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Sandvika, July 2018

E-mail: contact.scandinavia@trimble.com

Homepage: civil.trimble.com/novapoint

Trimble Solutions Sandvika, Leif Tronstads Plass 4, Postboks 434, 1302 Sandvika
Phone number: 67 81 70 00 Telefax: 67 81 70 01

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Part 1: Getting started

This course

This course is an introduction to Novapoint 21.

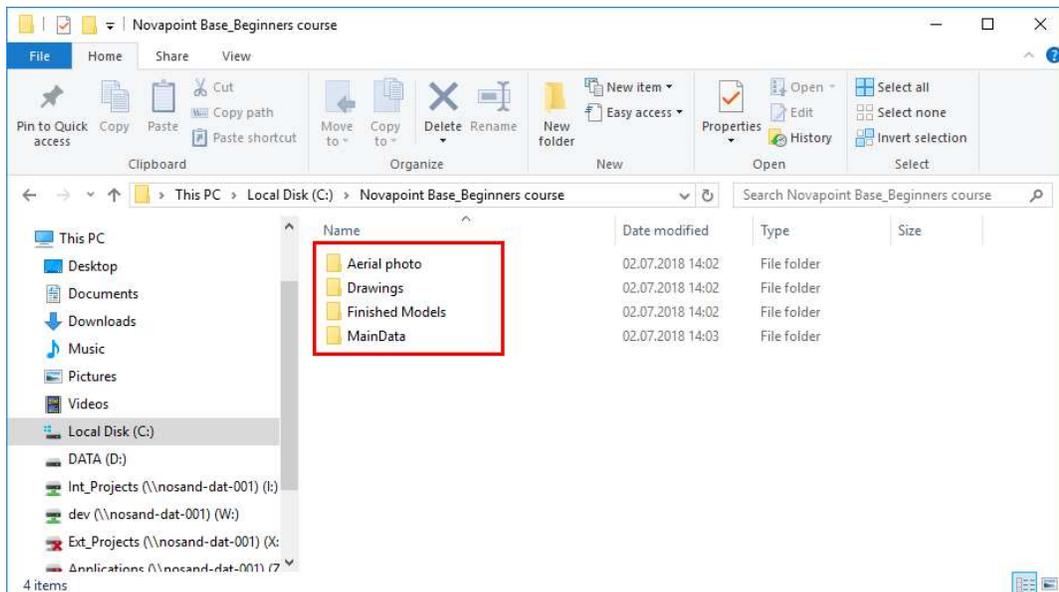
The focus of this course is:

- Become familiar with the user interface and working methods in Novapoint Base
- Import map data from files
- Build and edit terrain surface
- Construct 3D objects in the model
- Generate longitudinal-sections and cross-sections
- Build sub surface layers
- Become familiar with the use of windows, drawing rules, selecting objects, processes, etc.

Course files

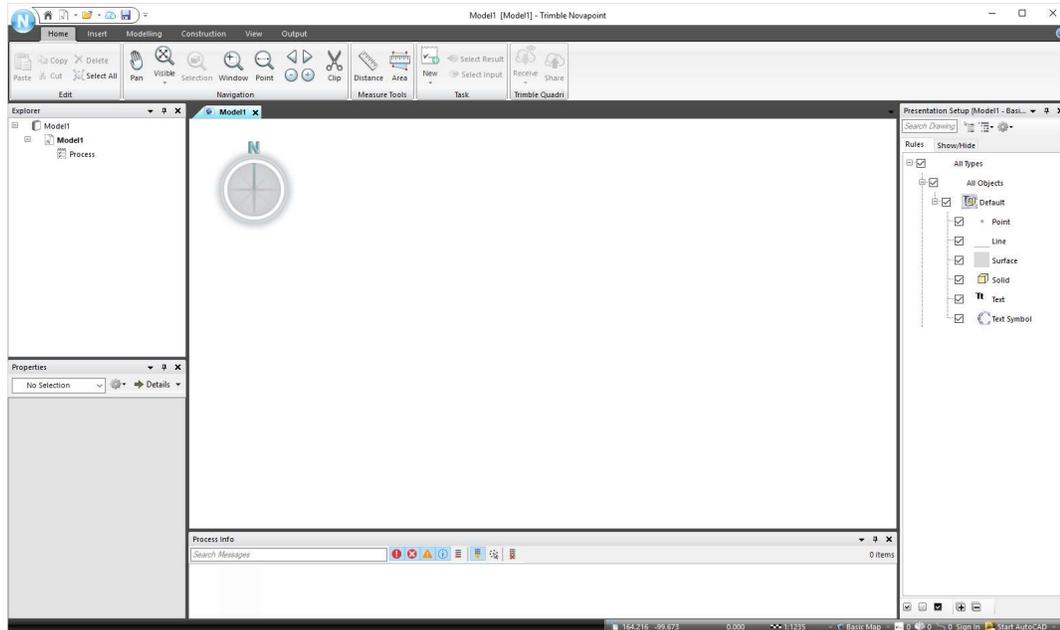
The set of data to be used for this course is available in **C:\Novapoint Base_Beginners course**

You will find the following files in this directory:

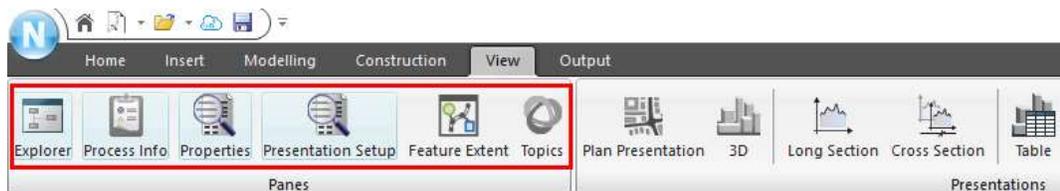


Terms and User Interface

On Start up the screen will normally appear as below.



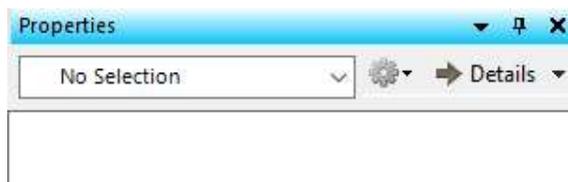
The various windows can be turned on and off or placed differently. Click on the **View** tab, and you will see the different panes:



At the first startup of Novapoint 21, the panes are enabled as shown above. The user can control which of them are active and where they are placed on the screen. The location of the windows is stored in the active binder, so that when you close, and open the binder again, the program will remember where you placed the windows.

It is recommended that you have the panes for Explorer, Process Info, Properties and Presentation Setup active.

As an example select the **Properties** window.



To move the panes, hold down the left mouse button whilst you drag the window, and the possible locations to move the window will be highlighted. Drag the window to the desired location and release.

Binder

A binder is a file that keeps track of your project information (see project binders). In the same binder, you may add one or more Quadri models. The Quadri-model contains 99.9% of the information handled, whilst the binders contain information on, for example, which Quadri model is active (only one at a time) and which windows were most recently displayed.

Explorer

The Explorer displays the contents of a Binder. As mentioned above, these primarily contain one or several Quadri-models. You can explore the contents of each model, where you can become familiar with the process tree and the object, which are often presented as a tree.

A model is made up of:

-  Process Tree (tasks in a hierarchy)
-  Objects, listed according to their object type

Task

A Task is just what it sounds like; something to be executed in order to complete the project. The tasks can be broken down into a hierarchy (Work Breakdown Structure, "WBS") to keep track of all the tasks.

A task is given a name and a place in the task hierarchy.

Each task is of a certain type. For each task type, there is a tool used to perform such task. The task type 'Alignment', for example, is performed by the Alignment design tool.

Each task stores information about which objects in the model that were used as input to the task, as well as which objects were created in the model as a result of the task being executed. There are some exceptions; tasks that do not necessarily have input data from the model (for example import tasks) and tasks that do not produce results in the form of objects (such as presentation tasks).

A task can therefore produce anything from 0 to 1 or several thousand objects.

NB! A task can be repeated until you are satisfied with the result.

Object

An object in the Quadri model represents primarily a physical object in the model with its attributes (geometry is one of the attributes).

One object in the Quadri model can also be an object without geometry, eg. an event (accident, animal collisions , etc.). The model also allows for physical object to exist in the model without geometry.

The available objects in a model are defined in the object directory. Object types are categorized into object groups. An object in the model is an instance of an object type, as defined in the object directory.

An object has at a minimum the following attributes:

- **Name** (name of the instance of the object type)
- **Life-cycle status** (existing or being designed)
- **Unique ID** (generated by the program, attached to the object throughout its lifetime)
- **Validity time period**
- **Valid from time**
- **Valid to time**
- **Generic attribute**

All objects have the ability to have an unlimited number of user-defined attributes associated with it (these are listed as "generic attributes" in the attribute window). User-defined attributes can be included during import or applied afterwards if one would like to add an attribute that has not been predefined in the object.

Other attributes found on an object will vary depending on what is defined for the object type in the object directory.

Geometry

As previously mentioned objects can exist without geometry.

The objects handle geometry like any other attribute and can therefore have 0 to several geometries.

Each geometry, with the exception of surfaces, have a set of attributes that provides information about:

- The quality and accuracy of the geometry.
- Where it is located, the height reference, where on the object the geometry is located and where in the 'space' the geometry is located (medium).
- Properties such as field numerical code (feature code) and field code (alphanumeric).
- A set of dates: first digitalisation date, verification date and any update dates for the geometry.
- The process history of geometry.

If you cannot find an object type that fits the desired object you want to create in the model, then the object directory has a type designated as 'unclassified object type'.

This makes it possible to import all types of objects even though one may not find a matching object type in relation to data being inputted.

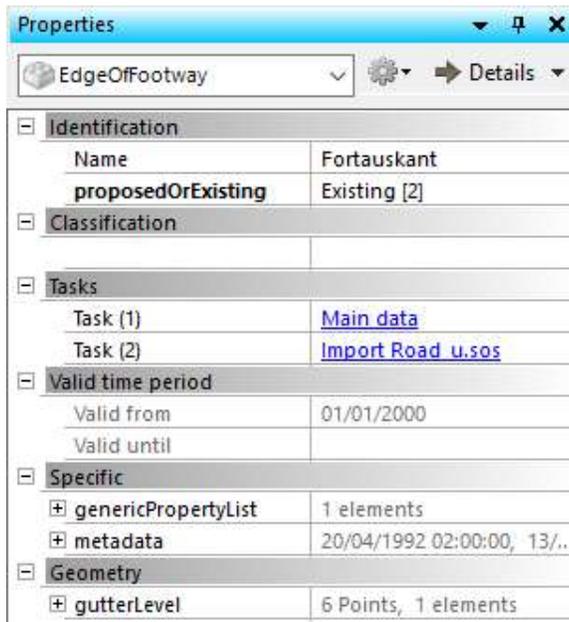
Properties/Attributes

This window shows the properties of the selected item. The following items are available:

- The Quadri model
- Tasks
- Objects

If you select multiple items the properties will be summarized in the properties window.

Picture below shows an example of EdgeOfFootway object seen in the Properties window.



EdgeOfFootway	
Identification	
Name	Fortauskant
proposedOrExisting	Existing [2]
Classification	
Tasks	
Task (1)	Main data
Task (2)	Import Road u.sos
Valid time period	
Valid from	01/01/2000
Valid until	
Specific	
genericPropertyList	1 elements
metadata	20/04/1992 02:00:00, 13/...
Geometry	
gutterLevel	6 Points, 1 elements

Process Info

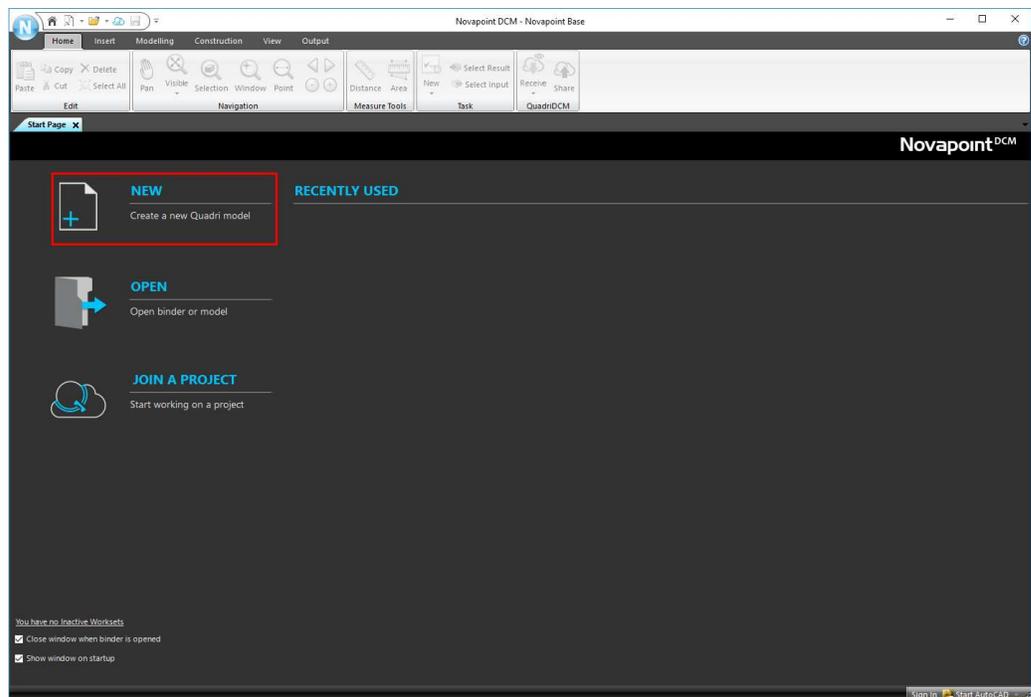
Process info displays system messages when tasks are performed. This may be error messages, but also information about what is being done, for example how many objects were imported.

Exercise 1 - Starting a new project

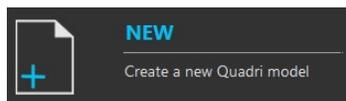
1. **Double-click the Novapoint Base icon on your desktop to start the program.**



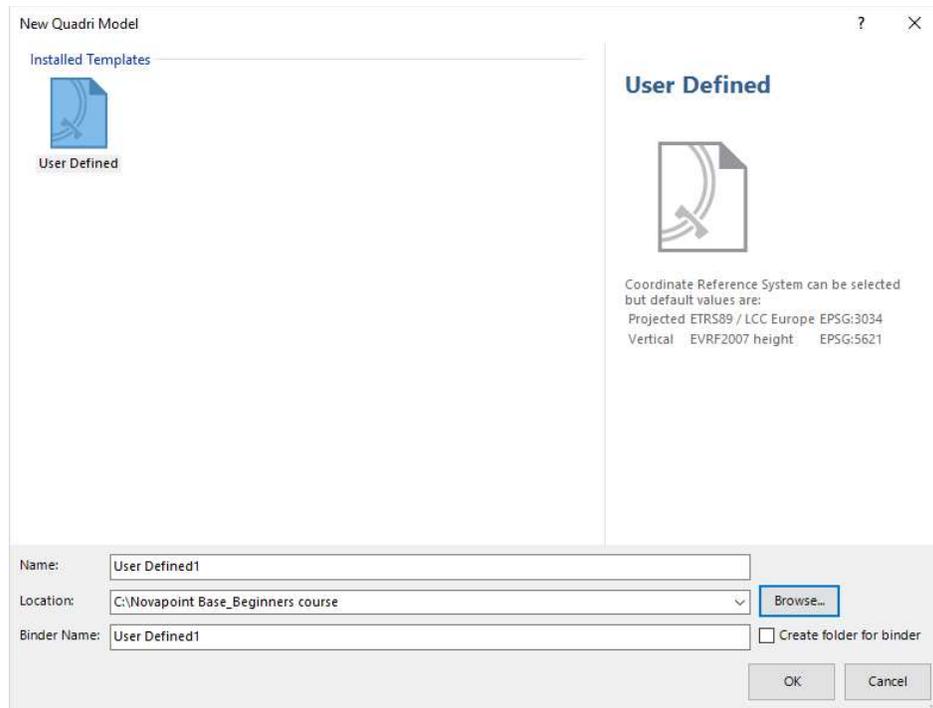
2. This dialog appears:



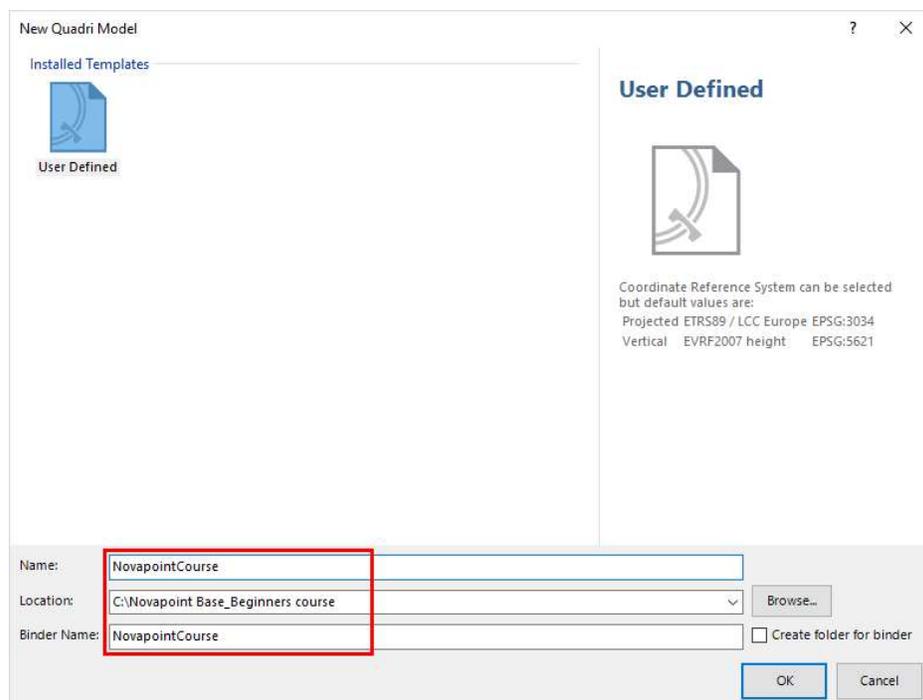
Select the **New** button:



This dialog appears:



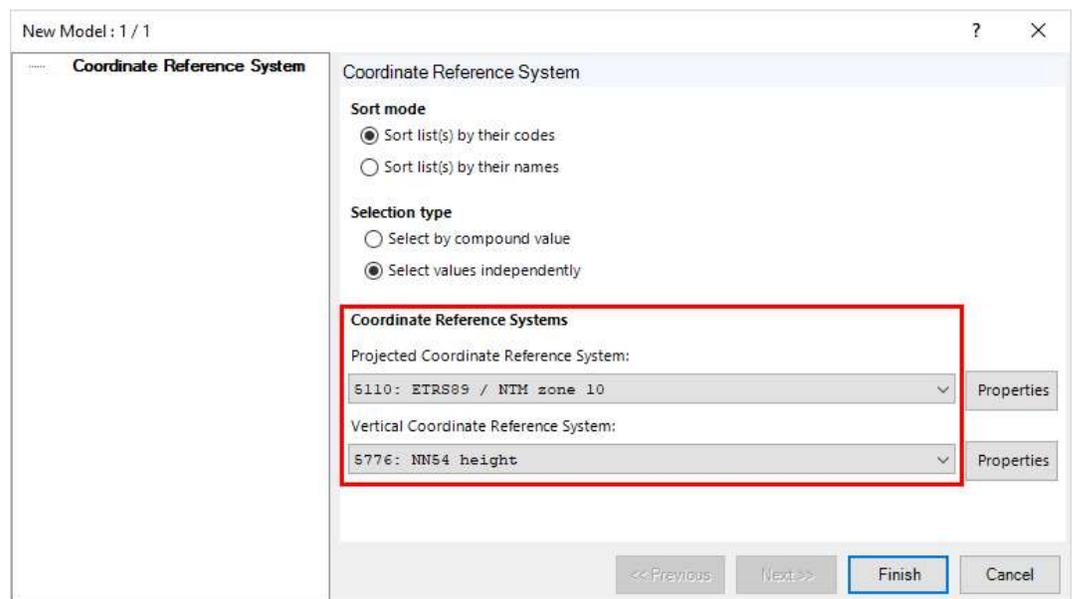
3. Enter a model name – **NovapointCourse**
Browse to a location for the project **C:\Novapoint Base_Beginners course**



Note that the name of the binder is set to the same name as the Quadri model. The binder name refers to the “binder” where the Quadri model is stored locally. Several Quadri models or subprojects may be linked to the same binder.

Click **OK**.

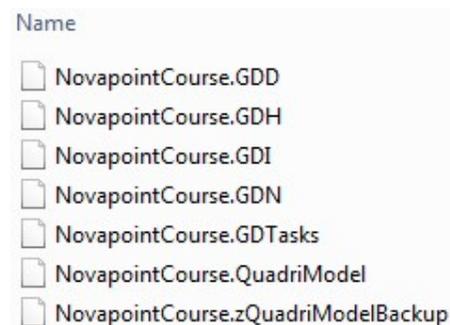
- You can now select a CRS (Coordinate Reference System) for you model. For the training course we select the values shown below that is in accordance with our input data:



Select **Finish**.

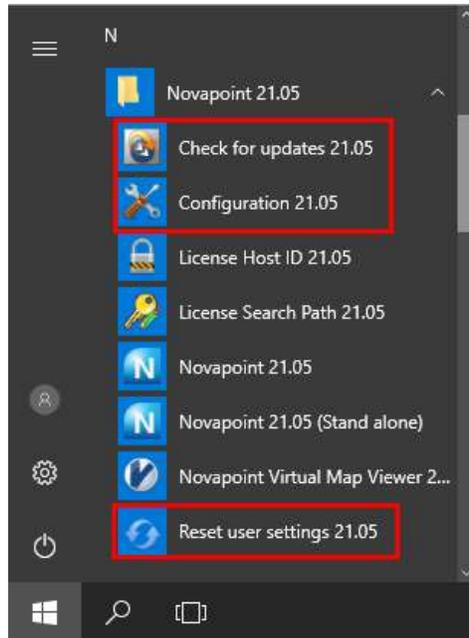
You have now set up a new Quadri model and Binder.

The Quadri model is stored in the file structure below. Each time you save the project you get the option to save the Binder you have created. In addition, folders with road model files, water and sewerage files etc. will be created. A folder is created for each task that requires a file attachment. The folder receives a name corresponding to the task GUID (Globally Unique ID).



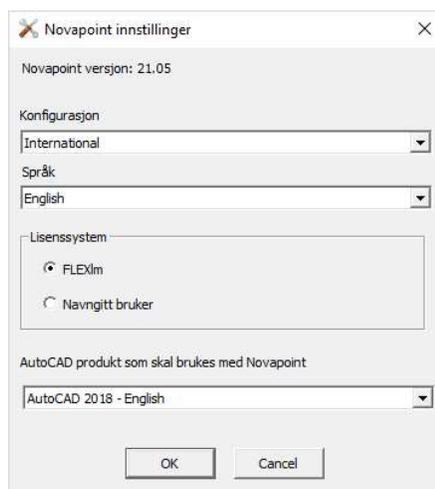
TIP:

Under Program files and Novapoint 21 there are three commonly used functions:



Check for updates – used to see if your version is the latest version and will install the latest update.

Configuration – used to change the Novapoint language version and to select which AutoCAD you wish to use. The most stable is pure AutoCAD but Novapoint will work with AutoCAD Map 3D and AutoCAD Civil 3D. Can also be used to set which licence system you are using – FLEXlm or Vianova ID:

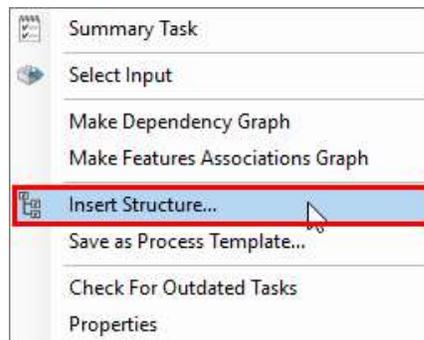


Reset user settings – can resolve some issues if Novapoint is not responding normally.

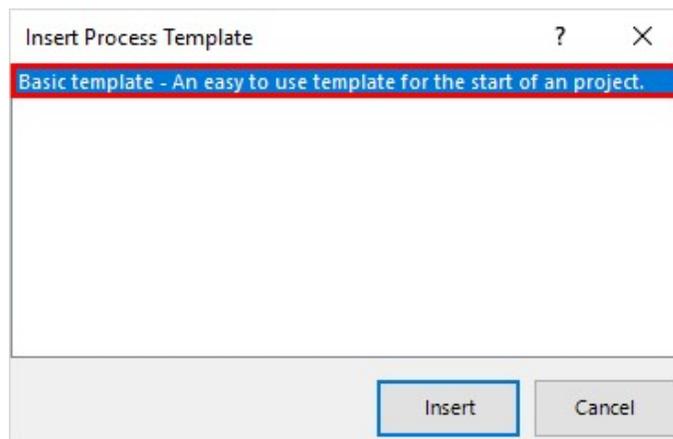
Exercise 2 - Creating a summary template

In this exercise, you will create a summary template.

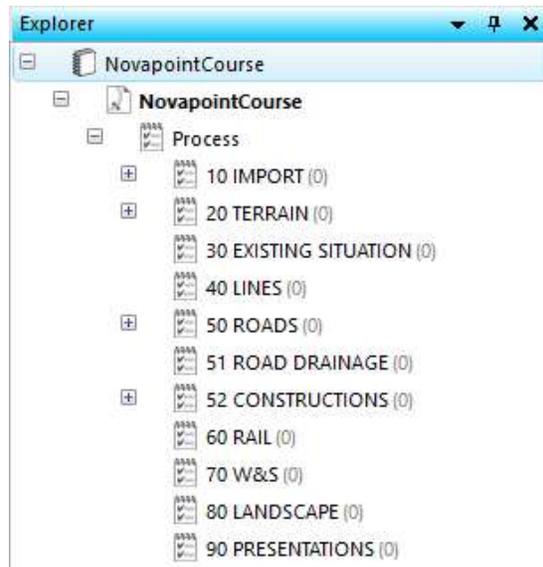
1. Click on **Process** in the explorer, then right-click on the mouse and select **Insert Structure...**



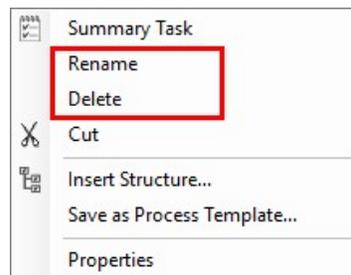
2. Insert the structure as shown below:



3. The Explorer tree is as shown below:



You can rename or delete any summary tasks by selecting and right mouse click:



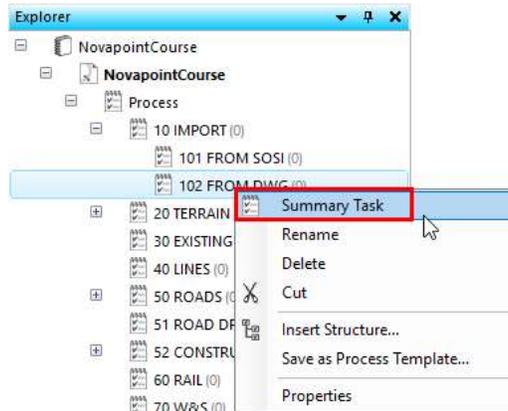
4. **Save** your project by clicking the save button:



TIP:

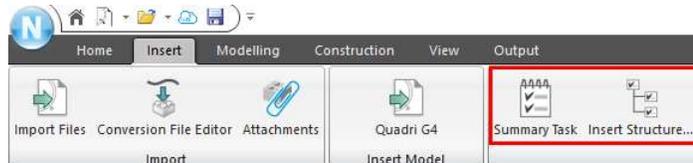
You can add your own **Summary tasks** either by:

- Right click anywhere in the tree and select **Summary Task**:

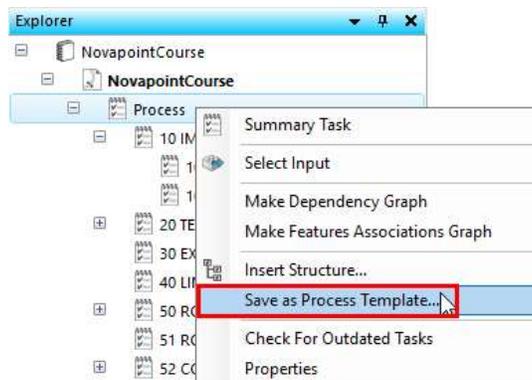


...and add a new Summary Task.

- By marking a Summary Task anywhere in the explorer tree and by selecting from the menu:



You can also create your own Process Template and use it in other projects:

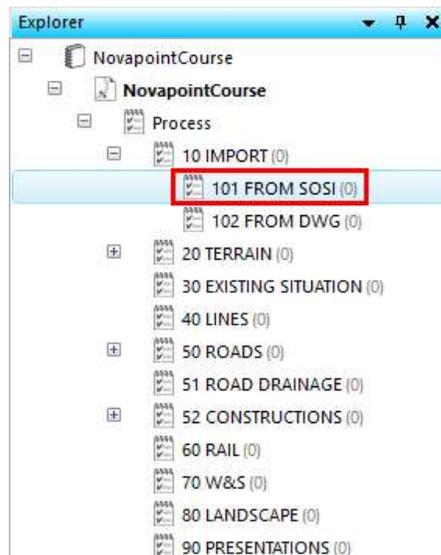


Part 2: Import Basemap and modeling ground surface

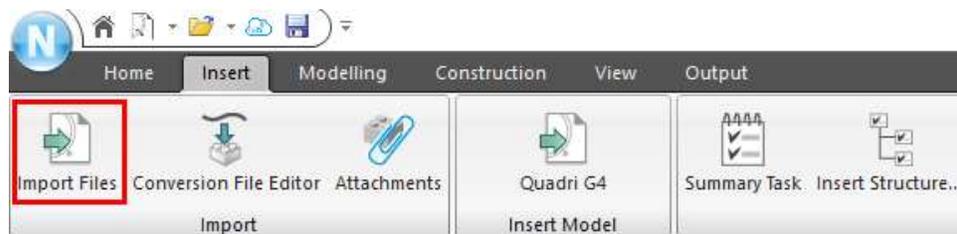
In part 2 you will import a text file with 3D mapping information, inspect the imported data in plan- and 3D view, and generate a terrain surface and edit it.

Exercise 3 - Importing a Norwegian Mapping file (SOSI)

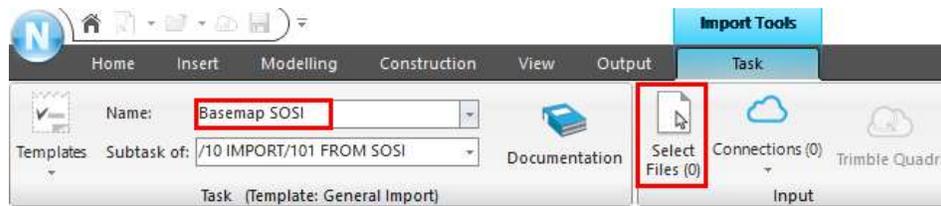
1. Click the Summary Task 101 FROM SOSI in the Explorer tree:



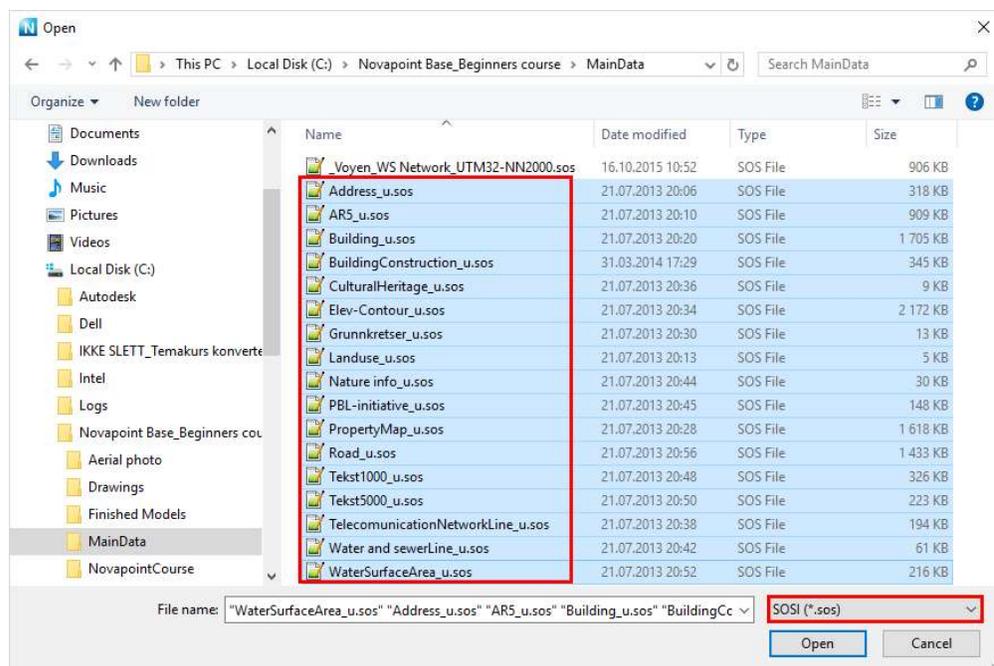
2. Select the **Insert** menu in the top menu ribbon. The Insert tool palette is displayed, giving options to import data of various formats. Click on **Import Files**.



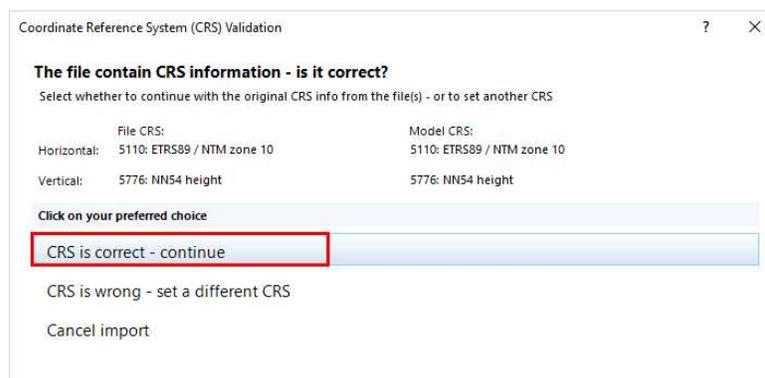
- Give the task the name **Basemap SOSI**. Then click **Select Files (0)**:



- Browse to folder **C:\Novapoint Base_Beginners course\MainData**. Set the file type to **SOSI**. Select all SOSI files, except **_Voyen_WS Network_UTM32-NN2000.sos**, and select **Open**.

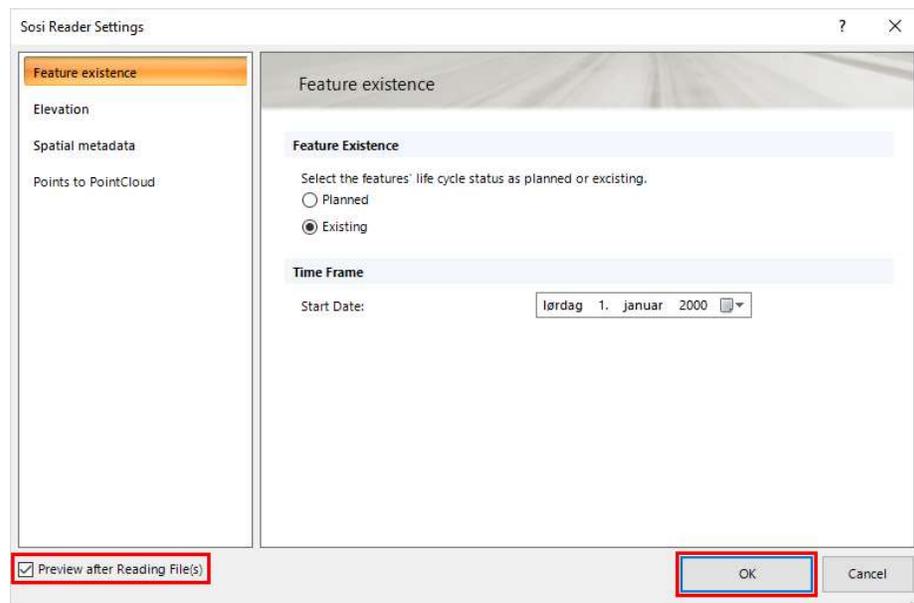


- This dialog box appears:



Click **CRS is correct - continue** to proceed.

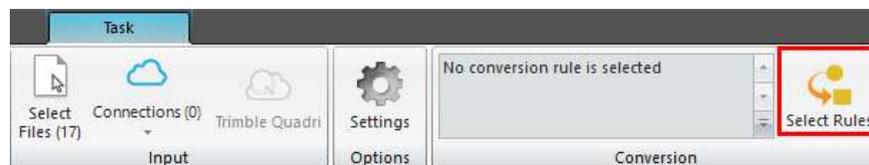
6. This dialog appears:



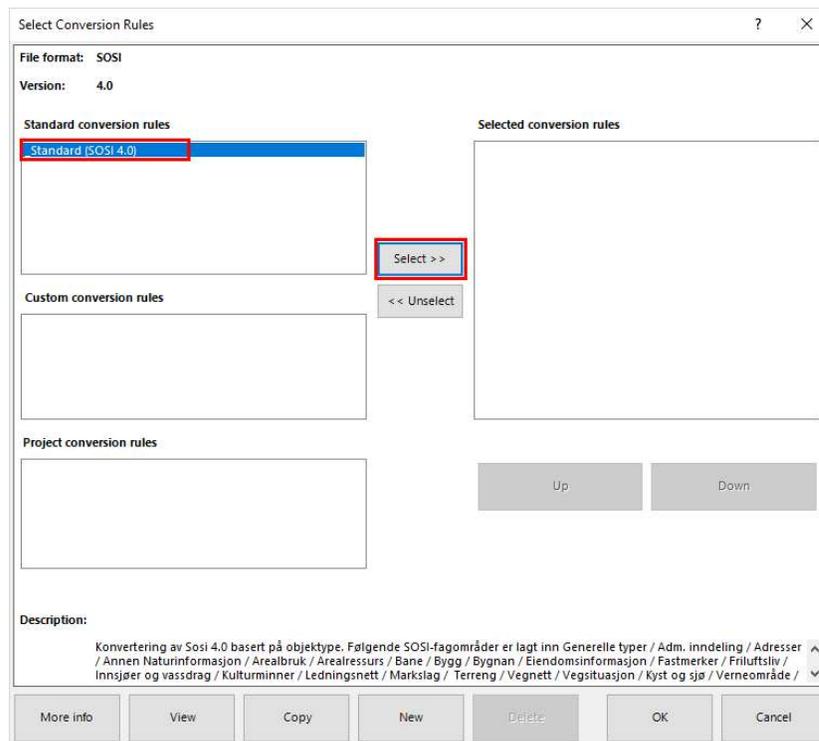
Tick the **Preview after Reading Files(s)**.

We will not use any of the other options in this window now, so click **OK** to start importing the file. A small window with a progress bar is display whilst the file is being read.

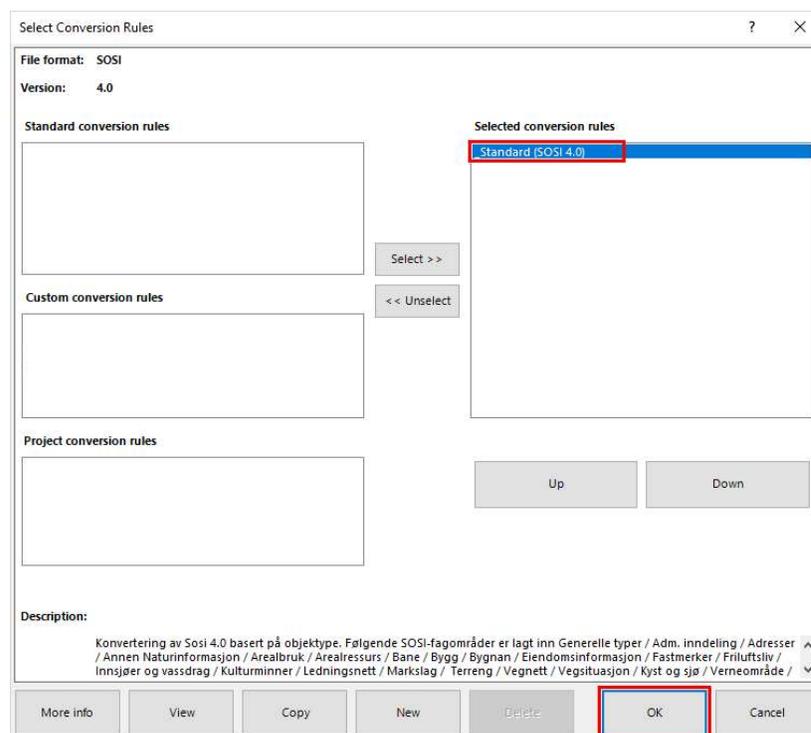
7. Back to the import ribbon, click **Select Rules**:



8. In the Conversion Rule dialog, click on **Standard (SOSI 4.0)** and then click **Select >>** :



Note: Conversion rules are a set of rules that determine how the information in the file, in this case a SOSI file, should be converted into objects in the model.



Click **OK** and you will return to the main window.



- Click **Preview** and the conversion starts. After the file has been converted, the result will be displayed.

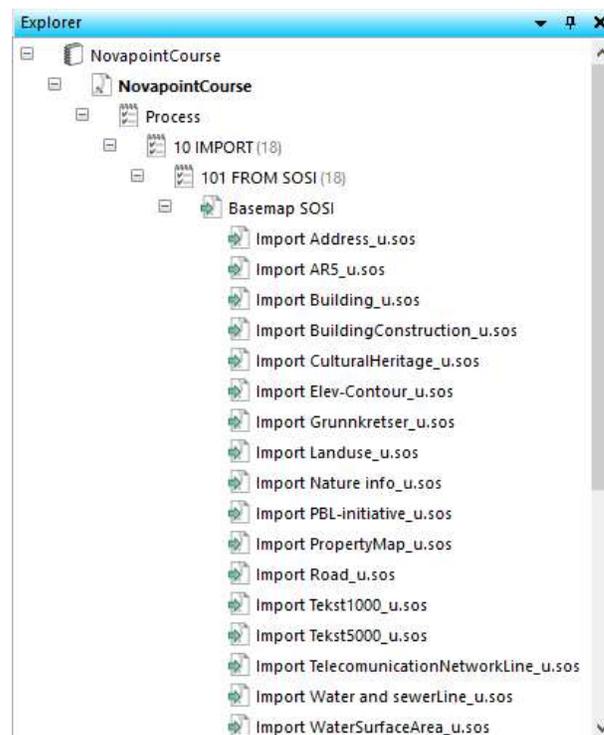
Note: In Novapoint, data that is not included in the conversion, will be displayed in a separate explorer tree and can be viewed. If this should be included, the conversion rule must be updated to include these elements.

In the process window any errors in the import or with the imported data will be displayed.

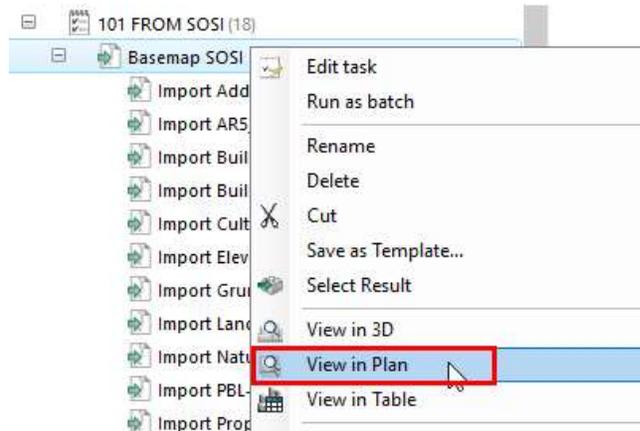


- Click **Finish** to finish the import.

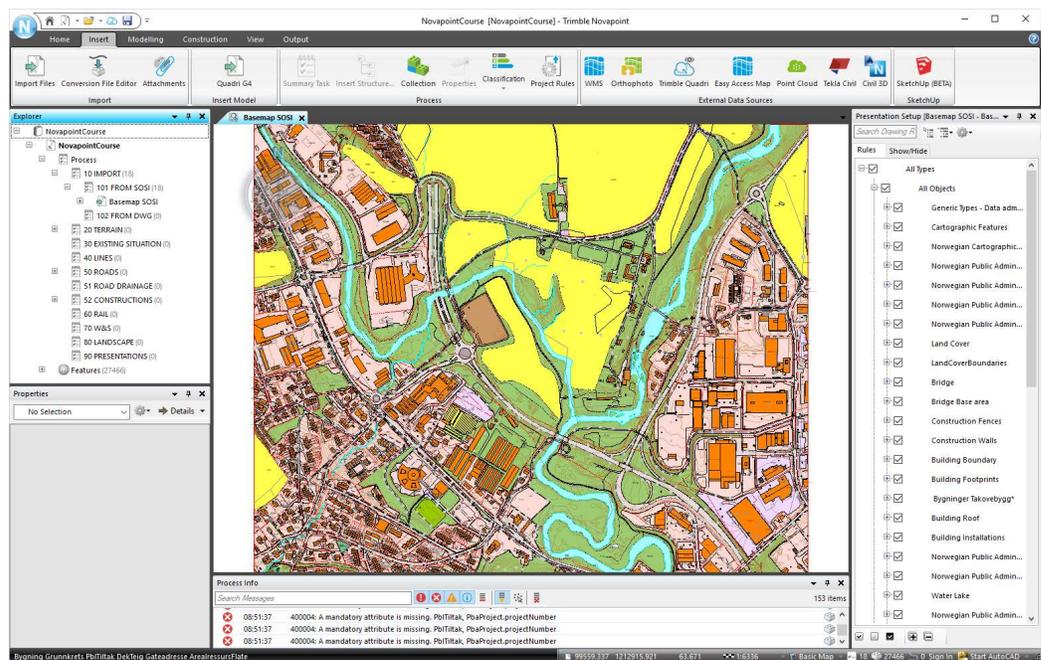
- The Explorer will now look like this, and include all the imported mapping files:



- Right-click **Basemap SOSI** in the explorer, and click on **View in Plan**.



You will now see the import in the window, and your screen will look like this.



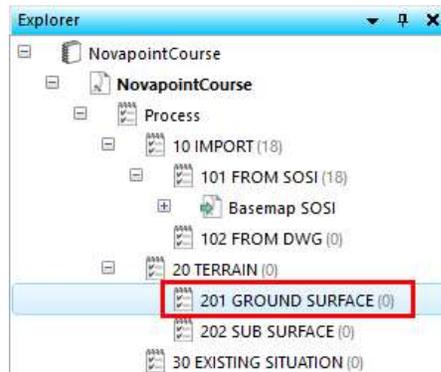
13. Save your project by clicking the save button:



Exercise 4 - Generating a terrain surface

In this exercise, you will generate a terrain surface based on the terrain objects in the mapping file.

1. Click on **201 GROUND SURFACE** in the Explorer:

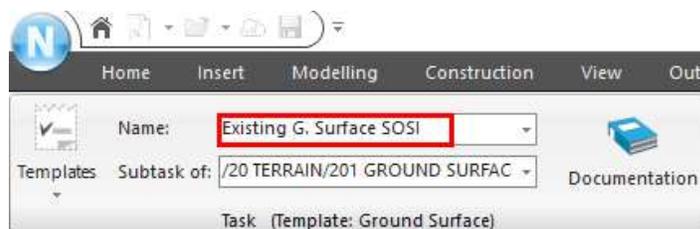


Tip: Click to highlight the relevant process (summary task) you want to import data for, before selecting the modelling task. The process name is then added to the summary task name. If you make a mistake, you can drag and drop a task to the correct location afterwards.

2. Click on **Modelling** and then the **Ground Surface** task:

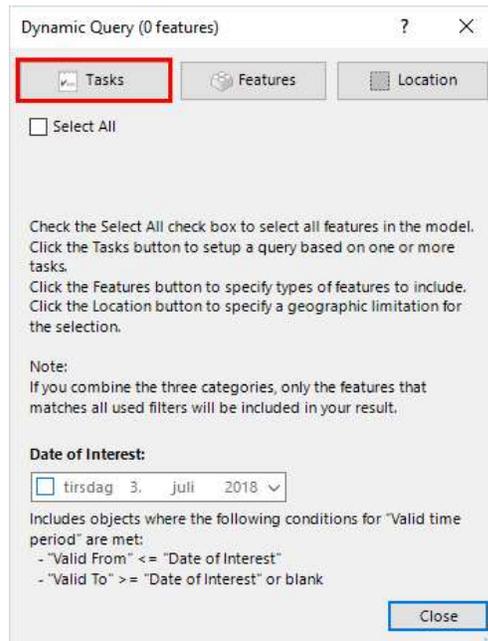


3. Type in a name for the terrain surface task, **Existing G. Surface SOSI**, and check that you have selected the correct sub-task. If you have highlighted a sub-task before starting the task then it will be selected automatically.

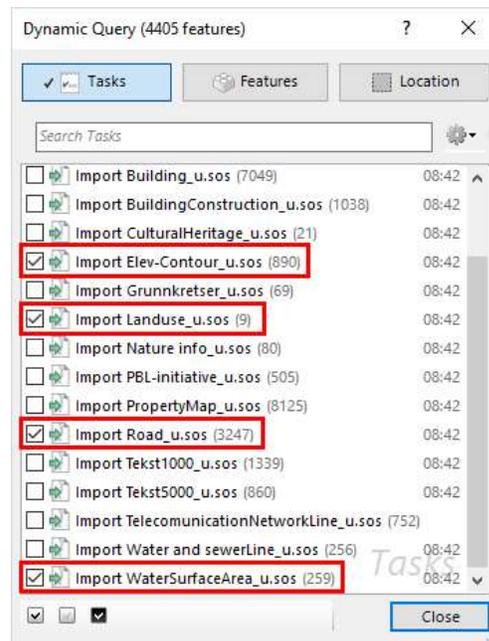




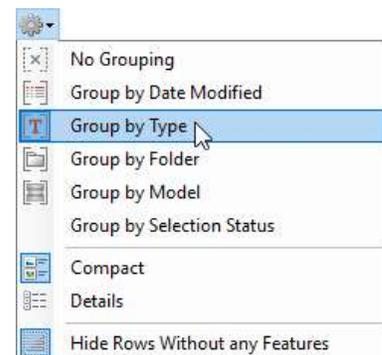
4. Click on **Features (0)**. This dialog comes up:



Click the **Tasks** tab, and select first the import tasks that has elevation information for terrain as shown.

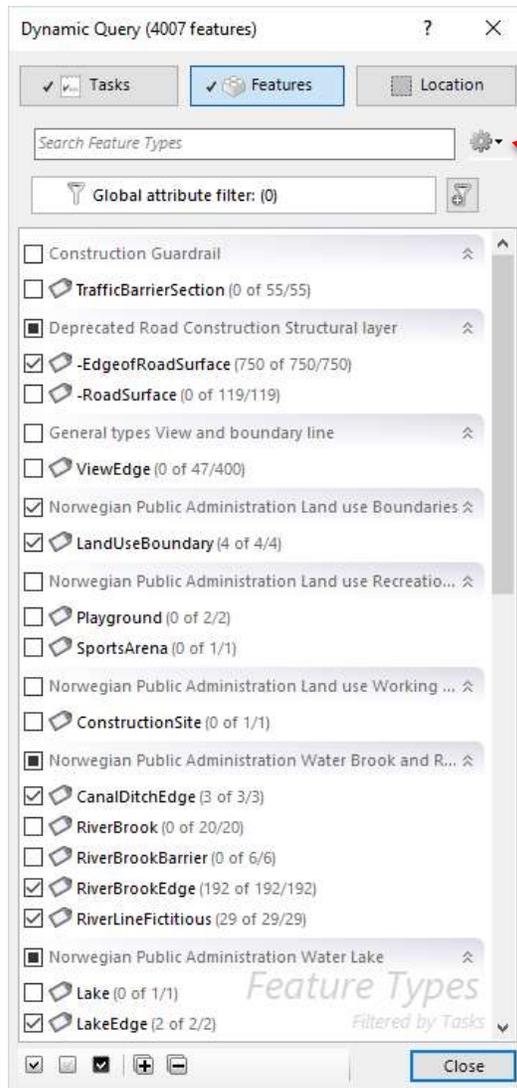


TIP: use the view setup to group by type.

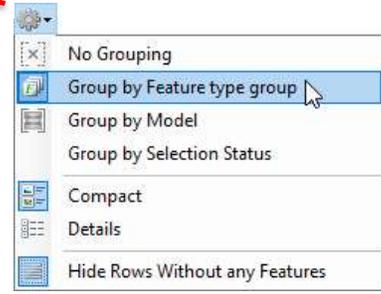


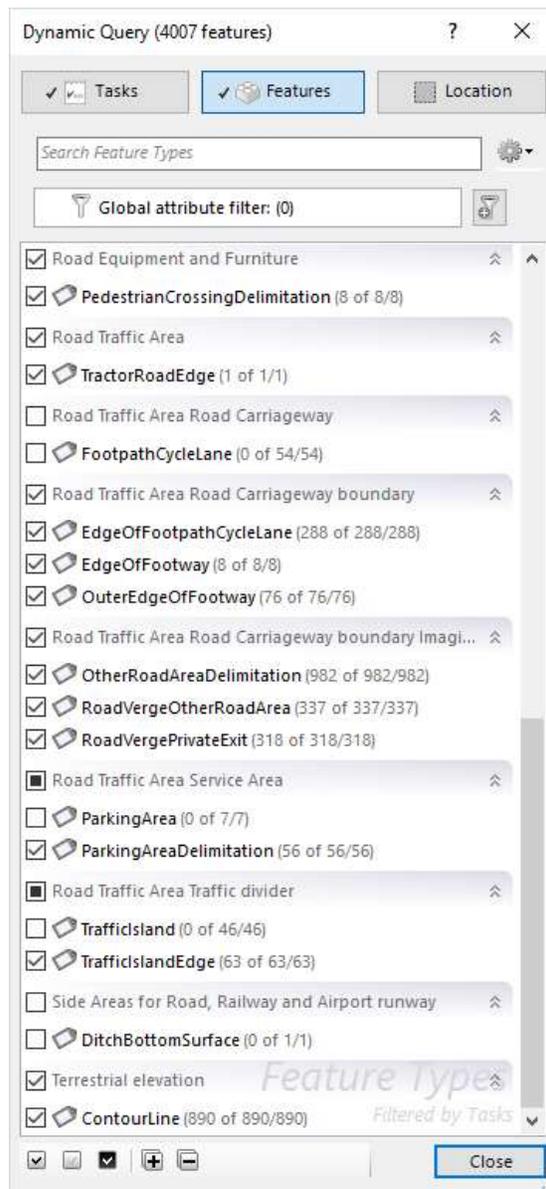
Note: All features selected here will be highlighted in red in the plan- and 3D-view window in the background.

- Click the **Features** tab, and select the feature types that will form the terrain surface. Select LandUseBoundary, ContourLine, and all features with “edge”, “delimitation” and “verge” in the name, as these are line geometry:



TIP: use the view setup to group by feature type group.





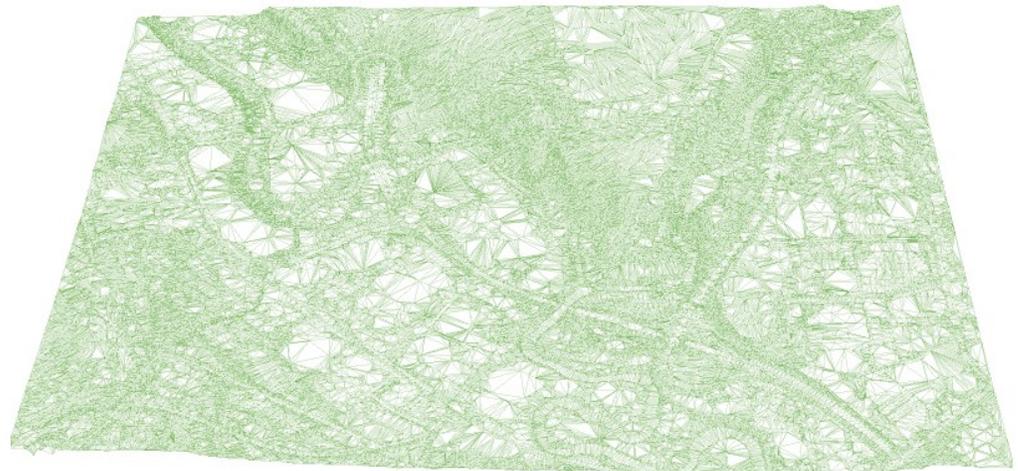
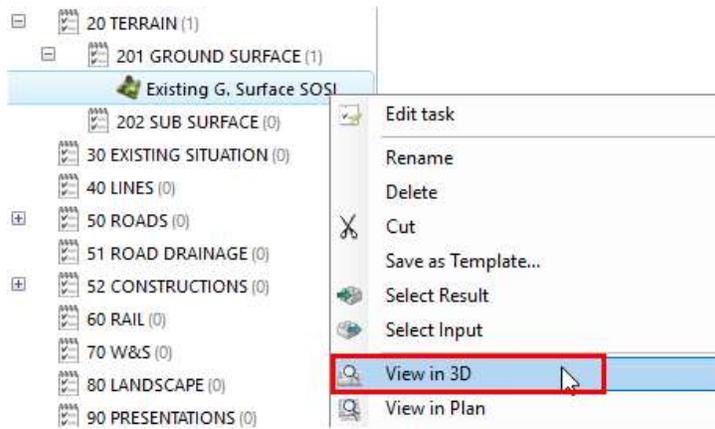
Then finished with your selection, click the **Close** button.

6. Click  **Finish** to start the calculation.



Note: You can control the calculation by selecting

7. Right-click **Existing G. Surface** in the explorer, and click on **View in 3D**.



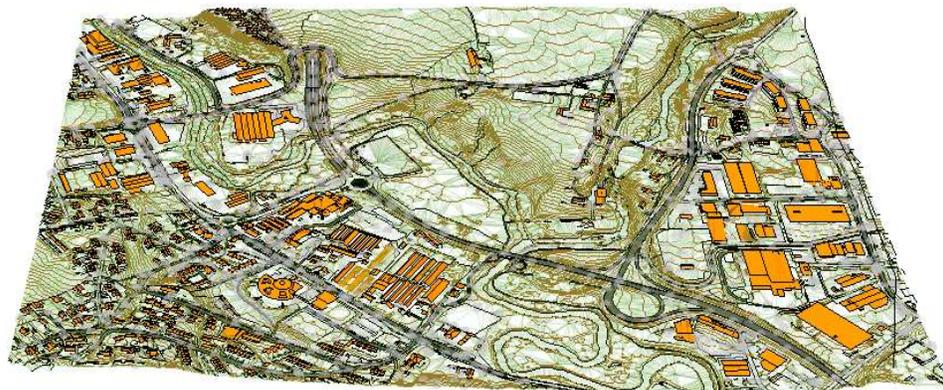
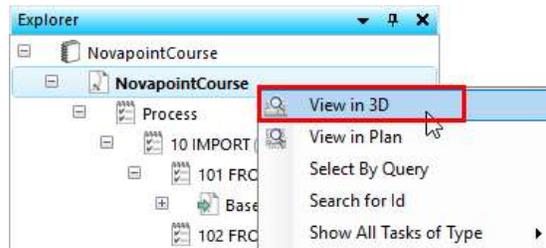
8. **Save** your project by clicking the save button:



Exercise 5 - Viewing the data in 3D

You can now view the whole model in 3D.

1. Select the whole model at the top of the process tree and right mouse click and select **View in 3D**:



The buttons on the right side are used to navigate the view:

Navigation Features

These Navigation features are available from the Home tab, the View tab and on the 3D view navigation pane.

	Navigation feature	Description
 Visible	Zoom Extend	Press to zoom out to view the whole model
 	Zoom In	Press + to zoom in
 	Zoom Out	Press + to zoom out
 Selection	Zoom Selection	Select object and press Zoom Selection to zoom in or out of the selected objects.

	Double-click	Double-clicking a selected objects does the same as Zoom Selection (short cut command "G")
	Select	It is still possible to navigate even if you are in Select mode. You can scroll the mouse wheel to zoom in and out. Hold down the mouse wheel to pan and use the right mouse button to rotate the camera angle. Left mouse button is for selecting objects.
	Pan	Use the left mouse button to pan. Hold down the mouse wheel to move the model. Use the right mouse button to rotate the camera angle.
	Orbit	The left mouse button controls Orbit, drag the wheel around to control. Zoom in and out with the mouse wheel.
	Orbit+zoom	Combine Orbit and Zoom in/out by holding down the right mouse button and dragging the mouse forward and backward.
	Fly	Fly in and out by holding down the left mouse button and dragging the mouse. The greater the distance from the centre of the window, the greater the navigation speed. Fly up and down by holding the mouse wheel down. Zoom in and out by scrolling the mouse wheel. Rotate the camera angle by holding down the right mouse button and dragging the mouse.

	Fly along a line	Select the base line you would like to fly along.
	Previous	Zoom Previous to view the previous section
	Next	Next Zoom to view the next section

You can temporarily switch to other navigation options:

Change navigation mode	Description
Alt	Hold ALT key to temporarily switch to Orbit. Can be used in PAN or SELECT mode. Release the ALT key to return to the original navigation mode.
Ctrl	Hold CTRL key to temporarily switch to select the mode. Can be used in PAN or ORBIT mode. Release the key to return to the original navigation mode.

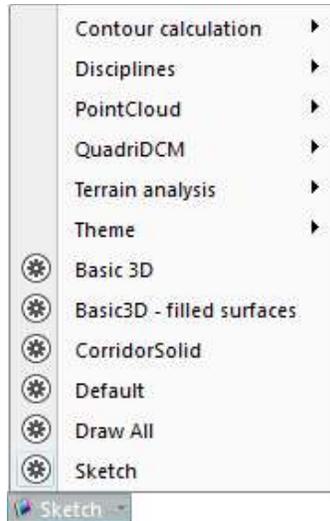
Keyboard Navigation (WASD):

The 3D view window also supports keyboard navigation. Navigation starts when you press a key.

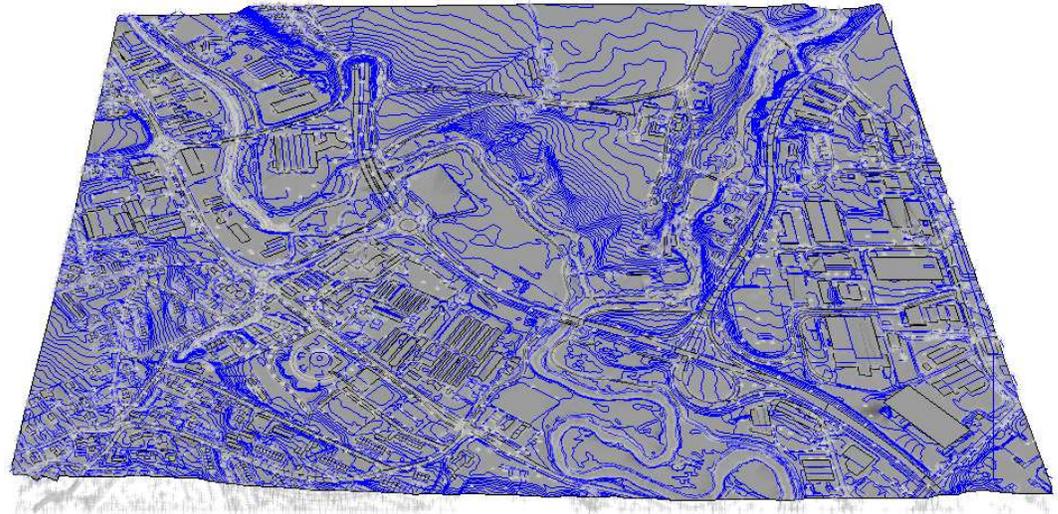
To end keyboard navigation press the Esc key.

Key	Description
U	Make a U-turn and turn direction angle 180 degrees.
G	Go to a highlighted object, or to a position defined by the crosshairs if highlighting is not enabled, for example in PAN mode.
W	Move forward
S	Move backward
A	Move to the left
D	Move to the right
Q	Move down
E	Move up
Caps Lock	When CAPS LOCK is turned off the navigation speed is constant (recommended). When CAPS LOCK is on, the navigation speed is dynamic and is based on the distance from the view point position to the model.
Shift	Hold down the SHIFT key to reduce the navigation speed. This must be combined with one of the direction keys, for example. W. When the SHIFT key is released, the navigation speed returns to normal.
CTRL	Hold down the CTRL key to increase navigation speed. This must be combined with one of the direction keys, for example. W. When the CTRL key is released, the navigation speed returns to normal.

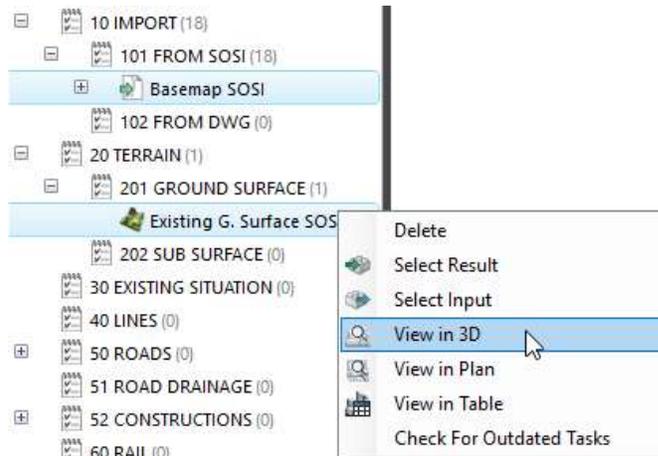
2. At the bottom of the program you have options to select the drawing rules for the window. Click to display a list of available rules.



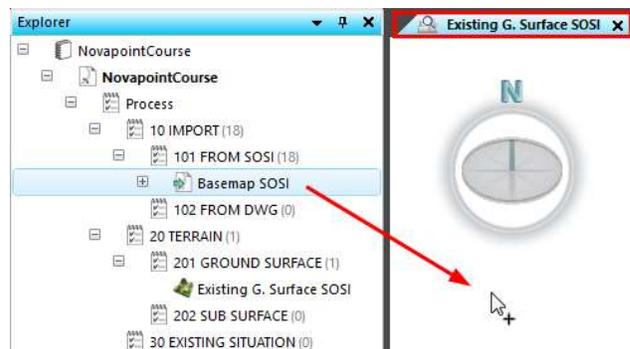
3. You can select from a wide range of Drawing rules. Below the **Draw all** drawing rule has been selected:



TIP: You can select a number of tasks to be displayed in 3D by holding the Ctrl-key down and selecting the tasks you want displayed together. Select, right mouse click and View in 3D.



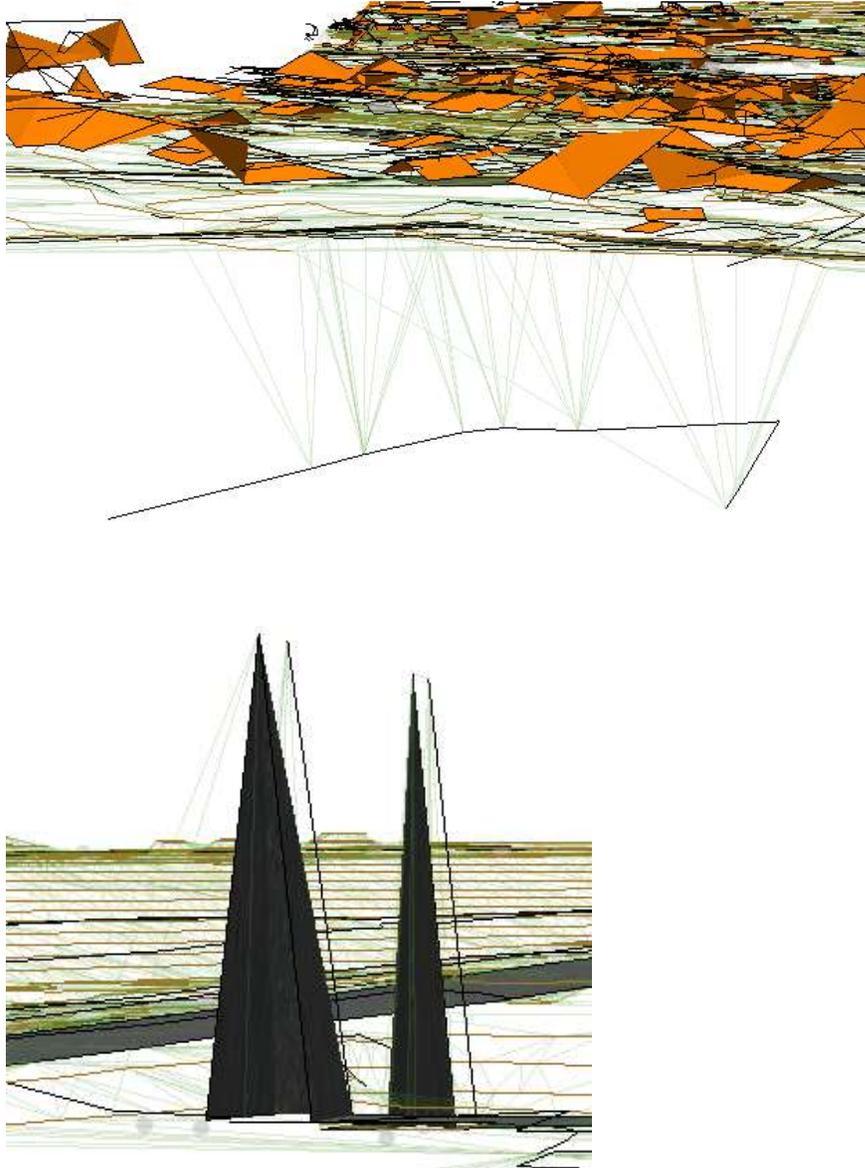
You can also “Drag and drop”. You can e.g. have the task **Existing G. Surface SOSI** active in the view. Now drag and drop the task **Basemap SOSI** right in the window to see them together in the view.



Exercise 6 - Editing the terrain surface

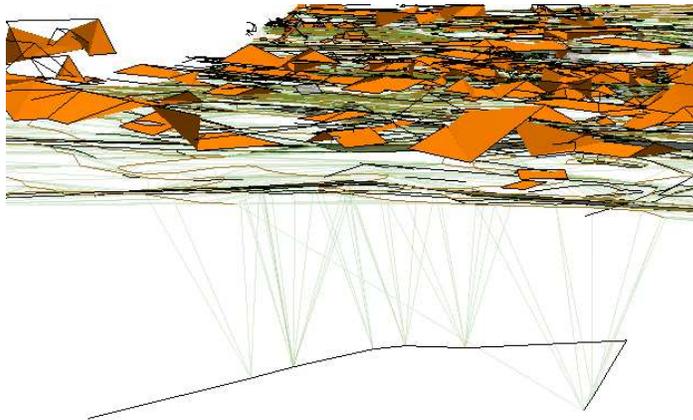
In this exercise you will learn different methods to edit the ground surface.

1. After navigating around the model we can find areas where the mapping data is incorrect, e.g. as shown below:



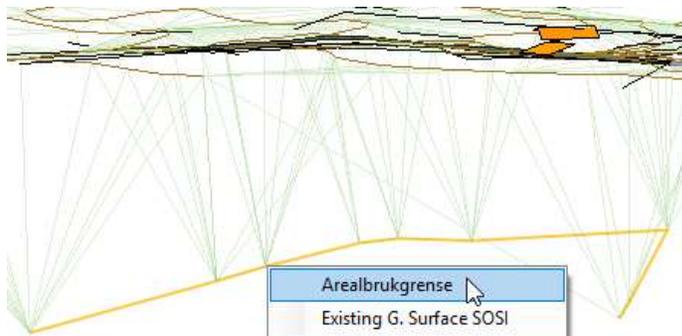
Some of the objects that have been used as the basis for the Ground Surface calculation have either incorrect elevations or they should not have been included in the Elevation input.

2. **Zoom in** on the area shown below. This is at the bottom left of the model.

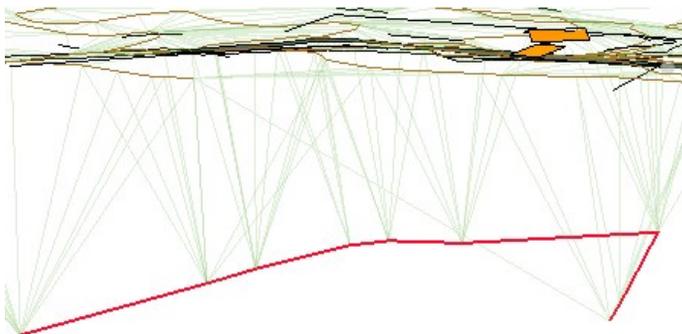


3. You can now check the point information for lines that have been used as Elevation Input.

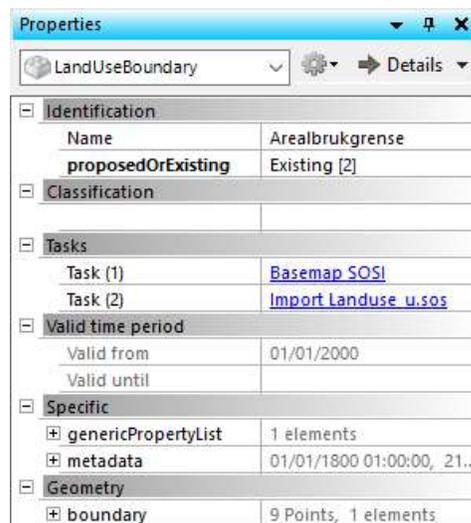
4. **Click** . Select a line with incorrect elevation. If there are multiple objects in the same area they will be displayed as shown and you can select the required object:



Click on **Arealbrukgrense** (=LandUseBoundary) and the selected element is highlighted in red:

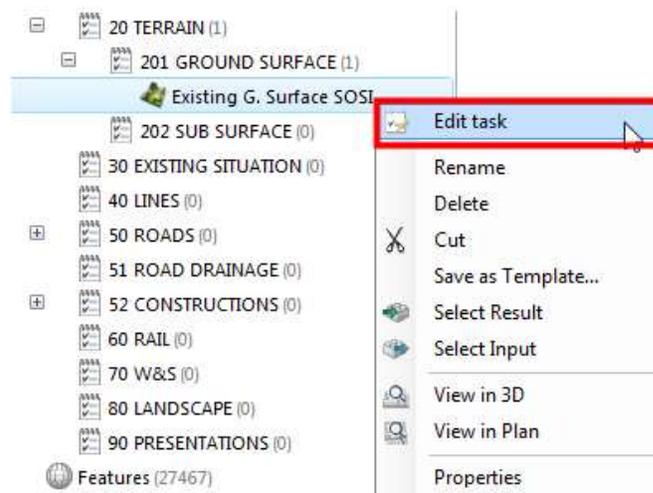


Object information is shown in the **Properties** window:

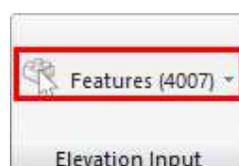


It is clear that this object type should not be part of the **Ground Surface** calculation. This object should be removed from the **Elevation Input** to the **Ground Surface** task.

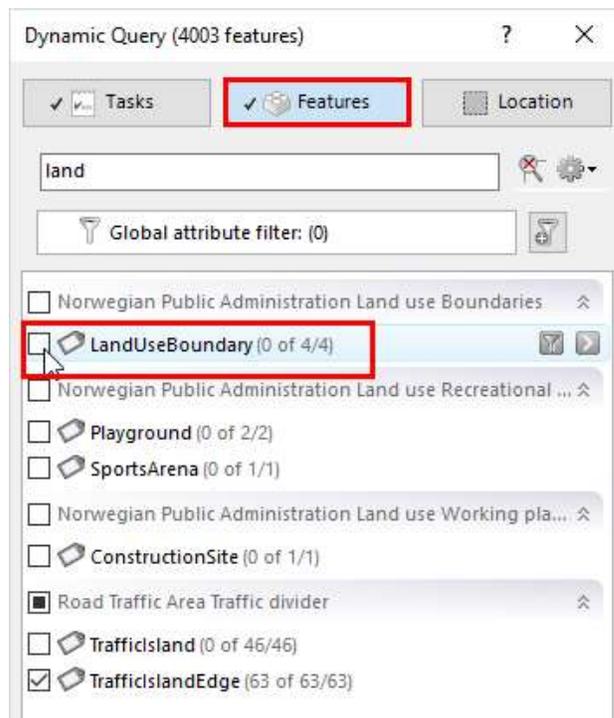
5. Select the Ground surface task **Existing G. Surface SOSI**. Right mouse click and select **Edit task** as shown:



6. Select **Elevation input** as shown:



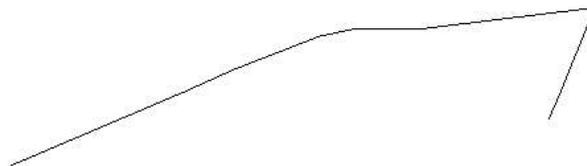
7. Click on **Features**. Use the filter to find the required object by writing **landuse**.



Deselect **LandUseBoundary** as input, and click **Close**.

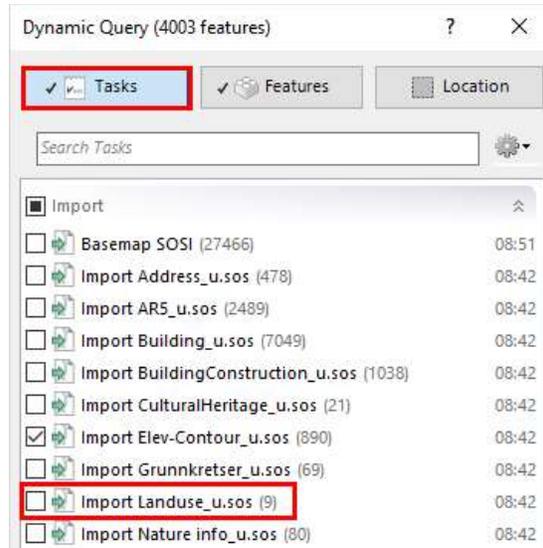


8. Click **Preview** to calculate and see the result of the change.

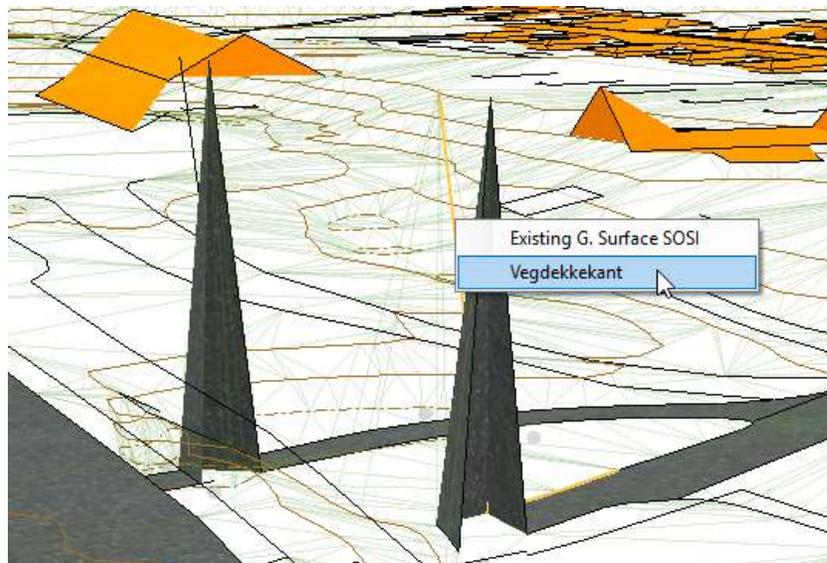


9. Click **Finish**.

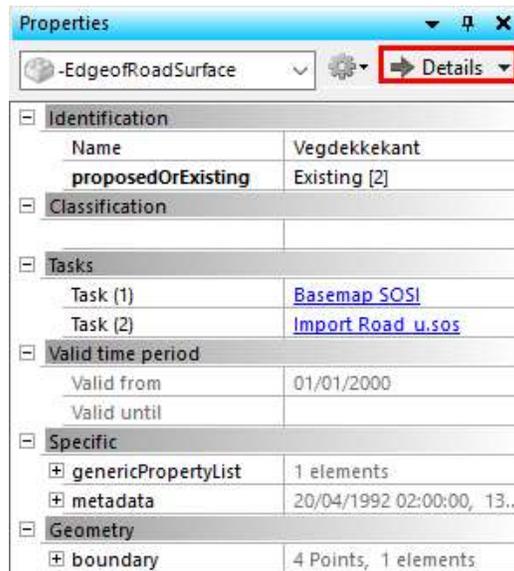
TIP: You can also deselect tasks in the Elevtaion Input.
E.g. you could deselect the file Import_LandUseboundary_u.sos.



10. Zoom in to another area we can edit:



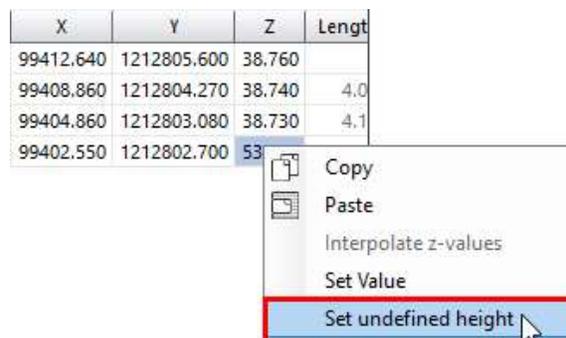
Click one of the lines with an "incorrect" elevation.



In the properties window, click on **Details** and examine the point details.

	Chainage	X	Y	Z	Length
1	0	99412.640	1212805.600	38.760	
2	4.007	99408.860	1212804.270	38.740	4.0
3	8.180	99404.860	1212803.080	38.730	4.1
4	10.521	99402.550	1212802.700	53.900	2.3

This point is clearly incorrect, as it is 15 m over the other points. Select in the cell, right mouse click and select **Set undefined height**.



You could also set all the points as undefined by selecting the column. Then they will no longer be included in the Ground Surface calculation.

11. Recalculate the **Existing G. Surface SOSI** by right clicking the task in the explorer, select



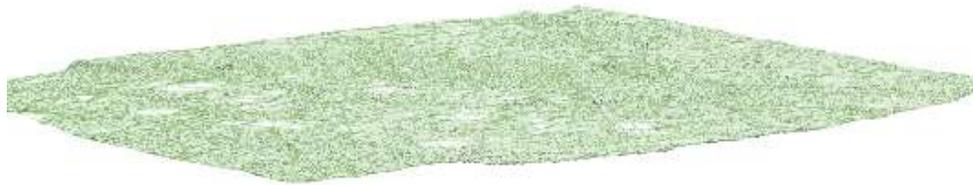
edit task and **Finish** button. See that the changes are updated.

TIP: You can also use the Interpolate z-values function if you want to interpolate between a start and end value.

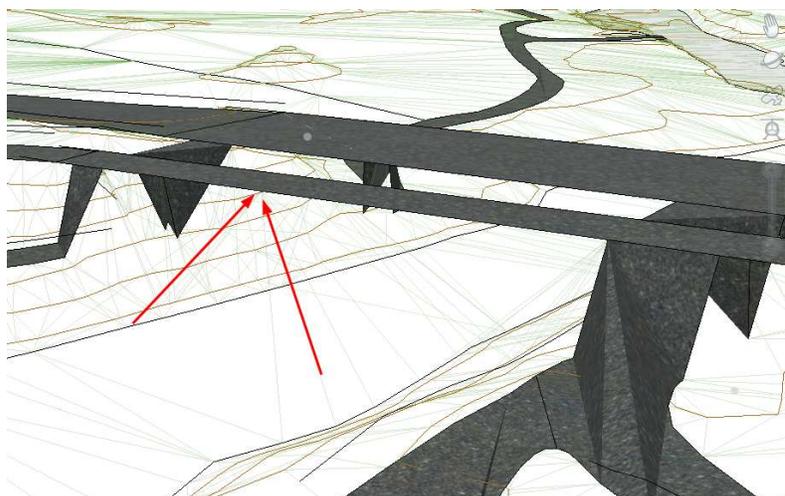
Y	Z	Length
1212805.600	38.760	
1212804.270	38.740	4.0
1212803.080	38.730	
1212802.700	53.900	

- Copy
- Paste
- Interpolate z-values
- Set Value
- Set undefined height

12. Continue to edit until you have a Ground Surface without errors.

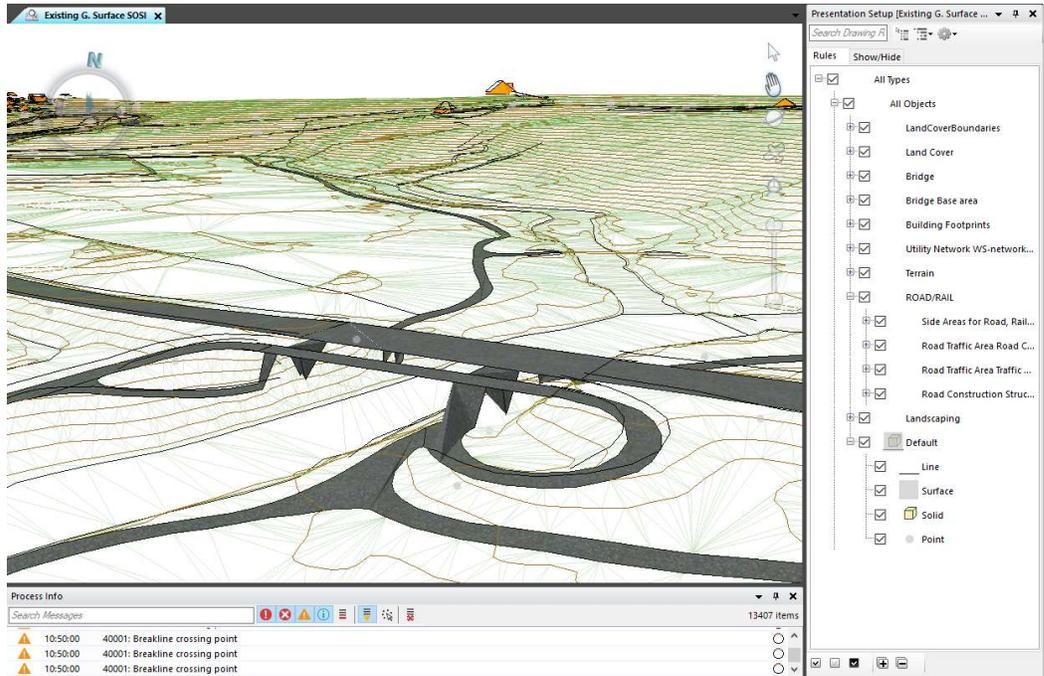


13. In some areas, e.g. bridges, the triangulation has included bridge edge lines in the Ground Surface calculation as shown in the example below. These can easily be removed.

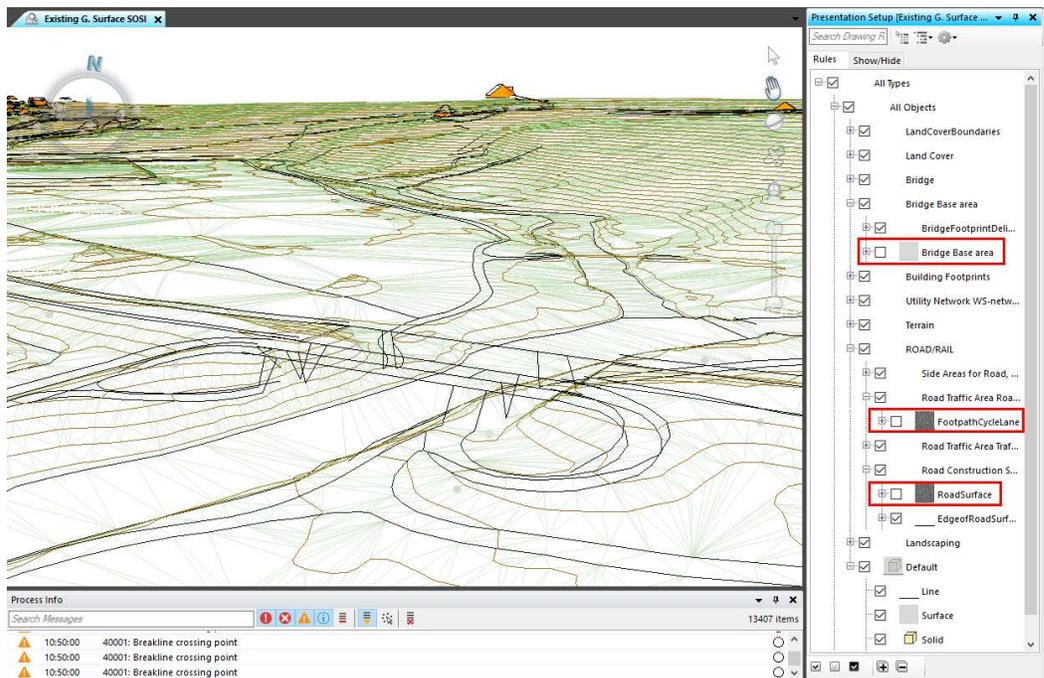


Often it is useful to exclude surface objects in the 3D view so it is easier to add/subtract single objects.

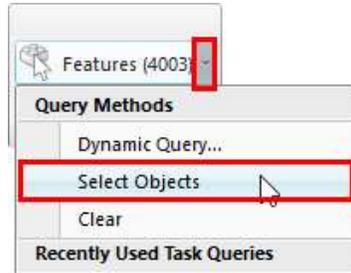
View when the surface objects are included:



The same view when Bridge decks and road surfaces are turned off:

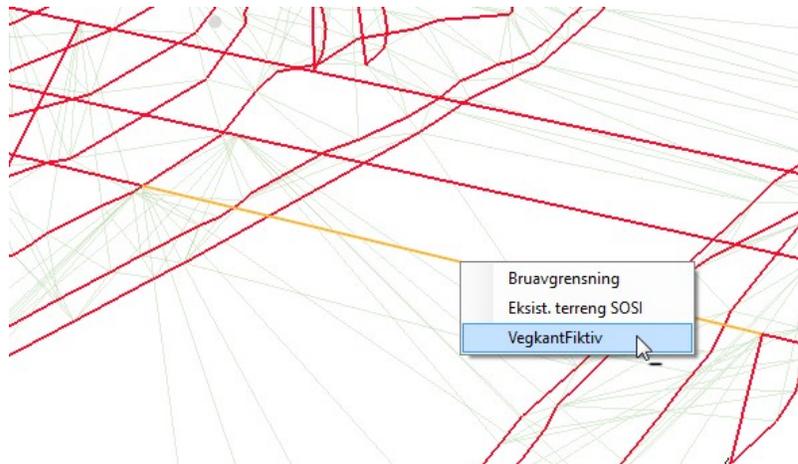


A method to remove single objects from the Elevation Input is with the 3D view open, then right click Existing G. Surface SOSI in the explorer and Edit task. Then click the small arrow to the right of the Elevation Input > Features (xxxx).



Click **Select Objects**:

In the select mode hold in the **Ctrl** and select the object you want to remove from the calculation. You will see a minus sign when selecting objects included in the calculation and a + sign when over objects that can be selected. Select the required object from the list.



The line will now be deselected.



OBS! Keep an eye on the number of objects selected in the Ground surface task so you don't end up with just 1 object.



TIP: If you lose control over the number of features (select without holding the **CTRL** key down), then end the task by clicking **Cancel**, and the task will roll back to where you started.

14. After deselecting the lines, click  to calculate the ground surface with the new information.

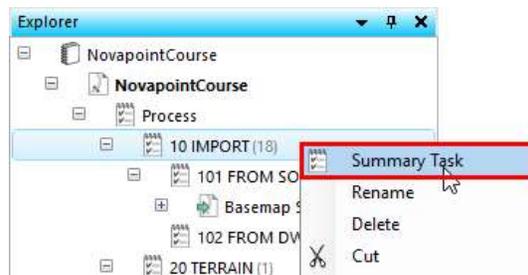
15. **Save** your project by clicking the save button:



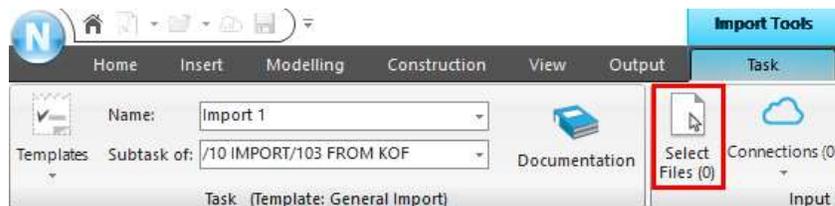
Exercise 7 - Importing other file types - KOF and LandXML

In this exercise you are going to import two other common file formats, KOF and LandXML.

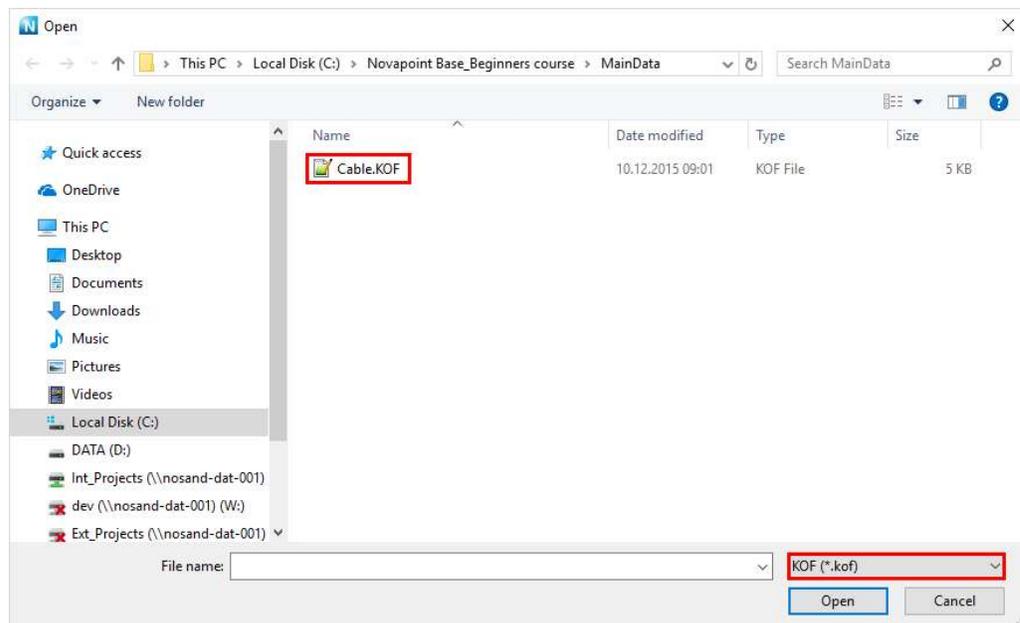
1. Create a new Summary Task - **103 FROM KOF**, by selecting 10 IMPORT, right clicking, and click **Summary Task**.



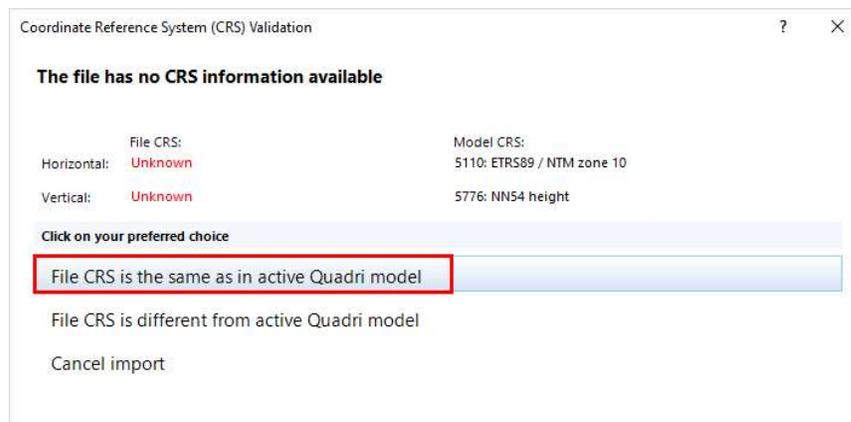
2. A KOF file is imported in the same way as a SOSI file by selecting the **Insert tab** and clicking the **Import** button.



Click **Select Files**, and select **Cable.KOF** file from folder **\Main Data**:

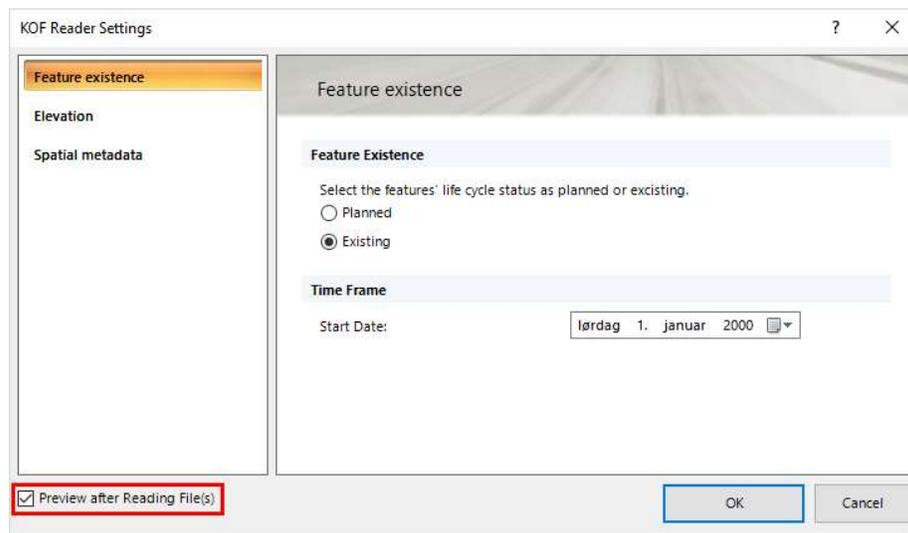


3. This dialog appears:



A KOF file contains no reference to the coordinate system. You must know which coordinate system the KOF file is in, and decide whether the coordinate reference system of the file is the same as the Quadri model. In this case select **File CRS is the same as active Quadri model** as shown above.

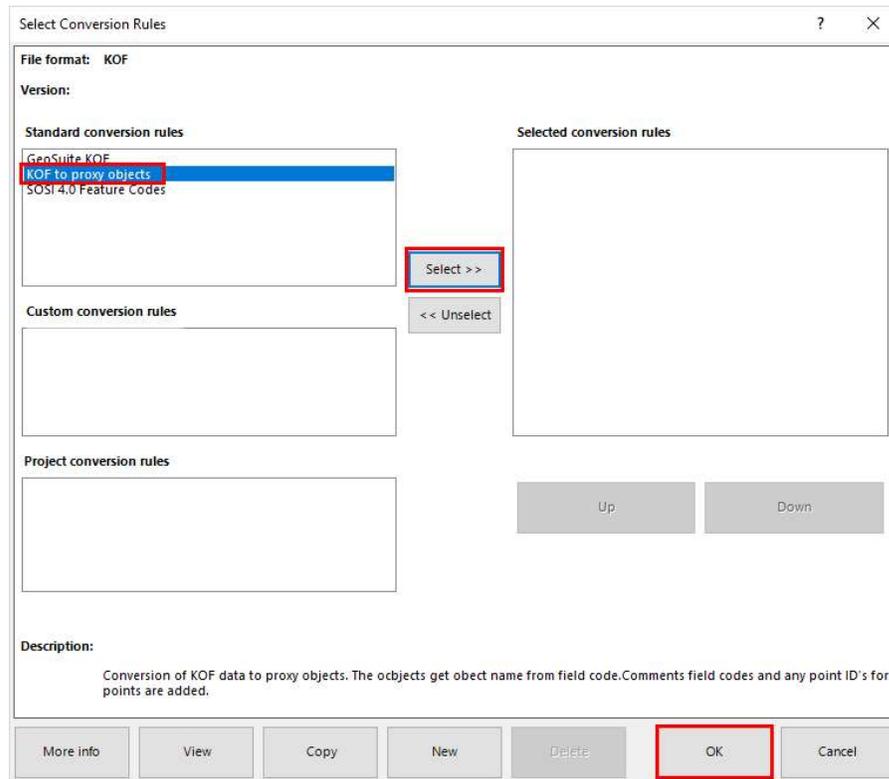
This dialog appears:



Tick the **Preview** checkbox as shown and press **OK**.

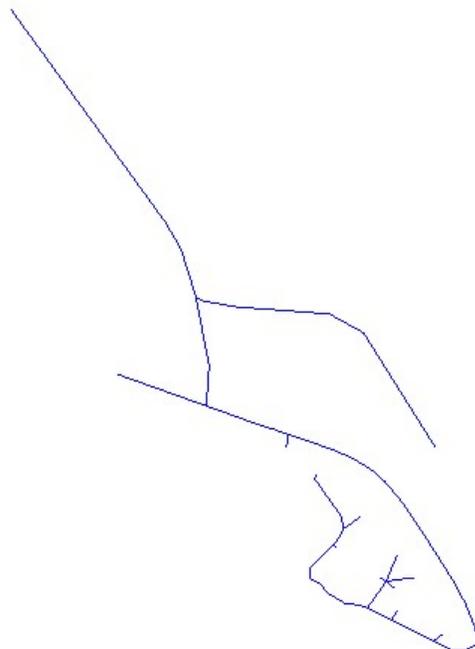
4. Click on **Select Rules**.





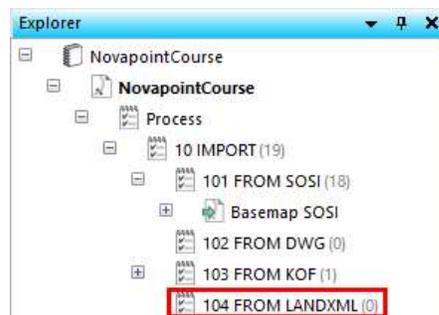
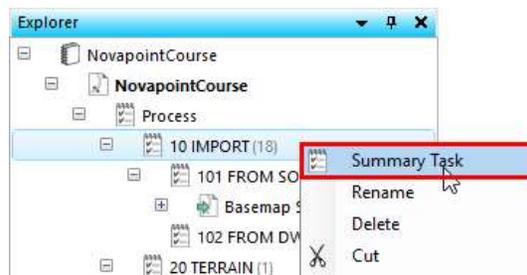
Select **KOF to Proxy Objects** and press the **Select>>** button. Then press the **OK** button.

5. Click **Preview**  Preview :



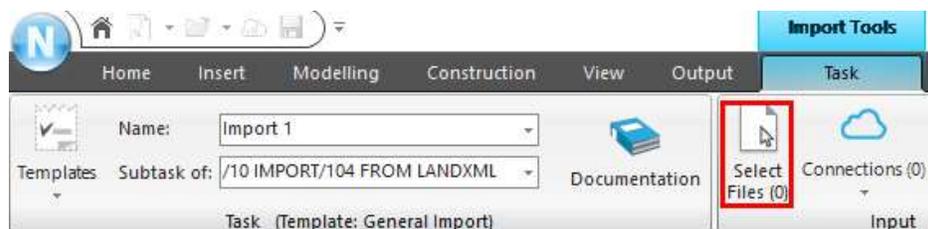


- Finish by clicking **Finish**.
- Now we will import an LandXML file.
Create a new Summary Task - **104 FROM LANDXML**, by selecting 10 IMPORT, right clicking, and click **Summary Task**.

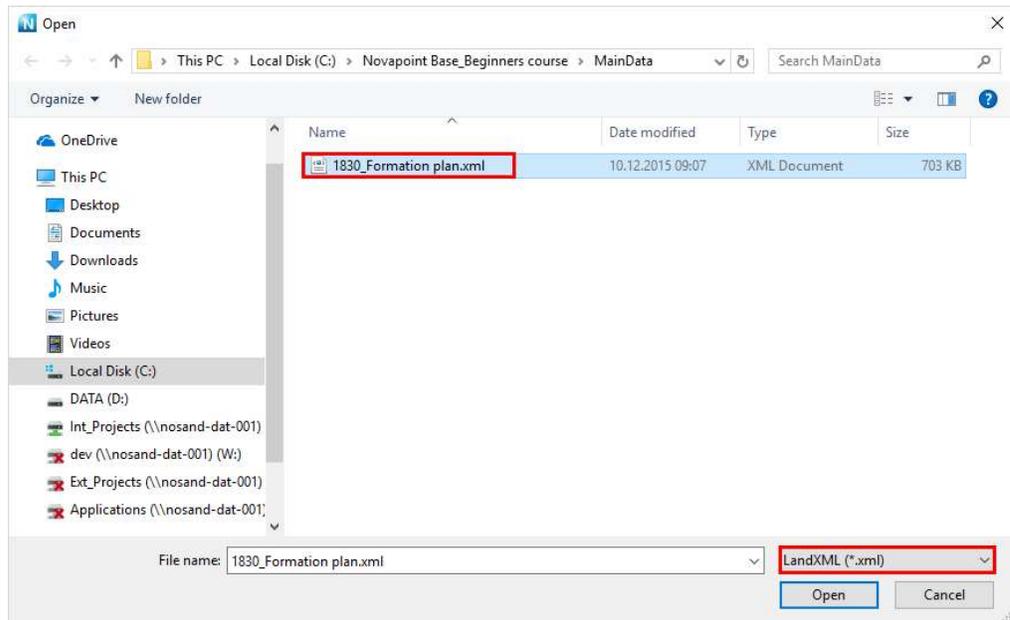


- A LandXML file is imported in the same manner as SOSI, KOF or other file types.

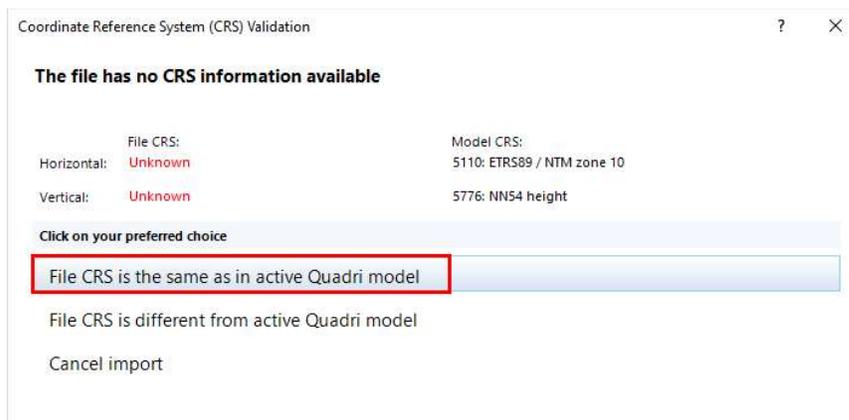
Click **104 FROM LANDXML** in the explorer. Select the **Insert** tab and click the **Import** button.



- Click **Select Files**. Select LandXML as the file format, click the file **1830_Formation Plan.XML** and click the **Open** button.

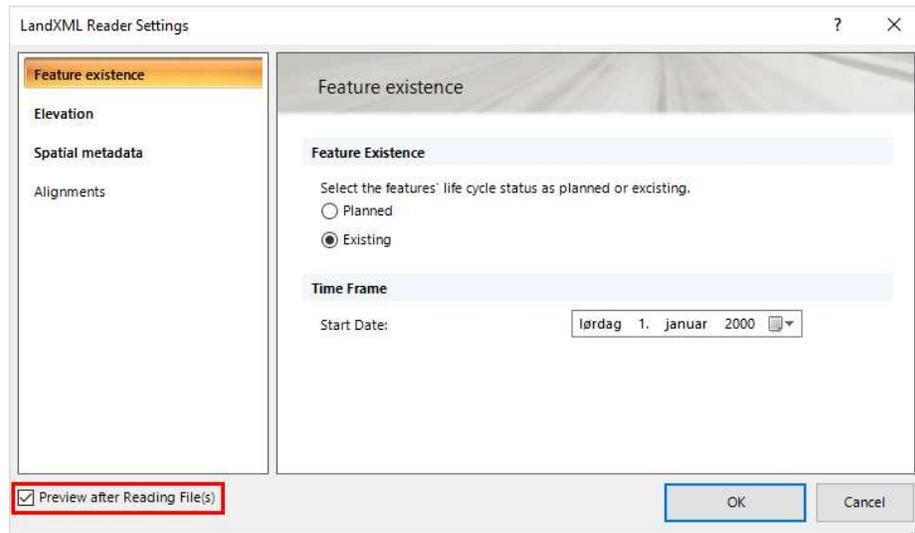


This dialog appears:



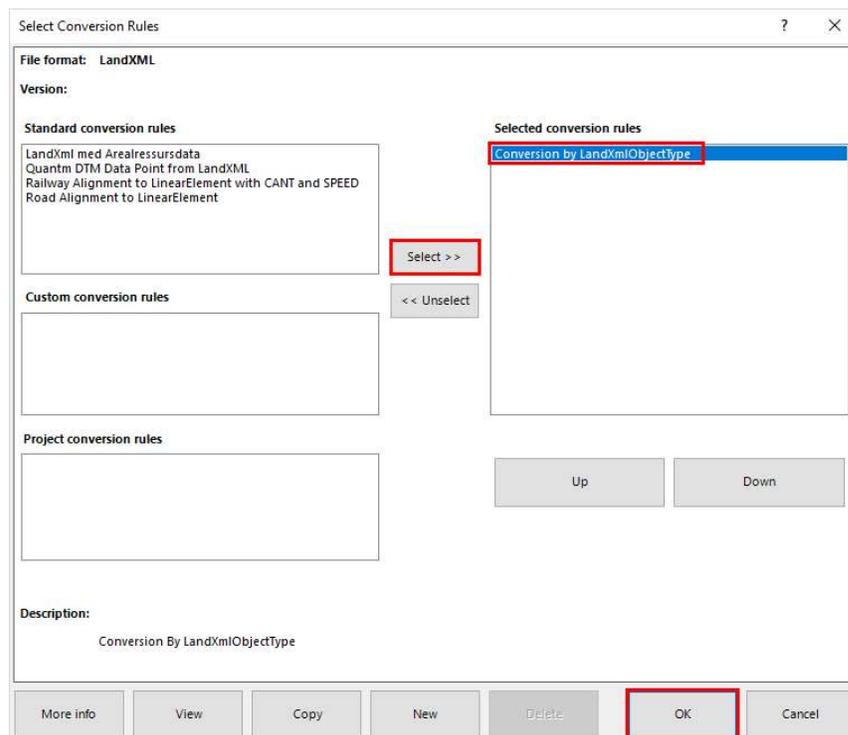
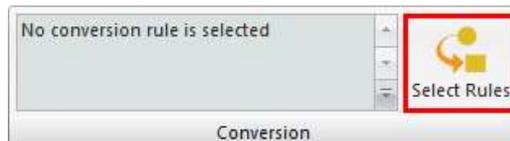
A LandXML file contains no reference to the coordinate system. You must know which coordinate system the KOF file is in, and decide whether the coordinate reference system of the file is the same as the Quadri model. In this case select **File CRS is the same as active Quadri model** as shown above.

This dialog appears:



Tick the **Preview** checkbox as shown and press **OK**.

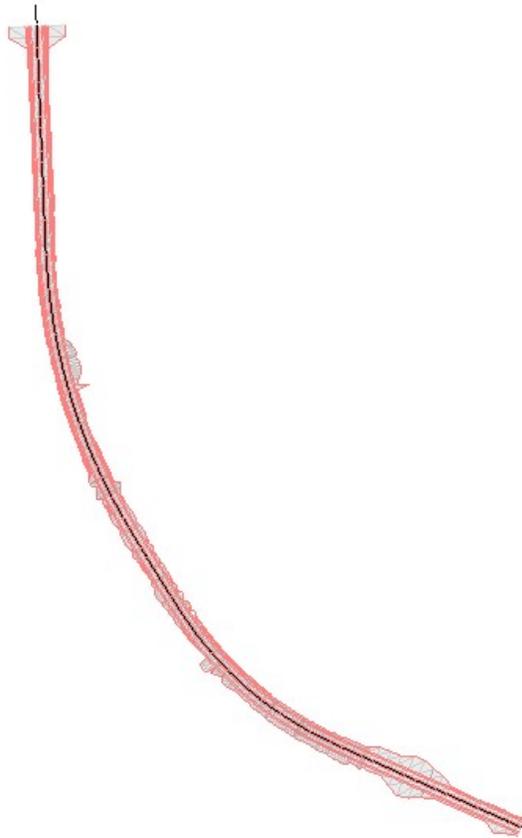
10. Click on **Select Rules**.



Select **Conversion by LandXMLObjectType**, click **Select>>**, then the **OK** button.



11. Click **Preview**, then **Finish**.



12. **Save** your project by clicking the save button:

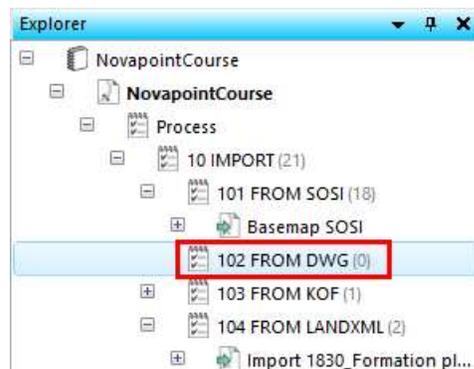


Exercise 8 - Import of surveying field data

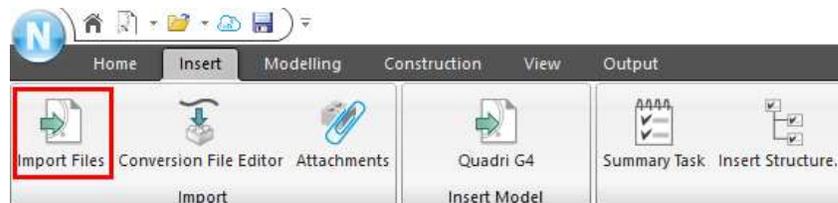
In this exercise, you will see how we can import survey data for an existing road and combine it with the mapping data we imported earlier.

1. First, import the survey data from a DWG.

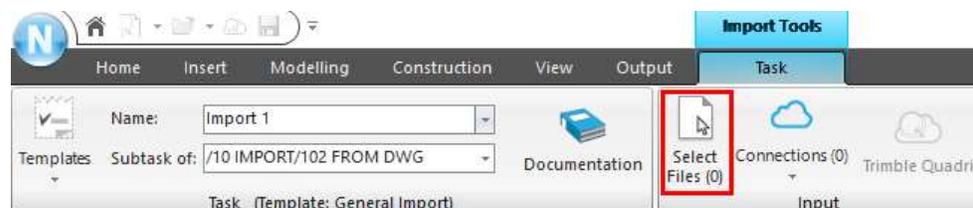
Click the Summary task **102 FROM DWG**:



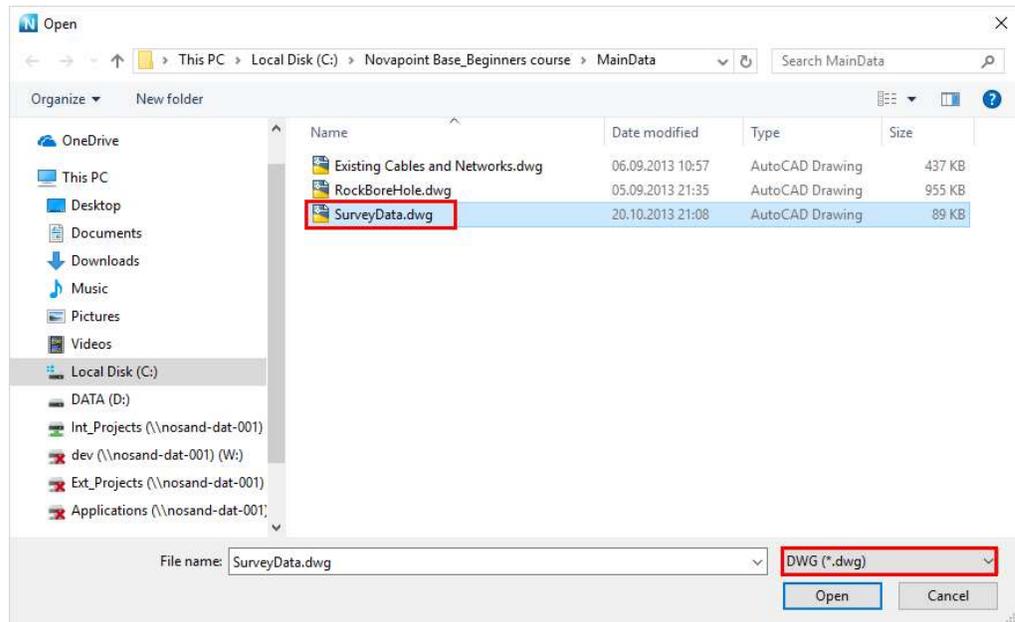
2. Click **Insert** and **Import files**.



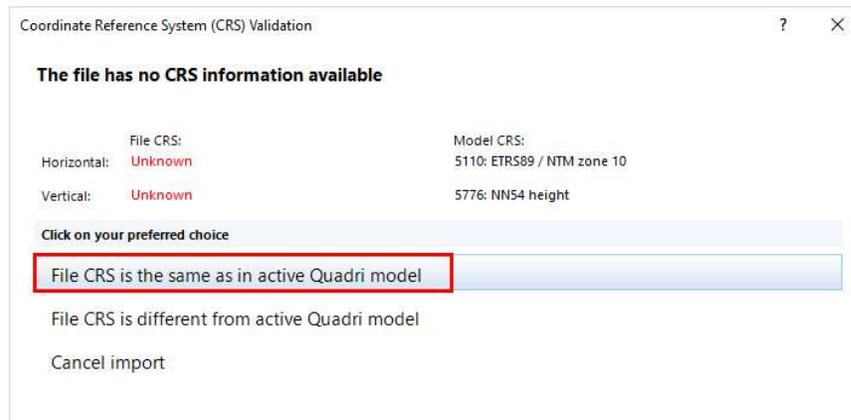
3. Click **Select Files**.



Select DWG as the file format, click the file **SurveyData.dwg** and click the **Open** button.

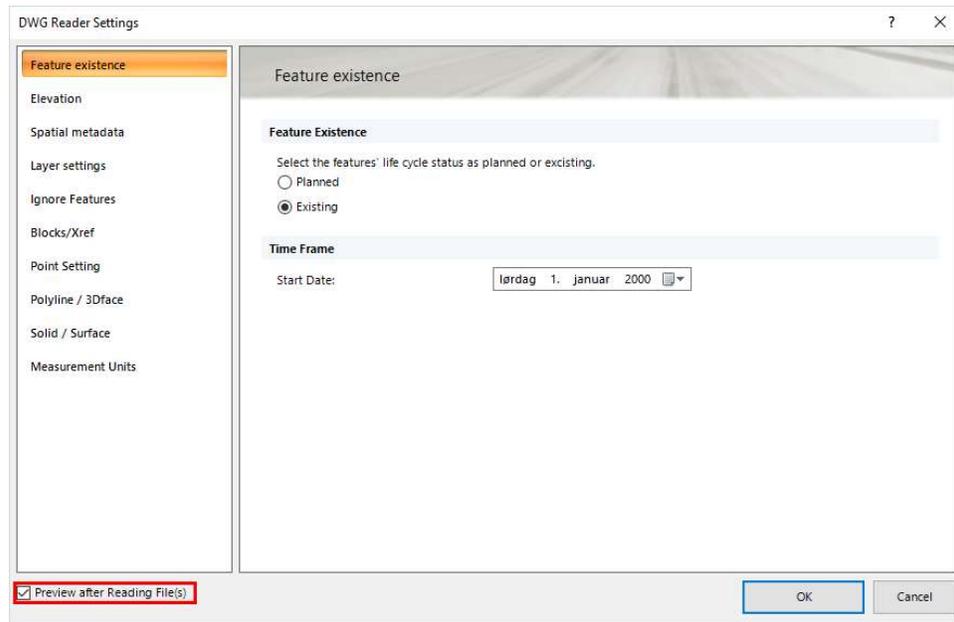


4. This dialog appears:

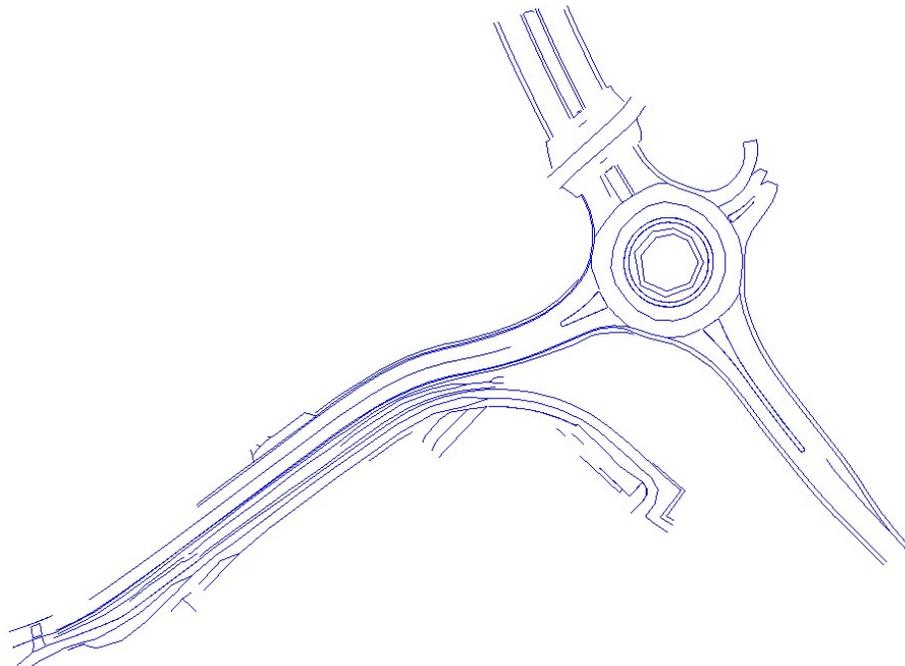


A DWG file contains no reference to the coordinate system. You must know which coordinate system the DWG file is in, and decide whether the coordinate reference system of the file is the same as the Quadri model. In this case select **File CRS is the same as active Quadri model** as shown above.

5. This dialog appears:



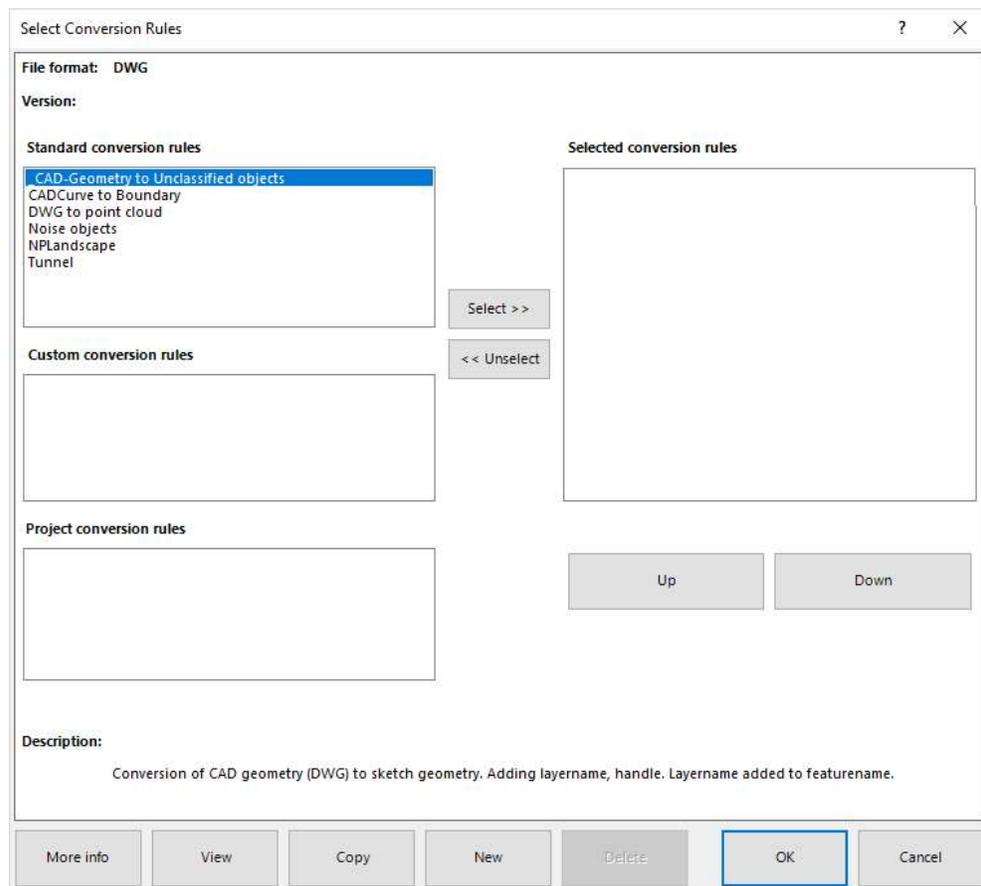
Tick the **Preview** checkbox as shown and click **OK**.



6. Click on **Select Rules**.

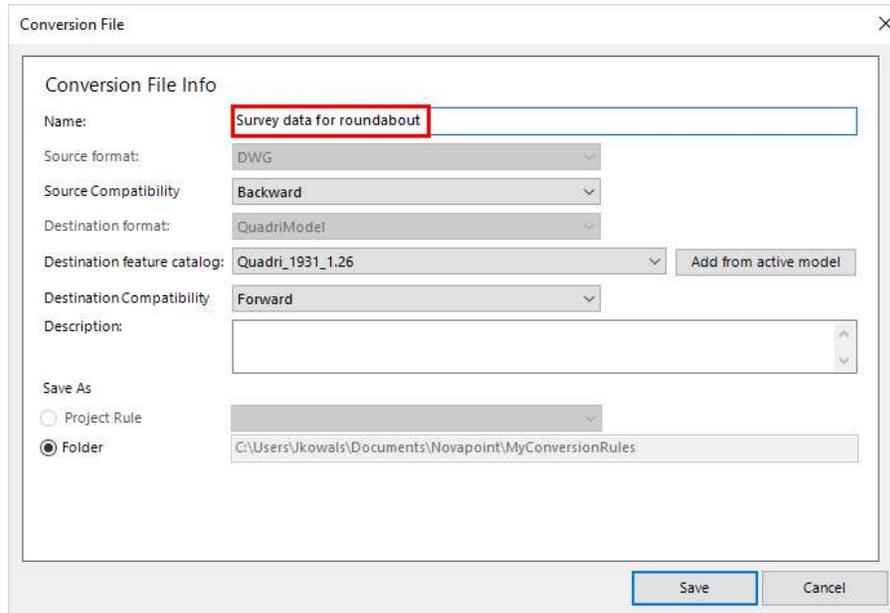


7. This dialog appears:

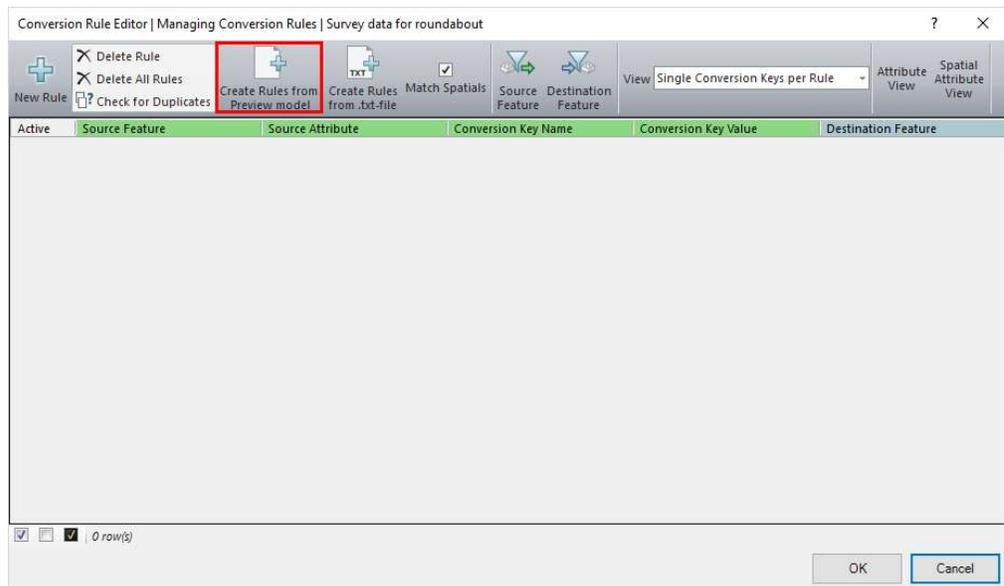


In a Quadri model the feature types play a key part in the information model. In order to convert the elements from the DWG we are importing, we need to make a conversion rule. We have here a DWG which consist of different CAD layers, that we want to assign to different feature types.

- Click on the  button in the dialog.

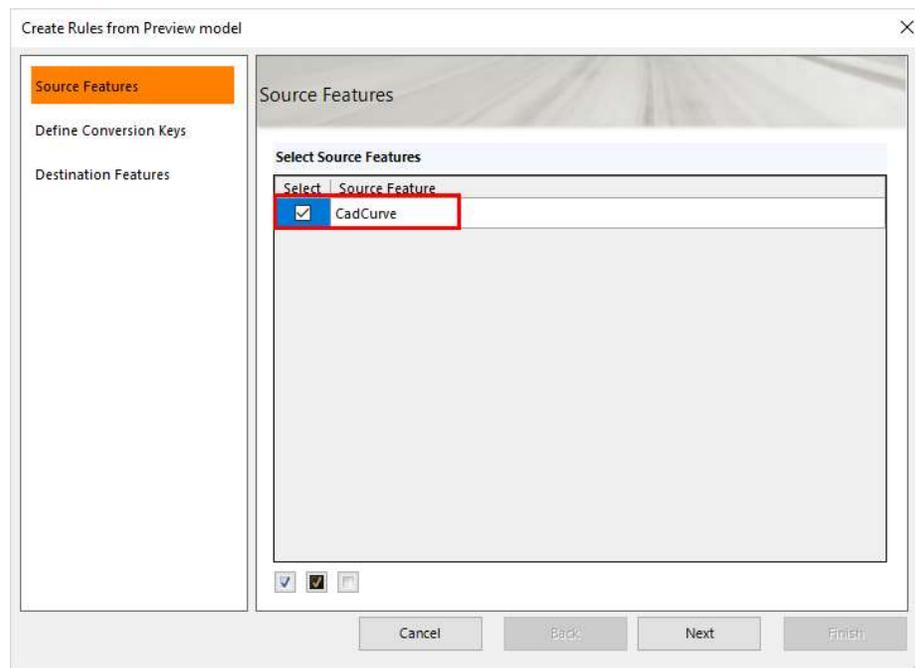


Give the conversion rule a name, e.g like the picture shows. Then click **Save**, and this dialog appears:



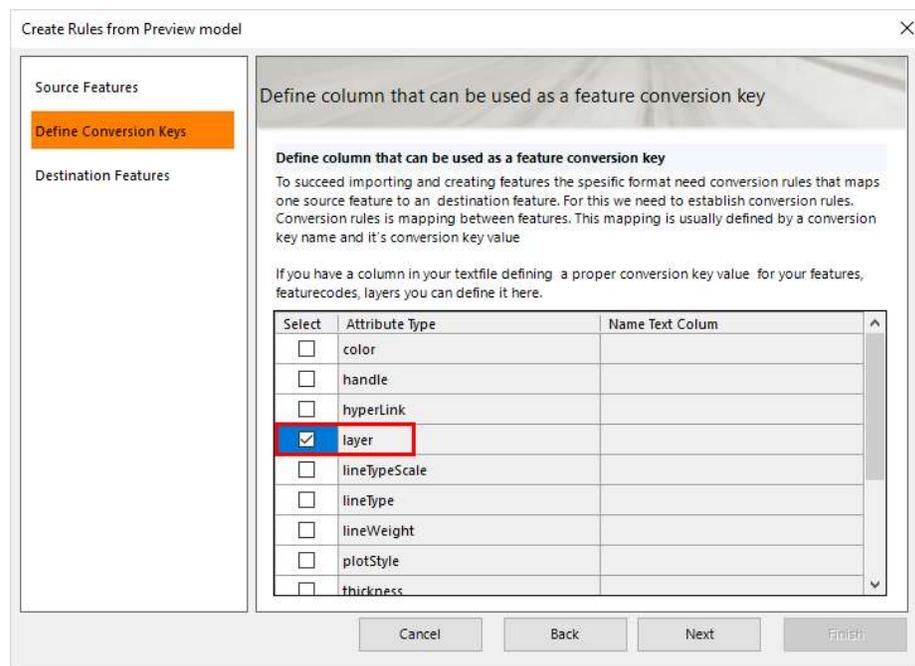
Click on **Create Rules from Preview model**.

9. This dialog appears:



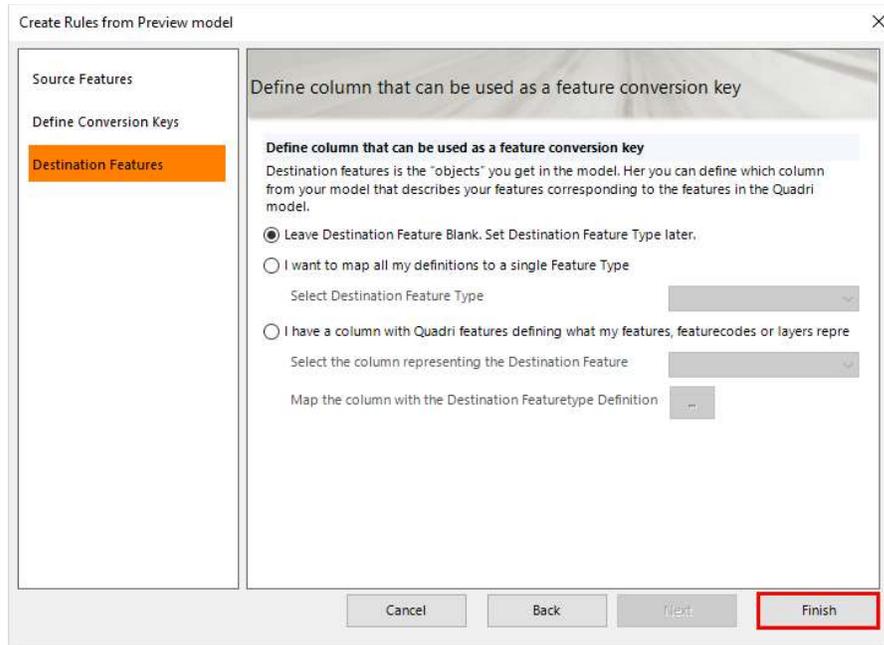
The dialog shows us that the Source Feature here is CadCurves (= line geometry). **Tick** for CadCurves, and then click **Next**.

10. **Tick** for **layer**. By doing that we will list up the information in the file by the CAD layer.

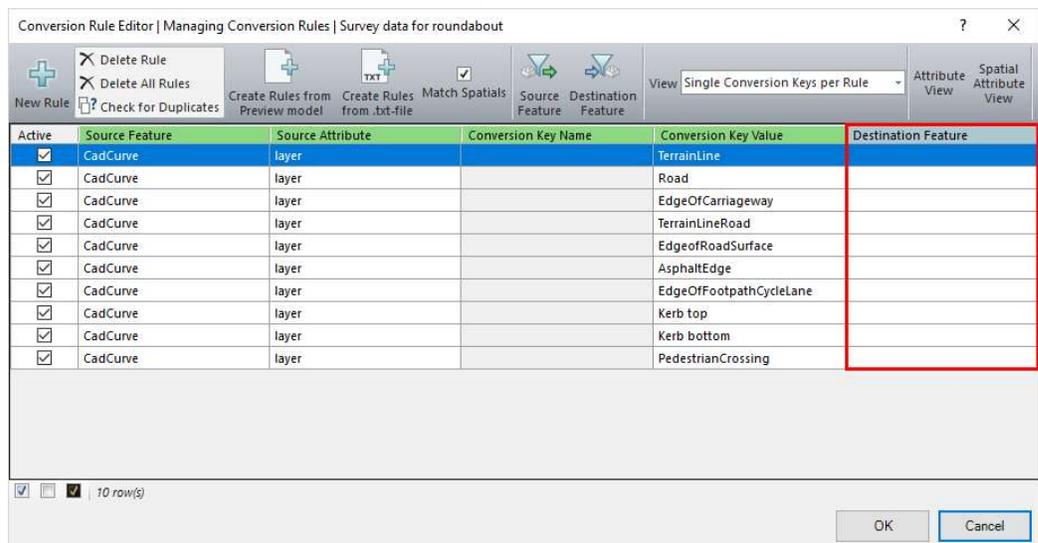


Click **Next**.

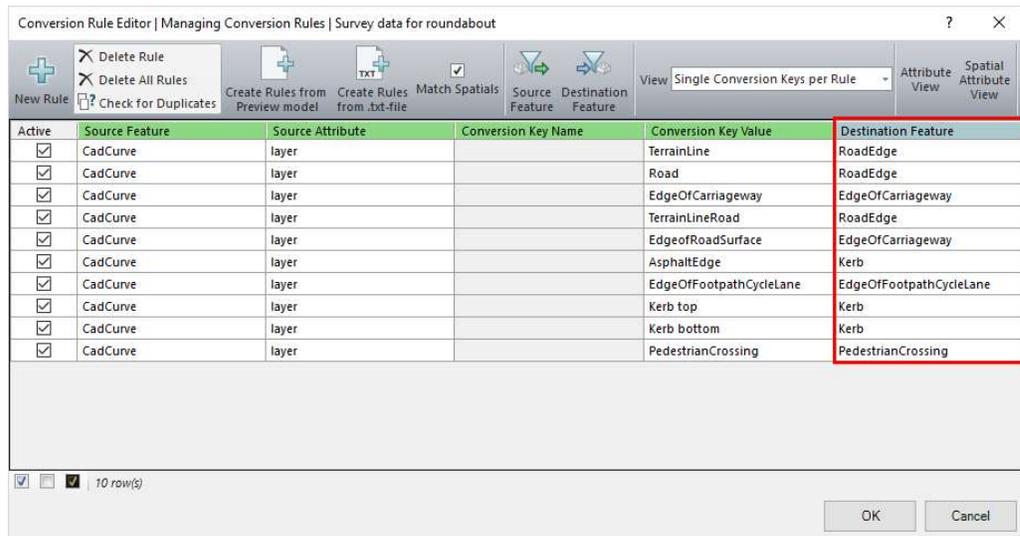
11. Click **Finish**.



12. Now, the CAD layers from the file we are importing will be converted to objects. Click the field in the Destination Feature column. You will now get a list of all the features that you can select the Feature Catalogue in Novapoint (for the specified geometry type, in this case lines/curves).

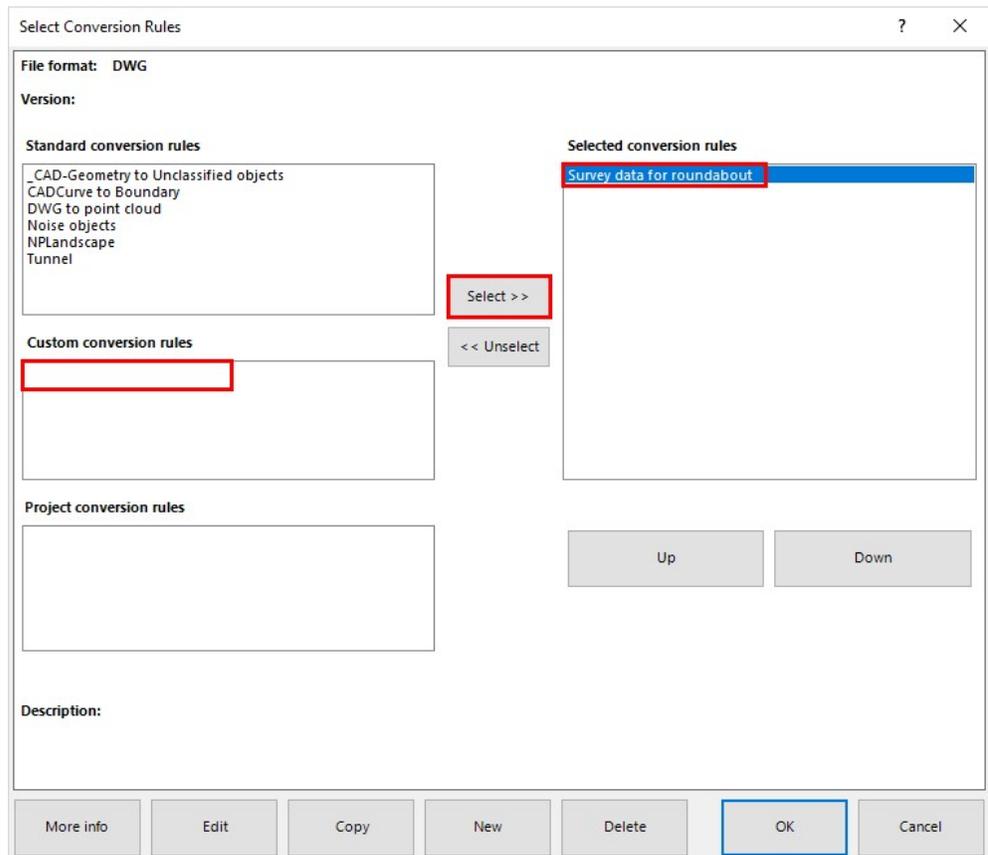


Fill in as shown below, or select features from the list that you think fit best.



When finished, click **OK**.

13. You are now back in the Conversion Rule dialog.

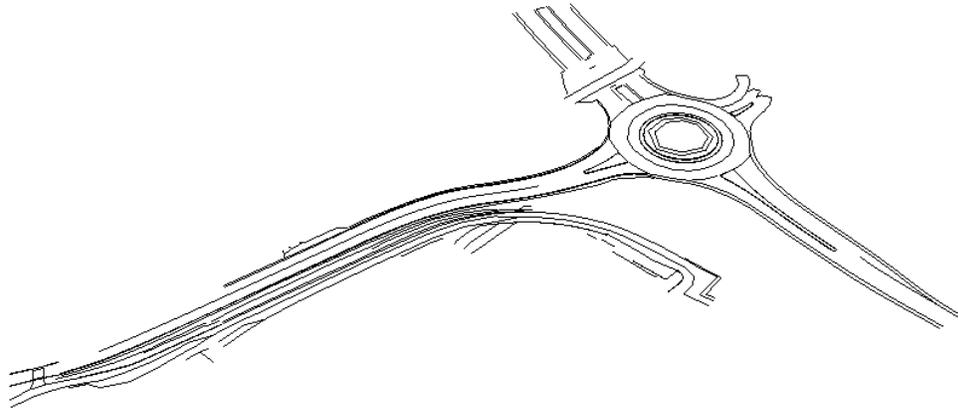


Select the conversion rule you just made. It will be located under **Custom conversion rules**. Click **Select>>**, and finish by clicking **OK**.



14. Finish the import by clicking the **Finish** button.

15. Click on the import **Import SurveyData.dwg** from the Explorer, right click, and **View in 3D**.



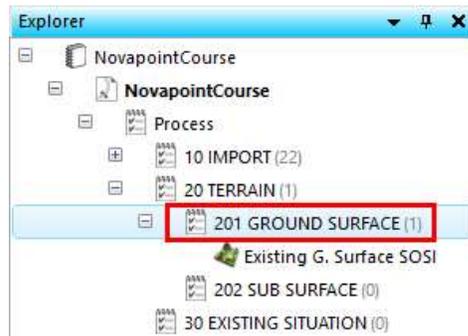
16. **Save** your project by clicking the save button:



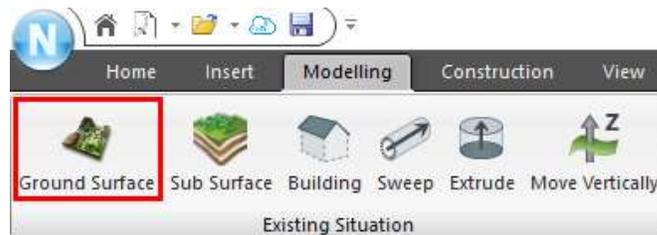
Exercise 9 - Ground surface of the surveying data

1. Now we will create a surface from the imported survey data.

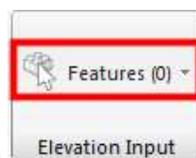
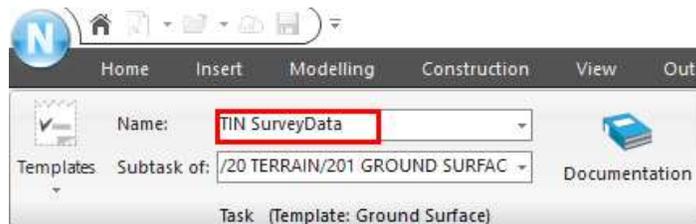
Click on **201 GROUND SURFACE** in the Explorer.



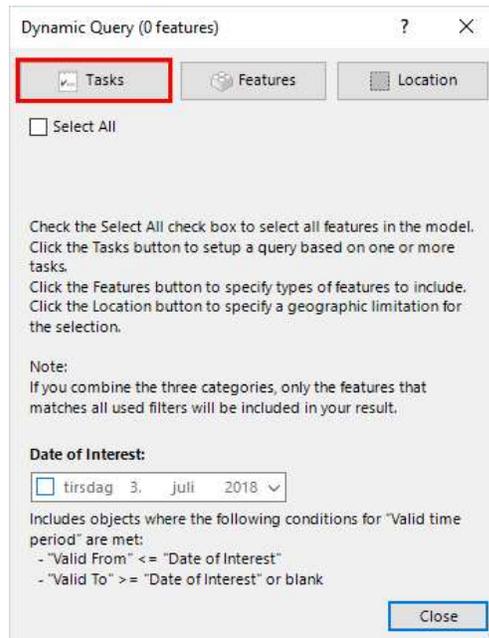
2. Click on **Modelling** and then the **Ground Surface** task:



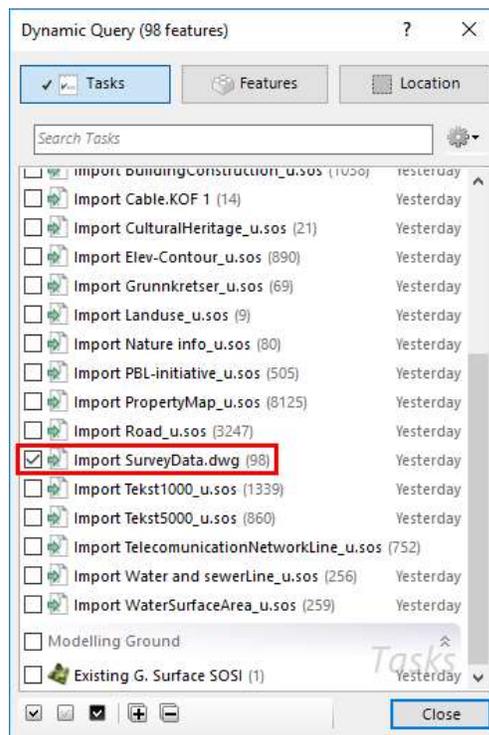
3. Type in a name for the terrain surface task, **TIN SurveyData**.



4. Click on **Elevation Input**. This dialog comes up:



Click the **Tasks** tab, and select **Import SurveyData.dwg**.

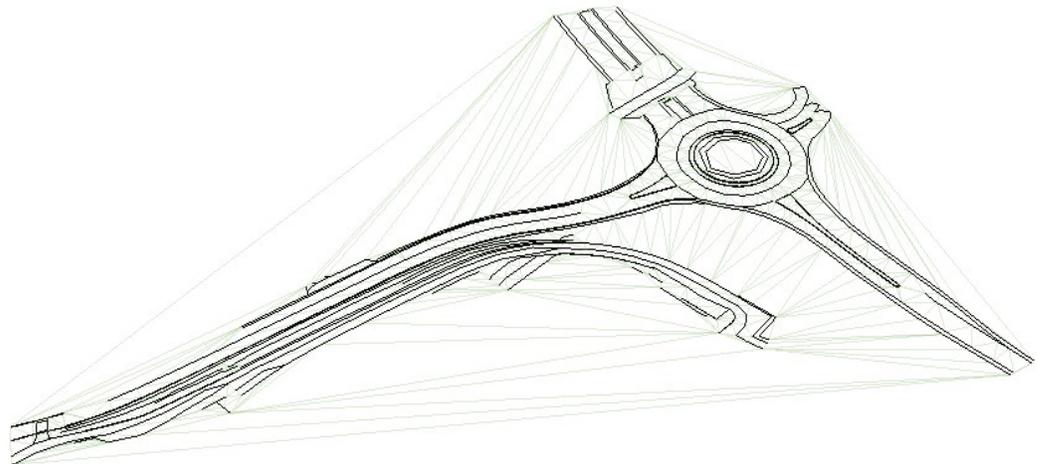
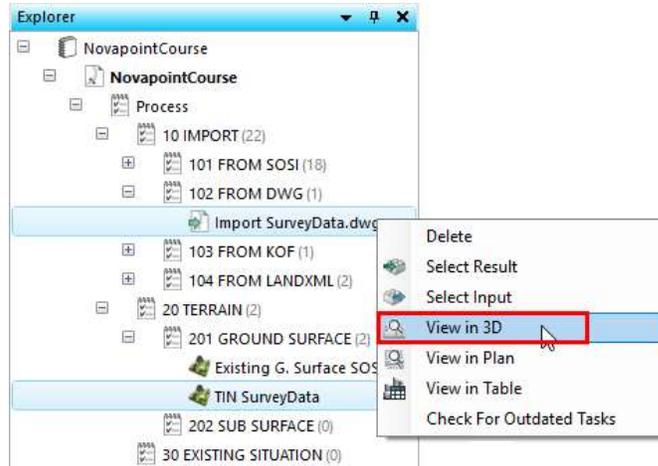


Click **Close**.



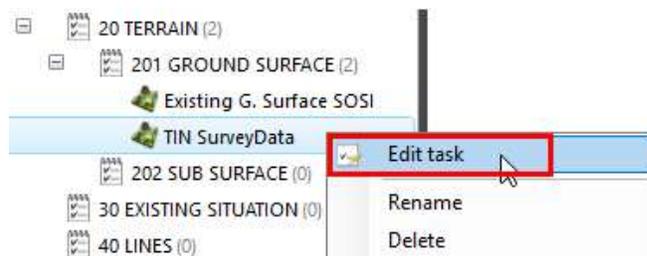
5. Finish the task by clicking **Finish**, and the ground surface task is created.

6. We can now view the import **Import Survey.dwg** together with **TIN SurveyData**. Select both in the explorer, right mouse click and **View in 3D**.



We can see that it is necessary to limit the long triangles. We can do that by removing long-edge triangles at the edge of the triangulation.

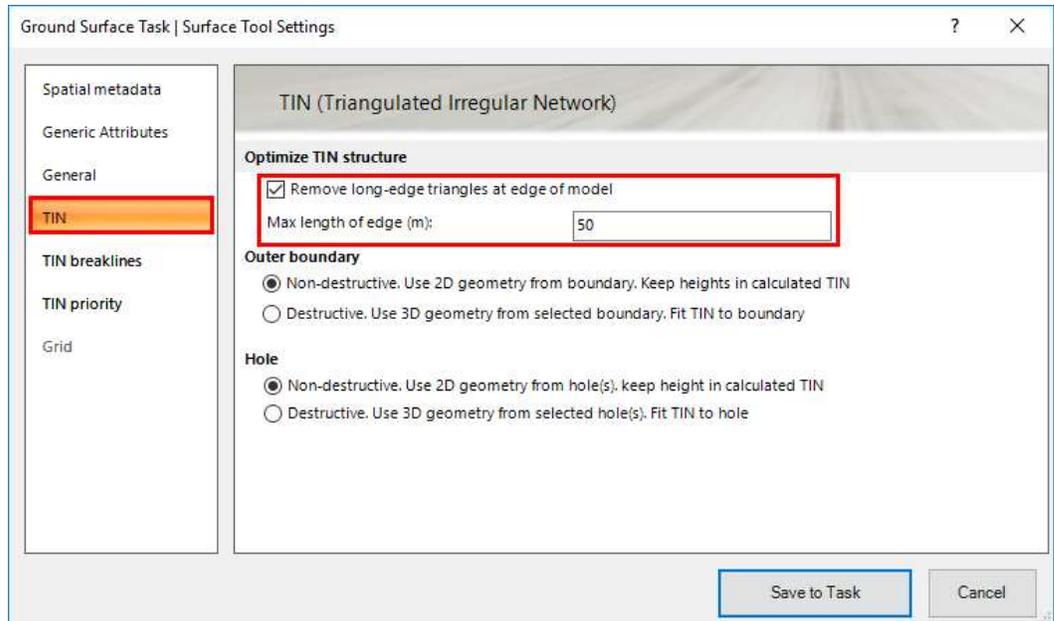
7. Select **TIN SurveyData** in the Explorer and **Edit Task**:





Click **Settings**

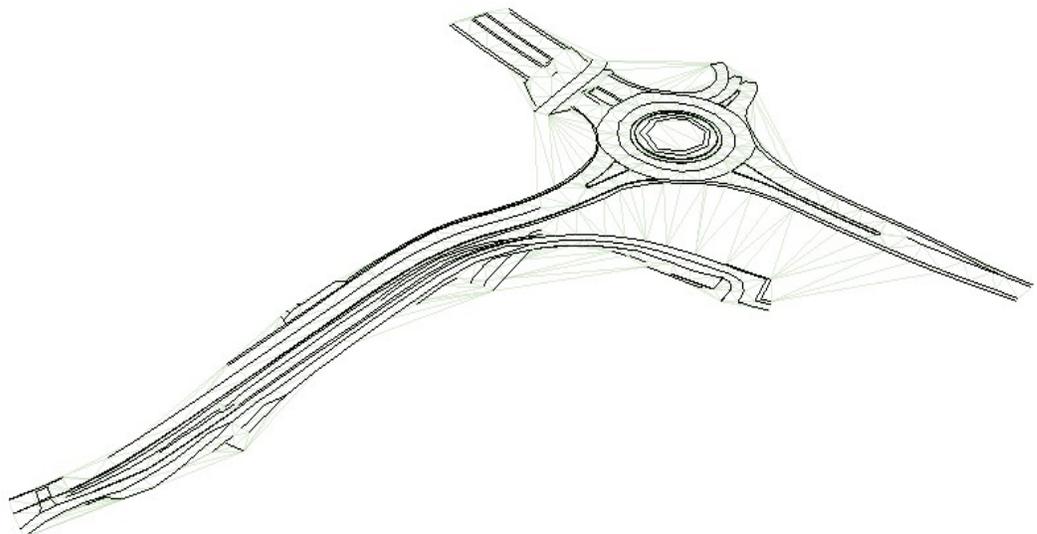
Click on **TIN**, and try first the max length of the edge at **50 m**.



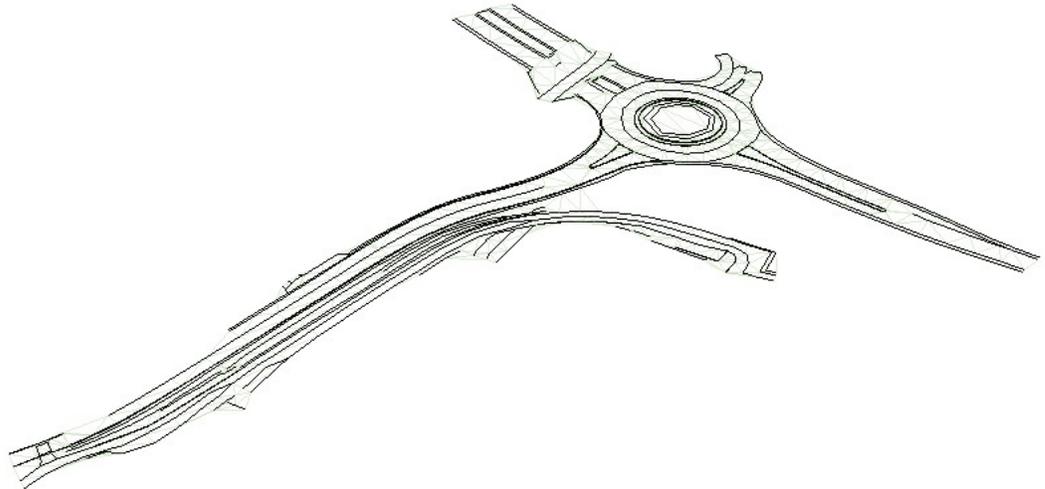
Click **Save to Task**.



Click **Preview** to build the TIN model.



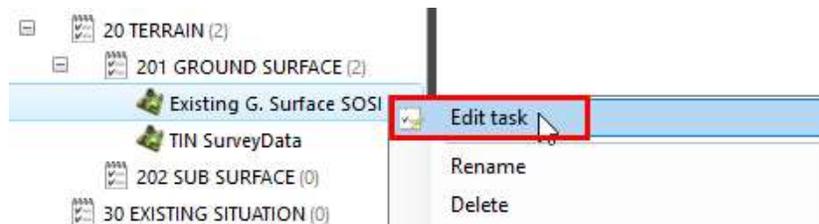
It looks better, but is still not perfect. Gå back to **Settings** and try different values to optimize the TIN surface. Click on **Preview** to view the result. In the picture below we have set the value to **13 m**, and it looks like a good value.



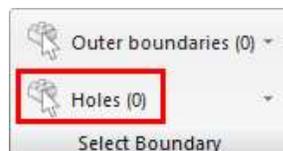
8. Click **Finish**.

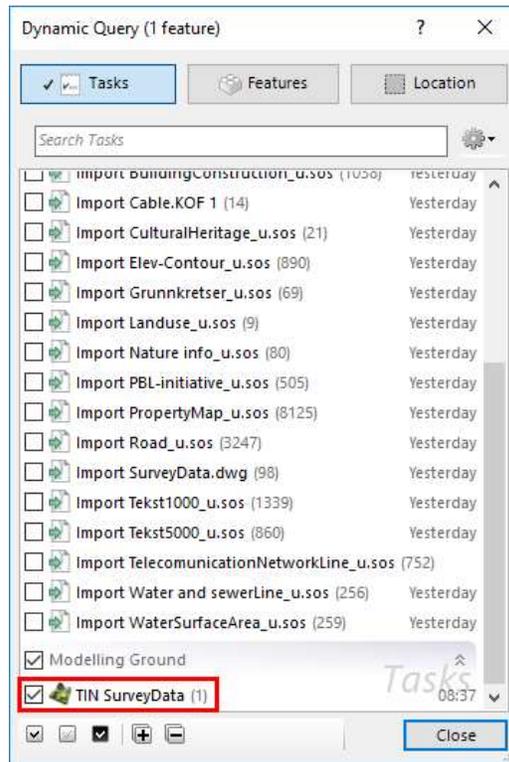
9. We will now clip a hole in the original **Existing G. Surface SOSI**, using **TIN SurveyData** as the hole.

Select **Existing G. Surface SOSI** in the Explorer and **Edit Task**.



Click **Holes** and select **TIN SurveyData** under tasks:





Click **Close**.

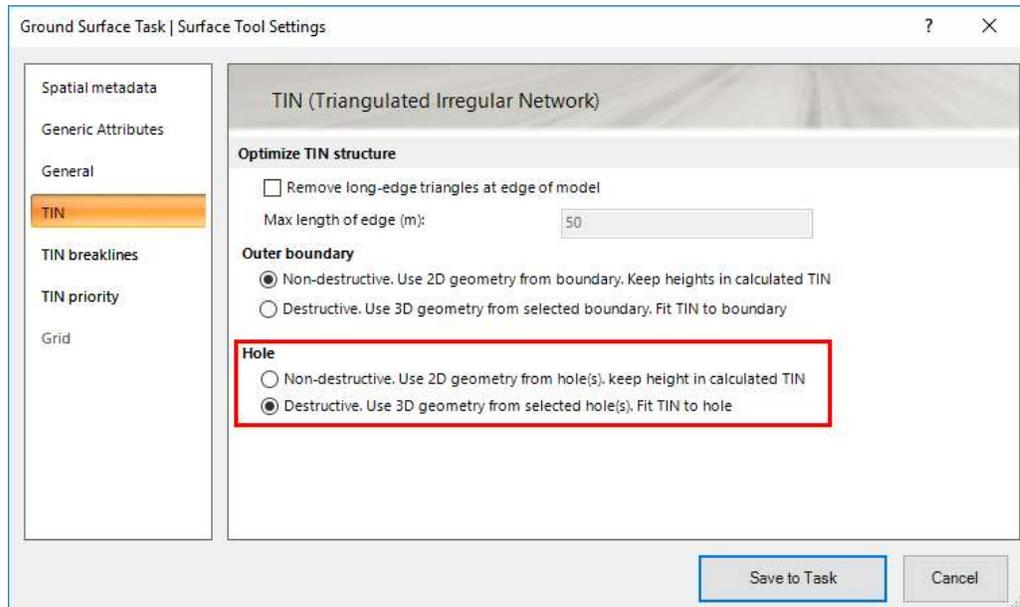
10. Click .

The original ground Surface now looks like this:



We can now use these two Ground surface tasks as a calculation basis for our road/rail/WS tasks.

Note under Settings in the **Existing G. Surface SOSI** task, we can set the hole to be destructive and then the triangulation will use the boundary from **TIN SurveyData** as part of the triangulation:



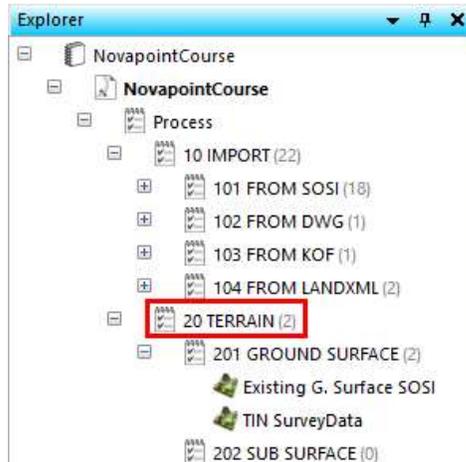
11. **Save** your project by clicking the save button:



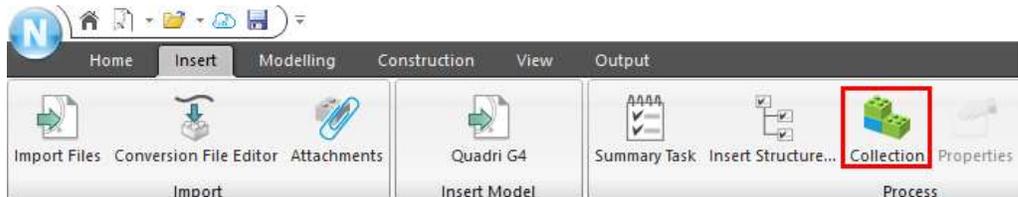
Exercise 10 - Collection

When working with a project it is very useful to create a collection task that holds tasks and features for existing situation as a calculation base. Collection tasks can also be used for illustrations objects. In this exercise, you will create a collection task that will be used for a alignment, road, rail, WS calculation.

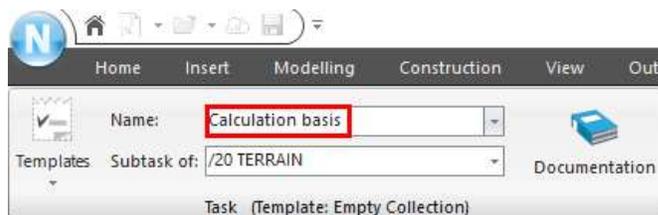
1. Click the Summary task **20 TERRAIN**:



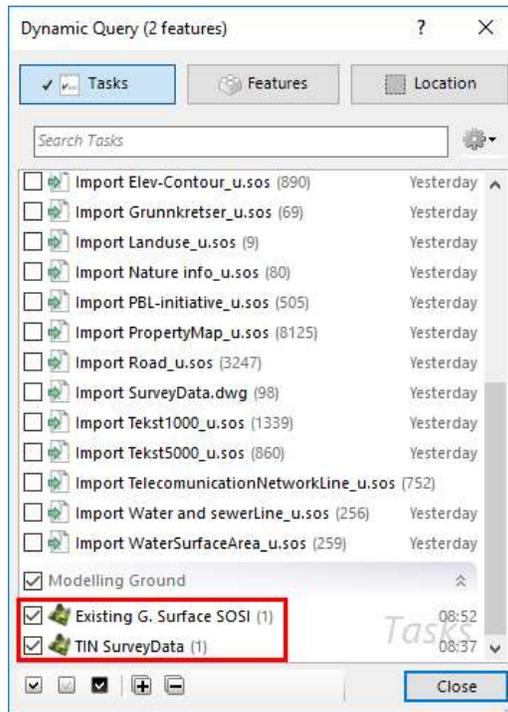
2. Click on the **Insert tab** and click on **Collection**.



3. Type in the name **Calculation basis**.



4. Click on **Select Features**. Under Tasks select the two Ground surface tasks.



Click **Close**.

5. Click  **Finish**.

6. **Save** your project by clicking the save button:



Part 3: Modeling existing situation

In this part of the course, we will look at how we can transform selected objects in the mapping data into 3D objects. This includes buildings, bridges, hedges and utility poles.

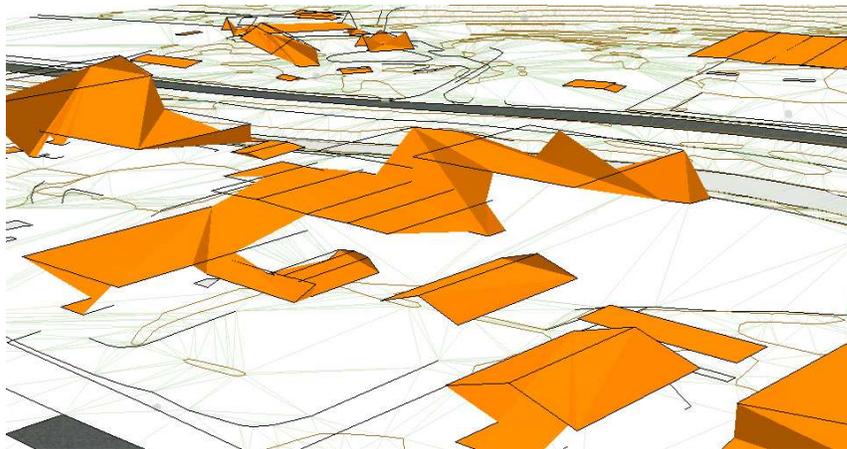
Exercise 11 - Buildings

The modeling of buildings we do in the same function by generating roof surfaces, and vertically extrude them to the ground surface.

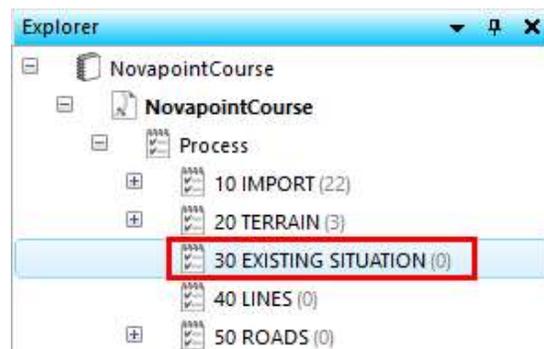
1. Before you start the function it is a good idea to inspect the map data in 3D, this will make it easier to see all the objects you select.

Select **NovapointCourse** at the top of the tree in explorer, right click and select **View in 3D**.

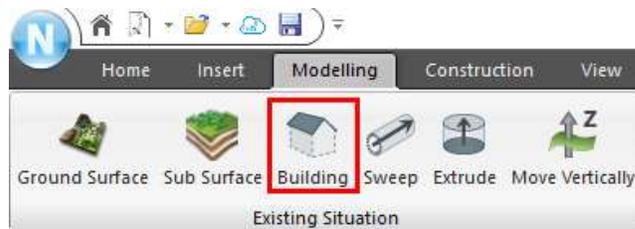
Use the navigation features to zoom in and twist the map data in 3D so you can clearly see some of the buildings as shown below:



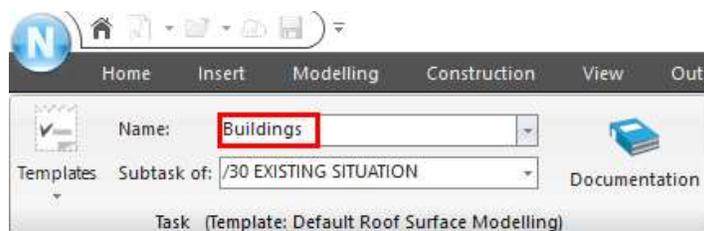
2. Click the Summary task **30 EXISTING SITUATION**:



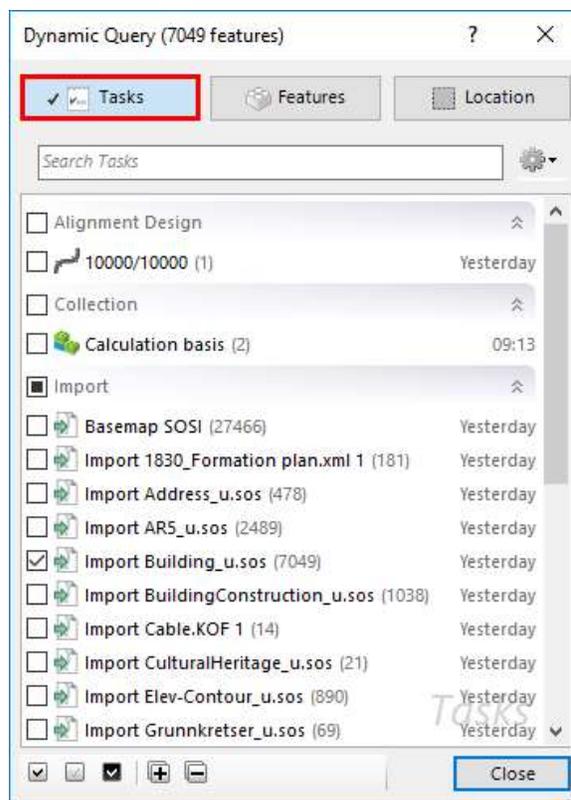
3. Click on **Modelling** and **Building** as shown below:



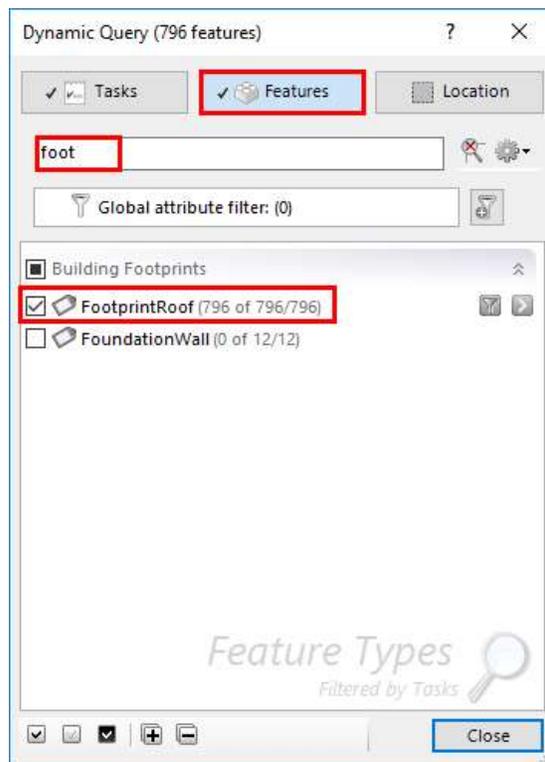
4. Input a suitable name - **Buildings**:



5. Click **Select Building Info**. In the Dynamic Query dialog that appears, click **Tasks** and select **Import Building_u.sos**.



Click **Features**:

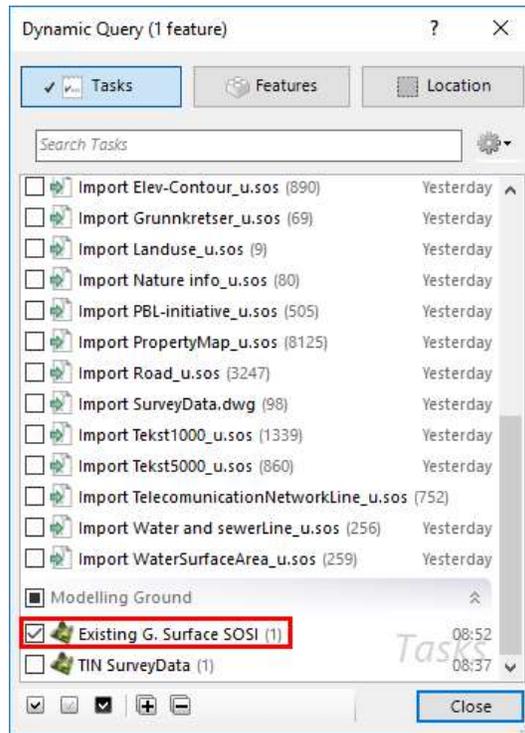


Browse for features **FootprintRoof** in the search field. Note that the features you have selected will be highlighted in the 3D model in red. Click the **Close** button.

6. Click **Features to follow**.



Select **Existing G. Surface SOSI** and then **Close**.



7. In the field Extrude vertical enter **-2**:



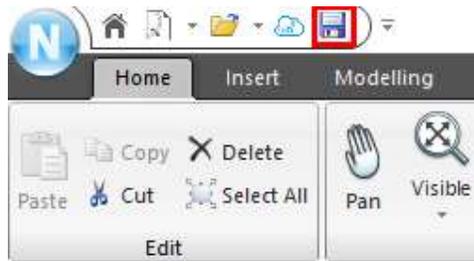
All the buildings will now be extruded from the roof heights, and 2 m under the ground surface, to simulate a cellar.

8. Click  **Finish** .

9. In the Explorer, select the **Buildings** task, right mouse click and **View in 3D**:



10. **Save** your project by clicking the save button:

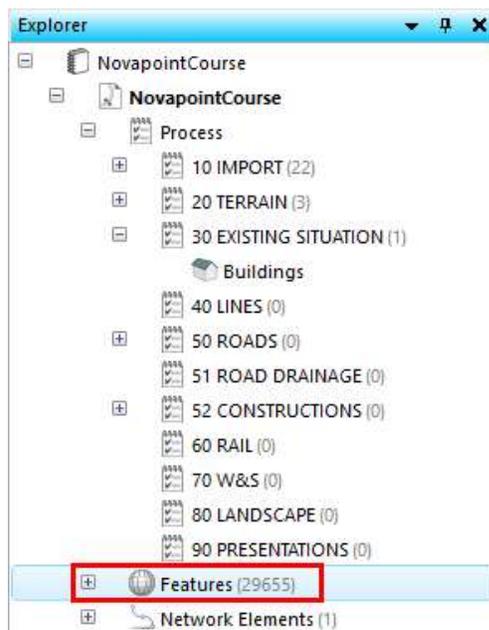


Exercise 12 - Modeling other 3D objects

In this exercise, we will model more existing features as 3D objects. The examples will include bridges, hedges and utility poles. It is possible to create 3D objects in this way using points, lines, polygons and surfaces.

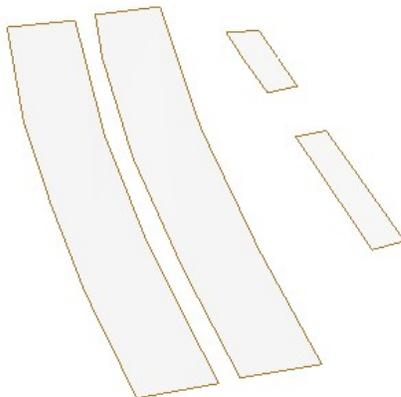
Bridges

1. In the explorer, scroll down to the bottom. Click the +mark in front of Features.

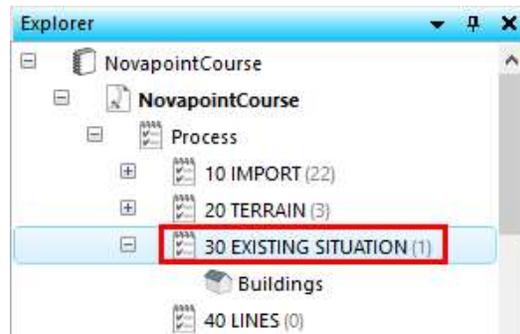


You will now get a list of all features that are in your model. Scroll down and find **BridgeFootprint**. Click the + in front of BridgeFootprint to list all BridgeFootprint surfaces found in your model. All features have a unique identification.

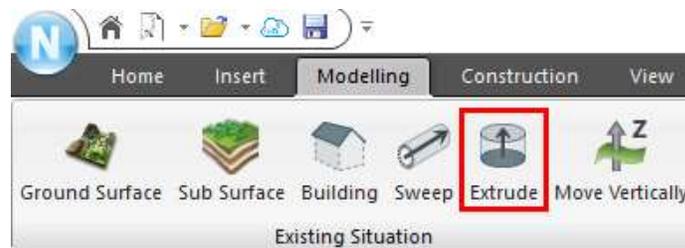
Click **BridgeFootprint**, right mouse click and select **View in 3D**. Zoom in on some of them:



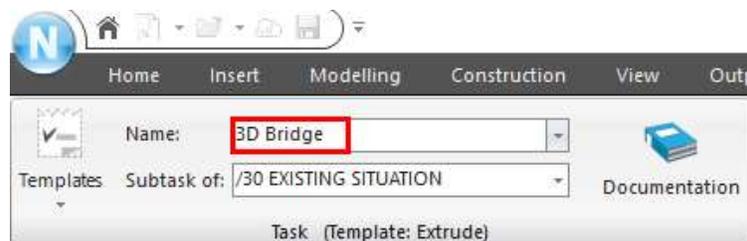
- Now scroll up in the explorer, and click the summary task **30 EXISTING SITUATION**.



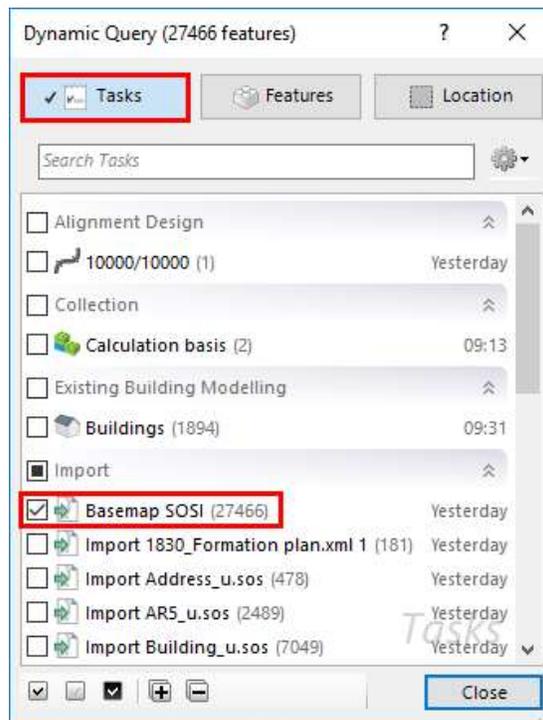
- Click **Modelling** and **Extrude**:



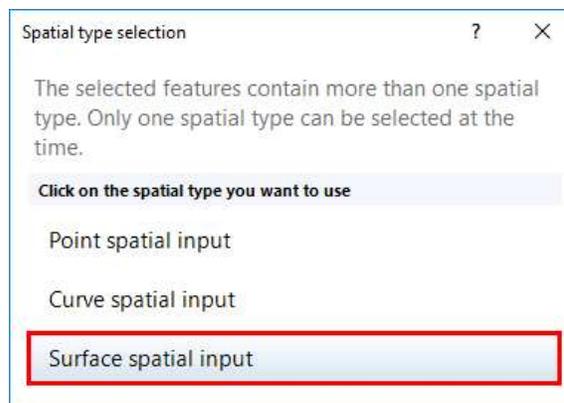
- Input the name **3D Bridge**:



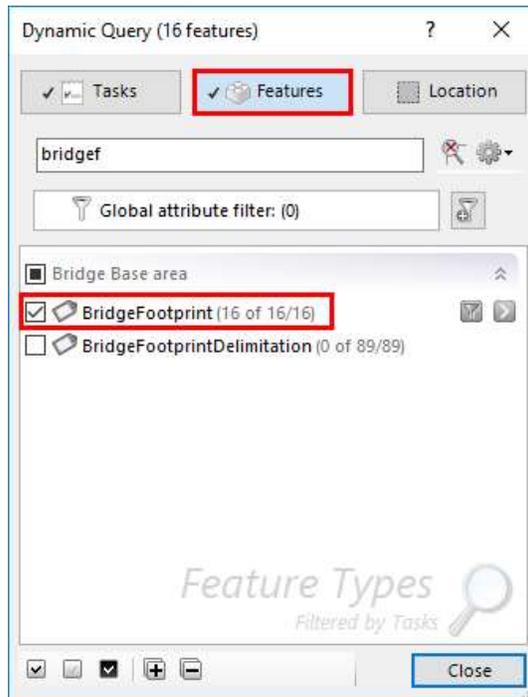
- Click **Select Feature(s)**. Under Tasks, select **Basemap SOSI**.



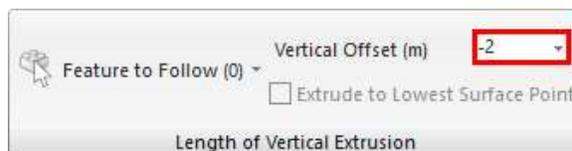
As the bridges are surface geometry, we select **Surface spatial input**.



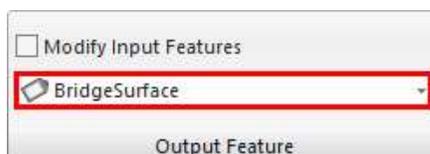
Under **Features** select **BridgeFootprint**.



- In this case we want to create a volum from a bridge surface, and give it a **Vertical Offset(m)** of **-2** (thickness 2m).

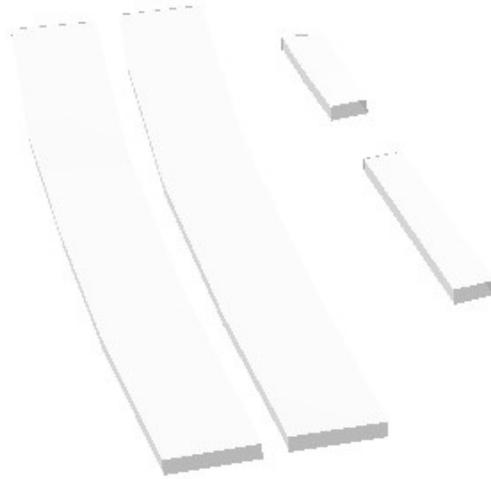


- As **Output Feature**, first un-tick **Modify Input Features**, and select **BridgeSurface**:



- Click  **Finish**.

- Click the **3DBridge** task in the explorer, **right mouse click** and **View in 3D**.



TIP: The 3D volume objects can be used as Illustration objects in Alignment Design and in the Road/Rail model. They will appear in the vertical alignment design window and in the road/rail Cross section viewer.

10. **Save** your project by clicking the save button:



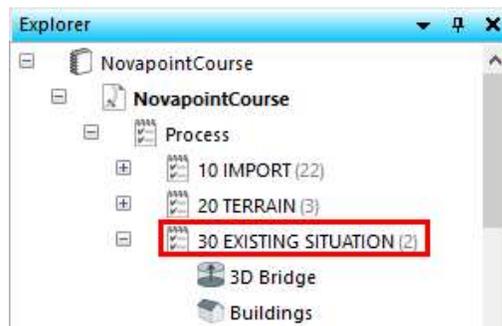
Hedges

1. Again, scroll down in the explorer under Features. Now find the feature type **Hedge**, right click and **View in 3D**.

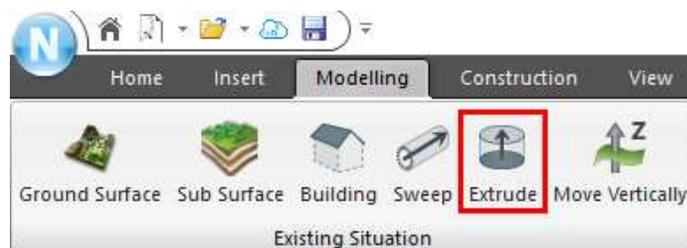


We see all the Hedges in 3D as single line objects, and we will add volume geometry to them

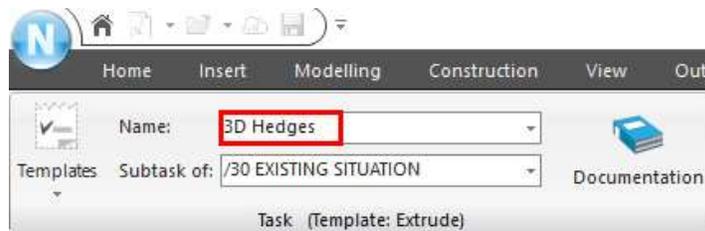
2. Now scroll up in the explorer, and click the summary task **30 EXISTING SITUATION**.



3. Click **Modelling** and **Extrude**:

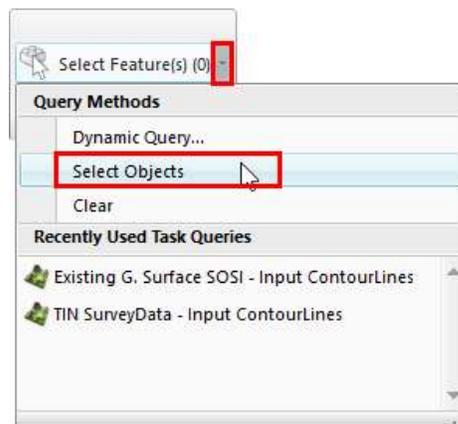


4. Input the name **3D Hedges**:

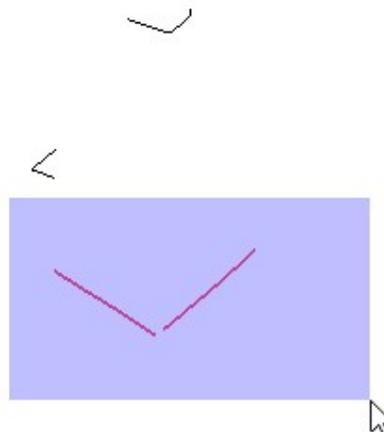


Now, instead of selecting all the hedges from the list, we will first select one or two straight from the view window. This is a good method to use when there are many instances of a feature type.

5. Click the down arrow next to **Select Feature(s)**, and click on **Select objects**.



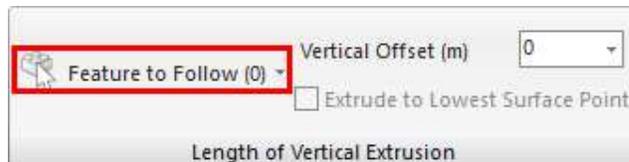
Select one or two hedge lines in the window.



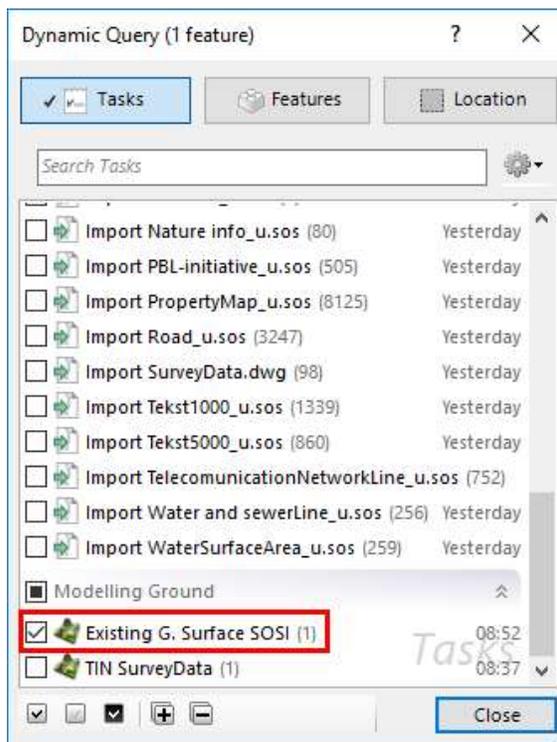
6. Under Normal Profile, fill in these values:



7. Click **Feature to Follow**.

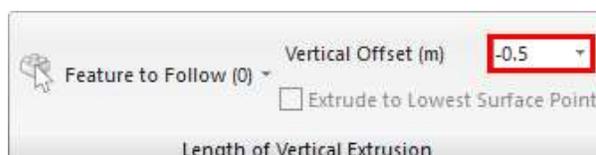


Select **Existing G. Surface SOSI** under tasks.



Click **Close**.

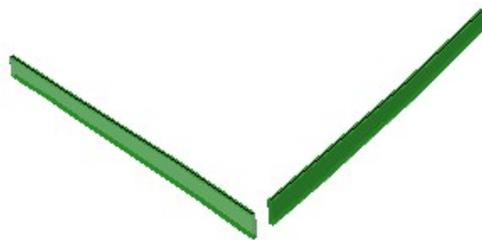
8. In Vertical Offset enter a value of -0.5 m under the ground surface, to represent the volume of roots under the hedges.



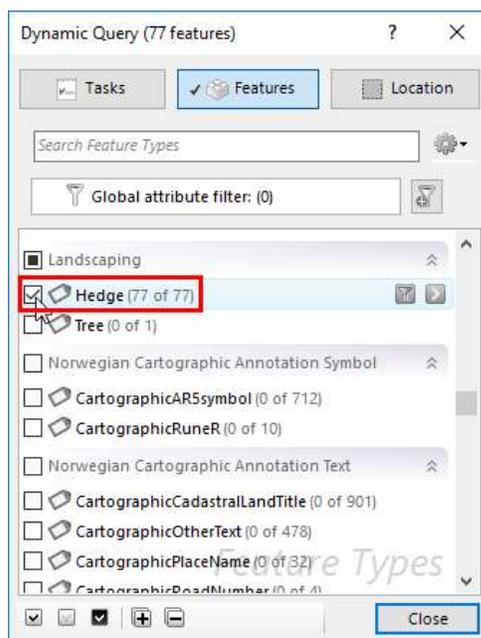
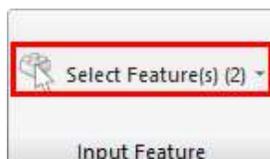
- As **Output Feature**, select **Modify Input Feature**. Then, the volume geometry is saved as additional property to the imported hedges, instead of duplicating the number of this object type.



- Click **Preview**, and the two hedges are modelled as a 3D hedge.

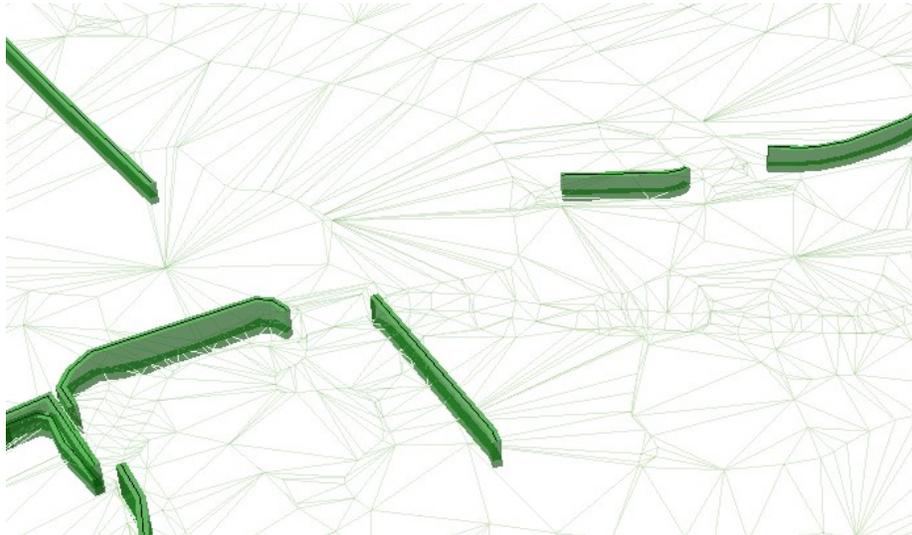


- You can now extend the task to include all hedges. Click **Select Feature(s)** and select all Hedges.



12. Click **Close**, then  .

13. Check all your hedges against the ground Surface, by selecting the two tasks, right mouse click and **View in 3D**.



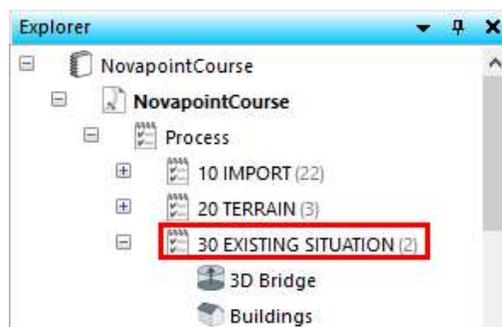
Optionally, select another drawing rule, to view this with textures.

Utility poles

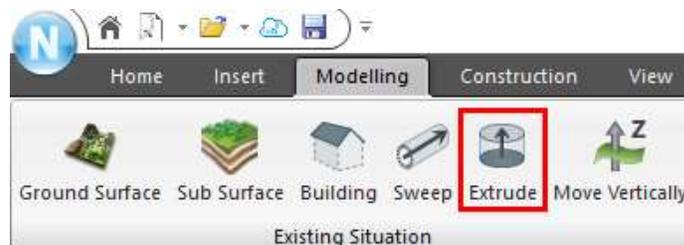
1. From Features at the bottom of the Explorer, select **UtilityPole** and **View in 3D**.



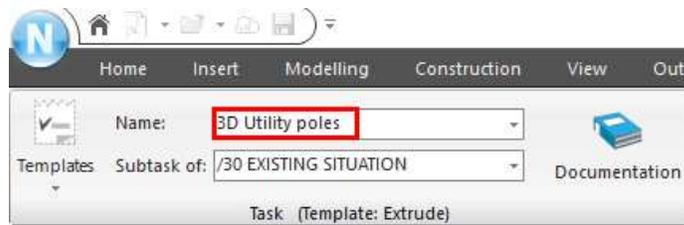
2. Now scroll up in the explorer, and click the summary task **30 EXISTING SITUATION**.



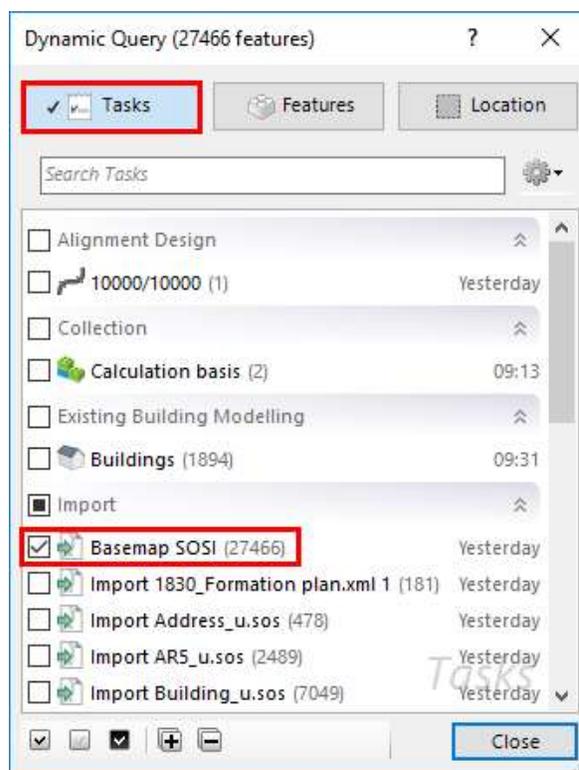
3. Click **Modelling** and **Extrude**:



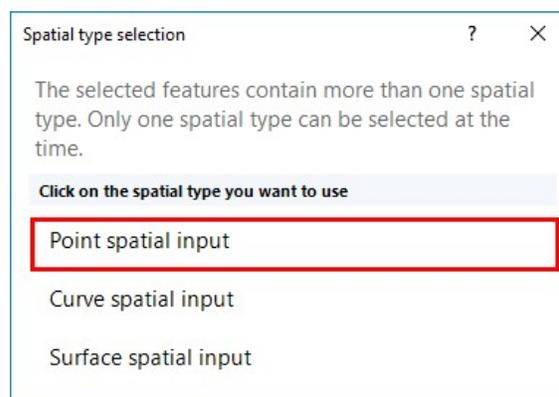
4. Input the name **3D Utility poles**:



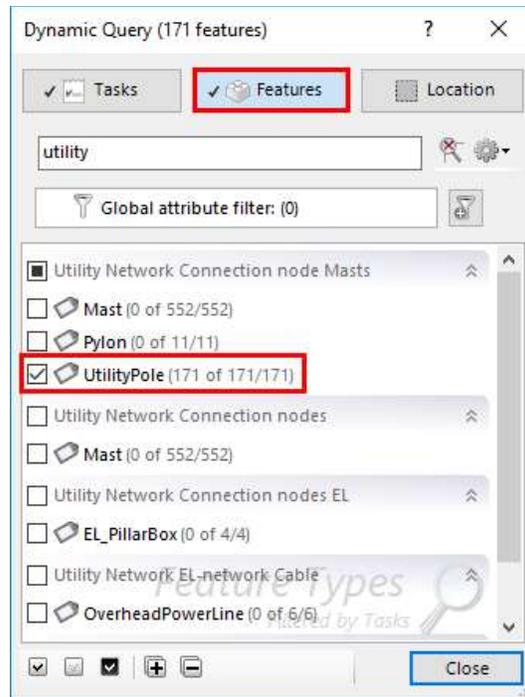
5. Click **Select Feature(s)**. Under Tasks, select **Basemap SOSI**.



As the Utility poles are point geometry, we select **Point spatial input**.



Under **Features** select **UtilityPole**.

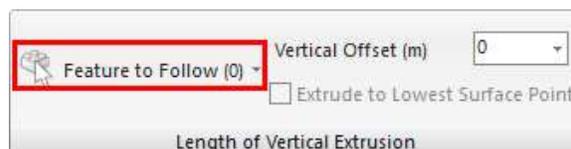


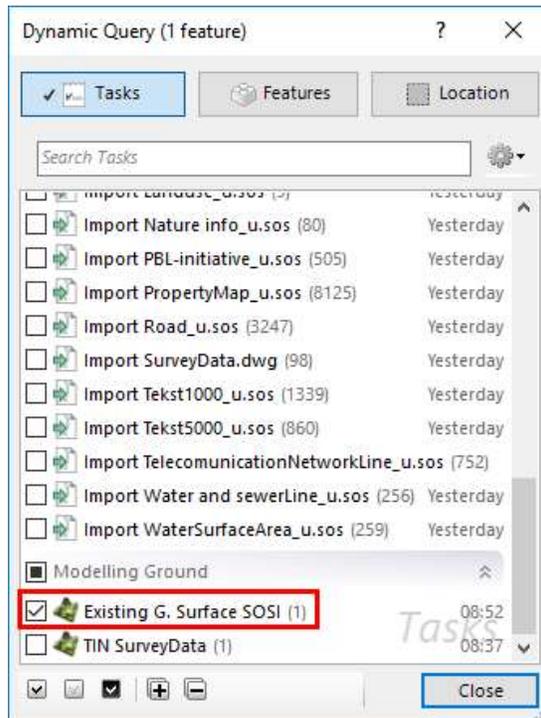
6. Under **Normal profile**, fill in the values as shown:



7. In this case we have a z value for each pole that we assume is the top of each pole and we want the pole volume to extrude to the Ground surface.

Click **Feature to Follow**:





Select **Existing G. Surface**, and then click **Close**.

- As Output Feature select **Modify Input Features**.

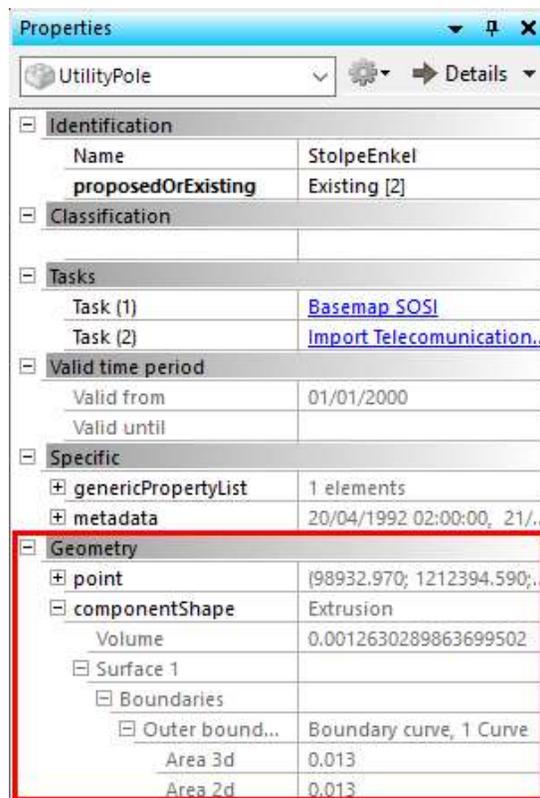


- Click  **Preview** and each pole is modelled.

- Now, it looks like nothing did happened, but if we zoom in a lot on one of the poles, we actually can see the result.

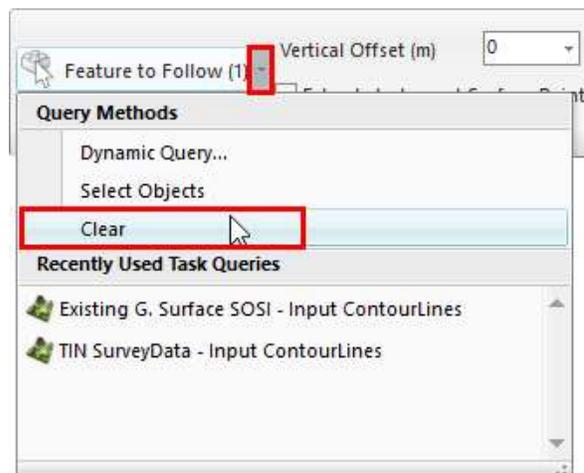


11. Select one of the Utility poles and look at its properties, it now has a volume geometry.

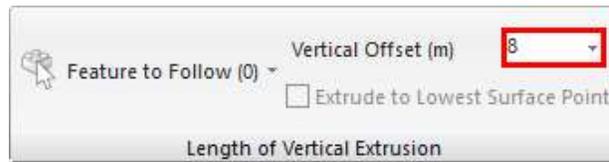


In this case it looks like the z value for each pole was the Ground Surface height. We can now change the geometry and give each pole a height of for example 8 m.

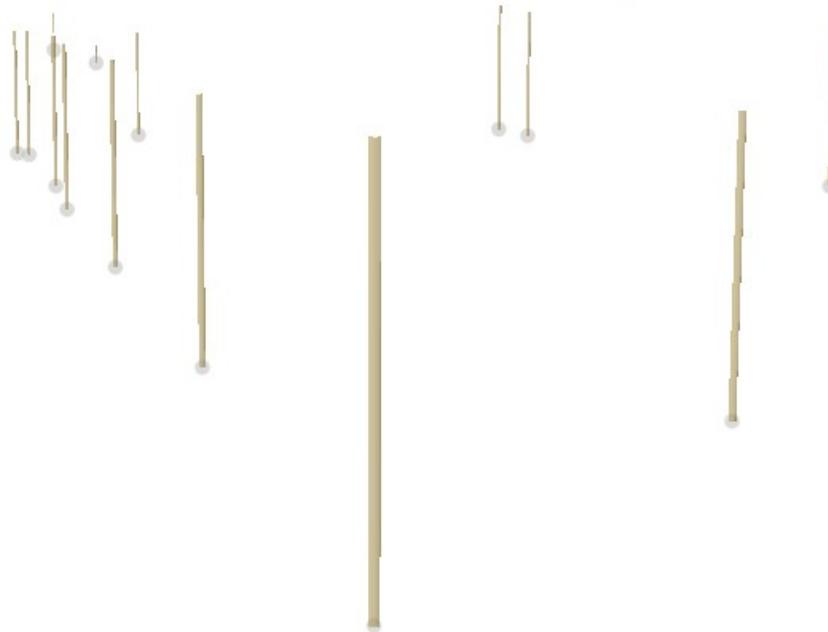
12. Clear the Feature to Follow:



Instead, enter a value of **8 m** for the **Vertical Offset**:



13. Click  Finish .



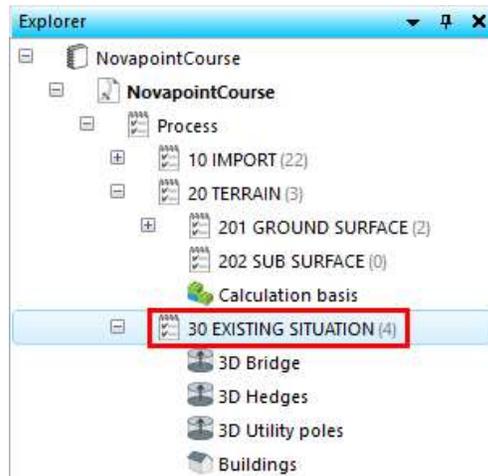
14. **Save** your project by clicking the save button:



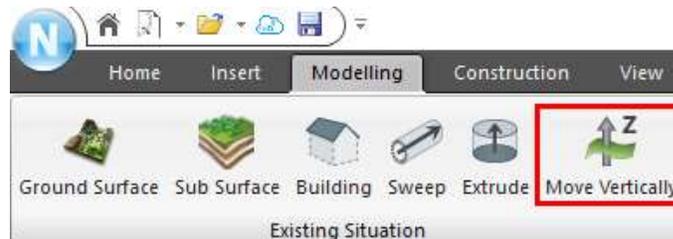
Exercise 13 - Modelling of existing cables

In this exercise, we will model the cables we imported from the KOF format earlier. They are currently in 2D with elevation 0, so we will first place them 0.8 m below the ground surface.

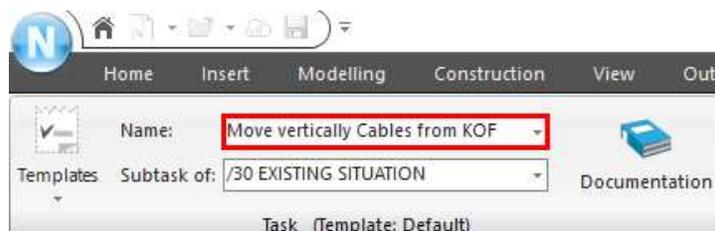
1. Click the summary task **30 EXISTING SITUATION**.



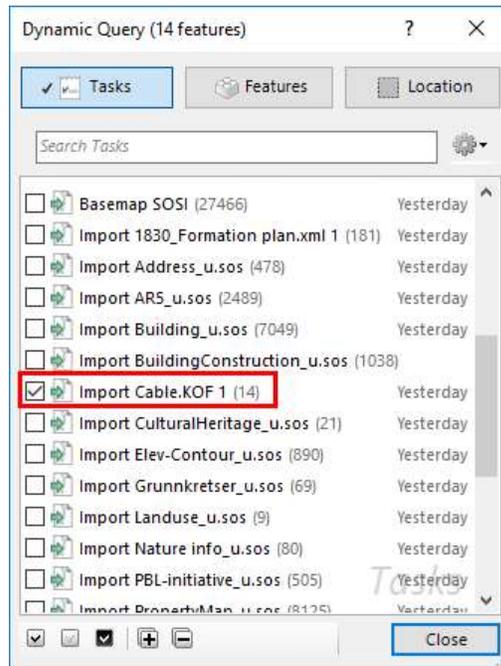
2. Click **Modelling** and **Move Vertically**:



3. Input the name **Move vertically Cables from KOF**:

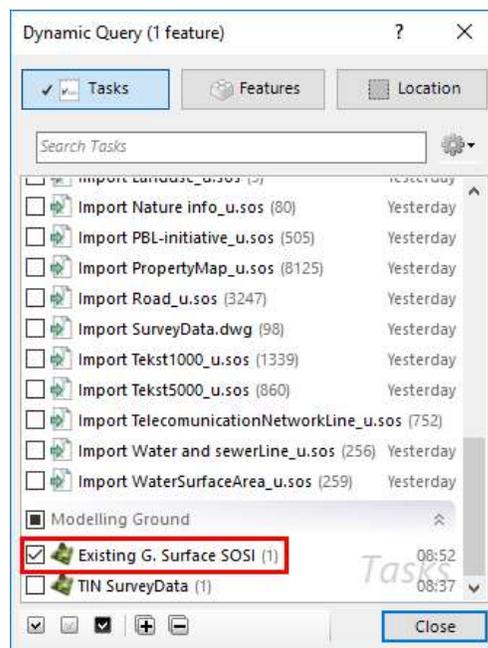
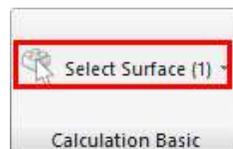


4. Click **Select Feature(s)**. Under Tasks, select **Import Cable.KOF**.

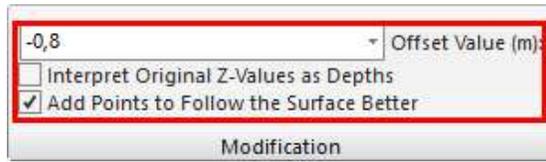


Click **Close**.

5. **Select Surface**, select the **Existing G. Surface SOSI** and **Close**.



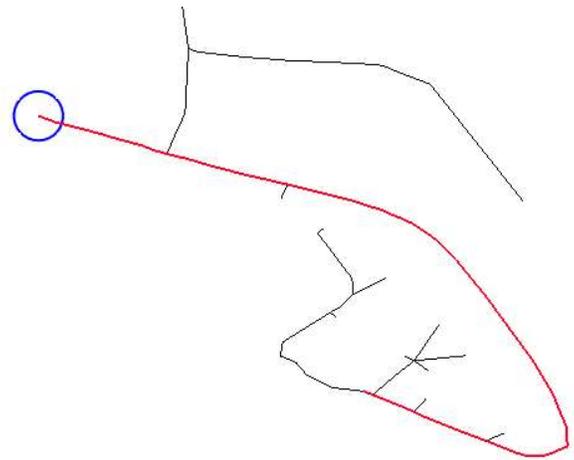
- Enter an offset value **-0.8 m** and tick **Add points** to follow the surface better.



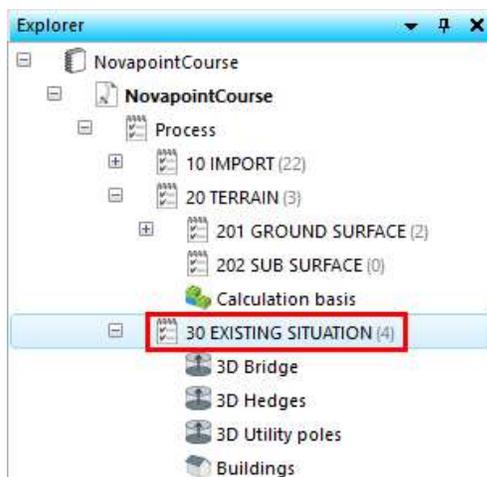
- Click **Finish**.

Right click **Import Cable.KOF** from the explorer, and **View in 3D**. The imported cables now have a z values:

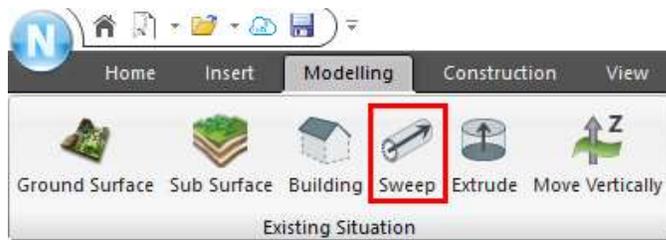
Chainage	X	Y	Z	Length, 2D
1	0	98560.770	1212491.623	23.332
2	0.304	98561.056	1212491.521	23.365
3	0.617	98561.351	1212491.415	23.278
4	1.995	98562.648	1212490.951	23.000
5	2.807	98563.413	1212490.677	22.871
6	2.941	98563.539	1212490.632	22.853
7	3.832	98564.378	1212490.332	22.745
8	4.338	98564.855	1212490.161	22.689
9	5.177	98565.644	1212489.878	22.645
10	5.808	98566.238	1212489.666	22.574
11	7.224	98567.571	1212489.188	22.218
12	8.204	98568.494	1212488.858	22.000
13	9.625	98569.832	1212488.379	22.000
14	17.764	98577.495	1212485.636	22.000
15	18.518	98578.205	1212485.382	22.000
16	19.519	98579.147	1212485.045	22.000
17	20.473	98580.045	1212484.724	22.000



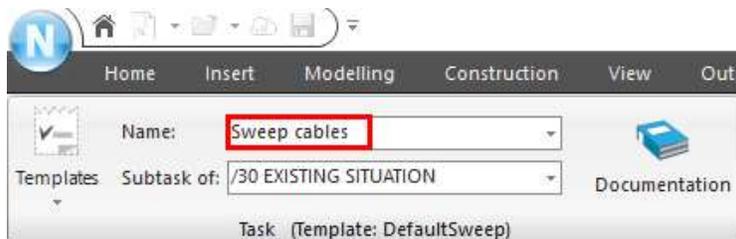
- Click the summary task **30 EXISTING SITUATION**.



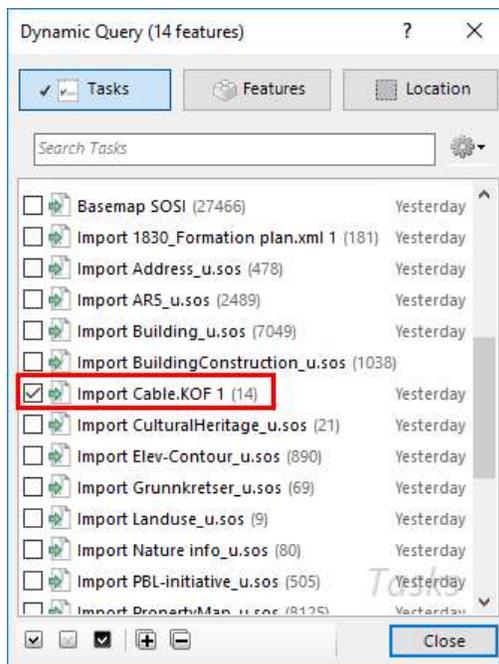
9. Click **Modelling** and **Sweep**:



10. Input the name **Sweep cables**:



11. Click **Select Feature(s)**. Under Tasks, select **Import Cable.KOF**.



Click **Close**.

12. Fill out the Normal Profile like this:

Circular	<input type="checkbox"/> Outer Diameter/Height	Height/Diameter (m)	0.1
Top Center		Width (m)	1
<input checked="" type="checkbox"/> Create Hole		Thickness (m)	0.01

Normal Profile

13. As Output Feature select **Modify Input Features**.

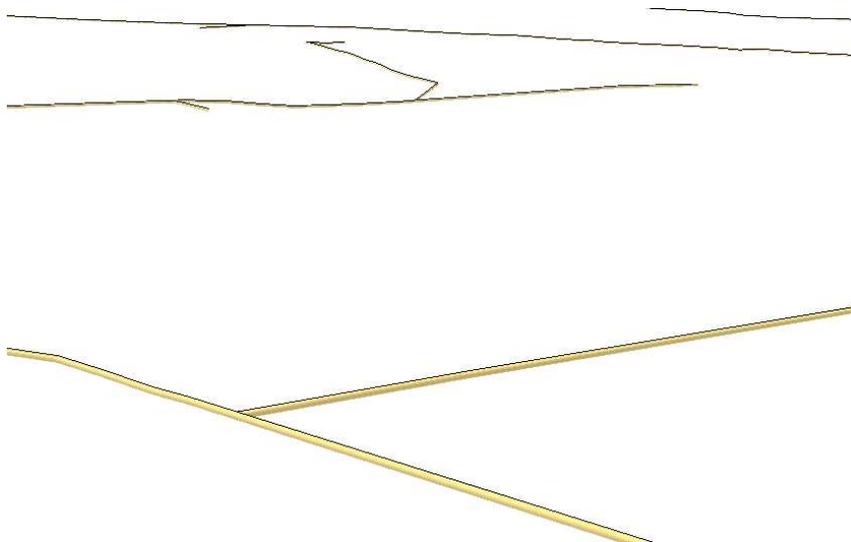
<input checked="" type="checkbox"/> Modify Input Features
Choose Feature Type

Output Feature



14. Click **Finish**.

15. The result when viewed in 3D:



16. **Save** your project by clicking the save button:



Part 4: Presentations, orthophotos, map delineating and sections

The views of the model you have used so far in this course have been temporary. We can select multiple tasks or objects to display at the same time, though we quickly get many window tabs open (as shown below).



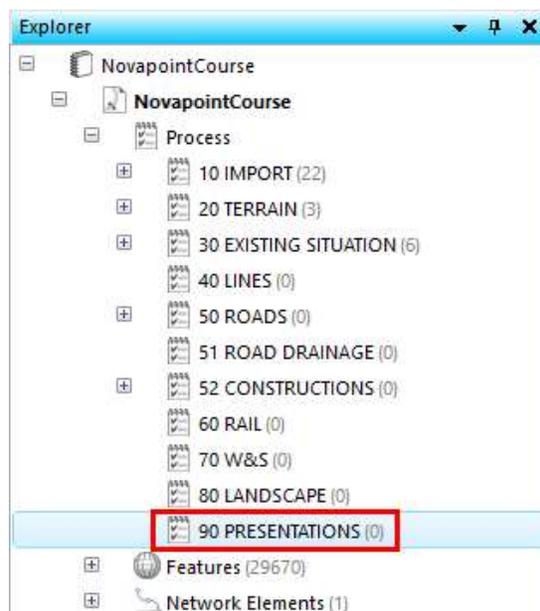
To close the windows, click X on the tab to close it, or press right mouse button over a tab and click Close All Other Windows, or Close All Windows.

If you want to save specific views or presentations, you will create a permanent plan or 3D presentation. These can also be linked to ortofoto or WMS. The plan presentation is also used to draw to AutoCAD.

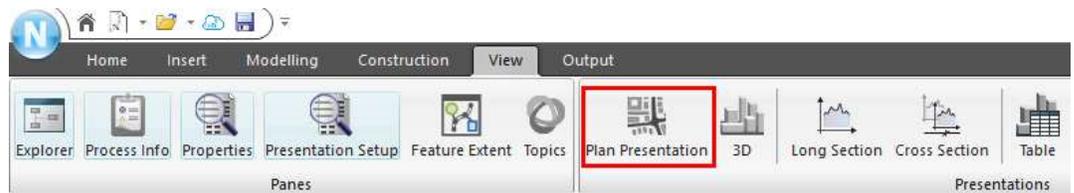
Exercise 14 - Presentation task of map data in plan

To export the map data to AutoCAD we can create a presentation task of type **Plan**, which can then be exported to DWG.

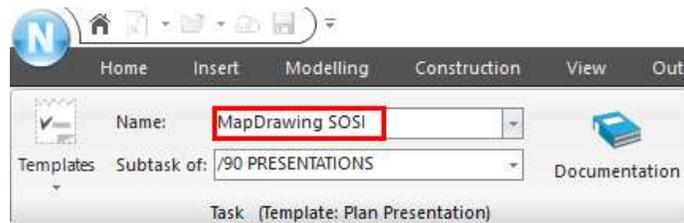
1. Click the summary task **90 PRESENTATIONS**.



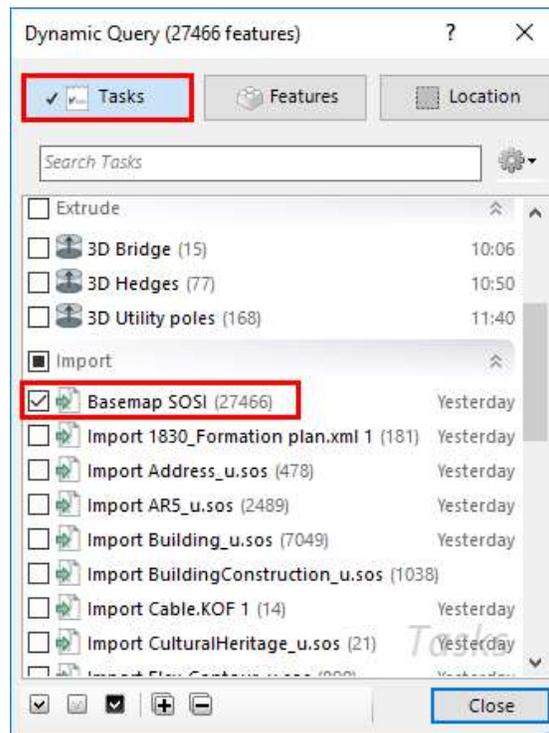
2. Click **View** and **Plan Presentation**.



3. Enter the name **MapDrawing SOSI**.

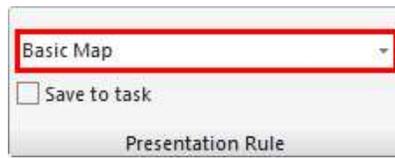


4. Click **Source Features(s)** and open the **Tasks** tab.



Select **Basemap SOSI** and **Close**.

5. As **Presentation Rule**, select **Base Map**.



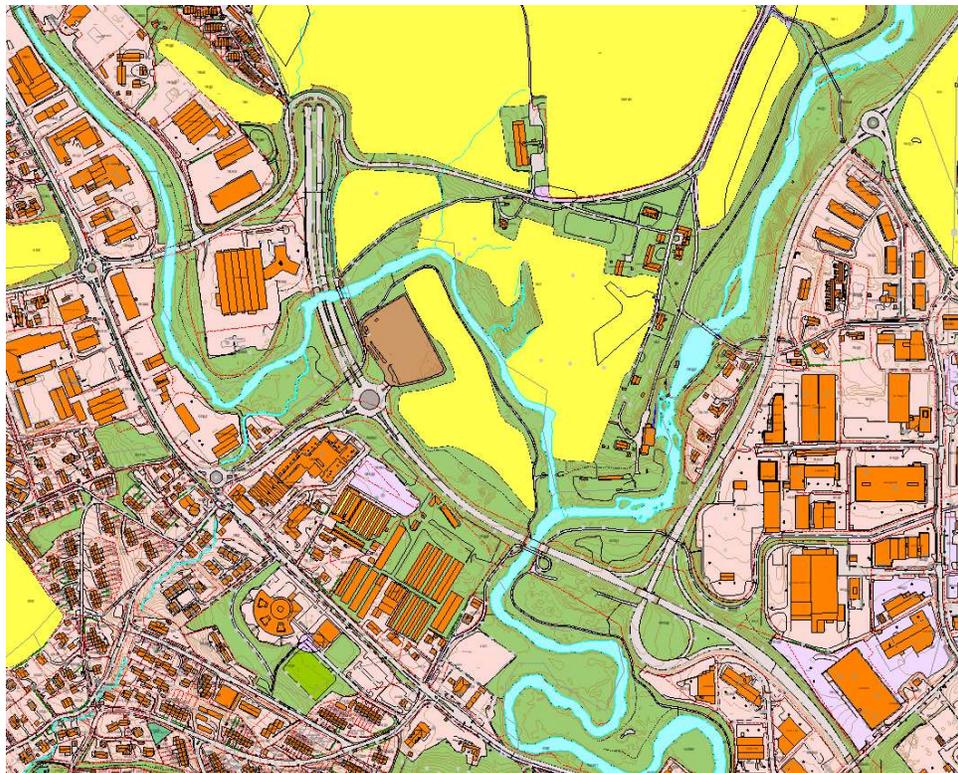
Basic Map

Save to task

Presentation Rule



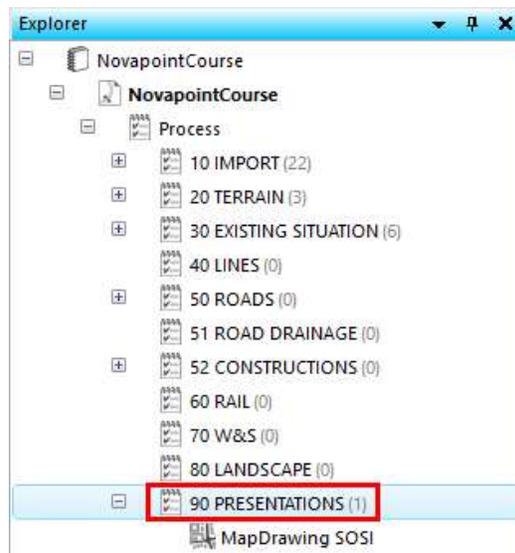
6. Click **Finish** and this Presentation view is now stored in the explorer in Novapoint, and can also be selected from AutoCAD.



Exercise 15 - 3D presentation of all objects with orthophotos

We can also make a permanent presentation of the 3D window, showing objects in our model draped with orthophotos of the terrain. We will first import the orthophoto.

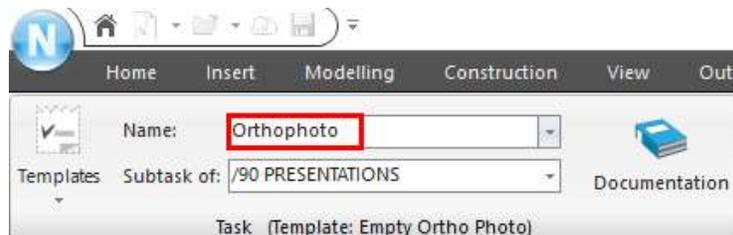
1. Click the summary task **90 PRESENTATIONS**.



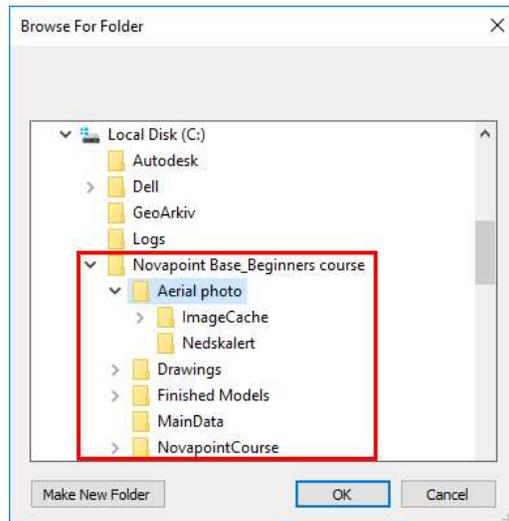
2. Click **Insert** and **Orthophoto**.



3. Enter the name **Orthophoto**.

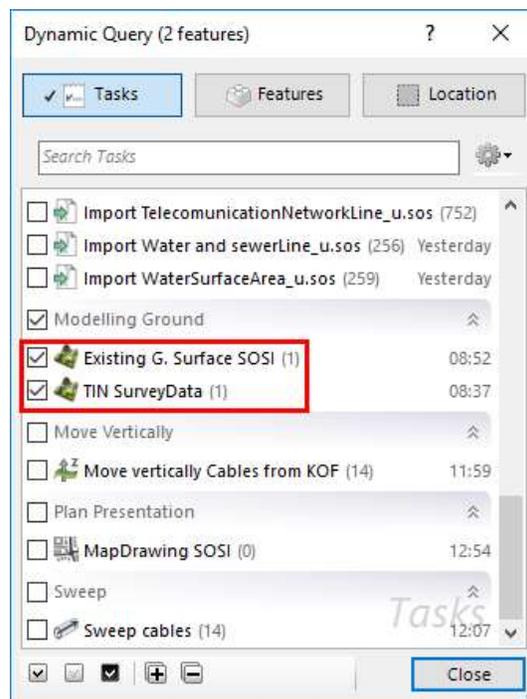


4. Click  **Add path**, and browse to the folder **C:\Novapoint Base_Beginners course\Aerial photo**



Click **OK**.

- Under Draping, **Select features** and select both **Existing G. Surface SOSI** and **TIN SurveyData**.

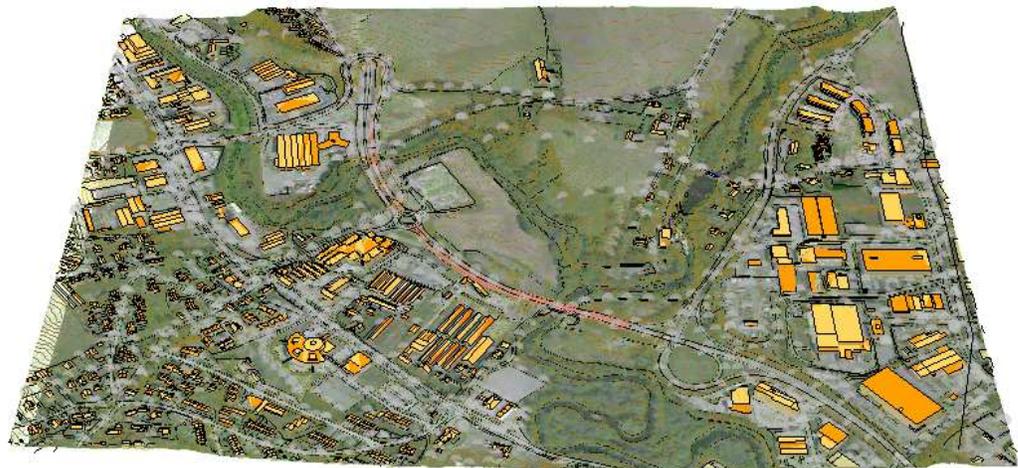


Click **Close**.

6. Click **Preview 3D**.

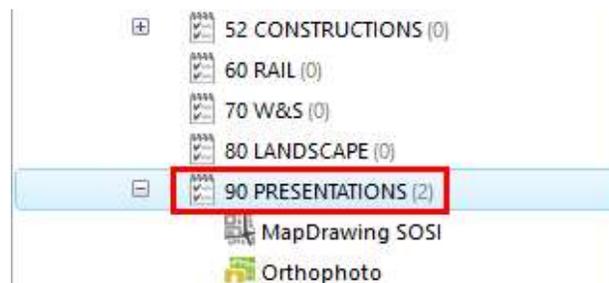


A 3D window with the complete model and the selected orthophoto is displayed:

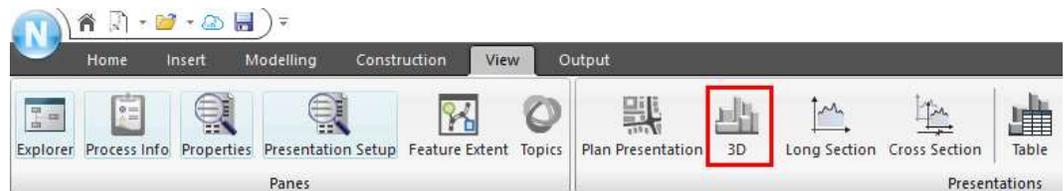


7. Now we will make the 3D presentation.

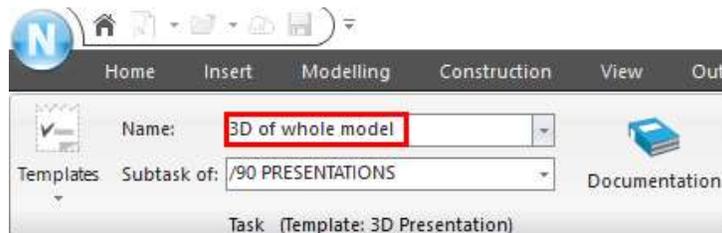
Click the summary task **90 PRESENTATIONS** in the explorer.



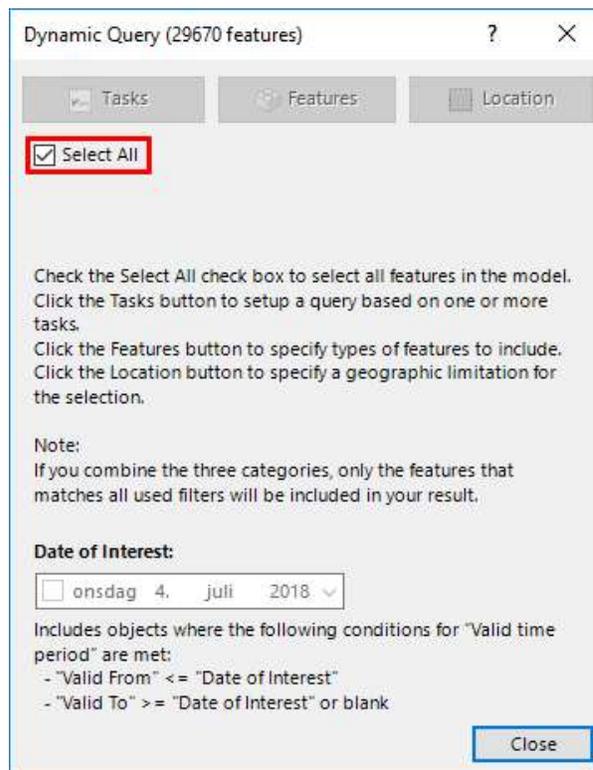
8. Click **View** and **3D Presentation**.



9. Enter name **3D of whole model**.



10. Click **Source Features** and **Select All**:



Click **Close**.

- Under Presentation Rule select **Default**.
Under EDS select **Ortophoto**.
Also set **Sky and Horizon** on.



- Click . The 3D-presentation is opened in a new window:



- Save** your project by clicking the save button:

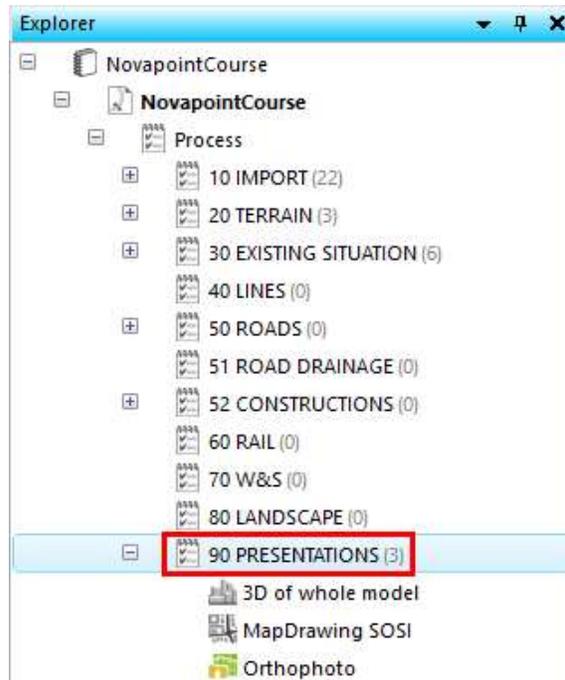


Tip: You can also drape the ortophono on e.g. bridges or buildings, in addition to the ground surface. To do so, set the Ortophoto-task's draping on these tasks as well.

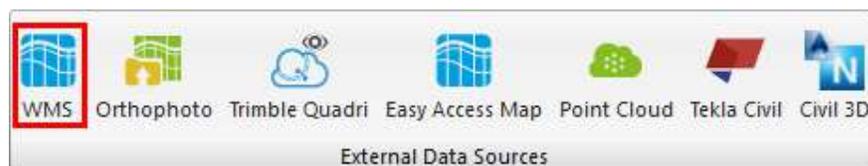
Exercise 16 - Connect to WMS

To connect to a WMS (Web Map Service) is a quick and easy way to add an information layer to your project.

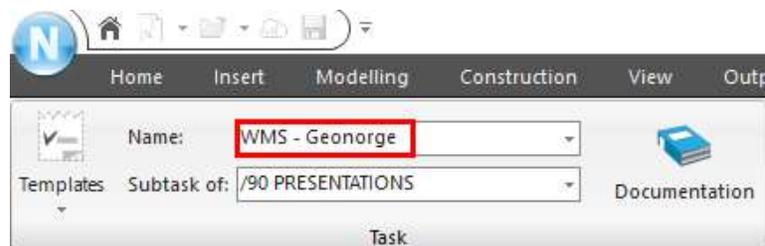
1. Click the summary task **90 PRESENTATIONS**.



2. Click **Insert** and **WMS**.

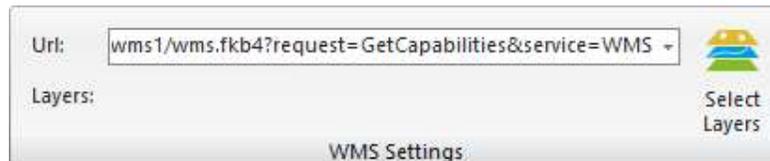


3. Enter name **WMS - Georange**.

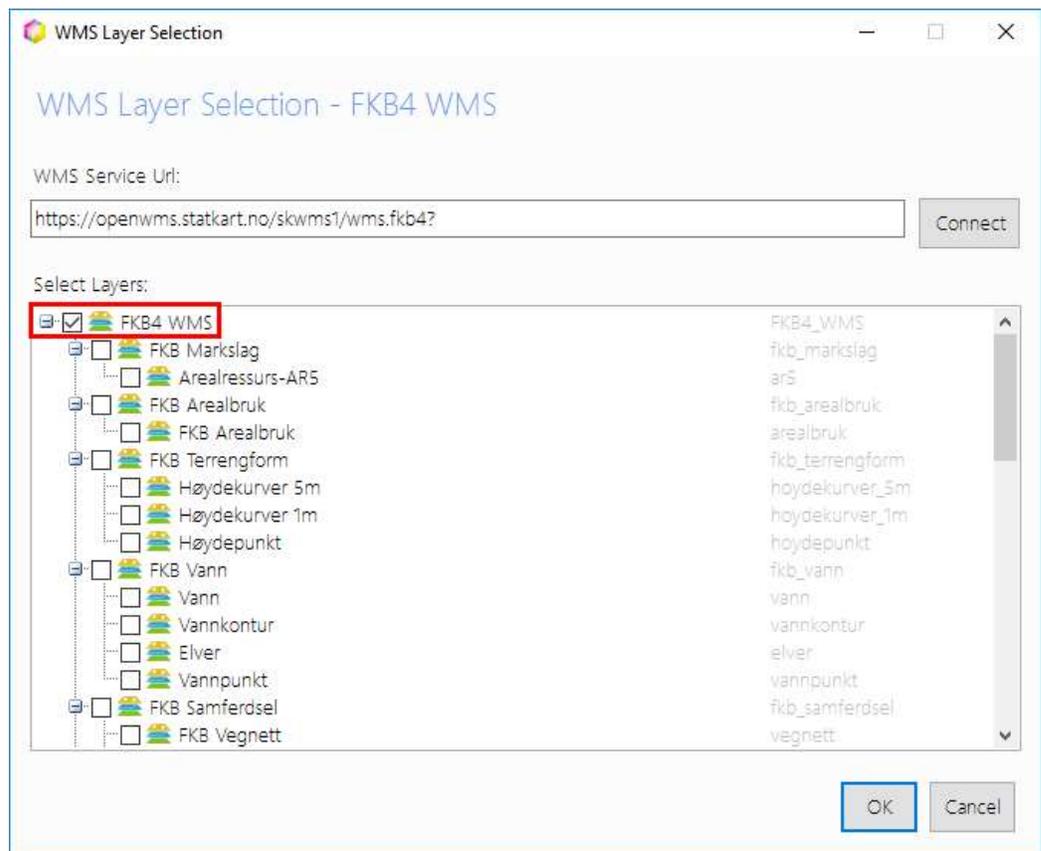


- If you run Novapoint with Norwegian configuration, you can click Templates at the left of the ribbons dialog, and use any of the stored templates. These are for norwegian coordinate systems. In international configuration, you can type in the URL yourself:

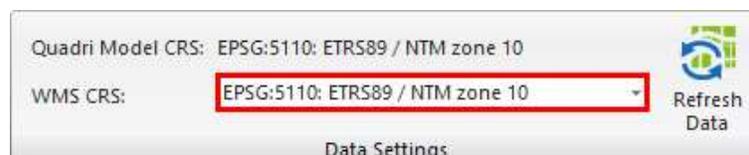
<https://openwms.statkart.no/skwms1/wms.fkb4?request=GetCapabilities&service=WMS>



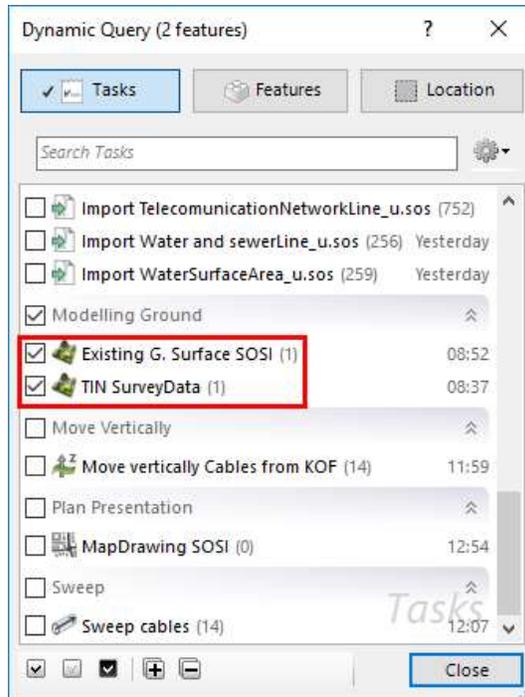
- Click **Select layers**, and this dialog comes up. Select any layers you want. Here we select all by ticking in front of **FKB4 WMS**.



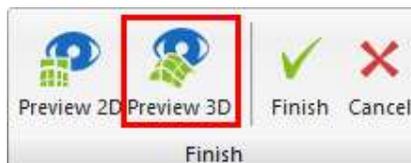
- You need to select the correct CRS for the WMS.



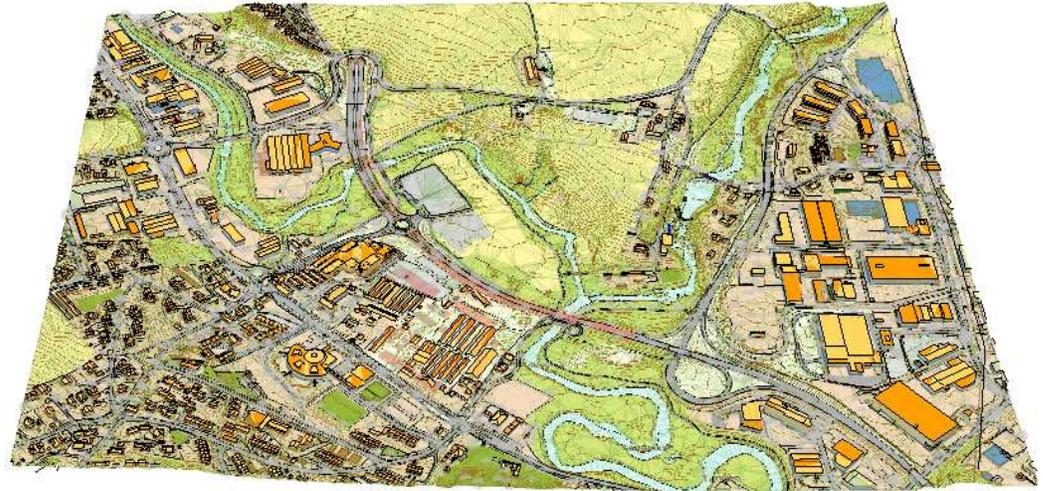
- Under Draping select which objects the WMS should be draped on, Normally the Ground Surfaces.



- Click **Preview 3D**.



A 3D window with the complete model and the WMS is displayed:



9. Click  Finish.

In order to view the WMS task from the explorer, you must select both the WMS task, and also the terrain surface tasks, and view them together in 3D. You can't only show the WMS task by itself. The view you get depends on which layers you have chosen.

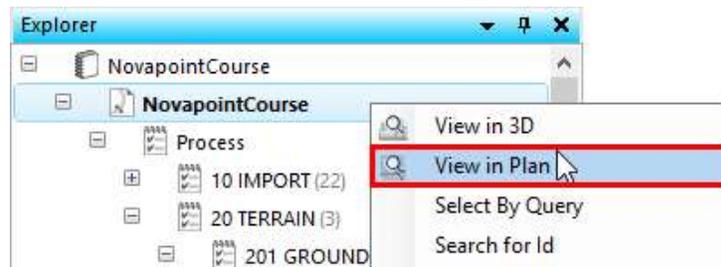
Exercise 17 - Generating longitudinal section through the model

In this exercise, we will generate a longitudinal section.

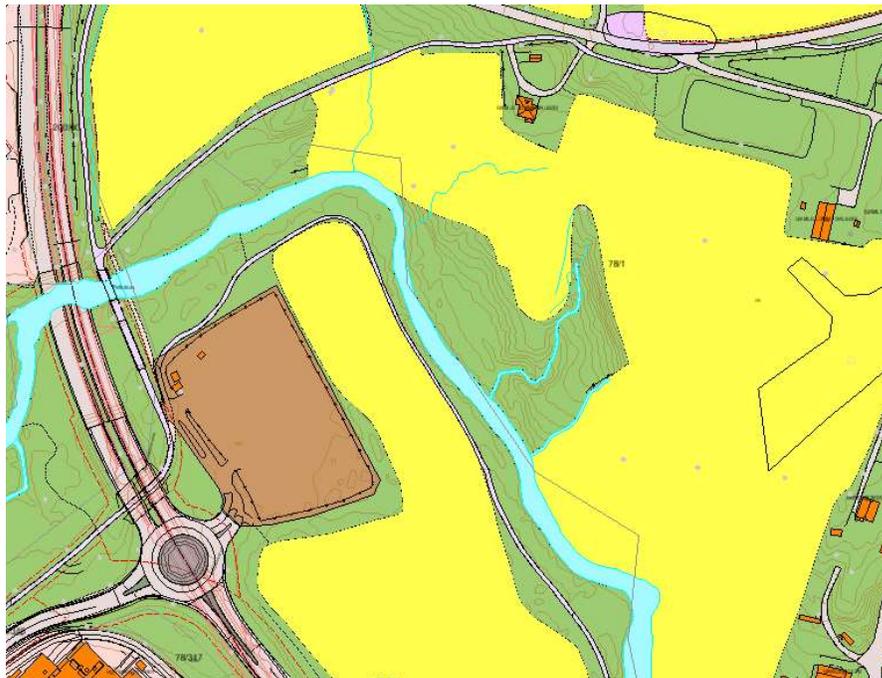
1. Sections can only be generated through a plan window.

Close all view tabs by right mouse click on a tab and click **Close All Windows**.

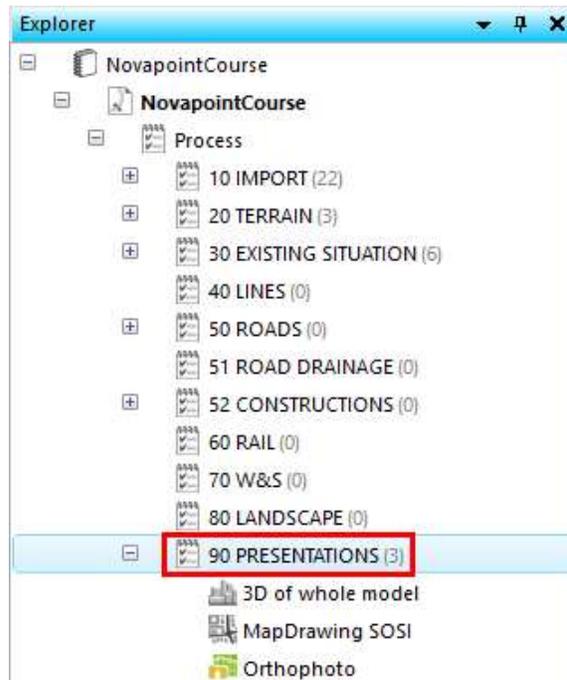
Open a plan window for the whole model by right mouse clicking the whole model in the explorer, and **View in Plan**:



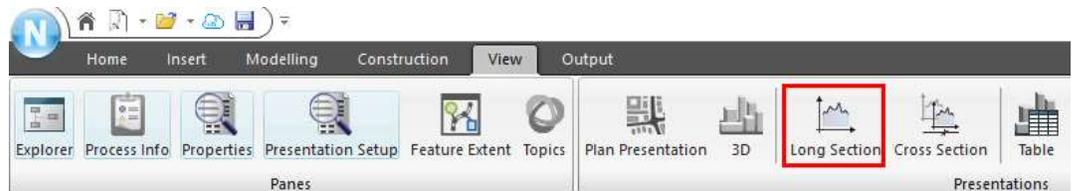
Zoom in to an area as shown:



2. Click the summary task **90 PRESENTATIONS**.



3. Click **View** and Long Section.

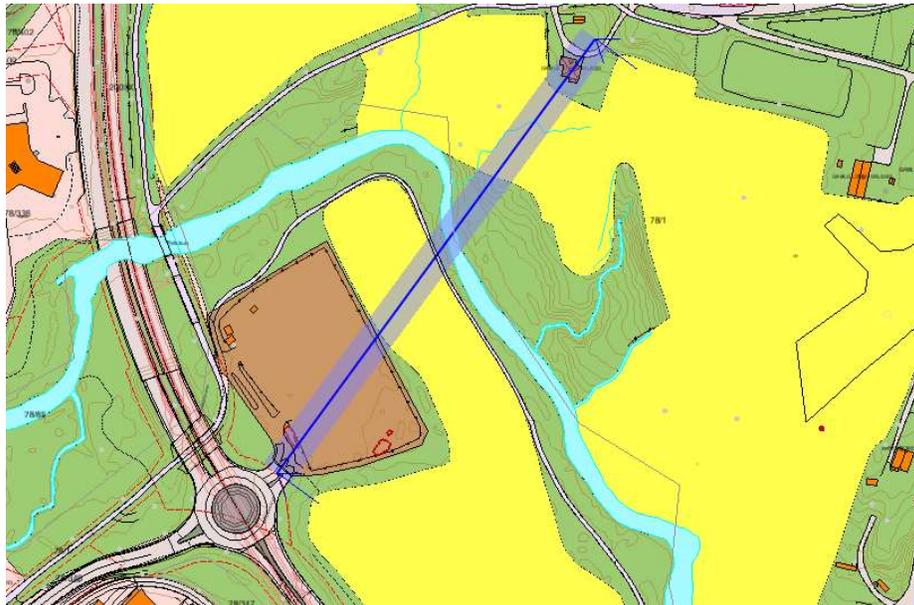


4. Under Baseline, click **Draw**.



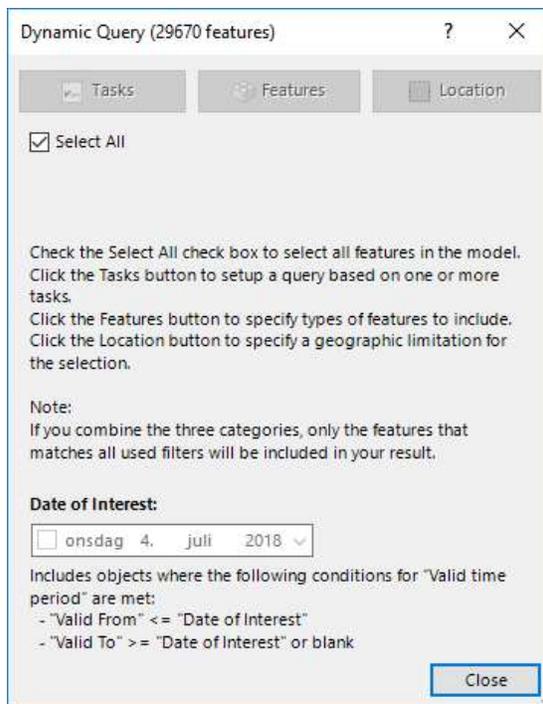
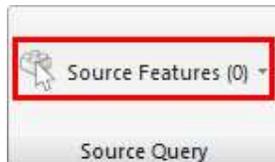
Using your left mouse button click on the two points along which you want to make the long section. The points are highlighted in the window and a corridor is created on the right and left sides.

Point objects located within the corridor will be part of the section, whilst sections through e.g a ground surface will be formed exactly along the line. You can adjust the **Length** of the section and the **Section Depth**.

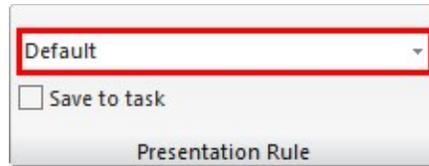


5. The next step is to select what objects should be included in the section calculation.

Click **Source Features** and **Select All**.



- Under Presentation Rule select **Default**.



- Click **Finish** and the long section is shown.



- Save** your project by clicking the save button:



Exercise 18 - Generating cross sections through the model

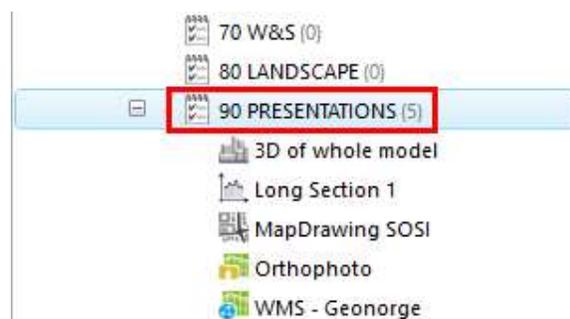
In this exercise, we will generate a cross sections through a plan window.

1. Sections can only be generated through a plan window. **Open** the plan window of the whole model from the previous exercise.

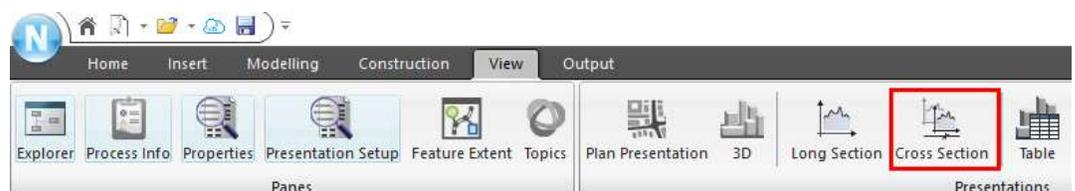
Zoom in to an area as shown:



2. Click the summary task **90 PRESENTATIONS** in the explorer.



3. Click **View** and Cross Section.

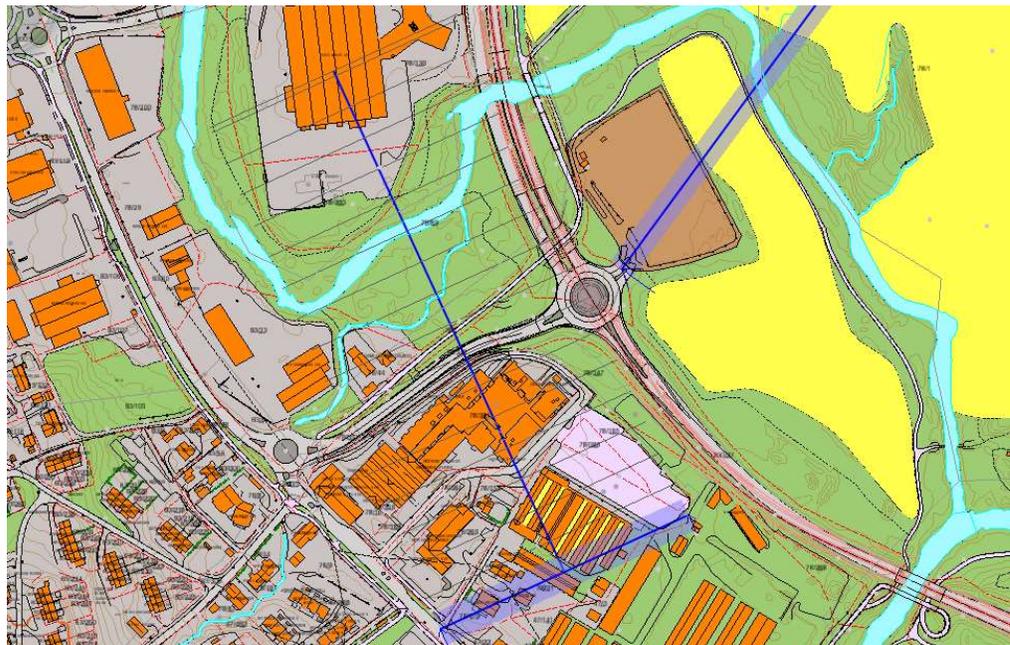


Using your left mouse button click on the two points along which you want to make the cross section. The points are highlighted in the window and a corridor is created on the right and left sides.

Point objects located within the corridor will be part of the section, whilst sections through, for example, a terrain surface will be formed exactly along the line. You can adjust the **Length** of the section, the **Section Depth** and the **Section Interval**.

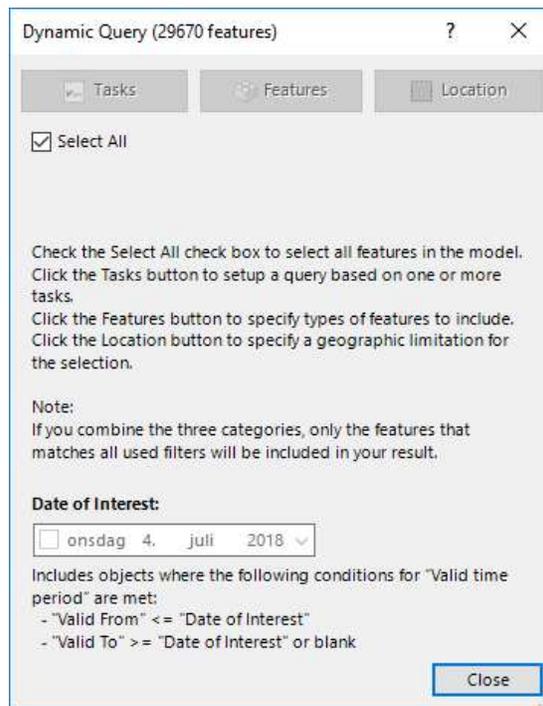
Fill inn with these values:

Distance between Sections: <input type="text" value="25"/> Section Interval	Left: <input type="text" value="100"/> Right: <input type="text" value="100"/> Section Width	<input checked="" type="checkbox"/> 1/2 of Section Interval Forward: <input type="text" value="12.5"/> Backward: <input type="text" value="12.5"/> Section Depth
---	--	---

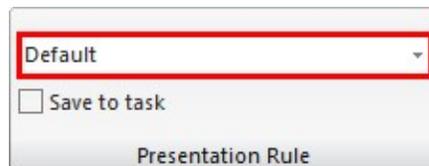


- The next step is to select what objects should be included in the section calculation.

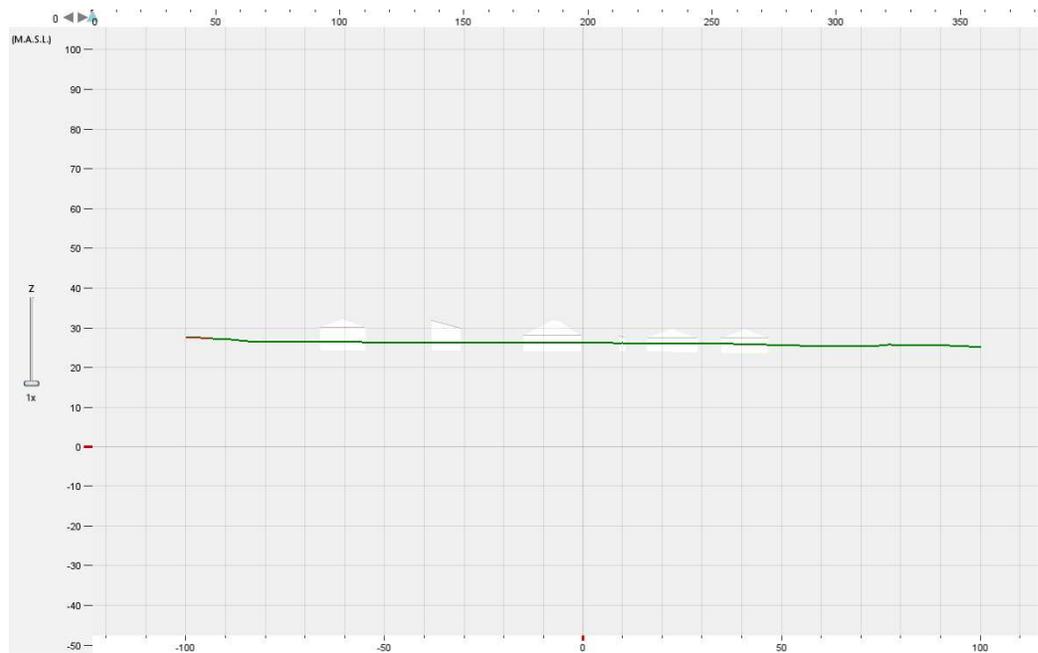
Click **Source Features** and **Select All**.



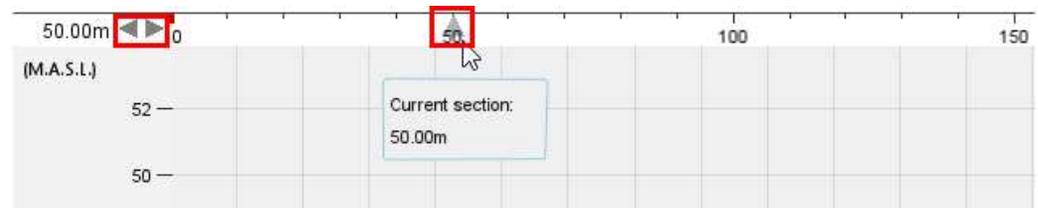
- Under Presentation Rule select **Default**.



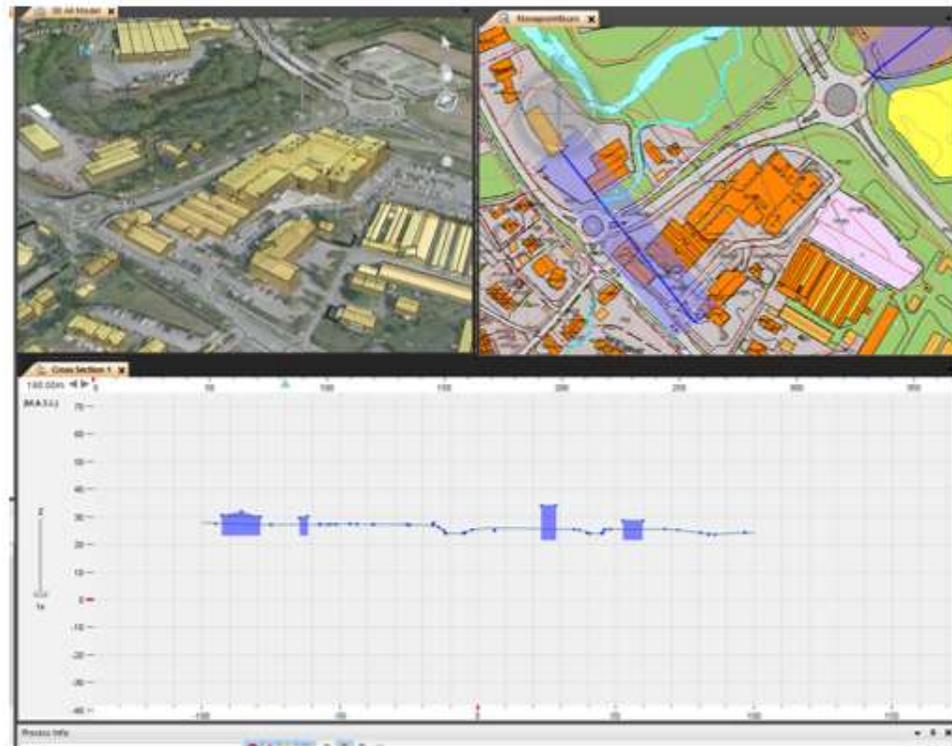
- Click  and the long section is shown.



Select other cross section along the section bar, either with the arrows or by dragging the blue triangle back and forth. Double-click on a profile to go directly to that.



TIP: You can have a number of windows open and see the plan, 3D and cross section at the same time:



7. **Save** your project by clicking the save button:



Exercise 19 - Start AutoCAD and draw the mapping data

In this exercise we will start AutoCAD from Novapoint Base and draw out the basemap, which we can use for alignment design and drawing production.

To start AutoCAD from Novapoint Base click the icon at the bottom right of the program, as shown below:



By clicking the arrow on the right, you will open up an option menu, where you can choose to open AutoCAD on startup of Novapoint.

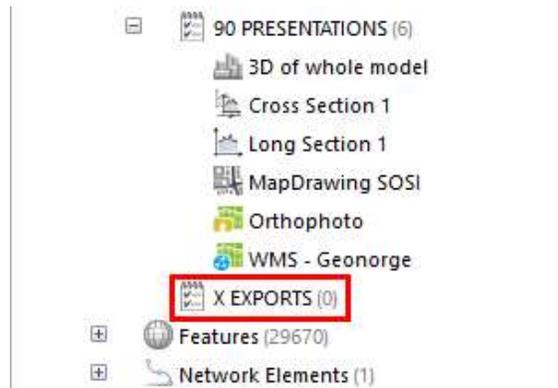
AutoCAD must always be started from within Novapoint Base in order to establish contact with Novapoint.

There are two ways to produce a drawing from Novapoint Base.

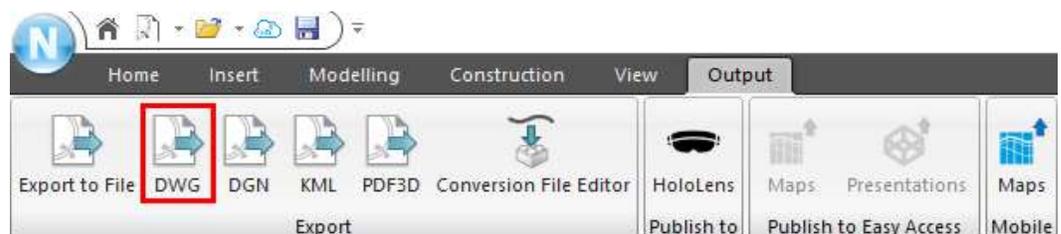
Method 1: Create an Export task to DWG

This is the fastest and recommended method.

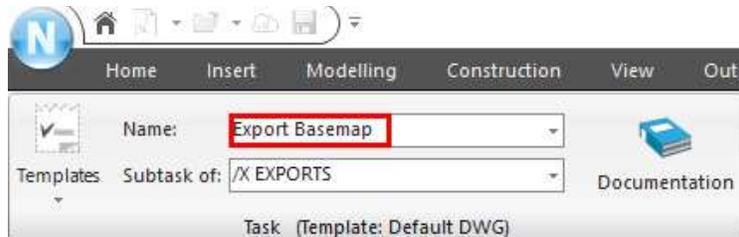
1. Start by making a new summary task. Right click at **Process** at the top of the explorer to do so. Give the name **X EXPORTS**.



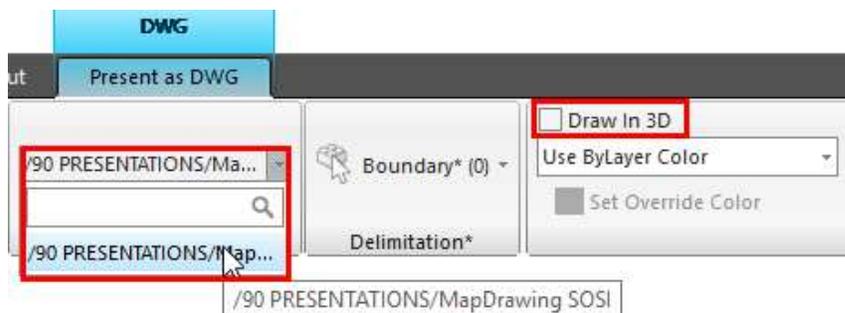
2. Click **Output** and **Export to DWG**:



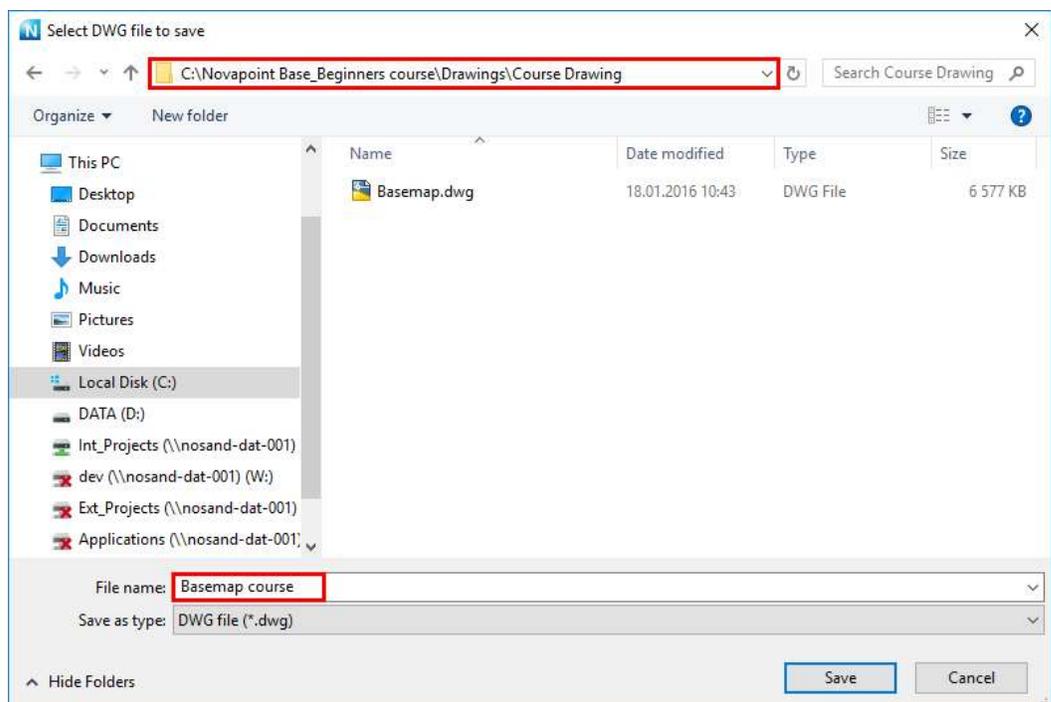
3. Enter the task name **Export Basemap**.



4. Select the plan presentation you want to export. In our case, we only have the one made earlier, **MapDrawing SOSI**. Deselect to draw in 3D, as this is a 2D map.

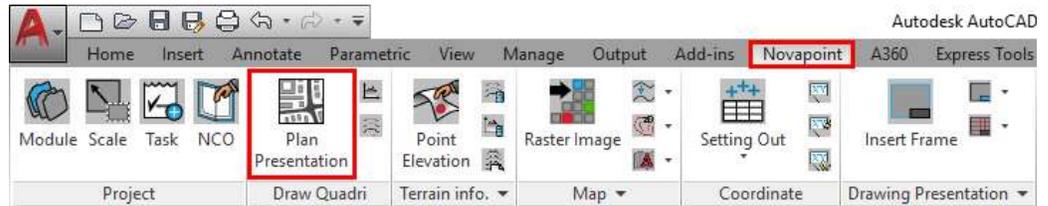


5. Click **Finish**, and enter the file name and path:

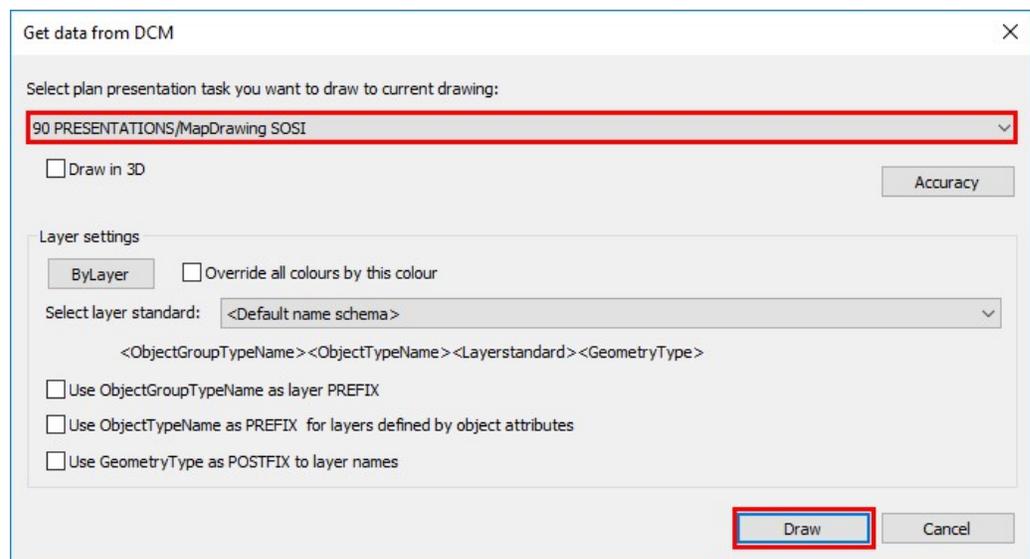


Method 2: Draw a plan presentation directly to AutoCAD

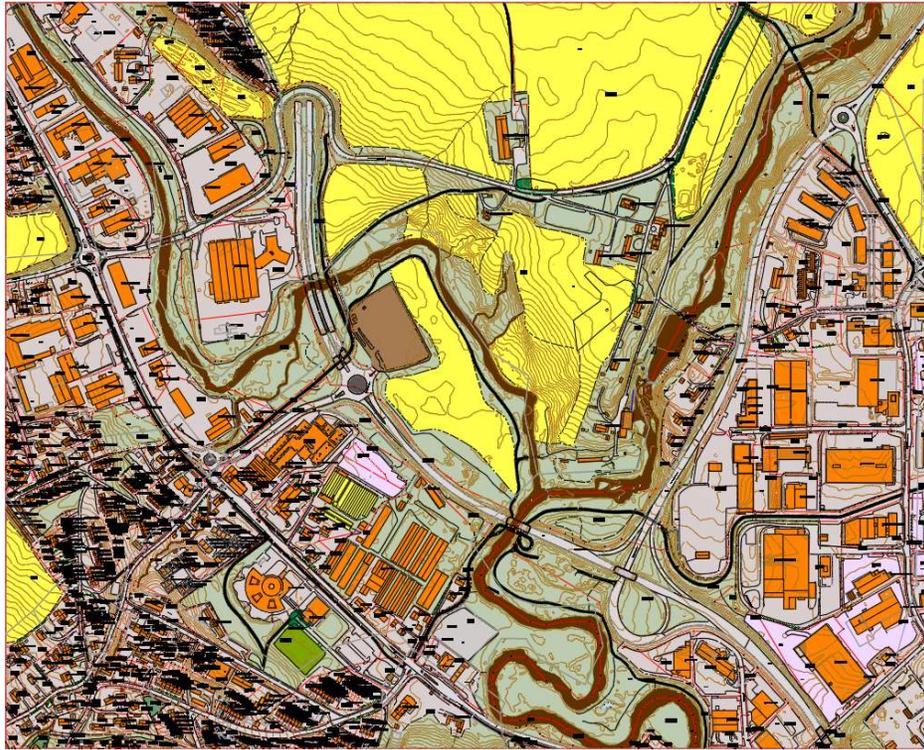
1. In AutoCAD, in the Novapoint ribbon, click **Plan Presentation**.



Select the correct plan presentation:



2. Click **Draw**.



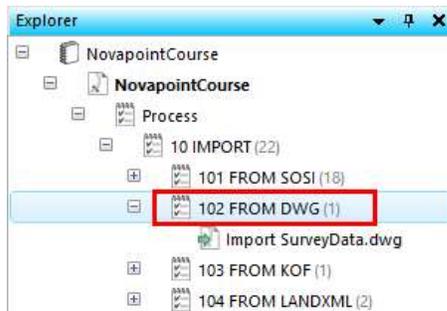
3. Save the drawing as **MapdrawingSOSI.dwg** in folder
C:\Novapoint Base_Beginners course\Drawings

Part 5: Sub-surface layers and existing WS

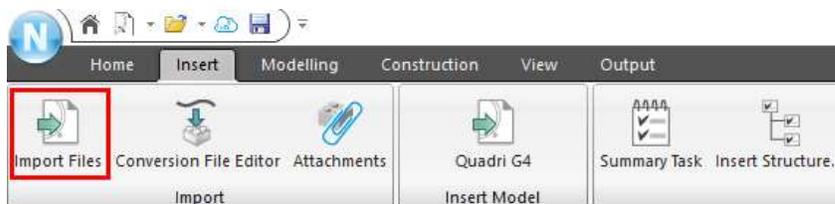
Exercise 20 - Importing boreholes to rock

In this exercise, we will import the surface layer data from an AutoCAD drawing that contains boreholes to rock.

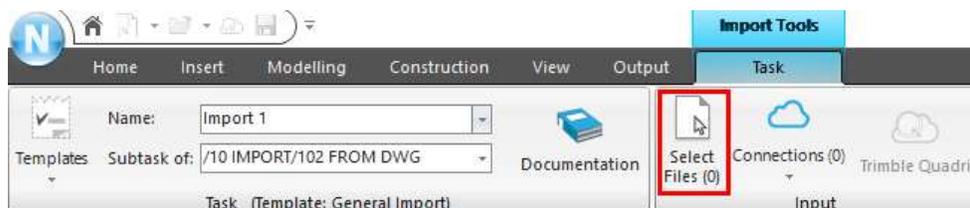
1. Click the Summary task **102 FROM DWG**:



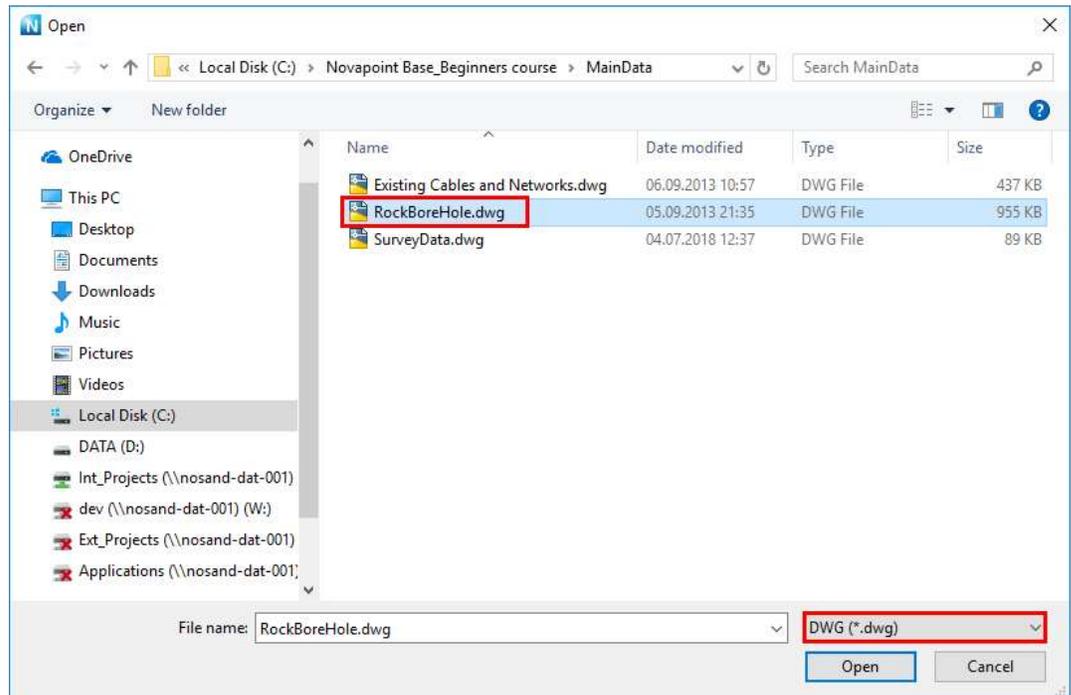
2. Click **Insert** and **Import files**.



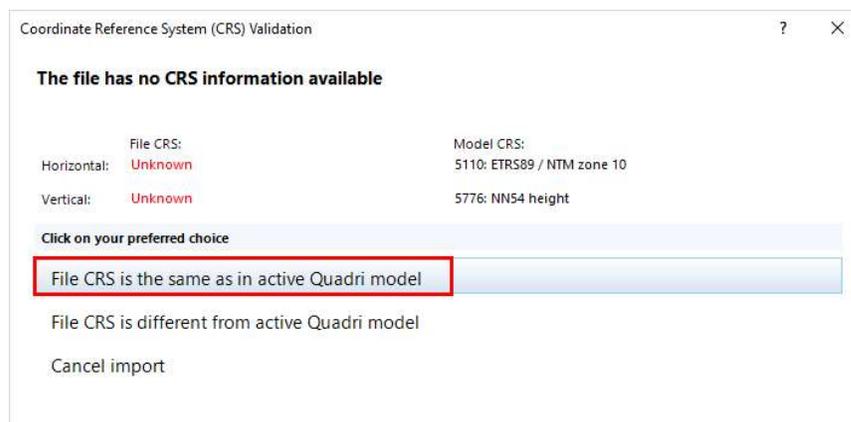
3. Click **Select Files**.



Select DWG as the file format, click the file **RockBoreHole.dwg** and click the **Open** button.

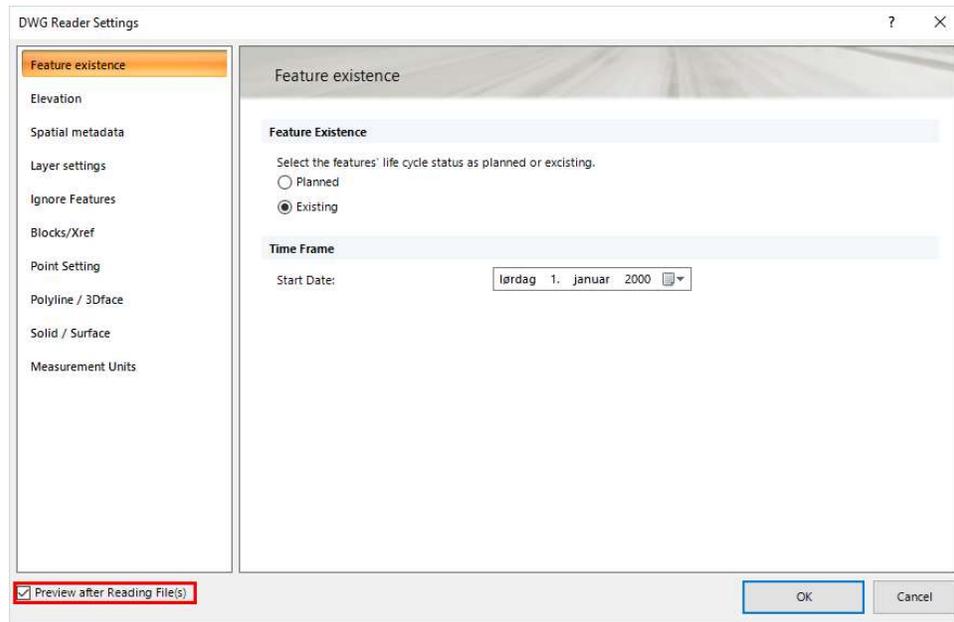


4. This dialog appears:



Select **File CRS is the same as active Quadri model** as shown above.

5. This dialog appears:



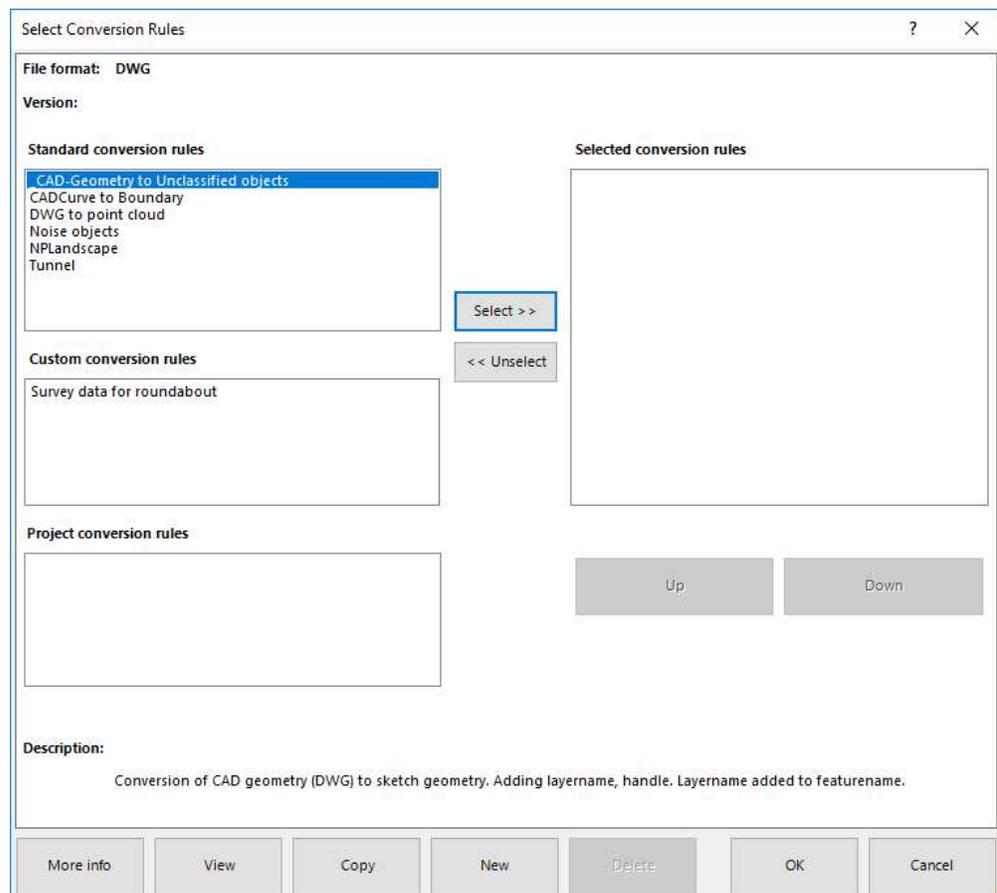
Tick the **Preview** checkbox as shown and click **OK**.



- Click on **Select Rules**.



This dialog appears:



- Here we use **_CAD-Geometry to Unclassified objects** conversion rule, which will convert to the feature ProxyFeature. Click **Select>>**, then **OK**.
(If you want, you can make you own conversion rule and convert to the feature **GeotechDrilling**).



- Click **Finish**.

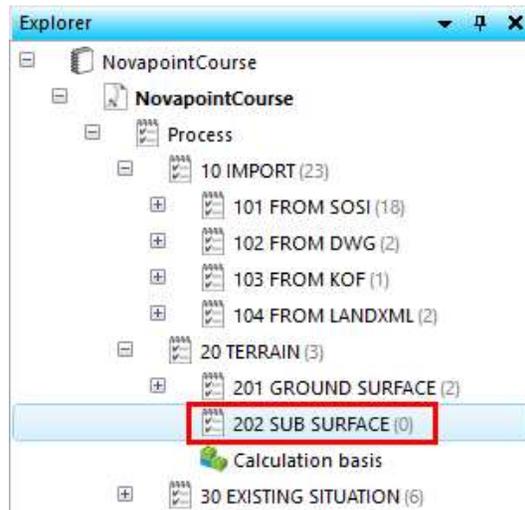
9. **Save** your project by clicking the save button:



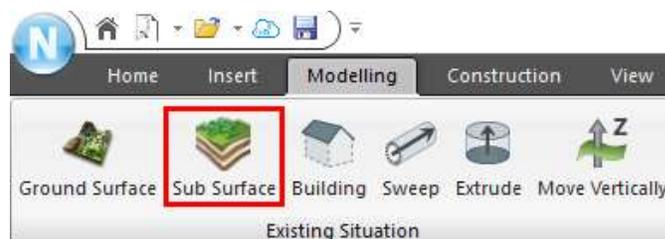
Exercise 21 - Sub Surface layers

In this exercise, we will generate sub-surface layers based on the borehole points we imported in the previous exercise.

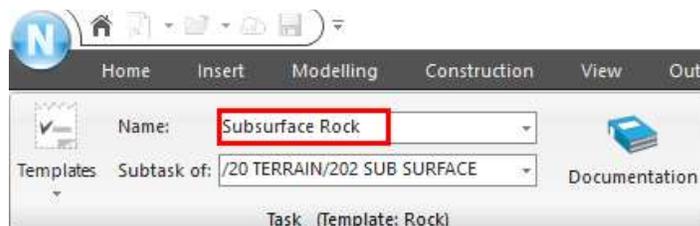
1. Select **ImportRockBoreHole.dwg** task in the explorer, right click and select **View in 3D**. These points will be the basis for the sub-surface layers.
2. Click on **202 SUB SURFACE** in the Explorer:



3. Click on **Modelling** and then the **Ground Surface** task:



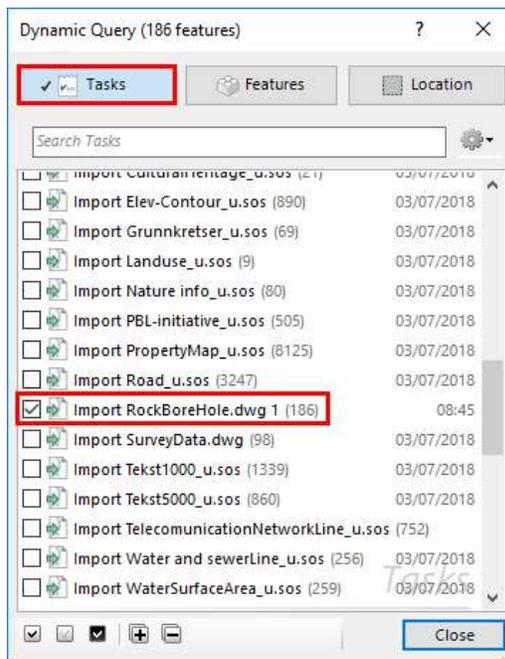
4. Type in a name for the subsurface task, **Subsurface Rock**.



- Click on **Features (0)**.



- Click **Tasks**, and select **ImportRockBoreHole.dwg**.



Click **Close**.

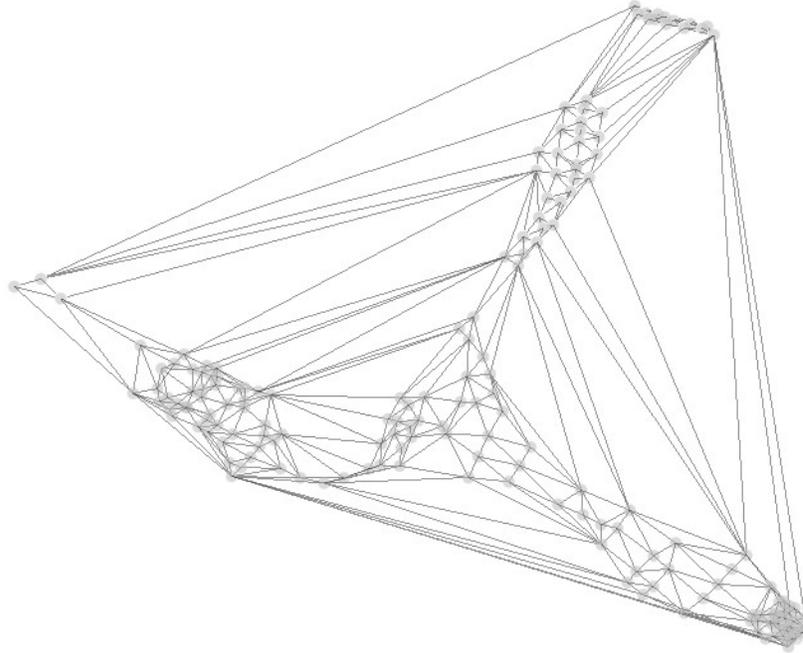
- Under layer Material select **Soil (1)**.



The layer material always defines the material over a layer.
Under the lowest sub surface layer is always rock.

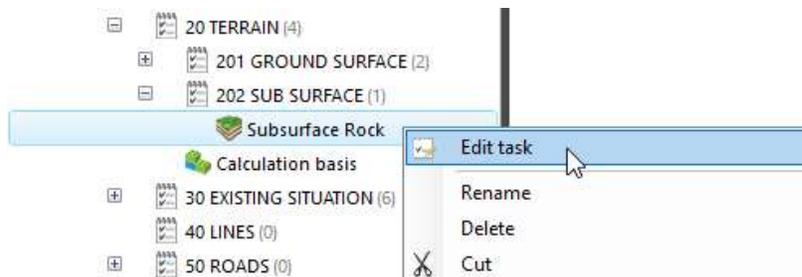
- Click  **Finish**.

9. Select both **Subsurface Rock** and **Import RockBoreHole.dwg** from the explorer, and **View in 3D**:



10. We see that there are long triangles that gives a wrong presentation of the rock layer. We wish to only have triangulations between the points.

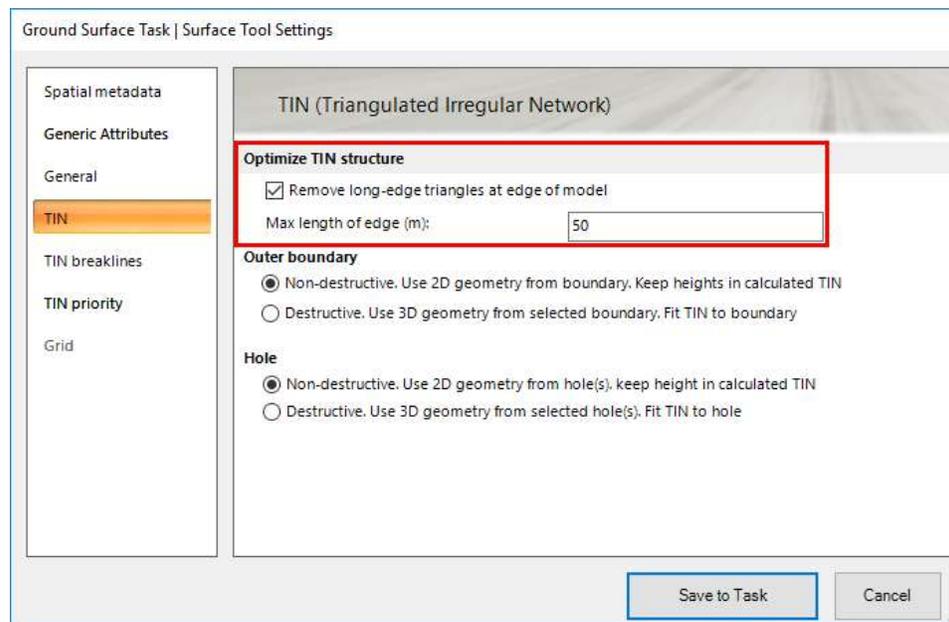
Edit the Subsurface Rock task by right clicking it, and **Edit task**:



Click **Settings**:

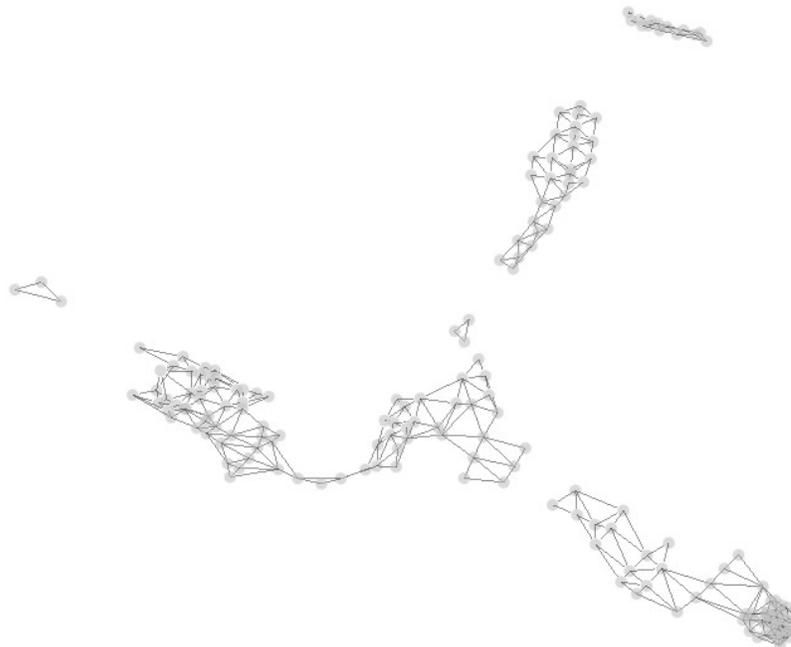


This dialog opens:



Under **TIN** select to **Remove long-edge triangles at edge of model**.
Set the value to **50 m**. Then click **Save to Task**

11. Click  **Preview**, and the sub surface task is updated:



Alternatly, adjust again and try with a different value.



12. When you are pleased with the result, click **Finish**.

13. Select **Existing G. Surface SOSI, TIN SurveyData** and **Subsurface Rock** in the Explorer, right click and select **View in 3D**:



TIP: It is also possible to use a 2D boundary line to limit a triangulation.

1. Make a closed boundary line in AutoCAD, and import back to the model before they can be used.
2. The boundary lines are drawn with the Draw Objects function in Novapoint Base.

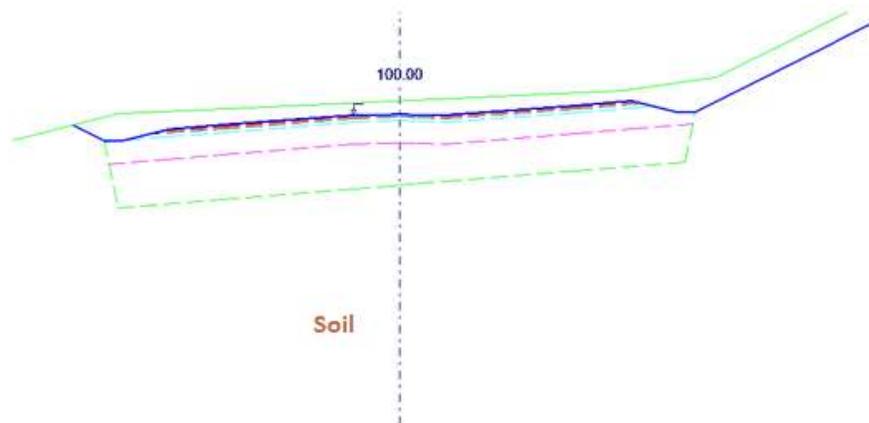
14. **Save** your project by clicking the save button:



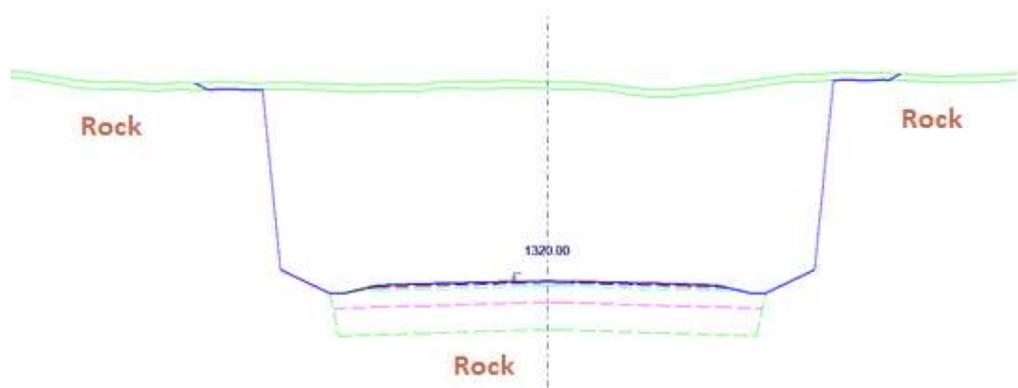
Exercise 22 - Sub Surface layer (bottom layer)

For Sub surface layers we have a number of important principles:

1. The volume under the Ground Surface must be unambiguous and clearly defined so that all the calculation routines for road, rail, WS... know which material they go through. The material type for a sub surface layer always defines the material *over* that layer.
2. If a model only has a ground surface and no sub surface layers defined, the model is assuming the volume under the surface is soil. The picture below shows this:

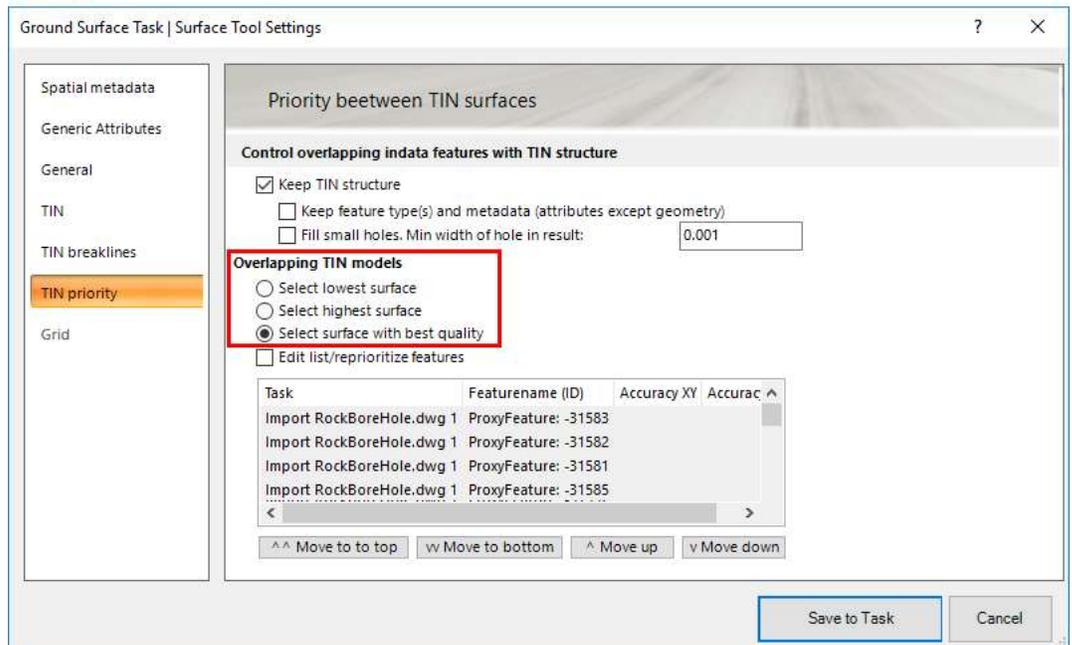


3. Under the last sub surface layer, the model always assumes there is a rock layer. In the picture below a top soil layer is defined under the ground surface, thus under this layer, the sub surface is rock:



4. If a sub surface layer cuts through the ground surface, the calculation routines will assume the ground surface is correct, and cuts the sub surface layer.

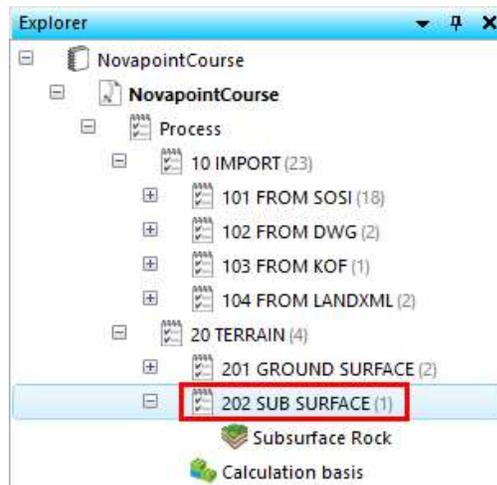
- Sub surface layers should not cross each other. Use the triangulation routines to fix this if it occurs. Use priority/highest/lowest and create a new sub surface:



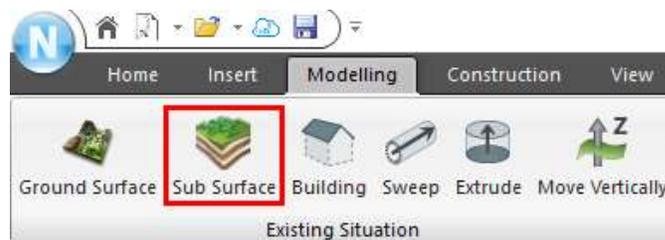
- Sub surface layers with the same material type should not overlap in plan. Use a different material type. There are 25 material types to select from.

To ensure an unambiguous sub surface description, it is necessary to define a dummy layer that defines the top rock layer. Over this layer will be soil. In our case, we have defined an area that is top rock, and over this we have soil. Now we need to define what is outside of this area.

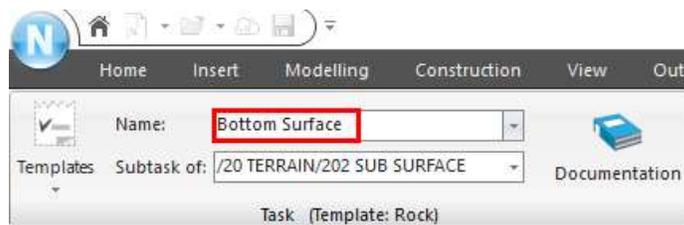
1. Click on **202 SUB SURFACE** in the Explorer:



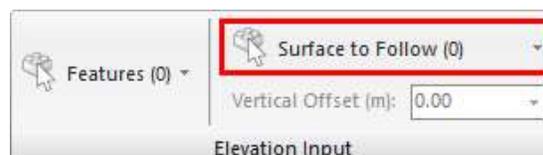
2. Click on **Modelling** and then the **Ground Surface** task:



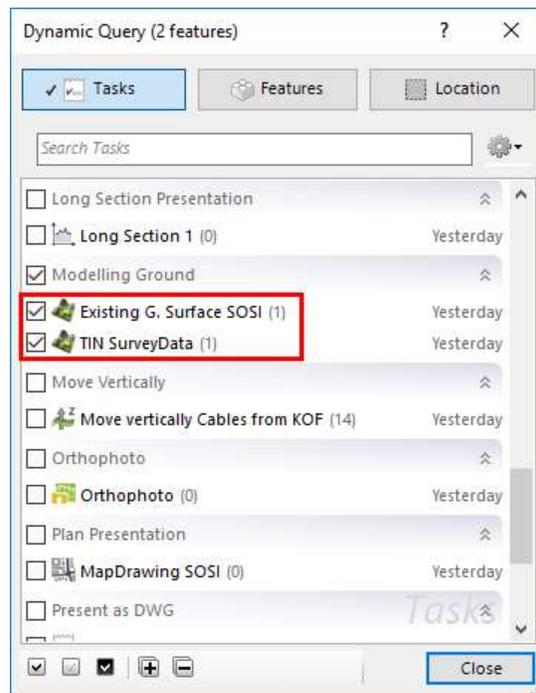
3. Type in a name for the subsurface task, **Bottom Surface**.



4. Click on **Surface to Follow (0)**.

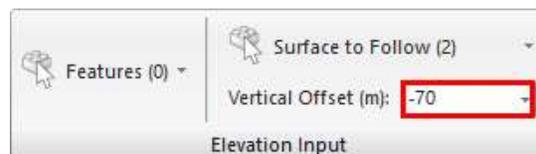


5. Click **Tasks**, and select **Existing G. Surface** and **TIN SurveyData**.



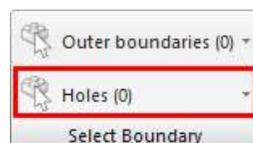
Click **Close**.

- Set the **Vertical Offset** to minus **70 meters (-70)**.

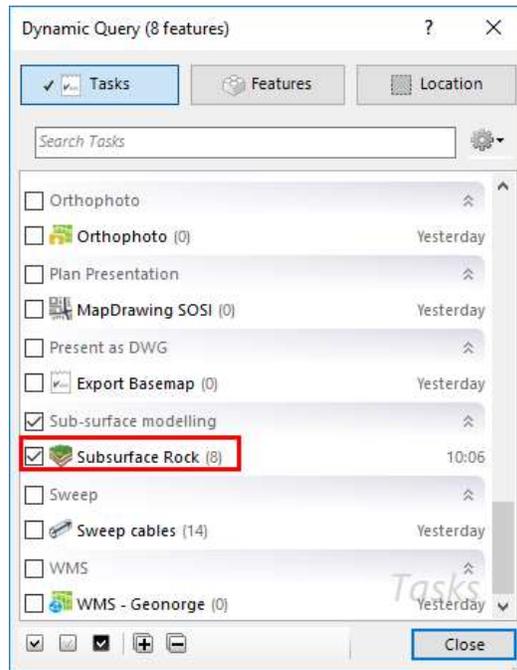


- Now, we want to clip a hole where we have the rock surface we defined from earlier.

Click **Holes** under Select Boundary.



- Select the task **Subsurface Rock**:

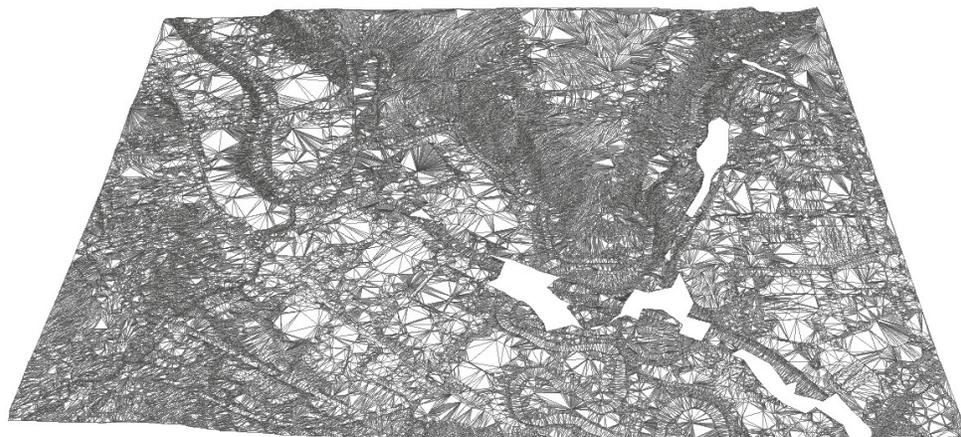


9. Under **Material Type** select **Soil [1]**.

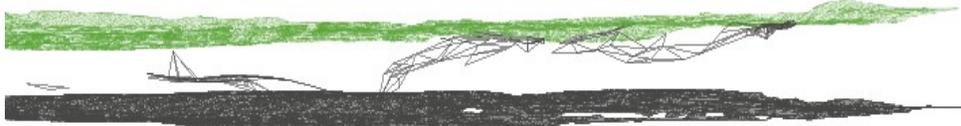


10. Click **Finish**.

11. In the explorer, select the task **Bottom Surface** and **View in 3D**:



12. In the explorer, select the tasks **Existing G. Surface SOSI**, **TIN SurveyData**, **Bottom Surface** and **Subsurface Rock**, and View in 3D:



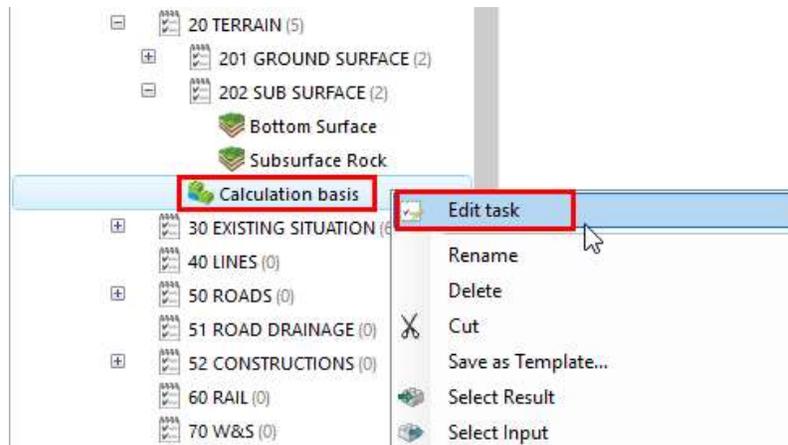
13. **Save** your project by clicking the save button:



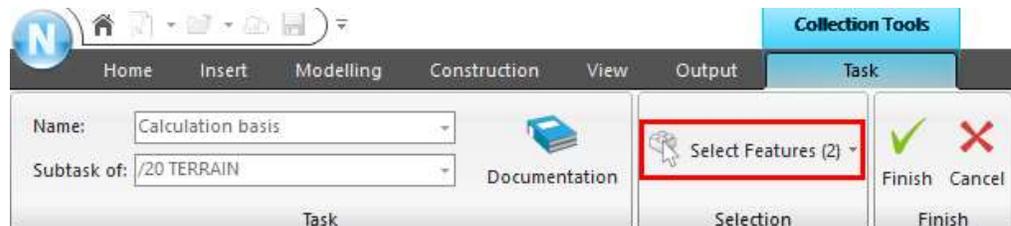
Exercise 23 - Updating the collection task

Now that we have defined sub surface layers in the model, which we will also calculate against, we need to update the collection task to include these.

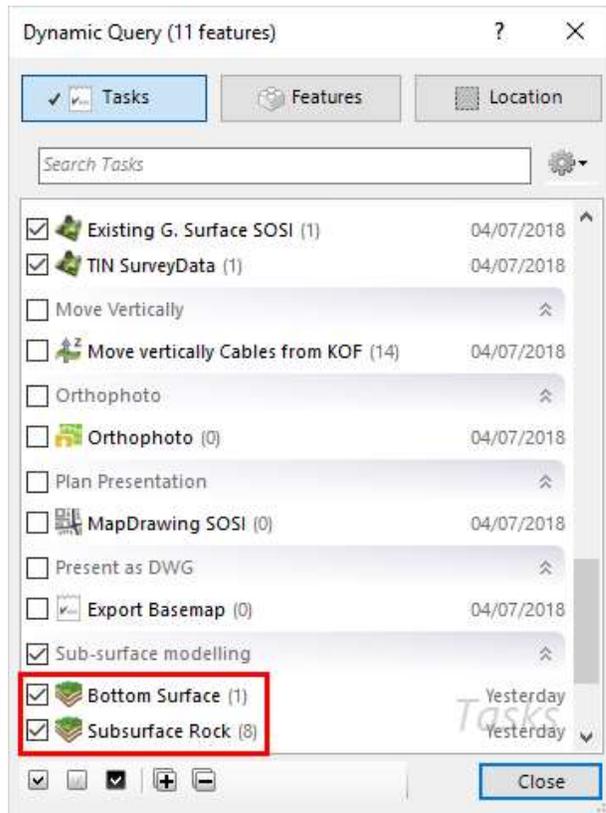
1. Right click **Calculation basis** in the explorer, and click **Edit task**.



2. Click **Select Features**.



3. Include **Bottom Surface** and **Subsurface Rock**.

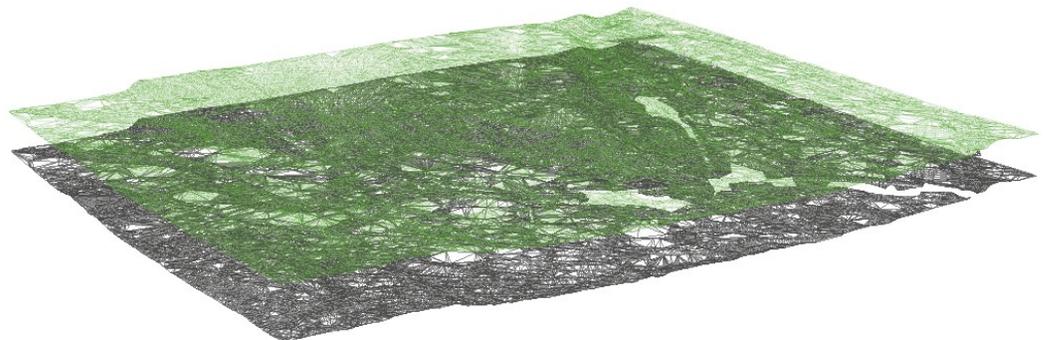


Click **Close**.



4. Click **Finish**.

5. View **Calculation basis** in 3D:

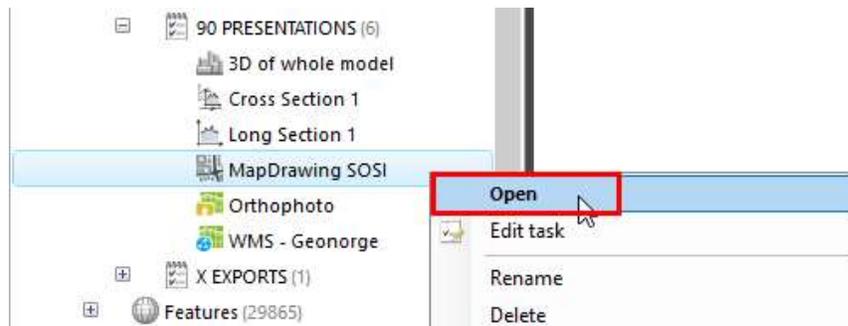


Part 6: Supplementary data and miscellaneous

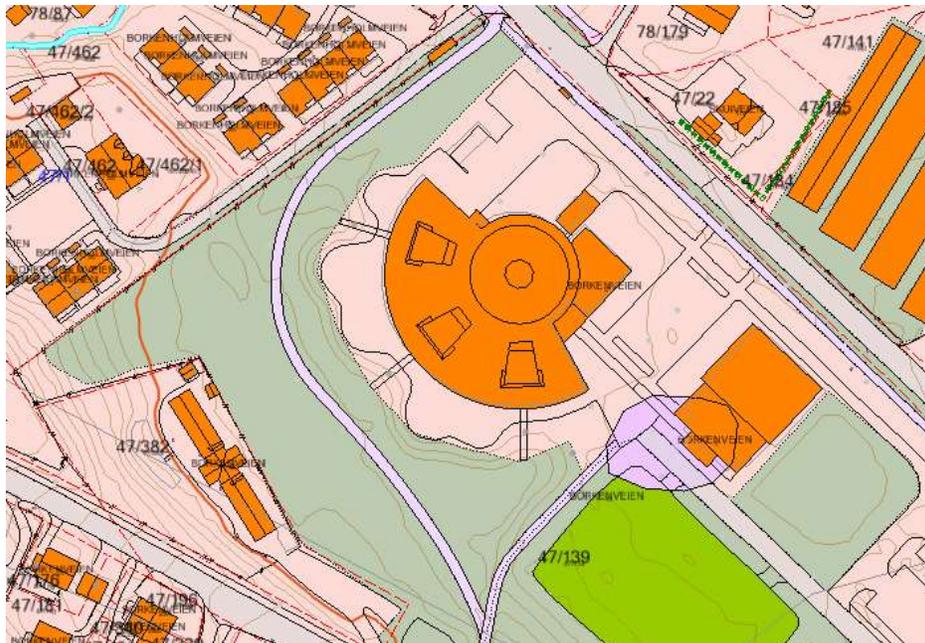
Exercise 24 - Draw object

In this exercise, you will use the function Draw Object to complement the model. In the example, we will draw a hedge.

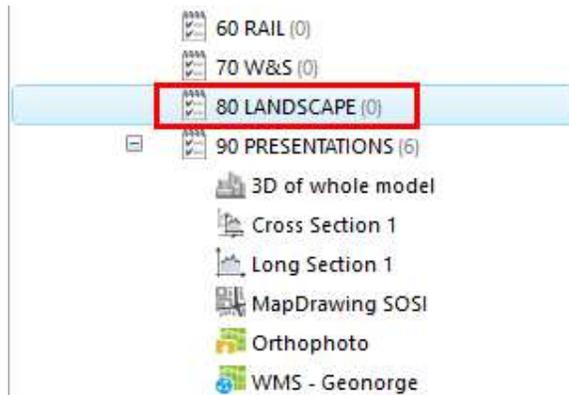
1. Open the plan presentation task **MapDrawing SOSI**.



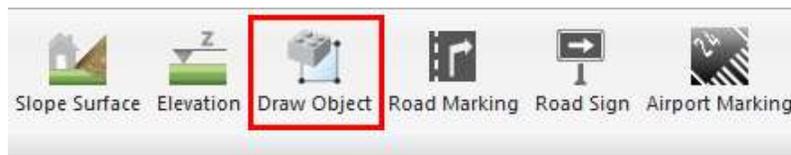
2. Zoom in on the area show in the picture:



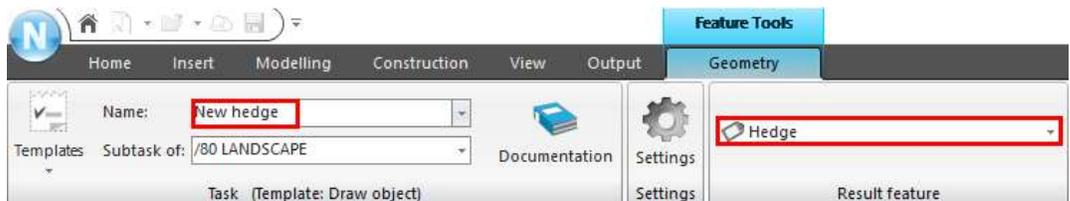
3. Click on **80 LANDSCAPE** in the Explorer:



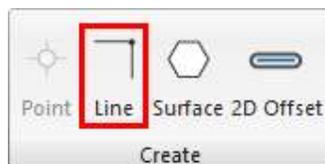
4. Click on **Modelling** and then the **Draw Object** task:



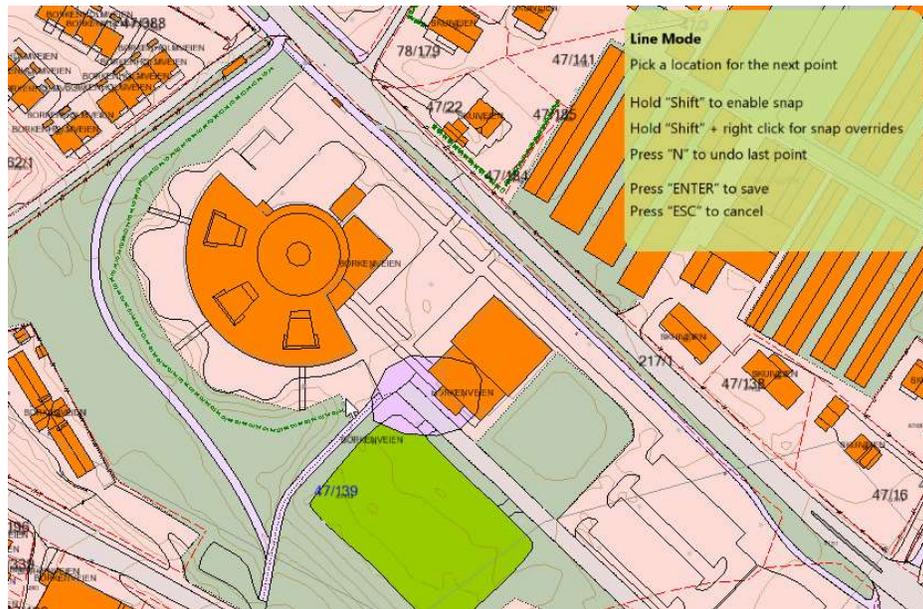
5. Type in a name for the task, **New hedge**, and set the Result feature to **Hedge**.



6. Click on **Line**.



7. Draw a line for the hedge.



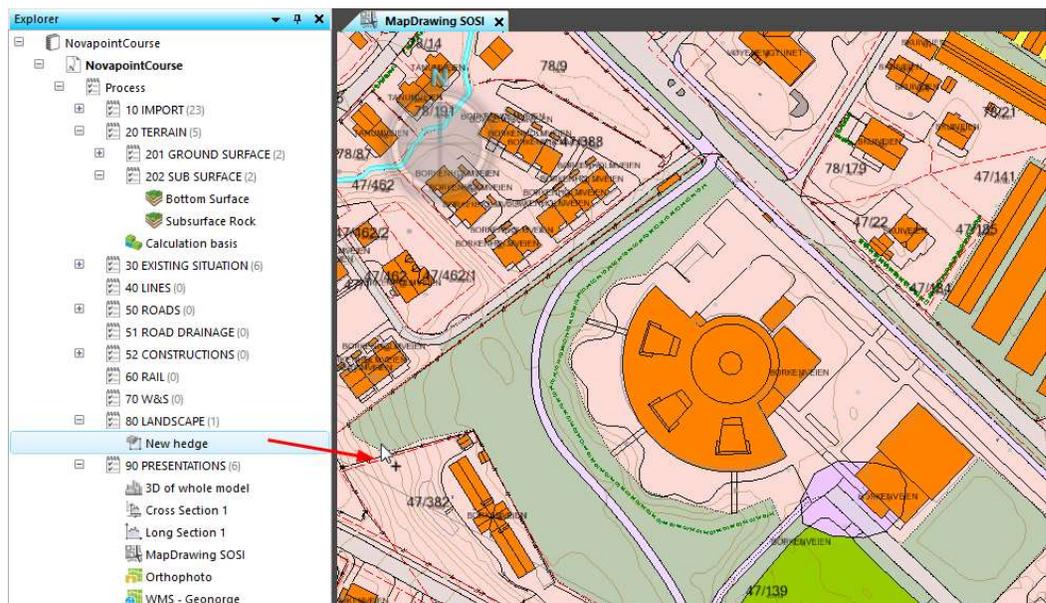
Use the assist panel in the top right corner as help.

When you have drawn the hedge line, click **Enter** on the keyboard. Note that the line “disappears” from the view. This is because we have the plan view of the MapDrawing in the background, which is not set up to show the line just drawn.



8. Click **Finish**.

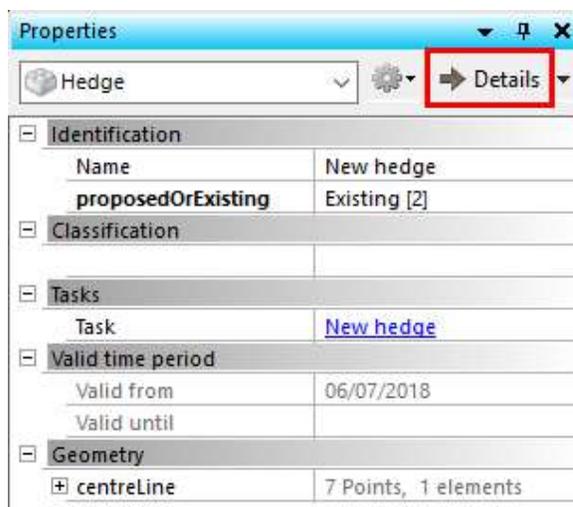
9. Drag & Drop the Draw Object task in to the view, to see the hedge.



10. Click on the hedge in the view.



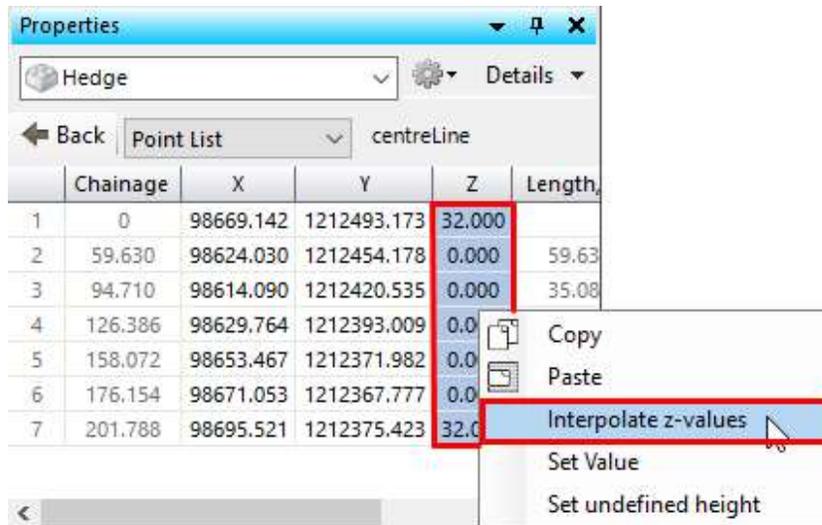
11. In the Properties view, click on **Details**.



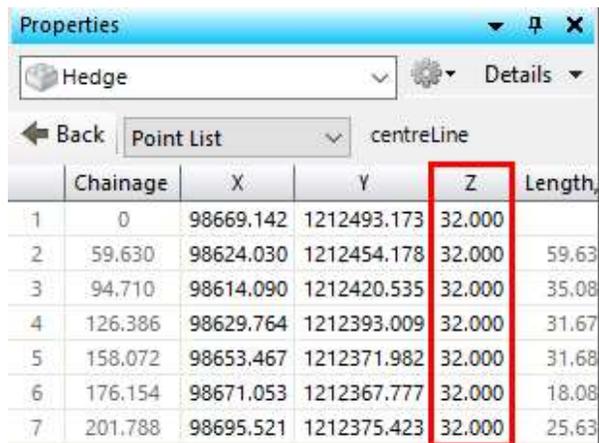
12. Set the first and last vertex point on the line to $z = 32$.

	Chainage	X	Y	Z	Length
1	0	98669.142	1212493.173	32.000	
2	59.630	98624.030	1212454.178	0.000	59.63
3	94.710	98614.090	1212420.535	0.000	35.08
4	126.386	98629.764	1212393.009	0.000	31.67
5	158.072	98653.467	1212371.982	0.000	31.68
6	176.154	98671.053	1212367.777	0.000	18.08
7	201.788	98695.521	1212375.423	32.000	25.63

13. Select all the vertex points by holding **Shift** on the keyboard, right mouse click, and **Interpolate z-values**.

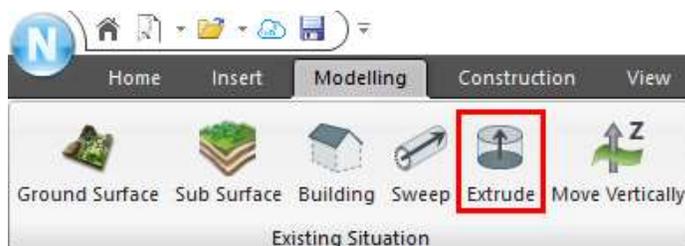


They will all get the height $z = 32$ m.

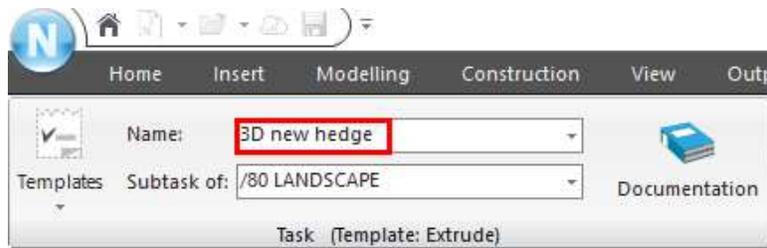


14. Lastly, we model the hedge.

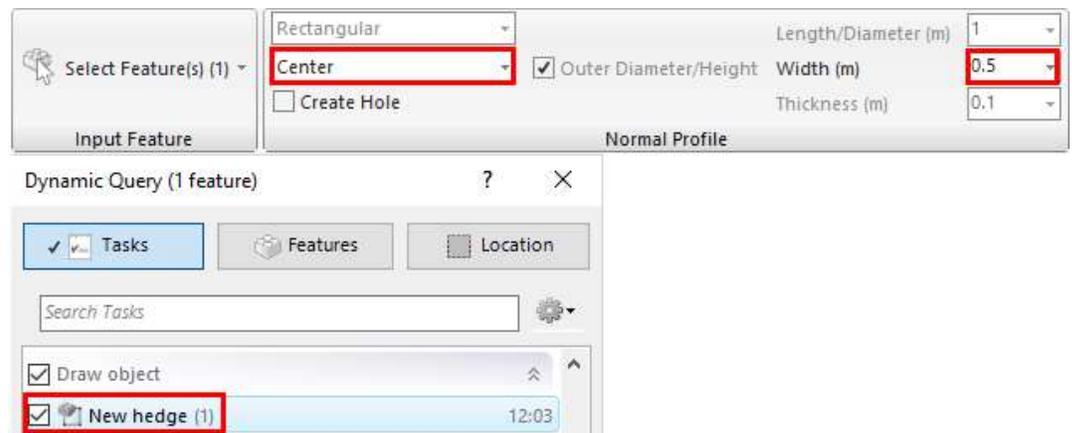
Click the summary task **80 LANDSCAPE**, click on **Modelling** and **Extrude**.



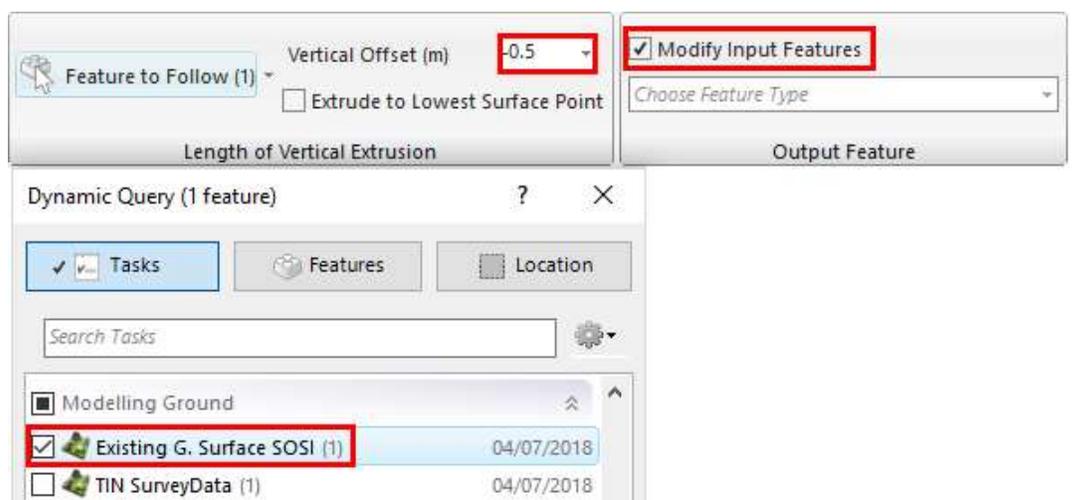
15. Give the task name **3D new hedge**.



16. Select **New hedge** as the input, set **Center** and width **0.5 meter**.

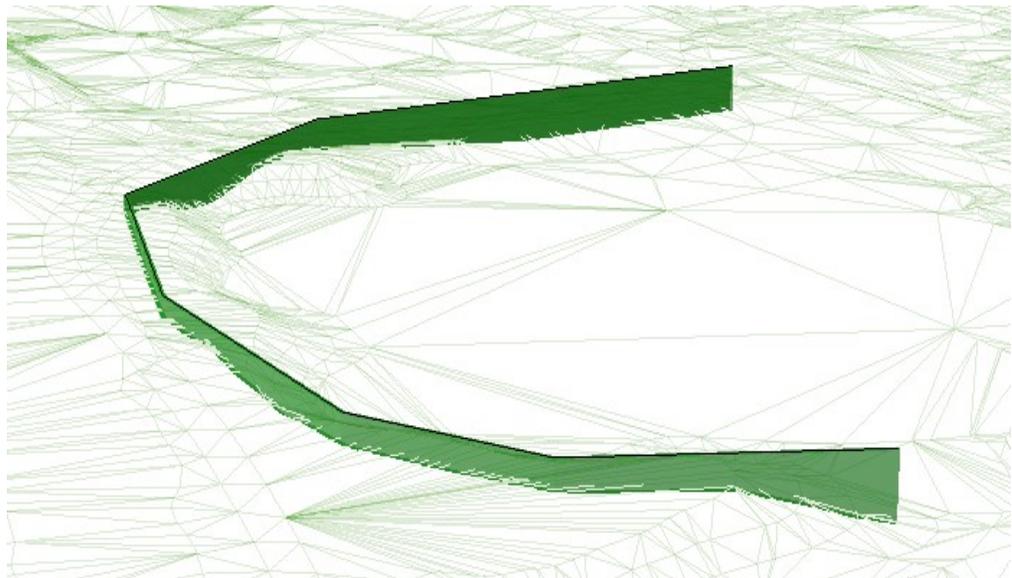
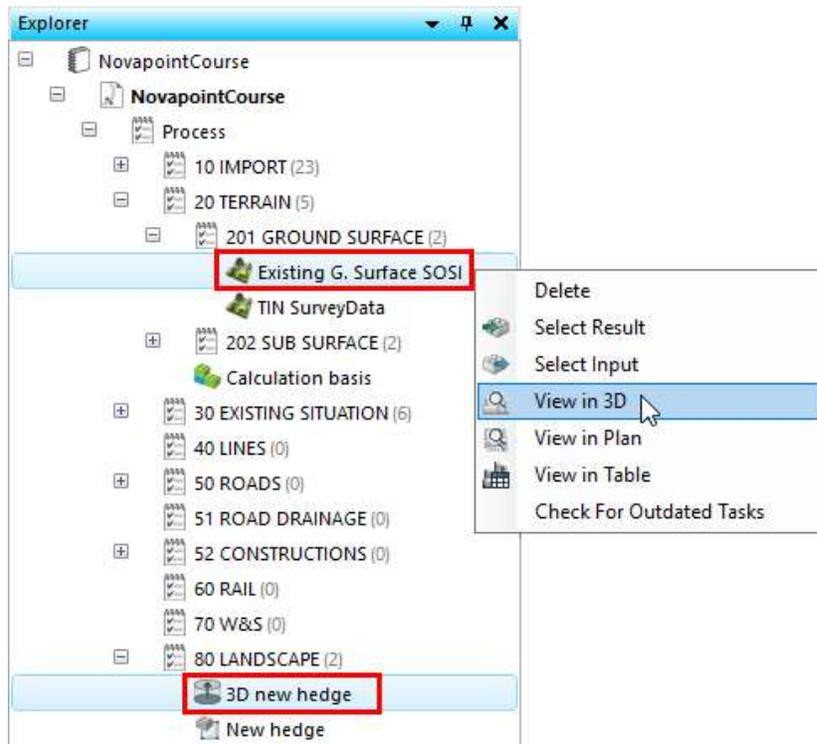


17. Select **Existing G. Surface** as Feature to Follow, with an offset of **-0.5 m**. Also select to **Modify Input Features**.



18. Click  **Finish**.

19. View both **Existing G. Surface SOSI** and **3D new hedge** in 3D.



Exercise 25 - Miscellaneous

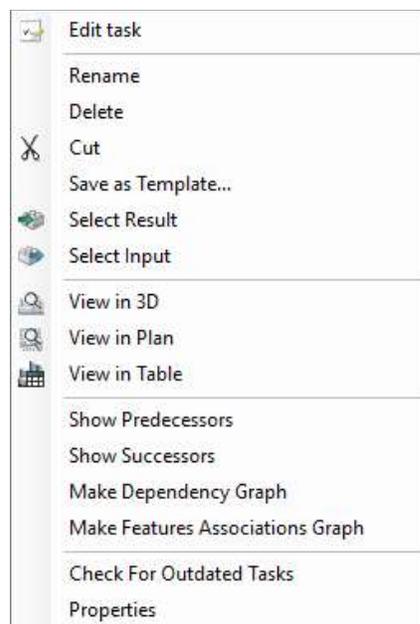
- Before we finish this section on Novapoint Base it is a good idea to check and possibly clean up the Explorer. That way, you get to organize the explorer in your project as you wish.
- Novapoint saves the model automatically every time you click the  **Finish** button in one of the functions. However, you must make sure to click save while using other functions that creates, cleans and clears in the Explorer.

At AutoSave, the .GD* files are saved, and there are different content in relation to the backup file. If you close a Quadri model and answer No to saving, the database is overwritten with the contents of the backup file so that you return to how the situation was at the last user-defined save.

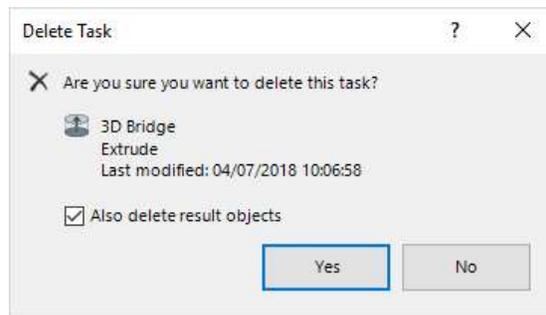
When you open a model, the system runs a check if the content is the same in the model as in the backup file. If it is not, the user is informed that the model is restored after abnormal termination, and the model will be overwritten with the copy in the backup file.

Every time you click **Save All**  the backupfile is updated. This backup file is a copy of the complete project.

- You can always select a task and drag it to move it to another location in the explorer. In addition; you can right click a task, and in the menu that appears, you can, e.g., rename or delete a task:

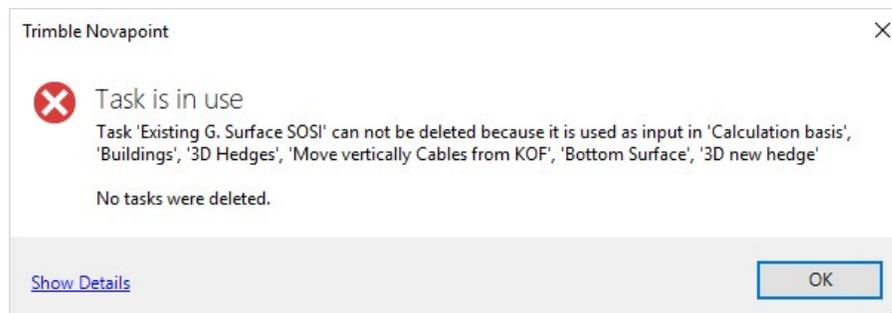


- If you delete a task that has content, you will be prompted with this dialog:



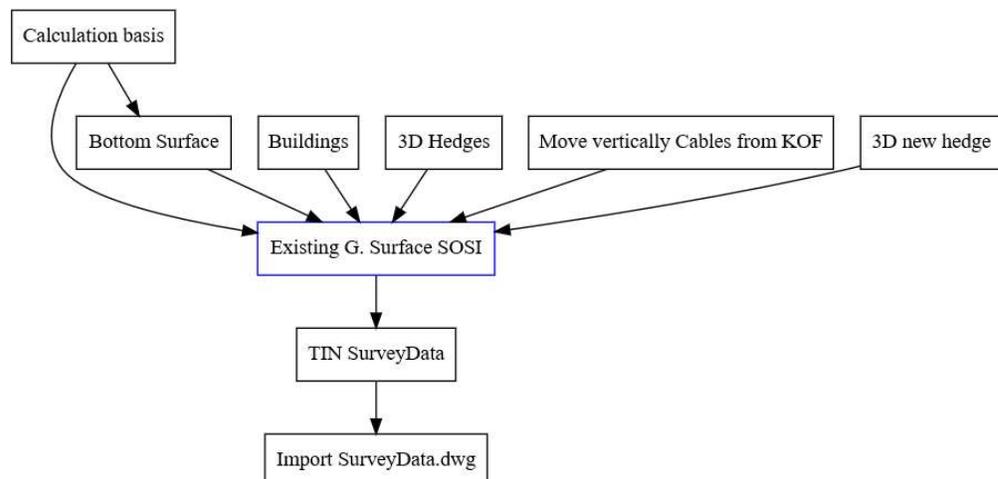
Ensure that you also tick **the Also delete result features** check box so that objects do not remain in the project model when the task is deleted.

- It is not possible to delete tasks that are in use by other tasks. If you try, you will receive this warning:



If you still want to delete this task, you need to first remove it from all other tasks.

- To see which tasks relate to each other, you can right-click a task in the explorer and select **Make Dependencies Graph**:



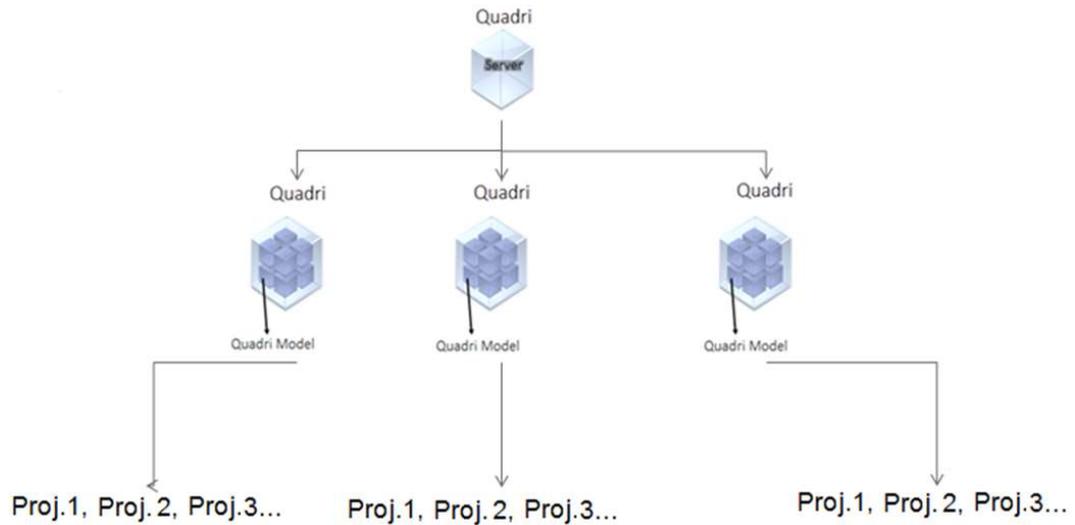
- You can take screenshots of the window by clicking  which is under View > Presentations. By clicking the small drop-down arrow below the icon first, you can select settings. Here you can set up the image format, as well as how and where the image is saved.

- End the course by saving your model.



Appendix 1: Server project - Quadri

A Quadri project enables multiple users to work with the same Quadri model, hosted on a server with a unique IP and Port.



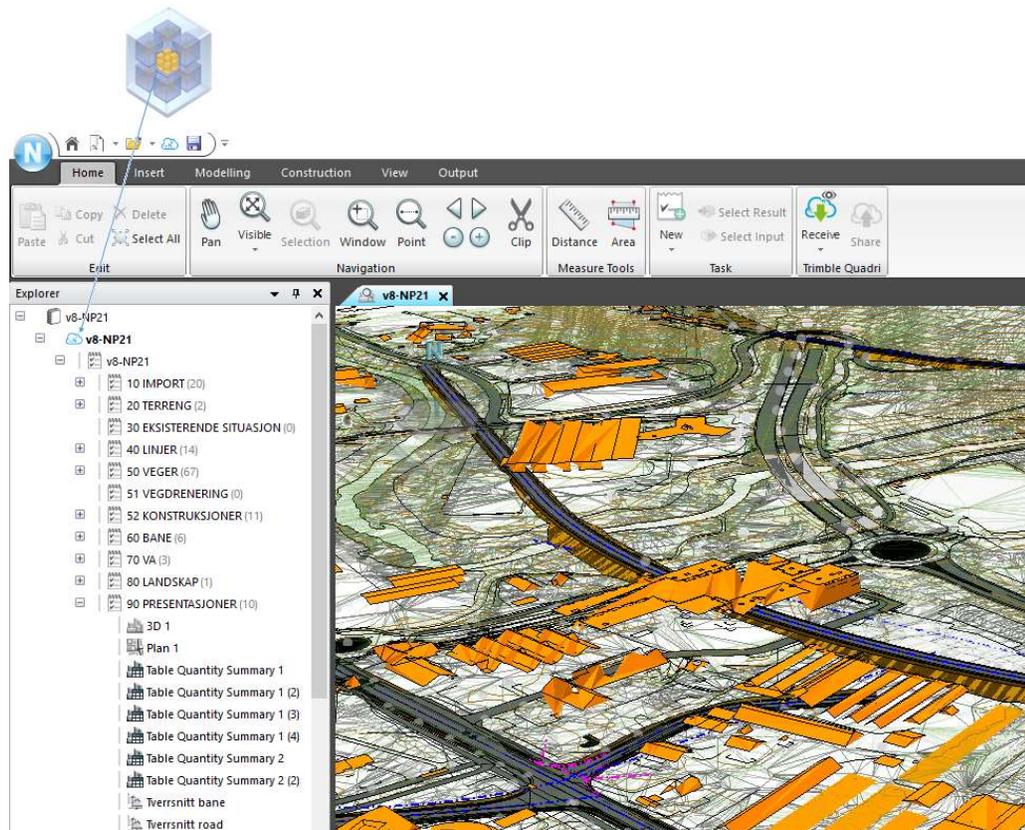
Each Quadri server can contain multiple Quadri models.

Each Quadri model can contain a hierarchy of Quadri projects where each project has a unique ID which is used to connect to Novapoint Base. CRS is attached to a Quadri model, so all projects have the same CRS.

It is recommended to create a new Quadri model for each project.



A user is working towards a Quadri project by checking out a workset (local copy) of the model. The user works locally on his copy of the model, and can receive / share from the project server. A user has the ability to extract multiple worksets from the same Quadri project.



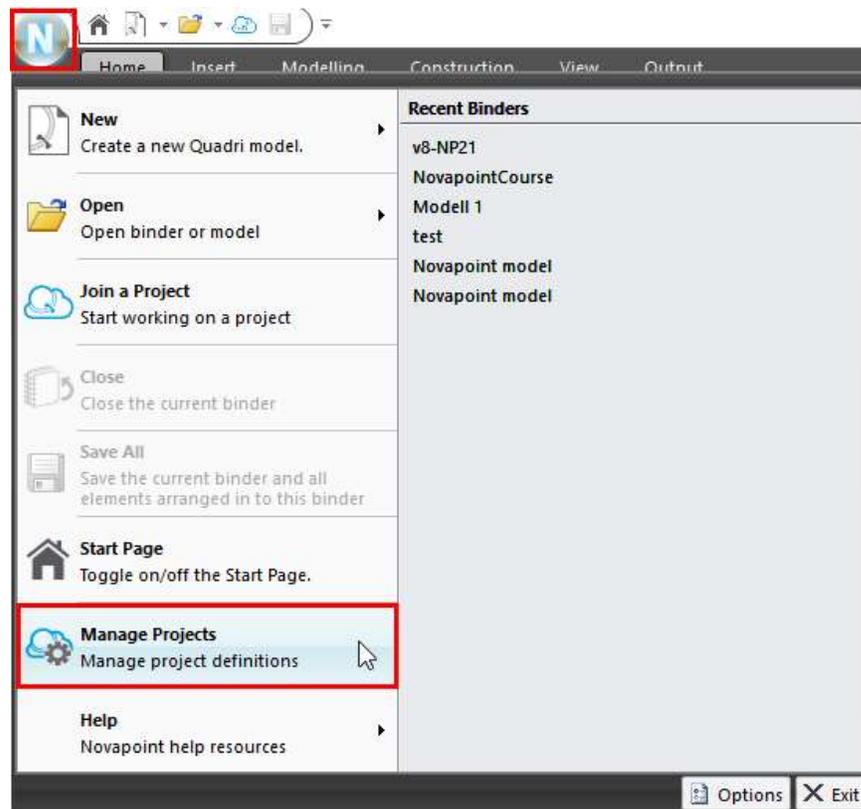
Important

- The project manager should establish a project structure that all participants are familiar with. This should be monitored daily.
- All tasks and objects should be quality assured before they are saved to the server. Have one person who is responsible for basic data.
- When sharing to the server, make shure you share everything (all tasks and objects) you've created in your local workset.
- Remember to share regularly. You can still make changes after you have shared.
- When receiving, you get everything back.
- With Quadri Model Manager (QMM), you can disconnect a workset. This means that the workset can no longer be used to work towards a shared model.
- There is a receive embedded in the reservation, because you must be sure that the changes are making changes in an updated version of the model.
- You may reserve / release entire worksets by right-clicking in the project name in the explorer
- You can reserve / release parts of the workset by selecting those particular tasks in the explorer
- You can delete a model with QMM. Then all the projects, all tasks, all objects, all users and absolutely everything is deleted.

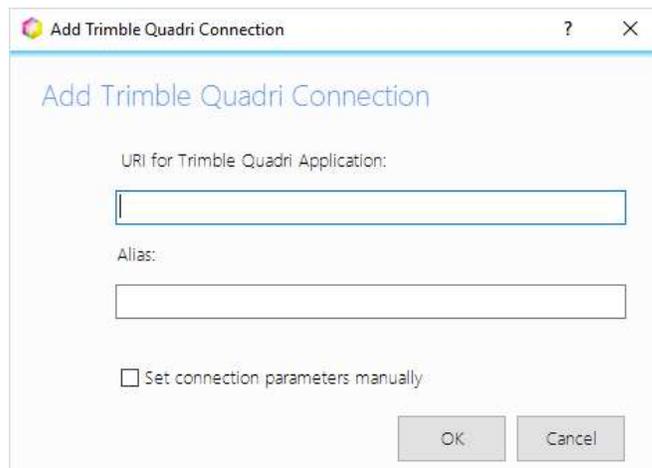
Create a project

- Models are set up in the Admin program Quadri Model Manager (QMM).
- It is recommended to have one model per project.
- Each model has one or more administrators, and a number of possible users. These are set up in Quadri Model Manager.
- Only the model administrator can set up a project. It is done in the Project Admin.

1. Start Novapoint.
2. Click the **(N)** and select **Manage Projects**.



3. In the dialog that comes up, click . This dialog then comes up:

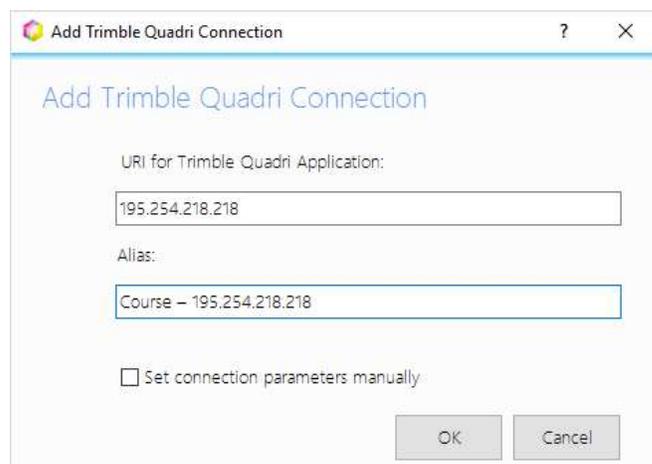


Fill in with the information you have gotten from the project admin.

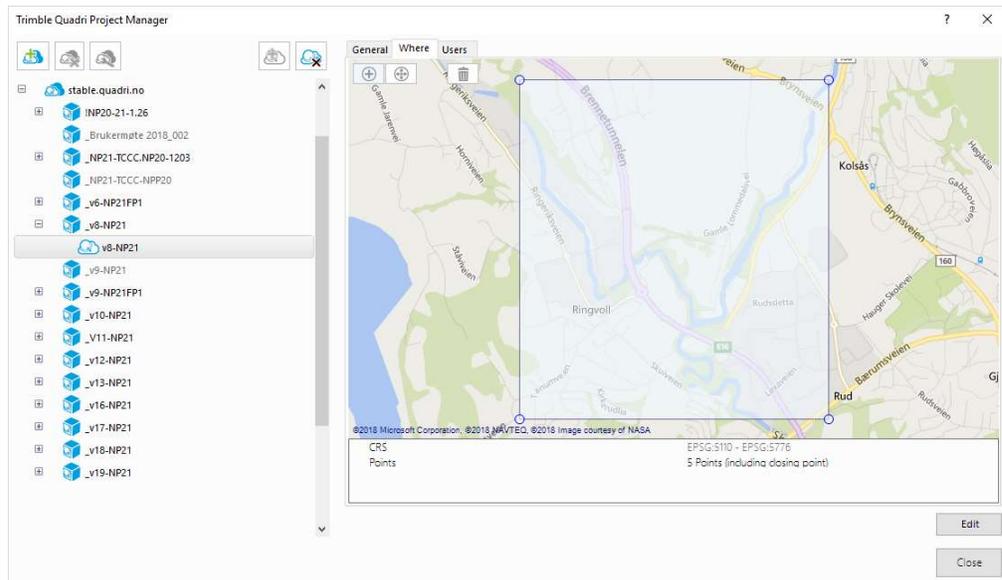
4. For a course on the Novapoint server, fill in with URL (name or IP) and alias:

URL: 195.254.218.218

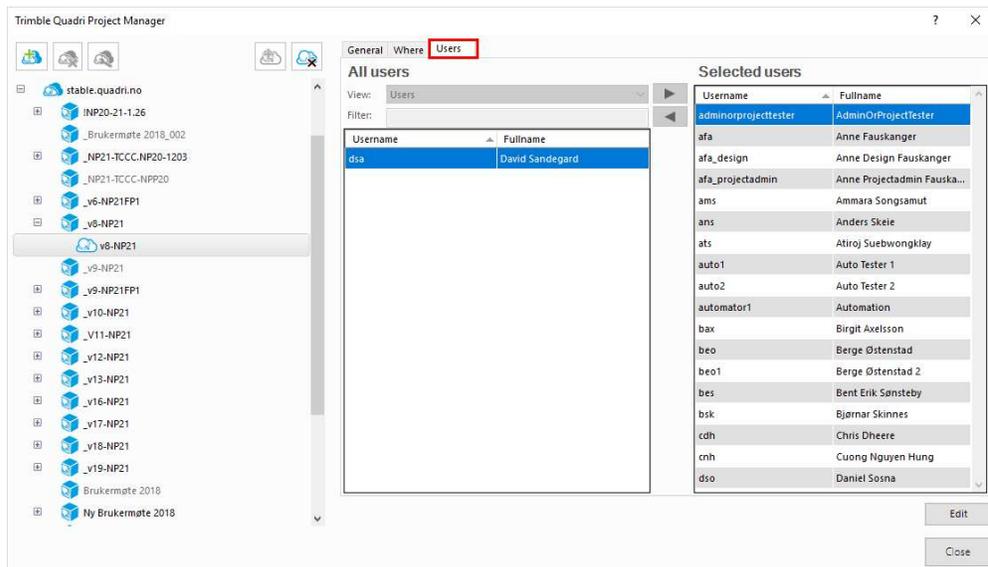
Alias: Course – 195.254.218.218



5. Select the model set up by the course instructor (below is an example from another model), and you will get information about the project:



6. Click the tab **Users**:

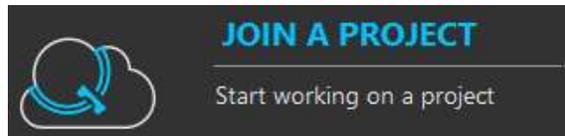


7. Click the **Close** button. All users that has been added can download the workset from the project.

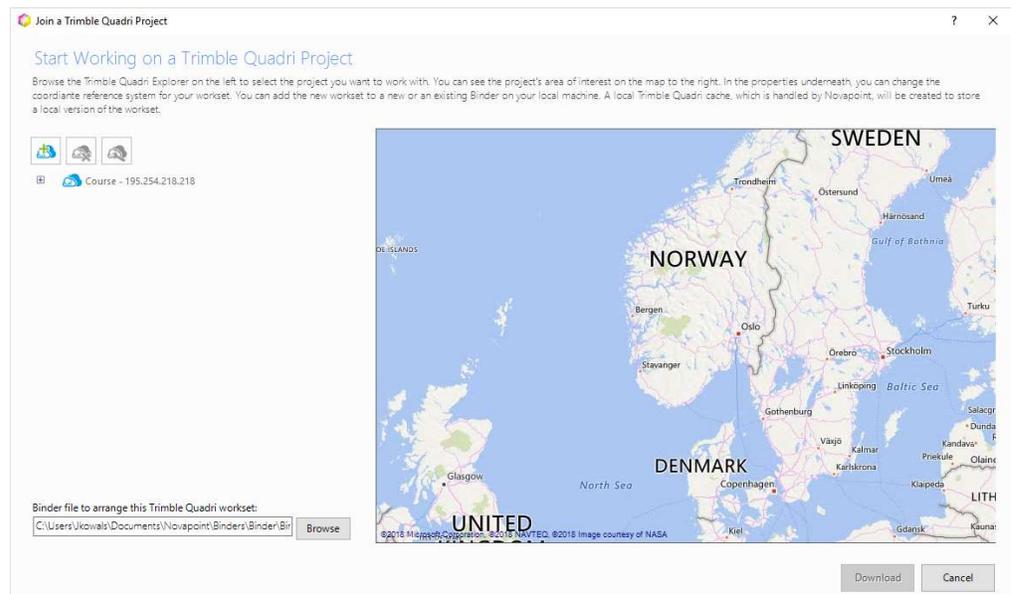
Download a workset from the server project

1. When you have been given access to a server project (Quadri) by getting a username and password, you can download a workset.

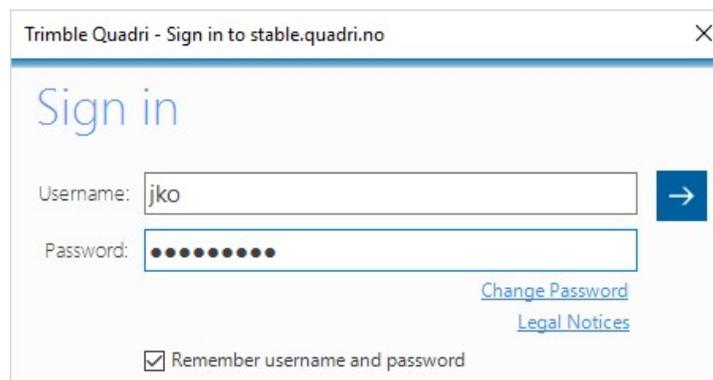
On the start page of Novapoint Base, click **Join a Project**:



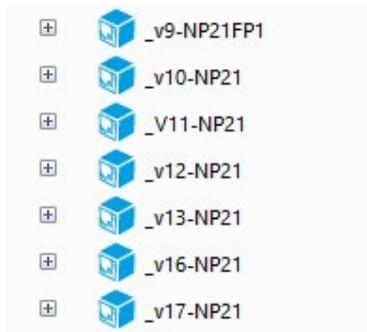
2. Here you will find a list of servers you can work with, with which you have set up a link to. Click the + character in front of Course – 195.254.218.218.



3. You will be asked to log in.

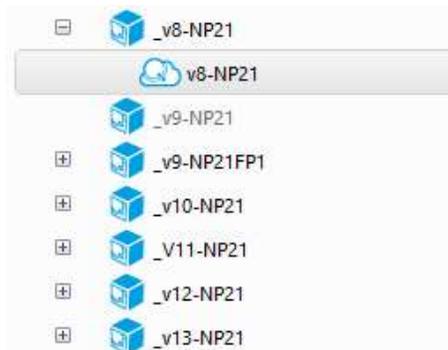


4. You will see the models that you have access to.



Click the + in front of the project name you want to work on:

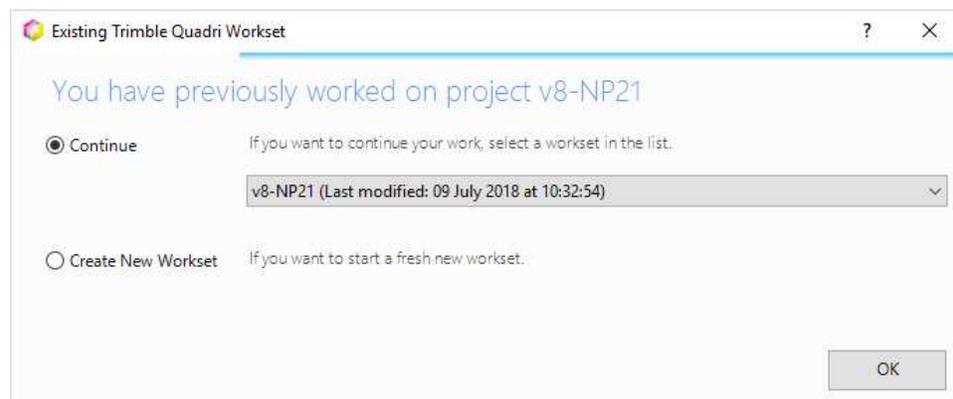
5. You will see a list of projects under this model:

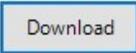


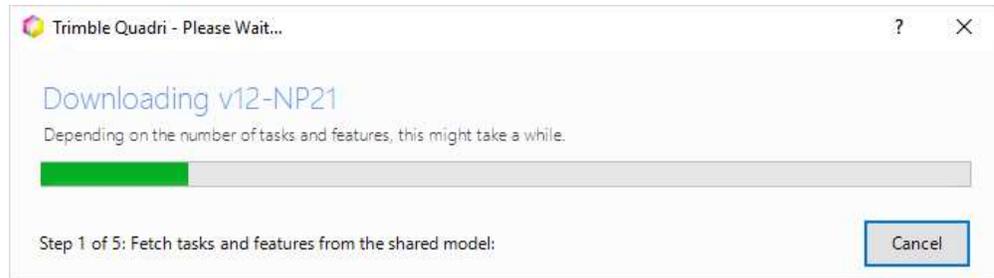
In the dialog you will see the area of interest for the project on the map, as well as the properties and coordinate system below the map.

Click the project name, and you will get the dialog for downloading the workset.

6. If you have download the project before you will get this dialog:



- Click  and the workset is downloaded. It can take some time, depending on the size of the model.



- When the workset is finished downloading, remember to **save**.



It is recommended to save frequently.

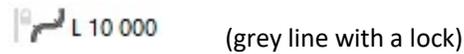
Status on tasks in the workset

In the explorer, the different tasks have icons that shows the status. A task can have the following status:

1. Read only in the workset. The task is not reserved by another user:



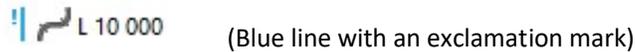
2. Read only in the workset. The task is reserved by another user:



3. Task reserved by you, and can be edited in this workset:



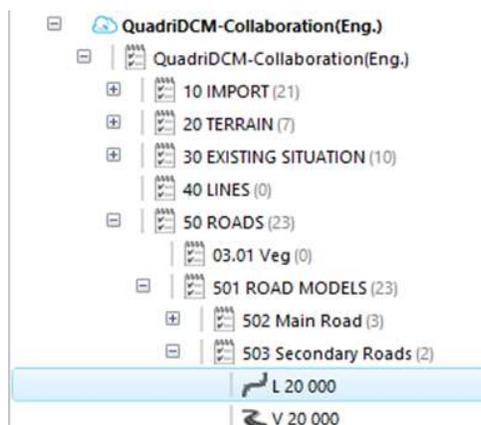
4. Task reserved by you which is changed in your workset, but not shared to the server:



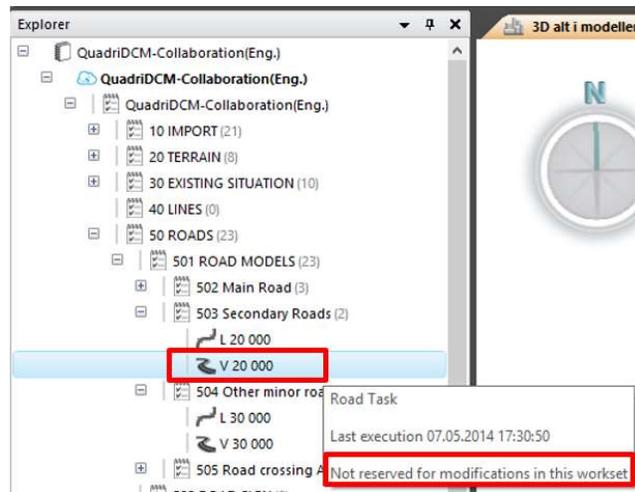
5. A new task created by you, but not shared to the server:



The following picture shows an example with line task L 20000. It is not reserved in this workset, and you can't edit it:



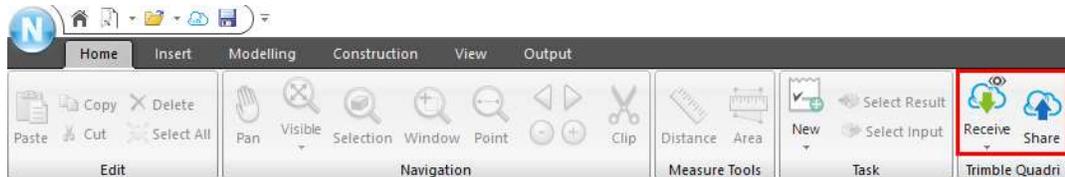
By hovering the mouse over a task you will see if the task is reserved, and by which user. You will also see which user lastly made changes to the task:



Receive and Share new tasks

You can create new tasks in Novapoint Base and share these to the server. By clicking Receive, you will update your model with tasks and features made by others.

These two functions you will find under the tab **Home > Quadri**.



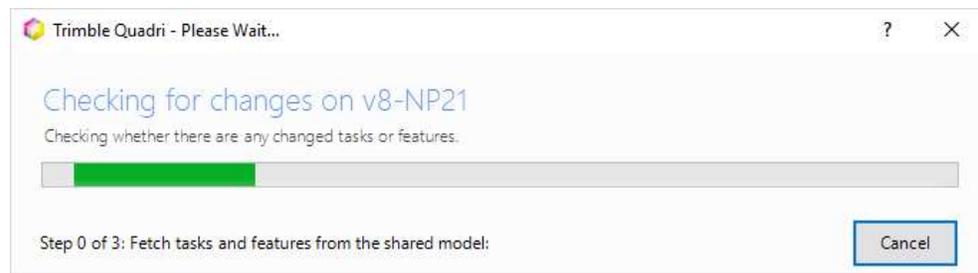
Receive

1. If you want to receive tasks made and shared by other users, click **Receive**:



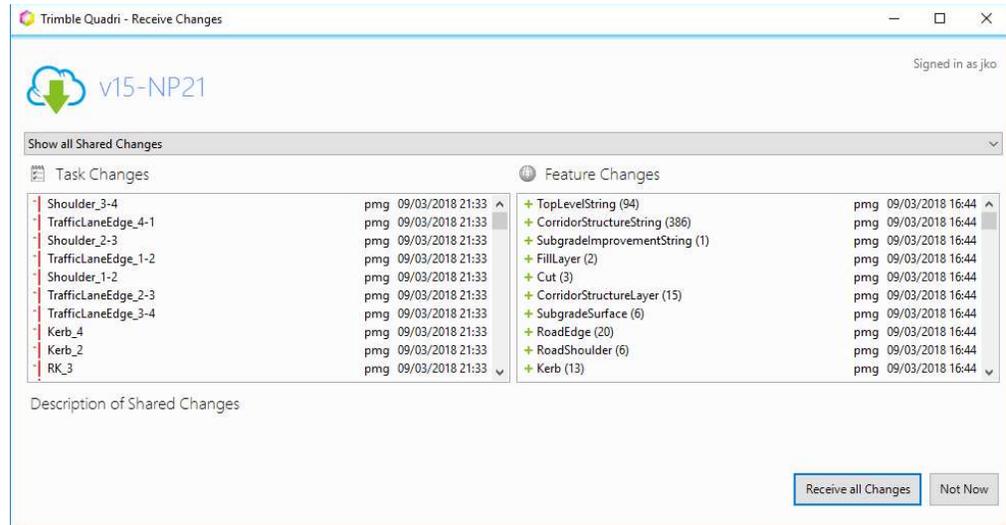
If you have not logged in, you will get the log in dialog. Log in.

After logging in, there will first be a check towards changes made in the server project.

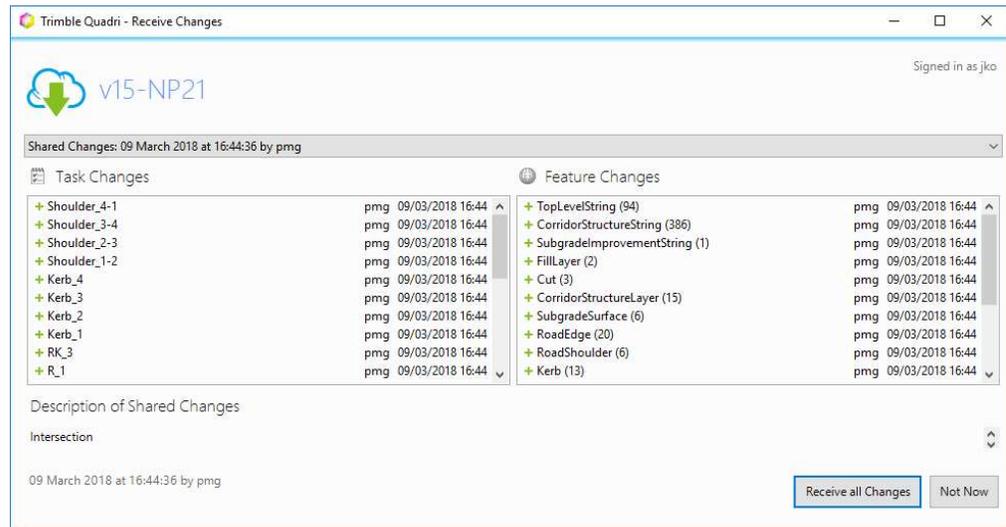


When the check is finished, the dialog below will come up. It shows a list of changes, who made them, and when.

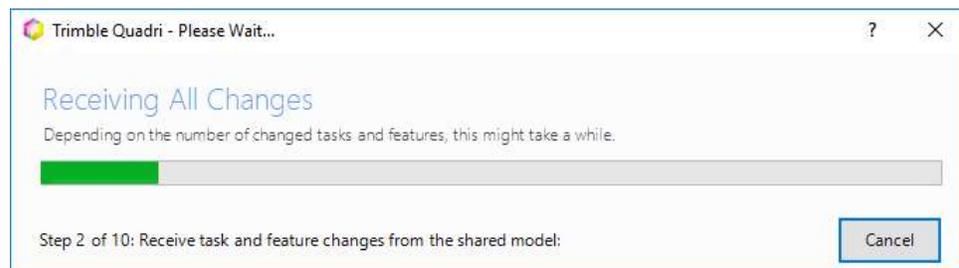
Example: Show all Shared Changes:



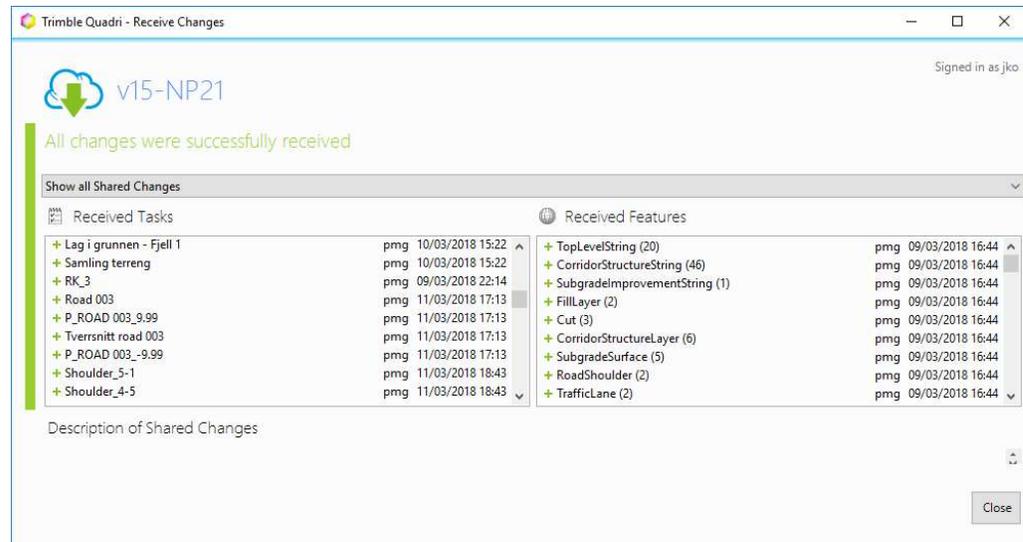
Example: Shared Changes on a specified date:



- Click **Receive All Updates**. The dialog below will come up. It will show time remaining for receiving changes:

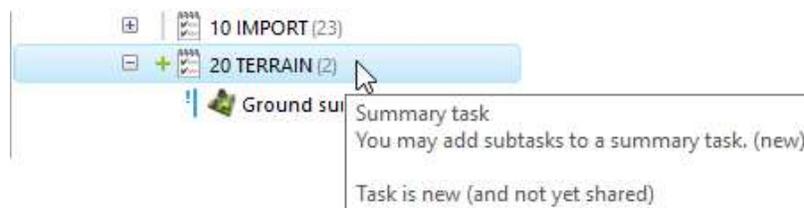


When the receiving is finished, the dialog below comes up. It shows all changes. Click **Close**:



- By hovering the mouse over a task you will see if the task is reserved, and by which user.

Example under shows a change made by another user:



- Save your workset:**

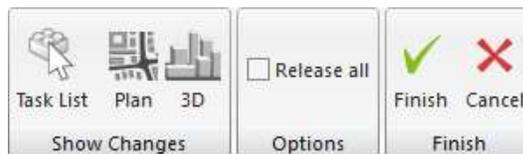


Share

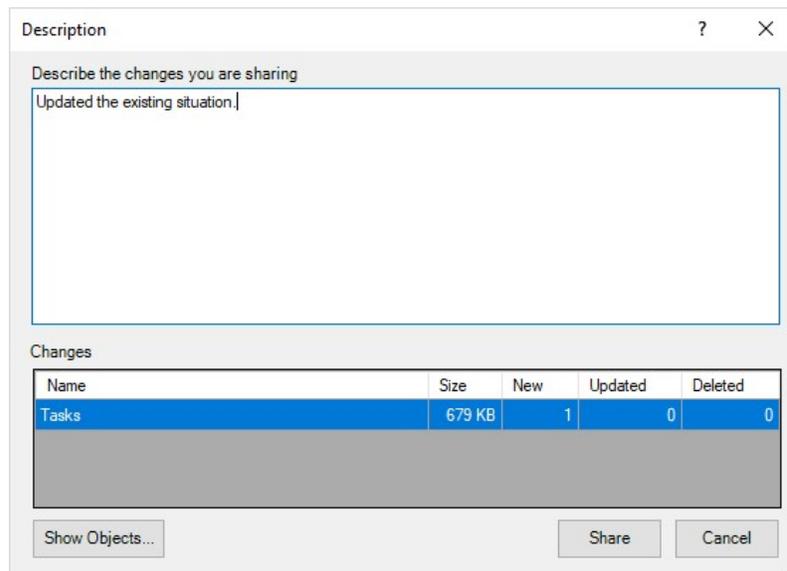
1. If you want to share tasks with the other users, click **Share**:



The tool will change:



2. Click **Finish** and the dialog for description will come up:

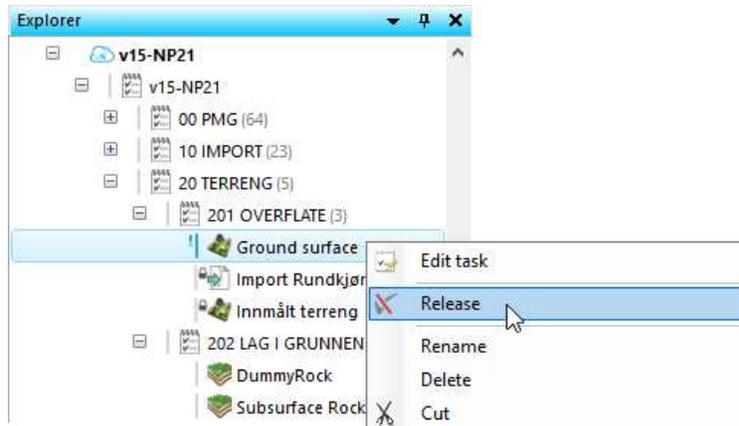


3. Give a description to the other users of what you have done, and what you are about to share. Click **Share**.
4. The tasks will now be shared to the server. The icon next to the task will be updated to the right statys, e.g. green plus or blue line with lock will change to green line. This means that the tasks are shared to the server, but are still reserved in your workset.

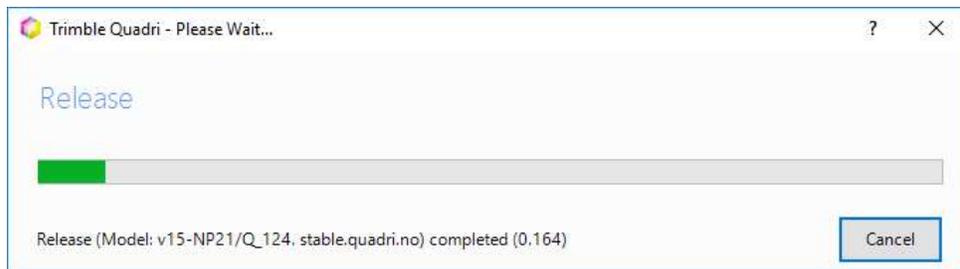
Release

1. After you have shared the changes you have made, you should now release tasks if you are done working on them, to give other users the opportunity to work on the tasks.

Click a task which is reserved by you, right click it, and click **Release**:



The release progress bar will come up:

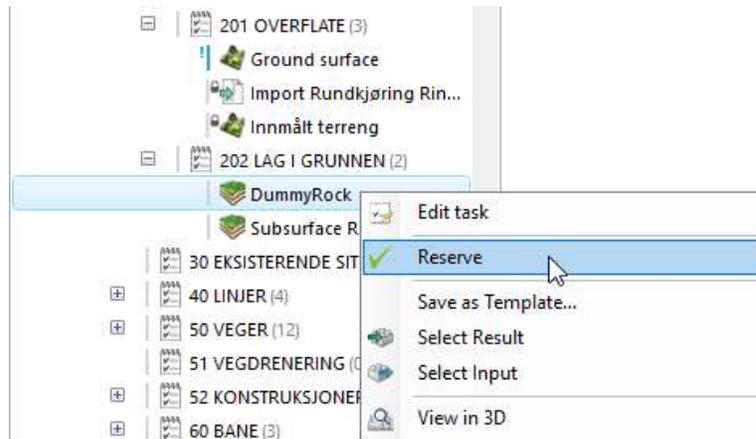


It is not possible to release a task without it being shared first.

Reserve

1. If you want to edit a task, you have to reserve it first.

Click a task, right click it, and click **Reserve**:



The reserve progress bar will come up:



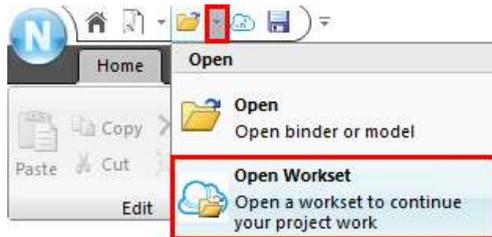
If there are changes on the server that have to be merged into your workset, you will get the dialog below. The Receiving process will be initiated.

2. **Save** you workset:

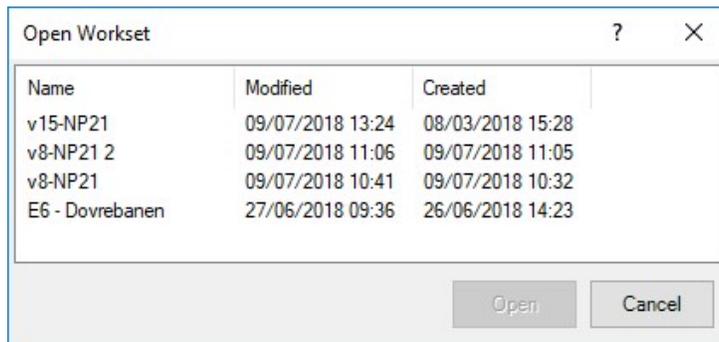


Continue working in a workset

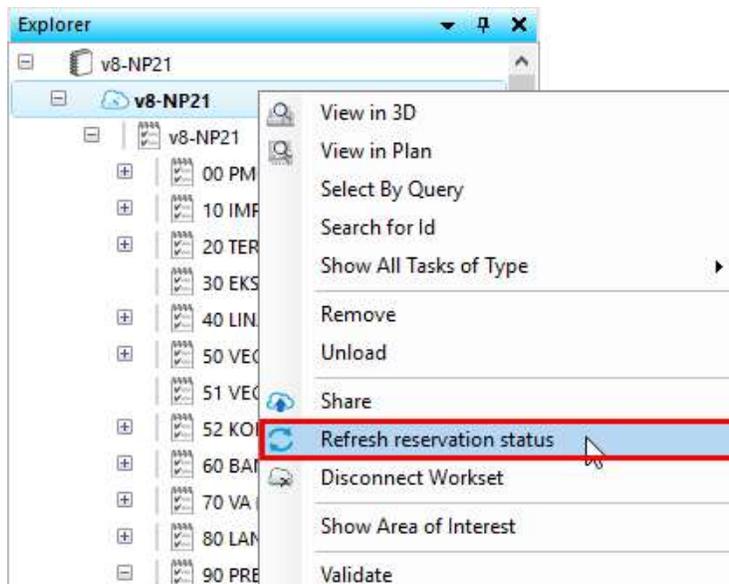
Once you have downloaded a workset, you should continue working on this (not download new worksets.) You open a workset by clicking the **down arrow next to the open icon**, and **Open Workset**:



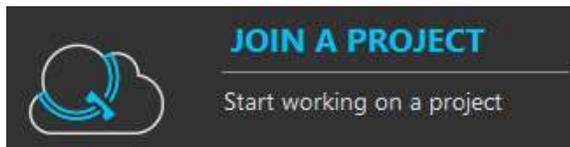
Then you open the project from the list:



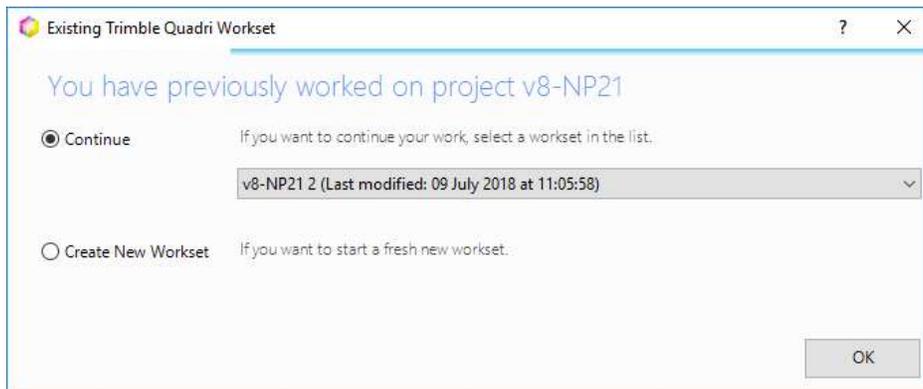
After you have opened the project, you should **Refresh reservation status**:



Another way to of opening an existing workset is from the Start Page:



When you continue working on a previous project, you will get the option on either continue working on the workset from last time, or to create a new one (usually selecting to continue).

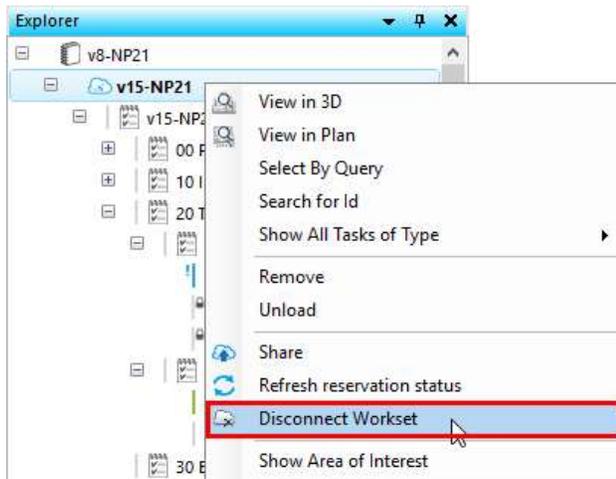


Deleting a workset

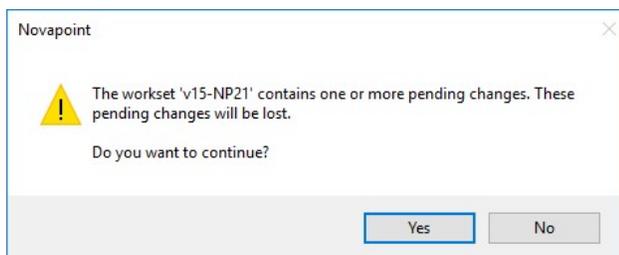
When deleting a workset, it is important that you not only delete files with Windows Explorer. The reason being that if a user deletes a workset and have forgotten to release some tasks, they will be locked on the server (an administrator user can go in and clean up the server.)

To delete a workset, right click your workset in the explorer and click **Disconnect Workset**.

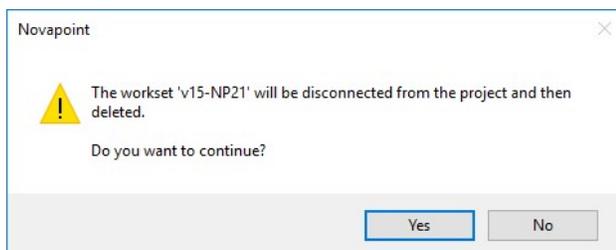
NB! If you have something in the workset that is not shared to the server and you want to keep it, you must first Share before disconnecting the workset.



Click **Yes**.



Click **Yes**.



NB! All changes done in this workset after the last share will be lost! You should never edit your local workset in Windows Explorer. It will result in that you will no longer be able to Receive or Share it.

USER NOTES

