

# UCL Depthmap 7: Basic Usage

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Version 7.12r

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# New file

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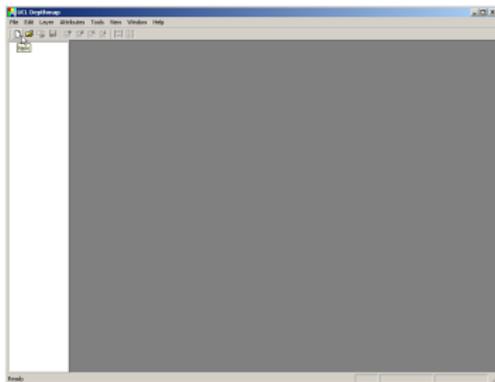
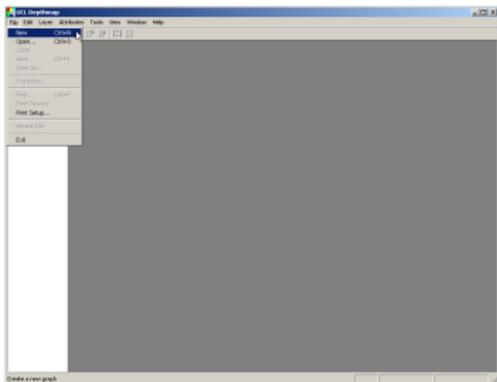
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To create a new Depthmap graph, you always need to select 'New'.

It may seem counter intuitive, but you cannot open a drawing or picture file directly to work from; they need to be imported.

# Import file

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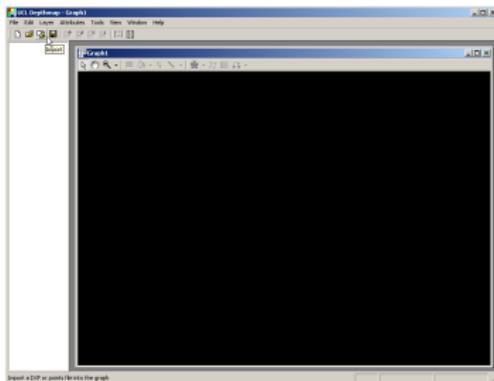
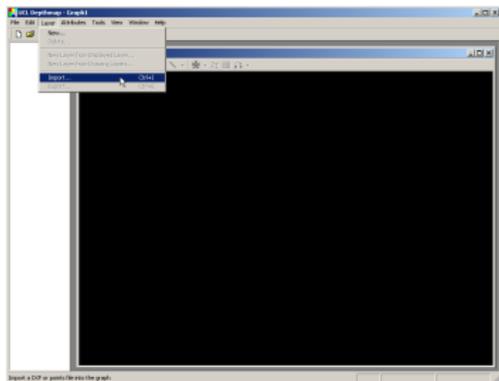
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Once you have a new Depthmap graph, you may import graphics using the 'Import' option.

The 'Import' menu item is found in the 'Layer' menu, as the graphics will in fact form a drawing layer.

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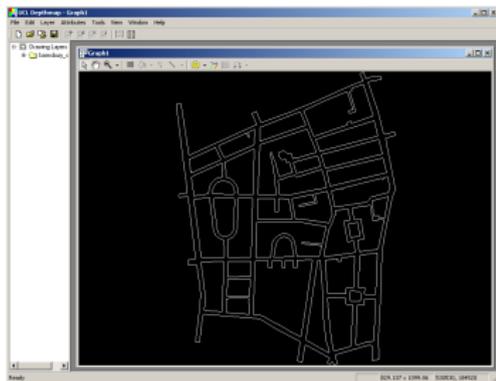
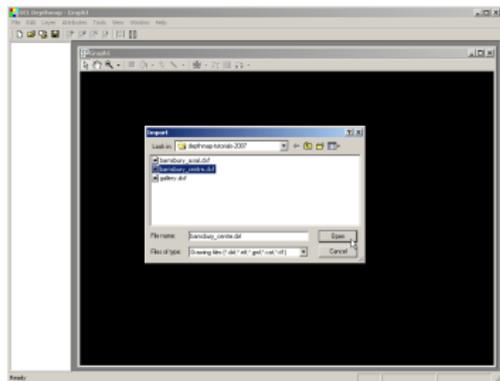
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For this example, we will import 'barnsbury-centre.dxf', a drawing exchange, or DXF, file, which can be created in AutoDesk or other CAD packages. Select the file you want to open and choose 'Open'.

# Viewing the layer

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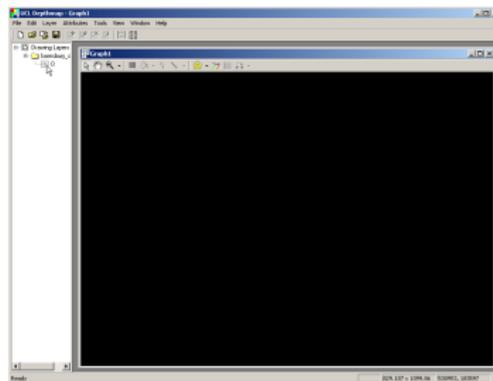
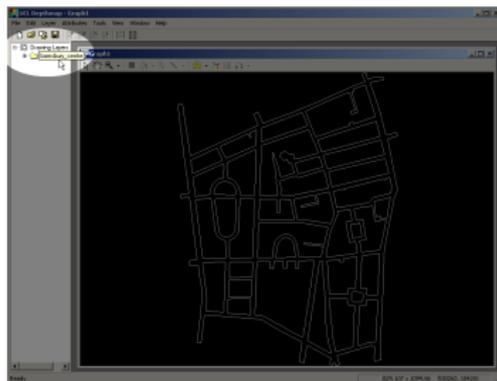
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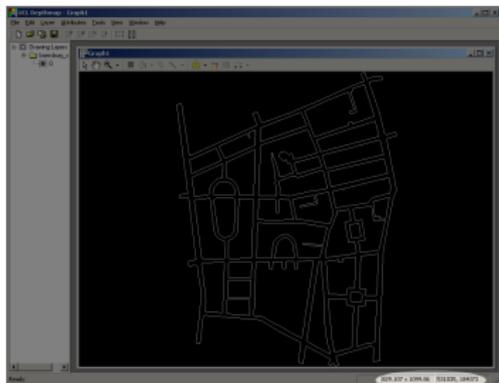
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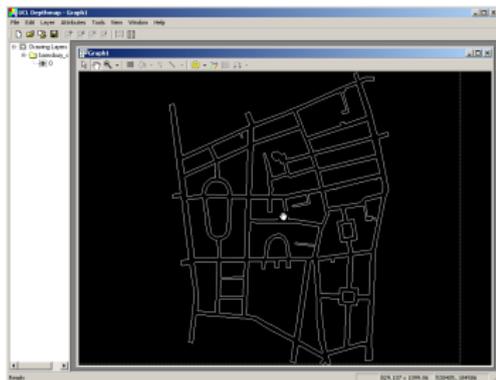
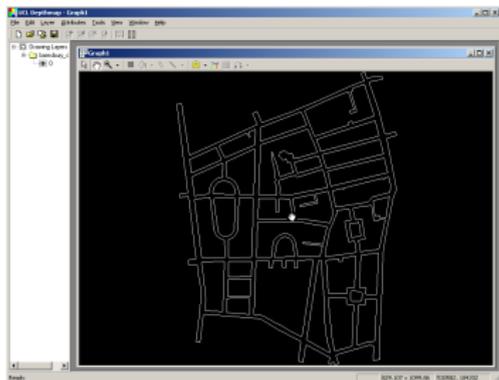
When you import the drawing, it is both seen in the main window, and referenced through the file name in the side bar to the left. If you open the file tree by clicking on the cross to the left of the file name in the side bar, the layers in the DXF file are shown. This file has just one layer called '0'. Clicking on the eye icon will hide or display the layer.

# Dimensions and mouse location



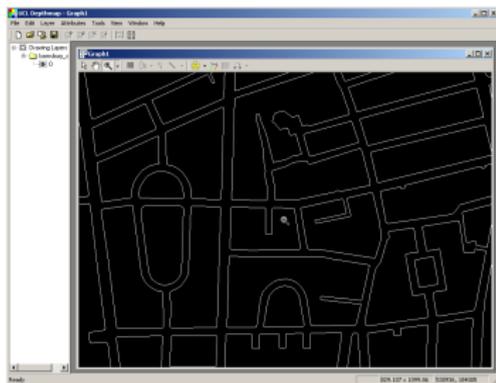
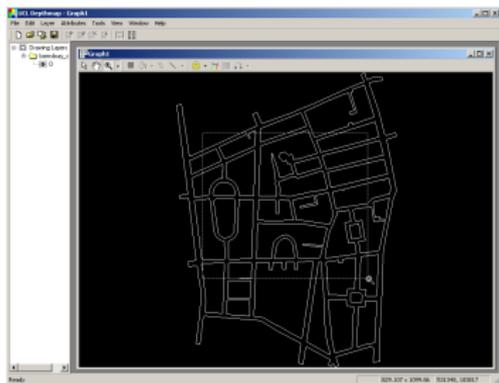
The dimensions of the drawing and the current mouse location are shown in the bottom right hand corner of the Depthmap window.

# Panning



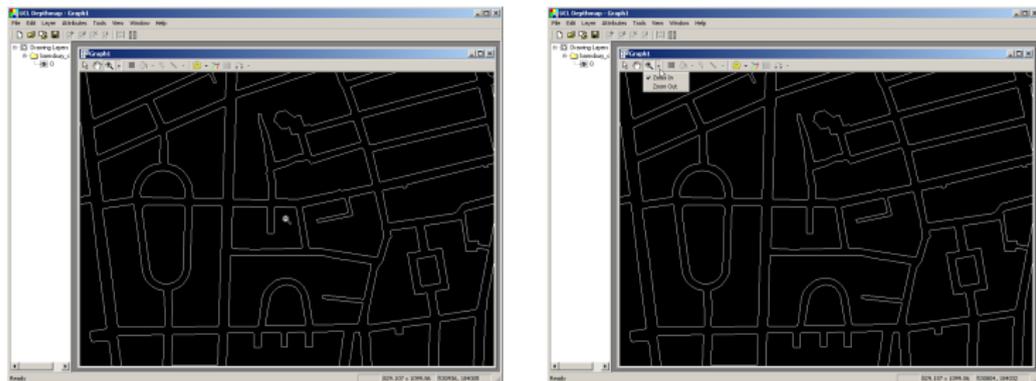
Panning can be achieved by selecting the hand tool from the map window tool bar. Click and drag to move the map. Alternatively, you can click and drag using the right mouse button in any mouse mode.

# Zoom In

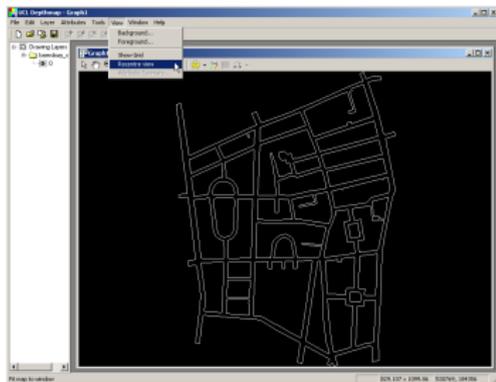
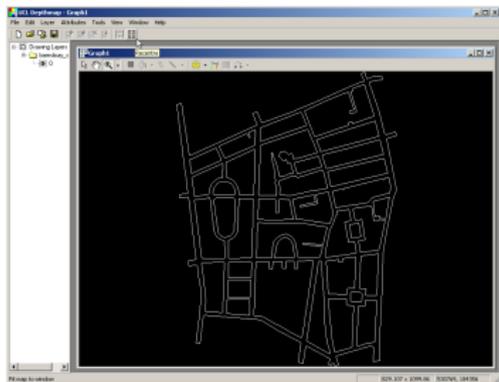


You can zoom in by selecting the magnifying glass tool from the map window tool bar. Click once to zoom in on a location, or click and drag to select an area to zoom into. Alternatively, you can zoom in by rolling the mouse wheel forward in any mouse mode.

# Zoom Out

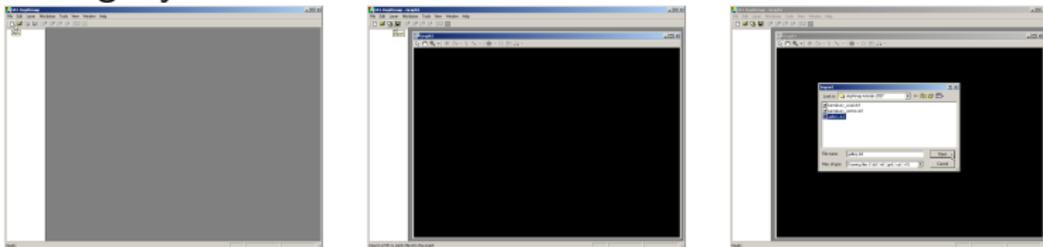


To zoom out you can hold the 'Alt' key while in zoom in mode (when you do, the cursor will change to a magnifying glass with a minus sign) and click, or you can drop down the zoom tools menu from the tool bar, and choose zoom out. Alternatively, you can zoom out by rolling the mouse wheel backwards in any mouse mode.



You can recentre the view at any time by clicking the fit to icon on the tool bar, or by selecting 'Recentre view' from the 'View' menu.

Visibility graph analysis (VGA) is the core of UCL Depthmap. It is what it was originally developed to do. This next section will show how to perform VGA on a simple building layout.



First open a file to analyse. This demonstration will use a simple gallery layout. As before, first select 'New' and then 'Import'.

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# Setting the grid

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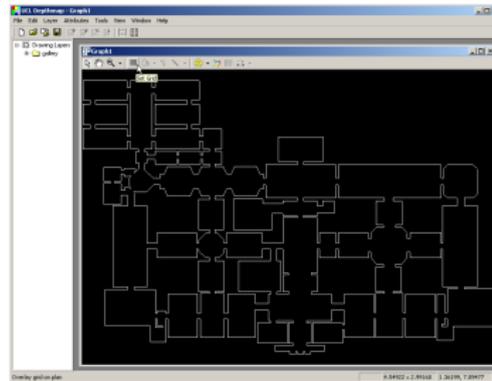
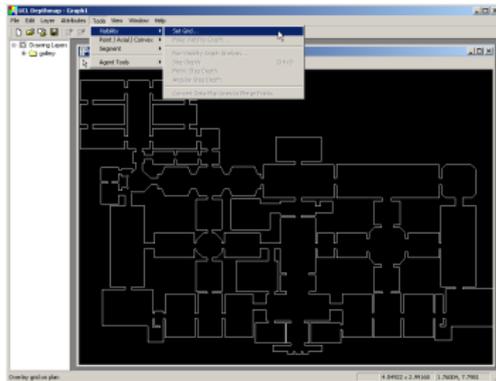
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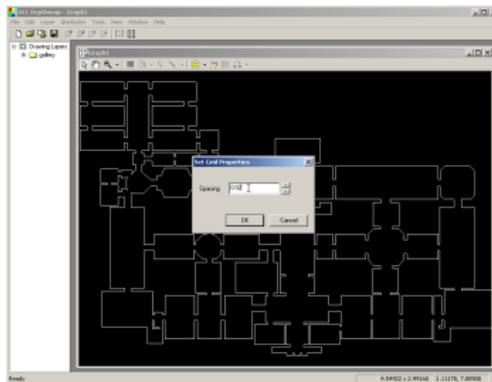
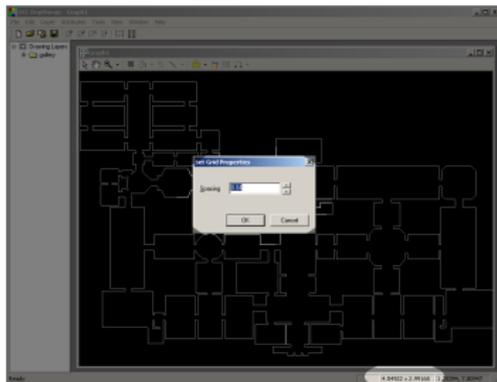
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The first thing to do to perform the analysis is to set a grid resolution. Choose 'Set Grid' from the 'Visibility Tools' menu, or the set grid tool from the map window tool bar.

# Setting the grid



You are given the option to set the grid spacing. The default spacing is set according to the dimensions of the drawing. You may want to set the grid to approximately 'human scale', or a grid of locations every 0.75 to 1 metre. In this case, the dimensions are arbitrary, and this corresponds to about 0.02 units.

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# Filling the grid

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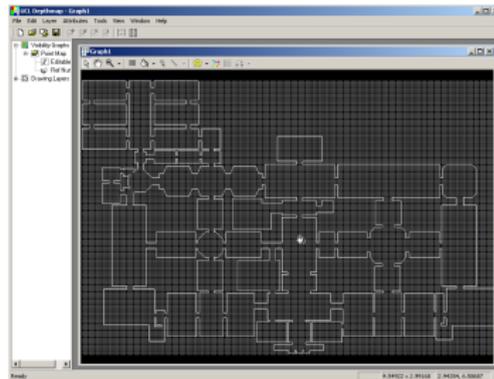
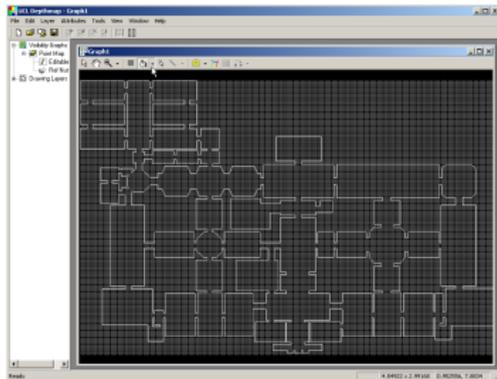
Making the graph

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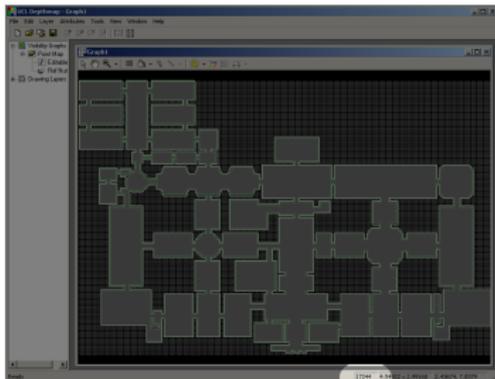
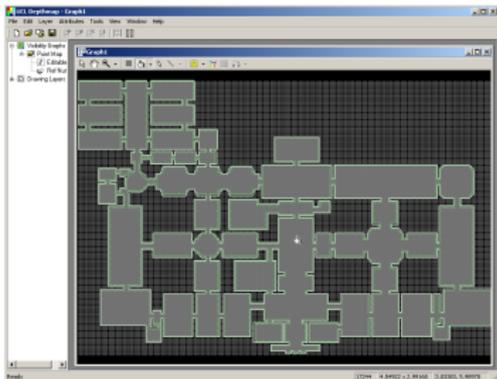
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Once the grid is set, you can fill it with the fill tool. The fill uses flood fill to fill with the area with analysis points.

# Filling the grid



Note that for the fill to work, you must close all geometry, otherwise it will flood into open areas. The number of locations created is shown in the bottom right of the Depthmap window. In this case, 17 244 locations have been created.

## Drawing files

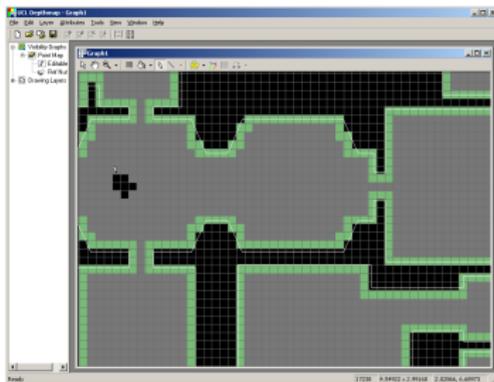
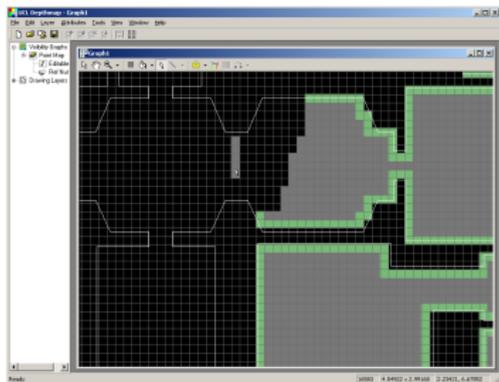
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# Using the pencil tool



You can use the pencil tool both to fill in individual points, by clicking the left mouse button, or to delete them by clicking the right mouse button.

# Selecting points

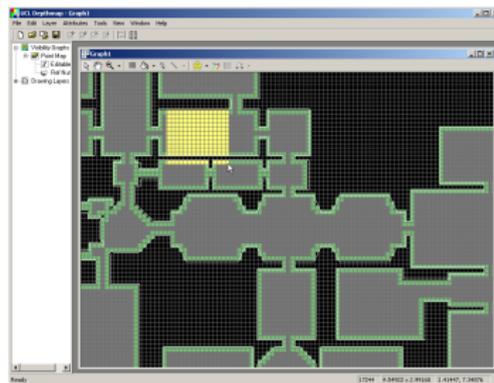
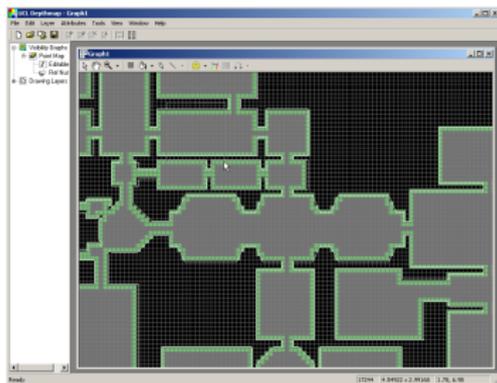
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Points can be selected using the standard arrow mouse mode. Single points can be selected by single clicking on the points, or a range by dragging the mouse. The selection can be cleared by clicking the right mouse button. If you hold down the shift key, more than one range can be selected.

# Deleting points

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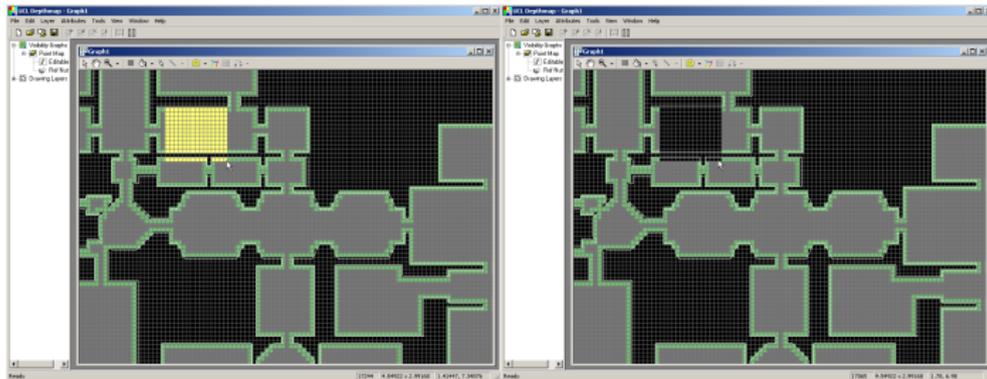
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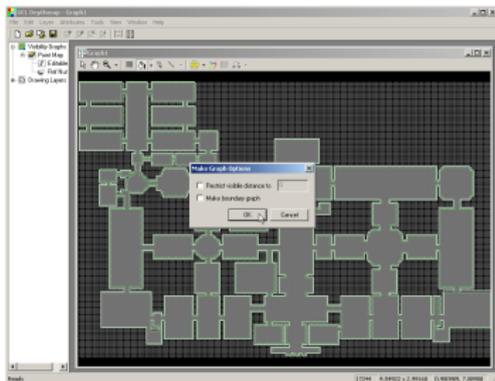
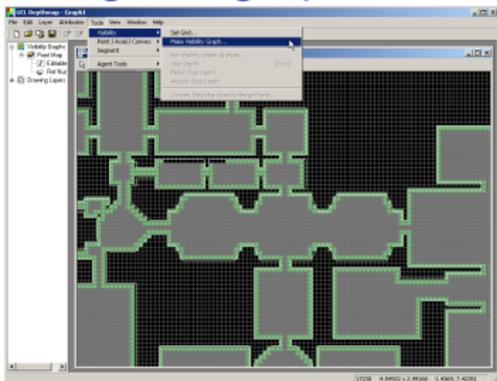
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Any selection of points can be deleted using the 'Del' key. Pressing 'Ctrl' and 'Z' will undo the delete.

# Making the graph



- ▶ When you are happy with the point locations you want to analyse, the visibility graph can be made by selecting 'Make Visibility Graph...' from the 'Visibility Tools' menu.
- ▶ Note that although the points are represented by squares, Depthmap will analyse the intervisibility of the centre of each square to the centre of each other square.
- ▶ For a standard visibility graph, simply select 'OK' when prompted.

## Drawing files

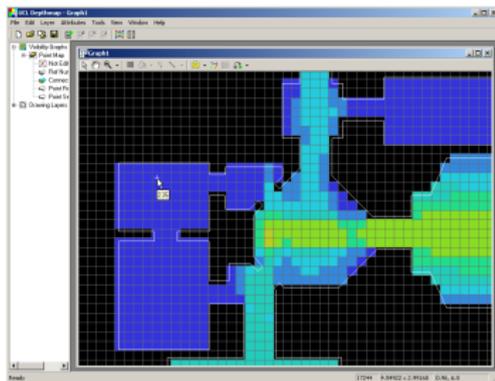
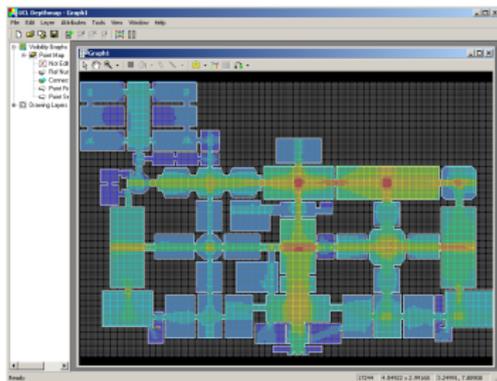
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# Visibility graph



- ▶ Once the graph has been created, the connections are not shown because there are simply too many of them. Instead, each location is coloured according to how many other locations are visible from it.
- ▶ The range runs from blue, for low, through green, yellow to red for many visible locations.
- ▶ Hovering over a location with the mouse shows the actual figure, for example, 237.

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# Boundary graph

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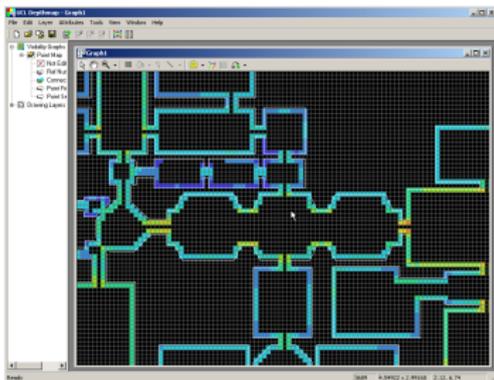
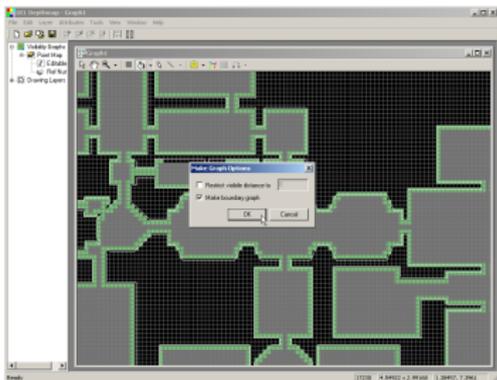
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A boundary graph creates a graph just using the edge locations (those locations that were coloured light green rather than grey before making the graph).

# Viewing attributes

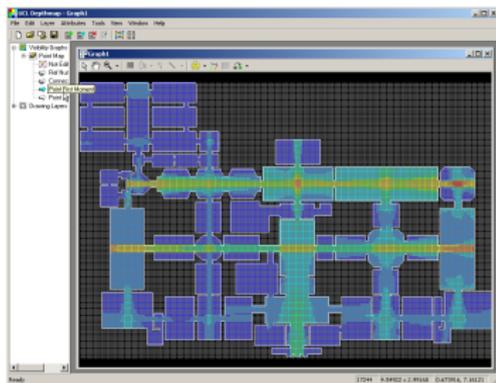
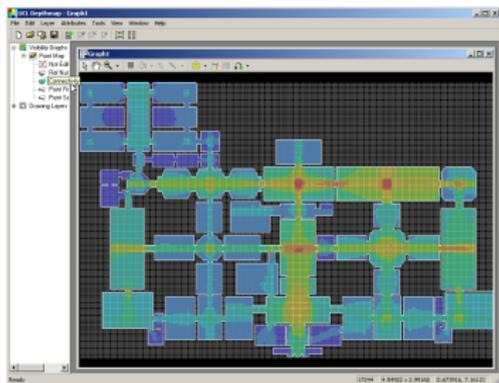
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The default attribute shown is the number of connections for each location. However, there are other attributes which can be selected. For example, 'First point moment' and 'Second point moment'. These are shown in the side bar to the left. Click on the attribute to display it.

# Step depth

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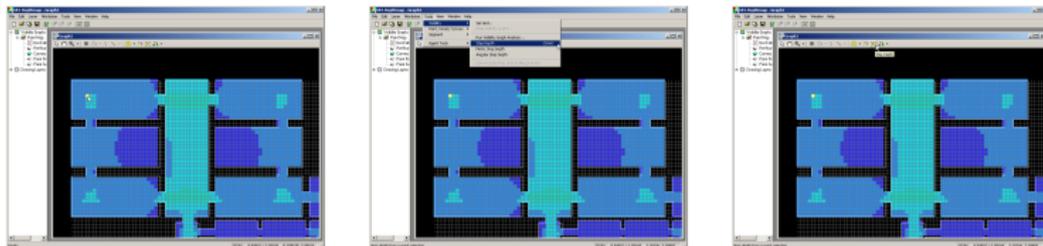
Making the graph

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**Step depth**

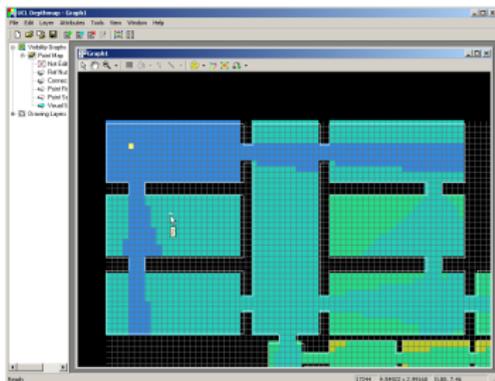
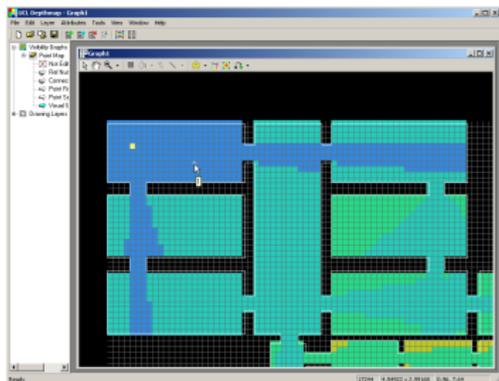
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Once the graph has been constructed, simple measures can be constructed. For example, the step depth from one location to all others within the graph. To show the step depth first select a point from which to calculate step depth. Then select 'Step Depth' from the 'Visibility Tools' menu, or by using the step depth tool bar button.

# Step depth



The step depth shows the number of steps it takes to get to each other location in the graph, starting from the current location. The current location has step depth 0. All locations directly visible from it have step depth 1, and all locations directly visible from those at step depth 1 have step depth 2, and so on through the graph. The result is a cumulative isovist growing from the initial location.

## Drawing files

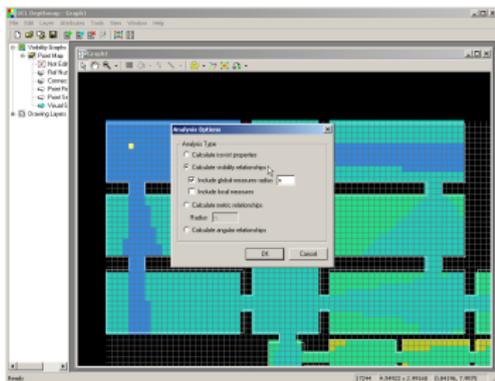
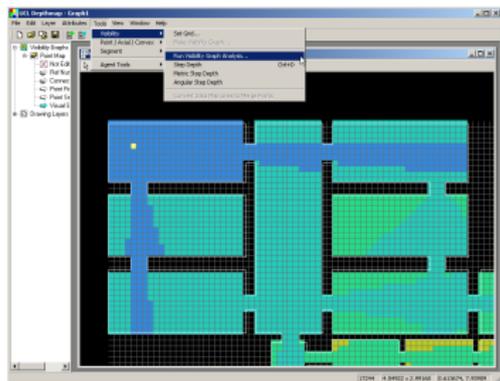
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# Analysing the graph



Step depth just shows depth values for one location. We can calculate the depth values for *all* locations in the graph, and compare them to each other, using the 'Run Visibility Analysis' option from the 'Visibility Tools' menu. Change the default analysis mode to 'Calculate visibility relationships' to create the comparative depth measures.

## Drawing files

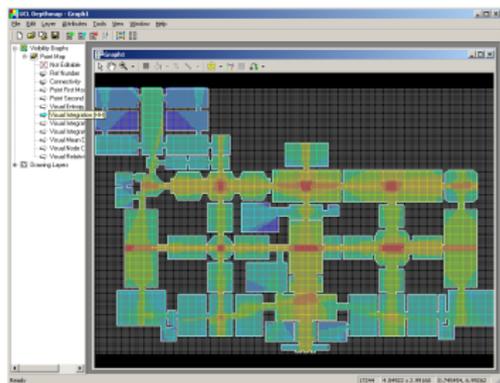
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# Visual depth



The default measure displayed is the 'integration' of every location, a measure of how deep each location is to all others. A well integrated location is shallow (in terms of number of steps) to all other locations; that is, you do not have to turn often to get from the location to any other in the system. A poorly integrated location is deep with respect to the other locations. Well integrated locations are coloured red, poorly integrated ones are coloured blue.

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# Other measures

There are many other measures that Depthmap can perform. These are covered in the Depthmap Researchers' Handbook, which include details of the calculation involved to create each measure as well as motivation for its implementation and research findings about its social applicability.

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This tutorial has covered the basics of Depthmap:

- ▶ importing and viewing a plan of an urban or building environment, and
- ▶ constructing a simple visibility graph analysis of it.