TSS**	**COD**	**BOD**
26/07/2021	-	-	-	-	-	-
20/09/2021	100,0	100,0	100,0	100,0	100,0	100,0
19/11/2021	44,0	82,0	92,0	48,0	72,0	81,0
25/01/2022	100,0	100,0	100,0	100,0	100,0	100,0
07/03/2022	98,2	98,6	98,8	98,6	98,6	99,1
05/05/2022	-	-	-	89,1	97,4	96,5

Table: Pollutant removal efficiency (% of mobilized mass)

The results of the analysis indicate that the implementation of NBS for drainage management has led to:

- high efficiency in the capture of pollutants such as TSS, COD, BOD, TP, TN.
- Reduced concentrations of COD, BOD, total nitrogen and total phosphorus to values below those set by Directive 91/271.
- reduced PAHs concentrations (µg/l) and decreased total Hydrocarbons and PAH amounts reaching sewers.
- Reduced concentrations of heavy metals (µg/l) and decreased amount reaching sewers.

Lessons learned

NBS features are efficient in removing pollutants but the identification of potential sediment sources is vital at the design stage of NBS for drainage management and water quality. Furthermore, maintenance strategies are important for the long-term performance of these solutions.

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