



# **EASPG SAFETY ADVISORY-06**

**(ESA-06)**

**December 2022**

---

## **GUIDANCE MATERIAL ON MEASURES TO IMPROVE THE EFFECTIVENESS OF ENHANCED GROUND PROXIMITY WARNING SYSTEM (EGPWS)/TERRAIN AWARENESS AND WARNING SYSTEM (TAWS)**

Date of Issue:	December 2022
Revision No:	Second Edition
Document Ref. No.:	EASPG/RESG/06
Owner:	EASPG

These guidelines are developed based on the work performed by the IE-REST and further RESG in collaboration with the ICAO EUR/NET Regional Office and the European Aviation System Planning Group (EASPG) championed by United Kingdom (Bermuda CAA) and further by IATA and are aimed to Improve the Effectiveness of TAWS/EGPWS.

### **Disclaimer**

This document is intended to provide guidance for civil aviation regulators, OEMs and aircraft operators on actions that could be taken by stakeholders to enhance the effectiveness of EGPWS/TAWS by reducing the likelihood of false or tardy warnings.

It is not intended to supersede or replace existing materials produced by the Civil Aviation Authorities (CAA) or in ICAO SARPs. The distribution or publication of this document does not prejudice the CAA's ability to enforce existing National regulations. To the extent of any inconsistency between this document and the National/International regulations, standards, recommendations or advisory publications, the content of the National/International regulations, standards, recommendations and advisory publications shall prevail.

---

## 1. Background

- 1.1. A controlled flight into terrain (CFIT) accident occurs when an airworthy aircraft under the control of the flight crew is flown unintentionally into terrain, obstacles or water, usually with no awareness of the impending collision on the part of the crew.
- 1.2. ICAO's first action in this regard can be traced to 1978, when requirements for equipping commercial air transport aircraft with GPWS were introduced into Annex 6 Part I International Commercial Air Transport - Aeroplanes. This led to a significant decrease in the number of CFIT occurrences, but not to their complete elimination. A significant advancement in technology was achieved with the development of GPWS with a forward looking terrain avoidance function, generally referred to as Enhanced Ground Proximity Warning System (EGPWS), and known also as Terrain Awareness and Warning System (TAWS).
- 1.3. With the advent of EGPWS/ TAWS in 1996, there has been a significant reduction in the frequency of CFIT accidents. ICAO subsequently required that aircraft be equipped with this equipment and Annex 6 Part I currently requires all turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than nine passengers, to be equipped with a ground proximity warning system which has a forward looking terrain avoidance function.
- 1.4. ICAO requires States to ensure that operators have procedures in place to ensure the integrity of electronic navigation data products and that the operator continues to monitor both process and products. While EGPWS/TAWS data base would not be utilized for navigation purposes, it would be considered important to ensure that the equipment is functioning with the latest software and data base available.
- 1.5. There are a number of factors that can reduce the effectiveness of ground proximity warning system (GPWS) equipment. Several measures can be taken by stakeholders to reduce the likelihood of false GPWS warnings or, more seriously still, the system's failure to provide a timely warning.

## 2. Analysis

- 2.1. Perhaps the most easily rectified shortcoming involves the software utilized by EGPWS/TAWS. Software updates are issued regularly, yet industry sources reveal these are not always being implemented by all operators, or are not installed in a timely manner.
- 2.2. Application of software updates improves the characteristics of the equipment. Such improvements are possible on the basis of operational experience, and enable earlier warnings in situations that occur closer to the runway threshold where previously it was not possible to provide such warnings. Similarly, it is important to regularly update the obstacle, runway and terrain database provided by manufactures for use with their equipment.
- 2.3. EGPWS/TAWS equipment was designed to function with a position update system, but not all installations are linked to Global Positioning System (GPS)/Global Navigation Satellite System (GNSS) receivers.
- 2.4. Errors in the aircraft position provided by the Flight Management Computer (FMC) to the EGPWS system may lead to spurious alerts and unnecessary go-arounds during approach and landing. Unwanted alerts can be traced to the failure to use GPS/GNSS to provide a direct source of aircraft three-dimensional (3D) position to the EGPWS – latitude, longitude, geometrical attitude. Use of GPS/GNSS as a position source for the EGPWS may assist in avoiding spurious alerts.

- 2.5. With respect to the above, GNSS/GPS vulnerability, including intentional and unintentional signal interference, has been identified as a major safety issue. Immediate reporting of such instances to the relevant ATC units and authorities could help States implement measures to manage and reduce causes and impact of the interference.
- 2.6. Timely pilot response to EGPWS/TAWS is an important element of effective use of the system. Selection of Terrain Awareness Display (TAD) during the critical phases of flight (such as climb and descent in proximity to the ground), could provide additional situational awareness for the pilots' timely reaction to terrain proximity.
- 2.7. The improper response by flight crew to EGPWS/TAWS alert jeopardizes the safety of flight. An up-to-date training program that ensures that flight crew is trained to respond to EGPWS/TAWS alert effectively, is an essential element of the relevant safety risk mitigation. The training program should be supported by FOQA data to monitor proper responses by flight crew to EGPWS events.

### **3. Recommended Action**

- 3.1. EASPG encourages States to advise air operators of factors that could reduce the effectiveness of EGPWS/TAWs warnings and enhance their safety oversight capacity by verifying during safety inspections that the necessary risk mitigation measures for CFIT precursors are in place.
- 3.2. EASPG recommends that States ensure aircraft operators have procedures in place to ensure that EGPWS/TAWS software and data bases (including obstacle, runway and terrain databases) are updated to the latest available standard. When aircraft operators choose not to update the software and data bases to the latest standard, they should conduct a risk assessment. The risk assessment is to confirm that CFIT safety risk for their operation would not be reduced through incorporation of the latest update. It is recommended that States ensure the navigation references are updated in accordance with WGS-84.
- 3.3. EASPG recommends that States ensure aircraft operators implement standard operating procedures (SOP) to ensure that at least one pilot selects terrain display during critical phases of flight (such as climb and descent below MSA) for additional situational awareness. If weather is not a threat, then both pilots could decide to select terrain display. Furthermore, to verify that TAD updates are implemented by manufacturers and database/software providers.
- 3.4. EASPG recommends that States ensure that air operators' EGPWS training is performed in compliance with pertinent regulations.
- 3.5. EASPG recommends that States should ensure that aircraft operators maintain and monitor the provision of most accurate positioning information to the EGPWS/TAWS system (e.g. encourage the broader use of GNSS/GPS input linked to EGPWS, etc.).
- 3.6. EASPG recommends that States adopt and implement measures to manage and reduce causes and impact of the GPS/GNSS interference and encourage pilots and operators to report instantly to the relevant ATC Units and authorities all incidents related to such interference.

— END —