

Australian Government Australian Transport Safety Bureau

# Flight below minimum safe altitude, Piper PA-31 Mojave, VH-XGW

Near Bankstown Airport, New South Wales, on 22 March 2021

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#### Addendum

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# Safety summary

## What happened

In the early afternoon of 22 March 2021, a Piper PA-31P-350 Mojave aircraft, registered VH-XGW, departed Dubbo Airport, New South Wales (NSW), for a flight conducted under the instrument flight rules to Bankstown Airport, NSW, with one pilot and a crew member on board.

On arrival at Bankstown, the pilot commenced a GPS instrument approach for runway 11C. While the initial part of the approach proceeded normally, the aircraft was observed by the Bankstown tower controller to track 0.5 NM (0.9 km) to the south of the required track and this was advised to the pilot. After the aircraft passed the final approach fix, due to continued deviation, the tower controller instructed the pilot to discontinue the approach.

The pilot initially acknowledged that instruction but then requested, and was approved by the controller, to continue the approach visually as the aircraft had descended clear of cloud. The pilot then conducted extensive manoeuvring, including two orbits, at low altitude that were not in accordance with the approach requirements, before landing the aircraft safely on runway 11C.

## What the ATSB found

The ATSB identified that, while conducting an instrument approach into Bankstown Airport in instrument meteorological conditions, the pilot did not conduct a missed approach when the aircraft exceeded the tracking tolerance limits. That resulted in the aircraft operating significantly below the minimum allowable altitude.

Additionally, having descended visually below the minimum descent altitude and commenced manoeuvring to position the aircraft for a landing at Bankstown Airport, the pilot did not conduct a missed approach when the aircraft exited the circling area and the required visual reference with the runway was lost.

## Safety message

Managing approaches is one of the ATSB's <u>SafetyWatch</u> priorities. Adherence to operational procedures ensures consistency of pilot action and aircraft operation during the approach and landing phases of flight. This, along with careful monitoring of aircraft and approach parameters, ensures instrument approaches are conducted safely.

Most importantly, if the criteria for safe continuation of an approach are not met, the pilot should conduct a missed approach to negate the risk of colliding with obstacles or terrain.

# The investigation

Decisions regarding whether to conduct an investigation, and the scope of an investigation, are based on many factors, including the level of safety benefit likely to be obtained from an investigation. 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 22 March 2021 the pilot of a Piper PA-31P-350/A1 Mojave, registered VH-XGW (Figure 1) conducted pre-flight preparations for an early afternoon flight from Dubbo, New South Wales (NSW), to Bankstown, NSW. The flight was to preposition the aircraft at Bankstown for a medical transport flight planned for later that day. The crew for the flight from Dubbo comprised the pilot and a flight nurse. The aircraft was fitted with a Global Positioning System (GPS)<sup>1</sup> navigation unit and autopilot.

### Figure 1: VH-XGW



A photo of VH-XGW. Source: JETPHOTOS, Kynan Schneider

The aerodrome forecast for Bankstown,<sup>2</sup> which was obtained by the pilot and covered the period from 1100 Eastern Daylight-saving Time<sup>3</sup> through to 2200, stated that the expected visibility was greater than 10 km with light rain showers and scattered<sup>4</sup> cloud at 1,500 ft above mean sea level (AMSL) and broken cloud at 2,500 ft.

The forecast included temporary changes, where visibility would reduce to 3,000 m in moderate rain showers and the cloud cover would include a broken layer at 800 ft. Having reviewed the forecast and other planning data, the pilot submitted a flight plan, which stated that the flight's planned duration was 58 minutes, the aircraft had an endurance in excess of 4 hours, and that the

<sup>&</sup>lt;sup>1</sup> GPS is a United States-developed Global Navigation Satellite System (GNSS).

<sup>&</sup>lt;sup>2</sup> Aerodrome Forecast (TAF): a statement of meteorological conditions expected for a specific period of time in the airspace within a radius of 5 NM (9 km) of the aerodrome reference point.

<sup>&</sup>lt;sup>3</sup> Eastern Daylight-saving Time (EDT): Coordinated Universal Time (UTC) + 11 hours.

<sup>&</sup>lt;sup>4</sup> Cloud cover: in aviation, cloud cover is reported using words that denote the extent of the cover – 'scattered' indicates that cloud is covering between a quarter and a half of the sky and 'broken' indicates that more than half to almost all the sky is covered.

flight would be conducted under instrument flight rules (IFR).<sup>5</sup> The flight plan also stated that the aircraft was performance category B (CAT B) (see the section titled *Circling area*).

At 1343, the aircraft departed Dubbo for Bankstown. As the aircraft approached Bankstown, the pilot was cleared to conduct an RNAV-Z<sub>(GNSS)</sub>RWY11C (RNAV-Z) instrument approach procedure into Bankstown (see the section titled *Bankstown RNAV-Z approach*). At 1448, the pilot called Bankstown tower and reported approaching the RNAV-Z intermediate approach fix at an altitude of 2,500 ft. In response, the tower instructed the pilot to report at the final approach fix (SBKWF). At this point in the flight the aircraft was in cloud. The pilot reported that the approach into Bankstown was predominantly flown with the use of the aircraft's autopilot.

Figure 2 shows the aircraft's flight path<sup>6</sup> in relation to the RNAV-Z instrument approach procedure's required track. The aircraft passed abeam the intermediate approach fix (SBKWI) at 1449:30 and then began diverging from the RNAV-Z approach path as it tracked towards the final approach fix (SBKWF). Approaching SBKWF, the tower advised the pilot that the aircraft was tracking 0.5 NM (0.9 km) to the south of the approach path and enquired whether aircraft operations were normal.

After the aircraft passed abeam SBKWF, the tower instructed the pilot to conduct the missed approach due to the continued significant deviation from the expected flight path. The pilot responded, 'going around'—at that time the aircraft was descending through 1,100 ft. Despite the pilot advising the intention to commence the missed approach, further communications then ensued, during which the pilot requested to conduct a circling approach. In response the tower enquired about whether the pilot was visual, and the pilot advised that they were. The aircraft continued to descend and track towards the runway. About 30 seconds after the pilot called 'going around', the tower acknowledged the pilot's 'visual' declaration and instructed the pilot to join final for runway 11C.

<sup>&</sup>lt;sup>5</sup> Instrument flight rules (IFR): a set of regulations that permit the pilot to operate an aircraft in instrument meteorological conditions (IMC), which have much lower weather minimums than visual flight rules (VFR). 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.

<sup>&</sup>lt;sup>6</sup> The aircraft's position and altitude data were derived from ADS-B and Mode S data transmitted to ATC by VH-XGW. ADS-B positional data was recorded in 5 second intervals. The Mode S pressure altitude data was reported to the nearest 100 ft and automatically adjusted for localised atmospheric pressure to produce an accurate altitude.

A AN A ANTA	A BUNKER	Time	Event
Aircraft flight path	SBKWI DNAV/Z Approach Bath	1449:30	Aircraft passed abeam SBKWI
State of the second	KNAV-Z Approach Paul		
	THE STOR		
2 Start		1450:25	Tower advised the pilot that the aircraft was tracking 0.5 NM to the south of the RNAV-Z
ALCONT AND	The second		
The state of the s	Rever and Sta		
ATC: Missod	SBKWF	1451:05	Aircraft passed abeam SBKWF
Approach'	1	1451:23	Pilot instructed to conduct a missed approach
ATC: 2 <sup>nd</sup> 'Terrain Alert'	ATC: 1 <sup>st</sup> 'Terrain Alert'	1451:55	Tower acknowledged the pilot was 'visual' and cleared the aircraft to position for final runway 11C
	Warwick Farm	1452:28	Tower issued the pilot with a 'Terrain Alert'
	SBKWM	1453:05	Tower issued the pilot with a second 'Terrain Alert'
1 - Local State			
L. REDRE	2.66NM arc from		
A CONTRACT	RWY11C threshold		
	RWY11C	1458	Aircraft landed

Figure 2: Aircraft flight path in relation to the RNAV-Z track and related key events

A Google Earth image of the aircraft's approach track with significant events and locations marked. Source: Google Earth and Airservices Australia, modified by the ATSB.

The pilot advised that, on receipt of the amended tracking instruction from the tower, they checked the GPS distance readout and confirmed that the aircraft was established within the CAT B circling area. Shortly after, the pilot stated that the aircraft entered a rain shower and visibility was momentarily reduced. To retain visual flight conditions, the pilot initiated a sharp left turn. Also, at about this time, the tower cleared the aircraft to land, which the pilot read back.

At 1452:28, as the aircraft was observed to be tracking away from the runway and at an altitude of 500 ft, the tower issued a safety alert for terrain to the pilot, which the pilot acknowledged. The tower followed this up with confirmation that the QNH<sup>7</sup> was 1019 (hPa), which the pilot read back. The aircraft continued the left turn to complete a full left orbit. During this orbit, the aircraft descended to an altitude of 400 ft as it crossed the RNAV-Z approach path the second time tracking south. The terrain elevation in that area is about 100 ft.

At 1453:05, as the aircraft exited the orbit to the west of the Warwick Farm racecourse at an altitude of 500 ft, the tower issued a second safety alert for terrain as they had lost sight of the aircraft. The pilot responded that the aircraft was over the Georges River (adjacent to Warwick

<sup>&</sup>lt;sup>7</sup> QNH: the altimeter barometric pressure subscale used to indicate height above sea level.

Farm racecourse) and manoeuvring. Shortly after, the tower advised the pilot that they had regained sight of the aircraft.

The pilot then commenced a second left orbit at an altitude of between 5-600 ft. During this second orbit the tower requested confirmation that the pilot had the aerodrome in sight. The pilot responded in the affirmative, and that the intention was to 'sort some things out' while over the racecourse. The tower then instructed the pilot to join final, track as required and report established on final. The pilot acknowledged the instruction. The aircraft had, by then, completed the second orbit and commenced tracking towards the aerodrome. Shortly thereafter, the tower provided further advice concerning weather to the north of the airfield. In response, the pilot positioned the aircraft for a right circuit to runway 11C and landed at 1458.

The pilot later reported that the aircraft performed normally during the flight and that there were no faults with the aircraft or it's navigation systems.

## Context

### Instrument approach requirements

Aeronautical Information Publication (AIP) ENR 1.1 paragraph 2.11.2.1<sup>8</sup> provided that, unless authorised to make a visual approach, an IFR flight must conform to the published instrument approach procedure nominated by air traffic control (ATC). A pilot can request ATC authorisation to deviate from an instrument approach procedure, and that subsequent authorisation is deemed an instruction from ATC.

The Bankstown automatic terminal information service (ATIS)<sup>9</sup> information valid at the time of the occurrence identified that an instrument approach procedure was required for the approach and landing into Bankstown. The relevant components of the information were that:

- runway 11C was in use
- instrument approach procedures were in place
- visibility was 8,000 m, reducing to 3,000 m in rain showers
- cloud comprised few at 1,000 ft, scattered at 2,000 ft and broken at 3,000 ft
- the QNH was 1019 hPa.

## Bankstown RNAV-Z approach

The RNAV-Z<sub>(GNSS)</sub>RWY11C approach procedure (Figure 3) is a non-precision approach (NPA) that uses GNSS signals for a 2-dimensional instrument approach procedure. The following features from the chart are relevant to the approach:

- The approach is designed as a straight-in approach to runway 11C, with the option of conducting circling approaches to the airport's runways.
- The minima titles are shaded. This identifies that the published minima could be reduced by 100 ft when using an actual QNH, such as that provided by the Bankstown ATIS.
- The approach minima, based on the aircraft's performance category CAT B<sup>10</sup> as reported in the flight plan, were:

<sup>&</sup>lt;sup>8</sup> AIP ENR 1 GENERAL RULES AND PROCEDURES, section 1.1 GENERAL RULES, subsection 2 OPERATIONS IN CONTROLLED AIRSPACE, sub subsection 2.11 Descent and Approach

<sup>&</sup>lt;sup>9</sup> Automatic Terminal Information Service (ATIS): The provision of current, routine information to arriving and departing aircraft by means of continuous and repetitive broadcasts during the hours when the unit responsible for the service is in operation.

<sup>&</sup>lt;sup>10</sup> For the purposes of determining safety-based criteria such as landing minima for an instrument approach procedure, aircraft are separated into performance categories. These categories are based on aircraft configuration and weight criteria and the aircraft's indicated airspeed under these conditions at the threshold when landing. CAT B covers airspeeds from 91-120 kt.

- for the straight-in approach, the minimum descent altitude (MDA) of 580 ft AMSL
- for the circling approach, the MDA of 650 ft AMSL.
- The plan profile of the chart identified several obstacles around the approach and missed approach track. The highlighted obstacles had the potential to directly affect the approach and/or missed approach flight paths when below the approach minima.<sup>11</sup>
- The minimum safe altitude within 15 NM of Bankstown Airport was 2,500 ft AMSL.

Figure 3: The RNAV-Z<sub>(GNSS)</sub>RWY 11C approach procedure chart



Source: Airservices

<sup>&</sup>lt;sup>11</sup> The approach minima indicate that the limiting obstacles for the straight-in and circling approaches are probably 334 ft for the straight-in approach and 355 ft AMSL for the circling approach.

## The circling area

The required obstacle clearance for circling approaches is established by applying a radius distance, which is based on the aircraft's performance category, to the threshold of all runways usable by that category of aircraft. For a CAT B aircraft, that radius is 2.66 NM. Tangents are then drawn from the extremities of the arcs to complete the circling area (Figure 4). The circling minima is then determined by applying the required obstacle clearance value of 90 m, or approximately 300 ft, to the highest obstacle within that area.

The pilot reported that, during the conduct of the instrument approach and the subsequent visual manoeuvring, an available option was to remain inside the higher CAT C circling limits (based on a radius of 4.2 NM) and above the required obstacle clearance limit of 400 ft.

The pilot also stated that at no time was the aircraft's barometric altimeter observed to go below 400 ft. However, with an accurate QNH set, that instrument measures height AMSL within defined accuracy tolerances. Consequently, operating at an altitude of 400 ft within the CAT C circling area for Bankstown Airport did not provide the required terrain clearance as it did not allow for the terrain elevation and obstacles.



#### Figure 4: CAT B circling area construction

Source: ICAO Doc 8168 Volume II.

## Approach tolerances for the RNAV-Z approach

The following lateral approach tolerances applied to the RNAV-Z approach into Bankstown Airport:<sup>12</sup>

 For the intermediate segment of the approach, the required navigation performance (RNP)<sup>13</sup> is 1.0 NM, which is displayed as full-scale deflection on a course deviation indicator (CDI)<sup>14</sup> to the pilot. The target level of safety performance for this segment is within half-scale CDI deflection—that is 0.5 NM.

<sup>&</sup>lt;sup>12</sup> The tolerances were derived from Civil Aviation Order (CAO) 20.91 and Civil Aviation Advisory Publication (CAAP) 179A-1(1).

<sup>&</sup>lt;sup>13</sup> RNP: required navigation performance, a statement of the navigation performance necessary for operation within a defined airspace. RNP is similar to the RNAV specification, but RNP requires on board performance monitoring and alerting.

<sup>&</sup>lt;sup>14</sup> An avionics instrument used for aircraft navigation. The CDI displays the aircraft's lateral displacement in relation to a specified course to or from a radio navigation beacon, or in relation to a specified GNSS-based track.

- From 2 NM before the final approach fix, the GPS tracking display transitions to the final segment RNP of 0.3 NM, displayed as full-scale CDI deflection. The target level of safety performance for the final segment is also half-scale CDI deflection—that is 0.15 NM.
- Under Civil Aviation Order 20.91,<sup>15</sup> a missed approach must be executed if, during the segment of a procedure, the cross-track error/deviation equals or is reasonably likely to equal, the RNP for segment of the procedure.

The aircraft's GPS unit automatically sets the aircraft navigation instruments' CDI scale to the RNP limits for the various segments of the RNAV-Z procedure as described above.

An aircraft must be 'established' on the instrument approach procedure's track before commencing descent on the approach procedure.<sup>16</sup> Established was defined as within half-scale deflection for GNSS type approaches.

#### Application of the approach tolerances to the occurrence flight path

The aircraft's flight path with respect to the approach tolerances is displayed in Figure 5. The half-scale and full-scale limits are displayed as a surface set to the segment's minimum segment altitude of 1,400 ft. while the full-scale tracking limits are displayed as the outer red line. The transition from the intermediate segment's RNP 1.0 NM to the final segment's RNP 0.3 NM is displayed as a progressively decreasing maximum permissible displacement (decreasing tolerance) from 2.0 NM before final approach fix (SBKWF).

The aircraft's track early in the intermediate approach segment was within tolerances, but progressively diverged from the required approach path. The decreasing tolerance from 2 NM before SBKWF and the divergent flight path resulted in the aircraft rapidly exceeding the required tracking tolerances for the intermediate segment. It was at around this point in the approach that the tower alerted the pilot to the aircraft tracking 0.5 NM south of the required instrument approach path. As the aircraft passed abeam SBKWF, it was significantly outside of the full-scale RNP limit at an altitude of 1,400 ft.



Figure 5: The aircraft's initial approach flight path in relation to tracking tolerances

Source: Google earth and Airservices, modified by ATSB.

<sup>&</sup>lt;sup>15</sup> Civil Aviation Order 20.91 (Instructions and directions for performance-based navigation) Instrument 2014.

<sup>&</sup>lt;sup>16</sup> AIP ENR 1 GENERAL RULES AND PROCEDURES, section 1.5 HOLDING, APPROACH AND DEPARTURE PROCEDURES, subsection 1. HOLDING AND INSTRUMENT APPROACH TO LAND (IAL) PROCEDURES, sub subsection 1.21 Descent.

The aircraft's flight path with respect to the approach tolerances in the final approach segment is displayed in Figure 6. After passing abeam the final approach fix the aircraft's lateral displacement from the required approach track exceeded the full-scale RNP limit.

During the final approach segment, the aircraft's track converged with the required track, but the aircraft was not established within the required tracking tolerances until after the pilot reported being visual to ATC.

At the commencement of the left orbit, and as the aircraft crossed the approach track for the first time, the aircraft was above the straight-in approach minimum descent altitude of 580 ft. As the orbit continued and the aircraft crossed the approach track for the second time, the aircraft was below the 930 ft segment minimum altitude and had descended below the 580 ft approach minimum descent altitude. The aircraft was also outside of the CAT B circling area (represented by the light blue arc).



Figure 6: The aircraft's final approach flight path in relation to tracking tolerances

Source: Google earth and Airservices, modified by ATSE

## Missed approach requirements

AIP ENR 1.5 paragraph 1.10.1<sup>17</sup> contained specific circumstances where a missed approach must be conducted. These included:

- during the final segment of an instrument approach, where the aircraft is not maintained within the applicable navigation tolerance for the aid in use
- when the required visual reference is not established at or before reaching the missed approach point from which the missed approach procedure commences
- when a landing cannot be made from a runway approach, unless a circling approach can be conducted in weather conditions equal to or better than those specified for circling
- when visual reference is lost while circling to land from an instrument approach.

In a note following these requirements, 'visual reference' was defined as meaning the runway threshold, or approach lights or other markings identifiable with the landing runway were clearly

<sup>&</sup>lt;sup>17</sup> AIP ENR 1 GENERAL RULES AND PROCEDURES, section 1.5 HOLDING, APPROACH AND DEPARTURE PROCEDURES, subsection 1. HOLDING AND INSTRUMENT APPROACH TO LAND (IAL) PROCEDURES, sub subsection 1.10 Missed Approach – Standard Procedures.

visible to the pilot, and for circling approaches, clear of cloud, in sight of the ground or water and with a flight visibility not less than the minimum specified for circling.

### Descent from the minimum descent altitude to the runway

The aim of an instrument approach procedure is to position the aircraft so that the pilot can establish visual contact with the runway and land. The AIP detailed the requirements for the transition from the instrument approach procedure and descent from the MDA to positioning for a landing. These requirements varied depending on whether a straight-in approach or a circling approach was being conducted.

#### Straight-in approach

For a straight-in approach, AIP ENR 1.5 paragraph 1.8.2<sup>18</sup> stated that, provided the required meteorological minima are met, descent below the straight-in MDA may only occur when:

- visual reference can be maintained and
- the aircraft is continuously in a position from which a descent to a landing on the intended runway can be made at a normal rate of descent using normal flight manoeuvres that will allow touchdown to occur within the touchdown zone of the runway of intended landing.

The definition of 'visual reference' in this context is the same as previously detailed in the section titled *Requirements for a missed approach*.

#### **Circling approach**

The circling approach and visual circling rules are more complex than those for the straight-in approach. The following components of these rules are relevant: <sup>19</sup>

During visual circling, descent below the circling MDA may only occur when the pilot:

a. maintains the aircraft within the circling area; and

b. maintains a visibility, along the intended flight path, not less than the minimum specified on the chart for the procedure; and

c. maintains visual contact with the landing runway environment (i.e. the runway threshold or approach lighting or other markings identifiable with the runway); and either ...

e. in daylight only, while complying with a., b. and c., maintains visual contact with obstacles along the intended flight path and an obstacle clearance not less than the minimum for the aircraft performance category until the aircraft is aligned with the landing runway.

Notes that followed these rules stated the following:

Note 1: The concept is as follows: ...

(2) When daylight exists and obstacles can be seen, the pilot has the option of descending from MDA from any position within the circling area while maintaining an obstacle clearance not less than that required for the aircraft performance category.

(3) Once the pilot initiates descent below circling MDA, the obstacle protection offered by visual circling at the MDA ends and they are responsible for ensuring the required clearance from obstacles is maintained visually.

<sup>&</sup>lt;sup>18</sup> AIP ENR 1 GENERAL RULES AND PROCEDURES, section 1.5 HOLDING, APPROACH AND DEPARTURE PROCEDURES, subsection 1. HOLDING AND INSTRUMENT APPROACH TO LAND (IAL) PROCEDURES, sub subsection 1.8 Visual Manoeuvring (non-Circling) Subsequent to Non-Precision Approaches (NPA) and Approaches with Vertical Guidance (APV).

<sup>&</sup>lt;sup>19</sup> AIP ENR 1 GENERAL RULES AND PROCEDURES, section 1.5 HOLDING, APPROACH AND DEPARTURE PROCEDURES, subsection 1. HOLDING AND INSTRUMENT APPROACH TO LAND (IAL) PROCEDURES, sub subsection 1.7 Circling Approaches and Visual Circling.

## Guidance on non-precision approaches

The Civil Aviation Advisory Publication (CAAP) 178-1(2)<sup>20</sup>, provided guidance on the conduct of an NPA, such as the Bankstown Airport RNAV-Z approach. The CAAP compiled all relevant regulation, standards, and practices into a single document, but also recommended that it be read in conjunction with those sources.

### Straight-in approach

The CAAP stated that it is commonly acknowledged that straight-in approaches are significantly safer than circling approaches. For an NPA with a straight in approach, once the criteria for descent from the MDA are met, the required approach path from the MDA to the runway is protected from obstacles by aerodrome and instrument procedure design standards. The visibility requirement for the straight-in approach is based on the distance from the runway threshold where a normal 3 degree approach descent path to the runway intercepts the MDA.

### **Circling approach**

Circling approaches normally require manoeuvring to align the aircraft with a suitable runway other than the designated straight-in runway. Circling is a visual procedure that can be hazardous if not executed correctly. Visibility for circling operations is based on the relevant aircraft category's radius of turn, in adverse wind conditions, to enable the aircraft to manoeuvre from a downwind position and align with the landing runway.

This visibility value will most likely be less than that required for a straight-in approach. This is due to the normal profile for the circling approach, which is to remain at or above the circling MDA until the aircraft is established within the aerodrome's circuit area, and then to visually circle for landing within the circuit while maintaining visual contact with the runway. Obstacle clearance is guaranteed in the normal runway circuit pattern.

The pilot may elect to descend below the circling MDA by day, but only in accordance with specific rules. In doing so the pilot takes responsibility for obstacle clearance. As spot heights on instrument approach and landing charts do not necessarily indicate the highest terrain, or all obstacles in the circling area, pilots should only exercise this option when they are familiar with the terrain in the circling area. Without detailed local knowledge, it is a safer option to utilise the obstacle protection afforded by remaining at the circling MDA until within the circuit area.

## **Safety analysis**

On the afternoon of 22 March 2021, the pilot of VH-XGW commenced a flight from Dubbo to Bankstown. The flight was conducted under instrument flight rules and, due to the prevailing weather conditions, an instrument approach procedure was necessary to enable a landing at Bankstown Airport.

### Tracking tolerance exceedance

The ATC clearance for the approach into Bankstown required the conduct of a straight-in instrument approach to runway 11C. As the aircraft passed abeam the intermediate approach fix, the aircraft was within the required half-scale deflection to be established on the approach path, enabling the pilot to commence descent on the approach. However, from that point on the aircraft progressively diverged from the required track.

Approaching abeam the final approach fix, the combination of reducing track tolerance and continued track divergence resulted in the aircraft exceeding the tolerance limit of full-scale deflection, or 0.3 NM track displacement. Significantly, this tracking error resulted in the aircraft being displaced outside of the area that had been surveyed to be clear of obstacles at an altitude

<sup>&</sup>lt;sup>20</sup> Titled Non-precision Approaches (NPA) & Approaches with Vertical Guidance (APV).

of 1,100 ft, well below the Bankstown 15 NM minimum safe altitude of 2,500 ft. Further, the pilot reported that, at this point in the approach, visual flight conditions had not yet been established.

Despite those circumstances, the requirements of the instrument approach and the ATC instruction, the pilot did not conduct the published missed approach procedure.

## Descent below the minimum descent altitude

Following initial acknowledgement of the ATC missed approach instruction, the pilot requested a clearance for a circling approach while continuing the descent. During the ensuing 30 seconds of communications, the aircraft descended out of the cloud and the pilot reported being visual to ATC. The pilot also advised that they checked the distance readout to Bankstown Airport and confirmed that the aircraft was within the aerodrome CAT B circling area.

At about the same time, ATC cleared the aircraft to track for final runway 11C. The pilot then initiated descent from MDA at the CAT B circling boundary with the intention of maintaining visual contact with obstacles along the intended flight path at the minimum permitted obstacle clearance height. The pilot considered that this was the safest option, given the weather conditions and the aircraft's absence of a weather radar.

Such manoeuvring at that position was contrary to the intention of a circling approach, which is normally performed within the surveyed environment of the circuit area as part of visual circling to other than the straight-in approach runway. More importantly, when compared to the straight-in approach descent profile, it resulted in reduced obstacle clearance, increased pilot workload and an increased risk of an unstable approach.

## Loss of visual reference while below MDA

Shortly after entering the CAT B circling area, and with the pilot having reportedly established visual contact with the runway environment, the aircraft entered a rain shower. To maintain visual flight conditions, the pilot commenced a left turn away from the runway. This turn continued in to the first of two left orbits, during which the aircraft exited the CAT B circling area and descended to an altitude of around 400 ft.

The pilot stated that the aircraft was maintained within the larger CAT C circling area and that the required separation with obstacles was maintained. However, flight surveillance data indicated that the aircraft descended below the minimum altitude required to maintain separation from the terrain below the aircraft. Further, ATC was expecting the aircraft to operate within the CAT B circling limits, as stated in the flight plan, and twice during the conduct of the orbits provided terrain alerts to the pilot.

When operating below MDA, collision with terrain or obstacles are the immediate threat. The AIP and CAAP 178 stated that not all terrain and obstacles are marked on aerodrome charts. Further, the only areas where obstacle clearance is assured are those associated with the straight-in approach path, and within the circling area. Outside of these areas, separation from terrain and obstacles while below the MDA is dependent on visual acquisition and avoidance. Additionally, continuation below MDA is predicated on the pilot continuously maintaining visual reference with the runway.

Almost immediately on declaring visual, visibility deteriorated sufficiently for the pilot to initiate a turn away from the runway. The pilot stated that visual reference was only lost momentarily, however, during the left turns away from the airport, the runway environment would have been obscured by the aircraft's structure for significant periods of time. Despite that, the pilot persisted with the approach and landing rather than conducting the published missed approach. Continuation of the approach resulted in the loss of obstacle clearance assurance and an increased risk to the aircraft occupants.

## **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 flight below minimum safe altitude by VH-XGW on 22 March 2021.

## **Contributing factors**

- While conducting an instrument approach into Bankstown Airport in instrument meteorological conditions, the pilot did not conduct a missed approach when the aircraft exceeded the tracking tolerance limits. That resulted in the aircraft operating significantly below the minimum allowable altitude.
- Having descended visually below the minimum descent altitude and commenced manoeuvring to position the aircraft for a landing at Bankstown Airport, the pilot did not conduct a missed approach when the aircraft exited the circling area and the required visual reference with the runway was lost.

## Safety actions

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.

## Sources and submissions

## Sources of information

The sources of information during the investigation included the:

- pilot
- Civil Aviation Safety Authority
- AIRMED Australia Pty Ltd
- Airservices Australia.

### 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 pilot
- Civil Aviation Safety Authority
- AIRMED Australia Pty Ltd
- Airservices Australia.

Submissions were received from:

- the pilot
- Civil Aviation Safety Authority.

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

# **General details**

## Occurrence details

Date and time:	22 March 2021 1448 EDT		
Occurrence category:	Serious incident		
Primary occurrence type:	Operational non-compliance, Flight below minimum altitude		
Location:	6 km west of Bankstown Airport		
	Latitude: 33° 53.718' S	Longitude: 150° 55.722' E	

## Aircraft details

Manufacturer and model:	Piper Aircraft Corp PA-31P-350/A1		
Registration:	VH-XGW		
Operator:	Airmed Australia Pty Ltd		
Serial number:	31P-8414001		
Type of operation:	Aerial Work-EMS - (Aerial Work)		
Activity:	Commercial air transport-Non-scheduled-Medical transport		
Departure:	Dubbo Airport, New South Wales		
Destination:	Bankstown Airport, New South Wales		
Persons on board:	Crew – 2	Passengers – 0	
Injuries:	Crew – 0	Passengers – 0	
Aircraft damage:	None		