Quality Report

Generated with PIX4Dmapper version 4.8.1 Preview

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	101 Innes Parkway
Processed	2023-06-30 04:36:22
Camera Model Name(s)	_1.0_640x512 (Grayscale)
Average Ground Sampling Distance (GSD)	6.87 cm / 2.70 in
Area Covered	0.035 km^2 / 3.5107 ha / 0.01 sq. mi. / 8.6795 acres
Time for Initial Processing (without report)	44m:40s

Quality Check

Images	median of 4009 keypoints per image	⚠
Dataset	1347 out of 1351 images calibrated (99%), all images enabled, 2 blocks	⚠
Camera Optimization	55.62% relative difference between initial and optimized internal camera parameters	⚠
Matching	median of 652.463 matches per calibrated image	⚠
Georeferencing	yes, no 3D GCP	⚠

Preview

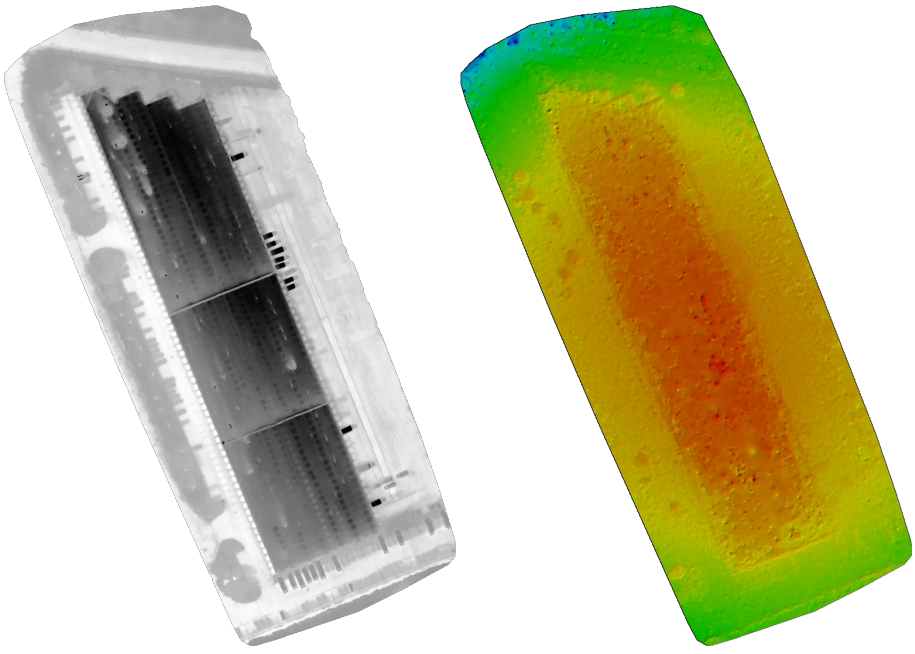


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	1347 out of 1351
Number of Geolocated Images	1351 out of 1351

Initial Image Positions

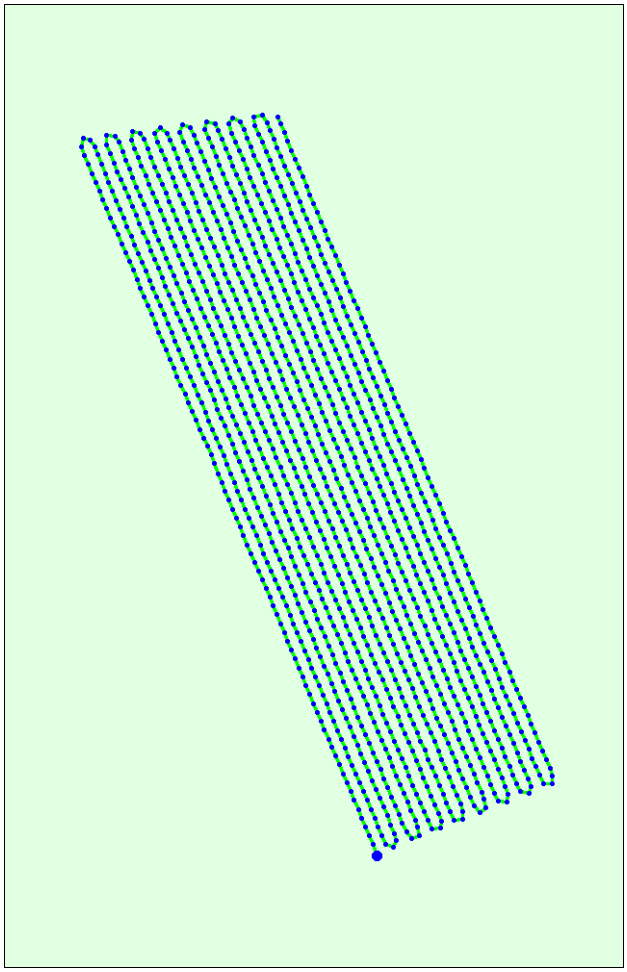
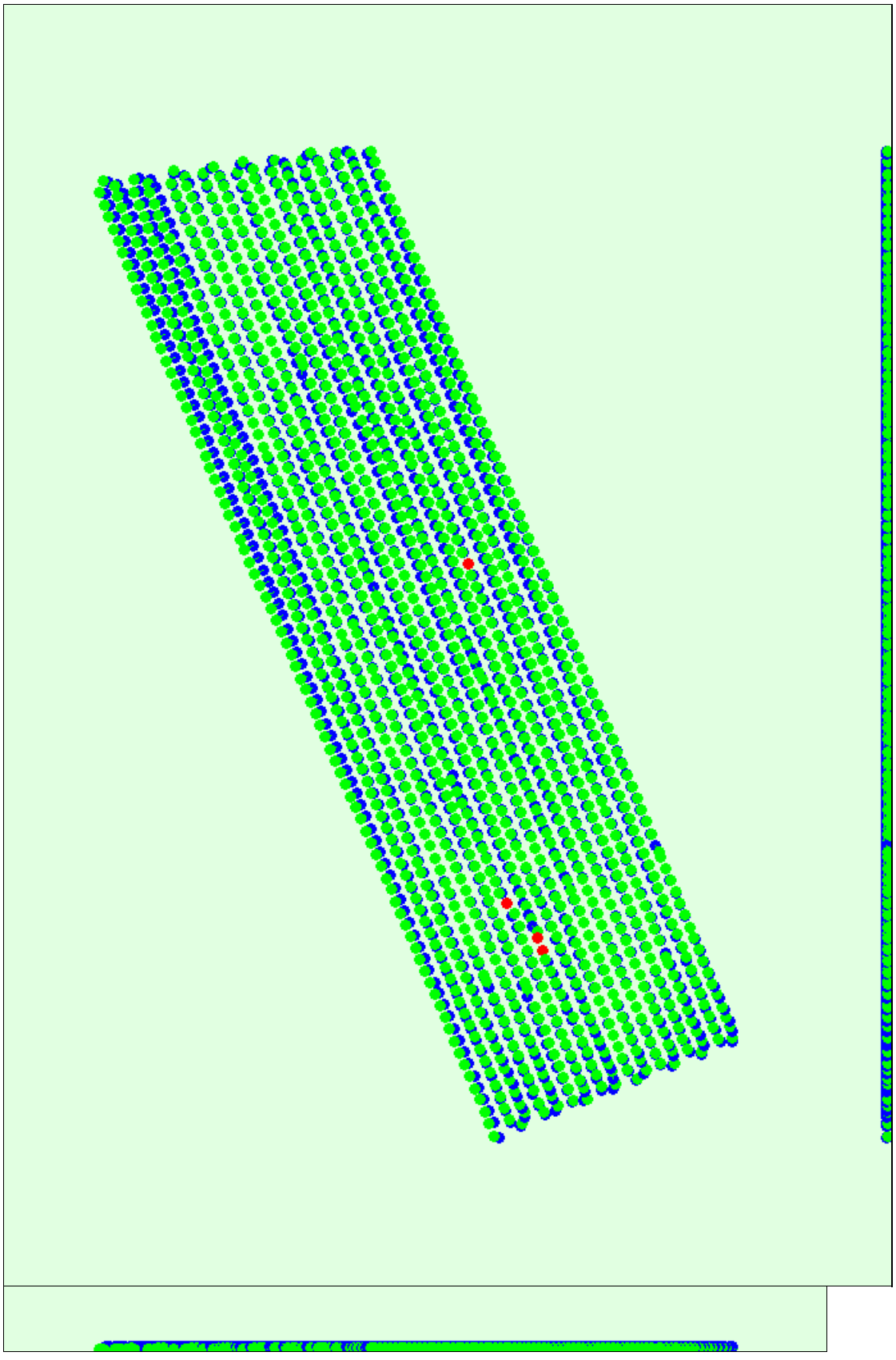


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

Computed Image/GCPs/Manual Tie Points Positions



Uncertainty ellipses 1x magnified

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). Red dots indicate disabled or uncalibrated images. 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	0.335	0.385	0.582	0.108	0.107	0.145
Sigma	0.043	0.089	0.014	0.025	0.027	0.076

Overlap

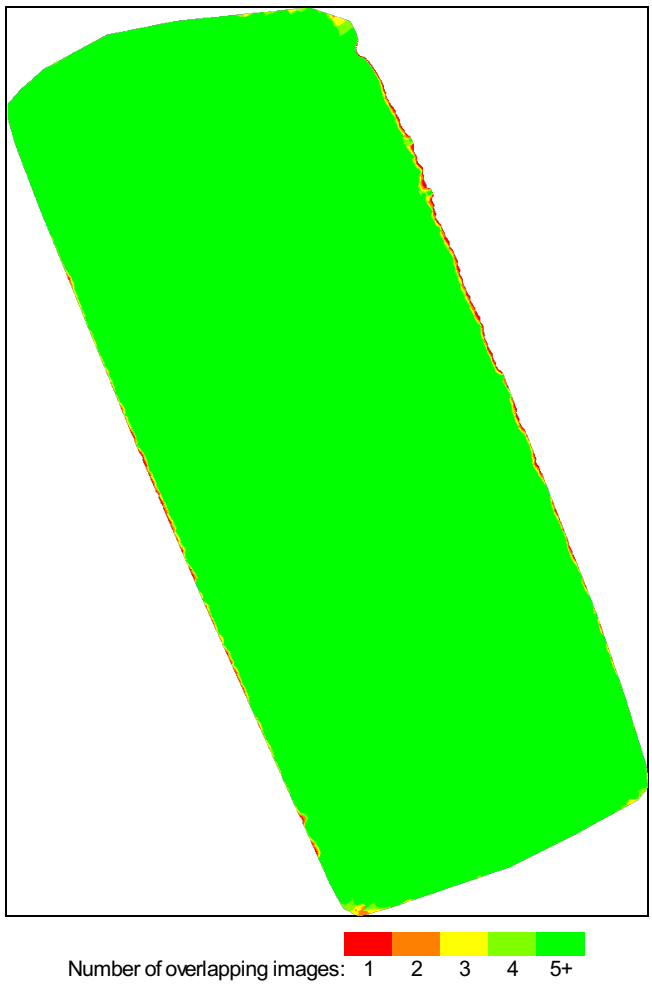


**Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint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

Bundle Block Adjustment Details

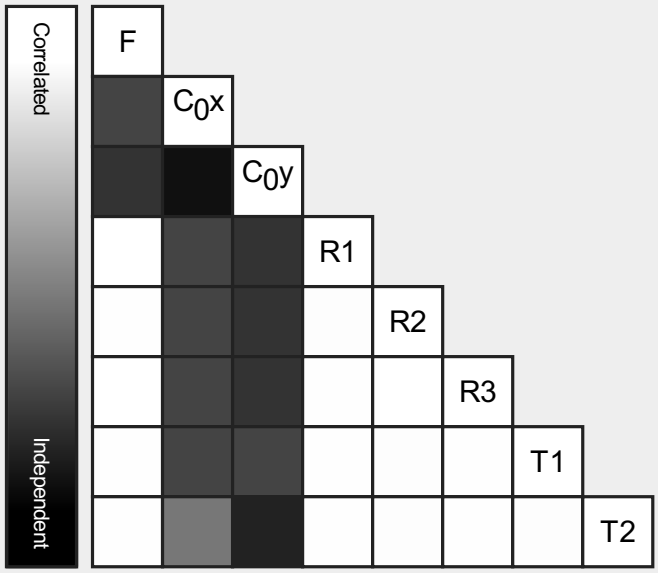
Number of 2D Keypoint Observations for Bundle Block Adjustment	921989
Number of 3D Points for Bundle Block Adjustment	338849
Mean Reprojection Error [pixels]	0.686

Internal Camera Parameters

_1.0_640x512 (Grayscale). Sensor Dimensions: 25.400 [mm] x 20.320 [mm]

EXIF ID: _1.0_640x512

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	25.197 [pixel] 1.000 [mm]	320.000 [pixel] 12.700 [mm]	256.000 [pixel] 10.160 [mm]	0.000	0.000	0.000	0.000	0.000
Optimized Values	11.181 [pixel] 0.444 [mm]	319.232 [pixel] 12.670 [mm]	242.094 [pixel] 9.608 [mm]	-0.000	-0.000	0.000	0.000	-0.000
Uncertainties (Sigma)	5.333 [pixel] 0.212 [mm]	0.157 [pixel] 0.006 [mm]	0.141 [pixel] 0.006 [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	4009	652
Min	3305	26
Max	6511	2053
Mean	4176	684

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	240355
In 3 Images	53422
In 4 Images	19723
In 5 Images	9318
In 6 Images	5052
In 7 Images	3021
In 8 Images	1991
In 9 Images	1399
In 10 Images	952
In 11 Images	721
In 12 Images	439
In 13 Images	317
In 14 Images	252
In 15 Images	241
In 16 Images	165
In 17 Images	146
In 18 Images	118
In 19 Images	115
In 20 Images	112
In 21 Images	114

In 22 Images	73
In 23 Images	94
In 24 Images	60
In 25 Images	50
In 26 Images	42
In 27 Images	49
In 28 Images	46
In 29 Images	39
In 30 Images	42
In 31 Images	38
In 32 Images	37
In 33 Images	26
In 34 Images	26
In 35 Images	30
In 36 Images	18
In 37 Images	23
In 38 Images	17
In 39 Images	18
In 40 Images	18
In 41 Images	19
In 42 Images	12
In 43 Images	11
In 44 Images	13
In 45 Images	7
In 46 Images	10
In 47 Images	6
In 48 Images	5
In 49 Images	4
In 50 Images	7
In 51 Images	1
In 52 Images	5
In 53 Images	4
In 54 Images	8
In 55 Images	3
In 56 Images	2
In 57 Images	3
In 58 Images	2
In 62 Images	2
In 64 Images	1
In 66 Images	1
In 68 Images	1
In 69 Images	1
In 75 Images	1
In 76 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.

Geolocation Details

Absolute Geolocation Variance

Min Error [m]	Max Error [m]	Geolocation Error X [%]	Geolocation Error Y [%]	Geolocation Error Z [%]
-	-15.00	0.00	0.00	0.00
-15.00	-12.00	0.00	0.00	0.00
-12.00	-9.00	0.00	0.00	0.00
-9.00	-6.00	0.00	0.00	0.00
-6.00	-3.00	0.00	0.00	0.00
-3.00	0.00	52.56	53.67	0.00
0.00	3.00	47.44	46.33	100.00
3.00	6.00	0.00	0.00	0.00
6.00	9.00	0.00	0.00	0.00
9.00	12.00	0.00	0.00	0.00
12.00	15.00	0.00	0.00	0.00
15.00	-	0.00	0.00	0.00
Mean [m]		-0.000286	0.000089	0.199515
Sigma [m]		0.758253	0.519630	0.090295
RMS Error [m]		0.758253	0.519630	0.218996

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.

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]	5.000000	5.000000	10.000000
Sigma of Geolocation Accuracy [m]	0.000000	0.000000	0.000000

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

Geolocation Orientational Variance	RMS [degree]
Omega	0.165
Phi	0.120
Kappa	2.826

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: AMD Ryzen Threadripper 2970WX 24-Core Processor RAM: 128GB GPU: NVIDIA Quadro P4000 (Driver: 31.0.15.2889)
Operating System	Windows 10 Pro, 64-bit

Coordinate Systems

Image Coordinate System	WGS 84 (EGM96 Geoid)
Output Coordinate System	WGS 84 / UTM zone 18N (EGM96 Geoid)

Processing Options

Detected Template	Thermal Camera
Keypoints Image Scale	Full, Image Scale: 2
Advanced: Matching Image Pairs	Aerial Grid or Corridor
Advanced: Matching Strategy	Use Geometrically Verified Matching: yes
Advanced: Keypoint Extraction	Targeted Number of Keypoints: Automatic
Advanced: Calibration	Calibration Method: Alternative Internal Parameters Optimization: All External Parameters Optimization: All Rematch: Auto, no

Point Cloud Densification details

Processing Options

Image Scale	multiscale, 1 (Original image size, Slow)
Point Density	Optimal
Minimum Number of Matches	3
3D Textured Mesh Generation	no
LOD	Generated: no
Advanced: Image Groups	Grayscale
Advanced: Use Processing Area	yes
Advanced: Use Annotations	yes
Time for Point Cloud Densification	01m:47s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	NA

Results

Number of Generated Tiles	1
Number of 3D Densified Points	2447589
Average Density (per m^3)	47.15

DSM, Orthomosaic and Index Details

Processing Options

DSM and Orthomosaic Resolution	1 x GSD (6.87 [cm/pixel])
DSM Filters	Noise Filtering: yes Surface Smoothing: yes, Type: Sharp
Index Calculator: Reflectance Map	Generated: yes Resolution: 1 x GSD (6.87 [cm/pixel]) Merge Tiles: no
Time for DSM Generation	00s
Time for Orthomosaic Generation	00s
Time for DTM Generation	00s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	09m:24s
Time for Index Map Generation	00s