Description
Technocad urban design software is a suite of personal-computer based programs for the design and automated drafting 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 drafting, rather than manually manipulated computer aided drafting, was identified as the only way of increasing design and drafting 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 has to 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 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

You, all on separate layers:
- Nodes
- Node numbers at a selected angle to the horizontal
- Pipe numbers or diameters midway above 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

Layout plan automatically annotated

Pressurised Water Reticulation Design and Draughting Software for Civil Engineers

WaterMate

Civil Engineering Software

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Linking to DTM for Levels
WaterMate can link to DTM surfaces created in either AutoCAD 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:
- 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 allowed for.
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)

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 so as to highlight low or high-pressure zones.

- Flow / velocity arrows
- Energy level
- Pressure
- Flow from reservoir
- Pumping head
- Flow

Hydraulic results report

Graphical visualisation of pipe flows/velocities in plan

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Working pressure contours

Simulation time-pressure graph for a node

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.

Graphical visualisation of node working pressures showing under pressures in red.

Sheet Generator

WaterMate has the ability to automate the process of creating documents (drawing sheets) for overland pipeline designs that have been drawn in Model Space. Using the 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.

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.

Fully detailed Longitudinal Section
On-line help
WaterMate has a full-featured Windows on-line help feature with indexing and search features. This documentation has been written by engineers making it really useful.

Hardware requirements
As per Autodesk recommendation for AutoCAD or AutoCAD Civil3D software

Software requirements

Ordering Details
Technocad Civil Engineering Software
Tel: +27-11-803-8834
Fax: +27-11-803-3452
Email: sales@technocad.co.za
Web: www.technocad.co.za

Plan / Profile sheets generated automatically

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Air and scour valves schedule produced for longsection

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Pipe bends schedule produced for longsection