



Dewberry's Response to USGS' Review

Of the

NRCS Virginia LiDAR Project

USGS Contract:

G10PC00013

Task Order Number:

G11PD00336

Prepared for:

USGS

Prepared by:

Dewberry
1000 Ashley Blvd., Suite 801
Tampa, Florida 33602-3718

Report Date: March 20, 2012

Table of Contents

1 Executive Summary2

2 Edit Calls3

 2.1 Bridges in the Ground Surface3

 2.2 Culverts Removed from the Ground Surface.....5

 2.3 Bridge Removal Artifacts.....6

3 Summary of Edit Calls8

1 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 USGS NRCS Virginia project area.

Deliverables for this project included LAS, breaklines, and bare earth Digital Elevation Models (DEMs). USGS' review of these deliverables resulted in 14 edit calls, two general comments about bridge artifacts, and one comment stating 21 swath files were over the 2GB size limit. All 14 specific edit calls were addressed and corrected in both the LAS and DEM files. The two general comments about bridge artifacts did not result in any modifications to the data. As the swath files were accepted by USGS, the 21 swaths over the 2GB size limits were not modified.

NRCS Virginia LiDAR Project

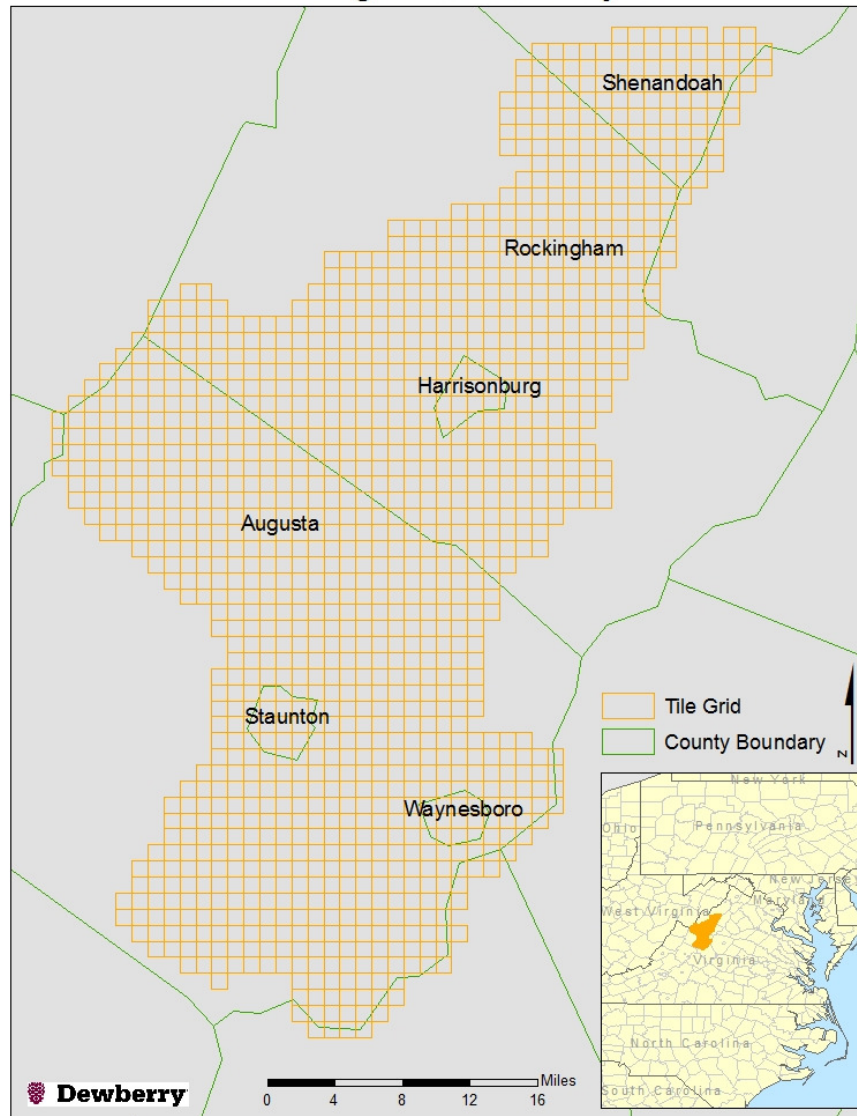


Figure 1: Project Map

2 Edit Calls

Three main types of edit calls were made in USGS' review of the NRCS Virginia project. The first type of call was for bridges left in the ground surface. The second type of call was for culverts removed from the ground surface. The last type of call was for bridge removal artifacts. The edit calls that required corrections impacted both the LAS and DEM files.

2.1 Bridges in the Ground Surface

There are four locations where Dewberry interpreted a feature as a culvert and left the feature in the ground surface. USGS identified these features as bridges, not culverts. While the

interpretation of the feature may be questionable in the intensity imagery, Dewberry agrees with all four calls after reviewing color imagery. All four instances identified by USGS have been corrected. An example is shown below.

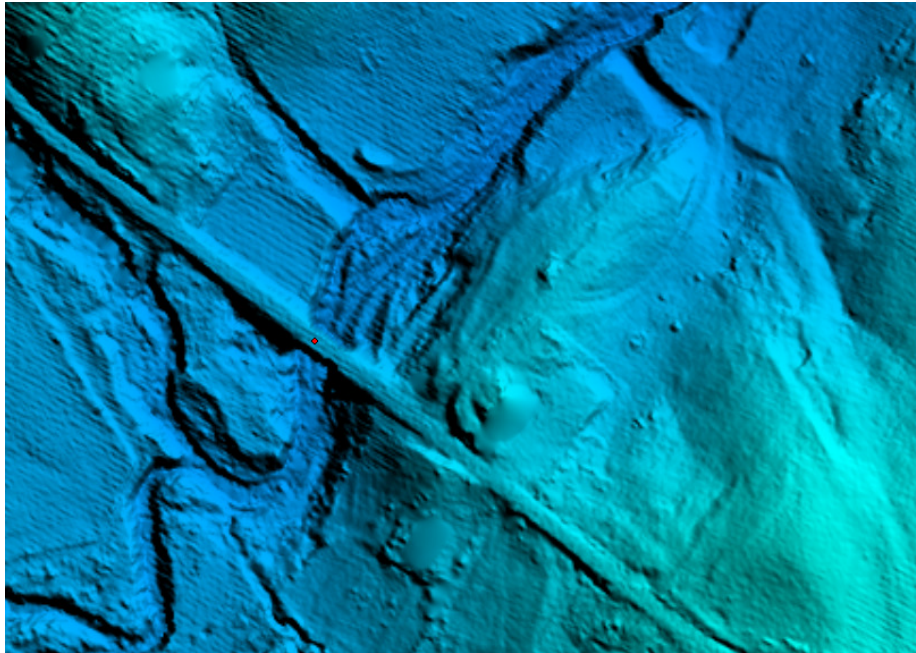


Figure 2- Tile N16_4924_10, Delivery 1. The feature identified by the red dot was originally interpreted as a culvert and left in the ground surface. USGS identified this feature as a bridge. The LAS and DEM has been corrected by removing this feature from the ground surface, shown below.

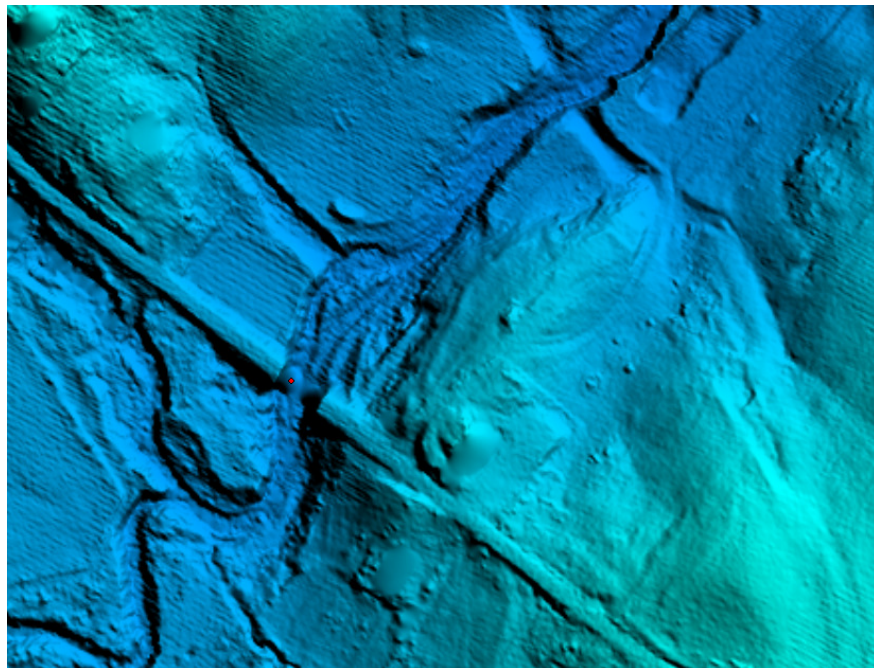


Figure 3- Tile N16_4924_10, Delivery 2. The bridge has been removed from the ground surface.

2.2 Culverts Removed from the Ground Surface

There are ten locations where Dewberry interpreted a feature as a bridge and removed the feature from the ground surface. USGS identified these features as culverts, not bridges. Dewberry agrees with all ten calls and all ten instances identified by USGS have been corrected. An example is shown below.

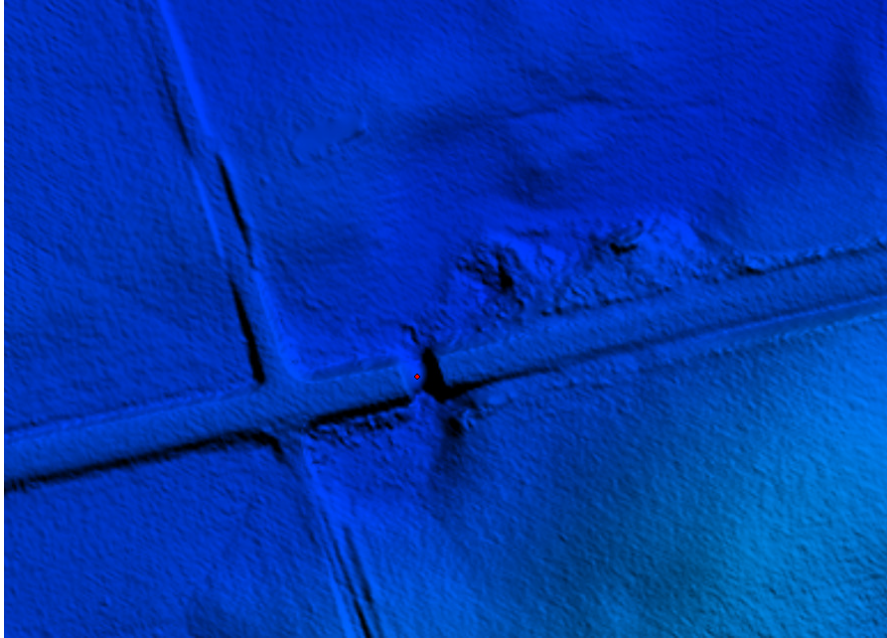


Figure 4- Tile N16_4921_20, Delivery 1. The feature identified by the red dot was originally interpreted as a bridge and removed from the ground surface. USGS identified this feature as a culvert. The LAS and DEM has been corrected by adding this feature back to the ground surface, shown below.

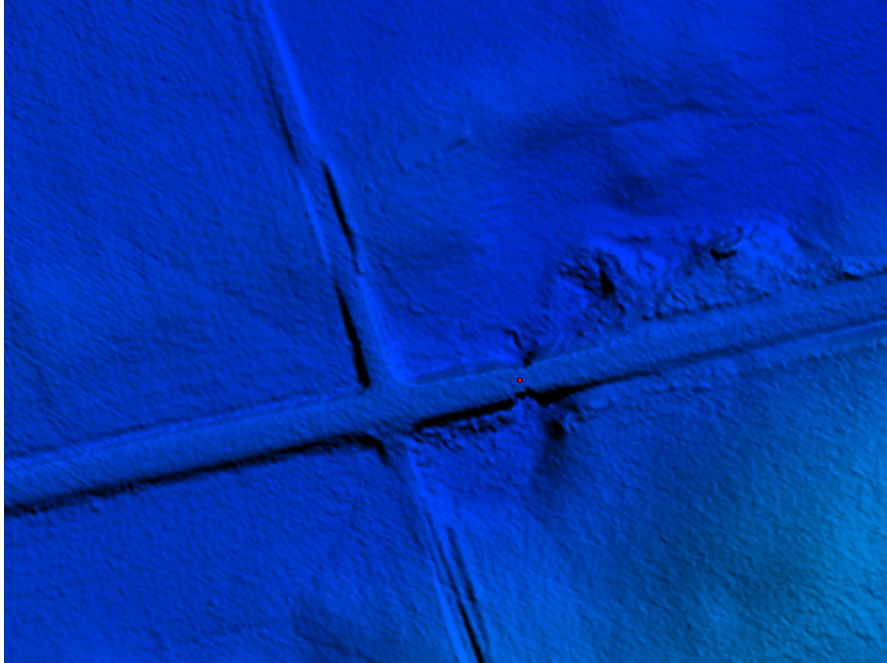


Figure 5- Tile N16_4921_20, Delivery 2. The culvert has been added back to the ground surface.

2.3 Bridge Removal Artifacts

Two general comments, affecting 21 locations, were made for bridge removal artifacts. The DEM surface models are created from TINs or Terrains. TINs and Terrain models create continuous surfaces from the inputs, in this instance LiDAR ground point and breaklines. Because a continuous surface is being created, the TIN or Terrain will use interpolation to triangulate across a bridge opening from legitimate ground points on either side of the actual bridge. This can make the model appear to contain a bridge even though points have been removed from ground. This can also cause visual artifacts or “saddles,” as labeled in the USGS review document. As these “artifacts” are only visual and do not exist in the LiDAR points or breaklines, no modifications were made to the LAS or DEMs in these areas. Examples are shown below.

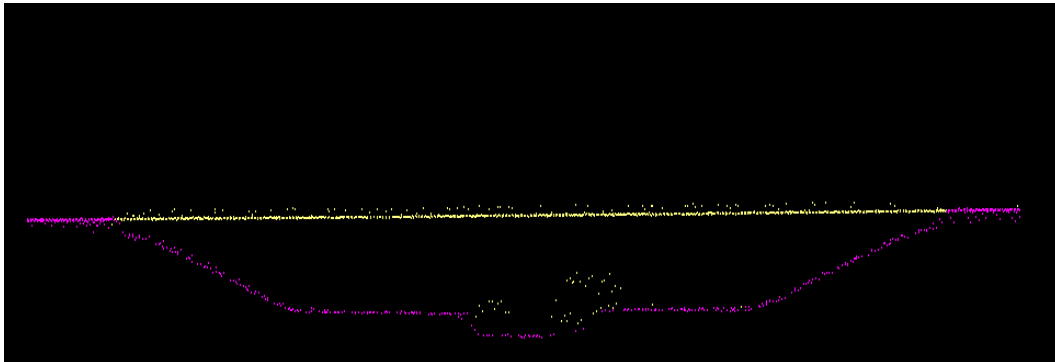
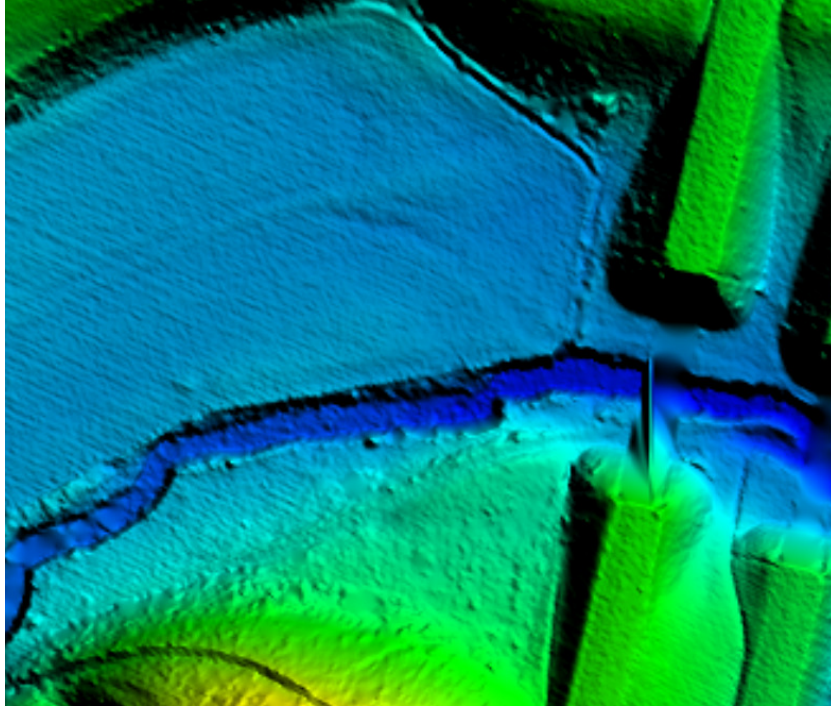


Figure 6- Tile N16_3734_10. The DEM in the top view shows a visual artifact because the surface model is interpolating from the slope leading to the bridge to the hydrographic banks. The surface model must make a continuous model and in order to do so, points are connected through interpolation. This can cause visual artifacts when there are features with large elevation differences. The profile in the bottom view shows the LiDAR points, colored by class, of this particular feature. All bridge points have been removed from ground (pink) and are unclassified (yellow). There are no ground points that can be modified to correct this visual artifact.

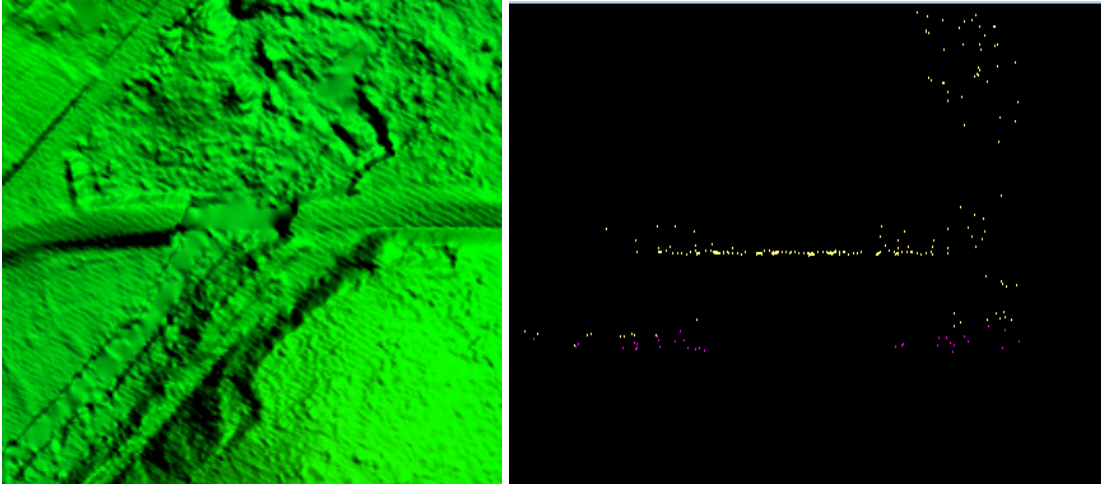


Figure 7- Tile N16_3831_10. The DEM in the left view shows a visual artifact, or “saddle” as labeled in the USGS review report, because the surface model is interpolating across the bridge gap. The surface model must make a continuous model and in order to do so, points are connected through interpolation. This can cause visual artifacts or loss of detail when the surface model must interpolate across removed features, such as bridges, where there are few or no ground LiDAR points. The profile in the right view shows the LiDAR points, colored by class, of this particular feature. All bridge points have been removed from ground (pink) and are unclassified (yellow). There are no ground points that can be modified to correct this visual artifact.

3 Summary of Edit Calls

There were fourteen (14) edit calls referring to bridges or culverts that should have been removed or left in the ground surface. All fourteen of these issues have been corrected. No modifications were made to data in reference to bridge removal artifacts as these artifacts are a result of the DEM interpolation process and not due to erroneous LiDAR points or breaklines. The swath files exceeding the 2GB size limit were not modified. USGS noted these files exceeded specifications, but do not require a re-delivery of modified swath data.