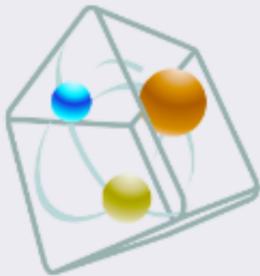


Works 2013



Small water network

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WHITEPAPER

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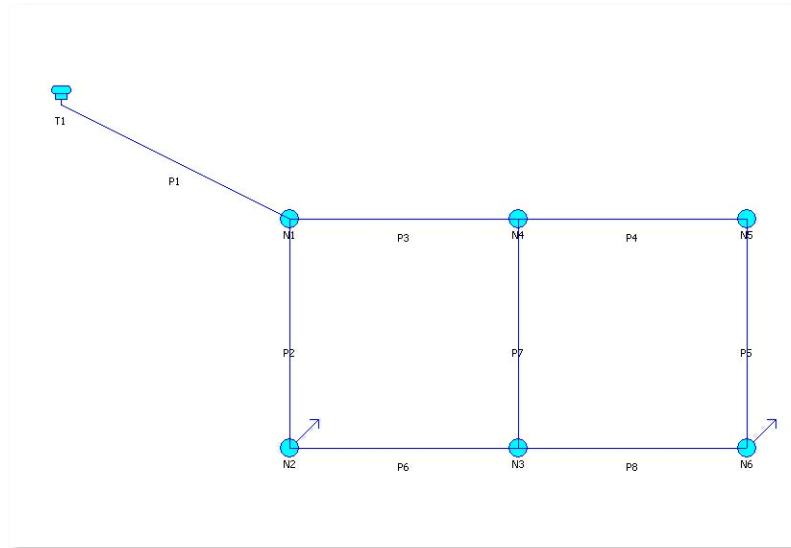
Chapter



1 About the whitepaper

1.1 Purpose

The purpose of this example is to solve the a small water network. The network consists of a tank and 8 pipes:



The pipe data are summarized in the following table:

Pipe	Length (m)	Diameter (mm)	Friction Factor
1	90	400	100
2	900	228.6	100
3	600	254	100
4	600	228.6	100
5	900	152.4	100
6	600	152.4	100
7	900	152.4	100
8	600	203.2	100

The Hazen - Williams friction formula will be used. The tank is circular, with a diameter of 5m and a ground elevation of 100m. The tank height is equal to 4m and we assume that the tank is full. The water temperature is equal to 20⁰. A constant demand of 10 and 20 L/s appears at nodes N2 and N6, respectively.

1.2 Software

In order to complete the example successfully, the following software is required:

- Water Networks v11.0.

Later versions of the aforementioned software may be incompatible with the structure of the example as it is presented herein.

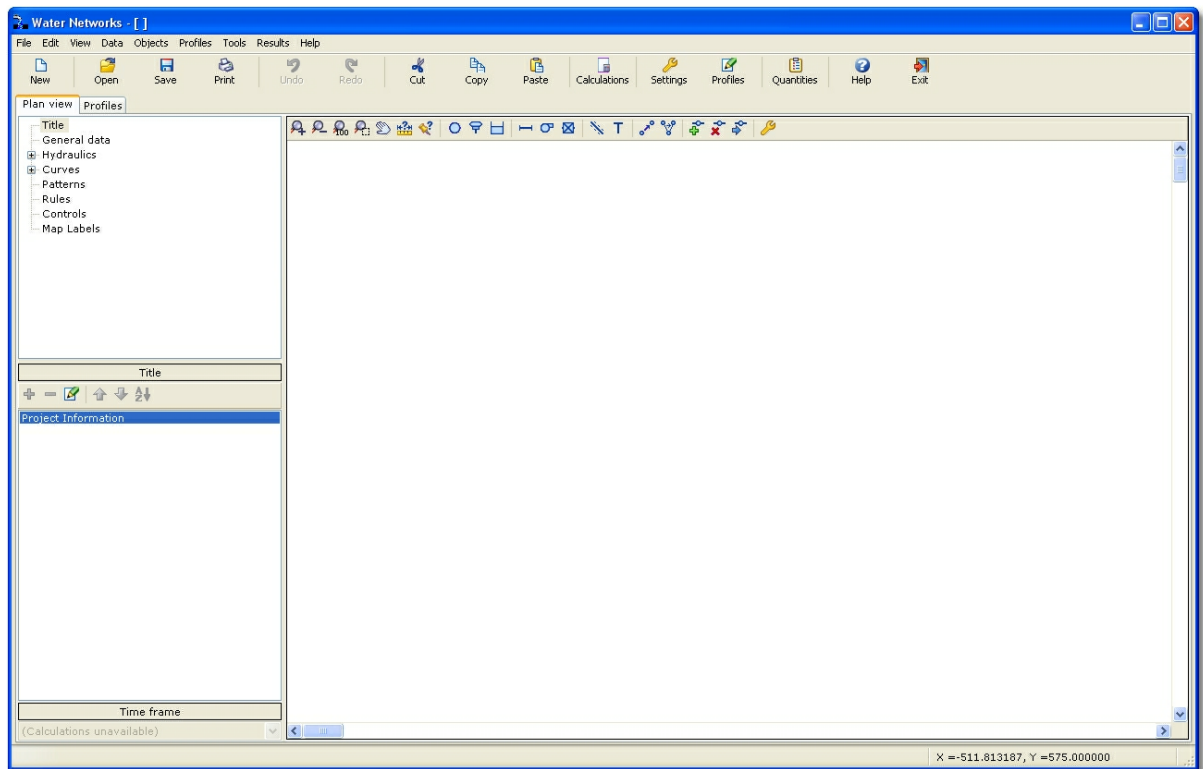
Chapter



2 Steps

2.1 Step 01: New Project

Select **New Project** from the **File** menu. The program will remove any data from memory and prepare to start a new project:

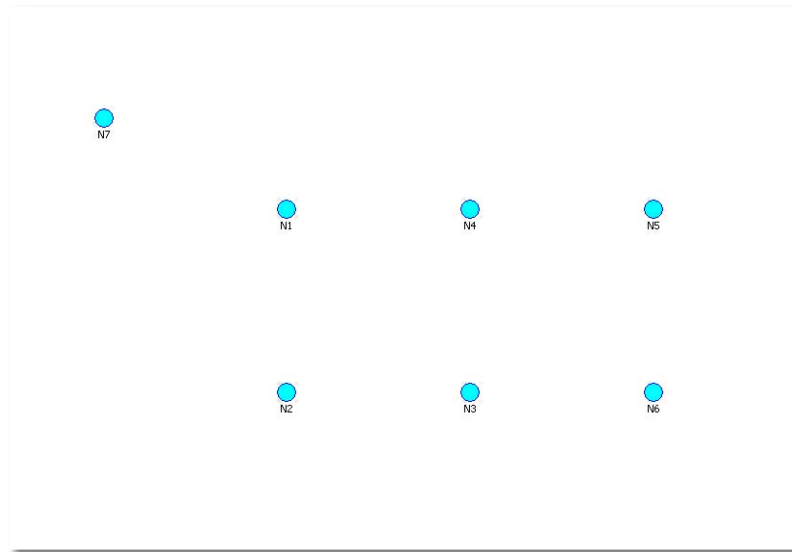


2.2 Step 02: Network Design

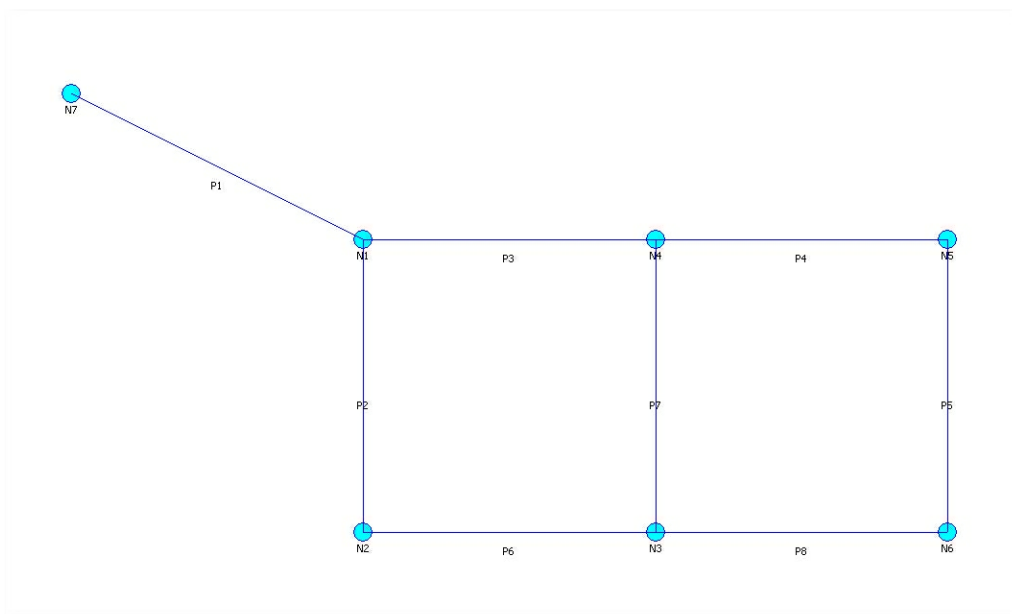
For reasons of simplicity, the design of the network will be schematic, i.e. not considering the exact location of the nodes. The connectivity of the elements will be deduced from the sketch; the actual length of the pipes will be entered manually.

First, you need to check that the correct unit system is used. Select **Data > General Data > Hydraulics**. Select **L/s** as the current flow units and hit **Ok**.

Select **Objects > Add > Node**. Click on the drawing while holding down the **CTRL** key. In this way, you can add more than one nodes consecutively. Click on the drawing to define the approximate position of nodes:

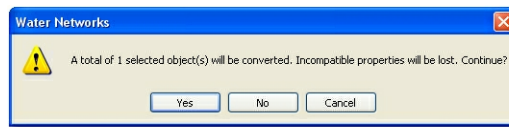


Select **Objects > Add > Pipe**. Click on the drawing while holding down the **CTRL** key. In this way, you can add more than one pipes consecutively. Click on the start and end nodes of each pipe consecutively:



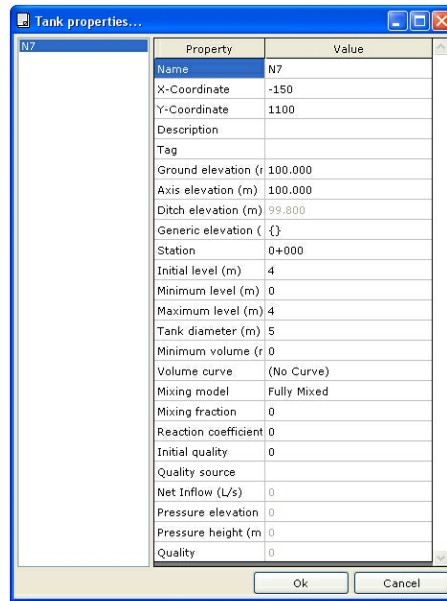
When finished, hit **ESC**.

Select node N7 by clicking on it or by enclosing it in a selection window. The node will change color. Select **Objects > Object Conversion > Convert Selected Nodes to... > Tanks**. The following warning message will appear:



Select **Yes**. The node will be converted to a tank.

Double-click on the tank to modify its data. The tank properties form will appear:

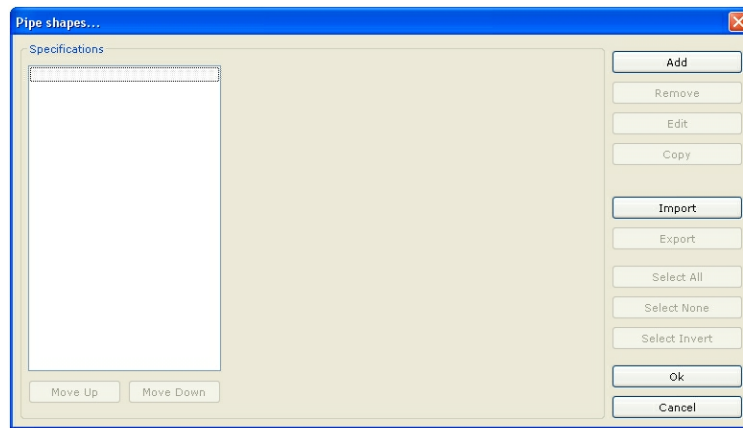


Make the following changes:

- **Name:** Enter "T1".
- **Initial Level:** Enter "4".
- **Maximum Level:** Enter "4".
- **Ground Elevation:** Enter "100".
- **Tank Diameter:** Enter "5".

Select **Ok**.

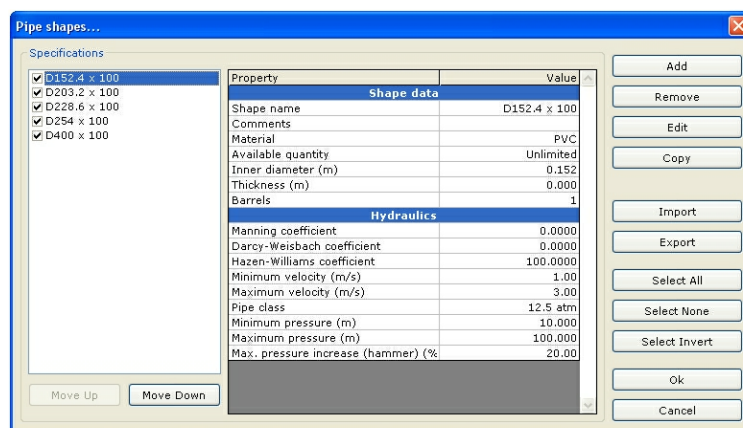
In order to enter the cross sectional properties, we need to define pipe shapes first. Select Data > Conduit shapes. Alternatively, hit **F7**. The following form appears:



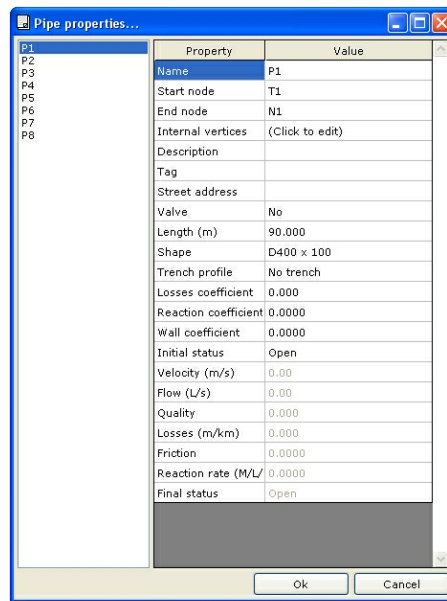
Hit **Add**. Complete the relevant data for each pipe shape, according to the following table:

Shape Name	Internal Diameter (mm)	Hazen Friction Coefficient
D400 x 100	400	100
D254 x 100	254	100
D228.6 x 100	228.6	100
D203.2 x 100	203.2	100
D152.4 x 100	152.4	100

Note that the internal diameter must be given in m. Finally, the pipe shape form may appear like this:



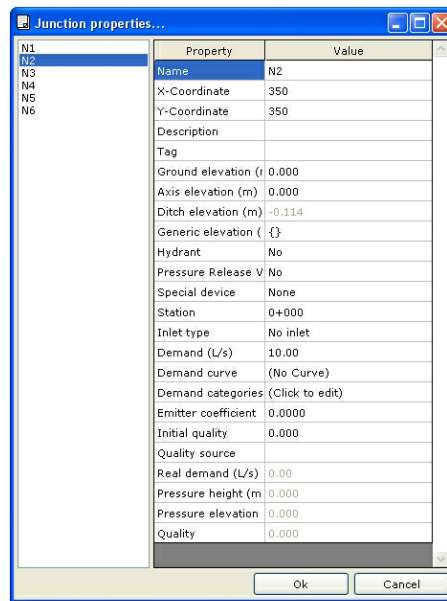
Hit **Ok** to return to plan view. Double click on pipe P1 to show its properties:



In the **Shape** field select **D400 x 100**. In the **Length** field type "90". Similarly, change the properties of the other pipes according to the data of the following table:

Pipe	Length (m)	Diameter (mm)
1	90	400
2	900	228.6
3	600	254
4	600	228.6
5	900	152.4
6	600	152.4
7	900	152.4
8	600	203.2

Double click on node N2 to show its properties:



Make the following changes:

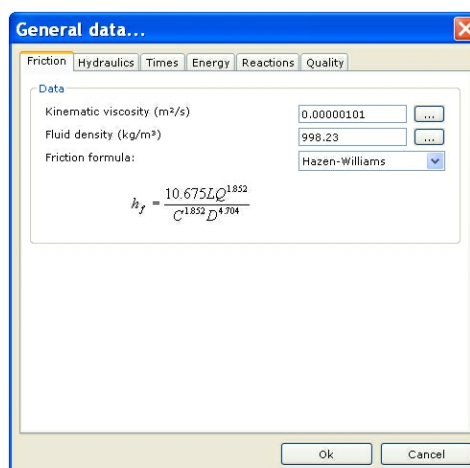
- **Demand:** Enter "10".

Select node N6 from the list on the left. Make the following changes:

- **Demand:** Enter "20".

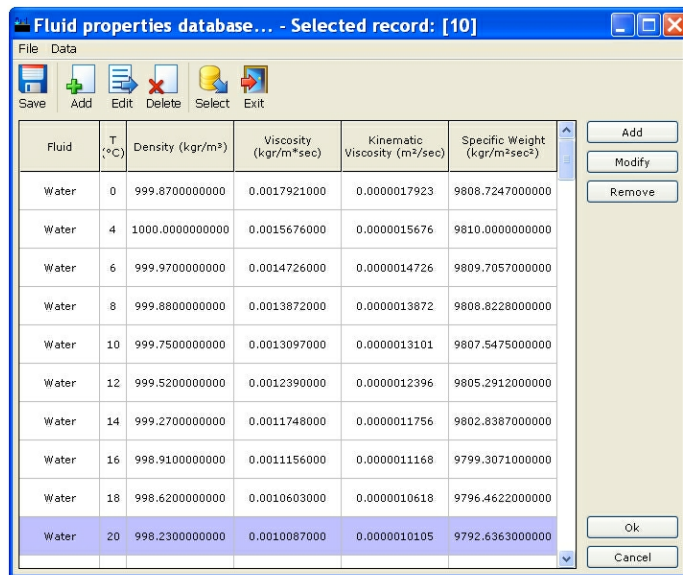
2.3 Step 03: Input Data

Select **Data > General Data > Fluid**. Select **Hazen - Williams** from the **Friction formula** drop-down list:



In the same tab, enter the **kinematic viscosity** and the **fluid density** from the

database. Click the corresponding button with the ellipses (...) on the right. The fluid database form will appear:



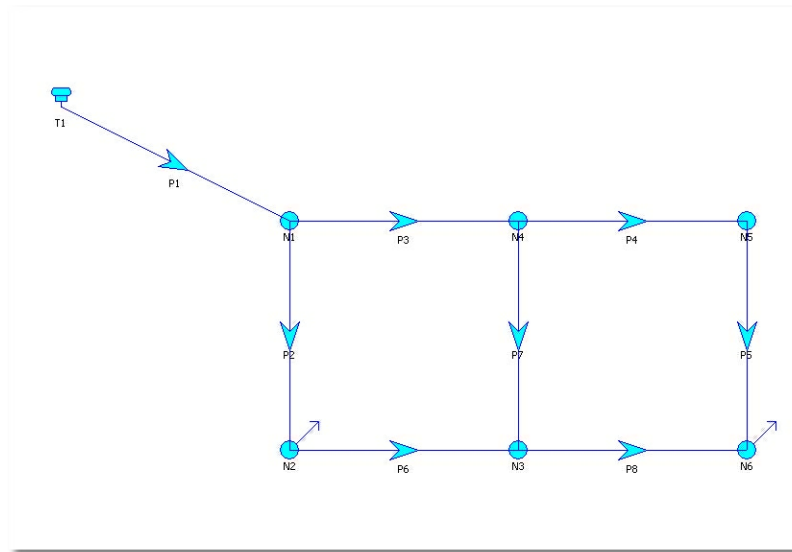
In both cases, select **Water** at **20°**. Select **Ok**.

2.4 Step 04: Calculations

In order to perform calculations, hit **F5**. The results are displayed in the following form:

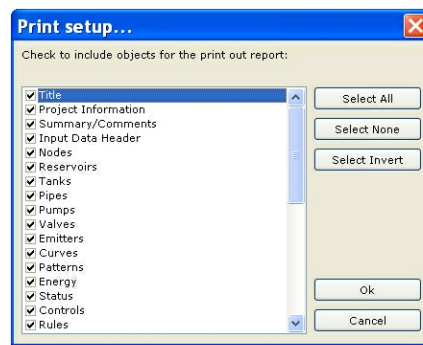
#	Name	Velocity (m/s)	Flow (L/s)	Losses (m/km)	Friction	Quality	Reaction rate (M/L/day)	Final status
1	P1	0.24	30.00	0.277	0.0381	0.000	0.0000	Open
2	P2	0.38	15.72	1.275	0.0390	0.000	0.0000	Open
3	P3	0.28	14.28	0.640	0.0401	0.000	0.0000	Open
4	P4	0.19	7.79	0.347	0.0433	0.000	0.0000	Open
5	P5	0.43	7.79	2.504	0.0411	0.000	0.0000	Open
6	P6	0.31	5.72	1.412	0.0430	0.000	0.0000	Open
7	P7	0.36	6.50	1.790	0.0422	0.000	0.0000	Open
8	P8	0.38	12.21	1.419	0.0399	0.000	0.0000	Open

Select **Ok**. The flow direction is now displayed in the main drawing:



2.5 Step 05: Printing

Optionally, you may want to print the results to a printer, to Microsoft Word or Microsoft Excel. From the **File** menu select **Print setup:**



Make the appropriate selections and select **Ok**.

From the **File** menu select **Print** or **Print To > Word** or **Print To > Excel** to invoke the corresponding print engine.

Chapter



3 Help

3.1 Technical support

Technical Support

TechnoLogismiki offers technical support 24 hours per day, 365 days per year, through the Web site where you can get information on the latest programs and services.

Support by e-mail

Please use the dedicated e-mail addresses for better customer service:

- for questions regarding sales: sales@technologismiki.com
- for questions regarding the usage of programs: support@technologismiki.com
- for any other question or comment: info@technologismiki.com

The normal response time is within two business days. If your inquiry cannot be answered via e-mail, a customer service representative will contact you via telephone.

Interactive Support

Business days, 09:00 - 17:00 Eastern European Time:

- Telephone [3 lines]: ++30-210-656-4147
- FAX: ++30-210-654-8461
- Address: 5, Imitou str, Cholargos, 15561, Athens, Greece.