**Statement of Work**

**to the**

**Cooperative agreement**

**for**

**Light Detection and Ranging (LIDAR) data Acquisition and**

**PRODUCTION OF ASSOCIATED DATASETS**

**between the**

**U. S. Geological Survey**

**and**

**Sonoma County AGRICULTURAL PRESERVATION AND OPEN SPACE DISTRICT, california**

**May, 2013**

###

**I. Purpose**

This is a cooperative project between the U.S. Geological Survey (USGS) and Sonoma County Agricultural Preservation and Open Space District to produce Quality levels 1 and 2 light detection and ranging data (lidar) that is detailed enough to support city, county, regional, state, and national purposes. The lidar will be collected in mid- to late summer, 2013, using airborne digital sensors to collect Quality level 1 and 2 lidar that meets National Map Accuracy Standards. The resulting lidar data will cover 1,600 square miles for complete county coverage; 700 square miles at Quality 1 level and the remaining 900 square miles at the Quality 2 level.

This project, which is part of the National Geospatial Program 3DEP, will be managed by the staff at the Sonoma County Agricultural Preservation and Open Space District District. Details on 3DEP can be found on USGS Fact Sheets FS12\_3088 and FS12\_3089 (<http://pubs.er.usgs.gov/publication/fs20123088> and <http://pubs.er.usgs.gov/publication/fs20123089>). Quality Assurance will be conducted by USGS NGTOC personnel; all data will reside in the public domain and be available through USGS repositories via data download and associated map services. High resolution lidar data benefits all levels of government, including U.S. Department of Interior science programs and USGS geospatial program goals for *The National Map.*

This project supports the various missions of the Sonoma County Agricultural Preservation and Open Space District partners who require regularly updated and highly accurate base map data to meet government operational needs. The partnership reduces both local and Federal government spending by coordinating procurement and contract mobilization costs, and contract management costs, including quality assurance, thus saving government money and minimizing impacts on related administrative resources.

**II. Background**

**OMB Circular A-16 “**Coordination of Geographic Information and Related Spatial Data Activities” provides for improvements in coordination and use of spatial data. Spatial data refers to information about places or geography, and has traditionally been shown on maps. This Circular describes the effective and economical use and management of spatial data assets in the digital environment for the benefit of the government and the nation.

The National Map is a collaborative effort to improve and deliver topographic information for the nation. It provides public access to high-quality, geospatial data and information from multiple partners to help support decision-making by resource managers and the public. The National Map is the product of a consortium of Federal, State, and local partners who provide geospatial data to enhance America's ability to access, integrate, and apply geospatial data at global, national, and local scales.

This Cooperative Agreement represents a high priority activity for the USGS and *The National Map* and results in the collection and sharing of high resolution data, including elevation data (lidar), which is particularly important for coastal watersheds that may potentially impacted by climate change and attendant sea level fluctuation and inundation.

1. **Scope:**

The Sonoma County 2013 lidar project deliverables will include the following deliverables for both the Quality level 1 collection area and the Quality level 2 collection areas. See graphic for the Quality level 1 and 2 collection areas (see Attachment A). Deliverables are detailed in Section VI. The final project deliverables, including all deliverables and supporting documentation, are estimated to be completed and delivered by or before May 31, 2014.

1. **Technical Requirements:**

The Sonoma County partners consulted with USGS to define these technical requirements. Further information and complete descriptions of the technical requirements are contained in the *USGS Lidar Base Specification Version 1.0* available at the USGS Publication warehouse: <http://pubs.usgs.gov/tm/1194/>

**Quality Levels as defined by USGS in the National Enhanced Elevation Assessment (NEEA)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Elevation Quality Levels (QL)** |  **Source** | **Vertical Accuracy Terms** | **Horizontal Resolution Terms** |
| **Vertical RMSEz** | **Equivalent Contour Accuracy** | **Point Density** | **Nominal Pulse Spacing (NPS)** | **NED DEM Post Spacing** |
| QL 1 | LiDAR | 9.25 cm | 1-ft | 8 pts/m2 | 0.35 m | 1/27 arc-sec ~1 meter |
| QL 2 | LiDAR | 9.25 cm | 1-ft | 2 pts/m2 | 0.7 m | 1/27 arc-sec ~1 meter |

Projection: Preferred coordinate reference system is Universal Transverse Mercator (UTM), NAD83 HARN (meters), NAVD88 (meters).

Metadata: FGDC-compliant project level metadata in .xml format.

Area of Coverage: 700 square miles at Quality level 1; 900 square miles at Quality level 2; total county coverage = 1,600 square miles

**Additional Technical Information:**

Hydroflattening: Employ hydro-flattening to the derived bare-earth DEM to generate flattened water bodies (two acres or greater) and inland streams and rivers (over 100 feet in width). See pages 7-9 and Appendix 3 in the Lidar Base Specification for details.

Point Cloud Classification: Details on this can be found in the Lidar Base Specification on pages 10 and 11. A minimum classified scheme would include:

**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

**V. Partner Responsibilities:**

Sonoma County partners will:

* Manage all aspects for lidar data collection by qualified vendor to include scope, Request For Proposals, vendor selection, task award, project management, quality assurance, and timely delivery of data
* Consult as needed with the USGS on technical or administrative issues
* Provide data products to USGS as defined below

USGS will:

* Provide $132,000 to Sonoma County.
* Consult as needed with the Sonoma County on technical and administrative issues
* Serve the lidar data to the public via USGS Earth Explorer (earthexplorer.usgs.gov)
* Process and make available 1/9 arc second National Elevation Data (nationalmap.gov)

**VI. Deliverables:**

Sonoma County will provide the following deliverables to the USGS National Geospatial Technical Operations Center via USBII- or Firewire-compatible external hard drives to the address provided below.

Deliverables:

• Task order/statement of work

• Collection report

• Survey report

• Processing report

• QA/QC report

• Control and calibration points

• Bare-earth DEM footprint shapefile

• Project shapefile or geodatabase

• Project tiling schema shapefile or geodatabase

• Control point shapefile

• Blind checkpoint shapefile

• Breakline shapefile or geodatabase

• Swath LAS files

• Intensity image files (if available)

• Tiles LAS files classified

• Bare-earth DEM files, hydroflattened

• Project xml metadata

• Tiles LAS file xml metadata

• Breakline xml metadata

• Bare-earth DEM xml metadata

U.S. Geological Survey

Emmit Witt

U.S. Geological Survey

National Geospatial Technical Operations Center

1400 Independence Road, MS-337

Rolla, MO 65401-2002

(573) 308-3652

ecwitt@usgs.gov

**VII. Financial Arrangements**

The project funding sources are:

|  |  |
| --- | --- |
| **Funding Source** | **Amount** |
| Sonoma County  | $550,000  |
| US Geological Survey | $132,000 |
| The Nature Conservancy | $ 10,000 |
| **Estimated Total Project Cost (estimate)** | **$692,000** |

**VIII. Points of Contact**

**Data/Technical POCs**

|  |  |  |
| --- | --- | --- |
| **USGS**  |  | **SONOMA COUNTY** |
| Carol Ostergren | Name | Tom Robinson |
| U.S. Geological SurveyNational Geospatial Program3020 State University DriveSuite 4003Sacramento CA 95819 | Address | Sonoma County Agricultural Preservation and Open Space District747 Mendocino Ave., Ste. 100Santa Rosa, CA 95401 |
| 916-278-9510 | Telephone | 707-565-7369 |
| costergren@usgs.gov | E-Mail | Tom.robinson@sonoma-county.org |
|  |  |  |

**Administrative POC**

|  |  |  |
| --- | --- | --- |
| **USGS** |  | **Sonoma County** |
| Leigh Ann Davison | Name | Karen Gaffney, Conservation Planning Program Manager |
| U.S. Geological SurveyCore Science Systems345 Middlefield RoadMenlo Park, CA 94025 | Address | Sonoma County Agricultural Preservation and Open Space District747 Mendocino Ave., Ste. 100Santa Rosa, CA 95401 |
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| ldavison@usgs.gov | Email | Karen.gaffney@sonoma-county.org |
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Attachment A: Sonoma County 2013 lidar project area coverage

