**TETRA TECH**

# LiDAR Reclassification and DEM Development Processing Report for Miami-Dade County

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**PRESENTED TO**

**Department of Commerce**
**National Oceanic and Atmospheric Administration**
**National Ocean Service**
**Office for Coastal Management**

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**Statement of Work**

Tetra Tech was tasked to reclassify LiDAR point data collected in 2015 of the Miami-Dade County area for the purpose of creating accurate Digital Elevation Models (DEMs). This processing report will detail the procedures used for the classification of the LiDAR data, and the subsequent generation of 5 foot grid-spaced Digital Elevation Models.

**Task 1: Review of Data**

NOAA delivered the 2015 data that was collected for Miami-Dade County via hard drive. This delivery included LAS files, DEMs, a geodatabase of breaklines, tile boundaries, and building outlines. Tetra Tech began by checking the delivered data for coverage over the Area of Interest (AOI). There were two areas where there was missing data. These locations were identified and forwarded to NOAA. An additional delivery of raw data from the acquisition company was made; however, after review, it was noted that the gaps still existed in the raw dataset, and the decision was made between both NOAA and Tetra Tech to work with the data that was available. Tetra Tech proceeded with an evaluation of the point cloud statistics to determine the classes that existed in the delivered LiDAR dataset. These initial reviews were conducted using LP360 v2017.1.54.7, which is an add-on extension to ArcMap 10.2.

**Task 2: Initial Classification**

The reclassification of the LiDAR data began by identifying the classes that were not necessary in the reclassified LiDAR, and assigning those points into an appropriate class. The main points that were reclassified in this stage were points identified as Vegetation (Classes 3,4,5). Vegetation classes were not necessary in the reclassified LiDAR, so these points were reclassed in Class 1 (Unclassified). Also, there were a small number of points in erroneous classes that were not identified in the original delivery. These points were examined and reassigned into an appropriate class. These steps were completed using TerraScan 017.029, which runs as an add-on extension to MicroStation Connect v10.00.00.25.

**Task 3: Additional Classification**

The next step was to refine the ground classification for the creation of Digital Elevation Models, along with the automated refinement of the Building Class (Class 6). Additionally, classification of High Points (Class 18) and Low Points (Class 7) was included in this step. This was accomplished using an automated classification filter. This step was completed using TerraScan 017.029, running as an add-on to MicroStation Connect v10.00.00.25.

**Task 4: Manual Review**

Following the automated classification, QA/QC DEMs were created using LP360 v2017.1.54.7, which runs as an add-on extension to ArcMap 10.2. Tetra Tech performed a hillshade QC on DEMs to i) find significant ground errors; ii) find ground points inside breaklines that need to be reclassified; and iii) locate bridge decks to reclassify to class 17 / ensure they were in class 17. A coverage check was also conducted on the dataset to find holes in the data that weren't covered by ground or buildings. The LAS files were then manually edited to classify ground surface in previously unclassified areas and classify tops of buildings in previously unclassified areas. Global Mapper 12 was used for the review of the DEMs, and TerraScan 017.029, running as an add-on to MicroStation Connect v10.00.00.25, was used for the manual reclassification.

**Task 5: Creation of DEMs**

After the manual review of the LAS tiles was completed, the 5 foot DEMs in .img format were generated using Global Mapper 12.  A manual review of these .img DEMs was conducted using LP360 v2017.1.54.7, and Global Mapper 12.  A shapefile of potential errors was created and the locations called out were reviewed manually.  Where necessary, manual fixes were made using TerraScan 017.029, and the corrected files were exported as DEMs in .img format.

**Task 6: Overlap Tags**

The final step was to apply an overlap tag to points that fell in areas covered by multiple flightlines.  These overlap tags were added to the applicable points using the Point Cloud Task functionality of LP360 v2017.1.54.7.

**Task 7: Metadata**

FGDC-compliant metadata was created for each dataset (LAS, DEM).  The metadata passed through the USGS metadata parser without errors or warnings.

**Task 8: Deliverables**

The LAS files, DEMs, Metadata, and Report were reviewed for completeness before they were loaded onto the hard drives.  A check was then conducted to be sure the number of files copied matches the expected number.  All efforts have been made to ensure that no files were corrupted during this process.