Look…up in the sky!

It's a bird…it's a plane…

No, it's a drone helping to manage your estuary!

Bob Hartzel, CLM, CPESC
Principal
Comprehensive Environmental Inc.

EagleEye

AEROBOTICS™

A wholly owned subsidiary of Comprehensive Environmental Inc.

Providing commercial engineering and environmental services in New England using sUAS platforms

FAA Regulations

FAA regulations (August 2016)

- Separate recreational and commercial rules

FAA Regulations

Commercial license required

- 400’ AGL maximum altitude
- Maintain line-of-sight
- Class G airspace (uncontrolled) only
- No flying over people
- All rules can be amended through FAA waiver

sUAS Estuary Services

- Ecological assessments
- Infrastructure inspections
- Shoreline inspections
- Topographic survey
- High-resolution imagery

Ecological Assessments

- **Vegetation / Invasive Species**
- **Document/Update Ecosystem Changes**

Ecological Assessments

- Detailed **species-level mapping** for coastal vegetation communities and related habitat (e.g., wildlife forage and nesting areas)
- Create **orthomosaic and digital surface model** (DSM) for salt marshes and estuarine habitats

COMPREHENSIVE ENVIRONMENTAL INC
EagleEye
AEROBOTICS

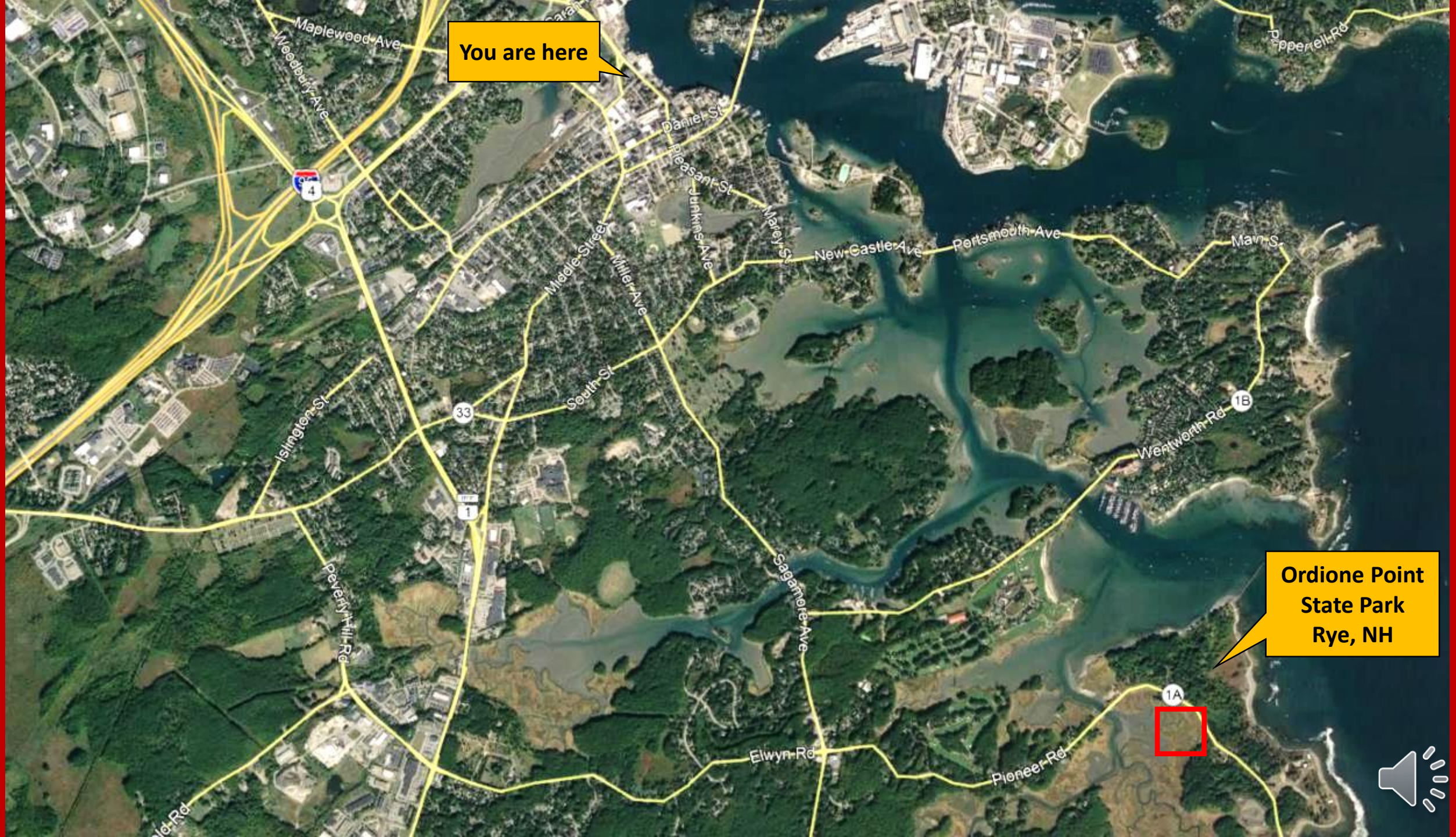
Large, Inaccessible Areas

Sesuit Harbor Marsh, Dennis

High-Resolution Imagery

Provide baseline for detailed assessment of:

- Sea-level rise / climate change
- Invasive species
- Ecological restoration projects
- Land use and stormwater runoff patterns
- Resolution typically between 0.8 to 2 inches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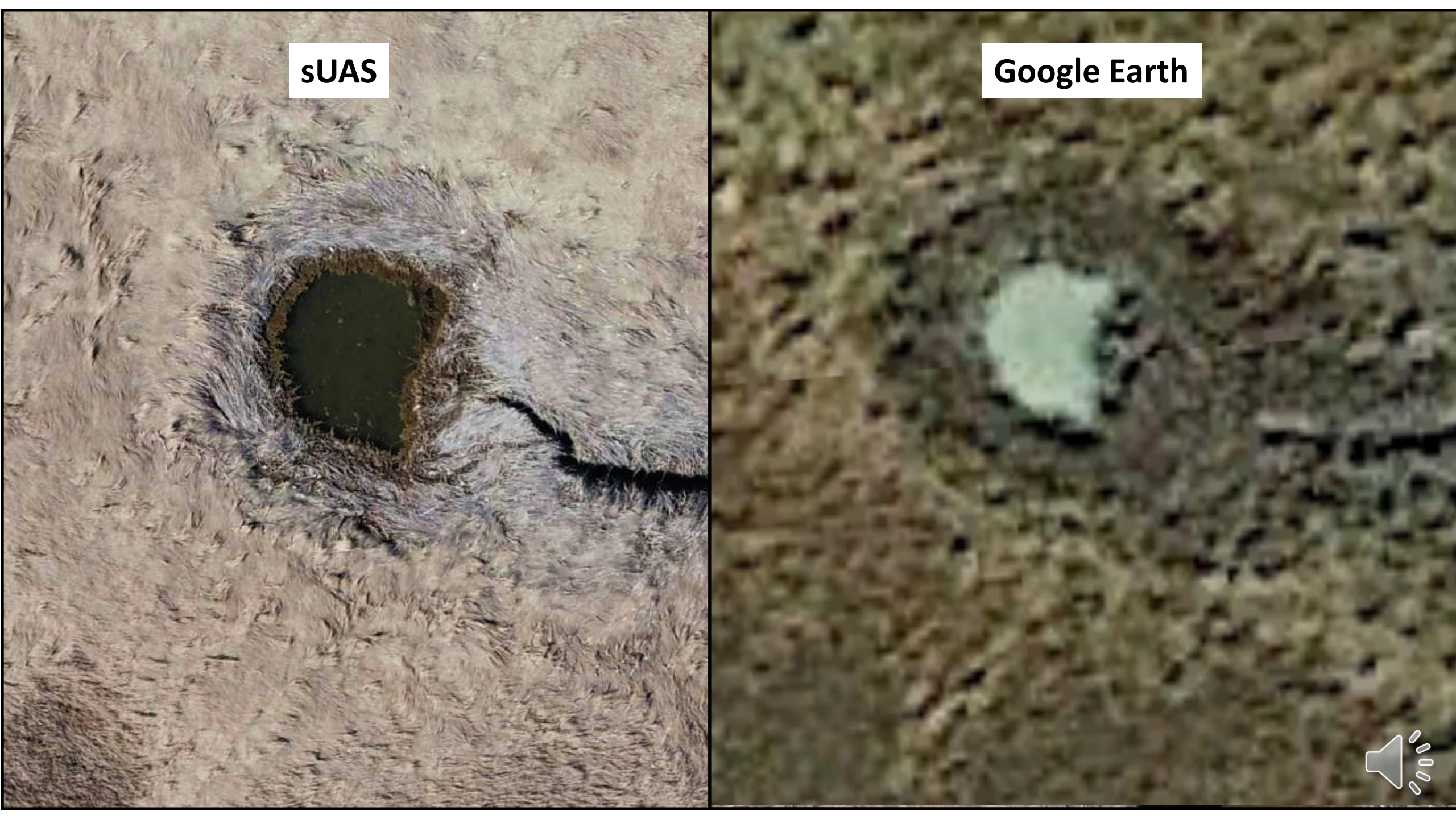
Rye, NH
Maplewood Ave
Woodbury Ave
Daniel St
Pleasant St
Junkins Ave
Marey St
Middle Street
Miller Ave
New Castle Ave
Portsmouth Ave
Main St
Wentworth Rd
Islington St
South St
Peverly Hill Rd
Sagamore Ave
Elwyn Rd
Pioneer Rd
Pepperell Rd
4
33
1
1B
1A

Ordione Point
Estuary

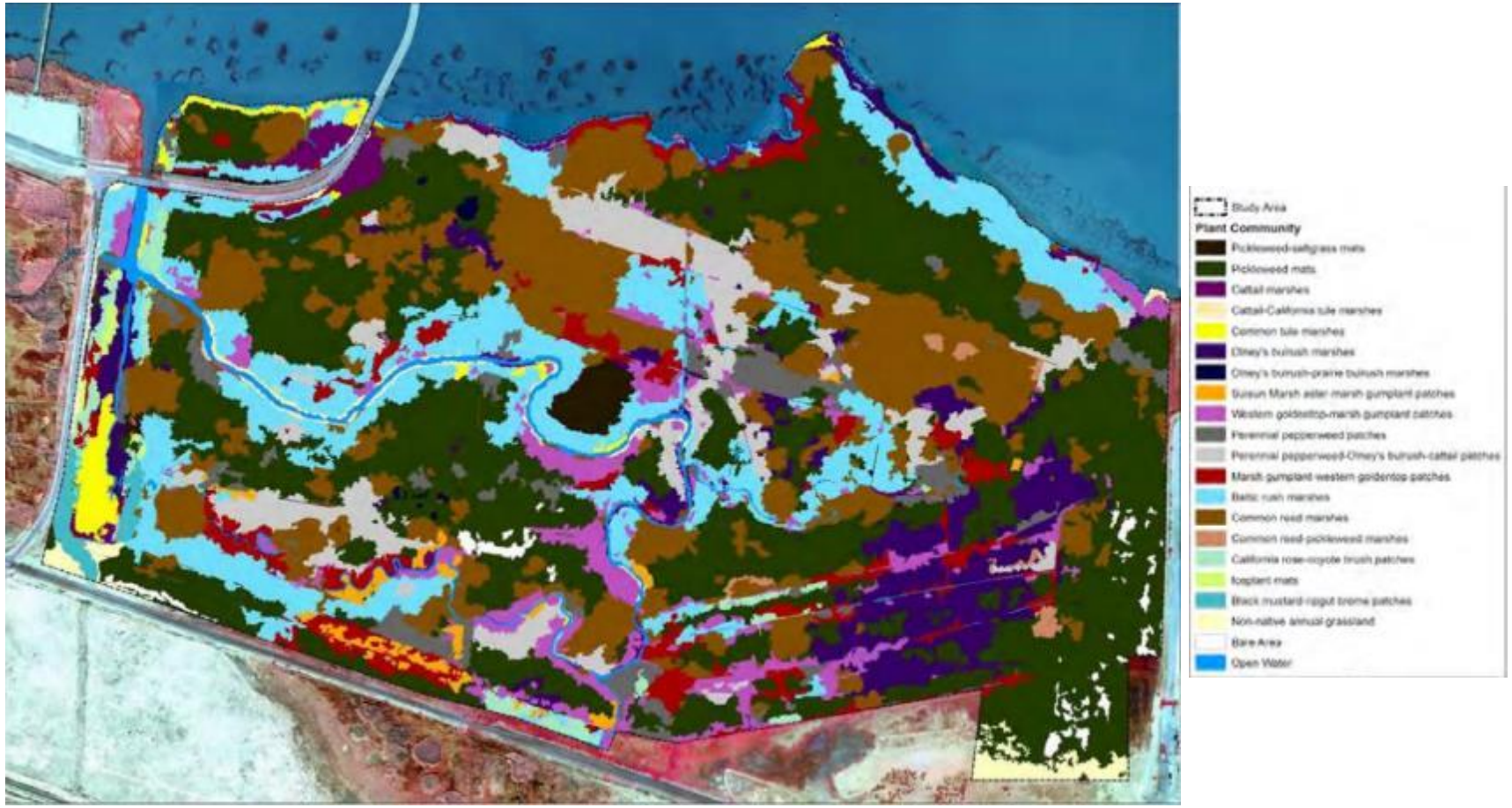

sUAS
Google Earth

Species-level Vegetation Community Mapping

Species-level Vegetation Community Mapping

- **Multispectral Near Infrared (NIR)**

Species-level Vegetation Community Mapping



Cyanobacteria Bloom, Tinkers Pond
(09/12/2017)
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Coastal Infrastructure

Mapping/inspections/ baseline imagery:

- Tide gates, other coastal structures
- Stormwater BMPs
- Culverts, dams
- Coastal flood storage

Infrastructure Inspections

Erosion

sediment deposition
erosion

Shoreline Inspections

- **Structure Inventories**
  - **Docks, piers, retaining walls, etc.**

Shoreline Inspections

- Bank Erosion
- Post-storm rapid assessment of damage
- BMP Site Screening

Topographic Survey

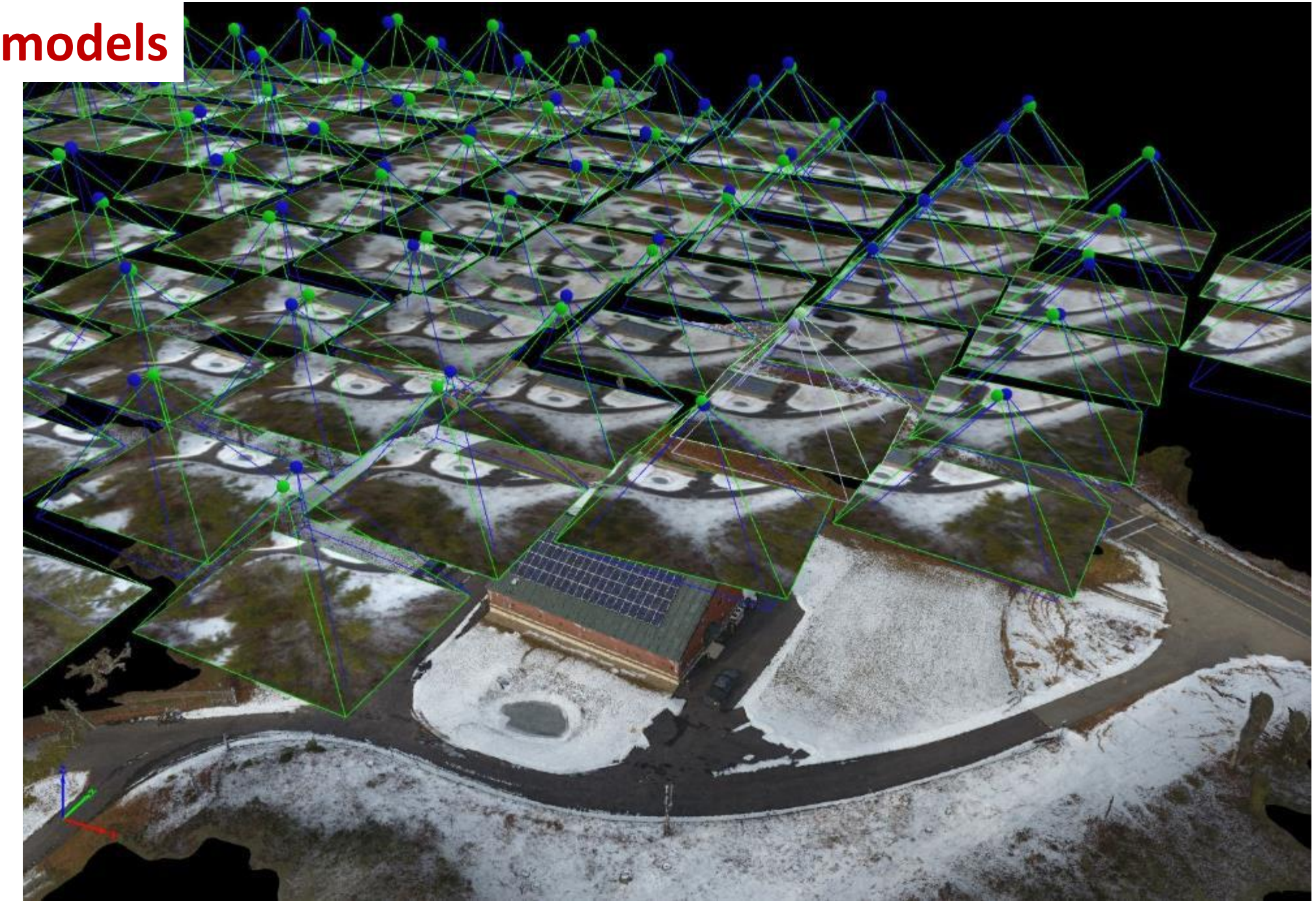
- Support BMP Design
- Construction progress and as-builts

Volume 1
Terrain 3D Area: 2706.20 ft²
Cut Volume: 0.74 0.77 ft³
Fill Volume: -6288.34 290.55 ft³
Total Volume: -6287.60 291.32 ft³
Help

Autonomous Mapping Capabilities

- Establish **repeatable transects**
- **Pre-Planned missions**
- **Manual takeover at any time**
- **Geo-rectified orthomosaics**
  - 1 inch/pixel ground resolution (typical)
  - Satellite resolution 3 feet/pixel (typical)
- **3D models**
  - Accuracy = 1-3 inches, vertical and horizontal

3D models

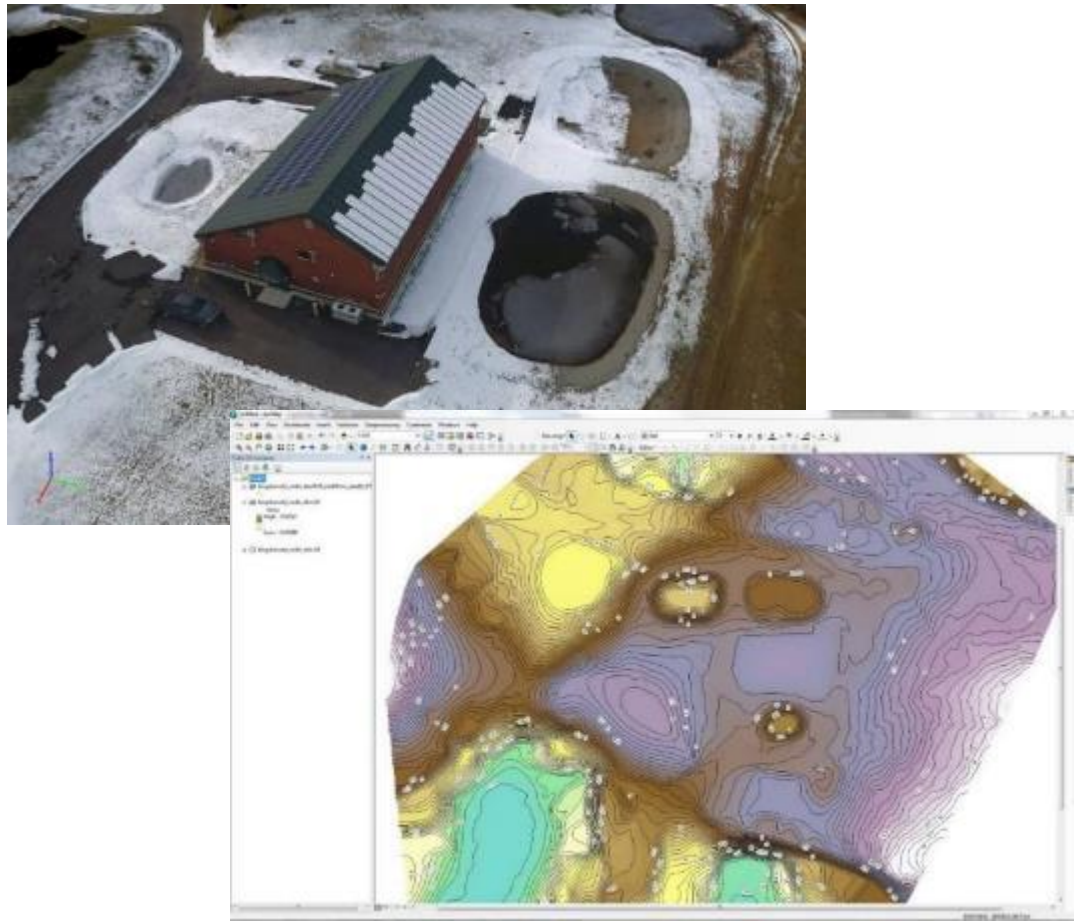


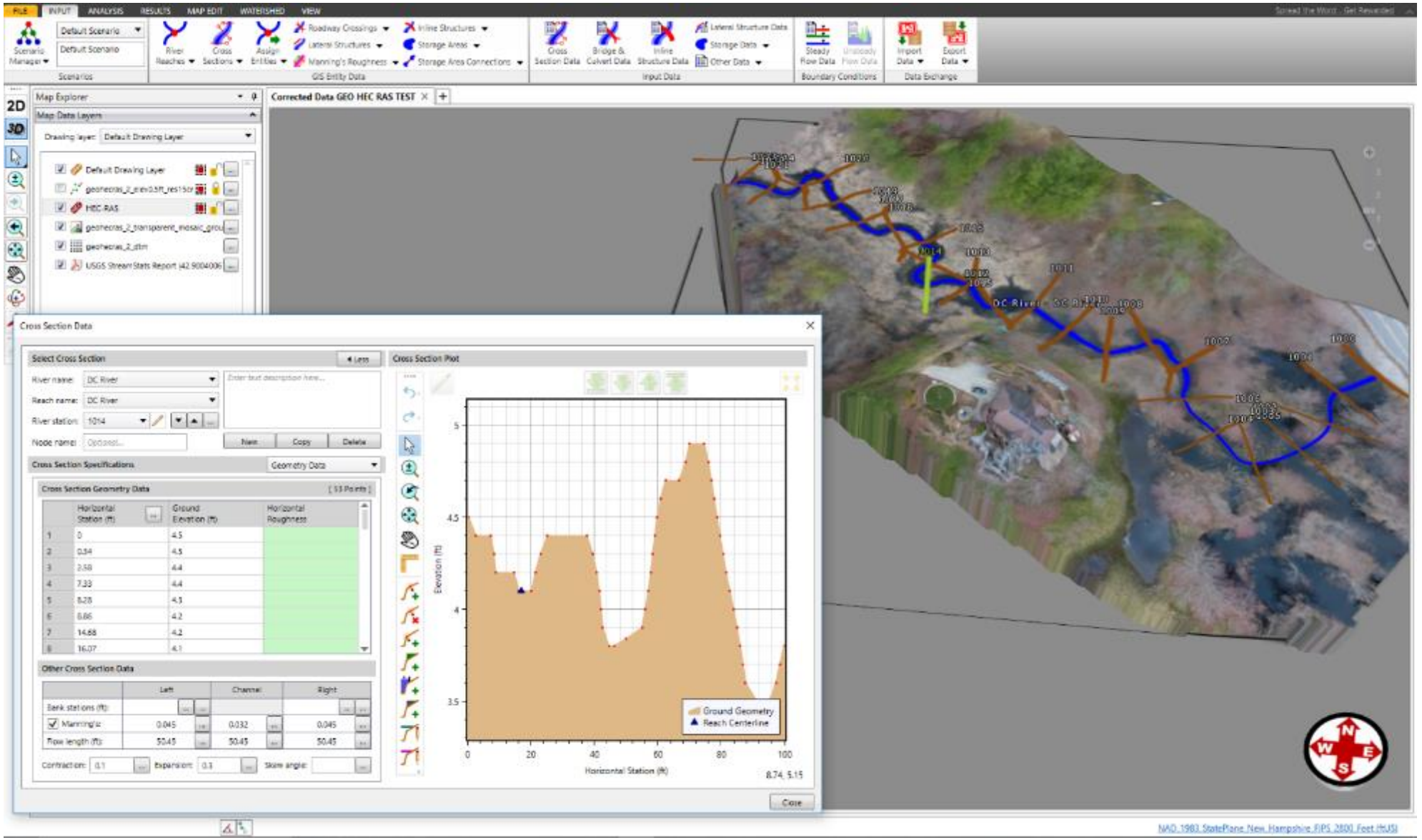
3D models

CEI's EagleEye Outputs/ Products

Outputs

1. Video Inspection
2. Orthomosaics
3. AutoCADD Outputs
4. GIS Outputs
5. GeoHecRas Outputs




Corrected Data GEO HEC RAS TEST
Cross Section Data
Select Cross Section
Cross Section Plot
Ground Geometry
Reach Centerline
Elevation (ft)
Horizontal Station (ft)
NAD 1983 StatePlane New Hampshire FIPS 2800 Feet (HUS)

The sky’s the limit.

EagleEye
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