

Supplementary data

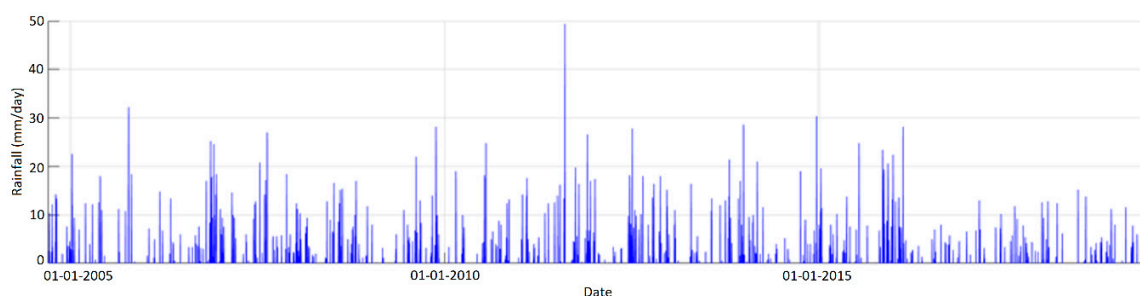


Fig. S1. Daily rainfall at Dalmarnock STW between 16/09/2004 and 31/05/2019.

Table S.1. Parameters for water non-potable purposes uses (ANA, 2005).

Parameter	Limit
Fecal coliforms (CFU/100 mL)	Not detectable
pH	Between 6.0 and 9.0
Colour (HU)	≤ 10 HU
Turbidity (NTU)	≤ 2 NTU
Odour and aspect	Not unpleasant
Oil and grease (mg/L)	≤ 1 mg/L
Biochemical oxygen demand (BOD) (mg/L)	≤ 10 mg/L
Volatile Organic Compounds (VOCs)	Absent
Nitrate (mg/L)	< 10 mg/L
Ammoniacal nitrogen (mg/L)	≤ 20 mg/L
Nitrite (mg/L)	≤ 1 mg/L
Total phosphorus (mg/L)	≤ 0.1 mg/L
Total suspended solids (TSS) (mg/L)	≤ 5 mg/L
Total dissolved solids* (TDS) (mg/L)	≤ 500 mg/L

*Recommended for washing clothes and vehicles.

Table S2. Midpoint impact categories considered for the study.

Categories of environmental impacts	Units
Global warming	kg CO ₂ eq
Stratospheric ozone depletion	kg CFC-11 eq
Ozone formation (Human health)	kg NO _x eq
Fine particulate matter formation	kg PM _{2,5} eq
Ozone formation (Terrestrial ecosystems)	kg NO _x eq
Terrestrial acidification	kg SO ₂ eq
Terrestrial ecotoxicity	kg 1,4-DCB
Freshwater ecotoxicity	kg 1,4-DCB
Marine ecotoxicity	kg 1,4-DCB
Human carcinogenic toxicity	kg 1,4-DCB
Human non-carcinogenic toxicity	kg 1,4-DCB
Land use	m ² a eq
Mineral resource scarcity	kg Cu eq
Fossil resource scarcity	kg oil eq
Water depletion	m ³

Table S3. Annual rainfall at Dalmarnock STW between 2005 and 2018.

Year	Rainfall at Dalmarnock STW (mm)
2005	927
2006	1081
2007	1025
2008	1229
2009	932
2010	799
2011	1365
2012	1199
2013	959
2014	967
2015	1304
2016	928
2017	891
2018	842
Average	1032

Table S4. Lengths of different types of roads in Glasgow.

Type of road	Length of roads (km)
Motorways	55
Motorway Slip roads	50
A roads	138
B roads	64
C roads	209
Unclassified roads	1422
Total	1938

Source: Transport Scotland, 2019.

Table S5. Average width of different road categories in Glasgow.

Type of road	Width (m)	Standard deviation (m)
A roads	18.97	3.90
B roads	15.98	4.31
Unclassified roads / C roads in the city centre	18.20	1.93
Unclassified roads / C roads in residential areas	12.29	3.48

Table S6. Total paved area in Glasgow.

Type of road	Area (m ²)
A Roads	2,617,860
B Roads	1,022,720
Unclassified / C Roads	24,864,595
Total	28,505,175

Table S7. Quantities of the components used in the proposed system (permeable pavement and stormwater harvesting).

Subsystem	Function	Components	Materials	Quantity		
Stormwater harvesting		Upper tanks (295 x 500 litres)	HDPE	2,950 kg		
		Concrete for lower tank (500 m ³)	Concrete	540,000 kg		
		Formwork for lower tank	Wood	18,720 kg		
		Steel bar for lower tank	Steel	34,875 kg		
		Waterproof membrane for lower tank	Asphalt	1,275 kg		
	Storage		Overflow siphon	PE	25 kg	
				HDPE	1 kg	
				Brass	2.5 kg	
			Floating set of suction	Silicone	26 kg	
				Stainless steel	0.5 kg	
				Brass	2 kg	
				PS	3 kg	
	Pumping		Level electro buoy	HDPE	3.5 kg	
				Solenoid valve	Brass	7.5 kg
				Register	Brass	4 kg
Water pumps				Cast iron	38 kg	
Distribution		Pipes	PVC	741.55kg		
			Connections	PVC	162.5 kg	
			Water pumps	Electricity	64,430 kWh	
Permeable pavement	Roads and pavings	Waterproof membrane	Asphalt	85,515 kg		
		Crushed stone	Stone	13,052,440 kg		
		Asphalt binder	Asphalt	475,506 kg		
	Drainage	Drains	Pre-cast concrete	89,712 kg		
	Cleaning	Sweeper	Diesel	1,200 litres		

Table S8. Quantities of the components used in the current scenario (traditional pavement and drainage).

Subsystem	Function	Components	Materials	Quantity
Traditional pavement	Roads and pavings	Diluted asphalt	Asphalt	34,204 kg
		Petroleum asphalt cement	Asphalt	136,618 kg
		Hot mix asphalt	Asphalt	2,277,035 kg
		Crushed stone	Stone	9,235,134 kg
Conventional drainage	Drainage	Concrete for gutters	Concrete	54,960 kg
		Precast concrete for gutters	Concrete	343,488 kg
		Formwork	Wood	134 kg
		Sand for mortar	Sand	7,017 kg
		Cement for mortar	Cement	946 kg
		Brick	Brick	20,160 kg
		Precast concrete pipes	Concrete	162,960 kg
Potable water supply (for non-potable purposes)	Water treatment and supply	--	--	669,864 m ³