One3D

User Guide

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1. Introduction

One3D is MYX's self-standing solution for quick and easy digital twin generation. It leverages cutting-edge technology to deliver an advanced cloud-oriented 3D reconstruction solution. Rooted in MYX's deep expertise in telco asset management, One3D offers advanced digital twin solution for any physical asset, with high precision and quality.

With One3D, customers save significant time and cost, while still enjoying top-quality performance and advanced analytical features, powered by cloud-based services.
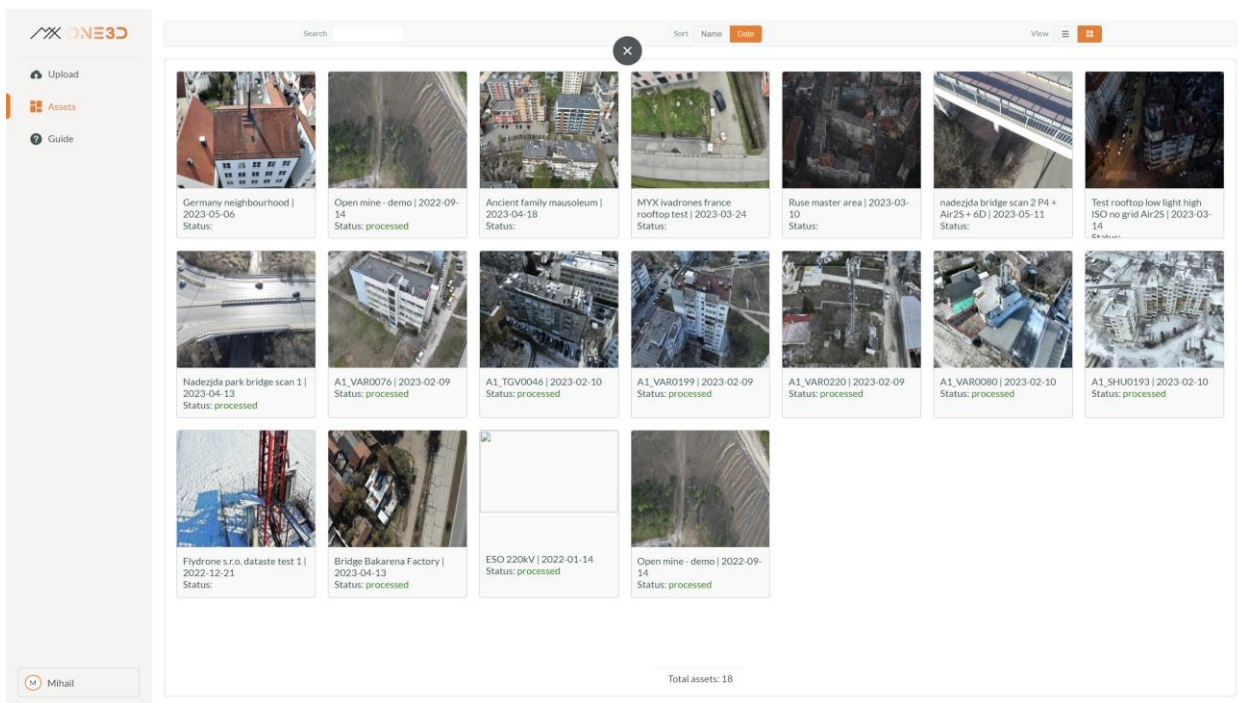
1.1 Why One3D?

Easy to Use - One3D is the easiest-to-use platform for processing, viewing, and sharing 3D photogrammetry models in just a few simple steps.

10 times cheaper - Up to 10x more cost-efficient compared to other solutions.

One free model on sign up - You get one model with up to 2500 images for free upon signing up on One3D.

1.2 Workflow

One3D offers the simplest and most efficient workflow for creating and managing 3D assets available online:

Step 1 - Collect data using your drone, smartphone camera, or any other digital device.

Step 2 - Upload your data and wait for the 3D model to be generated in just a few hours (depends on the size of the dataset).

Step 3 - Preview, inspect, and analyze your digital twin and share it with a click of a button.
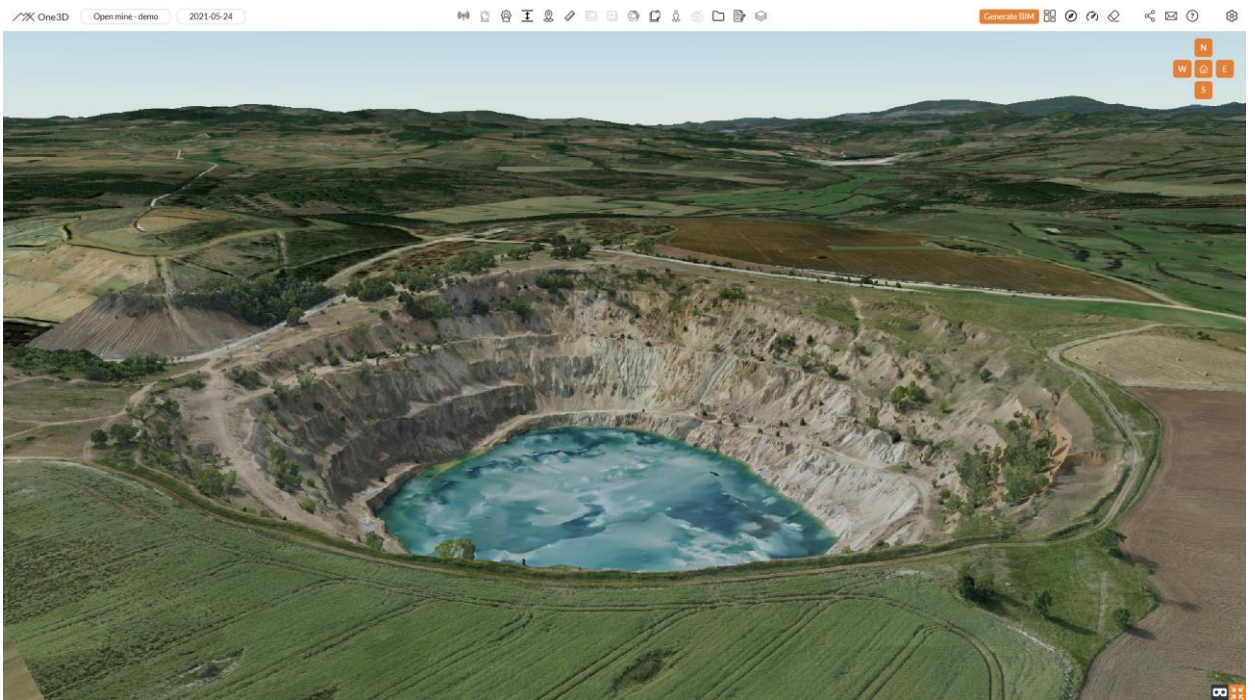
1.3 Getting started with One3D

The first step to get started is to go to the upload page of One3D (**https://app.one3d.ai/dashboard/upload/**) on your preferred browser and select and preview your images. Before the upload starts you will be asked to register, if you haven't got an account yet. Once you have registered and logged into your account the upload can start.

1.4 Registering an account

If you don't already have a One3D account, prior to your first upload you will be asked to create and verify one.

To sign up you will need to fill in your name and email address, create a password and agree to MYX's Terms of Service and Privacy Policy.

Once that is done, check your email for a verification message. To complete the verification process, click the link from that message.
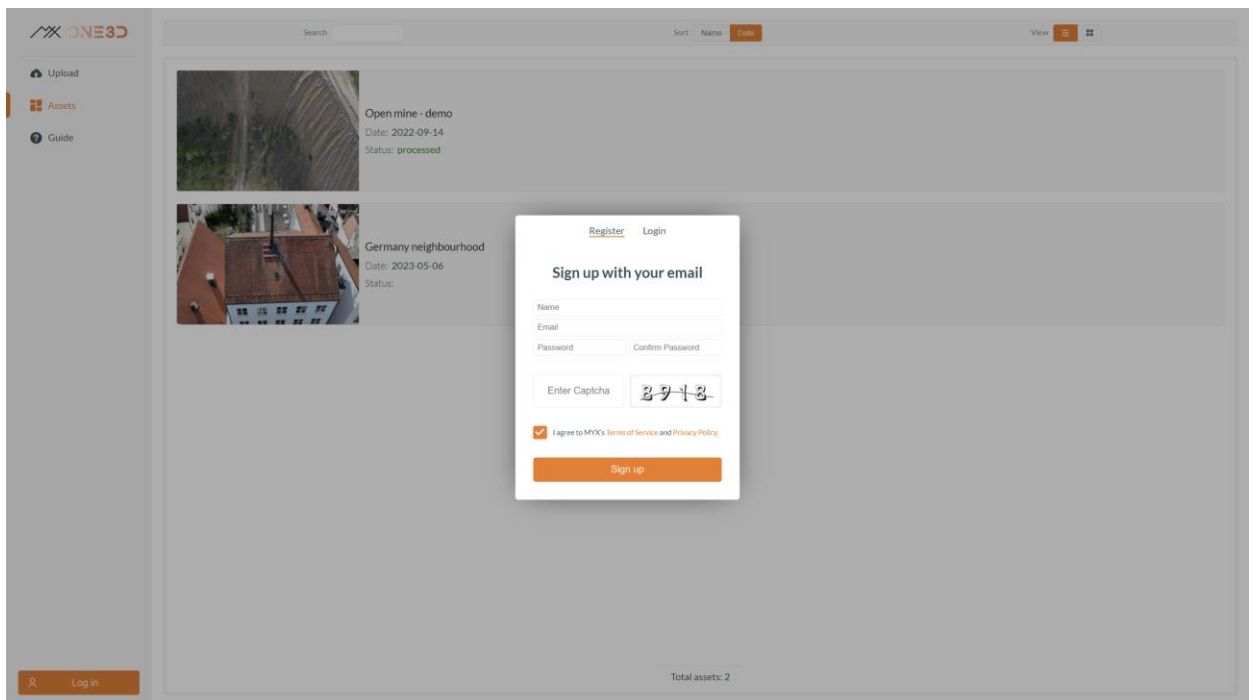
1.5 Logging into an existing account

To login into your existing account click on the "Log in" button on the bottom left side on **https://app.one3d.ai/dashboard**. Fill in your account's log in details and click on "Log in".

1.6 The Upload page

The upload page of One3D can be accessed trough
https://app.one3d.ai/dashboard/upload/

Here you can name your new upload, check your free trial, and preview and edit images prior to starting the upload.

1.7 Uploading files

To upload images to One3D click on "Click or drag files to upload" and select a single folder with all your files. A preview of all selected filles will appear shortly – here you can select files to be removed or add additional ones.

Once all files have been selected name the asset at the top right field of the main view.

On the top right you can check if your account is viable for a free trial (active for your first upload up to 2500 images).

To complete the upload, click on "Upload" at the bottom left corner. A loading bar at the bottom will appear and indicate once the upload has been finished.

1.8 Paying and free credits

Payment for the new asset is required prior to finalizing the upload. Acceptable payment methods include Visa, Mastercard, American Express, UnionPay, and Google Pay.

Free credits, if available, will be subtracted from the payment amount.

Upon registration on One3D each new user receives free credits for uploading up to 2500 images (regardless of their size, resolution, etc.) for their first upload.
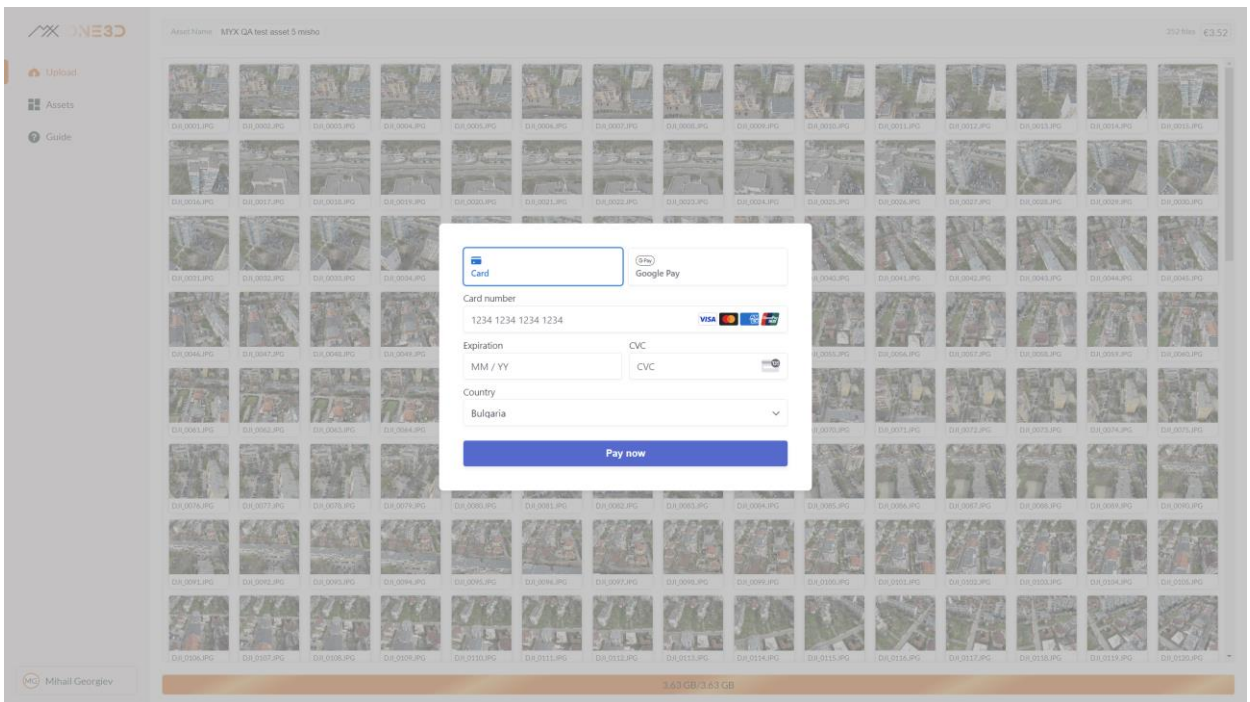
1.9 Processing assets

Once all images of your asset have been uploaded, they will be automatically processed by One3D without the need of any further input from your end. You can check the processing status of the asset on your account dashboard page. If you want to receive an email upon complete processing, you can enable that option from the account settings on the bottom left corner – "Email upon model completion".

1.10 Asset dashboard

You can access all your 3D models trough the asset dashboard page - **https://app.one3d.ai/dashboard/assets/**

On the bottom of the page, you will find the total number of assets you have uploaded (including the two demo models).

In the search field located on the top left corner you can search for assets by their name, date or status.

The sorting option located in the top middle allows for sorting assets by name or date.
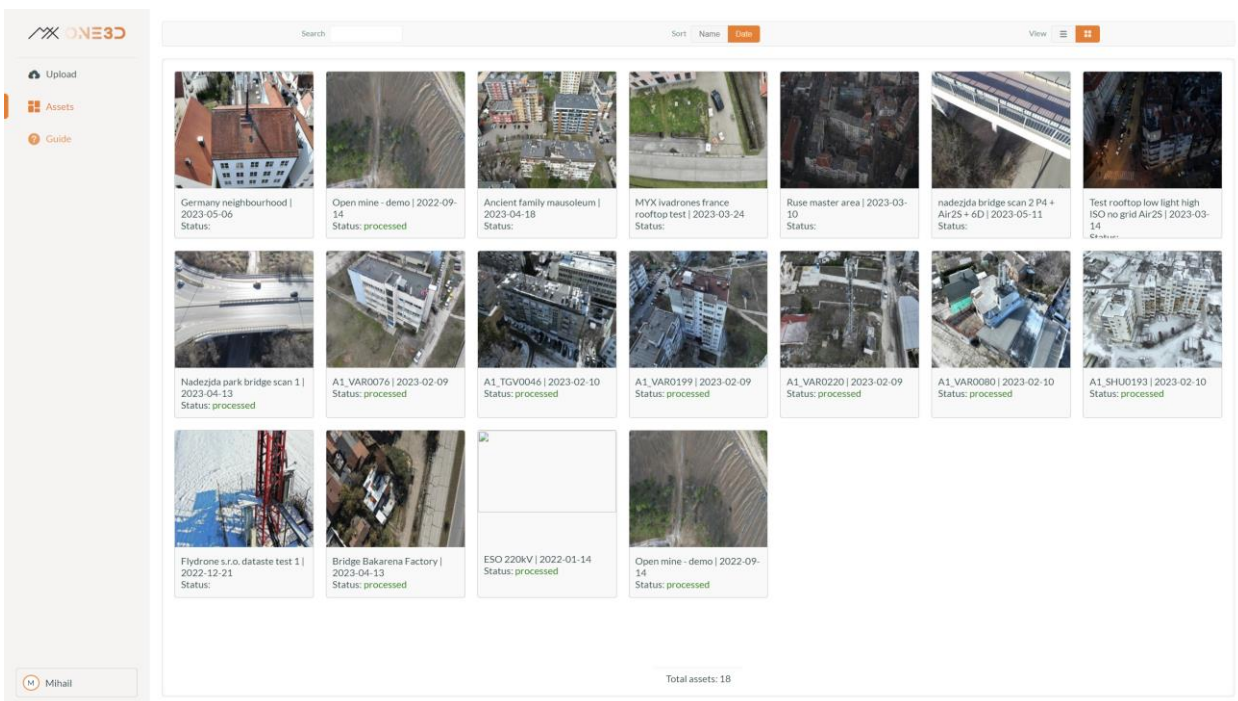
2. Digital twin view

The digital twin view consists of a fully digital and interactive 3D model of the uploaded images of a given asset and its surrounding area. Navigating in 3D space can be done using the mouse/trackpad. Zooming functionality can be accessed by scrolling through a mouse/trackpad.

2.1 Navigating in 3D space

To move in 3D space hold left click on the mouse or the trackpad and move the cursor.

To rotate the view place the cursor on a specific point in the 3D space that will act as the axis, then press and hold the scroll button on the mouse while moving it around.

To zoom in or out, simply position the cursor on any point in the 3D space and use either the scrolling wheel or the scrolling option on your trackpad.

To fix the view to one of the 4 cardinal directions (North, East, South or West), click on the according initial (N/E/S/W) from the top right orange direction buttons.

To reset the view to default, click on the middle (home) button between the top right orange direction buttons.
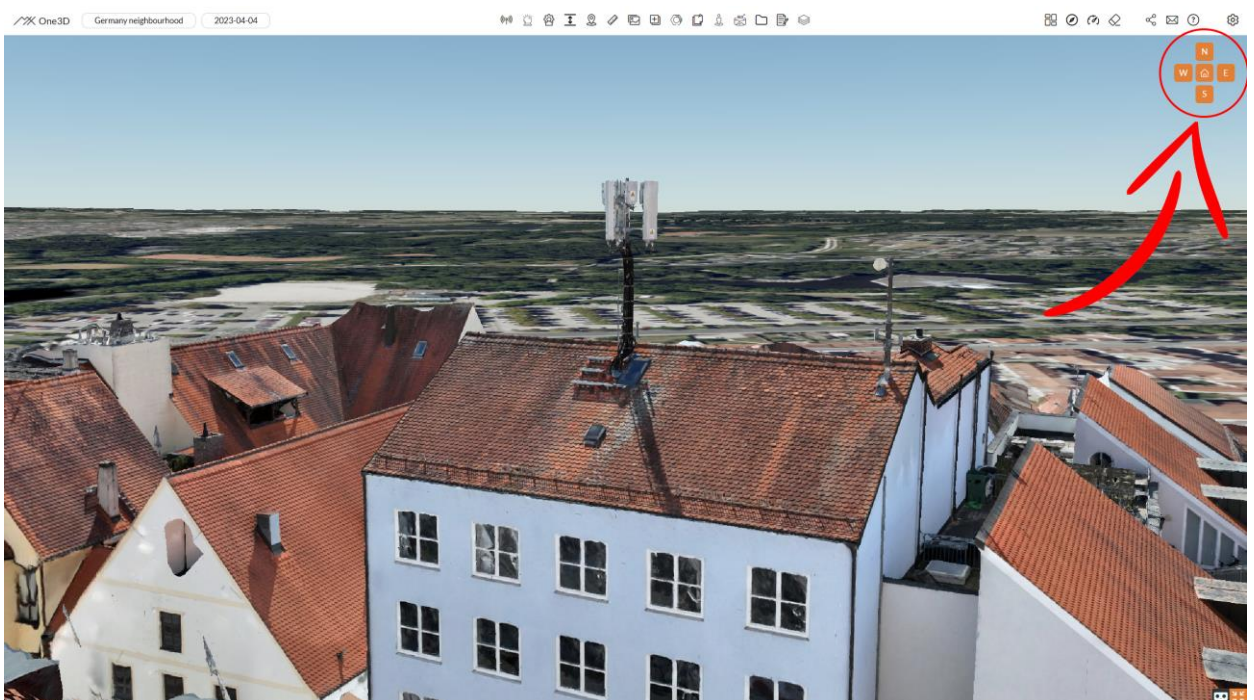
2.2 Measurement tool

With the measurement tools of One3D you can **manually measure distances, heights, angles, areas, perimeters, and volumes based on selected points**. By choosing specific points in the 3D space, you can make accurate measurements for various analysis and planning purposes.

To perform a measurement, choose a measurement tool from the top bar. Depending on the specific tool, select consecutive points on the digital twin until the measurement is complete. Each completed measurement will be saved in the Measurements sidebar, allowing you to rename or delete them as needed.

The following example demonstrates a basic volume measurement that involves selecting multiple points on the digital twin:


2.3 Location tool

The Location Finder tool enables **precise measurement of the location and altitude** of any point within the 3D model.

To utilize this feature, select the Location tool from the top toolbar and hover over the desired area or point of interest within the digital twin view. The measurement results will be displayed immediately.

By left-clicking, you can **save the measured data on the right sidebar and have the values automatically copied to your device's clipboard** for easy access and further use.

You can also search for a location by typing in an address.

The following example demonstrates a basic location and altitude measurement:
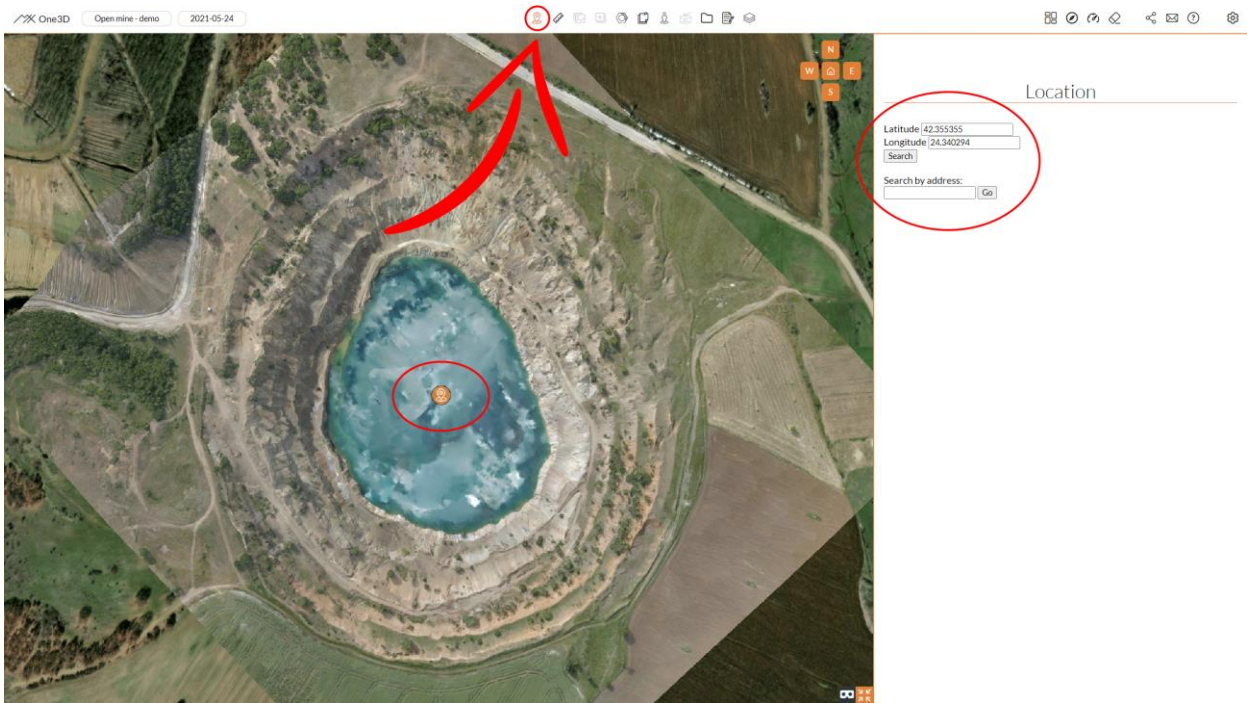
2.4 Images tool

The Images tool provides **convenient access and inspection of the images** utilized in the reconstruction of the 3D model for a selected point, as well as the ability to **view the positions of all the images in 3D space**.

To use this tool, select the Images option from the top toolbar and then left-click on any desired point within the 3D space.

In the digital twin view, you will notice the appearance of 20 orange points, representing the positions of the 20 closest images with a direct line of sight to the selected point.

A sidebar will also appear on the right, allowing you to preview these images. Within it, you can zoom in and out of the selected image, switch to another image, and access additional options. From the top of the sidebar, you can choose to **preview the camera model and settings of the selected image, rotate the digital twin view to align with the image's position and orientation, view the positions of all the images used in the model in 3D space, and download** the selected image.

The following example demonstrates using the images tool to **zoom into a detail from a selected image**:

The following example demonstrates using the images tool to **preview the positions of all images** used for the 3D model reconstruction. To access it from the top menu of the sidebar select "Camera direction". The sidebar displaying the image view can be closed to enhance the preview of the twin while still retaining visibility of all positions by clicking the image tool icon once more:
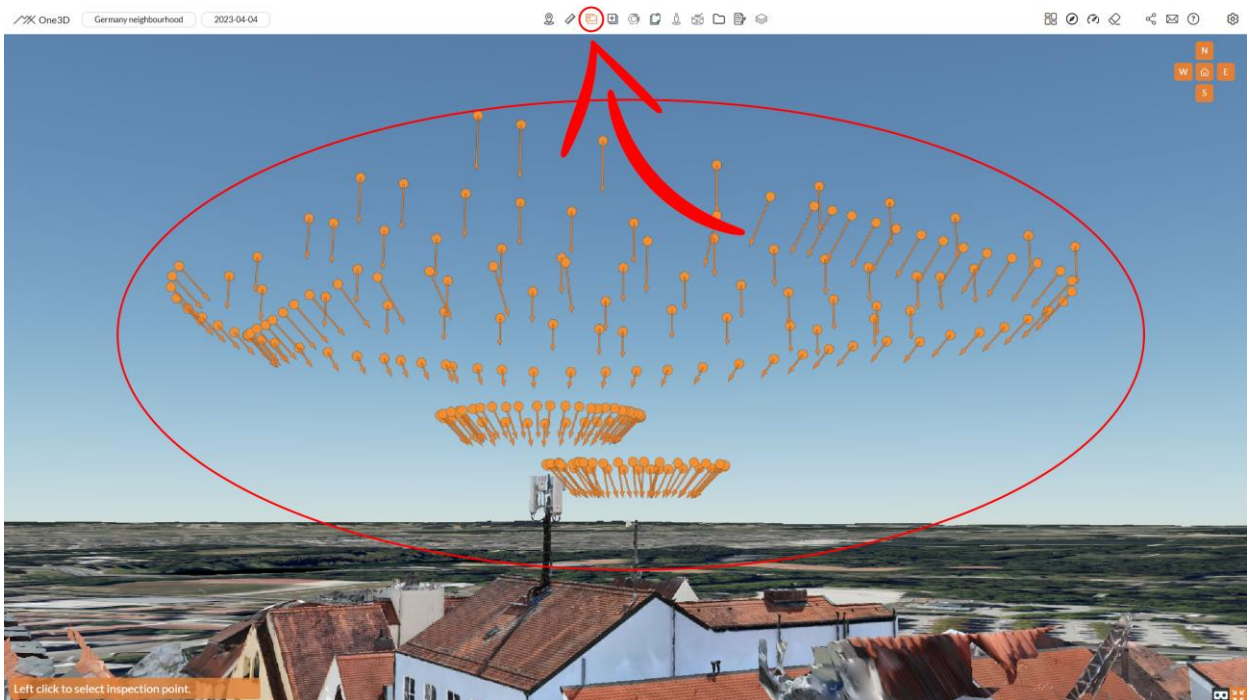
2.5 On-site (additional) images tool

The On-site images feature provides access to supplementary visuals of your asset that were not utilized in the reconstruction of the 3D model. These images should be included in the primary upload folder when initially creating the digital twin. Any images uploaded at a later stage (via the documents tool) will only be visible in the documents section.

To use this tool, simply select "On-site images" from the top toolbar. Similar to the images tool, a sidebar will appear on the right-hand side, enabling you to preview the images. Within the sidebar, you have the option to zoom in and out of the selected image, switch to another image, and access additional features. From the top of the sidebar, you can choose to preview the camera model and settings associated with the selected image, rotate an image, and download the selected image. You can also search for images based on their respective names.

The following example demonstrates using the On-site images tool to zoom into a detail from a selected additionally uploaded image that wasn't used for the 3D model reconstruction:

2.6 Rust tool

The **view rust** tool automatically highlights areas of rust that have been identified in the model. Each rusted area is classified and color-coded using an intensity index ranging from 1 to 10. A rating of 1 (yellow) indicates the lowest level of corrosion, while a rating of 10 (red) represents the highest level.

To use this tool, choose "View rust" from the top toolbar:
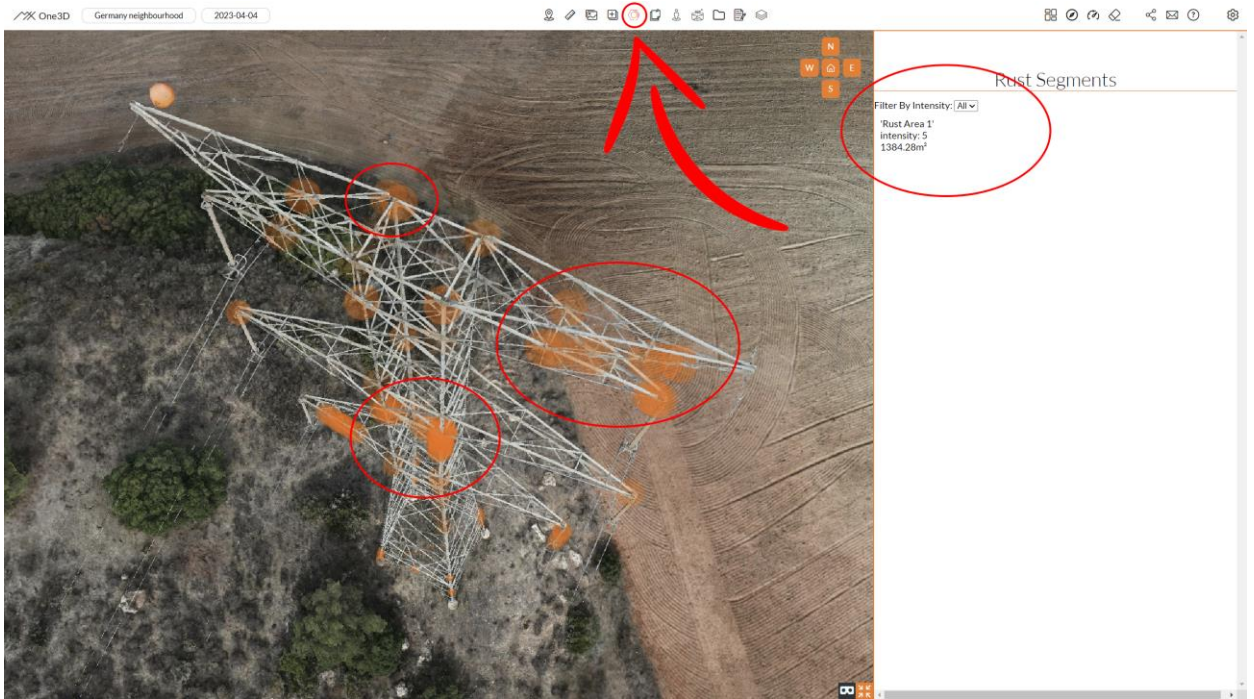
2.7 Annotations tool

The annotations tool allows you to create and modify annotations within the model. Each annotation can contain valuable information about its specific location in 3D space, such as labels, color codes, descriptions (providing additional information), webpage URLs (which can be directly accessed through One3D), and additional images (which need to be uploaded using this feature).

To use the tool, select "Annotations" from the top toolbar. If there are any existing annotations, they will be displayed as icons on top of the 3D model, with each icon assigned a specific color. When you hover over an annotation icon, its corresponding name will be shown.

To create a new annotation, double left-click on the desired point in the 3D model where you want the annotation to be placed. A sidebar will appear, allowing you to edit the label, color code, description, and add a URL or additional images to the annotation. To save the annotation, click on the save icon located at the top of the sidebar.

To view a particular annotation, simply left-click on its corresponding icon within the model. This action will display a sidebar on the right-hand side, allowing you to preview the annotation along with all the additional information it contains. You have the option to modify or add new information as needed. Remember to save any changes made by clicking on the save icon located at the top of the sidebar.

If you wish to delete an annotation, select it directly from the 3D model and choose the delete option from the top of the sidebar.

The following example demonstrates using the annotation tool to preview an annotation:
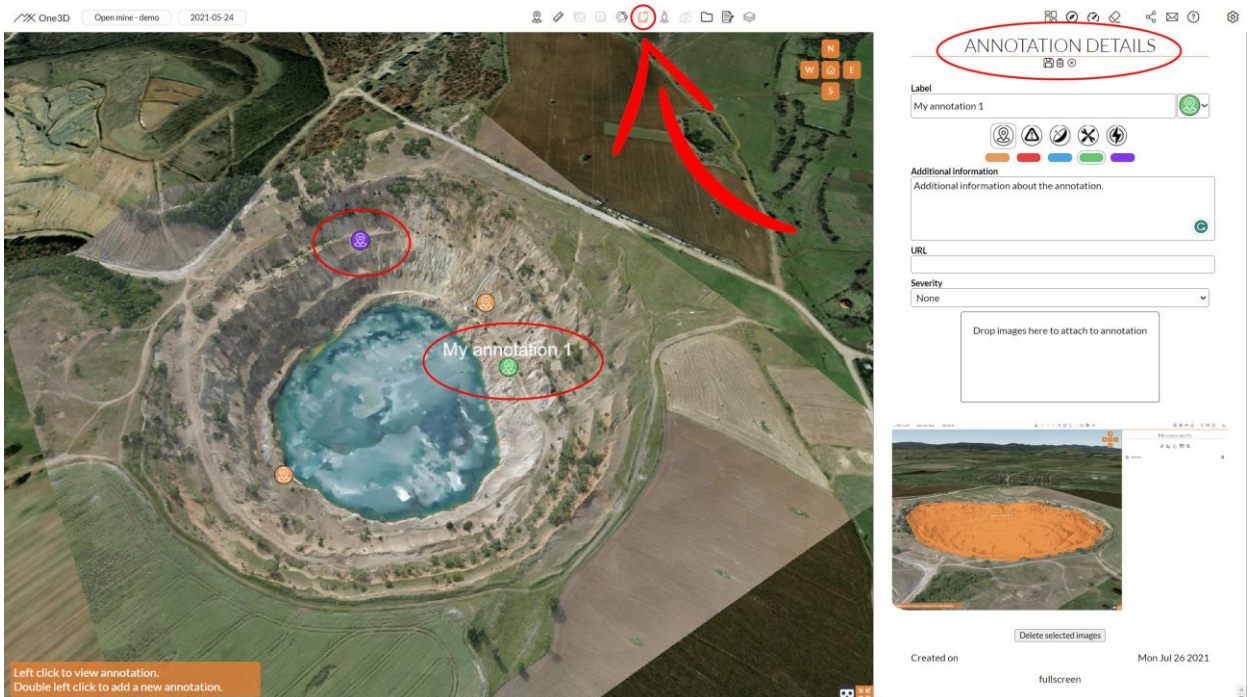
2.8 Google street view

This tool allows you to click anywhere on the 3D model to open the closest Google street view to the clicked location.

To use the tool, select "Google street view" form the top toolbar and click on any desired point within the 3D model. If a Google Street View panorama is present within a 50-meter radius of the selected location, it will automatically open, occupying most of the the twin view. Within the Google street view bar, you can use all standard features offered by Google Street View. To close the view, click again on the tool icon from the top bar.

If no panorama is available within a 50-meter range of the selected location, a corresponding message will be displayed in the bottom left corner of the twin view.

The following example demonstrates using the Google street view tool:
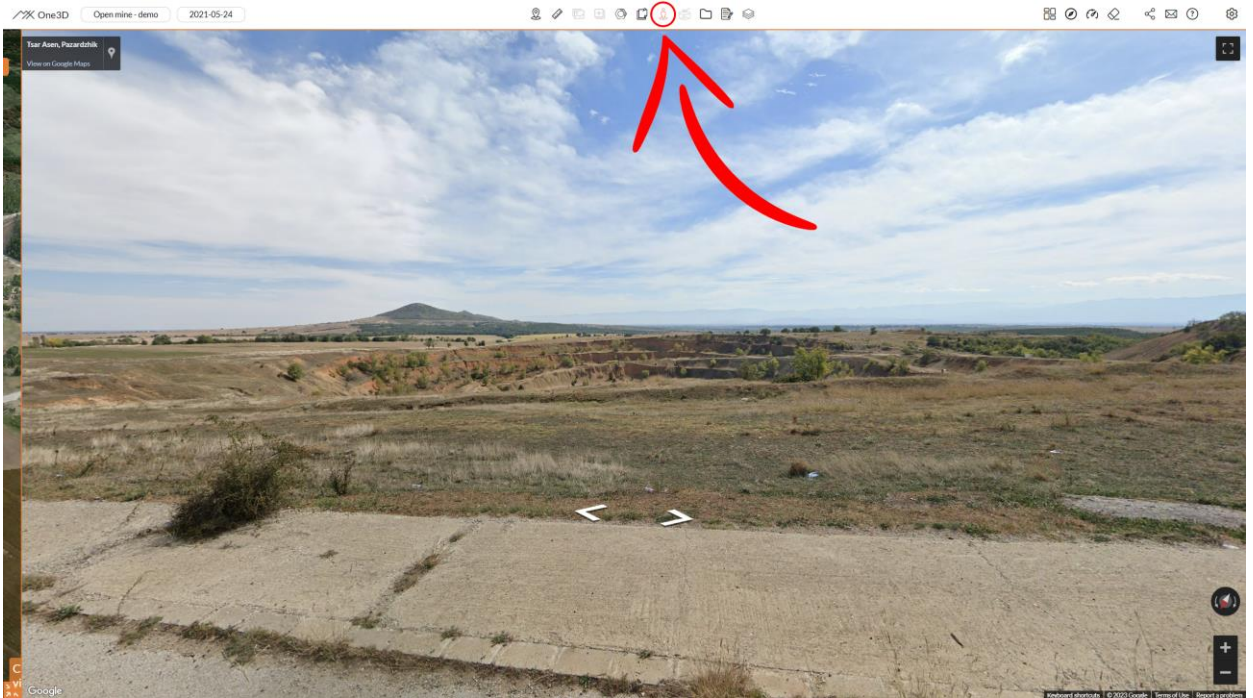
2.9 Panorama tool

The panorama tool allows you to explore 360-degree panoramas of the site, provided they were uploaded during the creation of the digital twin. When uploading panoramas, it is important to upload the individual images that will be stitched together to create the panorama, rather than an already stitched 360-degree panorama. One3D will automatically detect and stitch the panoramas for you.

To use the panorama tool, select "Panoramas" from the top toolbar. If there are any existing panoramas, they will be displayed as icons on top of the 3D model. Hovering over a panorama icon will reveal its corresponding name.

To view a specific panorama, simply left-click on its respective icon within the model. The panoramic image will open, occupying most of the twin view. In the image view, you can zoom in or out, rotate the panorama, or download it by clicking on the download button located at the top of the view. As you rotate the panorama, guiding lines will appear to indicate the center of the view.

On the top right side of the panorama view, you will find an interactive map displaying additional useful information, including the azimuth of the current view and the width of the angle, depending on the current level of zoom in the panorama.

To close the panorama image view or select another panorama, simply click again on the "Panoramas" icon in the top toolbar.

The following example demonstrates using the "Panoramas" tool:
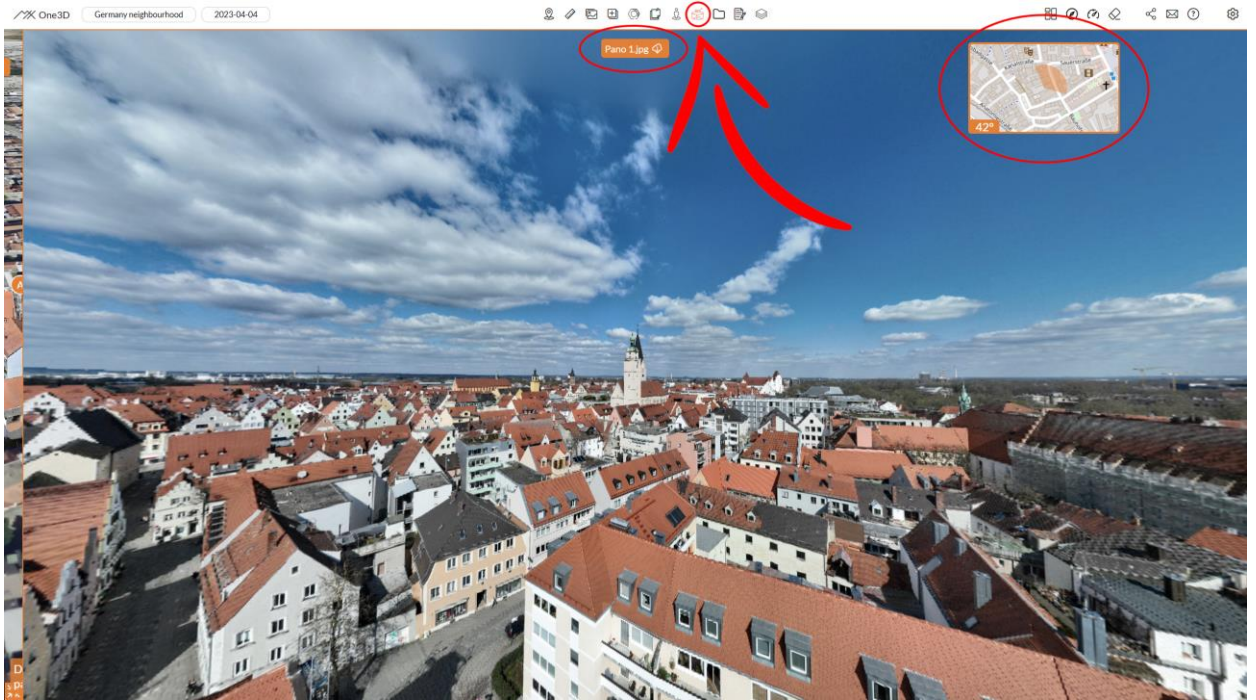
2.10 Documents folder

The documents folder allows you to upload and preview various files associated with your asset.

To use it, select the "Documents" icon from the top toolbar. A sidebar will then appear, allowing you to upload files, search for files based on their names, or perform keyword searches within the content of the files.
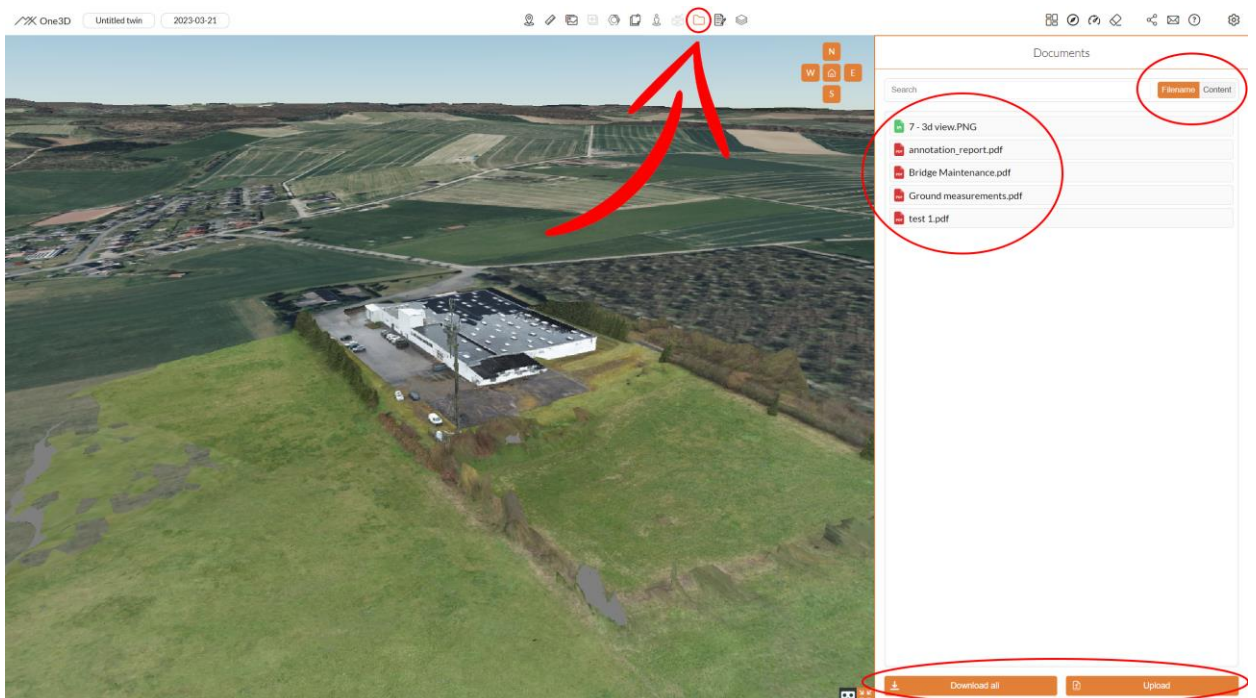
2.11 Notes

The Notes feature enables you to attach text-based notes that are relevant to your asset.

To use the "Notes" tool select its icon from the top toolbar. A sidebar will then appear, allowing you to preview existing notes, create a new note (from the plus button on top of the sidebar), or edit the names and the contents of already existing notes. You can delete a note by clicking on the delete icon under its name.

2.12 Go to dashboard

To navigate back to your account's asset list, where you can access a comprehensive view of all your assets, click on the "Go to dashboard" option located in the top-right toolbar:

2.13 View compass

The "View Compass" function displays the azimuth of the user's point of view. Furthermore, it presents an orange grid overlaying the 3D model, with each unit representing a length of 1 meter.

To use the compass tool, simply select "View Compass" from the top-right toolbar:

2.14 Low resolution mode

The low-resolution mode enables a smooth preview of the 3D digital twin on devices with slower hardware or limited internet connectivity.

To activate the low-resolution mode, click on "Low-res mode" located in the top-right toolbar:
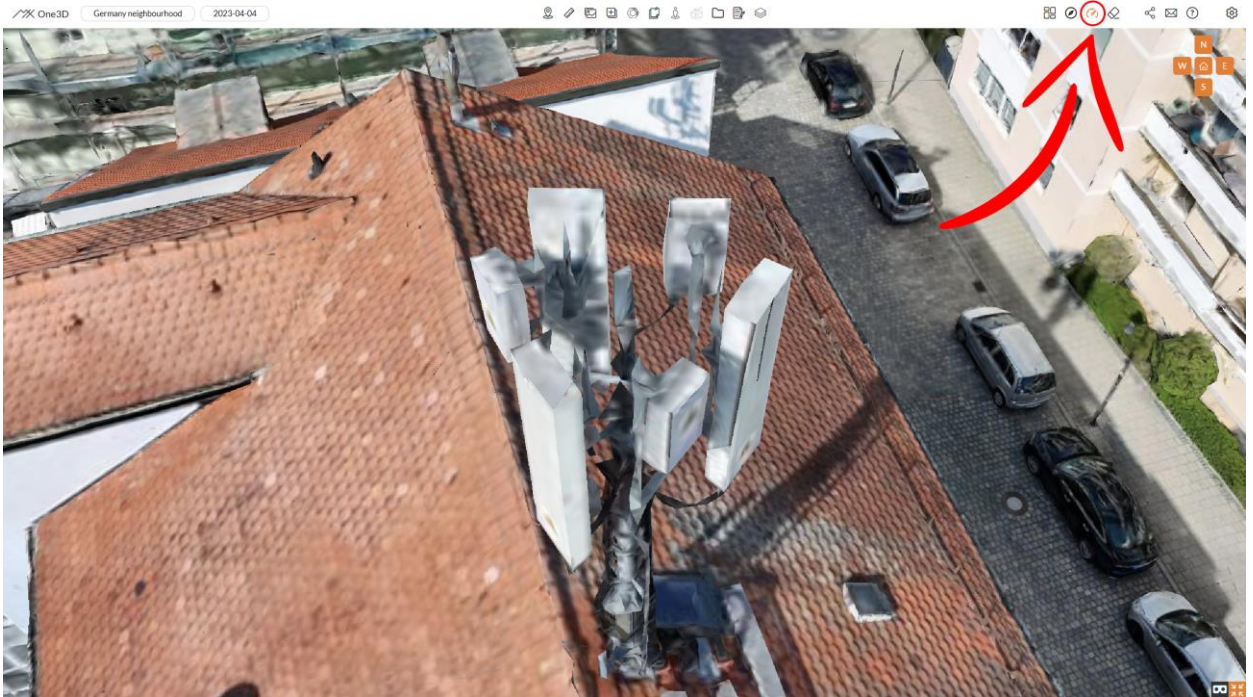
2.15 Reset tools

The reset tools button removes all measurements made with any of the measurement tools (distances, heights, angles, areas, perimeters, and volumes).

To use it, click on "Reset tools" located in the top-right toolbar:
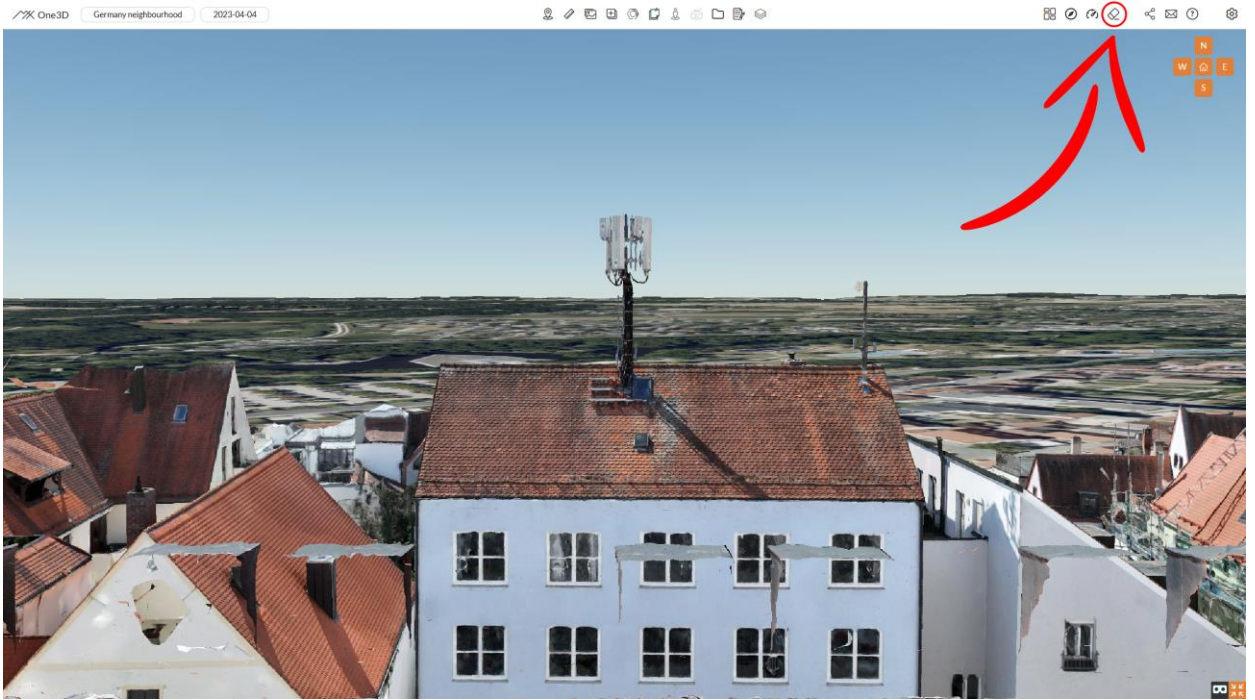
2.16 Get share link

You can easily share your 3D digital twin using its share link. To get the share link within the twin view, simply select the "Get share link" option from the top-right toolbar:

Share link copied successfully

app.one3d.ai/twins/9763/?invcode=7asheX17
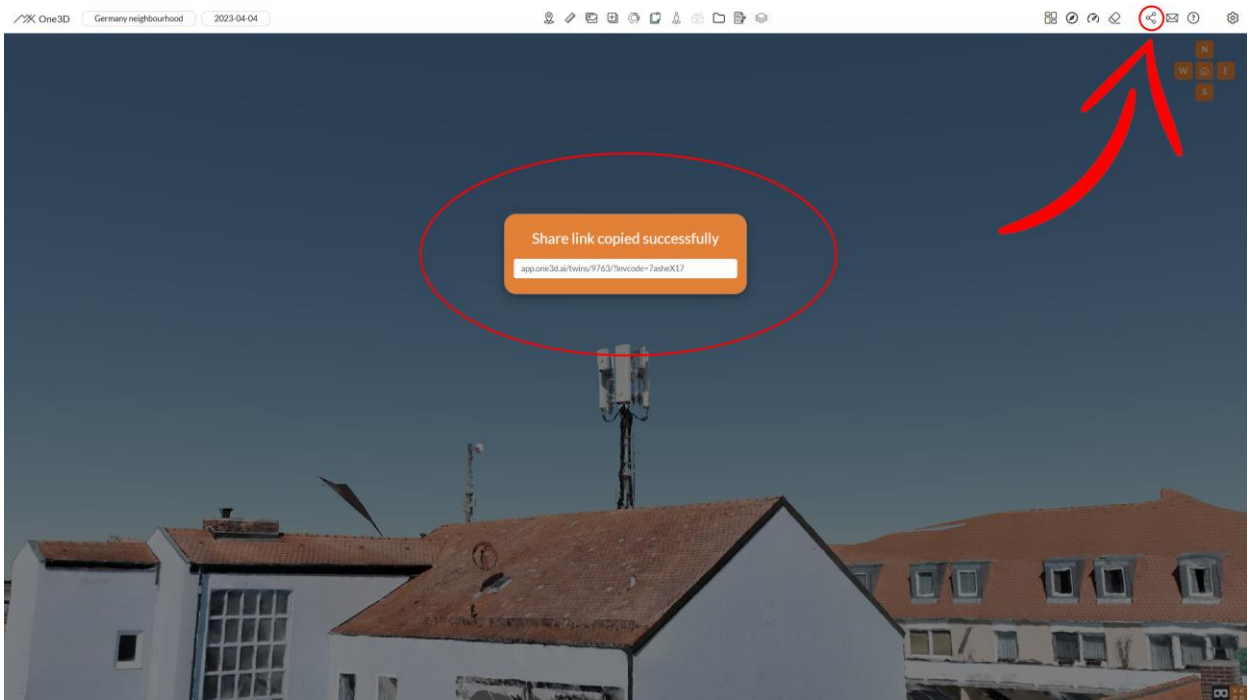
2.17 Access settings

You can **manage who has access to your digital twin** through its access settings. To access these settings, click on "Settings" located at the far right of the top toolbar. From there, you can review the current list of users who have access, add new users, or remove existing ones.

2.18 VR mode

One3D viewer offers the capability to preview your digital assets in Virtual Reality (VR) when connected to compatible equipment, such as the HTC Vive, Valve Index, Oculus Quest 2, Samsung HMD Odyssey, or similar systems.

To switch the 3D digital twin viewer to VR mode, simply click on the "Enter VR mode" icon located in the bottom right corner. To exit VR mode, press "ESC" or the same icon once again:
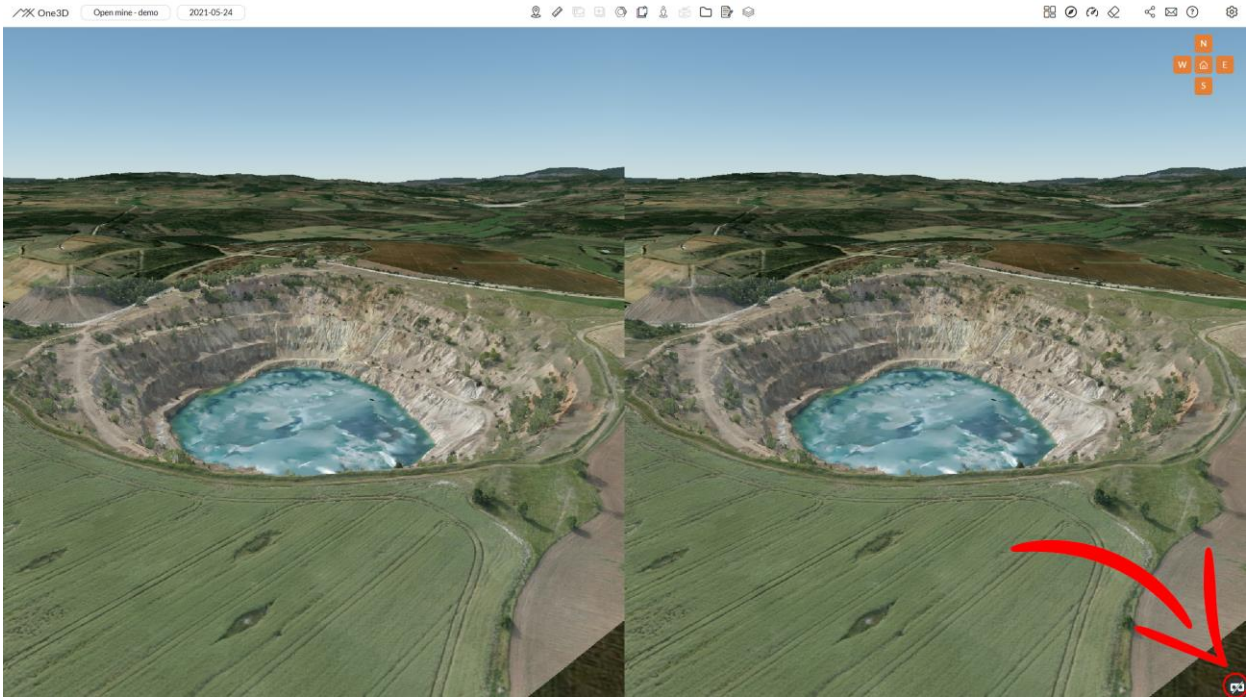
2.19 Full screen view

To expand the digital twin view to full screen, press the "Full screen" button, positioned at far right at the bottom of the view. To exit full screen, press that same button once again or "ESC":
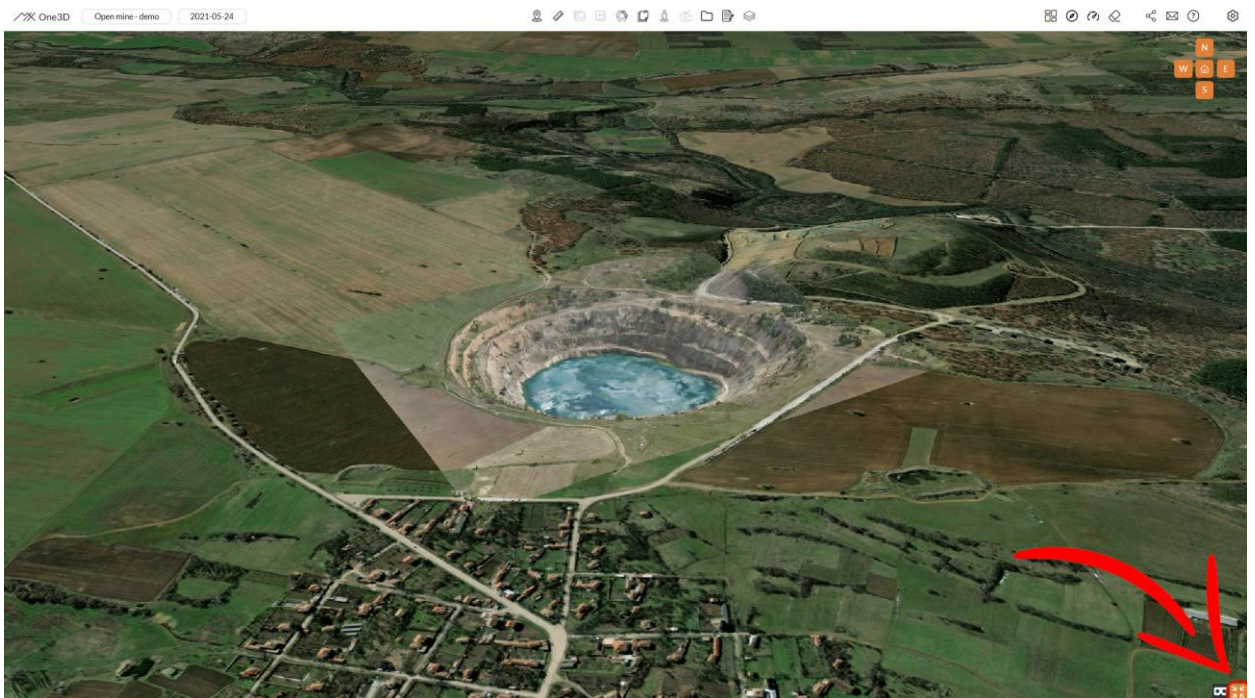
3. Data requirements

One3D supports a wide range of input files for 3D model generation.

3.1 Supported file formats

Image formats - JPEG, Tag Image File Format (TIFF), Panasonic RAW (RW2), Canon Raw (CRW, CR2), Nikon Raw (NEF), Sony Raw (ARW), Hasselblad (3FR), Adobe Digital Negative (DNG), JPEG 2000, ECW, PNG.

One3D uses EXIF metadata if present.

Video formats - Audio Video Interleave (AVI), MPEG-1/MPEG-2 (MPG), MPEG-4 (MP4), Windows Media Video (WMV), Quicktime (MOV).

Point cloud formats - ASTM E57 file format (.e57), Cyclone point cloud export format (.ptx).

3.2 File recommendations

Camera settings:

- Photo format: ".JPG"

- Shutter speed: 1/8000 – 1/200 sec (the faster the better)

- F-stop: 1.2 – 8.0 (the higher the better)

- Recommended ISO: 50 – 200

- Focal length: Fixed focus

- EV: -1.5 – 0.0

EXIF data - for best results make sure that the following information is being recorded in the EXIF of every photo:

- Latitude, longitude and height of the camera/drone

- Roll, yaw and pitch of the camera gimbal

- Camera settings such as shooting mode, shutter speed and ISO

- Camera model, focal length, optical center X/Y

- Date and time

4. Data capture guide

In the following pages you will find best practices and recommendations for collecting visual data for 3D model reconstruction according to MYX's standards.

4.1 Recommended hardware

One3D is compatible with various camera types, including drones, mobile phones, compact digital cameras, DSLRs, fisheye lenses, photogrammetric cameras, and multi-camera systems. It can process both still photographs and individual frames extracted from digital video cameras. However, it does not support linear pushbroom cameras, nor rolling shutter cameras when capturing fast motion scenes.

Recommended DJI drones: Mavic 2 Pro, Mavic 3/Pro/Enterprise, Inspire 2 (with ZENMUSE X7, ZENMUSE X5S, or ZENMUSE X4S gimbal), Inspire 3, Matrice 300/RTK (Zenmuse P1 gimbal), Matrice 350, Matrice 30.

Suggested DSLRs: Sony APS-C cams (a6000/6300/6500), Sony A7/A7R III/IV, Canon Mark 3/4, Nikon D3.

When considering camera options, key features to prioritize include higher resolution, larger pixel size, lower crop factor, and superior low-light performance.

While there is no minimum camera resolution requirement for One3D, using a higher resolution camera enables capturing a subject with greater precision using fewer photographs, resulting in a faster acquisition process compared to using a lower resolution camera.

4.2 Overlap

To ensure comprehensive coverage, it is recommended to photograph each part of the subject from a minimum of three distinct viewpoints. However, these viewpoints should not be drastically different. Ideally, there should be an overlap of at least two-thirds between consecutive photographs. Additionally, the viewpoints of the same part should not be more than 15 degrees apart.

For straightforward subjects, you can accomplish this by capturing approximately 30-50 evenly spaced photographs, encircling the subject from all angles.

In the case of aerial photography, **it is advisable to maintain both longitudinal and lateral overlap of 80% or more**. For optimal outcomes, it is recommended to capture both vertical and oblique photographs. This approach allows for the simultaneous reconstruction of building facades, narrow streets, and courtyards. For a more systematic acquisition, you may choose to prepare a flight plan.

4.3 Projected pixel size

The term 'projected pixel size' refers to the expansion of the traditional ground resolution to encompass a broader range of acquisition configurations, including non-aerial setups.

The quality and accuracy of the resulting 3D model depend on the projected pixel size applied to the subject. To achieve a desired projected pixel size, it is necessary to find an appropriate combination of focal length and distance to the subject, as indicated by the following formula:

projected pixel size × focal length × largest dimension of the photo = sensor width × distance to the subject

[measurement unit/pixel] [millimeters] [pixels] [millimeters] [meters]

Having a uniform projected pixel size throughout the entire image is not mandatory since One3D can automatically adjust for variations in projected pixel size, thereby affecting the resolution and accuracy of the resulting 3D model. However, One3D cannot seamlessly merge photographs with significantly different projected pixel sizes. If a wide range of projected pixel sizes is required, it is advisable to use intermediate values in order to create a smooth transition.

4.4 Focal length

It is advisable to **maintain a consistent focal length throughout the entire acquisition process**.

To achieve varying projected pixel sizes, it is recommended to adjust the distance to the subject. In cases where using multiple focal length settings is unavoidable, such as when the subject distance is restricted, it is advisable to capture several series of photographs, with each series using a fixed focal length.

When using a zoom lens, it is important to keep its position **fixed across a series of photographs**. You can use adhesive tape to secure a manual zoom lens in place.

If the camera model type is specified, One3D can automatically estimate extreme lens distortion when using wide-angle or fish-eye lenses.

Avoid using digital zoom.

4.5 Exposure

Choose exposure settings that minimize the effects of motion blur, defocus, noise, as well as over or under-exposure, which can significantly impact the accuracy of 3D reconstruction.

For optimal results, **manual exposure is recommended** as it reduces the chances of color inconsistencies in the texture map of the resulting 3D model. However, using manual exposure requires proficient photography skills and is best suited for stable and uniform lighting conditions. In situations where these conditions cannot be guaranteed, automatic exposure can be employed.

It is advisable to **disable both optical and digital image stabilization** during the capturing process.

4.6 Lighting

Consistent ambient lighting is preferable over direct and/or changing lighting conditions, as the latter can lead to overexposure or underexposure. When capturing images indoors, it is recommended to use fixed lights rather than flash.

For outdoor capture, cloudy conditions (with high-altitude cirrus clouds and no rain) are preferable to direct sunlight. If capturing photos on a sunny day is necessary, it is advised to take them around noon to minimize shadow areas.

It's important to note that correctly-exposed shadows do not affect the performance of One3D; however, they will be visible in the texture map of the resulting 3D model.

4.7 Photo retouching

Prior to importing photographs into One3D, it is **important not to alter them** by resizing, cropping, rotating, denoising, sharpening, or adjusting parameters such as brightness, contrast, saturation, or hue. Additionally, ensure that the auto-rotate feature on your camera is deactivated.

4.8 Telecom capture guide

1. **Orbits** - A typical scan of a telecom installation includes multiple orbits and orbit-like passes at different heights and distances to the objects of interest. These orbits can be distant (general orbit capture of the whole area) and close-ups (5 to 10 meters from the installation, for capturing the details). For best results, **the minimum recommended overlap for all orbits is 80%.**

2. **Grid missions** - Grid flight missions consist of multiple horizontal passes with the drone over a given zone of interest and are usually used to capture the site surrounding area if needed. These flight passes are usually parallel to each other, equally distant and with a consistent height. These properties, combined with the camera system optics, define the overlap. Higher overlap leads to a better-quality model, but at the cost of increased flight distance and time. **Best results are achieved at 80 – 95% overlap and the minimum recommended overlap is 75%.** Two types of grid missions are recommended for capturing telecom installations – **single grid mission with camera tilt at -90° and a double grid missions with camera tilt at -45°** above the area of interest.