PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM
REQUEST FOR PROPOSALS

SUBJECT: 2016-2019 Annual LiDAR and Aerial Photography
PROJECT NUMBER: P16-009
REQUEST DATE: March 23, 2016
CLOSING DATE: April 29, 2016
POINT OF CONTACT: Justin Brei
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I. OVERVIEW

The Platte River Recovery Implementation Program (**Program**) was initiated on January 1, 2007 between Nebraska, Wyoming, and Colorado and the Department of the Interior to address endangered species issues in the central and lower Platte River basin. The species considered in the Program, referred to as "target species", are the whooping crane, piping plover, interior least tern, and pallid sturgeon.

A Governance Committee (**GC**) has been established that reviews, directs, and provides oversight for activities undertaken during the Program. The GC is comprised of one representative from each of the three states, three water user representatives, two representatives from environmental groups, and two members representing federal agencies. The GC named Dr. Jerry Kenny to serve as the Program Executive Director (**ED**). Dr. Kenny established Headwaters Corporation as the staffing mechanism for Program. Program staff are located in Nebraska and Colorado and are responsible for assisting in carrying out the various Program-related activities.

Annual aerial photography is a requirement of the Program's Adaptive Management Plan and an integral part of several research and monitoring protocols. This annual aerial photography is typically acquired in June when piping plovers and interior least terns are nesting.

The Program acquired LiDAR for the central Platte River in the spring of 2009 as a part of baseline data collection. The Program has continued to acquire LiDAR over a portion of the original acquisition in order to assess change within the river banks. The Program will acquire LiDAR over this area annually to document change in channel characteristics and to assist in habitat availability evaluations for target species. Additional aerial photography that accompanies the LiDAR acquisition will assist in, and add value to the evaluation.

The GC submits this Request for Proposals (**RFP**) to solicit proposals from contractors to acquire LiDAR and aerial photography.

II. PROJECT DESCRIPTION

Annual color-infrared (**CIR**) orthophotography will be used to help document habitat conditions for Program target species. In addition, it can be used to document summertime vegetation characteristics throughout the system, on Program lands, and within managed areas. For example, bare sand substrates will be identified that may be potential least tern and piping plover nesting habitat, and major management changes can be tracked, such as tree clearing or cropland changes. Changes in available tern/plover nesting habitat will be tracked throughout the First Increment. Information gained from aerial photography will also be used in conjunction with measurements taken at specific sites on the ground that relate to vegetation establishment on sandbars, height of sandbars, etc. CIR photos will be used to estimate the land use/land cover types present (e.g., amount of grassland, forest, etc). This CIR photography will also be used for channel morphology measurements. The photos will be used to help measure parameters such as channel width, bank position, island position and stability, hydraulic geometry characteristics of width, and track changes associated with management techniques. Photos will be taken on an annual basis between late May and late June with flows at or near 1,200 cfs (i.e., Program target flow levels during this time of year). Aerial photography will be acquired in color-infrared at a six-inch digital resolution. The contractor will work with Program staff during the acquisition window to schedule flights in accordance with these requirements.

Acquiring LiDAR within the river channel every year allows the Program to evaluate the effects of annual flow conditions on channel morphology. These analyses will affect how the Program uses its limited water resources to manage habitat. CIR orthophotography will be acquired in combination with the LiDAR acquisition. This photography will be used as a tool to further assess both the quality and accuracy of the LiDAR, and as an additional data set for evaluating geomorphic change. Since the LiDAR and this additional photography acquisition will take place under low-flow conditions, this photography will also provide a picture of the Platte River under different conditions than the Program's annual spring aerial photography acquisition. CIR photography acquired in combination with the LiDAR also provides a way to examine land cover types and condition for use in modeling efforts. Aerial photography will be acquired in color-infrared at a six-inch digital resolution, and will be acquired concurrently with the LiDAR. The contractor will work with Program staff during the acquisition window to schedule flights in accordance with these requirements.

This RFP describes a multi-year program of work encompassing acquisition of aerial imagery and LiDAR in 2016 through 2019 according to the following schedule:

- **May/June 2016: Full Program area aerial photography and bathymetric LiDAR test**
- **November/December 2016: River channel LiDAR and concurrent aerial photography**
- **May/June 2017: Full Program area aerial photography and partial area LiDAR**
- **November/December 2017: River channel LiDAR and concurrent aerial photography**
- **May/June 2018: Full Program area aerial photography and partial area LiDAR**

- **November/December 2018: River channel LiDAR and concurrent aerial photography**
- **May/June 2019: Full Program area aerial photography and partial area LiDAR**
- **November/December 2019: River channel LiDAR and concurrent aerial photography**

In total, this includes four summer Program area aerial photography flights with a partial LiDAR coverage and four fall/winter concurrent LiDAR and Aerial photography flights. Under the final contract, written Notice to Proceed from the Program Executive Director's Office (ED Office) will be required before each acquisition period (spring/fall). All work will be contingent on availability of Program funding.

In addition, the Program is requesting that the contractor include one alternate solution (buy-up) with associated budgets in their proposal. The alternate solution is described in section IV. The contractor must include a cost for the buy-up in section IV.

III. SCOPE OF WORK

The Program is requesting proposals from potential bidders to provide LiDAR and digital aerial imagery of the project area as described above. Minimum product specifications follow:

1) **Schedule**

a) Sub-Project 1 - November/December concurrent LiDAR and Aerial photography.
   i) LiDAR and imagery will be acquired each year between November 1 and December 15 under leaf-off and low Platte River flow conditions beginning in November 2016. Bidder must be flexible and work with Program staff during that time to schedule flights such that river flows in the project area are as low as possible (ideally under 1,000 cfs).
   ii) Imagery will be acquired on cloud-free days with the sun at a sufficient angle to reduce the effect of shadows from trees and structures and efforts should be made to reduce sun glare on water surfaces.
   iii) Imagery will be acquired in combination with LiDAR such that the imagery reflects the condition of the river during the LiDAR acquisition. River conditions can change daily, and imagery must be flown at least the same day, if not at the exact same time as the LiDAR.
   iv) The acquisition area must be free of snow and ice, and extraneous environmental conditions such as rain, fog or smoke should be avoided.
   v) Final delivery of Sub-Project 1 aerial imagery deliverables will be within 45 days of final acquisition flight each year.
   vi) Final delivery of all other Sub-Project 1 deliverables will be within 90 days of final acquisition flight each year.

b) Sub-Project 2 - May/June Aerial photography.
   i) Imagery will be acquired each year between May 15 and June 30 Beginning in May 2016. Bidder must be flexible and work with Program staff during that time to schedule flights such that river flows in the project area are as close to 1,200 cfs as possible.
   ii) Imagery will be acquired on cloud-free days with the sun at a sufficient angle to reduce the effect of shadows from trees and structures and efforts should be made to reduce sun glare on water surfaces.
   iii) Final delivery of Sub-Project 2 deliverables will be within 45 days of final acquisition flight each year.

c) Sub-Project 2A – May/June LiDAR
   i) LiDAR will be acquired each year between May 15 and June 30 in combination with the Sub-Project 2 imagery acquisition. SEE SUB-PROJECT 3 FOR 2016 ACQUISITION.
   ii) LiDAR will be acquired in combination with imagery such that the imagery reflects the condition of the river during the LiDAR acquisition. River conditions can change daily, and imagery must be flown at least the same day, if not at the exact same time as the LiDAR over the Sub-Project 2A area.
   iii) Final delivery of Sub-Project 2A deliverables will be within 60 days of final acquisition flight each year.

d) Sub-Project 3 – 2016 Bathymetric LiDAR Test
   i) In June 2016, Sub-Project 3 will replace the Sub-Project 2A acquisition.
   ii) The Sub-Project 2A area will be collected as bathymetric (green) LiDAR as opposed to terrestrial LiDAR in 2016.
   iii) Sub-Project 3 schedule remains the same as Sub-Project 2A.

2) **Project Area**

a) The area of interest for Sub-Project 1 consists of an area generally between the high banks of the Platte River beginning near the junction of U.S. Highway 283 and Interstate 80 near Lexington, Nebraska, and extending eastward to near Chapman, Nebraska (approximately 128 square miles). A polygon shapefile of the acquisition area is included on the Program website (www.platteriverprogram.org) in the same location as this solicitation.
b) The area of interest for Sub-Project 2 consists of an area 3.5 miles either side of the centerline of the Platte River beginning at the junction of U.S. Highway 283 and Interstate 80 near Lexington, Nebraska, and extending eastward to Chapman, Nebraska (approximately 750 square miles). A polygon shapefile of the acquisition area is included on the Program website (www.platteriverprogram.org) in the same location as this solicitation.
c) The area of interest for Sub-Project 2A consists of an area generally between the high banks of the Platte River beginning near the J-2 Hydropower Return southeast of

Lexington, NE and extending eastward to the Highway 183 bridge near Elm Creek, NE (approximately 26 square miles). A polygon shapefile of the acquisition area is included on the Program website (www.platteriverprogram.org) in the same location as this solicitation.

d) The area of interest for Sub-Project 3 in 2016 is identical to Sub-Project 2A.

3) **Sub-Project 1 Technical Specifications**

CIR aerial photography and LiDAR over approximately 128 sq. mi.

a) LiDAR Technical Specifications

i) The LiDAR data will be collected at a mean resolution of 2.3 ft (0.7 m) GSD or better.

ii) The contractor shall ensure that the area of interest is fully and sufficiently covered with no data voids due to gaps between flightlines or system malfunction.

iii) Data voids in the bare-earth not caused by classification of geographic features shall not exceed three times the point spacing. Data voids of this size are sufficient reason to reject the dataset.

iv) LiDAR data should be classified using the following ASPRS Standard LiDAR Point Classes:

- Class 1 – Unclassified
- Class 2 – Ground
- Class 7 – Low point and noise
- Class 9 – Water
- Class 12 – Overlap

(1) Class 1 will be used for feature points that are not in Classes 2, 7, 9, or 12. These typically represent returns from man-made structures, vegetation etc.

(2) Class 2 will be used for feature points that represent the bare-earth.

(3) Class 7 will be used for artifacts that do not represent the ground, manmade structures or vegetation. Typically these are extraneous points that are either below, or well above the surface not representing any true feature.

(4) Class 9 will be used to identify points found within water bodies, including streams and rivers.

(5) Class 12 will be used for LiDAR points in the overlap portion of flight lines that have been removed due to redundancy (if necessary).

(6) No points shall be deleted from the LAS files.

v) Bare-earth classification shall adhere to the following specifications using both automated and manual filtering classification routines:

- 90% of artifacts classified
- 95% of outliers classified
- 95% of vegetation classified
- 98% of building classified

vi) Special attention must be applied to the classification process due to the geographic nature of the project area which consists of extremely flat terrain mixed with important hydrographic characteristics. Channel geometry of streams and drainage features must be maintained as well as the ability to identify sand bar features within the Platte River. Dense vegetation data voids must also be minimized by the automatic removal process and "over smoothing" due to aggressive classification must be avoided.

vii) Vertical accuracy for LiDAR will meet or exceed 0.3 ft (9.2 cm) RMSE ($Accuracy_z$ = 0.6 ft (0.18 m) at the 95% confidence level).

viii) Horizontal accuracy for LiDAR will meet or exceed 1.97 ft (0.6 m) RMSE ($Accuracy_r$ = 3.41 ft (1.04 m) at the 95% confidence level).

ix) The vertical datum for LiDAR is NAVD88 (Geoid03), and the horizontal datum is Nebraska State Plane (1983). Elevation and projection in feet.

b) Aerial Photography Technical Specifications

i) The imagery will be six-inch (0.5 ft) pixel resolution.

ii) The imagery will be color-infrared.

iii) The imagery will be ortho-rectified and seamless, and will be tone-balanced with adjacent images across the project area.

iv) Imagery will be acquired on cloud-free days with the sun at a sufficient angle to reduce the effect of shadows from trees and structures and efforts should be made to reduce sun glare on water surfaces.

v) The imagery will be projected in Nebraska State Plane Feet (1983 datum).

vi) The imagery must be acquired concurrently with the LiDAR so as to reflect river conditions during acquisition. The imagery must be collected at least the same day, if not at the exact same time, as the LiDAR.

4) **Sub-Project 2 Technical Specifications**

Four-band aerial photography over approximately 750 sq. mi. LiDAR over approximately 26 sq. mi.

a) Aerial Photography Technical Specifications

i) The imagery will be six-inch (0.5 ft) pixel resolution.

ii) The imagery will be 4-band (R, G, B, NIR).

iii) The imagery will be ortho-rectified and seamless, and will be tone-balanced with adjacent images across the project area.

iv) Imagery will be acquired on cloud-free days with the sun at a sufficient angle to reduce the effect of shadows from trees and structures and efforts should be made to reduce sun glare on water surfaces.

v) The imagery will be projected in Nebraska State Plane Feet (1983 datum).

vi) Deliverables will include both RGB and CIR products described in Section III.6.

b) LiDAR Technical Specifications

i) Same as Sub-Project 1 LiDAR Specifications in Section III.3.a above.

5) **Sub-Project 3 Technical Specifications**
Bathymetric LiDAR over approximately 26 sq. mi. in June 2016.

a) Bathymetric LiDAR Specifications
   i) Bathymetric LiDAR is expected to meet the accuracies and specifications as provided for terrestrial LiDAR in Section III.3.a above, with vertical accuracies of 0.3 ft RMSE.

6) **Project Deliverables**
All project deliverables should be processed and delivered according to the schedule in Section III.1.

a) LiDAR (terrestrial and bathymetric)
   i) LiDAR point data meeting or exceeding 2.3 ft (0.7 m) GSD resolution in a classified LAS file format and adhering to the technical specifications in III.3 above. LAS file projected to Nebraska State Plane Feet (1983 datum) and vertical reference NAVD88 feet (Geoid 03). Classified LAS file will include all LiDAR points, including first and last returns.
   ii) Daily reports during acquisition that display all flight lines, as well as completed areas. Once acquisition is complete, a project summary report that shows time and date of all flightline acquisitions. Time of day, not just the day, is important to match river flow condition to acquisition.
   iii) Tiling scheme shapefile for identifying LAS and DEM file locations. Tile size and file size is flexible and will be discussed upon award of project.

b) Digital Elevation Model
   i) Hydro-enforced bare-earth digital elevation model raster tiles (3-foot cell size), projected in Nebraska State Plane coordinate system – elevation and projection in feet.
      (1) See pages 11-13, 15, and Appendix 2 of the USGS LiDAR Guidelines and Base Specifications v13 for details on hydro-flattening: http://pubs.usgs.gov/tm/11b4/. In the proposal, provide details of the software/methodology to be used for this alternative.
      (2) Breaklines used in the generation of the hydro-enforced DEM are also a required deliverable.
   ii) Full project area mosaic of digital elevation model tiles (3-foot cell size).
   iii) NOTE: For Bathymetric LiDAR acquisition, two versions of the DEM will be required. One hydro-enforced DEM for the given flow conditions during the flight, and one DEM that incorporates bathymetry below the water surfaces.

c) Imagery
   i) Color-infrared (Sub-Project 1) and 4-band (Sub-Project 2) digital orthophotography with a six-inch (0.5 ft) pixel resolution (or better), covering the entire project area seamlessly and without data gaps.
   ii) The imagery should be geo-referenced and provided in tiled GeoTIFF (.tif) format.

iii) Shapefiles displaying photocenters and flight dates and times for image acquisitions. Time of day, not just the day, is important to match river flow condition to acquisition.
iv) Compressed imagery mosaic (.sid). Typically entire reach compiled into one mosaic, but may be split due to file size. Sub-Project 2 will require both a RGB mosaic and a CIR mosaic. Sub-Project 1 will be a CIR mosaic only.

d) LiDAR and Imagery
i) FGDC-compliant metadata to include, but not limited to: flight dates and times, flight altitude, camera system information, LiDAR system information, aircraft information, imagery resolution, LiDAR point density, horizontal accuracy, post-processing software and steps, and horizontal and vertical control references.
ii) All LiDAR data, photography, and supplemental products will be delivered on USB external hard drives or flash drives and will become the property of the Program. All media and data collected under the contract shall be the sole property of and can be freely distributed by the Program. No restrictions shall be placed on the data by the contractor.

7) **Permits and Clearances**

a) It is the contractor's responsibility to file all required flight plans and obtain all necessary approvals to fly over and acquire aerial imagery and LiDAR in the Project area**.**

IV. ALTERNATE SOLUTIONS (BUY-UPS)

In addition to the minimum specifications above, the contractor is required to provide additional costs and deliverables for the following alternate solution. The additional cost and deliverables for this addition will be considered with the minimum requirements and may be accepted and incorporated into the final contract.

1) Alternate 1
a) Acquire LiDAR as described for Sub-Project 1 and Sub-Project 2a for all years using bathymetric (green) LiDAR as opposed to traditional terrestrial LiDAR. Deliverables would include an additional DEM that incorporates the sub-surface bathymetry.

V. CONTRACT TERMS

The selected contractor will be retained by:

Nebraska Community Foundation
PO Box 83107
Lincoln, NE 68501

Terms and conditions will be negotiated as mutually agreeable. It is understood that the Governance Committee reserves the right to accept any proposal that, in its judgment, is the best proposal, and to waive any irregularities in any proposal.

Proposal costs incurred in response to this RFP will be the responsibility of the bidder. Neither the Nebraska Community Foundation nor the Governance Committee will be liable for any costs incurred by the bidder in the completion and submission of the proposal.

VI. SUBMISSION REQUIREMENTS

All interested parties having experience providing the services listed in this RFP are requested to submit a proposal.

Instructions for Submitting Proposals

One electronic copy of your proposal must be submitted in PDF format to Justin Brei at breij@headwaterscorp.com no later than 5:00 p.m. Central Time on Friday, April 29, 2016. Maximum allowable PDF size is 8MB. A proposal is late if received any time after 5:00 p.m. Central Time and will not be eligible for consideration.

Questions regarding the information contained in this RFP must be SUBMITTED IN WRITING by 5:00 p.m. Wednesday, April 20, 2016. No questions on content can be submitted after this time. Questions and answers will be shared with all interested parties. These can be emailed to Justin Brei at *breij@headwaterscorp.com* or mailed to the address at the top of this RFP. Submitted questions and answers may be posted intermittently to the Program website during the proposal period. Final questions and answers will be made available on the Program website in the location of this RFP by Thursday, April 21, 2016.

Proposal Content

Proposals must include:

1) **Technical information including:**
   a. Aircraft/LiDAR/camera system details
   b. Post-processing software and summary of methodology
   c. Design accuracy information

2) **Relevant LiDAR and aerial photography experience** from the last two years, especially projects related to natural resources and river geomorphology and projects using bathymetric LiDAR. Please provide a minimum of two project references including the name, location, and brief summary of the projects; name, address, and phone number of the contracting officer for the client; and when the project was completed.

3) **Statement of annual availability** within the acquisition window of November 1 to December 15 for Sub-Project 1 and May 15 to June 30 for Sub-Project 2.

4) **Estimated timeline** for activities including mobilization, acquisition and processing. Also, specifically the estimated flight time necessary to complete acquisition over entire project area (for planning purposes related to river operations in order to achieve lowest possible flow).

5) **Detailed firm fixed price proposal**. At minimum, project budget should itemize Sub-Project 1 and Sub-Project 2 on an annual basis and include estimate of any applicable taxes. A budget should also be provided for the Buy-up Option on an annual basis. Budget will be considered, but contract will not be awarded solely on a lowest cost basis. Governance Committee approval is needed before the contractor is authorized to begin implementation. A sample budget table is included for reference. A similar table should be included in the proposal.

	June 2016 SP2	June 2016 SP3	November 2016 SP1	June 2017 SP2	June 2017 SP2a	November 2017 SP1
Base Option (2016 Summer LiDAR bathymetric, all other terrestrial)						
Buy-up Option (all LiDAR bathymetric) – Cost in addition to Base						

	June 2018 SP2	June 2018 SP2a	November 2018 SP1	June 2019 SP2	June 2019 SP2a	November 2019 SP1
Base Option (2016 Summer LiDAR bathymetric, all other terrestrial)						
Buy-up Option (all LiDAR bathymetric) – Cost in addition to Base						

	Total Project Cost
Base Option (2016 Summer LiDAR bathymetric, all other terrestrial)	
Buy-up Option (all LiDAR bathymetric)	

6) **Conflict of interest statement** addressing whether or not any potential conflict of interest exists between this project and other past or on-going projects, including any projects currently being conducted for the Program.

7) **Description of insurance** shall be provided with the proposal. Proof of insurance will be required before a contract is issued. Minimum insurance requirements will include $1,000,000 general liability per occurrence.

VII. CONTRACTOR SELECTION

The GC will appoint a selection committee to review responses to this RFP. Proposals will be reviewed and the award made to the lowest cost proposal that conforms to the specifications of this solicitation and is considered to provide the most value to the Program.

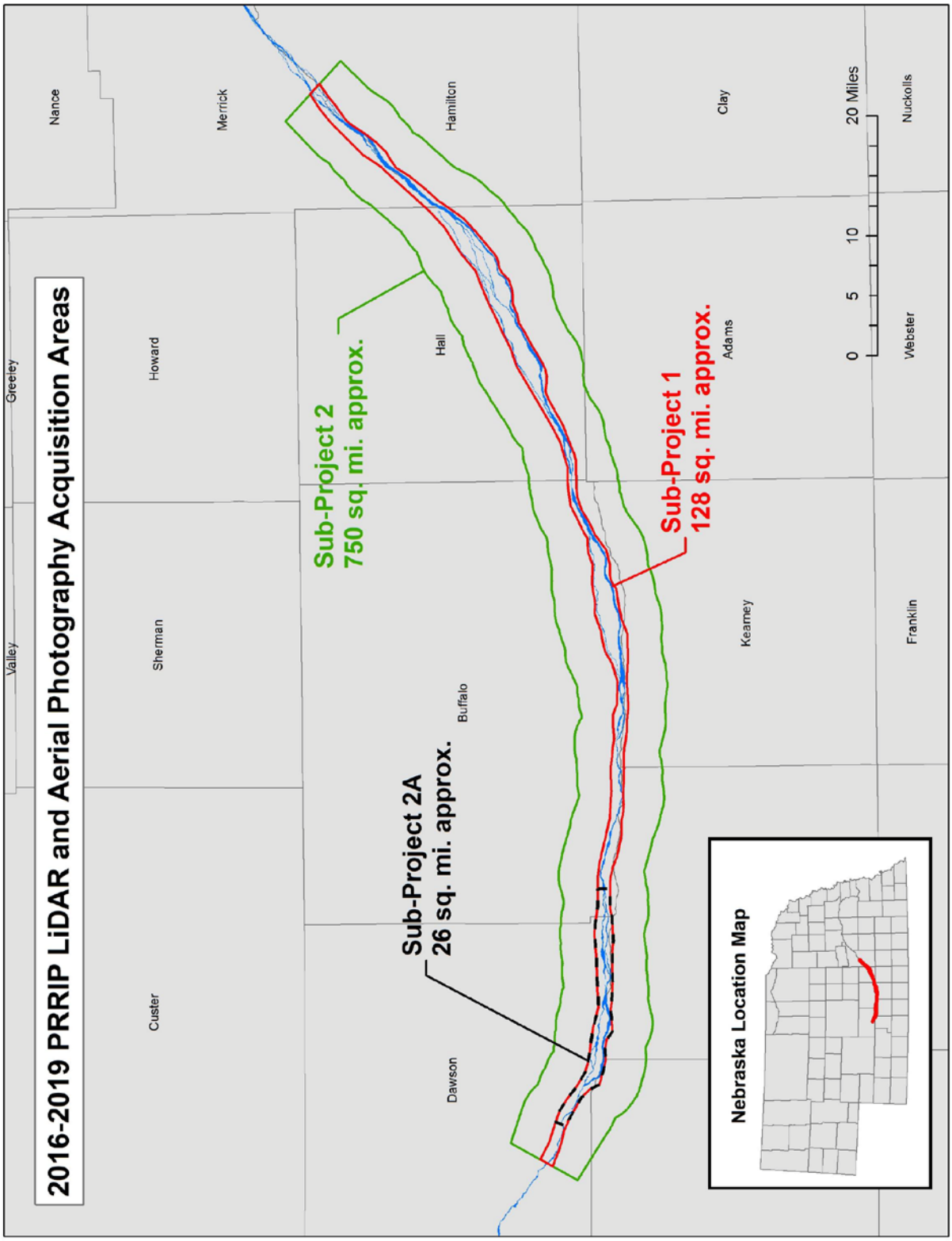
VIII. PROGRAM PERSPECTIVE

The GC of the Program has the sole discretion and reserves the right to reject any and all proposals received in response to this RFP and to cancel this solicitation if it is deemed in the best interest of the Program to do so. Issuance of this RFP in no way constitutes a commitment by the Program to award a contract, or to pay contractor's costs incurred either in the preparation of a response to his RFP or during negotiations, if any, of a contract for services. The Program also reserves the right to make amendments to this RFP by giving written notice to contractors, and to request clarification, supplements, and additions to the information provided by a contractor.

By submitting a proposal in response to his solicitation, contractors understand and agree that any selection of a contractor or any decision to reject any or all responses or to establish no contracts shall be at the sole discretion of the Program. To the extent authorized by law, the contractor shall indemnify, save, and hold harmless the Nebraska Community Foundation, the states of Colorado, Wyoming, and Nebraska, the Department of the Interior, members of the GC, and the ED Office, their employees, employers, and agents, against any and all claims, damages, liability, and court awards including costs, expenses, and attorney fees incurred as a result of any act or omission by the contractor or its employees, agents, subcontractors, or assignees pursuant to the terms of this project. Additionally, by submitting a proposal, contractors agree that they waive any claim for the recovery of any costs or expenses incurred in preparing and submitting a proposal.

IX. AVAILABLE INFORMATION

A shapefile of the acquisition area for Sub-Projects 1, 2, and 2A are available on the Program website (www.platteriverprogram.org) at the same location as this RFP solicitation. A map of the acquisition area is found on the last page of this solicitation.


2016-2019 PRRIP LiDAR and Aerial Photography Acquisition Areas
Sub-Project 2
750 sq. mi. approx.
Sub-Project 1
128 sq. mi. approx.
Sub-Project 2A
26 sq. mi. approx.
Nebraska Location Map
Nance
Merrick
Hamilton
Clay
Nuckolls
Greeley
Howard
Hall
Adams
Webster
Valley
Sherman
Buffalo
Kearney
Franklin
Custer
Dawson
0 5 10 20 Miles