



Australian Government

Australian Transport Safety Bureau

Collision with terrain involving Robinson R22 Beta II helicopter, VH-HKC

87 km north of Hughenden Aerodrome, Queensland, 11 February 2021

ATSB Transport Safety Report

Aviation Occurrence Investigation (Short)

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Addendum

Page	Change	Date

Executive summary

What happened

On the evening of 11 February 2021, the pilot of a Robinson R22 Beta II helicopter, registered VH-HKC was conducting a private flight near his property, 110 km NNW of Hughenden, Queensland. During the flight, the weather conditions in the direction of his return to the homestead deteriorated. While avoiding weather, the pilot landed at an adjacent property to refuel and obtain directions. The pilot however continued flying away from their homestead arriving at another station about 24 minutes later. After refuelling, and 5 minutes prior to last light in dark night conditions, the pilot departed in a northerly direction. When the helicopter became overdue and unable to be contacted, a search for the helicopter was commenced. The following morning, the pilot was found fatally injured and the helicopter destroyed adjacent to an unsealed road 36 km from their Reedy Springs station.

What the ATSB found

The ATSB found that the pilot of VH-HKC, who did not hold a night visual flight rules (VFR) rating, instrument rating or had night flying experience, continued flying towards his destination in a remote area after last light.

Planning, operational and navigational decisions made by the pilot before and during the flight did not adequately address the risk of visual flight into dark night conditions. Notably, the pilot had a number of opportunities to discontinue the flight before last light when he refuelled his helicopter at other stations in the area.

The pilot continued flying through the period of civil twilight into astronomical twilight then, in dark night conditions and without local ground lighting, inadvertently allowed the VFR-only equipped helicopter to descend into terrain.

The ATSB found that the pilot likely navigated at low-level over a sealed road in poor light conditions which likely resulted in the helicopter contacting a powerline. Failure of the powerline resulted in a loss of ground lighting in the direction of flight. Then, shortly after turning onto an unsealed road in overcast, moonless conditions the helicopter departed the road after a bend in the road before flying over open grassland and colliding with trees and terrain in a left bank, nose-down attitude.

Safety message

This accident highlighted the inherent high risk of night flying in remote areas due to the absence or degradation of the visual references for establishing an aircraft's attitude and position. This risk is increased when night flying is attempted by pilots without night VFR or instrument flying qualifications. To avoid disorientation and the possibility of loss of control of their aircraft, day VFR pilots need to plan to arrive at their destination at least 10 minutes before last light and to have a realistic alternate plan if it becomes apparent that an intended flight cannot be completed in daylight.

The ATSB has previously published material as part of safety publication [Avoidable Accidents No 7 - Visual flight at night accidents](#). The information contained in this document and supporting material is reiterated on release of this report.

The investigation

Decisions regarding the scope of an investigation are based on many factors, including the level of safety benefit likely to be obtained from an investigation and the associated resources required. For this occurrence, a limited-scope investigation was conducted in order to produce a short investigation report, and allow for greater industry awareness of findings that affect safety and potential learning opportunities.

The occurrence

On the morning of the accident, 11 February 2021, the pilot was briefly visited at their Reedy Springs homestead, Queensland, by close family members who were moving cattle by truck to an adjacent property. They advised that they may visit again later during their return journey if time allowed, although stormy weather in the area might prevent this. At 1600 Eastern Standard Time¹ the pilot started getting anxious when his family members had not arrived at the station as expected.

Departure from Reedy Springs Station

The weather in the area was reported as overcast with occasional showers. At 1715, during a clearing in the weather, the pilot departed the homestead in their Robinson R22 Beta II helicopter, VH-HKC, to search in an area near Cargoon Station, about 23 km east of the Reedy Springs homestead. The pilot was reported as leaving the homestead in a hurry.

Flight to Camden Park Station

At 1827, VH-HKC arrived at Camden Park Station, which is 35 km west-south-west of Cargoon and 18 km south-west of Reedy Springs.

On arrival at Camden Park Station, the pilot flew at low level over the entrance road towards the homestead, landing beneath a powerline (Figure 1). The pilot advised the owner he was lost, looking for Reedy Springs and that the helicopter's low fuel² light was on.

¹ Eastern Standard Time (EST) was Coordinated Universal Time (UTC) + 10 Hours

² The low fuel light illuminated when there was 10 litres of fuel remaining

Figure 1: Photo from 1829 EST - VH-HKC and pilot following arrival at Camden Park Station, property powerline indicated and southerly cloud conditions visible



Source: Camden Park Station owner, modified by the ATSB

The owner of Camden Park assisted the pilot to refuel the helicopter to full and provided directions for return to Reedy Springs to the north. The pilot appeared confused, disoriented and ‘bushed’ and appeared to not believe the directions provided. The owner offered to contact the pilot’s son at Pretty Plains Station³ to confirm the directions, the pilot responded that he would be fine and not to worry about it. The helicopter departed Camden Park at about 1835 and headed south towards Hughenden, the direction described as a line of dark, low cloud by the Camden Park owner (Figure 1). Following VH-HKC’s departure the owner rang both the pilot’s spouse at Reedy Springs and a son who lived at Pretty Plains advising of the situation. The son, also a Robinson R22 pilot advised they couldn’t depart to try to find their father since it was raining at Pretty Plains (Figure 2).

Flight to Wongalee Station

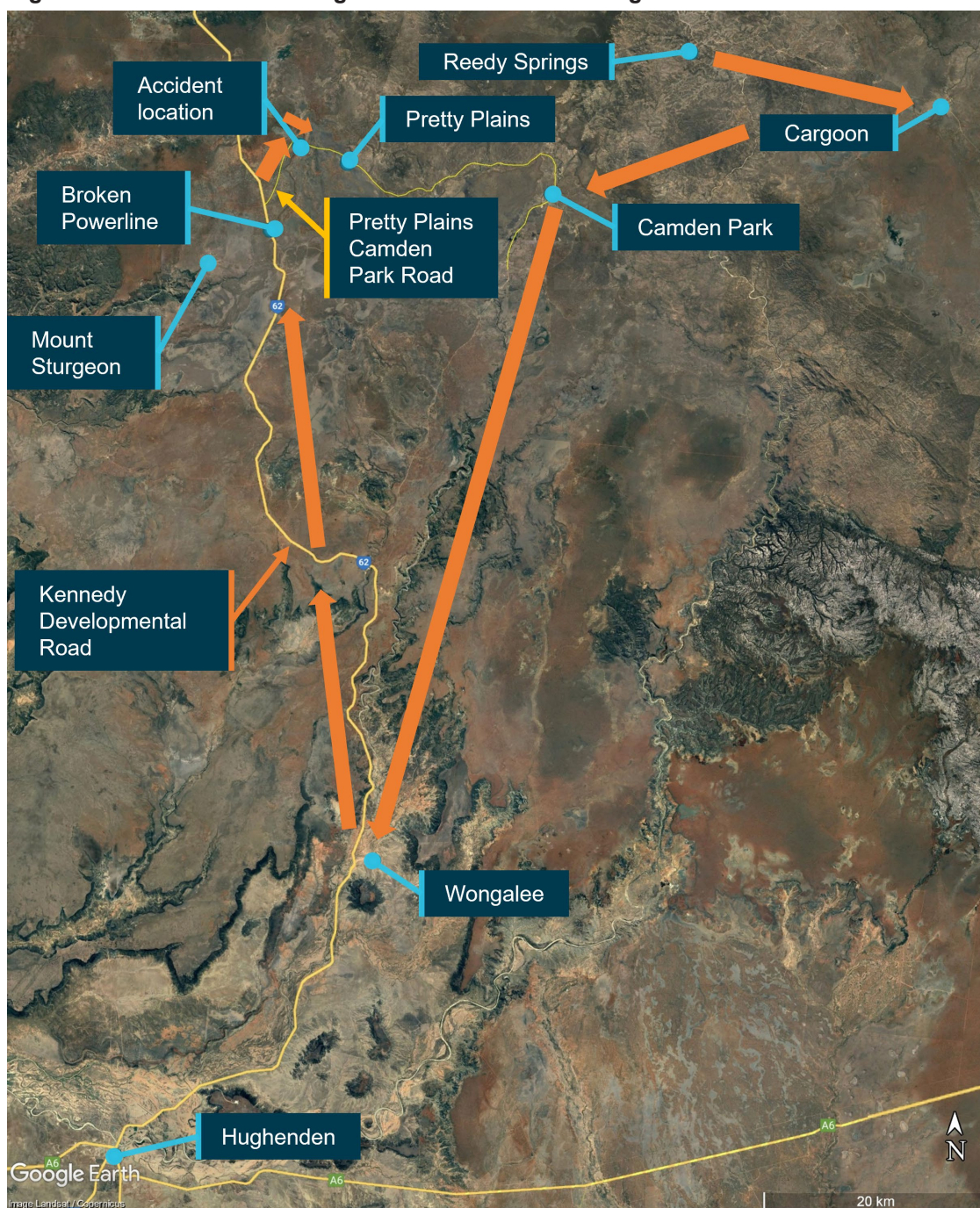
At 1910, VH-HKC arrived at Wongalee⁴ Station about 61 km south of Camden Park. The average ground speed in a direct line from Camden Park was calculated to be about 58 kt (106 km/h). The

³ Pretty Plains Station was the residence of a son of the pilot

⁴ Wongalee Station, subject to building works at the time of the accident was the residence of another son of the pilot

pilot spoke to a building contractor working at the property saying he had been avoiding storms and landing at stations. The pilot asked the contractor if it was Wongalee Station. When confirmed, the pilot flew to the hangar and was assisted to refuel the helicopter.⁵ The contractor, unaware of the pilot's intended destination, offered the pilot a meal and overnight accommodation. The pilot declined. The contractor observed that the pilot was disoriented although not anxious. At about 1920, after refuelling, VH-HKC departed Wongalee to the north in the direction of a storm (Figure 2).

Figure 2: VH-HKC accident flight - known locations and general direction of travel



Source: Google Earth, modified by the ATSB

⁵ This required 15-20 litres of Avgas to fill the tanks which was done with the engine running

Flight over Kennedy Developmental Road – Collision with powerline

Kennedy Developmental Road (Highway 62) was a remote unlit road heading north from Wongalee Station (Figure 2), recently sealed with side and centreline markings (Figure 3). The road was described by the contractor at Wongalee Station as not a busy road. The road was unlit.

Ergon Energy reported that at about 1954 EST, a high voltage powerline,⁶ strung 6.8 m above the Kennedy Developmental Road (KDR),⁷ 68 km north of Wongalee Station by road, was tripped. The poles supporting the wire on either side of the road were found bent towards the north and inwards with the easterly pole snapped near the base. The 3-strand single wire was broken directly above the road (Figure 3). The break in the line resulted in loss of power to nearby Mount Sturgeon and Pretty Plains Stations. This meant exterior and station lighting in the area was then not available to assist the pilot of VH-HKC.

Based on the nature and location of the wirestrike and accident location it was very likely that the pilot was initially flying above the sealed Kennedy Developmental Road (marked with a centreline and sidelines) then the unsealed Pretty Plains to Camden Park Road and using these roads for navigation to his intended destination. Both of these roads were in a remote rural area and not illuminated by street lighting.

Figure 3: Powerline above the Kennedy Developmental Road showing location of break and direction of supporting pole movement



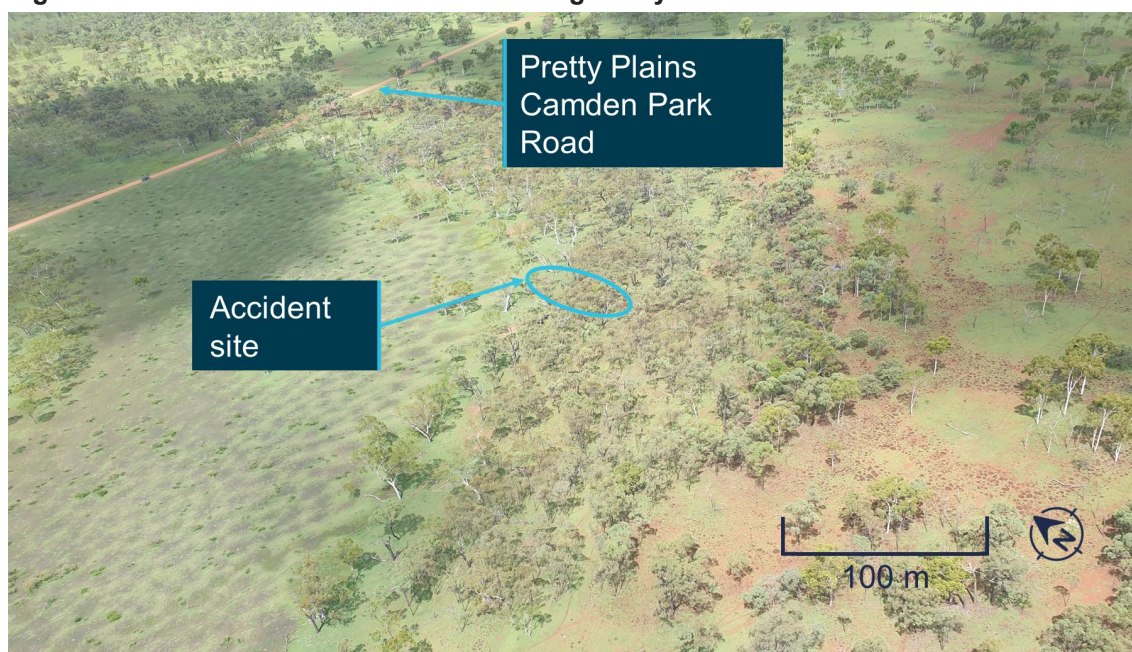
Source: Queensland Police Service, modified by ATSB

Search and rescue - Collision with terrain

When VH-HKC did not arrive at Pretty Plains or Reedy Springs that evening, search and rescue authorities were alerted. The helicopter was located the following morning, 8 km north-east of the broken powerline and 160 m south of the unsealed Pretty Plains Camden Park Road (Figure 4). This location was 11 km by road from the powerline break and 4.5 km west of the Pretty Plains homestead. The pilot was fatally injured and the helicopter was destroyed.

⁶ The tripped powerline was a 19.1 kV single-wire earth return (SWER) transmission line supplying single-phase electrical power to homesteads in the area including Mt Sturgeon, Pretty Plains and Camden Park Stations. This event was recorded and reported by Ergon Energy

⁷ Locally known as Hann Highway with sealing and line marking of the road (from The Lynd to Hughenden) completed in 2017 under the Federal Government Northern Australia Roads Program

Figure 4: Aerial view of accident site showing Pretty Plains Camden Park Road

Source: Queensland Police Service, modified by ATSB

Context

Pilot information

Qualifications and experience

The flight was conducted as a private category operation under the visual flight rules (VFR).⁸ The pilot held a Civil Aviation Safety Authority (CASA) Private Pilot Licence (Aeroplane) that was first issued in 1960. This license was converted to Part 61 on 29 January 2020. The pilot was not rated for instrument flying or night VFR operations.

The pilot's family reported that he had undertaken pre-license helicopter training in Cairns many years ago, however, the pilot's license was not endorsed for helicopter operations.

The pilot had owned and operated two helicopters and had been flying helicopters for over 40 years. As the sole owner and pilot of VH-HKC, he had accrued flying time of 1,870.2 hours since 2006.

Recent history

The pilot flew VH-HKC almost exclusively over his Reedy Springs property using the helicopter for mustering cattle, attending to fences and water infrastructure maintenance. The only time the pilot left the property was for helicopter maintenance at Charters Towers.

Medical information

The pilot held a Class 2 medical valid until 19 July 2021, and his most recent aviation medical examination was on 15 July 2019. Restrictions on the certificate were for distance vision correction to be worn and reading correction to be available.

The pilot was described as a very fit and aware 82-year-old. The pilot had well-managed Crohn's disease and had recently developed asthma following a chest infection. The pilot used medication for treatment of the condition as well as an asthma reliever and preventer.

⁸ Visual flight rules (VFR) are a set of regulations which allow a pilot to only operate an aircraft in weather conditions generally clear enough to allow the pilot to see where the aircraft is going.

The witness at Wongalee Station observed the pilot as ‘not puffing or panting’ on the day of the accident. The pilot’s glasses and a Ventolin (asthma) inhaler were located at the accident site.

The pilot’s autopsy identified that salbutamol (Ventolin) was not detected in the toxicology examination. In response to a suggestion that the pilot may have suffered an asthma attack prior to the accident the autopsy reported ‘there were...no features that could confirm a serious acute exacerbation of asthma.’

In response to a concern on whether a recent head injury whilst shopping in Charters Towers (described below) potentially contributed to the circumstances of his death, it was reported that ‘there were no features of significant recent (pre-crash) head injury identified at autopsy, although...difficult to completely exclude subtle pre-existing head injury’.

Events prior to the accident flight

In the two weeks leading up to the accident the pilot was in Townsville, Queensland. On 10 February 2021, the day before the accident, the pilot travelled about 350 km by road from Townsville to his homestead at Reedy Springs cattle station. During the journey, the pilot visited a Charters Towers hardware store. At about 1342, closed circuit television video footage recorded the pilot falling backwards to the ground when attempting to dismount from the tray of a utility vehicle. The pilot stood up from the fall within 10 seconds, before briefly talking to another customer and driving from the carpark. The pilot arrived at Reedy Springs at 1600 and reported he had lost balance on the utility vehicle and fell backwards onto concrete. He reported hitting the back of his head on the tyre of an adjacent vehicle in the carpark but did not have a lump on their head. After unpacking the vehicle, the pilot had a 30-minute rest before dinner at 1900. The pilot retired at about 2130 and had a normal night’s sleep.

On the day of the accident, the pilot woke about 0600 and then had a normal day, working around the Reedy Springs homestead eating both morning tea and lunch.

Aircraft information

VH-HKC was a Robinson R22 Beta II helicopter manufactured in the USA in August 2004. Initial registration of VH-HKC to the pilot was effective from February 2006. At the time of the accident, the helicopter had completed 1870.2 hours in service, and was certified for day VFR flight only. The last 100-hourly inspection was completed on 3 December 2020 at 1858.9 hrs, 11.3 hours prior to the accident, with all maintenance requirements completed.

The helicopter was equipped with two landing lights installed in the nose of the aircraft just below the canopy, and UHF/ VHF radios. In addition, it had an inertia reel lap/sash restraint fitted to the only installed seat.⁹ R22 helicopters are not fitted with a wire strike protection system (cable cutter) on the front of the helicopter.

Recorded information

No flight plan was submitted by the pilot. VH-HKC was not visible on recorded radar data and no communications from the helicopter were recorded by Airservices Australia. The aircraft had no onboard recording equipment. The pilot carried a satellite phone and a dual frequency (406/121.5 MHz) personal locator beacon on the aircraft. Neither of these communication devices were activated.

Accident site information

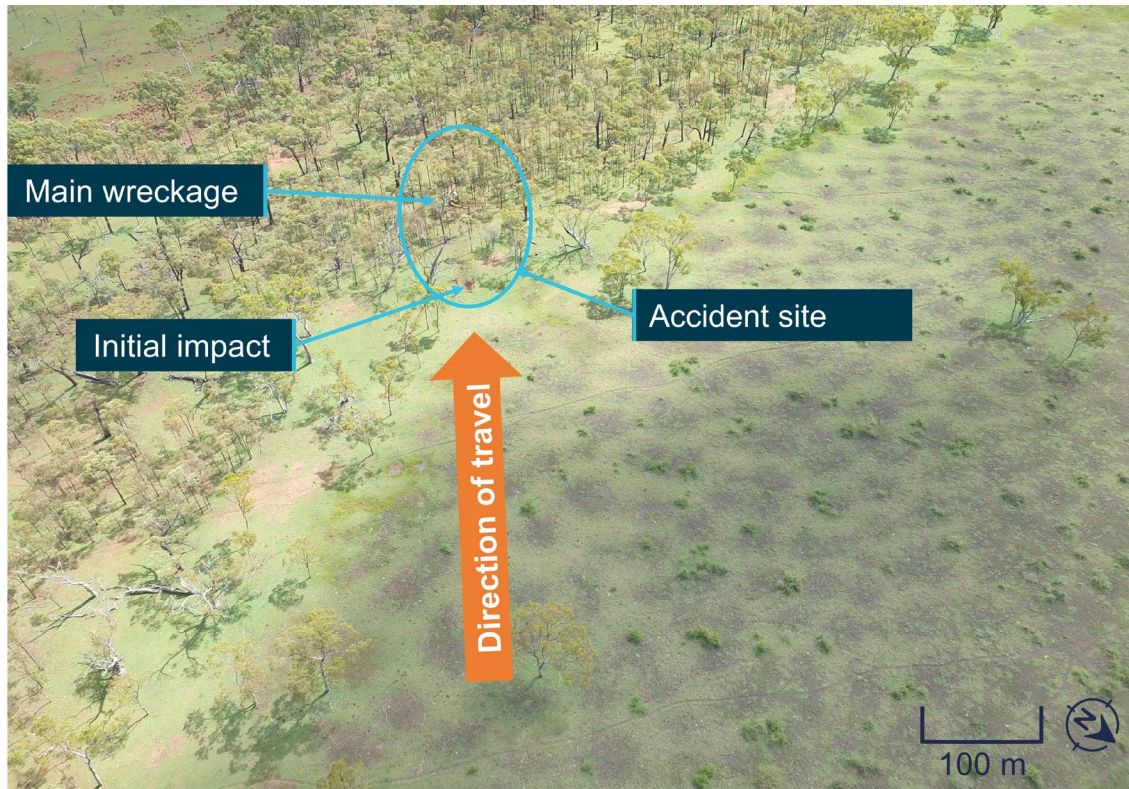
The ATSB did not attend the accident site. The following is based on an assessment of accident site photos and statements provided by Queensland Police Service.

The area near the accident site was open grassland and grassland with trees. The initial impact point was coincident with the tree line at the edge of an open grassy area about 160 m south of

⁹ The other seat had been removed from the aircraft by the pilot.

the unsealed Pretty Plains Camden Park Road (Figure 4). The site was 4.5 km west of the Pretty Plains Homestead. The wreckage trail extended in a south-westerly direction of over an area of about 50 m long and 20 m wide (Figure 5).

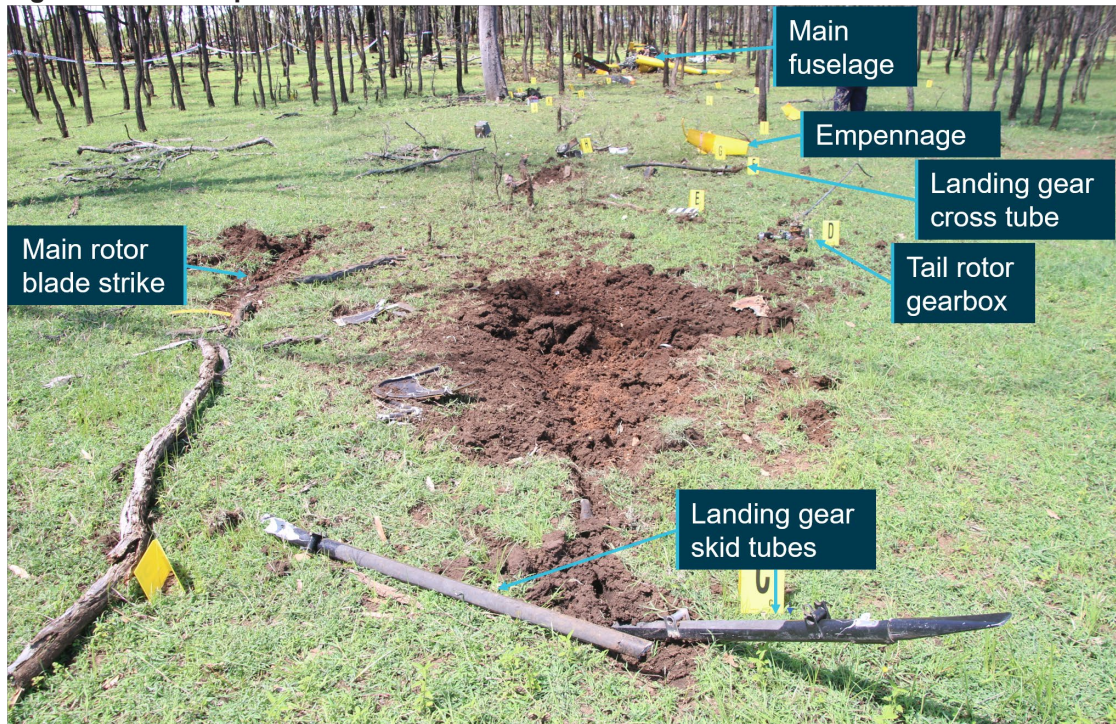
Figure 5: Overview of VH-HKC accident site



Source: Queensland Police Service, modified by ATSB

Both landing gear skid tubes were broken off at the initial impact point just prior to the main cabin impact crater evident in the soft ground (Figure 6), with main rotor blade strikes forward and to the left of the area of impact. The impact captured the airspeed indication at 38 kt (70 km/h) and the vertical speed indication at -870 ft/min (-16 km/h). This correlated to a flight path angle of 13 degrees nose-down with a groundspeed of 37 kt (68 km/h).

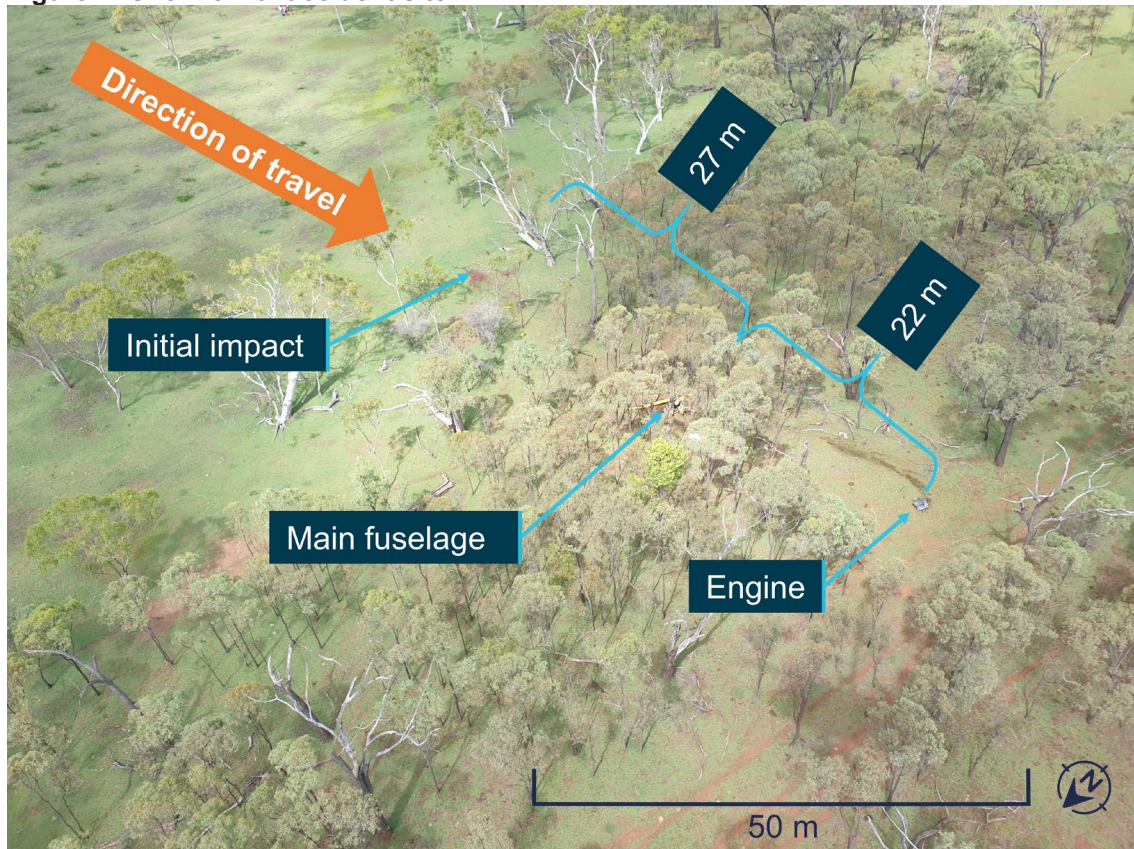
Figure 6: Initial impact location



Source: Queensland Police Service, modified by ATSB

The tail rotor gearbox, blades and empennage were located close to the initial impact. The remainder of the tail boom remained attached to the main fuselage which was 27 m further along the wreckage trail (Figure 6 and Figure 7). The engine was located at the end of the wreckage trail (Figure 7).

Figure 7: Overview of accident site



Source: Queensland Police Service, modified by ATSB

One main rotor blade separated during the impact sequence; the other blade remained attached to the hub at the main wreckage. Both blades were deformed in a manner indicative of powered rotation on impact. The wreckage trail and damage pattern were consistent with a high-energy nose-down impact, likely in a left skid-low attitude.

The front landing skid cross tube and shattered Perspex canopy, both of which are common wirestrike locations, were unable to be examined for evidence of a wirestrike.

R22 Wirestrike collisions

A review of the ATSB occurrence database showed a number of occurrences where a Robinson R22 helicopter had contacted a powerline that did not result in damage or collision with terrain. Of these occurrences, 22% resulted in nil or minor damage to the helicopter and the pilot was able to continue with no loss of control.

Weather and environmental information

Storms

Witnesses at Reedy Springs, Camden Park and Wongalee Stations reported storms and rain in the area during the time of the flights. An image taken at 1756 at Camden Park (Figure 8) captured the prevailing conditions.

Figure 8: Image taken at Camden Park and captioned ‘Another storm is coming’ sent via WhatsApp at 1756 EST about 30 minutes before VH-HKC arrival at Camden Park

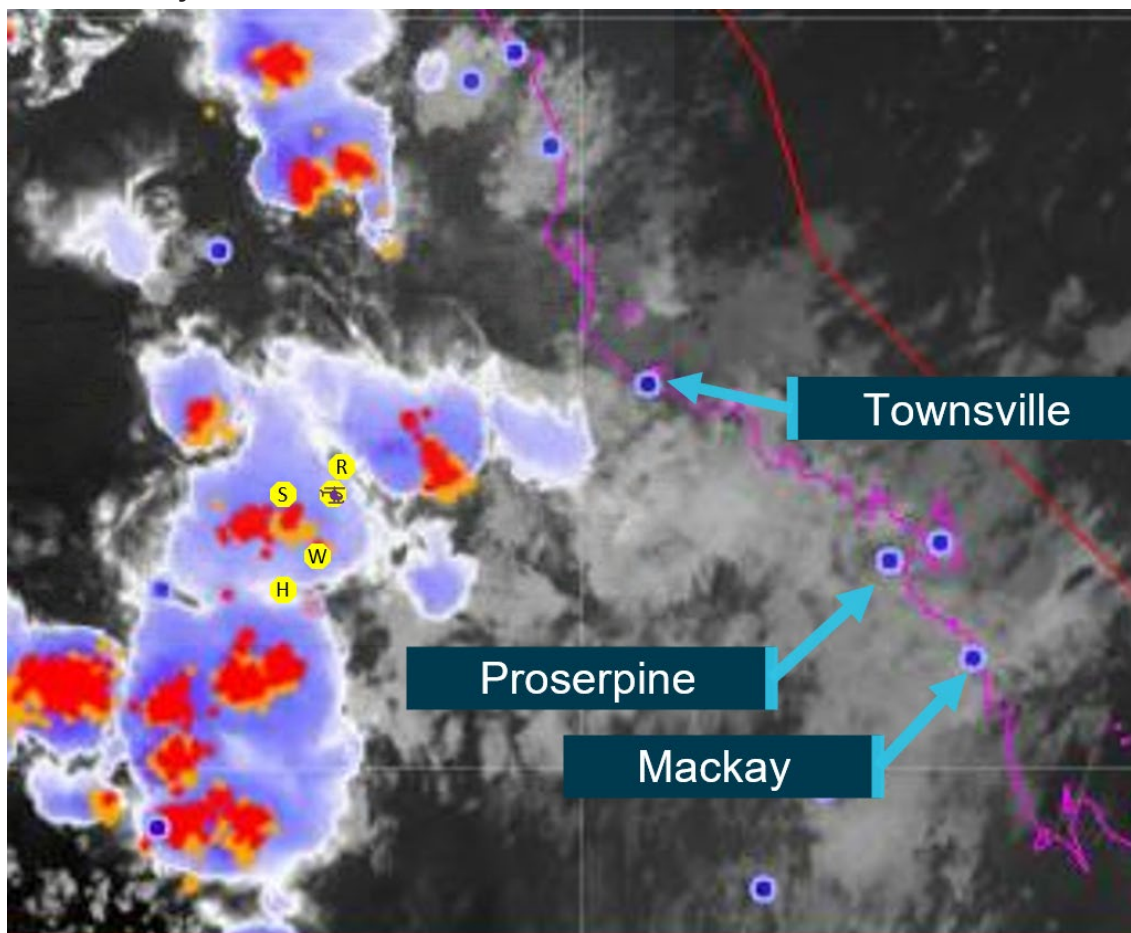


Source: Camden Park Station owner

The storm clouds to the south were evident at the time of the pilot's arrival at Camden Park (Figure 1). The pilot reported to at least one witness that they had been avoiding storms. The Bureau of Meteorology satellite infrared imagery shows the presence of clouds and storms in the area of the route taken by the pilot (Figure 9). The white and purple-blue colours in Figure 9

represent a scale of cloud-top temperatures. The colder the cloud-tops, the higher they are.¹⁰ The red and orange patches in Figure 9 were overlaid lightning strike data.¹¹ The image indicated that there was lightning in the discrete storm cells over Northern Queensland in the vicinity of VH-HKC and also showed the purple colour relating to the very high cumulonimbus cloud tops associated with the storms.

Figure 9: Satellite Infrared imagery¹² at 1830 showing extent of clouds and storms in the area visited by VH-HKC



Source: Bureau of Meteorology, modified by the ATSB

Light conditions¹³

On 11 Feb 2021 the moon phase at Wongalee Station was a waning crescent with 1% of the moon's visible disk illuminated. Moonset was at 1851 and sunset was at 1902.¹⁴ For aviation purposes, night is defined as the period of darkness commencing at the 'end of evening civil twilight',¹⁵ also known as last light. The pilot landed at Wongalee Station at 1910, 15 minutes prior

¹⁰ The following scale is used for the IR imagery (purple=coldest, dark grey=warmest).

¹¹ The red patches represent lightning strikes which occurred in the 10 minutes prior to the image time, and the orange dots for strikes recorded in the period 10 to 30 minutes prior to the image.

¹² Reedy Springs (R) Wongalee (W) Hughenden (H) and Mt Sturgeon (S) marked on map. Location of VH-HKC at time of image denoted by the helicopter icon.

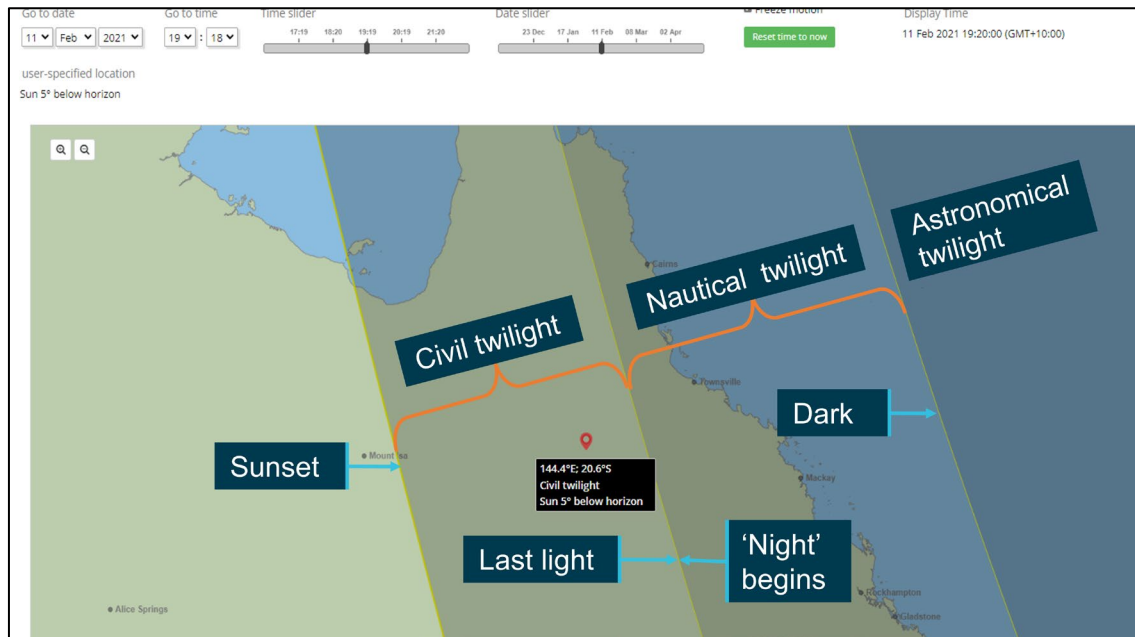
¹³ Geoscience Australia maintains sunrise, sunset and twilight times and moon/ sun elevation angle on their website at [Astronomical Information | Geoscience Australia \(ga.gov.au\)](https://www.ga.gov.au/astronomical-information) with a link to the United States Naval Observatory for moon phase data.

¹⁴ Sunset is defined as the instant in the evening under ideal meteorological conditions, with standard refraction of the Sun's rays, when the upper edge of the sun's disk is coincident with an ideal horizon.

¹⁵ When the sun is 6° below an ideal horizon. At this time, in the absence of moonlight, artificial lighting or adverse meteorological conditions, the illumination is such that large objects can be seen but no detail is discernible.

to last light.¹⁶ VH-HKC departed Wongalee at 1920 EST during the period of civil twilight, about 5 minutes prior to last light (Figure 10).

Figure 10: Regions of twilight relative to VH-HKC location at Wongalee Station 1920 EST



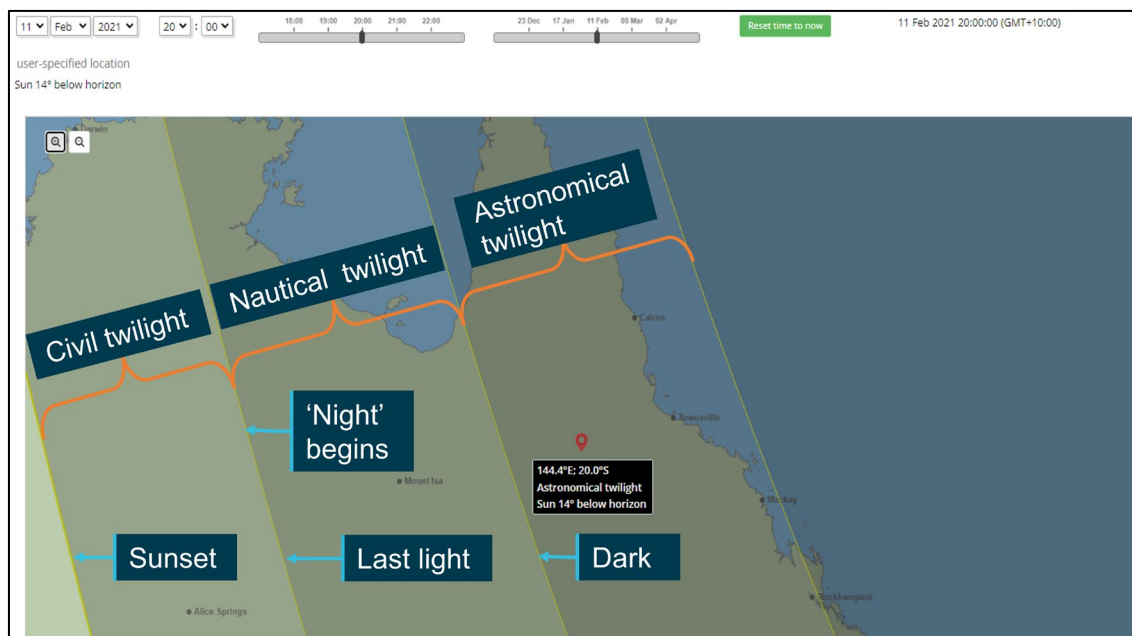
Source: in-thy-sky.org/twilightmap

The end of evening nautical twilight¹⁷ was 1951. At this time, it was dark. Both the collision with the powerline on Kennedy Developmental Road and collision with terrain adjacent to the Pretty Plains Camden Park Road occurred in the period of astronomical twilight¹⁸ (Figure 11).

¹⁶ Last light at Wongalee Station on 11 Feb 2021 was 1925.

¹⁷ When the sun is 12° below an ideal horizon. At this time in the absence of moonlight, artificial lighting or adverse atmospheric conditions, it is dark for normal practical purposes.

¹⁸ When the sun is 18° below an ideal horizon. At this time the illumination due to scattered light from the Sun is less than that from starlight and other natural light sources in the sky.

Figure 11: Regions of twilight relative to VH-HKC accident location at 2000 EST

The flight involving the collisions was conducted during astronomical twilight, moonless and in overcast conditions (no starlight) in a remote area with limited terrestrial lighting. This was considered to be a dark night with minimal light available. The collision with the powerline exacerbated the situation by extinguishing the Pretty Plains Station terrestrial lighting in the direction of travel.

Visual flight rules requirements

A VFR flight must not be conducted at night, unless the pilot in command is authorised under CASR Part 61 to conduct a flight under the instrument flight rules (IFR) or at night under the VFR and the aircraft is appropriately equipped for flight at night or under the IFR.^{19,20} A pilot who does not hold a night visual flight rules rating or an instrument rating must not depart unless the estimated arrival time for the destination (or alternate) is at least 10 minutes before last light allowing for any required holding.²¹

Risks of flying in areas of reduced visual cues

Night flying in remote areas is an inherently high-risk operation due to the absence or degradation of the visual references for establishing an aircraft's attitude and position. This risk is increased to unacceptable levels when night flying is attempted by pilots without night VFR or instrument flying qualifications.

The attempt to continue to the intended destination in fading or absence of daylight in this case, might have been reinforced by the availability of a well-marked but unlit road that could to some extent compensate for the navigational difficulties usually associated with degraded visibility. The pilot reportedly did not have any previous night flying experience.

The ATSB has previously highlighted the risk associated with VFR flight in dark environmental conditions. The ATSB Avoidable accidents booklet, 'Visual flight at night accidents: What you can't see can still hurt you' (AR-2012-122) describes that on average between 1993 and 2012, there were nearly two accidents per year as a result of visual flight at night. Importantly, accidents at

¹⁹ Aeronautical Information Publication Enroute 1.2 Visual Flight Rules 28 Feb 2019.

²⁰ Night means the period between the end of evening civil twilight and the beginning of the following morning civil twilight.

²¹ Aeronautical Information Publication Enroute 1.2 Visual Flight Rules 28 Feb 2019.

night tend to be unforgiving, with 75% of these accidents resulting in fatal outcomes. For the accidents during night visual conditions, half involved a loss of aircraft control, most likely due to the influence of perceptual illusions caused by the lack of visual cues. The other half involved controlled flight into terrain, where the pilot probably did not know of the terrain's proximity immediately before impact. Nearly all of these accidents occurred on dark nights.

Similar occurrences

AO-2011-087

On the evening of 27 July 2011, the owner-pilot of a Robinson R22 helicopter was conducting a local flight from Big Rock Dam to Brooking Springs homestead near Fitzroy Crossing, Western Australia. The pilot was reported missing and the wreckage of the helicopter was located the following day, 14 km north-west of Fitzroy Crossing township. The helicopter was seriously damaged and the pilot sustained fatal injuries.

The pilot was attempting to fly visually at low level on a dark night in an area that did not contain any local ground lighting. About halfway into the flight, the pilot inadvertently allowed the helicopter to develop a high rate of descent, resulting in a collision with terrain.

The ATSB investigation found that the pilot was operating at night without the appropriate training or qualification in a helicopter that was not suitably equipped. An examination of the helicopter found no evidence of any pre-existent defects or anomalies.

AO-2014-144

On the afternoon of 25 August 2014, the pilots of two Robinson R22 helicopters were ferrying the helicopters from Yeeda to Springvale via a refuelling stop at Leopold Downs, within the Kimberley region of Western Australia. The pilot who was ahead by about 10 NM (18 km) arrived at Springvale about 40 minutes after last light but the pilot of the second helicopter did not arrive as expected.

A search using helicopters began early the next morning and the overdue helicopter was found in a seriously damaged state, close to the intended track and 25 NM (46 km) west of Springvale. The pilot had been fatally injured.

The ATSB found that the pilot, who did not hold a night visual flight rules (VFR) rating or instrument rating, continued flying towards the destination after last light (end of civil twilight), then in dark night conditions without local ground lighting, inadvertently allowed the helicopter to descend into terrain.

AO-2016-031

On 7 April 2016, the pilots of two Robinson R22 helicopters flew from Mossman, Queensland to various fishing locations to the north with a passenger in each helicopter. Late in the afternoon, the pilots commenced the direct return flight to Mossman. However, the pilots encountered weather and winds that slowed their progress and required them to refuel at Cooktown.

The pilots departed Cooktown at last light intending to track via the coast to Mossman. As the flights progressed, the light available from the sun continued to decrease and there was no moon. There were also patches of cloud and rain in the general area.

Shortly after passing Cape Tribulation, in dark night conditions, one of the helicopters collided with the sea. The passenger was injured in the accident but was able to reach the shore and notify emergency services. Unaware of the accident, the occupants of the other helicopter continued to Mossman. A search was initiated and the missing helicopter was located on 9 April 2016 in about 400 m offshore in about 10 m of water. The pilot was not located.

The ATSB found that the pilot, who was only qualified to operate in day-VFR conditions, departed on a night flight and continued towards the destination in deteriorating visibility until inadvertently allowing the helicopter to descend into water.

These fatal collisions all involved pilots of R22 helicopters attempting to fly visually at low-level on dark nights in areas that did not contain any local ground lighting.

Safety analysis

The speed of the impact in a nose-down, left-skid-low attitude indicated that the pilot collided with terrain with substantial energy. This, along with the helicopter rotor damage, were consistent with delivery of engine power to the rotors and at least some control. The following analysis examines the circumstances of the occurrence to identify the contributing factors and any safety implications.

Flying at low-level and collisions

Powerline

The timing and physical appearance of the severed powerline on the Kennedy Development Road was consistent with contact with the helicopter. The distance from Wongalee Station to the severed powerline along the Kennedy Development Road was about 68 km, which was consistent with a speed of about 64 kt (119 km/h) had the pilot been following the road. It was likely that in the dark conditions, the pilot navigated by following the road centreline illuminated by the helicopter's landing lights.

Assuming the pilot was aware he had flown through a powerline, it should have served as an additional warning that he was flying with reduced visibility and risked a collision with terrain at this time.

Terrain

VH-HKC collided with terrain after departing from flight shortly after a bend above the unsealed and unmarked Pretty Plains Camden Park Rd. The pilot was almost certainly using this road for navigation. In the absence of ground lighting and a poor reflective surface after leaving the road, therefore losing his visual reference, the pilot left the SE heading road and flew at low-level over open grassland in a SE direction with a line of trees to the left until inadvertently descending into terrain at a speed of about 37 kt on a flight path angle of about 13 degrees nose down. The collision occurred at about 2000 EST which was in the period of astronomical twilight (after dark).

Operation at night

The pilot's family advised that the pilot avoided flying at night and predominantly only flew over their own property. CASA flight crew licensing information showed that the pilot did not hold a night VFR or instrument rating. The logbook for VH-HKC confirmed that the helicopter was not certified for instrument flight rule (IFR) or night VFR operations and was not equipped with suitable instruments for this type of operation.

Within 5 minutes of departure from Wongalee, the pilot was flying at night, with no illumination being provided by the moon or stars. There was very minimal terrestrial lighting with the roads unlit and homesteads sparsely located. The remote Kennedy Development Road carries a low level of traffic. A collision with a powerline over the road occurred 29 minutes after last light (1954) and the collision with terrain about 35 minutes after last light (2000). In such conditions and in particular after the loss of power to local stations as a result of the cut powerline, the available visual references for establishing an aircraft's attitude and position were degraded or absent.

The conditions on 11 February 2021 were particularly dark after departure from Wongalee Station. It was after moonset and sunset with the moon only 1% illuminated and in overcast weather. The flight after this time continued through the entire periods of civil and nautical twilight.

In very dark conditions such as rural areas, the skills needed to fly an aircraft at night are vastly different to day VFR flights, and may even exceed the capabilities of some pilots trained in night VFR operations.

Pilot's operational decision making and opportunities to discontinue flight

The pilot did not assess that weather conditions in the vicinity of Reedy Springs and Cargoan were unsuitable for flight in a helicopter only equipped for flight under the visual flight rules (VFR). The pilot's decision to depart Reedy Springs during a clearing in the weather was made in a hurry and without consideration of an alternate plan. The pilot subsequently became lost and close to fuel exhaustion before flying at low-level under powerlines at Camden Park Station.

The pilot did not consider suggestions at both Camden Park and Wongalee stations to discontinue his flight. Despite arriving at the familiar Wongalee Station within the prescribed 15 minutes before last light, the pilot elected to continue to his destination, likely by navigating at low-level, using a sealed highway. The pilot continued flying despite colliding with a powerline above the highway and flying into the night in dark conditions without the assistance of ground lighting.

The pilot also had opportunities to land the helicopter at a safe location and communicate by satellite phone or activate the personal locator beacon to obtain assistance.

The decisions that the pilot made both before departing Reedy Springs and during the flight both at Camden Park and Wongalee Station, including importantly, the decision to continue towards his destination despite offers of accommodation and attempts at discouraging continuing flight resulted in the pilot flying in dark night conditions where the eventual collision with terrain would have been difficult to avoid.

No helicopter endorsement

CASA flight crew licensing information indicated that the pilot's license was not endorsed for helicopters. The pilot had considerable experience flying helicopters over many years but predominantly over his own familiar property during day visual meteorological conditions. At the time of the accident the pilot was operating outside the regulations without a helicopter endorsement and in night conditions.

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.

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 collision with terrain in dark night conditions involving Robinson R22 Beta II helicopter, registered VH-HKC, which occurred 87 km north of Hughenden, Queensland on 11 February 2021. The findings should not be read as apportioning blame or liability to any particular organisation or individual.

Contributing factors

- While attempting to fly visually at low level, on a dark night without local ground lighting, the pilot inadvertently allowed the helicopter to descend, resulting in a collision with terrain.
- The pilot was operating at night without the appropriate night flying qualification or experience, in a helicopter that was not suitably equipped for night operations.
- The pilot continued flying towards the intended destination after last light (end of civil twilight), then in dark night conditions without local ground lighting despite opportunities available to discontinue the flight.

Other factors that increased risk

- The pilot made a decision to depart on the flight without prior planning. A number of operational and navigational decisions made by the pilot during the flight did not adequately address the risk of visual flight into dark night conditions.
- It was very likely that the helicopter struck a powerline above the Kennedy Developmental Road while flying at low-level in poor light.

Other (key) findings

- The pilot held a private pilot's license for aeroplane operations, however, was not endorsed for helicopter operations.

Sources and submissions

Sources of information

The sources of information during the investigation included:

- Civil Aviation Safety Authority
- Queensland Police Service (Hughenden Police and Townsville Forensic Crash Unit)
- the next-of-kin of the pilot
- witnesses from Camden Park and Wongalee Stations, Queensland
- Ergon Energy, Queensland
- the maintainer of VH-HKC
- Robinson helicopters

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:

- Civil Aviation Safety Authority
- Queensland Police Service (Hughenden Police and Townsville Forensic Crash Unit)
- the next-of-kin of the pilot
- witnesses from Camden Park and Wongalee Stations, Queensland
- Ergon Energy, Queensland

Submissions were received from;

- Civil Aviation Safety Authority
- Queensland Police Service (Hughenden Police and Townsville Forensic Crash Unit)

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

General details

Occurrence details

Date and time:	11 February 2021 – 2000 EST	
Occurrence class:	Accident	
Occurrence categories:	Collision with terrain	
Location:	87 km north of Hughenden Aerodrome, Queensland	
	Latitude: 20° 2.500' S	Longitude: 144° 21.400' E

Aircraft details

Manufacturer and model:	Robinson R22 Beta	
Registration:	VH-HKC	
Serial number:	3666	
Type of operation:	Private-Pleasure / Travel – (Private)	
Activity:	General aviation/ Recreational-Sport and pleasure flying-Pleasure and personal transport	
Departure:	Wongalee Station, Queensland	
Destination:	Reedy Springs Station, Queensland	
Persons on board:	Crew – 1	
Injuries:	Crew – 1 Fatal	
Aircraft damage:	Destroyed	

