



**Federal Aviation Administration**

**Aviation Safety**

## **REPORT TO CONGRESS:**

# **Net Passenger and Public Safety Benefits of Helicopter Terrain Awareness and Warning Systems**

Consolidated Appropriations Act of 2021 (Public Law 116-260)

## **Executive Summary**

The Federal Aviation Administration (FAA) prepared this report on Net Passenger and Public Safety Benefits of Helicopter Terrain Awareness and Warning Systems (HTAWS) in response to the request in the Joint Explanatory Statement accompanying the Consolidated Appropriations Act of 2021 (Pub. L. 116-260). This report focuses on commercial helicopters and excludes helicopter air ambulances (HAA) from its analysis, as the FAA already mandates HTAWS on HAA. The FAA concludes that HTAWS are likely to mitigate only controlled-flight-into-terrain incidents and that the costs outweigh the benefits of requiring HTAWS in all commercial helicopters.

Implementing a mandate for equipping all commercial helicopters with HTAWS would present the FAA with challenges, including expending agency resources to promulgate a rulemaking. This would be particularly challenging as the FAA analysis has determined that the rule would not be cost justified.

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## **Introduction**

A Helicopter Terrain Awareness and Warning System (HTAWS) is an alerting system that provides the helicopter pilot with audible and visual alerts for terrain and obstacles. HTAWS is designed to reduce the risk of controlled-flight-into-terrain (CFIT) accidents by providing situational awareness when the pilot is operating visually or by reference to flight instruments.

## **Legislative Request**

The Joint Explanatory Statement accompanying the Consolidated Appropriations Act of 2021 (Pub. L. 116-260) (the Act) includes the following request: *Not later than 180 days after enactment of this Act, the FAA shall submit a report to the House and Senate Committees on Appropriations detailing the net passenger and public safety benefits of terrain awareness and warning systems on all commercial helicopters, as well as any challenges with implementing such a mandate.*

## **Background**

In 2014, the FAA began requiring HTAWS for helicopter air ambulance (HAA) operations in accordance with Title 14 of the Code of Federal Regulations (14 CFR) § 135.605. The FAA issued this mandate because of the high accident rate among HAA flights at that time. This high rate of accidents was due to frequent nighttime operations flown to sites without landing pads, runways, or other improvements. The vast majority of these operations were conducted under pressure due to the emergency nature of HAA operations. Given the existing § 135.605 requirement, this report does not address HAA operations under 14 CFR part 135, subpart L.

## **Cost-Benefit Analysis**

The FAA analyzed data regarding rotorcraft incidents and accidents that occurred from 2014 to 2018 and identified four incidents classified as CFIT, for a rate of 0.8 incidents annually. These four incidents resulted in a total of three fatalities of flight crew members. One flight crew member and three passengers suffered minor injuries, two of the aircraft sustained “substantial damage,” and two were destroyed (see Appendix).

The fact that low-level flights (such as commercial air tour flights, agricultural and external load operations, nature research, resource exploration, or terrain mapping flights) follow terrain closely, but would be less likely to benefit from HTAWS because these low-level flight operations occur during daylight hours and under visual flight rules. The alerts from HTAWS are

designed primarily for instrument flight rules, when the pilot cannot see and relies on the aircraft's instruments to fly (e.g. due to inclement weather). Further, for these low-level flights, pilots would receive near-constant warnings from HTAWS, which could lead to pilots silencing alarms, putting the system on standby, or disregarding the system altogether.

### **Benefits of HTAWS to Passengers and the Public**

Using an annual rate of 0.8 CFIT incidents annually, the FAA estimates that four CFIT accidents or incidents may occur over the next five years. The FAA determined that none of the four incidents classified as CFIT would be 100 percent mitigated by a commercial helicopter operator's equipage and assigned a probability of prevention score to each of the four incidents to monetize the benefits. Of the four incidents, two were assigned a probability of prevention score of twenty percent and two were assigned a score of five percent. Specifically, the Agency estimates the passenger and public safety benefits from installing HTAWS on all commercial helicopters by considering the following factors:

- Department of Transportation guidance on valuing the reduction of fatalities and injuries by regulations;
- Costs of medical care;
- Replacement value of the destroyed aircraft;
- Repair costs of the damaged aircraft; and
- Costs of FAA and National Transportation Safety Board (NTSB) investigations into the crashes.

The FAA concludes that the estimated passenger and public safety benefit over five years is \$4.8M.

### **Cost of HTAWS**

The estimated cost of installing HTAWS to all commercial helicopters includes:

- Retrofits (adding the system to existing helicopters that do not already have one);
- New installations (adding the system to the designs of new helicopters being built or to be built); and
- Added fuel costs (e.g. the marginal cost of additional fuel due to the added weight of the system's sensors, computers).

Because the FAA used five years for the benefit analysis, the agency applied the same time period to the cost analysis. The FAA estimates that the five-year overall cost of installing HTAWS on all commercial helicopters is \$134.1M.

## **Net Benefit**

The FAA's analysis determined that there would not be a net passenger and public safety benefit in requiring HTAWS in all commercial helicopters, as the estimated costs outweigh the estimated benefits by \$129.3M. The FAA acknowledges that the cost of requiring HTAWS is front-loaded due to retrofitting the fleet. Over time, the cost of new installations would likely decrease while benefits would persist, but not such that the rule would become cost-justified over a longer period of analysis.

## **Challenges to Implementation**

The primary challenge in implementing an HTAWS mandate for all commercial helicopters is the cost issue discussed above, in addition to the challenges associated with promulgating a rulemaking on this issue. The FAA has received industry feedback in response to past discussions that supports these findings.

## Appendix

### Commercial Helicopter Accident Information (2014-2018)

NTSB Accident Number	Category	Year	Fatal	Injury	Damage
ANC16FA023	Part 135 operator conducting company internal cargo flight	2016	Yes (1)	N/A	Substantial
CEN17FA112	Part 135 doing 91 repositioning flight	2017	Yes (1)	N/A	Destroyed
CEN17FA100	Offshore	2017	Yes (1)	N/A	Destroyed
ANC17LA025	Pt 135 Air Tour/Sightseeing	2017	No	Minor (4)	Substantial