Australian Government
Australian Transport Safety Bureau

Midair collision involving Jabiru J430, VH-EDJ, and Piper PA-25-235, VH-SPA

Caboolture Airfield, Queensland, on 28 July 2023

ATSB Transport Safety Report
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Acknowledgement of Country and Traditional Owners

The Australian Transport Safety Bureau acknowledges the traditional owners of country throughout Australia, and their continuing connection to land, sea and community. We pay our respects to them and their cultures, and to elders both past and present.

Investigation summary

What happened

On the morning of 28 July 2023, the pilot of a Piper PA-25 Pawnee, registered VH-SPA, was in the circuit to land on runway 06 at Caboolture Airfield, Queensland. Caboolture was a non-controlled aerodrome relying on self-separation by pilots. The Pawnee was a tow aircraft for the local gliding club, and had been towing gliders from runway 06 and had previously landed on the same runway. Several other aircraft had used the intersecting runway 11 during periods where runway 06 was not being used. The windsock indicated a light wind that varied in direction, favouring runway 11 or runway 06 approximately equally.

As the Pawnee was on final approach to land, a Jabiru J430, registered VH-EDJ, commenced a take-off roll on runway 11. Approximately 16 seconds later, just prior to the Pawnee touching down, a Cessna 172, registered VH-EVR, taxied across runway 06 without stopping or making a radio call. Seeing the Cessna, the Pawnee pilot elected to conduct a go-around to avoid a potential collision with it.

While the Jabiru pilot appeared to see the Pawnee late in the sequence and attempted to evade it, the 2 aircraft collided near the runway intersection at approximately 130 ft above ground level. The Jabiru's right wing was damaged as a result, and the aircraft collided with terrain, fatally injuring the pilot and passenger. The Pawnee was damaged, but it landed safely and its pilot was uninjured.

What the ATSB found

While in the circuit, the Pawnee pilot had made positional radio calls, and a radio call stating their intention to land and hold short of the runway intersection. Based on the Jabiru pilot's apparent unawareness of the Pawnee until just before the collision, and most witnesses not recalling hearing any calls from the Jabiru throughout the event, it is likely that the Jabiru pilot could not transmit or hear radio calls for reasons that could not be determined. Likely unaware of the landing Pawnee's presence, the Jabiru pilot commenced take-off on runway 11 while the Pawnee was on final approach to runway 06.

A stand of trees between the runways prevented the Pawnee and Jabiru pilots from being able to see one another's aircraft once the Jabiru had taxied onto the runway heading. Not having heard any radio calls from the Jabiru, and unable to see it when on final approach to land, the Pawnee pilot was not aware that the Jabiru was taking off on runway 11.

The Cessna pilot had previously turned down the aircraft's radio and not restored the volume prior to crossing runway 06. The pilot was therefore not aware of the Pawnee, and seeing the traffic on runway 11, was not expecting aircraft to be operating on runway 06.

The local gliding club regularly chose to operate on runway 06 for the first flights of the day, due to the runway's proximity to the glider hangars, and sometimes used runway 06 later in the day when winds were light, including during periods of light traffic on runway

11/29. The use of an intersecting runway increased the collision risk as Caboolture was a non-controlled aerodrome relying on alerted see-and-avoid principles, exacerbated by the stand of trees blocking pilots' sightlines.

Both the Jabiru and Pawnee pilots were familiar with the aerodrome and would have been aware of the line of sight limitations between the intersecting runways due to the stands of trees. However, the ATSB found that the aerodrome operator, the Caboolture Aero Club (CAC), did not effectively manage or inform pilots of the risk presented by trees and buildings around the airfield that prevented pilots from being able to see aircraft on intersecting runways and approach paths.

In this accident, it is likely that all 3 pilots had an understanding that runway 11 was in general use by aircraft, and therefore could be considered an active runway under applicable Civil Aviation Safety Authority (CASA) guidance for pilots using non-controlled aerodromes. However, the Pawnee pilot reasonably considered runway 06 to be an active runway through their own use of it. The ATSB found that the CASA guidance did not clearly define the term 'active runway', and the definition could be interpreted in different ways. Further, the guidance did not provide practical advice to pilots using a secondary runway, and in some situations, it was contrary to existing regulations.

What has been done as a result

The CAC amended the *Caboolture Airfield operations manual* to state that no simultaneous runway operations are permitted under any circumstances. Pilots wanting to operate on a different runway must request this and receive confirmation or acknowledgement from all aircraft taxiing or in the circuit. The manual also now states that rolling (take-off) calls must be made. A submission has been made to include the procedure in Caboolture Airfield's En Route Supplement Australia (ERSA) entry.

CASA advised that it is in the process of improving guidance material regarding the factors and safety issues which should be considered in determining runway use. To better align with the regulations and avoid confusion, CASA is removing all references of the term 'active' when associated with a runway. CASA will also expand the guidance provided in the *Part 91 Acceptable Means of Compliance and Guidance Material* to assist in the industry's understanding of this issue.

Safety message

This accident demonstrates that following the existing regulations, rules of the air and associated guidance does not completely overcome the risks inherent in using multiple runways concurrently. Pilots need to carefully consider the choice of runway, not only in context of which runway might be considered 'active' or 'in use' by others, but in terms of the specific type of risks that arise when any 2 or more aircraft are going to use different runways. These risks can be heightened or alleviated by a range of factors (for example, visual obstructions) that differ widely across operations and aerodromes, and can change over time.

More generally, self-separation using alerted see-and-avoid principles carries some risk in all situations. Pilots can mitigate this to some extent by:

- checking radio equipment for functionality prior to taxi
- establishing two-way communication with potentially conflicting aircraft as needed
- being mindful of the potential for radio communications to be missed or misinterpreted
- never assuming a runway or aerodrome is safe to use simply because no other aircraft are visible.

The ATSB SafetyWatch highlights the broad safety concerns that come out of our investigation findings and from the occurrence data reported to us by industry. One of the safety concerns is reducing the collision risk around non-towered airports.

Contents

The occurrence

Overview

On the morning of 28 July 2023, the pilot of a single-seat Piper PA-25 Pawnee, registered VH-SPA and operated by the Caboolture Gliding Club, was towing gliders from runway 06[1] at Caboolture Airfield, Queensland. At various times, other aircraft were using the intersecting runway 11 (Figure 1).

Figure 1: Runway configuration at Caboolture Airfield

Source: Google Earth, annotated by the ATSB

As the Pawnee was on final approach to land after returning from the second glider tow, a Jabiru J430, registered VH-EDJ, with a pilot and passenger on board conducting a private flight to Dirranbandi Airport, Queensland, commenced a take-off roll on runway 11. About 16 seconds later, with the Pawnee about 200 m from touchdown, a Cessna 172, registered VH-EVR, taxied across runway 06 without stopping or making a radio call. Seeing the Cessna, the Pawnee pilot elected to conduct a go-around. The Pawnee began climbing at almost the same time as the Jabiru lifted off.

The 2 aircraft continued to climb on converging tracks. About 9 seconds later the Jabiru began a steep left turn in an apparent evasive manoeuvre but the 2 aircraft collided near the runway intersection, at about 130 ft above ground level.

The Jabiru's right wing tip and aileron separated in the impact, and the aircraft collided with terrain, fatally injuring the pilot and passenger on board. The Pawnee was damaged, and the pilot returned to land without further incident.

[1] Runway numbers represent the magnetic heading closest to the runway orientation (e.g. runway 11 is oriented 114° magnetic).

First glider tow

At 1005 the pilot of the Pawnee took off from runway 06. It was a clear day with a 1–3 kt wind that varied between easterly and north-easterly. This was the Pawnee pilot's first flight of the day, and the first time runway 06 had been used that day. All previous flights by other aircraft had operated on runway 11, which intersected runway 06.[2]

After the glider was released from aerotow,[3] the Pawnee pilot rejoined the circuit[4] for runway 06, and landed at 1017 without incident. Two radio calls related to this approach were recorded. The aircraft stopped short of the runway intersection, turned around and backtracked to the start of runway 06 – the runway threshold – to collect another glider.

Second glider tow and Pawnee rejoining the circuit

Caboolture Airfield was defined as an aircraft landing area (ALA), and was a non-controlled aerodrome located within class G (non-controlled) airspace, and had a designated common traffic advisory frequency (CTAF) on which pilots made positional broadcasts when operating within the vicinity of the airport.[5] Calls were not recorded at Caboolture Airfield, but some transmissions from aircraft in flight were recorded at Caloundra Airport, an airport about 32 km to the north that used the same CTAF frequency. The ATSB identified no recordings of radio transmissions from any aircraft on the ground at Caboolture around the time of the accident and some transmissions were only partially recorded (see *Recorded data*).

At 1022, the Pawnee pilot took off with another glider in tow. There was a radio recording of the Pawnee pilot responding at 1024 to a radio check request from another aircraft (the original call was not recorded). At about 1027, another aircraft took off from runway 11 after making a take-off radio call on CTAF that was heard by the Pawnee pilot, but not recorded.

Meanwhile, the pilot of a Jabiru J430, registered VH-EDJ, had just commenced taxi towards runway 11. The Jabiru had been taxied directly from the hangars next to runway 06, turning north-west onto the taxiway parallel to the runway (and facing northwest) from 1027:25.[6]

The Pawnee pilot reported that after the glider was released from aerotow, with the tow rope still attached, they made a radio call to indicate they were descending towards Caboolture to the west of the airfield. This call was not recorded.

At the time, the wind was suitable for runway 06 and there was no other traffic in the circuit or on the ground that the Pawnee pilot considered as a potential threat to a safe landing on this runway. The Pawnee pilot then joined the crosswind leg for runway 06 and made the following radio call at 1028:09 (truncated in the recording):

> Caboolture traffic sierra papa alpha Pawnee is heading crosswind to runway 06 Caboolture and…

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2 See Video recording for a description of the preceding flights.
3 Aerotow: the process of a powered aircraft towing a glider into the air.
4 See Standard circuit pattern.
5 See Mandatory and recommended radio calls and Radio communications at Caboolture Airfield.
6 Further details of the Jabiru's taxi sequence are in On-board recording.

The Pawnee pilot later reported that they also communicated with the aircraft that had just departed to arrange mutual separation. The Pawnee pilot then made the following radio call at 1029:07 on the downwind leg for runway 06:

> Caboolture traffic sierra papa alpha is now late downwind runway 06 Caboolture

At 1029:40 the pilot then made a radio call for the base leg, which was truncated in the recording:

> Caboolture traffic, sierra papa alpha is turning base runway…

Recorded data recovered from the Jabiru showed that at 1030:02, the pilot stopped at a hold point next to runway 11, facing north-east, perpendicular to the runway. At this time there were 2 other aircraft on the ground in the vicinity of the runway 11 threshold: one ahead of the Jabiru and one in the run-up bay. The Pawnee pilot recalled that while on the base leg, and focused on the potential for other traffic in the same circuit, they saw 2 aircraft in that area but did not identify what type they were and could not recall their exact positions.

The Pawnee pilot turned onto the final leg and made another radio call at 1030:19, truncated in the recording:

> Caboolture traffic, sierra papa alpha is…

According to the Pawnee pilot and several witnesses who heard the transmissions, the Pawnee pilot announced that the aircraft would be landing on runway 06 and ‘holding short’, indicating that the aircraft would not be crossing the intersection with runway 11/29 during the landing. The ATSB could not determine whether the pilot made this statement during the base call or the final call.

The Pawnee pilot reported that they intended to hold short because they did not want to cross ‘another active runway’, aware of another aircraft about to use runway 11 as well as one that had just taken off. In this case the pilot was using the term ‘active runway’ to describe a runway that is, or could soon be, in use, and considered both runway 11 and runway 06 to be active (the latter through their own use of it). The Pawnee pilot was expecting the second departing aircraft not to commence take-off until the Pawnee pilot had reported that they stopped short of the runway intersection. In general, the Pawnee pilot reported they made the hold short call to advise other traffic of their intentions. They did not expect pilots to use the intersecting runway on the basis of the hold short call, and only expected pilots to use the intersecting runway after a ‘stopped short’, or ‘clear’ call was made. The pilot reported that they had done this (radioed an intention to land and hold short with other traffic using runway 11) on many other occasions and the other aircraft had always waited until the pilot had radioed that they had stopped short and were clear of all runways.

The aircraft ahead of the Jabiru departed at about 1030:26 following an associated radio call (which was heard by the Pawnee pilot but not recorded).

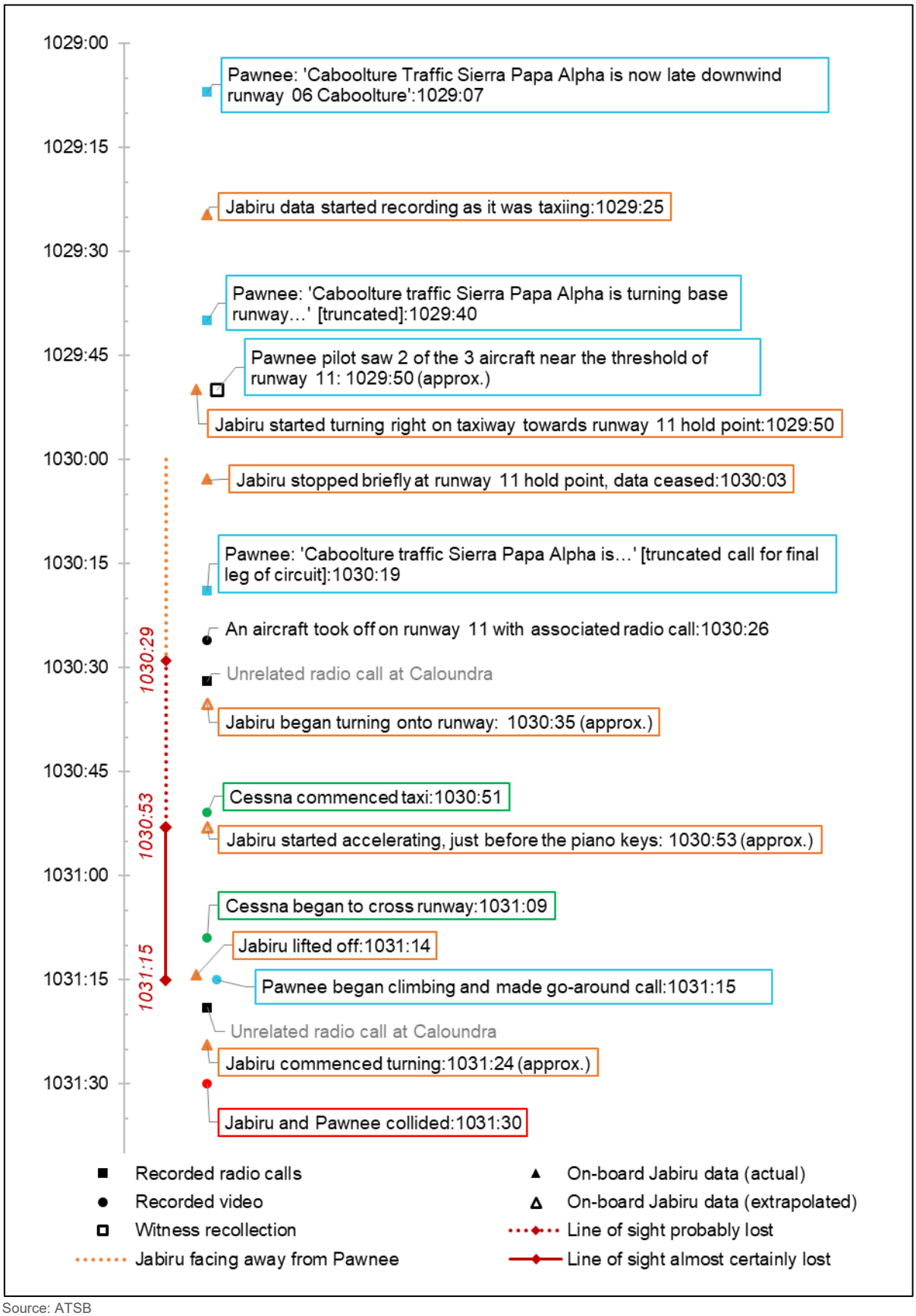
Pawnee continuing final approach and Jabiru commencing take-off

The subsequent sequence of events is illustrated in Figure 2 and Figure 3.

Figure 2: Approximate tracks of the involved aircraft based on video recordings and recorded track data

Dotted lines indicate aircraft taxiing.
Source: Google Earth, annotated by the ATSB

Figure 3: Sequence of events



Source: ATSB

An eyewitness stated that after waiting at the hold point, the Jabiru taxied onto the runway and immediately began the take-off roll. The recorded data was incomplete at this point, but ATSB analysis estimated that the Jabiru likely began to turn onto runway 11 at about 1030:35, establishing the runway heading a few seconds later. Take-off would have commenced at about 1030:53. Two witnesses reported hearing the Jabiru pilot make a 'rolling' (take-off) call on runway 11, while 7 other witnesses, including the Pawnee pilot, stated that they did not remember hearing a rolling call. No witnesses recalled any other calls from the Jabiru.

At about the same time (1030:51), a Cessna 172, registered VH-EVR, had just commenced taxiing from a run-up bay south of the runway intersection. The aircraft was being operated by a solo student pilot who was intending to depart from runway 11. When the Cessna pilot first entered the aircraft, they heard the Pawnee making radio calls in the circuit. However, the Cessna pilot later reported having turned the radio volume down in order to concentrate on engine run-ups and pre-flight checks at the run-up bay. As a result, the Cessna pilot did not hear the previous transmissions from the Pawnee pilot, and was not aware of it approaching runway 06 for landing. The Cessna pilot reported making a taxi call once checks were complete, and taxied onto the taxiway parallel to runway 11/29, heading towards the threshold of runway 11. At this point, the pilot realised the radio volume had not been restored and turned the volume back up.

At 1031:09, with the Pawnee about 200 m from touchdown on runway 06, the Cessna began to cross runway 06 ahead of the Pawnee. The Cessna pilot did not stop or make a radio call prior to crossing the runway. In interview, the Cessna pilot reported having been trained to stop and 'clear' a runway visually prior to crossing. However, the Cessna pilot had just seen an aircraft taking off from runway 11 and another (the Jabiru) lining up. With an understanding that aircraft were currently operating on runway 11, the Cessna pilot reported that they were therefore not expecting aircraft to be operating on runway 06/24, and did not look for any. In addition, due to the limited use of runway 06/24, the Cessna pilot did not always come to a complete stop before crossing.

As the Cessna began to cross the runway, the Pawnee pilot initiated a go-around,[7] unsure of the Cessna pilot's intentions (for example, whether the Cessna was going to turn onto runway 06) and concerned about the potential for a ground collision. The Pawnee pilot reported making a radio call stating that they were going around, and said something like 'watch out sunshine'. The order of these statements could not be determined. The radio call was not recorded, but 6 of the 10 witnesses with access to a radio reported hearing both the 'going around' and the 'watch out sunshine' parts of the call, and were relatively consistent in terms of the specific words used. Another 2 witnesses reported hearing the 'watch out' part of the call, but not the 'going around' part. At the same time, the Pawnee pilot applied full power, adopted a climb attitude and retracted one stage of flap.

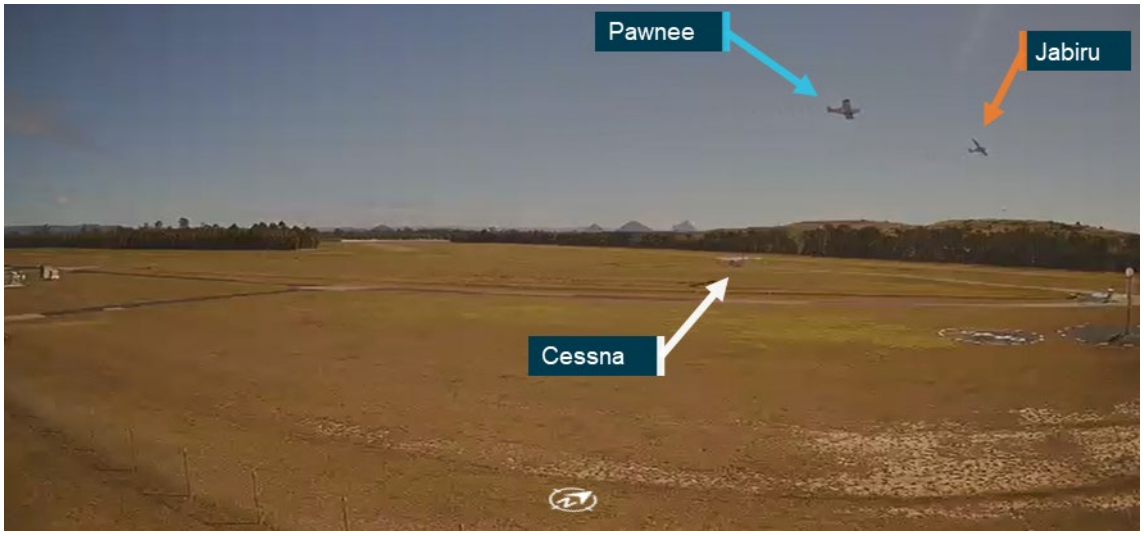
Both aircraft climbing and collision

At 1031:15, the Pawnee began climbing while maintaining the runway 06 heading just as the Jabiru lifted off from runway 11 before the runway intersection. The Pawnee pilot was

[7] A go-around, also known as a missed approach, is an aborted landing of an aircraft that is on final approach or has already touched down.

focusing on their climb rate, concerned about clearance between the trailing tow rope and the Cessna.[8] At about 1031:24, while the 2 aircraft were climbing at similar rates on converging tracks, the Jabiru pilot commenced a steep left turn (Figure 4). Given the steepness of the turn, and the low altitude, this was likely an attempt to avoid a collision. The Pawnee pilot reported not seeing the Jabiru until immediately after the impact, when they momentarily saw something behind the Pawnee's left wing as they leant over to fully retract the flaps.

Figure 4: CCTV still image at 1031:06, from a camera south of the runway intersection, showing the 2 aircraft converging as the Jabiru turns left



Source: Caboolture Aero Club, annotated by the ATSB

At 1031:30, the 2 aircraft collided on similar tracks above runway 06, just north-east of the 06/11 intersection, at a height of about 130 ft. The leading edge of the Pawnee's inboard left wing struck the Jabiru's right wing at the outboard trailing edge, resulting in separation of the Jabiru's right wing tip and part of the right aileron.

The Jabiru then rolled to the right while rapidly losing altitude. At 1031:38 it collided with terrain in a nose-down, right-wing-down attitude near the end of runway 06. The pilot and passenger were fatally injured.

The Pawnee sustained damage to its left wing in the collision but remained controllable and the pilot was uninjured.

After the collision the Pawnee pilot circled the airfield to direct first responders towards the accident site. The aircraft later landed on runway 11 without further incident.

[8] The tow rope was about 55 m long and can hang 40 ft or more below the tow aircraft.

Context

Pilot information

Jabiru VH-EDJ

The pilot of VH-EDJ (the Jabiru) held an Air Transport Pilot Licence (aeroplane) and was a grade 2 flight instructor with multiple endorsements and ratings including as a flight instructor and for large passenger jets, having previously been an airline pilot. The pilot's logbooks and other flight history could not be located. The pilot was reportedly experienced in general aviation and diligent with radio calls. The pilot had regularly flown at Caboolture Airfield, and held a class 2 aviation medical certificate that was valid until 30 October 2024. They were required to wear corrective lenses, but no other medical issues were listed on their licence. It could not be determined whether the pilot was using corrective lenses at the time of the accident. The ATSB could not obtain recent activity or sleep history for the pilot.

A post-mortem examination identified no significant pre-existing medical conditions (there was moderate heart disease that was considered 'not significant enough to have caused a medical event'). Toxicology testing showed no alcohol, illicit drugs or relevant medications. Both the pilot and passenger had non-elevated levels of carbon monoxide.

Pawnee VH-SPA

The pilot of VH-SPA (the Pawnee) held a Private Pilot Licence (aeroplane) and held endorsements for glider operations and glider towing operations. The pilot was a level 3 instructor[9] with Gliding Australia, as well as a senior instructor and tow pilot examiner for Recreational Aviation Australia. They had operated as a tow pilot at Caboolture for over 20 years, and had performed 2,570 aerotow glider launches with a total flight experience of over 2,000 hours. The pilot held a class 2 aviation medical certificate that was valid until 17 July 2025. There were no relevant medical restrictions on the pilot's licence, and they reported no medical issues or medications. The pilot also reported being well rested prior to the accident.

Cessna VH-EVR

The pilot of VH-EVR (the Cessna) was a student pilot conducting flying training at Caboolture. The pilot had commenced the process of attaining a Commercial Pilot Licence in January 2023 and did not yet hold a flight crew licence. The pilot had approximately 60 hours of flying experience. They attended Caboolture Airfield for flying training from Monday to Friday. The pilot was preparing to conduct their third solo navigation flight at the time of the occurrence. The pilot reported that runway 06/24 had been closed for approximately half of their training to date, having begun in January 2024.

[9] Level 3 is the highest instructor rating within Gliding Australia, and certifies instructors to train other instructors as well as glider pilots.

Aircraft information

Jabiru VH-EDJ

The Jabiru J430 is a high-wing light aircraft. VH-EDJ had a single Jabiru 3300 piston engine and a ground-adjustable fibreglass propeller. It was constructed primarily by the pilot, first registered on 19 February 2019, and had recorded 283.7 hours total time in service at the time of the accident.

The aircraft was fitted with a Dynon SkyView SV-HDX1100 integrated touch screen avionics system, as well as an automatic dependent surveillance broadcast (ADS-B) transponder.[10] This model of transponder was capable of broadcasting the aircraft's position (ADS-B OUT), but not receiving other positional broadcasts (ADS-B IN).

Pawnee VH-SPA

The Piper PA-25-235 Pawnee B is a low-wing single-engine aircraft. VH-SPA was powered by a Textron Lycoming O-540 piston engine with a fixed-pitch aluminium propeller. The aircraft was manufactured in 1969, and first registered in Australia in 1974. It had 10,181 hours total time in service, and had been operating as a tow aircraft at Caboolture Airfield since January 1997.

The aircraft was fitted with a basic analogue instrument suite. There was no ADS-B transponder fitted.

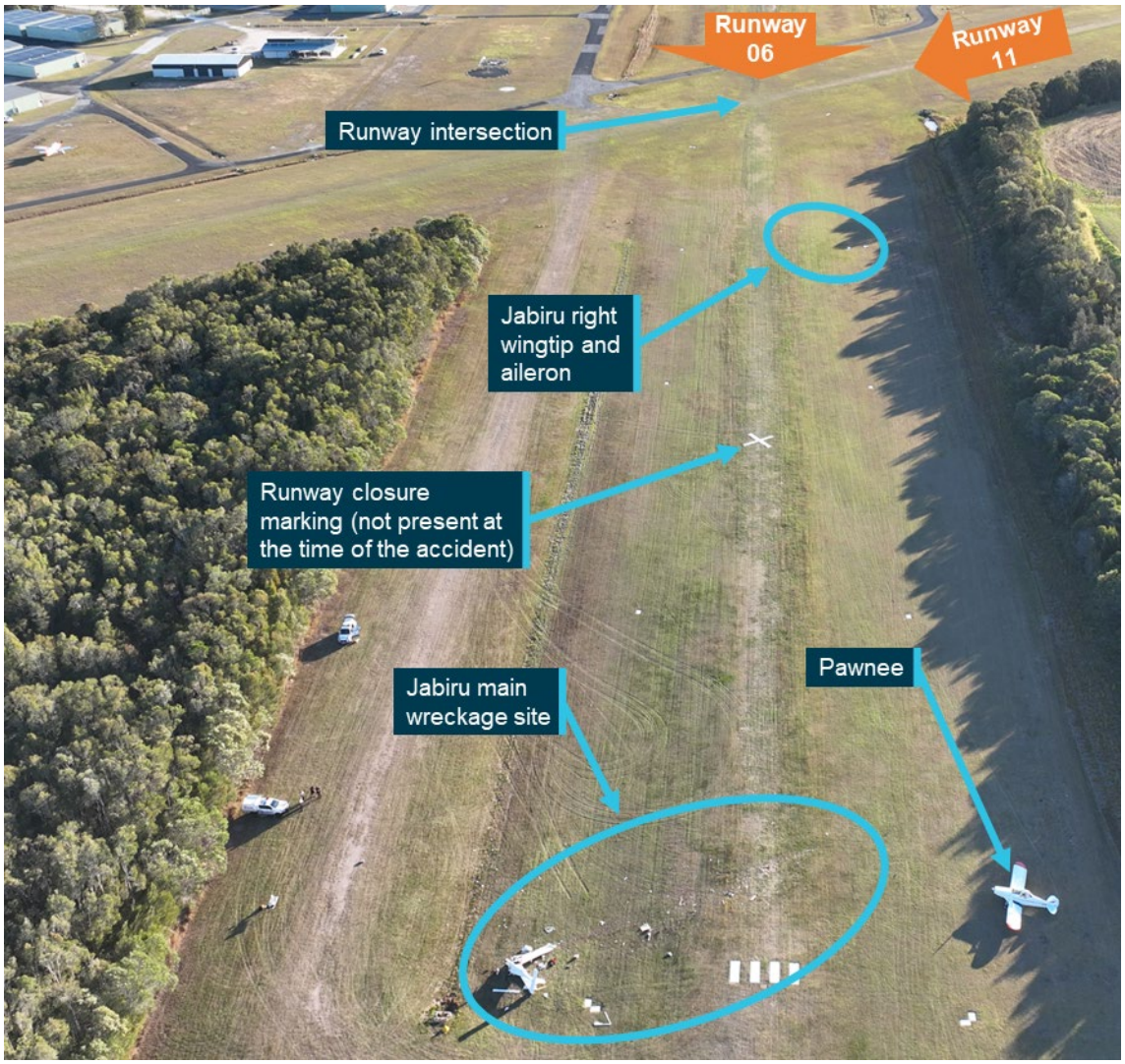
Wreckage and impact information

Overview

The ATSB conducted an onsite examination of the aircraft wreckage (Figure 5). The collision location and all aircraft components and wreckage were confined within the airfield. The Jabiru main wreckage site was near the threshold of runway 24, with a section of the Jabiru's right aileron, right wing tip and associated wreckage located near the runway intersection.

[10] Automatic Dependent Surveillance Broadcast (ADS-B): a means by which aircraft, aerodrome vehicles and other objects can automatically transmit or receive data such as identification, position and additional data, as appropriate, in a broadcast mode via data link.

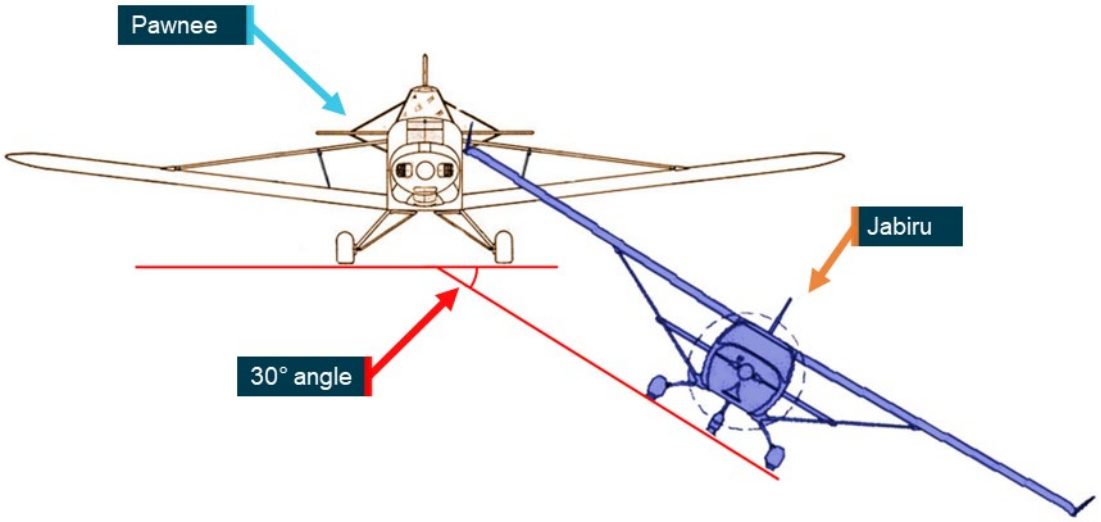
Figure 5: Locations of aircraft and wreckage after the Pawnee had landed



Source: Queensland Police Service, annotated by the ATSB

Based on the damage to each aircraft (described below), and the aileron and wing tip found near the runway intersection, the ATSB determined that the Pawnee's left wing leading edge collided with the Jabiru's right wing trailing edge. Damage signatures indicated that the relative angle between the 2 aircraft was about 30° in roll (Figure 6). There was no impact with the Pawnee's propeller.

Figure 6: Approximate collision attitudes



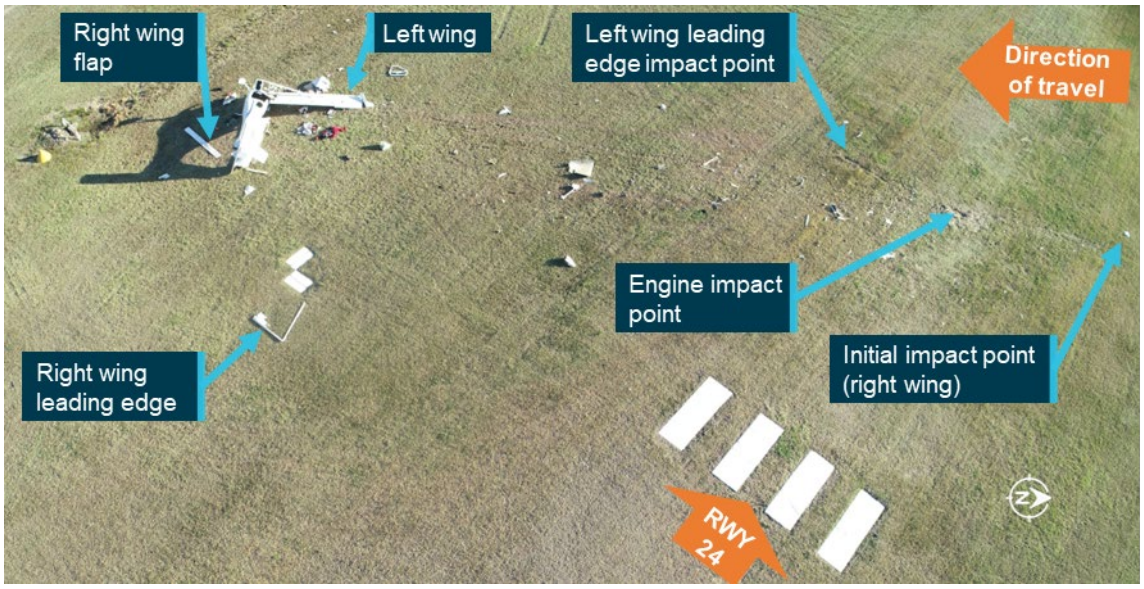
This is a simplified diagram designed to illustrate the approximate difference in height and roll attitudes between the aircraft at the point of collision. The image does not reflect differences in pitch and yaw.
Source: ATSB, Piper Aircraft and Jabiru Aircraft

Jabiru VH-EDJ

Accident site information

The Jabiru's impact point was about 212 m beyond the separated wing tip and aileron (Figure 7). The right wing impacted the ground first, followed by the propeller and engine. The aircraft tumbled across runway 06/24 for about 42 m in a direction almost parallel to runway 11, coming to rest next to the runway threshold.

Figure 7: Jabiru wreckage trail



Source: ATSB

The rudder and elevator control surfaces were almost undamaged. They could be moved by hand after the accident, and the associated cables were continuous with all attaching

hardware present. While the wing attachment points were heavily disrupted, damage to the control system appeared consistent with the midair collision and subsequent impact with terrain. Flaps were in the correct position for take-off.

The Jabiru's engine mounts had fractured in the impact, with the control cables and fluid lines still intact. The wreckage site showed evidence of fuel spill from the wing tanks. Forward bending in the propeller blades indicated that the engine was driving the propellers at the time of impact. This, in conjunction with witness statements and video recordings indicated that the engine was producing power at the time of the accident.

There was no fire. First responders reported that both occupants were wearing shoulder and lap restraints.

Based on measurements of the ground scarring and the chord-wise symmetry of the right wing damage, it is likely that the Jabiru impacted terrain right wing first, in a nose-down attitude of about 85°.

Based on the steep impact angle, the estimated speed, and disruption of the fuselage, the impact was not considered survivable.

Radio examination

A Microair M760-01 VHF transceiver radio was recovered from the Jabiru's cockpit following the accident. The unit was heavily damaged and pulled away from the instrument panel, with the associated wiring still connected but damaged. The antenna and radio were still connected via a coaxial cable when the aircraft was inspected onsite, and the cable and antenna appeared undamaged. The ATSB retained the radio and some of the associated hardware (such as push-to-talk buttons) for subsequent testing. The cable and antenna were not retained. The headsets were damaged in the collision with terrain and therefore also not retained.

The radio turned on when power was applied during testing, and was selected on when recovered (a click is heard and felt at the beginning of the knob's rotation to indicate on/off). The position of the volume knob prior to impact could not be determined as it may have moved during impact, recovery and transit. The radio was selectable between active and standby frequencies using a toggle switch, which was broken when found. The radio frequencies were set to 125.850 MHz (the CTAF frequency; see *Radio communications at Caboolture Airfield*) and 125.700 MHz (the area frequency). It was not possible to confirm which was selected as the active frequency prior to the collision.

Overall, the extent of damage to the radio and associated components precluded a determination of its probable functionality at the time of the accident.

Pawnee VH-SPA

The Pawnee remained intact after the collision (Figure 8). The tow rope stayed attached. Heavy impact damage occurred on the left wing leading edge, between about 0.25–1.2 metres from the wing-fuselage interface. Other impact damage was identified:

- on the wing strut, directly above the damage to the leading edge
- on a fuselage cowling panel located above the left wing
- on the left wing lower surface, including a small piece of fibre-reinforced plastic, caught between 2 panels, which appeared consistent with the skin of the Jabiru.

Figure 8: Damage to the Pawnee's left wing

Source: ATSB

During the ATSB examination, the rudder, aileron, and elevator controls all responded appropriately to control inputs with a full range of movement without binding or restriction. All flight control surfaces were inspected for damage, and none was found. A basic visual inspection found no obvious issues with the engine or controls. There was no visible damage to the propeller. Based on the condition of the aircraft and the location of damage, and given that the aircraft landed safely, a detailed examination of the aircraft and engine was not conducted.

The radio and headset were tested by the ATSB and found to be serviceable in both transmit and receive modes. The frequency was set to the Caboolture Airfield CTAF frequency.

Operations at non-controlled aerodromes

Aircraft landing areas

Caboolture Airfield is an aircraft landing area (ALA). ALAs are non-controlled aerodromes that are not certified by CASA. They are unregulated facilities where pilots and operators are responsible for determining whether they are suitable for their use.

In general, CASA had no requirements or regulations that specified how ALAs were to be managed and operated.[11] The regulations and guidance provided to pilots regarding right

[11] The only regulation applicable to uncertified aerodromes was regarding radio communication facilities, and the requirement for the aerodrome to carry an Aerodrome Frequency Confirmation System, depending on the frequency of scheduled air transport flights.

of way, radio use and rules of the air were applicable at all non-controlled aerodromes, not just ALAs.

See-and-avoid

In non-controlled airspace, pilots rely on the use of the rules of the air and 'see-and-avoid' principles to maintain separation from other aircraft sharing the airspace.

An 'alerted' visual search is one where the pilot is alerted to another aircraft's presence, typically through radio communications or aircraft-based alerting systems. Broadcasting on the CTAF to any other traffic in the vicinity of a non-controlled aerodrome is known as radio-alerted see-and-avoid and assists by supporting the pilot's situational awareness and visual lookout for traffic with the expectation of visually acquiring the subject in a particular area.

Conversely, an 'unalerted' search is one where reliance is entirely on the pilot searching for, and sighting, another aircraft without prior knowledge of its presence. Unalerted see-and-avoid relies entirely on the pilot's ability to sight other aircraft.

Issues associated with unalerted see-and-avoid have been detailed in the ATSB research report *See and Avoid* (Hobbs, 1991). The report stated:

> See-and-avoid can be considered to involve a number of steps. First, and most obviously, the pilot must look outside the aircraft.
>
> Second, the pilot must search the available visual field and detect objects of interest, most likely in peripheral vision.
>
> Next, the object must be looked at directly to be identified as an aircraft. If the aircraft is identified as a collision threat, the pilot must decide what evasive action to take. Finally, the pilot must make the necessary control movements and allow the aircraft to respond.
>
> Not only does the whole process take valuable time, but human factors at various stages in the process can reduce the chance that a threat aircraft will be seen and successfully evaded. These human factors are not 'errors' nor are they signs of 'poor airmanship'. They are limitations of the human visual and information processing system which are present to various degrees in all pilots.

The United States Federal Aviation Administration (FAA) advisory circular AC 90-48D CHG 1 *Pilots' Role in Collision Avoidance* indicated that it takes unalerted pilots around 12.5 seconds to sight an aircraft and react effectively to it (Table 1).

Table 1: Reaction times for airborne collision avoidance

Event	Seconds
See object	0.1
Recognise aircraft	1.0
Become aware of collision course	5.0
Decision to turn left or right	4.0
Muscular reaction	0.4
Aircraft lag time	2.0
TOTAL	12.5

Source: Federal Aviation Administration AC 90-48D CHG 1

The ATSB research report found that an alerted search is likely to be 8 times more effective than an unalerted search, as knowing where to look greatly increases the

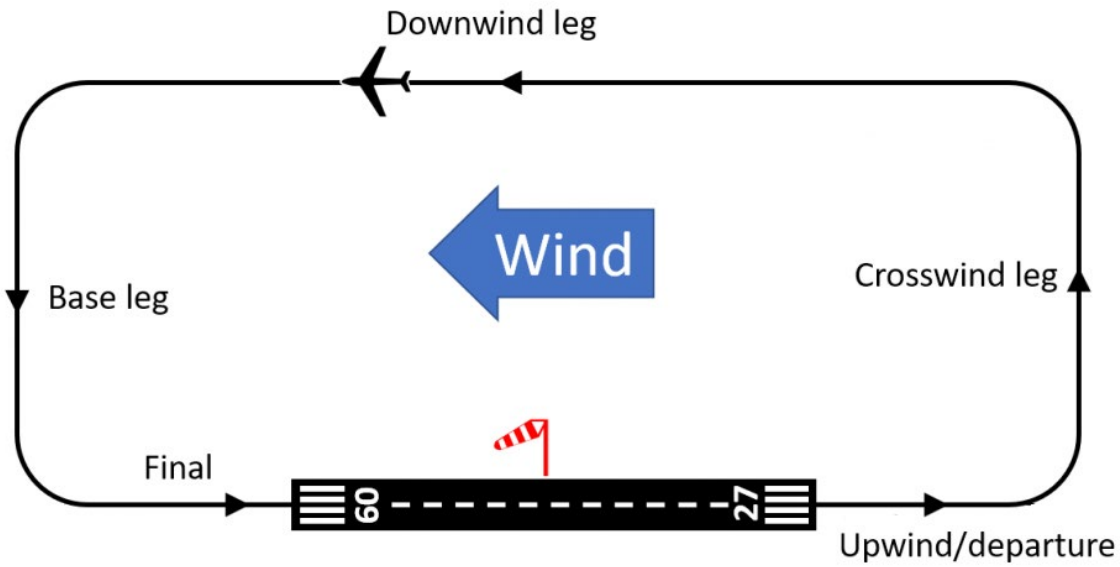
chances of sighting traffic. Similarly, an FAA research report (Andrews 1977) suggested that unalerted pilots may take 9 times longer to react than alerted pilots.

The ATSB research report *Aircraft performance and cockpit visibility study supporting investigation into the midair collision involving VH-AEM and VH-JQF, near Mangalore Airport, Victoria on 19 February 2020* (AS-2022-001) contains more information on the human performance limitations of the see-and-avoid principle.

Standard circuit pattern

A circuit is the specified path to be flown by aircraft operating in the vicinity of an aerodrome (Figure 9). It comprises upwind, crosswind, downwind, base and final approach legs.

Figure 9: Standard left-hand circuit pattern



Source: SKYbrary, modified by the ATSB

Regulations and right of way

Part 91 of the *Civil Aviation Safety Regulations 1998* (CASR) consolidates all of the general operating and flight rules for Australian aircraft and contains regulations detailing pilot responsibilities in relation to rules for the prevention of a collision, operating near other aircraft, right of way and operating in non-controlled airspace. These included but were not limited to the following regulations:

- 91.330: Right of way rules
- 91.335: Additional right of way rules
- 91.340: Right of way rules for take-off and landing
- 91.365: Taxiing or towing on movement area of aerodrome
- 91.370: Take-off or landing at non-controlled aerodrome—all aircraft
- 91.375: Operating on manoeuvring area, or in the vicinity, of non-controlled aerodrome—general requirements.

Right of way rules, which applied when there was a risk of collision between 2 aircraft, stated that when an aircraft is landing:

> Any other aircraft (whether in flight or operating on the ground or water) must give way to the aircraft that is landing.

Regulations describing take-off and landing procedures stated that a pilot may not commence take-off until certain circumstances are met, including:

> …if another aircraft is landing before the subject aircraft and is using a crossing runway—the other aircraft must have crossed, or must have stopped short of, the runway the subject aircraft is taking off from.

Regulation 91.370 prevented a pilot who is preparing to land from continuing an approach to land beyond the runway threshold if another aircraft is taking off on the same runway. These were not intended to take precedence over right of way rules, in the event of a collision risk. There was no specific regulation governing the continuation of a landing when another aircraft is taking off on a crossing runway.

When an aircraft is taxiing at an aerodrome:

> the aircraft and any tow vehicle must give way…to an aircraft that is landing or on its final approach to land[12]

Land and hold short operations (LAHSO) are a set of internationally recognised procedures to allow a landing aircraft to land and hold short of a runway intersection while a crossing runway is simultaneously used by another aircraft. LAHSO is subject to stringent safety standards and training requirements, and applies only to controlled aerodromes (where aircraft in the area are directed by an air traffic controller). LAHSO procedures are therefore not applicable at a non-controlled aerodrome such as Caboolture.

In all other circumstances, including at non-controlled aerodromes, aircraft in flight or on the ground must give way to a landing aircraft as stated above.

When 2 aircraft are on converging headings at approximately the same altitude, the aircraft that has the other aircraft on its right must give way to the other aircraft.

Regulation 91.335 required that, when there is a risk of collision between 2 aircraft, the aircraft with right of way must maintain the same heading and speed until there is no longer a risk of collision. However, the regulation also stated that the avoidance of a collision takes precedence over compliance with these rules. Where an aircraft is required to give way to another aircraft, the aircraft must not be flown so that it passes ahead, or directly over, or under the other aircraft so close that there is a collision risk.

Advisory circulars

CASA published plain-language and explanatory guidance on the regulations in the form of advisory circulars (ACs) and other material. The following advisory circulars issued by

[12] For a runway that does not have a marked runway hold position, the aircraft giving way and any tow vehicle must not encroach upon a graded runway strip.

CASA provided guidance to pilots operating at non-controlled aerodromes, including ALAs:

- AC 91-10 - Operations in the vicinity of non-controlled aerodromes
- AC 91-14 - Pilots' responsibility for collision avoidance.

Regarding operations at non-controlled aerodromes, AC 91-14 noted that 'rules of the air regarding right of way and rules for prevention of collisions must always be respected.'

The advisory circulars also outlined 'alerted see-and-avoid' principles and highlighted their importance for maintaining separation at non-controlled aerodromes. AC 91-14 gave guidance on visual searches and stressed the importance of improving a pilot's situation awareness beyond reacting to what they can see using tools such as radio, ADS-B, and other electronic systems used for traffic avoidance. It stated:

> The primary tool of alerted see-and-avoid that is common across aviation—from sport and recreational to air transport—is radio communication.

Carriage of radios

Part 91 of the CASR did not require aircraft to carry a radio when in the vicinity of uncertified aerodromes (such as Caboolture Airfield), but a radio was required in the vicinity of certified aerodromes (CASR 91.400).[13] Some aerodromes, including Caboolture, had a relevant instruction in the En Route Supplement Australia (ERSA) that required the carriage and use of a radio (see *En Route Supplement Australia*).

Mandatory and recommended radio calls

CASR 91.630 made certain radio calls (listed in the Part 91 Manual of Standards) mandatory for aircraft that are fitted with or carry a radio. The Part 91 Manual of Standards prescribed one type of mandatory broadcast at a non-controlled aerodrome, namely:[14]

> When the pilot in command considers it reasonably necessary to broadcast to avoid the risk of a collision with another aircraft.

AC 91-10 reinforced this requirement and also stated:

> Whenever pilots determine that there is a potential for traffic conflict, they should make radio broadcasts as necessary to avoid the risk of a collision or an Airprox event.

The Airservices Aeronautical Information Publication[15] stated:

> In Class G [uncontrolled] airspace, pilots … should monitor the appropriate [radio] frequency and announce if in potential conflict. Pilots intercepting broadcasts from aircraft which are considered to be in potential conflict must acknowledge by transmitting own callsign and, as appropriate, aircraft type, position, actual level and intentions.

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13 CASR 91.400 had a provision to mandate carriage of a radio at certain designated aerodromes; as of 2025, there were no aerodromes listed as such.

14 Some non-controlled aerodromes (not Caboolture) were in 'mandatory broadcast areas' where radio calls were mandatory.

15 The Aeronautical Information Publication (AIP), published by Airservices Australia, contained aeronautical maps, charts and other aeronautical information and instructions.

CASA recommended certain other broadcasts at a non-controlled aerodrome or dependent on traffic. AC 91-10 stated:

> Pilots are reminded they are required to make all broadcasts necessary to avoid the risk of a collision with another aircraft as prescribed by Section 21.04 [Non-controlled aerodromes — prescribed broadcasts] of the Part 91 MOS. Table 5 [Recommended broadcasts in the vicinity of a non-controlled aerodrome] … contains the recommended broadcasts to achieve this requirement.

The recommended calls for non-controlled aerodromes included when a pilot:

- intends to take off
- is inbound to an aerodrome.

Calls that were recommended dependent on traffic included when:

- a pilot intends to enter a runway, including crossing a runway
- a pilot is joining a circuit
- the aircraft is clear of the active runway(s).

Limitations of radio communication

Positional broadcasts are a one-way communication, intended to provide a short and concise broadcast to minimise radio channel congestion. They do not imply receipt of information by other parties unless direct radio contact is made between stations to acknowledge the traffic, confirm intentions and, if required, discuss measures to provide deconfliction.

The VHF radio requires line of sight between both stations in order to function effectively. If an aircraft does not have a clear visual path direct to another in the vicinity, then the radio wave signal strength and clarity can be affected by obstacles. In some cases, terrain, vegetation or buildings can create areas that may shield or substantially reduce radio wave propagation and adversely affect broadcast signal strength and clarity.

AC 91-14 also advised:

> Pilots should be mindful that transmitting information by radio does not guarantee receipt and complete understanding of that information. Many of the worst aviation accidents in history have their genesis in misunderstanding of radio calls, over-transmissions, or poor language/phraseology which undermined the value of the information being transmitted.
>
> Without understanding and confirming the transmitted information, the potential for alerted see-and-avoid is reduced to the less safe situation of unalerted see-and-avoid.

AC 91-10 stated:

> Pilots are reminded that although correct and informative radio calls play a critical role in ensuring collision avoidance in uncontrolled airspace, to ensure the safety of their aircraft they cannot assume that an absence of other radio calls means there are no nearby or conflicting aircraft…Pilots must continually look out for other aircraft, even when their broadcasts have generated no response.…
>
> Pilots should not be hesitant to call and clarify another aircraft's position and intentions if there is any uncertainty.
>
> It is essential that pilots maintain a diligent lookout because other traffic may not be able to communicate by radio. For example, the other pilot may be tuned to the wrong frequency, selected the wrong radio, have a microphone failure, or have the volume turned down.

Runway use

Determination of 'active runway'

The concept of an 'active runway' for non-controlled aerodromes was not defined in the regulations. The Part 91 Manual of Standards did not explicitly define the term, but referred to it in a paragraph about aircraft lighting (original emphasis):

> [white strobe lights must be displayed] if the aircraft, on its way to the runway from which it will take off, or on its way from the runway on which it has landed, crosses any other runway that is in use for take-offs or landings (an ***active runway***) — while the aircraft is crossing the active runway;

The same passage, slightly paraphrased, was also included in the *CASR Part 91 Plain English Guide*.[16] The following definition was provided as guidance in AC 91-10:

> Active runway: The runway most closely aligned into the prevailing wind, or, in nil wind, or when predominantly all crosswind, it is the runway in use.

The CASA Visual Flight Rules Guide[17] stated:

> Landings and take-offs should be made on the active runway or the runway most closely aligned into wind.

Use of multiple runways

The advisory circular AC 91-10 made the following statements regarding 'active' and 'secondary' runways (each in separate sections):

- Pilots should be vigilant when using a runway that is not the active runway to ensure that they do not create a hazard to aircraft using the active runway.
- Landings and take-offs should be made on the active runway or the runway most closely aligned into wind.
- If a secondary runway is being used (e.g. for crosswind or low-level circuits), pilots using the secondary runway should not impede the flow of traffic using the active runway.

The CASA Visual Flight Rules Guide stated:

> If a secondary runway is being used, pilots using this secondary runway should avoid impeding the flow of traffic on the active runway.

Other information on the use of runways at non-controlled aerodromes

Other than as stated above, there were no regulations or guidance applicable to the use of non-controlled aerodromes about:

- determination of which runway is 'active', 'secondary' or 'in use' in the context of the relevant guidance
- the use of runways that were not the active runway
- stopping prior to entering a runway.

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[16] At the time of writing, version 4.2 (2025) was current.

[17] At the time of writing, version 8.1 (2024) was current.

Caboolture Airfield information and procedures

Caboolture Airfield

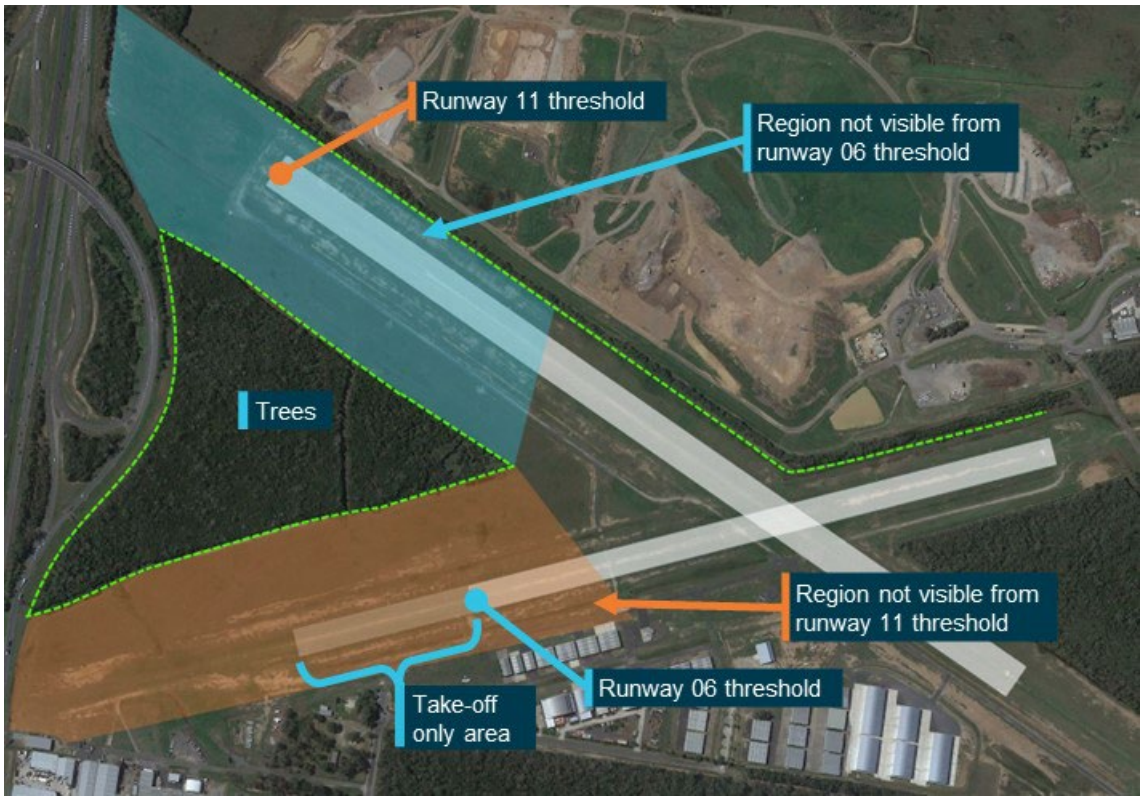
As stated previously, Caboolture Airfield was a non-controlled aerodrome owned by the Queensland State Government and leased to the Caboolture Aero Club (CAC) for the aerodrome's operation and management. It was an uncertified aerodrome, also known as an ALA. It was located about 3.5 km east of Caboolture, Queensland, with an elevation of 40 ft above mean sea level. Based on interviews with pilots familiar with Caboolture, the airfield sometimes had relatively high traffic volumes for an ALA, with a diverse traffic mix including light sport aircraft, weight shift aircraft, helicopters, gliders and warbirds. Several flight schools conducted both fixed-wing and helicopter flight training at the airfield.

Caboolture Airfield had 2 intersecting runways with magnetic orientations of 114°/294° (runway 11/29), and 065°/245° (runway 06/24). Their lengths were 1,129 m and 820 m respectively. Both runways were unsealed grass, except for a sealed portion at the beginning of runway 11.

Two different stands of evergreen trees were established between the intersecting runways (Figure 10). The stand between the arrival ends of runway 06 and runway 11 was dense and it was not possible to see through it. Site measurements found that at its eastern-most point, the trees were at a height of about 9.5 m, but elsewhere, the trees were approximately 14 m high (the terrain itself is relatively flat). The northern border of the aerodrome was marked by a fence and a line of trees. Hangars, training schools and other administrative buildings stood to the south of the 2 runways. From the perspective of any of the 4 runway thresholds, the trees and buildings around Caboolture Airfield prevented pilots from being able to see either end of the intersecting runway (Figure 11 and Figure 12).

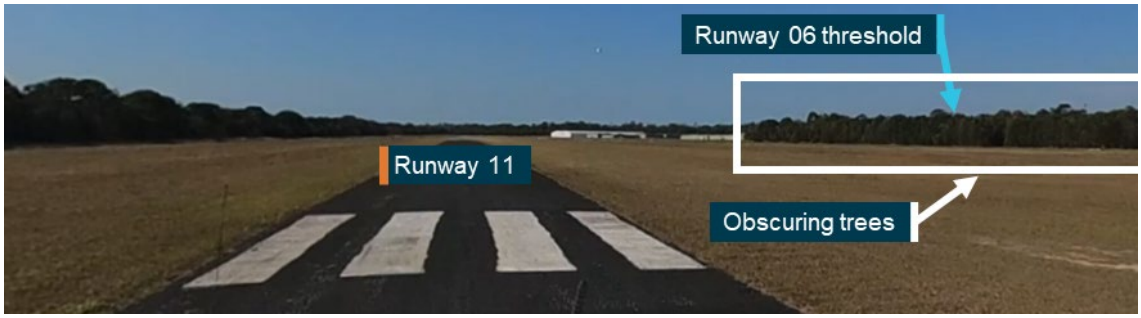
The ATSB estimated that the first 460 m of runway 11, and the first 180 m of runway 06, would not be visible from the other runway's threshold. Visibility between the runways was significantly more affected if an aircraft was using the 250 m section prior to the runway 06 threshold (which was permitted for take-off only) (Figure 10, Figure 11, and Figure 12).

Figure 10: Obscured parts of the adjacent runway from the thresholds of runways 11 (orange) and 06 (blue) while at ground level



The shaded areas illustrate the areas that would not be visible from the threshold of the other runway.
Source: Google Earth, annotated by the ATSB

Figure 11: Perspective from ground level at the threshold of runway 11



Source: ATSB

Figure 12: Perspective from ground level at the threshold of runway 06

Source: ATSB

Operations manual

Though not required to do so by regulation, the CAC maintained and published a *Caboolture Airfield operations manual* (available to the public on the club's website), detailing procedures for pilots intending to operate at Caboolture Airfield. The most recent revision was 2.0, issued in March 2023. The manual did not take precedence over the CASR.

The *Caboolture Airfield operations manual* noted that traffic at the thresholds of runways 11 and 29 would not be visible if taking off before the threshold of runway 06 (pilots were permitted to commence take-off 250 m before the threshold of runway 06). It stated that aircraft towards the departure end of runway 06 might not be visible from before the landing threshold due to a crest in the runway.

The Caboolture Airfield operations manual stated (original emphasis):

> Aircraft shall obey the standard Rule of the Air of '***giving way to aircraft***' established on final.

En Route Supplement Australia

Background

Information about controlled and non-controlled aerodromes around Australia was published in the En Route Supplement Australia (ERSA). The ERSA was part of the Airservices Australia AIP and published by Airservices Australia but the details for each aerodrome were provided by the aerodrome operator. CASR 139 required operators of certified aerodromes to ensure there was adequate aerodrome information in the ERSA. The types of information required included telephone numbers, runway specifications, lighting, visual aids, available ground services, local traffic regulations, special procedures and local precautions.

While there was no obligation for an uncertified aerodrome like Caboolture to have an ERSA entry, one had been submitted and maintained by CAC as the aerodrome operator. As a result, the CAC was considered to be an 'aeronautical data originator' under the regulations, and was therefore responsible for keeping the ERSA entry up to date.

ERSA information for Caboolture Airfield

The ERSA information for Caboolture Airfield noted the presence of gliding operations. It stated that trees may 'encroach on Transitional Slopes gradients'; that is, may not meet obstacle clearance criteria that are mandated only for certified aerodromes. The effect of the trees on visibility between runways was not noted. The ERSA information advised visiting pilots to refer to the *Caboolture Airfield operations manual* synopsis available on the 'aero club' (CAC) website. This synopsis referred to a one-page appendix containing a quick reference handout with basic aerodrome and circuit information. This did not mention visibility between runways. However, as discussed in *Guidance on the use of runways*, the *Caboolture Airfield operations manual* noted visual obstructions elsewhere.

The ERSA information for Caboolture also stated: 'Carriage and use of radio is required by the AD OPR [aerodrome operator].' There was no regulatory requirement for pilots to follow specific aerodrome instructions of this nature that are in the ERSA, except with regard to circuit direction and at controlled aerodromes. However, according to

AC 91-10, such instructions may be considered a condition of use imposed by the aerodrome operator.

Relevant information for other aerodromes

An ATSB review of ERSA information (2024 data) identified 27 entries for non-controlled aerodromes, including 6 entries for uncertified aerodromes[18] that included information about visual obstructions between runways. ERSA entries for 4 uncertified aerodromes noted obstructions between intersecting runways or intersecting runway centrelines (where the runways themselves do not intersect but the approach and departure flight paths do). The other 2 entries were for visibility between both ends of the same runway.

The ATSB examined the relevant guidance associated with the visual obstructions. The entry for Casino required pilots to broadcast their intentions before operating on the runway, Great Lakes Airfield stated that a pilot must confirm that runways are clear prior to take-off or landing (without specifying the means to do so, but likely via radio), and 3 others required a radio to be carried and used (in a similar manner to the ERSA entry for Caboolture). None directly linked these requirements to the visual obstructions.

There were also 19 entries for certified, non-controlled aerodromes that included information about visual obstructions between runways or runway ends.[19] Of these, 9 entries stated that certain radio calls were to be considered mandatory, and all of these linked the requirement to the visual obstructions.

Guidance on the use of runways

Standard left circuits were specified at Caboolture, except for runway 29, which was a right circuit.

With regard to which runway was preferred for use, the *Caboolture Airfield operations manual* stated:

> The active runway is the RWY [runway] most into wind and the runway being used by other aircraft at the time of your departure or inbound radio broadcast. Other runways may be used with radio notification to other traffic and with priority given to other aircraft already established in the circuit of the runway in use (the active runway) and with awareness of the Glider Launch point operations.

Regarding selection of runways by pilots, the manual stated:

> The pilot in command of an aircraft has the authority to select the runway most suited to the performance and operational requirements for the safe operation of their aircraft however, with combined operations the active runway is usually the one required by aircraft with the poorest cross wind capability. These factors may be less important to pilots of fast, heavy aircraft who are more interested in the length of runway available for safe operations.
>
> All operators at YCAB [Caboolture Airfield] are advised that any pilot selecting a runway other than the one which is clearly the 'active' runway (by virtue of into wind and minimum cross wind component and established circuit traffic), or that has been nominated as the 'active' runway by a radio information communication, then such pilot will lose all right of way privileges and shall conduct the landing or take-off procedure such as to give way to, and maintain separation from all other circuit traffic.

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[18] Casino (NSW), Great Lakes Airfield (Vic), Kyneton (Vic), Maryborough (Vic), Murray Bridge (SA), and Waikerie (SA).

[19] Information about visual obstructions between runways was also included for 2 aerodromes that had control towers but were usually only controlled during the day: Broome and Camden. They were excluded from this review.

The manual also described the gliding operations at Caboolture, and outlined the concept of a 'launch point': a base of operations for unpowered aircraft such as gliders, centred around a camping trailer that acted as a mobile administrative office. The manual stated:

> The launch point is usually established at a point on the airfield that minimises the time and effort required to retrieve the aircraft after landing and remain clear of the active runway so that the launch crew or parked aircraft do not impede the landing or taxiing aircraft.

The Caboolture Airfield operations manual did not state the gliding club's general preference to use runway 06 (see Gliding club information).

Based on interviews with pilots at Caboolture, including members of the CAC, in light or variable wind conditions, there was a general preference for runway 11. There were 2 main reasons for this:

- Runway 11 was the only runway with a paved section just beyond the threshold. All other runways were unsealed grass.
- Although open at the time of the occurrence, runway 06/24 had been closed for resurfacing for a long period of time (see *Closure of runway 06/24*), so operators had developed a habit of simply not using it.

Radio communications at Caboolture Airfield

The common traffic advisory frequency (CTAF) was 125.85 MHz, which was a frequency shared with Caloundra Airport, 32 km north-north-east of Caboolture.

The *Caboolture Airfield operations manual* stressed the importance of radio communication at Caboolture, and required that all aircraft – including gliders – carry a VHF radio tuned to 125.85 MHz. Regarding mandatory broadcasts, the manual required pilots to make an inbound call when 10 NM from the aerodrome, or at a known geographical feature. No other mandatory calls were listed, and the manual referred readers to the CASA advisory circular AC 91-10 (see *Mandatory and recommended radio calls*).

The Cessna pilot stated that they were trained to always make a radio call when crossing a runway, with the exception of runway 06/24 at Caboolture, where they were told not to make a call based on instructions from the CAC. An instructor at the Cessna pilot's flying school reported telling students to generally avoid making a runway crossing call for runway 06/24 while the runway was closed, which they also recalled was based on a change to CAC procedures. The CAC did not have a record of a directive or change in policy regarding crossing calls. Several Caboolture operators interviewed by the ATSB advised that crossing calls had been a subject of ongoing discussion at the CAC. Some questioned the benefits of making a crossing call when there was no chance of a conflict with other traffic, arguing that such calls only added more crowding on an already congested radio frequency.

Closure of runway 06/24

Runway 06/24 was closed for resurfacing in December 2021, and reopened on 6 April 2023. Because Caboolture was an uncertified aerodrome, there was no regulatory requirement for hold point markings. However, runway hold point markings had been previously present on the taxiway across runway 06/24, but they were removed when the

taxiway was repaved as part of the resurfacing (Figure 13). At the time of the occurrence, these lines had not been repainted. Hold point markings were still present on runway 11/29 (Figure 14).

Figure 13: Taxiway across runway 06/24 without hold point markings

Source: ATSB

Figure 14: Hold point markings at the threshold of runway 11

Source: ATSB

Gliding club information

General information

The Caboolture Gliding Club (CGC) was responsible for all unpowered glider operations conducted at Caboolture Airfield. Gliding operations were generally conducted on Fridays, Saturdays and Sundays. The CGC headquarters was situated near the threshold of runway 06. The club also used a camping trailer as a mobile base of operations that could be towed to the launch point during gliding operations. The positioning of the base would depend on which runway the CGC deemed was most appropriate for gliding operations for a given period. All unpowered gliders were towed into the air using the Pawnee.

The process for towing gliders from runway 06 was as follows: a pilot would check for conflicting traffic on runway 11/29 via radio. If clear, the pilot would tow a glider into the air using the Pawnee, then release it from the tow rope after gaining sufficient altitude. The Pawnee pilot would then re-join the circuit for runway 06 after it released, land while stopping short of the runway intersection, then backtrack to the launch point to pick up

any other gliders for aerotow. The tow rope, which can be jettisoned in an emergency, would normally remain attached to the tow aircraft throughout.

Runway selection

Runway selection is important for towed glider take-offs as well as landings. The CGC's documented standard operating procedures stated:

> Before moving any equipment to the flight line the Duty Instructor will consult with the Tug [tow] Pilot to determine the runway to be used.

There was no other information within the procedures regarding runway selection and the procedures did not discuss potential visibility issues between runways. If the winds were favourable or sufficiently light, and traffic on runway 11/29 was light, it was common on the first flights of the day for the gliders to be towed into the air from runway 06. This prevented members from having to hand-tow the gliders long distances from the hangars to other runways. The gliders could then land on whichever runway had been selected for operation by the duty instructor in consultation with the tow pilot. The CGC would sometimes use runway 06 throughout the day, depending on the prevailing winds, including during periods when runway 11/29 was being used by other aircraft. Several members stated that if the traffic volume on the intersecting runway became too high, the tow pilot or the duty instructor would decide to move gliding operations to the runway being used by the rest of the traffic.

The CGC reported that winds, both at ground level and aloft, were an important consideration in runway selection, particularly for glider launches and landings. On the morning of the occurrence, prior to any gliding operation, CCTV footage of the windsock near the runway intersection showed that there was a light (easterly) wind favouring runways 11 and 06 approximately equally. There was enough variability in the wind that at any given time, the windsock could be seen favouring runway 11 or runway 06. The CGC had its own windsock near the end of runway 06. This was not visible on CCTV cameras but would often show a different wind direction to the other windsock. The CGC duty instructor and Pawnee pilot reported observing a north-easterly wind on the morning of the occurrence.

The duty instructor assessed that traffic on 11/29 was light, later estimating one movement every 15 minutes. Based on this, it was decided that the gliders could be safely towed from runway 06 for the first flights. According to the information they used, winds were forecast to increase down runway 06 throughout the day. It was therefore decided that gliding operations would continue on runway 06 while the conditions permitted it.

Regarding runway selection for landing prior to the accident, the Pawnee pilot stated that they selected runway 06 prior to joining the crosswind leg based on the wind conditions at the time (established by their view of the 2 windsocks at the airfield).

After the accident, the ATSB surveyed 18 pilots familiar with Caboolture Airfield (including the Pawnee and Cessna pilots) about a range of topics. The relevant responses were as follows:

- When asked about simultaneous intersecting runway operations at Caboolture, most pilots reported that the CGC had used runway 06, particularly for their first flights of the day while other traffic was operating on runway 11.
- Their assessment of how often intersecting runways were in use concurrently was roughly evenly distributed between ‘rare’ and ‘often’.
- None of the pilots believed it was common to hear tow pilots or others make radio calls to indicate they would be holding short of the runway intersection but some had heard that occur before with tow pilots.
- None of the pilots could recall a previous situation where a landing pilot made a hold short call and a second pilot took off while the first aircraft was still in the process of landing.

Recorded data

On-board recording

The Pawnee carried no flight data recording devices, and no automatic dependent surveillance broadcast (ADS-B) transponder. An ADS-B transponder was fitted to the Jabiru but the ATSB did not identify any recorded ADS-B data from the Jabiru during the accident flight.[20]

The Jabiru was fitted with a Dynon SkyView SV-HDX1100 avionics system. The system was capable of recording flight data installed in the cockpit. Flight data from the accident flight was recovered from the damaged device at the ATSB’s engineering facility in Canberra (Figure 15). The unit recorded the latter part of the Jabiru’s taxi towards the hold point for runway 11, turning onto the perpendicular taxiway from about 1029:49–1029:59, and the data terminated at 1030:03 when the Jabiru was at the hold point. This likely coincided with the Jabiru coming to a stop, as reported by a witness, while another aircraft was departing on runway 11. Assuming the Jabiru’s average taxi speed from the hold point to the runway was the same as the recorded segment, the ATSB estimated that the Jabiru would have been stopped for about 2 seconds before commencing taxi to the runway, starting to turn onto the runway heading at about 1030:35.

[20] The transponder used a separate antenna system to the radio. The transponder was not examined for functionality.

Figure 15: Flight data recovered from the Dynon SkyView system in the Jabiru

Source: Google Earth, ATSB

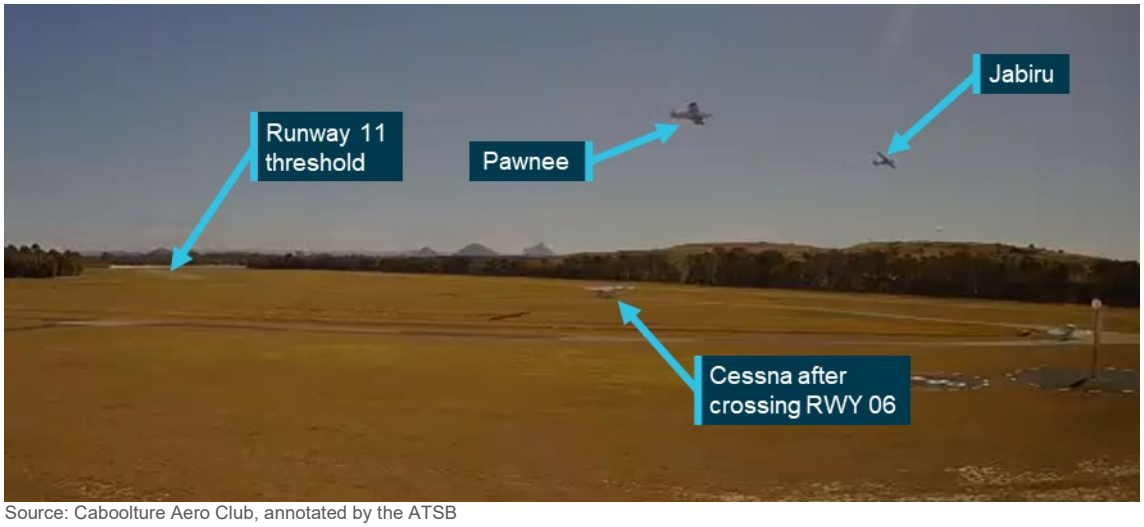
The GPS data recording was re-established at 1030:56, as the Jabiru was on the threshold markings of runway 11, rolling on the runway's heading at 13 kt. Data showed the Jabiru accelerating and taking off, then initiating a left turn before colliding with the Pawnee at a height of approximately 130 ft.

Video recording

Video footage of the accident was recovered from a closed-circuit television (CCTV) at Caboolture Airfield. The system included several cameras on buildings south of the runway intersection, aimed in different directions. Due to the limits of resolution and distance, the CCTV did not capture movement of the Jabiru near the threshold of runway 11. The Cessna crossing runway 06, the Pawnee initiating a go-around, part of the Jabiru's take-off and the collision itself were all visible on the recordings.

An example of the footage provided by the CCTV system is shown in Figure 16. Timestamps from the CCTV footage were adjusted to align with the times provided by the Jabiru's recorded GPS data.

Figure 16: Still from a CCTV camera located to the south of the runway intersection



Source: Caboolture Aero Club, annotated by the ATSB

Using the CCTV recordings, the ATSB logged aircraft movements in the hour prior to the accident. From 0930 until the Pawnee took off with the first glider at approximately 1005, there were 15 movements on runway 11. While the Pawnee was airborne on the first flight, an additional aircraft landed on runway 11. The next movement was the Pawnee landing on runway 06, then taking off with the second glider at 1022.

A review of the CCTV recordings found that from 0930 until the occurrence, 9 other aircraft used the same taxiway as the Cessna to cross runway 06. Of these, 8 aircraft, including the Jabiru, did not stop before crossing.

CTAF recording

CTAF broadcasts were not recorded at Caboolture Airfield, nor were they required to be. Recorded broadcasts were recovered from Caloundra Airport, which shared the same CTAF frequency. Due to distance and line of sight limitations, radio calls on or near the ground at Caboolture were generally not recorded, and some calls from within the Caboolture Airfield circuit were only partially recorded. There may have been other radio calls from aircraft in the vicinity that were not recorded.

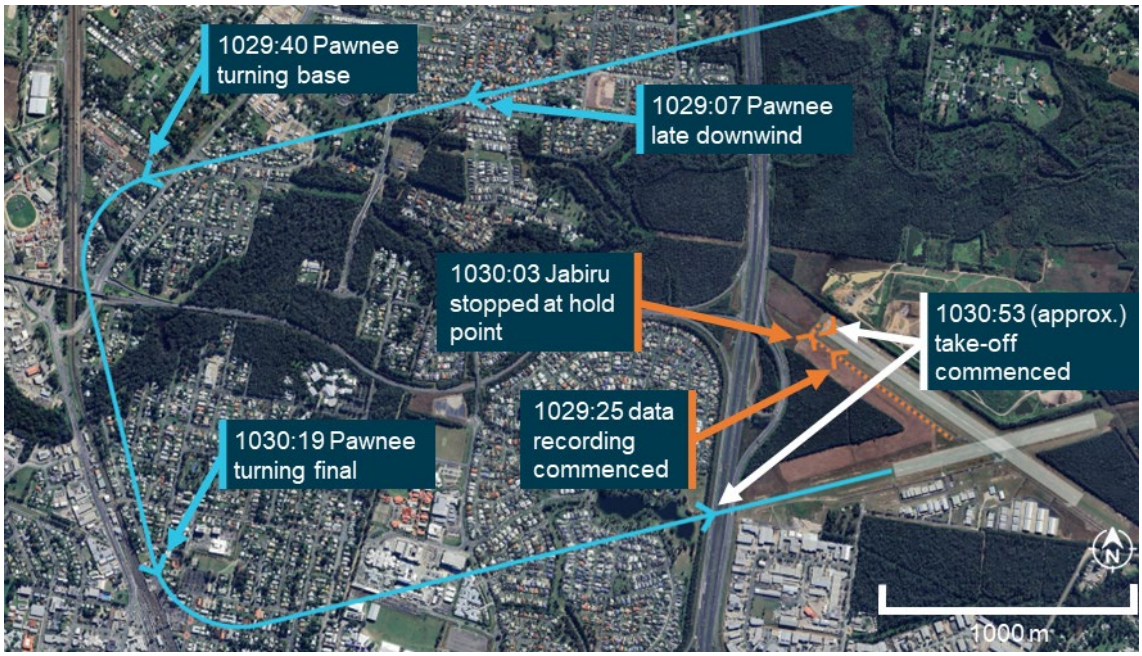
Recordings of radio calls made by the Pawnee pilot were assessed by the ATSB as being clear and readable. The recordings included some two-way communication, indicating that the Pawnee's radio was functional for transmitting and receiving at the time. There was no evidence in the recording of the sound associated with simultaneous radio calls interfering with one another (often referred to as heterodyning), and no witnesses recalled hearing any such interference on the morning of the accident. Several pilots who flew at Caboolture stated that heterodyning was relatively common due to frequency congestion.

Aircraft visibility

Using CCTV footage and recorded GPS data from the Jabiru, the ATSB conducted an analysis to determine when the pilots of the Pawnee and Jabiru may have had an opportunity to see one another based on whether there was a line of sight between their relative locations and the location of trees around the airfield, and on the orientations of the 2 aircraft.

While taxiing towards the hold point near the threshold of runway 11 (facing north-east from about 1027:25 to about 1029:58), the Jabiru pilot might have been able to observe the Pawnee in the downwind or base legs of the (runway 06) circuit. Once the Jabiru had turned towards the hold point, the Pawnee was on or turning onto the base leg, putting it almost directly behind the Jabiru. Approximate positions of the Pawnee and Jabiru are shown in Figure 17.

Figure 17: Approximate positions of the Jabiru and Pawnee



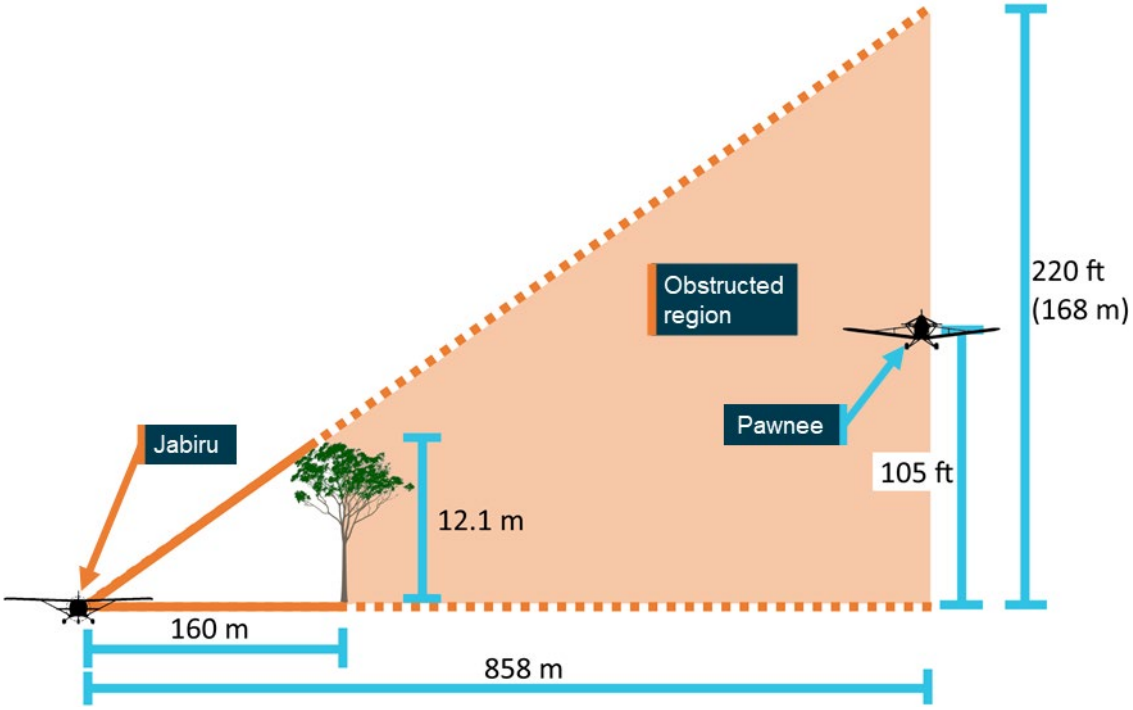
Positions of the Pawnee were approximated based on CTAF transmissions, assuming a 1 NM wide circuit. The take-off time was estimated by extrapolating the Pawnee's position backwards from when recorded data recommenced at 1030:56.
Source: Google Earth, annotated by the ATSB

Without flight data for the Pawnee, and given the perspective of the camera, the Pawnee's position and altitude could not be determined to a high degree of accuracy. For the purposes of estimating the Pawnee's position, it was assumed that during the final approach the Pawnee maintained the same heading as runway 06, along the centreline, with a constant speed and a 3° angle of descent.

The Pawnee pilot later recalled seeing 2 aircraft near the threshold of runway 06 while the Pawnee was on the base leg of the circuit, one of which was about to take off. At this point, the Jabiru was taxiing towards the hold point near the threshold of runway 11, and a third aircraft was conducting engine run-ups in the nearby run-up bay. It could not be determined which 2 of the 3 aircraft the Pawnee pilot saw.

At the time the Jabiru had commenced its take-off roll, the Pawnee (on final approach) would have descended to about 105 ft and the trees would have obstructed line of sight from this point onwards. This was determined using a trigonometric calculation based on the assumptions described above (Figure 18). The trees would also have obscured line of sight from earlier than this, possibly from when the Pawnee descended below about 220 ft (a more precise estimate could not be made due to uncertainties about the Pawnee's height and location on the downwind and base legs of the circuit). If the Pawnee's descent rate had been constant throughout the final descent, it would have likely descended below 220 ft at about 1030:29, when the Jabiru was likely taxiing towards the runway.

Figure 18: Tree line obstruction height calculation when the Jabiru began its take-off roll

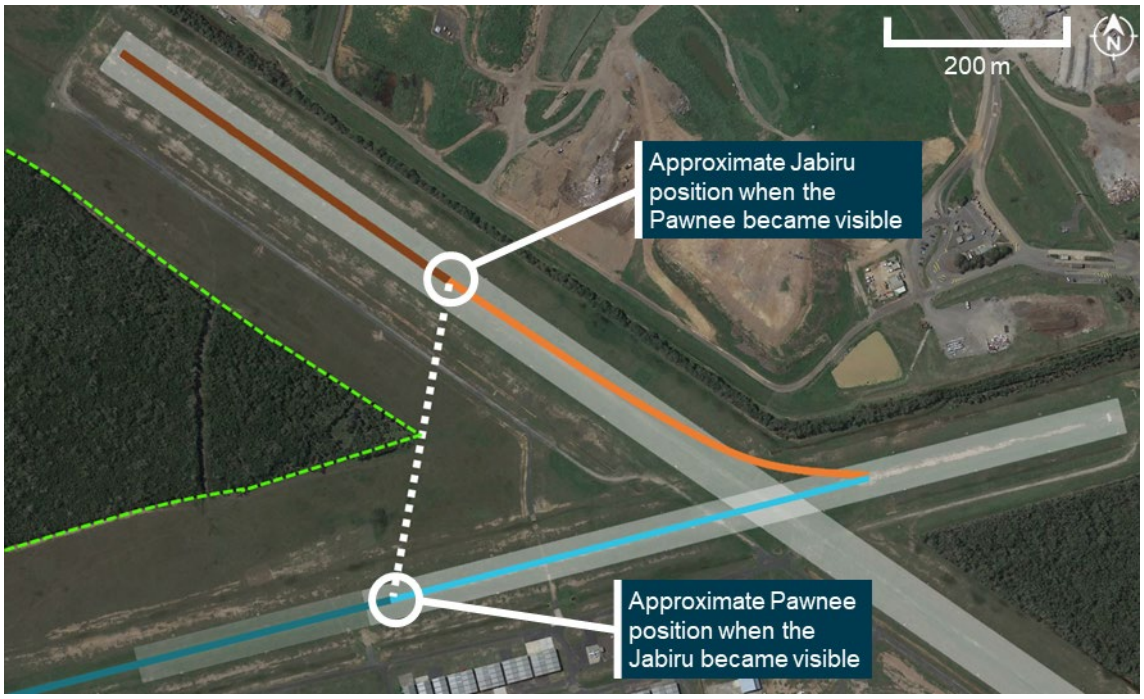


Not to scale. This calculation shows that the Jabiru and the Pawnee were not visible to one another when the Jabiru began rolling on runway 11. The Pawnee was estimated to be 105 ft high at this point. Assuming the Jabiru pilot's view was 2 m above the ground, the 14.1-m trees blocked the Jabiru's view up to 220 ft.
Source: ATSB

By the time the Jabiru had turned onto the runway heading at about 1030, the Pawnee would have been behind the Jabiru and below the tree line from the perspective of the Jabiru pilot.

The trees would have prevented the 2 pilots from observing one another up until they were over their respective runways and had passed the end of the stand of trees, at approximately 1031:15. At this point, the Jabiru had only just lifted off the ground, and the Pawnee was just about to begin climbing, having almost touched down prior to commencing the go-around. The point in time that the line of sight was regained is illustrated in Figure 19. At this time, the Pawnee was about 75° to the right of the Jabiru's heading, and the Jabiru was about 55° to the left of the Pawnee's heading.

Figure 19: Sightlines between the 2 aircraft as they climbed from the aerodrome



Source: Google Earth, annotated by the ATSB

At this point, both of the aircraft would have been visible to each other, in the occupants' peripheral vision if they were looking directly ahead. Objects in a person's peripheral vision are more difficult to detect due to a number of factors including limitations from visual clutter and reduced visual acuity (Rosenholtz, 2016). During this period until the collision, there would have been very little relative movement of the aircraft in each field of view, making detection difficult.[21] Visual detection of objects is also strongly dependent on a person's attention, head position and potential sight-blockers from the aircraft itself, such as a passenger, cockpit pillars, aircraft nose, wing struts or wings. The ATSB assessed that it was possible that the Pawnee's structure blocked the pilot's potential view of the Jabiru.

Related occurrences

Collisions or near collisions at non-controlled aerodromes

From 2013–2023 in Australia, there were 8 other reported collisions between 2 heavier-than-air[22] aircraft at non-controlled aerodromes, where at least one of the aircraft involved was either in the aerodrome circuit, taking off, landing or taxiing.[23]

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21 Over the 15-second period, Jabiru would have moved from about 45° to 55° to the left of the Pawnee's nose. The Pawnee would have moved from about 75° to 90° to the right of the Jabiru's nose.

22 There were 2 additional collisions between 2 balloons, which are excluded from this data.

23 This data includes a collision between 2 helicopters using adjacent helipads near Main Beach, Gold Coast, Queensland, on 2 January 2023 (AO-2023-001).

From 2013–2023 there were 118 reported near collisions[24] at non-controlled aerodromes. ATSB analysis indicated that, where relevant information was available, almost all of the incidents had 2 factors in common: a breakdown (or absence) of radio communication, and pilots not seeing each other's aircraft. The following relevant types of communication issues were seen in the occurrences that were investigated:

- pilots misinterpreting radio communications
- one or both pilots not carrying a radio
- radio equipment not functioning properly
- radio transmissions not being heard
- interference from other transmissions.

Over the same time period, at non-controlled aerodromes, the ATSB occurrence database was searched for any collisions, near collisions, instances of separation issues[25] or runway incursions where keywords in the occurrence summary indicated that intersecting runways were involved. The search found:

- 1 collision (excluding this accident)
- 7 near collisions
- 19 instances of separation issues
- 2 runway incursions.

The collision was investigated by the ATSB (AO-2015-023) and involved 2 aircraft landing on different runways that collided at the runway intersection. Both aircraft sustained substantial damage and the pilots were not injured. The ATSB found that although there were no visual obstructions between the 2 runways, the pilots did not see one another. One pilot reported having an awareness of the other aircraft being in the vicinity, but not seeing it due to it blending into the terrain. The other pilot reported not expecting another aircraft to be landing on the other runway. Neither pilot was using their radio.

A more recent example was a near collision in June 2023 at Mildura Airport between a Piper PA-28 and a Bombardier DHC-8 (Dash 8). An investigation report was published on the ATSB's website (AO-2023-025). Mildura was a certified, non-controlled aerodrome, and both flight crews were preparing for take-off. The Dash 8 crew believed the PA-28 was at a different aerodrome because the PA-28 pilot misidentified a runway in a previous radio call. The PA-28 pilot knew the Dash 8 was at Mildura, but believed it was still taxiing. Airport buildings prevented the PA-28 pilot from seeing the Dash-8. The Dash 8 started its take-off roll on runway 09 as the PA-28 made a rolling call on the intersecting runway 36. The Dash 8 crew did not make a rolling call, believing there to be no traffic at the airport. The Dash 8 crossed ahead of the PA-28 at the runway intersection by about 600 m.

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[24] In accordance with the ATSB's definition, a near collision occurs when an aircraft that is airborne, taking off or landing comes into such close proximity with another aircraft, terrain, person or object where immediate evasive action was required or should have been taken.

[25] Occurrences coded as 'separation issues' are those in non-controlled airspace where separation is a concern, but where the definition of near collision is not met.

The ATSB also investigated a related runway separation occurrence at Mildura, in September 2023 between a Dash 8 and a Lancair Super ES. Both aircraft were preparing to depart, from intersecting runways. Due to communication issues as well as the buildings and topography around the airport, neither of the flight crews were aware of the other aircraft prior to the Dash 8 taking off and the Lancair giving a rolling call. The pilot of a third aircraft (behind the Lancair) heard the Dash 8's call and advised the Lancair to hold position while the Dash 8 departed, which they did. An investigation report was published on the ATSB's website (AO-2023-050).

Other incidents at Caboolture Airfield

Not including this occurrence, there have been 21 occurrences at Caboolture Airfield involving aircraft separation between 2013 and 2023. Four of these occurrences were classified as near collisions, and the others were separation issues. Three of the occurrences at Caboolture involved intersecting runway operations that were counted in the above list. These occurrences were reported, but not investigated and are summarised below:

- In May 2021, the pilot of a Vans RV6 took avoiding action to pass below a Robinson R22 helicopter as both aircraft were departing on intersecting runways. The R22 crew reported not hearing radio calls from the RV6 (Near collision).
- In April 2021, while on approach, the pilot of an Aeropro 2k Eurofox reported horizontal separation concerns with a tow aircraft and glider that were climbing from an intersecting runway. The pilot did not hear any radio calls from the tow aircraft or glider. The tow aircraft was not identified (Separation issues).
- In May 2016, while landing on runway 30 (now runway 29), the crew of a Cessna 206 initiated a go-around to maintain separation with a Cessna 140 taking off from runway 24 (Separation issues).

Safety analysis

Introduction

While the Pawnee was on final approach to land on runway 06, the Jabiru pilot commenced a take-off on the intersecting runway 11. The Cessna taxied across runway 06 in front of the Pawnee, and the Pawnee pilot initiated a go-around to avoid a potential collision with it. While the Pawnee pilot did not see the Jabiru until immediately after the collision, the Jabiru pilot appeared to notice the Pawnee moments before the collision and turned, likely in an attempt to avoid the Pawnee. The leading edge of the Pawnee's left wing struck the trailing edge of the Jabiru's right wing. The Jabiru's aileron and a section of outer wing separated as a result, and the Jabiru subsequently collided with terrain. This impact was not survivable, and the pilot and passenger were fatally injured. The Pawnee remained controllable and landed safely shortly after.

This analysis will discuss the events and conditions that led to the midair collision and/or increased safety risk.

Pilot awareness

Jabiru pilot's awareness

The Jabiru pilot's decision to take off as the Pawnee was on final approach indicated that either the Jabiru pilot was not aware of the Pawnee at all when commencing take-off, or had some awareness but elected to take off anyway.

As established in the Context section of this report (see *Aircraft visibility*), trees between the intersecting runways meant the Pawnee would not have been visible from the Jabiru for a significant part of the sequence of events, including the period leading up to the commencement of the take-off. The Jabiru pilot may have had an opportunity to see and/or hear the Pawnee during preparation for flight or taxi. However, even if the Jabiru pilot only had a general awareness of the Pawnee's presence through seeing it earlier (such as when in the circuit), it would have been difficult to accurately project its flight path and predict its position.

The Jabiru pilot's level of situation awareness was therefore highly dependent on whether they heard any or all of the Pawnee pilot's radio calls. The Pawnee pilot's account, statements from various witnesses and common traffic advisory frequency (CTAF) recordings from Caloundra Airport were all consistent (accounting for witness recollection) to determine that the Pawnee pilot made at least 4 radio calls indicating their position in the circuit for runway 06.

Examples of reasons the Jabiru pilot might not have heard and understood the Pawnee pilot's calls include technical reasons, such as if the radio volume was turned down or other settings were incorrect, or the radio and associated equipment were not functioning correctly. No radio calls from the Jabiru were recorded, but this was as expected given the absence of other recordings from any aircraft on the ground (and the cut-off Pawnee transmissions). From a technical perspective, an examination of the Jabiru's radio found that the device was probably functional, but it was not possible to determine the radio's volume or other settings as well as the functionality of other components in the system

such as the headset, cables and antenna. It is important to note that a problem with transmission does not necessarily indicate a problem with reception, or vice versa.

Notably, most witnesses including the Pawnee pilot did not hear any calls from the Jabiru. The Jabiru pilot was reportedly diligent in making radio calls. A pilot with their amount of experience would know the recommended calls, including when entering the runway and commencing take-off. Further, the pilot would not have been expecting a reply, so the absence of such responses would not have indicated a radio problem to the pilot. On the other hand, a pilot who sees other aircraft in the circuit area might notice the apparent absence of radio traffic (in which case they may suspect a radio issue and test it and/or discontinue the flight).

The possibility of undetermined human factors affecting the Jabiru pilot's receipt and interpretation of the radio calls was considered. For example, there may have been some distraction preventing the pilot from hearing or understanding the calls. However, if this were the case it is unlikely that the receipt of all 4 radio calls in the circuit was affected to an extent that the Jabiru pilot was completely unaware of an aircraft in the circuit for runway 06.

Alternatively, if the Jabiru pilot was aware of another aircraft using the intersecting runway, it is possible that they heard and understood the 'land and hold short' call from the Pawnee, and therefore determined that it would be safe to take off, expecting the Pawnee to hold short of the intersection, or believing that one of the aircraft would pass the intersection significantly behind the other. However, the pilot had extensive flying experience and was very likely familiar with the rules of the air (which did not permit a take-off before the intersecting runway was clear), and the Pawnee pilot reported never seeing a pilot act on such a call previously.

Another possibility is that the Jabiru pilot misheard or misinterpreted radio calls from the Pawnee, and believed the Pawnee had already stopped short of the intersection (but was not visible due to the trees). This belief could have been reinforced by the other aircraft departing on runway 11 prior to the Jabiru. However, if the Jabiru pilot had been generally aware of another aircraft using the intersecting runway (whether or not the pilot thought it had landed), it is unlikely they did not then hear and react to the go-around call or alter the Jabiru's flight path unless there were other factors involved. None of the witnesses heard any transmissions from the Jabiru after the Pawnee announced the go-around, and the Jabiru continued on a fairly straight climbing path.

If the Jabiru pilot had initially not been aware of the Pawnee but did hear its go-around call, they probably would have then been looking out for it from that point onward until the pilot made an apparent avoidance manoeuvre about 6 seconds before the collision. There was also no radio call received by others at this time.

There were 2 occupants of the Jabiru, and the Pawnee was visible for a 9-second period before the apparent evasive manoeuvre began. This is less than, but close to, the 12.5 seconds that the United States Federal Aviation Administration determined it would take from a pilot seeing an object to evasive action beginning, if the pilot is not alerted to the other aircraft's presence. As suggested by related research (Hobbs 1991, Andrews 1977), an alerted pilot would likely see, recognise, and react to the other aircraft much more quickly. However, visual searches and reaction times are highly variable and, in this case, the Jabiru pilot's reaction time alone does not clearly indicate whether they would have been aware or unaware of the Pawnee before it became visible.

In summary, although other possibilities could not be completely excluded, the possibility that the Jabiru pilot was not aware of the Pawnee's presence on runway 06 until immediately before the collision is significantly more consistent with the established evidence and expected pilot behaviour. Therefore, a problem with the Jabiru's transmission and reception of radio calls is the simplest and most compelling explanation for the absence of radio calls from the Jabiru, the pilot's apparent unawareness of the Pawnee until just before the collision, and consequently, the pilot's decision to take off as the Pawnee was landing.

Ultimately, however, the reasons for the Jabiru pilot's likely non-awareness of the Pawnee could not be established with certainty. In any case, if the Jabiru pilot was not expecting other traffic they would have been less likely to see the Pawnee when it came into view. As established above, the relative movement of the Pawnee would have been slight and the view from the Jabiru cockpit could have been impeded by the aircraft's structure (such as its high wing, wing strut, and/or cockpit pillars).

Contributing factor

The Jabiru pilot likely unknowingly could not transmit or hear radio calls, and was probably not aware of the Pawnee being on final approach to runway 06 when they decided to commence take-off on runway 11.

The Jabiru's steep left turn was likely an attempt by the pilot to avoid collision, indicating that they saw or became aware of the Pawnee at that time. Given that this was done immediately before the collision, the pilot's choice to turn left (rather than right, or to descend) was probably mostly reactive rather than with consideration of factors such as the flight paths or a potential collision with the tow cable.

Pawnee pilot's awareness

The Pawnee pilot saw aircraft near the threshold of runway 11 while on the base leg of the circuit, although it could not be determined whether the Pawnee pilot saw the Jabiru taxiing towards the hold point, or the other aircraft in the run-up bay. Due to the sightlines being obscured, the Pawnee pilot would not have been able to see the Jabiru for much longer, losing visibility after descending below about 200 ft. At this time, the Jabiru was likely taxiing towards the runway. Accordingly, it would not necessarily have been clear to the Pawnee pilot how soon the Jabiru would be commencing take-off.

At non-certified aerodromes it was recommended, but not mandated, that pilots make a radio call for take-off, and if traffic necessitated it, for entering a runway. However, the Pawnee pilot did not hear the Jabiru pilot make a radio call for entering runway 11 or for commencing the take-off.

Of the other witnesses with access to a radio, 2 reported hearing a rolling (take-off) call from the Jabiru, while 6 did not hear any Jabiru calls. These types of call are very common at busy aerodromes such as Caboolture, and (especially if not relevant to the listener at the time) could be easily misremembered, not noticed, or confused with another aircraft's call, and people can also inadvertently construct false memories (Foster & Garry 2012).

An examination of the Pawnee's radio following the accident found it to be functioning normally and set to the correct frequency. The CTAF recordings show that the Pawnee pilot heard and responded to calls from other aircraft, and there were no recordings of any aircraft on the ground at Caboolture Airfield. As discussed above, it is also possible that the Jabiru's radio was not fully functional, or not set correctly.

Radio transmissions interfering with one another was considered as a possibility in this occurrence. A call from a taxiing aircraft at Caloundra Airport at 1030:32 could have hypothetically been made at the same time as an entering and rolling call from the Jabiru pilot. However, this was determined to be improbable, since none of the witnesses recalled a heterodyning sound and it is unlikely that a transmission 32 km away would be significantly stronger than one at the same aerodrome unless there was a problem with the Jabiru's radio.

If a take-off call was not transmitted from the Jabiru, it is possible that the 2 witnesses who recalled hearing it might have mistaken the taxi call at Caloundra for a take-off call. Given the conflicting witness accounts, uncertainty over the functionality of the Jabiru's radio, and the number of plausible scenarios, it could not be determined whether the Jabiru pilot attempted to transmit a take-off call before the Jabiru departed on runway 11.

Regardless of whether a radio call was successfully transmitted by the Jabiru, it was not heard by the Pawnee pilot. This was evidenced by the Pawnee pilot's statement, the absence of a radio response from the Pawnee pilot, their decision to continue climbing on the runway heading during the go-around, and the absence of any evasive manoeuvres prior to the collision, any of which could be expected if the Pawnee pilot had been aware of the Jabiru taking off.

During the landing the Pawnee pilot was aware of another aircraft about to take off on runway 11, but (reinforced by previous experience) was expecting the other pilot not to commence take-off until the Pawnee pilot had reported that they stopped short of the runway intersection. Having not heard an entering/rolling call, the Pawnee pilot had no indication that the other aircraft (the Jabiru) was actually taking off and no opportunity to see it until about 15 seconds before the collision (as both aircraft were climbing), because the stand of trees between runways blocked line of sight between the 2 aircraft. The ATSB assessed that it was possible that the Pawnee's structure blocked the pilot's potential view of the Jabiru.

In addition, there had just been a runway incursion ahead of the Pawnee pilot while in a high-workload phase of flight and they had just commenced a go-around. The Pawnee pilot was also focused on their climb rate, concerned about the clearance between the tow rope and the Cessna. The resulting distraction, surprise, and additional workload probably affected the ability of the Pawnee pilot to visually detect the Jabiru. Finally, the Jabiru would have exhibited very little relative movement in the Pawnee pilot's field of view, making its detection more difficult.

Contributing factor

The Pawnee pilot did not hear an entering and/or rolling call from the Jabiru pilot, and it was not possible to establish from the available evidence whether a call was broadcast. In combination with the line of sight between them being blocked, the Pawnee pilot was therefore not aware that the Jabiru was taking off on the intersecting runway.

Cessna pilot's awareness

While the Pawnee was in the circuit for runway 06, the Cessna pilot was conducting engine run-ups and pre-flight checks in the run-up bay adjacent to the runway. The pilot had turned the radio volume down in order to concentrate on the aircraft checks. Once these were completed, the Cessna pilot began taxiing towards the threshold of runway 11, and turned the radio back up. About 18 seconds after commencing taxi, the Cessna crossed runway 06/24. The radio volume being down until taxi restricted the pilot's opportunity to be aware of any traffic operating at Caboolture, including the Pawnee intending to land on runway 06. Since the radio was not turned up until after the commencement of taxi (1030:51) the Cessna pilot would not have heard the Pawnee's likely final call at 1030:19.

Most of the Cessna pilot's flight training had been conducted when runway 06/24 was closed. After it was reopened, most operators at Caboolture preferred to use runway 11 provided wind conditions did not prevent it. Operators using Caboolture reported a general preference for runway 11, apart from the Caboolture Gliding Club (CGC), which preferred runway 06 for first flights. When the CGC was using runway 06, it was sometimes only for the initial glider flights, and the Cessna pilot would only have seen gliders operating on one day (Fridays) out of the 5 the pilot usually used the airfield. Consequently, the Cessna pilot was not used to seeing aircraft using runway 06.

On the morning of the occurrence, when the Cessna pilot first entered the aircraft, they heard the Pawnee pilot making radio calls in the circuit. However, during taxi and immediately prior to crossing runway 06, the Cessna pilot saw an aircraft take off from runway 11, and another aircraft (the Jabiru) lining up behind it. At that time, the Cessna pilot had an understanding that aircraft were currently operating on runway 11. Not expecting any traffic on runway 06/24, the Cessna pilot did not 'clear' the runway prior to crossing. The pilot also reported not coming to a complete stop before crossing the runway, and that due to the limited use of runway 06/24, they did not always come to a complete stop before crossing.

Only one of the other 9 aircraft that had taxied across runway 06 previously on that day had stopped. Although entering the runway as the Pawnee was landing contravened general flight rules, there was no obligation for the Cessna pilot to come to a full stop prior to crossing.

Contributing factor

The Cessna pilot did not hear the Pawnee pilot make a landing call, and had limited opportunity to be aware of traffic during taxi, due to having turned the radio volume down during pre-flight checks and not restoring it before taxi.

Contributing factor

Not having heard the Pawnee pilot's landing call and with most traffic using runway 11, the Cessna pilot had no expectation of an aircraft using runway 06, and taxied across the runway without stopping or looking for traffic while the Pawnee was landing. This resulted in the Pawnee commencing a go-around manoeuvre.

Pawnee pilot's intention to hold short

While in the circuit, the Pawnee pilot was broadcasting the aircraft's position and intentions in accordance with the alerted see-and-avoid principles used at non-controlled aerodromes. The Pawnee pilot's radio call stating an intention to hold short of the runway intersection was not a standard call at non-controlled aerodromes, though it did not contravene any Civil Aviation Safety Authority (CASA) regulations or guidance.

Pilots using an intersecting runway would not be permitted to act contrary to the regulations on the basis of such a call because this would effectively be a type of land and hold short operation, which is not permitted at non-controlled aerodromes. In particular, if a pilot were to act upon an anticipatory 'hold short' radio call and take off or land on an intersecting runway under the assumption that the landing aircraft was going to hold short of the intersection, then that pilot would likely be contravening the general flight rules described in the Civil Aviation Safety Regulations. These rules require the pilot to wait until the landing aircraft has stopped short of the intersection, or crossed the intersection.

The Pawnee pilot's aim was to provide information to other traffic at Caboolture airfield about their own intentions. However, a 'holding short' radio call could lead to other pilots expecting that the intersecting runway could be safely used when, in fact, there would be no certainty that the landing aircraft would be able to hold short. The possibility of a go-around or long landing is always present. The potential for this call to have influenced the Jabiru pilot's decision-making is discussed in *Jabiru pilot's awareness*.

In the case of this accident, it was unlikely that the Jabiru pilot heard the Pawnee pilot's hold short call (see *Jabiru pilot's awareness*) so the call was probably not a factor in the Jabiru pilot's decision to take off.

Other factor that increased risk

During the circuit call for turning onto the base leg, the Pawnee pilot stated that they would hold short of the runway intersection. While the Pawnee pilot did not intend other pilots to rely on it to avoid conflict, this call could have led to other pilots assuming that the intersecting runway could be safely used when there was no certainty that the Pawnee would be able to hold short.

Simultaneous operations at intersecting runways

Visibility between runways

A stand of trees was between the threshold of runway 06 and runway 11. The trees were between about 9 and 14 metres tall, and prevented pilots at one runway threshold from observing aircraft at the other.

The Pawnee and Jabiru pilots would have been able to observe each other's aircraft for most of the time the Pawnee was in the circuit for runway 06. However, the ATSB analysis shows that the trees would have obstructed both pilots' vision of each other, likely from about the time the Pawnee was on the final leg and certainly by the time the

Jabiru had lined up with runway 11. Consequently, there would have been no opportunity for the Jabiru pilot to see the Pawnee landing on runway 06, or for the Pawnee pilot to see the Jabiru lining up and departing from runway 11.

Based on the analysis, there was no line of sight between the aircraft for about 46 seconds or more, until a point about 15 seconds before the collision, when the Jabiru was just lifting off and the Pawnee began climbing following the pilot's decision to perform a go-around.

Contributing factor

A stand of trees between the intersecting runways prevented the Jabiru and Pawnee pilots from being able to observe one another, from no later than the time the Jabiru turned onto runway 11 for take-off until both aircraft had begun climbing.

Gliding club use of runway 06

Caboolture Airfield could be busy at times, involving a diverse mix of traffic including light sport aircraft, weight shift aircraft, helicopters, gliders and warbirds. It is an aircraft landing area (ALA), and therefore not subject to the same regulations imposed by CASA on certified aerodromes. However, CASA guidance about operations at non-controlled aerodromes still applied.

According to interviews, pilots using Caboolture generally preferred runway 11 due to its paved section and established habits after the runway 06/24 closure. When weather and traffic conditions permitted it, the CGC preferred to use runway 06 for its first glider launches so that gliders would not need to be hand-towed a long distance before or after a flight. The CGC sometimes used runway 06 later in the day when winds were light, including during periods of light traffic on runway 11/29.

The CGC's preference for runway 06 even when other traffic was generally using runway 11/29 increased the risk of collision by using a runway that other pilots might not consider to be the 'active runway' in accordance with CASA and Caboolture Aero Club (CAC) definitions (as described in *Guidance on the use of runways* above). Depending on a pilot's interpretation of the guidance and the circumstances, either runway could be considered the active runway, and operating on both concurrently would increase risk. This is further discussed in *Guidance to pilots using intersecting runways*.

While CGC procedures did not discuss operations on an intersecting runway, club members took various measures to minimise conflicts. Prior to take-off, tow pilots would check via radio that runway 11/29 was clear, and the CGC would only operate from runway 06 when conditions and traffic volume allowed it.

However, as demonstrated in this occurrence, the amount of traffic on the aerodrome could vary relatively quickly (there was traffic using runway 11 prior to the first glider launch, then almost no traffic on runway 11 until after the second launch). Further, there was no advice to pilots in the En Route Supplement Australia (ERSA) or Caboolture Airfield operations manual about the gliding club's use of what might (at times) be considered a secondary runway, or in coordinating operations between pilots using different runways.

This risk of intersecting runway operations was exacerbated by the trees obstructing the pilots' vision of certain sections of the intersecting runways. Aircraft separation was therefore reliant on radio calls being broadcast, heard, and understood by the pilots on intersecting runways. The obstruction caused by the trees was understood by CGC members. However, it was not noted in the club's procedures. The obstruction caused by the trees was noted in the Caboolture Airfield operations manual, but only for aircraft operating before the threshold of runway 06, when in fact visibility was affected for much of the south-eastern end of the runway.

In this case, the Pawnee pilot reported selecting runway 06 for landing based on wind conditions, rather than as a result of CGC's earlier decision or common practice.

Other factor that increased risk

The Caboolture Gliding Club had a regular practice of using runway 06 for some flights, including during periods of light traffic on runway 11/29. This increased the risk of collision as Caboolture was a non-controlled aerodrome relying on alerted see-and-avoid principles, and there was a stand of trees obstructing pilots' vision of intersecting runways. (Safety issue)

Use of intersecting runways

Based on the traffic being light and a favourable wind forecast, the Pawnee pilot and duty instructor for the gliding club decided to use runway 06 for the first gliding flights of the day.

Given that runway 11 was frequently used by other traffic, this meant that the glider tow aircraft and gliders would likely be using a secondary runway, increasing the risk of conflict. However, this was permissible under the Civil Aviation Safety Regulations (CASR) since Caboolture was a non-controlled aerodrome. The relevant guidance from CASA, the CGC and the CAC is discussed in the Context section of this report (see *Runway use*, *Gliding club information* and *Guidance on the use of runways,* respectively).

Prior to joining the circuit, the Pawnee pilot elected to land on runway 06, although there would have been a reasonable expectation that the 2 aircraft near the threshold would soon be using runway 11. This decision was reportedly based on the position of the 2 windsocks at Caboolture. While there was no way to determine exactly what the Pawnee pilot could see at the time of the decision, the wind would have favoured runways 06 and 11 fairly equally. At the time, there was no other traffic in the circuit or on the ground that the Pawnee pilot considered as a potential threat to a safe landing on 06.

The trees between the 2 runways would have blocked the Pawnee pilot's view of the runway 11 threshold from any altitude below about 220 ft, as well as the view of the Pawnee by the occupants of the Jabiru, and the ATSB estimated the Pawnee's height at about 100 ft when the Jabiru commenced the take-off roll.

Without having heard any further take-off calls and no longer able to see the threshold of runway 11 during the latter part of the approach, the Pawnee pilot would not have necessarily been aware that the remaining aircraft were about to take off (discussed in

Pawnee pilot's awareness). Nevertheless, the Pawnee pilot was aware of other aircraft using runway 11 more generally and considered the potential for a conflict. The Pawnee pilot considered runways 06 and 11 to both be active at the time of their approach and attempted landing.

The Pawnee pilot's intention to stop short might have been a factor in the decision to operate on an intersecting runway, since the pilot did not intend to obstruct runway 11. Nevertheless, the decision to use runway 06 while aware of the potential for other traffic to be using runway 11 increased the risk of conflict.

Contributing factor

Based on the observed wind conditions at the time, and not anticipating any conflicting traffic, the Pawnee pilot elected to land on runway 06 even though all other traffic had been using runway 11.

Aerodrome operator guidance on visibility issues

Trees and buildings at Caboolture Airfield prevented aircraft at a given runway threshold from seeing either threshold of the intersecting runway. While aircraft are allowed to operate on intersecting runways at non-controlled aerodromes, the circumstances at Caboolture resulted in pilots being solely reliant on radio calls being made and correctly heard and interpreted to avoid traffic on intersecting runways.

The aerodrome operator, CAC, published limited information in the *Caboolture Airfield operations manual* about visibility between runways at Caboolture. This information was only for pilots operating from the displaced threshold of runway 06. The manual did not acknowledge that runway 11 threshold would likely not be visible from airborne aircraft on, or possibly before, the final leg of an approach to runway 06, as well as on the ground up to a point well past the threshold. Likewise, the manual did not mention similar visibility issues due to trees and buildings that pilots would have on any of the other 3 thresholds.

There was also no information in the ERSA to advise pilots of any obstructions to visibility at Caboolture Airfield. The ERSA, not an aerodrome operations manual, is the primary source of information pilots use to familiarise themselves with an aerodrome. While the ERSA entry for Caboolture Airfield included a note for pilots to refer to the aerodrome operations manual, not all pilots will do so, and the relevant information was not present in the operations manual at the time of the accident.

An ATSB review of the ERSA identified 27 aerodromes, 6 of which were uncertified, that had entries relating to visual obstructions between runways. There were 10 such aerodromes, including 1 that was uncertified, that included instructions for pilots to regard radio as calls mandatory (all the certified aerodrome entries stated that this was due to the visibility issues). Another uncertified aerodrome required pilots to confirm runways were clear before take-off or landing.

In this occurrence it is unlikely that mandated radio calls would have prevented a collision, because the Jabiru pilot probably could not transmit and hear radio calls. Additionally, a risk of collision is not eliminated if an aircraft attempting to land hears a

rolling call from the intersecting runway; though the landing pilot would now be alerted to another aircraft, going around or rolling through the intersection still risks a collision. Only stopping short of the intersection would guarantee that the 2 aircraft did not collide, and this is not always feasible. If the operations manual and/or the ERSA required pilots to ensure runways are clear before landing, the Pawnee pilot likely would have radioed the 2 aircraft near the runway 11 threshold (including the Jabiru) to confirm they were not taking off. However, there is no certainty that this would have prevented the collision, particularly if the Jabiru had radio issues. A lack of response from the Jabiru could be interpreted to mean that the aircraft was not preparing to depart.

Apart from this accident, since 2016 there have been 3 other reported instances of separation concerns due to intersecting runway operations at Caboolture. The risk of a collision could be mitigated if local and visiting pilots were informed of the visibility hazards, and guidance or procedures were provided for their management.

Other factor that increased risk

The Caboolture Aero Club did not effectively manage or inform pilots of the risk presented by trees and buildings around the airfield that prevented pilots from being able to see aircraft on intersecting runways and approach paths. (Safety issue)

Guidance on intersecting runways at non-controlled aerodromes

In addition to the regulations and right of way rules applicable at non-controlled aerodromes (including both certified and uncertified aerodromes), CASA provided guidance to pilots at these aerodromes regarding runway selection. This guidance was framed in terms of an ‘active runway’ and a ‘secondary runway’.

The following sections discuss how the concept of an ‘active runway’ is subject to different interpretations by pilots, as well as how the idea of an ‘active’ and ‘secondary’ runway can conflict with CASR regulations. Finally, they discuss the available guidance to pilots regarding runway selection at non-controlled aerodromes, and provide examples of recent occurrences where additional guidance could have provided a substantial improvement to risk controls.

Determination of active runway

CASA provided 4 official publications that described the concept of an ‘active runway’:

- part 91 Manual of Standards (MOS)
- CASR Part 91 Plain English Guide
- advisory circular AC 91-10 - Operations in the vicinity of non-controlled aerodromes
- CASA Visual Flight Rules Guide.

Although each definition had different elements and was subject to varying interpretations, they each suggested that a runway is active if it is ‘in use’ and/or one most closely aligned into the prevailing wind. The MOS and associated guide informed

pilots to use strobes when their aircraft '… crosses any other runway that is in use for take-offs and landings (an active runway)', implying that more than one runway could be active at a time. The other 2 documents indicated that only one runway could be active. AC 91-10 implied that a runway is always active if it is into wind, even if aircraft are operating on another runway. Further, there was no formal definition or further guidance to describe what makes a runway 'in use'. There are various possible circumstances that might cause a runway to become 'in use', including when an aircraft:

- is either on the runway or above it, in the process of landing or taking off
- is holding at, or taxiing to a runway with the intention of using it
- is on final approach to a runway
- has entered the circuit for a runway.

In addition, there was no information about when the 'in use' period would end, whether that was a certain time after an aircraft landed/took off, or when the circuit for that runway was empty, or some other criteria.

In the case of this accident, all 3 involved pilots likely considered runway 11 to be an active runway in the sense that it was in general use. However, the Pawnee pilot considered runway 06 to also be active through their own use of it, and also believed that they had right of way as the landing aircraft. By some CASA definitions, this would have made runway 11 the secondary runway from the perspective of the Pawnee pilot.

While this situation had the potential to cause confusion between the pilots, there was insufficient evidence to determine whether it contributed to this accident because it is not clear whether the Jabiru pilot was even aware of the Pawnee, and therefore whether the Jabiru pilot had any reason to consider which runway might be active.

Regardless, there are other potential situations where pilots at non-controlled aerodromes might have conflicting views, particularly when visibility is limited by trees, buildings or terrain or when there are radio communication issues. For example, if an aircraft is in the circuit for a runway, that pilot, having made the appropriate calls, could consider their runway active. Meanwhile, on an intersecting runway, an aircraft has recently taken off and another aircraft is waiting to depart. The waiting pilot has good reason to consider this runway active (an aircraft has just departed and they are about to depart). However, visual obstructions might prevent the 2 pilots from observing one another. If the final approach/take-off calls are not heard, or not made (neither are mandatory), both pilots would be operating on intersecting runways that they believe to be active, with no expectation of crossing traffic.

Implications of an active runway

CASA guidance stated that pilots at non-controlled aerodromes should operate on the active runway, or the runway most closely aligned into wind. However, it also acknowledged that there were situations where a secondary runway could be used. If a secondary runway was in use, CASA guidance stated that pilots on the secondary runway should not create a hazard, and should not impede the flow of traffic on the active runway.

There are 2 issues with this advice: firstly, depending on when a runway is considered 'active' (whenever a pilot believes it to be 'in use'), there could be no way to use a

secondary runway without impeding traffic on the active runway. If an aircraft is waiting to depart on the active runway, then an aircraft landing on the secondary runway is impeding the flow of traffic, since the departing aircraft must wait for the landing aircraft to stop, or cross the intersection in accordance with the regulations.

Conversely, if the landing aircraft (using a secondary runway) is not impeding traffic on the intersecting (active) runway because there is no traffic to impede, then that intersecting runway could be considered not active. Based on the 'in use' definition for active runways, the landing aircraft is now on an active runway, and the intersecting runway (not currently in use) is secondary.

The second issue with this advice is that telling pilots to not obstruct the active runway on a secondary runway is akin to giving the active runway right of way. In fact, the Caboolture Airfield operations manual states this explicitly. In certain situations, this directly conflicts with existing right of way regulations. For example, a landing aircraft has right of way over an aircraft waiting to take off on an intersecting runway. If all parties agree that the waiting aircraft is on the active runway, then right of way would be with the departing aircraft based on the guidance but with the landing aircraft based on the regulations. Unless an exemption exists, regulations take precedence over guidance material or operations manuals, but the contradiction is unhelpful and avoidable.

Guidance to pilots using intersecting runways

In addition to this accident, there have been numerous near collisions and similar incidents at non-controlled aerodromes involving intersecting runways and visual obstructions. This includes 2 recent examples at Mildura Airport (a certified aerodrome) involving large passenger aircraft operations.

Beyond instructing pilots to not obstruct traffic when using a secondary runway, CASA guidance on intersecting runway operations did not provide pilots with any actionable advice. However, there are various things that pilots operating at non-controlled aerodromes can do to minimise the risk of using an intersecting runway. Some, but not all non-controlled aerodromes with acknowledged visibility issues have provided additional guidance to pilots via the ERSA to help reduce this risk. This includes:

- informing pilots of potential visual obstructions between runways
- requiring pilots to broadcast their intentions before entering a runway
- requiring pilots to confirm other runways are clear (such as via two-way radio communication) prior to landing/taking off.

It is important that pilots using non-controlled aerodromes are equipped with the knowledge and skills necessary to assess and manage the risks associated with the concurrent use of multiple runways. CASA is in a position to provide guidance such as this for all pilots, rather than relying on aerodrome operators to identify and mitigate risk on a case-by-case basis.

Other factor that increased risk

The Civil Aviation Safety Authority guidance for pilots using non-controlled aerodromes did not clearly define the active runway. The guidance did not provide practical advice to pilots using a secondary runway, and in some situations, it was contrary to existing regulations. (Safety issue)

Hold point markings

When runway 06/24 was resurfaced, hold point markings on the taxiways were removed. They had not been restored at the time of the accident. As an uncertified aerodrome, there was no requirement for the runways at Caboolture to have hold point markings in place, and pilots were not required to stop prior to crossing a runway if there was no conflicting traffic. The CAC operations manual did not include any reference to hold point markings.

If hold point markings had been in place at the time of the accident, it is unclear whether they would have affected the Cessna pilot's decision to taxi across the runway without stopping. The pilot was otherwise aware that they were crossing a runway, but did not stop because they had no expectation that the runway would be in use.

Other factor that increased risk

There were no hold point markings on the taxiway crossing runway 06. Although not required at non-certified aerodromes, hold point markings can help prevent runway incursions.

Findings

ATSB investigation report findings focus on safety factors (that is, events and conditions that increase risk). Safety factors include 'contributing factors' and 'other factors that increased risk' (that is, factors that did not meet the definition of a contributing factor for this occurrence but were still considered important to include in the report for the purpose of increasing awareness and enhancing safety). In addition 'other findings' may be included to provide important information about topics other than safety factors.

Safety issues are highlighted in bold to emphasise their importance. A safety issue is a safety factor that (a) can reasonably be regarded as having the potential to adversely affect the safety of future operations, and (b) is a characteristic of an organisation or a system, rather than a characteristic of a specific individual, or characteristic of an operating environment at a specific point in time.

These findings should not be read as apportioning blame or liability to any particular organisation or individual.

From the evidence available, the following findings are made with respect to the midair collision involving Jabiru J430, VH-EDJ, and Piper PA-25-235, VH-SPA, at Caboolture Airfield, Queensland on 28 July 2023.

Contributing factors

- The Jabiru pilot likely unknowingly could not transmit or hear radio calls, and was probably not aware of the Pawnee being on final approach to runway 06 when they decided to commence take-off on runway 11.
- The Pawnee pilot did not hear an entering and/or rolling call from the Jabiru pilot, and it was not possible to establish from the available evidence whether a call was broadcast. In combination with the line of sight between them being blocked, the Pawnee pilot was therefore not aware that the Jabiru was taking off on the intersecting runway.
- The Cessna pilot did not hear the Pawnee pilot make a landing call, and had limited opportunity to be aware of traffic during taxi, due to having turned the radio volume down during pre-flight checks and not restoring it before taxi.
- Not having heard the Pawnee pilot's landing call and with most traffic using runway 11, the Cessna pilot had no expectation of an aircraft using runway 06, and taxied across the runway without stopping or looking for traffic while the Pawnee was landing. This resulted in the Pawnee commencing a go-around manoeuvre.
- A stand of trees between the intersecting runways prevented the Jabiru and Pawnee pilots from being able to observe one another from the time the Jabiru turned onto runway 11 for take-off until both aircraft had begun climbing.
- Based on the observed wind conditions at the time, and not anticipating any conflicting traffic, the Pawnee pilot elected to land on runway 06 even though all other traffic had been using runway 11.

Other factors that increased risk

- **The Caboolture Gliding Club had a regular practice of using runway 06 for some flights, including during periods of light traffic on runway 11/29. This increased the risk of collision as Caboolture was a non-controlled aerodrome relying on alerted see-and-avoid principles, and there was a stand of trees obstructing pilots' vision of intersecting runways.** (Safety issue)
- During the circuit call for turning onto the base leg, the Pawnee pilot stated that they would hold short of the runway intersection. While the Pawnee pilot did not intend other pilots to rely on it to avoid conflict, this call could have led to other pilots assuming that the intersecting runway could be safely used when there was no certainty that the Pawnee would be able to hold short.
- **The Caboolture Aero Club did not effectively manage or inform pilots of the risk presented by trees and buildings around the airfield that prevented pilots from being able to see aircraft on intersecting runways and approach paths.** (Safety issue)
- **The Civil Aviation Safety Authority guidance for pilots using non-controlled aerodromes did not clearly define the active runway. The guidance did not provide practical advice to pilots using a secondary runway, and in some situations, it was contrary to existing regulations.** (Safety issue)
- There were no hold point markings on the taxiway crossing runway 06. Although not required at non-certified aerodromes, hold point markings can help prevent runway incursions.

Safety issues and actions

Central to the ATSB's investigation of transport safety matters is the early identification of safety issues. The ATSB expects relevant organisations will address all safety issues an investigation identifies.

Depending on the level of risk of a safety issue, the extent of corrective action taken by the relevant organisation(s), or the desirability of directing a broad safety message to the Aviation industry, the ATSB may issue a formal safety recommendation or safety advisory notice as part of the final report.

All of the directly involved parties were provided with a draft report and invited to provide submissions. As part of that process, each organisation was asked to communicate what safety actions, if any, they had carried out or were planning to carry out in relation to each safety issue relevant to their organisation.

The initial public version of these safety issues and actions are provided separately on the ATSB website, to facilitate monitoring by interested parties. Where relevant, the safety issues and actions will be updated on the ATSB website as further information about safety action comes to hand.

Gliding club's use of runway 06

Safety issue description

The Caboolture Gliding Club had a regular practice of using runway 06 for some flights, including during periods of light traffic on runway 11/29. This increased the risk of collision as Caboolture was a non-controlled aerodrome relying on alerted see-and-avoid principles, and there was a stand of trees obstructing pilots' vision of intersecting runways.

Issue number:	AO-2023-036-SI-01
Issue owner:	Caboolture Gliding Club Inc
Transport function:	Aviation: General aviation
Current issue status:	Closed – Adequately addressed.
Issue status justification:	New procedures implemented by the Caboolture Aero Club, which are being followed by the Caboolture Gliding Club, should significantly reduce instances of aircraft operating simultaneously on intersecting runways.

Proactive safety action taken by *Caboolture Gliding Club*

Action number:	AO-2023-036-PSA-01
Action organisation:	Caboolture Gliding Club Inc
Action status:	Closed

In April 2025, the Caboolture Gliding Club advised that it was adhering to new rules implemented at Caboolture Airfield (see safety issue AO-2023-036-SI-03) which prohibited any simultaneous runway operations from occurring.

In addition, the club has incorporated new equipment into its ground-handling procedures which allow gliders to be more efficiently towed around the airfield. As a result, there is a reduced incentive to operate on runway 06.

Caboolture Airfield visibility hazards

Safety issue description

The Caboolture Aero Club did not effectively manage or inform pilots of the risk presented by trees and buildings around the airfield that prevented pilots from being able to see aircraft on intersecting runways and approach paths.

Issue number:	AO-2023-036-SI-03
Issue owner:	Caboolture Aero Club
Transport function:	Aviation: Airports
Current issue status:	Closed – Adequately addressed.
Issue status justification:	The new procedures implemented should significantly reduce instances of aircraft operating simultaneously on intersecting runways.

Proactive safety action taken by *Caboolture Aero Club*

Action number:	AO-2023-036-PSA-02
Action organisation:	Caboolture Aero Club
Action status:	Closed

Following the occurrence, the Caboolture Aero Club advised that runway 06/24 was closed for an extended period. It has since been reopened, but the following procedures have been implemented in the *Caboolture Airfield operations manual* (original emphasis):

> 2. NO simultaneous runway operations are permitted under any circumstances.
>
> […]
>
> 4. The change of Active Runway Procedure;
>
> Pilots requiring a change of runway due crosswind or wind direction change must communicate by radio to ALL aircraft in the circuit or taxiing, must receive confirmation or acknowledgement from ALL aircraft to accept the change. ALL aircraft in the circuit are allowed to complete the current circuit and land or depart the circuit. NO AIRCRAFT ARE TO TAKE-OFF prior to ALL aircraft in the circuit completing the landing and hearing a radio call of “Clear/Vacated” or “Departed the Circuit.”
>
> 5. A “Rolling” call must be made at the commencement of take-off.

The CAC has also communicated the procedures to members of the Caboolture Aero Club, and signs have been erected around the airfield. The CAC operations manual has been updated online to reflect these changes. The CAC has additionally submitted an ERSA update request so that these changes will be reflected in future ERSA issues.

Guidance on intersecting runways at non-controlled aerodromes

Safety issue description

The Civil Aviation Safety Authority guidance for pilots using non-controlled aerodromes did not clearly define the active runway. The guidance did not provide practical advice to

pilots using a secondary runway, and in some situations, it was contrary to existing regulations.

Issue number:	AO-2023-036-SI-04
Issue owner:	Civil Aviation Safety Authority
Transport function:	Aviation: General aviation
Current issue status:	Open – Safety action pending.

Proactive safety action taken by *the Civil Aviation Safety Authority*

Action number:	AO-2023-036-PSA-03
Action organisation:	Civil Aviation Safety Authority
Action status:	Monitor

In response to the draft ATSB investigation report, CASA advised:

> While the term 'active runway' is used in CASA guidance material as a way of referring to the runway which the majority of airport users are using at any particular time it is not a defined term in CASR. This is because while one runway might be used by the majority of airport users, it does not mean that any other runway is 'inactive'. A runway is always considered available to a pilot unless deemed to be closed or unserviceable. The runway a pilot chooses to use is determined by many factors, including but not limited to wind, operational requirements, performance calculations, aircraft limitations etc. which makes any determination of an 'active' status inherently problematic at uncontrolled aerodromes.

CASA also advised:

> The regulatory framework does not support a requirement to clearly define an active runway. Instead, the regulations require pilots to make decisions about runway usage based on the runways which are available for use at the time of operation.
>
> CASA does however acknowledge the use of the word 'active' within guidance material could create uncertainty around its use or misuse as the case may be.
>
> CASA is better articulating throughout all guidance material the factors and the safety issues which should be considered in determining runway use and to better align with the regulations and avoid confusion, removing all references of the term 'active' when associated with a runway. AC 91-10 and AC 91-14 have been reviewed and are going through document control process at the time of providing this feedback. Furthermore, CASA is reviewing the nomenclature associated with runway selection to best promote and ensure safe operations at aerodromes.

The response also stated that CASA will expand the guidance provided in the Part 91 *Acceptable means of compliance and guidance material* for regulation 91.340 to assist in the industry's understanding of this issue.

ATSB comment

The ATSB considers that the changes described by CASA in improving the guidance material and removing the term 'active' will likely adequately address this safety issue once they are implemented.

Safety action not associated with an identified safety issue

Additional safety action taken by the Caboolture Aero Club

The CAC advised that hold point markings have been restored on the taxiway across runway 06/24.

General details

Occurrence details

Date and time:	28 July 2023 – 10:32 EST	
Occurrence class:	Accident	
Occurrence categories:	Collision, Runway incursion	
Location:	Caboolture Airfield, Queensland	
	Latitude: 27.0756° S	Longitude: 152.9887° E

Aircraft 1 details

Manufacturer and model:	Amateur built aircraft Jabiru J430	
Registration:	VH-EDJ	
Serial number:	827	
Type of operation:	Part 91 General operating and flight rules-Other	
Activity:	General aviation / Recreational-Sport and pleasure flying-Pleasure and personal transport	
Departure:	Caboolture Aircraft Landing Area, QLD	
Destination:	Dirranbandi Aerodrome, QLD	
Persons on board:	Crew – 1	Passengers – 1
Injuries:	Crew – 1 fatal	Passengers – 1 fatal
Aircraft damage:	Destroyed	

Aircraft 2 details

Manufacturer and model:	Piper Aircraft Corporation PA-25-235	
Registration:	VH-SPA	
Operator:	Caboolture Gliding Club	
Serial number:	25-5008	
Type of operation:	Part 91 General operating and flight rules-Other	
Activity:	General aviation / Recreational-Sport and pleasure flying-Glider towing	
Departure:	Caboolture Aircraft Landing Area, QLD	
Destination:	Caboolture Aircraft Landing Area, QLD	
Persons on board:	Crew – 1	Passengers – 0
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Substantial	

Aircraft 3 details

Manufacturer and model:	Cessna Aircraft Company 172R	
Registration:	VH-EVR	
Operator:	Airwork Aviation	
Serial number:	17280252	
Type of operation:	Flying Training-Training Solo - (Flying Training)	
Activity:	General aviation / Recreational-Instructional flying-Instructional flying - solo	
Departure:	Caboolture Aircraft Landing Area, QLD	
Destination:	Caboolture Aircraft Landing Area, QLD	
Persons on board:	Crew – 1	Passengers – 0
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Glossary

AC	Advisory circular
ADS-B	Automatic dependent surveillance broadcast
ALA	Aircraft landing area
CAC	Caboolture Aero Club
CASA	Civil Aviation Safety Authority
CASR	Civil Aviation Safety Regulations
CGC	Caboolture Gliding Club
CTAF	Common traffic advisory frequency
ERSA	En route supplement Australia
GPS	Global positioning system
LAHSO	Land and hold short operations
MOS	Manual of standards

Sources and submissions

Sources of information

The sources of information during the investigation included:

- the Pawnee and Cessna pilots
- Airwork Aviation
- Caboolture Aero Club
- Caboolture Gliding Club
- Civil Aviation Safety Authority
- Queensland Police Service
- CTAF recordings from Caloundra Airport
- Airservices Australia
- Jabiru flight data recorder
- accident witnesses
- 16 other pilots familiar with Caboolture Airfield
- video footage of the accident flight and other photographs and videos taken on the day of the accident.

References

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Hobbs, A. (1991). *Limitations of the see-and-avoid principle*. Canberra: Australian Transport Safety Bureau.

Rosenholtz, R. (2016). Capabilities and Limitations of Peripheral Vision. *The Annual Review of Vision Science, 2,* 435-457.

Submissions

Under section 26 of the *Transport Safety Investigation Act 2003*, the ATSB may provide a draft report, on a confidential basis, to any person whom the ATSB considers appropriate. That section allows a person receiving a draft report to make submissions to the ATSB about the draft report.

A draft of this report was provided to the following directly involved parties:

- Pawnee and Cessna pilots
- Civil Aviation Safety Authority

- Caboolture Aero Club
- Caboolture Gliding Club
- Airwork Aviation.

Submissions were received from the:

- Pawnee and Cessna pilots
- Civil Aviation Safety Authority
- Caboolture Aero Club
- Caboolture Gliding Club.

The submissions were reviewed and, where considered appropriate, the text of the report was amended accordingly.

About the ATSB

The **Australian Transport Safety Bureau** is the national transport safety investigator. Established by the *Transport Safety Investigation Act 2003* (TSI Act), the ATSB is an independent statutory agency of the Australian Government and is governed by a Commission. The ATSB is entirely separate from transport regulators, policy makers and service providers.

The ATSB's function is to improve transport safety in aviation, rail and shipping through:

- the independent investigation of transport accidents and other safety occurrences
- safety data recording, analysis, and research
- influencing safety action.

The ATSB prioritises investigations that have the potential to deliver the greatest public benefit through improvements to transport safety.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, international agreements.

Purpose of safety investigations

The objective of a safety investigation is to enhance transport safety. This is done through:

- identifying safety issues and facilitating safety action to address those issues
- providing information about occurrences and their associated safety factors to facilitate learning within the transport industry.

It is not a function of the ATSB to apportion blame or provide a means for determining liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings.

At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

The ATSB does not investigate for the purpose of taking administrative, regulatory or criminal action.

About ATSB reports

ATSB investigation final reports are organised with regard to international standards or instruments, as applicable, and with ATSB procedures and guidelines.

Reports must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner

An explanation of ATSB terminology used in this report is available on the ATSB website.