WaterMate

Pressurised Water Reticulation Design and Draughting Software for Civil Engineers

technocad
Civil Engineering Software

Description

Technocad urban design software is a suite of personal-computer based programs for the design and automated draughting of civil engineering urban services.
Incorporated in this suite are software packages that cover all aspects of civil engineering services design such as Roads, Sewer reticulation, Stormwater reticulation and Water supply.
All the packages have been written with knowledge gained in the civil design office where the need for fully automated draughting, rather than manually manipulated computer aided draughting, was identified as the only way of increasing design and draughting productivity. WaterMate is the water reticulation software package of the Technocad urban design software.
The purpose of the software is to provide an intuitive graphical approach to water reticulation design, whereby information for the hydraulic analysis is gleaned directly from the AutoCAD drawing. In addition, WaterMate gives you *final working layout drawings with the minimum amount of manual input*. WaterMate can be used for networked systems and overland distribution pipelines.

Work Smarter

Water networks have the nodes and pipes numbered and co-ordinated automatically. This allows for easy re-arrangement of the network layout without having to manually re-number nodes and pipes.
Layout drawings are created automatically from parameters chosen by the designer. Because you are working in AutoCAD, you can easily add extra notes, insert background aerial photographs or attach reference contour files etc. prior to plotting the final working drawings. Let WaterMate do all the previously boring and mundane work!
A static hydraulic analysis or time simulation of the water network is done with a selection of reservoirs and/ or tanks and hydraulic devices which can be placed anywhere in the network. Pipe information is stored in your drawing, so you only have to enter it once. Enter data using user-friendly dialog boxes.

Horizontal Layout Drawings

The designer simply must draw the lines of the water network in plan in AutoCAD, connecting the plots/ stands as required, creating a closed / open-looped network in the process. Line endpoints will indicate node-positioning requirements.
You can use both lines and polylines to represent your pipes. Pipe properties can be selected from a database and assigned to the lines/ polylines. Simply place a reservoir or elevated tank at one or more

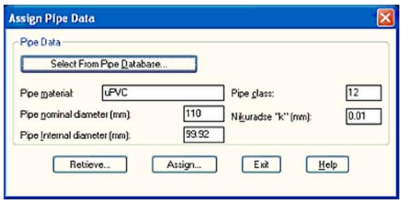

Figure 1 - Assign Pipe Data from database

places indicating sources of water. Place drawoffs on your network graphically; even assign peak draw-off factors to discrete areas of your network graphically. Drawoffs can vary with time according to user specified time patterns.
When you have created your water reticulation layout, simply 'window' the network and WaterMate does the following automatically:

- Nodes are numbered and sorted
- Pipes are numbered and sorted
- Node/pipe topology determined
- Nodes are co-ordinated to the specified survey system
- Pipe lengths are calculated and totalled

A layout drawing is automatically produced for any desired plotting scale (WaterMate takes care of all your text sizes), and the following is drawn for you, all on separate layers:

- Nodes
- Node numbers at a selected angle to the horizontal
- Pipe numbers or diameters midway above each pipe
- Pipe lengths midway below each pipe
- A co-ordinate list of all nodes
- A Pipe Data list of all pipes giving:
  - From node - To node
  - Pipe length
  - Pipe diameter
- A summary of total pipe lengths by diameter/class

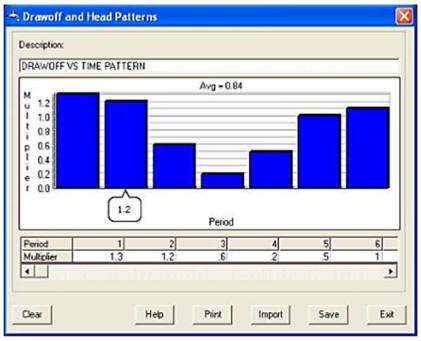

Figure 3- Draw-off & Head Patterns

Linking to DTM for levels

WaterMate can link to DTM surfaces created in either Autodesk Civil3D or SurfMate. This enables automatic extraction of ground levels at nodes or for extraction of detailed longitudinal sections along pumping / gravity mains.

Hydraulic Analysis

WaterMate creates all the information it requires for hydraulic static analysis or time simulation directly from the drawing:

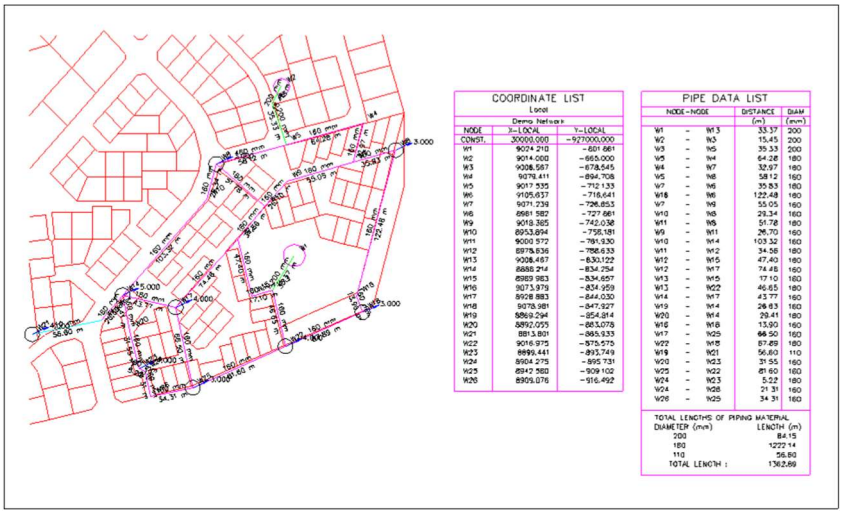

Figure 2- Layout plan automatically annotated

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- Reservoir/tank positions, ground levels and water levels
- Node numbers and associated pipe numbers
- Node ground levels (directly from an in-memory interrogation of the SurfMate digital terrain model or Civil3D surface) - lightning fast!
- Pipe lengths
- Friction (roughness) "k" factors for each pipe
- Internal diameter of each pipe

All this information is kept in open ASCII type data files. Various types of hydraulic devices can be placed in any pipe in the network:

- Reservoirs or tanks can be placed at any node
- Pumps, using commercial pump curves
- Pressure reducing valves
- Flow control valves
- Non-return valves

Minor losses can be taken into account. The hydraulic analysis / time simulation uses a linear method of convergence which is extremely fast.

Hydraulic results include:

- A schedule of piping quantities
- For each pipe:
  - Diameter chosen (mm)
  - Flow (l/s)
  - Velocity (m/s)
  - Calculated Darcy friction factor
  - Calculated equivalent Hazen Williams friction factor
  - Friction loss in metres and metres / metre
- For each node:
  - Energy level (m)
  - Pressure (m)
  - For each reservoir/tank:
  - Level (m)
  - Flow from reservoir (l/s)
- For each pump or other hydraulic device:
  - Pumping head (m)
  - Flow (l/s)

Water.OUT - Notepad

File Edit Format View Help

Pipe Data:

Pipe No	From Node	To Node	Int. Diam. (mm)	Length (Eff.) (m)	Flow (l/s)	Vel. (m/s)	Calcd. Darcy f	Equiv. HAZ/W C	Head Loss (m)	Head Loss/1000m (m/1000m)
1	1	2	181.7	16.2	92.0	3.5	0.013	155	0.77	49.966
2	2	4	181.7	38.3	92.0	3.5	0.013	155	1.82	49.990
3	3	4	145.3	67.8	-41.1	-2.5	0.015	150	2.16	33.459
4	3	5	145.3	34.6	40.6	2.5	0.015	151	1.08	32.693
5	4	6	145.3	60.6	50.9	3.1	0.014	153	2.86	49.673
6	5	7	79.8	57.8	-1.1	-0.2	0.027	140	0.05	0.909
7	5	18	145.3	251.1	21.8	1.3	0.016	153	2.47	10.343
8	6	8	145.3	32.1	27.8	1.7	0.016	150	0.49	16.172
9	6	9	79.8	52.4	3.1	0.6	0.021	148	0.28	5.574
10	7	9	79.8	28.0	-1.6	-0.3	0.025	142	0.05	1.719
11	8	10	79.8	33.8	-9.8	-2.0	0.017	151	1.43	44.428

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Figure 4 - Hydraulic Results report

View results graphically

As well as providing your results in the traditional 'calculation-pad' style, WaterMate allows you to view your results graphically. Flow / velocity arrows give the designer an overall graphical visualisation of the hydraulics of the network. Just hover over an arrow and the flow or velocity in a pipe or working/static pressure in a node is shown.

The nodal pressures in the network can also be contoured to highlight low or high-pressure zones.

With time simulations, time graphs can be produced for any pipes or nodes in the network showing how flow, velocity or pressure, head, demand etc vary with time.

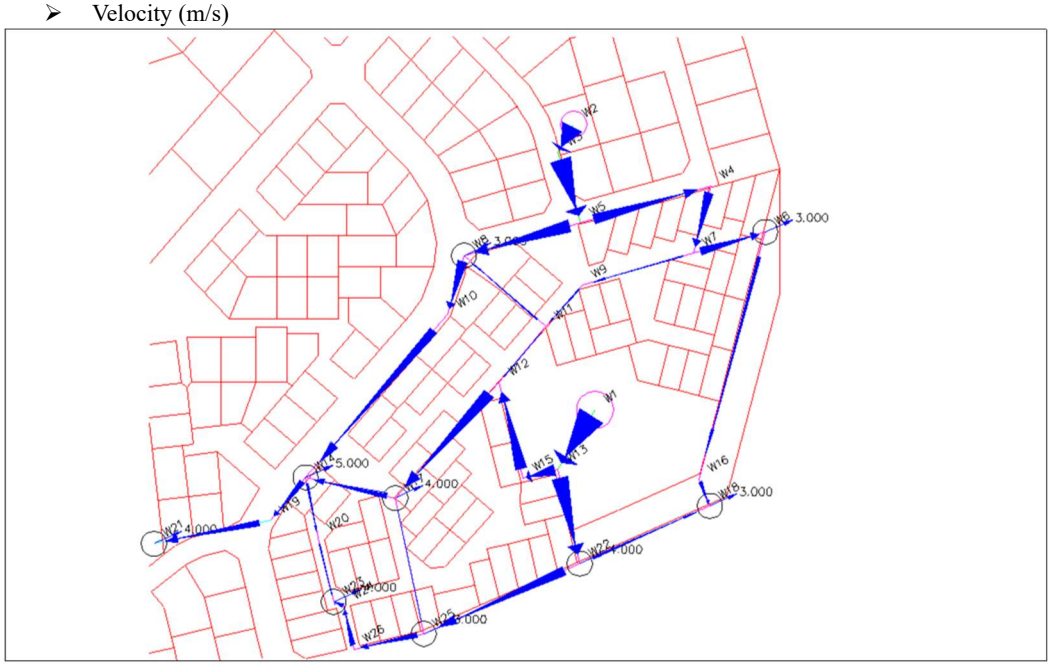

Figure 5: Graphical visualisation of pipe flows/velocities in plan

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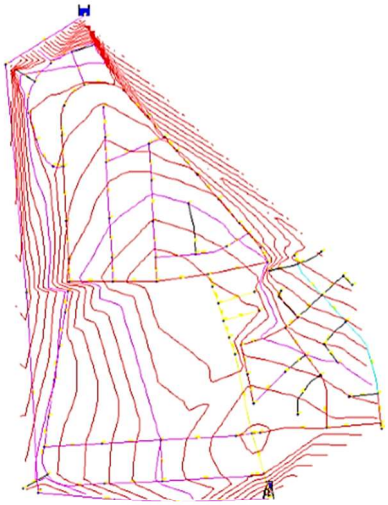

Figure 6-Working pressure contours

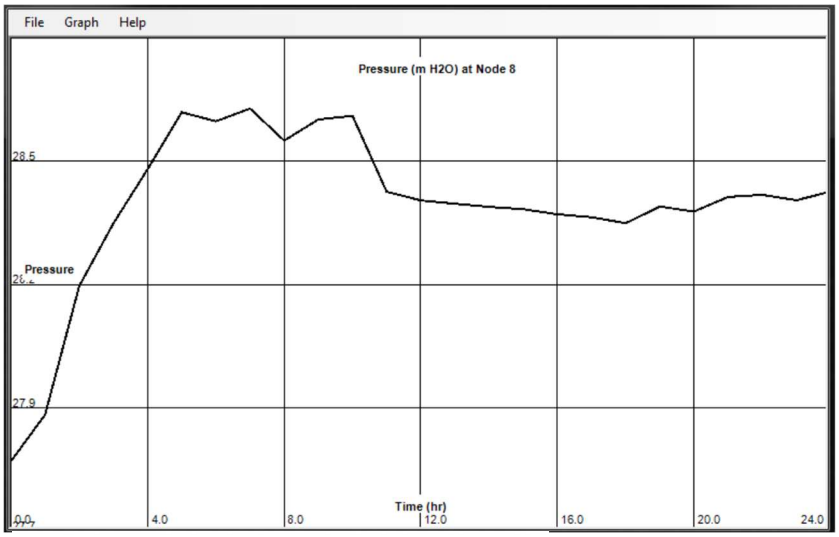

Figure 8 - Simulation time pressure graph for a node

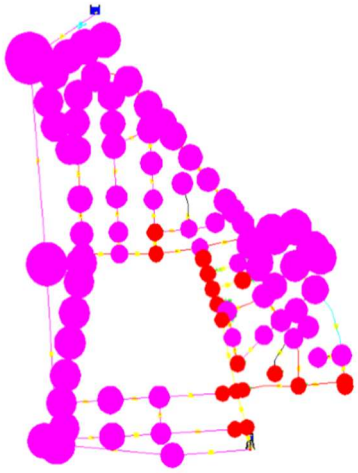

Figure 7-Graphical visualisation of node working pressures showing low pressure nodes in red

Query your network data graphically

WaterMate allows you to query your network pipe data. You can perform queries such as "Show me all the 150 diameter pipes that have a pressure class = 10". You can perform global edits on your input data; for example, change all existing 200 diameter uPVC pipes that are class 10 to class 12. This makes it easy to change pipe network parameters!

Hydraulic Device Controls / Rules

Hydraulic devices and pumps can be controlled by user specified rules as to when they must open / close / start / stop etc. during a time simulation. An example would be to start a pump when the level in a tank drops below a minimum level and to stop again when it is above a maximum level.

Longitudinal Sections

If you need to produce longitudinal sections along any of the pipes in the network, simply show WaterMate the relevant pipes by picking them and WaterMate will instantly produce *fully detailed* longitudinal sections showing required air/scour valve locations on the longitudinal section and optionally in plan. A schedule of air and scour valves is also generated.

Horizontal / vertical / compound bend angles are shown as well as a pipe bends schedule for bend angles greater than a user selected angle.

WaterMate includes a 2-way link to Vent-O-Mat CATT design software for the calculation of required air valve sizing and positioning along a pipeline. The results can then be imported into WaterMate and the fully detailed air valves can be shown in plan view as well as on your longitudinal section.

The pipe vertical profile can be modified (simply by using AutoCAD 'grips') to move, insert or remove vertical bends. Trench excavation quantities can also be calculated, using user defined depth categories.

Sheet Generator

WaterMate can automate the process of creating documents (drawing sheets) for overland pipeline designs. Using the

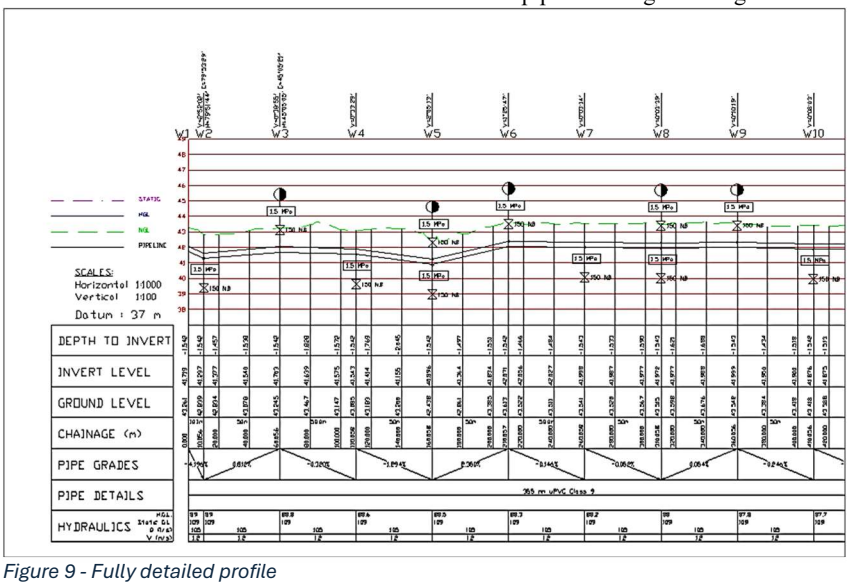

Figure 9 - Fully detailed profile

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Drawing Sheet Creation tools, you can quickly create paper space layout sheets that automatically display consecutive portions of pipe alignments (stakelines) in your documents.
This can save you many hours of tedious setting up of viewports manually.
The sheets created automatically have a viewport showing the plan of the water pipeline alignment, a survey grid drawn in for you at your desired grid spacing and the grid lines are fully annotated around the edges of the viewport.

You also have the option of automatically inserting a North Point Symbol into each sheet.
Viewports are automatically rotated such that the route of the pipeline lies in a 'left-to-right' direction.
When longitudinal sections (profiles) are drawn using the multi-partial option, then the relevant partial section is automatically shown in the profile viewports of each sheet as shown in the example

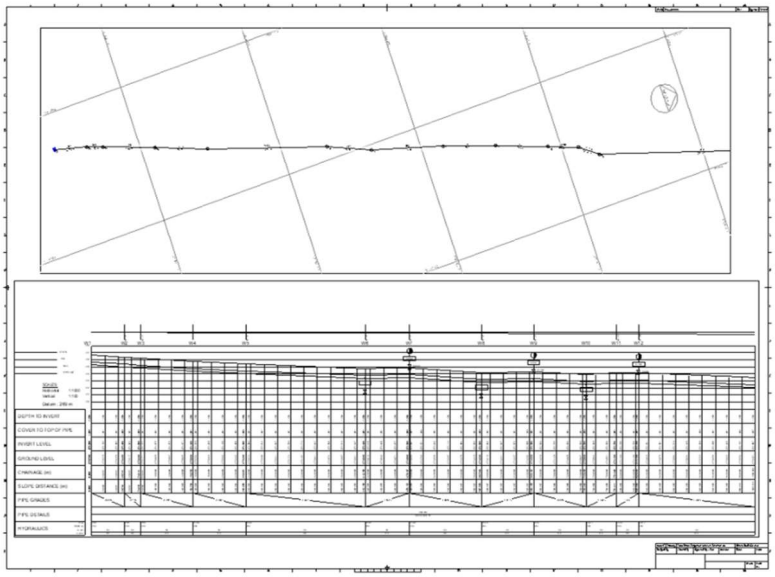

Figure 10- Automated Plan & Profile sheet generation

Air Valves Schedule				
No	Diameter (mm)	Pressure (Bar)	Model	Description
8	50	16	AV-1	Air valve model 1

Scour Valves Schedule				
No	Diameter (mm)	Pressure (Bar)	Model	Description
8	75	16	SV-2	Scour valve 75

Figure 11-Air Valve & Scour Valve Schedule

Pipe Bends Schedule (>5.0 Deg)			
CH	Diameter1 (mm)	Diameter2 (mm)	Angle (Deg)
26.463	400	315	80.6
128.117	315	315	95.4
174.524	315	315	45.9
235.428	315	315	25.6
303.698	315	315	76.5
386.165	315	315	18.3
400.262	315	315	28.4
534.767	315	315	87.8
618.065	315	315	39.4
731.958	315	315	75.6
855.557	315	315	73.7
910.120	315	315	47.4
1221.829	315	315	37.8

Figure 12- Pipe Bends Schedule

Create 3D Model

WaterMate can create a full 3D model of your network which can be created in your current drawing, exported to an existing drawing or created in a brand new drawing. Can be used for clash detection with other utilities.

Utility Crossings

Utility services such as water lines, cables, telecom lines etc. can automatically be shown on long-sections when simply indicated in plan.

On-line help

WaterMate has a full-featured HTML style on-line help with indexing and search features. Detailed explanations of the workflow and functions with an abundance of graphics.

Technical Support

Professional technical support is available with your subscription.

Purchase Options

You can purchase a short-term or long-term subscription. The choice is yours – whatever suits your budget and project requirements!

- Network licensing (LAN) is also available

Hardware Requirements

As per Autodesk recommendation for AutoCAD, AutoCAD Map or Autodesk Civil3D

Software Requirements

- AutoCAD Release 2023, 2024, 2025 & 2026 supported. Also Autodesk Map 2023, 2024, 2025 & 2026 and Autodesk Civil 3D 2023-2026
- Operating systems: Windows 10 64-bit and Windows 11 64-bit
- Microsoft Excel

Contact Details

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