



GEOSPATIAL TECHNOLOGIES

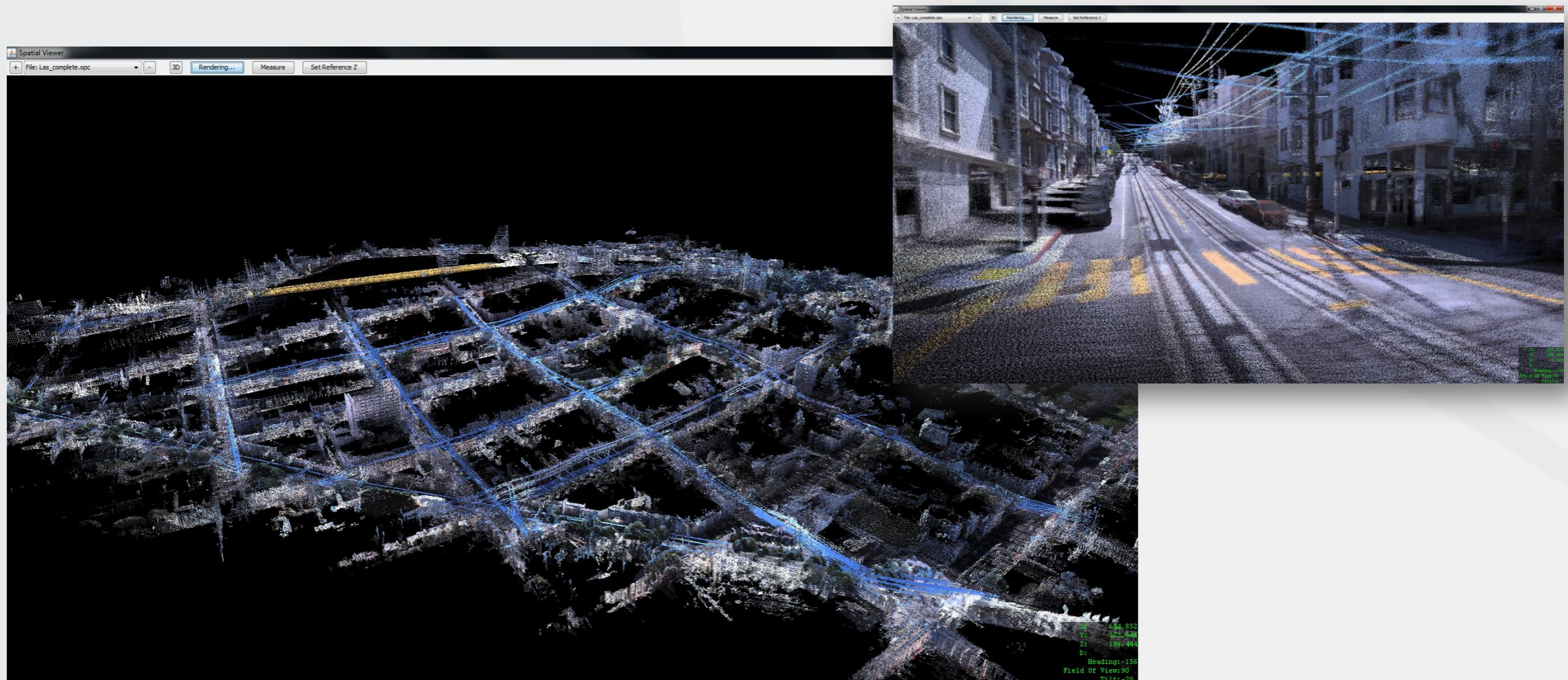
Dr. Lomme Devriendt

Photogrammetry Production Manager

Can UAS technology compete with standard land surveying?

Can UAS technology compete with standard land surveying?

- Combining the best of both worlds: merging the high precision of land surveying with the ease of geo-data capturing of photogrammetry.

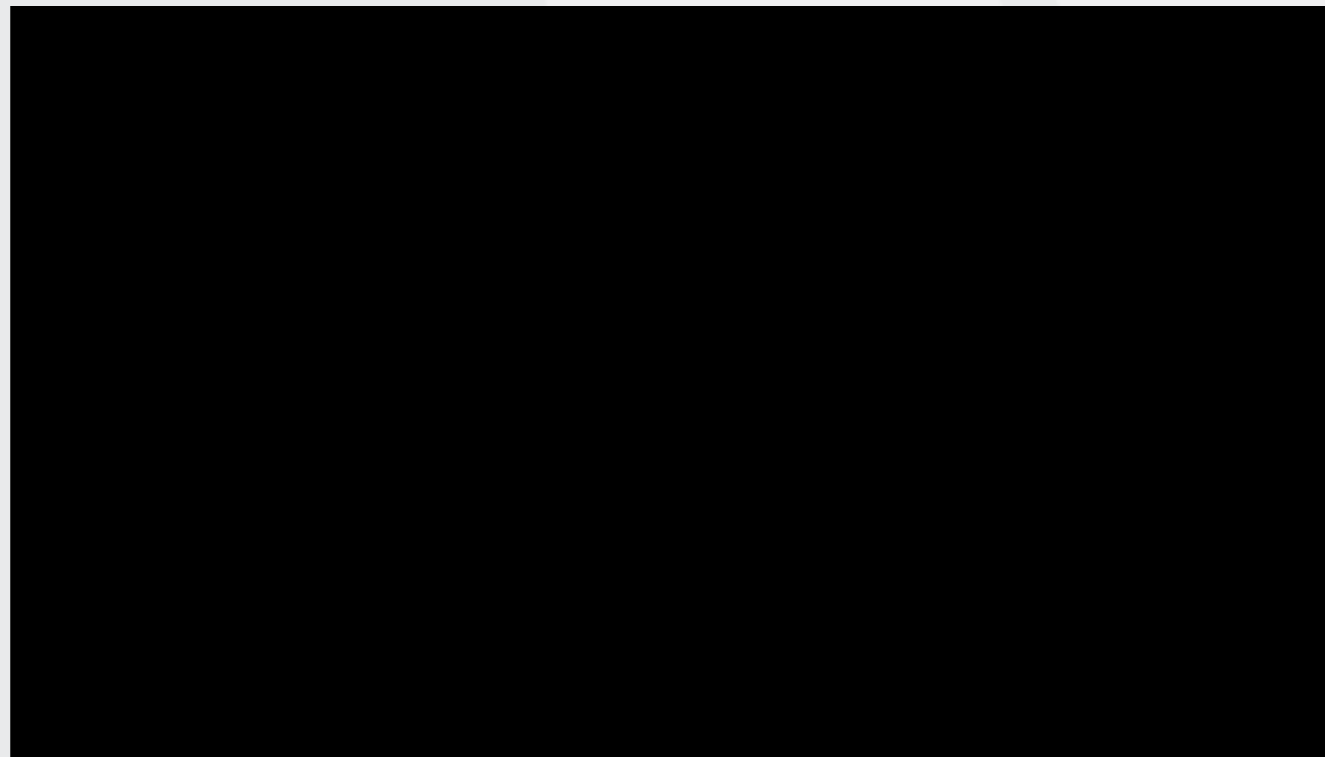


Can UAS technology compete with standard land surveying?

- (1) high immunity to weather, light and foliage conditions which limit the operational periods of image capture by high altitude photogrammetry;
- (2) supporting both 2D mapping for topographic and cadastral purposes as well as 3D modelling of buildings and other constructions; and
- (3) high ground resolution or Ground Sample Distance (GSD) and surveying precision, which are limited for high altitude photogrammetry.

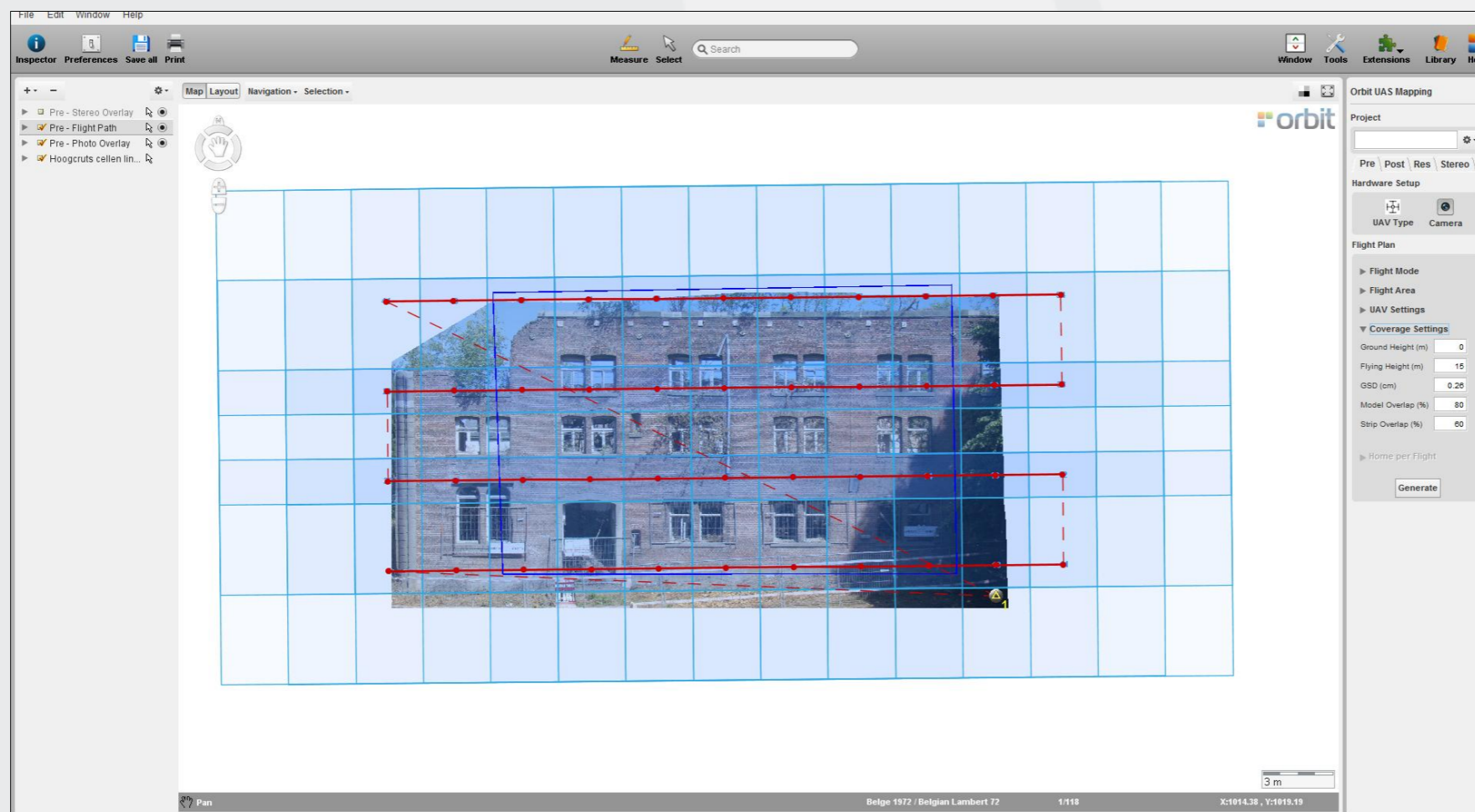
Can UAS technology compete with standard land surveying?

- (1) high immunity to weather, light and foliage conditions which limit the operational periods of image capture by high altitude photogrammetry;



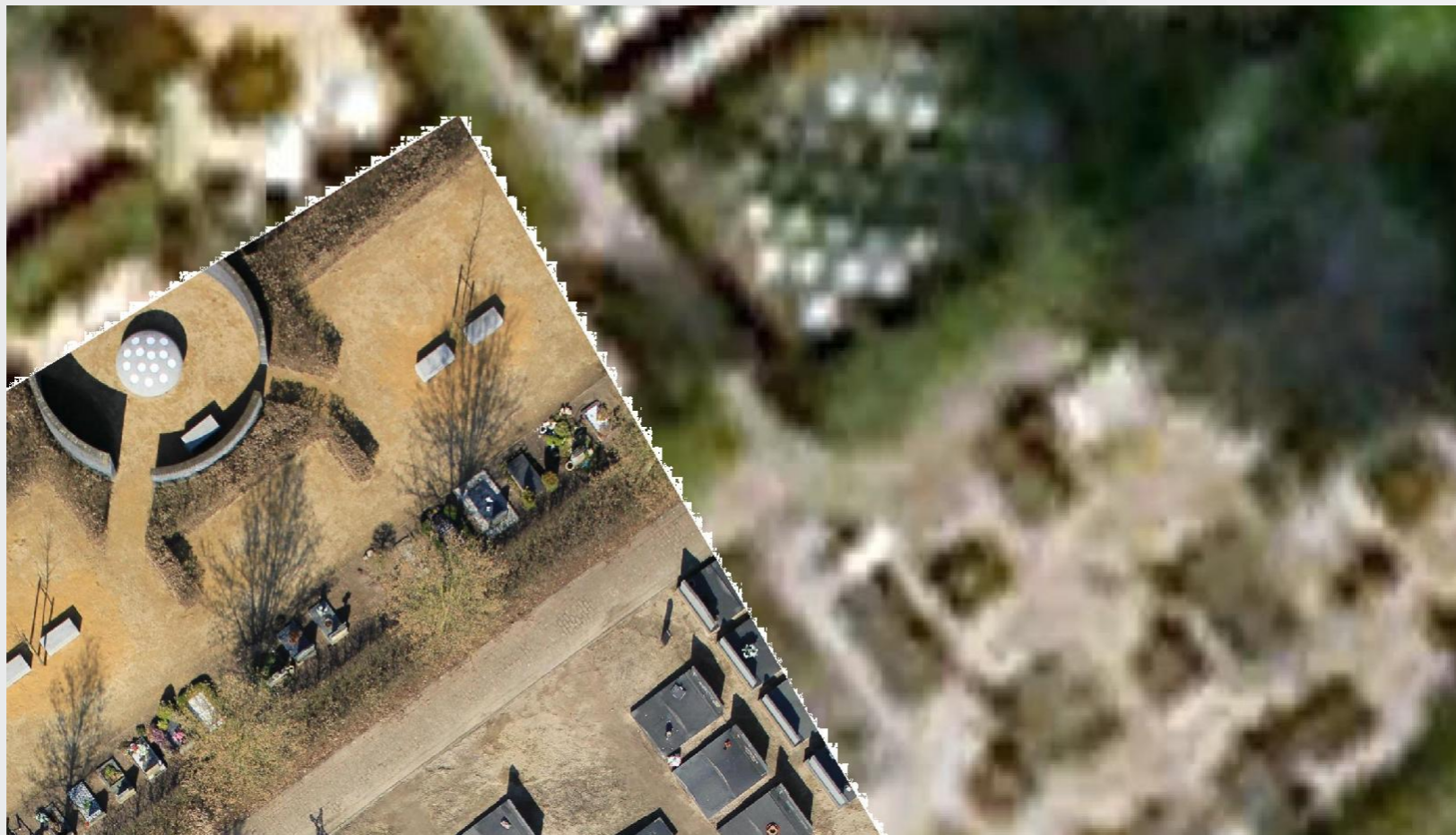
Can UAS technology compete with standard land surveying?

- (2) supporting both 2D mapping for topographic and cadastral purposes as well as 3D modelling of buildings and other constructions



Can UAS technology compete with standard land surveying?

- (3) high ground resolution or Ground Sample Distance (GSD) and surveying precision, which are limited for high altitude photogrammetry.



Can UAS technology compete with standard land surveying?

- Important Note: there is a big difference between nice visualizations and land surveying quality !
- Using modern UAS mapping technology, a resolution of 1cm and accuracy of 2cm is easy to achieve at a cost that is definitely competitive when compared with traditional methods of collecting data.
- Integrating this UAS system with specialized pre- and postflight software, that feeds the preprogrammed waypoint flight in a 'photogrammetry' way and adapts the postflight process on required image and flightlog data, results in a never seen high accuracy...

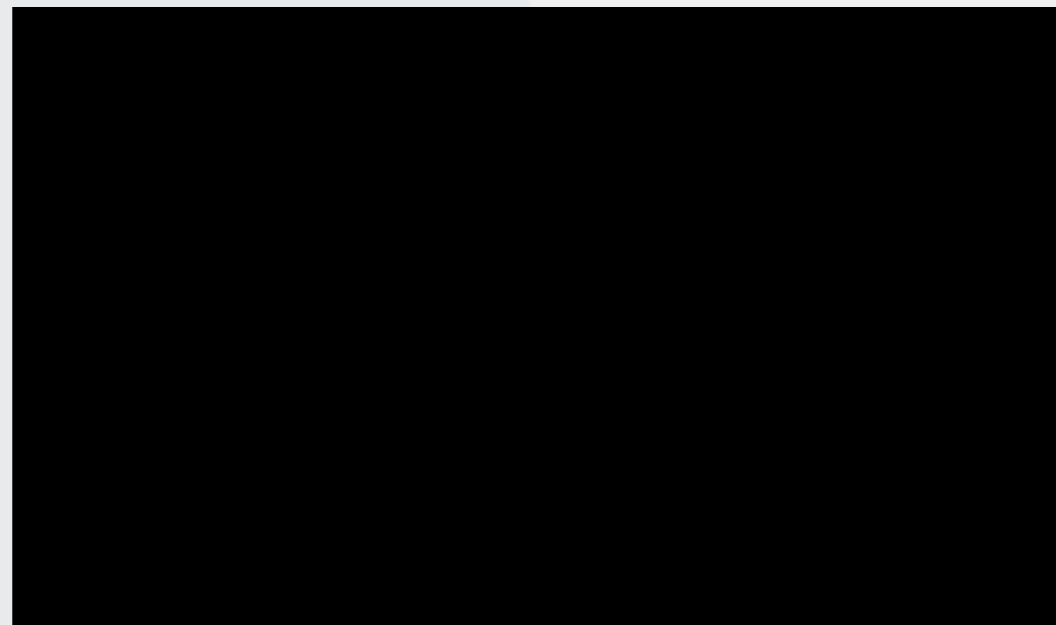


Orbit UAS Mapping Software

Orbit GeoSpatial Technologies

We Innovate, We Integrate

- Orbit GT bridges the gap between Airborne and Mobile Mapping, backed by over 45 years of experience in photogrammetry, cartography, spatial database management and geospatial processing. Products in photogrammetry and mobile mapping are sold worldwide.

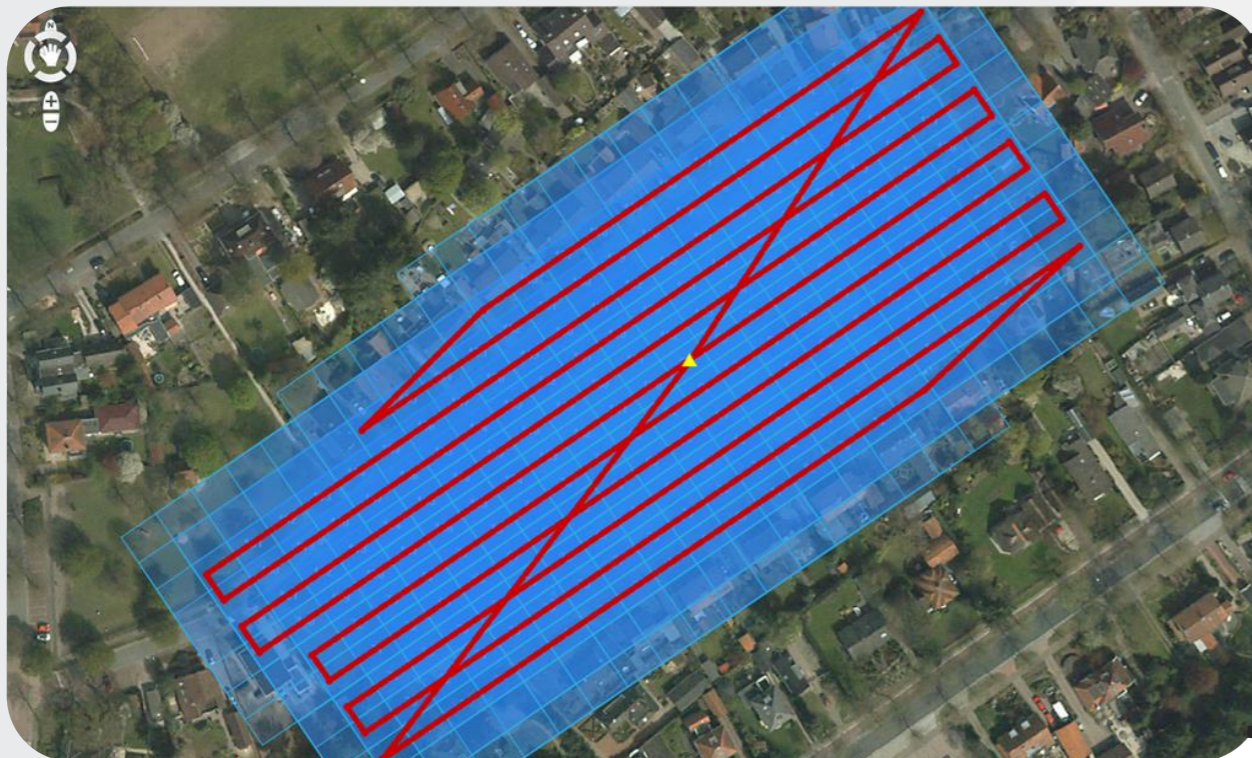


Facts...

- Topcon Europe Positioning (TEP) and Orbit GeoSpatial Technologies (Orbit GT) signed an agreement through which Topcon will resell Orbit GT's mobile mapping software solutions around the globe as a part of Topcon's leading IP-S2 portfolio.
- “Orbit UAS Mapping Solution delivers a degree of accuracy that is better than the norm of surveying on the ground. These results are above the expectations of our clients” (Cadastre The Netherlands)
- “Vietnamese governments has now started making updates to the cadastral map using Orbit UAS Mapping Solution.”

UAS Mapping Software

- The basis: a full stereo covered flight plan



UAS Mapping Software

- Professional software for 3D visualisation and high precision mappings...

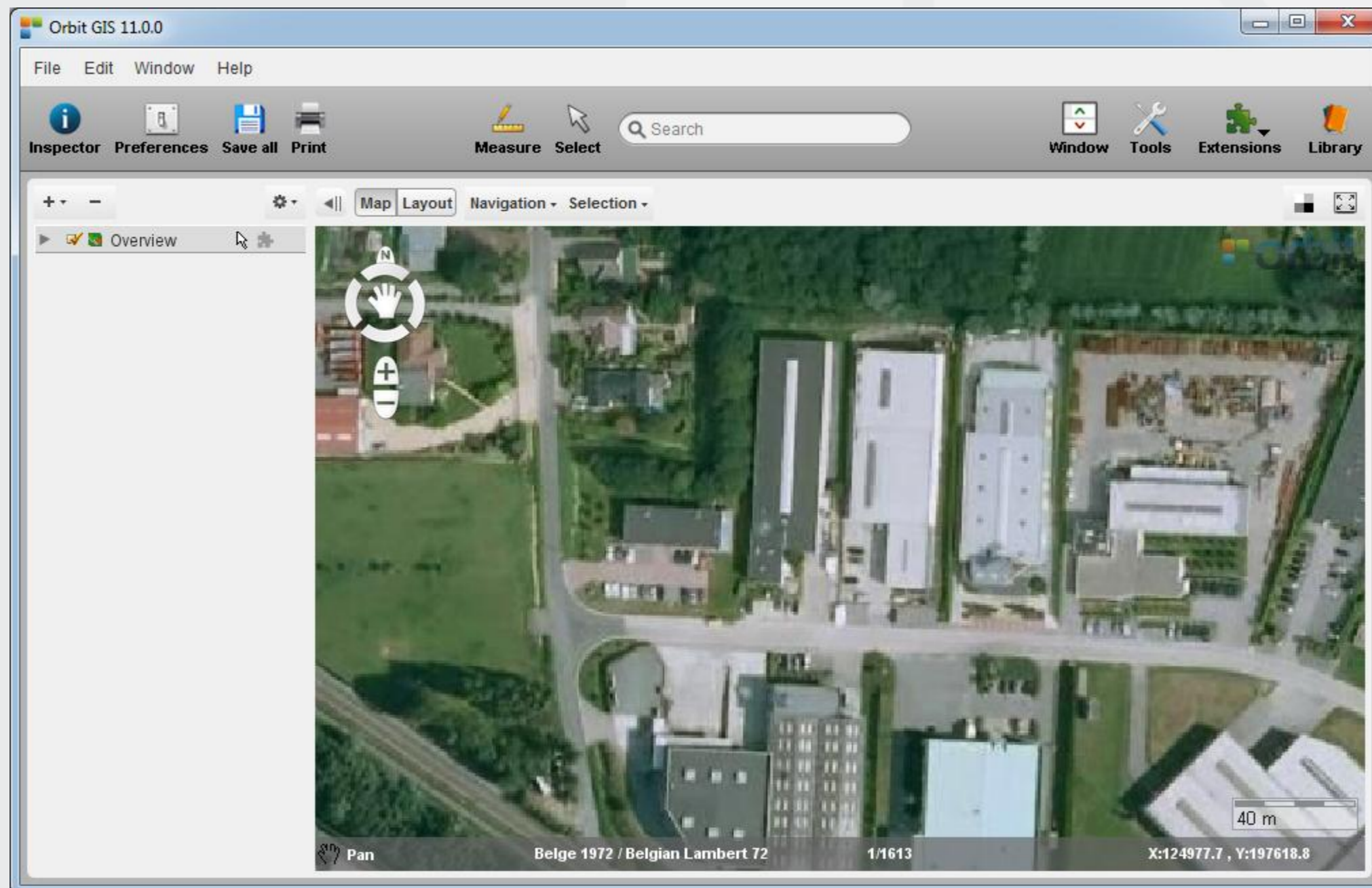




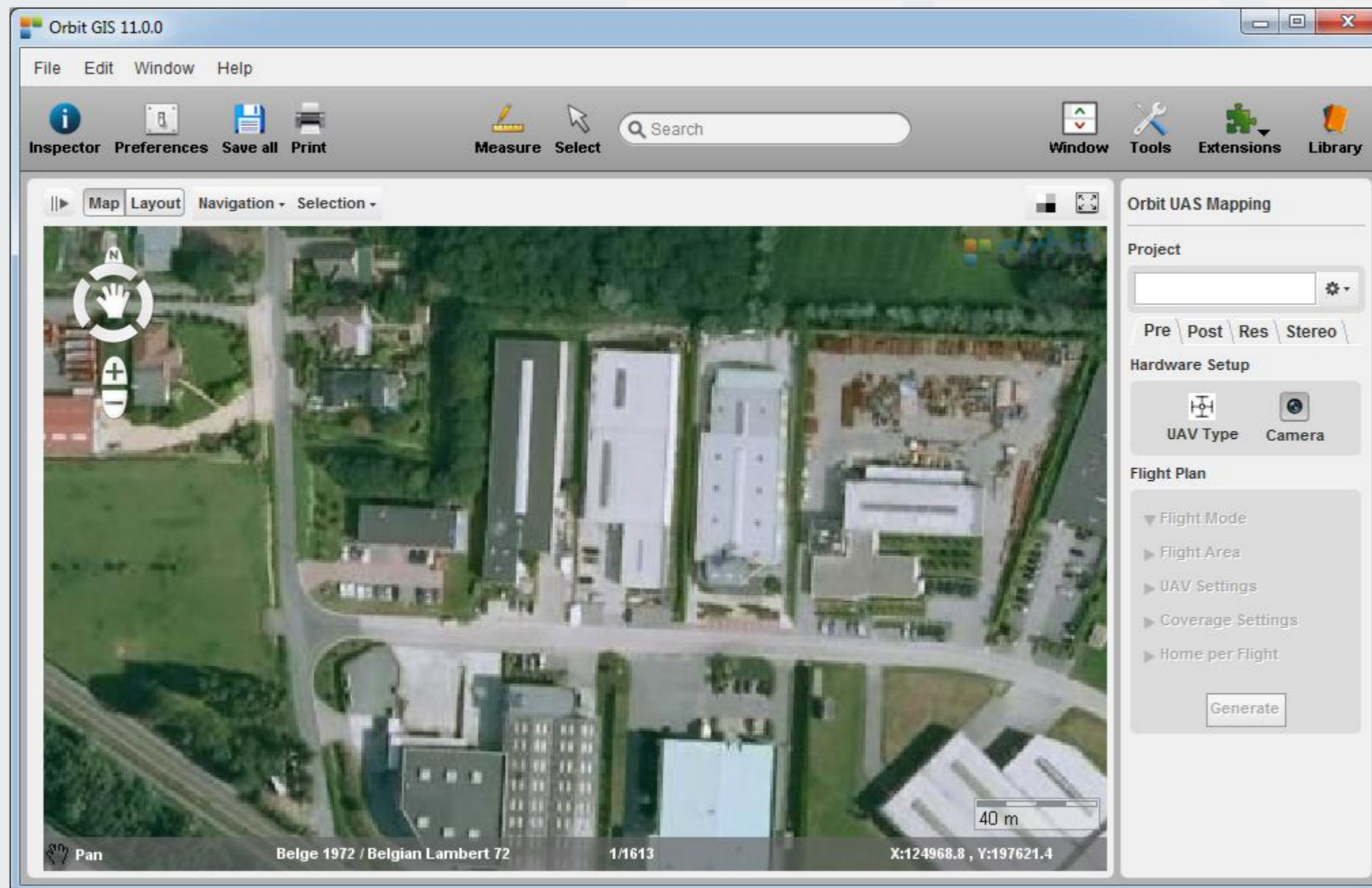
Orbit UAS Mapping Software

Planning your flight

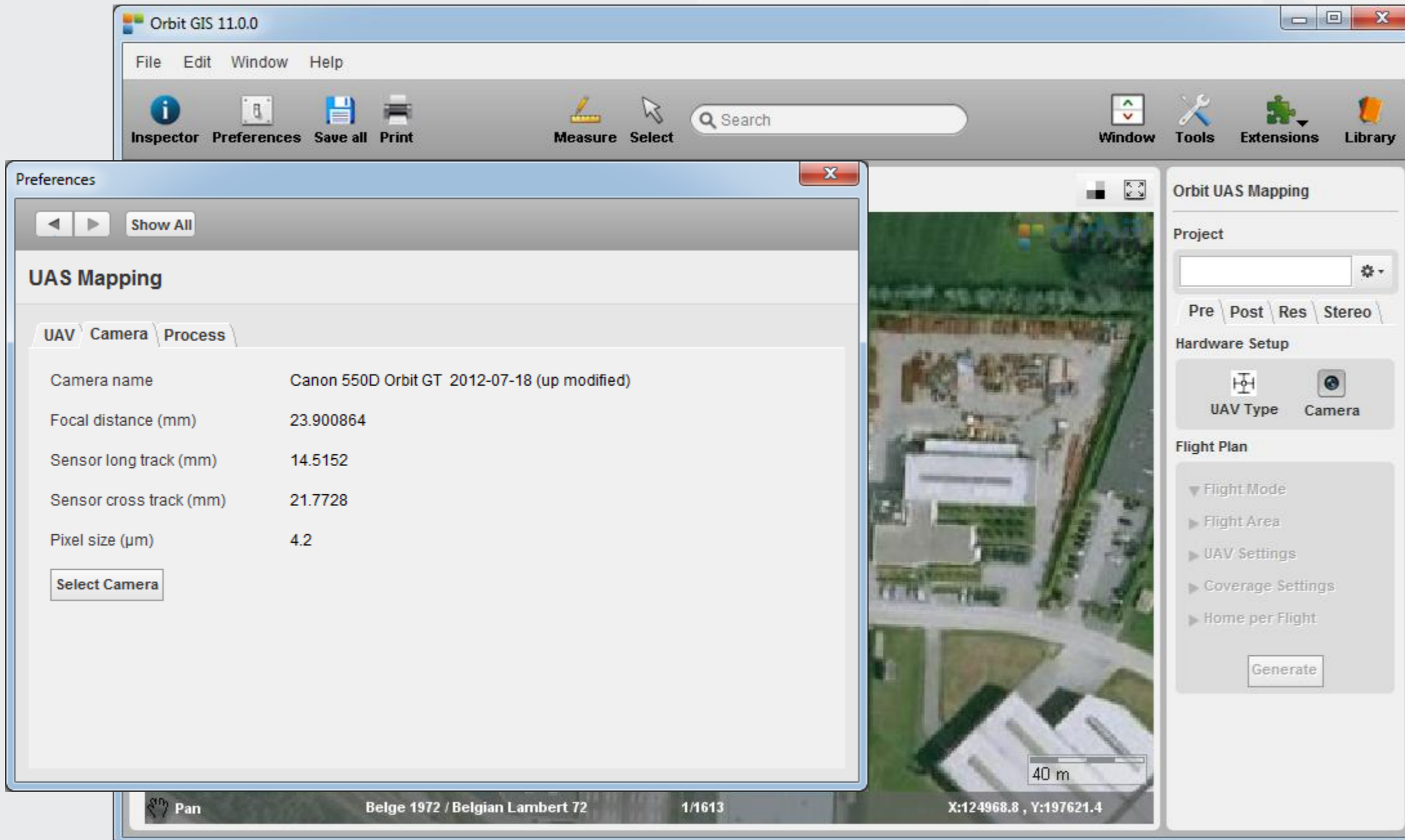
1. Import from Google, WMS, Local files, ...



1. Import from Google, WMS, Local files, ...



2. Choose your system & camera



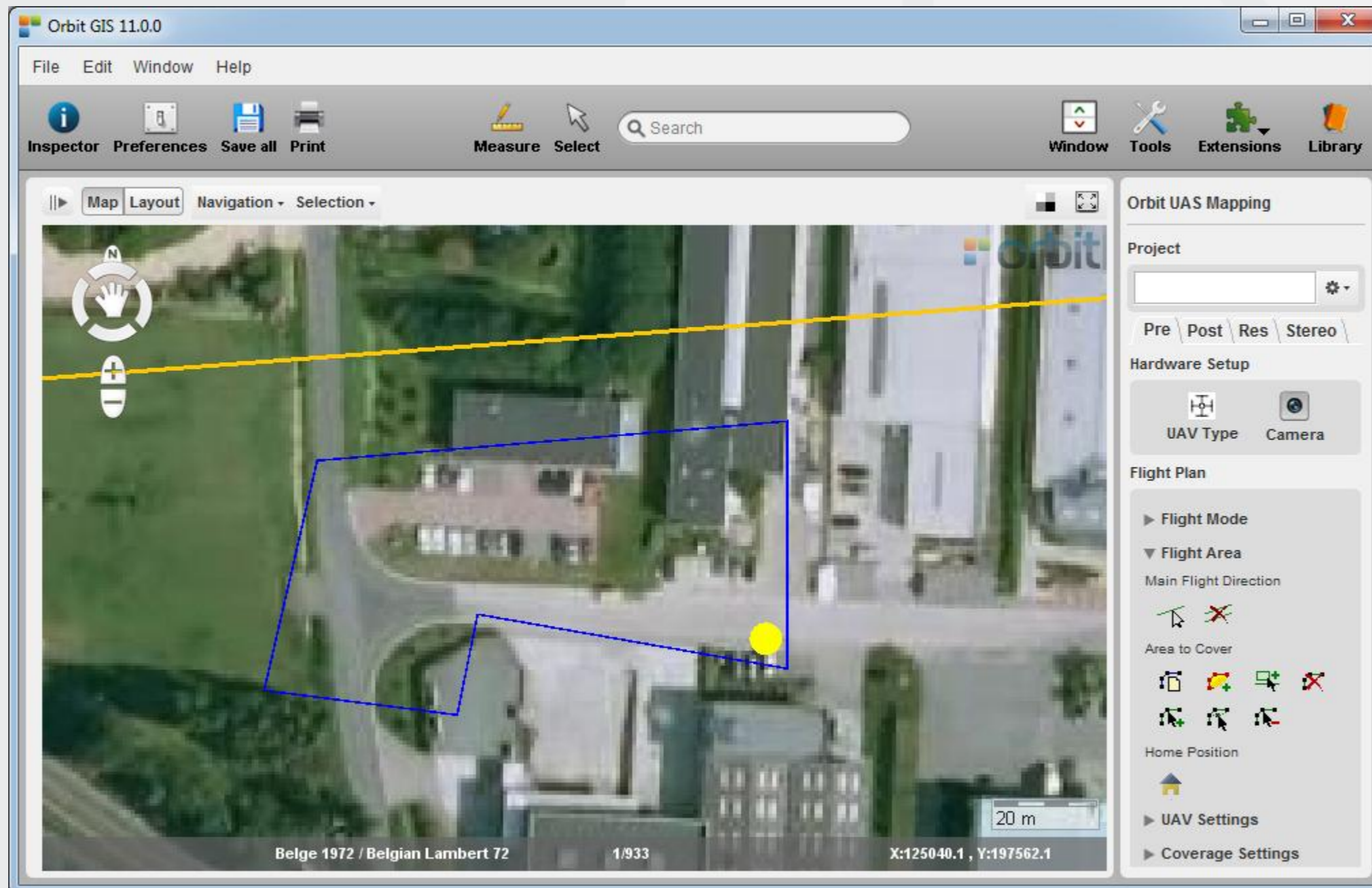
The screenshot displays the Orbit GIS 11.0.0 software interface. The main window shows an aerial map with a scale bar indicating 40 meters. The status bar at the bottom of the map area displays the following information: **Pan**, **Belge 1972 / Belgian Lambert 72**, **1/1613**, and **X:124968.8, Y:197621.4**.

The **Preferences** dialog box is open, showing the **UAS Mapping** section. It includes the following settings:

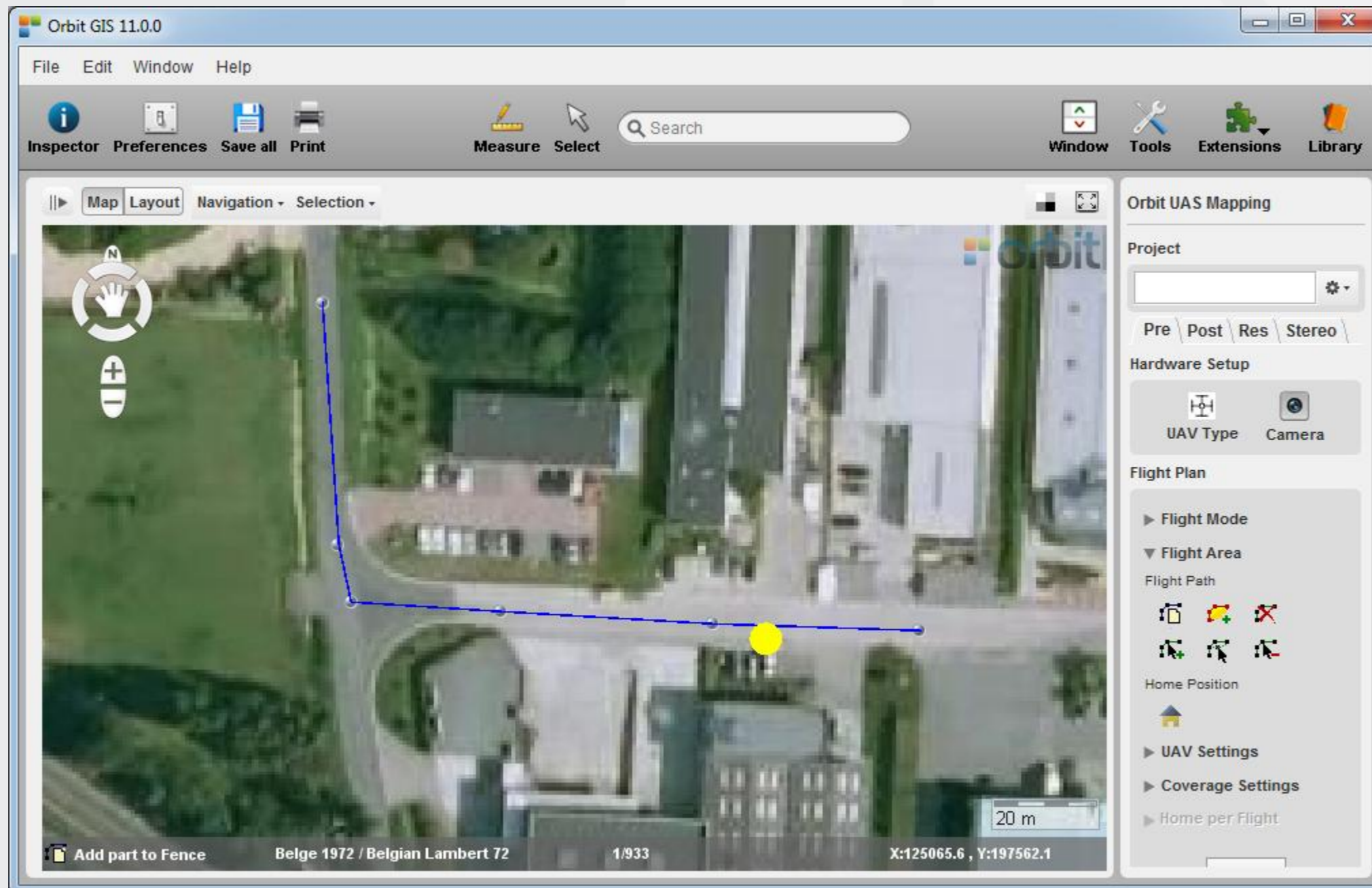
Parameter	Value
Camera name	Canon 550D Orbit GT 2012-07-18 (up modified)
Focal distance (mm)	23.900864
Sensor long track (mm)	14.5152
Sensor cross track (mm)	21.7728
Pixel size (µm)	4.2

Below the table is a **Select Camera** button. The right-hand side of the interface shows the **Orbit UAS Mapping** panel, which includes a **Project** field, **Pre** | **Post** | **Res** | **Stereo** options, **Hardware Setup** (with **UAV Type** and **Camera** icons), and a **Flight Plan** section with expandable options: **Flight Mode**, **Flight Area**, **UAV Settings**, **Coverage Settings**, and **Home per Flight**. A **Generate** button is located at the bottom of the Flight Plan section.

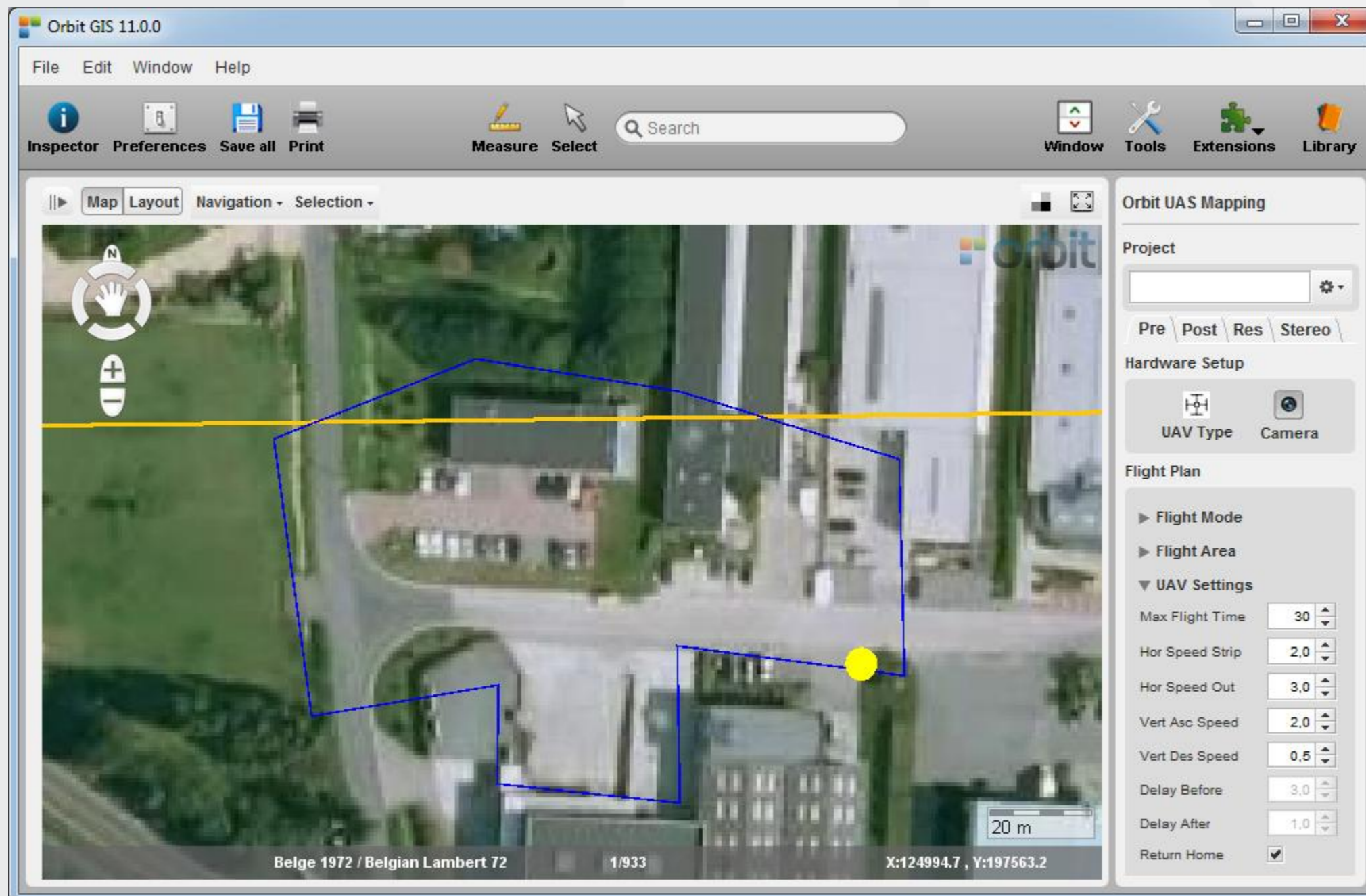
3a. Create area and flight direction for area coverage



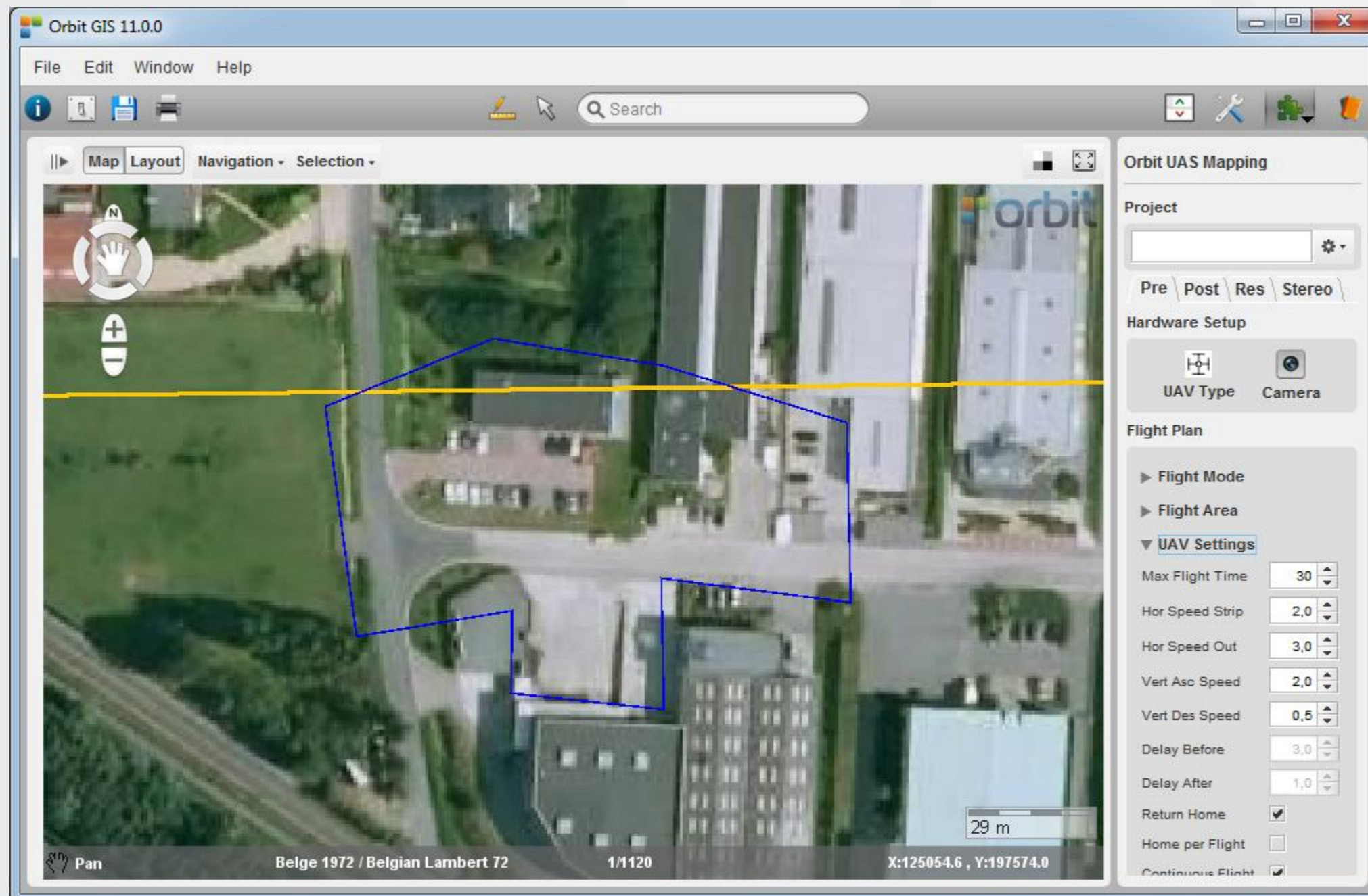
3b. Or create a line, set home for a linear flight



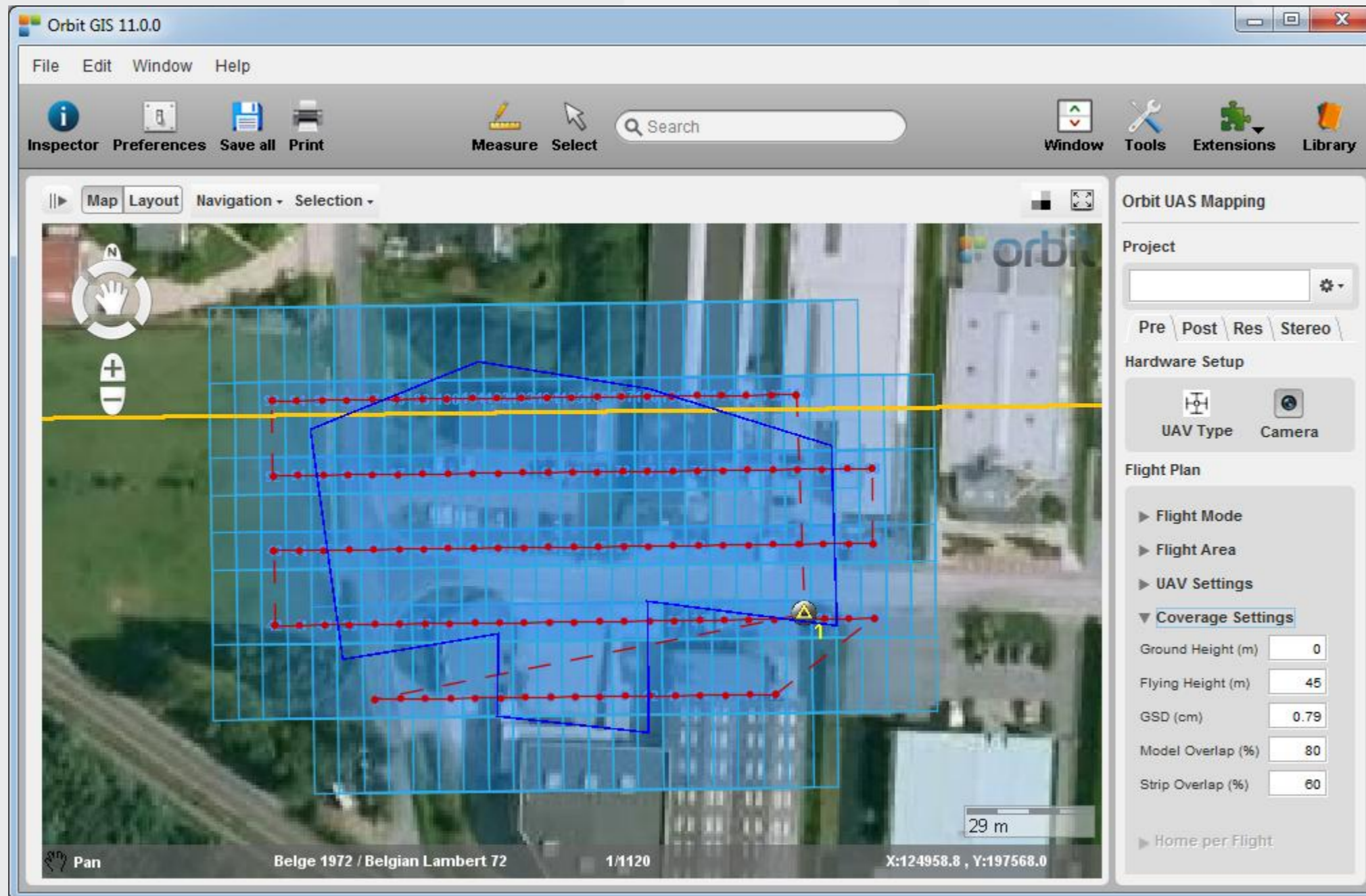
4. UAV settings: set speed, battery limits, ...



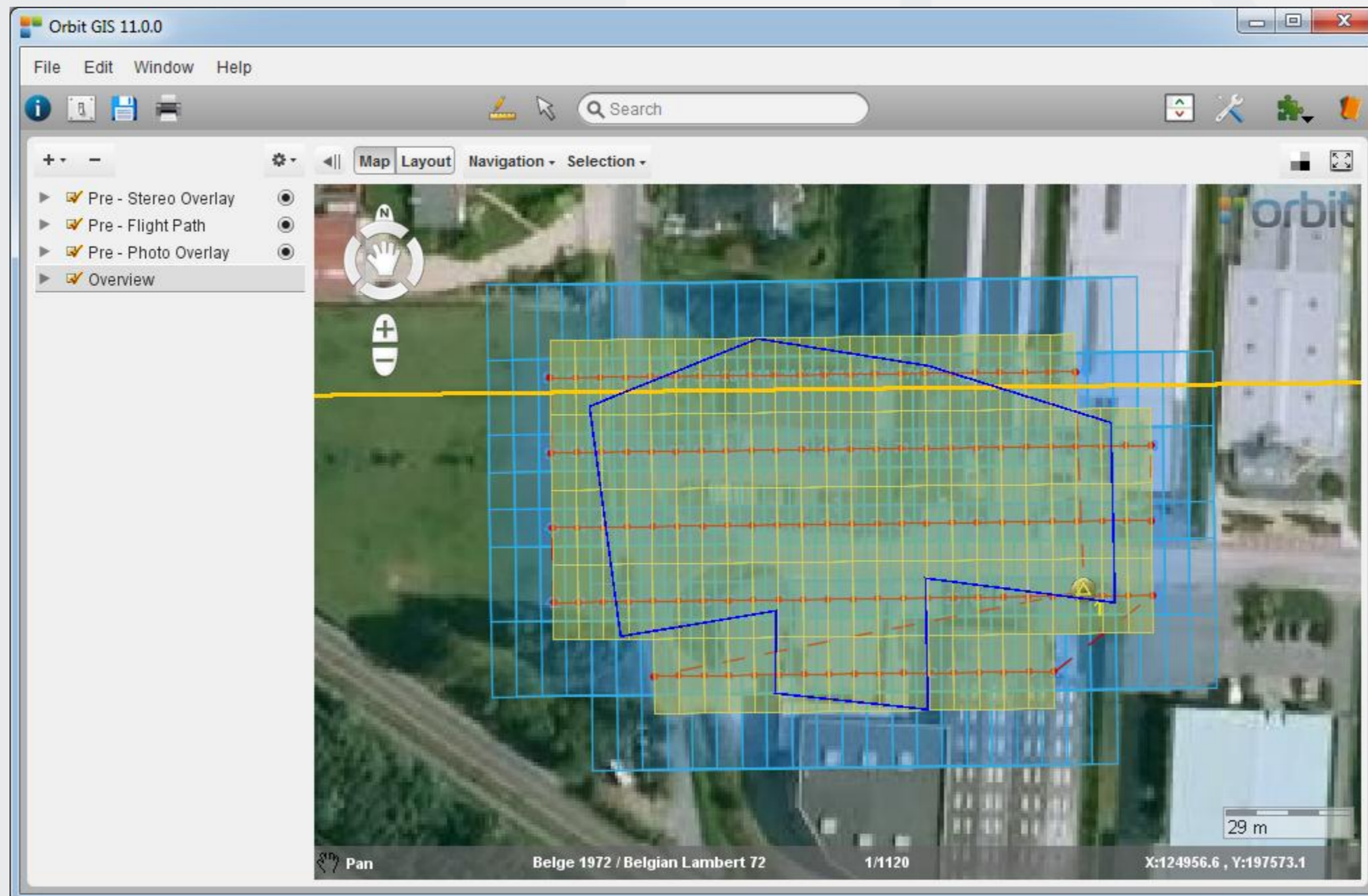
5. Coverage settings: set height, overlap, ...



6. Generate, save, and export to your system



6. Generate, save, and export to your system

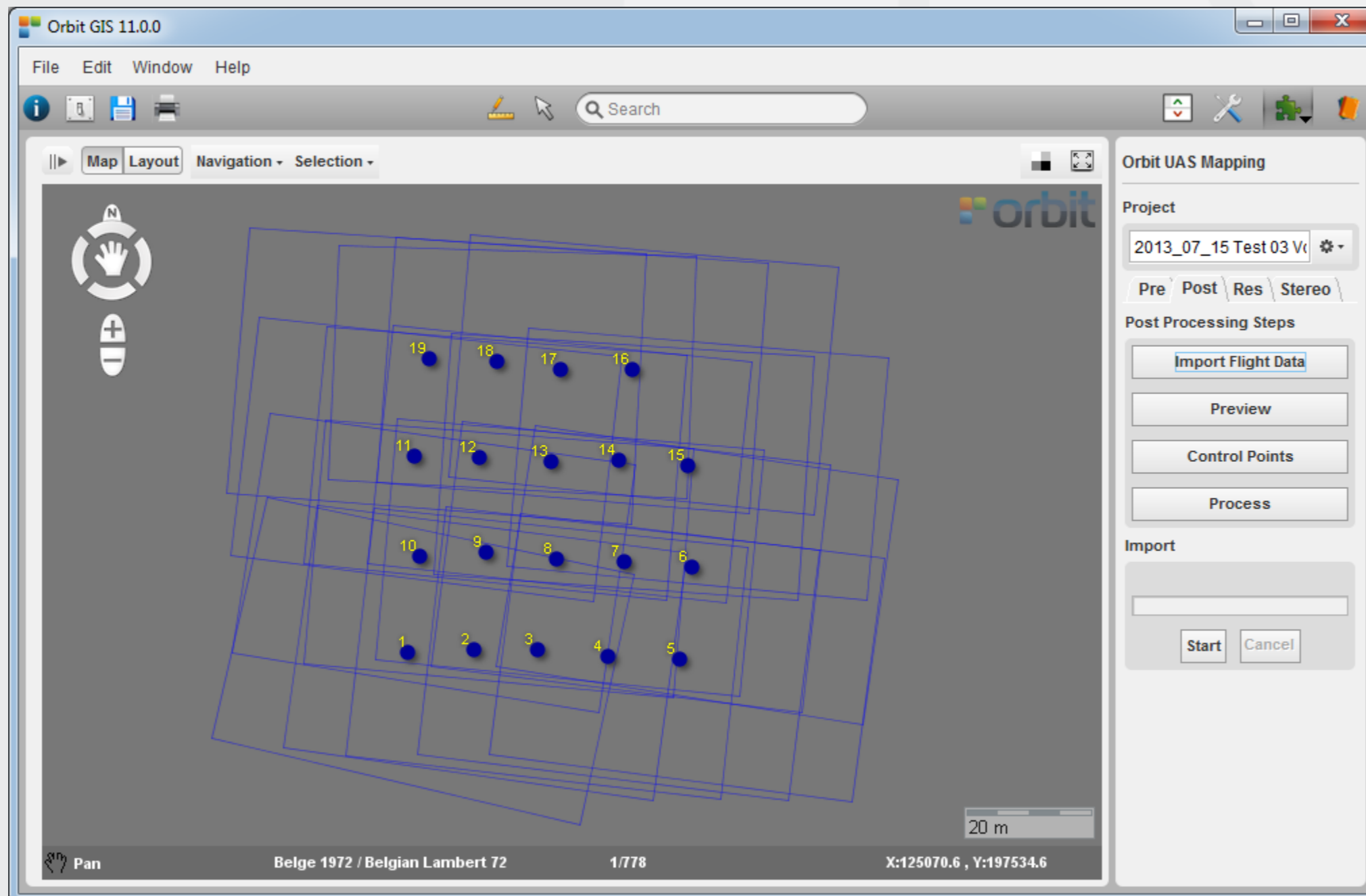




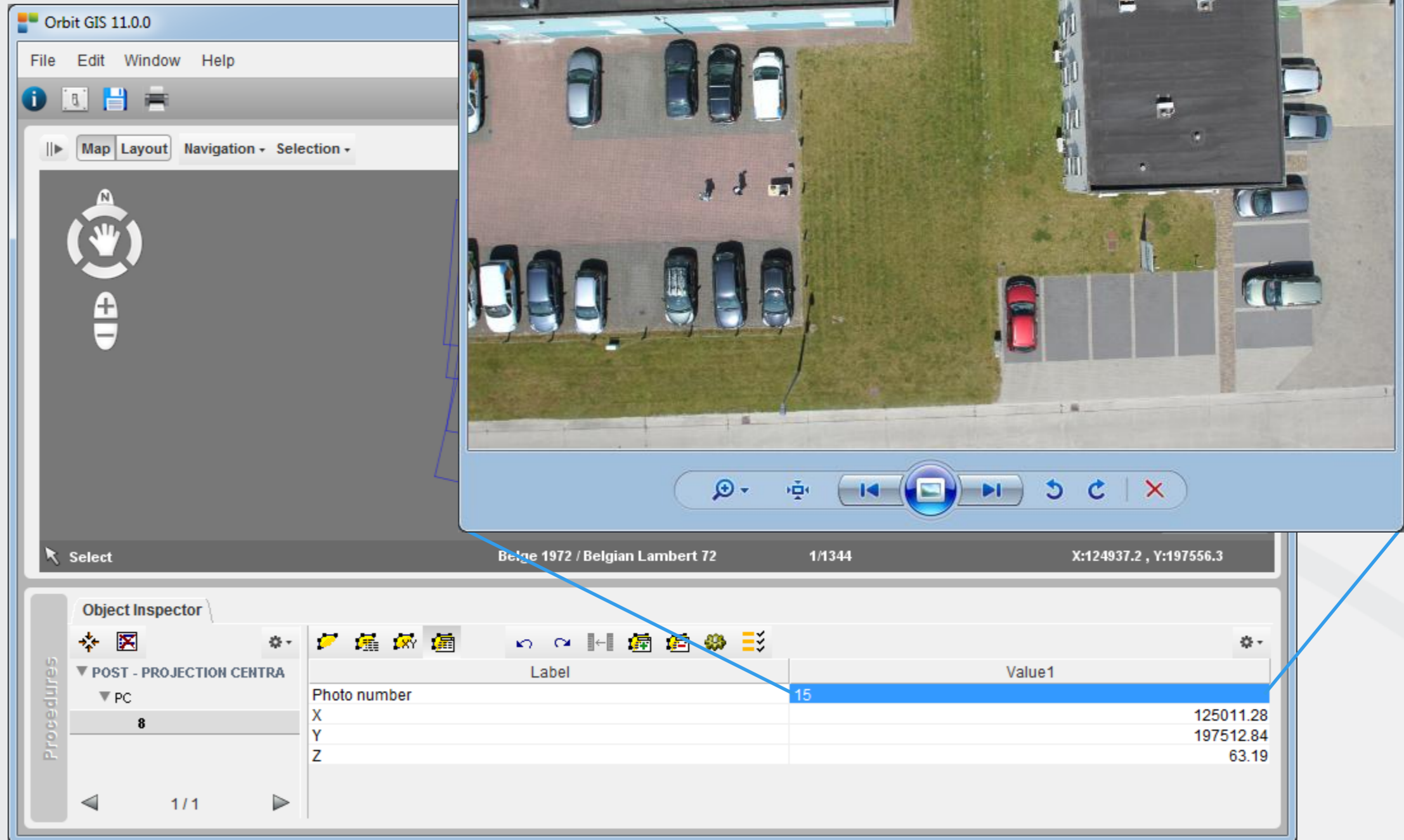
Orbit UAV Mapping Solution

Postprocessing

1. Import Flight Data



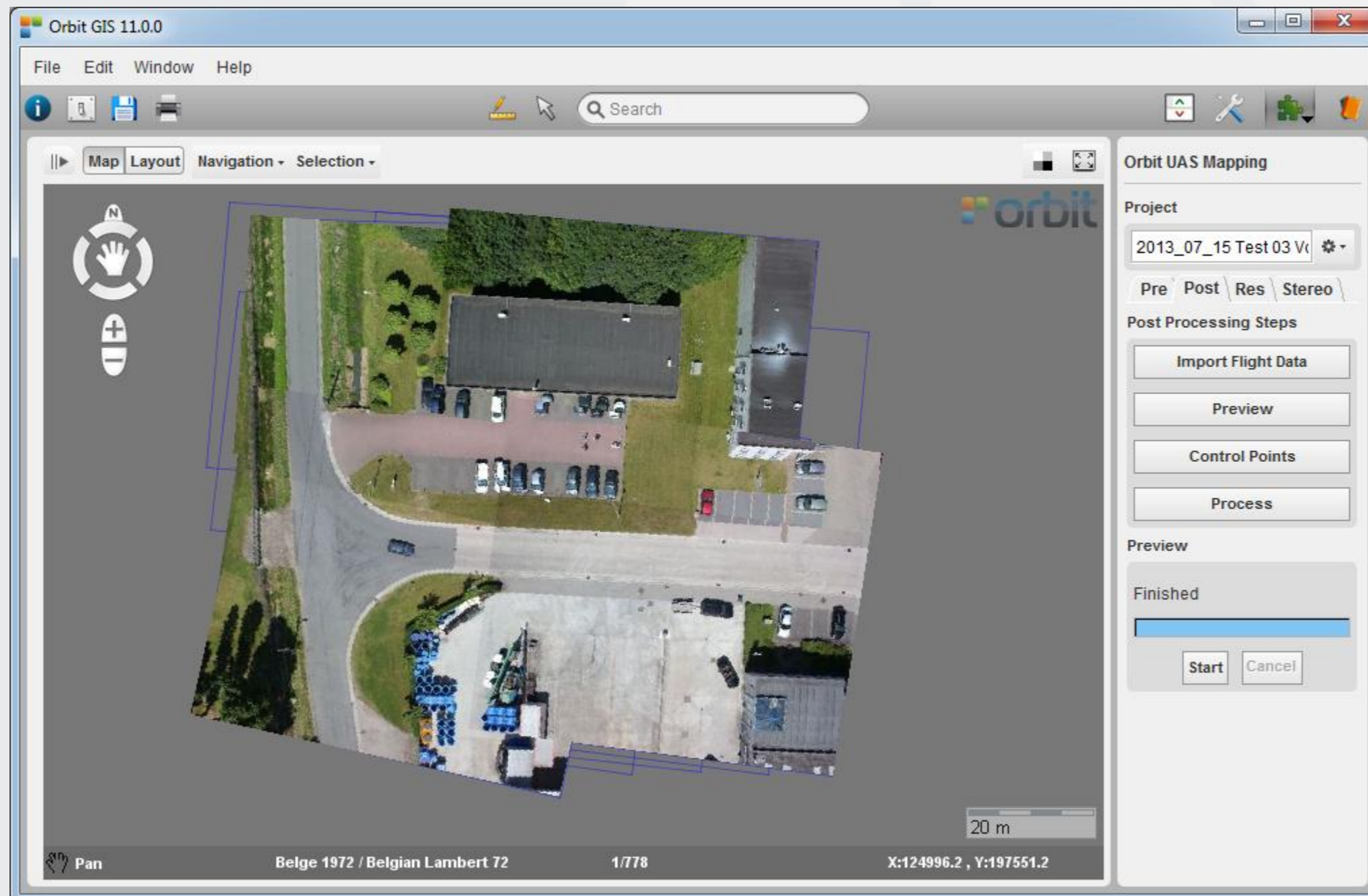
1. Check data via ob

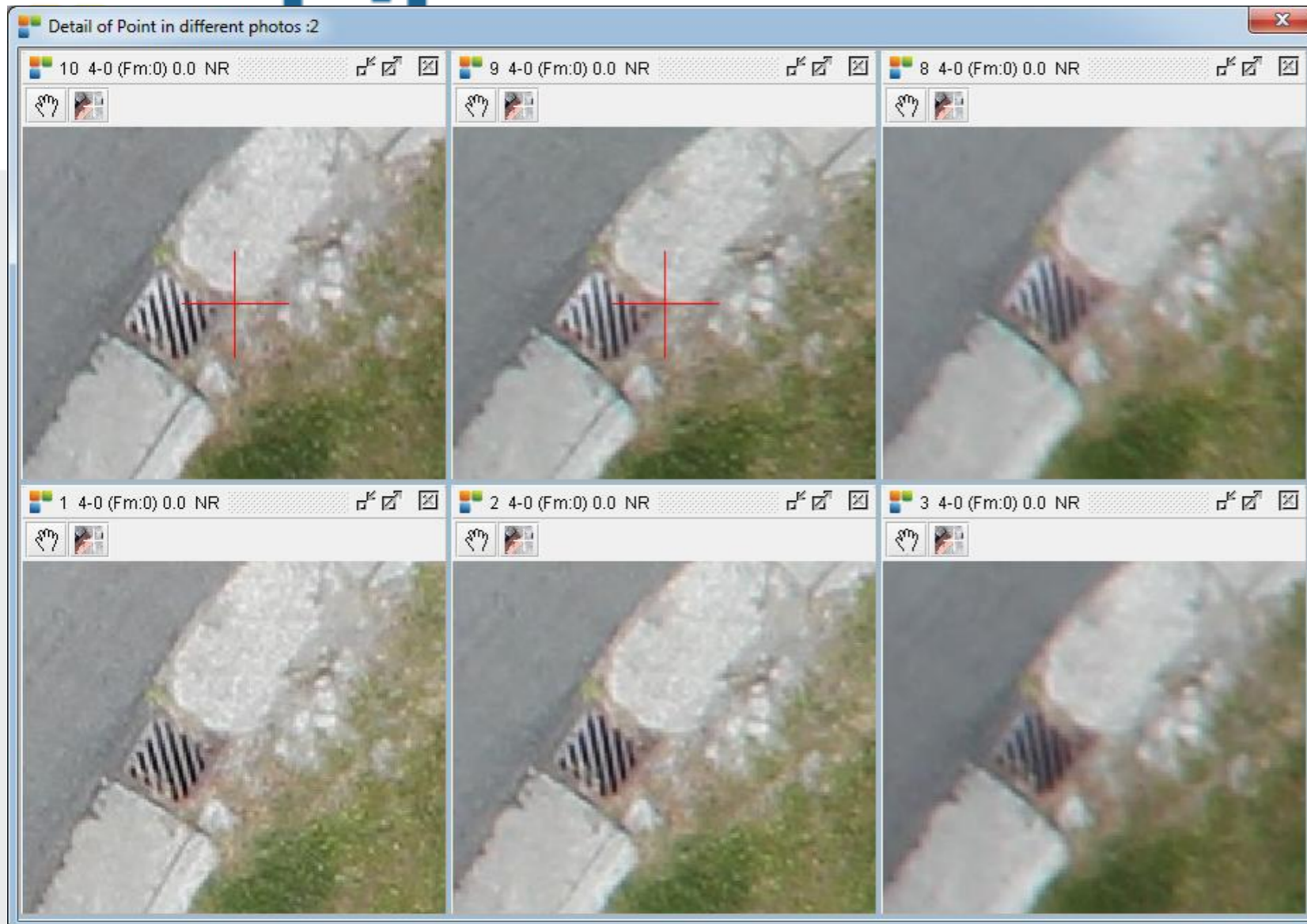


The screenshot shows the Orbit GIS 11.0.0 interface. A '15.jpg - Windows Photo Viewer' window is open, displaying an aerial photograph of a building and parking lot. The photo viewer has a menu bar with 'Bestand', 'Afdrukken', 'E-mail', 'Branden', and 'Openen'. Below the photo is a toolbar with zoom, pan, and navigation icons. The main GIS window shows a map area with a status bar at the bottom indicating 'Belge 1972 / Belgian Lambert 72', '1/1344', and coordinates 'X:124937.2, Y:197556.3'. The 'Object Inspector' panel at the bottom displays a table with the following data:

Label	Value1
Photo number	15
X	125011.28
Y	197512.84
Z	63.19

1. Check data via preview





Orbit UAS Mapping

Project: 2013_07_15 Test 03 V...

Pre | Post | Res | Stereo

Post Processing Steps: ...

Control Points

Name	E	M
1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Focus Measure

Name: 4

X (m): 124999.61

Y (m): 197491.32

Z (m): 5.19

Type: XYZ

Enabled:

3. Process...

The screenshot displays the Orbit GIS 11.0.0 interface with the 'Preferences' dialog box open. The dialog is titled 'UAS Mapping' and has three tabs: 'UAV', 'Camera', and 'Process'. The 'Process' tab is selected, showing the following settings:

- Import**
 - Reset Omega and Phi on Import:
 - Extend Strip Overlap Model:
- Detection and Matching**
 - Number of Detected Features: Low
 - Filter Method (Matching): Fund. Matrix
 - Search for Multi Ray Tiepoints:
 - Ratio for Multi Ray Matching: 0.5
- Bundle Adjustment**
 - PC's Calculation Capacity: Low
 - Refine Result:
 - Auto Calibrate Camera:
- DSM and Contours**
 - Generate High-Dense DSM (Sure):
 - DSM Density (Regular Grid) (m): 10.0
 - Generate Topview DSM:
 - Generate TIN:
 - Generate Contours:
 - Contour Step (m): 5.0
- Ortho**
 - Ortho PixelSize (m): 0.05

The background map shows a grid of flight paths with 15 numbered points (1-15) indicating the locations of the photos. The map is titled 'Belge 1972 / Belgian Lambert 72' with a scale of 1/778 and coordinates X:124961.4, Y:197555.8. A 20m scale bar is visible at the bottom right of the map area.

3


Orbit Adjustment Report: x

file:///G:/Voshol/3_postflight_data/report/Report.html

4	124999.6100	197491.3200	5.1900	-0.0049	0.0054	-0.0355
5	125014.4400	197473.1200	5.2400	0.0018	0.0000	-0.0243
6	125018.8700	197490.2700	5.1800	-0.0041	-0.0070	0.0300

[Results orthophoto creation](#)

orthophoto creation:	yes
orthophoto pixelsize:	0.015 m
orthophoto image format:	omi
orthophoto image size:	56833 kB



Orbit UAS Mapping

Project
2013_07_15 Test 03 V [gear icon]

Pre | Post | Res | Stereo

Post Processing Steps
...

Process
Start Cancel

Detection
[input field]

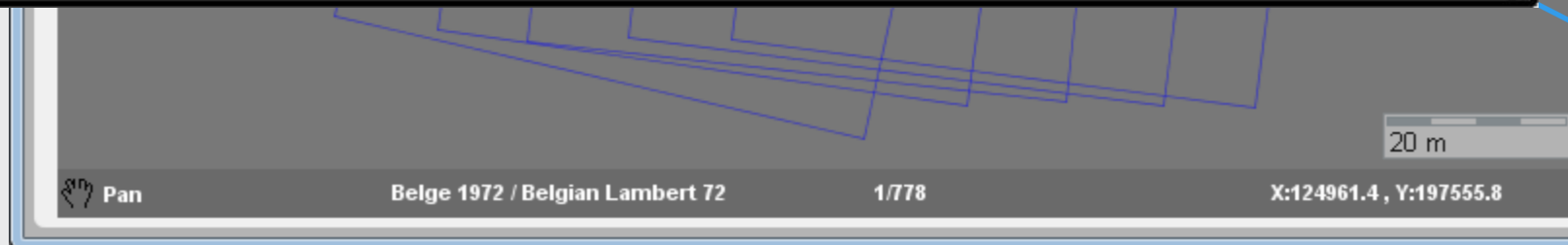
Matching
[input field]

Bundle Adjustment
[input field]

DSM Creation
[input field]

Ortho Creation
[input field]

View Report



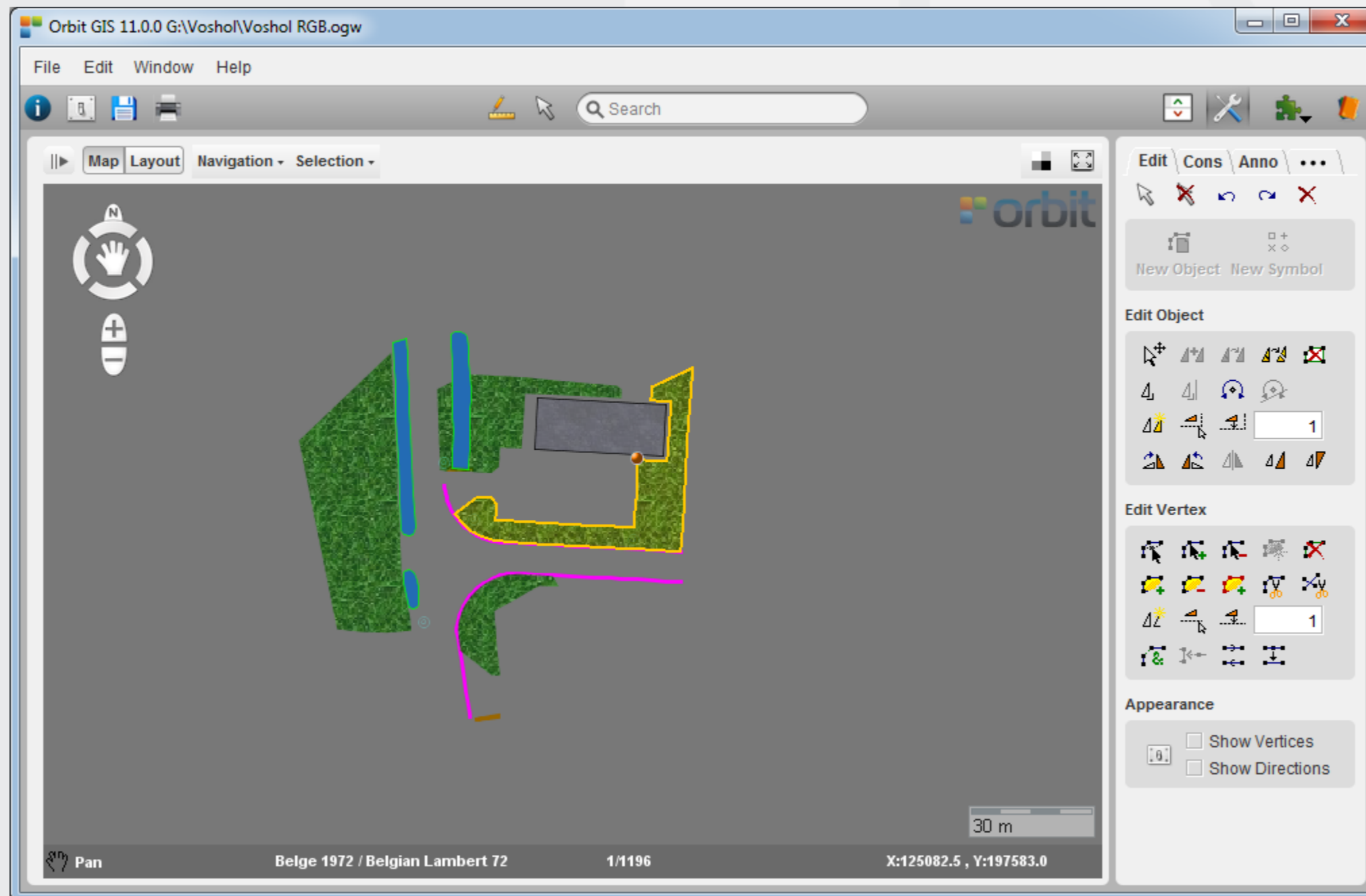
Pan Belge 1972 / Belgian Lambert 72 1/778 X:124961.4, Y:197555.8



Orbit UAS Mapping Software

*Results: integrated in GIS
Stereo Mapping Workflow*

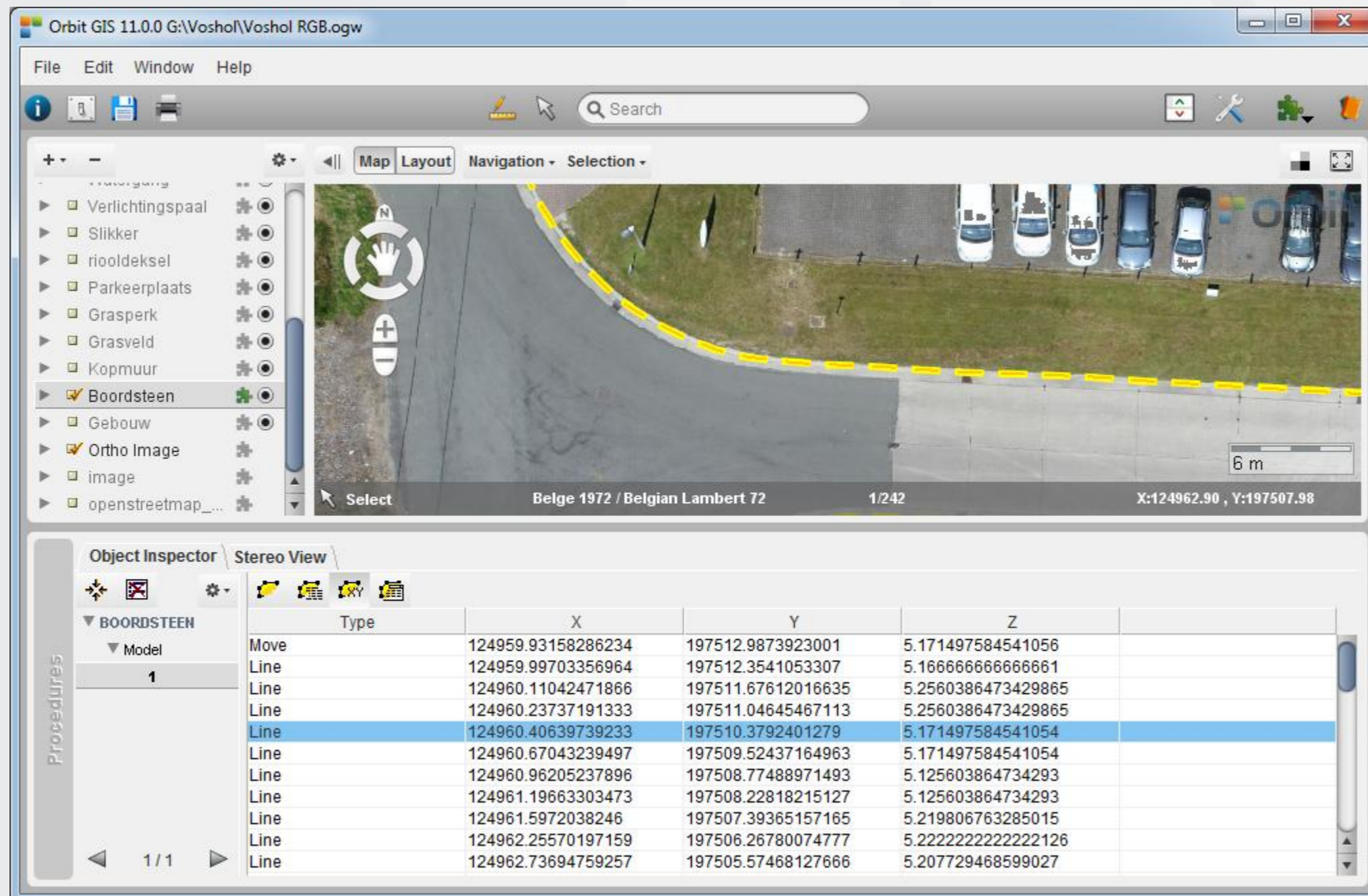
3. Process... -- orthophoto for 2D GIS mapping



3. Process... -- export: file or print



4. Process... -- stereo project for 3D GIS mapping



Orbit GIS 11.0.0 G:\Voshol\Voshol RGB.ogw

File Edit Window Help

Search

Map Layout Navigation Selection

Verlichtingspaal
Slikker
riooldeksel
Parkeerplaats
Grasperk
Grasveld
Kopmuur
Boordsteen
Gebouw
Ortho Image
image
openstreetmap_...

Select

Belge 1972 / Belgian Lambert 72 1/242 X:124962.90, Y:197507.98

6 m

Object Inspector Stereo View

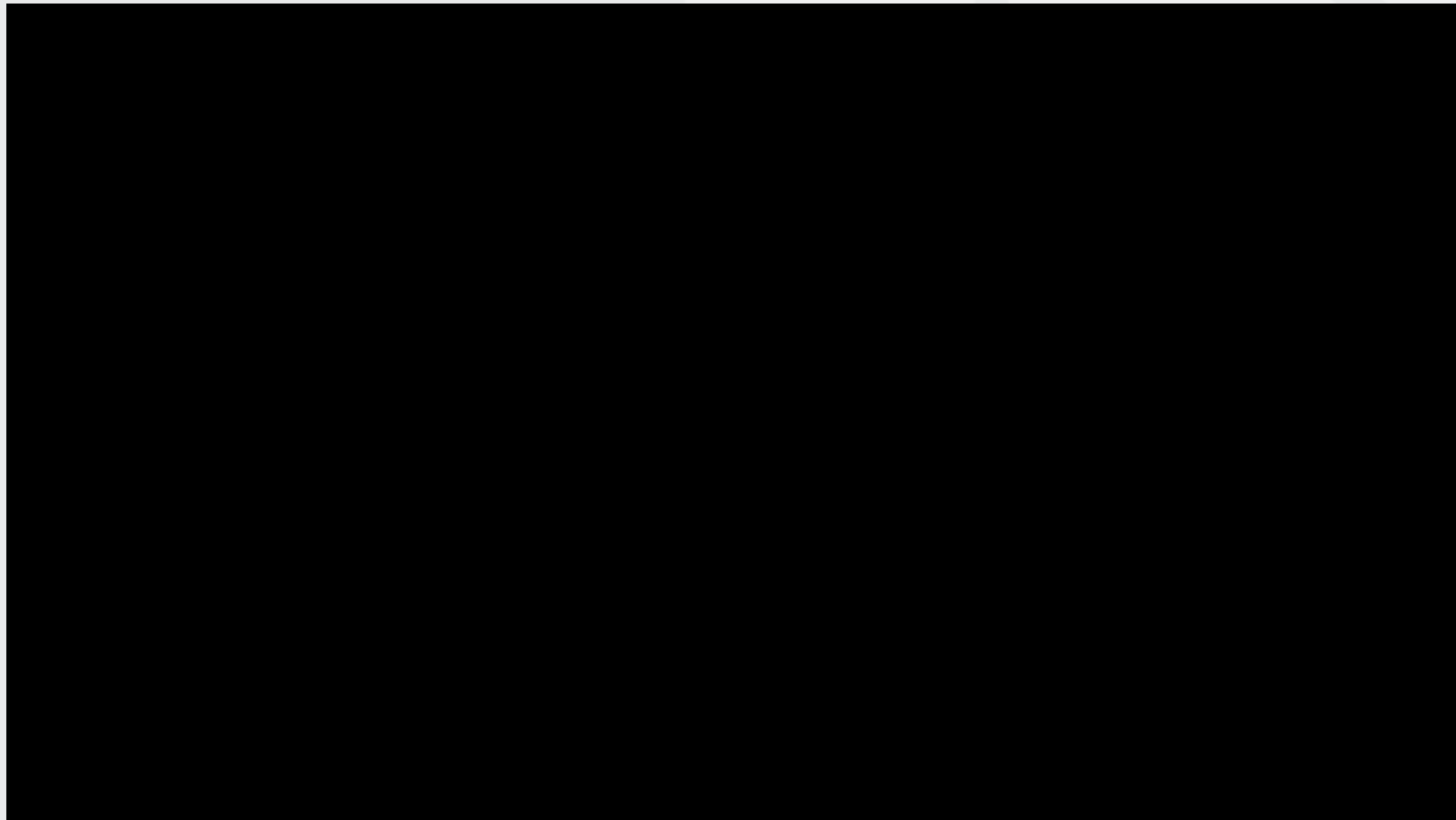
BOORDSTEEN

Model

1

Type	X	Y	Z
Move	124959.93158286234	197512.9873923001	5.171497584541056
Line	124959.99703356964	197512.3541053307	5.166666666666661
Line	124960.11042471866	197511.67612016635	5.2560386473429865
Line	124960.23737191333	197511.04645467113	5.2560386473429865
Line	124960.40639739233	197510.3792401279	5.171497584541054
Line	124960.67043239497	197509.52437164963	5.171497584541054
Line	124960.96205237896	197508.77488971493	5.125603864734293
Line	124961.19663303473	197508.22818215127	5.125603864734293
Line	124961.5972038246	197507.39365157165	5.219806763285015
Line	124962.25570197159	197506.26780074777	5.2222222222222126
Line	124962.73694759257	197505.57468127666	5.207729468599027

4. Process... -- HD pointcloud for 3D GIS mapping





Orbit UAV Mapping Solution

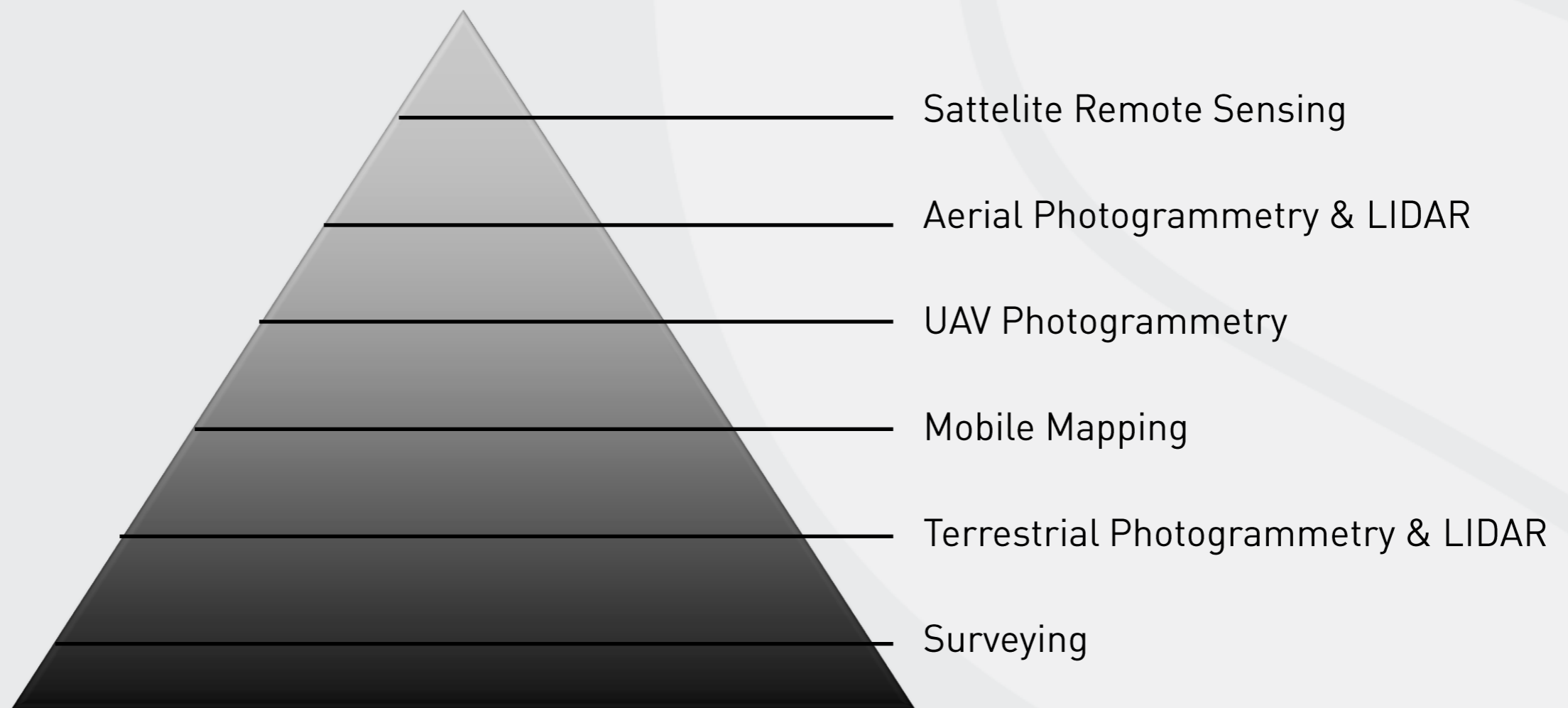
Conclusions

Conclusion: Orbit UAS Mapping Software

- Professional photogrammetric pre- and postflight software
- Full automated procedures (triangulation, dtm, volume calculation, ortho generation, ...)
- 2D and 3D GIS mapping in stereo, pointcloud, or on orthophoto
- Integrated in GIS, and other Orbit extensions to cover the whole workflow

Conclusion: Can UAS compete with land survey?

- Yes... but take into account:





GEOSPATIAL TECHNOLOGIES

Thanks for your attention.

Contact: www.orbitgis.com

More information: www.orbitgis.com

