**Table S1:** Parameters, their description, initial, maximum, and minimum values

Parameter name	Description	Initial value	Minimum	Maximum	Parameter group
cn_rca	Curve number A for row crops (-)	1	0.1	100	cn
cn_rcb	Curve number B for row crops (-)	1	0.1	100	cn
cn_rcc	Curve number C for row crops (-)	1	0.1	100	cn
cn_rcd	Curve number D for row crops (-)	1	0.1	100	cn
cn_wooda	Curve number A for woodland (-)	1	0.1	100	cn
cn_woodb	Curve number B for woodland (-)	1	0.1	100	cn
cn_woodc	Curve number C for woodland (-)	1	0.1	100	cn
cn_woodd	Curve number D for woodland (-)	1	0.1	100	cn
esco	Soil evaporation compensation factor (-)	0.38	0.1	1	hydro
perco	Percolation coefficient (-)	0.94	0.1	1	hydro
wt_depth	Initial water table depth (m)	2.88	0.5	25	gwflow
rech_del	Recharge delay (day)	108.91	1	1000	gwflow
Kaqu19	Hydraulic conductivity for zone 19 (m/day)	11.03	$1*10^{-6}$	300	gwflow
Kaqu24	Hydraulic conductivity for zone 24 (m/day)	3.71	$1*10^{-6}$	300	gwflow
Syaqu19	Specific yield for zone 19 (-)	0.49	0.05	0.6	gwflow
Syaqu24	Specific yield for zone 24 (-)	0.03	0	0.6	gwflow
bed_k	Hydraulic conductivity of riverbed (m/day)	0.03	$1*10^{-5}$	1	gwflow
bed_thick	Streambed Thickness (m)	1.01	0.2	5	gwflow
awc	Available water capacity (mm H_2O/mm soil)	0.44	0.01	1	soils
K_soil	Soil saturated hydraulic conductivity (mm/hr)	300	$1*10^{-3}$	500	soils
surq_lag	Surface runoff lag coefficient	0	$1*10^{-3}$	70	parameters
OVN1	Manning's "n" value for overland flow – conventional tillage (-)	0.8	$1*10^{-3}$	0.8	Ovn
OVN4	Manning's "n" value for overland flow – medium range forest (-)	0.8	$1*10^{-3}$	0.8	Ovn
n	Channel Manning coefficient (-)	0.09	$1*10^{-3}$	0.09	hyd
k	Channel bottom conductivity (mm/day)	4.58	$1*10^{-5}$	70	hyd
flo_min	Minimum aquifer storage to allow return flow (m)	5	0.1	100	aquifer
alpha	Baseflow alpha factor	0.09	$1*10^{-4}$	0.9	aquifer
cn2	Curve number (-)	10	-30	100	cn
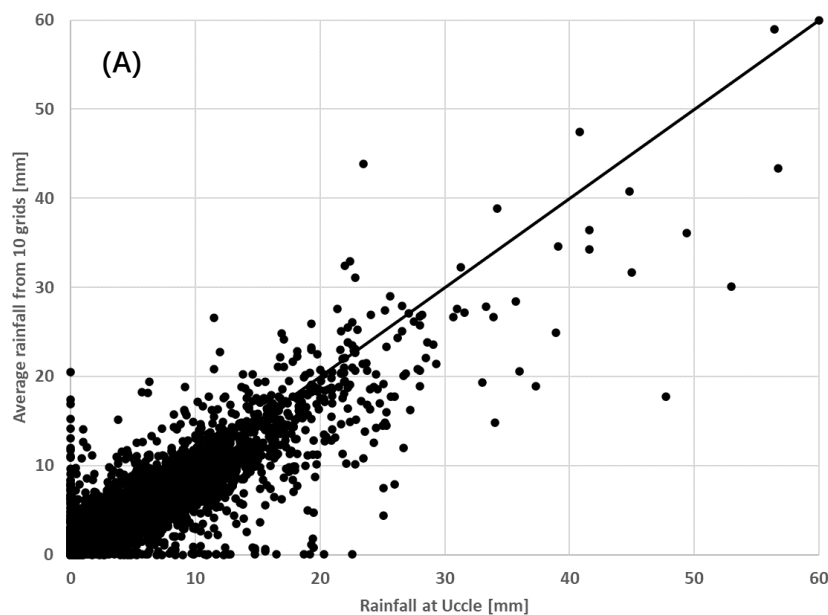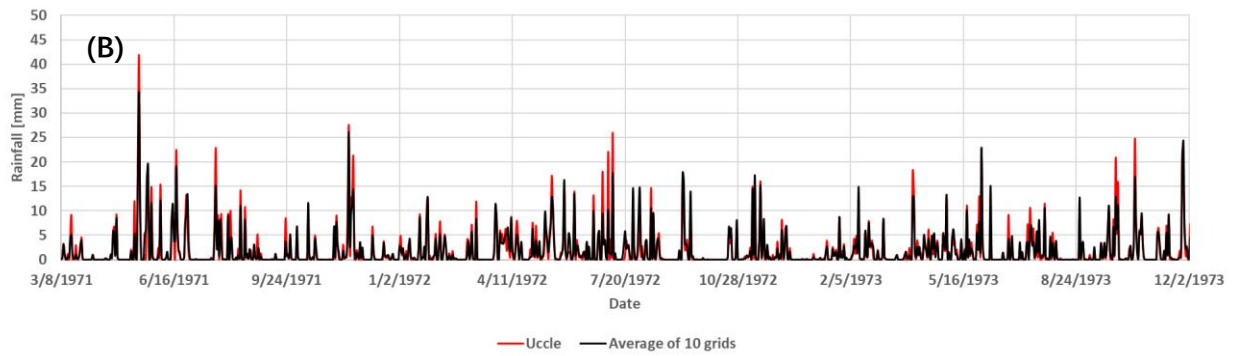
Location	Uccle	1	2	3	4	5	6	7	8	9	10
Long-term Average daily rainfall (mm)	2.29	2.15	2.12	2.15	2.09	2.23	2.21	2.09	2.41	2.20	2.13

Figure S1: The comparison of average daily rainfall from 10 grid points and Uccle station (A and B). The long-term average rainfall for the 10 locations and Uccle station is also shown in the table.
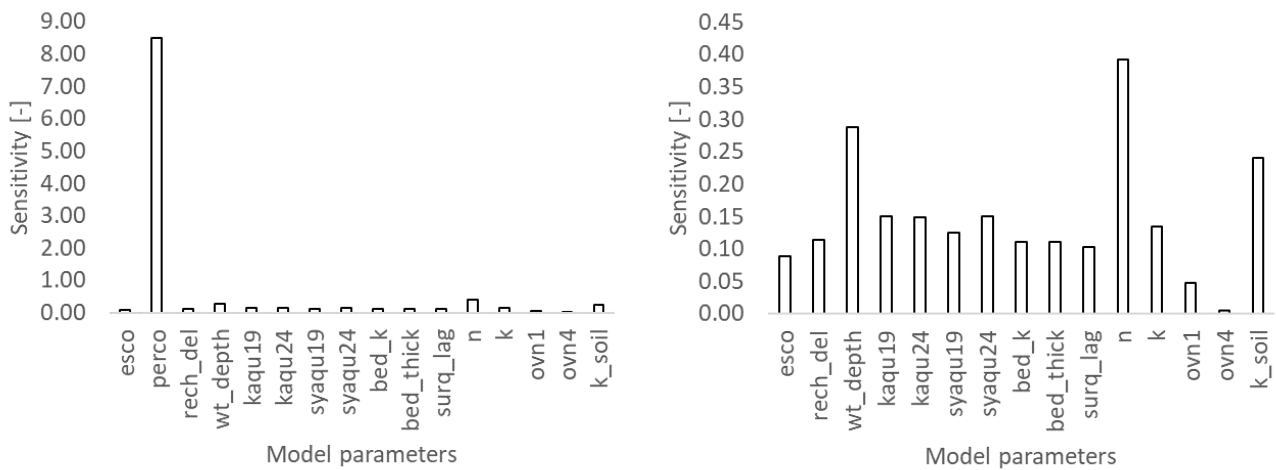
Figure S2: The sensitivity of model parameters where perco (left) is included in the plot. The sensitivity of other parameters (especially groundwater-related) is seen (right) when perco is removed from the plot.

Table S2: The calibrated model parameter values for the SWAT+gwflow and the standalone SWAT+ model

SWAT+gwflow calibrated parameters		SWAT+ parameters	
Parameter	Estimated value	Parameter	Estimated value
esco	0.2775	perco	0.737
perco	0.9539	awc	0.122
wt_depth	3.3745	esco	0.312
rech_del	74.4945	flo_min	87.871
kaqu19	9.6382	alpha	0.001
kaqu24	3.0785	cn2	-10.795
syaqu19	0.4174		

|	
syaqu24	0.0262
bed_k	0.0003
bed_thick	0.4172
surq_lag	0.0044
k_soil	332.0680
ovn1	0.8000
ovn4	0.8000
n	0.0899
k	5.2877

Table S3: The final aquifer parameters used for the simulation (calibrated for zone 19 and 24 and uncalibrated for the rest)

Zone	K (m/day)	Sy (-)
1	$3*10^{-5}$	0.200
2	5.79	0.123
3	$3*10^{-5}$	0.200
4	0.27	0.200
5	1.34	0.200
6	$3*10^{-5}$	0.200
7	$3*10^{-5}$	0.200
8	$3*10^{-5}$	0.200
9	0.77	0.071
10	$3*10^{-5}$	0.200
11	10.67	0.200
12	$8.48*10^{-2}$	0.200
13	$8.48*10^{-3}$	0.200
14	$1.40*10^{-4}$	0.200
15	3.79	0.200
16	3.79	0.200
17	3.79	0.200
18	25.60	0.200
19	9.64	0.417
20	$1.40*10^{-4}$	0.200
21	25.60	0.200
22	$8.48*10^{-2}$	0.200
23	1.34333	0.200
24	3.08	0.026
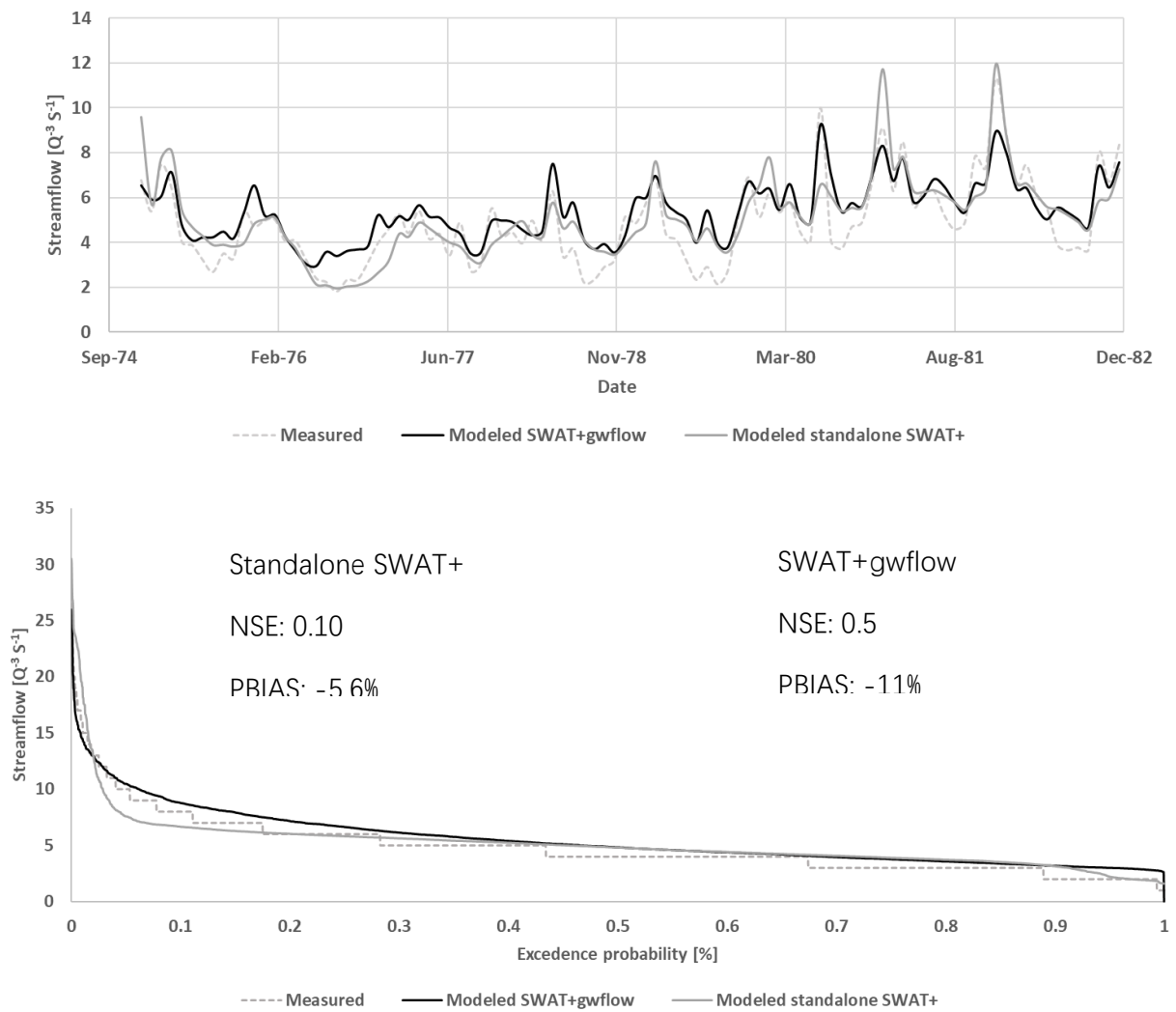
Figure S3: The comparison between measured and simulated monthly streamflow (top) and flow duration curve for daily time step (bottom). All plots are for the first validation period for the catchment outlet (1975 to 1982).
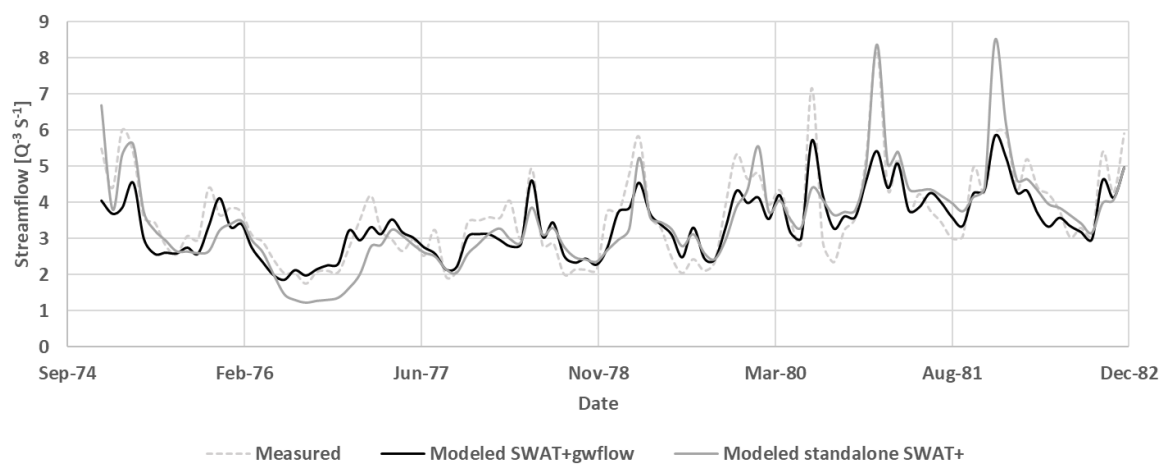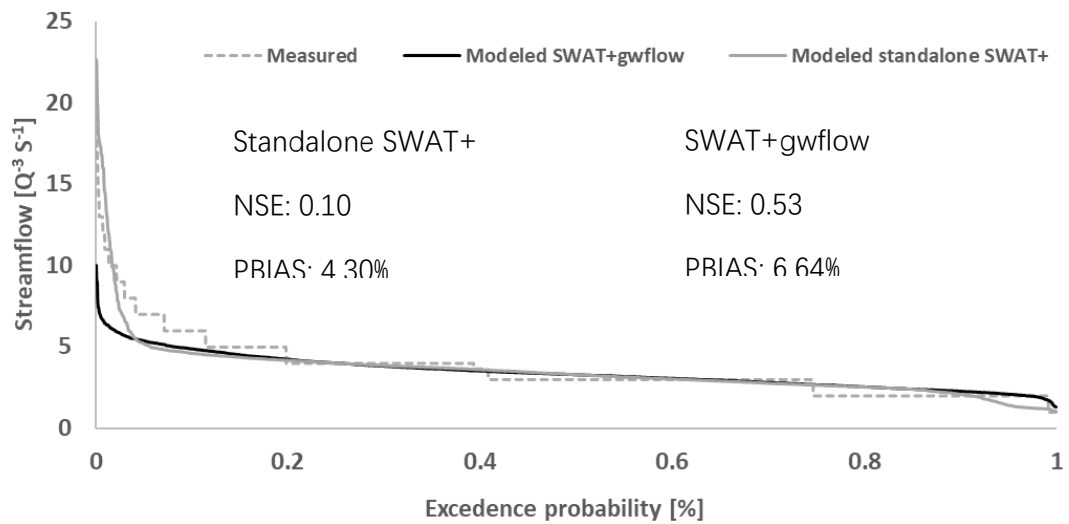
Figure S4: The comparison between measured and simulated monthly streamflow (top) and flow duration curve for daily time step (bottom). All plots are for the first validation period for the Sint-Joris-Weert gauging station (1975 to 1982).