

3DGeo Stakeholder Coordination: MN Lidar Plan

Call to Action: *Bringing New High-Density Lidar and Derived Products to Minnesota River East and West LABs & USGS 3DEP Grant Application Discussion*

Wednesday, October 5, 2022, 3:00 – 4:00

Sean Vaughn

(MNIT DNR)

Jennifer Corcoran

(DNR Forestry)

Gerry Sjerven

(Minnesota Power)

Alison Slaats

(MnGeo, CGIO)

Welcome & Meeting Housekeeping

- This meeting will be recorded.
 - The recording and presentation slides will be shared after the meeting
 - Jennifer will record the meeting



Welcome!

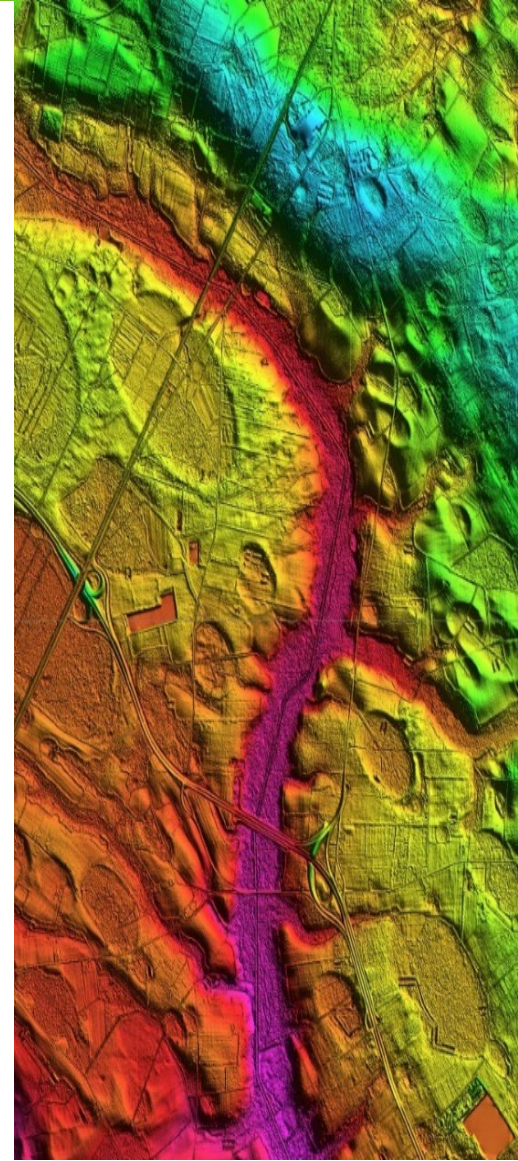
Thank you for joining us today, this is our 7th outreach meeting in the MN River Watershed LABs

- Past 3DGeo Outreach:

1. Tuesday, August 25, **2020**, Southern MN
2. Wednesday, October 7, **2020**, Southern MN
3. Tuesday, May 25, **2021**, Southern MN
4. Tuesday, June 15, **2021**, Steven's County
5. Friday, July 15, **2022**, MN River East LAB – GBERBA
6. Thursday, August 25, **2022**, MN River East & West LAB

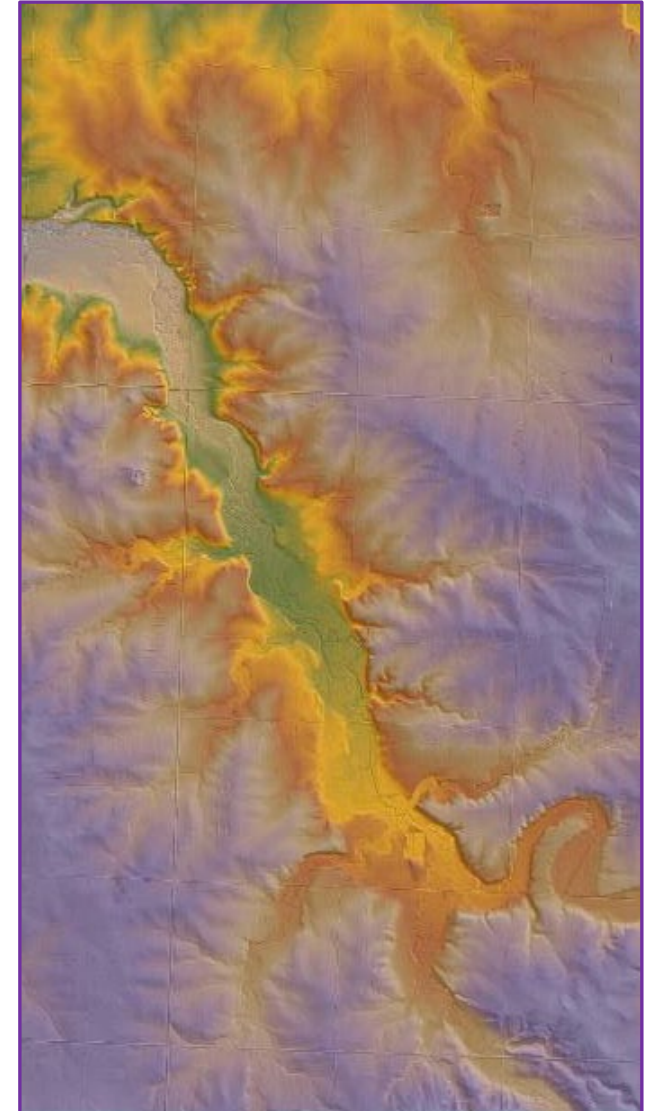
Group Question:

- Is there anyone attending today's meeting who has not attended one of the 3DGeo Outreach Meetings described above?



Topics for today

- Briefly Re-introduce:
 - The Minnesota **Lidar Plan** and **3D Geomatics Committee**
 - The USGS 3D Elevation Program (**3DEP**)
 - Review our lidar acquisition **status map**
- Answer Your **Questions** and have a Discussion
- **Work collaboratively** to ensure we don't miss this funding opportunity



3DGeo - Data Acquisition Workgroup

Mission:

- The Data Acquisition Workgroup promotes procurement of foundational 3D data for Minnesota.

Co-Chairs

- Sean Vaughn, Alison Slaats, and Gerry Sjerven

Lidar Acquisition Subgroup:

- Alison Slaats (MnGeo), Sean Vaughn (MNIT DNR), Gerry Sjerven (MN Power), Dan Ross (NSGIC), Jennifer Corcoran (DNR), Colin Lee (MnDOT), Matt Baltes (NRCS), Joel Nelson (U of MN), Joe Sapletal (Dakota Co), Mark Reineke (Widseth), and Brandon Krumwiede (NOAA), Clint Little (DNR), Terry Zien (USACOE), Jeff Weiss (DNR).



Minnesota Lidar Plan - Our Plan – Your Plan – One Plan

The Minnesota Lidar Plan

- **One** plan for Minnesota
- **Committee** led plan, not a state agency plan
- **Collaboration** of the geospatial community
- **Coordination** of lidar acquisition in Minnesota leverages federal match dollars

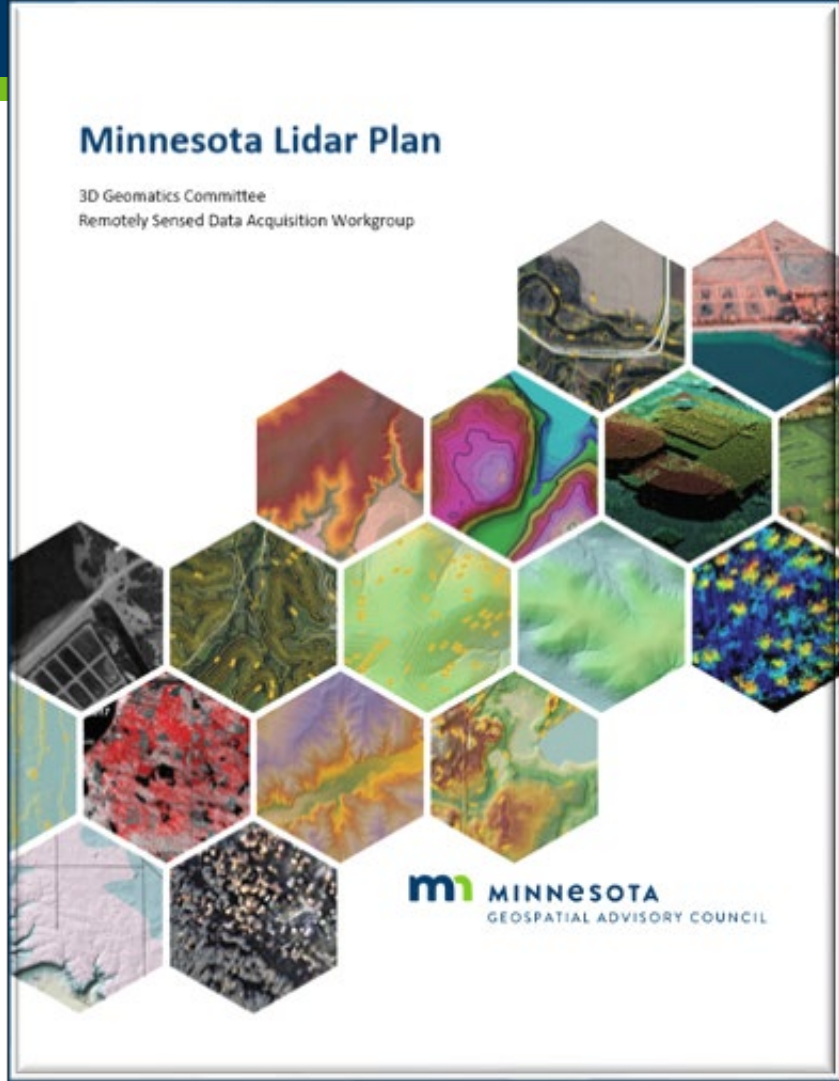


OUR PLAN

Cities | Counties | DNR | FEMA | MnDOT | MnGeo | MNIT
NOAA | NRCS | SWCD | Tribal Nations | Universities
USFS | USGS | Utilities | Watersheds | Other Partners

3DEP grant success is built on a guiding plan that pulls the community together to **foster collaboration** and coordinate funding to achieve the common goal of high density lidar acquisition across Minnesota

Minnesota Lidar Plan and StoryMap

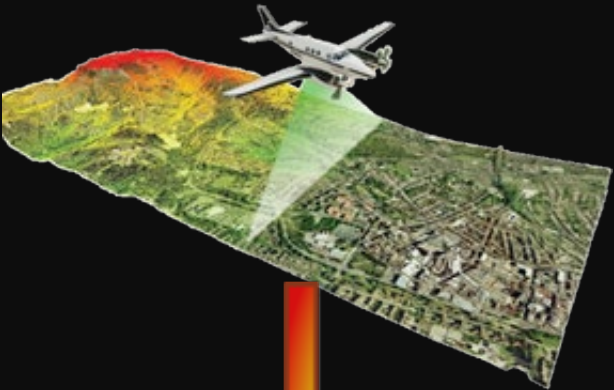


[https://www.mngeo.state.mn.us/committee/3dgeo/acquisition/Minnesota State Lidar Plan.pdf](https://www.mngeo.state.mn.us/committee/3dgeo/acquisition/Minnesota%20State%20Lidar%20Plan.pdf)



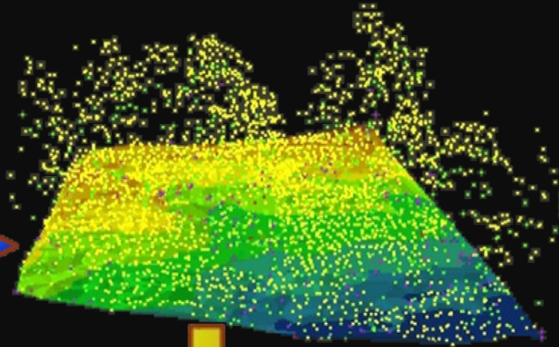
What is Lidar

1. Lidar Acquisition



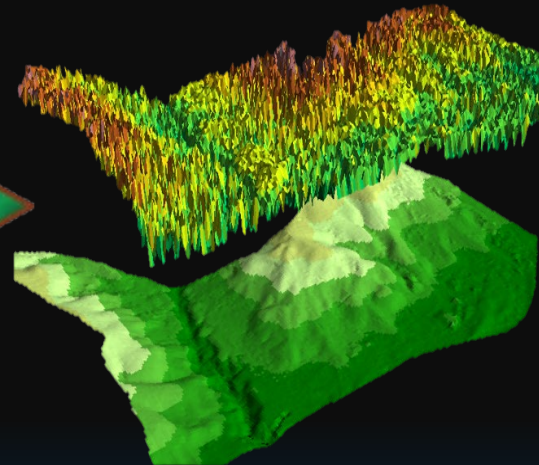
2. Lidar Point Cloud

3D Rendition of Natural and Built Environments



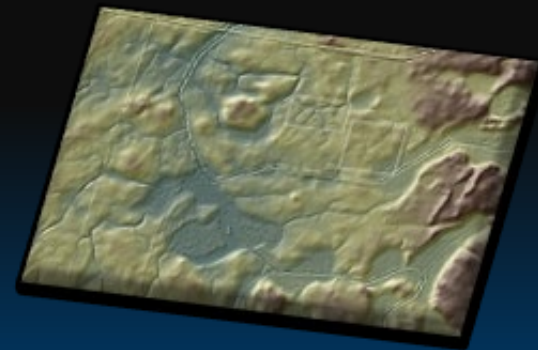
3. Point Cloud Classification

Feature Identification and Separation of Data for Sector Application



4. DEM

Lidar-derived Digital Elevation Model



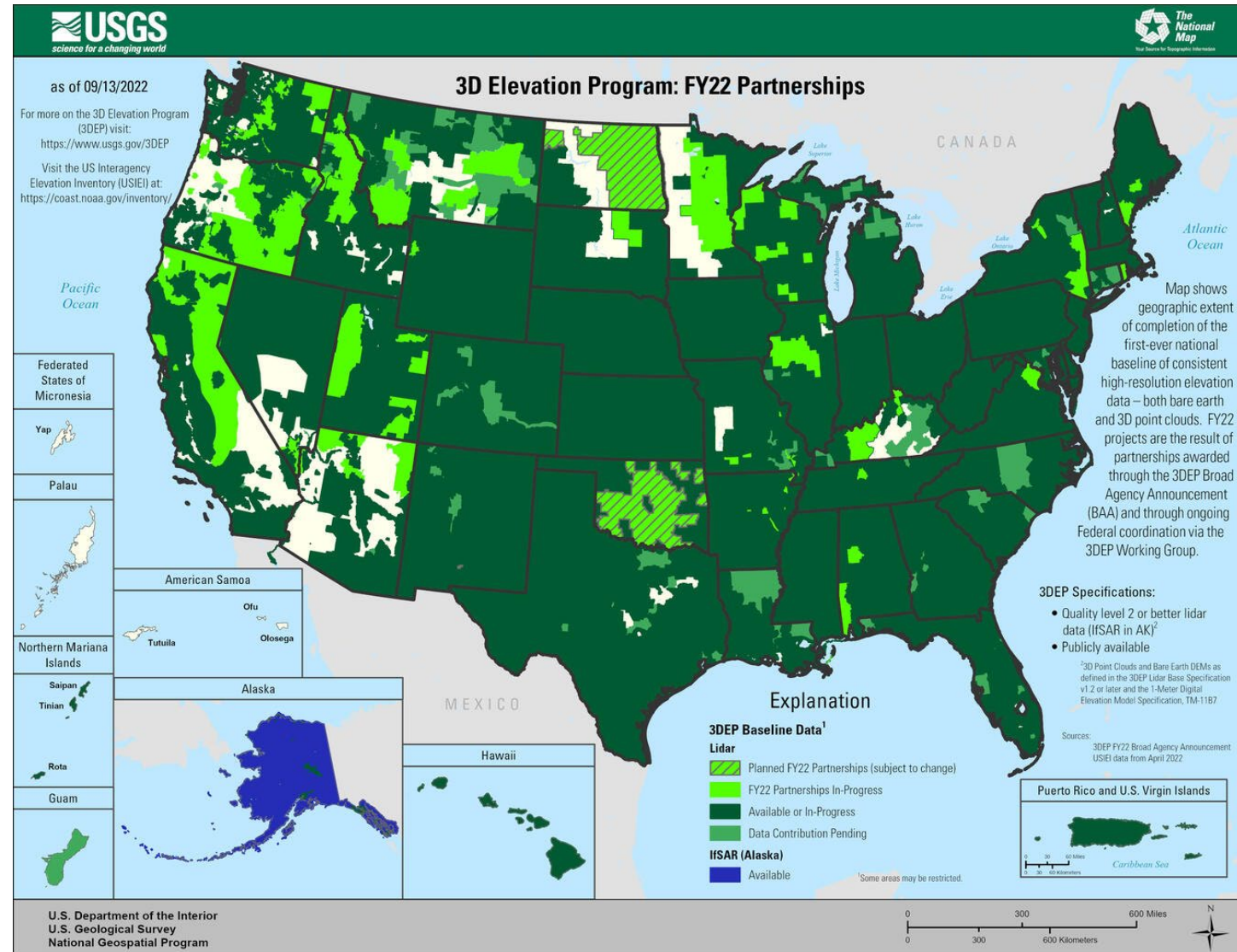
USGS 3D Elevation Program (3DEP)

3D Elevation Program (3DEP)

- **Systematically** guiding the collection of 3D elevation data in the form lidar data for the United States, and the U.S. territories

Broad Agency Announcement (BAA)

- **Due: Fall** (estimated to be released mid-Oct)
- **Grant coordinating** mechanism 3DEP
- Guides **partnerships** between the USGS and other Federal agencies with other public and private entities seeking high-quality 3D lidar elevation data acquisition



3D Geomatics: Funding, Agreements, and Acquisition



Contributions to Minnesota Lidar

(\$millions)

- Minnesota Partners: \$ 6.05
- USGS 3DEP: \$ 11.60
- Other Federal: \$ 0.45

Total: **\$18.09M**



Minnesota Funding Partners

- **47** Funding Partners
- **51,405** Square Miles of New Lidar
- **\$118*** Cost/mi² For MN Partners

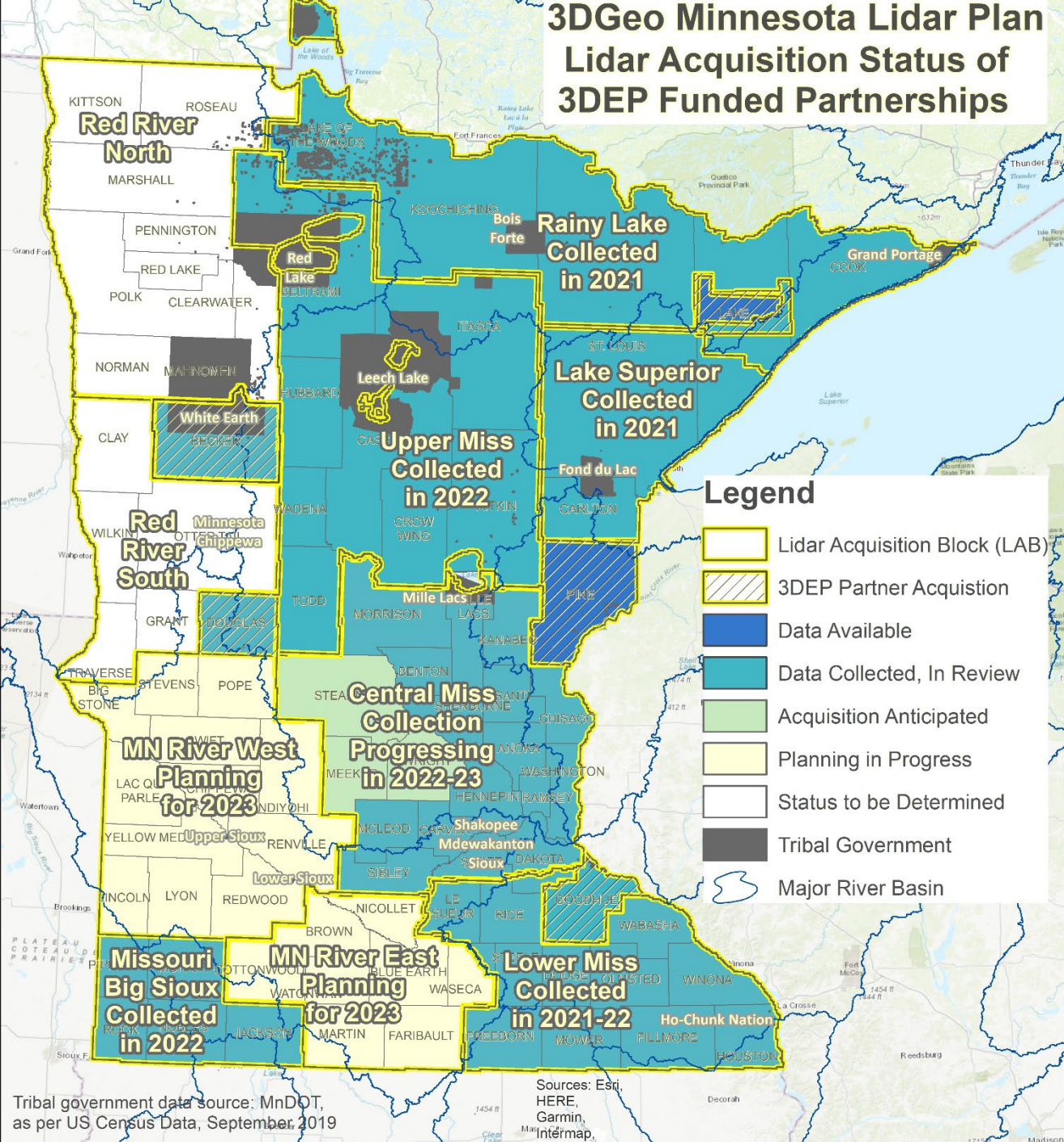
* Estimated cost per square mile paid by 48 unique Minnesota funding partners working collaboratively for consistent lidar data acquisition. **\$118 Value:** 1.) is not specific to a 3DGeo Lidar Acquisition Block, 2.) is based on current total Minnesota partner contributions of \$6,053,761.44, 3.) does not include federal contributions.

Fiscal agent and partnerships – Minnesota Partners



Partner Type	Unique partners	Total Contributions	Sum of Contributions
City	1	1	\$30,000.00
County	31	33	\$1,841,964.86
Federal - State office	2	8	\$2,558,560.58
Private Company	1	1	\$5,000.00
Regional Government	1	1	\$22,000.00
State	7	18	\$1,495,000.00
SWCD	3	3	\$68,500.00
Tribal Nation	1	1	\$32,736.00
Grand Total	47	66	\$6,053,761.44

3DGeo Minnesota Lidar Plan Lidar Acquisition Status of 3DEP Funded Partnerships



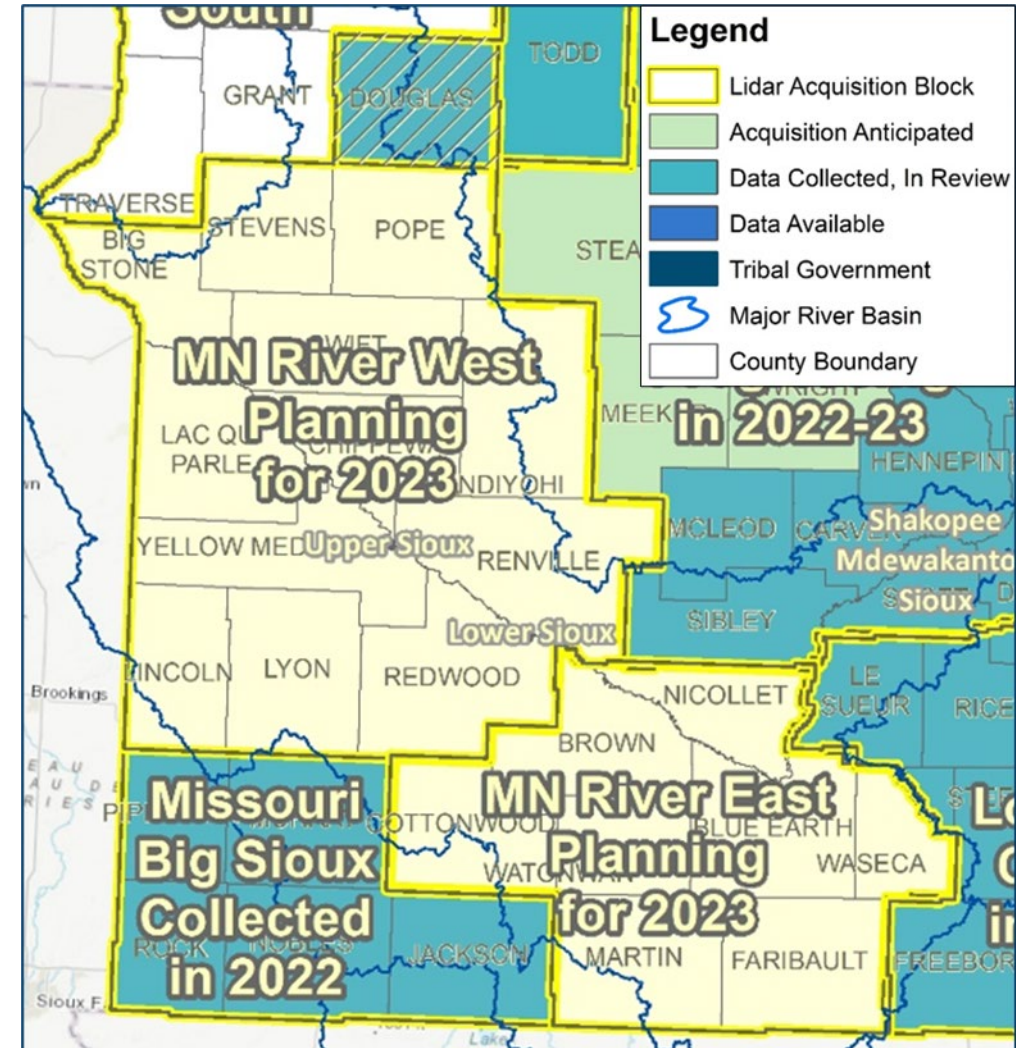
Lidar Acquisition Areas and Blocks of Interest

- Lake County area collected in fall 2018, data publicly available
- Pine County collected in spring 2019, data publicly available
- Goodhue County collected in spring 2020, data in review
- Rainy Lake and Lake Superior collected in spring 2021, data delivery fall 2022
- Missouri/Big Sioux, Becker and Douglas Counties, and Upper Mississippi collections completed spring 2022, data delivery expected in fall 2023
- Central Mississippi partially collected in spring 2022, remaining to be collected spring 2023
- Red River Watershed Management Board, with supporting Counties and Watershed Districts collected lidar in fall 2021 within the Red River Watershed

Call to action: Next steps – MN River East & West LAB

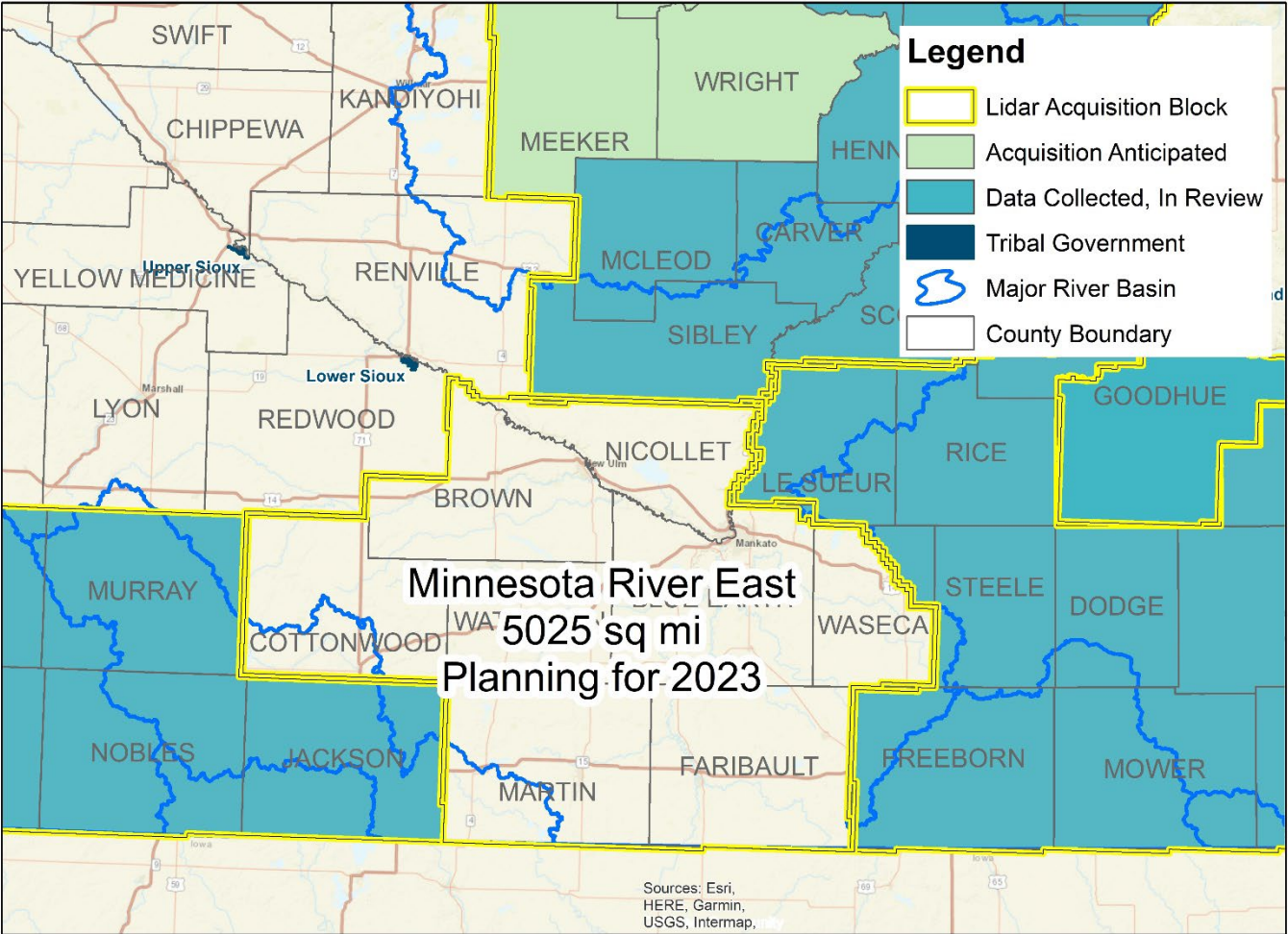
Call To Action

- 3DGeo seeks to identify local **champions** and **funding partners** across MN River - East and West LABs for a *Spring 2023* lidar acquisition project
 - 2023 - Lidar Collection
 - Data Delivery Late 2024
- Without stakeholder support and funding partnerships established by **September 2022**, 3DGeo will be forced to **withhold** its planned LAB grant submission(s) until September **2023**.
 - 2024 – Lidar Data Collection
 - Data Delivery late 2025

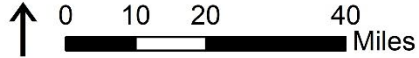


3DGeo Outreach: PLANNING for 2023

Minnesota River - East Block



Tribal boundaries data source: MnDOT,
as per US Census Data September 2019



Map Date: Aug 24, 2022

3DGeo stakeholder outreach began in the MN River East and West Blocks when conducting initial outreach in Southern MN in 2019

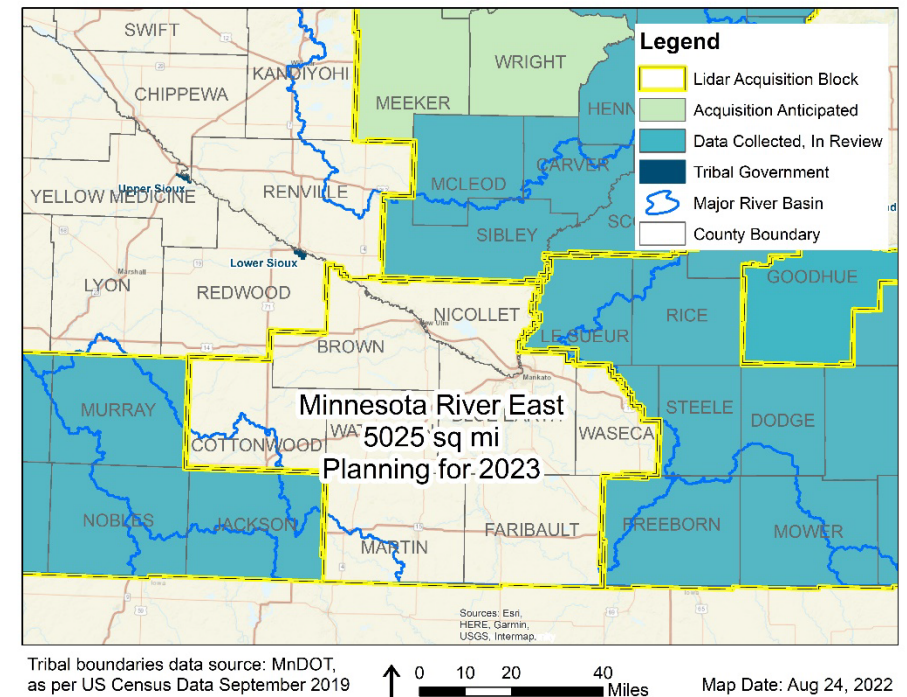
Estimated USGS 3DEP Contribution		Total Partner Contributions Needed	
%	\$	%	\$
40%	\$653,250	60%	\$979,875
5025 square miles Estimated at \$325 per sq mi total = \$1,633,125 TOTAL			
Average per County Partner Goal: \$61,242.19			

3DGeo Outreach: PLANNING for 2023

Minnesota River - East Block

- TOTAL Funds Needed: \$1,633,125
- Estimated using \$325 per square mile for QL1
- 8 Counties* - 5,025 square miles (range 433 – 765 mi²)

Contributors	%	Average Per County	\$
USGS	40		\$653,250
Partners	60		\$979,875
LAB Counties	~ 30**	\$61,242	\$489,938
All Others	~ 30**		\$489,938
Grand TOTAL	100		\$1,633,125



*Brown, Blue Earth, Cottonwood, Faribault, Martin, Nicollet, Waseca, Watonwan

**This is an estimate, up to 30% of the TOTAL, and dependent on the Lidar Acquisition Block

3DEP Standard Deliverables

- **Point Cloud** (classified to minimum level – meets most needs; data hosted online)
- Digital Elevation Model (**DEM**/Bare-Earth Surface Raster)
- Lidar Swath Polygon
- **Hydro**-breaklines
- Metadata & Reports

3DEP Program – Lidar Data and Derived Products

Possible Added Deliverables

Possible deliverables not funded by 3DEP, but can be part of the 3DEP contract as additional products and services with the 3DEP contract vendor at an additional cost

- Higher density Point Cloud
 - ✓ 3DGeo advocates for QL1, **partners may upgrade areas to QL1:30 (30 points/m²)**
- Improved hydrographic products
 - ✓ Advanced **hydro-modified DEM** (Conditioned DEM), and/or hydro-flattening
- Bare Earth point cloud
- Additional Point Classification
 - ✓ High vegetation and **buildings**
- **Intensity** imagery, GeoTIFF

State Agency Lidar Derived Products

Foundational Derived Products

- Publicly available data served as authoritative products from state agency distribution portals
 - 1-ft **Contour** Dataset
 - **Hillshaded** DEM
 - **Canopy Height** Model (CHM)
 - Other products to come?

Upgrade

8 Points per Square Meter → 30 Points per Square Meter

3DGeo - Lidar Acquisition Specifications for USGS 3DEP Submissions for Broad Agency Announcemnt (BAA), Statement of Work (SOW), and Task Orders										
Lidar Quality Levels Adopted from 3DEP Lidar Base Specification (LBS)	Description	LBS Table-2: Aggregate Nominal Pulse Spacing (ANPS) [m]	LBS Table-2: Aggregate Nominal Pulse Density (ANPD) [pulse/m ²]	LBS Table-4: Absolute Vertical Accuracy RMSEz (Non-vegetated) [m] <i>Alternative Units</i> ([cm] / [in] / [ft])	ASPRS Checkpoint Vertical Survey Requirement 3-times More Accurate than Non-vegetated RMSEz (3xRMSEz) [m] <i>Alternative Units</i> ([cm] / [in] / [ft])	LBS Table-6: DEM Cell Size [m]	Supported Contour Interval Accuracy [ft]	Delivered Point Density [point/m ²]	Central Miss - Metro LAB Cost Estimate Based on 2021 IGCE (2021-09-24) [mile ²]	QL Upgrade Cost (Central Miss LAB) Addition to Funding Partner's Initial Commitment (Based on 2021-09-24 IGCE) [mile ²]
QL1	• ASPRS Accuracy Compliant QL1	≤ 0.35	≥ 8.0	≤ 0.100 m ≤ 10.0 cm ≤ 3.937 in ≤ 0.328 ft	≤ 0.033 m ≤ 3.333 cm ≤ 1.312 in ≤ 0.109 ft	0.5 m	1.0 ft	≥ 30.0	\$505.38	\$179.67
QL1	• ASPRS Accuracy Compliant QL1	≤ 0.35	≥ 8.0	≤ 0.100 m ≤ 10.0 cm ≤ 3.937 in ≤ 0.328 ft	≤ 0.033 m ≤ 3.333 cm ≤ 1.312 in ≤ 0.109 ft	0.5 m	1.0 ft	≥ 8.0	\$325.71	\$0.00



MNIT Services is the Fiscal Agent

- MnGeo is establishing funding agreements with all local funding partners
- MnGeo establishes individual funding agreements with USGS 3DEP for each of the 3DGeo lidar acquisition blocks

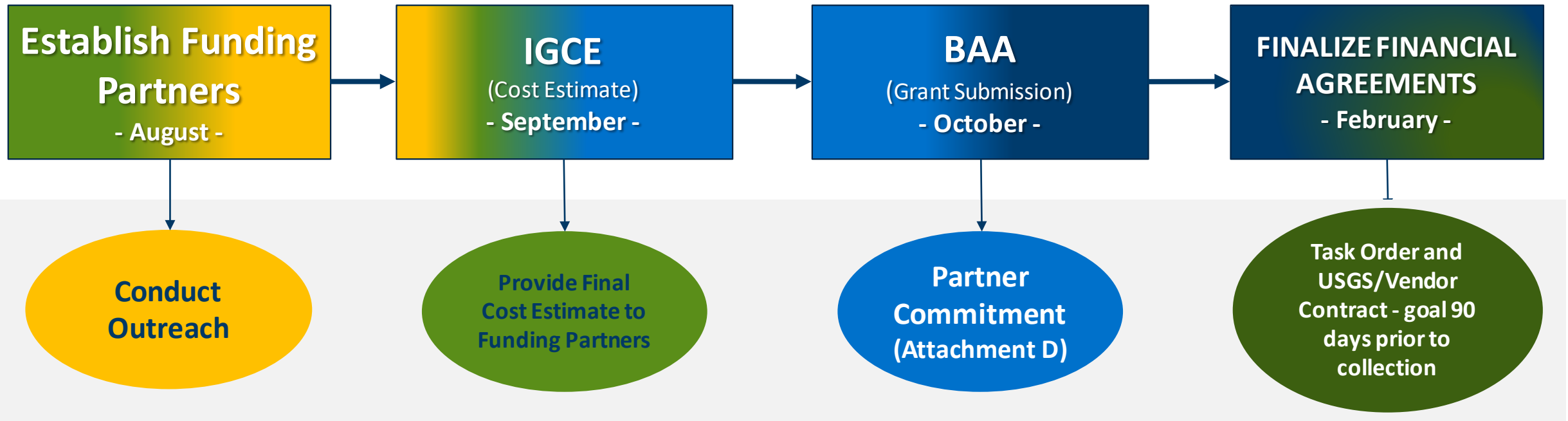


Next steps to be a Financial Partner

- Let the 3DGeo know you're interested in partnering (email: lidar@state.mn.us with amount)
- Complete an "Attachment D" document to validate you are a proposed funding partner (this can be marked as pending or guaranteed because we know partners may need to have official approval from their Boards, etc.)
- MnGeo submits all Attachment Ds with the BAA funding application
- If the BAA funding is approved, MNIT will create a Joint Powers Agreements (JPA) between MNIT and your organization. These documents should be executed 90 days before lidar acquisition (December - February)
- MNIT will invoice partner in late spring (April)



3DGeo Next Steps



Next Steps

- Learn more – Review Hub site
- Share Information with Your Organization – [tree/hub/material](#)
- Serve as a Champion – Build momentum of support in your organization
- Help Identify Funding Partners
- Let 3DGeo Know You Would Like to be a Financial Partner

■ The Original \$61,242.19 Ask:

- We want you to know that amount (\$61,242.19) was a meaningful calculation and very real goal to help us meet the USGS required 3DEP minimum 60% Partner contribution for lidar acquisition in your area.
- In our funding model, we divide that 60% in half shared between
 - (30%) state agencies, federal agencies with state-based funds and other funding sources
 - (30%) County-based funding sources, which can be any funding partner within the boundary of the county including cities, watershed organizations, SWCD, etc.

■ Considerations:

- Not meeting the minimum funding requirement is a risk in the grant submission -- not submitting a grant request has a greater risk of missing the best opportunity to leverage federal funding for lidar acquisition in your area.
- Through this 3DGeo managed process of establishing partnerships, we have seen an average cost of **\$118 /mile²** per local partner in Minnesota, which is as cheap as you will see for new high-density lidar.
- An additional benefit to local partners is that everything in the acquisition and data review process is managed by us/3DGeo and the USGS. Funding partners can be involved in all vendor/USGS update meetings and review of pilot data.

- **We are working off of 3 Knowns in this 11th-hour outreach:**
 1. We are not going to meet this 30% - \$61,242 minimum from local county-based partners
 2. In addition to individual partner contributions, the 3DEP grant process looks at the number of funding partnerships as a criteria for its evaluation process
 3. We don't want to miss this opportunity to leverage federal dollars through the USGS 3D Elevation Program that has had an ending date of 2023.

■ Grant Submission – Can we do this?:

- We are willing to submit a grant request for the 3DGeo MN River East Lidar Acquisition Block (LAB) that demonstrates to the USGS that we have established a coalition of partnerships who want and support new lidar for the area (even if we don't reach the required minimum local partner contribution).
- Our hope is that we still stand a chance to receive funding support from 3DEP, but we need funding partners that can contribute to the LAB.
- Our goal for the meeting today is to identify contributions from local/county-based funding partners who can collectively bring us towards an equitable pooled contribution for each county boundary within the LAB.

Stakeholder Questions

For the MN River East Block, the goal is roughly \$62k from each county. Is the goal the same amount from each county, even though counties are different sizes?

- *Yes.*
- *3DEP is a major contributor and on average contributes 40% of the cost, but it won't happen without partnerships.*
- *This amount is our GOAL per county to collect lidar across the whole Block.*
- *The MN Lidar Plan has a goal of statewide collection of high density lidar and 3DEP has a Nationwide goal.*
- *This goal represents an even 30% split between all counties within the Block, with the expectation of raising another 30% from state and other local partners, and an assumed 40% from 3DEP.*

What happens if a county decides not to participate and there is not 100% participation in the Block?

- *A funding opportunity will be missed. Without sufficient local partnerships within the LAB, 3DGeo may not be able to apply for the 3DEP funding during this round and we would need to delay a year.*
- *Costs are driven by economies of scale. A single county or smaller area of lidar acquisition will be more expensive.*

Would our contribution “buy” data in our county or just go into the larger pot for the region?

- *Partners contribute to the whole Block.*

Stakeholder Questions

Are we obligated to the Attachment D that we sign?

- *The Attachment D form is not a contract.*
- *Commitments can be marked as pending and become confirmed later.*
- *Funding agreements with partners happen between MNIT (MnGeo) and the county or other local government.*
- *The goal for a contractual agreement between the local governments and MNIT is within 90 days of lidar acquisition. This ensures the contractual agreements between MNIT and USGS are in place before the Task Order is finalized with the and USGS and the vendor, and all is complete before the spring collection season.*

If data is collected in spring 2023, when is data delivery expected?

- *The vendor will be obligated to submit data to the USGS to review around one year after data collection.*
- *The USGS preforms quality control and vertical accuracy checks, sometimes warranting edits from the vendor.*
- *Partners may receive a copy of the entire Block from the vendor after the USGS establishes provisional acceptance of the data, or after the USGS completes all final vertical accuracy reports.*
- *The public will be able to access the data through The National Map after the USGS uploads the data, after all final checks and reports are completed.*

Who will have access to the data?

- *All data will be public and accessible on The National Map.*

Stakeholder Questions

Can we add upgrades and/or enhancements?

- *Yes. Are some doing this? TBD*

What have others contributed? What has the State contributed?

- *See next slide and details in the beginning of this presentation*

When is the 3DEP Application due?

- *The BAA has not been released yet, it is estimated to be released in mid-October*
- *The due date will likely be in November, but we are not sure*

We would like to see some expected numbers per county instead of the average

- *Through this process we have an average cost of \$118 per square mile per local partner, which is as cheap as you will see for new high-density lidar.*

Thank You!

From: 3D Geomatics Data Acquisition Team

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