Exhibit F - Appeal

Executive Summary

Dark Sky Lighting Standard
MCC 39.6850, MCC 37.7740 (A) (B)

INTRODUCTION:

Preserving and protecting the Dark Skies in unincorporated Multnomah County in rural land east of the Sandy River is an important environmental concern. Unfortunately, the proposed cell tower to be constructed by Verizon is being constructed on a site in navigable airspace and requires FAA flashing red/white obstruction marker lights. The Appeal is to bring to the attention of Multnomah County Land Use that Dark Skies compliance can be adhered to.

ARGUMENT:

After study of Chapter 39, it was noticed that Multnomah County Land Use (MCLU) did not include Dark Sky Lighting code [MCC 39.7740 (8) (a) and (b)] that pertains to WCF in lands not zoned EFU for BlackRock/Verizon to comply to.

Ordinance 958 is an ordinance that amended Chapter 35 (East of Sandy River Rural Plan Area), at the time, to specifically address Wireless Cell Towers and provide standards for the appropriate location, regulation and development of Wireless Communications Facilities and Declaring an Emergency. It has since then been absorbed comprehensively into Chapter 39. MCC 39.7700-39.7765 contain the amendments of ordinance 958.

Since the proposed site is located east of the Sandy River, the code for Dark Sky Lighting Standard MCC 39.7740 (8) (a) and (b) should also be adhered to in addition to MCC 39.6850.

MCC 39.7740 Code is: APPROVAL CRITERIA FOR LANDS NOT ZONED EXCLUSIVE FARM USE.

To be approved all applications for Planning Director Review, Community Service Review or Building Permit Review of a wireless communications facility (WCF) **shall** demonstrate compliance with the following:

(A) Siting Requirements.

(8) Lighting.

(a) A new WCF shall only be illuminated as necessary to comply with FAA or other applicable state and federal requirements.

(b) No other exterior lighting shall be permitted on premises.

It is understood that MCC 39.7740 (Non-EFU Land) is compatible with MCC 39.6580 (MUA-20) but in accordance with MCC 39.7740 (A) (8) (a), to be illuminated as necessary to comply with FAA or other requirements, the proposed cell tower can remain compliant to FFA's requirement of marker lighting by installing an Aircraft Detection Lighting System. This type of lighting system has been added to the FAA Advisory Circular 70/7460-1L (**see Chapter 14 – Exhibits MAK4 and MAK6**) and has been approved by FAA and meets all FAA lighting requirements. This technology reduces the impact of nighttime lighting on nearby communities and on migratory birds and extends the life expectance of obstruction lights.

In short, this lighting is developed in response to the Dark Sky initiative to reduce light pollution and customer demand. It provides reliable continuous 360 degree radar surveillance of the airspace around communication towers (WCF) that automatically issues signals to activate obstruction lighting when aircraft are detected at a defined outer perimeter. This lighting system meets and exceeds all regulatory requirements including FAA as stated above.

Paul Holmquist, Specialist, FAA Obstruction Evaluation Group, who is the FAA contact person on BlackRock's Aeronautical Study 2017-ANM-948-OE, was contacted concerning the Aircraft Detection Lighting System and Dark Sky Standards. He noted that obstruction marking and lighting is required but that environmental issues (Dark Sky Standard Compliance) is an issue outside the scope of Part 77 and defers to local zoning code."(**See Exhibit MAK5**) Since this type of lighting is deferred to local zoning code, this lighting system is a way Multnomah County Land Use can uphold the code for Dark Sky Standards - an important environmental issue that needs protected. Therefore, this type of lighting system gives Multnomah County Land Use an avenue to keep the rural area east of the Sandy River protected from obtrusive flashing red/white lights and a protected dark sky a reality.

Within the "Notice of Decision" under "Conditions of Approval" (6) (h) Multnomah County Land Use noted that BlackRock LLC needs to:

> *Ensure that any exterior lighting associated with the WCF that is not required by the Federal Aviation Administration or other governmental body shall meet the definition of Dark Sky Lighting pursuant to MCC 39.6850.*

Although they need to comply with MCC 39.6850, **MCC 39.7740 (A) (8) (b),** that states that no other exterior lighting shall be permitted on premises, but BlackRock/Verizon is proposing an exterior light on ground equipment (reflected downward)" (**See Exhibit Z**). This is in violation of this code.

CONCLUSION:

Although Multnomah County Land Use code exempts cell tower lighting from complying with Dark Sky Standards (MCC 39.6850 and MCC 39.7740 (A) (8) (a), there is a way that MCLU can mitigate the very important environmental concern of protecting and preserving the Dark Skies in our rural community east of the Sandy River by requesting that Verizon remain Dark Sky compliant by installing an Aircraft Detection Lighting System.

EXHIBITS:

MAK5 – Email response from Paul Homquist, FAA Obstruction Evaluation Group Specialist
MAK4 – FAA Advisory Circular that notes the addition of Chapter 14 that covers Aircraft Detection Lighting Systems
MAK6 – FAA Advisory Chapter 14
MAK7 – Harrier Aircraft Detection Lighting System information
MAK12 – Information about Aircraft Detection Lighting Systems
Exhibit Z – The additional light that is not allowed [see MCC 39.7740 (A) (8) (b)]

Exhibit MAK4

U.S. Department
of Transportation
Federal Aviation
Administration

Advisory Circular

Subject: Obstruction Marking and Lighting **Date:** 12/04/15 **AC No:** 70/7460-1L
Initiated By: AJV-15

1. **Purpose.**
This Advisory Circular (AC) sets forth standards for marking and lighting obstructions that have been deemed to be a hazard to navigable airspace.

2. Advisory Circular 70/7460-1L is effective immediately. However, flashing L-810 lighting has a delayed effective date and becomes mandatory on September 15, 2016.

3. **Cancellation.**
Advisory Circular 70/7460-1K, Obstruction Lighting and Marking, dated February 1, 2007, is cancelled.

4. **Principal Changes.**
The principal changes in this AC are:

1. The height of a structure identified as an obstruction has been lowered from 500 feet above ground level (AGL) to 499 feet above ground level, by amendment to Title 14 Code of Federal Regulations (14 CFR) Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace* (75 Federal Register 42303, July 21, 2010). Accordingly, all structures that are above 499 feet AGL are considered obstructions and the Federal Aviation Administration (FAA) will study them to determine their effect on the navigable airspace. This will ensure that all usable airspace at and above 500 feet AGL is addressed during an aeronautical study and that this airspace is protected from obstructions that may create a hazard to air navigation.
2. Standards for voluntary marking of meteorological evaluation towers (METs), less than 200 feet above ground level (AGL), has been added to provide recommendations towards increasing conspicuity of these structures, particularly

for low-level agricultural flight operations. These standards include those for lighting and marking of the tower and associated guy wires.

3. A new Chapter 14, Aircraft Detection Lighting Systems, has been added to provide performance standards for these types of systems.
4. New lighting and marking standards are provided to reduce impact on migratory bird populations.
5. Medium-intensity white and medium-intensity dual obstruction light are now authorized on towers up to and including 700 feet AGL.
6. Editorial changes have been made.

5. **Related Reading Material.**

1. Advisory Circular 150/5345-43, Specification of Obstruction Marking and Lighting.
2. 14 CFR Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace.

6. **Application.**

The FAA recommends the guidelines and standards in this AC for determining the proper way to light and mark obstructions affecting navigable airspace. This AC does not constitute a regulation and, in general, is not mandatory. However, a sponsor proposing any type of construction or alteration of a structure that may affect the National Airspace System (NAS) is required under the provisions of Title 14 Code of Federal Regulations to notify the FAA by completing the Notice of Proposed Construction or Alteration form (FAA Form 7460-1). These guidelines may become mandatory as part of the FAA's determination and should be followed on a case-by-case basis, as required.

7. **Comments or Suggestions.**

Direct comments or suggestions regarding this AC to:

Manager, Obstruction Evaluation Group
Federal Aviation Administration
ATTN: AJV-15
800 Independence Avenue, S.W.
Washington, DC 20591

Jodi S. McCarthy

Jodi S. McCarthy
Director, Airspace Services

Exhibit MAK6

CHAPTER 14. AIRCRAFT DETECTION LIGHTING SYSTEMS

14.1 **Purpose.**

Aircraft Detection Lighting Systems (ADLS) are sensor-based systems designed to detect aircraft as they approach an obstruction or group of obstructions; these systems automatically activate the appropriate obstruction lights until they are no longer needed by the aircraft. This technology reduces the impact of nighttime lighting on nearby communities and migratory birds and extends the life expectancy of obstruction lights.

14.2 **General Standards.**

14.2.1 The system should be designed with sufficient sensors to provide complete detection coverage for aircraft that enter a three-dimensional volume of airspace, or coverage area, around the obstruction(s) (see Figure A-27 in Appendix A), as follows:

1. Horizontal detection coverage should provide for obstruction lighting to be activated and illuminated prior to aircraft penetrating the perimeter of the volume, which is a minimum of 3 NM (5.5 km) away from the obstruction or the perimeter of a group of obstructions.
2. Vertical detection coverage should provide for obstruction lighting to be activated and illuminated prior to aircraft penetrating the volume, which extends from the ground up to 1,000 feet (304 m) above the highest part of the obstruction or group of obstructions, for all areas within the 3 NM (5.5 km) perimeter defined in subparagraph 14.2.1 1 above.
3. In some circumstances, it may not be possible to meet the volume area defined above because the terrain may mask the detection signal from acquiring an aircraft target within the 3 NM (5.5 km) perimeter. In these cases, the sponsor should identify these areas in their application to the FAA for further evaluation.
4. In some situations, lighting not controlled by the ADLS may be required when the 3 NM (5.5 km) perimeter is not achievable to ensure pilots have sufficient warning before approaching the obstructions.

14.2.2 The ADLS should activate the obstruction lighting system in sufficient time to allow the lights to illuminate and synchronize to flash simultaneously prior to an aircraft penetrating the volume defined above. The lights should remain on for a specific time period, as follows:

1. For ADLSs capable of continuously monitoring aircraft while they are within the 3 NM/1,000 foot (5.5 km/304 m) volume, the obstruction lights should stay on until the aircraft exits the volume. In the event detection of the aircraft is lost while being continuously monitored within the 3 NM/1,000 foot (5.5 km/304 m) volume, the ADLS should initiate a 30-minute timer and keep the obstruction lights on until the timer expires. This should provide the untracked aircraft sufficient time to exit the area and give the ADLS time to reset.

2. For ADLSs without the capability of monitoring aircraft targets in the 3 nm/1,000 foot (5.5 km/304 m) volume, the obstruction lights should stay on for a preset amount of time, calculated as follows:

   a. For single obstructions: 7 minutes.

   b. For groups of obstructions: (the widest dimension in nautical miles + 6) x 90 seconds equals the number of seconds the light(s) should remain on.

14.2.3 Acceptance of ADLS applications will be on a case-by-case basis and may be modified, adjusted, or denied based on proximity of the obstruction or group of obstructions to airports, low-altitude flight routes, military training areas, or other areas of frequent flight activity. It may be appropriate to keep certain obstructions closest to these known activity areas illuminated during the nighttime hours, while the remainder of the group's obstruction lighting is controlled by the ADLS.

14.2.4 Project sponsors requesting ADLS use should include in their application maps or diagrams indicating the location of the proposed sensors, the range of each sensor, and a visual indication showing how each sensor's detection arc provides the full horizontal and vertical coverage, as required under paragraph 14.2.1. In the event that detection coverage is not 100 percent due to terrain masking, project sponsors should provide multiple maps or diagrams that indicate coverage at the affected altitudes. A sample diagram is shown in Figure A-27 in Appendix A.

14.2.5 Types of ADLS Component or System Failure Events.

1. In the event of an ADLS component or system failure, the ADLS should automatically turn on all the obstruction lighting and operate in accordance with this AC as if it was not controlled by an ADLS. The obstruction lighting must remain in this state until the ADLS and its components are restored.

2. In the event that an ADLS component failure occurs and an individual obstruction light cannot be controlled by the ADLS, but the rest of the ADLS is functional, that particular obstruction light should automatically turn on and operate in accordance with this AC as if it was not controlled by an ADLS, and the remaining obstruction lights can continue to be controlled by the ADLS. The obstruction lighting will remain in this state until the ADLS and its components are restored.

3. Complete light failure should be addressed in accordance with Chapter 2 paragraph 2.4.

14.2.6 The ADLS's communication and operational status shall be checked at least once every 24 hours to ensure both are operational.

14.2.7 The ADLS should be able to detect an aircraft with a cross-sectional area of 1 square meter or more within the volume, as required in subparagraphs 14.2.1 1 and 14.2.1 2.

14.2.8 Each ADLS installation should maintain a log of activity data for a period of no less than the previous 15 days. This data should include, but not be limited to, the date, time, duration of all system activations/deactivations, track of aircraft activity,

maintenance issues, system errors, communication and operational issues, lighting outages/issues, etc.

14.2.9 Operational Frequencies.

1. Unlicensed devices (including FCC Part 15) devices cannot be used for this type of system.
2. Any frequency used for the operation of ADLS must be individually licensed through the FCC.

14.3 **Voice/Audio Option.**

14.3.1 ADLS may include an optional voice/audio feature that transmits a low-power, audible warning message to provide pilots additional information on the obstruction they are approaching.

14.3.2 The audible transmission should be in accordance with appropriate FAA and FCC regulations.

14.3.3 The audible transmission should be over an aviation frequency licensed by the FCC and authorized under the Code of Federal Regulations Title 47- Part 87.483 (excluding 121.5 MHz).

Note: Using air traffic control frequencies in the 117.975-MHz to 137-MHz frequency band is prohibited for this operation.

14.3.4 The audible message should consist of three quick tones, followed by a verbal message that describes the type of obstruction the system is protecting. Appropriate terms to be used include tower(s), wind turbine(s), or power line(s).

14.3.5 The audible message should be repeated three times or until the system determines the aircraft is no longer within the audible warning area defined in the following paragraph.

14.3.6 The audible message should be considered as a secondary, final warning and should be activated when an aircraft is within 1/2 NM (926 m) horizontally and 500 feet (152 m) vertically of the obstruction. The use of, or variation to, the audible warning zone may occur, depending on site-specific conditions or obstruction types.

Exhibit MAK5

From: Holmquist, Paul (FAA)
Sent: Wednesday, September 16, 2020 1:30 PM
To: mark
Subject: RE: Aeronautical Study # 2017-ANM-948-OE

Alison, environmental restrictions/issues are outside the scope of Part 77. Our study results in findings related to the safe use and preservation of airspace. Federal, State or local jurisdiction can use environmental rules to be more restrictive than findings from a Part 77 related study (such as denying a building permit) but cannot be less restrictive (i.e. removing the requirement for marking and lighting). A local requirement for the use of a sensor based lighting system doesn't affect the findings as long as the system meets the established FAA requirements and the owner goes through the proper procedures with the FAA to get the system approved.

Paul Holmquist
206-231-2990
Specialist, FAA Obstruction Evaluation Group
AJV-A5 Western Service Area (WSA)
Federal Aviation Administration
FAA Northwest Mountain Region
2200 S 216th Street
Des Moines, WA 98198
https://oeaaa.faa.gov

From: mark <maknieriem@comcast.net>
Sent: Wednesday, September 16, 2020 12:37 PM
To: Holmquist, Paul (FAA) <Paul.Holmquist@faa.gov>
Subject: Aeronautical Study # 2017-ANM-948-OE

Paul,

Thank you for taking my call a few days back. I have a question and a request.

My question is.....Does or has an environmental assessment been performed or required in conjunction to the aeronautical study 2017-ANM-948-OE? If so, do you have a copy or can you direct me to a copy of the environmental assessment?
In our last conversation, you shared that environmental issues such as using Sensor-Based Aeronautical Lighting System for environmental reasons are out of the FAA's jurisdiction and in the jurisdiction of the local zoning code. Would you be willing and able to put that in writing in the form of an email? Please send to maknieriem@comcast.net.

I greatly appreciate your response.

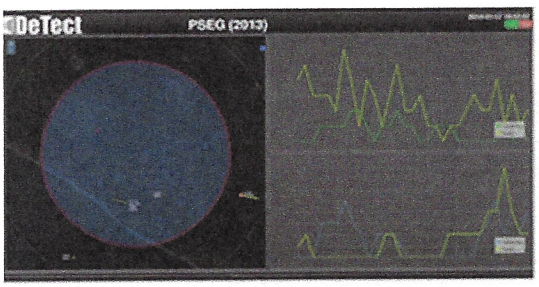
Thank you,
Alison Knieriem

Exhibit MAK12

Aircraft Detection Lighting Systems

In response to the Dark Sky initiative to reduce light pollution and customer demand, DeTect developed the HARRIER Aircraft Detection Lighting Systems (ADLS) for automatic obstruction lighting activation for aviation obstructions such as wind farm turbines, high voltage transmission lines and communication towers.

The HARRIER ADLS provides reliable, continuous 360 degree radar surveillance of the airspace around wind farms, communications towers, power lines and installations that require aircraft obstruction lighting from the ground level to above aircraft flight altitudes, automatically issuing signals to activate obstruction lighting when aircraft are detected at a defined outer perimeter. HARRIER is the most capable technology available and meets or exceeds all regulatory requirements including the recently issued US Federal Aviation Administration (FAA) Advisory Circular and Canadian NAVCAN requirements and well as various EU standards. The FAA Performance Assessment Report states that HARRIER ADLS system met "the performance requirements identified in Chapter 14 of AC 70/7460-1L" and is published on the **FAA Website** The HARRIER ADLS visual warning system additionally is compatible with all wind energy turbines, control and communication networks, and obstruction lighting systems.



The HARRIER ADLS collision avoidance system is based on DeTect's proven HARRIER ASR used for non-cooperative aircraft detection and UAV sense-and-avoid and the system provides aircraft detection out to 24+ miles with continuous tracking and lighting signal activation (through SCADA or direct interfaces). The HARRIER ADLS is highly customizable for each site and application with multiple alert zones and activation perimeters, and is

available as a stand-alone system or integrated with other sensors and warning devices such as audible beacons. The typical national standard (FAA, Transport Canada) minimum range is 3- 4 miles and HARRIER exceeds the expected minimum by a safety factor of more than 400%. Additionally, HARRIER's speed measurement and heading monitoring exceeds agency requirements for range for detection and activation. The HARRIER ADLS also provides continuous recording of operational data (aircraft detections and flight tracks, lighting activation events, and system information) to internal SQL Datasystem with customizable auto-reporting feature for recordkeeping and compliance documentation. With DeTect's MERLIN processor add-on, a HARRIER ADLS can additionally provide ADLS, bird radar and drone surveillance functionality from a common sensor platform.

HARRIER ADLS advantages include:

- Long range capability provides greater margin of safety.
- Compatible with all turbines, communication networks & lighting systems
- Low cost of acquisition & O&M State-of-the-art solid state
- High MTBF Doppler solid-state radar technology
- Lower installation cost, ground-based sensor packages
- Multi-function capable for bird & intruder detection
- Backed by full parts & labor warranty
- The HARRIER Aircraft Detection Lighting System is the most widely deployed and proven ADLS system on the market with systems installed and operating in the US, Canada and Europe.

Exhibit MAK7

ote technical note tech

Performance Assessment of the DeTect™ HARRIER® X-Band Aircraft Detection Lighting System (ADLS)

James Patterson, Jr.

July 2018

DOT/FAA/TC-TN17/58

U.S. Department of Transportation
Federal Aviation Administration

Technical Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
DOT/FAA/TC-TN17/58		

4. Title and Subtitle	5. Report Date
PERFORMANCE ASSESSMENT OF THE DETECT™ HARRIER® X-BAND AIRCRAFT DETECTION LIGHTING SYSTEM (ADLS)	July 2018
	6. Performing Organization Code: ANG-E261

7. Author(s)	8. Performing Organization Report No.
James Patterson, Jr.* and Garrison Canter**	

9. Performing Organization Name and Address		10. Work Unit No. (TRAIS)
Federal Aviation Administration* William J. Hughes Technical Center Aviation Research Division Airport Safety R&D Section Atlantic City International Airport, NJ 08405	SRA International, Inc.** A CSRA Company 1201 New Road Suite 242 Linwood, NJ 08221	11. Contract or Grant No.

12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
U.S. Department of Transportation Federal Aviation Administration Airport Engineering Division 800 Independence Avenue SW Washington, DC 20591	Technical Note
	14. Sponsoring Agency Code: AAS-100

15. Supplementary Notes

Mike DiPilato (FAA Airport Technology Research and Development Branch) and Joe Healey (SRA International, Inc.) provided technical support during this performance assessment.

16. Abstract

Federal Aviation Administration (FAA) Airport Technology Research and Development Branch (ATR) personnel conducted a performance assessment of the X-band radar version of the HARRIER® Aircraft Detection Lighting System (ADLS) developed by DeTect™, Inc. The purpose of this assessment was to determine if the DeTect HARRIER ADLS meets the ADLS requirements specified in Chapter 14 of FAA Advisory Circular (AC) 70/7460-1L, "Obstruction Marking and Lighting."

FAA ATR personnel assessed a DeTect HARRIER X-band ADLS installed by the Public Service Electric and Gas Company on transmission towers near Aeroflex-Andover Airport (12N), located in Andover, New Jersey. This performance assessment, consisting of demonstrations, flight testing, and data analysis was conducted on June 24, 2016. In the performance assessment, a series of flight patterns were flown against the DeTect HARRIER ADLS to demonstrate whether it could meet the FAA performance requirements specified in AC 70/7460-1L. The DeTect HARRIER X-band ADLS performed according to the manufacturer's specifications and met the performance requirements identified in AC 70/7460-1L.

17. Key Words	18. Distribution Statement
Aircraft detection lighting system (ADLS), Obstruction light control, Obstruction lighting, DeTect™ HARRIER	This document is available to the U.S. public through the National Technical Information Service (NTIS), Springfield, Virginia 22161. This document is also available from the Federal Aviation Administration William J. Hughes Technical Center at actlibrary.tc.faa.gov.

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	53	

EXECUTIVE SUMMARY

Federal Aviation Administration (FAA) Airport Technology Research and Development Branch (ATR) personnel conducted a performance assessment of the X-band radar version of the HARRIER® Aircraft Detection Lighting System (ADLS) developed by DeTect™, Inc. The purpose of this assessment was to determine if the X-band DeTect HARRIER ADLS meets the ADLS requirements specified in Chapter 14 of FAA Advisory Circular (AC) 70/7460-1L, "Obstruction Marking and Lighting."

ADLSs continuously monitor the airspace around an obstruction or group of obstructions for aircraft. When the ADLS detects an aircraft in its airspace, the system sends an electronic signal to the lighting control unit, which turns on the lights. Once the aircraft clears the obstruction area and there is no longer a risk of collision, the ADLS turns off the lights, and the system returns to standby mode.

The United States has experienced a steady increase in the number of applications for construction of telecommunication towers and wind turbines. Any temporary or permanent structure, including telecommunication towers and wind turbines, that exceeds an overall height of 200 feet (61 meters) above ground level or exceeds any obstruction standard contained in Title 14 Code of Federal Regulations Part 77, "Safe, Efficient Use, and Preservation of the Navigable Airspace," should be marked and/or lighted with FAA-approved paint markings or lighting fixtures to ensure that they are visible to pilots at night. Due to the number of existing telecommunication towers and wind turbines, combined with expected future construction, the number of obstructions that have these required lighting fixtures has greatly increased. The light generated by the increased number of fixtures has created a light pollution nuisance to residents living near these obstructions. Using an ADLS could have a positive impact on this problem by limiting the amount of time light fixtures are active while still providing a sufficient level of safety for pilots operating at night in the vicinity of these obstructions.

FAA ATR personnel assessed the DeTect HARRIER X-band system installed by the Public Service Electric and Gas Company on transmission towers near Aeroflex-Andover Airport (12N), located in Andover, New Jersey. This performance assessment, consisting of demonstrations, flight testing, and data analysis was conducted on June 24, 2016. In the performance assessment, a series of flight patterns were flown against the DeTect HARRIER system to demonstrate whether it could meet the FAA performance requirements specified in AC 70/7460-1L. The DeTect HARRIER X-band system performed according to the manufacturer's specifications and met the performance requirements identified in Chapter 14 of AC 70/7460-1L.

CONCLUSIONS

The Federal Aviation Administration (FAA) Airport Technology Research and Development Section assessed the X-band radar version of the DeTect™ HARRIER® Aircraft Detection Lighting System (ADLS) installed and owned by the Public Service Electric and Gas Company on transmission towers in the vicinity of Aeroflex-Andover Airport, near Andover, New Jersey. A performance assessment consisting of demonstrations, flight testing, and data analysis was conducted on June 24, 2016. In this performance assessment, a series of flight patterns were flown against the DeTect HARRIER ADLS to demonstrate that it could meet the FAA's performance requirements for an ADLS. The DeTect HARRIER X-band ADLS performed according to the manufacturer's specifications and met the performance requirements specified in Chapter 14 of FAA Advisory Circular 70/7460-1L, "Obstruction Marking and Lighting."

REFERENCES

1. Federal Aviation Administration (FAA), "Obstruction Marking and Lighting," Advisory Circular 70/7460-1L, December 4, 2015.

2. United States (U.S.) Federal Register, Title 14 Code of Federal Regulations (CFR), Part 77, "Safe, Efficient Use, and Preservation of the Navigable Airspace," U.S. Government Publishing Office, Washington, DC.

3. DigitaLogic, "IGIN-EFS (IGIN-Enterprise to Field System) - Advanced IT Platform for ADLS," November 2016.

4. DeTect, Inc., "Technical Data Sheet – HARRIER® ADLS," April 2016.

5. DeTect, Inc., "Briefing – HARRIER ADLS," 2015.

6. DeTect, Inc., "Summary of FAA ADLS Test," June 2016.

7. Patterson, James, Jr., "Performance Assessment of the Laufer Wind Aircraft Detection System as an Aircraft Detection Lighting System, FAA technical note DOT/FAA/TC-TN15/54, May 2016.

8. Patterson, James, Jr., "Performance Assessment of the Terma Obstruction Light Control System as an Aircraft Detection Lighting System" FAA technical note DOT/FAA/TC-TN16/41, June 2016.

9. U.S. Federal Register, Title 47 CFR, Part 15, "Radio Frequency Devices," U.S. Government Publishing Office, Washington, DC.

Technical Data Sheet

HARRIER

Aircraft Detection Lighting System

HARRIER

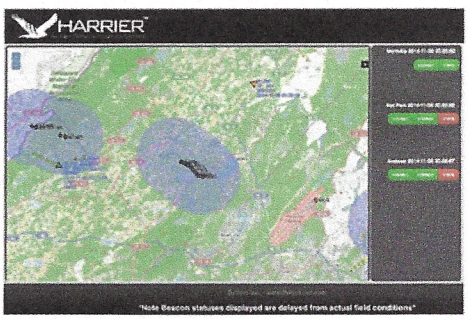
Aircraft DeTection Lighting System

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; Traffic Advisory System (TAS) and 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
- Secondary transponder 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
- ADSB integration minimizes lighting activation from high altitude commercial aircraft

DeTect™ INTELLIGENT RADAR

Offices in: Florida • Washington D.C. • London

www.detect-inc.com

DOC# TDS-HARRIER ADLS-092116

TECHNICAL DATA SHEET

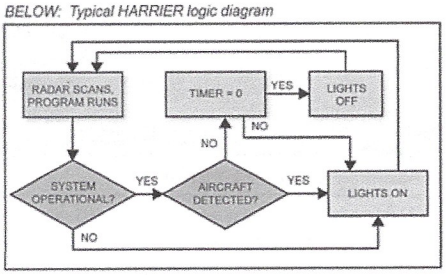
HARRIER AIRCRAFT DETECTION LIGHTING SYSTEM

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).

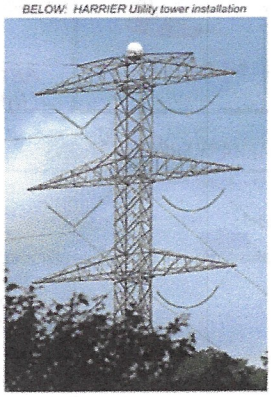
DeTect's ADLS uses patented Operational Risk Management (ORM) algorithms and operates in a failsafe manner where the lights are held in an 'ON' state by the system unless a target is not detected within the defined risk zone. When the sensors detect an aircraft, the obstruction lights are activated. 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 secondary surveillance using a Traffic Avoidance System (TAS) and Automatic Dependent Surveillance – Broadcast (ADS-B) receivers. The radar sensors, TAS antennas 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.

DeTect™ INTELLIGENT RADAR

Offices in: Florida • Washington D.C. • London www.detect-inc.com

Appendix C – IGIN-Enterprise to Field System Technical Data Sheet

Successful deployment of an ADLS may require that multiple diverse systems from different manufacturers should operate together in a seamless fashion. These may include some or all of the following technologies: Radar, FAA Obstruction Lights, Power Supply (e.g. solar, wind, grid, etc.), UPS, Telecommunications and HMI with applications that provide failsafe, alarming functionality, security and connectivity to other parties (e.g. customer facilities) – see Figure 1.

DigitaLogic's IGIN-EFS is a secure, open technology that enables the customer to have the freedom to choose the best-in-class vendors to fulfill the various roles required for a successful ADLS deployment.

IGIN-EFS is a general purpose, flexible, IT/OT platform that has been proven at many utilities and governmental organizations over almost two decades.

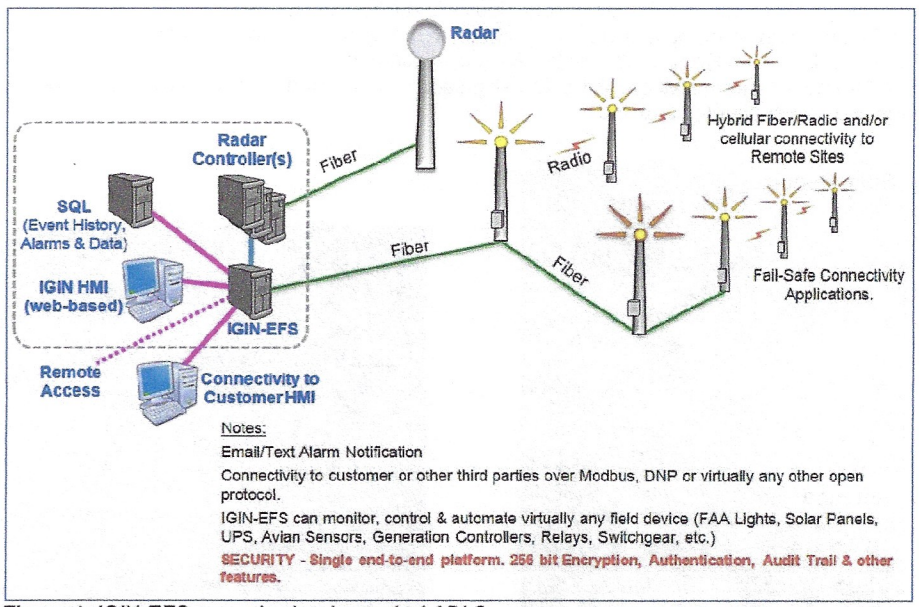


Figure 1: IGIN-EFS example showing typical ADLS components

IGIN-EFS provides:

- Telecommunications - the ability to communicate seamlessly over virtually any wired, fiber, wireless and/or cellular communication channels and creates secure a hybrid network (see Figure 2 & 3) with multiple links. Connectivity includes:
  - Enterprise Level Systems, Radar Controller(s), Customer HMI, etc.
  - Obstruction lights with and/or without ADLS control.
  - Third party solar systems and UPSs at remote sites.
- Security - Dynamic 256-bit encryption, time authentication, signature authentication, audit trail and other security features (end-to-end, encompassing any/all communication infrastructure).
- Scalability – the ability to start with a few sites and expand to many sites over time using different communications mediums (trunk voice, fiber, cellular, 900MHz, etc.)
- Reliability – Fail-Safe applications to detect communication failure for unsolicited connectivity and to switch the lights on until end-to-end communications are re-established and aircraft leave

the area. The Failsafe application accommodates different communication environments (TCP/IP, Serial, Fiber, Wireless) is able to automatically recover once end-to-end connectivity is re-established.

- Email/text notification - The system and automatically notifies utility personnel of alarms via email and/or text.
- Logging & Advanced communication diagnostics – The diagnostics include detailed logging at the front end and remote site, reporting communication events, reliability statistics, health of power supply and many other parameters on a real-time basis. This information is provided in order to simplify trouble-shooting and maintaining a reliable real-time wireless/cellular system on a pro-active basis.
- Ability to communicate
  - With any device from any lighting manufacturer and the solar power RTU/IED.
  - Over many different mediums (Cellular, Wireless, Fiber, Trunk Voice, etc.)
- Each Remote Site can report a large number of analogs and status points. IGIN is configured to only report specific points specified by the user.
- The ability to keep up with changing technology without becoming obsolete.
- Broadcast control to multiple devices (e.g. On/off to group of FAA Tower Warning Lights, Timesync, Dormant, Restart, Unsolicited AI/DI configuration.
- SCADA/HMI – Modern HMI capability enabling secure web-based browser viewing capability for computer, tablet smart phone, etc.

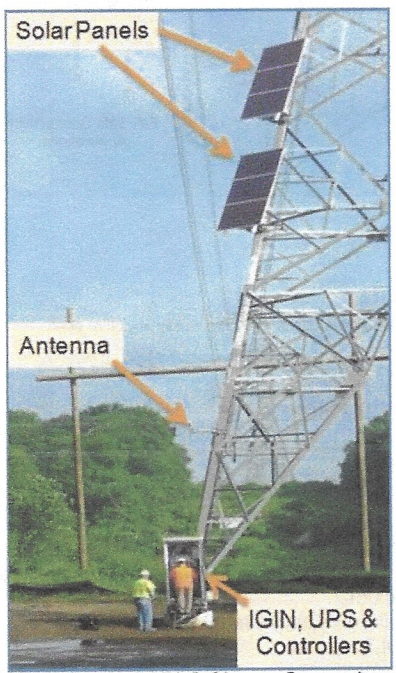


Figure 2: Typical ADLS Site on Susquehanna-Roseland Line on fiber/radio hybrid network.

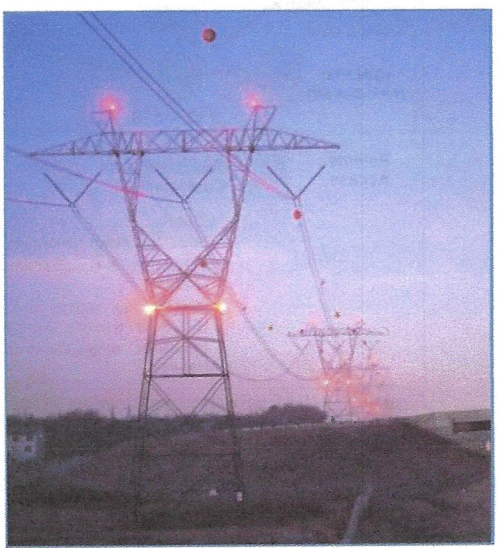


Figure 3: Monitoring-only sites alongside NJ Turnpike, NJ on cellular/radio hybrid network.

EXHIBIT Z

Catalog Number

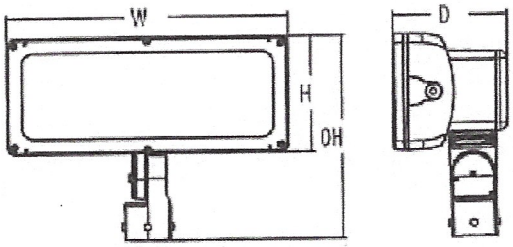
Notes

Type

HLF1
High Lumen LED Flood Luminaire

Specifications

EPA:	3.6 ft² (0.34 m²)
Depth:	10" (25.4 cm)
Width:	25" (63.5 cm)
Height:	10" (25.4 cm)
Overall Height:	19" (48.3 cm)
Weight:	61 lbs (27.6 kg)



A+ Capable Luminaire

This item is an A+ capable luminaire, which has been designed and tested to provide consistent color appearance and system-level interoperability.

- All configurations of this luminaire meet the Acuity Brands' specification for chromatic consistency
- This luminaire is A+ Certified when ordered with DTL® controls marked by a shaded background. DTL DLL equipped luminaires meet the A+ specification for luminaire to photocontrol interoperability[1]
- This luminaire is part of an A+ Certified solution for ROAM® or XPoint™ Wireless control networks, providing out-of-the-box control compatibility with simple commissioning, when ordered with drivers and control options marked by a shaded background[1]

To learn more about A+, visit www.acuitybrands.com/aplus.

1. See ordering tree for details.
2. A+ Certified Solutions for ROAM require the order of one ROAM node per luminaire. Sold Separately: Link to Roam; Link to DTL DLL

A+ Capable options indicated by this color background.

Ordering Information

EXAMPLE: HLF1 LED P1 40K WFL MVOLT IS DDBXD

HLF1 LED

Series	Performance package	Color temperature	Distribution	Voltage	Mounting	Options	Finish (required)
HLF1 LED	P1 P2 P3	30K 3000 K 40K 4000 K 50K 5000 K	VNSP Very narrow spot (7°)[2] MFL Medium flood (6x6) WFL Wide flood (6x7)	MVOLT[3] 120[3] 208[3] 240[3] 277[3] 347[3] 480[3]	**Shipped included** IS Integral slipfitter (fits 2-7/8" O.D. tenon) YKC62 Yoke with 15-3 SO cord	**Shipped installed** PER NEMA twist-lock receptacle only (controls ordered separate)[4,5] PER5 Five-wire receptacle only (controls ordered separate)[4,5] PER7 Seven-wire receptacle only (controls ordered separate)[4,5] SF Single fuse (120, 277, 347V)[3] DF Double fuse (208, 240, 480V)[3] CFB Black faceplate DMG 0-10v dimming wires pulled outside fixture (for use with an external control, ordered separately) **Shipped separately** UBV Upper/bottom visor (universal) FV Full visor WG Wire guard VG Vandal guard (polycarbonate)	DDBXD Dark bronze DBLXD Black DNAXD Natural aluminum DWHXD White

Mounting, Options and Accessories

IS - Integral slipfitter
(fits 2-7/8" O.D. tenon)

YHC62
Yoke with 16-3 SO cord

UBV
Upper/Bottom visor (universal)

FV
Full visor

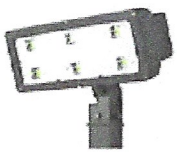
VG
Vandal guard

WG
Wire guard

CFB
Black faceplate

Optics

Depending on the distribution chosen, luminaires are built using internal and external reflectors.



Internal reflectors
MFL, WFL

Internal and external reflectors
VNSP

Photometric Diagrams

To see complete photometric reports or download .ies files for this product, visit Lithonia Lighting's HLF Size 1 homepage.

Isofootcandle plots for the HLF1 LED P3 40K. Distances are in units of mount height (20ft).