

# **SITE: Park Lake – ANC Demo**

Bath, MI 42.793092° -84.432765°

***Date: Oct 04 2019 10am***

***DRAFT FINAL***

## **sUAS Mission Planning Template**

## **EGLE-MMD/WRD**

Version 4 2019\_10\_03 AO

*EGLE management approval to process with Mission Planning S.H. WRD 2019\_10\_01*  
*EGLE management approval to proceed with Mission Flight S.H. WRD 2019\_10\_01*

# ***DEQ sUAS Mission Planning Template***

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*This Mission Planning Template is a guide to the safe, legal, and ethical operations of DEQ sUAS Drones. Its intent is to give the DEQ Drone Pilot in Command (DEQ Drone-PIC) and DEQ staff and Management a knowledgeable reference to the proposed Drone flight, objectives, contacts, preflight checklists, post processing timelines, and pilots log submittal.*

*It may be customized and adapted to individual Missions as required.*

## ***A. Private Landowner Aerial Authorization/Consent (if needed)***

***Not Needed – Public Lake and Launch***

## ***A. WRD Management Authorization (S.H. 10/1/2019)***



Heaton, Sylvia (EGLE)

Tue 10/1/2019 12:24 PM

Crouch, Ryan (EGLE); Ostaszewski, Arthur (EGLE); Huberty, Lisa (EGLE); Bacon, Eric (EGLE); Alexander, Christine (EGLE) ✓

Hi Ryan,

Chris and I approve of the drone test at Park Lake this Friday on October 4<sup>th</sup>.

Thanks and good luck. I'll be curious to hear how it goes and to what level of detail we can get regarding plant imagery.

Syl-

**B. Mission Clients/Contacts/Objectives: Park Lake - ANC**

Requestor: AO MMD-HWS 517-936-7991  
Lisa Huberty, WRD-ANC

Landowner: Public  
Consultant:

Objective: Ortho: treatment and control areas Park Lake  
Pano of Water Surfaces in treatment areas and Lake in general

**Preplanning:**

Remote Pilot In Charge: Art Ostaszewski EQA-HWS 517.936.7991 ostaszewskia@michigan.gov  
FAA 107 Cert #3968165 02/10/2017

Visual Observers: Ryan Crouch, Eric Bacon, Doyle Brunsen

**Site Airspace:** Class G: Surface to 700 ft  
Class E5: above 700 ft

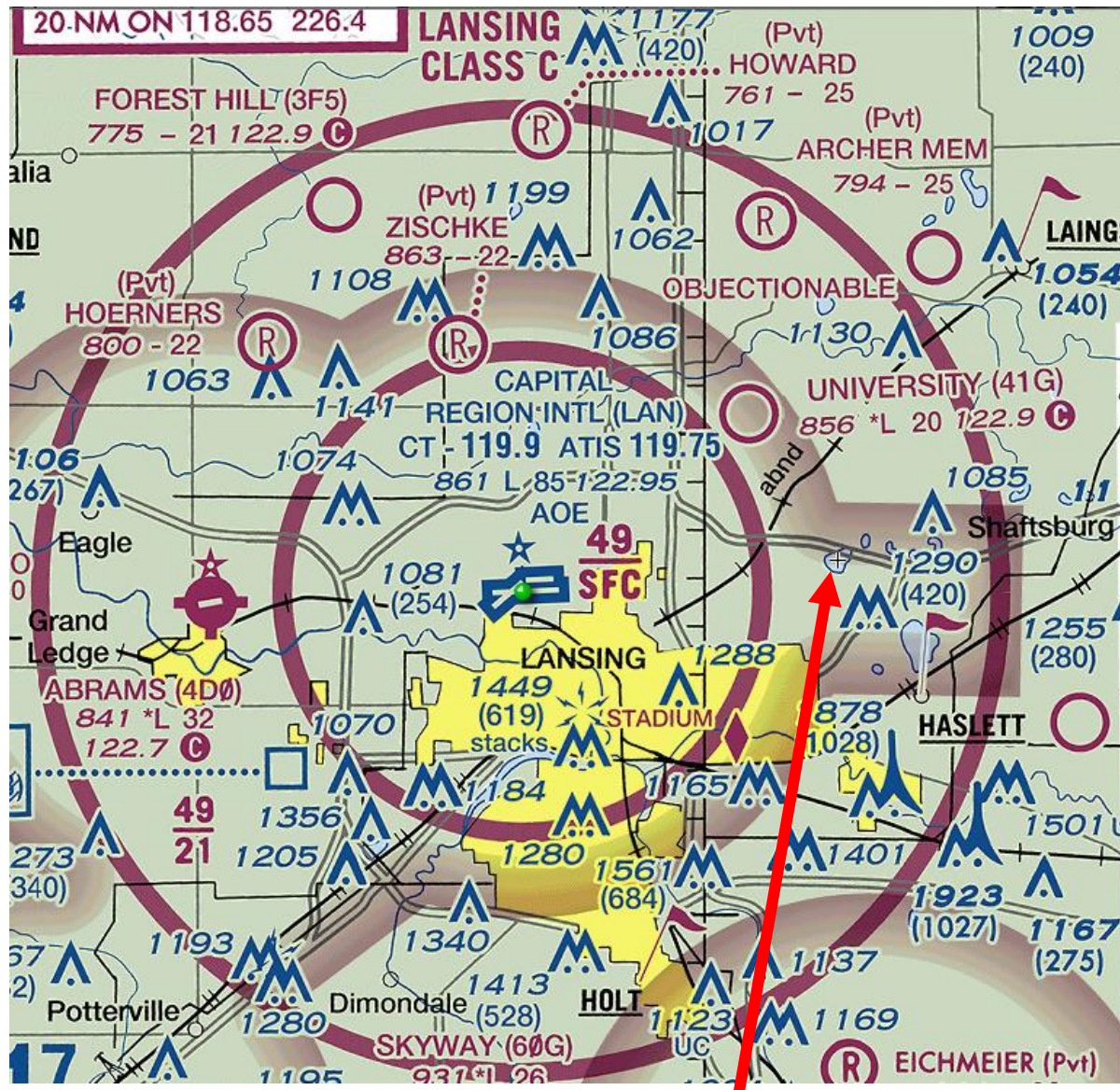
**Comments:**

I. Site FAA Airspace Determination – Sectional <https://skyvector.com/>

**AIRPORT TRAFFIC SERVICE AND AIRSPACE INFORMATION**  
 Only the controlled and reserved airspace effective before 18,000 ft. MSL are shown.

- Class B Airspace
- Class C Airspace (Mode C - see FAR 91.215/AM.)
- Class D Airspace
- Class E Airspace
- Class E Airspace with floor 700 ft. above surface that laterally abuts Class G Airspace.
- Class E Airspace with floor 700 ft. above surface that laterally abuts 1200 ft. or higher Class E Airspace
- Class E Airspace with floor 1300 ft. or greater above surface that laterally abuts Class G

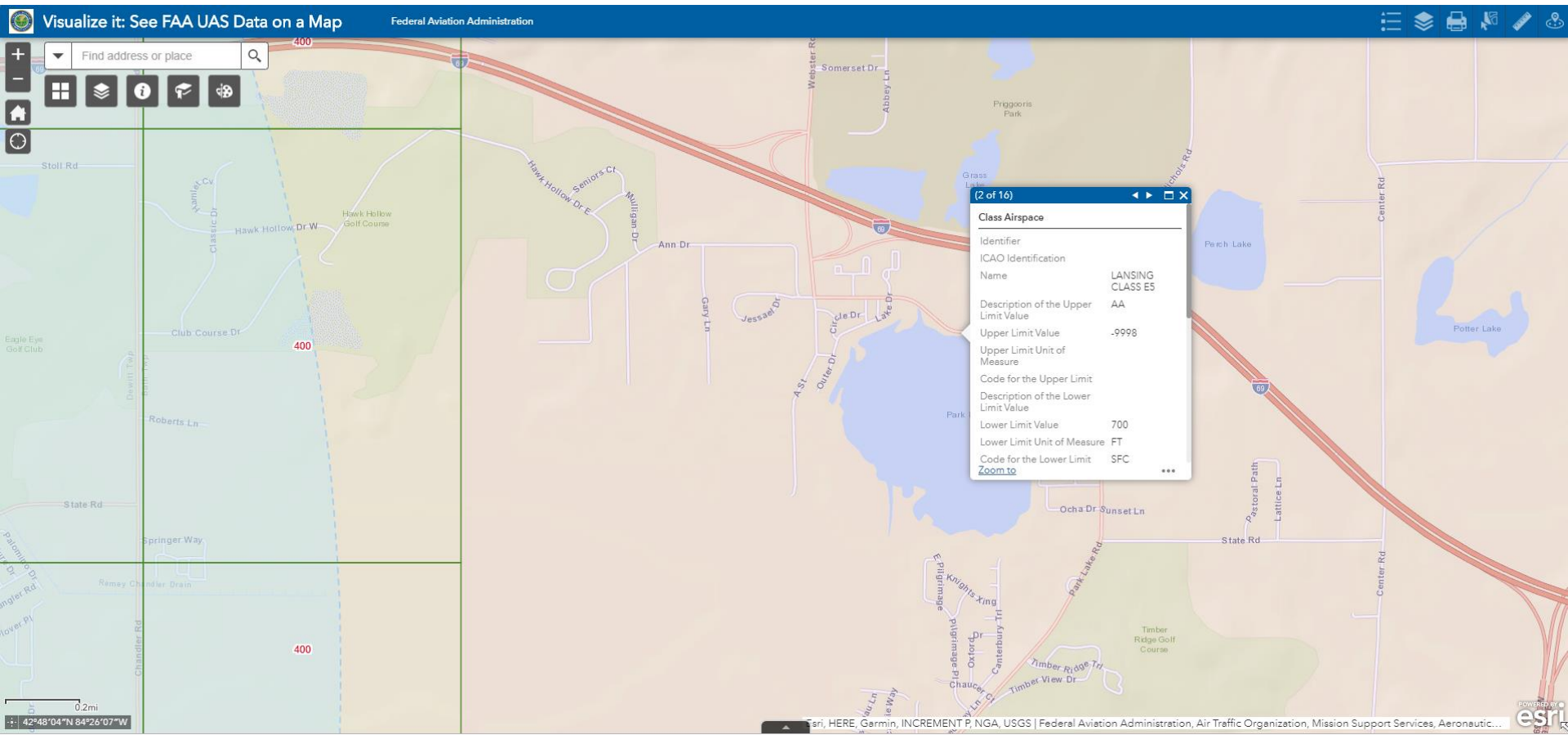
**CLASS G**



Location

Park Lake - ANC

# I. Site FAA Airspace Determination – FAA Visualize It



<https://faa.maps.arcgis.com/apps/webappviewer/index.html?id=9c2e4406710048e19806ebf6a06754ad>

Class G airspace – 0 to 700 ft  
Class E5 airspace – 700 ft

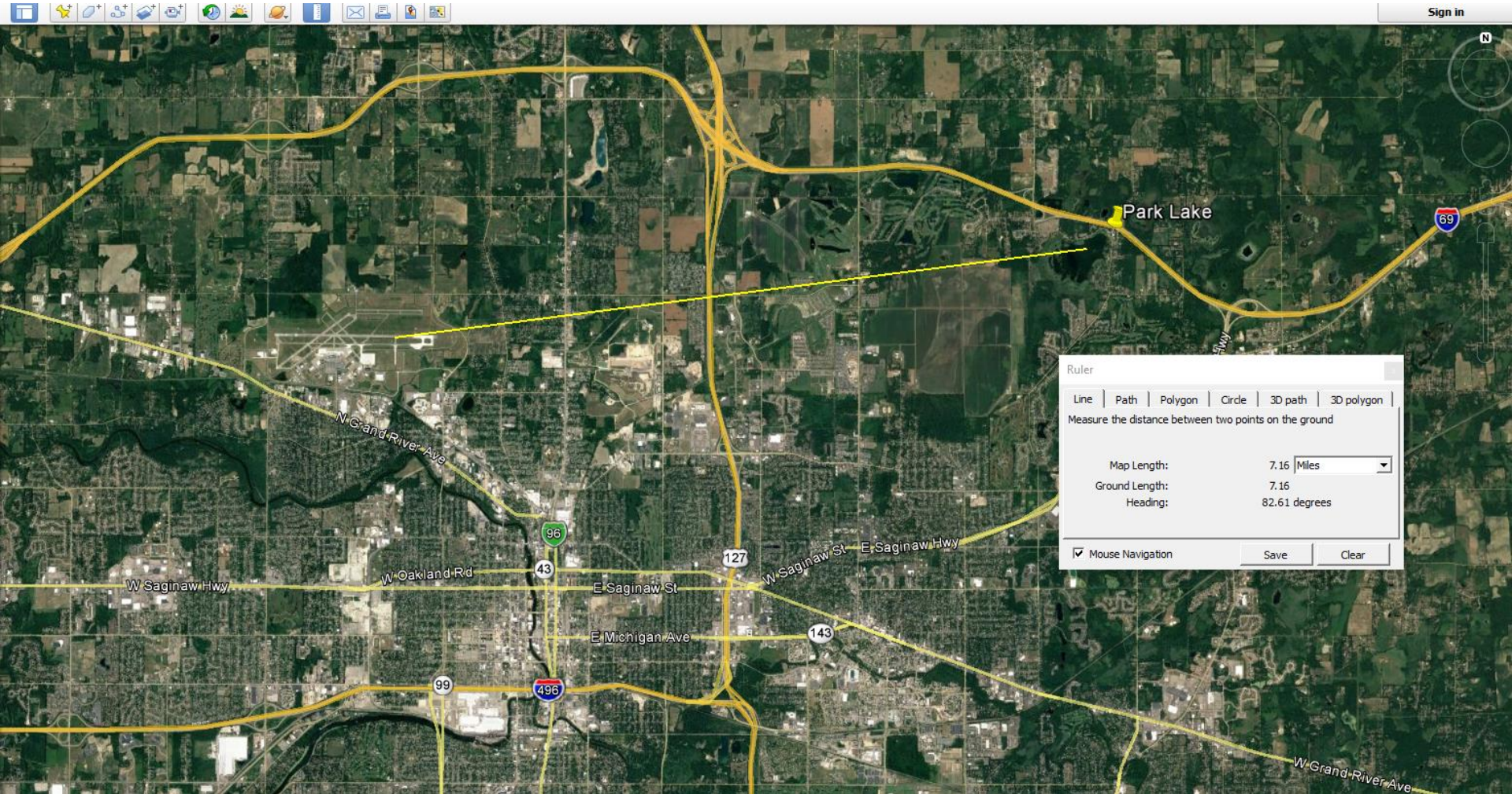
## Park Lake - ANC

# II. Site Airspace confirmation: AirMap



FAA Part 107 Class G – No Advisories

## Park Lake - ANC

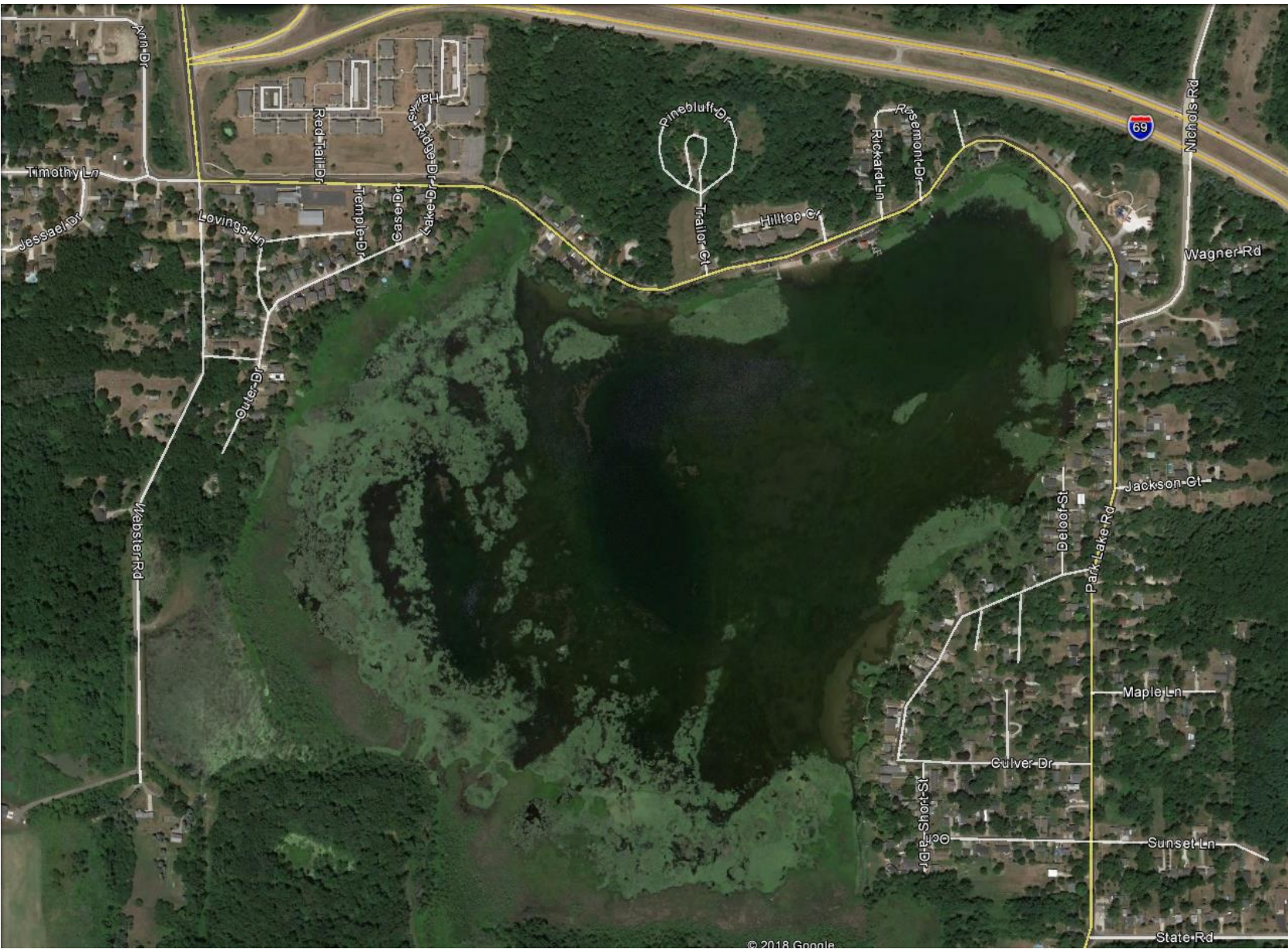


Nearest Airport – Lansing Capitol KLAN 7.16 miles @ 82.61 degrees

**Park Lake - ANC**



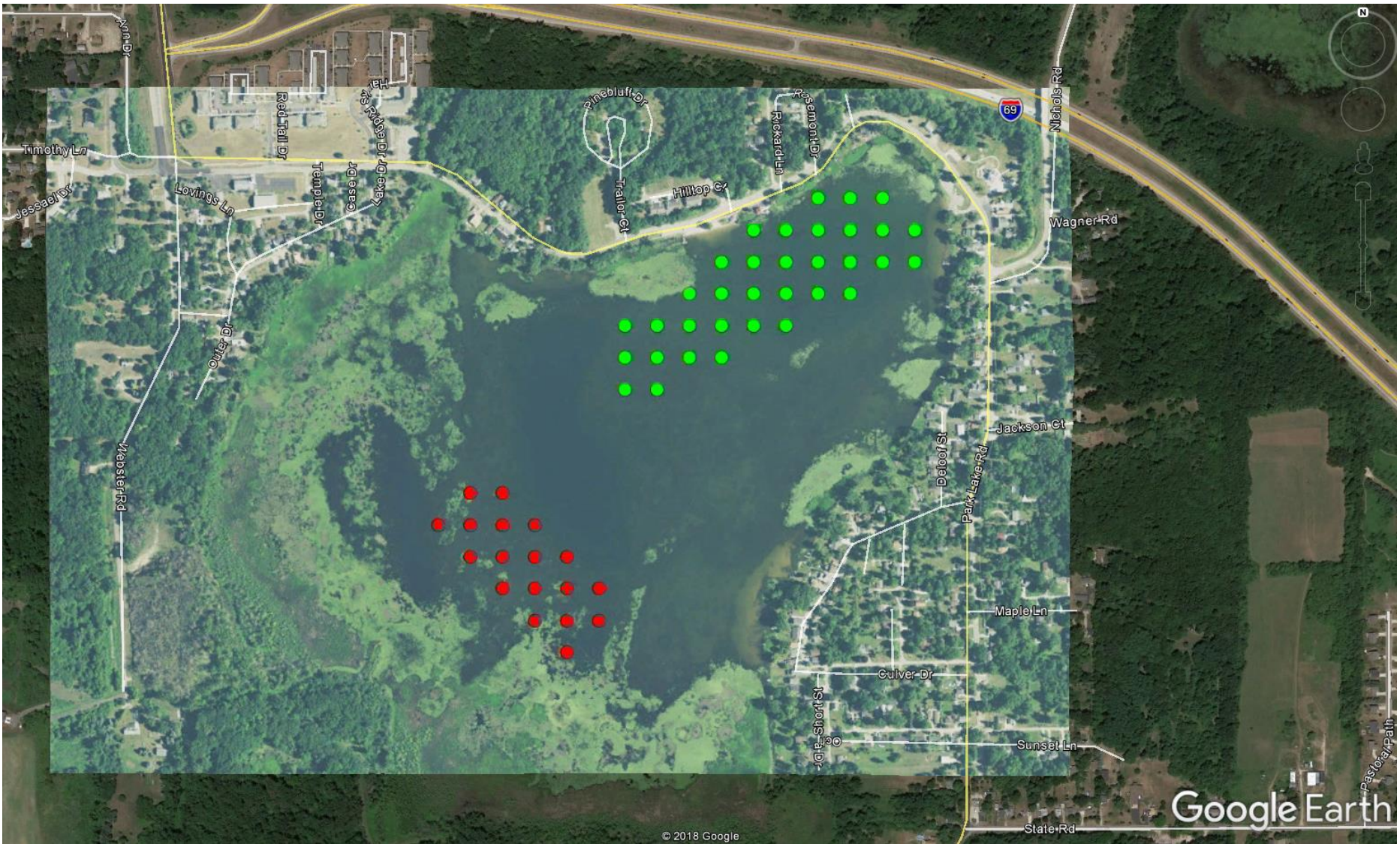
### III. Site Overview



© 2018 Google

### Park Lake - ANC

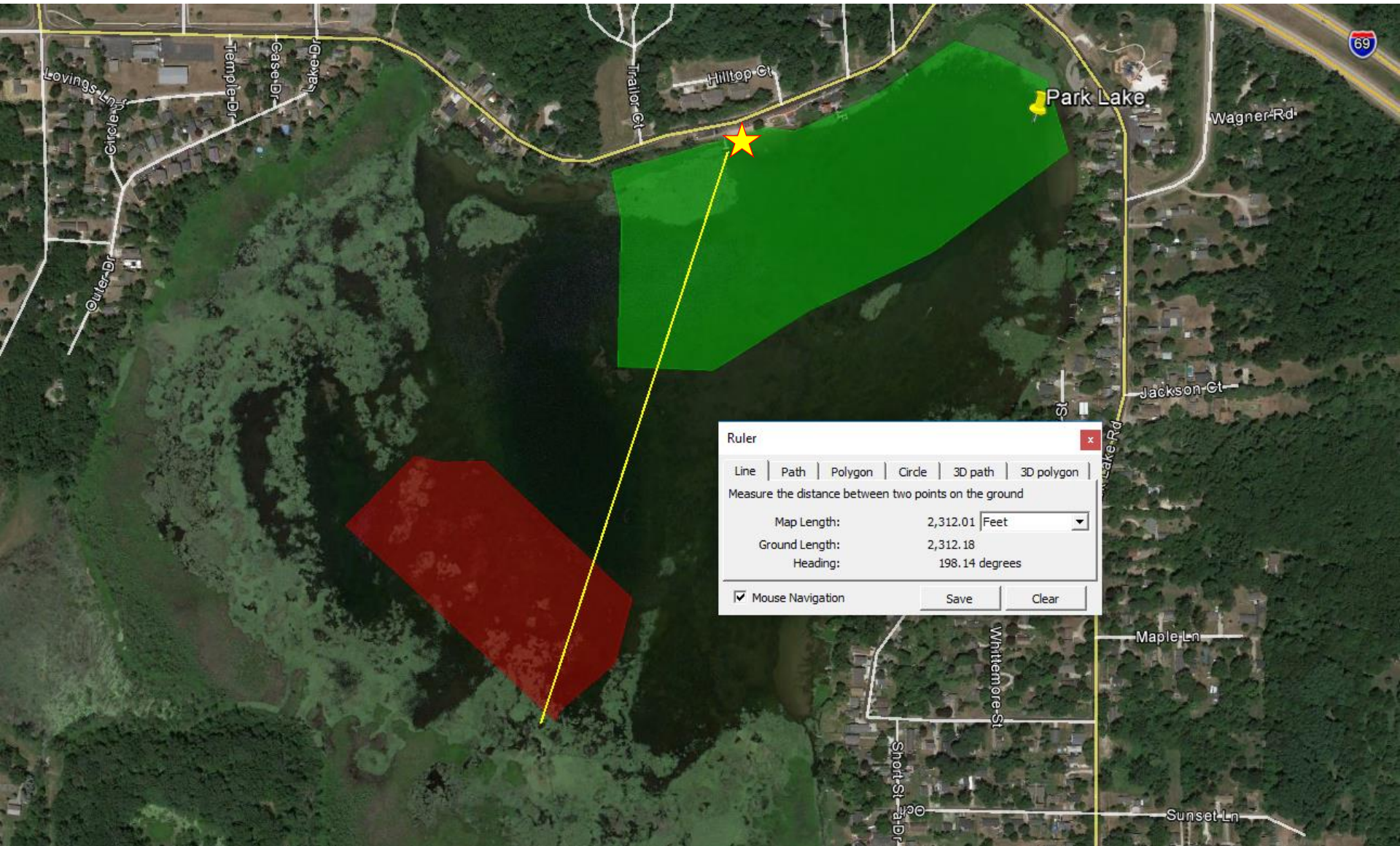
### III. Site Overview



● Treatment Area

● Control Area

### Park Lake - ANC

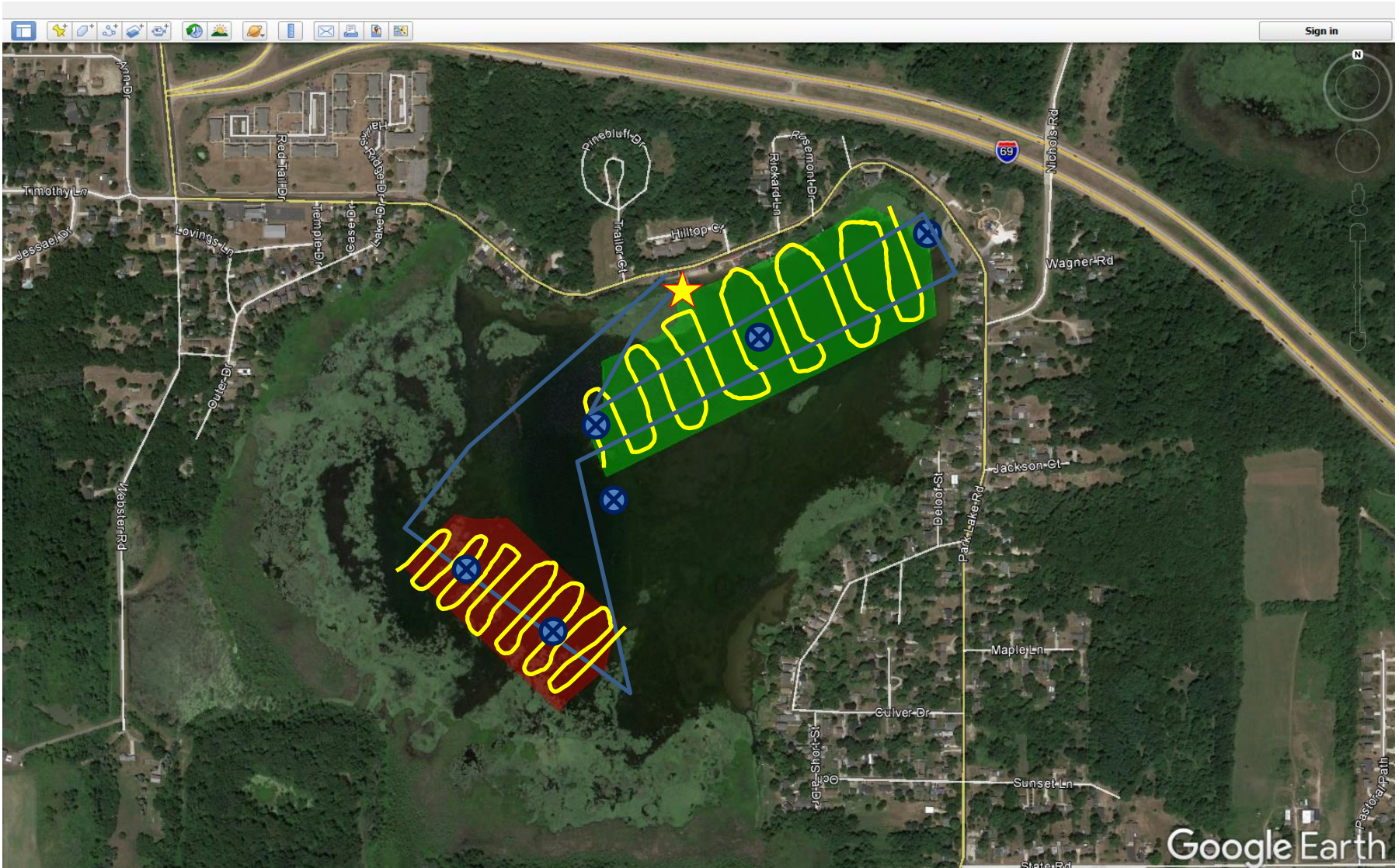


**Park Lake - ANC**




★ UAS Launch Location

- Treatment Area – 27 Acres
- Control Area – 13 Acres

### III. Site Overview – Flight Lines



Conduct at high (250 ft) and low (<100 ft) altitudes

-  Ortho Mapping Lines:
-  Panorama Locations:
-  Perimeter Video:

 UAS Launch Location

 Treatment Area – 27 Acres

 Control Area – 13 Acres

### Park Lake - ANC

# VI. Forecast: 2019\_09\_04

**Flight Window: 2019\_09\_04  
10am-2pm**

## Ideal conditions

Temp > 50° F  
Dewpoint < Temp

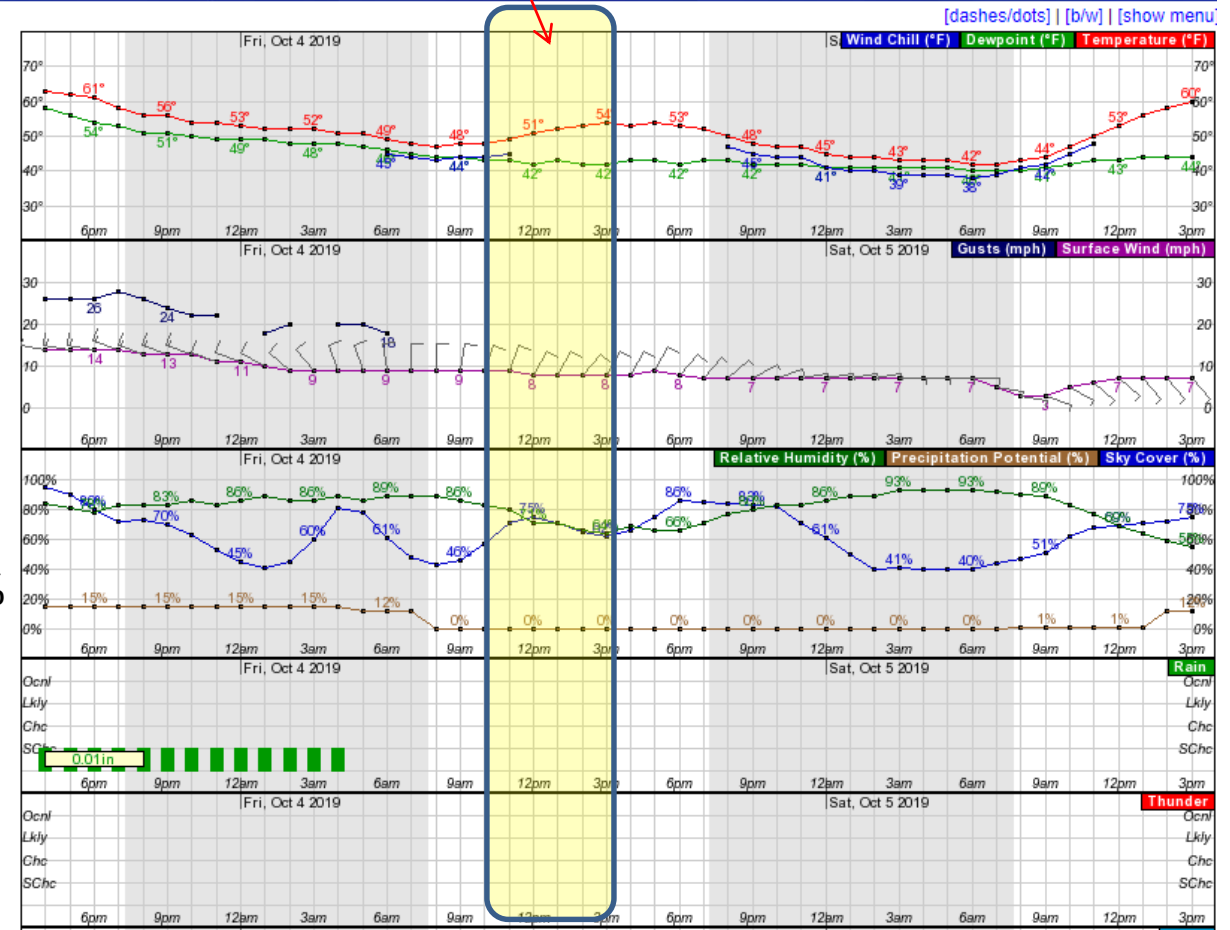
Surface Winds < 10mph  
Gusts < 15 mph

Precip Potential < 35 %

Rain = ZERO

Point Forecast: 2 Miles N Lansing MI  
42.73N 84.56W (Elev. 853 ft) Last Update: 3:09 pm ED

**Hourly Weather Forecast Graph**



# VII. 7d-3d-1d All Clear Pilot-In-Command Signoff :

Weather Checklist: GO/NOGO  
1 week out – GO  
3 days out – GO  
Day before – GO  
Day of -

ATC & Facility Permission:  
1 week out – GO  
3 days out – GO  
Day of – GO

Mission/Equipment/Pretest :  
1 week out- GO  
3 days out- GO  
Day before- GO  
Day of -

Clear

Clear

Clear

Clear

Remote Pilot in Command Initials

## **VIII. PreMission Checklist – Day before** (check/circle when complete)

~~sUAS 1: DJI M600P~~            Reg #FA3PAPWMTE  
sUAS 2: DJI P4P            Reg #FA3PLR4LRF  
sUAS 3: DJI MAir            Reg # FA3AA99KxN  
sUAS 4: Parrot Anafi        Reg # FA3MFF449X  
sUAS 5: DJI M2PED        Reg # FA3P4MPAEH

Firmware upgrade – DJI Go4

Camera Settings –

- a) Video in MP4 30fps 1080p
- b) Photos in hi res 4x3 jpg
- c) Mapping App– coverage overlap settings (70% minimum, <1.0 cm/pixel)

Return to Home HEIGHT setting \_\_\_\_ (**must sign off as checked**)

sUAS Batteries – charged

sUAS Controllers-charged

Display Phones charged – Apple i6, Moto E

Ipad/Tablet charged –

### **Field Conditions : CURRENT (date) Ideal**

- |                               |  |
|-------------------------------|--|
| a) Temperature                | > 50 degrees F (Cold Weather Conditions/fly to 50% Battery)                      |
| b) Dew Point / Chance of Rain | Low dewpoint (no chance of frost), low relative humidity (below 60%), Rain < 35% |
| c) Cloud ceiling              | > 900ft (FAA Required)   |
| d) Visibility                 | > 3 miles (FAA Required)   |
| e) Wind speed and direction   | <15mph (P3, P4, Air) < 10mph (Spark)   |
| g) Flight hours:              | Sunrise-Sunset 735am – 722pm Lansing, MI Sept 30 2019                            |
| h) Flight comments:           |  |

## IX. On Site Checklist – Remote Pilot in Charge/Date : \_\_\_\_\_

### Review

Area is clear of flight hazards, weather is suitable (vis > 3 miles, cloud ceiling > 900 ft) \_\_\_\_\_

Mission is clear \_\_\_\_\_

Permission and ATC clearance is secured \_\_\_\_\_

Conduct Briefing with Vos \_\_\_\_\_

Unpack Drone – (**REMOVE GIMBAL MOUNTS-2 in DJI**): Check here \_\_\_\_\_, Check maintenance (arms, props) \_\_\_\_\_

**Set up drone for Power On (not in tall grass)**

### BEFORE POWERING ON

Check NOTAMS TFR \_\_\_\_\_ Skyvector.com

Check METAR KLAN Ceiling \_\_\_\_\_ Vis \_\_\_\_\_

Determine definitively the tallest obstacle in Mission Area = ( \_\_\_\_\_ ft)

Set Geofence limit \_\_\_\_\_ Altitude limit \_\_\_\_\_ RTH \_\_\_\_\_

Turn on Controller BEFORE Drone

Turn on Drone Battery – **power up**

Confirm Compass Settings – recalibrate if new area \_\_\_\_\_

Reformat SD card

### START DRONE Propellers

1) Hover on Ground – assess Drone

2) Hover in Air (4ft) Drone is Stable

3) Hover at Altitude (100ft - 200 ft) Drone is Stable

4) Program flight path waypoints at altitude above obstacle (RTH is above tallest obstacle \_\_\_\_\_)

Conduct flight mission under control

### Post Flight

Confirm flight data, Backup to PC

Pack up – check maint of props, arms \_\_\_\_\_

Log Flight



## **X. Post Processing – Staff in Charge / Delivery Date**

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Insure Client has VLC, Google Earth, Chrome Browser

Archive Mission Data (Pic, Video) Archive Mission Flight (Flight Log)

Mission Software Tasks:

1. GeoSetter

**GeoSetter** all photos – send KML to client

2. Movie

Stitch all videos together in **Movie Maker**– save as mp4

**Hyperlapse** complete video to 4x – save as mp4

3. Orthomosaic – NVDI – Contours – DEM- Volume

Run Ortho images Pix4D – (las, obj, contours, NVDI, Volumes, KML)

4. Panorama

MarzioPano- Save

5. Thermal

**Pilot Reports:**

Staff Report –

WDS Entry –

DVD Flight Files Backup

Pilots Log >> Send to A.R.T. TAPS TEAM

**Client Deliverables:**

All Pictures All Video, Panoramas, DEM, OBJ Models, Volume Estimates, Maps and Figures

# X. MMD Drone Post Processing Workflow

Mission:

Due Date:

Workflow ID	Software	Product	Staff Assigned	Date Done	Minutes Spent	Shared w Client Date	Files	File Location Root	Comments
A.	Archive/Save Field Photos	jpg							
B.	Archive/Save Field Video	mp4							
1	Geosetter	KML							
2	Movie Maker	MP4							
3	Pix4d DroneMapper Drone2Map vSFM	DEM tif Ortho kml NVDI kml Volume kml OBJ LAS PLY							
4	Panoramas	.jpg Kuula Okolo Marzipano							
5									
6									
7									
8									
9									
10									
11									

## XI. A.R.T. DRONE TAPS TEAM Pilots Log – Flight Record Submittal

for every significant flight/mission send the following email information to the TAPS TEAM Coordinator for recordkeeping.  
(ostaszewskia@michigan.gov)

Mission Name:

DEQ-PIC:

Airspace:

Date:

Start Time of flight:

Total Duration:

Aircraft:

Notes:

Incidents- **All incidents** must be reported to the TAPS TEAM Coordinator regardless of level (Minor, Major, Catastrophic)

## Personal Injury - Are stitches needed?

**Yes** - apply direct pressure with clean bandage

seek medical attention (use phone GPS for nearest hospital or clinic if non-threatening)

if serious Call 911 and give location address from MPT.

No – clean wound, apply direct pressure if bleeding, bandage when bleeding stops

Report incident to DEQ Emergency Manager, DEQ EM will file appropriate reports with FAA and NTSB

## Equipment – Drone Loss w no video signal

Is drone potentially still in the air?

YES: 1) Trigger P-S-A switch to disable app override of RTH

2) Initiate RTH from Controller by holding for 5 seconds...wait for RTH beeps... if no response

3) Turn RC off completely – then restart – Drone may start RTH on RC loss

4) Wait for battery to deplete – Drone may RTH on low battery warning

WAIT at least 15 minutes (based on remaining battery) before leaving HOME.

NO: There is no hope of Auto RTH (after 15+ minutes)

Check flight route in Go4app, determine last known location

The drone WILL descend under control and land itself with <10% battery

Attempt to get near potential landing location and reconnect with controller

Report incident to DEQ Emergency Manager, DEQ EM will file appropriate reports with FAA and NTSB

## Personal Property Damage -

# FAA / EGLE Inspection Checklist – EGLE PIC sign off \_\_\_\_\_

- 1. Your Part 107 certificate.** Be prepared to show your certificate number to any FAA official who asks.
- 2. Your driver's license.** The Part 107 rules state that your driver's license can be used in lieu of a medical certificate.
- 3. An insurance verification form.** While the FAA doesn't require liability insurance, it's a must-have for any commercial sUAS operation. Check out our [drone insurance guide](#) for more information.
- 4. Your aircraft registration number.** If you haven't yet registered your sUAS or need to pull up your number, you can access the FAA's Drone Zone portal [here](#).
- 5. A summary of the FAA's Part 107 Rules.** A copy of the summary document for you to save and print can be found [in this PDF provided by the FAA](#).
- 6. A flight operations manual.** See [this example](#) from aerial services company Piper Mountain Aerial for a good starting place on what your manual should include.
- 7. A communications sheet.** This sheet should include the phone numbers and frequencies of local authorities.
- 8. A maintenance log.** Your maintenance log should include:  
How often/when do you change your rotor blades for each UAV you're operating? Is this noted?
  - Have you experienced any battery abnormalities? Are those abnormalities logged?
  - A record of preflight inspection for that day. This could be a written log, or you could have a printed preflight inspection checklist on hand.
- 9. Knowledge of your aircraft's weight.** For example, an Inspire with a camera weighs 8.5 lbs.
- 10. Your LAANC authorization confirmation number.** This only applies if you're using LAANC for airspace authorization.
- 11. The proximity/distance and direction of nearby airports.**
- 12. knowledge of TFRs (Temporary Flight Restrictions) in the area.** This does not need to be a formal document, but, to the best of our knowledge, could simply be a mental record of where there are TFRs nearby. To find active TFRs use [this webpage provided by the FAA](#). Alternately, you can call the FAA's Flight Services for up-to-date TFR information at 1-800-WX-BRIEF (1-800-992-7433).

# EGLE Drone Policy - Incident Response Plan

DEQ Pilot in Command Incident Planning v3 12/20/2018

Levels: **Green-Minor**, **Yellow-Major**, **Red-Catastrophic**

Definitions:

MPT = Mission Planning Template    TTC= TAPS TEAM Coordinator (AO)

TTDR = TAPS TEAM Division Representative (varies)    EM = Emergency Manager (JE)

## Level: Green - Minor

### Minor –

- I. Reported in >> Pilot Log Notes, brought to TTC and TTDR attn.
- II. Corrective Actions taken >> update preflight checklist

### Minor Incident Examples:

Prop damage on takeoff or landing  
Minor equipment damage - scuffing  
Undetermined flying errors that results in Safe Recovery and Landing  
Public or Law Enforcement Inquiry on Mission site with DEQ-PIC

## Level: Yellow-Major

### Major

I. Reported in >> Pilot Log Notes and brought to attention of TTC, TTDR, and MPT supervisor (signed off) attention within 24 hours, (e.g. email description). **EM and Executive Office will be notified of the incident through the TTC of any costs to repair equipment. EM will be notified if the TTC feels the situation warrants.**

II. Corrective Actions Taken >> DEQ Drone specific Flights Halted until Investigation and Diagnosis resolves issue to DEQ-PIC, TTC, **MPT supervisor (signed off)**. Checklist update and Retesting must be done before any new DEQ drone specific flights are made (email and note to TTC, TTDR, **MPT Supervisor (signed off)**)

### Major Incident Examples Are:

Equipment damage needing servicing (motors, IMU)  
Undetermined flying errors that results in Crash and Recovery  
Public/Law Enforcement Drone inquiry to DEQ Front Office (**Notify EM of this issue**)  
Any type of Injury to personnel below FAA/NTSB Thresholds **to PIC (Notify division safety liaison)**

## Level: Red-Catastrophic

### Catastrophic – EXE/FAA/NTSB Needs Notification

I. Reported ASAP >> TTC, TTDR, MPT Supervisor, DEQ I.C.  
Reported in Pilots Log and meeting held with DEQ I.C.  
DEQ I.C. submits FAA and NTSB reports within timeframe (10d)

### II. Corrective Actions Taken:

ALL DEQ Pilots grounded until Investigation and Diagnosis resolves issues to FAA, NTSB, and DEQ I.C. satisfaction.

### Catastrophic Incident Examples:

Drone is Lost – unrecovered (need to sticker/label all DEQ Drones)  
Drone is crashed – extensive damage to equipment/ **total loss**.  
Drone causes Injury **to PIC or property** above FAA/NTSB thresholds, **or any injury to any bystander**.  
Public /Law Enforcement makes legal inquiry against DEQ Mission



<b>Operational Limitations</b>	<ul style="list-style-type: none"> <li>Unmanned aircraft must weigh less than 55 lbs. (25 kg).</li> <li>Visual line-of-sight (VLOS) only; the unmanned aircraft must remain within VLOS of the remote pilot in command and the person manipulating the flight controls of the small UAS. Alternatively, the unmanned aircraft must remain within VLOS of the visual observer.</li> <li>At all times the small unmanned aircraft must remain close enough to the remote pilot in command and the person manipulating the flight controls of the small UAS for those people to be capable of seeing the aircraft with vision unaided by any device other than corrective lenses.</li> <li>Small unmanned aircraft may not operate over any persons not directly participating in the operation, not under a covered structure, and not inside a covered stationary vehicle.</li> <li>Daylight-only operations, or civil twilight (30 minutes before official sunrise to 30 minutes after official sunset, local time) with appropriate anti-collision lighting.</li> <li>Must yield right of way to other aircraft.</li> <li>May use visual observer (VO) but not required.</li> <li>First-person view camera cannot satisfy "see-and-avoid" requirement but can be used as long as requirement is satisfied in other ways.</li> <li>Maximum groundspeed of 100 mph (87 knots).</li> <li>Maximum altitude of 400 feet above ground level (AGL) or, if higher than 400 feet AGL, remain within 400 feet of a structure.</li> <li>Minimum weather visibility of 3 miles from control station.</li> <li>Operations in Class B, C, D and E airspace are allowed with the required ATC permission.</li> <li>Operations in Class G airspace are allowed without ATC permission.</li> <li>No person may act as a remote pilot in command or VO for more than one unmanned aircraft operation at one time.</li> <li>No operations from a moving aircraft.</li> <li>No operations from a moving vehicle unless the operation is over a sparsely populated area.</li> <li>No careless or reckless operations.</li> <li>No carriage of hazardous materials.</li> </ul>
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	<ul style="list-style-type: none"> <li>Requires preflight inspection by the remote pilot in command.</li> <li>A person may not operate a small unmanned aircraft if he or she knows or has reason to know of any physical or mental condition that would interfere with the safe operation of a small UAS.</li> <li>Foreign-registered small unmanned aircraft are allowed to operate under part 107 if they satisfy the requirements of part 375.</li> <li>External load operations are allowed if the object being carried by the unmanned aircraft is securely attached and does not adversely affect the flight characteristics or controllability of the aircraft.</li> <li>Transportation of property for compensation or hire allowed provided that-             <ul style="list-style-type: none"> <li>The aircraft, including its attached systems, payload and cargo weigh less than 55 pounds total;</li> <li>The flight is conducted within visual line of sight and not from a moving vehicle or aircraft; and</li> <li>The flight occurs wholly within the bounds of a State and does not involve transport between (1) Hawaii and another place in Hawaii through airspace outside Hawaii; (2) the District of Columbia and another place in the District of Columbia; or (3) a territory or possession of the United States and another place in the same territory or possession.</li> </ul> </li> <li>Most of the restrictions discussed above are waivable if the applicant demonstrates that his or her operation can safely be conducted under the terms of a certificate of waiver.</li> </ul>
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<b>Remote Pilot in Command Certification and Responsibilities</b>	<ul style="list-style-type: none"> <li>Establishes a remote pilot in command position.</li> <li>A person operating a small UAS must either hold a remote pilot airman certificate with a small UAS rating or be under the direct supervision of a person who does hold a remote pilot certificate (remote pilot in command).</li> <li>To qualify for a remote pilot certificate, a person must:             <ul style="list-style-type: none"> <li>Demonstrate aeronautical knowledge by either:                 <ul style="list-style-type: none"> <li>Passing an initial aeronautical knowledge test at an FAA-approved knowledge testing center; or</li> <li>Hold a part 61 pilot certificate other than student pilot, complete a flight review within the previous 24 months, and complete a small UAS online training course provided by the FAA.</li> </ul> </li> <li>Be vetted by the Transportation Security Administration.</li> <li>Be at least 16 years old.</li> </ul> </li> <li>Part 61 pilot certificate holders may obtain a temporary remote pilot certificate immediately upon submission of their application for a permanent certificate. Other applicants will obtain a temporary remote pilot certificate upon successful completion of TSA security vetting. The FAA anticipates that it will be able to issue a temporary remote pilot certificate within 10 business days after receiving a completed remote pilot certificate application.</li> <li>Until international standards are developed, foreign-</li> </ul>
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	<p>certificated UAS pilots will be required to obtain an FAA-issued remote pilot certificate with a small UAS rating.</p> <p>A remote pilot in command must:</p> <ul style="list-style-type: none"> <li>Make available to the FAA, upon request, the small UAS for inspection or testing, and any associated documents/records required to be kept under the rule.</li> <li>Report to the FAA within 10 days of any operation that results in at least serious injury, loss of consciousness, or property damage of at least \$500.</li> <li>Conduct a preflight inspection, to include specific aircraft and control station systems checks, to ensure the small UAS is in a condition for safe operation.</li> <li>Ensure that the small unmanned aircraft complies with the existing registration requirements specified in § 91.203(a)(2).</li> </ul> <p>A remote pilot in command may deviate from the requirements of this rule in response to an in-flight emergency.</p>
<b>Aircraft Requirements</b>	<ul style="list-style-type: none"> <li>FAA airworthiness certification is not required. However, the remote pilot in command must conduct a preflight check of the small UAS to ensure that it is in a condition for safe operation.</li> </ul>
<b>Model Aircraft</b>	<ul style="list-style-type: none"> <li>Part 107 does not apply to model aircraft that satisfy all of the criteria specified in section 336 of Public Law 112-95.</li> <li>The rule codifies the FAA's enforcement authority in part 101 by prohibiting model aircraft operators from endangering the safety of the NAS.</li> </ul>

# FAA / EGLE Inspection Checklist UAV Weights

DEQ Drones					
FAA Registered	weight				
1	3.06 lbs	dji	phantom	4	pro
2	0.66 lbs	dji	spark-red		
3	0.66 lbs	dji	spark-blue		
4	0.66 lbs	dji	spark-green		
5	0.95 lbs	dji	mavic	Air	
6	0.95 lbs	dji	mavic	Air	
7	3.06 lbs	dji	phantom	4	advanced
8	4.31 lbs	Yuneec	Typhoon	H	Pro
9	10.43 lbs	dji	Matrice	210	"A"
10	4.85	Swellpro	Splashdrone 3		
11	1.62 lbs	dji	Mavic Pro Enterprise Dual		Thermal
12	21.2 lbs	dji	Matrice	600	pro
13	10.43 lbs	dji	Matrice	210	"B"
14	0.95 lbs	dji	Mavic	Air	1
15	0.95 lbs	dji	Mavic	Air	2
16	0.95 lbs	dji	Mavic	Air	3
17	0.95 lbs	dji	Mavic	Air	4
18	2 lbs	dji	Mavic	2	Pro
19	3.06 lbs	dji	phantom	4	advanced
20	3.06 lbs	dji	phantom	4	advanced
21	3.06 lbs	dji	phantom	4	advanced
22	0.66 lbs	dji	spark-white2		
23	0.75 lbs	parrot	Anafi	Thermal	
24	1.62 lbs	dji	Mavic Pro Enterprise Dual		Thermal
25	0.75 lbs	parrot	Anafi	Thermal	