

# FAA Informational Briefing:

## Wind Turbine Marking & Lighting (M&L) / Aircraft Detection Lighting Systems (ADLS)

Presentation for: Aeronautical Charting Meeting Group 23-02

Presented by: FAA Obstruction Evaluation Group (OEG), AJV-A540

Date:



# Wind Turbine Marking & Lighting (M&L)

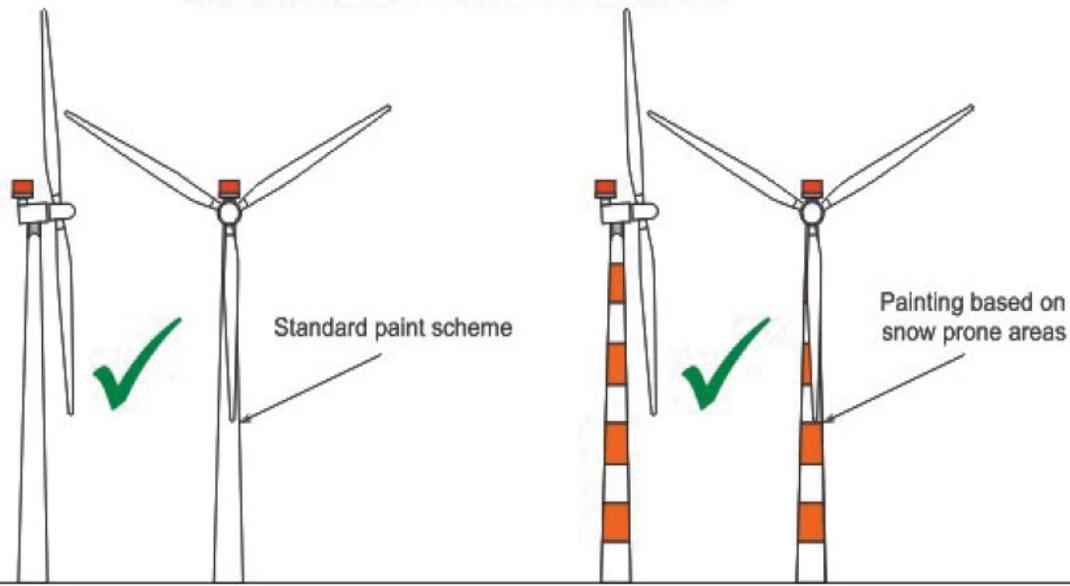
- M&L standard are covered in Advisory Circular 70/7460-1, Obstruction Marking and Lighting, Chapter 13.
- Wind turbines greater than 499 feet AGL require white paint (Pure White RAL # 9010) and L-864 flashing, strobe, or pulsed red obstruction light.
- Obstruction lights are placed as high a possible on the turbine nacelle and must be visible by a pilot approaching from any direction.
- Wind turbines greater than 699 feet AGL require an additional level of lights (L-810) located midway between the top of the nacelle and ground level.
- Geographic areas that experience lengthy periods of snow cover, the mast of the turbine may be painted alternating bands of aviation orange and white.

# Wind Turbine Marking

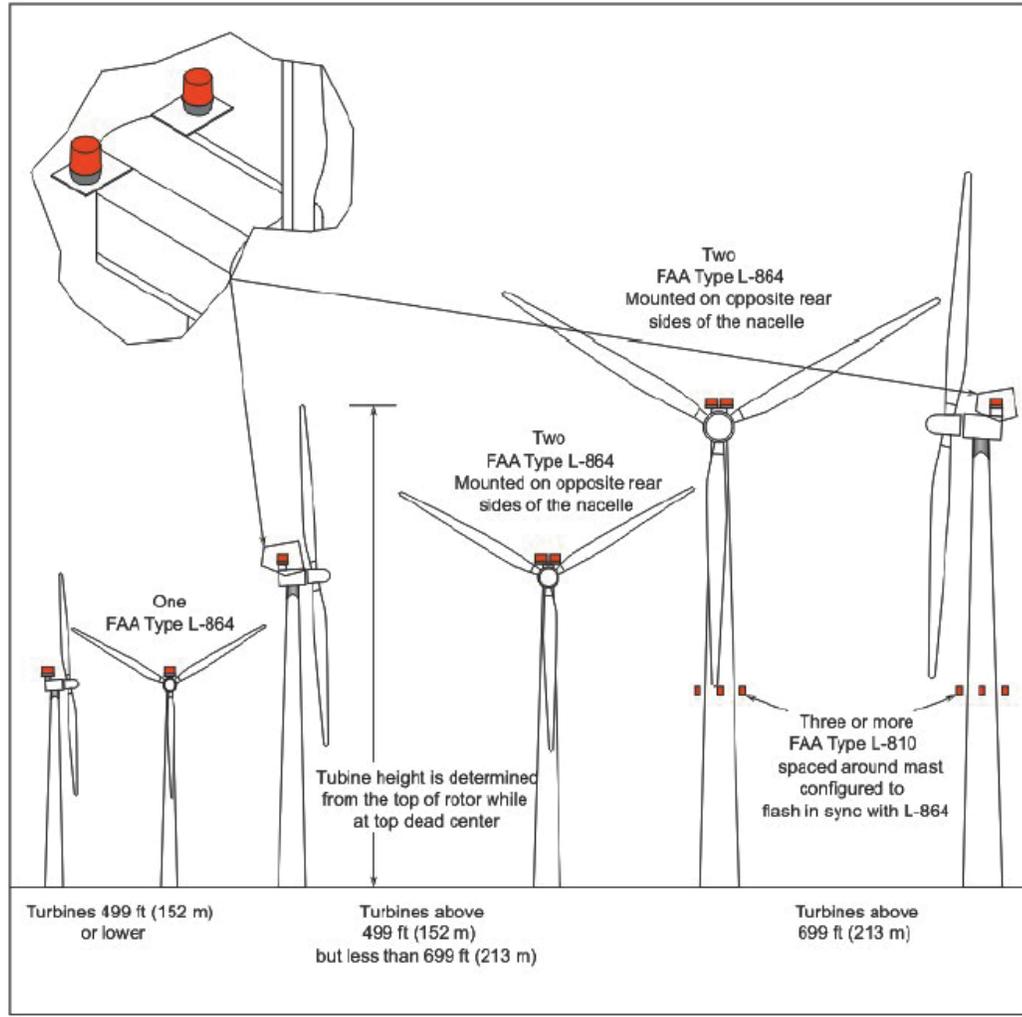
## LIGHTING AND MARKING OF WIND TURBINES PAINT SCHEMES

Day / Twilight Protection = Aviation Orange and Wind Turbine Off-White Paint  
Night Protection = 2,000 cd Red Lights / Turbines Under 499 ft (152 m)

### APPROVED PAINT SCHEMES

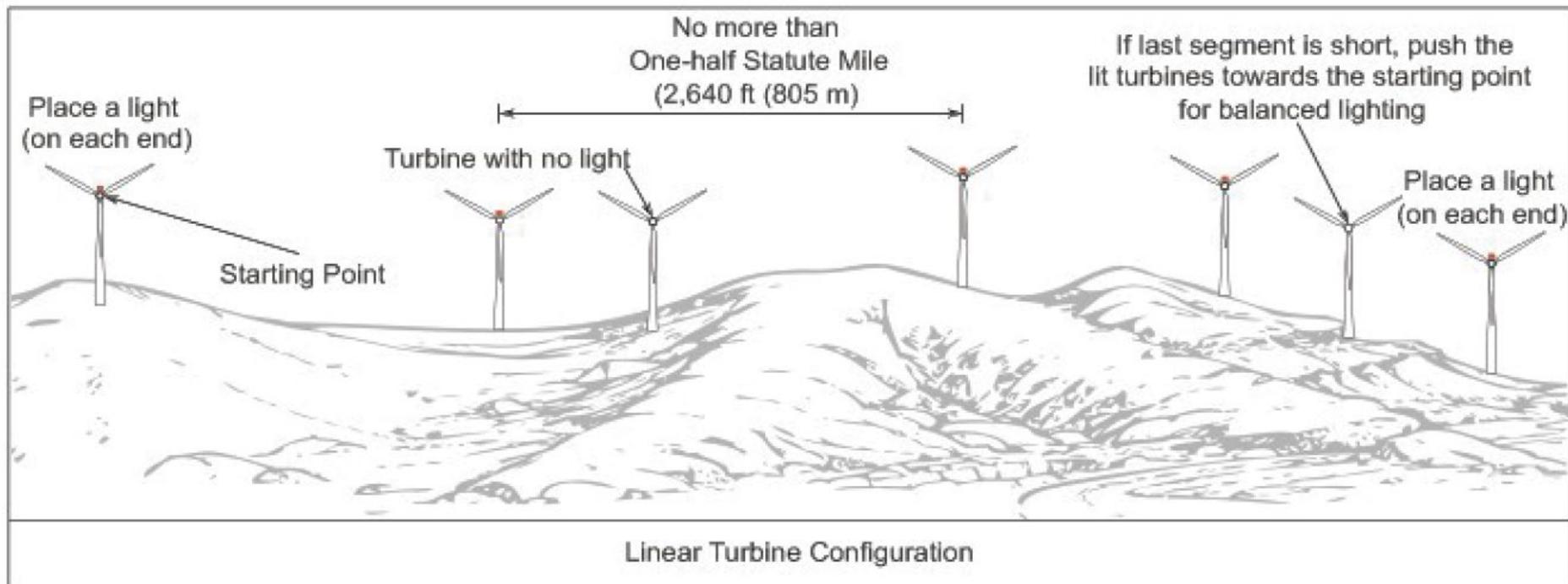


# Wind Turbine Lighting



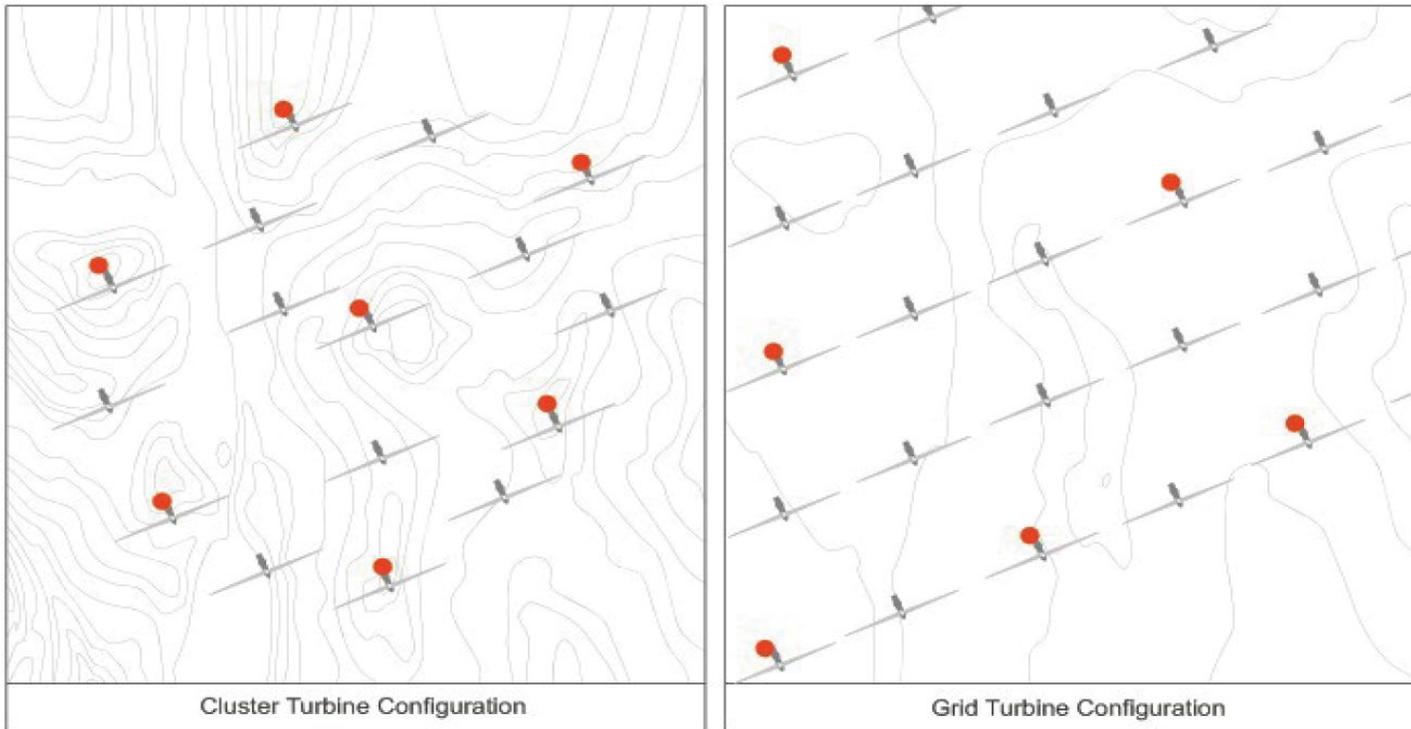
# Wind Farm Lighting Configurations

- Wind farms less than 500 feet AGL may qualify for reduced lighting (white paint only).
- Reduces nighttime lighting impact on local communities.
- Unlighted gaps can be no more than ½ statute.
- Three basic wind farm configurations; linear, cluster, grid.



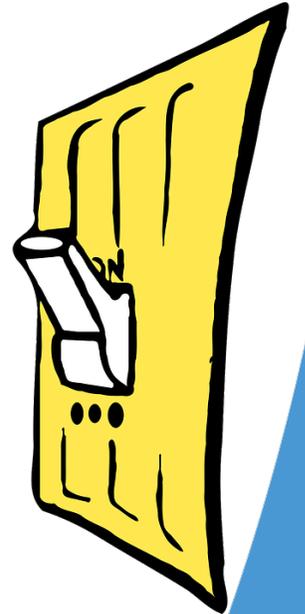
# Wind Farm Lighting Configurations

- Wind turbines greater than 499 feet AGL do not qualify for reduced lighting.
- Sponsor submits proposed wind farm M&L plan to OEG for review.
- Any change to the wind farm layout requires new M&L plan submittal.
- Very few wind turbines less than 500 feet AGL.



# Aircraft Detection Lighting System (ADLS)

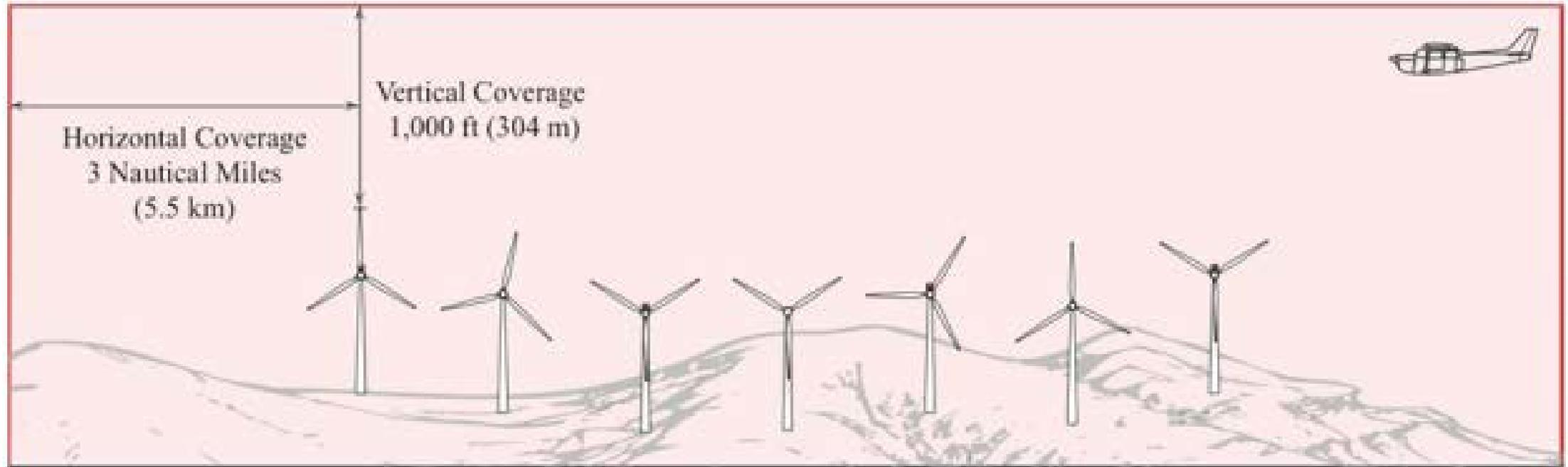
- Primarily used for wind farms.
- ADLS is basically a light switch that controls the obstruction lighting.
- Sensor-based systems designed to detect aircraft as they approach an obstruction or group of obstructions.
- Uses primary radar to detect approaching aircraft and activate the lighting system.
- Lights come ON when an aircraft is detected or if there is an ADLS system failure.
- Obstruction lights remain on until aircraft are clear of the ADLS coverage area.



# ADLS

- Horizontal radar detection = 3 NM perimeter.
- Vertical radar detection = 200 feet AGL up to 1,000 feet above the tallest wind turbine.
- Not always appropriate to use in some areas due to terrain limitations and other considerations (airports, VFR routes, MTRs, etc.).
- Multiple sensors may be necessary due to terrain masking.
- Lights must remain ON for those areas where required ADLS coverage is not available.
- Wind farm owner is responsible for continuously monitoring the ADLS operational status.

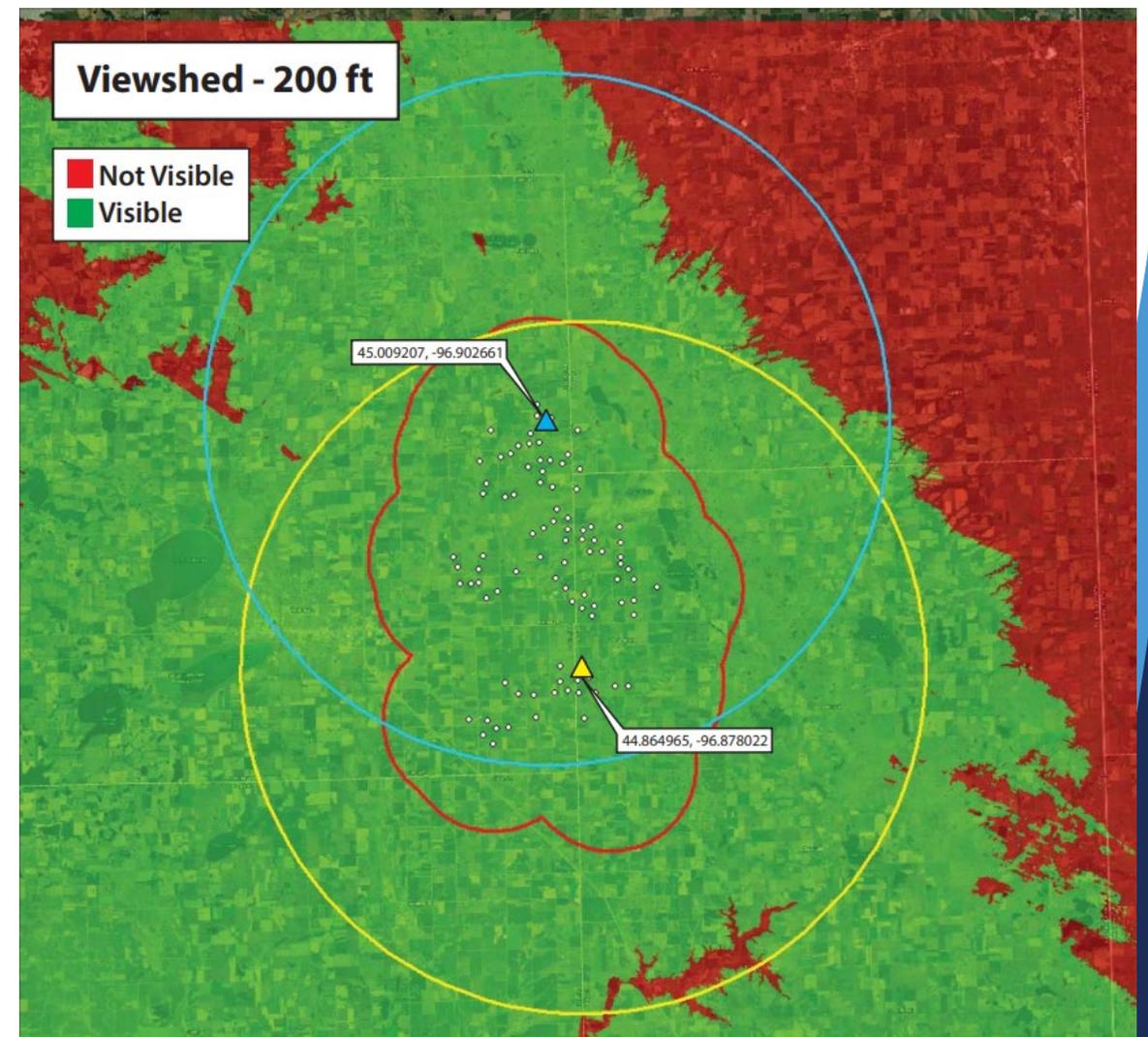
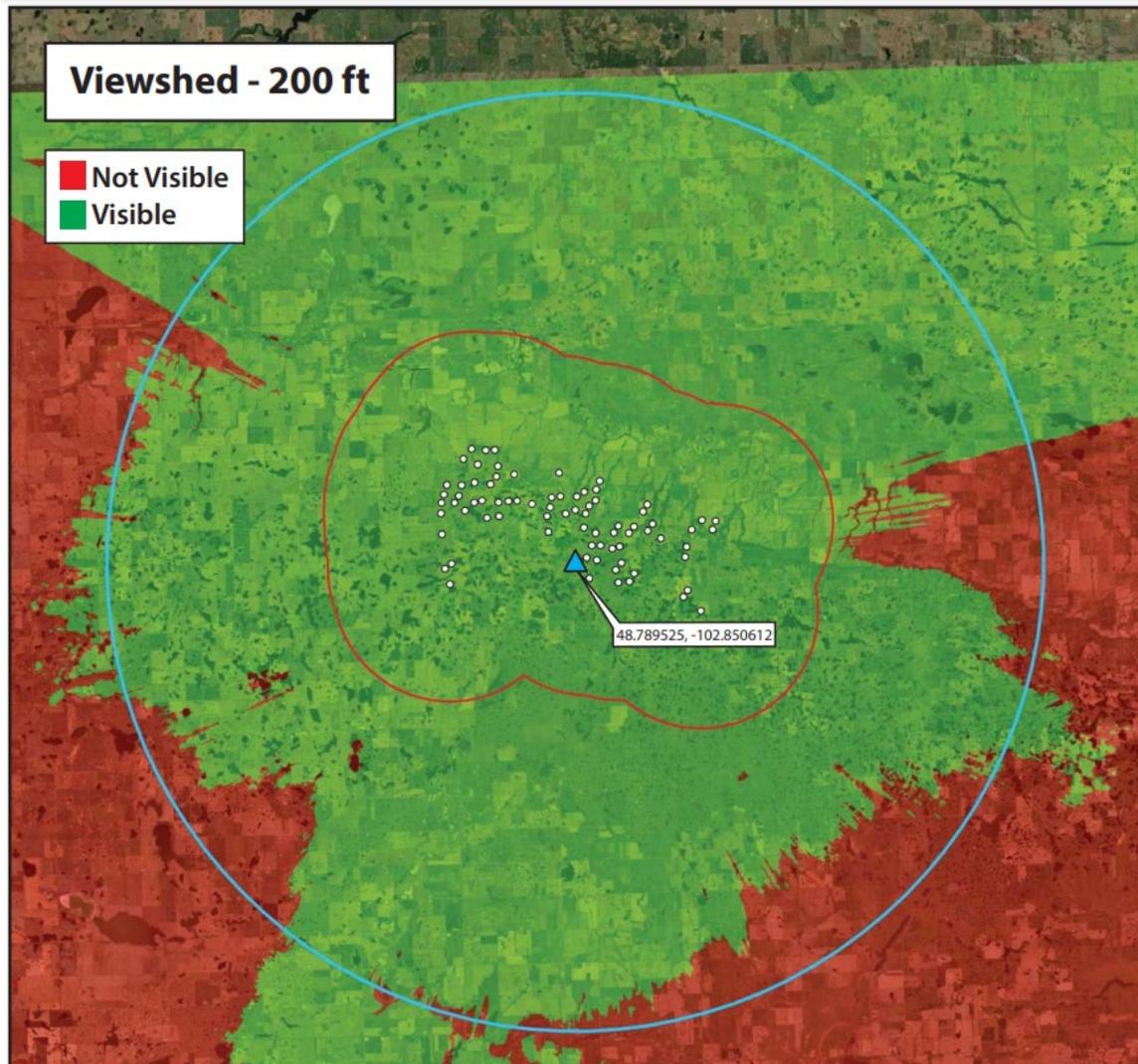
# ADLS Coverage Area



\* System above shown in active mode with aircraft in coverage area



# ADLS Coverage Area



# Typical ADLS Sensor Installation



# Typical ADLS Radar Site



# Sponsor's Role

## Owner/Operator requesting ADLS:

- Selects an approved ADLS vendor.
- Vendor provides all required documents (coverage maps, certifying statements, etc.).
- Vendor or owner/operator files FAA notice for an ADLS Marking and Lighting study through the FAA OEAAA website.
- Responsible for commissioning of newly installed ADLS.
- Files FAA supplemental notice when ADLS is activated / deactivated.
- Responsible for continuous monitoring of ADLS status.



# FAA's Role

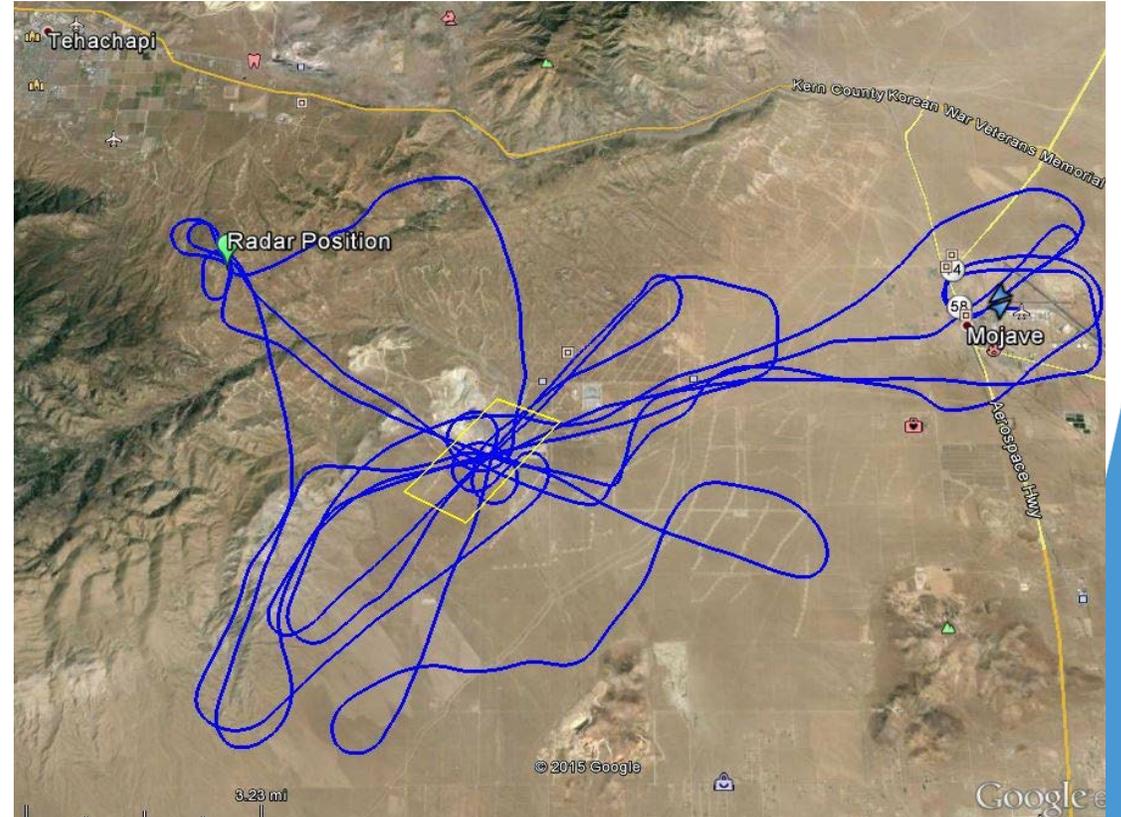
## Airports Safety Research and Development (R&D):

- Vendors contact R&D to request a review of their proposed ADLS system.
- Conducts ADLS on-site performance assessment which includes flight check.
- Ensures the ADLS is in compliance with Advisory Circular 70/7460-1.
- Publishes a one time “Technical Note” based on the vendor’s application for ADLS operation in the NAS.
- Technical Note states that the system has been inspected and meets the AC standards.
- Four systems (Terma, Laufer, Vestas, DeTect) with a valid FAA Technical Note.

# ADLS Performance Assessment



**Piper Tri-Pacer Used for Assessment**



**GPS Flight Track Data From the Aircraft**



# ADLS Performance Assessment

*ote technical note tech*

Performance Assessment of the Terma X-Band Obstruction Light Control System as an Aircraft Detection Lighting System (ADLS)

September 2018  
DOT/FAA/TC-TN16/41

This document is available to the U.S. public through the National Technical Information Services (NTIS), Springfield, Virginia 22161.

This document is also available from the Federal Aviation Administration William J. Hughes Technical Center at [actlibrary.tc.faa.gov](http://actlibrary.tc.faa.gov).



U.S. Department of Transportation  
Federal Aviation Administration

Technical Note



ADLS Sensor



# FAA's Role Continued

- **Obstruction Evaluation Group (OEG):**
- Reviews notices for ADLS submitted through the OEAAA system.
- Reviews all required documentation:
  - List of the structures controlled by the ADLS.
  - Radar coverage maps.
  - Certification letters.
  - Applicable ADLS Technical Note.
- Radar maps must depict required vertical and horizontal airspace coverage.
- May recommend that some wind turbines remain independent of the ADLS (terrain masking, airports, MTRs, VFR routes, etc.).
- Issues a marking and lighting recommendation letter for ADLS usage.

# ADLS Pros/Cons

## Pros:

- Several states have passed laws requiring light mitigation.
- Reduces the impact of nighttime lighting on nearby communities.
- Reduces the impact to migratory birds.
- Extends the life expectancy of the obstruction lights.

## Cons:

- Additional cost (installation, maintenance, software updates, etc.).
- Must be continuously monitored.
- Lighting outage complaints.
- Wind farms with ADLS are not depicted on aeronautical charts.



# ADLS Concerns

- Wind Farms with ADLS are uncharted.
- ADLS data currently not included in the DOF.
- Not practical near airports or areas with a high volume of night traffic.
- Pilots may expect to see a lighted windfarm and become disoriented while flying at night.
- Pilots could be distracted when the obstruction lights are suddenly activated by the ADLS.
- Pilots may confuse lighted wind farms with wind farms using ADLS.





# Questions / Comments?

Please visit  
<https://oeaaa.faa.gov>

# Useful Links

- Wind Turbine FAQ's (refer to questions 28, 29 ,30):
  - <https://oeaaa.faa.gov/oeaaa/external/searchAction.jsp?action=showWindTurbineFAQs>
- Marking and Lighting Advisory Circular (Chapter 10 ADLS):
  - [https://www.faa.gov/documentLibrary/media/Advisory\\_Circular/Advisory\\_Circular\\_70\\_7460\\_1M.pdf](https://www.faa.gov/documentLibrary/media/Advisory_Circular/Advisory_Circular_70_7460_1M.pdf) (AC chapter 10, ADLS)
- FAA approved vendors for ADLS:
  - <https://www.airporttech.tc.faa.gov/Products/Airport-Safety-Papers-Publications/Airport-Safety-Detail/PID/3682/mcat/3641/acat/2/evl/0/nsw/a/EDNSearch/adls>