LiDAR Quality Assessment Report

The USGS National Geospatial Technical Operations Center, Data Operations Branch is responsible for conducting reviews of all Light Detection and Ranging (LiDAR) point-cloud data and derived products delivered by a data supplier before it is approved for inclusion in the National Elevation Dataset and the Center for LiDAR Information Coordination and Knowledge. The USGS recognizes the complexity of LiDAR collection and processing performed by the data suppliers and has developed this Quality Assessment (QA) procedure to accommodate USGS collection and processing specifications with flexibility. The goal of this process is to assure LiDAR data are of sufficient quality for database population and scientific analysis. Concerns regarding the assessment of these data should be directed to the Chief, Data Operations Branch, 1400 Independence Road, Rolla, Missouri 65401 or NGTOCoperations@usgs.gov.

Materials Received:
11/1/2012

Project ID:
GA_17County_2010

Project Alias(es):
GA_17County_2010 Coastal (LAS only)

Project Type: GPSC

Project Description:
The GA_17County Coastal project consists of the following ten counties in Georgia: Brantley, Bryan, Bulloch, Camden, Charlton, Effingham, Long, McIntosh, Screven, and Wayne. This report only reflects the LAS data.

Year of Collection: 2010

Lot Select/type... of Select/type... lots.

Project Extent:
☑ Project Extent image?

Project Tiling Scheme:
☐ Project Tiling Scheme image?

Contractor:

Photo Science, Inc.

Applicable Specification:

V13

Licensing Restrictions:

☐ Third Party Performed QA?

Project Points of Contact:

POC Name	Type	Primary Phone	E-Mail
Joseph Scott	CPT	573-308-3700	jwscott@usgs.gov

Project Deliverables

All project deliverables must be supplied according to collection and processing specifications. The USGS will postpone the QA process when any of the required deliverables are missing. When deliverables are missing, the Contracting Officer Technical Representative (COTR) will be contacted by the Elevation/Orthoimagery Section supervisor and informed of the problem. Processing will resume after the COTR has coordinated the deposition of remaining deliverables.

☐ Collection Report
☐ Survey Report
☐ Processing Report
☐ QA/QC Report
☐ Control and Calibration Points

☐ Project Shapefile/Geodatabase
☐ Project Tiling Scheme Shapefile/Gdb
☐ Control Point Shapefile/Gdb
☐ Breakline Shapefile/Gdb
☐ Project XML Metadata

Multi-File Deliverables

File Type		Quantity
☐ Swath LAS Files ☐ Required? ☐ XML Metadata?		
☐ Intensity Image Files ☐ Required?		
☑ Tiled LAS Files ☑ Required? ☑ XML Metadata?		5538
☐ Breakline Files ☐ Required? ☐ XML Metadata?		
☐ Bare-Earth DEM Files ☐ Required? ☐ XML Metadata?		

Additional Deliverables

Errors, Anomalies, Other Issues to document? ○ Yes ○ No

Project Geographic Information

Areal Extent:

4386

Sq Mi
Grid Size:

```
Select...
```
Tile Size:
```
5000 x 5000
```
 U.S. feet
Nominal Pulse Spacing:
```
1.0
```
 meters

Vertical Datum: `NAVD88` U.S. feet

Horizontal Datum: `NAD83_NSRS2007` U.S. feet

Project Projection/Coordinate Reference System:
`NAD_1983_StatePlane_Georgia_East_FIPS_1001_Feet` U.S. feet.

This Projection Coordinate Reference System is consistent across the following deliverables:

☐ Project Shapefile/Geodatabase　　　　☐ Breaklines XML Metadata File
☐ Project Tiling Scheme Shapefile/Gdb　　☐ Bare-Earth DEM XML Metadata File
☐ Checkpoints Shapefile/Geodatabase　　☐ Swath LAS Files
☐ Project XML Metadata File　　　　　　☑ Classified LAS Files
☐ Swath LAS XML Metadata File　　　　　☐ Breaklines Files
☑ Classified LAS XML Metadata File　　　☐ Bare-Earth DEM Files

Project Shapefile/Geodatabase CRS

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Project Tiling Scheme Shapefile/Geodatabase CRS

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Check Point Shapefile/Geodatabase CRS

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Project XML Metadata CRS

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Swath LAS XML Metadata CRS

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Breakline XML Metadata CRS

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DEM XML Metadata CRS

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Swath LAS Files CRS

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Breakline Files CRS

```

```

DEM Files CRS

Review Cycle

This section documents who performed the QA Review on a project as well as when QA reviews were started, actions passed, received, and completed.

Reviewer:

T. Jerris

Review Start Date:

11/15/2012

Action to Contractor Date	Issue Description	Return Date

Review Complete: 1/10/2013

Metadata Review

Provided metadata files have been parsed using 'mp' metadata parser. Any errors generated by the parser are documented below for reference and/or corrective action.

The Project XML Metadata file parsed without errors.

The Classified LAS XML Metadata file parsed without errors.

Project QA/QC Report Review

ASPRS recommends that checkpoint surveys be used to verify the vertical accuracy of LiDAR data sets. Checkpoints are to be collected by an independent survey firm licensed in the particular state(s) where the project is located. While subjective, checkpoints should be well distributed throughout the dataset. National Standards for Spatial Data Accuracy (NSSDA) guidance states that checkpoints may be distributed more densely in the vicinity of important features and more sparsely in areas that are of little or no interest. Checkpoints should be distributed so that points are spaced at intervals of at least ten percent of the diagonal distance across the dataset and at least twenty percent of the points are located in each quadrant of the dataset.

NSSDA and ASPRS require that a minimum of twenty checkpoints (thirty is preferred) are collected for each major land cover category represented in the LiDAR data. Checkpoints should be selected on flat terrain, or on uniformly sloping terrain in all directions from each checkpoint. They should not be selected near severe breaks in slope, such as bridge abutments, edges of roads, or near river bluffs. Checkpoints are an important component of the USGS QA process. There is the presumption that the checkpoint surveys are error free and the discrepancies are attributable to the LiDAR dataset supplied.

For this dataset, USGS checked the spatial distribution of checkpoints with an emphasis on the bare-earth (open terrain) points; the number of points per class; the methodology used to collect these points; and the relationship between the data supplier and checkpoint collector. When independent control data are available, USGS has incorporated this into the analysis.

Checkpoint Shapefile or Geodatabase:
☐ Checkpoint Distribution Image?

The following land cover classes are represented in this dataset (uncheck any that do not apply):

☑ Bare Earth

☑ Tall Weeds and Crops

☑ Brush Lands and Low Trees

☑ Forested Areas Fully Covered by Trees

☑ Urban Areas with Dense Man-Made Structures

There are a minimum of 20 checkpoints for each land cover class represented. Points

within each class are uniformly distributed throughout the dataset. USGS Select...able to locate independent checkpoints for this analysis. USGS accepts the quality of the checkpoint data for these LiDAR datasets.

Errors, Anomalies, Other Issues to document? ○ Yes ○ No

☐ Image?

Accuracy values are reported in terms of Fundamental Vertical Accuracy (FVA), Supplemental Vertical Accuracy(s) (SVA), and Consolidated Vertical Accuracy (CVA).

Accuracy values are reported in: U.S. feet

Required FVA Value is 1.18 U.S. feet or less.
Target SVA Value is ⎮ U.S. feet or less.
Required CVA Value is ⎮ U.S. feet or less.

The reported FVA of the LAS Swath data is 0.33 U.S. feet.

The reported FVA of the Bare-Earth DEM data is ⎮ U.S. feet.
SVA are required for each land cover type present in the data set with the exception of bare-earth. SVA is calculated and reported as a 95th Percentile Error.

Land Cover Type		SVA Value		Units
Tall Weeds and Crops				U.S. feet
Brush Lands and Low Trees				U.S. feet
Forested Areas Fully Covered by Trees				U.S. feet
Urban Areas with Dense Man-Made Structu...				U.S. feet

The reported CVA of this data set is: ⎮ U.S. feet.

LAS Tile File Review

Classified LAS tile files are used to build digital terrain models using the points classified as ground. Therefore, it is important that the classified LAS are of sufficient quality to ensure that the derivative product accurately represents the landscape that was measured. The following was determined for classified LAS files for this project:

Classified LAS Tile File Characteristics
- ☑ Separate folder for Classified LAS tile files
- ☑ Classified LAS tile files conform to Project Tiling Scheme
- ☑ Quantity of Classified LAS tile files conforms to Project Tiling Scheme
- ☑ Classified LAS tile files do not overlap
- ☐ Classified LAS tile files are uniform in size
- ☐ Classified LAS tile files have no points classified as '12'

☑ Point classifications are limited to the standard values listed below:

Code	Description
1	Processed, but unclassified
2	Bare-earth ground
7	Noise (low or high, manually identified, if needed)
9	Water
10	Ignored ground (breakline proximity)
11	Withheld (if the "Withheld" bit is not implemented in processing software)

☐ Buy up?

Based on this review, the USGS does not accept at this time the classified LAS tile file data.

Errors, Anomalies, Other Issues to document? ⦿ Yes ○ No

☐ Image?

Note The box 'Classified LAS tile files have no points classified as 12 is not checked … therefore, the classification 12 is used and is prevalent throughout the counties.

Based on this review, the deliverables provided <u>do not meet at this time</u> the Task Order requirements.

Internal Note:

This report reflects only the LAS data for the GA_17County Coastal lidar project; all the other deliverables (i.e., DEM, etc.) were sent previously to EROS.

Of the 17 counties, 10 are Coastal and are: Brantley, Bryan, Bulloch, Camden, Charlton, Effingham, Long, McIntosh, Screven, and Wayne. The remaining 7 (Inland) counties are reported in another report.

The only error encountered is the use of LAS Classification of 12 (overlap). For this reason, these deliverables do not meet at this time the Task Order requirements and subsequently the NGTOC does not accept at this time the classified LAS tile file data.

EROS has informed the NGTOC to send this data to them, withstanding LAS Classification 12 encountered within the dataset.

<u>This is the end of the report.</u>

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