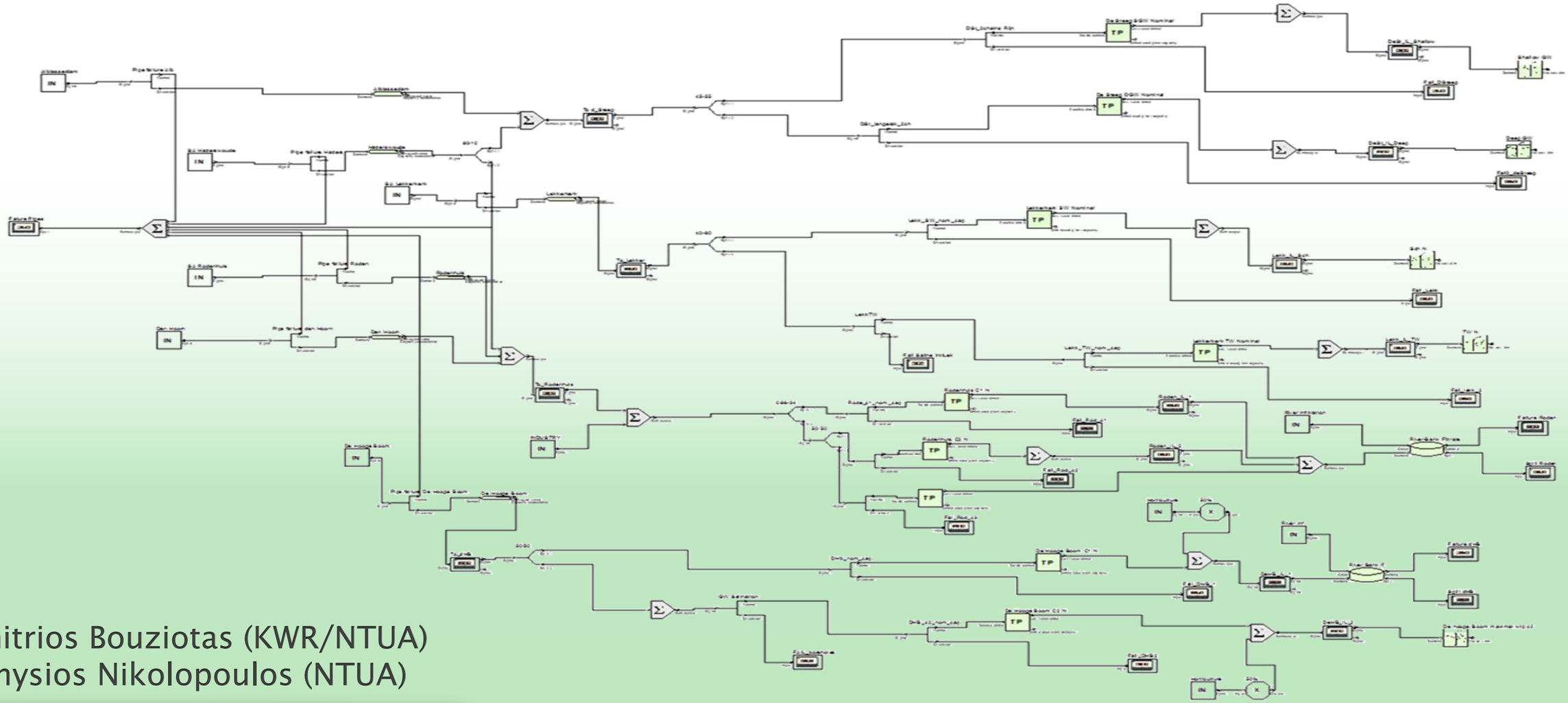
UWOT hands-on training: Part II



Dimitrios Bouziotas (KWR/NTUA)
Dionysios Nikolopoulos (NTUA)

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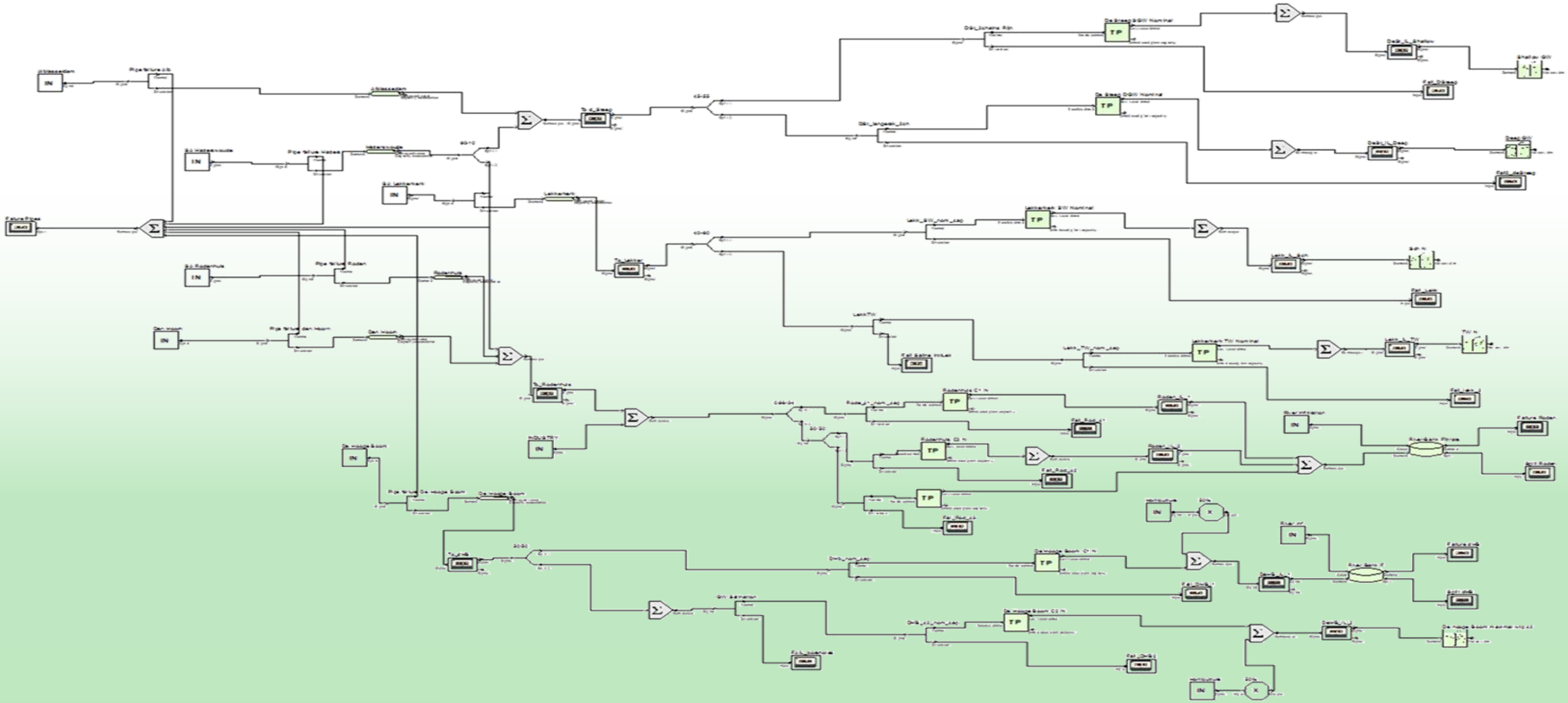
Creating a second set of houses and district



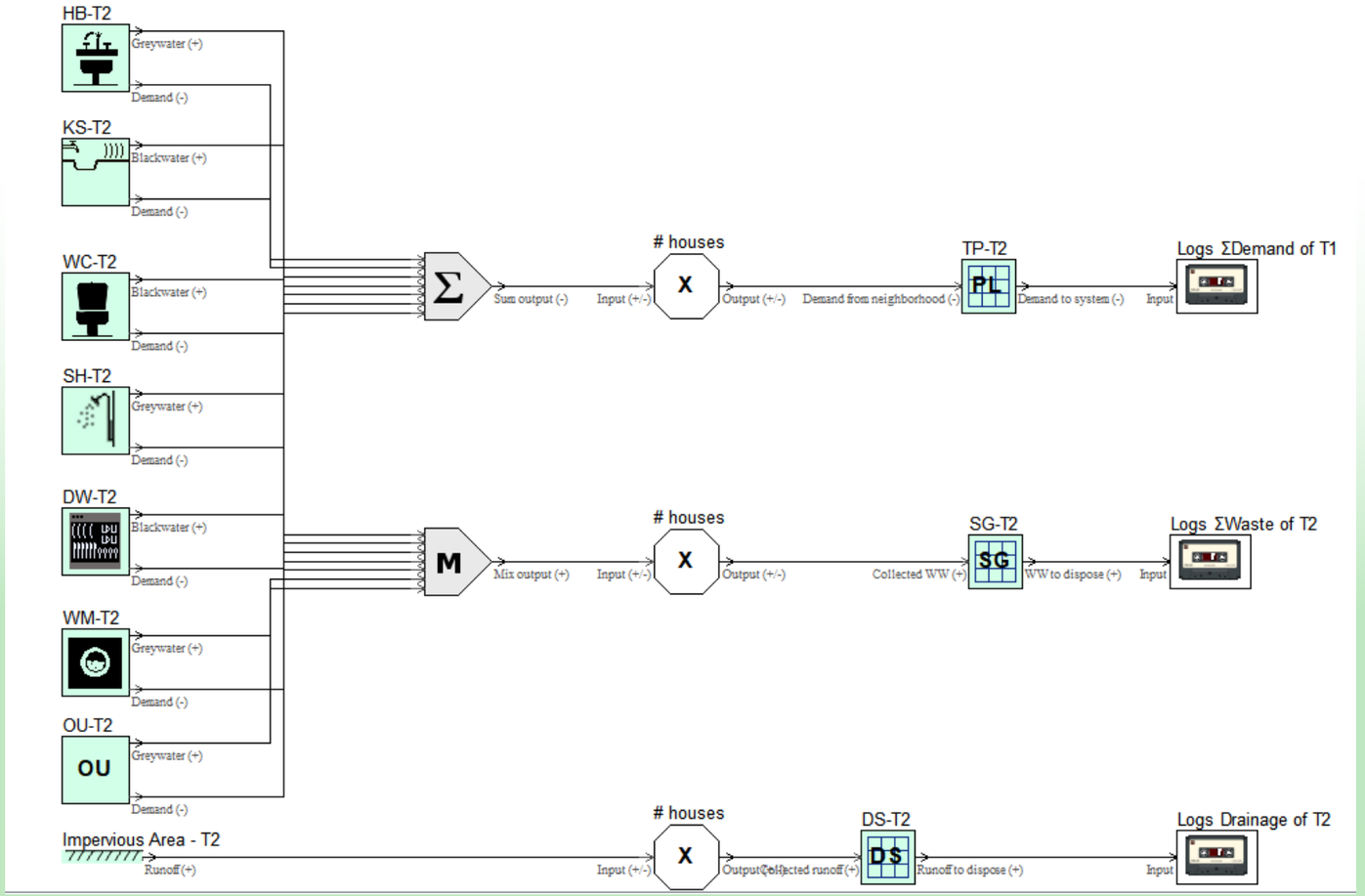
UWOT hands-on training: Part II

Define a second district

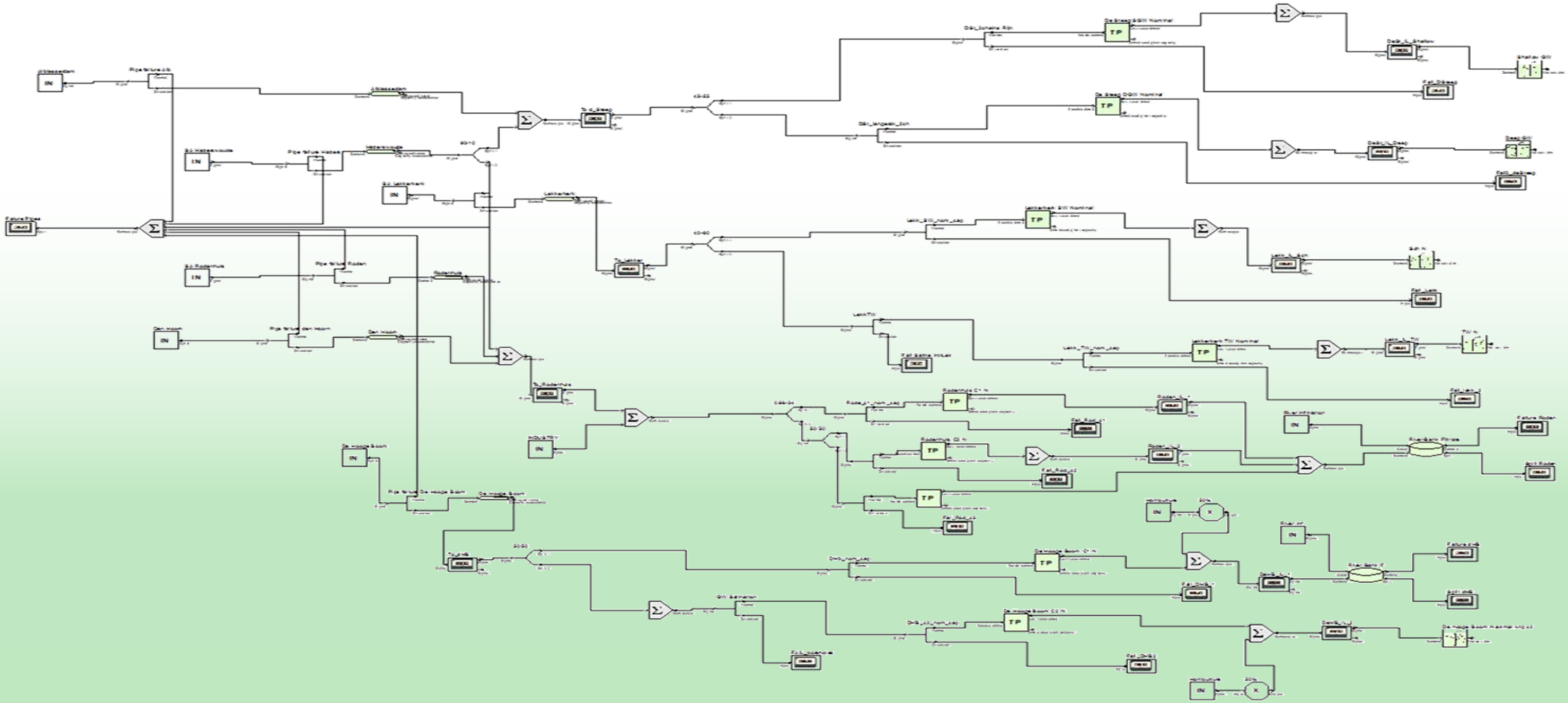
- *In the same UWOT model, define a second district, comprised of a different Household Type (Add components to another Group, named Household Type 2)*
- *For now, use the same components and brands. However, this district should have a size of 1000 households*
- *The Group time series should be the same, except for Occupancy. Set it constant to 2.6*

UWOT hands-on training: Part II

Define a second district



Adding technologies – creating custom brands



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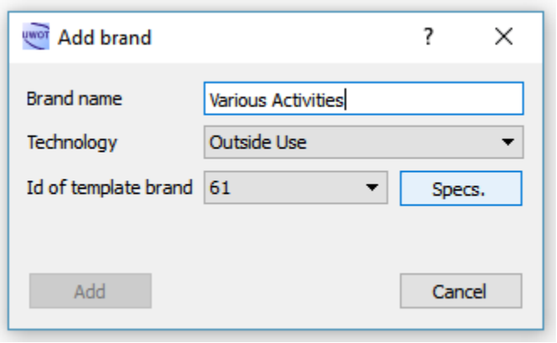
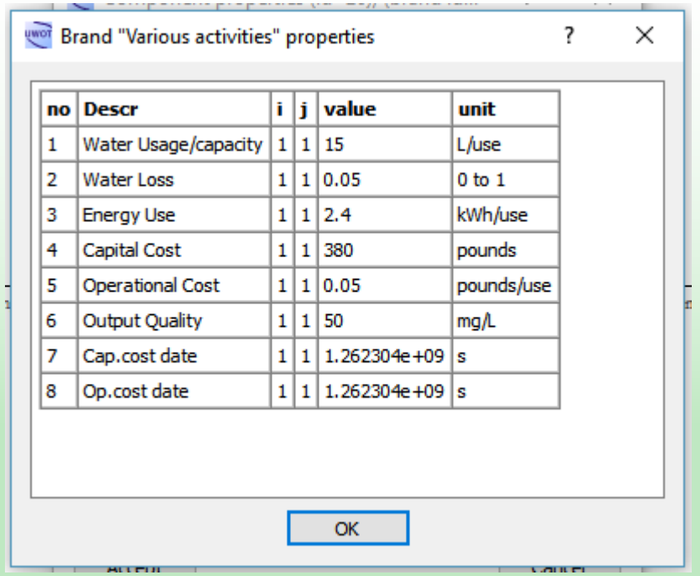
UWOT hands-on training: Part II

Defining Custom Brands

- *Select Project on the toolbar, then Add Brand.*
- *Define a Brand named "Various Activities" of Technology type Outside Use. Click Specs.*
- *Modify the Brand's specifications to:* →
- *Click Add*
- *Modify the Brand of OU to "Various Activities"*



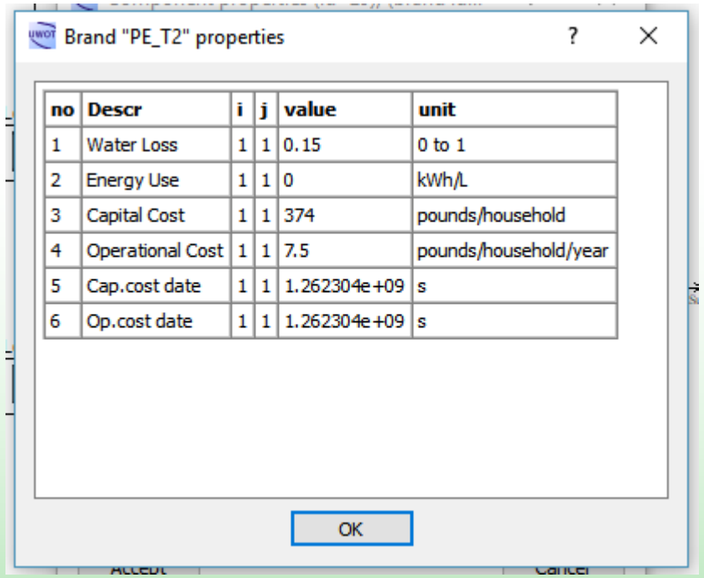


no	Descr	i	j	value	unit
1	Water Usage/capacity	1	1	15	L/use
2	Water Loss	1	1	0.05	0 to 1
3	Energy Use	1	1	2.4	kWh/use
4	Capital Cost	1	1	380	pounds
5	Operational Cost	1	1	0.05	pounds/use
6	Output Quality	1	1	50	mg/L
7	Cap.cost date	1	1	1.262304e+09	s
8	Op.cost date	1	1	1.262304e+09	s

UWOT hands-on training: Part II

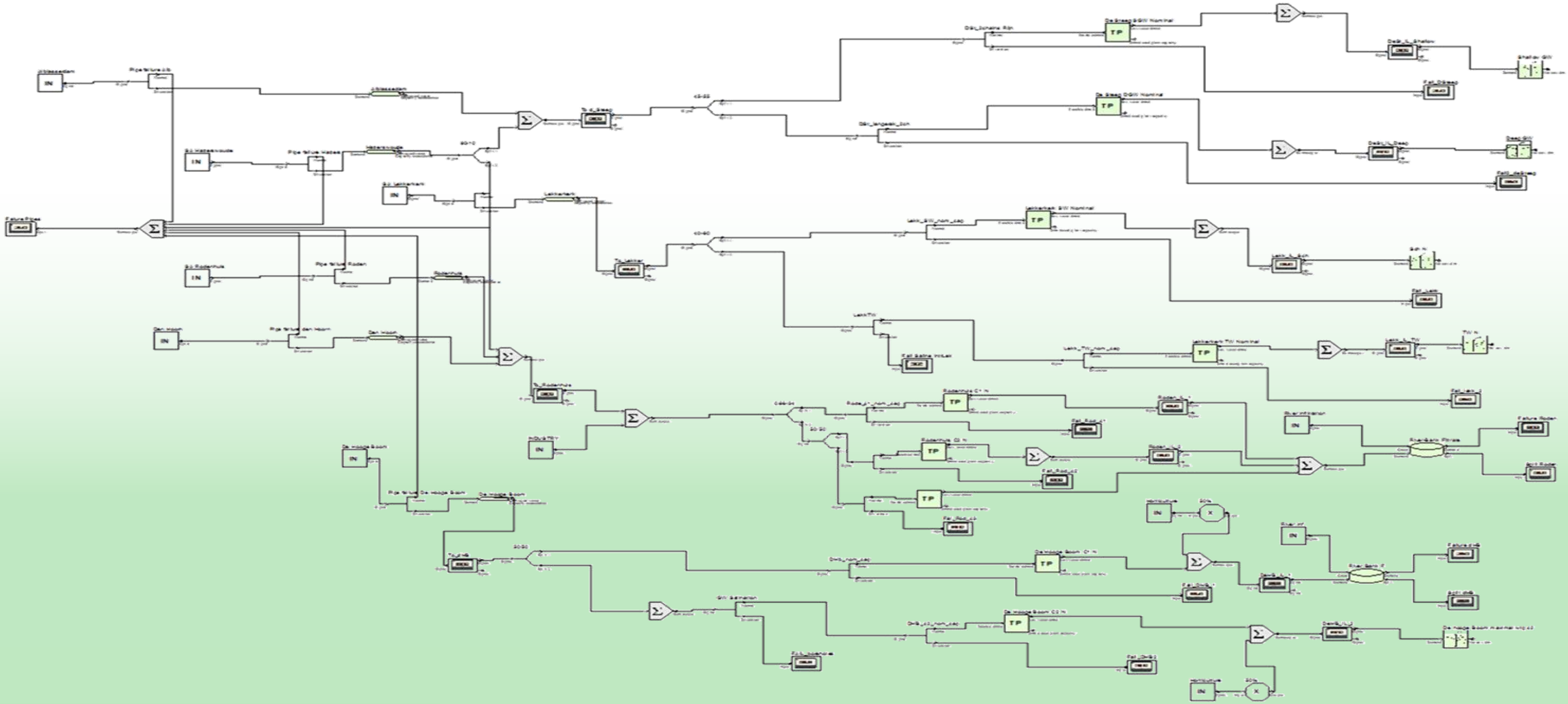
Defining Custom Brands

- *Define a custom Brand "PE_T2" for tertiary connections using this template:*
- *Modify the Brands of SG, PL, DS of the second household type*



no	Descr	i	j	value	unit
1	Water Loss	1	1	0.15	0 to 1
2	Energy Use	1	1	0	kWh/L
3	Capital Cost	1	1	374	pounds/household
4	Operational Cost	1	1	7.5	pounds/household/year
5	Cap.cost date	1	1	1.262304e+09	s
6	Op.cost date	1	1	1.262304e+09	s

Adding decentralised interventions – RWH, GWR & SUDS



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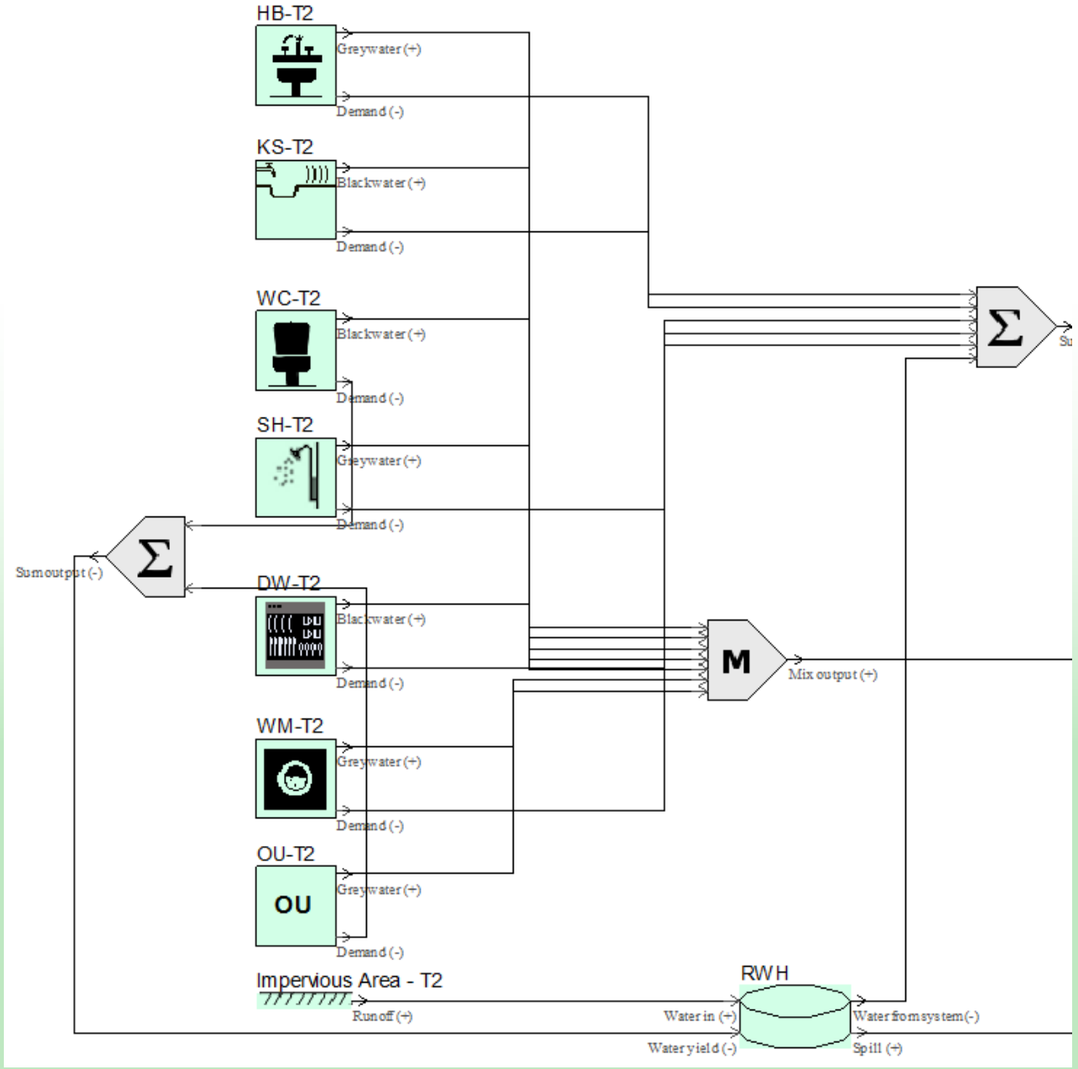
Exploring management options (RWH)

- *Add an Tank (TN) component.*
- *Connect the runoff of House Type 2 to the Water in (+) input.*
- *Add a new Summation (SM) for the demand signals of Toilet and Outside use*
- *Route the signal through Water yield (-)*
- *Connect Water from system to the respective SM component*
- *Spill signal goes to drainage*
- *Run simulations with varying tank capacities (3 m2, 5 m2, 10 m2).*
- *Keep in mind this tank is in the level of the house.*



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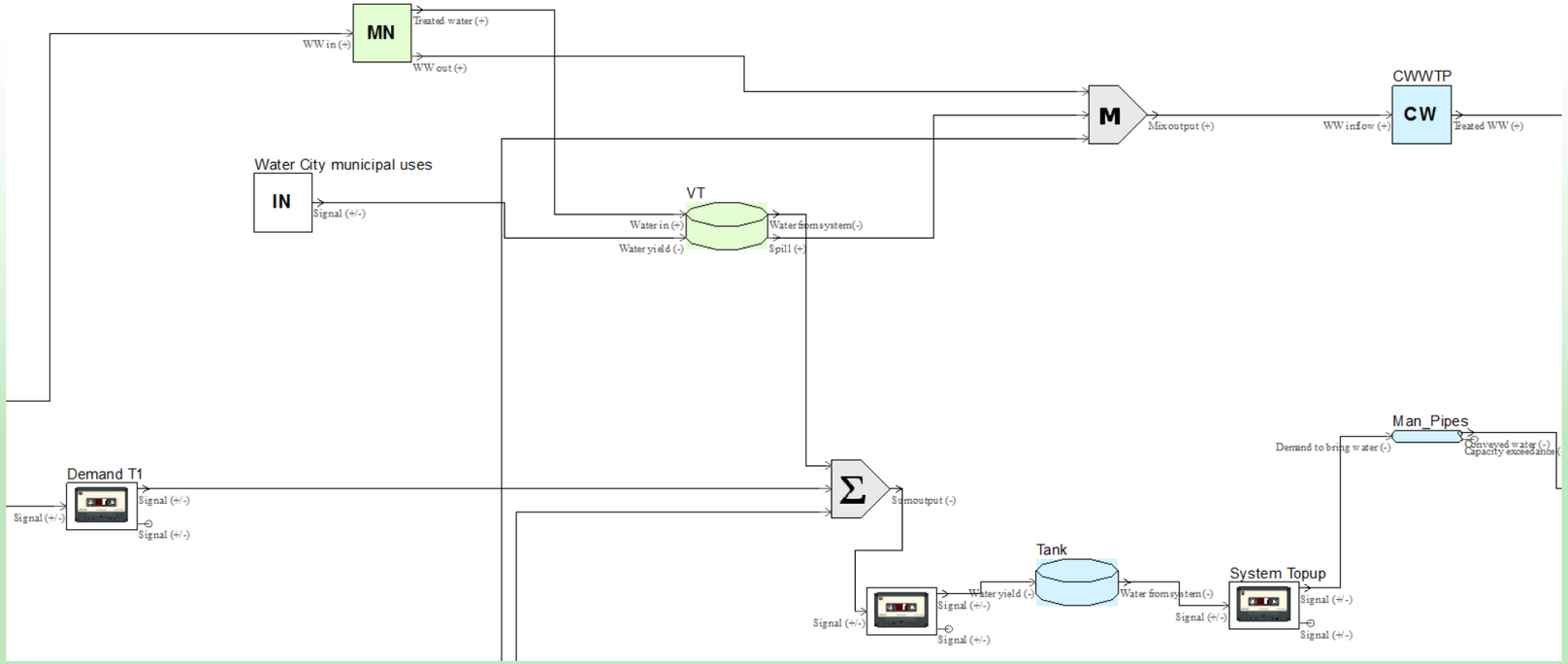
Exercise: Sewer Mining

Alter the topology with the use of a DESSIN sewer mining component (10000 l/d, 0.0005 kWh/l), located in the first district, in order to reuse water for the municipal uses. Find a way to connect all necessary components. Run a simulation and compare results.

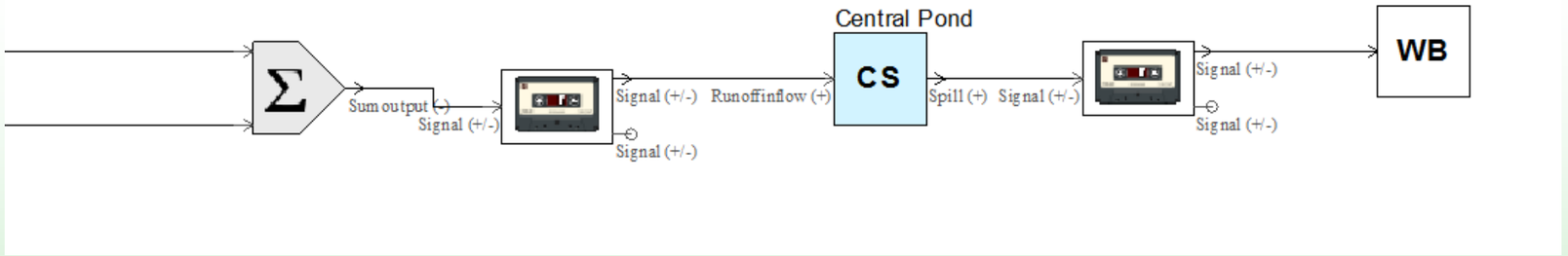
(Hint)



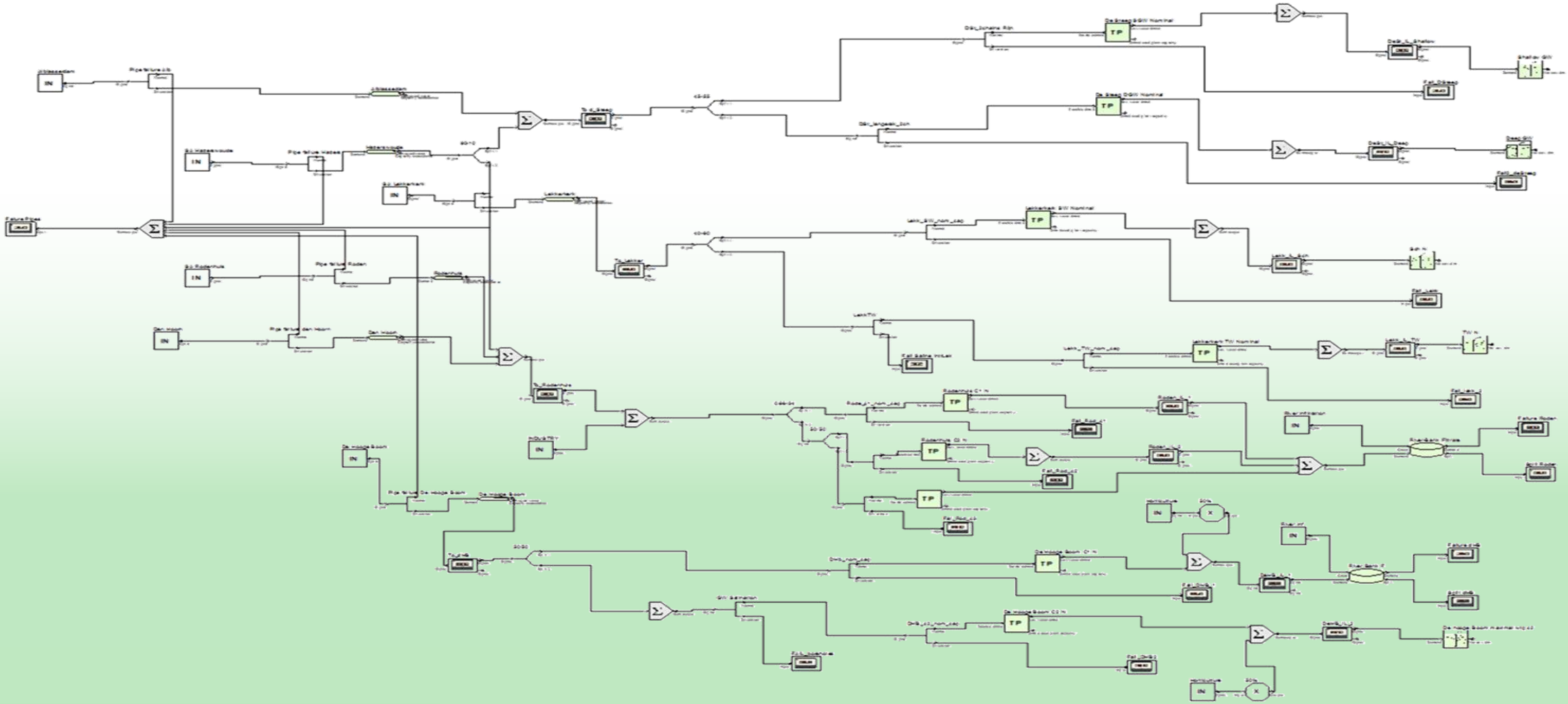
UWOT hands-on training: Part II

Exercise: Create a SUDS pond

Alter the topology with the use of pond to minimize storm runoff.



Source to tap – expanding to the supply side



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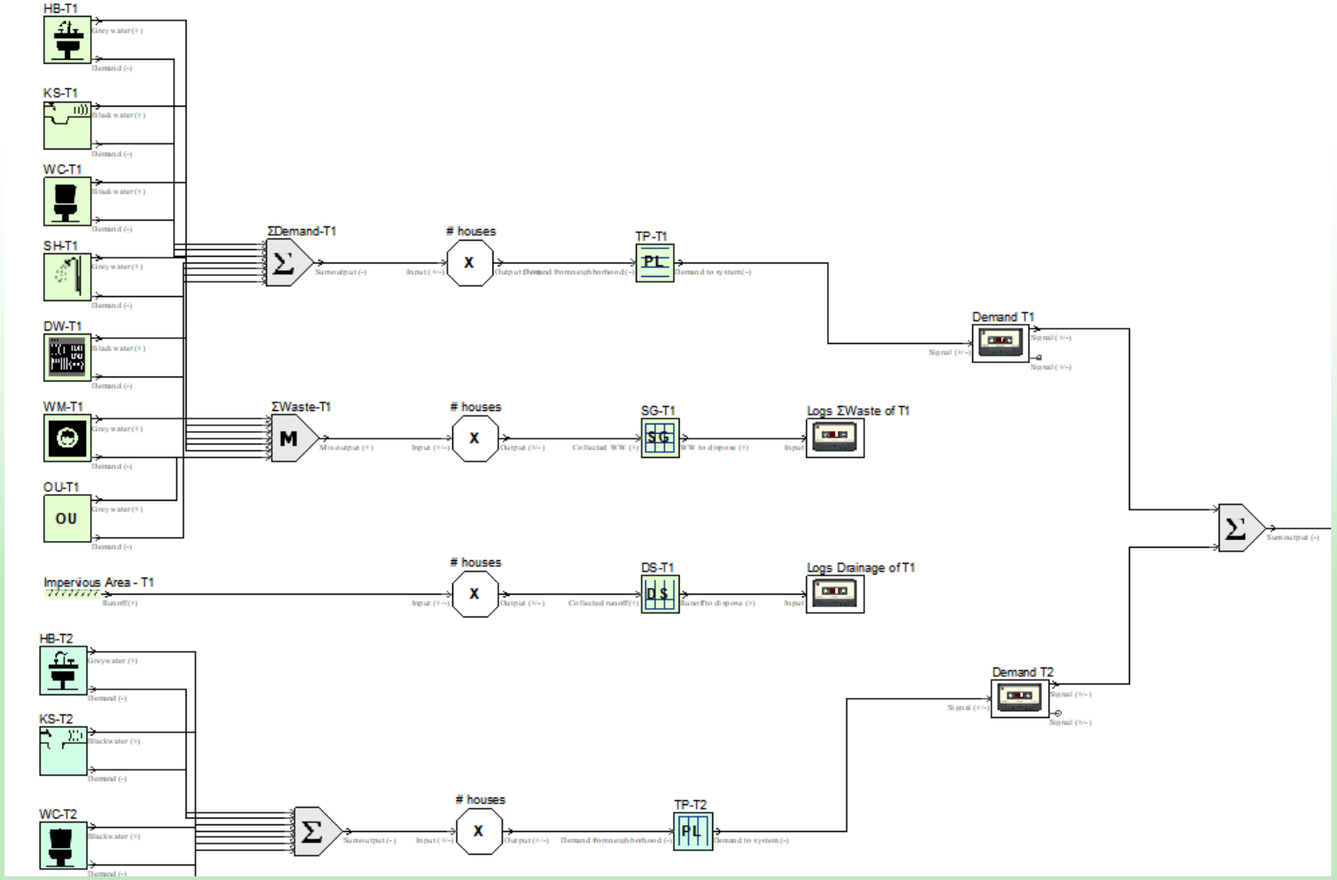
UWOT hands-on training: Part II

Creating the centralized water supply line

- *Delete the loggers for demand of both districts.*
- *Create Inline Loggers (IL). Connect the PL components to ILs, then sum signals from both Inline Loggers with a new SM*

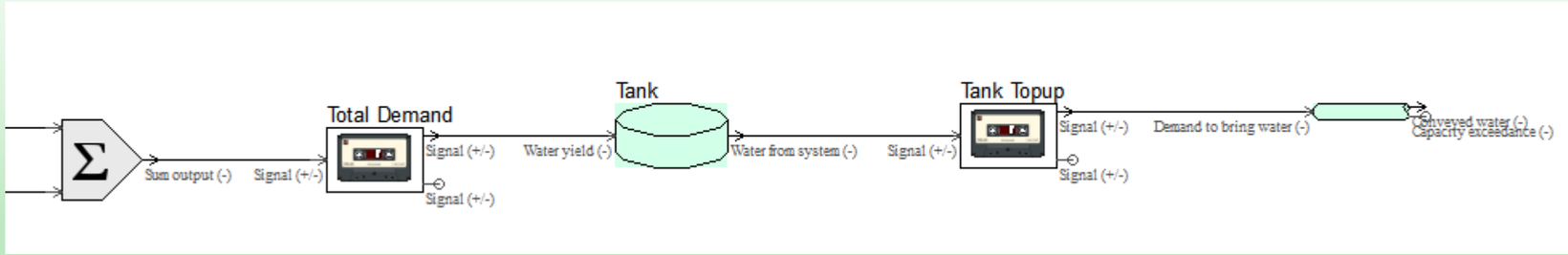
Inline loggers operate the same as normal loggers, but let the signal pass through.



UWOT hands-on training: Part II

Creating the centralized water supply line

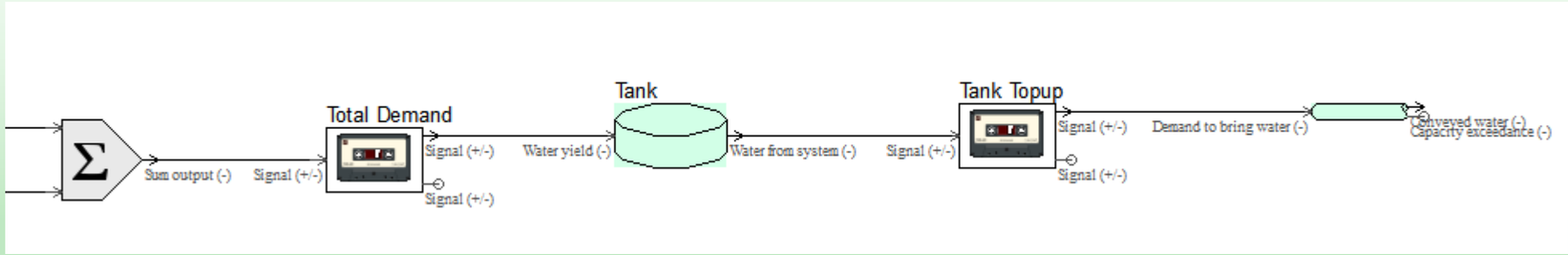
- *Create a Central Reservoir component (RS) that represents the buffer tank between the hydrosystem and the supplied districts. Add it to a new Group, "System"*
- *Route the signal through two inline loggers*
- *Add an Aqueduct component to simulate the main distribution network.*



UWOT hands-on training: Part II

Creating the centralized water supply line

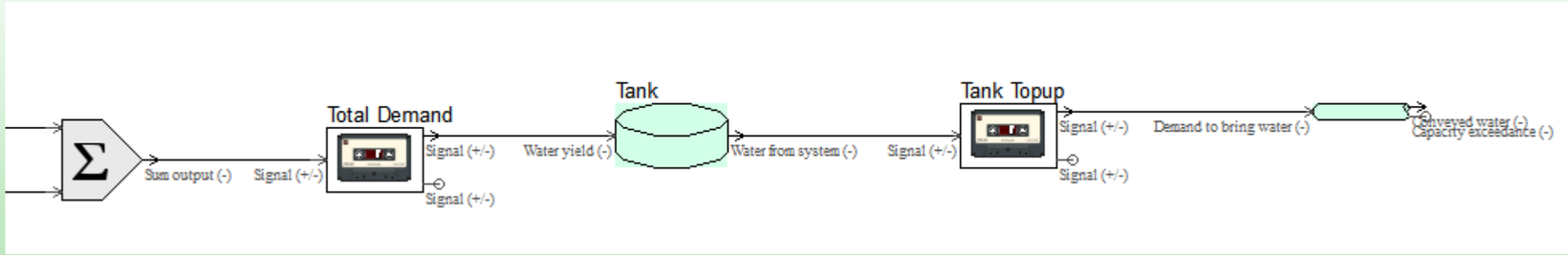
The RS component has an attribute called fill rate (daily ratio) which correlates with the capacity of the main distribution network. E.g. a 5000 m^3 tank with a fill rate of 0.5 will be able to top up with up to 2500 m^3 each day. Thus, the capacity of the Aqueduct component should be enough to handle this need.



UWOT hands-on training: Part II

Creating the centralized water supply line

- *Define the RS capacity at 1000 m^3 . The initial water storage is small (10 m^3) – tank is empty. Create a new Brand with 0.25 refill ratio.*
- *Create a new Brand for the aqueduct with 250 m^3/d capacity and 10% losses*



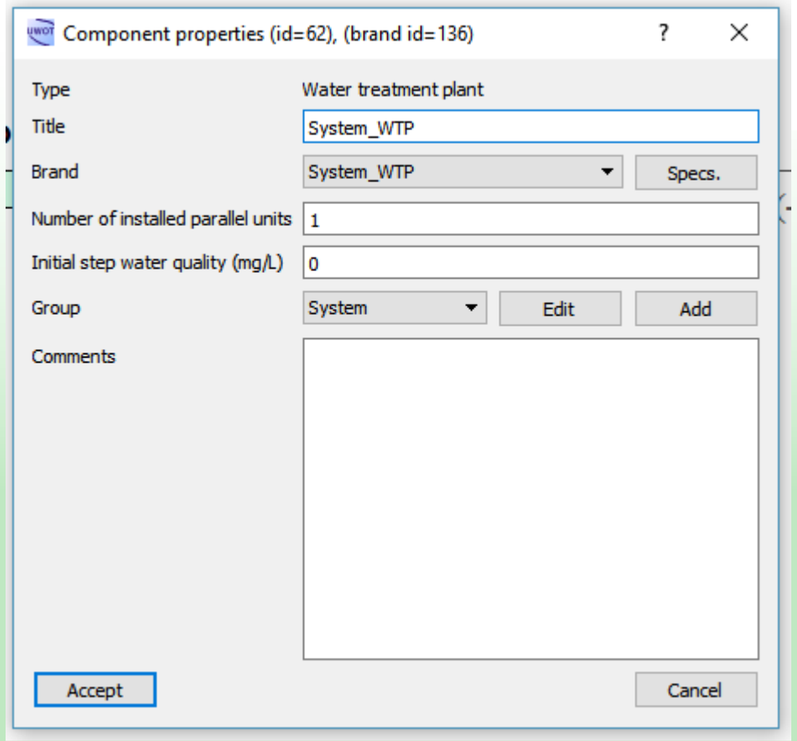
UWOT hands-on training: Part II

Water treatment plant

❖ *Add a Water Treatment Plant (TP) component.*

Water Treatment Plants have a capacity attribute and an internal logger for “not covered demand”. Also, you can define the # of parallel units.

❖ *Create a new Brand with the following attributes:*



Brand "System_WTP" properties

no	Descr	i	j	value	unit
1	Water Usage/capacity	1	1	300000	L/d
2	Water Loss	1	1	0.1	0 to 1
3	Energy Use	1	1	5e-05	kWh/L
4	Capital Cost	1	1	0	pounds
5	Operational Cost	1	1	0	pounds/year
6	Cap.cost date	1	1	1.262304e+09	s
7	Op.cost date	1	1	1.262304e+09	s

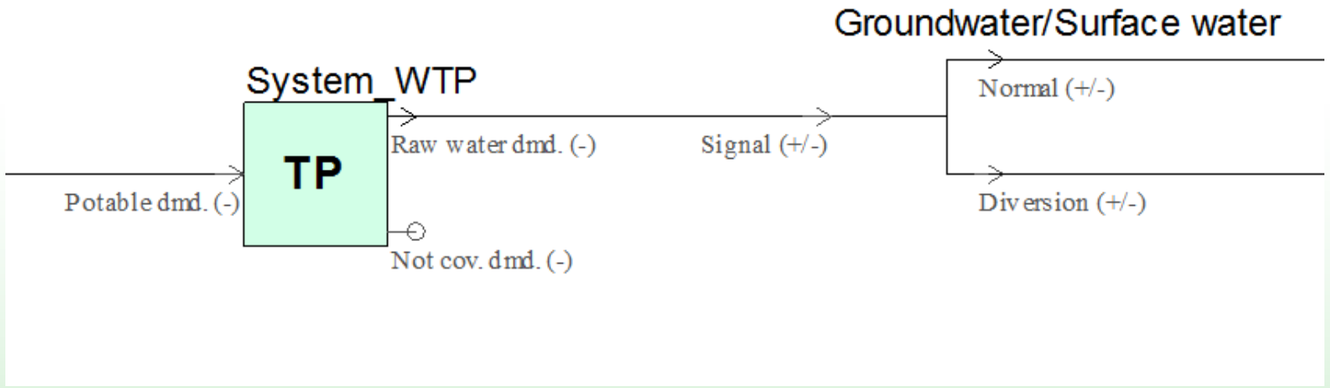
UWOT hands-on training: Part II

Divergence

❖ *Add a Divergence (DV) component.*

Divergence components are used to divert signals according to thresholds. Here, we simulate the preference for groundwater over surface water, but with an abstraction limit.

❖ *Set the threshold to 150000 l/d*



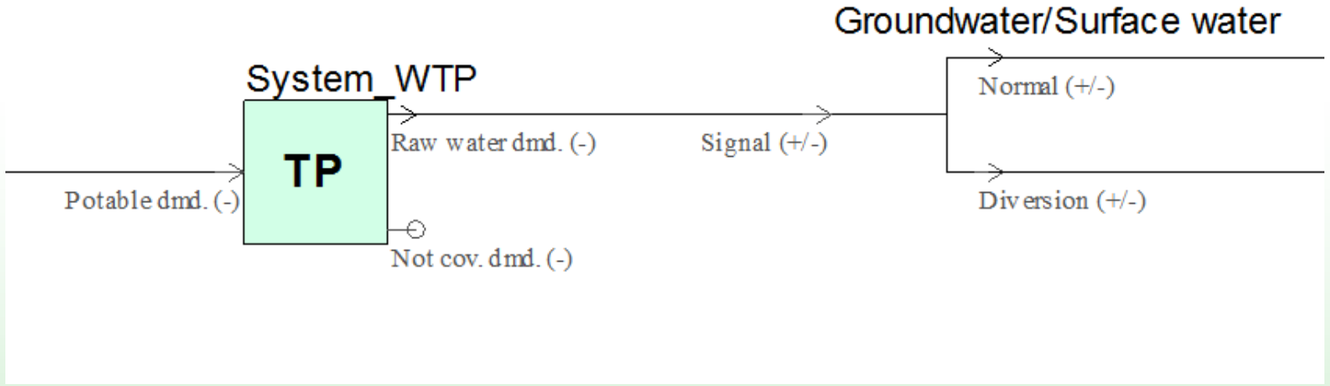
UWOT hands-on training: Part II

Splitter component

❖ *Add a Splitter (SP) component in the normal signal path*

Splitter components are used to split by percentage signals. Here, we simulate the abstraction from two different wellfields.

❖ *Set the percentage to 50*



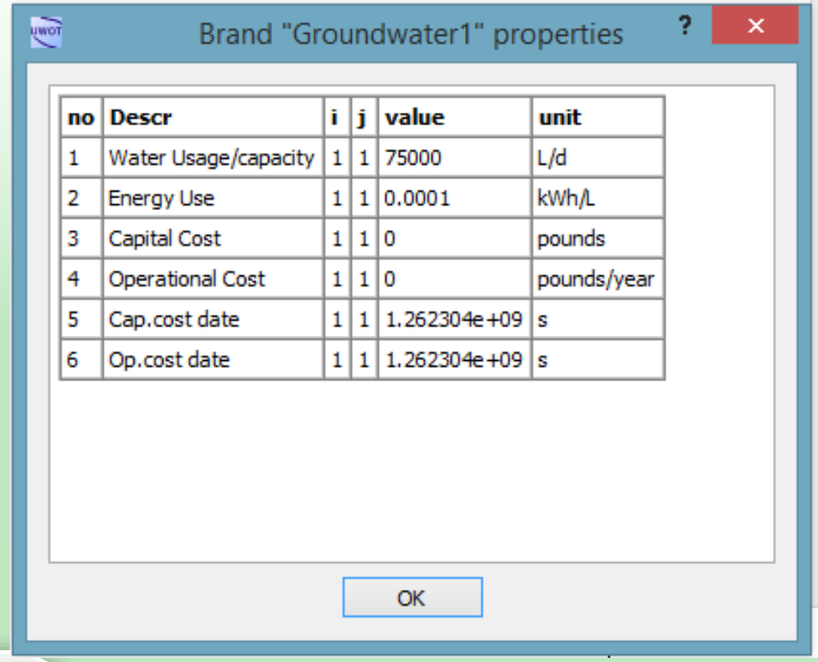
UWOT hands-on training: Part II

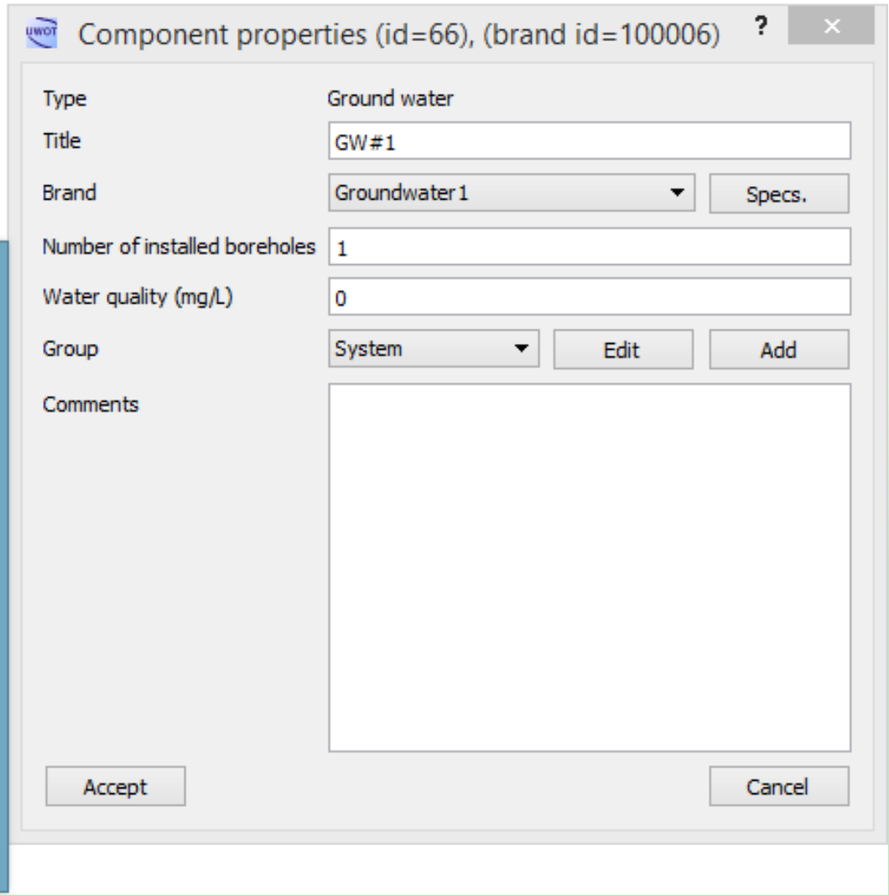
Groundwater wells

- *Add two Ground Water (GW) components and connect them to both splitter paths.*

Groundwater components are used as sources for water supply.

- *Add two Brands and differentiate them by energy use (0.0001 vs 0.0005). Both should have capacity of 75000 l/d*





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UWOT hands-on training: Part II

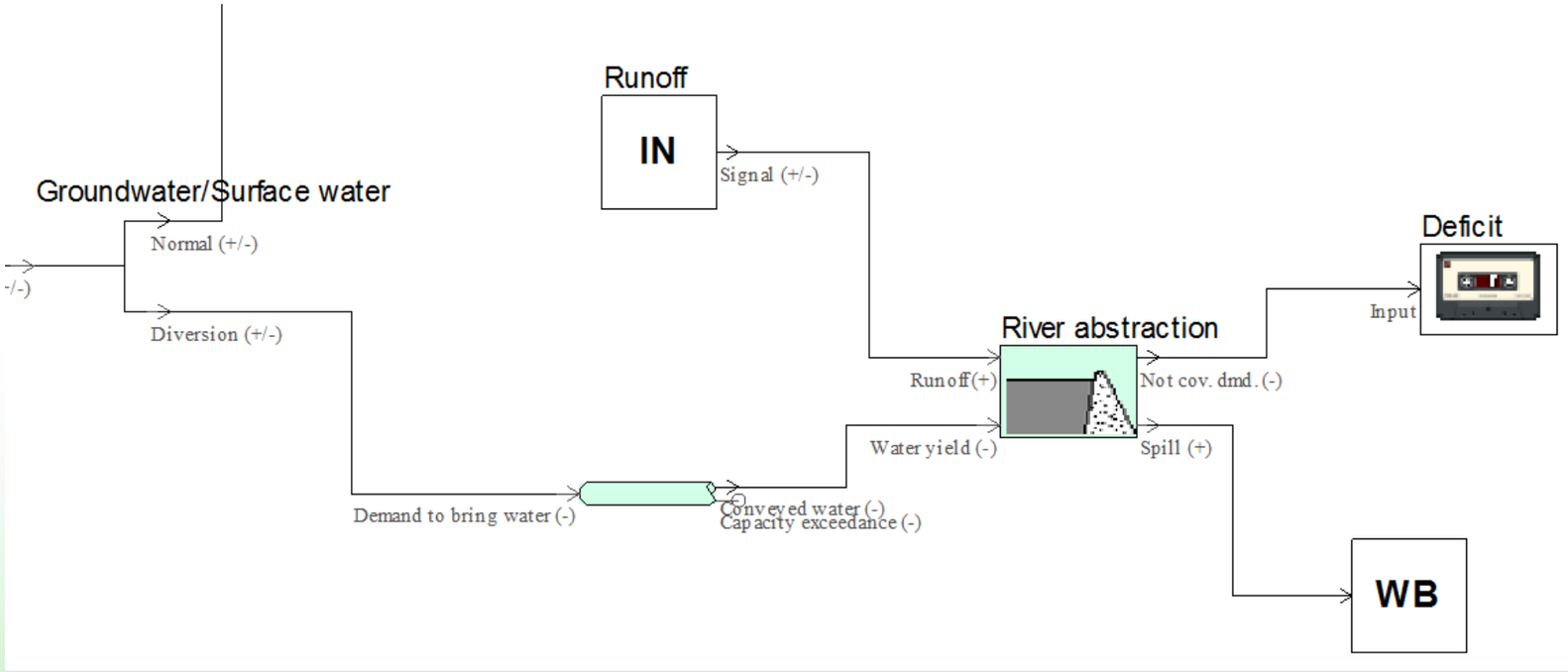
Surface water

- *Add a Surface Water (SW) component*
- *Connect the diversion to Water yield (-) input*

We need a runoff timeseries to connect to Runoff (+).

- *Add an Input (IN) component and attach the runoff.csv timeseries*

Input components can be used with both pull/push signal types



UWOT hands-on training: Part II

Surface water

- *Add a Surface Water (SW) component*
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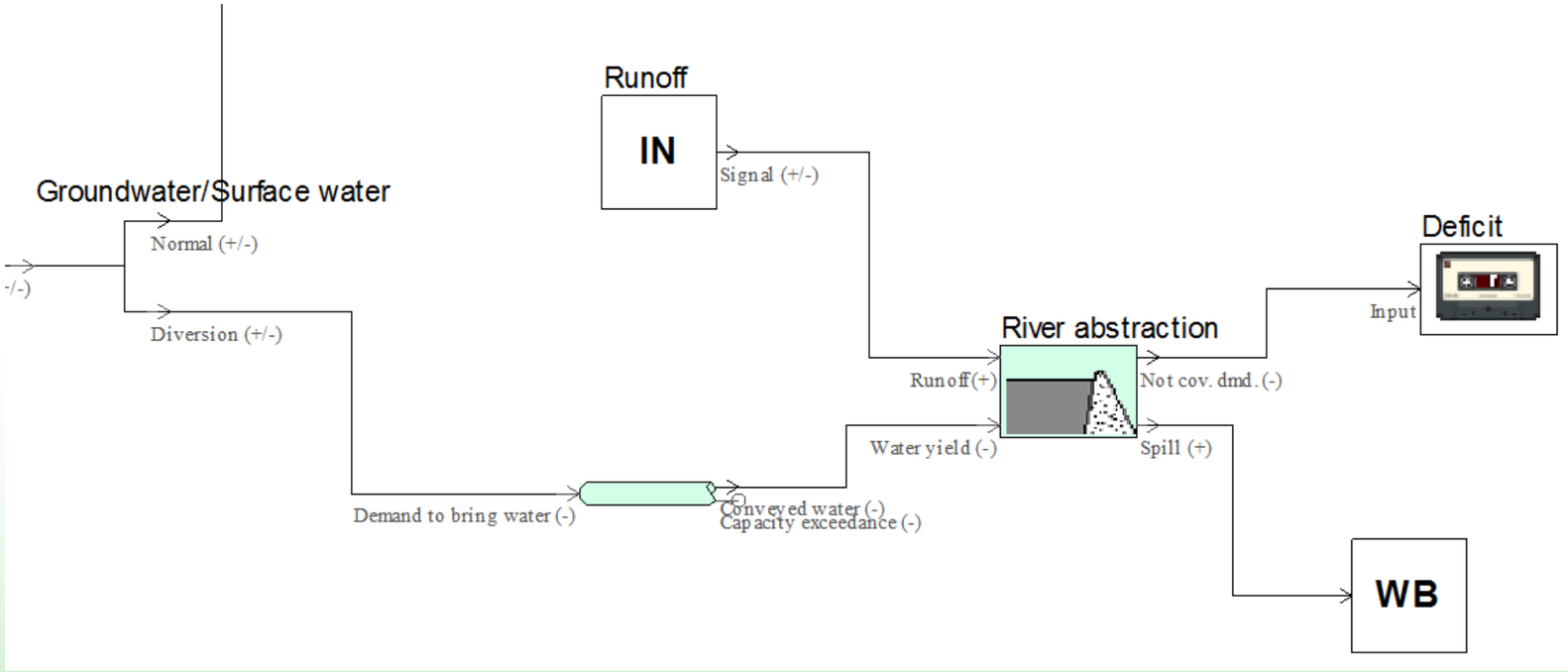
Input components can be used with both pull/push signal types



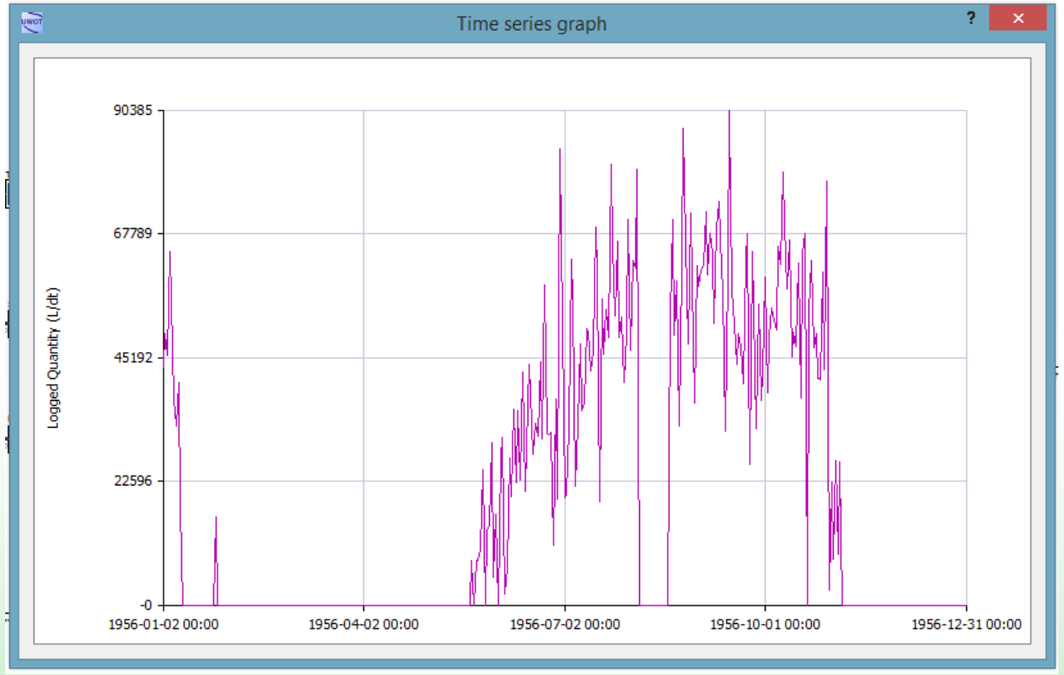
- *Connect a Logger (LG) to Not cov. Dmd. (-) outlet*
- *Connect a simple Water Body (WB) component to Spill (+) outlet*

UWOT hands-on training: Part II

Surface water

- *Select the "no surface water" Brand*
- *Perform a simulation*
- *Open the Not covered demand logger*

Note the failure frequency and volume

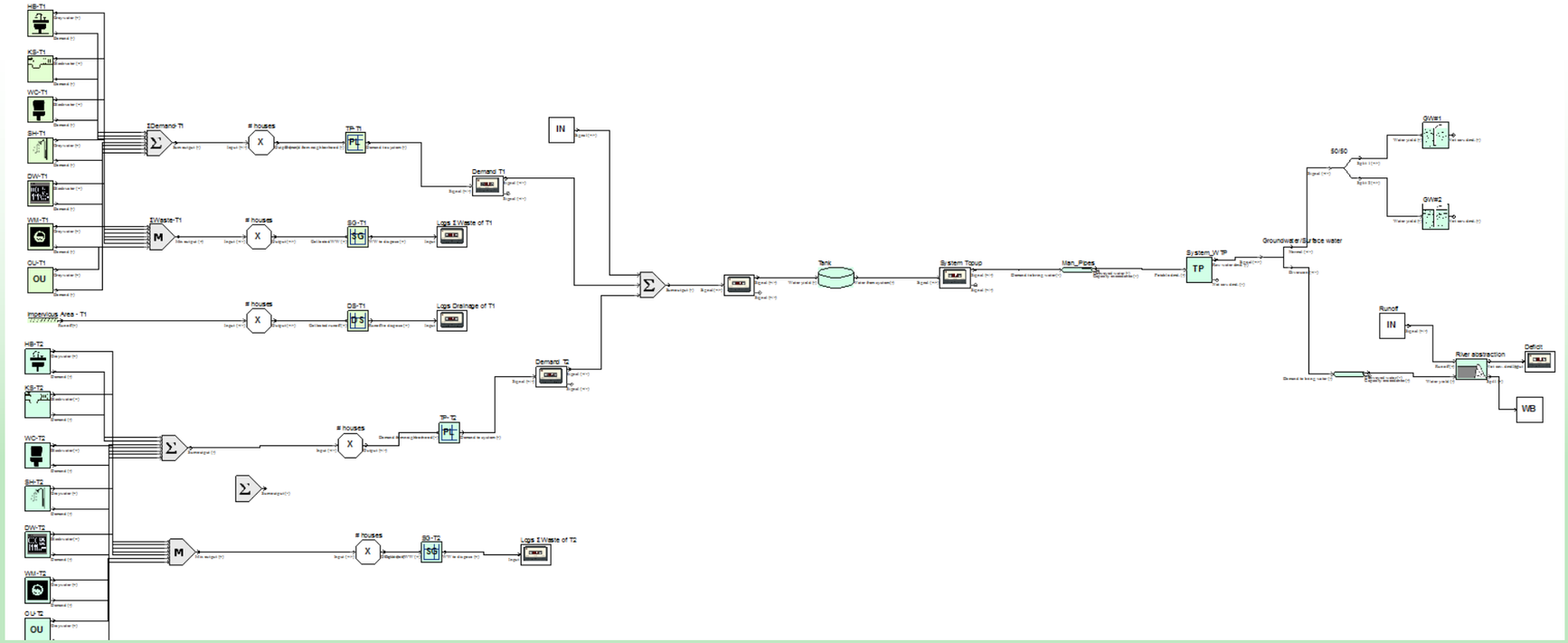


- *Select the "Bandkside Reservoir" , "Small Reservoir " and compare results after simulations*

UWOT hands-on training: Part II

Add municipal uses

- *Add an Input (IN) with a constant pull signal of 20000 l/d and run simulations again*



UWOT hands-on training: Part II

Central Wastewater Treatment Plant

- *Connect the runoff of House Type 2 to the Water in (+) input.*
- *Add a MX and connect both waste water signals from the two districts*
- *Add an Central Wastewater (CW) component.*
- *Make a new Brand with capacity of 300000 l/d*