Federal Public Service
Mobility and Transport
Air Accident Investigation Unit

Air Accident Investigation Unit (Belgium)
City Atrium
Rue du Progrès 56
1210 Brussels

Safety Investigation Report

Ref. AAIU-2015-AII-8
Issue date: 14 August 2016
Status: Final

SYNOPSIS

Classification:	Accident
Level of investigation:	Standard
Date and time:	14 August 2015 – 12:52 UTC
Aircraft:	Homebuilt helicopter, Rotorway A600 Talon, S/N 8040
Operator:	Private
Incident location:	Stasegemsesteenweg,Kortrijk 50°49'51.23"N, 3°17'24.84"E
Type of flight:	Cross-country
Phase:	During take-off from a private terrain
Destination:	EHSE (Breda International Airport)
Persons on board:	Two
Injuries:	None

Abstract

During take-off from the side of a street at the verge of the urban area of Kortrijk, the helicopter pilot made an avoiding manoeuver when the path of the helicopter crossed a telephone line running across the street. The helicopter fell from a height of 4m and hit the pavement, bending the skids. Both occupants exited the helicopter uninjured.

Cause.
The cause of the accident is an inadequate flight preparation, failing to identify the potential obstacles crossing the helicopter path.

Safety issue.
- Flying the helicopter with parameters within the height-velocity diagram above (or close vicinity) of a populated area.
- Inadequate flight preparation.
- Low experience distributed over several (3 in this case) different type of helicopter.
- Overconfidence.

Recommendation.
As no systemic issue was found during this investigation, AAIU(Be) does have any specific recommendation to make.

FACTUAL INFORMATION

History of the flight

The .pilot was asked by a friend to fly him to the Netherlands. The pilot agreed, and took off with the helicopter at 12.00 from its base, Zomergem (EBZM - 510753N - 0033120E) and flew towards Kortrijk city, to the office of the passenger (a motorbike shop). The helicopter landed in Kortrijk, around 12.30.

The helicopter made its approach, after circling three times around the area, and landed on the grass, adjoining a car parking lot, next to the motorbike shop, in the urban area of Kortrijk City. He further taxied the helicopter on the concrete surface of the parking lot.

The landing area is a confined space, limited on the East side by a freight container, on the North side by a hangar, on the West by trees and vegetation.

The street (Stasegemsesteenweg) is boarded by a factory building, houses, shops and lighting poles.

At 12.50, after the passenger climbed on board, the pilot brought the helicopter to a low hover, at 1m from the ground, then went backwards, over the grass area next to the parking lot. The helicopter took off, went above the street, alongside the motorbike shop.

The engine was operating at full power, but the rate of climb was not as the pilot expected.

The passenger suddenly realized the presence of a 4m-high electrical line crossing the street path, and notified the pilot. The pilot reacted by pulling the cyclic controls and pulling up the collective.

The helicopter jumped upwards, cut the electrical line with the aft rotor. The pilot heard the “low rotor rpm” warning, and lowered the collective. The pilot tried to decrease the rate of descend by pulling the collective just before impact, but could not avoid a hard contact with the pavement at 12.52.

The helicopter skids were bent as a result of the hard landing.

Both occupants exited the helicopter uninjured.

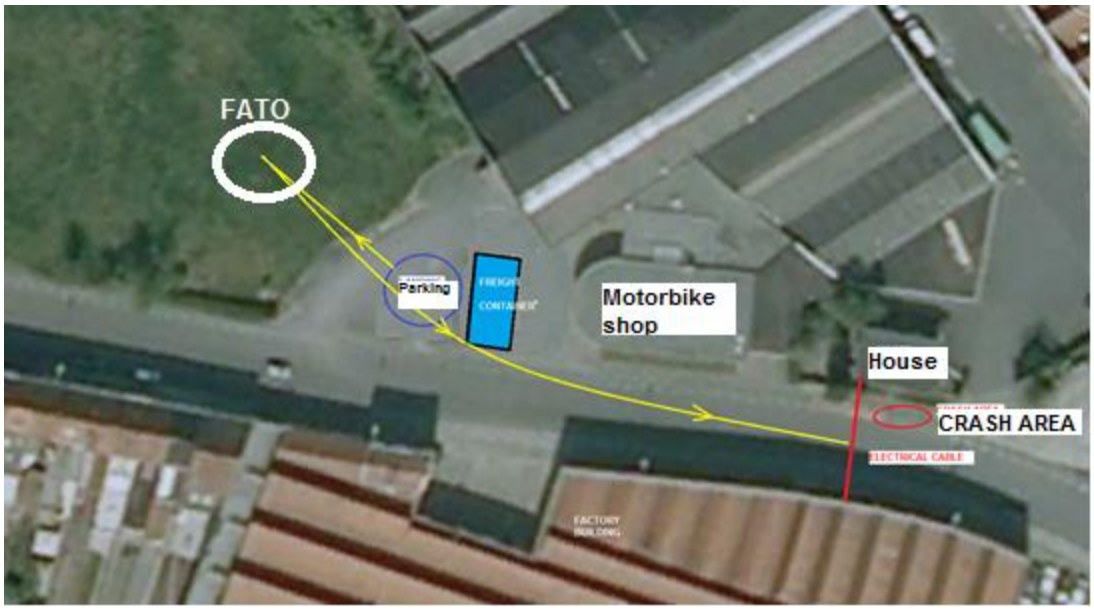


Figure 1: Crash area

Figure 2: Landing and take-off area

Figure 3: Crash area

Figure 4: Crash area

Damage to the helicopter:

Obvious damage on the skids support. No visible damage on the cabin, boom, rotors.

Figure 5: Bent skid

Figure 6: Bent skid

The lower tube structure of the helicopter shows two dents, at the skid attachment.

Figure 7: Damage to structure tube

Figure 8: Damage to tail rotor

Pilot

Sex: Male
Age: 24 years old
Nationality: Belgian

Licenses:

Holder of a Swedish CPL(H), first issued on 23 July 2015.

Holder of an ATPL(A) licence, MEP IR

Ratings:
Guimbal Cabri
Robinson R22
Conversion on Rotorway A600 Talon performed in France on 13 January 2015 (conversion course signed-off in the pilot's log-book).

Medical certificate class 1.

Note:
The Rotorway A600, as an amateur-built helicopter, falls in the "Annex II" category of aircraft. It is therefore not eligible for a type-rating on pilot's licences. The authorization to fly the helicopter, under Swedish Regulation is entered in the pilot's log book.
It allows the pilot to fly a Swedish-registered airplane but in order to fly this type of helicopter under another registry, this authorization has to be endorsed by the Civil Aviation Authority having jurisdiction.
In this case, the helicopter being registered in Belgium, the pilot was required to hold a specific Belgian CAA authorization to fly the helicopter.

This national conversion is essentially administrative.

Experience.

Total: 261:16 FH,

PIC: 107.36FH

On type (flight log from 16 Oct 2013 to 27 Jun 2015):

Type	Hours		Landings	
G2CA	PIC	37:12	340	
	Dual	118:32		
R22	PIC	20:06	150	
	Dual	28:38		
A600	PIC	50:18	86	37
	Dual	6:30		49

The aircraft

The RotorWay A600 Talon is an helicopter designed and produced by RotorWay International of Chandler, Arizona. The aircraft is supplied as a kit for amateur construction.

The A600 features a single main rotor, a two-seats in side-by-side configuration, enclosed cockpit with a windshield, skid-type landing gear and a turbocharged four-stroke piston engine, that drives a two-bladed rotor and conventional two-bladed tail rotor. The aircraft has an empty weight of 442 kg and a gross weight of 680 kg, giving a useful load of 238kg.

With full fuel of 64 L, the payload is 196 kg.

General characteristics

- Crew: one
- Capacity: one passenger
- Length: 9 m overall, with main rotor fore and aft
- Height: 2.6 m
- Empty weight: 442 kg
- Max. Gross weight: 680 kg
- Fuel capacity: 17 U.S. gallons (64 L; 14 imp gal)
- Powerplant: 1 × RotorWay RI 600N four stroke, 147 hp (110 kW)
- Main rotor diameter: 25 ft (7.6 m)

Performance

- Maximum speed: 100 kts)
- Cruise speed: 65 to 82 kts
- Endurance: 2.0 hours
- Service ceiling: 10,000 ft (3,048 m)
- Rate of climb: 1,000 ft/min (5.1 m/s)

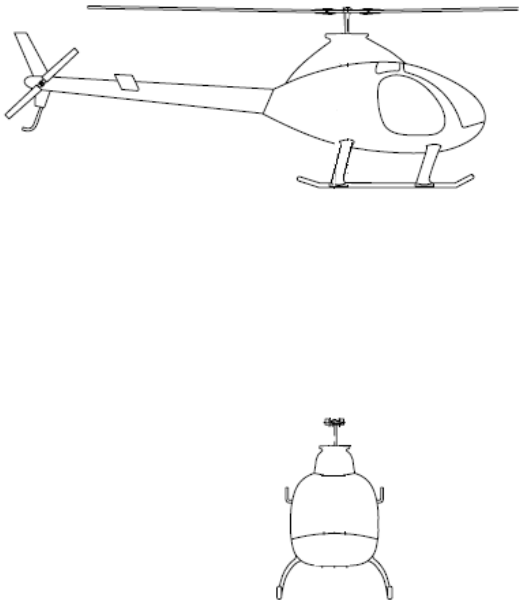


Figure 9: Rotorway A600 Talon: 3-view

The helicopter was built by its previous owner in 2009, and sold in 2015 to the current owner.

Helicopter type:	Rotorway A600 Talon
Serial number:	8040
Built year :	2009
Airworthiness certificate :	Limited, first issued by BCAA on 23/11/2009, last renewed on 19/6/2015.
Registration Certificate :	last issued by BCAA on 19 May 2015.
Total Flight hours :	185.5 FH (Hobbs)

Engine type :	RI600N
serial number	8028
Total flight hours:	186.9 FH

Climb Performances

From the Flight Manual:

There is no published schedule rate of climb data for any Rotorway A600 Talon helicopter. Therefore the rate of climb can only be compared with the previous year's result. If the climbs were carried out at similar weight /altitude and OAT then similar rate of climb can be expected. If the result is significantly (more than 75 ft/min) worse than the previous result, then investigative actions must be taken.

As a guide, an increase of density altitude of 1000 ft may reduce the rate of climb by approximately 100 ft/min. An increase of weight of 100 lbs, may reduce the rate of climb by approximately 180 ft/min.

Data gathered during flight test :

Rate of climb :	800 ft/min
Mean altitude:	1000 ft
Mean OAT:	22°C
Mean weight:	1260 lbs

Weight and balance

The helicopter was loaded with two persons (pilot (90kg) and passenger (78kg), without bags), and 50 liters of fuel.

Height velocity enveloppe (dead man's curve)

The **height–velocity diagram** or **H/V curve** is a graph charting the safe/unsafe flight profiles relevant to a specific helicopter. As operation outside the safe area of the chart can be fatal in the event of a power or transmission failure it is sometimes referred to as the **dead man's curve** by helicopter pilots.

In the simplest explanation, the H–V curve is a diagram indicating the combinations of height above ground and airspeed that should be avoided due to safety concerns relating to emergency landings. It is dangerous to operate within the shaded regions of the diagram, because it may be impossible for the pilot to complete an emergency autorotation from a starting point within these regions. The H–V curve will usually contain a take-off profile, where the diagram can be traversed from 0 height and 0 speed to cruise, without entering the shaded areas or with minimum exposure to shaded areas. (wikipedia)

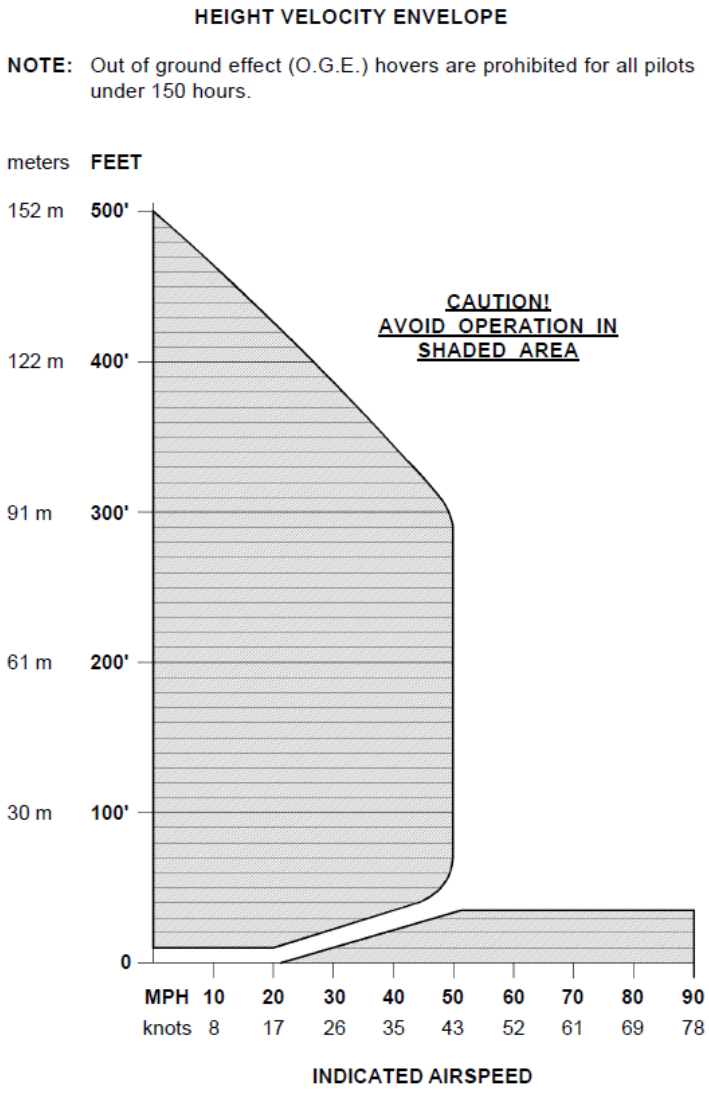


Figure 10: Height Velocity envelope

Meteorological data

Wind direction : 200° variable between 120 and 220
Wind speed : 10 kts
Temperature : 23°C
QNH : 1008.3 hPa

Regulation

Ministerial Decree of 29 May 2013 (extracts)

Article 1. Except in the case of helicopters performing rescue operations, and without prejudice of any other applicable legal requirement, the take-offs and landings of helicopters outside airfields are subjected to the minimal conditions defined hereunder:

(…)

2° The final approach and Take-off area (FATO) is defined as a disk of a diameter of at least 1.5 the length of the helicopter.

(…)

4° The final approach and take-off area is surrounded by a surface of at least 3 meters deep free of any obstacles,

5° The vicinity of the final approach and take-off area must be free of objects that could endanger the safety of take-offs and landings. Moreover, there may not be any house standing at a distance of at least 50m from the FATO area, except after agreement of the occupant of the concerned house.

(…)

7° Take-offs and landings must be performed in zones for which there is no obstacle above a surface having a 12.5% slope, and defined as:

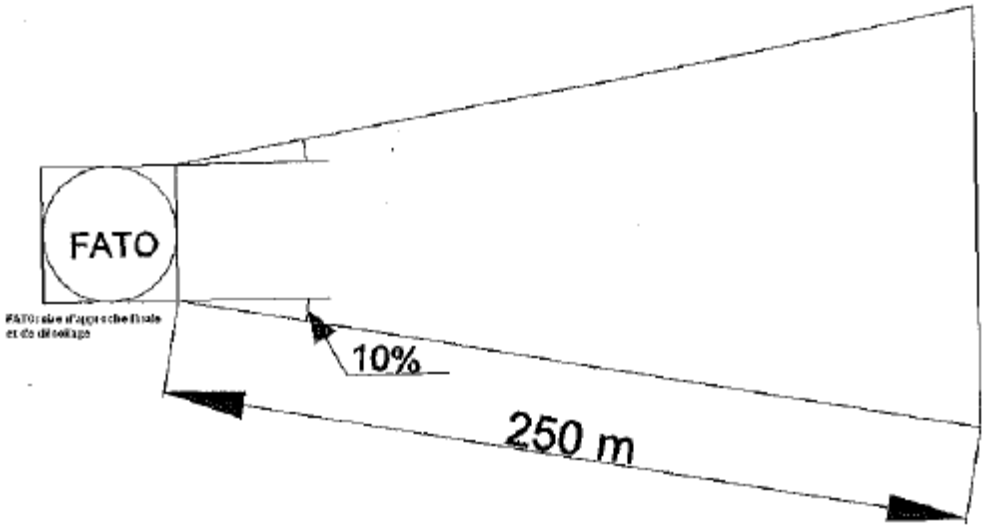
- Its inner border having the same dimension as the final approach and take-off area tangential to the latter, and perpendicular to the applicable take-off or landing axis.
- Two lateral borders, 250m long, starting from the inner border and diverging externally each of 10% from the applicable take-off or landing axis.

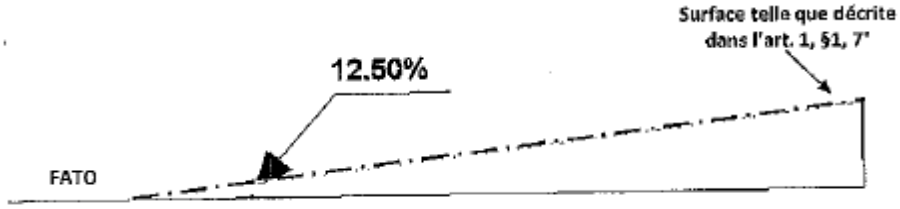
Under these surfaces, no building could be standing at a distance of less than 150m from the final approach and landing area.

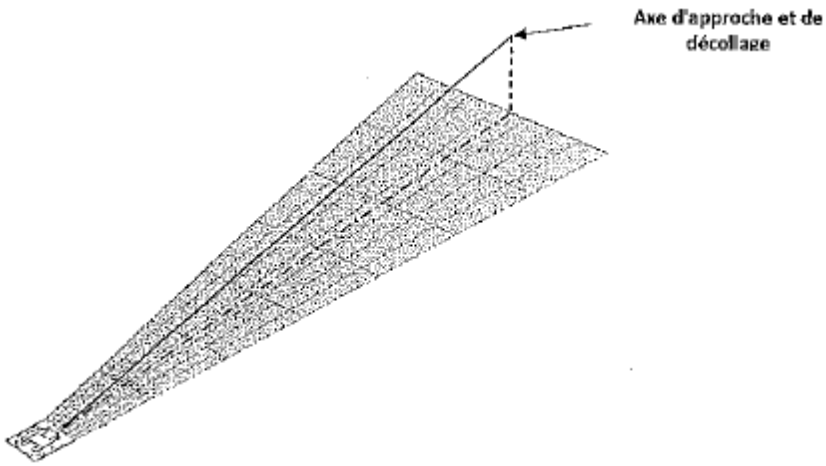
Article 2. Except when the helicopter is performing rescue operations, the landing and take-off of helicopters outside airfields are not authorized without a prior authorization of the Director General Air Transport, or his delegate, in the following cases:

(…)

3° Take-offs and landings inside cities and urban area of communes. A final approach and take-off area adjoining the countryside is considered to be outside the city and urban area of communes.







ANALYSIS

Choice of landing area.

The landing area is located within the urban area of Kortrijk (actually, the helicopter landed next to the "urban area" sign – see Fig.4). The pilot stated the FATO was located in an industrial zone, and indeed the area is mostly covered by industrial buildings. However it is itself embedded in an urban zone.

Figure 11: Area of the accident

The regulation requires the selected FATO to comply with a series of requirements. If we apply these requirements to the place the helicopter took off and landed, we notice the following anomalies:

- The freight container (see fig.2), the car parking area (it was not secured) and street lighting poles constitute obstacles protruding through the take-off surface.
- The 50m area around the FATO englobes houses whose occupants have not been notified.
- The vehicles running on the street could be considered as obstacles (assuming a lorry with a height of 4m), as the circulation was not interrupted during the take-off.

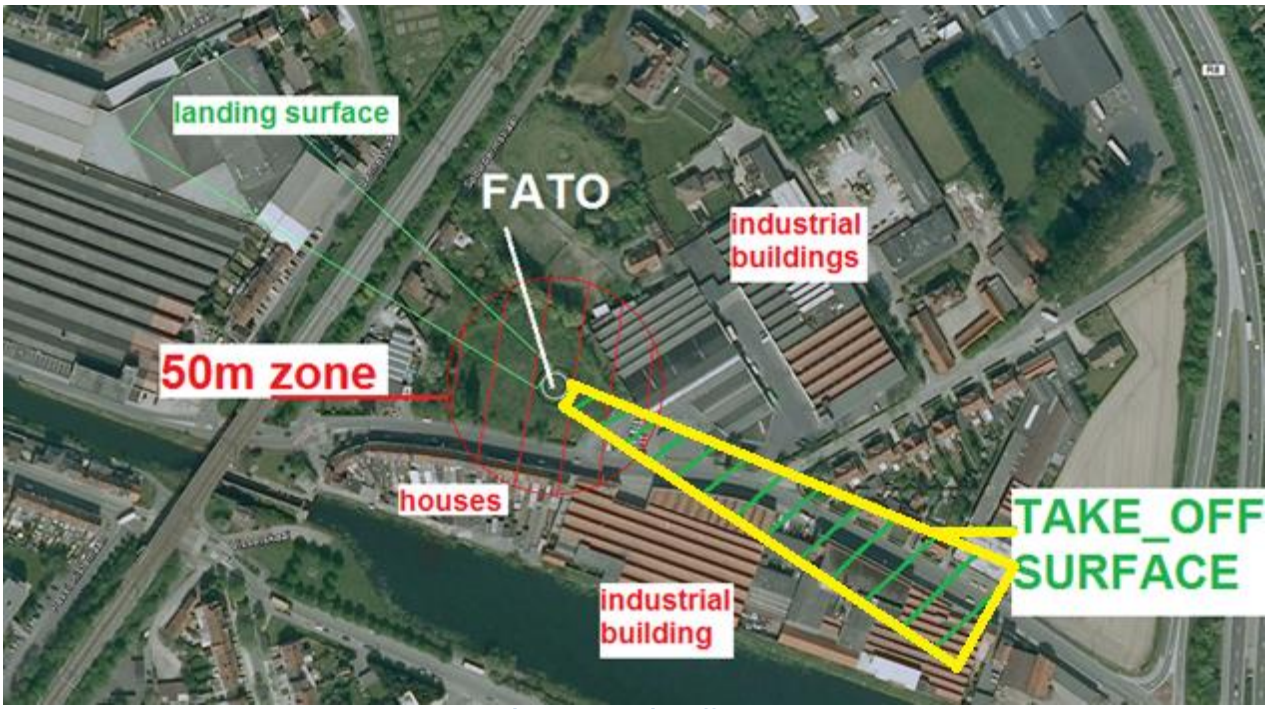


Figure 12: Take-off zone

Flight preparation.

The pilot made his flight preparation based on the aeronautical map, and his general knowledge of the area.

Obviously, a take-off complying with the height – velocity graph of the helicopter would have taken him at low height, above the road.
The flight preparation failed to identify the potential dangers, such as lighting poles and the electrical wire.
The pilot stated he was surprised that the helicopter could not climb "as expected".
The pilot stated also that, owing to the configuration of the take-off area, he could not avoid to fly the helicopter inside the height-velocity diagram.

Experience

The flight log data shows the following:

Total experience 261 FH, but on 3 different type of helicopters.

The Talon A600 is the third type of helicopter on the licence; this rating is obtained after a quite short flight time (6:30) and 49 landings.

The A600 is owned by the pilot, so quite rapidly, the pilot increases his experience on this type (50 FH, more than each of the two other helicopter type on his licence), however, the experience on take-off and landings does not follow the same pattern (only 37 landings recorded when PIC, 86 total, while the log book records 340 landings and 150 landings respectively for the two other types).

According to several instructors on A600, this helicopter is quite different than the two other type, in particular for the take-off performances.

The low experience on the take-off of this type of helicopter, combined with a low experience distributed over 3 different type may explain why the pilot was 'surprised' by the performance of the helicopter.

Attitude

During interview, the pilot showed great confidence in his ability to fly, considering it a positive "can-do" attitude.
Considering the elements of this accident, it is safe to state that the pilot over-estimated the performance of his helicopter and skipped some basic elements of airmanship, such as the flight preparation.
These symptoms are typical of 'overconfidence'.

Overconfidence can develop at any stage of a pilot's career (a statistical first peak is reached when a pilot experience reaches 250 – 300FH) and can be a killer. Those pilots who suffer from overconfidence are unlikely to ever recognize that their ability is considerably less than they think. The only way to overcome this personality disorder is to recognize the fact when an instructor or a peer points it out.

CONCLUSIONS

Cause.
The cause of the accident is an inadequate flight preparation, failing to identify the potential obstacles crossing the helicopter path.

Safety issue.
- Flying the helicopter with parameters within the height-velocity diagram above (or close vicinity) of a populated area.
- Inadequate flight preparation.
- Low experience distributed over several (3 in this case) different type of helicopter.
- Overconfidence.

Recommendation.
As no systemic issue was found during this investigation, AAIU(Be) does have any specific recommendation to make.

About this report

As per Annex 13 and EU regulation EU 996/2010, each safety investigation shall be concluded with a report in a form appropriate to the type and seriousness of the accident and serious incident. For this occurrence, a limited-scope, fact-gathering investigation and analysis was conducted in order to produce a short summary report.

It is not the purpose of the Air Accident Investigation Unit to apportion blame or liability. The sole objective of the investigation and the reports produced is the determination of the causes, and, where appropriate define recommendations in order to prevent future accidents and incidents.