Please provide the following information, and submit to the NOAA DM Plan Repository.

Reference to Master DM Plan (if applicable)

As stated in Section IV, Requirement 1.3, DM Plans may be hierarchical. If this DM Plan inherits provisions from a higher-level DM Plan already submitted to the Repository, then this more-specific Plan only needs to provide information that differs from what was provided in the Master DM Plan.

URL of higher-level DM Plan (if any) as submitted to DM Plan Repository:

1. General Description of Data to be Managed

1.1. Name of the Data, data collection Project, or data-producing Program:

2013-2014 U.S. Geological Survey CMGP LiDAR: Post Sandy (MA, NH, RI)

1.2. Summary description of the data:

TASK NAME: New England CMGP Sandy Lidar LiDAR Data Acquisition and Processing Production Task USGS Contract No. G10PC00057 Task Order No. G13PD00796 Woolpert Order No. 073667 CONTRACTOR: Woolpert, Inc. This data set is comprised of LiDAR point cloud data, raster DEM, hydrologic 3-d breaklines, raster intensity, survey control, project tile index, and project data extent which encompasses approximately 2120 square miles along with a 100 meter buffer over several areas in central to eastern Massachusetts. The coverage of the data includes slivers of areas that were missed by previous lidar acquisitions. LiDAR data is a remotely sensed high resolution elevation data collected by an airborne platform. The LiDAR sensor uses a combination of laser range finding, GPS positioning, and inertial measurement technologies. The LiDAR systems collect data point clouds that are used to produce detailed Digital Elevation Models (DEMs) of the earth's terrain, man-made structures, and vegetation. The task required the LiDAR data to be collected at a nominal pulse spacing (NPS) of 0.7m. The final products include files containing classified LAS, one (1) meter pixel raster DEMs of the bare-earth surface in ERDAS IMG Format, and 8-bit intensity images. Each LAS file contains lidar point information, which has been calibrated, controlled, and classified. Additional deliverables include hydrologic breakline data, control data, tile index, lidar processing and survey reports in PDF format, FGDC metadata files for each data deliverable in .xml format, and LAS swath data. Collected swath files that were that were larger than 2GB were provided in multiple sub-swath files, each less than 2GB. The LiDAR data was provided in 1,500 meters x 1,500 meters tiles in the UTM projection. The LiDAR tile file names were derived from the southwest corner of each tile and are named based on the US National Grid. Product specifics can be found in the processing description section of this file. Ground conditions: No snow; Leaf off. The tide window requirements for the lidar data acquisition; Tidally impacted waters within the AOI are expected to be acquired at Predicted MLW +- 2 hours exclusive of neap tide.; The bare earth DEMs along the coast may have a variance in the water heights due to temporal differences during the lidar data acquisition and will be represented in DEM as a seam-

like anomaly. This is especially true in areas of tidal flats. One coastal elevation was applied to entire project area. Due to differing acquisition dates and thus differing tide levels there will be areas in the DEM exhibiting what appears to be "digging" water features. Sometimes as much as approximately 1 meter. This was done to ensure that no coastal hydro feature was "floating" above ground surface. This coastal elevation will also affect connected river features wherein a sudden increase in flow will be observed in the DEM to accommodate the coastal elevation value; During Hydrologic breakline collection, Woolpert excluded obvious above-water piers or pier-like structures from the breakline placement. Some features extend beyond the apparent coastline and are constructed in a manner that can be considered an extension of the ground. These features were treated as ground during classification and subsequent hydrologic delineation. In all cases, professional practice was applied to delineate what appeared to be the coast based on data from multiple sources; Cranberry bogs are existent in the project. These are filled with shallow water for short periods during the year but were not collected as hydrologic features; Due to the many substructures and the complexity of the urban environment, interpolation and apparent "divots" (caused by tinning) may be evident in the surface of the DEM. Temporal differences from lidar collects in and around hydrologic features may manifest in the DEM as differing water levels. In all cases, professional practice was applied to best represent the topography. Data for the task order is referenced to the UTM Zone 19N, North American Datum of 1983 (2011), and NAVD88, in meters. However, a small portion of the AOI crossed into UTM 18 and this data is referenced to the UTM18N, North American Datum of 1983 (2011), and NAVD88 GEOID12A, in meters

1.3. Is this a one-time data collection, or an ongoing series of measurements?
One-time data collection

1.4. Actual or planned temporal coverage of the data:
2013-11-16 to 2014-12-27

1.5. Actual or planned geographic coverage of the data:
W: -72.741217, E: -69.926599, N: 43.100583, S: 41.145654

1.6. Type(s) of data:
(e.g., digital numeric data, imagery, photographs, video, audio, database, tabular data, etc.)
las

1.7. Data collection method(s):
(e.g., satellite, airplane, unmanned aerial system, radar, weather station, moored buoy, research vessel, autonomous underwater vehicle, animal tagging, manual surveys, enforcement activities, numerical model, etc.)

1.8. If data are from a NOAA Observing System of Record, indicate name of system:

1.8.1. If data are from another observing system, please specify:

2. Point of Contact for this Data Management Plan (author or maintainer)

2.1. Name:
NOAA Office for Coastal Management (NOAA/OCM)

2.2. Title:
Metadata Contact

2.3. Affiliation or facility:
NOAA Office for Coastal Management (NOAA/OCM)

2.4. E-mail address:
coastal.info@noaa.gov

2.5. Phone number:
(843) 740-1202

3. Responsible Party for Data Management
Program Managers, or their designee, shall be responsible for assuring the proper management of the data produced by their Program. Please indicate the responsible party below.

3.1. Name:

3.2. Title:
Data Steward

4. Resources
Programs must identify resources within their own budget for managing the data they produce.

4.1. Have resources for management of these data been identified?

4.2. Approximate percentage of the budget for these data devoted to data management (specify percentage or "unknown"):

5. Data Lineage and Quality
NOAA has issued Information Quality Guidelines for ensuring and maximizing the quality, objectivity, utility, and integrity of information which it disseminates.

5.1. Processing workflow of the data from collection or acquisition to making it publicly accessible
(describe or provide URL of description):
Process Steps:
- 2013-11-17 00:00:00 - Using two Leica ALS70 (lidar) systems on board a Cessna 404 and Cessna 310 aircraft, lidar data, at a nominal pulse spacing (NPS) of 0.7 meters,

was collected for this task order (approximately 304 square miles). AGL = 7500 feet - Aircraft Speed = 150 Knots, Field of View (Full) = 32 degrees, Pulse Rate = 239 kHz, Scan Rate = 41.6 Hz, with an average side lap of 25%. Multiple returns were recorded for each laser pulse along with an intensity value for each return. This acquisition was part of a larger effort designed to capture one other USGS task order AOI in New Jersey. For the New York portion of the collection, ten (10) missions were flown between March 21, 2014 and April 21, 2014. Six (6) Global Navigation Satellite System (GNSS) Base Stations were used in support of the lidar data acquisition. Specific information regarding latitude, longitude, and ellipsoid height to the L1 phase center is included in the lidar processing report. As a supplement to the USGS task order collection, Woolpert acquired lidar data of New York City as part of a 2013 task order for the NGA. This was acquired using a Leica ALS70 (lidar) system on board a Cessna 404 and produced lidar data, at a nominal pulse spacing (NPS) of 0.91 meters. AGL = 7500 feet - Aircraft Speed = 150 Knots, Field of View (Full) = 40 degrees, Pulse Rate = 239 kHz, Scan Rate = 36.9 Hz, with an average side lap of 30%. For the NGA task order portion of the collection One (1) mission was used. This mission was flown on August 6, 2013. One (1) Global Navigation Satellite System (GNSS) Base Station was used in support of the lidar data acquisition. Specific information regarding latitude, longitude, and ellipsoid height to the L1 phase center is included in the lidar processing report. Multiple returns were recorded for each laser pulse along with an intensity value for each return. The flight plan for the New York City NGA Lidar task order was developed with 11 additional cross flights over the Manhattan Metropolitan area to minimize data shadowing and data voids in the lidar dataset caused by tall buildings.
- 2013-11-17 00:00:00 - USGS requested use of this data from the NGA in order to reduce the duplication of lidar data acquisition effort on the New York CMGP Sandy Lidar task order. The NGA approved the use of this lidar data for the USGS task order. Following the approval by NGA, Woolpert was able to utilize the cross flights acquired as part of the NGA task order to minimize data shadowing and data voids caused by tall buildings in the USGS New York CMGP Sandy Lidar task order AOI. The lidar data acquisition parameters for this mission are detailed in the lidar processing report for this task order. For all acquired lidar data as part of entire USGS New York City task order, the geoid used to reduce satellite derived elevations to orthometric heights was GEOID12A. Data for the task order is referenced to the UTM Zone 18N, North American Datum of 1983 (2011), and NAVD88, in meters. Once the data acquisition and GPS processing phases are complete, the lidar data was processed immediately to verify the coverage had no voids. The GPS and IMU data was post processed using differential and Kalman filter algorithms to derive a best estimate of trajectory. The quality of the solution was verified to be consistent with the accuracy requirements of the project. The SBET was used to reduce the lidar slant range measurements to a raw reflective surface for each flight line. The coverage was classified to extract a bare earth digital elevation model (DEM) and separate last returns. The ALS70 calibration and system performance is verified on a periodic basis using Woolpert's calibration range. The calibration range consists

of a large building and runway. The edges of the building and control points along the runway have been located using conventional survey methods. Inertial measurement unit (IMU) misalignment angles and horizontal accuracy are calculated by comparing the position of the building edges between opposing flight lines. The scanner scale factor and vertical accuracy is calculated through comparison of lidar data against control points along the runway. Field calibration is performed on all flight lines to refine the IMU misalignment angles. IMU misalignment angles are calculated from the relative displacement of features within the overlap region of adjacent (and opposing) flight lines. The raw lidar data is reduced using the refined misalignment angles.
- 2014-05-07 00:00:00 - Ground control and QAQC control point survey was performed by Woolpert surveyors, to support the USGS New York CMGP Sandy Lidar 0.7 Meter NPS LIDAR project. All surveys were performed in such a way as to achieve ground control that supports lidar data at 9.25 cm RMSE accuracy and satisfy a local network accuracy of 5 cm at a 95% confidence level. All ground control survey field activities took place from 12/03/2013 thru 05/07/14. Woolpert collected control data for data processing as supplemental QAQC points. The supplemental QAQC points were collected to be used in independent accuracy testing. The survey was performed using two (2) Trimble Navigation R8 Model 3 GNSS Dual Frequency GPS receivers with a Trimble TDL-450 radio as dual base stations in conjunction with simultaneous data collected across two (2) Continuously Operating Reference Stations (CORS) GPS receivers. Additionally, Woolpert utilized a Trimble Navigation R8 Model 3 GNSS dual-frequency GPS receiver and a TSC2 data collector as a rover. Woolpert surveyors,utilizing Real-Time Kinematic GPS techniques, made observations using 1-second epoch rates and observations of 60 to 180 seconds. Each station was occupied twice to insure necessary horizontal and vertical accuracies. All GPS ground control observations were processed using Trimble Navigation's Trimble Business Center. All horizontal GPS control was based on UTM Zone 18N, NAD83(2011) expressed in meters. The vertical datum used for this project was based on the North American Vertical Datum of 1988 (NAVD88), GEOID12A, also expressed in meters.
- 2013-11-17 00:00:00 - The individual flight lines were inspected to ensure the systematic and residual errors have been identified and removed. Then, the flight lines were compared to adjacent flight lines for any mismatches to obtain a homogenous coverage throughout the project area. The point cloud underwent a classification process to determine bare-earth points and non-ground points utilizing "first and only" as well as "last of many" lidar returns. This process determined Default (Class 1), Ground (Class 2), Noise (Class 7), Water (Class 9), Ignored Ground (Class 10), Overlap Default (Class 17) and Overlap Ground (Class 18). The bare-earth (Class 2 - Ground) lidar points underwent a manual QA/QC step to verify the quality of the DEM as well as a peer-based QC review. This included a review of the DEM surface to remove artifacts and ensure topographic quality. Classification of water (class 9) and ignored ground (class 10) was completed via the use of the hydrologic breaklines collected for the hydro-flattening phase. The

overlap classes were determined by first identifying the overlapping areas and reclassifying the LAS data by offset from a corridor. This allows the returns located on the edge of the swath to be removed from the bare earth coverage in an effort to produce a more uniform data density. The returns determined to be overlap are then further classified to produce overlap default (class 17) and overlap ground (class 18). The surveyed ground control points are used to make vertical adjustments to the data set and to perform the accuracy checks and statistical analysis of the lidar dataset. Supervisory QC monitoring of work in progress and completed editing ensured consistency of classification character and adherence to project requirements across the entire project area. The resulting deliverables for this task order consist of classified LAS file in LAS 1.2 format, Raw Swath LAS files in LAS 1.2 format, 1 meter pixel size DEM files in ERDAS IMG format, 1 meter pixel size 8-bit Intensity files in GeoTIFF format, and Hydrologic Breakline data in ESRI shape file format.
- 2015-02-19 00:00:00 - The individual flight lines were inspected to ensure the systematic and residual errors have been identified and removed. Then, the flight lines were compared to adjacent flight lines for any mismatches to obtain a homogenous coverage throughout the project area. The point cloud underwent a classification process to determine bare-earth points and non-ground points utilizing "first and only" as well as "last of many" lidar returns. This process determined Default (Class 1), Ground (Class 2), Noise (Class 7), Water (Class 9), Ignored Ground (Class 10), Overlap Default (Class 17) and Overlap Ground (Class 18). The bare-earth (Class 2 - Ground) lidar points underwent a manual QA/QC step to verify the quality of the DEM as well as a peer-based QC review. This included a review of the DEM surface to remove artifacts and ensure topographic quality. Classification of water (class 9) and ignored ground (class 10) was completed via the use of the hydrologic breaklines collected for the hydro-flattening phase. The overlap classes were determined by first identifying the overlapping areas and reclassifying the LAS data by offset from a corridor. This allows the returns located on the edge of the swath to be removed from the bare earth coverage in an effort to produce a more uniform data density. The returns determined to be overlap are then further classified to produce overlap default (class 17) and overlap ground (class 18). The surveyed ground control points are used to make vertical adjustments to the data set and to perform the accuracy checks and statistical analysis of the lidar dataset. Supervisory QC monitoring of work in progress and completed editing ensured consistency of classification character and adherence to project requirements across the entire project area. The hydrologic breaklines were produced according to USGSv1.0 specifications. The compilation procedure incuded use of lidar intensity, bare earth surface model, point cloud data, open source imagery in an effort to manually compile hydrologic features in a 2-d environment. Following the compilation phase, a seperate process was used to adjust the breakline data to best match the water level at the time of the lidar collection. Any ponds and/or lakes were adjusted to be at or just below the bank and to be at a constant elevation. Any streams were adjusted to be at or just below the bank and

to be monotonic. Manual QAQC and peer-based QC review was performed on all delineated data to ensure horizontal placement quality and on all adjusted data to ensure vertical placement quality. The final hydrologic breakline product was delivered in ESRI shape file format and was also used in the processing of the DEM deliverable.
- 2015-02-19 00:00:00 - Tile Size: 1,500m x 1,500m. The tile file name was derived from the southwest corner of each tile. The tiles are named based on the US National Grid. Project data extent was provided by USGS and subsequently buffered by 100 meters and provided in shape file format. Project deliverables were clipped to the 100 meter data extent.
- 2015-06-05 00:00:00 - The NOAA Office for Coastal Management (OCM) received the topographic files in classified LAS format from USGS with V1 specifications. The data were received in UTM Zone 18N and 19N NAD83 coordinates (meters) and vertically referenced to NAVD88 using the Geoid12a model in meters. OCM performed the following processing for data storage and Digital Coast provisioning purposes: 1. LAS files were compressed to LAZ format with LASTools. 2. LAS files were removed of an duplicated points and extraneous points were reclassified to noise. 3. Zone 19 was processed with little changes though Zone 18 were transformed to Zone 19 and checks run to remove all duplicated points which may have been delivered in both Zone 18 and 19. There 93 tiles effecting, of which 20 were completely removed since all the points already existed in the Zone 19 delivery. 4. The LAS files were transformed to geographic (decimal degrees), ellipsoidal coordinates (meters) referenced to the Geoid12a model.

5.1.1. If data at different stages of the workflow, or products derived from these data, are subject to a separate data management plan, provide reference to other plan:

5.2. Quality control procedures employed (describe or provide URL of description):

6. Data Documentation

The EDMC Data Documentation Procedural Directive requires that NOAA data be well documented, specifies the use of ISO 19115 and related standards for documentation of new data, and provides links to resources and tools for metadata creation and validation.

6.1. Does metadata comply with EDMC Data Documentation directive?

No

6.1.1. If metadata are non-existent or non-compliant, please explain:

Missing/invalid information:
- 1.7. Data collection method(s)
- 3.1. Responsible Party for Data Management
- 4.1. Have resources for management of these data been identified?
- 4.2. Approximate percentage of the budget for these data devoted to data

management
- 5.2. Quality control procedures employed
- 7.1. Do these data comply with the Data Access directive?
- 7.1.1. If data are not available or has limitations, has a Waiver been filed?
- 7.1.2. If there are limitations to data access, describe how data are protected
- 7.4. Approximate delay between data collection and dissemination
- 8.1. Actual or planned long-term data archive location
- 8.3. Approximate delay between data collection and submission to an archive facility
- 8.4. How will the data be protected from accidental or malicious modification or deletion prior to receipt by the archive?

6.2. Name of organization or facility providing metadata hosting:

NMFS Office of Science and Technology

6.2.1. If service is needed for metadata hosting, please indicate:

6.3. URL of metadata folder or data catalog, if known:

https://www.fisheries.noaa.gov/inport/item/49846

6.4. Process for producing and maintaining metadata

(describe or provide URL of description):

Metadata produced and maintained in accordance with the NOAA Data Documentation Procedural Directive: https://nosc.noaa.gov/EDMC/DAARWG/docs/EDMC_PD-Data_Documentation_v1.pdf

7. Data Access

NAO 212-15 states that access to environmental data may only be restricted when distribution is explicitly limited by law, regulation, policy (such as those applicable to personally identifiable information or protected critical infrastructure information or proprietary trade information) or by security requirements. The EDMC Data Access Procedural Directive contains specific guidance, recommends the use of open-standard, interoperable, non-proprietary web services, provides information about resources and tools to enable data access, and includes a Waiver to be submitted to justify any approach other than full, unrestricted public access.

7.1. Do these data comply with the Data Access directive?

7.1.1. If the data are not to be made available to the public at all, or with limitations, has a Waiver (Appendix A of Data Access directive) been filed?

7.1.2. If there are limitations to public data access, describe how data are protected from unauthorized access or disclosure:

7.2. Name of organization of facility providing data access:

NOAA Office for Coastal Management (NOAA/OCM)

7.2.1. If data hosting service is needed, please indicate:

7.2.2. URL of data access service, if known:
https://coast.noaa.gov/dataviewer/#/lidar/search/where:ID=4914
https://noaa-nos-coastal-lidar-pds.s3.amazonaws.com/laz/geoid18/4914/index.html

7.3. Data access methods or services offered:
This data can be obtained on-line at the following URL:

https://coast.noaa.gov/dataviewer/#/lidar/search/where:ID=4914;

7.4. Approximate delay between data collection and dissemination:

7.4.1. If delay is longer than latency of automated processing, indicate under what authority data access is delayed:

8. Data Preservation and Protection

The NOAA Procedure for Scientific Records Appraisal and Archive Approval describes how to identify, appraise and decide what scientific records are to be preserved in a NOAA archive.

8.1. Actual or planned long-term data archive location:
(Specify NCEI-MD, NCEI-CO, NCEI-NC, NCEI-MS, World Data Center (WDC) facility, Other, To Be Determined, Unable to Archive, or No Archiving Intended)

8.1.1. If World Data Center or Other, specify:

8.1.2. If To Be Determined, Unable to Archive or No Archiving Intended, explain:

8.2. Data storage facility prior to being sent to an archive facility (if any):
Office for Coastal Management - Charleston, SC

8.3. Approximate delay between data collection and submission to an archive facility:

8.4. How will the data be protected from accidental or malicious modification or deletion prior to receipt by the archive?
Discuss data back-up, disaster recovery/contingency planning, and off-site data storage relevant to the data collection

9. Additional Line Office or Staff Office Questions

Line and Staff Offices may extend this template by inserting additional questions in this section.