



the smart software
for cartography

Drawing orienteering maps with OCAD

About this Document

The focus of this document is how to draw an orienteering map with OCAD. It doesn't matter if you start a new mapping project or update an existing map.

For more information and tutorials on OCAD and drawing orienteering maps, please refer to our highly recommended wiki:

<https://ocad.com/wiki/ocad/en/index.php?title=Tutorials#Orienteering>

Suggestions and complements are always welcomed: info@ocad.com.

Baar, March 2024

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Table of Contents

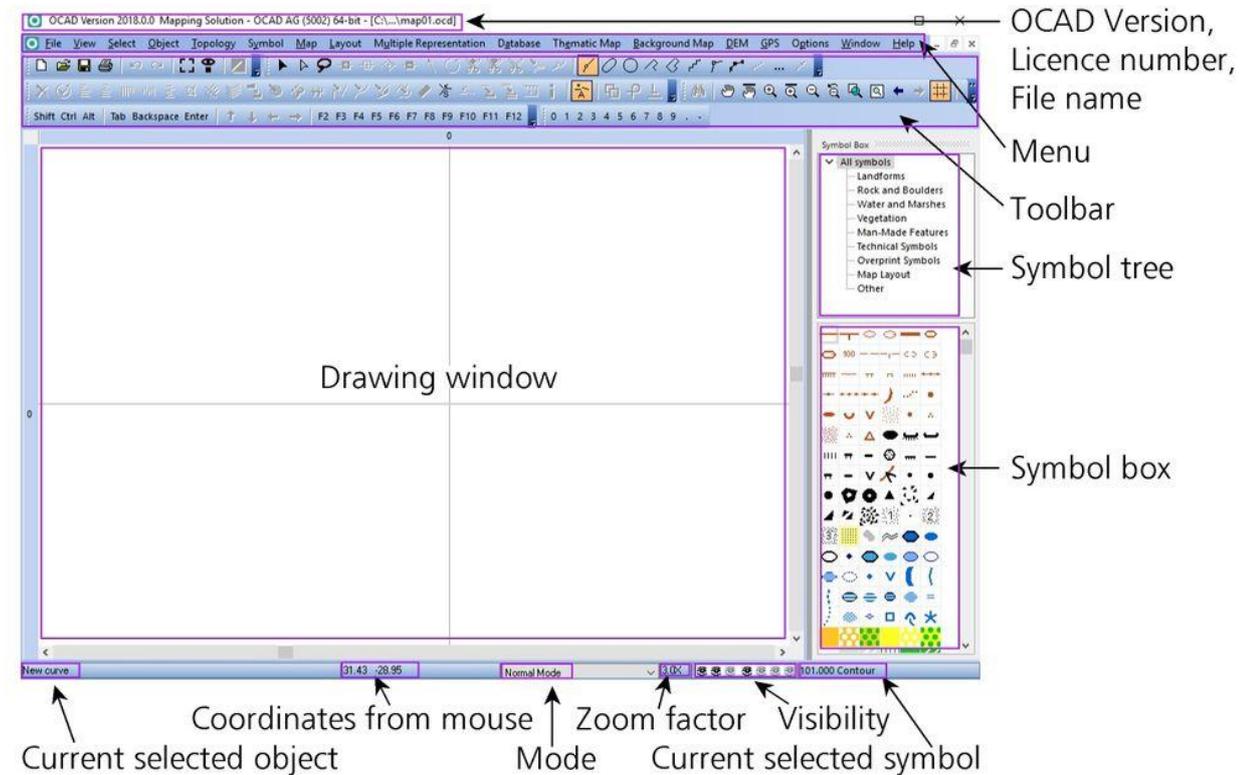
1	About OCAD.....	5
1.1	<i>Graphical User Interface.....</i>	5
1.2	<i>OCAD Help.....</i>	5
1.3	<i>OCAD Update.....</i>	5
1.4	<i>Editions and licensing models.....</i>	6
2	New map or update existing map.....	7
2.1	<i>Decision-making aids.....</i>	7
2.2	<i>Procedure for revision of the orienteering map.....</i>	8
3	Create new map.....	10
4	Create base map.....	12
4.1	<i>Open raster data.....</i>	12
4.2	<i>LiDAR data processing.....</i>	13
4.3	<i>Import vector data.....</i>	18
4.4	<i>Add more data sources.....</i>	20
4.5	<i>Display of the base map in OCAD.....</i>	21
5	Transfer of the base map into the OCAD Sketch App.....	25
6	Mapping in the field.....	26
6.1	<i>Installation OCAD Sketch App.....</i>	26
6.2	<i>Import project into the OCAD Sketch App.....</i>	26
6.3	<i>Terrain mapping with the OCAD Sketch App.....</i>	27
6.4	<i>Tips for the terrain survey.....</i>	30
7	Importing the Sketches into OCAD Desktop.....	32
7.1	<i>Import project into OCAD Desktop.....</i>	32
7.2	<i>Upload the sketches again.....</i>	33
7.3	<i>Cooperation of several map maker.....</i>	33
8	Draw map objects.....	35
8.1	<i>Drawing in general.....</i>	35
8.2	<i>Draw point objects.....</i>	36
8.3	<i>Drawing line and area objects.....</i>	36
8.4	<i>Draw map legibly.....</i>	40
9	Edit map objects.....	43
9.1	<i>Editing in general.....</i>	43
9.2	<i>Delete, Move, Change History, Change Icon.....</i>	43
9.3	<i>Edit line objects.....</i>	45
9.4	<i>Edit area objects.....</i>	46
10	Manage Sketch objects.....	48
11	Colours and symbols.....	50
12	Layout.....	51
12.1	<i>Create layout.....</i>	51
12.2	<i>Add logos.....</i>	51
12.3	<i>Add further layout objects.....</i>	51

13	PDF export and printing	53
14	Options	54

1 About OCAD

1.1 Graphical User Interface

Structure of the OCAD window.



The toolbars can be advanced on the left edge and adjusted on the right edge. In addition, toolbars can be shown and hidden under Menu **Options > OCAD Preferences**.



1.2 OCAD Help

In the **Help** menu you will find various links to further help in dealing with OCAD, such as tutorials.

In the **Licence Transfer Utility**, you can transfer your licence to other people or another device.

The **Licence Manager** shows an overview of the OCAD licences, and their activations assigned to your organisation (company, club, association).

In **About OCAD** you will find your licence information including expiry date and your current version of OCAD.

1.3 OCAD Update

OCAD regularly provides free service updates with the subscription model. In these updates, errors are corrected, and new functions are added. It is therefore highly recommended to always install the latest service update.

To do this, click on the **Download Update** function in the **Help** menu.

 To ensure that the service update is installed correctly, all OCAD files must be closed before installation.



1.4 Editions and licensing models

Editions

OCAD is available in different editions:

- **OCAD Course Setting**: Course setting for orienteering. No possibility to edit maps.
- **OCAD Starter**: For creating simple maps, e.g., school building maps. Course setting module included.
- **OCAD Orienteering**: For map production in orienteering. Course setting module included.
- **OCAD Mapping Solution**: For the creation of city plans, topographic and thematic maps.
- **OCAD Sketch App**: Free sketching app for Android and iOS mobile devices for digital field recording.
- **OCAD Viewer**: Free viewer to open, view and print OCAD maps.

OCAD Starter or OCAD Orienteering is recommended for recording an orienteering map.

In contrast to OCAD Orienteering, OCAD Starter contains certain restrictions (e.g., no LiDAR + DHM analysis, only 5 background maps) and is limited to 10'000 objects.

The OCAD Orienteering version contains everything needed for map production in orienteering.



OCAD Orienteering Edition is required to follow the content of this document.

Licensing models

An OCAD licence can be purchased as a Single User or Team Licence:

- Users of **Single User licences** can activate OCAD on several of their own personal devices (e.g., desktop, notebook, tablet).
- **Team licence** users can only activate the licence on one device at a time, but can independently, quickly, and easily transfer the licence to another person.

Further information on the various OCAD editions and licence models is available at:

<https://www.ocad.com/en/#editions>

2 New map or update existing map

2.1 Decision-making aids

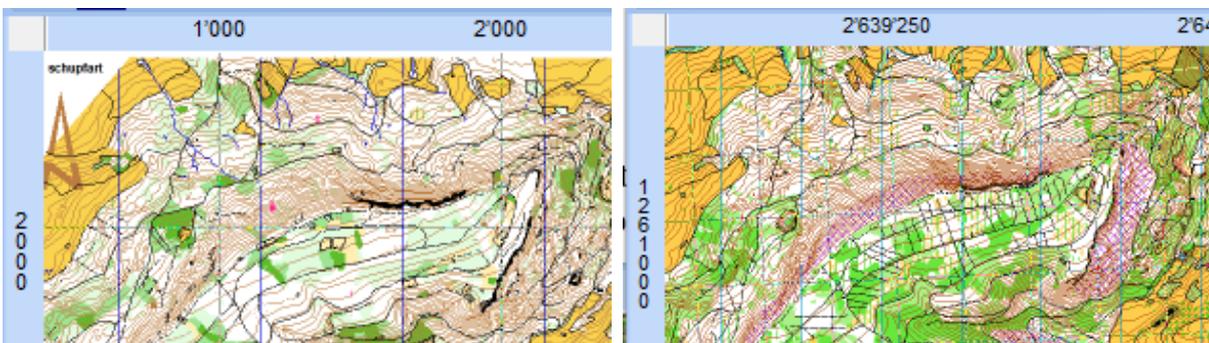
If you create an orienteering map of an area where there is no existing orienteering map, you will of course have to start a new map.

Nowadays old orienteering maps already exist of most areas and the question arises whether the old map should be updated or a completely new one should be created. This depends on various factors, such as the type of revision (complete or only partial), the quality of the old map, the available background data, the requirements for the new map or the budget.

Please consider the following points for decision-marking:

1. Existing map should be georeferenced.

With georeferencing, the map is assigned to a coordinate system and thus the map objects are provided with national coordinates (image on the right). A non-georeferenced map (image on the left) has no national coordinates.



A georeferenced map is an absolute must, as this is a prerequisite for many OCAD functions.

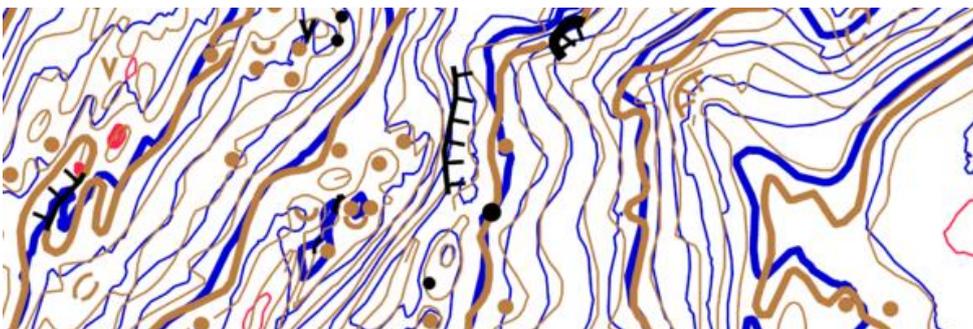
- Import and automatic fitting of georeferenced data
- Using the OCAD Sketch App
- Using WMS/WMTS, online map services or geoviewers
- Export to web services such as Livelox or SPORTIdent

 If your existing map is not yet georeferenced, you should start with a new map. You can also georeference the existing map, but experience shows that a new map is more efficient.

2. Contour lines should be based on LiDAR data

Contour lines from older maps can be based on aerial photo evaluations, survey plans or own measurements (brown colour, image below). In terms of positional correctness and accuracy, these cannot compete with contour lines based on LiDAR data (blue colour, image below).

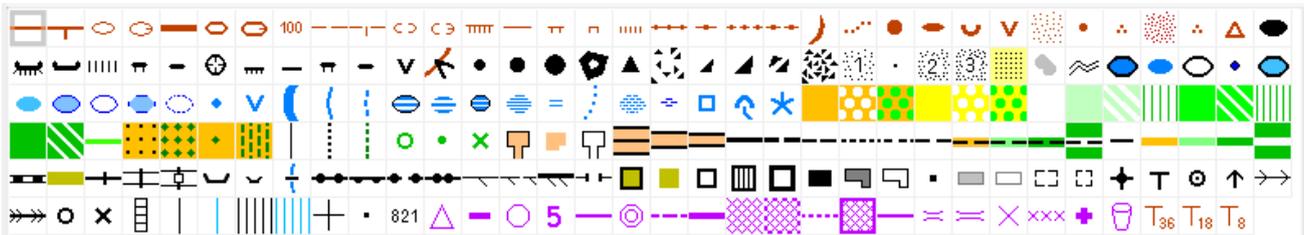
 More about LiDAR: <https://www.ocad.com/wiki/ocad/en/index.php?title=DEM>



 If the contour lines of the existing map are not based on LiDAR data, but such data is now available, you should start with a new map.

3. Symbols should correspond to the specifications

The International Orienteering Federation (IOF) defines specifications for orienteering maps (e.g., ISOM 2017, ISSprOM 2019, ...). These specifications state what symbols may be used for map production and how they are defined (size, shape, colour, ...). The specifications are adapted from time to time.



An up-to-date symbol set that meets the latest specifications is a prerequisite for many OCAD functions.

- Check IOF minimum dimensions and readability of the map
- Route analysis of sprint courses (Route Analyzer)

👉 If the symbol set of your existing map is out of date, you should update it (see next section). However, you do not have to start a new map immediately.

2.2 Procedure for revision of the orienteering map

In this tutorial we focus on the creation of a new map. If you want to create a new map, please continue in the next section.

If you are revising an existing map, you should first perform the following steps. Then you can follow this tutorial, as many workflows and functions are valid for the revision of an existing map as well. When revising a map, it is also important to prepare the current base data, export it to the OCAD Sketch App and then redraw it in OCAD.

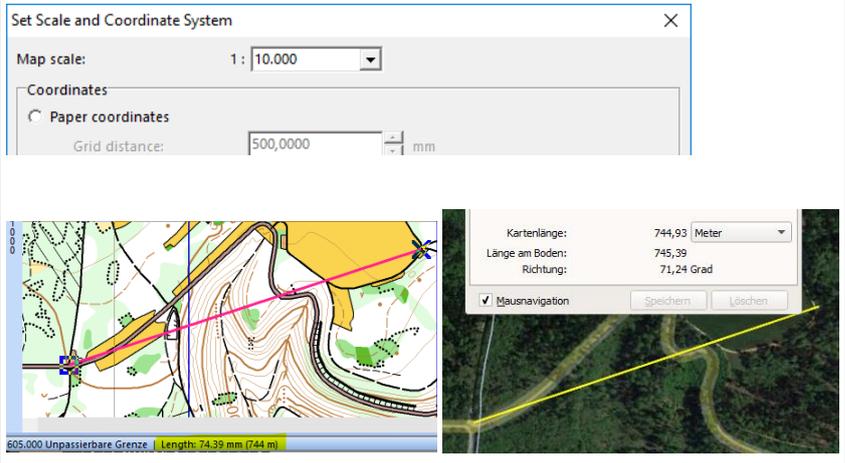
Check the following points before revising an existing orienteering map:

Check scale

Menu **Map > Scale and Coordinate System**

Check whether the **scale** is set correctly. To do this, measure a distance in OCAD and in Google Earth, for example, and compare their lengths.

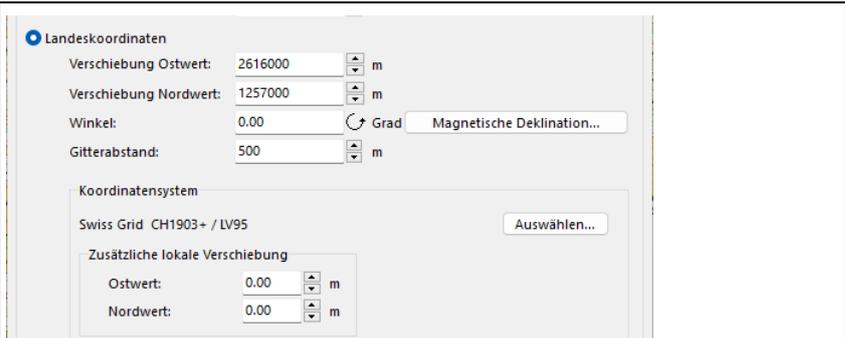
You can change the scale under Menu **Map > Change Scale**.

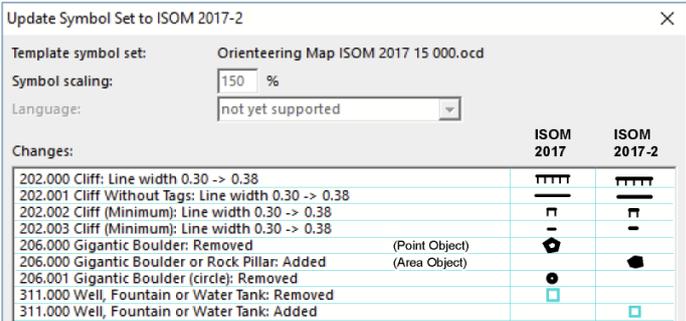
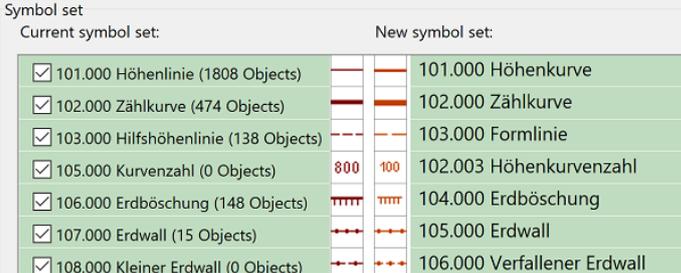


Check coordinate system

You have the option to change the coordinate system under **Map > Transform > Change Coordinate System**.

Check that your map is correctly georeferenced. To do this, go to Menu **Background Map > Online Map Services** and load an aerial image from Google Maps. If the aerial image matches the map,



<p>the map is correctly georeferenced.</p> <p>https://www.ocad.com/wiki/ocad/en/index.php?title=Online_Map_Services</p> <p>If the map is not georeferenced, we recommend re-creating the map from the beginning.</p>																															
<p>Check declination</p> <p>Go to the Map > Transform > Rotate Map to Magnetic North menu and adjust the declination if the deviation is large (>1°).</p> <p>https://www.ocad.com/wiki/ocad/en/index.php?title=Map_Transform#Rotate_Map_to_Magnetic_North</p>																															
<p>Update symbol set</p> <p>Select Update Symbol Set from the Map menu to update your symbol set, for example, from ISOM 2017 to ISOM 2017-2 or from ISSprOM 2019 to ISSprOM2019-2.</p> <p>The page https://www.ocad.com/wiki/ocad/en/index.php?title=Symbol_Set_Overview helps you to find out what kind of symbol set you are using.</p>	 <table border="1"> <thead> <tr> <th>Changes:</th> <th>ISOM 2017</th> <th>ISOM 2017-2</th> </tr> </thead> <tbody> <tr> <td>202.000 Cliff: Line width 0.30 -> 0.38</td> <td></td> <td></td> </tr> <tr> <td>202.001 Cliff Without Tags: Line width 0.30 -> 0.38</td> <td></td> <td></td> </tr> <tr> <td>202.002 Cliff (Minimum): Line width 0.30 -> 0.38</td> <td></td> <td></td> </tr> <tr> <td>202.003 Cliff (Minimum): Line width 0.30 -> 0.38</td> <td></td> <td></td> </tr> <tr> <td>206.000 Gigantic Boulder: Removed (Point Object)</td> <td></td> <td></td> </tr> <tr> <td>206.000 Gigantic Boulder or Rock Pillar: Added (Area Object)</td> <td></td> <td></td> </tr> <tr> <td>206.001 Gigantic Boulder (circle): Removed</td> <td></td> <td></td> </tr> <tr> <td>311.000 Well, Fountain or Water Tank: Removed</td> <td></td> <td></td> </tr> <tr> <td>311.000 Well, Fountain or Water Tank: Added</td> <td></td> <td></td> </tr> </tbody> </table>	Changes:	ISOM 2017	ISOM 2017-2	202.000 Cliff: Line width 0.30 -> 0.38			202.001 Cliff Without Tags: Line width 0.30 -> 0.38			202.002 Cliff (Minimum): Line width 0.30 -> 0.38			202.003 Cliff (Minimum): Line width 0.30 -> 0.38			206.000 Gigantic Boulder: Removed (Point Object)			206.000 Gigantic Boulder or Rock Pillar: Added (Area Object)			206.001 Gigantic Boulder (circle): Removed			311.000 Well, Fountain or Water Tank: Removed			311.000 Well, Fountain or Water Tank: Added		
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<p>Convert symbol set</p> <p>Select Convert Symbol Set in the Map menu to replace your symbol set with a new one. It is possible to transfer selected symbols from the old map to the new symbol set.</p> <p>https://www.ocad.com/wiki/ocad/en/index.php?title=Symbol_Set_Conversion</p>	 <table border="1"> <thead> <tr> <th>Symbol set</th> <th>Current symbol set:</th> <th>New symbol set:</th> </tr> </thead> <tbody> <tr> <td><input checked="" type="checkbox"/></td> <td>101.000 Höhenlinie (1808 Objects)</td> <td>101.000 Höhenkurve</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>102.000 Zählkurve (474 Objects)</td> <td>102.000 Zählkurve</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>103.000 Hilfhöhenlinie (138 Objects)</td> <td>103.000 Formlinie</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>105.000 Kurvenzahl (0 Objects)</td> <td>102.003 Höhenkurvenzahl</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>106.000 Erdböschung (148 Objects)</td> <td>104.000 Erdböschung</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>107.000 Erdwall (15 Objects)</td> <td>105.000 Erdwall</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>108.000 Kleiner Erdwall (0 Objects)</td> <td>106.000 Verfallener Erdwall</td> </tr> </tbody> </table>	Symbol set	Current symbol set:	New symbol set:	<input checked="" type="checkbox"/>	101.000 Höhenlinie (1808 Objects)	101.000 Höhenkurve	<input checked="" type="checkbox"/>	102.000 Zählkurve (474 Objects)	102.000 Zählkurve	<input checked="" type="checkbox"/>	103.000 Hilfhöhenlinie (138 Objects)	103.000 Formlinie	<input checked="" type="checkbox"/>	105.000 Kurvenzahl (0 Objects)	102.003 Höhenkurvenzahl	<input checked="" type="checkbox"/>	106.000 Erdböschung (148 Objects)	104.000 Erdböschung	<input checked="" type="checkbox"/>	107.000 Erdwall (15 Objects)	105.000 Erdwall	<input checked="" type="checkbox"/>	108.000 Kleiner Erdwall (0 Objects)	106.000 Verfallener Erdwall						
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[Further information on updating orienteering maps and examples at: https://www.ocad.com/wiki/ocad/en/index.php?title=Updating_Orienteering_Maps_in_OCAD#Examples](https://www.ocad.com/wiki/ocad/en/index.php?title=Updating_Orienteering_Maps_in_OCAD#Examples)

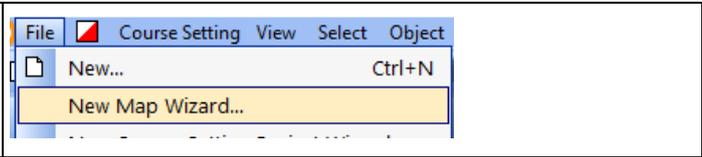
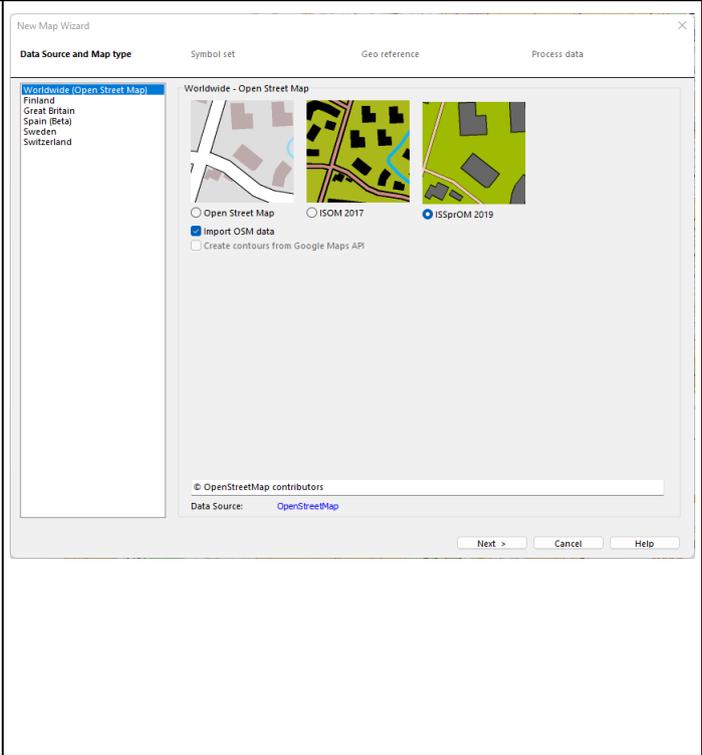
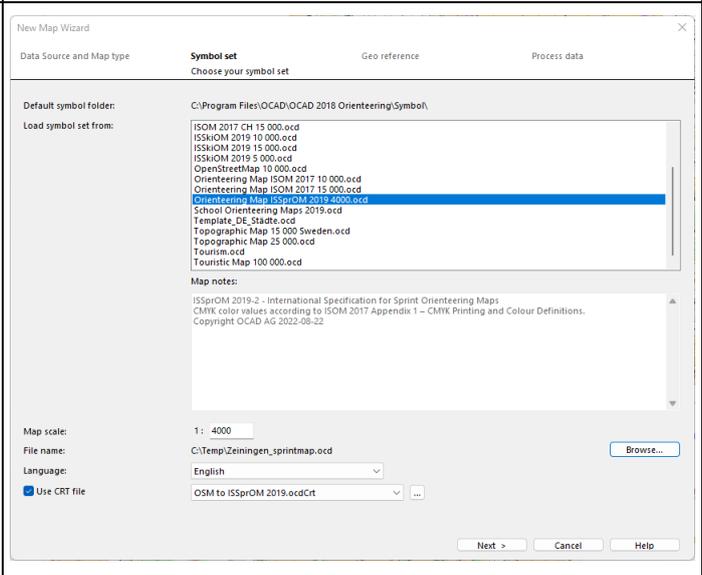
3 Create new map

Start **OCAD Orienteering**.

We recommend using the **New Map Wizard** to create a new map. You can georeference the map and optionally import geodata directly.

 It is also possible to start with a new map under menu **File > New**.

https://www.ocad.com/wiki/ocad/en/index.php?title=Create_a_New_Map

<p>Menu File > New Map Wizard</p>	
<p>In the first step of the wizard, you can import available geodata directly into OCAD.</p> <p>If other available geodata are displayed in your country (on the left in the dialogue), it is worth importing them.</p> <p>In our example, we create a sprint map and import Open Street Map (OSM) data. These are available worldwide. However, the quality of the data may vary from place to place.</p> <p>Select Worldwide (Open Street Map) as the data source.</p> <p>Select Import OSM data.</p> <p> You can also use the wizard without importing geodata and only georeferencing the map correctly. In this case, deactivate <i>Import OSM data</i>.</p>	
<p>Select the symbol set e.g. Orienteering Map ISSPrOM 2019 400.ocd to create a sprint map.</p> <p>Enter a map scale, e.g. 1: 4000 for the sprint map.</p> <p>Assign a file name.</p> <p>If you import geodata (like it's possible in the dialog before), you need to select a CRT file that assigns the imported objects directly to the correct OCAD symbols.</p> <p>In our example, we chose the file <i>OSM to ISSPrOM 2019.ocdCrt</i> to assign the objects from OSM to sprint sprint symbols.</p>	
<p>Move and zoom on the map to the desired map</p>	

section.

The data listed above is downloaded for the map section you see in the window. If you move the map in the window, the import area in the lower right area is adjusted. Keep the map section as small as possible so that an unnecessarily large amount of data is not downloaded.

In the lower right area of the dialogue, you can adjust the import area yourself by entering coordinates. This can be useful if, for example, the map extends north-south and you do not want to download an unnecessary amount of data on the east and west edges.

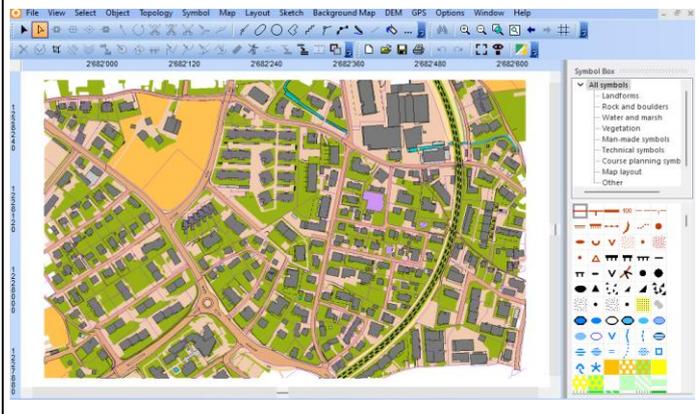
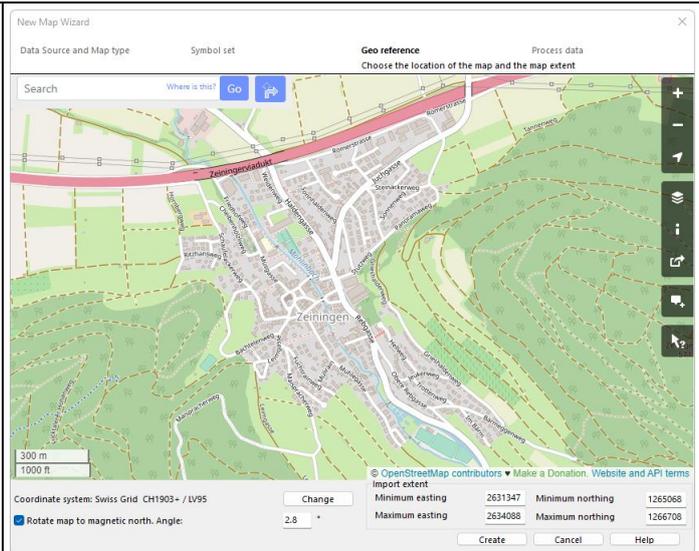
Select the coordinate system.

 Consult an experienced mapper if you are not sure which coordinate system to choose.

Select **Rotate map to magnetic north**. Leave the suggested angle.

Create the map.

Depending on the size of the map, this may take some time.



4 Create base map

You may have already imported geodata into OCAD using the **New Map Wizard**.

If not, or if you want to import more geodata, see the following section for instructions.

Basically, before you start mapping in the field, you should try to create the best possible base map. The more you invest in your base map, the faster and more accurate your field mapping will be. In OCAD you can import geodata, load old orientation maps and derive and combine a background map with LiDAR data.

4.1 Open raster data

Typically, orthophotos and occasionally survey or overview plans are supplied as raster files. Raster files consist of image points (pixels). OCAD supports the raster formats: JPG, TIFF, and PNG.

Orthophotos or survey or overview plans are usually georeferenced. Raster files are georeferenced if the image points are referenced with national coordinates. As a rule, this referencing is stored in a so-called world file, which must be in the same folder. The world file has the same name as the raster file, but a different file extension: JPG -> JGW, TIFF -> TFW, PNG -> PGW.

4.1.1 Open georeferenced raster base data as background map

Menu **Background Map > Open**

For example, select an orthophoto.

If the map and background map has the same coordinate system, the background map is automatically placed correctly when opened in OCAD.

 The orthophotos show additional information that is missing from the survey data, e.g., playground equipment, roadsides, or small walls.

Aerial photographs are also flown more regularly than, for example, LiDAR data and are therefore often more up to date.



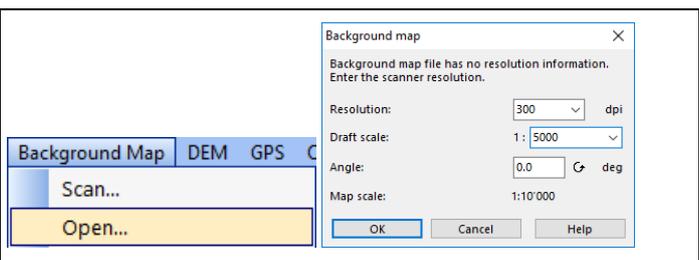
4.1.2 Open non-georeferenced raster base data as background map

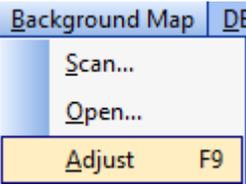
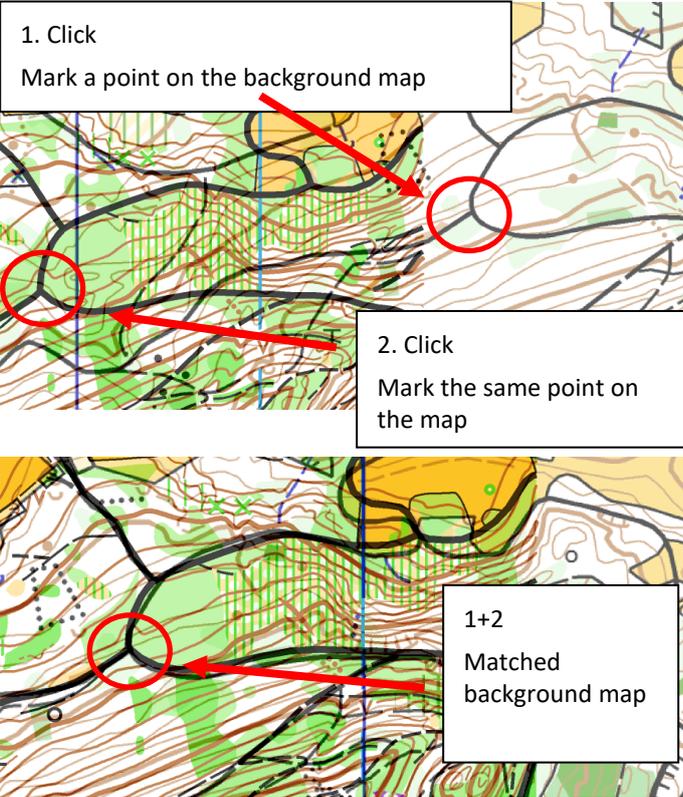
E.g., open and adjust old orienteering map as background map.

Menu **Background Map > Open**

Leave the default values in the Background Map dialogue.

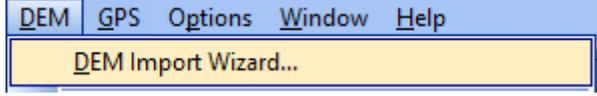
OK



<p>Menu Background Map > Adjust or F9</p>	
<p>Adjust background map</p> <p>Now the coordinates of the background map must be made to match the coordinates of the map:</p> <p>1. Marking a point on the background map</p> <p>2. Mark the same point on the map</p> <p>1 =  2 = </p> <p>Step 1 and 2 can be repeated with more points. Ideally 4 corner points are used.</p> <p>-> Enter key</p> <p>Pressing the Enter key executes the matching.</p> <p>The adjustment can be repeated until the results are satisfactory.</p>	 <p>1. Click Mark a point on the background map</p> <p>2. Click Mark the same point on the map</p> <p>1+2 Matched background map</p>

4.2 LiDAR data processing

LiDAR data often serve as the basis for orientation maps and are strongly recommended when available. LiDAR data is available as a point cloud in Las/Laz file format. Laz is the compressed form of Las. With LiDAR data you can easily get a lot of information about the terrain and vegetation, which makes the mapping much faster and more accurate. Las files are very large, and the calculation requires a lot of memory (RAM).

<p>Start the DEM Import Wizard (DEM = Digital Elevation Model) under Menu DEM > DEM Import Wizard</p>	
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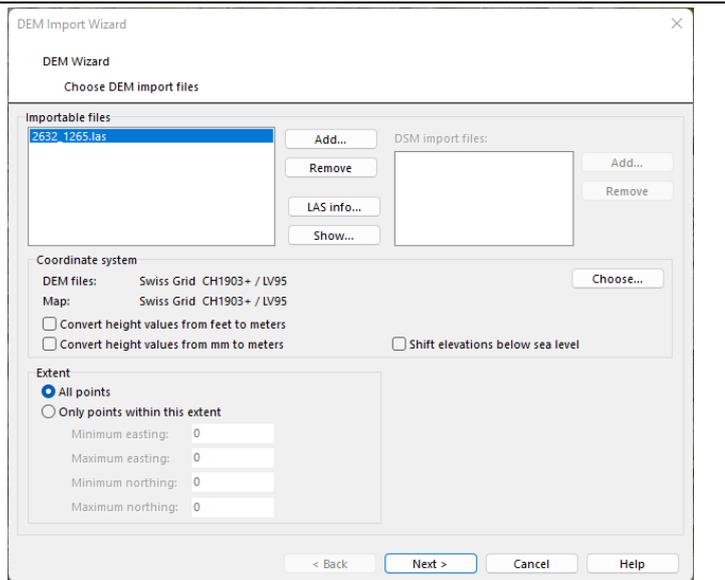
Choose DEM import files

Click on the *Add* button and select the desired files.

In addition to las files, you can also import xyz, asc, hgt or gml files. However, the full functionality of the DEM Wizard can only be used with las files.

->Next

This step may take some time depending on the size of your data



Settings

Select the grid width (1m recommended)

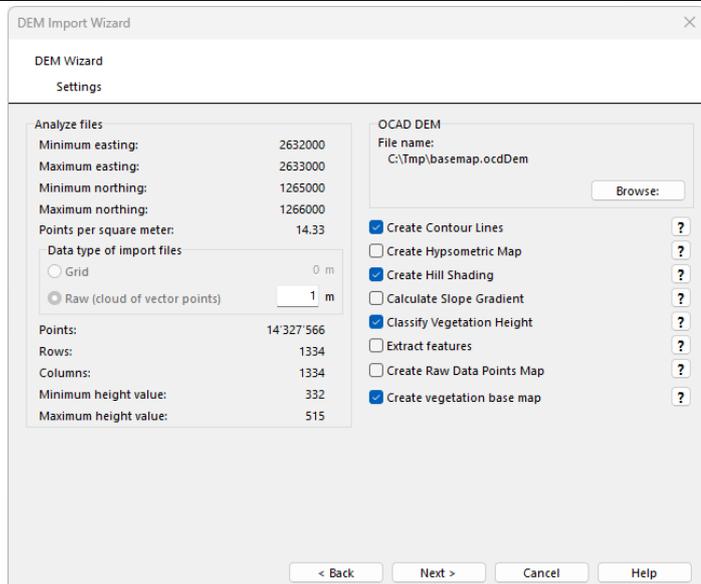
Change the file name and location if necessary.

Select the desired products (selection may vary depending on the import format)

The following are recommended for drawing an orienteering map:

- Create Contour Lines
- Create Hill Shading
- Classify Vegetation Height
- Create vegetation base map

-> Next



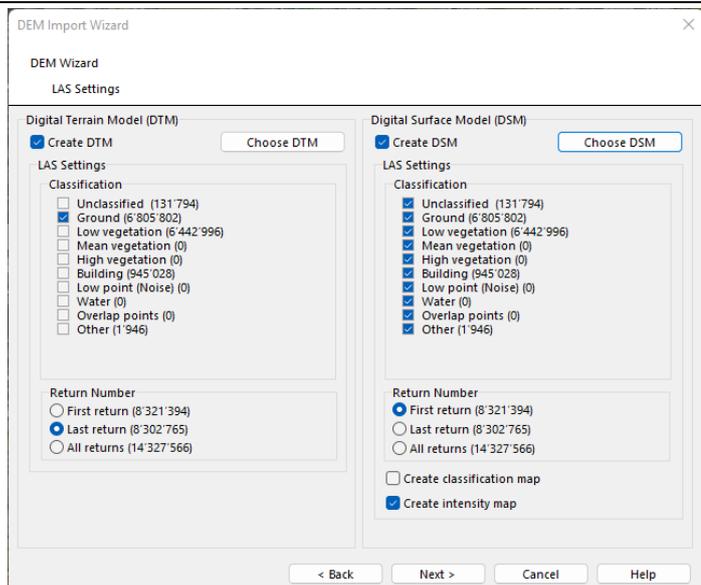
LAS Settings

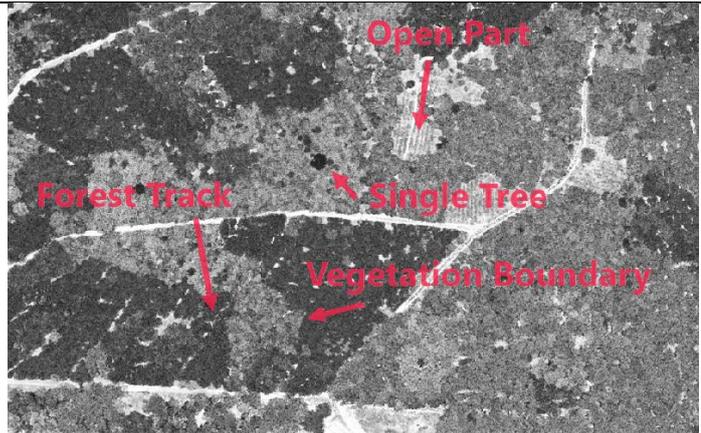
Click on *Create DTM* and *Create DSM*.

Activate **Create intensity map**

-> Next

 The intensity map clearly shows the vegetation boundaries between deciduous and coniferous forest.





Create Contour Lines

Activate both check boxes *Generate not smoothed contours* and *Generate smoothed contours using TPI*.

Select as elevation distance e.g., 1m/2m/10m (sprint map) or 1m/5m/25m (forest map).

Click on **Load symbols from template** to get 12 line symbols at the bottom of your symbol box. The fields are filled in automatically.

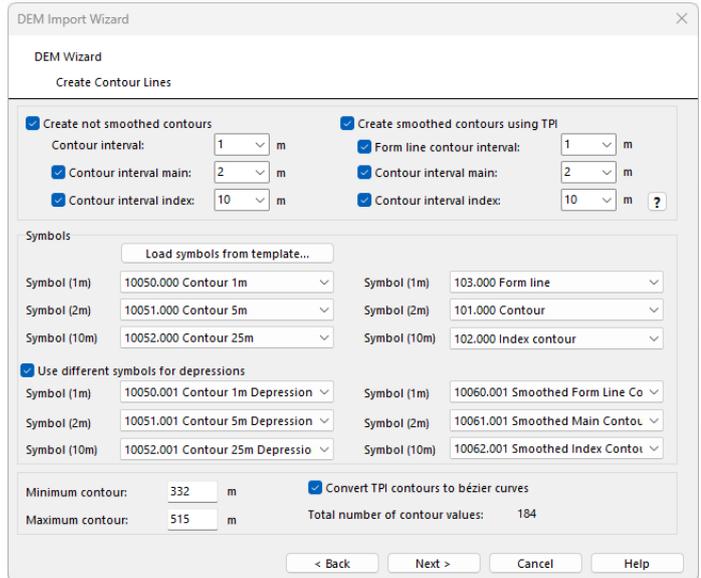
Select **Use different symbols for depressions** to distinguish depressions from hills.

-> Next



For mapping in the field, use the contour lines without smoothing as a background where all the terrain details are visible (provided you choose the contour interval small enough, 1m is a suitable interval).

To draw contour lines on the PC, first calculate and load the smoothed TPI height curves and then adjust them as required. To do this, use the **Reshape** function in the **Object** menu.



Create Hypsometric Map

This map can be useful for visualisation, but not for terrain mapping.

-> Next

Calculate Hill Shading

This function calculates a shaded relief image (hill shading).

Choose *Multi-directional* in the *Direction* section.

-> Next



Relief shading (as well as the slope gradient map) can be useful to identify point and line objects such as paths, tracks, pits, ditches, gullies, or watercourses.

DEM Import Wizard ✕

DEM Wizard
Create Hill Shading

Shading method

Hill shading (slope shading) ?

Hill shading (slope shading combined with oblique light shading) ?

Resolution:

DEM cell size (1.00 m) Interpolation mode: Bicubic

Interpolation 1.00 m

Direction

Azimuth: 315 deg

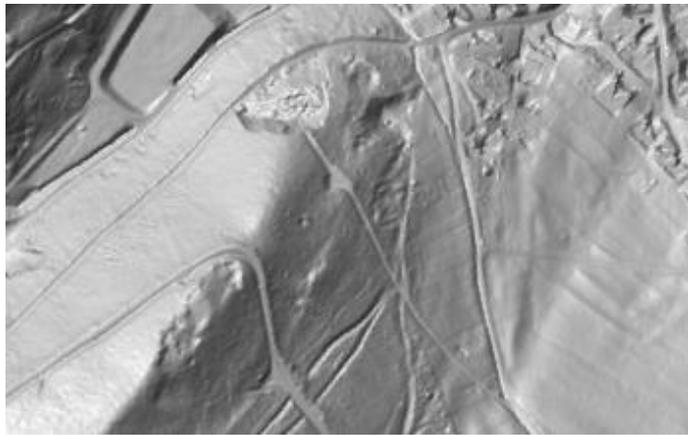
Multi-directional

Declination: 45 deg

Exaggeration: 4

Load exported map as a background map.

Preview...



Calculate Slope Gradient

The slope gradient map gives similar results to the relief shading and can be omitted.

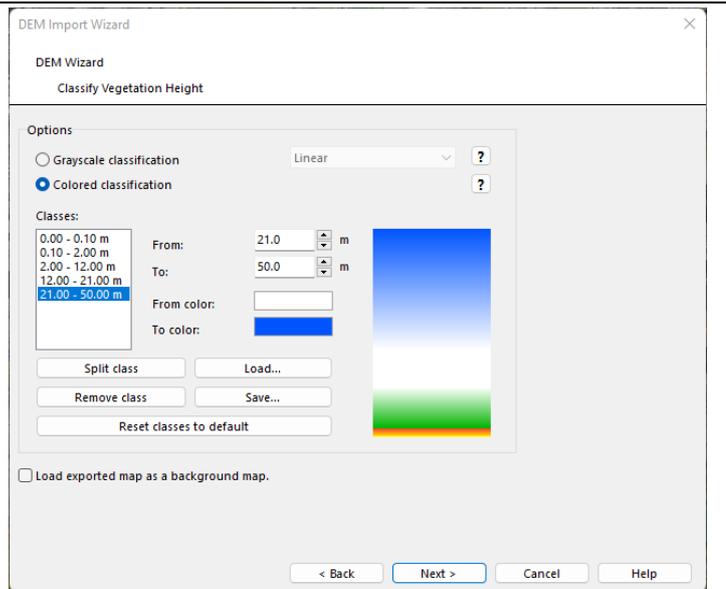
->Continue

Classify Vegetation Height

This function shows the height of the vegetation. Define classes with a height and a colour range. Under *Load* you can choose between different height profiles.

-> Next

 The vegetation height map is a very useful background map for terrain mapping. It shows, for example, individual trees, thickets, clearings, or hedges.



Extract features

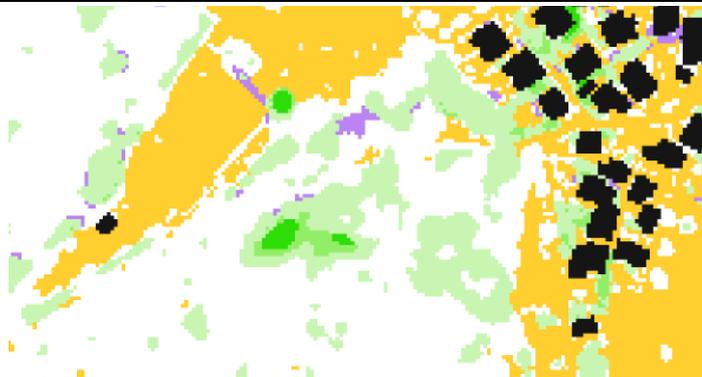
This function automatically extracts terrain and vegetation objects from your data. The function is computationally intensive and (1) heavily dependent on the quality of the data and (2) the results should be treated with caution.

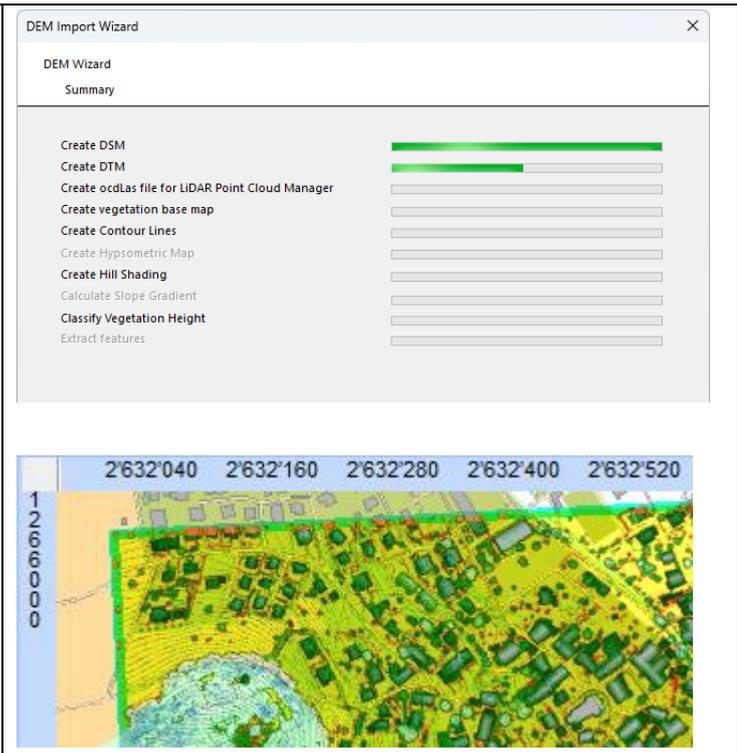
However, the results can give you an indication of which places to check carefully during fieldwork.

-> Next

Create vegetation base map

The vegetation base map provides similar results to the vegetation height map and is particularly suitable for recording forest maps or creating an automatically generated orienteering map

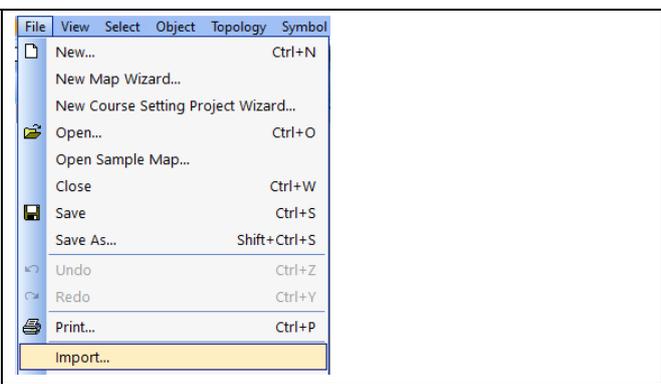
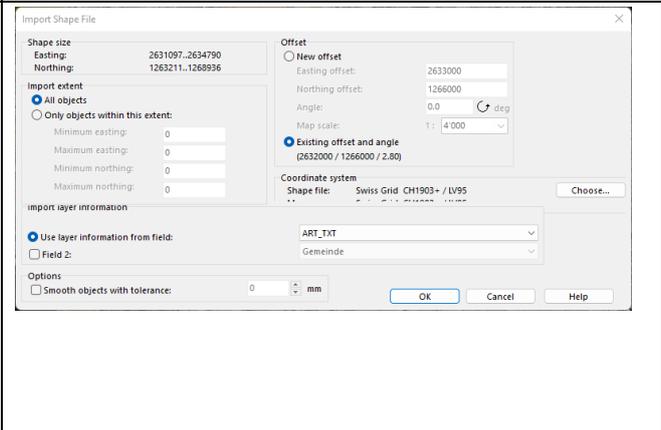


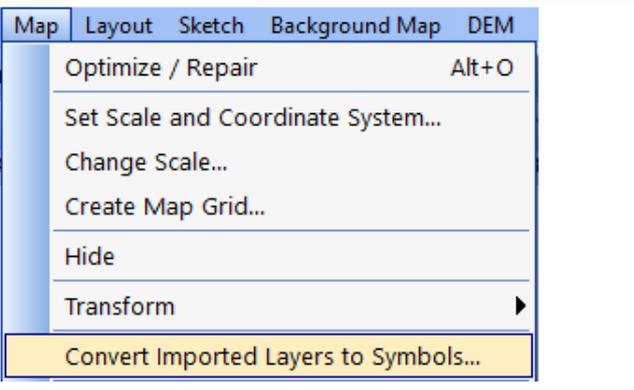
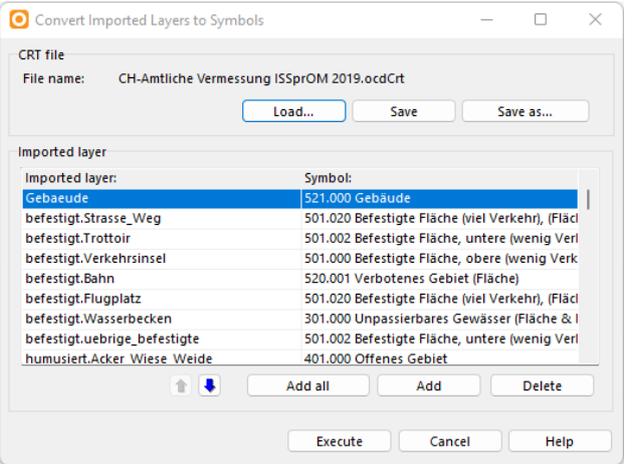
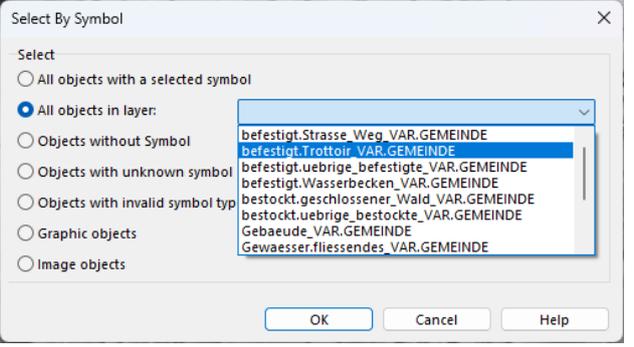
<p>Summary</p> <p>The <i>Summary</i> dialogue box shows the progress of the various functions.</p> <p>If the map is not already georeferenced, a message about georeferencing the map appears during the calculation. Do not change anything and click <i>OK</i>.</p> <p>After completing the DEM Wizard, the dialogue closes automatically and the results are displayed in OCAD.</p> <p>Contour lines and automatically detected objects are assigned to the corresponding symbols in the symbol box.</p> <p>All files are saved in the folder that you can specify in the DEM settings.</p>	 <p>The image shows the 'DEM Import Wizard' dialog box with a 'Summary' tab. It lists several tasks with progress bars: 'Create DSM' (100%), 'Create DTM' (approx. 75%), 'Create ocdLas file for LIDAR Point Cloud Manager' (0%), 'Create vegetation base map' (0%), 'Create Contour Lines' (0%), 'Create Hypsometric Map' (0%), 'Create Hill Shading' (0%), 'Calculate Slope Gradient' (0%), 'Classify Vegetation Height' (0%), and 'Extract features' (0%). Below the dialog is a 3D terrain map with coordinate axes: Easting (2'632'040 to 2'632'520) and Northing (1 266 000).</p>
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4.3 Import vector data

Vector data have the advantage that, in contrast to raster data, they do not contain pixels but point, line, area and text objects, which can be directly converted into orienteering map objects when imported into OCAD. This saves a lot of time, because - especially in urban areas - many objects of the orienteering map can be created automatically and do not have to be drawn (e.g., buildings, street edges).

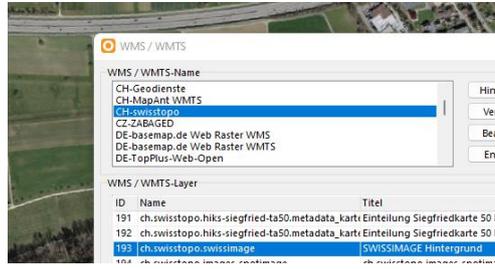
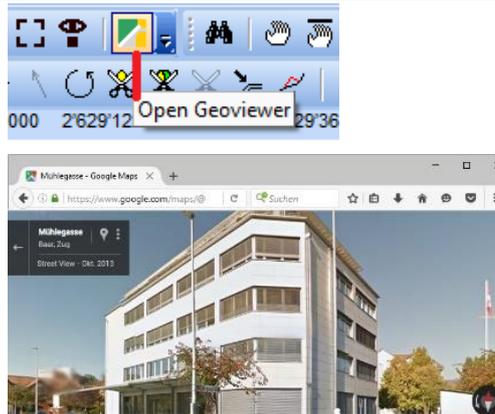
Vector data can be available in different formats (e.g., Shape, DXF, SOSI, PDF, AI, SVG or OSM).

<p>Menu File > Import</p> <p>In this example we import shape files.</p>	 <p>The image shows the 'File' menu in OCAD. The 'Import...' option is highlighted at the bottom of the menu. Other options include New..., New Map Wizard..., New Course Setting Project Wizard..., Open..., Open Sample Map..., Close, Save, Save As..., Undo, Redo, and Print...</p>
<p>Import Shape File dialogue</p> <p>When importing, make sure that you select a meaningful field in the field <i>Use layer information from field</i>.</p> <p>Leave the other settings as they are.</p> <p>-> OK</p> <p>The imported vector data are displayed in the drawing area as <i>Unsymbolised objects</i>. If you select an object, the layer designation is displayed in the bottom left of the status bar.</p>	 <p>The image shows the 'Import Shape File' dialog box. It includes fields for Shape size (Easting: 2631097..2634790, Northing: 1263211..1268936), Import extent (All objects selected), Offset (Existing offset and angle selected), Coordinate system (Swiss Grid - CH1903+ / LV95), and Import layer information (Use layer information from field selected, Field 2: Gemeinde). There are also checkboxes for 'Smooth objects with tolerance' and buttons for 'OK', 'Cancel', and 'Help'.</p>

																					
<p>To assign symbols to the unsymbolised objects: Menu Map > Convert Imported Layers to Symbols</p>																					
<p>Convert Imported Layers to Symbols Dialogue</p> <p>Load a CRT file</p> <p>A CRT file is a translation table between the layers of the shape file and the OCAD symbols.</p> <p>OCAD provides several CRT files which are available under <i>C:\Program Files\OCAD\OCAD 2018 Orienteering\Crt</i>.</p> <p>Assignment to the -1 symbol means that the object will be deleted.</p> <p>-> Execute</p> <p> You can also convert unsymbolised objects into OCAD symbols as follows:</p> <ul style="list-style-type: none"> - Menu Select > Select Objects by Symbol - <i>All objects in layer</i>: Select a layer - Select new symbol in the symbol field - Menu Object > Change Symbol (Selected Objects) <p>Run the Map>Optimize/repair command after every layer conversion to delete the already converted layer from the list.</p>	 <table border="1" data-bbox="790 1097 1396 1310"> <thead> <tr> <th>Imported layer:</th> <th>Symbol:</th> </tr> </thead> <tbody> <tr> <td>Gebaue</td> <td>521.000 Gebäude</td> </tr> <tr> <td>befestigt.Strasse_Weg</td> <td>501.020 Befestigte Fläche (viel Verkehr), (Fläc</td> </tr> <tr> <td>befestigt.Trottoir</td> <td>501.002 Befestigte Fläche, untere (wenig Verl</td> </tr> <tr> <td>befestigt.Verkehrinsel</td> <td>501.000 Befestigte Fläche, obere (wenig Verk</td> </tr> <tr> <td>befestigt.Bahn</td> <td>520.001 Verbotenes Gebiet (Fläche)</td> </tr> <tr> <td>befestigt.Flugplatz</td> <td>501.020 Befestigte Fläche (viel Verkehr), (Fläc</td> </tr> <tr> <td>befestigt.Wasserbecken</td> <td>301.000 Unpassierbares Gewässer (Fläche & l</td> </tr> <tr> <td>befestigt.uebrige_befestigte</td> <td>501.002 Befestigte Fläche, untere (wenig Verl</td> </tr> <tr> <td>humusiert.Acker_Wiese_Weide</td> <td>401.000 Offenes Gebiet</td> </tr> </tbody> </table> 	Imported layer:	Symbol:	Gebaue	521.000 Gebäude	befestigt.Strasse_Weg	501.020 Befestigte Fläche (viel Verkehr), (Fläc	befestigt.Trottoir	501.002 Befestigte Fläche, untere (wenig Verl	befestigt.Verkehrinsel	501.000 Befestigte Fläche, obere (wenig Verk	befestigt.Bahn	520.001 Verbotenes Gebiet (Fläche)	befestigt.Flugplatz	501.020 Befestigte Fläche (viel Verkehr), (Fläc	befestigt.Wasserbecken	301.000 Unpassierbares Gewässer (Fläche & l	befestigt.uebrige_befestigte	501.002 Befestigte Fläche, untere (wenig Verl	humusiert.Acker_Wiese_Weide	401.000 Offenes Gebiet
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befestigt.uebrige_befestigte	501.002 Befestigte Fläche, untere (wenig Verl																				
humusiert.Acker_Wiese_Weide	401.000 Offenes Gebiet																				

<p>The vector objects are now displayed with the assigned symbols.</p> <p> Hide unsymbolised objects under Menu Symbol > Show Objects without Symbol</p> <p> Survey data is very valuable, especially for sprint maps, as they often contain streets, houses, stairs, property boundaries and much more.</p>	
---	--

4.4 Add more data sources

<p>WMS/WMTS</p> <p>Under Menu Background Map > WMS/WMTS you can load a WMS or WMTS as a background map.</p> <p> https://www.ocad.com/wiki/ocad/en/index.php?title=WMS</p>	
<p>Online Maps Services</p> <p>Under Menu Background Map > Online Map Services you can load a georeferenced aerial image from Google Maps into the map.</p> <p> https://www.ocad.com/wiki/ocad/en/index.php?title=Online_Map_Services</p>	
<p>Geoviewer</p> <p>Select the Open Geoviewer icon in the toolbar.</p> <p>Click in the drawing area and Google Street Map will open in the appropriate place.</p> <p> https://www.ocad.com/wiki/ocad/en/index.php?title=Open_Geoviewer</p>	

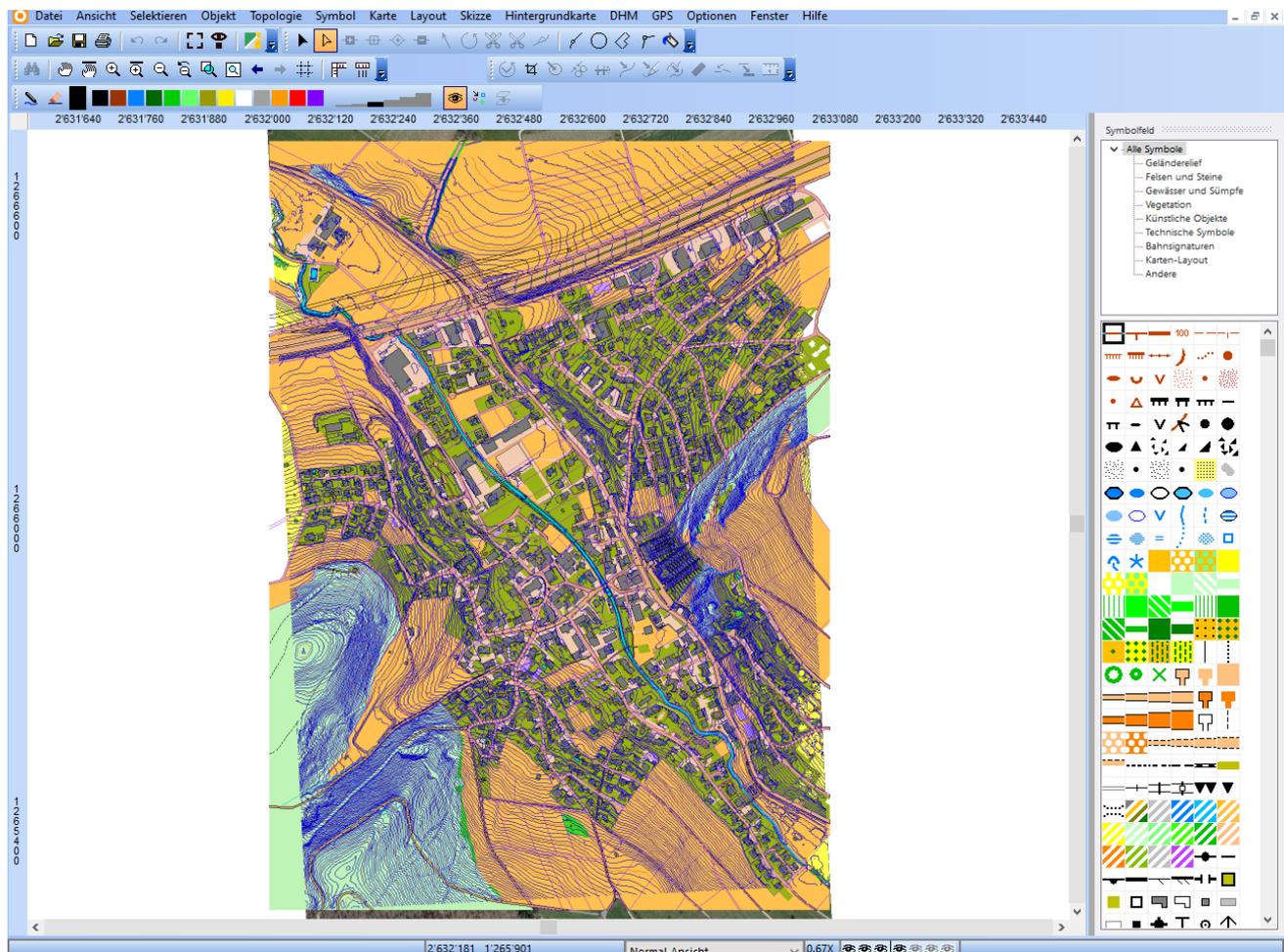
Old orienteering map

Under Menu **Background Map > Open** you can load an old orienteering map as ocd file or raster file (see above).



4.5 Display of the base map in OCAD

After completing the wizard and/or importing (further) geodata, the results can be viewed in OCAD.



All raster maps are listed in the menu **Background Maps > Manage**. You can change the visibility (V) and the order of the background maps there.

The background map at the top of the list is displayed in the OCAD window before the other background maps.

V	F	Dim	T	Assign to spot color	B	File name
		0	<input checked="" type="checkbox"/>			C:\Temp\2632_1265_DTM_Hill Shading.tif
		0	<input checked="" type="checkbox"/>			C:\Temp\2632_1265_VegetationBaseMap.png
		50				C:\Temp\2632_1265_DSM_LasIntensity.tif
		- 0				2632_1265_Classify Vegetation Height.tif
		- 0				2632_1266_Classify Vegetation Height.tif
		0				swissimage-dop10_2021_2632-1266_0.1_2056.tif
		0				swissimage-dop10_2021_2632-1265_0.1_2056.tif
		- 0				2632_1266_DTM_DSM_LasDifference.tif
		- 0				2632_1266_DSM_LasClassification.tif

The transparency (**T**) of the background map can also be set here. For example, an aerial photograph can be combined with a vegetation height map.

The transparency cannot be set later in the OCAD Sketch App.

Switch to **Draft Mode** in the **View** menu.

This makes the drawing area transparent, and the background maps are visible under the map.

A slider appears in the **view toolbar** to adjust the opacity of the Map/Map (**M**) and the Background Map/Background



Dark area signatures in the base map can be disturbing for the terrain mapping, as the sketches do not appear well legible on them. The following functions help you to tackle this problem.

<p>Hide irrelevant symbols for the terrain survey</p> <p>Right-click on the icon (e.g., Open Area, Paved Area, Prohibited Area) in the icon box and click Hide (or press F4).</p>	
<p>Hatch Areas</p> <p>Menu View > Hatch Areas</p>	

Convert area symbols to line symbols

Create a new line symbol (menu **Symbol > New > Line symbol**) or duplicate existing line symbol (right-click on symbol in the symbol box > **Duplicate**).

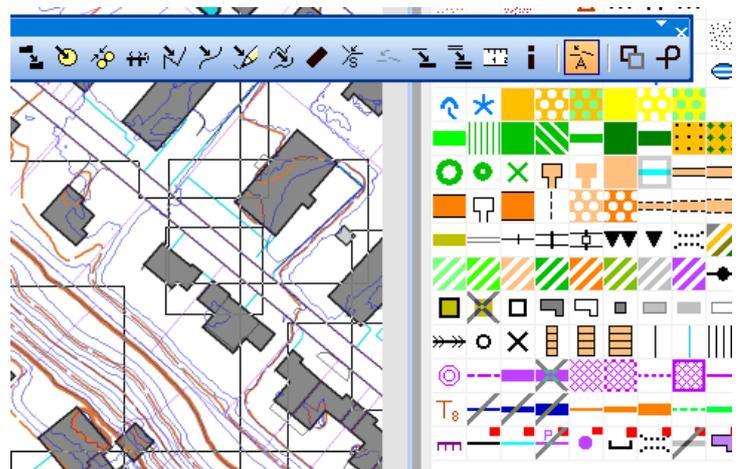
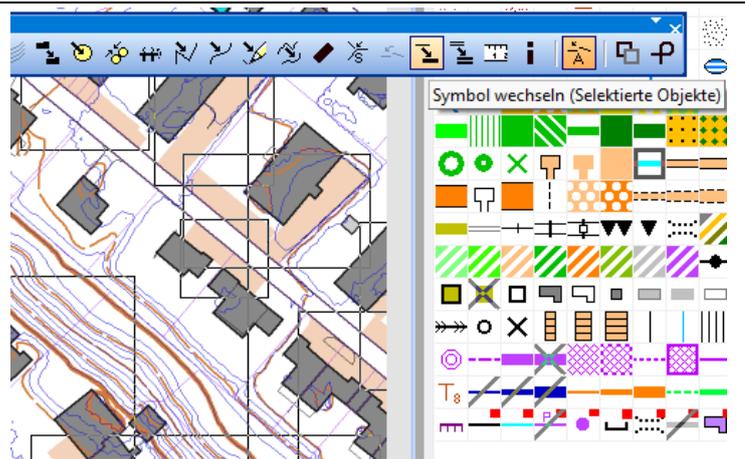
Right-click on the area symbol in the symbol box that is to be converted into a line symbol > **Select Objects by Symbol**

All objects of this symbol are selected.

Select the new line symbol in the symbol box.

Menu **Object > Change Symbol (Selected Objects)**

The selected objects are assigned to the new line symbol.



Cut the map

You can cut away parts of the map that you do not need.

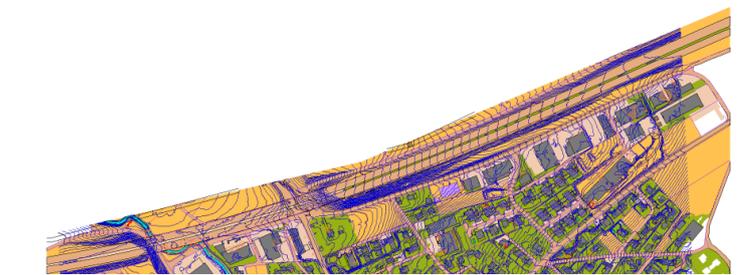
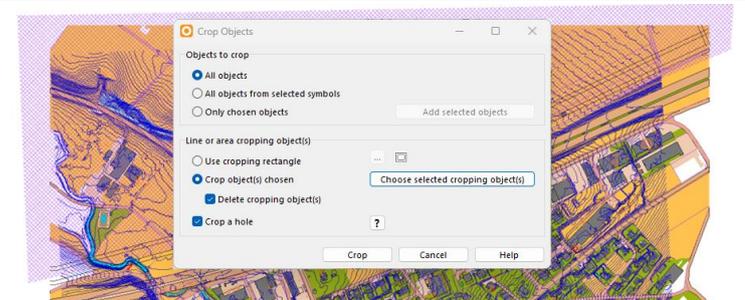
Select an area or line symbol and use it to draw the area you want to cut away.

Select the object you have drawn and choose **Objects > Crop Objects** from the menu.

Select **All objects** as objects to be cropped out and click on **Choose selected cropping object(s)**.

Also select the option **Delete cropping objects(s)** and **Crop a hole**.

-> **Crop**

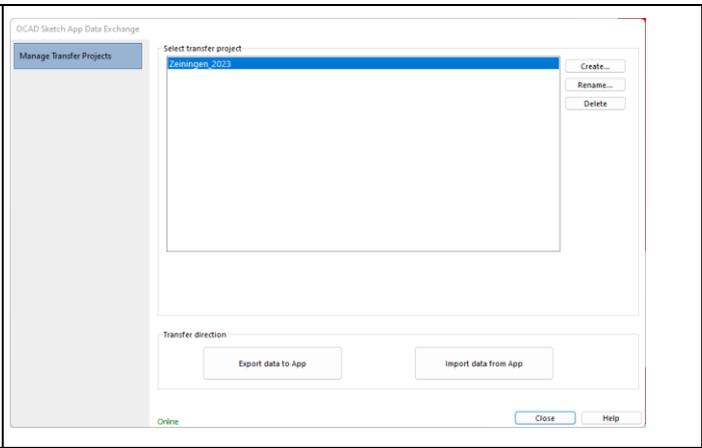
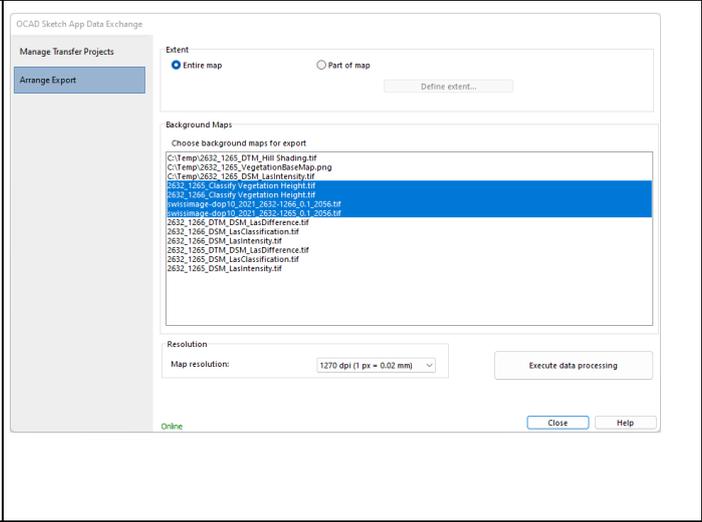
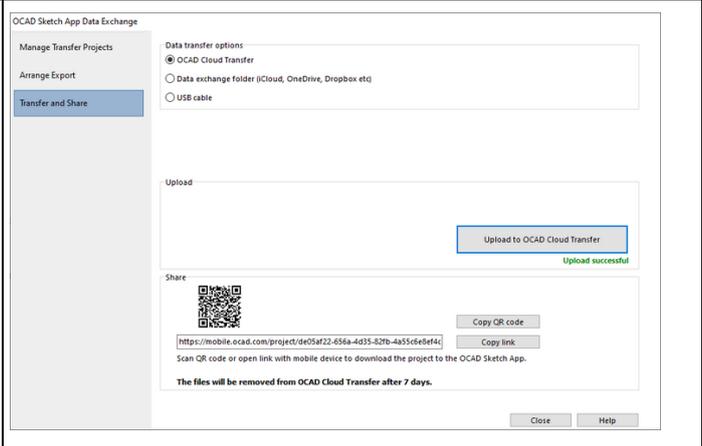


<p>Optimize / Repair the map</p> <p>Regularly run the function Menu Map > Optimize/Repair to permanently delete the deleted data and reduce the file size.</p>	<div style="border: 1px solid gray; padding: 5px;"> <p style="text-align: right; margin: 0;">✕</p> <p>Optimization Result</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">File size before:</td> <td style="text-align: right; padding: 2px;">1'128'212</td> </tr> <tr> <td style="padding: 2px;">File size after:</td> <td style="text-align: right; padding: 2px;">794'044</td> </tr> <tr> <td style="padding: 2px;">Objects repaired:</td> <td style="text-align: right; padding: 2px;">0</td> </tr> <tr> <td style="padding: 2px;">Damaged objects deleted:</td> <td style="text-align: right; padding: 2px;">0</td> </tr> <tr> <td style="padding: 2px;">Spurious objects deleted:</td> <td style="text-align: right; padding: 2px;">0</td> </tr> <tr> <td style="padding: 2px;">Objects without Symbol:</td> <td style="text-align: right; padding: 2px;">0 (not deleted)</td> </tr> <tr> <td style="padding: 2px;">Objects with unknown symbol:</td> <td style="text-align: right; padding: 2px;">3 (not deleted)</td> </tr> <tr> <td style="padding: 2px;">Objects with invalid symbol type:</td> <td style="text-align: right; padding: 2px;">0 (not deleted)</td> </tr> <tr> <td style="padding: 2px;">Sketch features:</td> <td style="text-align: right; padding: 2px;">24</td> </tr> <tr> <td style="padding: 2px;">Embedded DEM:</td> <td style="text-align: right; padding: 2px;">No</td> </tr> </table> <div style="text-align: right; margin-top: 5px;"> <input type="button" value="OK"/> <input type="button" value="Help"/> </div> </div>	File size before:	1'128'212	File size after:	794'044	Objects repaired:	0	Damaged objects deleted:	0	Spurious objects deleted:	0	Objects without Symbol:	0 (not deleted)	Objects with unknown symbol:	3 (not deleted)	Objects with invalid symbol type:	0 (not deleted)	Sketch features:	24	Embedded DEM:	No
File size before:	1'128'212																				
File size after:	794'044																				
Objects repaired:	0																				
Damaged objects deleted:	0																				
Spurious objects deleted:	0																				
Objects without Symbol:	0 (not deleted)																				
Objects with unknown symbol:	3 (not deleted)																				
Objects with invalid symbol type:	0 (not deleted)																				
Sketch features:	24																				
Embedded DEM:	No																				

We have now created many and high-quality recording bases and know how to display them in OCAD.
 Next, we transfer our project to the OCAD Sketch app for terrain mapping.

5 Transfer of the base map into the OCAD Sketch App

 When exporting to OCAD Sketch App later, raster tiles are created from the current map view (as the map appears on the screen). If you want to show or hide certain OCAD symbols, you must do this before the OCAD Sketch App Data Exchange.

<p>Menu File > OCAD Sketch App Data Exchange</p> <p>Create a new transfer project and enter a name.</p> <p>Select Export data to app as the transfer direction.</p>	
<p>Area</p> <p>As an area you can select the <i>Entire Map</i> or <i>Part of Map</i>. The latter can make sense for large map projects.</p> <p>Select for the Entire map area.</p> <p>Background Maps</p> <p>Select the background maps you want to export.</p> <p> Press the CTRL key to select several background maps.</p> <p>Resolution</p> <p>Leave the map resolution at the suggested value.</p> <p>Click on Execute data processing.</p>	
<p>Data transfer options</p> <p>Select the OCAD Cloud Transfer.</p> <p>Upload</p> <p>Now click Upload to OCAD Cloud Transfer.</p> <p>Depending on the size of the project, this may take a moment.</p> <p>Share</p> <p>A green hint shows you whether the upload was successful. The QR code and the link are displayed.</p>	

 More about OCAD Sketch App Data Exchange:

[https://www.ocad.com/wiki/ocad/en/index.php?title=OCAD Sketch App#OCAD Sketch App Data Exchange](https://www.ocad.com/wiki/ocad/en/index.php?title=OCAD_Sketch_App#OCAD_Sketch_App_Data_Exchange)

6 Mapping in the field

6.1 Installation OCAD Sketch App

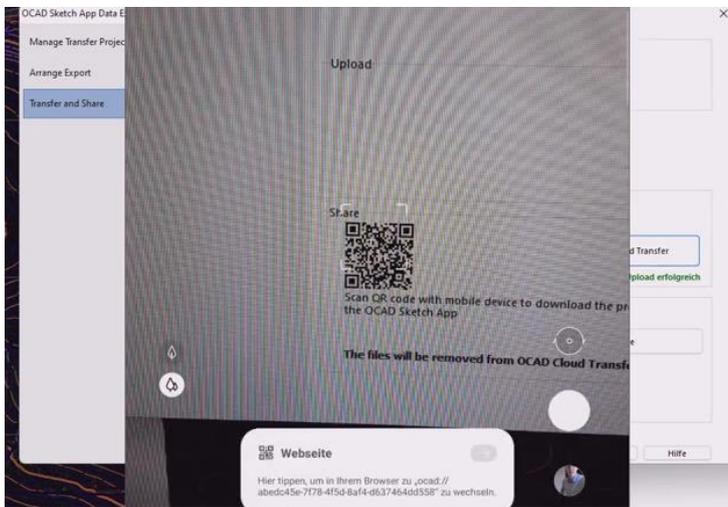
The OCAD Sketch App is an app from OCAD for mobile Android and iOS devices, such as tablets or smartphones. The OCAD Sketch App can be downloaded for free from Google Play Store (Android) or Apple App Store (iOS). Search for *OCAD Sketch*.

Further information on the app is available at <https://www.ocad.com/app>

➔ Install the OCAD Sketch App.

6.2 Import project into the OCAD Sketch App

Scan with your mobile device the QR code previously generated in OCAD Desktop (photo or QR Scan App) and confirm to open the link. The project is automatically loaded into the OCAD Sketch App. Your mobile device needs an internet connection for this process.

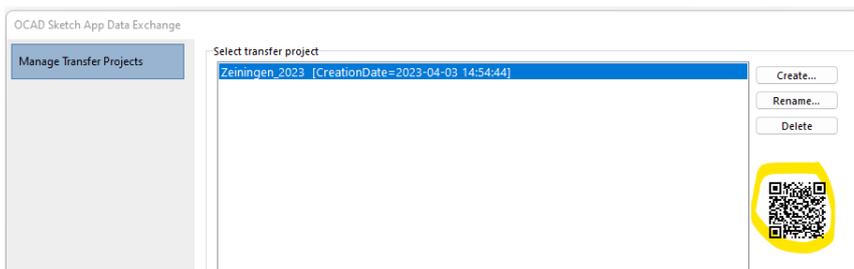


Alternatively, you can open the link (e.g., <https://mobile.ocad.com/project/af1bc2df-2abc-42a7-a190-0eeb97fb1e95>) directly on your mobile device in the browser or open the app and click on the "+" sign and enter the project ID (e.g., af1bc2df-2abc-42a7-a190-0eeb97fb1e95).



You can also copy the QR code or link to the clipboard and send it to another person by e-mail, SMS, WhatsApp, etc.

The QR code is also displayed in OCAD Desktop under Menu **File > OCAD Sketch App Data Exchange** in the *Manage Transfer Projects* area when you select the newly uploaded project there.



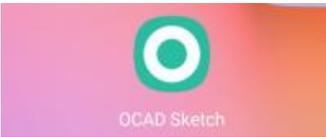
6.3 Terrain mapping with the OCAD Sketch App

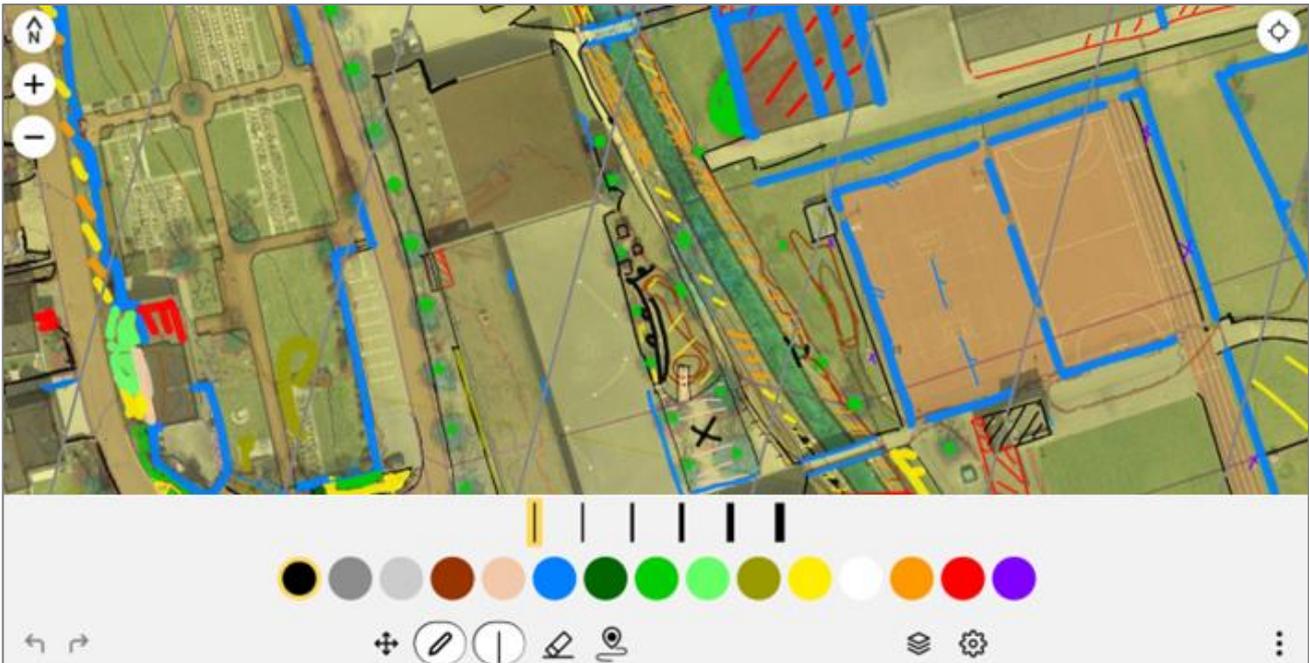
Mobile mapping with the OCAD Sketch App has several advantages over a traditional pen and paper terrain survey:

- Possibility to switch between different background maps
- Use of GPS for position determination and trajectory
- Different colours and line thickness, plus an eraser tool
- Manage multiple projects on one device
- Promote collaboration thanks to OCAD Cloud Transfer (event adviser, controller, course setter with map maker)
- No more scanning and matching of the paper sketch necessary, as sketches from app are georeferenced

 Terrain survey with pen and paper

https://www.ocad.com/wiki/ocad/en/index.php?title=Drawing_Orienteering_Maps_in_OCAD#Paper_and_Pen

<p>Open the OCAD Sketch App</p> <p>The first time you work with the app, you will be asked if the OCAD Sketch App is allowed to retrieve the location of the device. Agree if you want to work with the internal device GPS.</p>	
<p>Open the previously imported project.</p> <p>If your device does not have a compass, you will be informed of this when you start a project. Functions that require a compass will not work in this case.</p>	
<p>Start with the terrain survey.</p> <p>Choose a pen colour and a pen width and sketch.</p> <p>Open and dim the different background maps so that you you see as much information as possible.</p> <p>Learn more about the functionality of the OCAD Sketch App in the next section.</p>	



OCAD Sketch App user interface

The OCAD Sketch App includes the following functionality:

Finger gestures

- 2 Finger gestures: Use 2-finger gestures to zoom, pan and/or rotate the map.
- 1 Finger: Use 1-finger gestures with the tools in the lower toolbar:
 - o Pan / Draw sketch / Erase sketch
 - o Double tap with 1 finger to zoom in (only if the Pan tool is active)

Undo/Redo (Draw/Erase)

-  Undo the last draw/erase operation
-  Redo the last draw/erase operation

Layers

 Show/hide/dim layers (map and background map)

You can make layer visible or hide it by clicking the checkbox. You can show/hide all background maps at once.

 Use the slider to dim a layer, i.e. make the background map appear brighter.

 Drag a background layer to a different position in the list (change order). Background maps at the top of the list are displayed before background maps at the bottom of the list.

Settings (GPS, Compass, North Lines...)



Show current position: Shows your current position based on the GPS of your device. Your project must be correctly georeferenced, and you must be within the project extent to see your position.

Show position precision: Shows the expected accuracy of your current position.

Log positions in project: Logs your position to a file that can later be imported into OCAD Desktop.

Always allow background logging: Will always log GPS position, even if app is running in the background (e.g. using another app on the device, such as taking a photo) or device is not awake (e.g. put device in pocket while travel).

Show position tail: Shows the position history. Adjust its colour and length if necessary.

Only show today's tail: Shows only the position history of the current day.

Eraser size: Option to customize the eraser size.

Show zoom buttons: Show/Hide the Zoom-In/Out buttons

Show compass: Displays the compass. Only available if your device has a built-in compass.

Show scale bar: Shows a scale bar for better sense of distance.

Show north lines: Shows the north lines on the map. Adjust the distance between the north lines if necessary.

Save backup versions: Automatically saves a backup copy of your project according to the specified backup interval.

Straighten lines: If you stop drawing for 1 second and still press the on the display, the previous line segment(s) will be straightened. This option can be activated always, never or only for scales 0 - 1:5000 (sprint maps).

Project management



Close Project: Closes your project.

Align North / Maximize



If the map view is rotated -> Reset rotation of the map view (north lines parallel to the device screen).



If the map view is not rotated -> Show the entire map.

Zoom



Enlarge / Zoom in



Reduce / Zoom out

 You can also zoom in/zoom out with 2-finger gestures.

Positioning



Single tap: Centre map to current position (1 x)



Double tap: Centre map to position (permanently).

 Centre map only works if *Show current position* is activated.

Compass



Single tap: Rotate map view to current magnetic north (1 x)



Double tap: Rotate map view to magnetic north (permanent).

 If your device does not have a compass, this tool is not visible.

Pan



Pan the map with a pen or 1-finger gestures. Double-click to zoom in.

 You can also zoom in/out using 2-finger gestures.

Draw sketch



Click on the Draw Sketch button. Now you can sketch with the specified line colour/width.

You can either draw with your fingers or with a capacitive pen, which is advantageous for precise drawing (e.g., Samsung S Pen on Samsung Galaxy Note/Tab). In cold weather, a pen and gloves are suitable.

All your drawings are saved automatically. You do not need to save the file. When you have finished sketching, simply close the project.

Choose sketch width / colour



Click on the button Choose Sketch width / colour if you want a different colour or line width for sketching.

There are 6 different line widths and various colours available. On devices with a small screen (e.g., smartphones) you can scroll to the left to see all colours.

Click the  icon to sort and filter the sketch colors.

The line widths are: 0.05 mm | 0.10 mm | 0.2 mm | 0.4 mm | 0.6 mm | 0.8 mm

Erase sketch



Erase objects by moving the eraser over them. The further you zoom out, the faster you can erase sketches.

Start/stop GPS tracking



Current colour/width is used.

Double tap creates a point feature (start/stop at the same position)

GPS tracking helps you determine your current position. You can either use the internal GPS of your device (standard) or connect to an external GPS.

GPS recording is only active when the app is in the foreground.

6.4 Tips for the terrain survey

Generalisation

The accuracy of the basic data and the possibility of zooming in on the map can lead to too many objects being mapped.

- *Generalize:*

Do not try to map every detail that is visible in the base data. Ask yourself whether this object is important for orientation in the terrain and would be suitable as a control location.

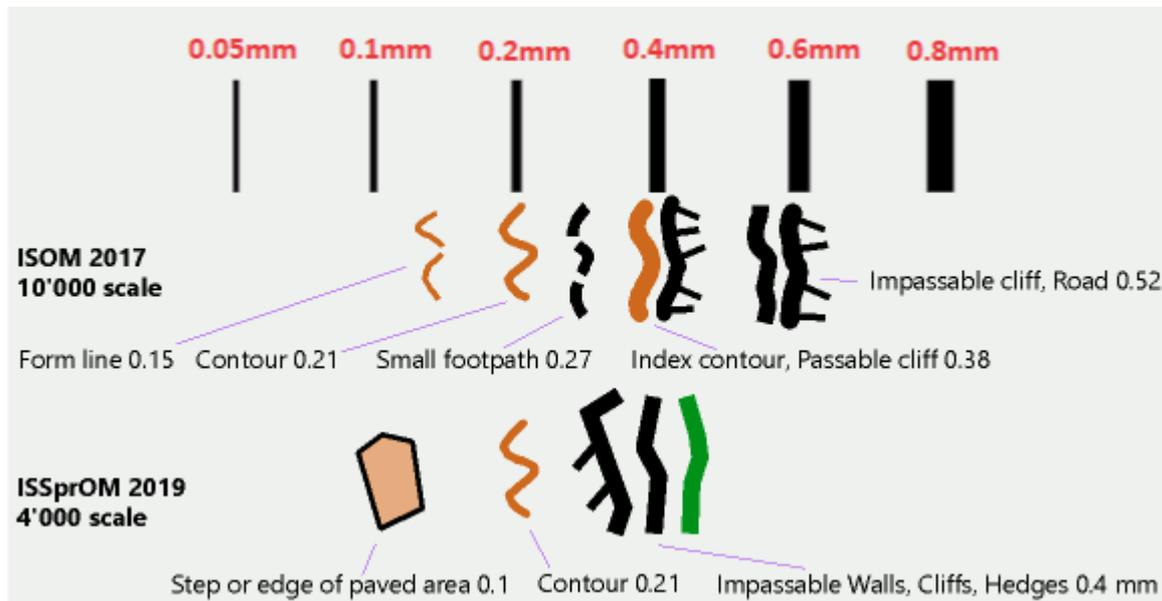
- *Objects do not have to be exactly in the right position:*

Map objects may be moved or enlarged for better readability. It is also more important to draw objects in the right relation to the other objects than exactly in the right place.

- Sketch already with the correct line width

The line widths are: 0.05 mm | 0.10 mm | 0.2 mm | 0.4 mm | 0.6 mm | 0.8 mm

It makes sense to sketch objects immediately in the correct width according to ISOM/ ISSprOM. In this way you can avoid too many objects being included when the map is zoomed in strongly.



GPS

The internal GPS of most tablets and smartphones is good enough. If your device does not have an internal GPS, you can connect an external GPS (e.g., Garmin Glo) via Bluetooth.

Pens

The app can also be used with fingers. However, for precise drawing, a pen (e.g., Samsung S Pen on Samsung Galaxy Note/Tab) is an advantage. In cold weather, a pen and gloves are suitable.

Battery life

The battery life depends on the device itself, the external conditions (temperature, required screen brightness), as well as the app use (e.g., GPS, automatic compass alignment). We recommend taking a strong power bank with you when mapping. When mapping with a tablet, it makes sense to load the project onto the smartphone as a backup so that you can continue working with it in an emergency.

Device settings

Lock the screen orientation in the settings of your mobile device so that it does not constantly switch between portrait and landscape format when mapping.

Device recommendations

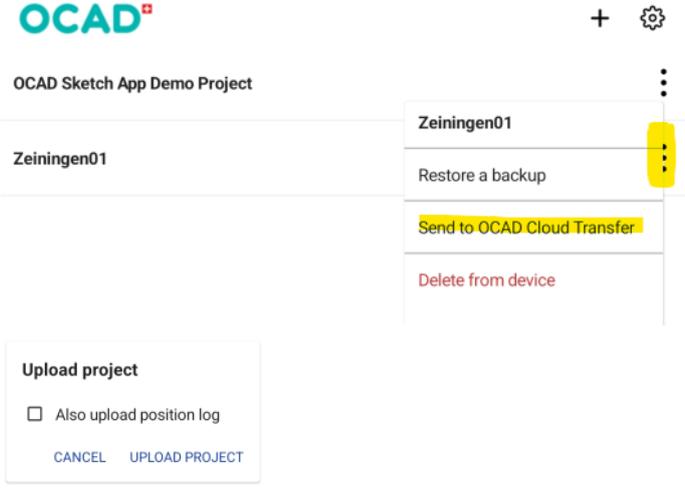
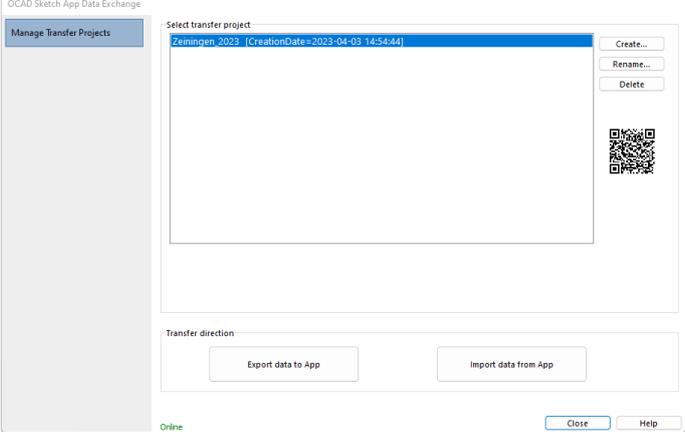
In our OCAD Wiki we have noted some device recommendations:

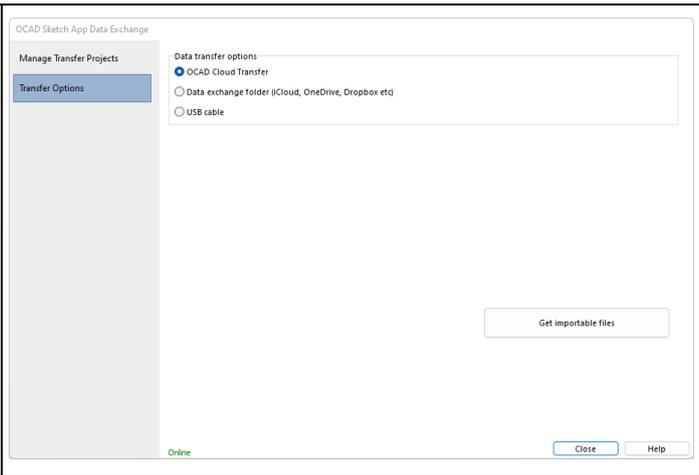
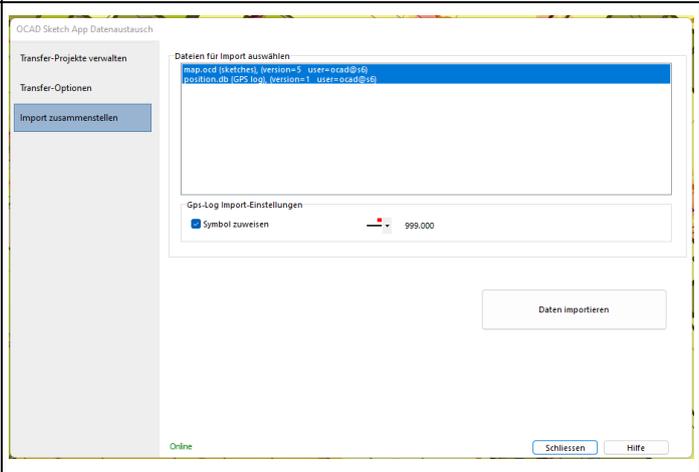
https://www.ocad.com/wiki/ocad/en/index.php?title=Technical_Data#Recommendations

When buying a device, make sure that GPS and compass are available.

7 Importing the Sketches into OCAD Desktop

7.1 Import project into OCAD Desktop

<p>Close your project in the OCAD Sketch App.</p> <p>👉 All your sketches are always saved automatically. Manual saving is not possible. When you have finished drawing, you can simply close the project.</p>	
<p>Select Send to OCAD Cloud Transfer in the project settings.</p> <p>Select Also upload position log to be able to view your position history as well.</p> <p>The project is loaded into the OCAD Cloud, from where you can import it back into OCAD Desktop.</p> <p>👉 Your mobile device needs an internet connection for this process.</p>	
<p>In OCAD Desktop, go to Menu File > OCAD Sketch App Data Exchange and select your map project.</p> <p>This time, click Import data from App.</p>	

<p>Select OCAD Cloud Transfer as the data transfer option and click Get importable files.</p>	
<p>Select the files for import. Press the CTRL key to select multiple files.</p> <ul style="list-style-type: none"> - <i>map.ocd</i> Contains the sketch objects. - <i>position.db</i> Contains the position history. You can select any symbol to display the position history in OCAD. <p>Click on Import aata. Close the dialogue. The sketches are now available in OCAD Desktop.</p>	

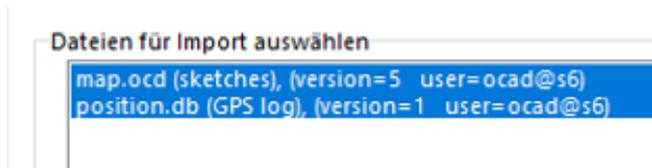
7.2 Upload the sketches again

Usually, a map is not drawn in one day, but the terrain survey and drawing on PC alternate several times until a map is finished.

You have two options for this:

- **Overwrite existing project**

In the OCAD Sketch App you can open an existing project as you wish and continue mapping. If you upload the project again, it will be indicated in brackets that it is a new version when you import it into OCAD Desktop.



- **Create new transfer project**

Before each terrain survey, create a new transfer project (e.g., Project_xy_02) and load it in the OCAD Sketch App. This can be useful if you have already drawn parts of the map.

7.3 Cooperation of several map maker

When uploading a map project to OCAD Cloud Transfer, you will receive a QR code and link that you can share.

It is important to bear in mind:

- It is possible for different mappers to use the same QR code/link to download the project, work with it in the OCAD Sketch App and then upload it again using OCAD Cloud Transfer.
- The sketches can only be imported into OCAD Desktop in the map file with which the project was created.
- Alternatively, the sketches can be imported into OCAD under menu **Sketch > Import**. To do this, select the file *map.ocd* from your internal device memory (Android\data/com.ocad.mobile/files/...).

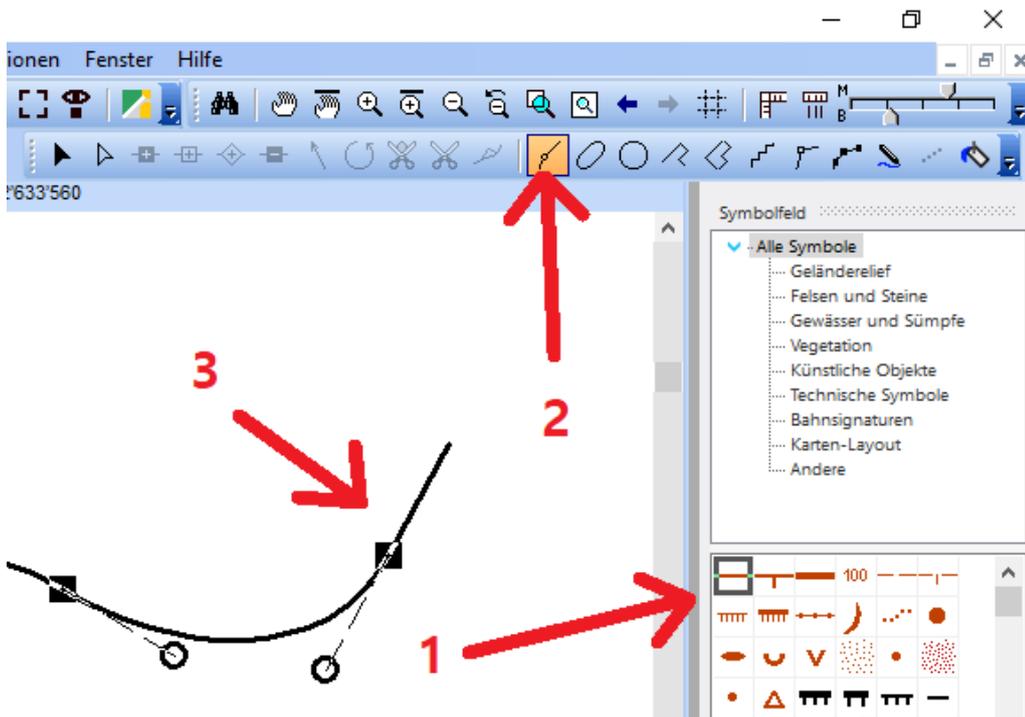
8 Draw map objects

Now that we have imported the sketches of the terrain survey into OCAD Desktop, you can start the final drawing.

 The exercise file *OCAD Basics.ocd* teaches both basic and advanced drawing and editing functions in an interactive way and includes many tips and tricks for more efficient work with OCAD. The exercise is available in different languages under menu **File > Open Sample Map**.

8.1 Drawing in general

When drawing, first click on the symbol in the **symbol box (1)**, then select the **drawing tool (2)** in the **toolbar** and then draw the **object** in the **drawing area (3)**.



There are six different symbol types:

- **Point symbol**
- **Line symbol**
- **Area symbol**
- **Text symbol**
- **Line text symbol**
- **Rectangle symbol**

It is advisable to draw the point and line objects first and the area objects only at the end because these cover the background map.

 Draw the paved area (area with colour *brown 30%*, symbol *501.002*) only at the very end by drawing an object over the whole map perimeter. As the colour *brown 30%* is at the bottom of the colour table, only the white areas are filled with it and no objects are overdrawn.

8.2 Draw point objects

For point objects, a distinction is made between objects that are oriented to the north (e.g., small depression, hole, tower) or have no orientation (e.g. knoll, stone) and objects that are to be drawn oriented (e.g. spring, cave).

<p>Point objects, oriented to the north</p> <ol style="list-style-type: none"> 1. Click on the symbol in the symbol box 2. Select any drawing tool in the toolbar 3. Click once with the left mouse button at the desired position in the drawing area. <p>The object is shown aligned to the north.</p>	
<p>Point objects, aligned</p> <ol style="list-style-type: none"> 1. Click on the symbol in the symbol box 2. Select any drawing mode in the toolbar 3. Click at the desired position in the drawing area and drag in the desired direction while holding down the left mouse button, release the left mouse button. <p>The object is displayed aligned in the corresponding direction.</p>	

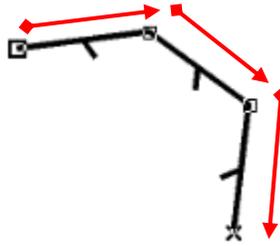
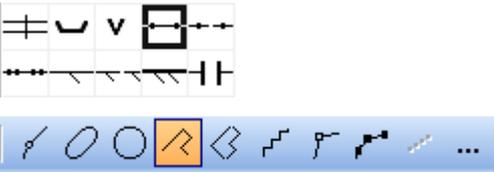
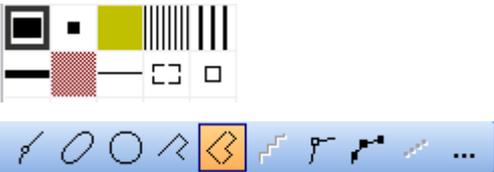
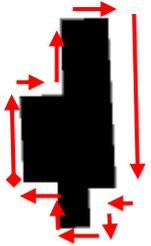
8.3 Drawing line and area objects

Various drawing tools are available for drawing line and area objects:

- **Straight line:** fences, walls, power lines etc.
- **Rectangular line:** fences, walls, ruins etc.
- **Rectangular area:** buildings etc.
- **Curve:** Contour lines, roads, paths, streams, ditches, etc.
- **Freehand:** Don't use this drawing tool. It is obsolete.

8.3.1 Straight line, rectangular area and rectangular line

<p>Straight</p> <ol style="list-style-type: none"> 1. Click on the symbol in the symbol box. 2. Select the drawing tool Straight line mode. 3. In the drawing area, position the cursor at the starting point of the straight line and drag the mouse in the desired direction while holding down the left button. 4. Insert corner point: Release the left mouse button and press again to draw the next straight line segment. 5. Exit: Click with left mouse button. 	
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	 <p>3.</p>
<p>Rectangular line</p> <ol style="list-style-type: none"> 1. Click on the symbol in the symbol box. 2. Select the drawing tool Rectangular line. <p>Steps 3-5 the same as for the drawing tool Straight line. In contrast, for each corner the new line is automatically drawn at right angles to the first line.</p>	 <p>1.</p> <p>2.</p>  <p>3.</p>
<p>Rectangular area</p> <ol style="list-style-type: none"> 1. Click on the symbol in the symbol box. 2. Select the Rectangular mode drawing tool. 3. In the drawing area, position the cursor at the starting point of the longest side and drag the mouse along the longest side to the next corner while holding down the left button. 4. At the corner, release the left mouse button, press again, and drag to the next corner. 5. Exit: On the second last page by clicking with the left mouse button. 	 <p>1.</p> <p>2.</p>  <p>3.</p>

8.3.2 Curves

The **Curve** drawing tool is used for drawing contour lines, but also for paths, tracks, roads, gullies, ditches, streams etc.

 Bézier curves should be drawn with as few support points as possible. This results in a smooth curve image and facilitates later corrections. It is worth investing time so that you can use this drawing tool efficiently and correctly.

<p>Curve mode</p> <ol style="list-style-type: none"> 1. Click on the symbol in the symbol box. 2. Select the Curve mode. 3. In the drawing area, position the cursor at the starting point of the curve and drag the mouse tangentially to the desired radius while holding down the left button. Release the left mouse button. 4. Insert interpolation point: Press the left mouse button and drag tangentially to the desired radius again and then release it. 5. Exit: Click with left mouse button. 	 <p>1.</p> <p>2.</p>
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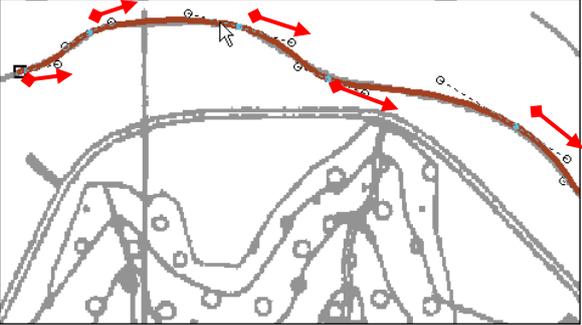
 Slight curvatures: Position the vertex at the **curvature points**.

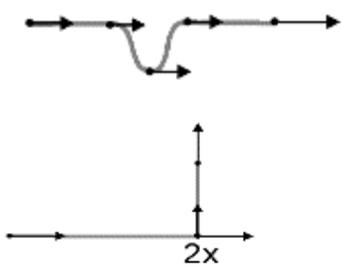
 Strong curvatures (e.g. depression): Position a vertex before the curvature, in the curvature maximum and after the curvature.

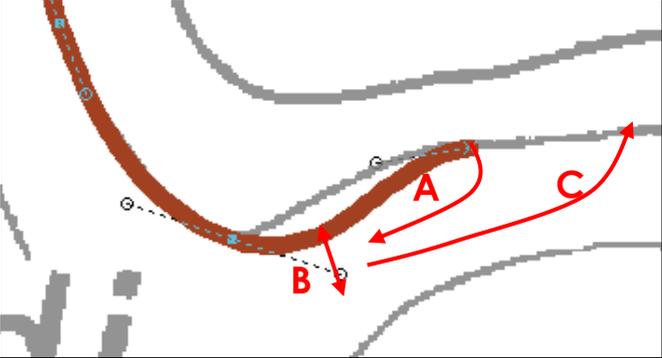
 You can create a corner vertex by dragging two tangents from the same vertex point. Curve: Tangents 2 and 3 start at the same point but move in different directions. A **Corner vertex** is created.

 **Delete vertex:** While drawing press the **Backspace** key, the vertexes are deleted in reverse.

 **Edit tangent point:** While drawing it is possible to edit the least two tangent points:
Before you click with the mouse for a new vertex, release the mouse and go to the tangent point **(A)**. The edit tool change temporary to **Edit Vertex** and the tangent point can be edited **(B)**. Then you can continue drawing **(C)**.

3. 



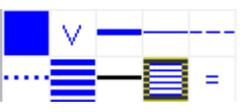
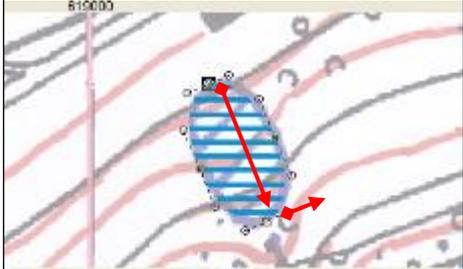


8.3.3 Ellipse and circle

Ellipse and circle

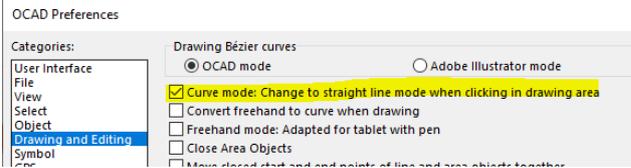
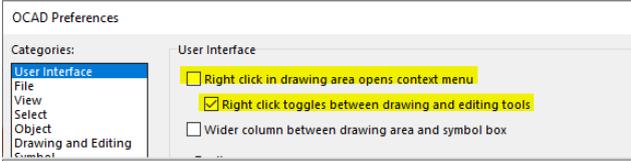
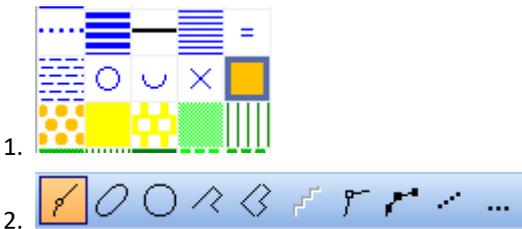
- Click on the symbol in the symbol box.
- Select the drawing tool **Ellipse or Circle**.
- Ellipse:** In the drawing area, position the cursor at the starting point of the ellipse axis and drag along the axis while holding down the left mouse button, release the mouse button. Press the left mouse button again and drag the second axis.
Circle: In the drawing area, position the cursor at the edge of the circle and, while holding down the left mouse button, draw the diameter, release the mouse button.

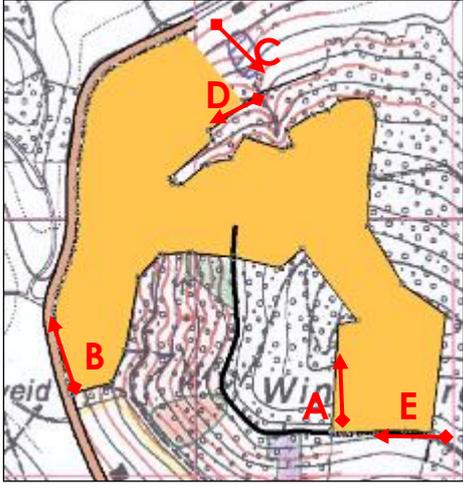
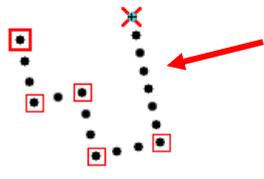
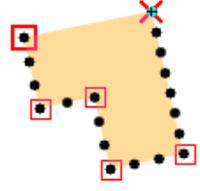
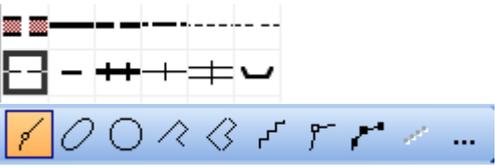
 With the Shift key held down, the circle is drawn from the centre.

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<p> If necessary, the shape of the ellipse or circle can then be changed by moving the support points.</p>	
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8.3.4 Drawing tips

<p>Draft mode</p> <p>To make the background maps visible under the map, the drawing area can be made transparent:</p> <p>Menu View > Draft Mode.</p> <p>A slider appears in the view toolbar with which the opacity of the map (M) and the background maps (B) can be adjusted.</p>	
<p>Combination Curve mode and Straight line mode</p> <p>First select the following settings in the menu Options > OCAD Preferences as shown in the graphic on the right.</p> <ol style="list-style-type: none"> 1. Select a line or area symbol in the symbol box. 2. Select the Curve mode 3. Each left click inserts a new vertex 4. Instead of just left-clicking, a Bézier curve can be drawn with clicking and dragging 	
<p>Close objects with right mouse button</p> <p>In the Options > OCAD Preferences menu, select the following settings as shown in the graphic on the right.</p> <ol style="list-style-type: none"> 1. Draw object 2. Right-click to close the object and switch to edit mode. 3. Another right-click switches back to drawing mode. 	
<p>Following Existing Objects</p> <p>Area objects are often limited by line objects. You can follow existing line or area objects without having to redraw them. (e.g. draw Open Land along the street and the cultivation boundary)</p> <ol style="list-style-type: none"> 1. Choose a symbol in the symbol box. 2. Select a drawing tool. 3. Press the Ctrl key and click on the starting point of the existing object with the left mouse button (A). Click the cursor at the ending point and then release the mouse button (B). Press the left mouse button at the starting point on the street line (B) and release the mouse button at the finish point (C). Go so on to (D)+(E). <p>The Ctrl key has to be pressed always except if you want to draw middle sections without following an object.</p>	

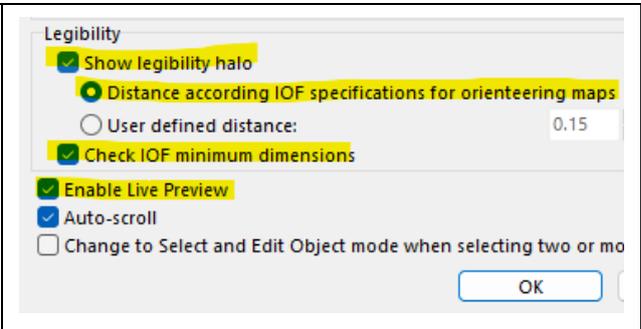
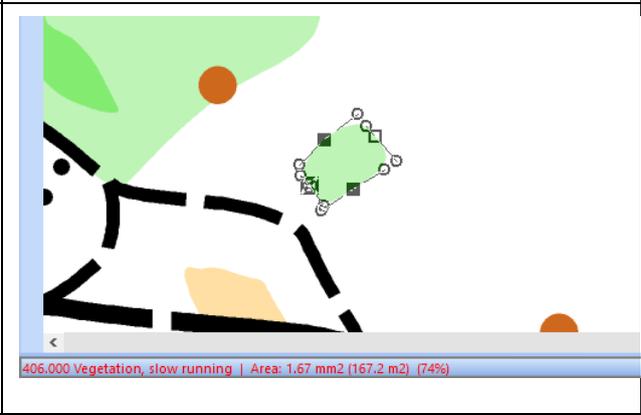
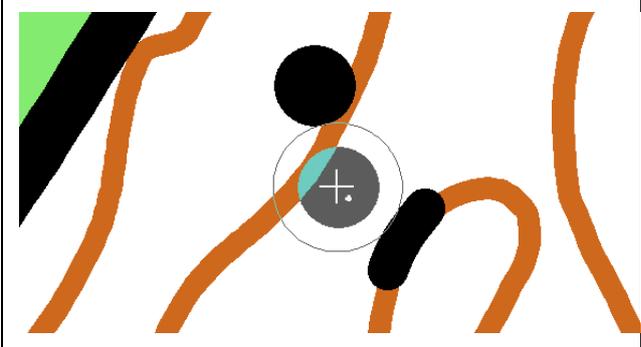
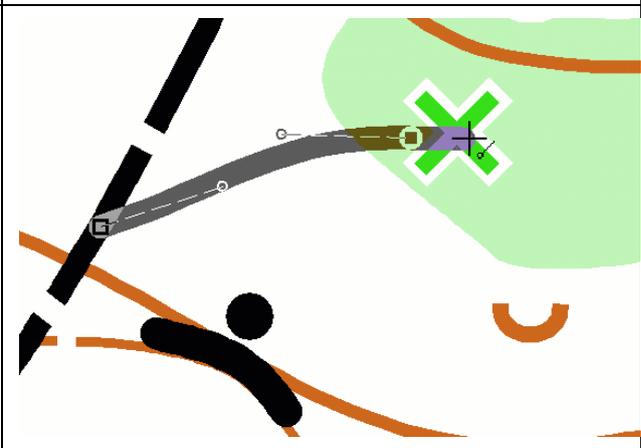
	 <p>3.</p>
<p>Fill/Border</p> <p>An existing line or area can be filled with an area object. (e.g. cultivation boundary filled with rough open land)</p> <ol style="list-style-type: none"> 1. Select the Select Objects and Edit Vertex icon in the toolbar. 2. Click on the object (cultivation boundary). 3. Click on a symbol (rough open land) in the symbol box. 4. Click on the Fill or make border icon  in the Edit Functions Toolbar. <p>The line object is filled with the area object.</p>	<ol style="list-style-type: none"> 1.  2.  3.  4.  
<p>Continue existing objects</p> <p>An existing object can be continued. (e.g. continue narrow ride)</p> <ol style="list-style-type: none"> 1. Select the symbol and the drawing tool 2. Press the Shift key and click on the end of the object and continue drawing. 	 

8.4 Draw map legibly

The term generalisation deals with the question of which objects are important and should appear on a map and which should not. The problem on orienteering maps is rarely that there are too few objects on the map. Rather, the map is overloaded with too many and too small objects. One reason for this is the accurate background maps nowadays, on

which every detail can be seen.

The International Orienteering Federation (IOF) has developed specifications that define a minimum size for each symbol. In OCAD it is possible to check directly during drawing whether the drawn line or surface object corresponds to the minimum size of the specifications.

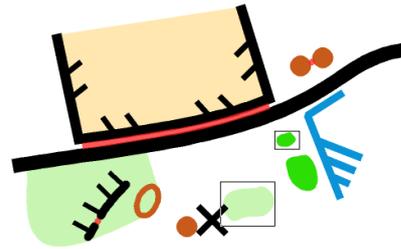
<p>Open the OCAD preferences in the Options menu.</p> <p>Set the settings according to the picture on the right in the category Drawing and Editing.</p>	
<p>An indication now appears in the lower left corner of the screen whether the drawn object already meets the minimum dimension of the IOF specifications or not. If this is the case, the indication appears green. If not, the display appears red. In this case, an additional percentage indicates by how much the object is too small.</p> <p>Of course, there are always legitimate reasons to ignore the minimum dimensions. Nevertheless, this tool sensitises to draw objects large enough or omit them in favour of readability.</p>	
<p>The readability halo reminds the user to leave enough space between adjacent objects.</p> <p>The spacing of this readability halo is based on the IOF specifications. The distance can also be defined by the user.</p>	
<p>The live preview shows the real dimensions of objects while drawing. This way, readability conflicts can already be detected while drawing.</p>	

To check an orienteering map for readability after drawing it, select the **Check legibility** function in the **Map** menu.

With this function you can check minimum distances between objects, minimum lengths of line objects or minimum sizes of area objects.



https://www.ocad.com/wiki/ocad/en/index.php?title=Map#Check_Legibility



Object index	Object type	Symbol	Colors	Number of	Elevation [m]	Length [m]	Area [m]
7	Area object	410.000 Vegetation, Fight	C=204 M=0 Y=255 K=0	10	0.00	-	28.41
10	Area object	406.000 Vegetation, Slow Running	C=51 M=0 Y=76 K=0	16	0.00	-	178.99

9 Edit map objects

 The exercise file *OCAD Basics.ocd* teaches both basic and advanced drawing and editing functions in an interactive way and includes many tips and tricks for more efficient work with OCAD. The exercise is available in different languages under menu **File > Open Sample Map**.

9.1 Editing in general

Numerous editing tools and functions are available for editing map objects:

Edit tools in the **Edit and Drawing Toolbar**



Edit functions in the **Edit Functions Toolbar**



Depending on whether no object, one or several are selected and depending on the object type (point, line, surface), the usable editing tools and functions are active.

To edit an object, it must first be selected:

Select and Edit Object(s)  e.g. move an object

Select Object and Edit Vertex  e.g. insert, move, remove a vertex

9.2 Delete, Move, Change History, Change Icon

Delete an Object

1. Select the **Select and Edit Object(s)** icon in the **Edit and Drawing Toolbar**.
2. Click on the **Delete** key. 

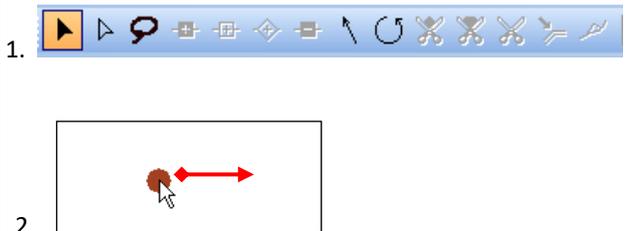


Move an Object

1. Select the **Select and Edit Object(s)** icon in the **Edit and Drawing Toolbar**.
2. Click on the object and move it to the new position with the left mouse button pressed. Release the left mouse button to finish the movement.

 Use the arrow keys

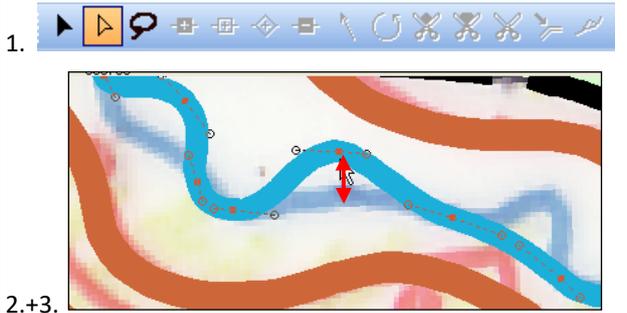
 Use the **Shift** key and the arrow keys to move the object rapidly.

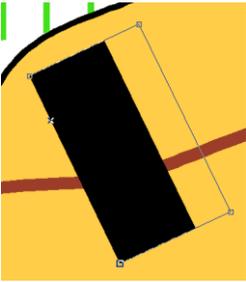
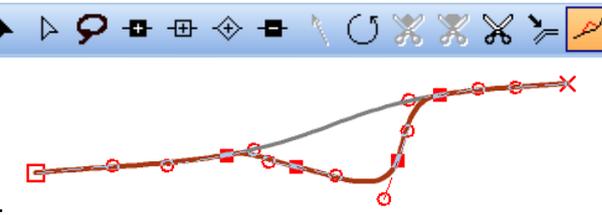


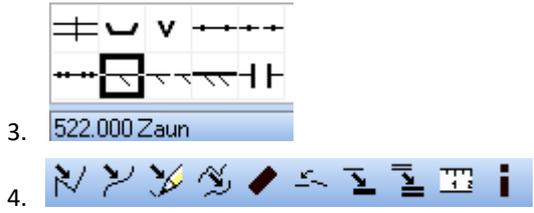
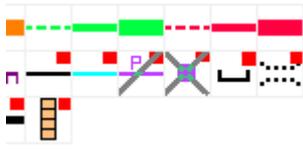
Move Vertices

(e.g. change the watercourse line).

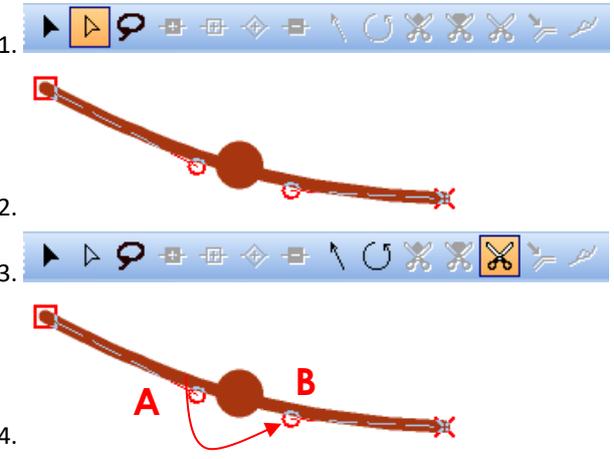
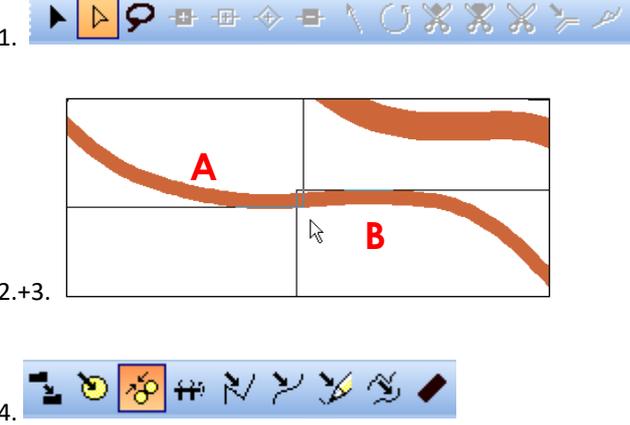
1. Select the **Select Objects and Edit Vertex** icon in the **Edit and Drawing Toolbar**.
2. Click on the line object
3. Move the vertex to the new position with the left mouse button pressed. Release the left mouse button to complete.

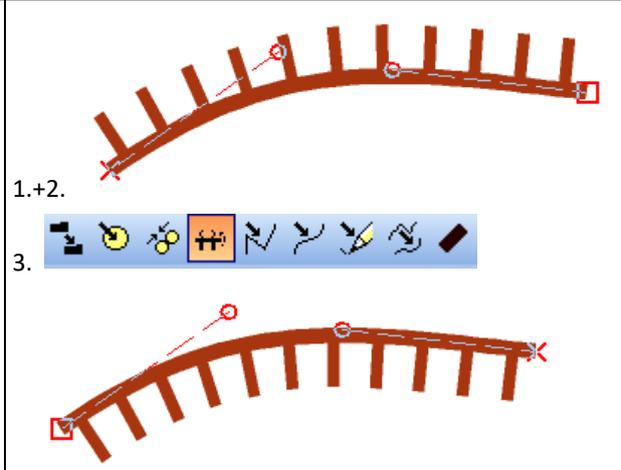
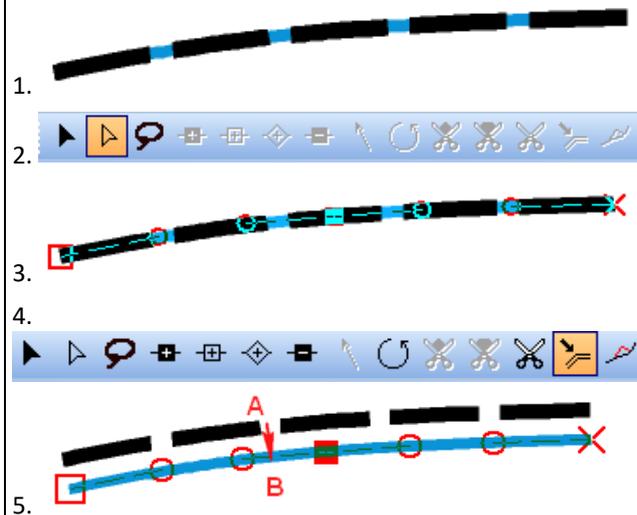


<p>Add a Vertex</p> <p>1. Select the Normal Vertex icon in the Edit and Drawing Toolbar and click on the position to add it.</p> <p> A Vertex can also be added, when you press the Shift and Ctrl key simultaneous while clicking on the object.</p>	<p>1. </p>
<p>Remove Vertex</p> <p>1. Select the Remove Vertex icon in the Edit and Drawing Toolbar and click on the vertex to remove it.</p> <p> Several vertexes can be removed, when you press the Ctrl key and go with the mouse over the vertexes.</p>	<p>1. </p>
<p>Change vertex type</p> <p>Click on a vertex with  holding down CTRL + space bar = change vertex type</p> <p>In the example to the right, the results is a change of the dashing of the object.</p>	
<p>Move Segments</p> <p>To move two vertexes together, click between the vertexes and move it with the pressed left mouse button to the new position.</p>	
<p>Reshape</p> <p>Existing lines and areas can be efficiently edited with the edit tool Reshape.</p> <p>1. Select the Select Objects and Edit Vertex icon in the Edit and Drawing Toolbar.</p> <p>2. Click on the object</p> <p>3. Choose a Drawing tool and after that choose the edit tool Reshape.</p> <p>4. Draw the new section of the object at the beginning and ending vertex locations. Note the start and the finish vertexes start and end exactly on the existing line object.</p> <p>5. This process can also be used to modify area objects.</p>	<p>1. </p> <p>2. </p> <p>3. </p> <p>4. </p>
<p>Change Symbol</p> <p>(e.g. change a high fence to a fence)</p> <p>1. Select the Select and Edit Object(s) icon in the Edit and Drawing Toolbar.</p>	<p>1. </p> <p>2. </p>

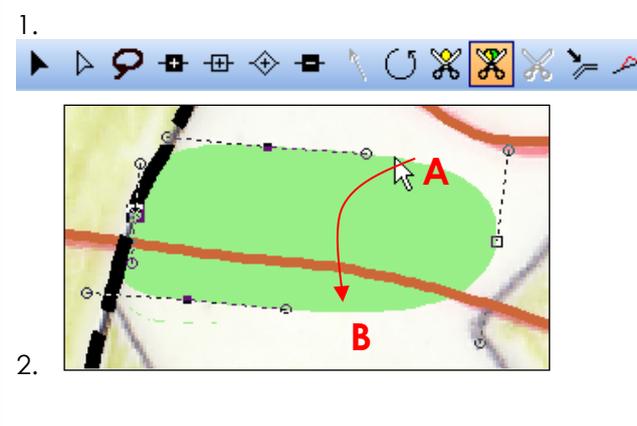
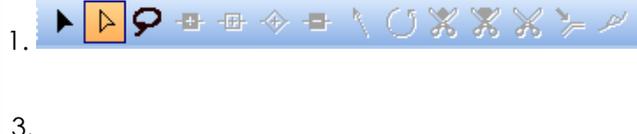
<ol style="list-style-type: none"> Click on the object (e.g. High fence). Click on the new symbol in the Symbol Box (e.g. Fence). Click on the Change Symbol icon  in the Edit Function Toolbar. The object changes to the new symbol. You can change object of the same type by choosing the change all objects icon. 	 <ol style="list-style-type: none"> 522.000 Zaun
<p>Protect or hide objects</p> <p>Protecting or hiding objects can be useful:</p> <ol style="list-style-type: none"> Select one or more symbols Press F3 (protect objects) or F4 (hide objects) Press F2 to make the objects visible and selectable again. <p>Protect objects</p> <p>The objects (e.g., plot boundaries) are still displayed, but cannot be selected by mistake.</p> <p>Hide object</p> <p>The objects are no longer visible, but still present.</p>	

9.3 Edit line objects

<p>Cut a Line</p> <p>(e.g. break the contour at a small knoll).</p> <ol style="list-style-type: none"> Select the Select Objects and Edit Vertex icon in the Edit and Drawing Toolbar. Click on the line object. Select the Cut icon in the Edit and Drawing Toolbar. Click on the first intersection (A), move the cursor with the pressed left mouse button to the second intersection (B). Release the left mouse button. There will now be a gap between the two points. <p> If the lines should be divided, click at the position once.</p>	 <ol style="list-style-type: none">
<p>Merge Lines</p> <p>(e.g. merge two contours).</p> <ol style="list-style-type: none"> Select the Select Objects and Edit Vertex icon in the Edit and Drawing Toolbar. Click on the first object (A). Press the Shift key and click on the second object (B). Select the Merge icon in the Edit Function Toolbar. <p> To do this the connections points have to be in</p>	 <ol style="list-style-type: none">

<p>contact.</p> <p>Reverse Object Direction (e.g. earth bank, when the slope lines are looking uphill)</p> <ol style="list-style-type: none"> 1. Select the Select Objects and Edit Vertex icon in the Edit and Drawing Toolbar. 2. Click on the object. 3. Select the Reverse Object icon  in the Edit Function Toolbar. 	 <p>1.+2.</p> <p>3.</p>
<p>Move Parallel (e.g. a watercourse along a track)</p> <ol style="list-style-type: none"> 1. Draw the watercourse following the existing track (see 8.3.4). 2. Select the Select Objects and Edit Vertex icon in the Edit and Drawing Toolbar. 3. Click on the drawn object. 4. Select the Move Parallel icon in the Edit and Drawing Toolbar. 5. Click on the watercourse (A) and move it away from the track with the pressed left mouse button (B). 	 <p>1.</p> <p>2.</p> <p>3.</p> <p>4.</p> <p>5.</p>

9.4 Edit area objects

<p>Cut Area (e.g. Cut a thicket)</p> <ol style="list-style-type: none"> 1. Select the Select Objects and Edit Vertex icon in the Edit and Drawing Toolbar. 2. Click on the area object. 3. Select the Cut Area icon in the edit toolbar. 4. Click on the first intersection at the border (A), move the cursor to the second intersection at the border with the pressed left mouse button (B). Release the left mouse button. You now have two objects. 	 <p>1.</p> <p>2.</p>
<p>Cut Hole (e.g. forest in an open land)</p>	 <p>1.</p> <p>3.</p>

1. Select the **Select Objects and Edit Vertex** icon in the **Edit and Drawing Toolbar**.

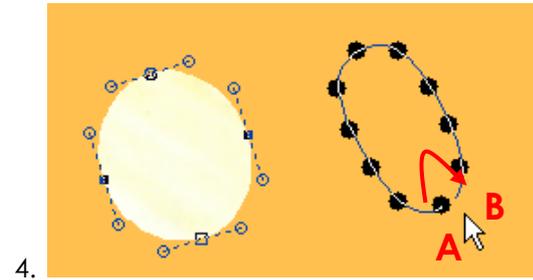
2. Click on the area object.

3. Select a drawing mode (Curve, Ellipse, Circle etc.)

4. Draw the hole in the area object.

Variation: Draw the hole by following an existing line (see 3.4.2).

Ctrl key + click on the starting point (**A**). set the cursor on the finish point on the line and release the **Ctrl** key (**B**).



10 Manage Sketch objects

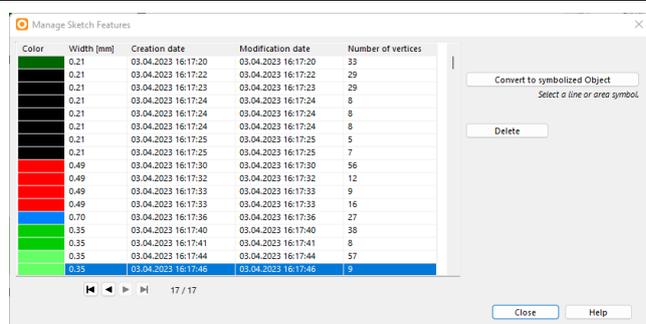
It can happen that during the final drawing certain sketch objects are hardly visible whereas other sketch objects cover already existing OCAD objects.

Whether the sketches should be continuously deleted during the final map drawing is a matter of personal preference. It is certainly important to know the different ways in which sketches can be managed and displayed.

Manage Sketch Features

All sketches are listed under menu **Sketch > Manage Sketch Features**

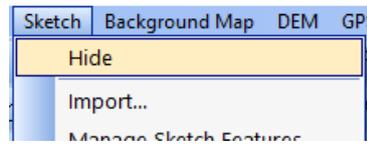
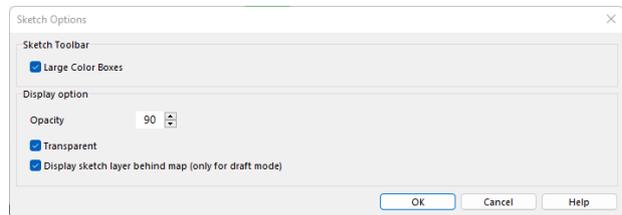
When a sketch is selected in the list, it is displayed in the OCAD drawing area.



Show sketches

Under Menu **Sketch > Options** there are different display options that make sense depending on the situation. We recommend testing different display options.

All sketches can be hidden under menu **Sketch > Hide**.



Delete sketch

The following options are available for deleting sketches.

- Eraser

The eraser in the sketch toolbar can be used to erase sketches completely or partially.

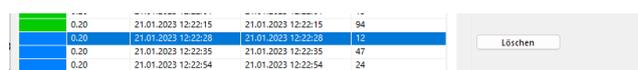
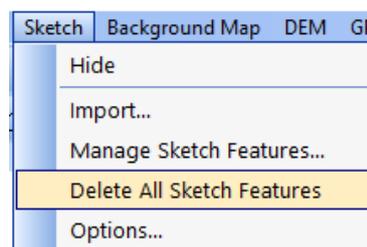
 Depending on the zoom level, sketch objects can be erased with varying degrees of **coarseness**.

- Delete All Sketch Features

Under **Sketch** menu, the corresponding function deletes all sketch objects.

- Manage sketches

Sketches can be deleted individually under **Sketch > Manage Sketch Features**.



Visual inspection

At the end of the final map work, the question arises: Have I worked through all my sketches?

In case the sketches were deleted or erased during the

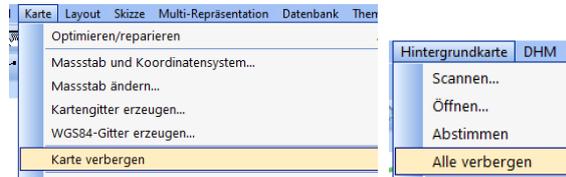
final map work, you can check the list under **Sketch > Manage Sketch Features**.

If the sketches were not deleted during the final map work, a visual check is necessary. To make the sketches clearly visible, the map and background maps can be displayed transparently or not at all.

- Use the slider in the view toolbar to set the opacity of the map (M) and background map (B) to the far left.

or...

- Menu **Map > Hide**
- Menu **Background Map > Hide All**



11 Colours and symbols

Colours

Under Menu **Map > Colours** the colours of the symbols are managed. No colours should be moved or changed in the colour table unless you know exactly what you are doing.

The order of the colours in the colour table controls the overlap: A colour overlaps all colours below it in the colour table when printing.

<https://www.ocad.com/wiki/ocad/en/index.php?title=Colors>

Symbol sets for orienteering maps

OCAD provides many predefined symbol sets for orientation maps and continuously adapts them to the currently valid specifications. Select one of the symbol sets when starting a new file.

If your map is still in an older standard, you can change the symbols under Menu **Map > Convert Symbol Set**.

https://www.ocad.com/wiki/ocad/en/index.php?title=Symbol_Set_Conversion

Create and edit symbol

Create a new symbol under menu **Symbol > New**.

To edit an existing symbol, right click the symbol in the symbol box and choose **Edit**.

https://www.ocad.com/wiki/ocad/en/index.php?title=Create_a_New_Symbol

Change preferred tool

For many symbols, a drawing mode is defined as the preferred tool. This means that when the symbol is clicked, the drawing mode defined as the preferred tool is automatically changed.

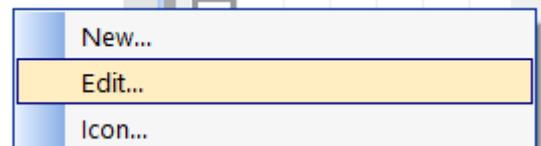
Change preferred tool

1. Click on the symbol in the symbol box with the right mouse button.
2. Select the **Edit** function in the context menu.
3. Select the desired preferred tool in the symbol dialogue.
4. OK

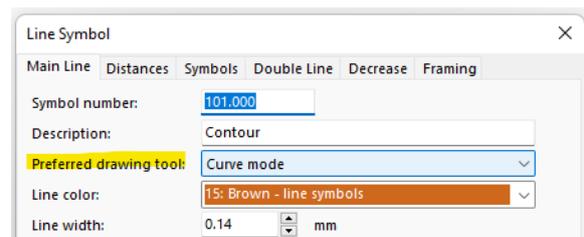


If no preferred tool is desired, the option **None** can be selected in the selection list.

1.+ 2.



3.



12 Layout

In the Layout menu, you can add layout objects, logos, north arrows, scale bars, map legends and QR codes to your map.

12.1 Create layout

Use the function **Edit Layout Objects** in the **Layout** menu to add, remove or edit layout objects and define their properties. The *Edit Layout Objects dialog* appears on the right side of the window. Now you can move, edit or remove layout objects in the drawing area like normal objects.

Choose the **Layout > Import Layout** command to import the layout objects from another OCAD map.

12.2 Add logos

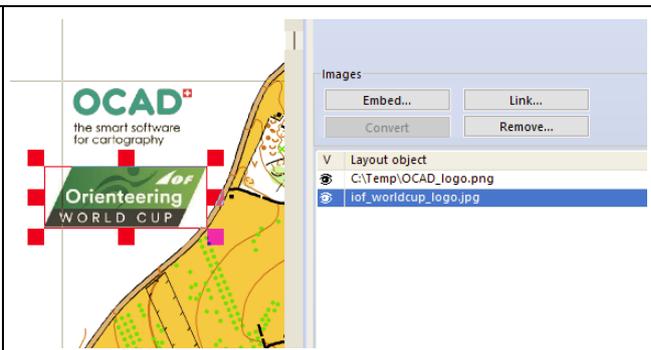
You can add logos as a raster file or import them as a vector PDF file.

Add raster logos

Menu **Layout > Edit Layout Objects**

Embed: By embedding the layout images directly in the OCAD file, the file size increases accordingly.

Link: Unlike with the *Embed* option, you must ensure that the layout images are also supplied and saved in the correct folder if you pass your file on to another person.



Add vector logos

It is also possible to import logos in vector PDF format under the **File > Import** menu. In this case, OCAD creates image objects that have the correct CMYK color values and can be scaled as required.

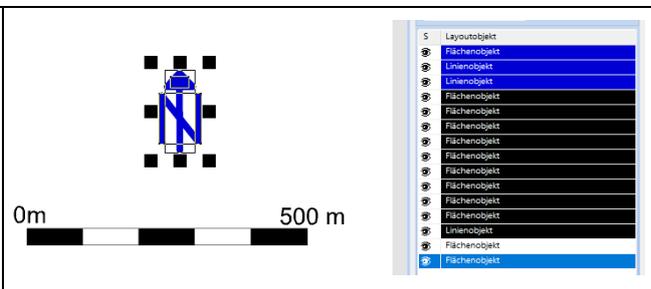


12.3 Add further layout objects

Add North Arrow or Scale Bar

Menu **Layout > Edit Layout Objects > Add North Arrow or Scale Bar**

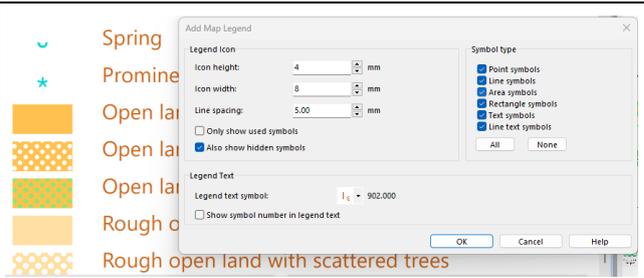
Select a north arrow and a scale bar from the templates. These are listed in the *Edit Layout Objects* dialog.



Add a map legend

Menu **Layout > Add Map Legend**

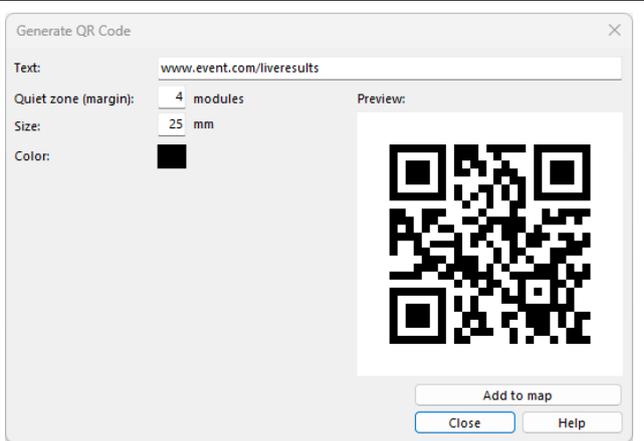
This function creates a legend which you can then change according to your requirements.



Generate QR Code

Menu **Layout > Generate QR Code**

In this way, you can easily link to further information from your map, e.g. to live results or information sheets.



13 PDF export and printing

 Due to the colour representation, we recommend that you always create a PDF from OCAD first and print this PDF, e.g., in Adobe Acrobat Reader.

Background: OCAD works with CMYK colours. What you see on your screen are RGB colours processed by the Windows Graphics Device Interface (GDI). When you print maps directly from OCAD, the Windows GDI first converts the CMYK values to RGB values and your printer driver converts them back to CMYK values. This can lead to changes in the colour values.

Menu **File > Export**

Select PDF as **export format**

 To export a PDF, you must be in Normal View (View menu > Normal View).

Partial map: any rectangle or standard paper format (e.g. A4 landscape format)

Export scale: Select scale

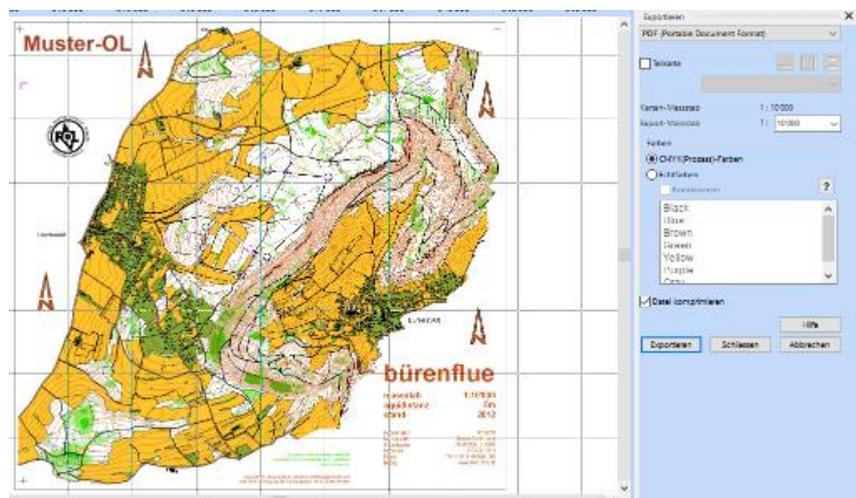
Select **CMYK (process) colours**

Compress file: on/off

-> **Export:** Exports file and saves settings

-> **Close:** Closes dialogue and saves settings

-> **Cancel:** Closes dialogue and **does not** save settings



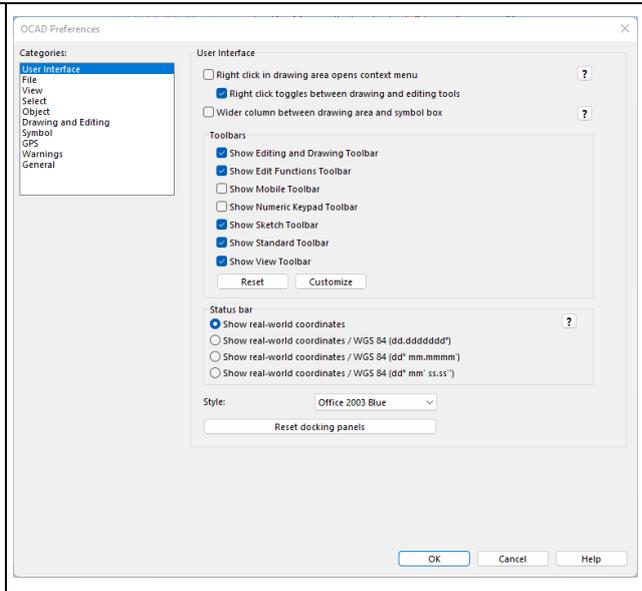
14 Options

OCAD Preferences

In the OCAD Preferences, various settings can be made to adapt OCAD to the personal way of working.

Menu **Options > OCAD Preferences**.

1. Select one of the categories on the left.
2. Make the desired settings on the right.



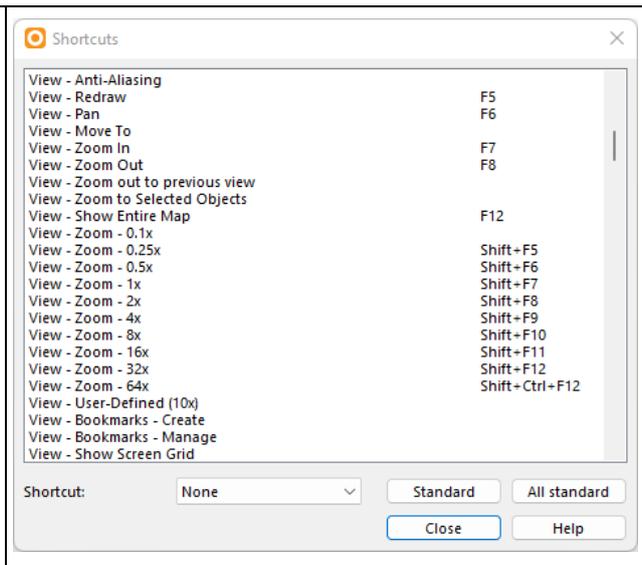
Shortcuts

Shortcuts (function keys) can be set for most functions in OCAD. Some shortcuts are already set by default. Shortcuts can be set in the options:

Menu **Options > Shortcuts**

Select command and desired shortcut.

Close the dialogue.



Language

In OCAD, the language can be changed directly in the programme:

Menu **Options > Language**

Select the desired language.

