Quality Report

Generated with Pix4Dmapper version 4.5.6

Important: Click on the different icons for:

Help to analyze the results in the Quality Report

Additional information about the sections

Click here for additional tips to analyze the Quality Report

Summary

Project	Eskil1
Processed	2021-03-04 09:48:24
Camera Model Name(s)	FC6310R_8.8_5472x3648 (RGB)
Average Ground Sampling Distance (GSD)	1.67 cm / 0.66 in
Area Covered	0.020 km^2 / 2.0178 ha / 0.01 sq. mi. / 4.9887 acres

Quality Check

Images	median of 65639 keypoints per image	✓
Dataset	51 out of 51 images calibrated (100%), all images enabled	✓
Camera Optimization	0.62% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 33808.4 matches per calibrated image	✓
Georeferencing	yes, 4 GCPs (4 3D), mean RMS error = 0.008 m	✓

Preview

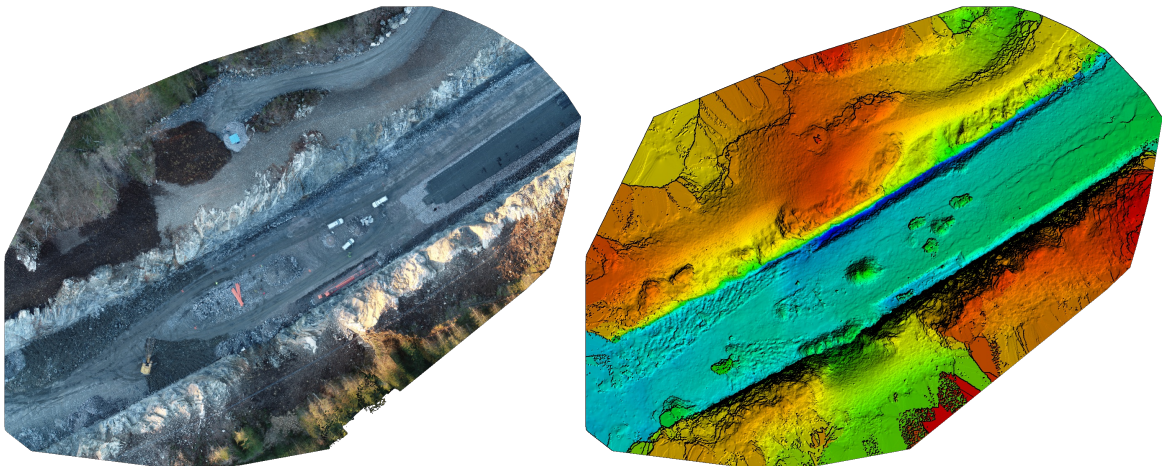


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	51 out of 51
Number of Geolocated Images	51 out of 51

Initial Image Positions

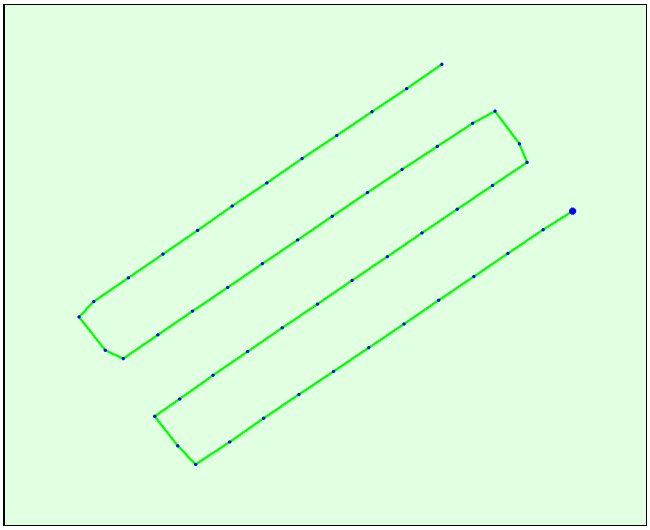


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

Computed Image/GCPs/Manual Tie Points Positions

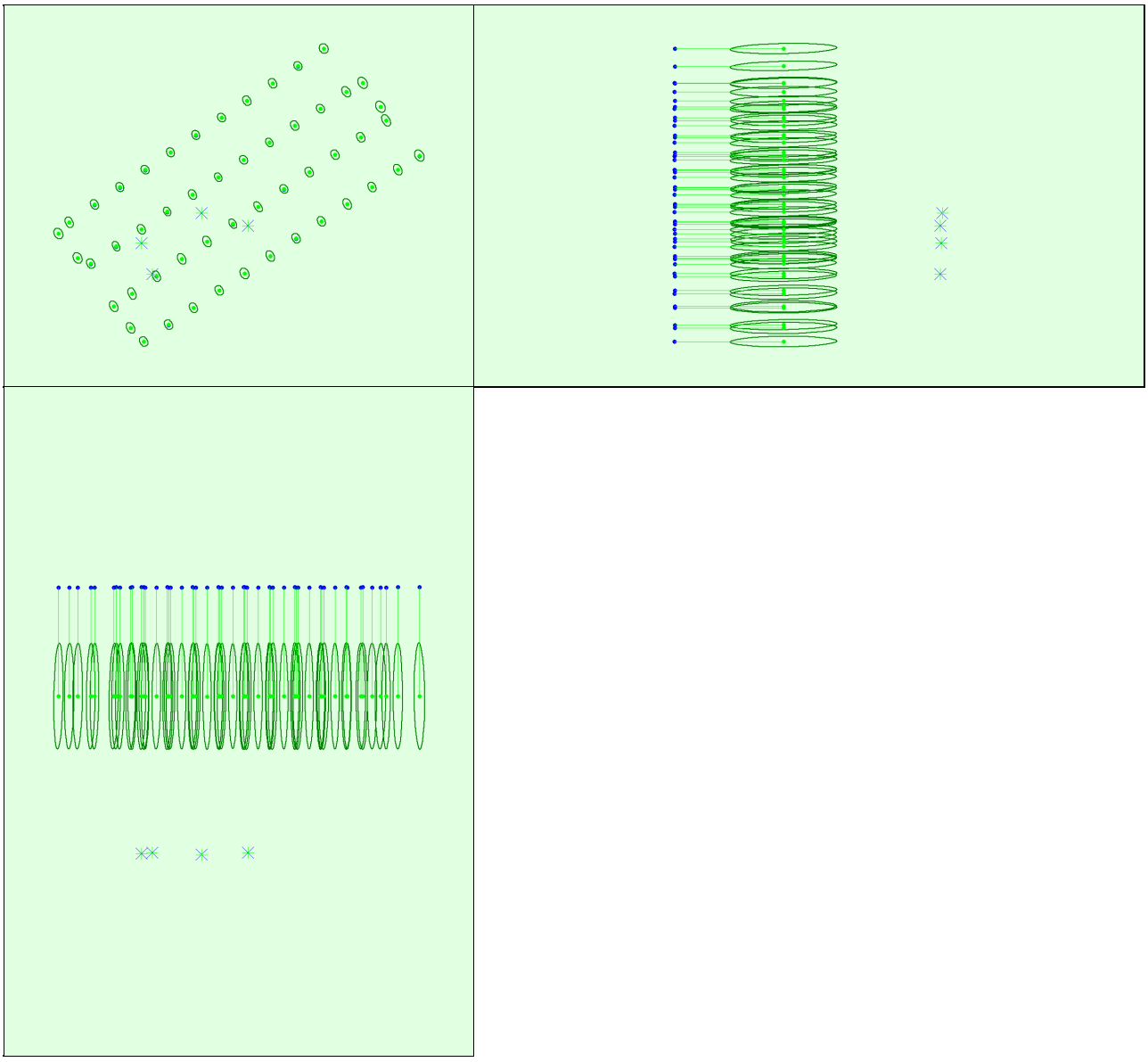


Figure 3: Offset between initial (blue dots) and computed (green dots) image positions as well as the offset between the GCPs initial positions (blue crosses) and

their computed positions (green crosses) in the top-view (XY plane), front-view (XZ plane), and side-view (YZ plane). Dark green ellipses indicate the absolute position uncertainty of the bundle block adjustment result.

Absolute camera position and orientation uncertainties

	X [m]	Y [m]	Z [m]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.002	0.002	0.020	0.002	0.002	0.001
Sigma	0.000	0.000	0.000	0.000	0.000	0.000

Overlap

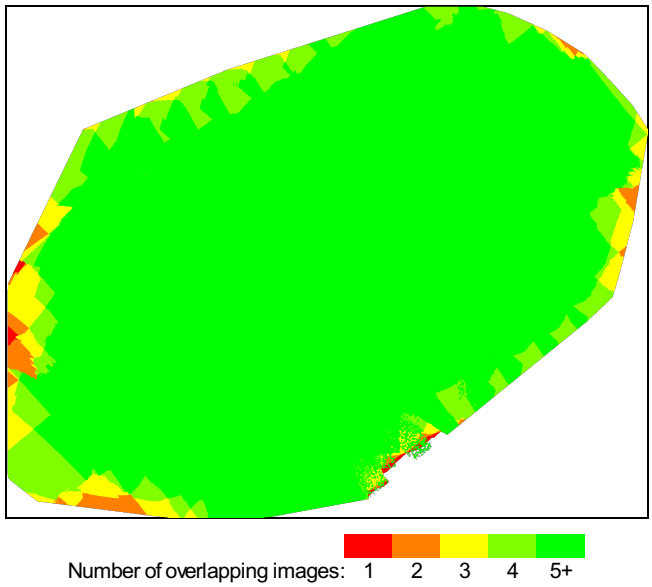


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint matches is also sufficient for these areas (see Figure 5 for keypoint matches).

Bundle Block Adjustment Details

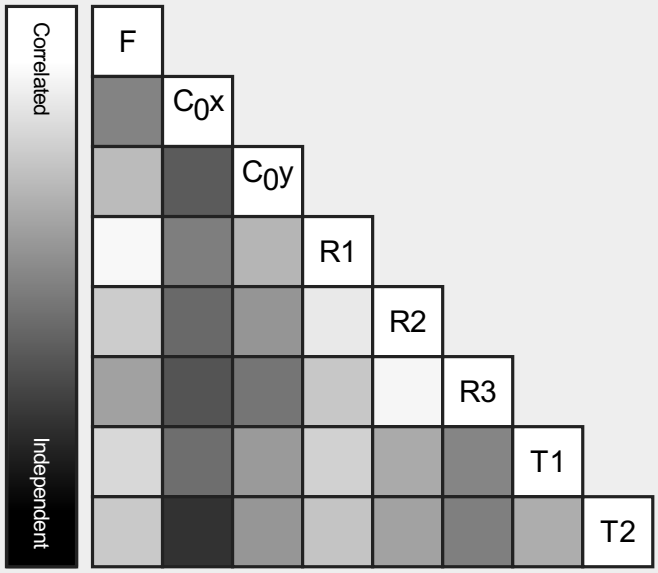
Number of 2D Keypoint Observations for Bundle Block Adjustment	1594694
Number of 3D Points for Bundle Block Adjustment	480028
Mean Reprojection Error [pixels]	0.153

Internal Camera Parameters

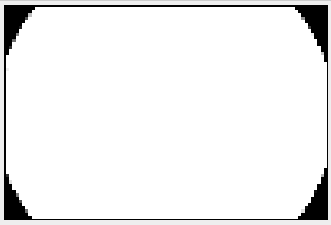
FC6310R_8.8_5472x3648 (RGB). Sensor Dimensions: 12.833 [mm] x 8.556 [mm]

EXIF ID: FC6310R_8.8_5472x3648

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	3658.300 [pixel] 8.580 [mm]	2722.500 [pixel] 6.385 [mm]	1835.100 [pixel] 4.304 [mm]	-0.269	0.112	-0.033	0.000	-0.001
Optimized Values	3635.585 [pixel] 8.526 [mm]	2719.293 [pixel] 6.377 [mm]	1850.336 [pixel] 4.340 [mm]	-0.263	0.107	-0.031	0.000	-0.001
Uncertainties (Sigma)	1.224 [pixel] 0.003 [mm]	0.051 [pixel] 0.000 [mm]	0.057 [pixel] 0.000 [mm]	0.000	0.000	0.000	0.000	0.000



The correlation between camera internal parameters determined by the bundle adjustment. White indicates a full correlation between the parameters, ie. any change in one can be fully compensated by the other. Black indicates that the parameter is completely independent, and is not affected by other parameters.



The number of Automatic Tie Points (ATPs) per pixel, averaged over all images of the camera model, is color coded between black and white. White indicates that, on average, more than 16 ATPs have been extracted at the pixel location. Black indicates that, on average, 0 ATPs have been extracted at the pixel location. Click on the image to the see the average direction and magnitude of the re-projection error for each pixel. Note that the vectors are scaled for better visualization. The scale bar indicates the magnitude of 1 pixel error.

2D Keypoints Table

	Number of 2D Keypoints per Image	Number of Matched 2D Keypoints per Image
Median	65639	33808
Min	54801	9203
Max	74197	42478
Mean	65819	31269

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	279279
In 3 Images	83272
In 4 Images	38727
In 5 Images	21958
In 6 Images	14494
In 7 Images	10242
In 8 Images	7613
In 9 Images	5539
In 10 Images	4071
In 11 Images	3381
In 12 Images	2660
In 13 Images	1933
In 14 Images	1471
In 15 Images	1239
In 16 Images	942
In 17 Images	745
In 18 Images	580
In 19 Images	440
In 20 Images	377
In 21 Images	321
In 22 Images	263
In 23 Images	261

In 24 Images	93
In 25 Images	84
In 26 Images	27
In 27 Images	10
In 28 Images	5
In 29 Images	1

2D Keypoint Matches

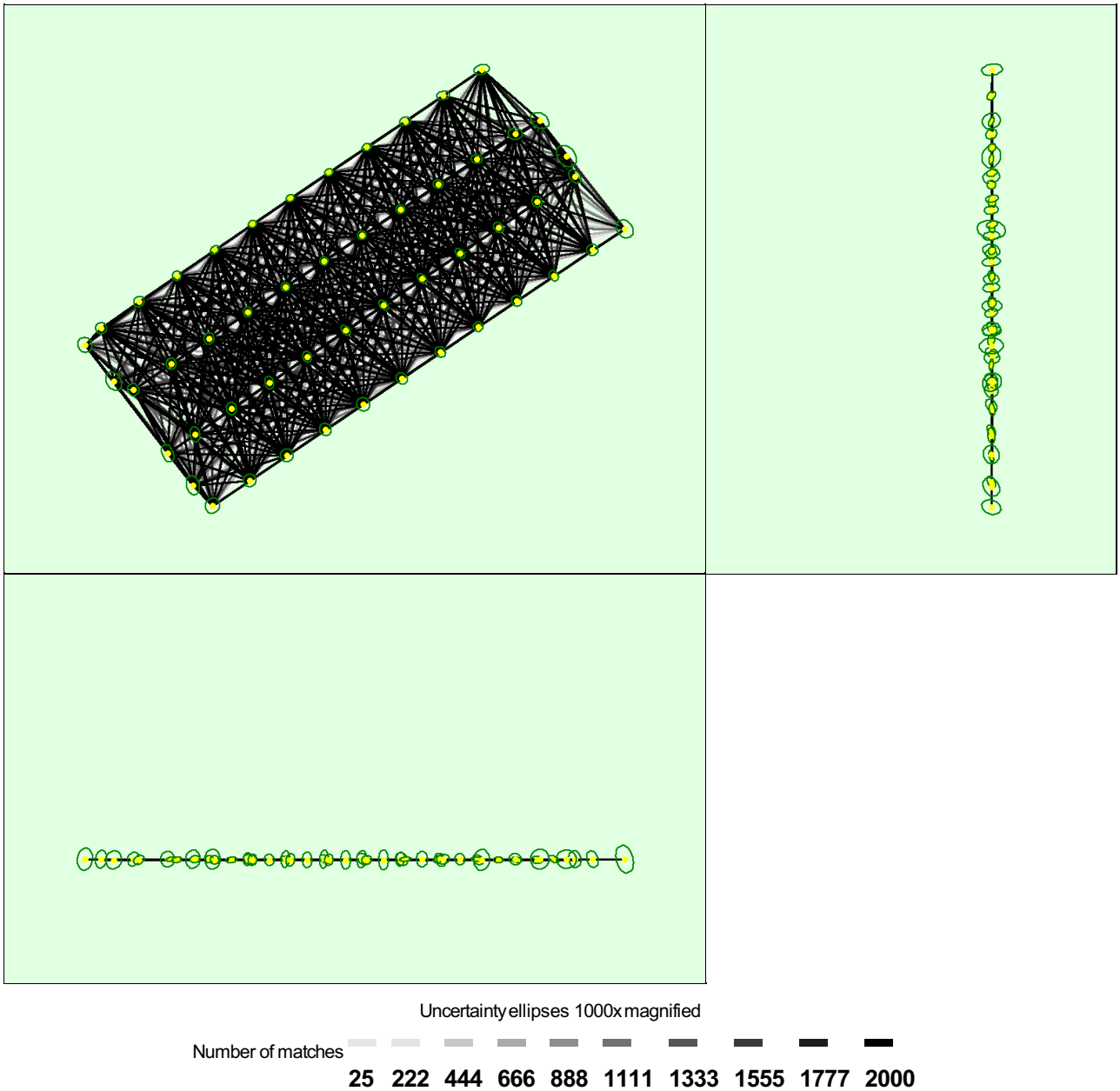


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images. Dark green ellipses indicate the relative camera position uncertainty of the bundle block adjustment result.

Relative camera position and orientation uncertainties

	X [m]	Y [m]	Z [m]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.001	0.002	0.002	0.004	0.004	0.001
Sigma	0.000	0.000	0.001	0.002	0.002	0.000

Geolocation Details

Ground Control Points

GCP Name	Accuracy XY/Z [m]	Error X [m]	Error Y [m]	Error Z [m]	Projection Error [pixel]	Verified/Marked
0001 (3D)	0.020/ 0.020	0.001	-0.002	-0.002	0.725	9 / 9
0002 (3D)	0.020/ 0.020	-0.000	-0.000	0.005	1.083	9 / 9
0003 (3D)	0.020/ 0.020	0.005	0.003	0.020	0.497	9 / 9
0004 (3D)	0.020/ 0.020	-0.006	-0.002	-0.032	1.122	9 / 9
Mean [m]		-0.000017	-0.000178	-0.002075		
Sigma [m]		0.004098	0.001981	0.019019		
RMS Error [m]		0.004098	0.001989	0.019131		

Localisation accuracy per GCP and mean errors in the three coordinate directions. The last column counts the number of calibrated images where the GCP has been automatically verified vs. manually marked.

Absolute Geolocation Variance

Min Error [m]	Max Error [m]	Geolocation Error X [%]	Geolocation Error Y [%]	Geolocation Error Z [%]
-	-0.08	0.00	0.00	0.00
-0.08	-0.06	0.00	0.00	0.00
-0.06	-0.05	0.00	0.00	0.00
-0.05	-0.03	0.00	0.00	0.00
-0.03	-0.02	0.00	0.00	0.00
-0.02	0.00	56.86	47.06	50.98
0.00	0.02	43.14	52.94	45.10
0.02	0.03	0.00	0.00	3.92
0.03	0.05	0.00	0.00	0.00
0.05	0.06	0.00	0.00	0.00
0.06	0.08	0.00	0.00	0.00
0.08	-	0.00	0.00	0.00
Mean [m]		0.006695	-0.034220	41.581434
Sigma [m]		0.003242	0.003176	0.007710
RMS Error [m]		0.007438	0.034367	41.581435

Min Error and Max Error represent geolocation error intervals between -1.5 and 1.5 times the maximum accuracy of all the images. Columns X, Y, Z show the percentage of images with geolocation errors within the predefined error intervals. The geolocation error is the difference between the initial and computed image positions. Note that the image geolocation errors do not correspond to the accuracy of the observed 3D points.

Geolocation Bias	X	Y	Z
Translation [m]	0.006700	-0.034073	41.581472

Bias between image initial and computed geolocation given in output coordinate system.

Relative Geolocation Variance

Relative Geolocation Error	Images X [%]	Images Y [%]	Images Z [%]
[-1.00, 1.00]	100.00	100.00	100.00
[-2.00, 2.00]	100.00	100.00	100.00
[-3.00, 3.00]	100.00	100.00	100.00
Mean of Geolocation Accuracy [m]	0.016818	0.016818	0.040830
Sigma of Geolocation Accuracy [m]	0.000734	0.000734	0.002612

Images X, Y, Z represent the percentage of images with a relative geolocation error in X, Y, Z.

Geolocation Orientational Variance	RMS [degree]
Omega	1.369
Phi	0.540
Kappa	5.181

Geolocation RMS error of the orientation angles given by the difference between the initial and computed image orientation angles.

Initial Processing Details

System Information

Hardware	CPU: Intel(R) Xeon(R) CPU E5-2690 v4 @ 2.60GHz RAM: 256GB GPU: NVIDIA Tesla M10 (Driver: 24.21.14.1181)
Operating System	Windows Server 2016 Datacenter, 64-bit

Coordinate Systems

Image Coordinate System	WGS 84
Ground Control Point (GCP) Coordinate System	ETRS89 / NTM zone 7
Output Coordinate System	ETRS89 / NTM zone 7

Processing Options

Detected Template	Runde 2*
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

Point Cloud Densification details

Processing Options

Image Scale	multiscale, 1/2 (Half image size, Default)
Point Density	Optimal
Minimum Number of Matches	3
3D Textured Mesh Generation	yes
3D Textured Mesh Settings:	Resolution: Medium Resolution (default) Color Balancing: no
LOD	Generated: no
Advanced: 3D Textured Mesh Settings	Sample Density Divider: 1
Advanced: Image Groups	group1
Advanced: Use Processing Area	yes
Advanced: Use Annotations	yes

Results

Number of Generated Tiles	1
Number of 3D Densified Points	6323940

Average Density (per m^3)	678.83

DSM, Orthomosaic and Index Details

Processing Options

DSM and Orthomosaic Resolution	1 x GSD (1.67 [cm/pixel])
DSM Filters	Noise Filtering: yes Surface Smoothing: yes, Type: Sharp
Raster DSM	Generated: yes Method: Inverse Distance Weighting Merge Tiles: yes
Orthomosaic	Generated: yes Merge Tiles: yes GeoTIFF Without Transparency: no Google Maps Tiles and KML: no