



# QUICK TOUR OF FLUIDIT SEWER

Aalto University – 2019-02-25

# OVERVIEW

## Model settings

## Model component styling

- Drawing order
- Manage colors and sizes
- Manage colors and sizes based on results
- Manage component filtering
- Edit legend

## Background layers:

- Insert background maps
- Add external files for reference
- Add calculated raster layers from nodes
- Manage background layer order

Scenario tree: Create a child scenario that inherits all features from mother scenario. Edits made in child scenario does not affect to mother scenario.

DEM Manager: Elevation layers can be used for example to define node elevations, critical pressure levels or rim elevations of manholes

Schematics: add fixed figures and maps that are stored in schematics for later use.

Modelling toolbar: Add model components, manage current simulation time

Fluidit Sewer Simulator [Base Scenario]

File Edit Model Simulate View Navigate Tools Window Help

Material: [Dropdown] | [Navigation icons] | 1.1.2017 0:00

**Model Browser**

- Fluidit Sewer Model
  - Drawing States
    - Default Visualization
      - Symbols [Symbols]
      - Label Lines [Label Lines]
      - Label Points [Label Points]
      - Outfalls [Outfalls]
      - StorageUnits [StorageUnits]
      - Dividers [Dividers]
      - Junctions [Junctions]
      - Node Elevations [Node Elevations]
      - Demands [Demands]
      - Weirs [Weirs]
      - Orifices [Orifices]
      - Pumps [Pumps]
      - Outlets [Outlets]
      - Conduits [Conduits]
      - Catchments [Catchments]
      - Point Components [Point Components]
      - Line Components [Line Components]
      - Area Components [Area Components]
- BasicDrawingState-1
- BasicDrawingState-2
- Background Layers
  - Open Street Map
  - Base Scenario
    - DEM Manager
      - Basic Elevation Model
    - Schematics
      - Schematic-1

Properties panel. Properties of selected components

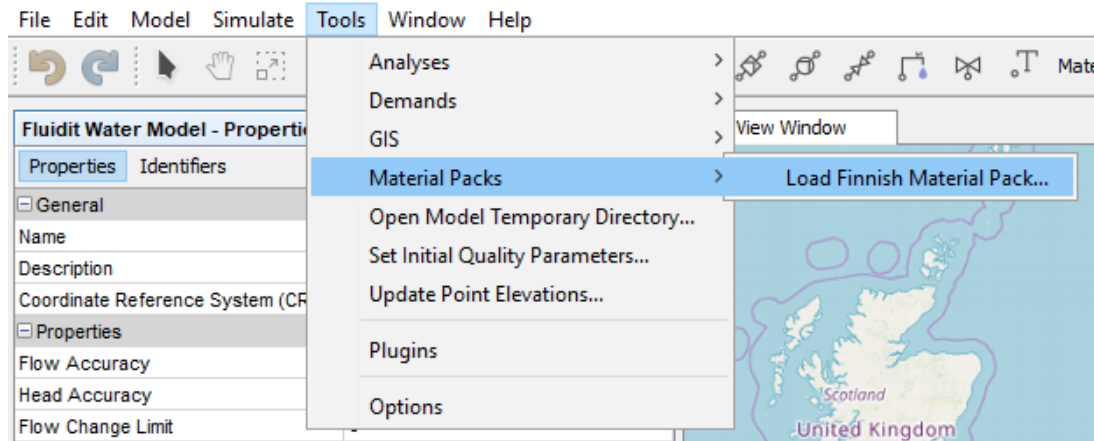
Result view Window: Self-updating component result viewer of selected components

General	
Name	Fluidit Sewer Model
Description	
Coordinate Reference System (CRS)	WGS 84 / Pseudo-Mercator (EPSG:3857)
Properties	
Active Scenario	Base Scenario
Background Color	<input type="checkbox"/> [255,255,255]
Default Pump Efficiency	70
Default Motor Efficiency	85
Default VSD Efficiency	95
Relative Specific Gravity	1
Allow Ponding	<input type="checkbox"/>
Zero Potential Elevation	0
Dry Days	0
Dry Step	3600
Flow Routing	Dynamic wave
Head Tolerance	0,002
Headloss Formula	Darcy-Weisbach
Surcharge Model	Original EXTRAN Method
Inertial Terms	Dampen
Infiltration Model	Horton
Lateral Flow Tolerance	5
Lengthening Step	0
Link Offsets	Depth
Maximum Trials	8
Minimum Slope	0
Minimum Surface Area	1,168
Minimum Step	0,5
Routing Step	30
Skip Steady State	<input type="checkbox"/>
Supercritical Flow	Slope + Froude number
Sweep Start	(No Property Editor)
Sweep End	(No Property Editor)
System Flow Tolerance	5
Threads	4
Units	l/s
Variable Step	0,5
Wet Step	300
Report Averages	<input type="checkbox"/>
Time	
Simulation Start Time	1. 1. 2018 0:00
Simulation End Time	2. 1. 2018 0:00
Report Results Start	1. 1. 2018 0:00
Report Step	3600

# MODEL PROPERTIES

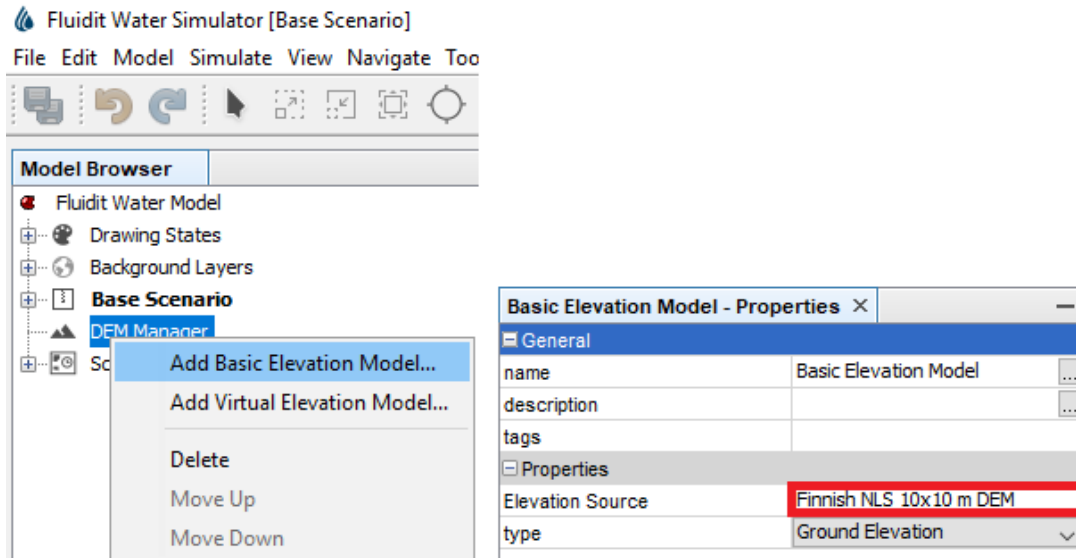
- Things to set up
  - **Units:** the most common approach is to use l/s everywhere – flows and demands in l/s, depths in meters of water column [m], diameters in m, roughness unitless / in mm for pressurized *force main* pipes
  - **Flow routing:** Dynamic Wave
  - **Headloss formula:** Darcy-Weisbach (general friction loss equation; used for surcharged, *force main* type conduits)
  - **Coordinate reference system:** the default, global Pseudo-Mercator system is not really metric – use ETRS89-GKxxFIN coordinate systems in Finland
  - **Simulation time settings:** Start time, end time, report start, report step (in seconds) and hydraulic time step (in seconds) – it's important to note, that it takes time for the network to fill up – simulate at least two days and report the last

# LOAD FINNISH MATERIAL PACK



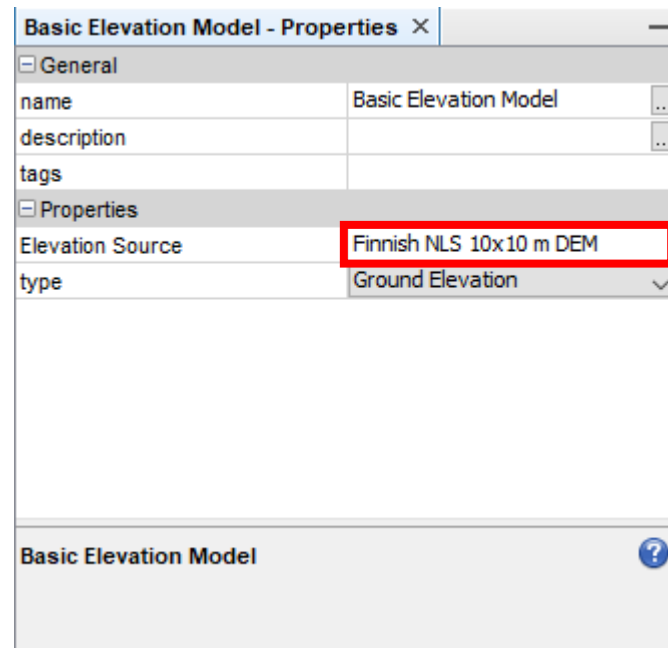
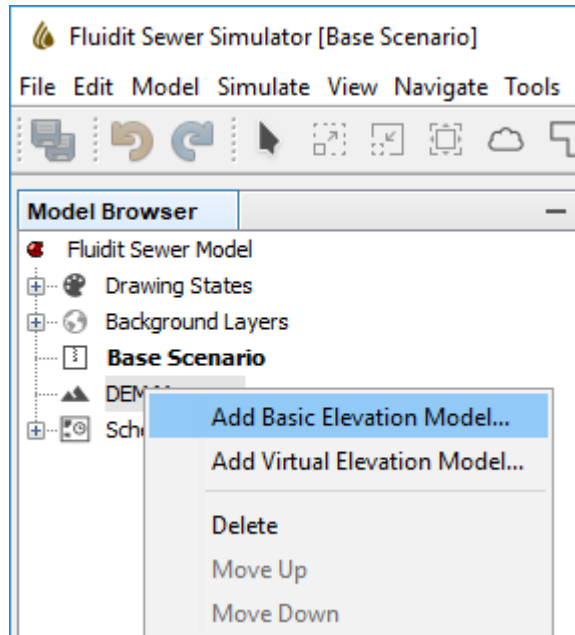
- The Finnish Material Pack includes the common pipe sizes and materials in use in Finland
- Most of materials include rough construction costs
- Materials can be inspected and modified via Model -> Materials... menu

# ADD AN ELEVATION MODEL

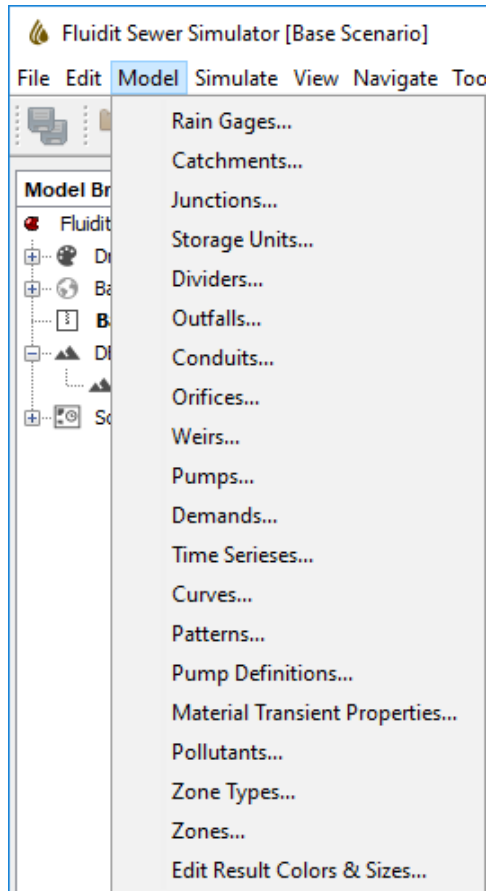


- Newly created nodes will automatically get elevation (z) from the DEM
- Elevations can be updated later from Tools->Update Point Elevations... (updates selected / all nodes and other points)
- Finnish NLS 10x10 m and 2x2 m grids are available – neither covers the whole country

# HOW TO ADD A DEM



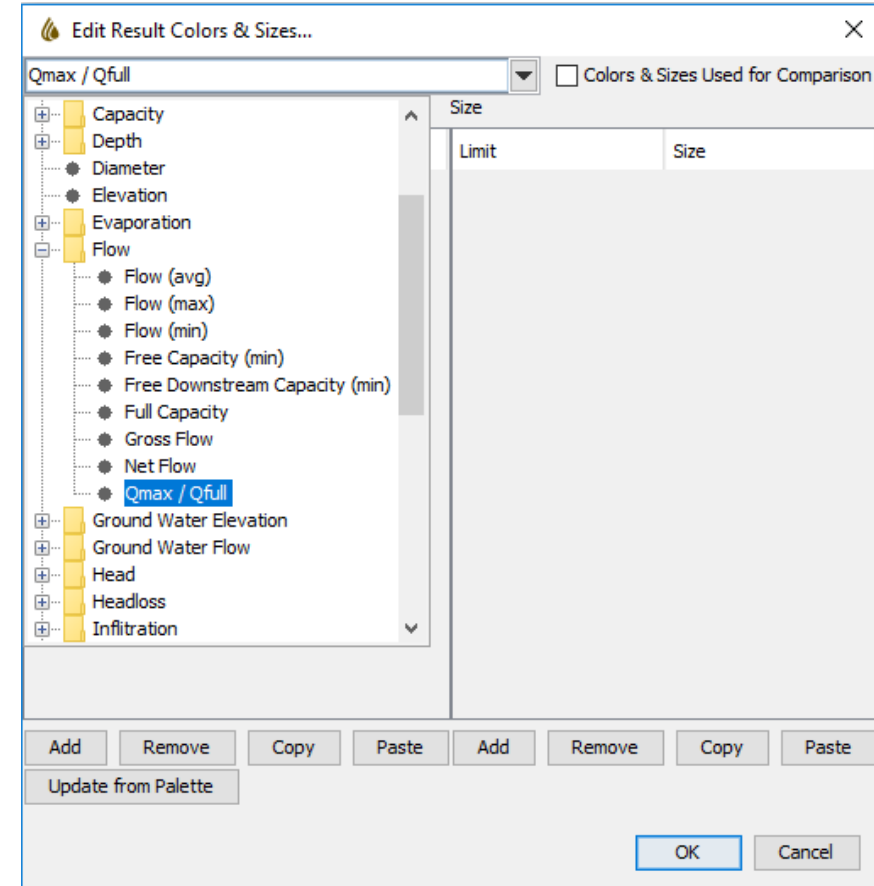
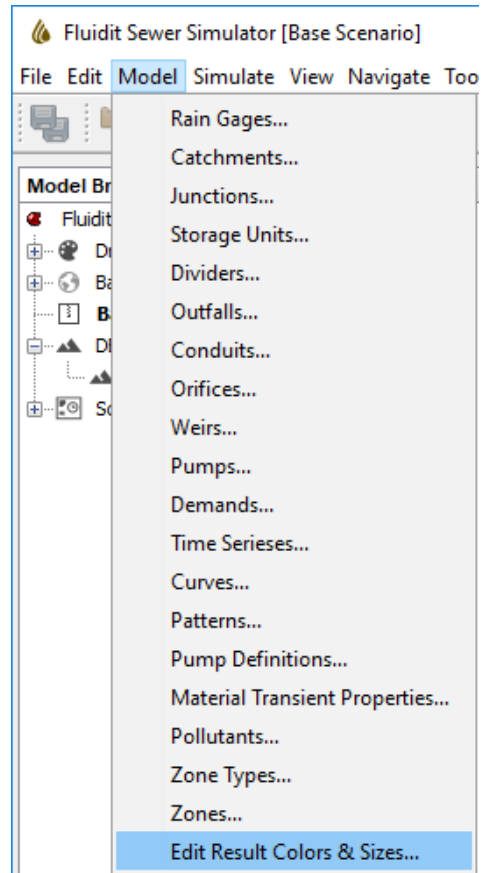
# OPEN LIST OF COMPONENTS IN TABLE



The screenshot shows the 'Map View Window' with a tab titled 'Junctions'. The window displays a table with the following columns: name, numberOf..., pondingArea, rimElevation, sewershed..., surcharge..., and symbol. The table contains 13 rows of junction data, with the last row partially cut off.

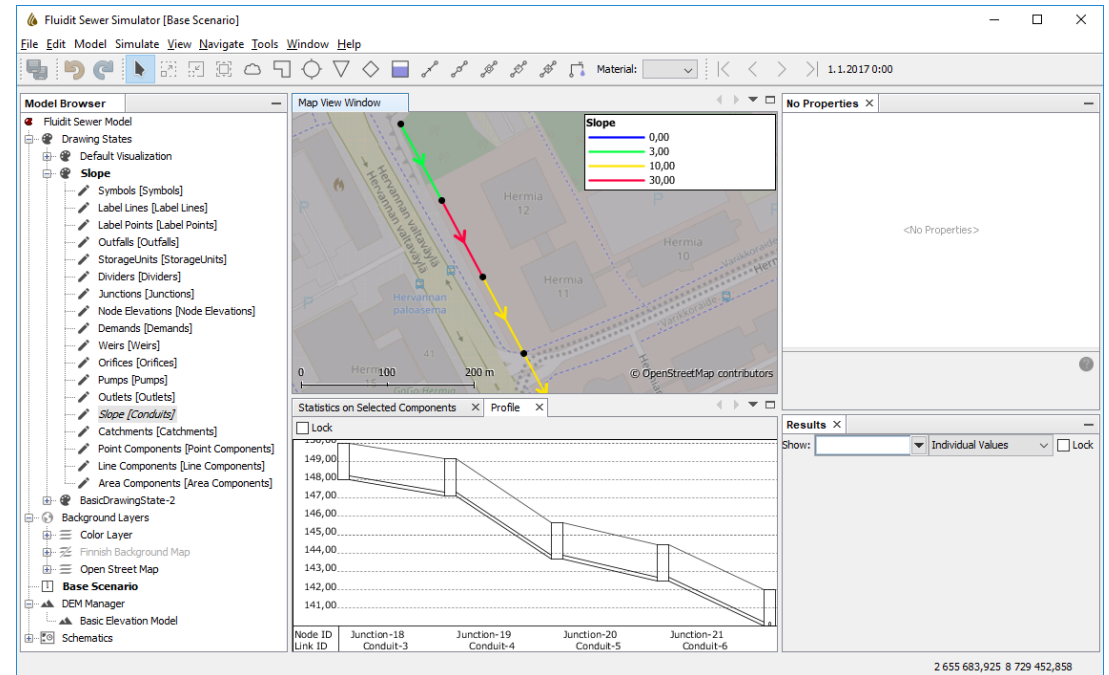
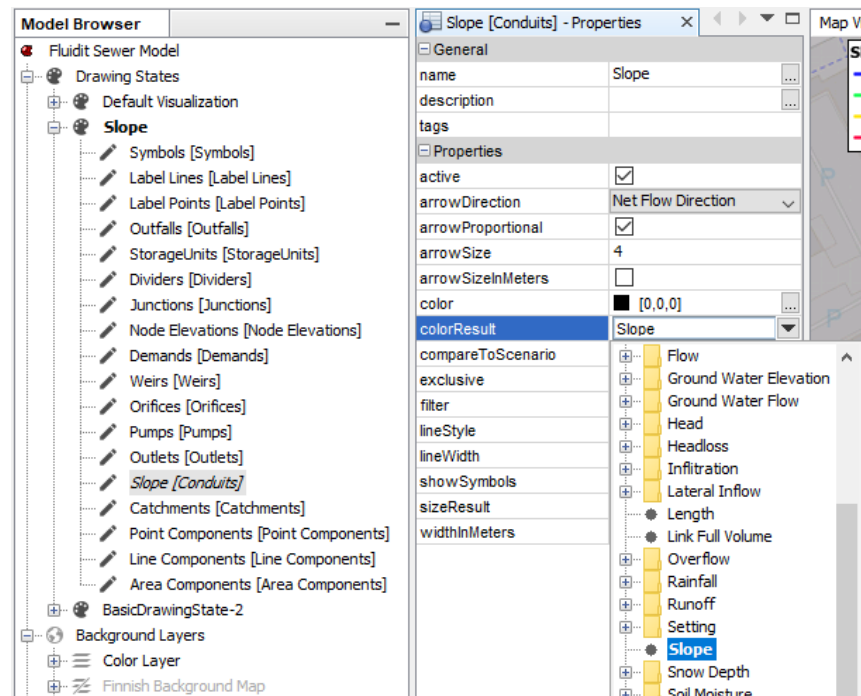
name	numberOf...	pondingArea	rimElevation	sewershed...	surcharge...	symbol
Junction-7	0	0	86,058	0	0	No syr
Junction-4	0	0	84,135	0	0	No syr
Junction-10	0	0	95,7	0	0	No syr
Junction-1	0	0	38,745	0	0	No syr
Junction-6	0	0	78,5	0	0	No syr
Junction-2	0	0	144,563	0	0	No syr
Junction-8	0	0	43,063	0	0	No syr
Junction-11	0	0	138,337	0	0	No syr
Junction-12	0	0	33,567	0	0	No syr
Junction-13	0	0	180,906	0	0	No syr
Junction-9	0	0	110,39	0	0	No syr
Junction-5	0	0	127,01	0	0	No syr

# EDIT RESULT COLORS





# DISPLAY RESULT COLORS



# MAIN TOOLBARS



SELECT PAN, ZOOM

COMPONENTS: RAIN GAGES,  
CATCHMENTS, JUNCTIONS, OUTFALLS,  
DIVIDERS, STORAGE UNITS, CONDUITS,  
PUMPS, ORIFICES, WEIRS, OUTLETS,  
DEMANDS

PIPE SIZE &  
MATERIAL

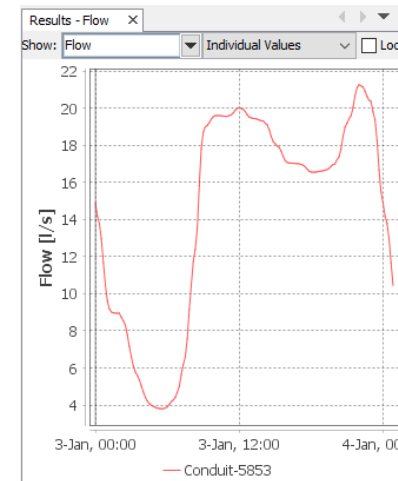
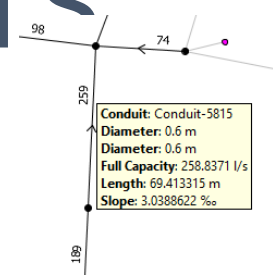
CHANGE TIME  
STEP BACK OR  
FORWARD

# CONTROLLING THE MAP VIEW & DRAWING COMPONENTS

- Pan with middle mouse button or arrow keys
- Zoom using mouse scroll or + and -
- Double-ESC always activates the selection tool
  - Select by clicking or dragging
  - Holding CTRL adds to current selection
  - SHIFT+CTRL removes from current selection
  - Selection is reflected in component tables
- Component properties from selection are displayed dynamically in properties window. Double clicking on component opens properties in a new window
- Right clicking opens context menu
- First draw nodes: choose desired tool and click on map
- Choose pipe size and material (also activates the pipe drawing tool)
  - Start from a node by clicking or CTRL click to create a junction automatically
  - Clicking adds vertices
  - Backspace removes last vertex
  - Esc cancels
  - End by clicking on another node or CTRL click to create a new junction or split existing link
  - It's possible to zoom and pan while drawing

# VIEWING SIMULATION RESULTS

- On map using controls in Display menu
- Most important results in tool tips
- Graphically using Result View Window or component context menu: show result
- Tabularly using:
  - Statistics from Selected Components
  - Results from component property window Results-tab
- More complex analysis possible using Schematics



Properties	Results	Identifiers
Results		
Actual Surge ΔP (max) [m]	0	
Depth [m]	0,136	
Depth (avg) [m]	0,128	
Depth (max) [m]	0,159	
Depth (min) [m]	0,063	
Elevation [m]	58,891	
Head [m]	59,027	
Head (avg) [m]	59,019	
Head (max) [m]	59,05	
Head (min) [m]	58,954	
Lateral Inflow [l/s]	0,03	
Lateral Inflow (avg) [l/s]	0,03	
Lateral Inflow (max) [l/s]	0,044	
Lateral Inflow (min) [l/s]	0,008	
Overflow [l/s]	0	
Overflow (avg) [l/s]	0	
Overflow (max) [l/s]	0	
Overflow (min) [l/s]	0	

# CREATING A HYDRAULIC PROFILE (GRADE LINE)

- Open Profile View Window
- Select starting node by clicking it
- Select ending node by CTRL clicking it
- Now that you have two nodes selected, right clicking the map view shows *Find Best* and *Find Shortest Route*– select either
- Selects all links between the nodes
- Left click on the profile and choose properties to change what is shown

