



GFP_Edit

User's Guide

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s u b s u r f a c e i m a g i n g s o l u t i o n s

Sensors & Software Inc.
1040 Stacey Court
Mississauga, ON L4W 2X8 Canada

Tel: (905) 624-8909
Fax: (905) 624-9365

E-mail: sales@sensoft.ca
Website: www.sensoft.ca

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Introduction

GFP_Edit is designed to create, view, and edit GFP (GPR Files and Parameters) files.

A GFP file contains information about groups of GPR lines. Typically, these are GPR lines that are related to one another in some manner, for example, lines collected over a grid to cover an area. The GFP file contains the names of the GPR lines, information about the position and direction of the GPR lines within the grid, and any data processing to be applied to the GPR lines.

When GPR lines are organized under a GFP file, the data can be quickly read into Sensors & Software programs such as EKKO_Project, processed, and visualized.

Opening GFP_Edit

- To open GFP_Edit click Start > All Programs > Sensors & Software GPR >  GFP_Edit.

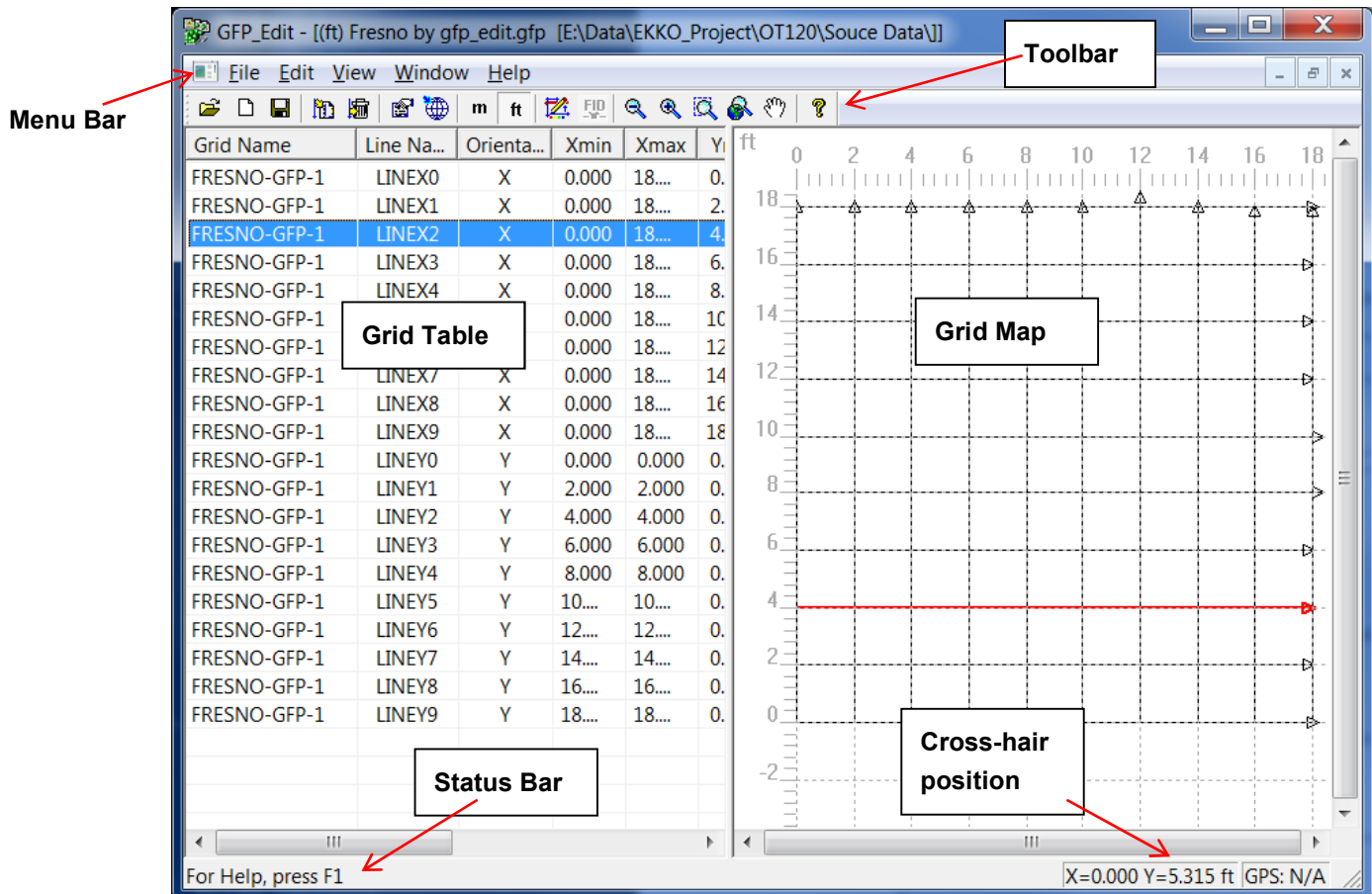


Figure 1: GFP_Edit main screen

- Use the following table as a guide to working with the GFP_Edit main screen.

Item	Description
Cross-hair Position	As you move the cursor over an area in the Grid Map, the position of the mouse cross-hair is displayed in XY coordinates and GPS (if present) at the bottom right of the screen.
Grid Table	The Grid Table displays the names, positions, and other parameters of each GPR line in the grid. To learn more see Grid Table .
Grid Map	The Grid Map displays the relative position, length, and direction of each GPR line in the grid. To learn more see Grid Map .

Item	Description
Menu	The menu bar contains links to a number of features that help you to navigate through, and work with, GFP_Edit. To learn more see Menu Bar .
Status Bar	As you move the cursor over buttons on the Toolbar, the status bar at the bottom left of the screen displays a description of the selected button.
Toolbar	Most GFP_Edit operations can be performed through the toolbar. If the Toolbar is not visible, in the Menu Bar, click View > Toolbar . To learn more see Tool Bar .

Grid Table

The Grid Table displays the names, positions, and other information about each GPR line in the grid.

Grid Name	Line Name	Orientati...	Xmin	Xmax	Ymin	Ymax	Length	Step	Edit	GPR Data	GPS
Grid #0001	XLine 0	X	0.000	9.750	0.000	0.000	9.750	0.025000	Yes	.\LINE0.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	XLine 1	X	0.000	9.725	0.500	0.500	9.725	0.025000	Yes	.\LINE1.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	XLine 2	X	0.000	9.375	1.000	1.000	9.375	0.025000	Yes	.\LINE2.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	XLine 3	X	0.000	9.375	1.500	1.500	9.375	0.025000	Yes	.\LINE3.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	XLine 4	X	0.000	11.275	2.000	2.000	11.275	0.025000	Yes	.\LINE4.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	XLine 5	X	0.000	11.275	2.500	2.500	11.275	0.025000	Yes	.\LINE5.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	XLine 6	X	0.000	10.775	3.000	3.000	10.775	0.025000	Yes	.\LINE6.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	XLine 7	X	0.000	10.725	3.500	3.500	10.725	0.025000	Yes	.\LINE7.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	XLine 8	X	0.000	10.675	4.000	4.000	10.675	0.025000	Yes	.\LINE8.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	XLine 9	X	0.000	10.450	4.500	4.500	10.450	0.025000	Yes	.\LINE9.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	XLine 10	X	0.000	9.100	5.000	5.000	9.100	0.025000	Yes	.\LINE10.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	XLine 11	X	0.000	10.675	5.500	5.500	10.675	0.025000	Yes	.\LINE11.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	XLine 12	X	0.000	10.650	6.000	6.000	10.650	0.025000	Yes	.\LINE12.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	XLine 13	X	0.000	10.750	6.500	6.500	10.750	0.025000	Yes	.\LINE13.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	XLine 14	X	0.000	10.825	7.000	7.000	10.825	0.025000	Yes	.\LINE14.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	XLine 15	X	0.000	11.000	7.500	7.500	11.000	0.025000	Yes	.\LINE15.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	XLine 16	X	0.000	11.125	8.000	8.000	11.125	0.025000	Yes	.\LINE16.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	XLine 17	X	0.000	11.200	8.500	8.500	11.200	0.025000	Yes	.\LINE17.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	XLine 18	X	0.000	11.500	9.000	9.000	11.500	0.025000	Yes	.\LINE18.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	XLine 19	X	0.000	9.475	9.500	9.500	9.475	0.025000	Yes	.\LINE19.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	XLine 20	X	0.000	11.725	10.000	10.000	11.725	0.025000	Yes	.\LINE20.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	XLine 21	X	0.000	11.950	10.500	10.500	11.950	0.025000	Yes	.\LINE21.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	XLine 22	X	0.000	9.275	11.000	11.000	9.275	0.025000	Yes	.\LINE22.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	YLine 0	Y	0.000	0.000	0.000	12.100	12.100	0.025000	Yes	.\LINEY0.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	YLine 1	Y	0.500	0.500	0.000	12.050	12.050	0.025000	Yes	.\LINEY1.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	YLine 2	Y	1.000	1.000	0.000	11.850	11.850	0.025000	Yes	.\LINEY2.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	YLine 3	Y	1.500	1.500	0.000	12.225	12.225	0.025000	Yes	.\LINEY3.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	YLine 4	Y	2.000	2.000	0.000	12.250	12.250	0.025000	Yes	.\LINEY4.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	YLine 5	Y	2.500	2.500	0.000	12.075	12.075	0.025000	Yes	.\LINEY5.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	YLine 6	Y	3.000	3.000	0.000	12.050	12.050	0.025000	Yes	.\LINEY6.dt1 (+)	<input checked="" type="checkbox"/>
Grid #0001	YLine 7	Y	3.500	3.500	0.000	12.100	12.100	0.025000	Yes	.\LINEY7.dt1 (+)	<input checked="" type="checkbox"/>

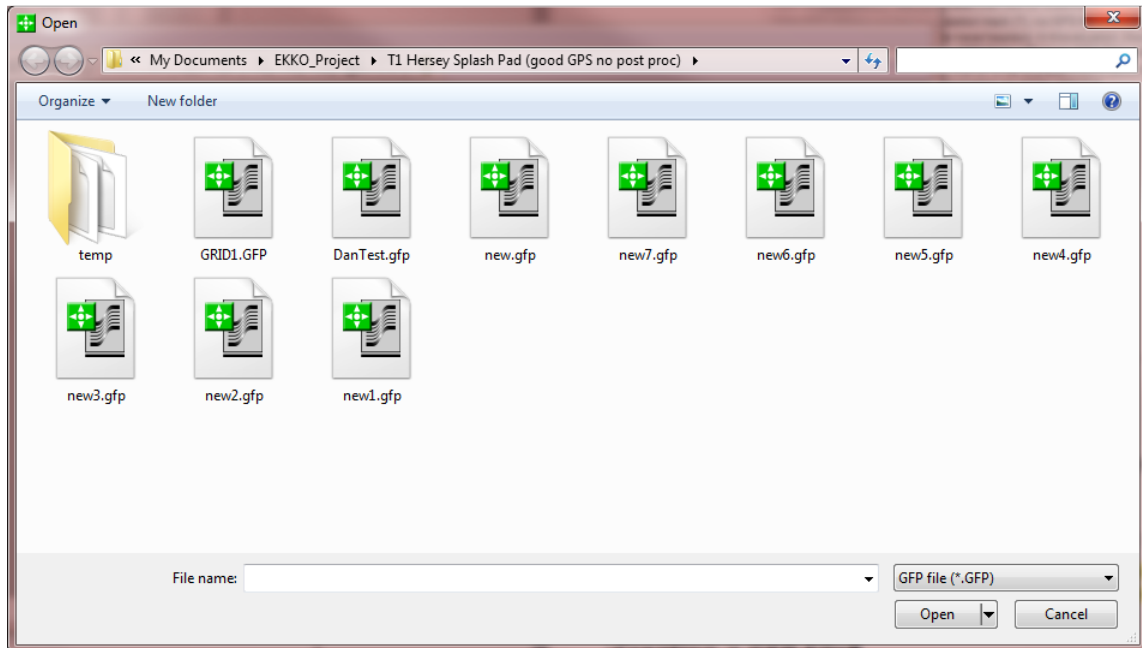
Use the following table as a guide to working with the GFP_Edit Grid Table.

Item	Description
Grid Name	Use the grid name to organize GPR lines from the same grid.
Line Name	The name of the GPR line
Orientation	The line direction, either X or Y. By convention, X lines are parallel to the X (horizontal) axis and Y lines parallel to the Y (vertical axis).

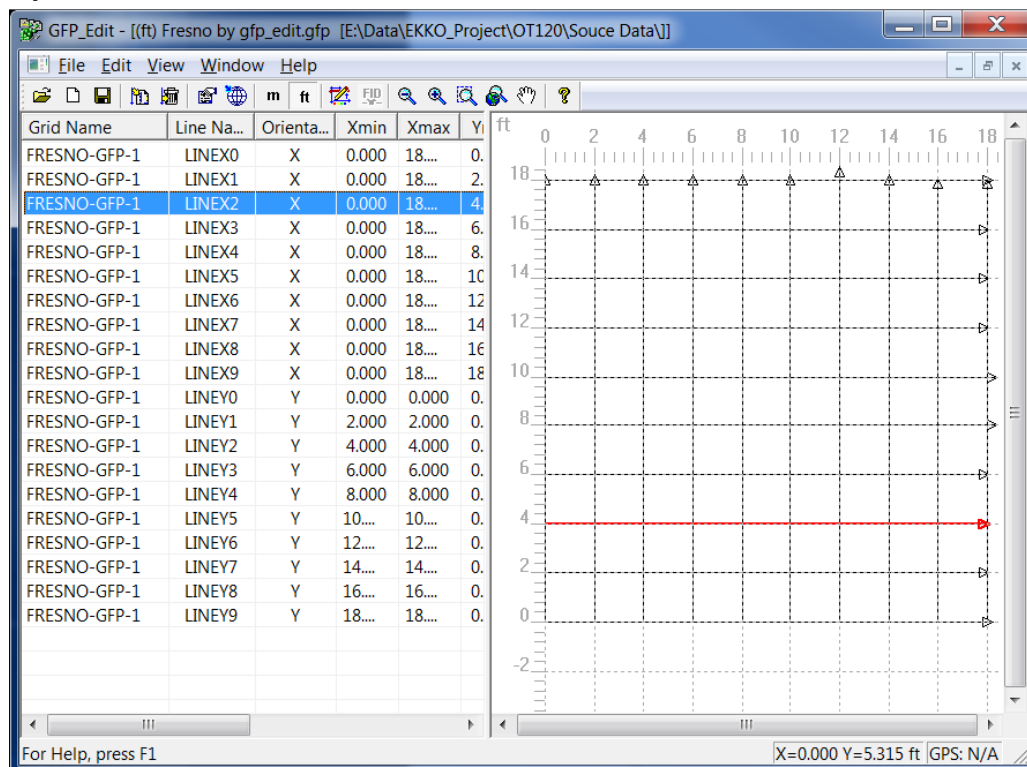
Item	Description
Xmin	The minimum X value on the GPR line
Xmax	The maximum X value on the GPR line
Ymin	The minimum Y value on the GPR line
Ymax	The maximum Y value on the GPR line
Length	The total length of the GPR line
Step	<p>The step size between traces on the GPR line</p> <p>The Step value can be negative if the PR line was collected in reverse starting at a positive value and then stepping in a negative direction toward the zero position. This is common when grid data are collected with a forward/reverse survey format.</p>
Edit	<p>The Edit column indicates whether the GPR line has been edited from the original data file while being imported into the GFP file.</p> <p>The options are: No, Yes and RLD (Reverse Line Direction).</p> <p>RLD means that the only editing done to the original GPR line was to reverse its direction (Reverse Line Direction).</p> <p>Yes means that more substantial editing was done to the data.</p>
GPR Data	<p>The path and file name of the GPR (DT1) line.</p> <p>When the DT1 name is followed by a plus (+) sign, it indicates that other files associated with the DT1 file have been added to the GFP file; for example, a GPS file.</p>
GPS	<p>If the GPS field is a check-mark, the GPS file associated with the GPR line is used to compute the Local-Global Coordinates Relationship calculation to add GPS to the GFP file.</p> <p>If the GPS field is not checked, the GPS file associated with the GPR data is not used in the calculation to add GPS to the GFP file. Click Edit > GPS Data > Error! Reference source not found. to remove one or more GPS files from the GFP file.</p> <p>If the GPS field is blank, no GPS files were found for the GPR lines.</p> <p>If the GPS column contains a zero (0), a GPS file is present but does not contain valid GPS data, either no data or less than two GPS points.</p> <p>If the GPS column contains a question mark (?), no GPS file is present but there is GPS information in the DT1 file trace headers. In this situation, the GPS files can be recovered by clicking Edit > GPS Data > Error! Reference source not found.</p> <p>If the GPS column contains an X, the GPS file is present but it could not be opened. For example, another application could be using it.</p>

Opening a GFP File

1. To open a GFP file, in GFP_Edit, click **File > Open**.



2. In the **Open** dialog box, select a .gfp file.
3. Click **Open**.



If GPS files were collected during data collection and added to the GFP file ([Add GPS](#)), the raw GPS lines can also be displayed in the Grid Map ([Figure 2](#)).

The color of the GPR (and GPS) Lines is selected in the **View > Line Settings** menu option.

Selecting one or more GPR lines files in the Grid Table will highlight the row(s) and the corresponding line(s) will change color on the [Grid Map](#) ([Figure 2](#)).

Creating a GFP File

1. To create a GFP file, in the GFP_Edit menu bar, click **File > Create New GFP for Grid Lines**.
2. In the **Please select new GFP file name and location** dialog box, select a location for the new file.
3. In the **File name** field, enter the new GFP file name.
4. Click **Save**.
 - To import GPR lines into the GFP file, click **Edit > Import Line(s)**.
If the GPR lines were collected with GPS, the Import Lines option allows you to add GPS to the GFP file.
You can also add GPS data manually (to learn more, see [Add GPS Manually](#)).
 - To delete GPR lines from the GFP file, click **Edit > Delete Line(s)**.
 - To edit a GFP file, click **Edit > Edit GFP File**.

Grid Map

Selecting Lines

- To highlight GPR lines in the Grid Map, on the Grid Table, click the line you want to highlight.
- To display consecutive multiple GPR lines, click the first line you want to display, press **Shift** and then click the range of lines.
- To display multiple lines that are not consecutive, click the first line you want to display, press **Ctrl** and then click the other lines you want to show in the Grid Map.
- To select GPR Lines on the Grid Map, click the GPR line or click and drag a box across several lines. Any GPR line that intersects the box will be selected - the line color changes on the Grid Map and the name is highlighted in the Grid Table.

- If the selected line(s) do not appear in the Grid Map they may be turned off. To enable or change the color of displayed lines, in the menu bar, click **View > Line Settings**. To learn more, see [Line Settings](#).

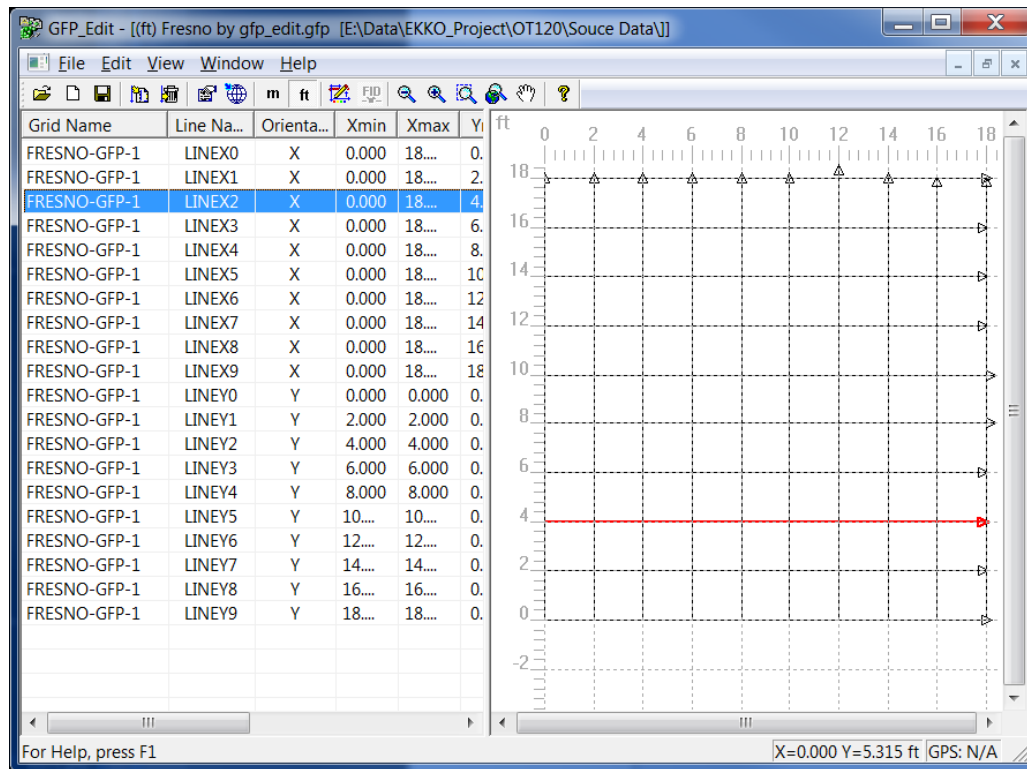


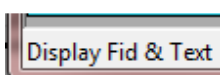
Figure 2: Grid Table and Grid Map displaying selected lines.

Toolbar












Most GFP_Edit operations can be performed using the toolbar. If the Toolbar is not visible, in the menu bar, click **View > Toolbar**.









To display a brief description of a toolbar button, hold your cursor over the button for at least one second. The description will appear in the Status Bar on the bottom left of the GFP_Edit main screen:



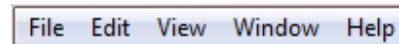
Use the following table as a guide to working with the GFP_Edit toolbar.

Item	Description
 Open	Open an existing GFP file. To learn more, see Opening a GFP file .
 New	Create a GFP file. To learn more, see Creating a GFP File .
 Save	Save the active GFP file. To learn more, see Save GFP .
 Import	Import Lines into GFP. To learn more, see Import Lines .
 Delete	Delete the selected line(s) from the GFP file.
 Edit	Edit the selected line. To learn more, see Edit GFP File .
 Define Relationship	Define local (XY)—Global (GPS) coordinate relationship. To learn more, see Local-Global Coordinates Relationship .
 meters	Display in meters
 feet	Display in feet
 Edit Display	Edit GRP and GPS lines display
 Display FID & Text	Display FID & Text. To learn more, see Display Fiducials .

Item	Description
 Zoom Out	Display more of the image. To learn more, see Zoom .
 Zoom In	Magnify the image. To learn more, see Zoom .
 Select Zoom Area	Select area to zoom in on. To learn more, see Zoom .
 Zoom Active Window	Zoom active window to fit all data. To learn more, see Zoom .
 Pan View	Pan the view area (drag and drop).
 Help	Display the GFP_Edit User's Guide.

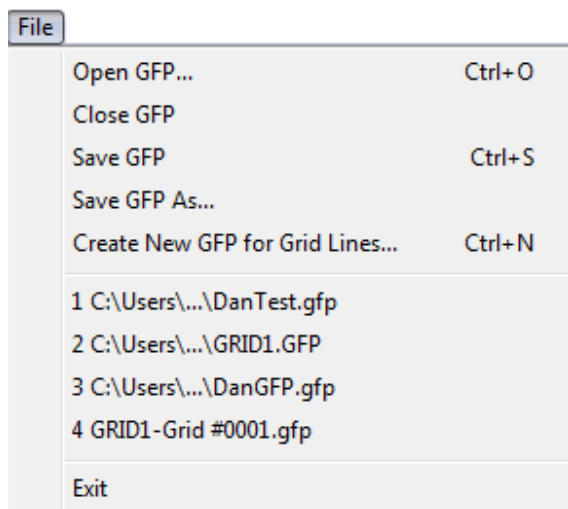
Menu Bar

The GFP_Edit menu bar contains links to a number of features that help you to navigate through, and work with GFP_Edit.



The following sections describe the GFP_Edit menu bar features.

File



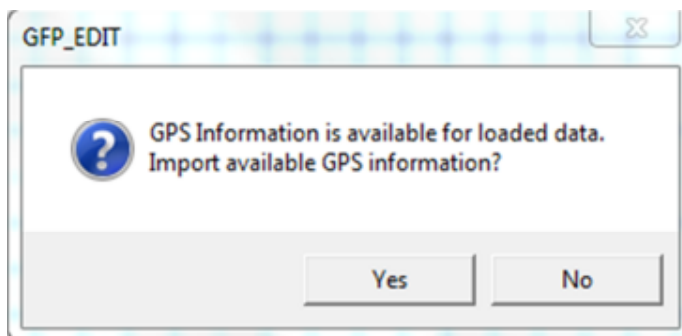
Open GFP

1. To open an existing project (.gfp) click **File > Open**.
2. In the **Open** dialog, navigate to and then select the .gfp you want to open.
3. Click **Open**.

To learn more, see [Opening a GFP file](#).

Automatically Add GPS

When a GFP file is opened, if GFP_Edit detects GPS files in the GPR line folder that have not been added, the program automatically prompts you to add the GPS files to the GFP file.



1. If GPS files are not automatically added:
2. In the [Grid Table](#), select one or more GPR lines.
3. Click **Edit > GPS Data > Add GPS**.

If GPR data were not collected with GPS you can still add GPS to the GFP file by defining the relationship between the Local XY grid and the Global coordinates (to learn more, see [Manually Entering Global Coordinates](#)).

Close GFP

1. To close the current GFP file, click **File > Close**.
2. In the message box, to close the project and save your changes, click **Yes**.
 - i. In the **Save As** dialog box, navigate to the folder you want to save the project to.
 - ii. Click **Save**.
- To close the project without saving your changes, click **No**.
- To close the message box and return to working with the GFP file, click **Cancel**.

Save GFP

To save the current GFP file, click **File > Save**.

Your work is automatically saved to the previously defined folder.

Save GFP As

1. To save the GFP current project to a different folder and/or name, click **File > Save As**.
2. In the **Save As** dialog box, navigate to the folder that you want to the project to.

To save the project with a different file name, in the **File Name** field enter the new project name.
3. Click **Save**.

Create New GFP for Grid Lines

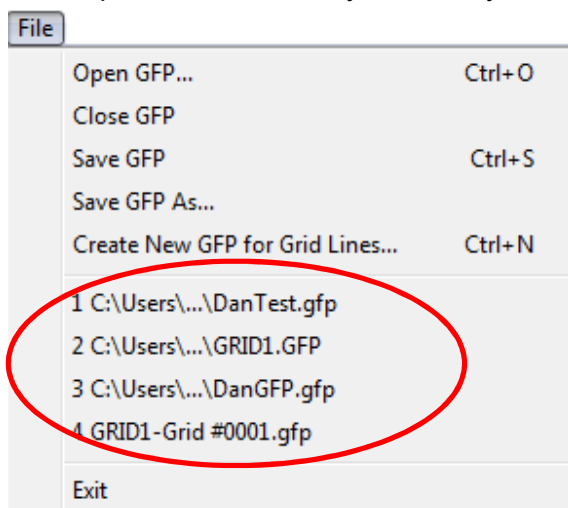
Not all GPR grid surveys have an associated GFP file. Earlier grid data acquisition software on a PC or the DVL (Digital Video Logger) did not automatically generate a GFP file when a grid was collected. To use software that requires GFP files for input, such as EKKO_Project, you need to create a GFP file for the grid survey.

1. To create a GFP file, in the GFP_Edit menu bar, click **File > Create New GFP for Grid Lines**.
2. In the **Please select new GFP file name and location** dialog box select a location for the new file.
3. In the **File name** field, enter the new file name.
4. Click **Save**.

To learn more, see [Creating a GFP File](#).

Recent Files

1. To re-open a GFP file that you recently worked with, click **File**.



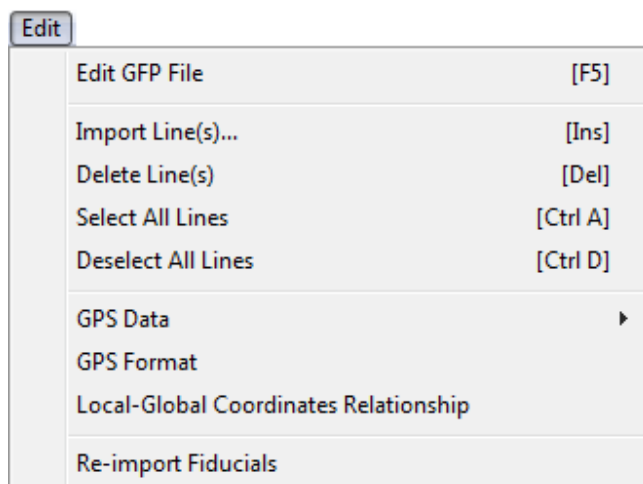
2. In the drop-down list, click one of the GFP files listed in the recent files area.

Exit

To close all windows associated with the current GFP_Edit session and exit the application, click **File > Exit**.

Edit

To open the Edit menu, in the [menu bar](#) click **Edit**.



Use the following table as a guide to working with the Edit menu.

Item	Description
Edit GFP File	<p>Edit GFP File is enabled when one or more GPR lines have been highlighted on the Grid Table or the Grid Map Selecting Lines.</p> <p>Use this feature to reposition or reorient lines within the grid.</p> <p>To reposition or reorient lines within the grid, in the menu bar, click Edit > Edit GFP File.</p> <p>To learn more, see Edit GFP File.</p>
Import Line(s)	<p>Click Import Lines to add GPR lines to a new or existing GFP file.</p> <p>You can also use this option to combine multiple grids to cover a larger area.</p> <p>To learn more, see Import Line(s).</p>
Delete Line(s)	<p>After GPR lines have been imported into a GFP file and one or more GPR lines have been highlighted on the Grid Table or the Grid Map, the Delete Line(s) option becomes available.</p> <ol style="list-style-type: none"> To remove GPR lines from the GFP file, in GFP_Edit select the line(s) you want to delete. In the menu bar, click Edit > Delete Line(s). <p>Note: no warning message will appear before the lines are deleted</p>
Select All Lines	To select all the lines in a Grid Table, in the menu bar click Edit > Select All Lines .
Deselect All Lines	To deselect all selected lines in the Grid Table, in the menu bar click Edit > Deselect All Lines .
GPS Data	<p>Use the GPS Data menu to add GPS data into the GFP file. You can also remove GPS data from the GFP file and export GPS positions from the trace headers for use with other software.</p> <p>To learn more, see GPS Data.</p>
GPS Format	Click GPS Format to modify the GPS format displayed in the status bar: Latitude/Longitude in Degrees Minutes Seconds or Decimal Degrees alongside UTM coordinates.
Local-Global Coordinates Relationship	Use this feature to define the relationship between local grid coordinates and a global coordinate system such as GPS.
Re-import Fiducials	Click Re-import Fiducials to read fiducials from the trace headers into the GFP file. This can be useful if the fiducials were not read when the GPR lines were imported.

Edit GFP File

Edit GFP File is enabled when one or more GPR lines have been highlighted on the Grid Table or the Grid Map Selecting Lines). Use this feature to reposition or reorient lines within the grid.

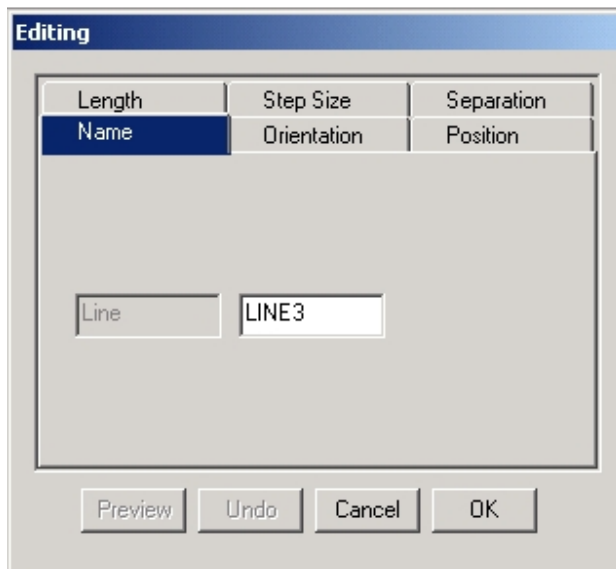
To edit a GFP file, in the menu bar, click **Edit > Edit GFP File**.

The **Editing** dialog box opens.

Editing—Name

- Click the **Name** tab to edit the lines name.

2. In the **Editing** dialog box **Name** tab, change the file name.



This option is not available when more than one file is selected.

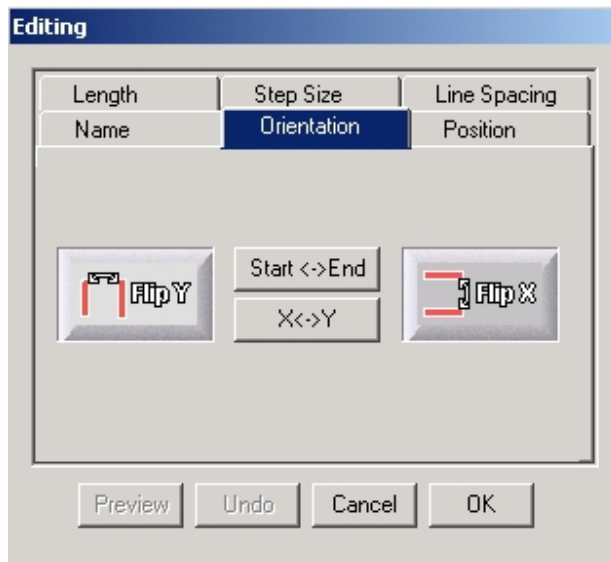
3. Click **OK**.
 - Press **Cancel** to exit without making the change.
 - Press **Undo** to revert back to the original name.

Clicking Undo will undo the last operation performed, even if you are on a different tab.
 - Press **Preview** to see how the name change affects the Grid Table.

Clicking a different tab implements the change; changes can be undone by clicking Undo.

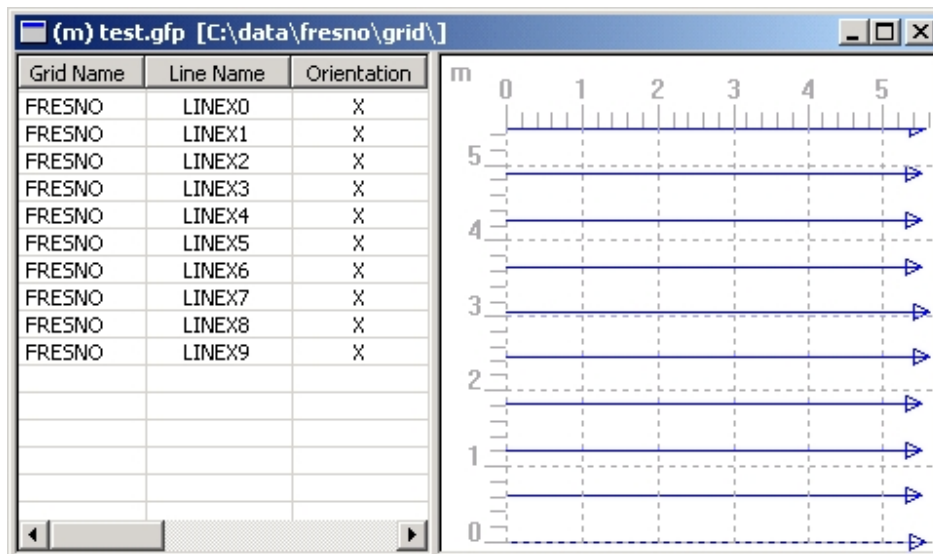
Editing Orientation

Click the **Orientation** tab to change the orientation of the selected line(s).

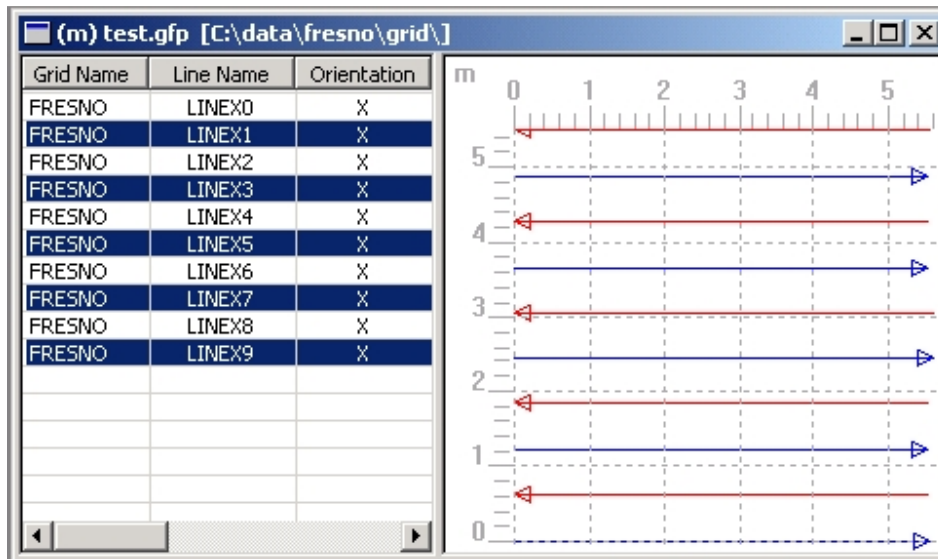


Start <-> End

Click **Start<->End** to reverse the direction of the selected line

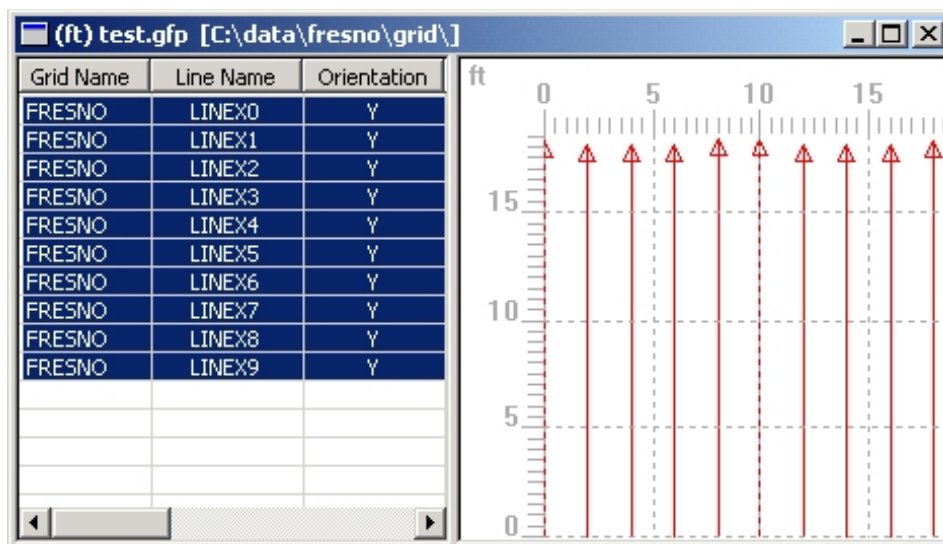
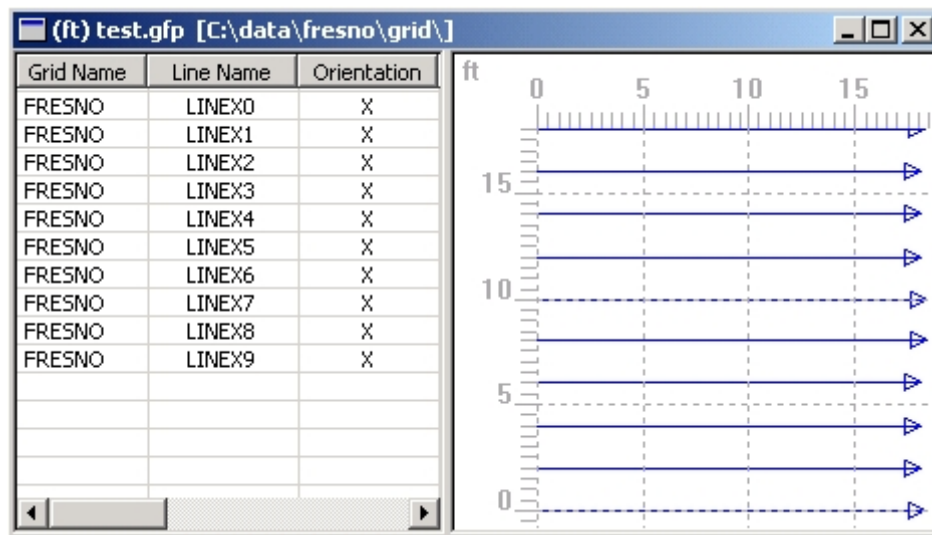


This option performs the same function as the Reverse Line Direction option when importing lines.



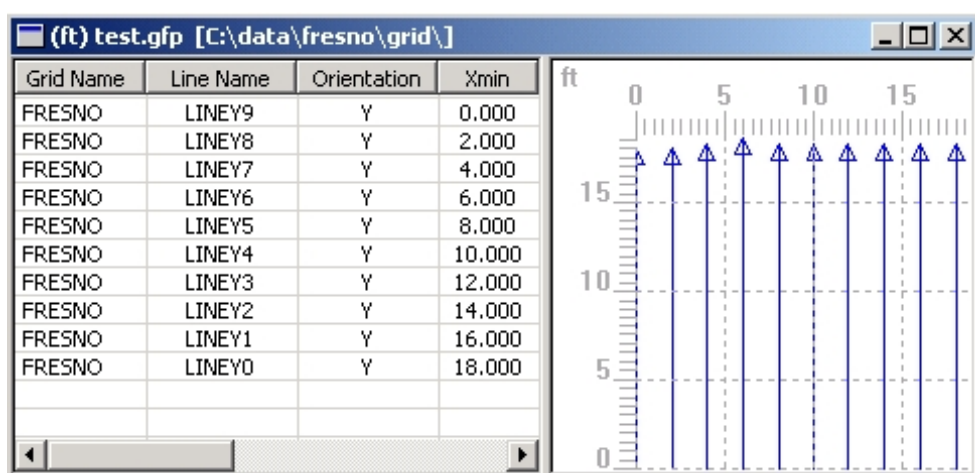
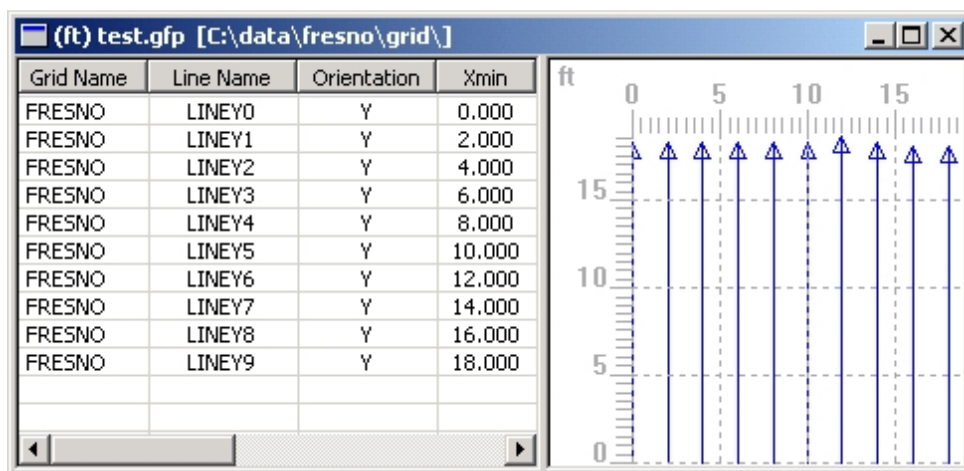
X <-> Y

Click **X<->Y** to change the lines from X lines to Y lines or Y lines to X lines.



Flip Y

Click **Flip Y** to reverse the order of the Y lines. For example, if Y lines are numbered 0 to 9 from left to right, clicking Flip Y changes the order to 9 to 0 from left to right.



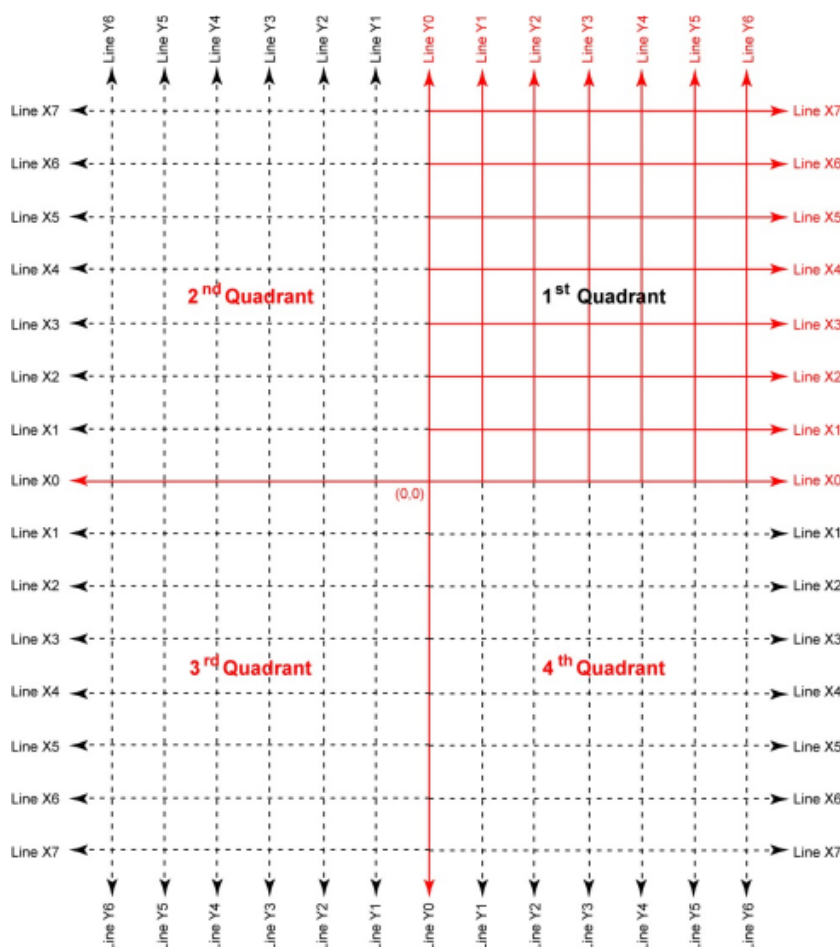
Flip X



Click **Flip X** to reverse the order of the X lines. For example, if X lines are numbered 0 to 9 from bottom to top, clicking Flip X change the order to 9 to 0 from bottom to top.

Flip X and Flip Y are most commonly used to re-orient lines collected in a different quadrant than the first quadrant. Two-dimensional plan map software like SliceView and 3D software expect data from the first quadrant.

The following image shows grid data are expected to be collected in the first quadrant with the origin (X=0, Y=0) in the bottom left corner and X line names incrementing up and Y lines incrementing to the right. If data were collected in a different quadrant, use Flip X and Flip Y to edit the line positions so the grid data displays properly.



Editing - Position

1. Click the **Position** tab to move the selected line(s) to a new position within the grid.

Editing

Length Step Size Line Spacing

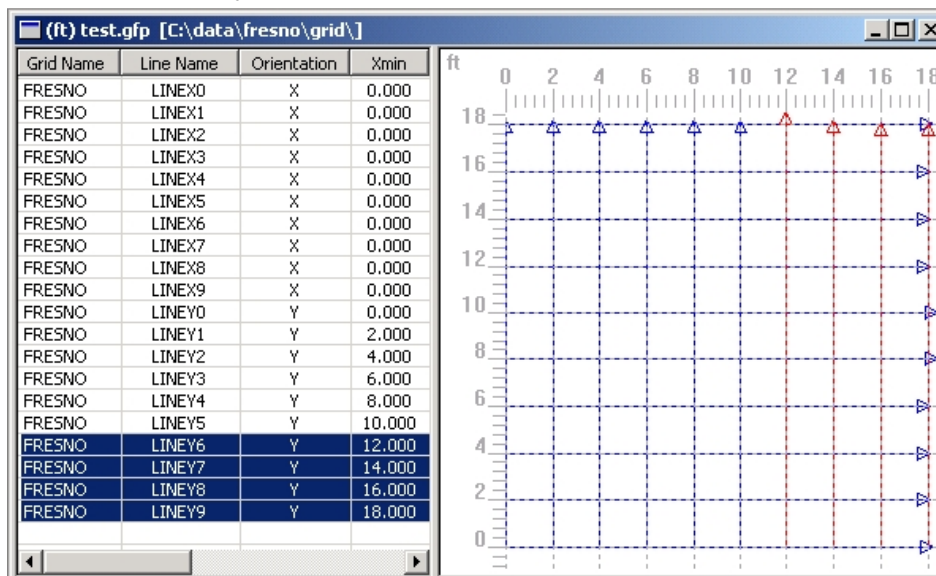
Name Orientation **Position**

Xmin: 12.000 Ymax: 18.560 Xmax: 18.000

Ymin: 0.000

Preview Undo Cancel OK

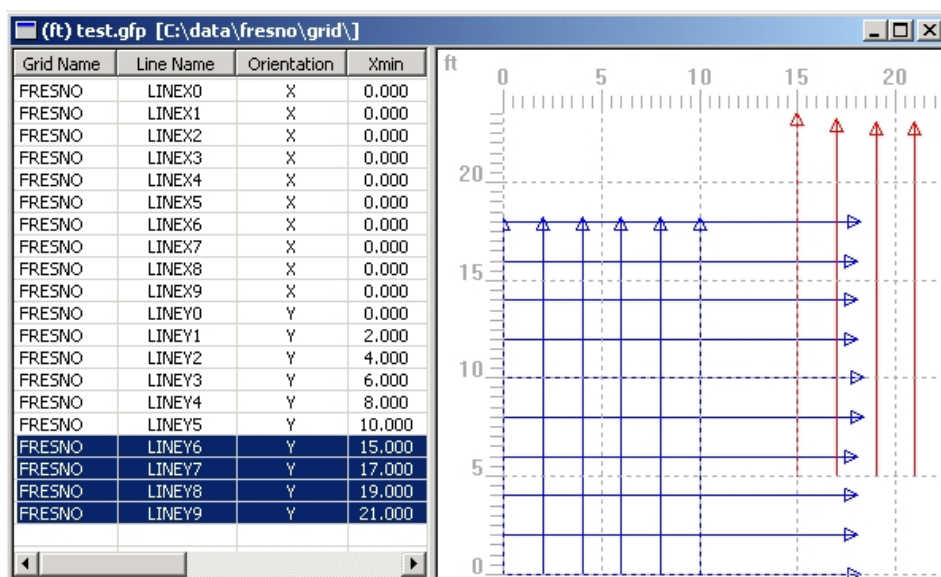
2. Click **OK** to displays the selected lines Minimum X (XMin) and Minimum Y (YMin) positions.



To edit the position of lines in the grid

1. Change the **XMin** and/or **YMin** values.
Lines are moved as a group to a new position.

- Click **OK**.



- Click Cancel to exit without making the changes.
- Click Undo to revert to the original positions.
- Click Preview to display the effect in the Grid Table and Grid Map.

Editing - Length

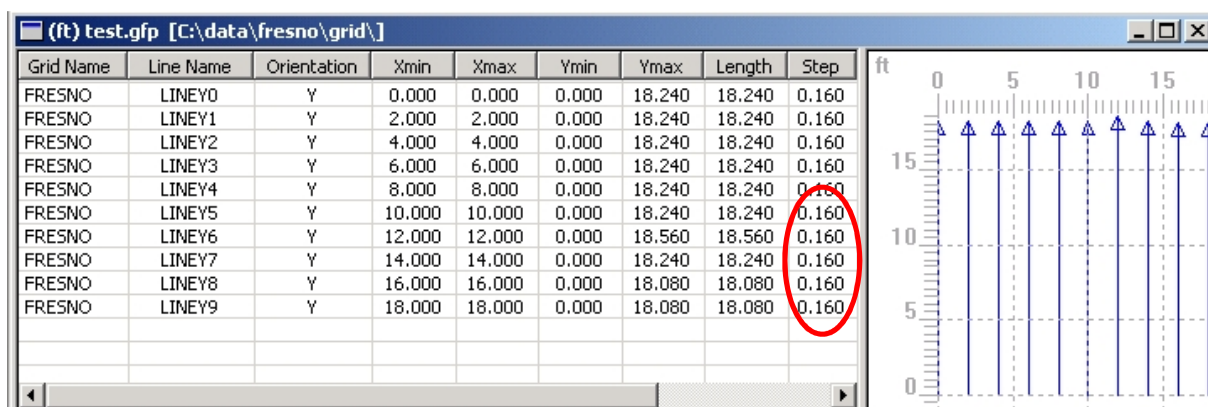
- Click the **Length** tab to change the length of the selected line(s).

The screenshot shows the 'Editing' dialog box. It has a tabbed interface with 'Name', 'Orientation', 'Position', and 'Length' tabs. The 'Length' tab is selected, showing a 'Step Size' field with the value '18.560'. Below the field are buttons for 'Preview', 'Undo', 'Cancel', and 'OK'.

- Click **OK** to displays the length of the selected line.

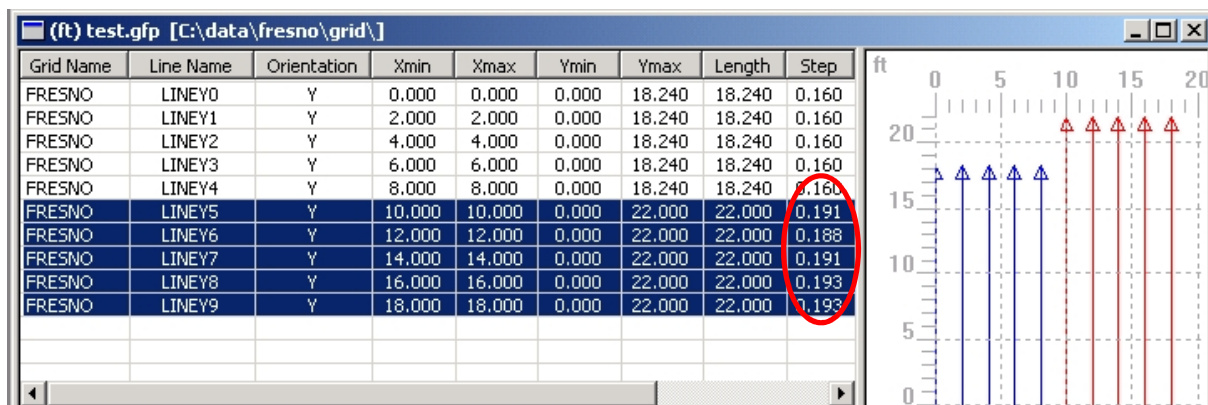
If more than one line is selected, the length of the longest line is displayed. The line length is changed by recalculating the Step Size (the distance between traces). No traces are added to or deleted from the data file; only the position of each trace changes.

In the following example, lines Y5 to Y9 were lengthened to 22 feet by changing the step size.



The selected lines are set to the same length. To change the length of lines but keep their step size and relative lengths consistent, use the Step Size routine.

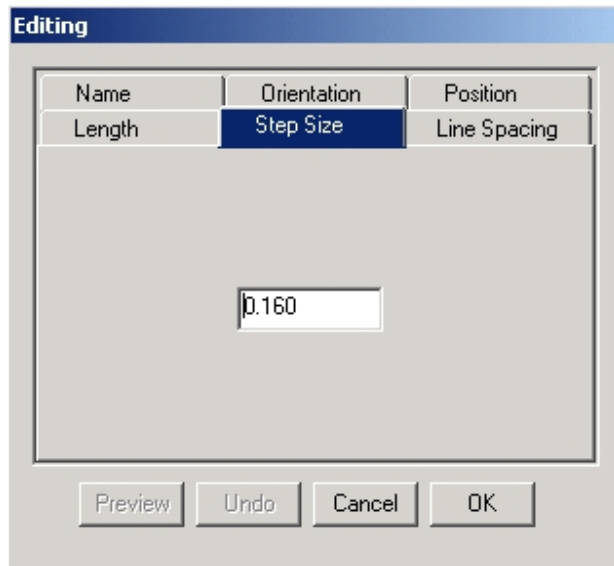
3. Click **OK**,



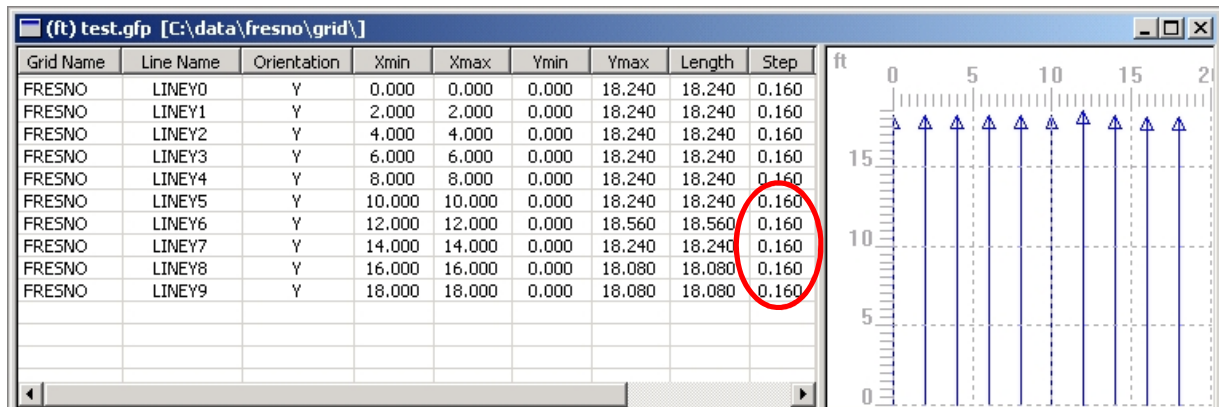
- Click **Cancel** to exit without making the changes.
- Click **Undo** to revert to the original positions.
- Click **Preview** to display the effect in the Grid Table and Grid Map.

Editing – Step Size

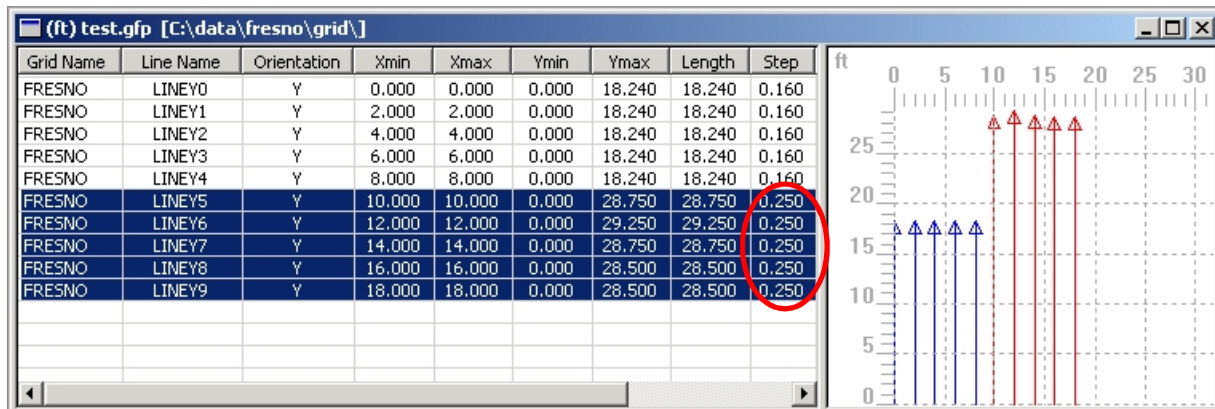
- Click the **Step Size** tab to change the distance between traces on the selected line(s).
The Editing – Step Size displays the current step size. If more than one line is selected, the largest step size is displayed. Changing the step size affects the length of the line.



- Click **OK** to display the Step Size.



In the following example, the step size for lines Y5 to Y9 was changed from 0.16 to 0.25 feet. This change lengthened the lines.



3. After changing the step size, click **OK**.
 - Click Cancel to exit without making the changes.
 - Click Undo to revert to the original positions.
 - Click Preview to display the effect in the Grid Table and Grid Map.

Editing – Line Spacing

Click the **Line Spacing** tab to change the distance between the selected lines.

Clicking the Editing – Line Spacing tab displays the current line. If multiple lines are selected and the line spacing varies, the average spacing is displayed.

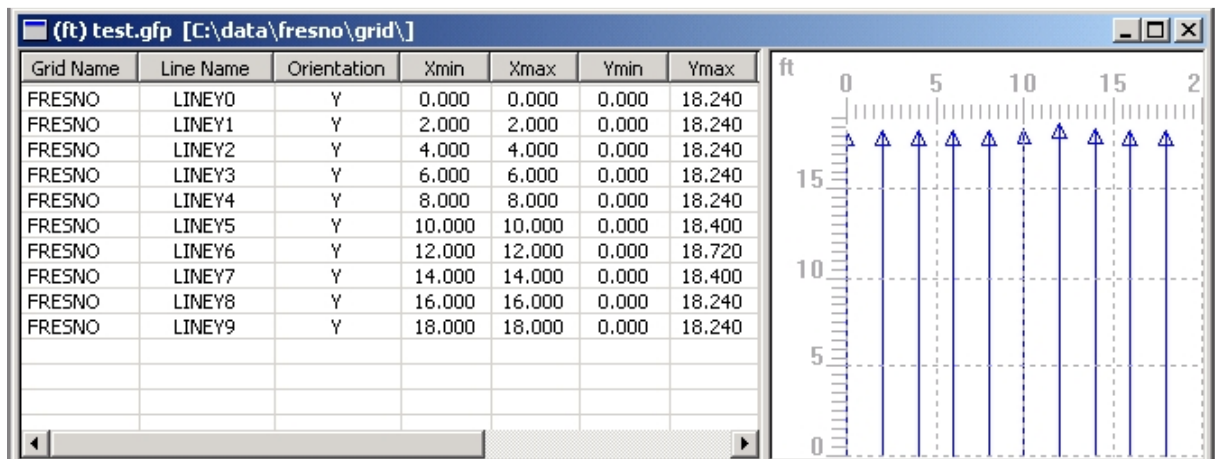
Editing

Name	Orientation	Position
Length	Step Size	Line Spacing

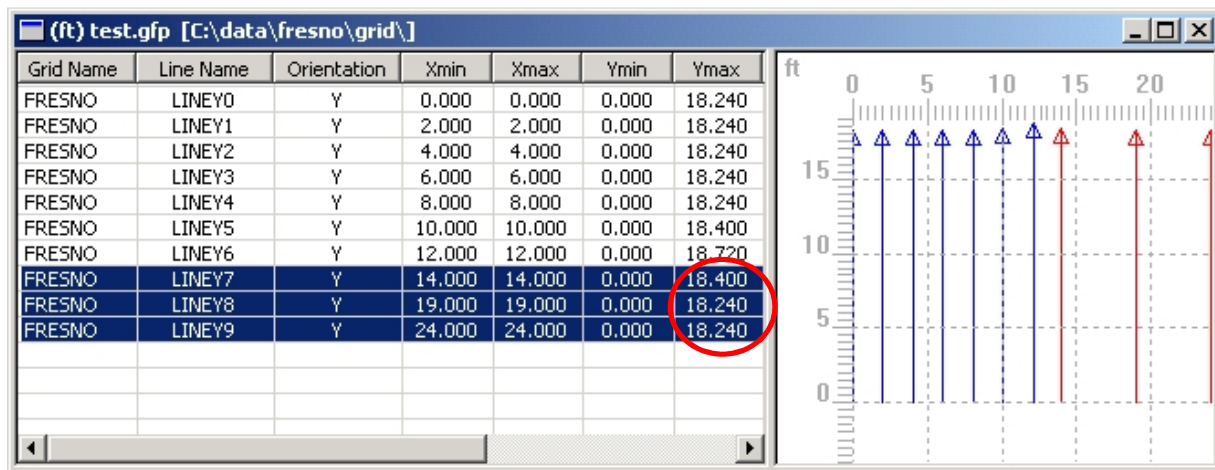
2.000000

Preview Undo Cancel OK

In the following example, the spacing between lines Y7 to Y9 was changed from 2 to 5 feet.



After changing the line spacing, click **OK**.

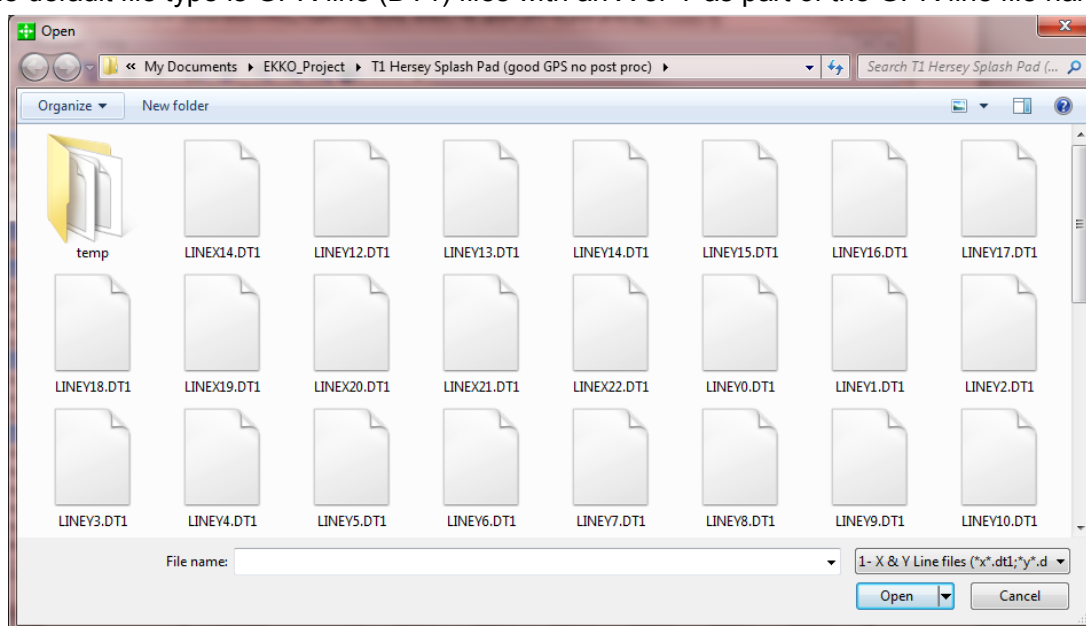


- Click Cancel to exit without making the changes.
- Click Undo to revert to the original positions.
- Click Preview to display the effect in the Grid Table and Grid Map.

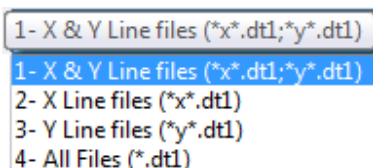
Import Line(s)

GFP_Edit allows you to create or edit a GFP file to group GPR lines collected by different systems with different hardware settings.

1. In GFP_Edit, select the GPR line(s) to be imported.
GPR lines must be in the same folder as the GFP file or in a sub-folder.
2. Click **Edit > Import Line(s)**.
3. In the **Open** dialog box, select a DT1 file.
The default file type is GPR line (DT1) files with an X or Y as part of the GPR line file name.



4. To change the DT1 file to X & Y Line files, X Line Files, Y Line Files, or All Files click the option from the drop-down list.



5. Click **Open**.

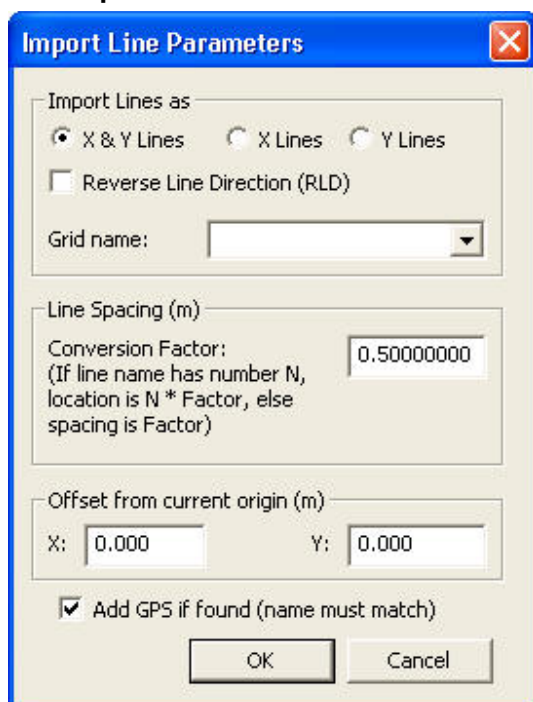
Grids of GPR lines collected using Sensors & Software GPR systems automatically embed an X or a Y into the line name to indicate the line direction, for example, LINEX0, LINEX1, LINEX2, etc.

- If the grid GPR lines being imported are in both the X and Y direction, use the **X and Y Line Files** file type.
- If the grid GPR lines being imported are in the X direction only, use the **X Line Files** file type.
- If the grid GPR lines being imported are in the Y direction only, use the **Y Line Files** file type.

- If the grid GPR lines were collected as a Noggin Line or a Conquest Line Scan or with an older pulseEKKO system on a PC, the names may have no indication of the line direction. In this case, to import the lines into the GFP file, use the All Files file type.

Importing a Grid of GPR lines

1. To import multiple GPR lines, press **Shift** or **Ctrl** to select the lines you want to import.
2. Click **Open**.



3. Use the following table as a guide to working with the **Import Line Parameters** dialog box.

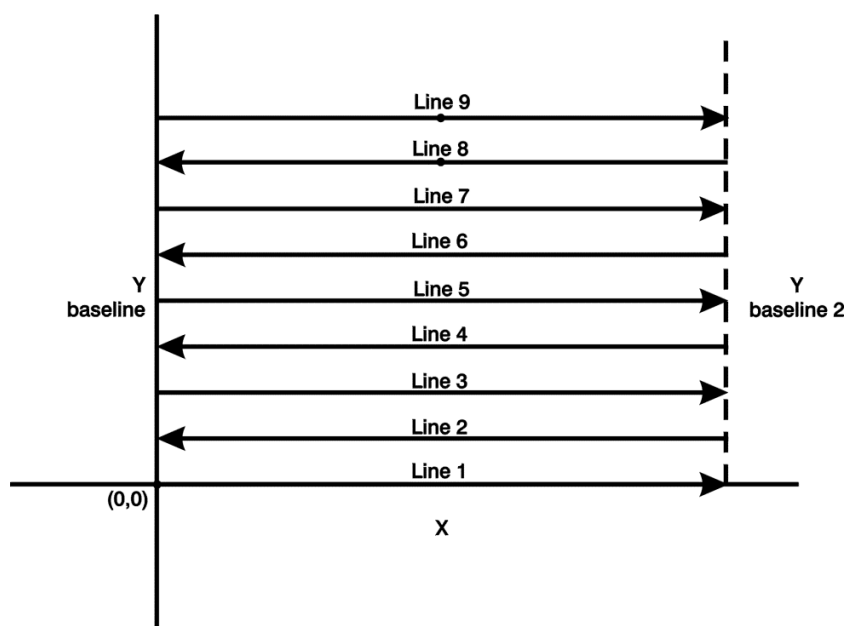
Item	Description
Import Lines as	This option defaults to the file type selected in the Import Line(s) dialog. Select one of the X & Y Lines , X lines , or Y Lines options to change the file type.
Reverse Line Direction	Select the Reverse Line Direction check box to reverse the line direction. To learn more, see Reverse Line Direction .
Grid name	From the drop-down list, click a Grid name . All the data files imported into a GFP file under one Grid Name are associated and are processed, displayed, and analyzed together in software, such as EKKO_Project, that opens GFP files. GFP files can contain information for more than one set of data (to learn more, see Importing Multiple Grids).

Item	Description
Line Spacing Conversion Factor	Use Line Spacing Conversion Factor tries to import GPR lines to their correct positions in the grid by using the number part of the GPR line name as a multiplication factor. To learn more, see Line Spacing Conversion Factor .
Offset from Current Origin	Set the X and Y offset values to move the imported GPR lines away from the absolute origin at X position = 0 and Y position = 0. To learn more, see Offset from Current Origin .
Add GPS if Found	If GPS files were created during data collection, select the Add GPS if found check box to add GPS to the GFP file when the lines are imported. The GPS files must reside in the same folder as the GPR lines and must have the same name as the GPR line but with a .GPS extension.

4. Click **OK**.

Reverse Line Direction

Use this option only when pulseEKKO grid data were collected in a zigzag (Forward/Reverse pattern), but the start position and step size direction were not updated for every file. For example, a grid was collected in the following way but the start of every line was set to zero no matter which direction it was actually collected in.



Collecting data in this manner results in every second line being reversed compared to its adjacent lines. Viewing the grid lines in a plan or 3D view displays the reversed lines in incorrect spatial positions resulting in erroneous and un-interpretable data views.

To remedy this situation, Import every second GPR line in the reverse line direction so all GPR lines are running in the same direction.

1. Import GPR lines in two groups:
 - i. Import standard lines with the Reverse Line Direction option un-checked.
 - ii. Import reversed lines with the Reverse Line Direction option checked.
2. To verify the lines were imported correctly, check that the line directions on the Grid Map match the directions of the grid survey.

Note: Do not use Reverse Line Direction when data were collected with a Noggin system in Grid mode with the Survey Format set to Forward/Reverse because the data acquisition software automatically sets the Start Position to ensure the position of every line is correct.

Line Spacing Conversion Factor

Line Spacing Conversion Factor tries to import GPR lines to their correct positions in the grid by using the number part of the GPR line name as a multiplication factor.

Example, when importing X GPR lines, LINEX0, LINEX1, LINEX2 with a line spacing of 2 feet, set the Conversion Factor to 2 feet. Y positions of the GPR lines will be calculated in the following manner:

LINEX0: $0 \times 2 \text{ feet} = 0 \text{ feet}$

LINEX1: $1 \times 2 \text{ feet} = 2 \text{ feet}$

LINEX2: $2 \times 2 \text{ feet} = 4 \text{ feet}$

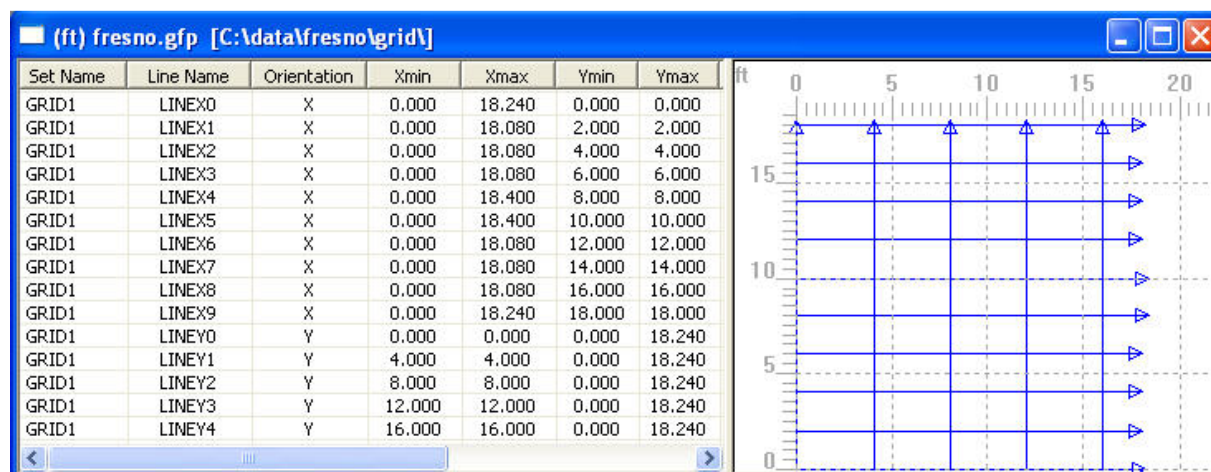
The following image displays how the Line Spacing Conversion Factor is used to quickly import and position GPR lines with incrementing numbers in of the GPR line name.



This assumes an origin of X=0 and Y=0. If X and Y are offset from the origin, this offset will be added to the final position values (see [Offset from Current Origin](#)).

Importing Conquest Lines: When importing Conquest lines into a GFP file it is important to remember that Conquest line names contain have numbers that indicate the line spacing in centimeters, i.e. XL0000, XL0005, XL0010 etc. To determine the correct the line spacing for each GPR line, set the Line Spacing Conversion Factor to 0.01 m or 0.0328 feet.

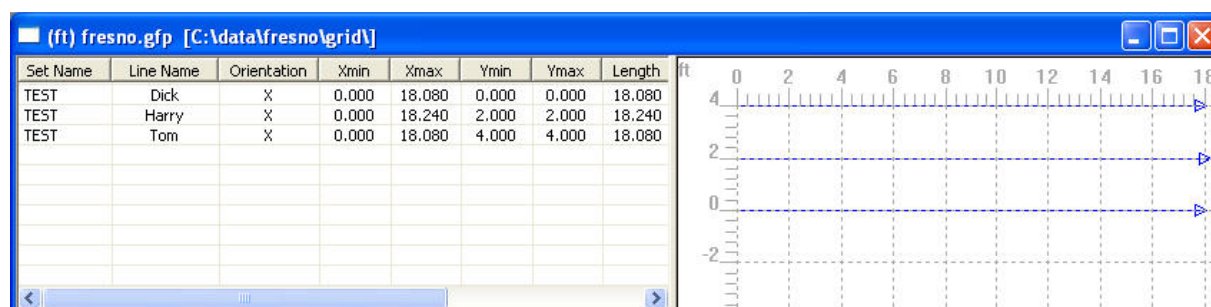
Different Line Spacing: If GPR lines in the X direction have different line spacing than GPR lines in the Y direction, import the X lines first with one Line Spacing Conversion Factor and the Y lines second with a different Line Spacing Conversion Factor.



GPR lines without Numbers in the Name: If the imported GPR line names do not contain numbers the following warning message is displayed when importing the files:



When GPR lines are imported without numbers in their names, they are arranged alphabetically and the first file position is set to zero.



If the GPR lines positions are still not set correctly, import each GPR line individually and set the position set using the offset from the origin option (to learn more, see [Importing a Single GPR line](#)).

Offset from Current Origin

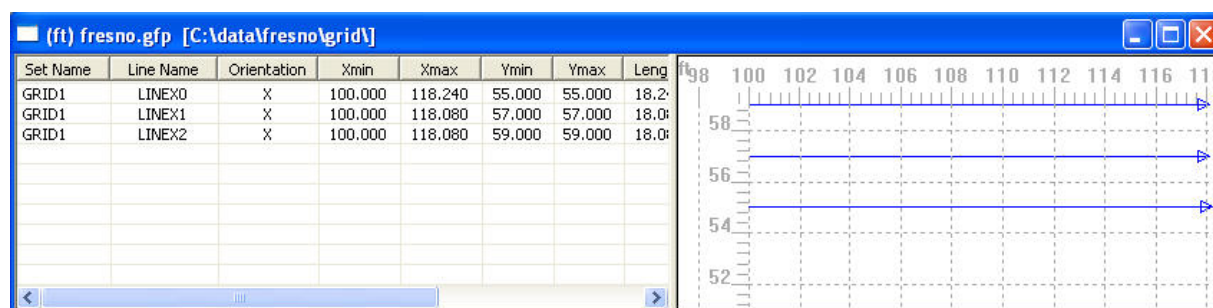
Set the X and Y offset values to move the imported GPR lines away from the absolute origin at X position = 0 and Y position = 0.

Example, GPR lines can be imported with the origin set to X = 100 and Y = 55.

Importing the line position from the [Line Spacing Conversion Factor](#) example above, will result in the following offsets from the origin and position:

LINEX0:	X Position = 100	Y Position = 55 + (0 x 2) feet = 55 feet
LINEX1:	X Position = 100	Y Position = 55 + (1 x 2) feet = 57 feet
LINEX2:	X Position = 100	Y Position = 55 + (2 x 2) feet = 59 feet

The following image displays GPR lines offset from the X=0, Y=0 origin.



Importing a Single GPR line

It is common to import a single GPR line when:

- The second part of a GPR line has a gap
- Lines do not have numbers in the name
- A grid of GPR lines has non-equal line spacing

1. In **GFP_Edit**, select the GPR line to be imported.
2. Click **Edit > Import Line(s)**.
3. In the **Open** dialog box, select a DT1 file.
4. In the [Import Line Parameters](#) dialog box click the **Grid name** drop-down list.
5. Click the **Grid name**.

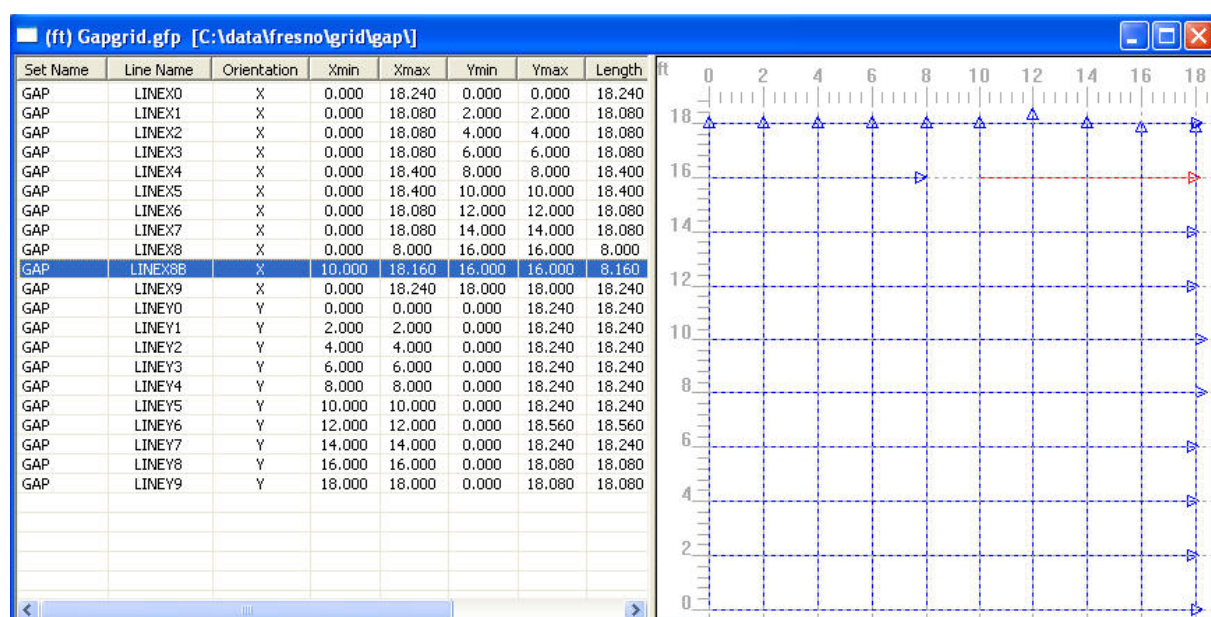
Make sure that the grid name is the same as the rest of the grid. For a single GPR line, the Line Spacing Conversion Factor is not accessible and the position of the line is determined using the Offset from Current Origin option.

6. Click **OK**.

Importing a Broken Line into a Grid

1. To import the second part of a GPR line that was separated due to an obstruction, import the GPR lines into the grid by selecting [Import the Grid of GPR lines](#).
2. [Import the single GPR line](#) that occurs after the gap in the data.
3. In the [Input Lines Parameters](#) dialog box, the **Import Lines as** option select a **Line Direction**.
 - i. In the **Grid name** drop-down list, check that the name is the same as the rest of the grid.
 - ii. Set the X and Y **Offset from Current Origin** fields to position the GPR line.

The following image displays an imported line on the other side of a gap in the grid survey.



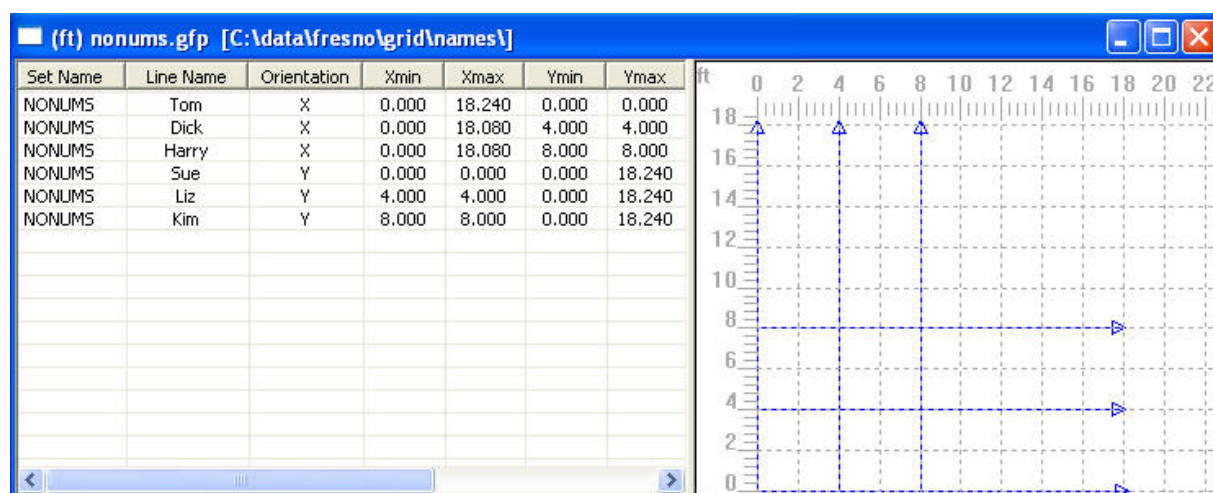
Importing GPR lines without Numbers

GPR lines with names that do not include numbers are placed in alphabetical order when imported as multiple files ([Importing a Grid of GPR lines](#)). If alphabetical order is not the correct order of the files in the grid, you can rename the files by appending appropriate numbers and then import them.

A second option is to import them as single files:

1. Import the [single GPR line](#).
2. In the [Input Lines Parameters](#) dialog box, in the **Import Lines as** pane, select the **Line Direction**.
3. Click the Grid Name drop-down list to check that the name is the same as the rest of the grid.
4. In the **Offset from Current Origin**, position the GPR line.
5. Repeat steps 1 to 5 until all the files have been imported.

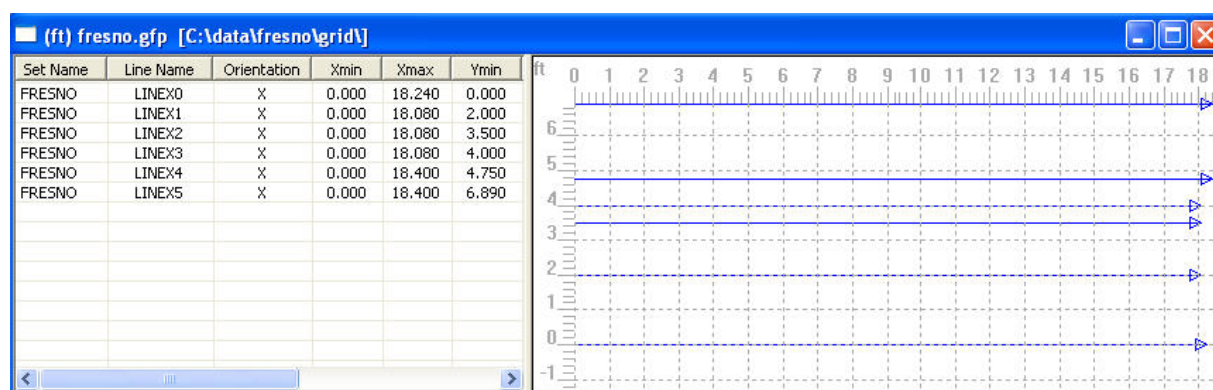
- Click **OK**.



Importing Lines with Variable Line Spacing

It is easier to import equally spaced GPR lines into a GFP file, but GFP_Edit allows you to import variable spaced line GPR lines individually.

- Import a single GPR line.
- In the [Input Lines Parameters](#) dialog box, in the **Import Lines as** pane, select a line direction option.
- Click the Grid name drop-down list to make sure that the grid name is the same as the rest of the grid.
- In the **Offset from Current Origin**, position the GPR line.
- Repeat steps 1 to 5 until all the files have been imported.
- Click **OK**.



Importing Multiple Grids

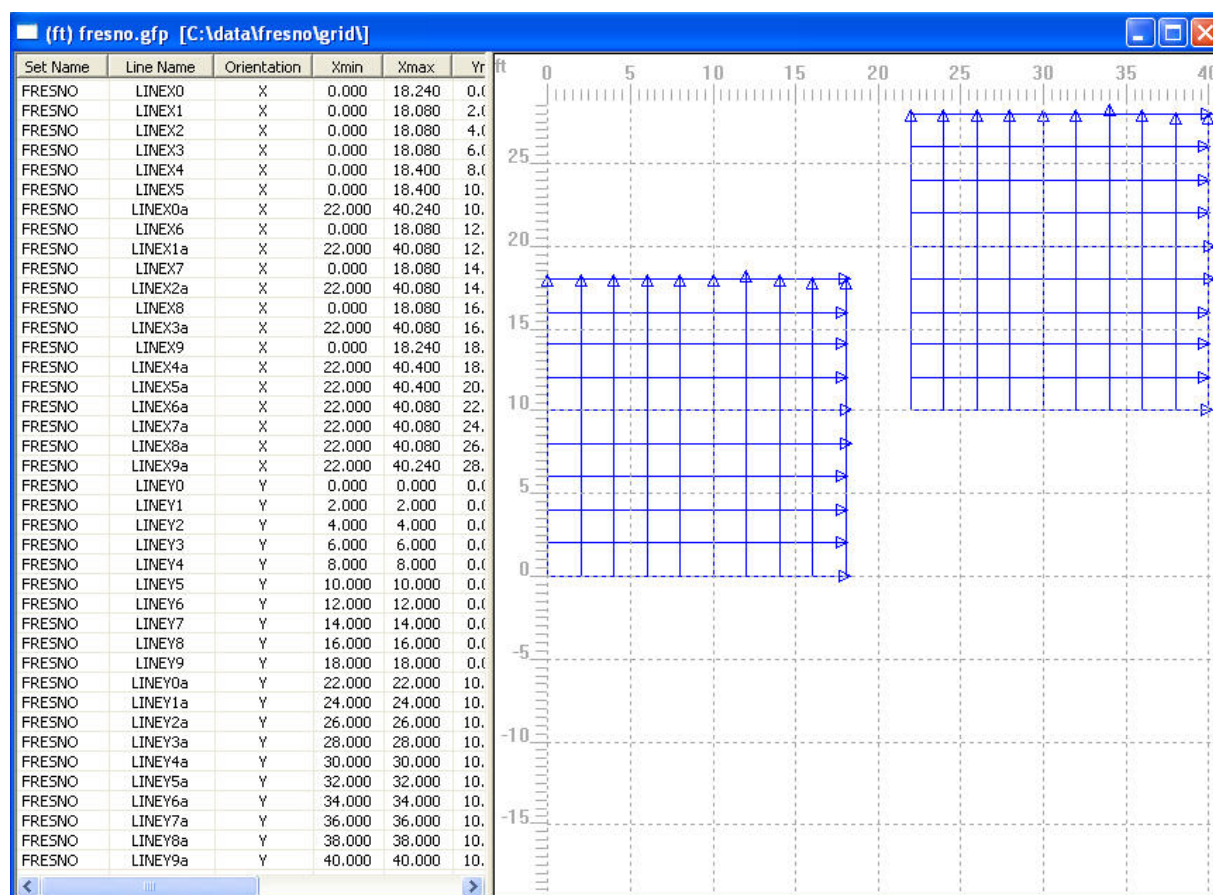
A GFP file can contain more than one grid. The GPR lines for the other grid(s) can either be in the same folder as the first grid or in a folder at the same level as the first grid.

Example: if the GFP file is in folder C:\data, GPR lines for the first grid could be in the sub-folder C:\data\grid1 and the GPR lines for the second grid could be in the sub-folder C:\data\grid2.

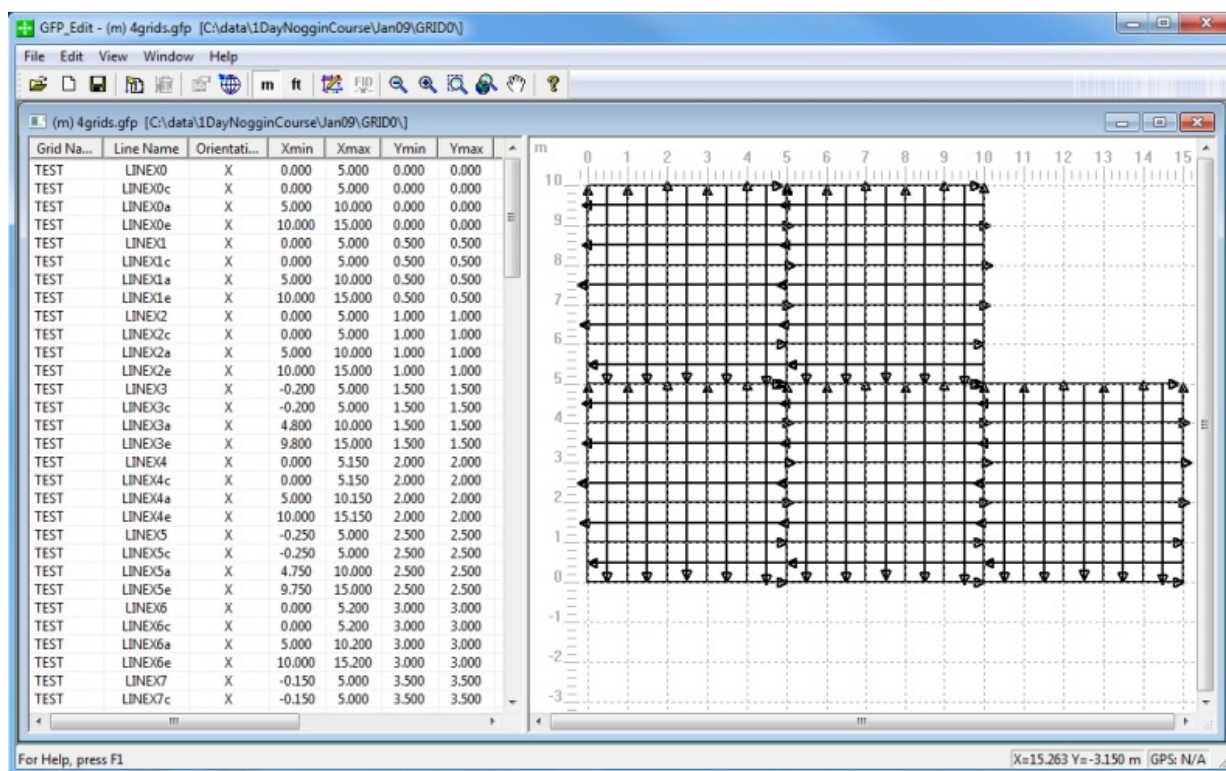
To import a second grid, follow the instructions from [Importing a Grid of GPR lines](#).

In the [Offset from Current Origin](#) pane enter X and Y positions to offset the second grid from the first.

To process both grids at the once, give them the same grid name. The second grid name can use a new name, but if the two grids have different grid names, SliceView can only process the GPR lines under one grid name at a time.



Using the method described above, multiple small grids can be merged together in a GFP file to make one large grid to process in SliceView; you just need to know the relative positions of each grid.

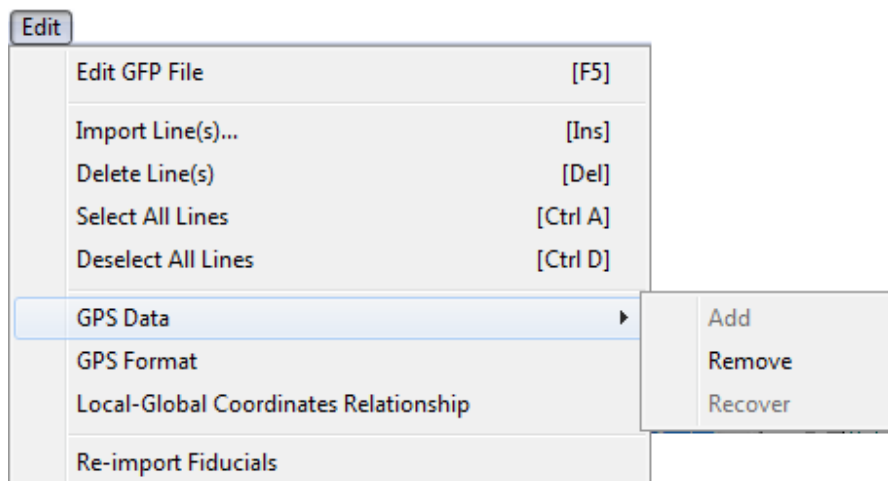


To process multiple grids together, they must have the same frequency and temporal sampling interval.

GPS Data

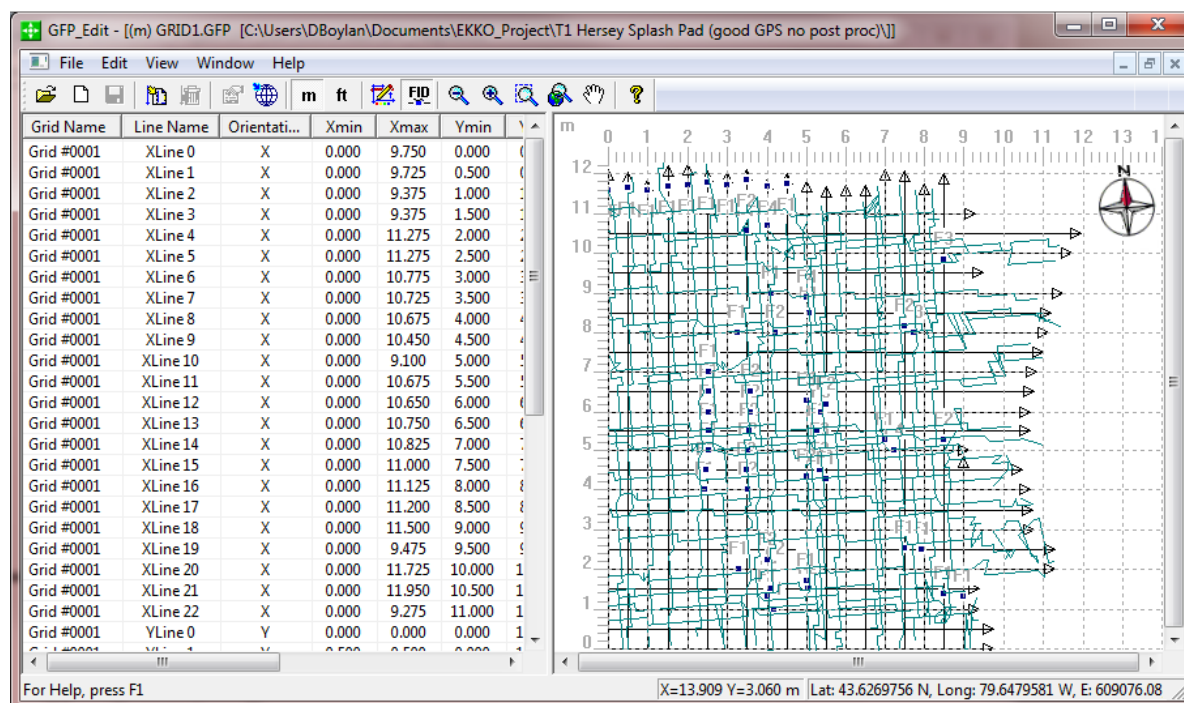
Use the GPS Data menu to add GPS data into the GFP file. You can also remove GPS data from the GFP file and export GPS positions into the trace headers for use with other software.

In the Menu bar, click **Edit > GPS Data**.



Add GPS

Click **Edit > GPS Data > Add** to add GPS data to a GFP file.



Adding GPS Automatically

When GFP_Edit detects GPS files in a GFP file that is in the same folder as the GPR line data files, and the GPS files have not already been added, the program automatically prompts you to add the GPS files into the GFP file (to learn more, see [Automatically Add GPS](#)).

Adding GPS Manually

1. To add GPS data after you have chosen to not to add it automatically, in the [Grid Table](#) highlight one or more file names.
2. In the menu bar, click **Edit > GPS Data > Add**.

Typically, all GPS files would be selected to add to the GFP file but any GPS data files known to be corrupt or inaccurate should not be selected.

GPS Fitting and Accuracy

The GPS positions for the added GPS files are processed to calculate the best fit of the GPS data to the GPR lines in the grid. The accuracy of the raw GPS data affects the accuracy of GPS position of the grid and consequently the target GPS positions interpreted in the data when viewed in the SliceView and LineView.

Viewing GPS Positions

Once you have added GPS positions, the GPS lines, relative to the GPR grid lines are viewed by enabling the **Raw GPS** in the **View > Line Settings** dialog (see Figure 4).

GPS information is displayed in the [Status Bar](#) when

- **Edit > Local-Global Coordinates Relationship > Use Global Positions** is enabled. GPS is displayed in the GPS Format as the mouse cursor is moved around the Grid Map in GFP_Edit (Figure 4). GPS positions are also displayed in SliceView and LineView.
- **Edit > Local-Global Coordinates Relationship > Use Global Positions** is disabled and no GPS files are present, **"GPS: N/A"**
- **Edit > Local-Global Coordinates Relationship > Use Global Positions** is disabled and there are GPS files present, **"GPS: Disabled"**
- The GPS point translates to an invalid point, **"GPS: Invalid, Out of Bounds."** This can happen at the poles.

GPS in Trace Headers

GPR lines are saved in two files: a data (.DT1) file and a header (.HD) file. The GPR signal amplitude values for every trace and trace header are saved in the .DT1 file and the survey parameters to the .HD file. For more details about the DT1 and HD files, see the GPR System User's Guide.

If GPS data have been added to the GFP file, the Add GPS option writes a unique GPS position for every trace to the trace headers. Writing GPS positions to the trace headers is necessary for viewing the GPS positions in LineView, used for plotting cross-sectional GPR line data.

Note: there may be a difference between GPS positions on GPR Lines displayed in GFP_Edit/SliceView and LineView.

In LineView, which plots GPR cross-sectional lines, the GPS position is based interpolating the GPS positions saved to the GPS file during data collection.

In GFP_Edit/SliceView, which use many GPR lines combined into a grid, GPS positions are determined by using the defined Local-Global Coordinates Relationship and grid line positions.

The GPS positions for any individual line in the grid will differ slightly from the GPS file collected with that line.

Remove GPS

1. To remove the selected GPS file(s) from the GFP file, in the [Grid Table](#) select one or more file names.
2. **Click Edit > GPS Data > Remove.**
Remove inaccurate GPS files to increase the accuracy of the best fit calculation of the GPS position of the GPR lines and grid.
3. After removing GPS files, run the [Compute from GPS](#) to ensure the best possible fit between the Local and Global Coordinates.

Note: Remove GPS does not remove GPS positions from the trace headers ([GPS in Trace Headers](#)) so GPS positions are displayed in LineView.

Recover GPS Files

Use Recover GPS Files when the original file has been lost or when GPS positions were added to the trace headers method other than Edit > GPS Data > Add GPS.

Recover is only available in when the GPS positions are saved in the trace headers of the DT1 file and there are no GPS files in the GPR lines folder. The Grid Table displays a question mark (?) in the GPS column.

Recover generates a GPS file with the same name as the GPR line but with a .GPS extension.

To recover a GPS File, in the [Grid Table](#)) highlight a GPR line or lines.

In the menu bar, click **Edit > GPS Data > Recover**.

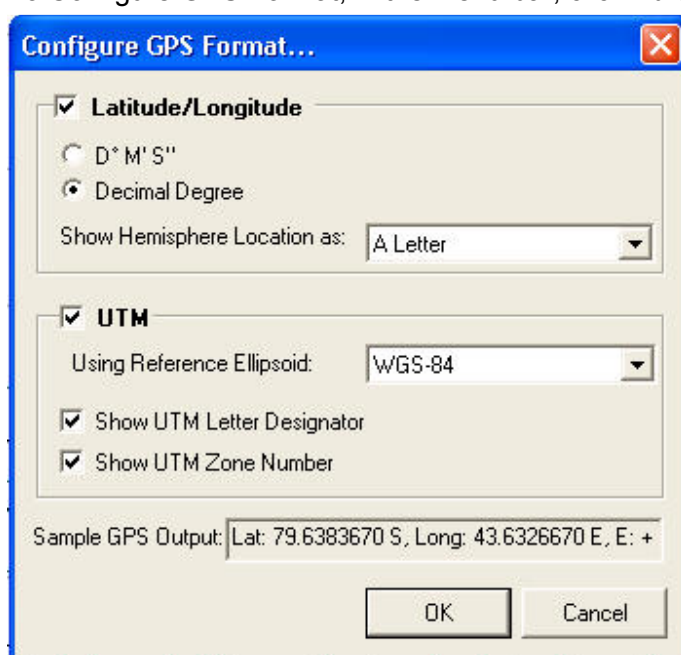
Note: The Recover operation will never overwrite an existing GPS file.

GPS Format

If GPS data were added to the GFP file, you can change the format of the GPS display on the Status Bar.

The GPS format selected is used for the GPS display on the Status Bar in SliceView (to learn more, see the SliceView User's Guide).

- To Configure GPS Format, in the menu bar, click **Edit > GPS Format**.



- Use the following table as a guide to working with the Configure GPS Format dialog box.

Item	Description
Latitude/Longitude	Click the Latitude/Longitude check box to enable the Decimal Minutes Seconds (D°M'S"), Decimal Degree , and Show Hemisphere options.
D°M'S"	Select D°M'S" to display Latitude-Longitude values in Degrees-Minutes-Seconds.
Decimal Degree	Select Decimal Degree to display Latitude-Longitude values in decimal-degree.

Item	Description
Show Hemisphere Location as	<p>From the Show Hemisphere drop-down list, click one of the following options:</p> <ul style="list-style-type: none"> • Do not show • Positive or Negative: A plus (+) sign indicates latitude in the Northern Hemisphere or longitude is in the Eastern Hemisphere. A minus (-) sign indicates latitude is in the Southern hemisphere or longitude is in the Western Hemisphere. • A Letter: For latitude N represents North and S represents South. For longitude, E represents East and W represents West. • Word: For latitude, use North or South. For longitude, use East or West. <p>The selected option is displayed in the Sample GPS Output field.</p>
UTM	<p>Click the UTM check box, to enable the Reference Ellipsoid, Show UTM Letter Designator, and Show UTM Zone Number options.</p> <p>The selected option is displayed in the Sample GPS Output field.</p>
Using Reference Ellipsoid	<p>From the drop-down list, click a Reference Ellipsoid option. The default is WGS-84.</p>
Show UTM Letter Designator	<p>Select the UTM Letter Designator option to display UTM Letter Designator.</p>
Show UTM Zone Number	<p>Select the UTM Zone Number option to display UTM Zone Number.</p>

Local-Global Coordinates Relationship

Local-Global Coordinates Relationships enable you to define the relationship between the Local XY (GPR grid) coordinates and the Global coordinates (Latitude-Longitude or UTM). If the GPR data were collected with GPS, this relationship is best calculated using [Compute from GPS](#). It can also be established by defining two points or one point and a heading in both the XY and Global coordinates.

1. To define the relationship between Local XY and Global Coordinates, in the menu bar, click **Edit > Local-Global Coordinates Relationship**.

Local-Global Coordinates Relationship

☒ Use Global Position: Compute from GPS Help...

Global Coordinates Expressed As:

☐ Latitude-Longitude ☒ UTM Zone: Hemisphere:

☐ Define using two reference points ☒ Define using one reference point and heading

1st Reference Point

Local (m)		Global (m)	
X:	<input type="text" value="0.000"/>	East:	<input type="text" value="496177.221"/>
Y:	<input type="text" value="0.000"/>	North:	<input type="text" value="5903343.389"/>

2nd Reference Point

☒ Use For Heading Only

Local (m)		Global (m)	
X:	<input type="text" value="18.260"/>	East:	<input type="text" value="496199.277"/>
Y:	<input type="text" value="12.440"/>	North:	<input type="text" value="5903344.690"/>

Y-Axis Heading

Heading (deg):
 North=0/360, E=90, S=180, W=270

GPS Display Format

GPS Format... Lat: 43.6321960 N, Long: 79.6382770 W, E: +609847.61, N: +4831923.78, Z: 17T

Preview OK Cancel

2. Use the following table as a guide to working with the Local-Global Coordinates Relationship dialog box:

Item	Description
Use Global Position	<p>Select the Use Global Positions check box to enable the Local-Global Coordinates Relationships dialog box features.</p> <p>When disabled, GPS coordinates are not displayed on the SliceView Status Bar. You will not be able to export slice images to KMZ files for display in Google Earth (to learn more, see the SliceView User's Guide).</p>
Compute from GPS	<p>If GPR lines were collected with GPS, the most common method for determining the relationship between the Local XY grid and the GPS positions is by calculating the best-fit.</p> <p>To learn more, see Compute from GPS.</p>
Global Coordinates Expressed As	<p>Global Coordinates are defined as Latitude-Longitude or UTM (Universal Transverse Mercator).</p> <p>To learn more, see Global Coordinates.</p>
Manually Entering Global Coordinates	<p>If GPS data were not collected for the entire GPR data grid but one or two GPS positions in the grid area are known, GPS positions for the entire grid can be calculated.</p> <p>To learn more, see Manually entering Global Coordinates.</p>
Define using two reference points	<p>Select this option to enable the 1st and 2nd Reference Point panes.</p>
Define using one reference point and heading	<p>Select this option to enable the 1st Reference Point and the Y-Axis Heading panes.</p>
1st Reference Point	<p>Enter the first point X and Y positions and the Latitude and Longitude, or UTM Northing and Easting points.</p> <p>To learn more, see 1st Reference Point.</p>
2nd Reference Point	<p>To enter two reference points to define the Local-Global Coordinates Relationship, depending on whether Longitude-Latitude or UTME are selected, enter the X, Y, Latitude, Longitude, or Northing and Easting values.</p> <p>To learn more 2nd Reference Point.</p>
Y Axis Heading	<p>If entering a point and a heading to define the Local-Global Coordinates relationship, enter the Y-Axis Heading in degrees from 0 (zero) to 360.</p> <p>To learn more, see Y Axis Heading.</p>
GPS Display Format	<p>Sometimes even though GPR data were collected with GPS and added into the GFP file, you may want to set the Local-Global Coordinates Relationship to a different GPS location than the position calculated from the Compute from GPS option.</p> <p>To learn more, see GPS Format.</p>

Compute from GPS

If GPR lines were collected with GPS, the most common method of determining the relationship between the Local XY grid and the GPS positions is by calculating the best-fit. This calculation may have been done when the GPS was added to the GFP file (see [Automatically Add GPS](#)). If so, the results of the best-fit calculation are displayed when the Local-Global Coordinates Relationship dialog is first opened. The best-fit calculation minimizes the length of the GPS Whiskers but depending on the GPS accuracy and visual correlation with the grid lines, a manual adjustment may be necessary in some cases.

Best-fit calculation is affected when the XY line positions edited (see [Edit GFP File](#)).

Specifically, changing the position, orientation, length, step size, or line spacing of one or more GPR lines will affect the best-fit calculation.

Only run **Compute from GPS** to define the Local-Global Coordinates Relationship after the GPR lines have been edited or GPS files have been removed.

1. Click **Compute from GPS**.

If GPS data have not been added to the GFP file, this button will be greyed out and not accessible.

GFP_Edit calculates the best-fit in UTM coordinates for the Local XY origin (0,0) and the corresponding Northing and Easting are displayed in the 1st Reference Point fields. The calculated UTM zone and hemisphere are displayed in the Global Coordinates - UTM fields.

The Latitude and Longitude of the best-fit calculated position for the Local XY origin (0,0) are displayed in the 1st Reference Point field by changing the Global Coordinates to Latitude-Longitude (see [Global Coordinates](#)).

Be careful clicking Compute from GPS and then greatly changing any of the editable fields in the Local-Global Coordinates Relationship dialog. In some cases, small changes to the Local XY Point, Y-Axis Heading, Latitude, Longitude, UTM Northing, and Easting may provide a better visual fit of the Local and Global coordinates. However, large changes in these values or changing the Zone and/or Hemisphere may result in the Local XY grid being widely separated from the Raw GPS Lines. If the Raw GPS Lines do become greatly separated, a warning message will appear. The Raw GPS settings can always be recovered by pressing the Compute from GPS button again.

2. Click **OK**.

Global Coordinates

Global Coordinates are defined as Latitude-Longitude or UTM (Universal Transverse Mercator).

1. Select **Latitude-Longitude** or **UTM**.

UTM is the default.

2. If UTM is selected, update the **Zone** field.

3. In the **Hemisphere** drop-down list click **Northern** or **Southern**.

Note: Editing these values after pressing Compute from GPS may result in errors. These fields are primarily designed to be edited when manually entering Global Coordinates (see [Manual Entering Global Coordinates](#)).

Manually Entering Global Coordinates

If GPS data were not collected for the entire GPR data grid but one or two GPS positions in the grid area are known, GPS positions for the entire grid can be calculated.

Or if the Compute from GPS does not provide an acceptable fit to the GPR data grid, manually entering the reference points may provide better results.

In the **Local-Global Coordinates Relationship** dialog box, select one of the following options:

- **Define using two reference points**
- **Define using one reference point and heading**

1st Reference Point

These values will be different depending on whether Latitude-Longitude or UTM is selected in the Global Coordinates Expressed As pane.

1. Selecting the **Define using two reference points** option enables both the **1st** and **2nd Reference Points** panes.
2. In the **Local X** field, enter the local X coordinates.
3. In the **Local Y** field, enter the local Y coordinates.
4. You can click **Select in View** and then click a point in the grid to represent the X and Y positions.
5. In the **Global East/Long** field enter the **East/ Longitude** Global coordinates.
6. In the **Global North/Lat** field enter the **North/Latitude** Global coordinates.
UTM Northing and Easting values are always entered in meters and can be positive or negative.
Latitudes north of the Equator are positive values and south are negative values. Longitudes east of the Prime Meridian (Greenwich) are positive and west are negative. Latitude and Longitude values are always entered in decimal degrees.
7. Click **Preview** to display the Local-Global Coordinates Relationship. You can move the mouse cursor over the grid image and see the proposed GPS values displayed on the Status Bar.
8. If the Local-Global Coordinates Relationship is acceptable, click **OK** to save the settings and exit the dialog.
If unacceptable, change the definition or click **Cancel**.

2nd Reference Point

If entering 2 reference points to define the Local-Global Coordinates Relationship, depending on whether Longitude-Latitude or UTME are selected, enter the X, Y, Latitude, Longitude, or Northing and Easting values.

Use for Heading Only

To enter the heading reference point only, to determine whether to use local or global positioning, select the **Use for Heading Only** checkbox.

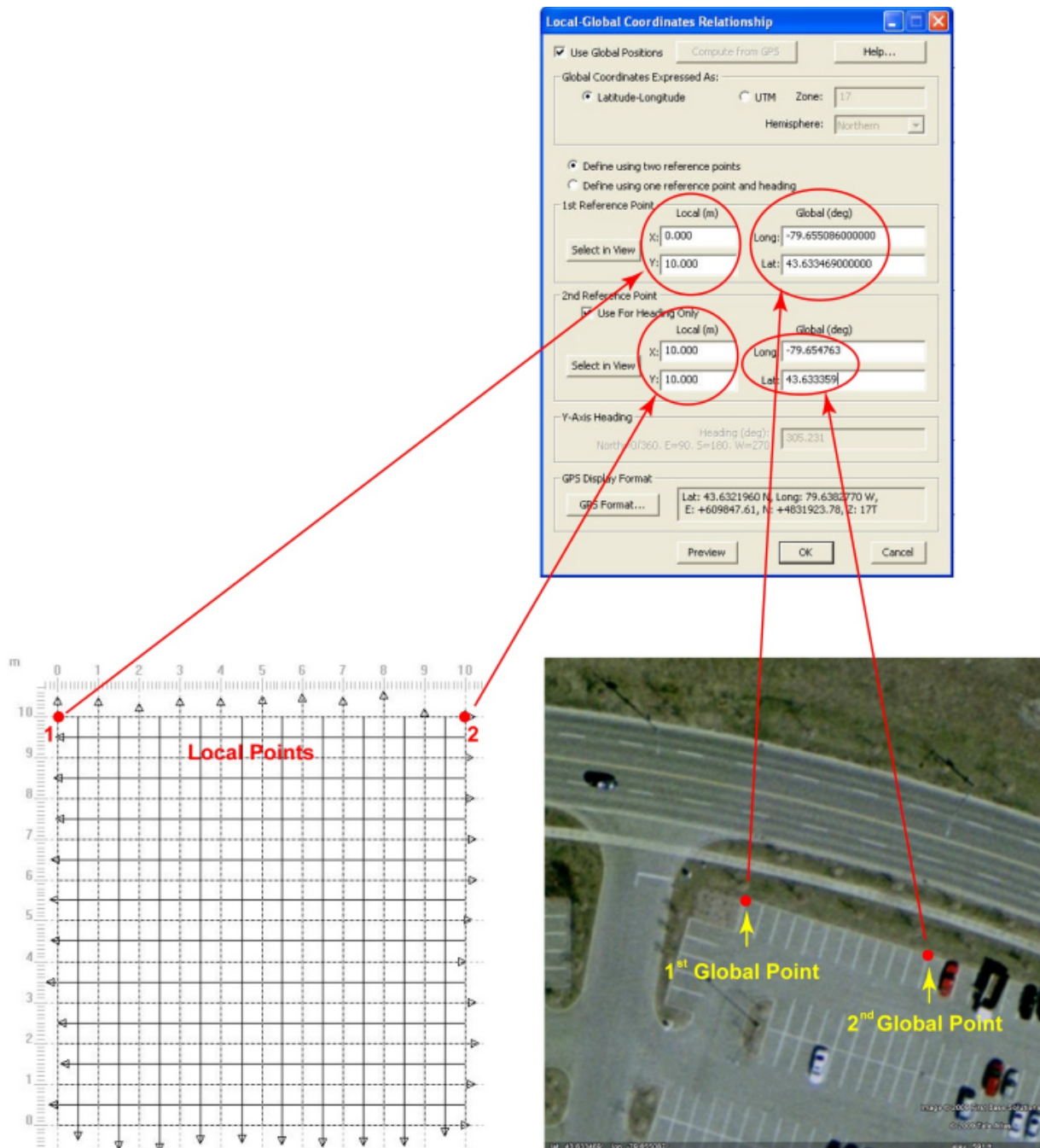
The Local XY positions and the heading between the first and second reference point determines the Local-Global Coordinate Relationship. When a GPR depth slice is plotted in global coordinates, for example in Google Earth, the size of the grid is determined by the GPR odometer positions used during data collection. In general, having Use for Heading Only enabled is more accurate so having it enabled is the default setting.

The Use for Heading Only option is commonly used when determining a heading using two points from third-party sources such as Google Earth; for example, using Google Earth to line up the GPR grid to the edge of a building or road that you know defined the edge of the GPR grid.



Entering Two Reference Points

The following images show how to set the Local-Global Coordinates relationship by entering the Latitude-Longitude positions of two XY positions in the grid. With the **Use for Heading Only** option selected, the heading of Point 1 to Point 2 is used; not the absolute position of Point 2. This method uses the local GPR odometer positioning saved during data collection when plotted with Global coordinates, for example in Google Earth.



Entering One Reference Point and the Y Axis Heading

The following images show how to set the Local-Global Coordinate Relationship by entering the Local XY and Global Latitude/Longitude (or UTM) coordinates for one reference point in the grid area and the Y-Axis Heading.

This method uses the local GPR odometer positioning saved during data collection when plotting data slices in Global coordinates, for example in Google Earth.

Enter the first reference point as described above.

Local-Global Coordinates Relationship

☒ Use Global Positions Compute from GPS Help...

Global Coordinates Expressed As:

☒ Latitude-Longitude ☐ UTM Zone: 17 Hemisphere: Northern

☐ Define using two reference points

☒ Define using one reference point and heading

1st Reference Point

Local (m) Global (deg)

X: 0.000 Long: -79.655086000000

Y: 10.000 Lat: 43.633469000000

Select in View

2nd Reference Point

☐ Use For Heading Only

Local (m) Global (deg)

X: 10.000 Long: -79.654973053231

Y: 10.625 Lat: 43.633506508339

Select in View

Y-Axis Heading

North=0/360, E=90, S=180, W=270

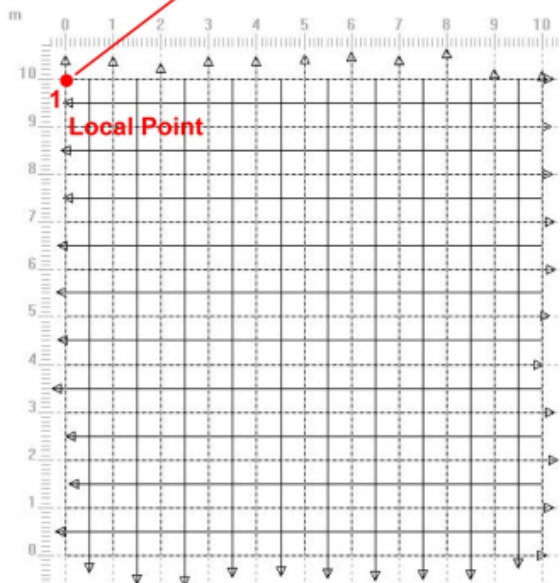
Heading (deg): 21

GPS Display Format

GPS Format...

Lat: 43.6321960 N, Long: 79.6382770 W, E: +609847.61, N: +4631923.78, Z: 177

Preview OK Cancel



Using GPS Positions from Third-Party Sources

Global positions in Latitude/Longitude or UTM can be obtained from an independent GPS that calculates the GPS position for two known XY points in the GPR grid, for example, two corners. These positions can be recorded before, during, or after the GPR data survey and then you can [Manually Enter Global Coordinates](#).

Another place to obtain Global positions for reference points in the area of your grid is from Google Earth. Find the location of the GPR grid in Google Earth and then use the mouse cursor to find the GPS position for a particular point near or within the grid.

To obtain better accuracy for points, use the Ruler option in Google Earth to change the mouse cursor from a hand to cross-hairs.



GFP_Edit expects Latitude-Longitude values expressed in decimal degrees or UTM. Google Earth usually displays in degrees-minutes-seconds. You can change the Google Earth display to decimal degrees or UTM under Tools > Options > 3D View Tab > Show Lat/Long.

Y-Axis Heading

If entering a point and a heading to define the Local-Global Coordinates relationship, enter the Y-Axis Heading by selecting the radio button to enable it and then entering the heading in degrees from 0 (zero) to 360. North is 0 (zero) and 360. Angles are defined positive in the clockwise direction and negative counter-clockwise direction. For example, East is +90 or -270, South is +180 or -180, and West is +270 or -90 degrees.

Re-import Fiducials

Fiducials are markers added during data collection at specific trace positions along the line (see [Display Fiducials](#)).

In the following image, fiducial markers (bottom of image) are added at significant positions during data collection. Fiducials usually consist of a letter "f" followed by an incrementing value.

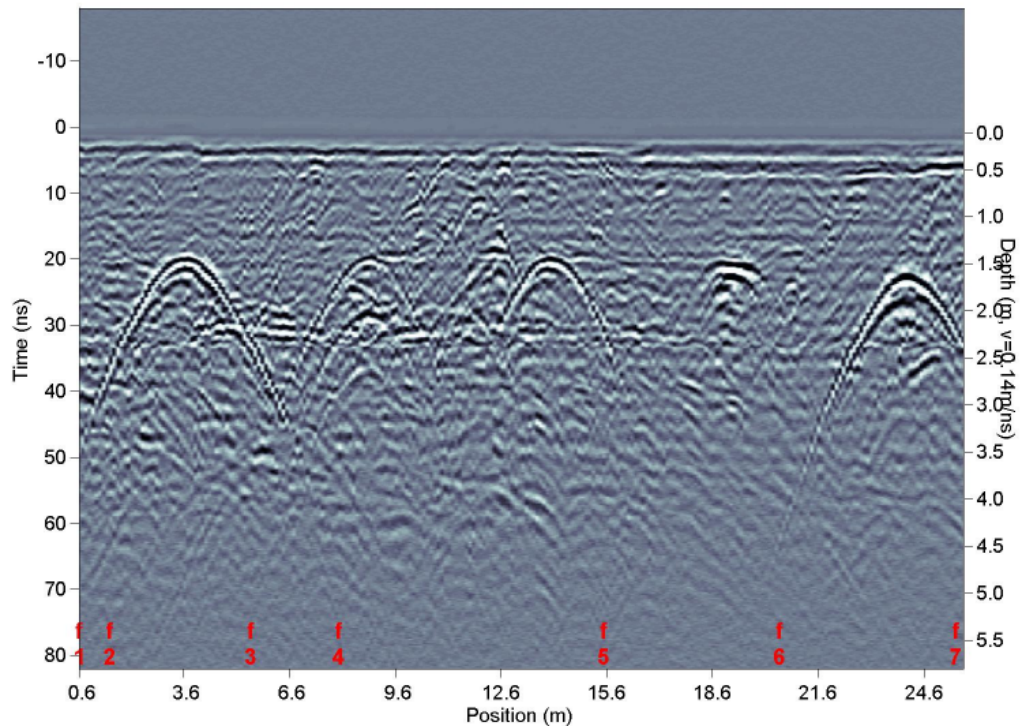
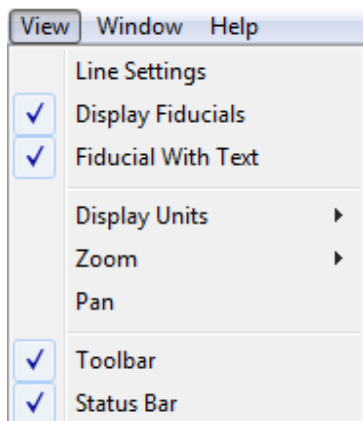


Figure 3: Fiducial markers displayed in a cross-section

Fiducials contained in the grid GPR lines (DT1 files) are automatically imported into the GFP file when the lines are imported.

View

- To open the View menu, in the [menu bar](#) click **View**.



- Use the following table as a guide to working with the **View** menu.

Item	Description
Line Settings	Click Line Settings to define which lines you want to display in the Grid Map (GPR and/or GPS). To learn more, see Line Settings .
Display Fiducials	Click Display Fiducials to show the markers added during data acquisition at specific trace positions along the line. To learn more, see Display Fiducials .
Fiducial with Text	Click Fiducial with Text to display the text associated with the fiducial markers. To learn more, see Fiducials with Text .
Display Units	You can display distance units on the Grid Table and the axes around the Grid Map in meters or feet. The units default to those used during the original grid data collection but can be converted and displayed in either meters (m) or feet (ft).
Zoom	Click Zoom to magnify or reduce the size of the Grid Map image. To learn more, see Zoom .
Pan	Click Pan to move around a zoomed in image. In Pan mode, the mouse cursor becomes a hand  that you can use to click and drag the data image to a new location. As the image is dragged, a dashed box outlining the current viewed image is formed. Click Pan again to exit Pan mode,
Toolbar	Click Toolbar to display the toolbar in the GFP_Edit interface below the menu bar. You can drag the Toolbar to other areas in the interface or remove it as a standalone bar on your computer screen.
Status Bar	Click Status Bar to display the Status Bar along the bottom of the GFP_Edit interface .

Line Settings

Line Settings enables you to define which lines you want to display in the Grid Map (GPR and/or GPS).

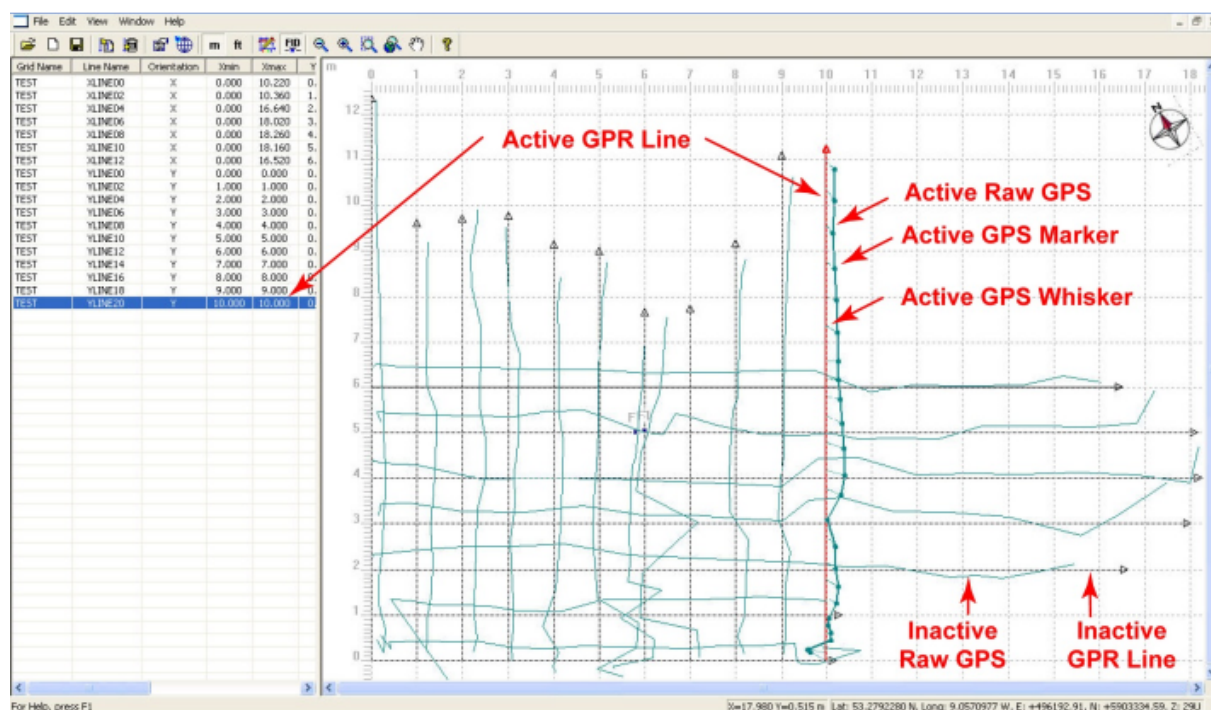


Figure 4: Types of lines displayed in the Grid Map.

In the menu bar, click **View > Line Settings**.

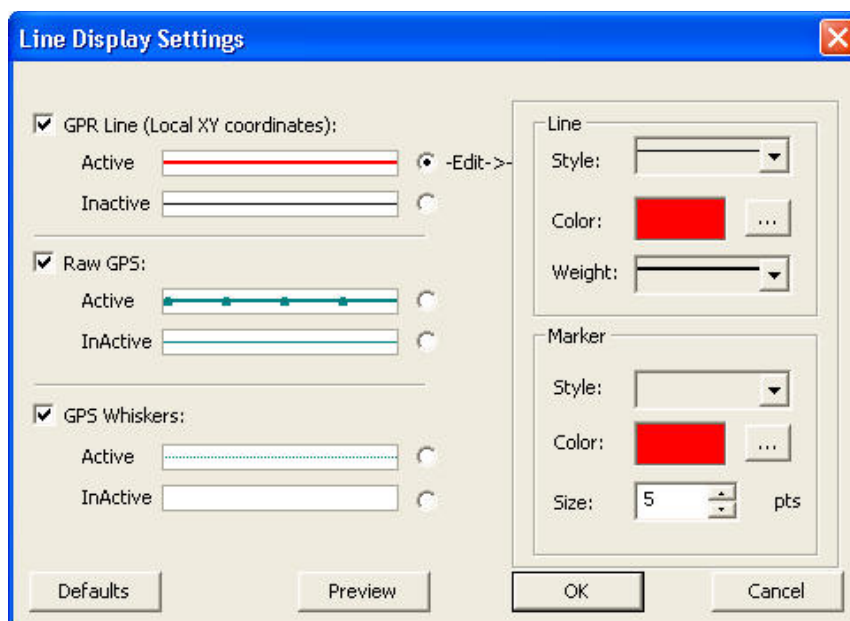
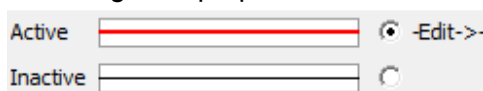


Figure 5: Line Display Settings dialog box

The following sections describe how you can use the **Line Display Settings** dialog box to edit color, style, and weight. You can also edit GPR and GPS points can also be edited for color, marker shape, and size.

GPR Lines

1. In the **Line Settings** (Figure 5) dialog box, click the **GPR Line (Local XY coordinates)** check box to display GPR Lines in the Grid Map ([Figure 4](#)).
GPR lines can have different properties when they are **Active** (selected) than when they are **Inactive** (not selected). To learn more, see [Selecting Lines](#).
2. To change the properties of GPR Lines select the **Active** or **Inactive** option.

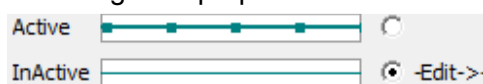


The word **Edit->** is displayed beside the selected option.

3. In the [Line](#) or [Marker](#) pane, edit the line settings.
Leave the GPR line marker style blank because the GPR traces that the markers represent are usually so close together that individual markers are not visible until zoomed in very close.

Raw GPS

1. In the **Line Settings** (Figure 5) dialog box, click the **Raw GPS** check box to display GPR lines collected with GPS in the Grid Map ([Figure 4](#)).
Raw GPS lines can have different properties when they are **Active** (selected) than when they are **Inactive** (not selected). To learn more, see [Selecting Lines](#).
2. To change the properties of Raw GPS lines select the **Active** or **Inactive** option.



The word **Edit->** is displayed beside the selected option.

3. In the [Line](#) or [Marker](#) pane, edit the line settings.
Markers represent points where GPS data were collected. Display raw GPS lines in the Grid Map by adding straight lines between the markers.
The number of raw GPS points collected along a GPR line depends on the GPS settings during GPR data collection (to learn more, see the GPS section in the GPR System User's Guide).

GPS Whiskers

GPS Whiskers connect the raw GPS position marker to the corresponding GPR trace.

Displaying GPS Whiskers helps display GPR lines that may have been accidentally reversed because the whiskers will connect the Raw GPS to the opposite ends of the GPR line than expected.

1. In the **Line Settings** (Figure 5) dialog box, click the **GPS Whiskers** check box to display GPS Whiskers from GPS Lines collected with GPS in the Grid Map ([Figure 4](#)).
2. To change the properties of Raw GPS lines select the **Active** or **InActive** option.



The word **Edit->** is displayed beside the selected option.

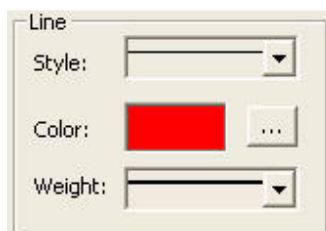
3. In the [Line](#) or [Marker](#) pane, edit the line settings.
Leave the Line and Marker style for Inactive GPS Whiskers blank to avoid cluttering the Grid Map.

GPS Accuracy

The difference in linearity and the distance between the Raw GPS line and the GPR line indicates the accuracy of the GPS used for data collection. Non-linear Raw GPS lines indicate poor GPS accuracy; be careful when using the extracted GPS positions of targets interpreted in the GPR data when viewed in the SliceView and LineView.

Line

The features in the Line pane enable you to modify the line color, style, or weight.



Style

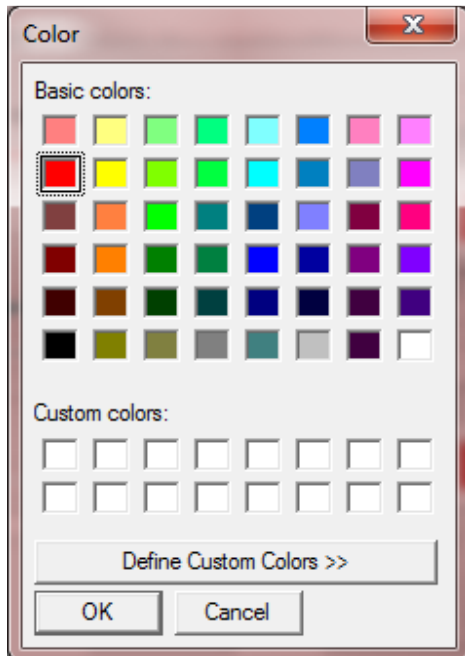
1. Click the **Style** drop-down list.



2. Select the line style to display the GPR Lines.

Color

1. Click the **Color** button.



2. Select a color to highlight the GPR Lines.
3. Click **OK**.

Weight

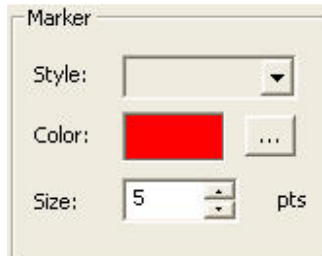
1. Click the **Weight** drop-down list.



2. Select a line weight to highlight the GPR Lines.

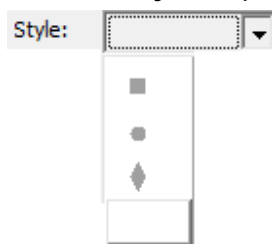
Marker

Markers represent points where GPS data were collected.



Style

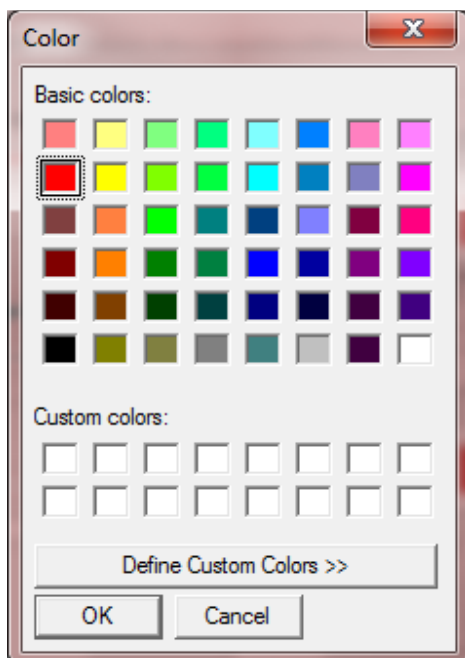
1. Click the **Style** drop-down list



2. Select a marker style to display the GPR Marker.

Color

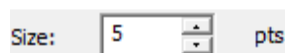
1. Click the **Color** button.



2. Select a color to highlight the GPR Markers.
3. Click **OK**.

Size

Click the **Size** buttons to increase or decrease the marker point size.

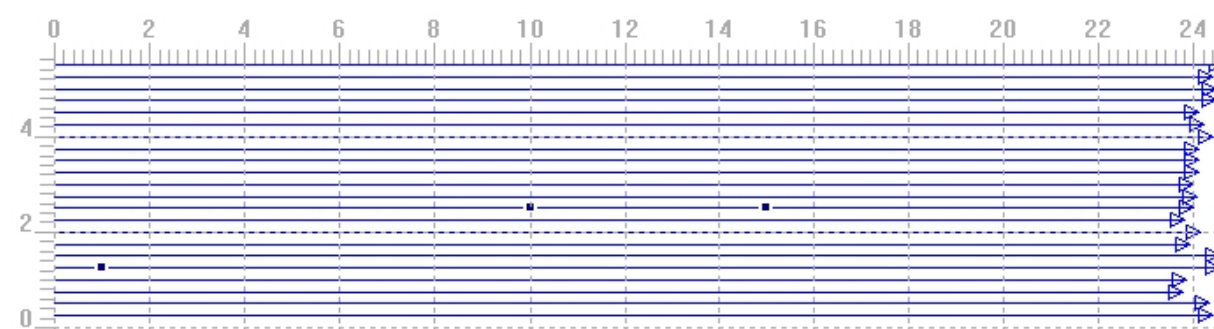


Display Fiducials

To enable/disable Fiducials, in the menu bar, click **View > Display Fiducials**.

Fiducials are markers added during data acquisition at specific trace positions along the line ([Figure 3](#)).

Fiducials are automatically displayed on the [Grid Map](#) image if they have been imported into the GFP file ([Re-import Fiducials](#)). The fiducials appear as small squares on the line.

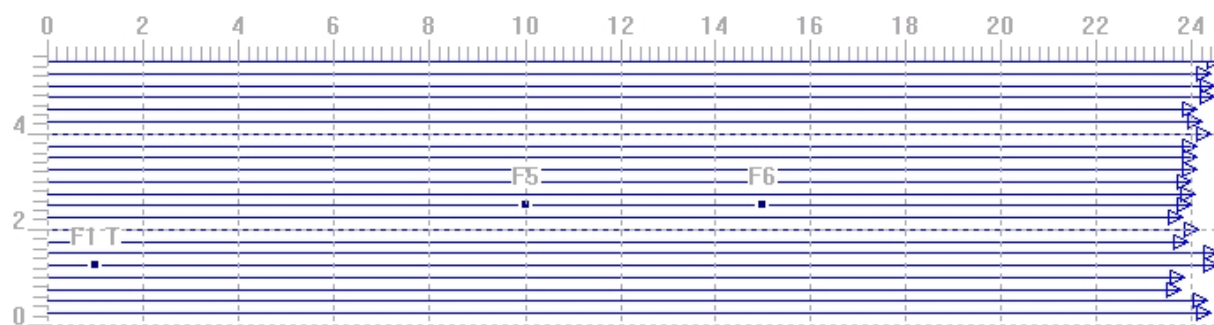


If the grid survey data does not contain any fiducials, this option is greyed out and not accessible.

Fiducials with Text

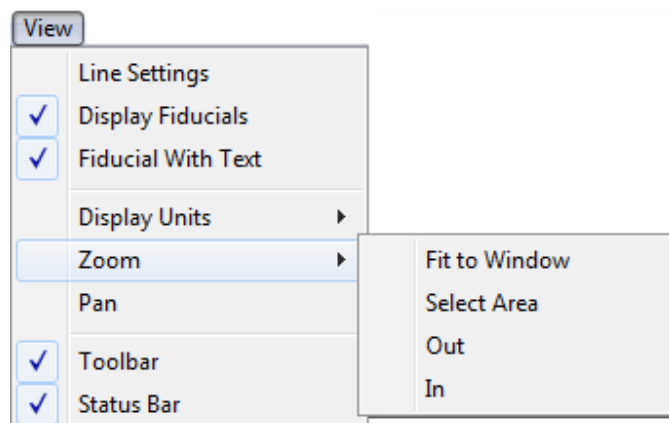
If **Display Fiducials** is enabled, **Show Fiducial Text** is also available. Click **Show Fiducial Text** to display the text associated with the fiducials.

If the grid survey data does not contain any fiducials, Show Fiducial Text is not enabled.



Zoom

Click **Zoom** to magnify or reduce the size of the Grid Map image.



In the Zoom drop-down list select one of the following options:

Fit to Window

Click **View > Zoom > Fit to Window** to display the full grid size within the screen. Click Fit to Window to return to the full image view after zooming in.

Select Area

Click **View > Zoom > Select Area** to zoom in on a specific area of the grid.

Out

Click **View > Zoom > Out** to Zoom out of the image size.

In

Click **View > Zoom > In** to magnify the image.

When you zoom into an image, scroll bars are displayed on the edge of the image. Use the scroll bars to move around on the image and view different areas. The scroll bar narrows each time the image is zoomed in to indicate that a smaller percentage of the full image range is displayed.

A zoomed in image will still display the X and Y scales.

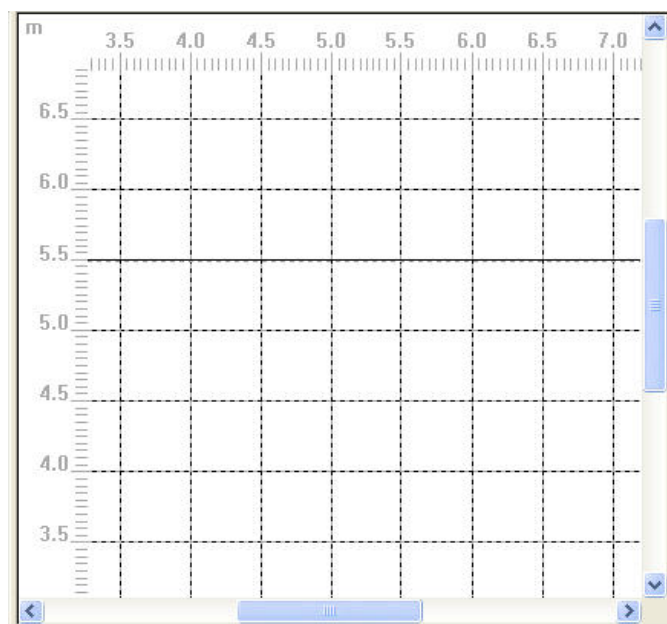
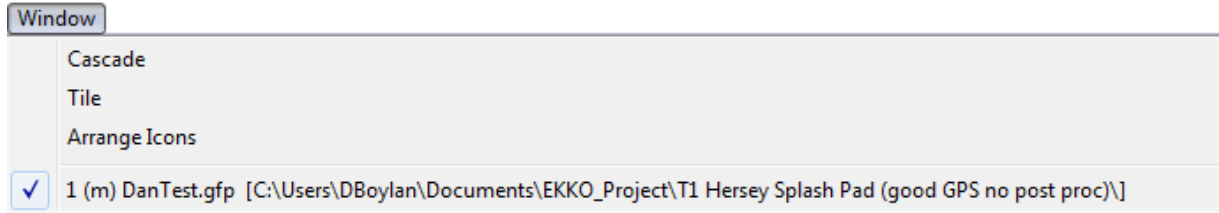


Figure 6: Example of a Zoomed image with scroll bars.

The zoomed in image may show more data than defined by the box because the additional data will be added to the right or bottom of the image so it always retains the correct aspect ratio.

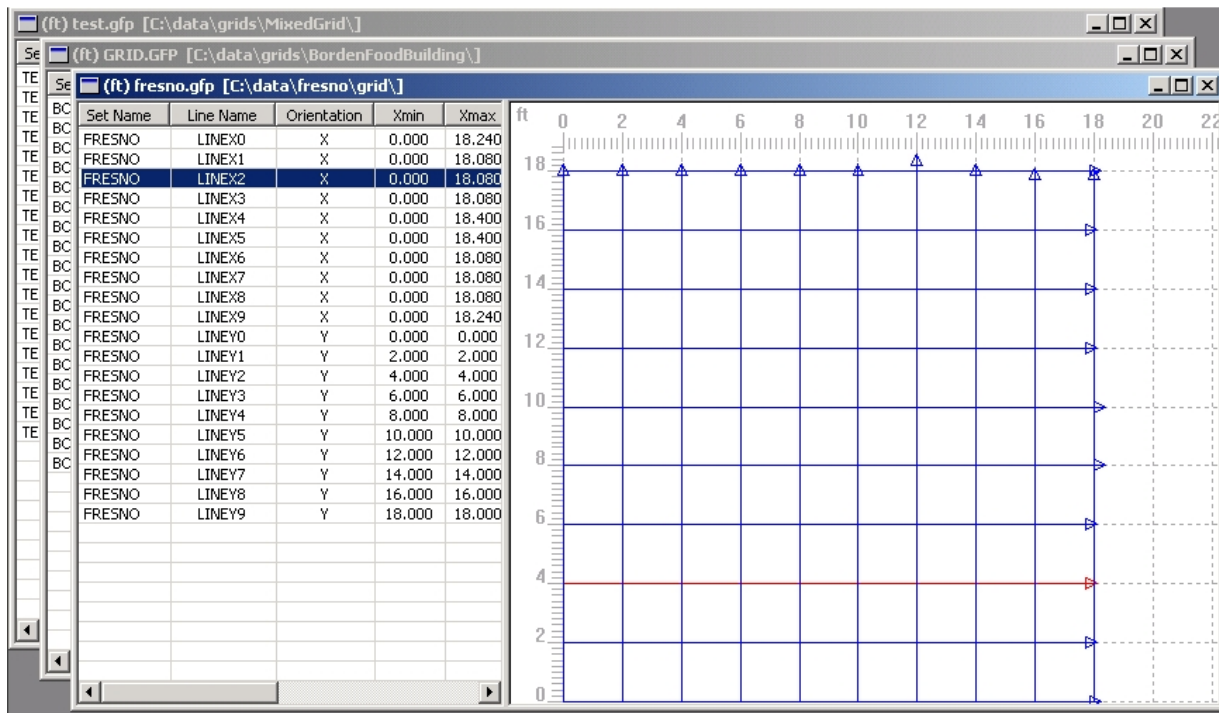
Window

To open the Window menu, in the [menu bar](#) click **Window**.



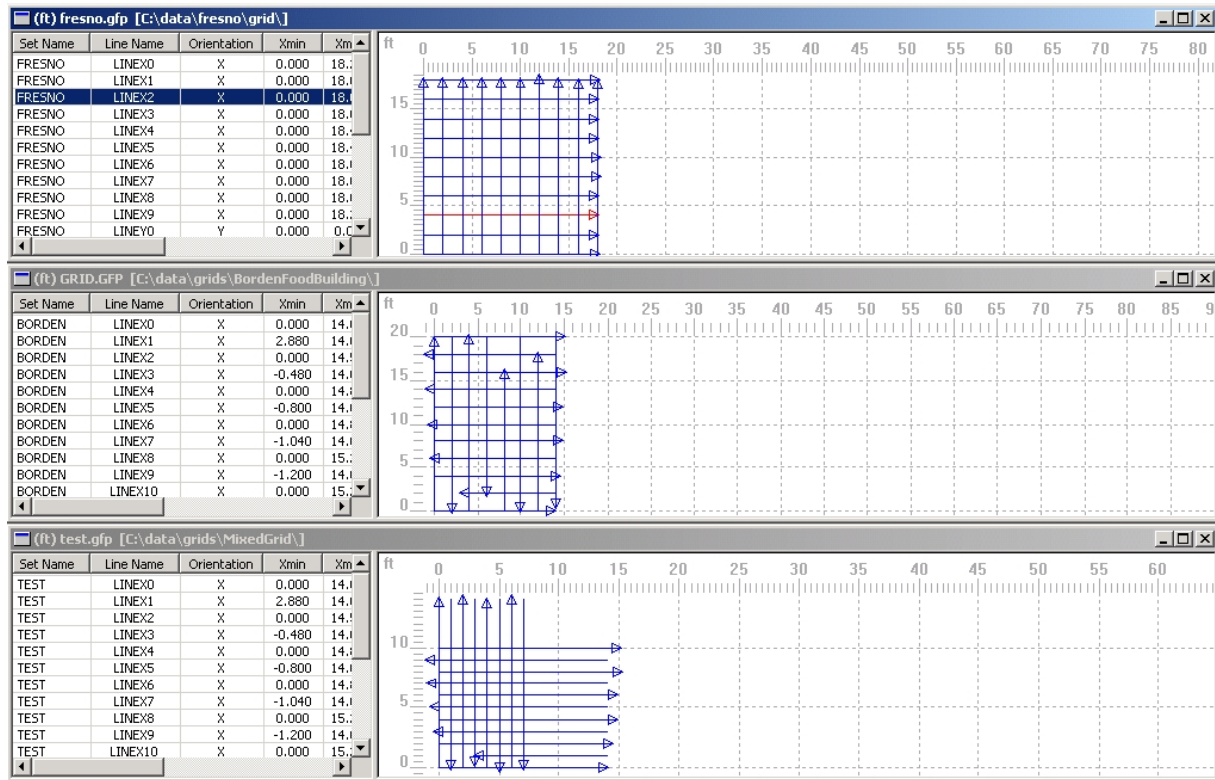
Cascade

Click **Cascade** to arrange open windows so they cascade on the screen; the front window is completely visible and the title lines from the other windows are visible and accessible.



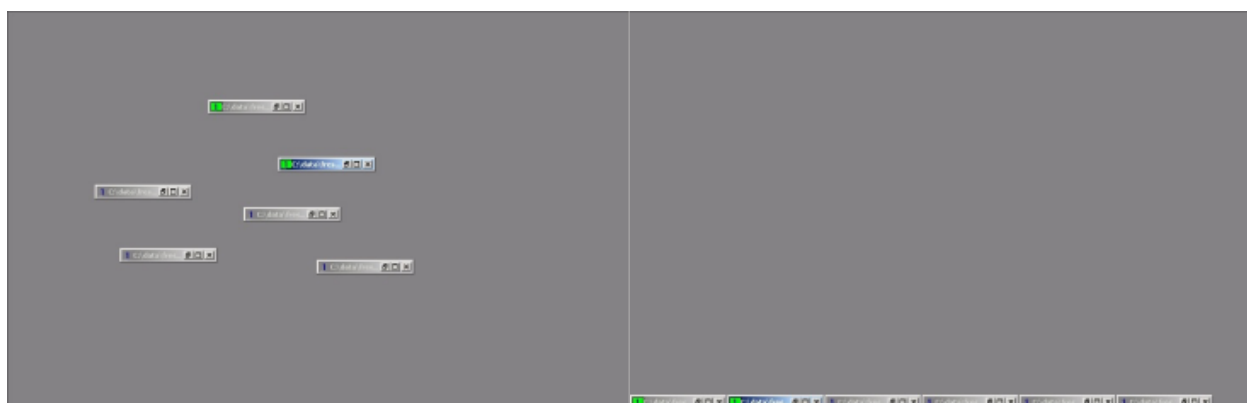
Tile

Click **Tile** to arrange all open windows so they are tiled on the screen; all windows are resized so they are all visible and accessible.



Arrange Icons

Click **Arrange Icons** to order all the icons (minimized windows).



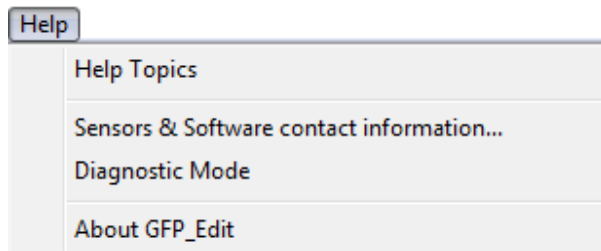
Selecting an Open GFP Window

The Windows menu lists all open GFP windows. A checkmark identifies the active window.

To change the active window, click another window in the list.

Help

To open the Help menu, in the [menu bar](#) click **Help**.



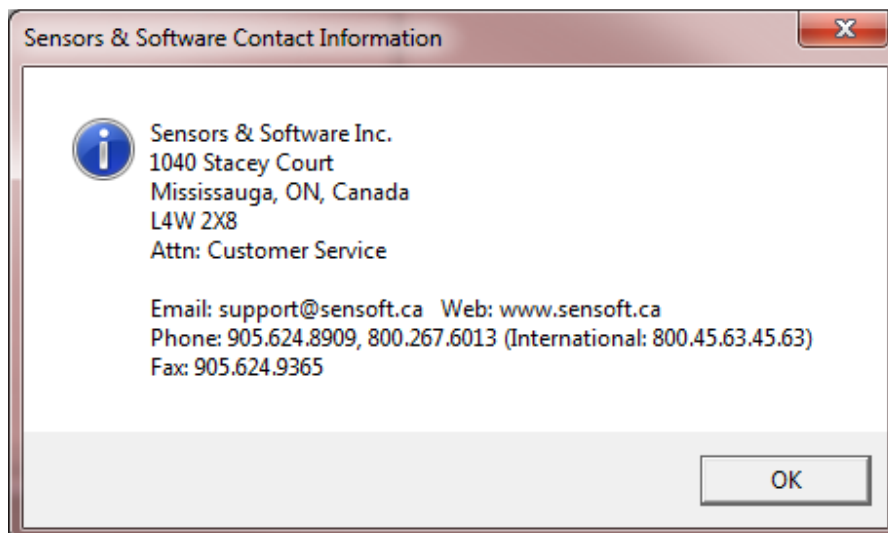
Help Topics

Click **Help Topics** to open the GFP_Edit User's Manuals in PDF.

Adobe Acrobat Reader must be installed on the PC to open this document. If not, you will be prompted to download it from the Adobe website.

Sensors & Software contact information

Click **Sensors & Software contact information** to display Sensors & Software contact information: mailing address, e-mail addresses, phone, and fax numbers.



Diagnostic Mode

Diagnostic Mode is designed to help resolve GFP_Edit issues.

1. If some GPR lines consistently cause GFP_Edit to crash or freeze, restart GFP_Edit.
2. Click **Help > Diagnostic Mode**.
3. Open the GFP file for the grid survey.
4. Re-run the steps that caused the crash.

Diagnostic Mode causes the program to run much slower than usual, because it is logging all the data processing steps.

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