

Workflow Guide

POINT CLOUD WORKFLOW IN TRIMBLE QUADRI

Civil Construction
May 2023

Background

Trimble® Quadri supports many different data types and formats to create terrain and soil layer surfaces. Point clouds are data types available to use for the modeling of existing ground; point clouds can also be used for illustrational purposes in the Quadri model. In this user guide, different methods to import, read and use point clouds in Quadri are described.

Point clouds are created by using laser scanning or photogrammetry data. Laser scanning gives the most accurate results, but is more time consuming than photogrammetry.

- **Laser scanning** is performed using stationary, vehicle mounted or airborne scanners.
- **Photogrammetry** is done by using a drone that takes large amounts of photos to be processed and by that a point cloud is created.

Both methods are often combined to reach an end product that meets the requirements of the actual project.



Trimble X7, laser scanner



Matrice 300 drone (Source: www.swedron.se/)

File formats

Trimble Quadri reads point clouds in different formats:

- **LAS** - the most common format for point cloud data
- **LAZ** - compressed LAS
- **TXT** - text file with columns for x,y and z coordinates
- **XYZ** - text file with columns for x,y and z coordinates

There are a lot of proprietary formats created by different systems and software, but the formats above are open and readable by most software.

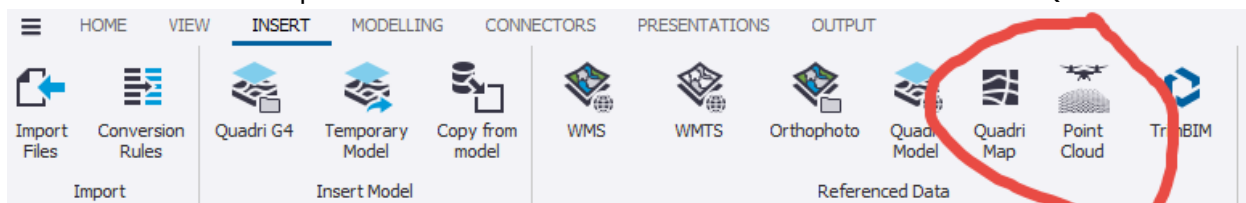
Methods of importing point clouds to Quadri

There are two main methods of using point clouds in Trimble Quadri; as referenced data and as imported data.

Point clouds as referenced data

This method is fast when using large and dense point clouds. The point cloud is not saved in the actual Quadri model, but is saved externally and streamed to the model from another location located on the user's PC.

With this method the point cloud data is not shared with other users on the Quadri server.



You can see the point cloud in plan and 3D and use it as a three-dimensional background picture.

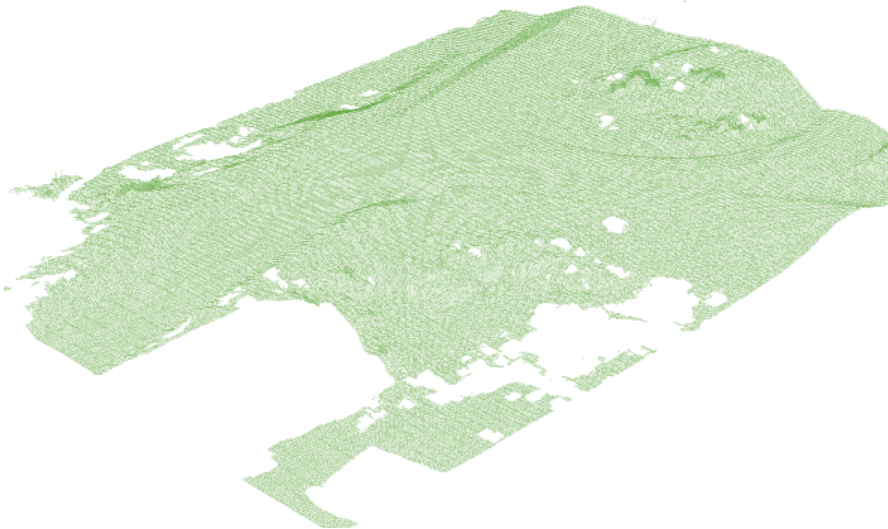


Point cloud with approx 240 000 000 points in Quadri. (source: FMT AB)

Point clouds as imported data

To create a terrain surface model you must import the point cloud to the Quadri model. There are three different settings to use when importing a point cloud for further use.

It is of great importance that the point cloud is classified so that the software can determine what points are terrain, vegetation, building and so on. This is a process that is done in another software, for example Trimble Business Center.



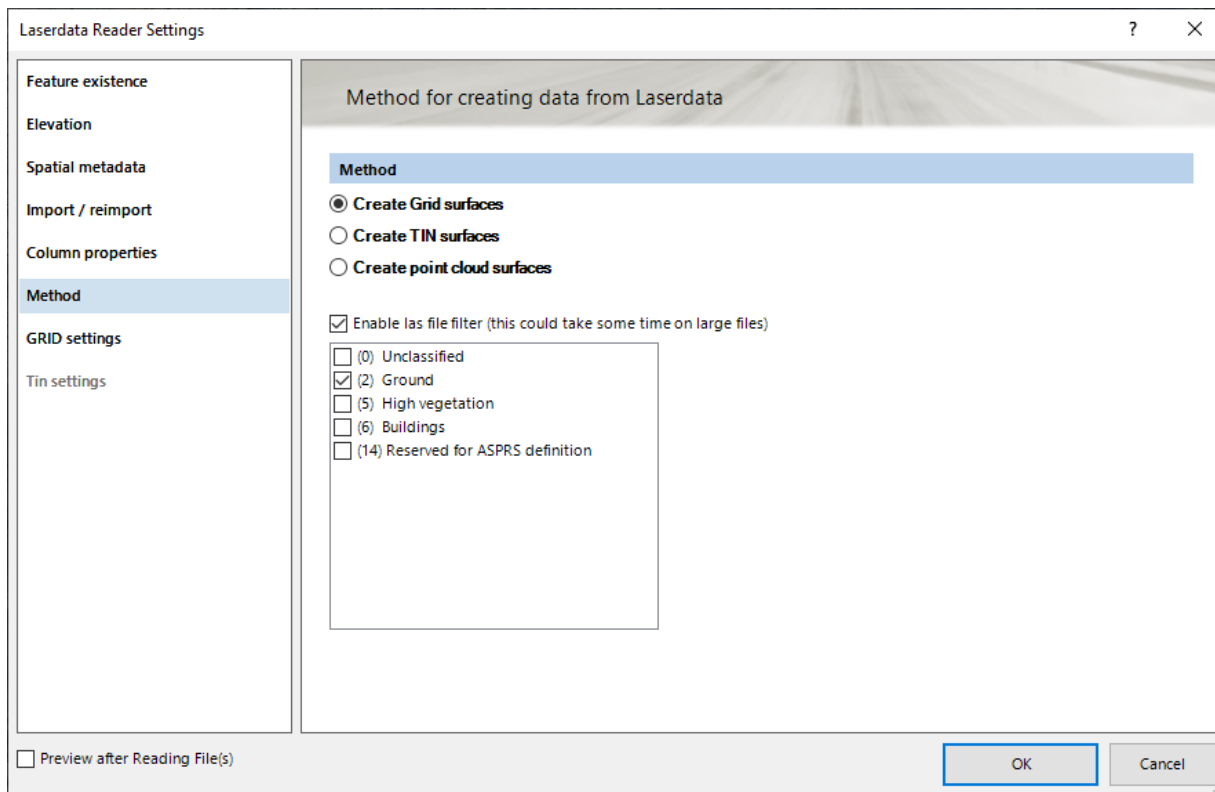
The same point cloud as in the previous picture. In this case imported only using points classified as terrain.

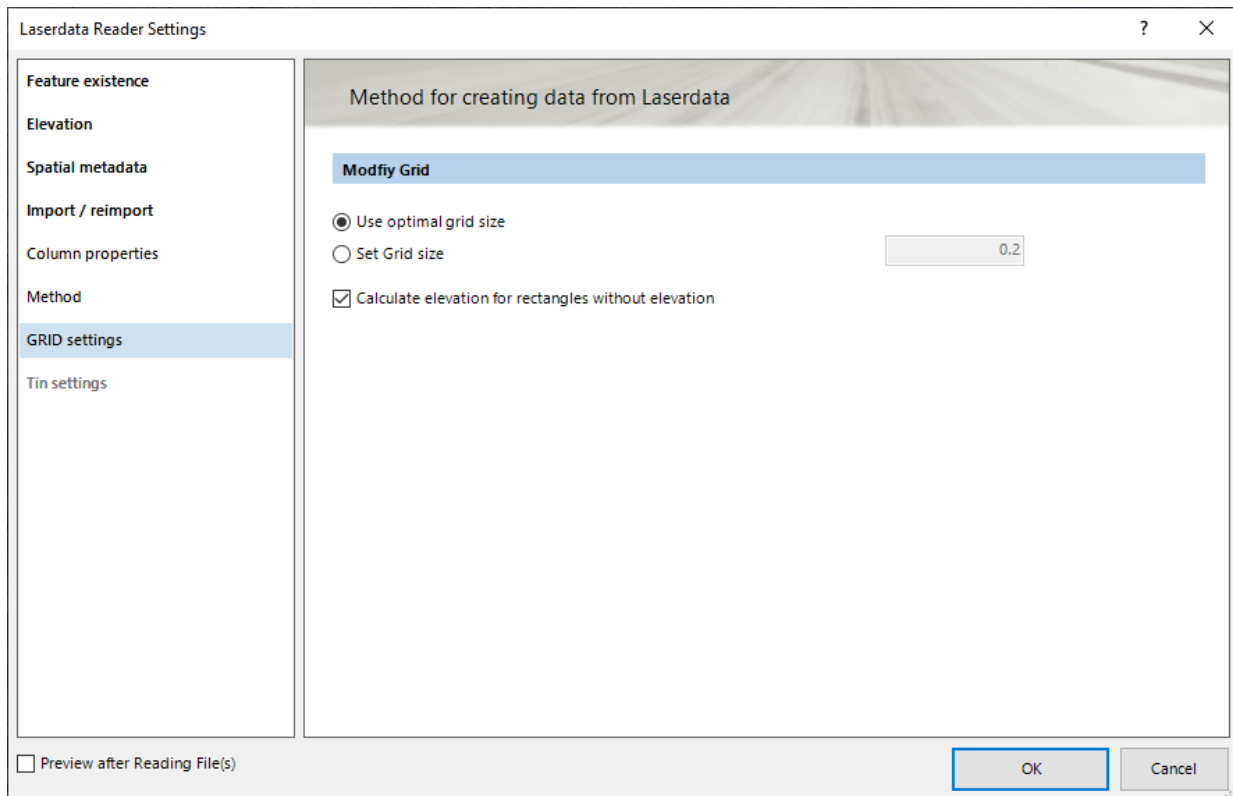
When ordering a point cloud from a surveyor, it is important that the end product is a classified point cloud. If it is not, you will not be able to use the data as a base for existing terrain.

Grid model

When creating a grid surface, the points in the point cloud are filtered so the result is a grid model with a specific grid size. It is possible to let Quadri decide the optimal grid size, or use a user defined grid size.

The result is one surface feature in the Quadri model. In our example an original file size of 45 MB gives a gridmodel with a file size of 0,57 MB.





Triangle model

With this method, a triangle model using all points of selected classification is created. The triangle model gives an exact model of the point cloud, but also a larger amount of data. Such a dense model can sometimes be hard to use as a base for calculations due to the amount of data to be processed in the design tool.

Laserdata Reader Settings

Feature existence

Elevation

Spatial metadata

Import / reimport

Column properties

Method

GRID settings

Tin settings

Method for creating data from Laserdata

Method

☐ Create Grid surfaces

☒ Create TIN surfaces

☐ Create point cloud surfaces

☒ Enable las file filter (this could take some time on large files)

☐ (0) Unclassified

☒ (2) Ground

☐ (5) High vegetation

☐ (6) Buildings

☐ (14) Reserved for ASPRS definition

☐ Preview after Reading File(s)

OK Cancel

Laserdata Reader Settings

Feature existence

Elevation

Spatial metadata

Import / reimport

Column properties

Method

GRID settings

Tin settings

Method for creating data from Laserdata

Create Tin Surface(s)

Improve edges of model by removing triangles with long edges.

☒ Use removal of long-edge triangle at edge of model

Max length of edge (m):

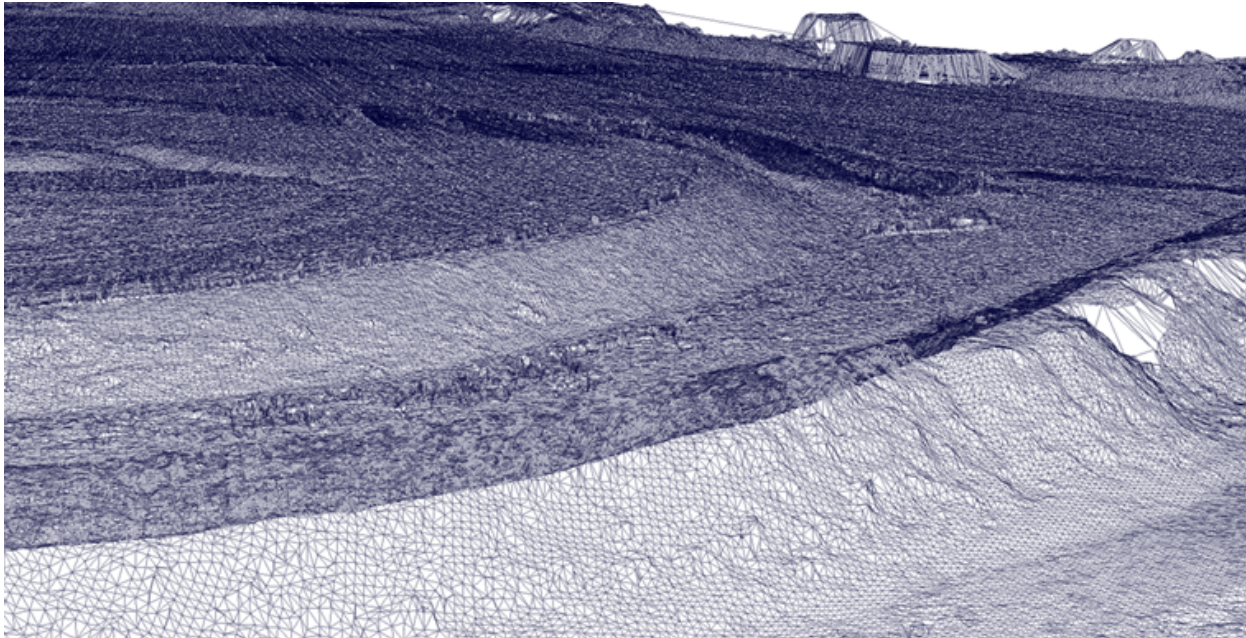
Only triangles at the outer edge of model are effected.

☐ Preview after Reading File(s)

OK Cancel

The result is one surface feature in the Quadri model. The original point cloud file (45 MB) gives a resulting tin model file size of approx 241 MB.

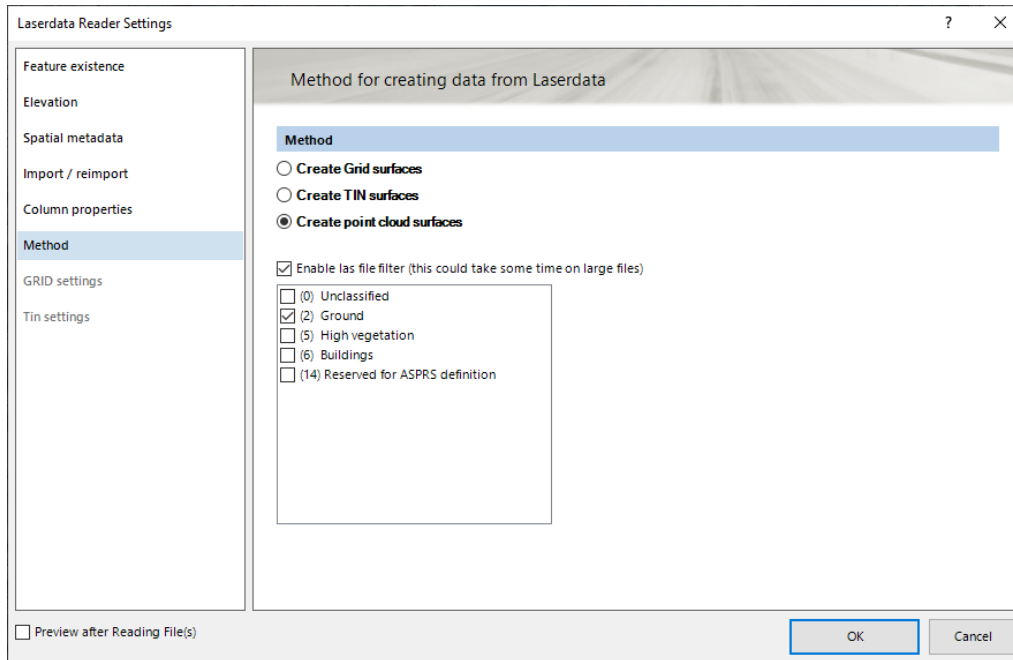
 Hantera Punktmoln.gdcrs	GDCRS File	1 KB
 Hantera Punktmoln.GDD	GDD File	241 160 KB
 Hantera Punktmoln.GDH	GDH File	3 KB



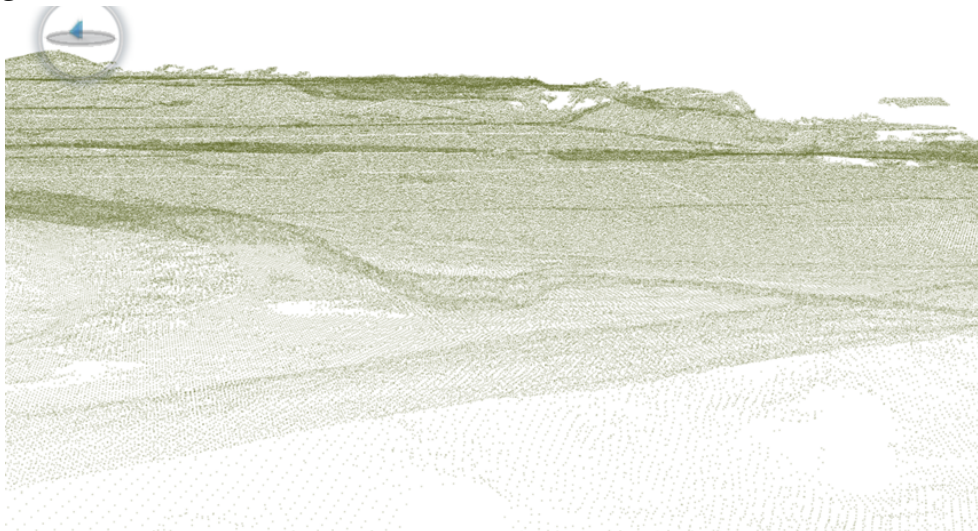
Create a point cloud

With this method you import the point cloud as it is, based on which classification of point you want to import. The point cloud is saved as one feature but only built by single points.

This feature can later on be used to create terrain surfaces, etc.



The result is one feature, so not one feature for each point. The original point cloud of 45 MB now gives us a result of 116 MB.



Differences between methods

In the graph below there is a comparison between a triangle model and a grid model. The red line represents the triangle model, and the green line represents the grid model. There is a clear difference between the two models, and that the grid model is smoothed out.

The “smoothing” of the grid model gives a total result that does not differ so much from the triangle model though.

