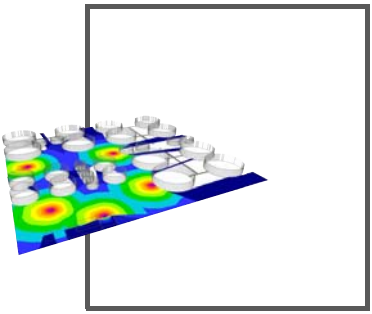
QUICK START GUIDE

Wireless Network Checker

WiNC



WirelessHART

PEPPERL+FUCHS

PROTECTING YOUR PROCESS

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2015-01

1 Purpose of this Quick Start Guide

This quick start guide contains basic instructions for operating the software. However, the manual takes priority over the quick start guide.

2015-01

2 WiNCMod Tutorial

This tutorial contains all major steps that are required to create a new factory site from scratch using WiNCMod. In this example, the factory site comprises a large area with multiple storage basins and a storehouse.

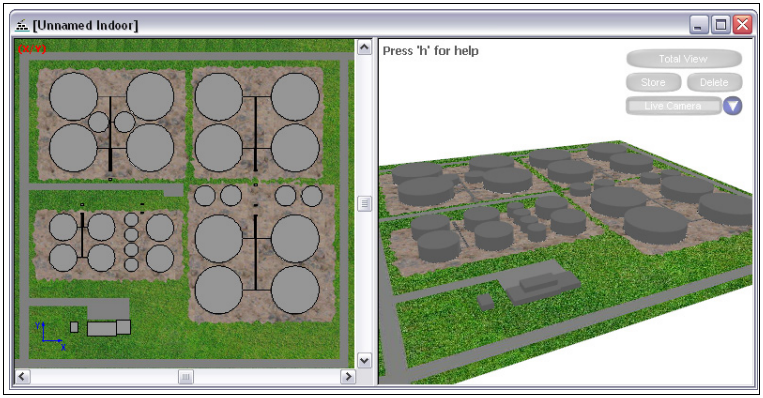

Figure 2.1 Overview

The following table contains some basic dimensions of the objects on the factory site.

Object	Material	Dimensions
Storage basin (small)	Metal	■ Height: 13 m ■ Diameter: 20 m
Storage basin (medium)	Metal	■ Height: 15 m ■ Diameter: 40 m
Storage basin (large)	Metal	■ Height: 15 m ■ Diameter: 70 m
Pipes	Metal	■ Diameter: 0.6 m
Storehouse (ground floor)	Brick	■ Height: 5 m
Storehouse (1st floor)	Brick	■ Height: 5 m

Create New Database

1. Click **New Database** or choose **File > New Database**.
2. Activate **Draw manually** in the **Mode of operation** area.
3. Click **OK**.
4. Select **Object relative to current plane** in the **Geometrical Parameters for Orthogonal Drawing Mode** area and enter 5 m in the **Height of walls relative to current plane** box.
   You can also use a different drawing mode. In this example, this setting is quite handy because each floor of the storehouse will automatically have a height of 5 m. The height of the storage basins can be specified individually when creating the cylindrical objects.
5. Define the default materials for new objects in the **Material Properties** area, for example **Brick; thickness 20 cm** for new walls and **Glass; thickness: 5 mm** for new subdivisions.
6. Click **OK**.

Insert Background Image

1. Click **Image Configuration** or choose **Images > Configuration** to upload a background image.
2. Click **Add** to upload a new background image.
3. Select an image file and click **Open**.
4. Click **Apply**.
5. Click **Close** to close the **Image Configuration** window.

   ↳ The background image has been defined.

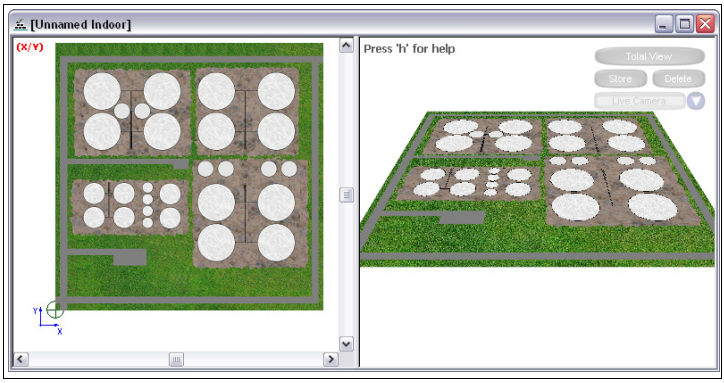

Figure 2.2 Background image inserted

Setup the Working Area

Tip

We recommend that you insert a floor plan or a map as background image for the working area in the XY view plane. Then you can resize the background image to a true to scale representation, which enables you to use the background as a template for new objects.

1. Click **Change Settings** in the **Standard Toolbar** or choose **Edit > Settings** to define the global settings.
2. Activate **Grid** in the **Drawing Help** area and enter 0.5 m in the **Grid Size** box. Note that you must use a dot as decimal separator.
3. Choose **Edit > Scale All Objects**.
4. Click **OK** to scale all objects including the background image by drawing a line.
5. Click **OK** to close the dialog window.
6. Draw a line in the working area. We recommend that you redraw an object of the background image whose dimensions are clearly defined. In this example, we use the diameter of a large storage basin as a reference point.

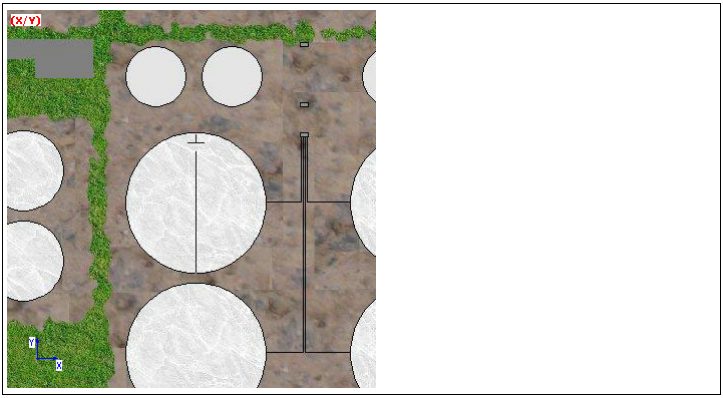

Figure 2.3 Scaling the background

↳ The **Scale** window appears.

7. Enter 70 m in the **Enter length of the specified line** box, because the diameter of the large storage basins is 70 m.
8. Click **OK**.
9. Click **Yes** to confirm.

↳ The background image has been resized to a true to scale representation. If you zoom into the working area, you will notice that the diameter of the small storage basins is made up of 40 dots, which corresponds to 20 m because we defined a grid size of 0.5 m.
You can also click **Call Mouse Meter Tool** in the **View Toolbar** to measure the diameter of the small storage basins.

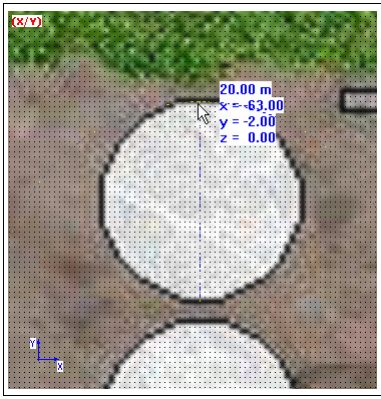

Figure 2.4 True to scale background image

Create Ground Floor of the Storehouse

Because the wave simulation will be performed in the outside area, we can abstract the storehouse by drawing three-dimensional cubes.

1. Click **Polygonal Object with Orthogonal Walls and Ceiling** in the **Objects Toolbar**.
2. Click into the working area to activate the working are and click again to set the starting point for the object. Click again to define the corners of the building. To complete the polygonal object, click into the working area using the right mouse button.
   You can also use other drawing tools. For example, you can draw the walls using the **Orthogonal Object** tool and add a ground plate and ceiling using the **Rectangular Object**.

   ↳ In the XY view plane you see the top view of the first building. In the 3-D view you see that you actually created a three-dimensional block. Note that the height of this block is 5 m because we set the default height for new objects to 5 m.

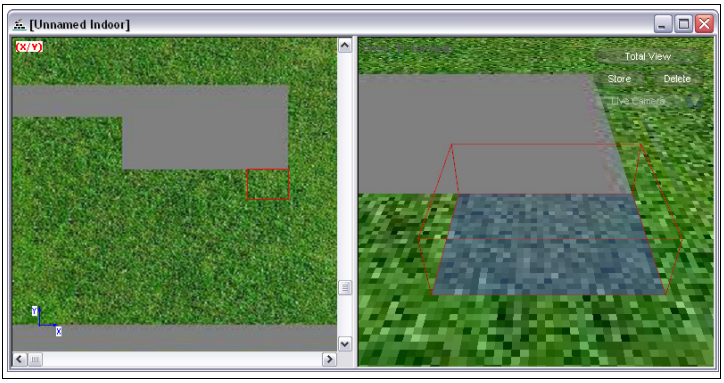

Figure 2.5 Ground floor of the storehouse

3. Proceed in the same way to create the other sections of the building on the ground floor.

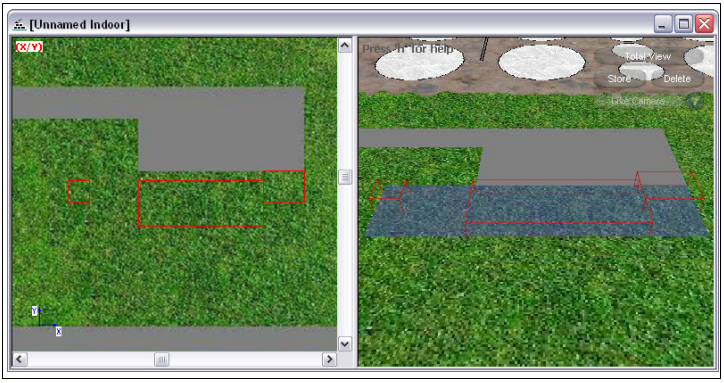

Figure 2.6 Ground floor of the storehouse

Tip

If you notice that the 3-D view does not update automatically, click **Redraw all objects** to update the view manually.

Create First Floor of the Storehouse

The first floor is created in the same way, but on a different height. Therefore you must move the XY plane upwards, along its third axis.

1. Click **3rd Coordinate Settings**.
2. Move the slider upwards until it says 5 m.

↳ The working area in the XY plane is now above the ground floor. The view plane resp. working area is displayed as a violet layer in the 3-D view.

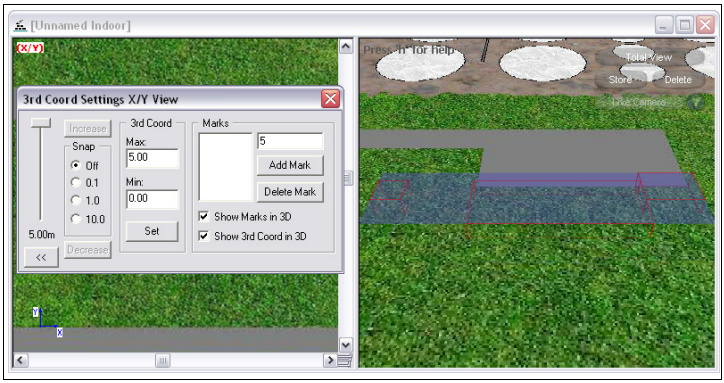

Figure 2.7 Moving the XY view plane along the Z axis

3. Click **Polygonal Object with Orthogonal Walls and Ceiling** in the **Objects Toolbar**.
4. Click into the working area to activate the working area and click again to set the starting point for the object. Click again to define the corners of the building. To complete the polygonal object, click into the working area using the right mouse button.
5. Click **Cancel** in the **Insert Subdivision** window.

↳ The first floor of the storehouse is complete.

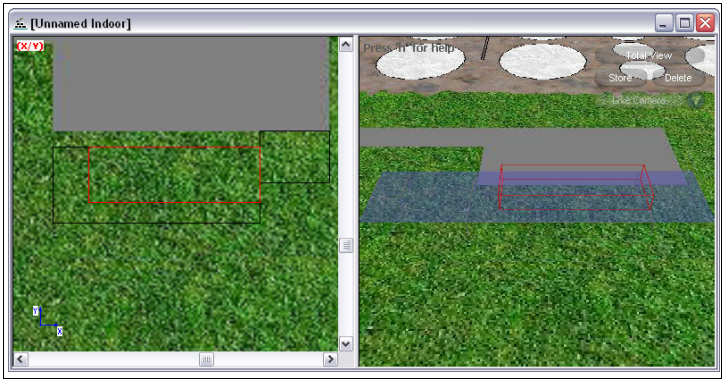

Figure 2.8 First floor of the storehouse

Create Storage Basins

1. Move the slider in the **3rd Coord Settings** window downwards until it says 0 m and the XY plane is on ground level again.
2. Click **Cylinder** in the **Objects Toolbar**.
3. Click **Material**.
4. Select **Metal; thickness 5mm** and click **OK**.
5. Deactivate **Define radius by mouse click**.
6. Enter 24 in the **number of corners** box to increase the level of detail.
7. Enter 13 in the **height** box and 10 in the **radius** box to create a small storage basin.
8. Click **OK**.
9. Click into the working area using the right mouse button to place the storage basin in the working area. Because the background image has been resized to a true to scale representation, you can place the storage basin directly on its correct location in the background image.

   ↳ You created a small storage basin.

Figure 2.9 Small storage basin

10. The storage basin is highlighted in red, because it is still selected. If not, use the selection tools to select the storage basin.
11. Right-click in the working area and select **Copy** or press **CTRL + C** on the keyboard to copy the selected storage basin.
12. Right-click in the working area and select **Paste** or press **CTRL + V** on the keyboard to insert another storage basin.
13. Click into the working area using the right mouse button to place the storage basin in the working area.
14. Proceed in the same way to create the other storage basins.

    ↳ The storehouse and the storage basins are complete.

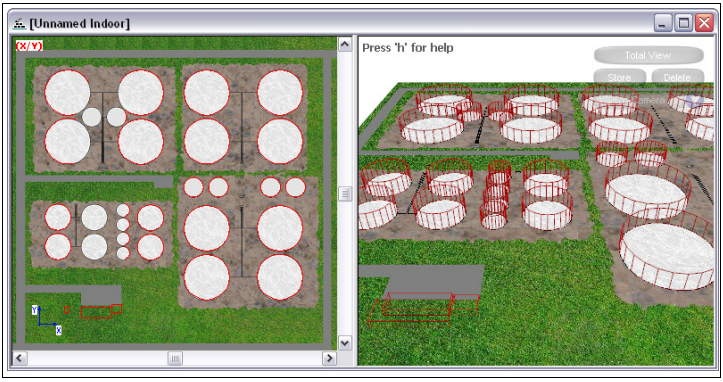

Figure 2.10 Wire frame display of the storehouse and the storage basins

Tip

To move an object in the working area, select the whole object, then click and hold the left mouse button to move the object around. To move an object to defined coordinates, select the whole object, right-click into the working area, select **Move selected Objects**, and enter the coordinates.

Tip

We recommend that you activate **Fill Objects** in the global settings to check if any walls or ceilings are missing.

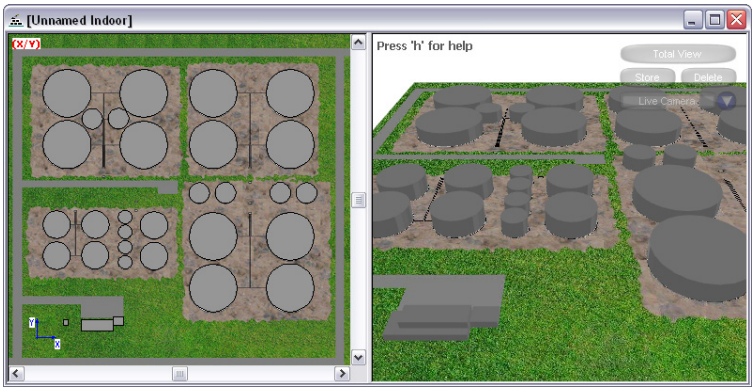

Figure 2.11 Non-transparent display of the storehouse and the storage basins

Create Pipes

1. Click **Pipe** in the **Objects Toolbar**.
2. Click **Material**.
3. Select **Metal; thickness 5mm** and click **OK**.
4. Enter 0.18 in the **radius** box. Note that you must use a dot as decimal separator.
5. Click **OK**.
6. Click into the working area to set the starting point for the pipe. Click again to draw the pipe.
7. Proceed in the same way to create the other pipes. If there are multiple pipes in parallel, you use copy & paste to insert multiple pipes in parallel.

   ↳ The 3-D model of the factory site is complete.

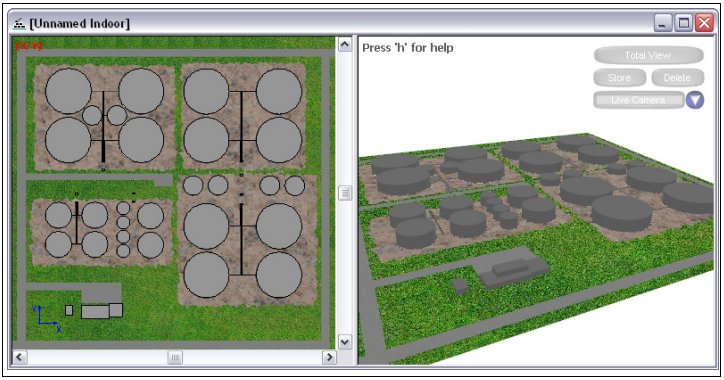

Figure 2.12 Overview

Save Database

1. Choose **File > Save Database As** to save the 3-D model for use in WiNCSim.
2. Enter a file name and click **Save**.

   ↳ The **Progress** window appears and WiNCMod saves the 3-D model to the specified file.

Tip

If you're unable to save the database, check whether the database contains problematic intersections of walls with other objects. Remove these intersections and try again.

3 WiNCSim Tutorial

This tutorial describes how to calculate network prediction and connectivity prediction for the factory site created in WiNCMod.

Create a New Project

Note!

Note that you need a license key in order to handle large projects. If the WiNCMod database is not displayed correctly, check if your USB hardware key is working correctly.

We recommend that you select a display height for the working area that intersects most objects. If you are missing an object in the working area, select another display height.

1. Click **New Project** or choose **File > New Project**.
2. Click **Browse** in the **Databases & Parameters** area.
3. Select a WiNCMod database file and click **Open**.
4. Click **OK**.

   ↳ The WiNCMod database is displayed in the working area.

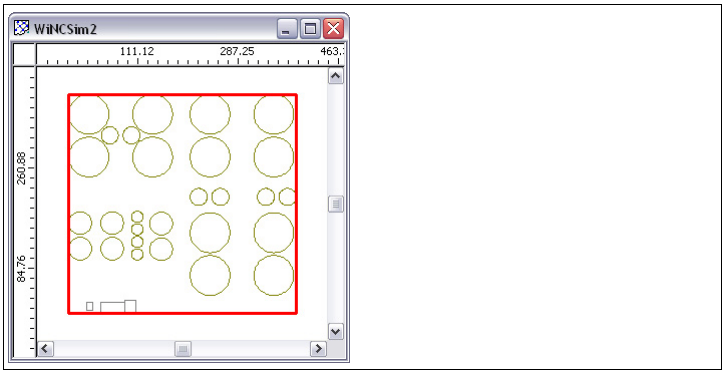

Figure 3.1 Top view

Insert Devices

Note!

Note that you need a license key in order to insert multiple *Wireless*HART devices. If you cannot insert a new device, check if your USB hardware key is working correctly.

1. Zoom into the working area.

2. Click **Insert Object** to insert a *Wireless*HART device into the working area.

   ↳ The **Insert new Node** window appears.

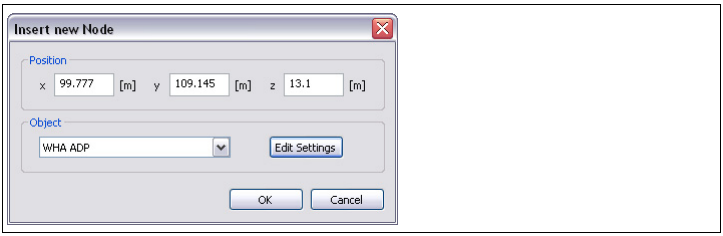

Figure 3.2 **Insert New Node** window

3. Enter the height in which the *Wireless*HART device is located in the **z** box, for example 10.10 m for the *Wireless*HART gateway, which is mounted on the roof top of the storehouse (10 m).
   We recommend that you add 10 cm to the actual height in which the device is located, because the antenna sticks out of the device. Furthermore, if adding 10 cm in height, you can make sure that the device is not located inside a wall or ceiling, which might falsify the results.
   If the device is located on a metal surface, we recommend that you add 30 cm to the actual height, to take into account the reflection of the material.
4. Select the device type in the **Object** drop-down list, for example **WHA GW** for a *Wireless*HART gateway.
5. To edit further details, such as the antenna position, click **Edit**.
6. Click **OK** to insert the device at the specified location.

   ↳ The device icon is displayed in the working area.

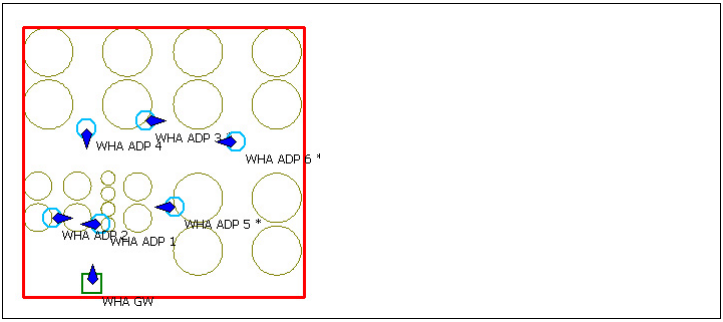

Figure 3.3 Top view of the *Wireless*HART devices

Import Devices from *Wireless*HART Gateway

Note!

Note that you need a license key in order to insert multiple *Wireless*HART devices. If you cannot insert a new device, check if your USB hardware key is working correctly.

1. You can use the web interface or the device type manager (DTM) of the *Wireless*HART gateway to create an instrument list. If using the DTM, you can also choose **Import Project Tree** to import the devices from the PACTware™ project tree into the instrument list of the *Wireless*HART gateway.

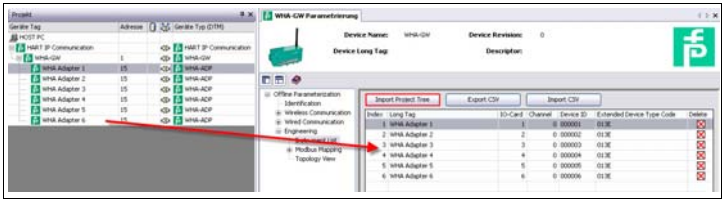

Figure 3.4 Import project tree

2. In the menu tree of the web interface or the DTM of the *Wireless*HART gateway navigate to the **Instrument List** and click **Export CSV** and save the CSV file locally.
3. In WiNCSim choose **File > Import > Object Data > Customer Specific > Instrument List File** and import the CSV file you exported from the *Wireless*HART gateway.

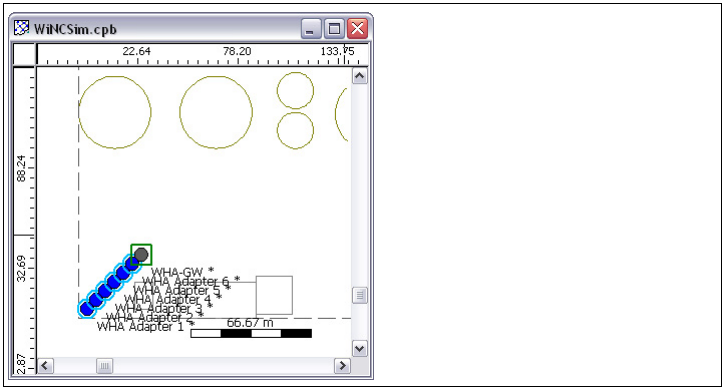

Figure 3.5 Imported instrument list

↳ The *Wireless*HART devices are inserted in the lower left corner of the working area.

4. To move the devices in the working area, use the **Move Object** button.
5. To check the device properties and adjust the height in which the device is located, right-click the device using the **Select Objects** tool and select **Properties**.

Simulate Network

1. Click **Project Parameter** in the **Project Toolbar** or choose **Project > Parameter**.
2. Select the **Prediction** tab.
3. Activate **Total Area** in the **Simulation Area** area.
4. Specify the height for which the results will be calculated, for example 10.10 m because the *Wireless*HART gateway is mounted in this height. Enter the height in the **Prediction Height(s)** box in the **Simulation Area** area.
5. Select **Dominant Path Model** or **Multi-Wall Model (COST 231)** in the **Prediction Model** area.
6. Click **OK**.
7. Click **Compute Propagation** to calculate wave propagation for the selected height.

   ↳ The calculation is in progress as long as the status bar displays **Engine Busy** Engine Busy.
8. After wave propagation has been calculated, click **Compute Network** or choose **Computation > Compute All > Network**.

   ↳ The **Output** window on the bottom of the screen shows the progress of the calculation.

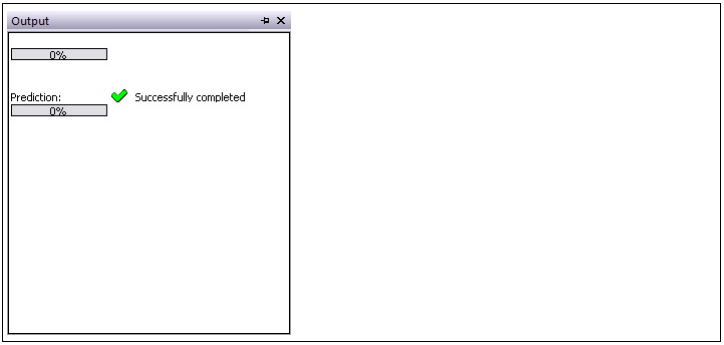

Figure 3.6 **Output** window

Simulate Connectivity

1. Click **Project Parameter** in the **Project Toolbar** or choose **Project > Parameter**.
2. Select the **Prediction** tab.
3. Activate **Node Locations** in the **Simulation Area** area.
4. Select the **3D Standard Ray Tracing (SRT)** prediction model.
5. Click **OK**.
6. Click **Compute Propagation** to calculate three-dimensional wave propagation for all devices.

   ↳ The calculation is in progress as long as the status bar displays **Engine Busy** Engine Busy.

7. After wave propagation has been calculated, click **Compute Connectivity** or choose **Computation > Compute All > Connectivity**.

   ↳ The **Output** window on the bottom of the screen shows the progress of the calculation.

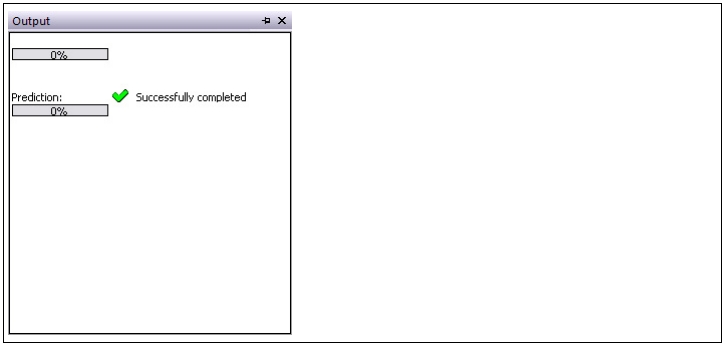

Figure 3.7 **Output** window

Analyze Results

1. Use the **File Browser** on the left side of the screen to display the results.
2. To display wave propagation for a selected device, select a result from the **propagation** folder.

   ↳ The propagation for the selected device is displayed.

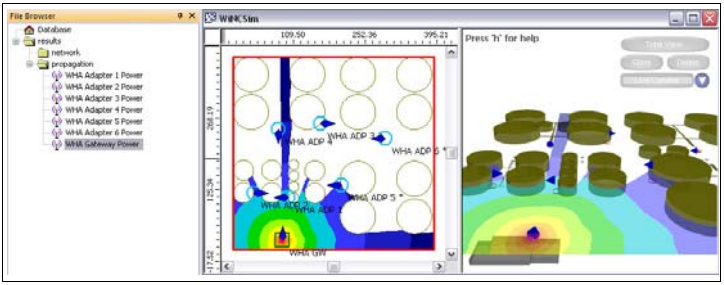

Figure 3.8 Wave propagation for individual devices

3. To display the entire network, select **Max Received DL Power** from the **network** folder.

   ↳ The network coverage is displayed.

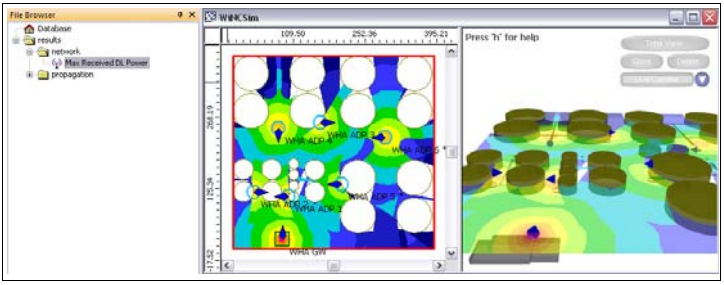

Figure 3.9 Network prediction

4. To display connectivity between the *Wireless*HART devices, open the **network** folder and select the ***Wireless*HART Network Connectivity** entry.
5. Click **Show Paths** in the **Edit Toolbar** or choose **Edit > Show Paths**.
6. Select a *Wireless*HART device in the working area.

   ↳ The connections of the selected device are displayed.

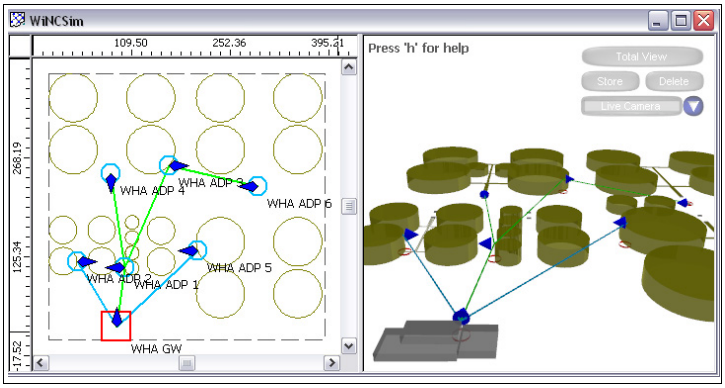

Figure 3.10 Connectivity prediction for *Wireless*HART gateway **WHA GW**

Note!

You can change the display settings and the color palette for the results on the **Display** and **Display 3D** tabs in the global settings. Click **Change Settings** or choose **Edit > Settings** to define the global settings.

Tip

Click **Show Threshold** in the **Edit Toolbar** or choose **Edit > Show Threshold** to define a signal threshold. Values above this threshold are automatically displayed in green, values below are displayed in red.

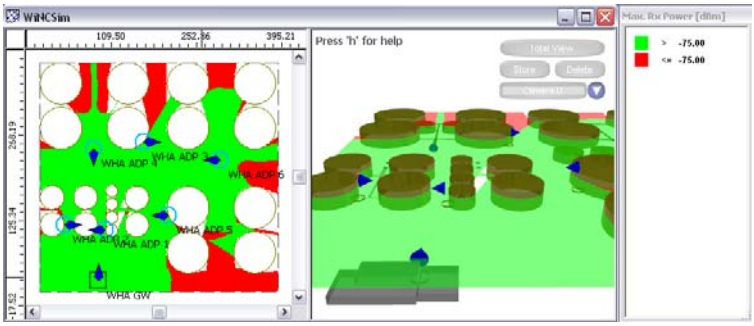

Figure 3.11 Analyze results using a customized color legend

Save Project

1. Choose **File > Save As** to save the project including the results of the simulations.
2. Enter a file name and click **Save**.

Update Instrument List of the *Wireless*HART Gateway

1. In WiNCSim choose **File > Export > Object Data > Customer Specific > Instrument List File**.

   ↳ WiNCSim automatically creates two CSV files. The first CSV file contains the instrument list. The second CSV file is automatically gets the extension **Topology** and contains the device positions.

2. In the menu tree of the web interface or the DTM of the *Wireless*HART gateway navigate to the **Instrument List** and click **Import CSV**. Note that the import will overwrite an existing instrument list.

   ↳ All devices from the working area in WiNCSim have been transferred into the instrument list of the *Wireless*HART gateway.

Update Topology View of the *Wireless*HART Gateway

1. Make sure you have the CSV file with the extension **Topology** that resulted from the export of the instrument list. If not, choose **File > Export > Object Data > Customer Specific > Instrument List File** in WiNCSim to create this CSV file.
2. In WiNCSim choose **File > Export > Map Data > Image File**.

   ↳ The **Export to Image File** window appears.

3. Enter the path and file name for the background image in the **General** area. Select **Export 2D View** and **Create Geo Reference for Image** in the **Export** area and click **OK**.

   ↳ The current view of the working area is saved as an image with embedded coordinates.

4. In the menu tree of the web interface or the DTM of the *Wireless*HART gateway navigate to the **Topology View**.
5. Click **Select Map** and open the background image you exported using WiNCSim.

   ↳ The background image is integrated into the topology view.

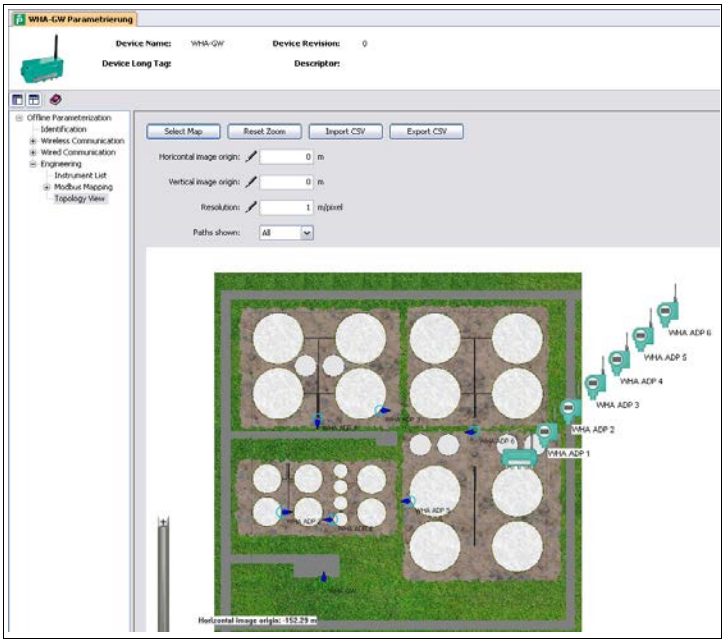

Figure 3.12 **Topology View** with background image

6. Transfer the coordinates that are displayed in the lower left corner of the background image into the **Horizontal image origin**, **Vertical image origin**, and **Resolution** fields.

Figure 3.13 Coordinates for the image origin

7. Click **Import CSV** and open the CSV file with the extension **Topology** containing the positions for each device.

   ↳ The devices are automatically aligned according to the positions that have been determined in WiNCSim.

Figure 3.14 *Wireless*HART devices have been aligned in the **Topology View**

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