Adventures in UAS:
Experiences of a UAS Operator

Presented by:

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- BA in Architectural Engineering from Pennsylvania State University and a Master of Science Degree in Civil Engineering from the University of Maryland
- Certified Construction Manager, Professional Engineer and LEED Professional
- 20 year career in the U.S. Navy
- Founded Navigator CS, LLC in 2006 as a Service Disabled Veteran Owned Small Business (SDVOSB), SWaM Certified

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Presentation Overview

- Why UAS?
- FAA Requirements of users, obtaining FAA exemption and operation
- Implementation and utilization
- Sample project

Why UAS?

- Who we are and what we do
- Inspections: essential for progress monitoring, Quality Control, public safety, put inspectors' lives at risk
- Plus – GIS mapping, Surveys, Ortho mosaic point cloud, NDVI – multi-spectral and other uses
- Solution: unmanned aircraft systems (UAS) – commonly known as "drones"

Requirements for Users of UAS

- Public/Government entities
  - Obtain Certificate of Waiver or Authorization (COA)
- Civil/Non-Government entities flying for fun/recreation
  - Think Radio Control Aircraft - Follow safety guidelines
- Civil/Non-Government entities flying for business or commercial profit
  - FAA exemption via Section 333
  - Register aircraft
  - FAA COA

Obtaining FAA Exemption via Section 333

- Review 14 CFR
- Identify sections that cannot be met due to the nature of the UAS
- Prepare and file petition seeking exemption from identified sections
- Then wait…
  - FAA received 1,125 petitions in 2014 and about 6,500 petitions by November 10, 2015
  - 2,256 petitions granted as of November 10, 2015

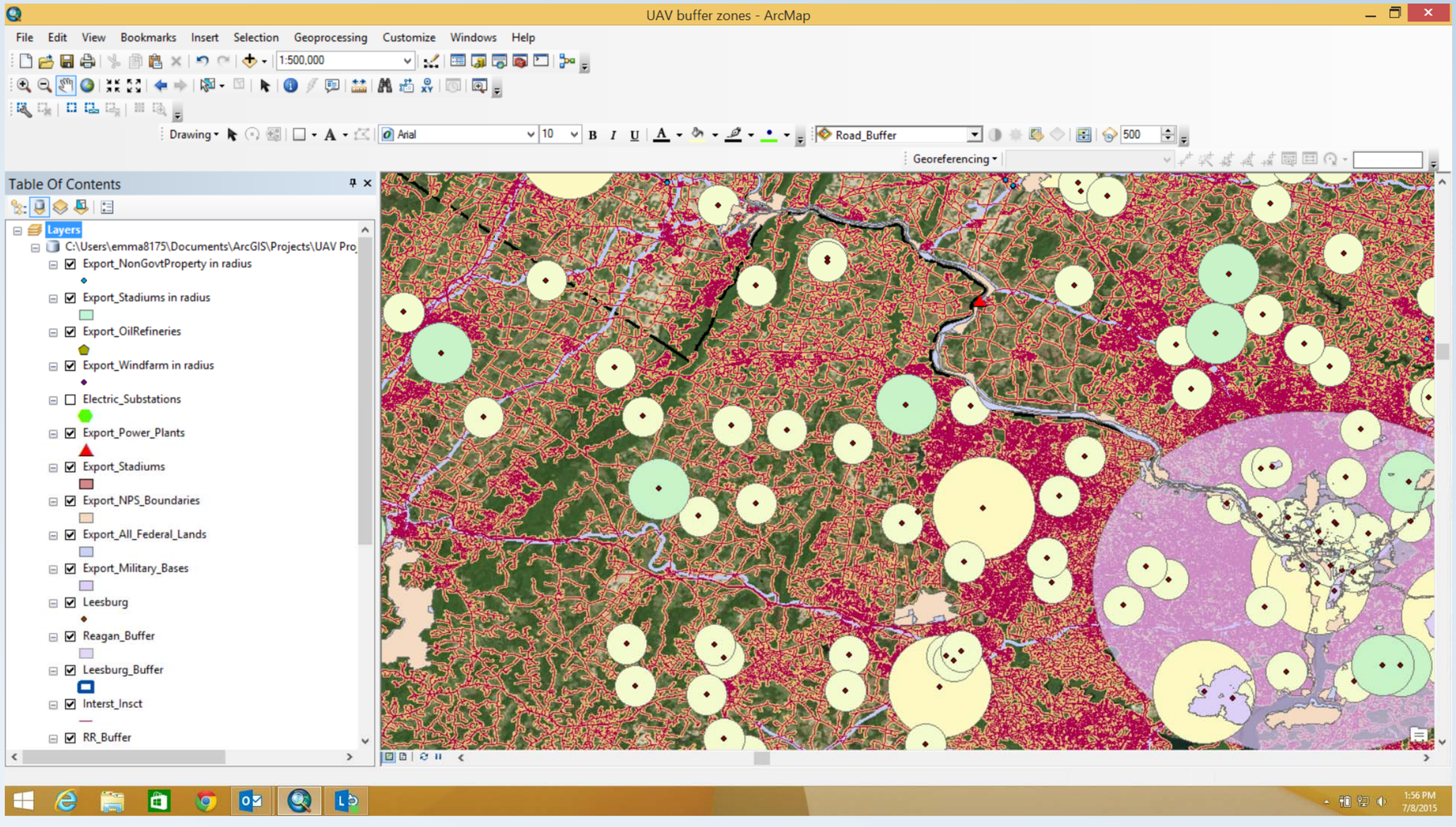
Surprise!!!! Exemption and COA are very restrictive!!!

- UAS' weight ≤ 55 lbs
- Licensed pilot and Visual Observer (VO)
- Only daytime flights
- Maintain Visual Line of Sight (VLOS) at all times during flight
- Max. altitude: 400 ft; 200 ft with "standard" COA
- No flying within 5 NM of airports with control towers (less for other airports)
- No flying in NOTAM restricted areas, National Parks, Military and Federal Facilities & more…

More Restrictions and Requirements…

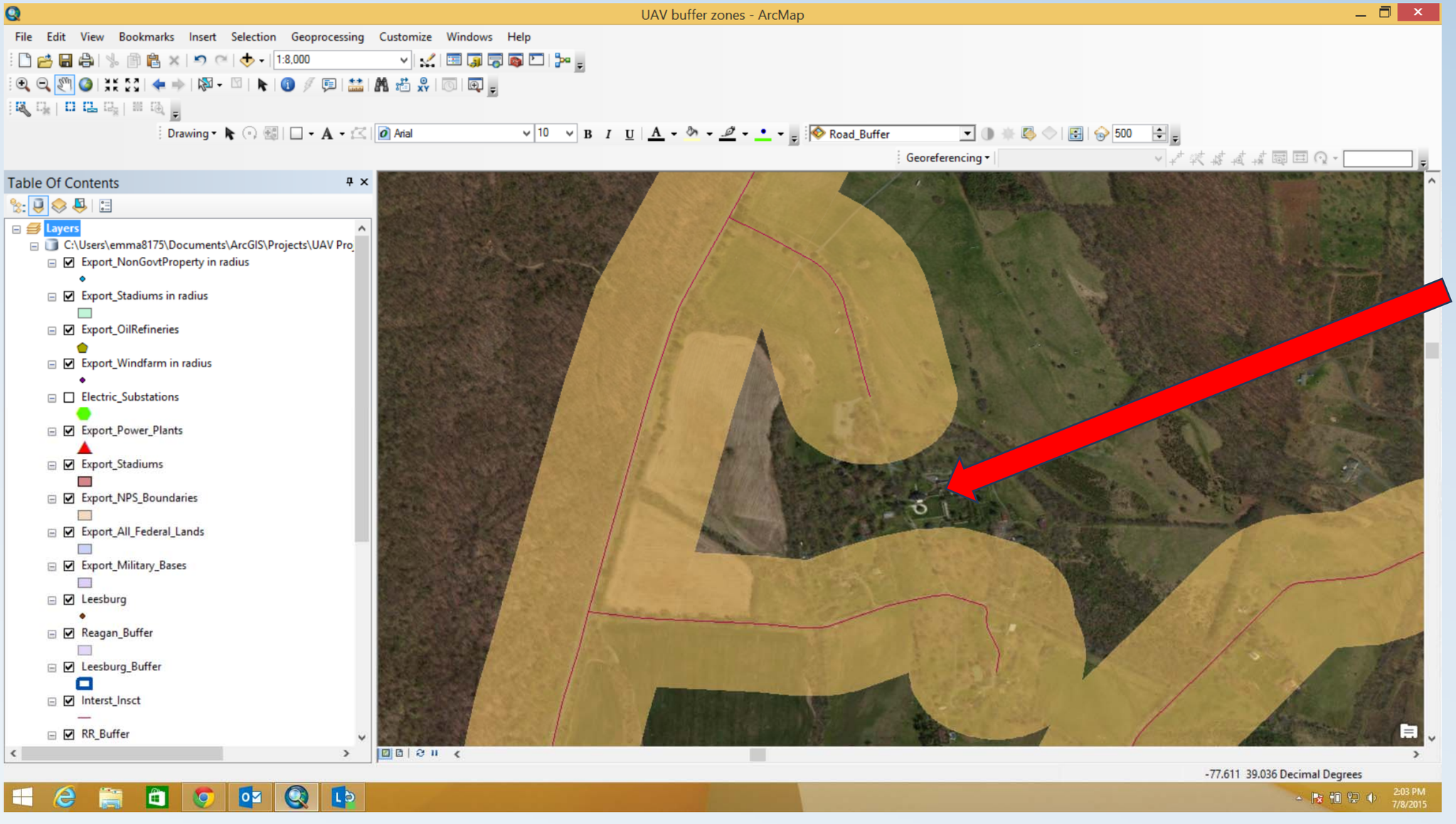
- Obtain permission from property owner and owner(s) of adjacent property within 500 ft of flight path
- Permission of participants
- Initiate avoidance maneuvers
- Stop flight if there are safety risks
- No flying over persons not be operated less than 500 ft below or less than 2,000 feet horizontally from a cloud
- Visual and unassisted verbal communication between PIC and VO

Exemption and COA are Very Restrictive



- Northern VA 2015
- Restrictions in Arcmap
- You can only fly in the green space!

Area around Oatlands, VA



Oatlands

Requirement for pilot and operator/observer

Developing the Technical Capability

- Select and purchase UAS and components
- Obtain liability insurance
- Learn to fly and to operate the camera
- Develop processes, procedures, forms, agreements, waivers, checklists
- Train pilot, visual observer, camera operator
- Process aerial images
- Develop project report

Reporting requirements

- Log all flights:
  - Date, pilot, location (city/name, longitude, latitude), type of activity, start/end times, damage, equipment malfunction, lost link events
- File NOTAM for all flights
- File monthly report with FAA, even if there were no flights
- Report any incident, accident, or flight operation that transgresses the lateral or vertical boundaries of the operational area of the COA to the FAA's UAS Integration Office within 24 hours.
- Report accidents to the National Transportation Safety Board (NTSB)

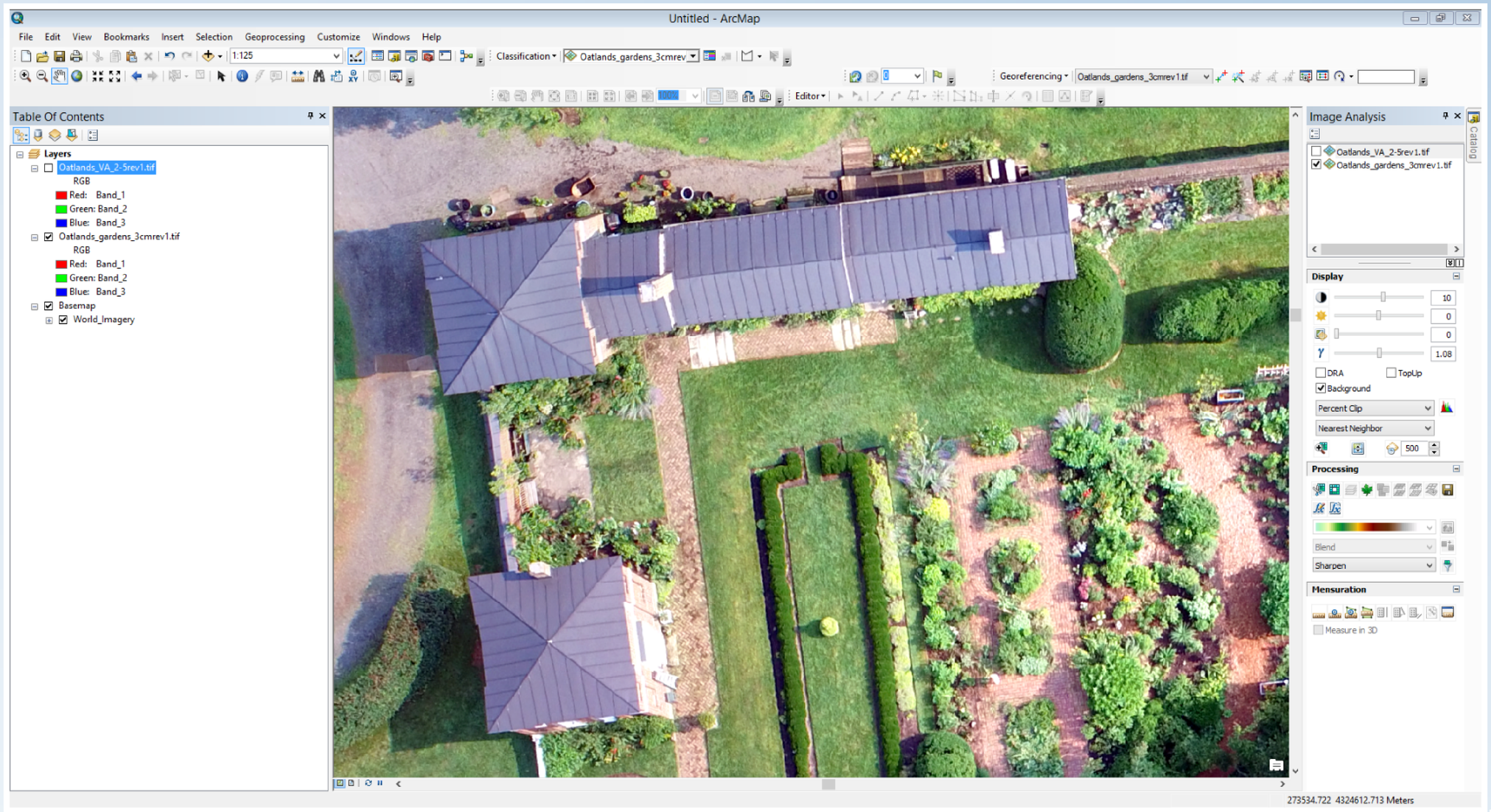
Lessons Learned

- Understand customer's expected outcomes
- Challenge: meet project objectives within FAA restrictions and UAS limitations, within time and cost constraints
- Big administrative process
- UAS is not a toy, but a serious engineering tool

Sample Project: working with Esri and Icaros

- Objective: develop GIS model and software tools
- Location: Oatlands Historic Plantation, Leesburg, VA
- Flights: multiple flights some with camera at nadir others at oblique
- Outcome: Orthographically correct photo mosaic with accurate GIS data and 3-D model of mansion
- Plus: Great stills and video

Sample Data: 3cm GSD ortho mosaic



[Esri Project Video]

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Questions?