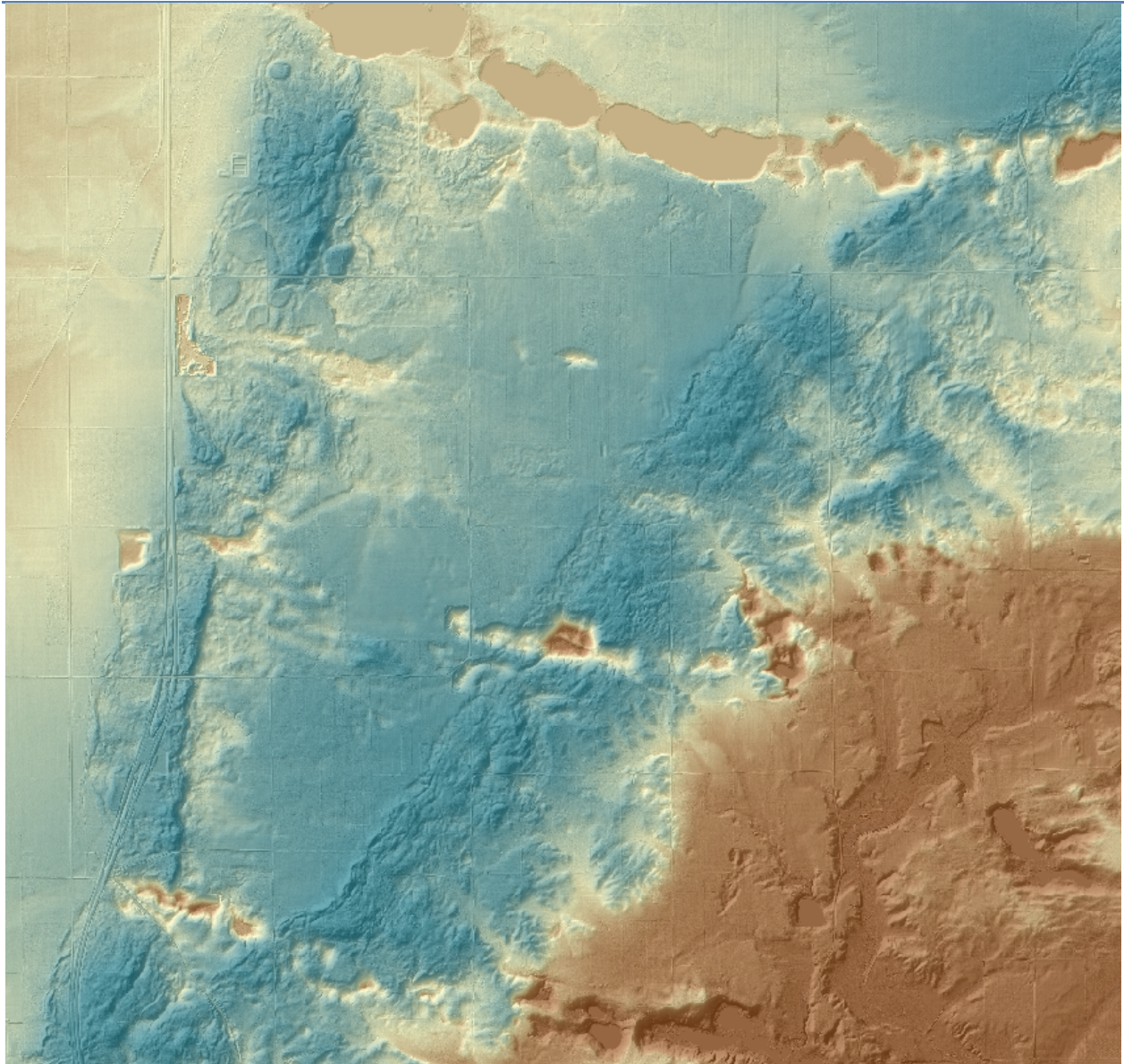# Areas of Low Confidence
Waushara County, Wisconsin
November 2018

1.0 Area of Low Confidence

An area of low confidence is an area where there is a decreased amount of returns (low point density) and increase of point spacing when looking at bare-earth point cloud classification. These are usually cause by vegetation. The image shown in **Figure 1.** shows an area where there is a low point density and large point spacing.

Figure 1. Ortho image with a red outline highlighting the area of interest.

The images in **Figure 2**. shows the same area as in figure 1 but as displayed as a bare earth point cloud. The image shows a clear drop in density in the area in question. An area of low confidence are only considered if the area is larger then 5 acres (20,000 square meters), for a vertical accuracy from 10-15 centimeters, as defined in ASPRS Positional Accuracy Standards for Digital Geospatial Data Ver.1 (NOV2014). Table 1. Shows the recommendations from ASPRS. The areas shown is approximately 5.6 acres in size, rationalizing an investigation.

Vertical Accuracy Class	Recommended Project Min NPD (pls/m^2) (Max NPS (m))	Recommended Low Confidence Min NGPD (pts/m^2) (Max NGPS (m))	Search Radius and Cell Size for Computing NGPD (m)	Low Confidence Polygons Min Area (acres (m^2))
1-cm	20 (0.22)	5 (0.45)	0.67	0.5 (2,000)
2.5-cm	16 (0.25)	4 (0.50)	0.75	1 (4,000)
5-cm	8 (0.35)	2 (0.71)	1.06	2 (8,000)
10-cm	2 (0.71)	0.5 (1.41)	2.12	5 (20,000)
15-cm	1 (1.0)	0.25 (2.0)	3.00	5 (20,000)
20-cm	0.5 (1.4)	0.125 (2.8)	4.24	5 (20,000)
33.3-cm	0.25 (2.0)	0.0625 (4.0)	6.0	10 (40,000)
66.7-cm	0.1 (3.2)	0.025 (6.3)	9.5	15 (60,000)
100-cm	0.05 (4.5)	0.0125 (8.9)	13.4	20 (80,000)
333.3-cm	0.01 (10.0)	0.0025 (20.0)	30.0	25 (100,000)

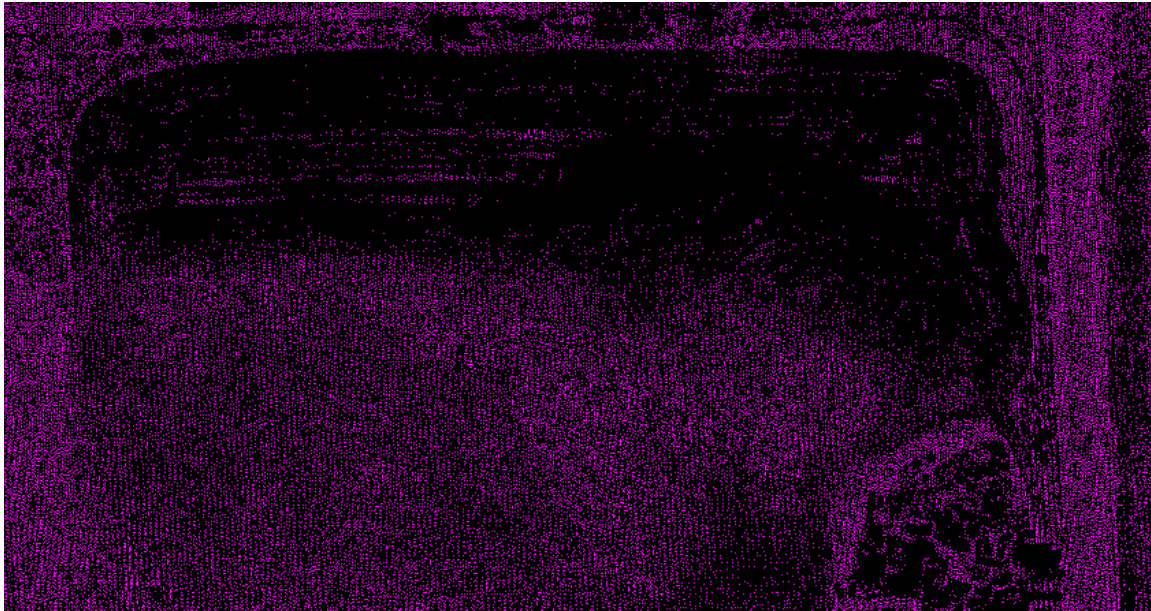Table 1. Low Confidence Areas table from ASPRS

Figure 2. Point Cloud Data of the area of Low Confidence.

The steps taken to determine the density and point spacing of the area of low confidence are those set on by the guidance reference provided by ASPRS. A density raster was made with a cell size of 2.12 meters from the LAS file that corresponds with tile 263 from the tile index. The Density raster was then clipped to a 2.12-meter buffered polygon of the area shown in **Figure 1.** Knowing the area and the point density of each cell, point density and point spacing was calculated for the area of low confidence. The classified ground point density at this location is approximately 0.02 pulses per square meter, has 1.3-meter point spacing, and is greater than five acres.   A 2D polygon has been included with this submission.
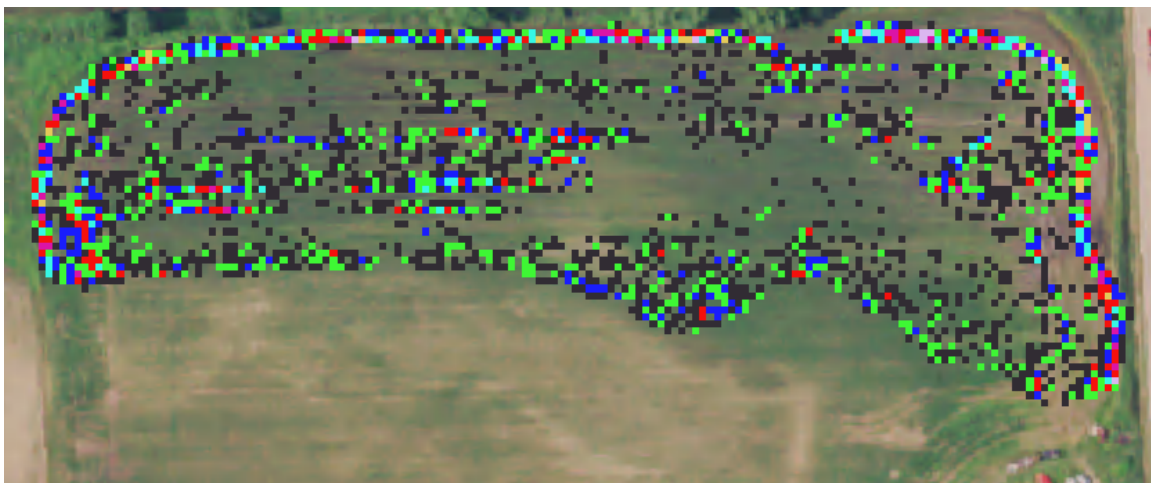

Figure 3. Density Raster over the area of interest.

2.0 Cause for area of Low Confidence.

Usually areas of low confidence are in areas of dense vegetation but for the instance in Waushara County, Wisconsin, the area of low confidence is brought on by the glacial soil type that encompasses much of the area.   According to the USDA Soil Survey of Waushara County, Wisconsin conducted in September of 1989 the area consists of three soil types. These soil types are the Belleville (Be), Yahara (YaA) and The Poy (Pt). The Belleville series consists of very deep, poorly drained or very poorly drained soils formed in sandy glaciofluvial and glaciolacustrine deposits underlain by loamy glacial or lacustrine deposits at 50 to 100 cm. Belleville soils are on lake plains, till-floored lake plains, and wave-worked till plains. Slope ranges from 0 to 2 percent. Poorly drained or very poorly drained. Potential for surface runoff is negligible to low. The Yahara is like the Belleville except that it is a fine grain soil and runs much deeper. The Poy is also similar except clay is more present. All soil types present support high water capacity which drain poorly.
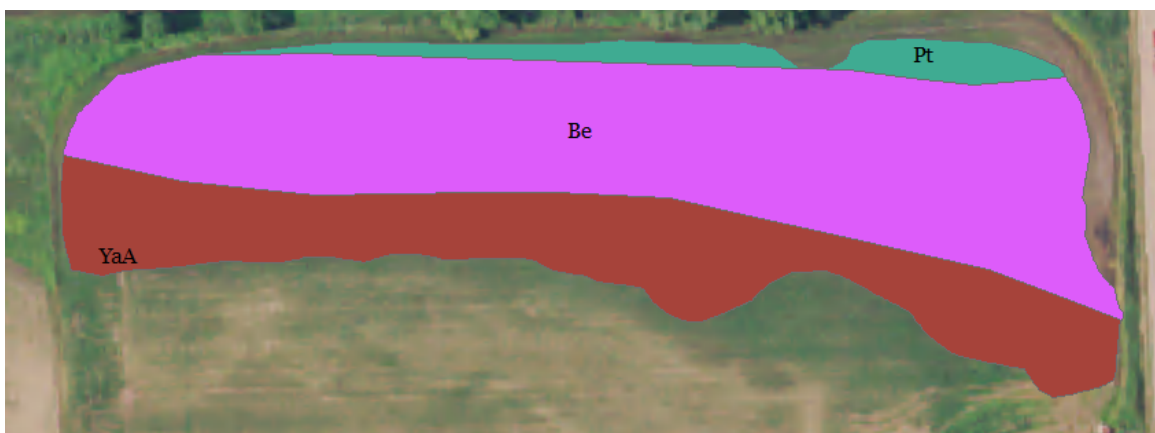

Figure 4. Soil Types of Area of low confidence.

3.0 Conclusion

Due to the geomorphologic history of the area of Waushara County, glacial deposits have made dark soils that are thick and have a high capacity for water. The soil types located specifically in the area also is poorly drained. The mixture of dark, sandy, silty, hydrated soil causes an effect where there is low reflectivity resulting in areas where the point density and point spacing is significantly impacted resulting in an affect on the digital elevation model.

References.

ASPRS. "ASPRS Positional Accuracy Standards for Digital Geospatial Data." *Photogrammetric Engineering & Remote Sensing* 81.3 (2014): A1-A26.

Otter, Augustine J., F. J. Simeth, and D. T. Simonson. "Soil survey of Waushara County, Wisconsin." (1990).