

NAVISUITE DEEP LEARNING (NSDL)

FIND OBJECTS FROM IMAGERY

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1 Prerequisites

The NaviSuite Deep Learning feature **Find Objects from Imagery** requires some beforehand actions.

Please follow these steps:

- Download and install the latest NaviModel Producer (see [EIVA download site](#))
- Two licences are needed (please ask EIVA@eiva.com for a 30 day trial licence):
 - NaviModel Producer licence activation key and a
 - NaviSuite Deep Learning – Pipeline Inspection licence activation key
- Prepare your NaviModel Producer project (*.nmp)

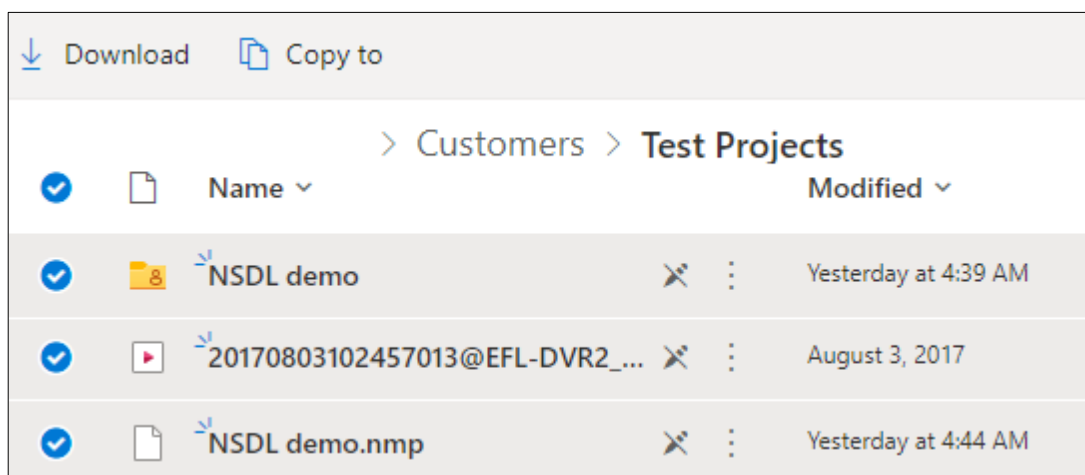


Figure 1 Example EIVA Deep Learning test project

The project needs to contain the following:

- Track
- Video or Image Series
- Event Collection containing Event Types
- Connection to a Deep Learning server

These parameters are needed to execute **Find Objects from Imagery**.

Note: If you are only performing a setup, you only need an **Event Collection** to get started.

Before you can begin, you need to enable Deep Learning in NaviModel. As this feature is in an experimental phase, the following steps need to be taken in order to enable it:

- Click in the **Map View** and press Ctrl + L to open the **Log Window**.

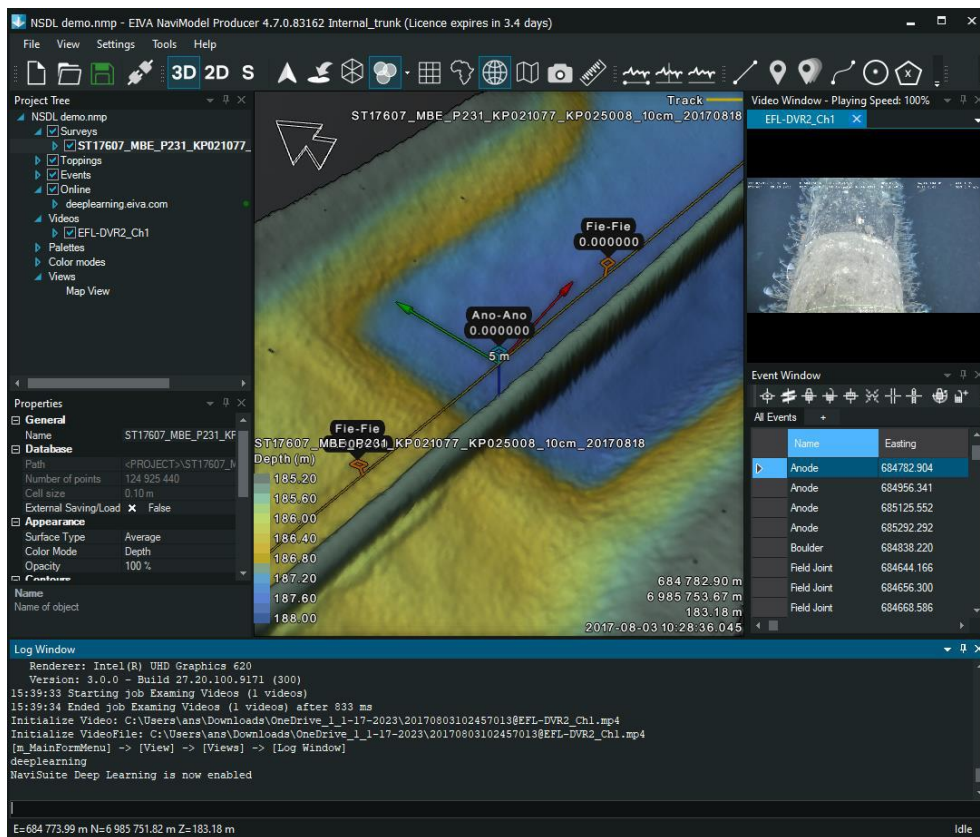


Figure 2 NSDL demo project: Log Window

- In the **Log Window** type **deeplearning** and hit enter. There should then be a message stating that Deep Learning is now enabled.

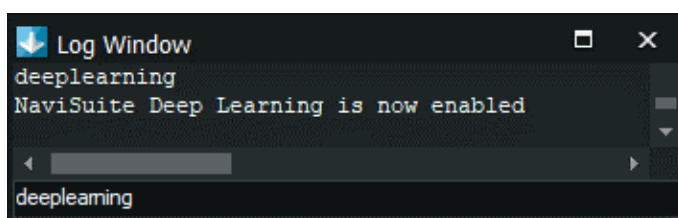


Figure 3 Log Window with deeplearning enabled

Note: If you want to disable Deep Learning later, open the Log Window using the same steps and type **deeplearningoff**

2 Establishing a connection

To choose a server to connect to, select the **Connect...** icon on the toolbar.

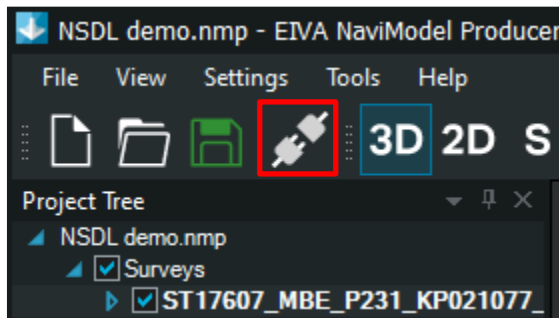


Figure 4 Toolbar: Connect button

This opens the Connect dialogue. Initially, there will not be a Deep Learning server available.

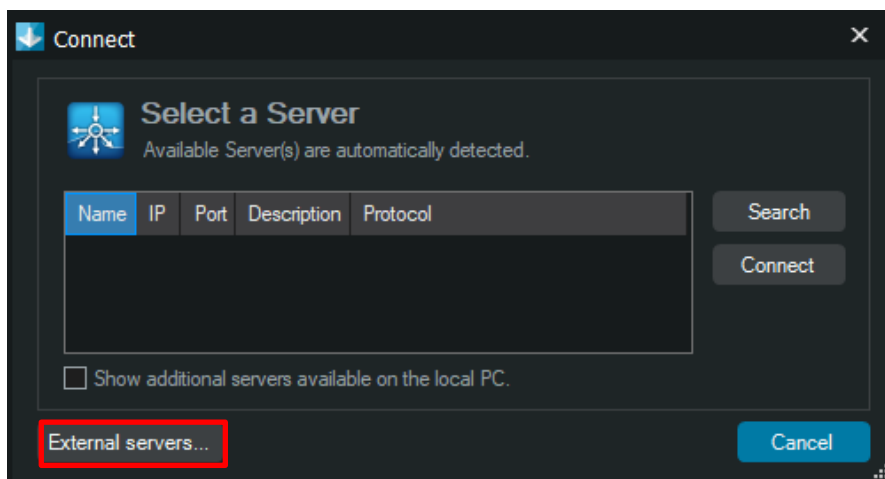


Figure 5 Select External servers...

To access the Deep Learning server, select External servers... This will open a .txt file. To access the Deep Learning server, copy/paste the following line:

deeplearning.eiva.com:443; NaviSuiteDeepLearning; EIVA public server

```

servers.txt - Notepad
File Edit Format View Help
#### Additional domains/addresses for discovering local network servers:
#### <ip or domain>
ais.eiva.com

#### Manual connection information for connecting directly to external servers/services:
#### <ip or domain> :<port>: <protocol>: <optional description>
#### deeplearning.eiva.com :443; NaviSuiteDeepLearning; EIVA public server
  
```

Figure 6 ExternalServer.txt

After saving (Ctrl + S) and closing the .txt file, a Deep Learning server should be available. Select the Deep Learning server and connect to it.

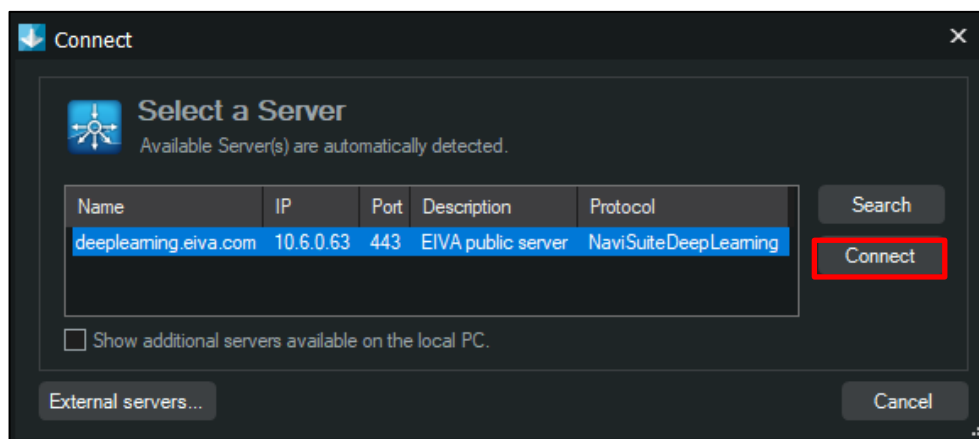


Figure 7 Available server

3 Setup

3.1 Accessing Find Objects from Imagery

Browse in the **Project Tree** to the **Events** node, right mouse-click on it and use the option **Remove Subnodes**. The event collection will be deleted.

Browse in the **Project Tree** to the **Events** node, right mouse-click on it and use the option **New Event Collection**. The event collection will be created.

Browse to the **Event collection**, right mouse-click on it, choose **Create > Set up Find Objects from Imagery...**

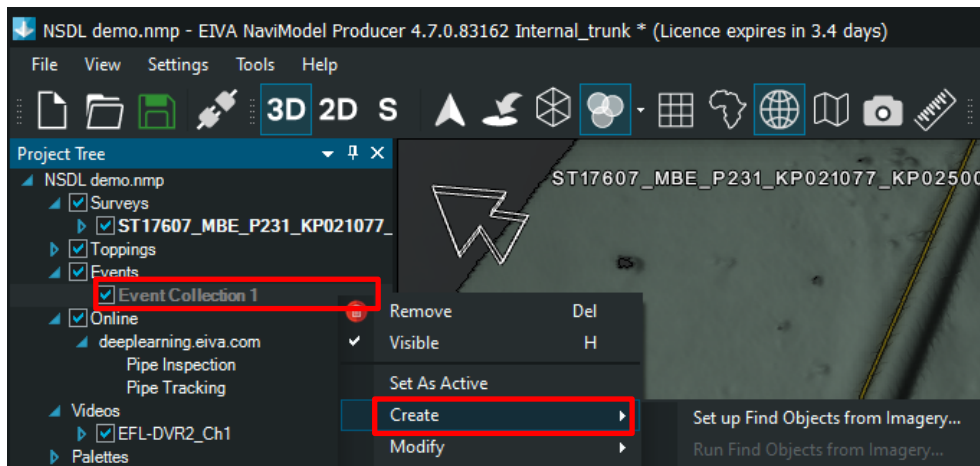


Figure 8 Navigate to Set up Find Objects from Imagery

This opens the dialogue box **Set up Find Objects from Imagery** with two headers:

- Dependencies and
- Mapping Objects to Event Types.

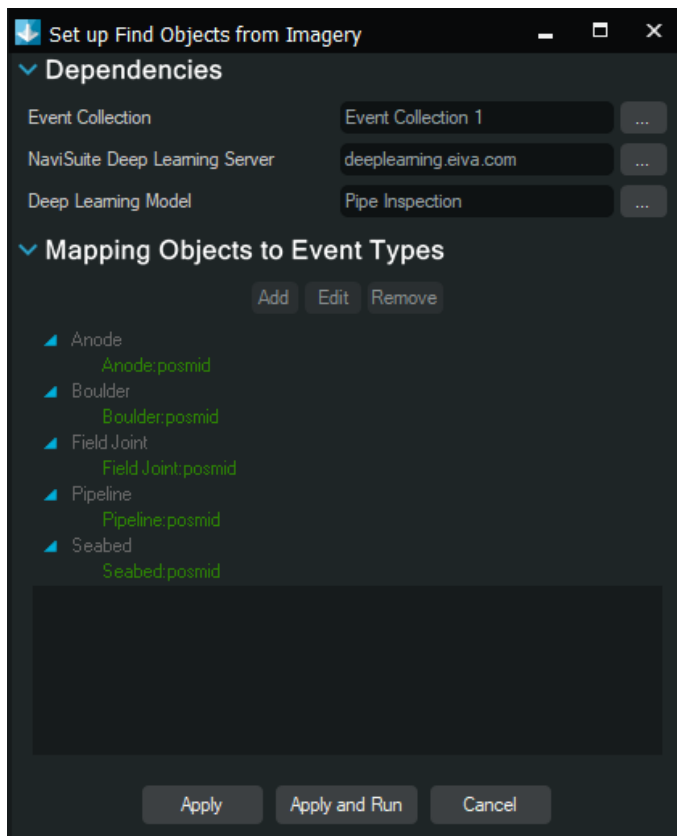


Figure 9 Set up Find Objects in Imagery window

3.1.1 Dependencies header

You can adjust the following parameters in this header:

- **Event Collection**
- **NaviSuite Deep Learning Server**
- **Deep Learning Model**

These will be discussed in further sections.

3.1.1.1 Event Collection

This allows you to select the **Event Collection** that you wish to use.

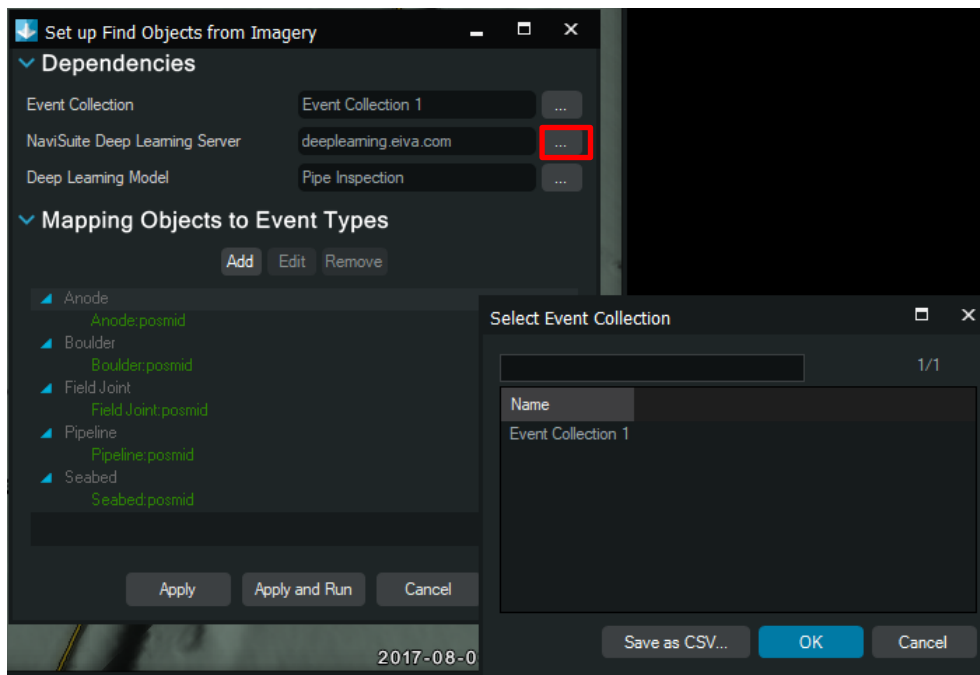


Figure 10 Choose Event Collection for Setup

3.1.1.2 NaviSuite Deep Learning Server

This displays the Deep Learning server that you are connected to. If you are not already connected to a Deep Learning server at this point, you can do so here.

3.1.1.3 Deep Learning Model

This section allows you to select the Deep Learning Model that you want to use. It is recommended that you use the most recent model.

3.1.2 Mapping Objects to Event Types header

If you have already selected your own **Event Types** for your **Event Collection**, you can create your own mappings to your **Event Types**.

To do this, select an **Event Type** and choose **Add** in the **Actions** field.

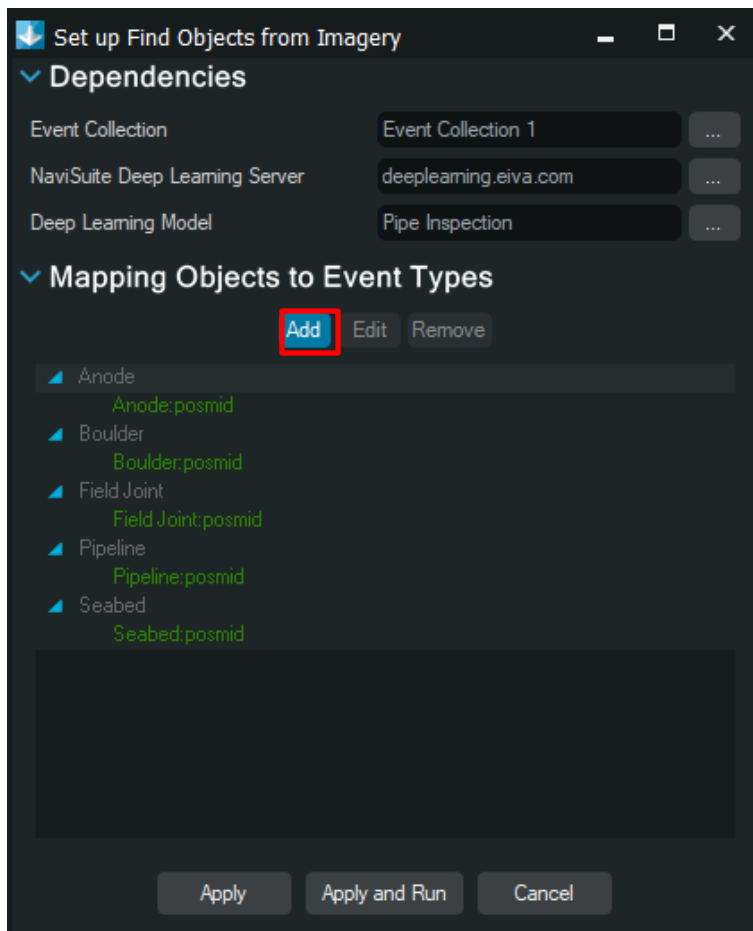


Figure 11 Add mappings to Event Type

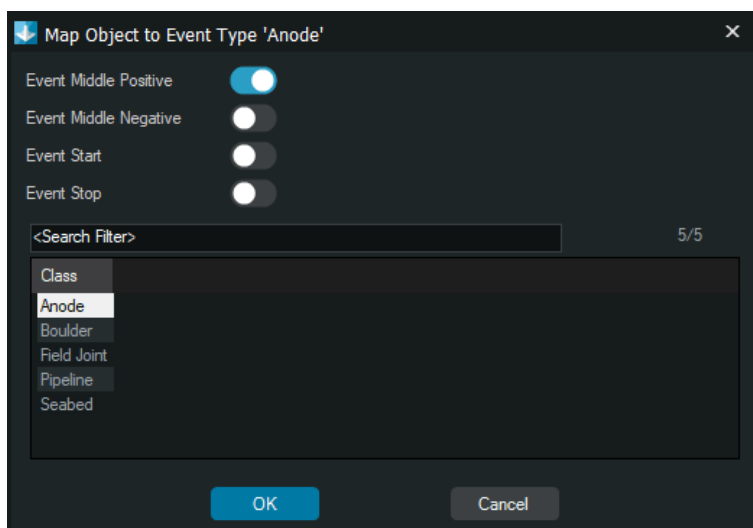


Figure 12 Choose mapping from Class list

As shown in Figure above, you can select your mapping from the Class list.

You also can choose which Events should be added to the Event Type. The options for this include:

- **Event Middle Positive**
- **Event Middle Negative**
- **Event Start**
- **Event Stop**

If you change your mind on a mapping, it is possible to **Edit** or **Remove** it. To do this, select the mapping and then choose either **Edit** or **Remove** in the **Actions** field.

Note: It is only possible to Edit or Remove a mapping. You are unable to add anything to it.

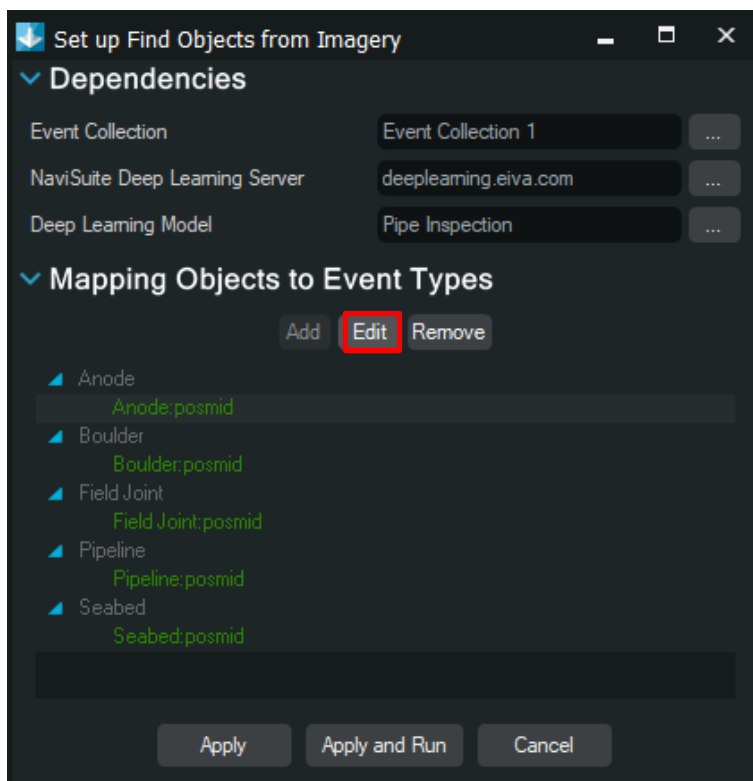


Figure 13 Edit or Remove mapping

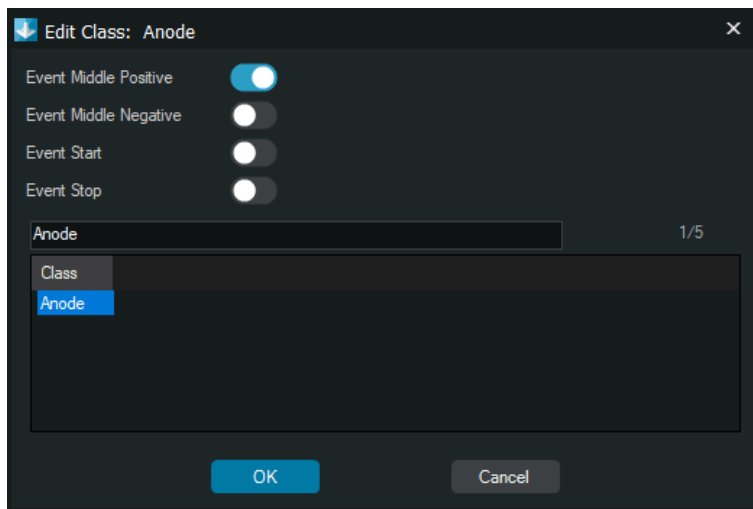


Figure 14 Edit mapping window

Note: After selecting the most recent **Deep Learning Model**, you will be prompted with a **No event types** window if it detects that your **Event Collection** is empty. If you select **Yes**, a default setup of **Event Types** and **Mappings** will be created and be displayed under the **Mapping Objects to Event Types** header.

If you are only performing a setup of the Deep Learning Parameters, then you can end here. If you want to execute Deep Learning, continue to the next section.

4 Executing Find Objects from Imagery

After you have completed all of the fields in **Set up Find Objects in Imagery**, you have the option to choose **Apply** or **Apply and Run** your setup.

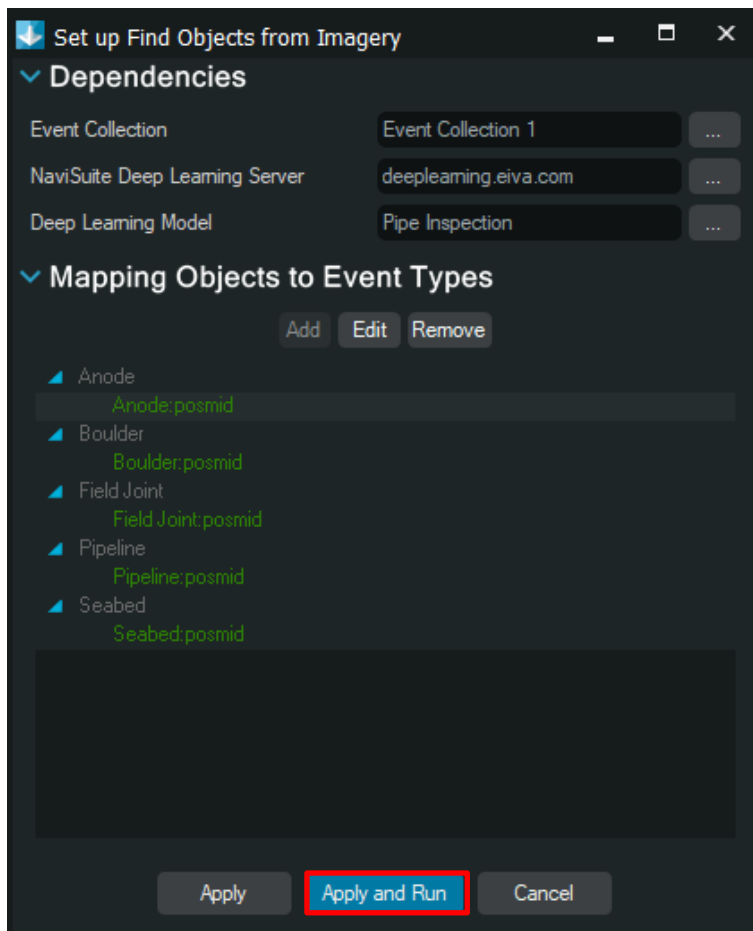


Figure 15 Apply and Run Setup

Note: If you select **Apply**, the setup is added to the **Event Collection** and the change is made to the project. If you save the project, the setup will then be saved as well. You can then run your setup later from the **Project Tree**.

If you select **Apply and Run**, a dialogue box appears for **Input Imagery Rate Parameters**.

This is to set how many frames to extract with which frequency in the video or image series.

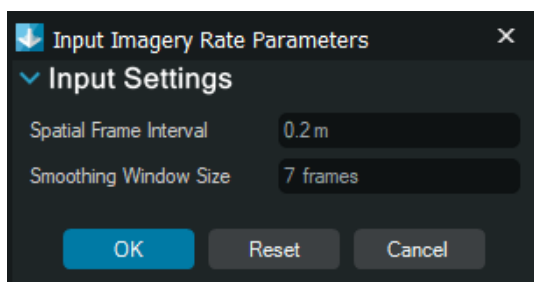


Figure 16 Input Imagery Rate Parameters with default settings

Default parameters are already input. You can adjust these accordingly to your video or image series.

Note: If you are working with an image series and you set the **Spatial Frame Interval** too low, you will receive a warning.

After establishing these parameters, you will be prompted to choose the input. If using a video feed, always select the centre camera feed.

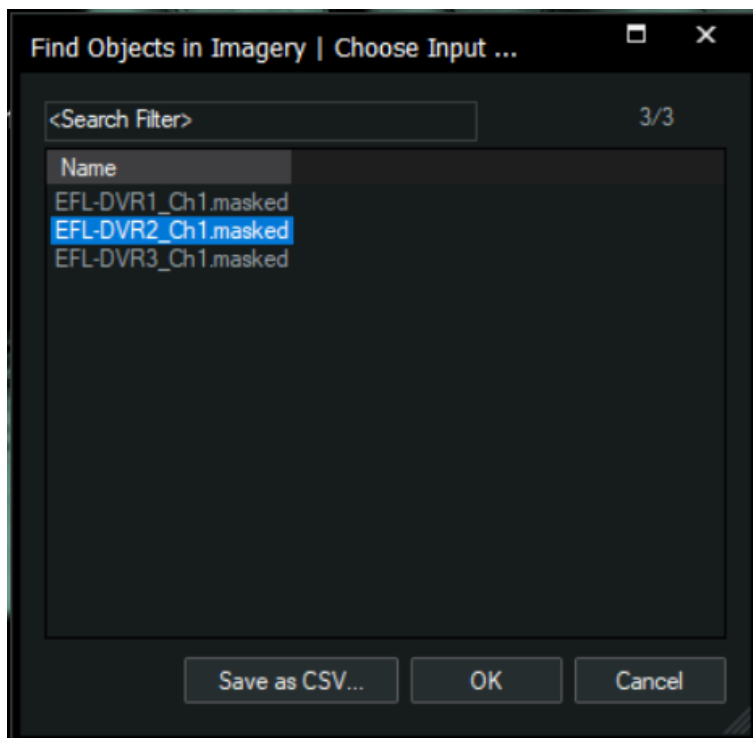


Figure 17 Select centre video feed

After making this selection, NaviModel will begin extracting frames from the video and placing **Events**. These will appear under **Events** in the **Project Tree**.

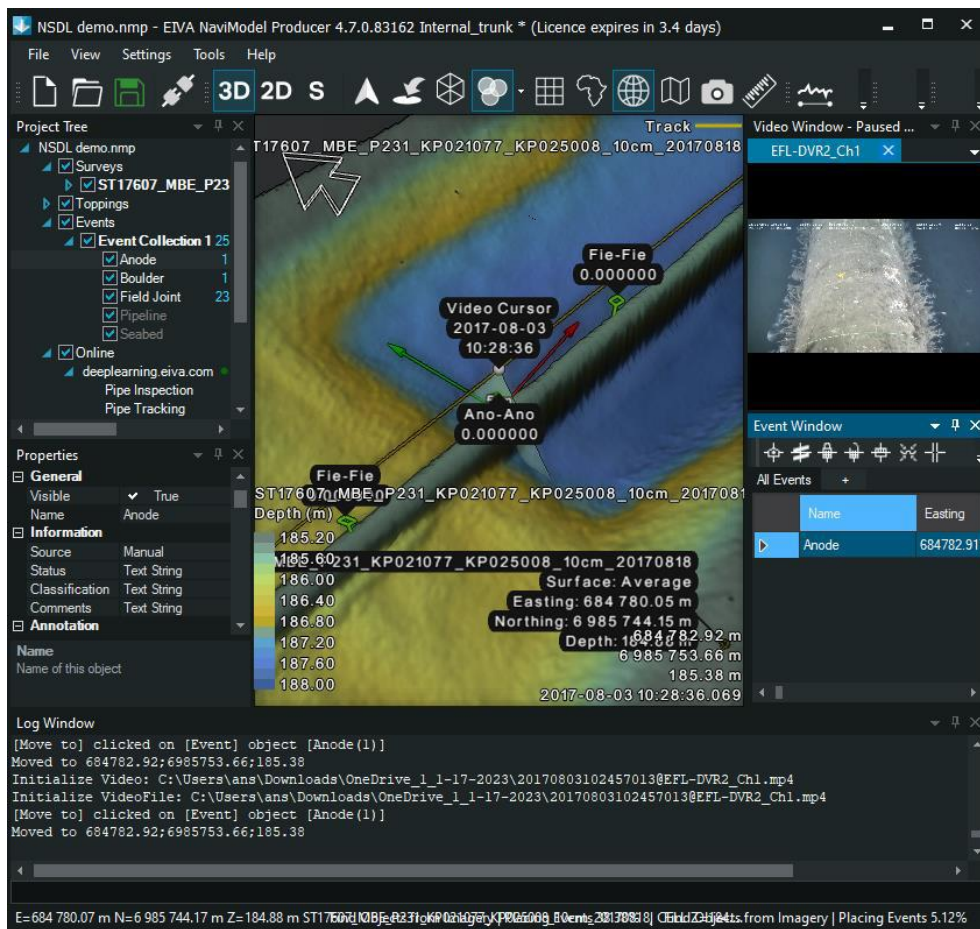


Figure 18 Found events displayed in the Map View

Once this process is complete, you can move between the Events to view them.

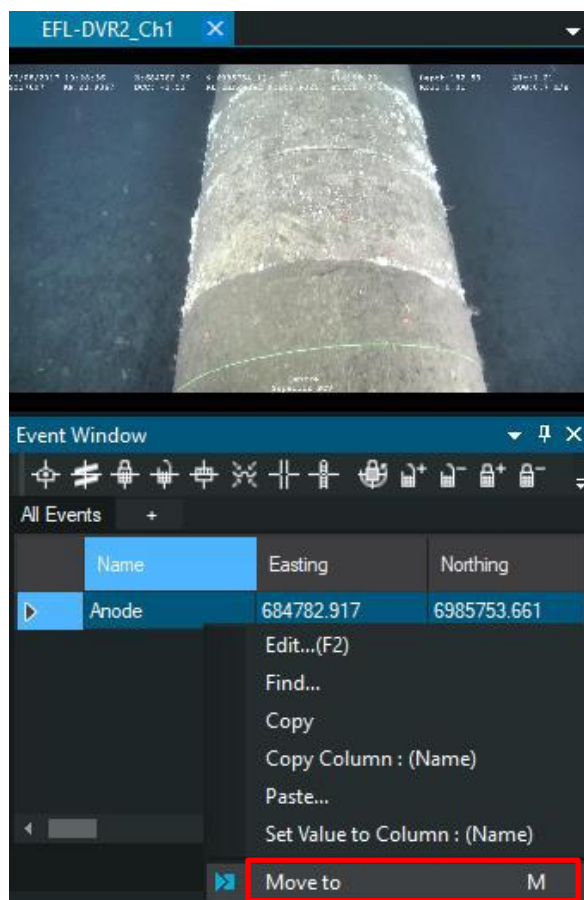


Figure 19 Move to Event

Note: Once you have gotten the results for the video or image series the first time, the subsequent results will be the same. These results will be stored. You can then change the mappings and start the process again, with a faster processing time.

Figure 20 Move to Event

Note: Once you have gotten the results for the video or image series the first time, the subsequent results will be the same. These results will be stored. You can then change the mappings and start the process again, with a faster processing time.