

# Vertical Accuracy Report

Wisconsin WROC - 3DEP 2019  
Jefferson County Lidar

The logo for Ayres Associates, featuring the word "AYRES" in a bold, sans-serif font. The letters are white with a blue outline, set against a white background that is part of a larger blue graphic element.

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# Vertical Accuracy Report

## Project Information

**Prepared By:** Ayres

**Project Name:** Wisconsin WROC – 3DEP Jefferson County Lidar 2019

**Sensor Info:** Riegl VQ 1560i, serial number 546 and 061

**USGS Quality Level:** 2

**Required Nominal Pulse Spacing:** 0.7

**Contractor Name:** Ayres

**Units:** US Survey Feet

**Date of Acquisition:** Start: 4/20/2019 Finish: 4/21/2019

## Report Information

This report documents the absolute vertical accuracy of the lidar data collected for the Jefferson County, WI, QL2 lidar project. Independent ground control checkpoints were collected by land surveyors using Trimble GNSS equipment connected to WISCRS base stations. The checkpoints were collected from April 30, 2019, to May 2, 2019.

The checkpoints were collected under various land cover types that are predominant in the County. Each land cover type falls into either the Non-vegetated Vertical Accuracy (NVA) or the Vegetated Vertical Accuracy (VVA) group. For this project, 43 NVA points and 36 VVA points were collected throughout the County.

The following report shows the final statistics for the NVA checkpoints compared against the raw swath point cloud and the bare earth DEM, and the VVA statistics compared against the DEM. Statistics are reported for LAS and DEM by NVA and VVA categories and by land cover type.

Vertical Accuracy Specifications per USGS QL2 level:

### LAS:

NVA equates to 10 cm RMSEz, or 19.6 cm (0.64 ft) at the 95% confidence level.

### DEM:

NVA equates to 10 cm RMSEz, or 19.6 cm (0.64 ft) at the 95% confidence level.

VVA equates to 29.4 cm (0.96 ft) at the 95th percentile.

The NVA and VVA statistics for this project are within the above stated specifications.

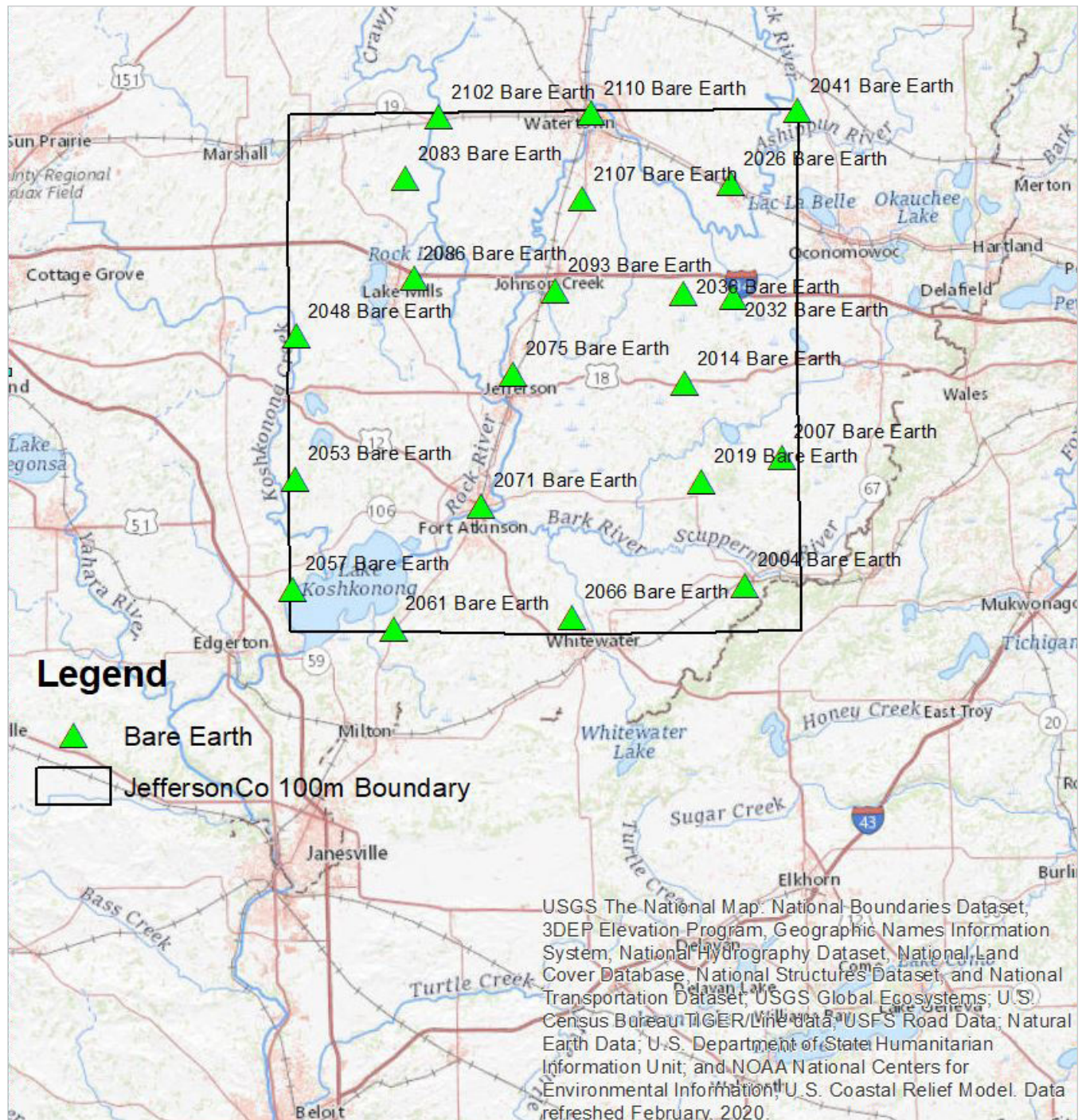


## Lidar Accuracy Assessment Summary

LAND COVER TYPE	# OF POINTS	NVA	VVA
<b>LAS</b>		95% confidence level	N/A
1. Bare Earth	21	0.382	N/A
2. Urban Areas	22	0.242	N/A
3. Tall Weeds	16	N/A	N/A
5. Forest	20	N/A	N/A
TOTAL	79	0.318	N/A
<b>DEM</b>		95% confidence level	95th percentile
1. Bare Earth	21	0.289	N/A
2. Urban Areas	22	0.183	N/A
3. Tall Weeds	16	N/A	0.389
5. Forest	20	N/A	0.411
TOTAL	79	0.241	0.411

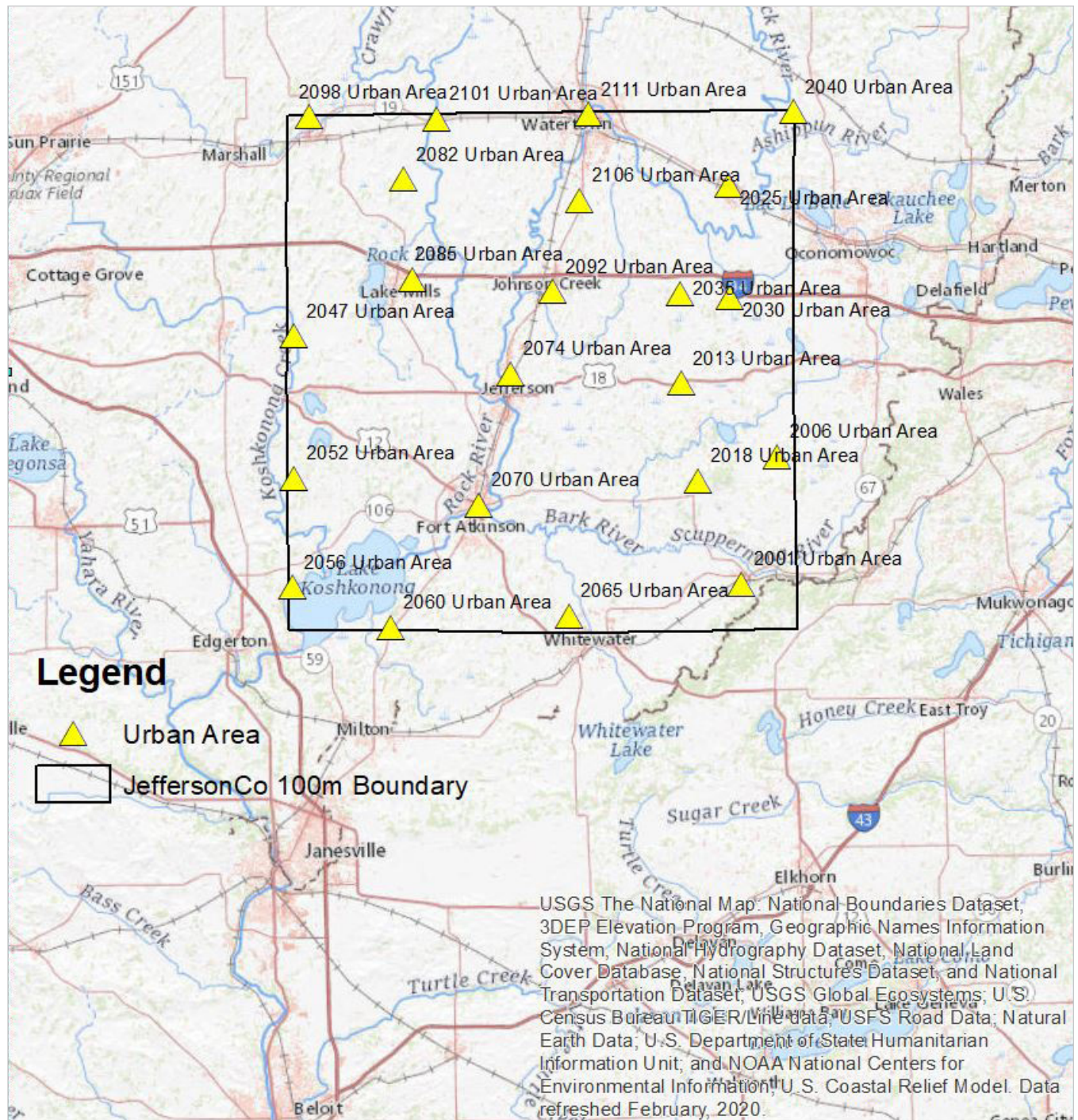
Units: US Survey Feet

## Map of NVA Checkpoint Locations - 1. Bare Earth



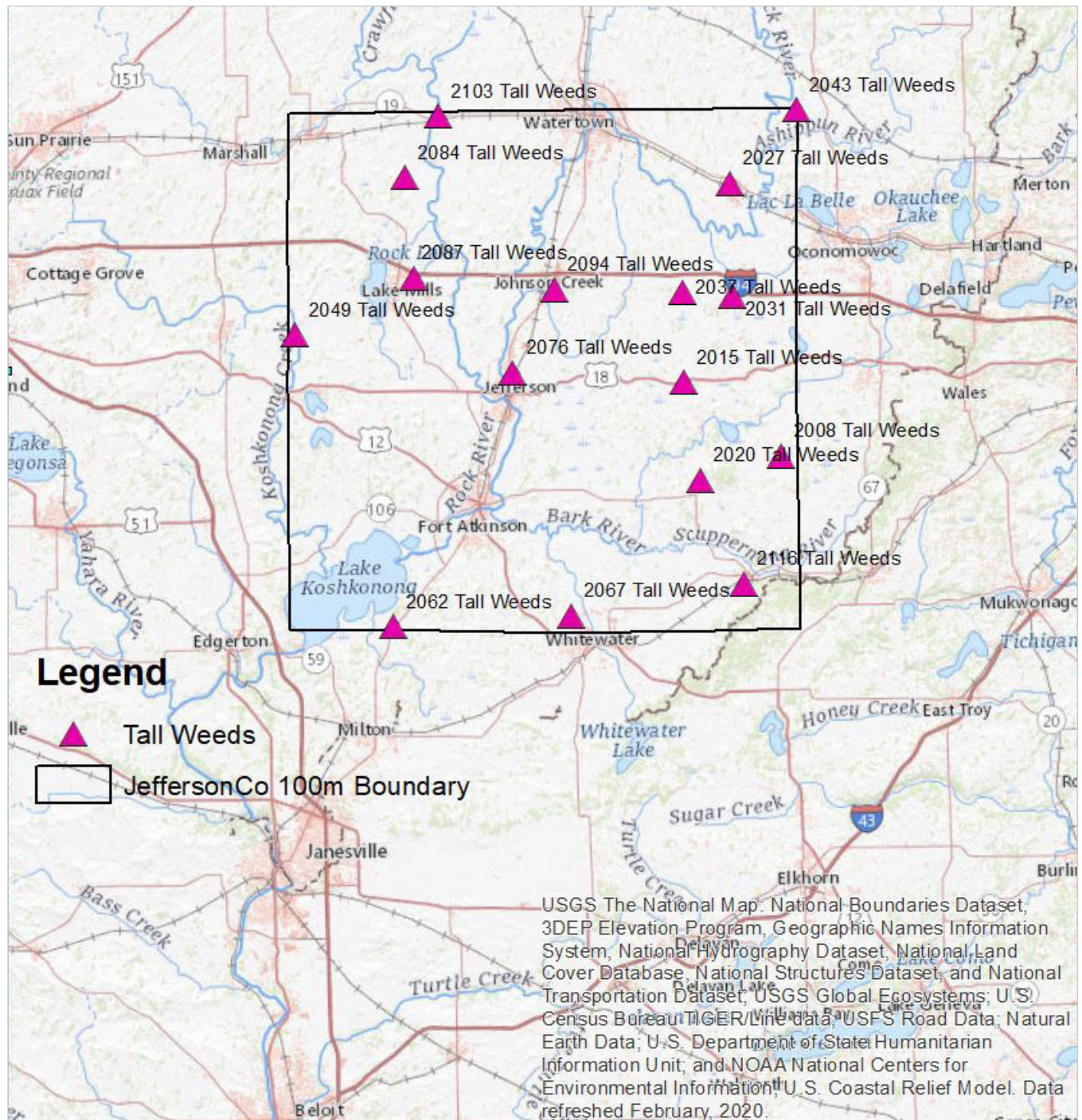


## Map of NVA Checkpoint Locations - 2. Urban Areas



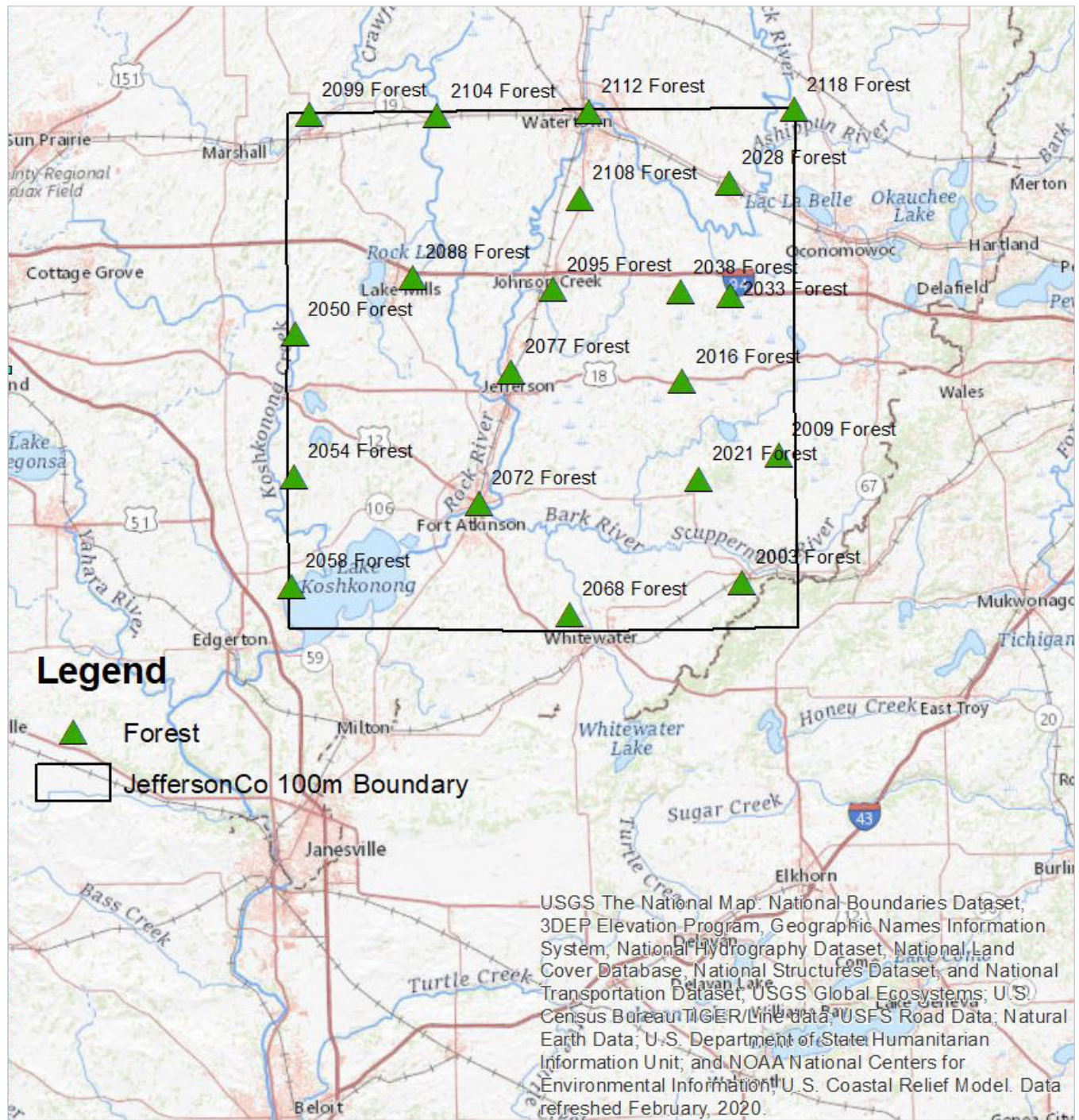


## Map of VVA Checkpoint Locations - 3. Tall Weeds





## Map of VVA Checkpoint Locations - 5. Forested Areas



## LAS

<b>NONVEGETATED VERTICAL ACCURACY – OVERALL</b>	
<b>Land Cover Type</b>	<b>1. Bare Earth, 2. Urban Areas</b>
Minimum DZ	-0.369
Maximum DZ	0.459
Mean DZ	0.031
Mean Magnitude DZ	0.358
Number Observations	43
Standard Deviation DZ	0.161
RMSE Z	0.162
95% Confidence Level Z	0.318
Units	US Survey Feet

## DEM

<b>NONVEGETATED VERTICAL ACCURACY – OVERALL</b>	
<b>Land Cover Type</b>	<b>1. Bare Earth, 2. Urban Areas</b>
Minimum DZ	-0.208
Maximum DZ	0.302
Mean DZ	0.043
Mean Magnitude DZ	0.313
Number Observations	43
Standard Deviation DZ	0.116
RMSE Z	0.123
95% Confidence Level Z	0.241
Units	US Survey Feet

## DEM (Continued)

VEGETATED VERTICAL ACCURACY	
Land Cover Type	3. Tall Weeds
Minimum DZ	-0.229
Maximum DZ	0.605
Mean DZ	0.197
Mean Magnitude DZ	0.475
Number Observations	16
Standard Deviation DZ	0.183
RMSE Z	0.265
95% Confidence Level Z	0.389
Units	US Survey Feet

## DEM (Continued)

VEGETATED VERTICAL ACCURACY	
Land Cover Type	5. Forest
Minimum DZ	-0.08
Maximum DZ	0.416
Mean DZ	0.178
Mean Magnitude DZ	0.431
Number Observations	20
Standard Deviation DZ	0.146
RMSE Z	0.228
95% Confidence Level Z	0.411
Units	US Survey Feet



# Point: 2001 Urban Area

Survey X: 2345772.11, Survey Y: 321437.54, Z1: 846.43, Z DEM: 846.37, Z LAS: 846.39, ΔZ DEM: -0.05, ΔZ LAS: -0.04



North



South



East



West



## Point: 2003 Forest

Survey X: 2345839.55, Survey Y: 321483.49, Z1: 849.21, Z DEM: 849.32, Z LAS: 849.21, ΔZ DEM: 0.11, ΔZ LAS: 0



North



South



East



West



## Point: 2004 Bare Earth

Survey X: 2345850.34, Survey Y: 321446.13, Z1: 848.79, Z DEM: 848.94, Z LAS: 848.92,  $\Delta Z$  DEM: 0.15,  $\Delta Z$  LAS: 0.13



North



South



East



West



# Point: 2006 Urban Area

Survey X: 2354865.83, Survey Y: 353210.36, Z1: 886.38, Z DEM: 886.36, Z LAS: 886.28, ΔZ DEM: -0.02, ΔZ LAS: -0.1



North



South



East



West



# Point: 2007 Bare Earth

Survey X: 2354942.45, Survey Y: 353205.67, Z1: 889.04, Z DEM: 889.01, Z LAS: 889.19, ΔZ DEM: -0.03, ΔZ LAS: 0.15



North



South



East



West



## Point: 2008 Tall Weeds

Survey X: 2354905.74, Survey Y: 353235.28, Z1: 886.33, Z DEM: 886.48, Z LAS: 886.67, ΔZ DEM: 0.15, ΔZ LAS: 0.34



North



South



East



West



# Point: 2009 Forest

Survey X: 2354934.05, Survey Y: 353271.46, Z1: 886.63, Z DEM: 886.7, Z LAS: 886.86, ΔZ DEM: 0.07, ΔZ LAS: 0.23



North



South



East



West



# Point: 2013 Urban Area

Survey X: 2330743.06, Survey Y: 371606.79, Z1: 852.72, Z DEM: 852.6, Z LAS: 852.51, ΔZ DEM: -0.12, ΔZ LAS: -0.21



North



South



East



West



## Point: 2014 Bare Earth

Survey X: 2330839.92, Survey Y: 371605.27, Z1: 847.05, Z DEM: 847.1, Z LAS: 846.92,  $\Delta Z$  DEM: 0.05,  $\Delta Z$  LAS: -0.13



North



South



East



West



# Point: 2015 Tall Weeds

Survey X: 2330798.04, Survey Y: 371637.24, Z1: 848.21, Z DEM: 847.98, Z LAS: 848.05, ΔZ DEM: -0.23, ΔZ LAS: -0.16



North



South



East



West



# Point: 2016 Forest

Survey X: 2330868.11, Survey Y: 371632.63, Z1: 845.63, Z DEM: 845.65, Z LAS: 845.52, ΔZ DEM: 0.02, ΔZ LAS: -0.1



North



South



East



West



# Point: 2018 Urban Area

Survey X: 2335092.53, Survey Y: 347246.62, Z1: 878.2, Z DEM: 878.29, Z LAS: 878.29, ΔZ DEM: 0.1, ΔZ LAS: 0.09



North



South



East



West

# Point: 2019 Bare Earth

Survey X: 2335035.13, Survey Y: 347231.3, Z1: 874.79, Z DEM: 875.04, Z LAS: 875.01, ΔZ DEM: 0.25, ΔZ LAS: 0.22



North



South



East



West



## Point: 2020 Tall Weeds

Survey X: 2335062.49, Survey Y: 347200.13, Z1: 873.26, Z DEM: 873.65, Z LAS: 873.73, ΔZ DEM: 0.39, ΔZ LAS: 0.47



North



South



East



West



## Point: 2021 Forest

Survey X: 2335048.85, Survey Y: 347270.21, Z1: 875.73, Z DEM: 875.94, Z LAS: 875.92, ΔZ DEM: 0.21, ΔZ LAS: 0.19



North



South



East



West



# Point: 2025 Urban Area

Survey X: 2342508.53, Survey Y: 421158.68, Z1: 871.71, Z DEM: 871.78, Z LAS: 871.76, ΔZ DEM: 0.06, ΔZ LAS: 0.05



North



South



East



West



# Point: 2026 Bare Earth

Survey X: 2342398.65, Survey Y: 421190.7, Z1: 869.79, Z DEM: 869.79, Z LAS: 869.89, ΔZ DEM: 0, ΔZ LAS: 0.1



North



South



East



West



## Point: 2027 Tall Weeds

Survey X: 2342335.2, Survey Y: 421134.04, Z1: 867.51, Z DEM: 867.73, Z LAS: 867.62, ΔZ DEM: 0.22, ΔZ LAS: 0.11



North



South



East



West



# Point: 2028 Forest

Survey X: 2342586.54, Survey Y: 421148.2, Z1: 870.98, Z DEM: 871.18, Z LAS: 871.09, ΔZ DEM: 0.19, ΔZ LAS: 0.1



North



South



East



West



# Point: 2030 Urban Area

Survey X: 2342871.57, Survey Y: 392997.95, Z1: 855.48, Z DEM: 855.4, Z LAS: 855.39, ΔZ DEM: -0.08, ΔZ LAS: -0.09



North



South



East



West



# Point: 2031 Tall Weeds

Survey X: 2342861.1, Survey Y: 393075.58, Z1: 851.62, Z DEM: 851.67, Z LAS: 851.86, ΔZ DEM: 0.04, ΔZ LAS: 0.24



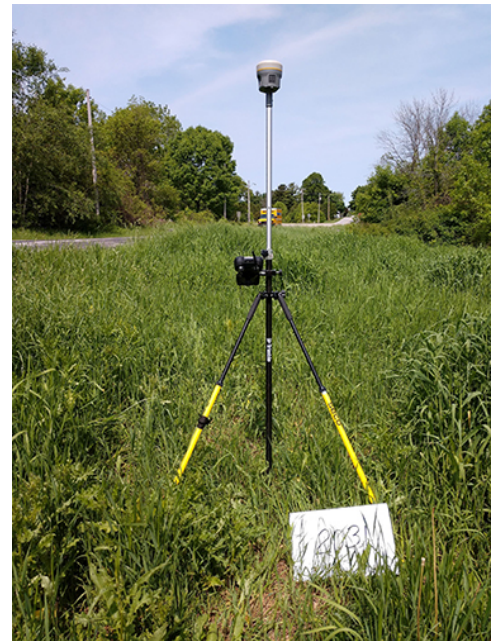
North



South



East



West



# Point: 2032 Bare Earth

Survey X: 2342798.82, Survey Y: 392945.36, Z1: 856.22, Z DEM: 856.01, Z LAS: 856.12, ΔZ DEM: -0.21, ΔZ LAS: -0.1



North



South



East



West



## Point: 2033 Forest

Survey X: 2342820.25, Survey Y: 392985.16, Z1: 854.81, Z DEM: 854.91, Z LAS: 854.93, ΔZ DEM: 0.1, ΔZ LAS: 0.12



North



South



East



West



# Point: 2035 Urban Area

Survey X: 2330514.93, Survey Y: 393827.38, Z1: 898.1, Z DEM: 898.02, Z LAS: 898.07, ΔZ DEM: -0.08, ΔZ LAS: -0.03



North



South



East



West



## Point: 2036 Bare Earth

Survey X: 2330514.94, Survey Y: 393897.6, Z1: 901.74, Z DEM: 901.78, Z LAS: 901.56, ΔZ DEM: 0.04, ΔZ LAS: -0.18



North



South



East



West



# Point: 2037 Tall Weeds

Survey X: 2330461.45, Survey Y: 393868.44, Z1: 904.11, Z DEM: 904.45, Z LAS: 904.32,  $\Delta Z$  DEM: 0.34,  $\Delta Z$  LAS: 0.21



North



South



East



West



# Point: 2038 Forest

Survey X: 2330496.38, Survey Y: 393892.39, Z1: 902.05, Z DEM: 902.45, Z LAS: 902.34, ΔZ DEM: 0.4, ΔZ LAS: 0.29



North



South



East



West



# Point: 2040 Urban Area

Survey X: 2358739.7, Survey Y: 439354.03, Z1: 858.62, Z DEM: 858.6, Z LAS: 858.25, ΔZ DEM: -0.02, ΔZ LAS: -0.37



North



South



East



West



# Point: 2041 Bare Earth

Survey X: 2358849.73, Survey Y: 439344.91, Z1: 857.21, Z DEM: 857.25, Z LAS: 857.67,  $\Delta Z$  DEM: 0.04,  $\Delta Z$  LAS: 0.46



North



South



East



West

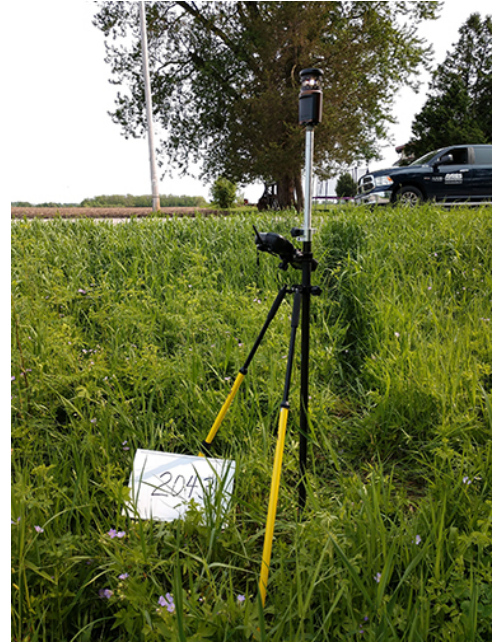


# Point: 2043 Tall Weeds

Survey X: 2358896.77, Survey Y: 439391.07, Z1: 854.99, Z DEM: 855.02, Z LAS: 855.09, ΔZ DEM: 0.03, ΔZ LAS: 0.1



North



South



East



West



# Point: 2047 Urban Area

Survey X: 2234111.69, Survey Y: 383332.64, Z1: 857.46, Z DEM: 857.55, Z LAS: 857.57, ΔZ DEM: 0.09, ΔZ LAS: 0.11



North



South



East



West



# Point: 2048 Bare Earth

Survey X: 2234204.55, Survey Y: 383354.6, Z1: 854.69, Z DEM: 854.88, Z LAS: 854.96, ΔZ DEM: 0.19, ΔZ LAS: 0.27



North



South



East



West



## Point: 2049 Tall Weeds

Survey X: 2234140.51, Survey Y: 383378.47, Z1: 855.38, Z DEM: 855.69, Z LAS: 855.83,  $\Delta Z$  DEM: 0.31,  $\Delta Z$  LAS: 0.44



North



South



East



West



## Point: 2050 Forest

Survey X: 2234187.79, Survey Y: 383409.97, Z1: 853.38, Z DEM: 853.53, Z LAS: 853.54,  $\Delta Z$  DEM: 0.16,  $\Delta Z$  LAS: 0.16



North



South



East



West



# Point: 2052 Urban Area

Survey X: 2234067.87, Survey Y: 347801.28, Z1: 864.86, Z DEM: 864.76, Z LAS: 864.81, ΔZ DEM: -0.1, ΔZ LAS: -0.05



North



South



East



West



# Point: 2053 Bare Earth

Survey X: 2234026.99, Survey Y: 347766.44, Z1: 863.54, Z DEM: 863.64, Z LAS: 863.74, ΔZ DEM: 0.09, ΔZ LAS: 0.2



North



South



East



West



# Point: 2054 Forest

Survey X: 2234023.83, Survey Y: 347814.38, Z1: 861.43, Z DEM: 861.84, Z LAS: 862.72, ΔZ DEM: 0.41, ΔZ LAS: 1.29



North



South



East



West



# Point: 2056 Urban Area

Survey X: 2233540.65, Survey Y: 320596.71, Z1: 810.17, Z DEM: 810.17, Z LAS: 810.13, ΔZ DEM: 0, ΔZ LAS: -0.04



North



South



East



West



## Point: 2057 Bare Earth

Survey X: 2233368.64, Survey Y: 320457.56, Z1: 807.3, Z DEM: 807.35, Z LAS: 807.35, ΔZ DEM: 0.05, ΔZ LAS: 0.05



North



South



East



West



# Point: 2058 Forest

Survey X: 2233386.71, Survey Y: 320492.63, Z1: 808, Z DEM: 808.07, Z LAS: 808.1, ΔZ DEM: 0.07, ΔZ LAS: 0.1



North



South



East



West



## Point: 2060 Urban Area

Survey X: 2258347.42, Survey Y: 310626.45, Z1: 828.71, Z DEM: 828.85, Z LAS: 828.82,  $\Delta Z$  DEM: 0.14,  $\Delta Z$  LAS: 0.11



North



South



East



West



## Point: 2061 Bare Earth

Survey X: 2258386.99, Survey Y: 310655.95, Z1: 827.3, Z DEM: 827.48, Z LAS: 827.49,  $\Delta Z$  DEM: 0.18,  $\Delta Z$  LAS: 0.19



North



South



East



West



# Point: 2062 Tall Weeds

Survey X: 2258401.37, Survey Y: 310698.03, Z1: 828.9, Z DEM: 829.51, Z LAS: 829.25, ΔZ DEM: 0.6, ΔZ LAS: 0.34



North



South



East



West



## Point: 2065 Urban Area

Survey X: 2302687.66, Survey Y: 313496.91, Z1: 835.8, Z DEM: 835.95, Z LAS: 835.87,  $\Delta Z$  DEM: 0.15,  $\Delta Z$  LAS: 0.07



North



South



East



West



# Point: 2066 Bare Earth

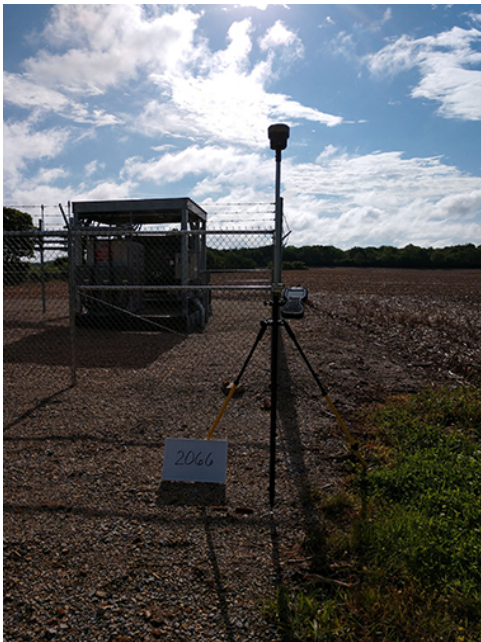
Survey X: 2302841.04, Survey Y: 313454.83, Z1: 836.58, Z DEM: 836.72, Z LAS: 836.73, ΔZ DEM: 0.14, ΔZ LAS: 0.15



North



South



East



West



## Point: 2067 Tall Weeds

Survey X: 2302776.09, Survey Y: 313470.01, Z1: 836.48, Z DEM: 836.69, Z LAS: 836.63, ΔZ DEM: 0.21, ΔZ LAS: 0.15



North



South



East



West



## Point: 2068 Forest

Survey X: 2302733.04, Survey Y: 313391.89, Z1: 835.97, Z DEM: 836.09, Z LAS: 836.09, ΔZ DEM: 0.12, ΔZ LAS: 0.12



North



South



East



West



# Point: 2070 Urban Area

Survey X: 2280129.62, Survey Y: 341169.7, Z1: 792.77, Z DEM: 792.92, Z LAS: 792.79, ΔZ DEM: 0.14, ΔZ LAS: 0.01



North



South



East



West



## Point: 2071 Bare Earth

Survey X: 2280294.37, Survey Y: 341137.14, Z1: 792.05, Z DEM: 791.9, Z LAS: 791.79, ΔZ DEM: -0.15, ΔZ LAS: -0.26



North



South



East



West



# Point: 2072 Forest

Survey X: 2280046.99, Survey Y: 341169.28, Z1: 793.35, Z DEM: 793.47, Z LAS: 793.35, ΔZ DEM: 0.12, ΔZ LAS: 0



North



South



East



West



# Point: 2074 Urban Area

Survey X: 2288164.44, Survey Y: 373969.4, Z1: 853, Z DEM: 853.05, Z LAS: 852.97, ΔZ DEM: 0.04, ΔZ LAS: -0.03



North



South



East



West



## Point: 2075 Bare Earth

Survey X: 2288237.01, Survey Y: 373959.37, Z1: 850.57, Z DEM: 850.87, Z LAS: 850.9, ΔZ DEM: 0.3, ΔZ LAS: 0.32



North



South



East



West



# Point: 2076 Tall Weeds

Survey X: 2288281.59, Survey Y: 373945.77, Z1: 847.68, Z DEM: 847.93, Z LAS: 847.79, ΔZ DEM: 0.25, ΔZ LAS: 0.11



North



South



East



West



## Point: 2077 Forest

Survey X: 2288288.81, Survey Y: 373964.71, Z1: 849.73, Z DEM: 850.04, Z LAS: 849.62, ΔZ DEM: 0.31, ΔZ LAS: -0.11



North



South



East



West



## Point: 2082 Urban Area

Survey X: 2261326.78, Survey Y: 422493.29, Z1: 806.09, Z DEM: 806.15, Z LAS: 806.03, ΔZ DEM: 0.07, ΔZ LAS: -0.05



North



South



East



West



## Point: 2083 Bare Earth

Survey X: 2261385.42, Survey Y: 422494.17, Z1: 801.81, Z DEM: 801.87, Z LAS: 801.86, ΔZ DEM: 0.07, ΔZ LAS: 0.06



North



South



East



West



# Point: 2084 Tall Weeds

Survey X: 2261404.3, Survey Y: 422485.44, Z1: 800.99, Z DEM: 801.17, Z LAS: 801.37, ΔZ DEM: 0.18, ΔZ LAS: 0.38



North



South



East



West



## Point: 2085 Urban Area

Survey X: 2263513.87, Survey Y: 397541.39, Z1: 822.17, Z DEM: 822.27, Z LAS: 822.26, ΔZ DEM: 0.11, ΔZ LAS: 0.09



North



South



East



West



## Point: 2086 Bare Earth

Survey X: 2263542.71, Survey Y: 397639.61, Z1: 823.25, Z DEM: 823.54, Z LAS: 823.49, ΔZ DEM: 0.29, ΔZ LAS: 0.24



North



South



East



West



## Point: 2087 Tall Weeds

Survey X: 2263579.6, Survey Y: 397483.9, Z1: 819.16, Z DEM: 819.44, Z LAS: 819.41, ΔZ DEM: 0.28, ΔZ LAS: 0.25



North



South



East



West

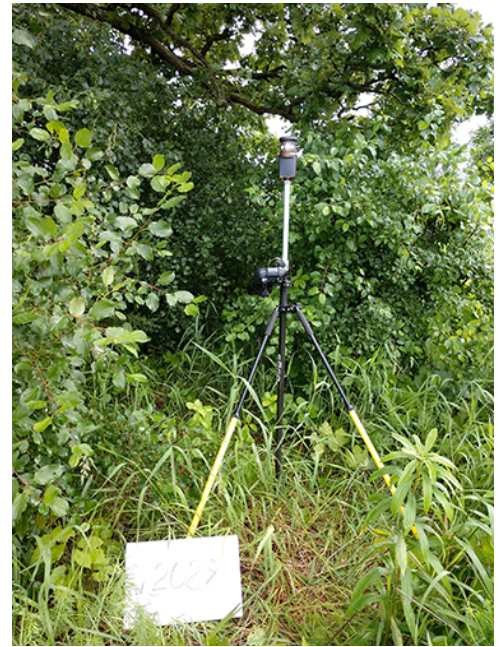


## Point: 2088 Forest

Survey X: 2263486.81, Survey Y: 397480.74, Z1: 820.82, Z DEM: 821.18, Z LAS: 821.16, ΔZ DEM: 0.36, ΔZ LAS: 0.33



North



South



East



West



# Point: 2092 Urban Area

Survey X: 2298628.02, Survey Y: 394549.11, Z1: 813.83, Z DEM: 813.86, Z LAS: 813.8, ΔZ DEM: 0.03, ΔZ LAS: -0.03



North



South



East



West



# Point: 2093 Bare Earth

Survey X: 2298706.58, Survey Y: 394707.68, Z1: 812.49, Z DEM: 812.54, Z LAS: 812.41,  $\Delta Z$  DEM: 0.05,  $\Delta Z$  LAS: -0.08



North



South



East



West



# Point: 2094 Tall Weeds

Survey X: 2298736.42, Survey Y: 394646.68, Z1: 810.16, Z DEM: 810.28, Z LAS: 810.51, ΔZ DEM: 0.12, ΔZ LAS: 0.35



North



South



East



West



# Point: 2095 Forest

Survey X: 2298719.99, Survey Y: 394572.61, Z1: 809.85, Z DEM: 810.19, Z LAS: 810.2, ΔZ DEM: 0.34, ΔZ LAS: 0.35



North



South



East



West



# Point: 2098 Urban Area

Survey X: 2237854.17, Survey Y: 438121.52, Z1: 901.83, Z DEM: 901.94, Z LAS: 901.96, ΔZ DEM: 0.11, ΔZ LAS: 0.12



North



South



East



West



# Point: 2099 Forest

Survey X: 2237818.69, Survey Y: 438171.5, Z1: 900.77, Z DEM: 900.86, Z LAS: 900.89, ΔZ DEM: 0.09, ΔZ LAS: 0.12



North



South



East



West



# Point: 2101 Urban Area

Survey X: 2269695.23, Survey Y: 437708.34, Z1: 794.3, Z DEM: 794.32, Z LAS: 794.3, ΔZ DEM: 0.02, ΔZ LAS: 0.01



North



South



East



West



# Point: 2102 Bare Earth

Survey X: 2269689.44, Survey Y: 437827.22, Z1: 791.32, Z DEM: 791.35, Z LAS: 791.3, ΔZ DEM: 0.03, ΔZ LAS: -0.02



North



South



East



West



# Point: 2103 Tall Weeds

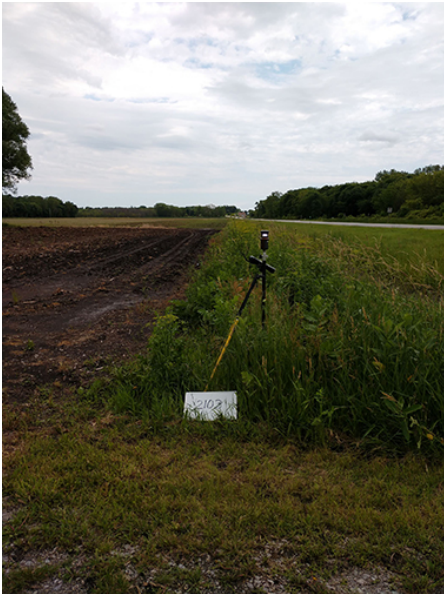
Survey X: 2269702.97, Survey Y: 437770.95, Z1: 791.04, Z DEM: 791.2, Z LAS: 791.04, ΔZ DEM: 0.16, ΔZ LAS: 0.01



North



South



East



West



# Point: 2104 Forest

Survey X: 2269725.89, Survey Y: 437888, Z1: 791.26, Z DEM: 791.67, Z LAS: 791.51, ΔZ DEM: 0.42, ΔZ LAS: 0.26



North



South



East



West



# Point: 2106 Urban Area

Survey X: 2305305.5, Survey Y: 417297.66, Z1: 860.69, Z DEM: 860.5, Z LAS: 860.52, ΔZ DEM: -0.19, ΔZ LAS: -0.17



North



South



East



West



## Point: 2107 Bare Earth

Survey X: 2305241.52, Survey Y: 417355.3, Z1: 854.5, Z DEM: 854.38, Z LAS: 854.4, ΔZ DEM: -0.12, ΔZ LAS: -0.09



North



South



East



West



# Point: 2108 Forest

Survey X: 2305258.68, Survey Y: 417244.84, Z1: 861.49, Z DEM: 861.41, Z LAS: 861.51, ΔZ DEM: -0.08, ΔZ LAS: 0.02



North



South



East



West



# Point: 2110 Bare Earth

Survey X: 2307552.6, Survey Y: 438790.2, Z1: 847.19, Z DEM: 847.2, Z LAS: 847.22, ΔZ DEM: 0.01, ΔZ LAS: 0.02



North



South



East



West



# Point: 2111 Urban Area

Survey X: 2307635.3, Survey Y: 438846.24, Z1: 842.53, Z DEM: 842.56, Z LAS: 842.71, ΔZ DEM: 0.03, ΔZ LAS: 0.19



North



South



East



West



## Point: 2112 Forest

Survey X: 2307543.28, Survey Y: 438875.37, Z1: 848.08, Z DEM: 848.11, Z LAS: 847.57, ΔZ DEM: 0.02, ΔZ LAS: -0.51



North



South



East



West



# Point: 2116 Tall Weeds

Survey X: 2345888.81, Survey Y: 321482.8, Z1: 849.37, Z DEM: 849.46, Z LAS: 849.49, ΔZ DEM: 0.09, ΔZ LAS: 0.12



North



South



East



West



## Point: 2118 Forest

Survey X: 2358793.17, Survey Y: 439401.97, Z1: 854.68, Z DEM: 854.79, Z LAS: 854.89,  $\Delta Z$  DEM: 0.11,  $\Delta Z$  LAS: 0.21



North



South



East



West