



# **Pix4Dmapper 4.1**

## **USER MANUAL**



Pix4D SA  
EPFL Innovation Park, Building F  
1015 Lausanne, Switzerland  
+41 21 552 0596  
[info@pix4d.com](mailto:info@pix4d.com)  
[www.pix4d.com](http://www.pix4d.com)



This guide explains how to get started with Pix4Dmapper. It shows the needed steps before using Pix4D to obtain good data to achieve the best results, how to create a project and how to start processing it. It also shows how to get started with advanced features such as using Ground Control Points. Offline version of the Getting Started and User Manual: [pdf](#).

#### System Requirements

#### Software Download and Installation

##### Step 1. Before Starting a Project

1. Designing the Image Acquisition Plan
  - a. Selecting the Images Acquisition Plan Type
  - b. Computing the Flight Height for a Given GSD
  - c. Computing the Image Rate for a Given Frontal Overlap
2. Configuring the Camera Settings
3. Georeferencing the Images (optional but recommended)
4. Getting GCPs in the Field or Through Other Sources (optional)

##### Step 2. Creating a Project

1. Creating a New Project
2. Importing the Images
3. Configuring the Image Properties
  - a. Selecting Image Coordinate System (optional)
  - b. Importing Images Geolocation and Orientation (optional)
  - c. Editing Camera Model (optional)
4. Selecting the Output / GCP Coordinate System
5. Selecting the Processing Options Template

##### Step 3. Before Processing (optional)

1. Selecting the Processing Area (optional)
2. Changing the Processing Options Template and /or the Process Options (optional)
3. Adding GCPs (optional)

##### Step 4. Processing

1. Initial Processing
  2. Analyzing the Quality Report
  3. Point Cloud and Mesh
  4. DSM, Orthomosaic and Index
- ##### Step 5. After Processing (optional)

Additionally, there are some recommended articles to consult in order to fulfill some specific actions with the software:

#### Navigating in the Support Site

[Pix4Dmapper Product Editions - Comparison Table](#)

[Features Description](#)

[How to buy Pix4Dmapper](#)

#### News and Updates

##### Using GCPs

[Using the rayCloud](#)

[Using the Volumes](#)

[Using the Mosaic Editor](#)

[Using the Index Calculator](#)

[Using Pix4Dmapper Output Files in Other Software](#)

##### Processing Large Datasets

[Merging Projects](#)

[Uploading Project Files to Pix4D Cloud](#)

[Input Files](#)

[Quality Report Help](#)

[Output Files](#)

#### Project Folder Structure

Pix4Dmapper's Software Manual describes every feature in detail:

[Pix4Dmapper Software Manual](#)



The following description shows the minimum and recommended Hardware and Software requirements:

Minimum:

Windows 7, 8, 10, Server 2008, Server 2012, 64 bits (PC or Mac computers using Boot Camp).  
Any CPU (Intel i5/ i7/ Xeon recommended).  
Any GPU that is compatible with OpenGL 3.2. (integrated graphic cards Intel HD 4000 or above).  
Small projects (under 100 images at 14 MP): 4 GB RAM, 10 GB HDD Free Space.  
Medium projects (between 100 and 500 images at 14 MP): 8 GB RAM, 20 GB HDD Free Space.  
Large projects (between 500 and 2000 images at 14 MP): 16 GB RAM, 40 GB HDD Free Space.  
Very Large projects (over 2000 images at 14 MP): 16 GB RAM, 80 GB HDD Free Space.

 Important: Unusually long times have been observed when processing with some Quadro GPU. This is related to some settings in the NVIDIA control panel. For more information: [218195063](#).

Recommended:

Windows 8, 10 64 bits.  
CPU quad-core or hexa-core Intel i7/Xeon.  
GeForce GPU compatible with OpenGL 3.2 and 2 GB RAM.  
Hard disk: SSD.  
Small projects (under 100 images at 14 MP): 8 GB RAM, 15 GB SSD Free Space.  
Medium projects (between 100 and 500 images at 14 MP): 16GB RAM, 30 GB SSD Free Space.  
Large projects (over 500 images at 14 MP): 32 GB RAM, 60 GB SSD Free Space.  
Very Large projects (over 2000 images at 14 MP): 64 GB RAM, 120 GB SSD Free Space.

 Information:  
An SSD hard drive can speed up processing.  
The graphic card may have an improvement on the processing speed for step 1 and step 2 (if the graphic card is compatible with CUDA (NVIDIA Graphic Cards). Processing time of step 3 is not affected by the GPU. The GPU affects considerably the visualization of the rayCloud. For more information about the use of the GPU: [203405619](#).  
For more information about Hardware components usage when processing with Pix4Dmapper: [202559519](#).  
For more information regarding: Mac / Windows XP / Linux / Remote Access - Virtual machine / Distributed - Parallel processing: [202556809](#).  
For more information about processing speed: [204191535](#).

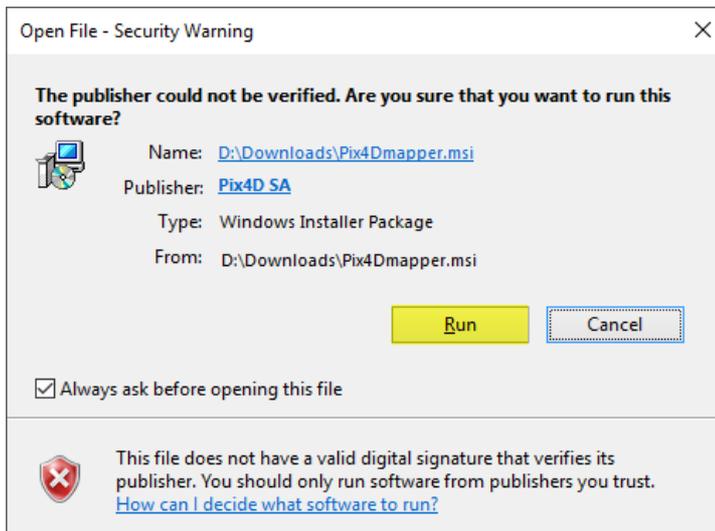
**!** Important: Internet connection is required to download and install the software.

Download the software following:

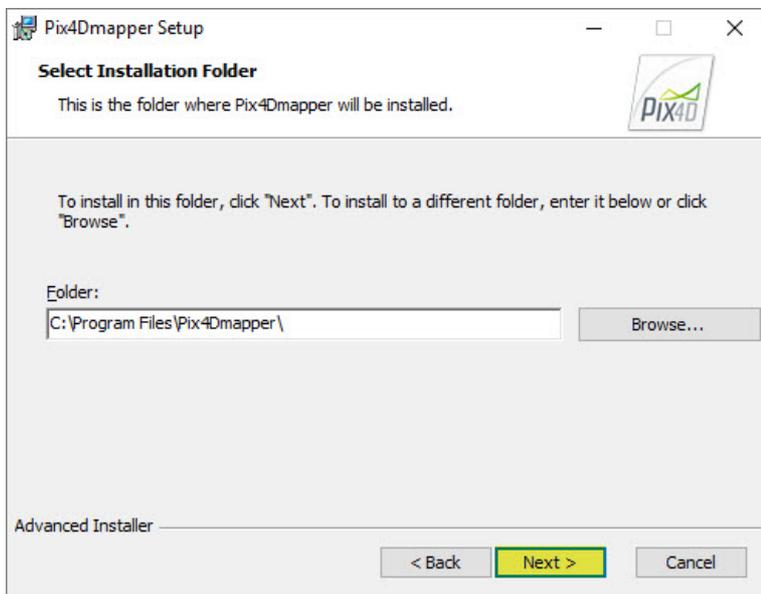
1. Go to: <https://cloud.pix4d.com/download/>.
2. Under the section *Pix4Dmapper* click Download.

Once the software has been downloaded, install it using the following steps:

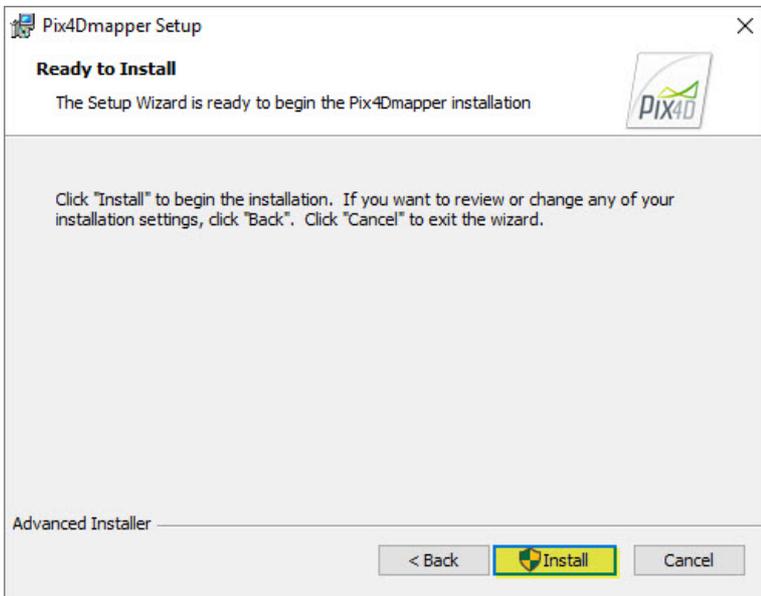
1. Double click the downloaded file. The *Pix4Dmapper Setup* wizard starts.
2. (optional): If the *Open file - Security Warning* pop-up appears, click Run.



3. In the *Pix4Dmapper Setup* pop-up, in the *Welcome to the Pix4Dmapper Setup Wizard* screen, click Next >.
4. (optional) Click Browse... to change the destination path for the installation and click Next >.



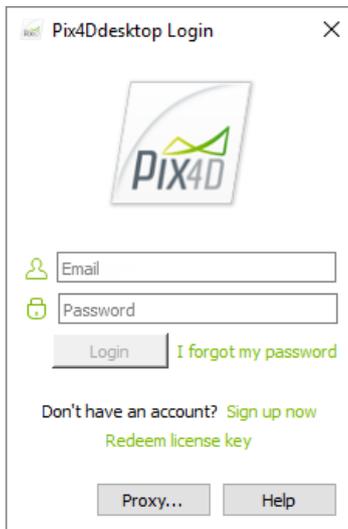
5. Click Install.



6. (optional) In the software information window: "Do you want to allow the following program to install software on this computer?", Click Yes.
7. Click Finish.
8. A shortcut is created on your desktop and the software opens automatically once the installation is completed.



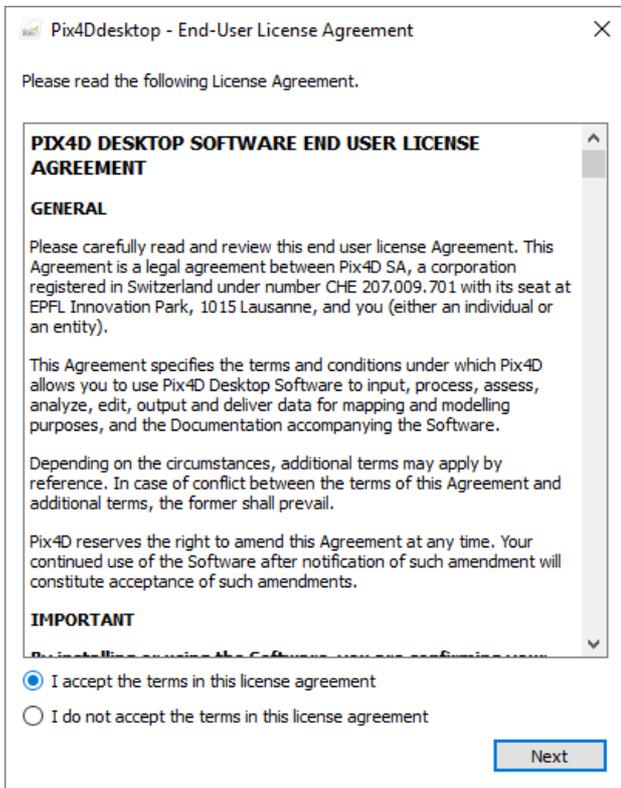
9. The first time the software opens, the *Pix4Ddesktop Login* window appears:  
(If a proxy server is used to connect to internet, click Proxy... and follow these instructions: [202560089](#))



10. Type the *Email* and *Password* of the account and click Login.

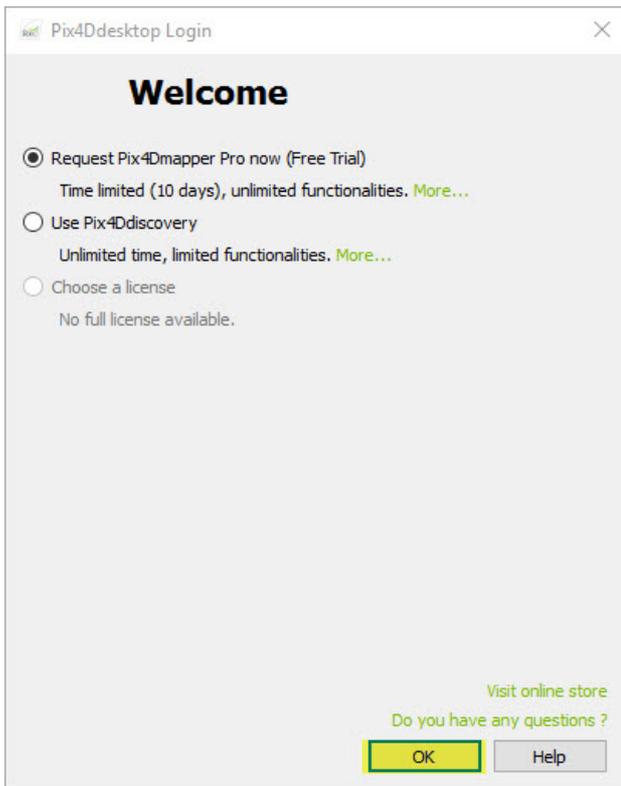
-  Note: If you do not have an account:
1. Click Sign up now.
  2. Complete the online form.
  3. A confirmation email will be sent to activate the account. Open the email and click Confirm my email.
  4. Go back to the *Pix4Ddesktop Login* window, type the *Email* and *Password* and click Login.

11. Read the *End-User License Agreement*, select "I accept the terms in the License Agreement" and click Next.



12. Select:

Request *Pix4Dmapper Pro now (Free Trial)* to activate a 15-day trial.  
Use *Pix4Ddiscovery*, to activate the limited version. For more information: [202559479](#).



13. Click OK.

Pix4D Desktop is now ready for processing!

 Note: When a new version of Pix4D Desktop is available, an update message will appear: [210661706](#).

 Warning: A dataset of insufficient quality will lead to poor results or may even lead to processing failure. This requires taking a new dataset on the field.

The dataset (compulsory: images, optional but recommended: images geolocation and Ground Control Points (GCPs)) have to be obtained on the field before using Pix4Dmapper. A good dataset is required in order to automatically produce results with high quality and accuracy. In order to take a good dataset, follow the steps below:

1. [Designing the Images Acquisition Plan](#): It is very important to design a good images acquisition plan considering:

Type of project (aerial, terrestrial, mixed).

Type of terrain / object.

Type of camera.

Purpose of the project.

Image rate that the images are taken.

Distance (flight height) at which the images are taken and with which angle to take the images.

Path(s) to follow to take the images.

etc.

For aerial projects, this also implies:

Selecting corridor path or regular grid and/or circular grid.

Deciding whether terrestrial images will be used.

If more than one flights are needed to cover the full area: designing the area to cover with each flight.

2. [Configuring the Camera Settings](#): The camera settings used to acquire the images need to be configured. Wrong configuration can result in images with blur, noise, distortions, etc.

3. [Georeferencing the Images \(optional but recommended\)](#): The images can be georeferenced using a camera with built-in GPS or using external GPS devices.

4. [Getting GCPs on the field or through other sources \(optional but recommended\)](#): Using GCPs (Ground Control Points) requires planning how many GCPs have to be acquired, as well as where and how they have to be measured.

In order to automatically get high accuracy results, a high overlap between the images is required. Therefore, the image acquisition plan has to be carefully designed in order to have enough overlap. The image acquisition plan depends on the required GSD by the project specifications and the terrain type / object to be reconstructed. A bad image acquisition plan will lead to inaccurate results or processing failure and will require to acquire images again.

When designing the image acquisition plan the following factors need to be taken into consideration:

Image acquisition plan type: The image acquisition plan type depends on the type of terrain / object to be reconstructed.

Ground Sampling Distance (GSD): The required GSD by the project specifications will define the distance (flight height) at which the images have to be taken.

Overlap: The overlap depends on the type of terrain that is mapped and will determine the rate at which the images have to be taken.

Nowadays, technologically advanced UAVs come with very good software that can design the image acquisition plan given some parameters (area of interest, the percentage of overlap between the images, the desired GSD, etc). In this case, the images are taken automatically by the UAV according to the selected images acquisition plan without any user intervention.

⚠ Important: Pix4Dmapper allows the user to process using a *Processing Template*. The templates with the label *Rapid/Low Res* produce fast results at low resolution that can be used on the field as an indicator of how good the dataset is.

If the *Rapid/Low Res* processing does not yield to good results, very probably, the dataset is not adequate and it is necessary to acquire images again. In some cases, the *Rapid/Low Res* option fails while the *Full* processing successfully reconstructs the model.

For more information about the difference between *Rapid/Low Res* and *Full* processing: [202558949](#).

The design of the image acquisition plan consists of 3 steps:

- a. [Selecting the Image Acquisition Plan Type](#)
- b. [Computing the Flight Height for a given GSD](#)
- c. [Computing the Image Rate for a given Frontal Overlap](#)

Pix4Dmapper is an image processing software that is based on automatically finding thousands of common points between images. Each characteristic point found in an image is called a *keypoint*. When 2 *keypoints* on 2 different images are found to be the same, they are *matched keypoints*. Each group of correctly *matched keypoints* will generate one 3D point. When there is high overlap between 2 images, the common area captured is larger and more *keypoints* can be matched together. The more keypoints there are, the more accurately 3D points can be computed. Therefore, the main rule is to maintain high overlap between the images.

As the image acquisition plan has a high impact on the quality of the results, it is important to design it carefully.

⚠ Important: Pix4Dmapper allows the user to process using a *Processing Template*. The templates with the label *Rapid/Low Res* produce fast results at low resolution that can be used on the field as an indicator of how good the dataset is.

If the *Rapid/Low Res* processing does not yield to good results, very probably, the dataset is not adequate and it is necessary to acquire images again. In some cases, the *Rapid/Low Res* option fails while the *Full* processing successfully reconstructs the model.

For more information about the difference between *Rapid/Low Res* and *Full* processing: [202558949](https://202558949).

### Ideal image acquisition plan

The ideal image acquisition plan depends on the type of terrain / object to be reconstructed.:

**General case:** For projects that do not include forests, snow, lakes, agricultural fields and/or other terrain that is difficult to reconstruct.

**Forest and dense vegetation:** For project with areas covered by forest or dense vegetation.

**Flat terrain with agriculture fields:** For flat terrain with homogeneous visual content such as agriculture fields.

**Building reconstruction:** For 3D modelling of buildings.

**Special cases:** For snow, sand, and water surfaces (oceans, lakes, rivers, etc).

**Corridor mapping:** For projects with linear area of interest (roads, rivers, etc).

**Multiple flights:** For projects with images taken using multiple flights.

**City reconstruction (visible facades):** For 3D modelling of urban areas.

**3D interior reconstruction:** For 3D modelling of the interior of buildings.

**Mixed reconstruction:** For combined datasets (interior/exterior and/or aerial/terrestrial and/or nadir/oblique).

**Large Vertical Objects reconstruction:** For 3D modelling of objects like power towers, wind turbines, etc.

**Tunnel reconstruction:** For 3D modelling of a tunnel.

**Small objects:** For 3D modelling of small objects.

⚠ Important: Below it is described the recommended different image acquisition paths and overlap for different cases, despite it may work with lower overlap than the suggested ones, in order to obtain the best possible results, it is suggested to use the recommended overlaps.

### General case

The recommended overlap for most cases is at least 75% frontal overlap (with respect to the flight direction) and at least 60% side overlap (between flying tracks). It is recommended to take the images with a regular grid pattern (Figure 1). The camera should be maintained as much possible at a constant height over the terrain / object to ensure the desired GSD.

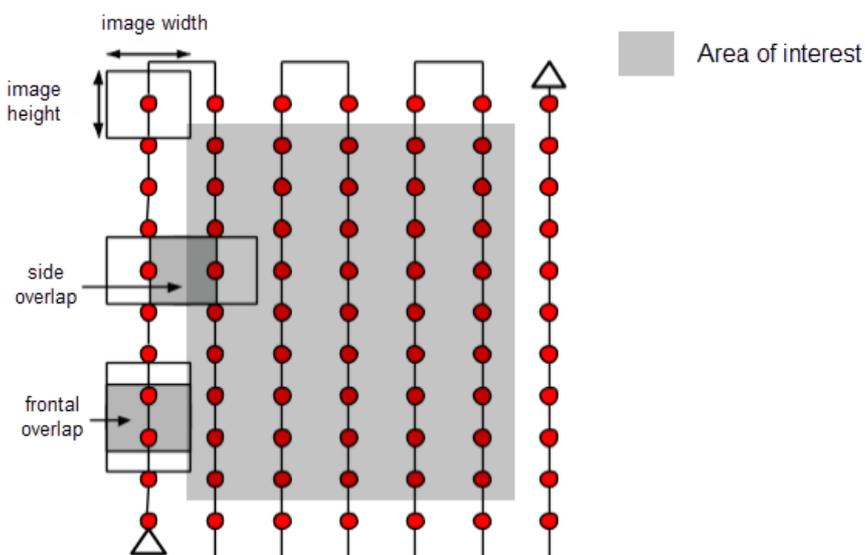


Figure 1. Ideal Image Acquisition Plan - General case.

## Forest and dense vegetation

Trees and dense vegetation often have a very different appearance between overlapping images due to their complex geometry (thousands of branches and leaves). Therefore, it is difficult to extract common characteristic points (keypoints) between the images. In order to achieve good results, it is recommended to use a grid image acquisition plan as the one described in the [General Case](#) section by applying the following changes:

Increase the overlap between images to at least 85% frontal overlap and at least 70% side overlap.

Increase the flight height: At higher altitude, there is less perspective distortion (therefore causing less appearance problems) and the dense vegetation has better visual properties. In other words, it is easier to detect visual similarities between overlapping images in such areas. The flight height in combination with the image pixel resolution and the focal length determine the Ground Sampling Distance (spatial resolution) of the images. Best results are obtained with a GSD higher than 10cm/pixel.

For more information about how to improve the results of dense vegetation areas selecting the correct processing options: [202560159](#).

## Flat terrain with agriculture fields

In cases where the terrain is flat with homogeneous visual content such as agriculture fields, it is difficult to extract common characteristic points (keypoints) between the images. In order to achieve good results, it is recommended to use a grid image acquisition plan as the one described in the [General Case](#) section by applying the following changes:

Increase the overlap between images to at least 85% frontal overlap and at least 70% side overlap.

Fly higher. In most cases, flying higher improves the results.

Have accurate image geolocation and use the *Agriculture* template. For more information about the *Agriculture (Ag)* template: [205319155](#).

## Building reconstruction

Reconstructing 3D buildings requires a specific image acquisition plan (Figure 2):

Fly around the building a first time with a 45° camera angle.

Fly a second and third time around the building increasing the flight height and decreasing the camera angle with each round.

 Note: For more information about oblique imagery: [202559859](#).

It is recommended to take one image every 5-10 degrees to ensure enough overlap, depending on the size of the object and distance to it. Shorter distance and larger objects require images every less degrees.

 Note:  
The flight height should not be increased more than twice between the flights, as different heights lead to different spatial resolution. For more information: [202558979](#).  
Pix4Dmapper generates a high quality point cloud for oblique images of buildings. However, no orthomosaic is generated, when the selected template is *3D Models*: [205319155](#).

 Important: By default, Pix4Dmapper generates orthomosaics that are parallel to the (X,Y) plane. Therefore, to generate mosaics of facades, the *Orthoplane* tool needs to be used. For more information: [202559889](#).

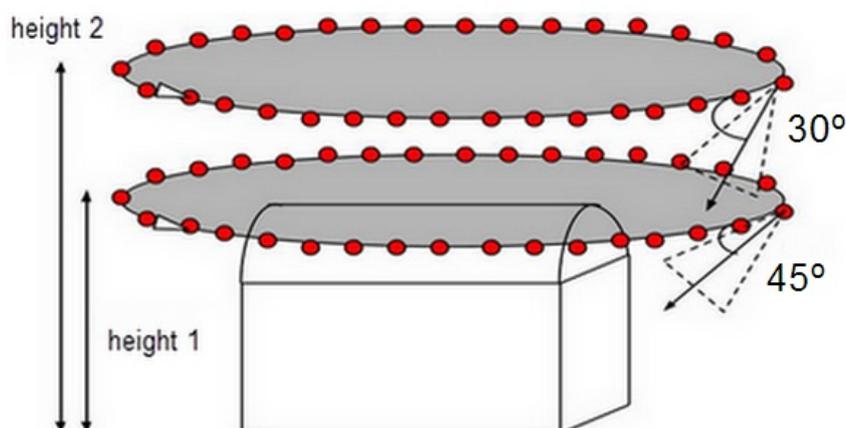


Figure 2. Ideal Image Acquisition Plan - Building.

 Note: It is possible to combine aerial nadir and/or aerial oblique and/or terrestrial images.

The images should have enough overlap in each dataset and between datasets. For such cases it is strongly recommended to use GCPs or Manual Tie Points to properly adjust the different sets of images. For more information: [202561599](#)

## Special cases

This section presents some hints for terrain that is difficult to map such as terrains with snow, sand, lakes, etc.

### Snow and sand

Snow and sand have little visual content due to large uniform areas. Therefore:

Use a **high overlap: At least 85% frontal overlap and at least 70% side overlap.**

Set the exposure settings accordingly to get as much **contrast** as possible in each image.

### Water

Water surfaces have almost no visual content due to large uniform areas. Sun reflection on the water and waves cannot be used for visual matching.

**Oceans** are impossible to reconstruct.

To reconstruct other water surfaces such as **rivers or lakes**, each image needs to have land features. Flying higher may help to include more land features.

## Corridor mapping

Mapping corridors such as railways, roads or rivers requires at least 2 flight lines (Figure 3). GCPs are not required, but are recommended to improve the georeference and accuracy of the reconstruction. For more information about the number and distribution of GCPs in corridor mapping: [202559299](#).

For a dual track it is recommended to use at least 85% frontal overlap and at least 60% side overlap.

It is possible to use nadir images or oblique images (with an angle between 0° and 45° pointing in both tracks to the center of the corridor). For flat terrain it is recommended to use nadir images.

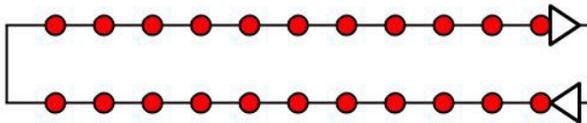


Figure 3. Dual track image acquisition plan for corridor mapping.

If a dual track image acquisition plan is not possible, a single track image acquisition plan can be used if (Figure 4):

Overlap is high enough: At least 85% frontal overlap.

Ground control points (GCPs) are defined along the flight line in zig zag.

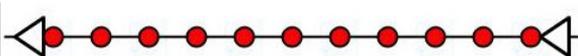


Figure 4. Single track flight NOT RECOMMENDED.

## Multiple flights

Pix4Dmapper can process images taken from multiple flights. When designing the different image acquisition plans, make sure that:

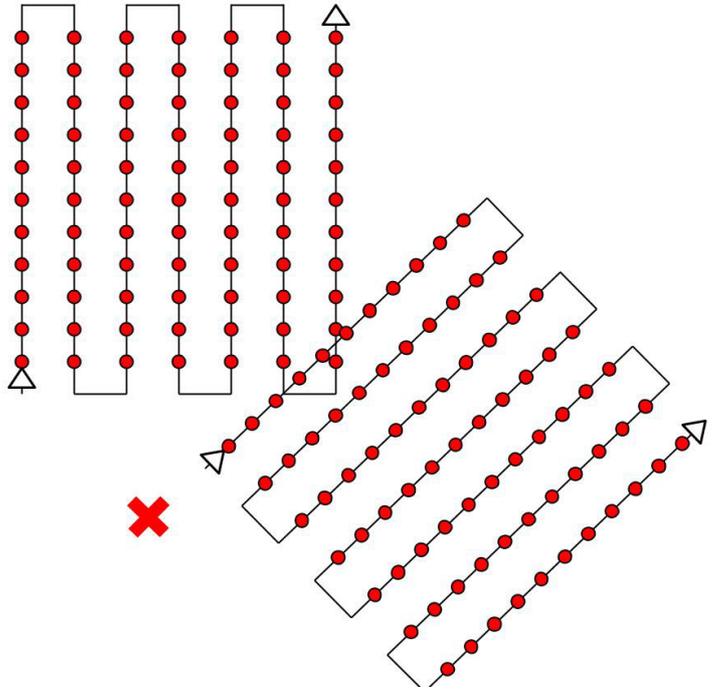
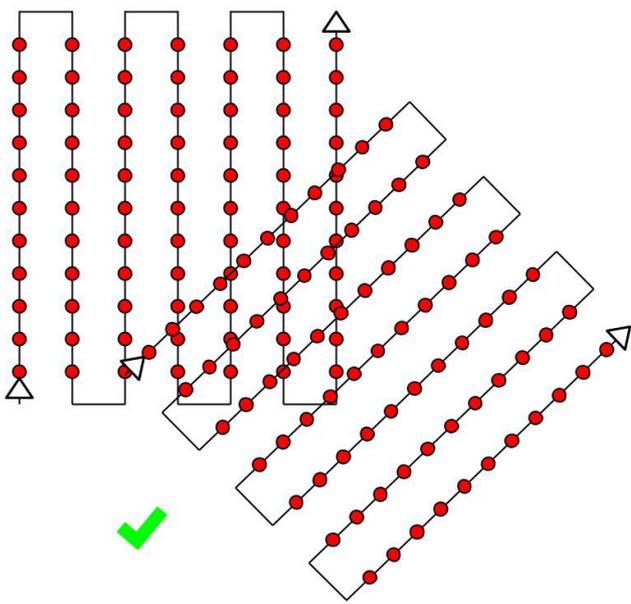
Each plan captures the images with enough overlap.

There is enough overlap between 2 image acquisition plans (Figures 5 and 6).

The different plans are taken as much as possible under the same conditions (sun direction, weather conditions, no new buildings, etc.).

 Important: The flight height should not be too different between the flights, as different height leads to different spatial resolution. For more information: [202558979](#).

There is a special way to process datasets taken from multiple flights, for step by step instructions: [202558579](#).



Enough overlap between 2 flights  
 Figure 5. Overlap between 2 flights.

Not enough overlap between 2 flights



Figure 6. Recommended image acquisition plan for 2 flights.

City reconstruction (visible facades)

The 3D reconstruction of urban areas requires a double grid image acquisition plan, so that all the facades of the buildings (north, west, south, east) are visible on the images. The overlap should be the same as in the [General Case](#).

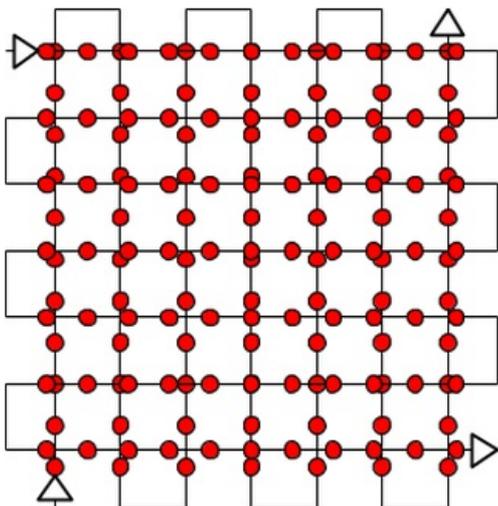


Figure 7. Double grid image acquisition plan.

For the facades to be visible, the images should be taken with an angle between  $10^\circ$  and  $35^\circ$ , (for more information about the definition of the angles: [202559859](#)) and not pointing to the nadir. If much detail is needed, aerial and terrestrial images should be combined.

 Note: It is possible to combine aerial nadir and/or aerial oblique and/or terrestrial images.

The images should have enough overlap in each dataset and between datasets. For such cases it is strongly recommended to use GCPs or Manual Tie Points to properly adjust the different sets of images. For more information: [202561599](#).

### 3D Interior reconstruction

For interior reconstruction, it is strongly recommended to use terrestrial images. High overlap is needed (90%). Therefore, it is recommended to use a fisheye lens camera.

Manual Tie Points improve the reconstruction and help to properly adjust the model. For more information: [202970309](#).

### Mixed reconstruction

It is possible to combine interior/exterior and/or aerial/terrestrial and /or nadir/oblique. Any combination is possible.

The images should have enough overlap in each dataset and between datasets. For such cases it is strongly recommended to use GCPs or Manual Tie Points to properly adjust the different sets of images. For more information: [202561599](#).

### Large Vertical Objects reconstruction

The 3D reconstruction of objects like power towers, wind turbines etc requires a specific image acquisition plan (figure 8):

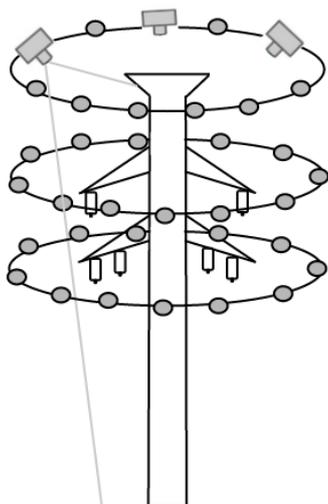
Fly close to the structure.

Turn several times around the structure at several heights.

Images should be taken with high overlap: 90% of overlap between images taken at the same height and 60% of overlap between images taken at different heights.

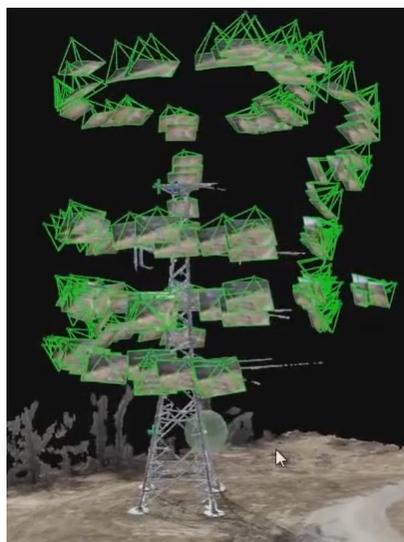
The optimal camera angle for the top circle is 45 degrees. By pointing to the ground, the content of the images is easier to be matched and the results are better. The images should be as focused as possible (both the main object and the background should be focused).

Having image geolocation is recommended. For more information about the image geolocation: [202557499](#).



**Power Tower**

Figure 8. Image Acquisition Plan - Power tower.



**Power Tower reconstructed in the rayCloud**

 Note: For more information on how to map and measure pole and tower structures: [202560479](#).

### Tunnel reconstruction

Pix4Dmapper can reconstruct tunnels. The biggest challenge for tunnel reconstruction is the lighting conditions. If the lighting is good either with natural light (if the tunnel is not too long) or with artificial light, the reconstruction could be very good.

In case of very dark tunnels, a tripod is recommended.

 Tip: It is recommended to:  
Use fisheye lens camera.  
Take images in more than one line (avoid single track shooting). If a multiple tracks image acquisition plan is not possible, a single track could work.  
GCPs are highly recommended in this case.

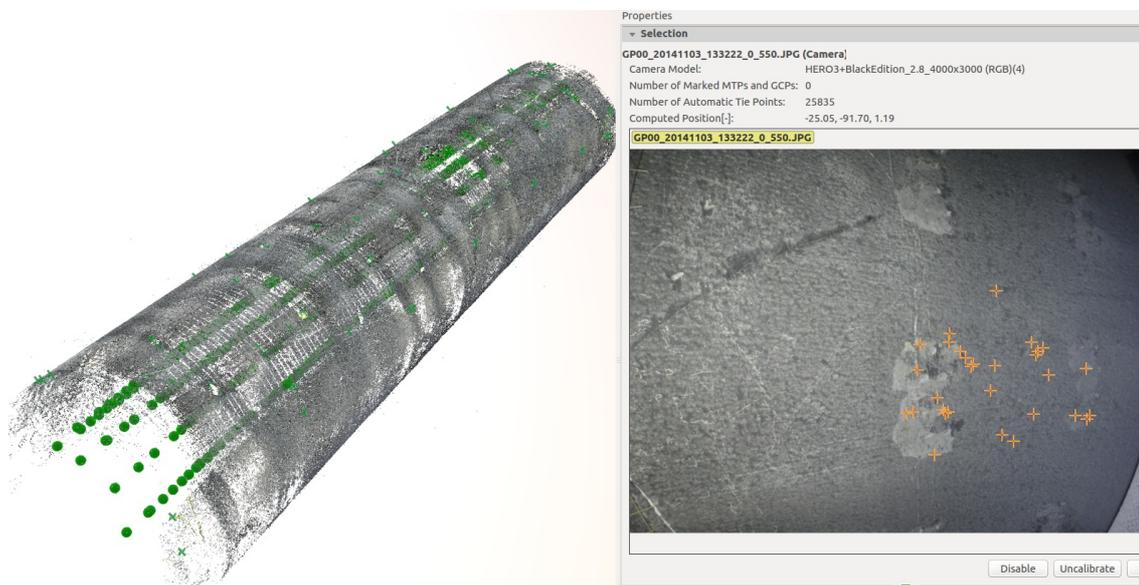
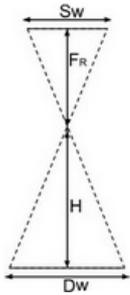


Figure 9. Automatic Tie Points of a tunnel.

The Ground Sampling Distance (GSD) is the distance between the center of two consecutive pixels on the ground. It influences the accuracy and the quality of the final results as well as the details that are visible in the final Orthomosaic.

The flight height  $H$  that is needed to obtain a given GSD can be computed and depends on the camera focal length, the camera sensor width [mm], and the image width [pixels].



$S_w$  = real sensor width [mm]

$F_R$  = real focal length [mm]

$H$  = flight height [m]

$D_w$  = distance covered on the ground by one image in the width direction (footprint width) [m]

Some lens manufacturers give the focal length ( $F_{35}$ ) in the 35 mm equivalent. It is not the 35 mm equivalent but the real focal length that should be used in Pix4Dmapper. In order to find the real focal length, some computations are needed. In the case of a 4:3 ratio, the formula for the real focal length  $F_R$  is given by:

$$F_R [\text{mm}] = (F_{35} * S_W) / 34.6 \quad (1)$$

Where

$F_{35}$  = focal length that corresponds to the 35 mm equivalent

$F_R$  = real focal length

$S_w$  = the real sensor width

For more information about the 35mm equivalent focal length concept: [Wikipedia article](#).

Using the fact that

$$H / F_R = D_w / S_w$$

the flight height  $H$  is given by:

$$H = (D_w * F_R) / S_w \quad (2)$$

The distance covered on the ground by one image in the width direction (footprint width) is given:

$$D_w = (imW * GSD) / 100 \quad (3)$$

where

$D_w$  = distance covered on the ground by one image [m] in the width direction (footprint width)

$imW$  = image width [pixel]

$GSD$  = desired GSD [cm/pixel]

Combining equation (2) and (3), the flight height is given by:

$$H [m] = (imW * GSD * F_R) / (S_w * 100) \quad (4)$$

 Note: The result is given in [m], considering that the GSD is in [cm/pixel].

 Example: Computation of the flight height to get a GSD of 5 [cm/pixel] using a camera with a real focal length of 5 [mm] and a real sensor width of 6.17 [mm]. Assuming that the image width is 4000 [pixels] and using the equation (4), the flight height should be 162 [m].

$$H = (imW * GSD * F_R) / (S_w * 100) = (4000 * 5 * 5) / (6.17 * 100) = 162.07 [m]$$

 Tools: The GSD Calculator can be found here: [202560249](https://202560249.com).



The image shooting rate to achieve a given frontal overlap depends on the speed of the UAV/plane, the GSD and the pixel resolution of the camera.

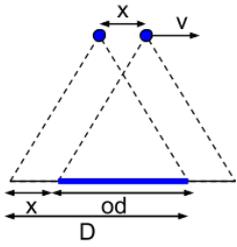


Figure 1.

From Figure 1, we obtain the following equations:

$$od = overlap * D \quad (1)$$

$$x = D - od \quad (2)$$

$$t = x / v \quad (3)$$

$D$  = distance covered on the ground by one image in the flight direction [m]

overlap = percentage of desired frontal overlap between two images

$od$  = overlap between two images in the flight direction [m]

$x$  = distance between two camera positions in the flight direction [m]

$v$  = flight speed [m/s]

$t$  = elapsed time between two images (image rate) [s]

Two cases are possible:

Camera oriented with the sensor width (long dimension) perpendicular to the flight direction (usual case)

Camera oriented with the sensor width (long dimension) parallel to the flight direction

Camera oriented with the sensor width (long dimension) perpendicular to the flight direction (usual case)

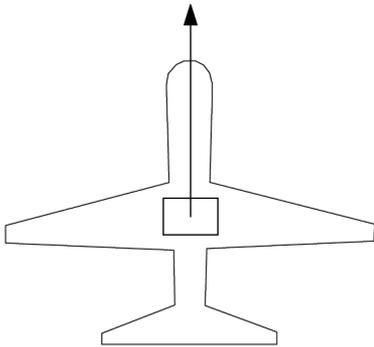


Figure 2. Sensor width placed perpendicular to the flight direction.

$$D = D_h = (imH * GSD) / 100 \quad (4)$$

Where:

$D_h$  = distance covered on the ground by one image in the height direction (footprint height) [m]

$imH$  = image height [pixel]

$GSD$  = desired GSD [cm/pixel]

Combining Equations (1) and (4) into Equation (2):

$$x = D_h - overlap * D_h$$

$$x = D_h * (1 - overlap)$$

$$x = ((imH * GSD) / 100) * (1 - overlap) \quad (5)$$

Note:  $x$  is given in [m], considering that the GSD is in [cm/pixel].

Combining the equations (3) and (5):

$$t = x / v = ((imH * GSD) / 100) * (1 - overlap) / v \quad (6)$$

Example: In order to achieve an overlap of 75% (overlap = 0.75) and a GSD of 5 [cm/pixel], supposing that the image height is 4000 [pixels] and the speed of the UAV/plane is 30 [km/h] = 8.33 [m/s], based on the equation (6), the image rate should be 6 seconds:

$$t = ((imH * GSD) / 100) * (1 - overlap) / v = ((4000 * 5) / 100) * (1 - 0.75) / 8.33 = 6 [s]$$

Camera oriented with the sensor width (long dimension) parallel to the flight direction

If the camera is placed on the plane / UAV having the sensor width (long dimension) parallel to the flight direction:

$$D = D_W = (imW * GSD) / 100 \quad (7)$$

Where:

$D_W$  = distance covered on the ground by one image in the width direction (footprint width) [m]

$imW$  = image width [pixel]

$GSD$  = desired GSD [cm/pixel]

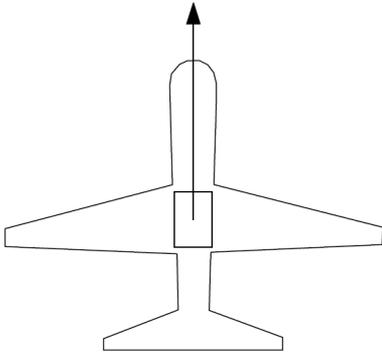


Figure 3. Sensor width placed parallel to the flight direction.

Combining equations (1) and (7) into the equation (2):

$$x = D_W - overlap * D_W$$

$$x = D_W * (1 - overlap)$$

$$x = ((imW * GSD) / 100) * (1 - overlap) \quad (8)$$



Note: The result is given in [m], considering that the GSD is in [cm/pixel].

Combining equations (3) and (8):

$$t = x / v = ((imW * GSD) / 100) * (1 - overlap) / v \quad (9)$$

Pix4Dmapper is able to process images taken with any camera:

- Lightweight compact cameras.
- DSLR cameras.
- Large format cameras.
- Action cameras.
- Camera Rigs.
- 360 ° panorama cameras.



Using any lens:

- Perspective (narrow and wide focal length).
- Ultra wide focal length (Fisheye).

The cameras can be loaded on any platform:

- UAVs from the hobby world.
- Professional UAVs.
- Manned aircrafts.
- Helicopters.
- Terrestrial vehicles.
- No platform, for terrestrial imagery (taken by hand).

Pix4Dmapper can process images regardless of the spectral specifications of the camera:

- RGB cameras.
- NIR, Red Edge cameras for agriculture applications.
- Thermal cameras: [20275534](#).
- etc.

### Summary

<p><b>Camera body and lens</b></p> <p>Perspective and fisheye lens supported.                      The zoom should be stable.                      Fixed focal length is recommended.                      Video frames are not recommended due to low pixel resolution.</p>	
<p><b>Camera settings</b></p> <p>Stabilization settings should be off.                      Shutter/aperture/ISO should be on <b>automatic</b>.                      If images are blurry or noisy, manually set shutter/aperture/ISO. For more information: <a href="#">Camera settings</a>.                      Select Manual Focus on Infinity.</p>	

### Camera Body

As a rule of thumb: Heavier cameras (higher pixel resolution) provide better results but require a flying platform with a higher payload.

### Recommended Cameras

Camera Type	Recommendation	Tips
Compact	Canon IXUS 220HS (135 g) Sony RX 100 (240 g)	Let parameters on automatic and disable image stabilization.
DSLR	Sony Nex 5/7 (270 g - 350 g) Canon 5D mark ii (>800 g)	Use a fixed focal length lens to improve the results.
Action	GoPro Hero 4	Recommended for close range imagery (up to 50 meters). Take the images with the widest angle and highest resolution possible.

### Video cameras

Videos are not recommended for accurate mapping: The quality of the results will almost always be inferior to the results from still imagery. 4K video from camera such as GoPro 4 and DJI provides reasonable results. Full HD video is usually not sufficient to get good results. When using a video for processing, it is important to consider the following: [205294735](#).

### Recommended Camera Focal Length

There is no limit in the focal length that can be used with Pix4Dmapper.

Application	Recommendation	Why
Mapping: aerial project with a flight height above 50 meters.	Perspective lens: between 22 mm and 80 mm focal length (in 35 mm equivalent).	To ensure a good GSD that will lead to higher accuracy results.
Indoor / close range reconstruction.	Fisheye lens: very small focal length.	Flexibility in data acquisition: Ensuring higher overlap.

Most lens manufacturers give the focal length ( $F_{35}$ ) that corresponds to 35 mm equivalent. In order to find the real focal length:

$$F_R = (F_{35} * SW_R) / 34.6 \text{ (mm)}$$

where:

$$F_{35} = \text{focal length that corresponds to 35 mm equivalent [mm]}$$

$$F_R = \text{real focal length [mm]}$$

$$SW_R = \text{the real sensor width [mm]}$$

For a given height, the wider the field of view (small focal length), the fewer the images to achieve sufficient overlap. This is especially useful if a regular and dense flight plan cannot be setup. The spatial resolution, though, will be low leading to less accurate results.

If the field of view is narrow (large focal length), more images will be required to ensure enough overlap when mapping the same area. The spatial resolution will be higher in this case, leading to more accurate results.

For more information about how to select camera focal length and flight altitude considering the desired spatial resolution (GSD) and the area to map: [202558849](#).

 Tip: Use a fixed focal length lens, as it will usually result in sharper images with reduced noise.

### Camera Settings

The shutter speed, aperture and ISO should be set on automatic. If images are blurry or noisy, it is recommended to manually set these parameters.

There is a tradeoff between the shutter speed, the aperture, and the ISO sensitivity. For processing, the images should be sharp and have the least amount of noise. Such images can be obtained when the scene is well illuminated (scattered clouds should be avoided) and the camera parameters are well adjusted. If the scene is not sufficiently illuminated, images will be noisier and less sharp, thus lowering the accuracy of the results.

As a rule of thumb, the shutter speed should be fixed, the ISO needs to be set at a low value that does not produce noisy images, and the aperture should be set to automatic to adjust for varying levels of brightness in the scene. If the tradeoff is not correct, overexposed or underexposed images may be obtained.

The shutter speed should be fixed and set to a medium speed (as an indication: between 1/300 second and 1/800 second), but fast enough to not produce blurry images. If more than 5% of the images are subject to a directional blur, it is a good indication that the shutter speed should be slightly increased.

The ISO should be set as low as possible (minimum 100). High ISO settings generally introduce noise into images and drastically reduce the quality of the results.

The aperture minimum and maximum values depend on the lens. High aperture is translated into low numbers, for example f2.7 (which will capture a lot of light). If both the shutter speed and ISO are adjusted, it is better to leave the aperture (f) on automatic.

The electronic and mechanical stabilization should be disabled as it interferes with Pix4Dmapper's algorithms.

The recommended focus mode is Manual Focus on Infinity. This mode of focusing should always give focused images for aerial projects. For terrestrial projects, this mode will probably lead to out of focus results, if a long focal length is used.

 Tip: For terrestrial projects it is recommended to use a wide angle lens.

Problems with images due to wrong camera parameters or inadequate equipment that interfere with the processing:



Blur due to slow shutter speed.	Noise due to high ISO sensitivity.	Overexposed or underexposed (wrong aperture and/or shutter speed).	Distortions due to electronic or mechanical image stabilization.	Distortions due to the rolling shutter. Pix4Mapper models the rolling shutter improving the results: <a href="#">202558159</a> .
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>> Skip this step if no Georeferencing will be used for the images <<

Pix4Dmapper can process images both with and without geolocation. However, it is strongly recommended to know the position of the camera for at least 80% of the images to get high quality and faster results. Pix4Dmapper does not require the IMU parameters. Orientation parameters are computed during the processing.

[Images without geolocation](#)

[Images with known position using a camera with built-in GPS tagging](#)

[Images with known position using an external GPS logger](#)

Images without geolocation

Pix4Dmapper can process images without geolocation. When images have no geolocation, Pix4Dmapper needs additional information to locate, scale and orient correctly the model. Ground Control Points ([202557489](#)) will place the model at the correct location, scale and orient it. If no GCPs are used, then the scale ([205360375](#)) and orientation ([205360385](#)) constraints can be used.

**Warning:** If neither GCPs nor constraints are used, the final results have no scale, orientation and absolute position information. Therefore, they cannot be used for measurements, overlay and comparison with previous results. Besides, they may produce an inverted 3D model in the rayCloud.

Images with known position using a camera with built-in GPS tagging

Most of the major manufacturers push their weight behind GPS tagging; Panasonic, Sony, and Canon are some well known camera manufacturers that have released such cameras so far. Most of these cameras save the GPS coordinates in the images' EXIF data. Pix4Dmapper reads this information from the EXIF data in order to automatically import the image geolocation into the software. For more information about the EXIF information read by Pix4Dmapper: [205732299](#).

**Warning:** If the GPS refresh rate is lower than the shooting images rate, more than one image will have the same GPS position and the processing may fail or may not calibrate correctly some of the images.

Images with known position using an external GPS logger

GPS loggers are very light devices (easily placed on a UAV) that can collect position information for the images. They register latitude, longitude and altitude values for each camera position while shooting. These values are saved to a file that can be imported into Pix4Dmapper if it has the correct file format. Otherwise, the file requires some editing before being imported in order to comply with Pix4Dmapper's geolocation file format.



Figure 1. GPS logger

Recommended GPS Logger

RTK GPS can capture accuracy of 2-4 cm at a high refresh rate. Having a RTK GPS, no GCPs are needed to obtain high accuracy.

**Information:** Some loggers come with image geotagging software. If not, GPS data and images can be synchronized by using other software such as:

[GPicSync \(free\)](#)

[Geosetter \(free\)](#)

[RoboGeo \(commercial\)](#)

A list of available loggers is maintained by [OpenStreetMap](#).

For more information about geolocation file formats supported by Pix4Dmapper: [202558539](#).

For more information about how the onboard GPS affects the accuracy of a project: [202558909](#).



>> Skip this step if no GCPs will be added <<

**Warning:** Using GCPs is **HIGHLY RECOMMENDED** when processing a project with no image geolocation.

If no Ground Control Points are used:

The final results have no scale, orientation, and absolute position information. Therefore they cannot be used for measurements, overlay, and comparison with previous results.

They may produce an inverted 3D model in the rayCloud.

The 3D reconstruction may not preserve the shape of the surveyed area. For more information: [202561199](#).

Ground Control Points (GCPs) are points of known coordinates in the area of interest. Their coordinates have been measured with traditional surveying methods or have been obtained by other sources (LiDAR, older maps of the area, Web Map Service). They are not required for processing a project with Pix4Dmapper, but they increase significantly the absolute accuracy of the project. GCPs can also be used as *Check points* to verify the accuracy of the results. They can be used:

In projects with image geolocation: GCPs increase the absolute accuracy of a project, placing the model at the exact position on the Earth. They reduce the shift due to GPS from meters to centimeters. For more information about the shift due to GPS: [202558909](#).

In projects without image geolocation: GCPs are required if there is need for georeferenced outputs. In this case, the GCPs will scale, oriente and position the final results. Additionally, they are very useful for increasing the relative accuracy of the outputs, i.e. the reconstruction of the 3D model.

When using GCPs the following points need to be taken into consideration:

[Number and distribution of GCPs](#)

[GCP acquisition](#)

Number and distribution of GCPs

The GCPs should be placed homogeneously in the area of interest. Imagine the area as a large table and the GCPs as the legs that will support it. If all the "legs" are placed at the same location of the "table," then it will tilt. If the "legs" are homogeneously spread, then the "table" will be stable. Additionally, it is also recommended to place one GCP in the center of the area in order to further increase the quality of the reconstruction (Figure 1).

**Important:**  
A minimum number of 3 GCPs is required for them be taken into account in the reconstruction. Each one should be clicked in at least 2 images.  
A minimum number of 5 GCPs is recommended. 5 to 10 GCPs are usually enough, even for large projects. More GCPs do not contribute significantly to increasing the accuracy.  
In cases that the topography of the area is complex, then more GCPs will, indeed, lead to better (more accurate) reconstruction.  
It is recommended to use at least 5 GCPs, each of which is identified in 5 images, as it minimizes the measurement inaccuracies and helps to detect mistakes that may occur when inserting the GCPs.  
The GCPs should be placed evenly on the landscape to minimize the error in Scale and Orientation.  
Do not place the GCPs exactly at the edges of the area, as they will only be visible in few images.  
For corridor mapping: [202559299](#).

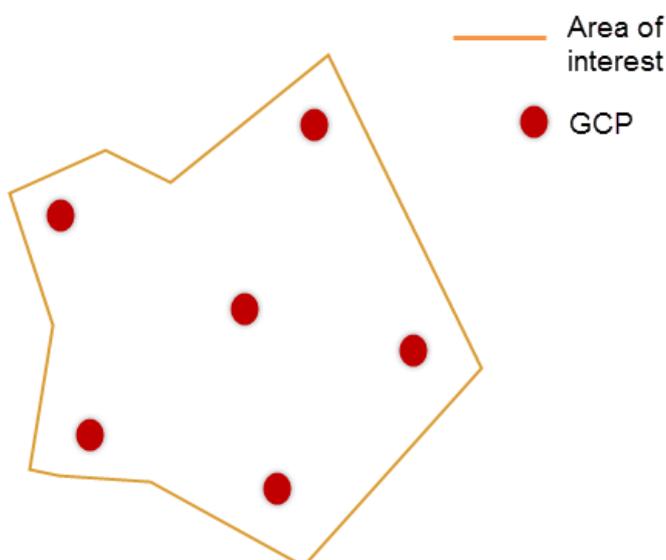


Figure 1. Distribution of the GCPs.

GCP acquisition

The Ground Control Points can be:

[GCPs measured in the field](#)

[GCPs defined from other sources](#)

### GCPs measured in the field

Measuring GCPs in the field requires spending some time in the area and locating the position where the GCPs should be measured. This process requires the terrain to be accessible. Before measuring the GCPs coordinates, the following items must be defined:

[GCP coordinate system](#)

[GCP accuracy](#)

[Topographic equipment](#)

#### GCP coordinate system

A coordinate system is a set of numbers and parameters that is used in order to define the position of any object in the 2D or 3D space. The chosen GCP coordinate system depends on the needs of the end-user. Usually the coordinate systems can be:

**Global coordinate systems:** They are defined using 3D ellipsoid coordinates (latitude, longitude, altitude).

**National coordinate systems:** They are usually defined using a projection defined for a specific country (X, Y, altitude).

**Local coordinate systems:** They are defined using a projection. The user sets the origin and orientation where it is most convenient (X, Y, altitude).

 **Note:** The altitude can be either geometric (using as reference the level of the ellipsoid) or orthometric (using as reference level the Mean Sea Level).

#### GCP accuracy

In order to define the accuracy with which the GCPs will be measured, the following factors must be taken into account:

**Accuracy needed for the final results:** The accuracy of the GCPs should correspond to the final absolute accuracy the user needs. For example, for projects for which an accuracy of some meters is acceptable (e.g. fast assessment tasks), then the accuracy of the GCPs is NOT required to be of some centimeters. For projects for which the accuracy is very important (e.g. construction sites) then the GCPs should be measured with an accuracy of some centimeters in order to comply with the project requirements. In general, the accuracy of the GCPs should be slightly better than the expected accuracy of the final results.

**Ground Sampling Distance of the images:** The GCPs should:

Be visible in the images. The GCP photogrammetric target (figure 2) should have about five to ten times the dimensions of the GSD. If the GCP is natural (a characteristic point in the area that is not signed by a photogrammetric target), then the GCP can be even more difficult to identify and mark.



Figure 2. GCP photogrammetric target.

Not be more accurate than 1/10 of the GSD. For example, if the GSD is 10 cm, the GCP accuracy should not be below 1 cm, since they cannot be marked in the images with such accuracy.

 **Important:** The accuracy of the GCPs must be known in order to correctly set the GCP accuracy (*Horizontal and Vertical*) for processing. For more information about the GCP accuracy: [202557919](#).

#### Topographic equipment

**Total station accuracy:** They can reach millimeters accuracy (depending on the distance of the measured points from the station).

**GPS system accuracy:** They can reach several centimeters accuracy (depending on the equipment, the area, and the country).

### GCPs defined from other sources

If no GCPs have been measured in the field, they can be extracted from other sources. The advantage of such GCPs is that they can be extracted at any time while being at the office. The disadvantage is that they give no control over the accuracy and that the coordinate system is the coordinate system of the GCP source.

GCPs can be extracted from 2 type of sources:

**GCPs extracted from high accuracy sources:** GCPs can be extracted from sources such as existing maps and laser scanning outputs of the same area. If these sources are updated, then the GCPs can be very accurate. The coordinate system and the accuracy of these points depend on the source.

**GCPs extracted from Web Map Services:** Web Map Services provide online georeferenced maps using a standard protocol called Web Map Service (WMS). Some servers have their GIS databases publicly available and free-of-charge. Well-known free WMS servers are Google Maps and Bing Maps. They cover the whole planet but the accuracy of the map georeference may not be high enough. In addition, their data is not available with the same accuracy for different parts of the world. It is recommend to use GCPs derived from such sources when:

The images are not geolocated and therefore the project has **no georeference**.

The desired output is a **.kml** file, which can align perfectly with Google Maps.

For more information about how to obtain the georeference using 2D or 3D GCPs taken from a Web Map Service server: [202560149](#).

To create a project, follow these steps:

1. [Creating a New Project.](#)
2. [Importing the Images.](#)
3. [Configuring the Image Properties:](#)

If the images have geolocation:

Define the coordinate system and import the image geolocation information.

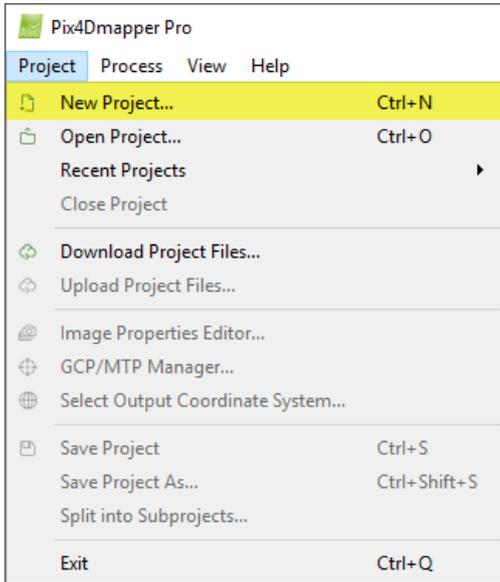
If the software cannot recognize the camera model or it is needed to use different camera parameters:

Edit the camera model.

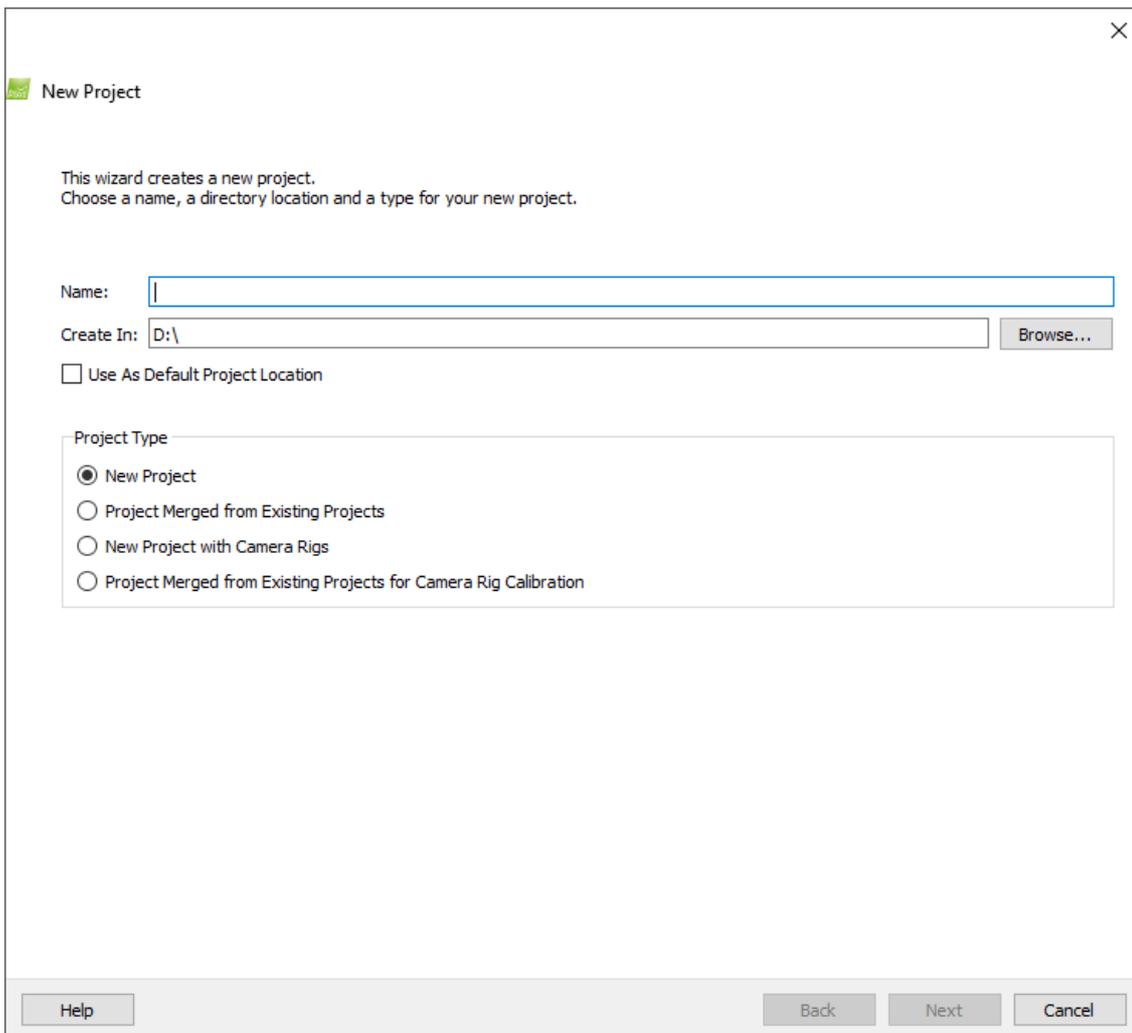
4. [Selecting the Output / GCP Coordinate System.](#)
5. [Selecting the Processing Options Template.](#)

To create a new project:

1. Start Pix4Dmapper.
2. On the Menu bar, click Project > New Project...



3. The *New Project* wizard opens:



4. In *Name*: type a name for the project.
5. (optional) In *Create in*: click Browse... On the *Select Project Location* pop-up, navigate to select the folder where the project and results will be stored and click Select Folder.



Warning: Ensure that:

The project name DOES NOT use special character(s).

The path where the project will be created DOES NOT use special character(s).

The project name and the path together contain less than 128 characters.



Note: When the wizard is completed, a folder named after the project will be created in the selected folder and it will store all the results.

6. (optional) Select the check box *Use As Default Project Location* to save all new projects in the selected folder.
7. In *Project Type*, keep the default option *NewProject* selected.
8. Click Next.

[Index](#) > [Step 2. Creating a Project](#)

[◀ Previous](#) | [Next ▶](#)

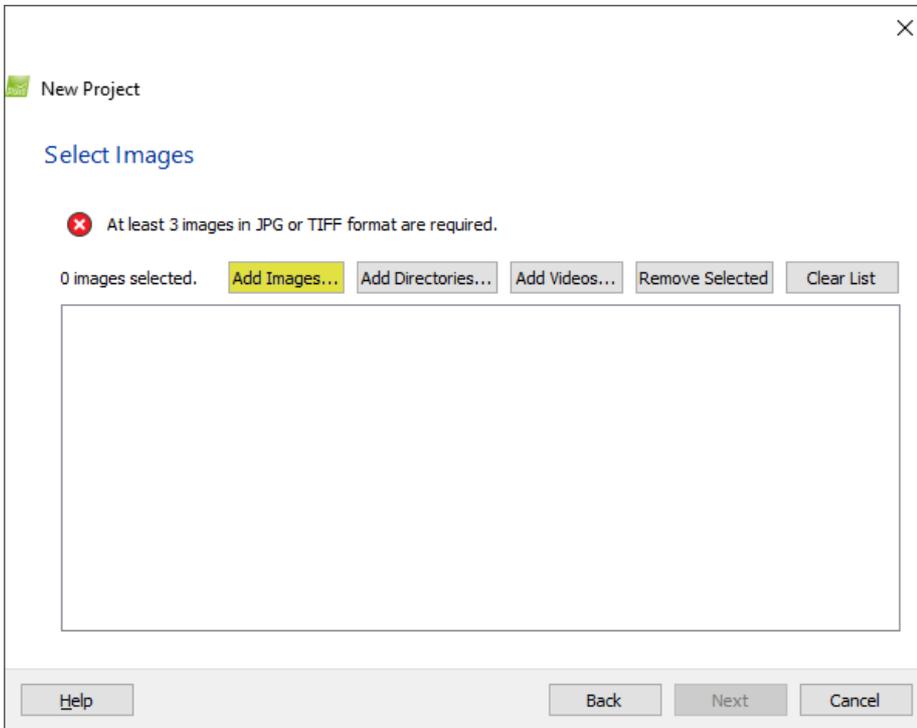
On the *Select Images* window:

1. Click Add Images... to add the images.



Warning:

Images should not contain any symbol such as time and date stamps. Images that contain such symbols cannot be processed.  
Images should not be edited manually, i.e. should not be scale, rotated, etc.  
Images taken during take-off or landing should not be used.



2. On the *Select Images* pop-up, navigate to select the folder where the images are stored, select the images to be imported (it is possible to select multiple images), and click Open.



Note:

Images can be imported as \*.jpg, \*.jpeg, \*.tif, or \*.tiff. By default all supported image formats can be selected. To filter images according to their format change the input format to JPEG images (\*.jpg,\*.jpeg) or to TIFF images (\*.tif, \*.tiff).  
It is possible to select images stored in different folders. Once images are imported from one folder, click Add images... again to add more images from another folder.

3. (optional) It is possible to remove images by selecting them in the image list (use Ctrl+click or Shift+click for multiple selection) and clicking Remove Selected.
4. (optional) It is possible to clear the list of images that have been added by clicking Clear List.
5. Click Next.

The *New Project* wizard displays the *Image Properties* window which contains 3 sections:

Image Geolocation:

Sets the coordinate system to which the image geolocation refers.

Imports/exports the coordinates and, optionally, the orientation of the images and/or the accuracy of the coordinates.

Sets the accuracy of the image geolocation.

Selected Camera Model: Sets and configures the camera model associated to the images.

Images table: Displays the selected images, as well as the group, position, position accuracy and orientation of each image and if the image is enabled or not (an enabled image will be taken into account for processing).

**Image Properties**

**Image Geolocation**

Coordinate System  
 Datum: World Geodetic System 1984; Coordinate System: WGS 84 Edit...

Geolocation and Orientation  
 Geolocated Images: 127 out of 127 Clear From EXIF From File... To File...

Geolocation Accuracy:  Standard  Low  Custom

**Selected Camera Model**

CanonIXUS220HS\_4.3\_4000x3000 (RGB) Edit...

Enabled	Image	Group	Latitude [degree]	Longitude [degree]	Altitude [m]	Accuracy Horz [m]	Accuracy Vert [m]
<input checked="" type="checkbox"/>	IMG_1146.JPG	group1	46.65611625	6.54326042	784.961	5.000	10.000
<input checked="" type="checkbox"/>	IMG_1147.JPG	group1	46.65603320	6.54238450	780.934	5.000	10.000
<input checked="" type="checkbox"/>	IMG_1148.JPG	group1	46.65609420	6.54155796	781.793	5.000	10.000
<input checked="" type="checkbox"/>	IMG_1149.JPG	group1	46.65608730	6.54070200	780.951	5.000	10.000
<input checked="" type="checkbox"/>	IMG_1150.JPG	group1	46.65613880	6.53983380	780.771	5.000	10.000
<input checked="" type="checkbox"/>	IMG_1151.JPG	group1	46.65617870	6.53898330	779.702	5.000	10.000
<input checked="" type="checkbox"/>	IMG_1152.JPG	group1	46.65620580	6.53813780	781.091	5.000	10.000
<input checked="" type="checkbox"/>	IMG_1153.JPG	group1	46.65624120	6.53729250	781.454	5.000	10.000
<input checked="" type="checkbox"/>	IMG_1154.JPG	group1	46.65627930	6.53641060	780.826	5.000	10.000
<input checked="" type="checkbox"/>	IMG_1155.JPG	group1	46.65633030	6.53554940	778.801	5.000	10.000

Help Back Next Cancel

There are 3 optional steps to follow before clicking Next:

a. (optional) [Select Image Coordinate System](#)

On *Coordinate System*, click *Edit...* if the image geolocation is given in a coordinate system other than WGS84 (default).

For more information and step by step instructions about how to select/change the Image Coordinate System: [202560029](#).

b. (optional, recommended) [Import Image Geolocation and Orientation](#)

If the image geolocation (position) information is stored in the EXIF of the images, it will be loaded automatically.

For more information and step by step instructions about how to select/change the Image Geolocation and Orientation: [202560019](#).



Note:

The software considers the Date Taken field of the EXIF to set up the order in which the images are taken.

Step 1. *Initial Processing* is faster for projects with image geolocation. In the case of not sufficient overlap, image geolocation helps calibrating the images.

### c. (optional) Edit Selected Camera Model

A camera model needs to be defined in order to run a project in Pix4Dmapper. The parameters of this model depend on the camera that was used to capture the image. Most cameras save their name in the metadata of the image in EXIF format. This field is used to associate a given camera model to all the images captured with this camera.

The *Selected Camera Model* section, on the *Image Properties* window displays the selected camera model. The camera model can be:

- ✔ Valid: A green check is displayed if the camera model is valid. A camera model is valid if it already exists in the camera model database of Pix4Dmapper or if there is sufficient information in the EXIF data of the images to create a new camera model that will be saved into the user camera model database. If the camera model is retrieved from the EXIF data, it is recommended to check the camera model parameters and, if needed, to edit them.
- ✘ Invalid: A red cross is displayed if the camera model is not valid. A camera model is invalid if it is not in the camera model database of Pix4Dmapper and if there is not enough information in the EXIF data of the images. In this case the camera model needs to be defined manually.

For more information and step by step instructions about how to edit the camera model: [202560169](#).



Note: Grouping the images:

When the project contains images with different spectral signatures (RGB, NIRGB, etc) usually the images are grouped automatically. In case that they are not grouped by default, group them manually following: [202560509](#).

In this case one orthomosaic is generated per group.

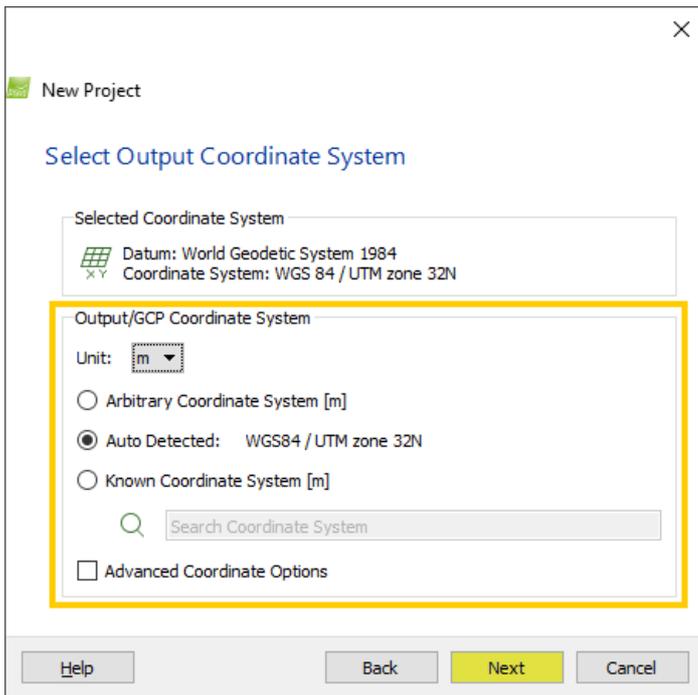
In the *Select Output Coordinate System* window:

1. (optional) Change the output / GCP coordinate system: [202560029](#).

 Note: For more information about the Output / GCP coordinate System section: [202558239](#).

 Note:  
By default, the output and GCP coordinates system will be the same. To select a different coordinate system for the outputs: [202558099](#). To select different coordinate system for the GCPs: [202557749](#).  
By default, the *Unit* is *m* (meters).  
If the images have geolocation, by default, *Auto detected* is selected, displaying the corresponding UTM or Nad83 zone of the images.  
If the images do not have geolocation, by default, *Arbitrary Coordinate System* is selected.

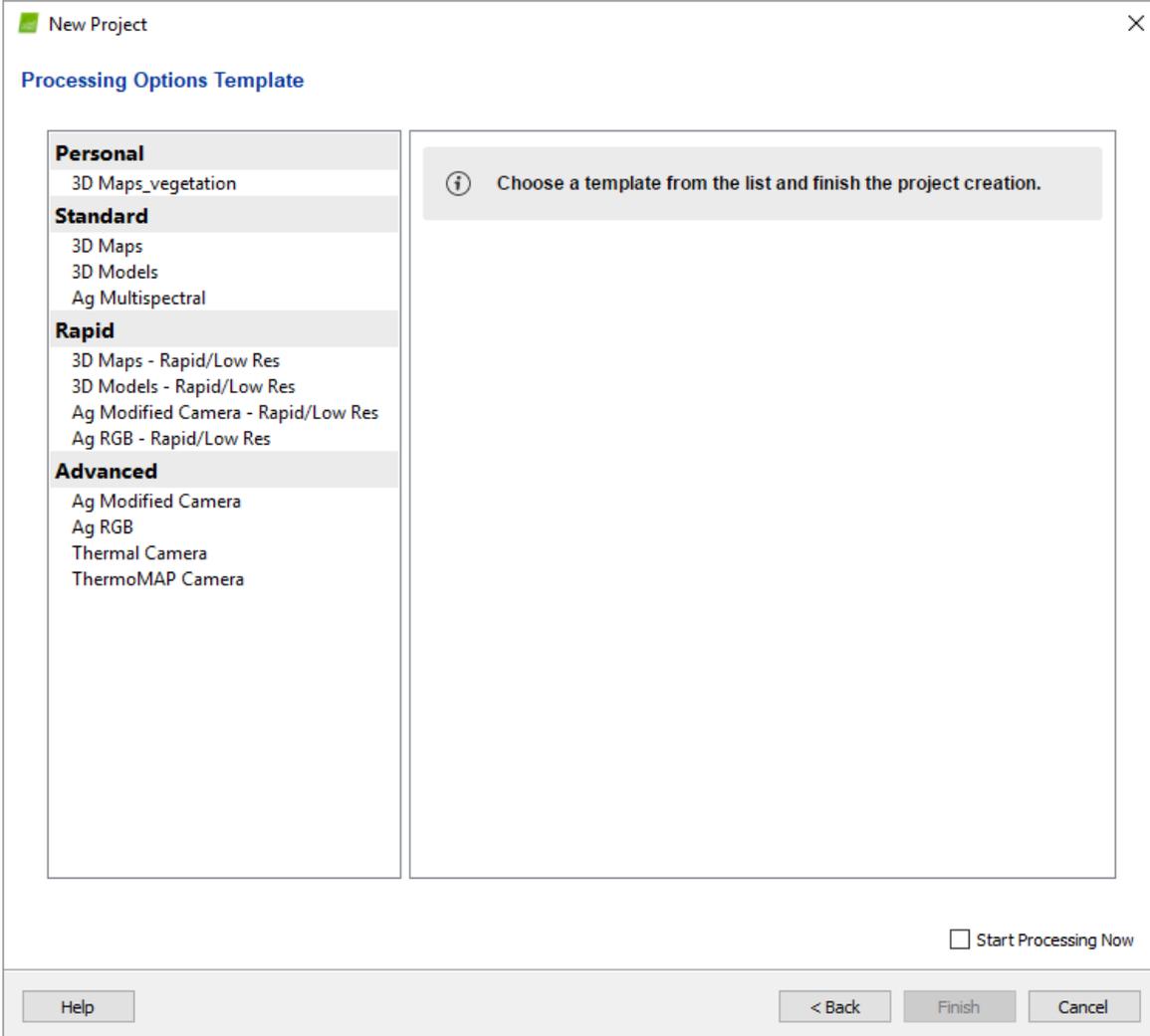
2. Click Next.



In the window *Processing Options Template*:

1. Select a processing options template.

 Note: A template has to be chosen in order to open a project, but it can always be modified or changed later.



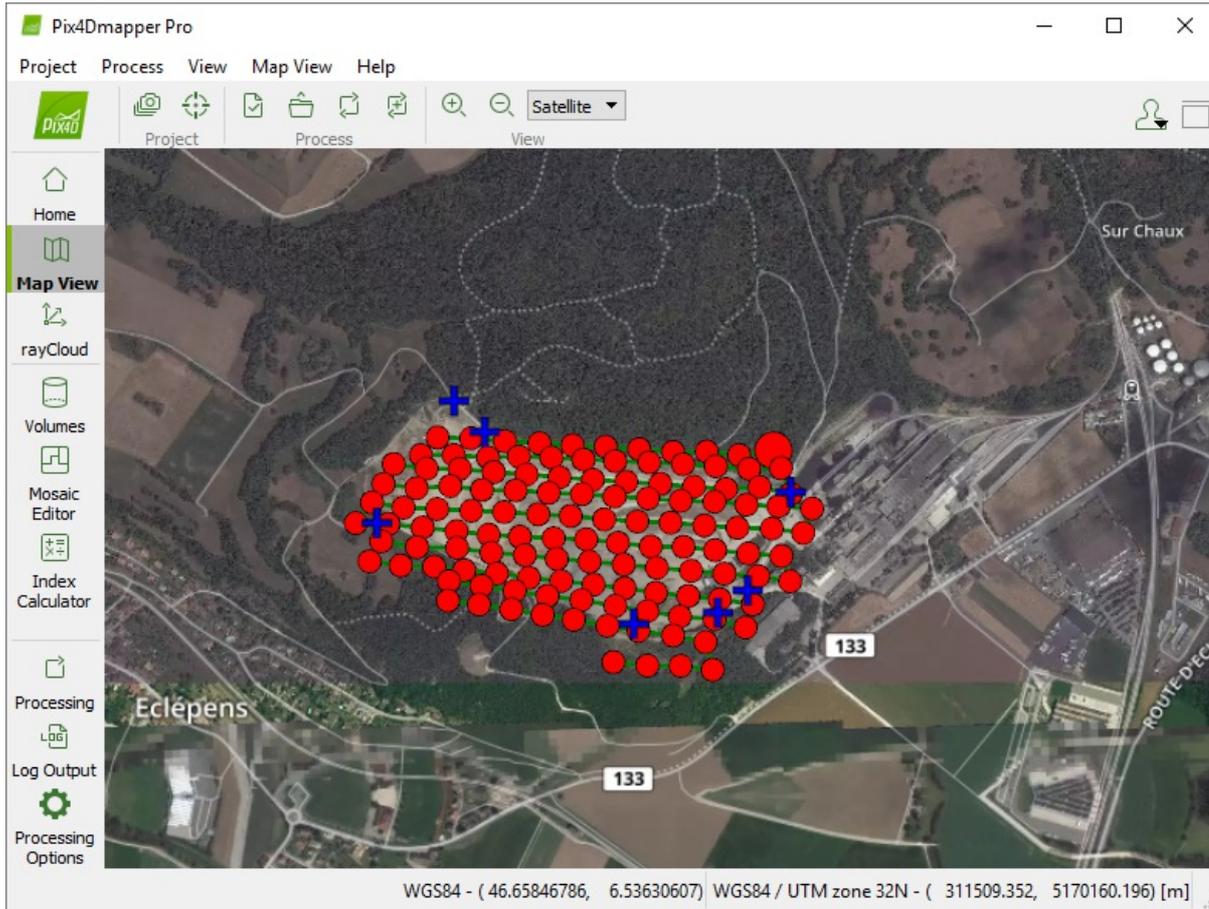
The screenshot shows a dialog box titled "New Project" with a close button (X) in the top right corner. The main area is titled "Processing Options Template". On the left, there is a list of templates organized into four sections: **Personal** (3D Maps\_vegetation), **Standard** (3D Maps, 3D Models, Ag Multispectral), **Rapid** (3D Maps - Rapid/Low Res, 3D Models - Rapid/Low Res, Ag Modified Camera - Rapid/Low Res, Ag RGB - Rapid/Low Res), and **Advanced** (Ag Modified Camera, Ag RGB, Thermal Camera, ThermoMAP Camera). On the right, there is a grey box with an information icon (i) and the text "Choose a template from the list and finish the project creation." At the bottom right, there is a checkbox labeled "Start Processing Now". At the bottom left, there is a "Help" button. At the bottom right, there are three buttons: "< Back", "Finish", and "Cancel".

 Note: For more information about the default processing templates, their outputs and their selected processing options: [205319155](#).

 Note: In the window *Processing Options Template*, the processing options templates are organized into three sections: *Standard*, *Rapid* and *Advanced*. A fourth section titled *Personal* appears above the others when a new personal template has been created by the user.

2. (optional) Select the box *Start Processing Now* to start the processing automatically.
3. Click *Finish* to close the wizard and start the project.

Once the project is created, the *Map View* is displayed.



There are some optional steps that can be done before processing:

#### 1. (optional) Selecting the Processing Area

By default, the area selected for processing corresponds to the entire area covered by all the images that are calibrated. It is possible to restrict the processing area to the area of interest, but it is not compulsory. This option can be useful to generate the outputs only for an area of interest instead of the entire area.

For step by step instructions about creating a Processing Area: [202560179](#).

#### 2. (optional) Changing the Processing Options Template and / or the Process Options

Change the output results files (types and format), change some processing options to improve the quality of the results when needed, or change some processing options for advanced use. For more information: [202560009](#).



Note: For more information about the *Processing Options Templates*, the outputs they generate and their selected processing options: [205319155](#).

#### 3. (optional) Adding GCPs

Add Ground Control Points (GCPs) to improve the global accuracy of the project (georeference). GCPs can be measured in the field using topographic methods, taken from existing geospatial data or Web Map Service (WMS).



Warning: Using GCPs is **HIGHLY RECOMMENDED** when processing images without image geolocation.

If no Ground Control Points are used:

The final results are not scaled, oriented or georeferenced. Therefore they cannot be used for measurements, overlay, and comparison with previous results.

They may produce an inverted 3D model in the rayCloud.

The final 3D model may be shifted (this problem can be corrected using Manual Tie Points: [202560349](#)).

For step by step instructions about how to include GCPs in the project: [202560239](#).



When processing a project it is recommended to go through the following steps:

[Initial Processing](#)

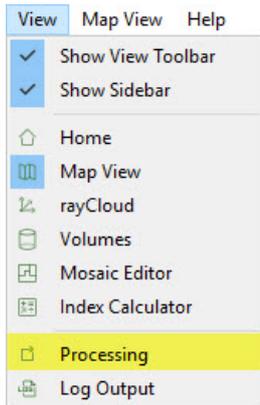
[Analyzing the Quality Report](#)

[Point Cloud and Mesh](#)

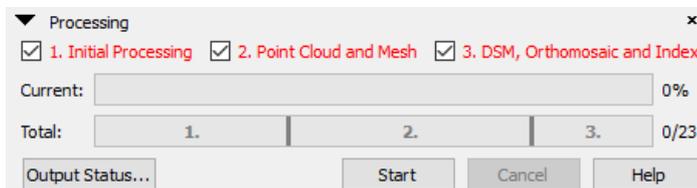
[DSM, Orthomosaic and Index](#)

To start processing the project:

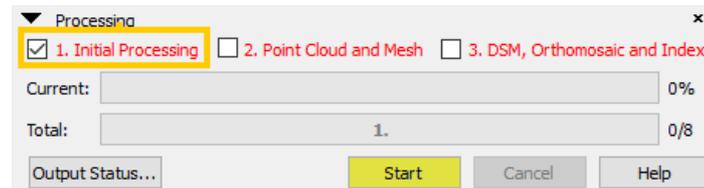
1. On the Menu bar, click View > Processing.



2. The *Processing* bar opens on the bottom of the main window.



3. Ensure that *1. Initial Processing* is selected and that *2. Point cloud and Mesh* and *3. DSM, Orthomosaic and Index* are unselected:



4. Click Start.

For more information about the outputs resulting from *1. Initial Processing*: [202558519](https://www.202558519.com).

**!** Important:  
 For a detailed description about how to analyze the Quality Report: [202558689](#).  
 For a detailed description about any parameter described in the Quality Report: [202558679](#).  
 Example of a Quality Report available at the following link: [Quality Report](#).

Once step 1. *Initial Processing* is completed, the Quality Report is automatically displayed. To not be displayed automatically, unselect the *Display Automatically after Processing* box at the bottom of the Quality Report.

When more than one step are processed sequentially the PDF Quality Report is generated in the results folder only when the processing is completed. However, it is automatically displayed in Pix4D Desktop once a step is completed.

It is recommended to verify the following information in the Quality Report:

1. Quality Check

Verify that:

- All the checks are green.
- All or almost all the images are calibrated in one block.
- The relative difference between initial and optimized internal camera parameters is below 5%.
- (optional) If using GCPs, the GCP error is below 3×GSD.

**Quality Check** ?

<b>?</b> Images	median of 35858 keypoints per image	✔
<b>?</b> Dataset	127 out of 127 images calibrated (100%), all images enabled	✔
<b>?</b> Camera Optimization	0.44% relative difference between initial and optimized internal camera parameters	✔
<b>?</b> Matching	median of 13945.5 matches per calibrated image	✔
<b>?</b> Georeferencing	yes, 7 GCPs (7 3D), mean error = 0.046 m	✔

2. Preview

For projects with nadir images and for which the orthomosaic preview has been generated, verify that the orthomosaic:

- Does not contain holes.
- Does not have distortions.
- (optional) If GCPs or image geolocation has been used, it has the correct orientation.

**?** Preview ?

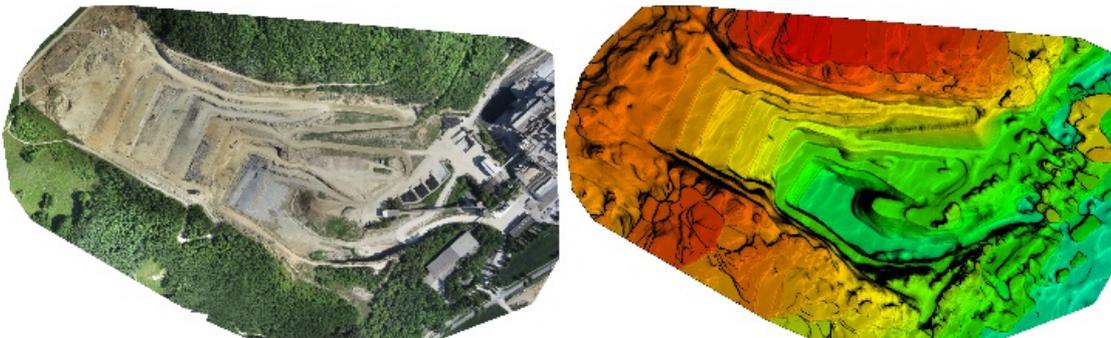
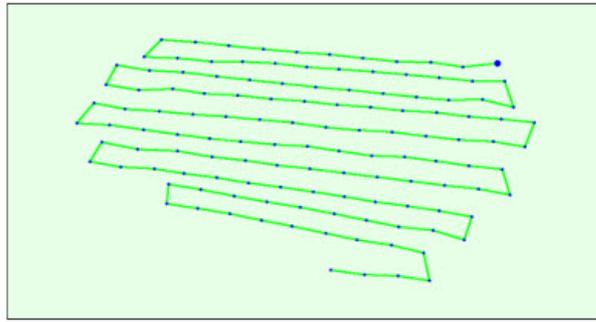


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

3. Initial Image Positions

(optional) If the images have geolocation, verify that the *Initial Image Positions* figure corresponds to the flight plan.

**?** Initial Image Positions ?

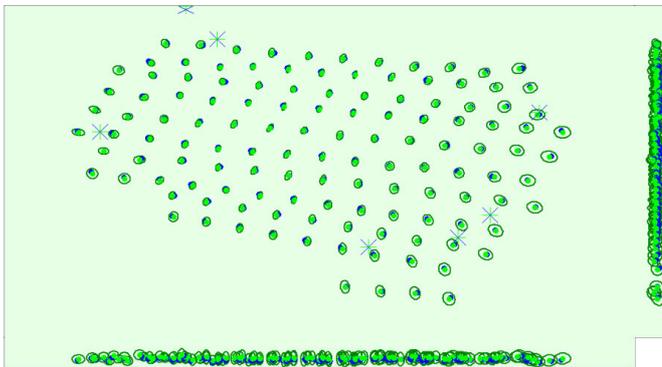


#### 4. Computed Image/GCPs/Manual Tie Points Positions

Verify that :

- (optional) If using images with geolocation, the computed image geolocation is good.
- (optional) If using only images with geolocation, the uncertainty ellipses are similar in size.
- (optional) If using GCPs, the GCPs' error is low (the difference between input and computed GCPs is small).
- (optional) If using GCPs and images with geolocation, the uncertainty ellipses are very small close to the GCPs and may increase for images further away.

#### **?** Computed Image/GCPs/Manual Tie Points Positions



#### 5. Absolute Camera Position and Orientation Uncertainties

Verify that:

- For projects only with image geolocation, the absolute camera position uncertainty is similar to the GPS accuracy and that the sigma is smaller than the mean.
- For projects with GCPs, the absolute camera position uncertainties are similar to the accuracy of the GCPs.

#### **?** Absolute camera position and orientation uncertainties



	X [m]	Y [m]	Z [m]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.083	0.083	0.111	0.020	0.020	0.007
Sigma	0.025	0.015	0.015	0.003	0.006	0.002

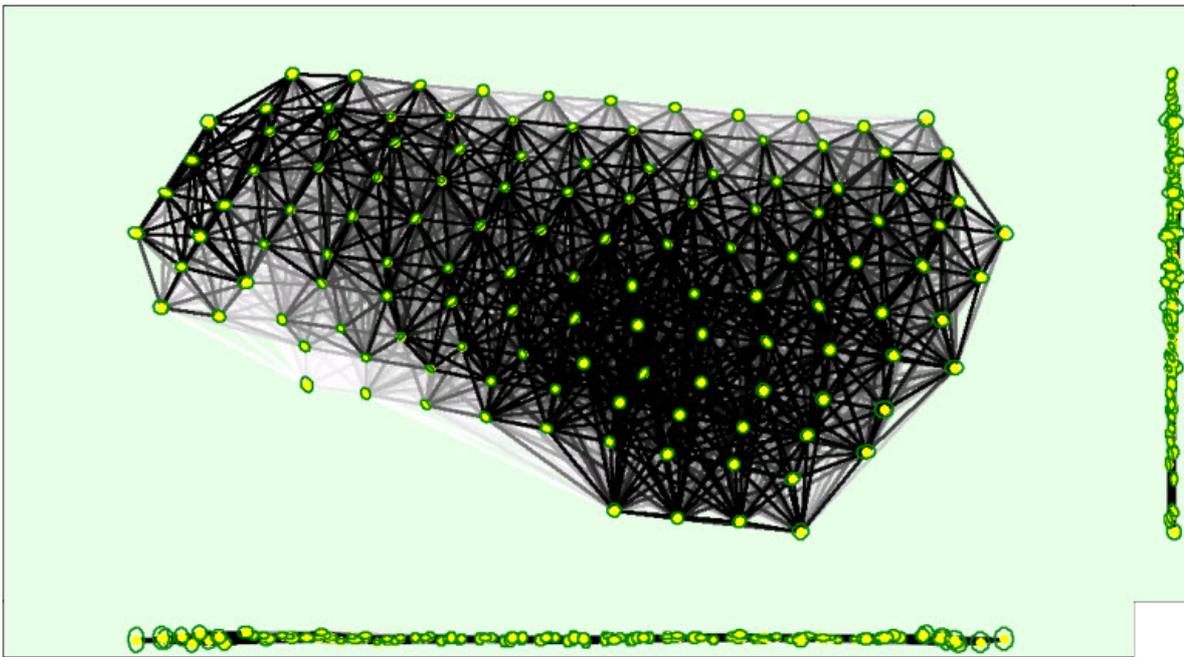
#### 6. 3D Points from 2D Keypoints Matches

Verify that:

- Enough matches have been computed between the images.
- The graph consists of one block. If multiple blocks exist, each block will have a different color.
- The uncertainty ellipses are approximately of the same size throughout the project.

#### **?** 2D Keypoint Matches





## 7. Geolocation Details

(optional) If using GCPs, verify that:

All GCPs are taken into account (not displayed with red color on the *Geolocation and Ground Control Points* table).  
All marked GCPs have been verified.

### 🔍 Ground Control Points



GCP Name	Accuracy XYZ [m]	Error X [m]	Error Y [m]	Error Z [m]	Projection Error [pixel]	Verified/Marked
9001 (3D)	0.020/ 0.020	-0.010	-0.011	-0.004	0.647	7 / 7
9002 (3D)	0.020/ 0.020	0.021	-0.019	0.041	0.592	4 / 4
9004 (3D)	0.020/ 0.020	-0.009	0.005	0.007	1.210	8 / 8
9011 (3D)	0.020/ 0.020	-0.008	-0.035	-0.114	0.948	9 / 9
9016 (3D)	0.020/ 0.020	-0.031	0.022	-0.098	0.936	10 / 10
9017 (3D)	0.020/ 0.020	0.024	0.016	-0.113	0.922	10 / 10
9012 (3D)	0.020/ 0.020	0.030	0.013	0.180	1.051	14 / 14
<b>Mean [m]</b>		0.002547	-0.001266	-0.014592		
<b>Sigma [m]</b>		0.021055	0.019540	0.098809		
<b>RMS Error [m]</b>		0.021208	0.019581	0.099881		

## 8. Processing Options

Verify that:

(optional) If using GCPs, the *Ground Control Point (GCP) Coordinate System* is correct.

(optional) If using images with geolocation, the *Image Coordinate System* is correct.

### System Information



Hardware	CPU: Intel(R) Xeon(R) CPU E5-4650 0 @ 2.70GHz RAM: 128GB GPU: RDPDD Chained DD (Driver: unknown), RDP Encoder Mirror Driver (Driver: unknown), RDP Reflector Display Driver (Driver: unknown)
Operating System	Windows Server 2008 R2 Enterprise, 64-bit

### Coordinate Systems



Image Coordinate System	WGS84
Ground Control Point (GCP) Coordinate System	WGS84 (egm96)
Output Coordinate System	WGS84 / UTMzone 32N (egm96)

## Processing Options



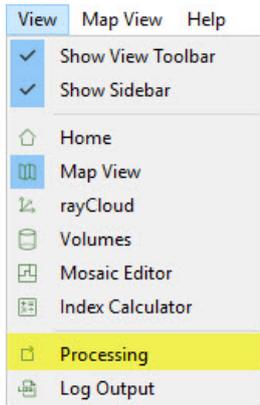
Detected Template	3D Maps
Keypoints Image Scale	Full, Image Scale: 1
Advanced: Matching Image Pairs	Aerial Grid or Corridor
Advanced: Matching Strategy	Use Geometrically Verified Matching: no
Advanced: Keypoint Extraction	Targeted Number of Keypoints: Automatic
Advanced: Calibration	Calibration Method: Standard Internal Parameters Optimization: All External Parameters Optimization: All Rematch: Auto, yes

[Index](#) > [Step 4. Processing](#)

[◀ Previous](#) | [Next ▶](#)

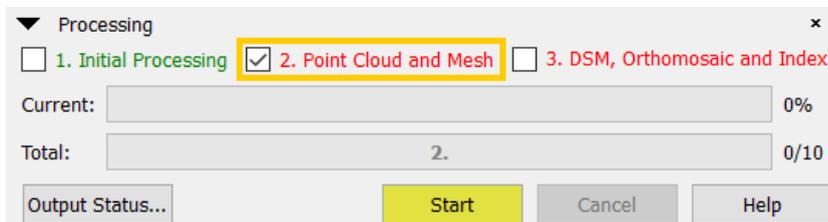
To process step 2. *Point Cloud and Mesh*:

1. On the Menu bar, click View > Processing.



2. The *Processing* bar opens on the bottom of the main window.

3. Ensure that 2. *Point Cloud and Mesh* is selected, and that 1. *Initial Processing* and 3. *DSM, Orthomosaic and Index* are unselected.

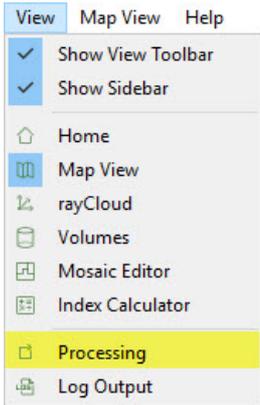


4. Click Start.

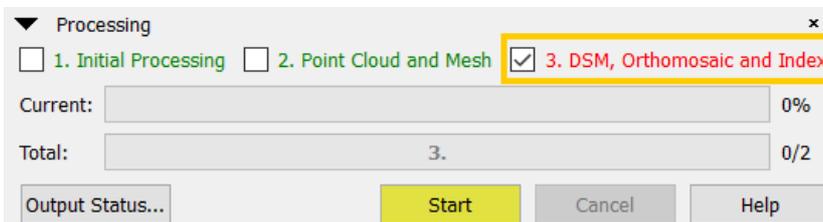
For more information about the outputs resulting from 2. *Point Cloud and Mesh*: [202558549](#).

To process step 3. *DSM, Orthomosaic and Index*.

1. On the Menu bar, click View > Processing.



2. The *Processing* bar appears in the bottom of the main window.
3. Ensure that 3. *DSM, Orthomosaic and Index* is selected, and that 1. *Initial Processing*, and 2. *Point Cloud and Mesh* are unselected.



4. Click Start.

For more information about the outputs resulting from 3. *DSM, Orthomosaic and Index*: [202558559](https://www.202558559.com).

Once the project has been processed, it is possible to use the results:

- [Using the rayCloud](#)
- [Using the Volumes](#)
- [Using the Mosaic Editor](#)
- [Using the Index Calculator](#)
- [Uploading Project Files](#)
- [Using output files in other software](#)

#### Using the rayCloud

The use of the *rayCloud* is optional and it can be used to:

- Visualize the different elements of the reconstruction (Camera Positions, Reprojections (rays), GCPs, Manual / Automatic Tie Points, Processing Area, Clipping Box, Densified Point Cloud, Terrain / Objects / other Point Groups, 3D Textured Mesh, Video Animation Trajectories) and their properties.
- Verify/ improve the accuracy of the reconstruction of the model.
- Visualize point clouds / triangle meshes created in other projects or with other software.
- Georeference a project using GCPs and /or Scale and Orientation constraints.
- Create Orthoplanes to obtain mosaics of any selected plane (for example, building facades).
- Assign points of the point cloud to different point groups.
- Improve the visual aspect.
- Create objects and measure distances (polylines) and surfaces.
- Create 3D fly-through animations (Video Animation Trajectories).
- Export different elements (GCPs, Manual / Automatic Tie Points, Objects, Video Animation Trajectories).
- Export point cloud files using points belonging to one or several classes.

For more information: [202558639](#).

#### Using the Volumes

The use of the Volumes is optional and it can be used to:

- Draw volumes.
- Measure volumes.
- Exports the measurements.

For more information: [209268446](#).

#### Using the Mosaic Editor

The use of the *Mosaic Editor* is optional and it can be used to:

- Visualize the DSM (raster GeoTIFF Digital Surface Model).
- Visualize the Orthomosaic.
- Improve the visual aspect of the Orthomosaic.

For more information: [202558709](#).

#### Using the Index Calculator

The use of the *Index Calculator* is optional and it can be used to:

- Generate an Index Map / Index Grid where the color of each pixel is computed using a formula that combines different bands of the Reflectance Map(s).
- Provide information about the bands of the Reflectance Map(s) and Index Map.
- Visualize the Index Map as a Colored Index Map by applying a color mapping to it.
- Export a georeferenced Colored Index Map.
- Annotate the classes of the Index Map to generate an Application Map.
- Export an Application Map as a shape file to be imported in any Tractors Consoles.
- Upload the Reflectance Map on MicaSense Atlas platform.

For more information: [202558729](#).

#### Uploading Project Files

The use of the *Upload Project Files* feature is optional and it can be used to:

Upload Files to the Pix4D Cloud, in order to:  
Store files in the Pix4D online account.  
Process projects online.  
Provide project information to the support team.  
Upload 3D Textured Mesh to Sketchfab, for viewing, interacting and sharing.

For a full description about the *File Upload* pop-up: [202557689](#).

For step by step instructions about how to Upload project files into Pix4D Cloud: [202558589](#).

#### Using output files in other software

Pix4Dmapper outputs are compatible with many software (GIS, CAD, etc.) and can be used for many different applications. For more information about how to use Pix4Dmapper output files in other software: [202558499](#).

[Index](#)

[◀ Previous](#)

The software manual describes all the options that can be found in the Pix4Dmapper software. Offline version: [pdf](#). The following links contain a detailed description of these options:

<b>Table View</b>	<a href="#">Blocks View</a>	<a href="#">Index View</a>
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Interface			
<a href="#">Menu bar</a>	<a href="#">Toolbar</a>	<a href="#">View toolbar</a>	<a href="#">Main view</a>
<a href="#">Floating License</a>			
<a href="#">Shortcuts</a>			

Menu Bar		
Menu Project	Menu Process	Menu View
<a href="#">New Project...</a>	<a href="#">Reoptimize</a>	<a href="#">Show View Toolbar</a>
<a href="#">Open Project...</a>	<a href="#">Rematch and Optimize</a>	<a href="#">Show Sidebar</a>
<a href="#">Recent Projects</a>	<a href="#">Quality Report...</a>	<a href="#">Home</a>
<a href="#">Close Project</a>	<a href="#">Open Results Folder...</a>	<a href="#">Projects</a>
<a href="#">Download Project Files...</a>	<a href="#">Outputs Status...</a>	<a href="#">Help</a>
<a href="#">Upload Project Files...</a>	<a href="#">Generate Quality Report</a>	<a href="#">Demo Project</a>
<a href="#">Image Properties Editor...</a>	<a href="#">Save Undistorted Images</a>	<a href="#">Map View</a>
<a href="#">Image Geolocation</a>	<a href="#">Run Point Cloud Classification</a>	<a href="#">rayCloud</a>
<a href="#">Selected Camera Model</a>	<a href="#">Generate 3D Textured Mesh</a>	<a href="#">Volumes</a>
<a href="#">Edit Camera Model</a>	<a href="#">Import Point Cloud for DSM Generation...</a>	<a href="#">Mosaic Editor</a>
<a href="#">Images Table</a>	<a href="#">Generate DTM</a>	<a href="#">Index Calculator</a>
<a href="#">GCP/MTP Manager...</a>	<a href="#">Generate Contour Lines</a>	<a href="#">Processing</a>
<a href="#">GCP Coordinate System</a>	<a href="#">Send Elevation Data (DSM) to eMotion</a>	<a href="#">Log Output</a>
<a href="#">GCP/MTP Table</a>	<a href="#">Send Map to eMotion</a>	<b>Menu Help</b>
<a href="#">Import GCPs...</a>	<a href="#">Processing Options...</a>	<a href="#">Help Contents</a>
<a href="#">Export GCPs...</a>	<a href="#">1. Initial Processing</a>	<a href="#">Online Support</a>
<a href="#">Add Point</a>	<a href="#">2. Point Cloud and Mesh</a>	<a href="#">Forum</a>
<a href="#">Remove Points</a>	<a href="#">3. DSM, Orthomosaic and Index</a>	<a href="#">Personal Support</a>
<a href="#">Import Marks...</a>	<a href="#">Resources and Notifications</a>	<a href="#">Settings...</a>
<a href="#">Export Marks...</a>	<a href="#">Templates</a>	<a href="#">About...</a>
<a href="#">GCP/MTP Editor</a>		
<a href="#">rayCloud</a>		
<a href="#">Basic GCP/MTP Editor</a>		
<a href="#">GCP/MTP Table</a>		
<a href="#">Images</a>		
<a href="#">Preview</a>		
<a href="#">Select Output Coordinate System...</a>		
<a href="#">Save Project</a>		
<a href="#">Save Project As...</a>		
<a href="#">Split into Subprojects...</a>		
<a href="#">Exit</a>		

Views		
<a href="#">Map View</a>	<a href="#">rayCloud</a>	<a href="#">Volumes</a>

Menu bar entry Processing Area Toolbar 2D View Status bar	Menu bar entry Viewpoint Navigation Modes Perspective/ Orthographic Change Background... Display Sky New Processing Area New Scale Constraint New Orientation Constraint New Orthoplane New Video Animation Trajectory... New Polyline New Surface Toolbar Left sidebar Create Layers Cameras Rays Tie Points Processing Area Point Clouds Point Groups Triangle Meshes Objects 3D View Right sidebar Clipping Box Cameras GCPs and Manual Tie Points Automatic Tie Points Processing Area Point Clouds Objects Status bar	Menu bar entry Viewpoint Navigation Modes Perspective/Orthographic Change Background... Display Sky New Volume 3D View Sidebar Objects Layers Status bar
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Views	
Mosaic Editor	Index Calculator
Menu bar entry View Mosaic Editing Visualization Toolbar Mosaic View Sidebar Status bar	Menu bar entry Toolbar Index View Sidebar 1. Reflectance Map 2. Regions 3. Index Map Formula Editor Index List 4. Color Maps and Prescription 5. Export Status bar

When Pix4Dmapper opens, 4 sections appear:

Menu bar

Toolbar

View toolbar

Main view

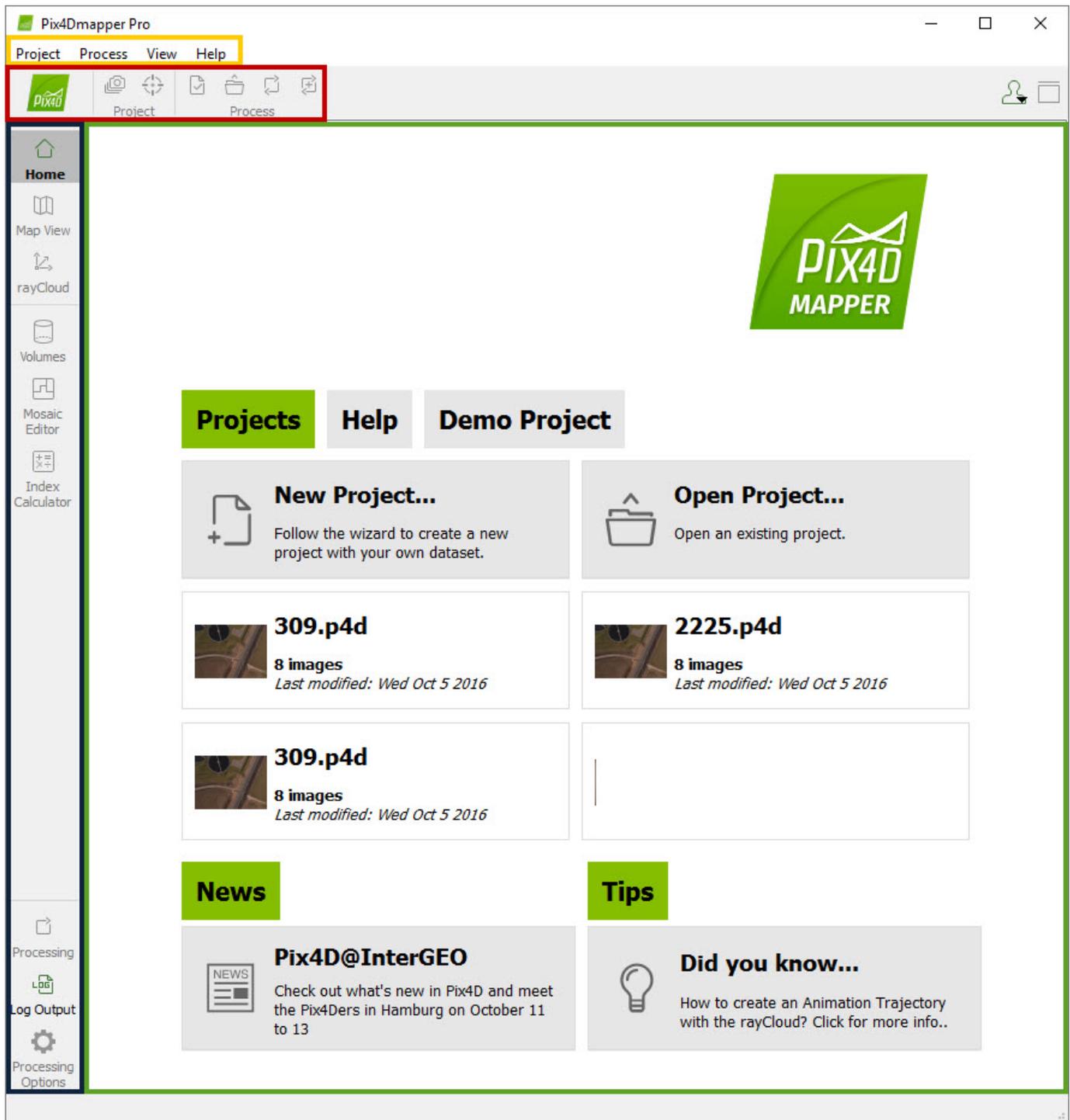


Figure 1. Menu bar (yellow), toolbar (red), view toolbar (blue) and main view (green).

Menu bar

There are 4 items:

**Project:** This menu allows to create, open, close, save, upload to download from the cloud or split a project. It also allows to view and define the properties of the images, GCPs, and output coordinate system.

**Process:** This menu gives access to all processing options and actions.

**View:** This menu gives access to the different views of the software. Depending on the selected view, a new item will appear on the Menu bar: *Map*, *rayCloud*, *Volumes*, *Mosaic Editor* or *Index Calculator*. This extra menu bar item contains options specific for the selected view.

**Help:** This menu:

Gives access to the Manual, Support Site and Forum.

Allows to set some settings (proxy, camera model database, language)

Gives information about the installed release.

The different options within the menu bar items may be active or grayed out depending on the status of the project and the selected options.

## Toolbar

The different buttons within the toolbar may be active or grayed out depending on the status of the project and the selected options. Each button's action can also be accessed through the Menu bar and is explained in more details in the next articles.

The toolbar buttons are:

On the left:

### Project

 Image Properties Editor...

 GCP/MTP Manager...

### Process

 Quality Report...

 Open Results Folder...

 Reoptimize

 Rematch and Optimize

On the right:

 User Options: There are 4 items that can be selected:

Logged In as USERNAME: Displays the username.

Cloud Projects: Opens the user website account, displaying the *Projects* page, where the user can access the uploaded projects (<https://mapper.pix4d.com/projects/>).

Manage Licenses: Opens the user website account, displaying the *Licenses* page, where the user can access the Licenses and Devices information (<https://mapper.pix4d.com/licenses/>).

Log Out...: Option to deactivate the license in the installed computer.

 Show sidebar: Shows the sidebar on the right of the main window. The Home view and the Volumes do not have a right sidebar.

 Hide sidebar: Hides the sidebar on the right of the main window. The Home view and the Volumes do not have a right sidebar.

When activating the different views using the View Menu bar item (*Map View*, *rayCloud*, *Volumes*, *Mosaic Editor* and *Index Calculator*) some extra buttons appear in the toolbar. These extra buttons are specific for the selected view (see *Figures 2-6* below).

## View toolbar

Appears on the left of the main window and allows to select the view, bars (*Processing* and/or *Log Output* bar) and the Processing Options window. Depending on the status of the project and the selected options, the different options may be active or grayed out. When starting the software, only the Welcome View and the *Log Output* bar are active.

The following views are available:

 Welcome

 Map View

 rayCloud

 Volumes

 Mosaic Editor

 Index Calculator

The following bars are available:

 Processing

The following windows are available:

In order to show / hide the view toolbar, on the Menu bar click View > Show View Toolbar.

Main view

When Pix4Dmapper opens, the Welcome View appears.

When opening a project the Map View is selected by default and the 2D View appears. When the rayCloud or the Volumes are selected, the 3D View appears. When the Mosaic Editor is selected, the Mosaic View appears and when the Index Calculator is selected, the Index View appears.

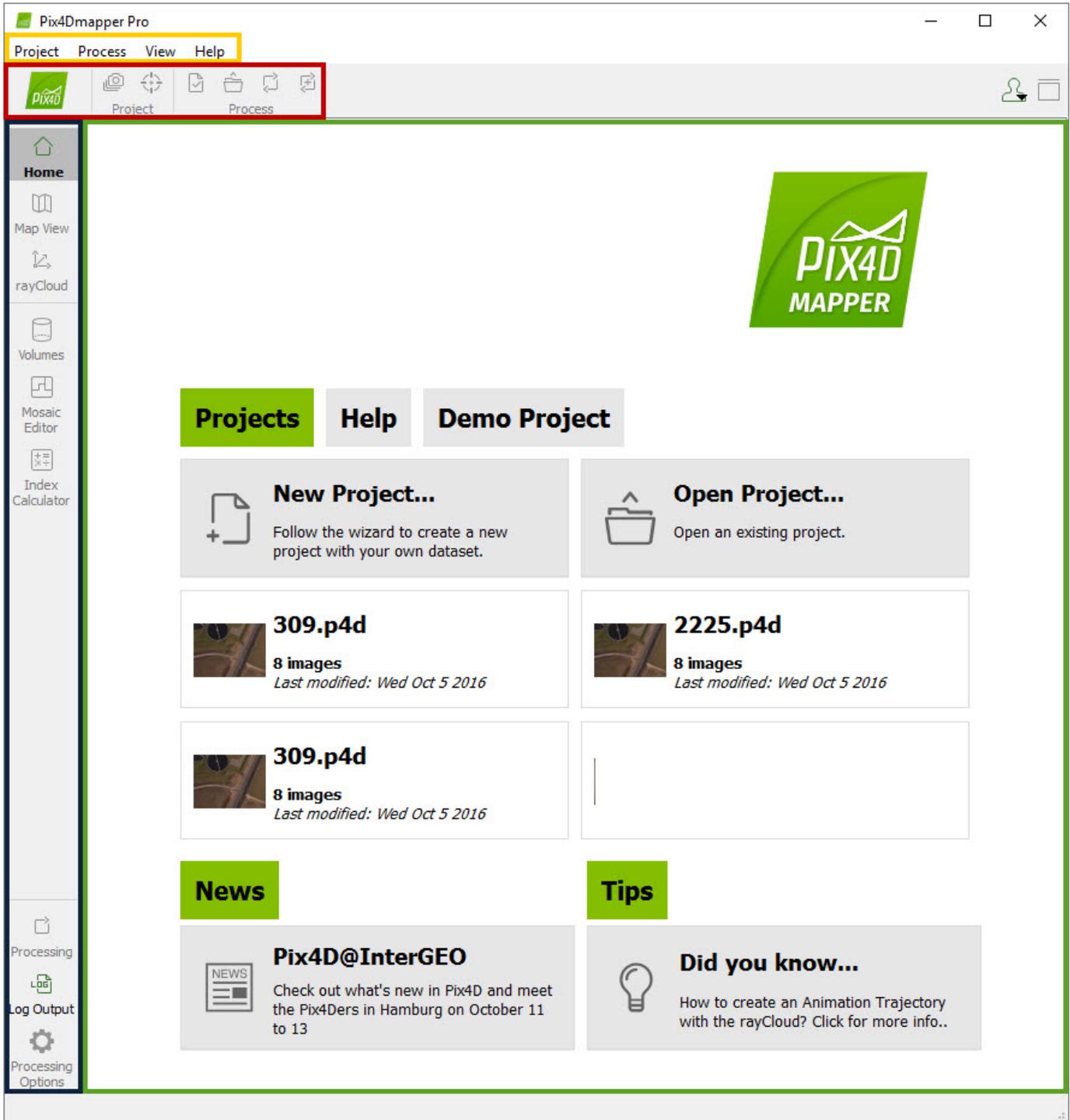


Figure 1. Menu bar, toolbar buttons, viewtoolbar and main view when starting the software.

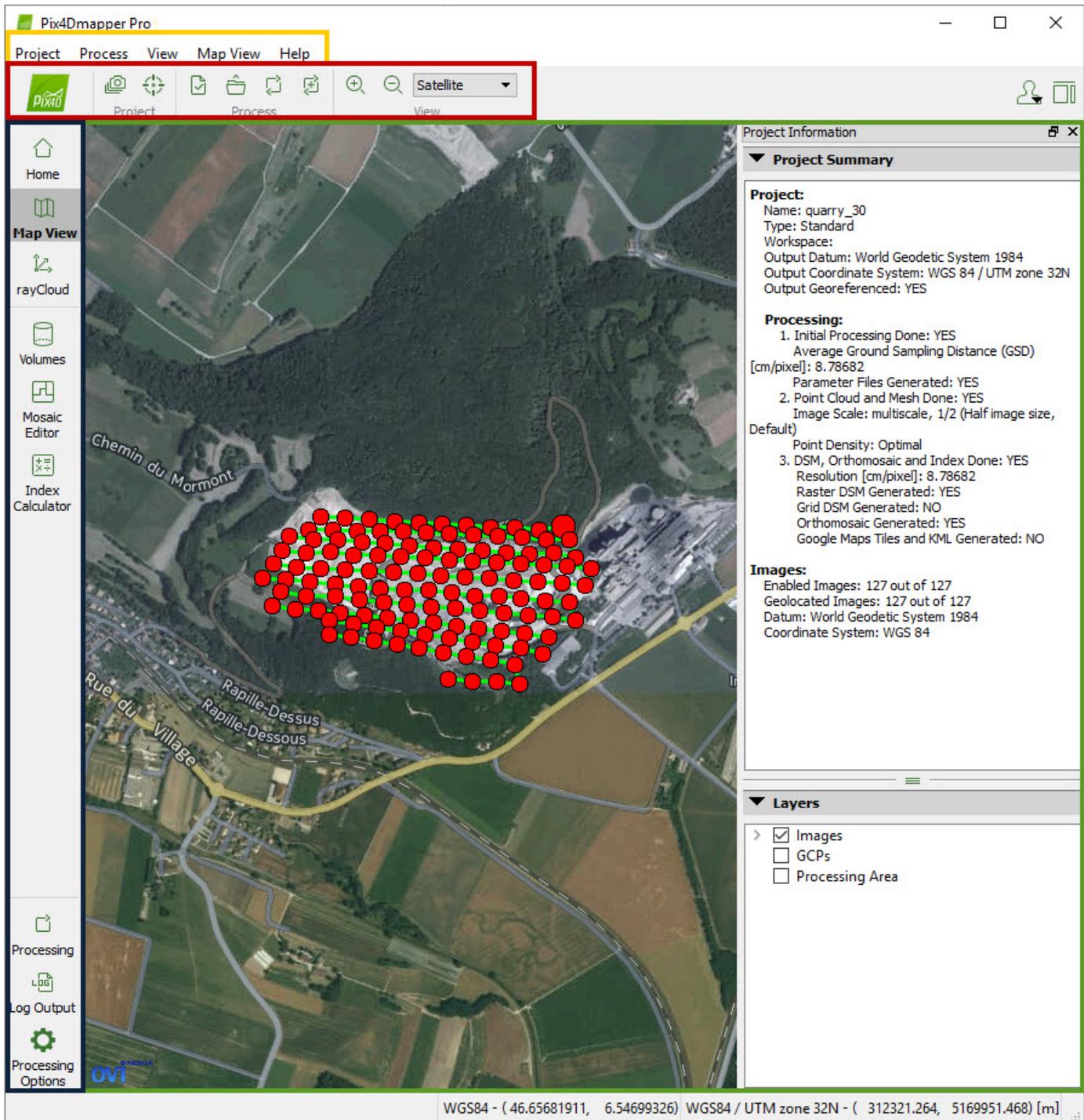


Figure 2. Menu bar, toolbar buttons, viewtoolbar and main view when the Map View is selected.

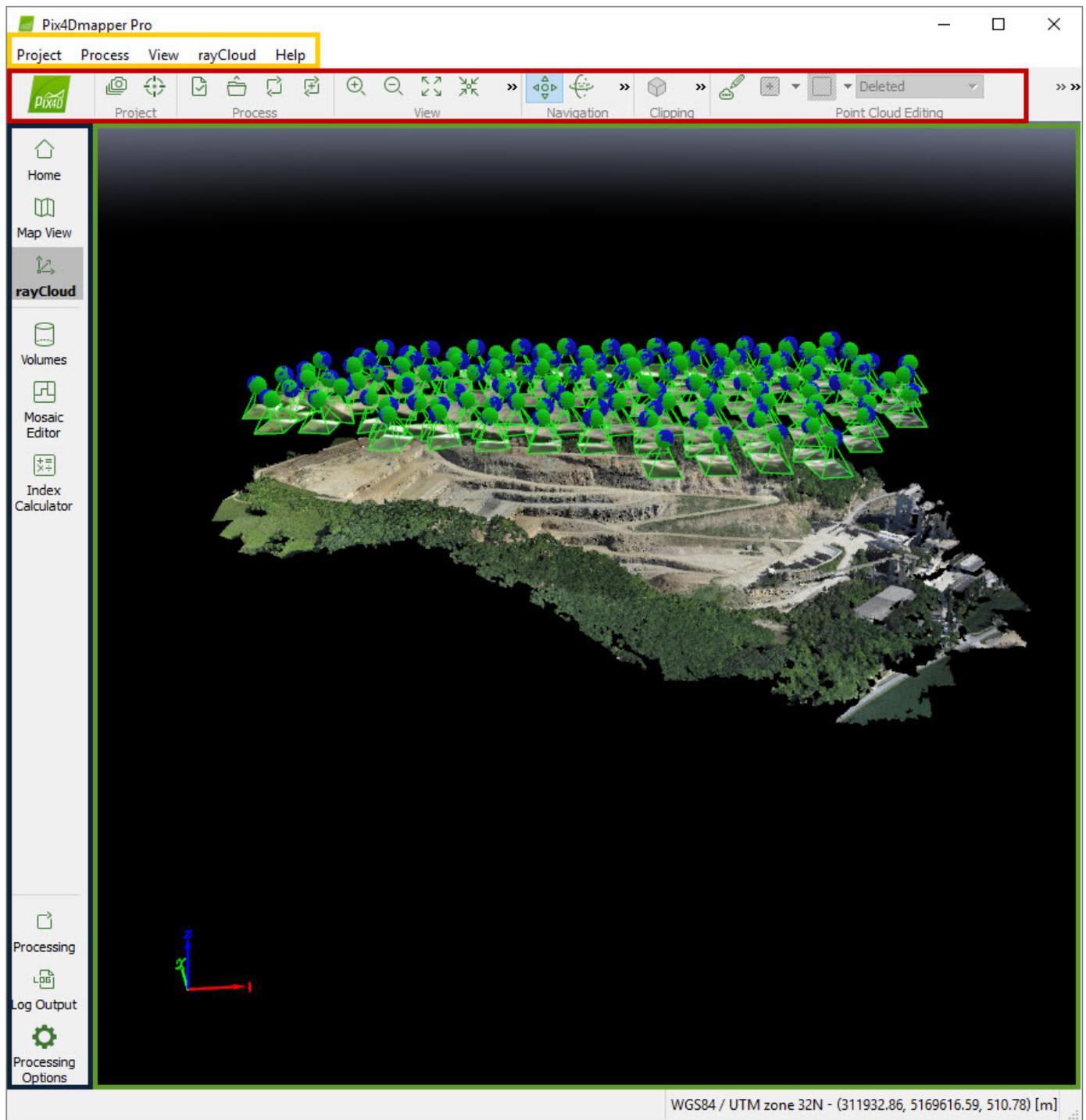


Figure 3. Menu bar, toolbar buttons, viewtoolbar and main view when the rayCloud is selected.

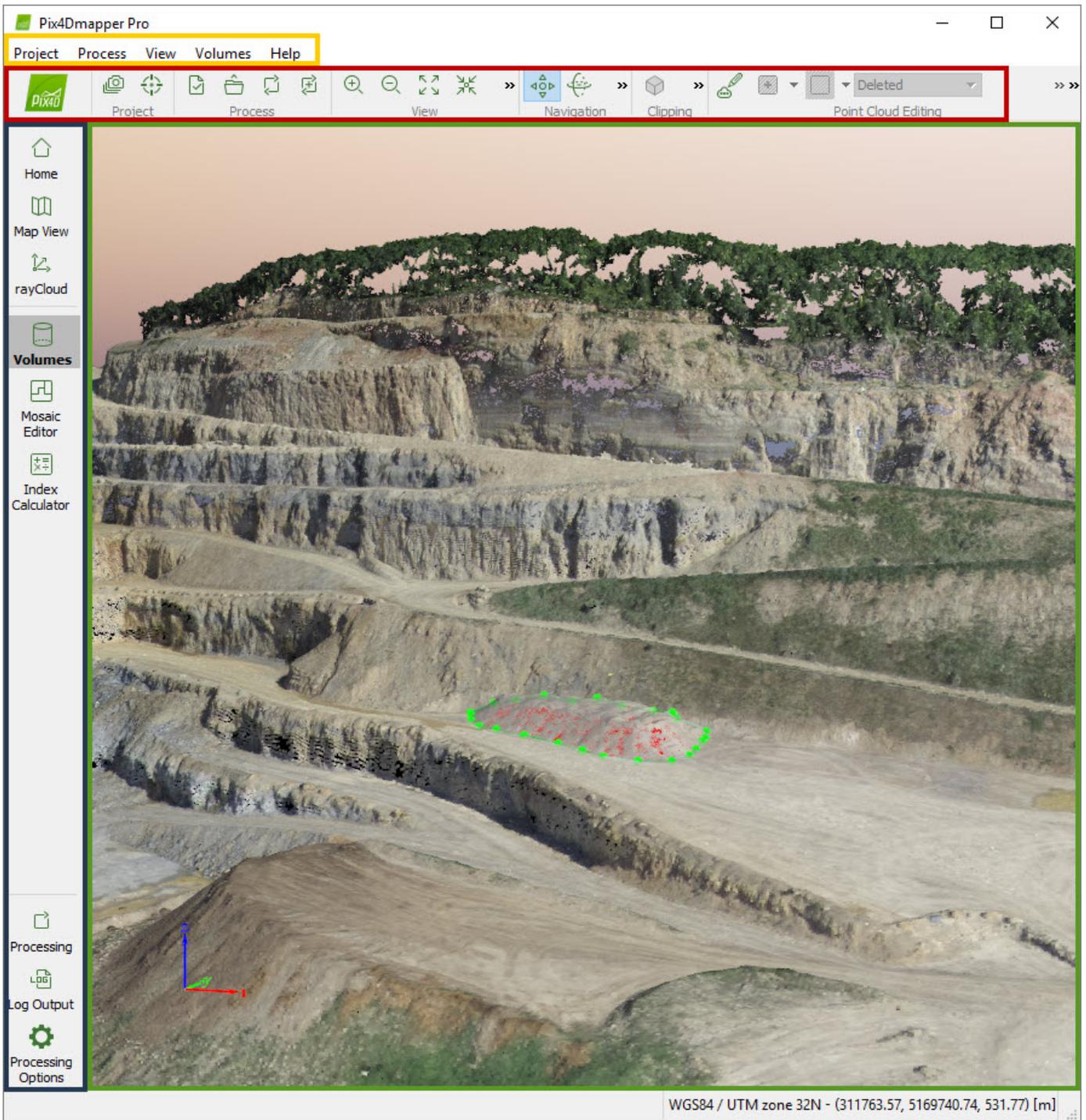


Figure 4. Menu bar, toolbar buttons, viewtoolbar and main view when the Volumes is selected.

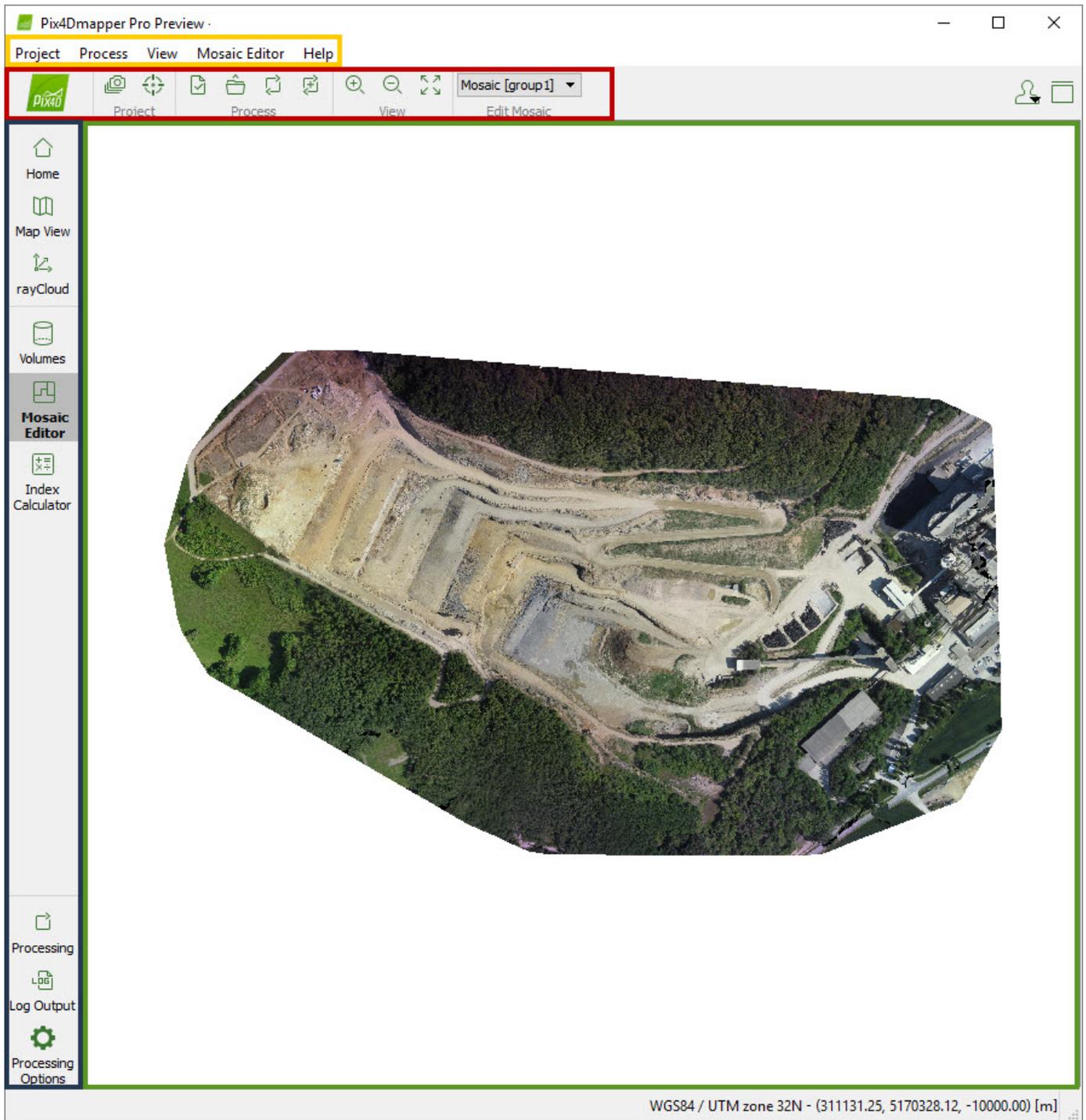


Figure 5. Menu bar, toolbar buttons, viewtoolbar and main view when the Mosaic Editor is selected.

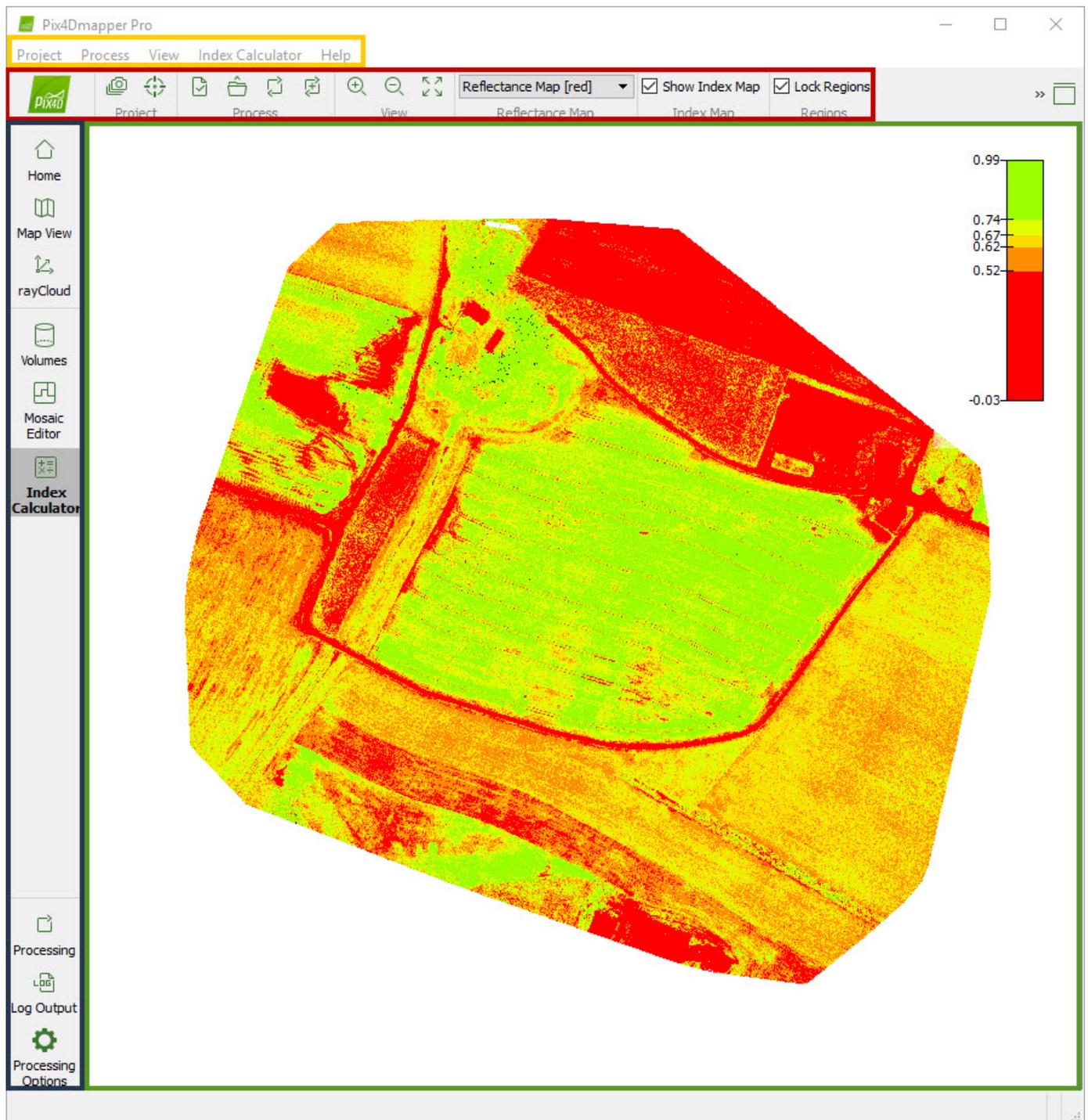


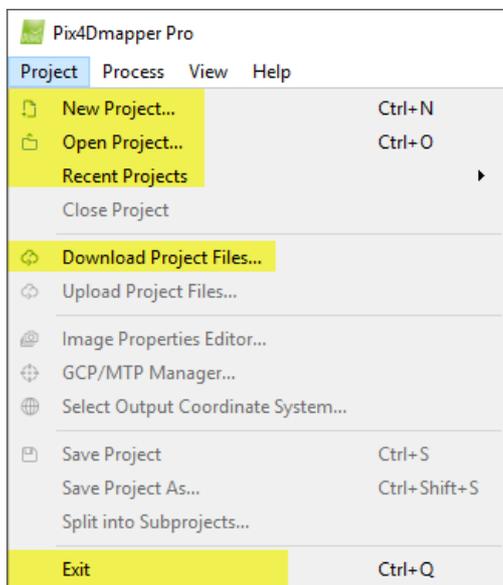
Figure 6. Menu bar, toolbar buttons, viewtoolbar and main view when the Index Calculator is selected.

 Access: On the Menu bar, click Project.

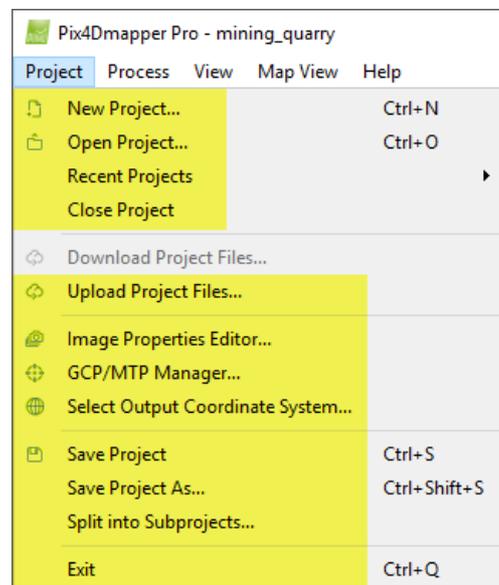
There are 13 items that can be selected:

- New Project...
- Open Project...
- Recent Projects
- Close Project
- Download Project Files...
- Upload Project Files...
- Image Properties Editor...
- GCP/MTP Manager...
- Select Output Coordinate System...
- Save Project
- Save Project As...
- Split into Subprojects...
- Exit

Depending on whether there is a project loaded/created, different options will be enabled or grayed out:



Available options before a project is loaded or created.



Available options once a project is loaded or created.

New Project...

Opens the wizard to create a new project.

For step by step instructions about how to create a new project: [202557309](#).

Open Project...

Opens an existing project. By clicking Open Project, a pop-up appears to navigate and select a *.p4d* project file (Pix4Dmapper project file format).

Recent Projects

Displays a menu with the 10 last projects that have been opened. By clicking on one of them, the project will open.

Close Project

Closes the current project.

Download Project Files...

Allows to download and load a project previously uploaded to Pix4D Cloud. This option is enabled when the software is opened and disabled once a project is loaded or created.

For step by step instructions: [205751415](#).

Upload Project Files...

Allows to:

[Upload and process a project on Pix4D Cloud.](#)

[Upload Files on Sketchfab.](#)

For more information: [202557689](#).

Image Properties Editor...

Allows to change the properties of the project's images such as: the coordinate system, the image geolocation, the image geolocation accuracy and the associated camera model. For more information: [202557849](#).

GCP/MTP Manager...

Allows to set up and edit the properties of the GCPs / Manual Tie Points / Check Points such as: Select the GCP coordinate system, import GCPs, add / remove points, import / export the marks, open the rayCloud or Basic Editor for marking. For more information: [202558329](#).

Select Output Coordinate System...

Allows to select the coordinate system of the results. For more information: [202558099](#).

Save Project

Saves the status/properties and configuration of the current project.

 Important: This option saves any change made since the project was opened and saved for the last time. The *.p4d* project file will be updated with the current state of the project. This has no impact on other files such as input files or output files. Output files will be modified/created only when processing.

Save Project As...

Save the status/properties, configuration, and results of the current project into another location and/or with a different name.

 Important: If a different project name or path is selected, this option will save a copy of the project in the new location using the new project name.  
A new *.p4d* project file will be created and saved with the same information as the current project. Once this new project is created, any changes made and saved with the option *Save Project* will not be saved in the original project. Only the new project will include all the changes.

Split into Subprojects...

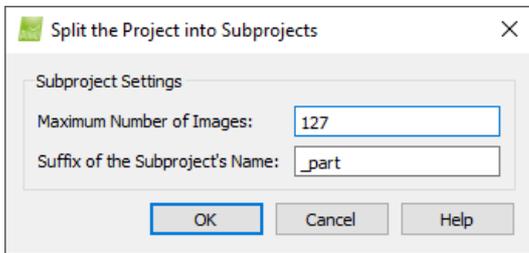
Allows to automatically split the project into subprojects by creating different *.p4d* files.

Each *.p4d* file contains the images for the created subproject.

The different subprojects overlap, therefore, some images will appear in more than one subproject.

 Important: Only aerial projects with geolocated images can be split.

By clicking Split into Subprojects... the *Split the Project into Subprojects* pop-up will open:



It contains the following options:

*Maximum Number of Images:* Defines the area to be used to split the terrain into subprojects. When selecting for example 100, a subproject will cover the area from 100 images plus some area and images from neighboring subprojects so as to ensure there will be overlap between them.

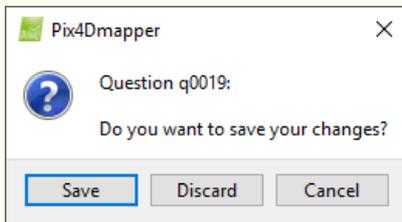
*Suffix of the Subproject's Name:* Text to use as suffix for the subprojects. Each subproject will be named as *projectname* + *Suffix* + *Number*.

**!** Important: All the Manual Tie Points, GCPs, Check Points and Objects created in the original project will be copied into all the generated subprojects.

Exit

Closes the project and exits the software.

**!** Important: If changes have been made and the project was not saved, the following pop-up appears:



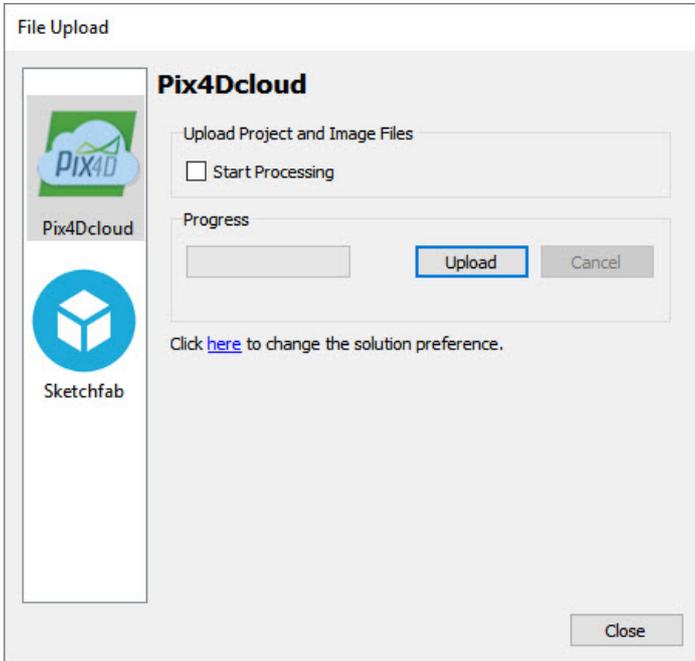
Click Save to save the changes and exit, Discard to exit without saving, and Cancel to keep the software open.

 Access: On the Menu bar, click Project > Upload Project Files... (active once a project has been loaded or created).

The *File Upload* pop-up appears, which allows the user to:

[Upload and process a project on Pix4D Cloud.](#)

[Upload Files on Sketchfab](#)



### Upload and process a project on Pix4D Cloud

The *File Upload* window contains 2 sections:

[Upload Project and Image Files](#)

[Progress](#)

and the action button:

**Close:** Closes the window.

#### Upload Project and Image Files

The *Upload Project and Image Files* section contains the *Start Processing* box:

**Start Processing:** To start processing on Pix4D Cloud. For more information and step by step instructions: [202558589](#).

 **Note:** When sending a project to Pix4D Support Team, there is no need to select *Start Processing*.

#### Progress

The *Progress* section contains:

**Progress bar:** Displays the upload status in percentage.

**Upload:** Allows to upload the selected files on the cloud.

**Cancel:** Cancels the upload.

 **Note:** The solution that corresponds to the valid license used to process the project can be selected: from the *File Upload* window. Click [here](#) to change the solution preference for more information: [115002204266](#).

### Upload Files on Sketchfab

 **Note:** In order to use the 3D Textured Mesh in Sketchfab: [203282189](#).

The *File Upload* window contains 2 sections:

[Account](#)  
[Upload](#)

and the action button:

**Close:** Closes the window.

#### **Account**

It displays the URL to log in or create (free of charge) a Sketchfab account.

 **Note:** There is a limit on the size of the files that can be imported:  
Basic (free account): 50MB per upload.  
Pro: 200MB per upload.  
Business: 500MB per upload.

#### **Upload**

It displays the instructions to upload the 3D Textured Mesh on Sketchfab: [204963595](#).

 Access: On the Menu bar, click Project > Image Properties Editor...

 Access via the New Project wizard: When creating a new project, after loading the images.

The *Image Properties Editor* window contains 3 sections:

**Image Geolocation:**

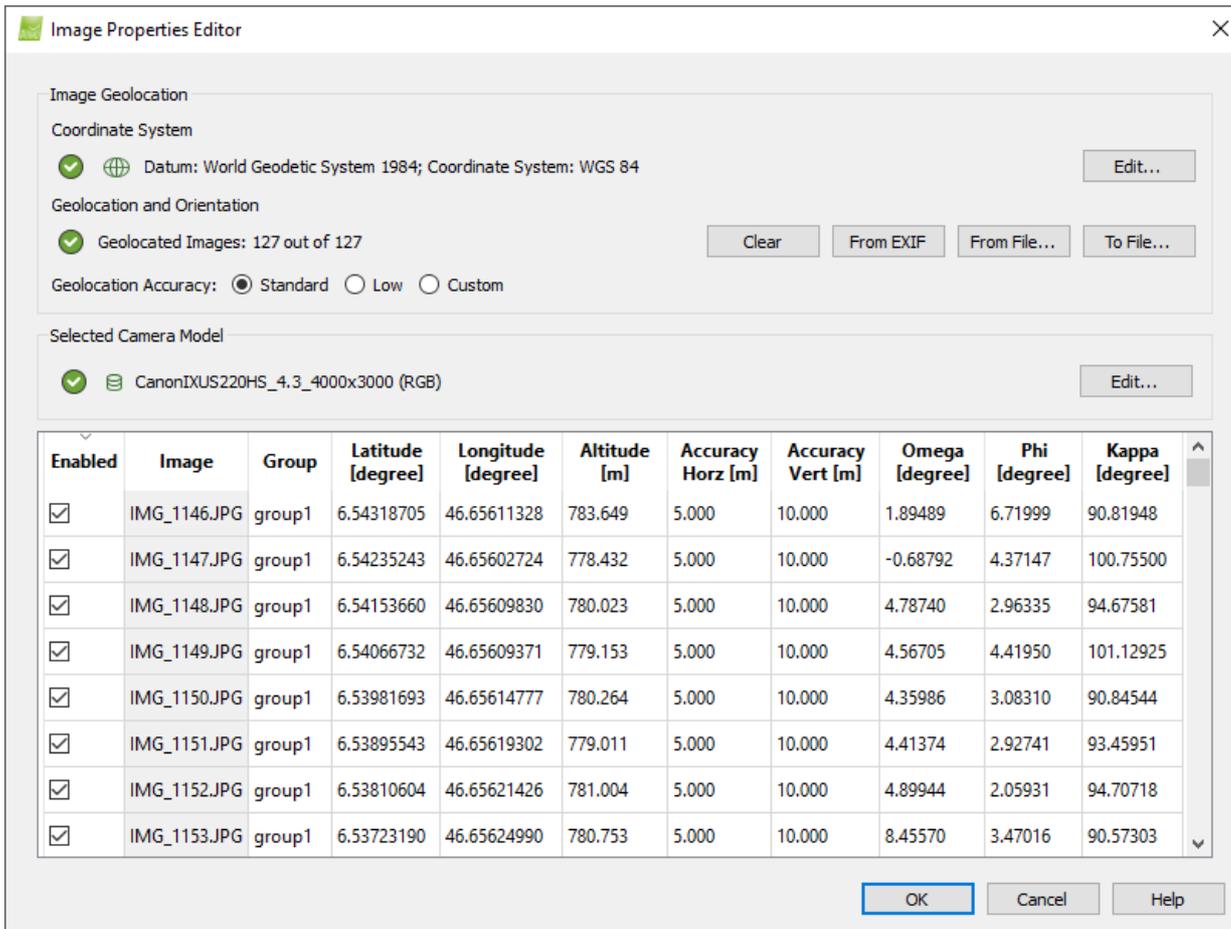
Selects the coordinate system used for the images' geolocation.

Imports/exports the coordinates and, optionally, the orientation of the images and/or the accuracy of the coordinates.

Selects the accuracy of the geolocation.

**Selected Camera Model:** Selects and configures the camera model associated to the images.

**Images Table:** Displays the selected images, as well as each image's group, position, position accuracy, orientation, and if the image is enabled or not (an enabled image will be taken into account for processing).



The screenshot shows the 'Image Properties Editor' dialog box. It has three main sections: 'Image Geolocation', 'Selected Camera Model', and an 'Images Table'.

**Image Geolocation Section:**

- Coordinate System:** A globe icon, 'Datum: World Geodetic System 1984; Coordinate System: WGS 84', and an 'Edit...' button.
- Geolocation and Orientation:** A checkmark, 'Geolocated Images: 127 out of 127', and buttons for 'Clear', 'From EXIF', 'From File...', and 'To File...'.
- Geolocation Accuracy:** Radio buttons for 'Standard' (selected), 'Low', and 'Custom'.

**Selected Camera Model Section:**

- A checkmark, a camera icon, 'CanonIXUS220HS\_4.3\_4000x3000 (RGB)', and an 'Edit...' button.

**Images Table:**

Enabled	Image	Group	Latitude [degree]	Longitude [degree]	Altitude [m]	Accuracy Horz [m]	Accuracy Vert [m]	Omega [degree]	Phi [degree]	Kappa [degree]
<input checked="" type="checkbox"/>	IMG_1146.JPG	group1	6.54318705	46.65611328	783.649	5.000	10.000	1.89489	6.71999	90.81948
<input checked="" type="checkbox"/>	IMG_1147.JPG	group1	6.54235243	46.65602724	778.432	5.000	10.000	-0.68792	4.37147	100.75500
<input checked="" type="checkbox"/>	IMG_1148.JPG	group1	6.54153660	46.65609830	780.023	5.000	10.000	4.78740	2.96335	94.67581
<input checked="" type="checkbox"/>	IMG_1149.JPG	group1	6.54066732	46.65609371	779.153	5.000	10.000	4.56705	4.41950	101.12925
<input checked="" type="checkbox"/>	IMG_1150.JPG	group1	6.53981693	46.65614777	780.264	5.000	10.000	4.35986	3.08310	90.84544
<input checked="" type="checkbox"/>	IMG_1151.JPG	group1	6.53895543	46.65619302	779.011	5.000	10.000	4.41374	2.92741	93.45951
<input checked="" type="checkbox"/>	IMG_1152.JPG	group1	6.53810604	46.65621426	781.004	5.000	10.000	4.89944	2.05931	94.70718
<input checked="" type="checkbox"/>	IMG_1153.JPG	group1	6.53723190	46.65624990	780.753	5.000	10.000	8.45570	3.47016	90.57303

Buttons at the bottom: OK, Cancel, Help.

 Access: On the Menu bar, click Project > Image Properties Editor...

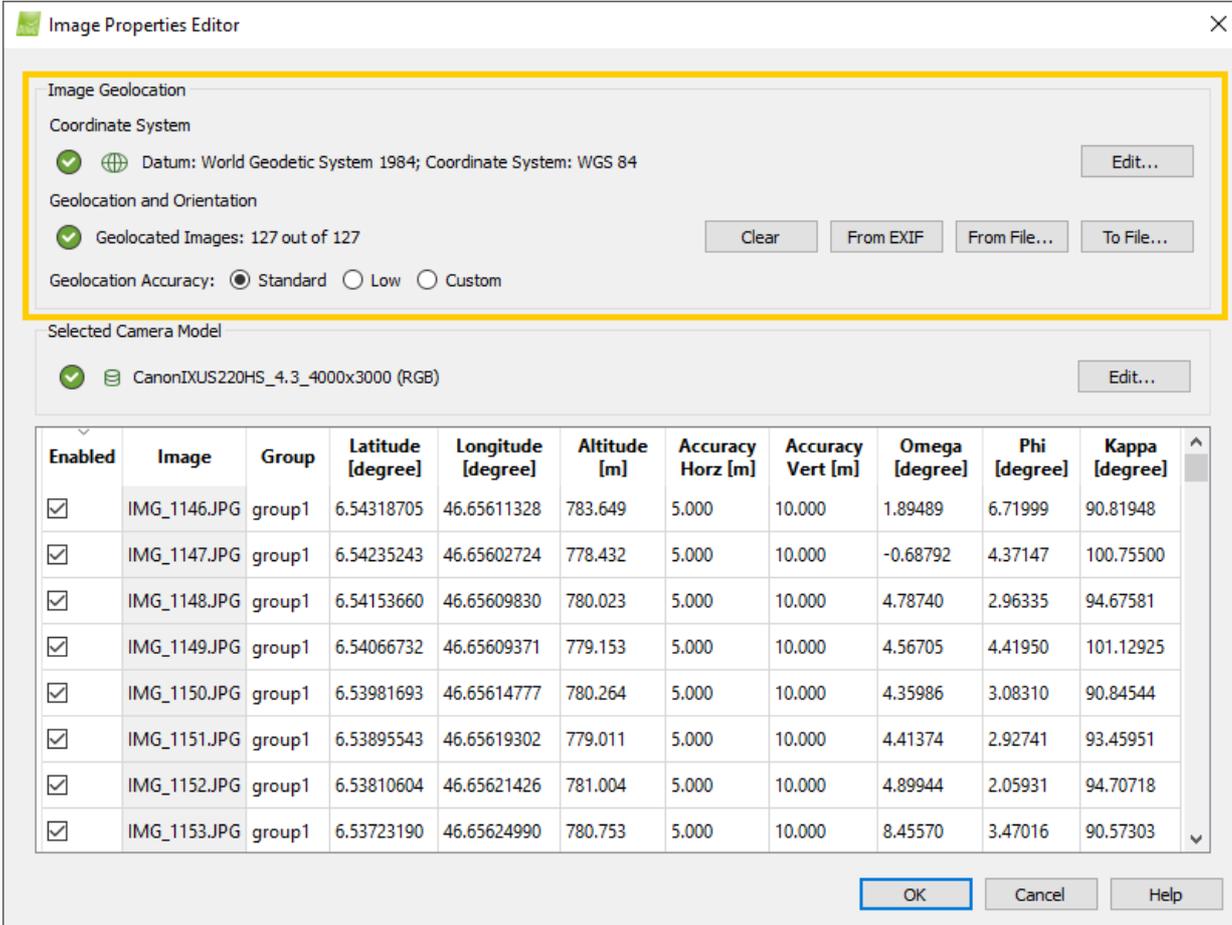
 Access via the New Project wizard: When creating a new project, after loading the images.

The *Image Geolocation* section contains:

**Coordinate System:** Selects the coordinate system used for the images' geolocation.

**Geolocation and Orientation:** Imports/exports the coordinates and, optionally, the orientation of the images and/or the accuracy of the coordinates.

**Geolocation Accuracy:** Selects the accuracy of the geolocation.



**Image Geolocation**

Coordinate System

 Datum: World Geodetic System 1984; Coordinate System: WGS 84 Edit...

Geolocation and Orientation

Geolocated Images: 127 out of 127 Clear From EXIF From File... To File...

Geolocation Accuracy:  Standard  Low  Custom

Selected Camera Model

 CanonIXUS220HS\_4.3\_4000x3000 (RGB) Edit...

Enabled	Image	Group	Latitude [degree]	Longitude [degree]	Altitude [m]	Accuracy Horz [m]	Accuracy Vert [m]	Omega [degree]	Phi [degree]	Kappa [degree]
<input checked="" type="checkbox"/>	IMG_1146.JPG	group1	6.54318705	46.65611328	783.649	5.000	10.000	1.89489	6.71999	90.81948
<input checked="" type="checkbox"/>	IMG_1147.JPG	group1	6.54235243	46.65602724	778.432	5.000	10.000	-0.68792	4.37147	100.75500
<input checked="" type="checkbox"/>	IMG_1148.JPG	group1	6.54153660	46.65609830	780.023	5.000	10.000	4.78740	2.96335	94.67581
<input checked="" type="checkbox"/>	IMG_1149.JPG	group1	6.54066732	46.65609371	779.153	5.000	10.000	4.56705	4.41950	101.12925
<input checked="" type="checkbox"/>	IMG_1150.JPG	group1	6.53981693	46.65614777	780.264	5.000	10.000	4.35986	3.08310	90.84544
<input checked="" type="checkbox"/>	IMG_1151.JPG	group1	6.53895543	46.65619302	779.011	5.000	10.000	4.41374	2.92741	93.45951
<input checked="" type="checkbox"/>	IMG_1152.JPG	group1	6.53810604	46.65621426	781.004	5.000	10.000	4.89944	2.05931	94.70718
<input checked="" type="checkbox"/>	IMG_1153.JPG	group1	6.53723190	46.65624990	780.753	5.000	10.000	8.45570	3.47016	90.57303

OK Cancel Help

### Coordinate System

**Datum:** Displays the selected image datum. By default the selected datum is *World Geodetic System 1984*.

**Coordinate System:** Represents the selected image coordinate system. By default the selected coordinate system is *WGS 84*.

**Vertical coordinate system or Geoid Height Above the Ellipsoid:** It is displayed in parenthesis. It represents the vertical coordinate system / Geoid Height Above the Ellipsoid that will be used to convert the image height from geoidal to ellipsoidal. For more information about when to use this function: [202559459](#).

**Edit...:** Opens the *Select Image Coordinate System* pop-up that allows the user to change the selected coordinate system.

For more information: [202558239](#).

### Geolocation and Orientation

 Important: Pix4Dmapper can process images with or without geolocation. If more than 80% images are not geolocated, lower precision results are expected.

The left icon indicates the status:

 : If less than 20% images are geolocated, lower precision results are expected.

 : More than 20% images are geolocated.

The number of geolocated images is displayed next to the status indicator icon.

There are 4 options available for this section:

Clear: Deletes the images' coordinates that are already loaded.

From EXIF: Imports the image geolocation (coordinates) written in the EXIF data of the images if they are available.

From File...: Imports from a file the coordinates of the images and, optionally, the orientation of the images and/or the accuracy of the coordinates using the [Select Geolocation File](#) pop-up.

To file: Exports to a file the coordinates of the images and, optionally, the orientation of the images and/or the accuracy of the coordinates using the [Export Image Geolocation](#) pop-up.

### Geolocation Accuracy

Defines the horizontal and vertical accuracy values (*Accuracy Horz*, *Accuracy Vert*).

The horizontal accuracy (*Accuracy Horz*) refers to the first and second coordinates (latitude and longitude or X and Y) of the images.

The vertical accuracy (*Accuracy Vert*) refers to the third coordinate (altitude or Z) of the images.

There are 3 options:

Standard: Useful when having very accurate image geolocation. Sets the values to:

Accuracy Horz: 5m.

Accuracy Vert: 10m.

Low: Useful when having non accurate image geolocation. Sets the values to:

Accuracy Horz: 50m.

Accuracy Vert: 100m.

Custom: Allows to set other values or edit the accuracy of each individual image or of a group of images.

The higher the accuracy numerical value (m or ft), the less influence the image's coordinates will have in the *Initial Processing* compared to other images or GCPs with lower accuracy numerical values (m or ft). The accuracy is a value between 0.001 and 10'000.



Warning: The accuracy must be given in meters or feet according to the selected coordinate system.

To edit the accuracy of one image, double click on the corresponding cell and enter the new value: [202557949](#).

Access: On the Menu bar, click Project > Image Properties Editor...

Access via the New Project wizard: When creating a new project, the *Image Properties* window appears after loading the images.

The *Selected Camera Model* section is used to describe the selected camera model(s) associated with the images.

Enabled	Image	Group	Latitude [degree]	Longitude [degree]	Altitude [m]	Accuracy Horz [m]	Accuracy Vert [m]	Omega [degree]	Phi [degree]	Kappa [degree]
<input checked="" type="checkbox"/>	IMG_1146.JPG	group1	6.54318705	46.65611328	783.649	5.000	10.000	1.89489	6.71999	90.81948
<input checked="" type="checkbox"/>	IMG_1147.JPG	group1	6.54235243	46.65602724	778.432	5.000	10.000	-0.68792	4.37147	100.75500
<input checked="" type="checkbox"/>	IMG_1148.JPG	group1	6.54153660	46.65609830	780.023	5.000	10.000	4.78740	2.96335	94.67581
<input checked="" type="checkbox"/>	IMG_1149.JPG	group1	6.54066732	46.65609371	779.153	5.000	10.000	4.56705	4.41950	101.12925
<input checked="" type="checkbox"/>	IMG_1150.JPG	group1	6.53981693	46.65614777	780.264	5.000	10.000	4.35986	3.08310	90.84544
<input checked="" type="checkbox"/>	IMG_1151.JPG	group1	6.53895543	46.65619302	779.011	5.000	10.000	4.41374	2.92741	93.45951
<input checked="" type="checkbox"/>	IMG_1152.JPG	group1	6.53810604	46.65621426	781.004	5.000	10.000	4.89944	2.05931	94.70718
<input checked="" type="checkbox"/>	IMG_1153.JPG	group1	6.53723190	46.65624990	780.753	5.000	10.000	8.45570	3.47016	90.57303

The status indicator is represented with the left icon:

- : The camera model is valid, if it is retrieved from Pix4Dmapper's camera model database, from the user's camera model database, from a project file, or from the image EXIF data if enough information exists in the data.
- : The camera model is invalid if the camera model does not correspond to any model of the camera model databases and if the EXIF data of the images does not have sufficient information about the camera model.

On the right of the status indicator, there is an icon that describes the source of the camera model:

- : Camera model taken from the Pix4Dmapper's camera model database.
- : Camera model taken from the Pix4Dmapper's camera model database with some user-edited values.
- : Camera model taken from the user's camera model database.
- : Camera model taken from the image EXIF data when the camera model does not exist in the Pix4Dmapper's or the user's database and there is valid information in the EXIF data.
- : Camera model taken from the .p4d project file when a .p4d file is opened and its camera model does not exist in the Pix4Dmapper's or the user's database.

Beside the status indicator, appears the EXIF ID (*CameraModel\_FocalLength\_ResolutionWidthxResolutionHeight*) and the band configuration.

On the right of the *Selected Camera Model* section there are the following buttons:

Edit...: Opens the *Edit Camera Model* pop-up which allows the user to edit the corresponding camera model. For more information about the *Edit Camera Model* window: [202558159](#).

Assign (optional): Appears if more than one camera models are detected (e.g. multiple flights with different cameras or merged projects). By clicking it, the corresponding camera model is assigned to other detected camera models that have the same image width and height.



 Access: On the Menu bar, click on Project > Image Properties Editor..., the *Image Properties Editor* window appears, in the *Selected Camera Model* section, click Edit...

 Access via the New Project wizard: When creating a new project, the *Image Properties* window appears after loading the images, in the *Selected Camera Model* section, click Edit...

 Image Properties Editor
✕

**Image Geolocation**

Coordinate System

 Datum: World Geodetic System 1984; Coordinate System: WGS 84 Edit...

Geolocation and Orientation

Geolocated Images: 127 out of 127 Clear From EXIF From File... To File...

Geolocation Accuracy:  Standard  Low  Custom

**Selected Camera Model**

 CanonIXUS220HS\_4.3\_4000x3000 (RGB) Edit...

Enabled	Image	Group	Latitude [degree]	Longitude [degree]	Altitude [m]	Accuracy Horz [m]	Accuracy Vert [m]	Omega [degree]	Phi [degree]	Kappa [degree]
<input checked="" type="checkbox"/>	IMG_1146.JPG	group1	6.54318705	46.65611328	783.649	5.000	10.000	1.89489	6.71999	90.81948
<input checked="" type="checkbox"/>	IMG_1147.JPG	group1	6.54235243	46.65602724	778.432	5.000	10.000	-0.68792	4.37147	100.75500
<input checked="" type="checkbox"/>	IMG_1148.JPG	group1	6.54153660	46.65609830	780.023	5.000	10.000	4.78740	2.96335	94.67581
<input checked="" type="checkbox"/>	IMG_1149.JPG	group1	6.54066732	46.65609371	779.153	5.000	10.000	4.56705	4.41950	101.12925
<input checked="" type="checkbox"/>	IMG_1150.JPG	group1	6.53981693	46.65614777	780.264	5.000	10.000	4.35986	3.08310	90.84544
<input checked="" type="checkbox"/>	IMG_1151.JPG	group1	6.53895543	46.65619302	779.011	5.000	10.000	4.41374	2.92741	93.45951
<input checked="" type="checkbox"/>	IMG_1152.JPG	group1	6.53810604	46.65621426	781.004	5.000	10.000	4.89944	2.05931	94.70718
<input checked="" type="checkbox"/>	IMG_1153.JPG	group1	6.53723190	46.65624990	780.753	5.000	10.000	8.45570	3.47016	90.57303

OK
Cancel
Help

The *Edit Camera Model* window is used to define or edit the camera model.

The camera model can be set to perspective or fisheye lens.

There are 3 sections:

- Camera Model:** Displays the current EXIF ID and the associated camera model.
- Camera Model Bands:** Displays the configuration band selected for the camera model.
- Camera Model Parameters:** Describes the camera parameters for the selected camera model.

and 3 action buttons:

- OK:** Confirms/applies the changes:  
Uses the camera model selected in the *Camera Model* section if saved into the camera model database.
- Estimate from EXIF:** Uses the camera model name and parameters displayed in the *Camera Model Parameters* section if selected while editing or creating a new camera model. The currently displayed camera parameters are not saved into the camera model database but they are saved only in the project .p4d file.
- Cancel:** Does not save the changes.
- Help:** Opens the Pix4Dmapper help.

### Camera Model

The following items are displayed:

- EXIF ID:** Displays the current EXIF ID (*CameraModel\_FocalLength\_ResolutionWidthxResolutionHeight*) of the camera. No user intervention is possible.
- Camera Model Name:** Displays the currently selected camera model. The corresponding drop-down list allows the user to select another known camera model with the same image width and height.

Beside on the left of the selected camera model name, an icon appears that describes the source of the camera model:

- : Camera model taken from the internal camera model database.
- : Camera model taken from the internal camera model database with some user-edited values.
- : Camera model taken from the user camera model database.
- : Camera model taken from the image EXIF data when the camera model does not exist in the internal or the user database and there is valid

information in the EXIF data.

: Camera model taken from the .p4d file when a .p4d file is created and its camera model does not exist in the internal or the user camera database.

 Note: There are 2 camera databases: internal camera database (with the cameras and values from Pix4Dmapper), and user camera database (with the cameras added or modified by the user).  
The internal camera database cannot be edited, modified or deleted.  
The user camera database can be:  
Edited Menu Project > Image Properties Editor... > Selected Camera Model > Edit Camera Model.  
Cleared, imported or exported from Help > Settings..., under the tab Camera database.

Click the drop-down list to display the available camera models. The drop-down list only displays camera models with the same image width and height as the one detected in the EXIF ID. The drop-down list displays camera models using perspective lenses if Perspective Lens (*Camera Model Parameters* section) is selected and it displays camera models using fisheye lenses if Fisheye Lens (*Camera Model Parameters* section) is selected.

 Note: No information is displayed if no camera model exists with the same image width and height.

The following buttons are displayed:

Edit: Edit the *Camera Model Bands* and/or the *Camera Model Parameters* for the selected camera model. To edit the camera parameters: [202560169](#).

New: Create a new camera model. To create a new camera model: [202560169](#).

Restore: It is displayed only for camera models that exist in the internal camera database and have been edited by the user and stored in the user camera database. It removes the camera model from the  user database and restores the parameters from the  internal database.

Save to DB: Visible when clicking on Edit or New. Save the camera model in the user camera model database.

 Note:  
When editing , and saving to DB, it changes to   
When editing , and saving to DB, it creates   
When editing , and saving to DB, it creates   
When editing , and saving to DB, it creates   
When editing  or  or  or , and clicking in OK without saving to DB, it creates   
When creating new and Saving to DB, it creates   
When creating new and clicking in OK without saving to DB, it creates   
Cancel edit: Visible when clicking on Edit or New. Cancel the editing or creating of a new camera model.

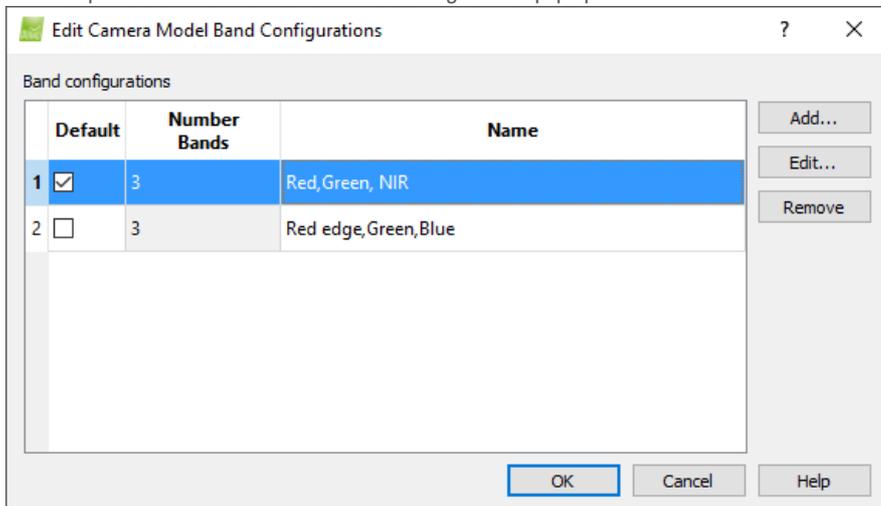
## Camera Model Bands



The section contains 2 items:

Bands: Displays the band configuration selected for the project. If the band configuration is in the EXIF, and it is one of the bands listed below, it is selected automatically. It allows the user to change the band configuration when more bands have been added to the camera model.

Edit...: Opens the *Edit Camera Model Band Configurations* pop-up:



 Access: It is enabled if Edit or New has been selected in the *Camera Model* section.

Allows to add/edit/remove Band configurations.

There is one section:

Band configurations table:

Default	Bands number	Name
---------	--------------	------

Each row displays information for one band configuration:

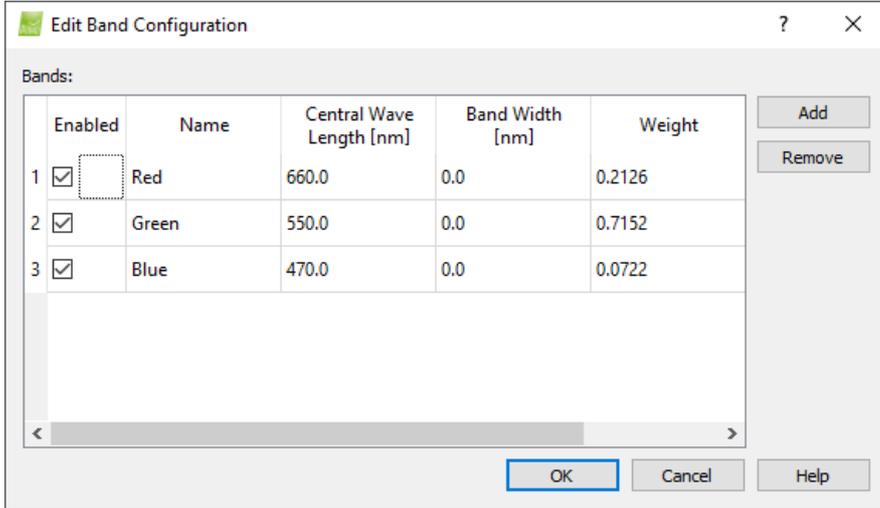
*Default:* Displays which band configuration is selected by default when using the selected Camera Model.

*Bands Number:* Number of bands for the Camera Model.

*Name:* Name of the band configuration, double click on the cell to edit the name.

and the action buttons:

Add...: Opens the pop-up band configuration window to add a new band configuration.



By default the values of the RGB band configuration appear:

Each row displays information for one band and by double clicking on them, it is possible to edit the value:

*Enabled:* Displays if the band is enabled or not for the selected band configuration.

*Name:* Name of the band for the band configuration.

*Central Wave Length [nm]:* Representative (most influential) wave length for the band.

*Band Width [nm]:* Width of the distribution related the central wave length of the band.

*Weight:* How much value Pix4Dmapper gives to the selected band compared to other bands of the band configuration. These values only affect step 1. *Initial Processing*. The sum of all weights should be 1.

And the action buttons:

Add...: Adds one more band. The number of bands should match the number of channels present in the image.

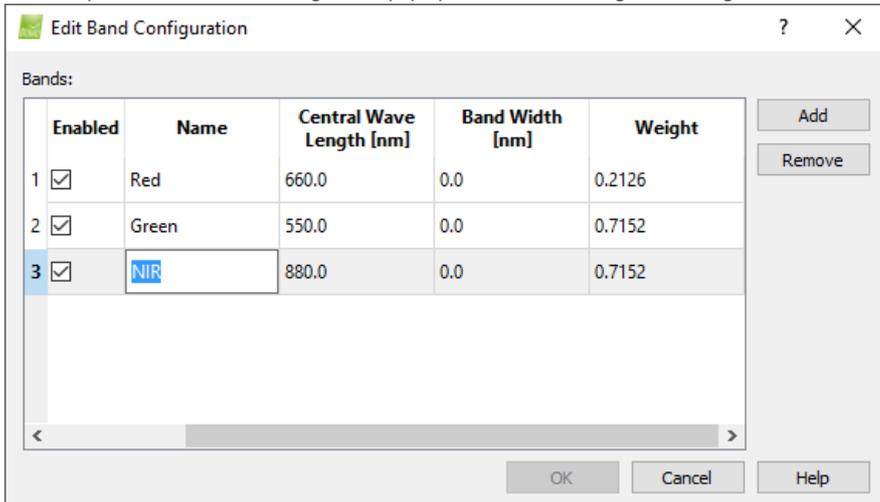
Remove: Deletes the selected row.

OK: Saves the new band configuration.

Cancel: Does not save the band configuration.

Help: Opens the Pix4Dmapper help.

Edit...: Opens the *Edit Band Configuration* pop-up. It edits an existing band configuration:



By default the values of the RGB band configuration appear:

Each row displays information for one band and by double clicking on them, it is possible to edit the value:

*Enabled*: Displays if the band is enabled or not for the selected Band configuration.

*Name*: Name of the band for the Band configuration.

*Central Wave Length [mm]*: Representative (most influential) wave length for the band.

*Band Width [mm]*: Width of the distribution related the central wave length of the band.

*Weight*: How much value Pix4Dmapper gives to the selected band compare to other bands of the band configuration. These values only affect step 1. *Initial Processing*. All the weights should sum to 1.

And the action buttons:

Add...: Add one more band. The number of bands should match the number of channels present in the image.

Remove: Deletes the selected row.

OK: Saves the new band configuration.

Cancel: Does not save the band configuration.

Help: Opens the Pix4Dmapper help.

Remove: Deletes the selected band from the *Band configurations* table.

OK: Confirms/applies the changes.

Cancel: Does not save the changes.

Help: Opens the Pix4Dmapper help.



Example: Examples of band configurations:

RGB: For images with 3 bands. The first band corresponds to Red, the second band corresponds to Green, and the third band corresponds to Blue.

Blue, Green, NIR: For images with 3 bands. The first band corresponds to Blue, the second band corresponds to Green, and the third band corresponds to Near Infrared.

NIR, Green, Blue: For images with 3 bands. The first band corresponds to Near Infrared, the second band corresponds to Green, and the third band corresponds to Blue.

NIR, Red, Green: For images with 3 bands. The first band corresponds to Near Infrared (or Infrared), the second band corresponds to Red, and the third band corresponds to Green.

Red edge, Green, Blue: For images with 3 bands. The first band corresponds to Red edge, the second band corresponds to Green, and the third band corresponds to Blue.

Red, Green, NIR: For images with 3 bands. The first band corresponds to Red, the second band corresponds to Green, and the third band corresponds to Near Infrared.

## Camera Model Parameters

The *Camera Model Parameters* section includes all camera parameters and is enabled for editing if the Edit or New button has been clicked in the *Camera Model* section. It displays the camera parameters of the selected *Camera Model Name* in the *Camera Model* section.

The *Camera Model Parameters* section has 3 action buttons (enabled if Edit or New has been clicked in the *Camera Model* section):

Clear: It clears all the fields except image width (pixel) and height (pixel).

Estimate from EXIF: Estimates the parameters from the EXIF data if enough information about the camera model is found there.

Load Optimized Parameters: Enabled once at least step 1 has been completed, it changes the camera initial values to the optimized values.

It also has the *Shutter Model* dropdown list with the following options:

[Global Shutter or Fast Readout](#)

[Linear Rolling Shutter](#)

Global Shutter or Fast Readout

To be used if the camera has a global shutter: all light information is read at the same time for the whole sensor.

Linear Rolling Shutter

This option models the rolling shutter (the image is scanned line by line) of some cameras such as the GoPro or the standard DJI cameras. This can be enabled if the camera's shutter is a rolling shutter and, the flight plan is linear (grid mission, building facade, etc.). For more information about how Pix4D models the rolling shutter effect: [scientific white paper](#).

The parameters can be defined or edited for a:

[Perspective lens](#): When the camera model uses a perspective lens.

[Fisheye lens](#): When the camera model uses a fisheye lens (ultra wide angle lens).

Spherical camera: Only available when the camera detected is spherical or the height of the image is two times the width. Spherical images are unidorsorted by the camera manufacturer and the Image Properites Editor does not present any camera model parameters. For step by step instructions about how to process

Spherical images: 210663886.

Perspective lens

Edit Camera Model
✕

---

**Camera Model**

EXIF ID:

Camera Model Name:

---

**Camera Model Bands**

Bands:

---

**Camera Model Parameters**

Warning: wrong parameters can cause failure in the reconstruction. Read the Help for more information.

Perspective Lens     
  Fisheye Lens     
 Shutter Model:

---

Image Width [pixel]:

Image Height [pixel]:

Focal Length [pixel]:

Principal Point x [pixel]:

Principal Point y [pixel]:

Sensor Width [mm]:

Sensor Height [mm]:

Pixel Size [µm]:

Focal Length [mm]:

Principal Point x [mm]:

Principal Point y [mm]:

---

Camera Model with Distortions:

Radial Distortion R1:

Tangential Distortion T1:

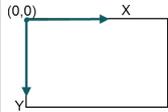
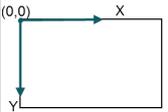
Radial Distortion R2:

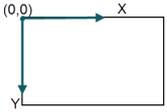
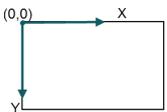
Tangential Distortion T2:

Radial Distortion R3:

---

To edit values in pixels, select the radio button on the left of the *Image width [pixels]* text box. To edit values in millimeters, select the radio button on the left of the *Sensor width [mm]* text box.

Internal Camera Parameters for Perspective lens	
Camera Model Name	Name for the camera model.
Image Width [pixel]	The image width in pixels. This value cannot be edited. It is read from the image file information.
Image Height [pixel]	The image height in pixels. This value cannot be edited. It is read from the image file information.
Focal Length [pixel]	The focal length in pixels.
Principal Point x [pixel]	The x image coordinate of the principal point in pixels. The principal point is located around the center of the image. The coordinate system has its origin as displayed here: 
Principal Point y [pixel]	The y image coordinate of the principal point in pixels. The principal point is located around the center of the image. The coordinate system has its origin as displayed here: 
Sensor Width [mm]	The sensor width in millimeters. If the sensor width is estimated from the EXIF and no information is in the image EXIF data, the sensor width is set to 36[mm].
Sensor Height [mm]	The sensor height in millimeters. If the sensor height is estimated from the EXIF and no information is in the image EXIF data, the sensor width is set to 36 [mm] and the sensor height is computed in such a way that the ratio sensor width / sensor height in millimeters equals the ratio image width / image height in pixels.
Pixel Size [µm]	The size of the pixel is read from the EXIF data if the information is available. If there is no information related to the pixel size, then it is calculated in order to correspond to 36 x 24 mm sensor size.
Focal Length [mm]	The focal length in millimeters.

Principal Point x [mm]	The x image coordinate of the principal point in millimeters. The principal point is located around the center of the sensor. The coordinate system has its origin as displayed here: 
Principal Point y [mm]	The y image coordinate of the principal point in millimeters. The principal point is located around the center of the sensor. The coordinate system has its origin as displayed here: 
Radial Distortion K1:	Radial distortion of the K1 lens.
Radial Distortion K2:	Radial distortion of the K2 lens.
Radial Distortion K3:	Radial distortion of the K3 lens.
Tangential Distortion T1:	Tangential distortion of the T1 lens.
Tangential Distortion T2:	Tangential distortion of the T2 lens.

 Tip: If the radial and tangential distortions of the lens are not known, it is recommended to set the values for K1, K2, K3, T1, T2 to 0. For more information about how to calibrate a perspective camera: [206065716](https://www.ros.org/wiki/camera_calibration).

 Note: For more information about how the internal parameters for a perspective lens are defined: [202559089](https://www.ros.org/wiki/camera_calibration).

## Fisheye lens

 Edit Camera Model
✕

---

Camera Model

EXIF ID:

Camera Model Name:

---

Camera Model Bands

Bands:

---

Camera Model Parameters

Warning: wrong parameters can cause failure in the reconstruction. Read the Help for more information.

Perspective Lens
  **Fisheye Lens**
Shutter Model:

Image Width [pixel]:

Image Height [pixel]:

Principal Point x [pixel]:

Principal Point y [pixel]:

Sensor Width [mm]:

Sensor Height [mm]:

Pixel Size [μm]:

Principal Point x [mm]:

Principal Point y [mm]:

Polynomial Coefficients:

Camera Model with Symmetric Affine Transformation

Affine Transformation C:

Affine Transformation D:

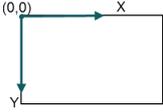
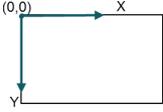
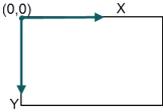
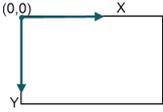
Affine Transformation E:

Affine Transformation F:

To edit values in pixels, select the radio button on the left of the *Image width [pixels]* text box. To edit values in millimeters, select the radio button on the left of the *Sensor width [mm]* text box.

### Internal Camera Parameters for Fisheye lens

Camera Model Name	Name for the camera model.
Image Width [pixel]	The image width in pixels. This value cannot be edited. It is read from the image file information.

Image Height [pixel]	The image height in pixels. This value cannot be edited. It is read from the image file information.
Principal Point x [pixel]	The x image coordinate of the principal point in pixels. The principal point is located around the center of the image. The coordinate system has its origin as displayed here: 
Principal Point y [pixel]	The y image coordinate of the principal point in pixels. The principal point is located around the center of the image. The coordinate system has its origin as displayed here: 
Sensor Width [mm]	The sensor width in millimeters. If the sensor width is estimated from the EXIF and no information is in the image EXIF data, the sensor width is set to 36[mm].
Sensor Height [mm]	The sensor height in millimeters. If the sensor height is estimated from the EXIF and no information is in the image EXIF data, the sensor width is set to 36 [mm] and the sensor height is computed in such a way that the ratio sensor width / sensor height in millimeters equals the ratio image width / image height in pixels.
Pixel Size [µm]	The size of the pixel is read from the EXIF data if the information is available. If there is no information related to the pixel size, then it is calculated in order to correspond to 36 x 24 mm sensor size.
Principal Point x [mm]	The x image coordinate of the principal point in millimeters. The principal point is located around the center of the sensor. The coordinate system has its origin as displayed here: 
Principal Point y [mm]	The y image coordinate of the principal point in millimeters. The principal point is located around the center of the sensor. The coordinate system has its origin as displayed here: 
Polynomial Coefficients	4 different type of polynomials can be selected from a drop-down list, where 1,2 or 3 values are already pre-defined and cannot be changed: 0-1-x-x-0 x-1-x-x-0 0-1-x-x-x: recommended x-1-x-x-x: ignores an area around the image center. This is useful when the center is blurry or contains a lot of noise
Camera Model with Symmetric Affine Transformation	If selected, the model is symmetric and C=D and E=F=0. This is useful when the circular image cannot be modeled by a sphere.
Affine Transformation C	Affine transformation C value.
Affine Transformation D	Affine transformation D value.
Affine Transformation E	Affine transformation E value.
Affine Transformation F	Affine transformation F value.

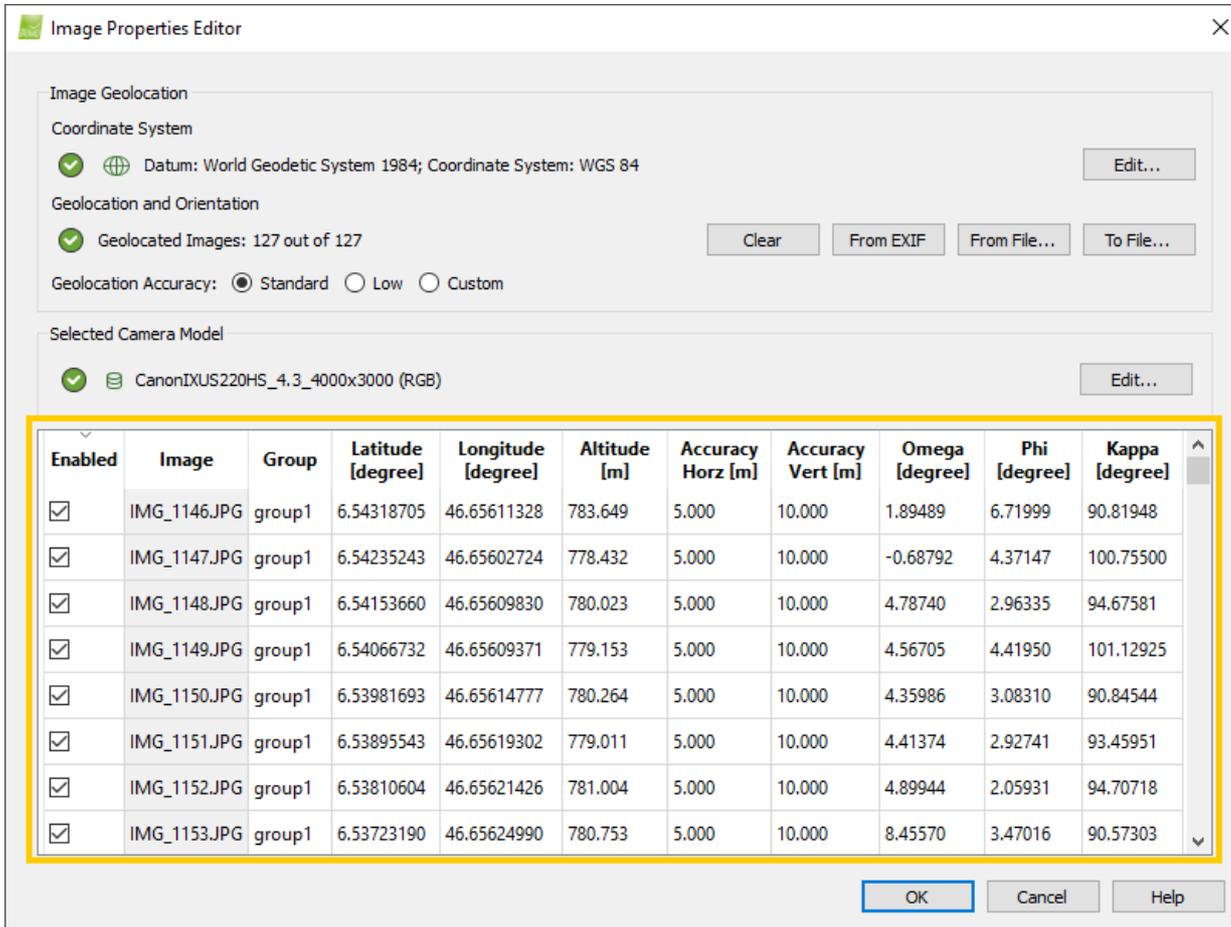
 Note: For more information about how the internal parameters for a fisheye lens are defined: [202559089](#).

 Tip: For more information about how to calibrate a fisheye camera: [202557009](#).

 Access: On the Menu bar, click Project > Image Properties Editor...

 Access via the New Project wizard: When creating a new project, the *Image Properties Editor* window appears after loading the images.

This table is used to describe and edit the information and the status of the images used for the project.



**Image Properties Editor**

Image Geolocation

Coordinate System

 Datum: World Geodetic System 1984; Coordinate System: WGS 84 Edit...

Geolocation and Orientation

Geolocated Images: 127 out of 127 Clear From EXIF From File... To File...

Geolocation Accuracy:  Standard  Low  Custom

Selected Camera Model

 CanonIXUS220HS\_4.3\_4000x3000 (RGB) Edit...

Enabled	Image	Group	Latitude [degree]	Longitude [degree]	Altitude [m]	Accuracy Horz [m]	Accuracy Vert [m]	Omega [degree]	Phi [degree]	Kappa [degree]
<input checked="" type="checkbox"/>	IMG_1146.JPG	group1	6.54318705	46.65611328	783.649	5.000	10.000	1.89489	6.71999	90.81948
<input checked="" type="checkbox"/>	IMG_1147.JPG	group1	6.54235243	46.65602724	778.432	5.000	10.000	-0.68792	4.37147	100.75500
<input checked="" type="checkbox"/>	IMG_1148.JPG	group1	6.54153660	46.65609830	780.023	5.000	10.000	4.78740	2.96335	94.67581
<input checked="" type="checkbox"/>	IMG_1149.JPG	group1	6.54066732	46.65609371	779.153	5.000	10.000	4.56705	4.41950	101.12925
<input checked="" type="checkbox"/>	IMG_1150.JPG	group1	6.53981693	46.65614777	780.264	5.000	10.000	4.35986	3.08310	90.84544
<input checked="" type="checkbox"/>	IMG_1151.JPG	group1	6.53895543	46.65619302	779.011	5.000	10.000	4.41374	2.92741	93.45951
<input checked="" type="checkbox"/>	IMG_1152.JPG	group1	6.53810604	46.65621426	781.004	5.000	10.000	4.89944	2.05931	94.70718
<input checked="" type="checkbox"/>	IMG_1153.JPG	group1	6.53723190	46.65624990	780.753	5.000	10.000	8.45570	3.47016	90.57303

OK Cancel Help

The following actions can be performed on the table:

- [Sorting the table](#)
- [Selecting Images](#)
- [Editing Values](#)

The table has as many rows as the amount of images in the project. Each row displays information for one image:

- [Status of the image \(Enabled\)](#)
- [Image](#)
- [Group](#)
- [Camera model \(Multi-camera model projects\)](#)
- [First coordinate](#)
- [Second coordinate](#)
- [Third coordinate](#)
- [Accuracy Horz](#)
- [Accuracy Vert](#)
- [Omega](#)
- [Phi](#)
- [Kappa](#)

Actions on the table

**Sorting the table**



### Editing the selected rows values for one column

Select multiple images and:

For the Enabled column:

1. Right click one of the selected cells of the column.
2. Click **Enabled Selected Images** or **Disable Selected Images**.

For the Group column:

1. Right click one of the selected cells of the column.
2. Click **Edit Groups in Selected Rows**.
3. Type the new value or click the left arrow to select among the existing values.
4. Click Enter or click outside the cell.

For the Latitude, Longitude, Altitude, Accuracy Horz or Accuracy Vert columns:

1. Right click one of the selected cells of the column.
2. Click **Edit Altitudes / Horz. Accuracies / Vert. Accuracies in Selected Rows**.
2. Type the new value.
3. Click Enter or click outside the cell.

### Status of the image (Enabled)

The status of the image is displayed in the *Enabled* column. It is defined by a box that indicates if the image is used for the processing or not. If the box is selected, the image is enabled and is used for the processing.

To select or unselect an image: Left click on the box.

 Note: The disabled images are not deleted from the project in case of further need to use them.

### Image

This column displays the name of the images. It cannot be edited.

### Group

When processing images that belong to different groups, all images are processed together, generating:

One point cloud of automatic tie points for the whole project. The color of the automatic tie points will be mixed: some points will take color from the RGB images and others from the NIRGB images.

One densified point cloud per group.

One DSM for the whole project.

One orthomosaic per group.

 Important: Images taken by the same camera during different flights should not be grouped into different groups, unless there is need to generate different orthomosaics for each data.

 Tip: Use the groups to group images with different spectral signatures (RGB, NIRGB, etc). In this case different reflectance maps are generated that can be used for index calculations. For more information about index calculations: [202558289](#).

By default the images that have the same number and type of bands as well as the images with the same pixel type (byte, float) will be grouped as group1. Images with different bands and pixel type will be grouped as group2, group3, etc. To change the group of one image, double click on the corresponding cell and edit the group. For more information about editing the group of multiple images: [202557949](#).

 Important: When having more than one group, the Google files (Google Maps tiles and .kml) will only be generated if one of the groups is named *RGB* (capital letters). Then the Google files will be generated only for this group.

### Camera model (Multi-camera model projects)

For projects with more than one camera model, this column displays the camera model assigned to the corresponding images.

To change the camera model of one image, double click on the corresponding cell. Click on the arrow that appears and, from the drop-down list, choose the desired camera model.

 Note: The camera model can only be chosen among a list of detected camera models for the project.

## First Coordinate

The first coordinate is:

Latitude [degree]: If the coordinate system of the images is a geographic coordinate system.

X [m]: If the coordinate system of the images is a projected coordinate system. The unit is given in meters.

X [feet]: If the coordinate system of the images is a projected coordinate system. The unit is given in feet.

Local X [m]: If the coordinate system is defined by the user (local coordinate system). The unit is given in meters.

The coordinate columns are filled:

When importing the coordinates from the image EXIF data if the information exists.

When importing the coordinates from the image geolocation file.

When manually editing the table: double click on the corresponding cell and enter the coordinate.



Note: If no image geolocation has been imported then the value of the cells is zero (0.000).

## Second coordinate

The second coordinate is:

Longitude [degree]: If the coordinate system of the images a geographic coordinate system.

Y [m]: If the coordinate system of the images is a projected coordinate system. The unit is given in meters.

Y [feet]: If the coordinate system of the images is a projected coordinate system. The unit is given in feet.

Local Y [m]: If the coordinate system is defined by the user (local coordinate system). The unit is given in meters.

The coordinate columns are filled:

When importing the coordinates from the image EXIF data if the information exists.

When importing the coordinates from the image geolocation file.

When manually editing the table: Double click on the corresponding cell and enter the coordinate.



Note: If no image geolocation has been imported then the value of the cells is zero (0.000).

## Third Coordinate

The third coordinate is:

Altitude [m]: If the coordinate system of the images is a geographic coordinate system.

Z [m]: If the coordinate system of the images is a projected coordinate system. The unit is given in meters.

Z [feet]: If the coordinate system of the images is a projected coordinate system. The unit is given in feet.

Local Z [m]: If the coordinate system is defined by the user (local coordinate system). The unit is given in meters.

The coordinate columns are filled:

When importing the coordinates from the image EXIF data if the information exists.

When importing the coordinates from the image geolocation file.

When manually editing the table: Double click on the corresponding cell and enter the coordinate.



Note: If no image geolocation has been imported then the value for the cells is zero (0.000).



Warning:

The Z coordinate must be given in the same unit as the (X,Y) coordinates (meters or feet).

All image geolocation coordinates have to be given in the same coordinate system.

## Accuracy Horz

Defines the horizontal accuracy value (*Accuracy Horz*). The horizontal accuracy refers to the first and second coordinates (latitude, longitude, or X,Y) of the images.

Very accurate image geolocation (latitude, longitude, or X,Y) coordinates: Low accuracy value.

Non accurate image geolocation (latitude, longitude, or X,Y) coordinates: High accuracy value.

The higher the accuracy value, the less impact the image's coordinates will have on the *Initial Processing*, compared to other images or GCPs with lower accuracy values. The accuracy is a value between 0.001 and 10'000.



Warning: The horizontal accuracy must be given in meters or feet according to the selected coordinate system.

To edit the horizontal accuracy of one image, double click on the corresponding cell and enter the new value. For more information about editing the horizontal accuracy of multiple images, see [Actions on the table](#).

### Accuracy Vert

Defines the vertical accuracy value (*Accuracy Vert*). The vertical accuracy refers to the third coordinate (altitude or Z) of the images.

Very accurate image geolocation (altitude or Z) coordinate: Low accuracy value.

Non accurate image geolocation (altitude or Z) coordinate: High accuracy value.

The higher the accuracy value, the less impact the image's coordinate will have on the *Initial Processing*, compared to other images or GCPs with lower accuracy values. The accuracy is a value between 0.001 and 10'000.

 Warning: The vertical accuracy must be given in meters or feet according to the selected coordinate system.

To edit the vertical accuracy of one image, double click on the corresponding cell and enter the new value. For more information about editing the vertical accuracy of multiple images, see [Actions on the table](#).

### Omega

Omega ( $\omega$ ) is the rotation around the X-axis. It is given in degrees.

The rotation columns are filled:

When importing the angles from the image geolocation file.

When manually editing the table: Double click on the corresponding cell and enter the angle.

This value is optional as Pix4Dmapper does NOT require the orientation of the camera in order to process the projects.

For more information about how Pix4Dmapper defines the Omega - Phi - Kappa angles: [202558969](#).

### Phi

Phi ( $\varphi$ ) is the rotation around the Y-axis. It is given in degrees.

The rotation columns are filled:

When importing the angles from the image geolocation file.

When manually editing the table: Double click on the corresponding cell and enter the angle.

This value is optional as Pix4Dmapper does NOT require the orientation of the camera in order to process the projects.

For more information about how Pix4Dmapper defines the Omega - Phi - Kappa angles: [202558969](#).

### Kappa

Kappa ( $\kappa$ ) is the rotation around the Z-axis. It is given in degrees.

The rotation columns are filled:

When importing the angles from the image geolocation file.

When manually editing the table: Double click on the corresponding cell and enter the angle.

This value is optional as Pix4Dmapper does NOT require the orientation of the camera in order to process the projects.

For more information about how Pix4Dmapper defines the Omega - Phi - Kappa angles: [202558969](#).

 Access: On the Menu bar, click Project > GCP/MTP Manager...

The *GCP/MTP Manager* pop-up has the following 3 sections:

**GCP Coordinate System:** Section to select the coordinate system on which the GCPs/MTPs/Check Points position are based.

**GCP/MTP Table:** Section to:

Import, edit, add and remove GCPs/MTPs/Check Points

Export GCPs/Check Points coordinates and, optionally for GCPs, the accuracy of the coordinates.

Import or export a file with the image coordinates of the GCPs/MTPs/Check Points and on which images have been marked, in which position and at which zoom level.

**GCP/MTP Editor:** Section to mark the GCPs/MTPs/Check Points on the images.

And the action buttons:

OK: Confirms the changes.

Cancel: Does not save the changes.

Help: Opens the Pix4Dmapper help.

**GCP/MTP Manager** ✕

**GCP Coordinate System**

 Datum: World Geodetic System 1984; Coordinate System: WGS 84 Edit...

**GCP/MTP Table**

	Label	Type	Latitude [degree]	Longitude [degree]	Altitude [m]	Accuracy Horz [m]	Accuracy Vert [m]
8	9001	3D GCP	46.65644157	6.53589498	573.325	0.020	0.020
4	9002	3D GCP	46.65698879	6.53511384	568.726	0.020	0.020
9	9004	3D GCP	46.65483476	6.53314731	565.699	0.020	0.020
19	9011	3D GCP	46.65537950	6.54370093	473.329	0.020	0.020
24	9012	3D GCP	46.65325332	6.54184116	460.896	0.020	0.020
12	9016	3D GCP	46.65305217	6.53969890	455.266	0.020	0.020
25	9017	3D GCP	46.65364415	6.54260020	465.026	0.020	0.020

Import GCPs...
Export GCPs...
  
Add Point
Remove Points

7/7 GCPs with enough image marks 
Import Marks...
Export Marks...

**GCP/MTP Editor**

In order to compute the 3D position of a GCP/MTP, it needs to be marked on at least two images.  
 In order to take GCPs into account for georeferencing the project, at least 3 GCPs need to be marked.  
 Marking GCPs/MTPs after step 1. Initial Processing requires the user to run Process > Reoptimize.  
 The GCPs/MTP accuracy can be verified in the Quality Report or in the rayCloud Editor.

(Recommended) Use the rayCloud Editor after step 1. Initial Processing is done. This allows a fast and precise point marking.

rayCloud Editor...

Use the Basic Editor before step 1. Initial Processing or when using non-geolocated images or an arbitrary coordinate system.

Basic Editor...

OK
Cancel
Help

 Access: On the Menu bar, click Project > GCP/MTP Manager...

The *GCP Coordinate System* section is used to define the coordinate system on which the GCPs/MTPs/Check Points position are based.

*Datum*: Represents the selected images' datum. By default the selected *Datum* is World Geodetic System 1984.

*Coordinate system*: Represents the selected images' coordinate system.

 When the selected coordinate system is a Geographic Coordinate System.

 When the selected coordinate system is a Projected Coordinate System.

*Vertical coordinate system or Geoid Height Above the Ellipsoid*: It is displayed in parenthesis. It represents the vertical coordinate system / Geoid Height Above the used ellipsoid that will be used to convert the GCPs height from geoid to ellipsoidal. For more information about when to use this function: [202559459](https://www.earthcam.com/202559459).

Edit...: Opens the *Select GCP Coordinate System* pop-up that allows to change the selected coordinate system.

For more information: [202558239](https://www.earthcam.com/202558239).

**GCP/MTP Manager** ✕

GCP Coordinate System

 Datum: World Geodetic System 1984; Coordinate System: WGS 84 Edit...

GCP/MTP Table

	Label	Type	Latitude [degree]	Longitude [degree]	Altitude [m]	Accuracy Horz [m]	Accuracy Vert [m]
8	9001	3D GCP	46.65644157	6.53589498	573.325	0.020	0.020
4	9002	3D GCP	46.65698879	6.53511384	568.726	0.020	0.020
9	9004	3D GCP	46.65483476	6.53314731	565.699	0.020	0.020
19	9011	3D GCP	46.65537950	6.54370093	473.329	0.020	0.020
24	9012	3D GCP	46.65325332	6.54184116	460.896	0.020	0.020
12	9016	3D GCP	46.65305217	6.53969890	455.266	0.020	0.020
25	9017	3D GCP	46.65364415	6.54260020	465.026	0.020	0.020

Import GCPs...

Export GCPs...

Add Point

Remove Points

7/7 GCPs with enough image marks Import Marks... Export Marks...

GCP/MTP Editor

In order to compute the 3D position of a GCP/MTP, it needs to be marked on at least two images.  
 In order to take GCPs into account for georeferencing the project, at least 3 GCPs need to be marked.  
 Marking GCPs/MTPs after step 1. Initial Processing requires the user to run Process > Reoptimize.  
 The GCPs/MTP accuracy can be verified in the Quality Report or in the rayCloud Editor.

(Recommended) Use the rayCloud Editor after step 1. Initial Processing is done. This allows a fast and precise point marking.

rayCloud Editor...

Use the Basic Editor before step 1. Initial Processing or when using non-geolocated images or an arbitrary coordinate system.

Basic Editor...

OK Cancel Help

 Access: On the Menu bar, click Project > GCP/MTP Manager...

This section contains a *GCP/MTP Table* which displays all the GCPs/MTPs/Check Points of the projects together with their properties, and 6 action buttons:

**Import GCPs...**: Allows the user to import a file with GCPs/Check points.

**Export GCPs...**: Allows the user to export GCPs/Check Points coordinates and, optionally for GCPs, the accuracy of the coordinates.

**Add Point** : Allows the user to manually add one by one GCPs/MTPs/Check Points.

**Remove Points** : Allows the user to remove the selected GCPs/MTPs/Check Points.

**Import Marks...**: Allows the user to import a file which contains, for each GCPs/MTPs/Check Points list of the marked images and, for each image, the coordinates and zoom level.

**Export Marks...**: Allows the user to export a file which contains, for each GCPs/MTPs/Check Points list of the marked images and, for each image, the coordinates and zoom level.

In the bottom left side, a status text appears indicating how many GCPs are implemented in the project and marked in at least 2 images.

 GCP/MTP Manager
✕

GCP Coordinate System

 Datum: World Geodetic System 1984; Coordinate System: WGS 84 Edit...

GCP/MTP Table

	Label	Type	Latitude [degree]	Longitude [degree]	Altitude [m]	Accuracy Horz [m]	Accuracy Vert [m]
8	9001	3D GCP	46.65644157	6.53589498	573.325	0.020	0.020
4	9002	3D GCP	46.65698879	6.53511384	568.726	0.020	0.020
9	9004	3D GCP	46.65483476	6.53314731	565.699	0.020	0.020
19	9011	3D GCP	46.65537950	6.54370093	473.329	0.020	0.020
24	9012	3D GCP	46.65325332	6.54184116	460.896	0.020	0.020
12	9016	3D GCP	46.65305217	6.53969890	455.266	0.020	0.020
25	9017	3D GCP	46.65364415	6.54260020	465.026	0.020	0.020

Import GCPs...
Export GCPs...
  
Add Point
Remove Points

7/7 GCPs with enough image marks Import Marks... Export Marks...

GCP/MTP Editor

In order to compute the 3D position of a GCP/MTP, it needs to be marked on at least two images.  
 In order to take GCPs into account for georeferencing the project, at least 3 GCPs need to be marked.  
 Marking GCPs/MTPs after step 1. Initial Processing requires the user to run Process > Reoptimize.  
 The GCPs/MTP accuracy can be verified in the Quality Report or in the rayCloud Editor.

(Recommended) Use the rayCloud Editor after step 1. Initial Processing is done. This allows a fast and precise point marking.

rayCloud Editor...

Use the Basic Editor before step 1. Initial Processing or when using non-geolocated images or an arbitrary coordinate system.

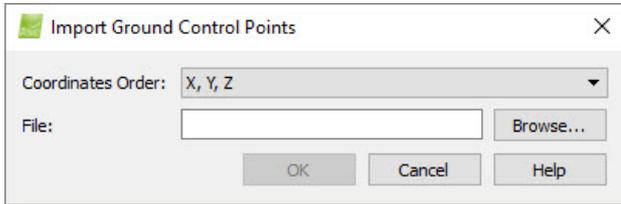
Basic Editor...

OK
Cancel
Help

 Access: On the Menu bar, click Project > GCP/MTP Manager..., on the *GCP/MTP Table* section, click Import GCPs...

Pix4Dmapper can import a file with the coordinates of the GCPs. For more information about the file format: [202558539](https://pix4d.com/202558539).

When clicking Import GCPs..., the *Import Ground Control Points* pop-up appears:



It contains the following sections:

**Coordinates Order:** Allows the user to select the order of the coordinates of the file to be imported. Depending the coordinate system, there are the following possibilities:

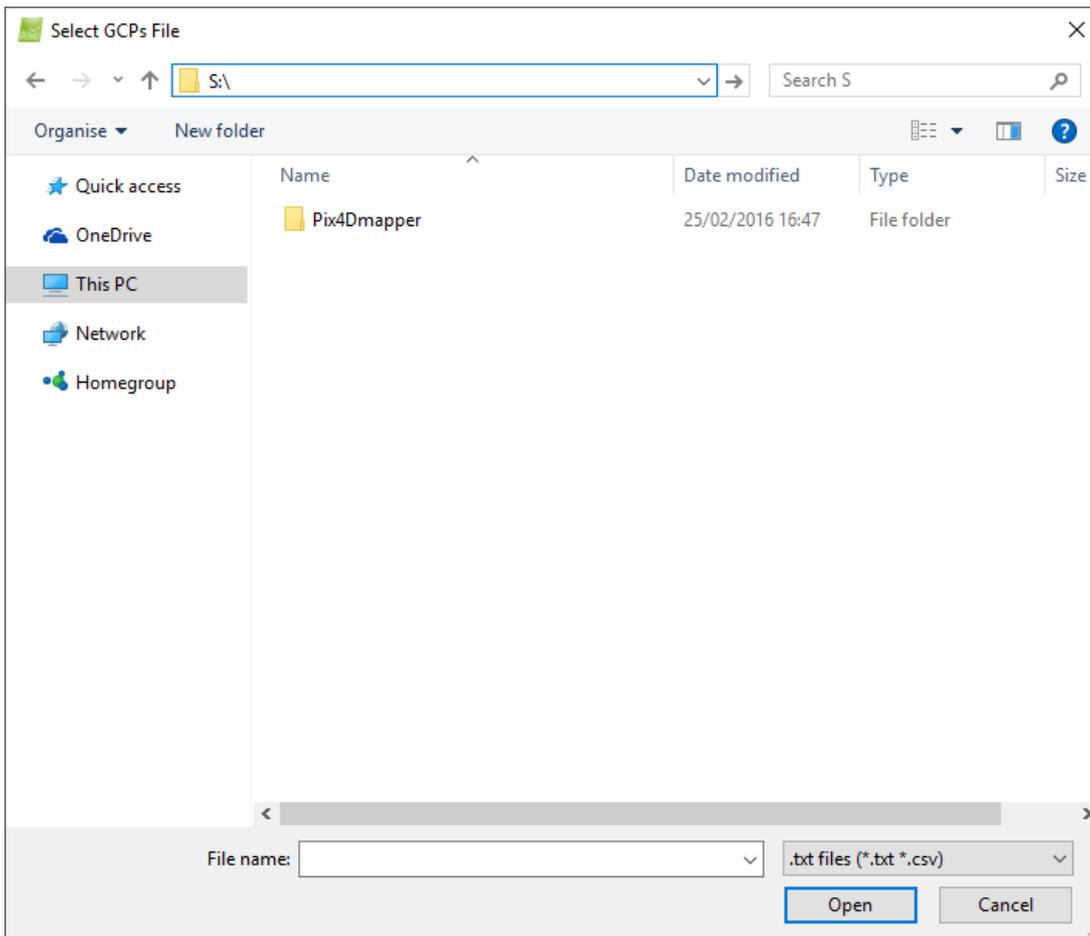
Latitude, Longitude, Altitude or Longitude, Latitude, Altitude (only if a geographic coordinate system is selected).

X, Y, Z, or Y, X, Z

**File:** Displays the name of the selected file to be imported.

And the action buttons:

**Browse...:** Opens the *Select GCPs File*, a navigation window used to search for and select the file to be imported.



**OK:** Imports the selected file.

**Cancel:** Does not save the changes and exits the pop-up.

**Help:** Opens the Pix4Dmapper help.

 Access: On the Menu bar, click Project > GCP/MTP Manager..., on *GCP/MTP Table*, click Add Point.

This button is used to manually add GCPs/MTPs/Check Points one by one.

 Note: Before adding the points, their coordinate system needs to be defined. For more information: [202557749](#).

 Warning: All GCPs/MTPs/Check Points need to be defined in the same coordinate system.

The Add Point button allows the user to add a new point in the *GCP/MTP Table*. The *Type* is by default set to *Manual Tie Point*. The label is automatically generated and starts by "mtp" followed by a number that increases with the number of points added (e.g. mtp1, mtp2, mtp3, etc.). The labels are automatically generated when adding a point in the *GCP/MTP Manager* by clicking the Add Point button or when adding a point or an object in the rayCloud. The point type can be changed by double clicking on the *Type* cell and selecting the desired type.

For more information about the *GCP/MTP Table* properties: [202557919](#).

 GCP/MTP Manager
✕

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**GCP Coordinate System**

 Datum: World Geodetic System 1984; Coordinate System: WGS 84 Edit...

---

**GCP/MTP Table**

	Label	Type	Latitude [degree]	Longitude [degree]	Altitude [m]	Accuracy Horz [m]	Accuracy Vert [m]
4	9002	3D GCP	46.65698879	6.53511384	568.726	0.020	0.020
9	9004	3D GCP	46.65483476	6.53314731	565.699	0.020	0.020
19	9011	3D GCP	46.65537950	6.54370093	473.329	0.020	0.020
24	9012	3D GCP	46.65325332	6.54184116	460.896	0.020	0.020
12	9016	3D GCP	46.65305217	6.53969890	455.266	0.020	0.020
25	9017	3D GCP	46.65364415	6.54260020	465.026	0.020	0.020
0	mtp8	Manual Tie P...					

Import GCPs...

Export GCPs...

Add Point

Remove Points

---

7/7 GCPs with enough image marks Import Marks... Export Marks...

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**GCP/MTP Editor**

In order to compute the 3D position of a GCP/MTP, it needs to be marked on at least two images.  
 In order to take GCPs into account for georeferencing the project, at least 3 GCPs need to be marked.  
 Marking GCPs/MTPs after step 1. Initial Processing requires the user to run Process > Reoptimize.  
 The GCPs/MTP accuracy can be verified in the Quality Report or in the rayCloud Editor.

(Recommended) Use the rayCloud Editor after step 1. Initial Processing is done. This allows a fast and precise point marking.

rayCloud Editor...

Use the Basic Editor before step 1. Initial Processing or when using non-geolocated images or an arbitrary coordinate system.

Basic Editor...

OK Cancel Help

 Access: On the Menu bar, click Project > GCP/MTP Manager..., on *GCP/MTP Table*, click Remove Points.

When clicking Remove Points the *GCPs/MTPs/Check Points* that are displayed on the *GCP/MTP Table* can be removed. One or multiple points can be selected from the *GCP/MTP Table* and be removed by clicking Remove Points. For more information about how to select a point on the *GCP/MTP Table*: [202557919](#).

**GCP/MTP Manager** ✕

GCP Coordinate System

 Datum: World Geodetic System 1984; Coordinate System: WGS 84 Edit...

**GCP/MTP Table**

	Label	Type	Latitude [degree]	Longitude [degree]	Altitude [m]	Accuracy Horz [m]	Accuracy Vert [m]
8	9001	3D GCP	46.65644157	6.53589498	573.325	0.020	0.020
4	9002	3D GCP	46.65698879	6.53511384	568.726	0.020	0.020
9	9004	3D GCP	46.65483476	6.53314731	565.699	0.020	0.020
19	9011	3D GCP	46.65537950	6.54370093	473.329	0.020	0.020
24	9012	3D GCP	46.65325332	6.54184116	460.896	0.020	0.020
12	9016	3D GCP	46.65305217	6.53969890	455.266	0.020	0.020
25	9017	3D GCP	46.65364415	6.54260020	465.026	0.020	0.020

7/7 GCPs with enough image marks

Import GCPs...

Export GCPs...

Add Point

Remove Points

Import Marks...    Export Marks...

**GCP/MTP Editor**

In order to compute the 3D position of a GCP/MTP, it needs to be marked on at least two images.  
 In order to take GCPs into account for georeferencing the project, at least 3 GCPs need to be marked.  
 Marking GCPs/MTPs after step 1. Initial Processing requires the user to run Process > Reoptimize.  
 The GCPs/MTP accuracy can be verified in the Quality Report or in the rayCloud Editor.

(Recommended) Use the rayCloud Editor after step 1. Initial Processing is done. This allows a fast and precise point marking.

rayCloud Editor...

Use the Basic Editor before step 1. Initial Processing or when using non-geolocated images or an arbitrary coordinate system.

Basic Editor...

OK    Cancel    Help

 Access: On the Menu bar, click Project > GCP/MTP Manager..., on *GCP/MTP Table*, click Import / Export Marks...

**GCP/MTP Manager** ✕

GCP Coordinate System

 Datum: World Geodetic System 1984; Coordinate System: WGS 84 Edit...

GCP/MTP Table

	Label	Type	Latitude [degree]	Longitude [degree]	Altitude [m]	Accuracy Horz [m]	Accuracy Vert [m]
8	9001	3D GCP	46.65644157	6.53589498	573.325	0.020	0.020
4	9002	3D GCP	46.65698879	6.53511384	568.726	0.020	0.020
9	9004	3D GCP	46.65483476	6.53314731	565.699	0.020	0.020
19	9011	3D GCP	46.65537950	6.54370093	473.329	0.020	0.020
24	9012	3D GCP	46.65325332	6.54184116	460.896	0.020	0.020
12	9016	3D GCP	46.65305217	6.53969890	455.266	0.020	0.020
25	9017	3D GCP	46.65364415	6.54260020	465.026	0.020	0.020

Import GCPs...

Export GCPs...

Add Point

Remove Points

Import Marks...
Export Marks...

GCP/MTP Editor

In order to compute the 3D position of a GCP/MTP, it needs to be marked on at least two images.  
 In order to take GCPs into account for georeferencing the project, at least 3 GCPs need to be marked.  
 Marking GCPs/MTPs after step 1. Initial Processing requires the user to run Process > Reoptimize.  
 The GCPs/MTP accuracy can be verified in the Quality Report or in the rayCloud Editor.

(Recommended) Use the rayCloud Editor after step 1. Initial Processing is done. This allows a fast and precise point marking.

rayCloud Editor...

Use the Basic Editor before step 1. Initial Processing or when using non-geolocated images or an arbitrary coordinate system.

Basic Editor...

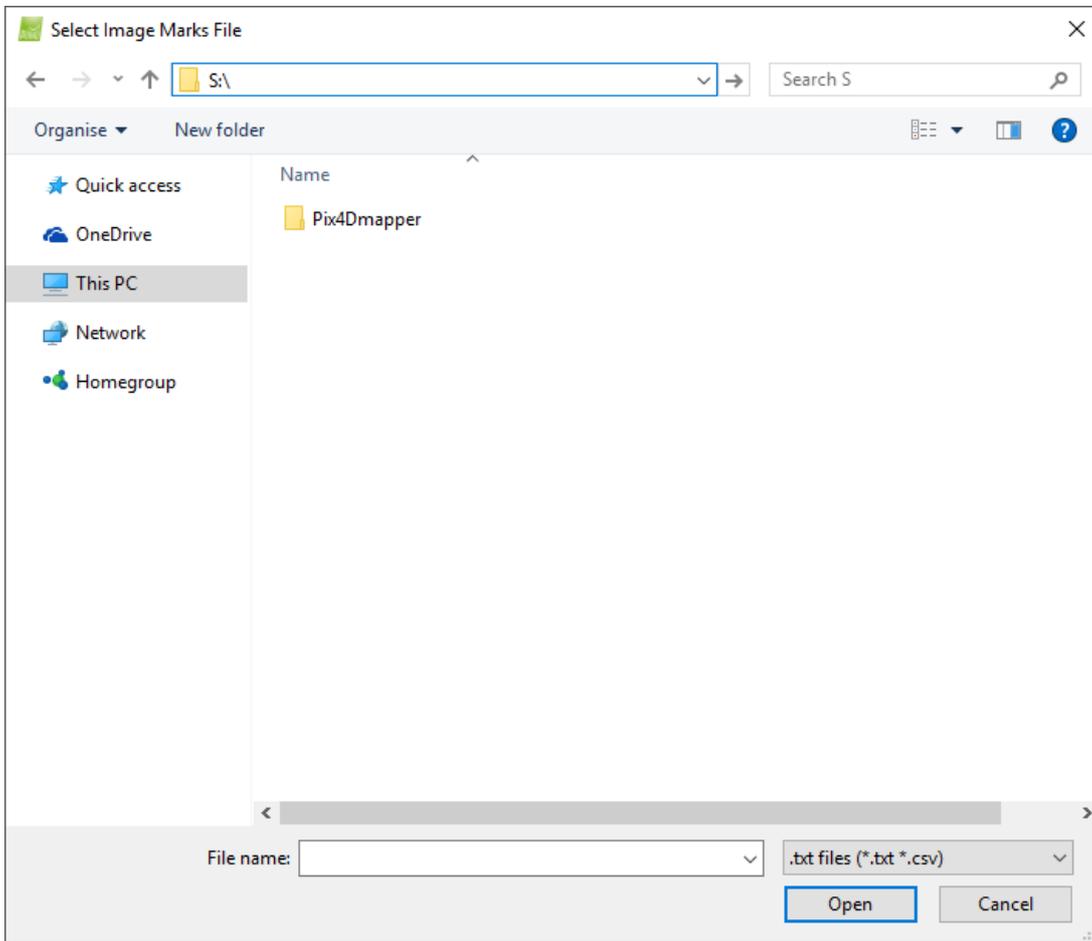
OK Cancel Help

Import Marks...

Pix4Dmapper can import a file with the image coordinates of the GCPs / MTPs. For more information about the file format: [202558539](https://pix4d.com/202558539).

 **Warning:** The zoom level at which GCPs / MTPs are marked has an impact on the GCP / MTP error obtained in the *Quality Report*. Usually the higher the zoom level, the more precisely the GCP / MTP is marked. These GCPs / MTPs will have a bigger impact on the reconstructed model than GCPs / MTPs marked on a lower zoom level; lower error values are also expected for these GCPs / MTPs. For example, when GCPs / MTPs are marked without zooming into the images, the GCP / MTP error can be 10 times higher than when the GCPs / MTPs are marked by zooming into the images.

When clicking Import Marks..., the *Select Import Image Marks File* pop-up appears:



Navigation menu, to select the location to store the file.

On *File name*, type the name of the file.

The *Save as type* displays the file format used to save the file:

*Pix4D marks files (\*.txt, \*.csv)*: 202558539.

*Bingo text file (\*.txt)*: 202558539.

*XML structure (\*.xml)*: 202558539.

Save: Saves the file.

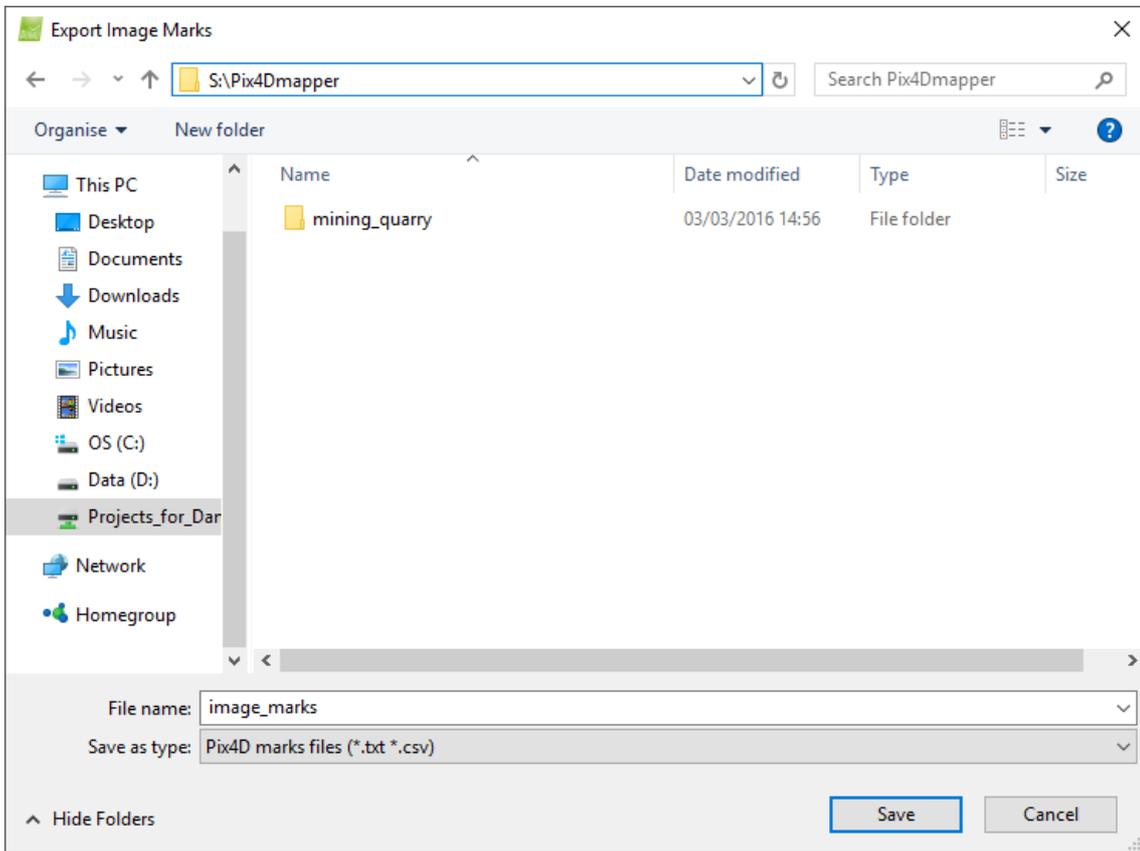
Cancel: Does not save the file and exits the pop-up.

Export Marks...

Once the GCPs / MTPs are marked on the images, Pix4Dmapper can export the image coordinates of the GCPs / MTPs. This option allows the user to use the same GCPs / MTPs with the same images the next time the project has to be processed (e.g. merging with another project, adding new images to the current project) without having to manually mark the GCPs / MTPs again.

**Warning:** The zoom level at which GCPs / MTPs are marked has an impact on the GCP / MTP error obtained in the *Quality Report*. Usually the higher the zoom level, the more precisely the GCP / MTP is marked. These GCPs / MTPs will have a bigger impact on the reconstructed model than GCPs marked on a lower zoom level; lower error values are also expected for these GCPs / MTPs. For example, when GCPs / MTPs are marked without zooming into the images, the GCP / MTP error can be 10 times higher than when the GCPs / MTPs are marked by zooming into the images.

When clicking Export Marks..., the *Export Image Marks* pop-up appears:



Navigation menu, to select the location to store the file.

On *File name*, type the name of the file.

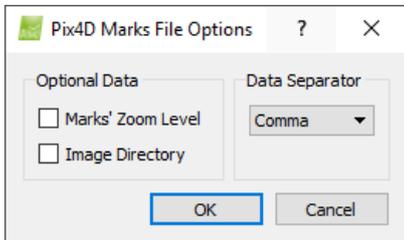
The *Save as type* displays the file format used to save the file:

*Pix4D marks files (\*.txt, \*.csv)*: [202558539](#).

*Bingo text file (\*.txt)*: [202558539](#).

*XML structure (\*.xml)*: [202558539](#).

When *Pix4D marks files* is selected, the *Pix4D Marks File Options* pop-up appears:



*Marks's Zoom Level* check box: Exports the zoom level at which the GCPs / MTPs are marked on the images.

*Image Directory* check box: Exports the directory of the images.

*Data Separator*: Sets the character used to separate the values in the file. The drop down list has the following options:

Comma (default)

Semicolon

Tab

Space

Save: Saves the file.

Cancel: Does not save the file and exits the pop-up.

For step by step instructions about how to export the marks of the GCPs / MTPs: [204924709](#).

 Access: On the Menu bar, click Project > GCP/MTP Manager...

 GCP/MTP Manager
✕

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GCP Coordinate System

 Datum: World Geodetic System 1984; Coordinate System: WGS 84 Edit...

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GCP/MTP Table

	Label	Type	Latitude [degree]	Longitude [degree]	Altitude [m]	Accuracy Horz [m]	Accuracy Vert [m]
8	9001	3D GCP	46.65644157	6.53589498	573.325	0.020	0.020
4	9002	3D GCP	46.65698879	6.53511384	568.726	0.020	0.020
9	9004	3D GCP	46.65483476	6.53314731	565.699	0.020	0.020
19	9011	3D GCP	46.65537950	6.54370093	473.329	0.020	0.020
24	9012	3D GCP	46.65325332	6.54184116	460.896	0.020	0.020
12	9016	3D GCP	46.65305217	6.53969890	455.266	0.020	0.020
25	9017	3D GCP	46.65364415	6.54260020	465.026	0.020	0.020

Import GCPs...  
Export GCPs...  
  
Add Point  
Remove Points

---

7/7 GCPs with enough image marks

Import Marks...
Export Marks...

---

GCP/MTP Editor

In order to compute the 3D position of a GCP/MTP, it needs to be marked on at least two images.  
 In order to take GCPs into account for georeferencing the project, at least 3 GCPs need to be marked.  
 Marking GCPs/MTPs after step 1. Initial Processing requires the user to run Process > Reoptimize.  
 The GCPs/MTP accuracy can be verified in the Quality Report or in the rayCloud Editor.

(Recommended) Use the rayCloud Editor after step 1. Initial Processing is done. This allows a fast and precise point marking.

rayCloud Editor...

Use the Basic Editor before step 1. Initial Processing or when using non-geolocated images or an arbitrary coordinate system.

Basic Editor...

---

OK
Cancel
Help

Allows the user to mark/edit the GCPs/MTPs/Check Points in the initial images. There are 2 options:

rayCloud Editor...: Available only if step 1. *Initial Processing* has been completed. It opens the left sidebar of the rayCloud.

Basic Editor...: Available even if no processing has been completed. It opens the Basic GCP/MTP Editor pop-up.

 Access: On the Menu bar, click Project > GCP/MTP Manager... The *GCP/MTP Manager* window opens. In the *GCP/MTP Editor* section, click Basic Editor...

The *Basic GCP/MTP Editor* pop-up has the following 3 sections:

**GCP/MTP Table:** Section that allows the user to edit the GCPs/MTPs/Check Points values and status.

**Images:** A list with all the images.

**Preview:** Section where the GCPs / MTP / Check Points are marked on the image.

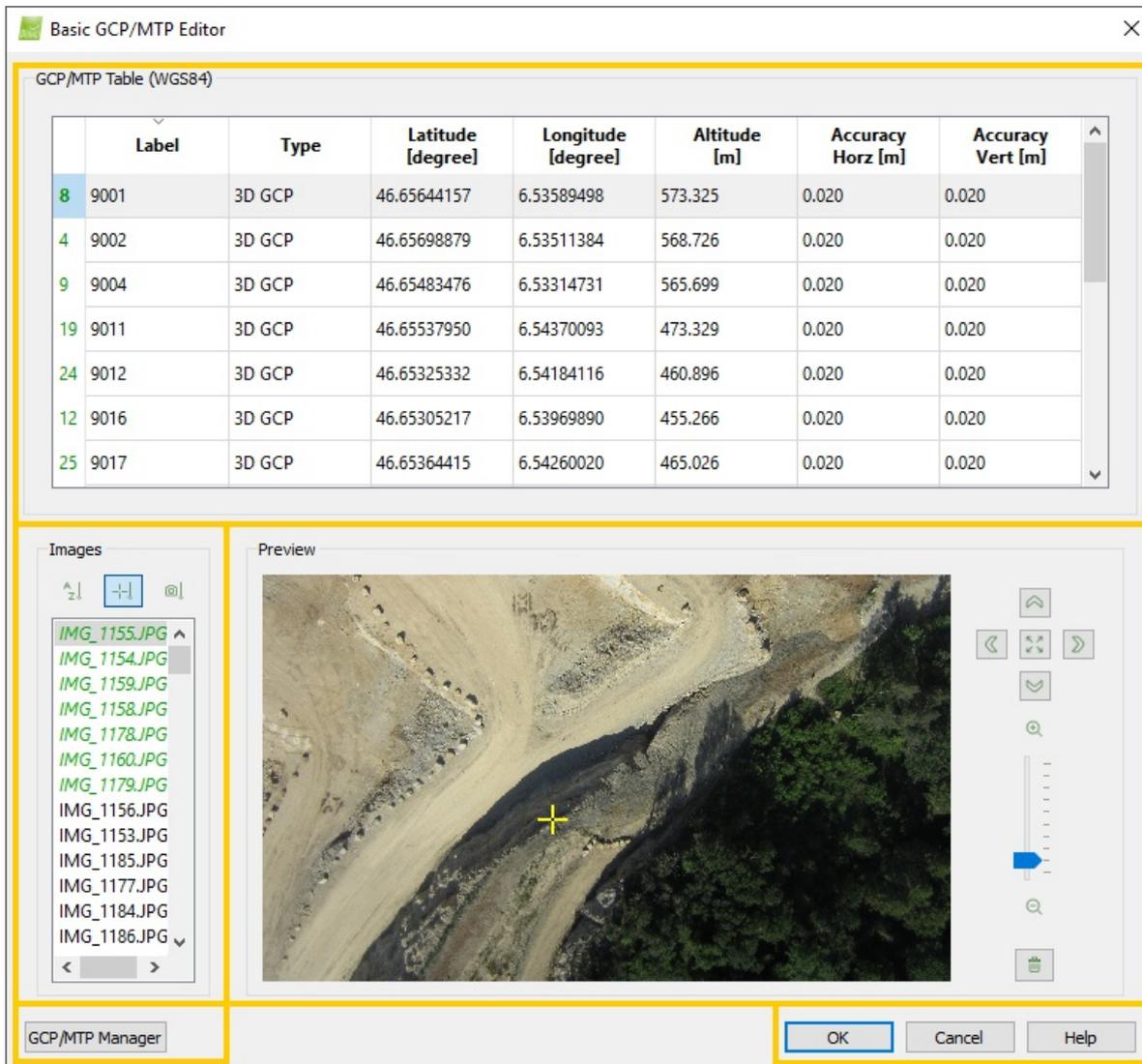
And the action buttons:

**GCP/MTP Manager:** Closes the Basic GCP / MTP Editor and goes back to the GCP/MTP Manager.

**OK:** Confirms the changes.

**Cancel:** Does not save the changes and exits the pop-up.

**Help:** Opens the Pix4Dmapper help.



**GCP/MTP Table (WGS84)**

	Label	Type	Latitude [degree]	Longitude [degree]	Altitude [m]	Accuracy Horz [m]	Accuracy Vert [m]
8	9001	3D GCP	46.65644157	6.53589498	573.325	0.020	0.020
4	9002	3D GCP	46.65698879	6.53511384	568.726	0.020	0.020
9	9004	3D GCP	46.65483476	6.53314731	565.699	0.020	0.020
19	9011	3D GCP	46.65537950	6.54370093	473.329	0.020	0.020
24	9012	3D GCP	46.65325332	6.54184116	460.896	0.020	0.020
12	9016	3D GCP	46.65305217	6.53969890	455.266	0.020	0.020
25	9017	3D GCP	46.65364415	6.54260020	465.026	0.020	0.020

**Images**

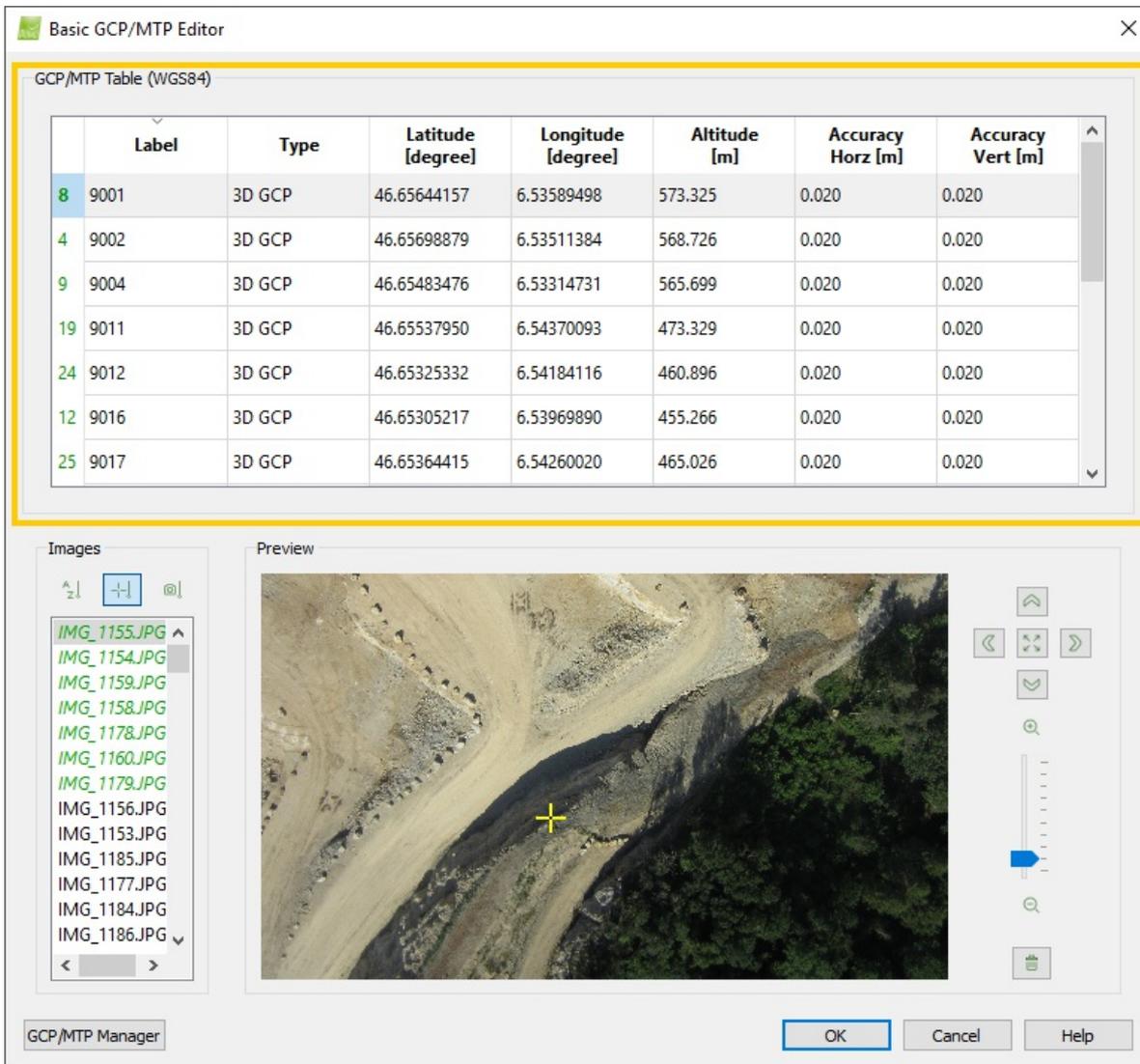
- IMG\_1155.JPG
- IMG\_1154.JPG
- IMG\_1159.JPG
- IMG\_1158.JPG
- IMG\_1178.JPG
- IMG\_1160.JPG
- IMG\_1179.JPG
- IMG\_1156.JPG
- IMG\_1153.JPG
- IMG\_1185.JPG
- IMG\_1177.JPG
- IMG\_1184.JPG
- IMG\_1186.JPG

**Preview**

**GCP/MTP Manager**      **OK**      **Cancel**      **Help**

 Access: On the Menu bar, click Project > GCP/MTP Manager... The *GCP/MTP Manager* window opens. In the *GCP/MTP Editor* section, click Basic Editor...

This section allows the user to view the GCPs/MTPs/Check Points, values and status.



The screenshot shows the 'Basic GCP/MTP Editor' window. At the top, it says 'GCP/MTP Table (WGS84)'. Below this is a table with the following data:

	Label	Type	Latitude [degree]	Longitude [degree]	Altitude [m]	Accuracy Horz [m]	Accuracy Vert [m]
8	9001	3D GCP	46.65644157	6.53589498	573.325	0.020	0.020
4	9002	3D GCP	46.65698879	6.53511384	568.726	0.020	0.020
9	9004	3D GCP	46.65483476	6.53314731	565.699	0.020	0.020
19	9011	3D GCP	46.65537950	6.54370093	473.329	0.020	0.020
24	9012	3D GCP	46.65325332	6.54184116	460.896	0.020	0.020
12	9016	3D GCP	46.65305217	6.53969890	455.266	0.020	0.020
25	9017	3D GCP	46.65364415	6.54260020	465.026	0.020	0.020

Below the table, there are two sections: 'Images' and 'Preview'. The 'Images' section shows a list of image files (IMG\_1155.JPG to IMG\_1186.JPG). The 'Preview' section shows a satellite image of a landscape with a yellow crosshair indicating a point. To the right of the preview image are navigation controls (arrows, zoom in/out, and a slider). At the bottom of the window are buttons for 'GCP/MTP Manager', 'OK', 'Cancel', and 'Help'.

Next to the section title *GCP/MTP Table*, the coordinate system of the GCPs is displayed.

This section contains a *Ground Control Points Table* which displays all the GCPs of the projects together with their properties.

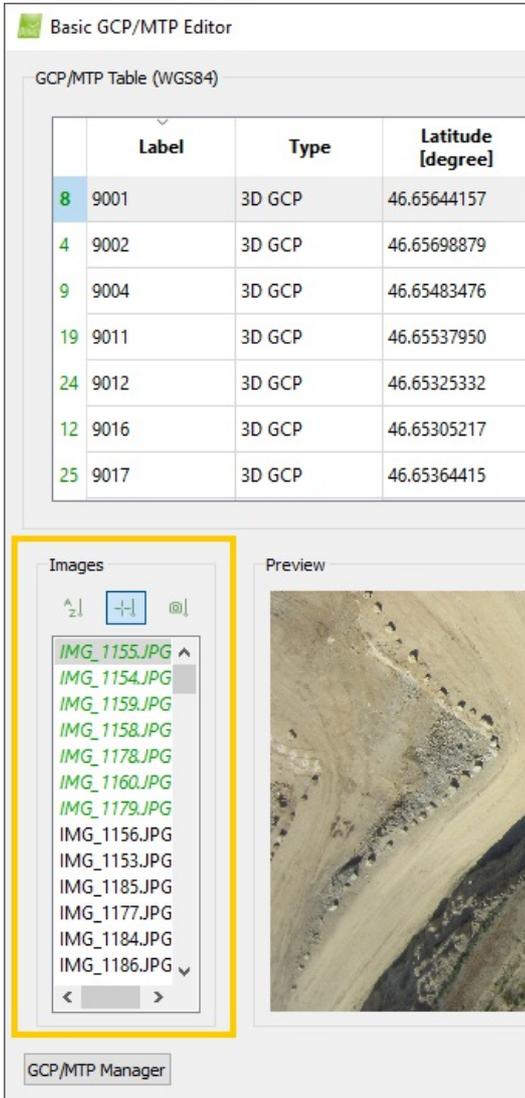
 Access: On the Menu bar, click Project > GCP/MTP Manager... The *GCP/MTP Manager* window opens. In the *GCP/MTP Editor* section, click Basic Editor...

This section displays a list of all the project's images.

For each selected point on the *GCP/MTP Table* section, the *Images* section is shown with:

Green color: The images on which the point has been marked.

Black color: The images on which the point has not been marked.



The screenshot shows the 'Basic GCP/MTP Editor' window. At the top, it says 'GCP/MTP Table (WGS84)'. Below this is a table with the following data:

	Label	Type	Latitude [degree]
8	9001	3D GCP	46.65644157
4	9002	3D GCP	46.65698879
9	9004	3D GCP	46.65483476
19	9011	3D GCP	46.65537950
24	9012	3D GCP	46.65325332
12	9016	3D GCP	46.65305217
25	9017	3D GCP	46.65364415

Below the table is the 'Images' section, which is highlighted with a yellow box. It contains a list of image files: IMG\_1155.JPG (green), IMG\_1154.JPG (black), IMG\_1159.JPG (green), IMG\_1158.JPG (black), IMG\_1178.JPG (green), IMG\_1160.JPG (black), IMG\_1179.JPG (green), IMG\_1156.JPG (black), IMG\_1153.JPG (black), IMG\_1185.JPG (black), IMG\_1177.JPG (black), IMG\_1184.JPG (black), and IMG\_1186.JPG (black). To the right of the list is a 'Preview' window showing an aerial photograph of a construction site.

The images can be sorted according to three different criteria by clicking on the corresponding buttons:

 Sort Images by Name.

 Sort Images by the Distance to GCP.

 Sort Images by the Distance to the marked Images.

There is one context menu for the *Images* section that can be accessed by right clicking on one image. The context menu gives access to the following action:

Remove Mark: Deletes the marked point that appears on this image.

Sort Images by Name

The images are sorted alphabetically by name.

Sort Images by the Distance to GCP

The images are sorted by distance to the GCP (closest image to the GCP is displayed first). This sorting is selected by default when 2D GCPs, 3D GCPs or

Check points have been imported into the project. This sorting is recommended to easily find images on which GCPs or Check points may appear.

 Note: Non geolocated images are displayed at the bottom of the list.

Sort Images by the Distance to the Marked Images

The images are sorted by distance to the marked images (closest image to the marked images is displayed first). This sorting is recommended to easily find images on which *Manual Tie Points* appear. It can be used after having marked the Manual Tie Point on at least one image.

 Note: Non geolocated images are displayed at the bottom of the list.

[Index](#) > [Interface](#) > [Menu Project](#) > [Basic GCP/Manual Tie Point Editor](#)

[◀ Previous](#) | [Next ▶](#)

 Access: On the Menu bar, click Project > GCP/MTP Manager... The *GCP/MTP Manager* window opens. In the *GCP/MTP Editor* section, click Basic Editor...

This section is used to mark the GCPs/MTPs/Check Points on the images.

 Important: Each point needs to be marked on at least 2 images to be taken into account in processing. It is recommended to mark each point in at least 4-5 images.

 Important: The zoom level at which GCPs are marked has an impact on the GCP error obtained in the Quality Report. Usually the higher the zoom level, the more precisely the GCP is marked. These GCPs will have more impact on the reconstructed model than GCPs marked in a lower zoom level and lower error values are expected for those GCPs. For example, when GCPs are marked without zooming into the images, the GCP error can be 10 times higher than when GCPs are marked by zooming into the images.

Basic GCP/MTP Editor
✕

GCP/MTP Table (WGS84)

	Label	Type	Latitude [degree]	Longitude [degree]	Altitude [m]	Accuracy Horz [m]	Accuracy Vert [m]
8	9001	3D GCP	46.65644157	6.53589498	573.325	0.020	0.020
4	9002	3D GCP	46.65698879	6.53511384	568.726	0.020	0.020
9	9004	3D GCP	46.65483476	6.53314731	565.699	0.020	0.020
19	9011	3D GCP	46.65537950	6.54370093	473.329	0.020	0.020
24	9012	3D GCP	46.65325332	6.54184116	460.896	0.020	0.020
12	9016	3D GCP	46.65305217	6.53969890	455.266	0.020	0.020
25	9017	3D GCP	46.65364415	6.54260020	465.026	0.020	0.020

Images

🔍
[-]
🖼️

- IMG\_1155.JPG ^
- IMG\_1154.JPG
- IMG\_1159.JPG
- IMG\_1158.JPG
- IMG\_1178.JPG
- IMG\_1160.JPG
- IMG\_1179.JPG
- IMG\_1156.JPG
- IMG\_1153.JPG
- IMG\_1185.JPG
- IMG\_1177.JPG
- IMG\_1184.JPG
- IMG\_1186.JPG v

<
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Preview



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🏠

GCP/MTP Manager

OK
Cancel
Help

When the *Basic GCP/MTP Editor* is opened the first time, no image is displayed in the *Preview* section. Once points are imported from a file or once a new point has been added, the first image is displayed in the *Preview* section.

The following actions are available:

Zoom in: Move the mouse scroll wheel forwards.

Zoom out: Move the mouse scroll wheel backwards.

Pan: Press the left mouse button and move the mouse.

Zoom in instantly to a specific point: Hover the mouse on the point of interest while pressing the Alt key.

Zoom out instantly to zero zoom level: Hover the mouse on the point of interest while pressing the Shift key.

Mark a point: Left click on the point on the image.

In the right part of the *Preview* section there is a control panel to navigate in the image:

-  Left arrow button: Moves to the left part of the image (when the image is zoomed in).
-  Right arrow button: Moves to the right part of the image (when the image is zoomed in).
-  Up arrow button: Moves to the top part of the image (when the image is zoomed in).
-  Down arrow button: Moves to the bottom part of the image (when the image is zoomed in).
-  Reset view button: Zooms out to zero zoom level.
-  Zoom in button: Zooms in.

Zoom slider: Zooms in or out.

In: Move the slider up.

Out: Move the slider down.

-  Zoom out button: Zooms out.

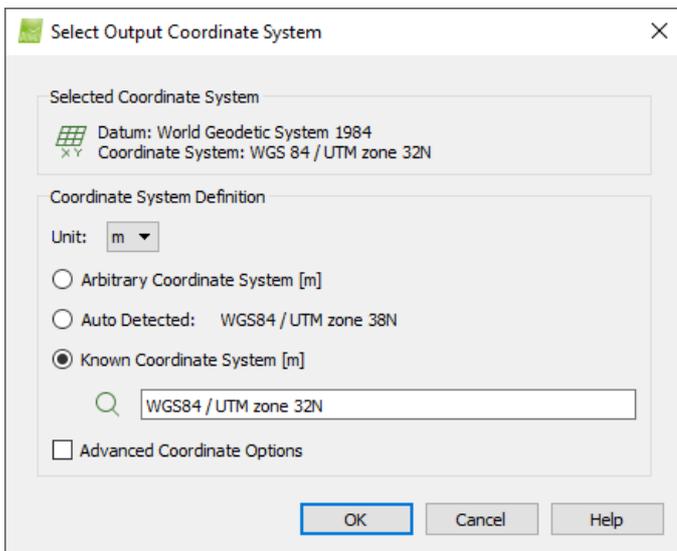
 Remove button: Removes the marked point (if any) from the image displayed in the *Preview* section. If there is no mark in the image displayed in the *Preview* section, the Remove button is grayed out.

 Access: On the Menu bar, click Project > Select Output Coordinate System...

 Important: The output coordinate system does not need to be the same as the image geolocation coordinate system or the GCPs coordinate system. By default, the output coordinate system is the same as the GCPs coordinate system if GCPs are used, otherwise it is the same as the image geolocation coordinate system. If the coordinates system is WGS84, the output is given in the corresponding UTM zone.

If less than 3 images are geolocated and less than 3 GCPs are defined, then the output coordinates system is set to "Arbitrary".

The *Select Output Coordinate System* pop-up allows the user to choose the coordinate system of the outputs.



For a full description of the *Select Output Coordinate System* pop-up: [202558239](#).



Access: On the Menu bar, click Process.

The following items can be selected:

**Reoptimize:** Reoptimizes the camera positions using information from GCPs/ Manual Tie Points that are added after step 1. *Initial Processing*.

**Rematch and Optimize:** Computes more matches between the images (and therefore more Automatic Tie Points) and reoptimizes the internal and external camera parameters.

**Quality Report...:** Opens the *Quality Report* in a new window.

**Open Results Folder...:** Opens an explorer window with the path where the project outputs are stored.

**Output Status...:** Shows the status of the generated output files.

**Generate Quality Report:** Generates a new *Quality Report* according to the new reconstruction obtained after applying changes to the project after step 1. *Initial Processing*.

**Save Undistorted Images:** Generates and saves an undistorted copy of each original image using the optimized distortion camera parameters.

**Run Point Cloud Classification:** Generates a point cloud classification using the densified point cloud that is generated during step 2. *Point Cloud and Mesh*.

**Generate 3D Textured Mesh:** Generates a 3D Textured Mesh based on triangles using a simplified densified point cloud.

**Import Point Cloud for DSM Generation...:** Allows the user to import a point cloud that will be used to generate the DSM and orthomosaic.

**Generate DTM:** Generates a DTM based on the DSM and a mask representing the terrain/objects.

**Generate Contour Lines (DSM):** Generates the contour lines specified in the *Processing Options* using the raster DSM.

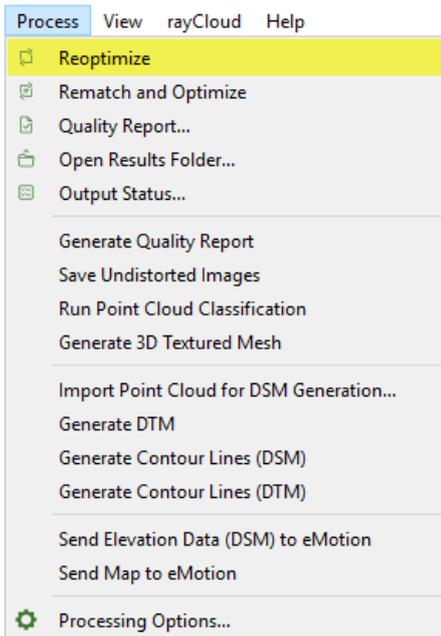
**Generate Contour Lines (DTM):** Generates the contour lines specified in the *Processing Options* using the raster DTM, if it has been generated.

**Send Elevation Data (DSM) to eMotion:** (only if senseFly eMotion is installed) Sends a DSM generated in Pix4Dmapper to eMotion.

**Send Map to eMotion:** (only if senseFly eMotion is installed) Sends an orthomosaic generated in Pix4Dmapper to eMotion.

**Processing Options...:** Opens a pop-up that allows the user to select the processing options and/or the processing options template.

 Access: On the Menu bar, click Process > Reoptimize (enabled once step 1. *Initial Processing* has been completed).



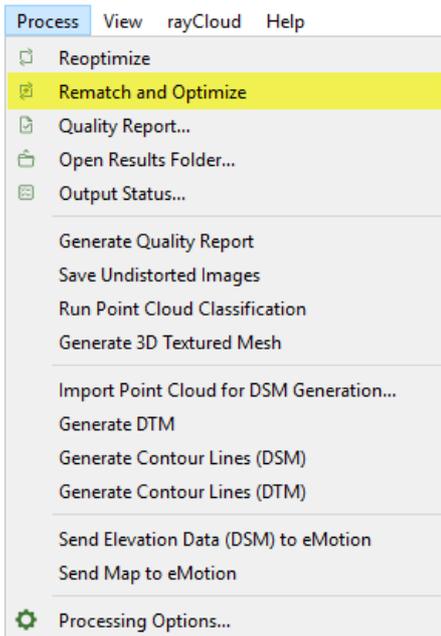
This process reoptimizes the internal and external camera parameters. It should be used when changes have been applied to the project after step 1. *Initial Processing* has been completed. Such changes can be:

- Adding GCPs.
- Adding Manual Tie points.
- Adding Check points.
- Changing coordinate systems.
- Disable images.

 Important: Disabled or uncalibrated cameras will not be taken into account. For more information about how to calibrate uncalibrated cameras: [202560189](#).

 Warning:  
Results generated during step 1. *Initial Processing* are overwritten.  
The *Quality Report* is deleted. To generate a new *Quality Report*: [202558319](#).  
If step 2. *Point Cloud and Mesh* and step 3. *DSM, Orthomosaic and Index* have been processed, their results files will be deleted so these files should be backed up.

 Access: On the Menu bar, click Process > Rematch and Optimize (enabled once step 1. *Initial Processing* has been completed).



This process computes more matches between the images (and therefore more Automatic Tie Points), and reoptimizes the internal and external camera parameters. It is recommended to use it:

After manually calibrating cameras that were not initially calibrated.

For difficult projects where few matches were initially found.

To merge individual projects that do not share common images.

To optimize step 1. *Initial Processing* by re-matching images. For projects with more than 500 images, this process is unselected and disabled in the processing options.

 Note: For large projects (more than 500 images), the *Rematch and Optimize* feature significantly increases processing time.

 Important: Disabled or uncalibrated cameras will not be taken into account. For more information about how to calibrate uncalibrated cameras: [202560189](#).

 Warning:  
Results generated during step 1. *Initial Processing* are overwritten.  
The *Quality Report* is deleted. To generate a new *Quality Report*: [202558319](#).  
If step 2. *Point Cloud and Mesh* and step 3. *DSM, Orthomosaic and Index* have been processed, their result files will be deleted so these files should be backed up.



Access: On the Menu bar, click Process > Quality Report... (active once step 1. *Initial Processing* has been completed). The *Quality Report* opens in a pop-up window.



Important:

For a detailed description about how to analyze the Quality Report: [202558689](#).

For a detailed description about the parameters described in the Quality Report: [202558679](#).

For a description about how to analyze the Quality Report: [202557339](#).

Example of a Quality Report available at the following link: [Quality Report](#).

# Quality Report



Generated with Pix4Dmapper Pro version 3.2.19 Preview

**!** **Important:** Click on the different icons for:

- ?** Help to analyze the results in the Quality Report
- i** Additional information about the sections

**💡** Click [here](#) for additional tips to analyze the Quality Report

## Summary **i**

Project	example_quarry
Processed	2017-04-11 14:37:18
Camera Model Name(s)	CanonIXUS220HS_4.3_4000x3000 (RGB)
Average Ground Sampling Distance (GSD)	8.77 cm / 3.45 in
Area Covered	0.5854 km <sup>2</sup> / 58.5432 ha / 0.2262 sq. mi. / 144.738 acres

## Quality Check **i**

<b>?</b> Images	median of 35858 keypoints per image	<b>✓</b>
<b>?</b> Dataset	127 out of 127 images calibrated (100%), all images enabled	<b>✓</b>
<b>?</b> Camera Optimization	0.45% relative difference between initial and optimized internal camera parameters	<b>✓</b>
<b>?</b> Matching	median of 13972.7 matches per calibrated image	<b>✓</b>
<b>?</b> Georeferencing	yes, 7 GCPs (7 3D), mean RMS error = 0.059 m	<b>✓</b>

## **?** Preview **i**

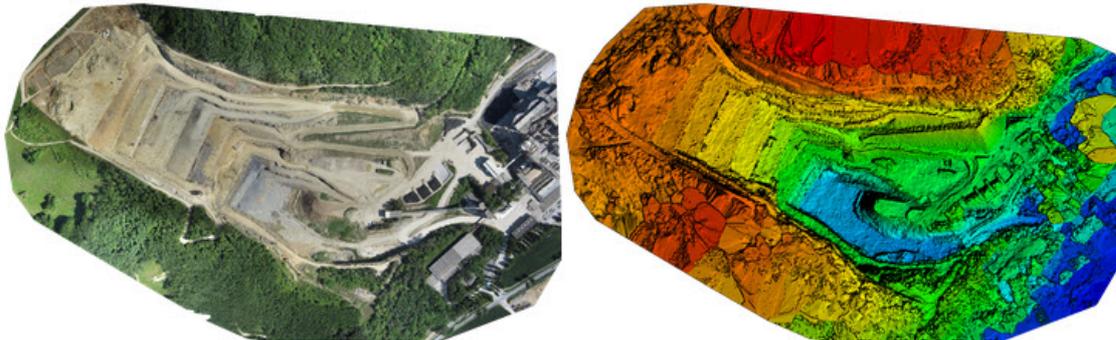
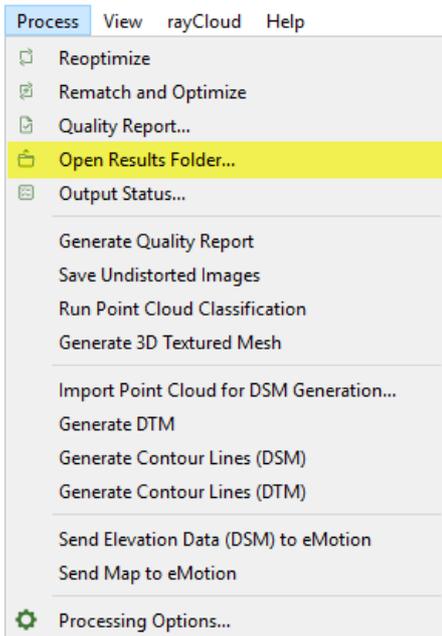


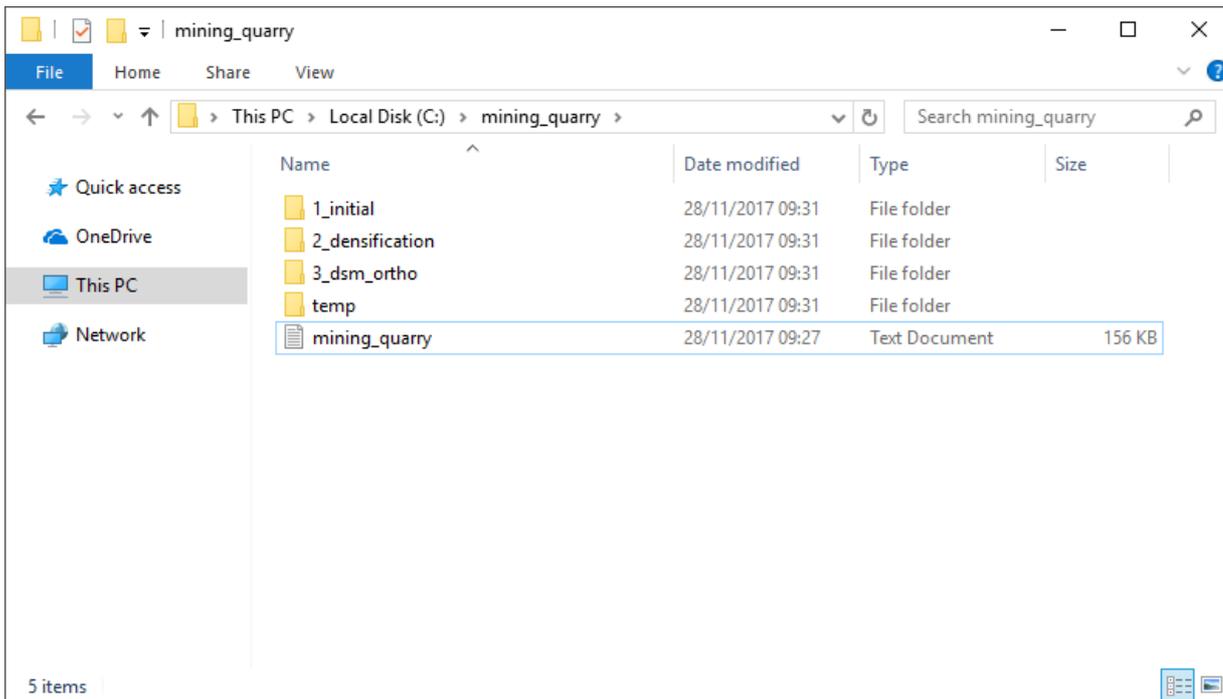
Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

 Display Automatically after Processing

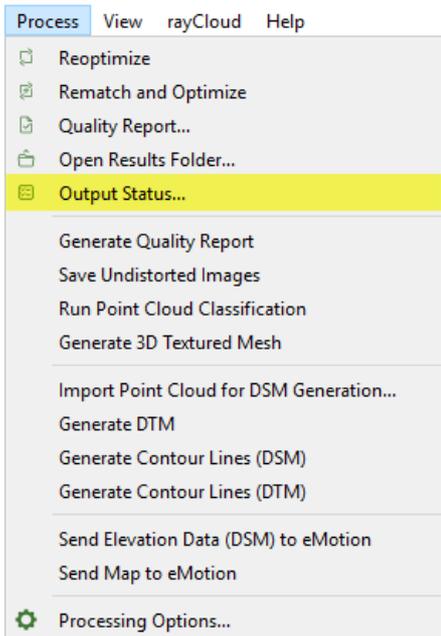
 Access: On the Menu bar, click Process > Open Results Folder...



 Important:  
For a detailed description of the folder structure: [20255864](#).  
For more information about the output files: [202558509](#).



 Access: On the menu bar, click Process > Output Status... The pop-up *Output Status* appears.



The pop-up *Output Status* displays:

The processing step that is being processed.

The processing steps that have already been processed.

The processing steps that cannot be processed with the current version of Pix4Dmapper. For more information: [204162839](#).

The output files that are selected to be generated.

The output file that is being generated.

The output files that have already been generated.

The output files that can be generated with the current version of Pix4Dmapper. For more information: [204162839](#).

The formats of the output files selected to be generated.

The dependencies between the output files.

Information and links to the processing options and the results folders about the output files.

The pop-up *Output Status* consists of:

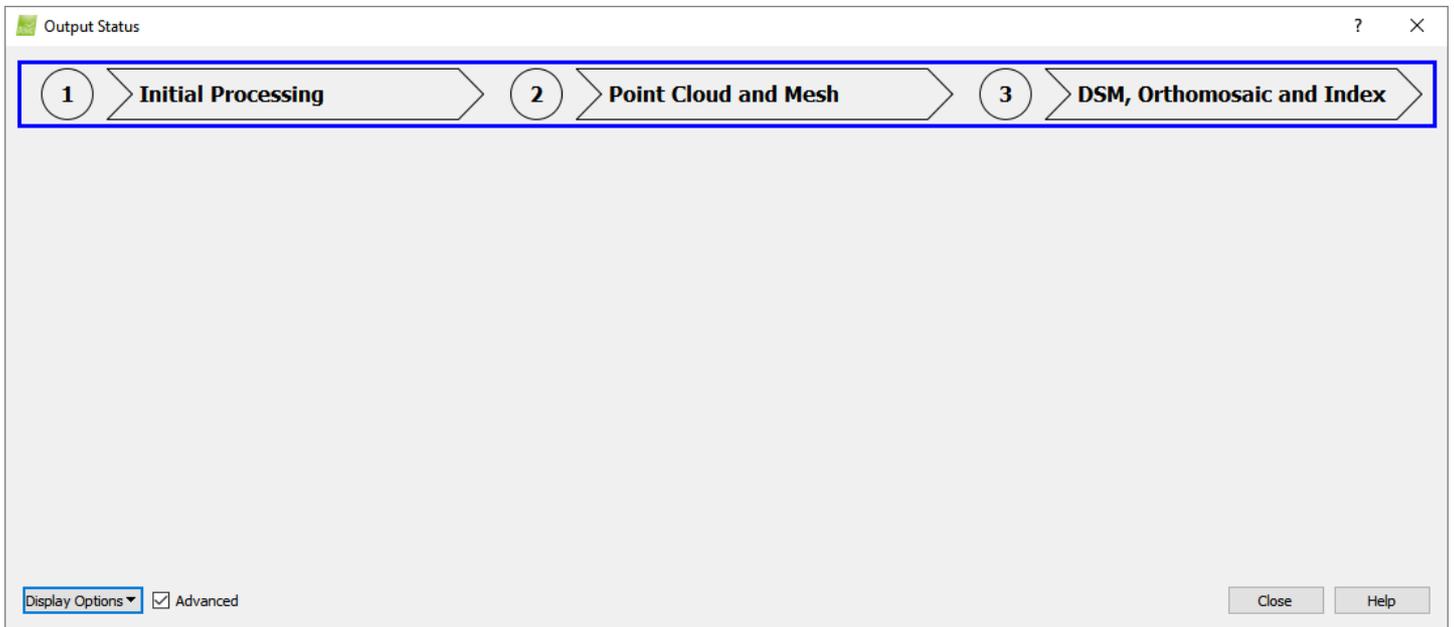
[Processing steps](#)

[Output files](#)

[Display options](#)

## Processing steps

The three processing steps, 1. *Initial Processing*, 2. *Point Cloud and Mesh* and 3. *DSM, Orthomosaic and Index* appear in the pop-up *Output Status*.



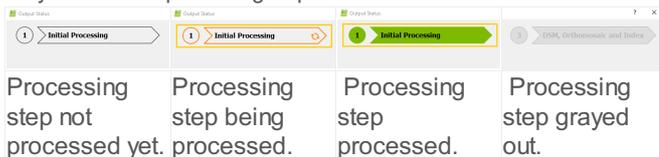
The processing steps can be:

Transparent: If the processing step is not processed yet.

Orange: If the processing step is being processed.

Green: If the processing step is already processed.

Grayed out: If the processing step is not available in the current version of Pix4Dmapper. For more information: [204162839](https://pix4d.com/204162839).



**!** Important: When no Output Files are selected for step 3. *DSM, Orthomosaic and Index*, step 3. *DSM, Orthomosaic and Index* is grayed out and cannot be processed.

## Output files

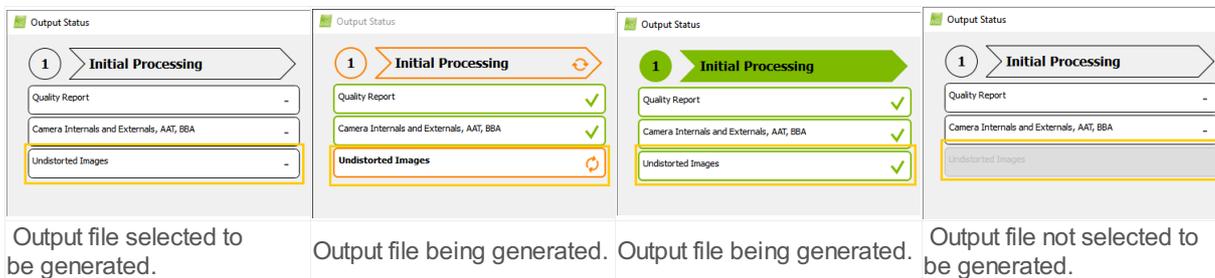
The output files can be:

White: If the output file is not generated yet.

Orange: If the output file is being generated.

Green: If the output file is already generated.

Grayed out: If the output file is not selected to be generated or if the output file is not available in the current version of Pix4Dmapper. For more information: [204162839](https://pix4d.com/204162839).



For each processing step, the following output files are displayed:

1. *Initial Processing*:

Quality Report

Camera Internals and Externals, AAT, BBA

Undistorted Images

**Note:** The *Camera Internals and Externals, AAT and BBA* and the *Undistorted Images* are displayed only when the *Advanced* box is selected.

2. Point Cloud and Mesh:

- Densified Point Cloud
- 3D Textured Mesh

3. DSM, Orthomosaic and Index:

- Grid DSM
- Raster DSM
- Contour Lines (based on the Raster DSM)
- Raster DTM
- Contour lines (based on the Raster DTM)
- Orthomosaic
- Google Maps Tiles and KML
- Reflectance Map
- Index Map

The screenshot shows the 'Output Status' window with three stages of processing:

- 1 Initial Processing:**
  - Quality Report -
  - Camera Internals and Externals, AAT, BBA -
  - Undistorted Images -
- 2 Point Cloud and Mesh:**
  - Densified Point Cloud: LAS, LAZ, PLY, XYZ -
  - 3D Textured Mesh: OBJ -
- 3 DSM, Orthomosaic and Index:**
  - Grid DSM: XYZ, LAS, LAZ -
  - Raster DSM -
  - Contour Lines: SHP, PDF, AutoCAD DXF -
  - Orthomosaic -
  - Google Maps Tiles and KML -
  - Mapbox Tiles -
  - Reflectance Map -
  - Index Map -

At the bottom, there is a 'Display Options' dropdown, a checked 'Advanced' checkbox, and 'Close' and 'Help' buttons.

In each output file box, the different selected output file formats are displayed.

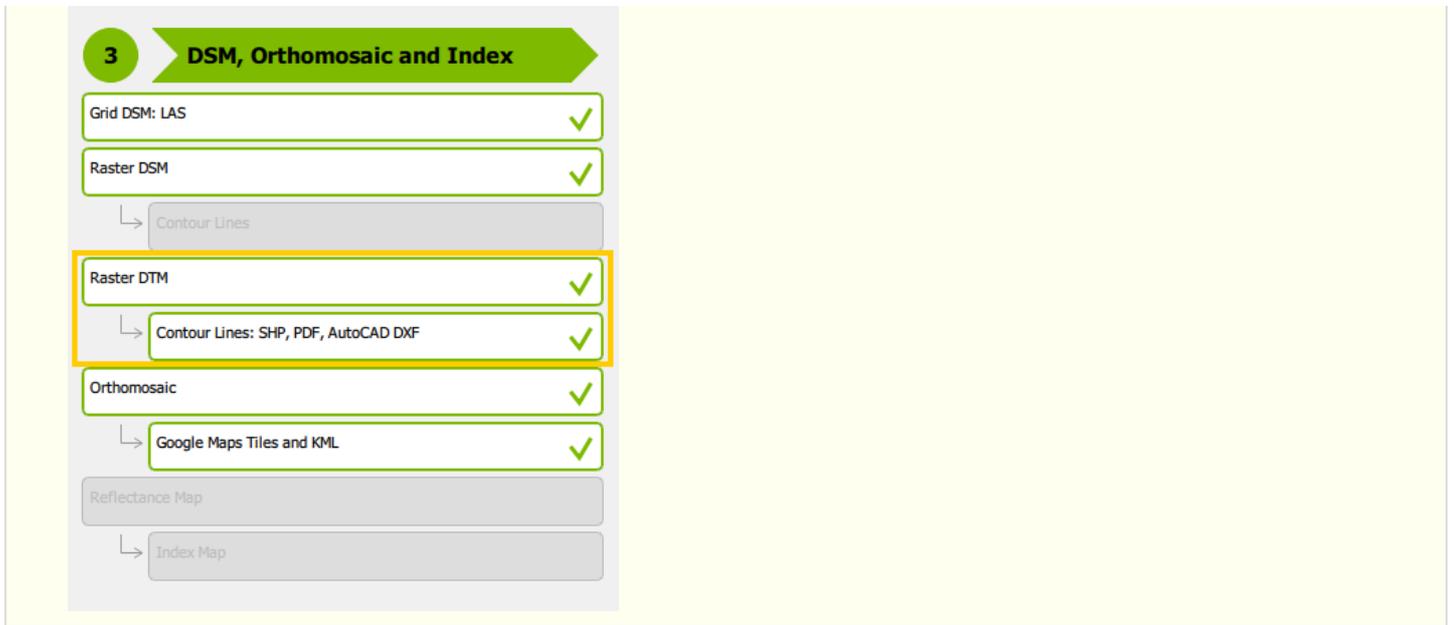
**Example:** For the *Densified Point Cloud*, the *.las*, *.laz*, *.ply* and *.xyz* file formats are selected.

The screenshot shows the 'Point Cloud and Mesh' stage with the following outputs:

- Densified Point Cloud: LAS, LAZ, PLY, XYZ -
- 3D Textured Mesh: OBJ -

Some output files are indented and connected to other output files with arrows. These arrows represent the dependencies between the different output files. If the initial output file is not selected, the dependent one cannot be generated and it is grayed out.

**Example:** The *Contour Lines* (based on the Raster DTM) depend on the generation of the *Raster DTM*.



When clicking an output file box, the box extends. The extended box contains:

A description of the output file.

A link to the processing options of this output file.

A link to the results folder directory of the output file.

2 Point Cloud and Mesh	2 Point Cloud and Mesh	2 Point Cloud and Mesh
<p><b>Densified Point Cloud: LAS, LAZ, PLY, XYZ</b></p> <p>A 3D dense point cloud (i.e. a 3D set of points): the X,Y,Z position and color information is stored for each point of the point cloud.</p> <p>More info <a href="#">here</a>.</p>	<p><b>Densified Point Cloud: LAS, LAZ, PLY, XYZ</b></p> <p>A 3D dense point cloud (i.e. a 3D set of points): the X,Y,Z position and color information is stored for each point of the point cloud.</p> <p>More info <a href="#">here</a>.</p>	<p><b>Densified Point Cloud: LAS, LAZ, PLY, XYZ</b></p> <p>A 3D dense point cloud (i.e. a 3D set of points): the X,Y,Z position and color information is stored for each point of the point cloud.</p> <p>More info <a href="#">here</a>.</p>
Description of the output file.	Open the processing options for this output file.	Open the results folder for this output file.

## Display options

The drop-down list *Display Options* selects the output files to be displayed. The display options are the following:

Disabled: The output files not selected or not available in the current version of Pix4Dmapper are displayed.

To do: The output files selected to be generated are displayed.

In Progress: The output files being generated are displayed.

Done: The output files already generated are displayed.

If the box *Advanced* is selected, the advanced output files are shown.

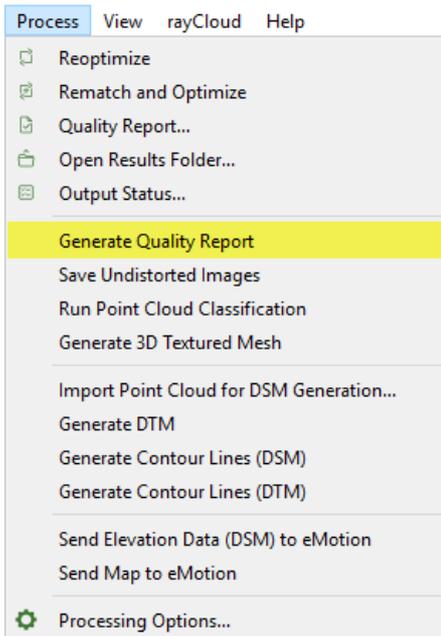
And the action buttons:

Close: Closes the pop-up *Output Status*.

Help: Opens the Pix4Dmapper help.



 Access: On the Menu bar, click Process > Generate Quality Report (enabled once step 1. *Initial Processing* has been completed).

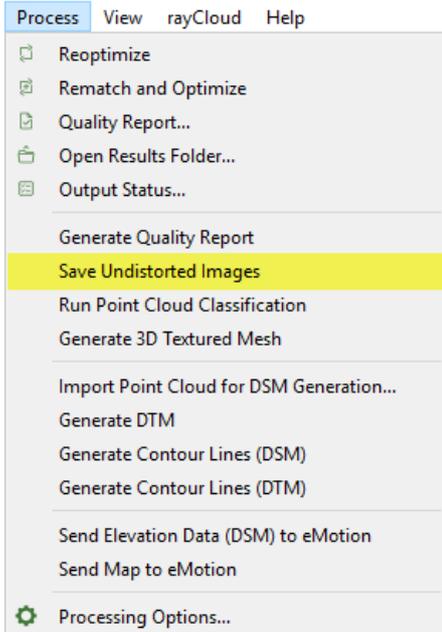


This process generates a new *Quality Report* that refers to the new reconstruction obtained after applying changes to the project once step 1. *Initial Processing* has been completed. Such changes can be:

- Adding GCPs.
- Adding Manual Tie Points.
- Adding Check Points.
- Changing coordinate systems.
- Enabling/disabling images.
- Running the *Rematch and Optimize* option.

 Important: When adding GCPs, Manual Tie Points, Check Points, changing coordinate systems or enabling/disabling images, the *Reoptimize* option has to be applied before generating the new *Quality Report*.

 Access: On the Menu bar, click Process > Save Undistorted Images (active once step 1. *Initial Processing* has been completed).



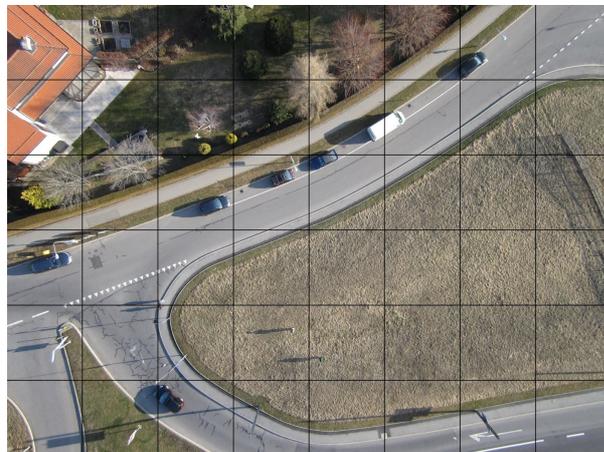
This process generates an undistorted copy of each original image using the optimized distortion parameters of the selected camera model.

 Important: This process is only available when processing images using a perspective lens camera model. The undistorted images will only be generated for the calibrated images.

 Information: For more information about camera distortion: [202559069](https://www.202559069.com).

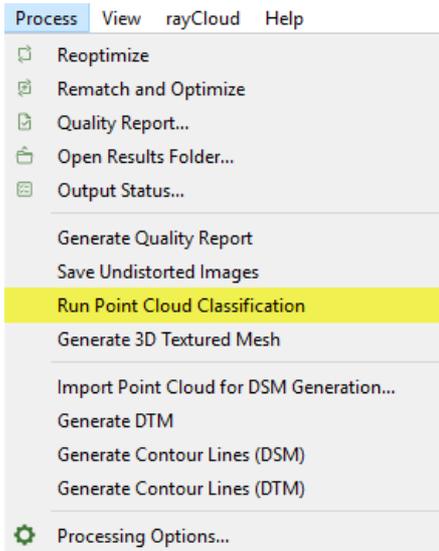


Original image: The square grid is distorted because of the lens of the camera.



Undistorted image: The square grid is now perfectly aligned.

 Access: On the Menu bar, click Process > Run Point Cloud Classification (active once step 2. *Point Cloud and Mesh* has been completed).

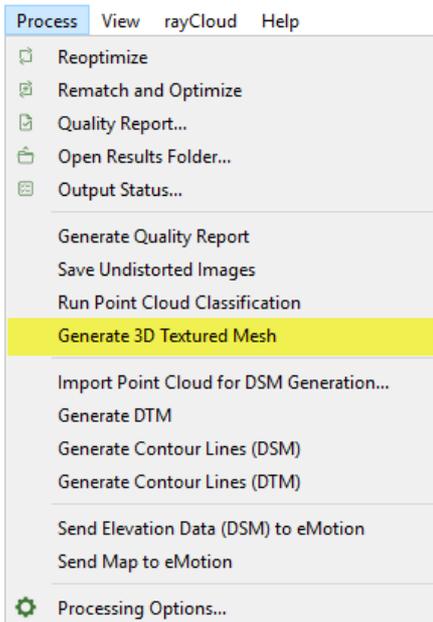


This process classifies the points of the *Densified Point Cloud* in 5 predefined groups:

- Ground
- Road Surface
- High Vegetation
- Building
- Human Made Object

 Warning: When reprocessing step 2. *Point Cloud and Mesh*, the existing outputs and all edits will be deleted and overwritten.

 Access: On the Menu bar, click Process > Generate 3D Textured Mesh (active once step 2. *Point Cloud and Mesh* has been completed).



This process generates a *3D Textured Mesh* based on triangles using the *Densified Point Cloud*.

 Important: By default, by clicking Process > Generate 3D Textured Mesh, the 3D Textured Mesh will be generated:

In .p4b format, only readable in the rayCloud:

`project_name\2_densification\project_data\project_name_3d_mesh.p4b`

In .obj format:

`project_name\2_densification\3d_mesh\project_name_simplified_3d_mesh.obj`

In .fbx format:

`project_name\2_densification\3d_mesh\project_name_simplified_3d_mesh.fbx`

In order not to generate the .obj or .fbx files and/or generate other outputs (.ply, .dxf, .pdf) before clicking Process > Generate 3D Textured Mesh, change the processing options and click OK. For more information: [202557799](#).

For step by step instructions about how to generate the 3D Textured Mesh: [202560669](#).

 Important: The *3D Textured Mesh* will be generated using the *Densified Point Cloud*. If any *Processing Area* and/or image annotation is defined, and if the corresponding options are selected in the *Point Cloud Filters* options, they will also be used for the *3D Textured Mesh* generation.

These options are available on the Menu bar, by clicking Process > Processing Options... and selecting 2. Point Cloud and Mesh. For more information: [202557799](#).

 Important: If the 3D Textured Mesh has holes or is not planar in planar surfaces, it can be improved in the rayCloud. For more information: [211083803](#).

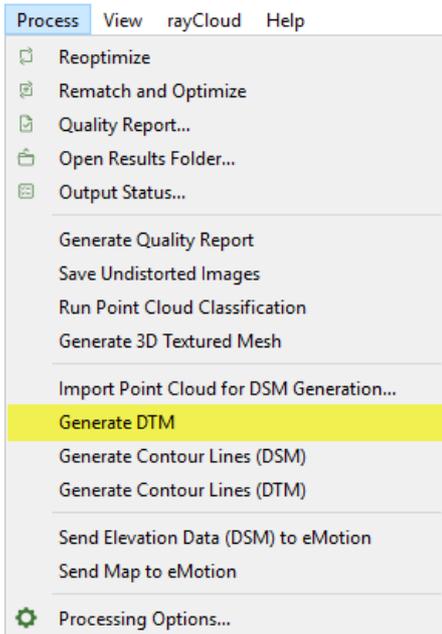


3D Textured Mesh

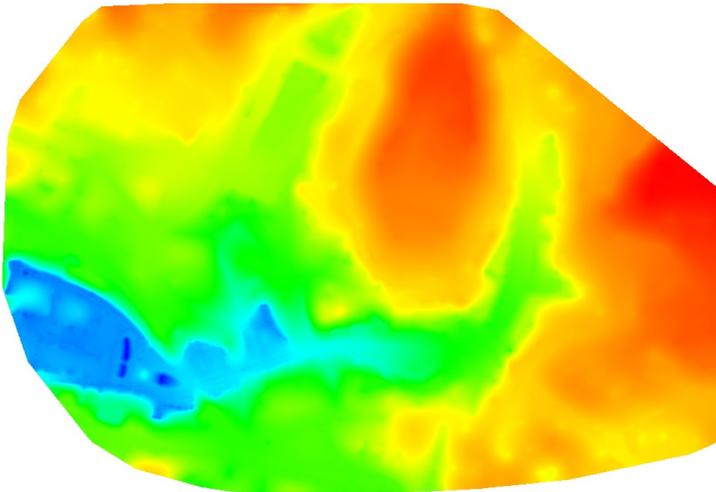
[Index](#) > [Interface](#) > [Menu Process](#)

[◀ Previous](#) | [Next ▶](#)

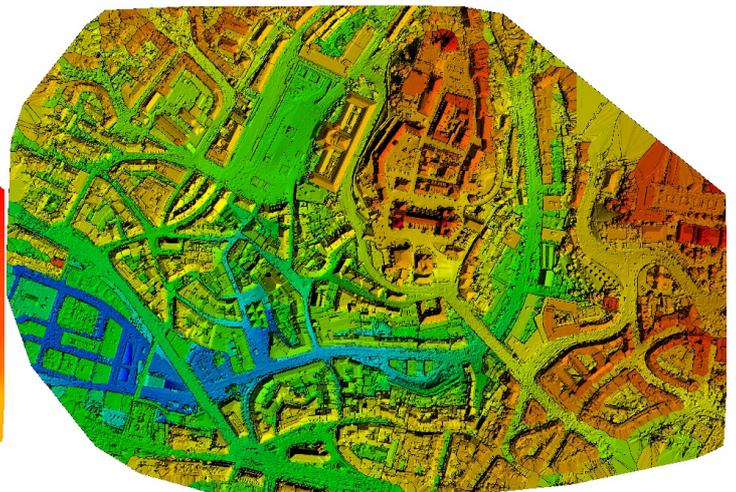
 Access: On the Menu bar, click Process > Generate DTM (enabled once the *Raster DSM* is generated and the tiles of the *Raster DSM* are merged).



This process takes as input the merged *Raster DSM (Digital Surface Model)*, computes a classification mask and generates the *Raster DTM (Digital Terrain Model)*.

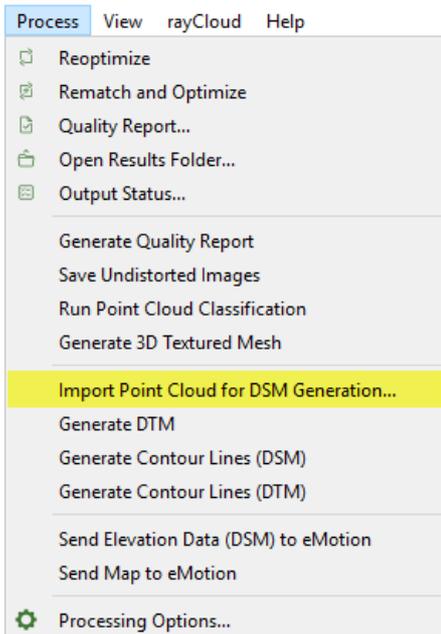


DTM of the center of the city of Lausanne



DSM of the center of the city of Lausanne

 Access: On the Menu bar, click Process > Import Point Cloud for DSM Generation... (enabled once step 1. *Initial Processing* has been completed).



This process allows to import a point cloud to generate the DSM and the orthomosaic.

Once the point cloud has been imported, step 3. *DSM, Orthomosaic and Index* needs to be processed to generate the DSM and the orthomosaic.

It opens the pop-up *Select Point Cloud*, which allows to navigate to the path where the point cloud to be imported is stored and select it.

The accepted formats are:

.xyz  
.las  
.laz

It contains the action buttons:

Open: Confirms the importation of the selected file.

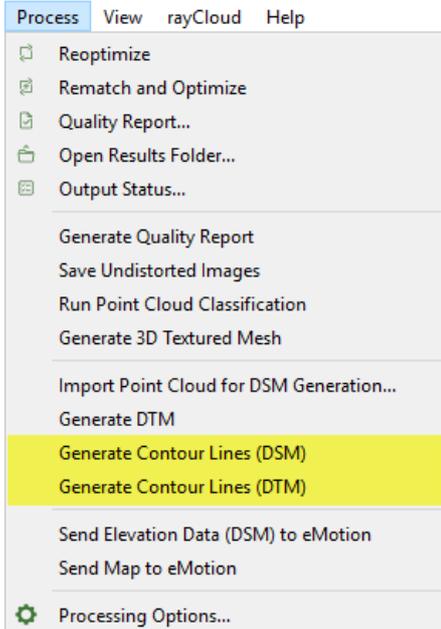
Cancel: Does not import any file and closes the pop-up.

 **Warning:**  
The external point cloud needs to be in the same coordinate system as the output coordinate system.  
The external point cloud needs to be aligned with the model generated in Pix4Dmapper. This can be achieved with common GCPs.  
If step 3. *DSM, Orthomosaic and Index* has already been completed for this project, existing results are overwritten when running step 3 again.

 **Important:**  
The imported point cloud cannot be visualized in the rayCloud.  
If step 2. *Point Cloud and Mesh* has been completed, its results are not used for the DSM and orthomosaic generation.  
The imported point cloud will be used to generate the DSM.  
The original images are projected on the DSM in order to obtain the orthomosaic.

 Video: Watch the instructional video related to *Contour Lines and DTM*. [here](#).

 Access: On the Menu bar, click Process > Generate Contour Lines (DSM or DTM) (active once step 3. *DSM, Orthomosaic and Index* has been completed and if any Contour Lines format is selected in the processing options). For step by step instructions: [202560639](#).



 Important: This process generates the contour lines using :  
the Raster DTM, if it is already generated. For more information about contour lines using the DTM: [217262006](#).  
the Raster DSM, if the raster DTM is not generated or if the DTM tiles are not merged. For more information about contour lines using the DSM: [202559879](#).

 Important: The option to generate the *Contour Lines* is grayed out if the option to merge the tiles of Raster DSM or Raster DTM are disabled. For more information about the options of the Raster DSM: [202557769](#) and the Raster DTM: [202558419](#).

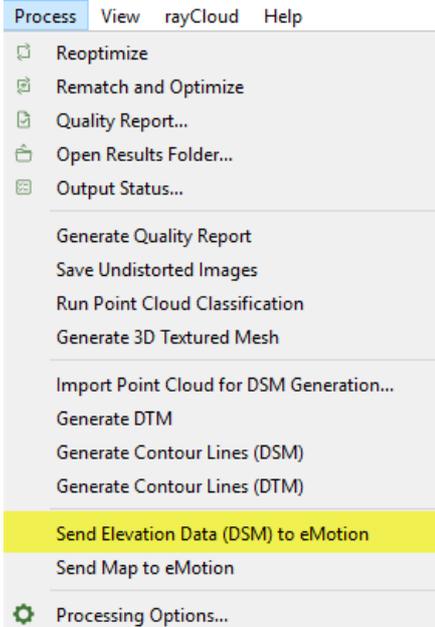
 Note:  
If contour lines with the same *Elevation Interval* are already generated, they will be overwritten.  
If the *Contour Lines* have been selected in the processing options, they will be generated when processing step 3. *DSM, Orthomosaic and Index*.



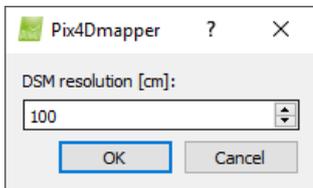
Contour lines

 Access: On the Menu bar, click Process > Send Elevation Data (DSM) to eMotion. Only available when eMotion (by senseFly) is installed on the same device and step 1. *Initial Processing* is completed.

 Important:  
If step 1. *Initial Processing* is processed, the Automatic Tie Points are used for the eMotion DSM generation. The same applies if step 1. *Initial Processing* and step 3. *DSM, Orthomosaic and Index* are processed.  
If step 2. *Point Cloud and Mesh* is processed, the densified point cloud is used for the eMotion DSM generation.  
It is possible to generate the DSM that will be sent to eMotion only if the output coordinate system is not set to arbitrary.  
The altitude of the DSM that is sent to eMotion refers to the ellipsoid. If the vertical coordinate system is set to a geoid model, a conversion will be applied.



When clicking Process > Send Elevation Data (DSM) to eMotion, a pop-up appears:



The resolution of the DSM that is sent to eMotion can be set. By default, the resolution of the DSM sent to eMotion is set to 100 cm.

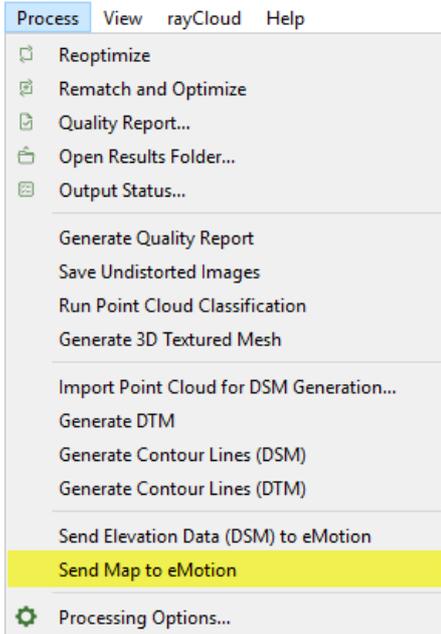
The action buttons:

OK: Generates the DSM that will be sent to eMotion.

Cancel: Cancels the generation of the DSM.

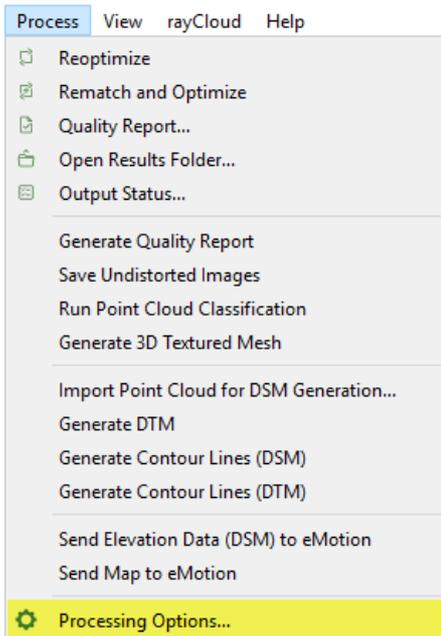
 Access: On the Menu bar, click Process > Send Map to eMotion. Only available when eMotion (by senseFly) is installed on the same device and step 3. *DSM, Orthomosaic and Index* is generated.

 Important: It is possible to generate the map that will be sent to eMotion only if the output coordinate system is not set to arbitrary.



When clicking Process > Send Map to eMotion, the Google Maps Tiles and KML are sent.

 Access: On the Menu bar, click Process > Processing Options..., the pop-up *Processing Options* appears.



This feature allows to:

View/edit the processing options:

Selecting which outputs are generated and in which format.

Assigning hardware resources to the processing.

Select a processing options template.

Create a new processing options template.

Manage the processing options template.

It contains three sections:

Processing steps and resources: Allows the user to select a step or the resources in order to visualize/edit options.

Tabs associated with the selected step or resources: Allows the user to visualize/edit the processing options, outputs and/or resources for the selected step/resource.

Processing options template: Allows the user to select a template, save a custom template and manage templates.

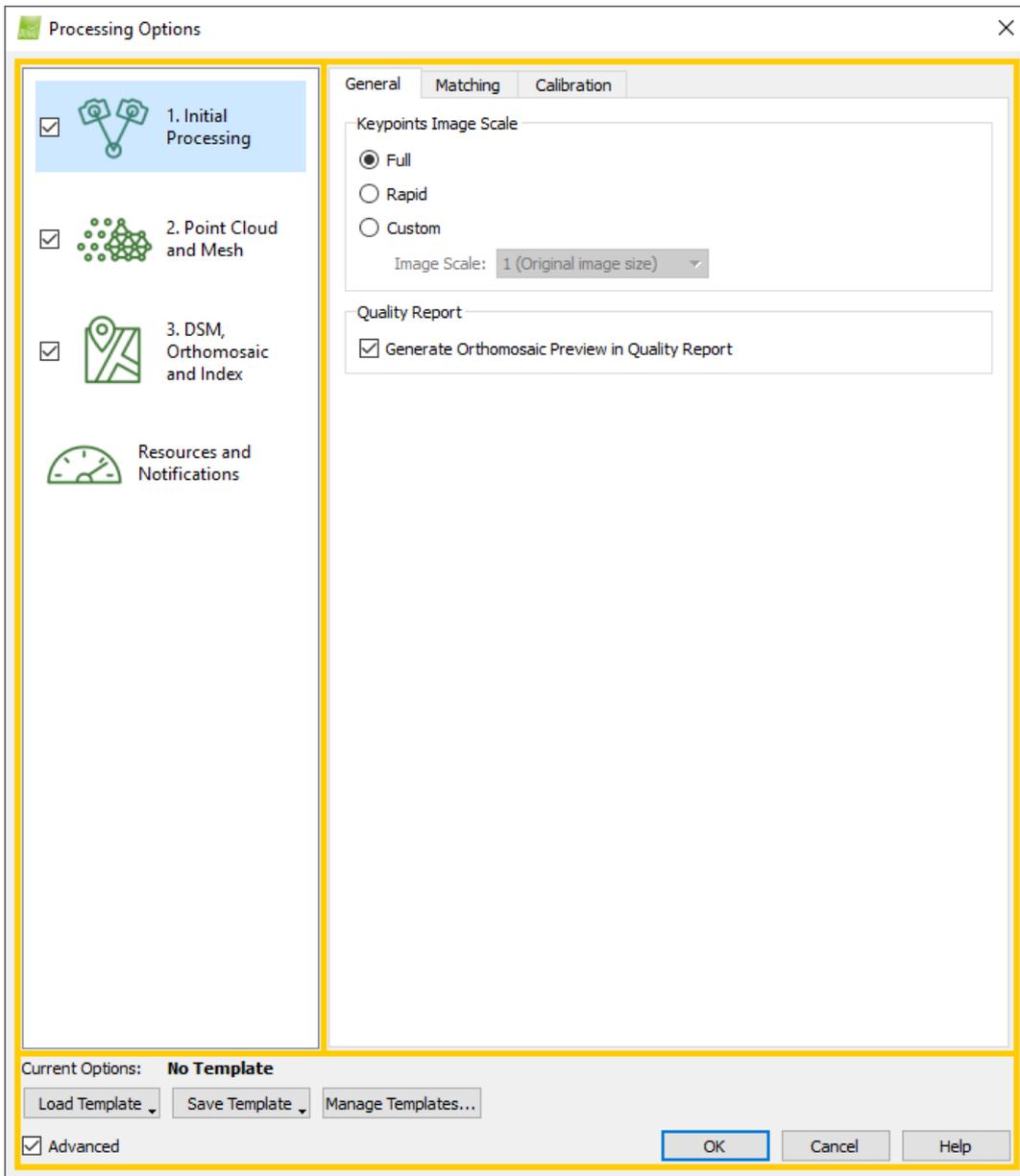
And four actions:

OK: Confirms the changes.

Cancel: Does not save the changes.

Help: Opens the Pix4Dmapper help.

Advanced options: Displays/hides the advanced options tabs, available for 1. *Initial Processing* and 2. *Point Cloud and Mesh*.



 Access: On the Menu bar, click Process > Processing Options..., the *Processing Options* pop-up appears. Click 1. Initial Processing. By default, only the *General* tab appears. On the bottom left, select the *Advanced* box to display all the tabs.

  
**1. Initial Processing**

  
2. Point Cloud and Mesh

  
3. DSM, Orthomosaic and Index

  
Resources and Notifications

**General**      **Matching**      **Calibration**

Allows the user to change the processing options and to select what the Quality Report will display. It contains 2 sections:

**Keypoints Image Scale:** Allows to define the image size used to extract the keypoints.

**Quality Report:** Allows to select what will be displayed in the Quality Report.

 Processing Options✕

-  1. Initial Processing
-  2. Point Cloud and Mesh
-  3. DSM, Orthomosaic and Index
-  Resources and Notifications

GeneralMatchingCalibration

**Keypoints Image Scale**

Full  
 Rapid  
 Custom

Image Scale: 1 (Original image size)

**Quality Report**

Generate Orthomosaic Preview in Quality Report

Current Options: **No Template**

Load Template Save Template Manage Templates...

Advanced

OK Cancel Help

## Keypoints Image Scale

Allows to define the image size at which the keypoints are extracted in comparison to the initial size of the images. It is possible to select:

Full: It sets full *Image Scale* for precise results.

Rapid: It sets a lower *Image Scale* for fast results.

Custom: Allows the user to select the *Image Scale*. There are the following options:

*Image Scale*:

1 (Original image size): This is the recommended *Image Scale*.

2 (Double image size): For small images (e.g. 640x320 pixels), a scale of 2 (double image size) should be used. More features will be extracted and this will have a positive impact on the accuracy of the results.

1/2 (Half image size): For large projects with high overlap, a scale of 1/2 (half image size) can be used to speed up processing. This will, usually, result in a slightly reduced accuracy as less features will be extracted. This scale is also recommended for blurry or low textured images, as it usually results in better outputs than the full scale for such images.

1/4 (Quarter image size): For very large projects with high overlap, a scale of 1/4 (quarter image size) can be used to speed up processing. This will, usually, result in a slightly reduced accuracy as less features will be extracted. This scale is also recommended for very blurry or very low textured images, as it usually results in better outputs than the full scale for such images.

1/8 (Eighth image size): For very large projects with high overlap, a scale of 1/8 (eighth image size) can be used to speed up processing. This will, usually, result in a slightly reduced accuracy as less features will be extracted.

## Quality Report

Allows the user to select what the Quality Report will display.

Generate Orthomosaic Preview in Quality Report: The Quality Report will display a low resolution DSM and Orthomosaic. To display these elements, the Quality Report generation takes longer. Disabling this option, the Quality Report generation is faster.

 Important: The low resolution DSM is generated using only the Automatic Tie Points. The low resolution Orthomosaic is generated based on this DSM. Both outputs are expected to be of low quality and should not be used for further analysis.

 Note: When processing images that belong to different groups, all images are processed together, generating only one DSM for the whole project, but generating one Orthomosaic per group using the images associated to that group. For more information about the image groups: [202557949](#).

 Access: On the Menu bar, click Process > Processing Options..., the *Processing Options* pop-up appears. Click 1. Initial Processing. By default, only the *General* tab appears. On the bottom left, select the *Advanced* box to display the *Matching* tab.



1. Initial Processing



2. Point Cloud and Mesh



3. DSM, Orthomosaic and Index



Resources and Notifications

General

Matching

Calibration

Allows the user to change the processing options related to the keypoints matching for step 1. *Initial Processing*. It contains 2 sections:

**Matching Image Pairs:** Allows to select which pairs of images are matched.

**Matching Strategy:** Allows to determine how the images are matched.

 Processing Options
✕

-  1. Initial Processing
-  2. Point Cloud and Mesh
-  3. DSM, Orthomosaic and Index
-  Resources and Notifications

General
Matching
Calibration

**Matching Image Pairs**

Aerial Grid or Corridor

Free Flight or Terrestrial

Custom

Use Capture Time  
Number of Neighboring Images:

Use Triangulation of Image Geolocation

Use Distance  
Relative Distance Between Consecutive Images:

Use Image Similarity  
Maximum Number of Pairs for Each Image Based on Similarity:

Use MTPs  
Maximum Number of Image Pairs per MTP:

Use Time for Multiple Cameras

**Matching Strategy**

Use Geometrically Verified Matching

Current Options: **No Template**

Advanced

Allows the user to select which pairs of images are matched:

Aerial Grid or Corridor: Optimizes the pair matching for Aerial Grid or Corridor flight paths.

Free flight or Terrestrial: Optimizes the pair matching for Free-flight paths or Terrestrial images (for example, taking images around a house or a statue).

Custom (for advanced users): Specific pair matching parameters useful in specific projects. Suggested if one of the above options does not provide the desired results. It contains the different pair matching parameters:

 Important: Higher number of matches will increase the processing time and the quality of the results and may generate results in case of low quality datasets that failed with the default matching options.

Use Capture Time: Matches images considering the time on which they were taken.

Number of Neighboring Images: It allows the user to set how many images (before and after in time) are used for the pair matching.

Use Triangulation of Image Geolocation: Only available if the images have geolocation. It is only useful for aerial flights. The position of the images is triangulated. Each image is matched with images with which it is connected by a triangle.

Use Distance: Only available if the images have geolocation. It is useful for oblique or terrestrial projects. Each image is matched with images within a relative distance.

Relative Distance Between Consecutive Images: It allows the user to set the relative distance.

 Example: For *Relative Distance Between Consecutive Images* = 5 and average distance between consecutive images = 2 m: Pix4Dmapper will multiply the average distance by 5 ( $2 \times 5 = 10$  m). It will create a sphere with center the image and radius 10 m and will match this image with all other images included in the sphere.

Use Image Similarity: Uses the image content for pairs matching. Matches the  $n$  images with most similar content.

Maximum Number of Pairs for Each Image Based on Similarity: Maximum number of image pairs with similar image content to be matched.

Use MTPs: Images connected via a shared Manual Tie Point will be matched.

Maximum Number of Image Pairs per MTP: Maximum number of image pairs connected by a given MTP.

Use Time for Multiple Cameras: When having multiple flights without geolocation using the same flight plan over the same area, and having different camera models for each flight, it matches the images from one flight with the ones from the other flight using the time information.

## Matching Strategy

Allows the user to determine how the images are matched:

Use Geometrically Verified Matching: Slower but more robust. If not selected, matches are established using only the image content. If selected, the relative camera positions are also taken into account to discard geometrically unrealistic matches. Useful when many similar features are present throughout the project: rows of plants in a farming field, window corners on a building's facade, etc.

 Access: On the Menu bar, click Process > Processing Options..., the *Processing Options* pop-up appears. Click 1. Initial Processing. By default, only the *General* tab appears. On the bottom left, select the *Advanced* box to display the *Calibration* tab.



1. Initial Processing



2. Point Cloud and Mesh



3. DSM, Orthomosaic and Index



Resources and Notifications

General

Matching

Calibration

Allows to change the processing options and desired outputs for step 1. *Initial Processing*. It contains 5 sections:

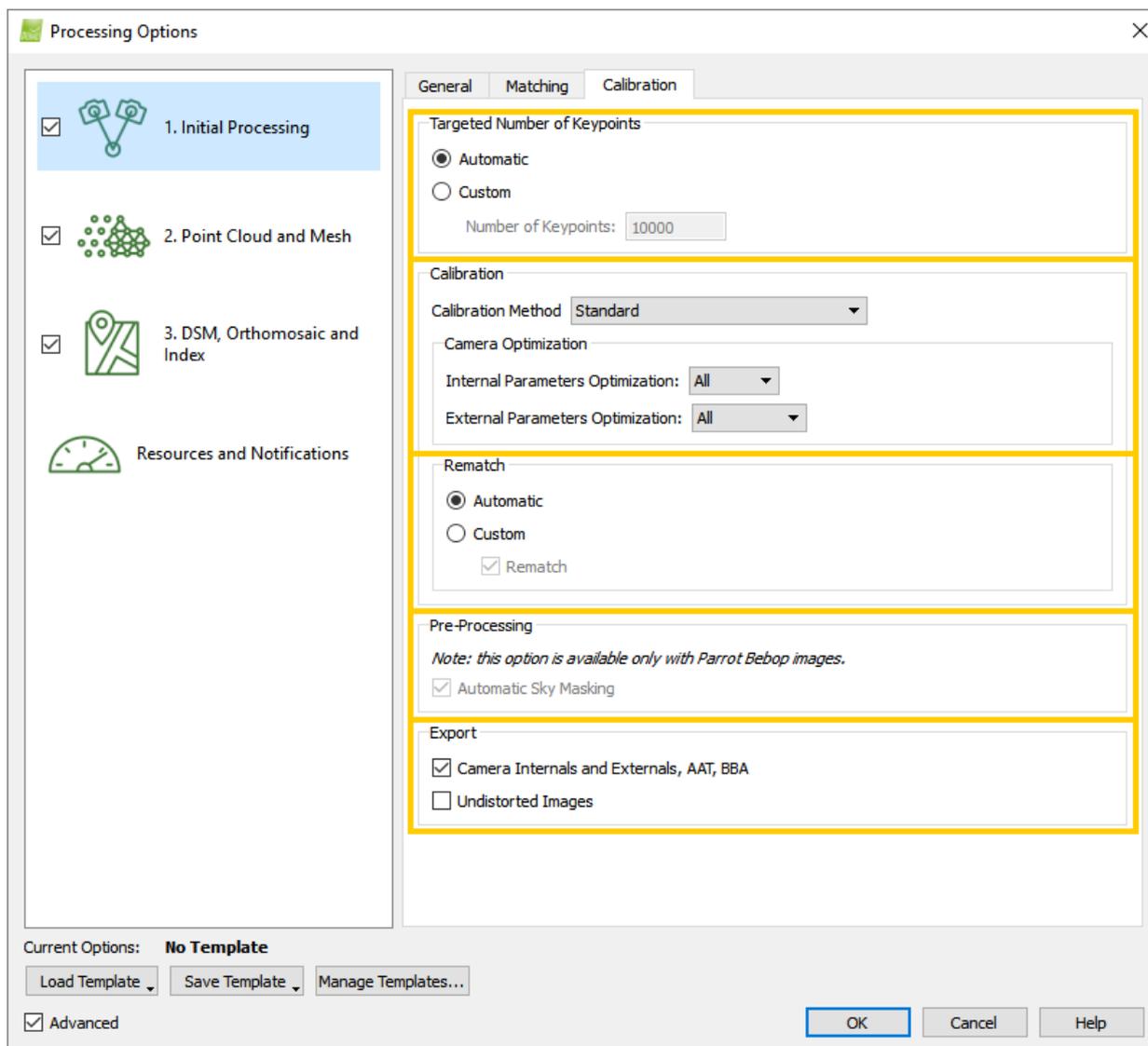
**Targeted Number of Keypoints:** Allows to set up the number of keypoints extracted.

**Calibration:** Allows to select how the camera internal and external parameters are optimized.

**Rematch:** Allows to add more matches after the first part of the initial processing.

**Pre-Processing:** Allows to select the pre-processing options.

**Export:** Allows to select the outputs of step 1.



**Processing Options**

1. Initial Processing

2. Point Cloud and Mesh

3. DSM, Orthomosaic and Index

Resources and Notifications

General Matching **Calibration**

Targeted Number of Keypoints

Automatic  
 Custom  
 Number of Keypoints: 10000

Calibration

Calibration Method: Standard

Camera Optimization

Internal Parameters Optimization: All  
 External Parameters Optimization: All

Rematch

Automatic  
 Custom  
 Rematch

Pre-Processing

*Note: this option is available only with Parrot Bebop images.*

Automatic Sky Masking

Export

Camera Internals and Externals, AAT, BBA  
 Undistorted Images

Current Options: **No Template**

Load Template Save Template Manage Templates...

Advanced

OK Cancel Help

Targeted Number of Keypoints

Allows to set up the number of keypoints to be extracted.

Automatic (Default): Automatic way to select which keypoints are extracted.

Custom: Allows to restrict the number of keypoints.

Number of Keypoints: Maximum number of keypoints to be extracted per image.

 Information: When extracting the keypoints per image, an internal scoring is assigned to them. Based on this scoring, the best keypoints are selected.

## Calibration

Allows to select how the camera internal and external parameters are optimized.

The optimization step consists of running the Automatic Aerial Triangulation (AAT), Bundle Block Adjustment (BBA), and camera self-calibration steps multiple times, till an optimal reconstruction is achieved:

### Calibration Method

Standard (default)

Alternative: Optimized for aerial nadir images with accurate geolocation, low texture content and relatively flat terrain, fields for example. The calibration will fail if the number of oblique images (>35 deg) in the dataset is higher than 5%. Furthermore, at least 75% of all images have to be geolocated.

Accurate Geolocation and Orientation: Optimized for project with very accurate image geolocation and orientation. This calibration method requires all images to be geolocated and oriented.

Camera Optimization: This option defines which camera parameters are optimized.

All (default): Optimizes all the internal camera parameters. Small cameras such as those used with UAVs, are much more sensitive to temperature or vibrations, which affect the camera calibration. Therefore, it is recommended to select this option when processing images taken with such cameras.

None: Does not optimize any of the internal camera parameters. It is recommended when using large cameras that are already calibrated and when these calibration parameters are used for processing.

Leading: Optimizes the most important internal camera parameters. This option is useful to process certain cameras such as cameras with a slow rolling shutter speed.

Perspective lens camera models: The focal length and the first two radial distortion parameters.

Fisheye lens camera models: The polynomial coefficients.

All Prior: Forces the optimal internal parameters to be close to the initial values.

All (default): Optimizes the rotation and position of the camera as well as the linear rolling shutter in case the camera model follows the linear rolling shutter model. In this case the camera model should be defined accordingly: [202558159](#).

None: Does not optimize any of the external camera parameters. Only enabled when *Accurate Geolocation and Orientation* has been selected as *Calibration Method*. Only recommended when the camera orientation and position are known and very accurate.

Orientation: Optimizes only the orientation of the cameras. Only enabled when *Accurate Geolocation and Orientation* has been selected as *Calibration Method*. Only recommended when the camera position is known and very accurate but the orientation is not as accurate as the camera position.

Internal Parameters Optimization: Defines which internal camera parameters of the camera model are optimized.

External Parameters Optimization: The position and orientation of the cameras. Defines how the external camera parameters are optimized.

 Note:

The *Camera Optimization* processing options define which camera parameter are optimized. There are 2 types of camera parameters:

Internal camera parameters: The parameters of the camera model.

External camera parameters: The position and orientation of the cameras.

The optimization procedure starts with some initial values in order to compute the optimized values. The following initial values are used:

Internal camera parameters: The initial values are extracted from the camera model that has been chosen.

External camera parameters: The initial values are extracted from the Automatic Aerial Triangulation (AAT) during Step 1. *Initial Processing* or using the geolocation and IMU when *Accurate Geolocation and Orientation* has been selected as *Calibration Method*.

After step 1. *Initial Processing* has been completed, the optimized values for the internal and external camera parameters are saved in output files. For more information about the files generated during step 1. *Initial Processing*: [202558159](#).

The initial and optimized values for the internal camera parameters are also displayed in the *Quality Report*.

## Rematch

Allows to add more matches after the first part of the initial processing, which usually improves the quality of the reconstruction:

Automatic (Default): Enables rematching only for projects with less than 500 images.

Custom: Allows to select if rematch is done or not for the project.

Rematch: Enables the rematch option.

## Pre-Processing

Allows to select the pre-processing options:

Automatic Sky Masking: Selected by default and only available for projects consisting of Parrot Bebop images. The Automatic Sky Masking is masking the pixels that are covered by sky on the images to avoid noise in the point cloud.

## Export

Allows to select outputs:

Camera Internals and Externals, AAT, BBA: When this option is selected, the results of the AAT, BBA, and optimized internal and external camera parameters are exported.

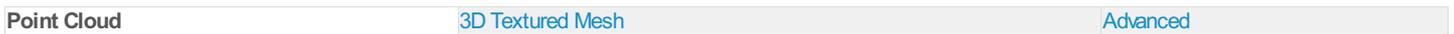
Undistorted Images: When this option is selected, an undistorted copy of each original image is generated using the optimized distortion parameters of the selected camera model.

 Important: This feature is only available when processing images using a perspective lens camera model.

If step 1. *Initial Processing* has already been done, it is possible to generate undistorted images without running step 1 again. For more information: [202557929](#).

 Information: For more information about the camera distortions: [202559069](#).

 Access: On the Menu bar, click Process > Processing Options..., the *Processing Options* pop-up appears. Click 2. Point Cloud and Mesh. By default, only the *Point Cloud* and the *3D Textured Mesh* tabs appear. On the bottom left, select the *Advanced* box to display other tabs.

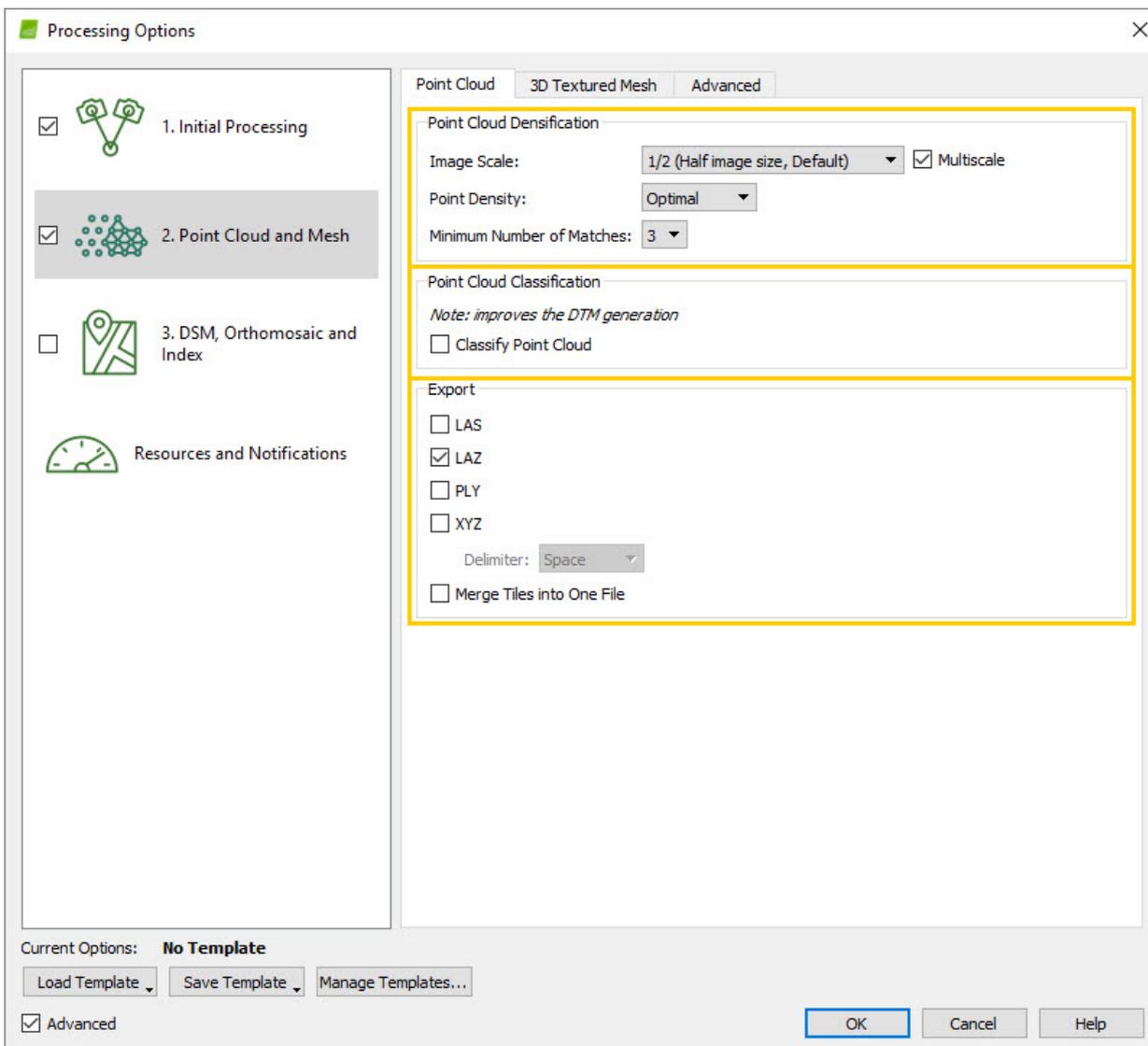


Allows to change the processing options and desired outputs for the Point Cloud that is generated during step 2. *Point Cloud and Mesh*. This step increases the density of 3D points of the 3D model computed in step 1. *Initial Processing*, which leads to higher accuracy both for the DSM and the Orthomosaic. This tab contains 2 sections:

**Point Cloud Densification:** Allows the user to define parameters for the point cloud densification.

**Point Cloud Classification:** Allows the user to classify the point cloud.

**Export:** Allows the user to select the desired output formats for the densified point cloud.



### Point Cloud Densification

Allows the user to set parameters for the point cloud densification. It contains the following options:

**Image Scale:** The *image scale* defines the scale of the images at which additional 3D points are computed. From the drop-down list, it is possible to select:

- 1/2 (Half image size, Default):** Half size images are used to compute additional 3D points. It is the recommended image scale.
- 1 (Original image size, Slow):** The original image size is used to compute additional 3D points. More points are computed than with half image scale, especially in areas where features can be easily matched (e.g. cities, rocks, etc.). This option may require four times more RAM and processing time than when choosing the default value *1/2 (half image size)*, and usually it does not significantly improve the results.
- 1/4 (Quarter image size, Fast):** Quarter size images are used to compute additional 3D points. Less points are computed than with the half image scale. However, more points are computed in areas with features that cannot easily be matched such as vegetation areas. This scale is recommended for projects with vegetation.
- 1/8 (Eighth image size, Tolerant):** Eighth size images are used to compute additional 3D points. Less points are computed than with the half or quarter image scale. However, more points are computed in areas with features that cannot easily be matched such as vegetation areas. This scale is recommended for projects with vegetation.

**Multiscale (default):** When this option is activated, additional 3D points are computed on multiple image scales, starting with the chosen scale from the *Image scale* drop down list and going to the *1/8 scale (eighth image size, tolerant)*. For example, if *1/2 (half image size, default)* is selected, the additional 3D points are computed on images with half, quarter, and eighth image size. This is useful for computing additional 3D points in vegetation areas as well as keeping details in areas without vegetation.

 Note: The Image Scale has an impact on the number of 3D points generated. For more information: [203269885](#).

**Point Density:** This parameter defines the density of the densified point cloud. The point density can be chosen from the following options:

- Optimal (Default):** A 3D point is computed for every  $(4/ \text{Image Scale})$  pixel. For example, if the *Image Scale* is set to *1/2 (half image size)*, one 3D point is computed every  $4/(0.5) = 8$  pixels of the original image. This is the recommended point cloud density.
- High (Slow):** A 3D point is computed for every *Image Scale* pixel. The result will be an oversampled Point cloud that requires up to 4 times more processing time and RAM than optimal density. Usually, this point cloud option does not significantly improve the results.
- Low (Fast):** A 3D point is computed for every  $(16/\text{Image Scale})$  pixel. For example, if the *Image Scale* is set to *1/2 (half image size)*, one 3D point is computed every  $16/(0.5) = 32$  pixels of the original image. The final point cloud is computed up to 4 times faster and uses up to 4 times less RAM than optimal density.

 Note: The Point Density has an impact on the number of 3D points generated. For more information: [203269885](#).

**Minimum Number of Matches:** The minimum number of matches per 3D point represents the minimum number of valid re-projections of this 3D point to the images. The minimum number of matches per 3D point can be:

- 3 (default):** Each 3D point has to be correctly re-projected in at least 3 images.
- 2:** Each 3D point has to be correctly re-projected in at least 2 images. This option is recommended for projects with small overlap, but it produces a point cloud with more noise and artifacts.
- 4:** Each 3D point has to be correctly re-projected in at least 4 images. This option reduces the noise and improves the quality of the point cloud, but it might compute less 3D points in the final point cloud.
- 5:** Each 3D point has to be correctly re-projected in at least 5 images. This option reduces the noise and improves the quality of the point cloud, but it might compute less 3D points in the final point cloud. It is recommended for oblique imagery projects that have high overlap.
- 6:** Each 3D point has to be correctly re-projected in at least 6 images. This option reduces the noise and improves the quality of the point cloud, but it might compute less 3D points in the final point cloud. It is recommended for oblique imagery projects that have very high overlap.

#### Point Cloud Classification

**Classify Point Cloud:** Enables the generation of the point cloud classification. For more information: [115004864586](#)

 Note: When the point cloud classification is used for the DTM generation, it significantly improves the DTM.

#### Export

Allows the user to select the desired output formats for the Point Cloud.

The following formats can be chosen:

 Note: It is possible to select more than one format in order to save the Point Cloud in multiple formats. When no output is selected, only a .p4b file is generated. This is always generated, but it can only be opened in the rayCloud of the Pix4Dmapper.

**LAS (default):** LiDAR LAS file with X,Y,Z position and color information for each point of the Point Cloud.

**LAZ:** Compressed LiDAR LAS file with X,Y,Z position and color information for each point of the Point Cloud.

**PLY:** PLY file with X,Y,Z position and color information for each point of the Point Cloud.

**XYZ:** ASCII text file with the X,Y,Z and color information for each point of the Point Cloud.

**Delimiter:** Defines the delimiter character of the file, used to separate the values. The drop down list has the following options:

Space

Tab

Comma

Semicolon

**Merge Tiles:** If the point cloud consists of many points, several tiles are generated. This option produces a single file with all the points.

For more information about the file formats and the software with which these files can be opened: [202558499](#).



 Access: On the Menu bar, click Process > Processing Options..., the *Processing Options* pop-up appears. Click 2. Point Cloud and Mesh. By default, only the *Point Cloud* and the *3D Textured Mesh* tabs appear. On the bottom left, select the Advanced box to display other tabs.



**Point Cloud**      **3D Textured Mesh**      **Advanced**

Allows the user to change the processing options and desired outputs for the 3D Textured Mesh of step 2. *Point Cloud and Mesh*. This tab contains 3 sections:

- Generation:** Allows the user to select the generation of the 3D Textured Mesh.
- Settings:** Allows the user to select parameters concerning the generation of the 3D Textured Mesh.
- Export:** Allows the user to select the desired output formats for the 3D Textured Mesh.

 Processing Options
✕

 1. Initial Processing

 2. Point Cloud and Mesh

 3. DSM, Orthomosaic and Index

 Resources and Notifications

Point Cloud
3D Textured Mesh
Advanced

**Generation**

Generate 3D Textured Mesh

**Settings**

High Resolution  
 Medium Resolution (default)  
 Low Resolution  
 Custom

Maximum Octree Depth:

Texture Size [pixels]:

Decimation Criteria:  Quantitative  
Maximum Number of Triangles:

Qualitative  
Strategy:

Use Color Balancing for Texture

**Export**

PLY

FBX

DXF

OBJ

Tiled Texture

Zipped OBJ

3D PDF Logo:

Current Options: **No Template**

Advanced

Generate 3D Textured Mesh: Allows the user to select whether the 3D Textured Mesh should be generated.

## Settings

Allows the user to select the resolution for the 3D Textured Mesh generation.

 **Important:**  
The Point Cloud is used to generate a surface composed of triangles. The distance between the mesh and the points of the Point Cloud is optimized to be minimal, but this means that points of the mesh do not necessarily correspond to points of the point cloud.  
Since the mesh is 3D, it is unfolded onto a 2D plane in order to define the resolution (pixel size). Then the 3D position of the pixel is reprojected into the original images to obtain the color. Blending is used instead of stitching to generate the texture of the 3D Textured Mesh.  
The 3D Textured Mesh will be generated using the Point Cloud. If a Processing Area and/or Image Annotations are defined, and if the corresponding options are selected in the *Point Cloud Filters* options, they will also be used for the generation of the 3D Textured Mesh.

The available parameters are:

**High Resolution:** High level of detail. Recommended to maximize the visual aspect of the 3D Textured Mesh. Computing time and size will increase significantly.  
**Medium Resolution (default):** Default option. Recommended setting for most project. Strikes a good balance between size, computing time and level of detail for the 3D Textured Mesh.

**Low Resolution:** Lower level of detail leading to faster computing time and lower size. Good compromise for sharing the 3D Textured Mesh.

**Custom:** Allows the user to select the options for the 3D Textured Mesh generation:

**Maximum Octree Depth:** To create the 3D Textured Mesh, the project is iteratively subdivided into 8 subregions. These are organized in a tree structure, and this parameter indicates how many subdivisions should be created. Higher values mean that more regions will be created, hence each region will be small, leading to higher resolution and higher computing times.

**Texture Size [pixels]:** Parameter used to define the resolution of the texture of the 3D Textured Mesh, affecting the pixel size.

**Decimation Criteria:** After the first step in the mesh creation, too many triangles are created and this parameter indicates how the spurious triangles should be discarded.

**Quantitative:** Some triangles will be discarded till they reach the desired number:

**Maximum Number of Triangles:** Maximum number of triangles in the final 3D Textured Mesh. The number will depend on the geometry and the size of the project.

**Qualitative:** Some triangles will be discarded trying to maintain the original geometry.

**Strategy:** Indicates the strategy employed to discard the triangles:

**Sensitive:** The triangles selected have as priority to maintain the original geometry of the 3D Textured Mesh.

**Aggressive:** The triangles selected have as priority to maintain a lower number of triangles.

**Use Color Balancing for Texture:** The Color Balancing algorithm will be used for the generation of the texture of the 3D Textured Mesh. The Color Balancing algorithm ensures that the texture will be homogeneous.

 **Note:** For projects that are not very large, it may be that the resulting number of triangles is lower than the maximum set up in the options. The maximum will only be reached if the project is large and could create a model with more triangles.

 **Important:** The higher the parameters selected the longer the processing time. Using high definition parameters have more visual impact when zooming in and visualizing the model from close. This allows to better identify details in the model.

For step by step instructions about how to generate the 3D Textured Mesh: [202560669](https://202560669).

## Export

Allows the user to select the desired output formats for the 3D Textured Mesh.

The following formats can be chosen:

 **Note:** It is possible to select more than one format in order to save the 3D Textured Mesh in multiple formats. When no output is selected, only a .p4b file is generated. It is always generated but can only be opened in the rayCloud of Pix4Dmapper.

**PLY:** PLY file with:

X,Y,Z position for each vertex of the 3D Textured Mesh

Texture information (using a .jpg texture file).

**FBX:** FBX file with:

X,Y,Z position for each vertex of the 3D Textured Mesh.

Texture information embedded.

**DXF:** DXF file with:

X,Y,Z position for each vertex of the 3D Textured Mesh.

**OBJ (default):** OBJ file with:

X,Y,Z position for each vertex of the 3D Textured Mesh.

Texture information (using a .jpg and .mtl texture files).

**Tiled Texture:** Allows the user to tile the texture file to reduce the size of each individual file.

**3D PDF:** PDF file containing a 3D model of the 3D Textured Mesh. The texture size of the 3D Textured Mesh that is displayed in the 3D PDF is 2000\*2000 pixels.

**Logo:** Selects a logo (.jpg or .tif) that will be displayed on the 3D pdf.

 Important: The *3D Textured Mesh* file is not georeferenced. It has coordinates on a local coordinate system centered around the project. To visualize the *3D Textured Mesh* with georeference: [204606535](#).

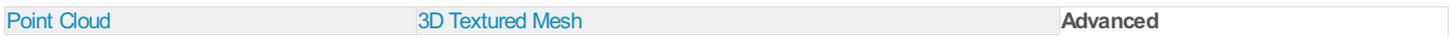
 Warning:  
For .ply and .obj format, the texture is generated in a .jpg file, which contains a 2D planar RGB image of the values for each pixel of the triangles that forms the 3D Textured Mesh.  
In order to use the 3D Textured Mesh in other software, use both files, having them in the same folder and without renaming the texture .jpg file. The .jpg texture file is associated to the .ply / .obj / .p4b generated while generating the attached .jpg file.  
If new .ply / .obj / .p4b files are generated, they cannot use a .jpg file generated previously even if it is for the same project and same parameter values. If having problems visualizing the 3D textured Mesh in the rayCloud or external software due to lack of hardware resources, it is possible to resize the .jpg file (reducing the same percentage for the width and height) using any image editor. This requires less memory.  
Texture of sizes 65536x65536 and 131072x131072 are only supported for the .obj format and should be generated with the Tiled Texture option. Several texture files will be generated. Not all external software can read tiled texture files.

 Important: The 3D Textured Mesh can be exported in multi-LOD format in order to be visualized on a web interface. To generate and export the LOD Mesh: [202558079](#).

For step by step instructions about how to generate the 3D Textured Mesh: [202560669](#).

For more information about the file formats and the software with which these files can be opened: [202558499](#).

 Access: On the Menu bar, click Process > Processing Options..., the *Processing Options* pop-up appears. Click 2. Point Cloud and Mesh. By default, only the *Point Cloud* and the *3D Textured Mesh* tabs appear. On the bottom left, select the *Advanced* box to display the *Advanced* tab.



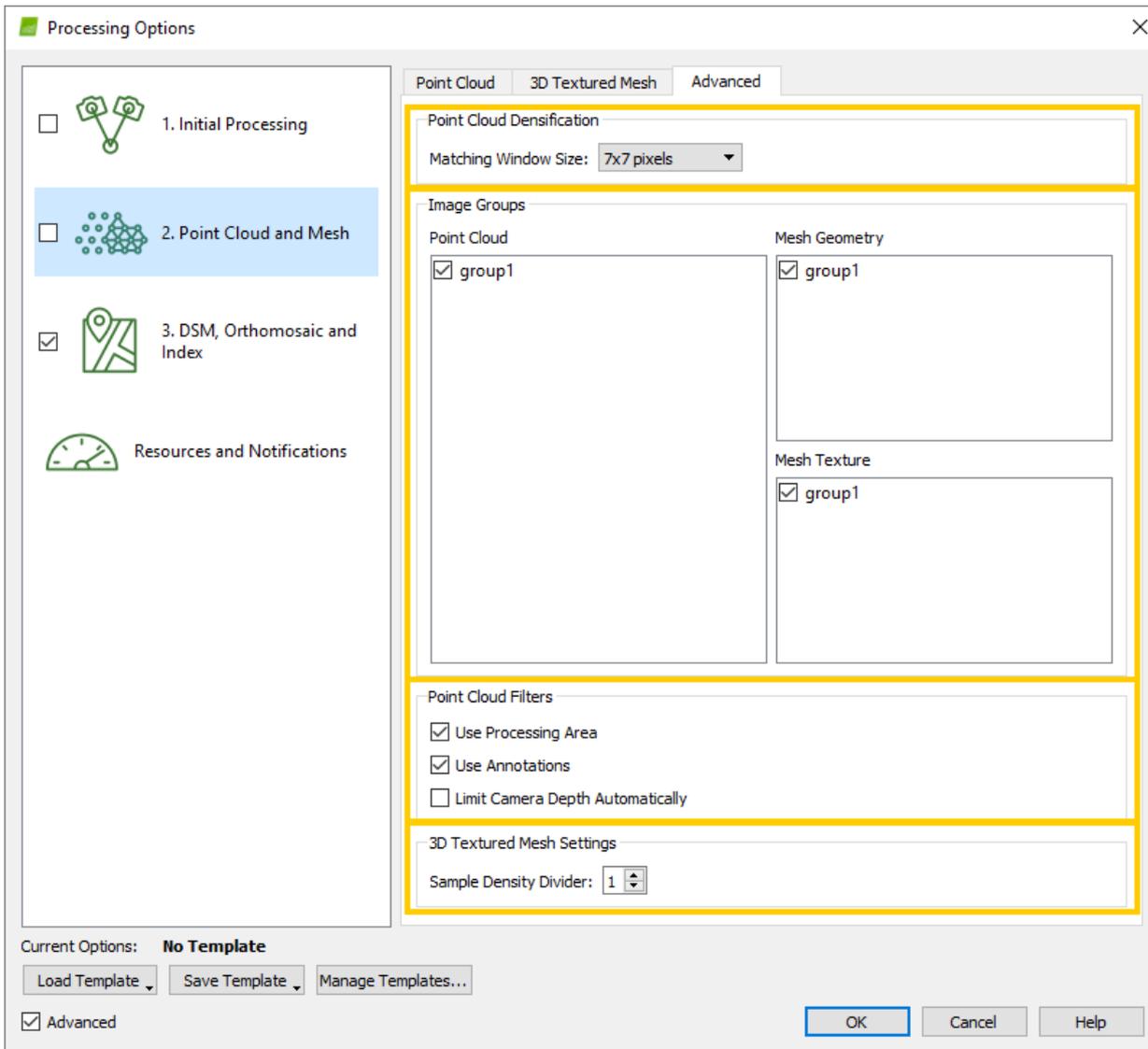
Allows to change the advanced processing options for the Point Cloud and the 3D Textured Mesh of step 2. *Point Cloud and Mesh*. This tab contains 4 sections:

**Point Cloud Densification:** Allows to define parameters for the point cloud densification.

**Image Groups:** Allows to select which image groups are used for different outputs.

**Point Cloud Filters:** Allows to change options concerning the filtering of the point cloud.

**3D Textured Mesh Settings:** Allows to change options concerning the mesh generation.



Point Cloud Densification

Allows to set parameters for the point cloud densification. It contains the following option:

Matching Windows Size: Size of the grid used to match the densified points in the original images.

7x7 pixels: Faster processing. Suggested when using aerial nadir images.

9x9 pixels: Finds a more accurate position for the densified points in the original images. Suggested when using oblique and / or terrestrial images.

## Image Groups

Allows to define which image groups are used to generate each of three different outputs: the Point Cloud, the Mesh Geometry and the Mesh Texture. Useful for projects that consist of images of different band configuration.



Example: For a project that consists of both RGB and NIR images, the point cloud can be generated based on both the RGB and the NIR images, the geometry of the Mesh can be computed using only the RGB images and the texture of the Mesh using only the NIR images.

This section consists of 3 fields:

Point Cloud: Image groups used for the Point Cloud generation.

Mesh Geometry: Image groups used for the computation of the geometry of the Mesh.

Mesh Texture: Image groups used for the texture of the Mesh.

## Point Cloud Filters

Allows to select filters that are taken into account for the Point Cloud and the 3D Textured Mesh generation. The following options are available:

Use Processing Area: If a Processing Area has been drawn, it is used to filter the Point Cloud and the 3D Textured Mesh. For more information: [202558439](#).

Use Annotations: If Image Annotations have been created, they are used to filter the Point Cloud and the 3D Textured Mesh. For more information: [202558199](#).

Limit Camera Depth Automatically: Prevents the reconstruction of background objects. Useful for oblique/terrestrial projects around objects.

## 3D Textured Mesh Settings

Advanced option influencing the generation of the 3D Textured Mesh:

Sample Density Divider: The value goes from 1 (default) to 5. Increasing this value creates more triangles in regions with a lower density of points. However, this might also create more unwanted triangles in noisy regions. To be used when there are holes in the mesh and the model is not too noisy.

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 Access: On the Menu bar, click Process > Processing Options..., the *Processing Options* pop-up appears. Click 3. DSM, Orthomosaic and Index.



**DSM and Orthomosaic**      **Additional Outputs**      **Index Calculator**

Allows the user to change the processing options and desired outputs for DSM and Orthomosaic generation of step 3. *DSM, Orthomosaic and Index*. It contains 4 sections:

**Resolution:** Allows the user to define the spatial resolution used to generate the DSM and Orthomosaic.

**DSM Filters:** Allows the user to define parameters to filter and smooth the points of the Point Cloud used to obtain the DSM.

**Raster DSM:** Allows the user to select the output file format and options for the raster DSM.

**Orthomosaic:** Allows the user to select the output file format for the Orthomosaic as well as different options related to the Orthomosaic generation.

 Processing Options
✕

 1. Initial Processing

 2. Point Cloud and Mesh

 3. DSM, Orthomosaic and Index

 Resources and Notifications

DSM and Orthomosaic
Additional Outputs
Index Calculator

**Resolution**  
 Automatic  
1 x GSD (8.77549 cm/pixel)  
 Custom  
8.78 cm/pixel

**DSM Filters**  
 Use Noise Filtering  
 Use Surface Smoothing  
 Type: Sharp

**Raster DSM**  
 GeoTIFF  
 Method: Inverse Distance Weighting  
 Merge Tiles

**Orthomosaic**  
 GeoTIFF  
 Merge Tiles  
 GeoTIFF Without Transparency  
 Google Maps Tiles and KML

Current Options: **No Template**

Load Template ▾
Save Template ▾
Manage Templates...

Advanced
 

OK
Cancel
Help

Resolution

Allows the user to define the spatial resolution used to generate the DSM and Orthomosaic.

Automatic (default): By default one GSD is selected. One can also easily change the resolution to multiples of the GSD.  
Custom: Allows to select any value for the resolution of the Raster DSM and the Orthomosaic generation.

## DSM Filters

Allows the user to define parameters to filter and smooth the points of the Point Cloud used to obtain the DSM.

 Important: The filtering and smoothing will not have any impact in the Point Cloud.

The following options are available:

Use Noise Filtering: The generation of the Point Cloud can lead to noisy and erroneous points. The noise filtering corrects the altitude of these points with the median altitude of the neighboring points.

Use Surface Smoothing: Once the noise filter has been applied, a surface is generated using the points. This surface can contain areas with erroneous small bumps. The surface smoothing corrects these areas by flattening them. This section allows the user to set the following parameter:

Type: Three smoothing types can be selected:

Sharp (default): Tries to preserve the orientation of the surface and to keep sharp features such as corners and edges of buildings. Only quasi-planar areas are flattened.

Smooth: Tries to smooth areas, assuming that sharp features exist because of noise and that they should be removed. Areas that are not very planar are smoothed and become planar.

Medium: This is a compromise between the two other options. It tries to preserve sharp features while flattening roughly planar areas.

## Raster DSM

Allows the user to select whether the raster DSM is generated and to select the method with which the DSM will be generated:

GeoTIFF (activated by default): Saves the DSM as a GeoTIFF file. For most projects the DSM is split into several tiles and one GeoTIFF file is generated per tile.

Method: The method that is used for the Raster DSM generation. The method will affect the processing time and the quality of the results.

Inverse Distance Weighting: The inverse distance weighting algorithm is used to interpolate between points. This method is recommended for buildings.

Triangulation: The triangulation algorithm based on Delauney triangulation is used. This method is recommended for flat areas (agriculture fields) and stockpiles.

 Important: The triangulation method can be up to 10 times faster than the Inverse Distance Weight Method, but the results may be worse especially for buildings.

Merge Tiles (activated by default): Generates a single DSM GeoTIFF file by merging the individual tiles. When this option is not selected, the merged DSM file is not generated.

## Orthomosaic

Allows the user to select the output file format for the Orthomosaic as well as different parameters related to the Orthomosaic generation:

GeoTIFF (activated by default): Saves the Orthomosaic into a GeoTIFF file. For most projects, the Orthomosaic is split into several tiles and one GeoTIFF file is generated per tile.

Merge Tiles (activated by default): Generates a single Orthomosaic GeoTIFF file by merging the individual tiles. When this option is deactivated, the merged Orthomosaic file is not generated.

GeoTIFF Without Transparency: Generates a GeoTIFF file without transparency. For more information: [202558809](#).

Google Maps Tiles and KML: This option allows the user to generate the Google Maps and Google Earth files for the Orthomosaic.

 Important:  
When having images grouped in more than one group, the *Google Maps Tiles* and *KML* will only be generated if one of the groups is named *RGB* (capital letters). For more information about the image groups: [202557949](#).  
The *Google Maps Tiles* and *KML* are only generated for 3 band images with 8 bit per band.

 Important: When having images grouped in more than one group, one Orthomosaic per group is generated. For more information about image groups: [202557949](#).

 Access: On the Menu bar, click Process > Processing Options..., in the *Processing Options* pop-up click 3. DSM, Orthomosaic and Index.



1. Initial Processing



2. Point Cloud and Mesh



3. DSM, Orthomosaic and Index



Resources and Notifications

DSM and Orthomosaic

Additional Outputs

Index Calculator

Allows the user to change the selected processing options and output files for the additional outputs to be generated during step 3. *DSM, Orthomosaic and Index*. It contains 2 sections:

**Grid DSM:** Allows the user to select the output file format for the Grid DSM.

**Raster DTM:** Allows the user to select the output file format and options for the raster DTM.

**Raster DTM Resolution:** Allows the user to define the spatial resolution used to generate the DTM.

**Contour Lines:** Allows the user to generate the contour lines using the Raster DSM or the Raster DTM and to select the processing options for the contour lines.

 Processing Options
✕

 1. Initial Processing

 2. Point Cloud and Mesh

 3. DSM, Orthomosaic and Index

 Resources and Notifications

DSM and Orthomosaic
Additional Outputs
Index Calculator

**Grid DSM**

 XYZ Delimiter: Space

LAS

LAZ

Grid Spacing [cm]:

**Raster DTM**

 GeoTIFF

Merge Tiles

**Raster DTM Resolution**

Automatic

5 x GSD (4.7909 cm/pixel)

Custom

cm/pixel

**Contour Lines**

*Note: Contour lines generated from DTM*

 SHP

PDF

DXF

Contour Base [m]:

Elevation Interval [m]:

Resolution [cm]:

Minimum Line Size [vertices]:

Current Options: **No Template**

Load Template
Save Template
Manage Templates...

Advanced

OK
Cancel
Help

Grid DSM

Allows the user to select the desired file format for the DSM:

XYZ: ASCII text file with the X,Y,Z position and color information for each point of the Grid DSM.

Delimiter: It defines the delimiter character of the file, used to separate the values. The drop down list has the following options:

Space

Tab

Comma

Semicolon

LAS: LiDAR LAS file with X,Y,Z position and color information for each point of the Grid DSM.

LAZ: Compressed LiDAR LAS file with X,Y,Z position and color information for each point of the Grid DSM.

Grid Spacing [cm]: The spacing defines the distance between two 3D points in the Grid DSM and is given in centimeters. For example: a grid spacing of 100 centimeters will generate one 3D point every 100 centimeters. The default value is 100 centimeters. One DSM with the selected spacing is generated in addition to a DSM generated using the resolution selected in the *DSM and Orthomosaic* tab.

For more information about the file formats and the software with which these files can be opened: [202558499](https://www.terraconnect.com/202558499).

 Note: It is possible to select more than one format to save the Grid DSM in more than one formats.

 Note: The Grid DSM is restricted to 256 million points. If the chosen grid spacing or resolution generates more than 256 million points, then the grid sampling or resolution distance is doubled until the number of generated points does not exceed 256 million.

## Raster DTM

Allows to generate the raster DTM. For more information about the concept of DTM: [217263226](https://www.terraconnect.com/217263226).

 Important: The option to generate the raster DTM is only available when the options *Raster DSM* and *Merge Tiles* for raster DSM are selected. For more information about the options of the raster DSM: [202557769](https://www.terraconnect.com/202557769).

Merge Tiles (activated by default): Generates a single DTM GeoTIFF file by merging the individual tiles. When this option is not selected, the merged DTM file is not generated and the contour lines are not using the DTM.

## Raster DTM Resolution

Allows to define the spatial resolution used to generate the DTM.

Automatic (default): By default, the resolution is set to 5 X GSD. One can also easily change the resolution to multiples of the GSD.

Custom: Allows to select any value higher than 5 X GSD, for the resolution of the Raster DTM.

## Contour Lines

Allows to generate contour lines using the Raster DSM or the Raster DTM. For more information about the concept of contour lines using the Raster DSM: [202559879](https://www.terraconnect.com/202559879) and the raster DTM: [217262006](https://www.terraconnect.com/217262006).

 Important: The contour lines are computed using the:  
the Raster DTM, if it is already generated. For more information about contour lines, using the DTM: [217262006](https://www.terraconnect.com/217262006).  
the Raster DSM, if the raster DTM is not generated or if the DTM tiles are not merged. For more information about contour lines, using the DSM: [202559879](https://www.terraconnect.com/202559879).

 Important: The option to generate the contour lines is grayed out if the option to merge the tiles of Raster DSM is disabled. For more information about the options of the Raster DSM: [202557769](https://www.terraconnect.com/202557769).

SHP: When this option is selected, the contour lines file is generated in .shp format.

PDF: When this option is selected, the contour lines are saved in .pdf format.

DXF: When this option is selected, the contour lines file is generated in .dxf format.

Contour Base [units]: It defines the relative altitude which is used as a contour line base. It can be in meters or in feet according to the coordinate system used.

Elevation Interval [units]: It defines the contour line elevation interval. It can be in meters or in feet according to the coordinate system used. It can be any positive value.

 Warning: The *Elevation Interval* must be smaller than (Maximum - Minimum) altitude of the DSM/DTM.

 Note: The smaller the *Interval* value, the larger the size of the contour lines file and the more processing time will be needed for its generation.

 Note: The minimum altitude of the model, the *Contour Base* and the *Elevation Interval* define the elevation of the contour lines: The *Contour Base* expected to be the altitude of the first contour line. If it is lower than the minimum altitude, then the elevation of the first contour line is expected to be *Contour Base*+*Elevation Interval*. If this is still lower than the minimum altitude, then this check continues till the *Contour Base*+ $n$ \* *Elevation Interval* is equal or bigger than the minimum altitude of the model.



**Example:**

For a project with minimum altitude 315 meters, Contour Base = 30 meters and *Elevation Interval*=1 means that the first contour line (the base) will be at 315 meters ( $30+1*285$ ).

For a project with minimum altitude 15 meters, Contour Base = 30 meters and *Elevation Interval*=1 means that the first contour line (the base) will be at 30 meters ( $30+1*0$ ).

For a project with minimum altitude 315 meters, Contour Base = 0 meters and *Elevation Interval*=10 means that the first contour line (the base) will be at 320 meters ( $0+32*10$ ).



Example: For a project with Minimum altitude 400 meters and Maximum altitude 650 meters and *Contour Base* = 0 meters, *Elevation Interval* = 50 meters means that that contour lines will be generated at 400, 450, 500, 550, 600, and 650 meters.

**Resolution [units]:** It defines the horizontal distance for which an altitude value is registered. The higher the *Resolution* value, the smoother the contour lines.



Example: If the *Resolution* is set to 100 cm, an altitude value will be registered every 100 cm horizontally.

**Minimum Line Size [points]:** It defines the minimum number of vertices that a contour line can have. Lines with less vertices will be deleted and less noise will be produced.



Example: If the *Minimum Line Size* [points] is set to 20, all contour lines that have less than 20 vertices will be deleted.



**Note:**

It is possible to select more than one format in order to save the contour lines in multiple formats.

If step 3. *DSM, Orthomosaic and Index* has already been processed and the DSM or DTM are generated, it is possible to generate the *Contour Lines* without running step 3 again. For more information: [202558469](#).

For step by step instructions about how to generate contour lines: [202560639](#).

 Access: On the Menu bar, click Process > Processing Options..., the *Processing Options* pop-up appears. Click 3. DSM, Orthomosaic and Index.



1. Initial Processing



2. Point Cloud and Mesh



3. DSM, Orthomosaic and Index



Resources and Notifications

#### DSM and Orthomosaic

#### Additional Outputs

#### Index Calculator

Allows the user to change the processing options and outputs related to the Index Calculator. These are processed during step 3. *DSM, Orthomosaic and Index*.

These settings come in 4 sections:

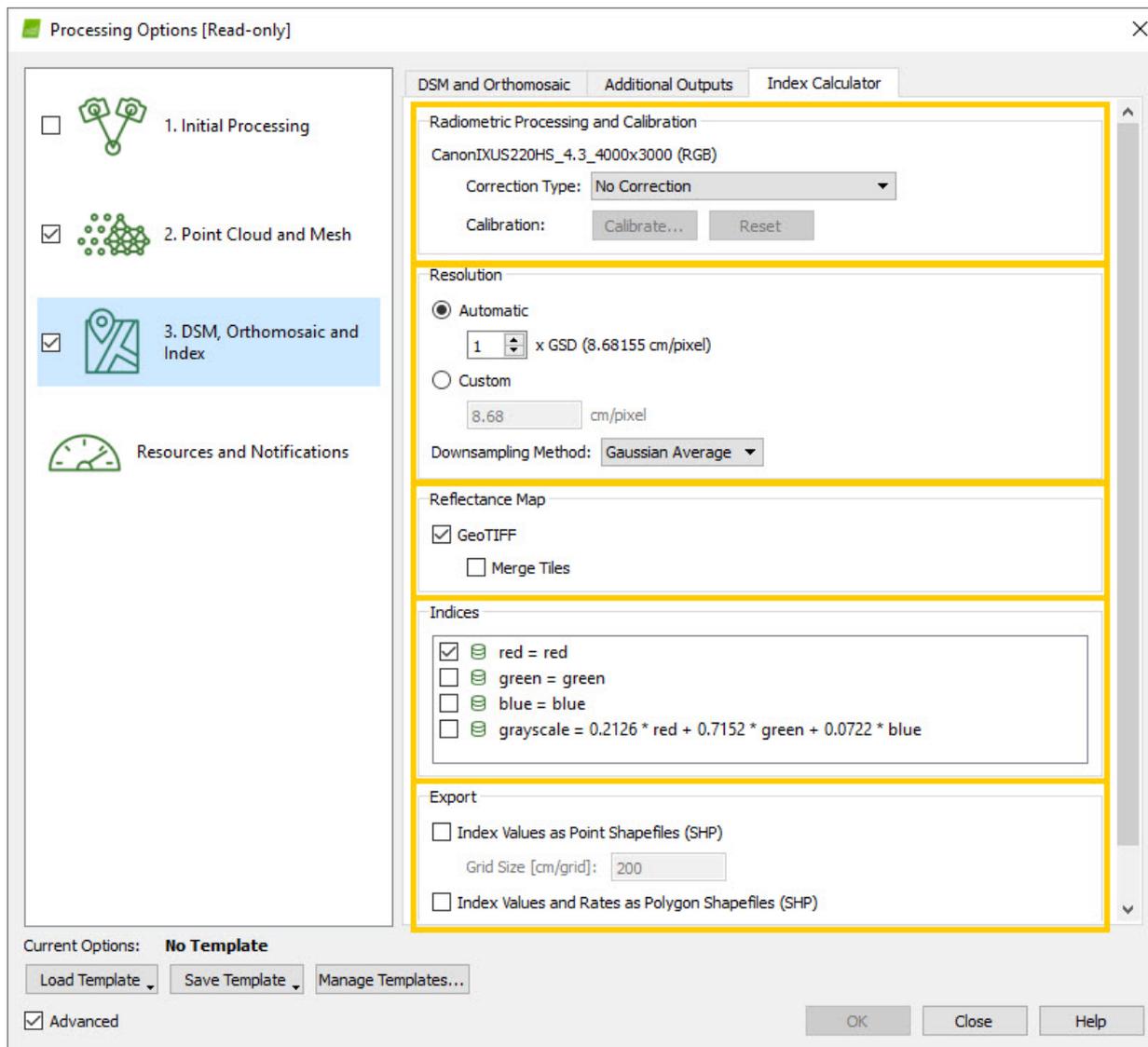
**Radiometric Processing and Calibration:** Allows the users to calibrate and correct the image reflectance, taking the illumination and sensor influence into consideration.

**Resolution:** Allows the user to set the resolution as well as the downsampling method (if needed).

**Reflectance Map:** Allows the user to decide if the Reflectance Map(s) will be generated while processing step 3. *DSM, Orthomosaic and Index*, and if the Tiles will be merged.

**Indices:** Shows the list of indices either from the database or created by the user. Allows the user to select which indices are generated while processing step 3. *DSM, Orthomosaic and Index*. For the selected indices, the Index Map is saved as a GeoTIFF, the Index Map Grid as a .shp file, the Classes as a .shp file and the Classes with color representation as a .jpg file.

**Export:** Allows the user to select some desired outputs.



### Radiometric Processing and Calibration

Allows the users to calibrate and correct the image reflectance, taking the illumination and sensor influence into consideration. It is possible to choose the type of radiometric correction to be done:

No correction: no radiometric correction will be done

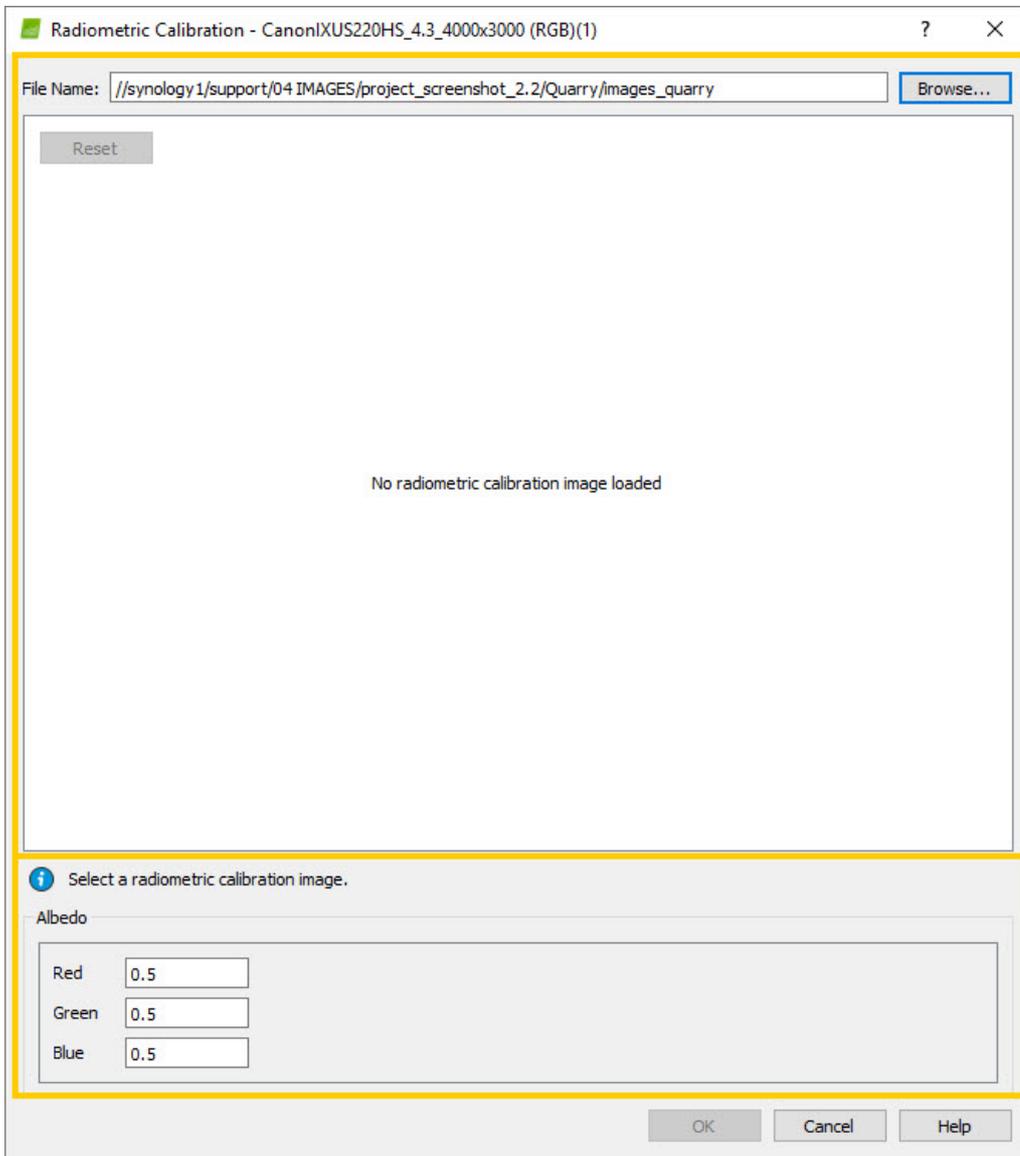
Camera only: corrections will be applied to the parameters that are written in the EXIF metadata and relate to the camera (vignetting, dark current, ISO, etc...): [115001846106](#)

Camera and Sun Irradiance: corrections will be applied to the camera parameters (same as using the option *Camera only*) as well as for the sun irradiance information written in the XMP.Camera.Irradiance EXIF tag.

Camera, Sun Irradiance and Sun angle: corrections will be applied to the camera parameters and the sun irradiance information (same as using the option *Camera and Sun Irradiance*) as well as to take into account the sun position. This option should only be chosen for flights that were done in clear sky conditions.

The camera used is displayed. Users can calibrate the sensor to perform an illumination adjustment in order to obtain more accurate reflectance values. If there are more than one camera models in the project, all the cameras will be listed in the Radiometric Processing and Calibration section.

The Calibrate button allows to take into account the information from a picture with radiometric calibration target if such a target was used during the project. After clicking Calibrate for a camera model, the *Radiometric Calibration* pop-up appears:



The *Radiometric Calibration* pop-up has the 2 sections:

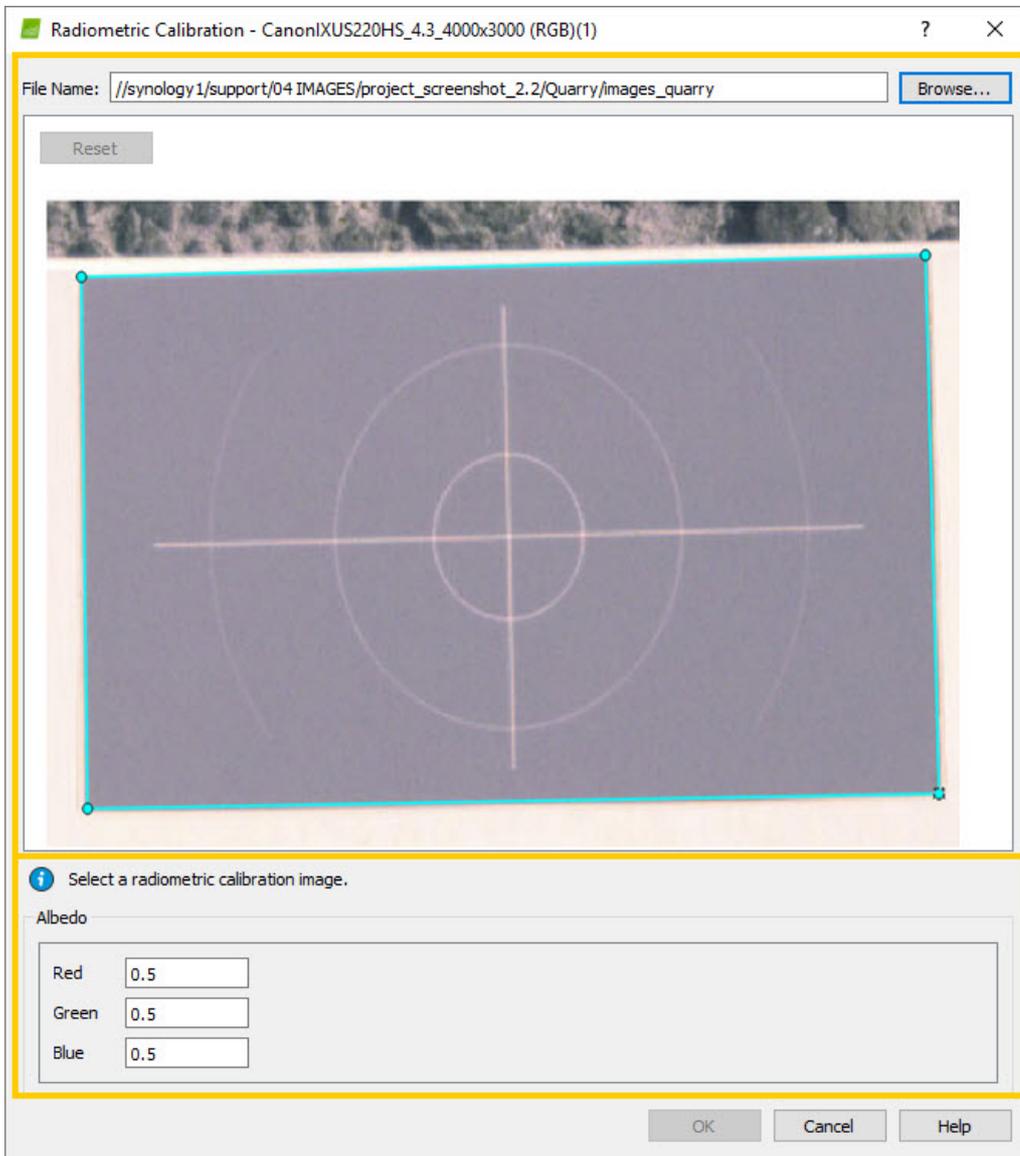
**Image:** The image section allows the user to browse the image that will be used for the radiometric calibration.

**Albedo:** The Albedo section allows the user to set the albedo values for the calibration target.

Image

In *File Name*, the Browse button, opens the *Select a radiometric calibration image* pop-up. This pop-up allows the user to select the image in which the radiometric calibration target appears.

When an image is browsed, the user can draw a region on the image that will define the radiometric calibration. The Reset button, resets the area drawn by the user.



#### Albedo

In the Albedo section the detected bands of the camera model appear. This section allows the user to type the albedo values for the calibration target for the bands of the camera model selected.

**!** Important: The albedo values can be between 0.0 and 1.0.

For more information about the radiometric calibration target: [206494883](#).



and the action buttons:

OK: Confirms the radiometric calibration.

Cancel: Does not save the radiometric calibration.

Help: Opens the Pix4Dmapper help.

#### Resolution

Allows the user to set the resolution for the reflectance map. If a resolution lower than 1 GSD is chosen, the downsampling method can be chosen among the following options. Note that the window size will depend on the downsampling rate:

Gaussian Average: Apply a Gaussian filter to the image.

Fast Gaussian: This option performs the downsampling on the original images (hence does not produce a 1GSD reflectance map first), resulting in faster processing time.

Average: The pixel takes the average value of the window around it.

Median: The pixel takes the median value of the window around it.

75% Quantile: The pixel takes the value of the 75% quantile of the window around it.

Minimum pixel: The pixel takes the minimal pixel value of the window around it.

Maximum pixel: The pixel takes the maximal pixel value of the window around it.

## Reflectance Map

Allows users to generate and save the Reflectance Map in GeoTIFF format.

GeoTIFF: The Reflectance Map is generated and saved in GeoTIFF format during the step 3. *DSM, Orthomosaic and Index*.

Merge Tiles: For most projects, the Reflectance Map is split into tiles where every tile is in GeoTIFF format. This option generates a single Reflectance Map file by merging all the individual tiles.

When this box is deselected, the merged Reflectance Map file is not generated, and users will only find smaller tiles in the result folder.

## Indices

Allows the user to select which indices are generated while processing step 3. *DSM, Orthomosaic and Index* (If in the section *Reflectance Map, Geotiff* is selected), and generates the Index Map Grid and the Classes for the selected indices. The resolution of the Index Map generated is the same as the Reflectance Map.

Indices Box: All indices are displayed in the gray box with icons:

: The index exists in the Pix4Dmapper index database. For more information about the Pix4Dmapper Index Database List: [202558379](#).

: The index was created / edited by the user in another project (on the same computer) that was closed and saved. :[202560489](#).

: The index was created / edited by the user in this project: [202560489](#).

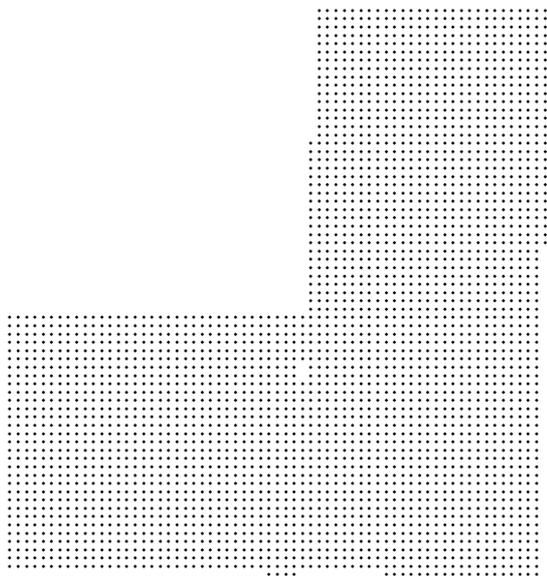
## Export

Allows the user to select some desired outputs:

Index Values as Point Shapefiles (.shp): This map is generated while generating the Index Map. The Index Map Grid is generated by placing a grid in the Index Map. If a grid point lays on exactly 1 pixel, it takes the value of the pixel of the Index Map. If a point lays on several pixels, its value is interpolated with the values of the neighboring cells of the Index Map.

Grid Size [unit/grid]: Defines the grid size. The default value is 200 cm/grid.

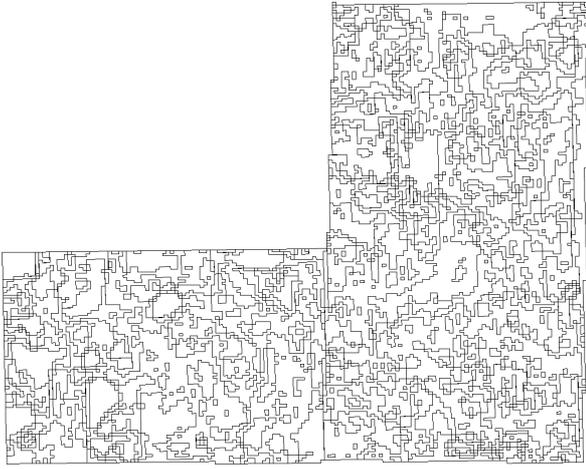
 Note: The maximum value that can be entered is 10000.



Index Values and Rates as Polygon Shapefiles (.shp): Allows the user to export the index values and rate regions as a .shp file.

Grid Size [unit/grid]: Defines the grid size. The default value is 400 cm/grid.

 Note: The maximal value that can be entered is 10000.



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 Access: On the Menu bar, click Process > Processing Options..., in the *Processing Options* pop-up click Resources and Notifications.



**Resources and Notifications**

Allows the user to select the usage of the hardware resources and to select a notification for when processing is done. This can be useful when running multiple projects on the same computer or when the computer is needed for tasks other than processing:

This tab contains two sections:

**Maximum Resources Available for Processing:** Allows to throttle the resources dedicated to the software

**Notifications:** Allows to trigger a notification when processing is completed.

**Maximum Resources Available for Processing**

**RAM [GB]:** By default all the available RAM memory is used. It is possible to reduce the amount of RAM assigned to the processing of the project by moving the slider to a lower value.

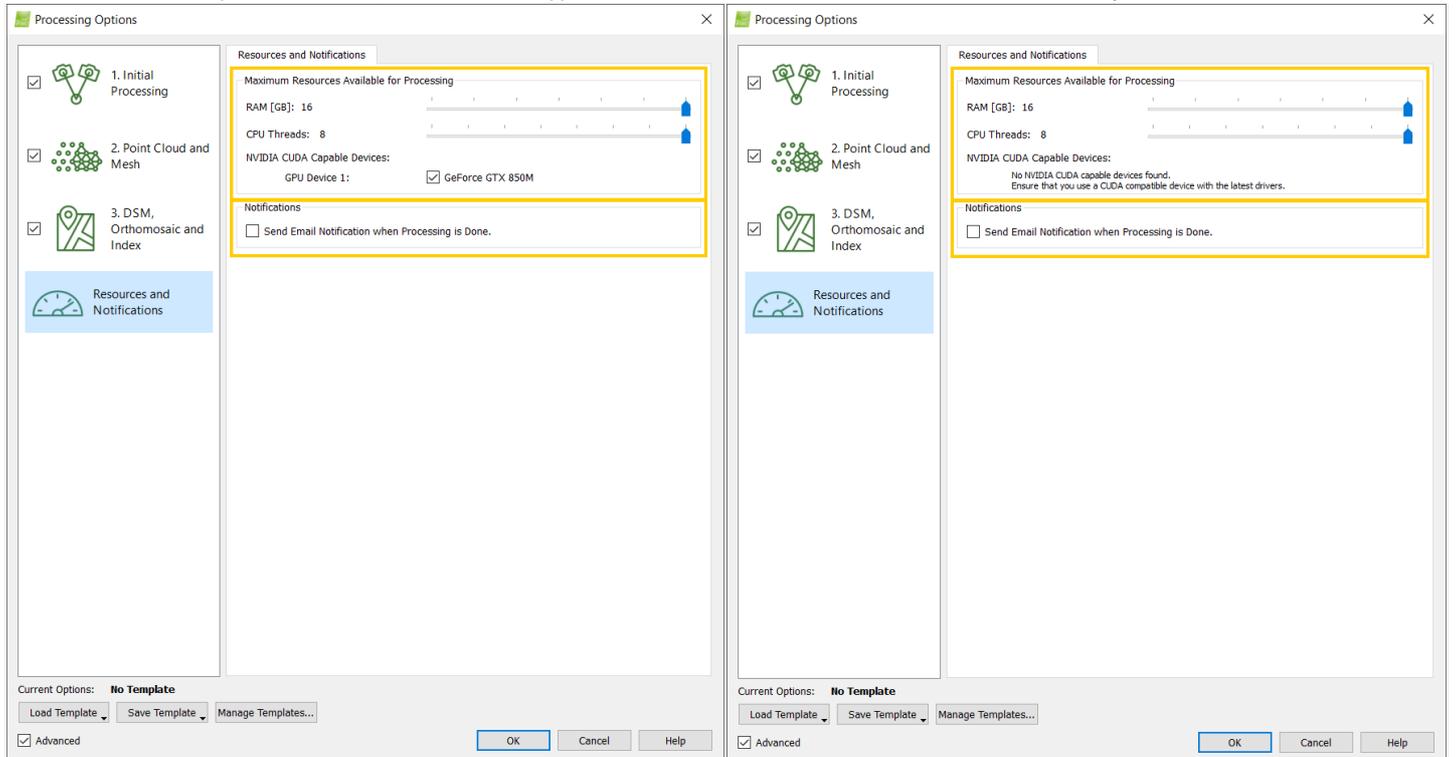
**CPU Threads:** By default all the CPU threads are used. It is possible to reduce the amount of CPU threads assigned to the processing of the project by moving the slider to a lower value.

**NVIDIA CUDA Capable Devices:**

ONLY when using NVIDIA Graphic card(s) compatible with CUDA, it is possible to activate / deactivate the use of the Graphic card(s) by selecting/deselecting the box.

When using Cuda processing, the processing speed is increased and the impact is more significant for large projects.

Under *NVIDIA CUDA capable devices list*, the list of GPUs appears. The cards that have at least 2 GB RAM are selected by default.



NVIDIA CUDA Capable Devices available.

NVIDIA CUDA Capable Devices not available.



Tip: When processing several projects of a given size at the same time, the first project starting step 2. *Point Cloud and Mesh* will use as much RAM as possible. When another project starts processing step 2. *Point Cloud and Mesh* as well, less RAM will be available and processing might be slower. Therefore, reducing the amount of RAM to be used so that the resources are shared between the projects running at the same time helps to reduce the overall processing time.

For example on a 64GB RAM computer, when running 2 projects, set the amount of RAM to 32GB for each project.

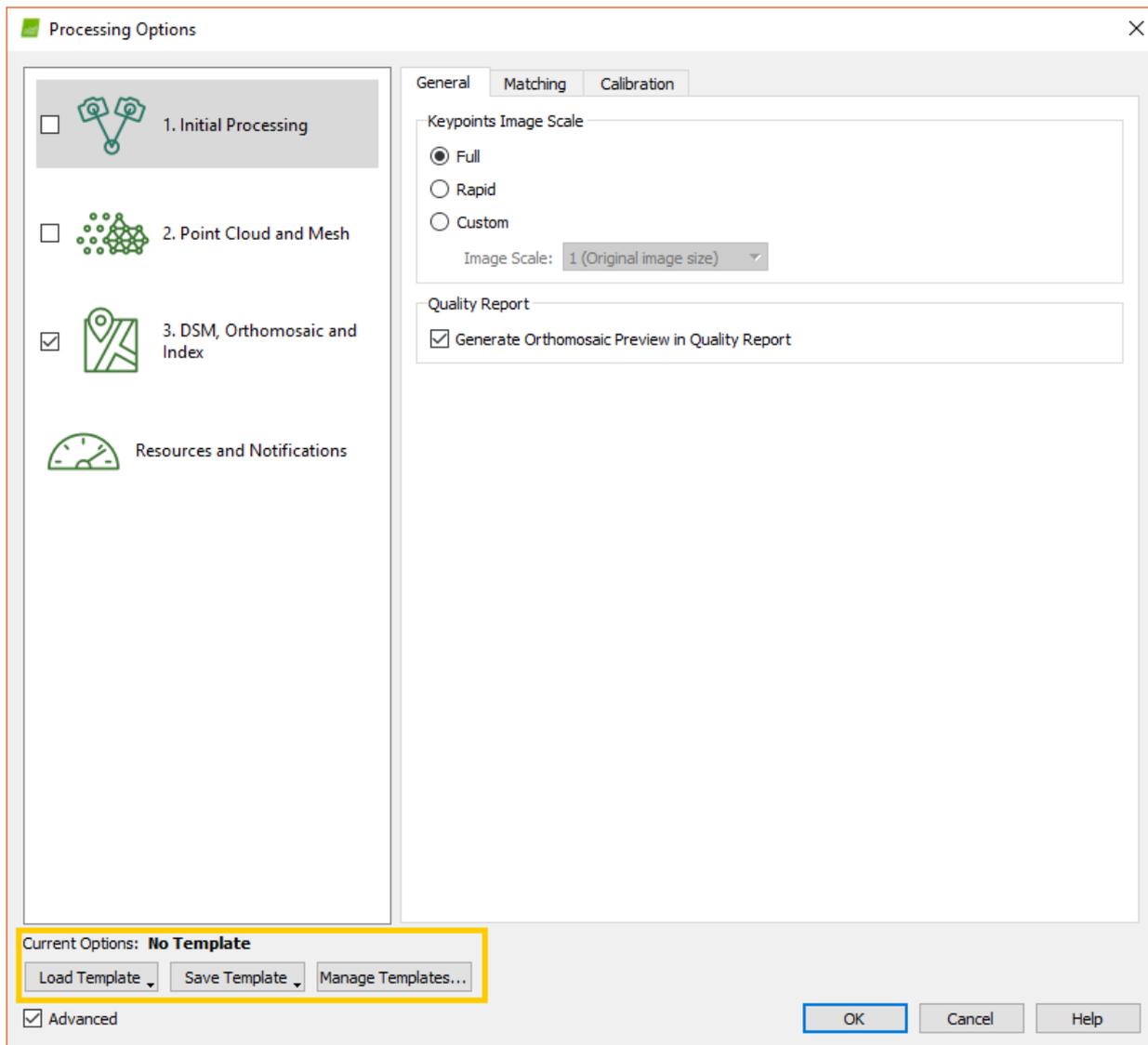
#### Notifications

If the notification box is selected, an email notification will be sent to the email address used to log in Pix4Dmapper when processing is done.

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 Access: On the Menu bar, click Process > Processing Options..., the pop-up *Processing Options* appears.



The section about templates allows to:

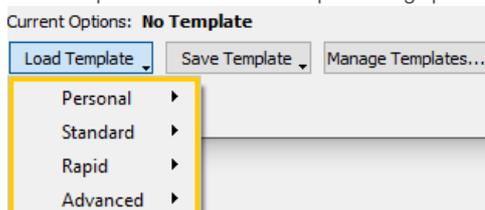
- Load (select) a template.
- Save a custom template.
- Visualize the description of a template (*Manage Templates*).
- Edit the name and description of a custom template (*Manage Templates*).
- Delete a custom template (*Manage Templates*).
- Import templates from the support site (*Manage Templates*).

It contains:

Current Options: Displays the selected processing options template.

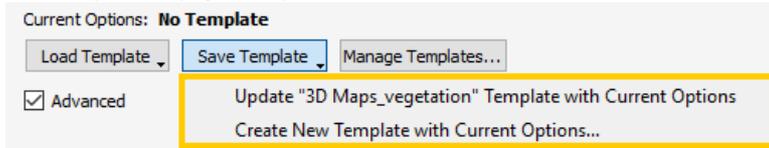
 Note: *No Template*: Refers to processing options templates (default or created by the user) that have been edited but are not saved.

Load Template: Allows to select a processing options template.



 Note: The processing options templates are organized into three sections: *Standard*, *Rapid* and *Advanced*. A fourth section titled *Personal* appears above the others when a new personal template has been created by the user.

Save Template: Displays two options:



Current Options: **No Template**

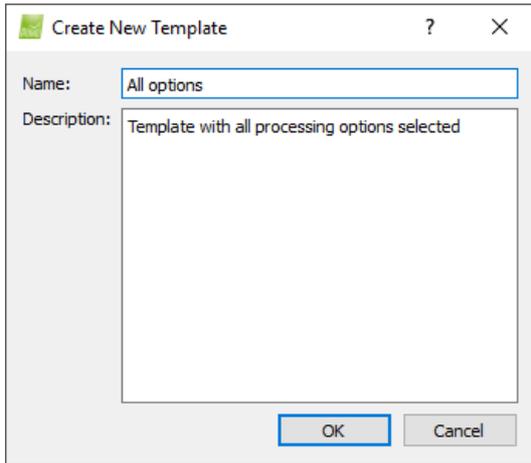
Load Template ▾ Save Template ▾ Manage Templates...

Advanced

- Update "3D Maps\_vegetation" Template with Current Options
- Create New Template with Current Options...

Update "Template" with Current Options: Allows to overwrite the processing options template with the new selected options. Available when a Personal template is selected and some options have been changed.

Create New Template with Current Options...: Allows to save the selected processing options as new Personal processing options template. Opens the *Create New Template* pop-up which allows to enter a *Name* and a *Description* for the new template:



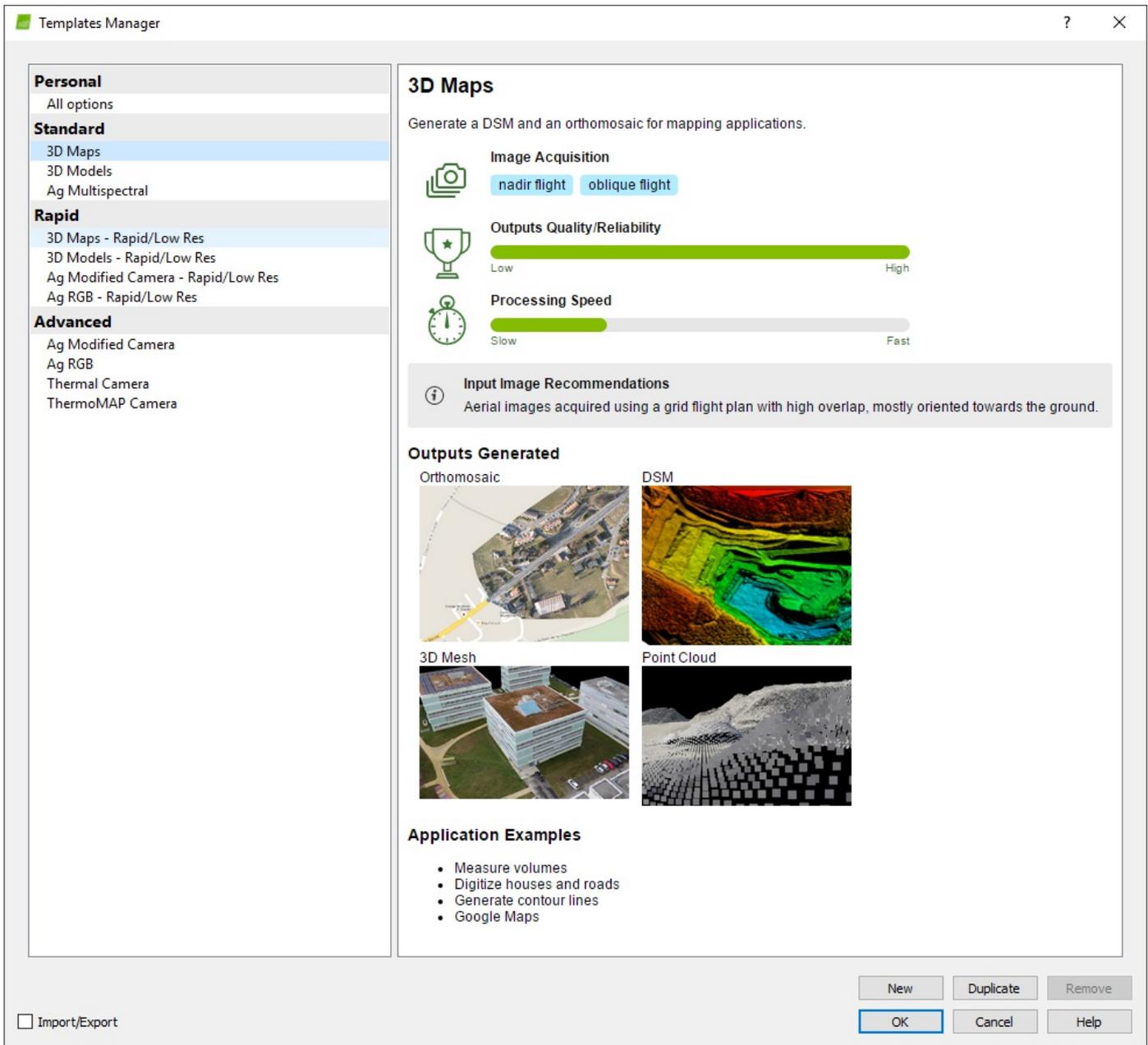
**Create New Template** ? X

Name: All options

Description: Template with all processing options selected

OK Cancel

Manage Templates...: The pop-up *Templates Manager* appears:



It contains two sections:

List of existing processing options templates.

 Note: The processing options templates are organized into three sections: *Standard*, *Rapid* and *Advanced*. A fourth section titled *Personal* appears above the others when a new personal template has been created by the user.

Description of the selected processing options template regarding the:

*Image acquisition*: Recommended image acquisition type for applying the template; the blue color refers to the acquisition plan and the yellow color refers to the terrain or object type.

*Outputs Quality/Reliability*: The scale ranges from *Low* to *High* to differentiate the quality and reliability of the results between full and rapid/low resolution processing ; high reliability indicates the higher resolution that can be achieved for the specific dataset with the specific processing options selected in the template.

 Note: For more information about the differences between the full and rapid/low resolution: [202558949](https://202558949).

*Processing Speed*: The scale ranges from *Slow* to *Fast* to differentiate the completion time between the full and rapid/low resolution processing.

*Outputs Generated*: List of images of the generated outputs.

*Application Examples*: List of common applications for which the template should be used.

And the buttons:

**New**: Creates a new processing options template in the *Personal* section with the selected processing options.

**Duplicate**: Duplicates an existing processing options template with another name.

**Remove**: Deletes a processing options template.

**Check box Import/Export**: displays the buttons:



Import...: Allows to import a template (.tmpl files created with Pix4Dmapper).

Export...: Allows to export a template as a .tmpl file.

Folder...: Opens the folder where the user processing options template are saved.

 Note: More processing options templates (.tmpl) available [here](#).

OK: Confirms the changes.

Cancel: Does not save the changes.

Help: Opens the Pix4Dmapper help.

 Note: For more information about the *Processing Options Templates*, their outputs and their selected processing options: [205319155](#).

 Access: On the Menu bar, click View.

There are 2 items that can be selected / unselected:

Show View Toolbar: Show / hide the View toolbar. For more information: [202557839](#).

Show Sidebar: Show / hide the Sidebar. For more information: [202558389](#).

And 7 items that can be selected:

**Home:** Opens the Home View interface.

**Map View:** Opens the Map View, available when a project is created/opened.

**rayCloud:** Opens the rayCloud View, available when a project is created/opened.

**Volumes:** Opens the Volumes View, available when the point cloud and the DSM of a project are generated.

**Mosaic Editor:** Opens the Mosaic Editor View, available when the DSM and the Orthomosaic are generated.

**Index Calculator:** Opens the Index Calculator View, available when step 1. *Initial Processing* is completed.

**Processing:** Opens the *Processing* bar, available when a project is created/opened.

**Log Output:** Opens the *Log Output* bar, available when a project is created/opened.



Access: On the Menu bar, click View > Home.

The Home View has 3 sections:

- [Projects](#)
- [Help](#)
- [Demo Project](#)

#### Projects

Contains the items:

- New Project...:** Opens the wizard that guides the user to create a new project. For step by step instructions about how to create a new project:[202557309](#).
- Open Project...:** Opens an existing project. Opens a pop-up to navigate and select a .p4d project file (Pix4Dmapper project file format).
- Recent Projects:** Displays a menu with the 4 last projects that have been opened. By clicking one of them, the project will open.
- News:** Displays news about Pix4D.
- Tips:** Displays information about the use of Pix4Ddesktop. It opens the Knowledge Base articles containing a detailed description.

#### Help

Contains the items:

- Getting Started:** Opens the Support site, displaying the Getting Started index. This guide explains how to get started with Pix4Dmapper. It shows the needed steps before using Pix4Ddesktop, how to obtain a good dataset, how to create a project and how to start processing.
- Pix4Ddesktop Manual:** Opens the Support site, displaying the Desktop Manual index.
- Quick Links:** Opens the Support site, displaying the Quick Links index.
- Example Datasets:** Opens the Support site, displaying the Example Datasets index.
- Video Academy:** Opens the Support site, displaying the Video Academy index.
- Forum:** Opens the Support site, displaying the Forum index page.
- News:** Displays news about Pix4D.
- Tips:** Displays information about the use of Pix4Ddesktop. It opens the Knowledge Base articles containing a detailed description.

#### Demo Project

Contains the items:

- Pix4Ddesktop Demo Project:** Automatically loads a demo project, ready to be processed. Opens in a browser window the Getting Started index that explains how to get started with Pix4Ddesktop.
- News:** Displays news about Pix4D.
- Tips:** Displays information about the use of Pix4Ddesktop. It opens the Knowledge Base articles containing a detailed description.

 Access: On the Menu bar, click View > Map View.

By selecting the Map View the following elements are displayed on the main window:

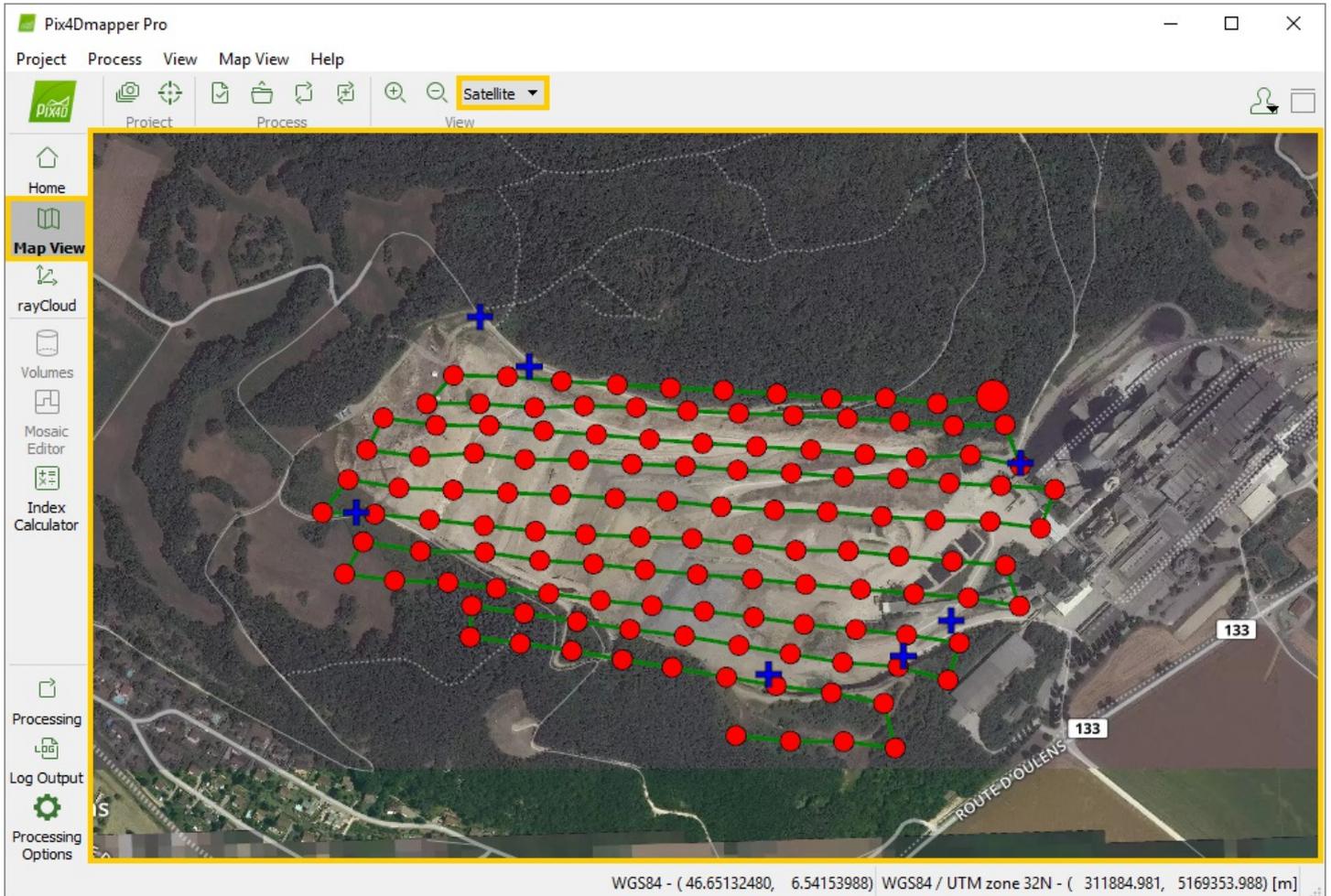
**Menu bar entry:** Displayed on the Menu bar.

**Toolbar:** The standard toolbar and some extra buttons related to the Map View.

**2D View:** Displayed in the main window. By default the Satellite view is displayed.

**Status bar:** Displayed at the bottom right of the Map View. Displays the coordinates when passing the mouse over the 2D View.

 Important: The 2D Map displays the Earth if the images are not geotagged.



Menu bar entry

On the Menu bar, when clicking Map View, the following option is displayed:

**Processing Area:** Indicates the area of the project for which the different outputs will be generated.

Toolbar

The following toolbar buttons are displayed:

Standard toolbar buttons: For more information: [202557839](https://www.pix4d.com/202557839).

Toolbar extra buttons:

Toolbar extra buttons

View

 Zoom In: Zooms in the selected view.

 Zoom Out: Zooms out the selected view.

Change Background Map: A drop-down list that changes the 2D View background displayed on the main window. It has the following options:

Satellite (default): Displays a satellite view of the project's location. If none of the images is geolocated and there are no GCPs in the project, the whole Earth is displayed.

Maps: Displays a map view of the project's location. If none of the images is geolocated and there are no GCPs in the project, the whole Earth is displayed. The background map is provided by Mapbox.

## 2D View

Section which displays the location of the project on Earth and the project elements (images, GCPs, etc.). For more information: [202557979](#).

## Status bar

The coordinates of the current mouse position on the 2D View are displayed at the bottom right of the Map View. Two types of coordinates are displayed:

WGS84 - (46.6508319, 6.54048085) WGS84 / UTM zone 32N - (0311802.23, 5169301.75) [m]

### Geographical WGS84 coordinates

Latitude and longitude coordinates are displayed.

### Selected Coordinate System

The X and Y coordinates of the selected output coordinate system ([202558239](#)) are displayed .

 Note: If the project has no georeference or it is georeferenced in an arbitrary coordinate system, only the geographical WGS84 coordinates are displayed.

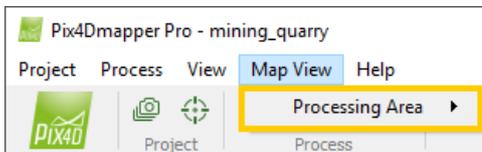
 Access: On the Menu bar, click View > Map View and then, on the Menu bar, click Map View > Processing Area.

 Note: Only one *Processing Area* can be used.

 Warning:  
 It is recommended to include areas covered by images in the *Processing Area*, so as to exclude areas of low overlap that can affect the results. The *Processing Area* affects only the visualization of the Automatic Tie Points in the 3D View of the rayCloud. It does not affect the results of step 1. *Initial Processing*.  
 When the *Processing Area* is defined before step 2. *Point Cloud and Mesh* is processed, it affects the Point Cloud visualized in the 3D View of the rayCloud and the *Volumes View* and the results saved on disk. This *Processing Area* will also affect the results of step 3. *DSM, Orthomosaic and Index*.  
 When the *Processing Area* is defined after step 2. *Point Cloud and Mesh* is completed, it only affects the Point Cloud visualized in the 3D View of the rayCloud and the *Volumes View* but not the results saved on disk. This *Processing Area* will also affect the results of step 3. *DSM, Orthomosaic and Index*.  
 When exporting the Point Cloud, it is possible to take into account the *Processing Area*, even if it is drawn after step 2 is processed. For more information about how to export the Point Cloud: [203890769](#).  
 When the *Processing Area* is defined before step 3. *DSM, Orthomosaic and Index* is completed, only the results of step 3 will be affected.

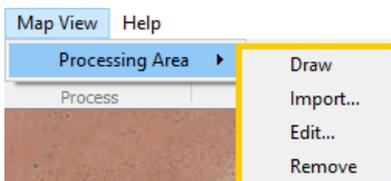
 Warning:  
 In order to take the *Processing Area* into account for the visualization of the Point Cloud and / or the generation of the outputs of step 2. *Point Cloud and Mesh*, the corresponding filter should be selected in the *Processing Options*. For more information: [204644369](#).  
 The *Processing Area* will be taken into account for the results of step 3. *DSM, Orthomosaic and Index* even if the *Processing Areas* box is not selected in the *Point Cloud Filters*.

The *Processing Area* indicates the area of the project for which the different steps of processing will be applied. The area can be defined in the Map View if the project is georeferenced in a known coordinate system.



It contains 4 options:

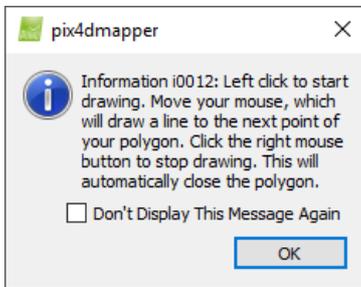
- [Draw](#)
- [Import...](#)
- [Edit...](#)
- [Remove](#)



For step by step instructions about how to select / draw the *Processing Area*: [202560179](#).

Draw

By clicking *Draw*, the information i0012 pop-up appears with instructions about how to draw the area:



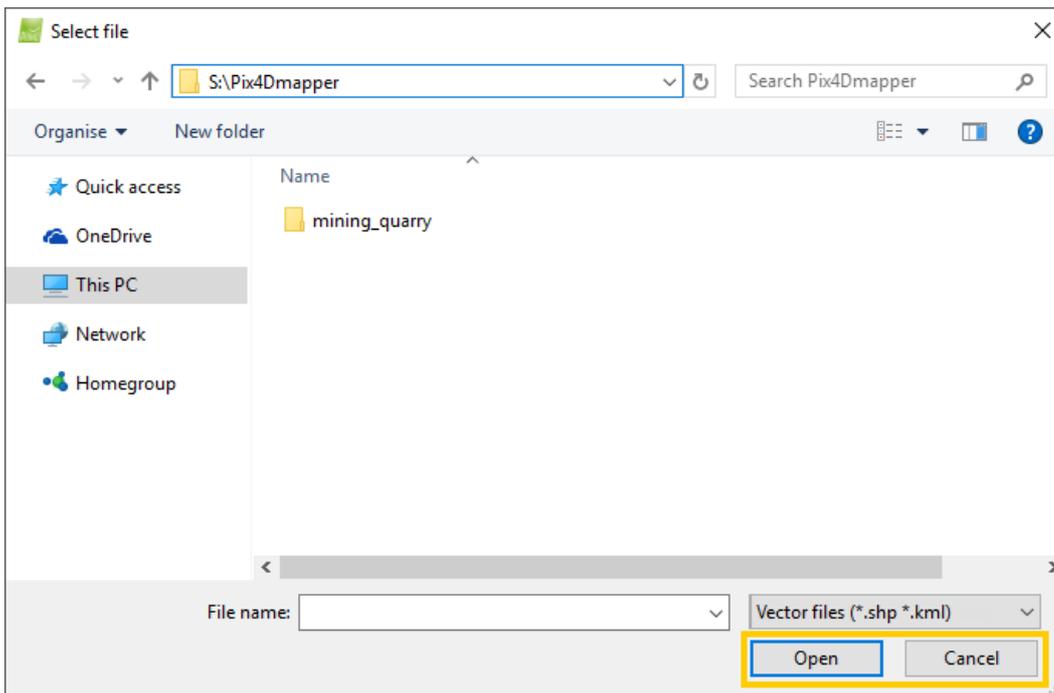
Left click starts drawing.

Right click inserts the last vertex of the *Processing Area* and stops the drawing.

Esc button stops drawing and cancels the process.

Import...

By clicking *Import...*, the *Select file* pop-up appears which allows to load the area from a vector file (.shp or .kml):



Navigation window. Used to search for and select the vector file.

Open: Loads the file.

Cancel: Does not save the changes and closes the pop-up.

 Note: The Vector file (.shp or .kml) has to be a polygon file (not lines) and can be given in any coordinate system from Pix4Dmapper's coordinate system database.

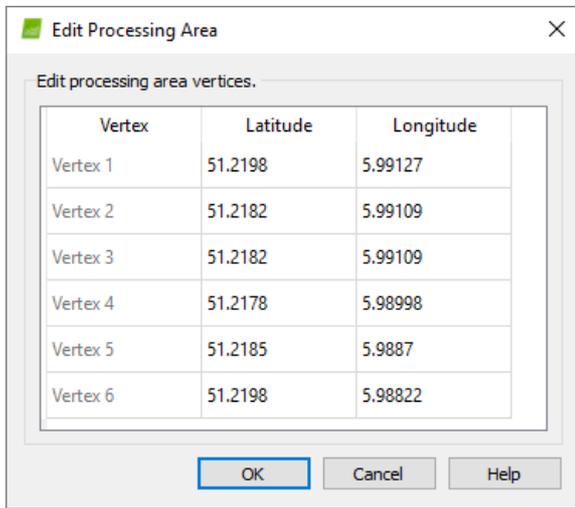
Edit...

Available only if a *Processing Area* has already been drawn / imported. By clicking *Edit...*, the *Edit Processing Area* pop-up appears. It contains a table with the following columns:

*Vertex*: Each vertex of the area drawn or imported.

*Latitude*: The latitude of each vertex.

*Longitude*: The longitude of each vertex.



To edit the area, by changing the *Latitude* and/or *Longitude* values, double-click on the corresponding cells in the table.

The *Edit Processing Area* pop-up also has 3 action buttons:

OK: Confirms the changes.

Cancel: Does not save the changes and closes the pop-up.

Help: Opens the Pix4Dmapper help.

Remove

Available only if a *Processing Area* has already been drawn / imported. By clicking *Remove*, the previously drawn or imported area is deleted.

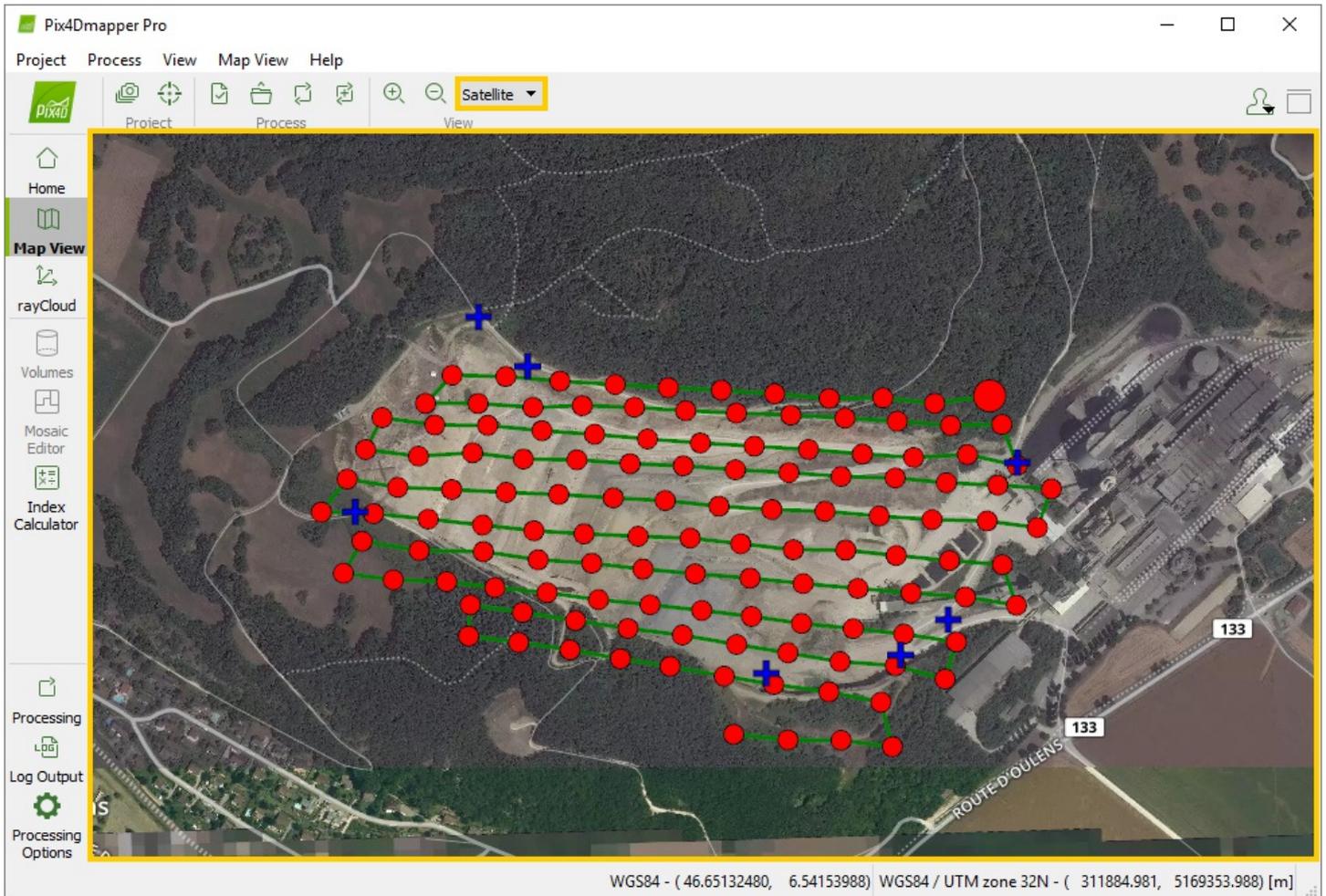
 Access: On the Menu bar, click View > Map View. The 2D View is displayed on the Main window.

The 2D View has 2 components:

- [Background map](#)
- [Displayed elements](#)

### Background map

On the top of the 2D View there is a drop-down list indicating the type of the background map that has been selected.



By default when a project is loaded, the *Satellite* type is selected. To navigate the map:

- Zoom in: Move the mouse scroll wheel forwards.
- Zoom out: Use the mouse scroll wheel backwards.
- Pan: Left click and move the mouse.

Click on the background drop down list to select a different type of map. The following background maps are available:

- Satellite*: The background map displays a satellite map. The *Satellite* background is loaded only if there is Internet connection.
- Maps*: The background map displays the Mapbox map. The *Maps* background is loaded only if there is Internet connection.

### Displayed elements

The elements that are displayed are the following:

- [Images](#)
- [Flight plan](#)
- [GCPs](#)
- [Processing Area](#)

## Images

The images of the project that are geolocated with a known coordinate system are displayed as dots on the 2D View. The first image is displayed as a larger dot. The color of the dot indicates the phase of the processing:

*Red:* When a project is loaded before processing has started.

*Gridded red:* For the images that are disabled (not taken into account for processing).

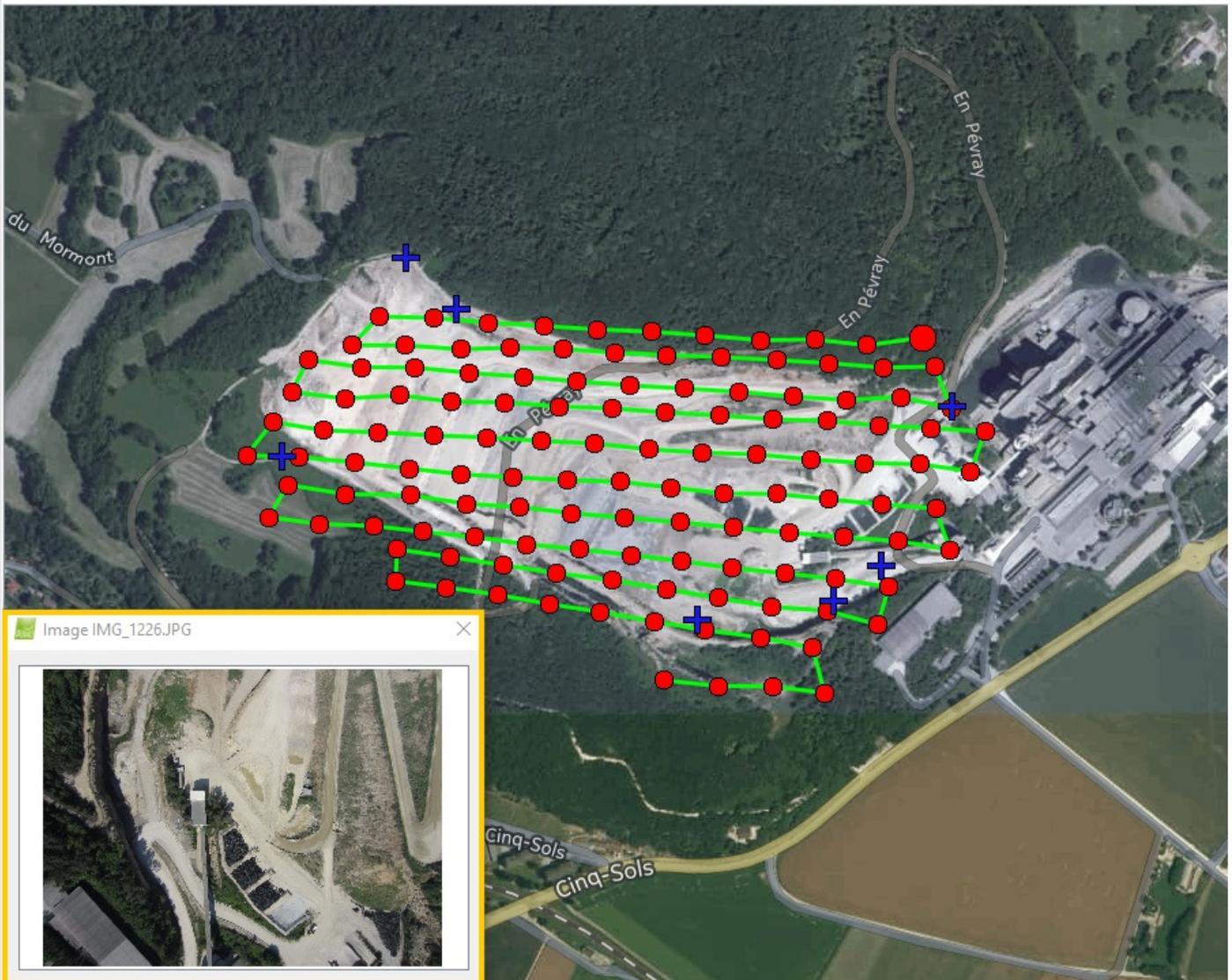
*Dark green:* For images that have been calibrated after step 1. *Initial Processing.*

*Blue:* During step 2. *Point Cloud and Mesh* for the loaded images.

*Luminous green:* After step 2. *Point Cloud and Mesh.*

When hovering over the image dots, the image name is displayed at the bottom part of the 2D View. When clicking on an image dot, a pop-up appears that displays the corresponding image.

**!** **Important:** If the project has no georeference or it is georeferenced in an arbitrary coordinate system, the images are not displayed on the 2D View. The 2D View displays the whole Earth.



The Images layer has a sub-layer:

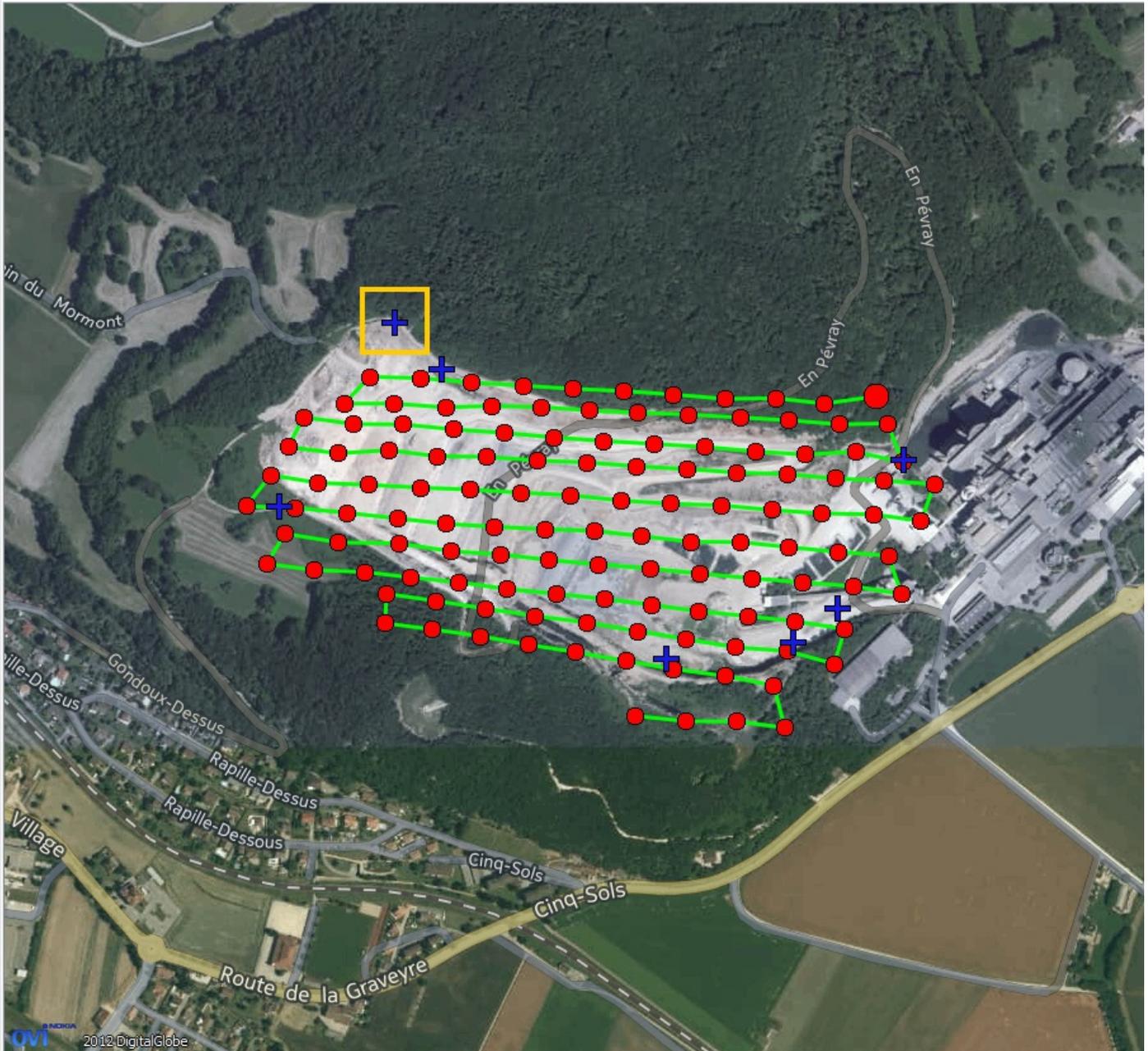
**Flight plan:** It displays the flight plan that was used to take the images as a green line starting from the larger dot (first image).

## GCPs

The GCPs of the project (if any), are displayed as a blue crosses on the map.

When hovering over the GCP cross, the GCP name is displayed at the bottom of the 2D View. When clicking on a GCP cross, the *GCP/MTP Manager* window opens and the corresponding GCP is selected.

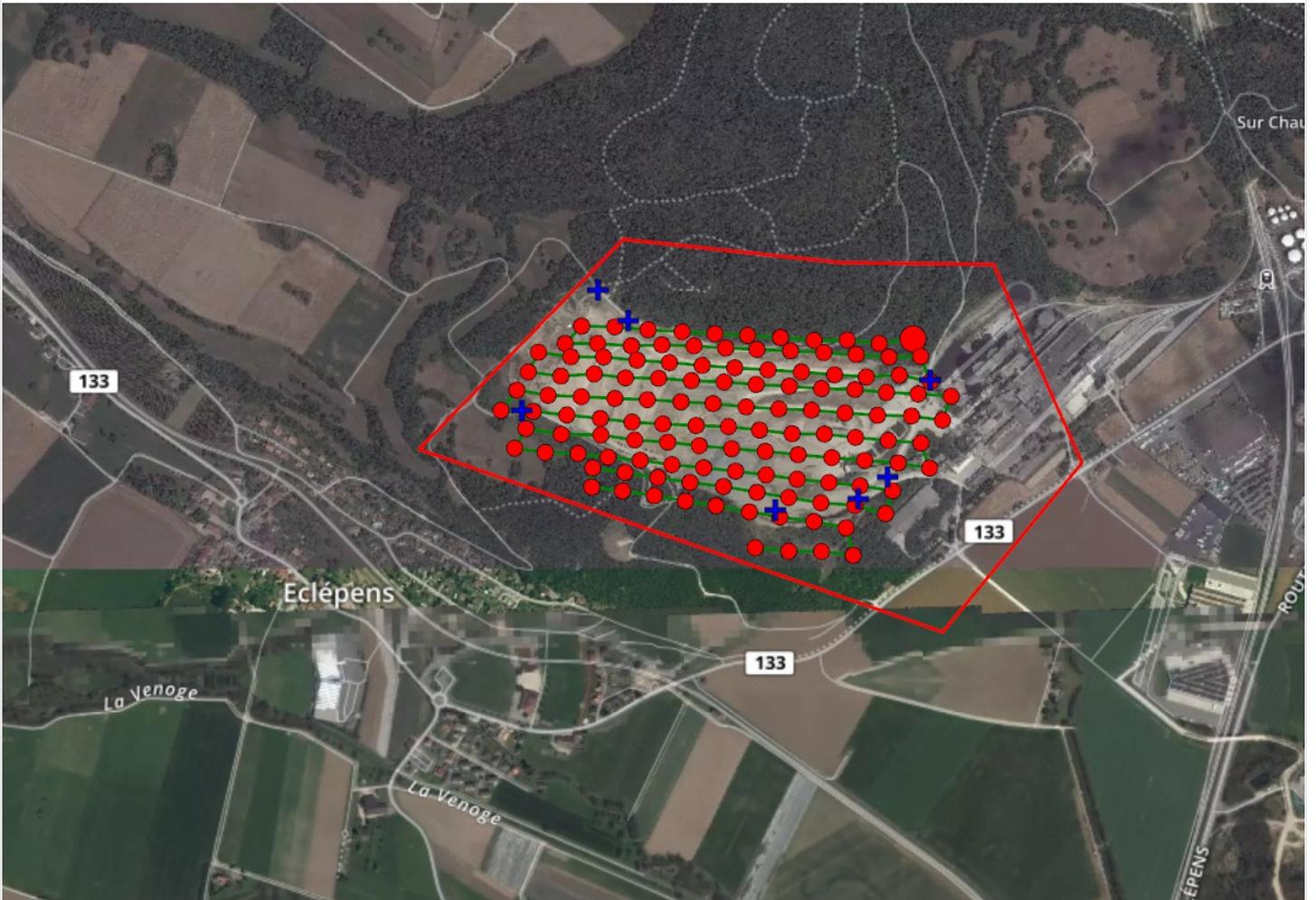
**!** **Important:** If the project has no georeference or it is georeferenced in an arbitrary coordinate system, the GCPs are not displayed on the 2D View. The 2D View displays the whole Earth.



Processing Area

The *Processing Area*, if defined, is displayed on the 2D View as a polygon with a red border.

**!** **Important:** If the project has no georeference or it is georeferenced in an arbitrary coordinate system, the *Processing Area* is not displayed on the 2D View. The 2D View displays the whole Earth.



 Access: On the menu bar, click View > rayCloud.

The use of the *rayCloud* is optional and it can be used to:

Visualize the different elements of the reconstruction (Camera Positions, Reprojections (rays), GCPs, Manual / Automatic Tie Points, Processing Area, Clipping Box, Densified Point Cloud, Point Cloud Classification, 3D Textured Mesh, Objects, Video Animation Trajectories) and their properties.

Visualize point clouds created in other projects or with other software.

Georeference a project using GCPs and /or scale and orientation constraints.

Create orthoplanes to obtain mosaics of any selected plane (for example, building facades).

Verify / improve the accuracy of the reconstruction.

Assign points of the point cloud to different classes.

Improve the visual aspect of the reconstruction.

Create objects, measure distances (polylines) and surfaces.

Create 3D fly-through animations (Video Animation Trajectories).

Export different elements (GCPs, Manual / Automatic Tie Points, Objects, Video Animation Trajectories).

Create point cloud files using points belonging to one or several groups.

When selecting the *rayCloud* the following elements are displayed on the Main window:

**Menu bar entry:** The standard menu bar items and an extra item.

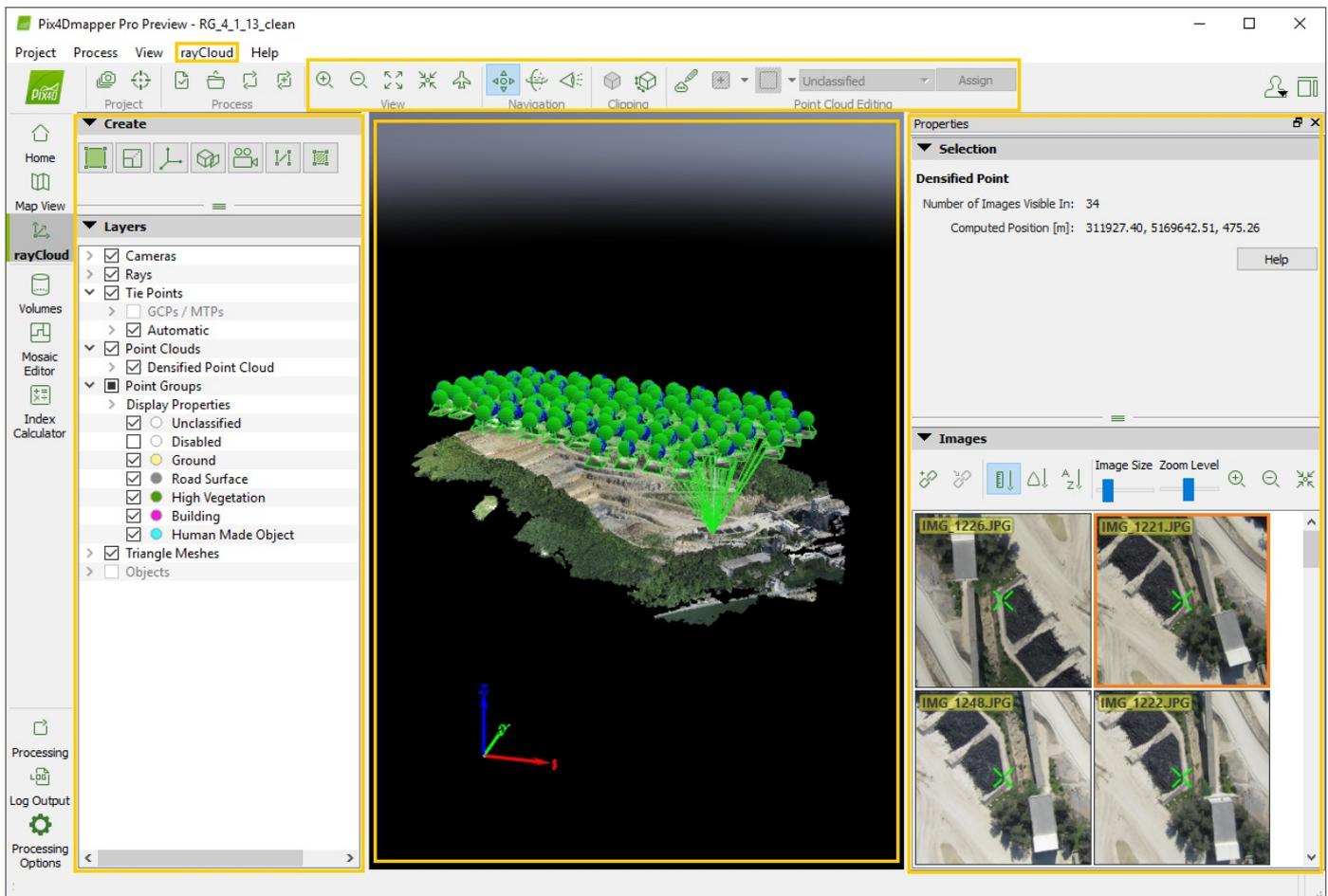
**Toolbar:** The standard toolbar and some extra buttons specific to the *rayCloud*.

**Left Sidebar:** Displayed on the left of the 3D view. It consists of two sections: the *Create* section and the *Layers* section. The *Create* section allows the user to create a *Processing Area*, *Objects*, *Scale and Orientation Constraints* and *Orthoplanes*. The *Layers* section displays the list of layers and sub layers (elements) which are displayed on the 3D view. It allows to edit the display options of existing elements as well as to insert or import elements on the 3D view, and export elements to file.

**3D View:** Displayed in the main view. Displays the different elements in 3D.

**Right sidebar:** Displayed on the right of the 3D view. Displays different information depending the selected element.

**Status bar:** Displayed on the bottom right of the *rayCloud* view. Displays the coordinates when passing the mouse over any element displayed in the 3D view.



More information in this Webinar: Using the rayCloud: [202561629](#).

Status bar

On the bottom right part of the 3D view, the following is displayed:

WGS84 / UTM zone 32N - (311684.29, 5169774.29, 496.97) [m]

Selected Coordinate System: Displays the selected coordinate system of the point.

Position: Displays the (X,Y,Z) coordinates in meters / feet of each point of the 3D view when passing the mouse over any element. When passing the mouse over the displayed elements, the coordinates change.

 Important: In the rayCloud, the coordinate system is the output coordinate system. By default the output coordinate system is the same as the GCPs coordinate system, if GCPs are used, otherwise it is the same as the image geolocation coordinate system. If the coordinates system is WGS84, the output is given in UTM. If less than 3 images are geolocated and less than 3 GCPs are defined, then the output coordinates system is set to "Arbitrary".

[Index](#) > [Interface](#) > [Menu View](#)

[◀ Previous](#) | [Next ▶](#)

 Access: On the Menu bar, click View > rayCloud, and then click rayCloud.

The following options are displayed:

- Viewpoint
- Navigation Modes
- Perspective/Orthographic
- Change Background...
- Display Sky
- New Processing Area
- New Scale Constraint
- New Orientation Constraint
- New Orthoplane
- New Video Animation Trajectory...
- New Polyline
- New Surface

Viewpoint

 Information: This option is also available in the Volumes view. On the Menu bar, click View > Volumes and then click Volumes.

Allows to select pre-defined viewpoints for the 3D View. These predefined viewpoints are accessible:

Using the Menu bar rayCloud > Viewpoint or the Menu bar Volumes > Viewpoint.  
Using the keyboard.

#### Using the Menu bar rayCloud > Viewpoint or the Menu bar Volumes > Viewpoint

**View All:** Moves the viewpoint in order to fit all the layers in the 3D View.

**Focus on Selection:** Moves the viewpoint in order to display in detail the selected element (point, camera).

**Top:** Moves the viewpoint in such a way that the layers are viewed from the top and fits all the layers in the 3D View.

**Front:** Moves the viewpoint in such a way that the layers are viewed from the front and fits all the layers in the 3D View.

**Back:** Moves the viewpoint in such a way that the layers are viewed from the back and fits all the layers in the 3D View.

**Left:** Moves the viewpoint in such a way that the view looks towards the left part of the layers and fits all the layers in the 3D View.

**Right:** Moves the viewpoint in such a way that the view looks towards the right of the layers and fits all the layers in the 3D View.

**Home:** Moves the viewpoint to the default viewpoint when opening the rayCloud and fits all the layers in the 3D View.

#### Using the keyboard

**View All:** Press "C" to move the viewpoint in order to fit all the layers in the 3D View.

**Focus on Selection:** Press "F" to move the viewpoint in order to display in detail the selected element (point, camera)

**Top:** Press "7" to move the viewpoint in such a way that the layers are viewed from the top and fit in the 3D View.

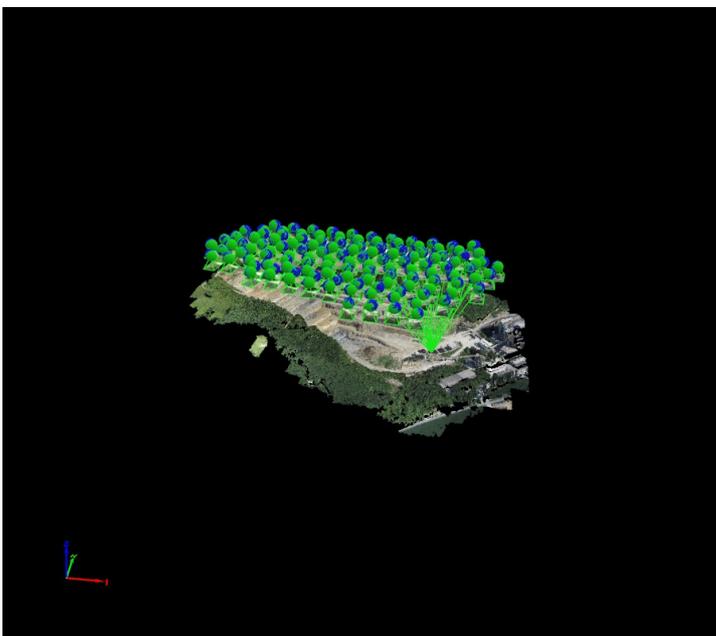
**Front:** Press "1" to move the viewpoint in such a way that the layers are viewed from the front and fit in the 3D View.

**Back:** Press "Ctrl" + "1" to move the viewpoint in such a way that the layers are viewed from the back and fit in the 3D View.

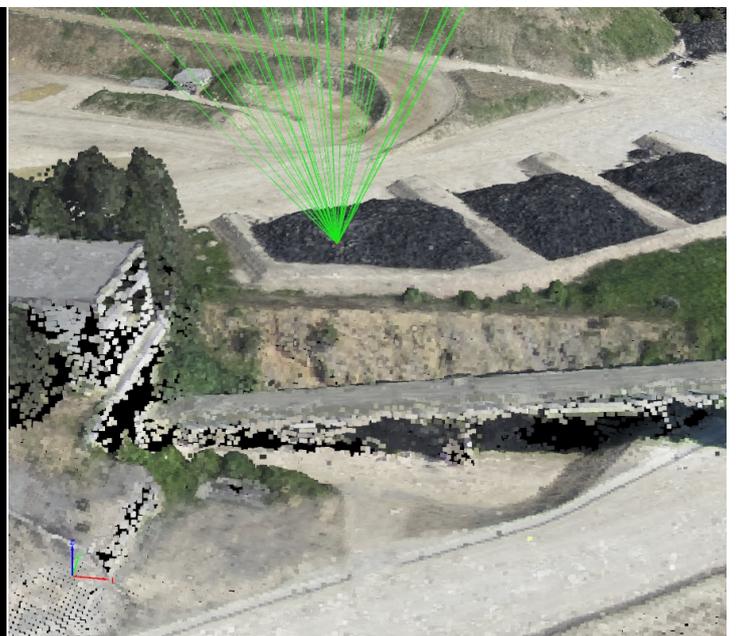
**Left:** Press "3" to move the viewpoint in such a way that the layers are viewed from the left and fit in the 3D View.

**Right:** Press "Ctrl" + "3" to move the viewpoint in such a way that the layers are viewed from the right and fit in the 3D View.

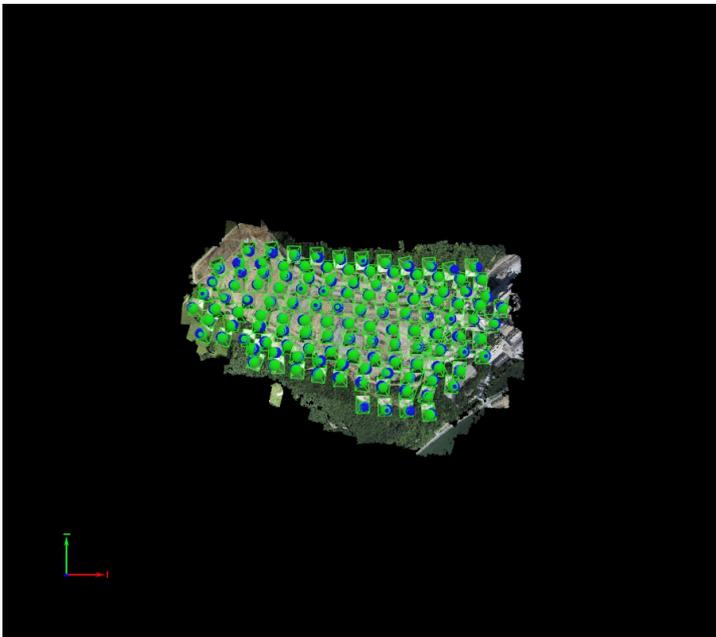
**Home:** Press "0" to move the viewpoint to the default viewpoint when opening the rayCloud and fits all the layers in the 3D View.



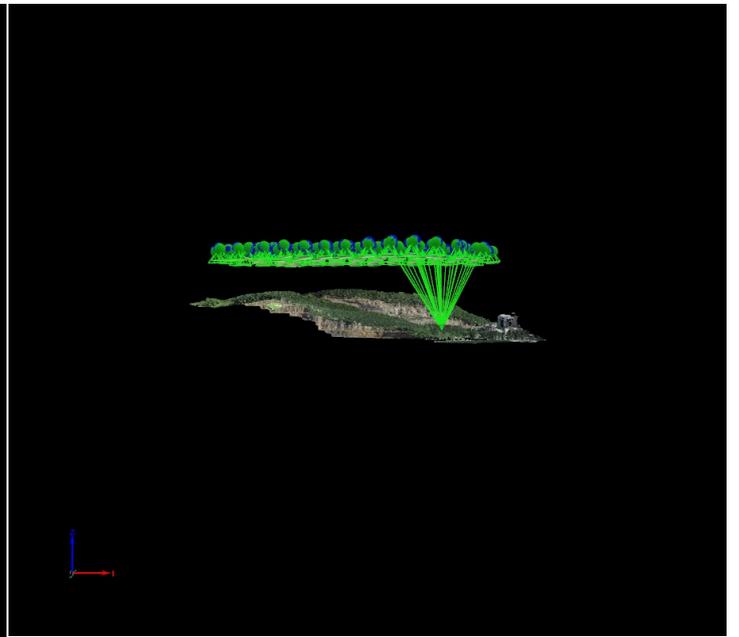
View All



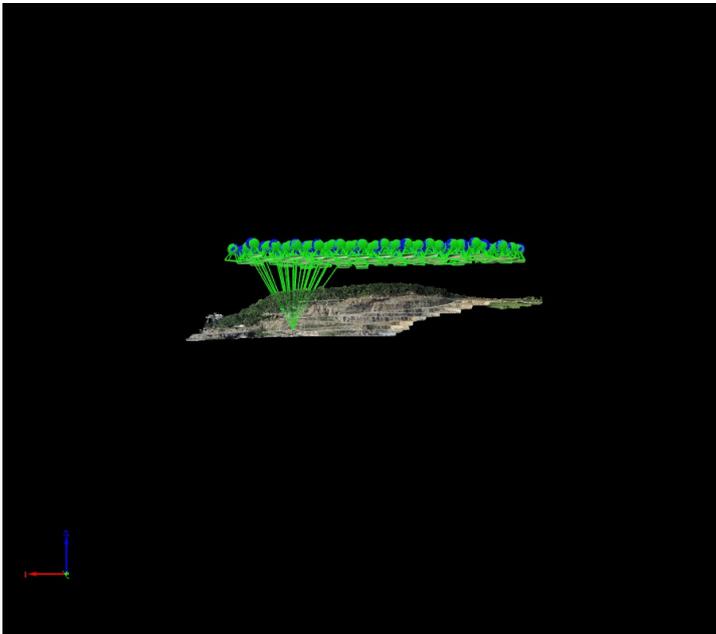
Focus on Selection



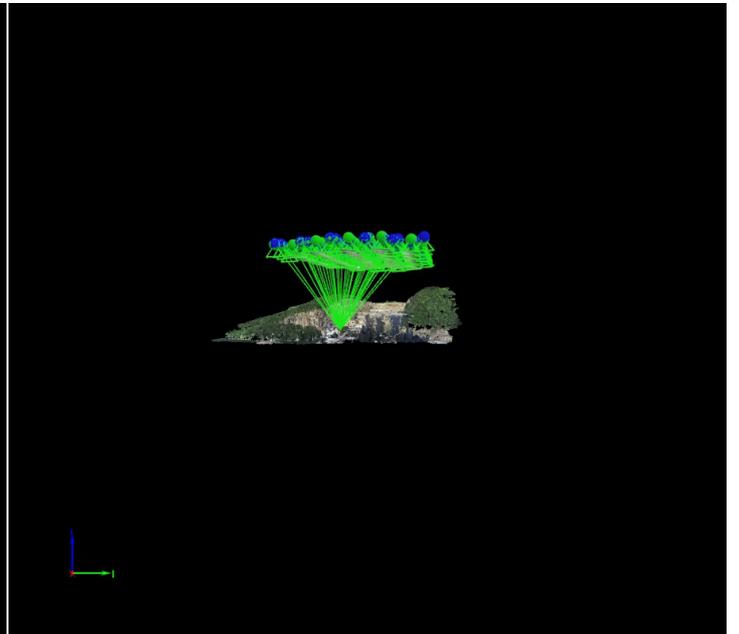
Top



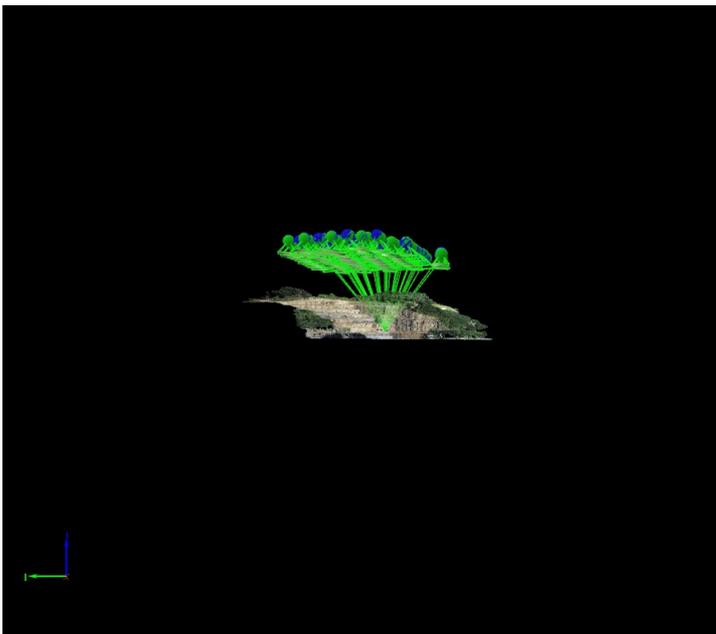
Front



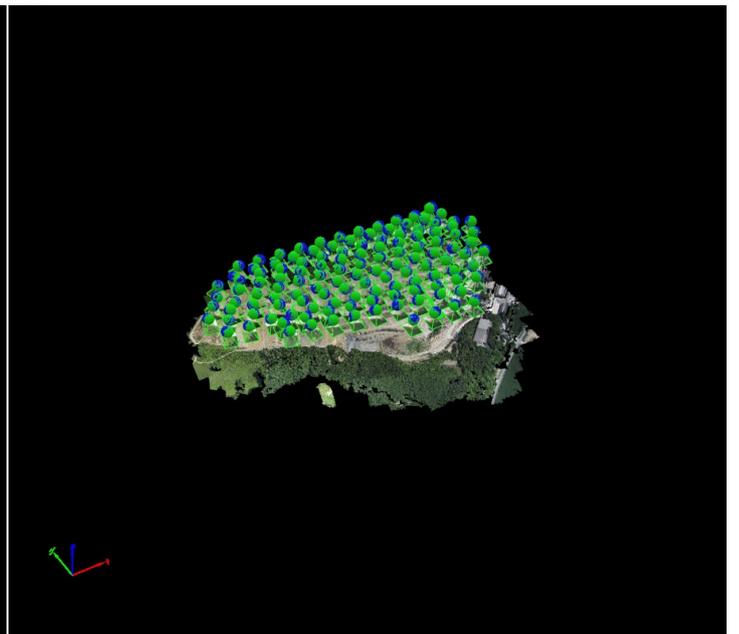
Back



Left



Right



Home

 Information: This option is also available in the Volumes view. On the Menu bar, click View > Volumes and then click Volumes.

Allows the user to change the way to navigate in the 3D View, which defines how the 3D view reacts when using the mouse or keyboard:

**Standard:** Pix4D standard navigation mode.

**Trackball:** The camera movements are defined relatively to a ball placed at the center of the view. Recommended to efficiently navigate around a single centered object.

**First Person:** Allows the user to interact with the view by simulating piloting the camera rather than manipulating the model. Recommended for close inspection and complex models requiring more degrees of freedom.

For more information and a full description of all the possible actions to navigate in the 3D View using the mouse or keyboard: [205360675](#).

Perspective/Orthographic

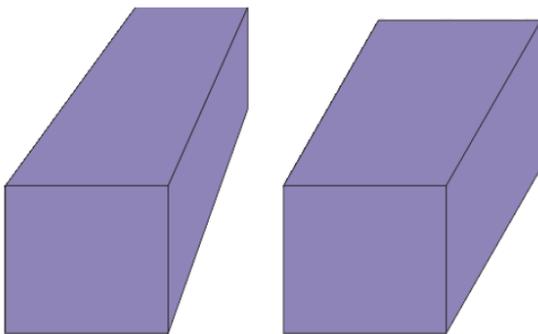
 Information: This option is also available in the Volumes view. On the Menu bar, click View > Volumes and then click Volumes.

Defines the projection used to display the layers in the 3D View. By default, the perspective projection is used. It is possible to switch between perspective and orthographic projection by clicking on the Perspective/Orthographic option of the rayCloud Menu bar or the Volumes Menu bar.

It is also possible to change the view type from perspective to orthographic using the keyboard by pressing "5".

Perspective projection: Parallel lines don't look parallel and further objects appear smaller. This is what human eyes see.

Orthographic projection: Parallel lines stay parallel. Therefore the size of objects does not depend on the distance. This view mode is recommended for technical drawing.



*Perspective projection vs Orthographic projection*

For more information about Perspective/Orthographic projections:

[Wiki Orthographic projection](#)

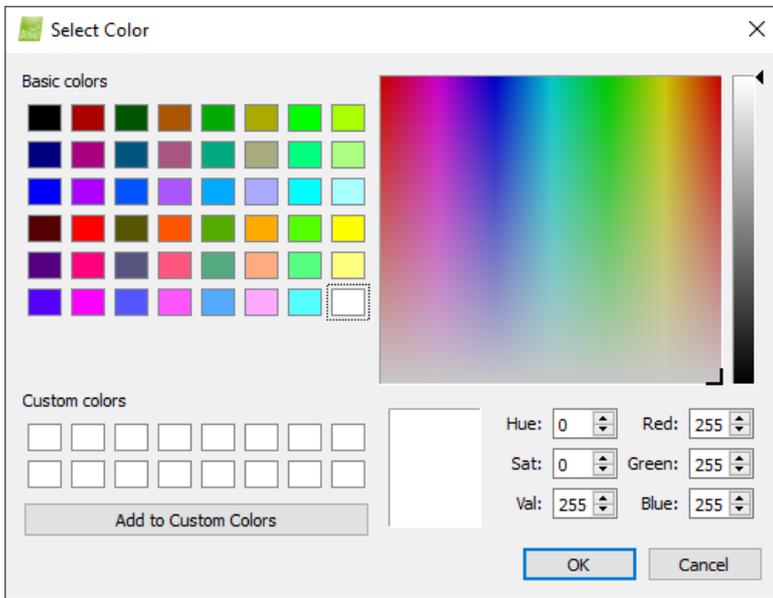
[Wiki Perspective projection](#)

Change Background...

 Information: This option is also available in the Volumes view. On the Menu bar, click View > Volumes and then click Volumes.

Allows the user to change the color of the background in the 3D View.

The *Select Color* pop up appears:



The *Select Color* pop-up has the following sections:

Basic colors: Selects a basic color.

Palette: Selects / modifies a color using the palette.

Color Properties Values: Modifies a color typing the color properties values (Hue, Sat, Val, Red, Green, Blue).

Display of the selected color.

Add to custom colors: Adds the selected color to custom colors, available for other projects.

And the action buttons:

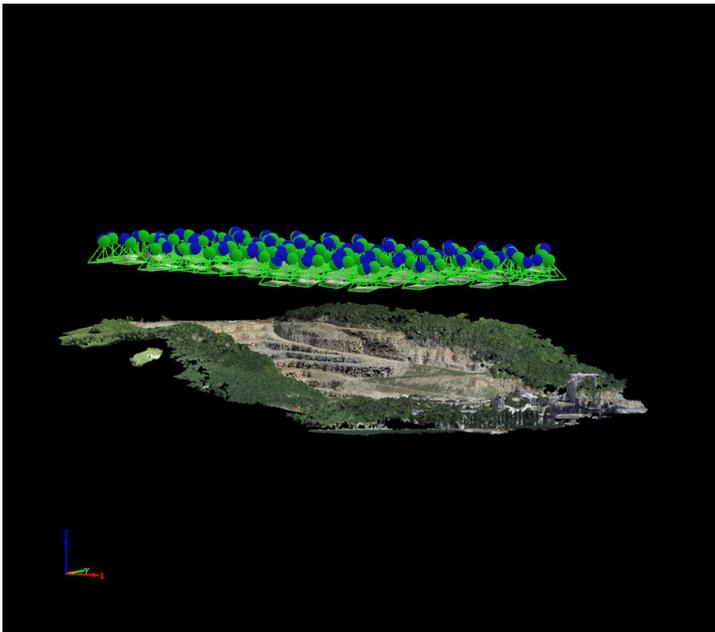
OK: Confirms the changes.

Cancel: Does not save the changes.

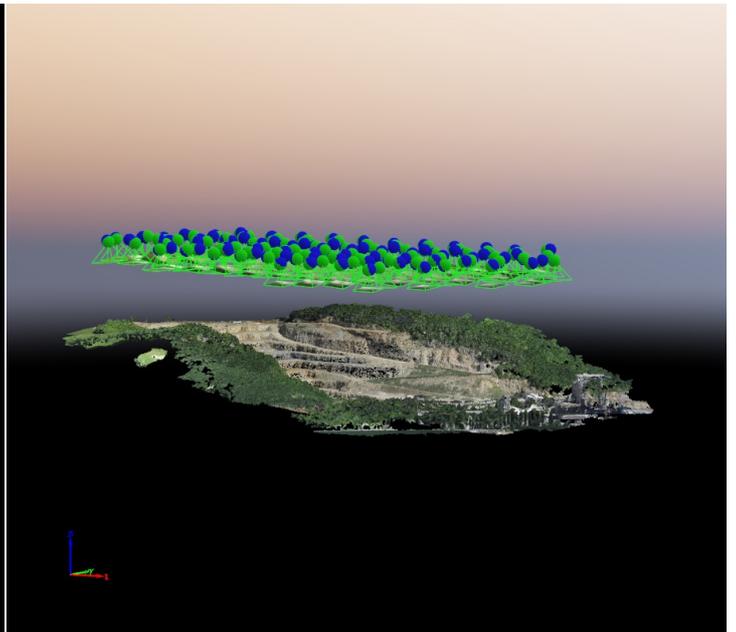
## Display Sky

 Information: This option is also available in the Volumes view: On the Menu bar, click View > Volumes and then click Volumes.

Allows the user to display a realistic sky gradient in the horizon of the plane where the project is based.



Realistic Sky Disable



Realistic Sky Enable

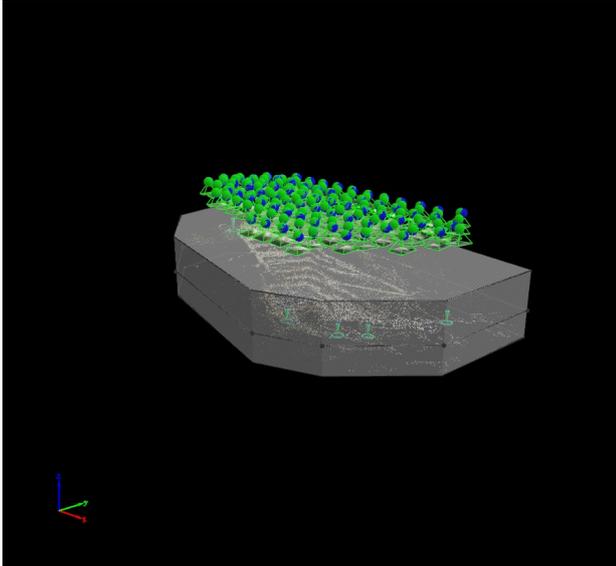
## New Processing Area

A Processing Area is an area that restricts the model displayed and/or the outputs generated. Only one Processing Area can be drawn/imported in the project. If a Processing Area already exists, the option *New Processing Area* is grayed out.

For more information about the Processing Area: [202558439](https://www.autodesk.com/support/technical/article/caas/sfdict/articles/202558439.html).

For step by step instructions on how to draw a Processing Area: [202560179](#).

Once a new Processing Area is created, the right sidebar displays the following information: [202558449](#).



### Processing Area

#### New Scale Constraint

A Scale Constraint is a line with known real Cartesian distance between 2 points, allowing to set up a local scale of the model.

It is a mathematical constraint over the geometry of the project.

It is used when:

No GCPs are not being used.

No good image geolocation is used for the images.

It is used to improve the relative accuracy by adding a local scale to the project, by defining the real distance between 2 known points.



**Important:**

It is recommended to use the several Scale Constraint and distribute them along the project.  
Once the Scale Constraints objects are added, it is needed to reoptimize.



**Warning:** When creating Scale Constraints, if the project does not have image geolocation, it is suggested as well to create Orientation Constraints to set up an local orientation for the model.



**Example:** In the real model, a Cartesian distance between point 1 and point 2 is known to be 5 meters, then, it is possible to create a scale constraint (line) having as vertices the Points A and B and setting up the distance between the points to 5 meters.

For step by step instructions about how to draw a new Scale Constraint: [205360375](#).

Once a new Scale Constraint is created, the right sidebar displays the following information: [202558219](#).



#### New Orientation Constraint

An Orientation Constraint is a line that represents a known axis, allowing to set up a local orientation of the model.

It is a mathematical constraint over the geometry of the project.

It is used when:

No GCPs are not being used.

No good image geolocation is used for the images.

It is used to avoid a rotated model or to force a certain orientation to the model, by defining one or more desired axes (X and /or Y and / or Z).



**Important:**

In case of using several Orientation Constraint, if they represent a different axis (X, Y, Z), they must be placed with  $90^\circ$  between each other to avoid a deformed model.

It is possible to create more than one Orientation Constraint for one axis (for example, X), then, the average value will be used.

Once the Orientation Constraints objects are added, it is needed to reoptimize.



**Warning:** When creating Orientation Constraints, if the project does not have image geolocation, it is suggested as well to create Scale Constraints to set up a local scale of the model.



**Example:** In the real model, the user knows that the desired orientation regarding the axis X, Y, and Z, then, it is possible to create 3 Orientation constraint having  $90^\circ$  with each other and selecting which object represents which axis, defining a 3 dimensions coordinate system basis.

For step by step instructions on how to draw a new Scale Constraint: [205360385](#).

Once a new Scale Constraint is created, the right sidebar displays the following information: [202558219](#).



### New Orthoplane

An Orthoplane is a tool to create one or several orthophotos of arbitrary areas of the model without having any impact / modifications in the model.

It is created by defining orthoprojection areas that allows to set up:

Area of interest (surface and depth).

Location.

Orientation and direction of the projection.

- ⚠ Important: It is important to define properly the box (orthoprojection area):
  - Area of interest (surface and depth).
  - Location.
  - Orientation and direction of the projection.

Only the geometry inside the box (points of the densified point cloud) will be used to find the projection surface.

For step by step instructions about how to draw a new Scale Constraint: [204664359](#).

Once a new Scale Constraint is created, the right sidebar displays the following information: [202558219](#).

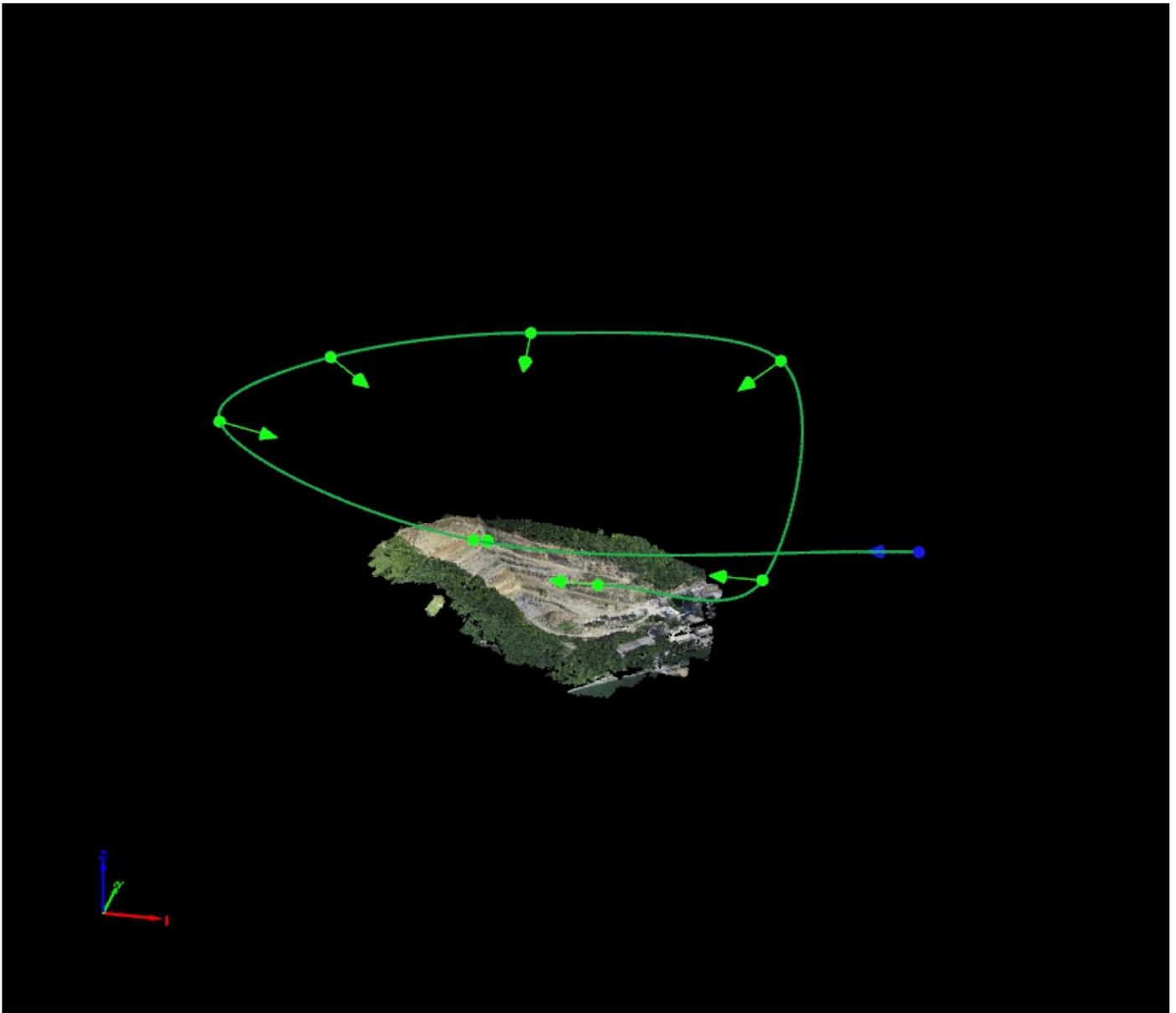


### New Video Animation Trajectory

An Animation trajectory is a 3D Fly-through Animation created as a video.

For step by step instructions about how to create a 3D Fly-through Animation: [202560299](#).

Once a new Animation Trajectory is created, the right sidebar displays the following information: [202558219](#).

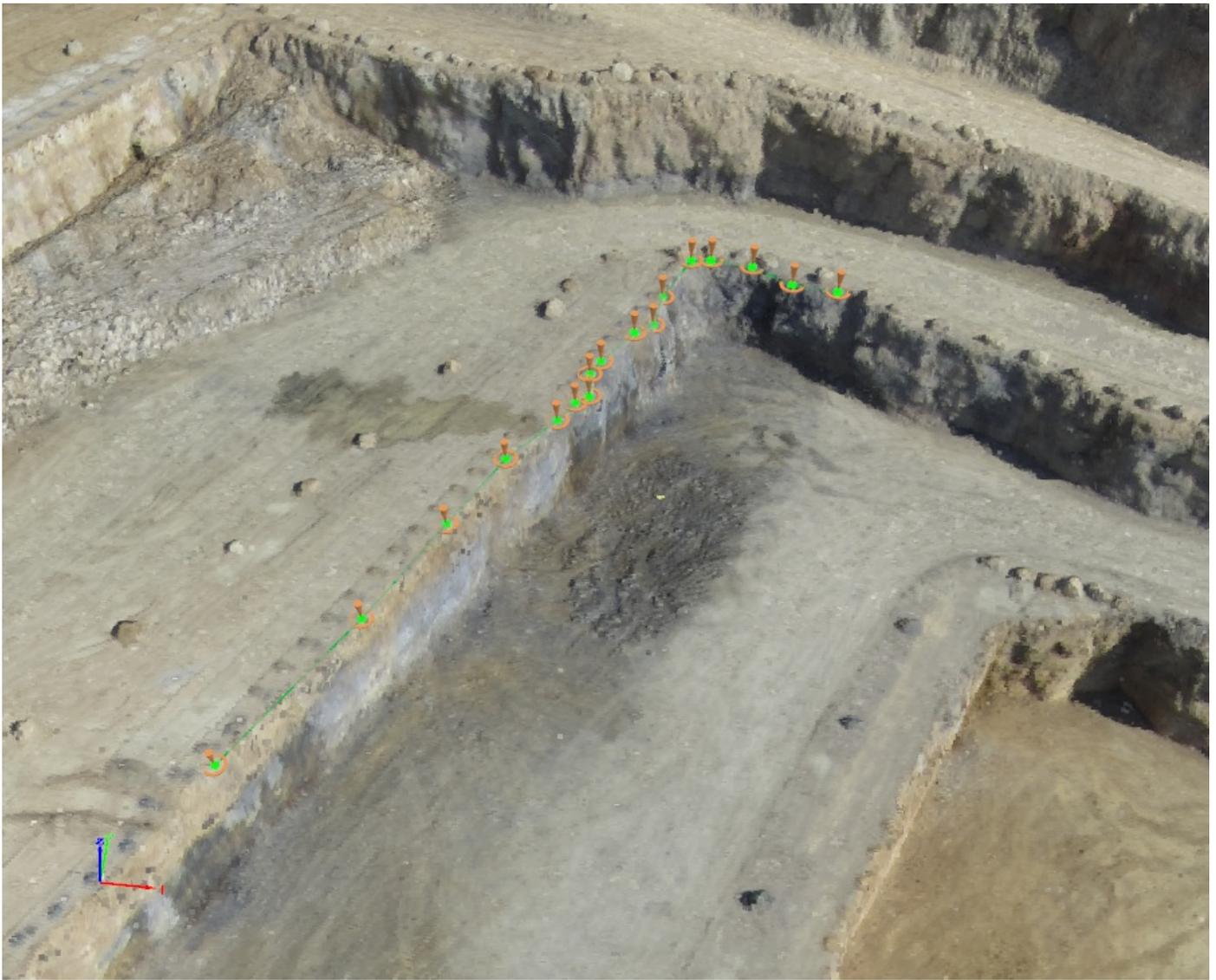


## New Polyline

A Polyline Object is a continuous line composed of one or more sub-lines. It is created by specifying the vertices of each line. For more information about the concept of Polylines: [202559829](#).

For step by step instructions about how to draw a new Polyline: [202560309](#).

Once a new Polyline is created, the right sidebar displays the following information: [202558219](#).

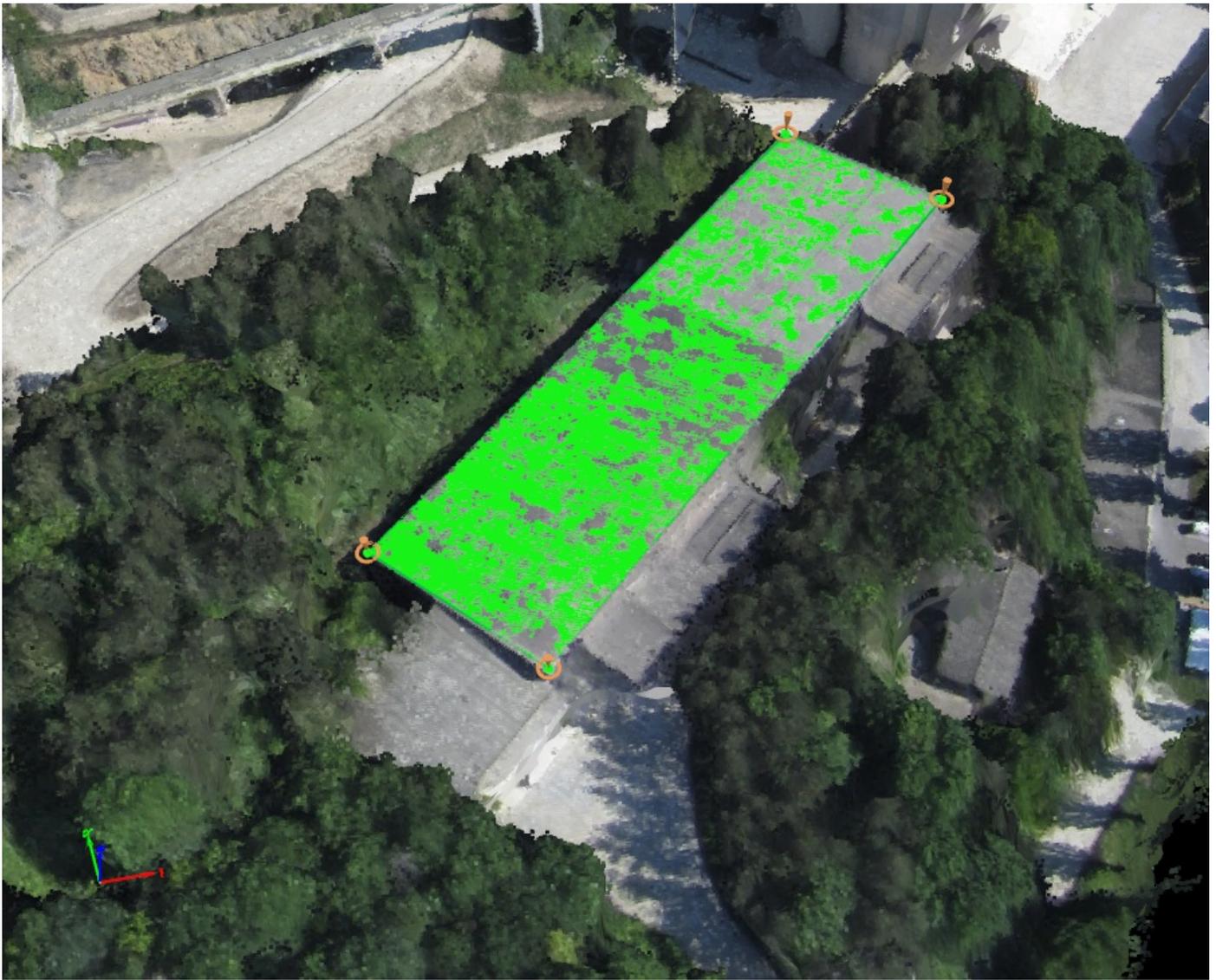


## New Surface

A Surface is an object that can be used to define planar areas such as a road, the roof of a building, etc. It can also be used to correct the DSM and generate a better orthomosaic on these surfaces.

For step by step instructions about how to draw a new Surface: [202560269](#).

Once a new Surface is created, the *Sidebar* displays following information: [202558219](#).

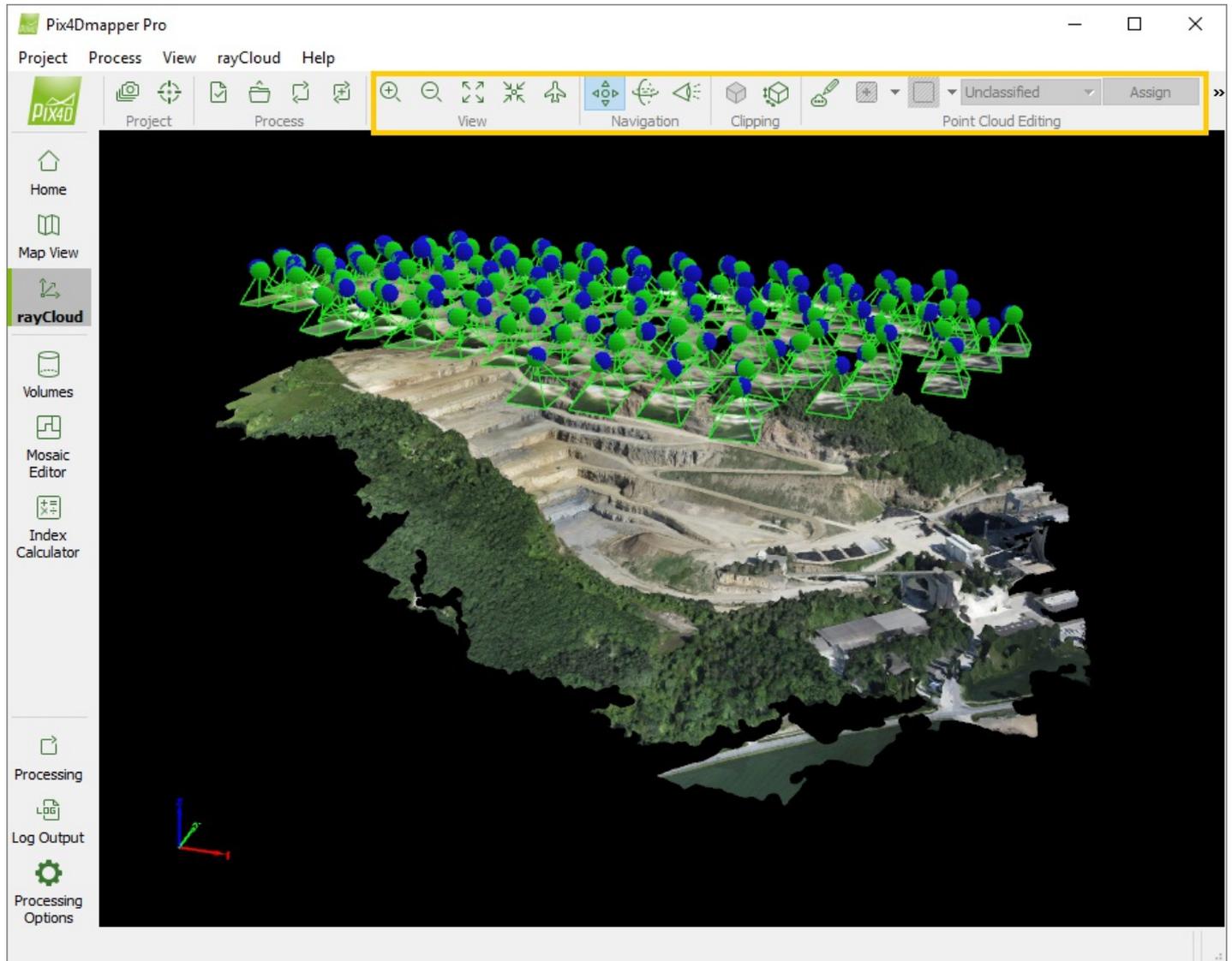


 Access: On the Menu bar, click View > rayCloud.

The following Toolbar buttons are displayed:

Standard Toolbar: For more information: [202557839](#).

Toolbar extra buttons.



Toolbar extra buttons

View

-  Zoom In: Zooms in the selected view.
-  Zoom Out: Zooms out the selected view.
-  View All: Moves the viewpoint in order to fit all the layers in the 3D View.
-  Focus on Selection: Moves the viewpoint in order to display in detail the selected element (point, camera).
-  View from Top: Moves the viewpoint in such a way that the layers are viewed from the top and fits all the layers in the 3D View.

Navigation

-  [Set standard camera](#)
-  [Set trackball camera](#)
-  [Set first person camera](#)

## Clipping

 Note: For step by step instructions about how use the clipping box in the rayCloud: [204048035](#).

 Clip Point Cloud: Applies the *Clipping Box* in the 3D View and visualizes only the area contained in the Clipping Box.

 Edit Clipping Box: Visualizes the *Clipping Box* in the 3D View, visualize the *Clipping Box* properties in the right sidebar and allows the user to edit it in the 3D View and/or the right sidebar.

## Point Cloud Editing

 Note: The points of the Point Cloud can be edited by assigning them into a different point group. For step by step instructions about how to edit the point cloud points in the rayCloud: [202560499](#).

 Edit Densified Point Cloud: Enters/exits the Edit Point Cloud Densification mode, enabling/graying out the editing toolbar buttons below.

 Add Points to Selection: Allows the user to select the points to be edited.

 Remove Points from Selection: Allows the user to unselect the points to be edited.

 Select All: Allows the user to select all the visible points to be edited.

 Clear Selection: Allows the user to clear all the points selected to be edited.

 Invert Selection: Converts the selected points to be edited into unselected and vice versa.

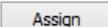
 **Unclassified** ▾ Allows the user to select the Point Group to which the selected points will be assigned. The options are:

**Unclassified:** Selected by default. It contains points that do not belong to any other point group. By default, all the points are Unclassified.

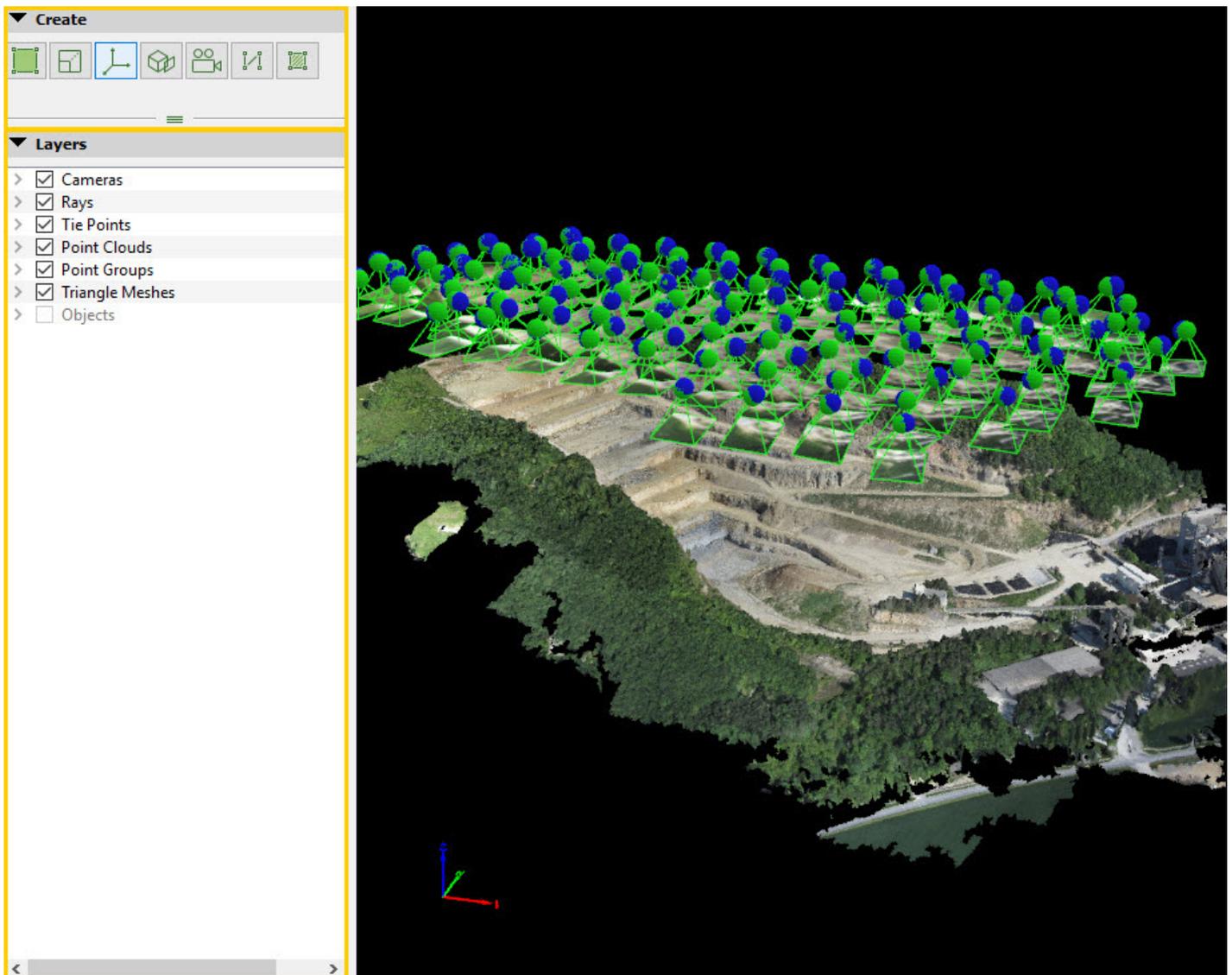
**Disabled:** Points that will not be used for the step 3. *DSM, Orthomosaic and Index*. When processing step 3. *DSM, Orthomosaic and Index*, only the points belonging to the point group *Disabled* will not be used.

**Ground, Road Surface, High Vegetation, Building, Human Made Object:** Predefined point groups that are created for the Point Cloud Classification.

**New Point Group:** Option to create new Point Groups. By clicking *New Point Group*, a pop-up appears, type the *New Point Group Name* and click OK. The created group is selected.

 **Assign** Assigns the selected points to the selected Point Group.

 Access: On the Menu bar, click View > rayCloud to open the rayCloud. The left sidebar is displayed on the left of the main window.



The left sidebar consists of the sections :

**Create:** This section allows the user to create a Processing Area, Orientation Constraints, Scale Constraints, Orthoplanes, Video Animations, Lines and Surfaces.

**Layers:** This section groups all the group of objects that can be displayed on the 3D View.

The left sidebar can be shown / hidden by dragging and dropping the left side border of the 3D View.

 Access: On the Menu bar, click View > rayCloud to open the rayCloud. The *Create* section in the left sidebar is displayed on the left of the main window.

The *Create* section consists of icons that allow the user to create a Processing Area, Scale Constraints, Orientation Constraints, Orthoplanes, Polylines and Surfaces.

The *Create* section consists of the following icons:

 Create Processing Area: Allows the user to create a Processing Area. This icon is grayed out once a Processing Area is created. For step by step instructions: [202560179](#).

 Create a New Scale Constraint: Allows the user to create a new 3D Scale Constraint. For step by step instructions: [205360375](#).

 Create a New Orientation Constraint: Allows the user to create a new 3D Orientation Constraint. For step by step instructions: [205360385](#).

 Create a New Orthoplane Constraint: Allows the user to create a new 3D Orthoplane. For step by step instructions: [204664359](#).

 Create a New Video Animation Trajectory: Starts the New Video Animation Trajectory wizard. For step by step instructions: [202560299](#)

 Create a New Polyline Object: Allows the user to create a new 3D Polyline. For step by step instructions: [202560309](#).

 Create a New Surface Object: Allows the user to create a new 3D planar Surface. For step by step instructions: [202560269](#).

 Access: On the Menu bar, click View > rayCloud to open the rayCloud. The *Layers* section in the left sidebar is displayed on the left of the main window.

A layer is a group of objects that can be displayed on the 3D View. The Layers section of the left sidebar contains the following layers:

**Cameras:** Contains all the cameras of the project. One camera is associated to each image.

**Rays:** Allows to show / hide the rays between selected points in the model and the cameras where the point has been found. Contains the rays display properties.

**Tie Points:** Contains the Manual Tie Points, GCPs, Check Points and Automatic Tie Points.

**Processing Area:** (available only if a Processing Area exists) Contains the Processing Area.

**Point Clouds:** Contains point clouds (Densified Point Cloud and loaded external point clouds).

**Point Groups:** Contains the different groups of points (each point of the densified point cloud is assigned to one group).

**Triangle Meshes:** Contains Triangle Meshes (generated in Pix4Dmapper or imported).

**Objects:** Contains any drawn object: Polylines, Surfaces, Video Animation Trajectories, Orthoplanes, Scale Constraints and Orientation Constraints.

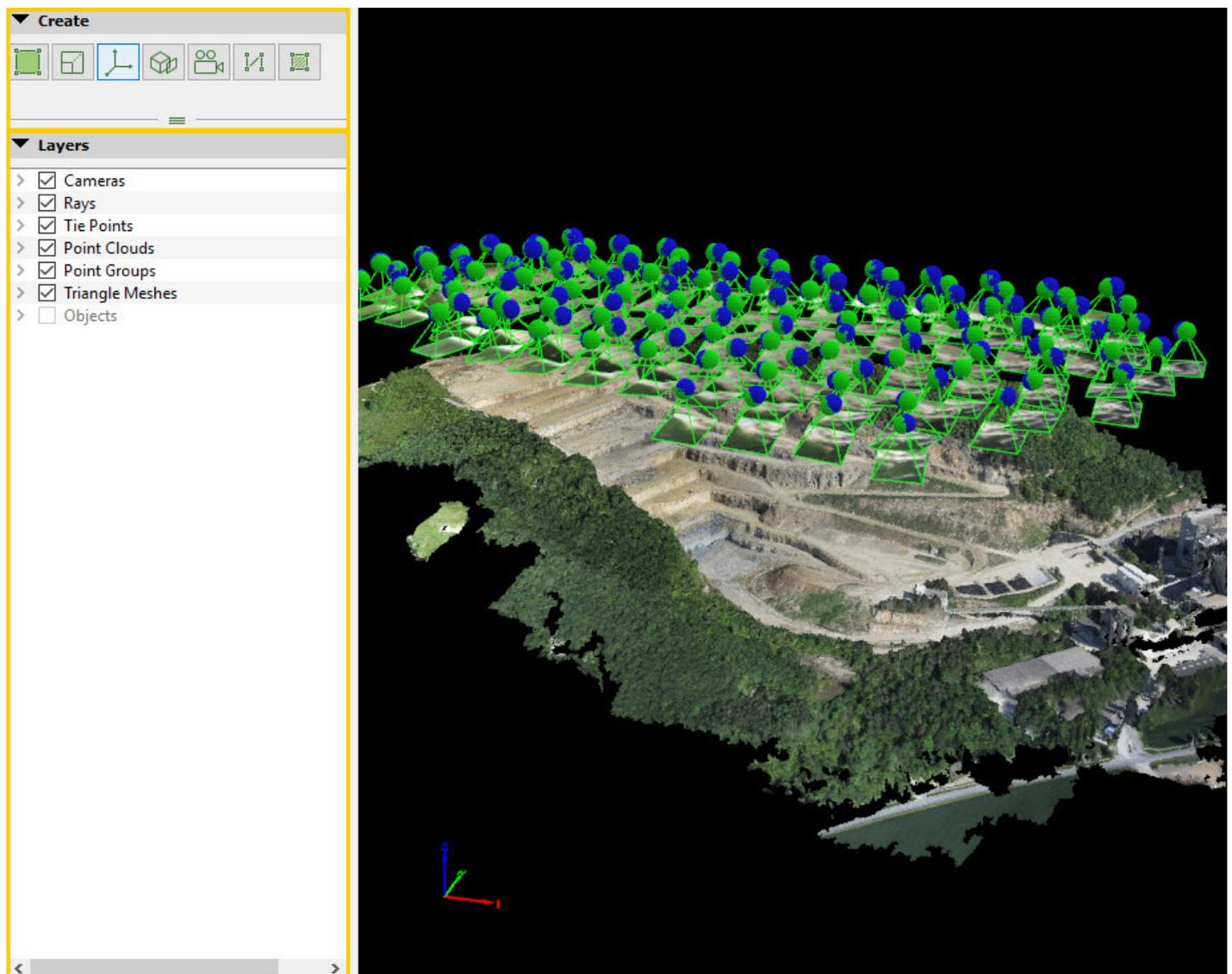
Characteristics:

By clicking on the left arrow of a layer, the sub-layers and layer properties are shown or hidden.

By clicking on the a layer's check box, the corresponding layer is shown or hidden in the 3D View.

The different layer properties can be edited.

Some layers have a context menu that can be accessed by right clicking on the corresponding layer.



 Access: On the Menu bar, click View > rayCloud to open the rayCloud. The *Layers* section in the left sidebar is displayed on the left of the main window.

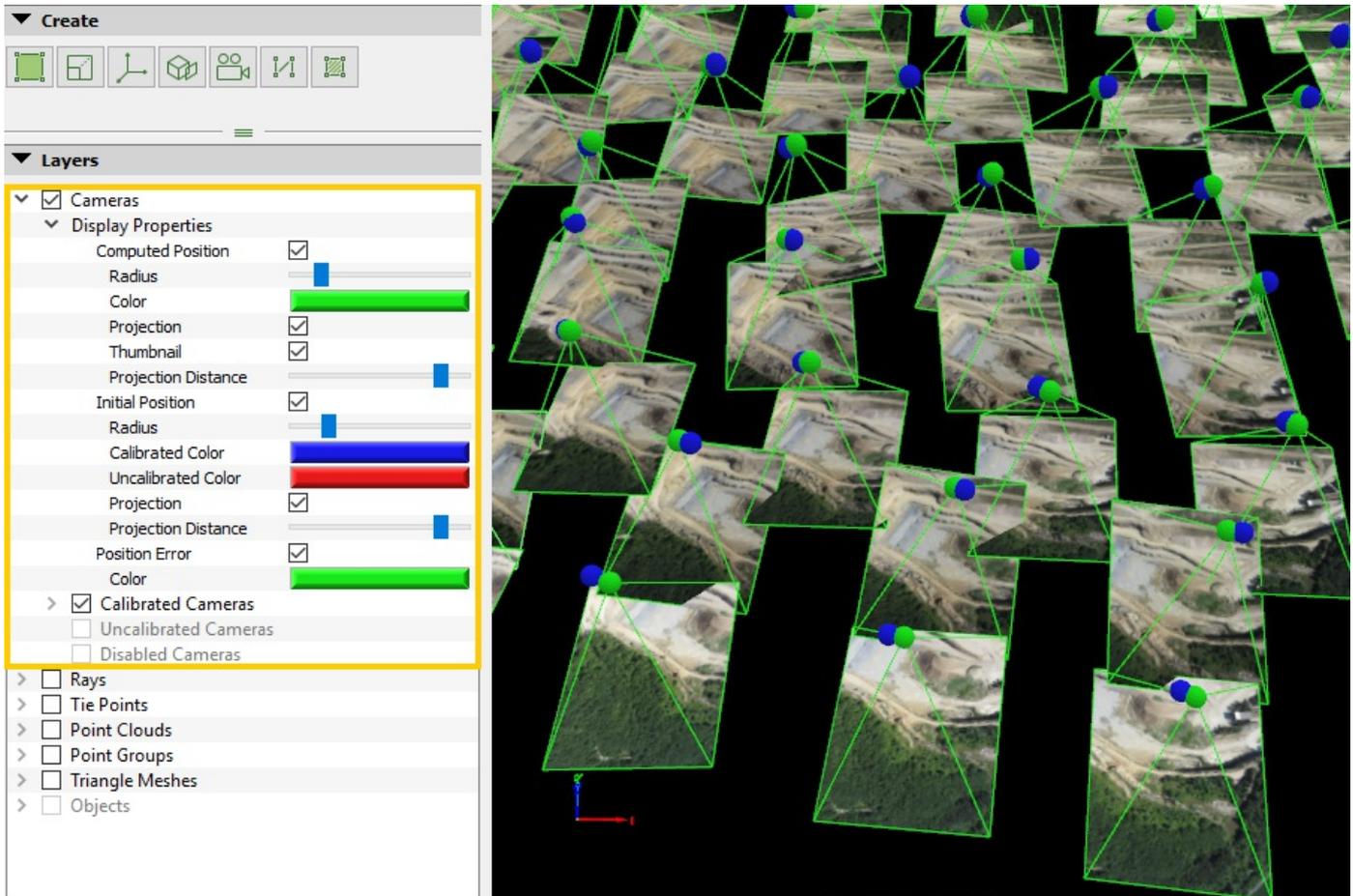
The *Cameras* layer contains the following sub-layers:

**Display Properties:** Displays properties for all the cameras.

**Calibrated Cameras:** The cameras that have been used for the reconstruction of the model.

**Uncalibrated Cameras:** The cameras that have not been used for the reconstruction. These cameras are cameras for which the optimized position could not be computed during initial processing and that have been discarded from the reconstruction.

**Disabled Cameras:** The cameras that have been disabled by the user.



### Display Properties

The Display Properties layer allows to edit the display properties for all the cameras. The following properties can be edited:

**Computed position:** View/hide the calibrated (optimized) camera position sphere (this property affects only the *Calibrated cameras*).

**Radius:** Increases/decreases the computed camera positions' sphere radius (this property affects only the *Calibrated cameras*).

**Color:** Selects the computed camera positions' sphere color, the color for the projection lines (between the computed position and the corners of the thumbnails) and the color for the thumbnails borders (this property affects only the *Calibrated cameras*).

**Projection:** View/hide projection lines between the computed camera positions and the thumbnails (this property affects only the *Calibrated cameras*).

**Thumbnail:** View/hide the thumbnails of the original images (this property affects only the *Calibrated cameras*).

**Projection Distance:** Increases/decreases the distance between the computed camera positions and the thumbnails (this property affects only the *Calibrated cameras*).

**Initial Position:** View/hide the initial camera position sphere.

**Radius:** Increases/decreases the initial camera positions sphere radius.

**Calibrated Color:** Selects the initial camera positions' sphere color for the *Calibrated Cameras* (cameras used for the reconstruction).

**Uncalibrated color:** Selects the initial camera positions' sphere color for the *Uncalibrated Cameras* (cameras not used for the reconstruction).

**Projection:** View/hide projection lines between the computed camera positions and the hypothetical thumbnails (the thumbnail box appears but empty).

**Projection Distance:** Increases/decreases the distance between the computed camera positions and the hypothetical thumbnails.

**Position Error:** View/hide a line between initial and computed camera positions (this property affects only the *Calibrated cameras*).

**Color:** Color for the line between initial and computed camera positions (this property affects only the *Calibrated cameras*).

### Calibrated Cameras

The Calibrated Cameras layer contains the list of Calibrated Cameras.

On the left of each camera name, the  icon is displayed to indicate that the camera is calibrated.

#### Uncalibrated Cameras

The Uncalibrated Cameras layer contains a list of Uncalibrated Cameras.

On the left of each camera name, the  icon is displayed to indicate that the camera is uncalibrated.

#### Disabled Images

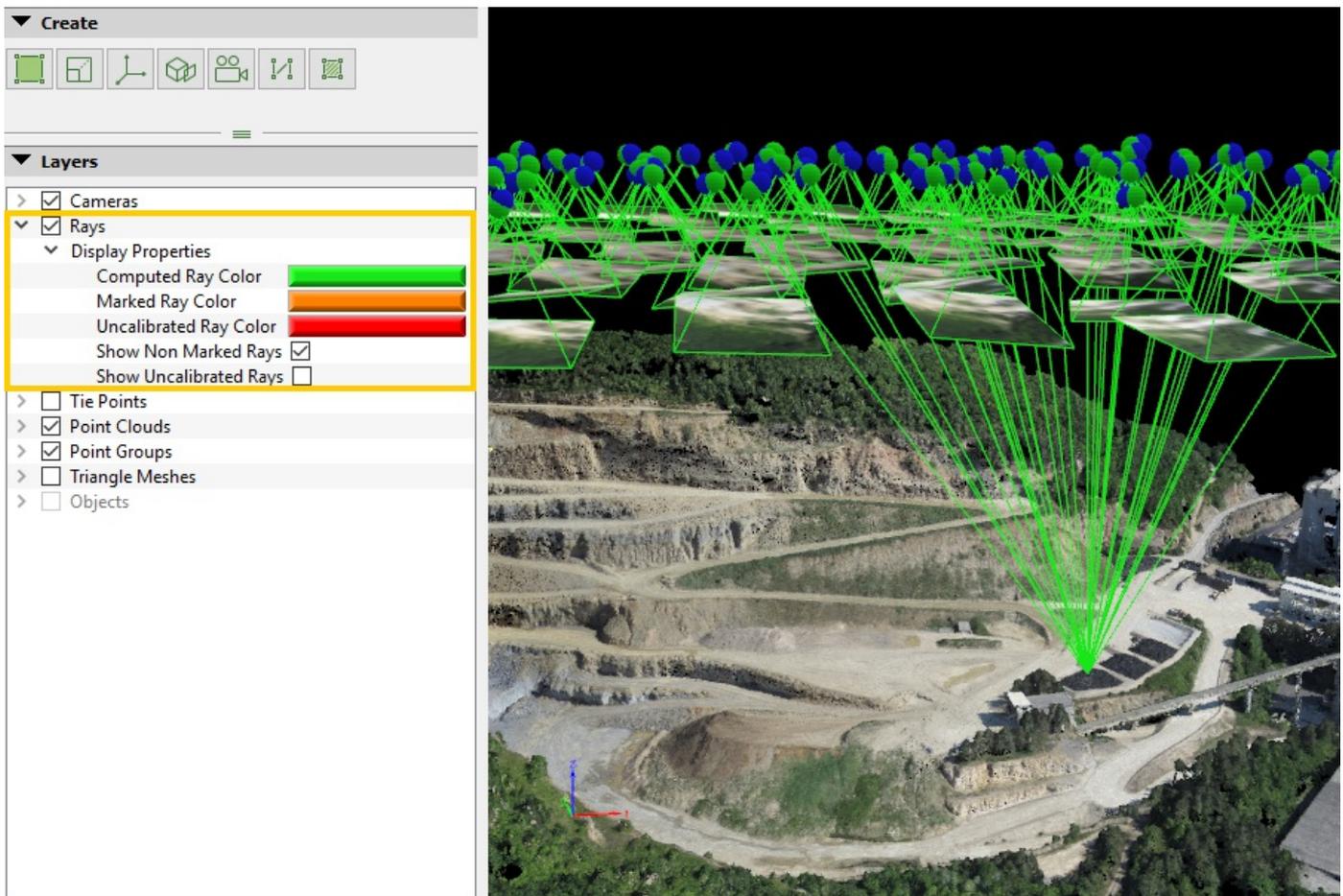
The Disabled images layer contains a list of the images disabled by the user.

On the left of each camera name, the  icon is displayed to indicate that the camera is disabled.

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 Access: On the Menu bar, click View > rayCloud to open the rayCloud. The *Layers* section in the left sidebar is displayed on the left of the main window.



 Note: Even if the layer *Rays* is selected, if the layer *Cameras* is not selected, the rays will not be visible.

The *Cameras* layer contains the following sub-layer:

Display Properties: Displays properties for all the rays.

#### Display Properties

The following properties can be edited:

Computed Ray Color: Selects the ray color for the projection lines between the selected 3D point and the calibrated cameras where the 3D point was visible but not marked, crossing the thumbnail in the 3D point where the point is found in the original image.

Marked Ray Color: Selects the ray color for the projection lines between the selected 3D point and the calibrated cameras where the 3D point was marked, crossing the thumbnail in the point where the 3D point is found in the original image.

Uncalibrated Ray Color: Selects the ray color for the projection lines between the selected 3D point and the not calibrated cameras.

Show Non Marked Rays: View/hide the rays for calibrated cameras where the 3D point was visible but not marked.

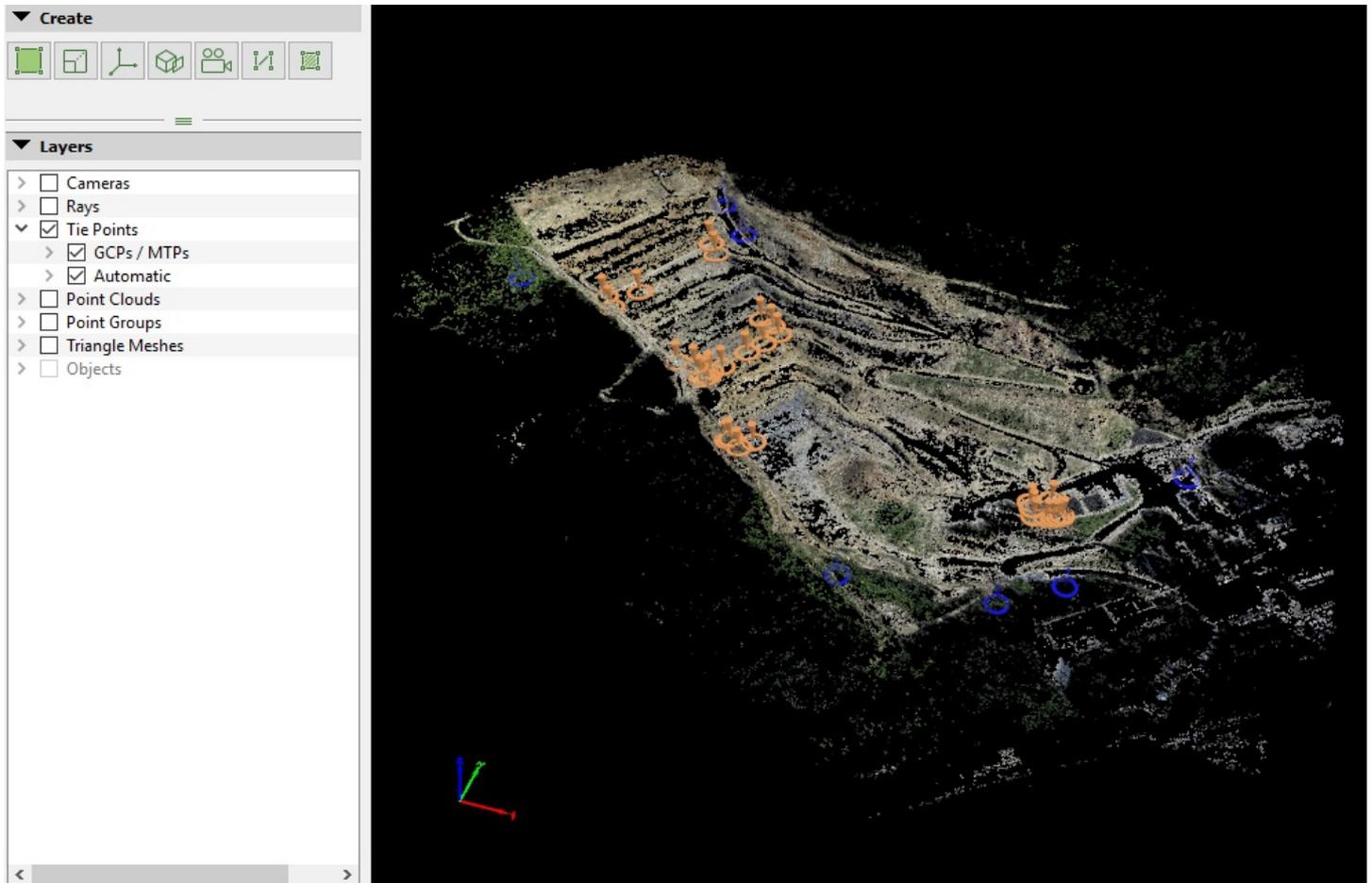
Show Uncalibrated Rays: View/hide the rays for uncalibrated cameras.

 Access: On the Menu bar, click View > rayCloud to open the rayCloud. The *Layers* section in the left sidebar is displayed on the left of the main window.

The Tie Points layer contains the following sub-layers:

**GCPs/MTPs:** All the Manual Tie Points, 2D GCPs, 3D GCPs, and Check Points of the project.

**Automatic:** The Automatic Tie Points computed during step 1. *Initial Processing*. Only Automatic Tie Points visible in at least 3 images are displayed.



## GCPs/MTPs

The GCPs/MTPs layer has the following structure:

**Display Properties:** Displays properties of all Manual Tie Points and GCPs.

**Computed Position:** View/hide the points optimized position.

**Minimum Pixel Size:** Defines the size of the points' computed positions on the screen (not the real size of the points with respect to the model). This property allows the points to be visible both when visualizing the model from very close and from very far. When the zoom level is above the given zoom level defined by the Minimum size property, the points keep the same size on the screen independently from the zoom level. When zooming in closer to the model, below the zoom level defined by the Minimum size property, the size of the points on the screen will increase each time the user zooms in so that the points remain visible even if the view is close to the model.

**Minimum Physical Size:** Defines the minimum physical size of the points in the 3D View. This defines the zoom level below which the points need to be displayed with their real size with respect to the model so that the points remain visible even when zooming in very close to the model.

**Marked Color:** Cross color of the points' computed positions for points marked on at least 2 images.

**Non marked color:** Cross color of the points' computed positions for points marked in less than 2 images.

**Initial Position:** View/hide the points' initial positions (this property affects only the GCPs and Check points).

**Minimum Pixel Size:** Defines the size of the points' initial positions on the screen (not the real size of the points with respect to the model). This property allows the points to be visible both when visualizing the model from very close and from very far. When the zoom level is above the given zoom level defined by the Minimum size property, the points keep the same size on the screen independently from the zoom level. When zooming in closer to the model, below the zoom level defined by the Minimum size property, the size of the points on the screen will increase each time zooming in so that the closer to the model the view gets, the points remain visible.

**Minimum Physical Size:** Defines the physical minimum size of the points on the 3D View. This defines the zoom level below which the points need to be displayed with its real size with respect to the model so that the points remain visible even when zooming in very close to the model.

**Color:** Cross color of the points' initial positions for GCPs.

**Checkpoint Color:** Cross color of the points' initial positions for Check Points.

**Position error:** View/hide the line between the points' initial and computed positions (this property affects only the GCPs and Check points).

**Color:** Color for the line between the points' initial and computed positions (this property affects only the GCPs and Check points).

Show Error Ellipsoid: View/hide the ellipsoid formed by the theoretical error. For more information: [202559139](#).

Color: Color for the error ellipsoid.

Physical Size Scale: Defines the minimum physical size of the ellipsoid on the 3D View. This defines the zoom level below which the ellipsoid need to be displayed with their real size with respect to the model so that the ellipsoid remain visible even when zooming in very close to the model.

List of Manual Tie Points, 2D GCPs, 3D GCPs and Check points: Each point has the following sub-element:

Display Properties: This layer allows the user to edit the display properties for the corresponding point. The properties that can be edited are the same than the properties for all the points.

On the left of each point's name, an icon is displayed that indicates the type of the point. The type can be:

 Manual Tie Point

 2D GCP

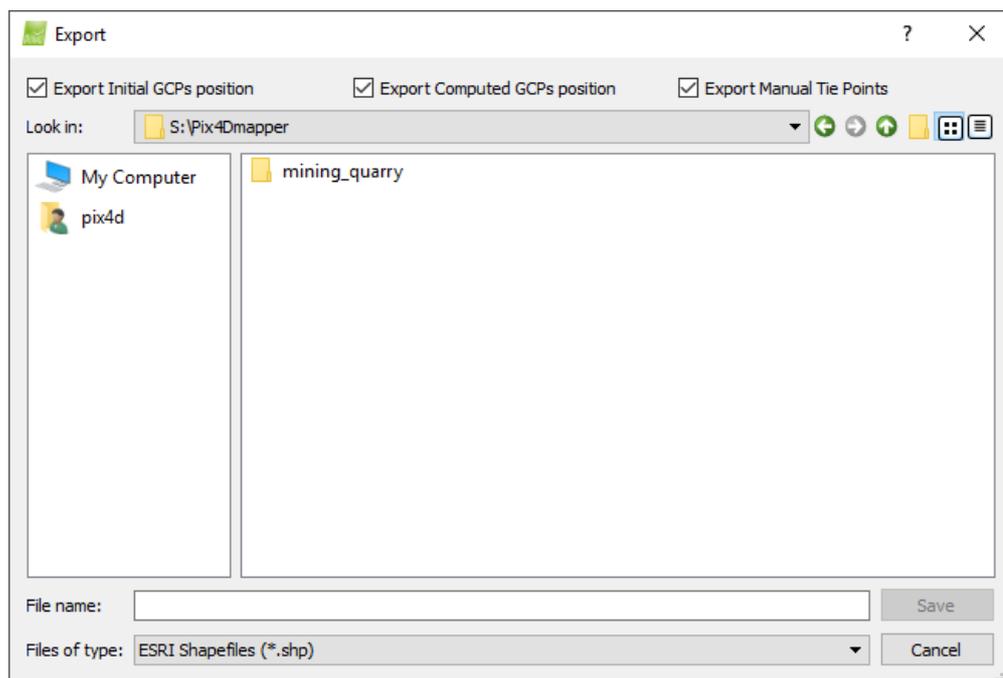
 3D GCP

 Check Point

By right clicking the GCPs/MTPs layer, a context menu with the following action appears:

Export Points: Opens the *Export* pop-up, allowing the user to export Manual Tie Points and/or, export initial and/or computed GCPs position.

 Note: If the model does not have GCPs or Manual Tie Points, the option Export Points will be grayed out.



The available formats are:

AutoCad DFX (\*.dxf)

ESRI Shapefiles (\*.shp)

Keyhole Markup Language (\*.kml)

Microstation DGN (\*.dgn)

On the top of the *Export* pop-up there are 3 check-boxes that allow the user to select what kind of points to export:

Export Initial GCPs position: Exports the initial position of the GCPs.

Export Computed GCPs position: Exports the computed position of the GCPs.

Export Manual Tie Points: Export the Manual Tie Points.

By right clicking on a point layer, a context menu with the following actions appears:

Rename: Rename the point.

Remove: Removes the point.

Automatic

This layer displays the Automatic Tie Points that are computed during initial processing. Each Tie Point is visible in at least 3 images. The Automatic layer has the following sub-element:

Display Properties: Displays properties of the Automatic Tie Points.

Point Size: Size for each point in the 3D View.

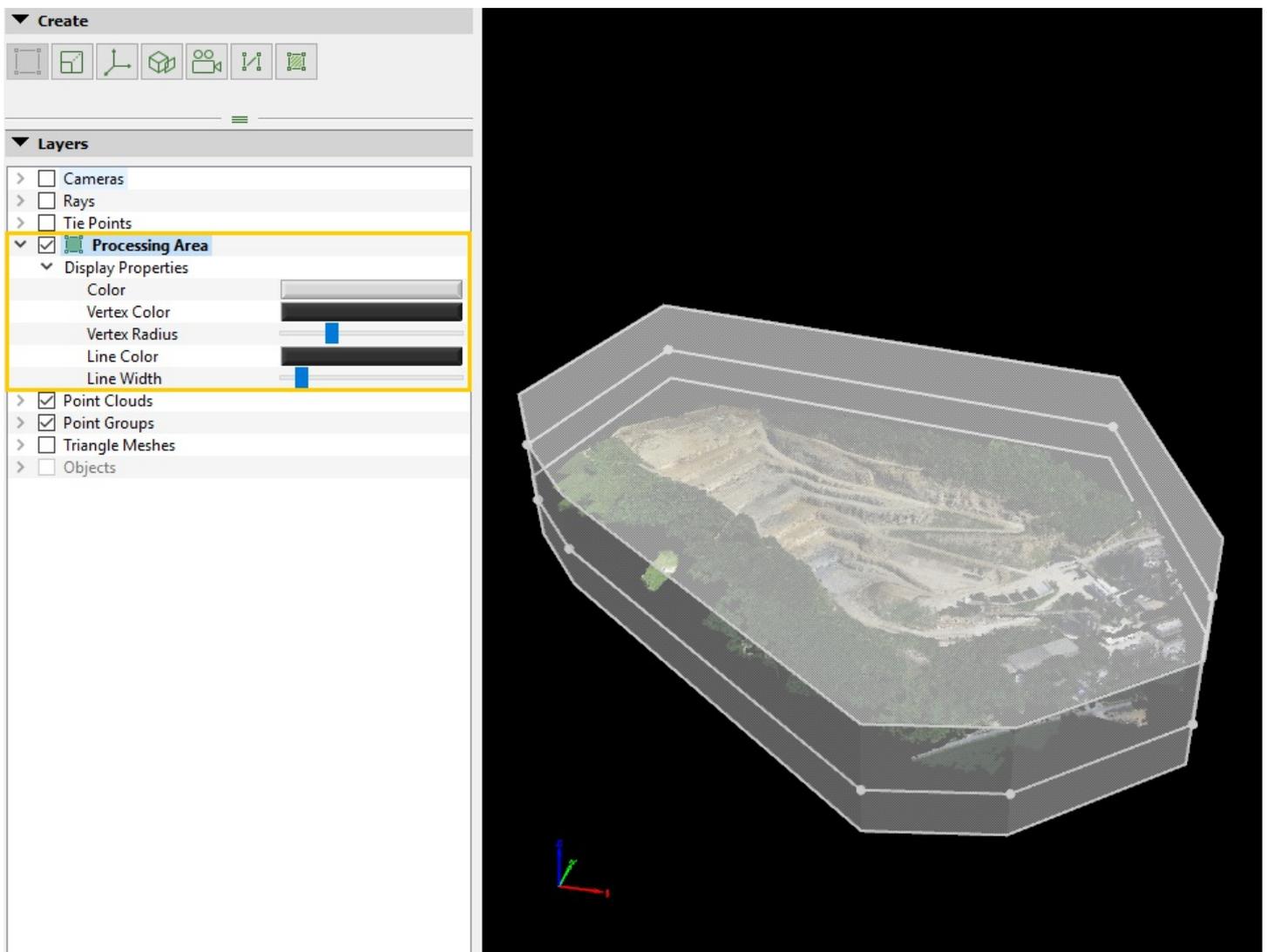


 Access: On the Menu bar, click View > rayCloud to open the rayCloud. The *Layers* section in the left sidebar is displayed on the left of the main window. The *Processing Area* layer appears on the *Layers* section of the left sidebar once a *Processing Area* is drawn.

 Warning:  
It is recommended to include areas covered by images in the *Processing Area*, so as to exclude areas of low overlap that can affect the results. The *Processing Area* affects only the visualization of the Automatic Tie Points in the 3D View of the rayCloud. It does not affect the results of step 1. *Initial Processing*.  
When the *Processing Area* is defined before step 2. *Point Cloud and Mesh* is processed, it affects the Point Cloud visualized in the 3D View of the rayCloud and the *Volumes View* and the results saved on disk. This *Processing Area* will also affect the results of step 3. *DSM, Orthomosaic and Index*.  
When the *Processing Area* is defined after step 2. *Point Cloud and Mesh* is completed, it only affects the Point Cloud visualized in the 3D View of the rayCloud and the *Volumes View* but not the results saved on disk. This *Processing Area* will also affect the results of step 3. *DSM, Orthomosaic and Index*.  
When exporting the Point Cloud, it is possible to take into account the *Processing Area*, even if it is drawn after step 2 is processed. For more information about how to export the Point Cloud: [203890769](#).  
When the *Processing Area* is defined before step 3. *DSM, Orthomosaic and Index* is completed, only the results of step 3 will be affected.

 Warning:  
In order to take the *Processing Area* into account for the visualization of the Point Cloud and / or the generation of the outputs of step 2. *Point Cloud and Mesh*, the corresponding filter should be selected in the *Processing Options*. For more information: [204644369](#).  
  
The *Processing Area* will be taken into account for the results of step 3. *DSM, Orthomosaic and Index* even if the *Processing Areas* box is not selected in the *Point Cloud Filters*.

 Note: For step by step instructions about how to select a *Processing Area*: [202560179](#).



By right clicking on the *Processing Area* layer a context menu with the following option appears:

**Remove:** Allows the user to remove the Processing Area. The *Create Processing Area* icon in the *Create* section of the left sidebar of the rayCloud can be used again to create a new Processing Area. The *Processing Area* layer of the *Layers* section of the left sidebar of the rayCloud is removed.

The Processing Area has the following sub-element:

**Display Properties:** Allows the user to edit the display properties for the Processing Area. The following properties can be edited:

**Color:** Color of the top, bottom, and side planes that define the area.

**Vertex Color:** Color of the spheres that represent the vertices of the middle plane of the area.

**Vertex Radius:** Radius of the spheres that represent the vertices of the middle plane of the area.

**Line Color:** Color of the lines between the vertices of the planes (bottom, middle, and top planes) of the area.

**Line Width:** Width of the lines between the vertices of the planes (bottom, middle, and top planes) of the area.

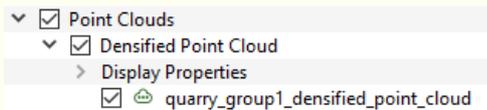
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 Access: On the Menu bar, click View > rayCloud to open the rayCloud. The *Layers* section in the left sidebar is displayed on the left of the main window.

 Note: This layer is also accessible from the Volumes view. On the Menu bar, click View > Volumes to open the *Volumes*. The *Layers* section is displayed on the left of the main window. The Volumes view is available when the point cloud and the DSM are generated. The Display Properties of the point clouds can be changed in the rayCloud and the Volumes. When they are changed in one view, they will be inherited in the other view.

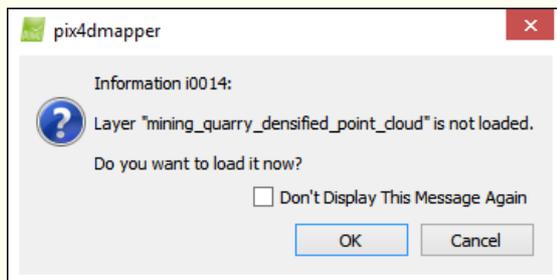
 Note: By default, the different point clouds are not loaded or displayed: The name of a loaded point cloud is displayed in standard format, while the name of point clouds that are not loaded are displayed in italics.



By clicking on the point cloud's check box, the corresponding point cloud's visibility is toggled in the 3D View.

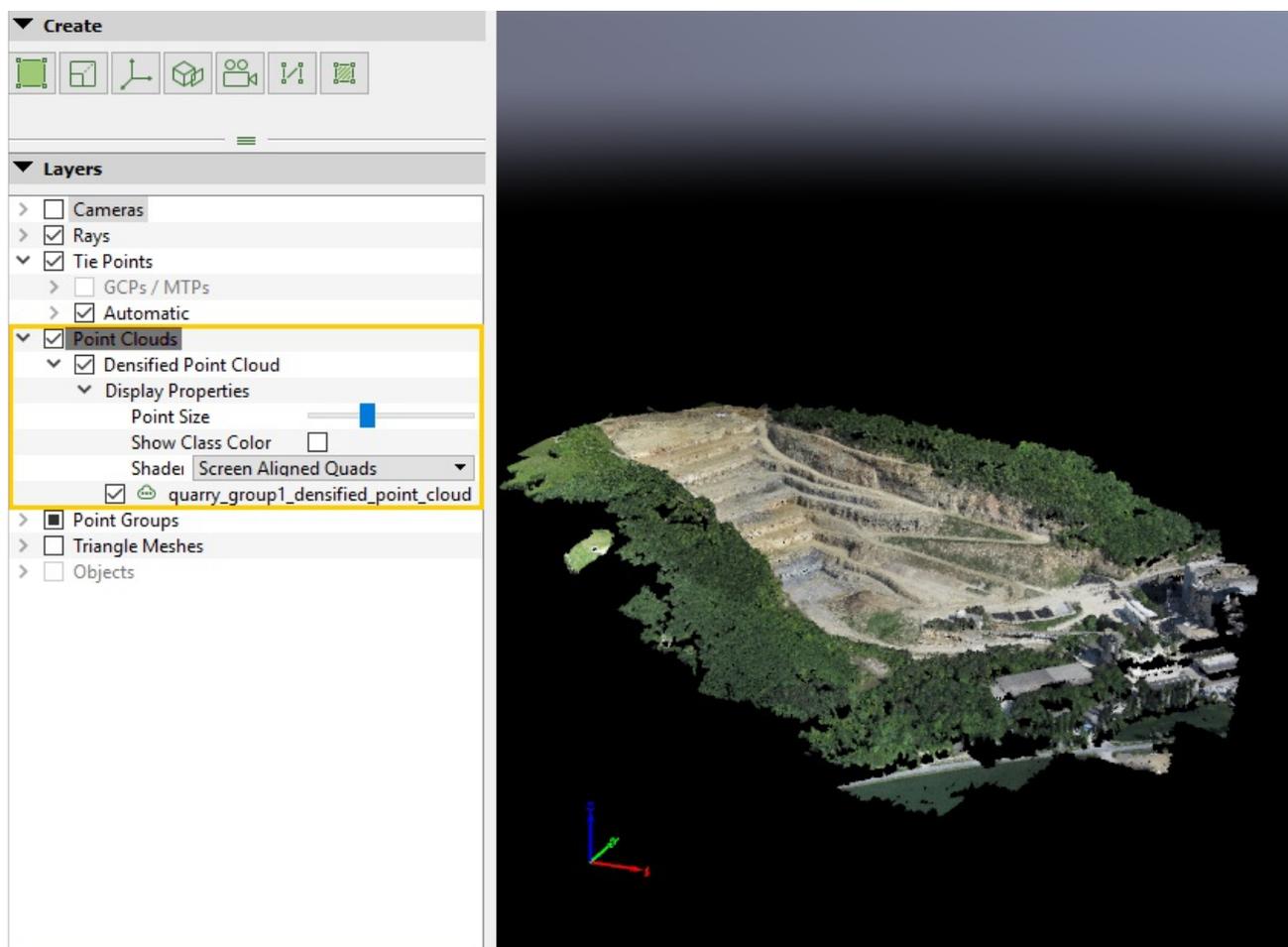
Once step 2 is completed, when reopening a project, or when a point cloud has been unloaded:

The point clouds are not loaded in the rayCloud. The next time that the point cloud's check box is selected, the *Information i0014* pop-up message appears:



OK: Loads and displays the mentioned layer in the rayCloud.

Cancel: Closes the pop-up message and does not perform any action.



## Densified Point Cloud

The Densified Point Cloud layer has a sub-layer that displays the name of the available point cloud(s). If the point cloud has been generated by splitting it into multiple parts, each part is displayed as one layer. On the left of the point cloud name there is an icon indicating that the layer is a point cloud: .

The loaded point cloud layer has the following sub-elements:

Display Properties: Allows to edit the display properties for the densified point cloud. The following property can be edited:

Point Size: Size of each point for the densified point cloud in the 3D View.

Show Class Color: Displays the point cloud classification results. Each point is drawn as a flat square, having a different color according to the predefined point group it belongs. When the point cloud classification is not generated, white color is applied to all the points. White color is also applied to points that belong to a user-defined group.

Shader: Defines the points shape and color in the 3D View. The different options are:

Screen Aligned Quads (default): Each point is drawn as a flat square where the point is located. It is the fastest to render but produces many artifacts when changing the viewpoint. The color for each point comes from the reconstruction.

Spherical Points: Each point is drawn as a non-perspective corrected sphere, for example, an approximated ball. It reduces the artifacts when moving the view but is not correct when the points are very close to the viewpoint. It gives the best compromise between rendering speed and image quality. The color for each point comes from the reconstruction.

Spherical Points (HD): Each point is drawn as a perspective corrected sphere. This gives the highest image quality but it is very slow to render. The color for each point comes from the reconstruction.

Screen aligned quads, Altitude (Red,Green,Blue): The same as *Screen Aligned Quads* but the color for each point is given by the altitude.

Spherical Points, Altitude (Red,Green,Blue): The same as *Spherical Points* but the color for each point is given by the altitude.

Spherical Points (HD), Altitude (Red,Green,Blue): The same as *Spherical Points (HD)* but the color for each point is given by the altitude.

Screen aligned quads, Thermal: Useful for thermal project. The same as *Screen Aligned Quads* but the color for each point is given by the value of the channel in the Ironbow palette.

Spherical Points, Thermal: Useful for thermal project. The same as *Spherical Points* but the color for each point is given by the value of the channel in the Ironbow palette.

By clicking on an specific densified point cloud's check box, the corresponding point cloud is shown or hidden in the 3D View.

By right clicking on an specific densified point cloud's name, a context menu with the following action appears:

Load Layer: Visible if the point cloud is not loaded, loads the point cloud in the rayCloud.

Unload Layer: Visible if the point cloud is loaded, unloads the point cloud from the rayCloud.



Tip: Loaded layers consume RAM and GPU memory. Unloading layers that are not needed increases the speed using the rayCloud.

Export Point Cloud: Allows to export a Densified Point Cloud of all the selected point groups, with the selected properties, in the selected formats and with the desired path / file name.

 Important: If a Processing Area exists, only points with the processing area are exported.

Useful in cases where:

The point cloud has been modified using the rayCloud (deleted points, changed or created the Processing area).

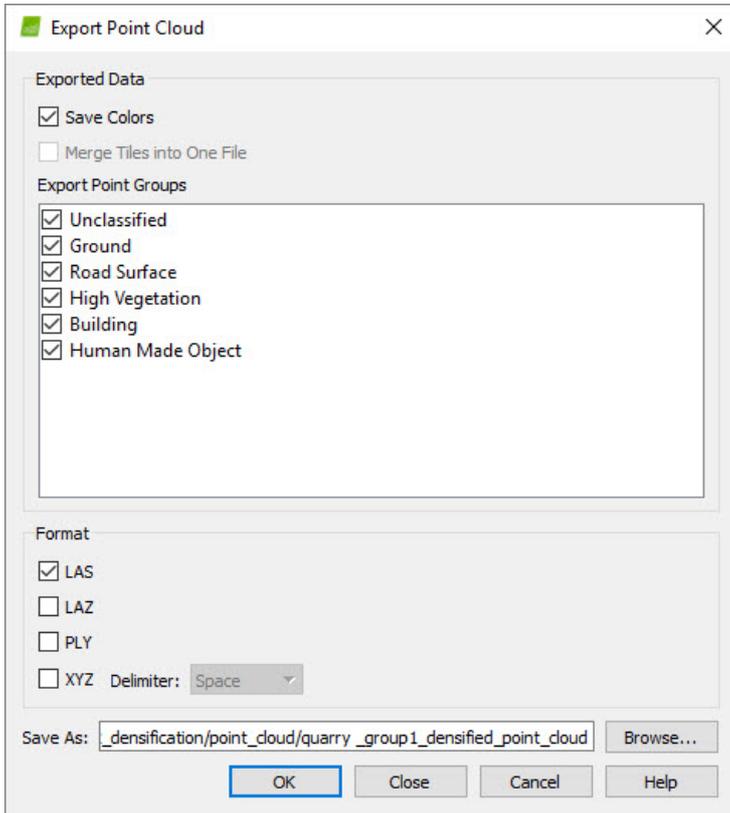
The point groups generated during the point cloud classification need to be exported.

The intent is to export only one/some point groups.

Some point cloud format files were not generated (not selected in the processing options).

Change output options: Save/discard colors.

By clicking Export Point Cloud, the *Export Point Cloud* pop-up appears:



It contains 2 sections:

Exported Data: Allows the user to configure some parameters for the exporting and allows to select the *Point Groups* to export.

Save Colors: Selected by default, this saves the color values for each point of the Point Cloud. If not selected, the color will not be exported for the exported point cloud.

Merge Tiles Into One File: Not selected by default. In case the point cloud output files were divided in parts, this forces to export all parts within the same file by merging the parts.

 Warning: When generating the point cloud, if it consists of many points, it is divided into parts.

When exporting a point cloud and selecting Merge Tiles Into One file, the software will export one tile for the entire point cloud.

Export Point Groups: Allows the user to select which point groups will be exported for the Densified Point Cloud. By default, all the point groups are selected.

Even when the point cloud classification has not been generated, the predefined point groups appear in the *Export Groups* section. By selecting the box next to the point group name, the point group will be exported.

 Warning: The exported Densified Point Cloud will contain all the point groups selected. By default, all the point groups are selected. The Disabled point group cannot be exported.

Format: Allows the user to select the different formats in which the point cloud is exported. It is possible to select:

LAS

LAZ

PLY

XYZ (it is possible to use as a delimiter: Space, Tab, Comma and Semicolon).

And:

File Name: Displays the path and name where the point cloud will be stored. By default, this is the project folder where the point cloud is stored after step 2. *Point Cloud and Mesh*.

Browse...: Allows the user to select the path/name where the exported point cloud will be stored.

 Warning: If the exported point cloud file is saved with the same name in the same folder where an existing file exists, it will replace the existing point cloud.

OK: Saves the project and exports the selected formats with the selected parameters.

Cancel: Closes the pop-up message and does not perform any action.

## External Point Clouds

It is possible to visualize other point clouds by selecting the point cloud file and drag and dropping it into the *Point Clouds* layer. A new sub-layer is added to the Point Clouds layer with the path to the loaded file as name. The loaded point cloud has the following sub-element:

Display Properties: Displays properties for the corresponding point cloud.

Point Size: Size of each point for the corresponding point cloud in the 3D View.

Shader: Defines the points shape and color in the 3D View. The different options are:

Screen Aligned Quads (default): Each point is drawn as a flat square where the point is located. It is the fastest to render but produces many artifacts when changing the viewpoint. The color for each point comes from the reconstruction.

Spherical Points: Each point is drawn as a non-perspective corrected sphere, for example, an approximated ball. It reduces the artifacts when moving the view but is not correct when the points are very close to the viewpoint. It gives the best compromise between rendering speed and image quality. The color for each point comes from the reconstruction.

Spherical Points (HD): Each point is drawn as a perspective corrected sphere. This gives the highest image quality but it is very slow to render. The color for each point comes from the reconstruction.

Screen aligned quads, Altitude (Red,Green,Blue): The same as *Screen Aligned Quads* but the color for each point is given by the altitude.

Spherical Points, Altitude (Red,Green,Blue): The same as *Spherical Points* but the color for each point is given by the altitude.

Spherical Points (HD), Altitude (Red,Green,Blue): The same as *Spherical Points (HD)* but the color for each point is given by the altitude.

The following formats can be loaded:

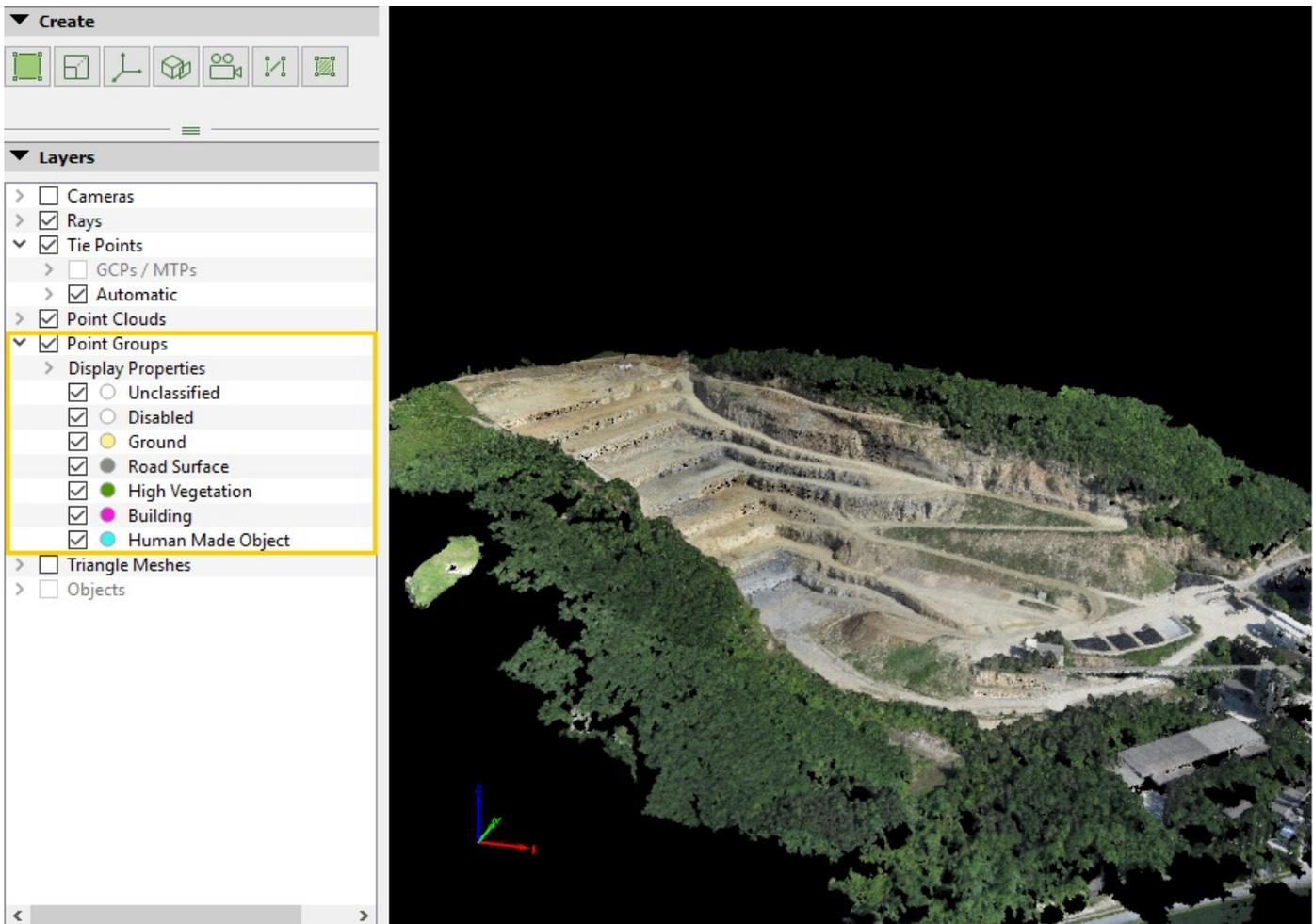
.las

.laz

Loaded point clouds are displayed in the right position if it is a Pix4Dmapper file or an external file using the same coordinate system as the output coordinate system selected in Pix4Dmapper.

 Access: On the Menu bar, click View > rayCloud to open the rayCloud. The *Layers* section in the left sidebar is displayed on the left of the main window.

 Note: This layer is also accessible from the Volumes view. On the Menu bar, click View > Volumes to open the *Volumes*. The *Layers* section is displayed on the left of the main window. The Volumes view is available when the point cloud and the DSM are generated.



The Point Groups layer contains the following sub-layers:

**Unclassified:** Selected by default. It contains points that do not belong to any other point group. By default, all the points are Unclassified.

**Disabled:** Points that will not be used for step 3. *DSM*, *Orthomosaic* and *Index*. When processing step 3. *DSM*, *Orthomosaic* and *Index*, only the points belonging to the point group *Disabled* will not be used.

**Ground, Road Surface, High Vegetation, Building, Human Made Object:** Predefined point groups created for the Point Cloud Classification. When the point cloud classification has not been generated the predefined point groups are empty.

By selecting/unselecting a specific Point Group checkbox, the corresponding Point Group is shown/hidden in the 3D View.

By right clicking a specific Point Group, a context menu with the following action appears:

**Rename:** Allows to change the Point Group name.

**Remove:** Deletes the selected Point Group.

For:

**Unclassified:** Rename and Remove are grayed out.

**Disabled:** Rename and Remove are grayed out.

**Predefined Point Groups:** Rename and Remove are grayed out.

**New Point Groups:** Rename and Remove are available.

By right clicking on the Point Groups layer, a context menu with the following action appears:

**New Point Group:** Option to create *New Point Group*. By clicking *New Point Group*, a new point group named *Group 1* will be created in the Point Groups sub-layer.



 Access: On the Menu bar, click View > rayCloud to open the rayCloud. The *Layers* section in the left sidebar is displayed on the left of the main window.

 Note:  
This layer is also accessible from the Volumes view: On the Menu bar, click View > Volumes to open the *Volumes*. The *Layers* section is displayed on the left of the main window. The Volumes view is available when the point cloud and the DSM are generated.  
The Display Properties of the triangle meshes can be changed in the rayCloud and the Volumes. When they are changed in one view, they will be inherited in the other view.

The Triangle Meshes layer can display a 3D Textured Mesh.

By default, the 3D Textured Mesh (if generated) is not loaded in the 3D view.

By selecting/unselecting the *Triangle Mesh* checkbox, the corresponding triangle mesh is shown/hidden in the 3D view.

The Triangle Meshes layer can also display a 2.5D Triangle Mesh of any point cloud file that has been loaded by dragging and dropping it on the *Triangle Meshes* layer. The following formats can be dragged and dropped:

.las  
.laz

It displays a 2.5D triangle mesh, in the right position if it is a Pix4Dmapper file or external file in the same coordinate system as the output coordinate system selected in Pix4Dmapper.

 Warning: DO NOT drag and drop a point cloud to generate the Triangle Mesh while a project is processing; processing may stop.

Once step 2. *Point Cloud and Mesh* is completed, when reopening a project, or when a triangle mesh has been uploaded, the Triangle Meshes are not loaded in the 3D view. Next time that the triangle meshes checkbox is selected, the triangle mesh is loaded again.

The *Triangle Meshes* layer contains the following sub-layers:

[Display Properties](#): Displays properties for all the triangle meshes.

[List of triangle meshes](#): All the triangle meshes loaded in the project.

#### Display Properties

Displays properties for all the triangle meshes.

Allows to edit the display properties for all the triangle meshes. The following properties can be edited:

**Color**: The color of all the triangles of the triangle meshes. The color is only applied to the monochrome shader. The default color is gray.

**Shader**: Specifies the way each triangle of the mesh is colored. The color is related to the 3D position of each triangle. The mesh can be colored in different ways:

**Textured**: Selected by default for the 3D textured Mesh generated for the project. Not available for dragged and dropped triangle meshes. The triangles are colored with the texture file generated when generating the 3D Textured Mesh.

**Monochrome**: The triangles are colored with a color-to-black scale that depends on an angle measured with respect to a virtual sun positioned 45 degrees from the north-east horizon. It uses the color selected above.

**Color**: The triangles are colored with an RGB scale. The color of a triangle depends on an angle measured with respect to 3 virtual suns that have Red, Green, and Blue illumination. The color of each triangle is the combination of the light received by the three virtual suns. This shader displays a slope map if the model is viewed from above. It gives information about the orientation of each surface.

**Altitude (Red, Green, Blue)**: The triangles are colored with an RGB scale. The color of a triangle depends on the altitude of the triangle.

**Altitude (Topography)**: The triangles are colored with a default scale. The color of a triangle depends on the altitude of the triangle.

**Thermal**: Useful for thermal project. The triangles are colored according to the channel value in the Ironbow palette.

#### List of triangle meshes

By default, the 3D Textured Mesh (if generated) is not loaded in the 3D view. If it has been generated, by selecting/unselecting the triangle mesh's checkbox, the corresponding triangle mesh is shown/hidden in the 3D view.

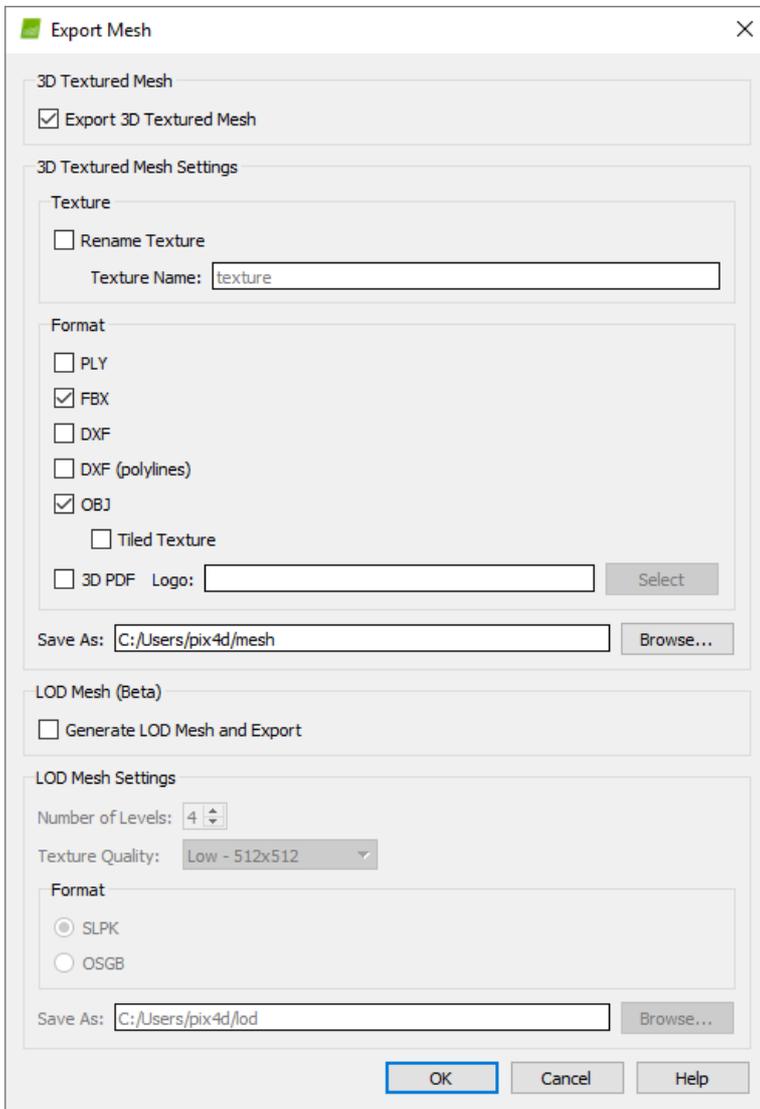
By right clicking on a specific triangle mesh's name, a context menu with the following action appears:

**Load Layer**: Visible if the triangle mesh is not loaded, load the triangle mesh in the 3D view.

**Unload Layer**: Visible if the triangle mesh is loaded, unload the triangle mesh from the 3D view.

**Export Mesh...**: Allows to export a triangle mesh from the 3D view with the selected properties, in the selected formats and in the desired file path/image name.

By clicking *Export Mesh...*, the *Export Mesh pop-up* appears:



It contains 4 sections:

3D Textured Mesh: Exports the 3D textured mesh.

3D Textured Mesh Settings: It contains 2 sections:

Texture: Allows to rename the texture file. By default the texture file name is project\_name\_texture.

Format: Allows to select the different formats in which the textured mesh is exported. It is possible to select:

- PLY
- FBX
- DXF
- DXF (polylines)
- OBJ

Tiled Texture: It tiles the texture file of the obj file.

3D PDF: If this format is selected, it is possible to select the Logo that is embedded in the 3D PDF. The logo can be imported in .jpeg or .tiff format.

LOD Mesh (Beta): Allows to generate and export the mesh to multi-LOD (level of details) format. The LOD mesh is in Beta version.

LOD Mesh Settings: Allows to define the LOD mesh settings:

Number of Levels: Allows to define the number of different levels of details to be generated between 1 and 7. The higher the number of levels the more detailed the representation and the longer the processing time.

 Important: For large projects, it is possible that the LOD cannot be generated for a high number of levels as there is a maximum number of 20000 triangles that can be generated for each level of details.

Texture Quality: Allows to define the resolution of the texture. It is possible to select:

- Low - 512x512
- Medium - 1024x1024
- High - 4096x4096

Format: Allows to select the format in which the LOD mesh is exported. It is possible to select:

- OSGB
- SLPK

 Warning:  
The two files cannot be generated and exported at the same time. It is possible to export them separately.  
The SLPK file is georeferenced only when the project is georeferenced. Only the georeferenced SLPK files can be opened in ArcGIS Online and ArcGIS Earth.

And:

Save As: Displays the path to the folder where the mesh is stored. By default, this is the project folder where the 3D Textured Mesh is stored after step 2. *Point Cloud and Mesh*.

Browse...: Allows the user to select a different name for the mesh and a different path to be stored.

 Warning: If the exported triangle mesh is saved with the same name in the same folder where a previously generated triangle mesh already exists, the existing triangle mesh will be overwritten.

OK: Saves the project and exports the selected formats with the selected parameters.

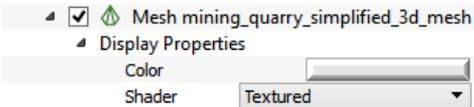
Cancel: Closes the pop-up message and does not perform any action.

Help: Opens the Pix4Dmapper help.

Each triangle mesh layer has the following sub-element:

Displays Properties: Displays properties for the corresponding triangle mesh and only applies to the corresponding triangle mesh. The same properties are available for all triangle meshes.

On the left of the triangle mesh name, there is an icon indicating that the layer is a triangle mesh: .



 Access: On the Menu bar, click View > rayCloud to open the rayCloud. The *Layers* section in the left sidebar is displayed on the left of the main window.



The Objects layer contains the following sub-layers:

**Polylines:** Contains the list of polylines added to the project. A *Polyline* object is a continuous line composed of one or more sub-lines. It is created by specifying the vertices of each line. For more information about the concept of polyline: [202559829](#).

**Surfaces:** Contains the list of surfaces added to the project. A *Surface* object can be used to define planar areas such as a road, the roof of a building, etc. It can also be used to correct the DSM to generate a better orthomosaic on these surfaces and to correct the visual aspect of the 3D Textured Mesh removing noise or filling areas.

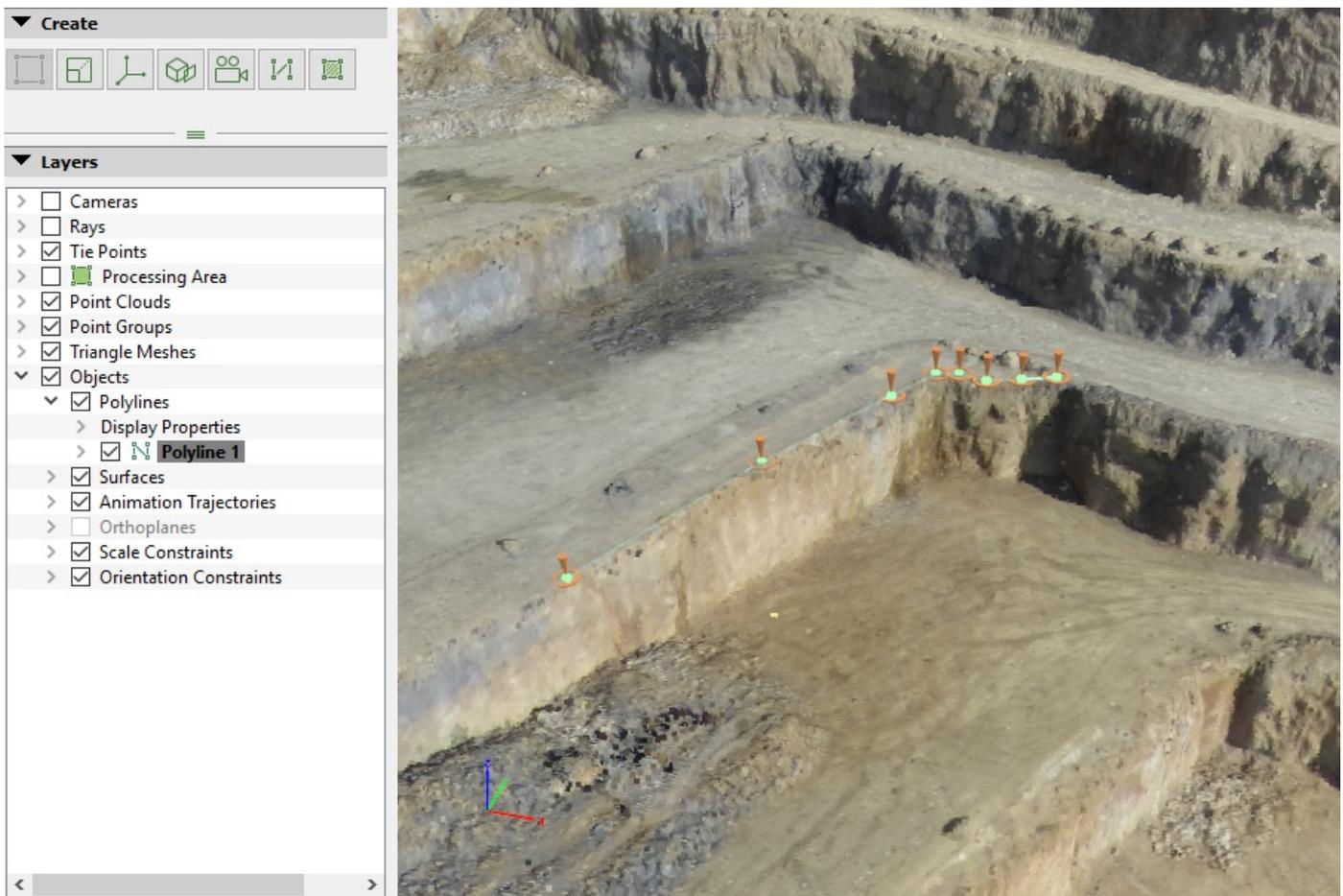
**Animation Trajectories:** Contains the list of Animation Trajectories added to the project. The animation Trajectories consist of waypoints that define the path for an imaginary camera that records the scene.

**Orthoplanes:** Contains the list of Orthoplanes added to the project. The Orthoplane is a tool to create one or several orthophotos of arbitrary areas of the model without having any impact / modifications in the model.

**Scale Constraints:** Contains the list of Scale Constraints added to the project. The Scale Constraint is a line with known real Cartesian distance between 2 points, allowing to set up a local scale of the model.

**Orientation Constraints:** Contains the list of Orientation Constraints added to the project. The Orientation Constraints is a line that represents a known axis, allowing to set up an local orientation of the model.

Polylines



Contains the [list of polylines](#) added to the project. A *Polyline* object is a continuous line composed of one or more sub-lines. It is created by specifying the vertices of each line. For more information about the concept of Polyline: [202559829](#).

The *Polylines* layer has the following structure:

Display Properties: This layer allows the user to edit the display properties all the polylines.

Vertex Color: Color of the spheres that represent the vertices of the polylines.

Vertex Radius: Radius of the spheres that represent the vertices of the polylines.

Line Color: Color of the lines between the vertices of the polylines.

Line Width: Width of the lines defining the polylines.

List of Polylines: Each Polyline has the following sub-element:

Display Properties: This layer allows the user to edit the display properties of the line. The properties that can be edited are the same than the Display properties of the Polylines listed above.

By right clicking on the *Polylines* sub-layer, a context menu with the following options appears:

New Polyline: Allows the user to draw a new polyline. For step by step instructions: [202560309](#).

Export All Polylines: Opens the *Export* pop-up that allows to export the corresponding components from the polyline into a file.

**!** Important: A Polyline is composed of lines and vertices to which Manual Tie Points are associated. The lines and vertices of the Polylines are exported.

The following file formats can be selected for export:

AutoCAD DFX (.dxf).

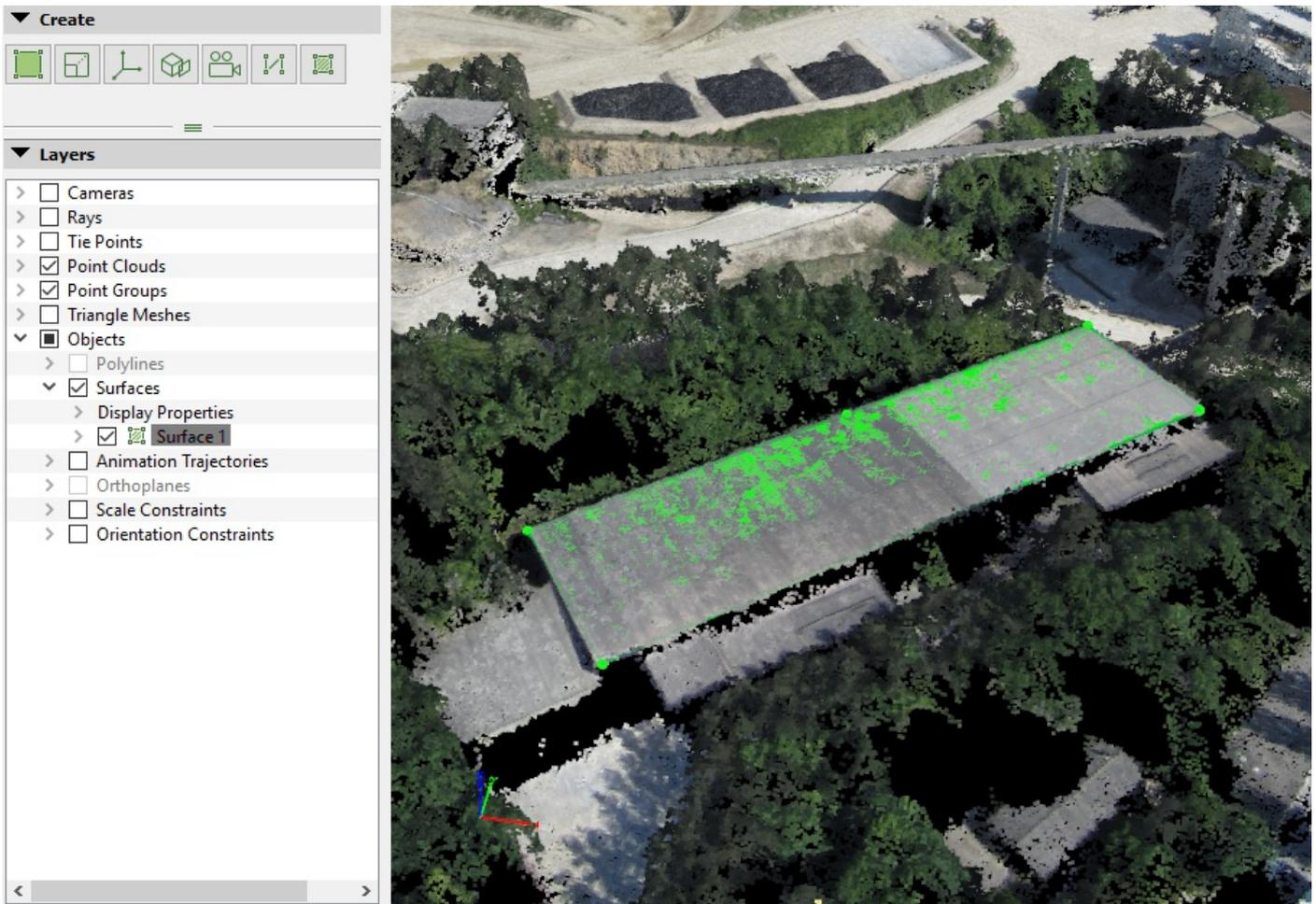
ESRI Shapefiles (.shp).

Keyhole Markup Language (.kml).

Microstation DGN (.dgn).

**!** Important: The option *Export All Polylines* is enabled only if at least one Polyline has been drawn.

Surfaces



Contains the [list of surfaces](#) added to the project. A *Surface* object can be used to define planar areas such as a road, the roof of a building, etc. It can also be used to correct the DSM to generate a better orthomosaic on these surfaces and to correct the visual aspect of the 3D Textured Mesh removing noise or filling areas.

The *Surfaces* layer has the following structure:

**Display Properties:** This layer allows the user to edit the display properties for all the surfaces.

**Vertex Color:** Color of the spheres that represent the vertices of the surfaces.

**Vertex Radius:** Radius of the spheres that represent the vertices of the surfaces.

**Line Color:** Color of the lines between the vertices of the surfaces.

**Line Width:** Width of the line defining the surface areas.

**Base:** View/hide the base of the surfaces.

**Color:** Color of the base of the surfaces.

**Shader:** Specifies the way each triangle of the base surfaces is colored. The color is related to the 3D position of each triangle. 2 ways of coloring the triangles are available:

**Monochrome:** Selected by default. The triangles are colored with a color-to-black scale depending on the angle with respect to a virtual sun positioned in the north-east at 45 degrees from the horizon. It uses the color selected above.

**Color:** The triangles are colored with a RGB scale. The color of a triangle depends on the angle with respect to 3 virtual suns with Red, Green, and Blue illumination. The color of each triangle is the combination of the light received by the 3 virtual suns. This shader gives a slope map if the model is looked at from top. It gives information about the orientation of each surface.

**List of Surfaces:** Each Surface has the following sub-element:

**Display Properties:** This layer allows the user to edit the display properties of a surface. The properties that can be edited are the same than the Display Properties of the Surfaces listed above.

By right clicking on the *Surfaces* sub-layer, a context menu with the following options appears:

**New Surface:** Allows the user to draw a new surface. For step by step instructions: [202560269](#).

**Export All Surfaces:** Opens the *Export* pop-up that allows to export the corresponding components from the surface into a file.

**Important:** A Surface is composed of a surface mesh and vertices to which Manual Tie Points are associated. The vertices and the surface mesh of the Surfaces are exported.

The following file formats can be selected for export:

AutoCad DFX (.dxf).

ESRI Shapefiles (.shp).

Keyhole Markup Language (.kml).

Microstation DGN (.dgn).

 Important: The options *Export All Surfaces* is enabled only if at least one Surface has been drawn.

List of objects

Each object layer has the following sub-element:

Display Properties: Displays properties of the corresponding objects. The properties that can be edited are not the same for all the objects.

 Note: Changing the *Display Properties* of the selected object, affects only to the selected object.

On the left of the object name, there is an icon indicating the type of the object:

 Polyline

 Surface

By right clicking on a specific object's layer, a context menu with the following options appears:

Insert Vertices: (only available for Polylines) Insert vertices on the line between existing vertices of the object.

Rename: Rename the object.

Export: Opens the *Export* pop-up that allows the user to export the corresponding components from the selected object into a file.

 Important:  
A Polyline is composed of lines and vertices to which Manual Tie Points are associated. The vertices and lines of the Polyline will be exported.  
A Surface is composed of a surface mesh and vertices to which Manual Tie Points are associated. The vertices and the surface mesh of the Surface will be exported.

The following file formats can be selected for export:

AutoCad DFX (.dfx).

ESRI Shapefiles (.shp).

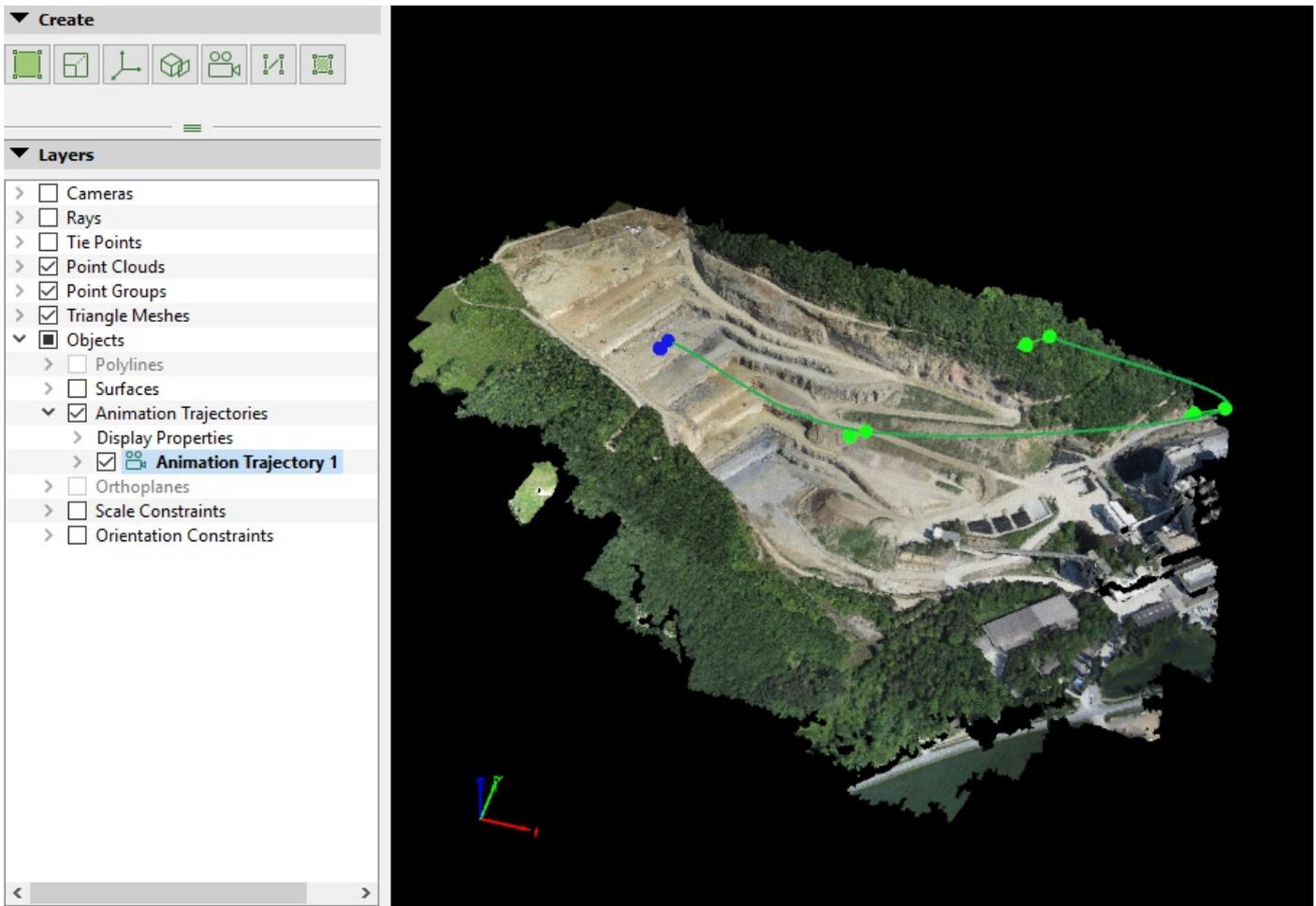
Keyhole Markup Language (.kml).

Microstation DGN (.dgn).

Remove: Removes the selected object.

 Important: The option *Remove* do not delete the Manual Tie Points generated when drawing the object (when drawing a Polyline or a Surface, the vertices are associated to Manual Tie Points).

Animation Trajectories



Contains the [list of Animation Trajectories](#) added to the project. The Animation Trajectories consist of waypoints that define the path for an imaginary camera that records the scene.

The *Animation Trajectories* layer has the following structure:

Display Properties: Displays properties of the corresponding objects. The properties that can be edited are:

Start Vertex Color: Color of the spheres that represent the first waypoints.

Vertex Color: Color of the spheres that represent the waypoints.

Vertex Radius: Radius of the spheres that represent the waypoints.

Line Color: Color of the lines between waypoints.

Line Width: Width of the line defining the path between waypoints.

List of Animation Trajectories: Each Animation Trajectory has the following sub-element:

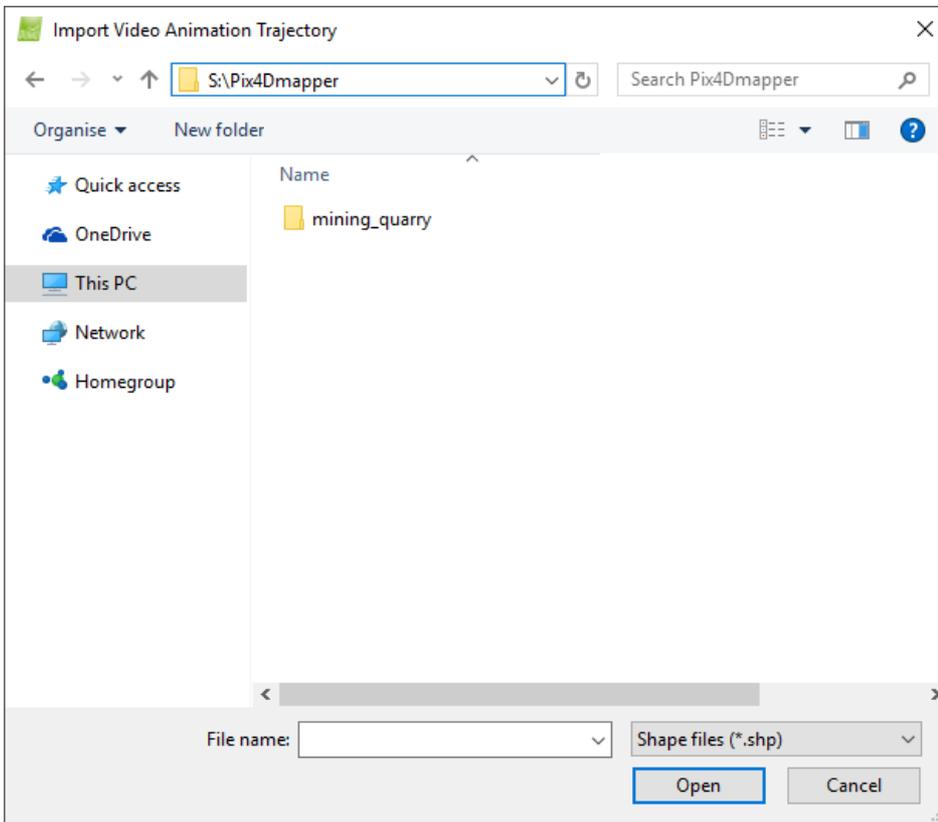
Display Properties: This layer allows to edit the display properties of the Animation Trajectories. The properties that can be edited are the same than the Display properties of the Animation Trajectories listed above.

By right clicking on the *Animation Trajectories* sub-layer, a context menu with the following options appears:

New Video Animation Trajectory: Allows to create a new Animation Trajectory. For step by step instructions: [202560299](#).

Import...: Opens the *Import Video Animation Trajectory* pop-up that allows to import Animation Trajectories created previously with Pix4Dmapper for the same area of study or created manually.

For step by step instructions about how to import an Animation Trajectory to the rayCloud: [202560569](#).



Contains the sections:

Navigation window: Used to search for and select the file to be imported.

File name: Displays the name of the selected file to be imported.

Files of type: Displays the possible formats accepted for the input file: .csv and .txt are accepted.

And contains the action buttons:

Open: Imports the selected file.

Cancel: Does not import the animation and exits the pop-up.

**!** Important: Manually created Animation Trajectories must have the same format and extension than files generated when exporting an Animation Trajectory with Pix4D.

#### List of Animation Trajectories

On the left of the object name, there is an icon indicating the type of the object:

 Animation Trajectory

By right clicking a specific object's layer, a context menu with the following options appears:

Rename: Renames the object.

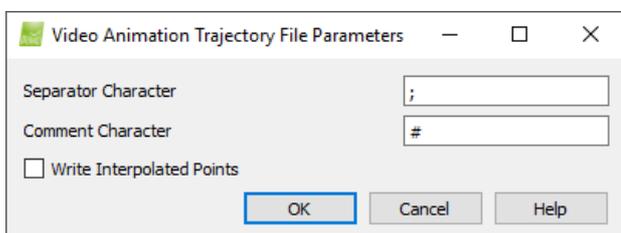
Remove: Removes the selected object.

Export...: Opens the *Export Video Animation Trajectory* pop-up that allows to export the selected Animation Trajectory.

For step by step instructions about how to export an Animation Trajectory with the rayCloud: [203123429](https://www.raycloud.com/203123429).

Contains the action buttons:

Save: Confirms the path and name to export the animation and opens the *Video Animation Trajectory File Parameters* pop-up:



Contains the options:

*Separator Character:* Character to be used as separator for the different information for each waypoint / interpolated Point:  
*Time [s], Position X, Position Y, Position Z, Rotation X, Rotation Y, Rotation Z.*

 Note: The default value for separator ";" in Microsoft Excel is read as Tab and will place each separated text in one column.

*Comment Character:* Character to be used as first character for the comment lines which includes information about the video animation options:  
*Name, Time computation, Interpolation, Max speed, Duration, Number of points, Distance unit of measure, Angle unit of measure.*

*Write Interpolated Points [m]:* By default it is not selected. Only the video animation options, the created waypoints and its coordinates are stored. Select *Write Interpolated Points [m]* to store as well intermediate points between consecutive waypoints and select the *Maximum distance between interpolated points*. By default, the value is 1, and it will create one intermediate point per meter.

OK: Exports the animation.

Cancel: Does not export the animation and exits the pop-up.

Help: Opens the Pix4Dmapper help.

 Important: It is possible to export Animation Trajectories as CSV files which can be opened with any text editor or spreadsheets editor.

## Orthoplanes



Contains the list of orthoplanes added to the project. An *Orthoplane* is a tool to create one or several orthophotos of arbitrary areas of the model without having any impact / modifications in the model.

The *Orthoplanes* layer has the following structure:

Display properties: This layer allows the user to edit the display properties for all the orthoplanes.

Color: Color of the top, bottom, and side planes that define the area.

X Handle Color: Color of the X location arrow and X dimension sphere.

Y Handle Color: Color of the Y location arrow and Y dimension sphere.

Z Handle Color: Color of the Z location arrow and Z dimension sphere.

Near Plane Edge Color: Color of the lines that define the surface that represents the origin of the projection.

Far Plane Edge Color: Color of the lines that define the surface that represents the limit of the projection.

List of Orthoplanes: Each object has the following sub-element:

Display Properties: This layer allows the user to edit the display properties for the orthoplane. The Display Properties that can be edited are the same as the Display Properties of the Orthoplanes listed above.

By right clicking on the *Orthoplanes* sub-layer, a context menu with the following options appears:

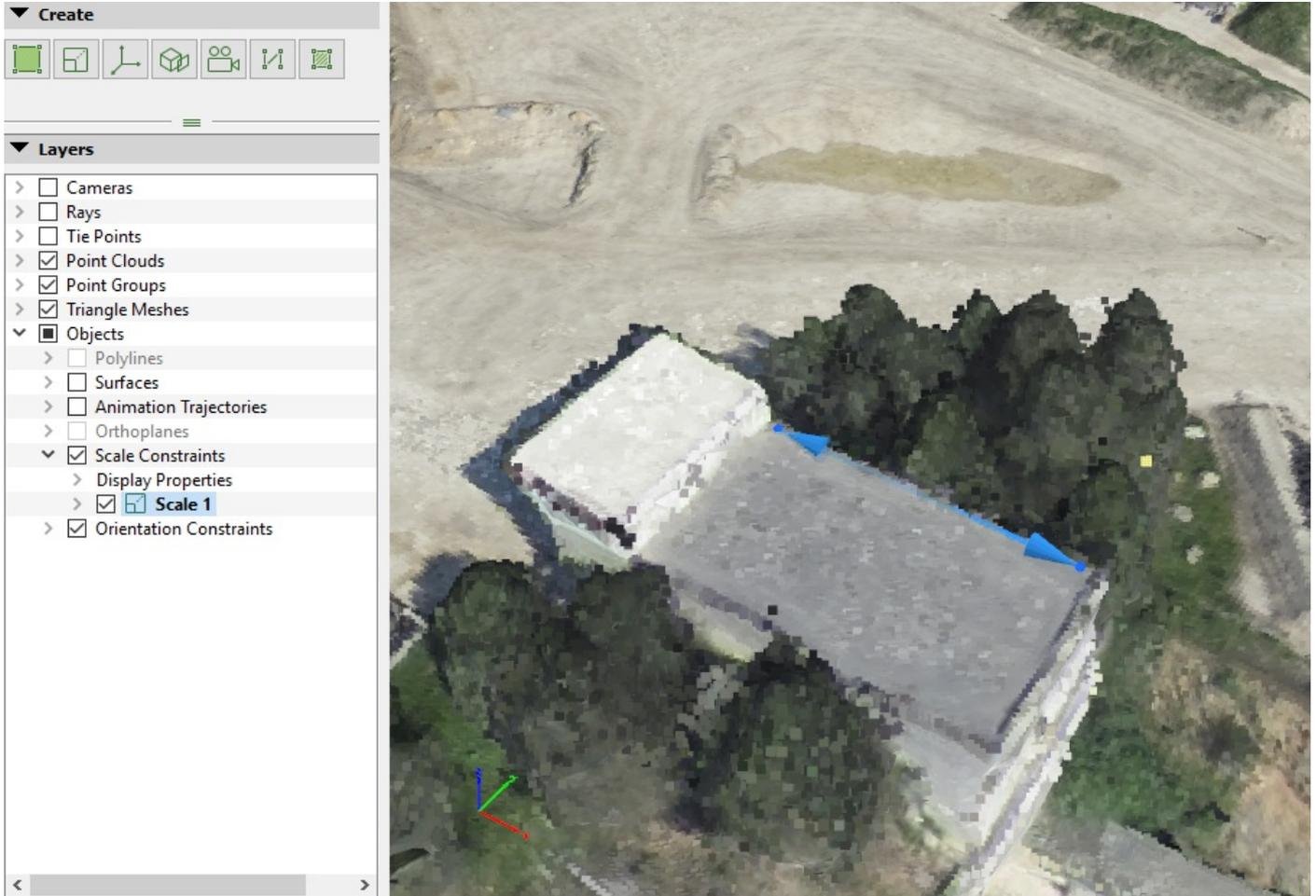
New Orthoplane: Allows to create a new 3D Orthoplane. For step by step instructions: [204664359](#).

By right clicking on a specific object's layer, a context menu with the following options appears:

Rename: Renames the object.

Remove: Removes the selected object.

### Scale Constraints



Contains the list of Scale Constraints added to the project. A *Scale Constraints* object is a line with known real Cartesian distance between 2 points, allowing to set up a local scale for the model.

The *Scale Constraints* layer has the following structure:

Display Properties: This layer allows to edit the display properties for all the Scale Constraints.

Vertex Color: Color of the spheres that represent the vertices of the Scale Constraints.

Vertex Radius: Radius of the spheres that represent the vertices of the Scale Constraints.

Line Color: Color of the lines between the vertices of the Scale Constraints.

Line Width: Width of the line defining the distance between vertices of the Scale Constraints.

List of Scale Constraints: Each object has the following sub-element:

Display Properties: This layer allows the user to edit the Display Properties of the Scale Constraint. The properties that can be edited are the same as the Display Properties for the Scale Constraint listed above.

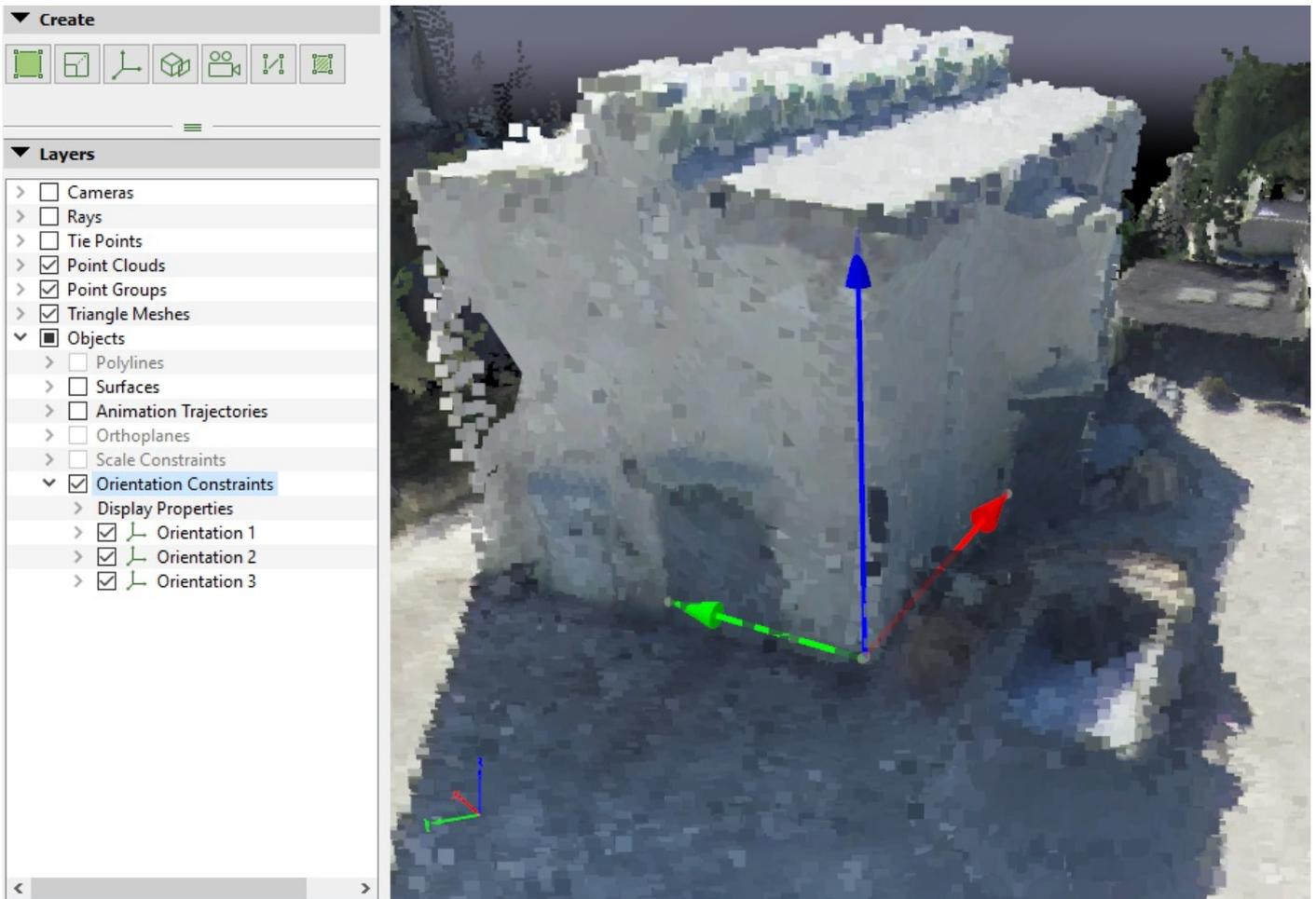
By right clicking on the *Scale Constraints* sub-layer, a context menu with the following options appears:

New Scale Constraint: Allows the user to create a new Scale Constraint. For step by step instructions: [205360375](#).

By right clicking on a specific object's layer, a context menu with the following options appears:

Remove: Removes the selected object.

### Orientation Constraints



Contains the list of Orientation Constraints added to the project. An *Orientation Constraints* object is a line that represents a known axis, allowing to set up an local orientation for the model.

The *Orientation Constraints* layer has the following structure:

Display properties: This layer allows the user to edit the display properties for all the Scale Constraints.

Vertex Color: Color of the spheres that represent the vertices of the Orientation Constraints.

Vertex Radius: Radius of the spheres that represent the vertices of the Orientation Constraints.

Line Width: Width of the line defining the Orientation Constraints.

List of Orientation Constraints: Each object has the following sub-element:

Display Properties: This layer allows the user to edit the Display Properties of the Orientation Constraint. The Display Properties that can be edited are the same as the Display Properties for the Orientation Constraints listed above.

By right clicking on the *Orientation Constraints* sub-layer, a context menu with the following options appears:

New Orientation Constraint: Allows the user to create a new 3D Orientation Constraint. For step by step instructions: [205360385](#).

By right clicking on a specific object's layer, a context menu with the following options appears:

Remove: Removes the selected object.

 Access: On the Menu bar, click View > rayCloud to open the rayCloud. The 3D View is displayed in the center of the main window.

The 3D View displays the different objects defined in a project, such as the cameras, the GCPs, etc. The different layers that are displayed in the 3D View and that are also visible in the Layers section of the left sidebar are:

**Cameras:** This layer groups all the cameras of the project (calibrated, uncalibrated and disabled). One camera is associated with each image of the project. It is defined by its initial position (if known), the optimized position and orientation.

**Rays:** They are displayed when clicking on a 3D point on the 3D View if the Cameras and the Rays layers are shown. The 3D point is projected to all the calibrated cameras in which the point is visible. The rays cut the thumbnails of the cameras at the location where the point is visible in the original images.

**Tie Points:** This layer groups all the Manual Tie Points, GPCs, Check Points, and Automatic Tie Points. The Automatic Tie Points are computed during initial processing.

**Processing Area:** This layer displays the Processing Area defined in the Map View or the rayCloud.

**Point Clouds:** This layer groups all the point clouds. It contains the Densified Point Cloud and the drag-and-dropped external point clouds.

**Point Groups:** This layer groups all the point cloud classes. It contains the unclassified group but also all the predefined groups of the point cloud classification and the user-defined groups.

**Triangle Meshes:** This layer groups the 3D Textured Mesh and triangle meshes generated by triangulating a point cloud that is loaded as a triangle mesh.

**Objects:** This layer groups all the objects defined by the user. These objects can be Polylines, Surfaces, Animation Trajectories, Orthoplanes, Scale Constraints and Orientation Constraints.

**Clipping Box:** This tool allows to visualize only the points included in the Clipping Box. This tool is not visible in the Layers section of the left sidebar.

The layers can be shown/hidden using the Layers section of the left sidebar, which can also be used to change the display properties (color, size, etc.) of each layer. For more information about the Layers section of the left sidebar: [202558029](#).

 Important: It is possible to change the *Points Density* by Press "Alt" + "+" or "AltGr" + "-" in order to increase or decrease the density, "Alt" + "0" reset the *Points Density* to default values.

 Important: The navigation in the 3D View (how the 3D view reacts when using the mouse or keyboard) depends on the *Navigation Mode* selected. For more information and full description of all the possible actions to navigate in the 3D View using the mouse or keyboard: [205360675](#).

 Important: Several predefined viewpoints exist such as top view, front view, etc. These predefined viewpoints are accessible using the keyboard or the Menu bar rayCloud > Viewpoint. For more information about the available viewpoints: [202558069](#).

## Layers

### Cameras

By default, the Camera layers are displayed on the 3D View as:

*Blue sphere:* Initial camera positions (GPS coordinates).

*Green sphere:* Optimized camera positions.

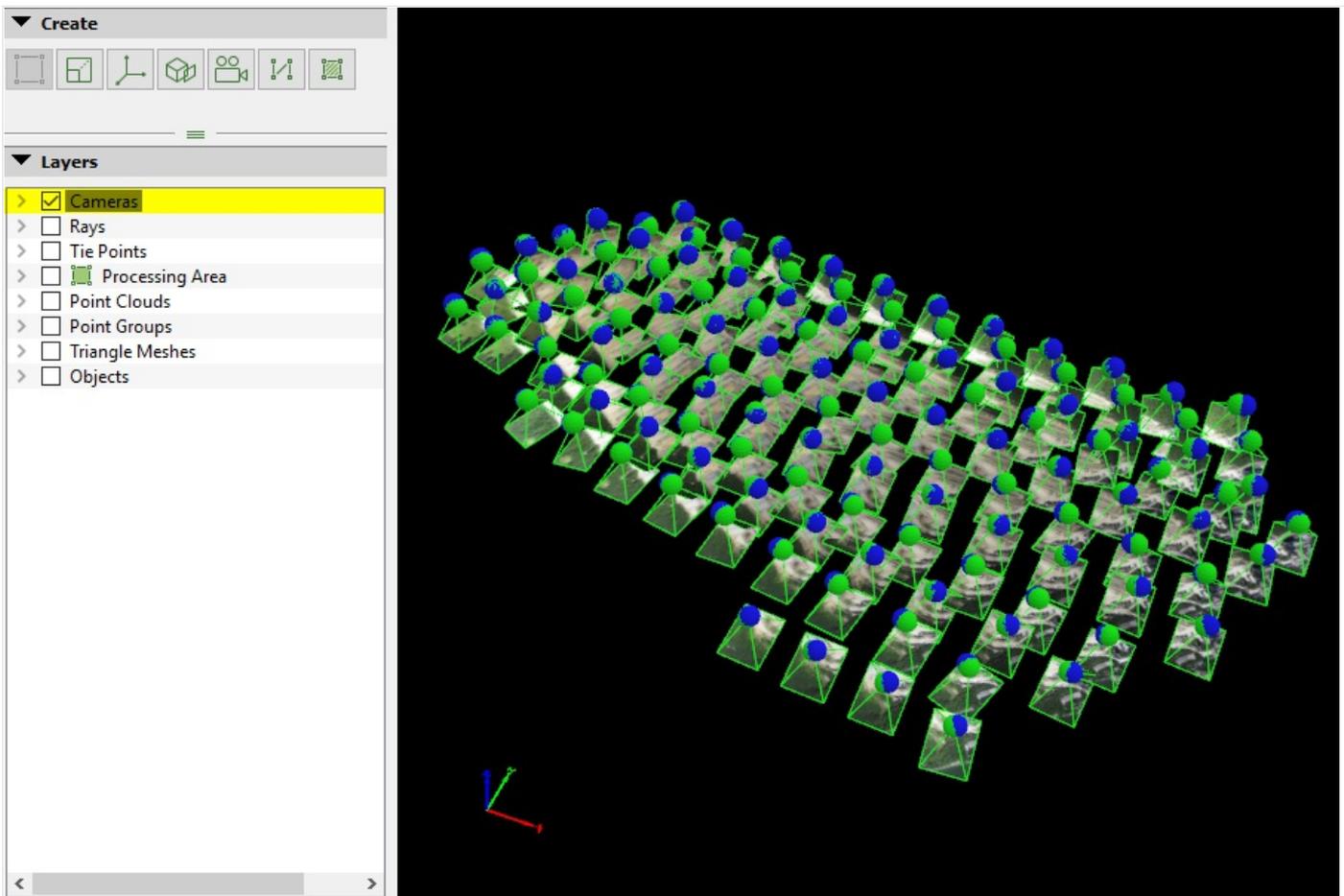
*Red sphere:* Initial camera positions (GPS coordinates) for Uncalibrated Cameras for which Pix4Dmapper could not find optimized positions and therefore were not used for the reconstruction.

*Pale Red sphere:* Initial camera positions (GPS coordinates) for Uncalibrated Cameras that were disabled by the user and were not used for the reconstruction.

*Green line:* Distance between initial and optimized positions.

*Green lines:* Projection lines between the optimized camera positions and the original image thumbnails.

*Green squares:* Borders of the original image thumbnails.



## Cameras

### Rays

By default, the rays can have the following colors:

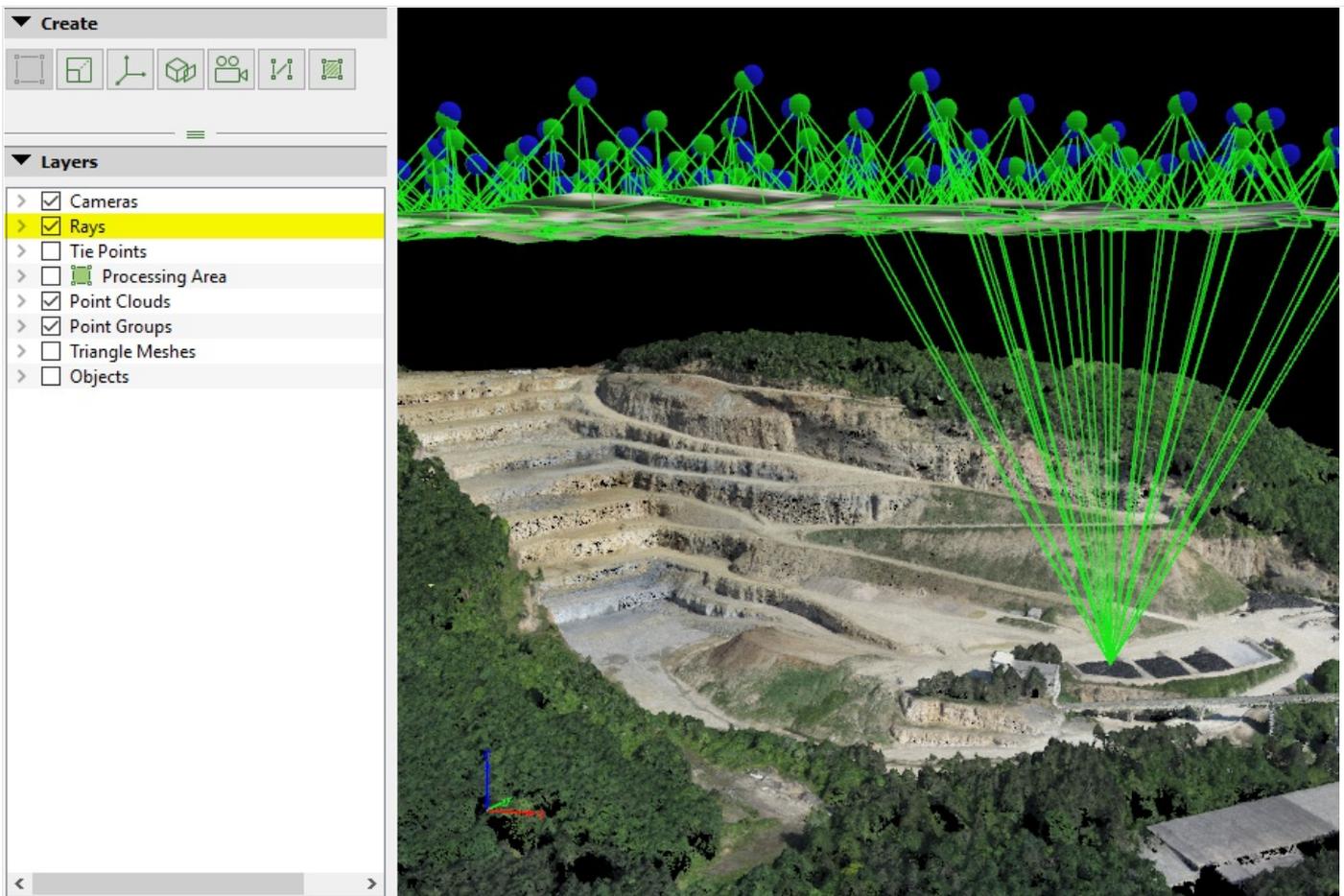
*Green rays:* The rays that connect the selected 3D point and the calibrated cameras in which the 3D point was visible but not marked.

*Orange rays:* The rays that connect the selected 3D point and the calibrated cameras in which the 3D point was marked.

*Red ray:* The rays that connect the selected 3D point and the uncalibrated cameras.

*Light Blue ray:* The ray that connects the selected 3D point with the image that is currently selected in the *Image View*, and on which the point is visible but not marked.

*Light Purple ray:* The ray that connects the selected 3D point with the image that is currently selected in the *Image View*, and on which the point has not been marked.



Rays

### Tie Points

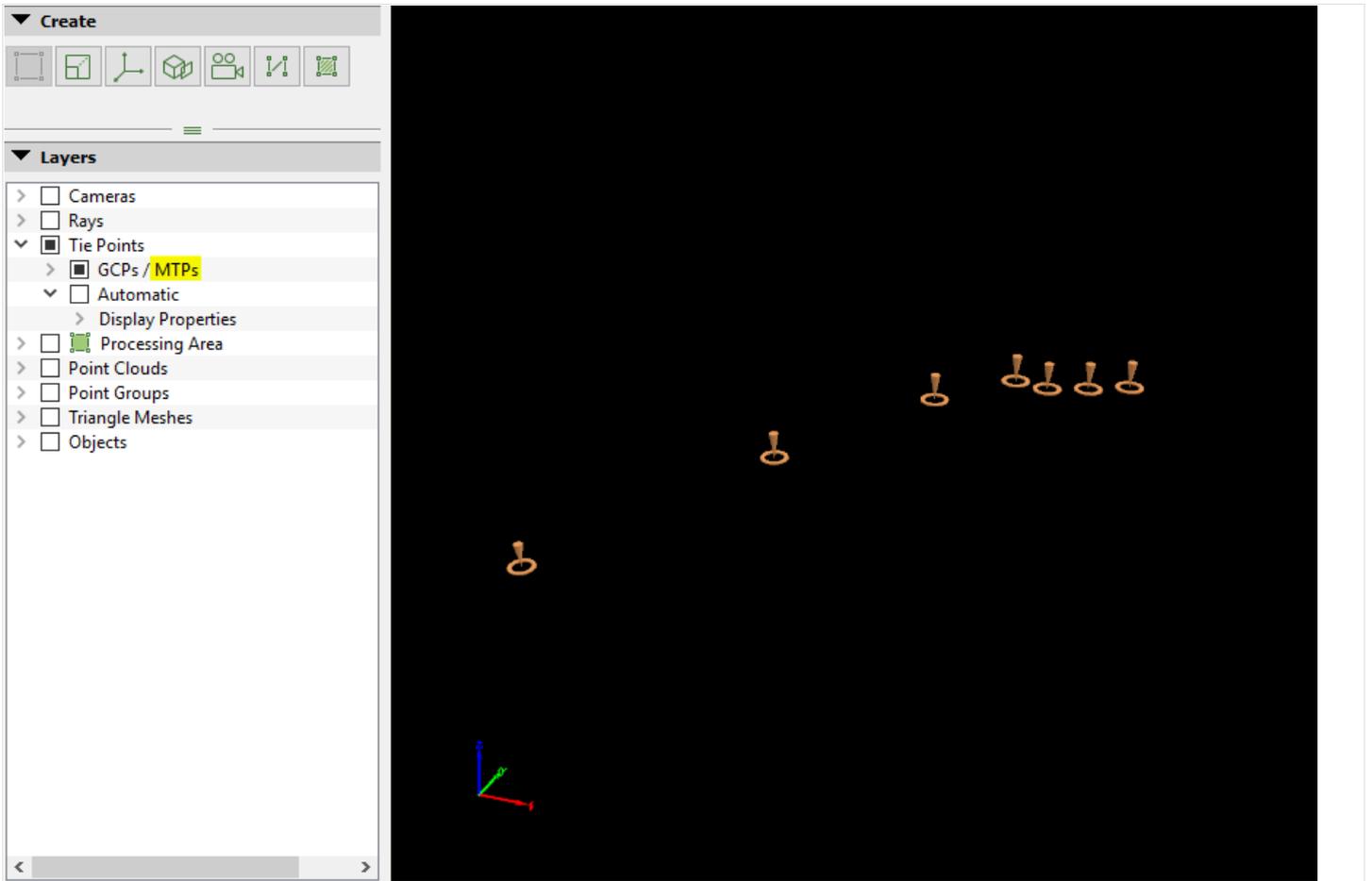
By default, the Tie Points are displayed on the 3D View as:

*Green cone:* Optimized position of Manual Tie Points, GCPs, Check Points, and vertices of the *Objects* drawn in the 3D View that are marked in at least 2 images.

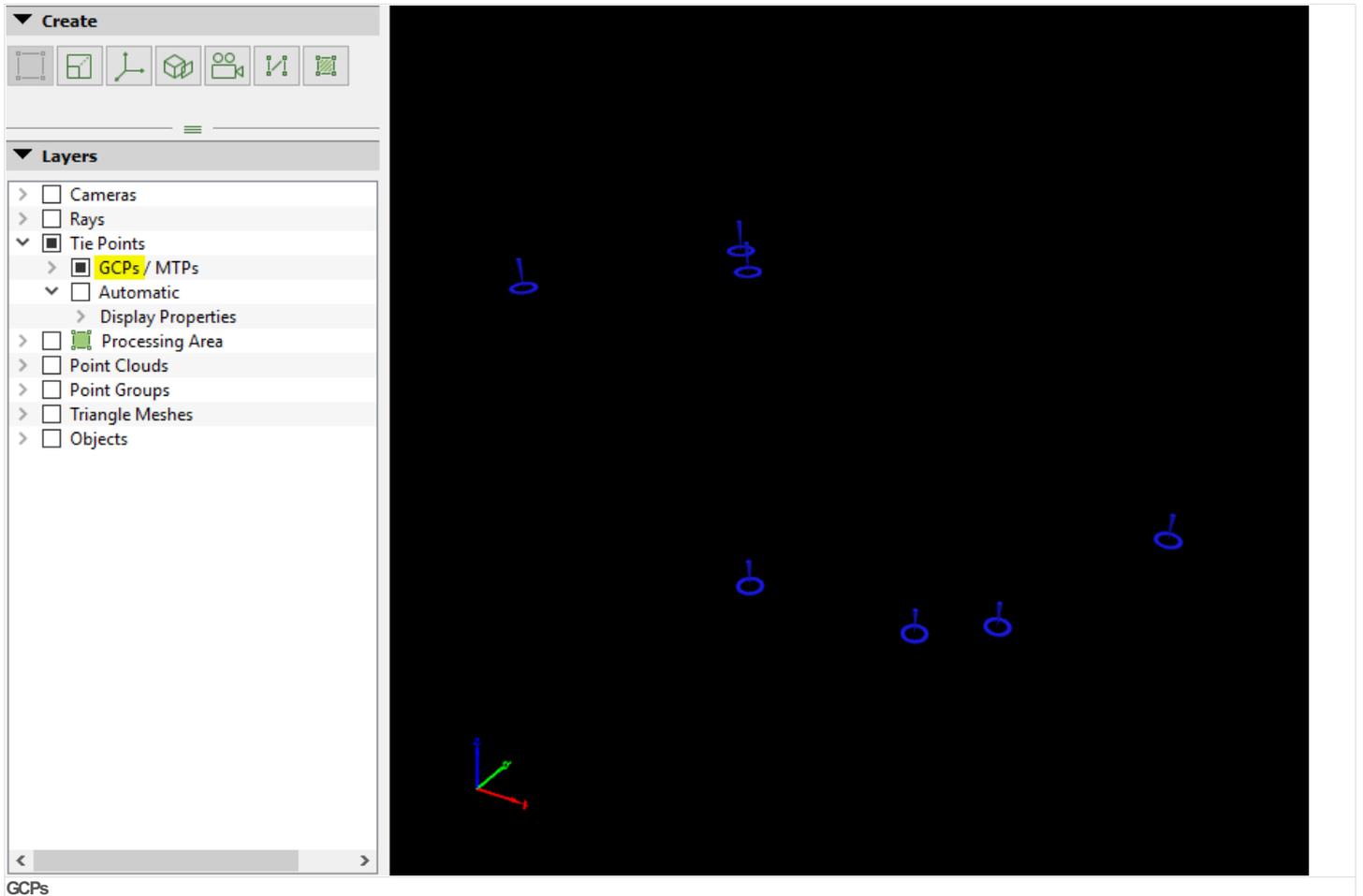
*Orange cone:* Vertices of the *Objects* drawn in the 3D View that are marked in less than 2 images.

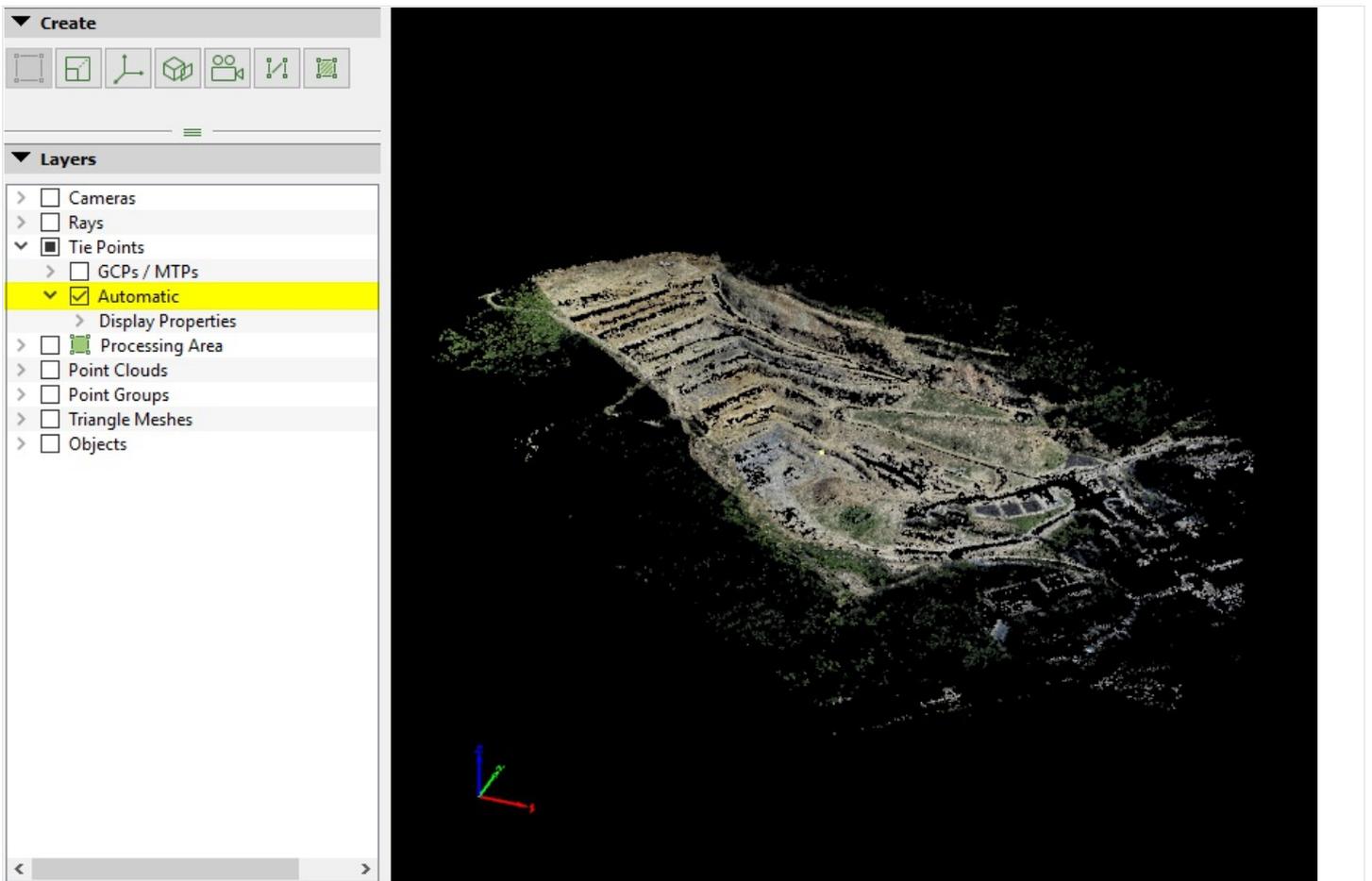
*Blue cone:* Original position of GCPs and Check Points.

*Colored point:* Automatic tie point computed at step 1. *Initial Processing* colored using the original images.



Manual Tie Points





#### Automatic Tie Points

#### Processing Area

By default, a Processing Area is displayed on the 3D View as:

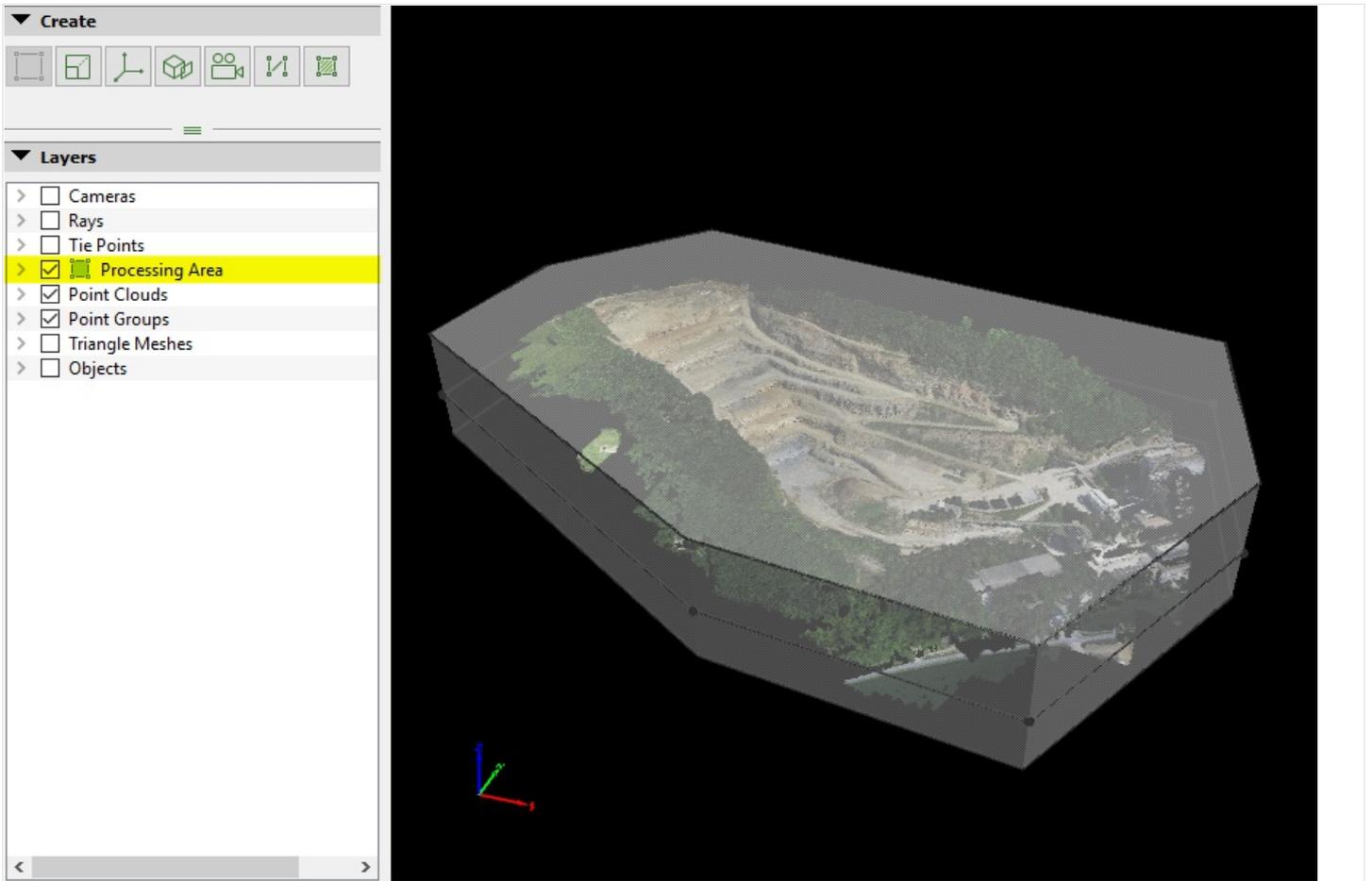
*Gray spheres:* Vertices of the middle plane of the 3D Processing Area.

*Gray lines:* Lines between the vertices of the planes (bottom, middle, and top planes) of the 3D Processing Area.

*Transparent gray planes:* Top, bottom, and side planes that form the 3D Processing Area.

*Transparent light gray planes:* Top, bottom, and side planes that form the 3D Processing Area when hovering over the area in the 3D View.

*White lines:* Lines between the vertices of the planes (bottom, middle, and top planes) of the 3D Processing Area when selecting the area in the 3D View.



#### Processing Area

#### Point Clouds

By default, the Point Clouds are displayed on the 3D View using the 3D coordinates of their points as computed by Pix4Dmapper.

The coordinates of a given point are displayed on the bottom right part of the main window when the point is selected in the 3D View.

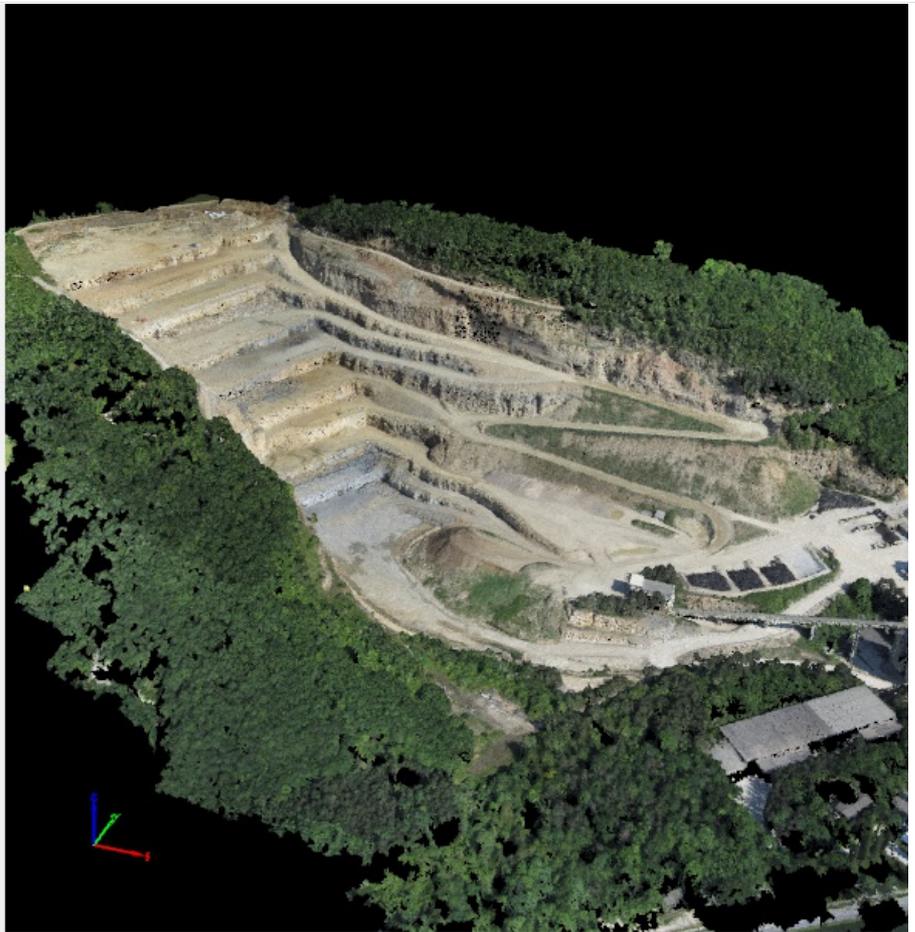
▼ Create



---

▼ Layers

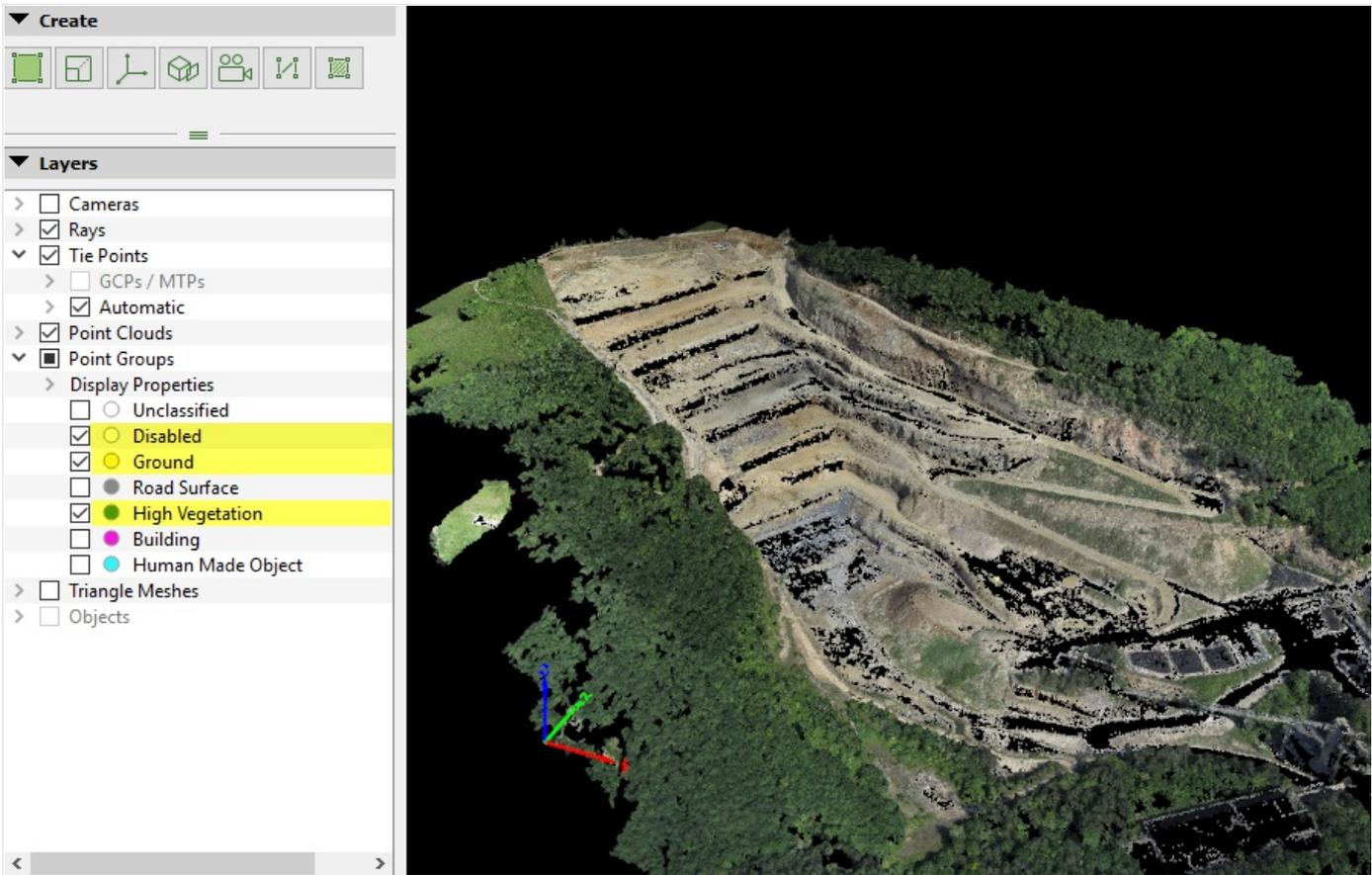
- >  Cameras
- >  Rays
- >  Tie Points
- >  Processing Area
- >  Point Clouds
  - >  Densified Point Cloud
    - > Display Properties
    - >  densified\_point\_cloud
- >  Point Groups
- >  Triangle Meshes
- >  Objects



#### Densified Point Cloud

#### Point Groups

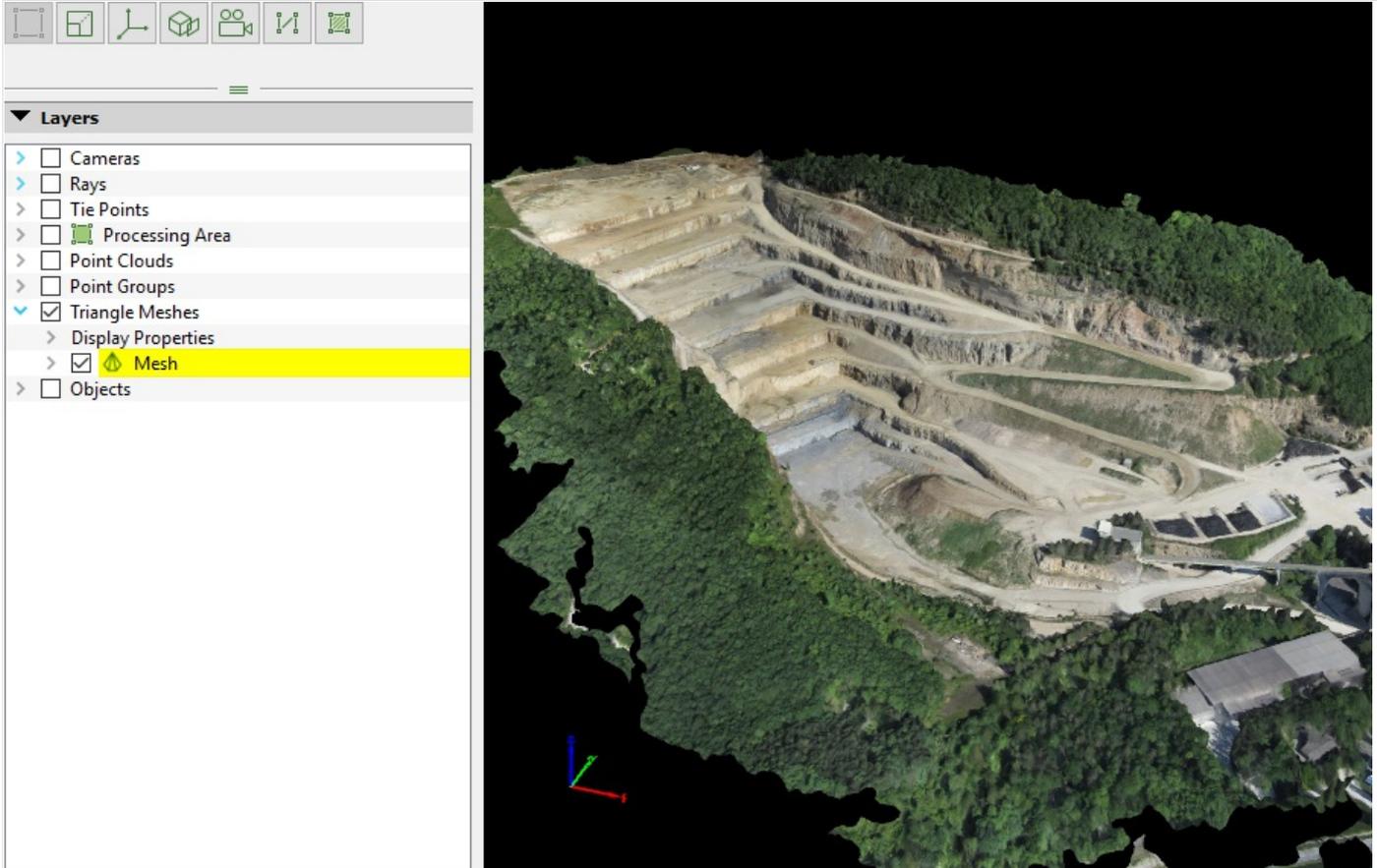
By default, the Point Groups are displayed on the 3D View using the 3D coordinates of the points of the selected point groups as computed by Pix4Dmapper or defined by the user.



Point Groups: Disabled, Ground and High Vegetation

### Triangle Meshes

By default, the 3D Textured Mesh is displayed using the Texture shader and other triangle meshes are displayed using the Monochrome shader with gray color. For more information about the Display Options of the Triangle Meshes: [202558079](https://www.bentley.com/202558079).



Triangle Mesh

By default, the Objects are displayed on the 3D View as:

For Polylines, Surfaces and Video AnimationTrajectories:

*Green sphere*: Object vertices for Polylines and Surfaces. Waypoints for Animation Trajectories.

*Green Arrow*: Orientation of the camera in the waypoint (only for Animation Trajectories).

*Blue sphere*: First Waypoint in Animation Trajectories (only for Animation Trajectories).

*Blue Arrow*: Orientation of the camera in the first waypoint (only for Animation Trajectories).

*Green surface*: Base surface for Surfaces.

*Green lines*: Lines between vertices/waypoints from the same object. For Polylines, Surfaces and Animation Trajectories.

For Scale Constraints:

*Light Blue double arrow*: Scale Constraints.

For Orientation Constraints:

*Dark Blue single arrow*: Orientation Constraints.

For Orthoplanes:

*Red sphere*: Allows to increase the 3D orthoplane in the X dimension.

*Blue sphere*: Allows to increase the 3D orthoplane in the Y dimension.

*Green sphere*: Allows to increase the 3D orthoplane in the Z dimension.

*Red cone*: Allows to move the 3D orthoplane in the X dimension.

*Blue cone*: Allows to move the 3D orthoplane in the Y dimension.

*Green cone*: Allows to move the 3D orthoplane in the Z dimension.

*Gray lines*: Lines between the vertices of the planes of the 3D orthoplane.

*Light gray lines*: Defines the frontal surface of the 3D orthoplane (face that will be mapped).

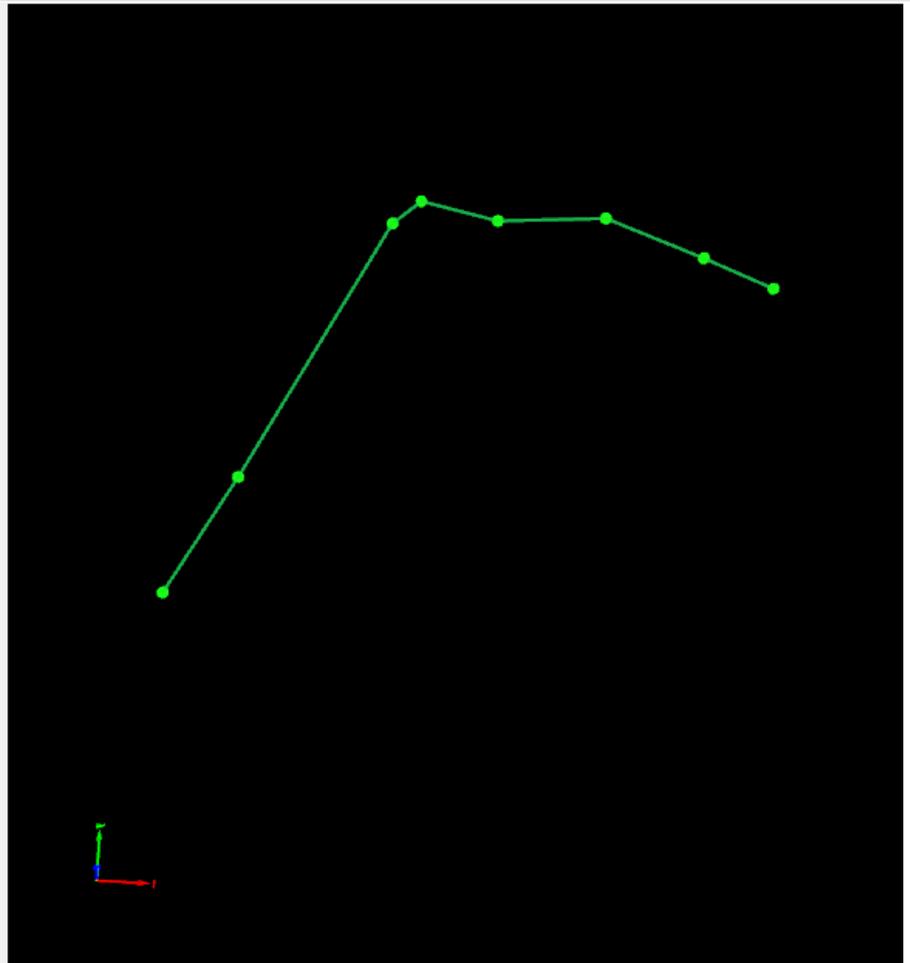
*Transparent light blue planes*: Side planes that form the 3D orthoplane.

**▼ Create**



**▼ Layers**

- >  Cameras
- >  Rays
- >  Tie Points
- >  Point Clouds
- >  Point Groups
- >  Triangle Meshes
- ▼  Objects
  - >  Polylines
  - >  Surfaces
  - >  Animation Trajectories
  - >  Orthoplanes
  - >  Scale Constraints
  - >  Orientation Constraints



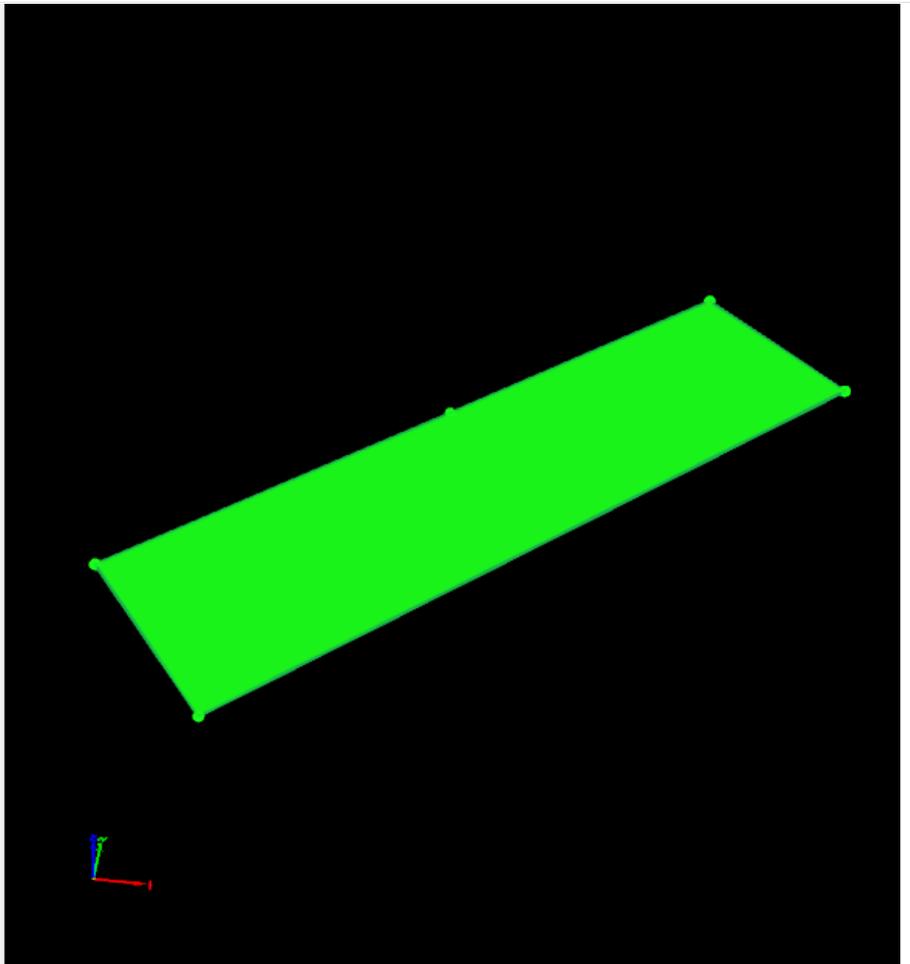
Polylines

▼ Create



▼ Layers

- >  Cameras
- >  Rays
- >  Tie Points
- >  Point Clouds
- >  Point Groups
- >  Triangle Meshes
- ▼  Objects
  - >  Polylines
  - >  Surfaces
  - >  Animation Trajectories
  - >  Orthoplanes
  - >  Scale Constraints
  - >  Orientation Constraints

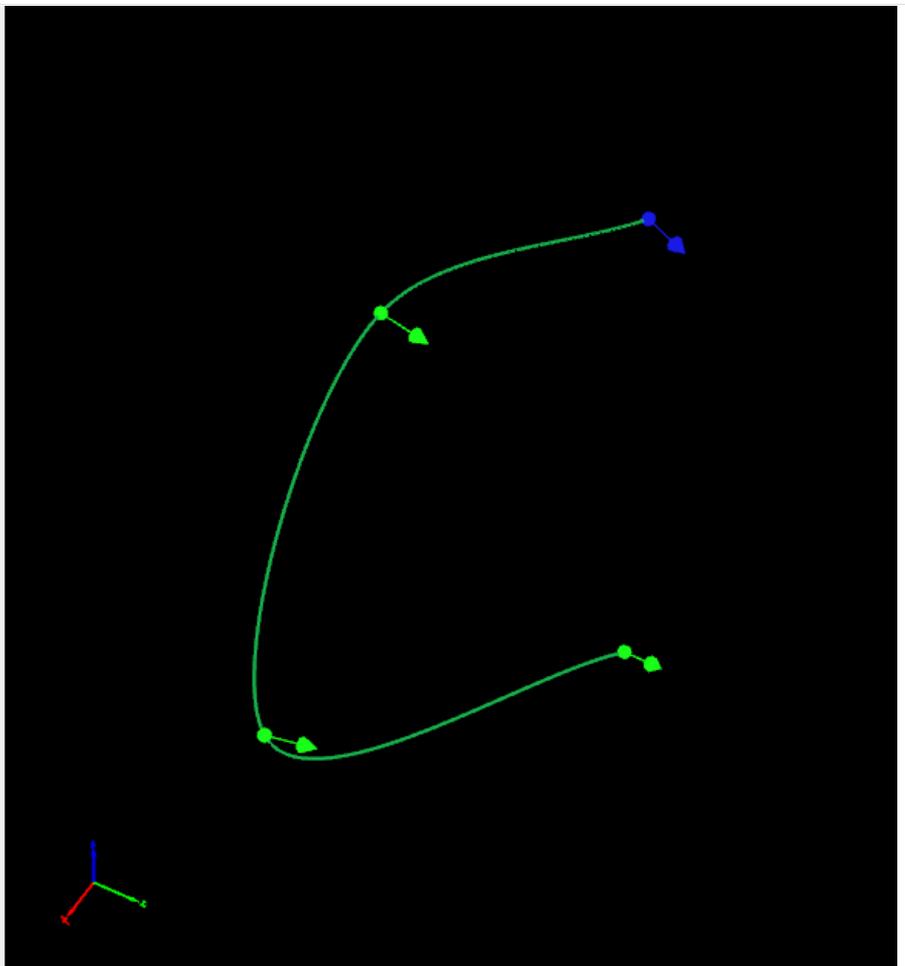


▼ Create



▼ Layers

- >  Cameras
- >  Rays
- >  Tie Points
- >  Point Clouds
- >  Point Groups
- >  Triangle Meshes
- ▼  Objects
  - >  Polylines
  - >  Surfaces
  - >  Animation Trajectories
  - >  Orthoplanes
  - >  Scale Constraints
  - >  Orientation Constraints



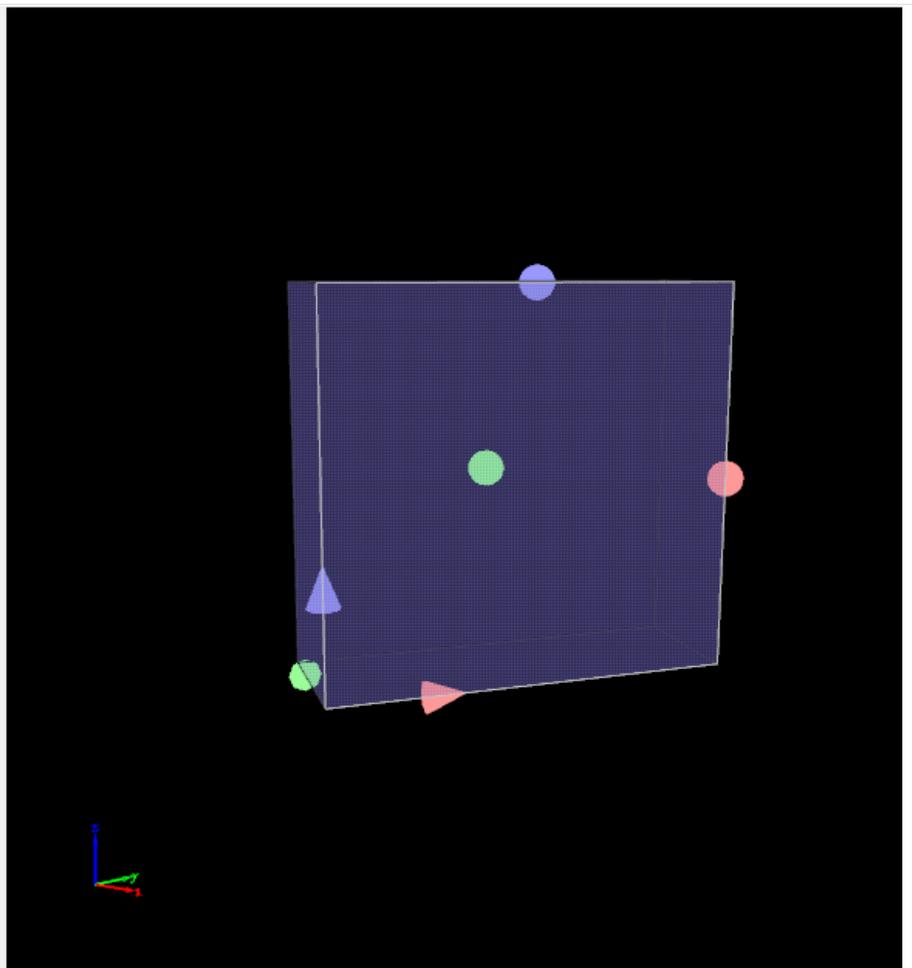
Animation Trajectory

▼ Create



▼ Layers

- >  Cameras
- >  Rays
- >  Tie Points
- >  Point Clouds
- >  Point Groups
- >  Triangle Meshes
- ▼  Objects
  - >  Polylines
  - >  Surfaces
  - >  Animation Trajectories
  - ▼  Orthoplanes
    - > Display Properties
    - >  Orthoplane 1
    - >  Scale Constraints
    - >  Orientation Constraints



Orthoplanes

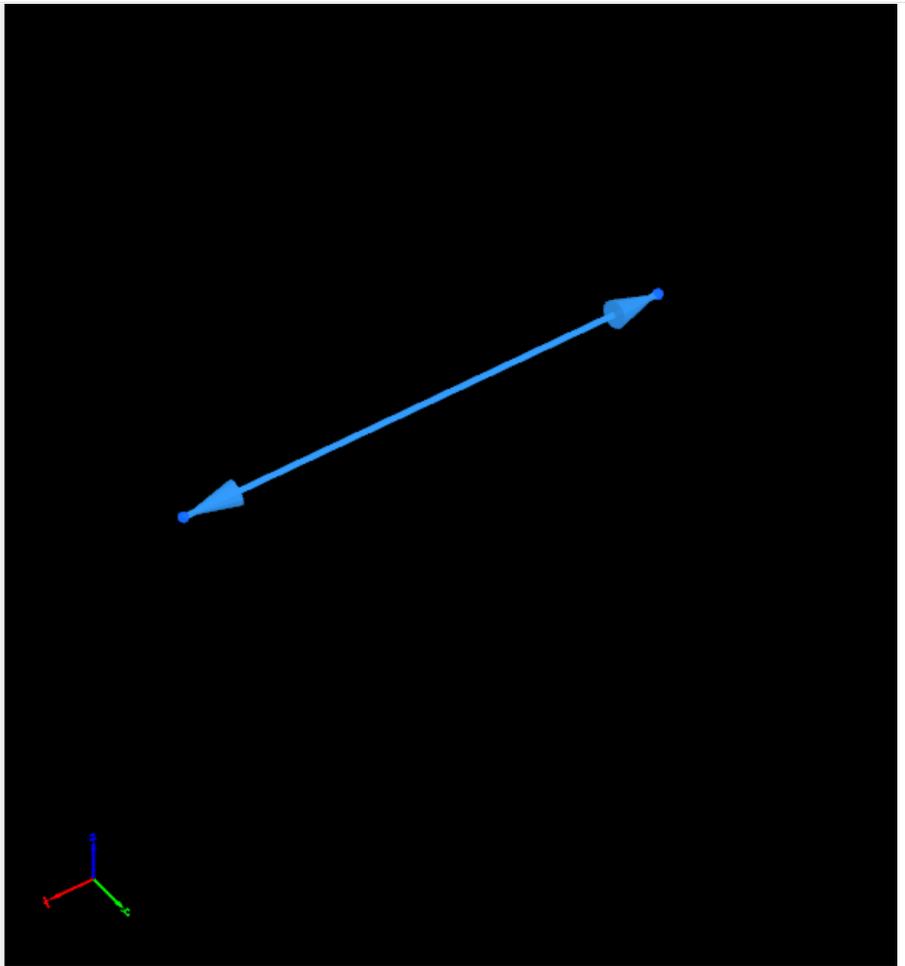
▼ Create



≡

▼ Layers

- >  Cameras
- >  Rays
- >  Tie Points
- >  Point Clouds
- >  Point Groups
- >  Triangle Meshes
- ▼  Objects
  - >  Polylines
  - >  Surfaces
  - >  Animation Trajectories
  - >  Orthoplanes
  - >  Scale Constraints
  - >  Orientation Constraints



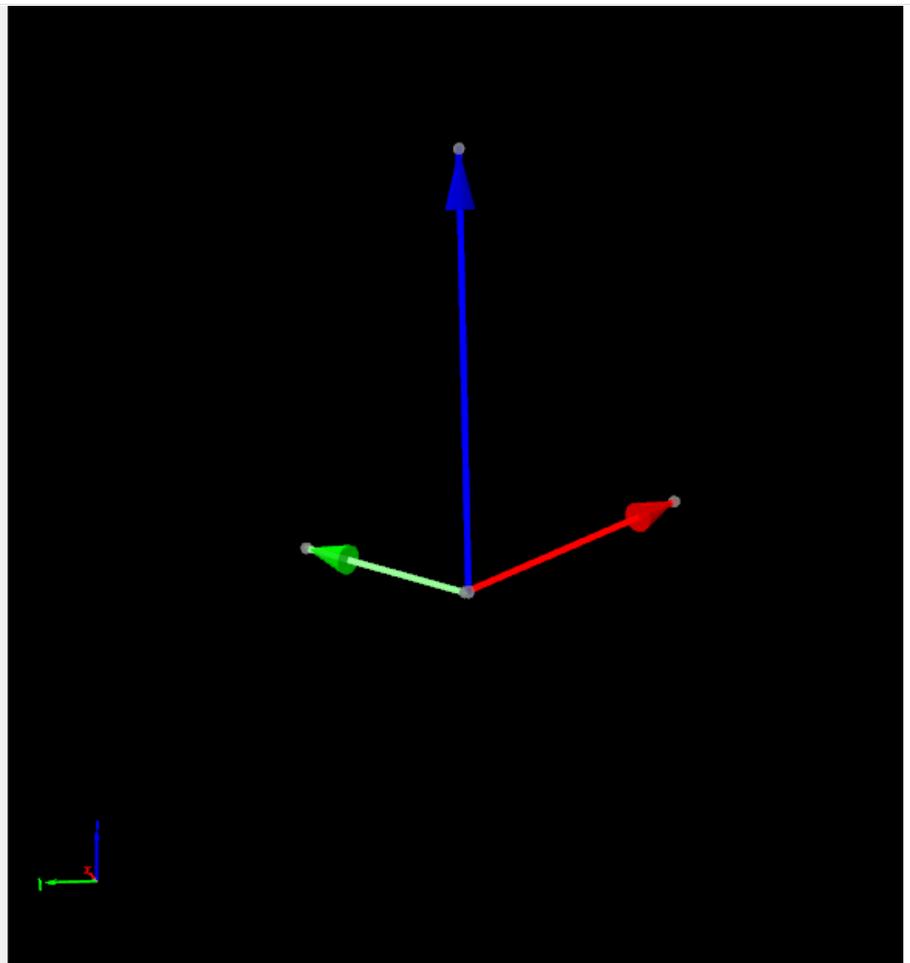
Scale Constraint

▼ Create



▼ Layers

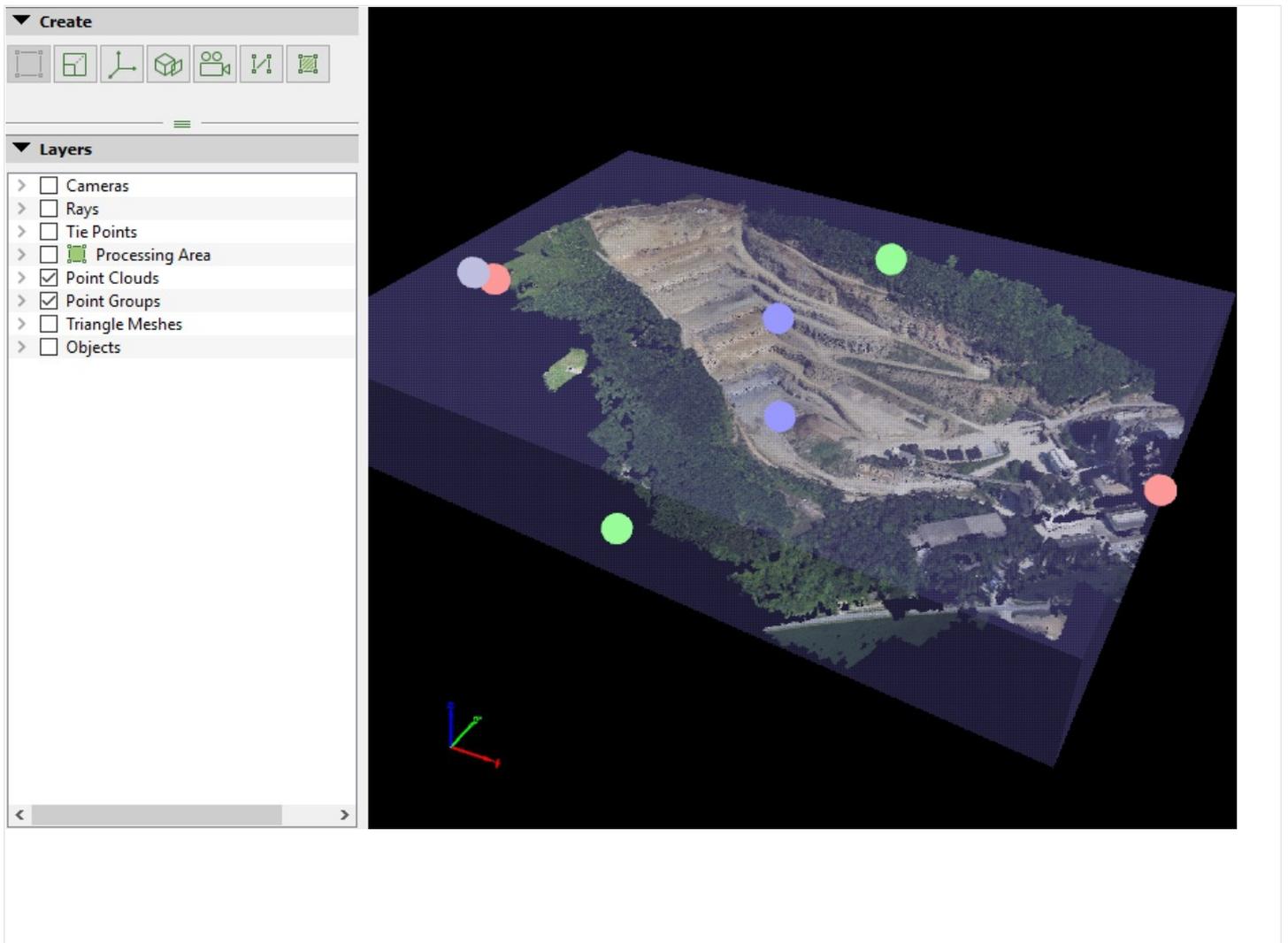
- >  Cameras
- >  Rays
- >  Tie Points
- >  Point Clouds
- >  Point Groups
- >  Triangle Meshes
- ▼  Objects
  - >  Polylines
  - >  Surfaces
  - >  Animation Trajectories
  - >  Orthoplanes
  - >  Scale Constraints
  - >  Orientation Constraints



#### Orientation Constraint

#### Clipping Box

- Pink spheres:* Allows to increase the 3D area in the X dimension.
- Light blue spheres:* Allows to increase the 3D area in the Z dimension.
- Light green spheres:* Allows to increase the 3D area in the Y dimension.
- Light purple sphere:* Allows to rotate the 3D area.
- Transparent light blue planes:* Side planes that form the 3D area.



 Access: On the Menu bar, click [View > rayCloud](#) to open the rayCloud. The right sidebar is displayed on the right of the main window. For information about the sidebar's display possibilities: [202558389](#).

The *rayCloud* right sidebar displays different information for the element that is currently selected in the 3D View. The elements that can be selected in the 3D View are:

[Clipping box](#)

[Cameras](#)

[GCPs and Manual Tie Points](#)

[Automatic Tie Points](#)

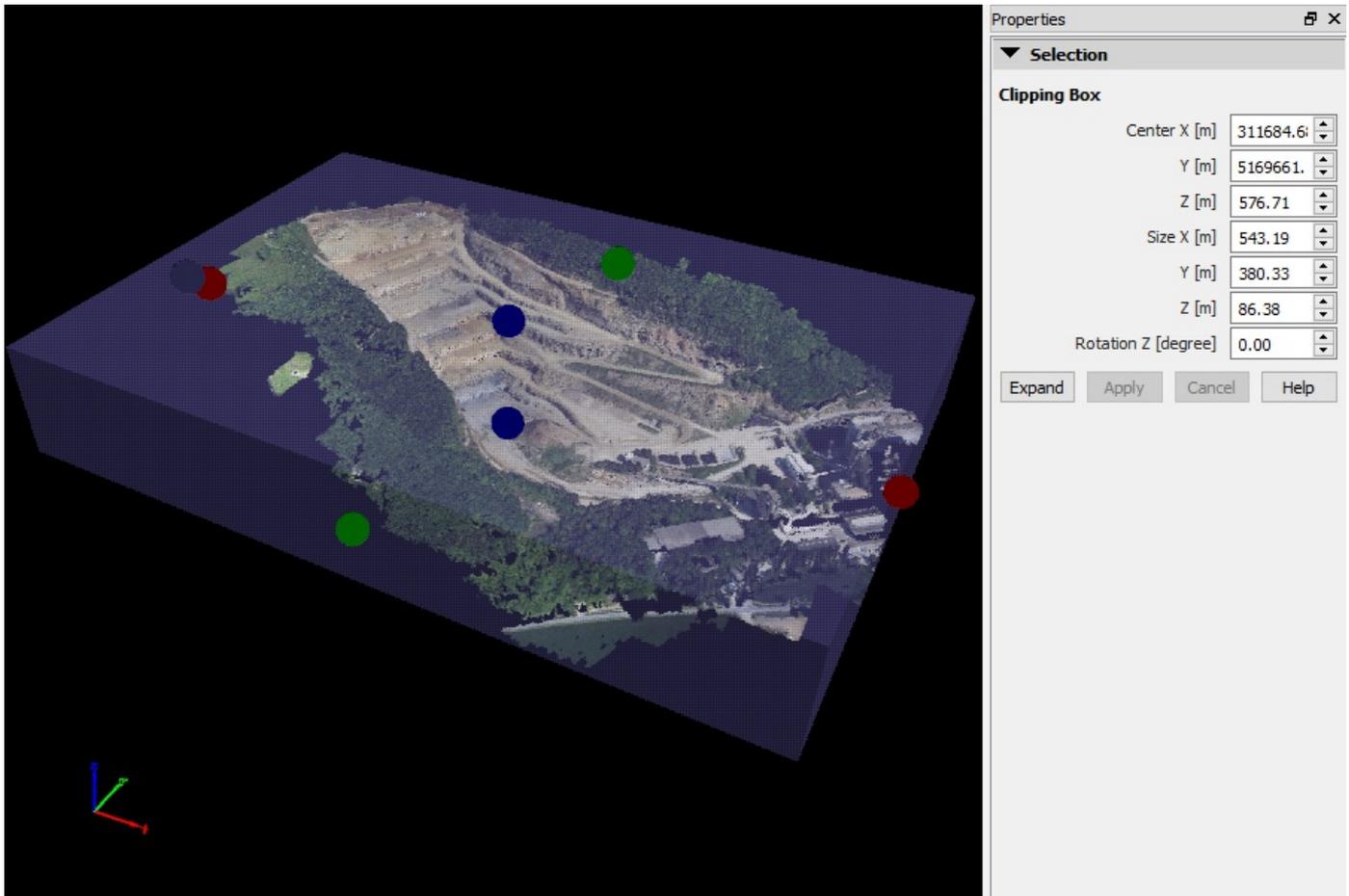
[Processing Area](#)

[Point Clouds](#)

[Objects: Polylines, Surfaces, Animation Trajectories, Orthoplanes, Scale Constraints and Orientation Constraints](#)

 Access: On the Menu bar, click View > rayCloud to open the rayCloud. In the toolbar, click the button . The right sidebar is displayed on the right of the main Window.  
The *Clipping Box* is displayed in the 3D View and the *Clipping Box Properties* are displayed in the right sidebar.

 Note: The *Clipping Box* only affects the display, not the results of any outputs of step 1. *Initial Processing*, step 2. *Point Cloud and Mesh* or step 3. *DSM, Orthomosaic and Index*.



The following information is displayed:

Center X [m]: Relative X coordinate of the center of the Clipping Box.

Y [m]: Relative Y coordinate of the center of the Clipping Box.

Z [m]: Relative Z coordinate of the center of the Clipping Box.

Size X [m]: Size in meters of the X side of the Clipping Box.

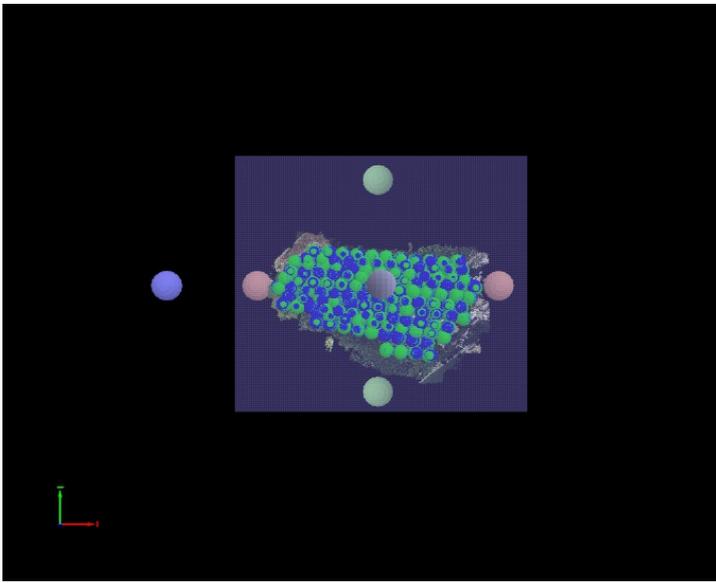
Y [m]: Size in meters of the Y side of the Clipping Box.

Z [m]: Size in meters of the Z side of the Clipping Box.

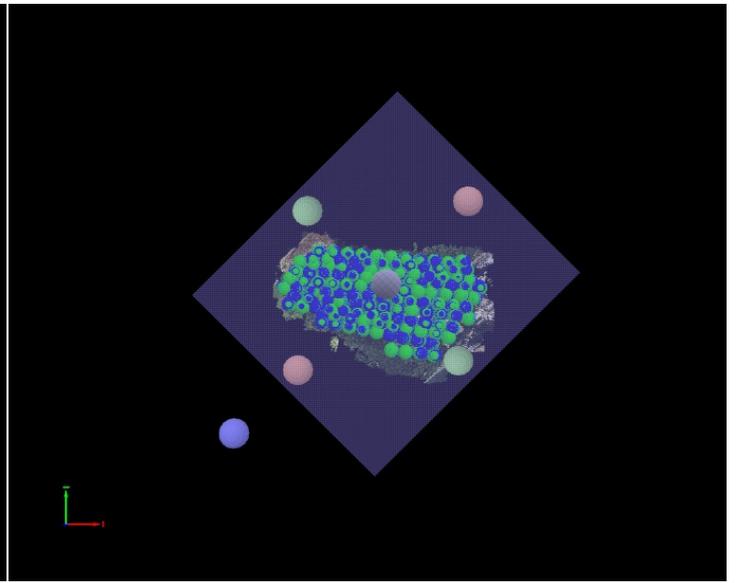
Rotation Z [degree]: Represents the angle between:

The X axis of the model and the X axis of the Clipping Box.

The Y axis of the model and the Y axis of the Clipping Box.



Rotation 0°



Rotation 45°

Below that information there are four buttons:

Expand: Creates a new Clipping Box which covers the full model.

Apply: Applies the changed in the values of the properties of the Clipping Box.

Cancel: Cancels the changes in the values of the properties of the Clipping Box.

Help: Opens the Pix4Dmapper help.

 Note: On the toolbar,  applies the *Clipping Box* in the 3D View and visualizes only the area contained in the Clipping Box.

For step by step instructions about how to use the Clipping Box: [204048035](#).

[Index](#) > [Interface](#) > [Menu View](#) > [rayCloud](#) > [Right sidebar](#)

[◀ Previous](#) | [Next ▶](#)

 Access: On the Menu bar, click View > rayCloud to open the rayCloud. The *right sidebar* is displayed on the right of the main window.

The camera information is displayed on the right sidebar when selecting in the 3D View:

The initial camera position (for calibrated and uncalibrated cameras for which the initial position is known).

The calibrated camera position (for calibrated images).

The camera associated image thumbnail (for calibrated images).

The camera information is also displayed when selecting a given camera in the *Layers* section of the left sidebar.

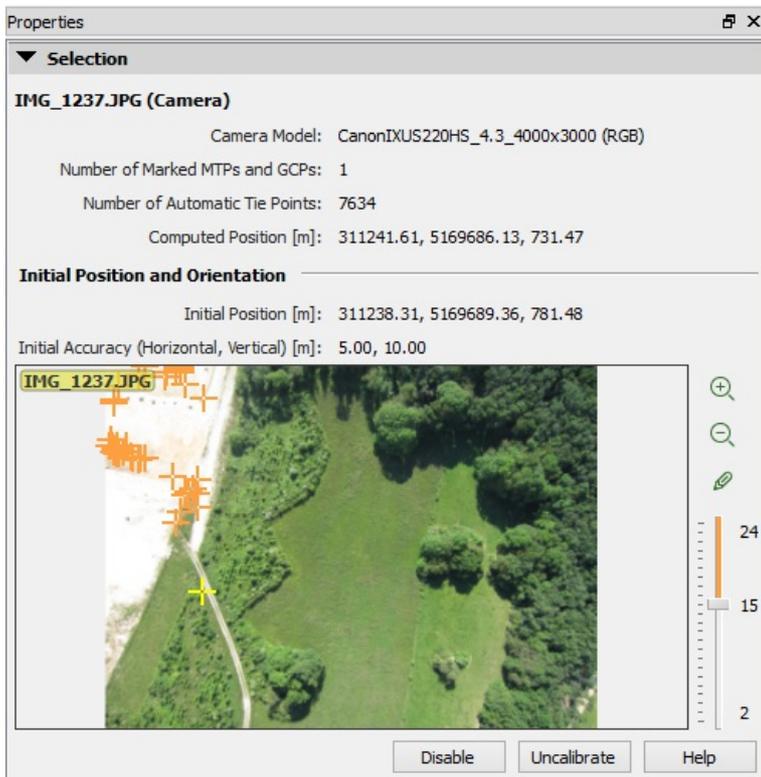
The displayed camera information is different for:

[Calibrated images](#)

[Uncalibrated images](#)

Calibrated images

The following information is displayed in the *Selection* section:



**Properties**

▼ **Selection**

**IMG\_1237.JPG (Camera)**

Camera Model: CanonIXUS220HS\_4.3\_4000x3000 (RGB)

Number of Marked MTPs and GCPs: 1

Number of Automatic Tie Points: 7634

Computed Position [m]: 311241.61, 5169686.13, 731.47

---

**Initial Position and Orientation**

Initial Position [m]: 311238.31, 5169689.36, 781.48

Initial Accuracy (Horizontal, Vertical) [m]: 5.00, 10.00

**IMG\_1237.JPG**

Disable    Uncalibrate    Help

Camera: Name of the image associated to the selected camera.

Camera Model: Camera model associated to the selected camera, including Image size in pixels (widthxheight) and band configuration.

Number of Marked MTPs and GCPs: Number of Manual Tie Points / GCPs marked on the image.

Number of Automatic Tie Points: Total number of matched keypoints found on the image.

Computed Position [units]: X, Y, Z computed position of the camera.

Buttons:

Disable: Disables the image. In order to remove the camera from the reconstruction, the project needs to be reoptimized. This button is shown for enabled cameras.

Enable: Enables the image. In order to include the camera in the reconstruction, the project needs to be reoptimized. This button is shown for disabled cameras.

Uncalibrate: This option should be chosen if the user is not confident about the calibration of the camera.

Help: Opens the Pix4Dmapper help.

Apply: (available when the *Image Annotation* tool is used): Applies the image annotation.

Image preview: Displays the image associated to the calibrated camera.

Orange cross: Represents the position of an automatic keypoint that has been matched with keypoints from other images.

Yellow cross: Represents a Manual Tie Point or a GCP marked on the image.

Right slider: Allows to select the minimum number of images with which a keypoint has been matched.

 Zoom in: Zoom in on the image.

 Zoom out: Zoom out of the image.

 Image Annotation: Activates the *Image Annotation* mode.

The *Image Annotation* tool includes the following:

Mask: The pixels masked are not used for processing. Suitable for:

Removing an obstacle that appears in a few images, like a scaffold. For more information: [210748986](#).

Removing the background of the Orthoplane: For more information: [210226543](#).

(for Bebop projects) Removing the sky automatically. For more information: [205327965](#).

Carve: All the 3D points located on the rays connecting the camera center and the annotated pixels are not used for processing. Suitable for sky removal. For more information: [212262883](#); [212262943](#).

Global Mask: The pixels annotated are propagated to all the images. All these pixels are not used for processing. Suitable for a consistent obstacle on all the images, e.g. the foot of the drone. For more information: [210749586](#).



Tip: For the selected image:

In order to zoom in/out: Place the mouse over the location on which to zoom, and move the mouse scroll button forwards/backwards.

In order to pan: Place the mouse over the location on which to pan, and press the left mouse button while dragging the mouse.

By placing the mouse over an image and typing space, the image is displayed in full screen, where is possible to zoom, pan, click, etc.

When using the full screen mode, by typing:

Space: Minimizes the image and keeps the full screen zoom and panning level.

Esc: Minimizes the image and keeps the previous zoom and panning.

## Images section

When double clicking on a cross in the Image preview (Automatic/Manual Tie Point or GCP), the *Images* section displays the images where the point can be found (including the currently selected image). For more information: [202558459](#).

## Uncalibrated images

When selecting an uncalibrated camera, it can be manually calibrated.

The following information is displayed in the *Selection* section:

Properties

**Selection**

**IMG\_1237.JPG (Camera) UNCALIBRATED**

Camera Model: CanonIXUS220HS\_4.3\_4000x3000 (RGB)

Number of Marked MTPs and GCPs: 1

Number of Automatic Tie Points(Inliers/Total): 7/2919

Computed Position [m]: n/a

**Initial Position and Orientation**

Initial Position [m]: 311238.31, 5169689.36, 781.48

Initial Accuracy (Horizontal, Vertical) [m]: 5.00, 10.00

**Tie Points**

Label	Type	Latitude [degree]	Longitude [degree]	Altitude [m]	Accuracy Horz [m]	Accuracy Vert [m]
8 9004	3D GCP	46.654835	6.533147	565.699	0.020	0.020

Apply



Disable Calibrate Close Help

Camera: Name of the image associated to the selected camera.

Camera Model: Camera model associated to the selected camera, including Image size in pixels (widthxheight) and band configuration.

Number of Marked MTPs and GCPs: Number of Manual Tie Points / GCPs marked on the image.

Number of Automatic Tie Points (Inliers/Total): Inlier points and total number of matching keypoints found on the image.

Computed Position [units]: X Y, Z position of the computed camera. Since there is no computed position, it appears as *n/a*.

Buttons:

Disable: Disables the image. In order to remove the camera from the reconstruction, the project needs to be reoptimized. This button is shown for enabled cameras.

Calibrate: Allows to calibrate an uncalibrated camera. This button is enabled only if more than 20 Manual Tie Points and Automatic Tie Points are considered as being inliers.

Close: Exits the manual calibration mode.

Help: Opens the Pix4Dmapper help.

Apply: (available when the *Image Annotation* tool is used): Applies the image annotation.

Note: For step by step instructions about how to calibrate a camera: [202560189](#).

Image preview: Displays the image associated to the uncalibrated camera.

Red cross: Represents the position of an automatic keypoint that was not matched with keypoints of other images.

Orange crosses: Represents the position of an automatic keypoint which has a high probability of being accurately matched with keypoints of other images.

Yellow crosses: Represents a Manual Tie Point or a GCP marked on the image.

Right slider: Allows the user to select the minimum number of images with which a keypoint could be matched.

Zoom in: Zoom in on the image.

Zoom out: Zoom out of the image.

Image Annotation: Activates the *Image Annotation* mode.

The *Image Annotation* tool includes the following:

Mask: The pixels masked are not used for processing. Suitable for:

Removing an obstacle that appears in a few images, like a scaffold. For more information: [210748986](#).

Removing the background of the Orthoplane: For more information: [210226543](#).

(for Bebop projects) Removing the sky automatically. For more information: [205327965](#).

Carve: All the 3D points located on the rays connecting the camera center and the annotated pixels are not used for processing. Suitable for sky removal. For more information: [212262883](#); [212262943](#).

Global Mask: The pixels annotated are propagated to all the images. All these pixels are not used for processing. Suitable for a consistent obstacle on all the images, e.g. the foot of the drone. For more information: [210749586](#).



Tip: For the selected image:

In order to zoom in/out: Place the mouse over the location on which to zoom, and move the mouse scroll button forwards/backwards.

In order to pan: Place the mouse over the location on which to pan, and press the left button while dragging the mouse.

By placing the mouse over an image and typing space, the image is displayed in full screen, where is possible to zoom, pan, click, etc.

When using the full screen mode, by typing:

Space: Minimizes the image and keeps the full screen zoom and panning level.

Esc: Minimizes the image and keeps the previous zoom and panning.

Tie Points section: Displays in a table information about the Manual Tie Points and GCPs that are marked on the selected image. The table allows to edit the information about the *Tie Points* by double clicking on the corresponding cell. For detailed information: [202557919](#).

Apply: When clicking on this button, the new marks or changes for the displayed Manual Tie Points and GCPs are added to the project.

Images section

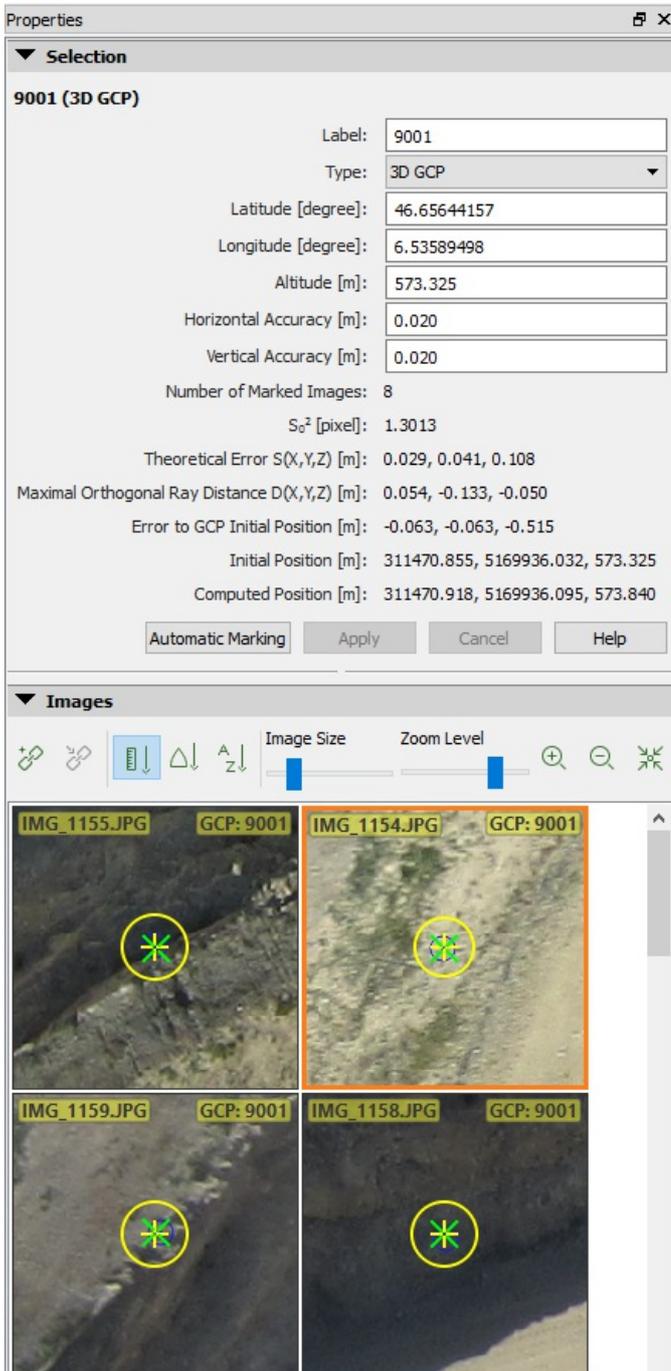
When double clicking on a cross in the Image preview (Automatic / Manual Tie Point or GCP), the *Images* section displays the images where the point can be found (including the currently selected image). For more information: [202558459](#).

[Index](#) > [Interface](#) > [Menu View](#) > [rayCloud](#) > [Right sidebar](#)

[◀ Previous](#) | [Next ▶](#)

 Access: On the Menu bar, click View > rayCloud to open the rayCloud. The right sidebar is displayed on the right of the main window.

The GCP or Manual Tie Point information is displayed when selecting a given 2D GCP, 3D GCP, Check point or Manual Tie Point in the 3D View or in the *Layers* section of the left sidebar.



**Properties**

**Selection**

**9001 (3D GCP)**

Label: 9001

Type: 3D GCP

Latitude [degree]: 46.65644157

Longitude [degree]: 6.53589498

Altitude [m]: 573.325

Horizontal Accuracy [m]: 0.020

Vertical Accuracy [m]: 0.020

Number of Marked Images: 8

$S_o^2$  [pixel]: 1.3013

Theoretical Error  $S(X,Y,Z)$  [m]: 0.029, 0.041, 0.108

Maximal Orthogonal Ray Distance  $D(X,Y,Z)$  [m]: 0.054, -0.133, -0.050

Error to GCP Initial Position [m]: -0.063, -0.063, -0.515

Initial Position [m]: 311470.855, 5169936.032, 573.325

Computed Position [m]: 311470.918, 5169936.095, 573.840

Automatic Marking Apply Cancel Help

**Images**

Image Size Zoom Level

IMG\_1155.JPG GCP: 9001 IMG\_1154.JPG GCP: 9001

IMG\_1159.JPG GCP: 9001 IMG\_1158.JPG GCP: 9001

The following information is displayed:

Label: The name of the point.

Type: The type of the point (3D GCP, 2D GCP, Check point, Manual Tie Point).

First Coordinate:

Latitude [degree]: If the coordinate system of the GCPs is a geographic coordinate system.

X [m]: If the coordinate system of the GCPs is a projected coordinate system. The unit is given in meters.

X [feet]: If the coordinate system of the GCPs is a projected coordinate system. The unit is given in feet.

Arbitrary X [m]: If the coordinate system of the GCPs is defined by the user (local coordinate system). The unit is given in meters.

Arbitrary X [feet]: If the coordinate system of the GCPs is defined by the user (local coordinate system). The unit is given in feet.

Second Coordinate:

Longitude [degree]: If the coordinate system of the GCPs is a geographic coordinate system.

Y [m]: If the coordinate system of the GCPs is a projected coordinate system. The unit is given in meters.

Y [feet]: If the coordinate system of the GCPs is a projected coordinate system. The unit is given in feet.

Arbitrary Y [m]: If the coordinate system of the GCPs is defined by the user (local coordinate system). The unit is given in meters.

Arbitrary Y [feet]: If the coordinate system of the GCPs is defined by the user (local coordinate system). The unit is given in feet.

Third coordinate:

Altitude [m]: If the coordinate system of the GCPs is a geographic coordinate system.

Z [m]: If the coordinate system of the GCPs is a projected coordinate system. The unit is given in meters.

Z [feet]: If the coordinate system of the GCPs is a projected coordinate system. The unit is given in feet.

Arbitrary Z [m]: If the coordinate system of the GCPs is defined by the user (local coordinate system). The unit is given in meters.

Arbitrary Z [feet]: If the coordinate system of the GCPs is defined by the user (local coordinate system). The unit is given in feet.

Horizontal Accuracy [units]: The horizontal accuracy defined for the 2D and 3D GCPs. For more information: [202557919](#).

Vertical Accuracy [units]: The vertical accuracy defined for the 3D GCPs. For more information: [202557919](#).

Marks in images: The number images on which the point is marked.

So<sup>2</sup> [pixel]: A posteriori variance component of all the marked points for a given 3D point. For more information: [202559199](#).

Theoretical Error S(X,Y,Z) [units]: Theoretical error estimation. For more information: [202559139](#).

Maximal Orthogonal Ray Distance D (x,y,z)[units]: Maximal distance from the estimated 3D point and all the rays used to compute that 3D point. The distance is measured between the 3D point and the point defined by the line perpendicular to the ray passing through the 3D point. For more information: [202559179](#).

Error to GCP Initial Position [units]: Error in X, Y, Z between the original 3D position and the estimated 3D position. This information does not appear for Manual Tie Points.

Initial Position [units]: The initial X, Y, Z position of the 3D GCP, Manual Tie Point or Check point. The initial X, Y position of the 2D GCP.

Computed Position [units]: The computed X, Y, Z position of the 3D GCP, Manual Tie Point or Check point. The computed X, Y position of the 2D GCP.

Below the table there are four buttons:

Automatic Marking: Allows the user to automatically mark the 3D point in the images that have not been marked. This button is activated when the 3D point has been marked in at least two images.

Apply: This button is active when the image marks have been modified, i.e. when a new image has been marked or when an existing mark has been updated or removed. When clicking this button, the new marks are taken into account and the 3D position of the corresponding point is recomputed. This button is also active when a change is done in the information regarding the point.

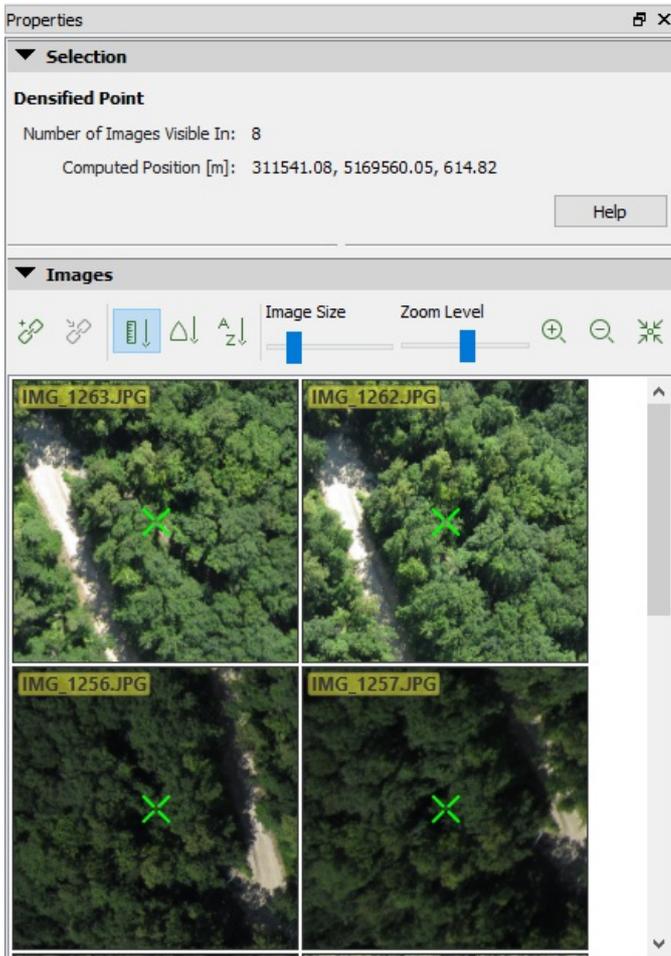
Cancel: Does not save the changes made to the marks of the point in the images or the information of the point.

Help: Opens the Pix4Dmapper help.

The *Images* section: Displays the selected image and the other images where the point can be found. For more information: [202558459](#).

 Important: The zoom level at which GCPs / Manual Tie Points are marked has an impact on the GCP / Manual Tie Point error obtained in the *Quality Report*. Usually, the higher the zoom level, the more precisely the GCP / Manual Tie Point is marked. These GCPs / Manual Tie Points will have a bigger impact on the reconstructed model than GCPs / Manual Tie Points marked on a lower zoom level; lower error values are also expected for these GCPs / Manual Tie Points. For example, when GCPs / Manual Tie Points are marked without zooming into the images, the GCP / Manual Tie Point error can be 10 times higher than when the GCPs / Manual Tie Points are marked by zooming into the images.

 Access: On the Menu bar, click View > rayCloud to open the rayCloud. The right sidebar is displayed on the right of the main window. The Automatic Tie Points information is displayed when an Automatic Tie Point is selected in the 3D View.



The following information is displayed:

Automatic Tie Point name (Automatic Tie Point): A unique name that identifies the Automatic Tie Point: ATP *[number]*, where number is unique.

Number of Images Marked On: Number of calibrated images on which the point has been automatically marked (identified as the same 2D keypoint).

Number of Images Visible In: Number of calibrated images on which the 3D automatic tie point has been reprojected (number of calibrated images where the computed 3D point is visible).

So<sup>2</sup>[pixel]: A posteriori variance component of all the marked points for a given 3D point. For more information: [202559199](#).

Theoretical Error S(X,Y,Z)[units]: Theoretical error estimation. For more information: [202559139](#).

Maximal Orthogonal Ray Distance D(X,Y,Z)[units]: Maximal distance from the estimated 3D point and all the rays used to compute that 3D point. The distance is measured between the 3D point and the point defined by the line perpendicular to the ray passing through the 3D point. For more information: [202559179](#).

Computed Position [units]: X Y, Z position of the selected point.

Below this information there is one button:

Help: Opens the Pix4Dmapper help.

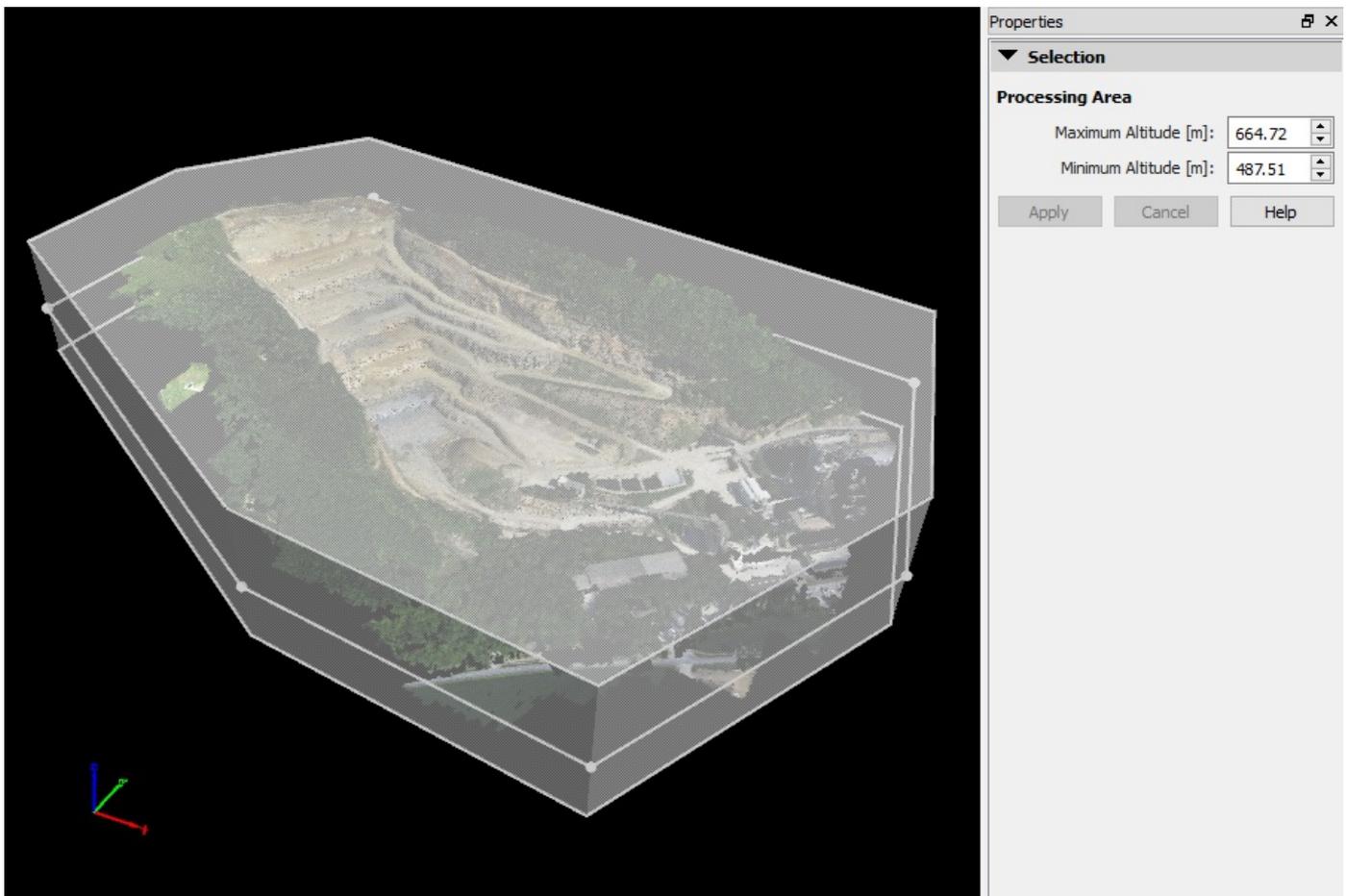
The *Images* section: Displays the images where the point is marked on and visible in. For more information: [202558459](#).

 Access: On the Menu bar, click View > rayCloud to open the rayCloud. The right sidebar is displayed on the right of the main window. The *Processing Area* information is displayed when the *Processing Area* is selected in the 3D View.

 Warning:  
 It is recommended to include areas covered by images in the *Processing Area*, so as to exclude areas of low overlap that can affect the results. The *Processing Area* affects only the visualization of the Automatic Tie Points in the 3D View of the rayCloud. It does not affect the results of step 1. *Initial Processing*.  
 When the *Processing Area* is defined before step 2. *Point Cloud and Mesh* is processed, it affects the Point Cloud visualized in the 3D View of the rayCloud, the *Volumes View* and the results saved on disk. This *Processing Area* will also affect the results of step 3. *DSM, Orthomosaic and Index*.  
 When the *Processing Area* is defined after step 2. *Point Cloud and Mesh* is completed, it only affects the Point Cloud visualized in the 3D View of the rayCloud, the *Volumes View* but not the results saved on disk. This *Processing Area* will also affect the results of step 3. *DSM, Orthomosaic and Index*.  
 When exporting the Point Cloud, it is possible to take into account the *Processing Area*, even if it is drawn after step 2 is processed. For more information about how to export the Point Cloud: [203890769](#).  
 When the *Processing Area* is defined before step 3. *DSM, Orthomosaic and Index* is completed, only the results of step 3 will be affected.

 Warning:  
 In order to take the *Processing Area* into account for the visualization of the Point Cloud and / or the generation of the outputs of step 2. *Point Cloud and Mesh*, the corresponding filter should be selected in the *Processing Options*. For more information: [204644369](#).  
 The *Processing Area* will be taken into account for the results of step 3. *DSM, Orthomosaic and Index* even if the *Processing Areas* box is not selected in the *Point Cloud Filters*.

 Note: For step by step instructions about how to select a *Processing Area*: [202560179](#).



The section *Selection* displays the following information:

Maximum Altitude [units]: Altitude of the top plane of the *Processing Area*.

Minimum Altitude [units]: Altitude of the bottom plane of the *Processing Area*.

 Important: *Maximum Altitude* should be higher than *Minimum Altitude*.

 Note: The *Maximum Altitude* and *Minimum Altitude* can be edited by:  
Selecting the text box and:  
Clicking Page Up/Page Down keys: Increase/Decrease the value by 10 units.  
Clicking Up Arrow/Down Arrow keys: Increase/Decrease the value by 1 unit.  
Clicking Up Arrow/Down Arrow text box buttons: Increase/Decrease the value by 1 unit.  
Typing a new number in the text box.

Below that information there are 2 buttons, grayed out by default, enabled once the values for Minimum or Maximum Altitude are modified.

Apply: Saves the new values for the Minimum/Maximum Altitude and applies the new filters.

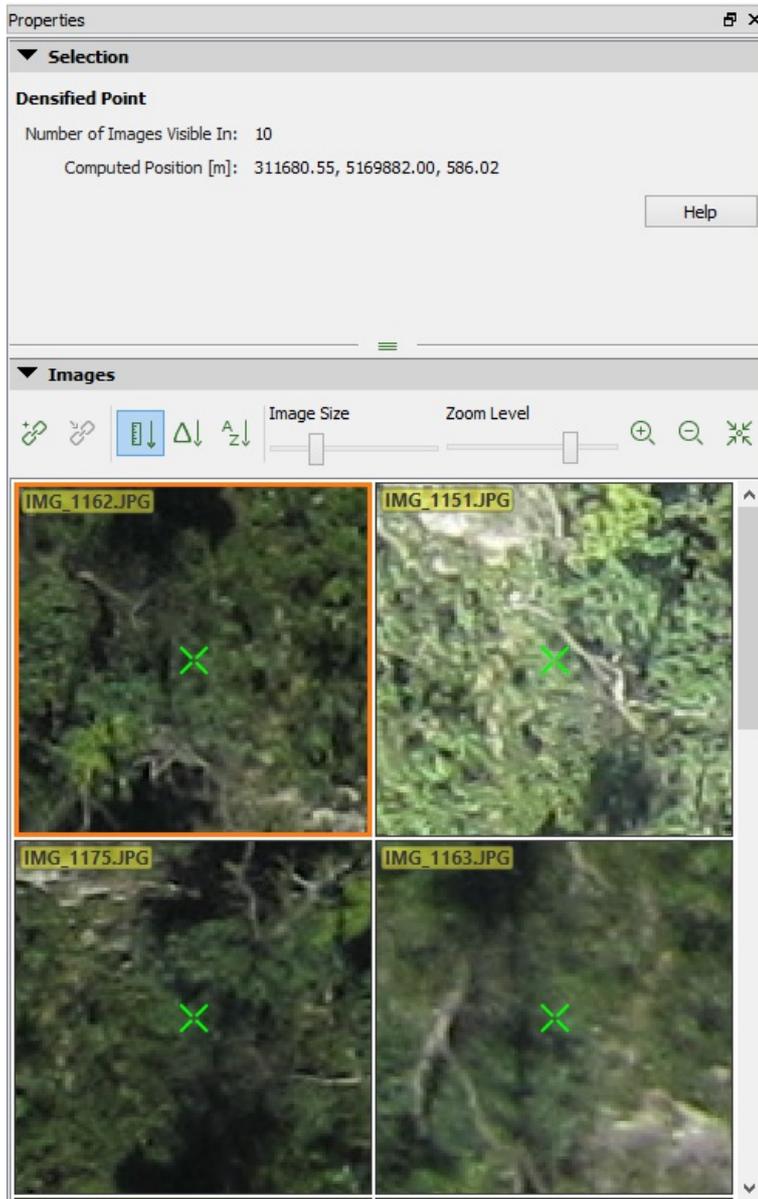
Cancel: Does not save the new values for the Minimum/Maximum Altitude.

Help: Opens the Pix4Dmapper help.

[Index](#) > [Interface](#) > [Menu View](#) > [rayCloud](#) > [Right sidebar](#)

[◀ Previous](#) | [Next ▶](#)

 Access: On the Menu bar, click View > rayCloud to open the rayCloud. The right sidebar is displayed on the right of the main window. The Point Clouds information is displayed when a point of a point cloud is selected in the 3D View.



The following information is displayed:

Number of Images Visible In: Number of calibrated images on which the selected point has been reprojected (number of calibrated images where the computed 3D point is visible).

Computed Position [units]: X, Y, Z position of the selected point in the 3D View.

Below this information there is one button:

Help: Opens the Pix4Dmapper help.

The *Images* section: Displays the selected image and the other images where the point can be found. For more information: [202558459](https://pix4d.com/202558459).

 Access: On the Menu bar, click View > rayCloud to open the rayCloud. The right sidebar is displayed on the right of the main window. The object information is displayed when an object is selected in the 3D View, or when an object is selected in the *Layers* section of the left sidebar.

There are 7 type of objects:

[Polylines](#)

[Surfaces](#)

[Animation Trajectories](#)

[Orthoplanes](#)

[Scale Constraints](#)

[Orientation Constraints](#)

 Note: A Manual Tie Point is associated to each vertex of the objects. The *Sidebar* allows the user to mark these Manual Tie Points on the images. Each vertex that is marked in a least 2 images is taken into account in step 1. *Initial Processing* if it is started from scratch or if the reconstruction is re-optimized.

Polylines



Properties
⊞ ×

▼ Selection

**Polyline 1 (Polyline)**

Number of Vertices: 8

Measurements

Terrain 3D Length [m]:	63.91	error n/a	
Projected 2D Length [m]:	63.83	error n/a	

Copy to Clipboard
Apply
Cancel
Help

---

▼ Images

Image Size
Zoom Level













The following information is displayed:

Object name (object type): The name of the Polyline and its type (Polyline).

Number of Vertices: Number of vertices used to draw the Polyline.

Measurements

Terrain 3D length [units]: 3D length of the Polyline, taking into account the three coordinates of the vertices. For more information: [202559819](https://www.raycloud.com/202559819).

Projected 2D length [units]: 2D length of the Polyline, taking into account the (X,Y) coordinates of the vertices. For more information: [202559839](https://www.raycloud.com/202559839).

 Note: When the polyline is created, next to the measurements, "error n/a  " appears indicating that the measurement accuracy cannot be calculated till all the vertices of the polyline are marked on at least 2 images. For step by step instructions: [202560609](https://www.raycloud.com/202560609).

The buttons:

Copy to Clipboard: Copy the selected information to the clipboard that can be pasted into a text editor or spreadsheet by opening the destination file and pasting.  
 Apply: This button is active when the image marks for the Manual Tie Points associated to the Polyline vertices have been modified, i.e. when a new image has been marked or when an existing mark has been updated or removed. When clicking this button, the new marks are taken into account and the 3D position of the

corresponding vertices is recomputed.

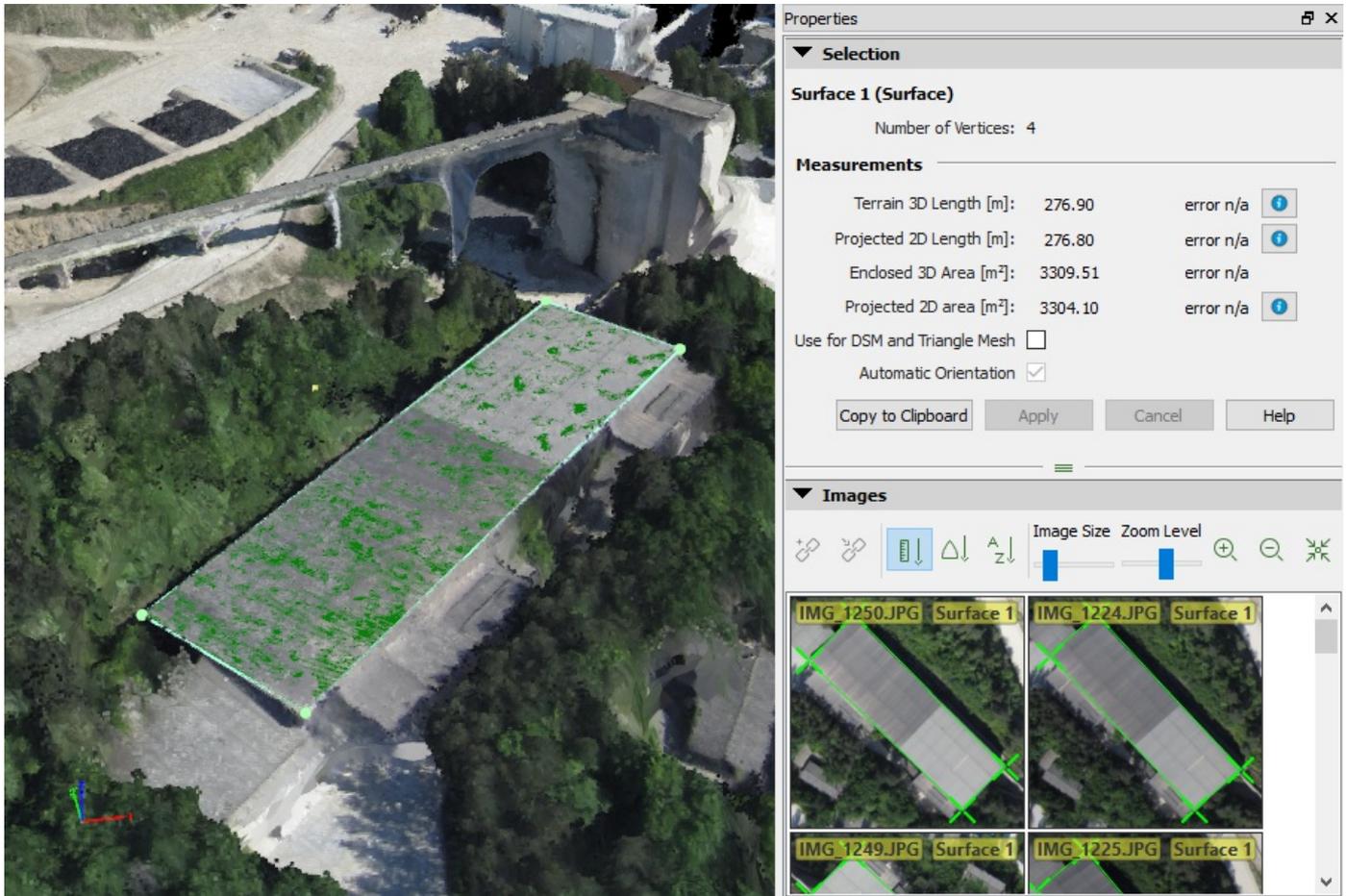
Cancel: This button is active when the image marks for the Manual Tie Points associated to the polyline vertices have been modified, i.e. when a new image has been marked or when an existing mark has been updated or removed. It cancels the modifications of the image marks.

Help: Opens the Pix4Dmapper help.

The *Images* section: Displays the images where the object can be found. For more information: [202558459](#).

For step by step instructions about how to draw a new Polyline: [202560309](#).

## Surfaces



The following information is displayed:

Object name (object type): The name of the Surface and its type (Surface).

Number of Vertices: Number of vertices used to draw the object.

Measurements

Terrain 3D Length [units]: 3D length of the line that has been used to draw the Surface taking into account the three coordinates of the vertices. For more information: [202559819](#).

Projected 2D Length [units]: 2D length of the line that has been used to draw the Surface taking into account the (X,Y) coordinates of the vertices. For more information: [202559839](#).

Enclosed 3D Area [units<sup>2</sup>]: 3D area that is enclosed by this surface, taking into account the three coordinates of the vertices.

Projected 2D Area [units<sup>2</sup>]: 2D area that is enclosed by this surface, taking into account the (X,Y) coordinates of the vertices.

 Note: When the surface is created, next to the measurements, "error n/a ⓘ" appears indicating that the measurement accuracy cannot be calculated till all the vertices of the surface are marked on at least 2 images. For step by step instructions: [202560609](#).

Used for DSM and triangle Mesh: When this box is selected, the surface is used to improve the DSM model and the 3D textured Mesh. For more information: [211083803](#).

Automatic: Selected by default. It uses the normals of the points covered by the surface to estimate the normal of the plane. If the checkbox is not selected, the sequence in which the surface vertices are drawn is used to define the normal of the plane. In this case, the surface should be drawn counterclockwise.

And the buttons:

Copy to Clipboard: Copy the selected information to the clipboard that can be pasted into a text editor or spreadsheet by opening the destination file and pasting.

Apply: This button is active when the image marks for the Manual Tie Points associated to the surface vertices have been modified, i.e. when a new image has been marked or when an existing mark has been updated or removed. When clicking on this button, the new marks are taken into account and the 3D position of the corresponding vertices is recomputed.

Cancel: This button is active when the image marks for the Manual Tie Points associated to the surface vertices have been modified, i.e. when a new image has

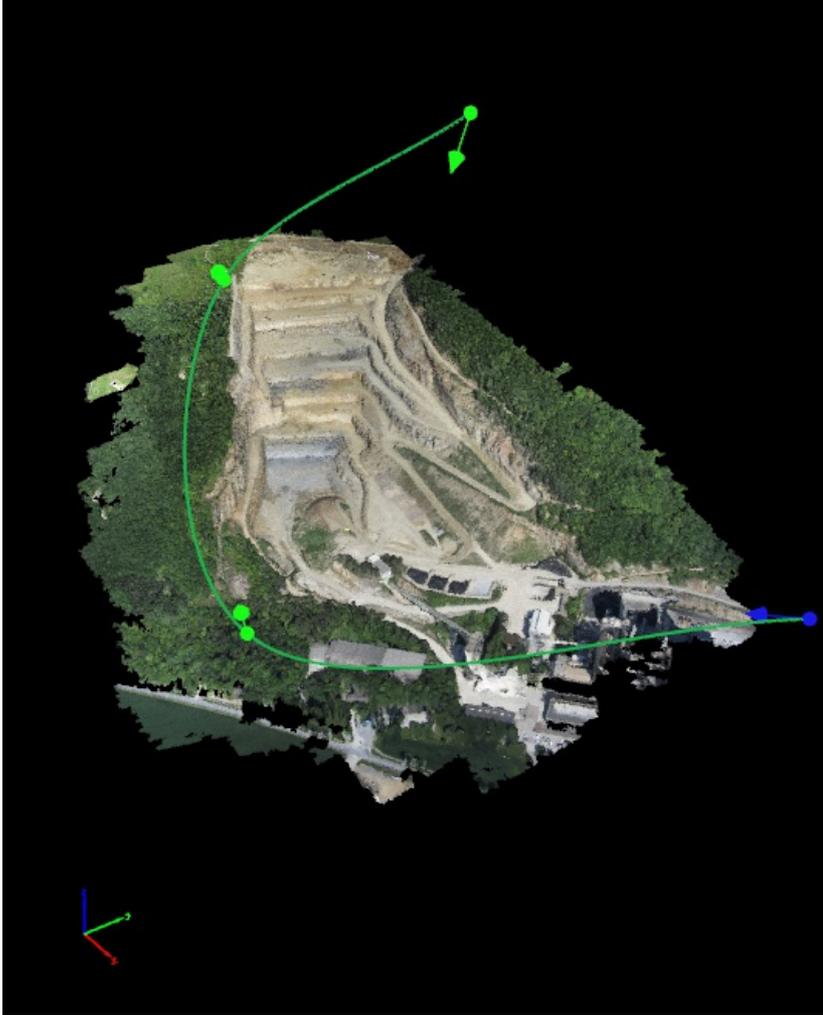
been marked or when an existing mark has been updated or removed. It cancels the modifications of the image marks.

Help: Opens the Pix4Dmapper help.

The *Images* section: Displays the images where the object can be found. For more information: [202558459](#).

For step by step instructions about how to draw a new Surface: [202560269](#).

### Animation Trajectories



Properties ✖

**Selection**

**Animation Trajectory 1**

**Waypoints**

	Timestamp [s]	X [m]	Y [m]
1	0	312355.398941275	5169815.08637506
2	3.13263	312036.866750801	5169382.06621635
3	7.28116	311429.431999109	5169677.43488928

**Video Animation Options**

Duration [s]:

Maximum Speed [m/s]:

Use Interpolation

**Playback Controls**

**Video Rendering**

File Name:

Format:

Frame Rate:

Resolution:

Encoding Quality:

Show Visible Area

Pix4Dmapper Logo

Under Selection in the main frame the name of the Animation trajectory and 4 sections appear:

[Waypoints](#)

[Video Animation Options](#)

[Playback Controls](#)

[Video Rendering](#)

And the button:

Help: Opens the Pix4Dmapper help.

### Waypoints

The following actions can be performed on the table:

Inserting Waypoints: Right click on any cell and click on one of the followings:

Insert Current Viewpoint as Waypoint Before Selection: Inserts the actual viewpoint in the 3D View as waypoint before the selected row (selected waypoint).

Insert Current Viewpoint as Waypoint After Selection: Inserts the actual viewpoint in the 3D View as waypoint after the selected row (selected waypoint).

Insert Displayed Computed Cameras Position as Waypoint Before Selection: Inserts ALL the cameras that are actually visible in the 3D View as waypoints before the selected row (selected waypoint) by placing them (if more than one camera is inserted, the order is defined considering the exif information from the cameras).

Deleting Waypoints: Right click on any cell, and click on Remove Selected Waypoints.

Editing Values: Double click on the cell and edit the value. Timestamp cannot be edited manually, the values can be changed by changing the Duration, Maximum Speed or selecting/unselecting the Use Interpolation checkbox.

The table has as many rows as there are waypoints in the Animation Trajectory. Each row displays information for one waypoint.

Label: Name of the waypoint.

Timestamp [s]. Time at which the animation passes through the waypoint.

X coordinate [units]

Y coordinate [units]

Z coordinate [units]

Omega (Rotation in X Axis) [degrees]

Phi (Rotation in Y Axis) [degrees]

Kappa (Rotation in Z Axis) [degrees]

## Video Animation Options

This section allows the user to change the time of the animation and use or not use interpolation between waypoints:

Duration [s]: Total length in seconds for the animation.

Maximum Speed [m/s]: Maximum speed of the movement of the fly-trough camera in meters/second. The speed is not constant since the software recognizes changes in direction and orientation and reduces the speed in that sectors to allow smoother camera movements.

Use Interpolation: Ensures a smooth transitions between waypoints.



Note:

If the *Use Interpolation* checkbox is NOT selected, the path between waypoints will be straight lines.

If the *Use Interpolation* checkbox is selected, the path between waypoints will be curved lines. The angle of the curve is related to the angle between consecutive lines.

This section contains 2 action buttons:

Apply: Saves the changes done in the sections *Waypoints* or *Video Animation Options*.

Cancel: Reverts the changes to restore the saved Animation Trajectory.

## Playback Controls

This sections allows to display the animation in the 3D View.

Play animation

Stop animation

## Video Rendering

This sections allows to create a video file and set up different video rendering properties:

File Name: Displays the path and the name where the video will be rendered and saved.

Format: Video file format. The available options are: MPEG4 and MPEG2.

Frame Rate: Frames per second to be stored in the video. The available options are: 24, 30 and 60 fps.

Resolution: Total width and height of the video in pixels. The available options are: 800x600, 1024x768, 1280x720 and 1920x1080.

Encoding Quality: Defines the pixel size within the video, the higher the encoding quality the higher definition

Show Visible Area: Displays / does not display in the 3D View a frame allowing to see which part of the 3D View fits in the scene to be recorded according to the resolution. Elements outside the visible area do not appear in the recorded video

Pix4Dmapper Logo: When rendering and creating the video, it displays/ does not display the Pix4Dmapper logo in the bottom right of the video.

This section contains 4 action buttons:

Browse... : Opens the *Save Video As* window which allows to choose the video's folder.

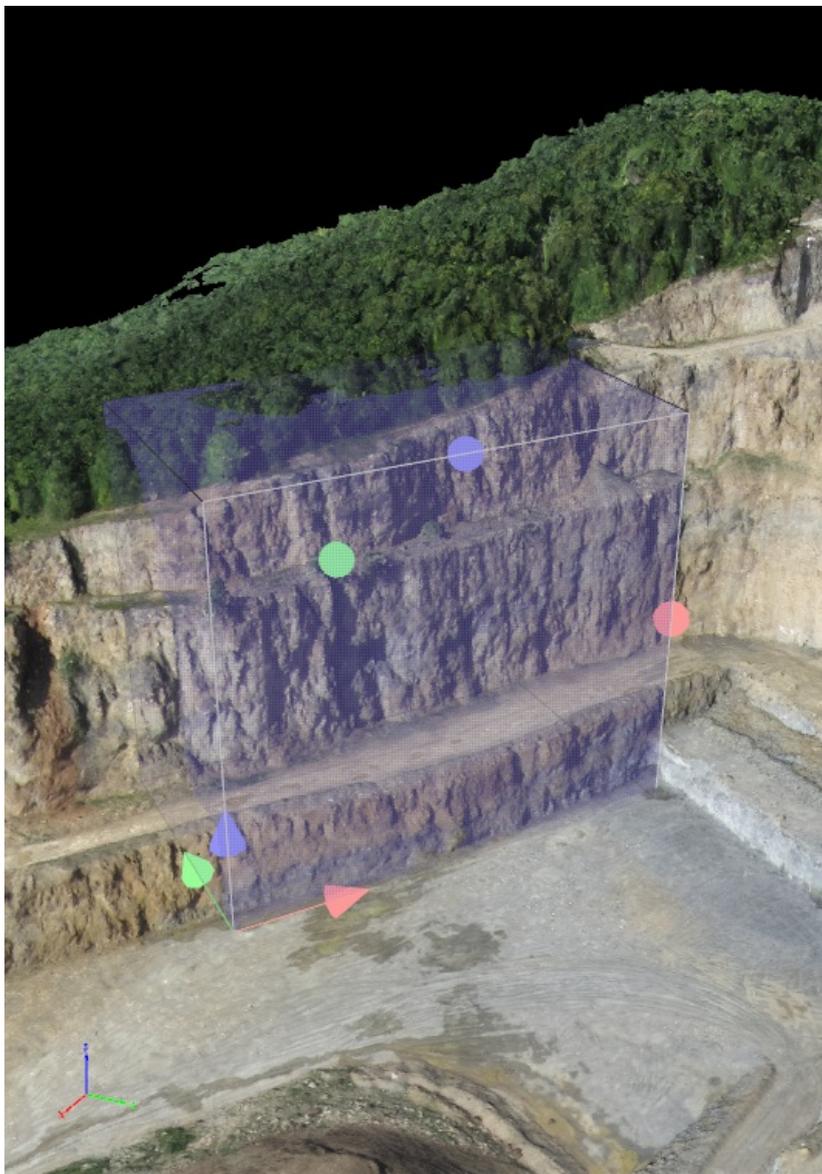
Render: Converts the animation Trajectory into a video, saved in the selected path and using the video properties selected.

Cancel: Enabled while Rendering is in progress, allows to cancel the rendering of an Animation Trajectory into Video.

Help: Opens the Pix4Dmapper help.

For step by step instructions about how to create an Animation Trajectory: [202560299](https://pix4d.com/202560299).

## Orthoplanes



Properties ⏏ ×

▼ Selection

**Orthoplane 1 (Orthoplane)**

Position X [m]:

Y [m]:

Z [m]:

Width [m]:

Height [m]:

Clipping Distance [m]:

Orientation

Yaw [degree]:

Pitch [degree]:

Roll [degree]:

**Alignment Tool (optional)**

**Orthomosaic Generation Options**

Resolution [cm/pixel]:

Generate DSM

File Name:  ...

▼ Instructions

To create an orthomosaic from any plane:

1. Click on the point cloud to insert the *Orthoplane*.
2. Place the *Orthoplane* such that the green arrow points towards the object of interest.
  - To place the *Orthoplane*:
  - 1. Align the *Orthoplane* with an existing *Surface* by selecting the *Surface* and clicking **Align**.
  - 2. Drag the *Orthoplane's* arrows in the *3D View* to translate it.
  - 3. Drag the *Orthoplane's* balls in the *3D View* to resize it.
3. Set the *Orthomosaic Generation Options*.
4. Click **Apply**.
5. Click **Generate**.

Under *Selection* in the main frame appears 3 sections:

Object name (object type): The name of the Orthoplane and its type (Orthoplane).

Position X[units]: Position in X of the reference corner with respect to the origin of the output coordinate system.

Y [units]: Position in Y of the reference corner with respect to the origin of the output coordinate system.

Z [units]: Position in Z of the reference corner with respect to the origin of the output coordinate system.

Width [units]: Size in X of the orthoplane area in output coordinate system units.

Height [units]: Size in Y of the orthoplane area in output coordinate system units.

Clipping Distance [units]: Size in Z of the orthoplane area in output coordinate system units.

Orientation: Defines the rotation of the orthoplane area with respect to the axes of the coordinate system.

Yaw [degrees]: Rotation around the Y axis.

Pitch [degrees]: Rotation around the X axis.

Roll [degrees]: Rotation around the Z axis.

Flip: Changes the orientation and direction of the projection.

Alignment tool (optional): Allows the user to align the orthoplane with a Surface Object.

Surface1: Allows the user to select the surface object to use for alignment.

Align: Aligns the Orthoplane to the selected surface by using the perpendicular vector to the surface as direction of the projection and using the base of the surface as middle point of the Z of the Orthoplane.

Orthomosaic Generation Options: Options related to the output files.

Resolution [cm/pixel]: This value can be modified before generating the new Orthoplane mosaic and indicates the spatial resolution of the Orthomosaic.

Generate DSM: When the checkbox is selected, a DSM file is generated with the Orthoplane Mosaic. Processing options are optimized for facades (sharp *Surface Smoothing* and *Noise Filtering* for the DSM filters, Raster DSM method set to *Inverse Distance Weighting*).

File Name: Path where the Orthoplane and optionally the DSM will be stored.

...: Selects the path where the Orthoplane and optionally the DSM will be stored.

And the buttons:

Apply: Enabled when there has been any change in the properties of the object. It applies the changes.

Cancel: Cancels the changes in the properties since the last time that apply has been clicked.

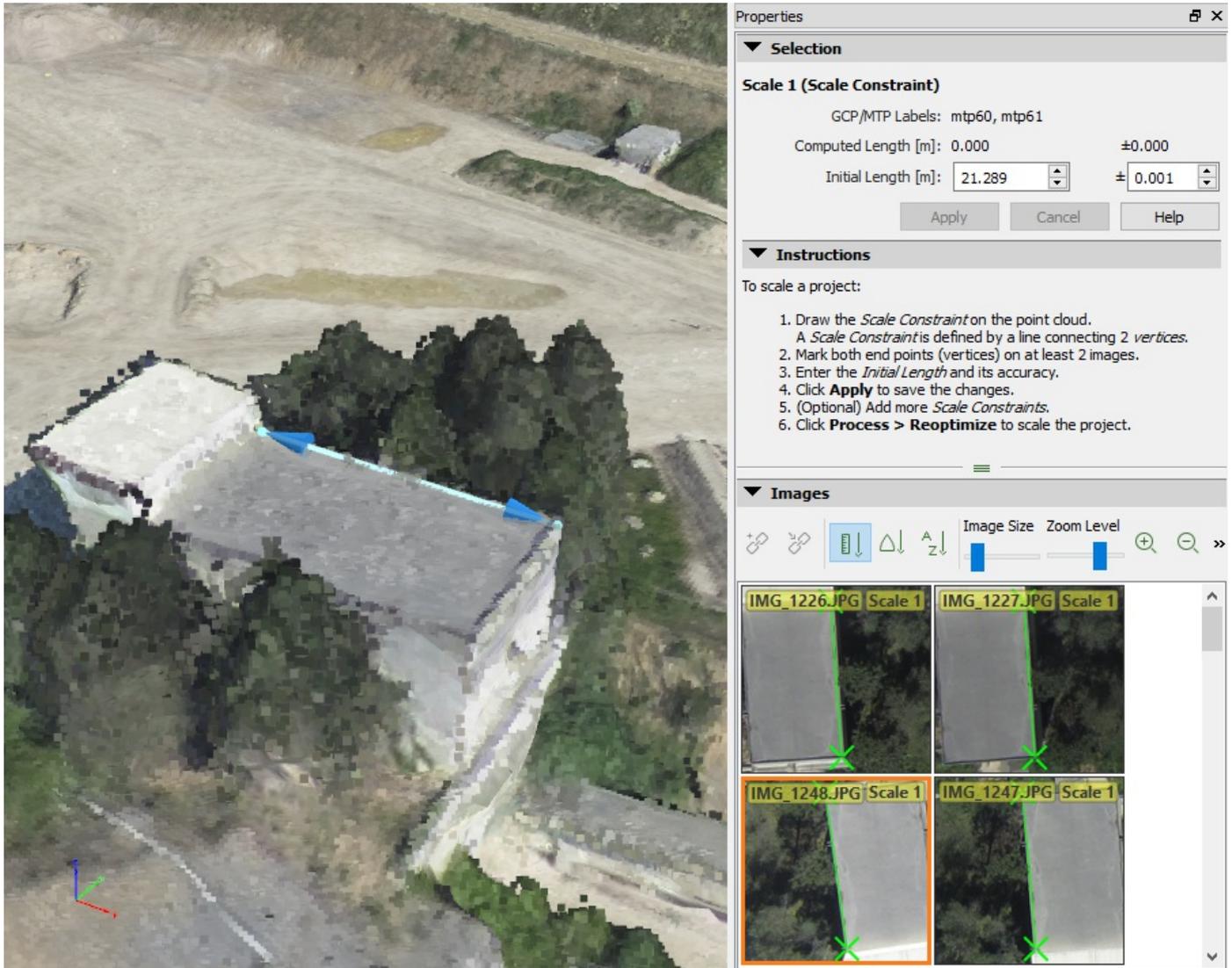
Generate: Generates the Orthomosaic and optionally the DSM for the selected orthoplane in the selected path.

Help: Opens the Pix4Dmapper help.

The *Instructions* section displays instructions about how to draw a new Orthoplane.

For step by step instructions about how to draw a new Orthoplane: [204664359](#).

## Scale Constraints



The screenshot shows the Pix4Dmapper interface. On the left is a 3D model of a building with a blue line representing a scale constraint on its roof. On the right is the 'Properties' panel for 'Scale 1 (Scale Constraint)'. The panel has three sections: 'Selection', 'Instructions', and 'Images'. The 'Selection' section shows 'GCP/MTP Labels: mtp60, mtp61', 'Computed Length [m]: 0.000 ±0.000', and 'Initial Length [m]: 21.289 ±0.001'. The 'Instructions' section lists six steps for creating and applying a scale constraint. The 'Images' section shows four image thumbnails (IMG\_1226.JPG, IMG\_1227.JPG, IMG\_1248.JPG, IMG\_1247.JPG) with green lines and 'X' marks indicating the scale constraint's position in each image.

Contains 3 sections:

Selection  
Instructions  
Images

Under *Selection* in the main frame appears:

Object name (object type): The name of the Scale and its type (Scale Constraint).

GCP/MTP Labels: When creating a *Scale Constraint*, the vertices of the line representing the scale constraint are associated to Manual Tie Points. This label displays the names of the Manual Tie Points associated to the object.

Computed Length [units]: Length measured in the 3D model. The *Computed Length Error* is given by the difference between the *Computed Length* and the *Initial Length*.

Initial Length [units]: Length measured in the field representing the real length of the scale constraint. The accuracy of the *Initial Length* is the accuracy of the measurements in the field.

And the buttons:

Apply: Enabled when there has been any change in the properties of the object or a new marking in the images. It applies the changes.

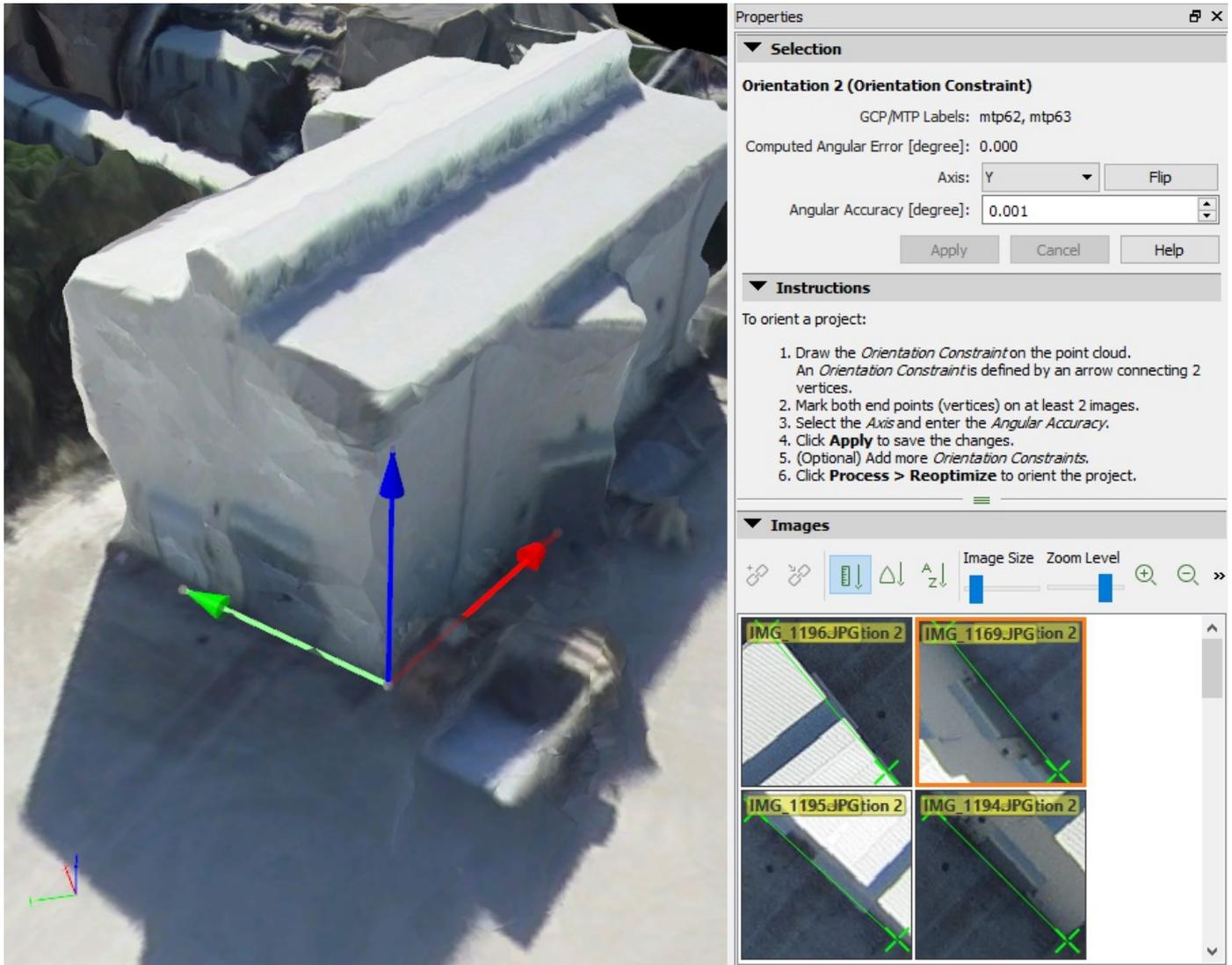
Cancel: Cancel the changes in the properties or in the marking since the last time that apply has been clicked.

Help: Opens the Pix4Dmapper help.

The *Instructions* section: Displays instructions about how to draw a new Scale Constraint.

The *Images* section: Displays the images in which the object is visible. For more information: [202558459](#).

For step by step instructions about how to draw a new Scale Constraint: [205360375](#).



Contains 3 sections:

- Selection
- Instructions
- Images

Under *Selection* in the main frame appears:

- Object name (object type): The name of the Orientation and its type (Orientation Constraint).
- GCP/MTP Labels: When creating an *Orientation Constraint*, the vertices of the arrow representing the scale constraint are associated to Manual Tie Points. This label displays the names of the Manual Tie Points associated to the object.
- Computed Angular Error [degree]: Angular difference between the computed axis and the axis that was drawn.
- Axis: Name of the direction of the Orientation Constraint represents.
- Flip: Changes the direction of the Orientation by rotating it by 180°.
- Angular Accuracy [degree]: Angular accuracy of the measurements in the field.

And the buttons:

- Apply: Enabled when there has been any change in the properties of the object or a new marking in the images has been done. It applies the changes.
- Cancel: Cancels the changes in the properties or in the marking since the last time that apply has been clicked.
- Help: Opens the Pix4Dmapper help.

The *Instructions* section: Displays instructions to draw a new Orientation Constraint.

The *Images* section: Displays the images where the object can be found. For more information: [202558459](https://www.pix4d.com/help/202558459).

For step by step instructions about how to draw a new Orientation Constraint: [205360385](https://www.pix4d.com/help/205360385).

 Access: On the Menu bar, click View > Volumes.

The use of *Volumes* is optional and it can be used to:

Draw and visualize volumes.

Measure volumes.

Import and Export volumes.

When selecting the *Volumes* view the following elements are displayed on the main window:

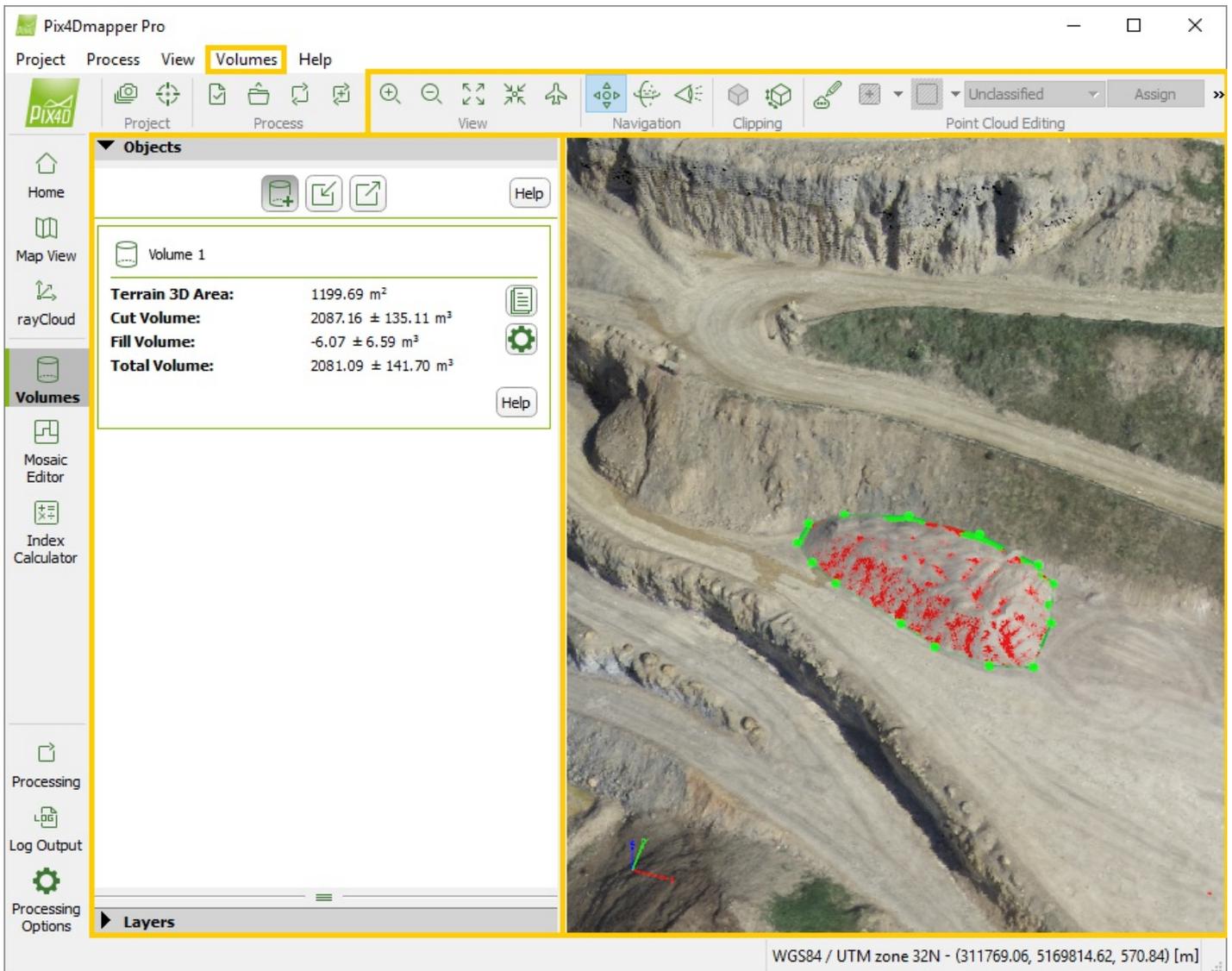
**Menu bar entry:** The standard Menu bar items and an extra item.

**Toolbar:** The standard toolbar and some extra buttons specific to the rayCloud and the Volumes view.

**3D View:** Displayed in the main window. It is a simplified version of the rayCloud 3D View. Displays in 3D the different elements.

**Sidebar:** Displayed on the left of the Volumes view.

**Status bar:** Displayed on the bottom right of the Volumes view. Displays the coordinates when passing the mouse over any element displayed in the 3D View.



The screenshot shows the Pix4Dmapper Pro interface in the Volumes view. The main window displays a 3D terrain model with a red volume highlighted. The sidebar on the left shows the following volume statistics for 'Volume 1':

Volume 1		
<b>Terrain 3D Area:</b>	1199.69 m <sup>2</sup>	
<b>Cut Volume:</b>	2087.16 ± 135.11 m <sup>3</sup>	
<b>Fill Volume:</b>	-6.07 ± 6.59 m <sup>3</sup>	
<b>Total Volume:</b>	2081.09 ± 141.70 m <sup>3</sup>	

The status bar at the bottom right displays the coordinates: WGS84 / UTM zone 32N - (311769.06, 5169814.62, 570.84) [m].

Status bar

On the bottom right part of the 3D View, the following is displayed:

WGS84 / UTM zone 32N - (311684.29, 5169774.29, 496.97) [m]

**Selected Coordinate System:** Displays the selected coordinate system of the point.

**Position:** Displays the (X,Y, Z) coordinates in meters / feet of each point of the 3D View when passing the mouse over any element. When passing the mouse over the displayed elements, the coordinates change.

 Important: In the Volumes, the coordinate system is the output coordinate system.

By default the output coordinate system is the same as the GCPs coordinate system, if GCPs are used, otherwise it is the same as the image geolocation coordinate system. If the coordinates system is WGS84, the output is given in UTM. If less than 3 images are geolocated and less than 3 GCPs are defined, then the output coordinates system is set to "Arbitrary".

 Access: On the Menu bar, click View > Volumes to open the Volumes view. The 3D View is displayed in the center of the main window.

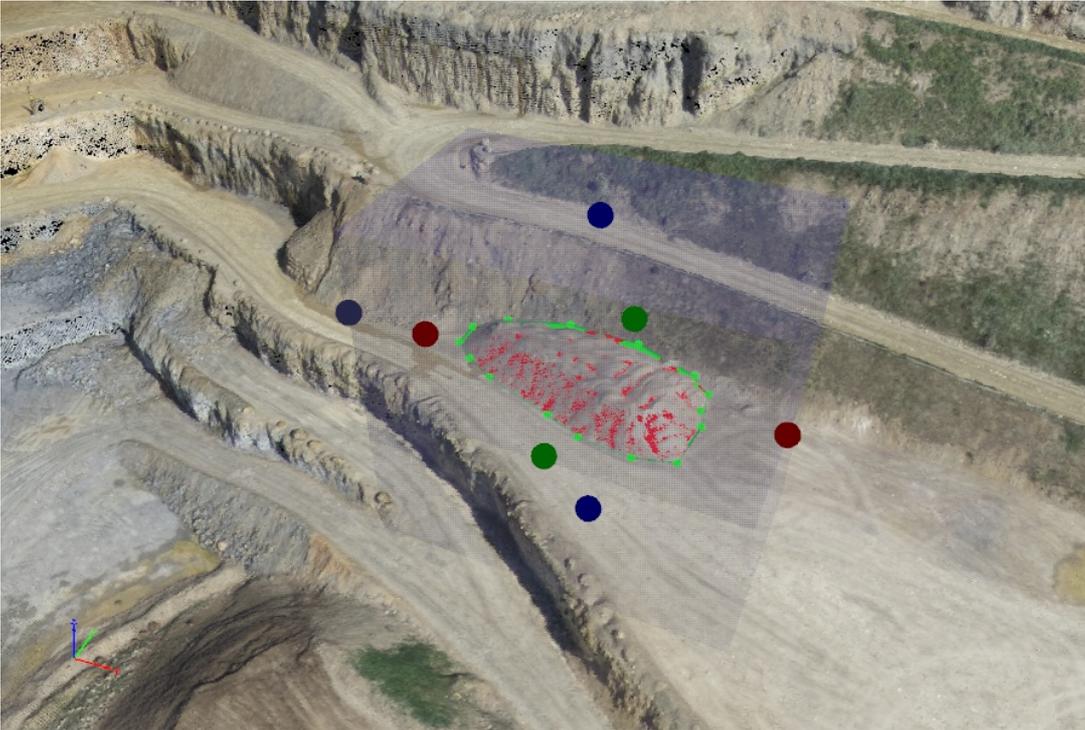
The 3D Volumes view is a simplified version of the rayCloud view to facilitate the volume measurements. The different layers that are displayed in the 3D View (also visible in the rayCloud) are:

**Point Clouds:** This layer contains the Densified Point Cloud generated during step 2. *Point Cloud* and Mesh and the drag-and-dropped external point clouds. It is the background for drawing the volumes.

**Triangle Meshes:** This layer groups the 3D Textured Mesh and triangle meshes generated by triangulating a point cloud that is loaded as a triangle mesh.

**Volumes:** This layer contains the volumes defined by the user.

**Clipping Box:** This tool allows to visualize only the points included in the Clipping Box. This tool is not visible in the Layers section of the sidebar.



 Important: It is possible to change the *Points Density* by Press "Alt" + "+" or "AltGr" + "-" in order to increase or decrease the density, "Alt" + "0" reset the *Points Density* to default values.

 Important: The navigation in the 3D Volumes View (how the 3D view reacts when using the mouse or keyboard) depends on the *Navigation Mode* selected. For more information and full description of all the possible actions to navigate in the 3D View using the mouse or keyboard: [205360675](#).

 Important: Several predefined viewpoints exist such as top view, front view, etc. These predefined viewpoints are accessible using the keyboard and are using the Menu bar Volumes > Viewpoint. For more information about the available viewpoints: [202558069](#).

### Point Clouds

The Display Properties selected in the rayCloud are inherited to the Volumes. The Display Properties of the Point Cloud can be selected in the rayCloud or in the Layers section of the sidebar of the Volumes view. For more information about the Display Properties: [202558049](#).

### Triangle Meshes

The Triangle Meshes are not displayed by default. The Display Properties selected in the rayCloud are inherited to the Volumes. The Display Properties of the Triangle Meshes can be selected in the rayCloud or in the Layers section of the sidebar of the Volumes view. For more information about the Display Properties: [202558079](#).

### Volumes

By default, the volumes defined in the Volumes view appear in the 3D View as:

*Green sphere:* Volume vertices.

*Green surface:* Base surface the volumes.

*Green lines:* Lines between vertices/waypoints of the same volume.

*Red Terrain:* Triangles between the base surface and the terrain defined by the DSM.



[Index](#) > [Interface](#) > [Menu View](#) > [Volumes](#)

[◀ Previous](#) | [Next ▶](#)

 Access: On the Menu bar, click View > Volumes, and then click Volumes.

The following options are displayed:

- [Viewpoint](#)
- [Navigation Modes](#)
- [Perspective/Orthographic](#)
- [Change Background...](#)
- [Display Sky](#)
- [New Volume](#)

### New Volume

A Volume is an object that can be used for volume calculations. It is defined by a 3D Surface called base surface. The volume is computed between the base surface and the terrain surface, defined by the DSM.

For step by step instructions about how to draw a new volume: [202560319](#).

Once a *New Volume* is created, the *Sidebar* displays the following information: [208652926](#).

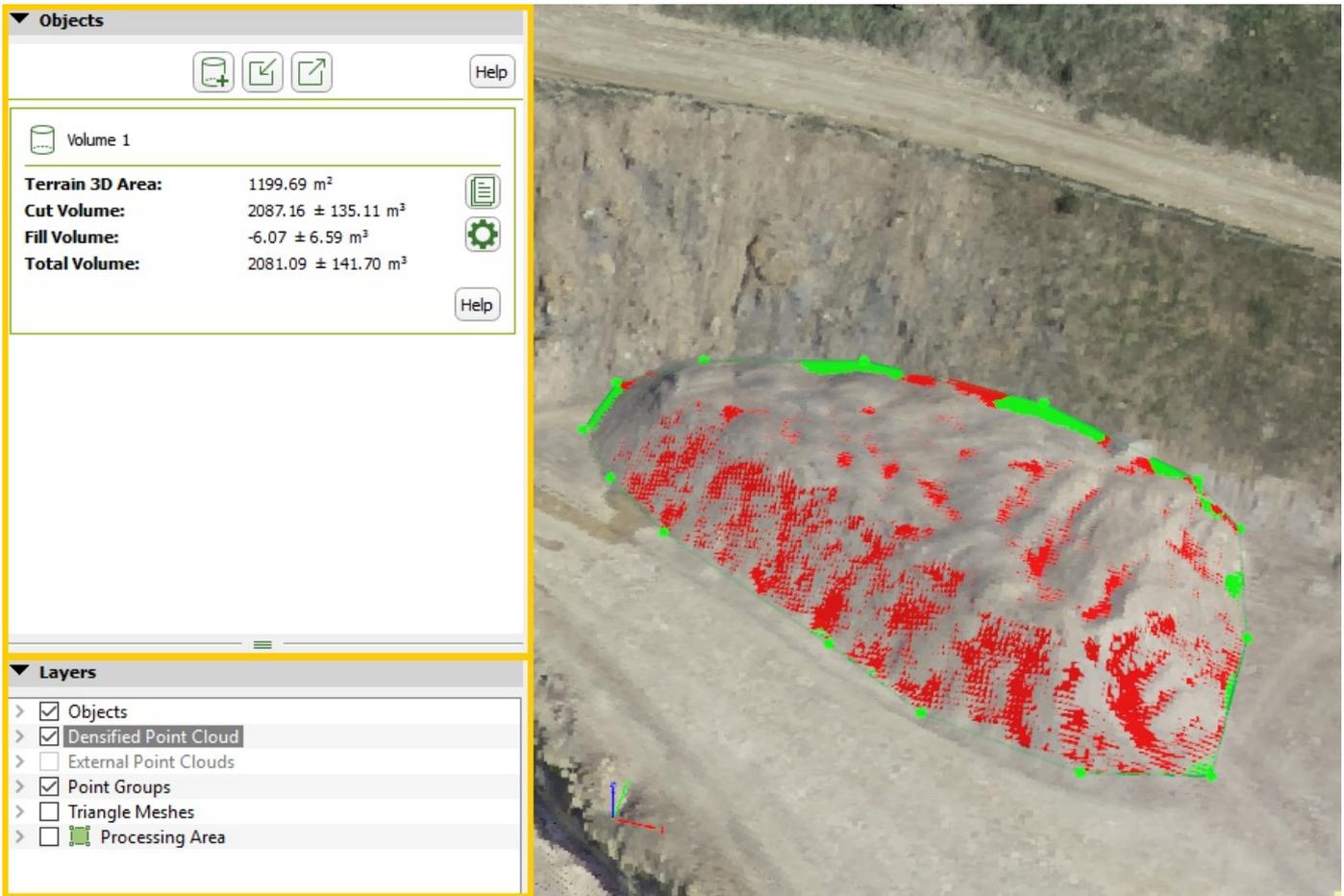


The screenshot shows a software interface with a sidebar on the left and a 3D terrain view on the right. The sidebar, titled "Objects", contains a table of volume data for "Volume 1". The table lists the following values:

Property	Value
Terrain 3D Area:	1199.69 m <sup>2</sup>
Cut Volume:	2087.16 ± 135.11 m <sup>3</sup>
Fill Volume:	-6.07 ± 6.59 m <sup>3</sup>
Total Volume:	2081.09 ± 141.70 m <sup>3</sup>

The 3D view shows a terrain surface with a red volume overlay. The volume is defined by a green boundary line and a red surface. The terrain is shown in a perspective view, with a dirt road and a hillside visible. A coordinate system is visible in the bottom left corner of the 3D view.

 Access: On the Menu bar, click View > Volumes to open the Volumes view. The sidebar is displayed on the left of the main window. The Volumes view is available when the point cloud and the DSM are generated.



**Objects**

Volume 1

<b>Terrain 3D Area:</b>	1199.69 m <sup>2</sup>
<b>Cut Volume:</b>	2087.16 ± 135.11 m <sup>3</sup>
<b>Fill Volume:</b>	-6.07 ± 6.59 m <sup>3</sup>
<b>Total Volume:</b>	2081.09 ± 141.70 m <sup>3</sup>

**Layers**

- Objects
- Densified Point Cloud
- External Point Clouds
- Point Groups
- Triangle Meshes
- Processing Area

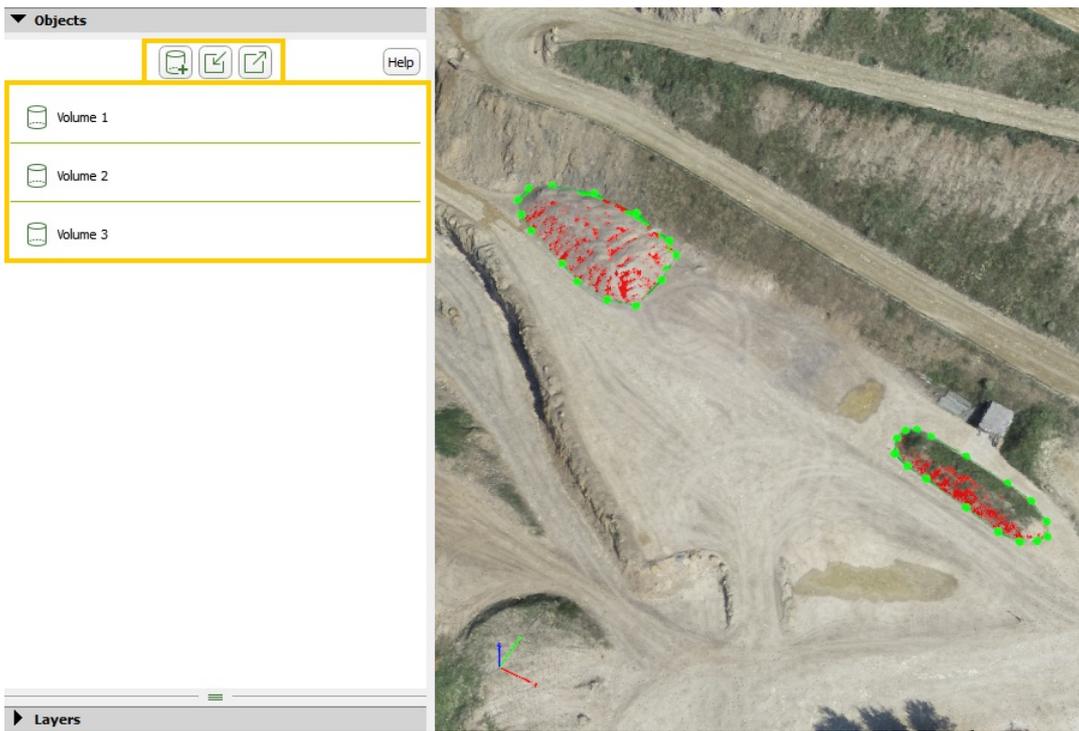
The sidebar consists of the sections:

**Objects:** This section allows to draw, import and export volumes and obtain the measures of the drawn volumes.

**Layers:** This section groups all the objects that can be displayed on the 3D View.

The sidebar can be shown / hidden by dragging and dropping the left side border of the 3D View.

 Access: On the Menu bar, click View > Volumes to open the Volumes view. The sidebar is displayed on the left of the main window. The Volumes view is available when the point cloud and the DSM are generated.



The *Objects* section consists of two parts:

[The action buttons](#)

[The volume list](#)

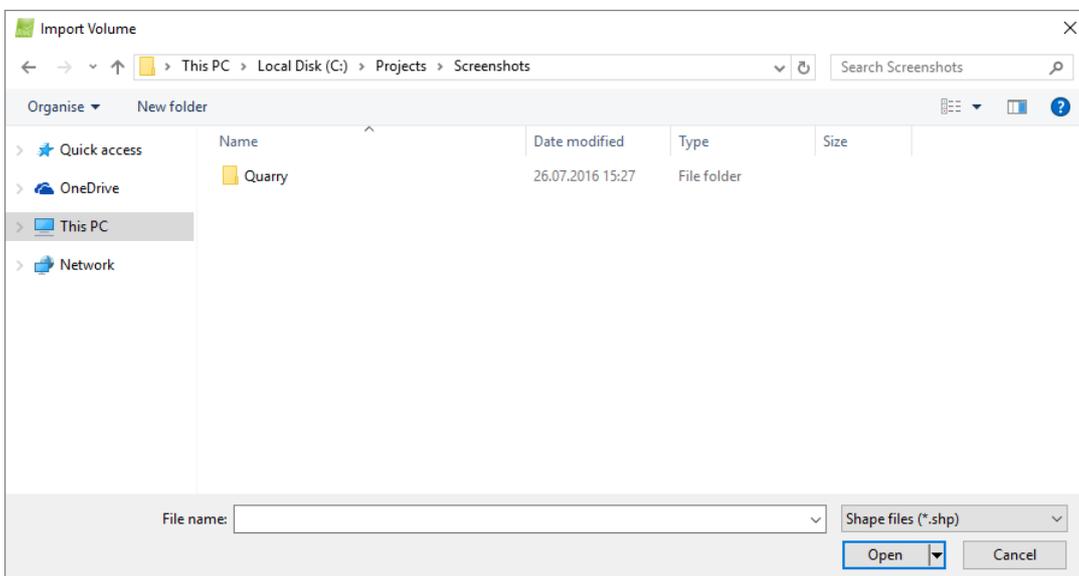
## Action buttons

There are 3 action buttons:

 New volume: Allows the user to draw a new volume. For step by step instructions: [202560319](#).

 Import volume: Opens the *Import Volume* pop-up that allows to import volumes created previously with Pix4Dmapper or created manually for the same area of study. For step by step instructions: [204836569](#).

 Important:  
 To import a volume created previously with Pix4Dmapper, it has to be a .shp file that contains surfaces (*name\_surfaces.shp*) or vertices (*name\_vertices.shp*).  
 To import a volume created with an external software, it has to be a .shp file that contains a 3D polygon (surface) or 3D vertices.



It contains the sections:

Navigation window: Used to search and select the file to be imported.

File name: Displays the name of the selected file to be imported.

Files of type: Displays the possible formats accepted for the input file: Shape files (.shp) are accepted.

And the action buttons:

Open: Imports the selected file.

Cancel: Does not import the Volume and exits the pop-up.

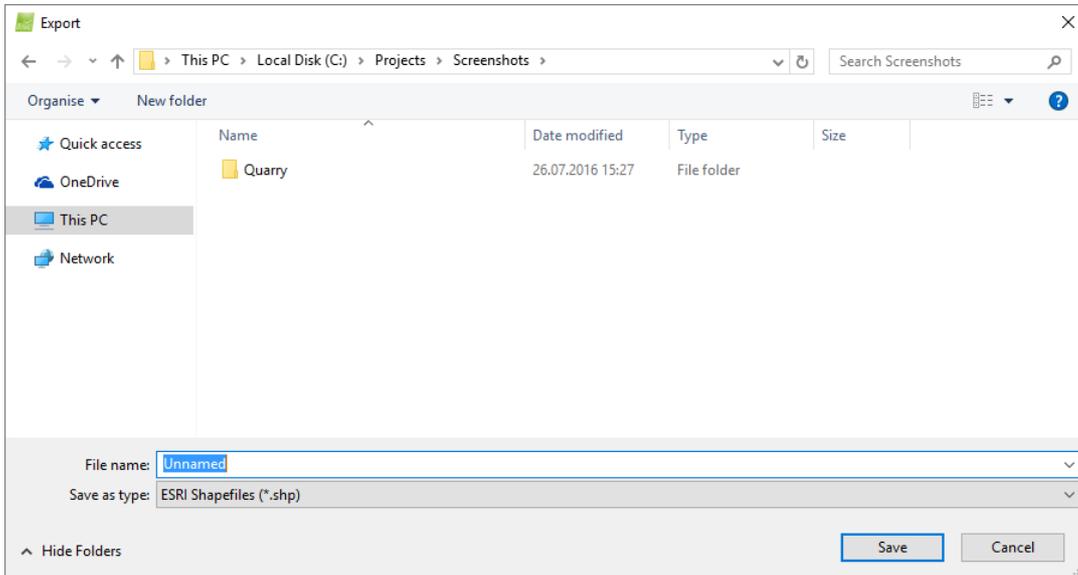
 Export volume: Allows the user to select and export the volumes the following buttons appear:

Select: Allows the user to select *All* or *None* of the volumes to be exported. The user can also select some of the Volumes to be exported by selecting the box that appears next to the names of the volumes.

 Important: At least one volume needs to be selected to be exported.

Cancel: Cancels the export of volumes.

Export: Opens the *Export* pop-up:



It contains the sections:

Navigation window: Used to search and select the directory in which the volume will be exported.

File name: Allows the user to select the name of the file to be exported.

Save as type: Displays the possible formats accepted for the input file:

AutoCad DFX (.dxf).

ESRI Shapefiles (.shp).

Keyhole Markup Language (.kml).

Microstation DGN (.dgn).

## Volume list

It contains the list of volumes added to the project and the measures for each volume.

 Important: The volume is computed between the volume's base and the surface defined by the DSM generated in step 3. *DSM, Orthomosaic and Index*.

The volume information is displayed by clicking the volume name in the Objects layer of the sidebar.

 Important: The volume information is displayed once the volume is computed. If the volume is not computed, the Compute button will appear. Clicking the Compute button will compute the volume.

The following information is displayed:

Volume name: The name of the volume.

Terrain 3D Area [units<sup>2</sup>]: Area that is defined by the DSM included in the volume's base.

Cut Volume [units<sup>3</sup>]: Volume that is above the volume base. The volume is measured between the volume's base and the surface defined by the DSM.

Fill Volume [units<sup>3</sup>]: Volume that is below the volume base. The volume is measured between the volume base and the surface defined by the DSM.

Total Volume [units<sup>3</sup>]: Total volume, Total Volume = Cut volume + Fill volume.

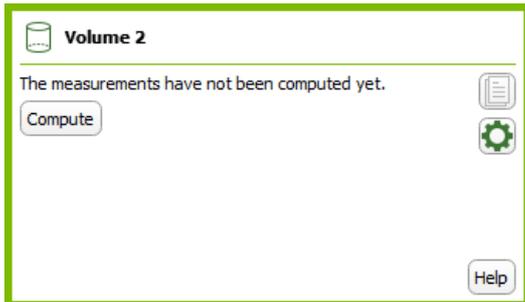
 Tip: For more information on the error estimation (+/-) in volume calculation: [217114246](https://www.terraconnect.com/217114246).

When hovering over one volume, 2 action buttons appear:

-  View/Hide: Allows to view or hide the volume from the 3D view.
-  Delete: Allows the user to delete the volume.

When selecting a volume, 3 action buttons appear:

-  Compute: Computes the volume selected. Appears when the volume is not computed, when there is a change in the name or in the base surface of the volume or the DSM.
-  Copy to Clipboard: Copies the measures of the selected volume to the clipboard that can be pasted into a text editor or spreadsheet by opening the destination file and pasting.
-  Settings: Allows the user to select the base surface settings and the display settings of the volumes. The *Volume Settings* pop-up appears.



It consists of two tabs:

Base surface Settings: Allows to select the base plane for the volume calculation. There are six different options:

Triangulated: Selected by default. Connects all the vertices and triangulates the volume above and below the base surface. Recommended option when the entire boundary of the stockpile is visible and the surface is relatively flat.

Fit Plane: Fits a plane to the vertices, so that all vertices are at the minimum distance from the base surface. Recommended option when the entire boundary of the stockpile is visible and the base surface is a hard surface, a slope or flat with the same altitude.

Align with Average Altitude: The base surface is parallel to the XY plane with altitude at the average altitude of all vertices.

Align with Lowest Point: The base surface is parallel to the XY plane with altitude at the lowest altitude of all vertices. Recommended option when part of the boundary is not visible, for example the stockpile is partially surrounded by walls.

Align with Highest Point: The base surface is parallel to the XY plane with altitude at the highest altitude of all vertices. Recommended option when the desired computation is the fill volume of a bunker, a pool, a pond, etc.

Custom Altitude [units]: The base surface is parallel to the XY plane with altitude at a custom altitude. Recommended option when the stockpile is surrounded by walls and only part or even no boundary is visible, but the altitude of the flat base surface is known.

 Tip: For more information and specific cases about how to choose the base surface settings: [217114246](https://www.terraconnect.com/217114246).

Display: Allows to edit the display properties for one or all the volumes.

Vertex Color: Color of the spheres that represent the vertices of the bases of the volumes.

Vertex Radius: Radius of the spheres that represent the vertices of the bases of the volumes.

Line Color: Color of the lines between the vertices of the bases of the volumes.

Line Width: Width of the lines defining the bases of the volumes.

Base: View/hide the bases of the volumes.

Color: Color of the bases of the volumes.

Shader: Specifies the way each triangle of the bases of the volumes is colored. The color is related to the 3D position of each triangle. There are 2 ways of coloring the triangles available:

Monochrome: Selected by default. The triangles are colored with a color-to-black scale depending on the angle with respect to a virtual sun positioned in the north-east at 45 degrees from the horizon. It uses the color selected above.

Color: The triangles are colored with an RGB scale. The color of a triangle depends on the angle with respect to 3 virtual suns with Red, Green, and Blue illumination. The color of each triangle is the combination of the light received by the 3 virtual suns. This shader gives a slope map if the model is looked at from top. It gives information about the orientation of each surface.

Terrain: View/hide the triangles defining the terrain. These triangles are generated using the base of the volume and the DSM and below that surface.

Color: Color of the triangles defining the terrain. These triangles are generated using the base surface and the points above and below that surface (this property only affects Volume objects).

Shader: Specifies the way each triangle defining the terrain is colored. The color is related to the 3D position of each triangle. 2 ways of coloring the triangles are available:

Monochrome: Selected by default. The triangles are colored with a color-to-black scale depending on the angle with respect to a virtual sun positioned in the north-east at 45 degrees from the horizon. It uses the color selected above.

Color: The triangles are colored with an RGB scale. The color of a triangle depends on the angle with respect to 3 virtual suns with Red, Green, and Blue illumination. The color of each triangle is the combination of the light received by the 3 virtual suns. This shader gives a slope map if the model is looked at from top. It gives information about the orientation of each surface.



 Access: On the Menu bar, click View > Volumes to open the Volumes view. The *Layers* section is displayed on the left of the main window. The Volumes view is available when the point cloud and the DSM are generated.

A layer is a group of objects that can be displayed on the 3D View. The Layers section of the left sidebar contains the following layers:

**Objects:** Contains all the volumes drawn in the Volumes view.

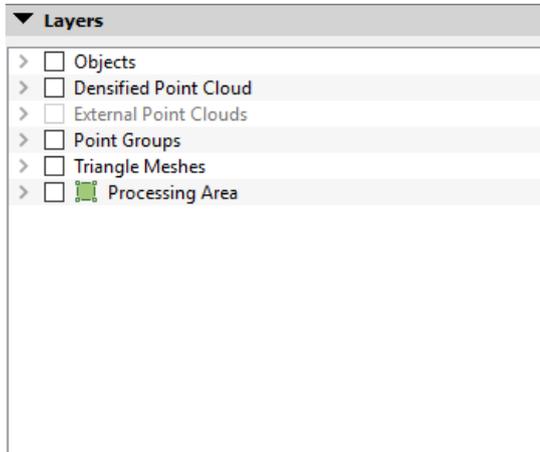
**Densified Point Cloud:** Contains the densified point cloud generated during step 2.

**External Point Clouds:** Contains the external point clouds loaded.

**Point Groups:** Contains the different groups of points (each point of the densified point cloud is assigned to one group).

**Triangle Meshes:** Contains Triangle Meshes (generated in Pix4Dmapper or imported).

**Processing Area:** Contains the Processing Area.



Characteristics:

By clicking on the left arrow of a layer, the sub-layers and layer properties are shown or hidden.

By clicking on the a layer's check box, the corresponding layer is shown or hidden in the 3D View.

The different layer properties can be edited.

Some layers have a context menu that can be accessed by right clicking on the corresponding layer.

Objects

The *Objects* layer contains the *Volumes* sublayer, which contains the list of volumes added to the project.

The volumes layer has the following structure:

Contains the [list of volumes](#) added to the project. It can be used for volume calculation. It is defined by a 3D surface called a base. The volume is computed between the base and the terrain surface.

The *Volumes* layer has the following structure:

**Display Properties:** This layer allows the user to edit the display properties for all the volumes.

**Vertex Color:** Color of the spheres that represent the vertices of the bases of the volumes.

**Vertex Radius:** Radius of the spheres that represent the vertices of the bases of the volumes.

**Line Color:** Color of the lines between the vertices of the bases of the volumes.

**Line Width:** Width of the lines defining the bases of the volumes.

**Base:** View/hide the basex of the volumes.

**Color:** Color of the bases of the volumes.

**Shader:** Specifies the way each triangle of the bases of the volumes is colored. The color is related to the 3D position of each triangle. There are 2 ways of coloring the triangles available:

**Monochrome:** Selected by default. The triangles are colored with a color-to-black scale depending on the angle with respect to a virtual sun positioned in the north-east at 45 degrees from the horizon. It uses the color selected above.

**Color:** The triangles are colored with an RGB scale. The color of a triangle depends on the angle with respect to 3 virtual suns with Red, Green, and Blue illumination. The color of each triangle is the combination of the light received by the 3 virtual suns. This shader gives a slope map if the model is looked at from top. It gives information about the orientation of each surface.

**Terrain:** View/hide the triangles defining the terrain. These triangles are generated using the base of the volume and the points above and below that surface.

**Color:** Color of the triangles defining the terrain. These triangles are generated using the base surface and the points above and below that surface (this property only affects Volume objects).

**Shader:** Specifies the way each triangle defining the terrain is colored. The color is related to the 3D position of each triangle. 2 ways of coloring the triangles are available:

**Monochrome:** Selected by default. The triangles are colored with a color-to-black scale depending on the angle with respect to a virtual sun positioned in the north-east at 45 degrees from the horizon. It uses the color selected above.

**Color:** The triangles are colored with a RGB scale. The color of a triangle depends on the angle with respect to 3 virtual suns with Red, Green, and Blue illumination. The color of each triangle is the combination of the light received by the 3 virtual suns. This shader gives a slope map if the model is looked at from top. It gives information about the orientation of each surface.

**List of Volumes:** Each object has the following sub-element:

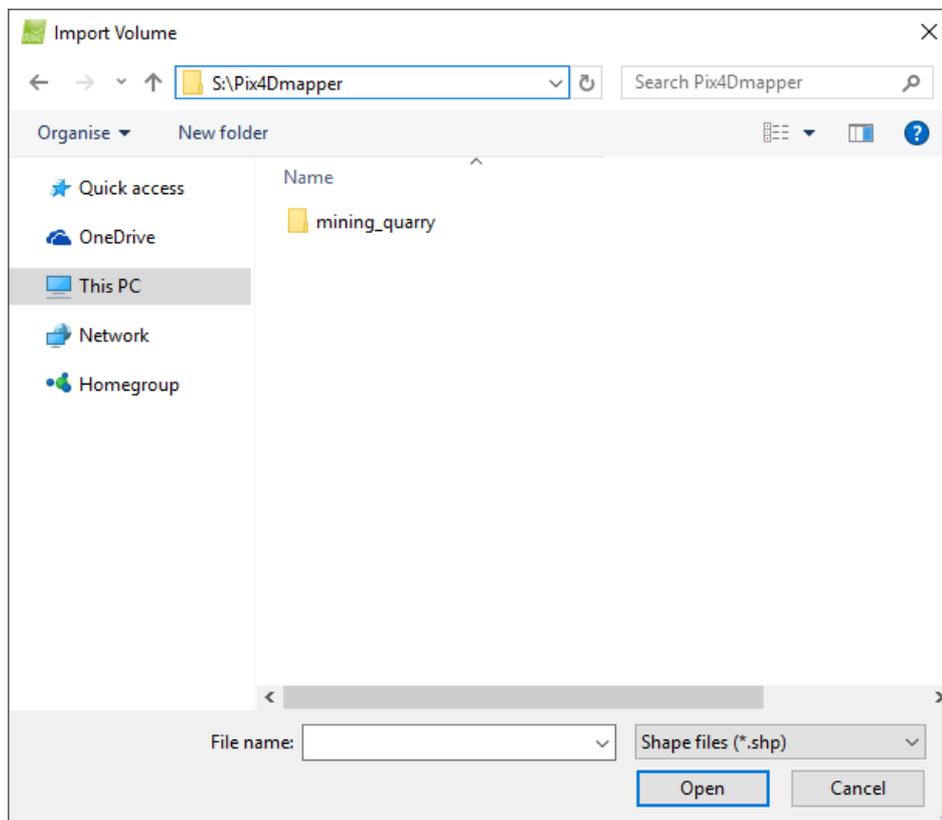
Display Properties: This layer allows the user to edit the Display Properties of a Volume. The properties that can be edited are the same as the Display Properties of the Volumes listed above.

By right clicking on the *Volumes* sub-layer, a context menu with the following options appears:

New Volume: Allows the user to draw a new volume. For step by step instructions: [202560319](#).

Import Volume: Opens the *Import Volume* pop-up that allows the user to import Volumes created previously with Pix4Dmapper for the same area of study or created manually.

**!** Important:  
To import a volume created previously with Pix4Dmapper, it has to be a .shp file that contains surfaces (*name\_surfaces.shp*) or vertices (*name\_vertices.shp*).  
To import a volume created with an external software, it has to be a .shp file that contains a 3D polygon (surface) or 3D vertices.



Contains the sections:

Navigation window. Used to search for and select the file to be imported.

File name: Displays the name of the selected file to be imported.

Files of type: Displays the possible formats accepted for the input file: Shape files (.shp) are accepted.

And the action buttons:

Open: Imports the selected file.

Cancel: Does not import the Volume and exits the pop-up.

Help: Opens the Pix4Dmapper help.

Export All Volumes: Opens the *Export* pop-up that allows the user to export the corresponding components from the volume into a file.

**!** Important: A Volume is composed of volume meshes, lines, and vertices to which Manual Tie Points are associated.

The following file formats can be selected for export:

AutoCad DFX (.dxf).

ESRI Shapefiles (.shp).

Keyhole Markup Language (.kml).

Microstation DGN (.dgn).

The type of components to export can be selected. The following components can be exported:

Export Vertices: Exports the vertices of the Volumes.

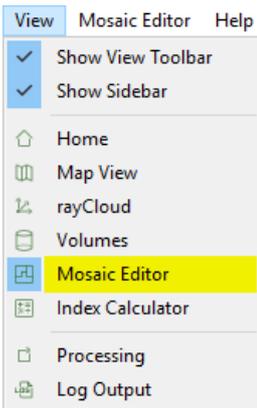
Export Surfaces: Exports the surface meshes of the Volumes.

Export Meshes: Exports the volume meshes of the Volumes.

**!** Important: The options *Export All Volumes* is enabled only if at least one Volume has been drawn.



 Access: On the Menu bar, click View > Mosaic Editor (available only if step 3. *DSM, Orthomosaic and Index* has been completed).



 **Warning:**  
 The *Mosaic Editor* may be used to manually correct artifacts in the Orthomosaic resulting from Step 3. *DSM, Orthomosaic and Index* and in order to improve its visual aspect.  
 The changes applied in the Mosaic Editor affect a local copy, not the mosaic resulting from Step 3. *DSM, Orthomosaic and Index*.  
 In order to obtain the edited mosaic, the mosaic needs to be exported: [202560079](#). The orthomosaic resulting from Step 3. *DSM, Orthomosaic and Index* will then be overwritten. The Grid DSM as well as the different orthomosaic formats (GeoTIFF, Google Maps Tiles, etc.) will be generated if selected in the processing options.  
 For more information about the Mosaic Editor processes workflow: [204829349](#).

For step by step instructions about how to improve the visual aspect of the orthomosaic: [202559939](#) (for buildings), [202559959](#) (for bridges).

The use of the *Mosaic Editor* is optional and it can be used to:

- Visualize the DSM (raster GeoTIFF Digital Surface Model).
- Visualize the DTM (raster GeoTIFF Digital Terrain Model).
- Visualize the Mosaic.
- Improve the visual aspect of the orthomosaic.

When selecting the *Mosaic Editor* view the following elements are displayed on the Main window:

**Menu Bar Entry:** Extra entry displayed on the Menu bar.

**Toolbar:** The standard toolbar and some extra buttons specific to the Mosaic Editor.

**Mosaic View:** Displayed in the main window. By default the *Orthomosaic* is displayed. The Mosaic Editor can also be used to visualize the DSM (Elevation).

**Sidebars:** Displayed on the right of the Mosaic View. By default the *Mosaic editing* sidebar is displayed.

**Status bar:** Displayed on the bottom right of the Mosaic View. Display the coordinates when passing the mouse over the orthomosaic / DSM.

For step by step instructions related to the use of the Mosaic Editor: [202558709](#).

 Video: Watch the instructional video related to the *Mosaic Editor*: [here](#).

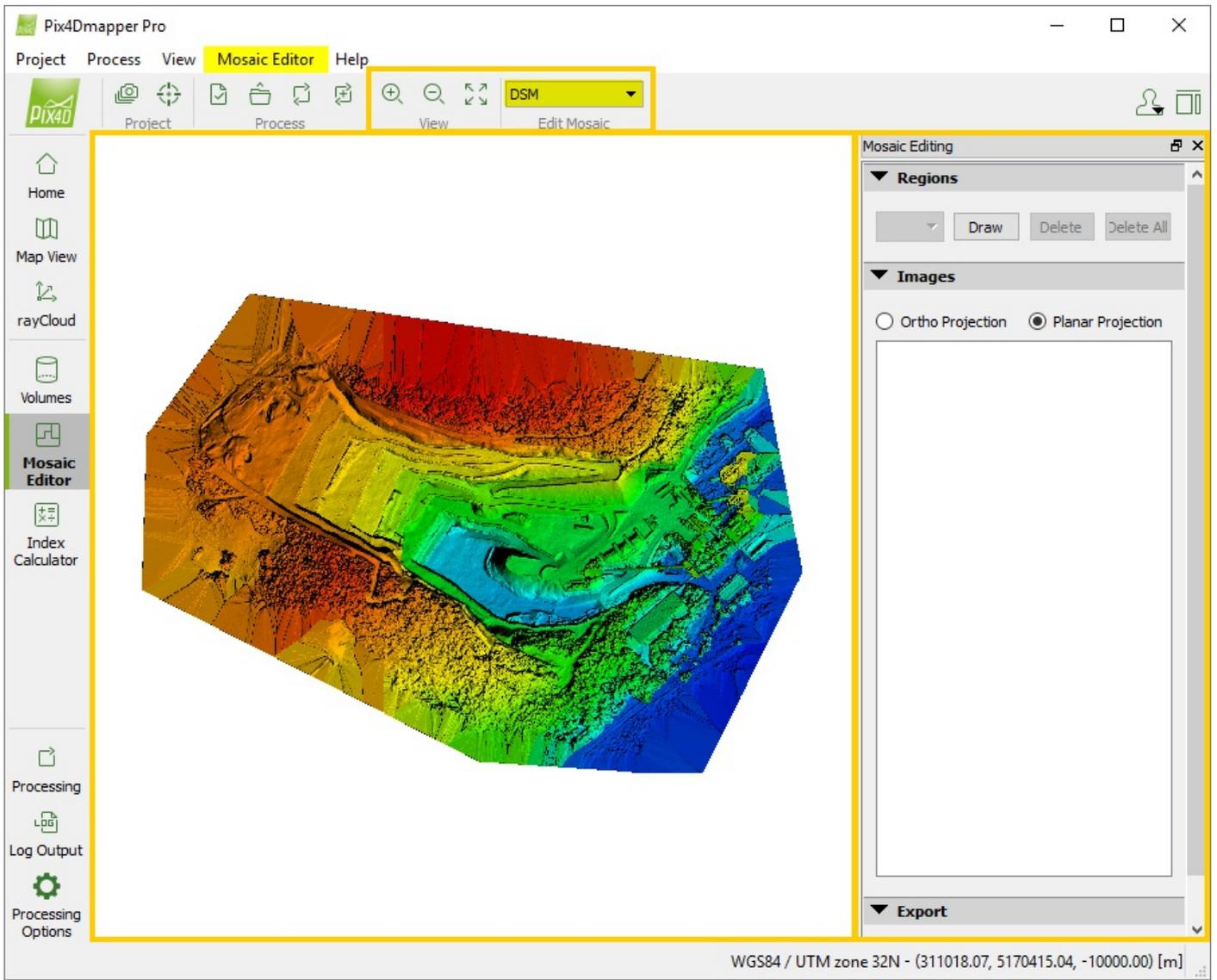


Figure 1. Mosaic Editor with DSM view

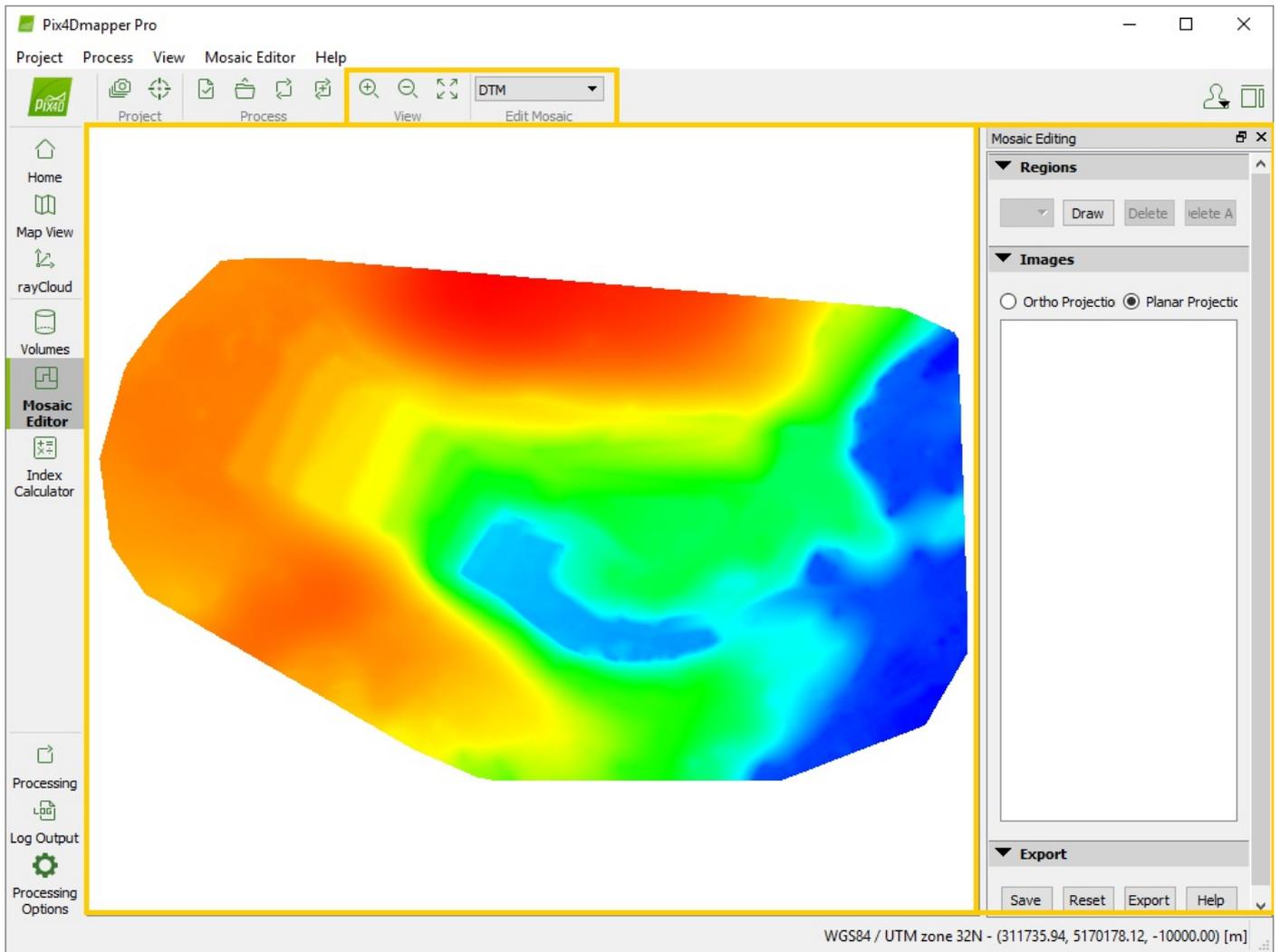


Figure 2. Mosaic Editor with DTM view

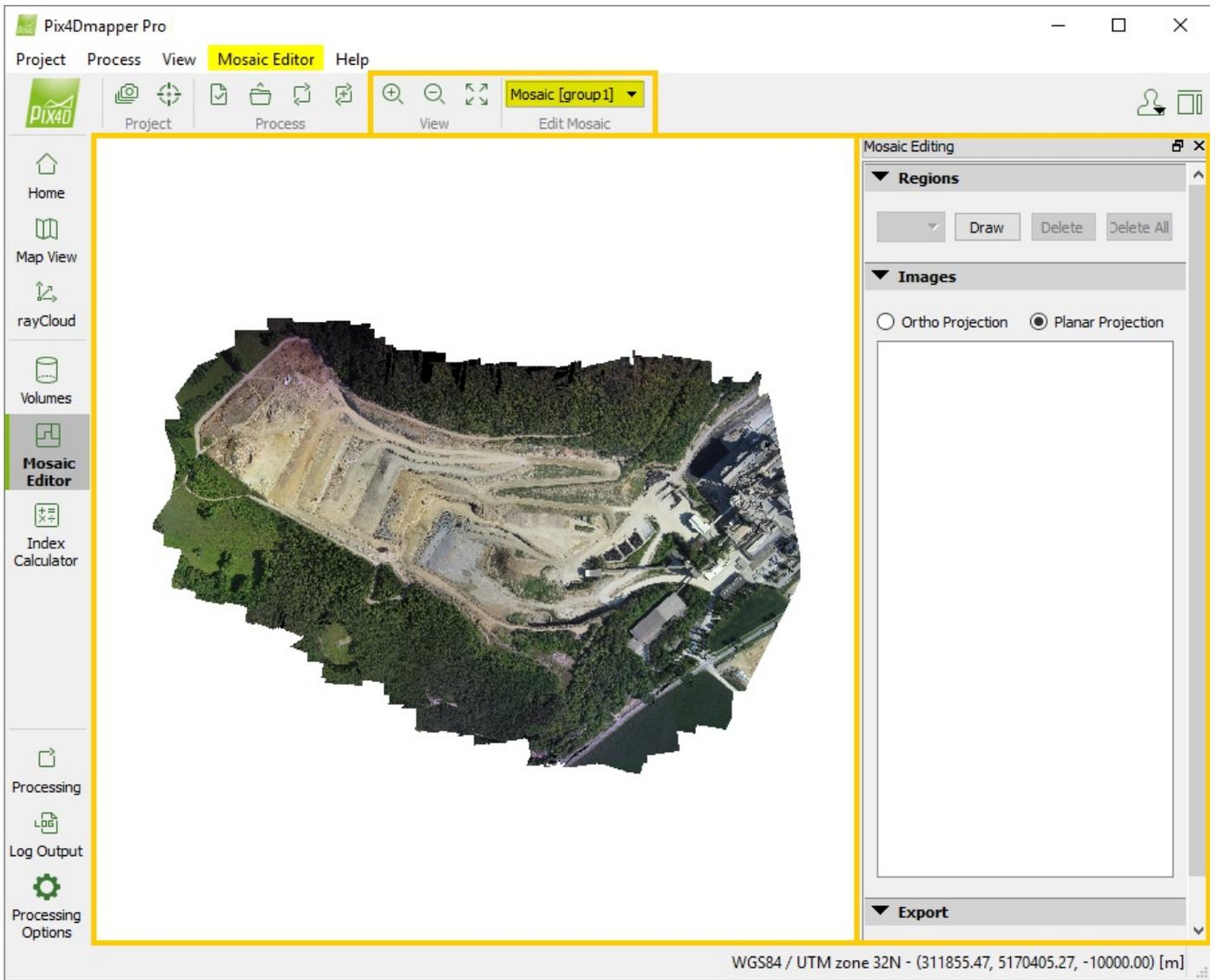
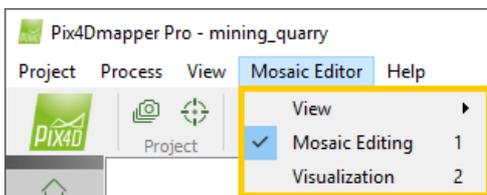


Figure 3. Mosaic Editor with Orthomosaic view

Menu bar entry

On the Menu bar, by clicking Mosaic Editor the following options are displayed:



**View:** Shows the view options of the Mosaic View.

**Mosaic Editing:** Opens the *Mosaic Editing* sidebar.

**Visualization:** Opens the *Visualization* sidebar.

Toolbar



The following Toolbar buttons are displayed:

Standard Toolbar: For more information: [202557839](https://www.pix4d.com/support/202557839).

Toolbar extra buttons:

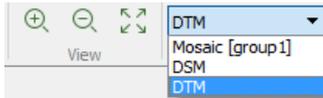
View

 Zoom In: Zooms in the selected view.

 Zoom Out: Zooms out the selected view.

 View All: Moves the viewpoint in order to fit the model in the Mosaic View.

Edit Mosaic



Element to be displayed in the Mosaic View, by default the Mosaic [group1] is displayed. If there are more than one groups of images, one Mosaic is generated per group of images. It is possible to display the different generated mosaics as well as the DSM and the DTM.

Mosaic View

By default the *Mosaic* view is selected and the mosaic is displayed. If the *DSM* view is selected, the DSM is displayed. If the *DTM* view is selected, the DTM is displayed.

When passing the mouse over the orthomosaic / DSM / DTM, the Mosaic Status bar displays the coordinates of the hovered point.

The following mouse interactions are available:

Left click on the mosaic and move the mouse: Pan the mosaic.

Left click on a Region vertex while moving the mouse: Allows to move the vertex of the region.

Moving the mouse scroll forwards: Zoom in on the mosaic.

Moving the mouse scroll backwards: Zoom out of the mosaic.

Sidebars

There are two sidebars:

[Mosaic editing sidebar](#) : Allows the user to edit the mosaic.

[Visualization sidebar](#): Allows the user to visualize the mosaic or the DSM.

Status bar

On the bottom right part of the Mosaic View, the following is displayed:

WGS84 / UTM zone 32N - (311684.29, 5169774.29, 496.97) [m]

Selected Coordinate System: Displays the selected coordinate system of the point.

Position: Displays the (X,Y) coordinates in meters / feet of each point of the orthomosaic / DSM / DTM. When passing the mouse over the orthomosaic / DSM / DTM the coordinates change.

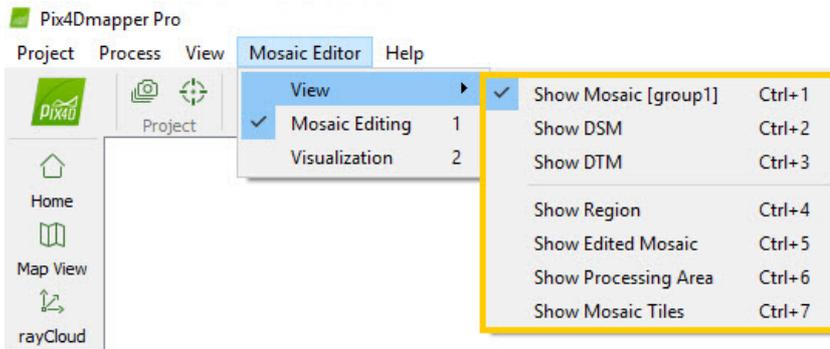
 Important: The geographic (ellipsoid) projection coordinates are used in meters / feet, instead of geographic (ellipsoid) coordinates in degrees, considering the output coordinate system selected.

By default the output coordinate system is the same as the one of the GCPs if GCPs are used. Otherwise it is the same as the one of the images. If the coordinates system is WGS84, the output is given in UTM.

If less than 3 images are geolocated and less than 3 GCPs are defined, then the output coordinates system is "Arbitrary".

 Note: The Status Bar displays the position for the whole area covered by the Orthomosaic / DSM / DTM and the area without data. When passing the mouse over areas where there is no data, the no data altitude value -10000 is displayed.

 Access: On the Menu bar, click View > Mosaic Editor, in the Mosaic Editor, on the Menu bar click Mosaic Editor and select the menu option View (available only if step 3. *DSM, Orthomosaic and Index* has been completed).



The View options affect the Mosaic View. The following options are available:

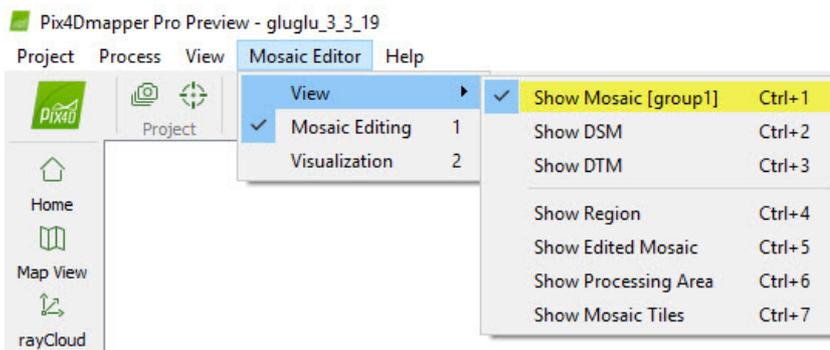
- Show Mosaic [Group]
- Show DSM
- Show Region
- Show Edited Mosaic
- Show Processing Area
- Show Mosaic Tiles

Show Mosaic [Group]

This option is selected by default.

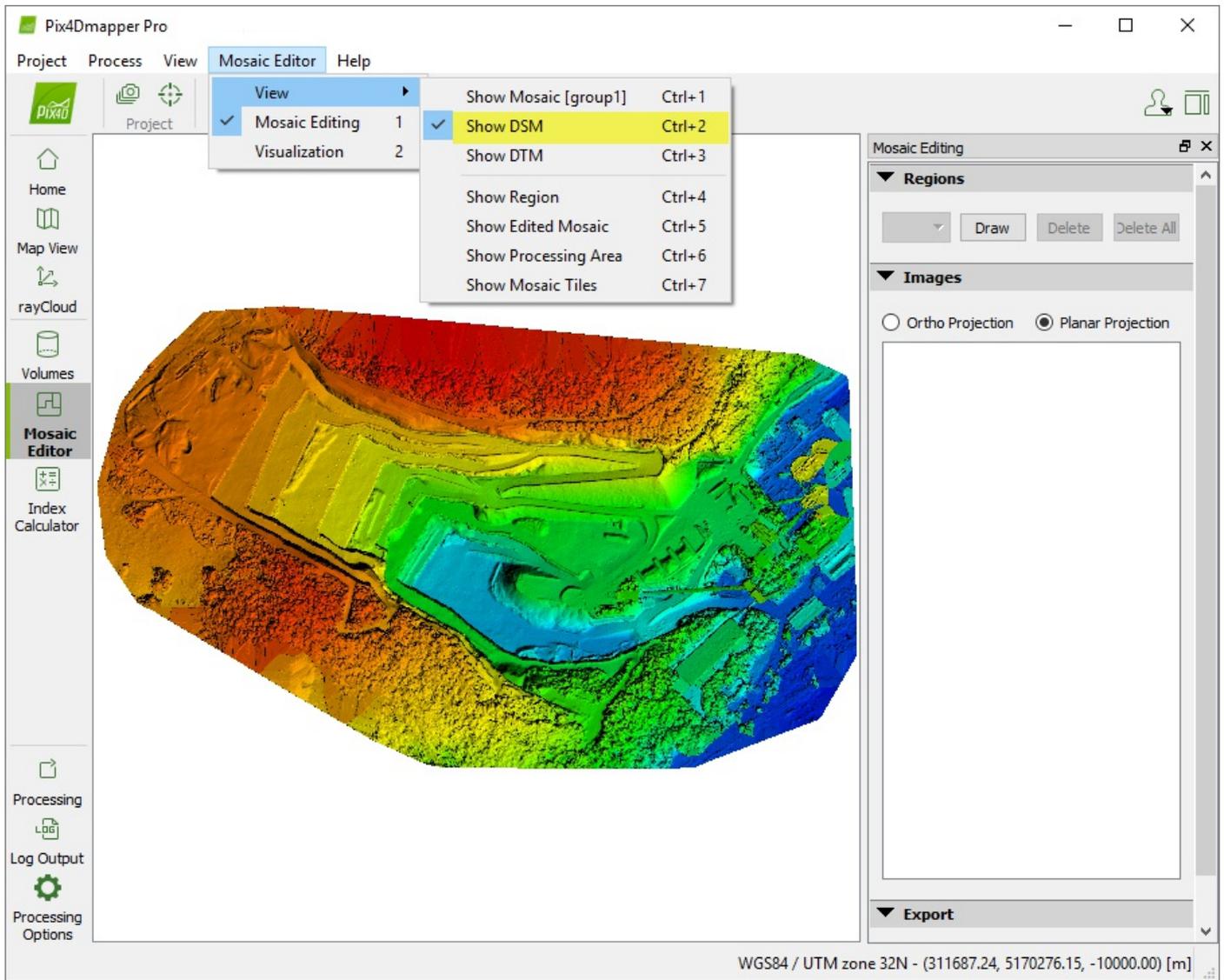
It displays the mosaic generated using the images that belong to the corresponding group. The default group is group1. For more information about the image groups: [202557949](https://www.pix4d.com/faq/202557949).

The mosaic can be edited by creating regions and by assigning another image to them or selecting another projection for each region. The edited mosaic will be edited and visualized in real time. Once the editing has been completed, the mosaic needs to be exported in order to generate the new output files for the mosaic.



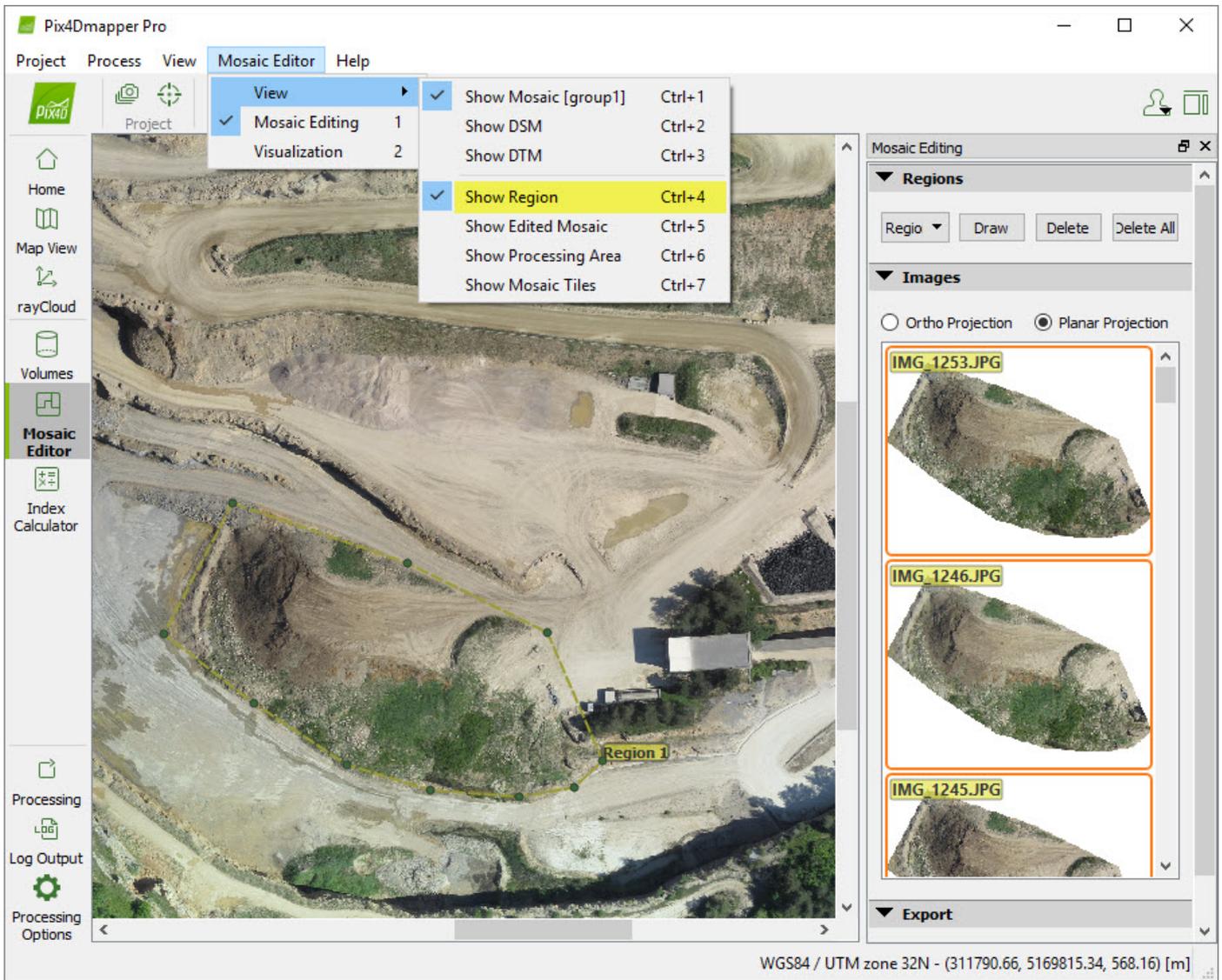
Show DSM

It displays the *DSM* using by default an RGB color map for the altitude values.



Show Region

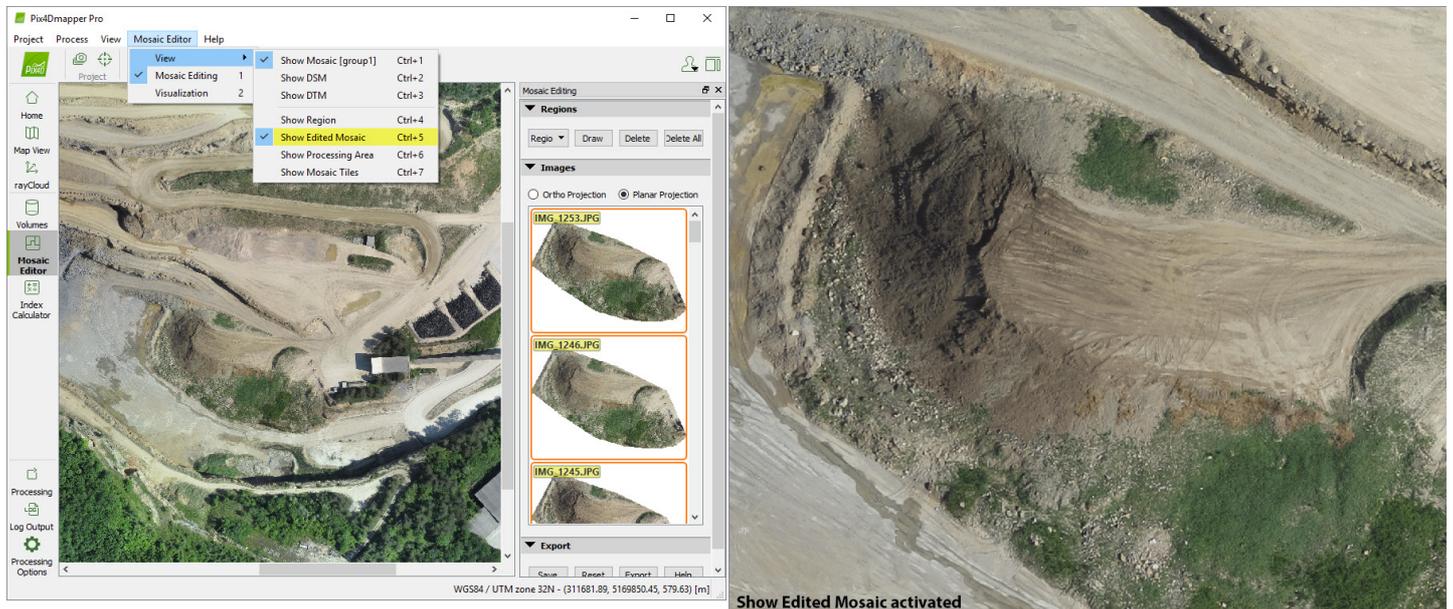
This option is activated by default. It displays the drawn *Regions*.



### Show Edited Mosaic

This option is activated by default. It displays the edited mosaic.

When it is not activated, the Mosaic View displays the content of the mosaic stored in file.

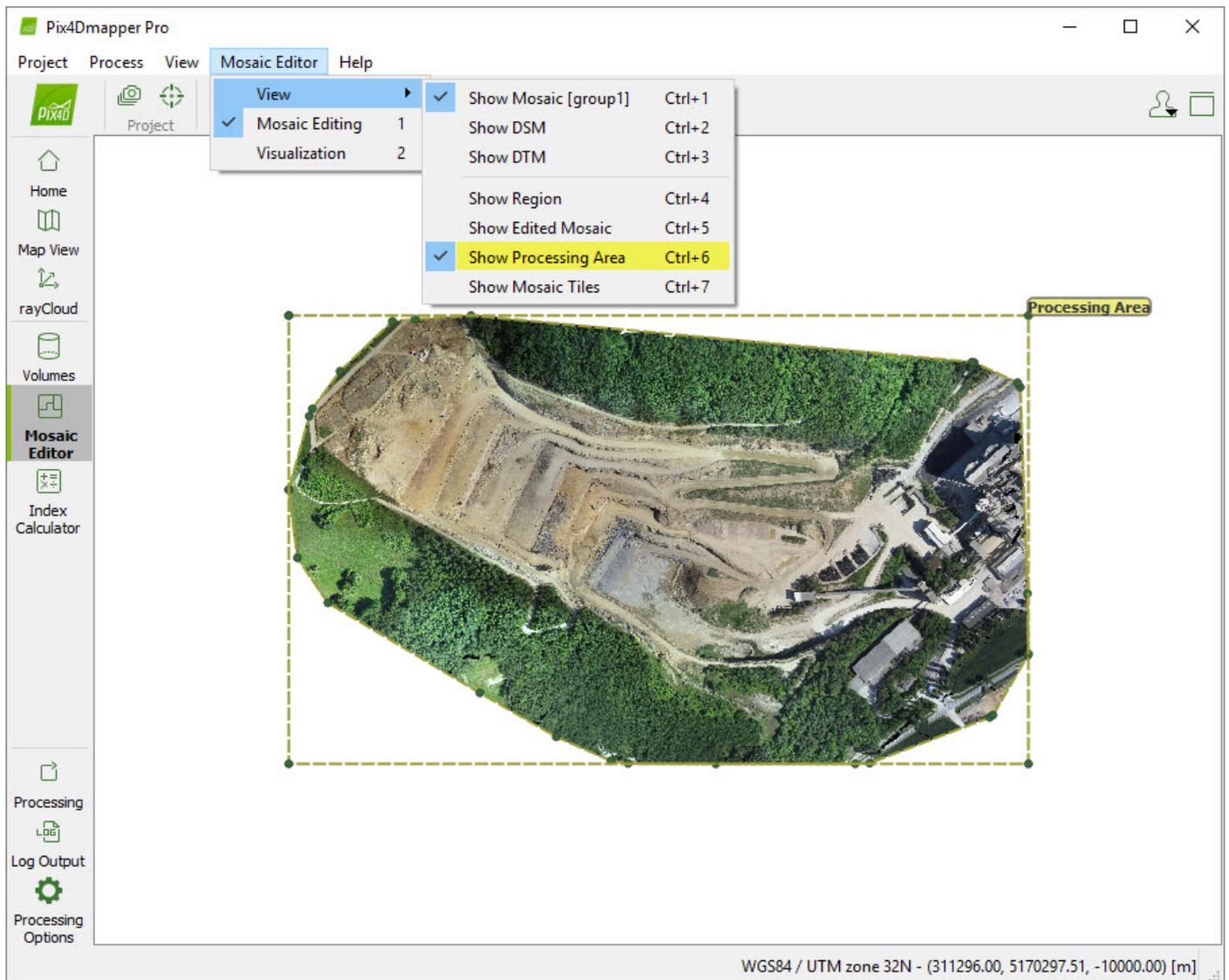


Where to activate/deactivate the Show Edited Mosaic

## Show Processing Area

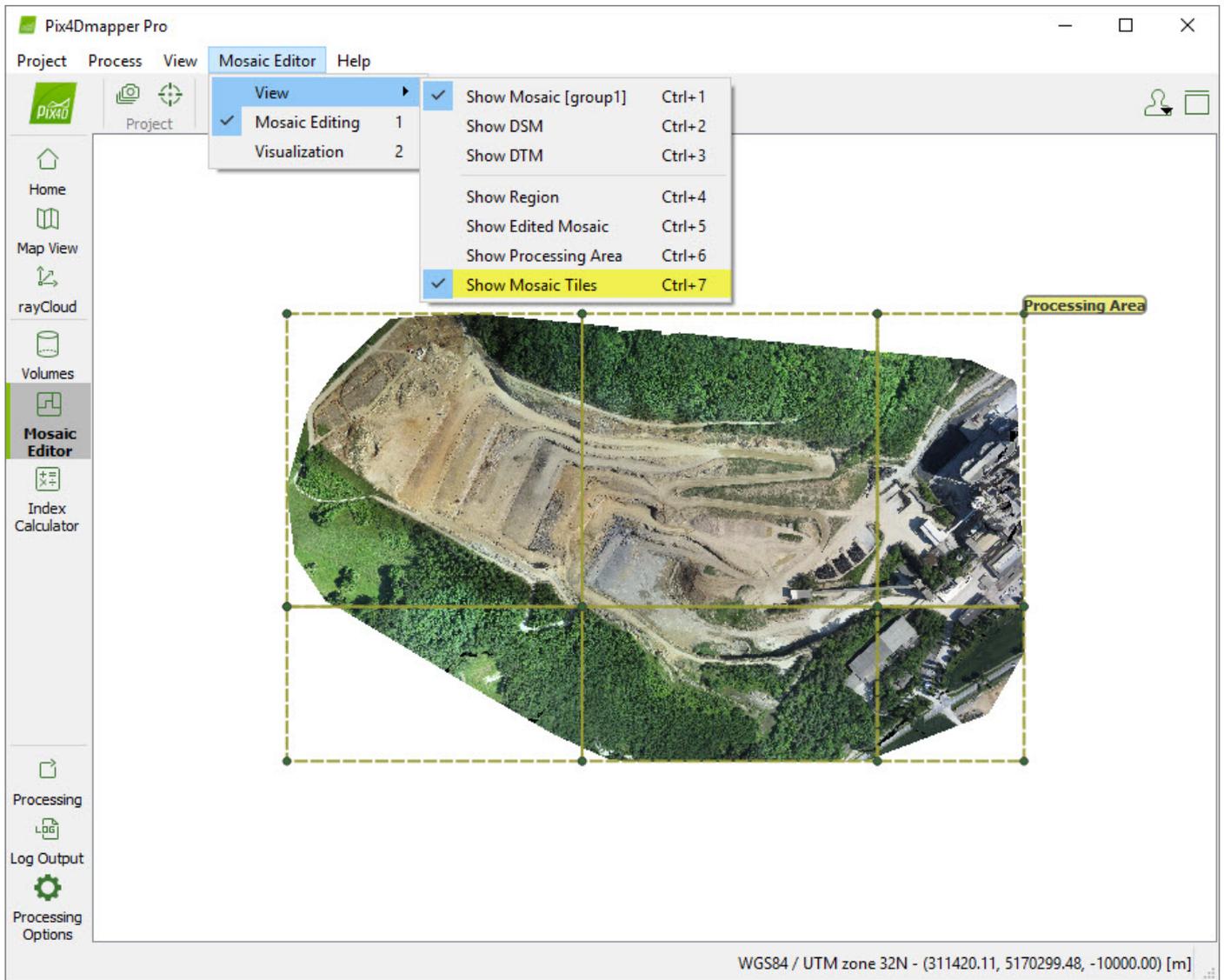
This option is deactivated by default. It displays the Processing Area, which is the area for which the Orthomosaic is generated.

For more information about the Processing Area: [202558439](https://pix4d.com/help/202558439).



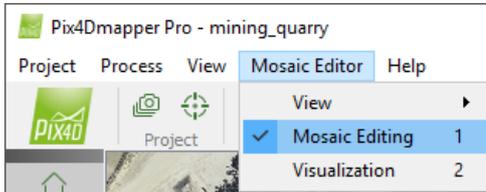
## Show Mosaic Tiles

This option is deactivated by default. It displays the GeoTIFF mosaic tiles that will be generated when exporting the mosaic. When the Processing Area is modified, the mosaic tiles are modified as well.



 Access: On the Menu bar, click View > Mosaic Editor, on the Menu bar click Mosaic Editor > Mosaic Editing (available only if step 3. *DSM, Orthomosaic and Index* has been completed).

For information about the sidebar's display possibilities: [202558389](#).



The *Mosaic Editing* sidebar contains the following sections:

**Regions:** Allows the user to select, draw or delete regions.

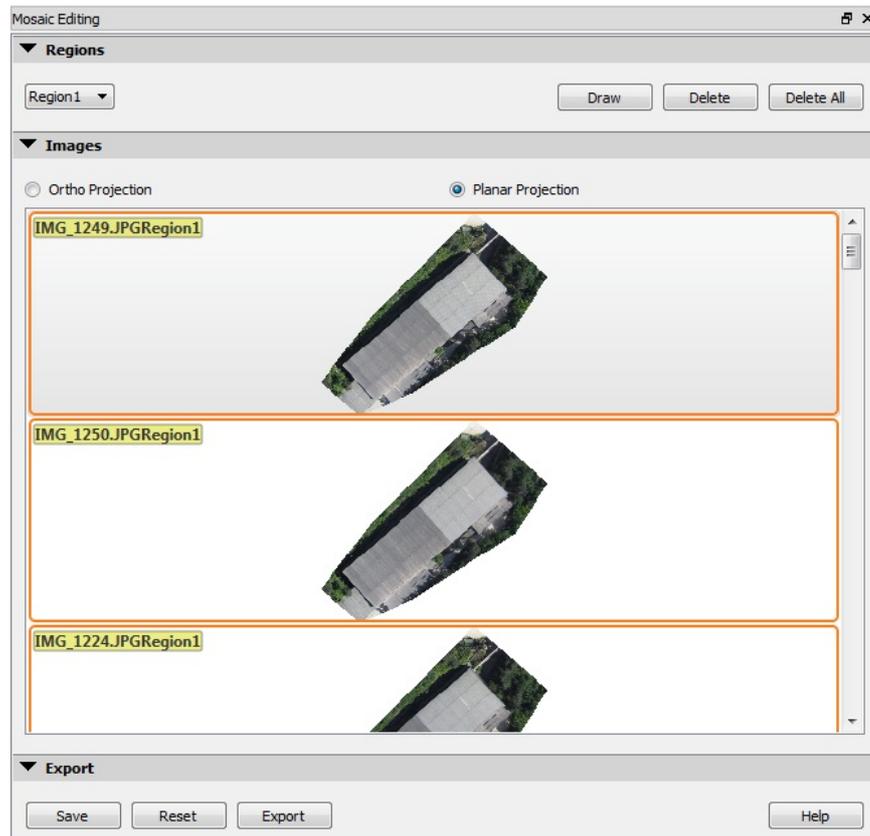
**Images:** Allows the user to select which projection and which image can be used for each region.

**Export:** Allows the user to:

Save locally the changes (saves changes in the *Mosaic View* in internal temporary files).

Reset the displayed mosaic.

Export an edited mosaic by exporting the internal temporary files.



### Regions

Allows the user to select, draw or delete regions.

Contains the following buttons:

Region[number]: Available once one region has been drawn. Allows the user to select a region.

Draw: Allows the user to draw a region. For step by step instructions: [202560079](#).

Delete: Allows the user to delete the selected region.

Delete All: Allows the user to delete all the existing regions.

### Images

This section:

Displays the different projections available for the selected region.

 Note: The first projection that is displayed uses the most perpendicular image to selected region.

Displays the selected projection type and image for the selected region.

Allows the user to change the projection type and image to be used for the selected region.

It is possible to select:

Ortho Projection: displays a list of original images in ortho projection.

Planar Projection: displays a list of original images in a planar projection.

 Note:  
Ortho Projection: The ortho projection preserves distances and can be used for mosaics dedicated to measurement applications.  
Planar Projection: The planar projection does not preserve distances, but has fewer distortions than the ortho projection on sharp transitions such as building edges. Therefore, it is not recommended to use planar images for mosaics dedicated to measurement applications. Its basic use is to improve the visual aspect of the orthomosaic.

## Export

 Warning:  
The *Mosaic Editor* can be used to manually correct artifacts in the Orthomosaic resulting from Step 3. *DSM, Orthomosaic and Index* and in order to improve its visual aspect.  
The changes applied in the Mosaic Editor affect a local copy, not the mosaic resulting from Step 3. *DSM, Orthomosaic and Index*.  
In order to obtain the edited mosaic, the mosaic needs to be exported: [202560079](#). The orthomosaic resulting from Step 3. *DSM, Orthomosaic and Index* will then be overwritten.  
For more information about the *Mosaic Editor* processes workflow: [204829349](#).

Allows the user to:

*Save* locally the changes (saves changes in the *Mosaic View* in internal temporary files).

*Reset* the displayed mosaic.

*Export* an edited mosaic by exporting the internal temporary files saved.

Contains the following buttons:

*Save*: Saves the changes in the mosaic: Overwrites only the areas corresponding to the existing *regions* using the selected projections.

The saved *Edited Mosaic* will be loaded when opening the project again and when exporting it.

*Reset*: Resets the *Edited Mosaic* with the *Generated Mosaic* (which is stored in the results folder).

 Note: When resetting all edits that have not been exported will get lost.

Export: The selected *Edited Mosaic* overwrites the Mosaic generated at step 3. *DSM, Orthomosaic and Index*.

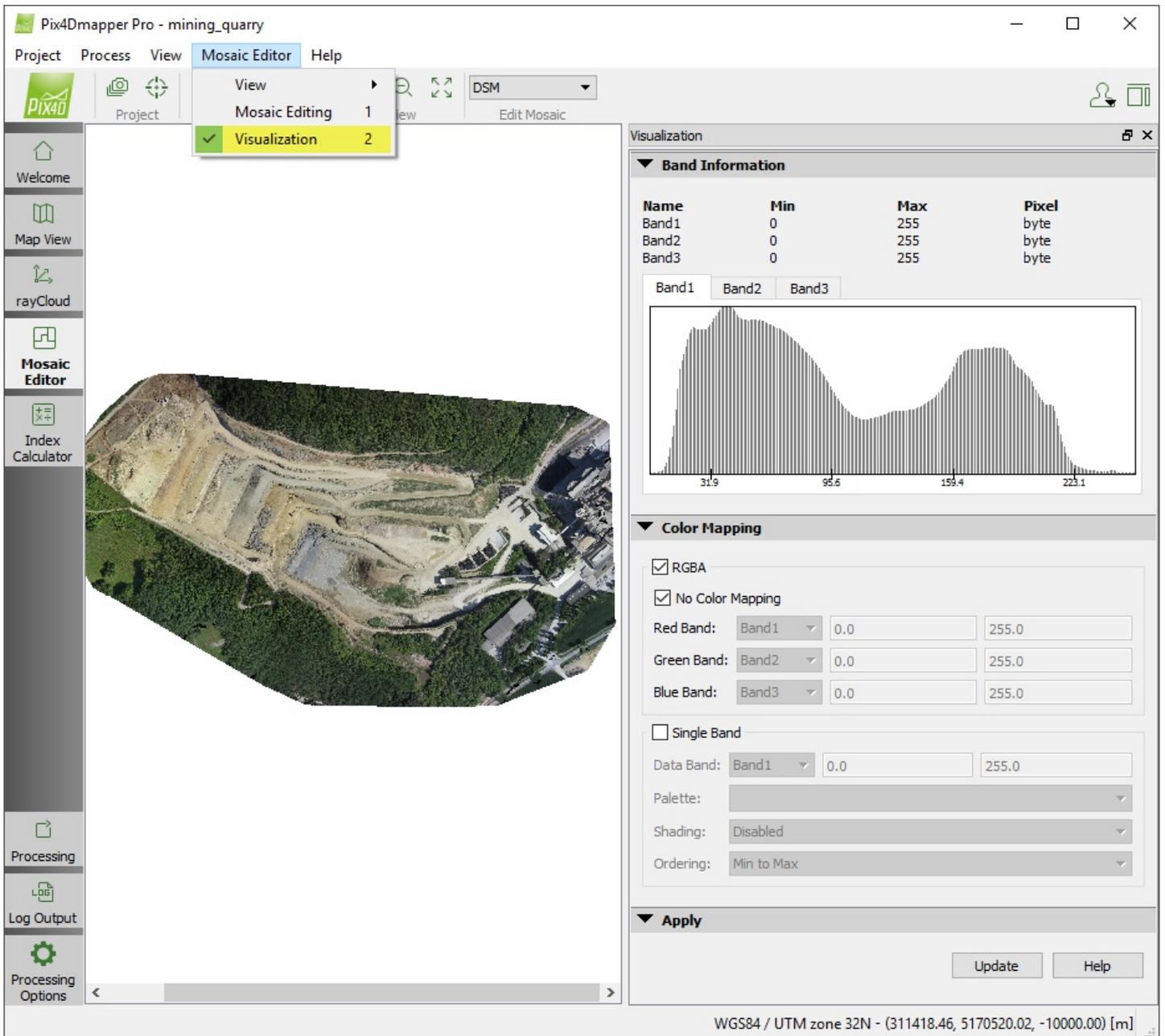
Help: Opens Pix4Dmapper help.

[Index](#) > [Interface](#) > [Menu View](#) > [Mosaic Editor](#)

[◀ Previous](#) | [Next ▶](#)

 Access: On the Menu bar, click View > Mosaic Editor, on the Menu bar click Mosaic Editor > Mosaic Editing (available only if step 3. DSM, Orthomosaic and Index has been completed).

For information about the sidebar's display possibilities: [202558389](#).



The screenshot shows the Pix4Dmapper Pro interface for a project named 'mining\_quarry'. The 'Mosaic Editor' menu is open, showing 'View' (with a sub-menu), 'Mosaic Editing' (1), and 'Visualization' (2). The main window displays an aerial orthomosaic of a quarry. The 'Visualization' sidebar on the right contains the following sections:

- Band Information:** A table showing the properties of the mosaic bands.
 

Name	Min	Max	Pixel
Band1	0	255	byte
Band2	0	255	byte
Band3	0	255	byte
- Color Mapping:**
  - RGBA**
  - No Color Mapping**
  - Red Band: Band1 (0.0 to 255.0)
  - Green Band: Band2 (0.0 to 255.0)
  - Blue Band: Band3 (0.0 to 255.0)
  - Single Band**
  - Data Band: Band1 (0.0 to 255.0)
  - Palette: [Dropdown]
  - Shading: Disabled
  - Ordering: Min to Max
- Apply:** [Update] [Help]

At the bottom of the interface, the coordinate system is displayed as WGS84 / UTM zone 32N - (311418.46, 5170520.02, -10000.00) [m].

 Important: This View is very useful for non standard original images (16 bits per band). It allows the user to specify which band is considered as red, green and / or blue.

The *Mosaic Editing* sidebar contains the following sections:

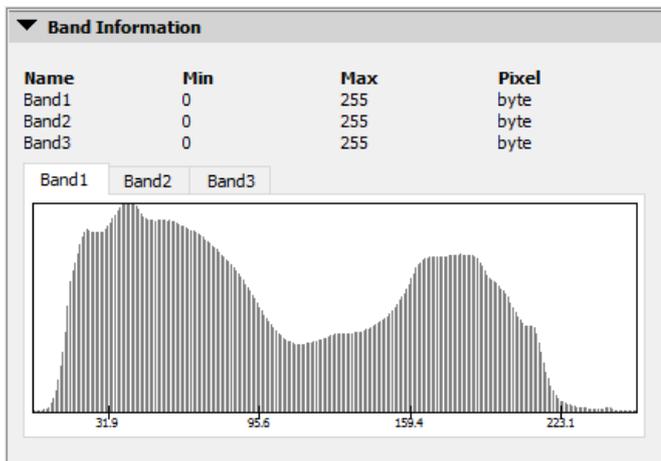
**Band Information:** Displays information for the different bands of the mosaic group / DSM / DTM.

**Color Mapping:** Allows the user to change the values to be considered for visualization for each pixel and the visualization rules.

**Apply:** Allows the user to apply the changes. It considers the visualization parameters to be used in the *Mosaic View*.

### Band Information

It displays information for the different bands of the mosaic group / DSM / DTM.



The following information is displayed:

Name: Name of the band.

Min: Minimum pixel value for all the pixels of the band.

Max: Maximum pixel value for all the pixels of the band.

Pixel: Data type, how many bytes are used to store the information of each band.

The band histogram section has one tab per band.

The histogram displays how many pixels in the model have a certain value for each band.

### Color Mapping

Allows the user to change the values to be considered for visualization for each pixel and the visualization rules.

It contains 2 sections:

#### RGBA

Selected by default for Mosaics.

It uses always 3 bands: The final color visualized will be the combination of the values for the 3 bands.

It is possible to select:

No color mapping: Selected by default. It takes the values from the original mosaic file.

Red band: Grayed out unless *No color mapping* is not selected. It allows the user to select which band is considered as the red band for the visualization.

Green band: Grayed out unless *No color mapping* is not selected. It allows the user to select which band is considered as the green band for the visualization.

Blue band: Grayed out unless *No color mapping* is not selected. It allows the user to select which band is considered as the blue band for the visualization.

#### Single Band

Selected by default for the DSM / DTM.

It is possible to use only one band. The final color visualized will consider only the values of one band.

Data band: Allows the user to select which band will be used for visualization.

Palette: Allows the user to select the palette of colors for the visualization of the values of the selected band. The different available options are:

Atlas: It uses the Atlas standard palette. Selected by default for DSM. It uses a palette using blue for low values, yellow for middle values and red for high values.

HSV: It uses the HSV standard palette.

RdYlGn: Low values are red, medium values are yellow and high values are green, used for agriculture.

Thermal: Low values are blue, high values are red. It is used for temperature measurements.

Spectral: It uses all the colors from the visual spectrum. It is used when many different values need to be distinguished.

Grays: It uses a gray scale.

Blues: It uses blue scale.

Red: It uses red scale.

Shading: Allows the user to disable / enable shading using illumination based on the values of each pixel on the model. For more information: [How Hillshade works](#). The different options available are:

Enabled: Selected by default, it uses shading.

Disabled: It does not use shading.

Ordering: Allows the user to invert the selected colors distribution. The different options available are:

Min to Max: Selected by default. It uses the standard colors distribution for the selected palette.

Max to Min: It inverts the selected colors distribution for the selected palette.

Apply



Contains the following buttons:

Update: It applies the changes and considers the visualization parameters to be used in the *Mosaic View*.

Help: It opens Pix4Dmapper help.



Warning:

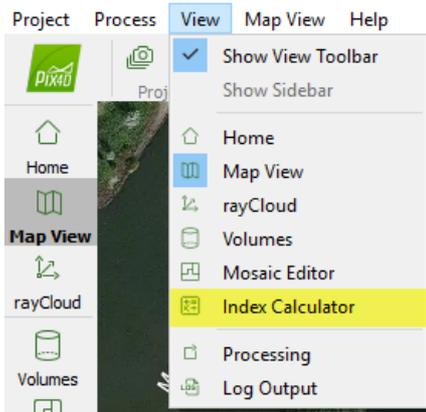
The *Mosaic Editor* may be used to manually correct artifacts in the Orthomosaic resulting from Step 3. *DSM, Orthomosaic and Index* and in order to improve its visual aspect.

The changes applied in the Mosaic Editor affect a local copy, not the mosaic resulting from Step 3. *DSM, Orthomosaic and Index*.

In order to obtain the edited mosaic, the mosaic needs to be exported: [202560079](#). The orthomosaic resulting from Step 3. *DSM, Orthomosaic and Index* will then be overwritten. The Grid DSM as well as the different orthomosaic formats (GeoTIFF, Google Maps Tiles, etc.) will be generated if selected in the processing options.

For more information about the Mosaic Editor processes workflow: [204829349](#).

 Access: On the Menu bar, click View > Index Calculator (available once step 1. *Initial Processing* has been completed).



 Note:

A DSM is used to generate the *Reflectance Maps*.

One *Reflectance Map* is generated for each band of each group of images, but only one DSM is generated, regardless of the number of images' groups.

The *Reflectance Maps* contain the reflectance values of each pixel and are used to generate the *Index Maps*.

The *Index Maps* are calculated using some specific band(s) from one or more groups of images. Therefore, information from one or more *Reflectance Maps* may be used.

If a *Region* is drawn, the *Index Maps* and *Colored Index Maps* will be generated only for this region.

*Colored Index Maps* are generated by applying the defined coloring rules to the *Index Maps*. They are raster files with RGB values.

If a *Colored Index Map* already exists, creating a new *Colored Index Map* will overwrite the existing one.

 Important:

For more information about the files that are generated, under which action and where they are stored: [202558739](#).

All the outputs will be stored in: ...\*project\_name*\4\_index

For more information about the project folder structure: [202558649](#).



Warning: Once the *Index Calculator* has been used and results are generated, all the outputs from the *Index Calculator* will be DELETED if any of the following steps / actions is started: step 1. *Initial Processing*, step 2. *Point Cloud and Mesh*, step 3. *DSM, Orthomosaic and Index, Reoptimize, Rematch and Optimize*.

The existing results need to be backed up if they are to be kept.

The use of the *Index Calculator* is optional and allows to:

Generate an *Index Map / Index Grid* where the "color" of each pixel is computed using a formula that combines different bands of the *Reflectance Map(s)*.

Visualize the *Index Map* as a *Colored Index Map* by applying a color mapping to it.

Export a georeferenced *Colored Index Map*.

Annotate the classes of the *Index Map* to generate an *Application Map*.

Export an *Application Map* as a shape file to be imported in tractor consoles.

Upload a *Reflectance Map* on MicaSense Atlas platform for processing, storage, management, presentation and analytics of multispectral data.

When selecting the *Index Calculator* view the following elements are displayed on the main window:

**Menu bar entry:** Extra entry displayed on the Menu bar.

**Toolbar:** The standard toolbar and some extra buttons related to the *Index Calculator*.

**Index View:** Displayed in the main window. When opening the *Index Calculator* for a project for the first time, it is blank. Once at least one *Reflectance Map* has been generated, it displays by default the last index that was displayed before the project was closed.

**Index Calculator sidebar:** By default, it is displayed on the right of the *Index View*. Displays information about the *Reflectance Map(s)*, the *Index Map*, and provides tools to generate and edit the *Index Maps*.

**Status bar:** Displayed on the bottom right of the main window. Displays the *Index Value*, the coordinate system and the coordinates when passing the mouse over the *Reflectance Map / Index Map*.

For step by step instructions about how to use the *Index Calculator*: [202558729](#).

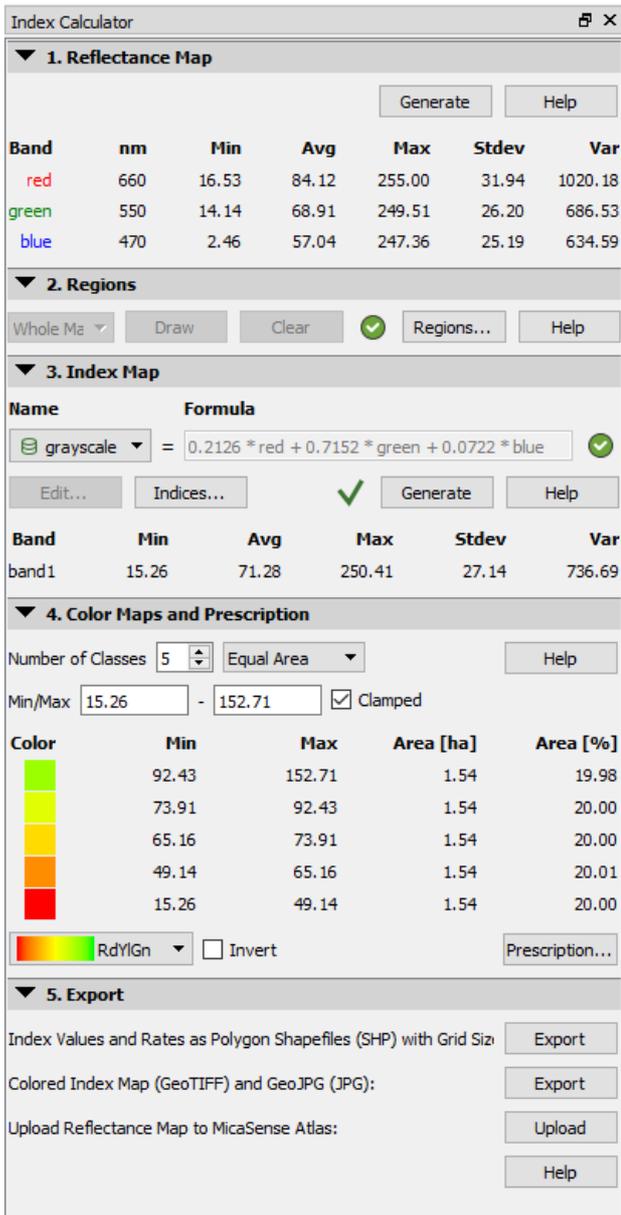
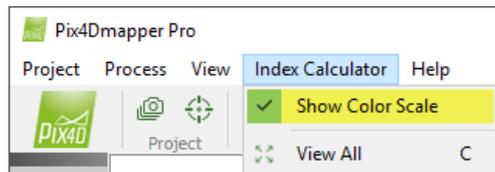


Figure 1. Index Calculator

Menu bar entry

On the Menu bar, by clicking on Index Calculator the following option is displayed:



Show Color Scale: By default it is selected. View/hide the color scale graphic of the Index Map that is displayed on the top right of the Index View.

View All: Zoom in and out, so that the full *Reflectance Map* or *Index Map* is displayed in the *Index View*.

Note: For information about the files that are generated, following which action and where they are stored: [202558739](https://www.pix4d.com/support/202558739).

Toolbar



The following Toolbar buttons are displayed:

Standard toolbar: For more information: [202557839](https://www.pix4d.com/support/202557839).

Toolbar extra buttons:

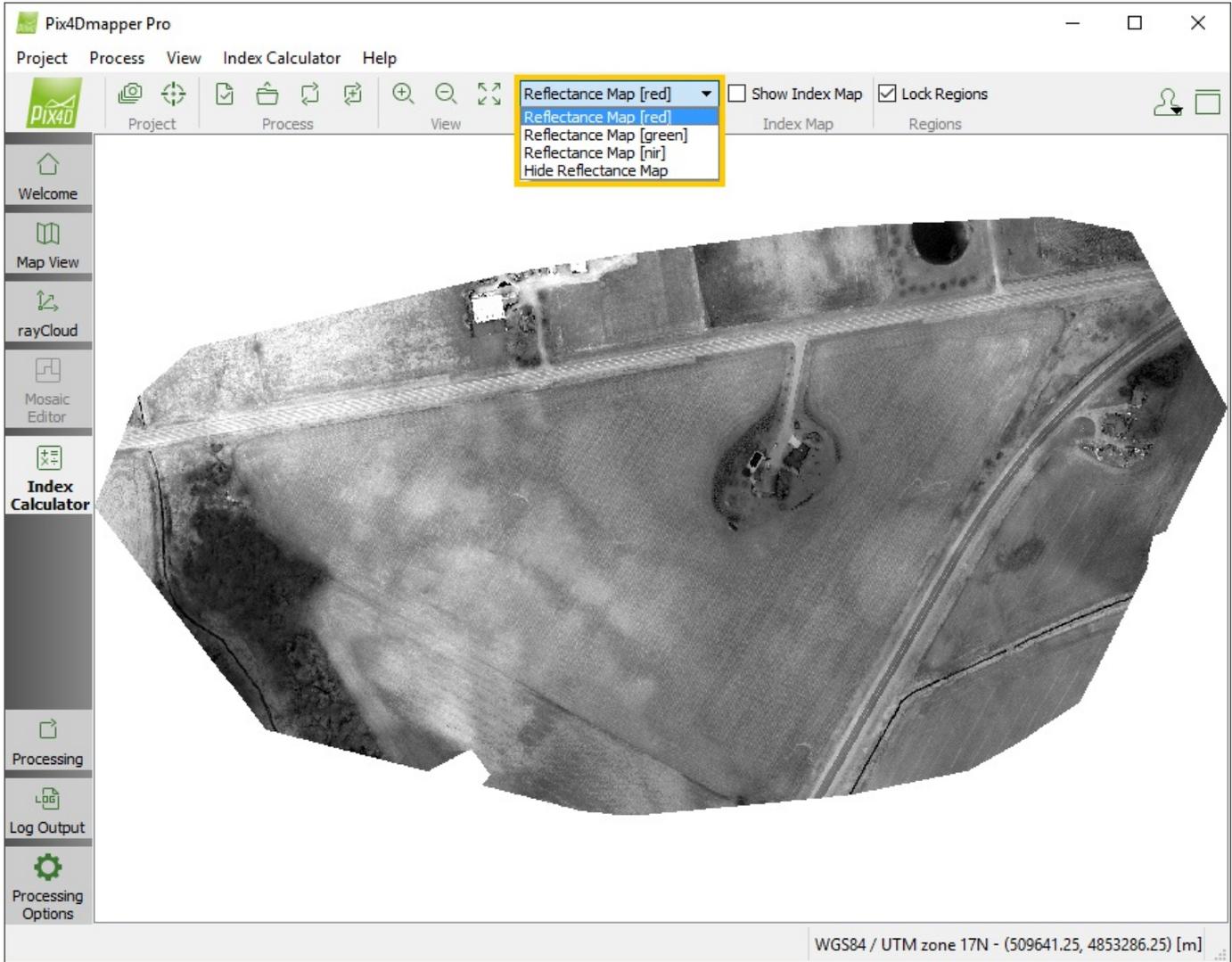
View:

Zoom In: Zooms in the selected view.

🔍 Zoom Out: Zooms out the selected view.

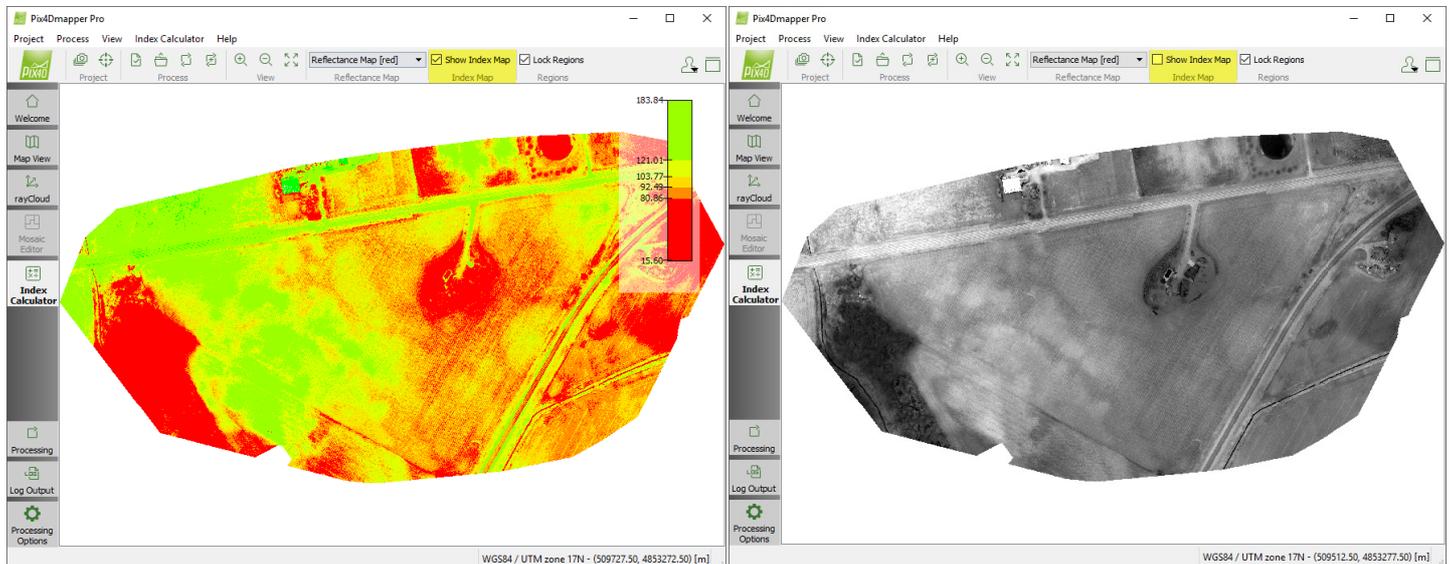
🔄 View All: Zooms in and out, so that the full *Reflectance Map* or *Index Map* is displayed in the *Index View*.

Reflectance map:



By default the *Reflectance Map* of the first band is displayed. The drop-down list gives the option to hide the *Reflectance Map* and select the *Reflectance Map* of a different band.

Index Map:

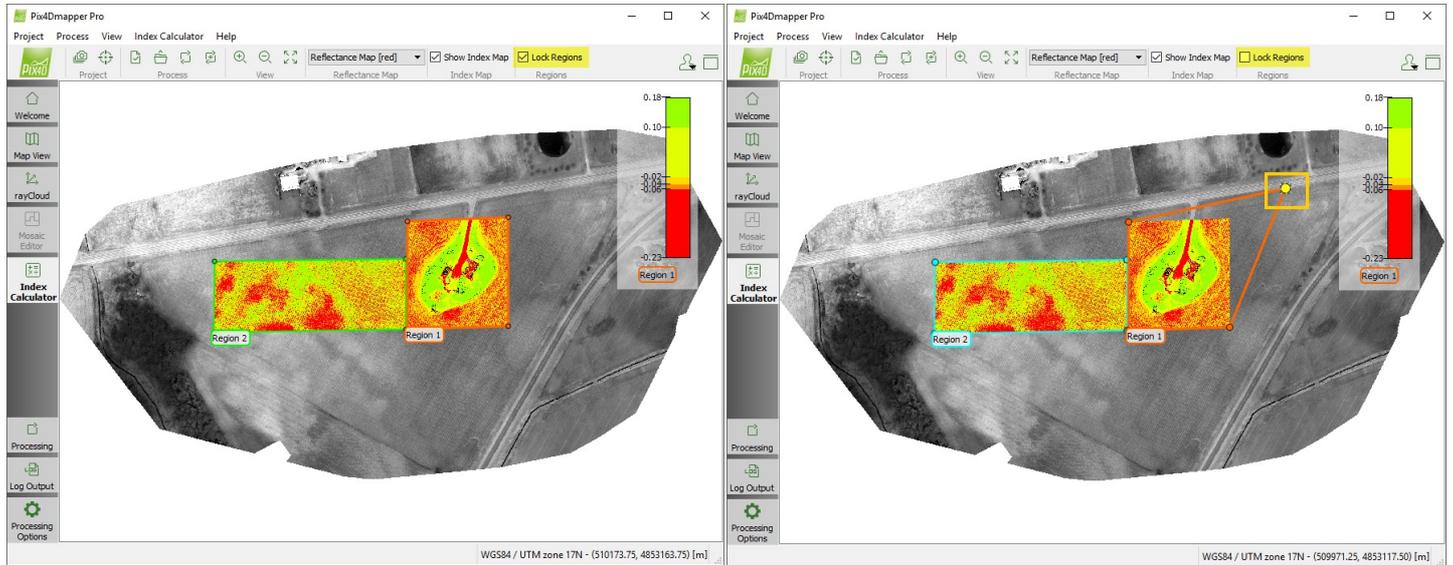


Index Map display

Index Map not display

By default, the *Show Index Map* box is selected. This option controls whether the generated *Index Map* will be displayed and overlaid on top of the reflectance map.

Regions:



Regions locked

Regions unlocked

By default the *Lock Regions* box is selected. After the regions are drawn: [203937289](#), they will be displayed in the Index View. If the *Lock Regions* box is selected, the region frame will be locked in position. Unselect the *Lock Regions* box to enable the editing of previously drawn regions by dragging the whole region or a single vertex.

Index View

When opening the *Index Calculator* for a project for the first time, it is blank. Once at least one *Reflectance Map* has been generated, it displays by default the last *Reflectance Map* / *Index Map* that was displayed before the project was closed.

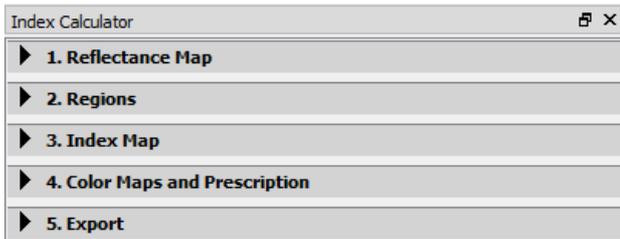
Navigating on the Index View using the mouse:

- Pan: Right/Left click and move the mouse (a hand icon appears representing the focus point for the movement).
- Zoom in: Move the scroll wheel forward while positioning the mouse over the Index View.
- Zoom out: Move the scroll wheel backwards while positioning the mouse over the Index View.

Index Calculator sidebar

The sidebar displays information about the *Reflectance Map(s)* and the *Index Map* and provides tools to generate and edit the *Index Maps*.

For details about the Index Calculator Sidebar: [202558249](#).



Status bar

On the bottom right part of the main window, if a *Reflectance Map* / *Index Map* is loaded in the Index View, the following information is displayed:

WGS84 / UTM zone 17N - (510197.50, 4853252.50) [m]

- Index Value: Displays the pixel value of the Index under the current mouse location. When passing the mouse over the Index View, the value changes.
- Output Coordinate System: Displays the selected output coordinate system.
- Coordinates: Displays the (X,Y) coordinates in meters / feet of each point of the *Reflectance Map* / *Index Map*. When passing the mouse over the *Reflectance Map* / *Index Map* the coordinates change.

Note: Coordinates of both the areas covered by the *Reflectance Map* / *Index Map* and of the areas not covered are displayed.

 Access: On the Menu bar, click View > Index Calculator (available once step 1. *Initial Processing* has been completed). The *Index Calculator* sidebar is displayed on the right of the main window. For information about the sidebar's display possibilities: [202558389](#).

The *Index Calculator* Sidebar contains the following sections:

1. **Reflectance Map:** Used to:

Generate the *Reflectance Map(s)* used to generate the indices. One *Reflectance Map* is generated per group of images (RGB, NIR, etc...). Displays information about the *Reflectance Map(s)*.

2. **Regions:** Used to:

Define specific areas that the index calculation will be applied to.

3. **Index Map:** Used to:

Generate, view, edit indices or select the index to be displayed in the Index View. Displays information about the selected index.

4. **Color Maps and Prescription:** Used to:

Classify the *Index Map*, based on the indices values.

5. **Export:** Used to:

Export the index values and prescription rates as polygon shapefiles.

Export the selected *Index Map* using the selected classes for the color mapping.

Upload the *Reflectance Map* on MicaSense Atlas platform.

**1. Reflectance Map**

Band	nm	Min	Avg	Max	Stdev	Var
red	660	16.53	84.12	255.00	31.94	1020.18
green	550	14.14	68.91	249.51	26.20	686.53
blue	470	2.46	57.04	247.36	25.19	634.59

**2. Regions**

**3. Index Map**

Name:  Formula:

Band	Min	Avg	Max	Stdev	Var
band1	15.26	71.28	250.41	27.14	736.69

**4. Color Maps and Prescription**

Number of Classes:  Equal Area

Min/Max:  -   Clamped

Color	Min	Max	Area [ha]	Area [%]
	92.43	152.71	1.54	19.98
	73.91	92.43	1.54	20.00
	65.16	73.91	1.54	20.00
	49.14	65.16	1.54	20.01
	15.26	49.14	1.54	20.00

Invert

**5. Export**

Index Values and Rates as Polygon Shapefiles (SHP) with Grid Size:

Colored Index Map (GeoTIFF) and GeoJPG (JPG):

Upload Reflectance Map to MicaSense Atlas:



Note:

One *Reflectance Map* is generated for each band of each group of images.

The *Reflectance Maps* contain the reflectance values of each pixel and are used to generate the *Index Maps*.

The *Index Maps* are calculated using some specific band(s) from one or more groups of images. Therefore, information from one or more *Reflectance Maps* may be used.

If a *Region* is drawn, the *Index Maps* and *Colored Index Maps* will only be generated for this region.

*Colored Index Maps* are generated by applying the defined coloring rules to the *Index Maps*. They are raster files with RGB values.

If a *Colored Index Map* already exists, creating a new *Colored Index Map* will overwrite the existing one.



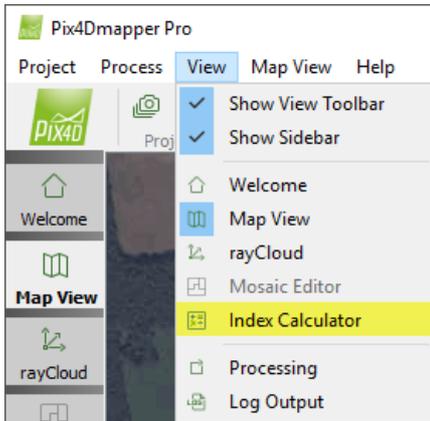
Important:

For information about the files that are generated, under which action and where they are stored: [202558739](#).

All the outputs will be stored in: ...\*project\_name*\4\_index

For more information about the project folder structure: [202558649](#).

 Access: On the Menu bar, click View > Index Calculator (available once step 1. *Initial Processing* has been completed). The *Index Calculator* sidebar is displayed on the right of the main window. For information about the sidebar's display possibilities: [202558389](#).



On the left part of section 1. *Reflectance Map*, there is an arrow that allows the user to show/hide the section by clicking on it:

- ▼ **1. Reflectance Map** By default section 1. *Reflectance Map* is visible.
- ▶ **1. Reflectance Map** Section 1. *Reflectance Map* is not visible.

▼ 1. Reflectance Map						
Generate Help						
Band	nm	Min	Avg	Max	Stdev	Var
red	625	0.00	99.72	251.78	28.04	786.19
green	560	0.00	99.03	268.31	28.78	828.31
nir	850	0.00	93.30	190.32	23.72	562.66

And the buttons

Generate: Generates the *Reflectance Map* if not generated.

 Note: The *Reflectance Map* is generated based on the selected *Processing Options*: [203891879](#). For more information about the generated files and where they are stored: [202558739](#).

Help: Opens the Pix4Dmapper help.

The section 1. *Reflectance Map* also displays information for each band of the generated *Reflectance Map*(s) for each group of images. The following information is displayed:

- Band: Name of the band. If more than one group exists and the same band name exists in different groups, the bands are displayed as "Groupname\_band."
- Min: Minimum pixel value per band.
- Avg: Average pixel value per band.
- Max: Maximum pixel value per band.
- Stdev: Standard deviation of pixel values per band.
- Var: Variance of pixel values per band.

If the *Reflectance Map*(s) are not generated, it displays: "Reflectance Map not yet generated."



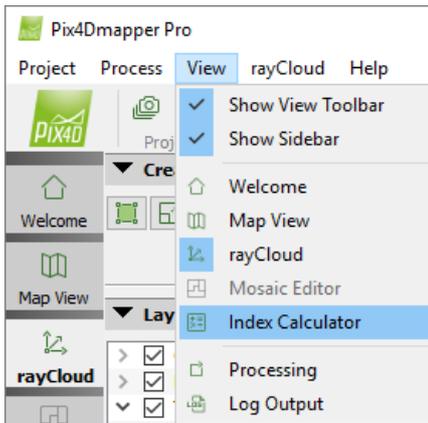
Reflectance Map not generated

Reflectance Map generated

 Note:  
 One *Reflectance Map* is generated for each band of each group of images.  
 The *Reflectance Maps* contain the reflectance values of each pixel and are used to generate the *Index Maps*.  
 The *Index Maps* are calculated using some specific band(s) from one or more groups of images. Therefore, information from one or more *Reflectance Maps* may be used.

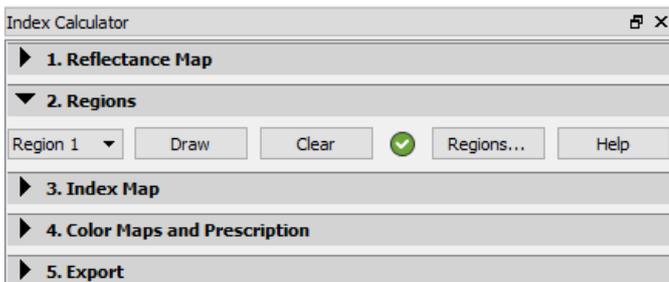


 Access: On the Menu bar, click View > Index Calculator (available once step 1. *Initial Processing* has been completed). The *Index Calculator* sidebar is displayed on the right of the main window. For information about the sidebar's display possibilities: [202558389](#).



On the left part of section 2. *Regions*, there is an arrow that allows the user to show/hide the section by clicking on it:

- ▼ **2. Regions** By default section 2. *Regions* is expanded and visible.
- ▶ **2. Regions** Section 2. *Regions* is collapsed and hidden.



The following information is displayed:

**Selected region:** Allows the user to select the region you want to edit.

**Draw:** Allows the user to draw the selected region in the *Index View*.

**Clear:** Allows the user to clear the drawn region in the *Index View*. Enabled if the selected region is drawn.

**Formula Status icon:** Next to the button *Clear* appears:

-  The region exists and is valid.
-  The region has not been drawn or the drawn area is incorrect (its edges intersect).

**Regions...:** Opens the *Region List* pop-up, which allows the user to manage the regions:

Add a new region.

Delete an existing region.

Edit the name of a region.

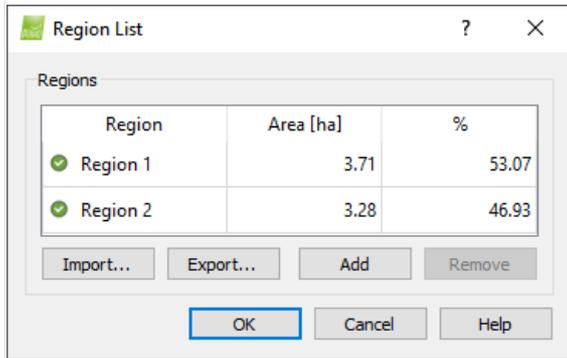
Display some properties of the region.

Import / export the regions.

Help: Opens the Pix4Dmapper help.

Regions...

When the button **Region...** is clicked, the following pop-up appears:



It contains the section *Regions*:

**Regions table:** Contains the columns:

**Region:** Name of the region, by double clicking on it, it is possible to edit the name.

**Area [units]:** Surface covered by the region.

**%:** Percentage of the total area occupied by the region.

**Import...:** Allows to import regions from a .shp files.

**Export...:** Allows to export the regions to a .shp file.

**Add:** Creates a new region.

**Remove:** Deletes the selected region.

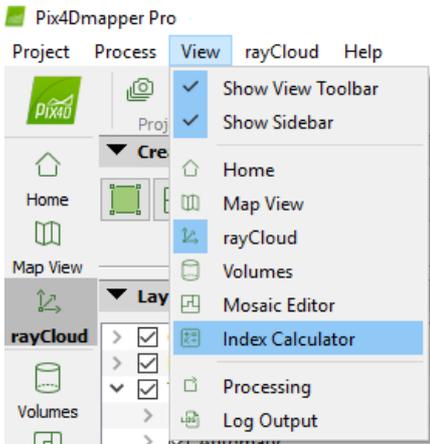
And the buttons:

**OK:** Confirms the changes.

**Cancel:** Does not save the changes.

**Help:** Opens the Pix4Dmapper help.

 Access: On the Menu bar, click View > Index Calculator (available once step 1. *Initial Processing* has been completed). The *Index Calculator* sidebar is displayed on the right of the main window. For information about the sidebar's display possibilities: [202558389](https://202558389).



On the left part of section 3. *Index Map*, there is an arrow that allows the user to show/hide the section by clicking on it:

- ▼ 3. Index Map By default section 3. *Index Map* is visible.
- ▶ 3. Index Map Section 3. *Index Map* is not visible.

The screenshot shows the 'Index Calculator' sidebar with several sections. Section 3, 'Index Map', is highlighted with a yellow border. It contains a 'Name' dropdown set to 'grayscale', a 'Formula' field with the equation  $0.2126 * red + 0.7152 * green + 0.0722 * blue$ , and a 'Generate' button. Below the formula is a table with columns for Band, Min, Avg, Max, Stdev, and Var.

Band	Min	Avg	Max	Stdev	Var
band1	15.26	71.28	250.41	27.14	736.65

Other sections visible include '1. Reflectance Map' with a table of band statistics, '2. Regions' with a 'Regions...' button, and '4. Color Maps and Prescription' with a color scale and 'Prescription...' button.

An *Index Map* is a single band image where each pixel value is computed using a mathematical formula combining the band information of the *Reflectance Maps*.

The following information is displayed:

Name: List of available indices. The icon shown before the index name is:

 The index exists in the Pix4Dmapper index database.

For more information about the Pix4Dmapper index database list: [202558379](#).

 The index was created / edited by the user in this project.

 The index was created / edited by the user in another project (on the same computer) that was closed and saved.

Formula: Displays the formula associated with the selected index.

Formula Status icon: Next to the *Formula* there is an icon:

 The formula is valid.

 The formula is incomplete or contains undefined band names.

Index Status icon: If next to the *Generate* button there is

 The index has been generated.

Edit...: Grayed out when the selected index belongs to the Pix4Dmapper database. Enabled when the selected index was created by the user. Opens the *Index Maps* window that allows the user to edit the formula that corresponds to the selected index.

For detailed information: [202558279](#).

Indices...: Opens up the *Index List* window which displays the existing indices and allows the user to add, edit, or remove indices. For detailed information: [202558299](#).

Generate: Generates a single band GeoTiff image. Each pixel's value is computed by applying the formula to the corresponding pixel of the *Reflectance Map(s)*. It is grayed out if the user-defined index formula is not valid.

Help: Opens the Pix4Dmapper help.

 Important: For more information about the generated files and where they are stored: [202558739](#).

The section 3. *Index Map* also displays information about the generated index band. The following information is displayed:

Band: The Index Map has only one band to be displayed (*band1*).

Min: Minimum pixel value.

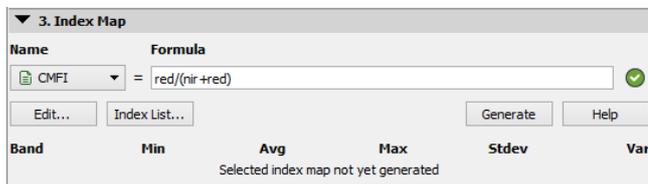
Avg: Average pixel value.

Max: Maximum pixel value.

Stdev: Standard deviation of pixel values.

Var: Variance of pixel values.

If the selected index has not been generated, it displays: "Selected index map not yet generated."



The screenshot shows the '3. Index Map' window. The 'Name' dropdown is set to 'CMF1' and the 'Formula' field contains 'red/(nir+red)'. A green checkmark icon is visible next to the formula. Below the formula field are buttons for 'Edit...', 'Index List...', 'Generate', and 'Help'. At the bottom, there is a table with columns: Band, Min, Avg, Max, Stdev, and Var. The table content is 'Selected index map not yet generated'.

Index Map not generated



The screenshot shows the '3. Index Map' window. The 'Name' dropdown is set to 'ndvi' and the 'Formula' field contains '(nir - red) / (nir + red)'. A green checkmark icon is visible next to the formula. Below the formula field are buttons for 'Edit...', 'Index List...', 'Generate', and 'Help'. A green checkmark icon is also visible above the 'Generate' button. At the bottom, there is a table with columns: Band, Min, Avg, Max, Stdev, and Var. The table content is as follows:

Band	Min	Avg	Max	Stdev	Var
band1	-0.54	0.58	0.97	0.21	0.04

Index Map generated

 Note:  
The *Index Maps* are calculated using some specific band(s) from one or more groups of images. Therefore, information from one or more *Reflectance Maps* may be used.  
If a *Region/Regions* drawn, the *Index Maps* and *Colored Index Maps* will be generated only for this region/regions.  
*Colored Index Maps* are generated by applying the defined coloring rules to the *Index Maps*. They are raster files with RGB values.

 Access: On the Menu bar, click View > Index Calculator (available once step 1. *Initial Processing* has been completed). The *Index Calculator* sidebar is displayed on the right of the main window. In section 3. *Index Map*, click Edit to edit the selected index (available for user defined indices).

The *Index Map* pop-up is used to easily edit the formula associated to the user defined index. The name of the index that is edited is displayed in the window title.

It contains 3 sections:

[Reflectance Map Band Selection](#)

[Operations](#)

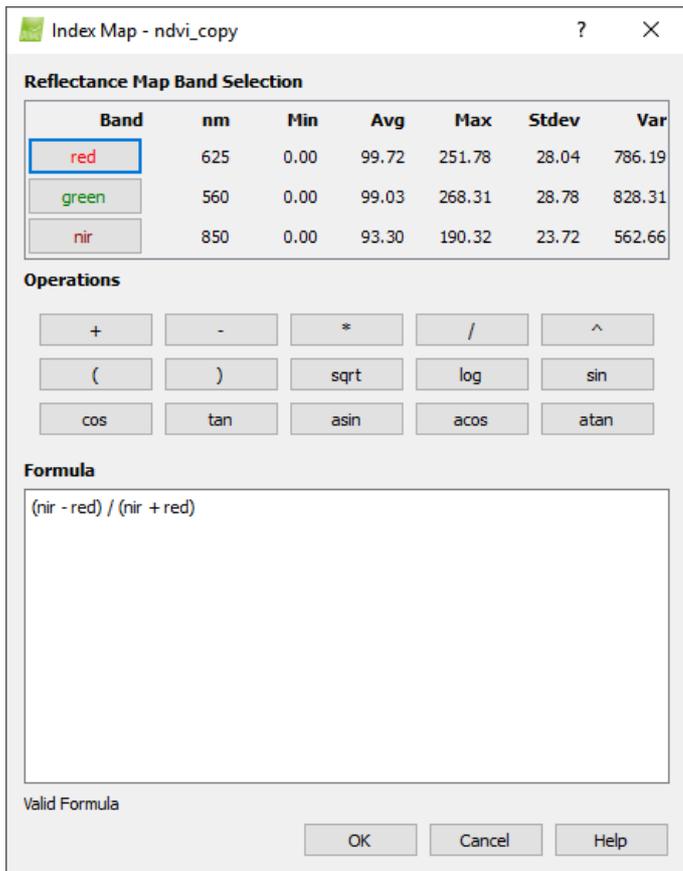
[Formula](#)

And 3 action buttons:

OK: Confirms the changes.

Cancel: Does not save the changes.

Help: Opens the Pix4Dmapper help.



**Index Map - ndvi\_copy** ? X

**Reflectance Map Band Selection**

Band	nm	Min	Avg	Max	Stdev	Var
red	625	0.00	99.72	251.78	28.04	786.19
green	560	0.00	99.03	268.31	28.78	828.31
nir	850	0.00	93.30	190.32	23.72	562.66

**Operations**

**Formula**

(nir - red) / (nir + red)

Valid Formula

Reflectance Map Band Selection

Displays information for each band of each group of images of the generated *Reflectance Map(s)*. The following information is displayed:

Band: Name of the band . If more than one group exists and the same band name exists in different groups, the bands are displayed as "Groupname\_band."

nm: Wavelength of the band in nano-meters.

Min: Minimum pixel value per band.

Avg: Average pixel value per band.

Max: Maximum pixel value per band.

Stdev: Standard deviation of pixel values per band.

Var: Variance of pixel values per band.

By clicking a band button, the band name will be automatically inserted in the *Formula* text box at the current cursor position.

Operations

Buttons that allow the user to automatically insert mathematical operations in the formula text box at the current cursor position.

The available operations are:

<b>Symbol</b>	+	-	*	/	^	(	)
<b>Action</b>	addition	subtraction	multiplication	division	exponentiation	open parenthesis	close parenthesis

<b>Symbol</b>	sqrt	log	sin	cos	tan	asin	acos	atan
<b>Action</b>	square root	natural logarithm	sine	cosine	tangent	arcsine	arcosine	arctangent

Formula

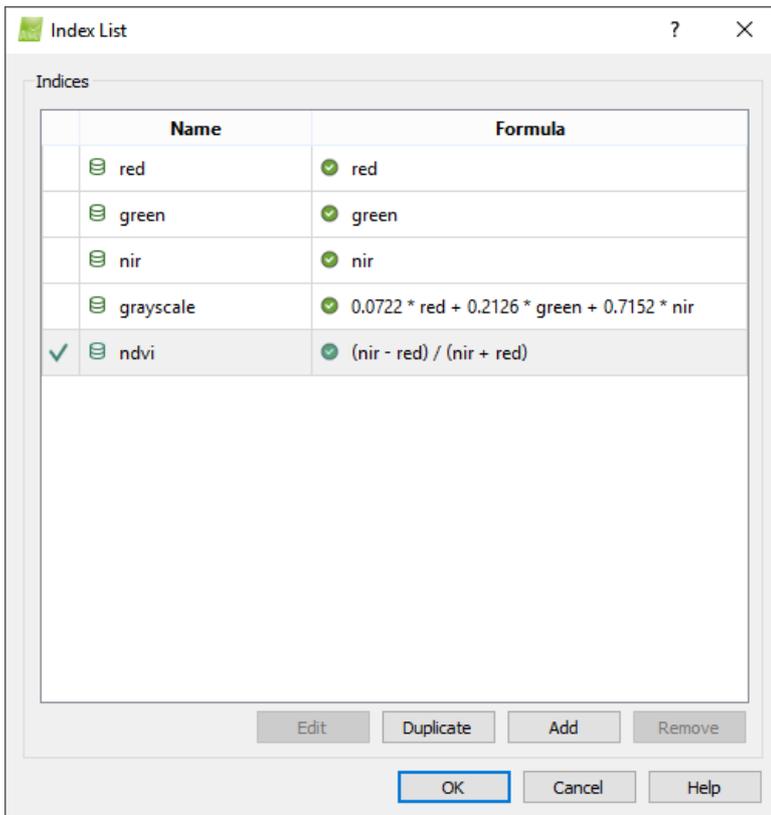
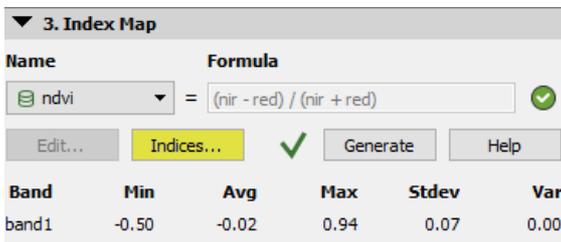
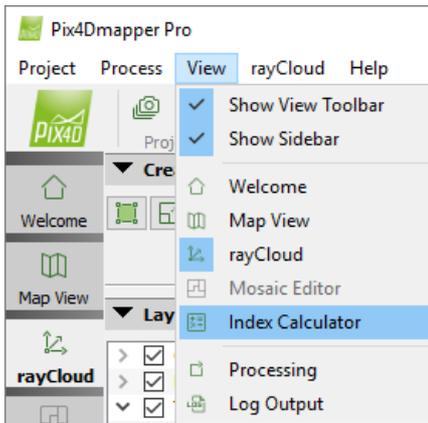
Text box to edit/write the fomula associated to the index.

Under the text box a message appears indicating the formula validation status:

- Valid formula.
- Undefined "band\_name" band.
- Incomplete formula.
- Syntax error.

 Important: The formulas' expression is case sensitive: it distinguishes between upper and lower case.

 Access: On the Menu bar, click View > Index Calculator (available once step 1. *Initial Processing* has been completed). The *Index Calculator* sidebar is displayed on the right of the main window. On section 3. *Index Map*, click Indices...



The section *Indices* contains the Index table:

Status: The first column displays a green check  if the index has been generated and is empty if the index has not been generated.

Name: Displays:

An icon that shows if:

 The index exists in the Pix4Dmapper index database.

For more information about the Pix4Dmapper index database list: [202558379](https://www.pix4d.com/202558379).

 The index was created / edited by the user in this project.

 The index was created / edited by the user in another project (on the same computer) that was closed and saved.

The index name.

Formula: Displays:

An icon that shows:

 If the formula is valid.

 If the formula is incomplete or contains undefined band names.

The formula.

And the buttons:

Edit: Enabled for user defined indices. Opens the *Index Map* pop-up allowing the user to edit the currently selected index formula.

Duplicate: Duplicates the selected index with the name: *selectedIndex\_copy*. The duplicated index will be user defined even if it is duplicating an index from the Pix4Dmapper index database.

Add: Creates a new user defined index. Opens the *Index Map* pop-up to enter the new formula. By default, it adds it with the name: *unnamed*. If the name already exists, it will be created with the name: *unnamed2*.

Remove: Enabled for user defined indices. Deletes the selected index.

 Important: User defined indices created for a project will be available for other projects on the same computer.

Available actions on the table:

Select an Index: By clicking on a cell, the row will be selected and depending on the type of index (from the Pix4Dmapper database or user defined) some buttons will be available or grayed out (see above for more information).

Edit Index name: Available only for user defined indices. Double click on a user defined index name and edit it.

Edit Formula: Available only for user defined indices. Double click on a user defined formula expression and edit it.

 Important: The formulas expression is case sensitive: it distinguishes between upper and lower case.

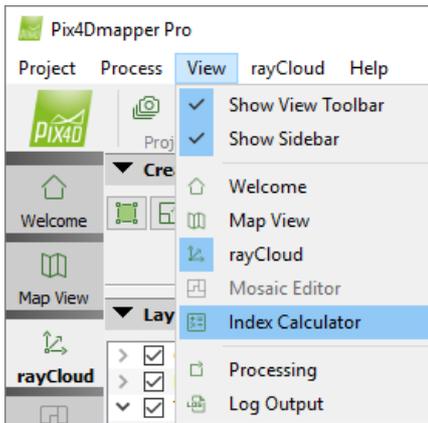
The *Index List* pop-up has as well the following action buttons:

OK: Closes the *Index List* pop-up and the marked index is selected in the *Name* of the 3. *Index Map* section of the *Index Calculator Sidebar*.

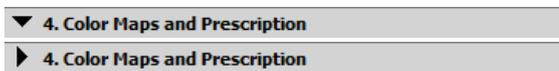
Cancel: Closes the *Index List* pop-up without selecting an index.

Help: Opens the Pix4Dmapper Help.

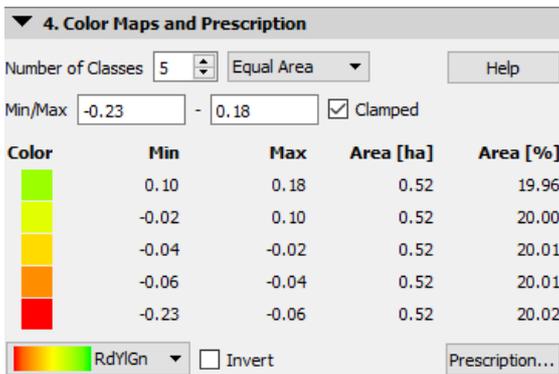
 Access: On the Menu bar, click View > Index Calculator (available once step 1. *Initial Processing* has been completed). The *Index Calculator* sidebar is displayed on the right of the main window. For information about the sidebar's display possibilities: [202558389](https://202558389).



On the left part of section 4. *Color Maps and Prescription*, there is an arrow that allows the user to show/hide the section by clicking on it:

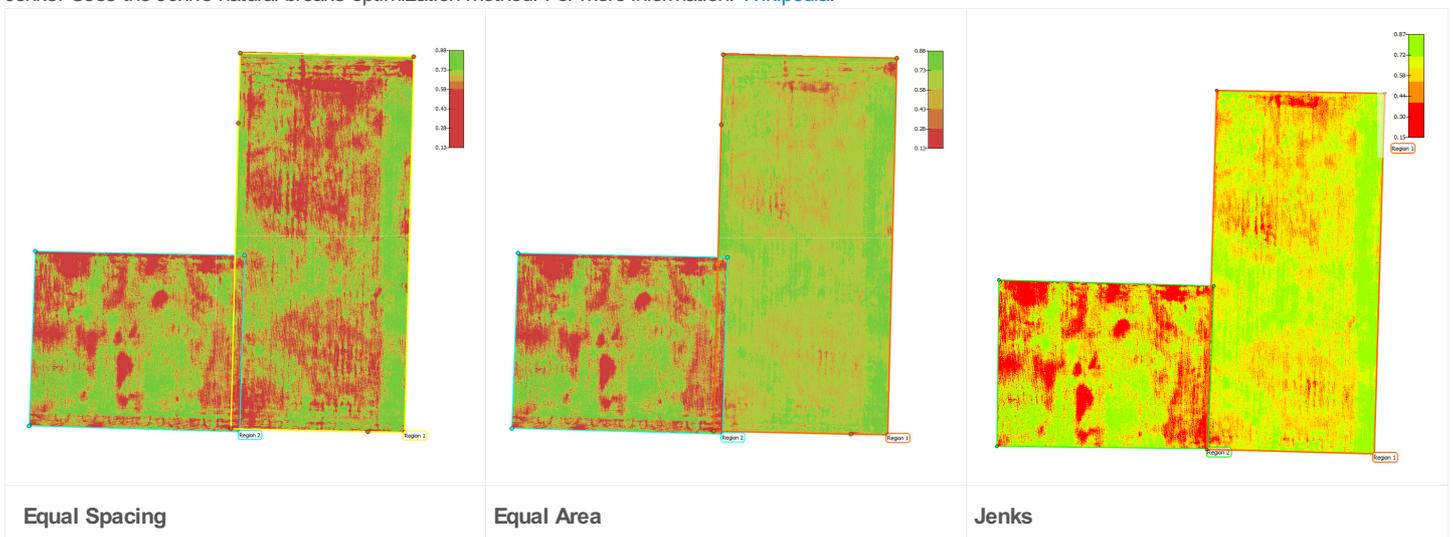


By default section 4. *Color Maps and Prescription* is expanded and visible. Section 4. *Color Maps and Prescription* is collapsed and hidden.



The following information is displayed:

- Number of Classes: Number of classes to classify the model. The default value is 5, the minimum value 2 and the maximum value 32.
- Method of classification: It is possible to classify the area (classify the pixels in intervals based on their index value and represent each interval using one class and therefore one color) considering:
  - Equal Spacing: Selected by default, all classes have the same range.
  - Equal Area: All classes represents the same area in the model.
  - Jenks: Uses the *Jenks* natural breaks optimization method. For more information: [Wikipedia](https://en.wikipedia.org/wiki/Jenks_natural_breaks_optimization).



Use Min/Max:

Enter the minimum and maximum index values to ignore the values outside this range.

Clamped: Displays the pixels that have an index value outside the selected range (*Min/Max*) with the color of the minimum or maximum selected index values. It is selected by default. If not selected, the pixels that have an index value outside the selected range (*Min/Max*), will be displayed with transparency.

Classes description: It displays the properties of the classes.

Color: Color used in the Index View to represent the class.

Min / Max: Index value range used for each class.

Area [units]: Surface covered by the class.

Area [%]: Percentage of the total area occupied by the region.

Colors Distribution: Contains the palettes that can be used for coloring the classes.

RdYIGn: Low values are red, medium values are yellow and high values are green, used for agriculture.

Thermal: Low values are blue, high values are red, used for temperature measurements.

Spectral: Uses all the colors of the visual spectrum, used when it is needed to distinguish many different values.

Grays: Uses a gray scale.

Blues: Uses a blue scale.

Reds: Uses a red scale.

Invert: Unselected by default, it allows to invert the selected colors' distribution.

Prescription...: It displays some classes' parameters and allows to set the application rate and add comments:

Color: Color used in the Index View to represent the class.

Area [units]: Surface covered by the class.

Area [%]: Percentage of the total area occupied by the region.

Rate: It allows to enter the application rate for each class. This rate value should be filled after the on-site scouting is done. The rate units depend on the tractor software. For chemicals and fertilizer, it could be kg/hectare, grams/hectare, liter/hectare etc. For seeds, it could be seed/hectares.

Quantity: Area[units] x Rate.

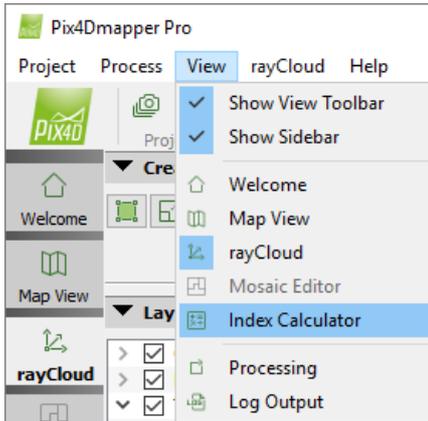
Comment: It allows to add comments for each class. These descriptions could be notes from the on-site scouting.

Color	Area [ha]	Area [%]	Rate	Quantity	Comment
	0.50	19.38	10.00	5.05	Healthiest
	0.27	10.46	20.00	5.45	
	0.78	30.06	30.00	23.49	Moderate Stress
	1.02	39.14	40.00	40.78	
	0.02	0.96	0.00	0.00	Problematic Region
<b>Total:</b>	<b>2.60</b>	<b>100.00</b>		<b>74.77</b>	

Help: Opens the Pix4Dmapper help.

[Index](#) > [Interface](#) > [Menu View](#) > [Index Calculator](#) > [Sidebar](#)

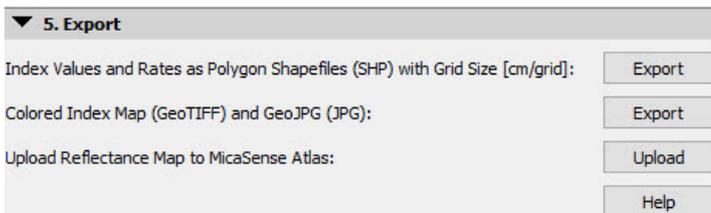
 Access: On the Menu bar, click View > Index Calculator (available once step 1. *Initial Processing* has been completed). The *Index Calculator* sidebar is displayed on the right of the main window. For information about the sidebar's display possibilities: [202558389](#).



On the left part of section 5. *Export*, there is an arrow that allows the user to show/hide the section by clicking on it:

▼ 5. *Export* By default the 5. *Export* is expanded and visible.

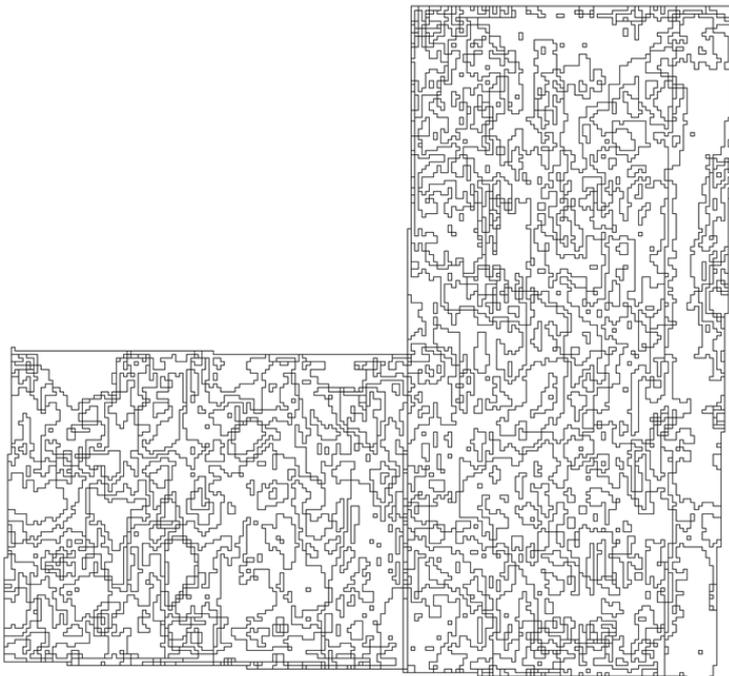
▶ 5. *Export* Section 5. *Export* is collapsed and hidden.



The following information is displayed:

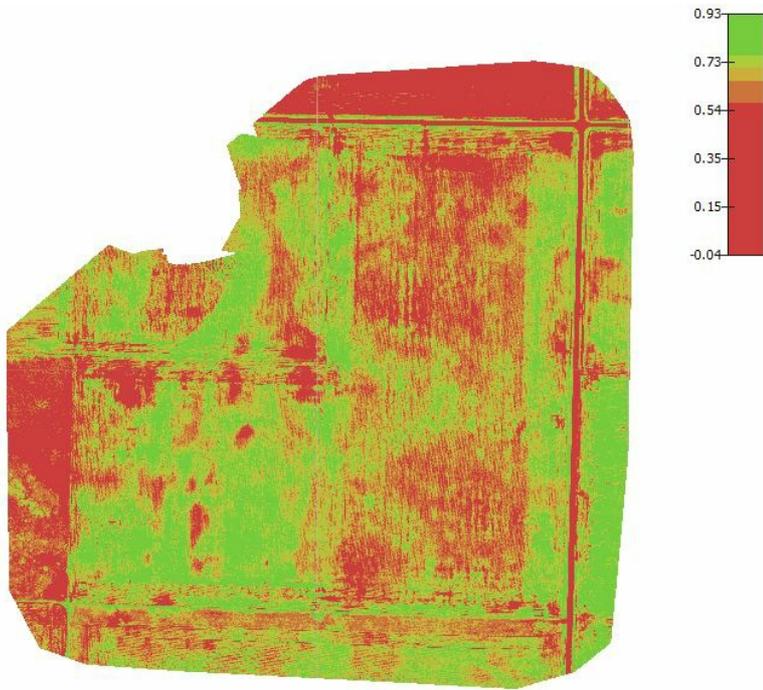
Index Values and Rates as Polygon Shapefiles (.shp) with Grid Size [unit/grid]

Exports the classes as a .shp file (polygon and grid) based on the selected *Processing Options*: [203891879](#). One shapefile will be exported for each *Region*. This file can be imported directly into the tractor's displays for field (fertilizer) application.



Colored Index Map GeoTIFF (.tif) and GeoJPG (.jpg)

Exports a *Colored Index Map* that is generated by applying the defined coloring rules to the Index Map. It is a raster file with RGB values. A single *Colored Index Map* will be exported for all the regions in 3 formats: .jpg, .tif and .kml.



### Upload Reflectance Map to MicaSense Atlas

Uploads the necessary reflectance maps for further processing on the MicaSense Atlas platform.

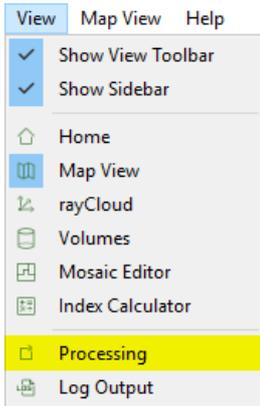


Note: MicaSense Uploader needs to be installed on the computer in order to upload to MicaSense Atlas.

[Index](#) > [Interface](#) > [Menu View](#) > [Index Calculator](#) > [Sidebar](#)

[◀ Previous](#) | [Next ▶](#)

 Access: On the Menu bar, click View > Processing (enabled once a project has been loaded or created). The *Processing* bar is displayed at the bottom of the main window. For information about the displayed bars: [202558389](#).



The *Processing* bar allows to process a project.

It contains 1 section:

### Processing

It also contains 2 Progress bars:

#### Current

#### Total

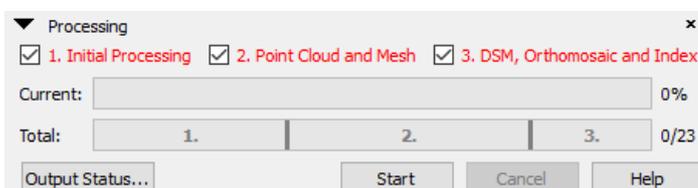
and the buttons:

**Output Status...**: Opens the Output Status pop-up.

**Start**: Starts the processing of the selected processing steps.

**Cancel**: Cancels processing.

**Help**: Opens the Pix4Dmapper help.



### Processing

The *Processing* section contains 3 subsections:

1. **Initial Processing**: Automatically extracts keypoints from the images to compute the internal and external camera parameters using the software's advanced Automatic Aerial Triangulation (AAT) and Bundle Block Adjustment (BBA). A sparse 3D point cloud is computed and a low resolution DSM and Orthomosaic are generated and displayed in the Quality Report. For more information about the files generated during the *Initial Processing*: [202558519](#).



Warning: When reprocessing this step, the existing outputs of step 1 are deleted and overwritten and outputs of steps 2 and 3 (if previously completed) are deleted.

2. **Point Cloud and Mesh**: Generates a dense 3D point cloud and a 3D textured mesh. For more information about the files generated during the *Point Cloud and Mesh*: [202558549](#).



Warning: When reprocessing this step, the existing outputs of step 2 are deleted and overwritten and outputs of step 3 (if previously completed) are deleted.

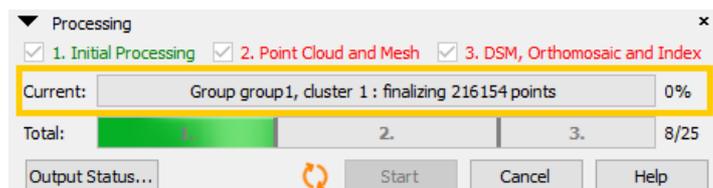
3. **DSM, Orthomosaic and Index**: Generates the DSM, orthomosaic, reflectance map and index map. For more information about the files generated during the *DSM, Orthomosaic and Index*: [202558559](#).



Warning: When reprocessing this step, the existing outputs of this step are deleted and overwritten.

## Current

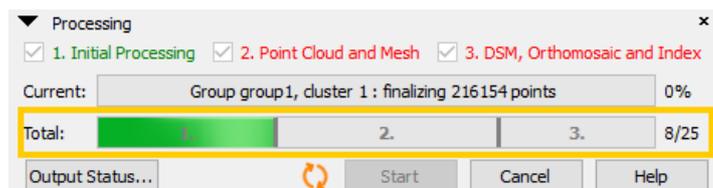
It displays the processing status of each substep as a percentage.



 Note: When the project is processing, information about the substep that is currently running is displayed in the *Current* bar.

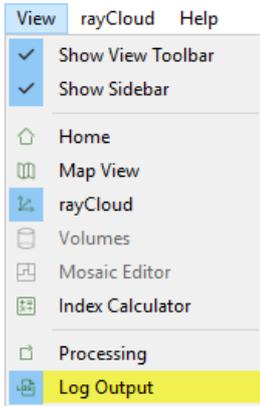
## Total

It displays the processing status of all steps of processing that have been selected as the number of completed substeps.



 Note: When the project is processing, the processing steps (1, 2, 3) that have been selected are displayed in the *Total* bar.

 Access: On the Menu bar, click View > Log Output. The *Log Output* bar is displayed at the bottom of the main window. For information about the displayed bars: [202558389](#).



The *Log Output* bar displays useful information about the processing of the project. It describes the steps and substeps of processing, the actions taken, the warnings and the errors during the processing.

 Important:  
 Pix4Dmapper exports the log file (*project\_name.log*). It is stored at the output folder *project\_name*.  
 The log file displayed at the *Log Output* bar is cleared each time that Pix4Dmapper closes. The next time that the software will be opened, the log file will start registering the different actions from scratch.

It consists of the following:

**Levels** drop-down list: Allows to define the level of details of the log displayed on the main window.

**Options** drop-down list: Allows to set the displaying options for the log on the main window.

**Search Engine**: Allows to search for specific text / numbers in the log displayed on the main window.

**Clear Log**: Clears (deletes) the log displayed on the main window.

**Main window**: Displays the log.

**Help**: It opens Pix4Dmapper Help.

## Levels

There are the following levels of details:

[Info]: Displays general information that is printed in the log file. The text is displayed in black.

 Example: It displays the used version of Pix4Dmapper: *[Info]: Version = <2.2.15>*.

[Warning]: Displays the processing warning messages that are printed in the log file. The text is displayed in yellow.

 Example: *[Warning]: Some geotags were invalid and therefore removed.*

[Error]: Displays the processing error messages that are printed in the log file. The text is displayed in red.

 Example: *[Error]: Failed to open file <file\_directory>!*

[Processing]: Displays the processing steps and substeps that are printed in the log file and their status. The text is displayed in green.

 Example: *[Processing]: Substep Camera calibration started.*

[UI]: Displays the actions that the user does in the User Interface. The text is displayed in blue.

 Example: It displays *[UI]: Open Results Folder clicked*, when the user clicks the button Open Results Folder...

## Options

There are the following options:

Full Headers: It displays the full headers (*Date, Time, % RAM, % CPU*).

Wrap Lines: It wraps the lines when the main window is too small.

### Search Engine

It allows to search for specific keywords, characters or numbers. The results of the searching are displayed in the main window.

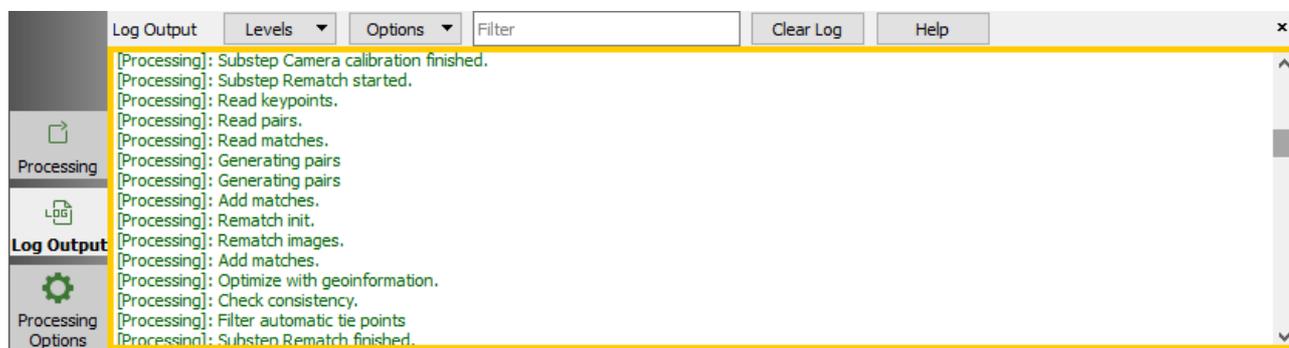
### Clear Log

It clears (deletes) the log that is displayed in the main window.

**!** Important:  
The log file stored at the output folder *project\_name* will not be deleted.  
The *Clear Log* action can not be retrieved. Once the log is deleted from the main window, there is no way to bring it back.

### Main window

It displays the log. The displayed information depends on the selected *Levels* and *Options*. If a keyword, character or number is used in the *Searching Engine*, the displayed log shows only the strings that contain these elements.





Access: On the Menu bar, click Help.

The Help menu has 6 items that can be selected:

**Help Contents:** Opens Pix4Dmapper help for the current View.

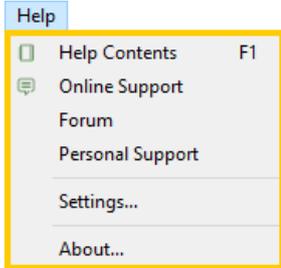
**Online Support:** Opens the Online support site in a browser.

**Community:** Opens the Support site, displaying the Community index page.

**Personal Support:** Opens the *Online form* to submit a request to the Support Team in a browser.

**Settings...:** Opens the Settings window that gives the user access to the proxy and camera database settings.

**About...:** Provides information about the version, License, *Terms of service*, *Privacy policy* and third party licenses.



### Help Contents

The Pix4Ddesktop help provides full and detailed information about the current View (*Welcome*, *Map View*, *rayCloud*, *Volumes*, *Mosaic Editor*, *Index Calculator*).

### Online Support

Opens a browser pointing to the Support website, which contains numerous articles with step by step instructions, answers to frequently asked questions as well as news, updates, tutorials, use cases, etc.

### Community

The Community contains the following topics:

**User Space:** Place to share news or discuss the profession.

**Image Acquisition:** Pix4Dcapture, flight plans, indoor mapping, drones, cameras, GPS,...

**Processing:** Desktop and Cloud: processing, troubleshooting, outputs, accuracy, computer hardware.

**Hall of Fame:** Place to share 3D Models, Orthomosaics, fly-through videos of projects.

**Important Communication:** Updates about software releases, Support material (articles, videos), workshops,...

### Personal Support

Contact the dedicated support team for personal support.

CC

Subject \*

Description \*

Enter the details of your request, explain the problem.

For quicker reply and if applicable, please provide or attach:

*DESKTOP* - Quality report, log file, screenshot.

*MOBILE* - App version, drone and camera model, screenshot.

*CLOUD* - Name of the project or preferably its link, screenshot.

For more information, [click here](#).

Request topic \*

Agricultural / Thermal

Check the box if the request is related to agricultural or thermal imagery (optional).

License email

Email address of a Pix4D license with valid Support & Upgrade subscription (strongly recommended).

Attachments

Settings...

Opens the *Settings* pop-up that gives the user access to the proxy and camera database settings and the language selection.

It has 4 Tabs:

[Proxy](#)

[Camera Database](#)

[Language](#)

[Help Improving the Software](#)

And 3 action buttons:

OK: Confirm the changes.

Cancel: Exit without saving.

Help: Open the Pix4Dmapper help.

**Proxy**

This tab allows the user to configure the Internet connection.

The first drop down list allows the user to select how to connect to the proxy:

**No Proxy** (default): If no proxy server is used.

**Use Systems Settings**: Uses the system-wide settings.

**Socks5**

**Http**

The following fields are displayed:

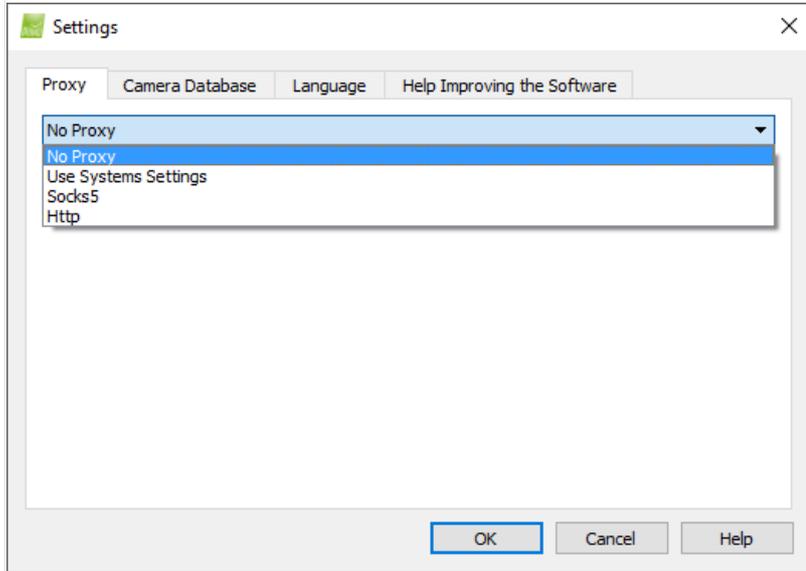
**Host**: Proxy host name.

**Port**: Proxy port number.

**Username**: Proxy user name.

**Password**: Proxy password.

In order to enter the proxy settings: [202560089](#).



### Camera Database

This tab allows the user to clear the user camera model database or to import/export it from/to a file. It also displays the built-in database that is used.

The camera database tab has 2 sections:

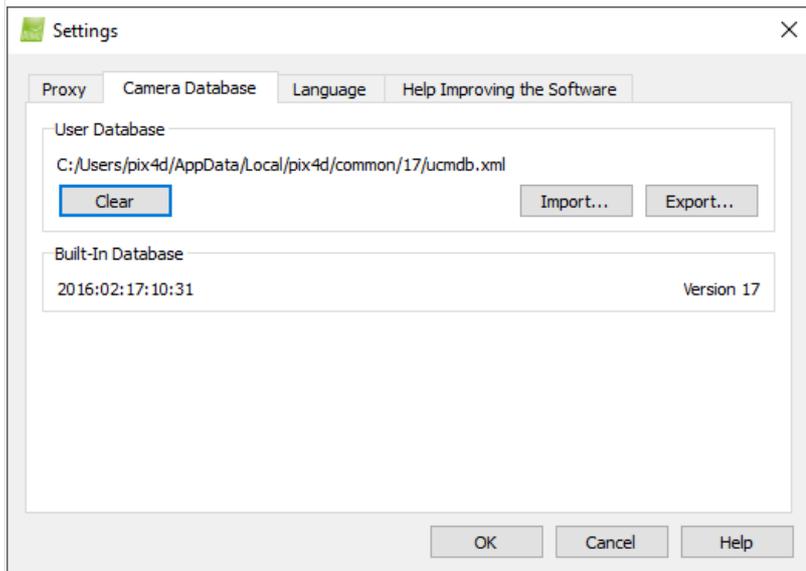
**User database**: This section has the following action buttons:

**Clear**: Clears the user camera model database (cameras added or modified by the user).

**Import...**: Loads a camera database file \*.xml with cameras added or modified by the user.

**Export...**: Exports cameras added or modified by the user to a camera database file \*.xml.

**Built-in database**: Displays the date and the version of the last built-in camera database update.

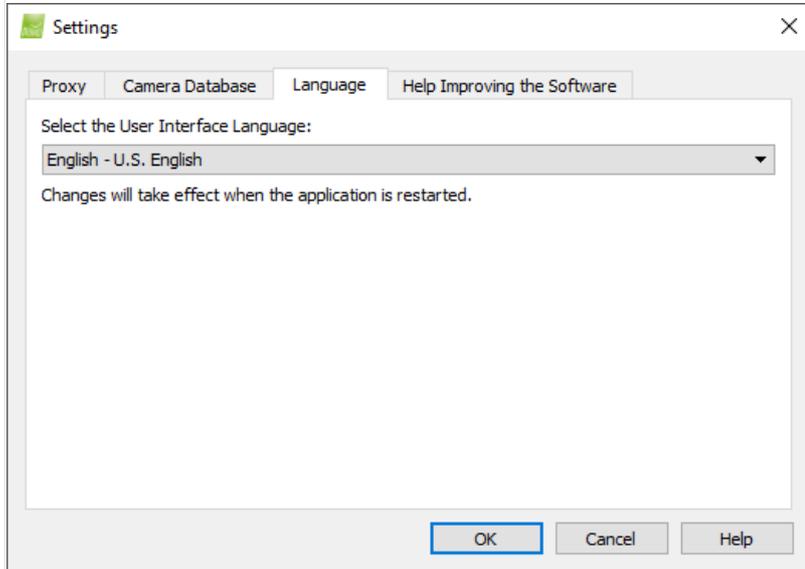


### Language

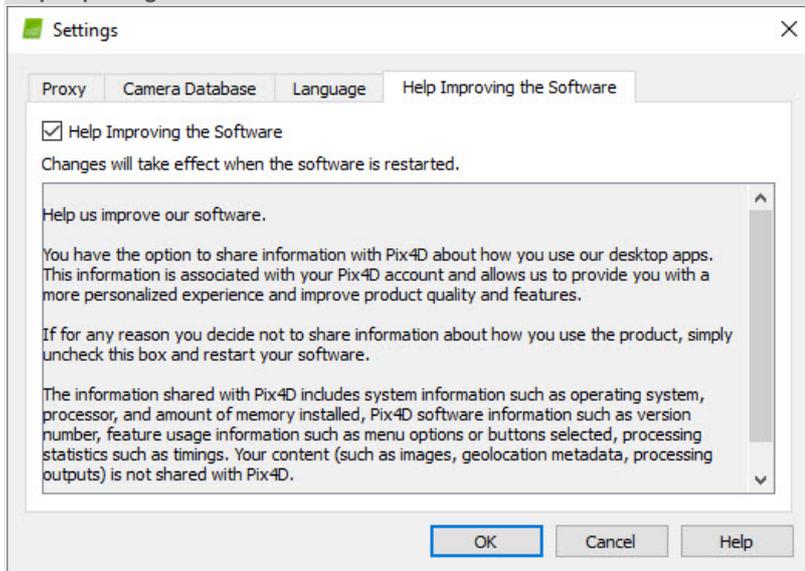
This tab allows the user to set up the language.

The following languages are available:

English - U.S. English (default)  
German (Germany) - Deutsch (Deutschland)  
Spanish (Spain) - español de España (España)  
French (France) - français (France)  
Italian (Italy) - Italiano (Italia)  
Chinese (China) - 中文 (中国)  
Chinese (Taiwan) - 中文 (台灣)  
Japanese (Japan) - 日本語 (日本)  
Russian (Russia) - русский (Россия)



## Help Improving the Software



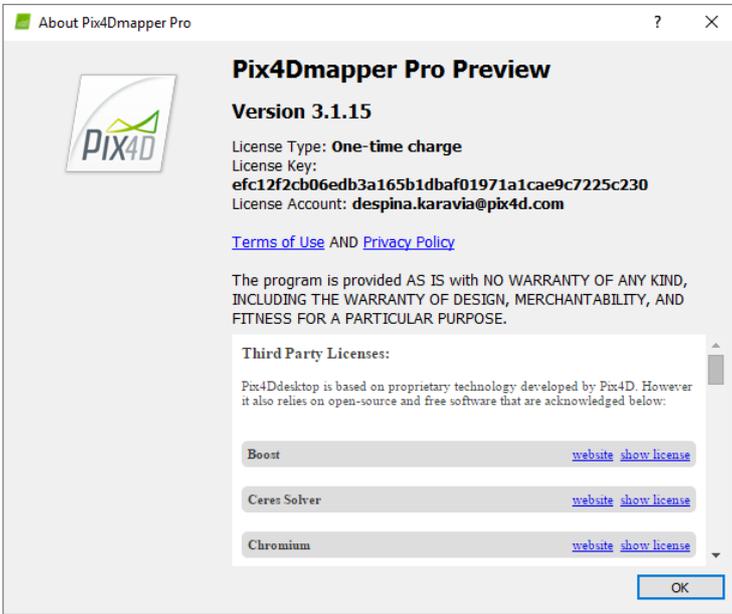
About...

It provides information about the version, license type, license key, license account, [Terms of Use](#), [Privacy Policy](#) and third party licenses.

License Type.

License Key.

License Account: Pix4D user account to which the license is bound.



 Note: The Pix4D Desktop license is a floating license which allows the user to log out one device and log in another. It is not needed to uninstall Pix4D Desktop to move the license.

Each Pix4D Desktop license can be activated on different number of devices:

<b>Version</b>	 Pix4Dmap	 Pix4D	 Pix4D	 Pix4D	 Pix4D	 Pix4D
<b>Number of devices</b>	<p><b>Two</b></p> <p>A desktop for full processing.</p> <p>A laptop for rapid check in the field.</p>	<p><b>One</b></p>	<p><b>One</b></p>	<p><b>Two</b></p> <p>A desktop for full processing.</p> <p>A laptop for rapid check in the field.</p>	<p><b>Custom</b></p> <p>More information <a href="#">here</a>.</p>	<p><b>Discovery Unlimited</b></p>

For more information about how to download and install Pix4D Desktop: [202557299](#).

For step by step instructions about how to Log out Pix4D Desktop: [208469726](#).

For step by step instructions about how to Log in Pix4D Desktop: [207948656](#).

The following shortcuts are available:

[General shortcuts](#)

[Basic GCP/MTP Editor shortcuts](#)

[Log output shortcuts](#)

[rayCloud shortcuts](#)

[Layers Sidebar](#)

[3D View](#)

[Right Sidebar](#)

[Volumes shortcuts](#)

[Mosaic Editor shortcuts](#)

[View](#)

[Right Sidebar](#)

[Index Calculator](#)

#### General shortcuts

Category	Action	Shortcut	Note
Pix4Dmapper Help	Open the Pix4Dmapper help	F1	
Project	New project	Ctrl + N	
	Open project	Ctrl + O	
	Save project	Ctrl + S	Does not save the changes done in the Mosaic Editor
	Save project as	Ctrl + Shift + S	
	Exit	Ctrl + Q	

#### Basic GCP/Manual Tie Point Editor shortcuts

Category	Action	Shortcut	Note
Preview	Remove marked GCP in currently displayed image	Del	The mouse needs to hover over the image
	Zoom out of the image as long as the key is pressed	Shift	The mouse needs to hover over the image
	Zoom in the image as long as the key is pressed	Alt	The mouse needs to hover over the image

#### Log output shortcuts

Category	Action	Shortcut	Note
View	Open find bar	Ctrl + F	
	Close find bar	Esc	

#### rayCloud shortcuts

Category	Action	Shortcut	Note
<b>Layers Sidebar</b>			
Tie Points > GCPs/MTPs	Rename point	F2	A point needs to be selected
	Remove point	Del	A point needs to be selected
Processing Area	Remove area	Del	An area needs to be selected
Objects	Rename object	F2	An object needs to be selected
	Remove object	Del	An object needs to be selected
<b>3D View</b>			
Viewpoints	View All	C	
	Focus on Selection	F	
	Top	7	
	Front	1	
	Back	Ctrl + 1	
	Left	3	
	Right	Ctrl + 3	
Navigation Modes	Standard	Ctrl + Y	
	Trackball	Ctrl + T	
	First Person	Ctrl + H	
Navigation Modes > Standard	Zoom in	+	

	Zoom in faster	Ctrl + "+"	
	Zoom out	-	
	Zoom out faster	Ctrl + "-"	
	Move forward parallel to the ground plane	Arrow Up	
	Move forward parallel to the ground plane faster	Ctrl + Arrow Up	
	Move backward parallel to the ground plane	Arrow Down	
	Move backward parallel to the ground plane faster	Ctrl + Arrow Down	
	Move up	Page Up	
	Move up faster	Ctrl + Page Up	
	Move down	Page Down	
	Move down faster	Ctrl + Page Down	
	Rotate view down	8	
	Rotate view down faster	Ctrl + 8	
	Rotate view up	2	
	Rotate view up faster	Ctrl + 2	
	Rotate view left	4	
	Rotate view left faster	Ctrl + 4	
	Rotate view right	6	
	Rotate view right faster	Ctrl + 6	
Navigation Modes > Trackball	Zoom in	+	
	Zoom in faster	Ctrl + "+"	
	Zoom out	-	
	Zoom out faster	Ctrl + "-"	
Navigation Modes > First Person	Move forward	W Arrow Up	
	Move backward	S Arrow Down	
	Move left	A Arrow Left	
	Move right	D Arrow Right	
	Move up	Page Up	
	Move down	Page Down	
	Look up	I	
	Look down	K	
	Look left	J	
	Look right	L	
Perspective/Orthographic	Switch between perspective and orthographic projection	5	
Point cloud density	Increase point density	Alt + "+"	Decreases the number of points visible (improves performance on slow computers)
	Decrease point density	Alt + "-"	Increases the number of points visible (requires better computers)
Edit Densified Point Cloud	Delete points	Del	Must be in Edit mode and points must be selected
	Select all	Ctrl + A	Must be in Edit mode
	Clear selection	Ctrl + C	Must be in Edit mode
	Invert selection	Ctrl + I	Must be in Edit mode
<b>Right Sidebar</b>			
Images section	Focus on selection	P	The mouse needs to hover over the image or the image needs to be selected
	Pop up and maximize thumbnail	Space	Maximizes the image under the mouse cursor. Pressing Space again docks the image again keeping the new point of view. Pressing Escape docks the image and keep previous point of view.

#### Volumes shortcuts

The shortcuts of the Processing Area and the Objects layers of the Layers section of the sidebar and the shortcuts of the 3D View are the same as in the rayCloud: [202558059](https://202558059.com).

## Mosaic Editor shortcuts

Insert Cell Insert a new cell after having added the last vertex. InsThe *insert Cell* mode needs to be activated and the vertices need to be created / marked

Category	Action	Shortcut	Note
<b>View</b>			
View	Show Mosaic	Ctrl + 1	If several mosaics are generated because of multiple image labels, the shortcut number is incremented by the number of mosaics - 1. For example, if two mosaics are generated, the shortcut to display the second mosaic is Ctrl + 2
	Show DSM	Ctrl + 2	If several mosaics are generated because of multiple image labels, the shortcut number is incremented by the number of mosaics - 1. For example, if two mosaics are generated, the shortcut to display the DSM is Ctrl + 3
	Show Region	Ctrl + 3	If several mosaics are generated because of multiple image labels, the shortcut number is incremented by the number of mosaics - 1. For example, if two mosaics are generated, the shortcut to display the regions is Ctrl + 4
	Show Edited Mosaic	Ctrl + 4	If several mosaics are generated because of multiple image labels, the shortcut number is incremented by the number of mosaics - 1. For example, if two mosaics are generated, the shortcut to display the edited mosaic is Ctrl + 5
	Show Mosaic Area	Ctrl + 5	If several mosaics are generated because of multiple image labels, the shortcut number is incremented by the number of mosaics - 1. For example, if two mosaics are generated, the shortcut to display the mosaic area is Ctrl + 6
	Show Mosaic Tiles	Ctrl + 6	If several mosaics are generated because of multiple image labels, the shortcut number is incremented by the number of mosaics - 1. For example, if two mosaics are generated, the shortcut to display the mosaic tiles is Ctrl + 7
<b>Right Sidebar</b>			
Right Sidebar	Mosaic Editing	1	
	Visualization	2	
	Draw region	F2	Start drawing a region. Like clicking on the Draw button
	Finish drawing region	Right Click	End drawing a region and insert it in the list
	Cancel region drawing	Esc	

## Index Calculator

Category	Action	Shortcut	Note
View	View the whole map	C	
	Delete the selected region or region vertex	Del	The region/region vertex must be selected and the option <i>Lock Regions</i> must be deselected