



TSB Recommendation A07-06

Runway end safety area (RESA) requirements

The Transportation Safety Board of Canada recommends that the Department of Transport require all Code 4 runways to have a 300 m runway end safety area (RESA) or a means of stopping aircraft that provides an equivalent level of safety.

Air transportation safety investigation report	A05H0002
Date the recommendation was issued	12 December 2007
Date of the latest response	September 2023
Date of the latest assessment	March 2024
Rating of the latest response	Satisfactory in Part
File status	Closed

Summary of the occurrence

On 02 August 2005, the Air France Airbus A340-313 aircraft (registration F-GLZQ, serial number 0289) departed Paris, France, at 1153 Coordinated Universal Time (UTC) as Air France Flight 358 on a scheduled flight to Toronto, Ontario, with 297 passengers and 12 crew members on board. Before departure, the flight crew members obtained their arrival weather forecast, which included the possibility of thunderstorms. On final approach, they were advised that the crew of an aircraft landing ahead of them had reported poor braking action, and Air France Flight 358's aircraft weather radar was displaying heavy precipitation encroaching on the runway from the northwest. At about 200 feet above the runway threshold, while on the instrument landing system approach to Runway 24L with autopilot and autothrust disconnected, the aircraft deviated above the glideslope and the groundspeed began to increase. The aircraft crossed the runway threshold about 40 feet above the glideslope.

During the flare, the aircraft travelled through an area of heavy rain, and visual contact with the runway environment was significantly reduced (UC). The aircraft touched down about 3800 feet down the 9000-foot runway (UA); it was not able to stop on the runway and departed the far end at a groundspeed of about 80 knots. The aircraft stopped in a ravine at 2002 UTC (1602 eastern daylight time) and caught fire. All passengers and crew members were able to

evacuate the aircraft before the fire reached the escape routes. A total of 2 crew members and 10 passengers were seriously injured during the crash and the ensuing evacuation.

The Board concluded its investigation and released report A05H0002 on 12 December 2007.

Rationale for the recommendation

The aircraft departed the end of the runway at about 80 knots, and traveled over a distance of just over 300 m before coming to rest in the Etobicoke ravine. The overrun area for Runway 24L was compliant with Transport Canada's (TC) current document TP 312E, *Aerodrome Standards and Recommended Practices*, in that it was designed with a strip 60 m beyond the end of the runway, free of non-frangible obstacles and graded in order to reduce the risk of damage to aircraft during an overrun situation. However, it did not meet the present International Civil Aviation Organization (ICAO) standard of 150 m from the end of the runway. It must also be noted that the 1999 ICAO revision incorporated a recommended practice of a runway end safety area (RESA) length of 780 feet (240 m).

Although there is no RESA required or published for Runway 24L, no non-frangible objects existed along the path followed by the occurrence aircraft until a distance 150 m from the end of the runway. This established a de facto RESA that exceeded the standard currently stipulated in TP 312E by 90 m. Regardless, the investigation established that the terrain beyond this point largely contributed to the damage incurred by the aircraft and the injuries to the crew and passengers.

There exist other Code 4 runways in Canada for which similar conditions exist. Such runways, while compliant with TP 312E, include hostile terrain beyond the 60 m overrun area required by the standard. The Board believes that all such runways could benefit from a RESA built in accordance with the ICAO Annex 14 recommended practice or the Federal Aviation Administration's (FAA) runway safety area (RSA) standard. This safety action would remove all non-frangible objects and create a surface graded so as to reduce the risk of damage to an aircraft up to a distance 300 m beyond the end of the runway.

The Board is aware that requiring a 300 m RESA may affect many existing Code 4 runways that are located where natural obstacles, local development, and/or environmental constraints make the construction of a RESA of this length impracticable. In such cases, the Board believes that there exists a requirement for an alternate means of compliance, such as the use of an engineered material arresting system to provide a level of safety that is equivalent to a 300 m RESA.

Therefore, the Board recommended that

the Department of Transport require all Code 4 runways to have a 300 m runway end safety area (RESA) or a means of stopping aircraft that provides an equivalent level of safety.

TSB Recommendation A07-06

Previous responses and assessments

February 2008: response from Transport Canada

In its response to this recommendation, Transport Canada states that, it is currently working with industry experts to review airport certification standards.

The review of TP312, *Aerodrome Standards and Recommended Practices*, has resulted in a recommendation to harmonize the Canadian standards with the current runway end safety area standards beyond the runway strip end contained in Annex 14 - Aerodromes of ICAO. The result of this review will be subject to the Canadian Aviation Regulation Advisory Council regulatory consultation process.

September 2008: TSB assessment of the response (Unsatisfactory)

In its response, Transport Canada (TC) does not address the specific content of the recommendation, namely to: “require all Code 4 runways to have a 300 m runway end safety area (RESA) or a means of stopping aircraft that provides an equivalent level of safety”. Rather, it proposes to harmonize TP 312 with the International Civil Aviation Organization Annex 14 RESA standard, which only requires a RESA 150 m in length. Furthermore, where construction of a RESA of any length is impracticable, TC’s response is silent.

Therefore, TC’s response to Recommendation A07-06 is assessed as **Unsatisfactory**.

April 2009: updated response from Transport Canada

In its updated response, Transport Canada (TC) acknowledges that the runway end safety area (RESA) requirement specified in Recommendation A07-06 is for a total of 300 m, which consists of a runway strip of 60 m at the end of runways plus 240 m of RESA measured from the strip end and that current TP 312E, *Aerodrome Standards and Recommended Practices*, only call for a requirement for a runway strip of 60 m at the end of all Code 3 and 4 instrument runways.

TC restates that regulatory amendments through Canadian Aviation Regulation Advisory Council (CARAC) activity are in development to harmonize with the current International Civil Aviation Organization (ICAO) standard for a 90 m RESA measured from the strip end of Code 3 and 4 runways. At the end of the CARAC process, Canada will therefore have a total runway end safety area requirement of 150 m (that is, 60 m plus 90 m). TC further states that provision to permit the use of systems such as engineered material arrestor systems will be included in the amended Canadian standard. Stakeholder information sessions on the draft standards are planned for late 2009 followed by formal consultation through the CARAC process. The estimated date of completion is 2011.

Additionally, TC comments that ICAO is actively studying the possibility of increasing the total RESA requirement from 150 m to 300 m, and Canada is fully participating in these discussions.

May 2009: TSB assessment of the response (Satisfactory in Part)

The Board is pleased to note that a provision to permit the use of systems such as engineered material arrestor systems will be included in the new Canadian standard. However, Transport Canada (TC)'s recent update to its initial response outlines an action plan that is not sufficiently advanced to reduce the risks to transportation safety as described in Recommendation A07-06.

Firstly, the Board is concerned that, although TC is aware that the Federal Aviation Administration (FAA) requires a 300 m (1000 feet) runway safety area (RSA) as a standard and acknowledges that a 300 m runway end safety area (RESA) is being considered as the International Civil Aviation Organization (ICAO) standard, this latest response describes a Canadian Aviation Regulation Advisory Council (CARAC) proposal that would merely meet the present ICAO standard of 150 m. The Board is disappointed that TC chooses to harmonize with the present ICAO standard instead of aggressively working to harmonize with the FAA's 300 m RSA requirement.

Secondly, it is well known that the regulatory change process can be prolonged. The Board is convinced that TC's present plan, to incrementally increase the RESA requirements from 60 m to 150 m, will unnecessarily lengthen the time taken to implement a known safety enhancement.

Finally, this TC response does not clearly specify whether the CARAC activity will result in a regulatory change that would require all existing Code 4 runways to be retrofitted as opposed to only newly built Code 4 runways being required to meet the amended standard. A response to this query states that: "no grandfather clause is being contemplated, and the RESA requirement will apply to all existing and future runways. The CARAC process will determine what the coming into force date of any new RESA requirement will be, which will, of course, be more problematic for existing runways than for future runways."

Because TC's planned action will reduce, but will not substantially reduce or eliminate, the deficiency raised in Board Recommendation A07-06, the response is assessed as **Satisfactory in Part**.

February 2010: response from Transport Canada

Transport Canada (TC)'s latest update in response to Recommendation A07-06 repeats its intention to harmonize with the Standards of ICAO Annex 14, which require a runway end safety area of 150m in length. Additionally, Notice of Proposed Amendment development and industry consultation via the CARAC process is planned for 2010. TC also states that TP 312 is undergoing a legal review with the goal of dismantling it and incorporating its rules of conduct as part of existing regulations, standards, and advisory material.

July 2010: TSB assessment of the response (Satisfactory in Part)

The issue of landing accidents and runway overruns is on the Board's Watchlist. Transport Canada (TC)'s latest update repeats its stated intention to harmonize runway end safety area

requirements with the existing International Civil Aviation Organization (ICAO) standard of 150 m and not with ICAO's Recommended Practice of 300 m. The fact that TC's planned action goes only part-way to resolve this safety issue, coupled with the lengthy rulemaking process, means the safety deficiency remains at many Canadian airports. The Board believes that any necessary legal review of TP 312 should not lengthen the time taken to implement a required safety enhancement.

Because TC's planned action will reduce, but will not substantially reduce or eliminate, the deficiency raised in Board Recommendation A07-06, the response is assessed as **Satisfactory in Part**.

January 2011: response from Transport Canada

Transport Canada (TC) has drafted proposed regulatory amendments that meet International Civil Aviation Organization's requirement to have a runway end safety area (RESA) of 150 m in length. The proposed amendments were presented at a November 2010 CARAC meeting. Members have since submitted their comments and concerns to the CARAC Secretariat. Comments that included analysis of data for the past 20 years were presented to the CARAC in January 2011. It was determined by CARAC that TC has sufficient information to make a safety case to move forward with the Notice of Proposed Amendment requiring a 150 m RESA. The data does not support an extension of the RESA to 300 m. The next step is to conduct an impact assessment, which would include a cost-benefit analysis.

Additionally, TC intends to arrange a meeting with TSB to brief on its data analysis related to the RESA issue.

April 2011: response from Transport Canada

As part of its action plan to address the TSB Watchlist on Landing Accidents and Runway Overruns, Transport Canada (TC) has committed to conducting a risk assessment to determine the safety benefits of requiring a 150 m and a 300 m runway end safety area (RESA). This assessment is being done in phases.

TC has reviewed/analyzed cost benefit information recently obtained from domestic airports with respect to a RESA of 150 m. The cost benefit analysis supports a RESA of 150 m. TC will now conduct a risk assessment to determine the safety effectiveness of requiring a 300 m RESA versus a 150 m RESA. This risk assessment will involve conducting an aggregate risk assessment of runway ends.

In order to ensure harmonization with the TP 312 5th Edition Project and with the regulatory changes tabled at the CARAC, this risk assessment will focus on those runways with lengths of 1200 m or greater or with lengths less than 1200 m where the runway is certified as precision or non-precision. Approval of the Terms of Reference for the risk assessment team, nomination of the team members and commencement of the risk assessment itself will occur in June 2011.

In light of the analysis above, TC has drafted proposed regulatory amendments that meet the ICAO's requirement to have a RESA of 150 m. Where the site lacks suitable land area to comply with the RESA specifications, the provision of an Engineered Material Arresting System or an adjustment to the declared distances were also introduced as acceptable alternatives.

The proposed amendments were presented and consulted at a CARAC meeting held from 15 to 17 November 2010. TC received many comments from stakeholders as a result of this consultation. In light of these comments, an analysis of data for the past 20 years was subsequently conducted on RESA events.

The comments received and the data analyses were presented to the CARAC on 12 January 2011. At its subsequent meeting on 23 March 2011, the CARAC determined that TC now has sufficient information to make a safety case, supported by a cost benefit analysis, to move forward with regulatory changes requiring a 150 m RESA.

The NPA originally submitted in November 2010, will be modified to accommodate the concerns of stakeholders where it is feasible to do so. Pending the results of the risk assessment of a 300 m RESA, the revised NPA will be tabled for consideration at the September 2011 CARAC meeting.

A regulatory review of the airport standards document, TP 312, 4th Edition has been underway for several years now. This review proposes a complete departure from the existing establishment of runway codes, which focuses on safety standards based on the amount of runway that exists (i.e., a code 4 runway has to be capable of supporting large aircraft operations even though only small aircraft operate from it). The proposed 5th Edition instead focuses on the establishment of safety standards based on the operational usage of the runway (e.g. a runway supporting Transport Category aircraft operations will be required to meet a higher standard than one supporting single engine traffic operations). This methodology has been well received by Canadian stakeholders and is also receiving favourable international attention.

As well, the proposed 5th Edition contains provisions for additional visual aids that could assist pilots in their assessment of landing distance remaining, which will aid considerably in the prevention of runway overruns.

Due to the magnitude of the review and other commitments, it is anticipated that the document will now be ready for industry consultation in 2012/2013. The timeframe has been adjusted to incorporate further amendments that may be required as a result of the risk assessment.

May 2011: TSB assessment of the response (Satisfactory in Part)

The critical safety issue of landing accidents and runway overruns remains on the Board's Watchlist.

Transport Canada (TC)'s initiative to date is based on its preliminary analysis that reveals approximately 90% of all overruns end with the aircraft coming to rest within 150 m of the

runway end. In its view, TC's decision to move toward compliance with ICAO's existing 150 m standard would mitigate the majority of future occurrences. Therefore, a new Canadian Aviation Regulation is proposed that would require certain runways to have a RESA of 90 m in addition to the current Canadian requirement of a 60 m strip beyond the runway end. Additionally, where the site lacks land area to comply with the new RESA specifications, TC's NPA allows for a means of stopping aircraft that provides an equivalent level of safety, as contained in Recommendation A07-06, or an adjustment to the declared distance.

The new edition of TP 312 is expected to replace the existing coding system for runways based on length with a focus on operational usage. This change in approach will group runways 1200 m or greater with those less than 1200 m if the runway is certified as precision or non-precision. The regulatory changes to expand the RESA will likely be couched to reflect this re-categorization.

In the spring of 2010, TC committed to individual risk assessments for each of the Code 4 runways in Canada within a year; this has the potential to address the safety deficiency identified by the TSB, leading to Recommendation A07-06. TC now proposes to conduct a risk assessment and cost-benefit analysis to determine the safety effectiveness of requiring a 300 m RESA. This approach will involve conducting an aggregate risk assessment, rather than an assessment of individual runway ends. Pending the results of this risk assessment, and consideration of concerns of stakeholders, a revised NPA will be tabled at the September 2011 CARAC meeting.

The Board is encouraged that TC plans to comply with the current 150 m international standard. However, the Board is disappointed that TC has not committed to implement the internationally recommended 300 m RESA which has been adopted by other countries, notably the United States. Furthermore, the Board is also concerned that TC has not followed through on its previously stated plan to assess the individual risk at Code 4 runways and require that, where there is an unacceptable risk, it be managed on a case by case basis. TC's proposal to conduct an aggregate risk assessment may not identify or effectively mitigate risks due to hostile terrain beyond the planned 150 m RESA at some Canadian airports.

Given the limited progress since the Board's last assessment, TC's proposal to require only the current international standard of 150 m rather than the recommended RESA of 300 m, and TC's plan to conduct an aggregate risk assessment (in lieu of site specific assessments), the Board has assessed TC's response as **Satisfactory in Part**.

May 2011: response from Transport Canada

TCCA has reviewed/analyzed cost benefit information recently obtained from domestic airports with respect to Runway End Safety Area (RESA) of 150 m. The cost benefit analysis supports a RESA of 150 m. TCCA will now conduct a risk assessment to determine the safety benefits of requiring a 300 m RESA vice a 150 m RESA.

The Notice of Proposed Amendment (NPA) originally submitted in November 2010, will be modified to accommodate the concerns of stakeholders where it is feasible to do so. Pending the results of the risk assessment of a 300 m RESA, the revised NPA will be tabled for consideration at the September 2011, CARAC meeting.

Additional details and information relating to this recommendation may be found in a letter to the TSB Board Dated May 02, 2011

September 2011: update from Transport Canada

NPA 2010-012 on RESA will be presented at the Sept. 2011 CARAC Technical Committee meeting.

March 2012: TSB assessment of the response (Satisfactory in Part)

TC's latest update states that a revised version of NPA 2010-012, originally scheduled for CARAC review in November 2010, was to be deferred until the September 2011 CARAC Technical Committee Meeting in order to address stakeholders' concerns.

Additionally, the response does not update TSB on the status of its 300 m RESA risk assessment initiative announced in May of 2011. As TC has previously stated "*Pending the results of the risk assessment of a 300 m RESA, the revised NPA will be tabled for consideration at the September 2011, CARAC meeting.*" it may be assumed that its 300 m RESA risk assessment was completed prior to submission of the revised version of NPA 2010-012 to the September 2011 CARAC Technical Committee Meeting

While TC has not shared the details of either its 300 m RESA risk assessment or the stakeholders' concerns, a review of the revised version of NPA 2010-012, obtained from TC's NPA webpage, reveals that the RESA minimum length requirement remains at 150 m.

Noteworthy revisions are as follows:

- Section 302.551 would now require a 150 m RESA for a runway greater than 1200 m or less than 1200 m and the runway type is non-precision or precision; and that is utilized by scheduled passenger-carrying operations of an air carrier operating aircraft designed for more than 9 passenger seats as determined by the aircraft type certificate; and
- Section 302.552 is included and states, "This part does not apply to airports located north of the 60th degree parallel that only serve air carrier operations utilizing small aircraft."¹

The lack of information about TC's 300 m RESA risk assessment is disappointing. Additionally, as the September 2011 CARAC Technical Committee Meeting decision record has yet to be

¹ Canadian Aviation Regulations defines a "small aircraft" as an aeroplane having a maximum permissible take-off weight of 5700 kg (12 566 pounds) or less, or a helicopter having a maximum permissible take-off weight of 2730 kg (6 018 pounds) or less.

promulgated, it is not known whether or not the revised version of NPA 2010-012 was approved.

While revised NPA 2010-012 appears to be progressing through the CARAC process, if fully implemented, it will reduce but not eliminate the deficiency as described in Recommendation A07-06.

The response is considered **Satisfactory in Part**.

December 2012: response from Transport Canada

Transport Canada is planning a modified approach to RESA by collaborating with industry stakeholders to undertake a risk assessment in fiscal year 2013-2014 to determine the applicability criteria for RESA at Canadian airports.

The initial objective of the risk assessment (300 m vs 150 m) has been amended to identify how long and where a RESA should be applied from a safety and financial (cost benefit) perspective.

Advisory circulars concerning RESA construction maintenance; runway arresting systems (EMAS) will be issued by the end of 2012.

March 2013: TSB assessment of the response (Satisfactory in Part)

The TSB flagged this issue in 2007. In 2010 and again in 2012, the issue of landing accidents and runway overruns was included on the TSB Watchlist as one of the highest transportation risks facing Canadians.

TC states that in FY 2013-2014 it plans a risk assessment to establish RESA criteria at Canadian airports. The stated objective for this risk assessment is to collaborate with industry to establish a RESA length on a case-by-case basis. Other than the broad criteria of safety and cost, no details are provided as to how a RESA length would be established for code 4 runways as stated in Recommendation A07-06. Presumably the results of this risk assessment would affect the current version of NPA 2010-012, which is currently deferred as a result of the CARAC meeting dated 12 January 2011.

This change in approach will result in further delays and a protracted period of time in which Canada is not in compliance with international standards.

As the proposed risk assessment may address RESA requirements for Code 4 runways, if fully implemented, it will reduce but not eliminate the deficiency as described in Recommendation A07-06.

The response is considered **Satisfactory in Part**.

November 2013: response from Transport Canada

The contract for an independent risk assessment is out for tender and is expected to be awarded in 2013. The independent risk assessment will help identify which airports and which runways will be required to have a 150m RESA.

Advisory Circulars concerning RESA Construction Maintenance and Runway Arresting Systems have been issued. (AC 300-007 EMAS and AC 305-015 Runway End Safety Area Bearing Strength Requirements)

April 2014: TSB assessment of the response (Satisfactory in Part)

Since its last update, TC has launched several initiatives related to RESA.

Early in the 2nd quarter of 2013 TC issued 2 RESA-related Advisory Circulars (AC 300-007 EMAS and AC 302-015 *Runway End Safety Area Bearing Strength Requirements*). A consequence of TC's NPA 2010-012 activities, the intention of this guidance material is to assist airport operators with the planning, design, establishment and maintenance of RESAs at Canadian aerodromes in anticipation of regulatory change to RESA requirements.

To better define Canada's RESA needs, on 5 July 2013, TC issued a Request for Proposal (T8080-120164) entitled *Risk Assessment for Runway End Safety Area at Canadian Airports*. The purpose of this work is to conduct an independent risk assessment on the implementation of the current ICAO RESA standard (90 m beyond runway strip end of 60 m) in Canada. The scope of work for this risk assessment makes no mention of a 300 m RESA for Code 4 runways as described in Recommendation A07-06. Rather it is limited to the following:

Provide recommendations that establish and define the criteria to determine where the international standard (150m RESA) should apply at Canadian airports.

TC states in the request for proposal that it intends to use the results of this independent risk assessment to establish the application criteria for a RESA in Canada. In accordance with the terms of the request for proposal, a final report should be delivered in the August/September 2014 timeframe.

Concurrently, on 12 December 2013, TC issued a draft TP 312 5th edition as part of the CARAC review process. This draft is based on NPA 2010-012 activities and, subject to several conditions, proposes to amend TP 312 RESA requirements to align it with the ICAO standard. For example: an aerodrome operator would only need to provide a RESA where the runway length is:

- (a) 1200 m or greater; or
- (b) less than 1200 m and the runway type is non-precision or precision; and

- (c) the runway is utilized by scheduled passenger-carrying operations of an air carrier operating aircraft designed for more than 9 passenger seats as determined by the aircraft type certificate.

The Board is very concerned that current TC RESA initiatives seem to have abandoned any discussion of a 300 m RESA option for Code 4 runways. Rather it appears that TC's response to Recommendation A07-06 has transitioned from its 2011 position to "...conduct a risk assessment to determine the safety benefits of requiring a 300 m RESA vice a 150 m RESA." through its 2012 approach to "...identify how long and where a RESA should be applied from a safety and financial (cost benefit) perspective." to its current direction that appears to be focussed solely on implementing the ICAO standard of a 150 m RESA.

Given that the proposed action goes only part-way to addressing the safety deficiency by examining a 150 m RESA in lieu of 300 m, TC's response is considered **Satisfactory in Part**.

January 2015: response from Transport Canada

Transport Canada agrees with the intent of the recommendation.

The contract for an independent risk assessment was awarded in December 2013, and Transport Canada anticipates receiving the completed Risk Assessment early in 2015. Transport Canada will implement the ICAO Standard at higher risk airports across the country.

March 2015: TSB assessment of the response (Unsatisfactory)

Transport Canada's update indicates that it will not receive the results of its independent risk assessment entitled *Risk Assessment for Runway End Safety Area at Canadian Airports* (T8080- 120164) until early 2015.

The final statement in Transport Canada's update appears to dispel any expectation that the independent risk assessment's final report will contain a discussion about the possibility of 300 m RESAs at Code 4 runways. Rather the response previews that the cornerstone of Transport Canada's action plan, in response to the yet to be released independent risk assessment's final report, is to implement the existing ICAO Standard (150 m RESA) at higher risk airports.

As runway overruns remain part of the TSB's 2014 Watchlist item entitled "Approach and Landing Accidents", Transport Canada's apparent abandonment of any consideration into the safety benefits of 300 m RESA at Code 4 runways is of concern.

Given that Transport Canada's implementation of changes to RESA requirements at Canadian airports is further delayed and such changes are unlikely to include 300 m RESAs at Code 4 runways, Transport Canada's response is assessed as **Unsatisfactory**.

November 2015: response from Transport Canada

Transport Canada agrees with the intent of the recommendation.

In early 2014, TC commissioned an independent risk assessment (RA) to establish implementation criteria for RESAs across all airport types in Canada. The risk assessment has been completed. On the basis of that RA, TC is in the process of developing options for the implementation of RESA. TC will then undertake a full cost/benefit analysis along with additional stakeholder consultation, before proceeding with drafting an updated Notice of Proposed Amendment (NPA) and revised regulatory language.

March 2016: TSB assessment of the response (Unsatisfactory)

Transport Canada (TC) has not included any information in its latest update to address TSB's March 2015 concern that TC's independent risk assessment (RA) entitled *Risk Assessment for Runway End Safety Area at Canadian Airports* (T8080-120164) would not include a study of 300 m RESAs on Code 4 runways.

Furthermore, TC's update does not provide any details of the risk assessment's findings merely stating that the RA is complete. Without such particulars it is impossible to assess whether or not TC's stated plan, to implement changes to RESA regulatory requirements, will include options that specifically address the deficiency identified in Recommendation A07-06.

Consequently, as TC implements its plan to develop options, undertakes a cost/benefit analysis, consults with stakeholders, and drafts an NPA, it is still not known whether these efforts will include a discussion about the possibility of 300 m RESAs on Code 4 runways.

Given that Transport Canada's latest update provides no precise information, action plan or timeline to provide for 300 m RESAs on Code 4 runways at Canadian airports, Transport Canada's response is assessed as **Unsatisfactory**.

January 2017: response from Transport Canada

TC agrees in principle with this recommendation. Transport Canada has developed options for the scope of application and the implementation of RESA at Canadian Airports. Public consultation on these options were initiated by NPA 2016-007 on May 12, 2016. Transport Canada is currently assessing the comments received before formalizing the regulatory proposal on RESA. Transport Canada expects to complete the analysis and determine the regulatory scope and timelines by June 2017. Following that decision, a briefing with the Transportation Safety Board will be scheduled to outline scope and timelines.

March 2017: TSB assessment of the response (Satisfactory in Part)

TC's update states that it has developed options for the scope of application and implementation of RESA at Canadian airports, and has engaged in public consultation in May 2016, through its NPA 2016-007. TC is currently analysing the responses received, and is expecting to complete the analysis and determine the regulatory scope and timelines by June 2017.

A review of NPA 2016-007 provides some insight into TC's current position with respect to the RESA requirement at Canadian airports. The objective of NPA 2016-007 reads as follows:

The primary objective of these proposed amendments is to increase the safety at Canadian certified airports by introducing a requirement of 150 m RESA based on air traffic volume and a risk-based approach.

In the NPA's analysis section, it is clear that TC has rejected the approach stated in Recommendation A07-06, that Code 4 runways in Canada would benefit from 300 m RESAs. Rather, TC's risk analysis concludes that a 150 m RESA (or a comparable arresting system) on all runways at airports where passenger volumes warrant, is a better approach.

The NPA seeks comments on four application options, which would require 150 m RESAs at an increasing number of affected airports, depending on passenger volume. According to TC, these options would reduce passenger risk exposure for between 91% and 97% of commercial air travellers in Canada.

While it appears that TC has abandoned any consideration for 300 m RESAs on Code 4 runways, it is not clear by how much its alternative approach, if implemented, would reduce the deficiency raised in Recommendation A07-06.

The Board is very concerned by these ongoing delays and has included runway excursions on its 2016 Watchlist. Runway overrun occurrences continue to happen and the lack of timely action exposes commercial air travellers in Canada to unnecessary risks until these regulatory amendments are in effect.

Therefore, the response to Recommendation A07-06 is assessed as **Satisfactory in Part**.

June 2018: response from Transport Canada

TC agrees in principle with the recommendation.

TC plans to publish a Notice of Proposed Amendment in the summer of 2018, which will substantially address the risks identified by the TSB.

July 2018: update from Transport Canada

- Pre-publication in *Canada Gazette* Part I is now planned for late 2018;
- Publication in *Canada Gazette* Part II in late 2019 / early 2020; and
- Airports would be required to comply by 2022/23.

Airports that meet the 325,000 passenger threshold as of the publication in CGII would be granted with a 24 months delay from publication in CGII to comply with RESA. Should the publication in CGII be delayed, the compliance timeline will be delayed accordingly.

March 2019: TSB assessment of the response (Satisfactory in Part)

To date, Transport Canada (TC) has taken the following actions to address the safety deficiency identified in Recommendation A07-06, regarding the requirement for all Code 4 runways to have a 300 m runway end safety area (RESA) or a means of stopping aircraft that provides an equivalent level of safety:

- In 2013, 2 advisory circulars (AC) were published:
 - AC 300-007 – Engineered Materials Arresting Systems for Aircraft Overruns, and
 - AC 302-015 – Runway End Safety Area Bearing Strength Requirements;
- In 2013, the 5th edition of the *Aerodrome Standards and Recommended Practices* (TP 312) was published, aligning Canadian standards with the 150 m RESA International Civil Aviation Organization (ICAO) standards;
- In early 2014, TC commissioned an independent risk assessment (RA) to establish implementation criteria for RESAs across all airport types in Canada. The RA was completed in 2015; and
- Proposed regulatory amendments were planned to be published in the *Canada Gazette*, Part I in the summer of 2018, followed by late 2018. However, at the time of this reassessment, the regulatory amendments had yet to be published.

This recommendation was issued over 11 years ago. The Board is concerned with the protracted delays in addressing the safety deficiency identified in Recommendation A07-06. Additionally, the Board is disappointed that TC is not pursuing the ICAO recommended 300 m RESA for Code 4 runways. The proposed regulatory changes, as currently written, will reduce the hazards associated with an overrun; however, not to the level that would be afforded by a 300 m RESA.

Therefore, the response to Recommendation A07-06 is assessed as **Satisfactory in Part**.

October 2019: response from Transport Canada

TC agrees in principle with this recommendation.

TC is developing proposed Runway End Safety Area (RESA) amendments to the *CARs*. Stakeholders have been consulted throughout the development of the proposed RESA amendments, including through Notices of Proposed Amendment; the last of which was published in May 2016.²

In order to maximize the benefits of RESA for the vast majority of air travelers and crews, the proposed amendments would mandate that Canada's busiest airports must provide a 150 m

² Canadian Aviation Regulation Advisory Council (CARAC), Notice of Proposed Amendment (NPA) on Runway End Safety Areas (RESA). CARAC Activity Reporting Notice #: 2016-007, at <https://wwwapps.tc.gc.ca/saf-sec-sur/2/npa-apm/npaapmr.aspx?id=2924&lang=eng> (last accessed 19 March 2021).

RESA at both ends of runways serving scheduled commercial passenger-carrying flights. Canadian airports with an annual passenger threshold of at least 325,000 would be subject to the proposed amendments. By addressing the construction of RESA to cover traffic instead of runway length this 150 m provides enough distance to contain 90% of runway excursions. This proposed approach would increase the safety of the travelling public and crews without imposing excessive costs to the aviation industry. It is expected that the proposed requirements would initially apply to 28 airports, and to an additional 9 airports in the next 20 years (as other airports reach the 325,000 passenger threshold), for a total of 37 airports. Overall, the proposed approach would represent 95% a passenger coverage by 2038 while aligning the Canadian regulations with the ICAO standard.

The pre-publication of the proposed amendments in the *Canada Gazette*, Part I is now planned for late 2019. The publication of the final amendment in *Canada Gazette*, Part II is planned for late 2020.

February 2021: updated response from Transport Canada

The Regulations amending the *Canadian Aviation Regulations* (Parts I, III and VI — Runway end safety areas RESA) were published in the *Canada Gazette*, Part I, on March 7, 2020. TC is aiming to publish these amendments in the *Canada Gazette*, Part II in May 2021.

March 2021: TSB assessment of the response (Satisfactory in Part)

In its responses, Transport Canada (TC) indicated that it agrees in principle with Recommendation A07-06.

In March 2020, TC proposed regulations that would, among other things:

- Require a 150 m Runway End Safety Area (RESA) at airports with over 325 000 commercial passengers annually;
- Require the use of an arresting system on runways where the 150 m RESA cannot be implemented; and
- Be limited to runways serving commercial passenger services.

According to TC, these regulations, once implemented, will increase runway overrun protection to passengers from 75% of passenger traffic in 2017 to 95% by 2038. However, these regulations focus only on the risk to a majority of, but not all, passengers and do not consider non-passenger air traffic or the terrain at the end of all runways. Also, the TSB believes that the proposed regulations may not fully meet the International Civil Aviation Organization (ICAO) standard, which requires a 150 m RESA for all runways 1200 m in length and longer, and provisions for other types of runways.

The proposed amendments were published in the *Canada Gazette*, Part I, in March 2020. TC is aiming to publish these amendments in the *Canada Gazette*, Part II in May 2021.

The proposed regulatory changes, as currently written, will reduce the risks associated with an overrun; however, not to the level that would be afforded by the ICAO recommended 300 m RESA. At a minimum, the Board believes that the proposed regulations must meet the ICAO standard.

Therefore, the response to Recommendation A07-06 is assessed as **Satisfactory in Part**.

September 2021: response from Transport Canada

Transport Canada (TC) agrees in principle with the recommendation.

Since the recommendation was issued in 2007, while pursuing changes to the regulations, TC worked with industry experts in 2008 to review airport standards (TP312 Aerodrome Standards and Recommended Practices³) and in 2013 issued two Advisory Circulars (AC) concerning Runway End Safety Area (RESA) Construction Maintenance and Runway Arresting Systems (AC 300-007 EMAS⁴ and AC 302-015 Runway End Safety Area Bearing Strength Requirements⁵).

In early 2014, TC commissioned an independent risk assessment (RA) to establish implementation criteria for RESAs across all airport types in Canada. Based on the recommendations of the RA, TC favoured the adoption of RESA requirements based on passenger volumes and went forward to issue a Notice of Proposed Amendment (NPA) 2016-007 that would amend *Canadian Aviation Regulations* (Parts I, III and VI — Runway end safety areas - RESA). The amended regulations were published in the *Canada Gazette*, Part I, on March 7, 2020.⁶

In our last update in February 2021, the Department mentioned aiming to plan these amendments in the *Canada Gazette*, Part II in May 2021. Work is still underway for the final publication and TC will notify the TSB when a publication date is available.

March 2022: TSB assessment of the response (Satisfactory in Part)

In its latest response, Transport Canada (TC) indicated that it agrees in principle with Recommendation A07-06. The *Regulations Amending the Canadian Aviation Regulations (Parts I,*

³ Transport Canada (2015). TP 312 –*Aerodromes Standards and Recommended Practices*. Available at: <https://tc.canada.ca/en/aviation/publications/aerodromes-standards-recommended-practices-tp-312>

⁴ Transport Canada (2017). Advisory Circular (AC) 300-007 -*Engineered Materials Arresting Systems for Aircraft Overruns*. Available at: <https://tc.canada.ca/en/aviation/reference-centre/advisory-circulars/advisory-circular-ac-no-300-007>

⁵ Transport Canada (2013). Advisory Circular (AC) 302-015 - *Runway End Safety Area Bearing Strength Requirements*. Available at: <https://tc.canada.ca/en/aviation/reference-centre/advisory-circulars/advisory-circular-ac-no-302-015>

⁶ Government of Canada (2020). *Canada Gazette*, Part I, Volume 154, Number 10: *Regulations Amending the Canadian Aviation Regulations (Parts I, III and VI— RESA)*. Available at: <https://www.gazette.gc.ca/rp-pr/p1/2020/2020-03-07/html/reg3-eng.html>

III and VI – RESA): *SOR/2021-269*⁷ were published in the *Canada Gazette*, Part II in January 2022. According to TC, these regulations will increase runway overrun protection to passengers from 75% of passenger traffic in 2017 to 95% by 2038. However, these regulations focus only on the risk to a majority of, but not all, passengers and do not consider non-passenger air traffic or the terrain at the end of all runways.

The Board believes that the regulations do not fully meet the International Civil Aviation Organization's (ICAO) standard, which requires a 150 m runway end safety area (RESA) for all runways 1200 m in length and longer, and provisions for other types of runways. Additionally, TC has not yet provided an assessment of the residual risk represented by the gap between TC's regulations and the ICAO standard.

Furthermore, while the regulatory changes will reduce the risks associated with an overrun, they will not reduce the risks to the level that would be afforded by the ICAO-recommended 300 m RESA.

Therefore, the response to Recommendation A07-06 is assessed as **Satisfactory in Part**.

October 2022: response from Transport Canada

Transport Canada (TC) agrees in principle with the recommendation.

Since the recommendation was issued in 2007, while pursuing changes to the regulations, TC worked with industry experts in 2008 to review airports standards (TP312 Aerodrome Standards and Recommended Practices⁸) and in 2013 issued two Advisory Circulars (AC) concerning Runway End Safety Area (RESA) Construction Maintenance and Runway Arresting Systems (AC 300-007 EMAS⁹ and AC 302-015 Runway End Safety Area Bearing Strength Requirements¹⁰).

In early 2014, TC commissioned an independent risk assessment (RA) to establish implementation criteria for RESAs across all airport types in Canada. Based on the recommendations of the RA, TC favoured the adoption of RESA requirements based on passenger volumes and went forward to issue a Notice of Proposed Amendment (NPA) 2016-

⁷ Government of Canada (2022). *Canada Gazette*, Part II, Volume 156, Number 1 : *Regulations Amending the Canadian Aviation Regulations (Parts I, III and VI— RESA)*. Available at: <https://www.gazette.gc.ca/rp-pr/p2/2022/2022-01-05/html/sor-dors269-eng.html>

⁸ Transport Canada (2015). TP 312 – Aerodromes Standards and Recommended Practices. Available at: <https://tc.canada.ca/en/aviation/publications/aerodromes-standards-recommended-practices-tp-312>

⁹ Transport Canada (2017). Advisory Circular (AC) 300-007 - Engineered Materials Arresting Systems for Aircraft Overruns. Available at: <https://tc.canada.ca/en/aviation/reference-centre/advisory-circulars/advisory-circular-ac-no-300-007>

¹⁰ Transport Canada (2013). Advisory Circular (AC) 302-015 - Runway End Safety Area Bearing Strength Requirements. Available at: <https://tc.canada.ca/en/aviation/reference-centre/advisory-circulars/advisory-circular-ac-no-302-015>

007 that would amend Canadian Aviation Regulations (Parts I, III and VI — Runway end safety areas - RESA).

In TC's September 2021 update, the Department mentioned that work was still underway for the final publication of the amendment in the *Canada Gazette*, Part II. The updated regulations were published on January 5th, 2022.¹¹ These amendments to the CARs require Canadian-certified aerodromes to extend their current safety area from the existing mandated 60 m to a minimum length of 150 m at the ends of runways **for existing and new runways of all lengths at airports serving 325 000 or more passengers on scheduled commercial passenger-carrying flights for two consecutive years.**

In its latest reassessment, the TSB requested TC to “provide an assessment of the residual risk represented by the gap between TC's regulations and the ICAO standard.” Research was undertaken in the National Aerodrome Safety Database (NASD) to respond to the TSB's request. TC's initial intent was to fully align with the international standards, as established by ICAO. This approach would have required a 150 m RESA at both ends of the following types of runways at land airports serving public transportation (which may include the runway safety area):

- code 2 runways (between 800 and 1 200 m), if instrument landing systems are used (this system enables pilots to conduct an instrument approach to landing when visibility is low); and
- all code 3 and 4 runways (1 200 m and more) regardless of the type of approach used.

This approach would have increased RESA requirements for a total 217 runways at 190 airports (Table 1). Given the number of affected airports, the risk to safety would have been reduced. However, shorter runways would not have been covered, even if serving scheduled commercial passenger-carrying flights.

The projected costs would be very high under this approach, while providing only a minimal incremental safety benefit to passengers due to low levels of passenger traffic at many of the captured airports. Although desirable for safety reasons, the costs associated with the ICAO approach would disadvantage small airports located in remote and northern areas.

¹¹ Government of Canada (2022). *Canada Gazette*, Part II, Volume 156, Number 1: Regulations Amending the Canadian Aviation Regulations (Parts I, III and VI — RESA). Available at: <https://www.gazette.gc.ca/rp-pr/p2/2022/2022-01-05/html/sor-dors269-eng.html>

Table 1. Number of runways in Canada that would be subjected to International RESA Standards and TSB Recommendations compared to those subjected to RESA according to the amendment published by Transport Canada.

Runway Code	Runway length	Runway Type	International RESA Standard (90 m)	TSB Recommendation	TC Amendment (Pre-COVID – CG1 ¹ /Post-COVID – CG2 ²)
Code 2	800 m < 1 200 m	Instrument	39	0	1 / 0
Code 3	1 200 m < 1 800 m	Instrument & non-instrument	109	0	11 / 1
Code 4	≥ 1 800 m	Instrument & non-instrument	69	69	25 / 12
Total runways			217	69	37 / 13
Total airports			190	69	28 / 12

Data source: National Aerodrome Safety Database (9 September 2022)

¹ Government of Canada (2020). Canada Gazette, Part I, Volume 154, Number 10: Regulations Amending the Canadian Aviation Regulations (Parts I, III and VI — RESA). Available at: <https://canadagazette.gc.ca/rp-pr/p1/2020/2020-03-07/html/reg3-eng.html>

² Government of Canada (2022). Canada Gazette, Part II, Volume 156, Number 1: Regulations Amending the Canadian Aviation Regulations (Parts I, III and VI — RESA). Available at: <https://www.gazette.gc.ca/rp-pr/p2/2022/2022-01-05/html/sor-dors269-eng>

Northern Airports

The major concern expressed by stakeholders pertained to the proposal to extend the application of RESAs to northern and remote airports. Concerns expressed included the burden and logistics associated with RESA implementation, as well as the related costs and their expected adverse impact on airports operating within limited budgets.

TC decided to exclude airports located north of the 60th parallel that only serve air carrier operations using small aircraft. The removal of the northern and remote airports excluded many airports from the initial proposal, all of them located in Quebec, Nunavut, the Northwest Territories, and Yukon.

Given that the inclusion of northern airports in the NPA had an important impact on all comments expressed as part of this consultation, including on the timelines and costs related to remote and northern airports, TC issued a revised NPA that excluded airports north of the 60th parallel, which represented 31 airports according to NASD; one airport remains subjected to the TC RESA requirements (Table 2).

Table 2. Number of runways in Canada above the 60th parallel that would have been subjected to International RESA Standards and TSB Recommendations compared to those subjected to RESA according to the amendment published by Transport Canada.

Runway Code	Runway length	Runway Type	International RESA Standard (90 m)	TSB Recommendation	TC Amendment (Pre-COVID – CG1 ¹ /Post-COVID – CG2 ²)
Code 2	800 m < 1 200 m	Instrument	10	0	0 / 0
Code 3	1 200 m < 1 800 m	Instrument & non-instrument	16	0	2 / 1
Code 4	≥ 1 800 m	Instrument & non-instrument	7	7	2 / 1
Total runways			33	7	4 / 2
Total airports			31	7	2 / 1

Data source: National Aerodrome Safety Database (9 September 2022)

- ¹ Government of Canada (2020). Canada Gazette, Part I, Volume 154, Number 10: Regulations Amending the Canadian Aviation Regulations (Parts I, III and VI — RESA). Available at: <https://canadagazette.gc.ca/rp-pr/p1/2020/2020-03-07/html/reg3-eng.html>
- ² Government of Canada (2022). Canada Gazette, Part II, Volume 156, Number 1: Regulations Amending the Canadian Aviation Regulations (Parts I, III and VI — RESA). Available at: <https://www.gazette.gc.ca/rp-pr/p2/2022/2022-01-05/html/sor-dors269-eng.html>

TC’s risk/exposure-based approach

The preferred approach is to mandate the provision of 150 m RESA at Canada’s busiest airports. This approach would address the safety risk at the busiest commercial passenger airports and would enhance compliance with international standards. This option is consistent with the findings of the *Runway End Safety Area, Risk Assessment at Canadian airports (2015)*. Given that the analysis did not reveal any key criteria to account for runway excursions (including the runway length and type of approach), the study recommended implementing a risk/exposure-based approach focusing on passenger threshold. This approach (325,000 pax) was chosen to maximize the benefits of RESA in consideration of the level of activity at the airport. As a risk of excursion is present in every take-off and landing, installing RESA on runways serving a high volume of flights would bring greater benefits in comparison to installing RESA where the air traffic is low.

Based on 2017 air passenger data, roughly 75% of passenger traffic in Canada occurred on runways that are fully compliant or met the physical characteristics for RESA. The proposed requirement would apply to the 28 busiest airports (that is with at least 325,000 annual passengers) in Canada. Over the next 20 years, another nine airports could potentially reach the passenger threshold, thus bringing the total number of airports implementing RESA at runways used for the transportation of scheduled commercial passenger-carrying flights to 37. Overall,

this option would see passenger coverage increased by 20 percent (that is from 75% to 95%) by 2038.

By limiting RESA investments to runways that serve scheduled commercial passenger-carrying flights, this option focuses on providing safety benefits to the vast majority of travelers and crew members without imposing excessive costs on the industry. This approach would bring Canada closer to international standards and with those of the U.S.

COVID-19 Pandemic

The COVID-19 pandemic has greatly impacted the aviation industry and taken a financial toll on airport operators. Airport operators have expressed concerns about their ability to undertake significant projects due to the financial impacts caused by the pandemic. To reflect the challenges experienced by the industry due to the pandemic, the Cost-Benefit Analysis section considers COVID-19 recovery scenarios in the sensitivity analysis.

Additionally, the previous list published in the *Canada Gazette*, Part I, contained 28 airports, while the amended list contains 12 airports. The changes in the published list are explained by the significant drop in air travel in 2020 and 2021 as a result of the COVID-19 pandemic, which has caused many airports to fall below the 325 000-passenger volume threshold. Once an airport reaches again the threshold of at least 325 000 passengers per year during any period of two consecutive calendar years, the requirement under subsection 302.600(1) will apply.

Next steps with ICAO

TC has a Category C difference on file with ICAO according to Article 38 of the *Convention of International Civil Aviation*:¹²

“Any State which finds it impracticable to comply in all respects with any such international standard or procedure, or to bring its own regulations or practices into full accord with any international standard or procedure after amendment of the latter, or which deems it necessary to adopt regulations or practices differing in any particular respect from those established by an international standard, shall give immediate notification to the International Civil Aviation Organization of the differences between its own practice and that established by the international standard.”

A Category C difference applies when the national regulation is less protective than the corresponding SARP; or when no national regulation has been promulgated to address the corresponding SARP, in whole or in part.

¹² ICAO (2006). Document 7300/9: Convention on International Civil Aviation - §Article 38: Departures from international standards and procedures. Pages 17-18. Available through the ICAO website.

The associated text needs to be updated to reflect the current Canadian application of RESA. TC is planning to review the listing of differences related to ICAO Annex 14 - Volume I,¹³ for submission by the end of 2022.

February 2023: TSB assessment of the response (Satisfactory in Part)

In its latest response, Transport Canada (TC) indicated that it agrees in principle with the recommendation.

TC's initial intent was to fully align with the international standard as established by ICAO. The ICAO standard requirement is 150 m RESA for all runways 1200 m in length and longer (code 2, 3, and 4 runways), and there are also provisions for other types of runways. This approach would have increased RESA requirements for 217 runways at 190 airports (see Table 1 in TC's October 2022 response). According to TC, the projected costs would be very high under this approach, would disadvantage small airports located in remote and northern areas, and would provide only minimal incremental safety benefit to passengers due to low levels of passenger traffic.

In January 2022, TC published updated *Canadian Aviation Regulations* (Parts I, III and VI – RESA) in the *Canada Gazette*, Part II that will require Canadian-certified aerodromes to extend their current safety area from the existing 60 m to a minimum length of 150 m for existing and new runways of all lengths at airports serving 325 000 or more passengers on scheduled commercial passenger-carrying flights for two consecutive years. Subsection 302.602(2) of the regulations was modified to amend the list of airports that will be required to comply with RESA regulations. TC's initial list, published in the *Canada Gazette*, Part I (March 2020), included 28 airports. However, TC amended the list to include only 12 airports due to the COVID-19 pandemic and the decrease in passenger volume. These 12 airports have three years to comply with the RESA regulations.

TC states that the regulations could increase overrun protection for passengers from 75% of passenger traffic in 2017 to 95% by 2038. However, TC's regulations do not extend runway overrun protection to all passengers, and they consider neither non-passenger air traffic nor the terrain at the end all runways. As example, of the 24 runway overrun occurrences investigated by the TSB from 01 January 2005 to 30 June 2022, 17 of them occurred at airports that had passenger volumes less than 325,000.

Furthermore, as per the data contained in Table 2 of TC's October 2022 response, these regulations exclude 31 airports, located north of the 60th parallel, with only one airport remaining subject to the RESA requirements. In essence, the amended regulations are predicated on a minimum passenger threshold and a comprehensive regulatory cost-benefit analysis.

¹³ ICAO (2018). Annex 14 to the Convention on International Civil Aviation: Aerodromes – Volume I: Aerodrome Design and Operations. Available through the ICAO website.

TSB Watchlist 2022 includes runway overruns and describes many of the initiatives taken by TC and the industry to mitigate the risks surrounding overruns. The Board is encouraged to see that activity to meet ICAO's 150 m RESA standard has begun at some airports, and that others have already implemented ICAO's 300 m RESA recommendation. However, the Board is not convinced that the residual risk at airports with runways not required to comply with ICAO's standard is as low as reasonably practicable. Additionally, the Board believes that TC should require operators of airports with runways longer than 1800 m that have a RESA shorter than ICAO's recommended length of 300 m to conduct formal runway-specific risk assessments and to take action to mitigate the risks of overruns to the public, property, and the environment.

The Board is of the opinion that, despite the actions taken to date, the safety risks associated with this recommendation remain. Therefore, the Board considers the response to Recommendation A07-06 to be **Satisfactory in Part**.

Latest response and assessment

September 2023: response from Transport Canada

Transport Canada (TC) agrees in principle with the recommendation.¹⁴

Since the recommendation was issued in 2007, while pursuing changes to the regulations, TC worked with industry experts in 2008 to review airports standards (TP 312 *Aerodrome Standards and Recommended Practices*¹⁵) and in 2013 issued two Advisory Circulars (AC) concerning Runway End Safety Area (RESA) Construction Maintenance and Runway Arresting Systems (AC 300-007 EMAS¹⁶ and AC 302-015 Runway End Safety Area Bearing Strength Requirements¹⁷).

In early 2014, TC commissioned an independent risk assessment (RA) to establish implementation criteria for RESAs across all airport types in Canada. Based on the recommendations of the RA, TC favoured the adoption of RESA requirements based on passenger volumes and went forward to issue a Notice of Proposed Amendment (NPA) 2016-007 that would amend Canadian Aviation Regulations (Parts I, III and VI — Runway end safety areas - RESA).

¹⁴ All responses are those of the stakeholders to the TSB in written communications and are reproduced in full. The TSB corrects typographical errors and accessibility issues in the material it reproduces without indication but uses brackets [] to show other changes or to show that part of the response was omitted because it was not pertinent.

¹⁵ Transport Canada (2015). TP 312 – *Aerodromes Standards and Recommended Practices*. Available at: <https://tc.canada.ca/en/aviation/publications/aerodromes-standards-recommended-practices-tp-312>

¹⁶ Transport Canada (2017). Advisory Circular (AC) 300-007 - *Engineered Materials Arresting Systems for Aircraft Overruns*. Available at: <https://tc.canada.ca/en/aviation/reference-centre/advisory-circulars/advisory-circular-ac-no-300-007>

¹⁷ Transport Canada (2013). Advisory Circular (AC) 302-015 - *Runway End Safety Area Bearing Strength Requirements*. Available at: <https://tc.canada.ca/en/aviation/reference-centre/advisory-circulars/advisory-circular-ac-no-302-015>

The updated regulations were published on January 5th, 2022¹⁸. These amendments to the CARs require Canadian-certified aerodromes to extend their current safety area from the existing mandated 60 m to a minimum length of 150 m at the ends of runways for existing and new runways of all lengths at airports serving 325 000 or more passengers on scheduled commercial passenger-carrying flights for two consecutive years.

In TC's October 2022 update, the Department provided the TSB an assessment of the residual risk represented by the gap between TC's regulations and the ICAO standard. TC initially aimed to align with international standards set by ICAO for Runway End Safety Areas (RESA), which would have required a 150-meter RESA for specific runways at land airports serving public transportation. This approach would have affected 217 runways at 190 airports, increasing safety but at a high cost and with limited benefits for smaller airports.

Stakeholders expressed concerns about extending RESA requirements to northern and remote airports due to logistical and budgetary challenges. Consequently, airports north of the 60th parallel serving only small aircraft were excluded from the proposal.

The preferred approach is to mandate 150-meter RESA at Canada's busiest airports, focusing on those with at least 325,000 annual passengers, aligning with international standards and maximizing safety benefits. Approximately 75% of passenger traffic in Canada already complies with or meets RESA characteristics. This approach would increase passenger coverage to 95% by 2038 and bring Canada closer to international standards and those of the U.S..

Considering the financial impact of the COVID-19 pandemic on the aviation industry, the Cost-Benefit Analysis takes into account recovery scenarios. Additionally, the list of affected airports has been revised due to reduced passenger volumes during the pandemic. Once an airport reaches the 325,000-passenger threshold in two consecutive calendar years, RESA requirements will apply.

Currently, TC does not intend to require operators of airports with runways longer than 1800 m, which have a RESA shorter than ICAO's recommended length of 300 m, to conduct formal runway-specific risk assessments.

Next steps with ICAO

TC has a Category C difference on file with ICAO according to Article 38 of the *Convention of International Civil Aviation*:¹⁹

Any State which finds it impracticable to comply in all respects with any such international standard or procedure, or to bring its own regulations or practices

¹⁸ Government of Canada (2022). *Canada Gazette*, Part II, Volume 156, Number 1: *Regulations Amending the Canadian Aviation Regulations (Parts I, III and VI — RESA)*. Available at: <https://www.gazette.gc.ca/rp-pr/p2/2022/2022-01-05/html/sor-dors269-eng.html>

¹⁹ ICAO (2006). Document 7300/9: *Convention on International Civil Aviation - §Article 38: Departures from international standards and procedures*. Pages 17-18. Available through the ICAO website.

into full accord with any international standard or procedure after amendment of the latter, or which deems it necessary to adopt regulations or practices differing in any particular respect from those established by an international standard, shall give immediate notification to the International Civil Aviation Organization of the differences between its own practice and that established by the international standard.

A Category C difference applies when the national regulation is less protective than the corresponding SARP [standard and recommended practices]; or when no national regulation has been promulgated to address the corresponding SARP, in whole or in part.

March 2024: TSB assessment of the response (Satisfactory in Part)

In its latest response, Transport Canada (TC) reiterated that it agrees in principle with the recommendation.

TC's latest update is largely unchanged from its previous response. TC reiterated its preferred approach, which is to mandate a 150 m runway end safety area (RESA) at Canada's busiest airports, focusing on those with at least 325 000 passengers annually. These regulations apply only to certain runways at airports that meet the specific annual commercial passenger volume criterion; they do not apply to all runways 1200 m in length or longer as stipulated in the International Civil Aviation Organization (ICAO) standard. TC states that the regulations will increase runway overrun protection to passengers from 75% of passenger traffic in 2017 to 95% by 2038.

TC indicated that it acknowledges the challenges in fully aligning with the international standards and retains a Category C difference²⁰ on file with ICAO. Based on its cost-benefit analysis, which includes the projected costs to meet ICAO compliancy, stakeholder consultation, and its analysis of the *Runway End Safety Area, Risk Assessment at Canadian airports* (2015), TC's approach (325 000 annual passenger threshold) was chosen to maximize the benefits of RESA in consideration of the level of activity at an airport rather than the length of a runway. TC further emphasized the financial impact that the COVID-19 global pandemic had on the aviation industry. Consequently, the significant reduction in passenger volumes during the pandemic resulted in the list of affected airports being reduced by more than half (from 28 airports to 12). TC stated that once an airport reaches the 325 000-passenger threshold for 2 consecutive calendar years, the RESA requirements will apply.

The TSB has investigated 24 runway overrun occurrences that took place in the period from 01 January 2005 to 30 June 2022. Of those, 17 occurred at airports that had passenger volumes

²⁰ A member State will file a Category C difference with ICAO "when the national regulation is less protective than the corresponding SARP [standard and recommended practice]; or when no national regulation has been promulgated to address the corresponding SARP, in whole or in part." (Source: International Civil Aviation Organization, Attachment D to State letter AN 4/1.2.23-09/30: Note on the Notification of Differences to Annex 14, Volume 1 and Form of Notification, at icaoint.org/sam/documents/grepecas/2009/agaopsg7/030e.pdf [last accessed on 13 March 2024].)

less than 325 000. At the time of this assessment, the TSB had 4 active investigations²¹ into runway overruns (one of which was a Class 2 occurrence involving a *Canadian Aviation Regulations* [CARs] Subpart 705 operator that took place in November 2022). Three of these 4 investigations involved runway overrun occurrences that took place at smaller, remote, or northern airports. Moreover, according to the TSB's last quarterly statistics, 3 runway overrun incidents occurred in the first half of 2023, and 6 runway overruns occurred in the third quarter (4 accidents and 2 reportable incidents). One accident involved a flight training operation (operating under CARs Subpart 406) and 3 involved private aircraft. The 2 reportable incidents involved a commuter aircraft (operating under CARs Subpart 704) and an air taxi aircraft (operating under CARs Subpart 703).

Although the Board acknowledges TC's efforts and progress to reduce the risk of runway overruns at Canada's major airports through regulatory changes, the Board remains concerned that these regulations do not address the risk of runway overruns at smaller and remote airports. The Board also remains concerned about the residual risk represented by the gap between TC's regulations and the ICAO standard and recommendation. Additionally, since 2018, the TSB Watchlist has called for TC to require operators of airports with runways longer than 1800 m that have a RESA shorter than ICAO's recommended length of 300 m to conduct formal runway-specific risk assessments and to take action to mitigate the risks of overruns to the public, property, and the environment. TC's confirmation that it has no intention of doing so is disappointing to the Board, particularly because TC provided no explanation for its decision.

The Board is of the opinion that, without further planned action, the safety risk associated with the safety deficiency remains. Therefore, the Board considers the response to Recommendation A07-06 to be **Satisfactory in Part**.

File status

TC has indicated that no further action will be taken to address the residual risk represented by the gap between TC's regulations and the ICAO standard and recommendation. Although some progress has been made to reduce the risk of runway overruns, it has been more than 17 years since Recommendation A07-06 was issued, and the runway end safety hazards remain at some airports with Code 4 runways, including Toronto/Lester B. Pearson International Airport, the site of the occurrence that prompted the recommendation.

Although the TSB will no longer follow up on this recommendation, it will continue to monitor runway overrun occurrences, as well as TC and industry activity to address the risk associated with the safety deficiency, and address the issue through the TSB Watchlist.

This deficiency file is **Closed**.

²¹ TSB air transportation safety investigations A23C0081, A23O0046, A22O0161, and A22Q0025.