

# RIBERA DE MIGUELETE

Processing Report

11 June 2024



# Survey Data

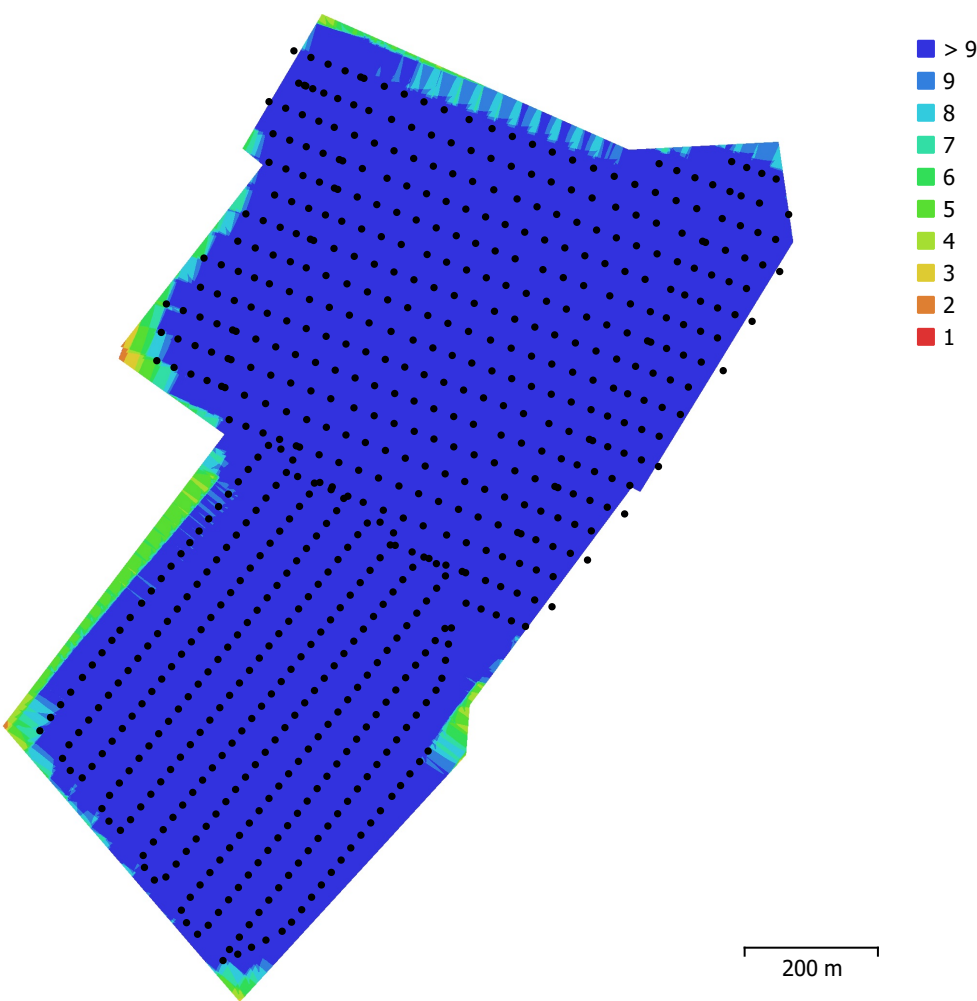


Fig. 1. Camera locations and image overlap.

|                    |                       |                     |           |
|--------------------|-----------------------|---------------------|-----------|
| Number of images:  | 690                   | Camera stations:    | 690       |
| Flying altitude:   | 124 m                 | Tie points:         | 380,045   |
| Ground resolution: | 6.42 cm/pix           | Projections:        | 2,513,063 |
| Coverage area:     | 0.868 km <sup>2</sup> | Reprojection error: | 0.873 pix |

| Camera Model  | Resolution  | Focal Length | Pixel Size     | Precalibrated |
|---------------|-------------|--------------|----------------|---------------|
| M3E (12.29mm) | 5280 x 3956 | 12.29 mm     | 3.36 x 3.36 μm | Yes           |
| M3E (12.29mm) | 5280 x 3956 | 12.29 mm     | 3.36 x 3.36 μm | Yes           |

Table 1. Cameras.

# Camera Calibration

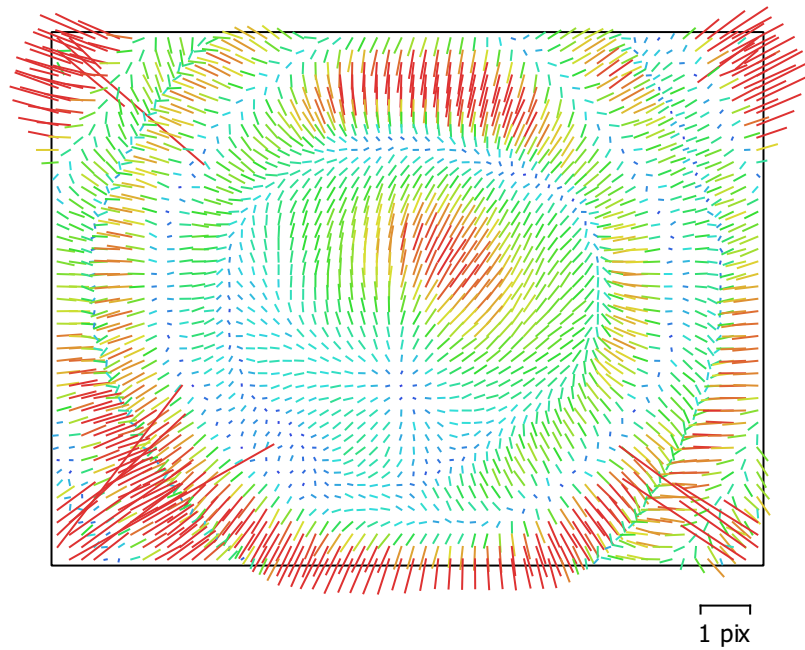


Fig. 2. Image residuals for M3E (12.29mm).

## M3E (12.29mm)

401 images, precalibrated

|              |                    |                 |                                             |
|--------------|--------------------|-----------------|---------------------------------------------|
| Type         | Resolution         | Focal Length    | Pixel Size                                  |
| <b>Frame</b> | <b>5280 x 3956</b> | <b>12.29 mm</b> | <b>3.36 x 3.36 <math>\mu\text{m}</math></b> |

|           | Value               | Error   | F    | Cx    | Cy    | B1    | B2    | K1    | K2    | K3    | K4    | P1    | P2    |
|-----------|---------------------|---------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| <b>F</b>  | <b>3707.96</b>      | 0.038   | 1.00 | -0.01 | 0.09  | -0.33 | -0.04 | -0.24 | 0.14  | -0.11 | 0.08  | 0.01  | -0.07 |
| <b>Cx</b> | <b>22.9846</b>      | 0.01    |      | 1.00  | -0.05 | 0.01  | -0.03 | -0.01 | 0.01  | -0.01 | 0.02  | 0.43  | 0.03  |
| <b>Cy</b> | <b>-62.6649</b>     | 0.0085  |      |       | 1.00  | -0.00 | 0.02  | 0.02  | -0.03 | 0.04  | -0.05 | 0.03  | 0.39  |
| <b>B1</b> | <b>-0.461648</b>    | 0.011   |      |       |       | 1.00  | 0.12  | 0.00  | 0.01  | -0.01 | 0.02  | -0.00 | 0.03  |
| <b>B2</b> | <b>-0.439743</b>    | 0.0089  |      |       |       |       | 1.00  | -0.01 | 0.01  | -0.01 | 0.01  | -0.02 | 0.01  |
| <b>K1</b> | <b>-0.0861555</b>   | 2.7e-05 |      |       |       |       |       | 1.00  | -0.97 | 0.93  | -0.88 | -0.01 | 0.04  |
| <b>K2</b> | <b>-0.088448</b>    | 0.00011 |      |       |       |       |       |       | 1.00  | -0.99 | 0.96  | 0.01  | -0.05 |
| <b>K3</b> | <b>0.130309</b>     | 0.00019 |      |       |       |       |       |       |       | 1.00  | -0.99 | -0.01 | 0.05  |
| <b>K4</b> | <b>-0.0826748</b>   | 0.00011 |      |       |       |       |       |       |       |       | 1.00  | 0.01  | -0.06 |
| <b>P1</b> | <b>-3.76839e-05</b> | 5.1e-07 |      |       |       |       |       |       |       |       |       | 1.00  | -0.02 |
| <b>P2</b> | <b>-0.00022291</b>  | 4.7e-07 |      |       |       |       |       |       |       |       |       |       | 1.00  |

Table 2. Calibration coefficients and correlation matrix.

# Camera Calibration

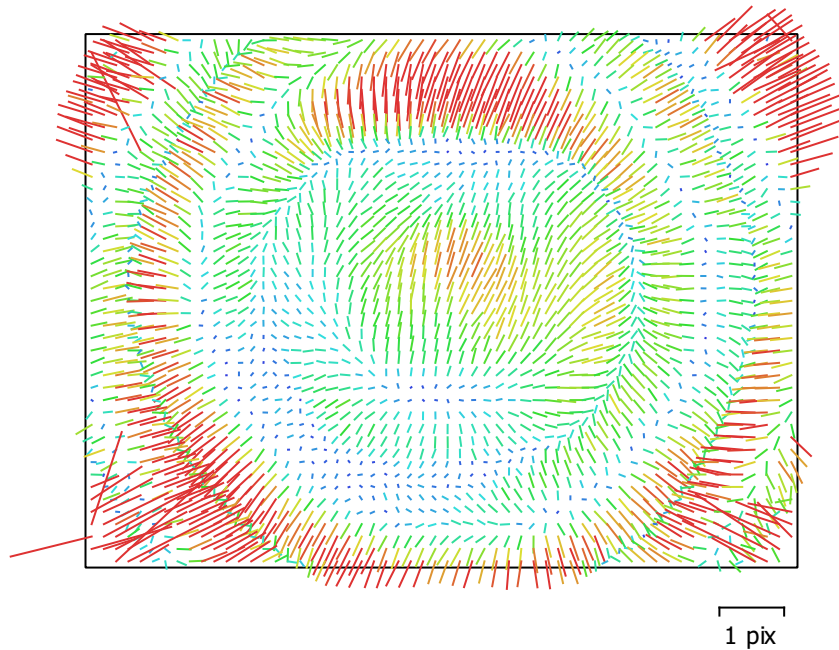


Fig. 3. Image residuals for M3E (12.29mm).

## M3E (12.29mm)

289 images, precalibrated

|              |                    |                 |                                             |
|--------------|--------------------|-----------------|---------------------------------------------|
| Type         | Resolution         | Focal Length    | Pixel Size                                  |
| <b>Frame</b> | <b>5280 x 3956</b> | <b>12.29 mm</b> | <b>3.36 x 3.36 <math>\mu\text{m}</math></b> |

|           | Value               | Error   | F    | Cx    | Cy    | B1   | B2    | K1    | K2    | K3    | K4    | P1    | P2    |
|-----------|---------------------|---------|------|-------|-------|------|-------|-------|-------|-------|-------|-------|-------|
| <b>F</b>  | <b>3737.86</b>      | 1.4     | 1.00 | -0.42 | 0.67  | 0.01 | 0.17  | -0.89 | -0.73 | 0.85  | -0.92 | 0.43  | -0.70 |
| <b>Cx</b> | <b>23.1812</b>      | 0.035   |      | 1.00  | -0.29 | 0.00 | -0.10 | 0.38  | 0.32  | -0.36 | 0.39  | -0.78 | 0.30  |
| <b>Cy</b> | <b>-61.416</b>      | 0.041   |      |       | 1.00  | 0.04 | 0.12  | -0.60 | -0.48 | 0.56  | -0.61 | 0.29  | -0.86 |
| <b>B1</b> | <b>-0.0564565</b>   | 0.0055  |      |       |       | 1.00 | -0.00 | -0.00 | -0.03 | 0.03  | -0.02 | -0.01 | -0.02 |
| <b>B2</b> | <b>0.0574752</b>    | 0.0053  |      |       |       |      | 1.00  | -0.15 | -0.13 | 0.14  | -0.16 | 0.07  | -0.12 |
| <b>K1</b> | <b>-0.0865316</b>   | 7.2e-05 |      |       |       |      |       | 1.00  | 0.35  | -0.53 | 0.66  | -0.38 | 0.62  |
| <b>K2</b> | <b>-0.112502</b>    | 0.00022 |      |       |       |      |       |       | 1.00  | -0.98 | 0.93  | -0.32 | 0.52  |
| <b>K3</b> | <b>0.19112</b>      | 0.00049 |      |       |       |      |       |       |       | 1.00  | -0.99 | 0.37  | -0.59 |
| <b>K4</b> | <b>-0.126183</b>    | 0.0004  |      |       |       |      |       |       |       |       | 1.00  | -0.40 | 0.65  |
| <b>P1</b> | <b>0.000113432</b>  | 1.4e-06 |      |       |       |      |       |       |       |       |       | 1.00  | -0.30 |
| <b>P2</b> | <b>-0.000330189</b> | 1.5e-06 |      |       |       |      |       |       |       |       |       |       | 1.00  |

Table 3. Calibration coefficients and correlation matrix.



# Camera Locations

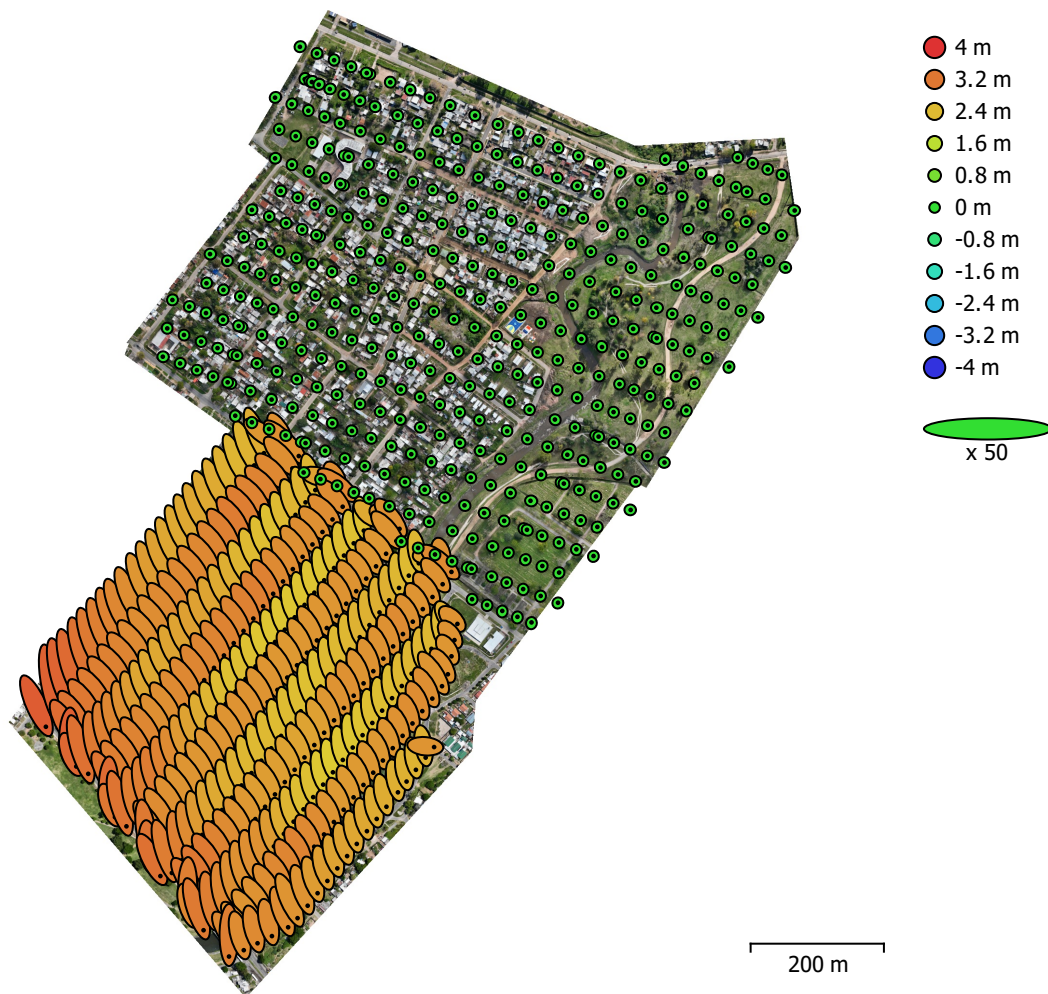


Fig. 4. Camera locations and error estimates.

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) |
|-------------|-------------|-------------|--------------|-----------------|
| 0.250739    | 0.549917    | 1.82324     | 0.604383     | 1.9208          |

Table 4. Average camera location error.

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

# Ground Control Points

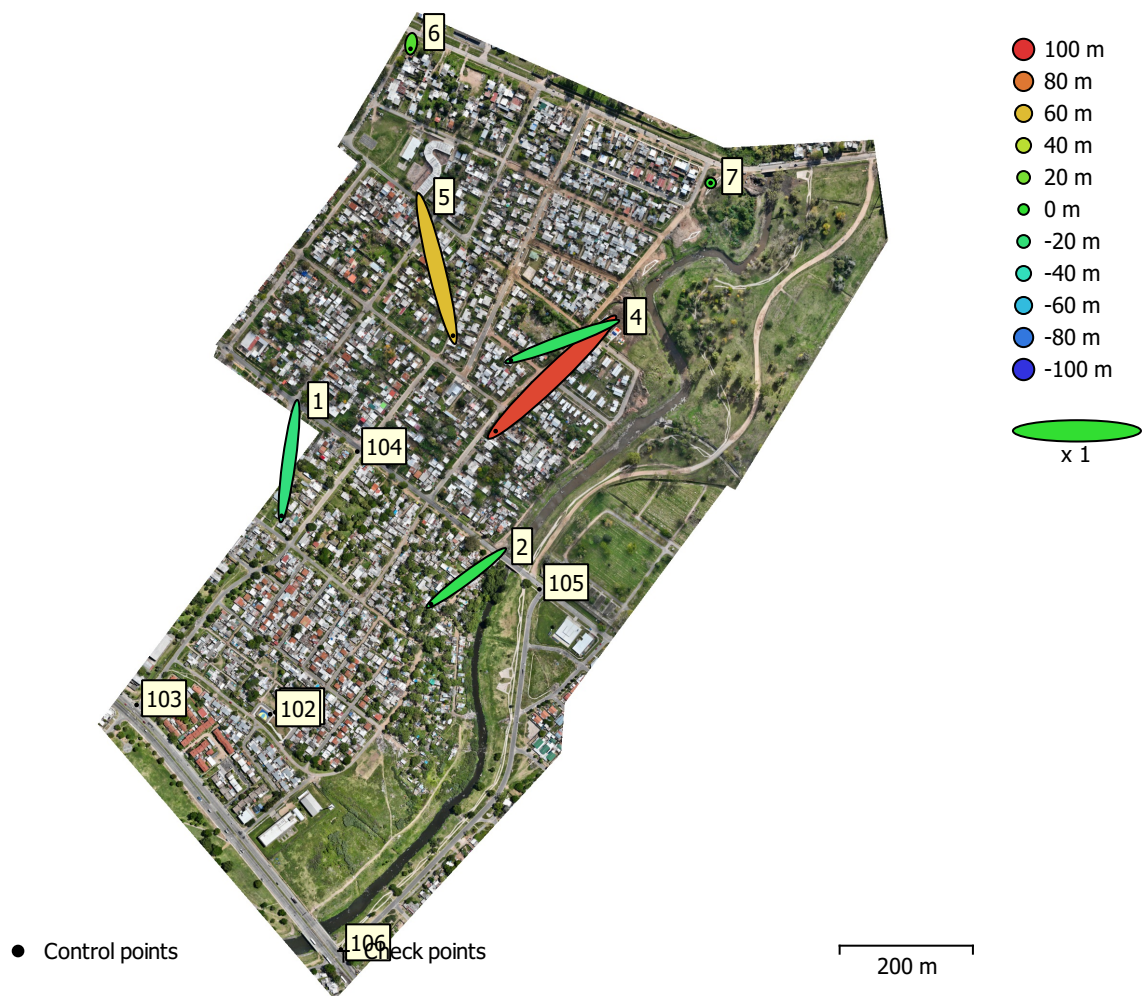


Fig. 5. GCP locations and error estimates.

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 (m) | Y error (m) | Z error (m) | XY error (m) | Total (m) |
|-------|-------------|-------------|-------------|--------------|-----------|
| 7     | 97.3717     | 121.516     | 43.4645     | 155.716      | 161.668   |

Table 5. Control points RMSE.

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

| <b>Label</b> | <b>X error (m)</b> | <b>Y error (m)</b> | <b>Z error (m)</b> | <b>Total (m)</b> | <b>Image (pix)</b> |
|--------------|--------------------|--------------------|--------------------|------------------|--------------------|
| 1            | -22.2799           | -164.252           | -21.9103           | 167.198          | 6713.456 (23)      |
| 2            | -105.325           | -78.3367           | -8.96669           | 131.569          | 6058.156 (23)      |
| 3            | -169.16            | -162.099           | 93.9664            | 252.43           | 65220.510 (32)     |
| 4            | -154.059           | -56.6467           | -14.2102           | 164.757          | 6483.291 (8)       |
| 5            | 49.2555            | -201.347           | 59.4289            | 215.635          | 18758.863 (29)     |
| 6            | -1.88895           | -14.893            | 10.0122            | 18.0448          | 29869.346 (18)     |
| 7            | 0.00028996         | 0.0193247          | 0.00321656         | 0.0195927        | 0.924 (10)         |
| 101          |                    |                    |                    |                  |                    |
| 102          |                    |                    |                    |                  |                    |
| 103          |                    |                    |                    |                  |                    |
| 104          |                    |                    |                    |                  |                    |
| 105          |                    |                    |                    |                  |                    |
| 106          |                    |                    |                    |                  |                    |
| <b>Total</b> | <b>97.3717</b>     | <b>121.516</b>     | <b>43.4645</b>     | <b>161.668</b>   | <b>33927.117</b>   |

Table 6. Control points.  
X - Easting, Y - Northing, Z - Altitude.

# Digital Elevation Model

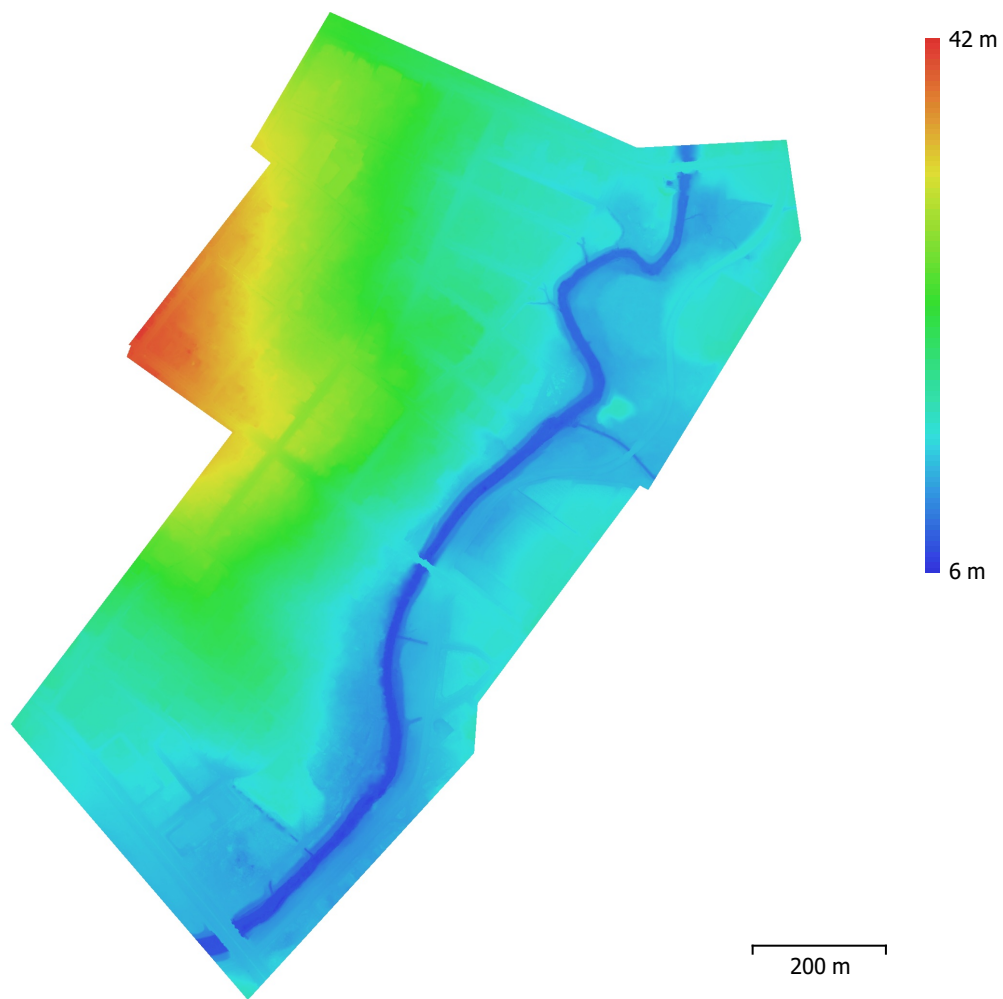


Fig. 6. Reconstructed digital elevation model.

Resolution: 6.42 cm/pix  
Point density: 242 points/m<sup>2</sup>



# Processing Parameters

## General

|                 |     |
|-----------------|-----|
| Cameras         | 690 |
| Aligned cameras | 690 |
| Markers         | 13  |

## Shapes

|                   |                             |
|-------------------|-----------------------------|
| Polygon           | 1                           |
| Coordinate system | WGS 84 / UTM zone 21S EGM08 |
| Rotation angles   | Yaw, Pitch, Roll            |

## Tie Points

|                                |                        |
|--------------------------------|------------------------|
| Points                         | 380,045 of 432,287     |
| RMS reprojection error         | 0.232168 (0.87341 pix) |
| Max reprojection error         | 4.2128 (65.9284 pix)   |
| Mean key point size            | 3.01446 pix            |
| Point colors                   | 3 bands, uint8         |
| Key points                     | No                     |
| Average tie point multiplicity | 6.95355                |
| File size                      | 55.89 MB               |

## Depth Maps

|                                         |            |
|-----------------------------------------|------------|
| Count                                   | 690        |
| <b>Depth maps generation parameters</b> |            |
| Quality                                 | High       |
| Filtering mode                          | Aggressive |
| File size                               | 4.92 GB    |

## Point Cloud

|                      |             |
|----------------------|-------------|
| Points               | 358,712,424 |
| Coordinate precision | 1.61 cm     |

## Point attributes

|            |                |
|------------|----------------|
| Color      | 3 bands, uint8 |
| Normal     |                |
| Confidence | 1 - 28         |

## Point classes

|                            |             |
|----------------------------|-------------|
| Created (never classified) | 195,992,121 |
| Ground                     | 162,260,121 |
| Low Point (noise)          | 460,182     |

## Ground points classification parameters

|                             |                       |
|-----------------------------|-----------------------|
| Max angle (°)               | 15                    |
| Max terrain slope (deg)     | 5                     |
| Max distance (m)            | 0.2                   |
| Cell size (m)               | 50                    |
| Classification time         | 24 minutes 50 seconds |
| Classification memory usage | 8.28 GB               |

|           |         |
|-----------|---------|
| File size | 4.81 GB |
|-----------|---------|

## Tiled Model

|           |                |
|-----------|----------------|
| Texture   | 3 bands, uint8 |
| File size | 988.40 MB      |

## DEM

|                   |                             |
|-------------------|-----------------------------|
| Size              | 19,759 x 23,643             |
| Coordinate system | WGS 84 / UTM zone 21S EGM08 |

## Reconstruction parameters

|             |             |
|-------------|-------------|
| Source data | Point cloud |
|-------------|-------------|

|                                  |                                                                       |
|----------------------------------|-----------------------------------------------------------------------|
| Interpolation                    | Enabled                                                               |
| Source classes                   | Ground                                                                |
| Processing time                  | 3 minutes 16 seconds                                                  |
| Memory usage                     | 311.01 MB                                                             |
| Date created                     | 2024:06:07 14:48:05                                                   |
| Software version                 | 2.1.0.17532                                                           |
| File size                        | 1.13 GB                                                               |
| <b>Orthomosaic</b>               |                                                                       |
| Size                             | 42,693 x 50,891                                                       |
| Coordinate system                | WGS 84 / UTM zone 21S EGM08                                           |
| Colors                           | 3 bands, uint8                                                        |
| <b>Reconstruction parameters</b> |                                                                       |
| Blending mode                    | Mosaic                                                                |
| Surface                          | DEM                                                                   |
| Enable hole filling              | Yes                                                                   |
| Enable ghosting filter           | No                                                                    |
| Processing time                  | 27 minutes 38 seconds                                                 |
| Memory usage                     | 1.89 GB                                                               |
| Date created                     | 2024:06:07 11:06:26                                                   |
| Software version                 | 2.1.0.17532                                                           |
| File size                        | 20.76 GB                                                              |
| <b>System</b>                    |                                                                       |
| Software name                    | Agisoft Metashape Professional                                        |
| Software version                 | 2.1.0 build 17532                                                     |
| OS                               | Windows 64 bit                                                        |
| RAM                              | 63.93 GB                                                              |
| CPU                              | Intel(R) Core(TM) i7-9700F CPU @ 3.00GHz                              |
| GPU(s)                           | Intel(R) FPGA Emulation Device<br>Radeon(TM) RX 460 Graphics (Baffin) |