

# **CABLE ROUTE PLANNING TOOL**

## **TRENCHER ROUTE**

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Version: 4.6.1

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# 1 The Cable Planning tool

The Cable Planning Tool is an easy-to-use route drawing tool where the cable properties are used to drape the cable on the seabed and automatically detect free spans, cable bending and develop barge cable lay runlines for the chosen route.

## 2 How to set up

Start NaviModel and load the DTM of the intended site. Create a digitised line that will be used as a host for the route.

The nodes of the digitised line must be draped to the DTM surface, otherwise the route will curve to the digitised line node. This feature was done so that the user has control and can place cable start and end points away from the DTM if the real cable start and end points are not on the seabed. It is a good practice to drape the digitised line before designing the route unless where there are points where the route is designed as suspended; starting from a wall or coming off from a structure, for example.

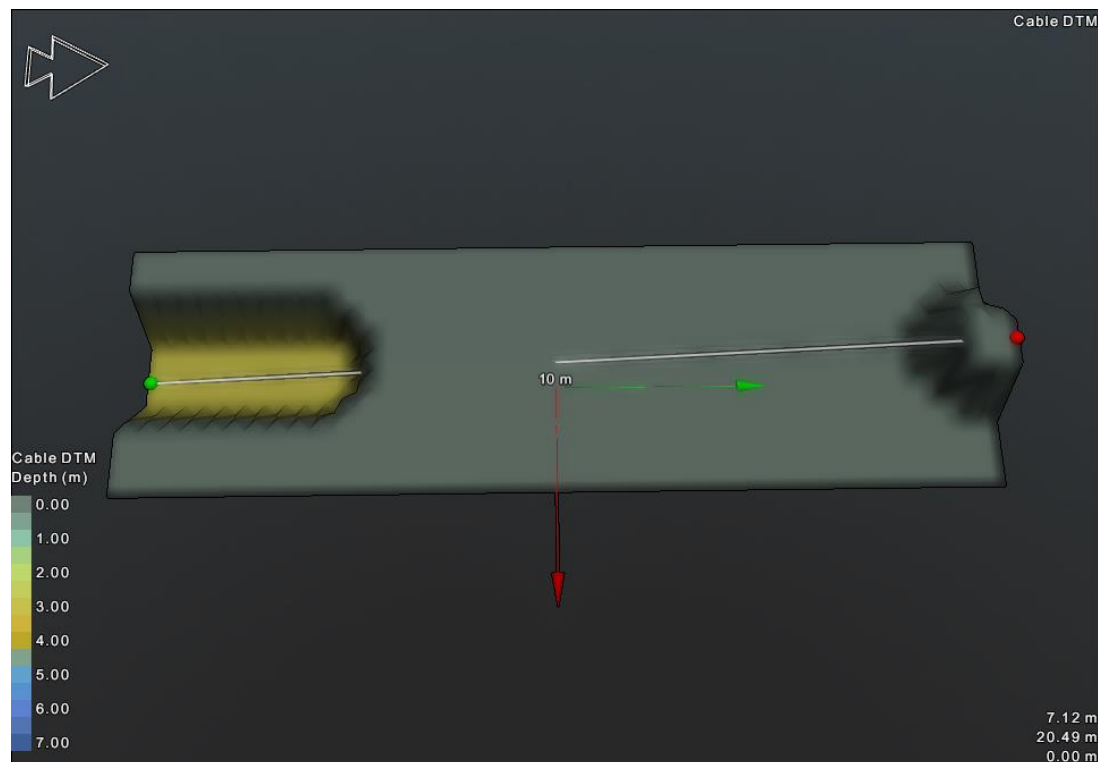


Figure 1 Create a digitised line over the DTM

Go to **Tools > Design > Cable Route**.

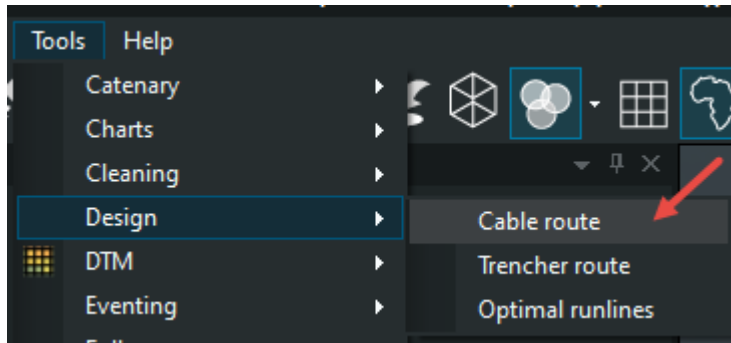


Figure 2 Location of Cable route tool

Use the digitised line as a host line.

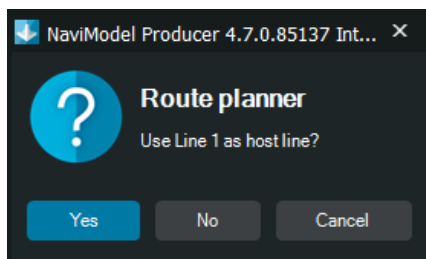


Figure 3 Use the digitised line as host

The **Cable Depth Profile** view opens, and the **Cable Routes** node is created in the NaviModel **Project Tree**.

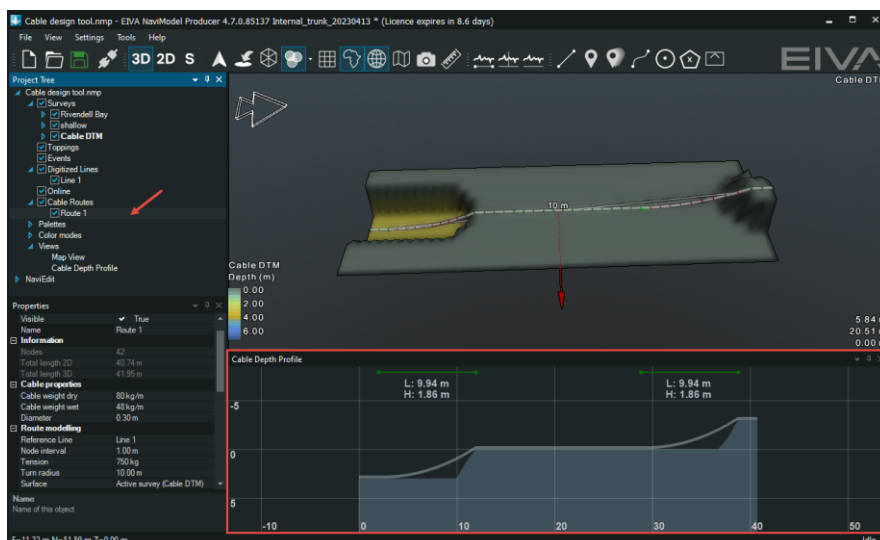


Figure 4 After selecting the host line a Cable route node appears with the Cable Route

The route is calculated with a bending radius along the digitised line.

## 3 Route properties

The user can adjust the Route properties from the **Properties** view.

Adjusting the Cable Weight will change the free span.

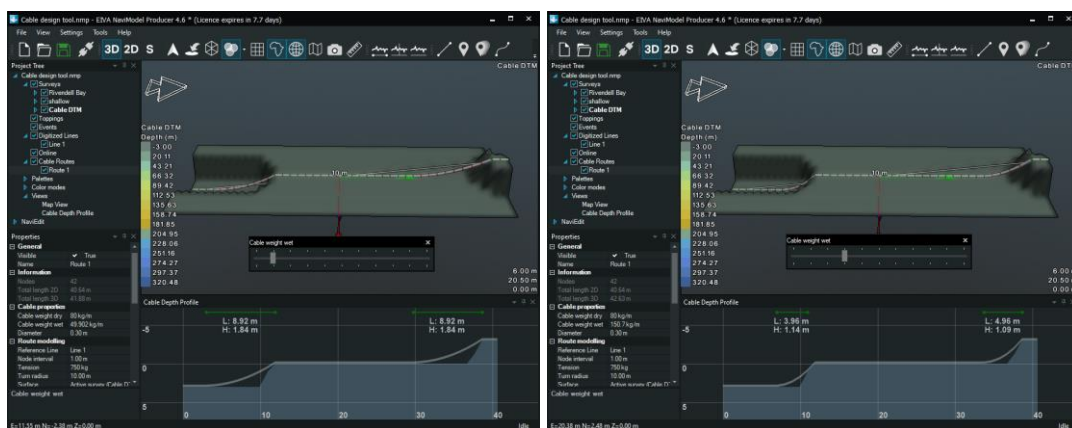


Figure 5 Changing the weight will adjust the calculated free span

The cable free span is also adjusted by changing the designed tension.

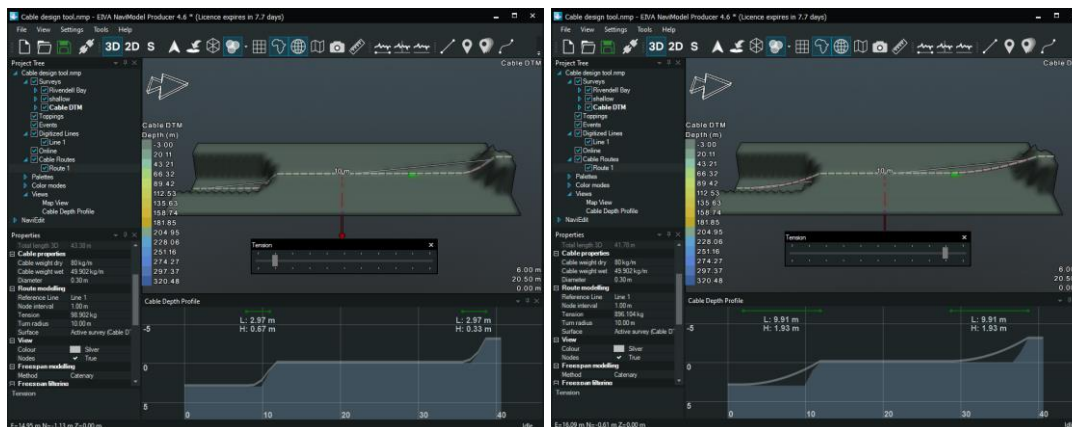


Figure 6 Changing the Tension will adjust the calculated free span

In the **Properties** view of the **Cable route**, the user should set up:

- The cable diameter
- The maximum allowed turn radius

Also, in the Properties, the user can adjust or change:

- The reference line
- Node spacing
- Cable color
- Free span modelling

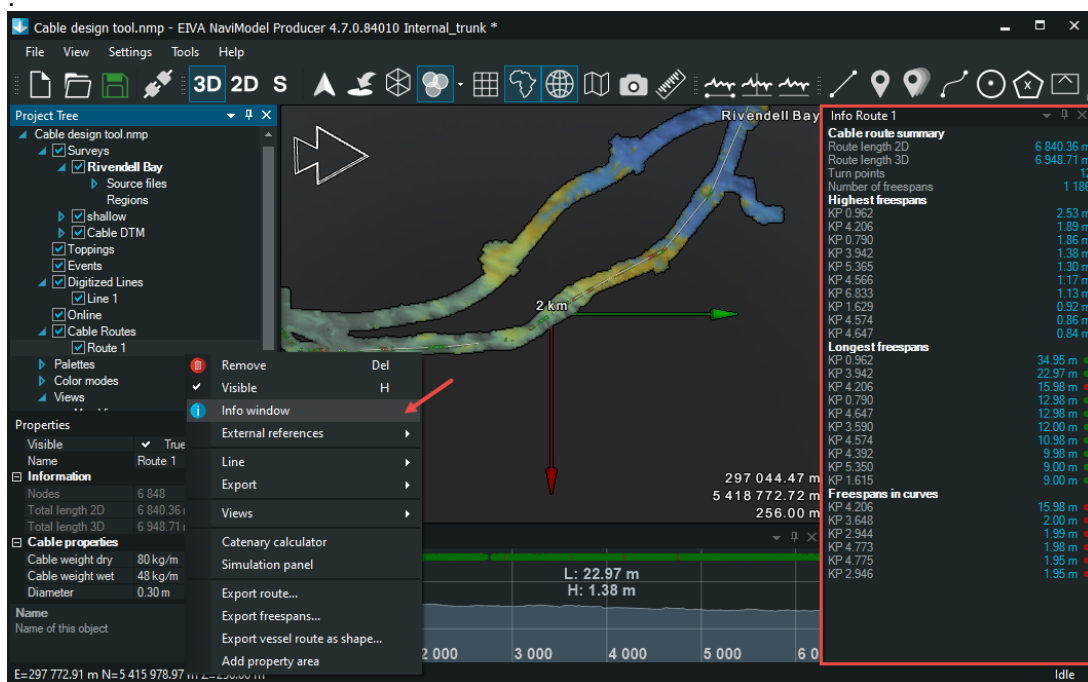


Figure 7 The Info Window also displays more information about the route

Free spans are flagged with red if the free span occurs while the cable is bending. This alerts the user that the modelled free span is not realistic and the user should adjust the host digitised line so that the nodes create a realistic route.



## 4 Adjusting the route

The route is calculated with a bending radius along the digitised line and with the properties set up in the previous chapter.

The user can adjust the route by editing the nodes of the controlling digitised line. The route is calculated by rounding the corners of a digitised line until it meets the bending radius requirement.

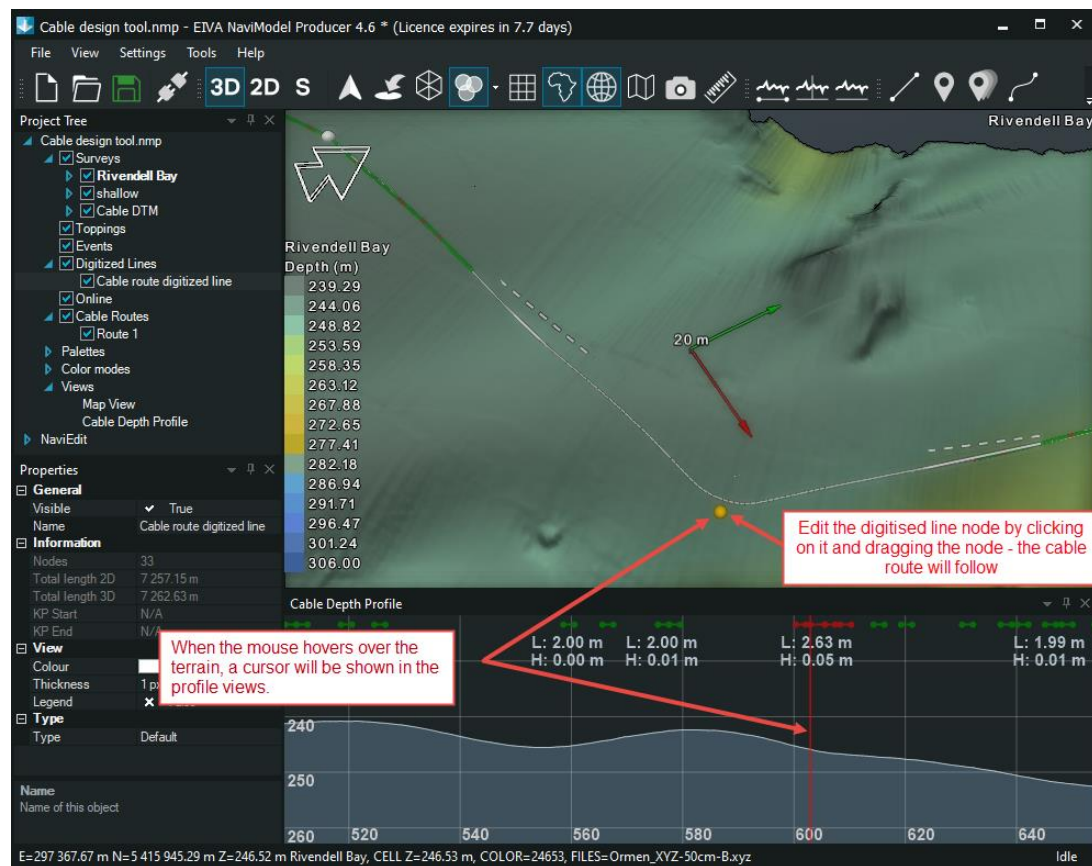


Figure 8 Edit the digitised line to adjust the cable route

The bending radius is used in valleys along the route to predict free spans. This is not an accurate calculation, but a visual clue that free span is unavoidable at the location.



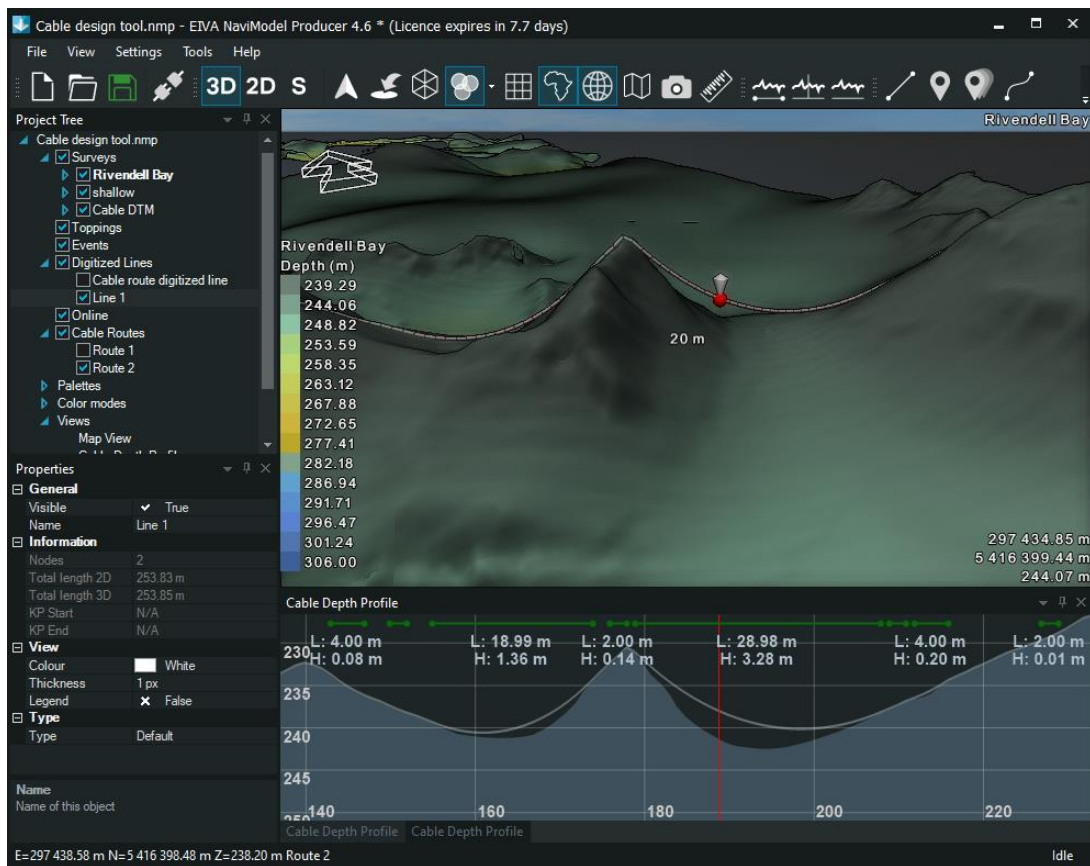


Figure 9 Free span visualisation

## 5 Profile Views

The user can open more profile views for the cable route:

- Depth – opens by default when creating the route
- Side Slope
- Along Slope
- Bending

The profiles and the 3D views are always in sync. When zooming or panning in 3D or in profile views, the other views follow along. You can drag the profile views to a secondary monitor for convenience.

The bending profile has the unit of degrees/meter, this way a bending violation will show as a spike. If bending radius was used in this profile, a straight segment of the route would

have an infinite bending radius at the location. Thus, the inverse is used. The horizontal red line shows the bending radius threshold.

The user can double-click in all the profile views to jump to a particular location, for example on the spike in the bending profile.

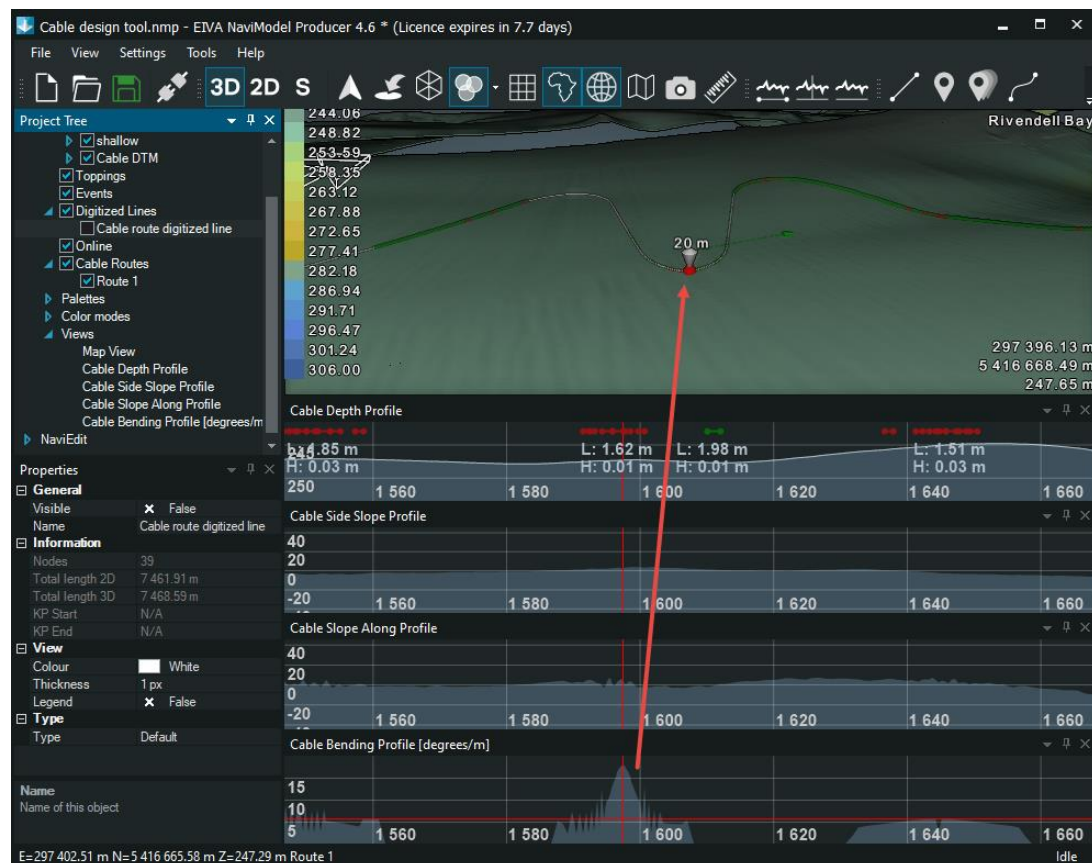


Figure 10 The profile views – the Cable Bending Profile showing how to spot an excessive bending of the cable

## 6 Lay simulation

In the **Properties** of the **Cable Route** you can set up the width and length of the laying vessel.

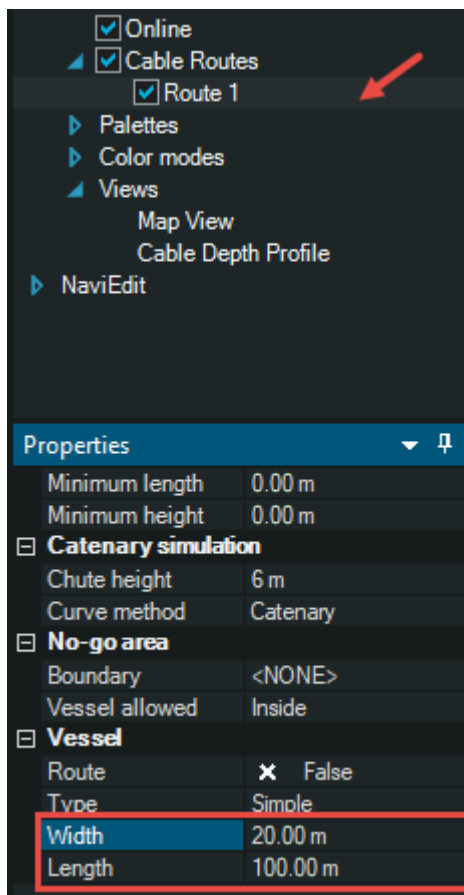


Figure 11 Set up the Vessel size

Right click the route to open a simulation panel. With this panel, you can animate a vessel laying the route. For each touch down point along the route, a catenary is projected to the surface. This gives us the vessel route.

Adjusting the cable parameters will change the way the barge route will be designed.

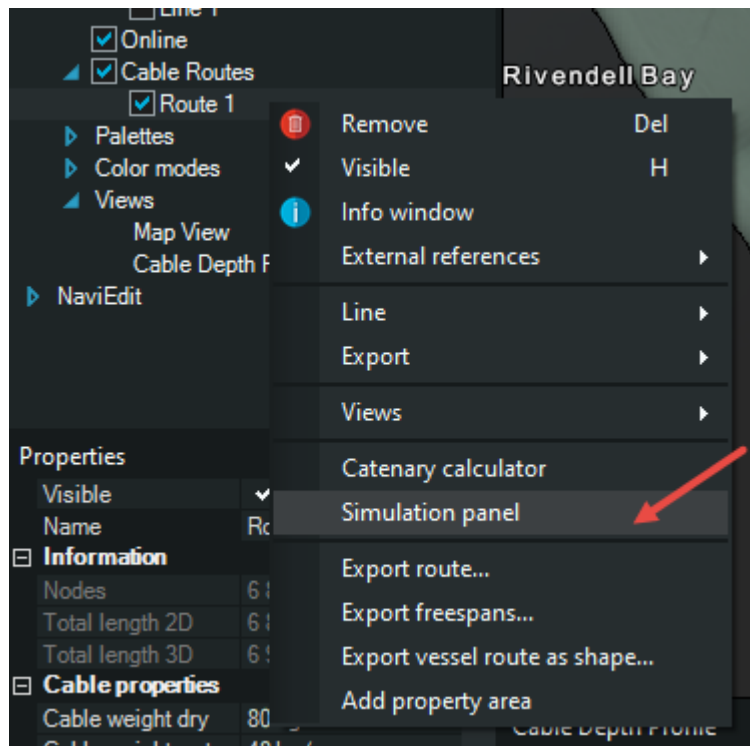


Figure 12 Where to find the Simulation panel

Click **Play** on the **Simulate** panel to run the animation.

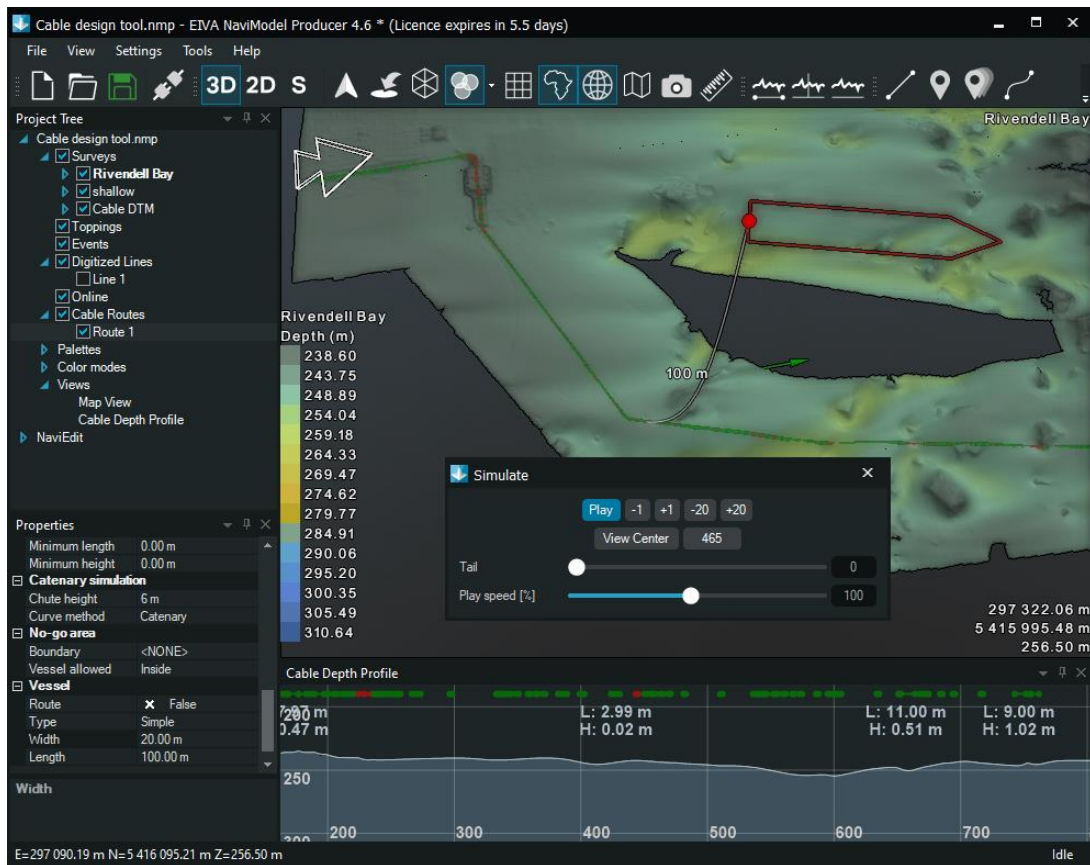


Figure 13 Visualising the cable lay simulation with Simulate panel open

From the route object **Context Menu**, you can save the cable route or the vessel route as a shape file.

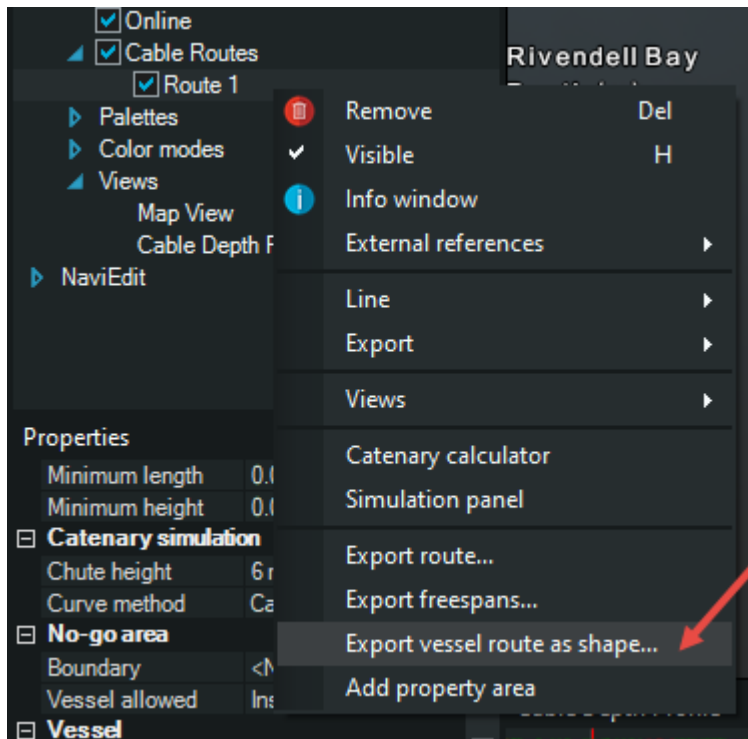


Figure 14 Export vessel route

A good way to investigate the vessel route can be to import it back into NaviModel by dragging and dropping the .shp file into the **Map View**.



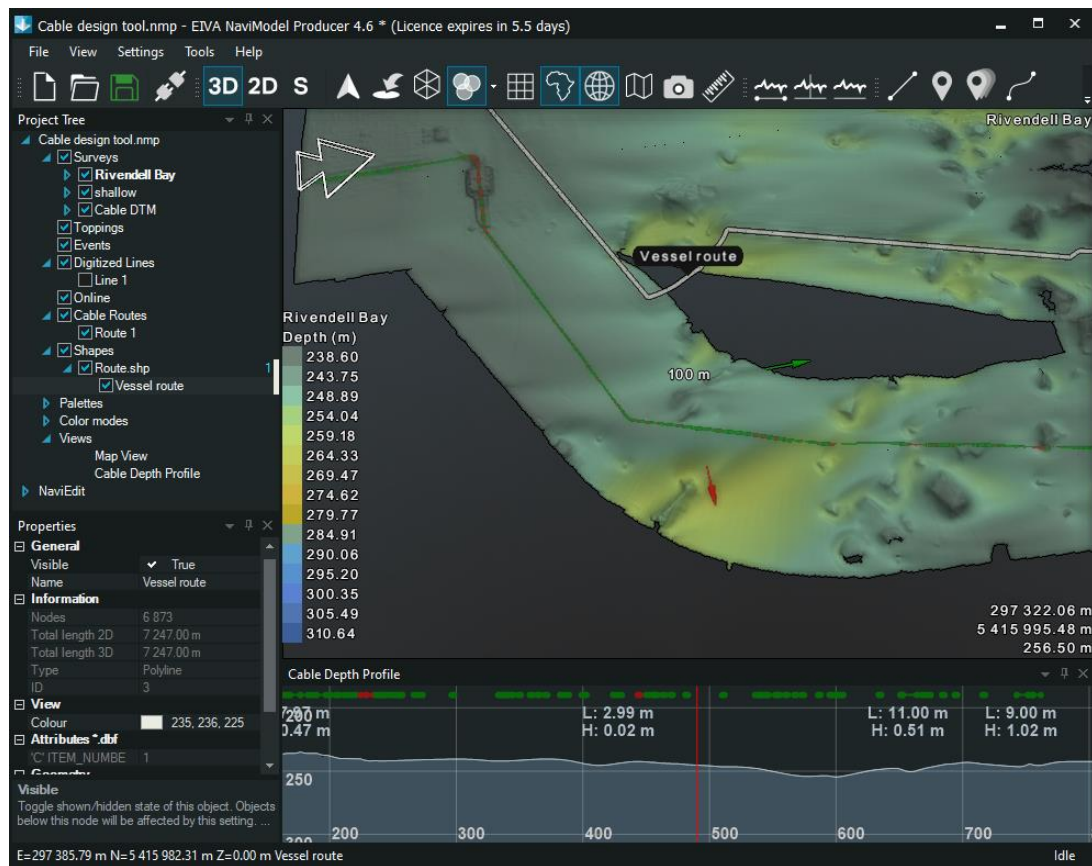
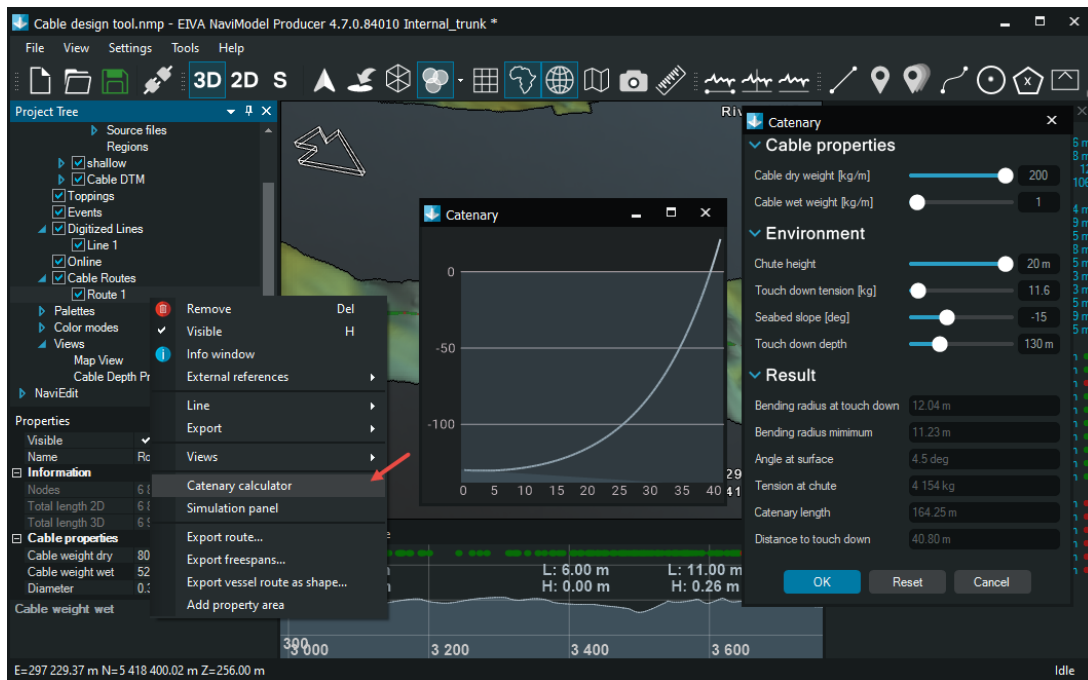


Figure 15 The Vessel route imported in NaviModel

## 7 Catenary calculation

The user can access a catenary calculator by right-clicking on the route. The **Catenary calculator** allows the user to adjust various parameters and see how this influences the cable catenary.



## 8 Trencher route

Using the cable route, the user can simulate a trencher and analyse the roll and pitch angles as the trencher would lay a cable. The tool can be started from **Tools > Design > Trencher Route**.

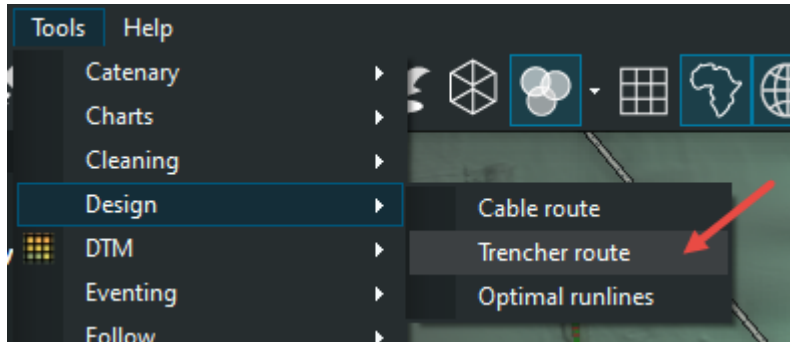


Figure 16 The Trencher route tool

A trencher route node will appear in the **Project Tree**. Select it and set up your cable route as the reference line and a trencher model. By default, NaviModel comes with a T-1500 trencher model.



Figure 17 Set up the Reference line and Model

As the user hovers over the Map View, the trencher will follow and keep in the middle of the **Map View**.

The user can set up a dashboard to see the heading, roll and pitch values of the simulated trencher.

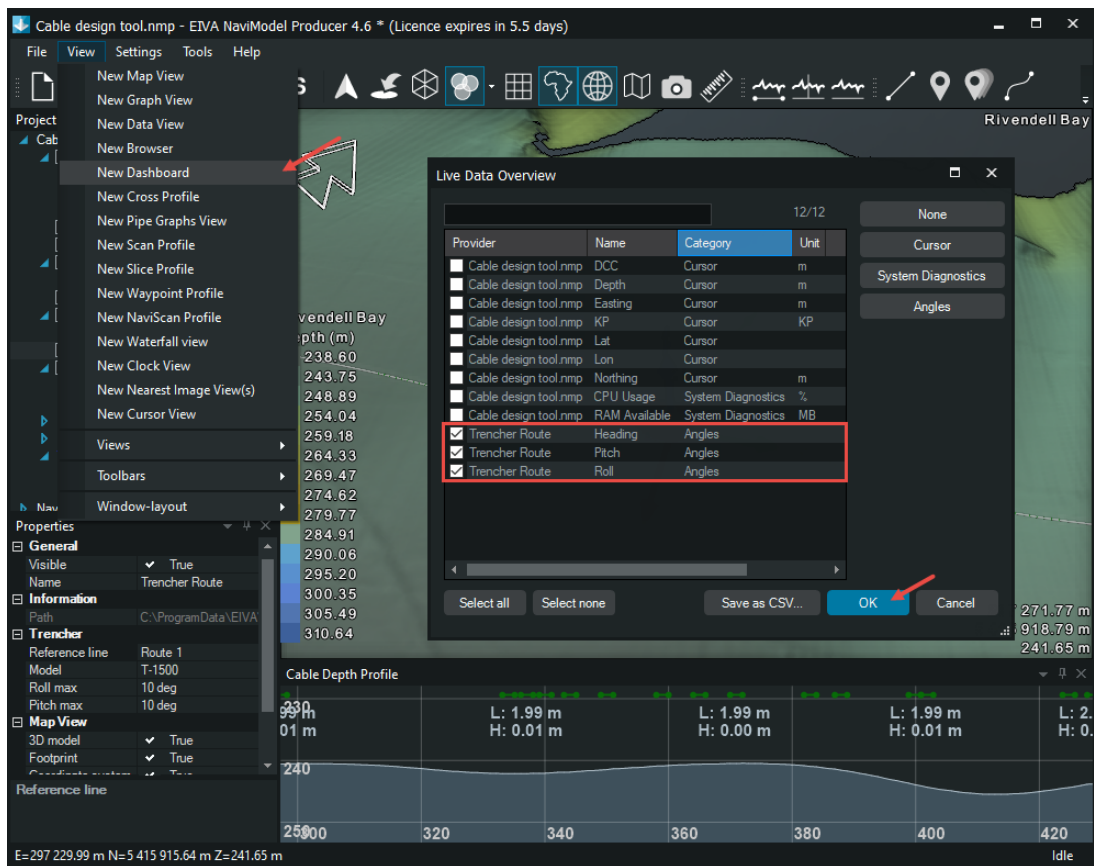


Figure 18 Set up the dashboards with heading, roll, and pitch angles



Figure 19 Dashboard showing Heading, Pitch, and Roll values



## 9 Version descriptions

Version	Date	Author	Description
		JEK	NaviModel Help
4.6.1	06.06.2023	VLA	Turned to manual, added trencher chapter