

Introduced by: Mayor Matherly  
Date: November 7, 2016

**RESOLUTION NO. 4769**

**A RESOLUTION SUPPORTING THE FAIRBANKS NORTH STAR  
BOROUGH'S GRANT APPLICATION TO THE U.S. GEOLOGICAL SURVEY  
3D ELEVATION PROGRAM**

**WHEREAS**, the Fairbanks North Star Borough (hereinafter "Borough") is applying for a grant from the U.S. Geological Survey 3D Elevation Program for new aerial photography and LiDAR mapping of the Fairbanks area; and

**WHEREAS**, the Borough is seeking partnership with local organizations to contribute financially to the match for the project, including but not limited to, the City of Fairbanks (hereinafter "City"), Golden Valley Electric Association, and Utility Services of Alaska; and

**WHEREAS**, the project has non-financial support from the Natural Resource Conservation Service, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, U.S. Army Garrison Fort Wainwright, State of Alaska Department of Natural Resources Division of Forestry, University of Alaska, and Tanana Chiefs Conference; and

**WHEREAS**, leveraging this financial and non-financial support will provide valuable products and publically available data for the community and all layers of government; and

**WHEREAS**, the project will directly benefit and improve the emergency response, engineering, and public works functions of the City; and

**WHEREAS**, the City would like to partner with the Borough on the project and intends to contribute match funding.

**NOW THEREFORE BE IT RESOLVED**, that the City Council supports the Borough's grant application to the U.S. Geological Survey 3D Elevation Program and intends to provide financial contribution.

**PASSED AND APPROVED** this \_\_\_ day of November 2016.

---

**Jim Matherly, Mayor**  
**City of Fairbanks**

AYES: None  
NAYS: Cleworth, Pruhs, Rogers, Huntington, Norum Therrien  
ABSENT: None  
FAILED: November 7, 2016

ATTEST:

APPROVED AS TO FORM:

---

D. Danyielle Snider, CMC, City Clerk

---

Paul Ewers, City Attorney

**CITY OF FAIRBANKS**  
**FISCAL NOTE**

**I. REQUEST:**

Ordinance or Resolution No: 4769

Abbreviated Title: FNSB GRANT APPLICATION TO USGS 3D ELEVATION PROGRAM

Department(s): ENGINEERING AND DISPATCH

Does the adoption of this ordinance or resolution authorize:

1) additional costs beyond the current adopted budget? Yes X No         

2) additional support or maintenance costs? Yes          No x

If yes, what is the estimate? see below

3) additional positions beyond the current adopted budget? Yes          No x

If yes, how many positions?         

If yes, type of positions?          (F - Full Time, P - Part Time, T - Temporary)

**II. FINANCIAL DETAIL:**

PROJECTS:	Equipment	Contracts	Personnel	Total
3D ELEVATION PROGRAM WITH FNSB		\$150,000		\$150,000
				\$0
				\$0
				\$0
				\$0
				\$0
<b>TOTAL</b>	<b>\$0</b>	<b>\$150,000</b>	<b>\$0</b>	<b>\$150,000</b>

FUNDING SOURCE:	Equipment	Contracts	Personnel	Total
CAPITAL FUND (NON APPROPRIATED)		\$150,000		
				\$0
<b>TOTAL</b>	<b>\$0</b>	<b>\$150,000</b>	<b>\$0</b>	<b>\$0</b>

Any operations and maintenance costs associated with this project will be funded by Fairbanks North Star Borough.

Reviewed by Finance Department: Initial cp Date 11/2/2016



## **BAA G16AS00121 Grant Application U.S.G.S. 3D Elevation Program**

**Fairbanks North Star Borough, Alaska  
October 10, 2016**

### **PROJECT OVERVIEW**

The Fairbanks North Star Borough, Alaska (FNSB) is requesting USGS 3DEP grant assistance for a LiDAR collection in 2017. The current LiDAR datasets within the FNSB are fragmented, have varied quality levels, and varied timeframes. Most of the populated areas are not covered by QL-2 level data. Most of the data is old or does not meet the minimum QL-2 specification, which dramatically limits its usefulness. There is a clear need for expanded, high quality LiDAR elevation data in the Fairbanks North Star Borough that is updated, of uniform quality, and covers most of the populated areas. Several important public needs can be addressed by improved data, including; flood plain management, wildfire hazard analysis, emergency response, stormwater management, flight path safety, road and subdivision planning, building modeling for energy analysis, and a number of other vital applications. The elevation data is valuable to a number of private sector applications such as mining, land development, and communications, and will be a great economic development tool. The 3DEP grant will be leveraged with additional community funding to provide valuable products and publically available data for the community and all layers of government.

The FNSB is organizing a partnership of local organizations to contribute financially to the project. Also, a number of other agencies have expressed non-financial support of the project. The FNSB intends to use the USGS Geospatial Product and Service Contracts (GPSC) as the acquisition mechanism.

The estimated cost of the QL-2 eligible project is \$890,750.

The FNSB is requesting a grant of \$445,000. The FNSB and partners will contribute a match of \$445,750 for the QL-2 eligible portion of the project. The FNSB and partners will pay full upgrade cost for the QL-1 area.

## **PROJECT PARTNERS**

Joining the Fairbanks North Star Borough in providing a financial match for the project is the City of Fairbanks, and Golden Valley Electric Association, the local electric utility cooperative. The project also has non-financial support from the Natural Resource Conservation Service (NRCS), the U.S. Fish and Wildlife Service (USFWS), the U.S. Army Corps of Engineers (USACOE), The U.S. Army Garrison Fort Wainwright (USAGFTWW), the State of Alaska Department of Natural Resources Division of Forestry (ADOE), the University of Alaska (UA), and the Tanana Chiefs Conference (TCC), the Fairbanks regional Native non-profit corporation.

## **PROJECT DETAIL**

The Fairbanks North Star Borough, Alaska (FNSB) is requesting USGS 3DEP grant assistance for a LiDAR collection in 2017. The current LiDAR datasets with the FNSB are disconnected and sometimes overlapping areas of varied quality levels, and of varied timeframes since 2009. The uneven quality and time frames of the data limits the usefulness and consistency of applying the elevation data to vital public projects. The purpose of the 2017 collection is to create a single collection for most of the populated areas of the Borough that meet the minimum QL-2 level specification of 2 points per sq. meter (PPSM). In the more densely populated urban core areas, the FNSB hopes to collect at QL-1 level (8 PPSM) in order to enable feature extraction, feature modeling, and more precise ground modeling. The FNSB understands that the project partners will fund the extra cost of any collection that exceed the QL-2 minimum standard. The FNSB intends to use the USGS Geospatial Product and Service Contracts (GPSC) as the acquisition mechanism in order to meet all USGS technical specifications for LiDAR collection.

The FNSB has a population of 98,500, and a total area of 7,361 sq. miles, about the size of New Jersey. A majority of the FNSB is uninhabited, so the planned LiDAR acquisition will be limited to 2,545 square miles, which will cover 99.9% of the population. The QL-1 upgrade area covers 416 square miles and includes 88.9% of the population.

Ideally, the collection will take place concurrently with an aerial photography project planned in May, 2017. There is usually a time frame of one to three weeks between the completion of winter snow melt, and leaf-out in later April or the first half of May. This is the ideal window for Aerial Photography in Fairbanks. Synchronizing the timing of Aerial and LiDAR collection will greatly add to the usefulness of the products, because surface elevation data collected from the

LiDAR will match surface features visible in the Aerials. Too much difference in time between collection of Aerials and LiDAR will result in a noticeable difference in identified features.

## PROJECT BENEFITS

The benefits expected from the acquisition of higher resolution LiDAR collected at the same time that covers most of the population of the FNSB include:

- Provides ability to far more accurately estimate base flood elevations (BFE) when administering Flood Plain regulations.
- Greatly improve emergency response by enhancing the ability to accurately map features such as buildings, lights poles, power poles, and power lines.
- More accurate data for hazard impact models (flood, wildfire, earthquake) such as topographic features, slope, and fuels for evaluating wildfire danger.
- Provide a base line that will enable volumetric estimates after disaster, for example debris calculations.
- Create a Borough-wide base line for more easily identifying new structures in the future, which significantly improves emergency response and tax assessment.
- Provides the first LiDAR elevation data to include both sides of the Tanana River, which is critical for accurately modeling flood hazards for much of the populated portions of the FNSB.
- Improved ability to calculate more precise height and volume of structures, which will improve evaluation of FAA and military flight paths, and enable more accurate calculation of energy loads of structures.
- More accurate topographic data will provide ability to detect erosion patterns, or permafrost melting that could assist with identifying impacts of climate change.
- More accurate topologic data will improve road corridor planning, including minimization of roadways with significant grades.
- More accurate elevation and contour data will lead to readily available information for processing subdivision plats.
- More accurate elevation and contour data will assist in accurate drainage and storm water plans.
- Ability to determine appropriate locations for telecommunications equipment based on line of sight.
- Ability to create accurate 3D models for development planning and visualization.

### LiDAR Benefits for Flood Management

Community-wide LiDAR data will have an immediate and substantial impact on flood preparedness, public and individual safety, and efficiency of public services in the Fairbanks

North Star Borough. Having consistent, accurate LiDAR elevations throughout the populated areas of the Borough make it possible to create flood forecast maps, simulating flood flows and flood depths all across the floodplain to see when the floodwater will arrive and crest. Further, LiDAR elevation data can be displayed on our GIS for the public to see where the highest ground is located on their property on which to build, saving money on flood insurance and limiting or eliminating future flood damage. Flood forecast maps are also useful for our first responders before, during and after a disaster.

FNSB's current Flood Maps are derived from statistical analyses of records of river flow, storm tides, and rainfall, hydrologic and hydraulic analyses, topographic surveys, and information obtained through consultation with our community. This data is often outdated and inaccurate. On-the-ground elevation data enables far more precise analysis. The Borough has only 191 square miles of flood zones designated with Base Flood Elevations (BFEs) and 545 square miles of flood zones without BFEs, resulting in high flood insurance rates in these areas. Many of these areas are populated but have no LiDAR data. LiDAR would enable BFEs to be determined, providing for safe development patterns and lowering insurance rates in these areas.

Without LiDAR data community-wide, FNSB residents are subject to unnecessarily high flood insurance rates and poor flood prediction information. Our first responders, public works and road crews are limited in their ability to conduct maintenance and construction in the safest and most efficient ways. Most importantly, lives and property are at stake due to a simple shortage of accurate information. Acquiring LiDAR for the community is a simple and highly effective means to increasing safety and efficiency and saving money and resources throughout the Fairbanks North Star Borough.

## **PROJECT COSTS**

The estimated cost of the QL-2 eligible project is \$890,750. The estimate is based on a per square mile cost of recent comparable LiDAR projects in Alaska of \$350 per square mile. The FNSB is requesting a grant of \$445,000.

The FNSB and partners will contribute \$445,973 as a match.

The estimated of the QL-1 upgrade in the core populated area of \$87,360 above the QL-2 cost. The estimate is based on a per square mile cost of recent comparable LiDAR projects in Alaska of \$560 per square mile. The FNSB and partners will contribute the full cost of the QL-1 upgrade.

**EXISTING ELEVATION DATA**

The FNSB currently has access to four different LiDAR collections taken of different areas during different time frames since 2009. Two limited LiDAR collections within the FNSB meet the minimum 3DEP QL-2 specification of 2 PPSM:

1. The small 2016 Tanana River Railroad crossing LiDAR in Salcha, has an average of 2.72 PPSM (ground classified).
  2. The 2011 Alaska DNR DGGs Pipeline corridor collection has an average of 2.72 PPSM.
- These two collections combined cover only 26% of the populated areas of the Borough.

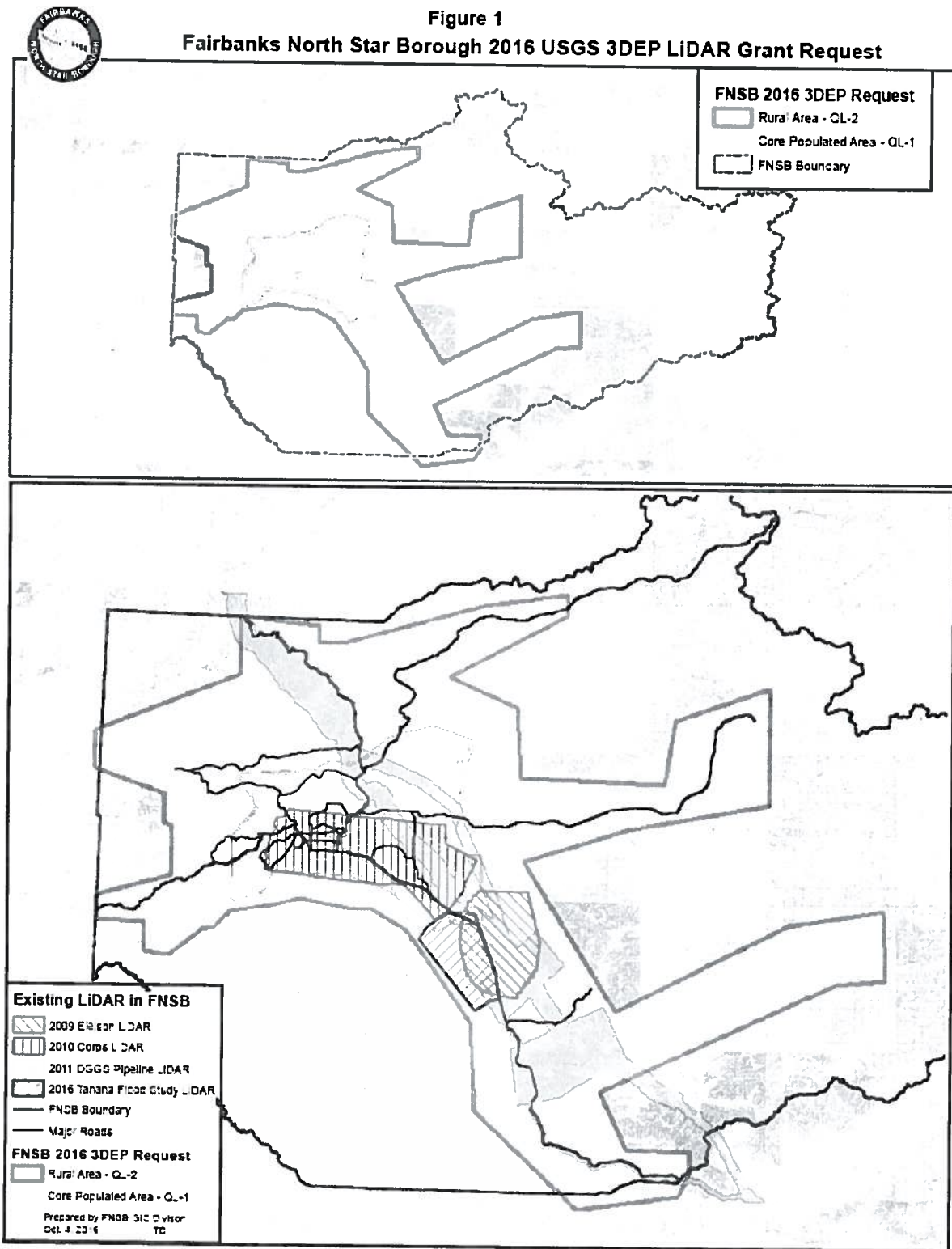
The largest and most useful LiDAR data set in the FNSB is the 2010 collection for the Corps of Engineers Chena Flood Control Dam Flood Inundation Study. The Corps LiDAR covers much of the core populated areas. However, this dataset was only collected at an average of 1.25 PPSM, and will be seven years old by 2017. The FNSB also has access to the small 2009 Eielson Air Force Base collection of 1.1 PPSM.

A comparison of the four existing LiDAR collections is below, along with a summary of the proposed 2017 collection:

**TABLE 1: EXISTING LiDAR DATA WITHIN FAIRBANKS NORTH STAR BOROUGH**

YEAR	DESCRIPTON	PPSM	QL-2 QUALITY	SqMILES	% AREA OF FNSB	% POP	COMMENT
2009	Eielson AFB	1.1	No	93.82	1.3	3.8	Not QL-2, limited area, will be 8 years old in 2017
2010	US Army COE	1.25	No	178.17	2.4	68.3	Not QL-2, covers urban population, will be 7 years old in 2017
2011	DGGs Pipeline	2.72	Yes	429.77	5.8	25.0	QL-2, limited area, will be 6 years old in 2017
2016	Tanana River Flood Study	2.72	Yes	61.13	0.8	1.1	QL-2, limited area and population
2017	Proposed USGS 3DEP	2.0	Yes	2544.55	34.6	99.99	Updated QL-2, covers virtually entire population, consistent info for applications
2017	Proposed 3DEP QL-1 upgrade	8.0	Yes	416	5.7	88.9	QL-1 upgrade to cover core populated area.

Below is a figure of the four existing collections, along with the proposed 2017 collection.





## **CONCLUSION**

The current LiDAR datasets with the FNSB are not sufficient to meet the elevation data needs of the Fairbanks North Star Borough. There is a clear need for expanded, high quality LiDAR elevation data in the Fairbanks North Star Borough that is up to date, of sufficient quality, and covers most of the populated areas. Improved elevation data is valuable to a number of private and public sector applications. A broad partnership has demonstrated financial and non-financial support for acquisition of modern elevation data. The 3DEP grant will be leveraged with partnership funding to provide valuable products and publically available data for the community and all layers of government.

**2017 AERIAL PHOTOGRAPHY AND LiDAR PROJECT**  
**AGENCY CONTRIBUTIONS - BUDGET PLAN**

Agency Name	Aerials	LiDAR Match	GPSC (5%)	Match + GPSC	TOTAL LiDAR & Aerial
Fairbanks North Star Borough	\$250,000	\$357,872	\$17,894	\$375,766	\$625,766
City of Fairbanks	\$15,000	\$128,571	\$6,429	\$135,000	\$150,000
GVEA		\$46,667	\$2,333	\$49,000	\$49,000
Utility Services of Alaska	\$25,000 -				\$25,000
USGS 3-DEP Grant (50% of QL-2)		\$445,000			\$445,000
<b>TOTAL PROJECT</b>	<b>\$290,000</b>	<b>\$978,110</b>			<b>\$1,294,766</b>