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| U.S. Army Corps of Engineers – Tennessee LiDAR Delivery ReportDelivery Report Produced for U.S. Army Corps of EngineersUSACE Contract: W912P9-10-D-0534Task Order: 0001Reporteport Date: 10/09/2012 |
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**U.S. Army Corps of Engineers Tennessee LiDAR –Deliverables Overview Checklist**

[x]  **Classified Point Cloud Data**

 [x]  LAS Version 1.2

 [x]  Correct Georeference Information

 [x]  Contains GPS Times

 [x]  Contains Intensity Values

 [x]  Tile to 1000 m x 1000 m Tile Grid

 [x]  Classified with class 1 – unclassified, class 2 – Bare-earth Ground, 7 – Noise, 9 – Water, 12-Withheld

[x]  **Bare Earth LiDAR Data**

 [x]  LAS Version 1.2

 [x]  Correct Georeference Information

 [x]  Contains GPS Times

 [x]  Contains Intensity Values

 [x]  Tile to 1000 m x 1000 m Tile Grid

 [x]  Classified with class 2- Bare-earth Ground

[x]  **First Return LiDAR Data**

 [x]  LAS Version 1.2

 [x]  Correct Georeference Information

 [x]  Contains GPS Times

 [x]  Contains Intensity Values

 [x]  Tile to 1000 m x 1000 m Tile Grid

 [x]  Contains first returns from all point classes

[x]  **Last Return LiDAR Data**

 [x]  LAS Version 1.2

 [x]  Correct Georeference Information

 [x]  Contains GPS Times

 [x]  Contains Intensity Values

 [x]  Tile to 1000 m x 1000 m Tile Grid

 [x]  Contains last returns from all point classes

[x]  **Model Key Point LiDAR Data**

 [x]  LAS Version 1.2

 [x]  Correct Georeference Information

 [x]  Contains GPS Times

 [x]  Contains Intensity Values

 [x]  Tile to 1000 m x 1000 m Tile Grid

 [x]  Classified with class 8 – Intelligently thinned bare-earth ground points

[x]  **Bare Earth Surface (Raster DEM)**

[x]  Cell size of 1 m

[x]  ESRI GRID File format

 [x]  Tiled with no overlap

 [x]  Reviewed for edge-matching and artifacts

 [x]  Free of void areas

 [x]  Hydrographic features have been flattened according to SOW

[x]  **Survey Data**

 [x]  Surveyed Quality Check point report, photos, and coordinate listing

 [x]  Check points in Shapefile format

[x]  Check points in ASCII format (X, Y, Z)

[x]  RMSE error report in Microsoft Excel format

[x]  **Metadata**

 [x]  FGDC Compliant metadata for:

[x]  Deliverables (LAS, First Return, Last Return, Bare Earth, Model Key Points, DEM, Breakline,

 Intensity Imagery, and Project)

 [x]  Shapefile of flight lines, as flown, including dates for each flight line in the attribute table

[x]  **Project Reports**

 [x]  Collection Report detailing mission planning and flight logs.

 [x]  Survey Report

 [x]  Processing report

 [x]  QA/QC Reports

[x]  **Extents**

 [x]  Tile grid in Shapefile format derived from the LiDAR Deliverable

 [x]  Project Boundary delivered as shapefile

 [x]  Tile grid according to USNG format, 1000 m x 1000 m, and in Shapefile format

[x]  **Breakline Data**

 [x]  Breakline Data in GDB

 [x]  Breakline Data as Shapefiles

[x]  **Intensity Imagery**

[x]  Intensity imagery in GeoTIFF format and 0.3 m (1FT) pixel size

[x]  **Other Ancillary Data**

 [x]  Shapefile showing the locations of temporal changes that occurred between the two LiDAR acquisition

 periods

# Classified Point Cloud

Classified point cloud data has been delivered tiled to 1000 m x 1000 m tiles that are named according to US National Grid format. This delivery is a re-delivery of the full project area and consists of 14,822 LiDAR tiles that meet the project specified requirement.

# Bare Earth LiDAR Data

The bare earth ground data is delivered as its own tile, containing only bare earth ground points in class 2. This data is tiled to 1000 m x 1000 m tiles that are named to according to US National Grid format. This delivery is a re-delivery of the full project area and consists of 14,768 tiles that meet the project specified requirement. Fifty-four (54) tiles had too few ground points to be created. Most of these tiles are small tiles along the project boundary and coincide with hydrographic features. The names of project tiles that do not have corresponding bare earth tiles can be found in the attribute table of the project tile grid shapefile and in Appendix D of the project report.

# First Return LiDAR Data

First returns from all point classes are delivered tiled to 1000 m x 1000 m tiles that are named to according to US National Grid format. This delivery is a re-delivery of the full project area and consists of 14,822 tiles that meet the project specified requirement.

# Last Return LiDAR Data

Last returns from all point classes are delivered tiled to 1000 m x 1000 m tiles that are named to according to US National Grid format. This delivery is a re-delivery of the full project area and consists of 14,822 tiles that meet the project specified requirement.

# Model Key Points

The bare earth ground points were intelligently thinned to create model key points. Model key points are defined as class 8 and are delivered tiled to 1000 m x 1000 m tiles that are named according to US National Grid format. This delivery is a re-delivery of the full project area and consists of 14,739 tiles that meet the project specified requirement. Eighty-three (83) tiles had too few ground points to be created. Most of these tiles are small tiles along the project boundary and coincide with hydrographic features. The names of project tiles that do not have corresponding model key point tiles can be found in the attribute table of the project tile grid shapefile and in Appendix C of the project report.

# Bare Earth Surface (Raster DEM)

This delivery is a re-delivery of the full project area and consists of 14,822 bare-earth DEMs in ESRI GRID format, tiled to 1000 m x 1000 m tiles. All tiles have a cell size of 1 m and have been reviewed to ensure that they meet the project required specifications.

# Survey Data

All survey control data, reports and photos are included in this delivery. Accuracy assessment points are in both ESRI shapefile and ASCII (X, Y, Z) format. The RMSE error report is included as a Microsoft Excel spreadsheet.

# Metadata

Project level metadata for each of the deliverables (Fully classified LiDAR, bare-earth LiDAR, first return LiDAR, last return LiDAR, model key points, breaklines, DEM, intensity imagery, and overall project) has been delivered in XML format. Metadata has been reviewed through the USGS metaparser tool to ensure that it is FGDC compliant. Flight lines (as flown) are delivered in ESRI shapefile format. This shapefile includes flight dates as part of the attribute table.

# Project Report

A comprehensive project report has been delivered in PDF format. This report includes the LiDAR acquisition and processing information along with detailed information on the production and quality control process used for the development of all deliverables. The GPS processing data is very lengthy due to all of the processing graphs; this data has been delivered as two separate appendices in PDF format.

# Extents

Three ESRI shapefiles are included with this delivery. One shapefile is the boundary of the project area. The second shapefile is the tile grid, created and named according to US National Grid format. The third shapefile is derived from the extents of the actual LAS deliverable to ensure that all delivered LiDAR have been accounted for. The extents have been verified against the project boundary to ensure that there is full coverage for the project.

# Breakline Data

Breaklines have been delivered in an ESRI file geodatabase and as shapefiles. Breaklines were derived to meet the project specifications as outlined in the SOW.

# Intensity Imagery

Intensity imagery is delivered tiled to 1000 m x 1000 m tiles that are named to according to US National Grid format. The imagery is in GeoTIFF format with 0.3 m or 1 ft pixel size, which exceeds project requirements. The intensity imagery is created from the full point cloud LiDAR data. This delivery is a re-delivery of the full project area and consists of 14,822 GeoTIFF tiles.

# Ancillary Data

The LiDAR data for the Tennessee Project was acquired during two different acquisition periods. Due to the time difference, there are some temporal changes between adjacent flight lines, particularly within hydrographic features or marsh areas where water levels varied between the two acquisitions. A few terrestrial temporal changes have been noted due to construction. A shapefile identifying locations of temporal changes has been provided along with the data.

# Other Comments

Data for the Tennessee LiDAR Project is delivered on three (3) hard drives due to the size of the project and is approximately 4 Terabytes in size. The First Return and Last Return LiDAR data are located on the 2 TB Lacie big disk extreme hard drive (S/N 183003949). The Bare-Earth LiDAR and Model Key Point LiDAR data are located on the Western Digital My Book 500 GB hard drive (S/N WCAU46476292). All other data in this delivery is located on the second Lacie hard disk 2 TB hard drive (S/N 13481006230190QR).