Dewberry Response to USGS Review of the Virginia FEMA NRCS South Central LiDAR Project– Block 1

Produced for U.S. Geological Survey

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Executive Summary

The primary purpose of this project was to develop a consistent and accurate surface elevation dataset derived from high-accuracy Light Detection and Ranging (lidar) technology for the Virginia FEMA NRCS South Central Lidar Project Area – Block 1.

The LiDAR data were processed to bare-earth digital terrain models (DTM). Detailed breaklines and bare-earth digital elevation Models (DEMs) were produced for the project area.

Deliverables for this project included raw point cloud data, classified point cloud data, bare earth hydro-flattened digital elevation models, intensity images, breaklines, surface elevation contours, control points, metadata, project report, and project extent shapefiles.

The USGS's review of these deliverables resulted in two missing data calls, 25 bridge/culvert calls, 133 spike/divot calls, 38 hydrographic breakline calls, 10 replace ground calls, eight artifact calls, 4 cornrowing/sensor issue calls, and 31 calls that after a call with USGS where deemed acceptable to leave as is.

PROJECT AREA

Data was formatted according to tiles with each tile covering an area of 1500 m by 1500 m. A total of 5,130 tiles were produced for the project encompassing an area of approximately 4176 sq. mi.

Figure 1 - Project Map

Edit Calls

METADATA

USGS's Assessment report states that the metadata is not accepted. This is because the metadata reports delivered with Block 1 reported the vertical accuracy of the block, not the entire project. Metadata (including accuracy information) for the full project will be delivered in its entirety at the completion of the project.

MISSING DATA

USGS made two calls for missing data. One call was on the edge of the project, that ground could be added. The other was an area of dense tree cover and there were no ground points that could be replaced. Dewberry corrected the issue with the missing ground along the edge of the project.
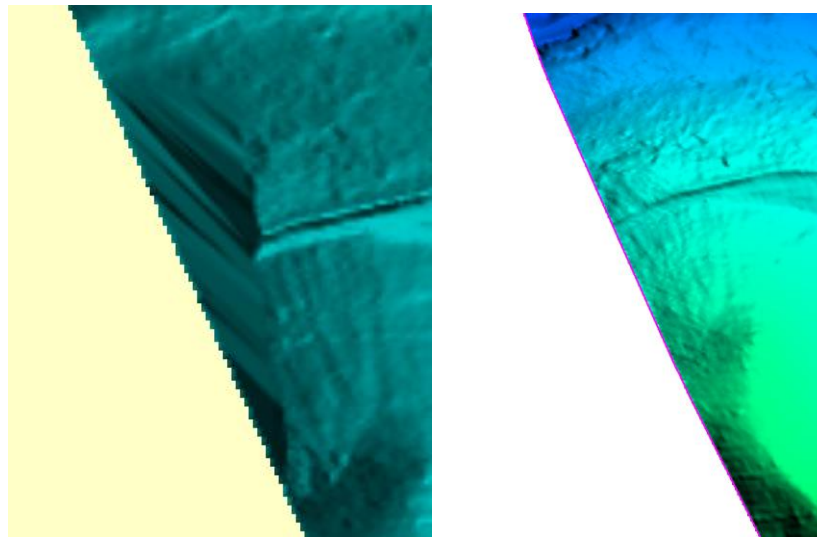.

Figure 2 - Tile 17SLC64500750. The image on the left shows the DEM where USGS made a missing data call. The image on the right is an overview of the DEM after Dewberry clipped the tile to the project boundary.

BRIDGE REMOVAL AND CULVERTS

USGS identified twenty-five bridge and culvert calls. The bridge points were reclassified from ground to bridge deck while the culverts had points returned to ground. The LAS was re-classified and the DEMs and contours updated. Examples are shown below.
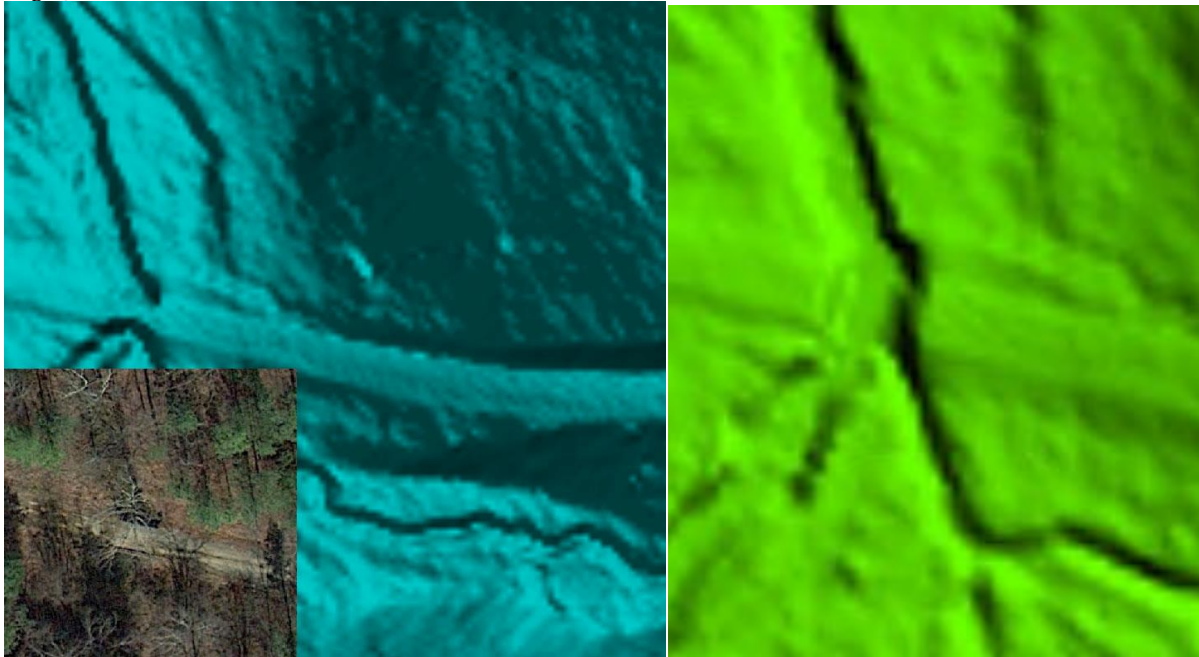
Figure 3 - Tiles 17SNA68506650. At left, a USGS screenshot of part of a bridge classified as ground. At right, the bridge has been removed from the Lidar and DEM.
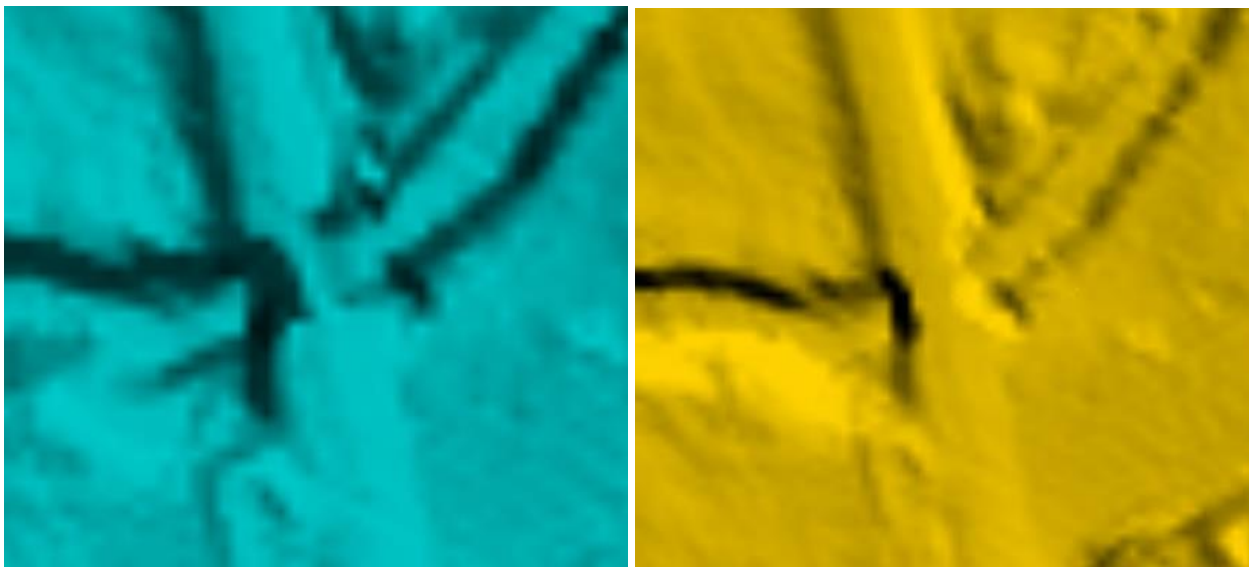

Figure 4 - Tiles 17SNB49002350. At left, a USGS screenshot shows of part of a culvert classified as bridge. At right, the culvert has been returned to ground in both the Lidar and DEM.

SPIKES AND PITS

USGS identified 134 spikes and divots that needed to be removed from the ground. The edit calls were assessed and corrected. An example is provided below.
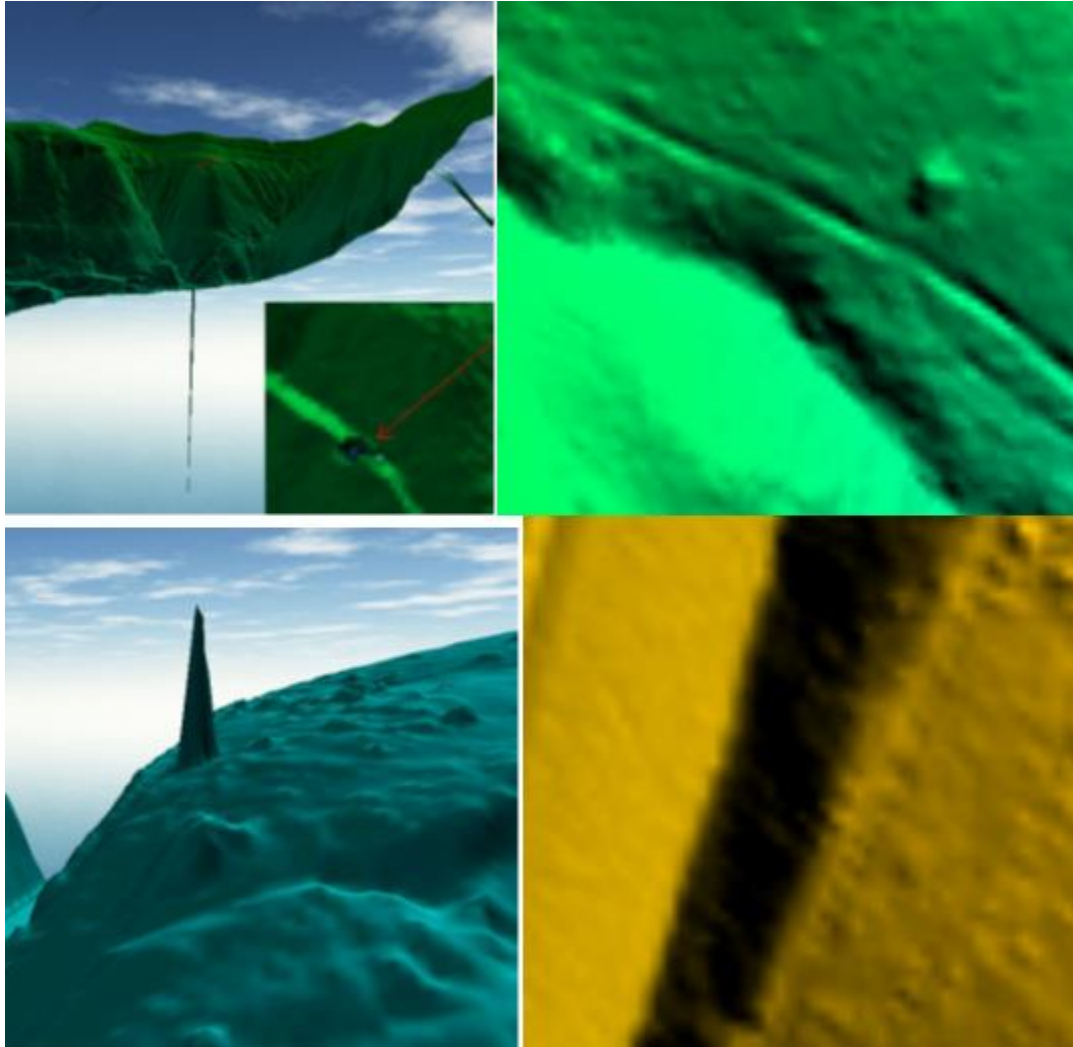
Figure 5 - Tiles 17SLC97501350 (Top) and 17SNB25000100 (Bottom) are pictured above. The top pair of images shows USGS screenshot of low points on the left and the Dewberry correction on the right. The bottom pair shows the USGS screenshot of a spike and the right the Dewberry correction.

HYDROGRAPHIC FEATURES

USGS identified thirty-eight hydro-flattening/water level calls, three hydrographic artifact, and a call to raise all river breaklines by 3'. They hydro flattening/water level calls were addressed as well as the artifacts but to maintain monotonicity and to keep the rivers from floating the call for raising the breaklines by 3' systematically was not an option.   Examples are shown below.
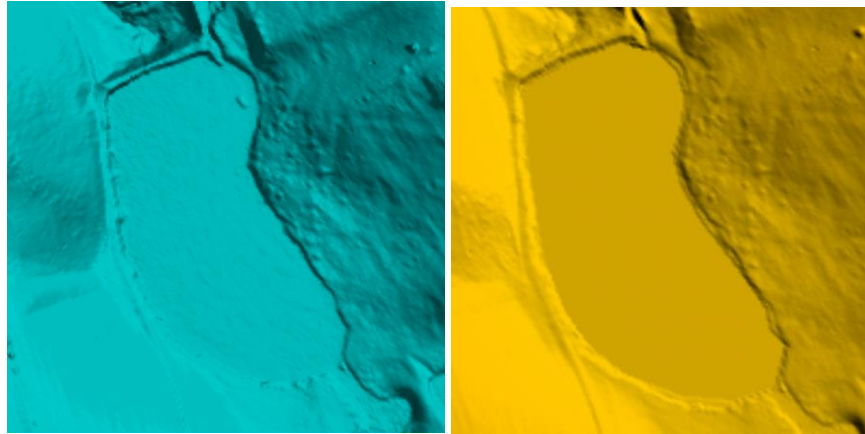
Figure 6 - Tile 17SNA41509950. The pond shown was identified by USGS as over 2 acres and needed to be hydro-flattened (left). The LAS and DEM have been corrected by adding breaklines and hydro-flattening (right).
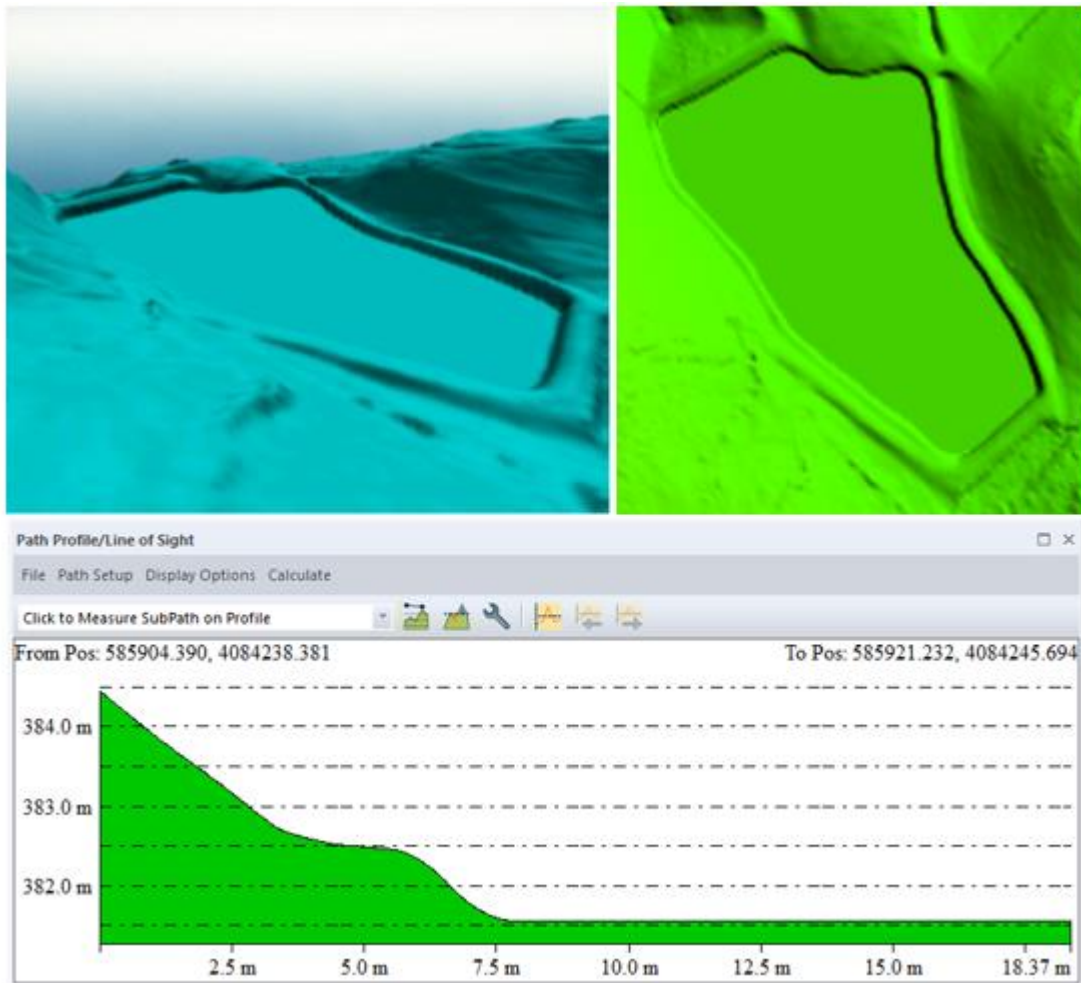

Figure 7 – Tile 17SNA85008300. The pond shown was identified by USGS digging (left). The breakline was adjusted to make sure that the water level is a high as it can be without any portions floating (right).
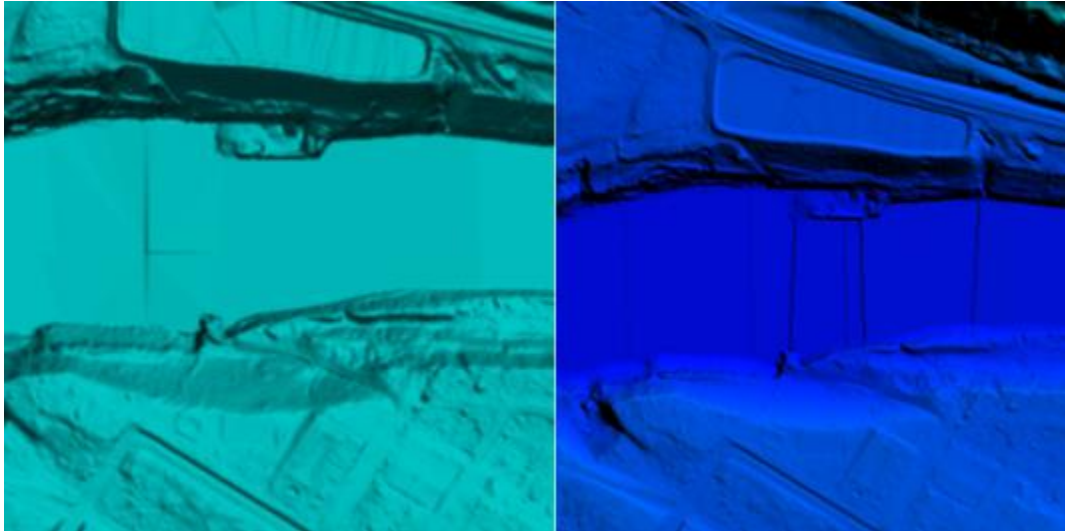
Figure 8 – Tile 17SLC58501950. The water artifact was identified by USGS digging (left). The right image shows those artifacts have been removed (right).
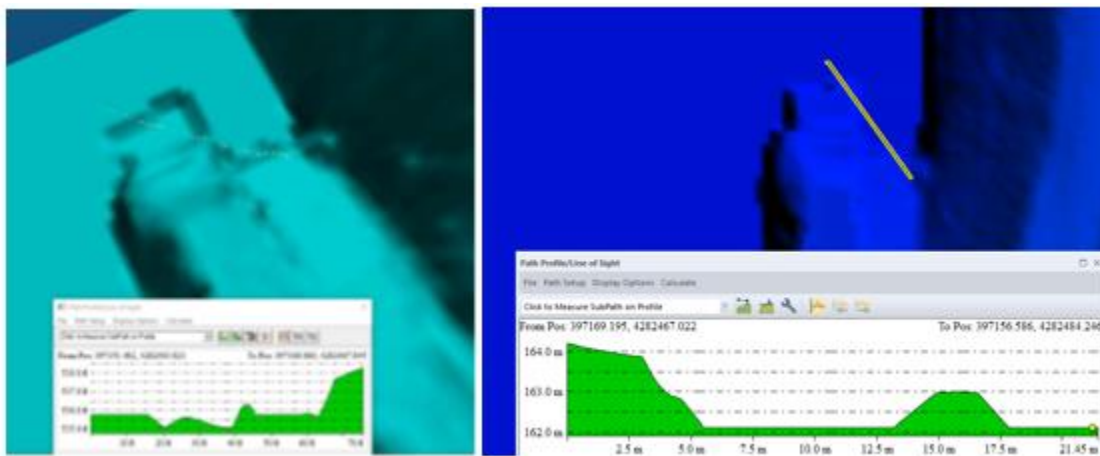

Figure 9 – 17SLC96008100. USGS call to return points to ground is shown on the left. The Dewberry update is shown on the right. All water is below ground level.

ARTIFACTS

USGS identified eight artifacts to be removed from ground. Six of the calls pertained to the orchard as shown below. Dewberry found all of these areas to be an accurate representation of the ground. No updates to the Lidar/DEM were made.
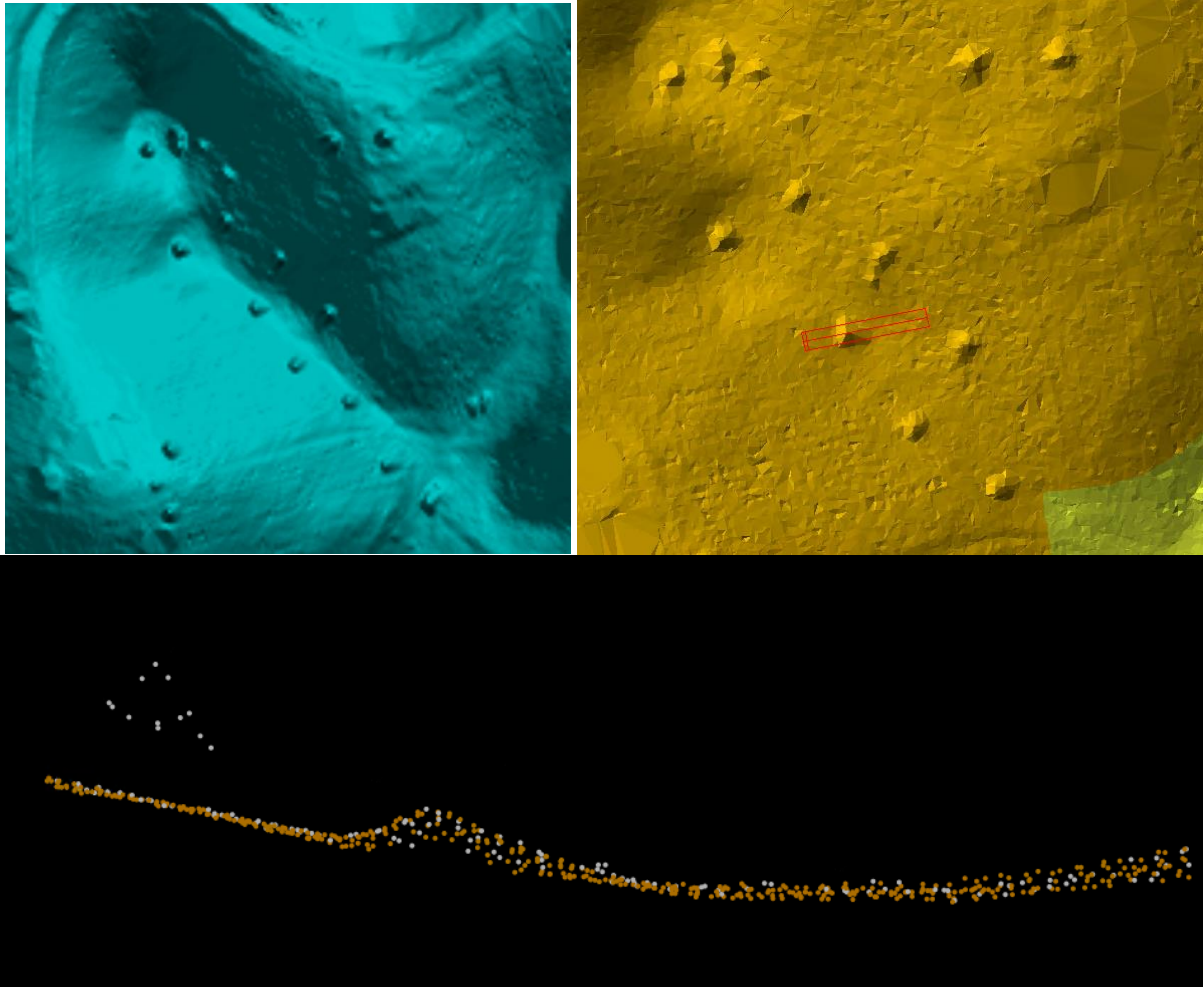
Figure 10 - Tile 17SNB41501300. The top two screenshots are from USGS called "Check for Trees in Orchard." Dewberry found that these artifacts are mounds and that no points could be removed from ground. The bottom screenshot shows the ground (orange) and unclassified (grey) points.

REPLACE GROUND

USGS identified ten areas where points needed to be returned to ground. Nine of the calls were addressed; one call did not have any points that could be moved. An example is show below.
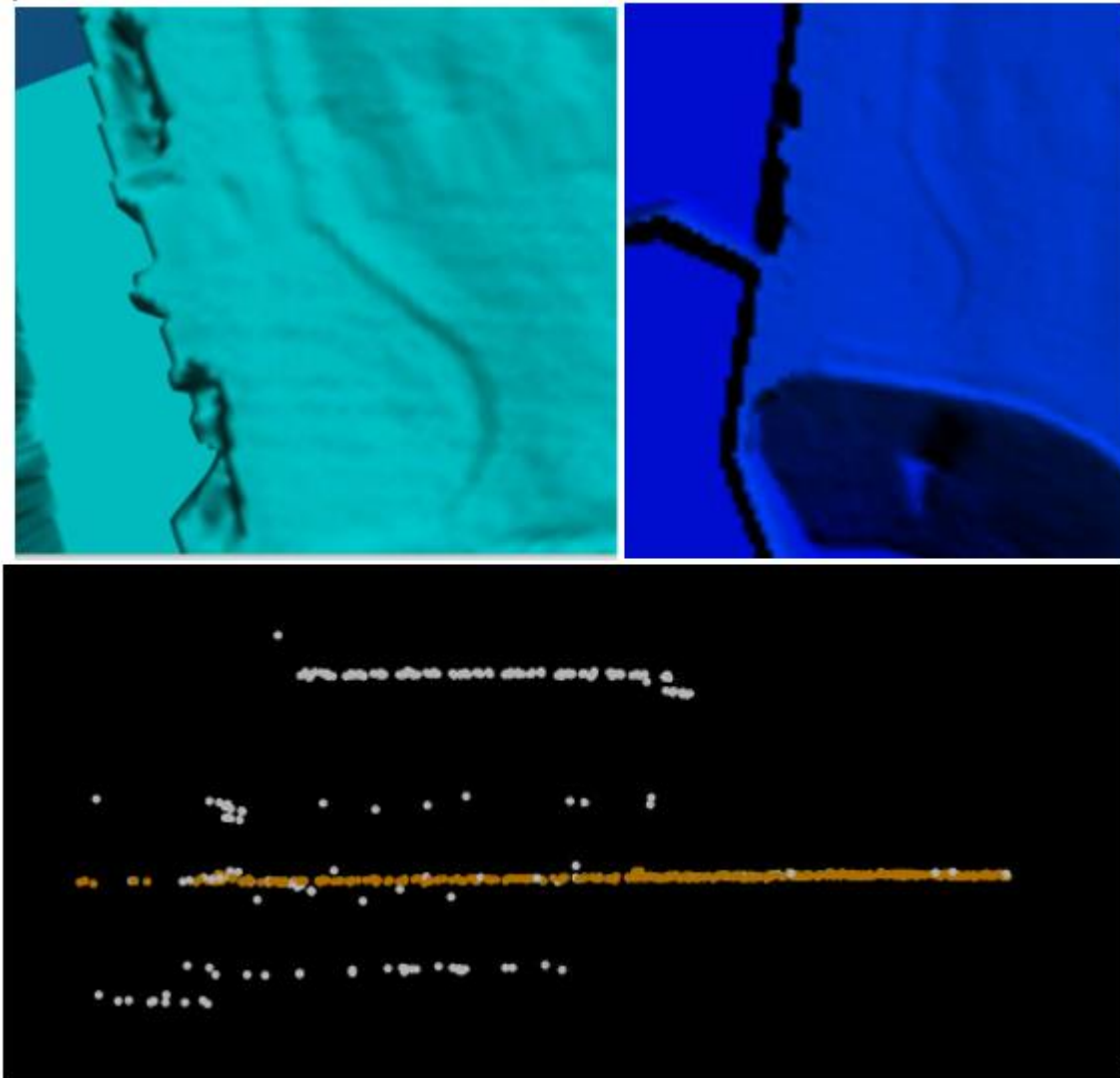
Figure 11 – Tile 17SLC96008100. USGS call to return points to ground on the top left, Dewberry updates shown on the top right. The bottom shows a cross-section of the points where many points could be returned to ground (orange) from unclassified (grey).

CORN ROWING

USGS identified four areas where there were some anomalies in the ground surface. An example is show below.
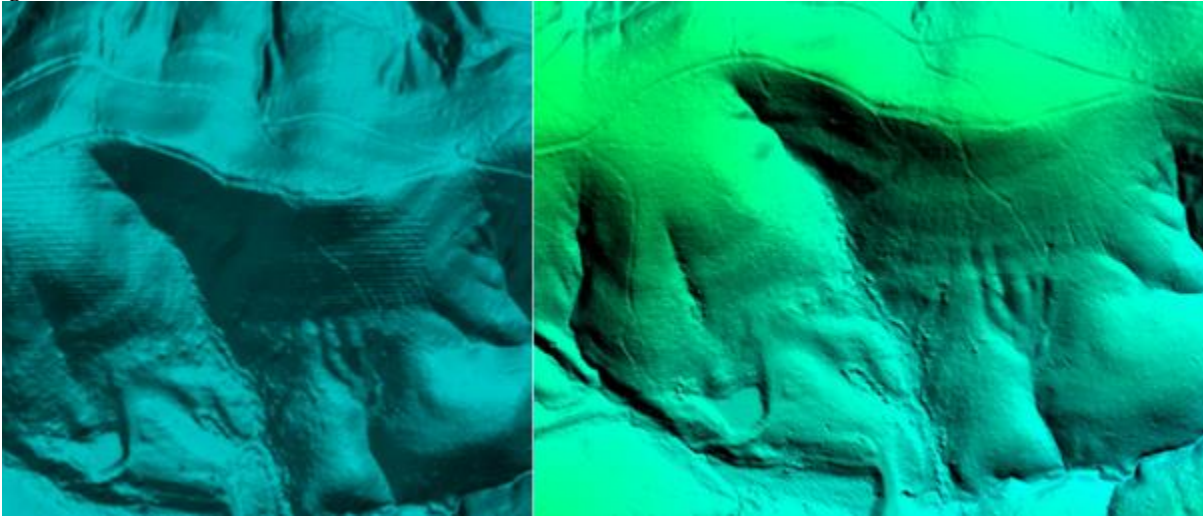
Figure 12 – 17SMC00503150. USGS call for cornrowing shown on the left. The Dewberry update is shown on the right. The cornrows have been smoothed out in the ground surface.

DEM REVIEW

USGS made ten calls to unflatten areas of rivers and twenty one calls to remove dams to water level. After a call between the USGS and Dewberry both parties agreed to leave these areas as is. Below is an example of these calls.

Figure 13- The image on the left shows a river segment that was hydro classified. These rivers were collected in areas that were below collection spec to maintain flow and to avoid sausage linking. The image on the right shows a dam that was left in the ground. The dam stops the flow of water and are to be left as ground.

Summary of Edit Calls

- There was one metadata edit call.
  - The metadata delivered with this block contains vertical accuracy results that pertain to this block, but the final metadata will contain the vertical accuracy results for the entire project.

- There were two missing data calls for DEMs extending beyond the project boundary.
  - One tile had ground points added, the other tile had no points to be added.

- There were 25 bridge/culvert calls.
  - Class 2 points in the bridge were reclassified to class 17 and culverts had points returned to ground.

- There were 133 spike/divot calls.
  - The low ground points were classified to Low Noise (Class 7) and the high points were classified to unclassified.

- There were 38 hydrographic calls. Hydro flattening/water level/artifact calls as well as a systematic call to raise all river breaklines by 3 feet
  - The hydro flattening/water level and artifact calls were addressed.
  - The systematic "raise all rivers by 3 feet" was not performed to maintain monotonicity as well as causing large portions of the river to "float".

- There were 10 calls that directed points be returned to ground.
  - Nine of these calls were addressed and points were added back to ground.
  - One call had no points that could be moved.

- There were 8 artifact calls for features to be removed from ground
  - All calls were found to accurately portray the ground and were not removed.

- There were 4 calls for corn rowing.
  - These areas were addressed.

- There were 10 calls made to unflatten rivers
  - After a call with USGS it was agreed that these areas were ok as is.

- There were 21 calls to removed dams/walls to water level
  - After a call with USGS it was agreed that these areas were ok as is.