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Processing Report
27 September 2021



Survey Data

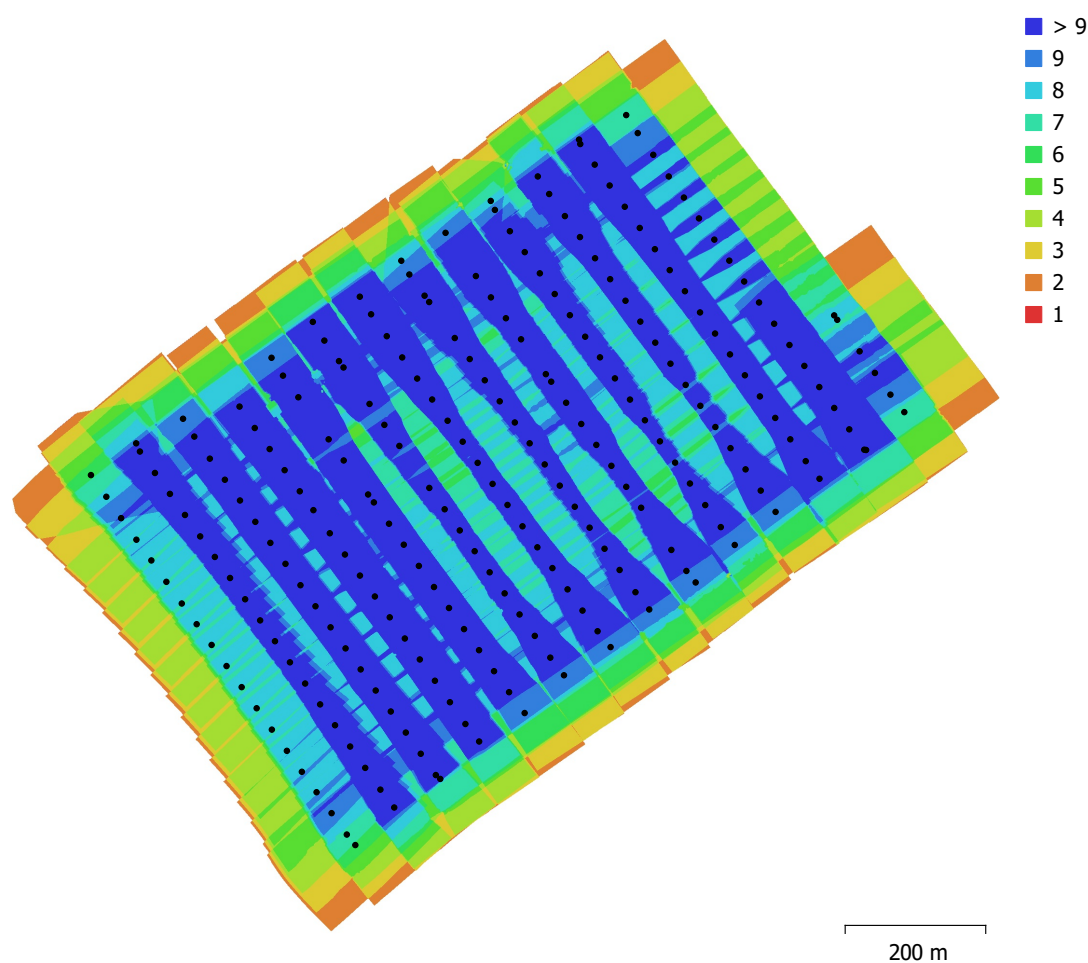


Fig. 1. Camera locations and image overlap.

Number of images:	237	Camera stations:	237
Flying altitude:	169 m	Tie points:	163,417
Ground resolution:	4.27 cm/pix	Projections:	931,308
Coverage area:	0.907 km ²	Reprojection error:	0.558 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
FC6310 (8.8mm)	4864 x 3648	8.8 mm	2.61 x 2.61 μm	No

Table 1. Cameras.

Camera Calibration

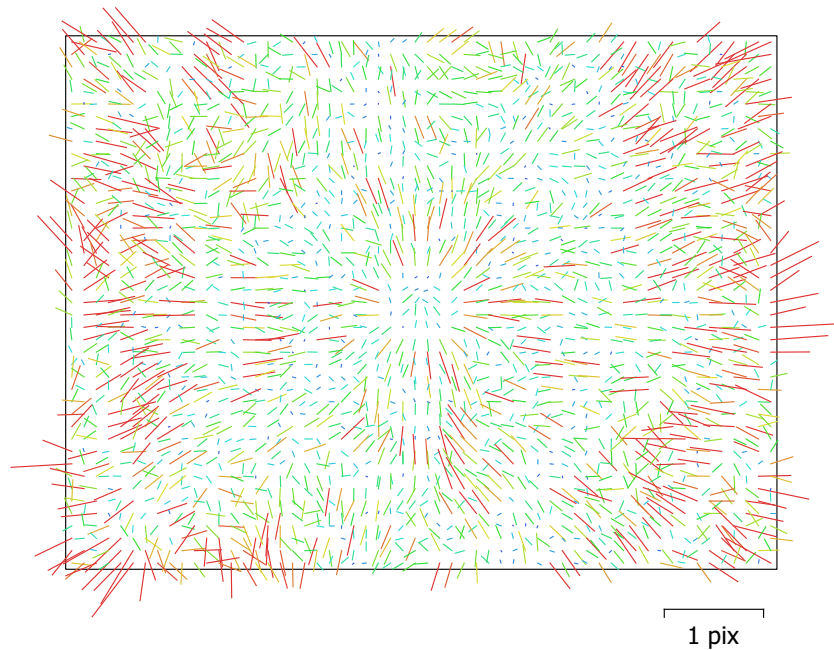


Fig. 2. Image residuals for FC6310 (8.8mm).

FC6310 (8.8mm)

237 images

Type
Frame

Resolution
4864 x 3648

Focal Length
8.8 mm

Pixel Size
2.61 x 2.61 μm

	Value	Error	F	Cx	Cy	B1	B2	K1	K2	K3	K4	P1	P2	P3	P4
F	3629.43	0.54	1.00	0.07	0.18	-0.03	-0.01	0.01	-0.17	0.25	-0.30	-0.06	-0.06	-0.02	0.02
Cx	-4.85785	0.024		1.00	-0.01	-0.01	0.02	0.00	-0.01	0.02	-0.02	0.50	0.03	0.06	-0.05
Cy	15.8212	0.024			1.00	0.01	0.01	0.01	-0.03	0.05	-0.06	0.03	0.40	0.09	-0.07
B1	-0.591724	0.017				1.00	-0.04	0.01	-0.00	0.00	0.00	-0.02	0.01	0.00	-0.00
B2	-0.462788	0.017					1.00	-0.00	0.00	-0.00	0.00	0.00	-0.00	0.01	-0.01
K1	0.0183174	5e-05						1.00	-0.96	0.91	-0.85	-0.00	-0.01	-0.02	0.02
K2	-0.102083	0.00028							1.00	-0.98	0.95	0.01	0.02	0.02	-0.02
K3	0.198863	0.00064								1.00	-0.99	-0.01	-0.02	-0.02	0.02
K4	-0.131127	0.00049									1.00	0.01	0.02	0.01	-0.01
P1	-0.000184926	2.4e-06										1.00	0.42	0.51	-0.47
P2	-0.000460923	3.1e-06											1.00	0.78	-0.72
P3	-0.318832	0.024												1.00	-0.98
P4	-0.0436613	0.032													1.00

Table 2. Calibration coefficients and correlation matrix.

Camera Locations

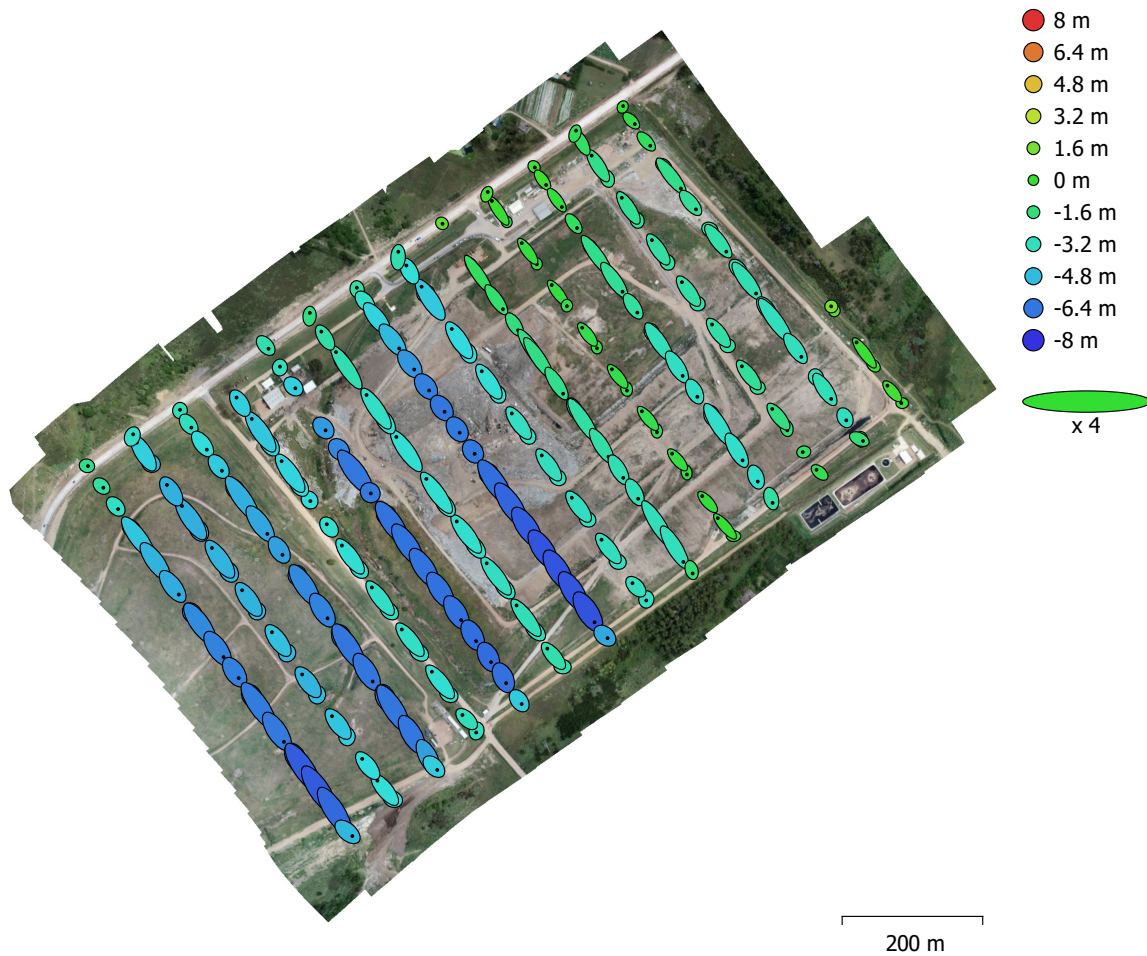


Fig. 3. Camera locations and error estimates.

Z error is represented by ellipse color. X,Y errors are represented by ellipse shape.

Estimated camera locations are marked with a black dot.

X error (m)	Y error (m)	Z error (m)	XY error (m)	Total error (m)
3.88895	5.54326	4.03173	6.77138	7.88077

Table 3. Average camera location error.

X - Easting, Y - Northing, Z - Altitude.

Ground Control Points



Fig. 4. GCP locations and error estimates.

Z error is represented by ellipse color. X,Y errors are represented by ellipse shape.

Estimated GCP locations are marked with a dot or crossing.

Count	X error (cm)	Y error (cm)	Z error (cm)	XY error (cm)	Total (cm)
12	0.961682	1.50349	1.92201	1.78475	2.62287

Table 4. Control points RMSE.

X - Easting, Y - Northing, Z - Altitude.

Label	X error (cm)	Y error (cm)	Z error (cm)	Total (cm)	Image (pix)
1	-1.67728	1.55566	-2.32023	3.25835	0.187 (8)
2	1.37196	-0.124422	0.208135	1.39323	0.306 (8)
3	1.5411	-3.51444	1.35367	4.06924	0.364 (9)
4	0.138139	-1.37304	4.62473	4.82623	0.205 (6)
5	-0.444901	1.65493	0.883997	1.92826	0.208 (8)
6	0.670661	-0.243569	-1.45616	1.62158	0.075 (9)
7	-0.499036	0.21088	-2.22959	2.29446	0.100 (10)
8	0.112944	0.772325	-0.128423	0.791034	0.123 (7)
9	-0.17945	2.29475	0.692477	2.40367	0.206 (12)
M1	-1.70018	-1.30858	0.473125	2.19701	0.200 (12)
M2	0.311387	0.185109	-2.53738	2.56311	0.149 (5)
M3	0.281166	-0.0458525	0.806891	0.855705	0.170 (7)
Total	0.961682	1.50349	1.92201	2.62287	0.208

Table 5. Control points.
X - Easting, Y - Northing, Z - Altitude.

Digital Elevation Model

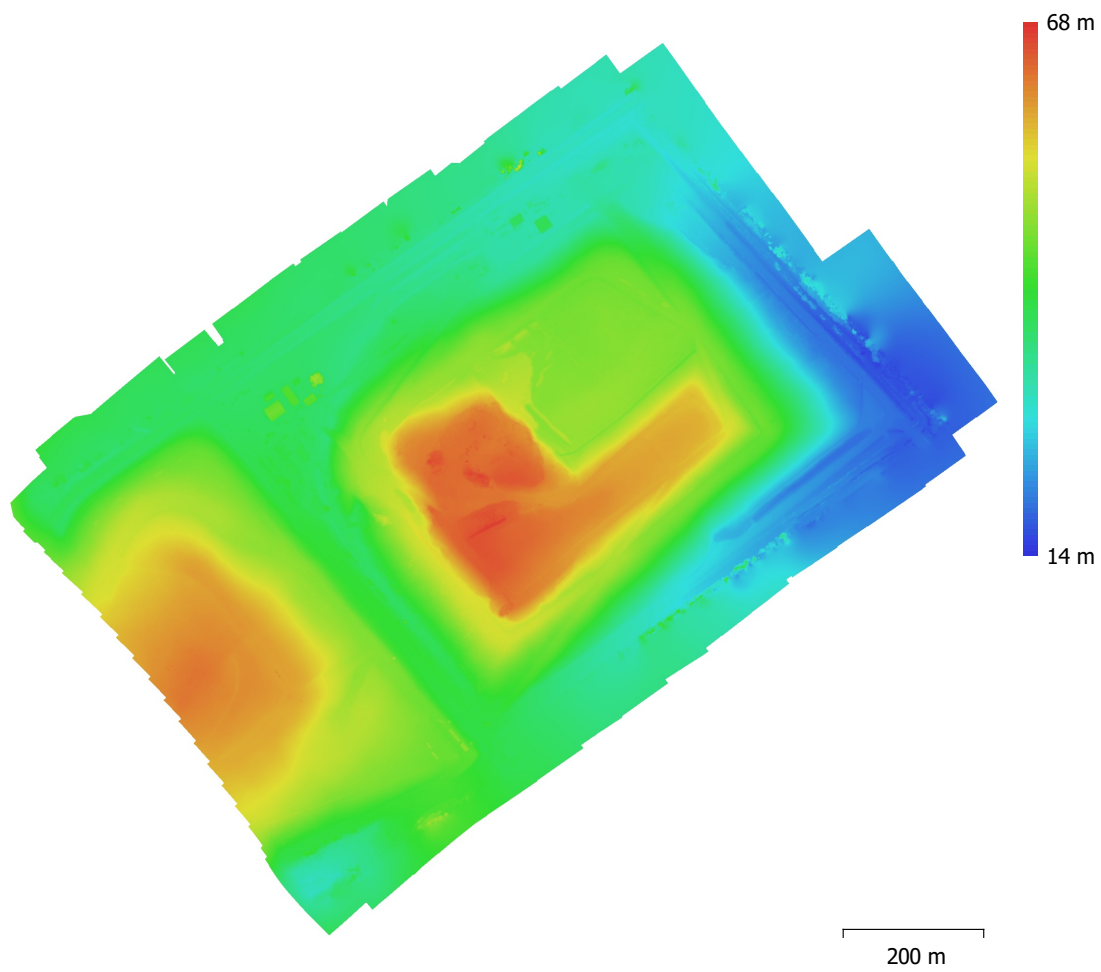


Fig. 5. Reconstructed digital elevation model.

Resolution: 8.53 cm/pix
Point density: 137 points/m²

Processing Parameters

General

Cameras	237
Aligned cameras	237
Markers	12
Coordinate system	WGS 84 / UTM zone 21S EGM08
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	163,417 of 174,464
RMS reprojection error	0.180138 (0.557706 pix)
Max reprojection error	0.795231 (12.7465 pix)
Mean key point size	3.19023 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	5.83231

Alignment parameters

Accuracy	High
Generic preselection	No
Reference preselection	Yes
Key point limit	40,000
Tie point limit	4,000
Adaptive camera model fitting	Yes
Matching time	9 minutes 19 seconds
Alignment time	1 minutes 5 seconds

Optimization parameters

Parameters	f, b1, b2, cx, cy, k1-k4, p1-p4
Adaptive camera model fitting	No
Optimization time	8 seconds
File size	19.80 MB

Dense Point Cloud

Points	107,714,306
Point colors	3 bands, uint8

Depth maps generation parameters

Quality	High
Filtering mode	Aggressive
Processing time	38 minutes 41 seconds

Dense cloud generation parameters

Processing time	28 minutes 32 seconds
File size	1.84 GB

DEM

Size	23,499 x 21,755
Coordinate system	WGS 84 / UTM zone 21S EGM08

Reconstruction parameters

Source data	Dense cloud
Interpolation	Enabled
Processing time	4 minutes 2 seconds
File size	548.86 MB

Orthomosaic

Size	32,913 x 29,751
Coordinate system	WGS 84 / UTM zone 21S EGM08
Colors	3 bands, uint8

Reconstruction parameters

Blending mode	Mosaic
Surface	DEM
Enable hole filling	Yes
Processing time	8 minutes 5 seconds
File size	3.94 GB

System

Software name	Agisoft Metashape Professional
Software version	1.7.2 build 12070
OS	Windows 64 bit
RAM	63.93 GB
CPU	Intel(R) Core(TM) i7-9700F CPU @ 3.00GHz
GPU(s)	Radeon(TM) RX 460 Graphics (Baffin)