



Australian Government

Australian Transport Safety Bureau

Runway excursion involving Cessna 310, VH-NXA

Lake Evella Aerodrome, Northern Territory, on 29 May 2025



ATSB Transport Safety Report

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Investigation summary

What happened

On 29 May 2025, a Cessna 310R, registered VH-NXA and operated by Marthakal Yolngu Airline, was conducting a non-scheduled passenger air transport flight from Darwin to Lake Evella, Northern Territory. On board were the pilot and 4 passengers.

During the approach at Lake Evella Aerodrome, recorded data indicated that the aircraft touched down just prior to halfway along the runway. The pilot subsequently applied braking, but the aircraft did not decelerate as expected. This resulted in a runway excursion and the aircraft subsequently collided with a perimeter fence which substantially damaged the left wing. The pilot and 4 passengers were uninjured.

What the ATSB found

The ATSB found that the pilot conducted the approach above the standard profile and crossed the threshold above the normal approach speed. This resulted in the aircraft floating during the landing flare for a prolonged period in ground effect, and a landing beyond the planned touchdown point. After the aircraft touched down, the pilot subsequently commenced braking about halfway along the runway. The long landing reduced the available distance to decelerate on the runway.

At the aircraft's landing weight, the remaining runway length should have provided sufficient stopping distance, but degraded braking capacity meant the aircraft could not be stopped before the runway end and it subsequently departed the runway.

During a scheduled maintenance event prior to the occurrence, a licensed aircraft maintenance engineer believed an apprentice had replaced the main-wheel brake pads. An inspection after the occurrence found that the right brake reservoir was empty and that the right pads were worn beyond limits, which reduced braking capacity on that side.

The ATSB also identified that the operator's procedures allowed the use of self-reported passenger weights without additional allowances, and that the electronic weight and balance system had been configured with higher maximum weights applicable to a modification not fitted to this aircraft. In combination with calculation errors on the day, this resulted in the aircraft being operated above the maximum permitted ramp and take-off weights.

What has been done as result

Marthakal Yolngu Airline advised that all references to the use of self-reported passenger weights for the purposes of weight and balance calculations will be removed in the next amendment of the operations manual.

The operator also advised that the electronic weight and balance system will be amended to reflect the correct maximum weights for VH-NXA prior to its return to service.

The safety manager briefed company personnel about the proposed changes and advised existing pilots that actual weights for passengers must be used for all flights.

The ATSB will monitor these safety actions until the proposed changes to the operations manual and weight and balance system have been formally implemented.

D & T Aircraft Engineering advised that, following the occurrence, a debrief with maintenance personnel highlighted the importance of increased vigilance during inspections conducted after maintenance tasks, and that the organisation also identified opportunities to improve internal processes following similar occurrences.

Safety message

Factors such as additional airspeed over the threshold can result in a landing beyond the intended touchdown point, increasing the risk of a runway overrun excursion. While adherence to a pre-determined stabilised approach criteria can effectively mitigate such risks, pilots should always exercise vigilance and ensure the aircraft is flown within the assumed conditions used to calculate landing performance.

Pilots are therefore encouraged to continue to actively monitor the flight path using cockpit instrumentation and external visual cues until a safe landing is assured. This should include identifying and nominating an appropriate touchdown point on the runway to ensure a go-around can be executed if a touchdown beyond this point is likely to occur.

Additionally, maintenance organisations should ensure that effective systems are in place to disseminate important information to all maintenance personnel, so that emerging defects are identified and rectified before they affect flight operations.

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The occurrence

Pre-flight preparation

On the morning of 29 May 2025, a Cessna C310R, registered VH-NXA and operated by Marthakal Yolngu Airline, was being prepared for a non-scheduled passenger air transport flight from Darwin to Lake Evella, Northern Territory.

When the pilot arrived at the airport, they observed a licensed aircraft maintenance engineer (LAME) and their apprentice performing maintenance on the aircraft braking system. During this period the pilot prepared their flight plan and when they returned to the aircraft, the LAME and the apprentice had completed the maintenance.

The pilot, who was operating their first flight as pilot in command of a multi-engine aircraft, commenced their pre-flight checks. Due to the recent work on the braking system, they taxied to an aircraft bay to conduct a static engine run-up.¹

With both engines at 1,700 RPM, they recalled that the aircraft moved forward slightly with the brakes applied. They physically increased their braking pressure, after which, the aircraft remained stationary. After completing the run-ups, the pilot taxied back to the terminal where the passengers were waiting. At this time, they also discussed the brakes with another C310 pilot who advised them that quite a lot of brake pressure was required during run-ups.

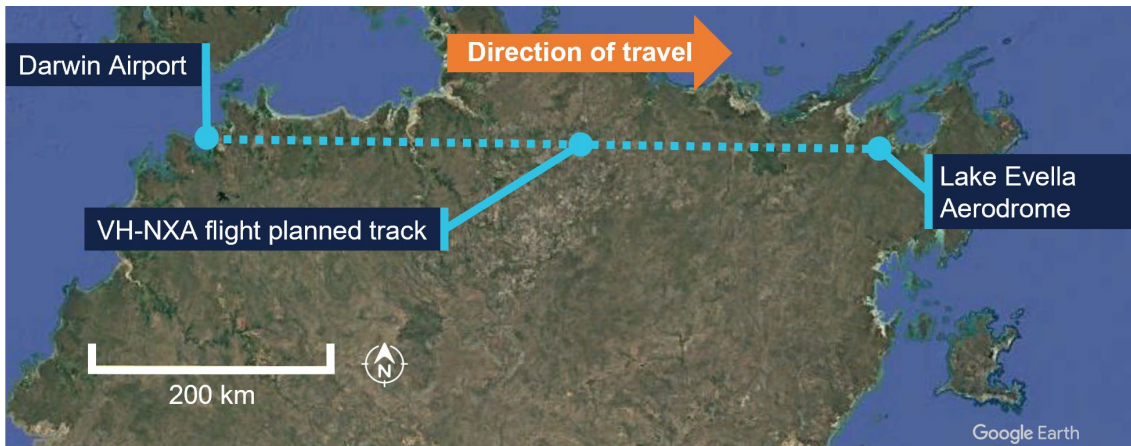
The pilot reported feeling rushed, and elected to use the self-reported passenger and baggage weights prior to boarding for weight and balance calculations, which were recorded on the manifest. These weights were entered into an electronic weight and balance system, which indicated that the planned load complied with the aircraft weight and balance limitations. The passengers were then taken to the aircraft where the pilot conducted a safety briefing before they boarded.

Occurrence flight

At 0857 local time, VH-NXA departed from Darwin Airport with the pilot and 4 passengers on board for Lake Evella (Figure 1). When approaching the Lake Evella Aerodrome, the pilot reported becoming visual with runway 08 at about 15 NM (28 km) and tracked for a straight in approach. At 1051, the aircraft was established on final approach for runway 08.

¹ Run-up: a high power run-up check is carried out in a piston-engine aircraft to check the aircraft's ignition and other systems before commencing an initial take off.

Figure 1: VH-NXA flight planned track



Source: Google Earth, annotated by the ATSB

The pilot recalled that there was a south-easterly wind between 8–10 kt for the approach, with a right crosswind component. Another pilot, who arrived at Lake Evella about 3 minutes after VH-NXA, recalled the wind was from an easterly direction at about 10 kt.

The pilot of VH-NXA recalled that the approach ‘seemed stable,’ (see *Stabilised approach criteria*) and stated that they generally used the runway threshold as their aiming point. They estimated crossing the threshold at their calculated approach speed of 90 kt or ‘just above.’

A navigational application (OzRunways)² was installed on a tablet computer and an Android phone on board the aircraft and broadcast flight data (see *Recorded information*). The OzRunways data taken from the Android phone, overlaid on a Google Earth image (Figure 2), showed the aircraft crossing the runway threshold at a height of 55 ft with a ground speed of 94 kt (Figure 2, A). The runway in Lake Evella was not equipped with visual slope guidance and the pilot relied on their visual assessment of ‘how the runway should look at certain height.’

Figure 2: VH-NXA ground speed at key points in landing sequence



Source: Google Earth, annotated by the ATSB

² OzRunways is an approved data provider for Australian pilots for flight planning and in-flight navigation.

The pilot and the passenger seated directly behind them estimated that the aircraft touched down approximately 200 m past the threshold. ATSB analysis of recorded data indicated touchdown at 1051:29 (the corrected altitude of the aircraft matched the terrain elevation of runway 08), which was 402 m past the threshold (Figure 2, B). The passenger seated in the front row beside the pilot recalled passing the taxiway immediately after touchdown (Figure 2, C).

Another pilot on the ground standing at the apron who witnessed the landing reported observing VH-NXA a few feet above the ground in the ‘flaring attitude’ about a third of the distance along the runway. They also recalled that the aircraft was travelling faster than what they thought was normal and landed just beyond the taxiway (Figure 2, C).

The pilot reported that after touchdown, they applied the brakes passing the apron area about halfway along the runway (Figure 2, C). At that point, they reported that the aircraft did not appear to be slowing as expected and the passenger in the last row recalled the aircraft passing the apron ‘very fast’.

The pilot recalled increasing their braking pressure and when they saw the end of the runway approaching, they shut both engines down by selecting the mixture controls to idle cut-off. The pilot then elected to steer the aircraft to the left of the runway centreline to increase the runway distance for the deceleration required.

The aircraft departed the left side of the runway, 118 m from the runway end (Figure 2, D) (Figure 3, inset left), while the passenger seated beside the pilot verbally prompted the passengers to ‘brace.’ Recorded data indicated the aircraft was travelling at 45 kt at this point. The left wing subsequently collided with a fencepost (Figure 2, E) (Figure 3, inset right) located 193 m from the point the aircraft departed the runway.

Figure 3: VH-NXA ground roll following runway excursion



Source: Marthakal Yolngu Airline, annotated by the ATSB

Following the collision, the aircraft came to a stop and the pilot and passengers disembarked through the right cabin door. There were no injuries to the pilot or passengers, however the aircraft sustained substantial damage (see *Post-accident inspection*).

Context

Pilot information

The pilot held a Commercial Pilot Licence (Aeroplane) issued in 2021 and a class 1 aviation medical certificate. They also held a multi-engine aircraft class rating, which was issued in 2022 and renewed with a flight training organisation on 24 May 2025.

The pilot had accumulated 1,066 hours of total aeronautical experience, which included 71 hours of multi-engine time accumulated under the supervision of an instructor.

They reported they had flown about 70 hours in the last 90 days, including a total of 11.7 hours on the Cessna C310R, which was conducted during the course of their training.

The pilot's training was conducted by a flight training organisation (FTO) in Darwin, on behalf of Marthakal Yolngu Airline. FTO training records detailed that the pilot commenced line training for the C310R on 15 May 2025.

This line training took place over 9.8 flight hours, after which they were assessed as proficient by a flight examiner during a combined line check and operator proficiency check for the C310R on 24 May.

The pilot had not operated the C310R to Lake Evella Aerodrome during the course of their training and had not operated there in any aircraft type prior to the occurrence. They reported sleeping about 8 hours the night before the occurrence and had been awake for about 7 hours at the time of the occurrence and feeling 'fully alert.'

Aircraft information

The Cessna 310R is a twin-engine, low-wing (with a wingspan of 11.3 m), 6-seat, unpressurised aircraft equipped with retractable landing gear and powered by 2 Continental IO-520 piston engines. VH-NXA was manufactured in the United States in 1978 and first registered in Australia in 1989. A maintenance organisation located in Darwin became the registration holder on 4 March 2020.

Braking system

Section 7 of the *Cessna 310R Pilots operating handbook* (POH) contained the following description of the braking system:

The airplane is provided with an independent hydraulically actuated brake system for each main wheel. A hydraulic master cylinder is attached to each pilot's rudder pedal. Hydraulic lines and hoses are routed from each master cylinder to the wheel cylinder on each brake assembly. No manual adjustment is necessary on these brakes. The brakes can be operated from either pilot's or co-pilot's pedals.

Meteorological information

The graphical area forecast and the applicable grid point wind and temperature forecast for the flight indicated:

- prevailing visibility greater than 10 km
- scattered cloud³ with bases 1,500 ft above mean sea level (AMSL)
- isolated areas of smoke reducing visibility to 5,000 m
- isolated rain showers and thunderstorms reducing visibility to 2,000 m and 1,000 m respectively, and broken cloud with bases 800 ft above AMSL
- moderate turbulence below 4,000 ft in thermals and dust/sand whirls (dust devils)
- wind 130° at 21 kt and temperature of 24°C at 1,000 ft above AMSL.

Aerodrome information

Lake Evella Aerodrome (YLEV) is situated at an elevation of 278 ft AMSL and comprised of a single sealed runway, 08/26, measuring 1,065 m in length and 18 m in width and was sloped 0.5% up toward the east. The aerodrome is uncontrolled and operated on a dedicated CTAF,⁴ and is subject to animal hazards.

Maintenance information

Aircraft maintenance manual

The *Cessna 310R Aircraft maintenance manual* (AMM) contained a troubleshooting guide to assist maintenance personnel to rectify defects relating to systems fitted to the aircraft. The section that covered the wheels and brakes included the following information (Table 1):

Table 1: Cessna 310R maintenance manual troubleshooting

Trouble	Probable Cause	Correction
Brakes fail to hold	Worn brake linings ⁵	Check for brake linings worn beyond limits. Replace linings as required
	Air in brake system	Check for air trapped in brake system. Bleed the brakes
Brakes spongy	Air in brake system	Check for air trapped in brake system. Bleed the brakes

The AMM also described the brake wear limits on the C310R, which included:

Check back plate and pressure plate linings for wear. If worn to a thickness of 0.125 to 0.100 inch, the linings should be replaced.

³ Cloud cover: in aviation, cloud cover is reported using words that denote the extent of the cover – ‘few’ indicates that up to a quarter of the sky is covered, ‘scattered’ indicates that cloud is covering between a quarter and a half of the sky, ‘broken’ indicates that more than half to almost all the sky is covered, and ‘overcast’ indicates that all the sky is covered

⁴ Common traffic advisory frequency (CTAF): A designated frequency on which pilots make positional broadcasts when operating in the vicinity of a non-controlled aerodrome or within a broadcast area.

⁵ Brake linings: brake linings, often referred to as brake pads, are the friction material that, when pressed against the brake discs, slows and stops the aircraft. Over time and with use, these linings wear down and require replacement.

Scheduled maintenance

The aircraft was flown to Darwin on 15 February 2025, where the authorising licensed aircraft maintenance engineer (LAME) planned to conduct a corrosion inspection at their maintenance facility. The LAME also performed a 'check 1' inspection, which they stated was the equivalent of a 100-hour inspection.

During the inspections, additional maintenance was conducted due to leaking brake callipers, which was common to the brakes on the C310 according to the LAME. This involved the removal, bleeding, resealing and refitting of both callipers and was performed by an apprentice. It was also the LAME's expectation that the brake pads would be replaced during this maintenance task because this was routine practice, although not in the procedure.

As part of the 100-hour inspection, the LAME performed an engine run-up and observed the aircraft did not hold under brakes at this time. Believing that they had been replaced, they believed that the new brake pads needed to be bedded or burnt in. The AMM stated 'brake burn in is required to minimize glazing of the friction surfaces' when new brakes are installed. They subsequently completed the engine run up on one engine at a time, which allowed the aircraft to remain stationary.

Following the completion of the inspections and associated maintenance tasks, including the additional work carried out on the brakes, the LAME certified the aircraft maintenance logbook on 26 May 2025.

The authorising LAME later stated that new brake pads should have been installed before the callipers were refitted to the landing gear, however they did not verify that this had occurred. They reported that the brake pads were last changed on 15 December 2023 and had 494 landings prior to the occurrence.

Pre-departure maintenance

The aircraft underwent a post-maintenance verification flight the day prior to the accident flight, with a flight instructor and the occurrence pilot as an observer. After the flight, the instructor advised the LAME by text message that the brakes felt 'spongy.'

On the morning of 29 May, prior to the accident flight, the LAME checked the aircraft brakes, reporting that they were acceptable, even though the brake pedal travel felt more than usual. The decision was made to bleed the brakes to remove any air or water in the brake lines and top up the brake fluid. With assistance from an apprentice during this process, the LAME reported that hydraulic fluid spilled onto the right tyre and was subsequently wiped down. The aircraft was then released back to service.

Post-accident inspection

Following the occurrence, the LAME inspected the aircraft at Lake Evella Aerodrome on 18 June 2025 and documented the aircraft damage. The aircraft had sustained significant damage to the left wing (Figure 4), which separated from the fuselage outboard of the left engine nacelle. The pitot tube, right tip tank, propeller and nose gear door were also damaged following the runway excursion.

Figure 4: VH-NXA damaged left wing



Source: Aircraft maintainer, annotated by the ATSB

The LAME found that the right brake reservoir was empty, with evidence of hydraulic fluid leakage on the right tyre, however stated that the right brake disc was serviceable.

They identified that the right brake pads were ‘heavily worn.’ Images supplied by the LAME also indicated the presence of hydraulic brake fluid, originating from the brake piston adjacent to the brake line (Figure 5). They also indicated that the hydraulic fluid on the tyre may have been from fluid spilling when the brakes were topped up on the morning of the occurrence flight.

Figure 5: VH-NXA right hand brake components and hydraulic brake fluid



Source: Aircraft maintainer, annotated by the ATSB

No defects were identified on the left brake system and the right brake calliper was removed and tested in Darwin by the LAME. The right brake calliper was bolted onto a brake disc with sufficient pressure applied to prevent calliper movement. After 13 days, sufficient hydraulic fluid had leaked, which allowed the calliper to be moved in relation to the brake disc. The LAME subsequently disassembled the right brake calliper and identified a ‘very small’ hydraulic fluid leak, which they did not consider was the cause of the fluid loss during the occurrence.

Operational Information

Weight and balance

The operator's standard operating procedures (SOP) stated that during the conduct of air transport operations, prior to each sector, the pilot in command must complete an aircraft load and trim sheet.

An operator-approved electronic load sheet was available to pilots for the purpose of completing weight and balance calculations in accordance with the POH weight and balance limitations.

The operator's Cessna 310R *Flight crew operating manual* (FCOM) included the following statement regarding the possible modification of company operated aircraft:

The Company operates C310R aircraft in several possible modification states, which may affect limiting weight.

The only modification listed in the FCOM that affected the weight limitations for VH-NXA was the fitment of a vortex generator (VG)⁶ kit. The FCOM also contained information relating to the fitment of the VG kit including increased weight limitations, changes to various airspeeds and stated:

If less than 84 vortex generators are in place or undamaged, the aircraft must be operated in accordance with the original AFM performance data (ie nil VGs).

Electronic weight and balance system

The electronic weight and balance system was developed by a third party to calculate the weight and balance for each flight. In the system, each aircraft was configured with a weight and moment arm⁷ when empty.

The pilot would enter the pilot and passengers' weights, their seating positions and fuel to calculate both the weight and centre of gravity of the aircraft at take-off and landing. The system was designed to alert the user if any weight and balance limitations were exceeded.

For VH-NXA, the electronic weight and balance system incorporated an increase in weight in accordance with a supplemental type certificate number for a C310R VG modification. However, the maintenance organisation that owned and maintained the aircraft stated that VH-NXA had not been fitted with the VG modification, and they were not aware of any modifications that increased the standard maximum permitted weights as prescribed in the POH.

⁶ A vortex generator installation typically offers the advantages of reduced stall speeds, reduced minimum single engine control speed (V_{mc}), improved take-off and landing performance and increased maximum take-off weight.

⁷ Moment arm: the horizontal distance from a reference datum to the centre of gravity of an item.

As a result, the weight and balance system contained the following increases to the standard POH weight limitations which were not applicable to the aircraft (Table 2):

Table 2: Cessna 310R maximum weights

POH limitation	Standard weight (kg) applicable for VH-NXA	C310R with VG kit (kg) as listed for VH-NXA
Maximum zero fuel weight	2,222	2,386
Maximum ramp weight	2,510	2,586
Maximum take-off weight	2,494	2,563
Maximum landing weight	2,449	2,449

Passenger-declared weights

The operator’s SOP stated that for the purposes of calculating the aircraft’s weight and balance, ‘passenger weights must be actual, or self-reported.’ Following the occurrence, a passenger reported that their body and baggage weights were requested without the use of a calibrated scale. The pilot did not indicate that any adjustments of additional amounts were applied to the passenger reported weights.

The CASA multi-part AC 121-05, AC 133-04 and AC 135-08 – *Passenger crew and baggage weights*, described acceptable weight calculation methods that could be defined in operating procedures. The circular stated that:

The use of actual weights is the most accurate method of maximising payload capacity. Appropriately calibrated weighing scales should be used. Actual weighing is more commonly used by Part 133 [helicopter passenger transport] and 135 [smaller aeroplane passenger transport] operators. This is, in part, due to the smaller number of passengers being carried, which makes this option less disruptive than it is for Part 121 [larger aeroplane passenger operations] operators.

Operators should have procedures to identify when passenger-declared weights are not appropriate, such as when operating close to limitations. Under these circumstances, the use of actual weights may be required to ensure limitations are not exceeded.

Passenger-declared weights have inherent inaccuracies as passengers may not know their actual weight, especially when fully dressed. An adjustment allowance should be added to any passenger-declared weight, as a factor or a fixed additional amount.

Weight and balance calculations

Following a review of documentation provided by the operator and pilot, the ATSB identified several discrepancies contained in the operational documentation from the day of the occurrence.

The passenger and baggage weights recorded in the manifest by the pilot indicated a combined weight of 387 kg. However, the corresponding load sheet indicated a combined passenger and baggage weight of 337 kg (excluding the pilot).

Additionally, the fuel plan prepared by the pilot indicated a total fuel figure of 441 kg. By comparison, the fuel figure on the load sheet was recorded as 432 kg.

Due to the identification of the combined discrepancy of 59 kg, the ATSB recalculated the aircraft’s weight and balance for the flight. This identified the following updated weights and exceedances (Table 3) prescribed in the POH for aircraft not fitted with a VG kit.

Table 3: VH-NXA calculated weights and exceedances

Item	POH weight limitation (kg)	Pilot-calculated weight (kg)	ATSB-calculated weight (kg)	ATSB-calculated exceedance (kg)
Zero fuel weight	2,222	2,087	2,137	Nil
Ramp weight	2,510	2,519	2,578	68
Take-off weight	2,494	2,510	2,569	75
Landing weight	2,449	2,339	2,367 ^[1]	Nil

[1] The re-calculated landing weight was based on pilot reported fuel remaining added to the ATSB calculated zero fuel weight.

Landing performance calculations

The operator’s SOPs stated that company aircraft are subject to the requirements of Civil Aviation Safety Regulations Part 135 Manual of Standards (MOS) with respect to take-off and landing performance requirements. Chapter 10 of the Part 135 MOS stipulated ‘that the aeroplane crosses the runway threshold at a height of 50 ft’ unless an approved short landing operation was being conducted. Additionally for landing, the FCOM stated that the reference landing approach speed (V_{ref})⁸ should be achieved at 50 ft above the landing surface.

For aeroplanes, take-off and landing distance calculations to determine maximum take-off weight or the maximum landing weight are achieved through a manual calculation using the limitations given in the POH for the specific aircraft type, taking into account:

- environmental conditions
- runway length.

The FCOM also required pilots to apply landing distance factoring of 1.20 for all calculations. The pilot stated they had calculated their landing performance based on the aircraft’s maximum landing weight and calculated a factored landing distance of 680 m on the flight plan with a V_{ref} of 90 kt for their landing at Lake Evella.

Calculations using the ATSB recalculated landing weight and the estimated ambient conditions at the time of the occurrence determined that the required landing distance (with the 1.20 factoring) with a 50 ft threshold crossing height was 659 m. This figure included a landing ground roll distance of 195 m and a corresponding V_{ref} of 91 kt.

Stabilised approach criteria

The SOPs stated that, ‘unless the aircraft meets stabilised approach criteria at the specified altitude, a missed approach must be executed.’

A stabilised approach was described in the SOPs as an approach to land that met a number of criteria by 300 ft above the runway during a visual approach. These included the following:

- the aircraft is on the correct flight path
- only small changes in heading & pitch are required to maintain the correct flight path

⁸ Reference Landing Approach Speed: The airspeed used on approach down to 50 ft above the runway when determining landing distances which is normally 1.3 times the stall speed.

- the aircraft speed is V_{ref} to $V_{ref} + 20$ kt
- sink rate is not greater than 1,000 fpm or pre-briefed limits.

Recorded information

The pilot used a flight planning application (OzRunways) on an iPad and an Android phone for en route flight planning and navigation. The flight planning software provider was an approved source of electronic aeronautical charts, however the application could not be used as a primary means of GPS-based navigation as the iPad and Android phone GPS did not meet certification for aviation use. The pilot reported that the iPad was placed on the floor for the approach while the Android phone was in their chest pocket. By examining the combination of groundspeed and derived deceleration data, in addition to the best direct line of sight to satellites, it was assessed that the Android data had the highest positional accuracy.

The recorded data had limitations due to an altitude resolution of 100 ft, while filtering and adjustments were also applied to smooth the data and are known to affect the accuracy of small sections. Additionally, the altitude data of VH-NXA was corrected to match the terrain elevation during the landing ground roll (Figure 6).

Based upon the operator's stabilised approach criteria, the decision to continue the approach, or conduct a go-around, became applicable by the time the aircraft reached 300 ft above the runway.

The following recorded parameters were observed from below 300 ft to the threshold:

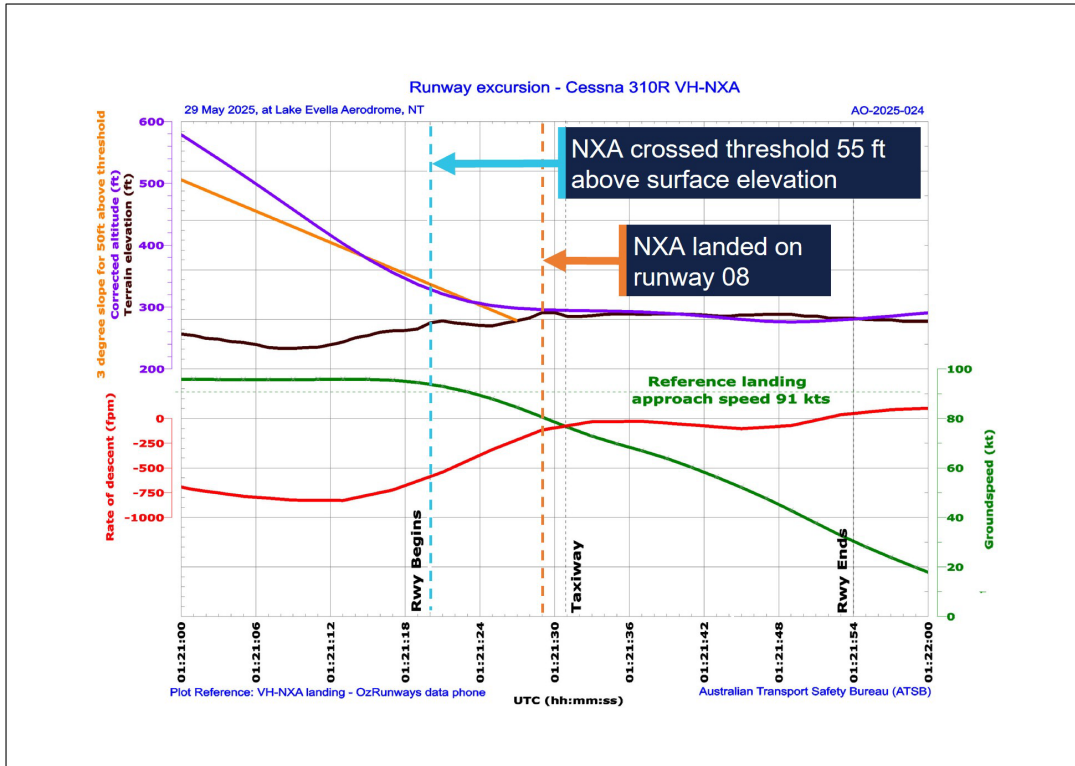
- the aircraft crossed the threshold of runway 08 at a height of 55 ft
- aircraft speed remained within V_{ref} to $V_{ref} + 20$ kt
- sink rate (vertical speed) less than 1,000 fpm.

The recorded data indicated (purple line in Figure 6) that at the 300 ft (578 ft corrected altitude) stabilised approach gate, the aircraft was about 42 ft above the normal 3 degree slope (orange line), and remained above it until reaching 104 ft above the aerodrome elevation. During this period, the sink rate exceeded 800 fpm for 8 consecutive seconds between 1051:06 and 1051:14 local time.

At 1051:20, the aircraft crossed the threshold with a groundspeed of 94 kt. The pilot reported the wind component during the approach was a south-easterly wind between 8–10 kt, which would have resulted in a 3–4 kt headwind component. Accordingly, the aircraft's airspeed was likely around 97–98 kt as it crossed the runway threshold, which was 6–7 kt above the V_{ref} of 91 kt.

At 1051:29, the corrected altitude of the aircraft matched the terrain elevation, which indicated that the aircraft landed 402 m along the runway with a groundspeed of 81 kt. The pilot reported applying brakes as the aircraft passed the apron area, which occurred about 2 seconds after touchdown. Following a ground roll distance of about 540 m, the aircraft decelerated to a groundspeed of 45 kt when it vacated the left side of the runway at 1051:48.

Figure 6: VH-NXA approach and landing



All times are coordinated universal time (UTC). Local time was Central Standard Time (CST), which was UTC +9 hours and 30 minutes. The aerodrome elevation is 278 ft. Source: ATSB, data provided by OzRunways and Google Earth

Related occurrences

ATSB investigation [AO-2024-056](#)

On 2 November 2024, a GippsAero GA8-TC Airvan, was being used to conduct a scenic flight from Whitsunday Airport (Shute Harbour), Queensland. During the landing the aircraft departed the upwind end of the runway before entering marshy ground and coming to a stop in a ditch.

The ATSB investigation identified that the aircraft's approach was above profile with a high airspeed and the pilot had an incorrect understanding of the required approach speed. Subsequently, the pilot did not initiate a go-around, resulting in a landing beyond the planned touchdown point. The ATSB also identified that the operator's weight and balance system used an incorrect empty weight moment arm to calculate the aircraft's centre of gravity, and passengers were not weighed in accordance with its procedures.

Safety analysis

On the morning of 29 May 2025, a Cessna 310R, registered VH-NXA, was being operated by Marthakal Yolngu Airline on a non-scheduled air transport flight from Darwin to Lake Evella, Northern Territory, with a pilot and 4 passengers on board.

During a straight-in visual approach, without visual slope guidance to runway 08 at Lake Evella, the pilot assessed that the approach was stable and continued with the landing. After the aircraft crossed the runway threshold, it floated for a prolonged period and subsequently landed before reaching a taxiway located about halfway along the runway.

When the pilot applied braking passing the airport's apron area, the aircraft did not decelerate as expected. The aircraft subsequently overran the runway and collided with a fence. The pilot and passengers were uninjured, however, the aircraft sustained substantial damage.

This analysis examines how the condition of the aircraft braking system, and the conduct of the approach and landing, contributed to the runway excursion. It also explores the operator's self-reported passenger weight procedures and electronic weight and balance system, and how the latter, in combination with incorrect pre-flight weight calculations, led to the aircraft being operated above the weight limits specified in the pilot's operating handbook.

Pre-flight maintenance

Maintenance which was completed on the aircraft 3 days before the occurrence involved numerous concurrent tasks. These were conducted by a licensed aircraft maintenance engineer (LAME) with the assistance of an apprentice. One of the tasks involved the apprentice conducting maintenance on the braking system due to leaking brake callipers. It was the LAME's expectation that the apprentice had replaced the main wheel brake pads during this maintenance task.

This expectation influenced their assessment that the aircraft rolled forward during post-maintenance engine run-ups, due to the new brakes requiring 'burning in.' In this case, a physical verification of the brake pads was not conducted as a result.

On the morning of the occurrence, the LAME carried out corrective maintenance in response to the flight instructor text message report of 'spongy brakes' the day prior. While the occurrence pilot was aware of this report, they were not aware of the LAME's experience with the aircraft rolling forward during the engine run-up.

When the pilot commenced the pre-flight engine run-up for the occurrence flight, the brakes failed to keep the aircraft stationary. The pilot physically increased the brake pressure and successfully kept the aircraft stationary, but did not advise maintenance personnel. The pilot's limited experience on multi-engine aircraft led them to consider that this might be normal, which was reinforced during a brief discussion with another Cessna 310 pilot.

Gaps in communication and incorrect assumptions allowed a latent defect to persist into operation, contributing to the runway overrun in this occurrence.

Contributing factor

The certifying licensed aircraft maintenance engineer did not verify that the brake pads had been replaced by an apprentice during scheduled maintenance, which resulted in the aircraft being returned to service with worn brake pads on the right brake system.

Approach

Lake Evella Aerodrome was not equipped with visual slope guidance, and as a result, the pilot relied on their assessment of visual cues of the runway itself to assess whether they were on the correct approach path while they typically used the runway threshold as their aiming point.

Recorded data from the pilot’s Android phone indicated that the aircraft was higher than the usual 3 degree ‘correct flight path’. The rate of descent exceeded 800 fpm for a period of 8 consecutive seconds until the aircraft descended below 140 ft relative to the runway. At the time, the pilot recalled the approach ‘seemed stable,’ while the operator’s stable approach criteria permitted rates of descent up to 1,000 fpm.

The aircraft subsequently crossed the threshold of runway 08 at a height of 55 ft with a ground speed of 94 kt. ATSB analysis concluded that the aircraft’s airspeed was likely 6–7 kt above the V_{ref} for the recalculated landing weight 91 kt.

When the aircraft neared the point of touchdown, it was subjected to ground effect, which meant that excess airspeed at the point of flare would result in a considerable float distance due to the reduction in drag and lack of power-off deceleration in ground effect (Federal Aviation Administration, 2023).

Additionally, landing distances provided in the aircraft flight manual are based on the aircraft achieving V_{ref} (plus wind and gust additives) at 50 ft above the runway surface. As a result, any additional airspeed will result in a later touchdown and reduce the remaining landing distance available (Federal Aviation Administration, 2023).

In this case, the additional airspeed crossing the threshold likely resulted in a prolonged float in ground effect. This resulted in the aircraft touching down 402 m beyond the runway threshold which was the pilot’s usual aiming point. Subsequently, the pilot applied braking about 2 seconds after the touchdown, at which point, there was about 585 m of remaining distance available to decelerate on the runway.

Contributing factor

The pilot conducted the approach above the standard profile and crossed the threshold above the normal approach speed. This resulted in a landing beyond the planned touchdown point, and the pilot applied braking about halfway along the runway, which reduced the available distance to decelerate on the runway.

Excursion

The pilot first became aware of an issue with the braking system when they applied brake pressure during the landing roll with about 585 m of runway remaining. Witness accounts recalled the aircraft was travelling at high speed as it passed the taxiway and apron area without any significant deceleration. Additionally, recorded data showed the aircraft only slowed from 81 kt at touchdown to 45 kt when it vacated the left side of the runway following a ground roll distance of about 540 m.

At the aircraft's landing weight, the ATSB calculated ground roll distance required was 195 m, which was sufficient to bring the aircraft to a stop within the remaining length of the runway had the brakes been functioning correctly. However, the loss of hydraulic brake fluid and the worn brake pads on the right-hand brake reduced the available braking capacity. As a result, the braking capacity was insufficient to arrest the aircraft's forward momentum before the end of the runway. The pilot attempted to increase the available stopping distance by steering left and departing the runway, however it was insufficient, and the aircraft subsequently collided with the perimeter fence.

Contributing factor

Due to the worn right brake pad and the lack of hydraulic fluid in the right brake system, there was insufficient braking capacity available to prevent a runway overrun following the landing and the application of brakes about halfway along the runway.

Passenger weights

The operator's exposition permitted the use of self-reported passenger weights for weight and balance calculations, without requiring the application of additional allowances or validation. This practice introduced errors into the weight and balance data used for pre-flight planning.

Research has found that people tend to underestimate the weights of themselves and others. Further, people are less accurate at estimating the weight of others than they are of themselves.⁹ To cater for the variation in weight, it is recommended that operators weigh passengers or apply adjustment factors to self-reported values (Civil Aviation Safety Authority, 2025). In contrast, the operator's reliance on unadjusted self-reported passenger and carry-on baggage weights provided no systematic mitigation for potential inaccuracies, which increased the likelihood that the aircraft would be operated overweight or at centre of gravity limits outside the manufacturer's requirements.

Other factor that increased risk

Marthakal Yolngu Airline's procedures did not require that additional allowances were applied when using self-reported passenger weights for weight and balance calculations. (Safety issue)

⁹ For example, see Ramos and others (2009), Reed and Price (1998), Sahyoun and others (2008) and Shapiro and Anderson (2003).

Electronic weight and balance

The operator used an electronic weight and balance system to calculate aircraft loading data for each aircraft in operation. In that electronic system, VH-NXA had been configured with the higher maximum weight limits applicable to aircraft fitted with a vortex generator (VG) modification. However, the aircraft did not have the specified modification installed. Consequently, the programmed maximum zero-fuel, ramp and take-off and weights in the system exceeded those authorised in the aircraft's POH.

This configuration error meant the electronic weight and balance system allowed VH-NXA to be loaded in excess of the certified weight limitations, while still indicating that the loading complied with those limitations. This created an ongoing risk that the aircraft could be operated above the approved maximum weights.

Other factor that increased risk

Marthakal Yolngu Airline's electronic weight and balance system used incorrect maximum weights for the aircraft, which increased the risk of flight crew operating the aircraft above the certified weight limitations. (Safety issue)

Weight exceedances

During the occurrence flight, the aircraft was operated above the certified maximum ramp and take-off weights due to cumulative errors in the pilot's weight and balance calculations. As a result of the configuration errors in the electronic weight and balance system, no alert to the overweight condition was made.

The pilot, who was conducting their first multi-engine command flight, reported feeling rushed during pre-flight preparation, which likely reduced the opportunity for careful verification of passenger weights, totals and data entry. Review of the weight and balance documentation from the occurrence identified multiple inaccuracies, indicating that the overweight condition arose from a breakdown in the usual cross-checking processes rather than a single isolated error.

Although the overweight condition did not result in the aircraft exceeding its maximum landing weight, operating above certified weight limits is known to increase take-off and landing distances and degrade braking performance. Additionally, excessive weight reduces the available safety margin if an in-flight emergency condition should arise (Federal Aviation Administration, 2016).

Other factor that increased risk

The aircraft was operated overweight due to incorrect weight and balance calculations, as well as errors in the electronic weight and balance system.

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 runway excursion involving Cessna 310, VH-NXA, at Lake Evella Aerodrome, Northern Territory, on 29 May 2025.

Contributing factors

- The certifying licensed aircraft maintenance engineer did not verify that the brake pads had been replaced by an apprentice during scheduled maintenance, which resulted in the aircraft being returned to service with worn brake pads on the right brake system.
- The pilot conducted the approach above the standard profile and crossed the threshold above the normal approach speed. This resulted in a landing beyond the planned touchdown point, and the pilot applied braking about halfway along the runway, which reduced the available distance to decelerate on the runway.
- Due to the worn right brake pad and the lack of hydraulic fluid in the right brake system, there was insufficient braking capacity available to prevent a runway overrun following the landing and the application of brakes about halfway along the runway.

Other factors that increased risk

- **Marthakal Yolngu Airline’s procedures did not require that additional allowances were applied when using self-reported passenger weights for weight and balance calculations.** (Safety issue)
- **Marthakal Yolngu Airline’s electronic weight and balance system used incorrect maximum weights for the aircraft, which increased the risk of flight crew operating the aircraft above the certified weight limitations.** (Safety issue)
- The aircraft was operated overweight due to incorrect weight and balance calculations, as well as errors in the electronic weight and balance system.

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.

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

Self-reported passenger weights

Safety issue description

Marthakal Yolngu Airline’s procedures did not require that additional allowances were applied when using self-reported passenger weights for weight and balance calculations.

Issue number:	AO-2025-024-SI-01
Issue owner:	Marthakal Yolngu Airline
Transport function:	Aviation: Air transport
Current issue status:	Open – Safety action pending
Issue status justification:	To be advised

Proactive safety action taken by Marthakal Yolngu Airline

Action number:	AO-2025-024-PSA-01
Action organisation:	Marthakal Yolngu Airline
Action status:	Monitor

Marthakal Yolngu Airline advised that all references to the use of self-reported passenger weights for the purposes of weight and balance calculations will be removed in the next amendment of the operations manual and that all passenger weights must be actual weights. Additionally, Marthakal Yolngu Airline provided the ATSB with a copy of meeting minutes that documented a briefing from the safety manager to all company personnel conducted on 9 February 2026. During the briefing, the safety manager outlined the proposed changes to the operations manual and advised pilots that actual passenger weights are required to be used for all flights.

ATSB comment

The ATSB welcomes Marthakal Yolngu Airline’s proposal to remove all references regarding the use of self-reported passenger weights for the purposes of weight and balance calculations from its operations manual. The ATSB will continue to monitor the

safety issue until documented evidence of the implementation of proposed safety action has been provided.

Weight and balance system

Safety issue description

Marthakal Yolngu Airline’s electronic weight and balance system used incorrect maximum weights for the aircraft, which increased the risk of flight crew operating the aircraft above the certified weight limitations.

Issue number:	AO-2025-024-SI-02
Issue owner:	Marthakal Yolngu Airline
Transport function:	Aviation: Air transport
Current issue status:	Open – Safety action pending
Issue status justification:	To be advised

Proactive safety action taken by Marthakal Yolngu Airline

Action number:	AO-2025-024-PSA-02
Action organisation:	Marthakal Yolngu Airline
Action status:	Monitor

Marthakal Yolngu Airline advised that the electronic weight and balance system will be amended to reflect the correct maximum weights for VH-NXA prior to its return to service. Additionally, Marthakal Yolngu Airline provided the ATSB with a copy of meeting minutes that documented a briefing from the safety manager to all company personnel conducted on 9 February 2026. During the briefing, the safety manager addressed the discrepancies in the electronic weight and balance system and recorded an audit of the system as a follow-up action item.

ATSB comment

The ATSB welcomes Marthakal Yolngu Airline’s proposal to correct the maximum weights for VH-NXA contained in the weight and balance system prior to its return to service and will continue to monitor the safety issue until documented evidence of the implementation of the proposed safety action has been provided.

Safety action not associated with an identified safety issue

Whether or not the ATSB identifies safety issues in the course of an investigation, relevant organisations may proactively initiate safety action in order to reduce their safety risk. The ATSB has been advised of the following proactive safety action in response to this occurrence.

Additional safety action by D & T Aircraft Engineering

D & T Aircraft Engineering advised that, following this occurrence, a debriefing was conducted with maintenance personnel to discuss key learnings. It was acknowledged

that increased vigilance would be exercised in the future to ensure that aircraft components are carefully inspected and confirmed to be in a serviceable condition following the completion of maintenance tasks. Additionally, the organisation stated that it would prioritise accessing the aircraft at the earliest opportunity in the future to assist in identifying potential causes of component failure, particularly in cases where perishable evidence plays a critical role in determining the cause.

General details

Occurrence details

Date and time:	29 May 2025 – 10:52 AUS Central Standard Time	
Occurrence class:	Accident	
Occurrence categories:	Runway excursion, Loading related, Landing gear / Indication	
Location:	Lake Evella Aerodrome	
	Latitude: 12.4989° S	Longitude: 135.8058° E

Aircraft details

Manufacturer and model:	Cessna Aircraft Company 310R	
Registration:	VH-NXA	
Operator:	Marthakal Yolngu Airline Pty Ltd	
Serial number:	310R1324	
Type of operation:	Part 135 Australian air transport operations - Smaller aeroplanes - Standard Part 135	
Activity:	Commercial air transport - Non-scheduled - Passenger transport charters	
Departure:	Darwin Airport, Northern Territory	
Destination:	Lake Evella Aerodrome, Northern Territory	
Persons on board:	Crew – 1	Passengers – 4
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Substantial	

Glossary

AFM	Aircraft flight manual
AMM	Aircraft maintenance manual
AMSL	Above mean sea level
CASA	Civil Aviation Safety Authority
FCOM	Flight crew operating manual
FTO	Flight training organisation
LAME	Licensed aircraft maintenance engineer
MOS	Manual of Standards
POH	Pilots operating handbook
RPM	Revolutions per minute
SOP	Standard operating procedures
VG	Vortex generator
VMC	Visual meteorological conditions
V _{REF}	Reference landing approach speed

Sources and submissions

Sources of information

The sources of information during the investigation included:

- pilot of the accident flight
- the operator
- the flight training organisation
- maintenance organisation
- Civil Aviation Safety Authority
- Bureau of Meteorology
- accident witnesses
- OzRunways.

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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:

- pilot of the accident flight
- the operator
- maintenance organisation
- Civil Aviation Safety Authority
- Bureau of Meteorology.

Submissions were received from:

- pilot of the accident flight
- the operator maintenance organisation
- Bureau of Meteorology.

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 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](#).