Workflow Guide

May 2025

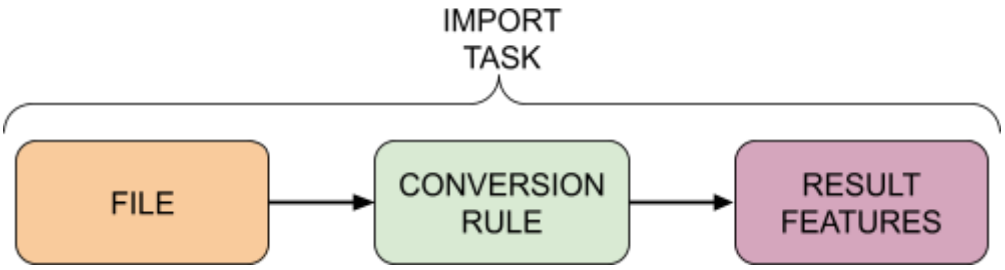
Import IFC Files

Overview

The system uses an object-based database. The database consists of different object types defined in an object type catalog. Currently, there are two object type catalog standards in use. One standard (QuadriDCM) contains commonly used infrastructure and mapping objects. The other standard (Quadri.IFC) contains objects representing the entities in the IFC4.3 ADD schema defined by buildingSMART International. A model (=database) is based on one of these two object type catalog standards. This guide covers the import of IFC files into models based on both these two object type catalog standards.

Since all data added to a model is stored as objects in the model, the system never stores files, only separate objects. This is a significant difference compared to other collaboration tools. This guide goes through the steps of importing IFC files into the model. The use of

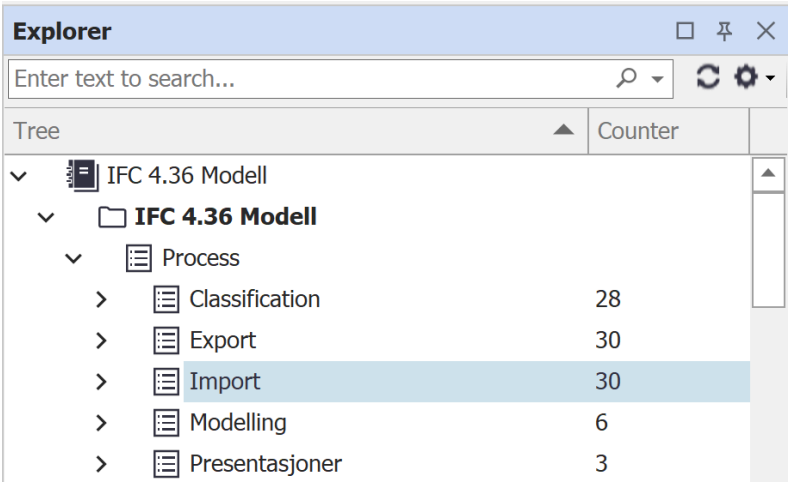
conversion rules is an important part of this process. Conversion rules are customizable and you are therefore able to get exactly the data you need from each imported file.



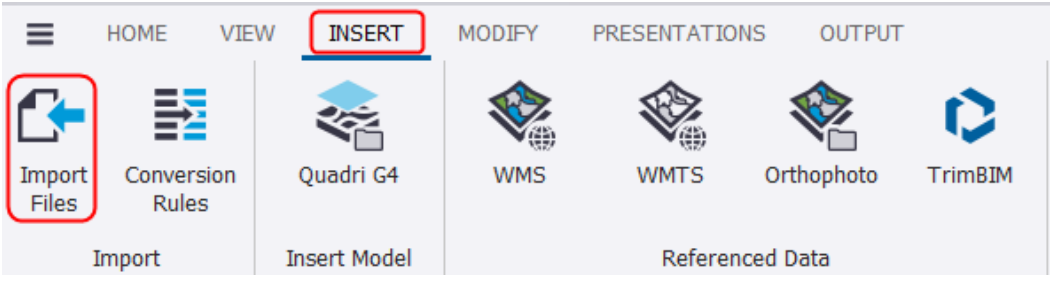
All import tasks work in the same way, regardless of the imported file format, but this guide focuses on the import of IFC files.

Workflow

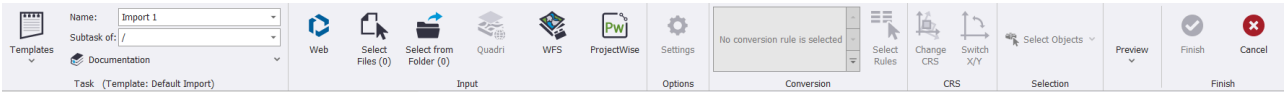
1. Select a suitable folder in the **Explorer**:



2. On the **INSERT** ribbon, choose the **Import Files** button:



An import toolbar opens on the ribbon. Work from left to right to specify the IFC files to import and the different options:



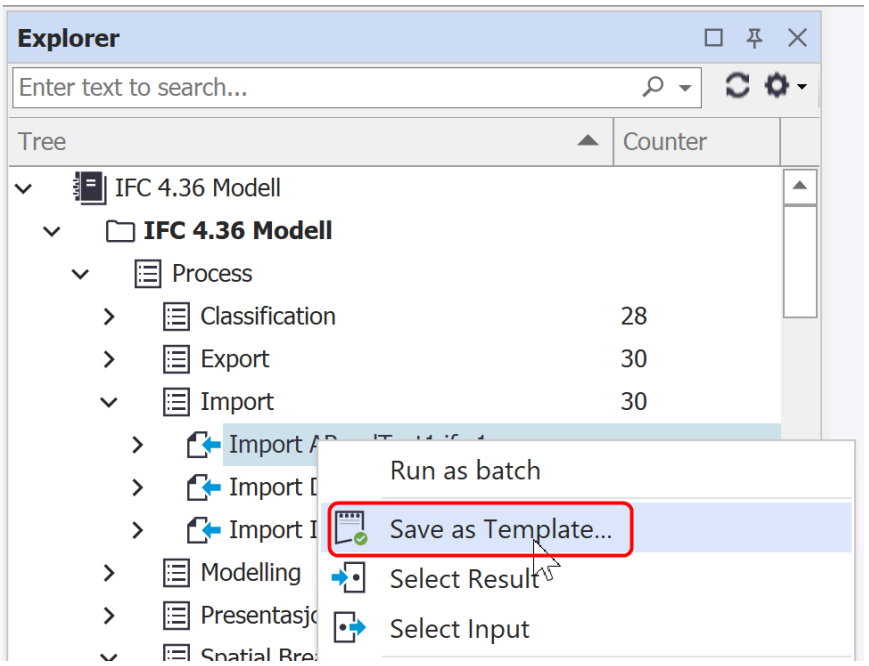
The different sections in this toolbar are explained in the following chapters.

Task Section

Templates

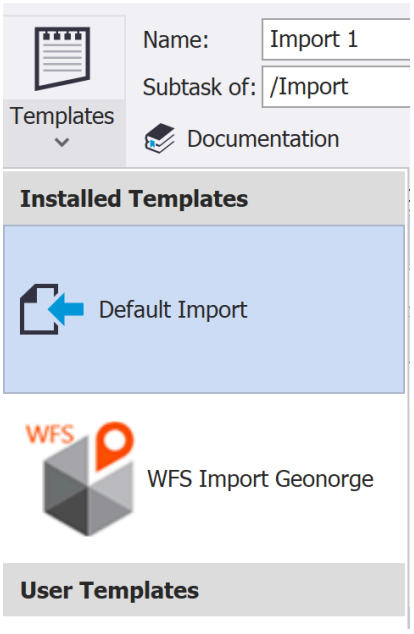
The first button in the **Task** section is the **Templates** button. The template mechanism allows you to save an import task that you are satisfied with as a template. You can then use the template to set up a similar import task when needed.

You can save an import task as a template by right-clicking the import task in the **Explorer** and choosing **Save as Template**.



To use a previously created template, do the following:

1. Click the **Templates** button.
2. A drop-down list opens containing the available templates. Templates following the installation are listed at the top and user-defined templates are listed below.



3. Select the template you want to use. The default template is ***Default Import***, so if you don't have any preferred user-defined templates, you don't need to click the **Templates** button.

Task Name and Location in the Task Tree

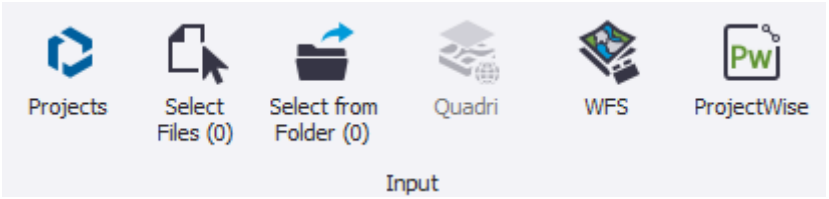
The **Name** and **Subtask of** controls are used to give the import task a name and locate it in the task tree.

Do the following:

1. Specify the name of the import task in the **Name** field.
2. In the **Subtask of** drop-down list, choose where you want the task to be located in the **Explorer** tree. For example:

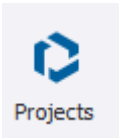
Input Section

In the **Input** section, specify which files from which sources you want to import into your model with this import task.

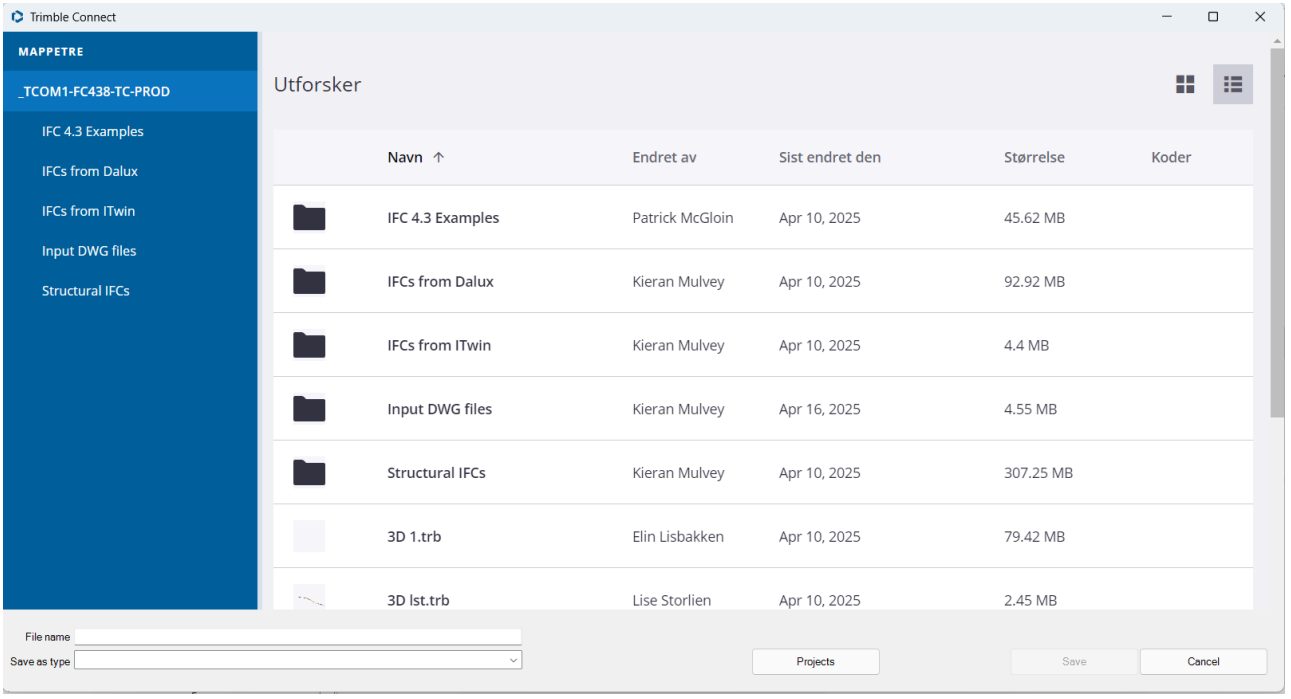


If you want to collect the file from a Trimble Connect project, do the following:

1. Click the **Projects** button.

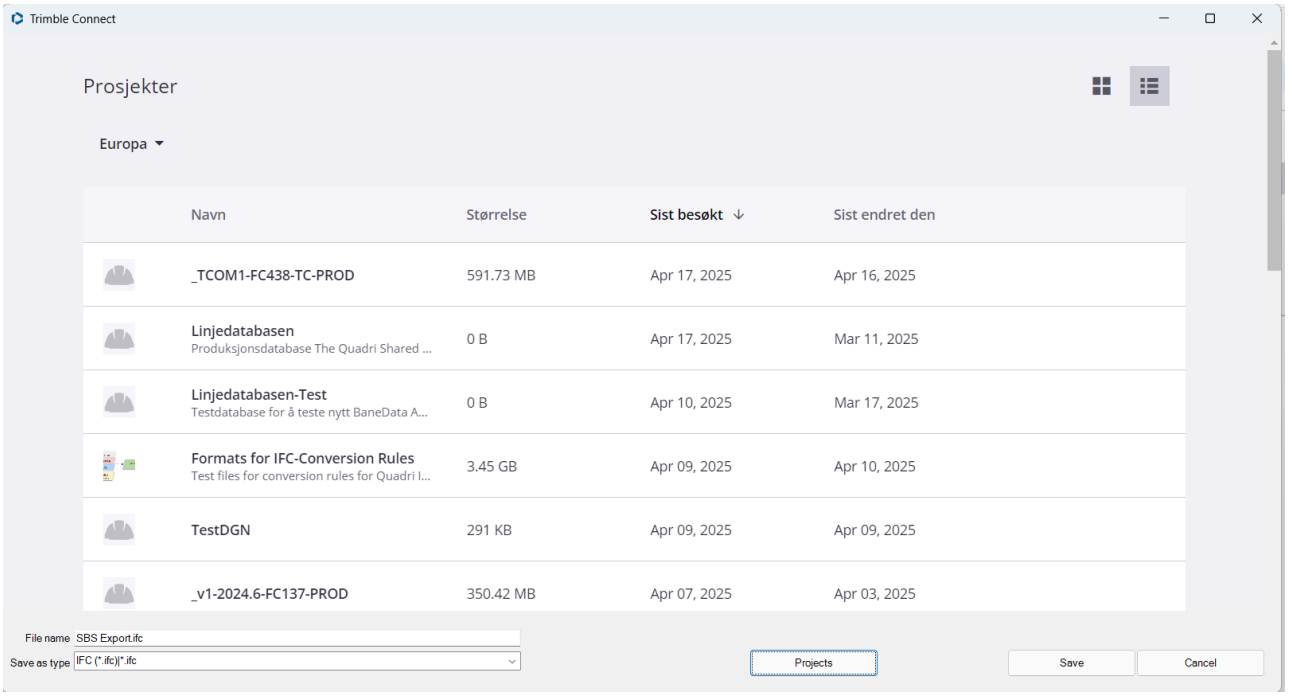
2. Then this dialog opens showing the folders in your active project:

3. Click the folder containing the file you want to import and then click the file you want to select for importing.

4. Click **Save** to start the import process for the selected file.

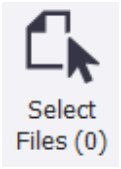
5. If you want to select a file from another project, then you can click the **Project** button and this dialog opens showing all your available projects:



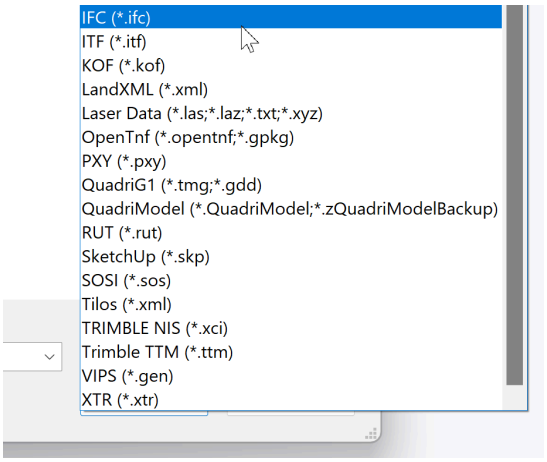
6. Click the project you want to select the file from and the folder dialog for this project opens.

If you want to select a file from the folder system available on your PC, do the following:

1. Click the **File** button:

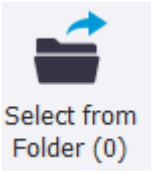


2. Make sure that the selected file format in the dialog is ***IFC***:



All valid IFC versions are supported: IFC 2X3, IFC 4 and IFC 4.3 ADD2 (mostly referred to as just IFC4.3).
You can select more that one file if you like

3. If you want to select all files in a specific folder, you can click on the **Select from Folder**-button:

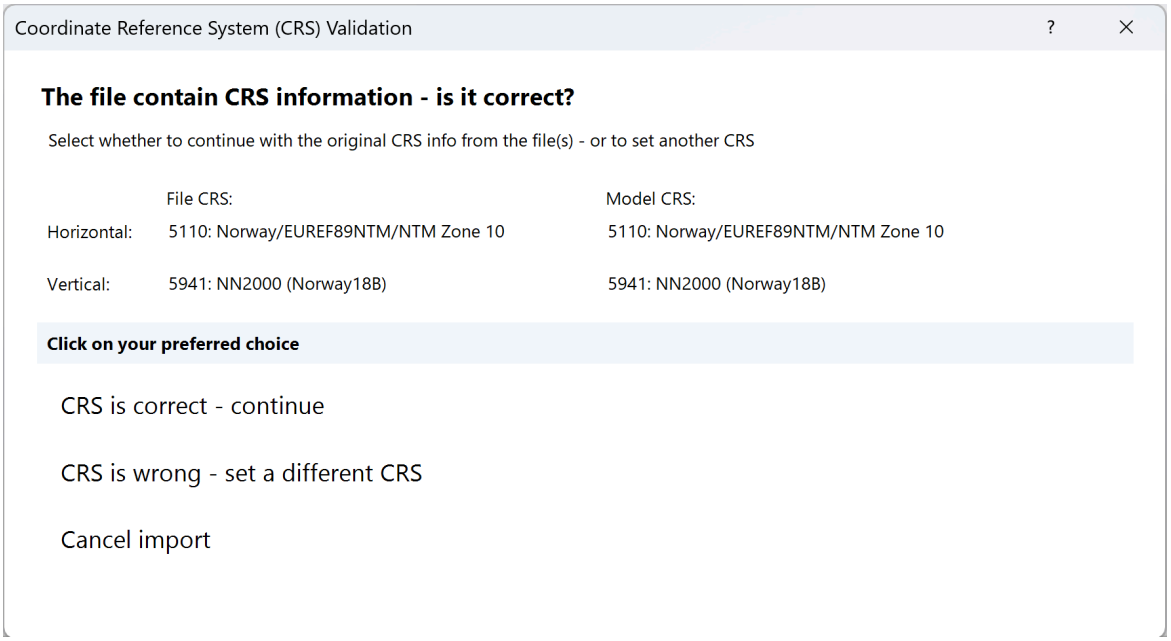


4. A **Select from Folder**-dialog opens in which you can select a folder for the files to import. In this dialog, it is also important to select the ***IFC*** file format.

5. If you want to select files directly from Bentley's ProjectWise and you have access to ProjectWise projects, then you can click the **ProjectWise** button. A log in dialog for ProjectWise opens and after filling in your credentials, you get up a dialog where you can select project, folder, and files.

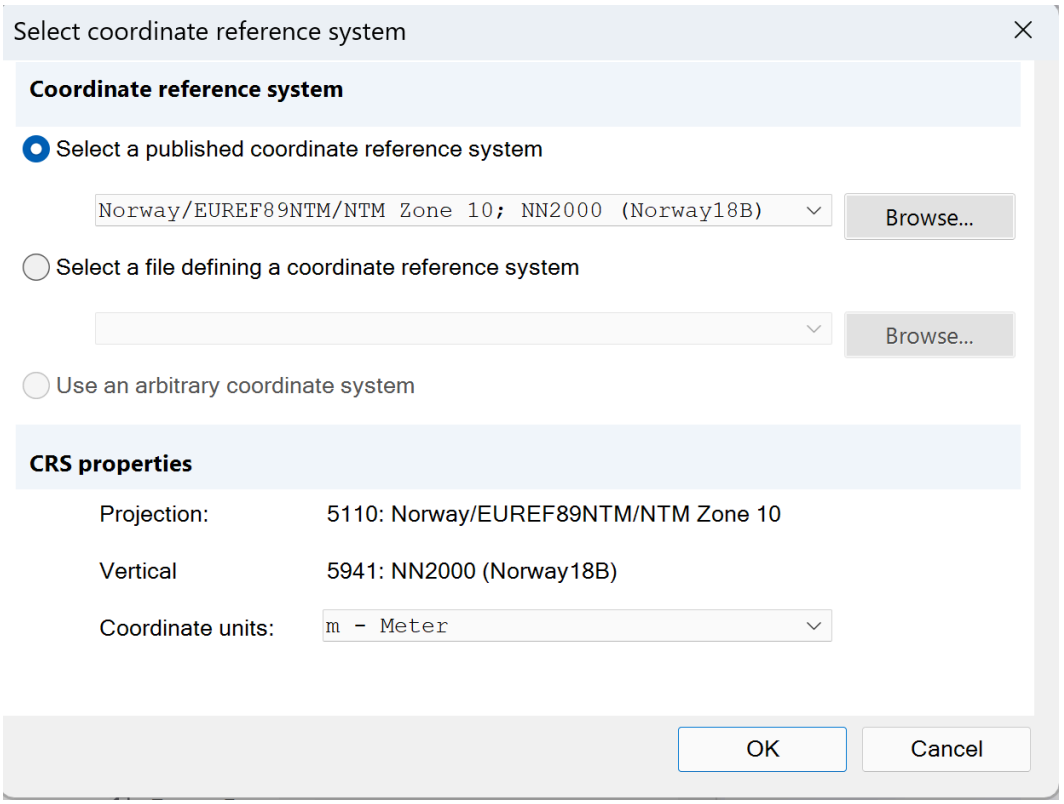
Coordinate Reference System

When you have selected the files to import, this dialog automatically opens in which you can check and specify the Coordinate Reference System (CRS) in the imported file.



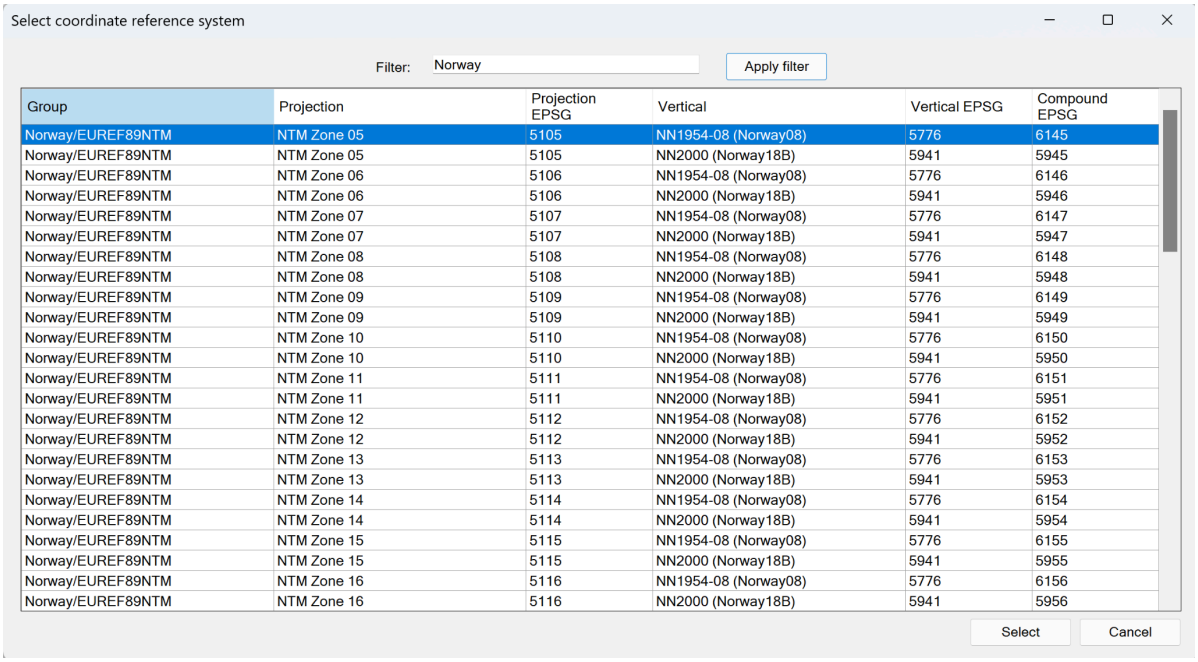
In this dialog, you can do the following:

1. Check the values for the horizontal and vertical CRS in the file. These are listed below the **File CRS:** in the dialog.
2. If the values are as expected, click the button: **CRS is correct - continue**
3. If the values for the CRS in the file are not as expected, then click the **CRS is wrong - set a different CRS** button and the dialog shown below opens.



In this dialog, you can select the desired CRS (combination of horizontal and vertical coordination system) in the drop-down list for the **Select a published coordinate reference system** radio button option.

If you don't find the CRS you are looking for, click the belonging **Browse...** - button to open this dialog where you can select among all the CRS available in Trimble Geospatial Library (TGL):



Note: You can **filter** on countries, e.g., as shown in the screen shot above.

Choose the CRS you want in the list and click **Select**.

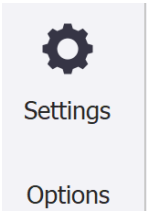
Note: You have the possibility to define the CRS with a calibration file by choosing the radio button option **Select a file defining a coordinate reference system**. You can add a CRS to your project by uploading a calibration file. Supported file types are **.jxl** and **.dc**.

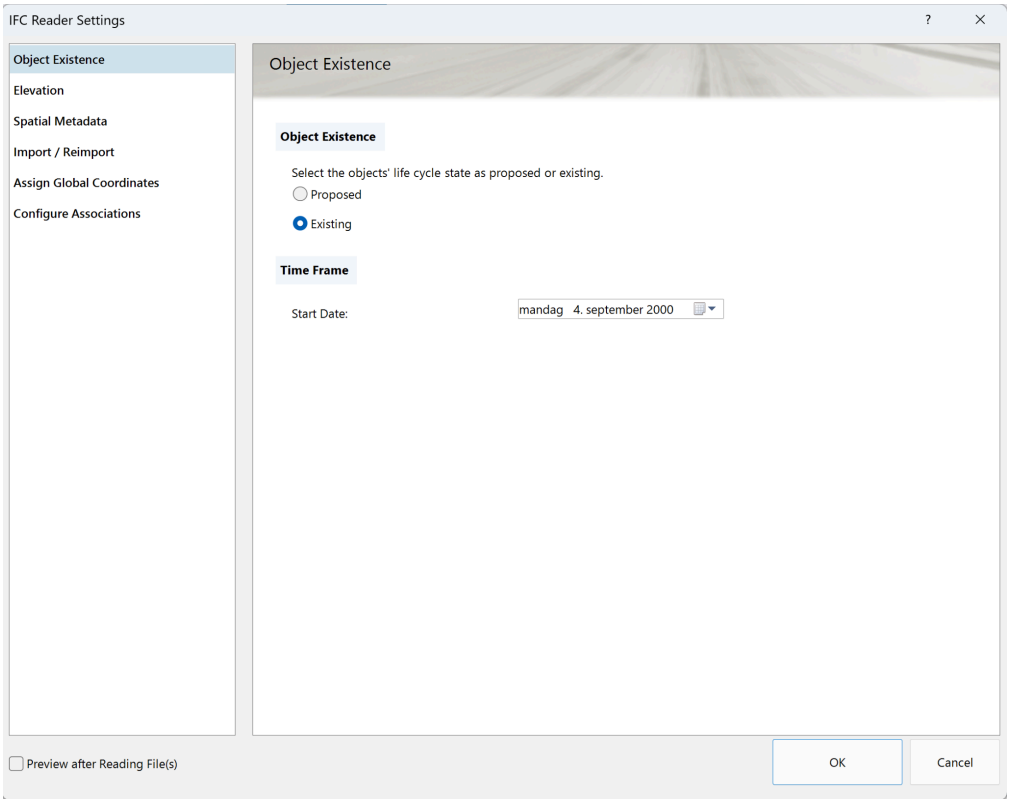
4. Sometimes the CRS is not recognized in the IFC file. Then, the following buttons are available in the **Coordinate reference system (CRS) Validation** dialog:

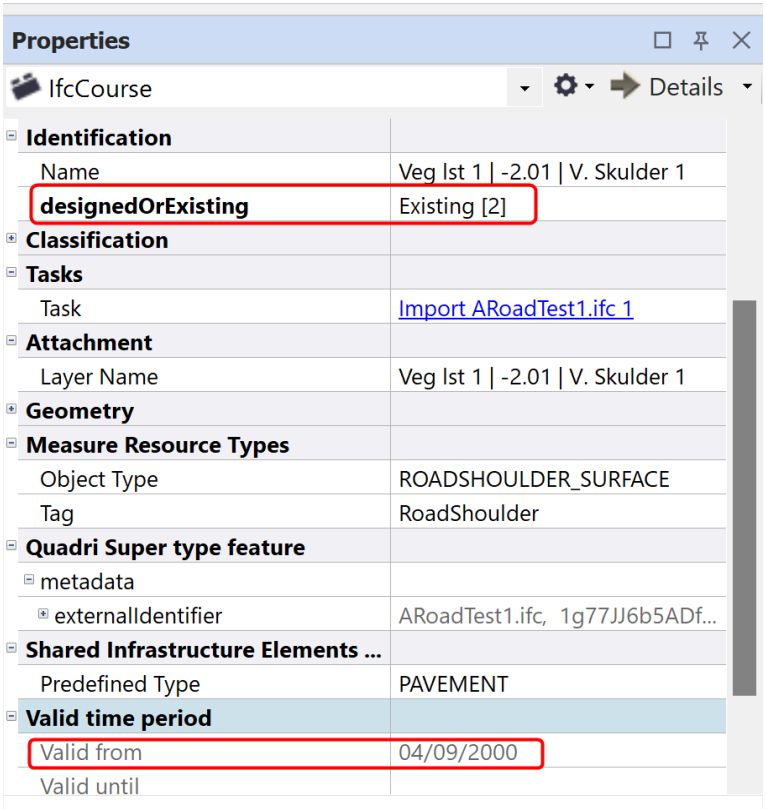
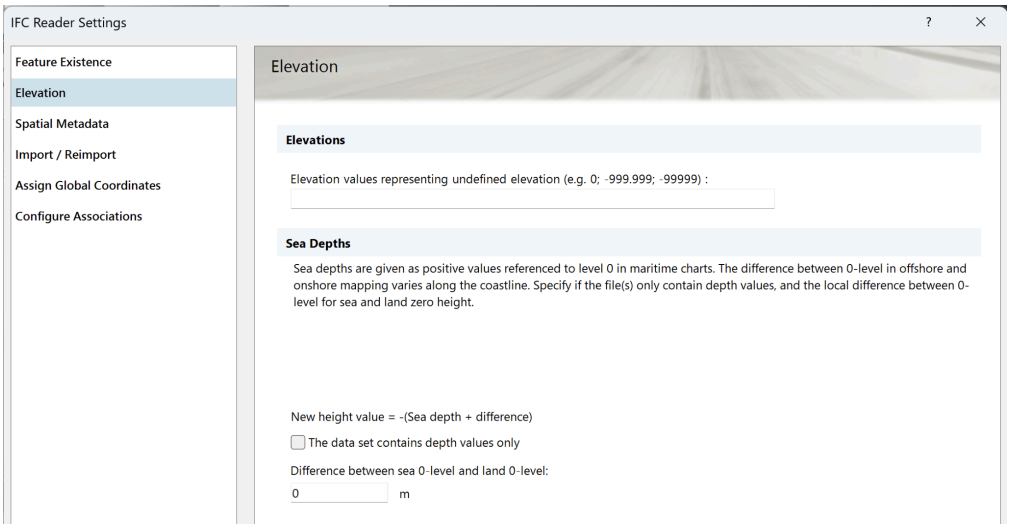
    - **File CRS is the same as in active model**: Click this button to set the CRS in the file to be the same as the CRS i the model
    - **File CRS is different from the active model**: Click this button to get up the **Select coordinate reference system** dialog shown above in which you can select the correct coordinate system.

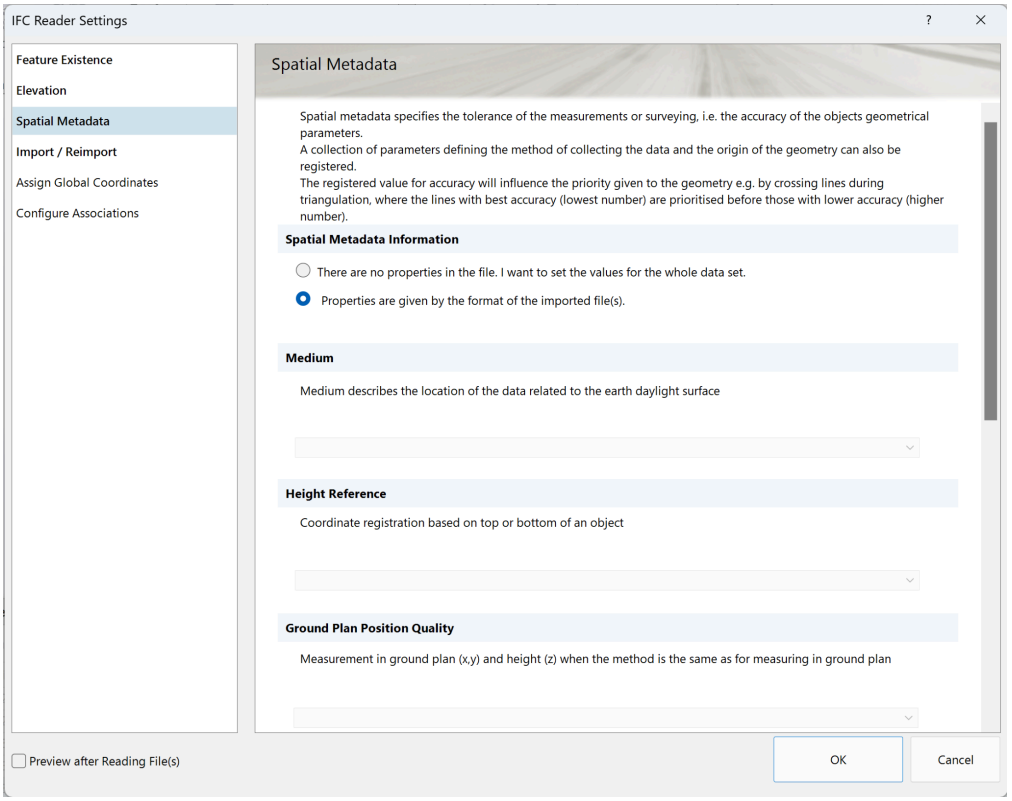
IFC Reader Settings

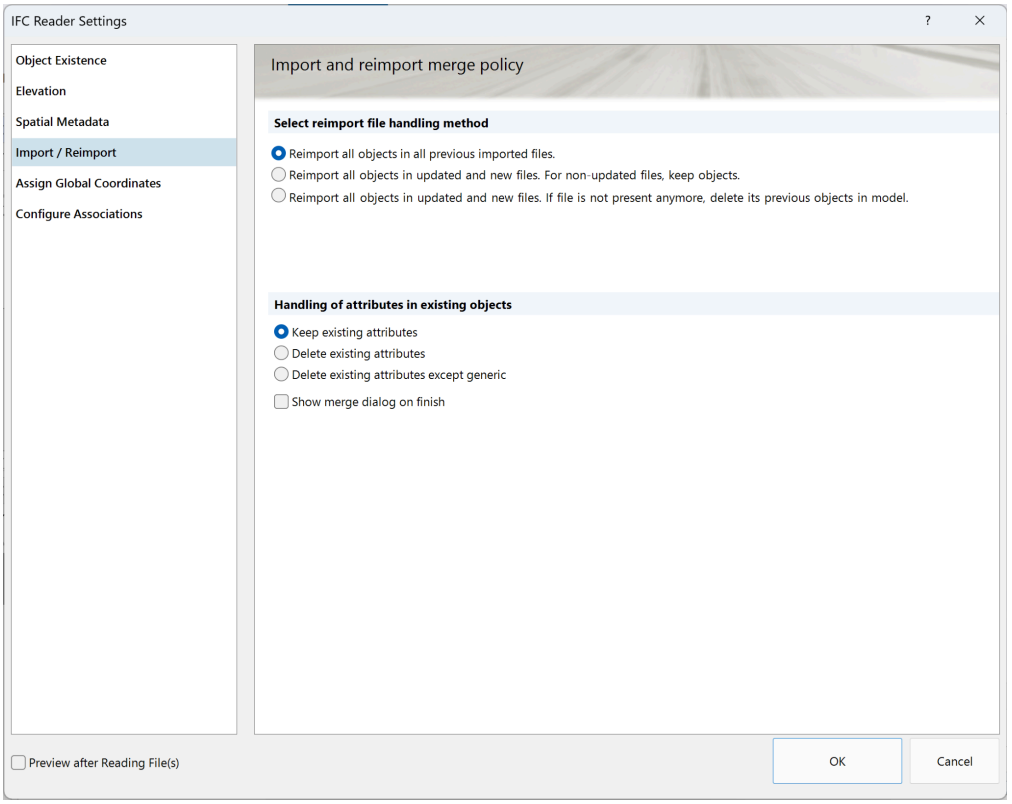
When you have completed the **Coordinate Reference System (CRS) Validation** dialog, then the **IFC Reader Settings** dialog automatically opens. You can also open this dialog by clicking the **Settings** button in the **Options** section:



Page	Purpose
Object Existence	On this page, you specify whether the objects you import represent **Existing** structures or if they represent **Proposed** (designed) structures. You also can set the **Start Date** for when the objects are valid.  These settings are not used much for IFC file import, but could be useful if you want to make presentation rules based on these property values, e.g..

	You find these values again in the **Property** view, e.g.,. 
Elevation	On this page, you can specify different aspects of the imported elevation values. These settings are useful when importing survey and/or mapping data.  In the **Elevations** section, you can specify which elevation values in the imported file represent undefined elevation values. Undefined values are automatically discarded when triangulating the terrain surface or viewing

	a cross-section, e.g.. In the **Sea Depths** section, you can specify if the imported file represents sea depths (positive values). If so, then you must check the **The data set contains depth values only** box. If this box is checked, then you can also specify the height difference between the sea level in the file and the zero elevation for the coordinate reference system used in the model.
Spatial Metadata	This page is relevant when importing survey data. On this page, you can register metadata, like registration methods and tolerances for the collected survey data. This page is only relevant for import of IFC files when the IFC files are used for transferring survey data. 
Import/ Reimport	On this page, you can specify how the objects and attributes should be treated when you re-use the import task to import files again. You can re-use the import task to import files again manually by right-clicking the import task and choosing the **Edit task**. Re-use of import tasks is also used when you run scheduled import batch jobs.

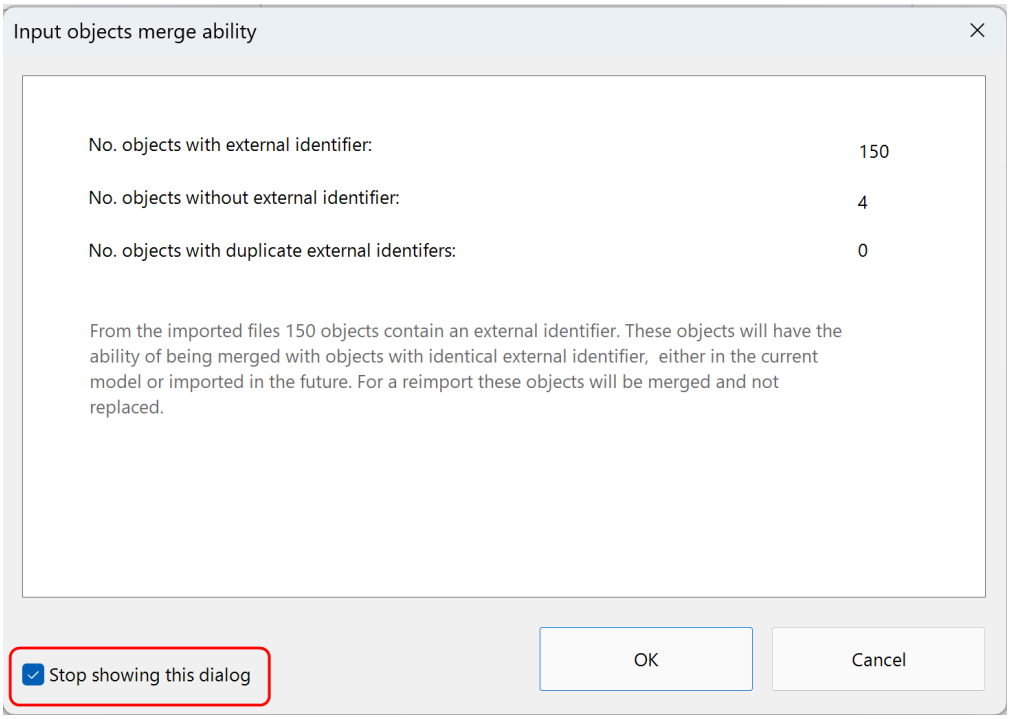


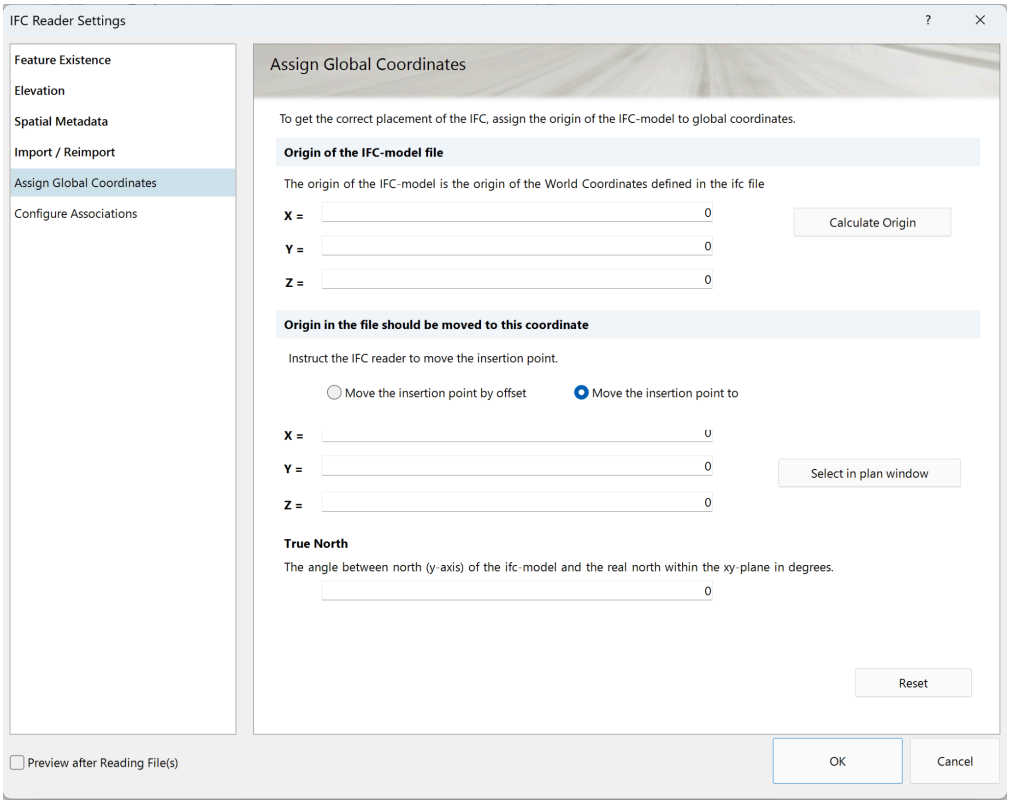
The first section on this page controls how to handle the files. The last section controls how to handle the attributes in the files.

For the **Select reimport file handling method**, you have three options:

- When choosing the first options; **Reimport all objects in all previous imported files**, then all files selected for import in the import task are considered, but only new and changed objects in the files are re-imported and merged, if needed. New files are also considered. This option should be chosen instead of the next option if you are unsure if updated files shift the date-time stamp, e.g..
- When choosing the second option, only updated files and new files are considered. This option does the same with the content of the files as the first option, but only updated and new files are considered. This option can therefore result in better performance than the first option.
- When choosing the third option, the import task behaves as for the second option, but in addition, objects in files that no longer exist at the location specified in the import task are deleted.

In the **Handling of attributes in existing objects** section, you can specify how attribute values are treated for attributes that exist in the model, but no longer exist in the imported files. These options should be

	self-explanatory. When the **Show merge dialog on finish** box is checked, the dialog shown below opens when you click **Finish** in the **Import Files** toolbar. This dialog informs you about how many of the imported objects have external identifiers and thus allow for merging of attributes. All entities in an IFC file typically have external identifiers because the entities have GUIDs. But for other formats, like the Norwegian mapping format SOSI, e.g., this is not the case.  If you check the **Stop showing this dialog** box, then the **Show merge dialog on finish** box is unchecked the next time you run the **Import Files** task. Click **OK** or **Cancel** to close the dialog and finish the **Import Files** task.
Assign Global Coordinates	On this page, you can adjust the coordinates in the imported files so that they match the coordinates system in the model.



In the **Origin of the IFC model file** section, you can specify the coordinates of the origo in the file relative to the origo in the model. The coordinates in the **X =**, **Y=** and **Z=** fields in this section are withdrawn from the object coordinates in the IFC file when imported.

If you click **Calculate Origin**, then you have three options:

- **From CRS**: The coordinates are collected from the ***IfcGeometricRepresentationContext*** statement in the IFC file. The coordinates are in most cases (0,0,0).
  See this page for documentation of ***IfcGeometricRepresentationContext***
  https://ifc43-docs.standards.buildingsmart.org/IFC/RELEASE/IFC4x3/HTML/lexical/IfcGeometricRepresentationContext.htm

- **From Bounding Box**: The coordinates are calculated as the "lower left corner" (min X-, min Y- and min Z-coordinate) of the bounding box of the objects in the imported IFC file.

- **Site.<name of the IfcSite>**: The coordinates are collected from the ***ObjectPlacement*** relation for the ***IfcSite***. If the imported file contains many ***IfcSites***, then all of them are listed.
  See this page to learn more about ***ObjectPlacement*** for ***IfcSite***.
  https://ifc43-docs.standards.buildingsmart.org/IFC/RELEASE/IFC4x3/HTML/lexical/IfcSite.htm

<table>
<tr>
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In the Origin in the file should be moved to this coordinate section, you can move the objects in the file using the given coordinate values before importing the file into the model. The coordinates given in this section are <u>added</u> to the object coordinates in the IFC file when imported.
You have two options for defining the coordinates:

Move the insertion point by offset: This option does not take into account the coordinates given in the Origin of the IFC model file section, but is only <u>adding</u> the coordinates given in this section to the coordinates in the imported IFC file.
Move the insertion point to: This option does take into account the coordinates given in the Origin of the IFC model file section. When choosing this option, the coordinates in the imported IFC file are then first <u>reduced</u> with the coordinate values from the Origin of the IFC model file section and then the coordinates in this section are <u>added</u> to the coordinates in the IFC file before the objects are imported.

Select in plan window:
Before you click this button, a plan drawing of your model must be shown in the geometry pan. When you click the Select in plan window button, the dialog closes and the geometry pane is in “select mode”. Click first on the insertion point you want. The cursor will then get a connected red line. This line indicates the true north. Click once more in the plan view when the red line is in the true north direction. The IFC Reader Settings dialog opens again with the values you selected from the plan view shown in the Origin in the file should be moved to this coordinate section.
True North
As explained in the dialog, here you can specify the angle between north in the IFC file and the real north in degrees. The angle value is given counterclockwise
You can specify the angle either by clicking in plan view, see explanation of the Select in plan window button above, or you can specify the value as an angle value with the insertion point given in the Origin in the file should be moved to this coordinate section.
</td>
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<tr>
<td>Configure Associations</td>
<td>On this page, you can adjust some settings regarding associations.</td>
</tr>
</table>

In this chapter, the different menu choices in the left side menu in the **IFC ReaderSettings** dialog are explained. Each of these menu choices opens different pages in the dialog.

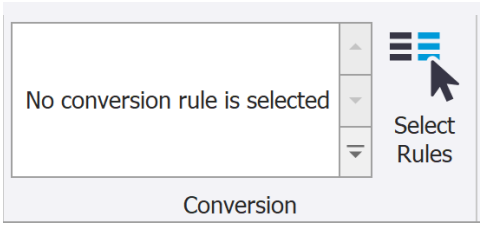
Note: If you check the **Preview after Reading File(s)** at the bottom left of the **IFC Reader Settings** dialog, then a preview of the imported files BEFORE the objects are converted is automatically created. See an explanation of the **Preview** functionality in a chapter further down.

Conversion Rules

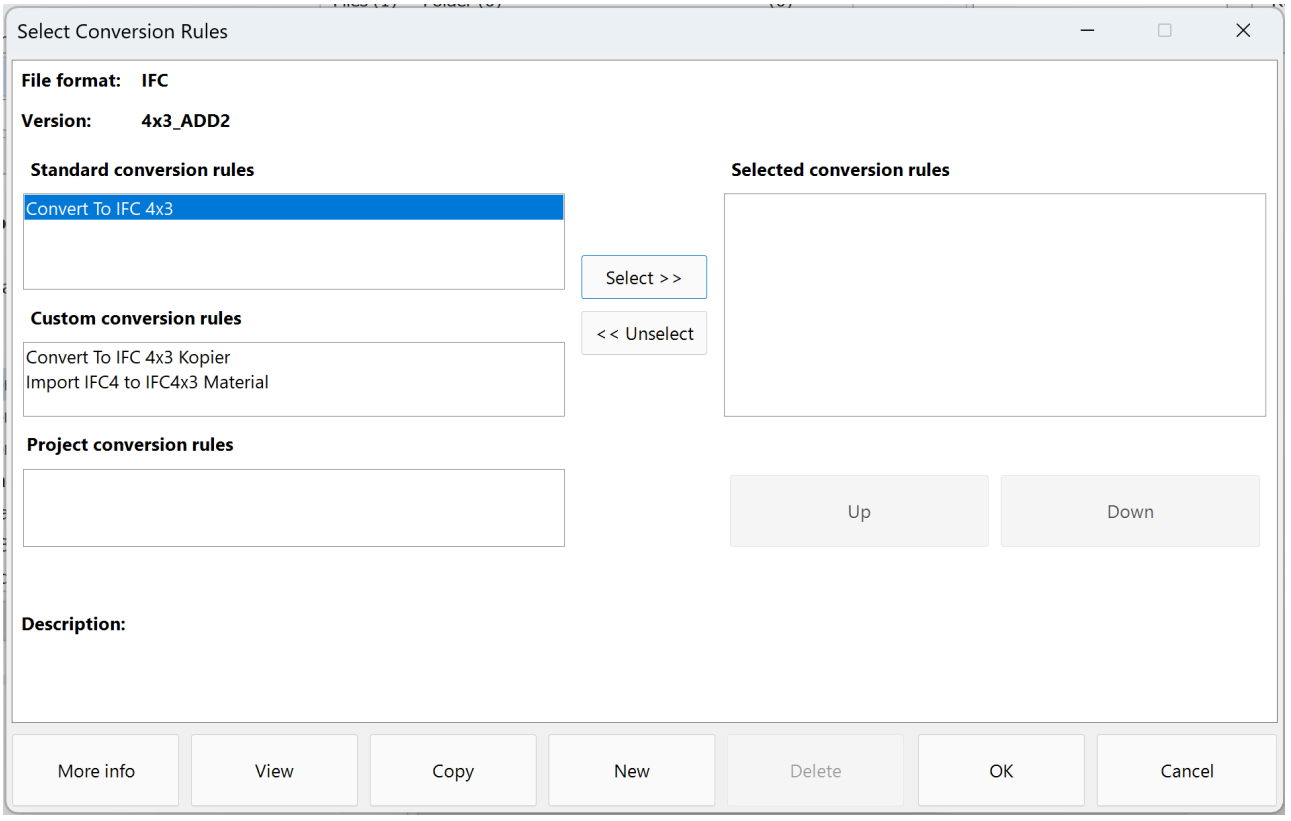
When you have finished the **IFC Reader settings** dialog, then you must select, and if needed edit, the conversion rules for converting the entities in the IFC file to objects in the model. This you can do in the **Conversion** section of the **Import Files** toolbar.

You must do the following:

1. Click the **Select Rules** button or click the "***No conversion rule is selected***" item in the list to open the **Select Conversion Rules** dialog.



2. Review the file format and version for the imported file(s) in the upper left corner of the dialog that opens:



In the **Standard conversion rules** list, you find the conversion rules shipped with the installation. For models based on a ***Quadri object type catalog,*** we ship several conversion rules to be used for different infrastructure domains. The infrastructure domain the rule supports is given by the conversion rule name as shown in the screen shot above.

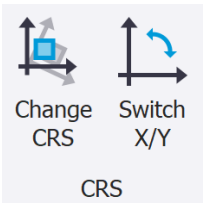
For models based on an Ifc 4.3 object type catalog, we ship with only one conversion file for import of IFC 4.3 ADD2 files. This file is shown in the screen shot above: ***Convert To IFC 4x3***. This conversion rule converts entities in the IFC file to objects in model one-to-one.

3. Select the conversion files you want by selecting them in the **Standard conversion rules** list and then clicking on the **Select >>** button to move them to the **Selected conversion rules** list. You can select more than one rule if you want to import an IFC file supporting several infrastructure domains, e.g..
4. You can also view the conversion rules by selecting the conversion rule and then clicking the **View** button. If you find the conversion rule shipped with the installation unsuitable for your purpose, then you can click the **New** button and create your own **Custom Conversion Rules**.
5. You can make a copy of the shipped conversion rules by selecting the rule and clicking the **Copy** button. When you have made a copy, then you can make your own changes in the conversion rule by selecting the copied rule and then clicking the **Edit** button.
6. If you want more info about the conversion rule, like where the conversion rule file is located, e.g., then select the conversion rule and click the **More info** button.

   Learn all about conversion rules in this chapter: Conversion Rules

CRS

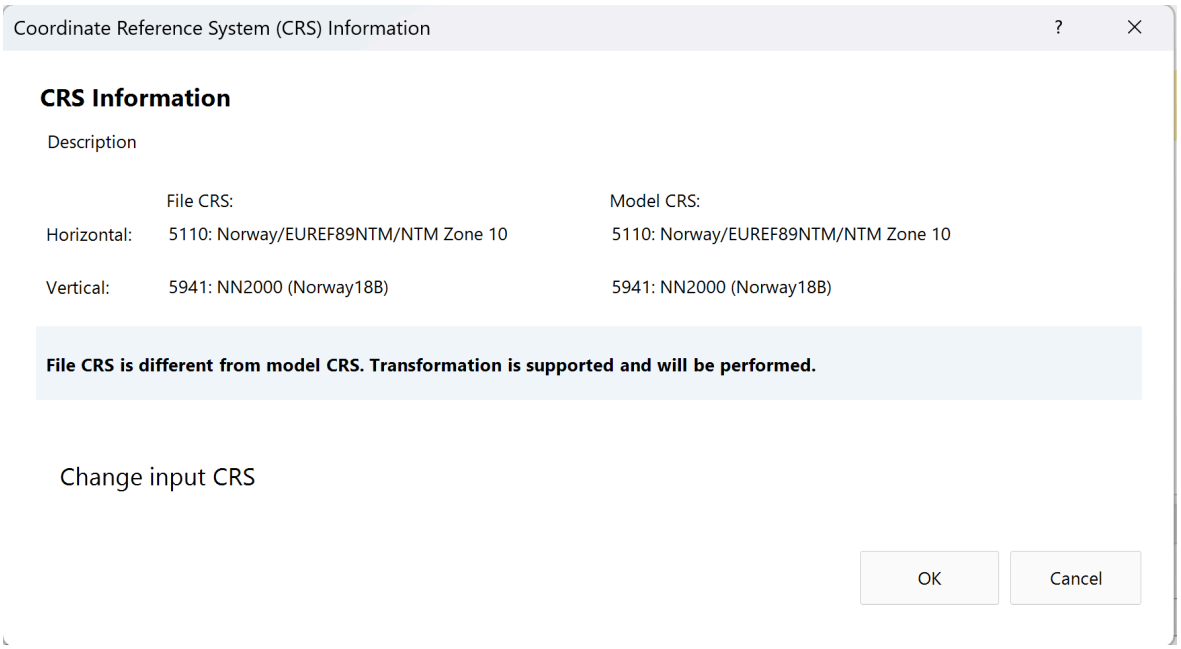
In the **CRS (Coordinate Reference system)** section of the ribbon, you can specify another CRS for the file or switch the X- and Y- coordinates imported from the file:



If you have chosen the wrong CRS for the file when the **Coordinate Reference System (CRS) Validation** dialog opened first the time, e.g., then you need to change the CRS. See the chapter about the “Coordinate Reference System” further up.

You must then do the following:

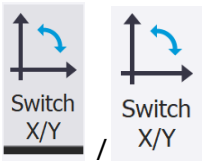
1. Click the **Change CRS** button.
2. The dialog shown below opens:



3. Click the **Change input CRS** button to open the **Select Coordinate Reference System** dialog to select the correct CRS representing the content of the imported files. See the chapter about the "Coordinate Reference System" further up for a detailed explanation of this dialog.

You can switch the X- and Y-coordinates in the file when imported into the model. This can be useful for situations when the file is in GIS coordinates (North, East) = (Y, X), but is usually not relevant for import of IFC files.

1. Click the **Switch X/Y** button to do the switching. If you preview the imported file from before, then you see the switch instantly. This is an on/off toggle button:



Selection

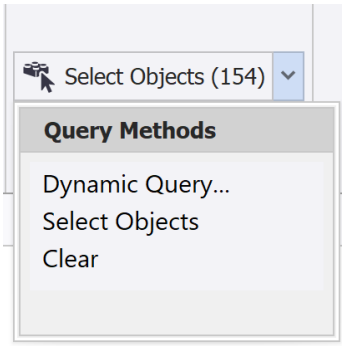
In the **Selection** section of the ribbon, select which of the converted previewed objects you want to import into the model.

> **Note:** This section only becomes active after you have done a **Preview** with a selected conversion rule. See the chapter about **Preview** below.

By default, all the converted objects are exported.

To reduce the number of objects to be exported, you can do the following:

1. Click the drop-down arrow to get up the choices: **Dynamic Query**, **Select Objects**, and **Clear** or click the **Select Objects (n)** directly to open the **Dynamic Query** dialog.



2. The **Dynamic Query** dialog opens with **Select All** checked on the front page:

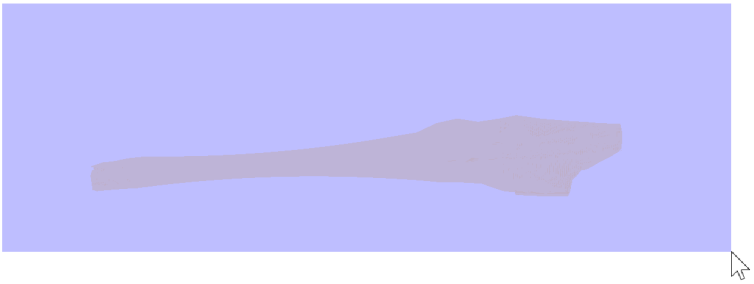
   If you want to use the functionality on the **Tasks**, **Objects** and **Location** tabs, then you must uncheck the **Select All** box.

3. Use the functionality on the **Tasks**, **Objects**, and **Location** tabs to select the objects you want to import. To toggle between the front page of the **Dynamic Query** dialog and one of the tabs, then just click on the tab title box for the active tab.

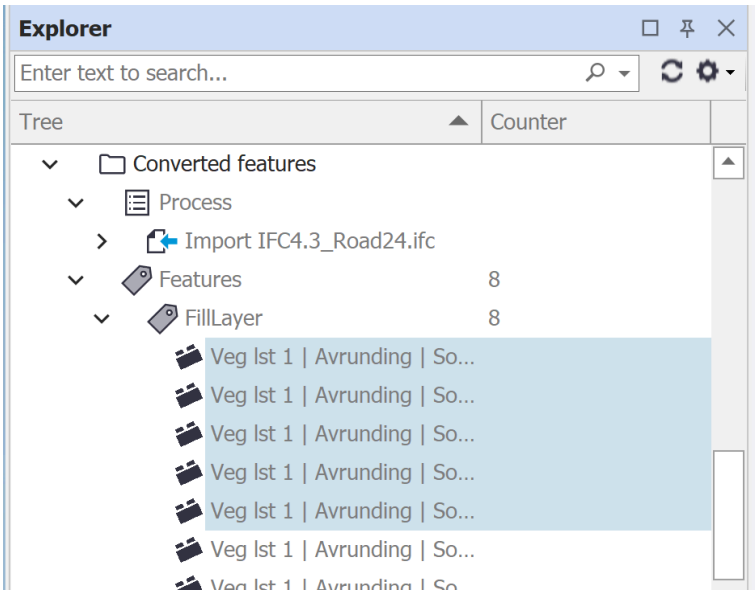
4. When you have made a selection, click the **Preview** button again to see the result.

If you choose **Select Objects** in the drop-down list, you can do the following:

1. Select the object in the graphical pan by dragging a 'window' across the previewed object while holding the left mouse down. The number of selected objects are shown on the **Selected Objects** button.



2. Alternatively, you can select the objects in the **Converted objects** preview model in the **Explorer**. Click the objects you want to import while holding the **CTRL** key down or click the first and last object while holding the **SHIFT** key down.

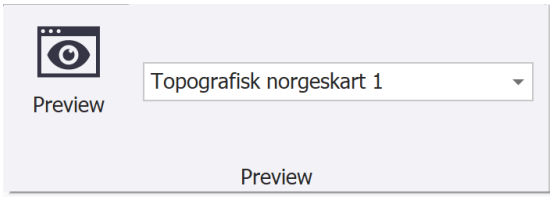


3. When you have made the selection, click the **Preview** button again to see the result.

If you choose **Clear** in the drop-down list, all the selected objects are cleared and you must start over again with the **Dynamic Query** dialog and check on **Select All** on the front page.

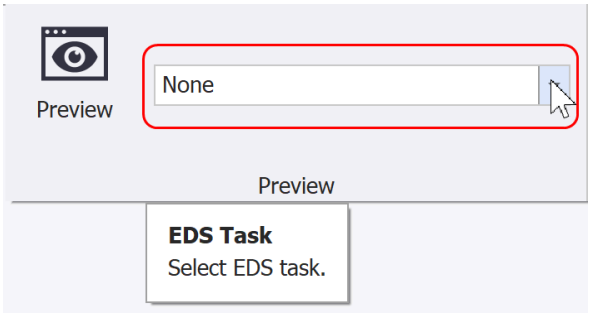
Preview

In the **Preview** section of the ribbon, you can create a plan view of the model you are about to import.



You can do the following:

1. Select an **External Data Source (EDS)** from the drop-down list or choose ***None*** to not show an **External Data Source** as a part of the preview.

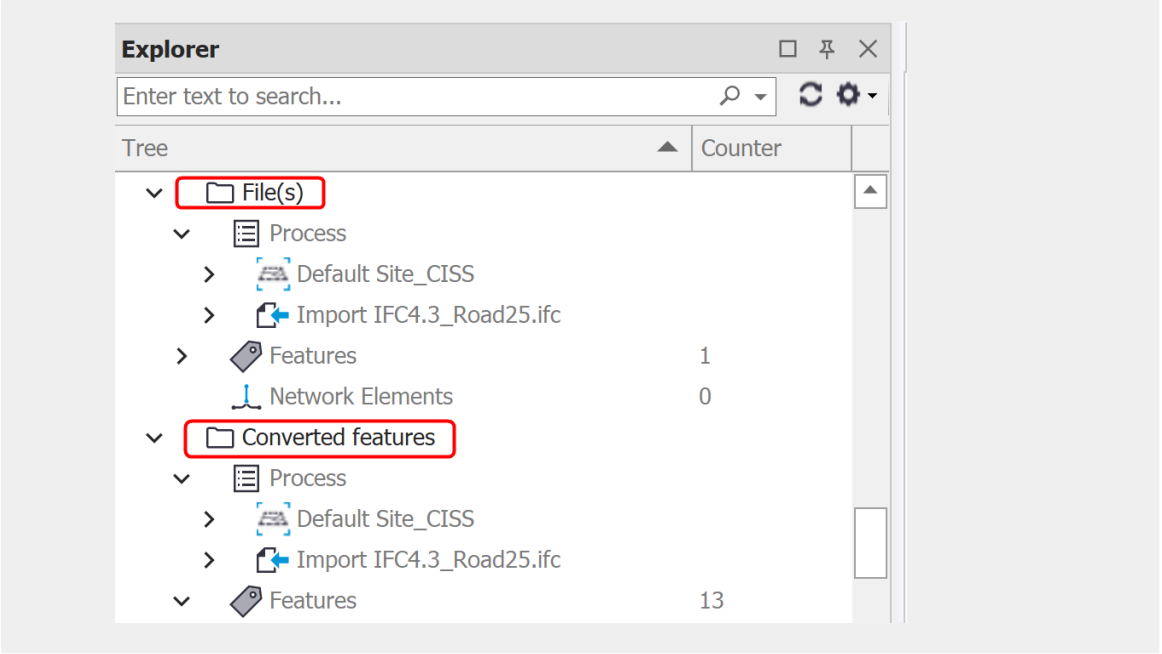


   The **External Data Sources** in this list are tasks you have already created from two of the tools in the **Reference Data** section on the **Insert** tab: **WMS** and **Ortophoto**

2. Click the **Preview** button to generate the preview shown in the graphic pane.

3. When you click the **Preview** button, you will see the preview model in the **Explorer** view too as a "passive model" with light grey nodes. You can inspect the preview model in the **Explorer** and click the preview object to get the properties listed in the **Property** view.

   Note: If you click the **Preview** button without selecting any conversion rule, the selected objects in the files are previewed, but if you click the **Preview** button after you have selected one or more conversion rules, the converted objects are previewed. Below is how it looks in the **Explorer** if you have done a **Preview** after selecting a conversion rule. Then you can see both the objects in the IFC file and the converted objects in the **Explorer**.



Finish

In the **Finish** section of the ribbon you can:

- **Finish** the import job by clicking the **Finish** button. Pay attention to messages in the **Process Info** view.
- **Cancel** the import job by clicking the **Cancel** button.