

# GreenVest

VISION • PERFORMANCE • RESULTS

## The Next Step:

Deploying New Technologies to Improve Restoration Approaches

2023 National Stream Restoration Conference – Baltimore, MD

Presenter:

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Photos (left to right): Topographical map of Waynesboro Stream Restoration project. Flying a drone at Baltimore's Middle Branch Park.



'Minor' erosion, only able to be captured by UAS.

- ✓ **GOAL:** Discuss established and emerging technologies to measure, evaluate, and improve restoration outcomes
  - ✓ Technologies & Applications
    - ✓ UAVs (drones)
    - ✓ Cameras (remote, 360, IR/LiDAR)
    - ✓ Sensors (groundwater, temperature)
    - ✓ GPS (RTK, FieldMaps, GIS)
  - ✓ Practicality & use cases
  - ✓ Costs & Benefits
- ✓ **TAKEAWAY:** Think about how you can bring a new technology to your work.



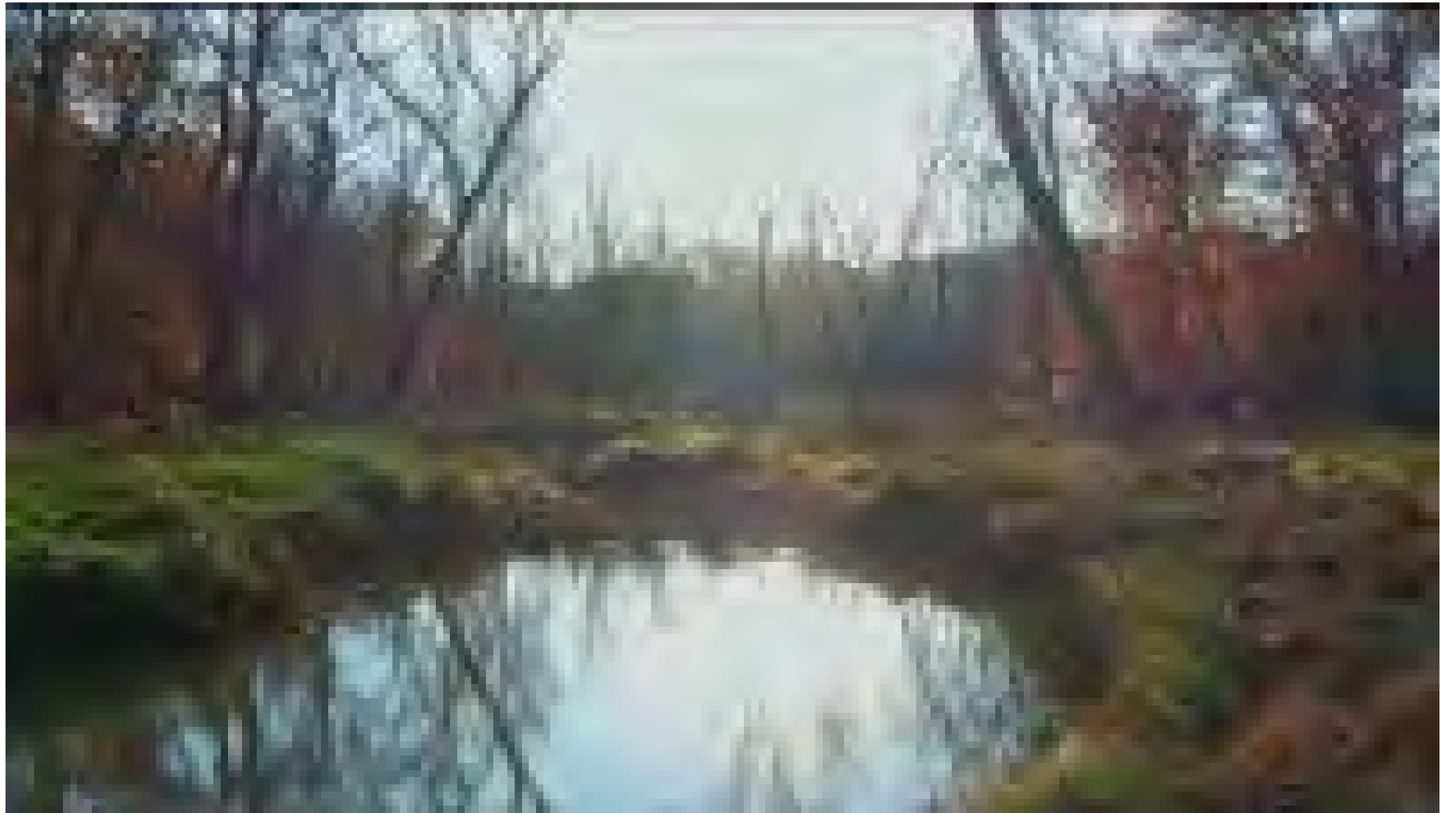
- Adoption
- Experiment
- Ask questions
- **LEARN!**



- Low-cost\* way to increase capabilities
- Reduce labor inputs
- Site selection
- Constraint/Opportunity identification
- Pre/post-construction comparisons
- 'Wow' factor



Restored stream system; top-down view



- Marketing
- Renders
- Virtual Tours
- Site conditions (before/after)
- Plant growth/cover
- Supporting on the ground data
- Construction progress
- Elevation/unofficial survey
- Takeoffs





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**Current Uses**





# Example #1 – Waynesboro Stream Restoration Project



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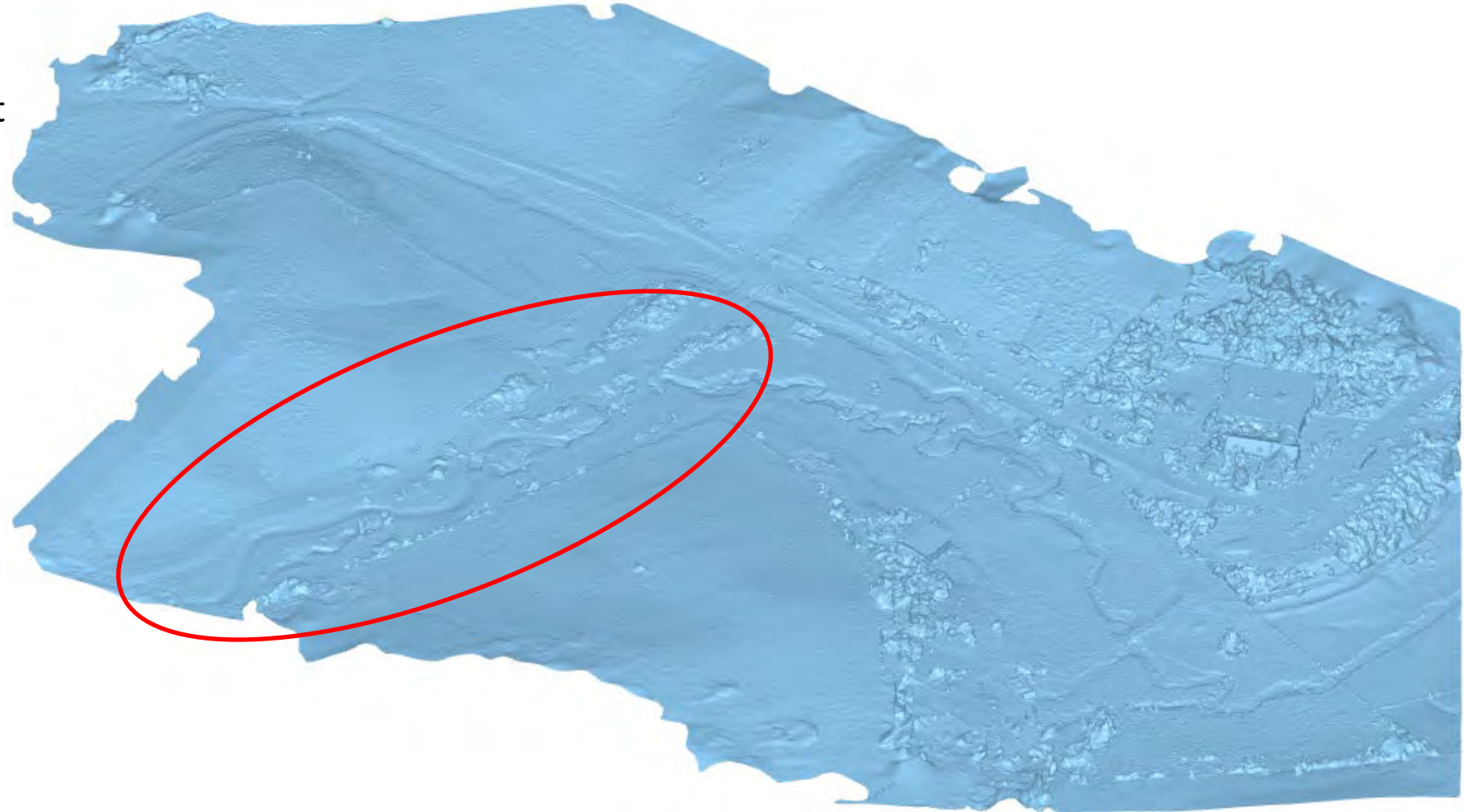


# Example #1 – Waynesboro Stream Restoration Project

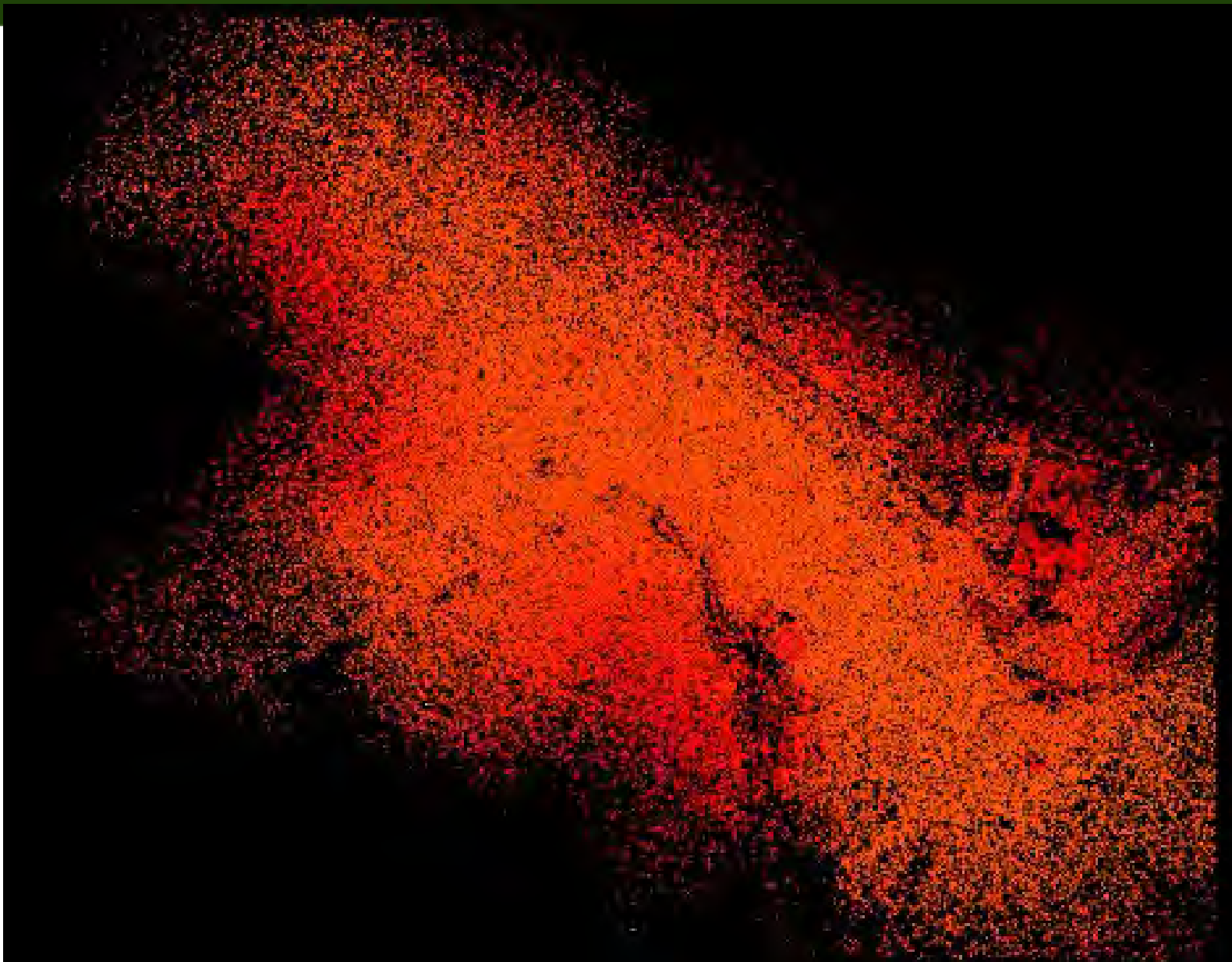


# Example #1 – Waynesboro Stream Restoration Project

- DroneDeploy automated flight
- 2D/3D mapping
- DEM
- Photogrammetry



# Example #1 – Waynesboro Stream Restoration Project



## Example #2 – BBMS Hydrology Comparison





# Example # 2 – BBMS Hydrology Comparison

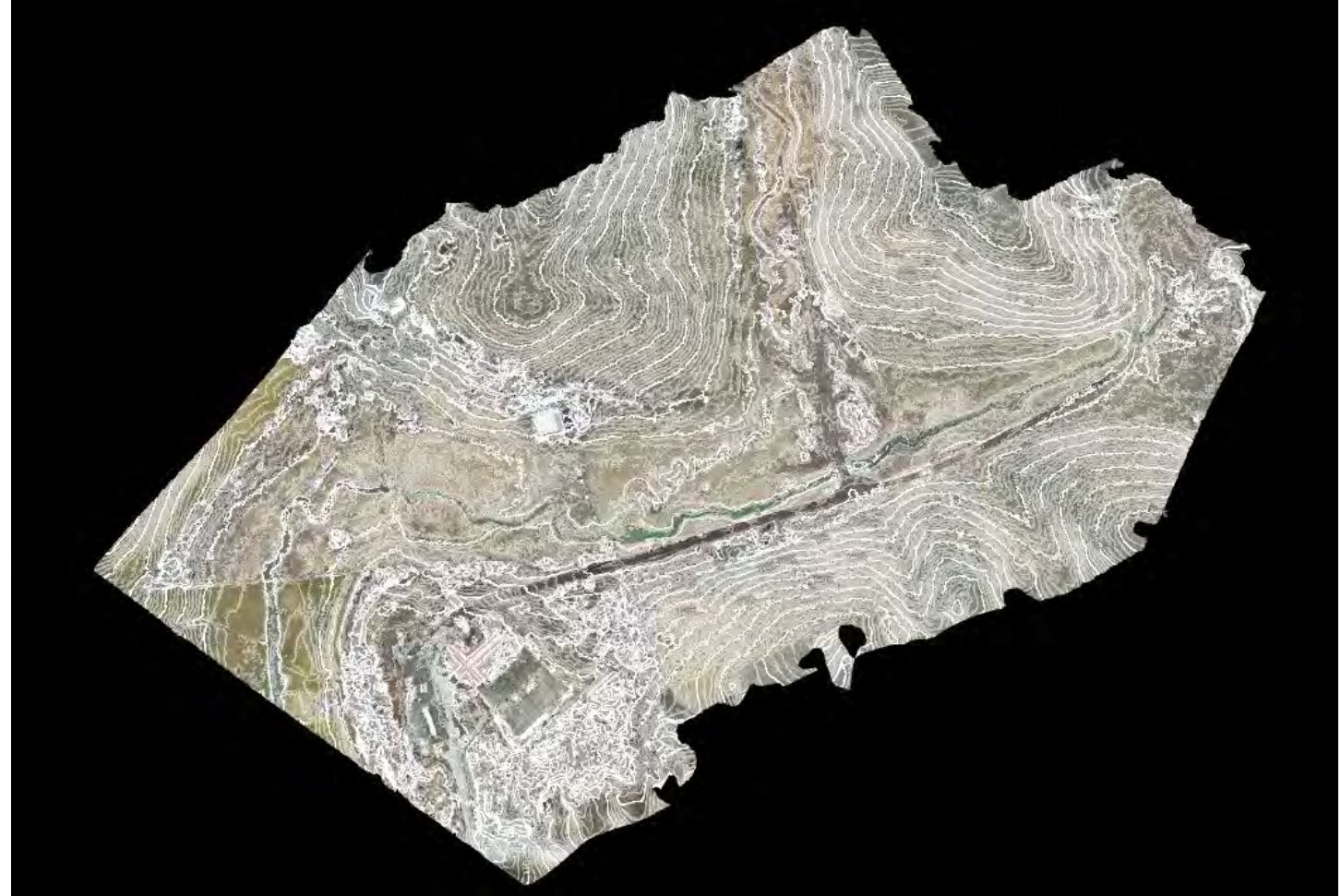


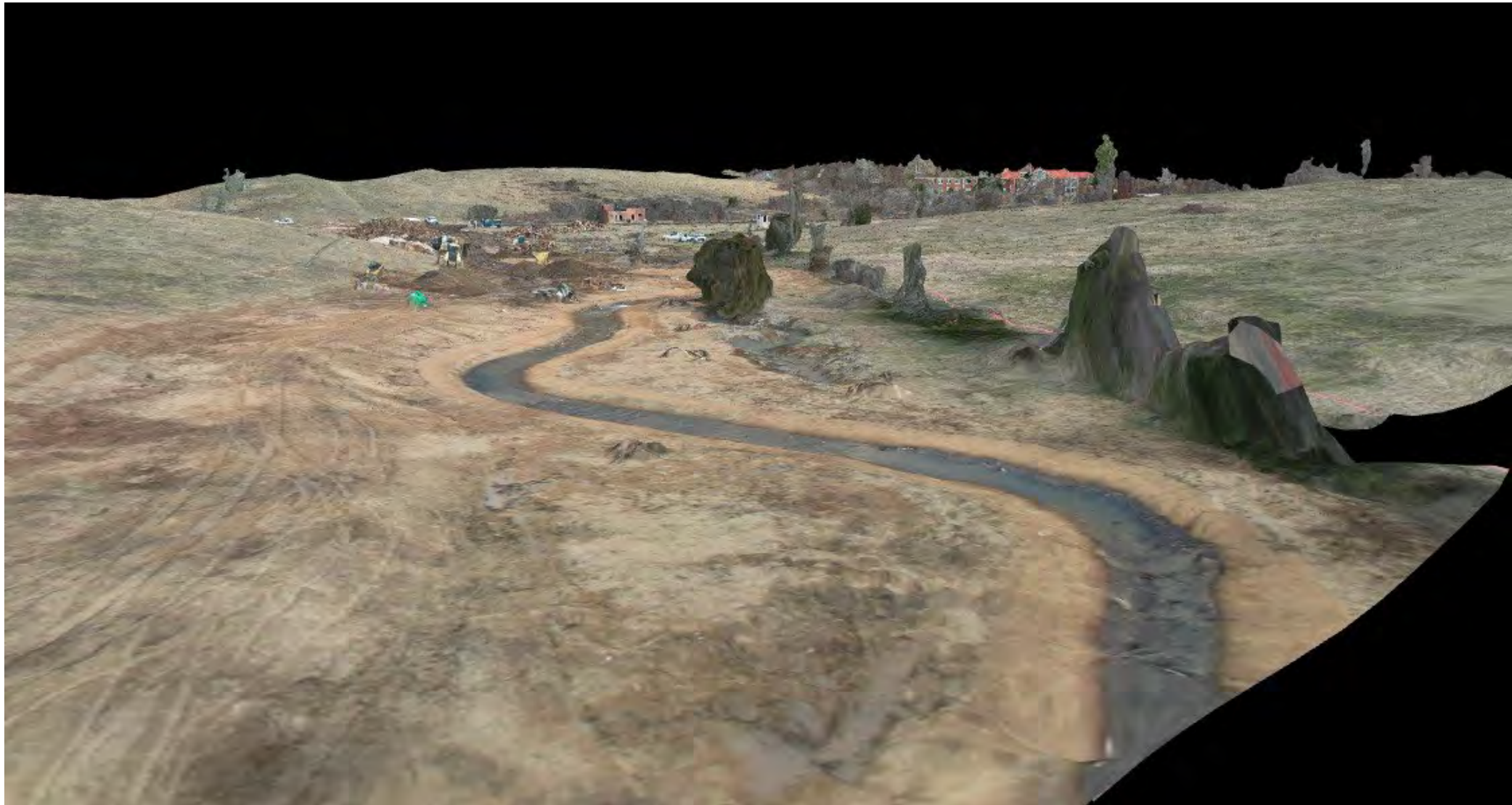
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# Advanced Uses

- 2D/3D Modeling
- ArcGIS/CAD data inputs
- Bank Erosion surveys
- Digital elevation mapping
- Floodplain mapping
- Plant health & coverage
- Construction progress
- Measurements & quantities

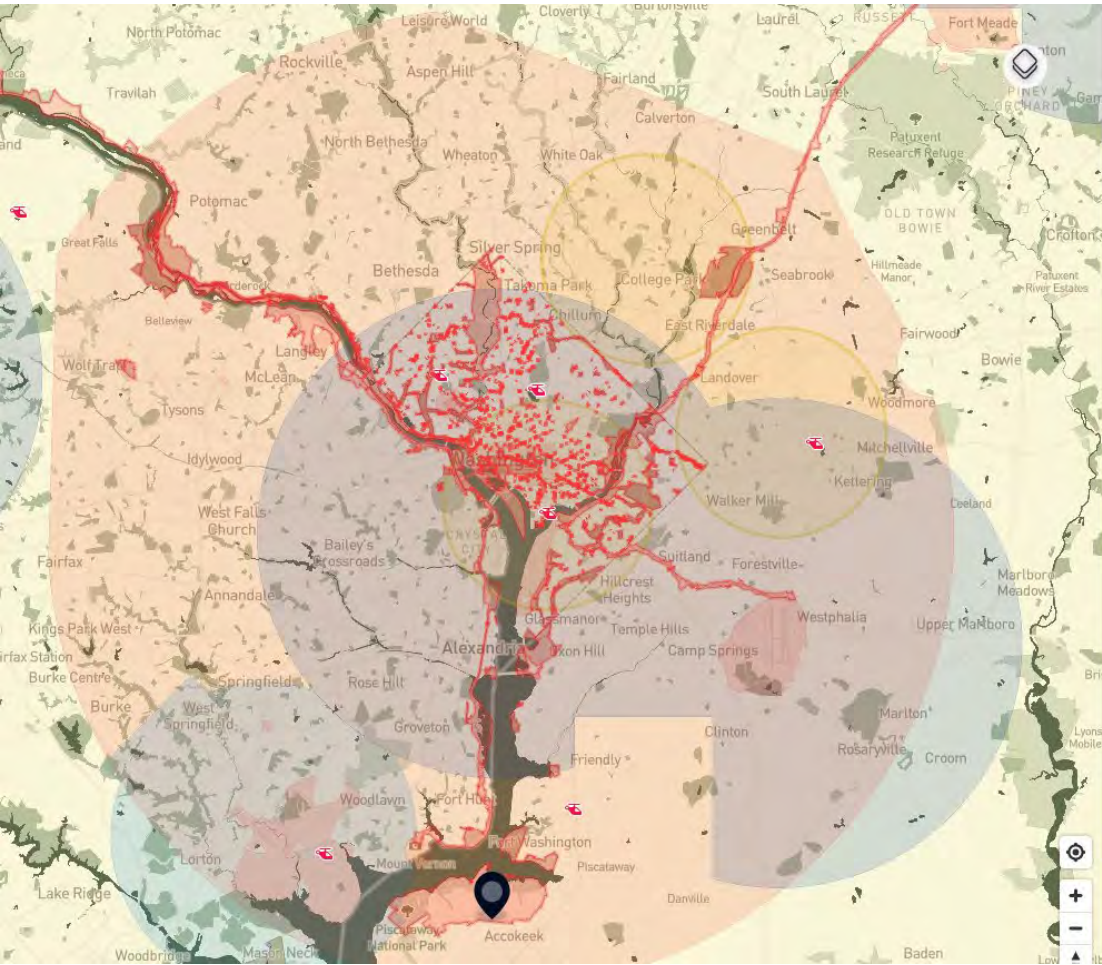




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# Constraints & Challenges

- Certifications (Part 107)
- Airspace restrictions (DC FRZ)
- Canopy cover & obstructions
- Accuracy & Precision – 1"/px
- Software & processing of data
- Learning curve
- Use cases



Search for a location

LAT: 38.67971024  
LONG: -77.04246343

**Restricted Operations**  
Current advisories restrict flight operations in this area.

[Notify & Fly](#)

- Piscataway Park**  
*Other Designation*  
[more](#)
- DC FRZ**  
[more](#)
- DC SFRA**  
*Special Flight Rules Area (SFRA)*  
[more](#)
- P-73**  
*Special Use Airspace Type Prohibited*  
[more](#)

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# The Next Step:

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# 360 Cameras

- Virtual Tours
- Before/after
- New perspective

[360 Photo Viewer](#)



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# Virtual Tours

<https://kuula.co/post/N5m9N/collection/7kf9h>

Category	Product	Cost
Drones	DJI Air 2S	\$ 999.00
	DJI Mavic 3 Pro	\$ 3,889.00
	DJI Matrice 300 RTK	\$ 10,599.00
Equipment	DJI L1 LiDAR Sensor	\$ 9,326.00
	DJI H20 Multispectral Camera	\$ 3,639.00
	GoPro 360 Max	\$ 499.00
	Brinno TLC300 Camera	\$ 249.00
	Vu-Situ VuLink	\$ 895.00
	EOS Arrow Gold GNSS Receiver	\$ 7,995.00
Software	DroneDeploy (monthly)	\$ 329.00
	Kuula Virtual Tours (monthly)	\$ 20.00
	Ricoh THETA	FREE
	KeyNet GPS RTK Network Access (monthly)	\$ 375.00
	HydroVu Cloud Services (monthly, per device)	\$ 10.00

# The Next Step: Deploying New Technologies to Improve Restoration Approaches

# Timelapse Cameras



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**The Next Step:**  
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# Timelapse Cameras



# Apps & Programs

## Identification

- Merlin Bird ID
- Google Lens
- iNaturalist
- Seek

## Reporting/Data Collection

- Wildnote
- Vu-Situ

## Tours/360/Drone

- Kuula
- Memento360
- Rico THETA
- Drone Deploy



# THANK YOU & QUESTIONS

