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August 12, 2020

Via Electronic Mail

Mr. Brian L. Johnson
Special Assistant Attorney General
North Dakota Public Service Commission
600 E. Boulevard, Dept. 408
Bismarck, ND 58505-0480
brljohnson@nd.gov
ndpsc@nd.gov

In re: Brady Wind, LLC – Case No. PU-15-690
Brady Wind II, LLC – Case No. PU-16-042
Oliver Wind III, LLC – Case No. PU-16-123
Emmons-Logan Wind, LLC – Case No. PU-18-280
ADLS Information Request
Our File Nos. 035218-000046 & 035218-000064

Dear Mr. Johnson:

On behalf of Brady Wind, LLC, Brady Wind II, LLC, Oliver Wind III, LLC and Emmons-Logan Wind, LLC, enclosed for filing in the above-referenced matters is a consolidated response to the August 2, 2020 Aircraft Detection Lighting System (ADLS) Information Request.

Please do not hesitate to contact me with any additional questions.

Sincerely,

CROWLEY FLECK PLLP

Casey A. Furey

CAF/lh
Enc.

cc: Tracy Davis (*via email*)

STATE OF NORTH DAKOTA
PUBLIC SERVICE COMMISSION

Brady Wind, LLC **Brady Wind Energy Center – Stark County** **Siting Application**	**Case No. PU-15-690**
Brady Wind II, LLC **Brady II Wind Energy Center – Stark & Hettinger Counties** **Siting Application**	**Case No. PU-16-042**
Oliver Wind III, LLC **Oliver III Wind Energy Center – Oliver & Morton Counties** **Siting Application**	**Case No. PU-16-123**
Emmons-Logan Wind, LLC **Emmons-Logan Wind Energy Center – Emmons & Logan Counties** **Siting Application**	**Case No. PU-18-280**

CONSOLIDATED RESPONSE TO DATA REQUEST

The following information is provided in response to Commission Staff's August 2, 2020 Aircraft Detection Lighting System (ADLS) Information Request pertaining to the Brady Wind Energy Center, Brady II Wind Energy Center, Oliver III Wind Energy Center, and the Emmons-Logan Wind Energy Center (collectively, the "Wind Facilities")[1] and filed in the above-referenced cases. Because the Wind Facilities utilize the same type of ADLS technology, the information set forth herein is largely applicable to each facility and a consolidated response is provided on behalf of the Wind Facilities with input from the ADLS manufacturer, DeTect, Inc. (DeTect).

[1] The Wind Facilities are owned and operated by the following companies, respectively: Brady Wind, LLC; Brady Wind II, LLC; Oliver Wind III, LLC; and Emmons-Logan Wind, LLC which are indirect, wholly owned subsidiaries of NextEra Energy Resources, LLC.

1. **NDPSC Question No. 1**: **Who is the manufacturer of your ADLS system and what systems are in place to collect data regarding ADLS operations?**

    a. **Can the system determine if an aircraft caused the mitigation of the ADLS system or if it was caused by something else?**

    b. **Please provide in percentages what is mitigating the ADLS system.**

RESPONSE: The Wind Facilities utilize ADLS manufactured by DeTect. Specifically, the Wind Facilities utilize the DeTect Harrier model ADLS.

The Harrier ADLS operates as follows to control the turbine lights at each of the Wind Facilities: When a target comes within 3.5 nautical miles (4.028 miles) of the boundary of the Wind Facilities, the ADLS radar system detects that target and the ADLS will activate the lights on the turbines and meteorological towers (MET). The Federal Aviation Administration (FAA) requires the lights to be on when there is a target within three nautical miles (3.45 miles) around every turbine, in order to ensure proper notification to aircraft within this boundary. DeTect recommended increasing that boundary by 0.5 nautical miles (0.58 miles) to ensure the turbine lights are on before a target is within the FAA-required boundary. In addition to detecting targets within this 3.5-nautical mile boundary, the Harrier ADLS also includes a secondary sensor that will detect whether certain aircraft are flying at 2,500 feet or below over the Wind Facilities, and activate the lights, if so. This secondary sensor detects aircraft that are equipped with transponders using Automatic Dependent Surveillance-Broadcast (ADSB) transmitter/receivers.[1] This is an additional safety precaution that helps detect low-flying aircraft over the facilities.

Safety is the Wind Facilities' highest priority in operating the ADLS at each site. The ADLS is a relatively new technology, and the Wind Facilities' understanding and operational experience with this technology continues to evolve. The Wind Facilities' operations teams continue to work with DeTect to fine tune the ADLS and improve the systems' performance based on data collected at each site. For example, by identifying specific conditions of the areas around each facility (*e.g.*, amount and timing of road traffic, farming operations, or avian species in the area), and by developing and implementing filters and masking features that keep the lights turned off when the ADLS is triggered by a cause that is not an aircraft (*e.g.*, road traffic or tractors), the teams are working to decrease the amount of time that the ADLS activates the turbine lights. These types of features aim to reduce the number of false positives that activate traditional lighting, and thereby safely decrease the amount of time that the turbine lights are turned on. However, implementing these filters and masking features takes operational time to understand the specific local features at each site and ensure the ADLS is not missing correctly identified aircraft targets.

To assist in these efforts, the Wind Facilities and DeTect collect and store data in a Microsoft SQL server database. The data collected consists of information regarding ADLS operations at each of the Wind Facilities, track data of targets the radar has detected, event data

[1] The FAA requires that commercial aviation and helicopters are required to be equipped with transponders with Mode C or S, or ADSB technology.

about light activation periods and the cause, as well as information that is unique to each site, like the sunrise and sunset time periods that assist with report summaries. The Wind Facilities and DeTect then work to interpret this data and utilize it to continue to improve ADLS performance.

a. The Wind Facilities interpret this question to be asking if the system can determine whether an aircraft or something else caused the ADLS to activate the turbine lights at the Wind Facilities (*i.e.*, to turn the turbine lights "on"). The Wind Facilities' operations teams and DeTect are able to utilize the data collected regarding each system's operations to determine whether the ADLS was triggered by an aircraft or some other cause. This analysis is a manual process that involves human interpretation of the data that is collected regarding conditions that may have triggered the ADLS to turn the lights on. As noted above, the Wind Facilities and DeTect use these determinations to improve ADLS operations. For example, site-specific data is being used to develop and implement masking features on the systems.

b. Based upon the Wind Facilities' and DeTect's analyses of the data collected to date, there are a number of causes that have mitigated the ADLS (*i.e.*, have triggered the ADLS to turn the turbine lights on). These causes include aircraft, weather events, avian species, tractors and other farming operations, and road traffic.

In addition, the FAA requires that the ADLS at each facility be tested at least once every 24 hours. The Wind Facilities and DeTect conduct this testing at night because the turbine lights do not turn on during daytime hours. This nightly test, which turns the lights on for 5 minutes and 30 seconds, is a required safety feature to ensure that the ADLS is operating safely and that the lights will turn on if necessary to notify an aircraft of the wind turbines.

Finally, the FAA requires the lights to default to turn "on" if the ADLS detects an issue with the radar or communications systems.

The Wind Facilities do not have a detailed breakdown in percentages of the different ADLS triggers since the systems were installed. As explained above, it is a manual process for the Wind Facilities' operations teams and DeTect to evaluate and determine the different causes that may have triggered the ADLS to activate at any given time.

2. NDPSC Question No. 2: Typically, what percentage of the lights are required to be in continuous operation?

a. Please provide the reason for their continuous operation.

RESPONSE:

The FAA determines the percentage of turbine lights that are required to remain in continuous operation on a site-by-site basis during its consideration of each site's ADLS. Through this process, the FAA required that one turbine light out of 159 turbines at the combined Brady Wind Energy Center and Brady II Wind Energy Center sites[1] (or approximately 0.6 percent of the total Brady and Brady II turbines) maintain traditional FAA obstruction lighting that is in

[1] Due to their proximity in location, the Brady Wind Energy Center and Brady II Wind Energy Center utilize a single ADLS, which consists of three separate radar towers.

continuous operation. All turbines at the Oliver III Wind Energy Center and the Emmons-Logan Wind Energy Center are equipped with ADLS lighting.

a. The turbine light at the Brady Wind Energy Center that is required to remain in continuous operation is due to FAA requirements. For other instances where the lights may be on at any given time, please see the Wind Facilities' response to Question 1(b), above.

3. NDPSC Question No. 3: Typically, how often are the lights mitigated by the ADLS system?

a. Please provide the response in percentage of time they are mitigated.

b. If there is a large variance between projects, please list them individually.

RESPONSE:

The Wind Facilities interpret this request as asking how often the ADLS turns the turbine lights off. Please see below for the average percentages of time that the turbine lights have been both off and on at each facility during the night, on a monthly basis.

Since installation of the ADLS, the Wind Facilities have continued to work with DeTect to identify site-specific conditions and features, such as the amount and timing of farming operations and road traffic in the areas near the sites. As described in the response to Question 1, this information allows DeTect and the Wind Facilities to fine tune the systems and to develop filters and masking features that reduce the number of false positives that occur at each site and ultimately reduce the amount of hours that the turbine lights are on. It is important to note that, in these efforts, safety, compliance with FAA requirements, and ensuring that the turbines are visible to nearby aircraft have remained and will continue to remain the Wind Facilities' highest priority and focus.

Through these efforts, the Wind Facilities have seen steady improvements in ADLS operations and a reduction in the number of hours per night that the turbine lights are on. The Wind Facilities continue to work closely with DeTect to improve this performance further.

Brady Wind Energy Center and Brady II Wind Energy Center

Month	Average % of Nighttime Hours Turbine Lights Are Off	Average % of Nighttime Hours Turbine Lights Are On
January 2020	46.26%	53.74%
February 2020	46.80%	53.20%
March 2020	35.24%	64.76%
April 2020	34.35%	65.65%
May 2020	37.44%	62.56%
June 2020	78.73%	21.27%
July 2020	69.96%	30.04%

Oliver III Wind Energy Center

Month	Average % of Nighttime Hours Turbine Lights Are Off	Average % of Nighttime Hours Turbine Lights Are On
January 2020	34.17%	65.83%
February 2020	43.10%	56.90%
March 2020	38.56%	61.44%
April 2020	28.56%	71.44%
May 2020	21.33%	78.67%
June 2020	65.64%	34.36%
July 2020	63.95%	36.05%

Emmons-Logan Wind Energy Center

Month	Average % of Nighttime Hours Turbine Lights Are Off	Average % of Nighttime Hours Turbine Lights Are On
February 2020	62.98%	37.02%
March 2020	41.72%	58.28%
April 2020	41.33%	58.67%
May 2020	64.68%	35.32%
June 2020	69.19%	30.81%
July 2020	63.90%	36.10%

4. NDPSC Question No. 4: What are the impediments to more frequent light mitigation?

RESPONSE:

In operating the ADLS, the Wind Facilities' primary objective is safety and providing proper notice to aircraft in the area. As described in the response to Question 1, FAA requirements mandate that the turbine lights turn on in the event there is a trigger within the ADLS boundary

around the turbines, during system testing, or if the system detects any potential issue with the radar or communication systems. The turbine lights at the Wind Facilities are on for a variety of reasons, including aircraft in the area, weather events, avian species, and ADLS testing and maintenance. Additionally, the systems have been triggered by road traffic and farming operations resulting in false positives. The Wind Facilities continue working with DeTect to improve system performance and to safely decrease the number of hours that the turbine lights are on at each site.

5. NDPSC Question No. 5: What other data or information can you provide based upon the company's experience with ADLS so far?

RESPONSE:

As explained above, the Wind Facilities' experience with the ADLS, which is a relatively new technology, continues to evolve as the Wind Facilities gain more operational experience with the systems. Included as Attachment 1 is additional technical information regarding the Harrier ADLS.

In the months since installation of the ADLS at the Wind Facilities, the companies and DeTect have continued to fine tune the systems and implement masking features and filters to customize the ADLS technology to the specific conditions at each site, based upon the specific areas in which the Wind Facilities operate, to reduce false positives and safely decrease the time the turbines lights are on, with safety of aircraft and compliance with FAA requirements as the Wind Facilities' number one priority.

For example, the Wind Facilities and DeTect implemented a masking feature at the Wind Facilities on August 7, 2020 to ensure that the ADLS does not respond to farming operations or road traffic in the project areas. The Wind Facilities and DeTect are actively monitoring the success of these features and propose to submit a further informational update to the Commission regarding these efforts by the end of November 2020.

Response Nos. 1-5 contained herein are provided by Brady Wind, LLC, Brady Wind II, LLC, Oliver Wind III, LLC, and Emmons-Logan Wind, LLC, with input from DeTect, Inc.

Technical Data Sheet

HARRIER

Aircraft Detection Lighting System

HARRIER

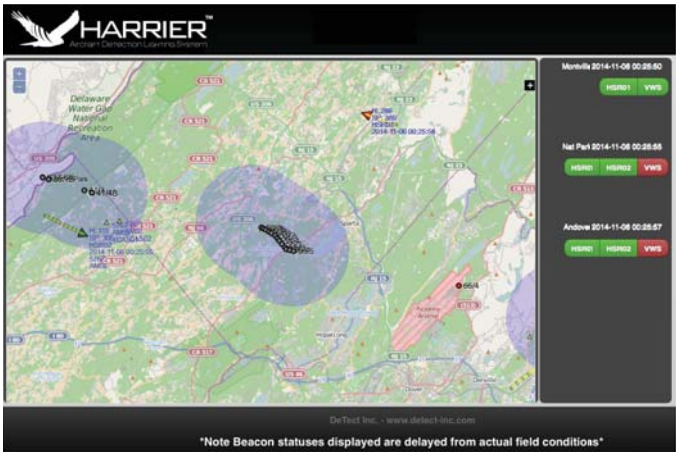
Aircraft Detection Lighting System

SUMMARY SPECIFICATIONS

subject to change without notice

Model :	ADLS-200d
Application:	High resolution, airspace surveillance with automatic activation of obstruction lighting when aircraft are detected approaching to within defined perimeters
Configuration:	Fully self-contained fixed system for obstruction lighting activation for wind farm, power transmission, communication and other projects that require automated obstruction lighting
Sensors:	200 watt solid state S- or X-band radar sensors with Doppler processing; Automatic Dependent Surveillance - Broadcast (ADS-B) secondary surveillance for cooperative aircraft
Operation:	Extended range detection of cooperative (transponder equipped) & non-cooperative aircraft & ultralights with automatic activation of obstruction warning lights at user-defined perimeters (10 mile minimum recommended)
Operating Range:	Full 360 degree 3D coverage with detection to 20 miles
Power:	110/220 VAC, 60/30 amps service with UPS back-up & power conditioning (30 minutes) & optional auto-start single or dual 6 kW propane or diesel generator & fuel tank to support 10-20 days 24-7 operation
Network:	TCPIP connection supports multi-user web remote real-time system display, control & data access via fiber optic

ABOVE: The HARRIER ADLS is typically supplied as a fixed, self-contained skid mounted system for ground based installation.
BELOW: HARRIER ADLS web display



Advantages of the *HARRIER ADLS*

- Longer range detection provides greater safety margin
- ADS-B receivers for detection backup
- Fewer sensors required for complete coverage
- Ground-based sensors with lower installation & O&M costs
- Based on FAA tested, military-grade technology
- Advanced solid-state Doppler technology
- Meets or exceeds all FAA, Transport Canada and European requirements
- Multi-functional capable for ADLS, site security & bird detection from a single sensor
- Fully compatible with all SCADA systems and turbines
- ADS-B integration minimizes lighting activation from high altitude commercial aircraft

Attachment 1

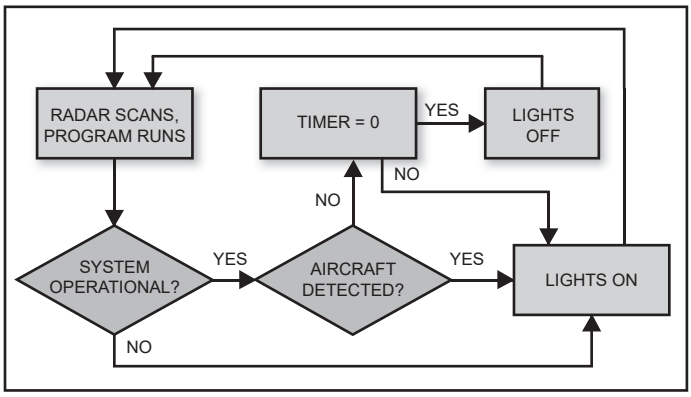
Technical Data Sheet
Aircraft Detection Lighting System

Many stakeholders recognize the environmental and social impacts of obstruction lighting at wind farms and similar project sites and are exploring strategies to mitigate the impact on surrounding communities. In response, DeTect developed the HARRIER Aircraft Detection Lighting System (ADLS), an advanced ground radar-based ADLS using high-resolution airspace surveillance with automated activation of wind farm obstruction lighting when aircraft are detected within defined parameters. DeTect HARRIER ADLS systems are currently operating in the US, Canada and Europe.

The HARRIER ADLS system provides extended-range detection of cooperative and noncooperative aircraft, including ultralight aircraft, with 360-degree coverage and detection up to 20 miles range, but only aircraft entering a custom configured exclusion zone will trigger the activation of the obstruction lighting. The HARRIER ADLS is also multi-function capable and can provide site security for aircraft, ultralights, and drones as well as bird detection for environmental monitoring and risk mitigation. The system is fully networkable and remotely controllable with real-time data display, data transmission, diagnostics, and Health and Status Monitoring (HSM).

DeTect's ADLS uses patented Operational Risk Management (ORM) algorithms and operates in a failsafe manner where the lights are held in an 'ON' state by the system unless a target is not detected within the defined risk zone. When the sensors detect an aircraft, the obstruction lights are activated. A "heartbeat" indicator provides constant system status reading of the ADLS and its network. Should the ADLS go offline, or heartbeat indicator lost, the lights will automatically activate and remain illuminated until the system returns online.

BELOW: Typical HARRIER logic diagram



HARRIER uses an advanced solid-state S- or X-Band Doppler surveillance radar that has the ability to penetrate into moderate rain. The HARRIER ADLS logic always errs on the side of safety and if severe weather is detected by the HARRIER system, the system will automatically activate the lights. The HARRIER ADLS also incorporates Automatic Dependent Surveillance – Broadcast (ADS-B) receivers. The radar sensors and ADS-B antennas are ground-based resulting in lower installation and O&M cost over the life of the project. The system electronics can be located at the radars (generally on the perimeter of the site) or can be remotely located at a central facility equipment room up to 50 miles away for ease of O&M and for security (requires broadband fiber network).

BELOW: HARRIER Utility tower installation

The HARRIER system is based on DeTect's MERLIN radar software and hardware platforms originally developed to detect and track low altitude, variable radar cross section (RCS), irregularly moving targets. HARRIER is not a modified aircraft or ship tracking system and all detection and tracking algorithms were specifically developed and programmed to 'look' for and follow targets with these complex characteristics to provide highly sensitive, reliable operation. DeTect's HARRIER radar processing software is user customizable and software definable to 'tune' the system to detect, track, and display only targets within the user desired target class based on a variety of parameters that include size, speed and track characteristics. Additionally, by using the S-band 3050 MHz frequency range, DeTect greatly minimizes the likelihood of frequency conflict with other systems such as air traffic control, weather radars, and communications networks.