

## Accident

<b>Aircraft Type and Registration:</b>	Socata TB-20 Trinidad, N33NW	
<b>No &amp; Type of Engines:</b>	Lycoming IO-540 SER piston engine	
<b>Year of Manufacture:</b>	1990 (Serial no: 1073)	
<b>Date &amp; Time (UTC):</b>	10 October 2023 at 1535 hrs	
<b>Location:</b>	Langham Airfield, Norfolk	
<b>Type of Flight:</b>	Private	
<b>Persons on Board:</b>	Crew - 1	Passengers - 2
<b>Injuries:</b>	Crew - 1 (Serious)	Passengers - 2 (Serious)
<b>Nature of Damage:</b>	Aircraft destroyed	
<b>Commander's Licence:</b>	Private Pilot's Licence	
<b>Commander's Age:</b>	47 years	
<b>Commander's Flying Experience:</b>	121 hours (of which 27 were on type) Last 90 days - 3 hours Last 28 days - 1 hour	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot and further enquiries by AAIB	

## Synopsis

Shortly after taking off from an unlicensed airstrip, the aircraft drifted to the left, struck trees along the side of the runway and decended before striking the ground. A combination of turbulent air from the trees and a tailstrike is likely to have contributed towards the accident. The occupants were all seriously injured.

The position of the trees, in relation to the runway, was less than that recommended for unlicensed aerodromes in CAA Civil Aviation Publication (CAP) 793 '*Safe Operating Practices at Unlicensed Aerodromes.*'

## History of the flight

The pilot and two passengers had flown from Nottingham to Langham earlier in the day. The pilot had not flown to Langham before but had visited the airfield two weeks previously, and sought advice from other pilots and the airfield tenant as part of his pre-flight planning.

There was a crosswind during final approach and landing requiring the pilot to 'crab' the aircraft, and after touching down the pilot felt the aircraft drag suddenly to the left during braking. During backtracking along the runway the pilot tested the aircraft's brakes and controls, could not find anything wrong, and did not see any damage to the runway surface that may have been contributory.

Upon embarking on the return flight to Nottingham, the weather was CAVOK with a wind from 230° at 12 kt. The takeoff roll commenced from the threshold of Runway 28 and the pilot recalls reaching 73 kt before the aircraft became airborne without pitch input.

An eyewitness saw the aircraft wheels leave the ground; shortly afterwards the aircraft “appeared to crab to the left” and then later “tip to the left.” The passengers “felt a shunt” to the left as if the aircraft had hit something or had encountered a gust of wind. The pilot applied corrective control inputs but as the aircraft became level with the top of trees alongside the runway’s edge, the left wingtip dropped and struck several trees. The aircraft descended steeply and came to rest on its left side.

Both passengers were assisted to escape out of the broken windscreen by bystanders, who then forced the right door open to extricate the pilot. Emergency services attended and the occupants were transferred to hospital, having sustained serious injuries.

### Accident site

N33NW came to rest just inside the far edge of a wood, approximately 460 m from the threshold of Runway 28 (Figure 1). The left wing and engine had separated from the fuselage, causing a fuel leak. The aircraft’s tail section including horizontal stabiliser and fin was attached but had been severely damaged in the accident sequence. The passenger cabin remained largely intact.



**Figure 1**

Accident site location

Rubber tyre marks matching N33NW’s main landing gear were visible along the surface of the runway. They began 240 m from the threshold, continued for approximately 150 m, and corresponded to braking after N33NW’s incoming flight. The marks deviated to the left after the left mainwheel crossed a slightly sunken and cracked area of the runway’s surface.

## Aircraft information

The Socata TB-20 is a low-wing, single engine piston aircraft with seating for up to four passengers (Figure 2). It has a 9.85 m wingspan and retractable landing gear.

The TB-20 standard airspeeds are: rotation 68 KIAS, initial climb 75 KIAS and optimum climb speed 95 KIAS. The manufacturer's takeoff settings for flaps are 10° and the aircraft is fitted with a manually operated rudder trim control, with a TAKE OFF setting to account for left yaw.

Maximum takeoff weight is 1,400 kg and at the time of the accident it was estimated the aircraft weighed 1,257 kg. The calculated takeoff roll at this weight is 232 m.



**Figure 2**

Socata TB-20 N33NW (used with permission)

## Aircraft examination

The main wheels turned freely, and the tyres showed some wear and light flat-spotting typical of normal operation. The parking brake rotary switch was set to the 'off' position.

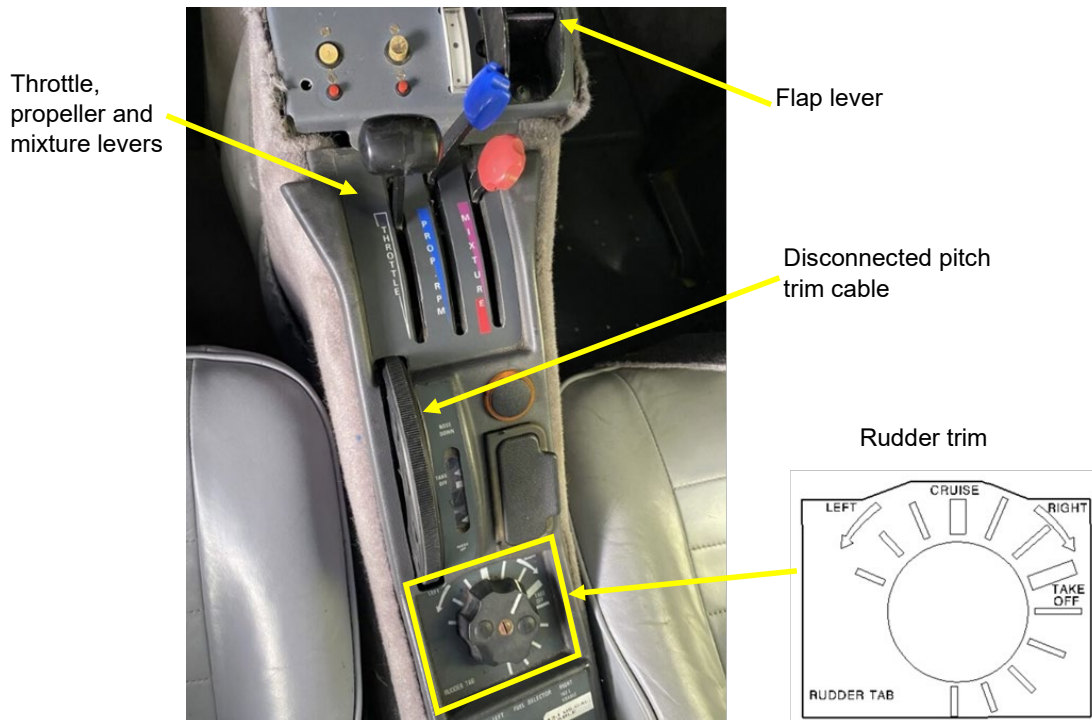
The underside of the tail cone had abrasion damage consistent with the tailcone being in contact with the runway during a tailstrike rather than impact damage with trees. (Figure 3) The pilot confirmed the damage was not present prior to the flight.





**Figure 3**

Tailstrike damage to the underside of the tailcone



**Figure 4**

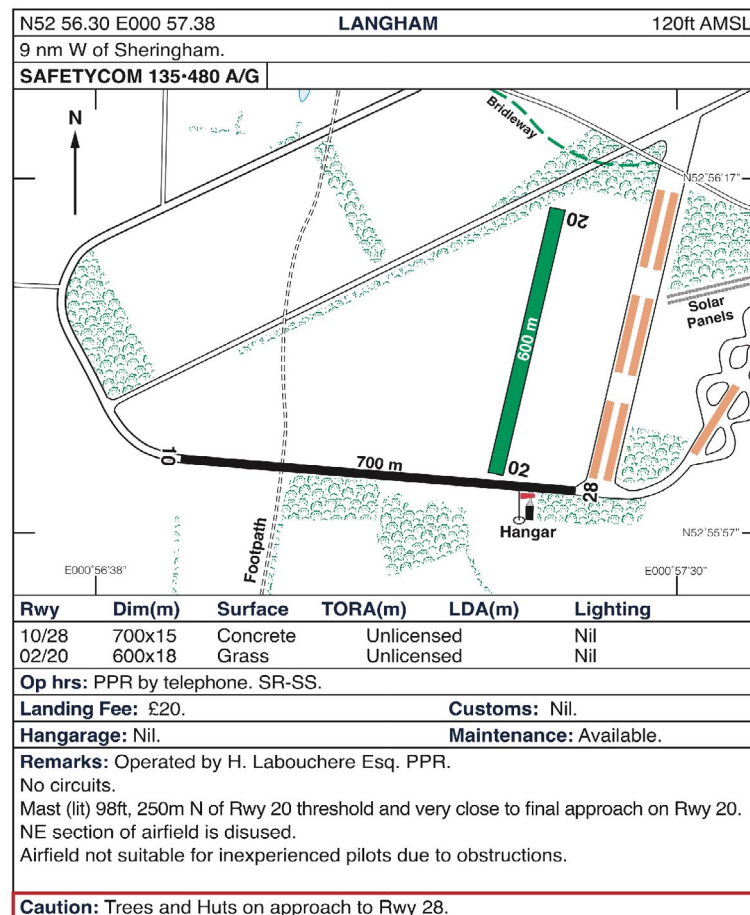
Control positions post-accident

Damage to the propeller indicated that it was under power at the time of the accident, and the throttle, propeller rpm and mixture levers were all fully forward which are the normal positions for takeoff (Figure 4).

Both flaps were extended to the takeoff setting of 10°, matching the flap operating lever's position. The rudder trim rotary switch was set to just over half-way between the CRUISE (0°) and TAKE OFF (10°) position. Due to rudder structural damage the rudder trim tab's position could not be correlated with the switch position. The pitch trim cable had come away from the control wheel, likely due to damage sustained during the accident sequence. Damage sustained to the tail meant that the positions of the pitch trim indicator, stabilator and anti-servo tab could not be correlated.

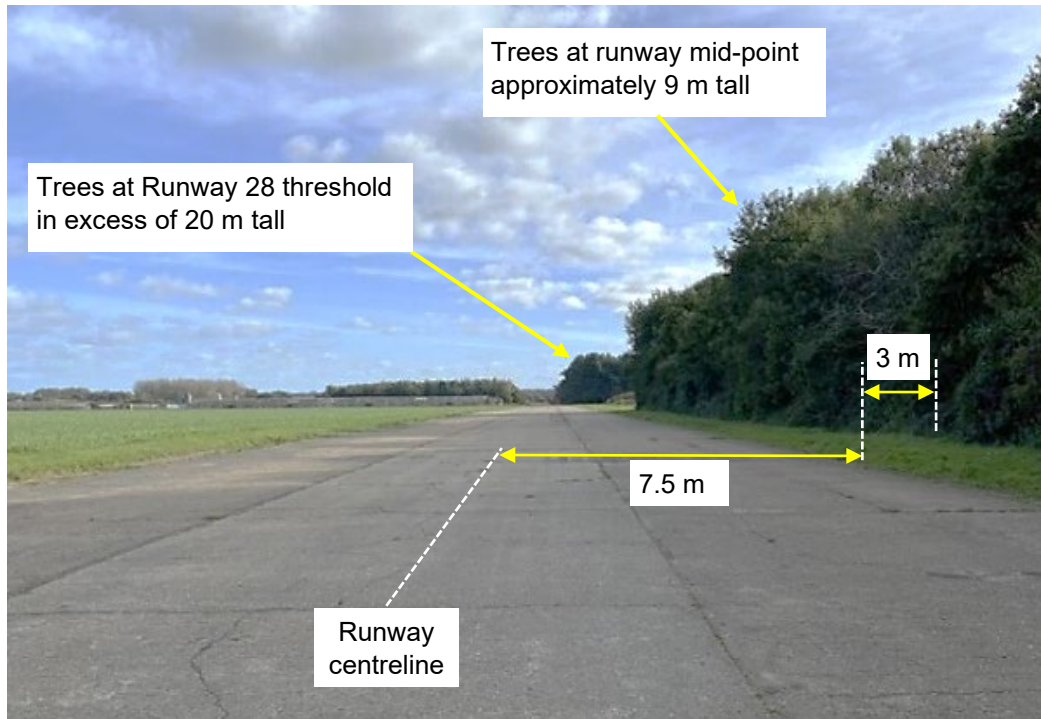
### Aerodrome information

Langham is an unlicensed aerodrome located on the southern periphery of a disused airfield. Runway 28 is 700 m long, 15 m wide, and is part of the old airfield's concrete perimeter track. The runway's surface condition is varied along its length with some pothole and cracking damage. Its alignment is nearly perpendicular to the prevailing south-westerly winds. The Pooley's plate for Langham (Figure 4) shows the trees along the southern edge of Runway 10/28 and notes 'Airfield not suitable for inexperienced pilots due to obstructions.'



**Figure 5**  
Langham airfield plate (Pooley's Flight Guide)

Runway 10/28 is lined by tall trees along much of its southern side (Figure 5). The trees at the runway's mid-point are approximately 9 to 10 m tall and are 3 m from the runway's edge, while those at the threshold of Runway 28 are in excess of 20 m tall.



**Figure 6**

View along Runway 10, towards the threshold of Runway 28

### Pilot information

The pilot held a valid Single Engine Piston rating and had flown a total of 121 hours, 10 of which were in the preceding 12 months. His flying comprised a mixture of circuits, local flights and rating revalidation.

### CAA publications

CAP 793 '*Safe Operating Practices at Unlicensed Aerodromes*'<sup>1</sup> specifies the recommended minimum dimensions of the runway, and distances of obstacles from the runway. For the operation of light aircraft such as N33NW the minimum runway width is 18 m and with regard to obstacles it states:

*'No vertical obstacles within 25 m either side of centre line. Runway end obstacles (hedges etc.) not above 2 m high.'*

---

### Footnote

<sup>1</sup> Civil Aviation Authority publication CAP 793, Issue 1, June 2010, [www.caa.co.uk/CAP793](http://www.caa.co.uk/CAP793) [accessed December 2024].

CAP 793 also contains information on the effects that nearby obstacles such as trees can have on winds:

*'Aerodrome operators and pilots should investigate and be aware of the effect of various wind directions on operations, considering wind shear, roll over from trees and buildings on the aerodrome.'*

CAA Safety Sense Leaflet 12 – 'Strip Flying'<sup>2</sup> provides advice to pilots on runway orientation and weather conditions:

*'Strips will often be oriented around whatever the constraints of local agriculture and topography will allow, rather than the prevailing winds. Crosswinds and rotor turbulence from obstacles may therefore be common.'*

*'Determine the weather conditions under which it is safe to use a strip and do not commence the flight unless these will be met. It may be that a particular strip is straightforward on a calm day but suffers from challenging low-level turbulence in higher winds.'*

## Analysis

Langham airfield is described as not suitable for inexperienced pilots due to obstructions, referring to trees and huts on approach to Runway 28 and a mast on the approach to Runway 20. This does not specifically include the trees adjacent to the edge of Runway 28 along its length. The pilot had conducted detailed pre-flight planning including seeking advice from other airfield users as well as visiting the airfield in advance to become aware of its features. He had conducted a successful approach and landing on the incoming flight.

Upon departing, the aircraft accelerated to its takeoff speed within the expected takeoff roll distance, indicating that there were no engine performance or braking issues before becoming airborne.

During the takeoff or the early climb it is likely that the tail struck the concrete runway as the pilot did not recall having seen the damage prior to flight. The pilot subsequently disagreed with this analysis, but the evidence still suggests this is a contributory factor to the accident. The passengers remembered feeling as if the aircraft had hit something or been caught by a gust of wind as it took off, but neither the passengers or pilot were aware of a tailstrike. It is probable that as the aircraft became airborne it encountered some form of turbulent air in the lee of the trees from the crosswind. As the pilot applied corrective control inputs, the combination of encountering turbulent air and a tailstrike is likely to have led to the aircraft entering an unstable climb.

---

### Footnote

- 2 Civil Aviation Authority Safety Sense Leaflet 12: Strip Flying, May 2022 [caa8230\\_safetysense\\_12-strip-flying\\_v12.pdf](#) [accessed December 2024].

The distance between the left wingtip and the trees was 5.5 m with the aircraft on the runway centreline. This is less than the minimum distance recommended within CAP 793 which, although not mandatory, would have been 15 m. The aircraft was seen to drift left after becoming airborne, it is possible that the rudder trim position set to approximately half the manufacturer's TAKE OFF setting was contributory, but it was not possible to confirm the cause. During the climb the margin between the wingtip and the trees was then reduced to an extent that the pilot was unable to recover the aircraft's position before striking the trees.

CAA Safety Sense Leaflet – '*Strip Flying*'<sup>3</sup> includes information on approach challenges, which is also applicable during takeoff:

*"Strips will often be oriented around whatever the constraints of local agriculture and topography will allow, rather than the prevailing winds. Crosswinds and rotor turbulence from obstacles may therefore be common."*

Pilots flying to unfamiliar or unlicensed airfields are encouraged to consider how the effects of features particularly close to a runway such as trees and buildings may further reduce expected safety margins.

#### **AAIB comment**

Pilots flying to unfamiliar or unlicensed airfields are encouraged to consider how the effects of features, particularly close to a runway, such as trees and buildings identified during pre-flight planning may further reduce expected safety margins in the event of an unexpected flight situation developing. CAA CAP 793 and Safety Sense Leaflet 12 provide information to assist with pre-flight planning.

---

#### **Footnote**

<sup>3</sup> Civil Aviation Safety Sense Leaflet '*Strip Flying* (SS12), [https://www.caa.co.uk/media/cwjom2ph/safetysense\\_12-strip-flying.pdf](https://www.caa.co.uk/media/cwjom2ph/safetysense_12-strip-flying.pdf) [accessed December 2024].