



# Field Work Methods and Techniques



Comprehensive  
Environmental  
Incorporated

## Navigating the New Stormwater Permit

New Tools for Smooth Sailing through MS4 Compliance

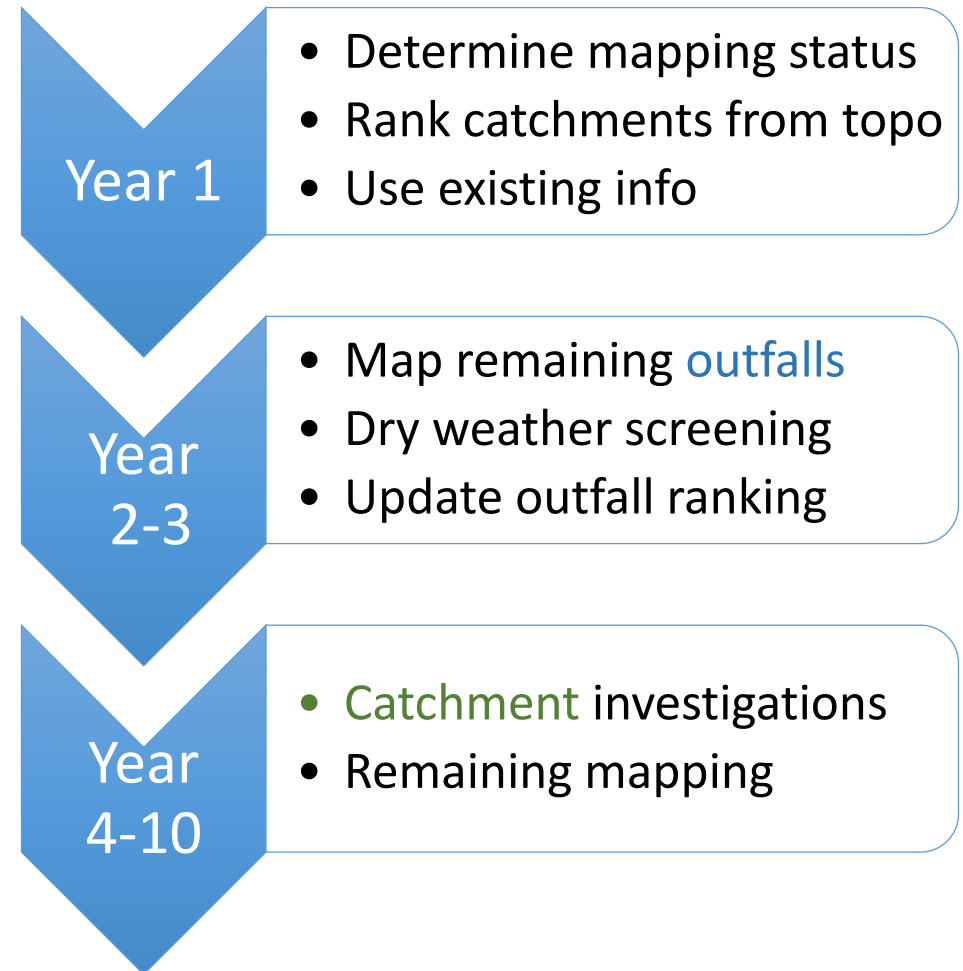
**March 30, 2017**



# Field Work Cost Savings Strategies

## • Field Work Schedule:

- Rank catchments, topo Year 1
- Map **outfalls** Year 2
- Dry weather **outfalls** Year 3 (High & Low)
- Update **outfall** ranking Year 3
- **Catchment** investigations
  - Includes wet weather & key junction manholes
  - Problem **catchments** Year 7
  - All **catchments** Year 10
- Map remainder Year 10





# General Outfall Procedures

- **All Outfalls**

1. Locate, GPS, photograph, name
2. Field sheets – characteristics, condition
3. If no flow, you're done!

- **Flowing Outfalls**

1. Field meter readings
2. Test kits
3. Lab samples
4. Field sheets – odor, color, etc.



<http://www.lafayetteela.gov>

<https://www.bluewaterbaltimore.org>



# Dry and Wet Weather Sampling

- **Can do Most with Field Kits**

- Ammonia (0.5 mg/L)
- Chlorine (0.02 mg/L)
- Surfactants (0.25 mg/L)



Hach Field Kit

- **or Field Meters**

- Salinity
- Conductivity
- Temperature

YSI Pro2030 Conductivity,  
Salinity, Temperature & DO



- **Still Some Lab: Bacteria, Pollutants of Concern**



# Costs

- **Field Test Kits**

- Base Kit: \$60-\$70 (30 tests)
- Refills: \$30 (30 tests)
- Translates to approx. \$1 per sample



CHEMetrics  
Field Kit

- Laboratory costs average \$20 to \$30 per sample
- Lab kits have 5-month shelf life, or 18 months refrigerated
- **Plan Ahead!**



Presented at CEI's Navigating the New Stormwater Permit on March 30, 2017 in Marlborough, MA  
© 2017 Comprehensive Environmental Inc.



**EagleEye**

**AEROBOTICS™**

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

# Unmanned Aerial Systems for MS4 Compliance

## Navigating the New Stormwater Permit

New Tools for Smooth Sailing through MS4 Compliance

March 30, 2017



# Presentation Overview

- Regulations
- sUAS piloting
- Real-time imagery services
- Software & post-processing
- Engineering & scientific analysis services
- MS4 benefits





# FAA Regulations

- New FAA regulations released late August 2016
  - Separate Commercial and Recreational rules
- Commercial license required (14 CFR part 107)
  - 400' AGL maximum altitude
  - Maintain Line-of-sight
  - Class G Airspace only
  - No flying over people
  - All rules can be amended through FAA waiver
- FAA enforcement after-the-fact
  - Legal situation very murky





Presented at CEI's Navigating the New Stormwater Permit on March 30, 2017 in Marlborough, MA  
© 2017 Comprehensive Environmental Inc.

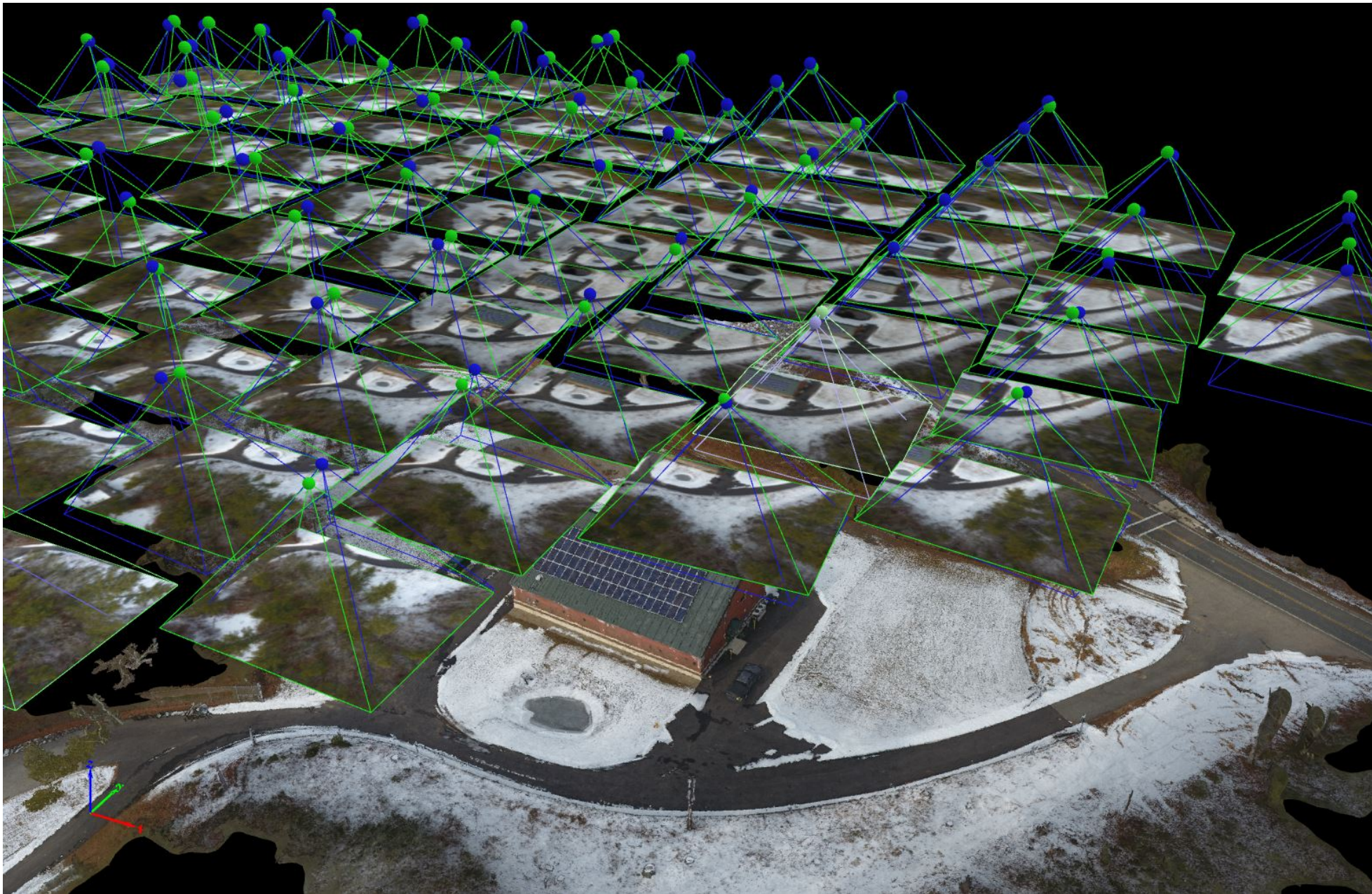


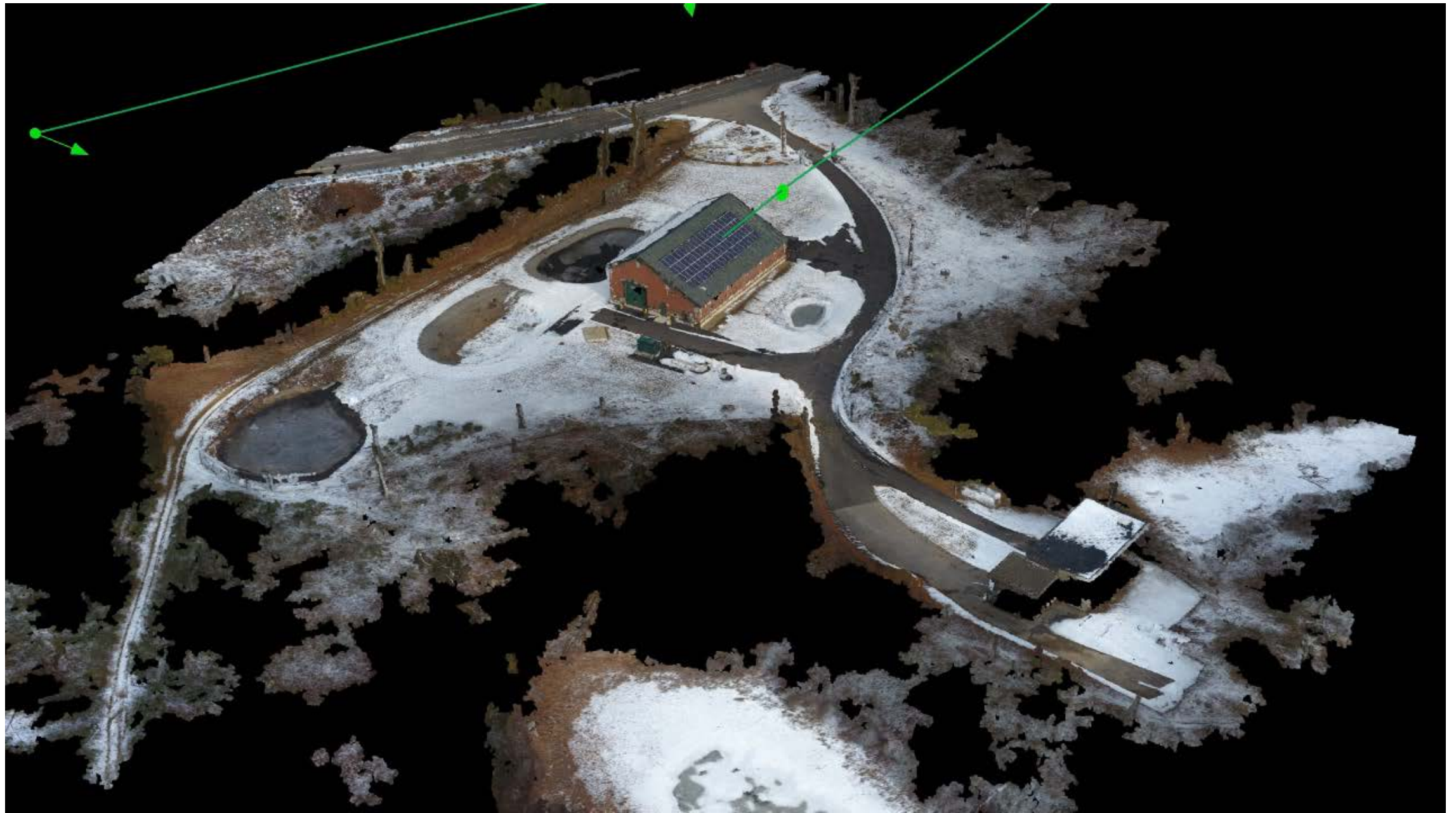


# Autonomous Mapping Capabilities

- Pre-Planned missions
- One-Click take-off to landing
- Manual takeover at any time
- Produce geo-rectified orthomosaics
  - 1 inch/pixel ground resolution (typical)
  - Satellite resolution 3 feet/pixel (typical)
- Produce 3D models
  - Ground truthing required (GCP's)
  - Accuracy can reach 3-5 inches

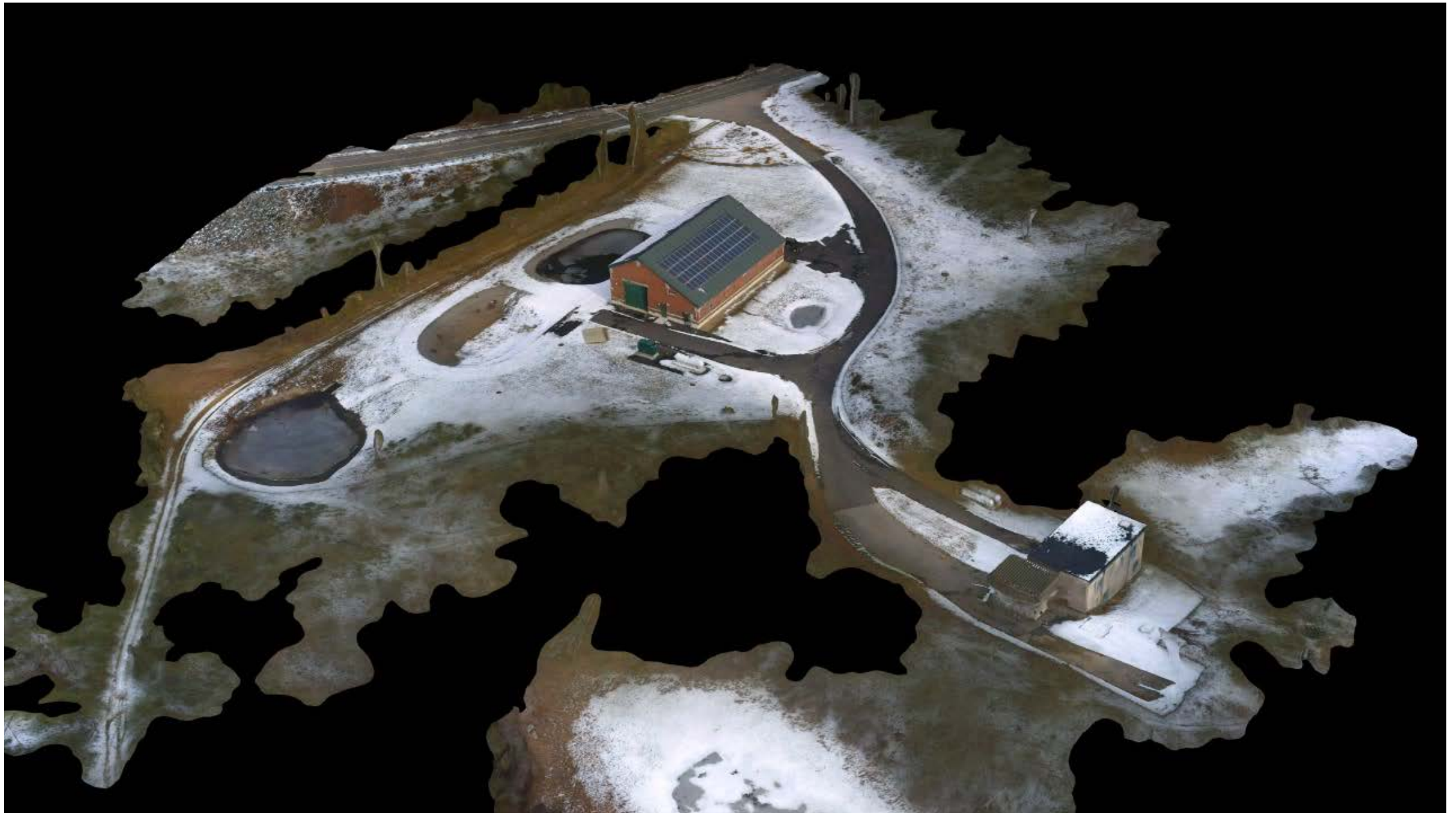








Presented at CEI's Navigating the New Stormwater Permit on March 30, 2017 in Marlborough, MA  
© 2017 Comprehensive Environmental Inc.

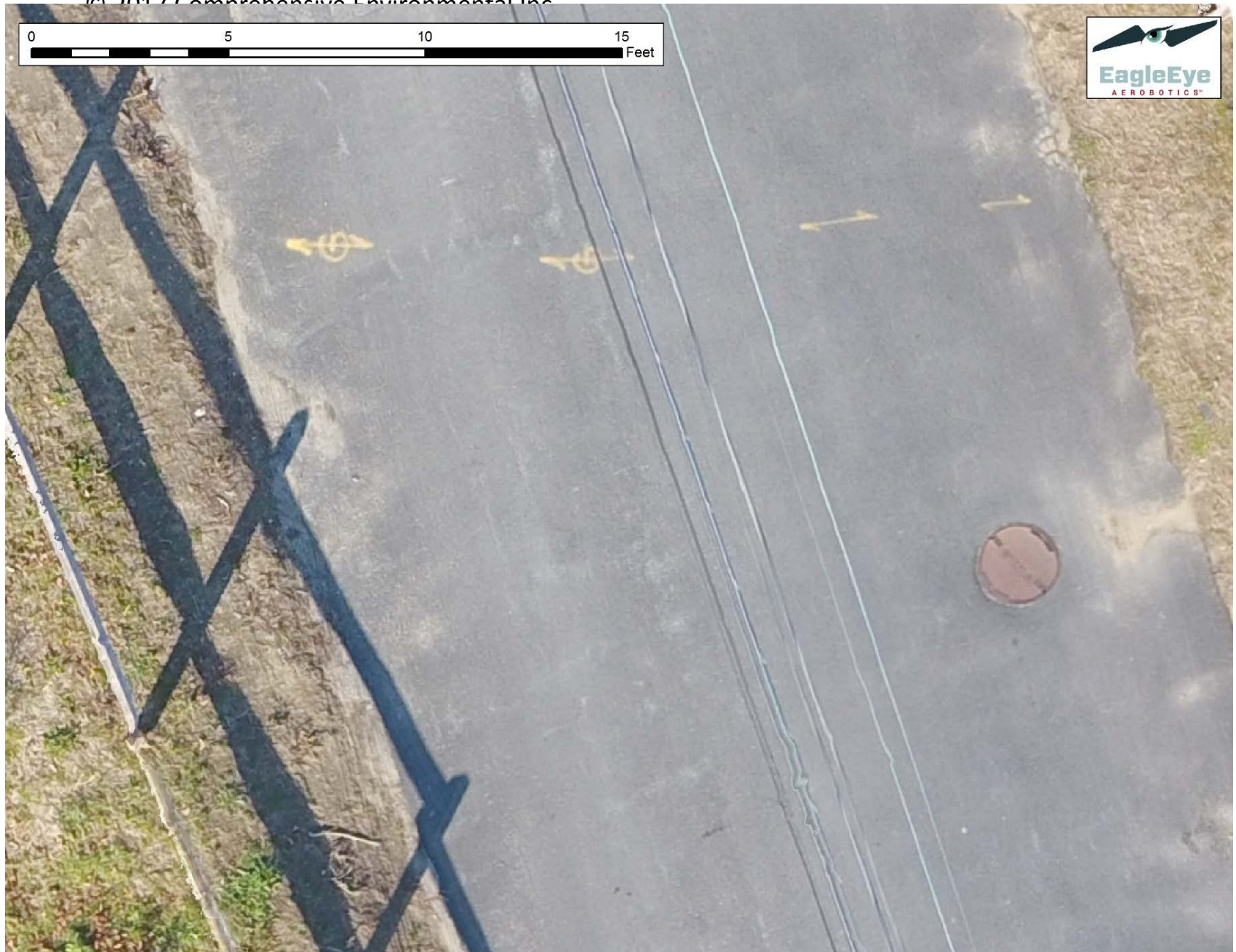








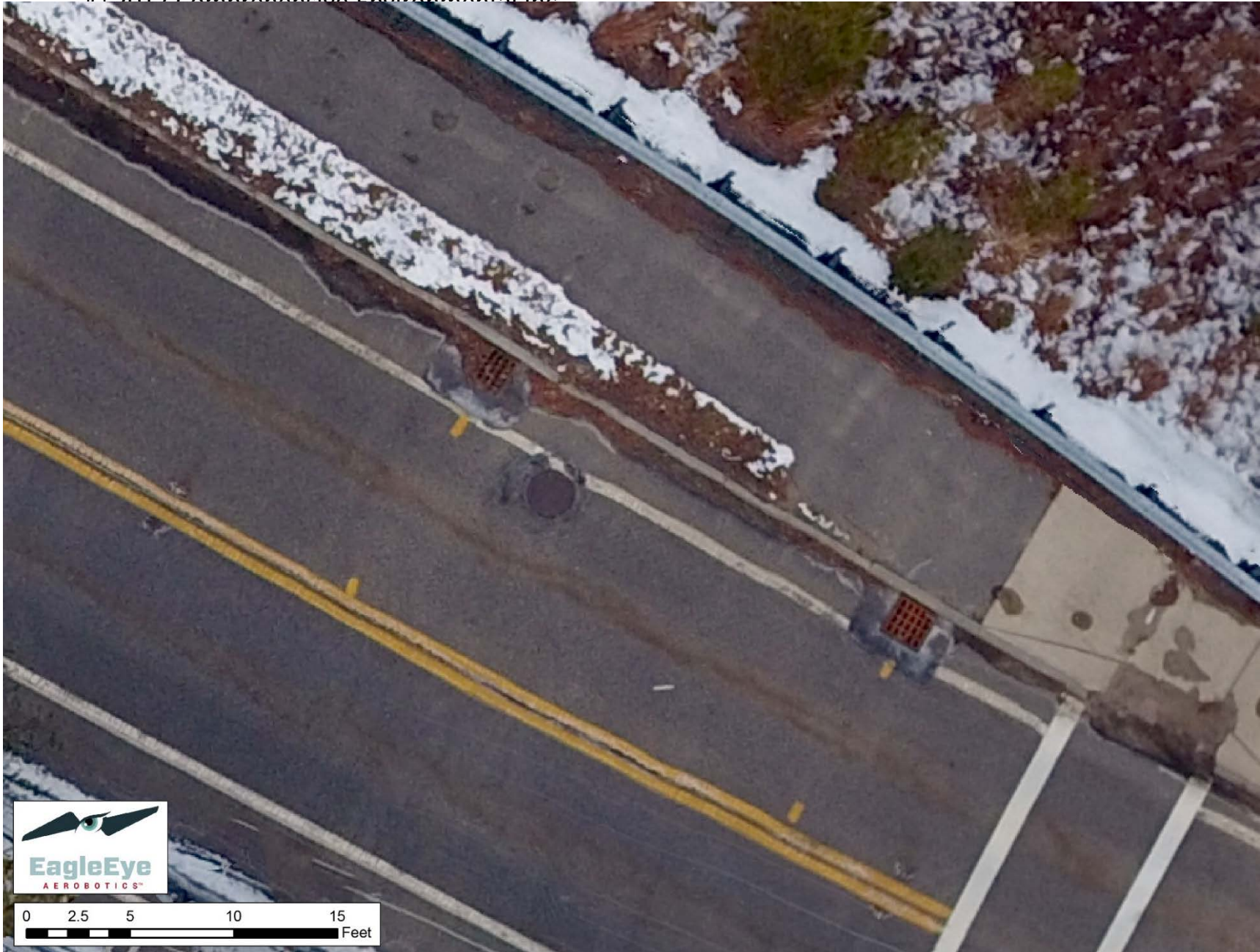


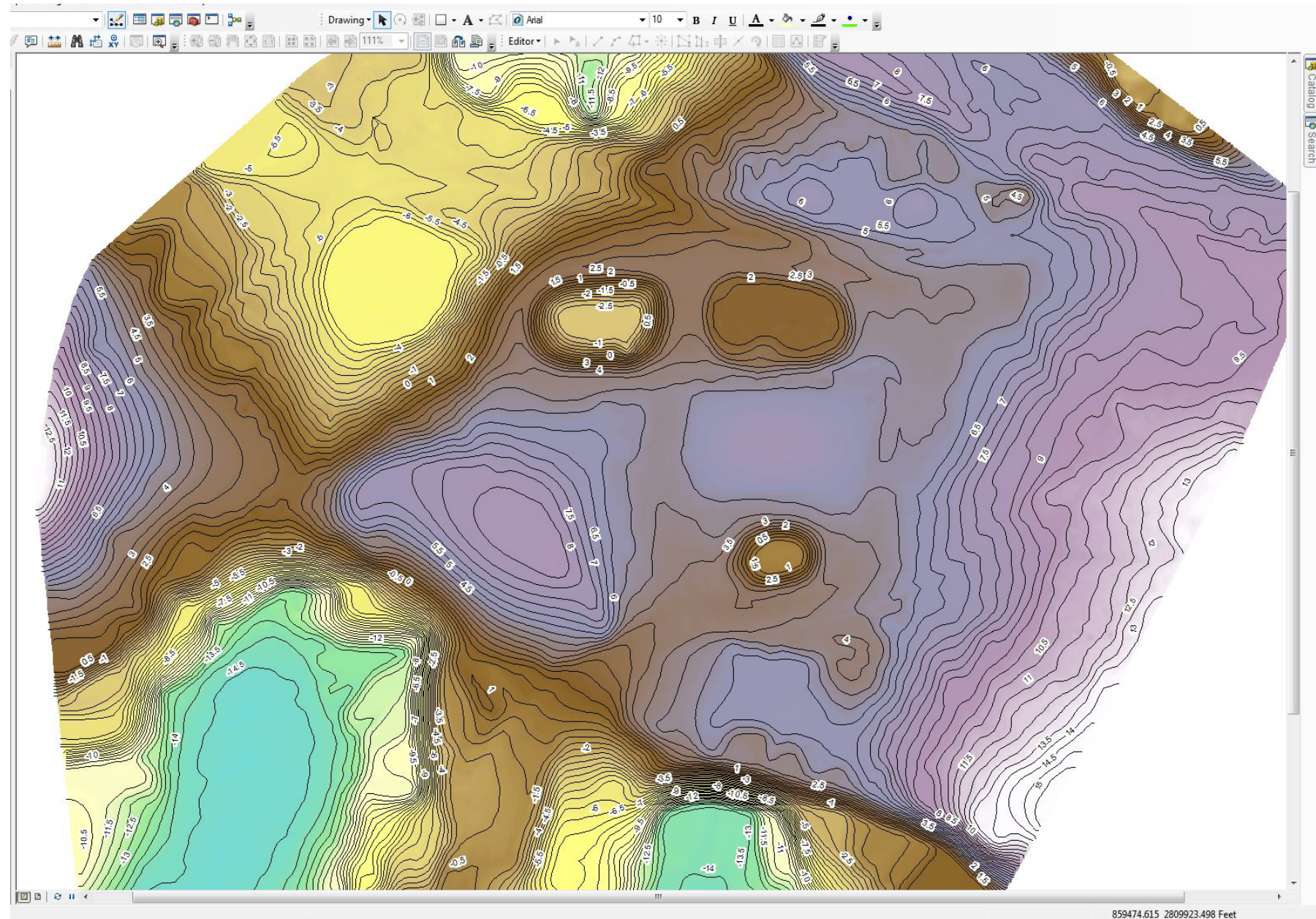


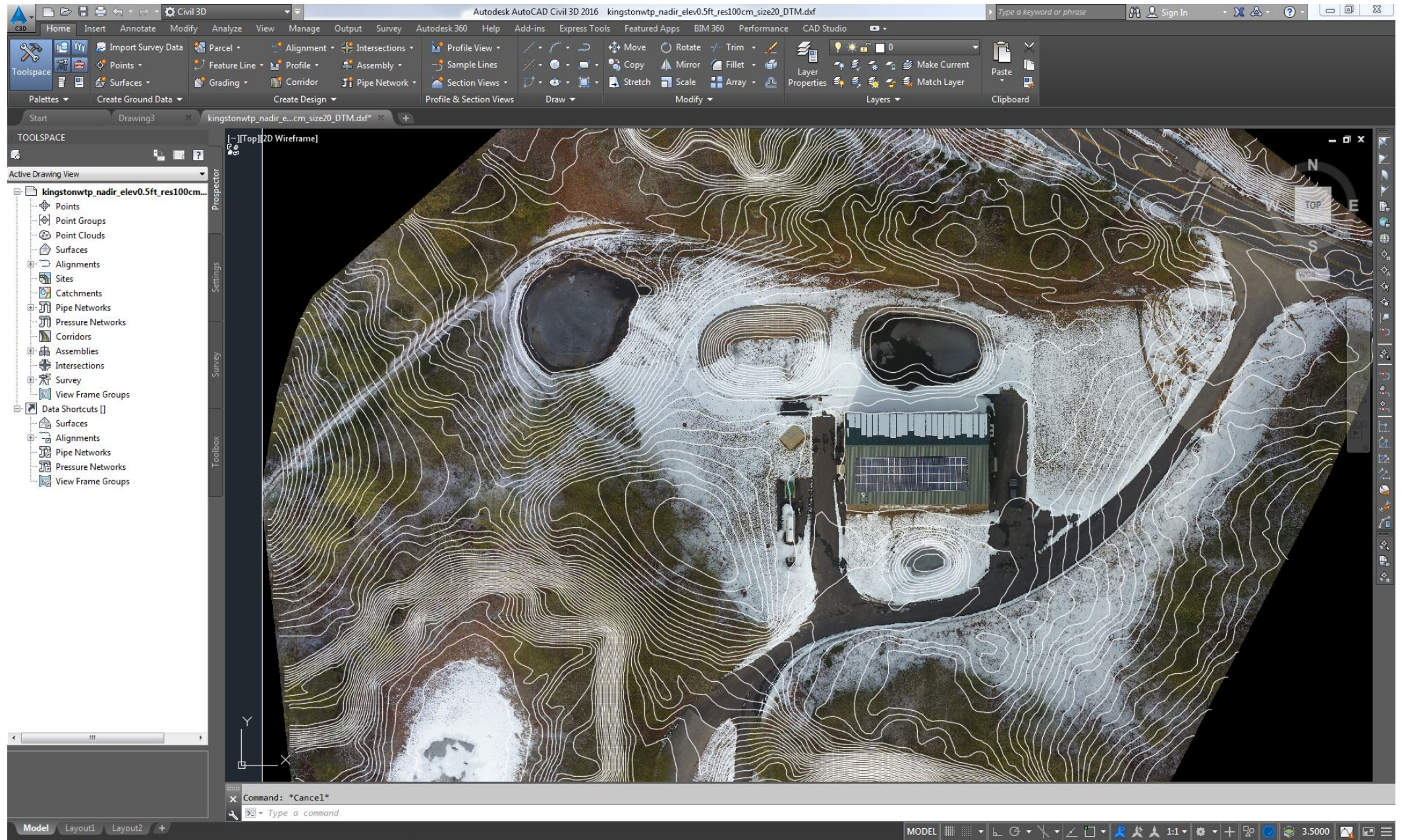


© 2017 Central Environmental Inc.









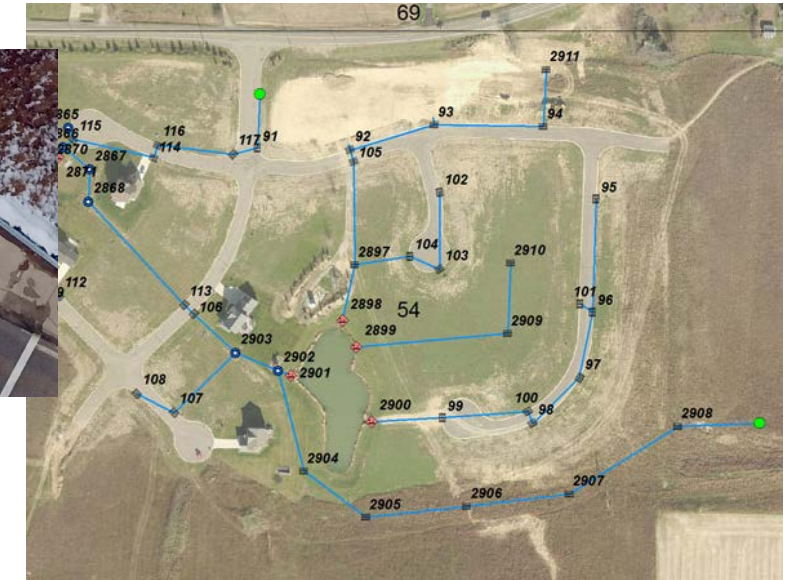


# UASs Flyovers for MS4s

<http://www.accurate-technologies.com/?q=epa-ms4>

## • Overhead Roadway

- Map catch basins and manholes
- Directly tied to GIS/GPS



## • Oblique Waterway

- Find outfalls
- Check condition
- Check if flowing



## • Topography Mapping

- Contributing catchments / delineations



# Other Uses

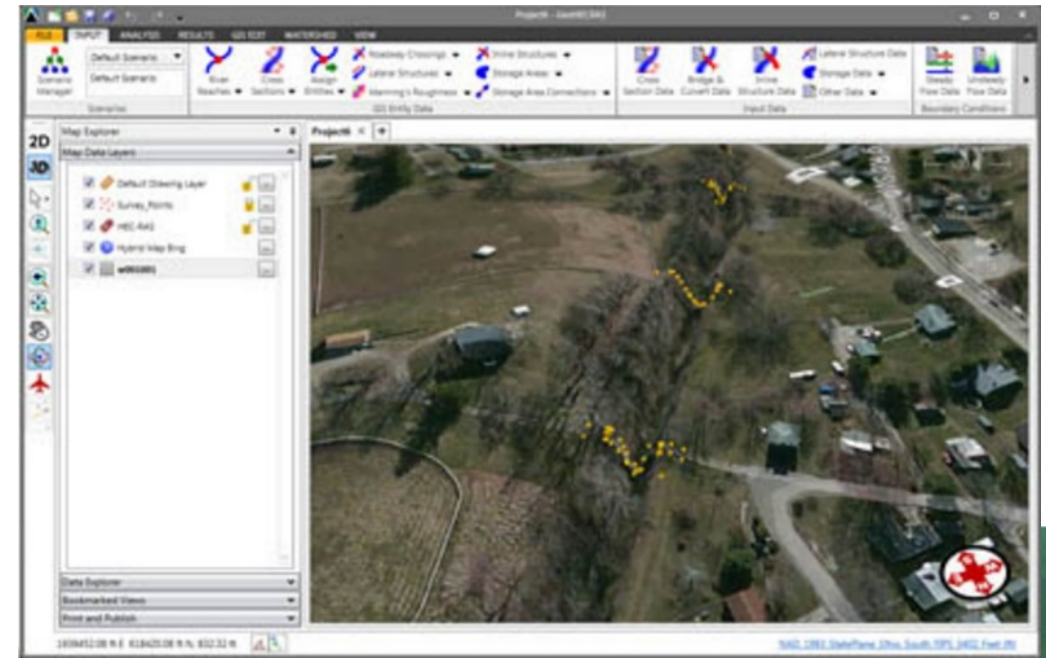
<https://www.civilgeo.com/geo-hec-ras/>

- **Storm System Hydraulic Analysis**

- Floodplain mapping
- Culvert & bridge hydraulic analysis
- GeoHECRAS interface

- **Surface Water Protection**

- Watershed assessment
- Shoreline surveys
- Algal bloom and cyanobacteria monitoring
- Wetland & invasive species delineation



<https://ehp.niehs.nih.gov/122-a206/>



# Questions?



The sky's the limit.