



Extract 3D buildings from point clouds

Assignment

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Version

Version 2.0

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Learning outcomes

At the end of this assignment, the learner is expected to be able to

- Identify and describe available 3D data sources that can be used for GIS and BIM
- Experiment with external geodata in QGIS



Expected competences when entering the assignment

- Basic knowledge in 3D Data Acquisition.
- Basic knowledge in 3D Data Sources.
- Basic knowledge in 3D Data Tools and Applications.
- Basic knowledge in QGIS.

Summary

The assignment explains possibilities of using 3D data sources in QGIS application to extract building data. The sample data used in the assignment are aerial laser scanning data (LIDAR).

Expected Workload

20 slides with assignment learning content, 2 hours

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Revision History:

Revision	Date	Author(s)	Status	Description
0.1	2024-03-11	V. Cetl	Final Draft	Assignment ready for review
1.0	2024-03-24	V. Cetl	Final	Final after revision
2.0	2025-04-29	V. Cetl	Final	Updated EU logo and disclaimer. Edited by T. Näslund



Assignment task

The task of the assignment is to Extract 3D buildings from point clouds.

Preparation

1) Data

In 3D modelling, a point cloud is a set of data points in a 3D coordinate system—commonly known as the XYZ (or E, N, H) axes. Each point represents a single spatial measurement on the object's surface. Taken together, a point cloud represents the entire external surface of an object.

The point cloud is usually result of 3D Laser scanning methods or Aerial Photogrammetry.

The most common format used point clouds is LAS (LIDAR Aerial Survey) or LAZ which is a compressed (zipped) version of the LAS. The LAS format is a file format designed for the interchange and archiving of Lidar point cloud data. It is an open, binary format specified by the American Society for Photogrammetry and Remote Sensing (ASPRS)

2) Data Sources

There are many available point cloud datasets on the Internet. Openly available LiDAR data is available in different formats (usually LAS), coordinate systems, and state of processing (from the cleaned point cloud data to the digital terrain model of the ground). Some examples are available here:

- INSPIRE Geoportal <https://inspire-geoportal.ec.europa.eu/>
- Archaeology of Slovenia https://arheologijaslovenija.blogspot.com/p/blog-page_81.html

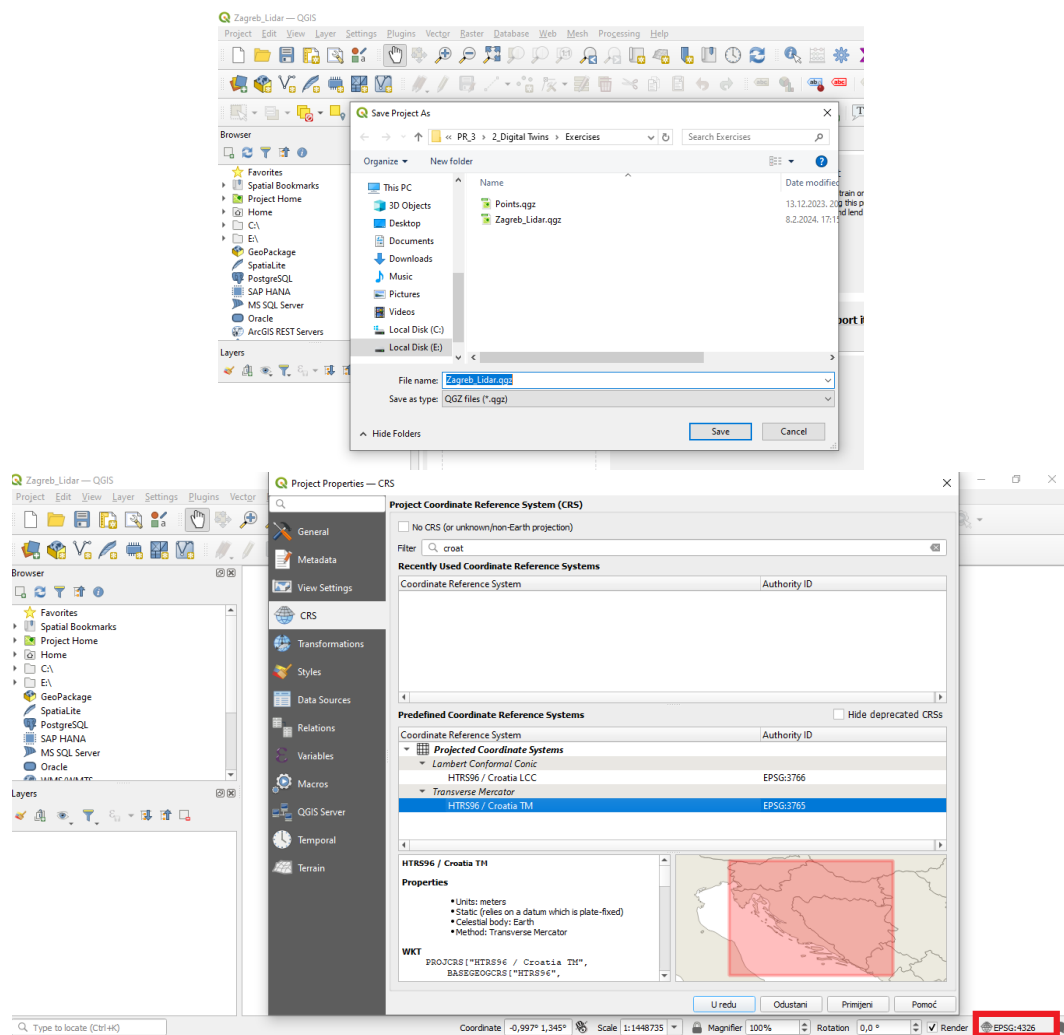
In this exercise we will use Sample Lidar data example (filename: Zagreb_Lidar_Example.laz). The data is available under the BIRGIT Project in the assignment data folder.

Software

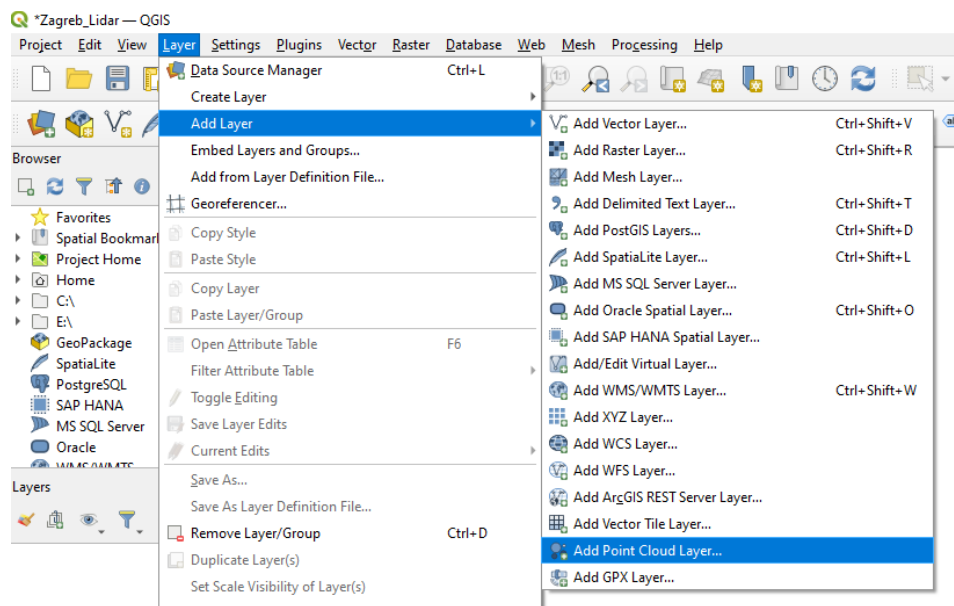
The QGIS software (version 3.28) is used for the exercise. The software together with many learning materials is available here: <https://qgis.org/en/site/>.

Data Import

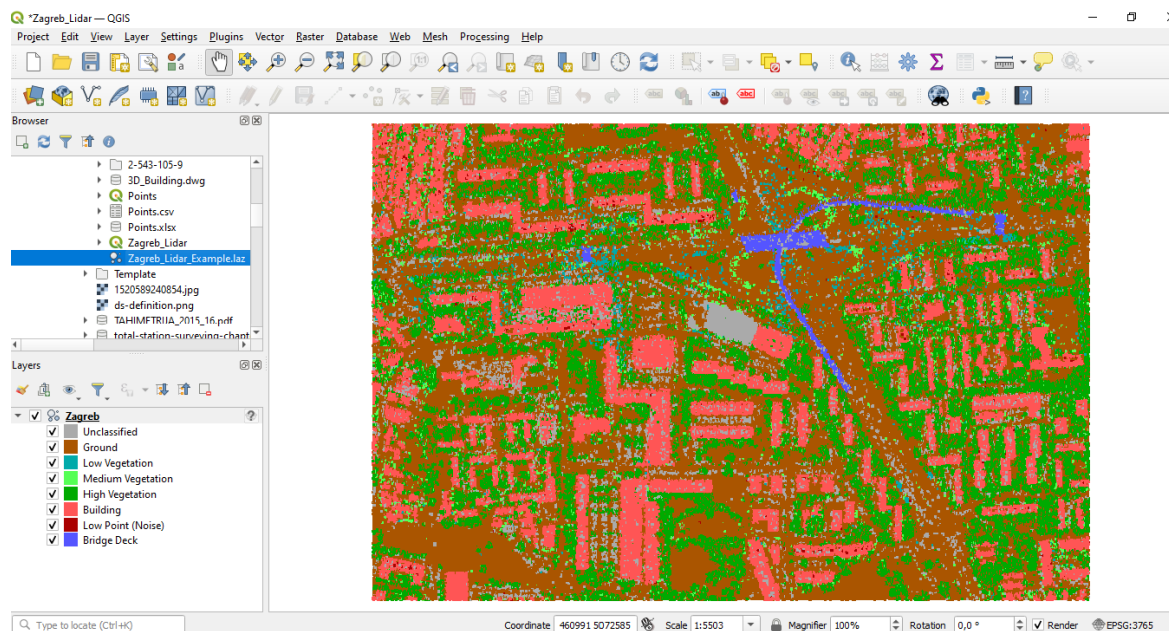
Before importing data it is necessary to create and save new project (i.e. Zagreb_Lidar.qgz) and to set the CRS to EPSG 3765 – HTRS96/ Croatia TM.



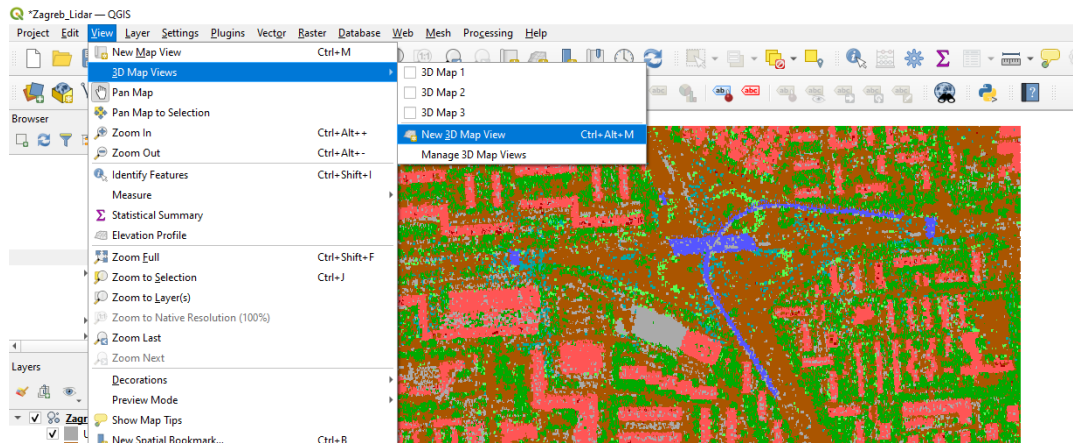
Data can be imported directly with Add Layer as a point cloud.



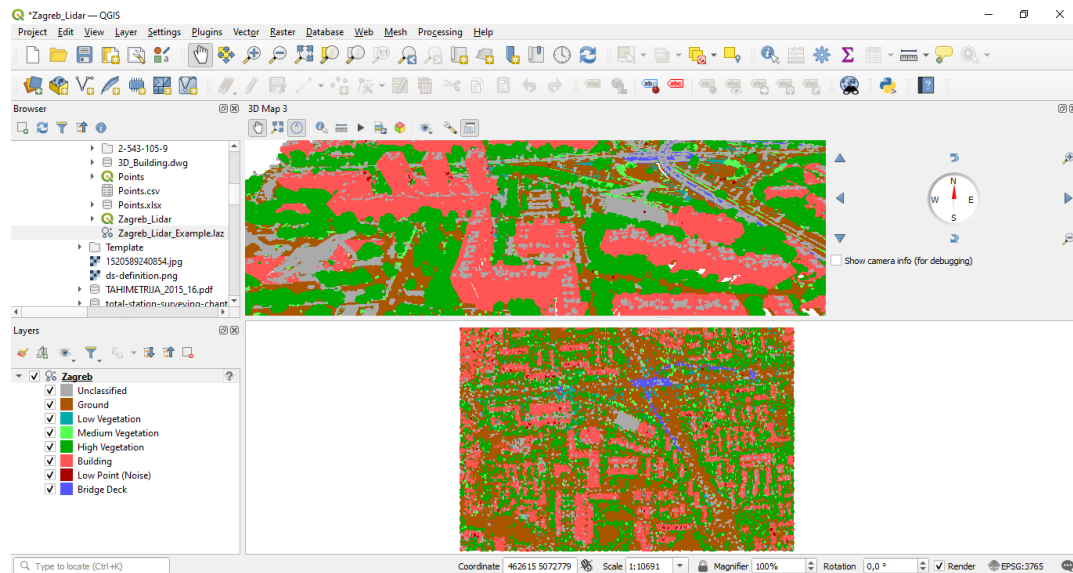
The result is the following figure.



To visualize 3D point cloud it is necessary to create 3D Map view.



The result is:



The point cloud contains different classes e.g. Ground, Vegetation, Buildings...

The building can be extracted simply by selecting attributes. In other words, all other classes can be switched off and class Building can be extracted to e.g. new Layer



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