Webinar Training Series

How to Use Drones in Stormwater Management

January 17, 2019

10:30 a.m. – 11:30 a.m. (Eastern)

www.SESWA.org

Today's Presenters

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NPDES Training Institute
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RETENTION POND SERVICES

StormTech
Detention • Retention • Water Quality
An ADS company

StormwaterONE.com
Online Training & Credentials

The Drones Are Coming!

How UAVs are being used to improve Stormwater Management

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January 17, 2019

Presenter:

Robert Gecy

Beaufort County Mapping and Applications

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Aspects of Stormwater Management that benefit from drone use

- Utility Billing Data management
- Construction Inspections
- Post-Construction BMP Inspections
- Damage Assessment
- Presentation tool

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Why drones are important in Stormwater Management

- Efficient way to gather field information
- Accuracy of data supports better decision making
- Allows for timely updates of data
- Excellent tool for conveying information
- Improved quality of inspections
- Pays for itself in time savings, increased revenue

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Beaufort County UAV Program

- Started in 2016
- FAA Public Aircraft Certification 2016
- FAA Part 107 Certification 2018

- Drones currently in use
  - DJI Phantom 3 Pro
  - DJI Inspire 1 v.2

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Types of Drones

- **Consumer / Semi-Professional**

  Phantom 3 & 4 Series (12mp camera)
  Mavic Series (very compact, Mavic 2 Pro now 20mp camera)

- **Professional**

  Phantom 4 Pro (20mp camera, larger 1" image sensor)
  Inspire Series (Interchangeable Cameras, FLIR)

- **Industrial / Enterprise**

  Matrice Series (Hi-Accuracy GPS, Multiple Cameras, FLIR, LIDAR)
  MG Series (Hi-Accuracy GPS, Multiple Cameras, FLIR, LIDAR, multi-rotor hexacopter)

www.dji.com

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Beaufort County UAV Program

- Inspections
  - Facilities
  - New Construction
  - Impervious Surface Data
- Site Contour Information
  - Drainage
- Volumetric Measuring
  - Debris Piles
  - Ponds/Excavation/Mining
- Post Disaster Imagery

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Beaufort County UAV Program

What are the Benefits?

- Real-time up-to-date imagery
- Higher Resolution Images
- Able to reach inaccessible areas
- Time saving
- Cost effective

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Impervious Surface Calculations

- Once a project is completed, UAV can be deployed to capture up-to-date aerial imagery
- Higher Resolution Imagery allows for better surface identification and measurement
  - Current Pictometry - 4 in/pixel (every other year)
  - UAV – 1 to 2 in/pixel
- Calculations are provided earlier in the billing process
- Increased efficiency vs personnel on the ground
- Minimize loss of revenue

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Impervious Surface Calculations

Typical Commercial Parcel with Impervious Surface Areas

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Complex Impervious Surface

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Imagery Comparison

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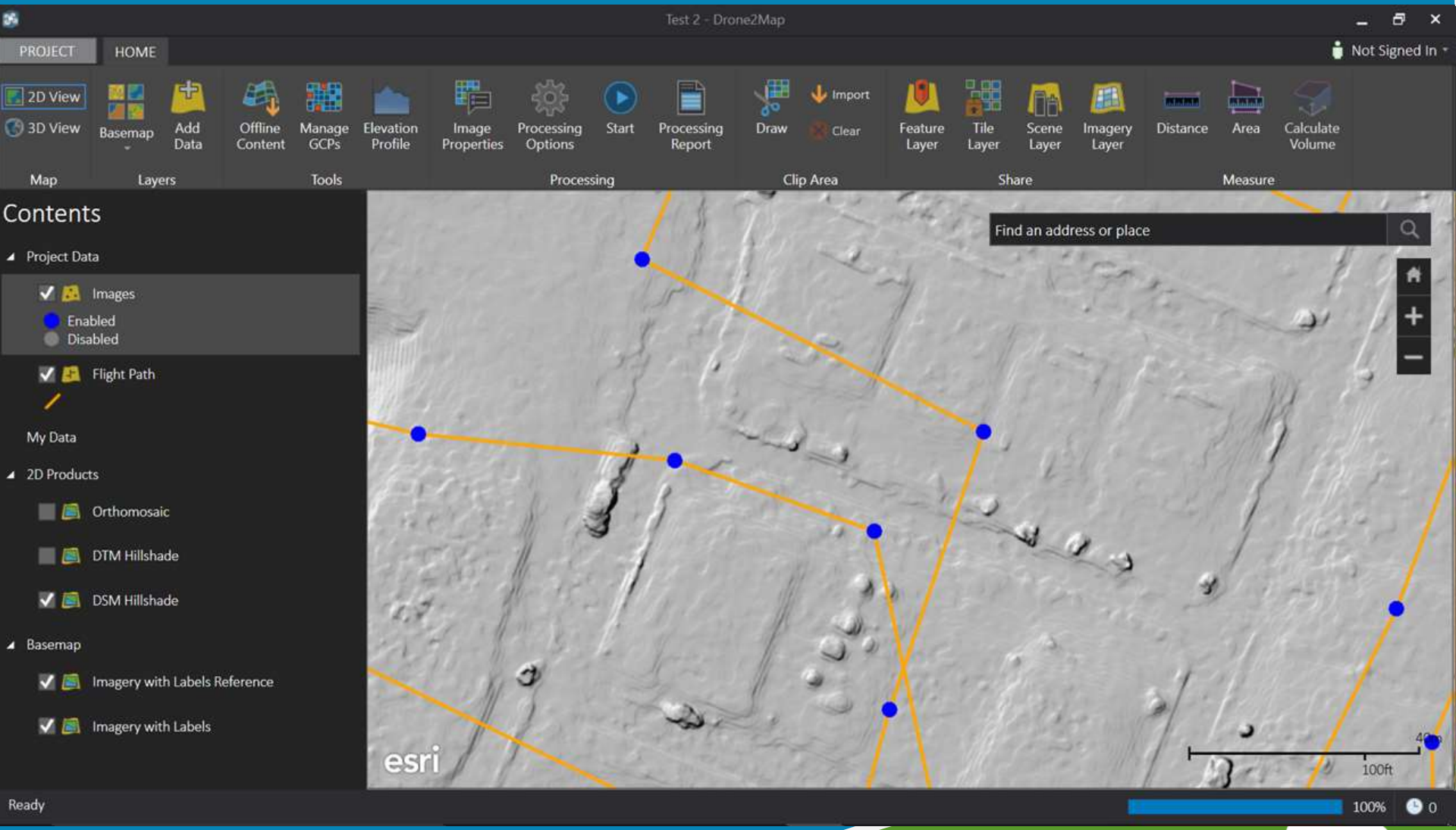
ESRI - Drone2Map



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Post Disaster Survey – Harbor Island

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Post Disaster Survey – Fripp Island

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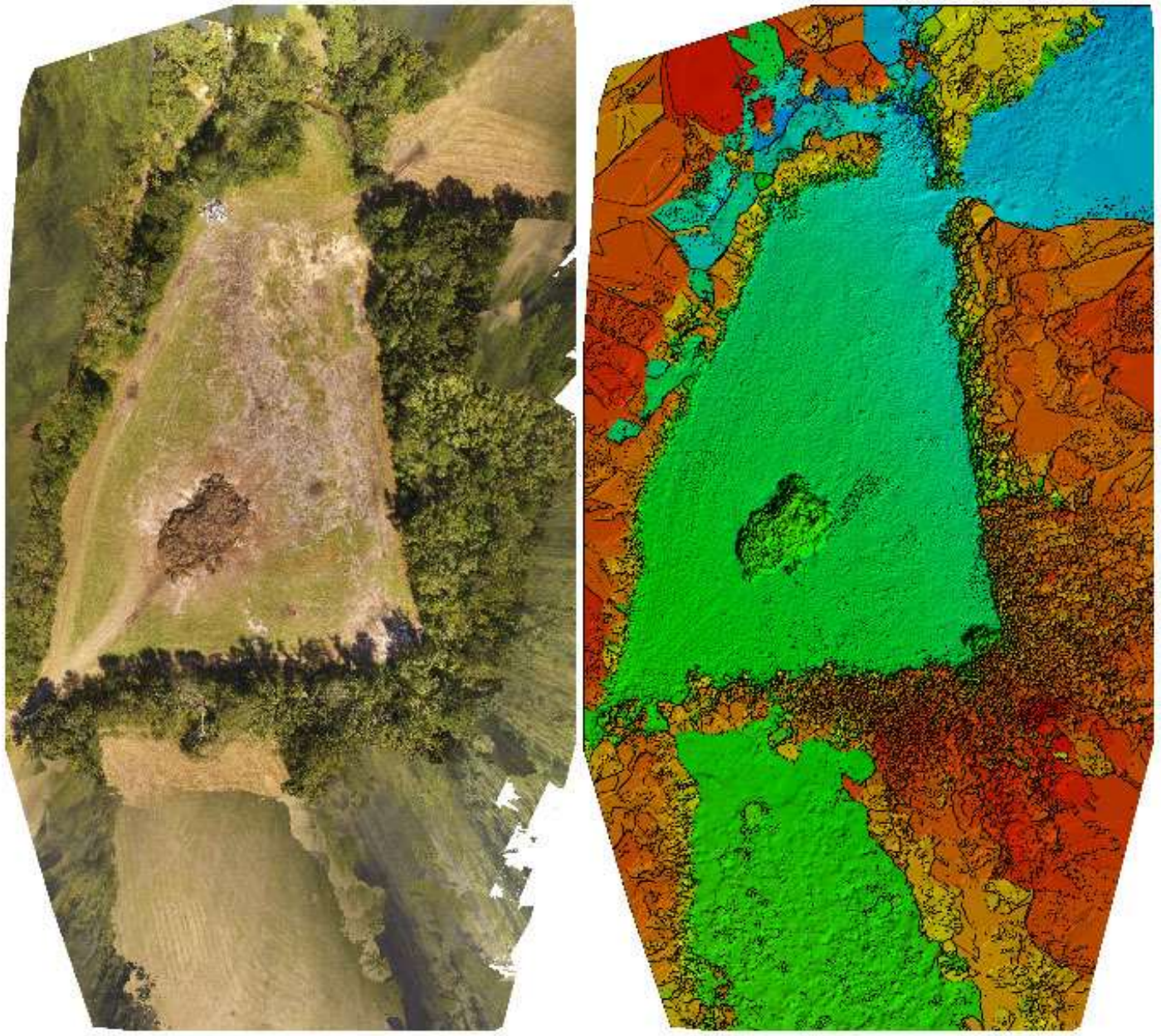
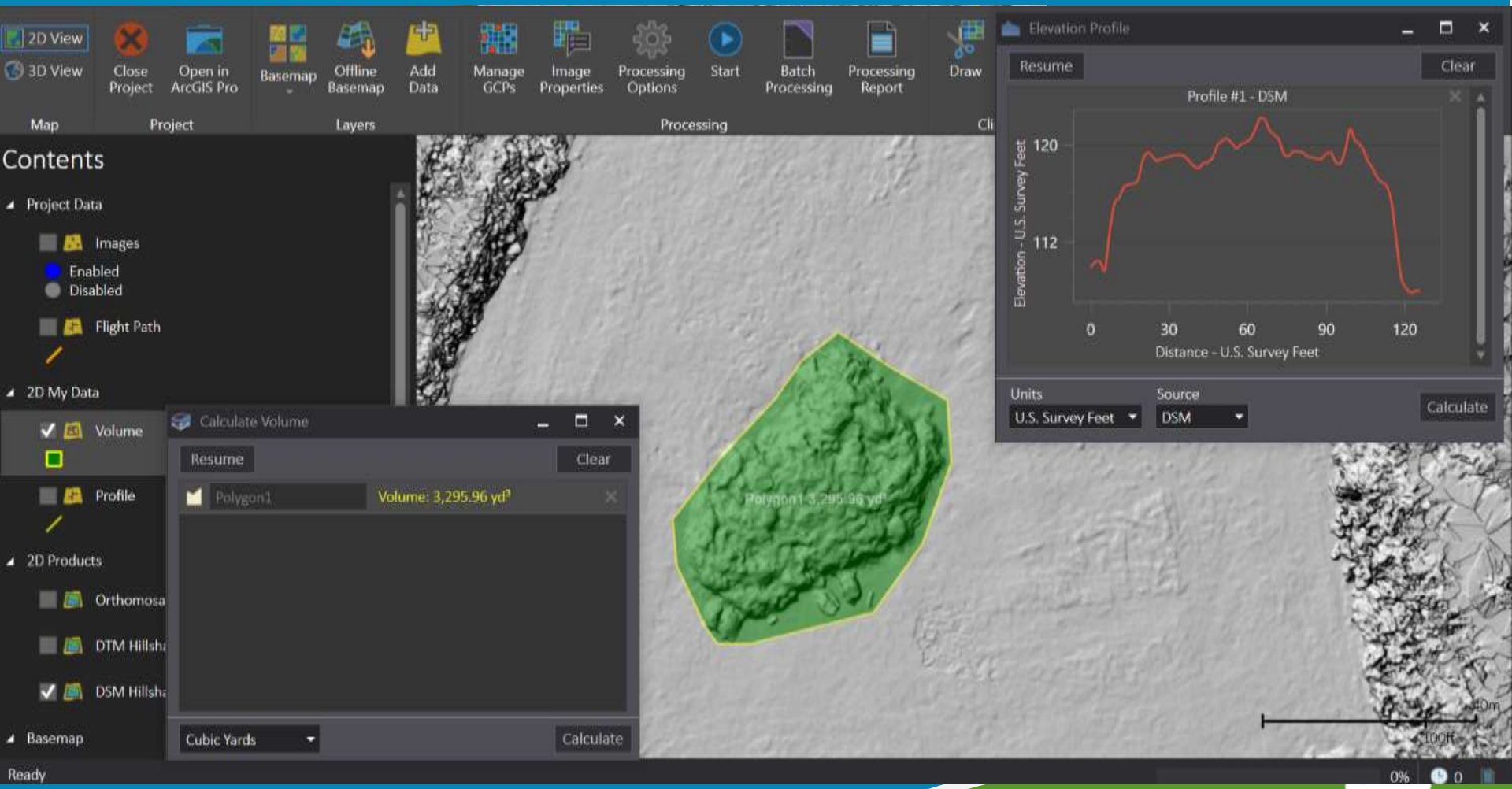


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Resulting DSM (Digital Surface Model)



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DJI Ground Station Pro

- Preflight planning
- Autonomous flight control / hands off
- Calculates time to complete mission
- Number of batteries needed
- Calculates area of survey
- Can create orthomosaic maps in software for viewing on site
- Resulting images are processed using ArcGIS Drone2Map

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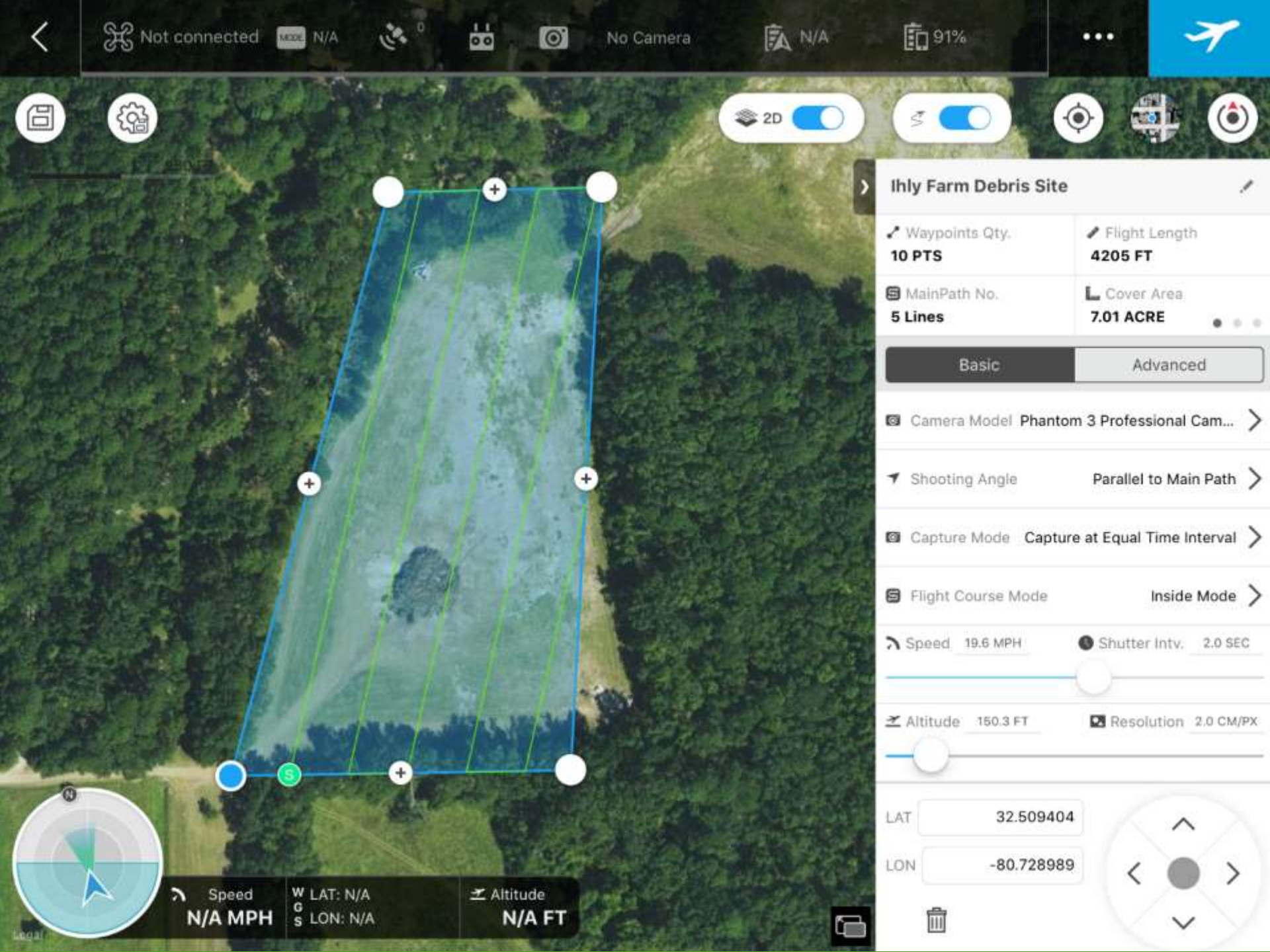
Not connected
N/A
0
No Camera
N/A
91%
2D
Ihly Farm Debris Site
Waypoints Qty.
10 PTS
Flight Length
4205 FT
MainPath No.
5 Lines
Cover Area
7.01 ACRE
Basic
Advanced
Camera Model
Phantom 3 Professional Cam...
Shooting Angle
Parallel to Main Path
Capture Mode
Capture at Equal Time Interval
Flight Course Mode
Inside Mode
Speed
19.6 MPH
Shutter Intv.
2.0 SEC
Altitude
150.3 FT
Resolution
2.0 CM/PX
LAT
32.509404
LON
-80.728989
Speed
N/A MPH
WGS
LAT: N/A
LON: N/A
Altitude
N/A FT

Operating a UAS as a Public Entity

You want to be a UAS Operator

Concept of Operations
Decide what type of mission the UAS will be used for

Know Your Options
Learn which rules meet your operating needs

Civil Operator Rules
(14 CFR part 107)

- Requires UAS registration & operator certification
- Less burdensome to fly immediately, but less flexible airspace access

Public Operator Rules
(14 CFR part 91 with a COA)

- Requires detailed concept of operations and specifies ATC services
- More work up front to get more flexible access to airspace

Pilot-In-Command
Make sure the individual flying the UAS understands the rules and their pilot responsibilities

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FAA Part 107 Rules Summary

- Obtain a Remote Pilot Certificate
- Register UAS
- UAV must weigh less than 55 lbs
- Maximum altitude of 400 feet *
- Maximum ground speed of 100 mph
- Fly within visual-line-of-sight
- Fly only during daylight or civil twilight
- Don't fly directly over people
- Don't fly in controlled airspace near airports without FAA Certificate of Authorization (COA)
- Must have ATC approval to fly within controlled airspace

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Part 107 Airspace Requirements

- Operations in Class G are allowed without air traffic control authorization
- Operations in Class B, C, D airspaces, and Class E airspace designated for airports require authorization from ATC

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BEAUFORT 3 MOA
BEAUFORT 2 MOA
CTC CHARLESTON APP WITHIN 20 NM ON 120.7 306.925
CTC SAVANNAH APP WITHIN 20 NM ON 125.3 377.875
BEAUFORT MCAS/ MERRITT (NBC)
CT 119.05
ATIS 279.525
RIDGELAND (3J1)
SAVANNAH CLASS C
See NOTAMs/Supplement for Class C eff hrs
See NOTAMs/Supplement for Class D eff hrs
MOAS EXCLUDE AIRSPACE 3000' AND BELOW
BEAUFORT 1 MOA
PORT ROYAL SOUND
VPBFE
VPREP
HILTON HEAD ISLAND RCO
ANDERSON
HILTON HEAD (HXD)
CT 118.975
ATIS 121.4
SALTY FARE
MELROSE
SAVANNAH/ HILTON HEAD INTL (SAV)
CT 119.1
ATIS 123.75
VORTAC SAVANNAH
115.95 Ch 106 SAV
MACON
BEAUFORT CO (ARW)
AWOS-3 119.675
MARSH POINT
TOO GOO DOO
YONGES ISLAND
PLUFF MUD
ROCKVILLE
Adams Run
Furman
antenna farm
Grays
Gillisonville
Pineland
Robertville
Coosawhatchie
Beaufort
Port Royal
Broad River
Combahee River
Okatie
Hardeeville
SAVANNAH NATIONAL WILDLIFE REFUGE
Edisto Beach
Bay Point
Harbor Island
Hunting Island
Fripp Island
Pritchards Island
Bull Point
Daufuskie Island
TYBEE NATIONAL WILDLIFE REFUGE
Tybee Roads
jetties
SOUTH CAROLINA
GEORGIA
RUBYS
WARNING AREA EXCLUDES AIRSPACE 3000' AND BELOW
1300 MSL
W-74
W-13
SOUTH FLORIDA CONTROL
ST HELENA SOUND
VR1040
VR1041
IR18
V1

Set safety standards and always fly within the law!

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