

Drones in Conservation Planning

Wilkes SWCD





What is a Drone?

- Sometimes referred to as UAS (Unmanned Aerial System) or UAV (Unmanned Aerial Vehicle)
- Controlled remotely through software-controlled flight plans or manually & used to collect real-time images and is equipped with sensors and GPS for mapping and/or surveying



Fixed Wing



Multicopter



Single Rotor

DJI Mavic Pro

- Mavic Pro 2 now available
- Foldable
- 27 mins flight time
- 4 miles distance
- JPEG, MP4
- Micro SD Card
- ~\$1500



DJI Phantom 3

- Phantom 4
- Better Quality Images
- Less flight time (23 mins)
- JPEG, MP4
- Micro SD Card
- ~\$2200



Advantages of a Drone

- Bird's eye view
- Real-time images for planning
- More accurate, whole farm planning
- Safety
- Saves time
- Saves expense, even earn money using it
- Reduces Biosecurity Risks



Did you know that 95 million workdays per year are lost due to slip-and-fall injuries? Accidents involving slips, trips and falls send 9 million people to the hospital each year and are a leading cause of workers' compensation claims, costing an average of \$20,000 per accident.



Who Can Fly a Drone?

For Recreational Use: Anyone

**For Commercial and Government Use
(e.g. Soil & Water Conservation District):
Must be a Certified Remote Pilot**

- FAA Part 107 Aeronautical Knowledge Exam
 - \$150
 - Must be retaken every 2 years
 - 60 Questions in 2 hours
- NC DOT Commercial and Government Exam
 - Free, online



Before Flying

1. Landowner must sign Drone Flight Permission Form
2. Check the Airspace (BeforeUFLy, Weather Conditions)
 - No flying over 400 ft!
 - Drone must be in line of sight at ALL TIMES.
 - Do not fly in Restricted Air Space
 - Do not fly within 5 miles of an airport
 - Do not take off or land in a state park
 - Do not fly over a prison or within a horizontal distance of 500 ft
1. PreFlight Planning (for mapping or surveying)



Drone Uses



- Mapping
- Forestry Planning
- Stream Assessment for Restoration and Brush Management
- Site Evaluation (Livestock Watering Tanks)
- Erosion Source Assessment
- Technical Assistance
- Construction Checks
- Elevation Maps for Drainage
- Crop and Livestock Management (Orchards)
- Funding Justification
- Promotional/Educational

Forestry

Before a Drone...



Forestry

With a Drone!



Composters

Construction Process Documentation



Whole Farm Planning

Construction Checks



Orchards/Specialty Crops



“I didn’t realize I had so many holes!”

~ Farmer



Advertisement Services for Marketing

Obstacle Avoidance



Streambanks



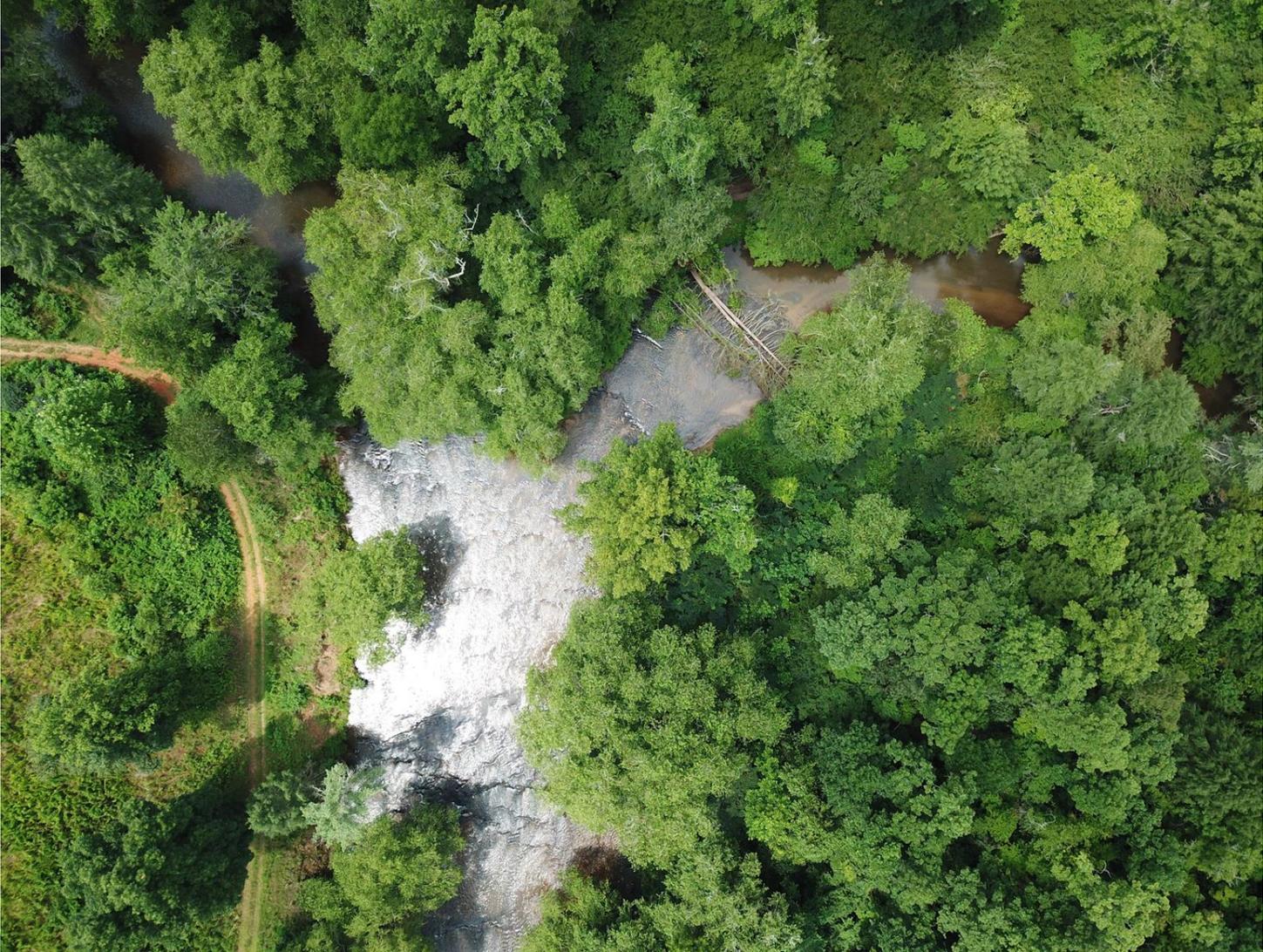
Streambanks

Storm Flow



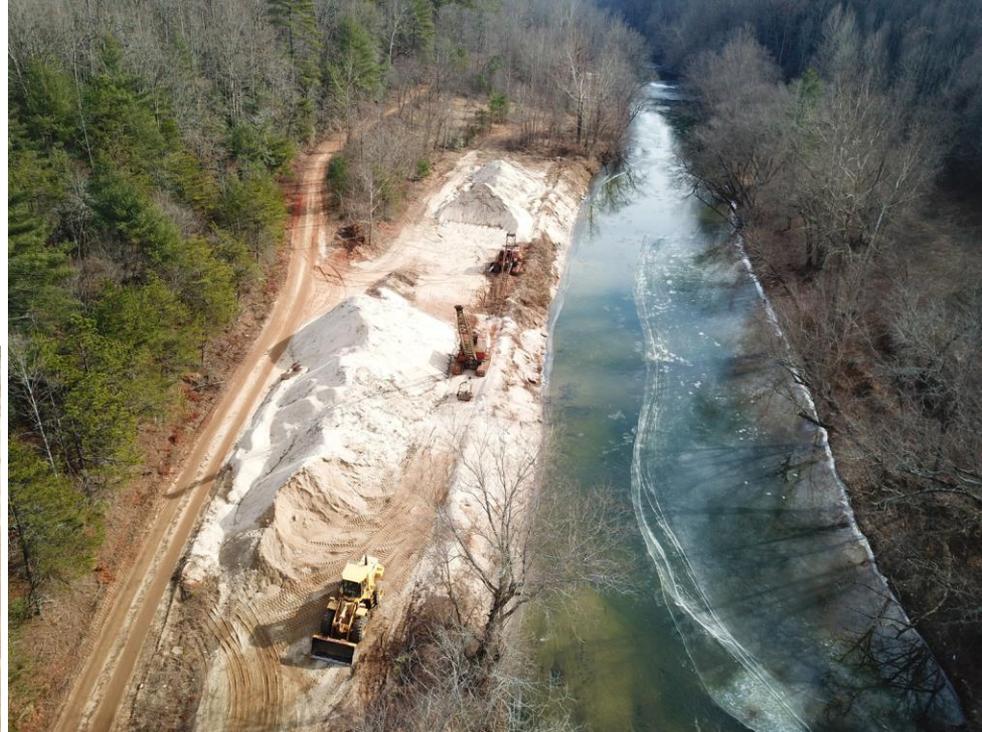
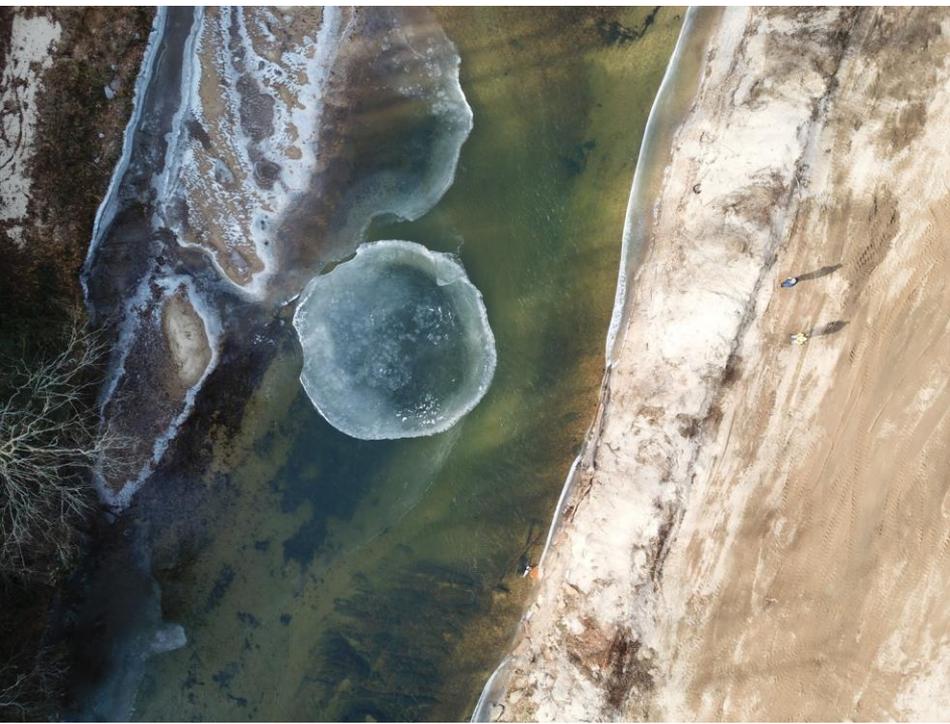






















Wastewater Treatment Plant

- Return to Home at 15% Battery
- Great service and/or additional income source
- Opportunity to help municipalities/local units of government



Other Uses

- Christmas Tree Farming
- Invasive Species



Mapping with a Drone

You need 2 Softwares:

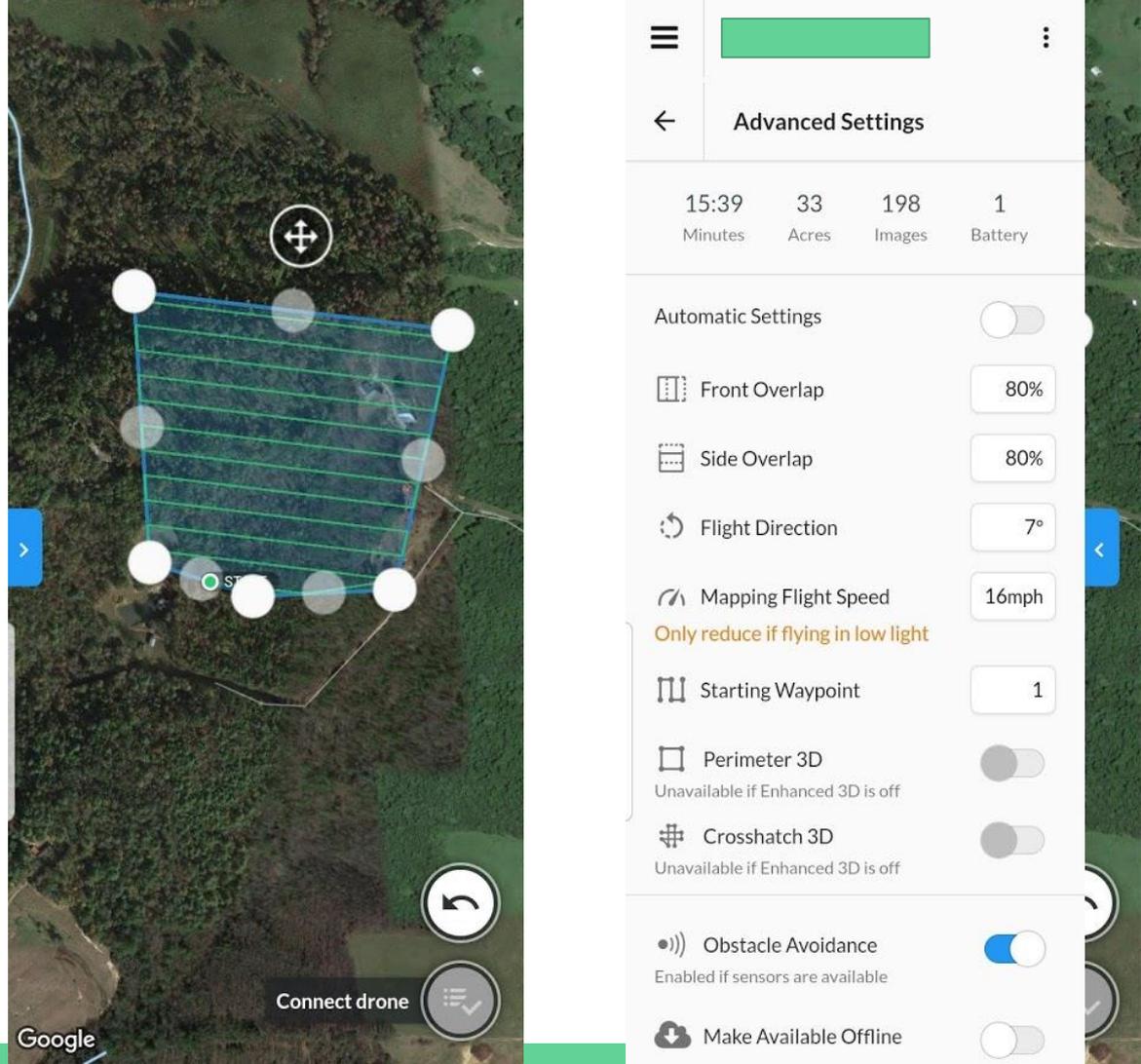
- One to take the pictures with drone (on your phone/Control Station)
 - Normally Free
 - **DroneDeploy**, Pix4D
- One to Stitch the Images together (on the computer)
 - Expensive
 - **DroneMapper**, ESRI's Drone2Map
 - Image Composite Editor (Free to sew the pictures together, but not georeferenced)



DroneDeploy

Flight Planning via Phone

- Remove SD immediately after flight
- Try to do use a single battery per flight
- Still learning best overlap
- Camera at 90 degrees



DroneMapper

Stitching Images via Computer

The screenshot displays the DroneMapper RAPID v1.7 interface. The main map area shows a flight path over a terrain with labels for 'Blue Ridge' and 'Appalachian Mountains'. A grid of green circular flight points is overlaid on the map. The interface includes a 'Project Data' panel on the left, a 'Project Imagery' table on the right, and a 'DroneMapper Processing' section at the bottom with three numbered tabs: 1. PREVIEW, 2. DIGITAL ELEVATION MODEL, and 3. ORTHOMOSAIC or MESH. Each tab has a table of settings and a play button. The 'PREVIEW' tab shows settings for EXIF, FEATURES, ALIGN, GEO, and TIME. The 'DIGITAL ELEVATION MODEL' tab shows settings for DEM, GEO, and TIME. The 'ORTHOMOSAIC or MESH' tab shows settings for ORTHO, GEO, and TIME. A 'Tasks Processing' section at the bottom right shows a progress indicator and a '0' count.

Project Imagery

Name	Date	Latitude	Longitude	Elevation
DJI_0006...	1/28/202...	36.32777...	-81.0413...	499.677
DJI_0007...	1/28/202...	36.32779...	-81.0416...	500.377
DJI_0008...	1/28/202...	36.32782...	-81.0418...	500.377
DJI_0009...	1/28/202...	36.32784...	-81.0421...	500.277
DJI_0010...	1/28/202...	36.32787...	-81.0423...	500.377
DJI_0011...	1/28/202...	36.32789...	-81.0425...	500.377
DJI_0012...	1/28/202...	36.32791...	-81.0428...	500.277
DJI_0013...	1/28/202...	36.32793...	-81.0430...	500.377
DJI_0014...	1/28/202...	36.32796...	-81.0432...	500.377

DroneMapper Processing

1 PREVIEW

EXIF	<input checked="" type="checkbox"/>
FEATURES	<input checked="" type="checkbox"/>
ALIGN	<input checked="" type="checkbox"/>
GEO	<input checked="" type="checkbox"/>
TIME	NA

2 DIGITAL ELEVATION MODEL

DEM	<input type="checkbox"/>
GEO	<input type="checkbox"/>
TIME	NA

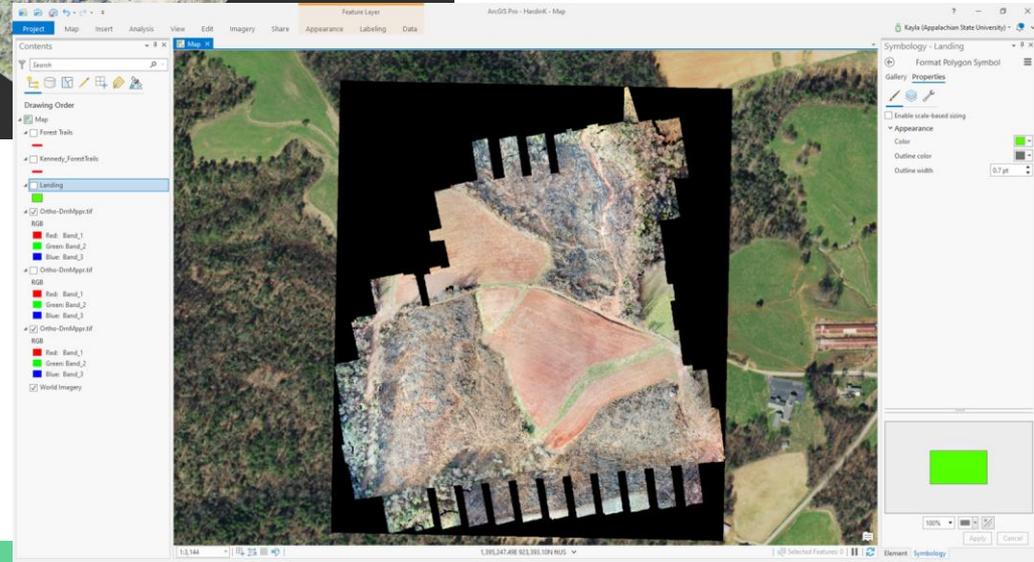
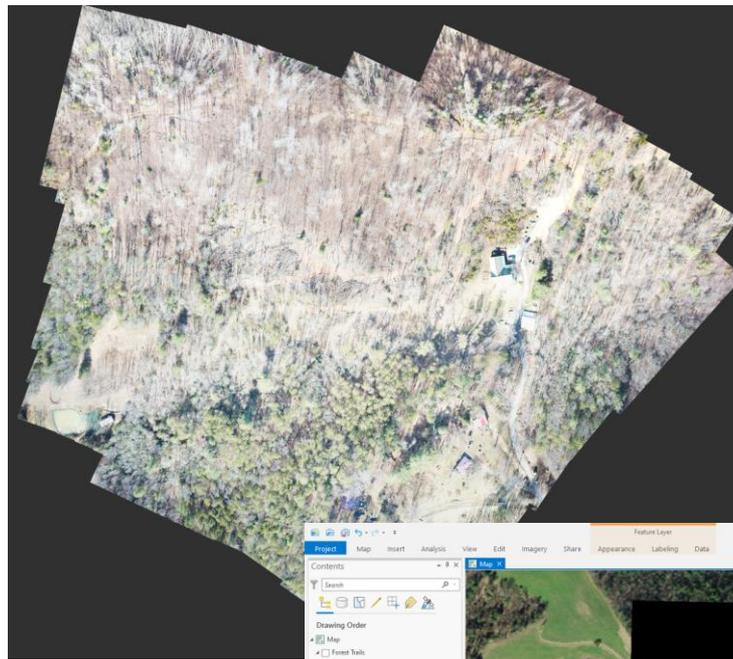
3 ORTHOMOSAIC or MESH

ORTHO	<input type="checkbox"/>
GEO	<input type="checkbox"/>
TIME	NA

00:00:00
Native GSD: 0 cm/px
Overnight Mode
Tasks Processing
0

GeoTIFF

- Can pull into ArcMap for Mapping
- Use Drone Images to mark practices
- Remove Drone Images

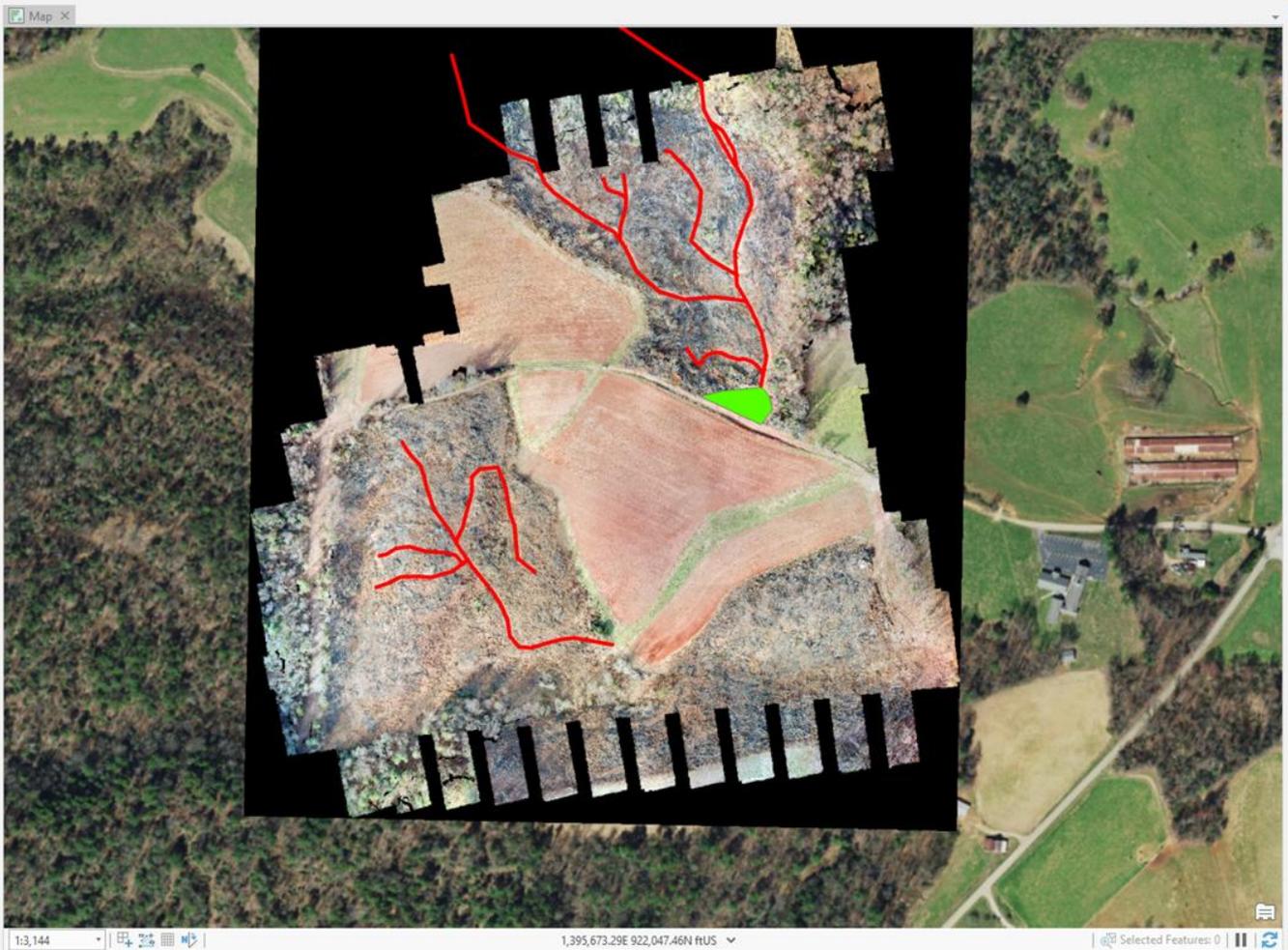


Contents

Search

Drawing Order

- Map
- Forest Trails
- Kennedy_ForestTrails
- Landing**
- Ortho-DrmMppr.tif
RGB
Red: Band_1
Green: Band_2
Blue: Band_3
- Ortho-DrmMppr.tif
RGB
Red: Band_1
Green: Band_2
Blue: Band_3
- Ortho-DrmMppr.tif
RGB
Red: Band_1
Green: Band_2
Blue: Band_3
- World Imagery



Symbology - Landing

Format Polygon Symbol

Gallery Properties

Enable scale-based sizing

Appearance

Color:

Outline color:

Outline width: 0.7 pt

100%

Apply Cancel

Conservation Plan Map

Date: 12/17/2019

District: Wilkes SWCD
Approximate Acres: 102.8

Field Office: Wilkes FO
Agency: USDA-NRCS
Assisted By: Kayla Mounce and BJ Cook



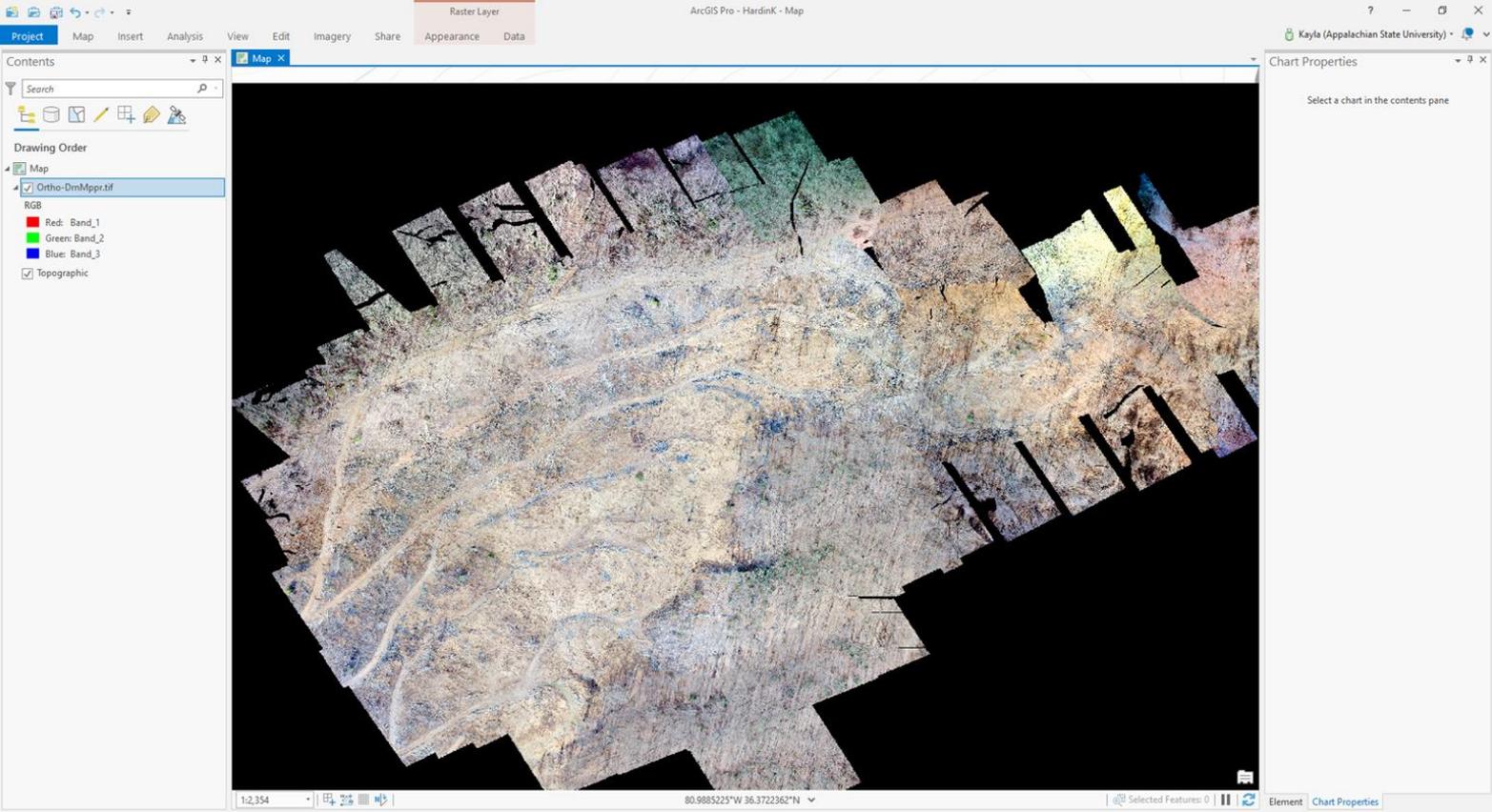
Copyright © 2018 Esri, 9301 Linda, N.A., 95131, USA. USDA-NRCS/NRCS

Prepared with assistance from USDA-Natural Resources Conservation Service

-  Critical Area Planting
-  Forestry Trails and Landings

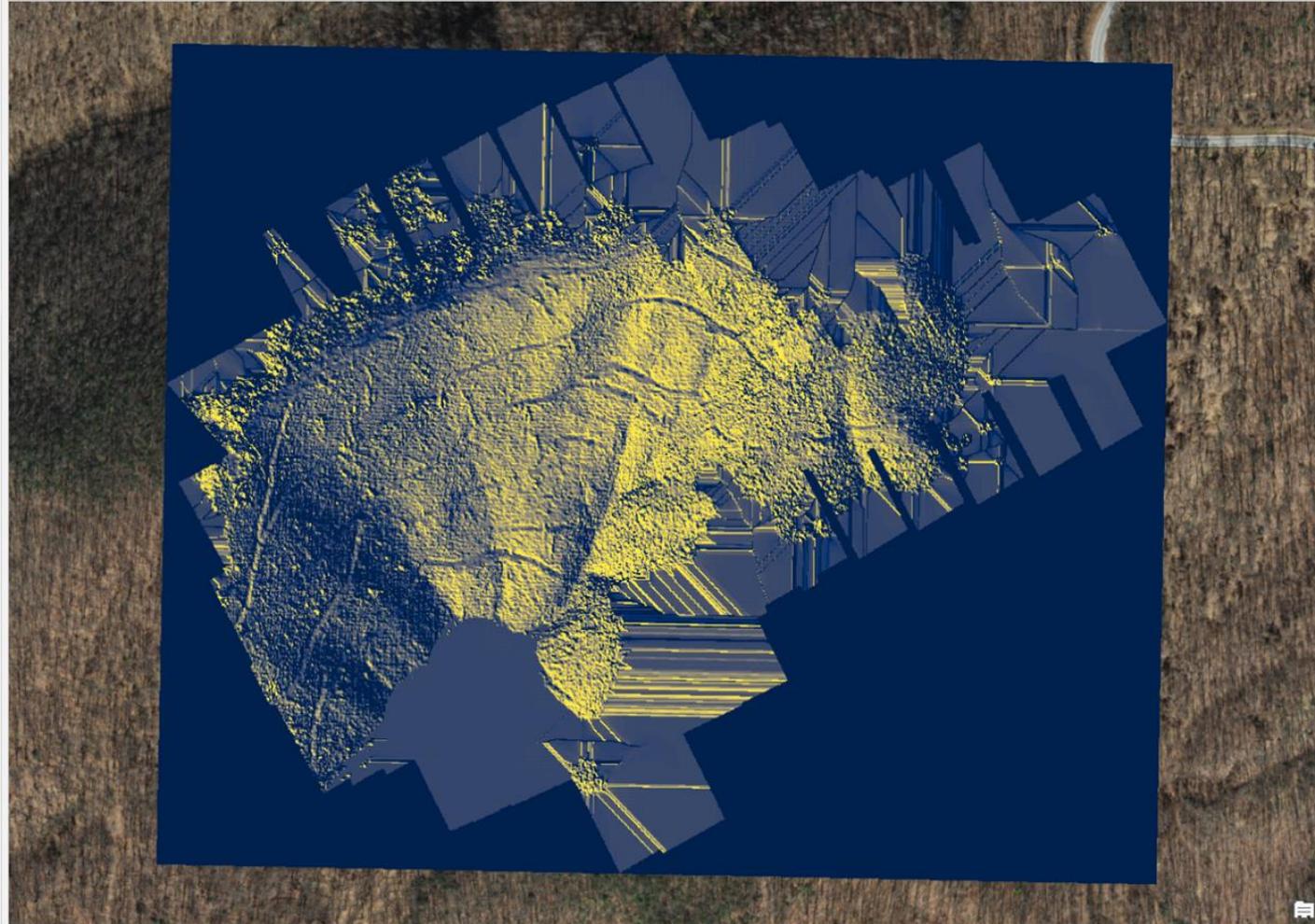


Elevation Analysis



Map

Symbology - DEM-Hillshade.tif



Primary symbology

Stretch

Band

Color scheme

Value

Label

Stretch type

Min Max

Gamma

Statistics Mask

Statistics

Min

Max

Mean

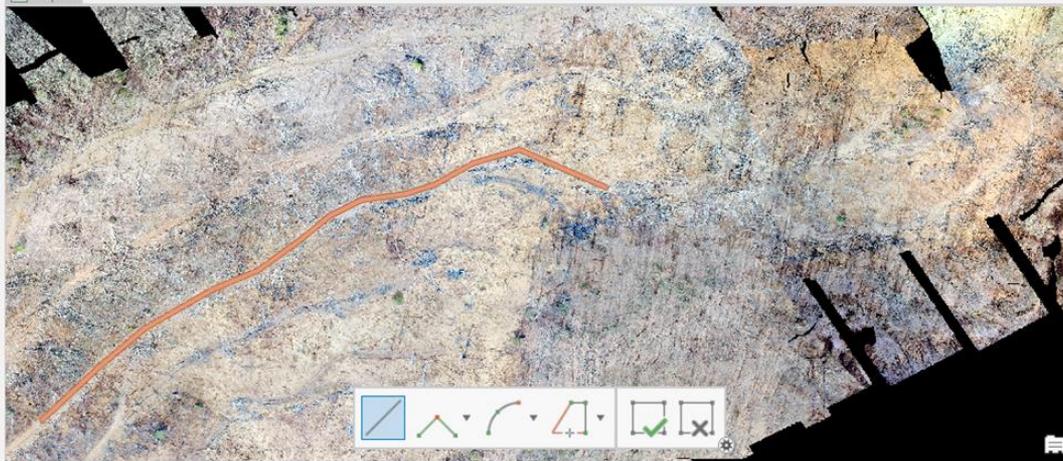
Std. dev

Contents

Search

Drawing Order

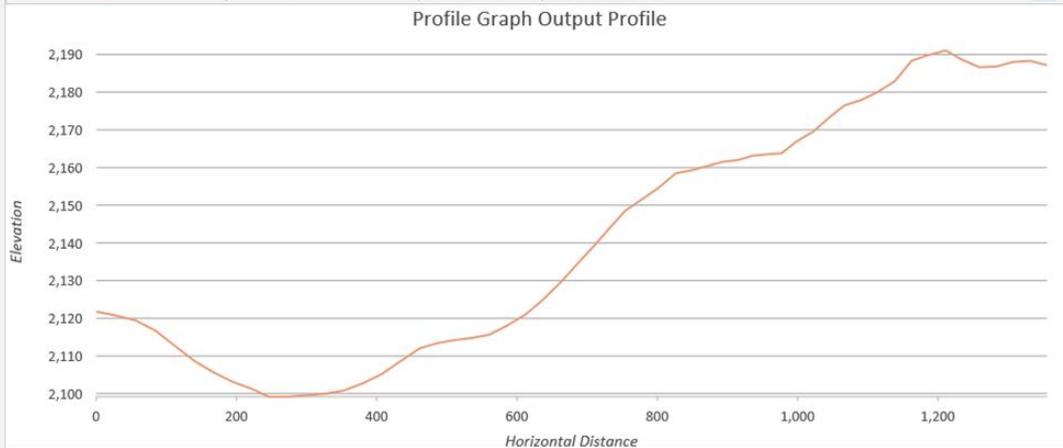
- Map
- Output Profile
 - Profile Graph Output Profile
 - Profile_Input_Line_Features_Lines
- Charts
 - Line Chart 1
 - Profile Graph Output Profile
- Ortho-DrnMppr.tif
 - RGB
 - Red: Band_1
 - Green: Band_2
 - Blue: Band_3
 - Topographic



1:2,354 80.9874636°W 36.3716815°N Selected Features: 0

Output Profile Output Profile - Line Chart 1 Output Profile - Pro... Output Profile X

Properties Export Sort Filter: Selection Extent Attribute Table Rotate Chart



Geoprocessing Profile

This tool consumes credits.

Parameters Environments

Input Line Features
 Profile_Input_Line_Features_Lines

Profile ID Field

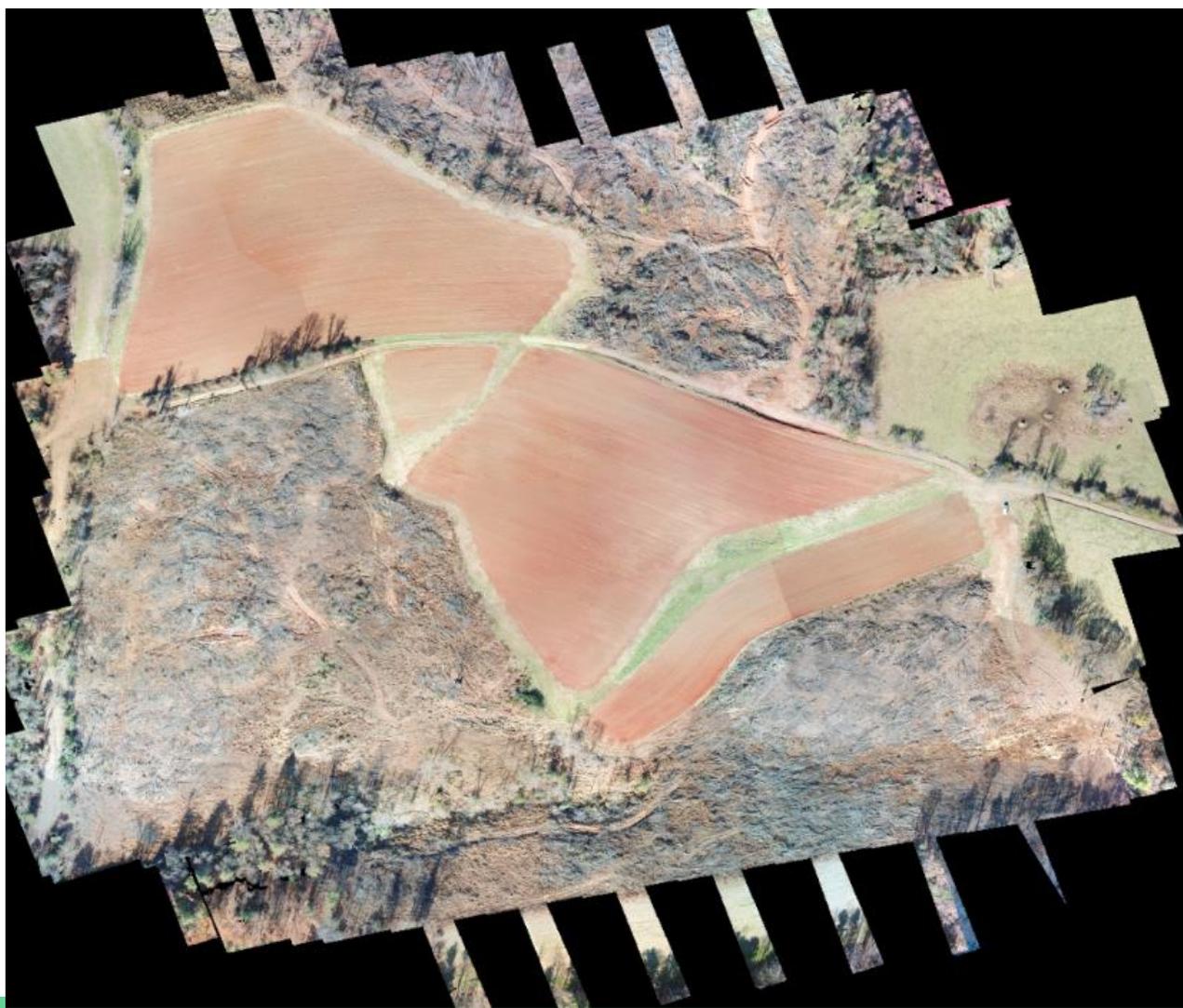
DEM Resolution
 FINEST

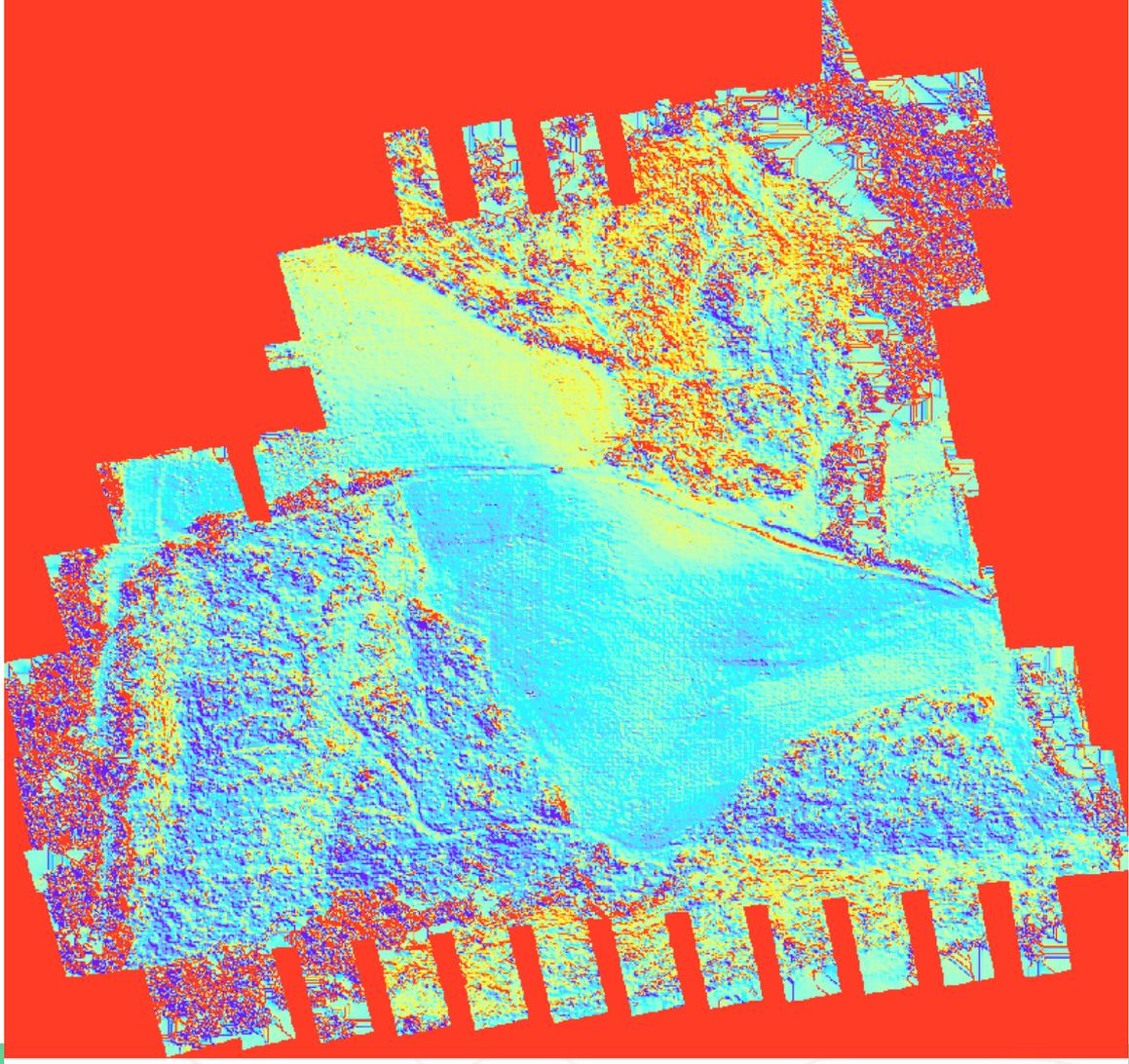
Maximum Sample Distance

Maximum Sample Distance Units
 Feet

Run

Profile completed. View Details Open History





Drone Cost and Equipment

- **DJI Mavic Pro Combo** - \$1,499
- **DJI Phantom 4** - \$2,199
- **DJI Inspire 2** - \$3,499



Aircraft
x 1



Remote Controller
x 1



Intelligent Flight Battery
x 3



Charger
x 1



Power Cable
x 1



Gold Tip Propellers
(Pair)
x 2



Platinum Tip Propellers
(Pair)
x 3



RC Cable (Lightning
connector)
x 1



RC Cable (Standard
Micro USB connector)
x 1



RC Cable (USB Type-C
connector)
x 1



Gimbal Cover
x 1



Gimbal Clamp
x 1



microSD Card (16GB)
x 1



Micro USB Cable
x 1



RC Cable Slider (Large)
x 2



RC Cable Slider (Small)
x 2



Battery Charging Hub
x 1



Car Charger
x 1



Battery to Power Bank
Adaptor
x 1



Shoulder Bag
x 1

Questions?

WILKES COUNTY



— SOIL & WATER —
CONSERVATION DISTRICT

Kayla Mounce

Natural Resource Conservationist - Grants Administrator

Wilkes Soil & Water Conservation District

416 Executive Dr. Ste. A, Wilkesboro, NC 28697

Office: (336) 838-3622 ext. 3

Cell: (336) 452-7733

E-mail: kaylamounce.wilkes@gmail.com

Website: www.wilkeswcd.org

Facebook: [Wilkes Soil & Water Conservation District](https://www.facebook.com/WilkesSoilWaterConservationDistrict)

