Unmanned Aerial Systems for Mapping

Jarlath O'Neil-Dunne

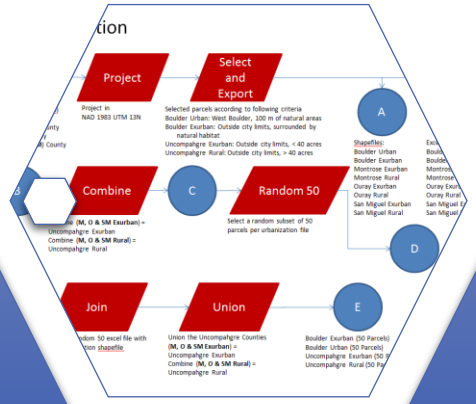
Adam Zylka, Sean MacFaden, Zack Borst, Jim Sullivan, Austin Troy, Noah Ahles, and Amanda Hannaway-Corrente

The UNIVERSITY of VERMONT

DISCLAIMER: The views, opinions, findings and conclusions reflected in this presentation are the responsibility of the authors only and do not represent the official policy or position of the USDOT/OST-R, or any State or other entity.

872
NASA
NORTHROP GRUMMAN
DRYDEN FLIGHT RESEARCH CENTER

Integrated workflows

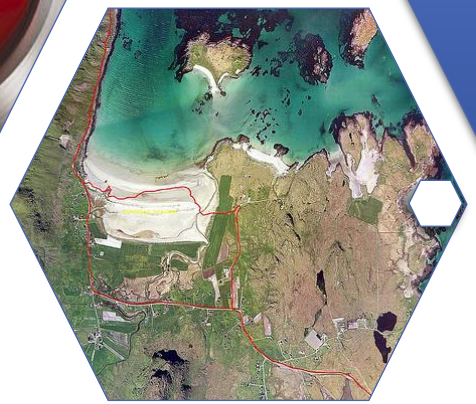


Lightweight & Deployable

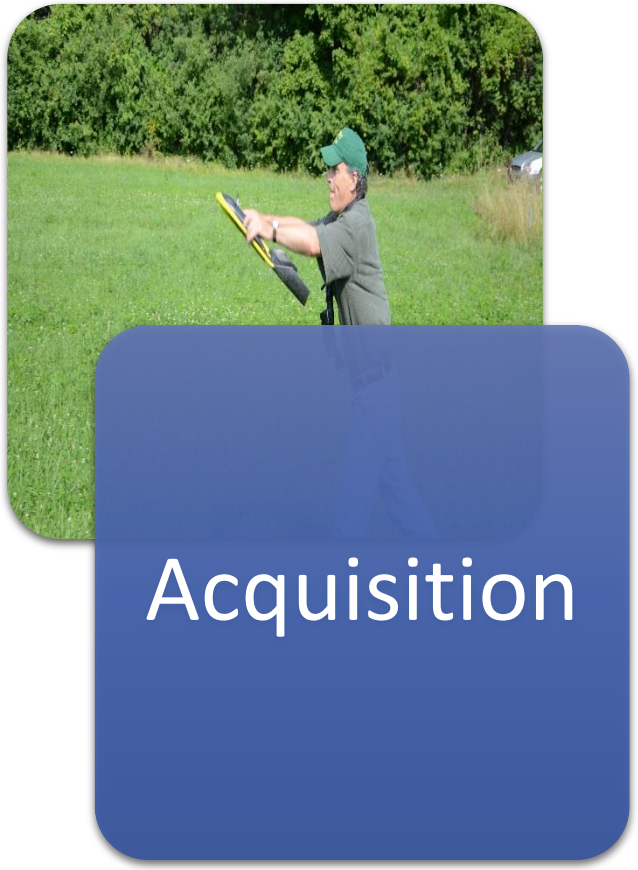
Ease of Use

Safety Mechanisms

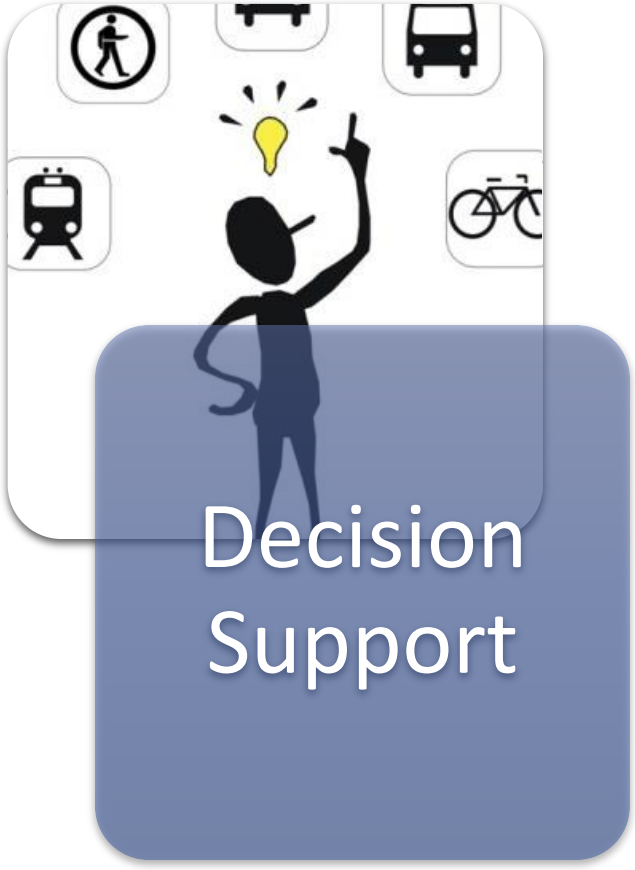
Small Footprint



GIS Ready


Acquisition

Products


Decision
Support

Satellite

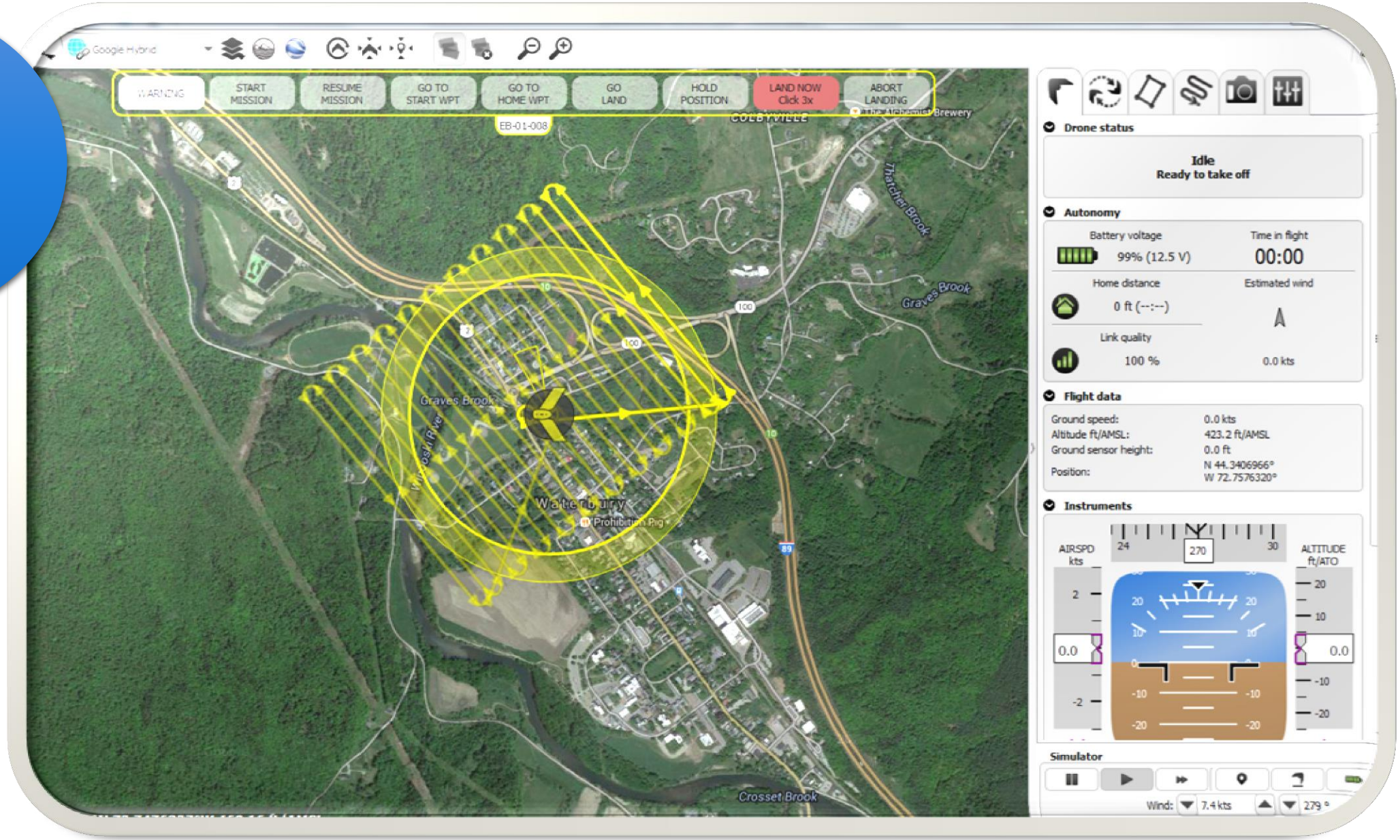
Aerial

Terrestrial LiDAR

Field Survey

Photo credit: Zach Borst

1

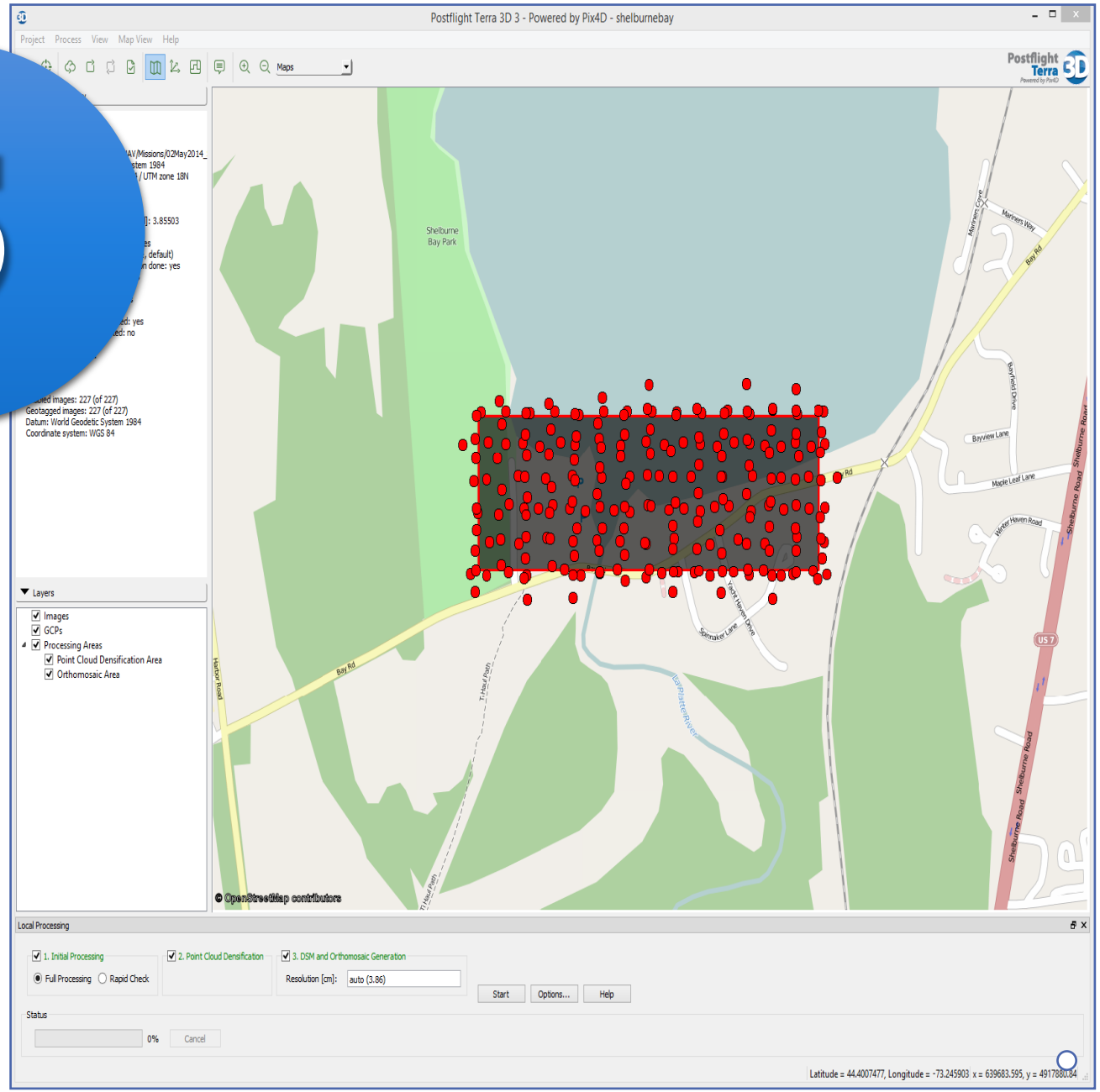

Google Hybrid
WARNING
START MISSION
RESUME MISSION
GO TO START WPT
GO TO HOME WPT
GO LAND
HOLD POSITION
LAND NOW Click 3x
ABORT LANDING
EB-01-008
COLBYVILLE
Brewery
Thatcher Brook
Graves Brook
Graves Brook
Waterbury
Crosset Brook
Drone status
Idle
Ready to take off
Autonomy
Battery voltage
99% (12.5 V)
Time in flight
00:00
Home distance
0 ft (--:--)
Estimated wind
Link quality
100 %
0.0 kts
Flight data
Ground speed: 0.0 kts
Altitude ft/AMSL: 423.2 ft/AMSL
Ground sensor height: 0.0 ft
Position: N 44.3406966° W 72.7576320°
Instruments
AIRSPD kts
ALTITUDE ft/ATO
Simulator
Wind: 7.4 kts 279 °

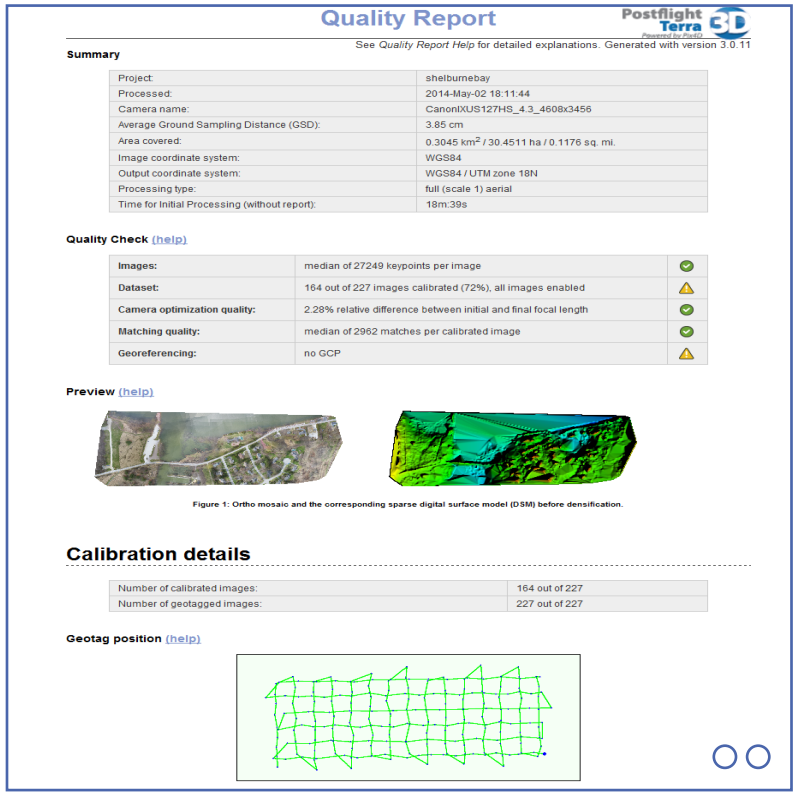
2

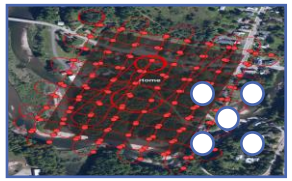
3

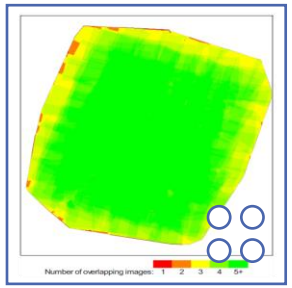
4

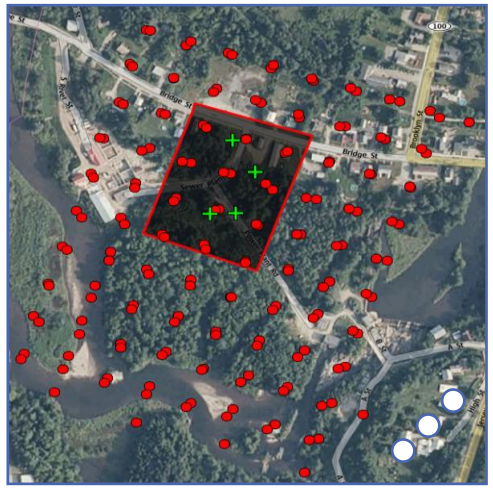
5


Postflight Terra 3D 3 - Powered by Pix4D - shelburnebay
Project Process View Map View Help
Layers
Images
GCPs
Processing Areas
Point Cloud Densification Area
Orthomosaic Area
Shelburne Bay Park
Bay Rd
Shelburne Road
US 7
© OpenStreetMap contributors
Local Processing
1. Initial Processing
Full Processing
Rapid Check
2. Point Cloud Densification
3. DSM and Orthomosaic Generation
Resolution [cm]:
auto (3.86)
Start
Options...
Help
Status
0%
Cancel
Latitude = 44.4007477, Longitude = -73.245903 x = 639683.595, y = 4917880.84

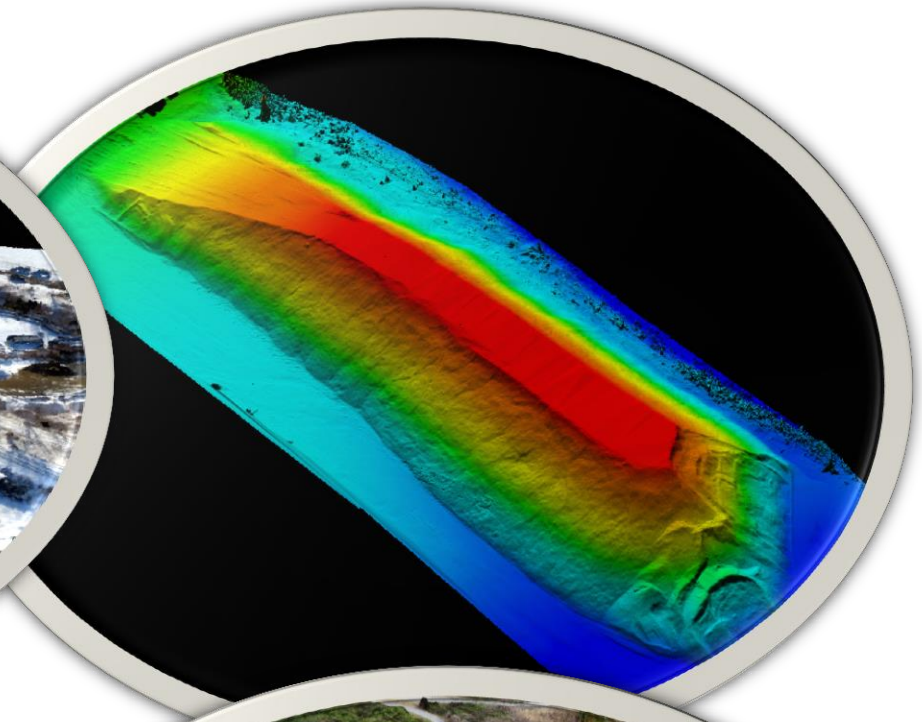

Quality Report
Postflight Terra 3D
See Quality Report Help for detailed explanations. Generated with version 3.0.11
Summary
Project: shelburnebay
Processed: 2014-May-02 18:11:44
Camera name: CanonIXUS127HS_4.3_4608x3456
Average Ground Sampling Distance (GSD): 3.85 cm
Area covered: 0.3045 km² / 30.4511 ha / 0.1176 sq. mi.
Image coordinate system: WGS84
Output coordinate system: WGS84 / UTM zone 18N
Processing type: full (scale 1) aerial
Time for Initial Processing (without report): 18m:39s
Quality Check (help)
Images: median of 27249 keypoints per image
Dataset: 164 out of 227 images calibrated (72%), all images enabled
Camera optimization quality: 2.28% relative difference between initial and final focal length
Matching quality: median of 2962 matches per calibrated image
Georeferencing: no GCP
Preview (help)
Figure 1: Ortho mosaic and the corresponding sparse digital surface model (DSM) before densification.
Calibration details
Number of calibrated images: 164 out of 227
Number of geotagged images: 227 out of 227
Geotag position (help)

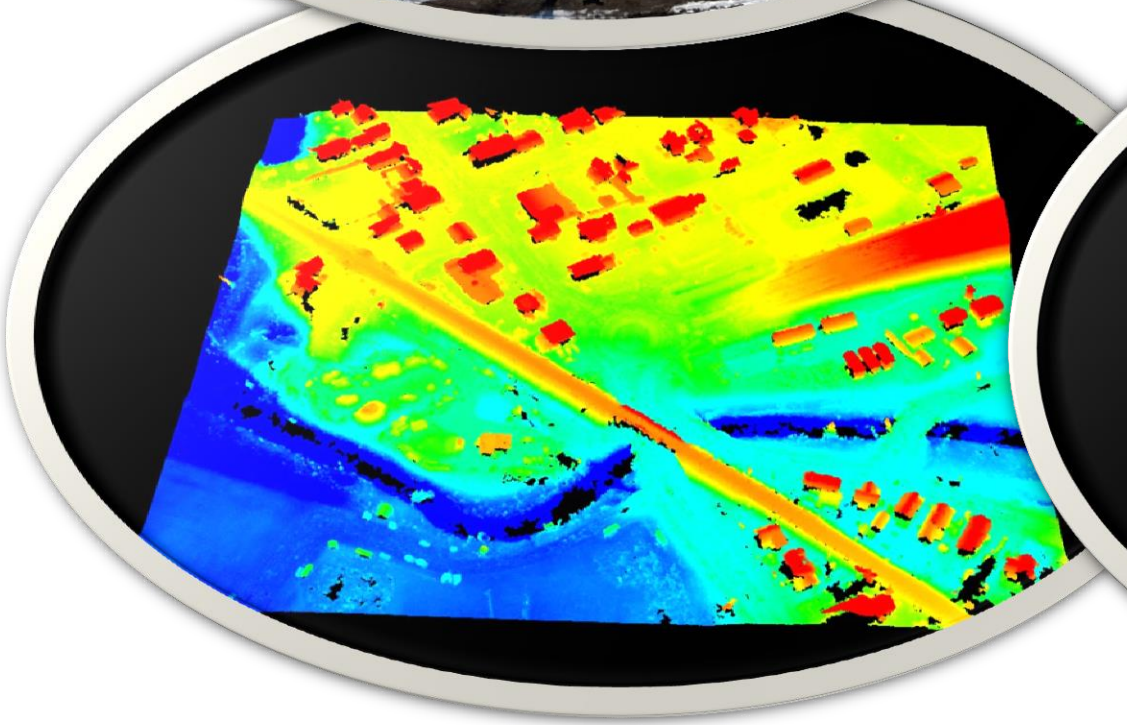






6





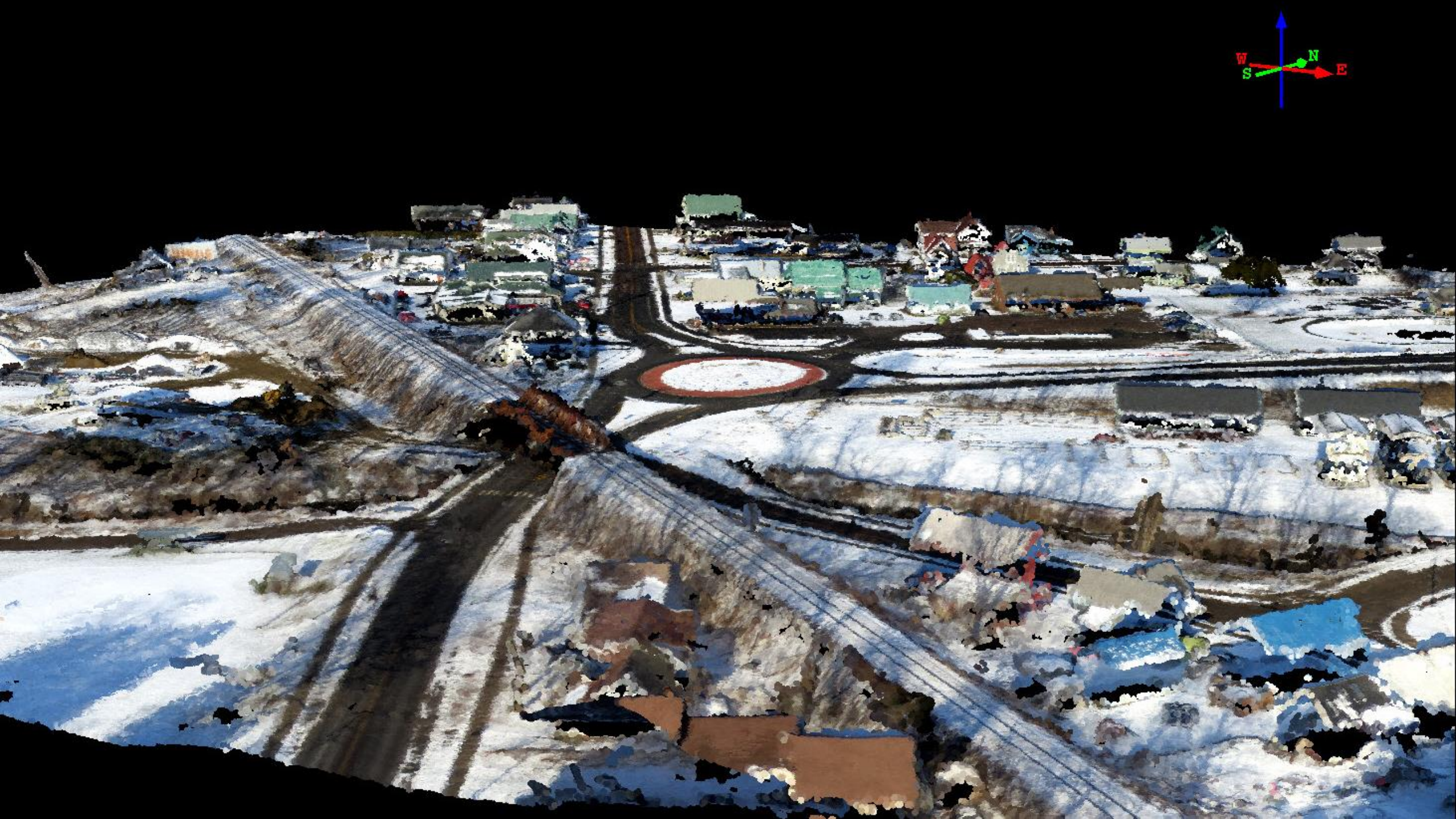
Flight Prep

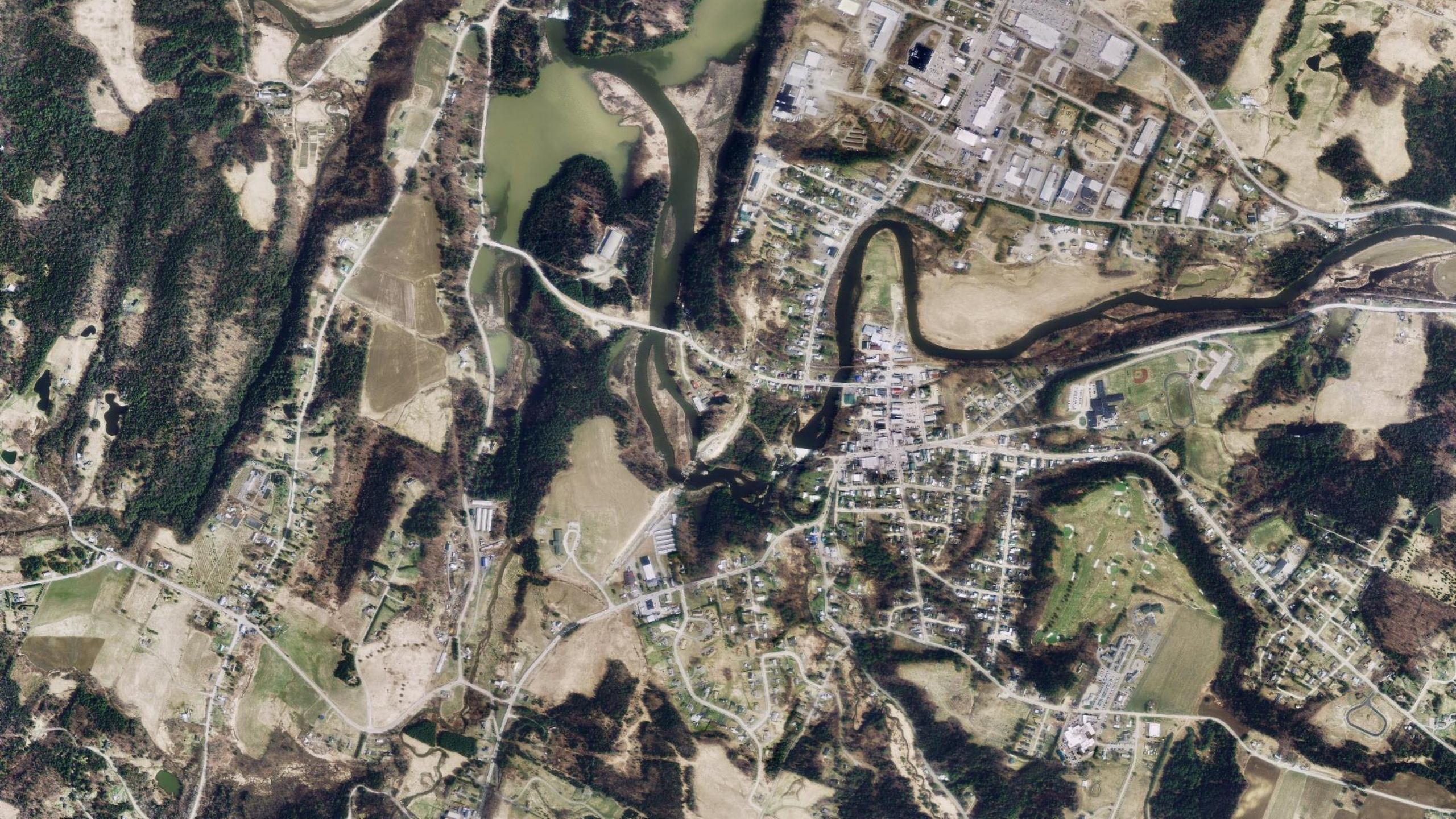
15 minutes

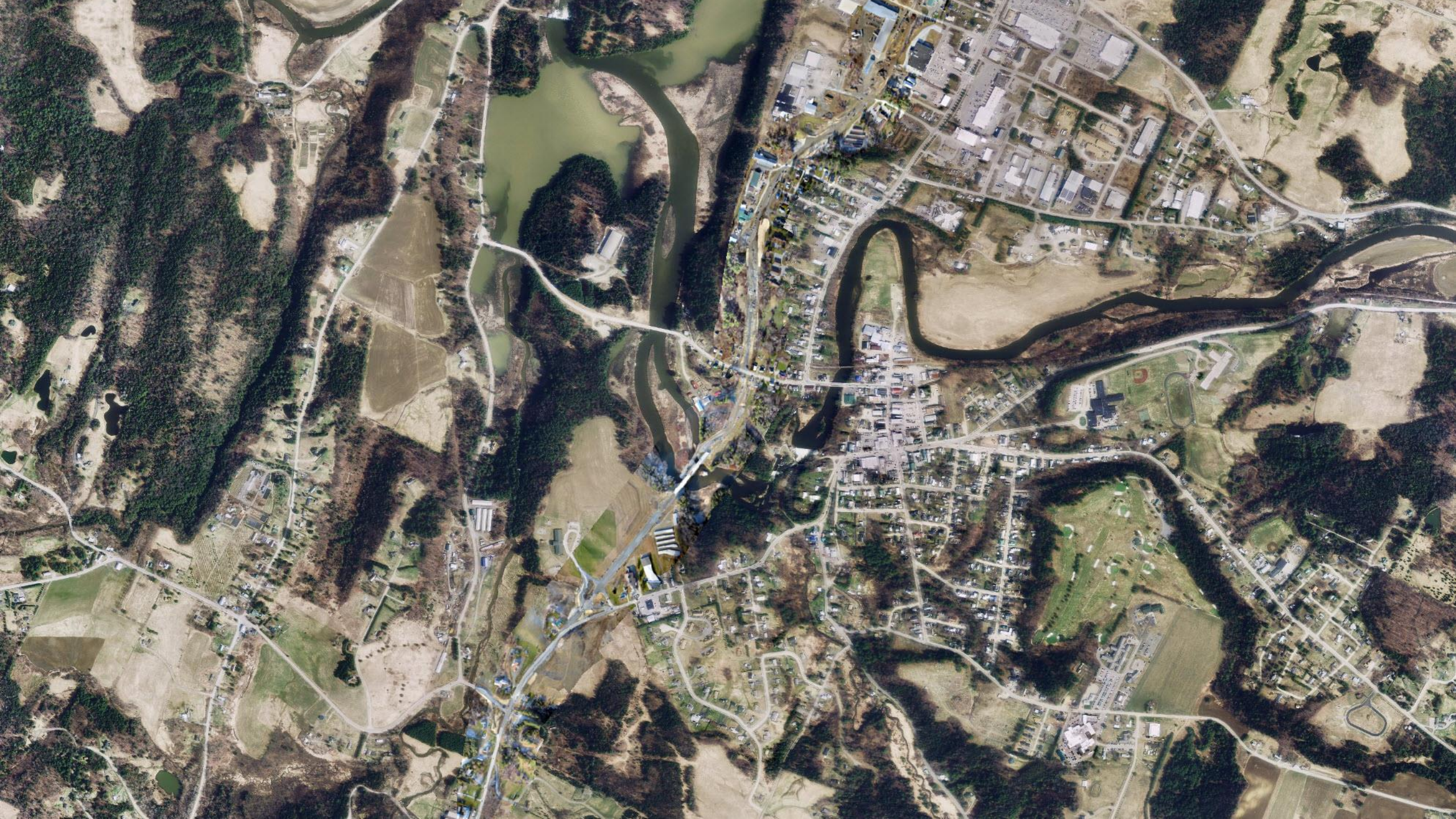
2D/3D Processing

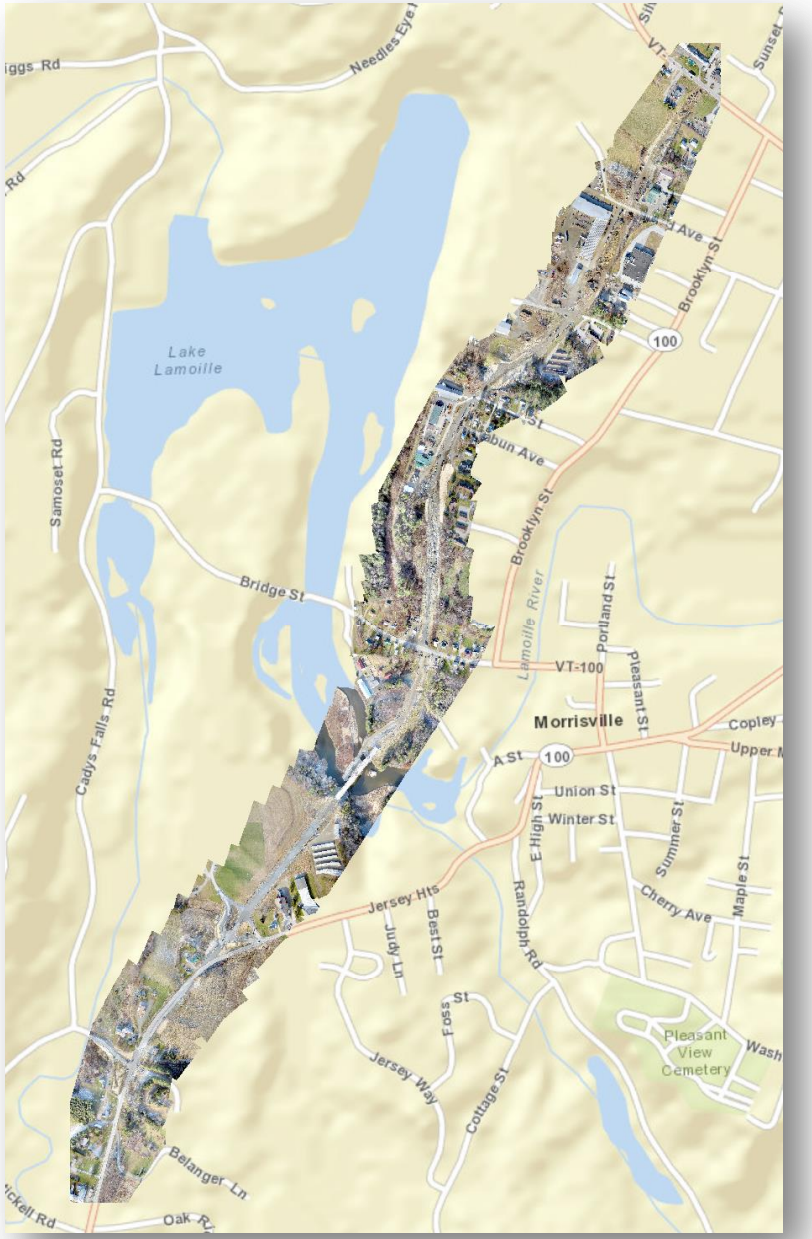
4-10 hours

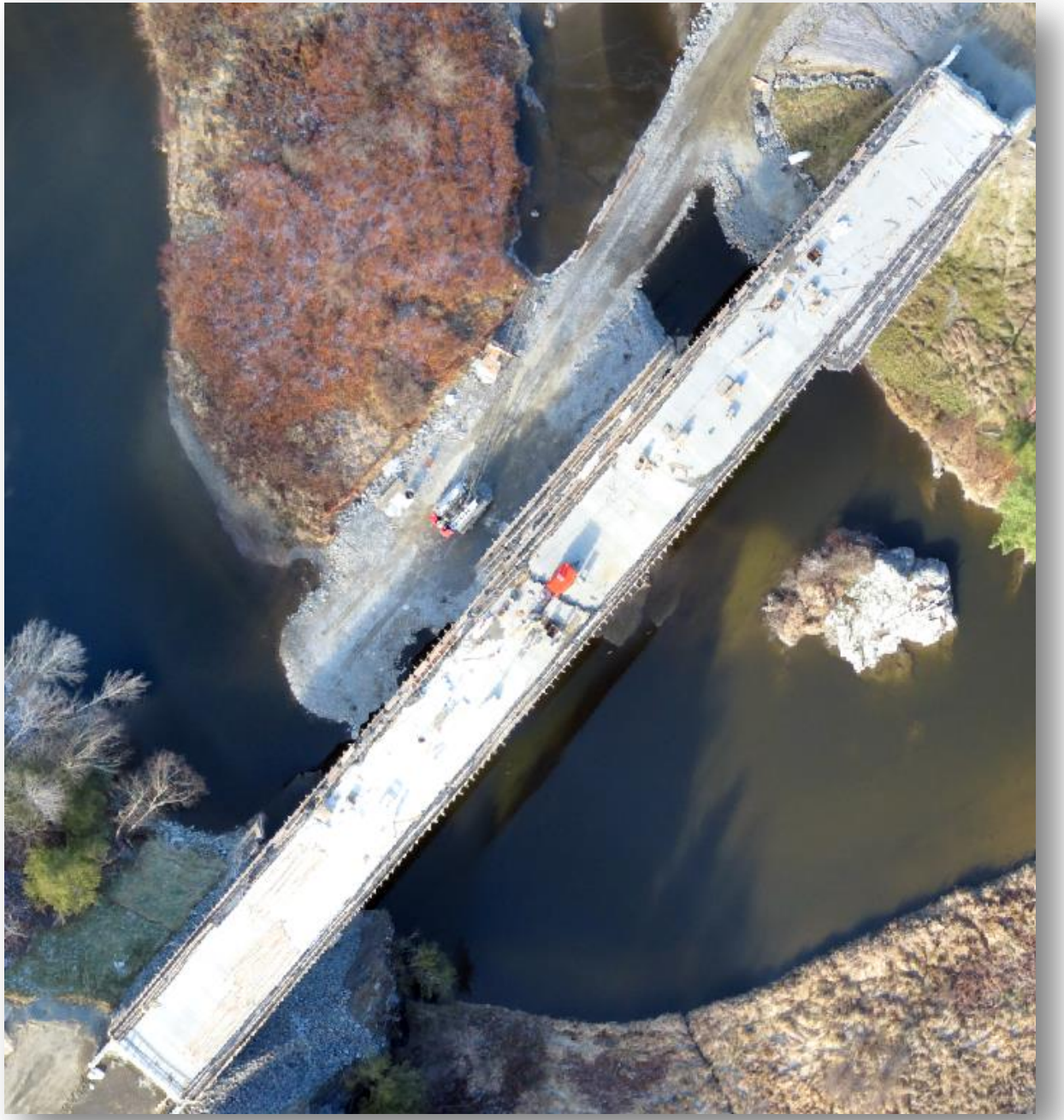
ArcGIS Basemap Imagery
Sensefly eBee imagery


W
S
N
E






Needles Eye
Lake Lamoille
Samoset Rd
Bridge St
Brooklyn St
Lamoille River
Portland St
Pleasant St
VT-100
Morrisville
A St
100
Copley
Union St
Winter St
E High St
Summer St
Cherry Ave
Maple St
Randolph Rd
Jersey Hts
Best St
Judy Ln
Foss St
Jersey Way
Cottage St
Pleasant View Cemetery
Belanger Ln
Cadys Falls Rd



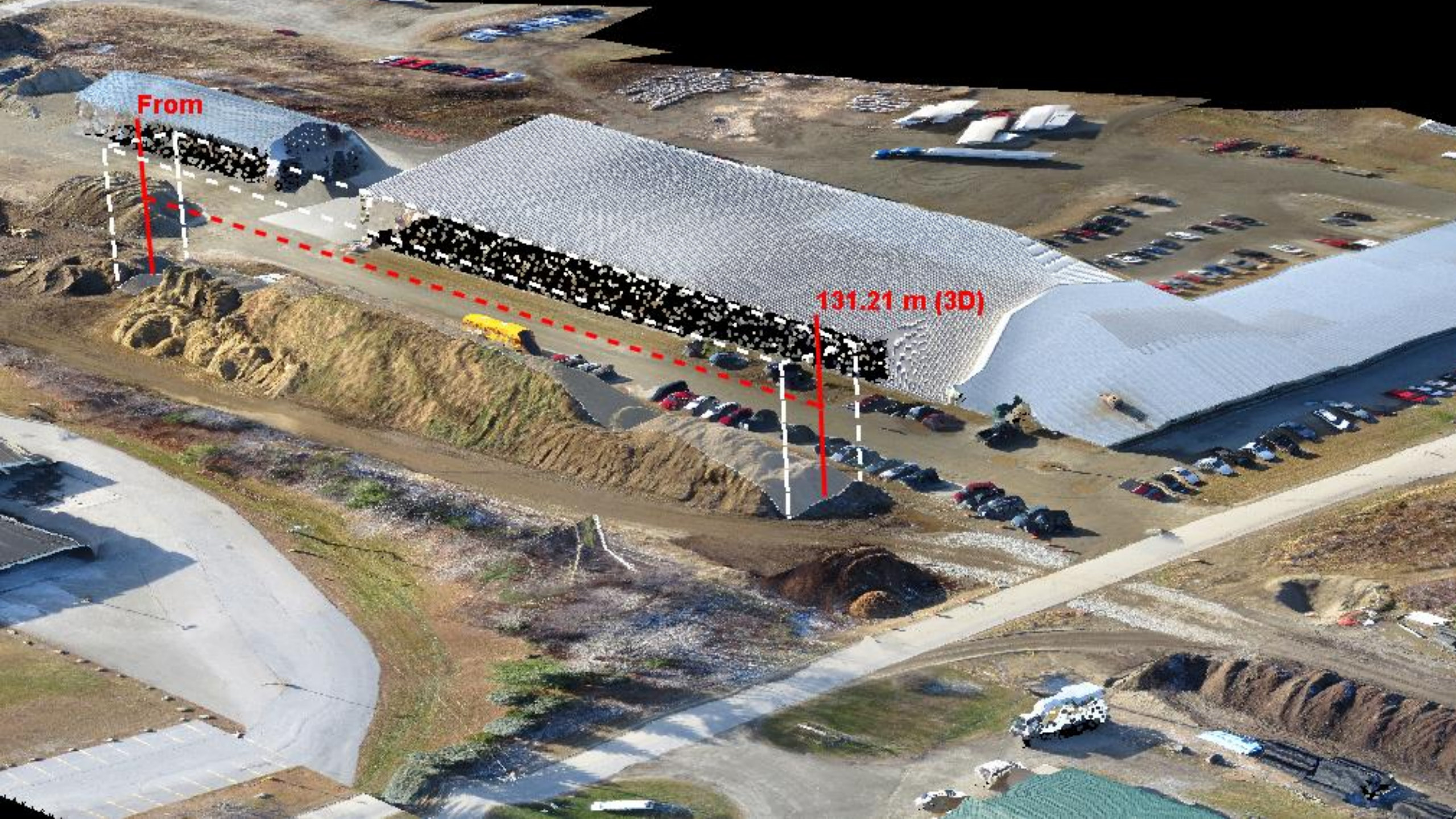
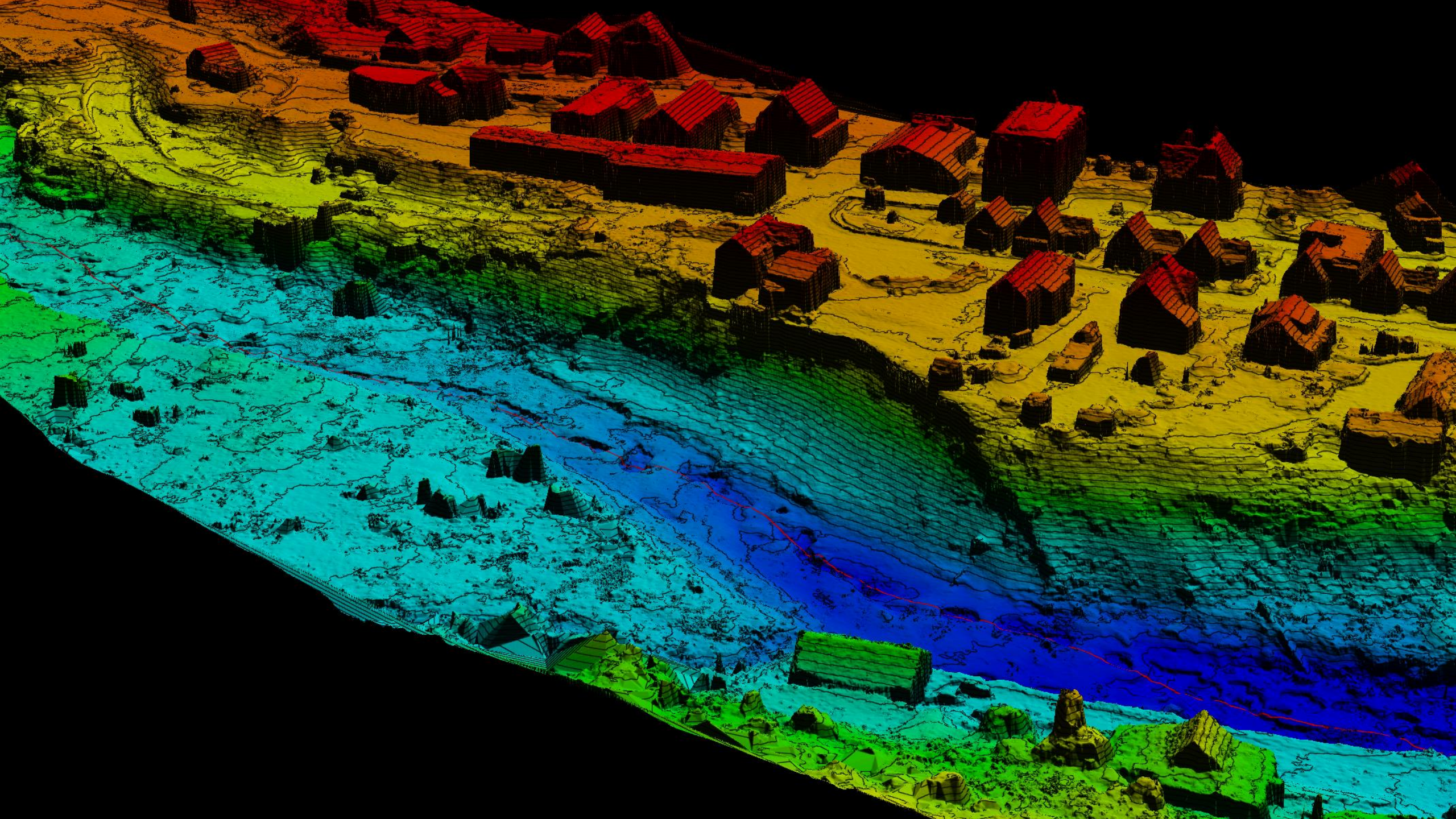

From
131.21 m (3D)

Photo credit: Zach Borst



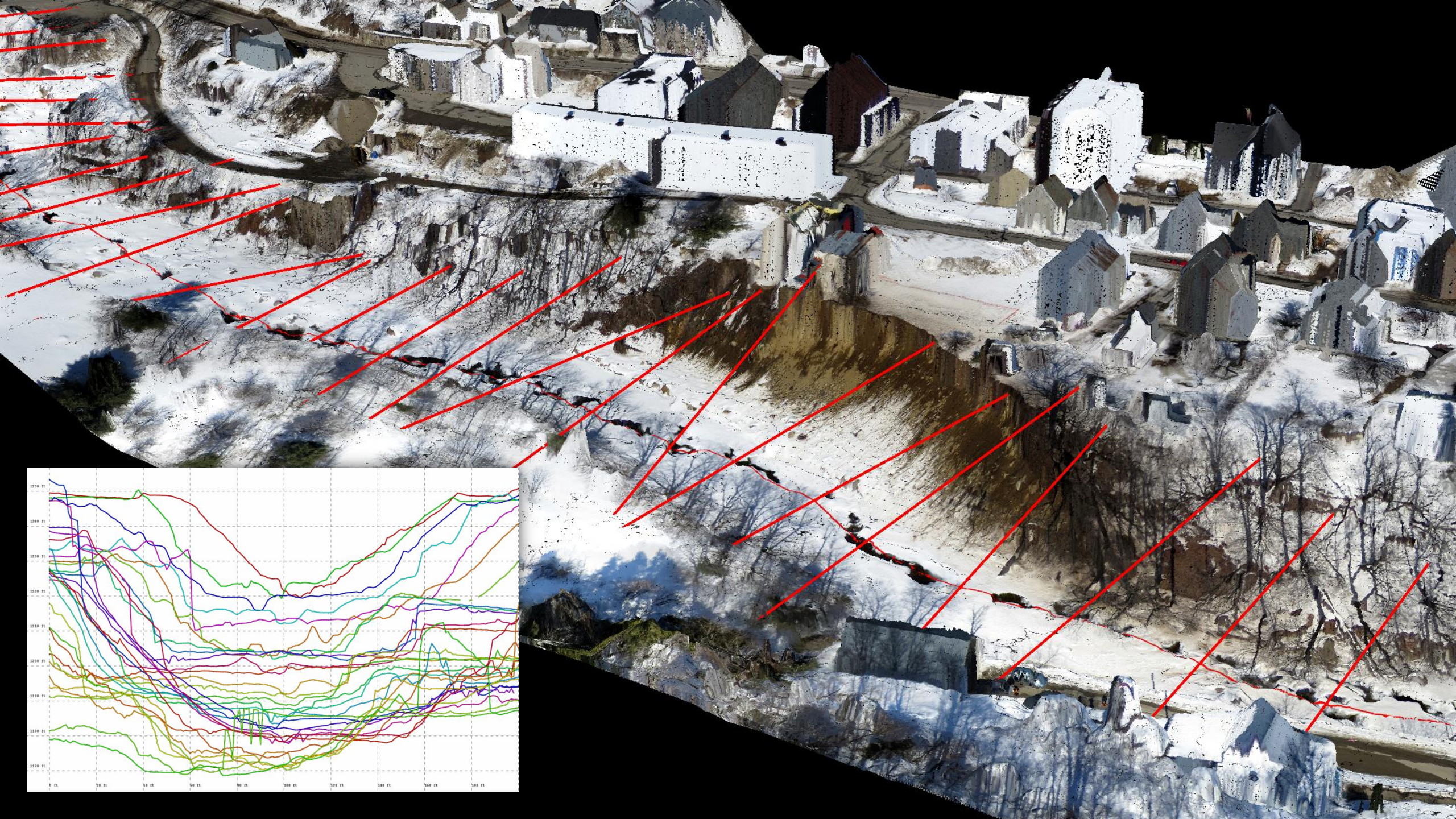
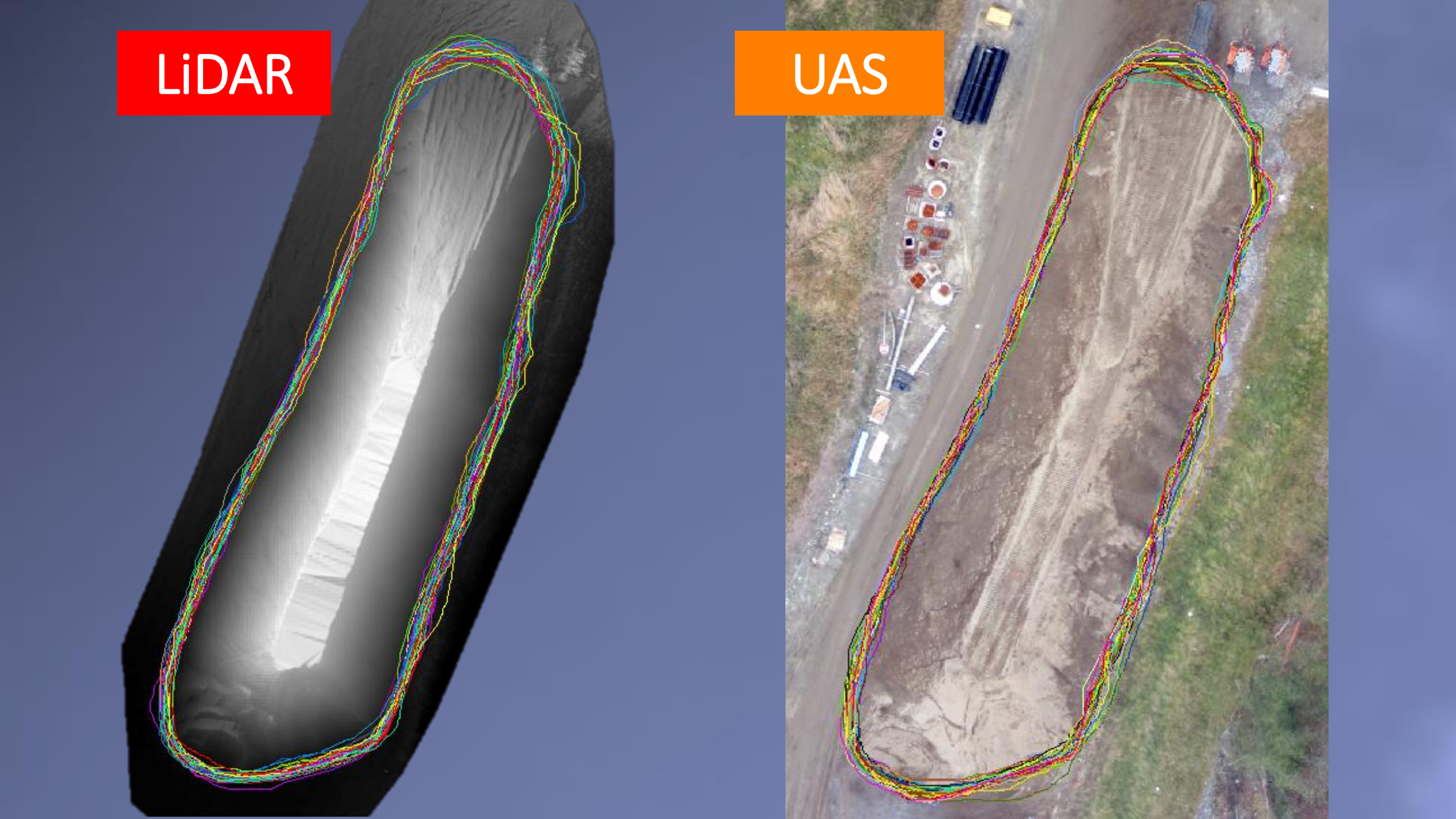
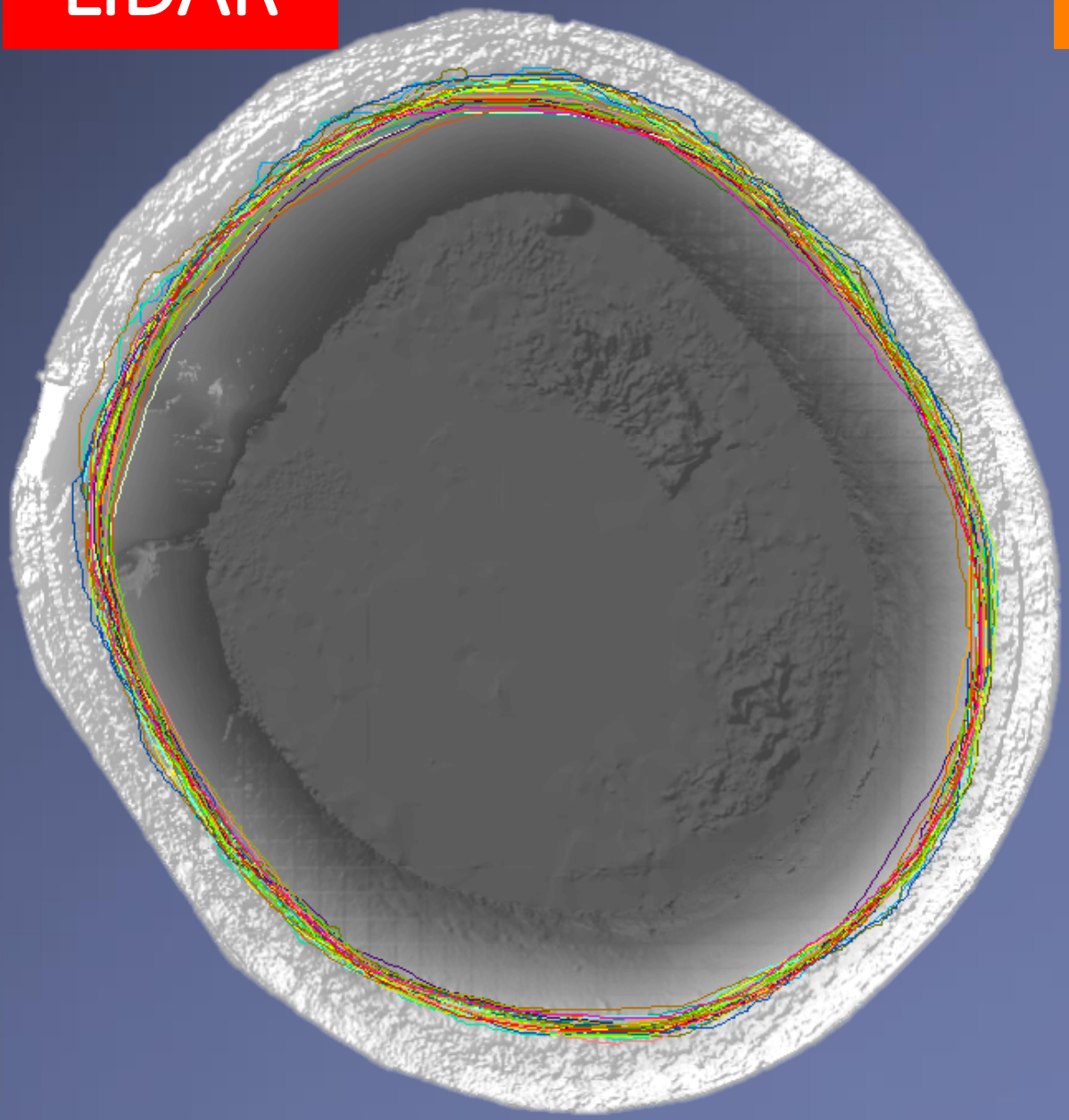

1250 ft
1240 ft
1230 ft
1220 ft
1210 ft
1200 ft
1190 ft
1180 ft
1170 ft
0 ft
20 ft
40 ft
60 ft
80 ft
100 ft
120 ft
140 ft
160 ft
180 ft

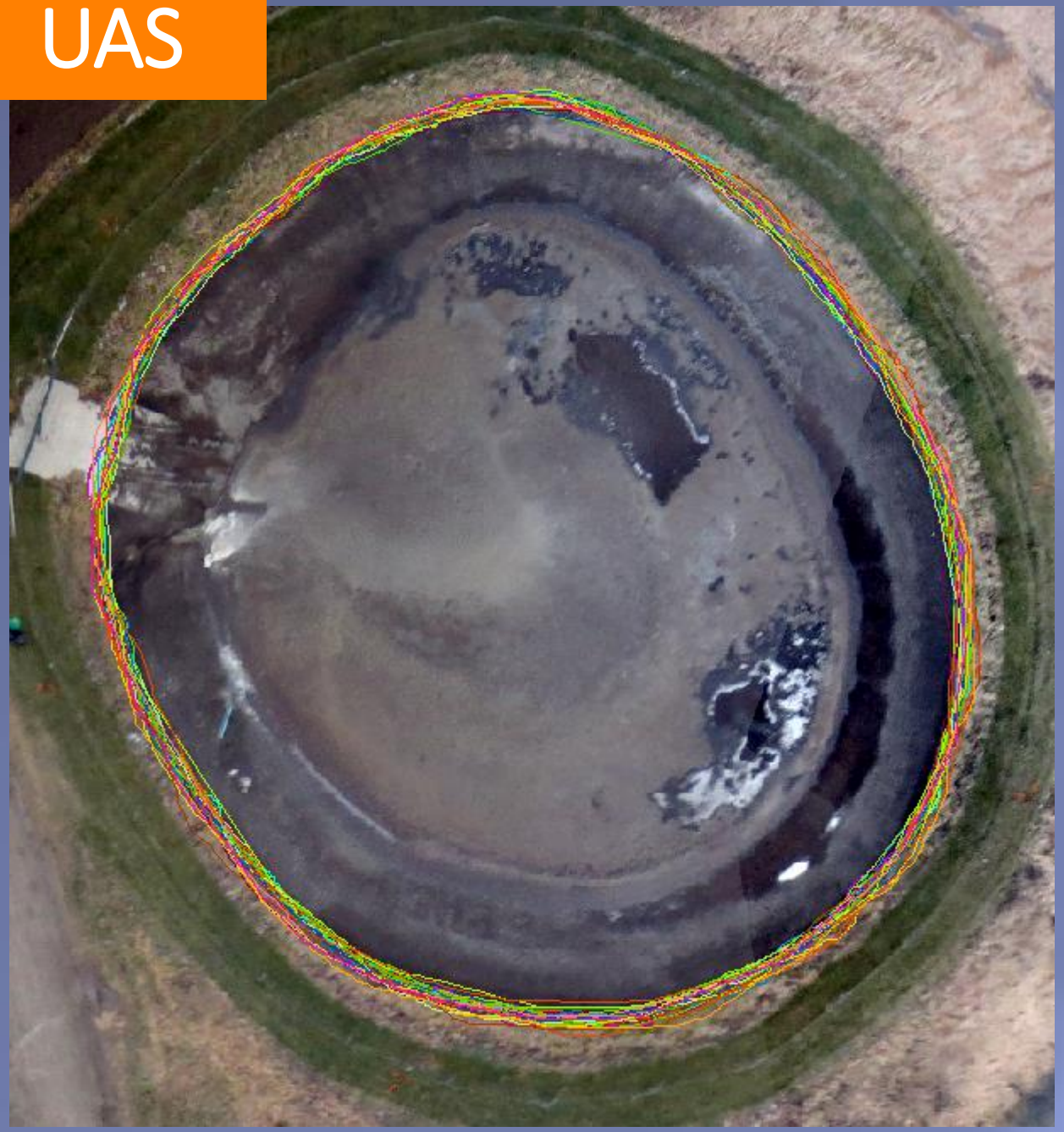
Photo: Zach Borst

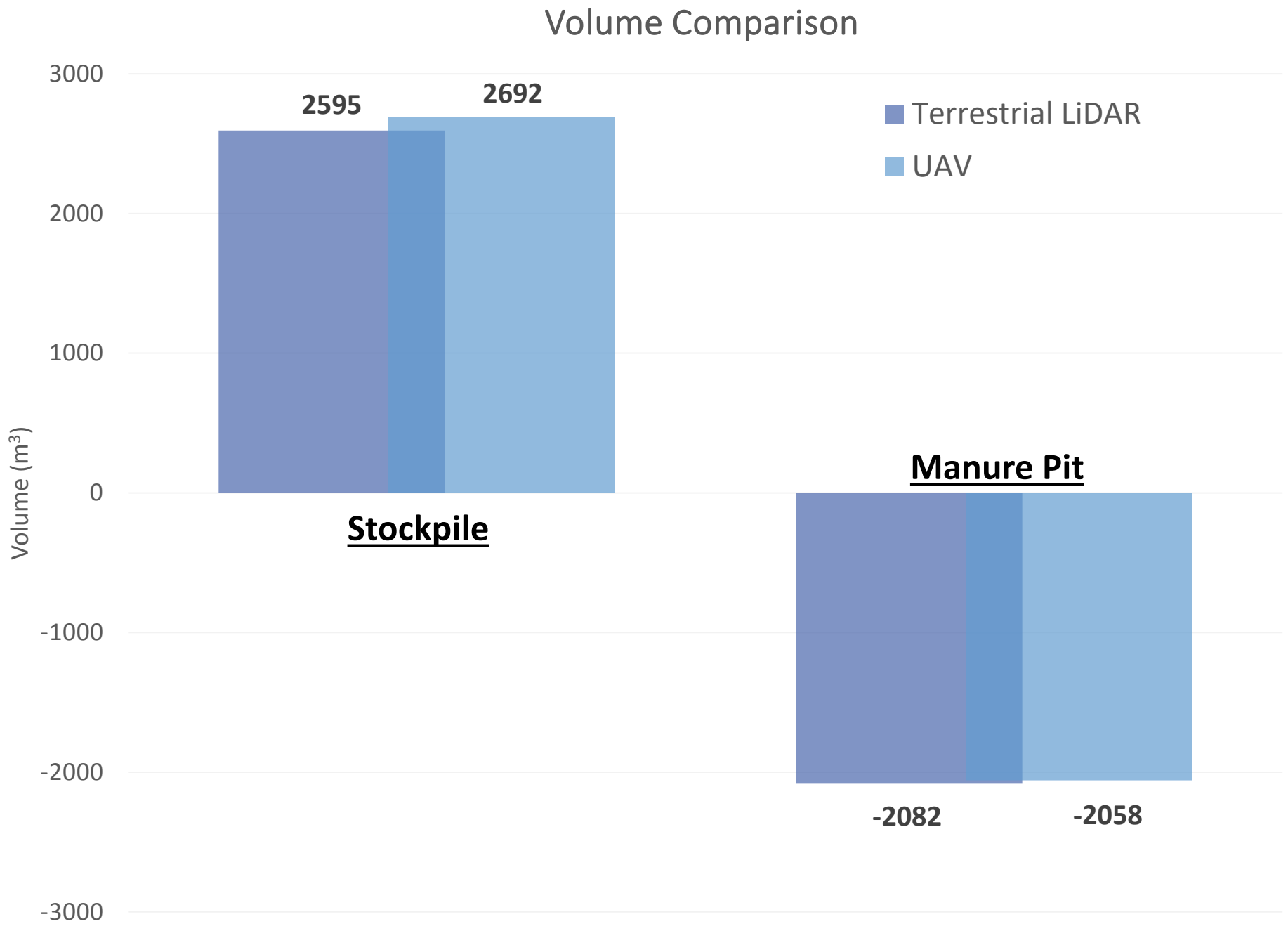

LiDAR
UAS

LiDAR



UAS




Volume Comparison
3000
2000
1000
0
-1000
-2000
-3000
Volume (m3)
2595
2692
Terrestrial LiDAR
UAV
Stockpile
Manure Pit
-2082
-2058

Unmanned Aerial Systems for Mapping

Jarlath O'Neil-Dunne
joneildu@uvm.edu

Adam Zylka, Sean MacFaden, Zack Borst, Jim Sullivan, Austin Troy, Noah Ahles, and Amanda Hannaway-Corrente

The UNIVERSITY of VERMONT

DISCLAIMER: The views, opinions, findings and conclusions reflected in this presentation are the responsibility of the authors only and do not represent the official policy or position of the USDOT/OST-R, or any State or other entity.