

Regulatory Impact Statement

Aircraft emergency location equipment

Agency Disclosure Statement

This Regulatory Impact Statement has been prepared by the Civil Aviation Authority (CAA) and Ministry of Transport. It provides an analysis of options to improve the regulatory framework for aircraft emergency location equipment requirements in New Zealand.

The key assumption underpinning this proposal is that there will be continued technological innovation/development across the communications and transport industries in the long term. Any other assumptions contained in the analysis have been noted throughout the document.

The analysis of cost and impacts is constrained by the difficulties in forecasting changes resulting from a proposal that will enable market adaptation. Costs will be faced by manufacturers wishing to prove that their product can meet the amended regulatory requirements, and the regulator will face costs in assessing these new products and providing acceptable means of compliance to aviation participants. Whilst these costs cannot be quantified, they are not expected to outweigh the economic benefits outlined in this proposal.

Executive Summary

New Zealand Civil Aviation Rules require most aircraft to be equipped with one or more emergency location transmitters, which provide a location signal to search and rescue crew in the event of an aircraft emergency.

In light of ongoing technological development in the communications and transport sectors, this level of regulatory prescription does not enable efficient uptake of alternative devices that may be introduced to the market. The preferred approach is to remove this regulatory 'red-tape' by amending the Rules to be more performance based. This will increase market competition, providing long term economic benefits to aircraft operators.

Several amendments are proposed to Civil Aviation Rule Parts 91 and 43, giving the Director of Civil Aviation the discretion to approve equipment that meets specified criteria in the Rules:

- Aircraft emergency location equipment must:
 - automatically activate and broadcast a signal to search and rescue (SAR) service providers when the aircraft becomes distressed;
 - provide the aircraft's location as accurately as possible, to a five kilometre radius or better via a homing device;
 - broadcast the distress position for no less than 24 hours after onset of distress;
 - operate from independent battery power, which contains at least 24 hours of battery life; and,
 - provide sufficient coverage of New Zealand land and sea search area.
- Aircraft emergency location equipment must meet a minimum specification standard approved by the Director of Civil Aviation.

New Zealand has a commitment to align its regulations for international operations to current international standards. The proposed amendment is for domestic operations only.

Acceptable means of compliance will be developed by the regulator in order to ensure operators are equipped with adequate information to comply with the Rule.

Status quo

1. Civil aviation in New Zealand is regulated through the Civil Aviation Act 1990 and a suite of Civil Aviation Rules (Rules). The Civil Aviation Authority of New Zealand (CAA), on behalf of the Minister of Transport, develops, maintains and enforces minimum aviation safety and security standards through the Rules. New Zealand is also party to the Convention on International Civil Aviation (Chicago Convention), which requires the Rules to reflect the standards and recommended practices prescribed in annexes to the Convention by the International Civil Aviation Organization (ICAO).
2. New Zealand, like many other ICAO member States, has aligned its Rules for aircraft emergency location equipment (*Part 91 – General Operating and Flight Rules*, and *Part 43 – General Maintenance Rules*) with Annex 6 of the Chicago Convention, requiring most aircraft to be equipped with an Emergency Location Transmitter (ELT). An ELT automatically activates without human intervention when the aircraft is in distress¹ and broadcasts a distinctive signal on designated radio frequencies. The signal is detected by the international satellite system to alert search and rescue service providers, such as the Rescue Coordination Centre New Zealand (RCC), to an accident and its approximate location.
3. Rule 91.529 requires nearly all aircraft to install at least one automatic ELT, and larger aircraft operating internationally are required to install three ELTs. Aircraft equipped with no more than one seat (for example, microlights and gliders) or no more than two seats if operating within 10 nautical miles from an aerodrome, can use a Personal Locator Beacon (PLB) in place of an ELT. PLBs are designed to be carried on a person, and are manually activated. The different requirements are intended to address the different safety risks in a way appropriate for the size and operation of the aircraft.
4. In New Zealand, there are two main suppliers of ELTs (Aviation Safety Supplies Ltd and South Pacific Avionics Ltd), who source from a few manufacturers (e.g. Kannad, Artex, Skyhunter, Integra). ELTs cost approximately \$3,600² to install (approximately \$1,600 for the ELT itself and approximately \$2,000 for an antenna package). There are also maintenance costs – battery replacement is \$600 every six years, and testing every 12 months is approximately \$800 to \$1,500.
5. There is also a range of Flight Tracking Devices (FTDs) on the market. The primary purposes of these devices are to provide real-time aircraft tracking and text messaging; however, most FTDs also have a distress alert function. FTDs plug into the cigarette lighter on the aircraft dashboard, and the flight tracking and distress alerting is achieved by live position reporting, with a polling rate of approximately 10-15 minutes in most cases. FTDs range in cost from \$1,000 to \$2,000, with added charging for distress alerts³ and annual subscription costs of \$30 to \$240 per flight hour, depending on the operator's level of activity.

¹ A g-switch associates deceleration of the aircraft associated with an impending crash

² All quoted figures are in New Zealand dollars and are GST inclusive

³ For example, SpiderTracks FTD charge \$0.75 per 'SOS text message'.

6. There has been considerable voluntary uptake of FTDs by small to medium commercial and recreational aviation operators over recent years – public consultation found that 32 of 64 submitters use additional location devices with their ELTs, and of these 32, approximately 70 percent use FTDs. The consultation identified that the voluntary uptake is because FTDs are a cheaper alternative to installing additional transponders⁴, which provides flight information such as height, coordinates, position, speed and direction. FTDs are also preferred because they allow text messages outside of normal cell-phone coverage. There are no regulatory requirements pertaining to the use of FTDs.
7. Submitters also noted using FTDs because they consider that ELTs are not always effective at activating in an accident, which will adversely impact on search and rescue. Subsequently, the CAA undertook a review of the effectiveness of ELTs and found that in 2013/14 ELTs had an estimated efficacy rate of only 27 – 43 percent. The review identified that human factors were the key issue affecting the performance of ELTs (for example, poor installation of ELTs by maintenance engineers). As a result of these findings, the CAA will be updating its emergency location guidance material and delivering an educational campaign to help improve ELT performance.

Problem definition

The current regulatory framework for emergency location of aircraft presents barriers to operators using potentially cheaper and/or more effective location devices which may become available over the long term

8. If an aircraft operator wishes to use an alternative device to the 406Mhz for emergency location they must either adopt a new device whilst maintaining compliance with the ELT requirements; petition the CAA to amend the Rule (assuming that the subsequent analysis and recommendations would lead to a Rule change that allow the desired alternative to be used); or, apply to the CAA for an exemption to the Rule⁵. All of these approaches have time or cost implications (or both). This is outlined in Table 1 below:

Table 1: Current options for operators to use alternative location device

<p>1</p> <p>Operators use an additional device, but maintain compliance with ELT requirements</p>	<p>Cost to install and maintain ELT, plus costs to install and maintain additional device. Using FTDs as a theoretical example, installing two systems would cost approximately \$5,000 - \$6,000, but maintain only one of these devices would cost approximately \$1,000 - \$4,000.</p>
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⁴ Identification of aircraft movement (including position, speed, direction, height, etc.) by radar.

⁵ A petition for exemption is a request to the Director of Civil Aviation to provide relief from any specified requirement in a Civil Aviation Rule made by the Minister of Transport. Under section 37 of the Civil Aviation Act 1990, the Director may, if considered appropriate, grant an Exemption from a rule requirement, with appropriate conditions. Before granting an Exemption, the Director will consider whether an applicant's proposal provides a level of safety, or risk control, equivalent to that required by the existing rule.

<p>2</p> <p>Rule reviewed, and possibly amended, each time a new device is presented as a suitable alternative to ELTs</p>	<p>Anyone can petition the CAA to assess an issue. The CAA will also initiate Rule reviews where appropriate. The process to complete a robust assessment (detailed evaluation of the problem and options, plus adequate public consultation) and then progress with regulatory change is time consuming – depending on the issue, it will generally take an estimated 1-3 years to implement an amendment from the time the issue was first raised.</p> <p>For example, this regulatory impact statement is the result of a policy review which stemmed from three industry petitions about ELTs that were raised between 2011 and 2013.</p>
<p>3</p> <p>Operators apply to CAA for an exemption to the Rule</p>	<p>An Exemption Application goes through a robust and structured assessment by a number of CAA personnel before it is presented to the Director of Civil Aviation for consideration, which (similarly to 2 above) can take a significant period of time. Up to 90 days is generally allocated to assess and either accept or decline an exemption application.</p> <p>In terms of cost, applicants are charged at the CAA Standard Rate hourly charge of \$284, as per the Civil Aviation Charges Regulations (No2) 1991. These charges apply whether or not the petition is granted. In 2015/16 the CAA has processed 28 Exemption applications in which the average chargeable hours is 7 hours (40 hours the longest application, 2.5 hours the shortest). This equates to an average of \$1,988 (including GST) per exemption.</p>

9. Whilst the additional costs identified with the first approach are not a barrier to uptake of alternative or complementary devices (as indicated through consultation), it is preventing operators from saving money if the other device is a suitable alternative to the ELT.
10. There are no devices currently on the market that are a suitable alternative to ELTs. This is because ELTs are the only device that can meet the minimum standards set by the current Rule – automatically activate and broadcast a distress location without human intervention, provide location accuracy by means of a homing signal, and broadcast an ongoing distress position for a significant period of time.
11. For example, FTDs source power from the aircraft and provide position reports every 10-15 minutes – this means that if the aircraft lost power, the FTD could not provide an accurate location for the crash site, as the last position report would have been the location of the aircraft 10-15 minutes before it crashed. Using a small fixed-wing aircraft as an example, the aircraft's final position could be almost 30kms from the position reported 10 minutes earlier⁶. This significant discrepancy would pose considerable

⁶ Based on average flight speed of Cessna fixed wing aircraft (used by a number of recreational and commercial operators) - 177 km per hour.

challenges for search and rescue, which could affect the chances of saving a life and the cost of conducting the operation.

12. Approaches 2 and 3 provide robust decision making processes to ensure the regulations are fit for purpose, however, even if the CAA made the process as efficient as possible, there would still be cost and time barriers which mean that the sector cannot efficiently capitalise on appropriate technological developments of location tools. Additionally, the exemption approach is not a sustainable option in the long term as it leads to inconsistencies in the application of the Rule between individual operators. General exemptions are also not appropriate as they risk rule-making by exemption, and thus undermining the rules, and should be referred to regulatory review (as per approach 2).
13. Overall, the current regulatory framework for emergency location does not enable timely and cost-efficient acceptance of new emergency location devices into the regulatory system. This problem creates barriers to economic benefits for aircraft operators, as they are unable to utilise potentially cheaper and more effective emergency location technologies that are introduced to the market.
14. This is more of a problem for the 'general aviation' sector (commercial and recreational operators using small aeroplanes and helicopters) than airlines using medium-large aircraft. This is because larger aircraft carry additional surveillance devices on board (in some cases mandatory) which can help provide location information, and they generally have a higher turnover than small domestic operators, and therefore can more easily absorb the costs of maintaining more than one location system. There are 236 general aviation operators in New Zealand, operating 979 small aeroplanes and helicopters⁷.
15. The problem also creates barriers to economic benefits for communications technology manufacturers, as even if their product is a suitable alternative to an ELT, it is at a disadvantage in the market until it is approved by the regulator.

Objectives

16. The objective is to have an *effective* and *efficient* regulatory framework for aircraft emergency location.

Options and impact analysis

17. Given that the problem is attributed to the specific Rule requirement, there are two feasible options:
 - a) **No action taken:** continuation of status quo. ELTs (and PLBs) remain the only accepted technology for emergency location of aircraft.
 - b) **Amend the Rules to allow domestic operators use of any emergency location device that meets certain objectives (preferred option):** amend the Rules to set

⁷ Excludes microlight and glider operators who use PLBs in place of ELTs

performance criteria which emergency location devices must satisfy before being approved for use.

18. New Zealand has a commitment to align its regulations for international operations to current international standards. The option to amend the Rule is considered for domestic operations only, as ICAO Annex 6 prescribes that ELTs must be used for international operations.

19. Table 3 below provides an assessment of the options against the objectives:

Table 3: Options analysis

<i>Option</i>	<i>Effective?</i>	<i>Efficient?</i>
a) No action taken	<ul style="list-style-type: none"> • Yes, because it sets a minimum standard (technology specific) • No, because it does not enable alternative devices (that are potentially cheaper and/or more effective than ELTs) to be readily adopted • No, because if an operator wants to use a suitable alternative, they must continue to comply with the ELT requirements (which is unnecessary cost) 	<ul style="list-style-type: none"> • Yes, because it is simple for the regulator to oversee/audit this particularly prescriptive rule • Yes, because it is clear to operators what device they must install and maintain in order to be compliant (no room for ambiguity)
b) Amend the rules	<ul style="list-style-type: none"> • Yes, because it reduces regulatory 'red-tape' by enabling potentially cheaper and more effective devices to be used for emergency location of aircraft (that may be available on the market in the future) • Yes, because it gives more flexibility to operators to choose an emergency location device best suited to their aircraft operations • Yes, because it will increase market competition, which will have economic benefits • Yes, because it maintains a minimum standard (via performance criteria) 	<ul style="list-style-type: none"> • No, because it is more difficult for the regulator to oversee/audit a broader range of devices • No, because the regulator will need to invest resources in considering and producing acceptable means of compliance that give guidance to operators on which devices can be used • Yes, because it will provide a framework to keep up to speed with appropriate technological developments, thereby reducing the time and money spent on reviewing and amending the rule or processing exemption applications

20. Amending the Rule is the preferred option. The benefits of ‘red-tape’ reduction, future-proofed regulations, and more flexibility and cost-efficiency for the sector, outweigh the costs on the regulator to develop acceptable means of compliance for a more performance based rule and take a different approach to oversight. As the CAA transitions towards more risk-based regulation (via the recently introduced Civil Aviation Rule Part 100 *Safety Management* regulations), having the capacity and capability to appropriately regulate risk via performance based approaches will be integral to its role.
21. In terms of other impacts, depending on the ability for manufacturers and suppliers to respond, competition brought about by the enabling regulations may have a negative impact on existing ELT manufacturers. Additionally, manufacturers with new devices will need to invest fiscal resources to prove to the regulator that their device meets the requirements of the Rule. The scale of both of these costs and impacts is unclear, as possible market changes cannot be predicted.
22. A shift to more performance-based rules for emergency location could also risk New Zealand implementing a domestic system that, over time, becomes increasingly different from that implemented internationally. Amending the Rule will not mean that international operators can avoid meeting their international requirements – international operators will still be required to meet standards set by ICAO. The greater flexibility for domestic operators is appropriate to address the problems that have been identified as affecting them.
23. The performance criteria contained in the Rule will need to ensure that safety standards are maintained. In this case, as the safety of the flight is not affected (i.e. the requirement is for something to occur after safety has already been affected), any location tool used must provide sufficient distress signals and not have an adverse impact on the ability for search and rescue crew to find the crash site as timely as possible. The proposed criteria are as follows.
- Aircraft emergency location equipment must:
 - automatically activate and broadcast a signal to search and rescue (SAR) service providers when the aircraft becomes distressed;
 - provide the aircraft’s location as accurately as possible, to a five kilometre radius or better via a homing device;
 - broadcast the distress position for no less than 24 hours after onset of distress;
 - operate from independent battery power, which contains at least 24 hours of battery life; and,
 - provide sufficient coverage of New Zealand land and sea search area.
 - Aircraft emergency location equipment must meet a minimum specification standard approved by the Director of Civil Aviation⁸.

⁸ This could be any type of standard (for example TSO, Advisory Circular, Australia New Zealand Standard) provided by a private or public entity.

24. The proposed criteria are based on the notional minimum standards set by the current requirement to use ELTs (which are reflective of the United States Coast Guard minimum search and rescue requirements). The criteria were then further refined via consultation with RCC and the public. The effect of the proposal to use these objectives and remove specific references to ELTs within the rule will allow other technologies to be more readily taken up if they meet the criteria. In the short to medium term, ELTs are expected to remain the sole technology approved for emergency location, as they are the only available location tool that meets all six proposed objectives.
25. Small aircraft with only 1-2 seats, such as microlights and gliders, are not currently required to install ELTs but must otherwise use PLBs. There are no known safety issues with this arrangement, nor specifically with the technical performance of PLBs, which require human intervention to activate and broadcast a signal (and therefore do not meet the proposed objectives above). It is proposed that operators of these aircraft continue to be allowed to use only a PLB, but may alternatively use any device that complies with the new Rule.

Consultation

26. On 12 September 2014, the CAA released a public consultation document on its website to obtain the sector's feedback on:
 - proposed objectives for emergency location devices on aircraft operating domestically, which could provide the criteria for a performance-based rule;
 - an assessment of emergency location technologies or tools in terms of the proposed objectives, to test the CAA's assessment that there are currently no suitable alternatives to ELTs; and
 - potential options for addressing the problems identified with emergency location.
27. A copy of the document was sent to 2,033 stakeholders. These included aircraft owners and operators, aviation industry associations and other interested parties. The consultation document was also published on the CAA website and advertised in the September/October issue of CAA's periodical *Vector*.
28. The CAA received 64 submissions in total. Forty-six of the submissions were from individuals (from the general aviation sector), and 18 submissions were from organisations (such as the Sport Aircraft Association of New Zealand, search and rescue related organisations, and flight tracking device manufacturers).
29. Analysis of the submissions highlighted the following issues as of particular interest to the sector in response to consultation.
 - Relying on one location technology or tool is not effective. Twenty-two of the 64 submitters advised that they use additional location devices on their aircraft such as FTDs, PLBs, or GPS devices.
 - There is support for the use of FTDs as alternatives to or in addition to ELTs, as many submitters considered ELTs to be ineffective. Some submitters considered that the reliability of FTDs is more significant than the location accuracy of ELTs.

- There were mixed views about the proposed objectives for emergency location devices – most disagreed. Reasons provided were that they are too restrictive or don't capture the right performance qualities.
 - Installing an ELT is a disproportionate requirement for those operators not carrying passengers, particularly given the poor reliability of the devices, i.e. larger commercial operators shouldn't have the same device requirements as recreational operators.
30. The RCC submission, which is supported by the New Zealand Search and Rescue Council, agreed with the overall purpose of the policy review. In summary, RCC provided the following comments:
- there needs to be a solution that will enable an emergency signal to be initiated while still airborne, either automatically or pilot activated;
 - ELT and FTD systems have very different roles, and whilst ELTs are the most appropriate device to determine the final location of the crash site, FTDs can provide additional information to support the search;
 - the CAA should record ELT activation information during accident investigations; and
 - the performance-based rule option could lead to a wide variety of devices being used, and this needs to be appropriately considered and managed. RCC can respond to non-registered 406MHz beacons, but they cannot monitor them and verify false alarms.
31. There was good support for introducing performance-based rules for emergency location equipment requirements in New Zealand. Twenty-nine of the 64 respondents agreed with this approach, noting that it was more cost-effective and increased the flexibility of the rules to incorporate new technologies over time.

Conclusions and recommendations

32. It is recommended that the Rules are amended to allow the use of any emergency location device that meets certain objectives. This will remove the regulatory 'red-tape' (time and cost) that disables new location technologies to be adopted. This will provide economic benefits as market competition increases, and readily allow the use of potentially more cost-efficient and effective alternatives for aircraft emergency location.

Implementation plan

33. Several amendments will be made to Rule Parts 43 and 91 to introduce a performance-based rule for emergency location of aircraft equipment requirements. Section 28(5) of the Civil Aviation Act 1990 provides a mechanism that supports more performance-based rules to be drafted, by giving the Director of Civil Aviation the discretion to determine the means of compliance to meet such the Rule. The criteria proposed in paragraph 21 will

be used to specify the performance that technologies will be required to meet in order to be installed in an aircraft as an emergency location tool⁹.

34. A NPRM will be developed providing specific details on the proposed Rule amendments. This will be published on the CAA's website, and affected parties will have the opportunity to submit their views. Much of the NPRM will be focused on ensuring that the proposed performance-based objectives are fit for purpose.
35. Once signed, the amended Rule Parts (including any necessary consequential amendments) will be published on the CAA website. Parties will be notified of what is required of them to comply with the Rule changes through updated Advisory Circulars (i.e. what devices are approved for use). The Advisory Circulars will also provide clear guidance to manufacturers and suppliers on what requirements need to be met in a new device in order to deem it acceptable for use under the Rule.
36. The CAA will work closely with RCC to ensure that implementation of the new Rule is operating effectively and efficiently from the perspective of search and rescue service providers. This includes ensuring that distress alerts are appropriately received (as per the status quo, RCC manage the 406MHz beacon alerts, but all other alerts will need to be provided by an intermediary) and notifying RCC of the device used by individual aircraft (as it will help them to find the aircraft they are looking for).

Monitoring, evaluation and review

37. Once the Rule changes are complete, the CAA will monitor adherence to the Rules and proactively engage with operators during certifications and inspections to clarify the Rules. Where necessary, proportionate enforcement action will be taken to ensure ongoing compliance with the Rules.
38. Currently 406MHz ELTs are the only device available that can meet the proposed performance criteria, however, the CAA will assess any new proposals that come in and update the acceptable means of compliance contained in the Advisory Circulars accordingly. The CAA may consult with RCC on some matters.
39. The CAA will also continue to monitor progress of the amended technical specification standard for 406MHz ELTs, currently being developed by the Radio Technical Commission for Aeronautics. Once the new standard becomes available, the CAA will assess the costs and benefits of amending the Rules to adopt the standard for international operators, and make recommendations to the Minister of Transport accordingly.
40. The CAA has recently updated their safety investigation reporting to capture more information on what type of emergency location device was installed or used in an aircraft, and whether it successfully activated in an accident. This information will be used to evaluate the effectiveness of the different types of devices used under the more performance-based rules, and review whether the criteria is working as intended.

⁹ International operators will still be required to meet international standards, and this will be reflected in the rule.