# **Documentation Porteau 4**

#### ✓ User Guide

#### Inrae

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# **Graphic Interface**

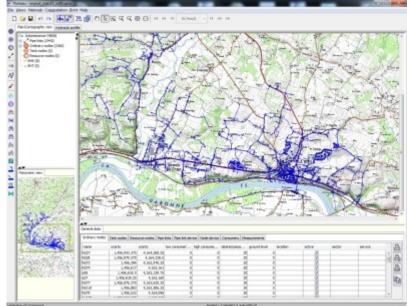
Some screenshots of this document are not updated when Porteau is updated.

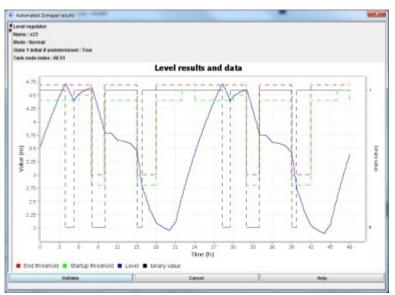
### Presentation

Porteau is a tool to **model the behaviour of looped main networks distribution or transporting water under pressure**. It provides a decision-making tool for designing and managing drinking water supply networks.

### **Graphic interface**

The graphic interface is easy tu use. It can draw the network studied with pipes et nodes for cross section. These elements are documented to represent all equipments and all hydraulics conditions to be like the realaty as possible.

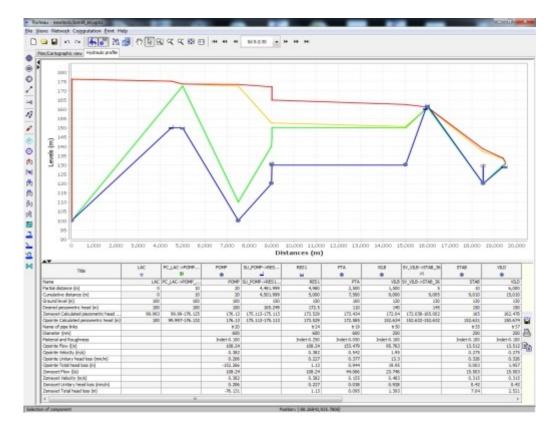




The main features are:

- network visualization of water distribution in basemap,
- viewing plans of distribution networks of drinking water,

- plotter printing sizes up to A0,
- viewing and printing the results in tabular form or on the network plan,
- viewing and printing results as hydraulic profiles,
- export data and results to a spreadsheet,
- export graphics in vector format results.

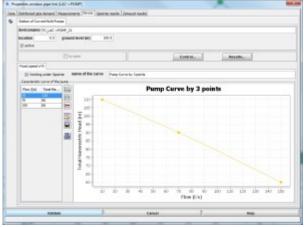


### **Module Zomayet**

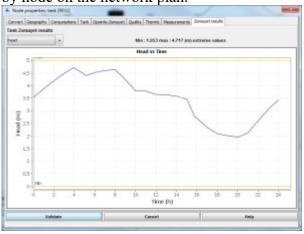
It produces a simulation over several hours (from 24 hours to 15 days) to study the hydraulic operation of a looped main network distributing or transporting water under pressure. It provides a view of the corresponding network plan.

The network may include tanks (with a choice of several filling/emptying modes), pumps, Control Valves Flow, Pressure Reducing Valve, motorised valves and pressure regulators, as well as commsumption determined by models providing a breakdown of data over the course of the day or more.

The data required includes the complete topography of the network (length, diameter and roughness of the pipes, position in the relation to the datum level of fixed flow nodes, water level, invert and overflow, surface area at the invert and overflow for fixed-load nodes) as well as the most precise distribution possible of the consumers between the different nodes or along the pipes.



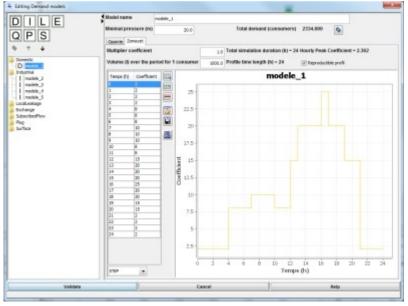
A deterministic model is used to process the data. The calculation results give the variations in the different values for each node and pipe over the day (or more): water level in the tanks, incoming and outgoing volumes, lead level of the consumption points, flows in the pipes, hours of operation of the pumps and point at which they start up and stop, working of the various components in the network etc. The results can be displayed either in the form of a table at each of the time steps (1 s to 1 hour) for the whole network or in the form curves of the different values over the course of the simulation by pipe and by node on the network plan.



#### **Module Opointe**

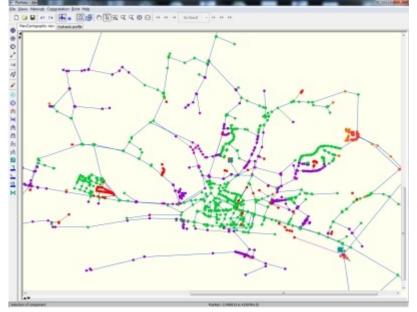
It provides to simulate the working of a looped drinking water distribution network in a peak operating mode and to view results on the diagram.

The data used is the physical data concerning the nodes and pipes (position, water level, diameters, lengths), hydraulic data (roughness, household or industrial consumptions) and the data concerning the distribution of the subscribers. The probabilities of opening and satisfaction of the subscribers on the network must also be known.



A probabilistic model is used to process the data and estimate the peak flow, as well as the pressure at each node.

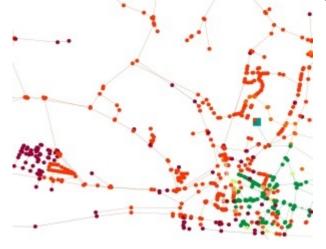
The results can be displayed either in the form of a table or on the network diagram.



### **Module Quality**

It provides to simulate changes in solute concentration throughout the network over time. Chlorine is the most common solute. It is used to ensure the bacteriological quality of the water in the network. Excessively low concentrations of chlorine can render the water unfit for consumption while excessively high levels can be unpleasant for consumers. It is therefore essential to manage chlorine injections correctly in order to optimise concentations.

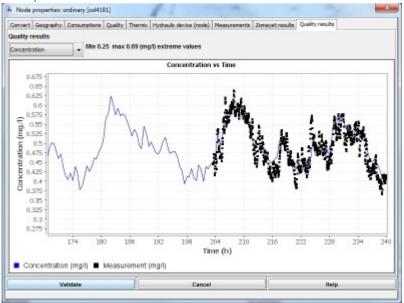
This module takes into consideration the legitimate expectations of consumers who now demand not only smooth, constant supply, but perfect water quality.



The quality calculation thus monitors the quality of the water in the network and optimises the quantities injected and/or the points where injections take place. The calculation is based on reaction kinetics and considers that mixtures at each node are perfect. Concentations are calculated on the basis of the hydraulic data obtained by the Zomayet module.

Three types of results are supplied: the concentration of a product (chlorine for example) the age of the water and the origin of the water. The results can be displayed either in the form of a table at each step for the whole network or on the network diagram, or in the form of a table over the whole simulation by

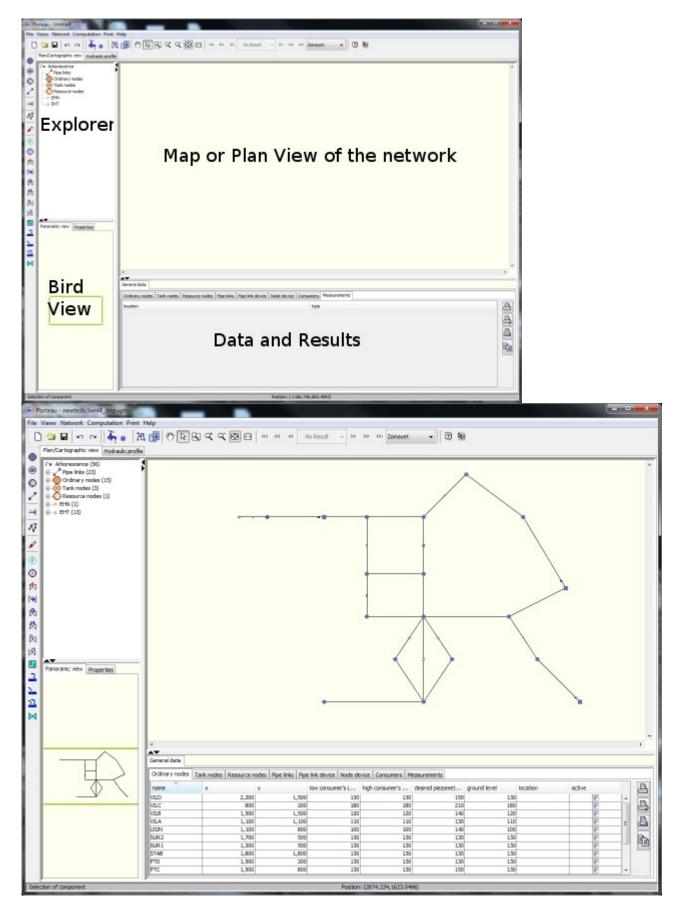
#### node, or in a form of variation curves.



#### **Module Thermic**

Latest of Porteau's modules, it allows to calculate the temperature of the water at every point in the distribution network. It is based, as module Quality, on the results of the module Zomayet and its speeds to simulate the transport of fluid and the evolution of the desired parameter. Its operation is similar to the module Quality, the main parameters are the thermal constants of exchange and the outside limit temperature for sections.

### Windows



### Menus

### File Menu

- New: to create a new project.
- Open: to open an existing project. The opening or the creation of a file automatically closes the current file opened.
- Concat: to concat the current network with an existing file.
- Save: to save the current project. Perform often to avoid losing any changes to the project.
- Save As: to save the changes into a project with a new name.
- Import a PTO file: to import an old project Porteau V2 into the new XPTO format.
- Import a SHP file: to import a Shape-coded file into the current network.
- **Export a SHP file:** to export a part of the data into the SHP format.
  - Export of Nodes : to export the nodes into the SHP format, if results are present, they are exported into the CSV format.
  - Export of Sections : to export the pipes into the SHP format, if results are present, they are exported into the CSV format.
- Import an INP file: to import an INP file into the current network.
- **Export in INP format:** to export a part of the data into INP format.
- Recents: list of 10 last opened file to reopen.
- Exit: to exit Porteau.

### View Menu

- Map:
  - Map view: show the graphic view in map view. The coordinates of the nodes define the graph cartography; pipe segments are represented as polylines if they possess intermediate vector coordinates.
  - Select background: to select an image that will become the map background.
  - **<u>Resize background:</u>** to alter the scale of the background to that of the cartography.
  - Show/hide the background: to switch on or off the background image.
- Schematic:
  - Schematic View: to show the graphic view in schematic view. The coordinates of the nodes used for the graph are the "schematics"; pipe segments are represented as straight lines even if they contain intermediary points.
- <u>Current graphical attribute</u>: to set the attributes of the graphics views: arrow direction, choice of labels, choice of thickness and color attributes by object type (ordinary node, tank, resource, pipe).
- Graphic styles: to manage the sheets of graphic styles: add, delete, copy, print a graphic style.

### **Network Menu**

- Management of materials/pipe types: to allows the management of libraries of materials and pipe types for the application and for the project, and the exchange of data between them.
  - Application library: to conserve the materials and pipe types to use them in other projects, it consists of a file stored under the user's profile: C:\Documents and Settings\User\ porteau\bib\catalogue.xml, thus by copying this file to another user's profile, it is possible to exchange lists of materials and pipe types. This can also be achieved simply by transferring a project file.
  - Project library: all materials and pipe types, these data are stored in the project file (xpto).
- Management of Sectors-Services: to allows the management of sectors and services of the network.

- **<u>Consumption models</u>**: To manage the consumption in the network with different patterns.
- <u>General</u>: To manage the data of each calculation module, the algorithm parameters, the warning levels, preferences related to the project. Certain data are saved in the project file, others in a file linked to the user profile in the file, C:\Documents and Settings\User\porteau\bib\contexte.xml.
- <u>Synthesis:</u>
  - **For the network:** report of the different objects met in the project.
  - **<u>Pipe sections:</u>** cumulative length per material/pipe type.
  - **<u>Distribution:</u>** report by consumer model.
  - <u>Supply:</u> establishes the global report of pumps, motorised valves, tanks et resources.
  - <u>**Pipe devices:**</u> report of hydraulic devices related to the pipes.
  - Node devices: report of hydraulic devices related to the nodes.
- **Pressure Indicators**: To calculate pressure indicators by sector or for all of the network with Zomayet's results.
- **Quality Section Class**: to manage quality classes for pipe segments.
- <u>Thermic Section Class</u>: to manage thermic classes for pipe segments.
- **<u>Origins Management</u>**: to manage the list of tracked nodes crossed by the path of water.
- Tools:
  - Concat link without demand: concat links with the same pipe, same diameter, same roughness, same Hazen Williams, if there is no consumption along the link, no equipment and the node between the two links is converted in vertex. A logfile of merger operations can be created, if Cancel is clicked at the request of the filename, no tracking will be made. The choice of tracking or not is permanent for the running time of Porteau. The logfile contains:

"#CONCAT";LinkName1;BeginName1;EndName1;LinkName2;BeginName2;EndName2; ErasedNodeName;NewBegin;NewEnd

CONCAT;od6->od7;od6;od7;od7->Nd74;od7;Nd74;od7;od6;Nd74

The first line gives headers of column, it is repeated every time the merger menu is selected.

CONCAT refers to concatenate two sections described by their respective names and extremities, by the name of the deleted node, and by those of the extremities of the section so created.

- Concat link with demand: concat links with the same pipe, same diameter, same roughness, same Hazen Williams, no equipment, if there is a consumption along a link, it is affected to the new link, if the node between the two links has a consumption, it is shared between the two end nodes of the new link. The node between the two links is converted in a vertex of the new link.
- **Translate coordinates**: provides a translation of nodes and vertex of the network in the diagram view or cartographic view, or both.
- <u>Concat dead ends</u>: delete nodes and links of dead end without demand, one link by calling the function, or shorten dead end with a criterion of length and/or bigger diameter of the links and concat consumptions at the root node.
- Import demand by CSV: import demand by CSV format file on nodes and/or links.
- **Import demand by SHP**: import demand by SHP format file on the nodes by projecting position of consumers on links with model and quantity affected.
- Connexity to service, connected link to sectors: calculate the number of connex subnetwork. A subnetwork is a part of the network with no connexion pipes to the rest of the network, or isolated by closed valves. If there is a tank and/or a resource node in the subnetwork, porteau can calculated it, otherwise no module can be calculated. Each subnetwork is affected to a new service. The number of adjacency links for each node is calculated and affected in a new sector. There is the same number of sectors as the maximum adjaceny of a node in the network. Be careful: All services and sectors existing before the operation are deleted.

- DEM to ground level: the ground level is interpolated with the DEM data (Digital Elevation Model). The format of DEM file read with the Geotools library may be Ascii Grid ERSI, GeoTiff, Erdas Imagine. The interpolation method of the value of the grid is calculated by Sextante library, by BicubicSpline. If a selection of nodes is done, only selected nodes may be affected by the DEM import, otherwise all the network is affected.
- **<u>Reproject the network</u>**: give a new projection to the network, editing EPSG codes (origin, destination) and change the projection system of the network, to merge with another network which one has a different projection.

### Calculate Menu

- Opointe: launch calculations with Opointe module.
- Zomayet: launch calculations with Zomayet module.
- Quality: launch calculations with Quality module.
- Thermic: launch calculations with Thermic module.

### **Print Menu**

- Print...: launch the dialog box for the choice of printing options and print the current graphics view.
- Print preview: show the print preview for the current graphic view according to the chosen options.
- Page layout: launch the dialog box for the choice of parameters for the page layout to print the current graphics view.
- Set print zone: allows the tracing of the printing zone on the current graphics view.
- Delete print zone: delete the frame of the print zone; printing will include all the space occupied by the project.

### Help Menu

- Help: opens the online help window.
- About: version of Porteau and data about system.

🗍 About Porteau		×
INRAe	Executable Developed by <u>Inrae</u> Version : 4.21.04 Freeware module Opointe module Zomayet module Qualité module Thermic	
System		
Max mem : 17179869184 octets		
Free mem : 496745640 octets		
Total mem : 671088640 octets		
Java.version : 14.0.2 JVM :OpenJDK 64-	it Server VM	
Os : Windows 10 version : 10.0 architect	ire : amd64	
User's account name : denis.gilbert		
User's home directory : C:\Users\Denis.Gil	ert	
Current directory : C:\Users\Denis.Gilbert		
Librairies used		
commons-math3-3.6.1.jar		~
batik-all-1.14.jar		
batik-anim-1.14.jar		
batik-shared-resources-1.14.jar		
xml-apis-ext-1.3.04.jar		
batik-awt-util-1.14.jar		
xmlgraphics-commons-2.6.jar		
batik-bridge-1.14.jar batik-codec-1.14.jar		~
Validate	Cancel	Help
- and to	Surroy	

The "About" dialog box allows to verify:

- the current version of Porteau
- the available memory corresponding to that set in the launch shell of Porteau by the Xmx JVM parameter
- the version of the JVM: Java
- the operating system and its 32-bit or 64-bit architecture
- the settings of the user, here the configuration files and log files are stored directly in the root of C drive in a folder named Porteau; default this folder is created in the user profile "HOME"
- A table lists the libraries used in Porteau

### The standard button toolbar

The standard button toolbar contains icons and popup lists. These buttons allow a command to be executed; whenever you point at an icon, an explanation of the associated command is displayed in an information bubble.

- 1. <sup>1</sup> File -> New: Create a new project
- 2. Sile -> Open: Open an existing project
- 3. File -> Save: Save current project
- 4. 🎦 Undo

- 5. 🎦 Redo
- 6. Appy/Remove graphic style
- 7. Show names of nodes
- 8.  $\stackrel{\text{N1}}{\bullet}$  Hide names of nodes
- 9. View -> Map -> Map view: Show Map View
- 10. A View -> Schematic -> Schematic View: Show Schematic View
- 11. Show/Hide objects legend
- 12. 💐 Search a Node or a Pipe
- 13. 🖑 Panorama
- 14. Selection
- 15. Szoom window
- 17. 🔍 Zoom out
- 18. 🔁 Show all
- 19. <sup>144</sup> Result of first time step
- 20. **\*\*** Result 1 hour before current time
- 21. <sup>44</sup> Result 1 step before current time
- 22. \*\* Result 1 step after current time
- 23. \*\* Result 1 hour after current time
- 24. Mi Result of last time step

25. 0j 0:30:0 • List of c

List of choice of results show

# The tool palette

It proposes the different objects to model in the modules.

To select a tool, click on the icon of the palette corresponding to the tool of your choice. The cursor changes appearance as a function of the selected tool.

- Create an ordinary node.
- Create a tank node.
- $\bigcirc$  Create a resource node.
- Create a pipe section.
- Solution Divide a pipe section.
- $\sqrt[4]{}$  Enter a path for the hydraulic profile.
- Create a disinfectant injector on an ordinary node.
- Create a velocity pump on a pipe.
- Create a power pump on a pipe.
- Create a motorised valve on a pipe.
- $\bowtie$  Create a check valve on a pipe.
- Create a local headloss on a pipe.
- 🕅 Create a flow control valve on a pipe.
- Create a pressure reducing valve on a pipe.
- 🕅 Create a pressure sustaining valve on a pipe.
- K Create a pressure reducing valve on a pipe.
- Create an overflow inlet of a tank node.
- Create a float valve of a tank node.
- Create a combined float valve-overflow inlet of a tank node.
- Create a valve on a pipe.

# Tables

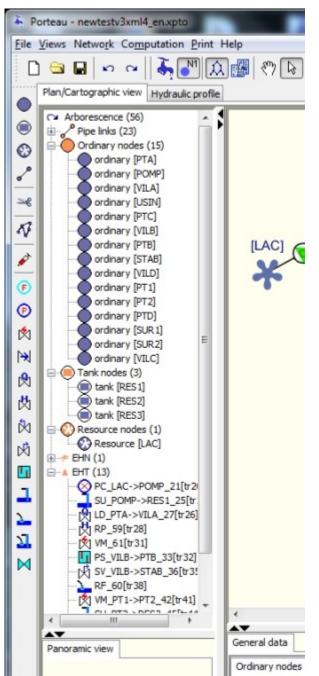
All the tables are linked with the graphic view by selection. They are printable and copiable to the

clipboard in tabulation separated format by a simple click on the button on the right side of the table. Usually they are not editable for control data reason, only dialog boxes do control.

- Data
  - Ordinaries Nodes.
  - Tank Nodes.
  - Resource Nodes.
  - Pipe Links.
  - Pipe Link Devices.
  - Node Devices.
  - Consumers: data for all consumers (node or pipe link, model, value)
  - Measurements
- Opointe Results: Same table as data except consumers and mesureaments.
- Zomayet Results: Same table as data except consumers and mesureaments.
- Quality Results: Only Ordinary and Reserve Nodes.
- Thermic Results: Only Ordinary Nodes.

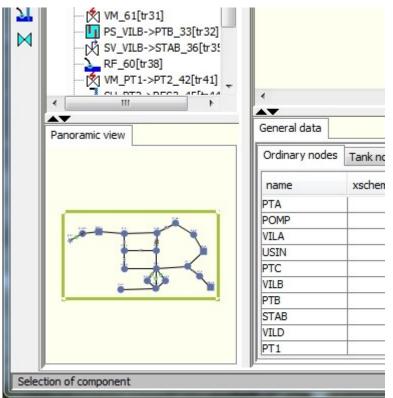
# View object in objects Explorer

Explorer uses a tree for group informations in directories. To develop a directory, click on the plus (+) caracter or double click, this action show more detailled informations. Double click on an object (node, pipe) to center the view on the object (if it's not visible) and open his dialog box.



The selected objects in the tree are also selected in all of the network views : graphic and tables if present.

### **Panorama View**



It is a small view of the entire network. You can use it to choose the visible part of the network or move the rectangle showing this part. You can change the rectangle dimensions.

### Mouse

### **Graphic View**

- Right click of the mouse in graphic view: Show an information bubble on the data of the object pointed at.
- Double left click of the mouse in graphic view: Switches to panoramic when no object selected.
   On an object: Shows the properties dialog box for the selected object .
- Double right click of the mouse in graphic view: Show a contextual menu based on the selected object.
- Wheel click: deplacement view action.
- Use of mouse wheel in graphic view: Forwards: zoom in on current view. Backwards: zoom in on current view.

### **Tabular View**

- Click left: selection of rows.
- Click right: choice of columns to display
- Click column header: increasing, then decreasing sorting column.

### **Keyboard shortcuts**

### **Creation of node/pipe segment**

In creation mode:

- Node: Shift + left click, new node and pipe section with last node of project.
- Pipe: Shift + left click for the end of the pipe section, new pipe leaves from an existing node and creates a new node serving the end of the pipe at the position of (Shift Click).
- Pipe: Ctrl + left click to edit vertex point if present. One more ctrl+left click add a new vertex, delete a selected vertex if it is at the same position as the mouse.

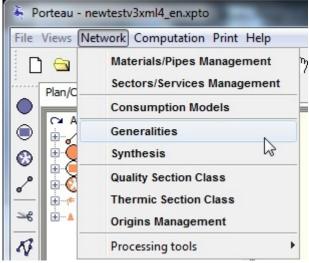
### Modifying hydraulic profile

In the editing mode of hydraulic profile:

- In the tab Profile in detail: right click on the menu of profiles: menu contextual.
- In the graphics view: tool creation of profile  $\sqrt[4]{}$ , click on the first node of the path, then from pipe section to pipe section, to go back click on the last pipe section.

# **General Data**

Select ""General" in the menu "Network" (Keyboard shortcut: <Alt>+R+G)



A dialog box containing six tabs entitled "General" is shown... The default tab is "General data." At the bottom are 3 buttons:

- **Validate** validates the data entered in the 6 tabs and exits "General" dialog box
- Cancel cancels the data entered in the 6 tabs and exits "General" dialog box without saving any values entered or modified
- Help accesses to contextual help depending on the active tab.

### General data tab

neral data	OPOINTE	ZOMAYET	QUALITY	THERMIC	Algorithmic	settings		
Identificatio								-
Network ti	tle							
Project titl	e							
Descriptio	n of proj	ect						
Sample Net	work of Po	rteau						1
Date of pro	oject cre	ation (for in	io)					
01/02/2008	15:11:37							
Author(s)	of projec	t						
Irstea								
Physical Cor Liquid den Kinematic Accelerati	sity viscosit	y (m²/s) o gravity (m	1.0 1.0E-6 (s²) 9.81	5				
Preferences	of materi	al and pipe by	default —					
Material id	entified	Unspecified					•	
Pipe identi	fied	Pipe[40.00;	44.00; <mark>1</mark> 4	1.00; 0.05	1		•	
Coefficien Law of line	t multipli ear head	to the whole r er of linear lost choser Explicit Col	head loss		d Calmon			
								=

**Identification** : **Title of Network:** enter the name of the network.**Title of Project:** enter the name of the project.**Project description:** enter the description of the project.**Project creation date:** the file creation date is shown and can be modified. **Project authors:** enter the name of the project author(s).

**Physical Constants** : **Density of liquid:** Also called the specific gravity of water. This field allows the density of water to be changed in particular cases, as a general rule the density should equal to 1.00. This value is not used in the calculations.**Kinematic viscosity (m<sup>2</sup>/s):** default value: 10-6Acceleration due to gravity (m/s<sup>2</sup>): default value of g: 9.81

**Preference of default material and pipe type : Identified material:** This is the choice of material that will be used by default when creating a new pipe section. The choice is made from a pop-up list:

Material identified	Matériau indéterminé	N	
Pipe identified	Unspecified	W.	C
	Fonte		
Parameter applicable	Indéterminé		
r and me cer applicable	Matériau indéterminé		
Coefficient multipli	PVC 6 bars		
	PVC 10 bars		
	PVC 16 bars		

from the materials already created. The material **"unspecified"** is proposed at start up to avoid total blockage. Note, the name of the material has no effect on the calculations, it is only for information. The

button in the right allows access to the "management of materials" dialog box to add one. Pipe type identified: From the list of pipe types associated with the material chosen in the previous step, choose a pipe type from the pop-up list:

Preferences of materi	al and pipe by default-			- 2
Material identified	Matériau indéterminé		•	
Pipe identified	Tuyau[40.00; 44.00; 141.00; 0.05]	N	-	
	Tuyau[40.00; 44.00; 141.00; 0.05]	N3	<u>_</u>	
Parameter applicable	Tuyau[40.00; 44.00; 141.00; 0.05] Tuyau[50.00; 55.00; 141.00; 0.05]		=	
Coefficient multipli	Tuyau[60.00; 66.00; 141.00; 0.05]			
	Tuyau[80.00; 88.00; 141.00; 0.05]			
	Tuyau[97.40; 105.20; 141.00; 0.05]			
	Tuyau[100.00; 110.00; 141.00; 0.05]			
	Tuyau[112.40; 121.40; 141.00; 0.05]			
	Tuyau[120.00; 132.00; 141.00; 0.05]		-	

that will be proposed by default during the creation of a new pipe section. The button  $\square$  to the right allows access to the **"modification of a material"** dialog box to add one.

**Parameter for the entire network** : **Multiplier for linear headloss:** value applied uniformly to all pipes of the network multiplying the linear headloss of the pipe.

The law of the headloss used for Opointe and Zomayet calculations is chosen among three possibilities: Hazen-Williams, Colebrook and Lechapt-Calmon. Law of linear head loss chosen:

- Hazen-Williams
- Colebrook explicite
- Lechapt-Calmon

### **Opointe tab**

5 Generalities	2004	0184		
General data OPOIN	TE ZOMAYET	QUALITY THERMIC	Algorithmic settings	
Proba Comm Wish Alert Minir Maxi	ed standard p hresholds conce num velocity ( mum velocity (	Opointe action 0.99 inte and Zomayet ressure ( m ) 20.0 rning Zomayet and Opc m/s ) 0.2 ( m/s ) 1.5	pinte	
	num pressure			
Maxi	mum pressure	e (m) 100.	.0	
Check	the box for rea	ading / writing of Op	ointe results: 🔲	
Validate		Cancel	Help	

**Preference specific to Opointe : Probability of satisfaction:** The probability of satisfaction of consumers: enter a number between 0.95 and 0.99 ; advised value: 0.99

**Data common to Opointe and Zomayet : Desired piezometric head (m):** By default it is the minimum pressure to be present at the consumer nodes. If inferior pressures are encountered, an error message is displayed at the end of the calculation. It corresponds to the desired pressure to supply all consumers; a value of 20m is generally considered acceptable. This value will be added to the elevation, during the specification of a node, to give the desired piezometric head. This value must be between 1 and 250m.

**Threshold alarms common to Opointe and Zomayet** : **Minimum velocity (m/s):** The velocity of water circulating in the pipes must not be less than this minimum velocity. If this occurs, an error message will appear at the end of the calculations for the Opointe and Zomayet modules.**Maximum velocity(m/s):** The velocity of water circulating in the pipes must not be greater than this maximum velocity. If this occurs, an error message will appear at the end of the calculations. It is advised to use a maximum value corresponding to the limits of the network, generally between 1.5 and 3 m/s.**Minimum Pressure (m):** The value of pressure at an ordinary node for which the calculated pressure should be superior. An error message is shown if this minimum is not achieved.**Maximum Pressure (m):** The value of pressure at an ordinary node for should be inferior. An error message is shown if this minimum is not achieved.**Maximum Pressure (m):** The value of pressure at an ordinary node for should be inferior. An error message is shown if this minimum is not achieved.**Maximum Pressure (m):** The value of pressure at an ordinary node for should be inferior. An error message is shown if this minimum is not achieved.**Maximum Pressure (m):** The value of pressure at an ordinary node for which the calculated pressure should be inferior. An error message is shown if this minimum is not achieved.**Maximum Pressure (m):** The value of pressure at an ordinary node for which the calculated pressure should be inferior. An error message is shown if this maximum is exceeded.

A check box allows results from Opointe to be saved and reread if checked.

### Zomayet tab

Generalities	010	4480	x
General data OPOINTE ZOMAYET C	UALITY THERM	IIC Algorithmic settings	
Common data for Opointe and Zoma Wished standard pressure ( m			
Common data for Zomayet and Qua	ality —	in the second second	
Time of start of simulation		0 h 0	min
Duration of the simulation ( h )		24	
Time step interval for Zomayet	t simulation ( s	) 300	
Alert thresholds concerning Zomaye	et and Opointe —		
Minimum velocity ( m/s )	0.2		
Maximum velocity ( m/s )	1.5		
Minimum pressure ( m )	0.0		
Maximum pressure ( m )	100.0		
Check the box for reading / writi	ing of Zomayet	results: 🕅	
Validate	Cancel	Hel	p

**Data common to Opointe and Zomayet** : "**Desired piezometric head (m)**": By default it is the minimum pressure to be present at the consumer nodes. If inferior pressures are encountered, an error message is displayed at the end of the calculation. It corresponds to the desired pressure to supply all consumers; a value of 20m is generally considered acceptable. This value will be added to the elevation, during the specification of a node, to give the desired piezometric head. This value must be between 1 and 250m.

**Data common to Zomayet and Quality** : "**Simulation duration (h)**": enter a value > 0 in number of hours (maximum 500 h)."Time of beginning of simulation": enter two values, the hour and if there is place the minutes."**Time step for Zomayet simulation (min)**": enter value between 1 and 60. In order to limit the derivatives during the calculation, notably for the tanks, it is recommended to use 5 minutes. However, in the case of a complex network, 5 minutes may lead to quite long calculation times. Usually 12 or 15 minutes provides a good compromise during initial calculations.

#### Threshold alarms common to Opointe and Zomayet: cf Opointe Tab :

A check box allows results from Zomayet to be saved and reread if checked.

### Quality tab

Generalities	x
General data OPOINTE ZOMAYET QUALITY THERMIC Algorithmic settings	
Common data for Zomayet and Quality	
Time of start of simulation	
Duration of the simulation ( h ) 24	
Time step interval for Zomayet simulation (s) 300	
Initialisation of Concentration at ordinary nodes	
by a fixed value at     0.0 (mg/l)	
by a permanent calculation	
Parameters of Saving	
Time of start of backup 0.0	
Saving time (in hours) 24.0	
No backup time in seconds 300	
Parameter of Calculating	
Calculating time step in seconds 60	
Kinetic parameters for pipe links	
Default kinetic constant for pipe links         0.0         Default kinetic constant for tanks         0.0           Default kinetic order for pipe links         1.0         Default kinetic order for tanks         1.0	
Increase the residence time	
Warning levels concerning Quality	
Minimum concentration ( mg/l ) 0.0	
Maximum concentration ( mg/l ) 100.0	
Maximum average age ( h ) 120.0	
Check the box for reading / writing of Quality results:	
Be careful : this box can be marked only if Zomayet box is it also	
Cancel Help	

**Concentration at ordinary nodes** : "**Initialisation of the concentration at ordinary nodes**": Choose the initialisation mode. If the first button is selected it is necessary to enter "**Initial ordinary node concentration**"

**Backup Parameters** : **Duration of simulation in hours:** duration of backup quality results, it's not interesting to save the beginning of the simulation which just intialize the values in the network ; but they can use a large memory space. **Time interval for simulation in seconds:** if quality values have small variation, it can save memory to save results with a larger time step than hydraulics. **Time of beginning of simulation:** link to the duration to save only interesting time steps.

**Calculating Parameters** : **Time interval of calculation in seconds:** a time interval used to calculate Quality parameters - it must be compatible with the time interval of simulation in backup (inferior or equal) and with the time interval of Zomayet (inferior or equal).

**Kinetic Parameters for pipes : Default kinetic constant for pipes:** default value of constant for pipes at creation. **Default kinetic order for pipes:** default value of order for pipes at creation.

**Kinetic Parameters for tank nodes** : **Default kinetic constant for tank nodes**: default value of constant for tank at creation. **Default kinetic order for tank nodes**: default value of order for tank at creation.

**Threshold alarms for quality** : **Minimum Concentration (mg/l):** lower value below which the concentration must not fall. If this appear, a fault message is generated by PostTreatment of Quality Module. **Maximum Concentration (mg/l):** upper value above which the concentration must not climb. If this appear, a fault message is generated by PostTreatment of Quality Module. **Maximum residence time** (h): upper value above which the residence time must not climb. If this appear, a fault message is generated by PostTreatment of Quality Module. **Maximum residence time** (h): upper value above which the residence time must not climb. If this appear, a fault message is generated by PostTreatment of Quality Module.

A check box allows results from Quality to be saved and reread if checked.

### Thermic tab

Generalities
General data OPOINTE ZOMAYET QUALITY THERMIC Algorithmic settings
Common data for Zomayet and Thermic
Time of start of simulation
Duration of the simulation (h)     24       Time step interval for Zomayet simulation (s)     300
Initialisation of Temperature at ordinary nodes
by a permanent calculation
Parameters of Saving
Time of start of backup 0.0
Saving time (in hours)     24.0       Backup time in seconds     300
Parameters of Calculating Calculating time step in seconds 300
Thermic parameters for pipe links
Default exchange constant for pipe links 0.0
Default extern limit temperature for pipe links 1.0
Warning levels concerning Thermic
Minimum temperature ( °C ) 0.0
Maximum temperature ( °C ) 100.0
Validate Cancel Help
champ Duration of the simulation ( h )

**Concentration at ordinary nodes** : **Choose the initialisation mode:** if the first button is checked, indicate the "Ordinary initial temperature".

**Backup Parameters** : **Duration of simulation in hours:** duration of backup thermic results - it is not worth saving the first time intervals of the simulation used to initialize the calculation, because they can take a large amount of memory. **Time interval for simulation in seconds:** if values have small variation, it can save memory to retain a part of results stored in constant time. **Time of beginning of simulation:** to connect with the time interval for simulation, only interesting time intervals.

**Calculating Parameters** : **Time interval of calculation in seconds:** a time interval used to calculate Thermic parameters - it must be compatible with the time interval of simulation in backup (inferior or equal) and with the time interval of Zomayet (inferior or equal).

**Thermic Parameters for pipes : Default exchange constant for pipes:** default value of thermic exchange constant with the outside for pipes. **Default limit exchange temperature for pipes:** default value of the outside temperature used by limit allocated to the pipe.

**Threshold alarms for Thermic : Minimal temperature (°C):** value below which the temperature should not go down. If it occurs, a message of anomaly is registered in the Post-treatment of the calculation for the Thermic module. **Maximal temperature (°C):** value above which the temperature should not go up. If it occurs, a message of anomaly is registered in the Post-treatment of the calculation for the Thermic module.

#### Algorithm Parameters tab

values to be restored if required.

Generalities	2024	1.05	14.4		x
General data OPOINT	E ZOMAYET	QUALITY	THERMIC	Algorithmic settings	
Be careful: to mod Maximum numb Precision for the	er of stepwis	se correcti	ons	FOR THE EXPERTS	
Flow value (in L/s) of overflow for the penalty1.0E-4Penalty in m H2O corresponding to previous flow15.0					
Large number 1000000.0					
Level of tracing messages     0       Maximum number of iterations     5000					
Maximum number of days     15       Reload the default algorithmic configuration settings					
Reserved for "Quality" experts Maximum number of internal points 1000					
Validate		Cancel		Help	
hamp Duration of the sin	nulation ( h )		61075		

**Remember** : **Be careful:** modification of these data is reserved for experts. For normal use, conserve the data proposed by default.

**Data for expert only**: **Maximum number of descending stepwise corrections:** default value 10. Between 0 and 1000. **Energy balance precision in mH2O:** default value 0.01. Between 0.01 and 0.0001. **Penalty threshold flow in l/s:** default value 1.0E-4. Between 0.01 and 0.00001. **Penalty in mH2O corresponding to previous flow:** default value 15.0. Between 15.0 and 35.0. **Infinity:** default value 1 000 000. **Level of message tracking:** by default 0, a higher value (maximum 99) allows more information to be available in the tracking files on the iterations of the calculation. This is to be used when there is a doubt in the development of the results. **Maximum number of iterations:** default value 5 000. Between 1 and 30 000. **Maximum number of days:** default value 15. Between 1 and 100.

At the bottom of the screen, the button Reload the default algorithmic configuration settings allows

allows the default

**Data reserved for Quality experts** : **Maximum number of internal points:** number of calculation points on a pipe through discretized for the calculation. Default 1000, between 1 and 100 000.

# **Graphic Styles**

This dialog box is accessible by selecting the menu "Views", sub-menu "Graphic styles".

F Por	teau - newtestv3xml4_step.xpto	5
File Vi	iews Network Computation Print	t F
	Map 🕨	λ
:	Plan 🕨	5
	Current Graphic Parameter	
	Graph Styles	P
0	😑 🔴 Ordinary nodes (15) 😾 📗	

The following dialog box allows the management of "graphic style sheets associated with Porteau.

	✓ Zomayet		
Ordinary	Tank	Resource	Pipe link
Labels 1-None 2-None 3-None	Labels 1-None 2-None 3-None	Labels 1-None 2-None 3-None	Harrow: Without Labels 1-None 2-None
Colour PressureOpointe	Colour GroundLevel	Colour GroundLevel	Colour Material
Threshold Colour	Thickness GroundLevel Threshold Thickness	Threshold Colour 0 Thickness GroundLevel Threshold Thickness	Threshold Colour
Threshold Thickness 20 12 25 6	1 120 20 30	0  120	Thickness DiameterLocal Threshold Thickness 0 16
Validate		Cancel	Help

The top of the dialog box contains a line allowing this management.

4

✓ Zomayet

- + •
- The first check box **I** on the left allows the style chosen in the list to the right to become • "active".
- The scroll box allows the present styles to be chosen for manipulation (printing, visualisation in • the space below, choice of active style etc.).
- The 🖃 button allows new styles to be added to the list by copying the chosen style in the list. •
- To create a new style and make it active, click the button 🖃 then check the box situated before • the scroll box.

- The 🗔 button allows the selected style to be deleted, as long as it is not the active style (the one with the checked box before the scroll list).
- The button allows the style to be printed on the system default printer with a presentation similar to the dialog box.
  - x Printing preview Width of page Close -Graph style Zomayet
- The <sup>b</sup> butto<u>n performs a print preview like below</u>.

- This allows visualisation at different zoom levels and to modify the printer parameters if necessary.
- The  $\blacksquare$  button allows to save the printable style sheet in bitmap or vector formats.

# **Active Graphic Style**

This dialog box is accessible by selecting the menu "Views", sub-menu "Active graphic attribute".

F Port	teau - newtestv3xml4_step.xpto
File Vi	ews Network Computation Print H
	Map → 入
÷	Plan
	Current Graphic Parameter
	Graph Styles
	in A Ordinary nodes (15)

The following dialog box allows the management of all the attributes of the graphical representation of the network.

▼ 1 ▲ 2 - ♥ None ▼ 1 ▲
▼ 1 ×
Thickness
PressureOpointe
Min: -Infinity
Threshold Thickness
20 120
30 30
Max: Infinity

The field "Style name" allows a style to be identified by a chain of characters. The field "Arrow for pipe" allows the selection of the type of arrow design for the pipes.

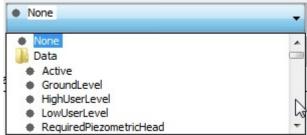


# The scroll box gives the list of possibilities : Zomayet instantaneous flow

Graph: the arrow is in the direction the pipe was created (start node towards end node). Opointe flow: the arrow is in the flow direction calculated by Opointe if such a result is present for the pipe, otherwise no arrow is drawn. Instant Zomayet flow: the arrow is in the flow direction calculated by Zomayet for the time step (Instant) selected in the list of time steps des pas de temps if such a result is present for the pipe, otherwise no arrow is drawn.

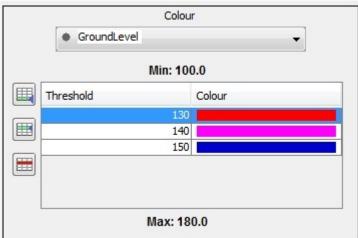
A tab allows the choice of objects to be parameterised: be it ordinary nodes, tank nodes, reservoir nodes, resource nodes or pipe segments. The parameterisation functions identically whichever tab is selected. On the graphic view, it is possible to write labels next to objects; three labels in addition to the name are possible for the nodes and two for the pipe segments. Both Schematic and Map views are illustrated identically. The choice of attribute written on the label is made by selecting from a scroll box for the type of object illustrated (pressure for node, flowrate for a pipe etc.).

This list shows the first choices for an ordinary node. The choices are organized by category :



RequiredPiezometricHead data, Calculated data, Opointe results, Instant Zomayet results, Results report for the Zomayet simulation, Instant Quality results, Results report for the Quality simulation.

For all the labels, the choice of number of decimal places 1 allows values to be shown with the desired precision. These fields are present for all the labels but only effective for numerical values. To increase the number of decimal places, click on the up arrow; to decrease click on the down arrow. The choice of colors for the attribute is also achieved through a scroll box.



When the attribute is chosen, its extreme values across the entire network are shown - the minimum (Min) value above and the maximum (Max) value below the table of parameters. Three buttons allow a line to be added to the bottom of the table  $\blacksquare$ , a line to be inserted above the current selected line  $\blacksquare$ , and the deletion of the selected line  $\blacksquare$ .

Each line becomes a limit with a corresponding colour such that if the attribute is <u>greater than</u> (>) the limit (and less than or equal to the next limit) the object is the colour of the line. If no colour is imposed by the values lower than tht of the first line, the objects will have the default colour (navy blue). The principal behind the thickness parameterisation is the same as for the colors.

Thickne	SS	
Service	•	
Min: 0.	0	
Threshold	Thickness	
-0.1		1
1.9		2
2		3
Max: 3	.0	-

This illustrates the choice of thickness attributes for node services. As the service is chosen from a scroll list of nodes (or pipes), the parameterisation is made by the correspondence between the service and its rank in the list of services. Here, the smallest size (1) is applied to the service node with rank 0, the first in the list of services. If a node does not have a service, it keeps the default size (30).



The choice of colors above shows how active (green) and inactive (red) attributes can be displayed.

To apply current style, click the button 5 in the standard button bar. If the button is on when style is modified, put it off and on by clicking **twice** on 5.

### Lists of attributes for styling

Tables list attributes which can be used as label for a node or a link or be used as variable for color and/or thickness.

If the variable is boolean, for calculate the color or thickness true = 1, false = 0.

If the variable is a link in a table (like material, sector), the rank in the table is used, the first object of a table has the rank 0.

### Attributes Ordinary Node

Data	
Active	True if active / false if inactive
GroundLevel	Value of ground level
HighUserLevel	Value of high user level
LowUserLevel	Value of low user level
RequiredPiezometricHead	Value of required piezometric head
Sector	Name of sector
Service	Name of service

Calculated	
SumDomesticUsers	Total of all users with type Domestic
SumIndustrialFlows	Total of flows with type Industrial
PeakFlowDuration	Peak Flow calculated on node for the duration of Zomayet's simulation
DomesticVolumeDuration	Volume consumed by domestic users for the duration of Zomayet's simulation
IndustrialVolumeDuration	Volume consumed by industrial consumers for the duration of Zomayet's simulation
VolumeDuration	Volume consumed for the duration of Zomayet's simulation
DifferenceHeadDesiredCalculated	Difference between the minimum of the simulated head and the local desired head

Opointe	
PiezometricHeadOpointe	Piezometric head calculated by Opointe
PressureOpointe	Pressure calculated by Opointe
PressureOpointeLow	Pressure for lower user calculated by Opointe
PressureOpointeHigh	Pressure for higher user calculated by Opointe
ExcessPressureOpointe	Excess of piezometric head between desired and calculated by Opointe

Zomayet Time Step	
PiezometricHeadTimeStep	Piezometric head at Zomayet Time Step
PressureTimeStep	Pressure at Zomayet Time Step
PressureTimeStepLow	Lower user Pressure at Zomayet Time Step
PressureTimeStepHigh	Higher user Pressure at Zomayet Time Step
ExcessPressureTimeStep	Difference between desired piezometric and calculated at Zomayet Time Step

Zomayet Duration	
PiezometricHeadMinDuration	Minimal Piezometric head reached for duration of Zomayet
PiezometricHeadMaxDuration	Maximal Piezometric head reached for duration of Zomayet
ExcessPressureMinDuration	Minimal Difference reached between desired piezometric head and calculated for duration of Zomayet
PressureMinDuration	Minimal Pressure reached for duration of Zomayet
PressureMaxDuration	Maximal Pressure reached for duration of Zomayet
PressureMinDurationUserHigh	Minimal Pressure reached on higher user for duration of Zomayet
PressureMaxDurationUserLow	Maximal Pression reached on lower user for duration of Zomayet

Quality Time Step	
Concentration	Concentration at Quality Time Step observed
AgeAverage	Average Age at Quality Time Step
AgeMinimum	Minimum Age at Quality Time Step
AgeMaximum	Maximum Age at Quality Time Step

Quality Duration		
ConcentrationMinimal	Minimal Concentration reached for duration of Quality saved	
ConcentrationMaximal	Maximal Concentration reached for duration of Quality saved	
AgeAverageMininimal	Minimal Average Age for duration of Quality saved	
AgeAverageMaximal	Maximal Average Age reached for duration of Quality saved	
AgeMinimumMinimal	Minimal Age Minimum reached for duration of Quality saved	
AgeMinimumMaximal	Maximal Age Minimum reached for duration of Quality saved	
AgeMaximumMinimal	Minimal Age Maximum reached for duration of Quality saved	
AgeMaximumMaximal	Maximal Age Maximum reached for duration of Quality saved	

Thermic Time Step	
	Temperature at Thermic Time Step observed

Thermic Duration	
	Minimal temperature reached for duration of Thermic saved
	Maximal Temperature reached for duration of Thermic saved

### Attributes Tank Node

Data		
Active	True if ative / False if inactive	
GroundLevel	Value of ground level	
AchievementD ate	Achievement Date	
BaseLevel	Value of Base Level	
EscapeLevel	Value of Escape Level	
MinimumHead	Minimum Level of water in the tank	
MaximumHead	Maximum Level of water in the tank	
Volume	Volume calculated of the tank	
Sector	Name of the sector	
Service	Name of the service	

Calculated		
SumDomesticUsers	Total of all users with type Domestic	
SumIndustrialFlows	Cotal of flows with type Industrial	
PeakFlowDuration	Peak Flow calculated on node for the duration of Zomayet's simulation	
	Volume consumed by domestic users for the duration of Zomayet's simulation	
	Volume consumed by industrial consumers for the duration of Zomayet's simulation	
VolumeDuration	Volume consumed for the duration of Zomayet's simulation	

Opointe	
HeadOpointe	Water level for Opointe

Zomayet Time Step	
HeadTimeStep	Water level at the beginning of the observed time step of Zomayet
PiezometricTimeStep	Piezometric head at the beginning of the observed time step of Zomayet

Zomayet Duration	
HeadMinDuration	Minimum level reached for duration of Zomayet
HeadMaxDuration	Maximum level reached for duration of Zomayet
VolumeUsefulDuration	Useful Volume calculated on the duration of Zomayet
VolumeEnteringDuration	Total entering Volume calculated on the duration of Zomayet
VolumeLeavingDuration	Total leaving Volume calculated on the duration of Zomayet
VolumeOverflowDuration	Total overflowed Volume on the duration of Zomayet

Quality Time Step	
Concentration	Concentration at Quality time step
AgeAverage	Average Age at Quality time step
AgeMinimum	Minimum Age at Quality time step
AgeMaximum	Maximum Age at Quality time step

Thermic Time Step	
Temperature	Temperature imposed at Thermic time step

#### Attributes Resource Node

Data	
Active	True if active / false if inactive
GroundLevel	Value of ground level
AchievementDate	Achievement Date
MaximumAuthorisedFlow	Maximum Instantaneous Authorised Flow
DailyVolumeMaximumAuthorised	Maximum Authorised Daily Volume
Sector	Name of the sector
Service	Name of the service

Opointe	
HeadOpointe	Head of water for Opointe

Zomayet Time Step	
Head LimeSten	Head of water at observed time step for Zomayet

\_

Zomayet Duration			
VolumeEnteringDuration	Total entering Volume calculated on the duration of Zomayet		
VolumeLeavingDuration Total leaving Volume calculated on the duration of Zomayet		eaving Volume calculated on the duration of Zomayet	
Quality Time Step			
Concentration		Average of Ending nodes Concentration at Quality Time Step	
AgeAverage		Average of Ending nodes Average Age at Quality Time Step	
AgeMinimum		Average of Ending nodes Minimum Age at Quality Time Step	
AgeMaximum		Average of Ending nodes Maximum Age at Quality Time Step	

Quality Time Step	]
Concentration	Concentration at observed Quality time step

Thermic Time Step	l
Temperature	Temperature imposed at Thermic time step

## Attributes Pipe Link

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Data	
Material	Material of the pipe
Length	Length
DiameterLocal	Local Diameter of the pipe link
HazenWilliamsLocal	Local Hazen Williams Coefficient of the pipe link
RoughnessLocal	Local Roughness of the pipe link
DiameterIntPipe	Interior Diameter of the pipe
DiameterExtPipe	Exterior Diameter of the pipe
HazenPipe	Hazen Coefficient of the pipe
RoughnessPipe	Roughness of the pipe
KineticClass	Kinetic Class of the pipe link
OrderKinetic	Ordre of the kinetic class
ConstantKinetic	Constant of the kinetic class
AchievementDate	Achievement Date
Sector	Name of the sector
Service	Name of the service

Calculated	
SumDomesticUsers	Total of all users with type Domestic
DomesticVolumeDuration	Volume consumed by domestic users for the duration of Zomayet's simulation
DifferenceLocalHazenPipe	Difference between local and pipe Hazen- Williams coefficients
DifferenceRoughnessLocalPipe	Difference between local and pipe Roughness coefficients
DifferenceDiameterLocalPipe	Difference between local and pipe interior diameter

Opointe	
FlowOpointe	Flow calculated by Opointe
VelocityOpointe	Velocity calculated by Opointe
UnitaryHeadLossOpointe	Unitary Head Loss calculated by Opointe
TotalHeadLossOpointe	Sum of Head Loss calculated by Opointe
Abs(FlowOpointe)	Absolute value of Flow calculated by Opointe
Abs(VelocityOpointe)	Absolute value of Velocity calculated by Opointe
Abs(UnitaryHeadLossOpointe)	Absolute value of Unitary Head Loss calculated by Opointe
Abs(TotalHeadLossOpointe)	Absolute value of Sum of Head Loss calculated by Opointe

Zomayet Time Step	
FlowTimeStep	Flow at observed Zomayet time step
VelocityTimeStep	Velocity at observed Zomayet time step
UnitaryHeadLossTimeStep	Unitary Head Loss at observed Zomayet time step
TotalHeadLossTimeStep	Sum of Head Loss at observed Zomayet time step
Abs(FlowTimeStep)	Absolute value of Flow at observed Zomayet time step
Abs(VelocityTimeStep)	Absolute value of Velocity at observed Zomayet time step
Abs(UnitaryHeadLossTimeStep)	Absolute value of Unitary Head Loss at observed Zomayet time step
Abs(TotalHeadLossTimeStep)	Absolute value of Sum of Head Loss at observed Zomayet time step

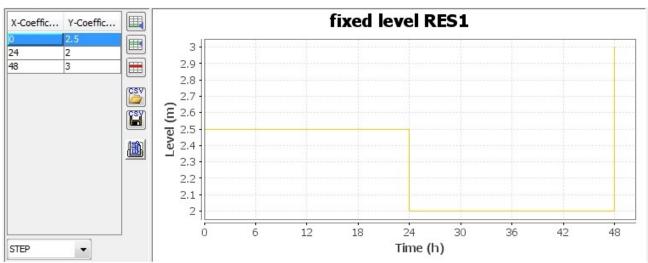
Zomayet Duration	
PeakFlowDuration	Peak Flow reached for the duration of Zomayet simulation
PeakVelocityDuration	Peak Velocity reached for the duration of Zomayet simulation
UnitaryHeadLossMaxDuration	Maximum Unitaru head Loss reached for the duration of Zomayet simulation
TotalHeadLossMaxDuration	Sum of Head Loss for the duration of Zomayet simulation
Abs(PeakFlowDuration)	Absolute of Peak Flow reached for the duration of Zomayet simulation
Abs(PeakVelocityDuration)	Absolute value of Peak Velocity reached for the duration of Zomayet simulation
Abs(UnitaryHeadLossMaxDur ation)	Absolute value of Unitary Head Loss reached for the duration of Zomayet simulation
Abs(TotalHeadLossMaxDurati on)	Absolute value of Sum of Head Loss for the duration of Zomayet simulation
SumPositiveFlowDuration	Sum of volume transported in the same direction as the pipe link the duration of Zomayet simulation
SumNegativeFlowDuration	Sum of Volume transported in the opposite direction of the pipe link for the duration of Zomayet simulation
BalanceFlowDuration	Balance of the two volumes above

Special	
AverageNodesValues	Average Value choose for color parameter of ordinary ending nodes

## Profil with tables and graphs

A number of dialog boxes require the entering of graphs that are functions of time or other abscissa. A "panel" allows curves to be constructed, either point-by-point or by importing a csv file. It is composed of 2 data entry fields: one text and one a scrolling list. Below the space is split into four vertical sections, from left to right:

- The table of values
- A button bar for the management of the table
- The graph representing the entered values and their interpolation

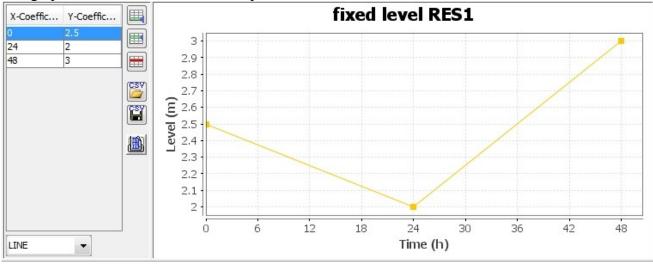


• The field here named "Imposed level" allows a name to be given to the profile, its name varies with the type of data entered (level, head, concentration etc.).

STEP	*
STEP	
LINE	
SPLINE	

- The scroll list PARABOLIC allows the type of interpolation between the entered points to be chosen.
- STEP the value remains constant between two points.
- LINE the value is interpolated linearly between two points.
- SPLINE a smoothing function passing by all points is applied.
- PARABOLIC a parabola is calculated from three points, this function is **required** for the graph of pumps with three points.

The graphic below shows a LINE interpolation.



## **Description of the Table**

Moving within the cells can either be done by the mouse or the keyboard. <TAB> and <SHIFT + TAB> moves from cell to cell. The up and down arrows allow moving from line to line.

- 📖 adds a line at the end of the table
- $\blacksquare$  adds a line above the selected line in the table
- deletes the selected line in the table
- 🗳 imports a table in CSV format
- exports the entered table in CSV format
- allows print preview of table

## Chart

The graph represents the interpolated data from the table. A right-click on the chart area shows the pop-up menu.

<	Navigation Selection			
	Marker			•
	Zoom			÷
	Reset			•
	Type of plot			+
-	Properties			
	Сору			
	Print			
2	Save as			•
	legend			+
-	Visibility graphs			
-	Coefficient			
2001	100/1108	IODIN .	T	0.1

A checkbox allows to determine the current function, here **Navigation** allows to move the area of points in the screen in all the directions by clicking and holding the left mouse button.



The function **Selection** allows to know by left-click at a point its coordinates.

The function Marker is used to draw a horizontal and/or vertical guideline following the mouse.

The function **Zoom** by clicking and holding the left mouse button allows to zoom either along the axis of abscissa, or along the axis of ordinates, or by drawing a rectangle defining the area to be zoomed.

The function **Reset** allows to return to the original zoom, either on an axis, or on both.

The function **Plot type** allows to change the plot shape of the curve, it is advised to leave the selected mode corresponding to the type of curve (Step, Line, ...).

The function **Properties...** opens the Properties dialog of the plot area properties to change the background or the color of the axes, for example.

The function **Copy** allows to copy the graph to the clipboard in bitmap mode.

The function **Print...** starts the Print dialog of the graphic area with choice of paper and margin size. The function **Save as...** allows to save the graphic area to a file in PNG, SVG, PDF, EPS and JPG format. The function **Legend** allows to show or hide the legend. The function **Graphics visibility** allows, for leftclick on the color representing a series, to show or hide it. This function is not active in all graphics.

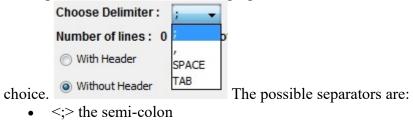
### Import of a table in CSV format

import a table in CSV format

Pressing the button for CSV file importation launches a procedure for selecting a file and choosing the data to import.

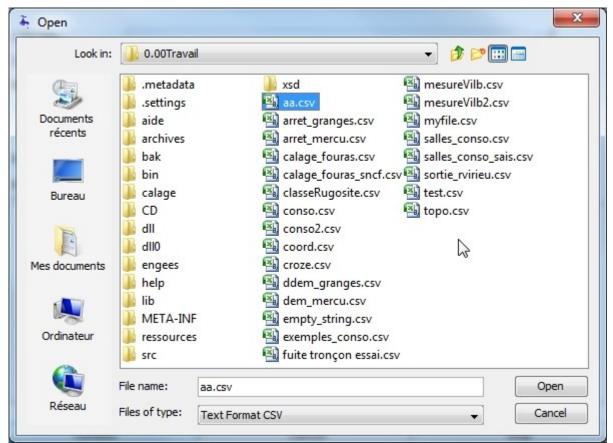
F Importation of CSV file	· · · · · · · · · · · · · · · · · · ·	×
CSV File : Choose Delimiter : ; •		
Number of lines: 0 Number of col	lumns: 0	
Without Header		
First treated line		
First treated column 1 🚔 Seco	nd treated Column 1 🚖	
Validate	Cancel	Help

The field separator used can be changed from the scrolling list "delimiter choice". If a file has already been opened and treated after changing the delimiter, it must be reopened to be treated with the new



- <,> the comma
- <SPACE> the space
- $\langle TAB \rangle$  the tab.

To select the file to treat, click on the button  $\Box$ .



After validating the choice, the file is read and treated with the chosen delimiter.

It is possible to indicate whether the file contains any header lines by clicking on one of the buttons "With Header" or "Without Header".

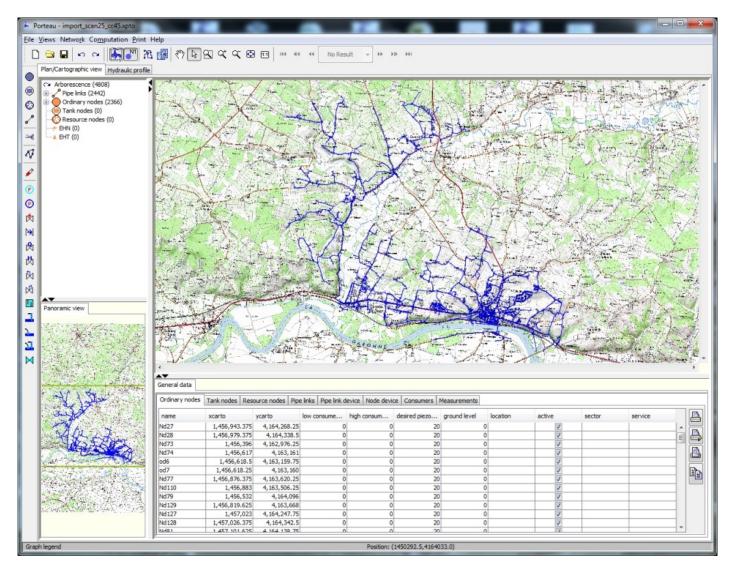
With header, the first line appears as headers for the columns selected.

	V file	
CSV File :	D:\porteau_java\0.00Travail\aa.csv	
Choose Delimite	r: ; 🗸	
Number of lines	: 5 Number of lines : 2	
<ul> <li>Without Heade</li> </ul>	r	
First treated line		
First treated colu	Imn 1 - Second treated Column 1	
arrete	В	
arrete		
D.O	4.0	
5.0	1.5	
	4.0	
22.0		
22.0	4.0	
	4.0	
	4.0	
	4.0	
	4.0	
	4.0	
	4.0	

Next, it is necessary to choose the first line of data which will act as the starting point for its treatment. This is entered in the field "first line treated". The treatment is performed until the end of the file. The field "first column treated" designates the data to be used for the abscissa.

The field "second column treated" designates the data to be used for the ordinate.

## **Background Map**



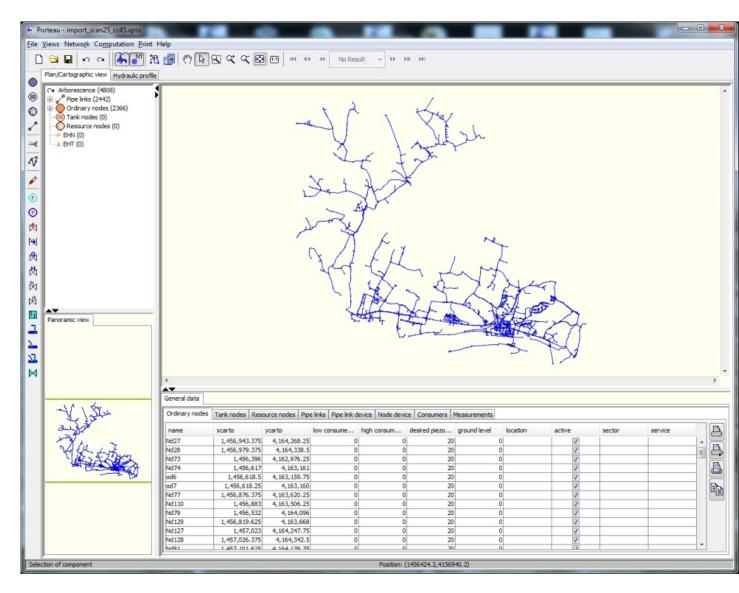
## Select the background map

This dialog box is accessible by selecting the menu "View", submenu "Select the background map".

_	teau - cocotierCarto.xpto ews Network Computation Pri	nt He	elp
	Map	• •	Cartographic View
	Plan	1	Select the map layout
	Current Graphic Parameter		Re-Size the map layout
	Graph Styles		Show / Hide the map layout

Warning, the map view must be active for this to work.

A dialog box for opening image files (JPG, GIF, PNG) allows the choice of image to be used as the background.



After validation, the image is read and sized by default as a 1000 by 1000 unit (metres) square with the **left lower corner 0,0**, as shown above by the small grey square at the bottom of the Map View. The background map can be showed or hidden selecting the corresponding menu.

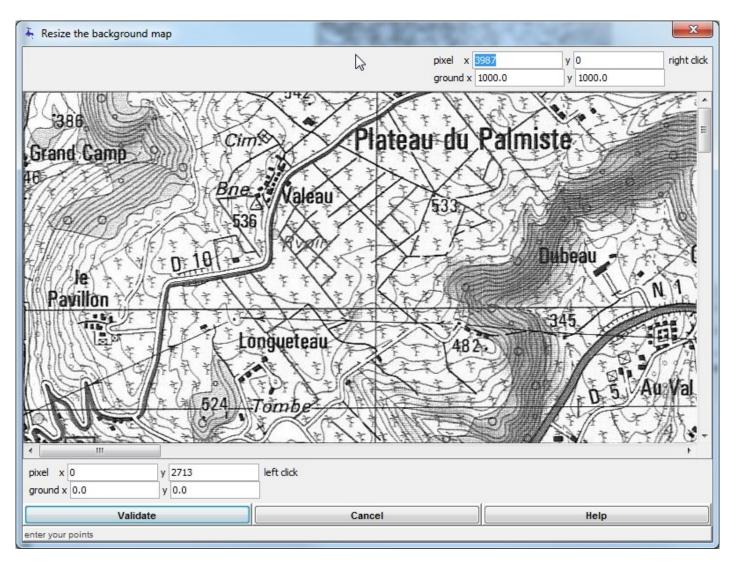
## Resize the background map

This dialog box is accessible by selecting the menu "View", submenu "Resize the background map".

File V	iews Network Computation Prir	nt He	łp
	Map	• •	Cartographic View
	Plan	•	Select the map layout
	Current Graphic Parameter		Re-Size the map layout
	Graph Styles		Show / Hide the map layout

Warning, the map view must be

active for this to work. The following dialog box appears. Warning, in the case of large images, if the memory available is insufficient, the display may be interrupted.



It allows the entering of two points of pixel and map coordinates: one for the bottom left and the other for the top right to have enough space between the two to rescale adequately in both X and Y. To enter the values, the user either types the limits directly in the fields or clicks on points in the image with the mouse.

For the top right point the **right click** on the mouse is active; the values appear in the fields

pixel x	3987	У	0	
ground x	1000.0	У	1000.0	

for the pixels, the user then enters the map coordinates

corresponding to the point clicked.

For the bottom left point the left click on the mouse is active; the values appear in the fields

pixel x	0	У	2713	
ground x	0.0	У	0.0	

for the pixels, the user then enters the map coordinates

corresponding to the point clicked.

The position of the mouse in pixels is always shown in the status bar of the dialog box After entering and validating the values, the Map View is updated under the network.

## **Sectors and Services**

Select "Management of sectors and services" under the menu "Network".

File Views	Network Computation Print Help
	Materials/Pipes Management
Plan/C	Sectors/Services Management
	Consumption Models
	Generalities
😵 🖳	Synthesis
	Quality Section Class
	Thermic Section Class
<u>∽</u> €	Origins Management
87	Processing tools

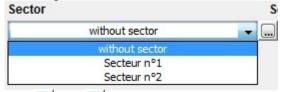
Two dialog boxes in two tabs are opened in order to enter the information.

#### Sectors

A sector is a geographic notion. You can define as many sectors as necessary to describe the network. Each node or pipe can be associated to any particular sector. Each sector is described by its order number, attributed automatically after its creation (not modifiable by the user) and its name. A value by default is attributed (Sector no. x) that the user can replace by the name of choice, e.g. "Secteur N°1".

Service Sector		
able of sectors	Delete All Sectors	
Sector row	Sector nar	ame +
	1 Secteur n°	•1
	2 Secteur nº	°2
	3 Secteur n®	°3
	4 Secteur nº	•4
		]
CSV to Node	CSV	V to Link
Validate	Cancel	Help

The identification of the sectors chosen in the column "Sector name" are visible in the scrolling list, allowing the choice of sector for an element in the network, as below:



The 🖃 and 🕒 buttons allow sectors to be added or deleted. Before a selected sector is deleted, the following dialog box is shown:



Note that only the affected sectors of model elements (nodes and pipes) can be deleted if you confirm the deletion (by choosing OK). The elements concerned will have no sector associated and will therefore have the attribute "without sector".

Click on the button "Delete All Sectors" clear all sectors for all nodes and links.

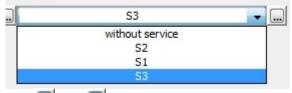
Click on the 2 buttons CSV to Node (Link) is described in a following paragraph.

### Services

A service is also a geographic notion but applies to elements with the same piezometric head. You can define as many services as necessary to describe the network. Each node or pipe can be associated to any particular service. Each service is described by its order number, attributed automatically after its creation (not modifiable by the user) and its name. A value by default is attributed (Service no. x) that the user can replace by the name of choice, e.g. "Servive  $n^{\circ}1$ ".

Service Sector				
able of services	Clear All Serv	ices		
Service row		Service name		+
		1 Service nº1		
		2 Service nº2		
		3 Service nº3		
		4 Service nº4		
	:	5 Service nº5		
CSV to Node		CSV to Link		
Validate		Cancel	Help	

The identification of the services chosen in the column "Service name" are visible in the scrolling list, allowing the choice of service for an element in the network, as below:



The 🗐 and 🗔 buttons allow services to be added or deleted. Before a selected service is deleted, the following dialog box is shown:

Deletion	of the service S1	×
?	No more connected services fo	r nodes and pipe links?
	OK	el

Note that only the affected services of model elements (nodes and pipes) can be deleted if you confirm

the deletion (by choosing OK). The elements concerned will have no service associated and will therefore have the attribute "without service".

Click on the button "Clear All Services" clear all services for all nodes and links.

Click on the 2 buttons CSV to Node (Link) is described in a following paragraph. At the bottom of the <u>dialog box are three</u> buttons:

Validate	to save and exit the dialog box
Cancel	to cancel and exit the dialog box
Help	to obtain help.

## **Import Sector-Service by CSV**

To import Sector and/or Service on Node or Link two buttons are available.

CSV to Link

imports a CSV file with 3 columns separated by ";":

- 1 Text identifing the Link described by the two ending nodes "NodeA->NodeB" or "NodeA\_NodeB"
- 2 Text name for the sector (can be empty but separated from next by ;)
- 3 Text name for the service (can be empty).

CSV to Node

imports a CSV file with 3 columns separated by ";":

- 1 Name of the Node
- 2 Text name for the sector (can be empty but separated from next by ;)
- 3 Text name for the service (can be empty).

## Materials & Pipe types

Select "Management of materials/pipe types" in the menu "Network" (keyboard shortcut: <Alt>+R+M)

File Views	letwork Computation Print Help
	Materials/Pipes Management
Plan/C	Sectors/Services Management
	Consumption Models
	Generalities
😢 🖳	Synthesis
	Quality Section Class
-	Thermic Section Class
<u>∽</u> €	Origins Management
53	Processing tools

The dialog box "Management of materials" is then shown.

Management o	f materials				_		1	
aterials of Applicat	tion			<b>_</b>	Materials of Proje	ect		
Abbreviated	Name	Roughness mm	Hazen		Abbreviated	Name	Roughness mm	Hazen
				1	Unsp	Unspecified	0.1	136
					Fonte	Fonte	0.1	136
					Ind	Indéterminé	0.1	136
					Indet	Matériau indéterminé	2	95
					PVC6	PVC 6 bars	0.025	145
					PVC10	PVC 10 bars	0.025	145
					PVC16	PVC 16 bars	0.025	145
					FD-St	Fonte Ductile joint standard	0.05	141
					FD-Ex	Fonte Ductile joint Express	0.05	141
					F-St	Fonte grise joint standard	0.1	136
					F-Ex	Fonte grise joint Express	0.1	136
					A-sd	Acier joint soudé	0.05	141
					PEHd	Polyéthylène haute densité	0.025	145
					PEBd	Polyéthylène Basse densité	0.025	145
					AC	Amiante Ciment/Eternit	0.1	136
					B	Béton/Bonna	0.1	1.36
Add Delet	te Modify				Add De	Modify		
	Validate			Cance	I		Help	
nage materials of	Application and	Project				Online H		

Here, a distinction is made between a list of materials for the application (consisting of a catalogue of generally usable materials) and a list of materials for the project (consisting of materials used in the current project).

These items can be moved from one table to the other by using the buttons in the centre, $\longrightarrow$ or $<<$ .
Each of the tables has a button Add allowing a new material to be added at the end of the list.
The button <b>Delete</b> allows a material to be deleted on condition that no pipe type exists
referencing this material. If this is the case, the button will be greyed out The panel
below appears when the button Add is clicked on a selected line:

abbreviated name	pipes of ma	terial			
PVC10	Internal mm	External mm	Roughness mm	Hazen	
	81.4	90	0.05	141	
PVC 10 bars	99.4	110	0.05	141	
roughness (mm)	113	125	0.05	141	Ξ
0.025	126.6	140	0.05	141	
	144.6	160	0.05	141	
Hazen-Williams' coefficient	180.8	200	0.05	141	-
145.0			!		-
	Add		Delete		

It allows data for attributes associated to the material to be entered on the left:

Material's data : the abbreviated name to be entered in the editing zone, e.g. PVC16 the full name to be entered in the editing zone, e.g. PVC 16 bars the roughness (Colebrook), e.g. 0.025 the Hazen Williams coefficient, e.g. 145.0

The table on the right contains the list of pipe types associated with this material. With the following data attributes that can be entered directly in the table:

#### Pipe's data : internal diameter in mm

external diameter in mm. This field is strictly for information only, it is not used in the roughness calculations.

rugosité en mm

#### Hazen Williams Coefficient

The button allows a new pipe type to be added that initially takes the following default values: 100 mm for the internal diameter, 105 mm for the external diameter and roughness and Hazen-Williams coefficient according to the material default.

The \_\_\_\_\_\_ button deletes a pipe type from the list.

The three buttons at the bottom of the screen,

Validate Cancel Help

function as with all the data entry dialog boxes.

If pipe parameters used in the network are changed, Porteau will suggest injecting these new values on the corresponding sections, in particular for the internal diameter and for the coefficients of linear headloss. The answers to the possible choices will package following treatment. "To inject" injects the displayed parameter, and moves to the next for a new question. "NOT to inject" does not change the pipes corresponding to the displayed value and advances to the next for a new question. "To inject ALL" injects all changes without asking new questions. "To inject ANY" injects no changes without any new question.

## **Models of consumption**

Common part to all types of "models of consumption"

The Porteau software is based on a demand-driven model. Consumption models are used to represent the consumption of network users. Note that leakage or exchange between networks can also be represented

with the help of consumption models called "localised leakage" or "exchange" at nodes. For pipes, there can only be distributed leakage model.

These models of consumption are used during the specification of the nodes and pipes. At each node it is possible to apply different models of consumption. On a pipe it is only possible to apply domestic consumers model.

Access to the dialog box for the models of consumption

File Views	Network Computation Print Help
Plan/C_	Materials/Pipes Management Sectors/Services Management
	Consumption Models
	Generalities Synthesis
	Quality Section Class Thermic Section Class Origins Management
87	Processing tools

In the creation **no** model is created by default.

#### Models of consumption in water distribution systems:

There are 4 types of models of consumption:

- ✓ Domestic consumptions: these models characterise domestic use. It is necessary to introduce the number of consumers (n) at the node level.
- ✓ Industrial consumptions: these models characterise factories, offices or other non-domestic consumption. They can also characterise a whole network under the condition that the consumed flows are known hour by hour and thus the total flow. In the case of industrial consumption, it is necessary to introduce the peak hourly flows in 1/s at the node level. This flow is considered as that of the Opointe calculations. Industrial consumption under Opointe is thus deterministic whilst domestic consumption is probabilistic (statistical law described by three coefficients, see later for further detail).
- ✓ Localised leakages: these leaks are located on ordinary nodes. Their values are fixed by the user at each place where they are identified. Each model of localised leakage is unique and attributed to the node where the leak occurs (representation of the output of an agglomerated sector and a node).
- ✓ Exchanges: these exchanges are often situated at the end of antennae. The model of flows given to or provided by neighbouring networks is deterministic. The associated model is composed of a temporal profile of measured or estimated values. It must be able to accept algebraic values (positives, negatives or nil). A coefficient multiplier allows projections to be made in the future and applies to the temporal profile. In the case of importing from a neighbouring network, for quality monitoring it is necessary to know the temporal profiles of residence time and concentration. If there is an export of water to a neighbouring network, the quality calculation is classic. In the case of a mixed exchange, it is only necessary to enter the data for the importation.

#### The models of consumption with irrigation:

There are 3 types of models of consumption with Irrigation:

• **Subscribed flows** with flows rule's profile of downstream subscribed flows (model with nodifferentiated plugs)

- Irrigated areas with flows rule's profile of downstream area flows (model with no-differentiated plugs)
- Watering plugs with flows rule's profile of downstream watering plugs flows (model with differentiated plugs)

Editing Demand models		×
DILE	\$	
QPS		
♦ ↑ ↓		
Domestic Industrial		
LocalLeakage Exchange		
SubscribedFlow		
🔒 Surface		
Validate	Cancel	Help

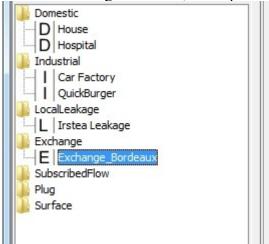
The following dialog box appears:

It contains three zones:

• The management buttons of network models.



• A tree describing all models, a complex example here already entered.



the edition of a model is done by selection in the tree.

The model selected in the tree appears then in the right window, here a model of type exchanges. • Model name Exchange\_Bordeaux Minimal pressure (m) Total demand (exchange(s)) 20.0 0.0... Opointe Zomayet **Multiplier coefficient** Total simulation duration (h) = 24 Hourly Peak Coefficient = 1 1.0 Volume (I) over the period for 1 exchange Profile time length (h) = 24 Reproductible profil 86400.0 Exchange\_Bordeaux Temps (h) Coefficient 24 1 ey Coefficient 0 2 8 10 12 14 16 18 20 22 24 Temps (h) STEP

The button bar for the management of the tree contains the following buttons:

- add a model of domestic consumption
- add a model of industrial consumption
- L add a model of localised leakage
- add a model of exchange
- add a model of subscribed flow of irrigation
- add a model of watering plug of irrigation
- add a model of irrigated area
- • delete the selected model if it has no associated water withdrawal
- $\uparrow$  up the selected line in the tree to convert the model with entered consumptions
- $\mathbf{\Psi}$  down the selected line in the tree to convert the model with entered consumptions

Depending on the selected row, the buttons are active or not, to show the possible actions. Let us see first the common zones of edition.

#### Common zone of dialogue boxes

Model name	modele_1		
Minimal pressure (m)	20.0	Total demand (consumers	s) 2334 🕥
Opointe Zomayet		Cancel	Help

In the common zone for all models, a name and a desired minimum pressure are required. The name of the models which are already created can be changed. This name has to be unique. In the cases of the models are used at the nodes and at the pipe sections for the distributed demand, the total demand of the network for these models is displayed.

Propagate the minima	pressure to the pie	zometric head	x
?			
Mode: mod	ele_1, Minimal Press	ure: 30	
Inject	Not Inject	Inject ALL	Nothing to Inject

If the desired pressure is

changed, all the nodes of the network carrying the type of consumptions can see its desired minimum piezometric impacted or not, depending on the choice of the user. Indeed, when clicking on the OK button, all the minimum pressures are inspected and those which are modified impacting the nodes engender the display of a dialog box suggesting to inject their values or not, either model by model by choosing "to inject" or "not to inject", either all the models at once without asking the question and by choosing "to inject everything" or "to inject nothing".

The gum  $\diamond$  allows to delete **all** consumptions attached to the selected model; be careful, this operation is not cancellable.

### Zomayet

Temporal profiles for these models should be based on a simulation in hours. In the case of calculations longer than the temporal profile, it can (or not) be automatically reproduced by checking the box

In addition, for all the types of model, it is necessary to describe data specific the duration of simulation, the duration of the profile being entered, the hourly peak coefficient of the profile. These values are updated only to validate the data being entered. The Zomayet module allows a simulation over 24 hours or several days of the behaviour of a meshed distribution network or the transportation of water under pressure by calculating the flows and pressures at every hour of the day.

This module adopts a deterministic approach that signifies that the user demand (domestic or industrial) is described by time step, during a period hour by hour over the entire day, with a curve, in the window defining the consumer models.

#### **Domestics consumers**

Multiplier coefficient Total simulation duration (h) = 24 Hourly Peak Coefficient = 2.362 1.0 Volume (I) over the period for 1 consumer Profile time length (h) = 24 1000.0 Reproductible profil House Temps (h) Coeffici... 22.5 CSV 17.5 Ε ey Coefficient 12.5 7.5 2.5 + 

**Domestic data** : **Coefficient multiplier** applied to the number of consumers. Default value: 1.0. **Non-dimensional temporal profile** of volume modulation.

Volume in liters for 1 consumer entered over the temporal profile duration.

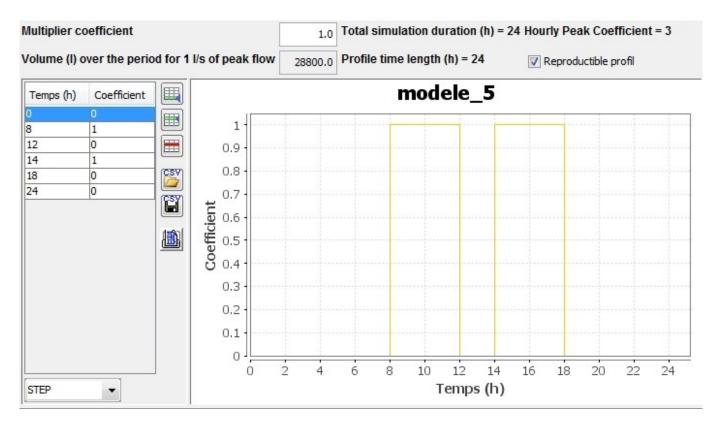
The given Volume is distributed along the surface described by the curve, Zomayet calculates the surface attributed to the time step and affect the proportion of the total volume assigned to the length of the curve.

Temps (h)

#### **Industrials consumers**

•

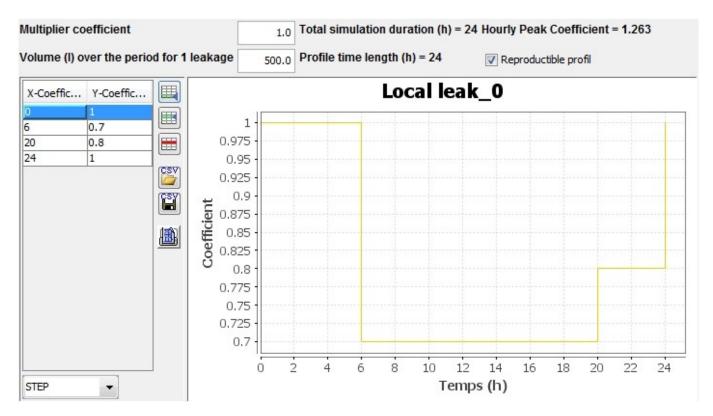
STEP



### **Industrial data** : **Coefficient multiplier** applied to peak flow. Default value: 1.0. **Non-dimensional temporal profile** of weighting of the peak flow. **Volume** in liters for 1L/s entered over the temporal profile duration.

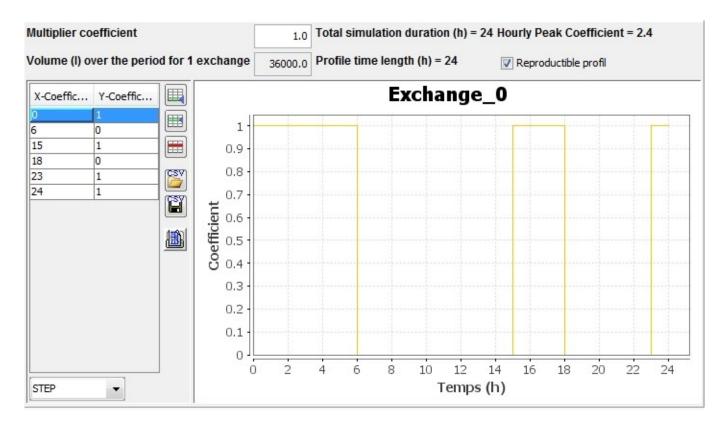
The peak flow given to the node is affected to the maximal value of the curve, all others values are calculated by weighting between the value at time step and the maximum value of the entire curve.

#### Localised leakage



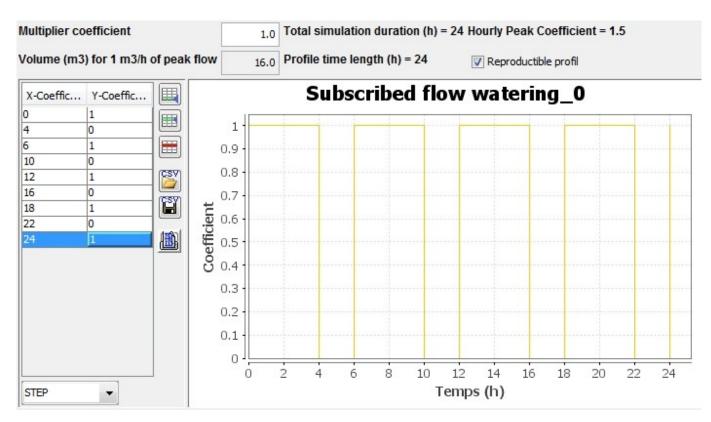
**Localised leakage data** : **Coefficient multiplier** applied to peak flow. Default value: 1.0. **Volume** in liters for the leakage entered over the temporal profile duration. **Non-dimesional temporal profile** of localised leakage volume modulation.

#### Exchanges with neighbouring networks



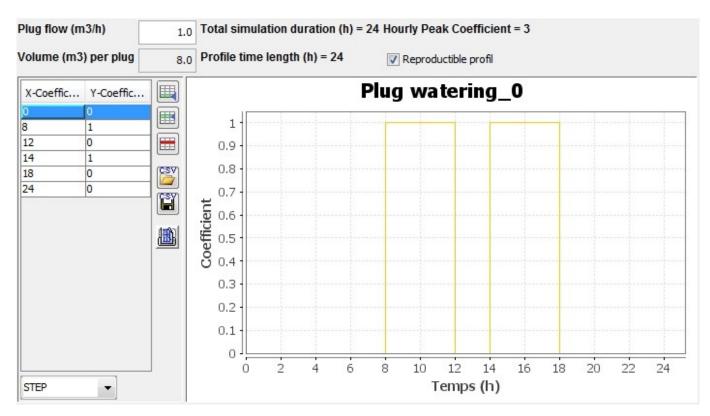
**Exchange data** : **Coefficient multiplier** applied to temporal profile values. Default value: 1.0. **Volume** in liters for the exchange entered over the temporal profile duration. **Temporal profile of flow** in (1/s).

#### Subscribed flow models



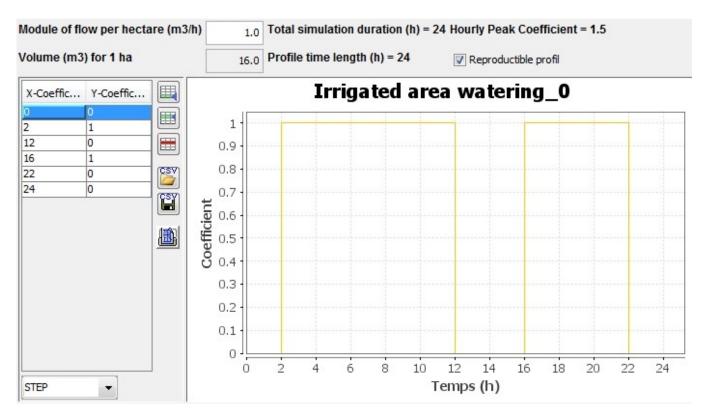
**Subscribed flow data** : **Coefficient multiplier** applied to temporal profile values. Default value: 1.0. **Volume** in m3 for 1 m3/h entered over the temporal profile duration. **Non-dimensional temporal profile** of the subscribed flow.

#### Watering plug models



Watering plug data : Flow of plug in m3/h applied to temporal profile values. Default value: 1.0. Volume in m3 for 1 plug entered over the temporal profile duration. Non-dimensional temporal profile applied to the flow of plug.

## Irrigating area models



**Irrigating area data** : **Flow module in m3 per hectare** applied to temporal profile values. Default value: 1.0.

**Volume** in m3 for 1 ha entered over the temporal profile duration. **Non-dimensional temporal profile** applied to the flow per hectare.

## **Opointe**

The Opointe module allows the simulation of the behaviour of a meshed water distribution network under pressure by calculating, using a statistical approach, the peak flows and pressures, i.e. at the time of day when demand is at the most.

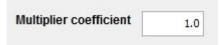
#### **Domestic consumers**

Satisfaction probability =	0.99
Multiplier coefficient	1.0
Probability of opening	<mark>0.0</mark> 3
Specific flow (I/s)	0.5

**Domestic data** : **Probability of satisfaction** of consumers: number between two values thresholds by default 0.5 and 0.999. The value is entered in the Opointe tab under the menu General. **Probability of consumer opening tap**: number between two values threshold by default 0 and 1.0 (excluded bounds).

**Specific flow** (l/s). Default value: 0.5. It corresponds to the opening of two taps on average in France. Opointe **coefficient multiplier** applied to the number of consumers. Default value: 1.0.

#### **Industrials consumers**



Industrial data : Opointe coefficient multiplier applied at peak flow. Default value: 1.0.

#### Localised leakage

Multiplier coefficient	1.0
Peak leakage coefficient	3.0
Average flow (I/s)	0.005787037

**Localised leakage data** : Opointe **coefficient multiplier** applied at peak flow. Default value: 1.0.**Peak coefficient** applied to the average flow to calculate the leakage rate for Opointe.

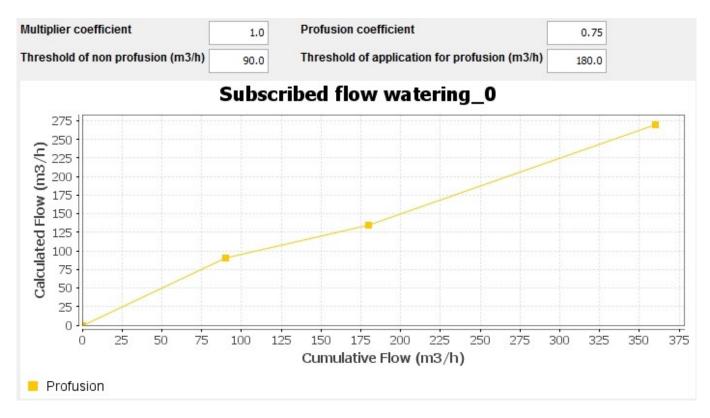
Average and peak flows are calculated from the validated data.

#### Exchanges with neighbouring networks

Multiplier coefficient	1.0
Peak flow (I/s)	20.0

# **Exchange data** : **Coefficient multiplier** applied at peak flow. Default value: 1.0. **Peak flow** in l/s.

#### Subscribed flow

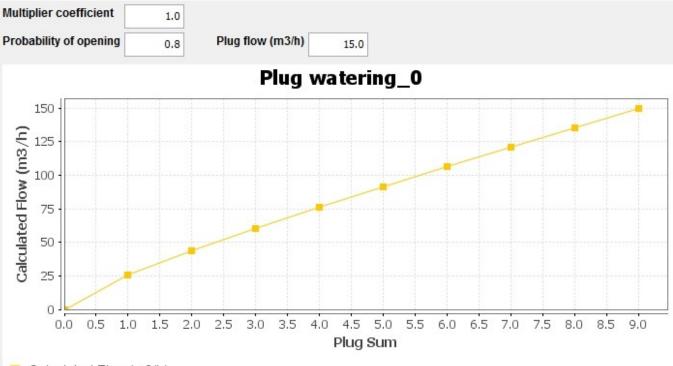


Subscribed flow data : Coefficient multiplier applied to flow. Default value: 1.0.

**Profusion coefficient**: type a number included between the default threshold values 0 and 1.0 (excluded bounds).

**Threshold of no profusion** (m3/h): highest bound of application of coefficient of no profusion = 1. **Threshold of profusion application** (m3/h): lowest bound of application of coefficient of profusion < 1

Watering plug



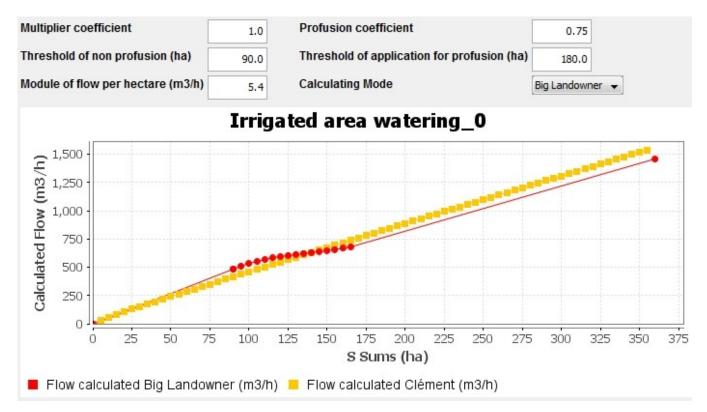
Calculated Flow (m3/h)

#### Watering plug data : Coefficient multiplier applied to flow. Default value: 1.0.

**Probability of opening** plugs simultaneously: type a number included between the default threshold values 0 and 1.0 (excluded bounds).

Plug flow (m3/h): Default value: 15.

#### **Irrigated Aera**



#### Irrigated area data : Coefficient multiplier applied to flow. Default value: 1.0.

**Profusion coefficient**: type a number included between the default threshold values 0 and 1.0 (excluded bounds).Displayed for a Big Landowner calculation.

**Probability of opening**: type a number included between the default threshold values 0 and 1.0 (excluded bounds).Displayed for a Clement's calculation.

**Threshold of no profusion** (m3/h): highest bound of application of coefficient of no profusion = 1 **Threshold of application of profusion** (m3/h): lowest bound of application of coefficient of profusion < 1

Module of flow (m3/h) per hectare

Choice of the calculation option:

- Big Landowner: linear law in three parts
- Clement: probabilistic law calculated according to Clement's method

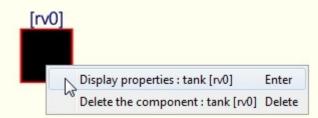
## Node

### Common data to all types of node

This dialog box is accessible by double left clicking on a node in Schematic View or Map View using the "select" cursor



Or by double right clicking and choosing the appropriate line in the contextual menu



The data entered at this level of the dialog box can be either essential, ie mandatory for the calculations, or supplementary, and not required for the calculation runs. For all the nodes, specification of the node occurs in the first tab, "Geography". The dialog box title states the type of node and its name.

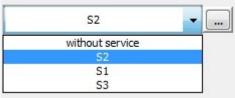
### Geographic tab

Node properties: ordinary [V	ILB]		×
Convert Geography Consumpti	ions Quality Thermic Hydr	aulic device (node) Measu	urements
Node name			
VILB			
Positions			
Mapping (m) 🖻	Plan 🧕	<u>_</u>	
1500.0	1500.0	1500.0	1500.0
Ground level (m) 120.0 comments			
location			
Sector	Service		
without sector	<b>•</b> ]]	S2	•]]
Validate	Cancel		lelp

**Data** : The **node name** is a chain of characters enabling the node to be uniquely identified; this field cannot be the same for two nodes and cannot be empty. The **coordinates** for the two viewing systems (schematic or map) are entered into the reference system chosen by the user, no constraints or controls are made on these fields. The **ground level** contains the head chosen by the user to represent the altitude of the node for calculations; it serves as a basis for the pressure calculation of the difference with the piezometric head. The **comments** field allows characters to be entered without control. The **location** field allows characters to be entered without control.

ector		
without sector	-	
without sector		
Secteur nº1		
Secteur nº2		

The **sector** and **service** fields allow the user to choose from a list of sectors and/or services to which the node belongs. If nothing is selected, the choice remains as "without sector" and/or "without service". **Service** 



The 😡 buttons open a dialog box for entering lists of possible sectors and services.

## **Ordinary Node**

#### **Consumptions tab**

Node properties: ordinary [VILB	]					X
Convert Geography Consumptions	Quality	Thermic	Hydrau	ulic device (node)	Measurements	
Low consumers Level High consumers Level Desired piezometric head (m) Node consumption		120.0 120.0 140.0	≪ cal	culated 140 (m)		
Model	ç	)uantity		Unit	Pressure m	÷
modele 2			5	/s		20 -
modele_1			55	/s		20 🛄
modele_2	6		6	/s		20
modele_3 modele_4 modele_5		to access	the list	of models		
Validate		Cance	1		Help	

An ordinary node can symbolise a group of consumers, remote in distance and altitude. To take into account this dispersion, it is possible to enter in the corresponding field, the **"Low user head"** and the **"High user head"**. These fields are not used in the simulations but may allow the identification of pressures outside the limits set by the user (for example by a colour code).

In case the ground level is modified they are automatically changed to this value.

The **piezometric head required** field allows a value to be assigned for the minimum head that the user requires in the hypothesis calculations. It is automacally calculated and proposed, but it is not updated automatically. The proposed value follows any change in the rating of the ground level added the maximum between the standard desired pressure done in the "generalities tab preference" and the maximum value of the minimum pressure necessary to consumers of the node.

The button sallows inject the proposed value in the field.

The "consumption at node" table contains the pair "consumption model" and "quantity consumed". To add a pair, click on the 🖃 button. To delete a pair, select the line and click on the 🕒 button.

Access to the dialog box for consumer models is made by clicking on the  $\Box$  button.

To modify the model of the pair, click on the cell of the line in the "Model" column and a scrolling list proposes all the models available. In the example, the four different types of model are illustrated. As a function of the type chosen, the "Quantity: and "Unit" columns are updated. For the "local leakage" or "exchange" models, the quantity must be in "l" and so the unit is left blank.

#### Node hydraulic device tab

Convert	Geography	Consumptions	Quality	Thermic	Hydraulic device (node	e) Measurements	
None       Inject		None					
				Canc		Help	

An ordinary node may or may not be equipped with a hydraulic device that could affect the quality calculations. By default, no device is present.

To modify the type of device at a node, click on the radio button corresponding to the type of device required. Only one device can be attached to each node.

To delete an existing device, click on the "none" button.

onvert Ge	ography Consumptions Q	uality 1	Thermic Hy	draulic dev	vice (noc	le) Me	asurem	ents							
) None						In	jector								
Injector	Injector activated         Image: Profile Auto-reproducible														
	Comments:														
	🔿 Increase 💿 Flow 🕥														
	Concentration of injecte		1	.0											
	Profile of injection flow	Profile of	finjection	n flow											
	time (h) flow (i/h)			Profile of injection flow											
	24 1														
	70														
			(t /]) moli												
			MO												
			÷												
			6	2	4	Ġ	8	10	12	14	16	18	20	22	24
	STEP -								time						
	Validate				Can	cel						н	elp		

The "Injector" button leads to a dialog box for entering data for a disinfectant injector. By default this device is disabled when created so the data can be conserved even without being used in the quality

calculations. To activate the injector, click on the

and vice versa.

button which then becomes

Injector activated

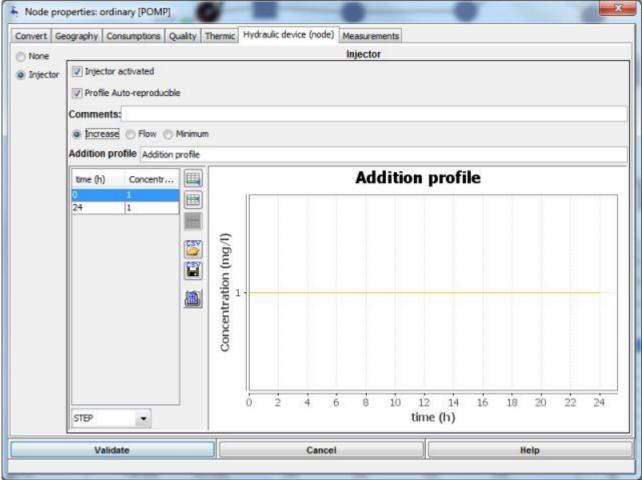
The graph describing the injection as a function of time can have a duration different to that of the simulation. In this case, it is possible to prolong it by repeating the cycle as many times as necessary by

clicking on Profile Auto-reproducible . Otherwise, the injection can stop at the end of its cycle by clicking on Non-reproducible profile

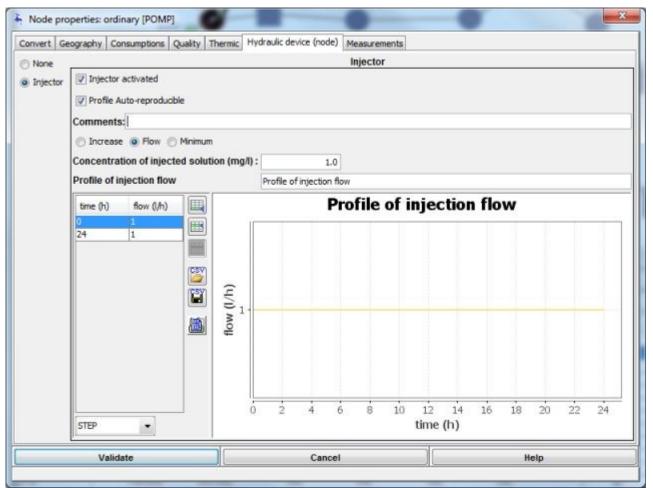
The **comments** field allows a field of any length to be entered without control.

The type of injector chosen, "Concentration of the injected solution" allows the initial disinfectant concentration to be specified; this is constant.

The injector type is chosen by selecting one of the three radio buttons: Increase So Flow Minimum Increase: the dose of disinfectant entered is added to that already present in the water at the injection node, it follows the function of time graph.

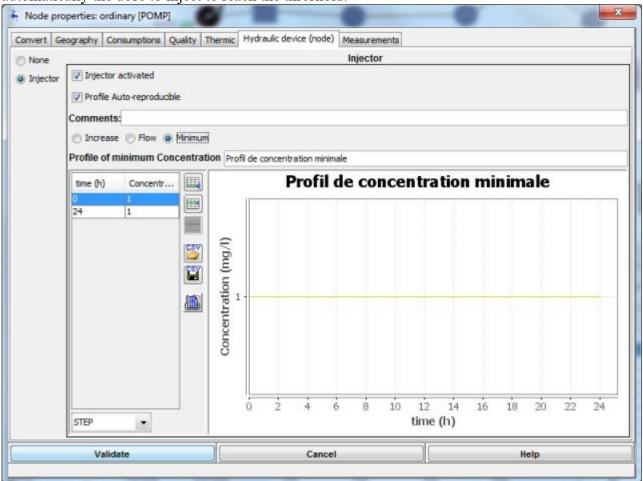


**Flow**: the calculated dose of disinfectant is provided by injecting the flow entered according to the curve at the initial concentration.



**Minimum**: the concentration exiting the injection node must always reach a minimum value entered in the graph; if it is already greater at the entry, no disinfectant is added. The simulation calculates

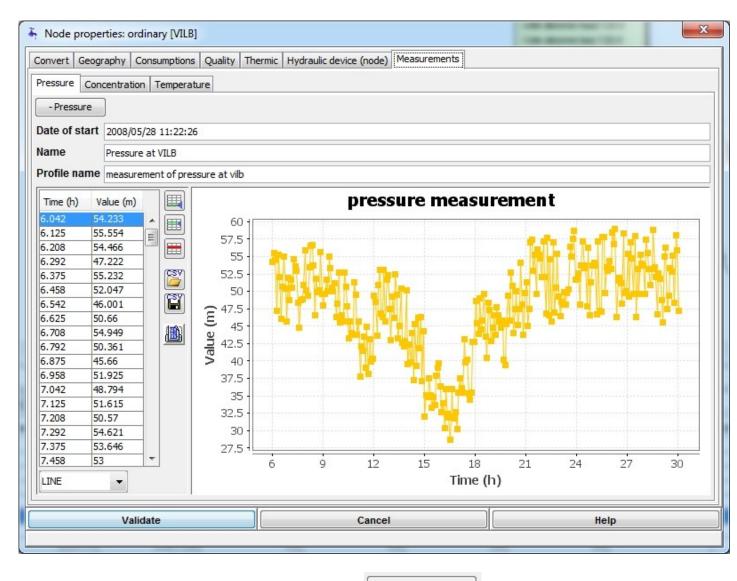
automatically the dose to inject to reach the threshold.



#### Measurements tab

It is possible to enter measurement values at an ordinary node. These will be superimposed on to the simulation results. By default, no measurement is included at the creation of a node..

🖣 Node p	properties: o	ordinary [VILB]						x	
Convert	Geography	Consumptions	Quality	Thermic	Hydraulic devi	ce (node)	Measurements		
Pressure	Concentra	tion Temperat	ure						
				+ Pressure	e				
	Validate			Cancel			Help		
		1210							
By clickin	g the	+ Pressure	button,	the dial	log box for o		a pressure 1	measure	ement is shown
To delete	a pressure	e measureme	ent, clic	k on the	e		ton.		



By selecting the "Concentration" tab and clicking the entering a concentration measurement is shown.

- Concentration

button.

To delete a concentration measurement, click on the

This is the same operation for a temperature mesurement.

### Quality tab

Node properties: ordinary [PTA]		×
Convert Geography Consumptions	Quality Thermic Hydraulic device (node) Measu	rements
Quality		
no concentration fixed		
Intel concentration		
Profile fixed Concentration fixed	concentration in PTA	
X-Coeffic Y-Coeffic	fixed concentrati	ion in PTA
0 0.5	0.5	
8 0.3	/b	
24 0.5	<u> </u>	
	(J) 0.45 0.45 0.4 0.35	
	в <sub>0.3</sub> .	
STEP	0 3 6 9 12 Time	15 18 21 24 (h)
Validate	Cancel	Help

For qualtiy module limits conditions may be fixed.

If the button If the button is selected, concentration is free and calculated along the simulation.

If the button is selected, a profile of concentration fixes, during the simulation, the concentration. If the length of the profile is less than the duration of simulation, the profile is copied from its start time as many times as necessary.

#### Thermic tab

Node properties: ordinary [PTA]		x
Convert Geography Consumptions	Quality Thermic Hydraulic device (node) Mea	asurements
Thermic class		
💿 no fixed temperature		
Ixed temperature		
Profil Fixed Temperature fixed te	nperature in PTA	
X-Coeffic Y-Coeffic	fixed temperatu	re in PTA
0 <u>55</u> 24 55	_	
	Temperature (°C)	
	te	
	du I	
	Te	
	0 3 6 9 12	15 18 21 24
STEP	Time (I	
Validate	Cancel	Help

For the Thermic module, limits conditions at the node can be specified.

If the button	no fixed temperature	is selected, temperature is free and calculated for the entire simulation.
If the button	fixed temperature	is selected, a profile of temperature fixes, during the simulation, the
		profile is less than the duration of simulation, it is copied from its start
time as many	times as necessary	Ι.

### Zomayet Results tab

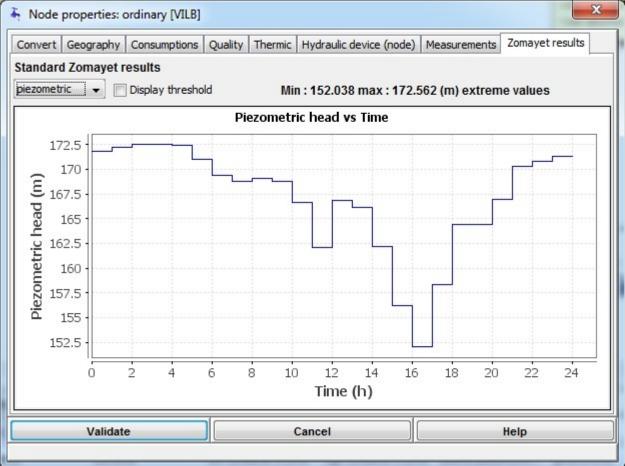
If any results from the Zomayet module are present for the selected node, the "Zomayet results" tab appears. Warning, even after modifying the data used for the Zomayet calculations, the results remain present until another calculation replaces them.

The scrolling list below allows the choice between different representations of the results for the node.

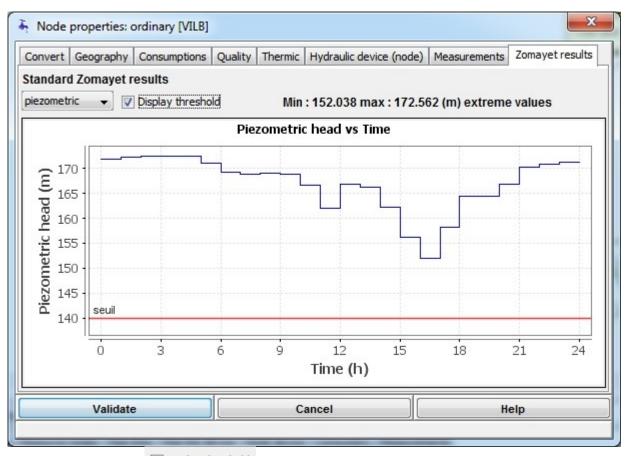
table	•
table	
piezometric	
pressure	
Consumptions	

Convert	Geography	Consumptions (	Quality	Thermic Hydraulic	device (node) Me	easureme	ents Zomayet results
tandard	Zomayet re	sults					
able	•						
Time		Time		Pressure (m)	Piezometric (m)	С	onsumption (l/s)
	00:30:00		0.5	51.85	4 17	1.854	13.25
	01:30:00		1.5	52.22	3 17	2.223	13.25
	02:30:00		2.5	52.56	2 17	2.562	13.25
	03:30:00		3.5	52.55	3 17	2.558	16
	04:30:00		4.5	52.40	1 17.	2.401	16
	05:30:00		5.5	51.01	7 17	1.017	24.25
	06:30:00		6.5	49.35	4 169	9.354	32.5
	07:30:00		75	49 70	16	2 700	35.25
	Validate	e		Cancel			Help

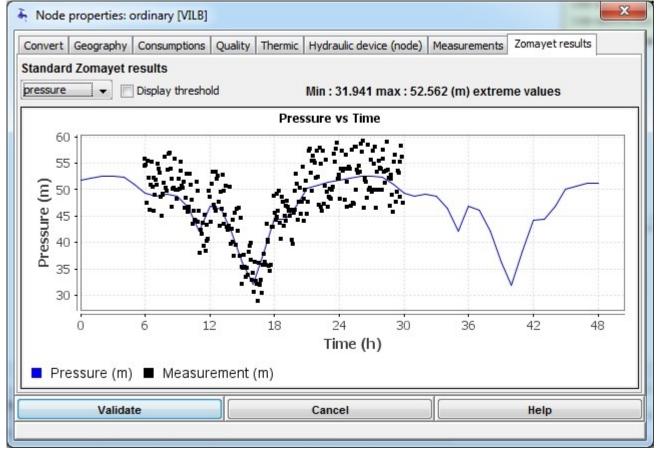
The choice "table" allows all the numerical values of all the calculated fields to be consulted: piezometric head, pressure and consumption. It allows copying to other tabular applications by selecting some or all (<Ctrl>+A) of the data, the short cut for copying (<Ctrl>+C).



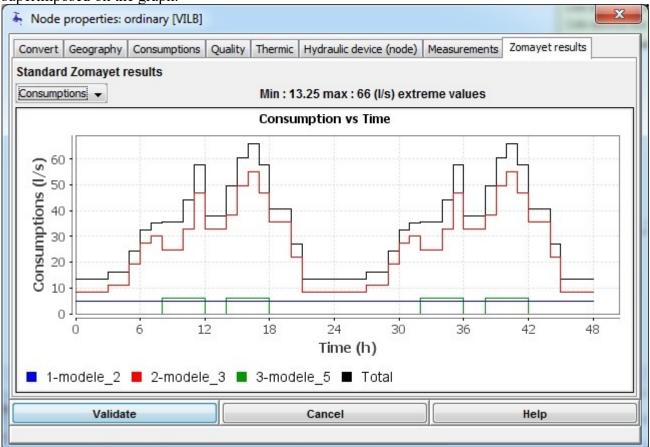
The choice "piezo" produces a graph of the piezometric head calculated at the node as a function of time. Above the graph are shown the extreme values reached during the simulation.



The activation of the Display threshold shows a red line representing the required piezometric head for the node.



The choice "pressure" produces a graph of the pressure calculated at the node as a function of time. Above the graph are shown the extreme values reached during the simulation. The display of required piezometric head is transformed into pressure. If a pressure measurement has been entered at the node, points representing the measured values are superimposed on the graph.



The choice "consumptions" produces a graph of the consumptions calculated at the node as a function of time. Above the graph are shown the extreme values reached during the simulation. Each of the consumers is represented as well as the algebraic total for the node.

#### **Opointe results tab**

If any results from the Opointe module are present for the selected node, the following tab is shown. Warning, even after modifying the data used for the Opointe calculations, the results remain present until another calculation replaces them.

Convert	Geography	Consumptions	Quality	Thermic	Hydraulic device	e (node)	Measurements	Opointe results	Zomayet results
	Opointe results								
		Opointe result	s	VILC					
		Ground				180 m			
		Pressure Piezometric			48.166 m 228.166 m				
Validate Cancel Help								Help	

The result of the peak calculation gives the piezometric head at the node; the difference with the ground level gives the pressure.

#### **Onglet Résultats Qualité et Thermic**

If any results from the Quality and Thermic modules are present for the selected node, the corresponding tabs are shown. Their respective functionings are identical to those of the Zomayet results, for variables of their own.

## Tank Node

A tank node represents a storage tank which can hold one or several consumptions. Typically, this is used to avoid simulating a flawless distribution network in a scheme of transportation between works. This network represents the downstream part of the works; in Zomayet it is not necessarily useful to handle it, but it is necessary to consider the information at the exit which consists of the sum of consumptions met for this downstream part.

#### **Consumptions tab**

Vert Geography Consumptions Node consumption	Tank Op	ointe-Zomayet	Quality	Thermic	Measurements	Zomayet res
Model		Quantity	Uni	t	Pressure m	
modele_1		1	,064 con:	sumer(s)		30 💷
modele_2			2 l/s			20 🛄

The entering of consumption data for a tank node functions the same as for an <u>ordinary node</u>. However, only domestic and industrial model types can be used at this type of node.

#### Tank Tab

 Node	properties: tank [Tank]	-		-	-	X
Convert	Geography Consumptions	Tank Opoint	te-Zomayet Quality N	leasurements		
Levels			Shape of TANK			
	Achievement date 0.0	133.0 129.0 4.0 0.0	Shape of tank	Ground tank	<b>m2):</b> 250.0	
				-1		
	Validate			Cancel	Help	

The tank at a tank node is described by attributes limited to the elevation head that can be reached by the water during the simulation and its shape.

The "Achievement date" field allows a date of end of construction to be entered but does not affect the calculations.

The Escape activated checkbox allows the overflow of the tank to be simulated when the water in the tank reaches the overflow level.

If the Escape deactivated checkbox is cleared, the level calculations don't have an upper limit.

The "Overflow level" field represents the height of water provoking an overflow.

The **"Base level"** field represents the height at the bottom of the tank. If the water reaches this level during the simulation, at the next time step the tank will not be allowed to deliver a flow.

The "**Maximum height**" field represents the maximum level of water fixed for exploitation purposes; it is only used in the graphical representation of results.

The "Minimum height" field represents the minimum level of water fixed for exploitation purposes; it is only used in the graphical representation of results.

The**volume** is automatically calculated following any modification of the various fields used in its calculation. It is calculated between the base and overflow levels.

type of tank	Ground tank 🗸
Shape of tank	Ground tank
	Water tower
	Cover

The choice of **tank type** is made from a scrolling list; this is not used in the calculations.

Node properties: tank [Tank]		X
Convert Geography Consumptions Tank Opoir	te-Zomayet Quality Thermic Measurements Zomayet	results
Levels	Shape of TANK	
Achievement date 0.0	type of tank Ground tank   Shape of tank  Cylindrical	
Escape activatedEscape level (m)133.0Base level129.0		
Maximum head (m) 4.0 Minimum head (m) 0.0 volume: 1000.000 m3	Constant area of the tank (m2)	: 250.0
Validate	Cancel	Help

The choice of **tank shape** is made from a scrolling list; there are four possibilities:

- Cylindrical
- Conical
- Spherical
- Other

For **cylindrical** tanks, the surface area of the tank is constant; the shape can be something else, e.g. cubic as the only data used in the calculation is the surface area.

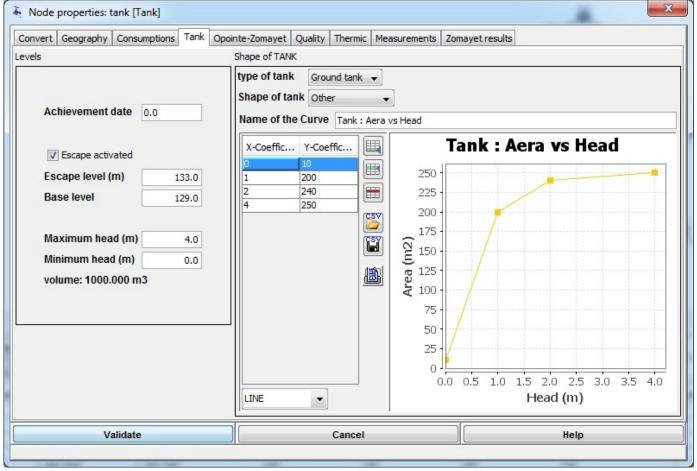
Node properties: tank [Tank]		×
Convert Geography Consumptions Tank Opoin	te-Zomayet Quality Thermic Measurements Zom	mayet results
Levels	Shape of TANK	
Achievement date 0.0	type of tank Ground tank   Shape of tank Truncated cone	
Scape activatedEscape level (m)133.0Base level129.0	Area of the tank at escape	e (m2) : 250.0
Maximum head (m) 4.0 Minimum head (m) 0.0 volume: 1000.000 m3	Area of the tank at base (r	n2): 250.0
Validate	Cancel	Help
champ Escape area		4

For **conical** tanks, two surface areas are used for the calculation – that at the base and that at the overflow.

Between the two, the surface area is calculated with respect to the height of the water above the base.

Node properties: tank [Tank]			
Convert Geography Consumptions Tank Opoi	nte-Zomayet Quality	Thermic Measurements	Zomayet results
Levels	Shape of TANK		
Achievement date 0.0	type of tank Shape of tank	Ground tank Spherical	
Scape activatedEscape level (m)133.0Base level129.0			
Maximum head (m) 4.0 Minimum head (m) 0.0 volume: 381.379 m3		Area of the tank at cen	ntre (m2) : 250.0
Validate		Cancel	Help
champ Spherical area			

For **spherical** tanks, only the surface area at the centre of the tank is necessary for calculating the shape of the tank and its volume is a function of the calculated head.



For**other** shapes, choose "other". This allows the surface area to be entered as a function of the water level in the tank by pairs of values (height, area).

#### **Opointe-Zomayet Tab**

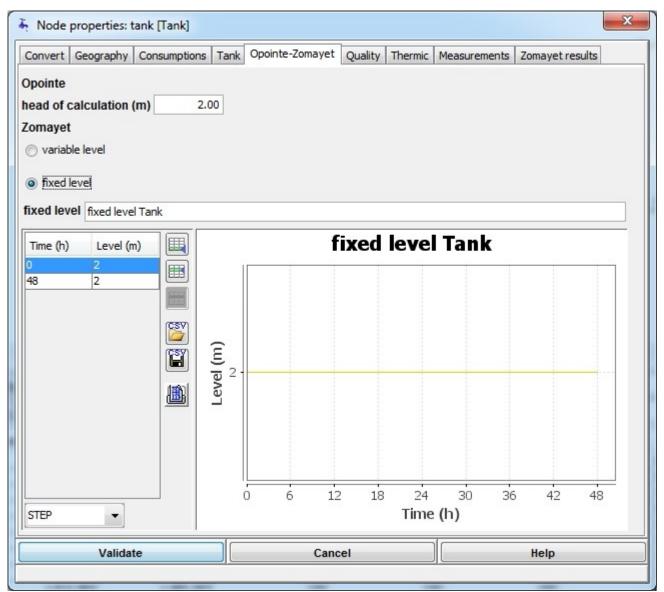
Node properties: tank [Tank]		×
Convert Geography Consumptions Tank Opoi	inte-Zomayet Quality Thermic Measurements 2	Zomayet results
Opointe head of calculation (m) 2.00 Zomayet (a) variable level Initial head (m) 2.00 (b) fixed level		
Validate	Cancel	Help

The conditions of initial head are fixed in the Opointe-Zomayet tab.

For Opointe, the calculation level is entered in the height of calculation field. For Zomayet, two options are possible:

- If the variable level button is selected, the level is variable, only the initial level is given.

- If the <sup>()</sup> fixed level button is selected, the level is imposed and is calculated following the entered graph as a function of time.



In the screen above, the level for Zomayet is imposed and varies linearly between 0 and 24 hours.

#### Quality tab

Node properties: tank [Tank]				×				
Convert Geography Consumptions Ta	ank Opointe-Zomayet	Quality Thermic	Measurements	Zomayet results				
Quality Initial age (h) : V Increase the re Free concentration								
Initial concentration	n (mg/l) : 0.0							
kinetic constant	0.0							
Kinetic order	1.0							
Fixed concentration								
Validate	Cancel		Н	elp				

The **Initial age** field allows an initial age of the water other than zero for the calculation of residence time.

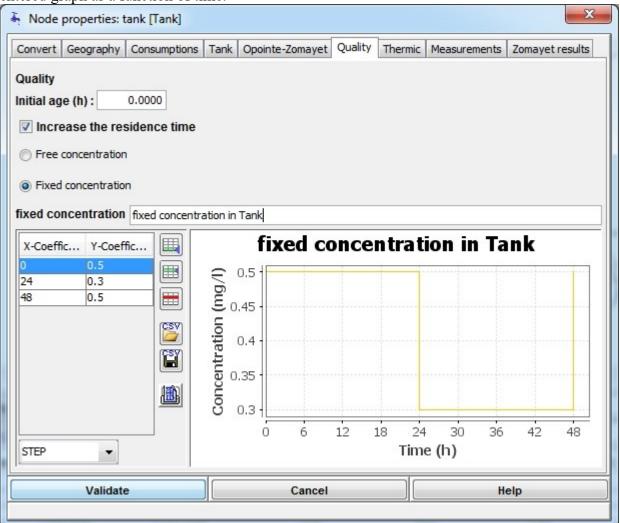
For the Quality simulation, two choices are possible:

- If the Free concentration button is selected, the simulated concentration is variable, only the initial level is given in the "Initial concentration" field; the "Kinetic constant" and "Kinetic order" fields contain the kinetic law parameters simulated in an evenly mixed tank.

- If the

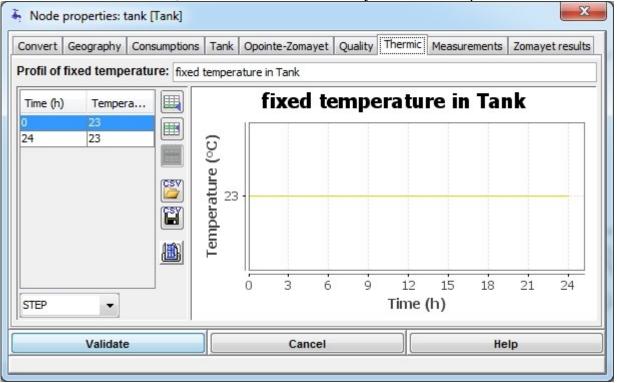
button is selected, the simulated concentration is calculated following the

entered graph as a function of time.



#### **Onglet Thermic**

For the Thermic simulation, Reserve nodes are **inevitably** with fixed temperature:



#### Measurements tab

It is possible to enter measurement values at a tank node. These will be superimposed on to the simulation results. By default, no measurement is included at the creation of a node.

Node properties: tank [Tank		X
		mic Measurements Zomayet results
Convert Geography Consumpt		mic Measurements Zomayet results
Head Concentration Tempera	aure	
	+ Head	
Validate	Cancel	Help
y clicking the Head	button, the dialog box for entering	a height level is shown. To delete
easurement, click on the	-Head button.	
Node properties: tank [Tank		×
Convert Geography Consumpt	ions Tank Opointe-Zomayet Quality Ther	mic Measurements Zomayet results
Head Concentration Tempera	ture	
- Head		
Date of start 2015/12/07 18:3	8:01	
Name Head measured i		
Profile name Basic profile of h	eight	
Time (h) Value (m)	head meas	urement
12 3.051 13 3.022	3	
13     3.022       14     2.906	_ 2.75	
15 2.674 16 2.627	Ε 2.5	
2 178		
18 1.834 19 1.442	■ > 1.75	
20 1.414	1.5	
	12 15 18 21	24 27 30 33 36
		me (h)
Validate	Cancel	Help
+ Concentra	tion	
y clicking the	button, the dialog box for en	tering a concentration measurement

shown. To delete a concentration measurement, click on the - Concentration This is the same functionning as the temperature measurement.

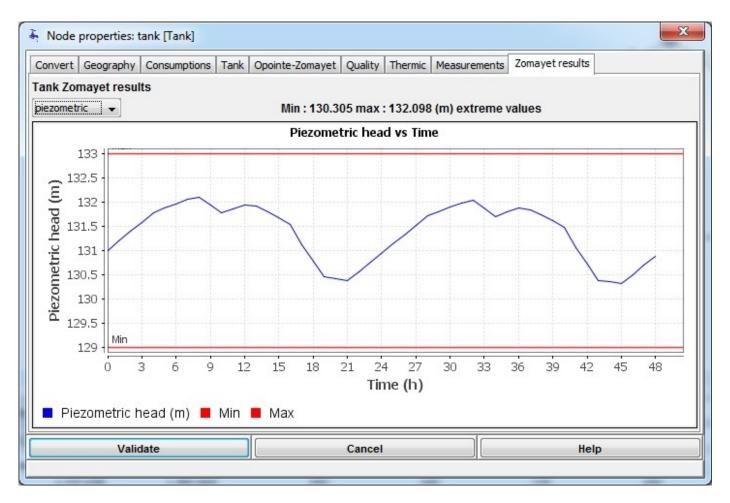
## **Zomayet Results Tab**

button.

#### The "Zomayet results" tab functions in an identical way as for an ordinary node

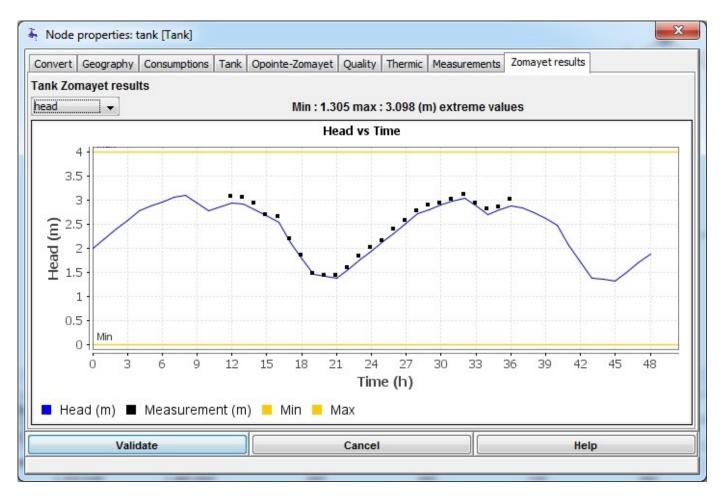
Convert G	eograph	y Cons	umptions Tar	nk Opointe	-Zomayet Qu	ality Ther	mic Measure	ements Zo	mayet results			
ank Zoma	ayet res	ults										
Date	Time	Head (m)	Piezometric (m)	Volume (m3)	Consumption (I/s)	Entering (m3)	Cumulati (m3)	Leaving (m3)	Cumulativ (m3)	Balance (m3)		
00:00:00	0	2	131	325								
01:00:00	1	2.191	131.191	370.96	2.33	56.15	56.15	8.38	8.38	47.78		
02:00:00	2	2.383	131.383	417.29	2.33	56.36	112.51	8.38	16.76	95.76		
03:00:00	3	2.576	131.576	464.01	2.33	56.56	169.07	8.38	25.13	143.94	Ξ	
04:00:00	4	2.769	131.769	511.03	2.33	56.68	225.75	8.38	33.51	192.24		E
05:00:00	5	2.861	131.861	533.53	9.31	56.56	282.31	33.51	67.02	215.28		
06:00:00	6	2.952	131.952	555.81	9.31	56.29	338.6	33.51	100.54	238.07		
07:00:00	7	3.042	132.042	577.82	9.31	55.97	394.57	33.51	134.05	260.52		
08:00:00	8	3.098	132.098	591.48	11.64	55.82	450.38	41.89	175.94	274.45		
09:00:00	9	2.93	131.93	550.42	11.64	0	450.38	41.89	217.83	232.56		
10:00:00	10	2.763	131.763	509.49	11.64	0	450.38	41.89	259.72	190.67		
11:00:00	11	2.851	131.851	531.05	9.31	55.59	505.98	33.51	293.23	212.75		
12:00:00	12	2.932	131.932	550.95	9.31	53.87	559.84	33.51	326.74	233.1		
13:00:00	13	2.902	131.902	543.58	17.45	55.3	615.14	62.83	389.57	225.57		
14:00:00	14	2.787	131.787	515.32	23.27	54.85	669.99	83.78	473.35	196.64		
15:00:00	15	2.664	131.664	485.57	23.27	53.25	723.24	83.78	557.13	166.11		
16:00:00	16	2.529	131.529	452.71	23.27	49.97	773.21	83.78	640.91	132.3	Ŧ	
	Va	lidate			Са	ncel			Hel	p	_	

The choice **table** allows all the numerical values at the node calculated by Zomayet to be consulted. The first line only contains the initial values. Then the values entering and leaving the tank and their relative cumulative values can be calculated by time step. Finally, the balance is deduced.



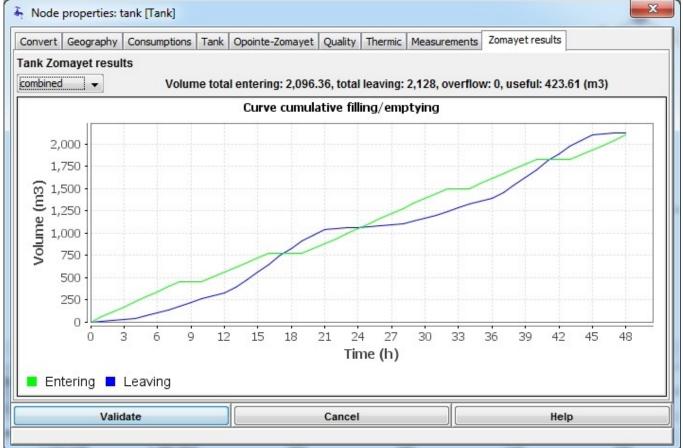
The choice **piezometric** produces a graph of the piezometric head imposed by the tank during the simulation.

The graph is scaled using the minimum and maximum heads chosen for the tank. Above the graph are shown the extreme values reached during the simulation.



The choice **head** shows the evolution of water level simulated (or imposed). The graph is scaled using the minimum and maximum height levels chosen for the tank.

Above the graph are shown the extreme values reached during the simulation.



The choice **"Combined"** shows the cumulative volumes entering and leaving the tank, this allows from the sum of the two largest differences to calculate the volume used in the simulation. Above the graph the numerical values for the balance are shown.

## **Resource Node**

A resource node can be used to model a water resource, be it real (source, water table) or fictive (reservoir without simulating the variation in level).

👫 Node properties: Resour	ce [LAC]			×				
Convert Geography Resou	rce Opointe-Zomayet	Quality Thermi	c Measurements	Zomayet results				
Ach	evement Date		0					
max	imum authorised flo	w (I/s)	0.0					
daily	daily maximum volume authorised (m3) 0.0							
Туре	e of resource							
pon	t · · · ·	-						
Drillin		45						
Sour								
Validate	c	ancel		Help				

The "resource" tab enables data to be entered that is not used in the calculations but can help the user in his approach.

The achievement date field allows the construction year to be entered.

The **maximum authorised flow** field allows the threshold for the regulated authorised instantaneous withdrawal to be recorded.

The**maximum authorised daily volume** field allows the threshold for the regulated authorised daily withdrawal to be recorded.

The **type of resource** scroll list allows the type of resource to be modelled to be chosen.

#### **Opointe-Zomayet Tab**

The conditions of initial head are fixed in the "Opointe-Zomayet" tab.

For Opointe the head for the calculation is entered in the **Opointe-calculation head** field.

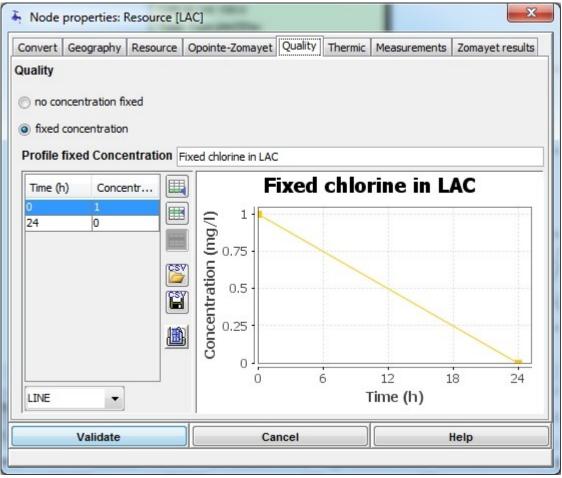
For Zomayet, a graph of the evolution of the head as a function of time is entered as a profile.

To obtain a constant head, two values defining the simulation length are indicated.

Otherwise the data entry operates the same as for all <u>temporal profiles</u>.

Node properties: Resource [LA	.C]	×
Convert Geography Resource	Opointe-Zomayet Quality Thermic Mea	surements Zomayet results
Opointe - Load calculation (m) :	100.0	
Zomayet		
Zomayet profile of fixed head	iezo of LAC	
Time (h) Head (m)	Piezo of L	AC
0 100 24 100		
	~	
<b>1</b>	E 100	
	Head (m)	
	0 6 12	18 24
STEP	Time	(h)
Validate	Cancel	Help

Quality Tab



For the Quality module, the conditions at the limits of the system must be indicated.

If the onconcentration fixed button is selected, the concentration is zero for all the simulation.

If the fixed concentration button is selected, a concentration profile describes the evolution of the concentration during the simulation. If the duration of the profile is lower than the duration of the simulation, it is reproduced from scratch as many times as necessary.

#### **Onglet Thermic**

As the Reserve nodes, temperature is **inevitably** fixed.

ermic cla												
Time (h)	Temperature	profile	of temper			le d	of te	emp	pera	tur	e	
) 24	10 10		(ɔ₀)									
			Temperature (°C)	-	_							
			Temp									
STEP	•	]		0	3	6	9	12 Fime	15 (h)	18	21	24

#### **Measurements Tab**

For information, a <u>concentration and/or temperature measurement</u> can be entered at a resource node.

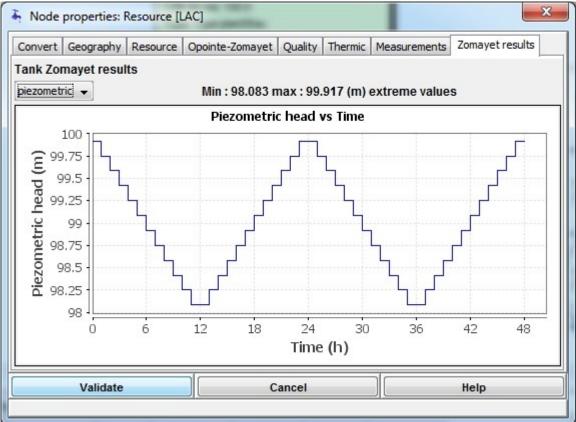
### **Zomayet Results Tab**

The "Zomayet results" tab functions in the same way as for an ordinary node, except this choice.

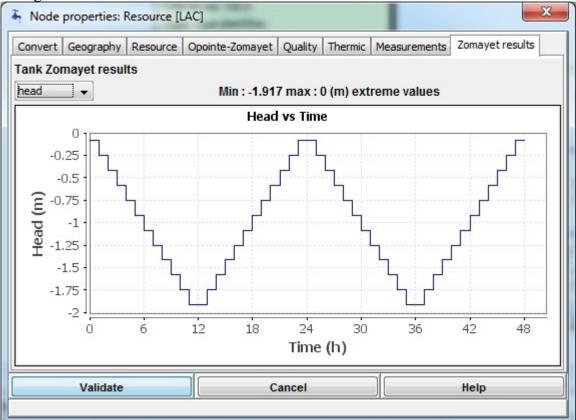
onvert G	Geography	Resou	rce Opointe-	Zomayet	Quality Thermic	Measurements	Zomayet results		
ank Zoma	ayet res	ults							
able	•								
Date	Time	Head (m)	Piezometric (m)	Leaving (m3)	Cumulative Leaving (m3)	Entering (m3)	Cumulative Entering (m3)	Balance (m3)	
00:30:00	0.5	0	100	388.41	388.4	1 0	0	-388.41	
01:30:00	1.5	0	100	388.41	776.8	2 0	0	-776.82	
02:30:00	2.5	0	100	388.41	1165.2	3 0	0	-1165.23	
03:30:00	3.5	0	100	388.41	1553.64	4 0	0	-1553.64	
04:30:00	4.5	0	100	0	1553.64	4 0	0	-1553.64	
05:30:00	5.5	0	100	0	1553.64	4 0	0	-1553.64	
06:30:00	6.5	0	100	388.41	1942.0	5 0	0	-1942.05	
07:30:00	7.5	0	100	388.41	2330.4	5 0	0	-2330.46	
08:30:00	8.5	0	100	0	2330.4	5 0	0	-2330.46	
09:30:00	9.5	0	100	0	2330.4	5 0	0	-2330.46	
10:30:00	10.5	0	100	388.41	2718.8	7 0	0	-2718.87	
11:30:00	11.5	0	100	388.41	3107.2	3 0	0	-3107.27	-
	Vali	Validate Cancel Help							

The **table** choice functions the same way as for a tank node.

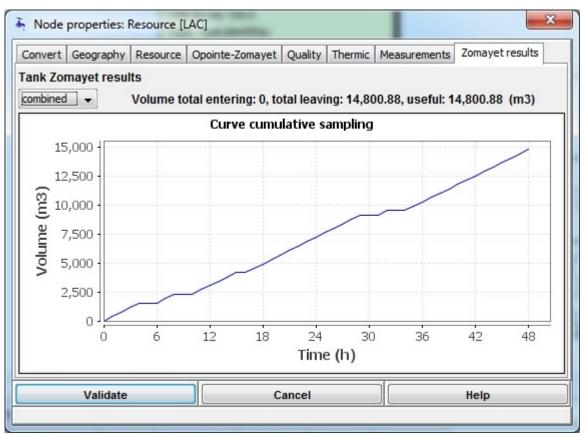
The inflow has been left in the eventuality that a simulation would end in a return of water towards to the resource.



The **piezo** choice redraws the head level imposed by the data for which the ground level is represented by the right.



The **head** choice redraws the pressure level imposed calculated relative to the ground level. Above the chart, extreme values reached during the simulation are displayed.



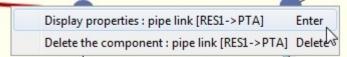
The **combined** choice functions as for a tank node and allows the inflow/outflow balance to be calculated for the node during the simulation.

# **Pipe link**

This dialog box is accessible by double left clicking on a pipe segment in Schematic or Map View with the "Select" cursor:



or by double right clicking and choosing the "Show properties: pipe [...->...]" from the contextual menu:



The data entered at this level of the dialog box can be either essential, ie mandatory for the calculations, or supplementary, and not required for the calculation runs. The dialog box title states the name of the pipe by associating it with its two nodes.

The "Properties window: pipe  $[\dots > \dots]$ " starts with the "Data" tab.

Reminder: Table match the old 8 standard roughnesses of Porteau 2.

N° of roughness Porteau 2	Hazen-Williams	Colebrook (mm)
1	95	2.0
2	106	1.0
3	116	0.5
4	130	0.25
5	136	0.10
6	141	0.05
7	145	0.025
8	146.5	0

#### Data Tab

Properties window	pipe link [PTA->VILA]			x				
Data Distributed pipe of	demand Measurements [	Device Opointe results Zoma	ayet results					
Pipe Link Name	tr26							
Comment								
	inversion of ends	Name						
Achievement Date								
Length (m)	3000.0	Recalculate						
Diameter (mm)	500.0							
Roughness (mm)	0.1	Hazen-Williams' coeff	icient 136.0					
Material identified	Matériau indéterminé		<b>•</b>					
Pipe identified	Pipe[500.00; 550.00; 1	36.00; 0.10]						
Inject thes	e values to the Pipe							
Kinetics of pipe link –								
Quality class Ord	re=1.00 / Constante=0.0	0 / Contact=true	•					
Thermic of pipe link — Thermic class Constant=0.00 / Limit=1.00								
Sector Service								
witho	without sector							
Validate		Cancel	Help					
				_				

Fields : The Pipe name is a chain of characters enabling the pipe segment to be uniquely identified; this field cannot be the same for two segments and cannot be empty. It can however be constructed from the names of its two nodes by clicking on the "name" button. The

**Comment** field allows characters to be entered without control. The **Enabled section** checkbox allows to active or not section for simulations. **Currently** this option has no effect. It is possible to inverse the direction of an entered pipe segment.

Click on the **Inversion of ends** checkbox (you will be alerted if there are any devices on the segment). Example, with the pipe segment VILA -> PTB:

Properties windo	w pipe link [PTA->VILB]					
Data Distributed pip	e demand   Measurements   Zomayet results					
Pipe Link Name Comment	tr 30					
	e pipe segment is renamed PTB -> VILA:					
	w pipe link [VILB->PTA]					
Data Distributed pip	e demand Measurements Zomayet results					
Pipe Link Name Comment	tr 30					
	inversion of ends					

Take care its name is not changed, to rebuild the name with end nodes names, click on the

Name button.

The Achievement Date field allows any string to be entered without control. The Diameter field allows a numerical value to be entered; its default value is that of the default pipe type chosen for the project. The default unit is the millimetre. The Hazen-Williams coefficient field allows a non-dimensional numerical value to be entered.

**Material and Pipe type** : The "Material and Pipe type" frame allows materials and pipe types that are different from the defaults to be chosen for the pipe segment. New materials and pipe types can be specified by clicking on the "Materials" and "Pipe type" fields and selecting from the lists.

Platenar and hipe		
Material identified	Matériau indéterminé	▼
Pipe identified	▼	
Inject these valu	es to the Pipe	
Material and Pipe		
Material identified	Matériau indéterminé	
ripe identified	Unspecified Fonte	3 <u></u>
Inject these valu	Indéterminé Matériau indéterminé	
Kinetics of nine link	PVC 6 bars PVC 10 bars	
	PVC 16 bars	

Diameter (mm)	250.0		
Roughness (mm)	0.1	Hazen-Williams' coefficient	136.0
Material and Pipe			
Material identified	PVC 10 bars		<b>•</b>
Pipe identified	Tuyau[113.00; 125.00;	; 141.00; 0.05]	<b>•</b>
Inject these valu	es to the Pipe		

By clicking the box "Assign these values to the pipe", the "Diameter", "Roughness" and "Hazen-Williams coefficient" fields are updated with the associated values.

Diameter (mm)	113.0		
Roughness (mm)	0.05	Hazen-Williams' coefficient	141.0
Material and Pipe			
Material identified	PVC 10 bars		• <u></u>
Pipe identified	Tuyau[113.00; 125.00;	; 141.00; 0.05]	▼ …
Inject these valu	es to the Pipe		Concernent of a difference of

The *w* buttons access the <u>dialog boxes</u> for entering the possible materials and pipe types.

The combination of the click on the Inject button and the pushed-down Shift key switches the function of injection mode : automatic mode or not, the automatic mode automatically injects the changes in choice of material and/or pipe in the local data for internal diameter, roughness and Hazen-Williams coefficient if necessary.

Material identified	Matériau indéterminé	<b>•</b> ]
Pipe identified	Pipe[500.00; 550.00; 136.00; 0.10]	<b>•</b>
Inject these va	lues to the Pipe Auto	

**Pipe segment kinetics** : The "Pipe kinetics" frame allows a kinetic order and constant to be chosen for the pipe segment. **If the order is equal to 1, the unit of the constant is [h-1].** 

A triplet of "Order/Constant/Contact" values can be specifief by clicking on the "Class" field by selecting from the list. The default triplet is that of the project default.

Kinetics of pipe	ink	
Quality class	Ordre=1.00 / Constante=0.00 / Contact=true	
	Ordre=1.00 / Constante=0.00 / Contact=true	
I nermic of pipe	Ordre=1.00 / Constante=0.00 / Contact=true Ordre=1.00 / Constante=0.10 / Contact=true	
Thermic class	Ordre=1.00 / Constante=0.20 / Contact=true	

The button access the <u>dialog box</u> for entering the possible kinetics.

**Thermic section** : The box "Thermic section" allows to choose a thermic exchange coefficient and an extern limit temperature for the section.

We can affect a couple "Constant/Limit" by clicking the field "Thermic" which allows to choose in the proposed list to which class the section belongs. The class by default is the one chosen for the project.

Thermic class	Constant=0.00 / Limit=10.00	
	Constant=0.00 / Limit=10.00	
Sector	Constant=0.10 / Limit=10.00	
W	Constant=0.13 / Limit=10.00	bl

The button allows to access the <u>input dialog box</u> of the suggested list of thermic classes.

Secteu	r / Service :	
Sector		S
	without sector	-
	without sector	
	Secteur nº1	
	Secteur nº2	
ervice	Secteur n°2	
Service	Secteur n°2 S2	
Service		
Service	S2	
Service	S2 without service	

The "Sector" and "Service" fields propose a list of the sectors and services which can be specified for each pipe segment; if none are chosen, the choice stay as "without sector" and/or "without service". The 💷 button access the <u>dialog box</u> for entering the possible sectors and services.

## Distributed demand tab

a Distributed	d pipe demand	Measurements	Zomayet result	s
Distributed p	pipe link dem	and		
Model	Quantity	Unit	Pressure m	•
modele_1		20 consumer(s)	20	
modele 1 🖕		0 consumer(s)	20	
modele_1	Sales and the second seco			

The entering of distributed demand data functions in the same way as for the <u>consumption at an</u> <u>ordinary node</u>.

However, **only** the domestic model type can be specified for a pipe segment.

The "Distributed demand" table contains pairs of "consumption model / quantity consumed". To add a pair click on the 🖃 button. To delete a pair, select the line and click on the 💷 button.

Click on the 💷 button to access the "consumption models" dialog box.

To modify the model of the pair click on its line in the "Model" column; the scroll list proposes all the models available. In the example, one type of possible model is illustrated. As a function of the model type chosen, the "Quantity" and "Unit" fields are updated. For domestic models, the quantity must be provided by the user and the unit is the consumer.

## Measurements tab

It is possible to enter measurement values for a pipe segment. These will be superimposed on to the simulation results. By default, no measurement is included at the creation of a pipe segment.

By clicking the button, the dialog box for entering a flow measurement is shown.

Properties window pipe link [PTA->VILB]     Data Distributed pipe demand Measurements Zomayet results		X
Flow -Flow Date of start 2012/03/14 16:21:41 Name Flow measured in tr30 Measurement profile Profile name Basic flow Time (n) Value (l/s) 24 1 24 1 (2) 10 1	flow measurement	
Validate	Cancel	Help

To delete a flow measurement, click on the **Flow** button.

# Devices Tab (Pipe segment hydraulic device)

A pipe segment can carry one or more hydraulic devices. By default, none are present. Only one device by type can be attached to a pipe segment.

To add a device, select the button of the desired device type in the device toolbar and click on a pipe segment.

To delete an existing device, click on the button.

Maximum **three** devices on a pipe segment. Not twice the same type of equipment on a pipe segment. Usage Condition:

- **Overflow inlet**: with a reserve node at end node of pipe segment, position > 50% of length
- Float Valve: with a reserve node at end node of pipe segment, position > 50% of length
- Float Valve-Overflow Combination: with a reserve node at end node of pipe segment, position > 50% of length

# Pipe link hydraulic devices

# **Common Datum for devices**

Check Valve		
device name CL_62		
location 0.5 ground level	0.0	
water flow direction	S1)> Downstream (PTA) (PTA)> Upstream (RES1)	
coefficient of local head loss	0.0 Coeffic	ient calculation

The **device name** field is composed of XX\_nnn, with XX the first letters of type of device and nnn the index number of network object representing the device.

The location field is the position of the device on the pipe link.

The ground level field allows a numerical value to be entered; its default unit is the metre.

The active checkbox allows the device to be rendered active or not for a calculation.

The button helps to calculate the head loss coefficient from a value of water level and a flow value, when this type of device is present.

## **Check Valve**

Check Valve		
device name CL_62		
location 0.5 ground level	0.0	
water flow direction     Opstream (RE     Opstream (RE     Opstream)	S1)> Downst	
coefficient of local head loss	0.0	Coefficient calculation

The **flow direction** field allows the upstream-downstream flow direction to be chosen using the radio buttons, "upstream-->downstream" or "downstream".

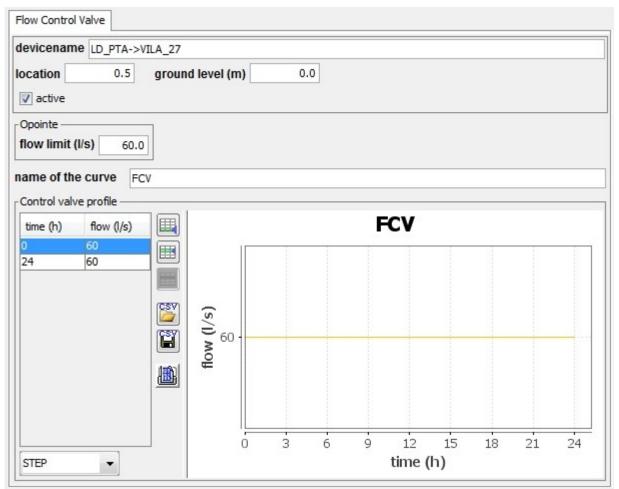
The local head loss coefficient field allows a non-dimensional numerical value to be entered.

## **Float Valve-Overflow Combination**

device name	RFSU_63		
location	0.9 ground l	evel 12	29.0
	of closure (m)	3.9	2
head at start	of closure (m) of closure (m)	3.9 4.0	

The **heigth at start of closure** field allow a numerical value to be entered; its default unit is the meter. The **heigth at end of closure** field allows a numerical value to be entered; its default unit is the meter. The **overflow head** field allows a numerical value to be entered; its default unit is the meter.

## Flow Control Valve



The **flow limit** field allows a numerical value to be entered for the Opointe calculation target; its default unit is the litre per second.

It is possible to enter a **temporal profile** for the flow. The way to enter this profile is identical to for <u>other profiles</u>.

## Local headloss

device name	PS_VI	LB->PTB_33		
location	0.5	ground level	0.0	
✓ active				

The local head loss coefficient field allows a non-dimensional numerical value to be entered.

## **Pressure Breaker Valve**

Pressure Break	er Valv	/e	
device name	RP_5	9	
location	0.5	ground level	99.0000
active			
Pressure Bre	aker	10.0	

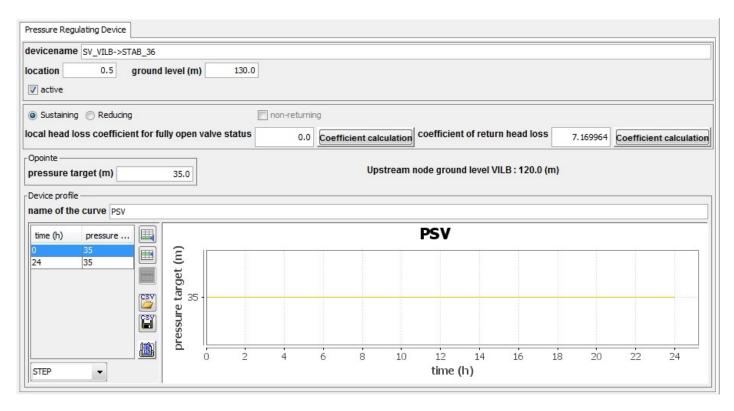
The Pressure Breaker field allows a reducing pressure imposed on the calculation to be entered.

## **Float Valve**

Float Valve	
device name RF_60	
location 0.9 ground le	vel 0.0
head at start of closure (m)	3.9
head at end of closure (m)	4.0

The **heigth at start of closure** field allow a numerical value to be entered; its default unit is the meter. The **heigth at end of closure** field allows a numerical value to be entered; its default unit is the meter.

# Pressure Valve (Sustaining or Reducing)



The Sustaining - Reducing radio buttons allow the choice of the type of the valve.

The non-returning checkbox allows the device to be function as non-return or not.

The **fully-opened head loss coefficient** field allows a non-dimensional numerical value to be entered. The **return head loss coefficient** field allows a non-dimensional numerical value to be entered.

The **pressure target** field allows a numerical value to be entered for the Opointe calculation target; its default unit is the meter.

A temporal profile for Zomayet pressure must be entered. The way to enter this profile is identical to for **<u>other profiles</u>**.

#### **Overflow Inlet**

device name	SU_P	OMP->RES1_25	
location	0.9	ground level	150.0
✓ active			

The overflow level field allows a numerical value to be entered; its default unit is the meter.

## **General Purpose Valve**

3 types of valve exist with different data for each one:

- Head loss coefficient type valve
- <u>Closed valve</u>
- <u>Head loss profile type valve</u>

Motorised valves are a different equipment with its own type and treated separately.

# Head loss coefficient type valve

General Purpo	se Valve	
device name location	VN_69 0.5 ground leve	96.0000
type of valve	Coefficient of head los	35 -
coefficient o	f local head loss	0.0 Coefficient calculation

The **coefficient of local head loss** field allows a non-dimensional numerical value to be entered.

## **Closed Valve**

General Purpos	se Valv	e	
device name	VN_69	9	
location	0.5	ground level	96.0000
type of valve	Close	d valve	•

No more data for this type of valve.

## Valve of head loss profile

Pro	Distributed p	dow pipe link [\ Dipe demand   M	VILA->U	pomonoma i	x
	Pressure Bre	eaker Valve Ger	neral Pur	pose Valve	
	devicenam location		ground	l level (m) 0.0	
	Device prof			type of valve Head loss profile	
	flow 0 3 6 12 24	head loss 0 1 1 10 100 1000		Valve with Profile Headloss=f(Flow	
		▼ idate		0 5 10 15 20 25 flow Cancel Help	
	Va	luate		Cancel Help	

For a valve of this profile type, it is possible to enter a <u>head loss profile</u> as a function of flow.

## **Motorised Valve**

device name	VM_PT1->PT2_42
location 0.5	ground level 129.0
Control	Results
Opointe	
The Control	button accesses the

The **control** button accesses the <u>dialog box for the regulation</u> of the valve. The **valve opened** checkbox allows the opening or closing of the valve to be imposed under Opointe.

If Zomayet results are present, the **Results...** button allows these to be accessed for the regulation of the valve under Zomayet.

# Pump

F Pro	operties window pipe link [LAC->PC	OMP]	x
Data	Distributed pipe demand Measureme	ents Device	
	Station of Curved Multi-Pumps		
	devicename PC_LAC->POMP_21		
	location 0.6 ground	level (m) 100.0	
	🔽 active		
	🔲 by-pass	Control	
	Fixed speed n°0		
	Working under Opointe Na	ame of the curve TMH=f(Flow)	١
	Caracteristic curve of the pump		
	Flow (I/s) Total Ma	Ξ curve TMH=f(Flow)	
	10 110 70 90	Pg 110	
	150 60		
		00 H	
		NO	
		Curve TMH=t(Flow)	
		25 50 75 100 125 150	
		Flow (I/s)	
	1		
	Validate	Cancel Help	

The **bypass** checkbox allows the pumping station to be bypassed with its exit functioning as a nonreturn valve.

The **Control...** button alowws accesses the <u>dialog box for the regulation</u> of the pump. The **Working under Opointe** checkbox imposes the starting and stopping of the pump under Opointe. The lower part of the dialog box allows the pump characteristic curve to be entered. It works in the same way as <u>entering a profile</u>.

Warning, the characteristic curve must contain exactly three points. If Zomayet results are present, the button Results... allows these to be accessed for the regulation of the pumping station by Zomayet.

# Regulation

# **Common datum**

This part is common to all types of "regulator".

This dialog box is accessible from the dialog box for any pipe carrying a regulating device (e.g. pumping

station or motorised valve). Point to the tab for the device, then click on the **Control...** button.

During construction, **no** regulation is created by default; the state of the device remains either **off** for a pump or **closed** for a valve if nothing is entered.



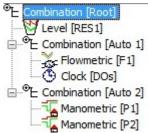
🕹 Automatic functionin	ng		×
●E ③ ♥ ; ◆ ↑ ↓	s 🔹 🖡		
		L3	s
Validate		Cancel	Help

It consists of three zones:

• The buttons for the management of the regulation sequence.



• A tree-menu showing the assembly of regulators; here is a complex example that has already been entered.



Editing of a regulator is made by selecting from the tree-menu.

• The selected regulator then appears in the window on the right - in this example a combined regulator.

Level Regulator						
Name :	RES1					
Mode :						
Normal	O Inverse					
Initial State for Zo	mayet if undefined by conditions	:				
True	◎ False					
Tank node index :	RES1	Base level 170,Escape level 175 m Minimum head 0, Maximum 5 m				

The button bar for the management of the regulation sequence contains the following buttons:

- <sup>•</sup> <sup>•</sup> <sup>±</sup> add a combined regulator
- 🕒 add a clock
- 💆 add a level
- 💑 add a flowmeter
- 🔁 add a manometer
- $\diamond$  delete the selected line
- $\uparrow$  up the selected line in the tree menu
- $\bullet$  down the selected line in the tree menu.

In order to show the possible actions, the buttons are active or inactive depending on the line selected. The regulators simply calculate the state as a unique function of level, flow, pressure or time. Here, only level is described but the other types of regulator function according to the same principles.

### Level regulator

This dialog box appears either by selecting a level regulator from the tree-menu or by adding a new one.

The upper part of the right-hand window is represented below:

Level Regulator		
Name :	RES1	
Mode :		
Normal	Inverse	
Initial State for Zor	nayet if undefined by condit	ions :
True	🔘 False	
Tank node index :	RES1	<ul> <li>Base level 170,Escape level 175 m</li> <li>Minimum head 0, Maximum 5 m</li> </ul>

The **name** field allows a particular name to be attributed to the regulator to better identify it. The **Mode** field has a choice of two radio buttons.

For a normal regulation, the Normal button should be selected. In this case, the regulation is set as true (1), if the reference variable (tank level) goes below or reaches the start-up level at the instant of the calculation and set to false (0) if the reference variable goes above or reaches the stop level. The goal is to fill the tank.

For an inverse regulation, the Inverse button should be selected. In this case, the regulation is set as true (1), if the reference variable (tank level) goes above or reaches the start-up level at the instant of the calculation and set to false (0) if the reference variable goes under or reaches the stop level. The goal is to empty the tank. Cf an example of an inverse-regulated flowmeter.

The **Zomayet if start-up condition is undetermined** field allows the state of the regulator to be fixed in the case where the initialisation of the calculation needs to know what happened before the simulation time begins. For example, if the reference variable at the start of Zomayet calculations is between the start-up and stopping level, the state of the regulator cannot be determined without knowing what happened before. This field allows a value to be fixed.

To fix this field in the true state (1), the False button should be selected. To fix this field in the false state (0), the False button should be selected.

The **Tank node index** field designates the tank for which the flow measurement serves as the variable for calculating the state of the regulator as a function of time. It is necessary to select the one concerned from

a list of tanks.

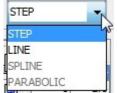
	ode index		RES1		•												
		_	aucun ir	ndex													
Startu	p level p	ro	RES	1													
_			RES Tan														
e lov	ver part	of the rig	ght-hand v	vindow is	-	_											
X-S	Stop Level	Y-Stop Level	X-Start Level	Y-Start Level	Stop	S	op Level										
0	4	ł.7	0	4.4						1.0	vel						
0	3		5	4.5						LC	VCI						
10	4	1.7	6.5	4.6		4.75	-			-			1	-			_
15			8	2.8		4.5		_								_	_
18		ł. <mark>7</mark>	10	4.4				_								-	
24	4	ł. <mark>7</mark>	15	2.8	· ·	4.25	-										
18 24			18	4.4	E E	4	-										
			22	4.5	U = .	2 75											
8			24	4.5	Level (m)	3.75											
_					Le II	3.5	+										
						3.25	4										
						3											
						3											
						2.75	+							····			
							0 2 4	4 6	8	10	12 Time	14 (h)	16	18	20	22	24
					<b>s</b>	top	Level 🔳 S	tart Le	vel			. ,					
STE	-	-			1232 32	-	art Level										

This part of the window functions in an identical fashion to the **window for entering profiles**.

In addition, having entered the profile for the start-up level as a function of time, a second profile is shown for the stopping level.

In **Normal** mode, the table associated with the former is to the right of the graph and the table of the latter, to the left and visa versa for **Inverse** mode.

The two profiles are obligatory of the same type, either STEP or LINE.

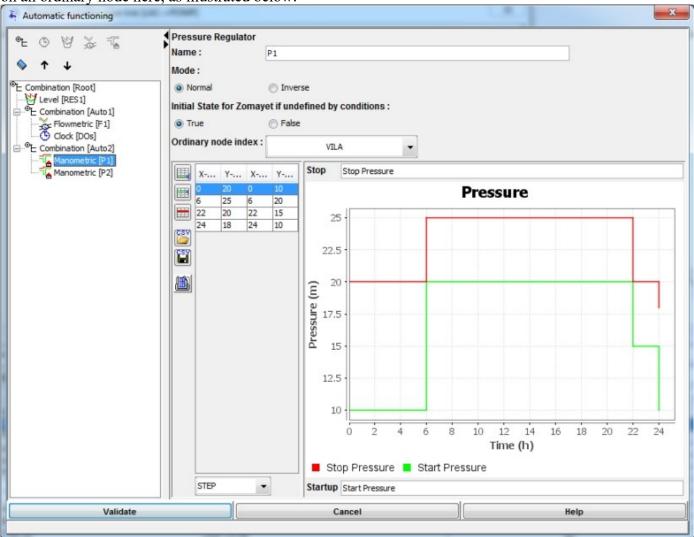


They do not need to contain the same number of points though.

For simulations longer than 24 hours, for which the regulation must be repeated, a value of 24 hours **must be** used for both profiles, otherwise the last value will be applied until the end of the simulation time.

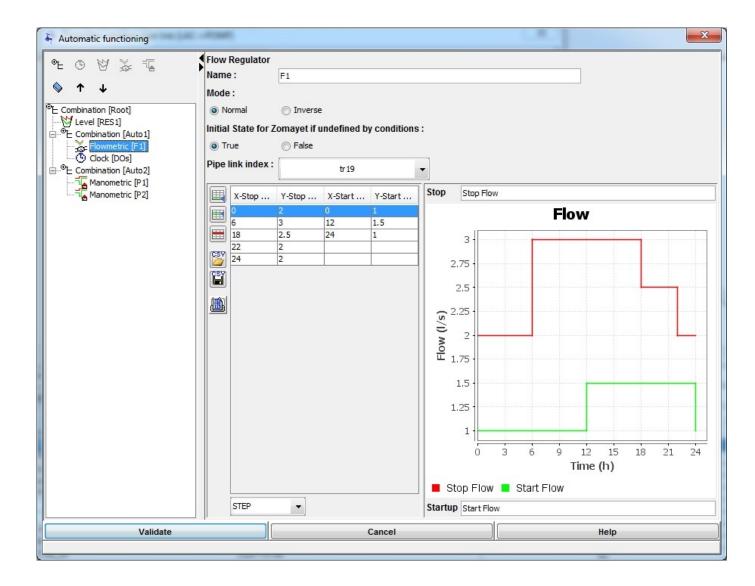
## **Pressure regulator**

The only difference with the <u>level regulator</u> is the data value for the reference variable that is a pressure on an ordinary node here, as illustrated below.

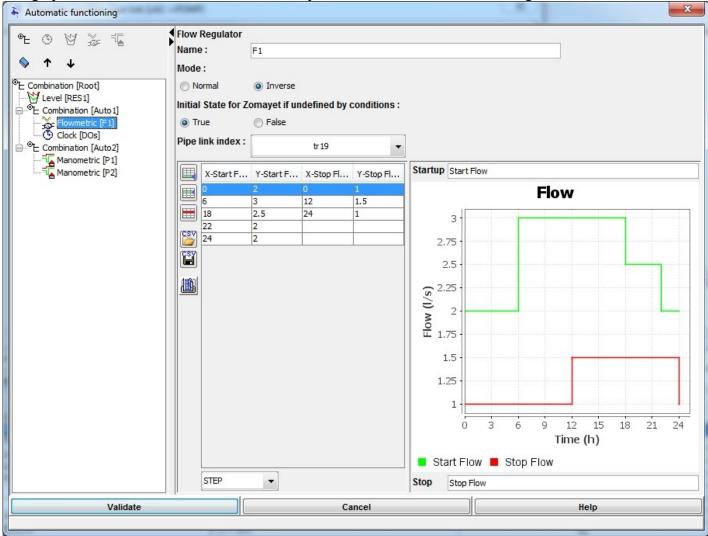


### **Flow regulator**

The only difference with the <u>level regulator</u> is the data value for the reference variable that is a flow through a pipe segment here, as illustrated below.

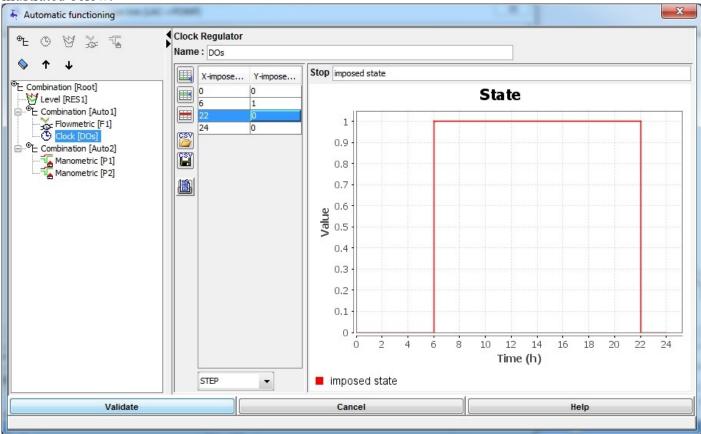


The graphic below shows the Inverse mode: stop at the lowest flow, start at the highest flow.



## **Clock regulator**

This is the simplest of regulators, it is only necessary to enter the state (0 or 1) as a function of time as illustrated below:



### **Combined regulator**

For complex regulation - dependent on several tanks, for example, it is necessary to combine the state of several single regulators (e.g. two tanks require water to turn on a pump).

The "Combined" is used for this. It allows as many regulators as necessary to be associated together, including different types of regulator (combined AND combined, combined OR level, etc...).

RES1	
Inverse	
mayet if undefined by condit	ions :
🔘 False	
RES1	<ul> <li>Base level 170,Escape level 175 m</li> <li>Minimum head 0, Maximum 5 m</li> </ul>
	<ul> <li>Inverse</li> <li>mayet if undefined by condition</li> <li>False</li> </ul>

The "name" field allows the combined regulator to be identified by a chain of characters. Two logical operators for combination are possible:

- Select the States of the regulators with the AND operator,
- Select the OR button to associate the states of the regulators with the OR operator.

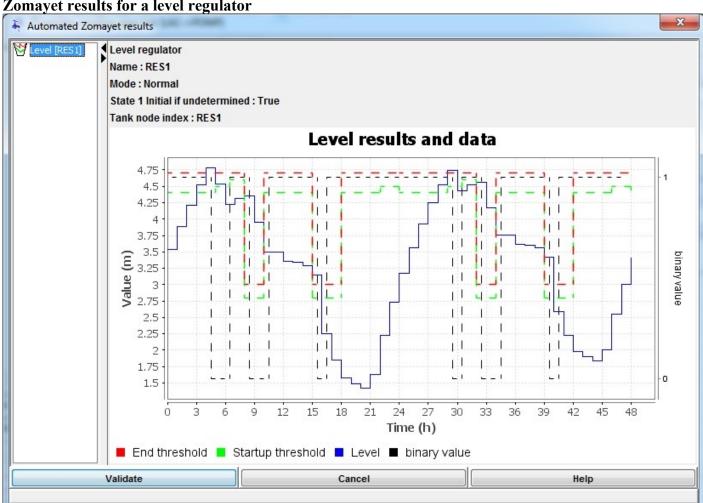
Example :

- AND
  - : (level 1) AND (level 2) :
  - if (state1 = true) AND (state2 = true) then true (start, open) •
  - if (state1 = false) AND (state2 = true) then false (stop, close) •
  - if (state1 = false) AND (state2 = false) then false (stop, close) •
  - if (state1 = true) AND (state2 = false) then false (stop, close) •

OR OR : (level 1) OR (level 2) :

- if (state1 = true) OR (state2 = true) then true (start, open) •
- if (state1 = false) OR (state2 = true) then true (start, open) •
- if (state1 = false) OR (state2 = false) then false (stop, close) •
- if (state1 = true) OR (state2 = false) then true (start, open) •

### **Results of regulation**



The graph above represents results of a Zomayet calculation over 24 hours. We find both curves of start

#### Zomayet results for a level regulator

and stop (green, red). The level calculated as time goes by is represented in blue. The state of the command under binary shape (here a pump) is represented in dotted line (0 for stop, 1 for start), its Y axis is on the right. This graph can be printed or exported in vectoriel file.

## Zomayet results for a combined regulator

nation [45m3/h]	Combination Name : 45m3 Boolean Oper							
Level [mercur_normal] Level [granges_normal]	Time step	Time	Time Decimal	AND Combi 45m3/h	OR Combin normal	Level mercur_nor	Level granges_n	OF
mbination [inverse]	0	06:02:30	6.04	false	false	false	false	
Level [mercur_inverse]	1	06:07:30	6.12	false	false	false	false	
vel [granges_inverse]	2	06:12:30	6.21	false	false	false	false	
	3	06:17:30	6.29	false	false	false	false	
	4	06:22:30	6.38	false	false	false	false	
	5	06:27:30	6.46	false	false	false	false	
	6	06:32:30	6.54	false	false	false	false	
	7	06:37:30	6.62	false	false	false	false	
	8	06:42:30	6.71	false	false	false	false	
	9	06:47:30	6.79	false	false	false	false	
	10	06:52:30	6.88	false	false	false	false	
	11	06:57:30	6.96	false	false	false	false	
	12	07:02:30	7.04	false	false	false	false	
	13	07:07:30	7.12	false	false	false	false	
	14	07:12:30	7.21	false	false	false	false	
	15	07:17:30	7.29	false	false	false	false	
	16	07:22:30	7.38	false	false	false	false	
	17	07:27:30	7.46	false	false	false	false	
	18	07:32:30	7.54	false	false	false	false	
	19	07:37:30	7.62	false	false	false	false	
	20	07:42:30	7.71	false	false	false	false	
	21	07:47:30	7.79	false	false	false	false	
	22	07:52:30	7.88	false	false	false	false	
	23	07:57:30	7.96	false	false	false	false	
	∢		III					+
Validate			Cancel			Help		_

The table for the assembly of regulators allows time step by time step to find the calculation of the complete regulation. The vertical scroll allows exploration of the time until the end of the simulation. This table can be copied (after selecting using <Ctrl>+A) as tabulated text.

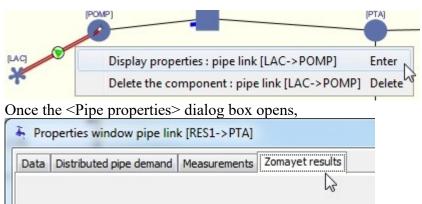
## Access to the pipe simulation results

## Introduction

The access to the pipe simulation results for individual pipe segments firstly requires the pipe itself to be selected and of course on there being calculations results available to consult. Note, even after the modification of the data used for the OPOINTE or ZOMAYET calculations, these results remain present until another calculation replaces them.

To recap, there are three ways to access in Map View or Schematic View:

- Double left click on the selected pipe here in red, LAC-RES1
- Double right click on the selected pipe then select the first line from the contextual menu by either right click or pressing <ENTER> on the keyboard.
- Double click on the table of pipes on the line of the selected pipe.



Click on the "<Opointe results> or <Zomayet results> tabs according to your need.

## Opointe

Only three result figures are shown: the flow in l/s, the velocity of the water in the pipe in m/s and the linear head loss in m.

OPOINTE RESULTS	lemand Measurements Opointe results Zomayet result	
OPOINTE RESULTS	RES1->PTA	
Flow	153.06 l/s	
Velocity	0.54 m/s	
Linear head loss	1.113 m	
Unitary head loss	0.445 mm/m	
Total head loss	1.113 m	
		Þ
Validate	Cancel Help	

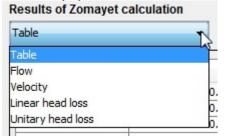
## Zomayet

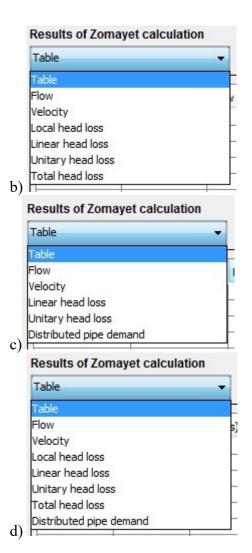
a)

There is access to the results of a Zomayet simulation of one of the pipe segments in the network as a function of time.

The tab shows a table giving different results according to whether the pipe supports a distributed demand or not and/or if it is equipped with a hydraulic device or not.

The scrolling list allows the choice of information to be shown, with 4 variations according to whether the pipe has (a) no particularity; (b) has a hydraulic equipment; (c) has a distributed demand or (d) has both hydraulic equipment and a distributed demand.





The full table of values is shown as follows (here for case d):

Properties window pipe link [PTA->VILB]

Data Distributed pipe demand Measurements Opointe results Zomayet results

•

Table

Time	Time	Flow (I/s)	Velocity m/s	Linear head loss m	Unitary head loss mm/m	Distributed pipe demand l/s	
00:02:30	0.041	24.26	0.49	1.565	1.043	0.04	
00:07:30	0.125	24.25	0.49	1.564	1.043	0.04	
00:12:30	0.208	24.25	0.49	1.564	1.042	0.04	
00:17:30	0.291	24.24	0.49	1.563	1.042	0.04	
00:22:30	0.375	24.23	0.49	1.562	1.041	0.04	
00:27:30	0.458	24.23	0.49	1.561	1.041	0.04	Þ
00:32:30	0.541	24.22	0.49	1.561	1.04	0.04	
00:37:30	0.625	24.21	0.49	1.56	1.04	0.04	
00:42:30	0.708	24.21	0.49	1.559	1.039	0.04	
00:47:30	0.791	24.2	0.49	1.558	1.039	0.04	
00:52:30	0.875	24.19	0.49	1.558	1.038	0.04	
00:57:30	0.958	24.19	0.49	1.557	1.038	0.04	
01:02:30	1.041	24.18	0.49	1.556	1.037	0.04	
01:07:30	1.125	24.18	0.49	1.555	1.037	0.04	
01:12:30	1.208	24.17	0.49	1.555	1.036	0.04	
01:17:30	1.291	24.16	0.49	1.554	1.036	0.04	
01:22:30	1.375	24.16	0.49	1.553	1.035	0.04	
01:27:30	1.458	24.15	0.49	1.552	1.035	0.04	
01:32:30	1.541	24.14	0.49	1.551	1.034	0.04	
01:37:30	1.625	24.14	0.49	1.551	1.034	0.04	
01:42:30	1.708	24.13	0.49	1.55	1.033	0.04	
01:47:30	1.791	24.12	0.49	1.549	1.032	0.04	+
	Validate			Cancel		Help	

There are two time displays, a) in h:m:s ; and b) in fraction of hours, with following calculation results: the flow in l/s, the velocity in m/s, the linear head loss in m, the singular head loss in m, the total head loss in m and the distributed demand in l/s if applicable. It is possible to copy part or all (<Ctrl>+A) of the data to tabular applications using the shortcut <Ctrl>+C.

There are only the first five columns

х

-	Properties	window	pipe	link	[PT1->PTC]
---	------------	--------	------	------	------------

Data Distributed pipe demand Measurements Opointe results Zomayet results

#### **Results of Zomayet calculation**

Time	Time	Flow (I/s)	Velocity m/s	Linear head loss m	Unitary head loss	
00:02:30	0.041	-5.75	-0.78	-33.421	-6.685	
00:07:30	0.125	-5.76	-0.78	-33.448	-6.69	
00:12:30	0.208	-5.76	-0.78	-33.474	-6.695	
00:17:30	0.291	-5.76	-0.78	-33.501	-6.701	
00:22:30	0.375	-5.76	-0.78	-33.527	-6.706	
00:27:30	0.458	-5.77	-0.78	-33.553	-6.711	
00:32:30	0.541	-5.77	-0.78	-33.579	-6.716	
00:37:30	0.625	-5.77	-0.78	-33.605	-6.721	_
00:42:30	0.708	-5.77	-0.78	-33.63	-6.726	
00:47:30	0.791	-5.78	-0.78	-33.656	-6.732	
00:52:30	0.875	-5.78	-0.78	-33.681	-6.737	
00:57:30	0.958	-5.78	-0.78	-33.706	-6.742	
01:02:30	1.041	-5.78	-0.78	-33.731	-6.747	
01:07:30	1.125	-5.78	-0.78	-33.755	-6.751	
01:12:30	1.208	-5.79	-0.78	-33.78	-6.756	
01:17:30	1.291	-5.79	-0.78	-33.804	-6.761	
01:22:30	1.375	-5.79	-0.78	-33.828	-6.766	
01:27:30	1.458	-5.79	-0.78	-33.852	-6.771	
01:32:30	1.541	-5.8	-0.78	-33.876	-6.776	
01:37:30	1.625	-5.8	-0.78	-33.9	-6.78	
01:42:30	1.708	-5.8	-0.78	-33.923	-6.785	
01:47:30	1.791	-5.8	-0.78	-33.947	-6.79	-
Valid	ate		Cancel		Help	

There are only the first seven columns

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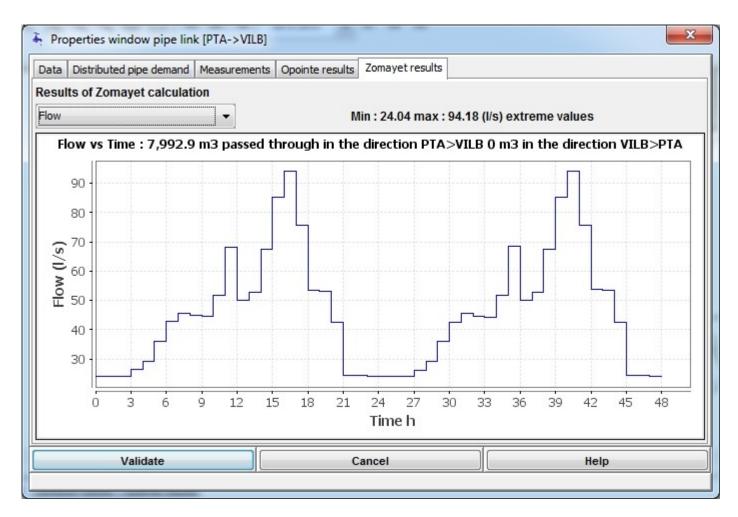
Distributed pip	e demand Meas	surements Device	Opointe results	Zomayet results				
esults of Zoma	yet calculation	L.						
able	-	•						
Time	Time	Flow (I/s)	Velocity m/s	Local head lo	Linear head I	Unitary head	Total head lo	
00:02:30	0.041	107.89	0.38	-76.266	0.004	0.232	-76.261	
00:07:30	0.125	107.89	0.38	-76.266	0.004	0.232	-76.261	
00:12:30	0.208	107.89	0.38	-76.266	0.004	0.232	-76.261	
00:17:30	0.291	107.89	0.38	-76.266	0.004	0.232	-76.261	
00:22:30	0.375	107.89	0.38	-76.266	0.004	0.232	-76.261	
00:27:30	0.458	107.89	0.38	-76.266	0.004	0.232	-76.261	
00:32:30	0.541	107.89	0.38	-76.266	0.004	0.232	-76.261	
00:37:30	0.625	107.89	0.38	-76.266	0.004	0.232	-76.261	
00:42:30	0.708	107.89	0.38	-76.266	0.004	0.232	-76.261	
00:47:30	0.791	107.89	0.38	-76.266	0.004	0.232	-76.261	
00:52:30	0.875	107.89	0.38	-76.266	0.004	0.232	-76.261	
00:57:30	0.958	107.89	0.38	-76.266	0.004	0.232	-76.261	
01:02:30	1.041	107.89	0.38	-76.266	0.004	0.232	-76.261	
01:07:30	1.125	107.89	0.38	-76.266	0.004	0.232	-76.261	
01:12:30	1.208	107.89	0.38	-76.266	0.004	0.232	-76.261	
01:17:30	1.291	107.89	0.38	-76.266	0.004	0.232	-76.261	
01:22:30	1.375	107.89	0.38	-76.266	0.004	0.232	-76.261	
01:27:30	1.458	107.89	0.38	-76.266	0.004	0.232	-76.261	
01:32:30	1.541	107.89	0.38	-76.266	0.004	0.232	-76.261	
01:37:30	1.625	107.89	0.38	-76.266	0.004	0.232	-76.261	
01:42:30	1.708	107.89	0.38	-76.266	0.004	0.232	-76.261	
01:47:30	1.791	107.89	0.38	-76.266	0.004	0.232	-76.261	-
	/alidate			Cancel			Help	

There are only the first five columns and the eighth

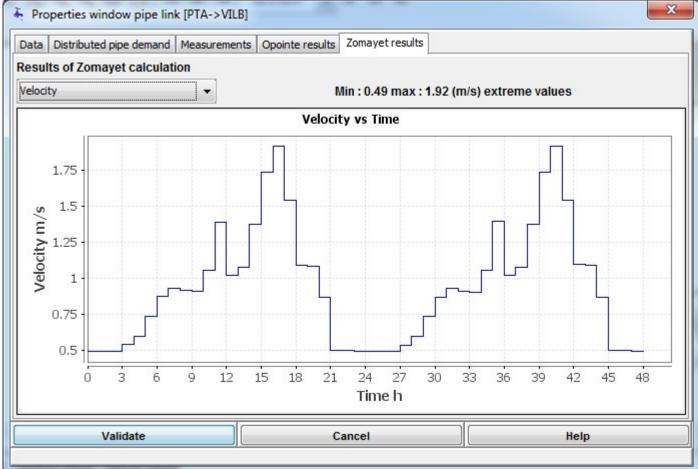
Distributed pip	e demand	Measurements	Opointe results	Zomayet results			
Results of Zon	nayet calc	ulation					
Table		•					
Time	Time	Flow (I/s)	Velocity m/s	Linear head loss m	Unitary head loss mm/m	Distributed pipe demand I/s	
00:02:30	0.041	14.04	0.28	1.137	0.379	0.54	
00:07:30	0.125	14.04	0.28	1.137	0.379	0.54	∍ 🐴
00:12:30	0.208	14.04	0.28	1.137	0.379	0.54	
00:17:30	0.291	14.04	0.28	1.137	0.379	0.54	à
00:22:30	0.375	14.03	0.28	1.136	0.378	0.54	
00:27:30	0.458	14.03	0.28	1.136	0.378	0.54	Þ
00:32:30	0.541	14.03	0.28	1.136	0.378	0.54	
00:37:30	0.625	14.03	0.28	1.136	0.378	0.54	
00:42:30	0.708	14.03	0.28	1.136	0.378	0.54	
00:47:30	0.791	14.03	0.28	1.135	0.378	0.54	
00:52:30	0.875	14.03	0.28	1.135	0.378	0.54	
00:57:30	0.958	14.03	0.28	1.135	0.378	0.54	
01:02:30	1.041	1	0.28	1.135	0.378	0.54	
01:07:30	1.125	14.02	0.28	1.135	0.378	0.54	
01:12:30	1.208	14.02	0.28	1.134	0.378	0.54	
01:17:30	1.291		0.28	1.134	0.378	0.54	
01:22:30	1.375		0.28	1.134	0.378	0.54	
01:27:30	1.458	200000000000000000000000000000000000000	0.28	1.134	0.378	0.54	
01:32:30	1.541		0.28	1.133	0.377	0.54	
01:37:30	1.625		0.28	1.133	0.377	0.54	
01:42:30	1.708		0.28	1.133	0.377	0.54	
01:47:30	1.791	14.01	0.28	1.133	0.377	0.54	-
	Validate			Cancel		Help	

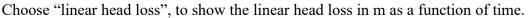
The following are the graphical representations that can be printed and exported in svg format (see the serie of buttons on the right, already presented elsewhere). A header for each graph shows the extreme values during the simulation period.

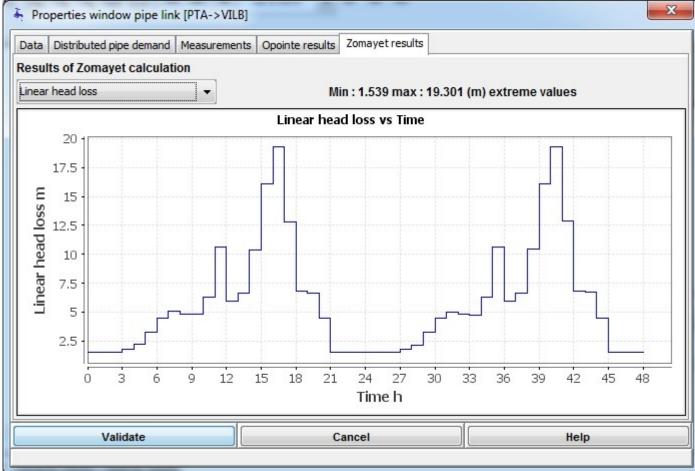
Choose "flow" to show the flow in l/s as a function of time.



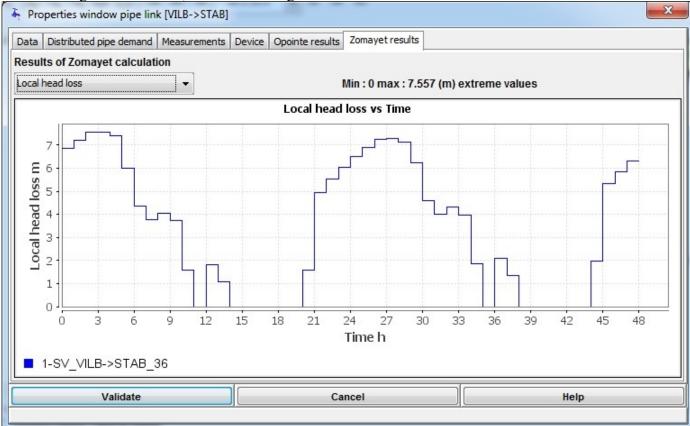
Choose "velocity", to show the velocity in m/s as a function of time.



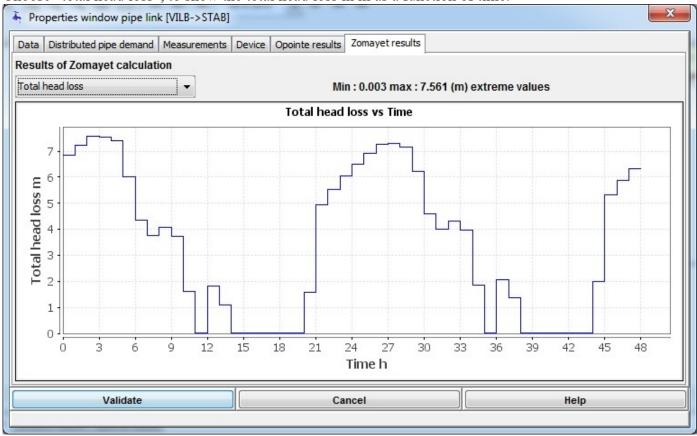




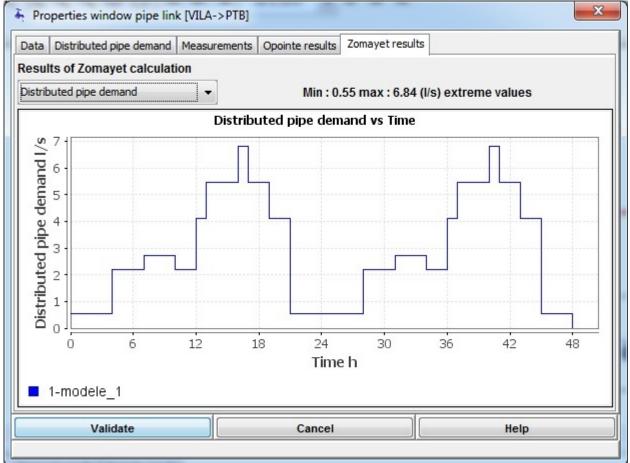
Choose "singular head loss", to show the singular head loss in m as a function of time.



Choose "total head loss", to show the total head loss in m as a function of time.



Choose "distributed demand", to show the distributed demand in l/s as a function of time.



Remember, whenever regulation is applied to a hydraulic device, the results associated to this regulation are explained by following this <u>link</u>.

# Quality

## Managing Quality classes for the pipe segments

The menu below allows "quality" data to be specified allowing the simulation of the evolution of the quality along the pipe segments by category.

) 🔄	Materials/Pipes Management Sectors/Services Management
	Consumption Models
	Generalities Synthesis
	Quality Section Class
	Thermic Section Class
	Processing tools

Each pipe is given parameters to simulate a kinetic law along the route.

The menu accesses t	the dialog	box below:
---------------------	------------	------------

								Class															
								Order		C	onst	tant	Time										
										1			0 🔽										
									- 2	1		0.											
									2	1		0.	2 🗸	]									
															1								
															-								
locati	on of pi	ipe link	is																				_
													Lad L .	In housed									
	k of the	class											Whole N	vetwork	C								
Pipe link	k of the		Material	Dint	Sector	Service	Order	Constant	Time				Name		End	Material	Dint	Sector	Service	Order	Constant	Time	
Pipe link Name	k of the Start	End	Material		Sector	1	Order 1		10110				Name	Start	End					Order 1			
Pipe link Name tr 19	start RES1	End PTA	Indet	600	Sector	S2	Order 1	0	1	-			Name tr 19	Start RES1	End PTA	Indet	600		S2	Order 1	0	V	
Pipe link Name tr 19 tr 20	start RES1 LAC	End PTA POMP	Indet Indet	600 600	Sector	S2 S1	Order 1 1	0	<b>V</b>		1		Name tr 19 tr 20	Start RES1 LAC	End PTA POMP	Indet Indet	600 600		S2 S1	Order 1 1	0	<b>V</b>	
Pipe link Name tr 19 tr 20 tr 24	start RES1 LAC POMP	End PTA POMP RES1	Indet Indet Indet	600 600 600	Sector	S2 S1 S1	Order 1 1 1	0	✓ ✓ ✓	* 	1	<<	Name tr 19 tr 20 tr 24	Start RES1 LAC POMP	End PTA POMP RES1	Indet Indet Indet	600 600 600		S2 S1 S1	Order 1 1 1 1	0	✓ ✓ ✓	
Pipe link Name tr 19 tr 20 tr 24 tr 26	Start RES1 LAC POMP PTA	End PTA POMP RES1 VILA	Indet Indet	600 600	Sector	S2 S1	Order 1 1 1 1 1	0	<b>V</b>		1	<	Name tr 19 tr 20	Start RES1 LAC	End PTA POMP	Indet Indet	600 600		S2 S1	Order 1 1 1 1 1 1	0	<b>V</b> <b>V</b> <b>V</b>	
Pipe link Name tr 19 tr 20 tr 24 tr 26 tr 28	k of the Start RES1 LAC POMP PTA VILA	End PTA POMP RES1 VILA USIN	Indet Indet Indet Indet	600 600 600 500	Sector	S2 S1 S1 S2	Order 1 1 1 1 1 1 1	0 0 0	✓ ✓ ✓		1	<	Name tr 19 tr 20 tr 24 tr 26	Start RES1 LAC POMP PTA	End PTA POMP RES1 VILA	Indet Indet Indet Indet	600 600 600 500		S2 S1 S1 S2	Order 1 1 1 1 1 1 1 1	0 0 0		
Pipe link Name tr 19 tr 20 tr 24 tr 24 tr 26 tr 28 tr 29	k of the Start RES1 LAC POMP PTA VILA	End PTA POMP RES1 VILA USIN	Indet Indet Indet Indet Indet	600 600 600 500 500	Sector	S2 S1 S1 S2 S2	Order 1 1 1 1 1 1 1 1 1	0 0 0 0			1	<	Name tr19 tr20 tr24 tr26 tr28	Start RES1 LAC POMP PTA VILA	End PTA POMP RES1 VILA USIN	Indet Indet Indet Indet Indet	600 600 600 500 500		S2 S1 S1 S2 S2	Order 1 1 1 1 1 1 1 1 1	000000000000000000000000000000000000000		
Pipe link Name tr 19 tr 20 tr 24 tr 26 tr 28 tr 29 tr 30	k of the Start RES1 LAC POMP PTA VILA USIN PTA	End PTA POMP RES1 VILA USIN PTC	Indet Indet Indet Indet Indet Indet	600 600 500 500 500	Sector	S2 S1 S1 S2 S2 S2 S2	Order 1 1 1 1 1 1 1 1 1 1	0 0 0 0 0			1	<<	Name tr 19 tr 20 tr 24 tr 26 tr 28 tr 29	Start RES1 LAC POMP PTA VILA USIN	End PTA POMP RES1 VILA USIN PTC	Indet Indet Indet Indet Indet Indet	600 600 500 500 500		S2 S1 S1 S2 S2 S2 S2	Order 1 1 1 1 1 1 1 1 1 1 1	0 0 0 0 0		
Pipe link Name tr 19 tr 20 tr 24 tr 26 tr 28 tr 29 tr 30 tr 31	k of the Start RES1 LAC POMP PTA VILA USIN PTA VILA	End PTA POMP RES1 VILA USIN PTC VILB	Indet Indet Indet Indet Indet Indet Indet	600 600 500 500 500 250	Sector	S2 S1 S2 S2 S2 S2 S2 S2	Order 1 1 1 1 1 1 1 1 1 1 1 1	0 0 0 0 0 0			1	<<	Name tr 19 tr 20 tr 24 tr 26 tr 28 tr 29 tr 30	Start RES1 LAC POMP PTA VILA USIN PTA	End PTA POMP RES1 VILA USIN PTC VILB	Indet Indet Indet Indet Indet Indet Indet	600 600 500 500 500 250		S2 S1 S2 S2 S2 S2 S2 S2	Order 1 1 1 1 1 1 1 1 1 1 1 1 1	0 0 0 0 0 0 0		
Pipe link Name tr 19 tr 20 tr 24	k of the Start RES1 LAC POMP PTA VILA USIN PTA VILA	End PTA POMP RES1 VILA USIN PTC VILB PTB	Indet Indet Indet Indet Indet Indet Indet Indet	600 600 500 500 500 250 250	Sector	S2 S1 S2 S2 S2 S2 S2 S2 S2 S2	Order 1 1 1 1 1 1 1 1 1 1 1 1 1	0 0 0 0 0 0 0 0			1	<<	Name tr 19 tr 20 tr 24 tr 26 tr 28 tr 29 tr 30 tr 31	Start RES1 LAC POMP PTA VILA USIN PTA VILA	End POMP RES1 VILA USIN PTC VILB PTB	Indet Indet Indet Indet Indet Indet Indet Indet	600 600 500 500 500 250 250		S2 S1 S2 S2 S2 S2 S2 S2 S2 S2 S2	Order 1 1 1 1 1 1 1 1 1 1 1 1 1	0 0 0 0 0 0 0 0		
Pipe link Name tr 19 tr 20 tr 24 tr 26 tr 28 tr 29 tr 30 tr 31 tr 32	k of the Start RES1 LAC POMP PTA VILA USIN PTA VILA VILA	End PTA POMP RES1 VILA USIN PTC VILB PTB PTB	Indet Indet Indet Indet Indet Indet Indet Indet Indet	600 600 500 500 250 250 250 200	Sector	S2 S1 S1 S2 S2 S2 S2 S2 S2 S2 S2 S2	Order 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 0 0 0 0 0 0 0 0 0 0			1	<<	Name tr 19 tr 20 tr 24 tr 26 tr 28 tr 29 tr 30 tr 31 tr 32	Start RES1 LAC POMP PTA VILA USIN PTA VILA VILB	End POMP RES1 VILA USIN PTC VILB PTB PTB	Indet Indet Indet Indet Indet Indet Indet Indet Indet	600 600 500 500 500 250 250 250		S2           S1           S2           S2	Order 1 1 1 1 1 1 1 1 1 1 1 1 1	0 0 0 0 0 0 0 0 0		

Select a line in the table of classes (at the top), the example here has a unique class.

The values of order and kinetic constant can be modified. If order is equal to 1, the unit of the kinetic constant is [h-1].

If the checkbox of the time column is checked, the sections of the class participate in the ageing of the water, otherwise the age of the water does not change in these sections.

In the "Allocation of pipe segments" table appears a list of pipe segments allocated to this class.

In the "Whole network" table appears a list of all pipe segments in the network.

To allocate the selected class to a pipe section in the network, select the line of the pipe in this table then click on the button, the pipe is transferred to the table on the left.

To add a quality class, click on the  $\blacksquare$  button.

To delete a quality class, click on the button. Warning, no other pipe segment must be allocated to a class for it to be deletable.

### Thermic tronçons

The "Management of Thermic Class for Sections" menu below allows to specify "thermic" data simulating the temperature evolution along the pipes by family.

	<u>Materials/Pipes Management</u>
Plan/C	Sectors/Services Management
	Consumption Models
∋ 👬	<u>G</u> eneralities
ð 🗄	<u>Synthesis</u>
	Quality Section Class
-	Thermic Section Class
≤€ 🗄 🗠	Origins Management
NJ .	Processing tools

Each pipe is given parameters to simulate a law of thermic exchange with the outside along its way.

### This menu accesses the dialog box below:

Mana	gemen	t of clas	ses Therm	ic Secti	ion												K			Σ
							Class	1		10										
							Ext	ern limit tem	perat	Thermic	constant									
										10		0								
										10		0.1								
										10		0.13								
01 01 01 01 01 01 01 01	n of pipe of the d	1000 CO.00									Whole I	Vetwork	2							
Name	Start	End	Material	Dint	Sector	Service	Extern li	Thermic			Name	Start	End	Material	Dint	Sector	Service	Extern li	Thermic	
tr 19	RES1	PTA	Indet	600		S2	10	C			tr 19	RES1	PTA	Indet	600		S2	10	0	0
tr 20	LAC	POMP	Indet	600		S1	10	C			tr20	LAC	POMP	Indet	600	2	S1	10	)	0
tr24	POMP	RES1	Indet	600		S1	10	C			tr24	POMP	RES1	Indet	600	2	S1	10	)	0
tr 26	PTA	VILA	Indet	500		S2	10	C		<<	tr26	PTA	VILA	Indet	500	2	S2	10	)	0
	VILA	USIN	Indet	500		S2	10	C			tr28	VILA	USIN	Indet	500	2	S2	10		0
	USIN	PTC	Indet	500		S2	10	C	- 1		tr29	USIN	PTC	Indet	500		S2	10		0
	PTA	VILB	Indet	250		S2	10	C			tr30	PTA	VILB	Indet	250	2	S2	10		0
r31	VILA	PTB	Indet	250		S2	10	C			tr31	VILA	PTB	Indet	250	2	S2	10	)	0
tr 32	VILB	PTB	Indet	200		S2	10	C	-		tr32	VILB	PTB	Indet	200		S2	10	)	0
			Validate						_	Cancel							Hel	p		
	ent of da																	-		

Select a line in the table of classes (at the top), the example here has a unique class. The values of the exchange constant and of the extern limit temperature can be modified. In the "Allocation of pipe segments" table appears a list of pipe segments allocated to this class.

In the "Whole network" table appears a list of all pipe segments in the network.

To allocate the selected class to a pipe section in the network, select the line of the pipe in this table then click on the button, the pipe is transferred to the table on the left.

To add a thermic class, click on the  $\blacksquare$  button.

To delete a thermic class, click on the button. Warning, no other pipe segment must be allocated to a class for it to be deletable.

### Management of source nodes

The menu below allows "quality" data to be specified allowing the tracking of the arrival of water at a node (Keyboard shortcut: <Alt>+R+P).

	<u>Materials/Pipes Management</u> Sectors/Services Management
Plan/C	<u>C</u> onsumption Models
	<u>G</u> eneralities Synthesis
8) #	Quality Section Class
	Thermic Section Class
≝	Origins Management
12	Processing tools

It concerns the identification of nodes from which for all network nodes you wish to know the percentage of water arriving from these designated nodes.

This menu accesses the following dialog box:

List of the Nodes			>>	Origin Nodes	
Type of Node	Name			Type of Node	Name
Reserve	RES1			Ressource	LAC
Ordinaire	PTA	E	Reset		
Ressource	LAC				
Ordinaire	POMP				
Ordinaire	VILA				
Ordinaire	USIN	-			

Select a node from the "List of nodes" in the network (the left hand table), in this example, the node GRATELOU. To pass it to the "Source nodes" list (the right hand table), click on the button.

To remove a node from the "Source nodes" list, select it as below for the VESVRES node.

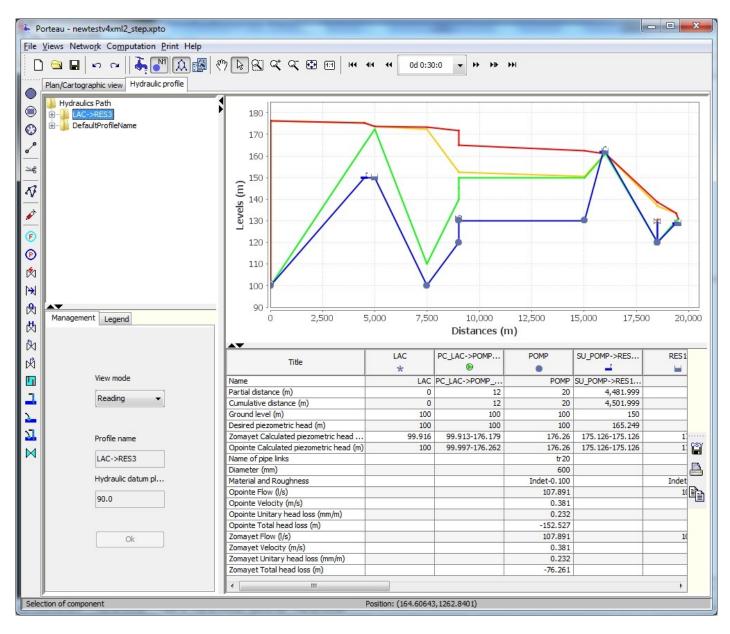
List of the Nodes			>>	Origin Nodes		
Type of Node	Name			Type of Node	Name	
Reserve	RES1		54			
Ordinaire	PTA	=	Reset De	lete the node from t	he Origins' list	
Ressource	LAC					
Ordinaire	POMP					
or an ion c	1.01.1	8				
	VILA					
Ordinaire Ordinaire		•	5			
Ordinaire		-	Cancel		Help	
Ordinaire Ordinaire		<b>•</b>	Cancel		Help	
Ordinaire Ordinaire		-	Cancel		Help	
Ordinaire Ordinaire Valida n click on the	VILA USIN tte	e nodes" li		n the Reset	Help	
Ordinaire Ordinaire Valida n click on the delete all the no	vilA USIN 		ist, click o	n the Reset		

Help to obtain help.

## The detailed profile

### Presentation

The detailed profiles are edited from the "Detailed profile" tab. The list of existing profiles is found in the navigator at the top left. This list may be empty. If no profile is selected, the basic window appears as below:



NB: we notice the following windows:

- 1. at the top left: Browser of detailed profiles
- 2. at the top right: Graphs or curves of the selected detailed profile
- 3. at the bottom left:
  - 1. Parameters tab of the selected detailed profile
  - 2. Legend tab of the graph or the curves of the selected detailed profile
- 4. at the bottom right: Data and results table of the selected detailed profile

### Select a detailed profile

A detailed profile is shown by selecting the name of the profile in the browser windows, and nodes and pipes are also selected by selecting their name, once the correct profile has been chosen.

### Add a detailed profile

To add a detailed profile, click right on the root of the list of profiles and choose "add a list".

### **Delete a selected profile**

To delete a detailed profile, click right on the profile of the list of profiles and choose "delete the list".

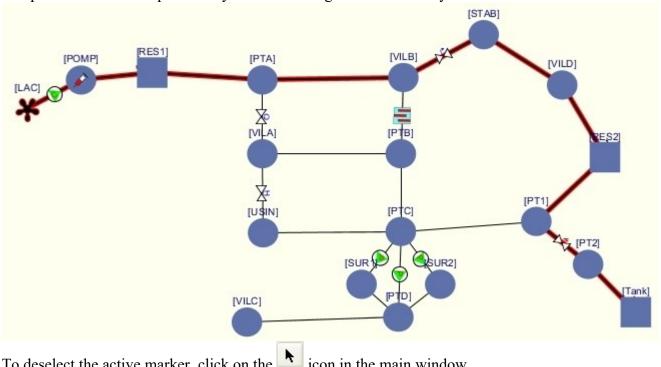
Plan/Cartogra	aphic view Hydraulic profile
Hydraulie	Add a path
⊕	Delete the path

### Create a detailed profile

From an existing network, a detailed profile is created by first adding a list in the window of detailed profiles. Then to create the profile in the graphic tab, click on the hydraulic profile icon symbolised by

 $\sqrt[47]{}$  in the button bar at the left of the main window.

Then, in the graphics window, use the cursor  $\searrow$  to position a source node for the network. This node is the start of a path of pipe segments that is highlighted when clicked on. The path of the detailed profile stays visible as long as the cursor stays active:



#### icon in the main window. To deselect the active marker, click on the

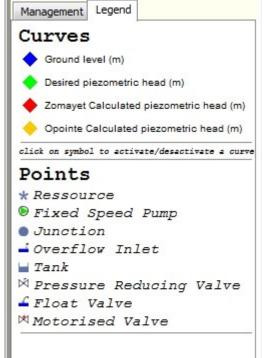
### **Read/Modify parameters**

In the "Management" tab, from the detailed profile window, the profile's parameters and consultation can be managed in the management/legend area.

 hagement Legend
View mode Editing
Profile name
LAC->RES3 Hydraulic datum plane (m)
90.0
Ok

To modify the parameters of the displayed profile, choose a display mode: "Edit", and validate changes. The PHR head allows the origin heads of the graphic to be regulated.

In the "Legend" tab, functions for consulting the detailed profiles are shown:



The legend for piezometric profiles for Opointe and Zomayet is shown only if the results of theses modules are present.

## **Pressure Indicators**

The menu below "Pressure Indicators" allows to compute sector by sector or for all of the network some pressure and demand indicators.

File	Views	Network	Computation	Test	Print	He
•	Plan/Car	Ser	terials/Pipes Ma ctors/Services I nsumption Mod	Manag		
) () ()		Ge	neralities nthesis			
28			essure indicato			
N/		The	ality Section Cla ermic Section C	lass		
é		Ori	gins Manageme	ent		
a		Pro	cessing tools			>

### This menu displays this dialog box:

	e Indicators Pressures Demar	ıds									
Sector	nb of Nodes	Demand m3	Length m	Mean Pres	Mean Pres	Mean Pres	Critical Pre	Critical node	Pressure m	Pressure m	Pressure m
A	0	0	0	0	0	0	0		0	0	0
3	0	0	0	0	0	0	0		0	0	0
8	0	0	0	0	0	0	0		0	0	0
Calculate	selected sector	Calculate re	emaining sector:	5							
	Valio	date			C	ancel				Help	

The dialog is composed of three tabs. The first tab gives a sector values for each line of the table. If one line or more are selected (multiple selection allowed), the table displays the selection and the calculation buttons are activated.

indicators	Pressures Deman	ids									
Sector	nb of Nodes	Demand m3	Length m	Mean Pres	Mean Pres	Mean Pres	Critical Pre	Critical node	Pressure m	Pressure m	Pressure m
l	0	0	0	0	0	0	0		0	0	0
}	0	0	0	0	0	0	0		0	0	0
3	0	0	0	0	0	0	0		0	0	0
Calculate	selected sector	Calculate r	emaining sector:	5				1			
	Valio	late			Ca	ancel				Help	

Click on the button Calculate selected sector launches the computation of pressures and demands for the selected sectors. Results are stored in tables of the two tabs "Pressures" and "Demands", and each line of the table in the current tab is updated with the results of indicators done with Zomayet results.

Pressure I	ndicators										×
Indicators Pre	essures Demar	nds									
Sector	nb of Nodes	Demand m3	Length m	Mean Pres	Mean Pres	Mean Pres	Critical Pre	Critical node	Pressure m	Pressure m	Pressure m
A	643	10,541.865	36,243.711	48.256	48.166	48.285	27.889	n50	38.958	49.377	54.657
В	0	0	0	0	0	0	0		0	0	0
С	0	0	0	0	0	0	0		0	0	0
Calculate se	lected sector	Calculate re	emaining sectors	5							
	Valio	late			Ca	ancel				Help	
Select a sector t	o calculate indi	cators		8				1210			

Click on the button Calculate remaining sectors launches the computation of indicators for the sectors not calculated before.

Indicators columns are:

- Sector: the name of the sector
- nb de Nodes: the number of nodes of the sector
- Demand m3: the total demand of the sector calculated for the duration of Zomayet simulation in en m<sup>3</sup>.
- Length m: the cumulated length for all links of the sector
- Mean Pressure m: the mean of pressure for all time steps of Zomayet and all nodes of the sector
- Mean Pressure / Length: the mean pressure weighted by the length of adjacent links of the node for the sector = sum for all nodes of the sector ( mean pressure \* 1/2 length of adjacent links of he node ) / sum of length of links for the sector Caution: only pressure for nodes with demand are taken in account, but all the length are summed.
- Mean Pressure / Demand: the mean pressure weighted by the demand of adjacent links and the demande of the nodefor the sector = sum for all nodes of the sector ( mean \* (node + 1/2 adj link demand ) / sum of all demands for the sector
- Critical Pressure m : the critical pressure (minimum of all Zomayet time steps) for the sector, only nodes with demands are considered
- Critical Node: Node where the critical pressure is measured
- Pressure max 10 %: the mean pressure for the first decile of sector mean pressures
- Pressure max 50 %: the mean pressure for the fifth decile of sector mean pressures
- Pressure max 90 %: the mean pressure for the ninth decile of sector mean pressures

The "Pressure" Tab shows for each node of calculated sectors one line with all pressures for all time steps of Zomayet simulation and at the end of the line values of "Mean Pressure", "Demand in m3" for the simulation duration, "Length in m" for adjacents links of the node divided by 2.

## Fressure Indicators

Sector	Node	150 s	450 s	85950 s	86250 s	Mean Pres	Demand m3	Length m
A	n100	49.202	49.218	49.169	49.156	49.173	32.578	73.211
A	n101	50.073	50.089	50.038	50.024	50.043	11.032	51.318
A	n102	50.51	50.527	50.475	50.46	50.479	7.453	83.497
A	n103	49.868	49.884	49.833	49.819	49.839	8.656	46.927
A	n104	53.203	53.22	53.165	53.149	53.168	0.42	80.941
A	n105	50.216	50.233	50.182	50.169	50.188	0.1	57.721
A	n106	50.693	50.71	50.657	50.642	50.661	9.975	50.076
A	n107	50.671	50.688	50.635	50.621	50.641	0.053	48.98
A	n108	54.339	54.357	54.301	54.285	54.304	0.205	68.088
A	n109	50.712	50.729	50.676	50.662	50.682	0.041	29.509
A	n110	50.51	50.524	50.481	50.469	50.486	2.115	59.241
A	n112	50.744	50.759	50.713	50.701	50.719	13.955	52.866
A	n113	50.642	50.658	50.608	50.595	50.616	12.367	70.596
A	n114	53.687	53.704	53.649	53.633	53.652	14.712	56.61
A	n115	50.721	50.731	50.701	50.694	50.709	0.464	105.481
<	I	i						>
	Valida	te		Cancel			Help	

The "Demands" Tab shows for each node of calculated sectors one line with all the demands values for all time steps of Zomayet simulation and at the end of the line the value of total demand of the node in m3 for the simulation. The Dressure Indicators

Sector	Node	150 s	450 s	750 s	1050 s	85950 s	86250 s	Demand m3
A	n100	0.09	0.087	0.084	0.083	0.094	0.093	32.578
4	n101	0.03	0.029	0.028	0.028	0.032	0.031	11.032
4	n102	0.02	0.019	0.019	0.018	0.021	0.021	7.453
4	n103	0.024	0.024	0.023	0.023	0.025	0.025	8.656
A	n104	0.001	0.001	0.001	0.001	0.001	0.001	0.42
A	n105	0	0	0	0	0	0	0.1
4	n106	0.028	0.027	0.026	0.025	0.029	0.028	9.975
4	n107	0	0	0	0	0	0	0.053
A	n108	0.001	0.001	0.001	0.001	0.001	0.001	0.205
1	n109	0	0	0	0	0	0	0.041
4	n110	0.006	0.005	0.005	0.005	0.006	0.006	2.115
4	n112	0.04	0.039	0.038	0.038	0.042	0.042	13.955
4	n113	0.035	0.034	0.033	0.032	0.036	0.036	12.367
A	n114	0.044	0.044	0.043	0.042	0.046	0.047	14.712
4	n115	0.001	0.001	0.001	0.001	0.001	0.001	0.464
<	1							>
	Validat	e		Cance	el		Help	

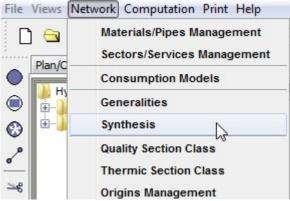
X

×

## Synthesis

## Synthesis of the collection of data comprising the project studied

Select "Synthesis" in the menu "Network" (Keyboard shortcut: <Alt>+R+S). The Synthesis of the network dialog box appears...



It contains six tabs for a synthesis of the different elements classed by families: general, pipe segments, distribution, supply, pipe hydraulic devices and node hydraulic devices.

## Synthesis for the network

e network For the pipe links For the distribution For the conveyance For t	he hydraulic device "pipe links"   For the hydraulic device "nodes"
General information Network : Project : Description : Exemple d'utilisation du programme ZOMAYET Août 194 Author(s) :	Consumptions and pipes 5 Consumption models of which 1 Domestic (cumulative volumes :4,668.0 m3) 4 Industrial (cumulative volumes :10,573.4 m3) Cumulative consumptions :15,241.4 m3 18 different materials / 60 different pipes
-Pipe links and hydraulic devices	2 Sectors / 3 Services
23 Pipe links (41581 m) 5 loops 13 hydraulic device "Pipe link" of which 1 Flow Control Valve 1 Local Headlosses 3 Constant Horsepower Pumps 1 Pump by its Curve 1 Pressure Breaker Valve 1 Float Valve 1 Float Valve 2 Overflow Inlets 1 General Purpose Valve 1 Motorised Valve	19 Nodes of which 15 Ordinary nodes 3 tanks 1 reservoir 1 hydraulic device "Node" of which 1 Disinfectant injector

• "General information" shows general information linked to the current project including company, network and author(s).

- "Consumptions and pipes" presents the numbers of each of the different types of consumption model as well as the number of materials and pipe types described.
- "Pipe segments and their hydraulic devices" shows the total number of pipes, the loops as well as the number of hydraulic devices by type.
- "Nodes and their hydraulic devices" shows the total number of nodes and number per type (ordinary, tank, source) as well as the number of hydraulic devices by type.

The **Continue** button closes the dialog box (identical to all the tabs concerning the synthesis).

## Synthesis for the pipe links

		•				1
Material	Diameter (mm)	Colebrook	Hazen-Williams roughness	Length	Percentage (%)	Number of pipe links
Matériau indéterminé	(mm) 600.00	roughness 0.05	141.00	(m) 2,500.00	6	1
Matériau indéterminé	600.00	0.10	136.00	2,300.00	0	1
Matériau indéterminé	600.00	0.25	130.00	4,980.00	12	1
Matériau indéterminé	500.00	0.10	136.00	7,000.00	17	3
Matériau indéterminé	250.00	0.10	136.00	10,510.00	25	4
Matériau indéterminé	200.00	0.10	136.00	4,570.00	11	7
Matériau indéterminé	300.00	0.50	116.00	2,500.00	6	1
Matériau indéterminé	97.40	0.05	141.00	6,000.00	14	2
Matériau indéterminé	112.40	0.05	141.00	2,500.00	6	1
Matériau indéterminé	150.00	0.10	136.00	1,001.00	2	2
Neighted average / total	320.03	0.13	135.40	41,581.00	100	23

A table presents the statistics by material and by diameter, including notably the length per pipe type, the percentage of the total length and the number of pipe segments belonging to this pipe type. The last line, highlighted in cyan shows information on the average type weighted by the length for the diameter and roughness columns, and by the total types for the length, percentage and number of pipes columns.

Remark 1: all the tables presented in this "Synthesis" chapter, including the column headers can be transferred to other programs by selecting using <Ctrl>+A and copying <Ctrl>+C then pasting. Remark 2: on the right of all the synthesis tabs with the table are three icons which have the following roles:

- prints the table with the default size of worksheet, margins and orientation to the default printer.
- Opens the print properties dialog, which includes choice of printer (including generating pdf files if PdfCreator ® or such like is installed), the worksheet orientation (portrait or landscape), the paper format and margins. These values, once modified and not cancelled, apply to all subsequent print operations during the Porteau session or until the next modification.
- provides a print preview. A dialog box opens and shows the format of the page that will be printed. A button allows the printing to go ahead and a button closes the dialog box without printing. A scroll list allows the scale to be chosen, either 10, 25, 50 or 100%.

## Synthesis for the distribution

A group of 7 tabs is proposed to detail the synthesis of consumptions.

### **Domestic consumptions**

This table shows the number of the consumption model, the title, the total number of users and the volume consumed during the simulation.

medde combampde		es with other networks	ocal leake Subecrib	ed watering Irrigat	ed area Irrigation byd	rant by costore by	convisor	
Model No.	Title	Probabiliy of opening	Specific flow (l)	Multiplier coef. Opointe	Volume/consummer over the period (I)	Multiplier coef. Zomayet	Total number of consumers	Volumes over the period of the simulation (m3)
1	Domestique 10 m3/an	0.02	0.5	1	920	1	5737	1033.2
4	Pertes	0.02	0.5	1	132.3	1	0	0
	Th	he information from one sim	ulation remains for i	ts duration Cu	umulative for domestic co	onsumers, number of	consumers : 5,73	7.0, Volumes : 1,033.3

### **Industrial consumptions**

This table shows the number of the consumption model, the title, the peak time (sum of consumptions at the peak time) and the volume consumed during the simulation.

Synthesis	TO A COURSE				×
For the network For t	he pipe links For the distribution For the conve	eyance For the hydraulic device "pipe lir	nks" For the hydraulic device "node	S"	
Domestic consumptions	s Industrial consumptions Exchanges with other	networks. Local leaks. Subscribed wate	ring Irrigated area Irrigation hyd	by sectors by services	
Model	Title	Peak time	Multiplier coef.	Multiplier coef.	Volumes over the period
No.		(l/s)	Opointe	Zomayet	
2	Incendie	0	1	1	•
3	Industriels	0	1	1	
5	vuitton	0	1	1	0
		The ir	nformation from one simulation remai	ns for its duration Cumulative	e for industrial consumers 0.0
		Con	tinue		

### Exchanges with other networks

This table presents a report of the exchanges with other networks allowing these volumes to be identified separately.

🧍 Synth	hesis	500 a 100	044400				-	0.8		×
For the	network For the	pipe links For the distrib	bution For the conveyance	For the hydra	aulic device "pipe links"	For the hydrau	lic device "nodes"			
Domes	stic consumptions	Industrial consumptions	Exchanges with other net	orks Local leak	s Subscribed watering	Irrigated area	Irrigation hydrant	by sectors by services		
	Model	Title		k flow	Multiplier coef.		Multiplier coef.	Peak coef	Volumes over the period	
	No.	(l/s)	0	ointe	Opointe		Zomayet	for Zomayet	of the simulation (m3)	
	7	échang	ge	20		1		1	4	216
					-The information from on	e simulation rer	mains for its duration	Cumulative for exchanges	with other networks 216.0	
					Continue	•				
0.00										

### Localised leakages

This table presents the synthesis of the volumes, clearly identified in the consumption models as leakage.

5 Synthesis	500 a 100	84400-					X
For the network For the	pipe links For the distribut	tion For the conveyance Fo	r the hydraulic device "pipe	links" For the hydraulic de	vice "nodes"		
Domestic consumptions	Industrial consumptions E	Exchanges with other networks	Local leaks Subscribed w	atering Irrigated area Irri	gation hydrant by sectors	by services	
Model	Title	Peak leak	Multiplier coef.	Volume over	Multiplier coef.	Number of	Volumes over the period
No.		coefficient	Opointe	the period (I)	Zomayet	local leaks	of the simulation (ms)
6	fuite locale	0.5	1	2000	1		1 2
2							
				-The information from one si	mulation remains for its dur	ation Cumulative for	or localised leakage 2.0 -
			C	ontinue			

### By sectors

This table gives information on the number of nodes and pipe segments allocated to each sector described, and for each family of consumption (domestic, industrial, exchange with other network, localised leakage) the volumes of water consumed during the period of simulation (24 hours by default). The last line of the table highlighted in cyan shows the total for each column. In the absence of a sector reference for the nodes and pipes, "without sector" is displayed.

mestic consumptio	ons Industrial con	sumptions Exchange	ges with other netwo	rks Local Jeaks Su	hscribed watering	Irrinated area Irrin	ation bydrant. by s	ectors by services	1		
Sectors	Allocated nodes	Allocated pipe links			Volumes of exchanges (m3)	Volumes of local	Volumes of	Volumes of	Volumes of	Total volumes (m3)	
Secteur nº5	2	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
3	0	160	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6
4	0	149	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
5	0	1155	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	U
1	0	33	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	0	386	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
without sector	1757	43	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
Totals	1759	1926	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

### By services

This table gives information on the number of nodes and pipe segments allocated to each service described, and for each family of consumption (domestic, industrial, exchange with other networks, localised leakage) the volumes of water consumed during the period of simulation (24 hours by default). The last line of the table highlighted in cyan shows the total for each column. In the absence of a service reference for the nodes and pipes, "without service" is displayed.

omestic consump	tions Industrial con	sumptions Exchange	es with other netwo	rks Local leaks Su	oscribed watering	Irrigated area Irrig	ation hydrant by s	ectors by services	1	
Services	Number of allocated no	Number of allocated pip	Volumes of dom		Volumes of exchanges (m3)	Volumes of local	Volumes of subscribed flow	Volumes of	Volumes of	Total volumes (m3)
S1	40	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
without service	1719	1926	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Totals	1759	1926	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## Synthesis on supply

This synthesis provides information across 4 tabs relating to tanks, reservoirs, pumps and motorised valves.

### - Tanks

	For the pipe links	For the distribution	For the conveyance	For the hydraulic device "pipe	links" For the hydraulic device "nodes"			
Tanks Resour	ces Pumps Moto	rised.Valves.						
N	lode iame	Тур	≥ of nk	Shape of the tank	Escape level (m)	Base level (m)	Capacity of tank (m3)	
RES	OCEAN	Groun	d tank	Cylindrical	28.3	25	1000	
RE	SCAR	Groun	d tank	Cylindrical	66.9	55.3	2444.2	2 6
RES	SSAUV	Groun	d tank	Cylindrical	66.3	55.7	1925.4	4
RES	ESCOU	Groun	d tank	Cylindrical	19.8	16	99.9	9 🗳
RES	STALA	Groun	d tank	Cylindrical	20	16	2000	
RES	STADE	Groun	d tank	Cylindrical	20.7	17.5	30(	
N	167	Groun	d tank	Cylindrical	40	20	2000	0

In the presence of Zomayet calculation results, several columns are added concerning these results with the totals at the bottom of the screen:

ks Resources	Pumps Motorised V	alves										
Node name	Type of tank	Shape of the tank	Escape level (m)	Base level (m)	Capacity of tank (m3)	Minimum level (m)	Maximum level (m)	Useful volume (m3)	Entering volume (m3)	Leaving volume (m3)	Overflowing volume (m3)	
RESOCEAN	Ground tank	Cylindrical	28.3	25	1000	3.29	3.39	29.4	2401.9	2316.6	55.8	
RESCAR	Ground tank	Cylindrical	66.9	55.3	2444.2	8.39	9.32	196	385.7	419.3	0	
RESSAUV	Ground tank	Cylindrical	66.3	55.7	1925.4	-0.04	8.7	1588.2	4295.8	5878.1	0	6
RESESCOU	Ground tank	Cylindrical	19.8	16	99.9	3.79	3.89	2.5	2764.8	287.7	2474.4	
RESTALA	Ground tank	Cylindrical	20	16	2000	3	4	499.9	3602.8	1658.8	1444	
RESSTADE	Ground tank	Cylindrical	20.7	17.5	300	3.2	3.29	9	2161	0	2151.9	E
N167	Ground tank	Cylindrical	40	20	20000	10	18.49	8521.9	8521.9	0	0	
		Th	e information from o	one simulation rema	ains for its duration	Total ente	ring / leaving / ov	erflowing volumes	: 24,134.2	10,560.7	6,126.3	

#### - Reservoirs

Node	type of the	Water level (m)	max instantaneous flow	d
name	resource		of sample (l/s)	9
ALIMOCEA	pond	30		0
ALIMESCO	pond	22		0 10
ALIMTAL	pond	22		0
ALIMSTAD	pond	23		0 10
ALIMHUGA	pond	50		0

In the presence of Zomayet calculation results, several columns are added concerning these results with the totals at the bottom of the screen:

nks Resources PL	mps Motorised Valves		nce For the hydraulic device "					
Node name	type of the resource	Water level (m)	max instantaneous flow of sample (I/s)	Maximum flow (l/s)	Minimum flow (I/s)	Useful volume (m3)	Entering volume (m3)	Leaving volume (m3)
ALIMOCEA	pond	30	0	27.8	27.8	2401.9	0	2401.9
ALIMESCO	pond	22	0	32	32	2764.8	0	2764.8
ALIMTAL	pond	22	0	41.7	41.7	3602.8	0	3602.8
ALIMSTAD	pond	23	0	25	25	2160	0	2160
ALIMHUGA	pond	50	0	30.6	30.6	2643.8	0	2643.8
			The information	n from one simulation re	mains for its duration	Total volumes ente	ring/leaving 0.0	2643.8 13,573.5

### - Pumps

the network For the pipe links For the distribution For the conveyance For the hydraulic	device "pipe links" For the hydraulic device "nodes"	
anks Resources Pumps Motorised Valves		
type of the	attributed to	
pump	the pipe link	
Power	tr282:N169-N2	
Power	tr317:N164-N142	
Curve	tr320:N173-N146	
Curve	tr324:N174-N147	
Curve	tr330:N165-N151	E
Curve	tr 334:N166-N152	Ē
	Continue	

In the presence of Zomayet calculation results, several columns are added concerning these results with the totals at the bottom of the screen:

ks Resources Pumps	Motorised Valves					
type of the pump	attributed to the pipe link	Maximum flow (I/s)	Minimum flow (l/s)	Duration of functioning	Number of startups	pumped volume (m3)
Power	tr282:N169-N2	27.13	25.81	24h 00mn	0	2316.6
Power	tr317:N164-N142	30.18	29.78	2h 40mn	1	287.7
Curve	tr320:N173-N146	15.88	15.8	0h 35mn	0	33.2
Curve	tr324:N174-N147	25.23	15.8	18h 10mn	2	1625.5
Curve	tr330:N165-N151	-0.2	-0.3	0h 35mn	0	-0.6
Curve	tr334:N166-N152	-0.2	-0.3	0h 35mn	0	-0.6
			The informatic	on from one simulation remain	os for its duration Total	volume pumped 4,262.2

### - Motorised valves

G Synthesis
For the network For the pipe links For the distribution For the conveyance For the hydraulic device "pipe links" For the hydraulic device. "nodes"
Tanks Resources Pumps Motorised Valves
attributed to
the pipe link
tr2856:0000353-0000354
0 2009:0000009-51_REMEA
tr2929:0000402-0000321
tr2931:00000405
Continue

In the presence of Zomayet calculation results, several columns are added concerning these results with the totals at the bottom of the screen:

ks Resources Pumps Motorised	Valves				
attributed to the pipe link	Maximum flow (l/s)	Minimum flow (I/s)	Duration of opening	Number of openings	Volume passing through (m3)
tr2931:00000404-00000405	-7.38	-10.61	12h 35mn	4	-388.4
tr2856:00000353-00000354	5.55	4.46	20h 05mn	1	364.5
tr2889:0000089-ST_REMEA	11.61	2.42	13h 10mn	4	371.3
tr2929:00000402-00000321	12.08	8.73	13h 20mn	5	493.7
		The	information from one simulatio	n remains for its duration Total	volume passing through 841.3

## Synthesis for pipe link hydraulic devices

For each type of device, a tab makes a list of them.

• Check Valves: for example the screen copy.

Pressure Breaker Valves	Float Valve	Pressure Sustainin	ng or Reducing Valve	Pressure Sus	staining&Reducing Valve	Overflow Inlet	General Purpose Valve	Motorised Valve
Check Valve Float Valve-Overflow Combination			Flow Control Valve Local Headloss		Curve Pump	Constant Horse		
ID			attributed to the pipe link			Flow direction		
CL_000003	375->00000185_2884	4	tr 2883 : 00000375-00000185			00000375>>>>>00000185		
CL_000003	CL_00000372->00000373_2907			tr2906 : 00000372-00000373			00000372>>>>>00000373	
			0250	010000072 0000	0373			6

- Float Valve-Overflow Combination
- Flow Control Valve
- Local Headloss
- Curve Pumps
- Constant Horsepower Pumps
- Pressure Breaker Valves
- Float Valve
- Pressure Valves (Sustaining or Reducing)
- Overflow Inlets
- General Purpose Valves
- Motorised Valves

## Synthesis for node devices

As the device of pipe, a tab makes a list for each device node type.

## **Disinfectant controllers**

Synthesis	
For the network For the pipe links For the distribution For the conveyance For the hydraulic dev	vice "pipe links" For the hydraulic device "nodes"
Disinfectant injectors	
ID	attributed to the node
ID_70	POMP
	Continue

## **Data import**

## **INP** import

### Acces to the INP importation menu

File	Views Network Comp
	New
	Open
	Concat
	Save
	Save as
	Import a pto file
	Import a dxf file
	Import a Shape File
	Import a INP file
	Export to INP file
	Recent Files
	Exit

This dialog box is accessible by selecting the menu "File", sub menu "Import an INP file".

The dialog box appears for the choice of file to treat.

### **Choice of INP file**

Open				×
Look in:	🕕 0.00Travail		•	🏂 📂 🖽 📟
e	🍌 .metadata			src
	🍶 .settings			xsd
Documents	🍶 aide			72_6.inp
récents	🍌 archives			8tr8nodebase.inp
	🍌 bak			] a.inp
	퉬 bin			brl.inp
Bureau	🍶 calage			] canca_actuel_global.inp
	🔒 CD			conso_dom.inp
B	🍶 dll			] craf.inp
	011b 🌜			] demand.inp
Mes documents	🍶 engees			] DenisTest.inp
	🍌 help			diams.inp
1	鷆 lib			ja.inp
	META-INF			] mayotte.inp
Ordinateur	l ressources			net3.inp
1	•	III		•
	File name:			Open
Réseau				
Reseau	Files of type:	EPANET (*.INP)		<ul> <li>Cancel</li> </ul>

Choose the file in Epanet INP format to convert.

### Conversion

After validation, the file is read and converted line by line.

Firstly the file is read to convert the OPTIONS, TIMES and BACKDROP sections.

Only the variables compatible with Porteau are transferred.

The background layer is not converted, it must be retreated by the <u>"select"</u> and <u>"resize"</u> background map dialog boxes.

The PATTERN and CURVE sections are read to store the names of "patterns" and "curves" referenced in other sections.

The file is then read again from the beginning.

The TITLE section is converted into three lines for the title, the network and the general description. The JUNCTIONS section is converted as an ordinary node. If consumptions are stored on the nodes without reference to a pattern model, a new consumption model of industrial type is created with a constant graph through the duration of the patterns and named "Epanet Default Demand Model". The unit must be **LPS**.

The TANKS and RESERVOIRS sections are converted into Tanks or Resources according to the data. The PIPES section is converted into pipe segments that are able to carry a closed valve - a check valve. Each new value of combinations of diameter and roughness creates a new pipe type in the project catalogue associated to the named material "INP Import". Following the law of head loss used, the roughness coefficient is converted from Hazen-Williams to Colebrook or vice versa so that all the fields are correct in the pipe types and pipe segments. The conversion is made by simple equivalence between the law of Hazen-Williams and that of Swamee-Jain for a velocity of 0.5 m/s.

The PUMP section is converted into a pipe with 1m of length and carrying a pump.

The VALVE section is converted into a pipe with 1m of length and carrying the device.

The PRV type is translated as a Pressure Reducing Valve, constant throughout the simulation.

The PSV type is translated as Pressure Sustaining Valve, constant throughout the simulation.

The FCV type is translated as a Flow Control Valve, constant throughout the simulation.

The TCV type is translated as a Local HeadLoss.

The GPV type is translated as a valve with head loss curve a function of flow.

The PATTERN section is converted into a function of time profile with a value for each time step.

A pattern that is not used is not imported.

The CURVE section is converted into profiles of different types following their use.

A curve that is not used is not imported.

The DEMANDS section is converted into consumption at ordinary nodes. Warning, if a first consumer is stored in the JUNCTIONS section on the node, it is replaced by the first value in this section.

The COORDS section is converted into schematic and map coordinates for all the nodes.

The VERTICES section is converted into intermediate points on the pipe sections.

The TAGS section is converted into sectors for nodes and into material for sections and pipes. All other sections are not converted.

## **SHP** import

## 🕉 Porteau - Untitled File Views Network Comput New ¢ Open H) Concat Save Save as Import a pto file Import a dxf file Import a Shape File Import a INP file Export to INP file • Recent Files Exit

### Access to the SHP file importation menu

This dialog box is accessible by selecting the "File" menu, "Import a Shape File" sub menu.

### The following dialog box allows to manage the parameters of file imported in the SHP format.

Import ShapeFile				
Type of object to convert :	Point	Line	☑ Add to existing demand	
File				
istance to merge points:	0.0 m		er nodes not shared ed links to nodes where split1	
nape		xpt	5	
Title			message	
End			Cancel	Help
hoose the file SHP				

Clicking the  $\square$  button, access the choice of the file to import.

### **Choice of SHP file**

🍝 Open	-		×
Look in:	0.00Trava	il 🔹 🌶 📴	<b></b>
Documents récents	.metadata .settings aide archives	a Src xsd LE PIAN RESEAU A M noued.shp	EP_E-TRONCO
Bureau	<ul> <li>bak</li> <li>bin</li> <li>calage</li> <li>CD</li> </ul>	A troncon.shp	
Mes documents	<ul> <li>dll</li> <li>dll0</li> <li>engees</li> <li>help</li> </ul>		
Ordinateur	lib META-IN ressource		G
	File name:		Open
Réseau	Files of type:	ShapeFile SHP 🔹	Cancel

Choose the file in the compatible SHP format of ARCGIS to convert.

## **Conversion options**

After validation, the file is read and presented in the dialog box as a table listing the entities.

Type of object to convert :	O Point	Line	✓ Add to existing a	demand
File D:\porteau_java\0.00Trava	ail \CD64\Exemp	ples\importSHP.shp	,	
Distance to merge points:	0.0 n	·	der nodes not shared ted links to nodes where spl	lit 1
shape		хр	ito	
Nom		1		
NOM				Not Imported
				Not Imported Material
Materiau				
Materiau Diametre				Material
Materiau Diametre Colonne 1 Title			message	Material Internal Diameter
Materiau Diametre Colonne 1			message MultiLineString correct	Material Internal Diameter Not Imported
Materiau Diametre Colonne1 Title				Material Internal Diameter Not Imported
Materiau Diametre Colonne 1 Title Type of objects			MultiLineString correct	Material Internal Diameter Not Imported

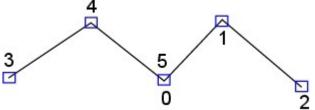
The choice between both radio buttons Point or Line allows to select the type of object to be imported of

the file. This choice depends on the processing of the information towards pipe sections for "Line" or towards nodes for "Point". In the choice "Line", if pipe sections were designed without hooking on properly ends to each other, sometimes by letting small lenghts between points as a rule mixed up, it is possible to merge their nodes. It reaches on the **distance of fusion**: if distance = 0.1 m then all the nodes close to 0.1 m at the most will be confused in a single node.

In case of "fusion" of two nodes, a line is added in the table of following messages (log), this table can be completely selected (by click on one line and ctrl+A), copy to the clipboard, and paste in a spreadsheet. This is usefull to create a shape of points where Porteau changes data to merge the nodes, by export coordinates in a csv file and create a shape in a GIS, to modify the original imported shape of the network. In the choice "Point", if a node is already present in coordinates (X, Y) at the **distance of fusion** near the imported point, the previous node is taken to allocate it the new attributes. In the choice "Point", the checkbox **Add to the existing consumption** allows to choose and treat the attributes either a new consumption (if the model is already present on the node, we clear the quantity), or an addition to the existing quantity).

In the choice "Line", the checkbox **Cut the pipe sections under nodes not shared** allows to share pipe sections for which end we observe another section orthogonal distance less than the distance of fusion a segment of the section, this appears especially when an extremity is entered without connection with a start node of a pipe section but with an intermediate point of the polyline.

The checkbox "sort vertex of polylines" allows to import polylines, sometimes results of merging lines in GIS not correctly sorted to be used for hydraulics, the next picture illustrates this problem with the rank of vertex.



It is then necessary to choose in the table the **attributes** to be imported by selecting in the xpto column the attribute to be allocated: a scroll list allows the choice of assignment. The same attribute can match only to a single field of the file SHP (DBF).

Type of object to convert : Point   Output  Description:	e 🕢 Add to existing	demand
File D: \porteau_java \0.00Travail \CD64 \Exemples \importSH	P.shp	
	ks under nodes not shared onnected links to nodes where sp	lit 1
sort vertex of polylines		
shape	xpto	
Nom		Not Imported
Materiau	22	Material
Diametre		Internal Diameter 🛶
Colonne 1	6	Internal Diameter External Diameter Roughness Hazen-Williams Coefficient Sector Service Closed Valve Achievement Date
Title	message	
Type of objects	MultiLineString correct	t
number of objects	29	
Import	Cancel	Help
choose the file SHP		

The available fields are:

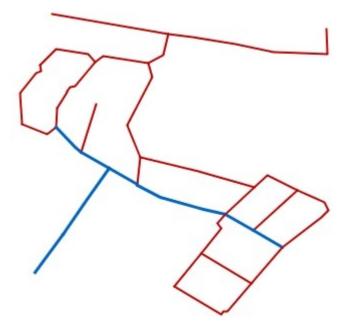
- in LINE mode:
  - Not imported: the field is not transferred
  - ROOTNAME: root of name of nodes (prefix), string which is added at the beginning of the name of the node, thhis can be usefull to give a prefix name to a class of node (sector, city).
  - NOMDEBUT: name of the start top node
  - NOMFIN: name of the end top node
  - NOM: name of the pipe section
  - COMMENTAIRE : comment of the pipe section
  - MATERIAU: material of the pipe section, corresponds to the material of the water pipe allocated to the pipe section, if it does not exist in the project, it is added; Be careful, to be processed, a diameter must be also converted.
  - DINT: internal diameter in mm, allocated to the water pipe and in local diameter of the pipe section
  - DEXT: outside diameter in mm, allocated to the water pipe
  - RUGOSITE: roughness in mm, allocated to the water pipe and in local roughness of the pipe section
  - CHW: coefficient of Hazen-Williams, allocated to the water pipe and in local chw of the pipe section
  - SECTEUR: name of the sector, if the sector is not present in the project, it is added, ending nodes automaticaly inherit this attribute
  - SERVICE: name of the service, if the service is not present in the project, it is added, ending nodes automatically inherit this attribute
  - VF : if value is "closed", the pipe section will carry a closed valve
  - ANNEPOSE: achievement date of the pipe section

- MODELE1: model of consumption for allocating a new consumer, a quantity must be also converted. If the model is already present in the network, it is taken for model of the quantity to be allocated. Idem for 2 and 3
- VALEUR1: quantity allocated to the consumer of the model 1. Idem for 2 and 3.
- in POINT mode:
  - Not imported: the field is not transferred
  - TYPE : type of node, if not present, the node is odinary, otherwise the node can take the following types : JUNCTION, RESSOURCE, RESERVE
  - NOM : name of the node, if it is not present, the name is automatically generated
  - $\circ$  Z : ground level
  - BAS : low user level
  - HAUT : high user level
  - DESIREE : required piezometric level
  - SECTEUR : name of the sector, if the sector is not present in the project, it is added
  - SERVICE : name of the service, if the service is not present in the project, it is added
  - COMMENTAIRE : comment
  - MODELE1 : model of consumption for allocating a new consumer, a quantity must also be converted. If the model is already present in the network, it is taken for model to the quantity to allocated. Idem for 2 and 3
  - VALEUR1 : quantity allocated to the consumer of the model 1. Idem for 2 and 3

Validate the options and import the file by clicking on **Import** or cancel the import. After the import of the file, the button changes aspect.

Click on **End** once all the files SHP imported.

Example of SHP import The "importSHP.SHP" file



A network containing polylines with the material as attribute of color:

- in red the PVC.
- in blue the Cast Iron.

Pipe sections also carry an attribute of diameter in meters (to show that it is imported such as) and a sector or a service in the column1 attribute. At the end of SHP file processing, the table of message is

filled, it can be exported towards clipboard by Ctrl+A and Ctrl+C. According to the quality of SHP file data, several messages can specify anomalies not allowing the import, in this case, the not corresponding recordings are not treated, as a polyligne having the same start node and end node, an already existing polyline between two nodes, etc. The final number of handled object and the linear are displayed.

## Import of consumptions in CSV

This dialog box is accessible by selecting the menu "Network", sub menu "Processing tools", sub menu "Import demand by CSV...".

E P		twork Computation Print	t Help	
2		Materials/Pipes Manage	ement 🦙 🗟 🔍 🔍 🔁 🖯	111 144 414 44 No Resu
:	Plan/C	Sectors/Services Mana		
		Consumption Models		
		Generalities		
$\odot$	<u> </u>	Synthesis		
~		Quality Section Class	35	
-	-	Thermic Section Class		
26	l	Origins Management		
N		Processing tools	Concat link without de	mand
<i>R</i> ¥			Concat link with deman	
-			Translate coordinates.	and the second
(F)			Concat branches of Gra	
0			Import demand by CSV Import demand by SHP	
囟				 onnected link to sectors
X			DEM to Ground level	
<mark>,Q</mark> ₁ This	dialog b	ox below allows to im	port a CSV file containing consur	mers
<u></u>	Import Co			X
	CSV file:			
	CSV file:			
	delimiter	choise: [; 🔹		
	delimiter add to	choise: ;		
	delimiter add to	choise: [; 🔹		
	delimiter add to	choise: ;	message	
	delimiter ( add to replace	choise: ;	message	
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	delimiter ( add to replace	choise: ;	message	Help

By clicking the button  $\square$ , we reach the choice of the file to be imported.

The file NECESSARILY has to contain four columns without headers:

1 - the name of the ordinary node or both extremities of the pipe section

2 - the type NODE for node or LINK for pipe section

3 - the name of the model already existing in the project

4 – the quantity to be imported

Example of rows: VILA; NODE; Domestic; 151 VILA-VILB; LINK; Domestic; 15

Choice between the buttons:

replace existing values : Allows to replace the consumers of the model met in the CSV file so already present on the node or the pipe section,

• add to existing values : Allows to add new consumptions to the already present consumption; be careful, if two lines contain the same node (or pipe section), the same model, both quantities are added in the import.

## Import of consumptions in SHP

This dialog box is accessible by selecting the menu "Network", sub menu "Processing tools", sub menu "Import demand by SHP...".

File Views Network Computation Print Help

🗋 🔂	Materials/Pipes Management Sectors/Services Management	
	Consumption Models	
	Generalities Synthesis	
	Quality Section Class Thermic Section Class Origins Management	
	Processing tools	Concat link without demand Concat link with demand Translate coordinates Concat branches of Graph on start node Import demand by CSV Import demand by SHP Connexity to service, connected link to sectors
1		DEM to Ground level

This dialog box below allows to import a SHP file containing points representing connections of the network or the location of the consumptions.

Three methods of projection can be chosen:

- The point is projected on the nearest ordinary node, the carried quantity is allocated to the node with the chosen model;
- the point is orthogonally projected on the segment of the nearest pipe section, the quantity is half allocated to extremity nodes if they can carry a consumption, to the only node otherwise;
- the point is orthogonally projected on the segment of the nearest pipe section, the quantity is allocated to the distributed demand all along the pipe section.

File					
Add to existing demand					
Choose the model of demand	No Model	~			
Choose the Model attribute N	Choice	~ [	Same Sector	Same Service	
hoose the Quantity attribute No Choice ~					
	ers 🖲 Node 🔿 Pipe->End		]		
Choose where put the Consum	ers 🖲 Node 🔿 Pipe->End		]		
Choose where put the Consum	ers 🖲 Node 🔿 Pipe->End	○ Pipe->Middle			

By clicking the button , we reach the choice of the file to be imported.

The checkbox **Add to existing demand** allows either to erase an already present quantity on the chosen model, or to add a new quantity by setting up a consumer with the model chosen below. By clicking the

scrolling list No Model , we choose the model of consumption to which we allocate the quantities given by the addresses. A model must necessarily be present in the network to be able to continue the processing following this method.

By clicking the Choice of Model attribut scrolling list No Choice , we choose the attribute of the SHP file containing the model of consumption to be used if it is present in the network, or to create otherwise. This choice is required if the previous scrolling list is on "no Model".

By clicking the Choice of Quantity attribut scrolling list No Choice , we choose the attribute of the SHP file containing the quantity to be processed and to be allocated to the model chosen by one of the two lists above.

By clicking one of the radio buttons Node Pipe->End Pipe->Middle, we choose one of three methods of allocation of the consumption.

In case of choice of projection of the distributed demand, the checkbox

with split and new Node at demand projection on link allows to cut the pipe section in two parts and to create a new node to assign the consumption, this is particularly interesting for big consumers for whom we want to follow the pressure of service or any other parameter.

After clicking "Import", Porteau offers saving consumers import and their projection as a CSV file. The file content is: "#SHP\_DEMAND\_LINKS";LinkName;BeginName;EndName;IdDemand

SHP\_DEMAND\_LINKS;144;od932;od929;PDL\_Secto.1

SHP\_DEMAND\_LINKS;144;od932;od929;PDL\_Secto.2

The first line gives the column headers. The first column contains the type of projection, here as the distributed demand all along the pipe sections. SHP\_DEMAND\_NODE describes a projection on the nodes, SHP\_DEMAND\_LINKENDS a projection on the pipe sections with distribution to end-nodes to half. If several imports are made with the same logfile, the first import reappears for each new import in this file, defining then the phases of the import. The fields "LinkName", "BeginName" and "EndName" give the name of objects on which the projection is made. "IdDemand" gives the same ID of object of the SHP file. "DemandFactor" gives the part to the mode for the projection by the pipe section by end-node (each node receives 0.5).

# **Data Export**

## **INP Export**

### Acces to the INP file exportation menu

File	Views Network Compu
	New
	Open
	Concat
	Save
	Save as
	Import a pto file
	Import a dxf file
	Import a Shape File
	Import a INP file
	Export to INP file
	Recent Files
	Exit

This dialog box is accessible by selecting the menu "File", sub menu "Export an INP file".

The dialog box appears for the choice of file to write.

### Conversion

All temporal profiles are converted by recreating, if needed, a value for each time step from the Zomayet calculation, this by interpolation conforms to the type of profile (LINE, STEP, .).

The TITLE section is made up of the fields containing into "Generalities" tab the following information: project, network, description and authors.

The JUNCTIONS section contains the ordinary nodes and eventually their consumption if it is unique. The RESERVOIRS section contains the resource nodes.

The TANKS section contains the tank nodes. If the shape isn't cylindrical, a volume curve is created as a function of height. Warning, difference can remain taking into account the different model used for this type of tank.

The PIPES section contains the pipe segments. Those carrying a pump or closed valve are translated as a closed pipe with a line in the PUMP section repeating some of those informations.

The PATTERNS section contains the profiles for the consumption models and those of the nodes if needed.

The CURVES section contains the profiles of tank nodes and pumps.

The COORDINATES section contains the cartographic coordinates of the nodes.

The VERTICES section contains the cartographic coordinates of the intermediate points of the pipe segments.

The BACKDROP section contains the references to the background map and the coordinates for the positioning of the image.

The TIMES section contains the duration of the simulation, the time step and the time of the start of the simulation.

The duration and the time step are used for the creation of all patterns exported.

The OPTIONS section contains the units (LPS) and the law of head loss.

## **Export en SHP**

This function is accessible by the "File" menu, sub menu "Export to SHP file". The dialogue box for choosing the file appears to enter the name of the file to be written. **Attention:** several files with the same name are written, only the extensions are different (Shp, shx, prj, dbf, qix, fix). If results of simulation are present, they are written in the CSV format in a file of extension csv and the name of which is completed by Results A unique identifier (ID) allows to connect the objects of the geographical layer to a line of the table csv. The exported attributes are:

- for nodes: ID, Name, Type (ordinary, reserve, resource), Ground (ground level), Service, Sector, Com (comment).
- for results of nodes according their presence in memory: ID, Name,
  - OPressure : the Opointe pressure
  - ZP\_jjhhmmss : the Zomayet pressure à chaque pas de temps avec jj le jour de simulation, hh l'heure, mm les minutes et ss les secondes,
  - C\_jjhhmmss : la concentration pour Qualité à chaque pas sauvegardé, même formatage du temps que Zomayet
  - A\_jjhhmmss : l'âge moyen pour Qualité à chaque pas sauvegardé, même formatage du temps que Zomayet
- pour les tronçons : ID, Begin (nom du noeud amont), End (nom du noeud aval), DLocal (diamètre local), KLocal (rugosité locale), HWLocal (hazen williams local), MatPipe (nom du matériau), DPipe (diamètre du tuyau), Service, Sector (nom du secteur), Com (commentaire).
- pour les résultats de tronçons en fonction de leur présence en mémoire : ID, Begin, End,
  - OFlow : le débit Opointe
  - ZF\_jjhhmmss : le débit pour Zomayet à chaque pas de temps avec jj le jour de simulation, hh l'heure, mm les minutes et ss les secondes,

# **Processing of graph**

## **Translating of coordinates**

This dialog box is accessible by selecting the menu "Network", sub menu "Processing tools", sub menu "Translate coordinates...".

) 🔄	Materials/Pipes Management Sectors/Services Management	) 🗟 🔍 🔍 😳 🖽   144 - 44 - No F
	Consumption Models	
	Generalities Synthesis	
	Quality Section Class Thermic Section Class Origins Management	
	Processing tools	Concat link without demand Concat link with demand Translate coordinates Concat branches of Graph on start node Import demand by CSV Import demand by SHP
		Connexity to service, connected link to sectors
		DEM to Ground level

This dialog box below allows to parametrize the handling. х Network Translation Coordinates translate coefficients X Map = \* X Map + 0.0 0.0 Y Map = 0.0 \* Y Map + 0.0 X Plan = \* X Plan + 0.0 0.0 Y Plan = \* Y Plan + 0.0 0.0 Coordinates copy of nodes only Map to Plan Plan to Map Validate Cancel Help Input values

It is possible to work independently on both systems of coordinates.

Capture in the corresponding fields the values to transform the coordinates of nodes. The processing follows the linear formula for all the values: Xnew = a \* Xprevious + b. In case of modification of map coordinates, the intermediate points of pipe sections are also changed. Checkboxes allow to inject a system of coordinates in the other one only for nodes; example for a file imported by Porteau 2 not containing map coordinates, copy of plan coordinates towards map coordinates to allow a display in map view, otherwise all the nodes will be in (0,0).

## **Concat dead ends**

This dialog box is accessible by selecting the menu "Network", sub menu "Processing tools", sub menu "Concat branches of graph on start node...".

Plan/C       Sectors/Services Management         Consumption Models         Generalities         Synthesis         Quality Section Class         Thermic Section Class         Origins Management         Processing tools         Concat link without demand         Concat link with demand         Translate coordinates         Concat branches of Graph on start node         Import demand by CSV         Import demand by SHP         Connexity to service, connected link to sectors	File Views N	etwork Computation Print Help	
<ul> <li>Generalities</li> <li>Synthesis</li> <li>Quality Section Class</li> <li>Thermic Section Class</li> <li>Origins Management</li> <li>Processing tools</li> <li>Concat link without demand</li> <li>Concat link with demand</li> <li>Translate coordinates</li> <li>Concat branches of Graph on start node</li> <li>Import demand by CSV</li> <li>Import demand by SHP</li> <li>Connexity to service, connected link to sectors</li> </ul>		Sectors/Services Management	") 🗟 🕰 🔍 🔂 🖽   144 - 44 - 44 - No Res
Generalities   Synthesis   Quality Section Class   Thermic Section Class   Origins Management   Processing tools   Concat link without demand   Concat link with demand   Translate coordinates   Concat branches of Graph on start node   Import demand by CSV   Import demand by SHP   Connexity to service, connected link to sectors		Consumption Models	
Quality Section Class   Thermic Section Class   Origins Management     Processing tools   Concat link without demand Concat link with demand Translate coordinates Concat branches of Graph on start node Import demand by CSV Import demand by SHP Connexity to service, connected link to sectors			
<ul> <li>Concat link with demand</li> <li>Translate coordinates</li> <li>Concat branches of Graph on start node</li> <li>Import demand by CSV</li> <li>Import demand by SHP</li> <li>Connexity to service, connected link to sectors</li> </ul>	2	Thermic Section Class	
	<ul> <li>✓</li> <li>✓</li></ul>	Processing tools	Concat link with demand Translate coordinates Concat branches of Graph on start node Import demand by CSV Import demand by SHP
DEM to Ground level	P¥		DEM to Ground level

This dialog box below allows to choose the parameters of the handling.

This one consists in locating all the dead ends, then to give the total consumption of the dead end to its "root", if no consumption is present, all is deleted.

Dead Ends without Demand	out concu	nation	
Delete comlete dead ends without co		n	
Dead Ends With Demand			
Maximal length of deleted dead ends	0.001	m	
Maximal diameter of deleted dead ends	0.0	mm	
Last node name begins by			

The removal of dead ends without consumption takes two options, which can be used independently of the options of removing with consumption.

The checkbox **Delete the last pipe section of the dead ends without consumption** allows not to include the length, if no node or no pipe section of the dead end carries consumer, and delete the last pipe section and the last node of the dead end.

The checkbox **Remove completely the dead ends without consumption** allows not to include the length, if no node or no pipe section of the dead end carries consumer. All the dead end is removed. The removal of dead ends with consumption can be made according to three criteria that can be mixed: The field **maximal length of deleted dead ends** allows to give the length from which a dead end is kept. The length is the total of the lengths of pipe sections composing the dead end. It can not be null. The field **maximum diameter of deleted dead ends** allows to give the diameter of the largest pipe sections from which a dead end is kept.

The field **Name of the last node starts with** allows to remove only the dead ends for which the last node has a name beginning with the entered text, the name is then carried over to the start node of the dead end. Caution if a node is the start node for several dead ends, the met first name will be applied. This function can be used to bring the connections of fire hydrants on main pipes without taking the identifier of the hydrant (example : PI0000).

The validation of removal settings traces these actions in a CSV format, this choice of the name of this file is unique for a Porteau session, if cancel is chosen, no tracing will be done until the next call of the removal function.

In the console of Porteau, a balance sheet of deleted nodes and deleted pipe sections appears. The logfile contains:

- to delete without consumption: "#DEADEND";LinkName;BeginName;EndName;ErasedNodeName;RootNodeName DEADEND;od6->od7;od6;od7
  DEADEND means a delete end of the dead end, followed by the name of the deleted pipe section, the name of its ends, the name of the deleted node and the name of the kept node.
  to delete on request of length, diametee, name of node:
- "#REQUESTED\_DEADEND";LinkName\_NodeName;BeginName;EndName;RootNodeName REQUESTED\_DEADEND\_LINK;od313->od314;od313;od314;Nd257 REQUESTED\_DEADEND\_LINK;od316->od313;Nd257;od313;Nd257 REQUESTED\_DEADEND\_NODE;od314;Nd257 REQUESTED\_DEADEND\_NODE;od313;Nd257 REQUESTED\_DEADEND\_NODE;od313;Nd257 REQUESTED\_DEADEND\_means there is a request by criteria, followed by either the name of the pipe section or the name of the deleted node, the corresponding names and the root node where consumption is returned. Here a dead end has two pipe sections that are erased and the two nodes and the root Nd257 receives the accumulated consumption to that possibly already on that node.

It is possible to reduce a simple dead end.

A double **right** click on the node extremity of the dead end shows the context menu.

Display properties : ordinary [VILC]	Enter
Delete the component : ordinary [VILC]	Delete
Shorten all if end node : ordinary [VILC]	Ctrl+Delete
Shorten one link if end node : ordinary [VILC]	Shift+Delete

Following the chosen line, either "shorten all if end node" or "shorten one link if end node", in every case, the consumptions are relocated towards the root of the dead end or towards the node becoming the bottom of dead end.

# **DEM to ground level**

This function is accessible by selecting the menu "Network", sub menu "Processing tools", sub menu "DEM to ground level".

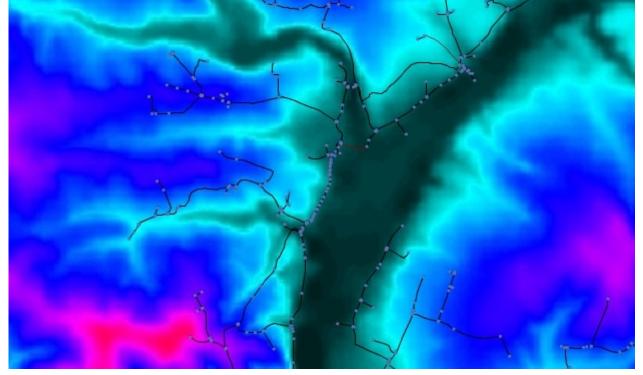
The dialog box of the choice of the file containing the DEM allows to read a file packaging the meshing of same coordinates as the level of nodes to calculate. The formats being able to be read are:

- ASC: Ascii Grid ARC/INFO or Arcgrid, containing in text the data
- TIF or TIFF: GeoTiff
- IMG: Erdas Imagine

If a selection of node is active, only the levels of the selected nodes are calculated, otherwise all the ground levels are calculated and erased.

The file is read by the Geotools library and the GDAL plug-in, the nodes are projected on the meshing,

then the value is interpolated by a bicubique spline method. After processing of a DEM in image with a shade according to the height, this below an example of network represented on the DEM background .



# **Reproject the network**

This function is accessible by selecting the menu "Network", sub menu "Processing tools", sub menu "Change the network projection".

The dialog box of the choice of the EPSG Codes of projection system allows to change the projection (GIS) of the network, nodes and links, for using the network in a new system. The formats being able to be read are:

- Origin EPSG Code: contains the code in EPSG format of the actual projection of the network (example 3857)
- destination EPSG Code: contains the code in EPSG format of the desired projection of the network (example 2154)

In case of error in the value of code or if the two codes are the equals, the state bar displays a message.

Origin EPSG Code =		3857	
Destination EPSG C	ode =	2154	