Target Surface Data Mapping

Maps provide a key tool for interpretation for many earth science applications. Target provides a wide range of surface mapping capabilities. Using Target's versatile gridding routines, grids can be created using point sample datasets (e.g. streams, soils, rocks, geophysical data, geochemistry data) from a variety of raw data sources (ASCII, Excel, Access, and acQuire). Target provides a full featured dynamic contouring algorithm with gradient feathering and extensive labelling control for professional quality presentation results. Easy-to-use design wizards simplify the creation of grids and contours.

Quickly create multiple and varied types of maps, including gridded maps, surface maps, posted value maps and sub-location maps. Interpretation can be done on all maps with CAD drawing tools, which enable a user to annotate and define areas of interest onto new layers in the map view.

The purpose of this How-To Guide is to help you become aware of the key components and capabilities of the surface mapping process to prepare you for plotting your results. In this exercise, you will be:

- Creating a Surface Map
- Plotting Survey Lines and Profile Plots
- Symbol Plotting
- Gridding Data
- Plotting Contours

Creating a New Map

Target Can be used to produce an intelligent entity called a Map. Physically a map is a special graphic file (*.MAP) containing drawings and images. We call the map intelligent because it enables you to edit it interactively, apply dynamic linking and track the map creation processes.When you create or open a map in Target, the system displays a Map window in the project. For a new map, the window is initially empty. For an existing map, all map elements are displayed when the window opens.

An important component of the map is the map template. Templates control placement of base map elements (surrounds), contours, grids, plots, images and any other graphics elements that you may require in your completed map. For more information on mapping, map components and working with maps see the Application Help.

To Create a New Map

1. Select the database you wish to create a map from in your current project.

2. On the *Surface Mapping* menu, select *New map* and then select **New map from E,N**.
   The *Data range to map* dialog appears.

3. Click the **Scan data** button to have the system query the database for the *Minimum X, Y* and *Maximum X, Y* coordinates, *Distance units* and the *Coordinate System* information, or enter the desired data range manually.

⚠️   *If the scanned data or grid file does not have an established unit, "metres" is assumed. It is important that the distance units accurately reflect the units of the data range. The default unit can be modified from the Default Settings dialog, found on the GX|Global Settings|Generalmenu.*

4. Click the **Next>** button.
   The *Create a New Map* dialog appears.

5. Enter a *Map name*. Using the dropdown list, select the *Map Template* and then click the **Scale** button.
   The system automatically calculates a scale that will fit the data on the map template. It's recommended that you increase the scale up to a more appropriate 'round' number (e.g. from 19255 to 20000).

6. Click the **Finish** button to display the new blank map.

Creating a Base Map

Maps are composed of views. A view is a coordinate translation and a masking region and is used to organise and display information on a map. Maps consist of a *Base view*, which uses paper coordinates with an origin at the bottom left corner of the page, and a Data view, which uses ground coordinates.

You can customize your base map with many elements, including map surround, north arrow, scale bar, reference grids, latitude/longitude annotations, text blocks/balloons and titles. The layout of your base map can either be map or figure style. Figure style maps have a layout with the title, scale bar and north arrow located at the bottom of the map, whereas map style maps have a layout with the title box, scale bar and north arrow along the right hand side of the map. The following images show the difference in layout between the two styles.
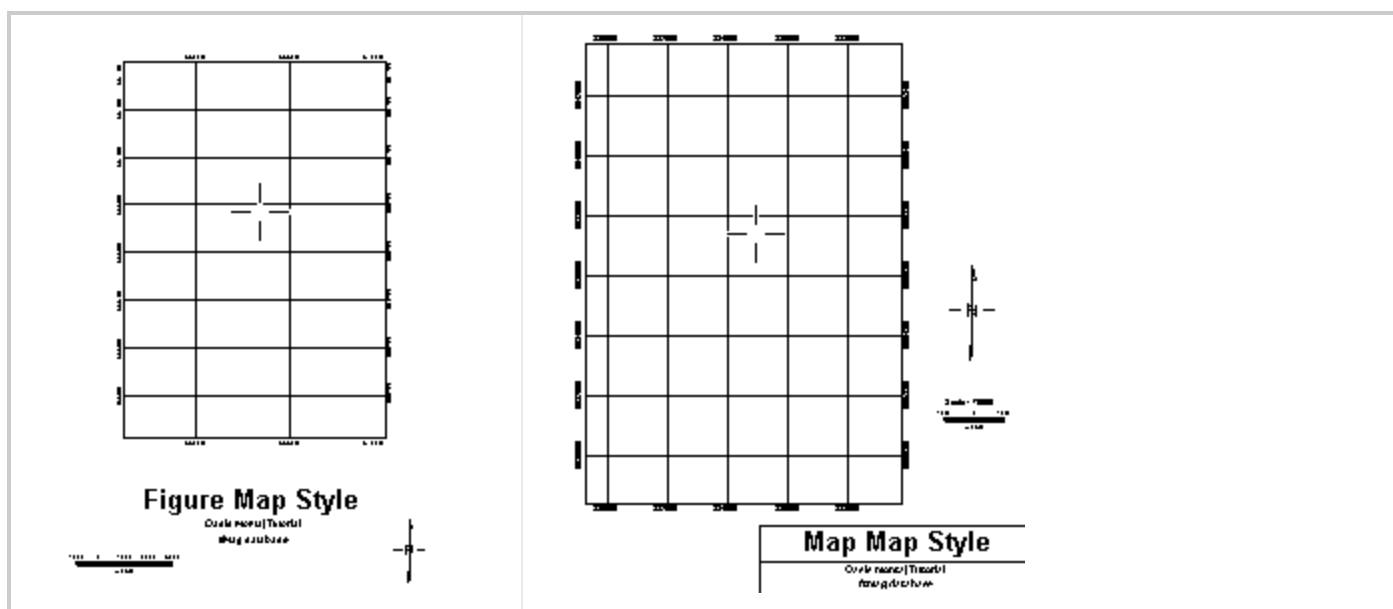
To Create and Plot a Figure Style Base Map

1. Make sure your map file is open and selected in the project.

2. On the *Surface Mapping* menu, select *Base Map* and then select **Draw Base Map**.
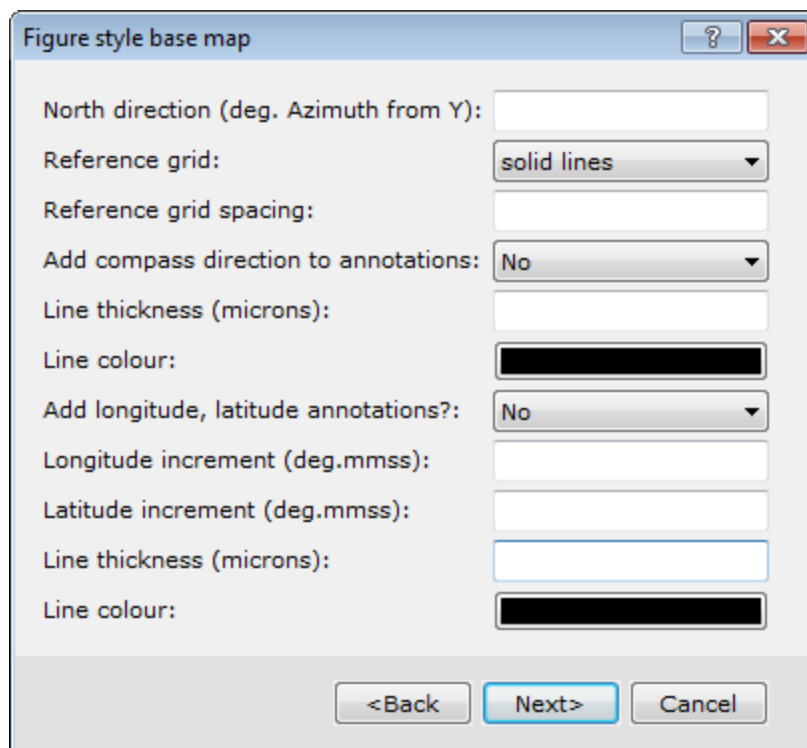   The *Basemap layout* dialog appears.
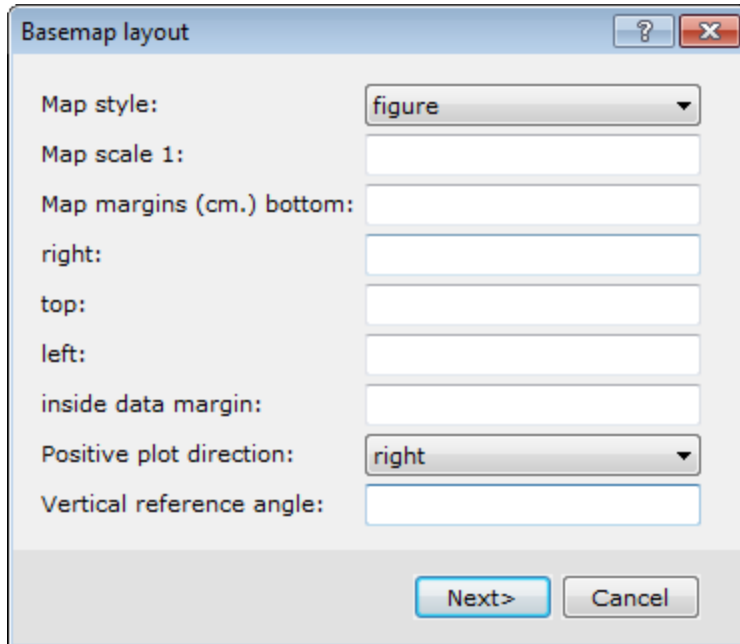
This dialog is the first dialog in the base map layout wizard. The type of *Map style* that you choose here will reflect the type of dialogs to follow.

⚠️ *For this example, we select the **figure** style.*

3. Select the *figure* style.
4. Click **Next>** to continue.
   The *Figure style base map* dialog appears.

5. Specify the display characteristics of the base map elements.

    💡   *For detailed information on each setting, click the **Help** button.*

6. Set the *North direction*. If blank, no North arrow is drawn.

7. You can specify different types of display styles for the *Reference grid* via the dropdown list.

8. Configure the other base map options as desired.
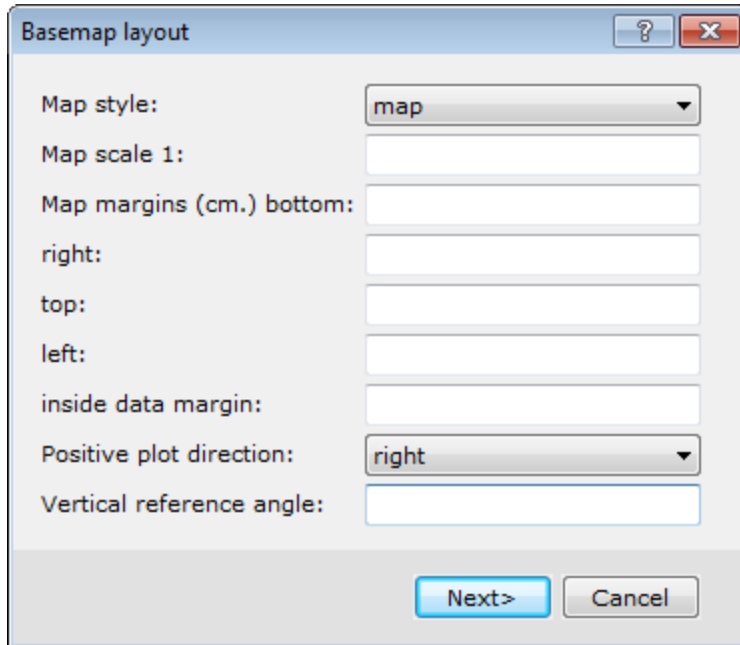
9. Click **Next>** to continue.
    The *Figure titles* dialog box appears.
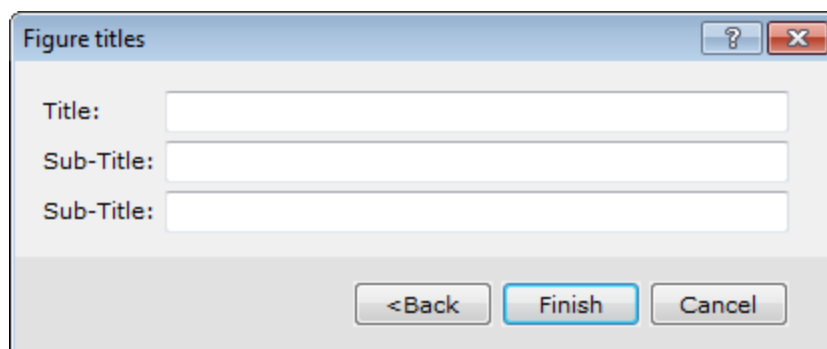
10. You can specify the map titles and sub-titles, if desired.

11. Click **Finish** to plot the base map on your current open map.

To Create and Plot a Map Style Base Map

1. Make sure your map file is open and selected in the project.

2. On the *Map Tools* menu, select *Base Map* and then select **Draw base map**.
   The *Basemap layout* dialog appears.

This dialog box is the first dialog box in the base map layout wizard. The type of *Map style* that you choose here will reflect the type of dialog boxes to follow.
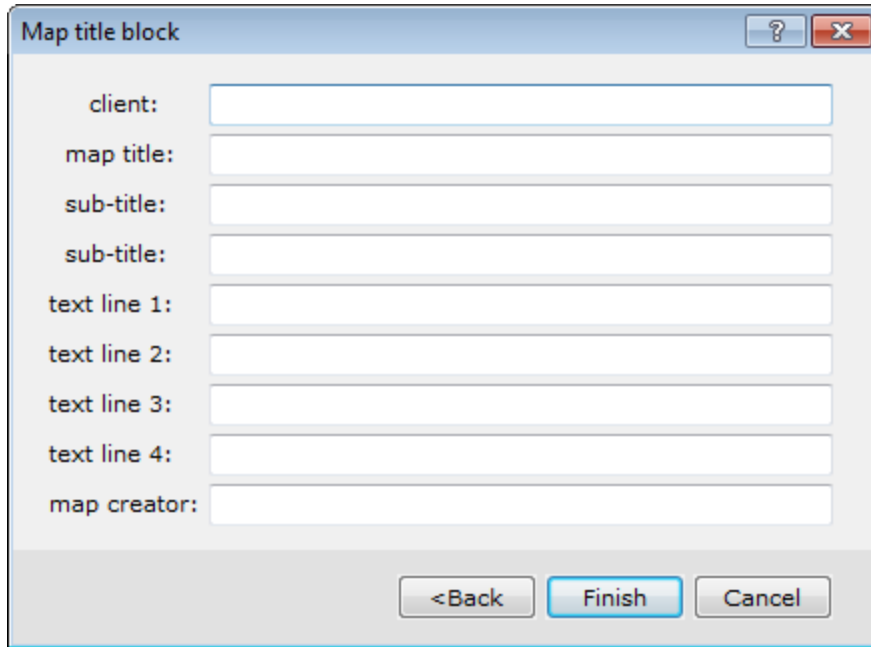
⚠️ *For this example, we select the **Map** style.*

3. Select *map*.

4. Click **Next>** to continue.
   The *Full map style base map* dialog appears.

💡 *For detailed information on each setting, click the* **Help** *button.*

5. Set the *North direction*. If blank, no North arrow is drawn.

6. You can specify different types of display styles for the *Reference grid* via the dropdown list.

7. Configure the other base map options as desired.

8. When complete, click **Next>**.
   The *Map title block* dialog appears.

9. You can specify the map titles and sub-titles, if desired.

10. Click **Finish** to plot the base map on the current open map.

Moving Around the Map

Once you have your map displayed, you may want to zoom into the map so that more detail is displayed. You may also wish to move around the map using other options.

💡 *You can also access these commands by right-clicking on a map and selecting the options from the pop-up menu.*

Map Layout

The following is a list of some of the different types of viewing options available for moving around and viewing the map with ease:

Zoom Box	Click this button to activate the Zoom Box. Click on the map, then while holding down the left mouse button and move your cursor to box in the area of the map you want to zoom. Click to select the area. Click the mouse button again to zoom to the area selected. ⚠️ *Once the box has been defined, the cursor and the box are linked and by moving the cursor around the map you can move the box to another location, and then click the left mouse button to zoom to the boxed area.*
Pan	Click this button to Pan around in the currently selected map. Click the left mouse button and while holding the button down, move the hand cursor to pan around the current map area.
Interactive Zoom	Click this button to activate the interactive zoom. Click on the area of the map you want to zoom (e.g. an anomalous location on a grid), then while holding down the left mouse button, move your cursor left to zoom out and right to zoom in on the selected area.
Zoom In	Click this button to zoom in and increase the displayed map features by 50%.
Zoom Out	Click this button to zoom out and shrink the displayed map features by 50%.
Full Map	Click this button to display the whole map area in the map window.
Zoom to Selection	Click this button to zoom to the selected map view or group.
Previous Extent	Click this button to undo all changes that you have made since the last time you saved the map. This command is useful for removing text and graphics that you may have added accidentally. When working on a map, you may prefer to use this command periodically so that you undo only a few changes at a time rather than your entire set of map edits and other changes.
Next Extent	Click this button to redo the latest changes that you have made since the last time you saved the map. This command is useful for adding text and graphics that you may have removed accidentally.
Redraw	If you manually resize the map window or perform editing on the map you may need to redraw the map to refresh its current view

Map Tools

The *Map Tools* menu provides several options which enable you to control how your map appears and which menus are active. The last three buttons on the toolbar determine on which maps zooming occurs:

- **This Map Only** button will zoom only the current map, which will be highlighted.
- **All Maps** button will zoom all the maps, which share the same coordinate system.
- **Other Maps Only** button will zoom all the other maps, which share the same coordinate system, with the exception of the current map. This enables the use of one map as a reference.

💡 *To find out the function of the other buttons on the Map Tools Bar, hold the cursor over the button until a description appears.*

Map Pop-Up Menus

Map Views		Map Groups	
Views	▶	Groups	▶
Coordinate System...		Edit This Group	E
ArcGIS Transformations...		Next Group	W
Next View	W	Previous Group	Q
Previous View	Q	Grid Value	▶
		Delete Group	Del

Map Window Status Bar

The projection information in the status bar is cleared when there are no active maps.

Configurable Hotkeys

Target provides configurable *Hotkeys* enabling quick and easy access to menu items including all map tools. To access the *Shortcut Keys* dialog, an interactive dialog enabling you to set your own Hotkeys or view the defaults, select the *GX|Database Settings|Configure GDB Shortcut Keys* menu item.

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Survey Line and Profile Plotting

The Target system provides the capability to plot survey lines for line-oriented Geoscience surveys, for example, airborne magnetic survey data. The system also provides the capability to display plan view profiles of the data values for each survey line.We recommend that you experiment with these options with your own line data.

To Plot Survey Lines (Line Path)

1. Select the open map with which you want to work.

2. On the *Surface Mapping* menu, select *Survey Lines* and then select **Line Path**.
   The *Line path plot* dialog appears.

3. Change the line colour to black or another colour.

4. Click **OK**. Target displays the survey line path on your map.

⚠️   *For more information on plotting survey line paths, click the **Help** button on the Line path plot dialog.*

To Plot Profiles

1. Select the open map with which you want to work.

2. Select the *Surface Mapping* menu, select *Survey Lines* and then select **Profile**.
   The *Profile plot* dialog appears.

Profile plot

Profile channel:	
Profile scale (units/mm):	1.0
Profile base:	
Log option:	linear
Log base:	1.0
Smooth line:	no
Line colour:	
Line thickness (mm):	0.15
Line style:	solid
Line pitch (mm):	5
Positive fill colour:	None
Negative fill colour:	None
Maximum down-line gap:	
Join to line ends?:	yes
Reverse plot order?:	yes

OK   Cancel

3. Use the dropdown menu to select the channel to display in profile view.

4. Change the line colour to red or another colour.

5. Click **OK**. Target displays the profile of the channel values on your map.

⚠️   *For more information on plotting profiles on your map, click the **Help** button on the Profile plot dialog.*

Plotting Symbols and Legends

The Target system provides the ability to create a variety of symbol type plots for spatially located Earth Science data. Symbol plotting is ideally suited for the presentation of data sets that are not line-orientated such as geochemical survey results.

Target enables you to create fixed size coloured symbols or symbols that are sized in proportion to the data values. Colours can be based on a variety of colour files, including zone (*.ZON), table (*.TBL) or image transform (*.ITR). Symbols can have different fill and edge colours. The fill and edge colours are independent, so they can be set to different values for different channels.

The symbol plots available from the *Surface Mapping|Symbols* menu, include:
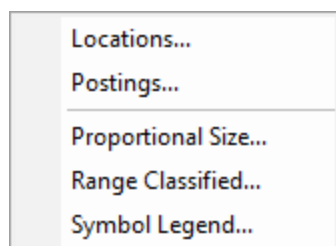
Location Plots

The most basic type of symbol plotting in Target is to draw location plot symbols on a map for all data points in the database.

To Plot Location Plot Symbols:

1. Select (highlight) your map.

2. On the *Surface Mapping* menu, select *Symbols* and then select **Locations**.
   The *Symbol plot* dialog appears.
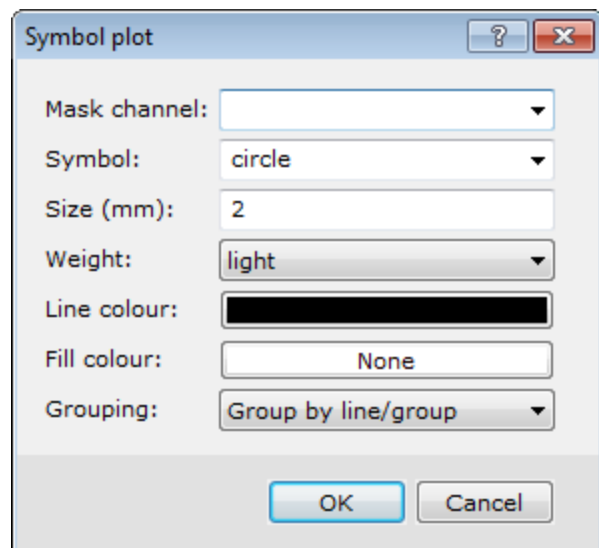
3. Specify the parameters for your symbols.

4. Click the **OK** button and the system plots and displays the survey locations on your map.
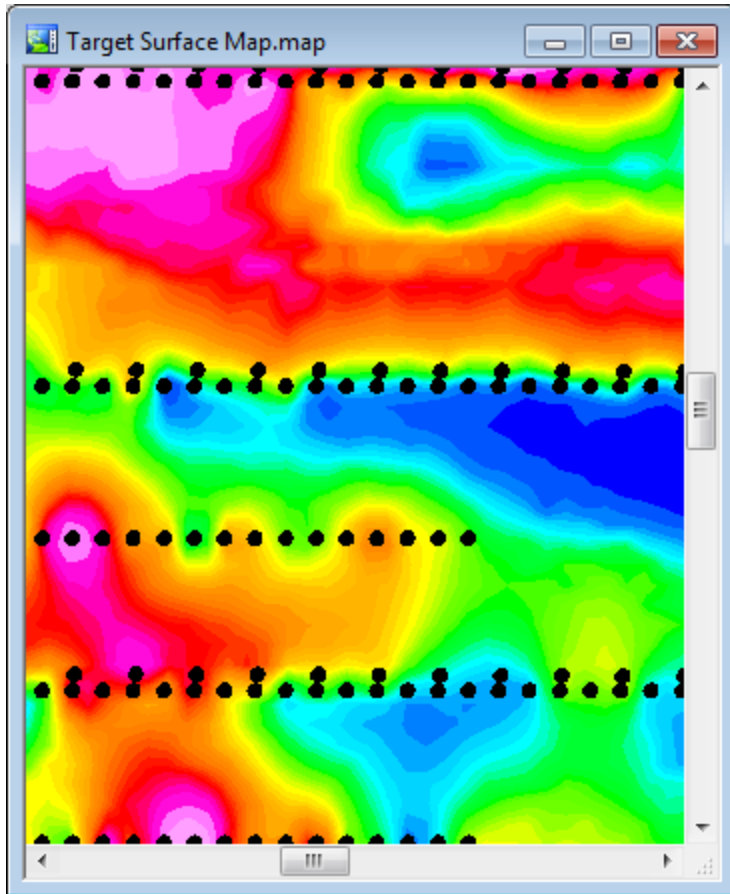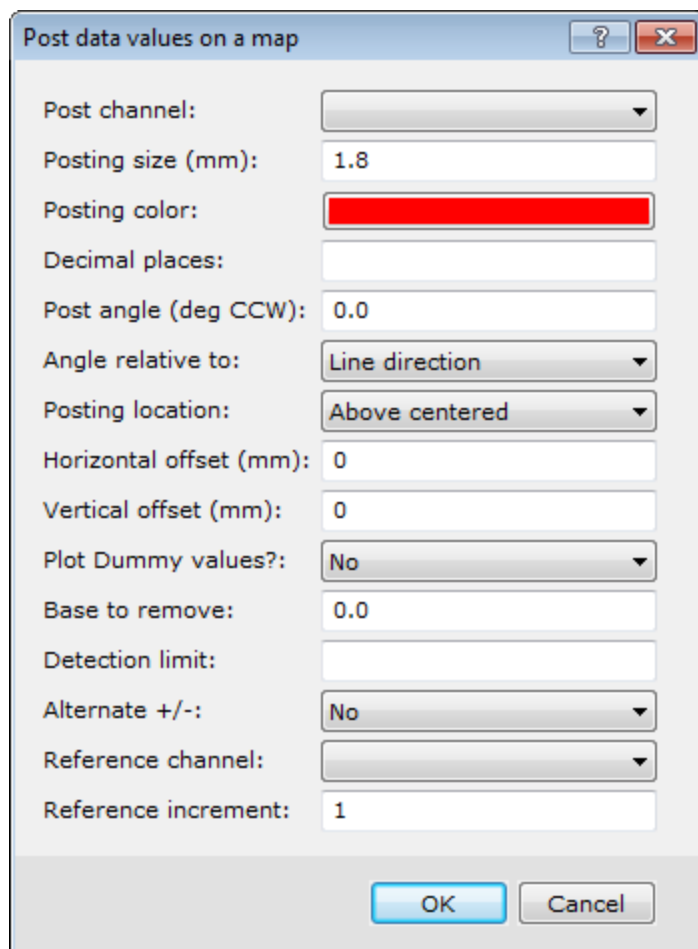
⚠️ *A mask channel is a channel that can be used to subset a database and has its CLASS attribute set to "MASK". If you have a mask channel, and it is selected, only those locations where the corresponding mask channel value is not a dummy will be used. For more information on Mask Channels, see the Application Help System.*

Post Data Values

Assay data values can be posted next to sample locations on your map.

To Post Assay Values

1. Select (highlight) the map to post assay data values on, as well as the database to extract posting information from.

2. On the *Surface Mapping* menu, select *Symbols* and then select **Postings**.
   The *Post data values on a map* dialog appears.

3. From the Post channel dropdown, select the channel you would like to create postings from.

4. Specify any other parameters for your posted data values as shown above. Click the **OK** button and the system plots and displays the assay data values on your map.
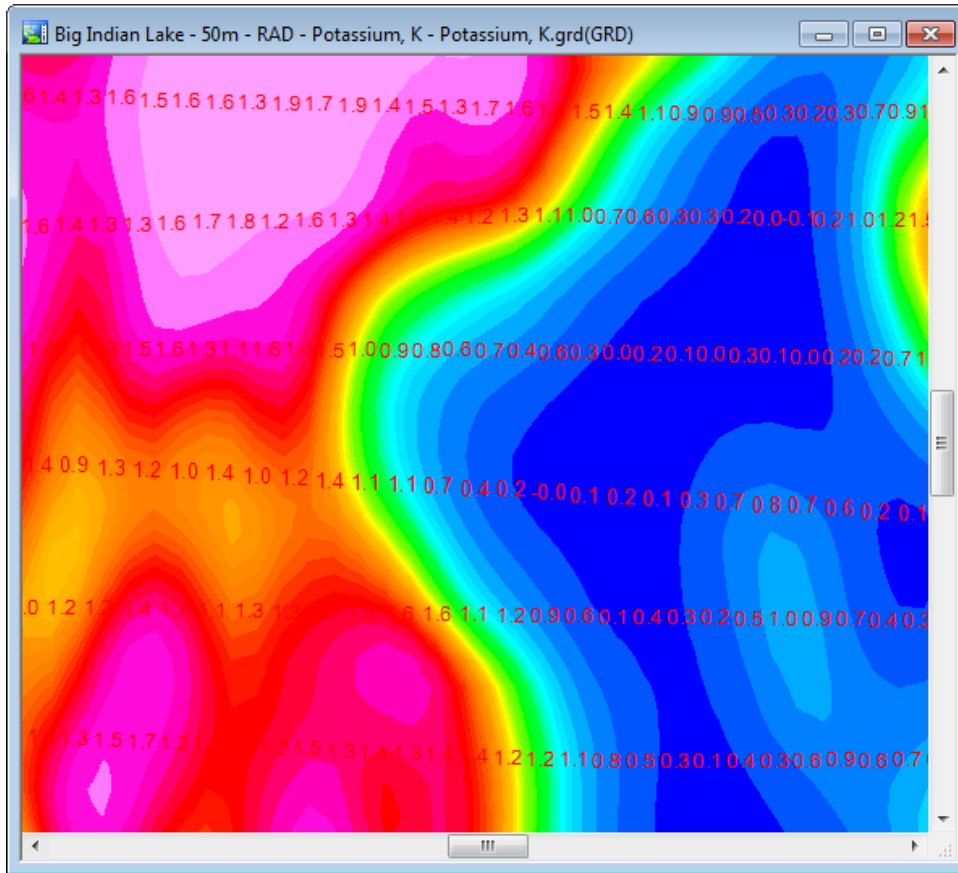
Plotting Range Classified Symbols

The Range Classified Symbols are the most flexible of the entire symbol tools collection. It enables different ranges of data to be plotted using different symbols, colours and sizes.

To Plot Range Classified Symbols

1. Select (highlight) the map you want to plot range classified symbols.

2. On the *Surface Mapping* menu, select *Symbols*, then select **Range Classified**.
   The *Classified symbol plot* dialog appears.
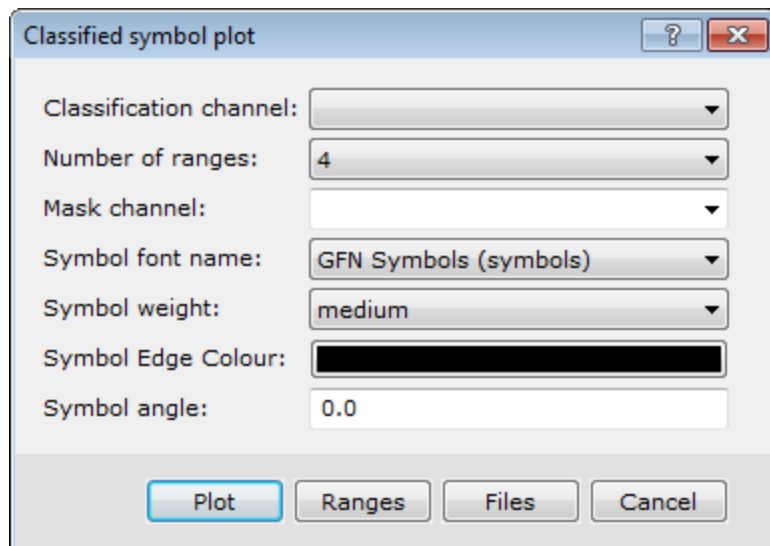
3. Fill in this form and click the **Ranges** button when you're done.
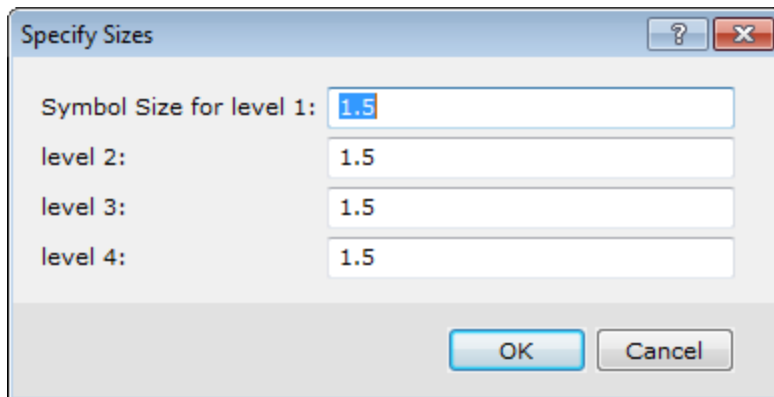   The *Specify Ranges* dialog appears.
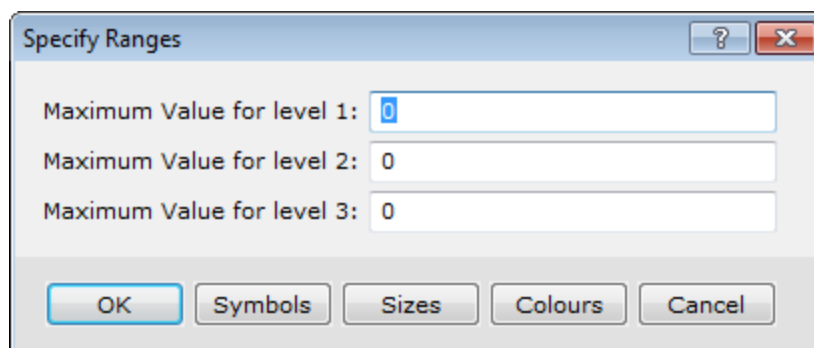
4. Specify the extent of each range by entering the maximum value for each range.

5. Click the **Symbols** button.
   The *Specify Symbols* dialog appears.
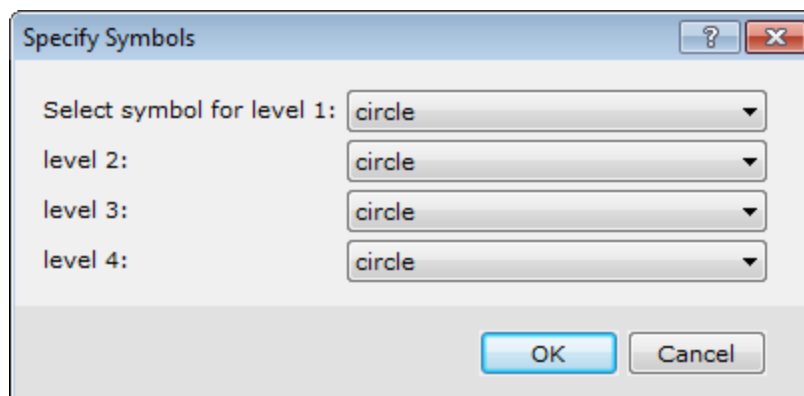
6. Specify the desired symbol shape for each range.Click the **OK** button to return to the *Specify Ranges* dialog and then click the **Sizes** button.
   The *Specify Sizes* dialog appears.

7. Specify the Symbol Size for each level. Click the **OK** button to return to the *Specify Ranges* dialog, then click the **Colours** button.
   The system displays the *Specify Fill Colours* dialog.
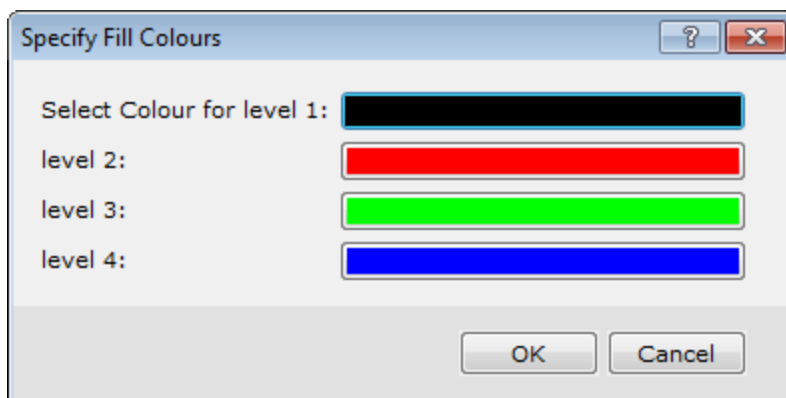
8. Choose the colours by clicking inside the colour boxes and the *Color Tool* will appear. Select a colour from the basic colour palette or click the **Define Custom Colors>>** button to select a custom colour. Repeat this step for all the colour levels and then click the **OK** button to return to the *Specify Ranges* dialog box.

9. Click the **OK** button on the *Specify Ranges* dialog to return to the *Classified symbol plot* dialog.

10. Click the **Plot** button. The system plots the classified symbols for all ranges on the map.
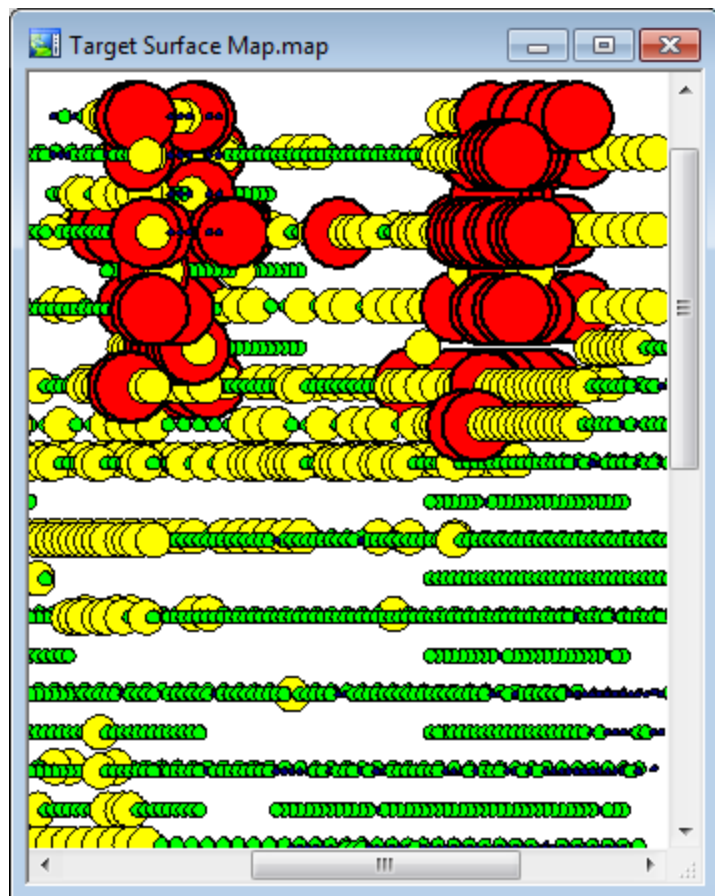
## Plotting Symbol Legend

When you use Range Classified symbols you will want to then create a legend showing the symbol colours and size ranges used on the map.

To Plot Symbol Legends

1. Select (highlight) the map you would like to post the symbol legend to.

2. On the *Surface Mapping* menu, select *Symbols* and then select **Symbol Legend**.
   The *Classified Symbol Legend* dialog will appear.
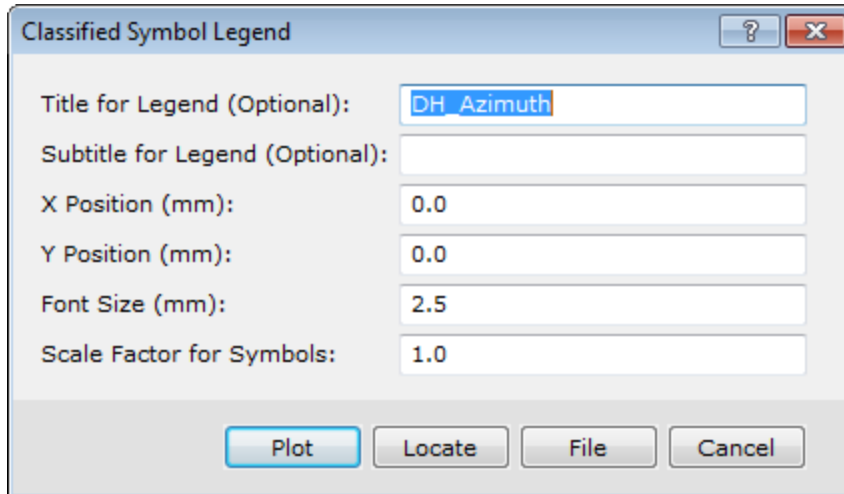
3. Specify the fields and click the **Plot** button. The system plots the legend at the lower left corner of the map. Note that, selecting the *Locate* button enables you to interactively select any location on your map to place the legend.

⚠️ *You can move the legend to a more appropriate location by simply selecting the legend group, holding down the left mouse button and then moving the legend to an appropriate location on your map.*
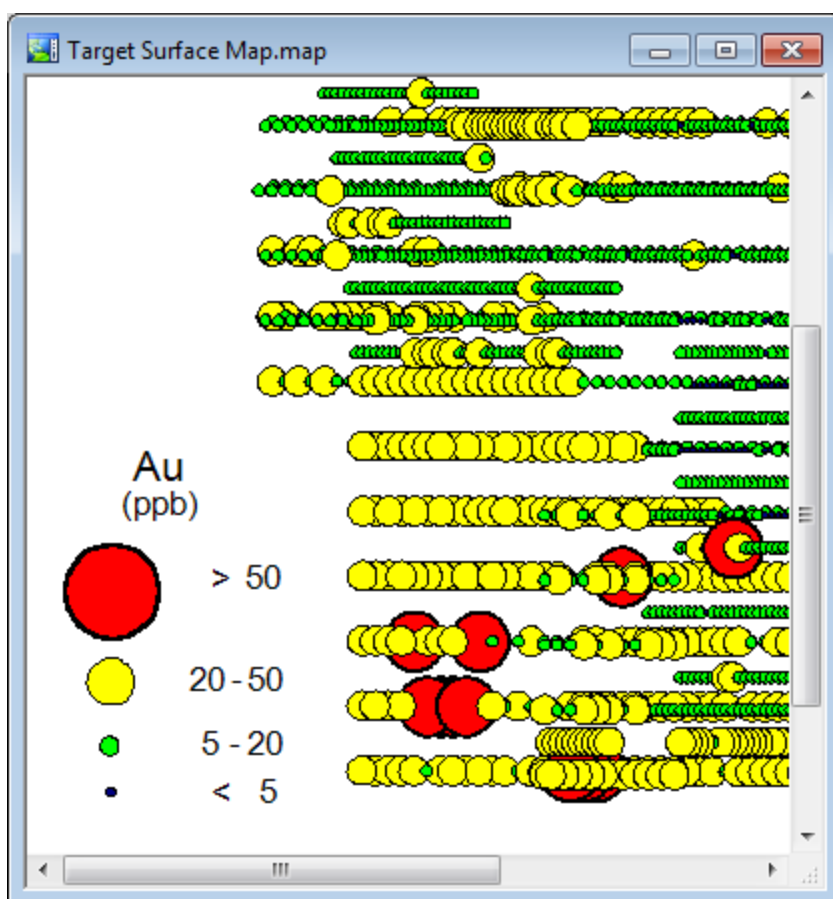
💡 *When you select this option, the system automatically records the colour, symbol and size settings you specified when creating the Range Classified Symbols. This makes generating a legend easy.*

This option is also used for plotting legends for the zoned colour symbols where a (*.ITR) file must be specified. A (*.ITR) file is created when the zoned colour symbols are plotted. The default name is the, "channel-name.itr", e.g. "Au.itr".

Gridding Data

Gridding refers to the process of interpolating data onto an equally spaced "grid" of "cells" or "nodes" in a specified coordinate system, such as X-Y. In the Surface Mapping component of Target, both Minimum Curvature and Kriging gridding methods are available.

These two gridding methods (Minimum Curvature and Kriging) are typically used when the data is not sampled along lines that run in roughly the same direction. Such data are often called random, because they give a random appearance when the data locations are plotted. Also, line data with survey lines that are orthogonal (or have random directions) should also be gridded using the Minimum Curvature or Kriging methods.

The following figure illustrates these types of data:

Random Data   Non-parallel Line Data   Orthogonal Line Data
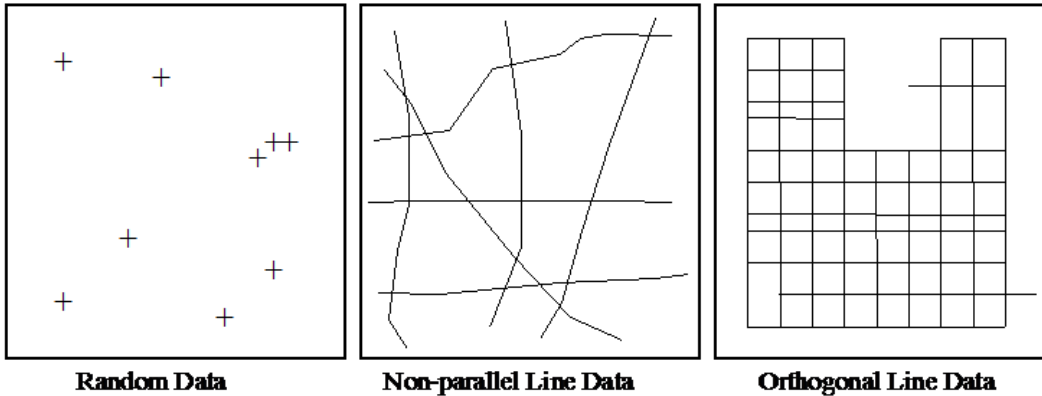
Surface Gridding using Minimum Curvature

The Minimum Curvature gridding method (RANGRID GX) fits a minimum curvature surface to the data points. A minimum curvature surface is the smoothest possible surface that will fit the given data values.

To perform minimum curvature gridding, you must supply the Channel to grid, Output grid name and Grid cell size (optional). In addition, you also have a variety of advanced options, including the ability to:

- Specify data limits and clipping
- Grid the original data or log of the data (using cut-offs or a data range)
- Specify desampling values (for low-pass filtering) and blanking distance (for removing values beyond a certain distance)
- Specify the tolerance to which the minimum curvature surface must match the data points. The default is 1.0% of the Z range of the data. Also specify the percentage of points that must meet the tolerance for the iterations for the current processing step to stop
- Specify the maximum number of iterations to allow
- Adjust the tension to produce a true minimum curvature grid or to increase the tension to reduce overshooting problems in areas where data coverage is sparse

The Minimum curvature gridding algorithm generates a grid file (*.grd) and grid report file (*.log).

To Grid using the Minimum Curvature Method

1. Make sure your database file is open and selected in the project.
2. On the *Surface Mapping* menu, select *Gridding* and then select **Minimum Curvature**.
   The *Minimum Curvature Gridding* dialog will appear.
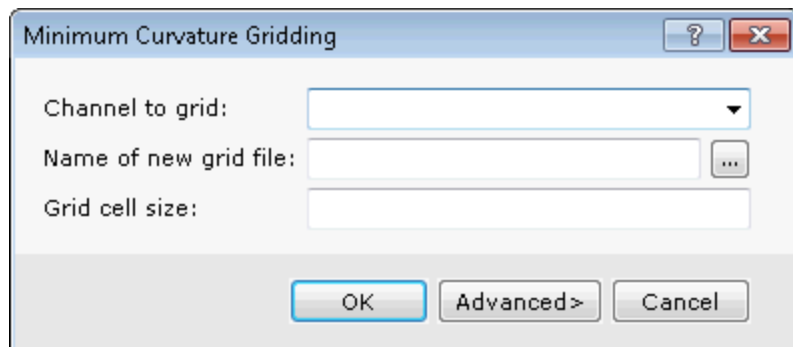
3. Select the *Channel to grid* from the dropdown list.

4. Specify the *Name of new grid file*.

5. Specify the *Grid cell size*. This should normally be ½ to ¼ the nominal sample interval. If not specified, the data points are assumed to be evenly distributed and the default cell size will be. ¼* (sqrt (grid area / #data points)).

> *For more information on the **Advanced** gridding parameters, click the **Help** button.*

7. Click the **OK** button. The system processes the data and displays the grid in a "map" window and adds it under *Grids* in the Project Explorer window.
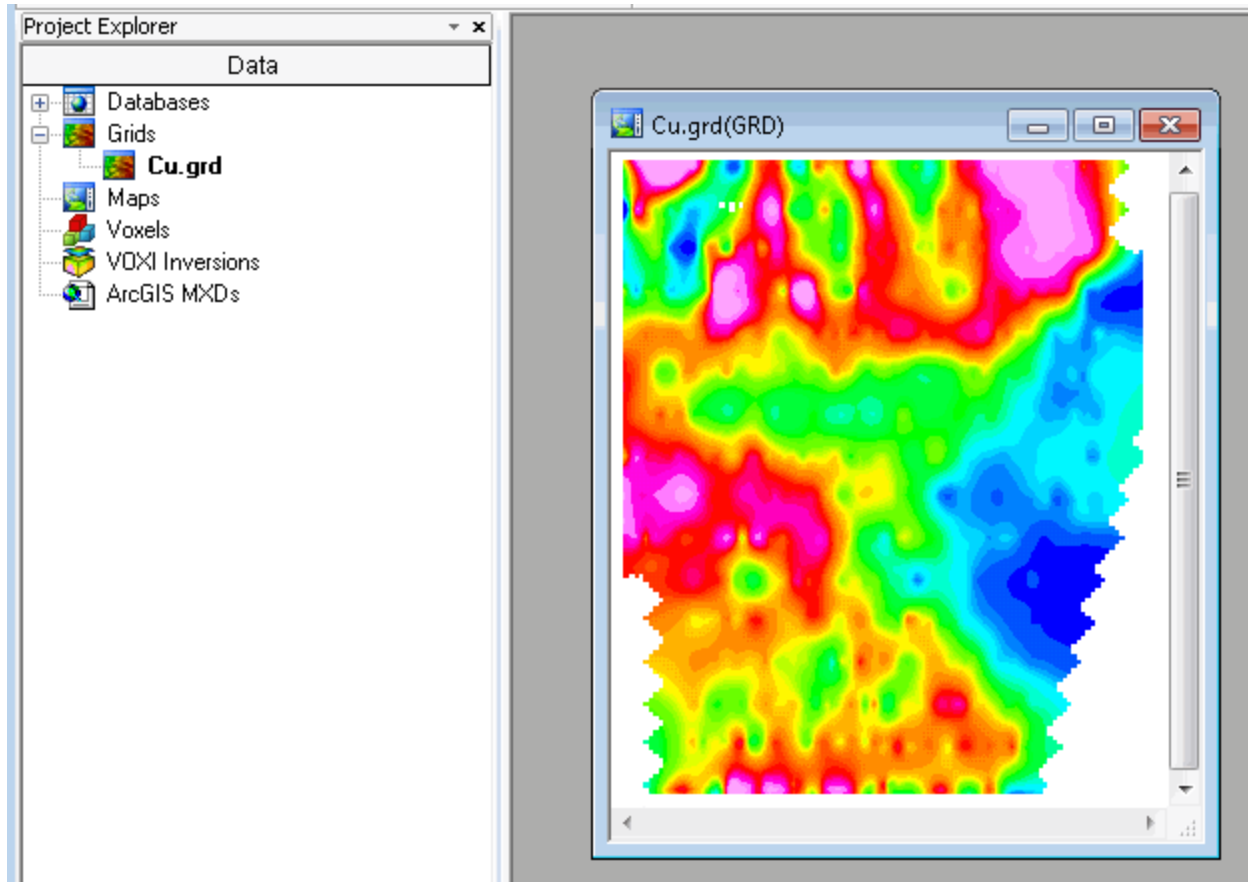
Displaying a Grid

There are a number of options for displaying grids; these include displaying single grids, colour-shaded grids, ternary image grids, two, three and four-grid composites and 3D grids. In this example, we will display a colour shaded grid.

Grids appear in the Project Explorer under "Grids". Opening a grid opens a view of the grid in its own internal "map". A grid map view is just like a real map and can accept any graphics that a map can. It can also be saved as a map, in which case the map will appear in the "Map" section of the Project Explorer.

> 💡 *When displaying grids, you must specify a colour table to use (supplied with the product). You may want to experiment with different colour tables to see how they affect your image.*

To Display a Colour-Shaded Grid on a Map:

1. Open and select your map.
2. On the *Surface Mapping* menu, select *Grid and Image Display* and then select **Colour-Shaded Grid**.

The *Colour-shaded grid image* dialog appears.
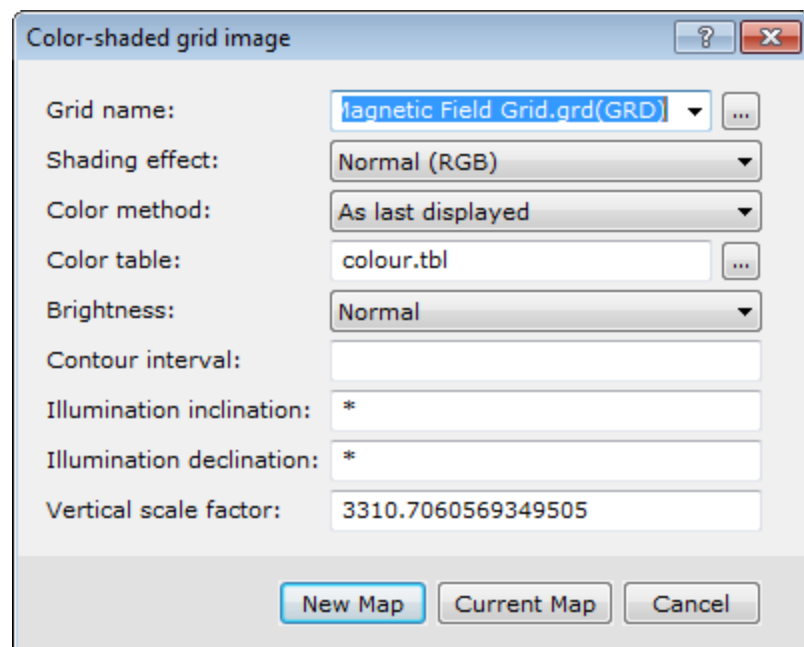
3. Select the *Grid name*.

4. Select the remaining grid display parameters and click the **Current Map** button to display the colour-shaded grid on your current map.
   Alternatively, you can select the *New map* button to display the colour-shaded grid to a new map.

Plotting Contours

Contours refer to the lines drawn at specified intervals or multiples of intervals on your map based on a gridded dataset. After you create a grid, you may want to contour your data and display these contours on your map. In Target, contouring is specially designed to handle the very large dynamic data ranges that characterize Earth Science data sets.

⚠️   *For more information on plotting contours, refer to the* ***Adding Contours to Maps*** *Help Topic.*

Target provides a Quick Contour option and a Define (or Custom) Contour option. The Quick Contour option uses intelligent default parameters and the Define (or Custom) Contour option uses user specified parameters.

In the following example we will use the Quick (automatic) method.

To Create a Quick Contour

1. Select (highlight) your *.map file in your project.

2. On the *Surface Mapping* menu, select *Contour* and then select **Quick**.
   The *Contour* dialog will appear.
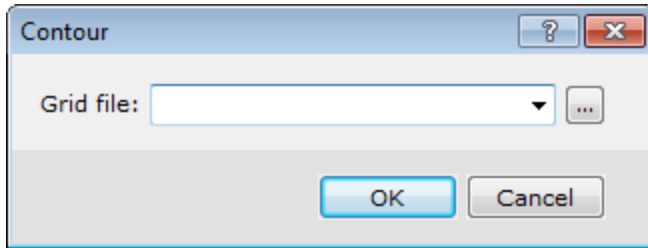
3. Use the dropdown list to select the *Grid file* you want to derive the contours from.

4. Click the **OK** button.

5. The contours are drawn on the map.
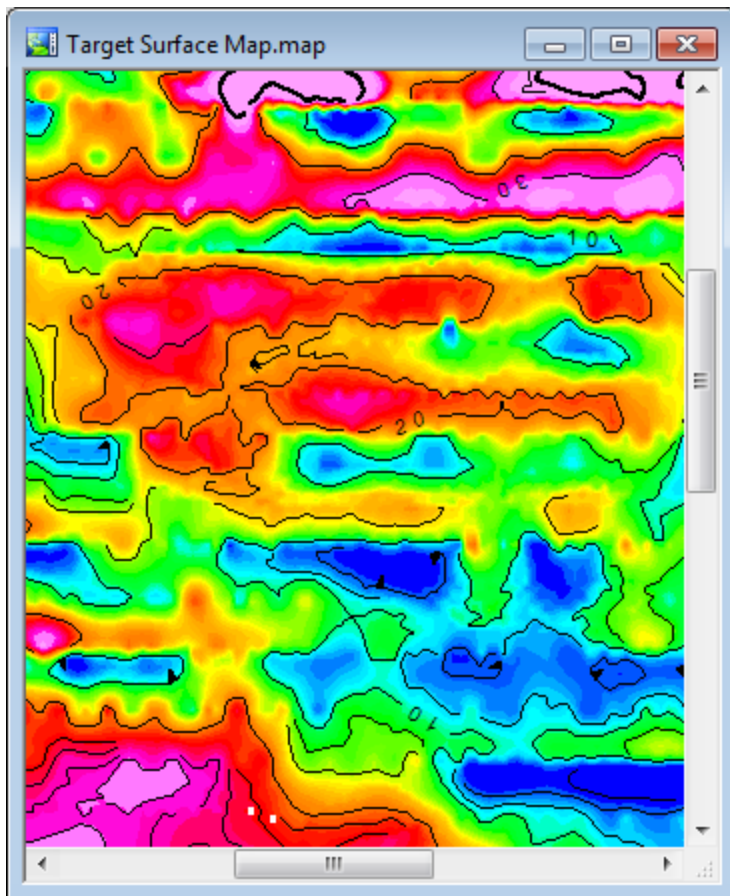
💡 *To define custom contours use the **Create a contour plot of a grid** dialog, found on the "Surface Mapping|Contour|Define Contours" menu.*

💡 *For more information click the **Help** button on your dialog of interest.*

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