## STATEMENT OF WORK

## Order #1

## 2019 Lidar Acquisition & Processing

## Flathead National Forest

1. **Purpose**

The U.S. Geological Survey of the U.S. Department of the Interior (hereinafter referred to as USGS) and the Flathead National Forest of the U.S. Department of Agriculture(hereinafter referred to as Partner) will collaborate to acquire high-resolution digital elevation data developed from airborne lidar (Light Detection and Ranging) for an area of approximately 91 square miles in the AOI (Appendix A). The data will be used to generate Digital Elevation Models (DEMs) for use in dam safety assessments, engineering design and design reviews, conservation planning, research, delivery, floodplain mapping, and hydrologic modeling utilizing lidar technology. The data is to be acquired during snow-free conditions in the 2019 field season. The project area will consist of high accuracy classified bare-earth lidar data in LAS format as well as raster DEMs per project requirements.

1. **General Terms**

USGS will select a qualified vendor to perform the lidar collection and processing via the Geospatial Product and Service Contract (GPSC). GPSC task orders are awarded to qualified contractors through federal government solicitation. Qualified contractors are selected for base contract award in accordance with Public Law 92-528 (Brooks Act) and FAR 36.6 - Architect-Engineering Services, which establishes a qualifications-based selection process in which contracts for Architectural and Engineering services are negotiated based on demonstrated competence and qualification for the type of professional services required.

Contractor selection is based on the following six criteria:

(1) Professional qualifications necessary for satisfactory performance of required services;

(2) Specialized experience and technical competence in the type of work required;

(3) Capacity to accomplish the work in the required time;

(4) Past performance on contracts with Government agencies and private industry in terms of cost control, quality of work, and compliance with performance schedules;

(5) Location in the general geographical area of the project and knowledge of the locality of the project; and

(6) Acceptability under other appropriate evaluation criteria.

Level of effort is negotiated on each task order issued under the base contracts. This process is aligned with the Department’s consultant RFP and selection process. The Task Order issued by USGS to the selected GPSC Contractor provides full details regarding project collection requirements and resulting deliverables. A copy of the Task Order will be provided to the Partner.

USGS will:

* Execute separate funding agreements with partners in support of the total project cost.
* Prepare a Task Order for agreed upon products and services.
* Serve as Government Point of Contact during the full period of the agreement.
* Administer data quality assurance and quality control (QAQC) for standard USGS Lidar Guidelines and Base Specification (LGBS) v2020A (or subsequent version) products and deliverables and manage all data deliverables.
* Require that all land surveys conducted in support of this project be performed under the supervision of a qualified professional land surveyor.
* Receive, inspect, and catalog all project deliverables.
* Prepare Quality Assessment Reports for standard USGS LGBS v2020A (or subsequent version) products and distribute to relevant project Points of Contact.
* Return data to contractor as needed for error correction/rework.
* Provide two copies of final data to partner.

USFS will:

* Provide funding for the project as described in the agreement.
* Pay contract project costs plus applicable GPSC assessment fee which is calculated by USGS as 6% of the contracted project cost, not to exceed the amount specified in the agreement.
* Assist the USGS National Geospatial Technical Operations Center (NGTOC) in resolving project issues as needed and appropriate.
* Provide available information, including informal observations from interested parties, on ground conditions to facilitate project flight planning.
* Be responsible for reviewing and publishing any additional products and services beyond USGS LGBS v2020A (or subsequent version) standard deliverables.

1. **Specifications and Deliverables**

Unless otherwise stated, all specifications and deliverables will meet or exceed the (Quality Level 1) U.S. Geological Survey Lidar Guidelines and Base Specification, v2020A (or subsequent version) ([*https://www.usgs.gov/3DEP/lidarspec*](https://www.usgs.gov/3DEP/lidarspec)). To supplement USGS specifications, FEMA-specific requirements such as cross section surveys, treatment of bridges and other features appearing in FEMA Procedure Memorandum No. 61 – Standards for Lidar and Other High Quality Digital Topography, (<https://www.fema.gov/media-library-data/1388780431699-c5e577ea3d1da878b40e20b776804736/Procedure+Memorandum+61-Standards+for+Lidar+and+Other+High+Quality+Digital+Topography+(Sept+2010).pdf>) may be adhered to and reflected in final product delivery as required.

**General Requirements**

* Data shall be of Quality Level 1 (QL 1), meeting the following accuracy requirements:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Quality Level | Pulse Density | Vertical Accuracy RMSEz | Aggregate Nominal Pulse Spacing (ANPS) | Aggregate Nominal Pulse Density (ANPD) | DEM Post Spacing |
| 1 | 8 pulses/m2 | 10 cm | 0.35 m | 8 pulses/m2 | 0.5 m |

* Horizontal Datum: Horizontal NAD83 (2011).
* Vertical Datum: NAVD88 using the most recent approved Geoid model from the National Geodetic Survey (NGS) for purposes of performing conversions from ellipsoidal heights to orthometric heights. Data to be delivered in orthometric heights.
* Coordinate System and Projection: UTM, Zone 12 North, horizontal units in Meters and vertical units in Meters.
* Tiling Scheme: U.S. National Grid naming convention, 1000 meters x 1000 meters, non-overlapping tiles.
* DEM: 0.5 Meter Cells, individually tiled from bare Earth, hydro-flattened, delivered in GeoTIFF format.

The lidar data will be processed to produce a classified point cloud, tile-based bare earth DEMs and related products. All resulting elevation products will be placed in the public domain and will be made available for viewing and download through the USGS National Map.

**Additional Products and Services Beyond USGS Standard:**

To supplement the USGS specifications, the following requirements will be adhered to and reflected in final product delivery.

|  |  |
| --- | --- |
| Acquisition conditions | Leaf-on summer season 2019 with no snow on the ground |
| Returns per pulse | 4 or more |
| On-ground beam diameter | Approx. 25 cm, use narrow divergence setting if instrument allows |
| Scan angle | ± 17 degrees |
| Flight line direction | Adjacent flight lines flown in opposing directions |
| Swath overlap | ≥50% sidelap (100% overlap) |
| Intensity values | Intensity value for each return, normalized to 16 bit |
| Format | lidar point clouds (LAS v1.4), raster DEM and DSM (GeoTIFF), breaklines and supporting data layers (ESRI shapefiles or geodatabase), metadata (XML) |

The following QL1 project deliverables shall be provided.

* Survey report
* Classified point cloud
* Bare-earth surface (raster Digital Elevation Model – DEM in UTM Zone 12N, hydro-flattened, 0.5 meter cells.
* Breaklines, 0.5 meter cells
* First-return (highest-hit) surface (raster Digital Surface Model - DSM), 0.5 meter cells
* Supporting data layers:
  + All ground control and check points
  + Aircraft trajectory (SBET files) flight lines and flight line swaths (line and polygon features, respectively)
  + Project index layer of tiling tessellation (polygon feature)
* FGDC-compliant metadata

**Variations from Standard**

* Should the budget support it, in addition to the Hydro-Flattening requirements, all culverts 25 ft. wide or larger shall be collected and all streams 50 feet wide or larger running for more than 100 ft. shall be collected as double line streams and shall represent the Hydro-Enforced breaklines. These breaklines shall be stored in a file geodatabase and shall be distinguishable from the Hydro-Flattened features. A second delivery of tiled DEMs shall be delivered with the Hydro-Enforced breaklines applied in addition to the Hydro-Flattened Lines.

USGS does not commit to performing Quality Assurance and Quality Control (QAQC) for these additional products or services. QAQC of these will be the responsibility of the partner. If any issues with the products or services are found by the partner within 60 days of data delivery USGS will pursue corrections on behalf of the partner.

USGS reserves the right but does not commit to publishing these additional products and services.

1. **Other Terms**

* Every effort will be made to award contract(s) to complete the objective of this program. However, if the total funding amount is not sufficient to complete the work as described, then adjustments will be made to either obtain additional funding or the project will be re-scoped to the mutual satisfaction of all stakeholders. Partners will be notified of any excess funds after task award. Upon notification, partners have 30 days to choose, in collaboration with USGS, to have excess funds applied to a re-scoped or new task order. If Partners do not make a decision within 30 days, the excess funds will be returned to the Partners.
* If data acquisition cannot be completed during a single season due to unacceptable capture conditions, then it is possible that the remaining AOI would be acquired during the next suitable collection window which may or may not be in the same calendar year.
* If data is to be collected over military properties, then DoD clearance may be required. Should unexpected restrictions affect access to data over military properties, then only federal funds will be applied to these areas.
* For agreements that are associated with or become associated with Broad Agency Announcement (BAA) proposals for 3DEP projects prior to BAA selection, the execution of this agreement does not guarantee any commitment of USGS funds, nor does the execution of the agreement constitute greater consideration of any related proposal under the BAA selection process.
* Data acquired concerning federally recognized Tribal lands may not be published if the Tribe objects to public release of any of the products resulting from the lidar acquisition over their lands. All other project area data outside of the Tribal lands boundaries will be published. Federal funding partners will be provided a copy of the entire project data for their own needs but may not publicly distribute the data concerning Tribal lands.

1. **Contacts**

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| **USGS Administrative Contact** |  | **Partner Administrative Contact:** |
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1. **Appendix A – Project Area Map**