NavView User Guide – 10 Survey Lines

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01	B	Added Survey Line Copy feature	GAW	SW	GAW	Aug 28, 2024
01	A	Initial release	SW	GAW	GAW	June 17, 2024

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10. SURVEY LINES

NavView uses several supporting files including waypoints, survey lines, pipelines. This section covers the creation and editing of survey lines.

10.1 OVERVIEW

A survey line is a reference route in NavView that can be displayed on the map view and selected for Point to Route Guidance to aid in navigation. NavView maintains a local SurveyLines.xml file in the Local\Station\Working folder. Survey Lines are also maintained in the NavView database used for distributed systems (see Network Services section).

If Rolls and Privileges are enabled, the following are what is allowed for each role:

Roles	Privileges
Not Logged In	Cannot add, load, import, edit or remove survey lines
User	Can add, load, import, edit survey lines but cannot remove survey lines
Online/Supervisor/ Administrator	Can add, load, import, edit and remove survey lines

10.2 SURVEY LINES WINDOW

The Survey Lines window is opened by clicking on the Survey Lines button in the Files section of the Home Ribbon Tab (see Figure 10-1) or project Explorer view (see Figure 10-2). This window provides access to all survey lines for creating and editing (see Figure 10-3)

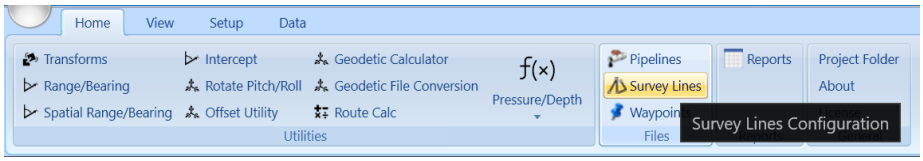

FIGURE 10-1 SURVEY LINES - HOME RIBBON TAB

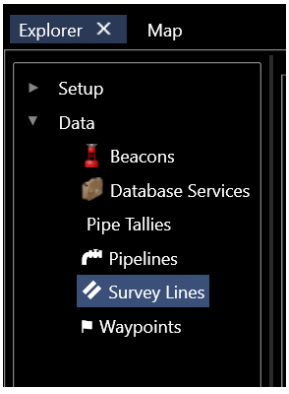

FIGURE 10-2 SURVEY LINES – EXPLORER

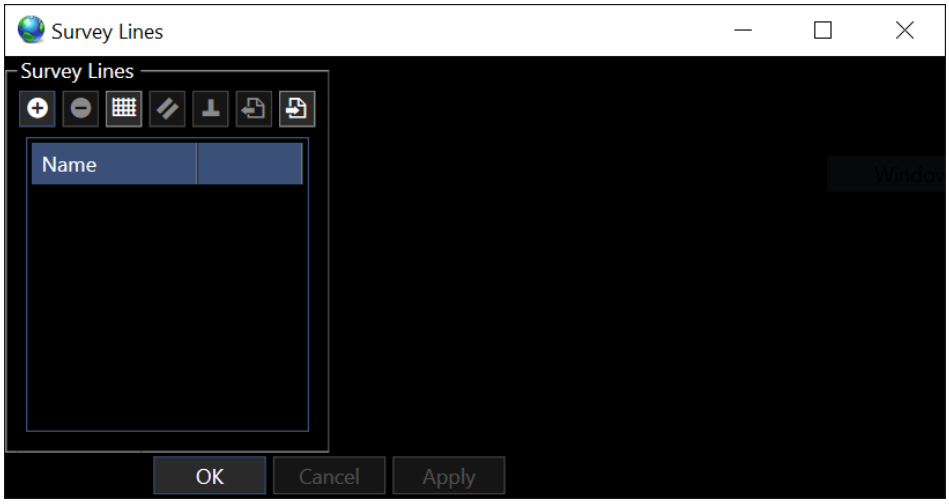

FIGURE 10-3 SURVEY LINES - MANAGEMENT WINDOW

The Survey Lines Window contains the following components:

1. **Tool Bar** 

   The survey lines tool bar provides the means to manipulate the survey lines and perform various tasks. Its options are listed below.

    Click to add a new survey line to the list

    Click to remove the selected survey line from the list. This button is inactive if no survey line is selected

    Click to open the popup to create a grid of survey lines. This functionality is described below

    Click to create a line parallel to the selected survey line. This button will only be enabled if a survey line is selected

    Click to create a line perpendicular to the selected survey line. This button will only be enabled if a survey line is selected

    Click to the export the selected survey line to a file

    Click to import a survey line from a text file

2. **Survey Lines List**

   All survey lines currently in the database are listed by name below the toolbar (see Figure 10-4)

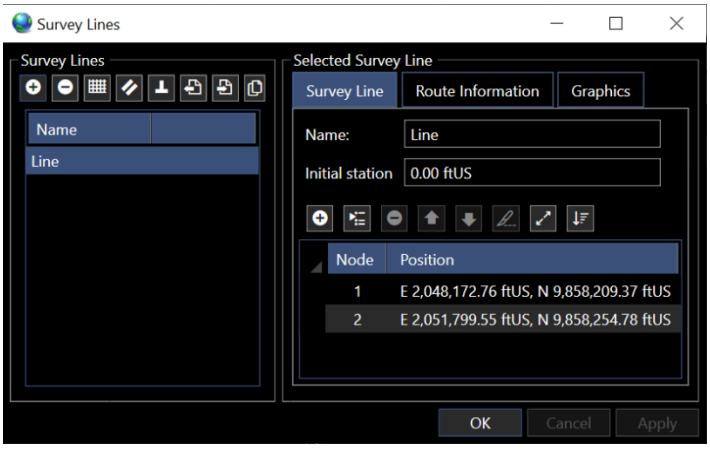

FIGURE 10-4 SURVEY LINES - MANAGEMENT WINDOW – LINES ADDED

3. **Selected Survey Line**

The selected survey line display consists of three tabs. The **Survey Line** tab allows for the editing of the name and the points in the line. The **Route Information** tab displays all data associated with the survey line. The **Graphics** tab allows for the editing of map display properties for the line. The options are described below.

a. **Survey Line Tab**

- **Name:** The name assigned to the survey line. This will be displayed on the screen and used as a reference in the list of survey lines
- **Initial station:** Offset applied to the stationing. For instance, if the stationing starts at an arbitrary point after the start of the route which needs to be tracked, this feature allows correct stationing in NavView
- **Survey Line Editing Toolbar** 
  The survey line editing toolbar allows for the manipulation of the selected survey line, including adding, inserting, reordering nodes, and extending the ends of the line
- **Survey Line Node List**
  The survey line Node List contains the Node positions of the selected survey line (see Figure 10-5). Its properties are as follows:

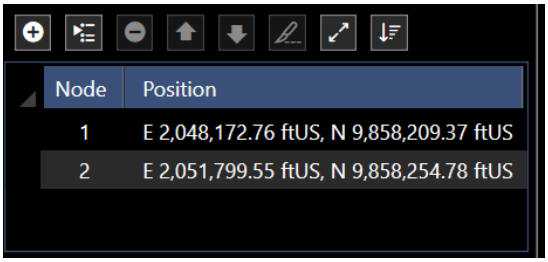

FIGURE 10-5 SURVEY LINES - SURVEY LINE NODE LIST

- **Node:** Name of the selected Node. The survey line nodes are named such they can be easily identified on the map or in the list

- **Position:** The position of the node can be edited within the list view by clicking on the position column in the row that is to be edited. The coordinate editing view will be displayed

b. **Route Information Tab**

Display of all data associated with the survey line. This display only.

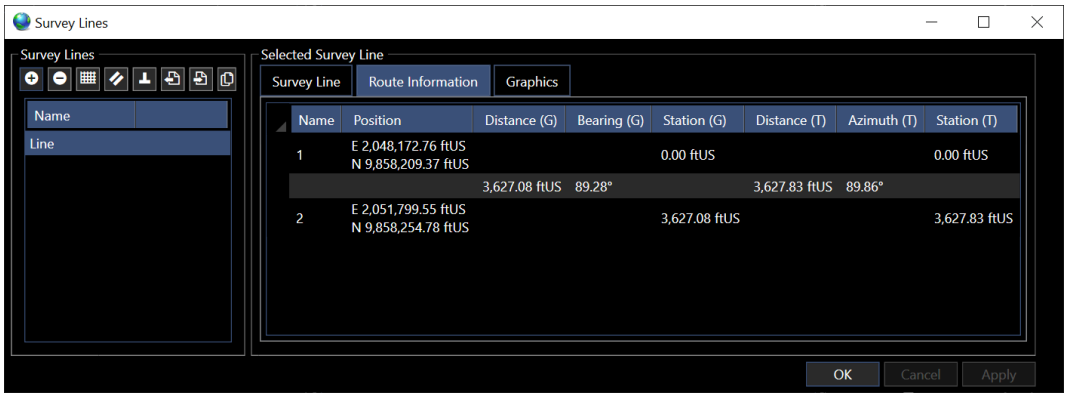

FIGURE 10-6 SURVEY LINES – ROUTE INFORMATION TAB

c. **Graphics Tab**

In the graphics tab, it is possible to control all aspects of the visibility of the line, nodes, and associated text items. The graphics display is shown below in Figure 10-7.

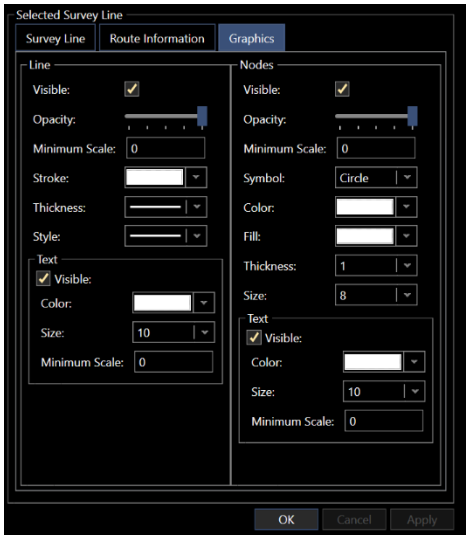

FIGURE 10-7 SURVEY LINE - GRAPHICS TAB

Note: The Minimum Scale setting is based on the Map view scale as displayed in the Map views when the Display scale bar option is enabled (see Windows section). As the Map view is zoomed in, the scale increases, as it is zoomed out the scale decreases. The survey line will display when the scale is greater than the Minimum Scale setting.

10.3 ADD A SURVEY LINE

A survey line can be added in several ways, from the map view and the Survey Lines Window.

10.3.1 ADD A SURVEY LINE FROM THE SURVEY LINES WINDOW

10.3.1.1 ADD A SINGLE SURVEY LINE

1. Open the Survey Lines Window from the Home Ribbon Tab or project Explorer view.
2. Click the Add Button.
3. A survey line is created and displayed in the selected survey line view. It has the default name of “Line”, and two nodes labelled SOL and EOL.
4. Edit the new survey line as required.
5. Click **Apply** to save the survey line and leave the window open, **Cancel** to discard it and leave the window open, **OK** to save the Survey Line and close the window.

10.3.1.2 ADD A GRID

The grid pattern tool creates a series of survey lines centered on a point, at a specified orientation.

1. Open the Survey Lines Window from the Home Ribbon Tab or project Explorer view.
2. Click the Grid Pattern button. The Grid Pattern pop-up is displayed. This is shown below in Figure 10-8.

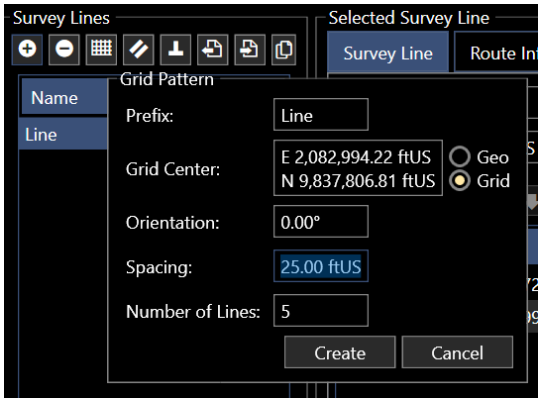

FIGURE 10-8 SURVEY LINES - GRID PATTERN CONFIGURATION

3. Enter the prefix for the grid pattern lines.
4. Enter the center coordinates for the grid pattern, either in Geographic or Grid coordinates.
5. Specify the orientation of the grid (G°)
6. Enter a spacing between lines.
7. Enter the number of lines.
8. Click **Create** to create the grid of lines or **Cancel** to abort the operation.

9. The grid pattern will be added to the Survey Lines List as a series of individual lines with the naming format: <Prefix>+/-<Offset>, where the +/- will indicate whether the line is to the port or starboard of the original orientation. The lines are created both along the specified orientation and perpendicular to it. The lines associated with the specified orientation are identified with (V).

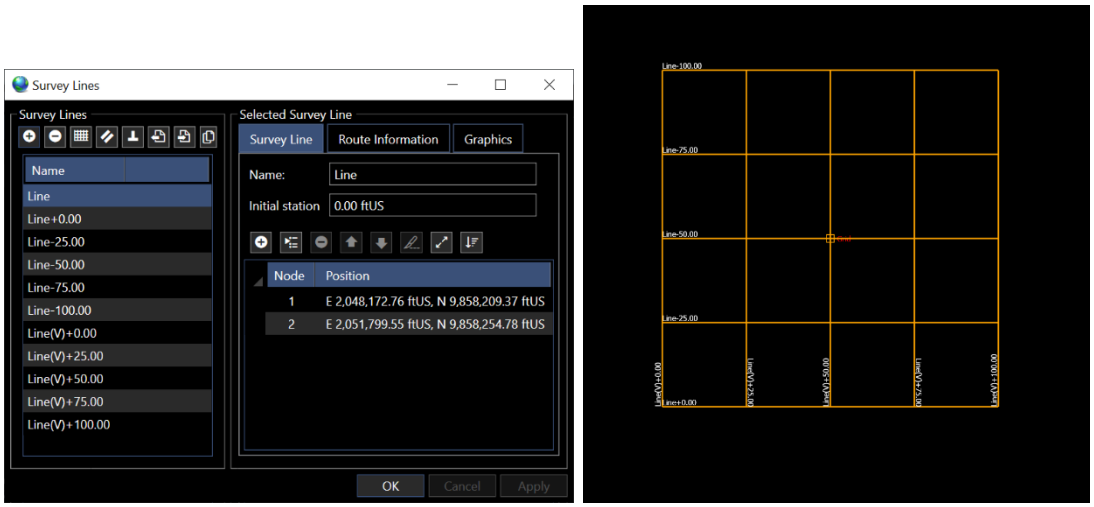

FIGURE 10-9 SURVEY LINES – GRID LINES ADDED

10. The created grid lines are normal Survey lines and can individually be further edited for name, color, etc.

10.3.1.3 ADD A PARALLEL LINE

1. Open the Survey Lines Window from the Home Ribbon Tab or project Explorer view
2. Select an existing survey line.
3. Click the  Parallel Button.
4. The parallel pop-up box is displayed, as shown in Figure 10-10

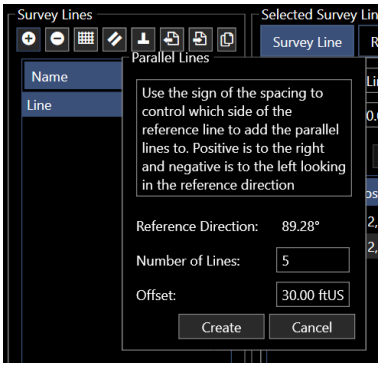

FIGURE 10-10 SURVEY LINES - PARALLEL SURVEY LINE CONFIGURATION

5. The reference direction displayed is the direction of the source line in (G°) if it has only two nodes and one segment between those nodes. If there are multiple nodes on the line, the reference direction will be from first node to last node of the source line.

6. The sign of the offset is used to set which side of the source line the new lines will be located. A positive offset results in the parallel lines to the starboard side, looking along the original line, and a negative offset results in the parallel lines being created to the port side.
7. Edit the number of lines and offset settings as necessary, and click **Create** to create the parallel lines, or **Cancel** to abort the process.

10.3.1.4 ADD A PERPENDICULAR LINE

1. Open the Survey Lines Window from the Home Ribbon Tab or project Explorer view.
2. Select an existing survey line in the list.
3. Click the  Perpendicular Button.
4. The perpendicular popup box is displayed, as shown in Figure 10-11

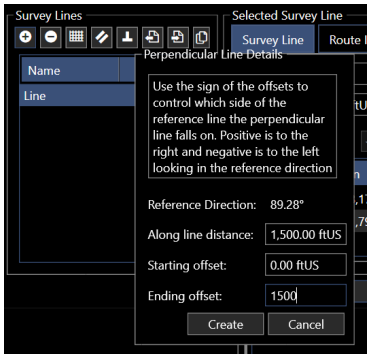

FIGURE 10-11 SURVEY LINES – PERPENDICULAR LINE CONFIGURATION

5. The reference direction is the orientation of the first segment of the source line in °G.
6. Along line distance is the distance from the start of the line at which the perpendicular line will cross the source line. A negative number can be entered to specify a perpendicular line that crosses prior to the start of the source line. If there are multiple segments, NavView will determine the orientation of the segment at the specified along line distance and create a line perpendicular to that orientation.
7. Starting offset is the distance from the source line where the perpendicular line starts, and Ending offset is the distance from the source line the perpendicular line ends. The sign convention for the Starting and Ending Offsets is based on looking along the source line, positive to the right or starboard of the source line, negative to the left or port of the source line. Entering positive distances for both offsets will create a line perpendicular to the source line and entirely to the right of the source line. Entering negative distances for both offsets will create a line perpendicular to the source line and entirely to the left of the source line. Entering positive and negative offsets will create a perpendicular line that crosses the source line.

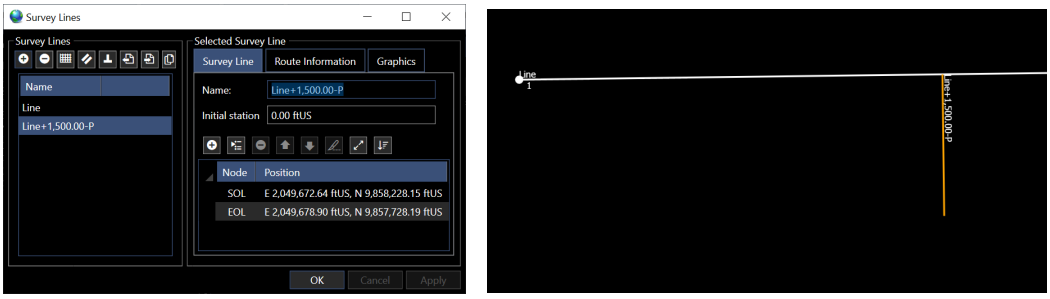

FIGURE 10-12 SURVEY LINES – PERPENDICULAR LINE – MAP VIEW

10.3.2 ADD A SURVEY LINE FROM THE MAP VIEW

10.3.2.1 USING A MAP TOOL

1. In a Map window, activate the MultiPoint Coordinate Picker or Ruler (see Map Window in the Windows section for details)
2. Create at least two points in the Map.
3. Right mouse click with the mouse on any of the line segments or the associated annotation, mouse over the resulting pop-up menu item Ruler in the case of using or Multi-point in the case of using and select **Copy To > Survey Line > New Survey Line**

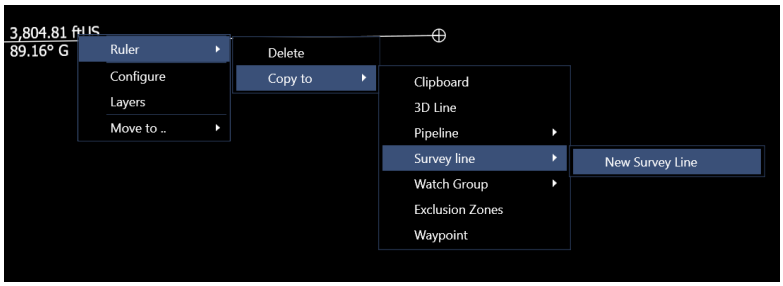

FIGURE 10-13 SURVEY LINES – ADD FROM MAP WINDOW

Note: Right mouse clicking with the cursor over one of the line's or ruler's nodes will result in the pop-up menu item **Node** appearing.

4. The Configure Survey Lines Window will appear with the newly created survey line selected for review and editing.

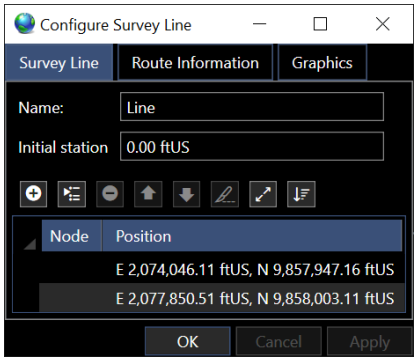

FIGURE 10-14 SURVEY LINES – LINE ADDED FROM MAP VIEW

10.3.2.2 FROM A POLYLINE

1. In the Map window, select an existing polyline in the map background by right mouse clicking with the pointer on the line.
2. From the pop-up menu select **Convert .... Polyline to > Survey Line**

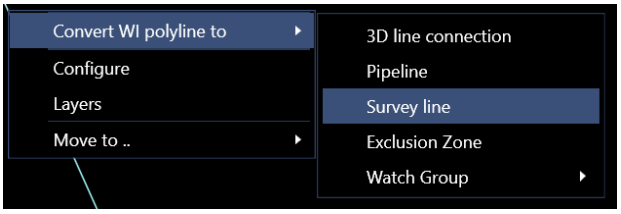

FIGURE 10-15 SURVEY LINES – ADD FROM POLYLINE

3. In the **Import Polyline** dialog, enter the **Simplification tolerance** value to be used in the application of the Douglas-Peuker algorithm to the polyline and click **OK** to import the line or **Cancel** to abort the import.

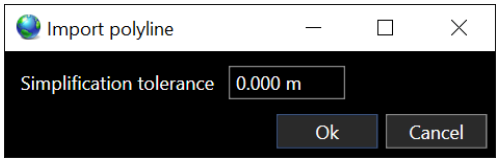

FIGURE 10-16 SURVEY LINES - IMPORT POLYLINE SIMPLIFICATION TOLERANCE

Note: To optimize the import of polylines comprised of many points very closely spaced, e.g., a polyline generated from an as-laid survey with points centimeters apart, NavView applies the Douglas-Peuker algorithm. The objective of this algorithm is to generate a simplified line similar to the original with fewer points where similar means that the maximum distance between the original and the simplified lines is less than or equal to the Simplification tolerance. As applied in NavView, the objective is to create a line with a workable number of points that still represents the original line to an acceptable level, the acceptable level being the Simplification tolerance.

4. The **Configure Survey Line** dialog will appear allowing editing of the points and graphics used to display the line. Click **Apply** to add the survey line and leave the dialog open, **OK** to add the survey line and close the dialog or **Cancel** to discard the survey line and close the dialog.

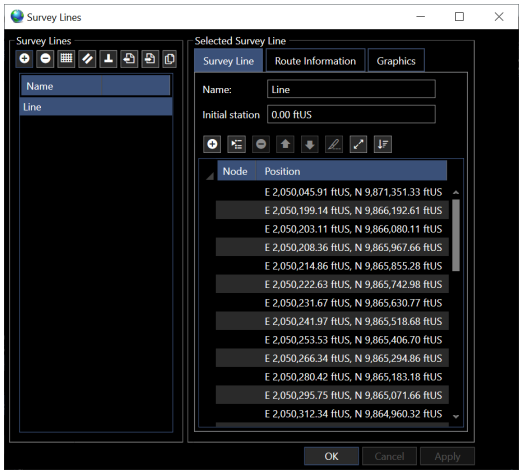

FIGURE 10-17 SURVEY LINES – CONFIGURE SURVEY LINE FROM POLYLINE

10.4 REMOVE A SURVEY LINE

1. Open the Survey Lines Window.
2. Select an existing survey line.
3. Click the Remove Button.

10.5 EDIT A SURVEY LINE

Survey lines can be edited from the survey lines window or from the map view. These operations are described below.

10.5.1 EDIT A SURVEY LINE FROM THE SURVEY LINES WINDOW

1. Open the Survey Lines Window from the Home Ribbon Tab or project Explorer view.
2. Select the survey line to be edited.
3. Edit the survey line as required. The survey line can be edited using the survey line editing toolbar.
4. Click the Add Button to add a new node to the end of the survey line. Edit node position
   a. Click the Insert Button to the insert a node above the selected node. Edit node position
   b. Click the Remove Button to remove the selected node from the list
   c. Click the Move Up Button to move the selected node up one position
   d. Click the Move Down Button to move the selected node down one position
   e. Click the Split Button to split the line into two lines, using the selected node as the last node in the existing line, and the first node of the new line
   f. Click the Extend Button to bring up the extend line pop-up, as shown in Figure 10-18

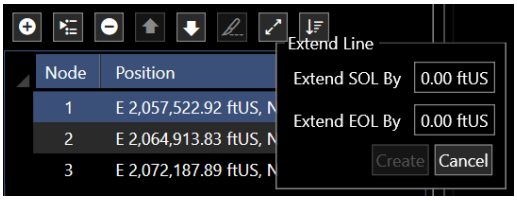

FIGURE 10-18 SURVEY LINES - CONFIGURE LINE EXTENSION

   g. The first node of the line will be moved along the reverse of the starting azimuth by the distance specified in **Extend SOL By** while the last node will be moved further along the ending azimuth by the distance entered in **Extend EOL By**
   h. Click the Reverse Node Order Button to reverse the Node order of the survey line
5. Click **Apply** to save the changes and keep the window open. Click **Ok** to save the changes and close the window or click **Cancel** to discard the changes but keep the window open.

10.5.2 EDIT A SURVEY LINE FROM THE MAP VIEW

1. Right click on a survey line in the Map View to bring up the survey line Pop-Up menu (see Figure 10-19)

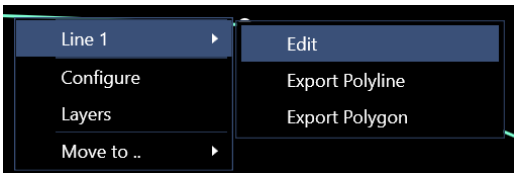

FIGURE 10-19 SURVEY LINES - EDIT SURVEY LINE POP-UP MENU

2. Click **Edit** to open the Configure Survey Line window (see Figure 10-20)

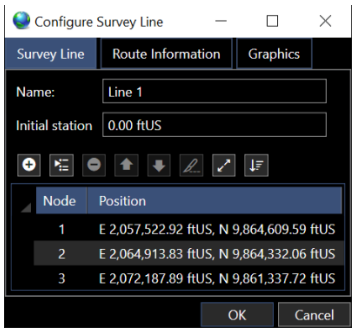

FIGURE 10-20 SURVEY LINES - CONFIGURE SURVEY LINE DIALOG

3. In addition, in the Map view the survey line nodes are highlighted with grips which can be selected and dragged (see Figure 10-21). Changes can be made via the dialog and the Map view.

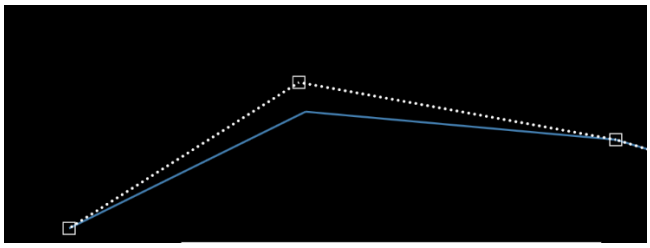

FIGURE 10-21 SURVEY LINES - NODE GRIP

4. Left mouse click on a node and drag it to the desired location, the node's coordinates will update in the Configure Survey Line Dialog after closing.
5. Right clicking on the line while in Editing Mode will display a context menu with an Insert node option. Click this option to insert a new node at the mouse coordinates (see Figure 10-22)

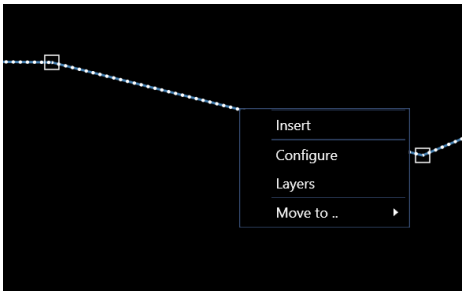

FIGURE 10-22 SURVEY LINES - INSERT NODE POP-UP

6. Right clicking on a node while in Editing Mode will display a context menu with a Node > Remove option. Click this option to remove the node.

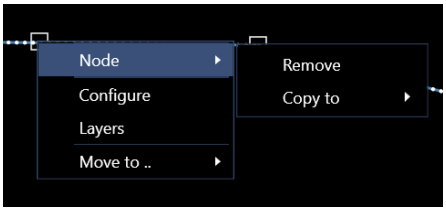

FIGURE 10-23 SURVEY LINES - REMOVE NODE POP-UP

7. To apply the changes made, click **OK** in the Configure Survey Line dialog, or **Cancel** to abort the changes.

10.6 EXPORT SURVEY LINES

Survey lines can be exported from the Survey Lines Window to a CSV text file or a Route Exchange Format.

The default extension for survey line export CSV text file is *.rln. The file contains one line for the line name and a line for each node in the Survey Line in the following format: Easting, Northing.

The default extension for the Route Exchange Format is *.rtz.

1. Open the Survey Lines Window.
2. Select one single survey line.
3. Click the Export Button.
4. A save file dialog is displayed. Select a location, file type and filename and click **Save** to export the line or **Cancel** to abort the operation.

10.7 IMPORT SURVEY LINES

The Import option allows the user to load a survey line from a file and add this to existing survey lines. On a networked system, this will result in the updating of the survey lines for all NavView systems on the network.

NavView supports custom import of any ASCII text data in a file. The input settings are configurable for delimited or for offset from start of line, as described below.

1. Open the Survey Lines Window.
2. Click the Import Button to launch the Open file dialog.
3. Browse to the file to import, select and click Open.

Note: Multiple files can be selected to be imported. In this case, steps 4 to 5 are repeated for each file selected.

4. The Import Route Data wizard is launched, File Settings (see Figure 10-24)

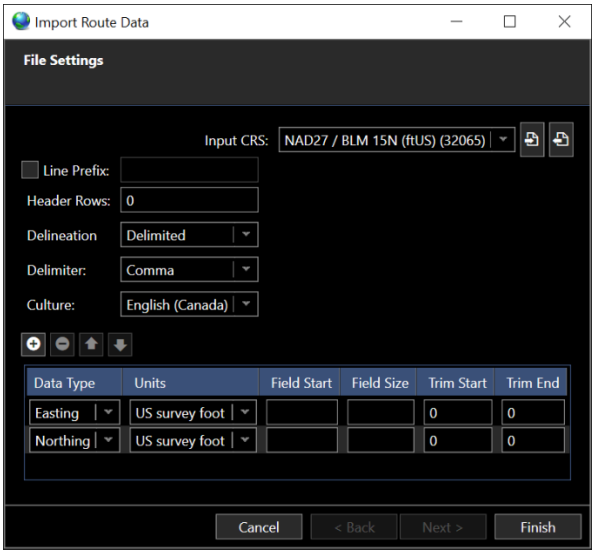

FIGURE 10-24 SURVEY LINES - IMPORT ROUTE DATA - FILE SETTINGS

- **Input CRS:** From the drop-down list of Horizontal CRSs present in NavView, select the CRS the points to be imported are on
- **Load Settings:** Click to load saved route import settings from a file
- **Save settings:** Click to save the current route import settings to a file
- **Line Prefix:** Check the box if there is a line prefix and enter the prefix in the box
- **Header Rows:** If a header is present in the file, enter the number of header rows
- **Delineation:** Select the data format, Delimited or Fixed Length
- **Delimiter:** Select the field delimiter from the respective drop-down list options
  - Comma
  - Space
  - Tab
  - Custom: selection of this option enables entry of the delimiter character
- **Culture:** From the drop-down list select the country numerical format

5. Click the button to add an entry to the data grid for every field in the record, whether the field is to be used in the import or not.

FIGURE 10-25 SURVEY LINES – IMPORT ROUTE DATA – ADD DATA FIELDS

- **Data Type:** Select the data type contained in the field, if the field is not to be used, select **Ignore**
- **Units:** Select the units or format that applies to the field and data type

- If **Delimiter** is Fixed Length
  - **Field Start:** Enter the zero-based index of the start of the field, e.g. the index of the first character in a record is 0, the index of the 10th character is 9
  - **Field Size:** Enter the length of the data in the field
- If **Delimiter** is comma, tab, space or custom
  - **Trim Start:** Enter the number of characters to trim from the start of the field value, e.g., if a field containing Depth contains “D 567.89”, 2 would be entered to trim the “D “ before reading the value
  - **Trim End:** Enter the number of characters to trim from the end of the field value, e.g., if a field containing Depth contains “567.89 D”, 2 would be entered to trim the “D“ before reading the value

Note: When using fixed length and Field Size, use the setting of the field start and field size to Trim unwanted start and end characters.

6. To **Move** a selected field up or down to re-order its place in the record, select the field and click either the  or  button
7. Click **Finish** to import the survey line and append it to the existing survey lines in NavView.

10.8 COPY SURVEY LINE

The Copy survey line feature enables the user to copy an existing survey line and edit it without affecting the original line. This is especially important for NavView’s option to track survey lines along the Geodesic. To support this, nodes must be inserted along the survey line such that it aligns with the geodesic.

1. Open the Survey Lines Window
2. Select the survey line to copy
3. Click the  Copy Button to launch the Copy file dialog

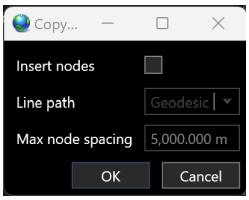

FIGURE 10-26 SURVEY LINE - COPY OPTION

4. If nodes are not to be inserted, go to step 6
5. To insert nodes
   a. Insert nodes:
      i. Check this box
   b. Line path:
      i. This is the path between original nodes that the new nodes will be generated on
      ii. Select Geodesic or Rhumb Line
   c. Max node spacing:
      i. Enter the maximum distance along the Geodesic or Rhumb Line between the nodes to be inserted

ii. Starting at each existing node, NavView will insert a node at this distance from the previous existing or new node until the distance to the next existing node is less than this

6. Click OK to create the copy
7. The new line will appear in the list with either the Line path and Max node spacing or an incrementing number in brackets appended to the original line name

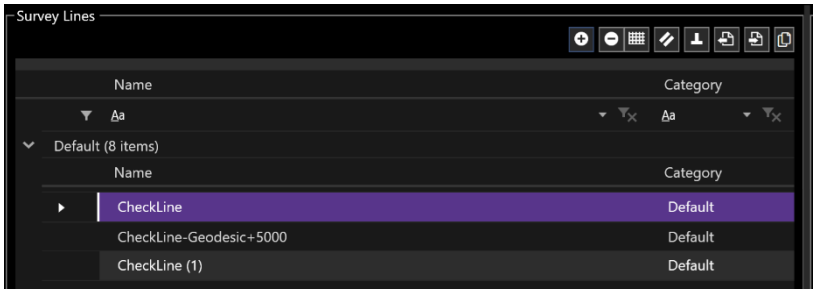

FIGURE 10-27 SURVEY LINES - COPIED SURVEY LINE