2011 LiDAR & Imagery Accuracy – 1 page Summary

For Imagery, the scope of work stated that the horizontal accuracy shall meet Federal Geographic Data Committee, Geospatial Positioning Accuracy Standards, Part 3: National Standards for Spatial Data Accuracy. The accuracy as compiled, tested and published in the final imagery report has met horizontal accuracy requirements as specified. The final imagery report can be found on the project website: https://data1-msb.opendata.arcgis.com/pages/2011-li-dar-&-imagery-project

For LiDAR, the scope of work stated that the vertical accuracy be assessed in accordance with the guidelines developed by the National Digital Elevation Program (NDEP) and subsequently adopted by the American Society of Photogrammetry and Remote Sensing (ASPRS). The key points outlined below are used by USGS to assess the data for inclusion into the National Elevation Dataset (NED).

LiDAR point cloud data is to be assessed independently of derivative products. Calibrated, unclassified LiDAR point cloud data is to be used to generate a Triangulated Irregular Network (TIN), whose elevations will be compared with survey check points in open areas of moderate terrain. The results of this comparison are to achieve a Fundamental Vertical Accuracy (FVA) of no greater than 24.5 cm ACCz at a 95% confidence level, which is defined as being RMSEz * 1.96 per NDEP / ASPRS guidelines. Using the methods outlined, the MSB LiDAR point cloud data assessment resulted in a FVA of 13.77cm, which passes the USGS requirements.

Derivative DEMs are to use the same guidelines in determining their FVA except that only the ground points are used and the checkpoints are tested against the raster product rather than a TIN. They must also have a Consolidated Vertical Accuracy (CVA) of 36.3 cm or less at the 95th percentile. CVA is computed using all check points in all land cover categories. Using the methods outlined, the MSB DEM assessment resulted in an FVA of 18.2cm and a CVA of 35.15 cm, both of which pass the USGS requirements.

In summary:

FVA = Fundamental Vertical Accuracy = assessed on barren ground only
CVA = Consolidated Vertical Accuracy = assessed on all ground cover classes (barren, forest, wetland, shrub, developed)
95% confidence level – means that at least 95 of 100 points fell w/in the accuracy level indicated

Point Cloud
FVA = 13.77 cm (5.4 in) - 95% confidence level

Digital Elevation Model (DEM)
FVA = 18.2 cm (7.2 in) - 95% confidence level
CVA = 35.15 cm (13.8 in) - 95% confidence level

In layman's terms…

For the point cloud, in areas of barren earth (bare ground with no trees, shrubs or tall grass), the elevation displayed for a point should fall within 13.77 cm (5.4 in) of the actual ground elevation, 95% of the time.

For the DEM, in areas of barren earth, the elevation displayed for a cell should fall within 18.2 cm (7.2 in) of the actual ground elevation, 95% of the time.

For the DEM, based on an average of the points tested across all types of vegetation coverage (bare ground, grass, shrubs and trees) project wide, the elevation displayed for a cell should fall within 35.15 cm (13.8 in) of the actual ground elevation, 95% of the time.

Additional details regarding the MSB LiDAR vertical accuracy assessment can be found in the final LiDAR project report and accompanying spreadsheet. These can be downloaded from the project website: https://data1-msb.opendata.arcgis.com/pages/2011-li-dar-&-imagery-project