



Australian Government

Australian Transport Safety Bureau

Controlled flight into terrain involving Mooney M20J, VH- DJU

26 km west of Coffs Harbour Airport, New South Wales, on 20 September 2019



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Postal address: PO Box 967, Civic Square ACT 2608
Office: 62 Northbourne Avenue Canberra, ACT 2601
Telephone: 1800 020 616, from overseas +61 2 6257 2463
Accident and incident notification: 1800 011 034 (24 hours)
Email: atsbinfo@atsb.gov.au
Website: www.atsb.gov.au

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Addendum

Page	Change	Date

Safety summary

What happened

At about 0640 Eastern Standard Time on 20 September 2019, a Mooney M20J aircraft, registered VH-DJU, departed Murwillumbah, New South Wales for a private flight under visual flight rules to Taree, New South Wales. On board were the pilot and one passenger.

At 0717, when DJU was 45 NM north of Coffs Harbour, the pilot contacted air traffic control and requested a clearance to transit the Class C controlled airspace at 6,500 ft. Air traffic control advised that a clearance was not available at that altitude and that, due to cloud conditions, a visual transit of the airspace would only be possible at an altitude not above 1,000 ft. The pilot then advised that the flight would descend to 'not above 1,000 ft'.

The aircraft continued on a direct track to Taree and at 0724 the pilot reported that the aircraft was operating outside controlled airspace in clear conditions at 4,100 ft and would remain on that track. The aircraft was then climbed to 4,500 ft and at 0732, commenced a descent in the vicinity of high terrain.

The aircraft did not arrive at Taree as expected so a search was initiated. The aircraft was found to have collided with terrain about 26 km west of Coffs Harbour Airport. The two persons on board were fatally injured and the aircraft was destroyed.

What the ATSB found

The ATSB found that the pilot was not provided clearance to transit Class C airspace due to the trainee controller's conservative assessment that workload would not allow it although there was no conflicting traffic, meteorological factor or limiting air traffic control instructions or procedures. The trainee's supervisor accepted the assessment as an alternate transit option was provided to the pilot. Additionally, the information subsequently provided by air traffic control likely resulted in the pilot deciding to descend the aircraft from 6,500 ft instead of other available safe options. This descent exposed the flight to increased risk.

The ATSB also found that the pilot was not carrying suitable navigation equipment and had most likely not obtained the required weather forecasts. These factors reduced the pilot's ability to manage the flight path changes and identify the high terrain. This led to the aircraft being descended toward the high terrain in visibility conditions below that required for visual flight, resulting in controlled flight into terrain.

The pilot had also not completed the required flight reviews or proficiency checks. This resulted in the pilot not possessing the required licence to undertake the flight and likely led to a deterioration in the knowledge and skills required for effective flight management and decision-making.

What has been done as a result

Following the occurrence, Airservices Australia (Airservices) provided additional training for air traffic controllers focussing on clearance issues, workload assessments, and coordination with other traffic units where decisions affect the other unit. An information and education package was developed for controllers regarding the provision of advice and information to pilots not subject to a clearance.

Performance checks and unit reviews were also undertaken to provide assurance that airways clearances were consistently issued in accordance with documented procedures. Airservices also included additional content in on-the-job instructor professional development sessions to ensure trainees' capability is commensurate with actual workload to optimise performance.

Safety message

The safety risks of visual pilots flying into non-visual conditions are well documented. This continues to be a recurring factor in aircraft accidents and has been the focus of numerous previous ATSB reports and publications.

This accident also emphasises the importance of pilot and flight preparation. Ensuring that all required training is completed assists a pilot to both develop and maintain the necessary skills to manage challenges that may be encountered during a flight, such as inclement weather or inadvertent entry into non-visual conditions. Further, confirming that appropriate operational information is obtained and readily available ensures that a pilot is well prepared to anticipate in-flight complications and successfully manage unforeseen challenges.

The accident also illustrates the significant influence that air traffic control can have on the conduct of a flight.

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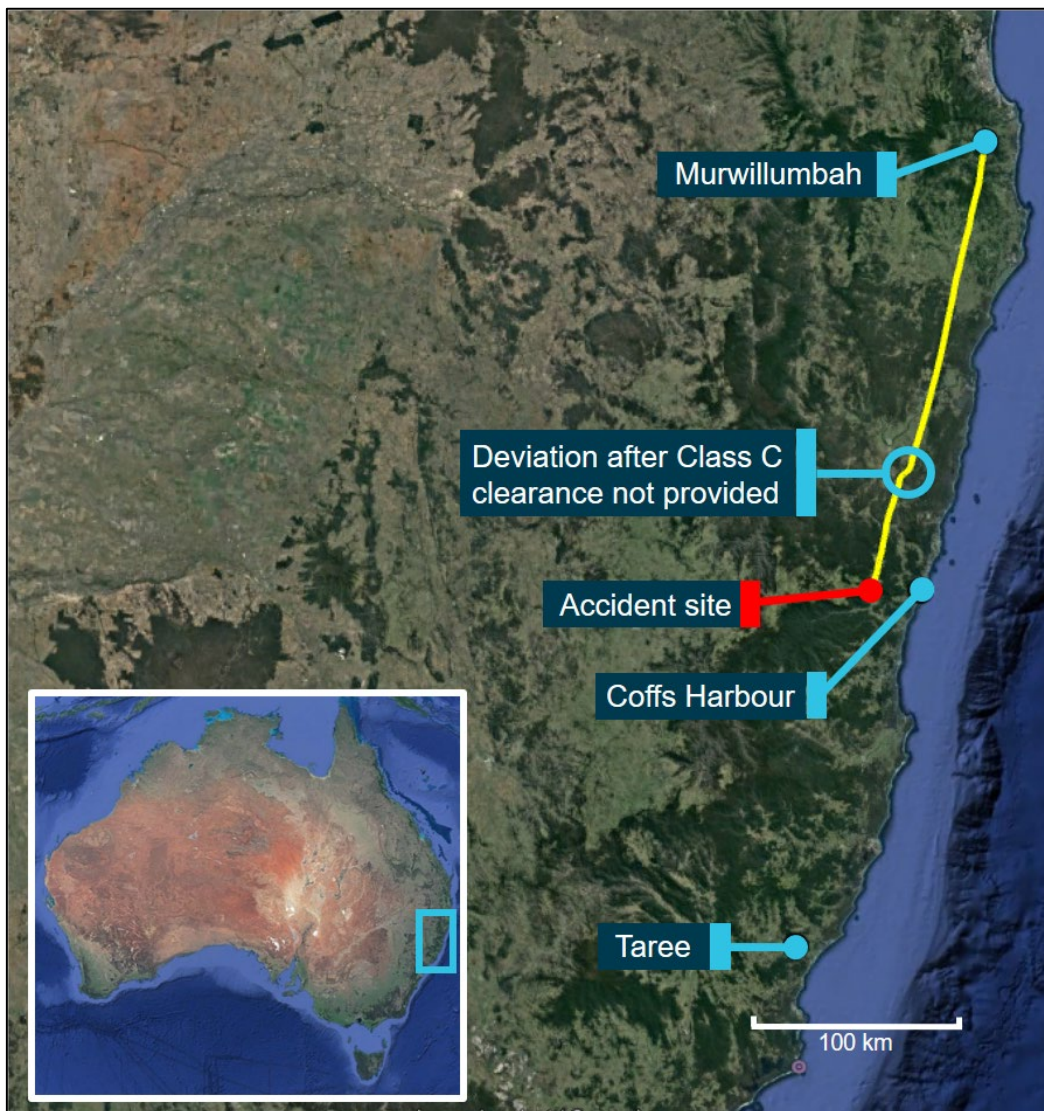
The occurrence

At about 0640 Eastern Standard Time¹ on 20 September 2019, a Mooney M20J aircraft, registered VH-DJU, departed Murwillumbah, New South Wales for a private flight under visual flight rules (VFR)² to Taree, New South Wales. On board were the pilot and one passenger.

After departing Murwillumbah, the aircraft climbed to 6,500 ft above mean sea level (AMSL) on a direct track to Taree (Figure 1).

At 0717 when the aircraft was 45 NM north of Coffs Harbour Airport, the pilot contacted Brisbane Centre air traffic control (ATC) and requested a clearance to transit Class C controlled airspace (see the section titled *Airspace and airways clearances*) on a continuation of the direct track to Taree at an altitude of 6,500 ft. The air traffic controller advised the pilot that a clearance to enter controlled airspace was not available at 6,500 ft and provided the option to request clearance through the underlying Coffs Harbour Class D controlled airspace.

Figure 1: Aircraft track (yellow) on 20 September 2019



Source: Google Earth, annotated by ATSB

¹ Eastern Standard Time (EST): Coordinated Universal Time (UTC) + 10 hours.

² Visual flight rules (VFR): a set of regulations that permit a pilot to operate an aircraft only in weather conditions generally clear enough to allow the pilot to see where the aircraft is going.

The pilot subsequently contacted the Class D controller in the Coffs Harbour air traffic control tower and requested a clearance. In response, the tower controller contacted the Brisbane Centre Class C controller to discuss and coordinate the aircraft's transit. Following that discussion, at about 0721, the tower controller advised the pilot that due to the extensive cloud cover, 'the only way' to transit that airspace under the VFR would be at an altitude not above 1,000 ft. The pilot responded that the aircraft would descend to 'not above 1,000 ft'.

Recorded air traffic surveillance data indicated that at about this time, the pilot manoeuvred the aircraft slightly further laterally away from the Class C airspace however, during the descent, it briefly entered that airspace without a clearance.

The aircraft then continued on a direct track outside controlled airspace (OCTA) towards Taree and at 0724, the pilot advised the tower controller the flight was 'currently 4100 in clear and we're OCTA'. In the context of the preceding discussion regarding the extent of the cloud, the ATSB assessed the pilots reference to 'in clear' was an indication that the aircraft was operating in clear weather conditions at an altitude of 4,100 ft at that time. The pilot also advised that the flight would continue on that track and that a clearance request would be made upon reaching the airspace boundary (the aircraft's track intersected further Class D controlled airspace to the south of Coffs Harbour). The tower controller acknowledged this and asked that the pilot report entering controlled airspace.

A review of recorded air traffic control surveillance data showed that after the pilot reported that the flight was operating in clear conditions, the aircraft was climbed to about 4,500 ft in Class G uncontrolled airspace and continued on a direct track until 0732. At that time, the aircraft commenced a descent, which continued until the last recorded position about 1 minute later. The aircraft was last recorded descending through an altitude of 3,564 ft at a ground speed of 165 kt. No further position or radio broadcasts were received from the aircraft.

In response to the aircraft not arriving at Taree as expected, a search was initiated. Although the search was initially hampered by rain and low cloud in the vicinity of the aircraft's last known position, the aircraft was located, having impacted terrain at an elevation of 2,920 ft. The wreckage was positioned in line with the last recorded track and about 2.8 km south of the last recorded position. The two persons on board were fatally injured and the aircraft was destroyed (Figure 2).

Figure 2: Accident site



Source: ATSB

Context

Pilot information and training

The pilot obtained a Civil Aviation Regulation 1988 Regulation 5 (CAR 5) Private Pilot Licence (Aeroplane) in 1982. For that licence, the pilot held endorsements for single engine aircraft below 5,700 kg maximum take-off weight, manual propeller pitch control, retractable undercarriage, tail wheel undercarriage and operation in controlled airspace. The pilot had never held an instrument rating.

The pilot was reported to have kept an up to date logbook but it was not found at the accident site or located during the investigation. An earlier logbook provided to the ATSB, contained two entries, including one relating to the conduct of a flight review in January 2010. The pilot had declared a total aeronautical experience of 1,006 hours at their last medical examination in November 2017.

Licencing and flight reviews under CASR Part 61

In September 2014, the Civil Aviation Safety Authority (CASA) introduced new flight crew licencing regulations, Civil Aviation Safety Regulation 1998 (CASR) Part 61. As part of the transition to the new licencing system, pilots could continue to exercise the privileges of their CAR 5 licence until 31 August 2018. Between September 2014 and 31 August 2018, pilots were required to make an application for a new Part 61 licence in conjunction with their next required flight review or proficiency check.

From 1 September 2018, CASA ceased recognising CAR 5 licences and a pilot was required to hold a CASR Part 61 licence in order to conduct a flight.

Prior to conducting a VFR private flight, CASR Part 61 required an aeroplane flight review (AFR), or other specified proficiency check, to have been undertaken within the previous 2 years.

The CASA [Flight reviews information sheet](#) provided the following guidance on the purpose and benefits of flight reviews:

A flight review is an opportunity to receive training that refreshes your flying skills and operational knowledge. Pilots undertake flight reviews to ensure they continue to be competent flying particular types of aircraft or exercising the privileges of an operational rating.

After gaining a qualification, it is normal for some skills to deteriorate over time. A flight review ensures your piloting skills remain - or are brought back up - to standard.

During an AFR, a pilot is required to demonstrate competency as outlined in the Part 61 manual of standards. The AFR also serves as an opportunity for a pilot to receive training to attain the required standards.

The manual of standards included the following competencies which were relevant to the management of hazards associated with the accident flight:

- 2.2 3 (d) perform diversion procedure
- 2.5 5 (a) perform basic flight manoeuvres using full instrument panel
- 2.7 7 (a) recognise and manage threats and errors during pre-flight planning and in-flight;
- (b) maintain effective lookout and situational awareness;
- (c) assess situations and make appropriate decisions;
- (d) set priorities and manage tasks;
- (e) maintain effective communication with stakeholders;
- (f) communicate effectively using aeronautical radio.
- 4 (c) obtaining, interpreting and applying meteorological and aeronautical information;

- (d) navigation and flight planning for day VFR operations;
- (j) hazard identification and risk management;
- (m) hazardous weather;

Prior to the introduction of CASR Part 61, flight reviews were only required to be recorded in a pilot's logbook. After the introduction of CASR Part 61, flight reviews and proficiency checks were required to be recorded in a pilot's licence, logbook and with CASA. As the pilot's current logbook was not recovered during the investigation, the date of any flight review after January 2010 and before September 2014 could not be determined.

However, CASA did not hold any record of an application for a flight review or equivalent proficiency check after September 2014. The ATSB contacted flying training organisations at Murwillumbah Airfield and Gold Coast Airport, where the pilot's previous aircraft was maintained and the pilot was reported to have regularly visited. None of these organisations held training records for the pilot.

Based on the available information, the ATSB concluded that the pilot had not met the CASR Part 61 flight review requirements and, as such, did not hold the required licence to undertake the flight.

Fatigue

The ATSB collected information about the pilot's 72 hours of activity prior to the accident. A review of that evidence identified that it was unlikely that the pilot was experiencing a level of fatigue known to affect performance.

Medical and pathological information

The pilot held a Class 2 medical certificate valid until November 2019.

Two prescription medications belonging to the pilot were found in the wreckage and the pilot's toxicology report confirmed the presence of both medications. The use of one of those medications was not recorded in the pilot's medical file held with CASA. It is unlikely that this medication adversely affected the pilot's performance during the accident flight.

CASR Part 67 describes the requirements for aviation medical certification. One of the criteria for exercising the privilege of a Class 2 medical certificate is that the use of 'any over-the-counter or prescribed medication or drug... that causes the person to experience any side effects likely to affect the person to an extent that is safety-relevant' is prohibited.

Further, medical certificate applicants are required to answer 'every question asked by the examiner that the examiner considers necessary to help...CASA decide whether the applicant meets the relevant medical standard'. They are obliged to notify CASA of changes in medical conditions that impair their ability to 'do an act authorised by the license'.

The following extracts from CASA-developed brochures are particularly relevant to pilot medical examinations.

Designated aviation medical examiners (DAMEs) and pilots together should foster a culture where it is likely that pilots will feel comfortable disclosing medical problems, even if they may impact on their ability to maintain an aviation medical.

Your DAME...will expect you to answer both written and verbal questions, honestly and fully...

Under the clinical practice guidelines for DAMEs, certain risk assessment protocols allowed them to take into account the pilot's need for medication use when assessing if the applicant met the relevant medical standard. A CASA brochure states 'only 0.29 percent of all initial and renewal medical certificates were refused by CASA during 2016-2017'.

Aircraft information

The Mooney M20J is a four seat, piston-engine aircraft with a two-blade variable-pitch propeller and retractable tricycle landing gear. VH-DJU (serial number 24-1075, Figure 3) was manufactured in 1981 and first registered in Australia in 2005.³

Figure 3: The aircraft, VH-DJU



Source: Previous aircraft owner

The pilot purchased the aircraft on 6 July 2019, about 3 months prior to the accident, and had flown about 31 hours in the aircraft. The most recent entry on the maintenance release was 11 days prior to the accident (9 September 2019) and showed that the aircraft had accumulated 3,295 hours total time-in-service.

At the last scheduled maintenance inspection, in December 2018, the required inspections and test of the pitot-static system⁴ to maintain the aircraft's approval for instrument flight rules (IFR)⁵ operation were not undertaken. However, as a condition of purchasing the aircraft, the pilot of the accident flight required that the test and inspections be carried out. In April 2019, this was carried out and at the time of the accident the aircraft was equipped and approved for IFR operation (Figure 4).

Figure 4: Composite image of the instrument panel



Source: Supplied

³ Prior to being registered in Australia, the aircraft was operated in South Africa.

⁴ The pitot-static system is a system of air pressure-sensitive sensors and instruments that are used to determine an aircraft's airspeed, altitude, and vertical speed.

⁵ Instrument flight rules (IFR): a set of regulations that permit the pilot to operate an aircraft to operate in instrument meteorological conditions (IMC), which have much lower weather minimums than visual flight rules. Procedures and training are significantly more complex as a pilot must demonstrate competency in IMC conditions while controlling the aircraft solely by reference to instruments. IFR-capable aircraft have greater equipment and maintenance requirements.

The aircraft was equipped with an autopilot capable of maintaining a selected heading and navigation track. The autopilot did not have an altitude hold function or ability to manipulate the vertical flight profile.

Two smartphones and a tablet computer were recovered from the wreckage. Neither smartphone contained an electronic flight bag or other aviation application. The tablet computer was found packed in an overnight bag indicating that it was not used during the flight.

Date-expired air navigation charts for the area encompassing the flight were found stowed in a flight bag indicating that they were not being used at the time of the accident. No paper flight plan or other flight planning notes were located in the wreckage.

Global Navigation Satellite System units

Passengers who had flown with the pilot reported that the pilot routinely used a Garmin Aera 500 Global Navigation Satellite System (GNSS)⁶ unit carried in their lap. The aircraft was also equipped with a Garmin GTN650 GNSS unit.

Aera 500

The Aera 500 unit carried by the pilot was not approved as a sole means of navigation. However, the unit did present useful information relating to the progress of the flight. This included topographical and airspace information. The unit had a terrain function that required a valid 3D GNSS position solution and a valid terrain and obstacle database to operate properly. Terrain information was advisory only and could include:

- display of altitudes of terrain and obstructions relative to the aircraft's altitude
- pop-up terrain alert messages issued when flight conditions meet parameters set within the terrain system software algorithms
- forward looking terrain avoidance alerts

The ATSB recovered data from this unit indicating that it was in use at the time of the accident. However, it could not be established which mode was selected at the time of the accident or whether the terrain function was operable and the status of any user and system inhibitions.

GTN650

The GTN650 unit fitted to the aircraft operated as both a radio communications unit and an IFR-approved GNSS unit. The unit was capable of operating in different modes, which could display a significant amount of information relating to progress of the flight. This included the selected track, any deviation from this track, topographical, and airspace information.

Like the Aera 500, the GTN650 had a terrain function. The unit provided similar advisory information and alerts as the Aera 500 unit with similar limitations. The previous owner of the aircraft, a flying instructor, advised the ATSB that at the time of the pilot's purchase of the aircraft, the pilot declined familiarisation training with the GTN650 unit as the Aera 500 would be used. It could not be determined if the pilot subsequently undertook user training for the GTN650 unit.

The ATSB was not able to recover any data from the GTN650 unit to determine if it was used during the accident flight.

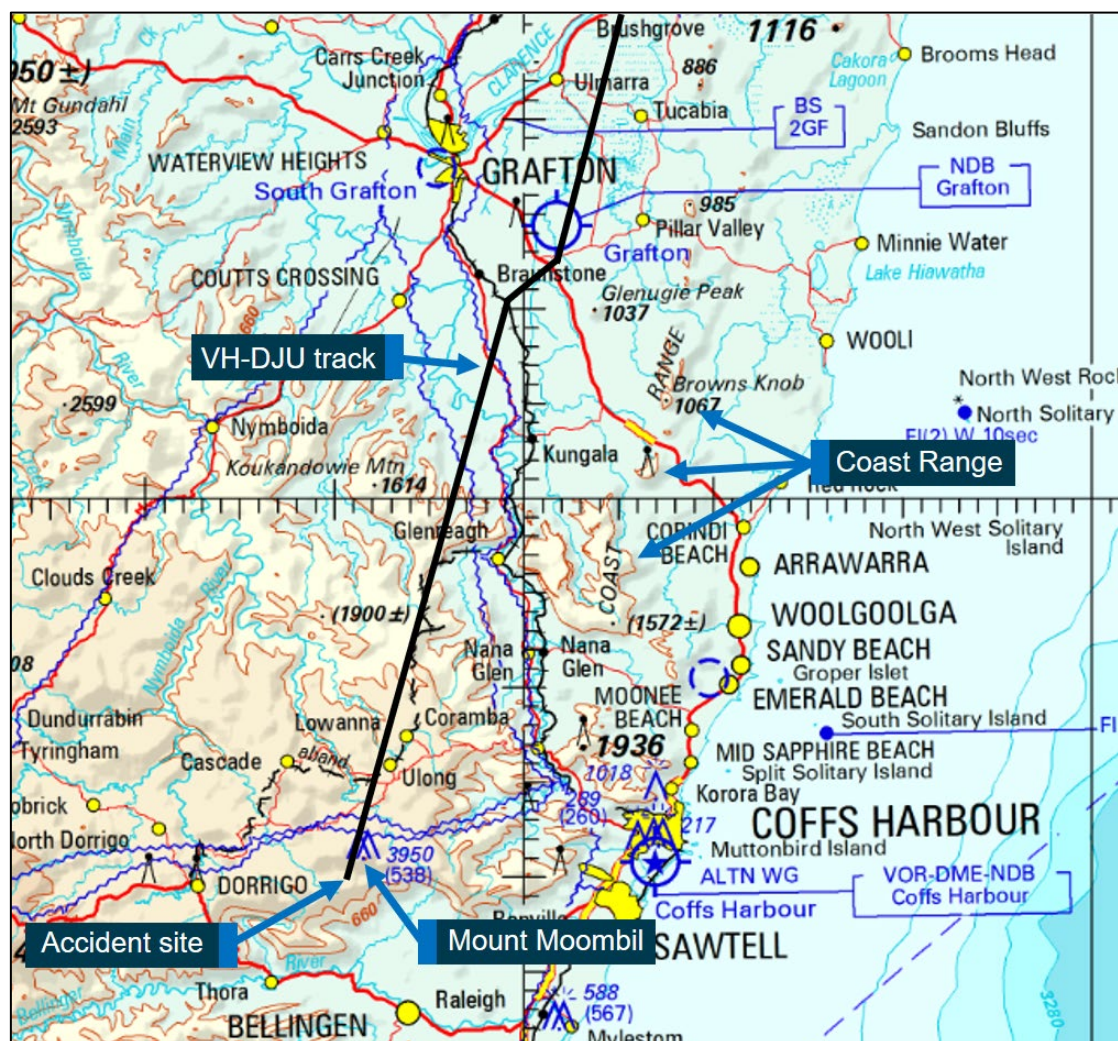
Terrain in the accident vicinity

At the time of the request to transit Class C airspace, the aircraft was about 10 NM north of Grafton (Figure 5). The area to the north of and surrounding Grafton was low-lying coastal terrain with elevations generally below 1,000 ft AMSL. However, the line of hills associated with the Coast

⁶ Global Navigation Satellite System: A satellite-based radio navigation system that uses signals from orbiting satellites to determine precise position and time.

Range, between the aircraft's position and a track toward the coast and Coffs Harbour, rose to elevations in excess of 1,000 ft AMSL.

Figure 5: World Aeronautical Chart extract showing terrain in the vicinity of the aircraft's track



Source: ATSB

Along a direct track toward Taree, the aircraft's path passed over a region where the Great Dividing Range extended near to the coast at Coffs Harbour. This area included the mountain range encompassing Dorrigo National Park. The topography within this region was substantially more rugged and elevated than the terrain further north, rising in excess of 3,000 ft AMSL.

The terrain over which the aircraft was flying at the time of the descent from 4,500 ft was within this mountain range. The highest obstacle near the aircraft's track were two towers on Mount Moombil at 3,950 ft, 400 m east of the track. Immediately south of Mount Moombil was a broad valley, which rose on the southern side to a ridge. The highest point of the ridge was 3,018 ft.

Meteorology

Airservices Australia (Airservices) did not hold any National Aeronautical Information Processing System (NAIPS)⁷ login records for the pilot for that, or any past, flights. A review of the pilot's

⁷ The National Aeronautical Information Processing System (NAIPS) is a computerised, aeronautical information system. It processes and stores meteorological and NOTAM information as well as enables the provision of briefing products and services to pilots.

personal electronic devices identified that there were no aviation flight planning or aviation weather applications and no weather documentation relevant to the accident flight was found in the wreckage.

The ATSB obtained relevant weather information from the Bureau of Meteorology (BoM).

BoM information

Graphical area forecast

The graphical area forecast for the accident region forecast the following cloud conditions for the time of the accident (all heights AMSL):

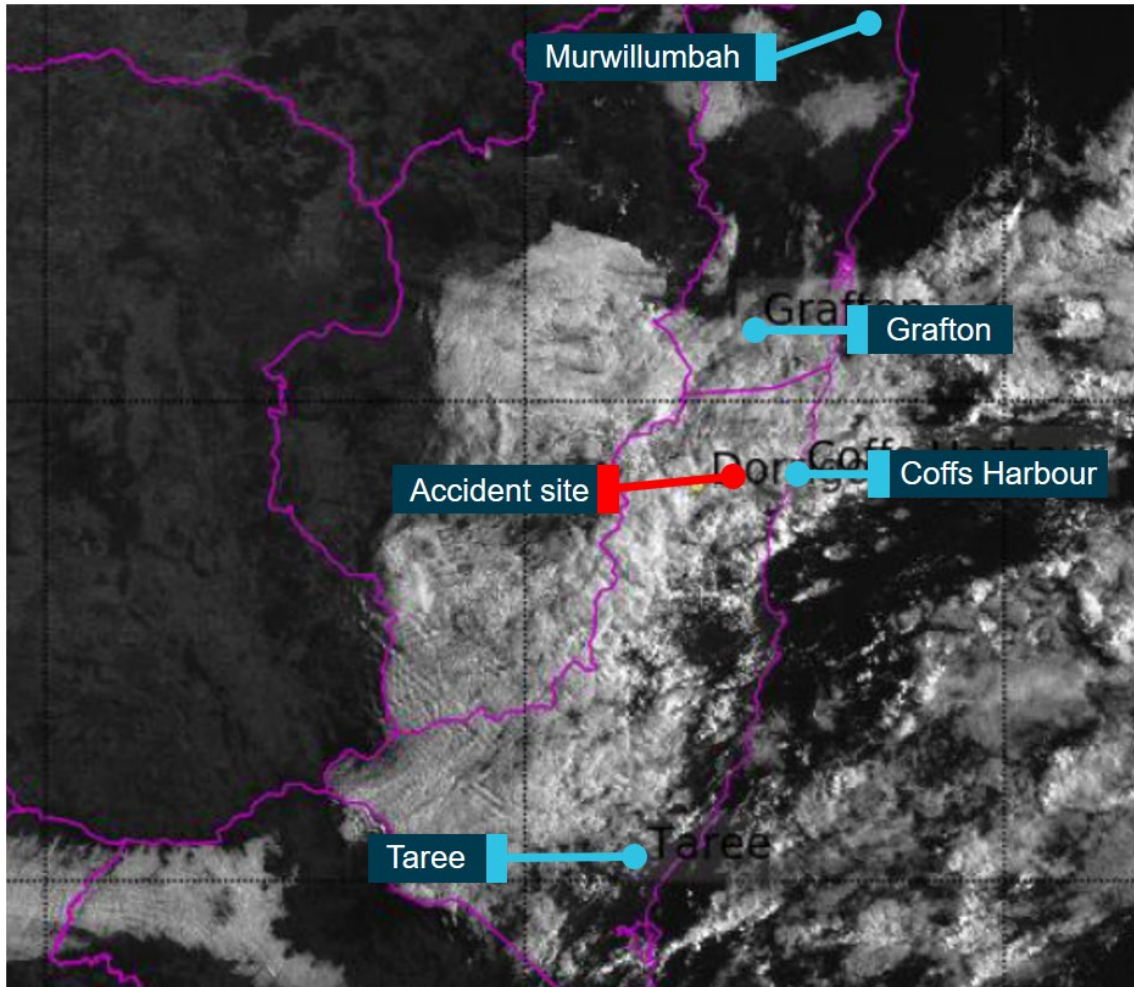
- broken⁸ stratus between 1,000-2,000 ft
- broken stratocumulus between 2,000-4,000 ft
- scattered cumulus between 4,000-9,000 ft

Satellite images

Satellite images (Figure 6) for the area just prior to the accident time showed generally clear conditions between Murwillumbah and Grafton. South of Grafton and throughout the area encompassing the high terrain west of Coffs Harbour, the images showed extensive cloud coverage. Further along the intended route towards Taree, the cloud coverage reduced near the coast, but persisted inland.

⁸ 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.

Figure 6: Meteorological satellite image extract for 0730 on 20 September 2019



Source: Bureau of Meteorology, annotated by ATSB

Analysis

The BoM provided the following analysis of meteorological conditions for the Coffs Harbour region on the morning of the accident:

On the 19th of September 2019, the analysed mean sea level pressure (MSLP) chart for 1800 UTC (4 am AEST 20th September) showed a strong, slow moving high pressure system over the Tasman Sea extending a ridge over eastern New South Wales. A coastal trough situated north of Coffs Harbour, whilst an approaching cold front was moving east through Central Australia at approximately 30 knots.

At the time of the incident the region was covered in widespread broken low cloud. With bases generally between 2000 - 3000ft above mean sea level, this most likely resulted in cloud on ground around Mount Moombil. Recent rainfall over the area with persistent onshore flow likely increased the low-level moisture within the air mass, creating saturated conditions.

The top of the broken low cloud layer was approximately 3,000 ($\pm 1,000$) ft AGL [above ground level] with a second cloud layer, few to scattered in its extent and at approximately 8,000 ($\pm 1,000$) ft AGL.

Automatic terminal information service

At the time of the accident, the Coffs Harbour automatic terminal information service detailed the following weather information:

- wind: Variable at 5 kt
- visibility: Greater than 10 km

- cloud coverage: Few at 1,500 ft and broken at 2,500 ft⁹
- temperature: 17° C

Witness

A witness located about 10 km south-east of the accident site stated that cloud was ‘down to the ground’ at the base of the mountain from 0700 until 0830 on the morning.

Visual meteorological conditions

Visual meteorological conditions (VMC) are the minimum meteorological conditions in which flight is permitted under the VFR – that is, conditions in which pilots have sufficient visibility to fly the aircraft while maintaining visual separation from terrain and other aircraft. Additionally, when operating VFR at or below 2,000 ft above the ground or water, the pilot must be able to navigate by visual reference to the ground or water.

The VMC requirements for aeroplanes vary for different classes of airspace (Table 1).

Table 1: Visual meteorological conditions

Airspace	Flight visibility	Distance from cloud	Additional conditions
Class C below 10,000 ft AMSL	5,000 m	1,500 m horizontal 1,000 ft vertical	ATC may permit operations in weather conditions that do not meet this criteria (special VFR)
Class D	5,000 m	600 m horizontal 1,000 ft vertically above; or 500 ft vertically below	ATC may permit operations in weather conditions that do not meet this criteria (special VFR)
Class C & D Special VFR	1,600 m	Clear of cloud	Operate within the requirements of Civil Aviation Regulation 157 Low flying.
Class G below 10,000 ft (subject to below)	5,000 m	1,500 m horizontal 1,000 ft vertical	
Class G at or below (whichever is the higher) of: (a) 3000 ft AMSL; (b) 1000 ft AGL	5,000 m	Clear of cloud and in sight of ground or water	Radio must be carried and used on the appropriate frequency

Source: Aeronautical Information Publication ENR 1.2

Airspace and airways clearances

Coffs Harbour airspace

Coffs Harbour Airport is situated within Class D terminal airspace (Figure 7). This airspace was controlled by an air traffic controller situated within the Coffs Harbour control tower. The Class D airspace extended to the north and south-west at ground level to a 7 NM boundary. West of the airport, the airspace extended about 6 NM and further west of this boundary, the controlled airspace base was the overlying Class E airspace at 8,500 ft.¹⁰ To the north and south-west, the airspace fanned out at increasing distances from Coffs Harbour. The base of the airspace also progressively stepped up at increasing distances to a maximum altitude of 4,500 ft at about 22 NM.

⁹ Cloud heights are above ground level.

¹⁰ For VH-DJU, a clearance was not required to transit the Class E airspace.

Figure 7: Visual terminal chart extract of Coffs Harbour airspace showing key events



Source: Aircservices Australia, annotated by ATSB.

Overlying the Class D airspace was Class C en route airspace, which continued up from 4,500 ft to overlying Class A airspace at flight level (FL) 180.¹¹ The Class C airspace was controlled by an air traffic control position situated in Brisbane. At the time of the accident, this position was occupied by a trainee controller (trainee) in the first week of on-the-job training and under the supervision of an on-the-job training instructor (OJTI). The trainee and OJTI were managing both the sector of Class C and uncontrolled Class G airspace overlying and surrounding Coffs Harbour (Grafton) combined with a second sector of Class C and Class G airspace (Newell) extending to the west over the New England region.

The base of the Class C airspace also fanned out and progressively stepped up at further distances from Coffs Harbour Airport. At a distance of about 30 NM, where the pilot of DJU

¹¹ Flight level: at altitudes above 10,000 ft in Australia, an aircraft's height above mean sea level is referred to as a flight level (FL). FL 180 equates to about 18,000 ft.

requested to enter the airspace, the base of the Class C airspace was 5,500 ft. Outside of these boundaries was Class G uncontrolled airspace that extended up to the base of overlying Class A airspace at FL 180.

Within Class C airspace, aircraft were identified and controlled using automatic dependent surveillance broadcast (ADS-B) or radar surveillance data. IFR aircraft were positively separated from both IFR and VFR aircraft. VFR aircraft were provided traffic information about other VFR aircraft. The controllers had access to relevant weather forecasts and observations, but as they were physically located in Brisbane, they could not see the actual weather conditions.

In addition, Class C controllers provided pertinent operational information to IFR aircraft as well as to VFR aircraft upon request within the Class G airspace.

Within Class D airspace aircraft were not identified and controlled using surveillance data, and separation between aircraft was provided as follows:

- IFR flights were separated from other IFR and special VFR flights,¹²
- IFR flights were provided traffic information for VFR flights,
- VFR flights were provided traffic information on other VFR flights, and
- special VFR flights were separated from other special VFR flights in conditions less than VMC.

The Class D controller at Coffs Harbour Airport had access to weather forecasts, observations and could observe the prevailing weather conditions for the airspace. In addition, the control tower was fitted with a tower situation awareness display (TSAD). This displayed ADS-B and radar aircraft position information to enhance controller awareness, but was not used for traffic management or separation.

Flight notification

The pilot was not required to and did not submit a flight plan prior to departure.

As the pilot intended to operate in the Class C airspace, notification of the flight was to be provided to ATC as per Airservices' Aeronautical Information Publication (AIP) requirements. The pilot provided this notification when the aircraft was 10 NM north of Grafton (about 4 minutes prior to reaching the airspace boundary), with detail of the intended track and a clearance request to transit the Class C airspace.

Traffic

At the time of the Class C clearance request, there was no other traffic below 10,000 ft in the Coffs Harbour airspace, nor were there any impending arrivals or departures during the time the aircraft would have transited the airspace. Within the remaining airspace being managed by the trainee and OJTI, there were five other aircraft being provided an air traffic service.

Additionally, in the minute prior to receiving the request from VH-DJU, the trainee had completed handling a flight following request from a VFR aircraft.

Class C clearance request

The pilot requested a clearance to proceed from a position 10 NM north of Grafton (14 NM from the airspace boundary) direct to Taree at an altitude of 6,500 ft. This track passed within the Class C airspace for a distance of about 7 NM (2 minutes and 50 seconds at the aircraft's speed).

On receiving the clearance request, the trainee assessed that workload and priorities would not permit a clearance at the requested level, and that the transit would be better facilitated through the underlying Class D airspace. The trainee then advised the pilot accordingly, providing the option to request clearance for the Class D airspace. The trainee or OJTI did not contact the Class

¹² By day, when VMC does not exist, air traffic control may authorise, at pilot request, a 'special VFR' flight for the purpose of entering or leaving the controlled airspace.

D controller prior to initially proposing the pilot contact that controller. The OJTI felt that it was more effective for the pilot to contact the Class D controller directly rather than coordinating the request.

Workload assessment

The Airservices investigation report into the accident identified the following:

Sampling of Grafton sector controller performance assessment reports and daily training records included debriefing and coaching comments emphasising to trainees and controllers to be cautious with issuing clearances below A080 through the [Coffs Harbour] airspace. These comments are intended to highlight the known complications of transiting aircraft with processing IFR departures and arrivals. Techniques including the use of alternative clearances for departing and overflying aircraft are also emphasised during training and checking together with options for transiting aircraft to climb/descend to transit the airspace to manage the traffic scenarios. Assessing the options available with regard to the traffic picture is also emphasised during training and checking.

While acknowledging the complexities during training and checking is appropriate, this may unduly influence decision-making particularly in trainees and inexperienced controllers as they gain confidence and familiarity with new airspace volumes. In these cases, perceived workload may be prioritised ahead of an appropriate assessment of the current and projected traffic disposition.

The OJTI assessed that the workload at the time of the clearance request was low, but the trainee being new to the role may have perceived the workload as higher. The OJTI also stated that while the trainee's decision was conservative, it was appropriate. The OJTI felt no intervention was required as the pilot had been provided a suitable option. The OJTI further stated that 6,500 ft was a level that created separation difficulties with Coffs Harbour arrivals and departures, and given the limited size of the airspace this can very quickly create a significant workload issue.

Class C airspace infringement

After being advised that a Class C clearance was not available, the aircraft entered the Class C controlled airspace without clearance. After entering the controlled airspace, the pilot descended the aircraft before exiting the airspace about 1 minute later (see the section titled *Class D clearance request and communications below*).

The trainee did not attempt to contact the pilot of the aircraft during the airspace infringement. The OJTI noted that this airspace infringement did not cause any separation or traffic management concerns.

Class D clearance request and communications

The direct track to Taree from the pilot's position did not intersect the northern sections of the Class D airspace and therefore a clearance was not required on the direct track at or below 4,500 ft. However, the track did intersect the southern section of the airspace beyond Coffs Harbour.

The pilot requested a clearance with the Class D controller for a transit at 6,500 ft on a direct track to Taree. This flight path would have transited the Class C airspace and the Class D controller, queried whether the pilot wanted to remain at 6,500 ft. The pilot stated being 'happy to remain at 6,500 ft' and the controller, unaware of the previous Class C clearance request, instructed the pilot to contact the Class C controller for a clearance through that airspace.

The Class D controller then contacted the trainee to advise that the pilot would be calling them to request the clearance through the Class C airspace and that they wanted to transit at 6,500 ft. The Class D controller informed the trainee that a VFR transit would be difficult. During this discussion between the controllers, the pilot again contacted the Class C controller for the clearance.

The trainee advised the pilot that the Class D controller had been in contact, and instructed the pilot to again contact that controller.

At 0721, the pilot again contacted the Class D controller. The Class D controller advised that a clearance through the Class D airspace would only be available 'about not above 1,000 ft' and the pilot responded that the flight would descend to that level. The Class D controller asked the pilot to report entering the airspace at the 7 NM boundary. While a change in track was required to enter the airspace at the 7 NM boundary, no tracking instruction or guidance was provided to the pilot. The pilot did not voice any concerns about the advice provided by the Class D controller.

At 0724, about 10 minutes prior to the accident, the pilot contacted the Class D controller and advised that the flight was operating outside controlled airspace, in clear conditions at 4,100 ft AMSL, would remain on that track and request a clearance upon reaching the airspace boundary. No clearance was issued by the tower controller but the controller acknowledged the request and instructed the pilot to report entering controlled airspace. No further broadcasts were heard from the aircraft.

Seventeen minutes later, at around the time the controller expected the pilot to enter controlled airspace (and about 7 minutes after the accident had occurred), the Class D controller tried contacting the pilot twice without receiving a response.

Uncertainty phase not declared

Aircraft to the west of Coffs Harbour were known to disappear from the TSAD (as DJU did about 1 minute prior to the accident) due to the effect of the surrounding terrain. It was also common for VFR aircraft to be uncontactable by Coffs Harbour ATC when operating in Class G airspace in that area. The controller reported that, as the pilot had advised that the flight was operating in clear conditions at 4,100 ft, they held no concern for the progress of the flight. Consequently, no uncertainty phase was declared with respect to the flight.¹³

Fatigue

The ATSB found no indicators that increased the risk of the controllers experiencing a level of fatigue known to affect performance.

Future Coffs Harbour airspace reclassification

Prior to the accident, Airservices commenced the [Airspace Modernisation Program](#). This program will reclassify the Class C airspace above Coffs Harbour to Class E. At the time of writing, the timeframe for the completion of this program was not available.

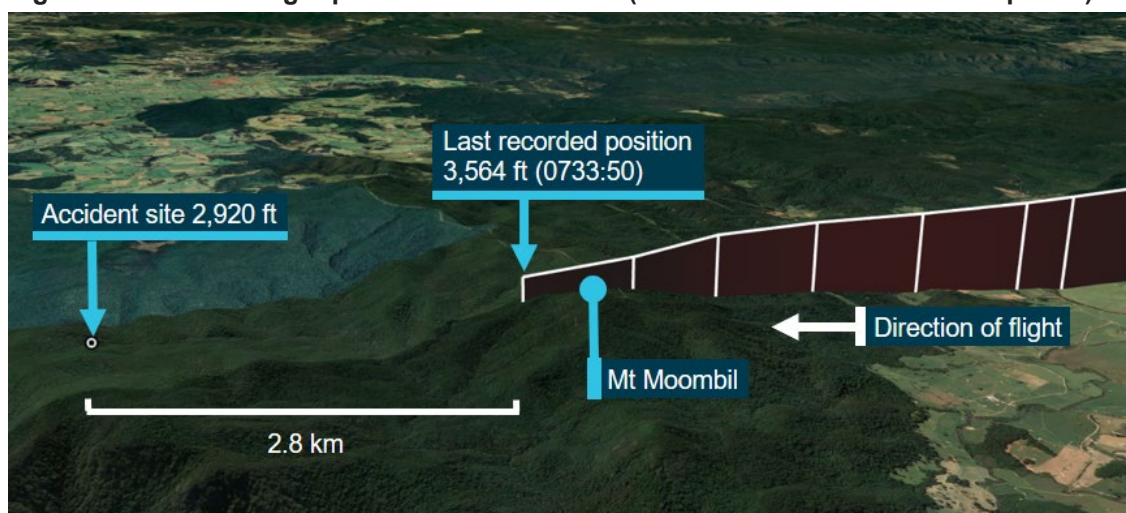
Undertaking a VFR transit of the Class E airspace will not require a clearance.

Recorded flight data

The aircraft was not required to be and was not fitted with flight data recorders.

Airservices provided ADS-B and radar surveillance data relating to the flight. The data captured the flight from soon after departure at Murwillumbah until about 2.8 km north of the accident site (Figure 8).

¹³ Uncertainty Phase: A situation where uncertainty exists as to the safety of an aircraft and its occupants.

Figure 8: Recorded flight path near accident site (towers on Mt Moombil not depicted)

Source: Google Earth annotated by ATSB

From 0722 until 0724, the aircraft descended from its cruising altitude of 6,500 ft to 4,100 ft. At this time, the pilot reported operating in clear conditions. About 2 minutes later, the aircraft climbed to 4,500 ft.

The aircraft remained at 4,500 ft until 0732 when a descent commenced and continued until the last recorded position at 0733:50. The descent rate averaged about 850 ft per minute with a groundspeed between 165 kt and 175 kt. The observed wind was almost directly across the descent track at 10-20 kt. According to the aircraft's previous owner, this descent profile was consistent with maintaining a cruise engine power setting.

During this descent, the aircraft passed a saddle about 400 m west of the summit of Mount Moombil. On top of the summit were two towers, 538 ft high. The aircraft passed about 386 ft below the top of these towers and continued descending across a broad valley. Throughout the descent, no significant variations in either aircraft track, speed or descent rate were recorded.

Data recovered from the pilot's Aera 500 GNSS unit was similar to the surveillance data until 3 minutes prior to accident (about 1 minute before the final descent) when the recorded data ended. The ATSB's examination of the unit determined that the data loss was most probably the result of power supply interruption during the accident sequence, before that data was recorded to the non-volatile memory.

Accident site and wreckage

The accident site was located at an elevation of 2,920 ft in heavily wooded, steep terrain within Dorrigo National Park (Figure 9).

Figure 9: Aircraft wreckage



Source: ATSB

The path made by the aircraft through the vegetation continued for about 65 m from the first identified aircraft component to the ground impact point (Figure 10). Tree-impact marks and the impact crater showed that the aircraft entered the vegetation in a wings-level attitude on a continuation of the previously recorded descent angle of about 2°.

Examination of the wreckage found that the aircraft entered the vegetation at relatively high speed with the flaps and landing gear retracted. No pre-impact faults were identified, but the examination was limited by the extensive damage. The serviceability of the flight instruments and associated systems could also not be verified. Both fuel tanks ruptured and an odour of fuel was present. The engine separated from the fuselage and the engine controls were severely disrupted during the accident sequence, which prevented determination of their positions. Damage to the propeller indicated that it was being driven by the engine at the time of the accident. The accident was not survivable.

Figure 10: Final descent path of the aircraft



Source: ATSB

Similar occurrences

The safety risks of visual pilots flying into non-visual conditions are well documented and continue to represent a significant factor in aircraft accidents and fatalities.

Many similar occurrences have been summarised in the ATSB research reports [General Aviation Pilot Behaviours in the Face of Adverse Weather](#) and [Accidents involving Visual Flight Rules pilots in Instrument Meteorological Conditions](#) as well as in ATSB accident reports, including [AO-2017-061](#) and [AO-2017-069](#).

A large amount of reference material is available to pilots for guidance on avoiding VFR flight into adverse weather as well as recovering a flight should inadvertent IMC entry occur, including by

seeking the assistance of ATC. The United States Aircraft Owners and Pilots Association Air Safety Institute website [VFR into IMC](#) provides an online course, videos and reference materials to assist pilots in avoiding and managing these scenarios. The following articles also provide valuable guidance on the subject.

- AVweb, [Surviving VFR into IMC](#).
- Plane & Pilot, [Surviving inadvertent IMC](#).

Safety analysis

Introduction

On the morning of 20 September 2019, while en route from Murwillumbah to Taree, New South Wales, a Mooney M20J, registered VH-DJU (DJU) descended into an area of low visibility and high terrain near the town of Dorrigo. During this descent, the aircraft collided with steep, forested terrain within Dorrigo National Park.

A review of the pilot's medical records, post-mortem toxicology results and recorded data indicated that it was very unlikely that the pilot became incapacitated during the flight. While examination of the wreckage was limited by extensive damage, no defects or anomalies were identified that contributed to the accident. As such, this analysis focuses on the examination of the operational factors that led to the aircraft's collision with terrain while being operated under the visual flight rules (VFR).

Class C clearance request

At 0717, about 4 minutes prior to reaching the Class C airspace north of Coffs Harbour, the pilot notified the controller (in Brisbane) of their intended track and requested clearance to transit the airspace. The intended transit would be short (7 NM, less than 3 minutes) and there was no other aircraft in the Class C or D airspace overlying Coffs Harbour, or any impending departures or arrivals there.

The aircraft was cruising at 6,500 ft and the pilot reported being 'happy' at that altitude, indicative of the visibility and conditions at the time. Based on the Bureau of Meteorology (BoM) analysis of the cloud conditions, the ATSB assessed that a VFR transit of the airspace at or above 6,500 ft was possible.

At the time the transit clearance request was made, the trainee controller (trainee) controlling the Class C airspace was managing five aircraft across two airspace sectors and had just completed handling another request. The trainee assessed that the workload would not allow the clearance requested for DJU and advised the pilot that it was not available and to contact the Coffs Harbour control tower to transit via the underlying Class D airspace.

The supervising on-the-job training instructor (OJTI) felt that the trainee's perception of workload was higher than it actually was, but it was a conservative assessment and appropriate given the trainee's experience (within the first week of on-the-job training). In any case, the OJTI was satisfied with the trainee's handling of the request as the decision to not provide a clearance was not considered unsafe and the pilot had been provided with an appropriate alternative.

The trainee and the OJTI also reported considering that the requested 6,500 ft transit may create separation difficulties with aircraft departing Coffs Harbour Airport under instrument flight rules. However, at the time there was no traffic expected to or from the airport. Additionally, a review of the available evidence indicated that there were no meteorological factors, traffic control instructions or procedures that prevented the pilot of DJU being provided with a clearance.

When DJU subsequently infringed Class C airspace as it descended, the trainee took no action and the OJTI felt the infringement did not present any traffic management issues. This indicates that the clearance requested could have been accommodated without any significant increase in controller workload.

Acceptance of the ATC option to seek a clearance through Class D airspace resulted in the pilot deviating from their intended plan and commenced a sequence of events that ultimately culminated in the accident. However, it is also important to recognise that the pilot had other available safe courses of action that were not utilised (discussed further below) and the ultimate outcome could not have been anticipated.

Decision to descend

When communicating with the Coffs Harbour tower controller to transit the Class D airspace, the pilot reported being 'happy at 6,500 ft'. An assessment of the BoM cloud conditions analysis indicated that visual meteorological conditions (VMC) allowed the flight to progress at and above that altitude or below about 2,000 ft, but extensive cloud cover probably prevented VMC flight between those two levels. The analysis also indicated that it was possible to proceed in VMC around the Class C controlled airspace at or above 6,500 ft. Conditions also permitted a diversion or descent to the north of Grafton to proceed coastal beneath the cloud layers south to Taree.

In response to the pilot's request, the Class D controller advised that '...the only way you could transit this airspace VFR would be around... not above one thousand [feet]'. The pilot responded that the flight would descend to 'not above 1,000 ft' and commenced a descent from 6,500 ft.

The controller had also requested that the pilot report at the 7 NM airspace boundary to receive a clearance, but had not provided any tracking information. Given the aircraft's position at the time, the pilot would have had to change track to reach that boundary.

At altitudes less than 1,000 ft along a track between the aircraft's position and Coffs Harbour Airport and more significantly, along a continuation of the direct track to Taree, terrain clearance was not possible. However, the pilot did not voice any concerns with the advice provided and the flight descended on the direct track to Taree.

While it was the pilot's decision to descend from 6,500 ft and continue along the direct track instead of other available safe options, this decision was likely influenced by the information provided by the controller. The descent took the aircraft toward both significant cloud and high terrain, increasing risk to the flight.

Pre-flight preparation

Although out-of-date, the aeronautical charts carried by the pilot showed the high terrain west of Coffs Harbour. However, the pilot was not using the charts at the time of the accident. Additionally, an electronic flight bag program was not used to provide topographical information. The pilot was heavily reliant on the global navigation satellite system units for situational awareness, but the limitations of these units may have prevented them from displaying adequate terrain information.

There was no evidence that the pilot obtained weather information prior to departure or during the flight, nor was any weather information found in the wreckage. As the weather encountered during the flight was similar to forecast, this information would have provided the pilot with advance notice of the likely conditions and supported more effective decision-making.

In summary, the pilot probably did not have an adequate understanding of the weather conditions or awareness of the topography west of Coffs Harbour. These factors reduced the pilot's ability to manage the flight path changes and identify the high terrain into which the aircraft was descending.

Flight into unsuitable conditions

The BoM analysis indicated that conditions across the mountain range west of Coffs Harbour at the time of the accident were below the minimum stipulated for VMC. This is consistent with the account of a witness located 10 km south-east of the accident site.

About 8 minutes after reporting that the aircraft was operating in clear conditions, surveillance data showed that the aircraft commenced a descent. Given the weather conditions in this area, it is possible that the pilot initiated this descent to remain clear of cloud (to comply with the VFR) as it is a pilot's responsibility to ensure VFR flights operate in accordance with VMC.

During the descent, the aircraft passed about 400 m to the west of and about 386 ft below the top of two towers at the summit of Mount Moombil. At or after that time, no significant change in flight

path was recorded, which suggests that the aircraft had encountered poor visibility and/or these towers were not sighted.

The aircraft's path through the vegetation to the final impact point was a continuation of the previous descent angle and track. This indicates that the flight was under control until the collision and that the pilot was unable to identify the high terrain in the aircraft's path in sufficient time to take avoiding action.

Flight reviews

An aeroplane flight review (AFR) is required every 2 years for a pilot to exercise the privileges of a flight crew licence. A current logbook was not located during the investigation, a previous logbook contained the only recorded flight review undertaken by the pilot, in January 2010. As the pilot had not undertaken an AFR since the introduction of CASR Part 61 in September 2014, by September 2018, the pilot's CAR 5 licence was no longer valid and the pilot was not licensed in accordance with Part 61.

As some piloting skills deteriorate over time, flight reviews serve as valuable opportunities for pilots to ensure that these skills remain at, or return to, the required standard. Furthermore, a number of the competencies required to be demonstrated during a flight review were relevant to the challenges faced by the pilot during the accident flight. Any deterioration in these skills would have diminished the pilot's ability to effectively manage these challenges. Therefore, undertaking the required regular training would very likely have assisted the pilot in the management of the flight. However, insufficient data was available to identify whether the uncompleted flight reviews contributed to the accident.

Mandatory medical disclosure

Toxicological examination identified that one of the medications that the pilot was using was not recorded in the pilot's medical file held by CASA. However, the ATSB found no evidence that the pilot's actions and decision making was impacted by this medication or a medical condition.

Nevertheless, it is important to declare all medications to address risks that could affect performance. While it is acknowledged that some pilots may be concerned about not meeting medical certificate requirements if they declare using medications or have a medical condition, pathways exist for managing certain medical conditions while maintaining a medical certificate.

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 involving Mooney M20J, VH-DJU, which occurred 26 km west of Coffs Harbour Airport, New South Wales on 20 September 2019.

Contributing factors

- The pilot was not provided with a clearance to transit Class C airspace despite no limiting meteorological factors. Instead, the Class C controller provided the option to seek a clearance at a lower altitude with an increased risk of encountering poor weather.
- The limited information provided by the Class D controller to enter that airspace probably led to the pilot's decision to descend into a hazardous area instead of other available safe options.
- The pilot was not carrying appropriate navigation equipment and had most probably not obtained weather forecasts. This reduced the pilot's ability to manage the flight path changes and identify the high terrain.
- The aircraft was descended into an area of high terrain in conditions below that required for visual flight, leading to controlled flight into terrain.

Other factors that increased risk

- The pilot had not undertaken required recurrent flight reviews or proficiency checks to maintain currency or obtain the licence required to undertake the flight. This probably led to a deterioration in the knowledge and skills required for safe flight management and decision making.
- Although there is no evidence that it contributed to this occurrence, the pilot was taking an undisclosed medication. The disclosure and recording requirements for a pilot's medical certificate aim to address the risks associated with medications or conditions that could affect performance.

Safety action

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. All of the directly involved parties are invited to provide submissions to this draft report. As part of that process, each organisation is asked to communicate what safety actions, if any, they have carried out to reduce the risk associated with this type of occurrences in the future. The ATSB has so far been advised of the following proactive safety action in response to this occurrence.

Additional safety action Airservices Australia

Following the occurrence, Airservices Australia implemented the following proactive safety actions:

- Classroom briefings and simulator exercises were completed by all New England controllers focussing on clearance issue techniques and workload assessment, as well as coordination with other units, where decisions taken will affect the other unit.
- Performance checks and unit reviews were undertaken to provide assurance that airways clearances were consistently issued in accordance with documented procedures.
- An information and education package was developed for controllers regarding the provision of advice and information to pilots not subject to a clearance.
- Inclusion of additional content to the on-the-job-instructor professional development sessions on ensuring the trainee's capability is commensurate with actual workload to optimise performance.

General details

Occurrence details

Date and time:	20 September 2019 – 0734 EST	
Occurrence category:	Accident	
Primary occurrence type:	Controlled flight into terrain	
Location:	26 km west of Coffs Harbour Airport, New South Wales	
	Latitude: S30° 20.22' S	Longitude: 152° 50.80' E

Pilot details

Licence details:	Private Pilot (Aeroplane) Licence (CAR 5)
Medical certificate:	Class 2 aviation medical certificate
Aeronautical experience:	about 1,037 hours

Aircraft details

Manufacturer and model:	Mooney Aircraft Corporation M20J	
Registration:	VH-DJU	
Serial number:	24-1075	
Type of operation:	Private	
Departure:	Murwillumbah, New South Wales	
Destination:	Taree, New South Wales	
Persons on board:	Crew – 1	Passengers – 1
Injuries:	Crew – 1 (fatal)	Passengers – 1 (fatal)
Aircraft damage:	Destroyed	

Sources and submissions

Sources of information

The sources of information during the investigation included the:

- aircraft manufacturer
- Aireon
- Airservices Australia
- Air Traffic Solutions
- Bureau of Meteorology
- Civil Aviation Safety Authority
- data from the pilot and passenger's personal devices
- Murwillumbah Aero Club and flying training providers at Gold Coast Airport
- New South Wales Ambulance and Police Force
- previous owner of the aircraft
- recorded data from the Aera 500 GNSS unit
- a witness

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:

- The Civil Aviation Safety Authority
- Airservices Australia
- the involved air traffic controllers
- Bureau of Meteorology

Submissions from those parties were reviewed and, where considered appropriate, the text of the draft report was amended accordingly.

Australian Transport Safety Bureau

About the ATSB

The ATSB is an independent Commonwealth Government statutory agency. It is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers.

The ATSB's purpose is to improve the safety of, and public confidence in, aviation, rail and marine transport through:

- independent investigation of transport accidents and other safety occurrences
- safety data recording, analysis and research
- fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia, as well as participating in overseas investigations involving Australian-registered aircraft and ships. It prioritises investigations that have the potential to deliver the greatest public benefit through improvements to transport safety.

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

Purpose of safety investigations

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

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

It is not a function of the ATSB to apportion blame or provide a means for determining liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner. The ATSB does not investigate for the purpose of taking administrative, regulatory or criminal action.

Terminology

An explanation of terminology used in ATSB investigation reports is available on the ATSB website. This includes terms such as occurrence, contributing factor, other factor that increased risk, and safety issue.