OpenSpatial

Munsys 14

WATER USER MANUAL

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Munsys® Water User Manual

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Chapter 1
Introducing the Munsys Water User Manual

Munsys Water is used to capture and maintain water networks. It is a user-friendly, easy to use geographic information management tool, which does not require GIS expertise to capture and manipulate data.

Munsys Water forms part of the Munsys product range, which comprises the following applications:

- Munsys Cadastral
- Munsys Cable Route
- Munsys Cable Fiber
- Munsys Drainage
- Munsys Electricity
- Munsys Roads
- Munsys Sewer
- *Munsys Water*
- Munsys Map Books
- Munsys Spatial Data Manager
- Munsys Management Console
- Munsys Query
- Munsys Linage
- Munsys Scheduled Tasks

About this manual

The *Munsys Water User Manual* enables users to easily find their way around Munsys Water, and provides a conceptual overview of the functionality used in Munsys Water. For the purpose of this manual, we assume that you are familiar with:

- The business rules of the application
- AutoCAD Map
- Common GIS terminology

What's in this manual

The *Munsys Water User Manual* consists of the following chapters:

- Chapter 1 – Introducing the Munsys Water User Manual, gives an overview of this manual, and provides links to additional reading material.
- Chapter 2 – Getting acquainted with Munsys Water, gives an overview of Munsys Water and its various components.
- Chapter 3 – Querying water data from the database, describes how to retrieve water data from the database.
- Chapter 4 – Creating water data, shows the user how to capture a water network, add additional water objects, and post water data to the database.
- Chapter 5 – Maintaining water data, describes how to maintain existing water data.

Additional reading material

Before you start using this manual, we suggest that you first read the Munsys Concepts User Manual, which contains the following information:

- the generic functionality of the various Munsys applications
- the generic query functionality that is used to query spatial data from the Oracle® database, and how to structure a query through query settings and GSC settings using the Munsys Query Palette
- how to view spatial data using the Munsys Info Palette
- how to work with Munsys Objects
- extras such as annotation, reporting and legend options.

Conventions in this manual

The following table lists the typographical conventions used in this manual.

Text element	Example
Keys you press on the keyboard	CTRL, ENTER, DEL
Screen buttons	Click Close.
Folder paths	C:\Program Files\Open Spatial
Menu paths	choose Query > Clear Basemap.
Hypertext links to applicable sections in the document/the Web	....see Appendix A
Text displayed/typed on the command line	Munsys Water
Dialog box/screen names	The Water Settings dialog box
Application functions	The Integrity Check function

Table 1   Munsys typographical conventions

Finding the information you need

To get help on

■   general issues, select Help from the Munsys menu bar.

■   an operation in progress, click the Help button on the dialog box.

■   the latest support options, visit http://www.openspatial.com

Chapter 2
Getting acquainted with Munsys Water

About Munsys Water

Munsys Water is designed to capture and maintain water networks. A water reticulation network consists of a series of water pipes that function on pressure and form a circular network. Munsys Water caters for potable, reclaimed, raw and abandoned categories.

Potable (treated) water is distributed through the water network for human consumption. Reclaimed (recovered water) is waste water (sewer) that has been processed at a sewer plant to acceptable quality for irrigation purposes. Raw or untreated water may come from groundwater sources or surface water such as lakes and rivers. Although untreated water may offer a high quality that could be consumed without disinfection, it almost always goes through the disinfectant residual. Utility departments also need to keep records of abandoned water networks and equipment because it might cause a health risk (for example, it may contain materials like asbestos). Expensive equipment like valves and pumps are normally removed, leaving only the pipe abandoned.

The Munsys Water toolbars and menus enable fast and efficient capturing and maintaining of a water network. Munsys Water has built-in rules to ensure that the water network data is maintained to engineering standards before it is posted to the database.

Launching Munsys and Munsys Water

To launch Munsys, do one of the following:

1 Double-click the **Munsys Applications 14.2** icon on the Windows desktop.

2 Choose **Start** > **Programs** > **Munsys 14.2** > **Munsys Applications 14.2**

Connecting to the Oracle database

Munsys uses Oracle as its data store. The advantage of using the Oracle Spatial or locator technology is that spatial and attribute data are captured and managed in a single database. This reduces processing overheads and eliminates the complexity of coordinating and synchronizing different sets of data.

Important   You have to be connected to the Oracle database before you can start working with Munsys Water. If you try to launch any application without being connected to the database, you will be prompted to connect to the database first.

To connect to the Oracle database

1 Do one of the following:

- Choose **File** > **Database** > **Connect...**.
- Click the **Connect to Database** button on the Munsys standard toolbar.

The Connect to Database dialog box is displayed.
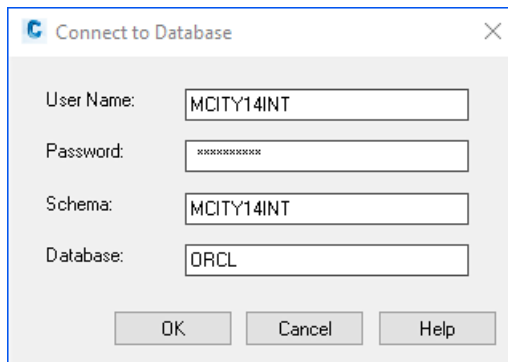
Figure 1   The Connect to Database dialog box

2 In the **User Name** field, enter your user name.

3 In the **Password** field, enter your password.

4 In the **Schema** field, enter the schema name.

5 In the **Database** field, enter the database name.

6   Click **OK**.

Note   The database administrator will inform you which user name, password, schema name, and database name to use.

To launch Munsys Water

When you launch Munsys for the first time, the configured base map automatically loads. When you launch Munsys Water, the Munsys Water functions are loaded on the menu bar and toolbars.

1   To launch Munsys Water, do one of the following:

- Choose **File** > **Munsys Applications**.
- Click the **Munsys Applications** button on the Munsys standard toolbar.

The Available Applications dialog box is displayed.
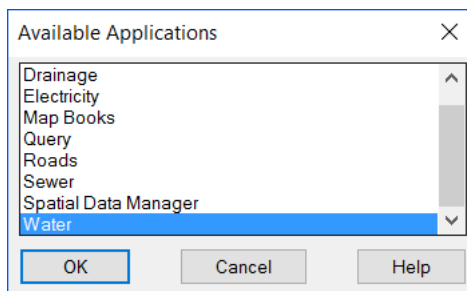
Figure 2   The Available Applications dialog box

2   From the list of available applications, select **Water,** and then click **OK**.

The Munsys Water functions are displayed on the menus and toolbars.

The Munsys Water interface

The Munsys Water interface consists of the following:
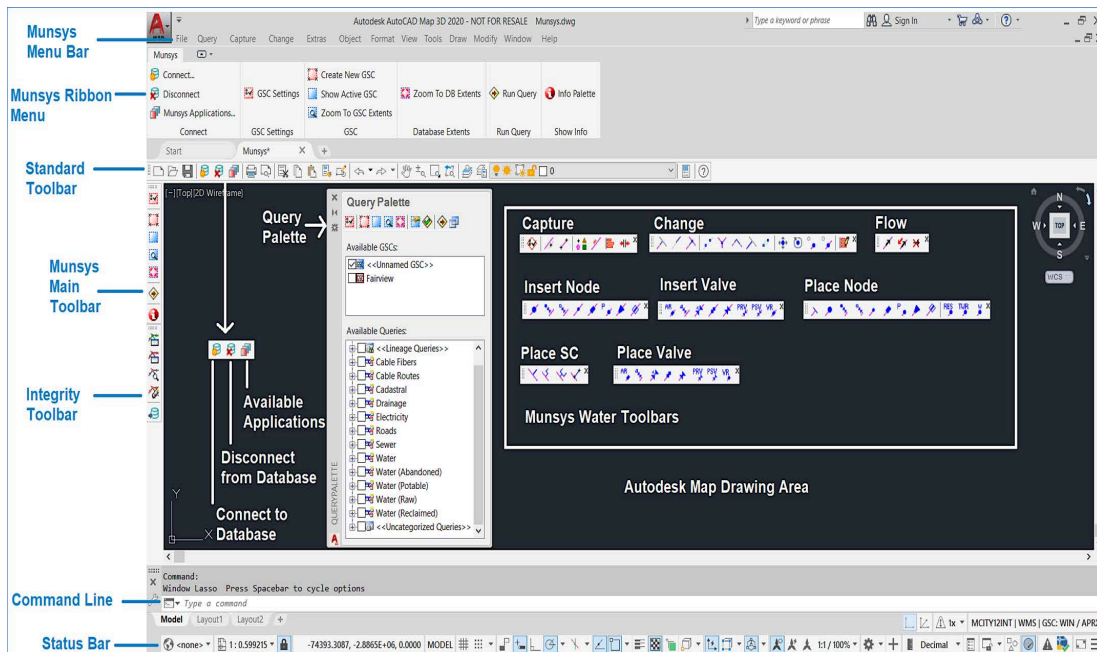
Figure 3   The Munsys Water interface

Munsys menu bar – contains the Munsys and AutoCAD Map menus. Munsys menus are defined by a menu file, which automatically loads when the Munsys application is launched. AutoCAD Map menus are also defined by a menu file, which the user can customize.

Standard toolbar – contains frequently used AutoCAD Map buttons, standard Microsoft® buttons and Munsys buttons for connecting to the database and launching the various Munsys applications.

AutoCAD Map drawing area – this area is used to display Munsys data that is extracted from the database and AutoCAD Map drawings.

AutoCAD Map command line – displays prompts and messages.

AutoCAD Map status bar – displays information/drawing aids.

Munsys main toolbar – contains frequently used Munsys functions.

Munsys Integrity toolbar – contains the Integrity Check and Post to Database functions.

Use this button	When you want to...
	...check water object integrity
	...check water network integrity
	...browse integrity markers
	...erase integrity markers
	...post data to the database

Table 4   The Munsys Water Integrity Toolbar

Munsys Water toolbars – Munsys Water has eight application-specific toolbars that are displayed when activated. To display the Water toolbars, right-click in the grey area on the right-hand side of the Munsys Standard toolbar.
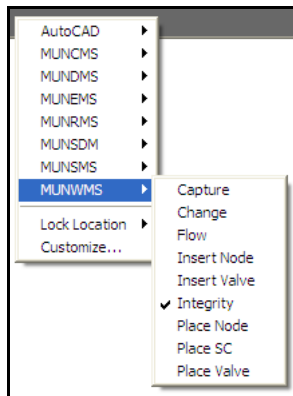
Point to MUNWMS, and then select the toolbars that you want displayed one by one. The toolbars are displayed in the drawing area.

■ The Munsys Water Capture toolbar contains the following buttons:

Use this button	When you want to...
	...specify water capture settings.
	...draw an offset water pipe.
	...draw a freehand water pipe.
	...place a water symbol.
	...place a water pipe label.
	...place a water note.
	...place dimension arrows.

Table 5   The Munsys Water Capture toolbar

■ The Munsys Water Change toolbar contains the following buttons:

Use this button	When you want to...
	...extend a water pipe to a boundary.
	...extend a water pipe by distance.
	...extend and break a water pipe.
	...break a water pipe.
	...change a water pipe.
	...fillet water pipes.
	...trim a water pipe.
	...move a node.
	...rotate a node.
	...snap a node to the endpoint of a pipe.
	...snap a node to the endpoint of a pipe, breaking the pipe.

Use this button	When you want to...
	...change a water note.

Table 6   The Munsys Water Change toolbar

■ The Munsys Water Flow toolbar contains the following buttons:

Use this button	When you want to...
	...show water pipe direction.
	...change water pipe direction.
	...clear direction arrows.

Table 7   The Munsys Water Flow toolbar

■ The Place Node toolbar is used to place water nodes at the endpoints of water pipes.

■ The Insert Node toolbar is used to insert water nodes anywhere on water pipes.

■ The Place Valve toolbar is used to place valves at the endpoints of water pipes.

■ The Insert Valve toolbar is used to insert valves anywhere on water pipes.

■ The Munsys Water Place SC toolbar contains the following buttons:

Use this button	When you want to...
	...place a straight service connection.
	...place a branch service connection.
	...place a double branch service connection.
	...place a freehand service connection.

Table 8   The Munsys Water Place SC toolbar

About water objects

Water pipes, nodes and service connections are used to build water networks.

The initial connection from a parcel to the rest of the water network is called a service connection. Water pipes are placed along parcel boundaries. Water pipe diameter is the largest at the source of water reticulation, becoming smaller as the water network develops to the parcels.

Water relies on pressure to flow through the pipes. Networks are classified according to the following water categories:

- Potable – also known as treated water. Potable water is distributed through the water network for human consumption.

- Reclaimed – also known as recovered or recycled water. Waste water (sewer) is processed at a sewer plant to acceptable quality for irrigation purposes. This water is called reclaimed water.

- Raw – also known as untreated water. Raw water may come from groundwater sources or surface water such as lakes and rivers. Although untreated water may offer a high quality that could be consumed without disinfection, it almost always goes through the disinfectant residual.

- Abandoned – equipment may no longer be in use (abandoned). Utility departments need to keep records of abandoned equipment because it might cause a health risk (for example, it may contain materials like asbestos). Expensive equipment like valves and pumps are normally removed, leaving only the pipe abandoned.

Water pipes are placed along cadastral boundaries.

Water nodes indicate where water pipes are connected, intersect or terminate.

Valves maintain the water flow in the water network.

Water notes are used to supply additional information on plans and drawings.

Dimensions also supply additional information in terms of the location of a water object relative to a parcel boundary.

Labels contain dynamic text information that represent a specified column in the database.

Residential water pipes are captured to indicate the water pipes running from service connections to buildings. Residential water does not form part of the network connectivity.

Water symbols represent additional annotation in the form of a symbol, and do not form part of the water network.

Water Zones are captured to obtain an overview of the network layout.
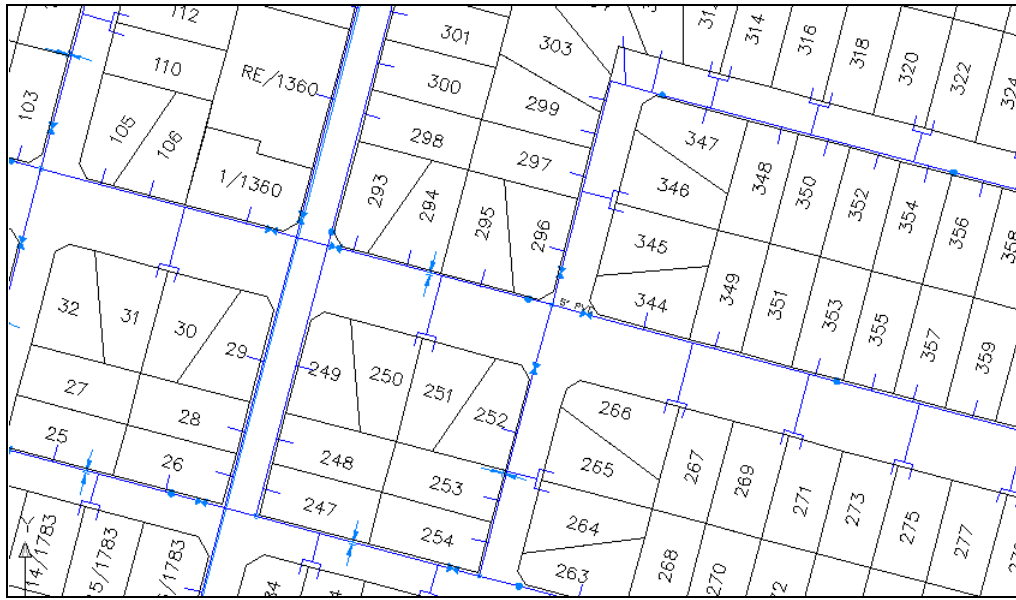
Figure 9   A water network

Chapter 3
Querying water data from the database

Introduction

This chapter describes how to query water data from the database using the Query menu. With the exception of residential water, water data is queried from the database by category, and according to the current GSC. Water categories are based on the quality of water transported by the equipment and the usability of the equipment. Should you need to query only a specific water object type or define a customized query, you can use the Munsys Query Palette. The Query Palette is discussed in the *Munsys Concepts User Manual*. You can also query a map page grid. Water data that is queried includes the retrieval of the spatial and attribute data.

Querying a map page grid

This query retrieves a map page grid from the database. The map page grid can be used to locate services based on the map page number, and is represented by a layout of polygons similar to the sheet layout used in Munsys Map Books. The map page grid can be modified by using the Object > Generate MunPolygons and Object > Edit MunPolygon menu items to capture and change the map page grid objects.

To query a map page grid

■ Choose **Query** > **Map Page Grid**.

The map page grid is retrieved to the extents of the database.
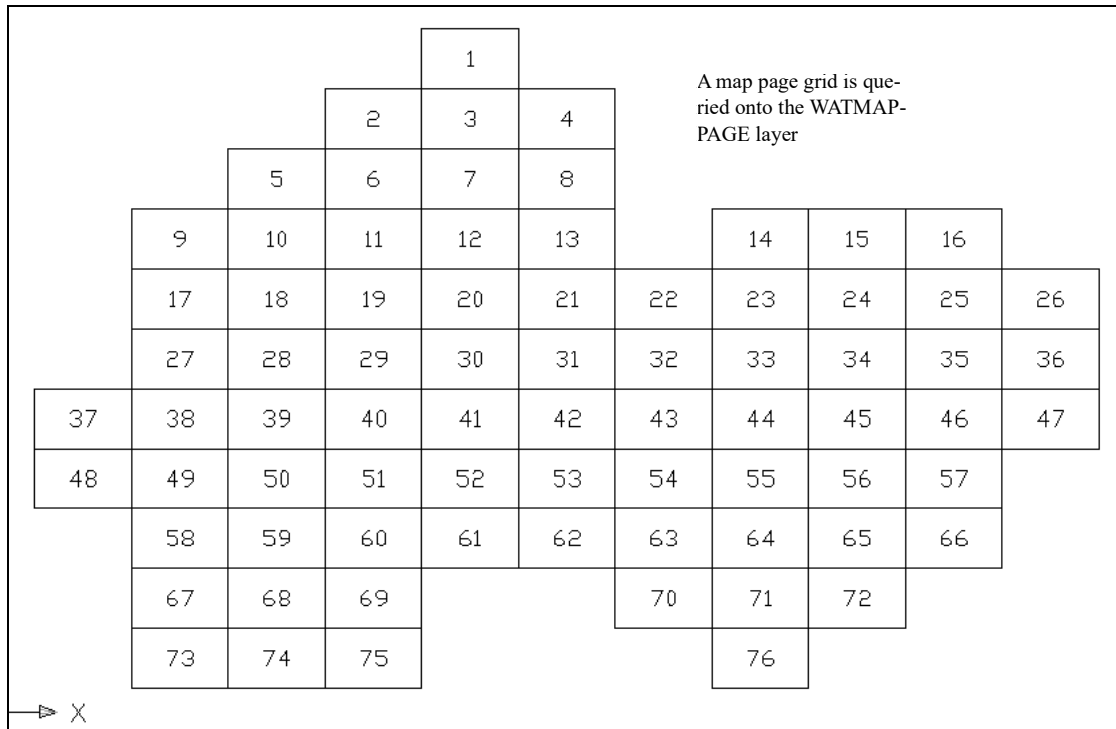
Figure 1   Querying a map page grid

Querying water objects by category

This group of queries retrieves water objects (pipes, nodes and service connections) from the database according to their water category. The water objects are queried onto their respective layers, for example WATPIPE_POTABLE, or WATNODE_RAW.

To query all water categories

■ Choose **Query** > **Water Category** > **All**.

The command line indicates how many water objects (dimensions, nodes, notes, pipes, service connections, labels and dimension notes) in all the water categories were retrieved from the database.

Querying water objects by single category

■ Do one of the following:

- ■ Choose Query > Water Category > Potable.

- ■ Choose Query > Water Category > Reclaimed.

- ■ Choose Query > Water Category > Raw.

- ■ Choose Query > Water Category > Abandoned.

The objects are retrieved from the database, and the command line indicates how many water objects (dimensions, nodes, notes, pipes, service connections, labels and dimension notes) in the category that you selected were retrieved from the database.
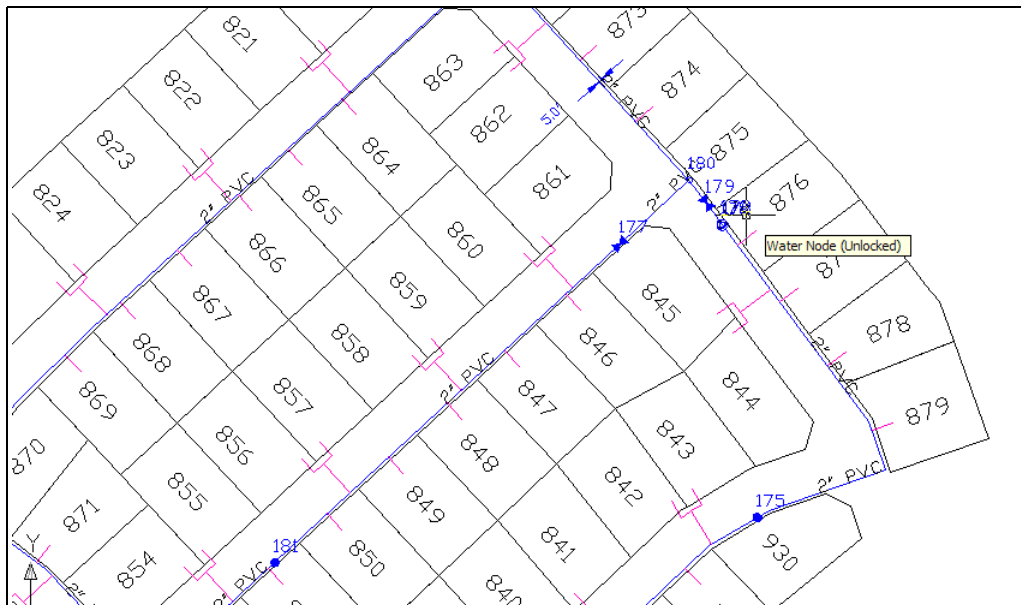
Figure 2   Querying water objects from all categories

Querying water zones

Water zones provide an overview of the water network layout, and are queried from the database according to the various water categories, and according to the current GSC. Water zones are retrieved onto the WATZONE_*CATEGORY* layer, for example a water zone in the potable category layer is retrieved on the WATZONE_POTABLE layer.

To query water zones (all categories)

■   Choose **Query** > **Water Zones** > **All**.

The command line indicated how many water zones in all the water categories were retrieved from the database.

To query water zones by category

■   Do one of the following:

- ■   Choose Query > Water Zones > Potable.

- ■   Choose Query > Water Zones > Reclaimed.

- ■   Choose Query > Water Zones > Raw.

- ■   Choose Query > Water Zones > Abandoned.

The command line indicated how many water zones in the category that you selected were retrieved from the database.
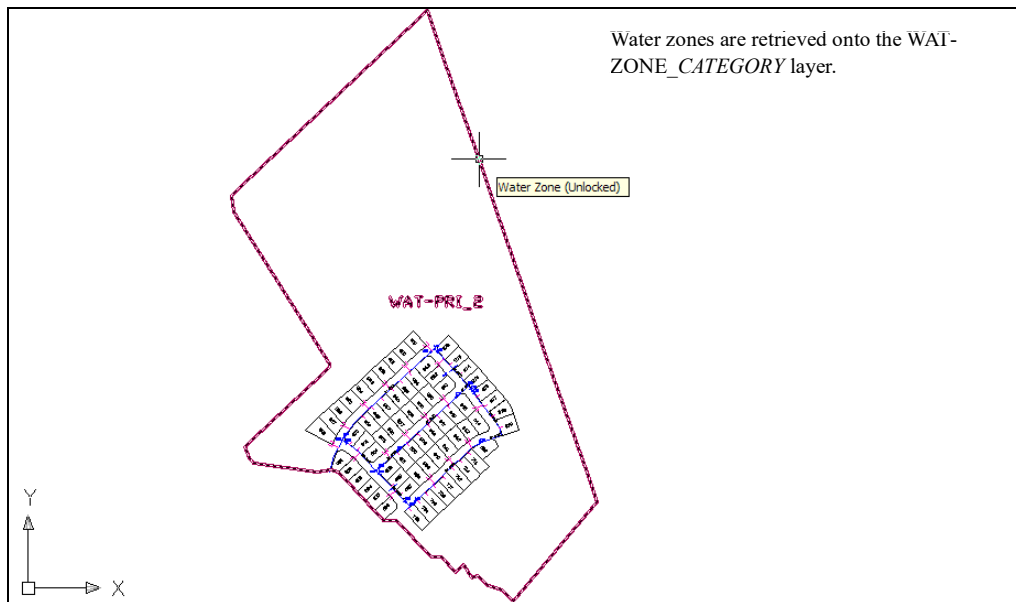
Figure 3   Querying water zones

Querying residential water

This query retrieves all the residential water pipes from the database according to the current GSC. Residential water pipes are queried onto the WATRESPIPE layer. Residential water pipes do not form part of the water network.

To query residential water

■ Choose **Query** > **Residential Water**.

The command line indicates how many residential water pipes were retrieved from the database.
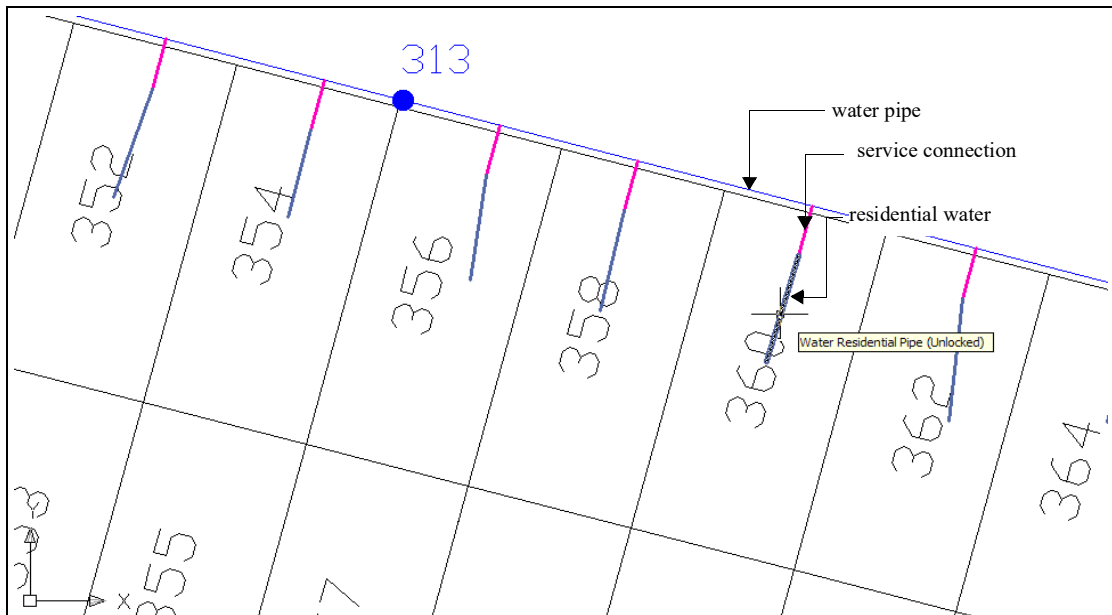
Figure 4   Querying residential water

Chapter 4
Creating water data

Capturing water data

When you start to capture a water network, you will first need to query the cadastral data from the database to make certain that the water objects locate geographically correct. Existing water objects should also be queried to determine the relationship between existing and new water objects. This will prevent data duplication.

All water objects, with the exception of residential water pipes, have a category assigned as part of the capture or convert process. The object is moved to the correct layer according to the water category. The water category is set on the Capture Settings dialog box before the capture process is started. Default layer names are used for each object type per water category. For example, a water pipe of the Potable category will be captured on the WATPIPE_POTABLE layer. When nodes, service connections, dimensions and labels are captured, they are assigned the water category of the associated water pipe.

Water pipes are the first water objects to capture, as they are usually aligned with existing cadastral boundaries. Water nodes are placed next. At every intersection of two or more pipes, a junction is placed to connect the pipes. If a water pipe does not loop back onto another pipe, the network is closed off with an end cap.

Next, service connections are placed. Service connections are the link between the reticulation network and the water meter on a parcel. In some cases a branch service connection, which connects two parcels to a reticulation simultaneously, is placed.

Residential water pipes show the water supply from service connections to buildings. Water zones represent different parts of the water network. Water zones are captured as polygons and do not affect connectivity; therefore the order of capture for these objects is irrelevant.

Once you have placed all the water objects that you need to complete the water network, you are ready to run the integrity check, and to post the water data to the database.

Water capture settings

Each Munsys application has its own default capture settings that are set by the GIS administrator in the Munsys Management Console.

In Munsys Water, default settings are available for:

- dimensions – dimension note height
- file – the drawing directory
- general – construction color, include network in object integrity, database extents display resolution, integrity circle size, tag and symbol scale and rotation if coordinate transformation is done, snap tolerance, tag angle, font, height and justification, and water category
- integrity – short objects, water pipe, node, service connection and search tolerance
- nodes – water node scale
- notes – note tag height
- symbols – water symbol scale
- service connections – length, branch offset, offset distance
- water pipes – label height, diameter, material, type, offset distance from cadastral boundaries
- water zones – zone tag height

You can change the current settings on the Water Settings dialog box to speed up the capture process. Capture settings only apply to *new* water objects, and if you change the default settings, the changes are only valid for the current session.

Settings are changed by highlighting the current value, and then:

- entering a new value
- selecting the new value from a drop-down list

The user cannot change all of the settings. Some settings may only be changed by the GIS administrator to enforce consistency and integrity on a higher level. Settings that cannot be changed are "greyed out" on the Capture Settings dialog box.

Tip   A short description of a value displays when it is highlighted.

To specify water capture settings

1 Do one of the following:

 - Choose **Capture** > **Water Settings...**
 - Click the **Water Settings...** button on the Munsys Water **Capture** toolbar.
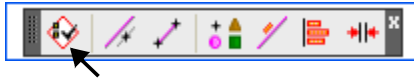
2 The **Water Settings** dialog box is displayed, showing the default water capture settings.

Some values are changed by manually entering a new value.

Some values are changed by selecting a value from a drop-down list.
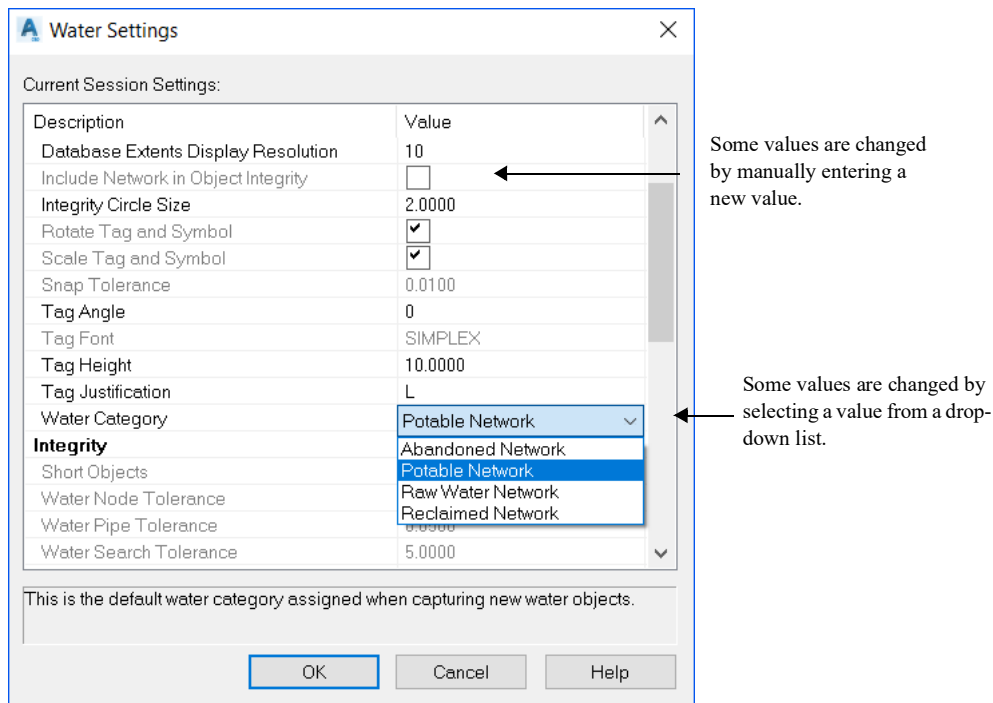
Figure 1   The Water Settings dialog

3 To change a value, do one of the following:

 - Highlight the current value, and then enter a new value.
 - Highlight the current value, and then choose the new value from the drop-down list.

4 Click **OK** to apply the new settings.

The settings will apply until you change them again, or until the current session is terminated.

Capturing water pipes

Water pipes are the first water objects that are captured and are normally aligned with parcels; therefore parcels need to be queried before any water data is captured.

Duplication of water objects can be avoided by querying all the existing water objects from the database before you start capturing the water network. Pipes are broken at intersections. Water pipe diameter is the smallest at the service connection and becomes larger to accommodate the flow. Water pipe diameter can be changed on the following conditions:

- at an intersection of water pipes
- at a junction point
- at a water node, such as a valve, etc.

Drawing offset water pipes

Offset water pipes are drawn by either specifying multiple points along a boundary (for example parcel or municipality boundaries), specifying the offset side, and then specifying the offset distance.

To draw an offset water pipe

1 Do one of the following:

- Choose **Capture** > **Draw Offset Pipe**.
- Click the **Draw Offset Pipe** button on the Munsys Water **Capture** toolbar.
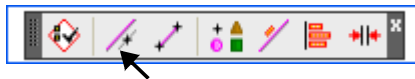
The command line prompts you to specify points, or to select a segment to offset the pipe from.

2 To draw a pipe by specifying points, do the following:

- Specify the first point, and then specify next point for the water pipe or [Arc/Halfwidth/Length/Undo/Width].
  The Arc option allows you to continue capturing offset water pipes as a series of arcs until you select a different option from the polyline linear list [Angle/CEnter/CLose/Direction/Halfwidth/Line/Radius/Second pt/Undo/Width]
- Press **ENTER** when you have specified all the points.
- Specify a point on the side to offset the pipe.
- On the command line, specify the offset distance, or press **ENTER** to accept the default offset distance.
  The command line displays a message confirming that the pipe was created successfully.

3 To draw a pipe by selecting segments, do the following:

- On the command line, type **O**, and then press **ENTER**.
- Select a segment to offset the pipe from.
- Specify a point on the side to offset the pipe.

- On the command line, specify a multiplication factor for the default offset distance, or press **ENTER** to accept the default offset distance.

- Continue selecting segments until all the required segments have been selected, and then press **ENTER**.

- Press **ENTER** to confirm that you have completed the segment selection.

  The command line displays a message confirming that the pipe was created successfully.
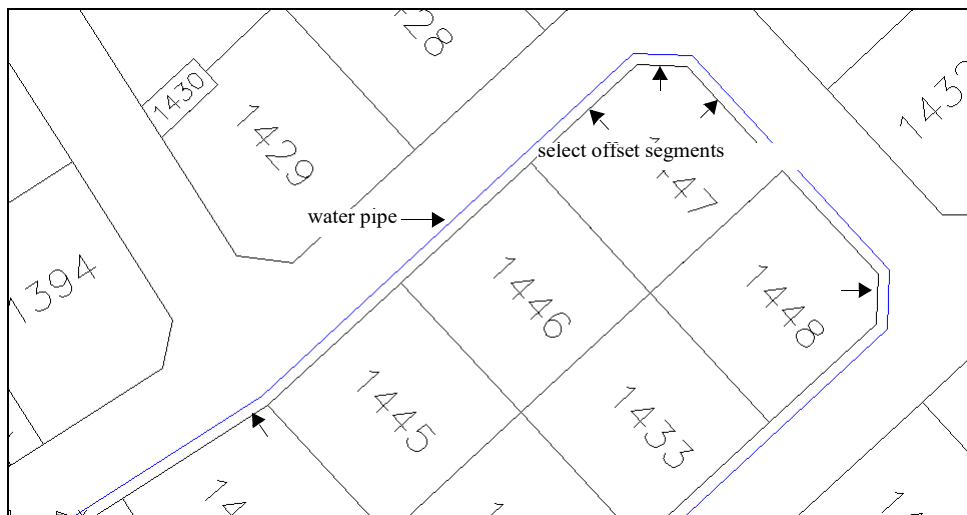
Figure 2   Offset water pipe drawn by selecting offset segments

Drawing freehand water pipes

Freehand water pipes are drawn by selecting points in the drawing, or by entering coordinates on the command line. The command line prompts you for endpoints, allowing a sequence of pipes to be constructed. Water pipes are captured on their appropriate layers, to be verified when the integrity check is run.

To draw a freehand water pipe

1   Do one of the following:

- Choose **Capture** > **Draw Freehand Pipe**.

- Click the **Draw Freehand Pipe** button on the Munsys Water **Capture** toolbar.

2   Specify the first point for the pipe.

3   Specify the next points for the pipe, and press **ENTER** when you have specified all the points.

The command line displays a message confirming that the pipe was created successfully.

Note   After capturing water pipes, you need to clean up the pipes, for example close all the gaps.
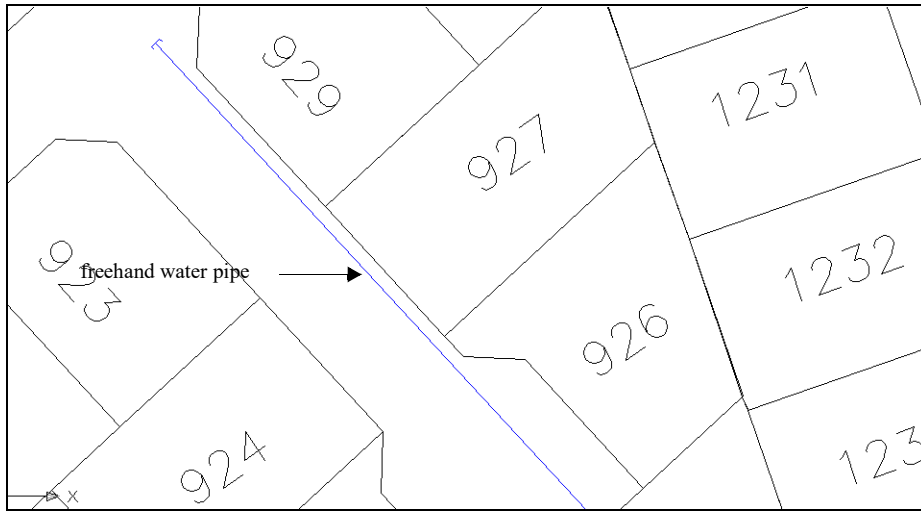
Figure 3   A freehand water pipe

Showing pipe direction

When you have captured and edited all the water pipes, you have to check the pipe direction to verify that it is correct. This can be done for both new and existing water pipes.

To show pipe direction

1   Do one of the following:

■   Choose **Capture** > **Show Pipe Direction**.

■   Click the **Show Pipe Direction** button on the Munsys Water **Flow** toolbar.

2   Select the appropriate water pipes, and then press **ENTER**.

A *direction arrow* on each selected pipe indicates the pipe direction, as shown in the following figure:
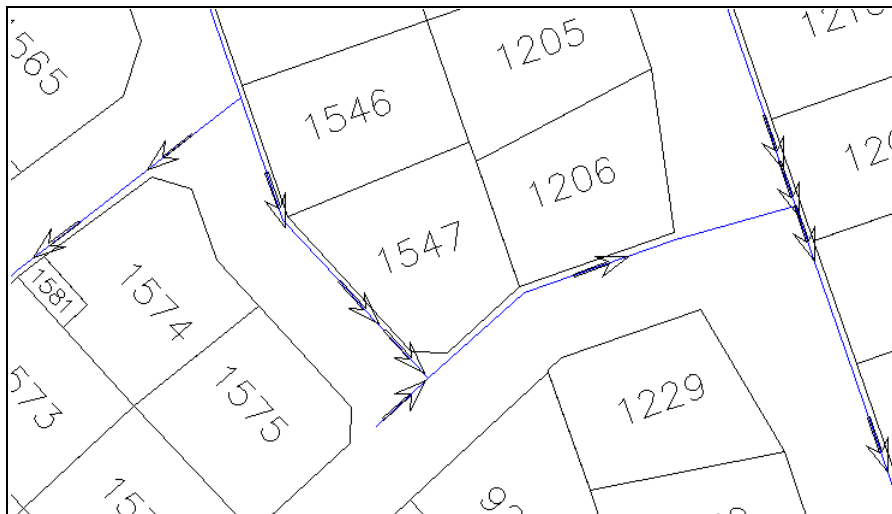
Figure 4   Showing water pipe direction

To change pipe direction

This function is used to reverse the direction of water pipes. This enables users to construct the network without taking direction into account. Once the construction is complete, the pipe direction can be changed easily.

1   Do one of the following:

   ■   Choose **Capture** > **Change Pipe Direction**.

   ■   Click the **Change Pipe Direction** button on the Munsys Water **Flow** toolbar.
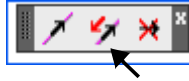
2   Select the water pipes of which you want to change the direction, and then press **ENTER**.

The direction is reversed automatically.

Important   The integrity check does not verify pipe direction; therefore it is very important to make certain that pipe directions are correct.

To clear direction arrows

When you are satisfied that the direction of all the water pipes is correct, the direction arrows can be cleared from the drawing.

Do one of the following:

   ■   Choose **Capture** > **Clear Direction Arrows**.

   ■   Click the **Clear Direction Arrows** button on the Munsys Water **Flow** toolbar.

The direction arrows are removed from the drawing.

Capturing water nodes

When capturing a water network, water nodes are placed once the pipes have been captured and cleaned, and the direction has been verified and corrected where necessary. Nodes can be placed at the end of water pipes (endpoint) or placed anywhere on the pipe (nearest), without breaking the underlying pipe. You can also insert nodes into water pipes, breaking the underlying pipe. Water nodes are captured on the WATNODE_*CATEGORY* layer (for example, a hydrant of the Potable category will be placed on the WATNODE_POTABLE layer), to be verified when the integrity check is run.

Placing endpoint water nodes

Endpoint nodes are placed at the end point of a water pipe, closest to the point where it was selected. The Munsys Water Place Node toolbar contains the functions that are used to place endpoint nodes.

To place an endpoint water node

1   Do one of the following:

■   Choose **Capture** > **Place Endpoint Node** > *Node Name*.

■   Click the appropriate button on the Munsys Water **Place Node** toolbar.

Figure 5   The Munsys Water Place Node toolbar

2   Select a point close to the endpoint on the water pipe where you want to place the node.

The appropriate symbol is placed at the endpoint of the water pipe.

Inserting nearest nodes

With this function, you can insert a node on any selected point on a water pipe. The underlying pipe is broken, and the node is captured on its appropriate layer, to be verified when the integrity check is run. The Munsys Water Insert Node toolbar contains the functions that are used to insert nearest nodes.

To insert a nearest water node

1   Do one the following:

- Choose **Capture** > **Insert Nearest Node** > *Node Name*.

- Click the appropriate button on the Munsys Water **Insert Node** toolbar.

Figure 6   The Munsys Water Insert Node toolbar

2   Select a point on the water pipe where you want to insert the node.

The underlying pipe is broken, and the appropriate symbol is placed on the water pipe.

Note   The original water pipe selected is flagged to be deleted from the database when changes are posted. Two new water pipes will be created to replace the original pipe. All the attributes of the original pipe are copied to the two new pipes, except for the GID and PIPE_ID columns.
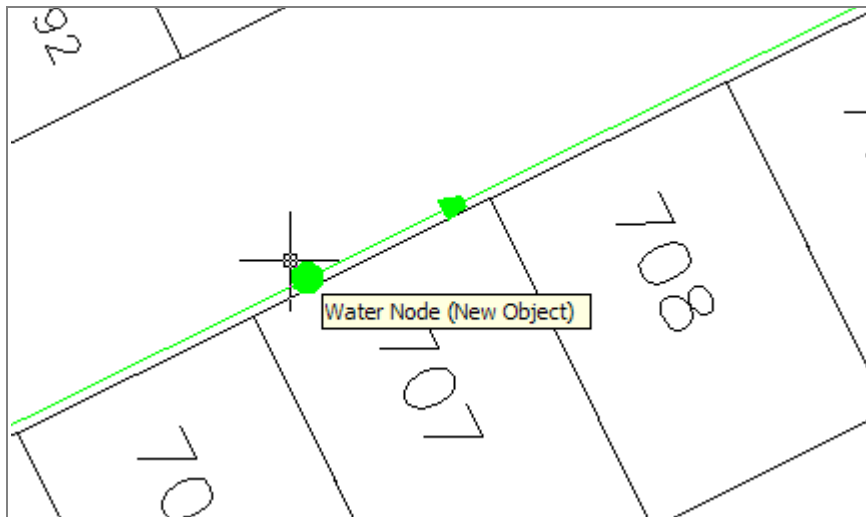
Figure 7   Capturing water nodes

Capturing valves

In a water network, valves control water flow. Valves are placed either at the endpoint of a water pipe, or inserted anywhere at a selected point on a pipe. The pipe is always broken at the point where a valve is inserted. All valve angles are aligned with the pipes. Valves are captured on the WATNODE_*CATEGORY* layer (for example, a butterfly valve of the Potable category will be placed on the WATNODE_POTABLE layer), to be verified when the integrity check is run.

Placing endpoint valves

Endpoint valves are placed at the endpoint of a water pipe. The Munsys Water Place Valve toolbar contains the functions that are used to place endpoint water valves.

To place an endpoint valve

1   To place an endpoint valve, do one of the following:

■   Choose **Capture** > **Place Endpoint Valve** > *Valve Name*.

■   Click the appropriate button on the Munsys Water **Place Valve** toolbar.

Figure 8   The Munsys Water Place Valve toolbar

2   Select a point close to the endpoint on the water pipe where you want to place the valve.

The appropriate valve symbol is placed on the water pipe.

Inserting nearest valves

Nearest valves are inserted at any selected point on a water pipe, breaking the underlying pipe. The Munsys Water Insert Valve toolbar contains the functions that are used to insert nearest water valves.

To insert a nearest valve

1   Do one of the following:

■   Choose **Capture** > **Insert Nearest Valve** > *Valve Name*.

■   Click the appropriate button on the Munsys Water **Insert Valve** toolbar.
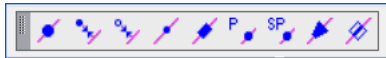

Figure 9   The Munsys Sewer Insert Valve toolbar

2   Select a point on the water pipe where you want to insert the valve.

The underlying pipe is broken, and the appropriate valve symbol is placed on the water pipe.
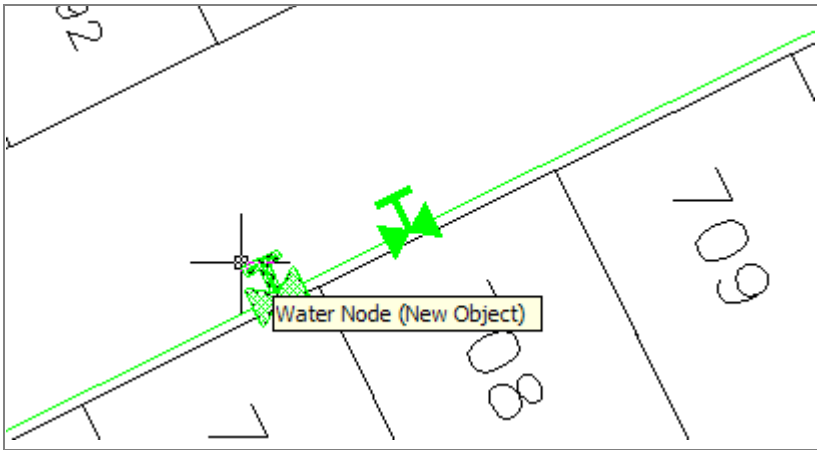
Figure 10   Capturing valves

Capturing service connections

Service connections connect parcels with the rest of the water network. Munsys Water caters for the following service connection types:

- straight service connections
- single and double-branched service connections
- freehand service connections

The Munsys Water Place SC toolbar contains all the functions that are used to capture different types of service connections. Service connections are placed on their appropriate layers, to be verified when the integrity check is run.

To place a straight service connection

Straight service connections are placed perpendicular to the water reticulation network, and end within the boundaries of land parcels.

1   To place a straight service connection, do one of the following:

- Choose **Capture** > **Place SC** > **Straight**.
- Click the **Place Service Connection Straight** button on the Munsys Water **Place SC** toolbar.
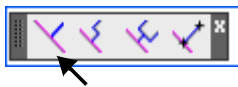
2   Select the water pipe closest to the parcel boundary where you want to place the service connection.

3   Select the parcel boundary where the service connection should be connected to.

The service connection is placed to end within the parcel boundary.

To place a branch service connection

Branch service connections are placed at a specified offset distance from a parcel boundary. The default offset distance can be changed on the Water Settings dialog box (see page 4-3).

1   To place a branch service connection, do one of the following:

- Choose **Capture** > **Place SC** > **Branch**.
- Click the **Place Service Connection Branch** button on the Munsys Water **Place SC** toolbar.

2   Select the water pipe closest to the parcel boundary where you want to place the branch service connection.

3   Select the parcel boundary to which the branch service connection should be connected.

4   Specify the boundary offset distance, and then press **ENTER**, or press **ENTER** to accept the default offset distance.

5   Specify an alignment point on the parcel boundary, and then press **ENTER**.

The branch service connection is placed as specified.

To place a double branch service connection

Double branch service connections are used to connect two parcels to the water reticulation network simultaneously.

1 To place a double branch service connection, do one of the following:

- Choose **Capture** > **Place SC** > **Double Branch**.

- Click the **Place Service Connection Double Branch** button on the Munsys Water **Place SC** toolbar.

2 Select the water pipe closest to the parcel boundary where you want to place the double branch service connection.

3 Select the parcel boundary to which the double branch service connection should be connected.

4 Specify the boundary offset distance, and then press **ENTER**, or press **ENTER** to accept the default offset distance.

5 Specify an alignment point on the parcel boundary, and then press **ENTER**.

The double branch service connection is placed as specified.

To place a freehand service connection

With this function, you can customize the length, direction and angle of a service connection. A service connection might, for example, be longer than the default service connection length specified on the Water Settings dialog box, and it might not tie in to a water pipe at a specified angle.

1   To place a freehand service connection, do one of the following:

   ■   Choose **Capture** > **Place SC** > **Freehand**.

   ■   Click the **Place Service Connection Freehand** button on the Munsys Water **Place SC** toolbar.

2   Select the water pipe where the service connection should be connected.

3   Specify points within the parcel boundary, and then press **ENTER** to complete the service connection.

   The service connection is captured on its appropriate layer.
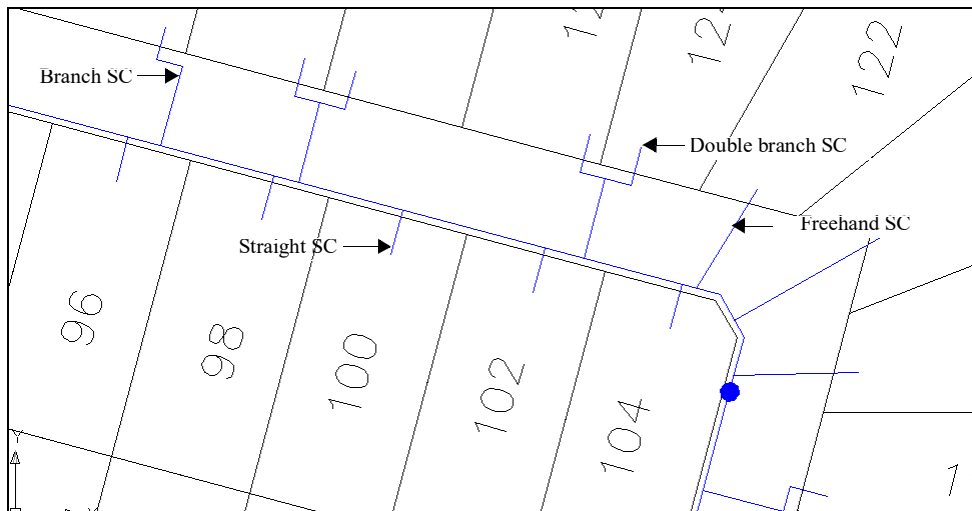
Figure 11   Service connections

Capturing water zones

Water zones are captured to obtain an overview of the network layout. Water zones are captured as polygons that represent a certain section of the water reticulation network.

Water zones are captured by:

- selecting consecutive points to form a water zone polygon
- specifying a tag for the polygon builder to use when creating the water zone polygon
- generating a polygon from the lines and tag that were created

To draw a water zone boundary

1   Choose **Capture** > **Water Zone** > **Draw Zone Boundary**.

2   Specify the first polygon point.

3   Specify the next points, and then press **ENTER**.

4   Press **ENTER** to close the polygon.

Munsys closes the polygon automatically by snapping to the first specified point.

To place a water zone tag

1   Choose **Capture** > **Water Zone** > **Place Zone Tag**.

2   Specify the insertion point for the tag.

3   On the command line, specify the tag height, or press **ENTER** to accept the default height.

4   To indicate the tag angle, do one of the following:

- Indicate the tag angle with your mouse.
- Type the angle on the command line.
- On the command line, type **A** to align the tag to an object, press **ENTER**, and then select the object to which you want to align the tag.

5   Type the tag value on the command line, and then press **ENTER**.

The tag is inserted as specified.

To generate a water zone polygon

1 Choose **Capture** > **Water Zone** > **Generate Zone Polygon**.

2 Select all the lines that form the water zone polygon, and then press **ENTER**.

3 Select the polygon tag, and then press **ENTER**.

The command line indicates that the polygon has been built successfully.
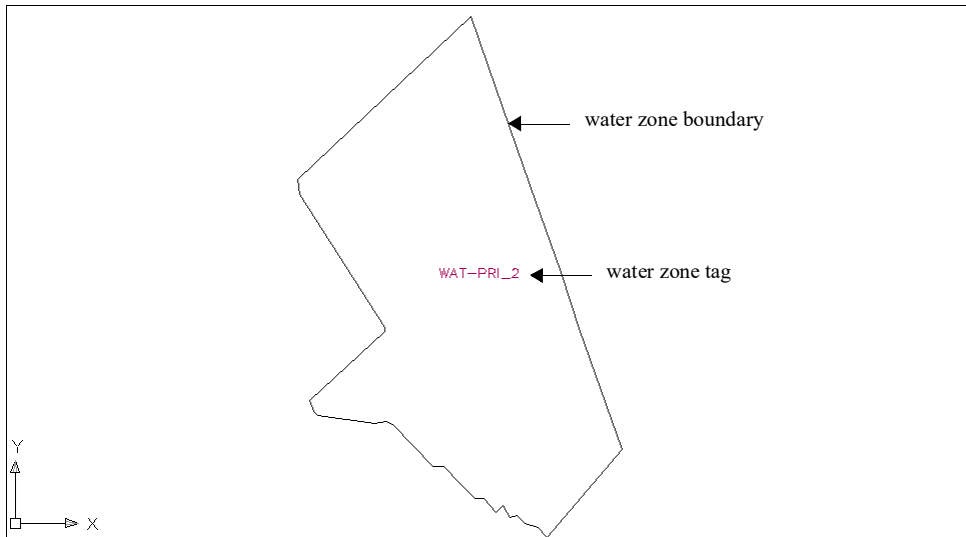
Figure 12   A water zone

Capturing residential water pipes

Residential water pipes can be drawn freehand, or captured at a specified offset distance from any selected object. Residential water pipes are placed on the WATRESPIPE layer, to be verified when the integrity check is run.

To draw a freehand residential water pipe

1   Choose **Capture** > **Residential Water** > **Draw Freehand Pipe**.

2   Specify the first point for the pipe, and then specify next points.

3   Press **ENTER** when you have specified all the points.

The command line displays a message confirming that the residential water pipe was created successfully.

To draw an offset residential water pipe

1   Choose **Capture** > **Residential Water** > **Draw Offset Pipe**.

The command line prompts you to specify points, or to select an offset segment.

2   To draw a pipe by specifying points, do the following:

  ■   Specify the first point, and then specify next points for the pipe.

  ■   Press **ENTER** when you have specified all the points.

  ■   Specify a point on the side to offset the pipe.

  ■   On the command line, specify the offset distance, or press **ENTER** to accept the default offset distance.
      The command line displays a message confirming that the pipe was created successfully.

3   To draw a pipe by selecting segments, do the following:

  ■   On the command line, type **O**, and then press **ENTER**.

  ■   Specify a boundary segment to offset the pipe from.

  ■   Specify a point on the side to offset the pipe.

  ■   On the command line, specify a multiplication factor for the default offset distance, or press **ENTER** to accept the default offset distance.

  ■   Continue selecting segments until all the required segments have been selected, and then press **ENTER**.

  ■   Press **ENTER** to confirm that you have completed the segment selection.
      The command line displays a message confirming that the pipe was created successfully.

Placing water symbols

This function is used to place water symbols in the current drawing. Water symbols represent additional annotation in the form of a symbol, and do not form part of the water network. Water symbols can be placed anywhere without any restriction. Water symbols are captured on the WATSYM layer.

Note   The database administrator can add additional water symbols to the lookup table **LU_WMS_WATSYM** as required. This table contains a number of default symbols, but can be customized.

To place water symbols

1   Do one of the following:

■   Choose **Capture** > **Place Water Symbol...**

■   Click the **Place Water Symbol** button on the Munsys Water **Capture** toolbar.

2   The **Water Symbols** dialog box is displayed, showing a list of available water symbols.
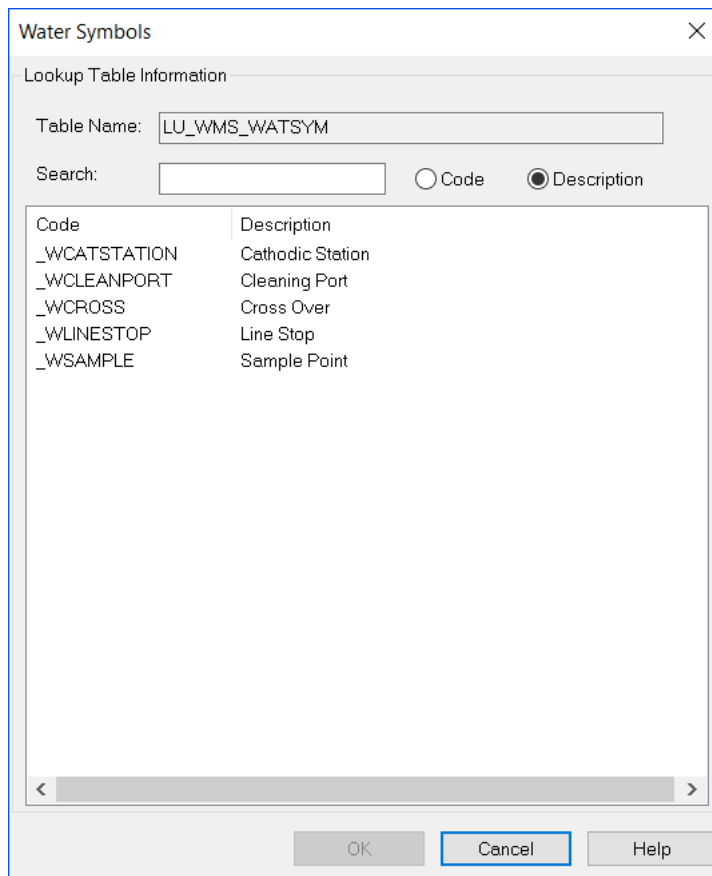
Figure 13   The Water symbols dialog box

3 From the list, select the symbol that you want to place, and then click **OK**.

4 Specify an insertion point for the symbol.

5 Specify a rotation angle for the symbol by doing one of the following:

- Enter the rotation angle on the command line, or press **ENTER** to accept the default angle of zero.

- Indicate the angle with your mouse pointer by picking a point in the drawing.

- On the command line, type **A** to align the symbol to an object, press **ENTER**, and then select the object to which you want to align the symbol.

The symbol is placed at the insertion point and angle that you specified.

Tip Press **ENTER** or **Spacebar** to continue placing consecutive symbols of the same type, without having to select a symbol type from the list every time.

Placing water labels

With this function, you can place a label on a water pipe that has been queried from the database. The water label shows the current pipe diameter and pipe material, for example 8".If you change the pipe diameter or material and post the changes to the database, the label will show the new value once it is queried again from the database. Water labels can therefore not be placed on new water pipes, but only pipes that have been posted to the database.

To place a water label

1 Do one of the following:

- Choose **Capture** > **Place Water Label**.

- Click the **Place Water Pipe Label** button on the Munsys Water **Capture** toolbar.
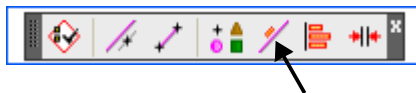
2 Select the water pipe to which you want to attach the label.

3 Specify an insertion point for the label.

4 Specify the tag height for the label, or press **ENTER** to accept the default tag height.

5 To indicate the tag angle, do one of the following:

- Indicate the tag angle with your mouse.

- Type the angle on the command line.

- On the command line, type **A** to align the tag to an object, press **ENTER**, and then select the object to which you want to align the tag to.
  The label is placed as specified.
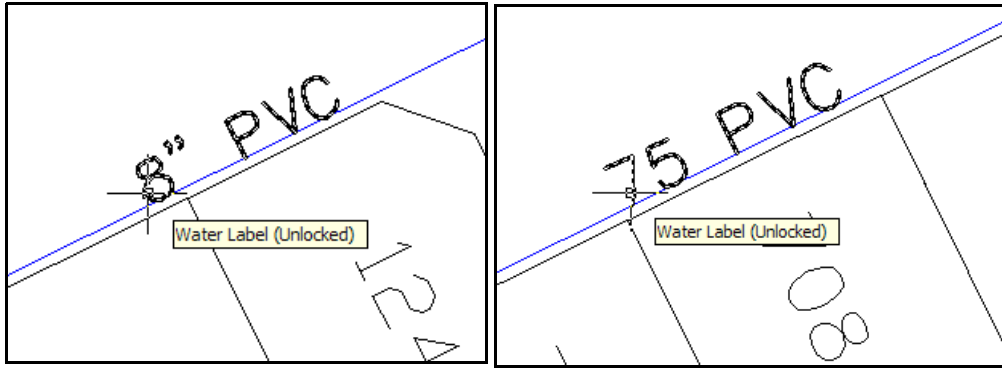
Figure 14 Water labels, showing pipe material and diameter

Placing water notes

For map production purposes, information about a spatial object is added in the form of a note.

To place a water note

1   Do one of the following:

- Choose **Capture** > **Place Water Note**.

- Click the **Place Water Note** button on the Munsys Water **Capture** toolbar.
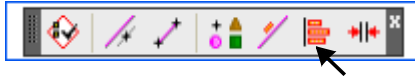
2   Specify the insertion point for the note.

3   On the command line, specify the note height, or press **ENTER** to accept the default note height.

4   To indicate the note angle, do one of the following:

- Indicate the angle with your mouse.

- Type the angle on the command line.

- On the command line, type **A** to align the note to an object, press **ENTER**, and then select the object you want to align the note to.

5   Type the note value on the command line, and then press **ENTER**.

The note is inserted as specified.

Placing dimension arrows

To place dimension arrows
Map production is a reduced version of reality and it is therefore virtually impossible to capture water pipes at the true offset distance from a parcel boundary. Dimension arrows are used to indicate the offset distance of a water pipe from a parcel boundary.

1   Do one of the following:

 - Choose **Capture** > **Place Dimension Arrow**.
 - Click the **Place Water Dimension Arrow** button on the **Munsys Water Capture** toolbar.
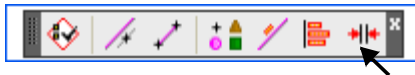
2   Specify the first segment for dimension.

  The dimension arrows will be placed perpendicular to this segment.

3   Specify the second segment for dimension.

The dimension arrows are aligned to the point selected on this segment.

4   On the command line, enter the offset distance, or press **ENTER** to accept the default offset distance as determined in the Water Settings, or press **A** to place the actual calculated distance.

The dimension text is placed at the dimension arrows, indicating the distance between the two dimension lines.
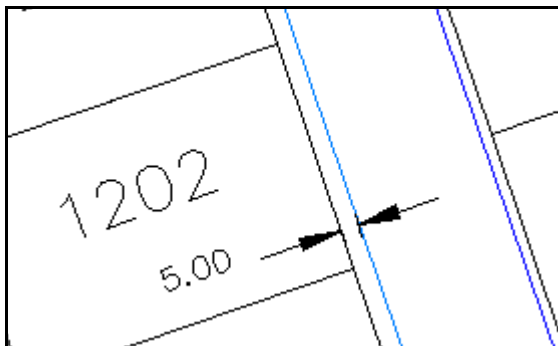
Figure 15   Dimension arrows

Checking water integrity

The Integrity Check provides a set of rules to validate spatial objects. All new or modified spatial objects have to be verified against integrity rules built into the capture and change routines of every application before they can be posted to the database. New and changed objects contain an internal status that requires the validation process.

The Integrity Check is run from the Capture menu, or by clicking the appropriate button on the Integrity toolbar. The way in which the integrity check is executed depends on the preferences/options specified in the Munsys Options dialog box. The various options available on this dialog box are discussed in detail in the Munsys Concepts User Manual.

The integrity check is split into two separate functions to facilitate flexibility and ease of use:

- Validate Object Integrity – checks and validates the spatial and/or attribute data of an object, according to the options specified in the Munsys Options dialog box:

  - When the Validate Geometry: Modified objects option has been selected, the geometry of only new or modified objects will be validated.

  - When the Validate Geometry: All objects option has been selected, all the objects in the selection set will have their geometry validated. This includes locked, unlocked, modified and non-modified objects.

When the object integrity check has completed and changes in objects have been encountered that may affect network integrity, a warning message to this effect is displayed if the option was specified in the Munsys Options dialog box.

- Validate Network Integrity – validates the rules that, together with the objects, make up a network, and according to the Network Integrity options specified in the Munsys Options dialog box. Network validation includes the topology and connectivity aspects, where topology is resembled in the geometry of objects and connectivity by means of attributes attached to objects.

This function is dependent on the relationships between objects, and therefore requires more objects to be included as part of the validation process than only those that were modified. The Validate Network Integrity function allows non-validated objects to be selected, but does not attempt to reset any integrity flags. It only places integrity markers when errors are encountered in the network. If the selection set contains objects that have not been validated by the Validate Object Integrity function, an Object Integrity Warning is displayed, recommending that object integrity has to be checked before network integrity.

Note   The *INTEG_NETWORK_AUTCHECK* application setting (Include Object in Network Integrity Check), which is set by the database administrator in the Munsys Management Console, allows a network integrity check to be performed automatically whenever an object integrity check is run. The same network rules and settings still apply. When the integrity check is completed, the **Integrity Results** dialog box displays a combined list of both object and network validations that were performed during the integrity check. When this setting is enabled, the object integrity check cannot be integrated with the database posting function, and the **Automatically perform Object Integrity** option on the **Munsys Options** dialog box **Preferences** tab will be unavailable.

When water object integrity is checked, the following is verified:

Validation check/error condition	Description
Unlocked objects not rectified	Indicates that an object could have been rectified but, because it was unlocked, the integrity check failed to rectify the object and it was left as is.
Short spatial objects	Applies to any object with a length shorter than the Munsys Water database tolerance setting.
Duplicate points in spatial objects	Applies to redundant coordinates being removed from an object. If the coordinates are within *SNAP* tolerance, they are discarded.
Objects with incomplete geometry	Refers to objects that do not have geometry, for example: tags that were placed without using the polygon builder process do not have a geometry.
Objects outside database extents	Checks if the objects selected are within the confines of the geographic extents of the database.
Attribute rules	Checks for the attribute rules as specified in the MUNSYS_INTEG_ATTR table, for example NULL values, etc.
Attribute data types	Checks the data type to be consistent with what is in the database; i.e. attached attributes should not exceed the limits of the table's column definition, for example: a tag may not be longer than the table's TAG_VALUE column width.

Table 16   The water object integrity check

When water network integrity is checked, the following is verified:

Validation check/error condition	Description
Unlocked objects not rectified	Indicates that an object could have been rectified but, because it was unlocked, the integrity check failed to rectify the object and it was left as is.
Pipes within snap tolerance	Checks for pipes that can snap to other pipes that are within the snap tolerance.
Pipes without nodes	Checks whether each pipe is connected to a node at both ends of the pipe.
Duplicate pipes	Checks for two different pipes connected to the same nodes.
Nodes within snap tolerance	Checks for nodes that can be snapped to pipes that are within the snap tolerance.
Isolated nodes	Checks for nodes that are not connected to any pipes.

Nodes with too many pipes	Checks for nodes that are connected to too many pipes.
Nodes with too few pipes	Checks for nodes that are connected to too few pipes.
Duplicate nodes	Checks for nodes that have been captured on top of one another.

Table 17   The water network integrity check

Checking water object integrity

1   Do one of the following:

- Choose **Capture** > **Data Integrity** > **Validate Object Integrity...**
- Click the **Validate Object Integrity** button on the **Integrity** toolbar.

2   Select the objects that you want to validate, and then press **ENTER**.

The Integrity Results dialog box is displayed, providing summarized information and validation results encountered during the object integrity check.

Figure 18   The Integrity Results dialog box

3   If you selected the **Notify when objects require network validation** option on the Munsys Options dialog box, and if objects were encountered during the integrity check that may affect network integrity, the following message is displayed:
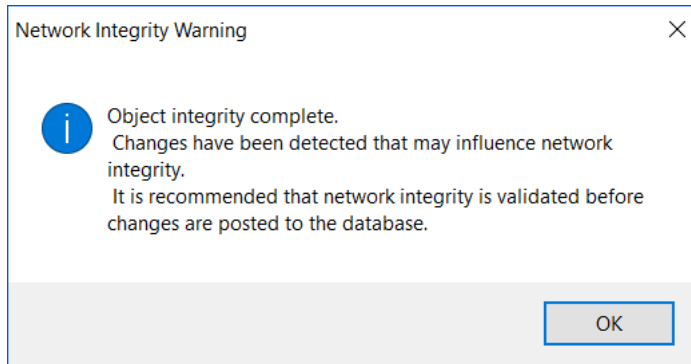
Figure 19   Network Integrity Warning

Checking water network integrity

1   Do one of the following:

- Choose **Capture** > **Data Integrity** > **Validate Network Integrity...**
- Click the **Validate Network Integrity** button on the **Integrity** toolbar.

2   Select the objects that you want to validate, and then press **ENTER**.

> **Note**   If you selected objects that have not been validated by the **Validate Object Integrity** function, the following message is displayed:
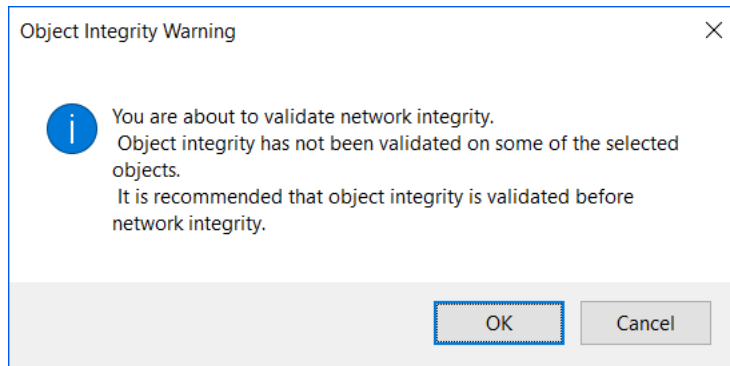
Figure 20   Object Integrity Warning

3   When the integrity check has completed, the **Integrity Results** dialog box is displayed, providing summarized information and validation results encountered during the network integrity check.
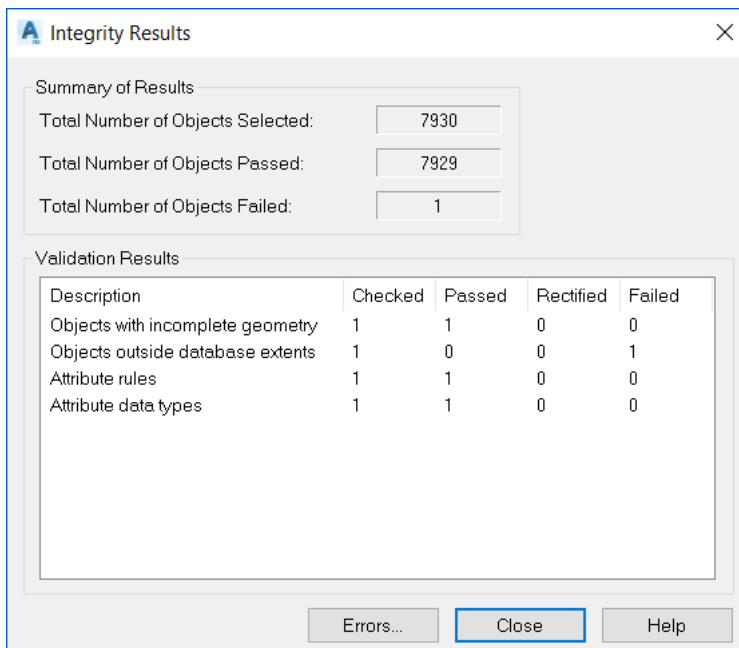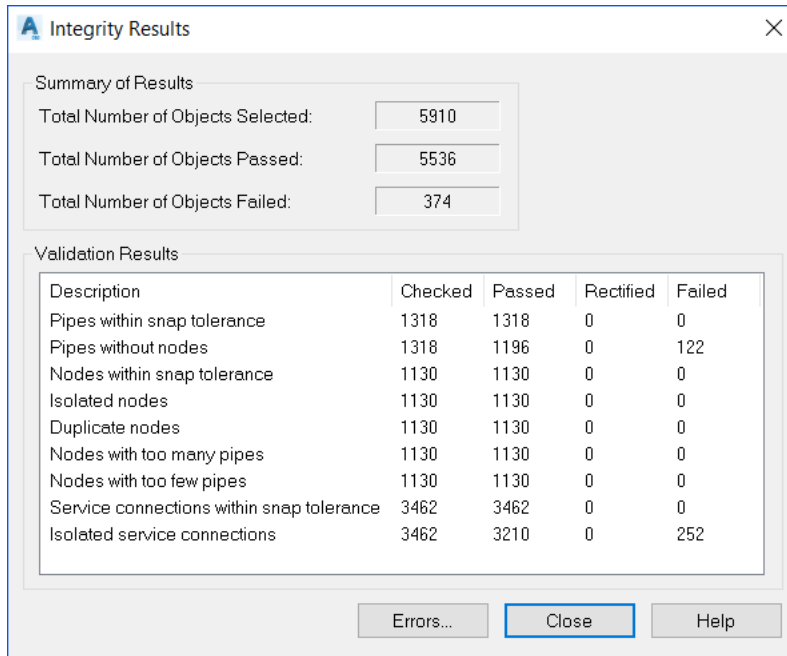
Figure 21   The Integrity Results dialog box

Browsing integrity markers

You can review the integrity markers resulting from the integrity check with the Browse Integrity Markers dialog box. This dialog box displays the complete list of errors encountered during the integrity check. The list consists of the error type, the object affected, a description of the error, and the GID of the spatial object. From this dialog box, you can locate and remove specific integrity markers in the drawing.

To browse integrity markers

1   Do one of the following:

- Choose **Capture** > **Data Integrity > Browse Integrity Markers...**
- Click the **Browse Integrity Markers** button on the **Integrity** toolbar.
- Click the **Errors...** button on the **Integrity Results** dialog box.

The Browse Integrity Markers dialog box is displayed.
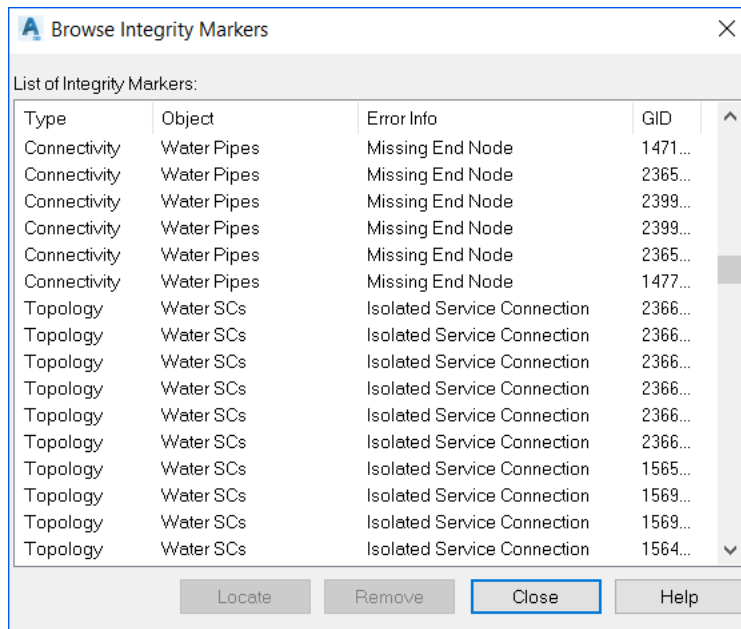
Figure 22   The Browse Integrity Markers dialog box

2   To locate an error, select the appropriate integrity marker, and then click the **Locate** button.

Munsys zooms to the extent of the spatial object to which the integrity marker refers.

3   To remove integrity markers from the list *and* from the drawing, select one or more integrity markers from the list, and then click the **Remove** button.

The integrity markers are removed from the drawing and from the list of markers.

Erasing integrity markers

With this function, you can erase all the integrity markers. Integrity markers are stored on the INTEG layer.

To erase integrity markers

1   Do one of the following:

- Choose **Capture** > **Data Integrity > Erase Integrity Markers**.
- Click the **Erase Integrity Markers** button on the Integrity toolbar.

The command line prompts you for confirmation to erase all the integrity markers.

2   Press **ENTER** to erase the integrity markers.

The integrity markers are erased.

Posting water data to the database

New or modified water data that has passed the integrity check is posted to the database.

To post water data to the database

1   Do one of the following:

- Choose **Capture** > **Post to Database...**
- Click the **Post to Database** button on the **Integrity** toolbar.

The Database Posting Summary dialog box is displayed.
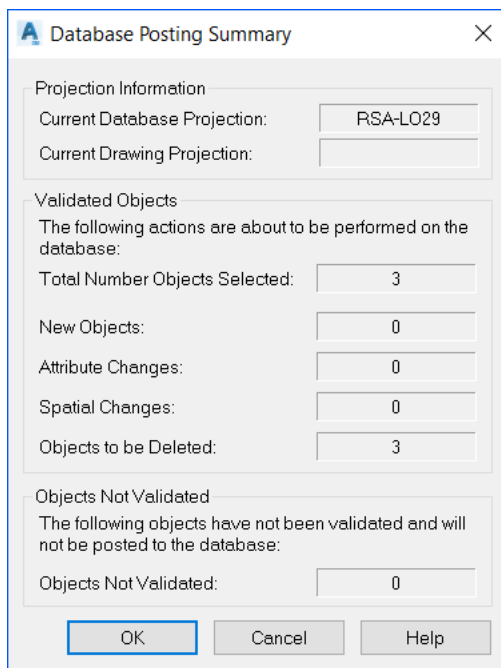
Figure 23   The Database Posting Summary dialog box

This dialog box displays the following:

- The total number of spatial objects selected for posting.

- The number of new objects created.
- The number of attribute changes made.
- The number of spatial changes made.
- The number of objects marked for deletion.
- The number of objects that have not been validated and that will not be posted to the database.

2   Click **OK** to update the database.

The Database Posting Results dialog box is displayed.
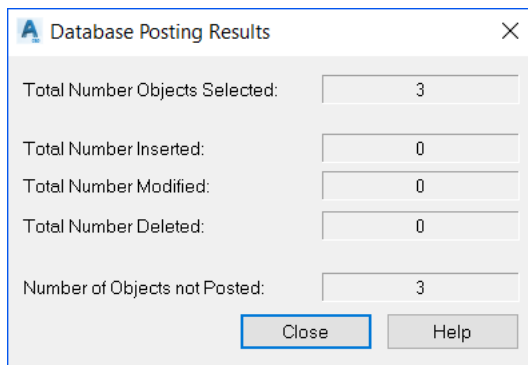
Figure 24   The Database Posting Results dialog box

This dialog box displays the following:
- The total number of objects selected for posting to the database.
- The total number of spatial objects inserted into the database.
- The total number of spatial objects modified in the database.
- The total number of spatial objects deleted from the database.
- The total number of objects not posted to the database.

3   Click **Close** to exit the **Database Posting Results** dialog box.

Note   Once you have posted objects to the database, you will not be able to undo this function, which will avoid duplicate objects and keep the content of the drawing synchronized with the database.

Validating object integrity and posting data at the same time

If you select the Automatically perform Object Integrity option on the Munsys Options dialog box Preferences tab, you can perform an object integrity check and database posting operation at the same time. The following rules will be applied when the objects integrity phase of the operation is executed:

- Only modified objects will be selected for object integrity

- The integrity flag will be reset automatically if the object passes object integrity

- Integrity markers will be placed accordingly where errors occur, as happens when a normal object integrity check is run from the Capture menu

- If an error occurs, the integrity flag will not be reset

- Only objects related to the current application will be included in the object integrity check (i.e. if you are working in the Water application, only water objects will be checked)

If errors occurred during the object integrity check, you can do one of the following:

- Ignore the errors that occurred and continue to post the objects that passed the integrity check to the database

- Cancel the database posting operation and return to the map interface

- View the errors that occurred with the Browse Integrity Markers dialog box (this option also cancels the posting operation, allowing you to correct the errors first before attempting to post the objects to the database once again)

To validate object integrity and post objects at the same time

1   On the **Munsys Options** dialog box **Preferences** tab, select the **Automatically perform Object Integrity** check box in the **Database Posting Preferences** group.

2   Choose **Capture** > **Post to Database.**

An object integrity check is run on the all the new or modified objects in the drawing.

3   If any errors occurred, the following message is displayed:

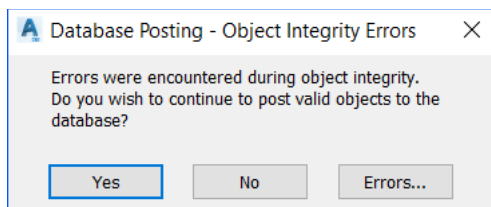*Figure 25   Database Posting – Object Integrity Errors*

4   Do one of the following:

Click Yes to ignore the errors that have occurred and post the objects to the database that have passed the integrity check

Click No to cancel the posting operation and return to the drawing

Click Errors... to view the errors that occurred using the Browsing Integrity Markers dialog box.

Water network quality reporting

The Network Quality Report function on the Extras menu is used to validate the quality of the entire water network. The network quality report complements the network integrity check. Although it is recommended that a network integrity check is always done before objects are posted to the database, some problems might still be present in the quality of a network. This could, for example, be due to the fact that the network integrity check might have been done on a small area of the network. The network quality check uses all the objects in the database to validate the quality of the entire network. The validation is done at attribute level, without having to validate the associated spatial data.

Specific columns in each of the spatial tables are used to build up the topology of the network, for example the start and end nodes of a water pipe. The network quality report will validate these values based on water-specific rules.

Any network errors that have been found are populated to the MUNSYS_INTEG_RESULTS table, together with the appropriate error message related to each spatial object where an error occurred. The MUNSYS_INTEG_RESULTS table can be used to set up a query, which will use this table as a linked table with a condition based on the SP_TABLE column that matches the spatial table name of the query.

If a single spatial object contained more than one error, a record will be stored for each error that occurred within that object. You can also have the errors populated to the COMMENTS column of the object(s) in which errors occurred, if you do not traditionally use this column for other purposes. If more than one error has occurred in an object, the COMMENTS column is populated with the last error that is found.

The following table shows the water network errors that may occur:

Spatial Table	Error	Description
SP_WATPIPE	NODE MISSING	The START_NODE/END_NODE value is NULL, or the node ID was not found in the SP_WATNODE table
SP_WATPIPE	ID NOT UNIQUE	The PIPE_ID column contains a non-unique value
SP_WATPIPE	SEQUENCE EXCEEDED	The value in the NODE_ID column exceeds the current value of the WMS_WATPIPE sequence
SP_WATPIPE	ID NULL	The value of the PIPE_ID column is NULL
SP_WATNODE	ID NULL	The value of the NODE_ID column is NULL
SP_WATNODE	SEQUENCE EXCEEDED	The value in the NODE_ID column exceeds the current value of the WMS_WATNODE sequence
SP_WATNODE	ID NOT UNIQUE	The NODE_ID column contains a non-unique value
SP_WATNODE	NODE ISOLATED	The node ID was not found in either the START_NODE or END_NODE columns of SP_WATPIPE tables
SP_WATSERV	UNCONNECTED SC	The value in the PIPE_ID or PRCL_GID column is Null, or the pipe ID was not found in the SP_WATPIPE table, or the PRCL_GID was not found in the SP_PARCEL table

Figure 26   Water network quality errors

To validate water network quality

1   Choose **Extras** > **Network Quality Report...**

The command line displays the message: Generating network quality report

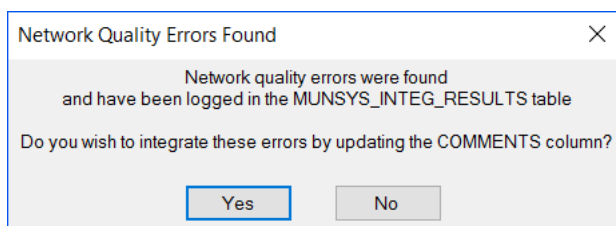2   If errors were found in the network, the following message is displayed:
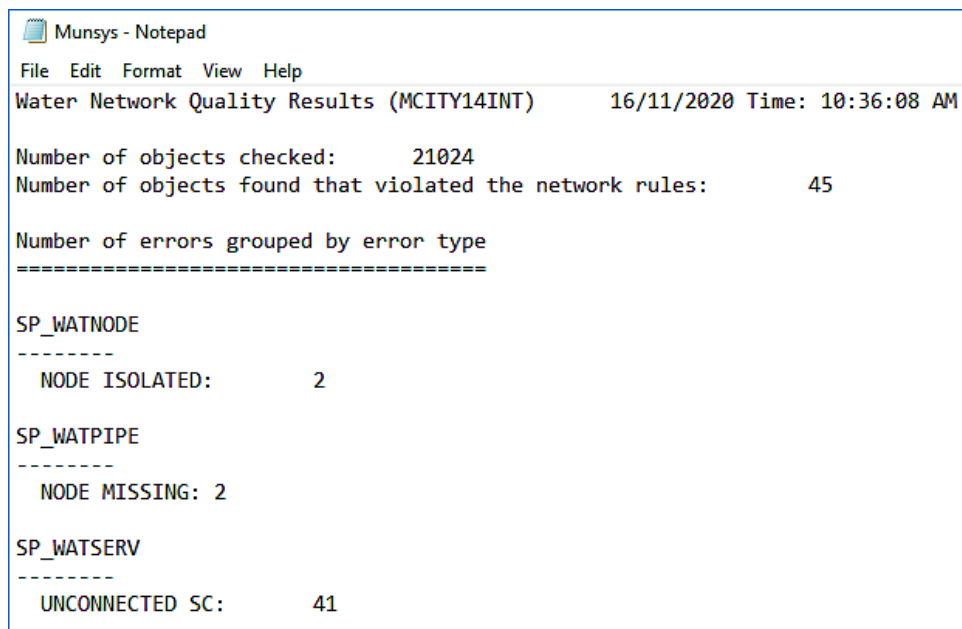

Figure 27   Network Quality errors found

3   Click **Yes** if you want the **COMMENTS** column updated, or **No** if you do not want the column updated.

The Save Results Summary As dialog box is displayed.

4   Save the report to a location of your choice.

The report is opened in Windows Notepad, and contains the following information:

- The number of objects that were checked

- The number of objects found that violated the network rules

- The number of endpoints that were found in the network

- The number of errors that were found, grouped by error type

```
Munsys - Notepad

File  Edit  Format  View  Help
Water Network Quality Results (MCITY14INT)       16/11/2020 Time: 10:36:08 AM

Number of objects checked:       21024
Number of objects found that violated the network rules:       45

Number of errors grouped by error type
======================================

SP_WATNODE
--------
  NODE ISOLATED:       2

SP_WATPIPE
--------
  NODE MISSING: 2

SP_WATSERV
--------
  UNCONNECTED SC:       41
```

Figure 28   A water network quality report

Generating water data status reports

Data status reports provide summarized information about spatial objects that are currently stored in the database. Once a report has been generated, it is saved to a comma delimited file, and then displayed in Notepad for easy viewing. The following reports can be generated for water objects:

- a summary of all the water objects in the database
- a summary of the total length and number of water pipes, by diameter and category
- a summary of the total length and number of water pipes, by material and category
- a summary of the total length and number of water pipes, by type and category
- a summary of the number of water nodes, grouped by type and category
- a summary of the total length and number of service connections by category
- a summary of the length and number of pipes diameter by material

To generate a water data status report

1 Choose **Extras** > **Data Status Report...**

The Data Status Report dialog box is displayed, showing a list of all the reports that can be generated.

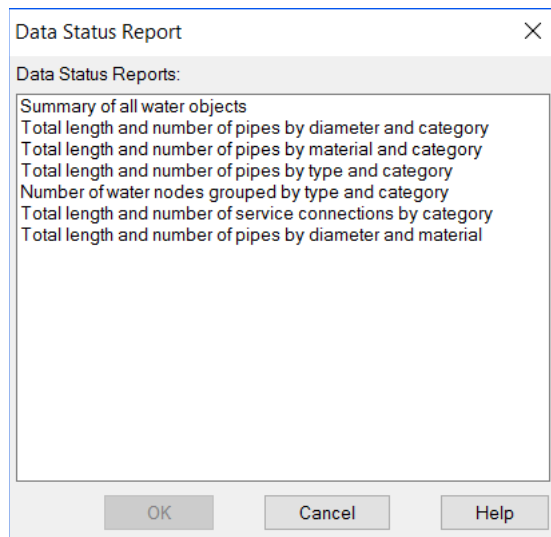*Figure 29   The Data Status Report dialog box*

2 Select one or more reports to generate from the list, and then click OK.

3 Save the file to a location of your choice.

The file is opened in Windows Notepad.

```
Munsys - Notepad
File  Edit  Format  View  Help
Water Data Status Report (MCITY14INT)     16/11/2020 Time: 10:39:21 AM
==============================

*   - Indicates that no matching record was found in the lookup table

Total length and number of service connections by category
==================================

Description,Number of Objects,Length
Potable Network,10472,143485.147
Raw Water Network,41,1172.4495
Total,10513,144657.5965
```

Figure 30   Data status report for service connections

Converting AutoCAD entities to water objects

With Munsys, you can convert selected AutoCAD entities to Munsys Water objects. Block entities can be converted to water nodes (hydrants, junctions, meters, etc.) or water symbols (cross over, sample point, cleaning port etc.), line entities can be converted to water pipes or service connections, text can be converted to tags or a water note, and polygons can be converted to water zones.

Although some basic attributes are assigned as part of the conversion process, you will need to assign attributes to the objects created with the conversion process.

To convert block entities to water nodes or valves

With this function, you can convert AutoCAD block entities to any of the available water nodes or valves. To convert block entities to water nodes or valves, do the following:

1   Choose **Extras** > **Convert Block to** > *Water Node/Valve Name*.

2   Select the block entities that you want to convert, and then press **ENTER**.

One water node is created for each block entity that you selected, and the drawing is updated accordingly.

To convert block entities to water symbols

With this function, you can convert AutoCAD block entities to any of the available water symbols. To convert block entities to water symbols, do the following:

1   Choose **Extras** > **Convert Block to** > **Water Symbol**.

2   Select the block entities that you want to convert, and then press **ENTER**.

The Water Symbols dialog box is displayed, showing a list of available water symbols.

3   From the list, select the symbol that you want to place, and then click on **OK.**

One water symbol is created for each block entity that you selected, and the drawing is updated accordingly.

To convert line entities to water objects

With this function, you can convert line entities to any of the following water objects:

- water pipes
- service connections
- residential water (pipes)

1   To convert line entities to water objects, do one of the following:

- Choose **Extras** > **Convert Line to** > **Water Pipe**.
- Choose **Extras** > **Convert Line to** > **Residential Water**.
- Choose **Extras** > **Convert Line to** > **Service Connection**.
  - When converting a line entity to a service connection (SC), the SC must also be linked to the parcel before the PIPE_ID and the PRCL_GID will be added to the respective SC columns. To link a SC to a parcel use the menu item: **Change > Link SC's to Parcels.**

2   Select the line objects that you want to convert to water objects, and then press **ENTER**.

The selected line objects are converted and the drawing is updated accordingly.

To convert text to water notes or tags

With this function, you can convert AutoCAD text entities to water zone tags or water notes.

1   Do one of the following:

■   Choose **Extras** > **Convert Text to** > **Water Zone Tag**.

■   Choose **Extras** > **Convert Text to** > **Water Note**.

2   Select the objects that you want to convert, and then press **ENTER**.

The entities are converted to the water objects that you specified, and the drawing is updated accordingly.

To convert polygons to water zones

1   Choose **Extras** > **Convert Polygon to** > **Water Zone**.

2   Select the polygons that you want to convert, and then press **ENTER**.

The polygons are converted to water zones, and the drawing is updated accordingly.

Chapter 5
Maintaining water data

Modifying water data

Spatial data is stored in database tables as records. Water objects that need to be edited are queried onto their respective layers. Attribute data can be edited directly in its table format.

Once the water pipes and nodes have been placed, the water objects have to be manipulated to make certain that they are joined correctly, for example with no overlaps or undershoots, and each pipe has to have a start and end node.

Attribute values linked to water objects can be modified easily from the Change menu, for example pipe diameter, type and material.

Water objects that have been changed need to be checked against the water business rules before they can be posted to the database.

Changing water pipes

To extend a water pipe to a boundary

Water pipes can be extended to a boundary object by first indicating the boundary object, and then selecting the pipe to extend. The boundary object must be able to intersect with the pipe. This function is often used to extend pipes to create Junctions during capture. The end point of the pipe is then changed to intersect the boundary object.

1 Do one of the following:

- Choose **Change** > **Extend Pipe to Boundary**.
- Click the **Extend Pipe to Boundary** button on the Munsys Water **Change** toolbar.

2 Select the boundary object where the pipe has to extend to.

3 Select the pipe that needs to extend.

The pipe is extended as indicated.

To extend a water pipe by distance

This function extends a pipe by a specified distance at the endpoint closest to a selected point on the pipe. You are prompted for the distance to extend the pipe with. You can also use this function to shorten a pipe by entering a negative distance, for example, -50.

1 Do one of the following:

- Choose **Change** > **Extend Pipe by Distance**.
- Click the **Extend Pipe by Distance** button on the Munsys Water **Change** toolbar.

2 Select the pipe that you want to extend, and then enter a distance on the command line.

The pipe is extended by the distance that you entered.

To extend a water pipe and break it at the intersection

This function extends a pipe to a boundary pipe that is then broken at the intersection. The pipe to be broken is selected first, and then the pipe to extend. The pipe to be broken must be able to intersect with the second pipe.

1 Do one of the following:

- Choose **Change** > **Extend and Break Pipe**.
- Click the **Extend and Break Pipe** button on the Munsys Water **Change** toolbar.

2   Select the pipe that you want to break.

3   Select the pipe that you want to extend.

The pipes are extended and broken respectively, as indicated.

To break a water pipe

This function breaks a pipe nearest to a selected point on the pipe.

1   Do one of the following:

- Choose **Change** > **Break Pipe**.
- Click the **Beak Pipe** button on the Munsys Water **Change** toolbar.

2   Select a point on the pipe where you want to break it.

The pipe is broken at the point that you selected.

To change a water pipe

With this function, you can move one or more selected pipe endpoints to a new location.

1   Do one of the following:

- Choose **Change** > **Change Pipe**.
- Click the **Change Pipe** button on the Munsys Water **Change** toolbar.

2   Select the endpoint of the pipe that you want to change.

3   Indicate the destination point.

The pipe is changed as indicated.

To fillet water pipes

This function connects two pipes at a projected intersection.

1   Do one of the following:

- Choose **Change** > **Fillet Pipe**.
- Click the **Fillet Pipe** button on the Munsys Water **Change** toolbar.

The command line prompts you to indicate the two pipes that need to be extended or trimmed.

2   Select the first pipe.

3   Select the second pipe.

The pipes are connected as indicated.

To trim a water pipe

1   Do one of the following:

- Choose **Change** > **Trim Pipe**.
- Click the **Trim Pipe** button on the Munsys Water **Change** toolbar.

2   Select the pipe that you want to trim to, as the cutting edge.

3   Select a point on the side of the second pipe that needs to be trimmed.

Munsys trims the last indicated pipe to the first one.

To join water pipes

This function is used to join two water pipes, creating a single pipe. The attributes from the first pipe selected remain the attributes for the joined pipe. If there is a gap between the two pipes to be joined, they are joined with a line segment. A joined pipe is created from the geometry of the selected pipes, and the second pipe selected is moved to the DELETED layer. The first selected pipe, now the new joined pipe, is flagged as a change to be verified when the integrity check is run.

1   Choose **Change** > **Join Pipe**.

2   Select the first water pipe (the pipe that you want to join to).

3   Select a point close to the endpoint of the second pipe (the pipe that you want to join).

The pipes are joined as indicated, and the attributes from the first pipe selected remain the attributes for the joined pipe.

To change the vertex of a water pipe

With these functions, you can remove, move, add or insert new vertices to segments in a pipe.

To add a vertex to a water pipe

1   Choose **Change** > **Change Pipe Vertex** > **Add**.

2   Select the appropriate water pipe.

3   Select the endpoint of the pipe to which you want to add a vertex.

4   Select a position for the new point.

A vertex is added at the point you selected.

To move a water pipe vertex

1   Choose **Change** > **Change Pipe Vertex** > **Move**.

2   Select the appropriate water pipe.

3   Specify a point closest to the vertex that you want to move.

4   Specify a point to move the vertex to.

The vertex is moved to the point that you specified.

To remove a water pipe vertex

1   Choose **Change** > **Change Pipe Vertex** > **Remove**.

2   Select the appropriate water pipe.

3   Select the vertex that you want to remove from the pipe.

Note   A vertex can only be removed from a segment with more than two vertices.

To insert a vertex into a water pipe

1   Choose **Change** > **Change Pipe Vertex** > **Insert**.

2   Select the appropriate water pipe.

3   Select the segment for the inserted point.

4   Select the position for the new point.

The vertex is inserted at the position you selected.

Changing water nodes

Using the Munsys Water Change menu/toolbar, water nodes can be moved to a new location, rotated manually or snapped to water pipes. You can also change the node type of one or more selected nodes. These functions are used when the water network is cleaned up after the capture process.

To move a node

With this function, you can move a single node to a new location.

1   Do one of the following:

- Choose **Change** > **Move Node**.
- Click the **Move Node** button on the Munsys Water **Change** toolbar.

2   Select the node that you want to move.

3   Specify a new insertion point for the node.

The node is moved as indicated.
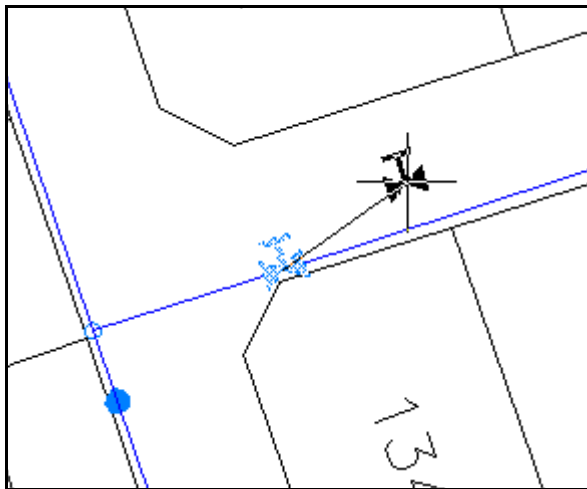
Figure 1   Moving a water node

To rotate a node

With this function, you can rotate one or more selected nodes.

1   Do one of the following:

- Choose **Change** > **Rotate Node**.
- Click the **Rotate Node** button on the Munsys Water **Change** toolbar.

2   Select the node that you want to rotate.

3   To specify the rotation angle, do one of the following:

- Enter the rotation angle on the command line, or press **ENTER** to accept the default angle.
- Indicate the angle with your mouse pointer by picking two points in the drawing.
- On the command line, type **A** to align the node to a segment, press **ENTER**, and then select the object to which you want to align the node.

The node is rotated as specified.

To snap a node to the endpoint of a water pipe

With this function, you can snap a node to the endpoint of a water pipe. The node is moved to the end point closest to the point selected on the pipe.

1   Do one of the following:

- Choose **Change** > **Snap Node to Endpoint**.
- Click the **Snap Node to Endpoint** button on the Munsys Water **Change** toolbar.

2   Select the applicable node.

3   Select the pipe close to the endpoint that you want to snap the node to.

The node is snapped to the endpoint of the pipe.

To snap a node to the endpoint of a pipe, breaking the pipe

With this function, you can break a pipe and snap a node to the endpoint of the broken pipe.

1   Do one of the following:

■   Choose **Change** > **Snap Node and Break Pipe**.

■   Click the **Snap Node and Break Pipe** button on the Munsys Water **Change** toolbar.

2   Select the applicable node.

3   Select the pipe that you want to snap the node to.

4   Specify a break point on the pipe.

The node is snapped to the endpoint of the broken pipe.

To change valve status

With this function, the status (Open or Closed) of selected butterfly or gate valves can be changed. The symbol is changed automatically when the status has been changed. The node type is not changed.

1   Choose **Change** > **Open/Close Valve**.

2   Select the valves of which you want to change the status.

The Valve Status dialog box is displayed.
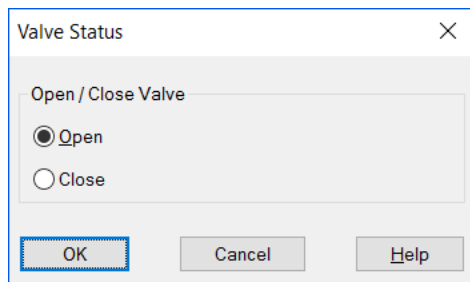
Figure 2   The Valve Status dialog box

3   Change the status as required, and then click **OK** to apply.

Note   The node type is used to open or close valves, using the correct symbol according to the NODE_TYPE value. There might be exceptions when the NODE_TYPE value is equal to CLOSED_VALVE, or is NULL. There might also be exceptions where the NODE_TYPE value is not GATE_VALVE or BUTTERFLY_VALVE. In this case, the NODE_TYPE cannot be linked to a symbol name. If any of these exceptions occur, a dialog box will be displayed, from where you can change the node type of the selected valves to either butterfly or gate valves.

To change a node type

With this function, you can change the node type of one or more selected nodes. The new node type is selected from a list. The symbol name and the NODE_TYPE column are updated according to the new node type selected.

1   Choose **Change** > **Change Node Type...**

2   Select the node(s) that you want to change, and then press **ENTER**.

The Node Types dialog box is displayed.

Figure 3   The Node Types dialog box

3   Select the new node type from the list, and then click **OK**.

Changing the category of water objects

Water objects are classified according to a water category. This function is used to change the water category of one or more selected water objects.

To change water category

1 Choose **Change** > **Change Water Category**.

2 Select the water objects that you want to change.

The Select Water Category dialog box is displayed. If you selected one object, the current category is highlighted. If you selected more than one object of different categories, no current category is highlighted.
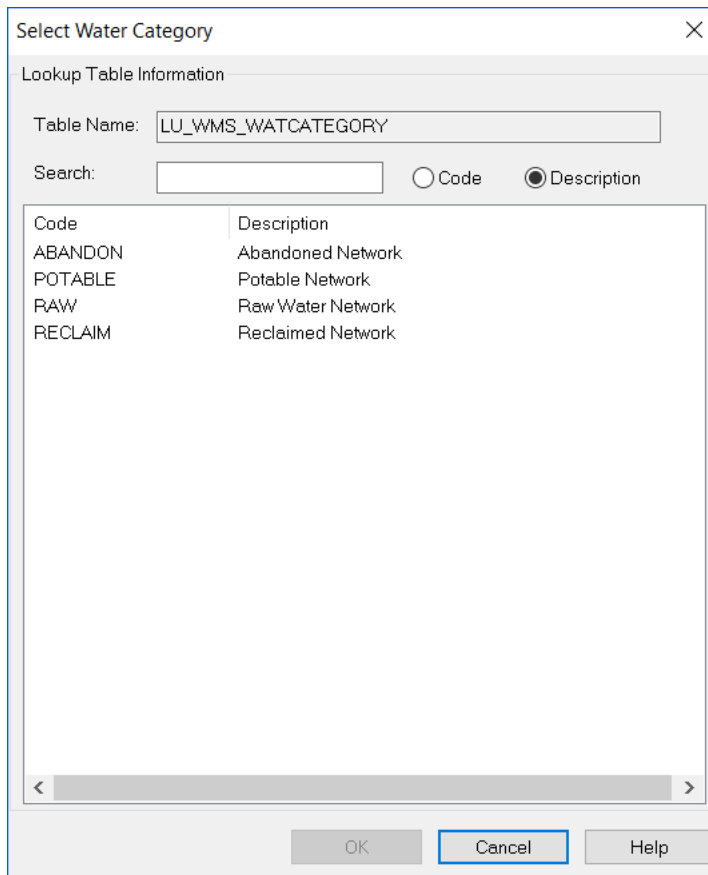
Figure 4   The Select Water Category dialog box

3 Select the new category from the list, and then click **OK**.

The water category you selected is assigned to the objects.

Changing water attribute data

With Munsys Water, you can change the individual physical attributes of water objects. You can also link service connections to their respective parcels, and open or close valves.

Editing water object attributes

The Edit Attributes function is used to edit the attributes of one or more selected water objects that belong to the same object type. The current application determines what object types may be selected; for example, if you are working in Munsys Water, only water objects may be selected. If you select more than one object type (for example pipes and nodes), you will be required to choose a single object type to edit.

Objects that are selected for editing are locked (if record locking is enabled in the database). Once the objects have been selected and an object type to edit has been specified, the Edit Attributes dialog box is displayed. This dialog box contains various options that can be used to edit the attributes of the spatial objects:

- Attribute templates – attributes can be edited using an attribute template. The attributes that will be displayed when an attribute template has been selected will depend on the attributes that have been specified on the template, as well as the formatting parameters that apply to each column selected as part of the attribute template. If no attribute template has been selected, all the attributes belonging to the spatial object type are displayed.

- Editing multiple objects simultaneously – if you select this option, attributes of multiple objects are displayed simultaneously. Where the attributes of all the selected objects are the same, a value is displayed. Where attributes of the various objects that were selected differ, a value of *VARIES* is displayed. When a change is made to a value, the new value is applied to all the selected objects. If you do not select the Edit multiple objects simultaneously check box, you can edit the selected objects one by one. The values that are changed are only applied to the object that is currently selected.

- AutoZoom – this option is only available when the Edit multiple objects simultaneously option is not selected, i.e. when you are going to edit the objects one by one. If the AutoZoom to object option is selected, Munsys will zoom to each object in the drawing as it becomes the current object, and highlight it. The object navigation buttons are used to move from one object to the next.

The various attributes are displayed on the Edit Attributes dialog box in three columns: Description, Value and Column Name. You can resize the dialog box for easier viewing. Values that may not be edited are unavailable. Attributes are edited in the *Value* column, either by typing a new value or by selecting a value from a drop-down list. Changes that are made are applied to objects in the drawing. These changes will only be updated in the database when the object integrity check has been run and the objects have been posted to the database.

To edit water objects

4   Choose **Change** > **Edit Attributes...**

5   Select the objects that you want to edit, and then press ENTER.

If you selected more than one object belonging to different object types, the Spatial Object Identification dialog box is displayed.
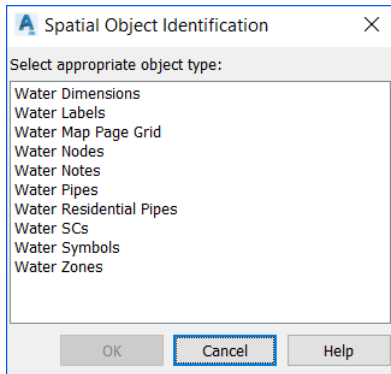

Figure 5   *The Spatial Object Identification dialog box*

6   Select a single spatial object type to edit, and then click OK.
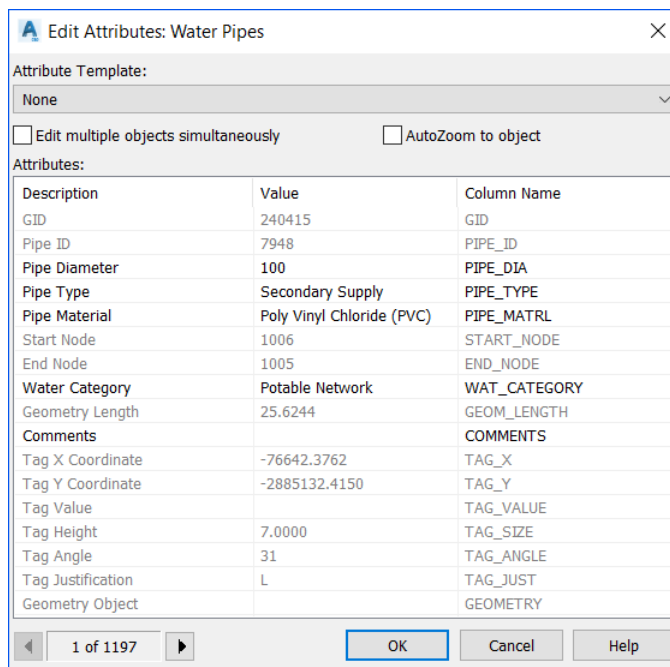
The Edit Attributes: [*Object Type*] dialog box is displayed.

Figure 6   *The Edit Attributes dialog box*

7   If you want to edit the objects using an attribute template, select the appropriate attribute template from the **Attribute Template** list. If you do not want to make use of an attribute template, select **None**.
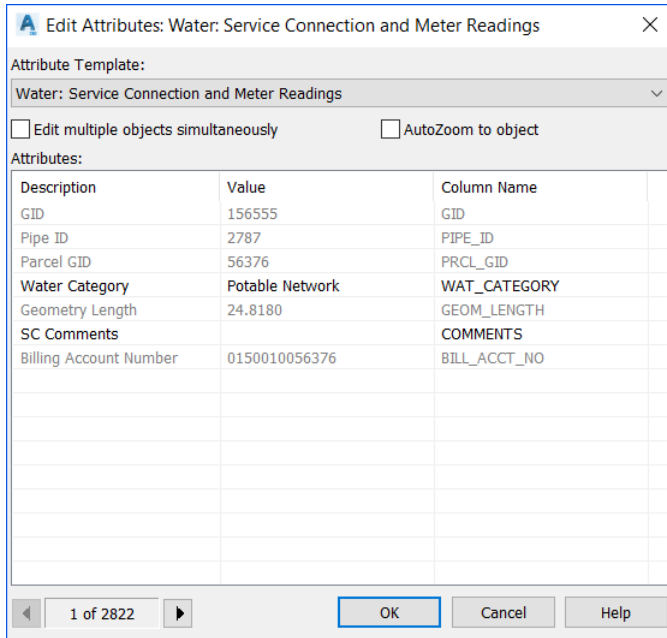
Figure 7   Edit Attributes: Selecting an attribute template

8   If you want to edit the attributes of all the selected objects at the same time, select the **Edit multiple objects simultaneously** check box.

Similar values are displayed, while values that differ between objects are displayed as *VARIES*, as seen in the following figure:
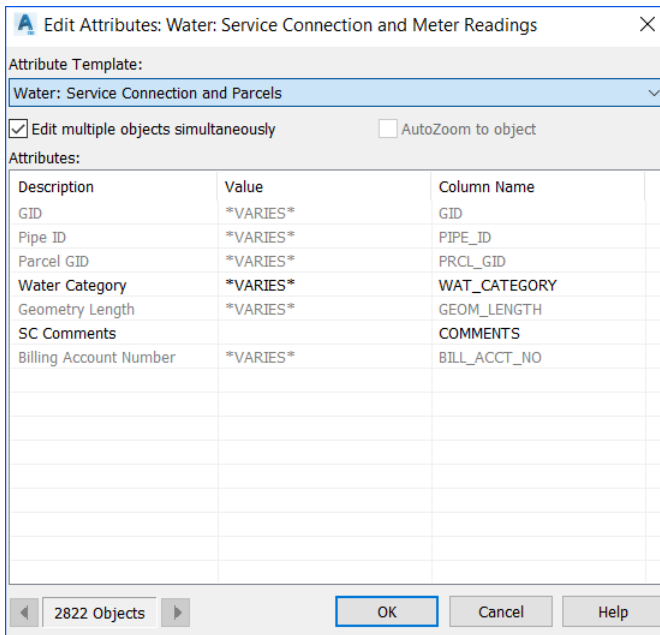
Figure 8   The Edit Attributes dialog box: Edit multiple objects simultaneously

9 If you want to edit the selected objects one by one, clear the **Edit multiple objects simultaneously** check box. Select the **AutoZoom to object** check box to zoom to the objects one by one and highlight them. The object navigation buttons are used to move from one object to the next.

10 To edit an attribute, do one of the following:

- Highlight a value, and then choose a value from the list in the **Value** column.
- Highlight a value, and then enter a new value in the Value column

11 Click OK to apply the new value(s) to the object(s).

The values are applied to the objects, to be verified with the object integrity check.

Editing linked table attributes

This function is used to edit spatial object attributes that exist in linked tables. Linked table attributes are updated directly to the database. The current application determines what object types may be selected; for example, if you are working in Munsys Water, only water objects may be selected. If you select more than one object type (for example pipes and nodes), you will be required to choose a single object type to edit. You can only select objects that have previously been posted to the database.

The link tables that can be edited using this function must be defined through an attribute template. The applicable attribute template is selected from a list, which is created by filtering attribute templates according to the following characteristics:

- Only attribute templates associated with the current spatial object type, being edited are included – the primary table in the attribute template is the same table from which the spatial objects were queried.
- Only attribute templates that contain linked tables are included
- The linked table specified may not be a Munsys spatial table
- The user must have edit privileges to the linked table
- The link column used to describe the relationship with the primary table must reference a true column in the linked table. This may not be an expression.

Attributes are displayed on the Linked Table Attributes dialog box in three columns: Description, Value and Column Name. You can resize the dialog box for easier viewing. Values that may not be edited are unavailable. Attributes are edited in the Value column by typing in a new value. Navigation buttons are used to move between the various records that are available and to move from one object to the next. You can also insert records into, or delete records from a linked table, depending on the privileges you have on the link table.

The procedure for editing linked table attributes is described in detail in the *Munsys Concepts User Manual*.

Changing water pipe attributes

You can change the default pipe diameter, material or type that was assigned to a water pipe during the capture process. The new attribute is selected from a list to ensure data accuracy.

Tip If you construct the water pipes with the default diameter, material or type set to the one used most commonly, only pipes that have a different diameter, material or type need to be changed, reducing the amount of data to be captured.

To change water pipe diameter

1 Choose **Change** > **Change Pipe Attributes** > **Diameter...**

2 Select the appropriate water pipe/s, and then press **ENTER**.

The Select Water Pipe Diameter dialog box is displayed, highlighting the diameter of the pipe that you selected. If you selected multiple pipes, no current diameter is displayed.
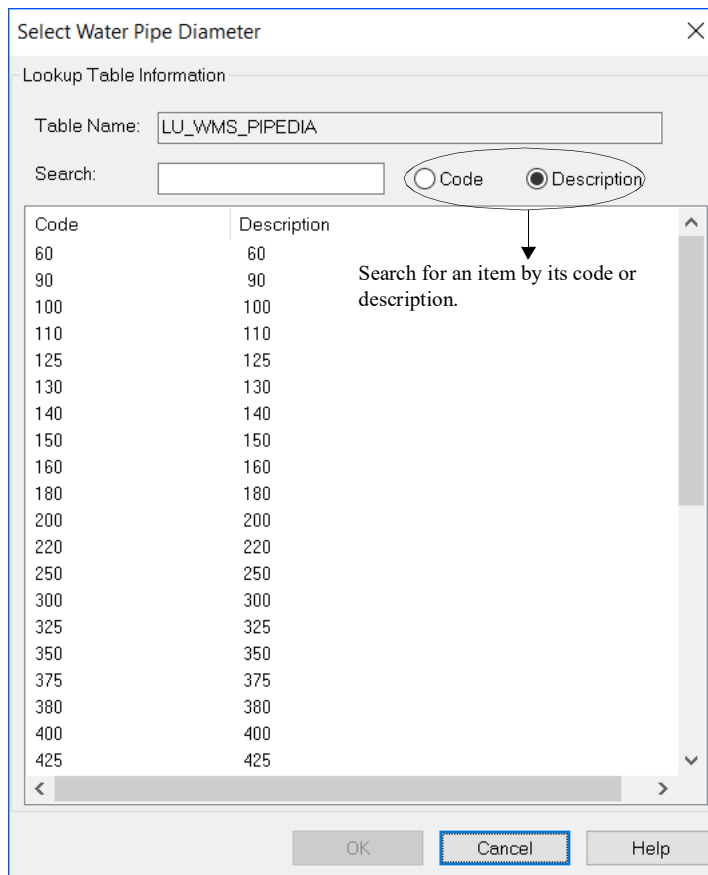
Figure 9   The Select Water Pipe Diameter dialog box

3 Select the appropriate diameter, and then click **OK**.

To change water pipe material

1 Choose **Change** > **Change Pipe Attributes** > **Material...**

2 Select the appropriate water pipe/s, and then press **ENTER**.

The Select Water Pipe Material dialog box is displayed, highlighting the material of the pipe that you selected. If you selected multiple pipes, no current diameter is highlighted.

Search for an item by its code or description.
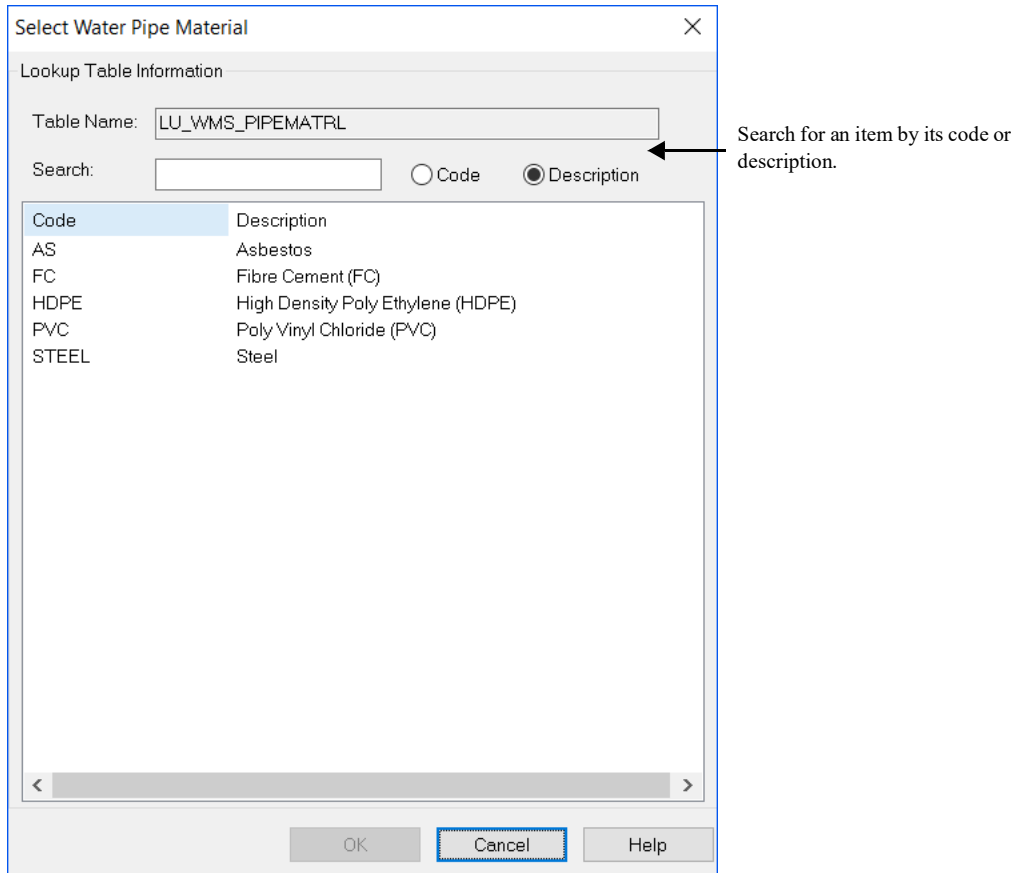
Figure 10   The Select Water Pipe Material dialog box

3 Select the appropriate pipe material from the list, and then click **OK**.

To change a water pipe type

1 Choose **Change** > **Change Pipe Attributes** > **Type...**

2 Select the appropriate water pipe/s, and press **ENTER**.

3 The **Select Water Pipe Type** dialog box is displayed, highlighting the type of the pipe that you selected. If you selected multiple pipes, no current type is highlighted.

Search for an item by its code or description.
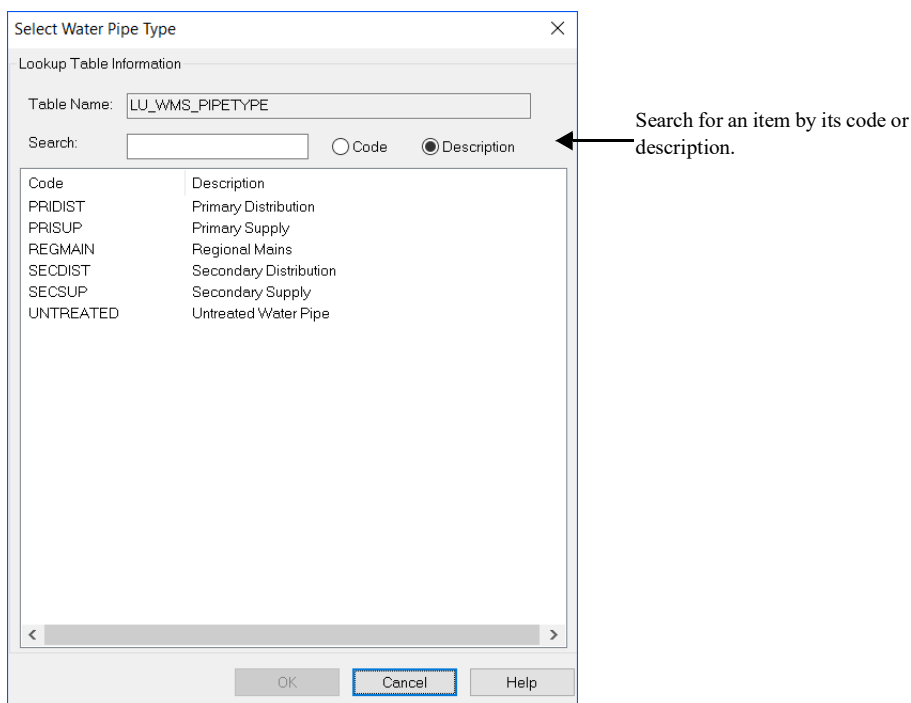
Figure 11   The Select Water Pipe Type dialog box

4   Select the appropriate pipe type, and then click **OK**.

Linking service connections to parcels / buildings

This function is used to link service connections to their respective parcels or buildings. The parcels and buildings have to be queried from the database when running a Building or Property Network Trace in order for the LINK_ID column to be populated.

To link service connections to parcels

1   Choose **Change** > **Link Service Connections...**

2   Select the appropriate service connections, and then press **ENTER**.

The selected service connections are linked to their respective parcels and buildings.

If the endpoint of the service connection falls inside a parcel boundary the PRCL_GID column is updated with the GID value from SP_PARCEL.

If the endpoint of the service connection falls inside a parcel boundary and a building polygon the PRCL_GID column is updated with the GID value from SP_PARCEL, and the LINK_ID column is updated with the GID value from SP_BUILDING.

Note   The user should ensure that the value of Property/Building should be populated in WMS_WATSERV_LINKMUNID/SMS_SEWSERV_LINKMUNID settings.

By default Building is the default value which allows Service Connections to Buildings/Parcels/Property, however if switched to Parcels then Buildings/Property would not be allowed.

Changing water notes

With this function, you can change the text of an existing water note.

To change a water note

1   Do one of the following:

  ■   Choose **Change** > **Change Water Note...**

  ■   Click the **Change Water Note...** button on the Munsys Water **Change** toolbar.

2   Select the water note that you want to change.

The Water Note text box is displayed.
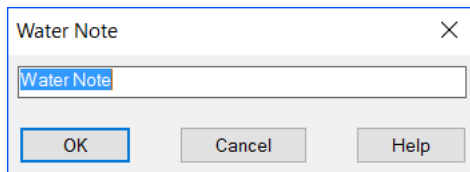
Figure 12   The Water Note text box

3   Change the note as required, and then click **OK**.

Adding comments

This function is used to assign descriptive comments to one or more selected objects.

To add comments

1   Choose **Change** > **Add Comment...**

2   Select the water object(s) that you want to add a comment to.

The Water Comment text box is displayed.

3   In the text box, add the comment, and then click **OK**.
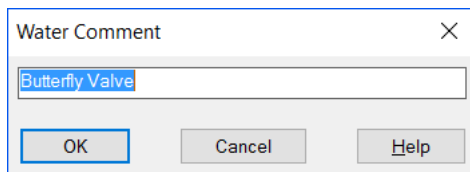
Figure 13   The Water Comment text box

The comment is assigned to the selected object(s), as seen in the following figure.

Deleting and undeleting water objects

With Munsys Water, existing water objects can be deleted from the database. Multiple objects can be selected for deleting. Water objects that form part of a redundant network have to be deleted. Deleted water objects are moved to a frozen layer DELETED, which is removed from the database when changes are posted. With the Undelete function, you can restore water objects that have been moved to the DELETED layer and that are marked for deletion.

To delete water objects

1 Choose **Change** > **Delete Water Object**.

2 Select the water objects that you want to delete.

   The command line indicates how many water objects you have selected, and how many have been filtered out.

3 Press **ENTER** to delete the selected water objects.

   The water objects are flagged for deletion and moved to the DELETED layer. These changes are applied to the database when changes are posted.

To undelete water objects

1 Choose **Change** > **Undelete Water Objects**.

   The objects that you have deleted are displayed in the drawing.

2 Select the water objects that you want to restore.

   The Delete flag is no longer set for the selected objects. In the event of spatial or attribute changes before the objects were flagged for deletion, these changes are applied.

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