Results situation A,B,C,D

	A) 60mm in 60 min (60mm/h)		B) 30mm in 60 min (30mm/h)		C) 120mm in 2h (60mm/h)		D) 60mm in 2h (30mm/h)	
	Simulation	Manually	Simulation	Manually	Simulation	Manually	Simulation	Manually
Total Rain [m^3]	59760	60000	29880	30000	64740	120000	32370	60000
Land surface storage [m^3]	57686	18333	27806	0	62493	36667	30123	0
Underground unsaturated storage [m^3]	0	39583	1	28500	1	75000	1	54000
Underground saturated storage [m^3]	2074	2083	2074	1500	2247	8333	2247	6000
Groundwater table [m + datum]	0,0083	0,0083	0,0083	0,0060	0,009025	0,0333	0,009025	0,0240

Defult Settings

Terrayn type:

Surface:	Open land
Underground:	Onbekend
Project area:	1000x1000m
Grid size:	0,5x0,5m
Maaiveld:	1 m Datum
Grondwater peil:	0 m datum
GROUND_BOTTOM_DISTANCE_M [m]:	
Surface:	1m/day
Underground:	0,05m/day
WATER_STORAGE_PERCENTAGE:	0,25
Droogte na neerslag:	0 uur
Evaporatie:	0 mm/day

Calculation

Below I show the calculation I did for situation A. The calculations for situation B, C, D are done in the same way, by using an spread sheet.

Surface infiltration:

1: $C_{water} = W_{surface} = \frac{precipitation\,[mm]}{1000} = 0{,}060[m]$ 2: $C_{top} = max(I_{con}, I_{surf}) = 0{,}042[m/h]$ $I_{con} = 0 \rightarrow no\ constructions\ pressent$ $I_{surf} = \left(\frac{Surface\ GROUND_{INFILTRATION_{MD}}}{24\ hour}\right) = \frac{1}{24} = 0{,}042[m/h]$ 3: $\Delta w_{unsat} = \min\left(C_{water}, (\Delta t * C_{top})\right) = 0{,}042[m]$ $C_{water} = 0{,}060\ [m]$ $\Delta t * C_{top} = 1u * 0{,}042 = 0{,}042[m]$ 4: $\Delta wTot_{\_Unsat} = \Delta w_{unsat} * opp = 0{,}042 * 1\,000\,000 = 41666\ [m^3]$	Δw_{unsat} = The surface infiltration which takes place [m]. $\Delta wTot_{\_Unsat}$ = Total surface infiltration [m³] Δt = Computational timestep. C_{water} = The amount of infiltration that can take place based on the amount of water on the surface. C_{top} = The amount of infiltration that can take place based on the infiltration values present. $W_{surface}$ = The amount of water (the water column) on the surface. I_{con} = The GROUND_INFILTRATION_MD of a construction on a specific cell (if present). I_{surf} = The GROUND_INFILTRATION_MD of the surface terrain type. This value should be interpreted as the vertical conductivity (Kv) of the sub-soil. opp = project surface [m²]

Underground infiltration

1: $H_{unsat} = H_{surface} - WL_{underground} = 1 - 0 = 1$ [m] 2: $S = \frac{W_{unsat}}{H_{unsat}} = \frac{0{,}042}{1} = 0{,}042\ [-]$ $W_{unsat} = \Delta w = 0{,}042[m]$ 3: $C_{inf} = \min(H_{unsat}, (\Delta t * I_{und})) = 0{,}05$ [m] $H_{unsat} = 1$ [m] $\Delta t * I_{und} = 1u * 0{,}05 = 0{,}05$ [m] 4: $\Delta w_{sat} = C_{inf} * S = 0{,}05 * 0{,}042 = 0{,}002083\ [m]$ 5 $\Delta wTot_{\_Sat} = \Delta w_{Sat} * opp = 0{,}002083 * 1\,000\,000 = 2083\ [m^3]$	Δw_{sat} = The underground infiltration which takes place [m]. $\Delta wTot_{\_Sat}$ = total underground infiltration [m³] Δt = Computational timestep. H_{unsat} = The height of the unsaturated zone. S = Ratio of water to height in the unsaturated zone. C_{inf} = The height in the unsaturated zone which can be subject to infiltration to the saturated zone. W_{unsat} = The amount of water in the unsaturated zone. The height of the water column if the equivalent amount of water was placed on the surface. $WL_{underground}$ = The groundwater level, relative to datum. $H_{surface}$ = The terrain height in the cell, relative to datum. I_{und} = The GROUND_INFILTRATION_MD of the underground terrain type.

Groundwater level

1: $h_u = \frac{\Delta w_{sat}}{sp} = \frac{0{,}002083}{0{,}25} = 0{,}0083[m]$ 2: $gl_u = h_u + gl_{original} = 0 + 0{,}0083 = 0{,}0083\ [m]$	h_u = The height (column) of the saturated zone. Δw_{sat} = The underground infiltration which takes place. sp = The WATER_STORAGE_PERCENTAGE of the underground terrain type, used here as a fraction. gl_u = groundwater level [m+datum]

	$gl_{original}$ = Initial groundwater level [m+datum]

Final values

Storage terain surface:

$S_{surface} = (Precipitation * opp) - \Delta wTot_{sat} = \left(\frac{60mm}{1000} * 1000000\right) - 41666 = 60000 - 41666 = 18333\ [m^3]$

Storage unsaturated zone:

$S_{unsaturated} = \Delta wTot_{\_Unsat} - \Delta wTot_{sat} = 41666 - 2083 = 39583\ [m^3]$

Storage unsaturated zone:

$S_{Saturated} = \Delta wTot_{\_Sat} = 2083\ [m^3]$