SERIOUS INCIDENT

Aircraft Type and Registration:	Agusta AW169, G-KSST	
No & Type of Engines:	2 Pratt & Whitney Canada PW210A turboshaft engines	
Year of Manufacture:	2016 (Serial no: 69014)	
Date & Time (UTC):	2 July 2022 at 1710 hrs	
Location:	Epsom, Surrey	
Type of Flight:	Emergency Services Operations	
Persons on Board:	Crew - 4	Passengers - None
Injuries:	Crew - None	Passengers - N/A Other - 1 (Minor)
Nature of Damage:	None	
Commander's Licence:	Airline Transport Pilot's Licence	
Commander's Age:	59 years	
Commander's Flying Experience:	7,260 hours (of which 352 were on type) Last 90 days - 5 hours Last 28 days - 3 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Synopsis

As the helicopter transitioned to forward flight after departing from an in-town landing site, the downdraught of the helicopter caused a significant amount of flying debris in a local garden. One person in the garden was hit in the face by a flying object and suffered a significant cut to his face.

History of the flight

The crew of G-KSST had been attending an incident in the local area but had been re-tasked. The crew prepared for departure, which included moving spectators back to a safe area and completing a visual check of the departure area. After a normal start, G-KSST lifted into a hover and completed a clearing turn. The helicopter performed a 'ground and elevated heliport/helideck variable takeoff decision point procedure' (also known as a variable helipad profile to a takeoff decision point). This meant that the helicopter climbed backwards until it reached the calculated decision point (in this case 200 ft agl) before transitioning to forward flight and climbing away on the departure route.

The injured person was in the garden in which he had been constructing a climbing frame. There was a large amount of cardboard packaging in the garden as well as a patio umbrella which was up at the time. Although he had heard the helicopter start up, he did not see it initially as there were large trees at the end of the garden. He saw the helicopter as it

reversed up for its departure and as it reached the decision point just before the tall trees at the end of the garden. As the helicopter transitioned to forward flight, the householder described his garden as being "affected by a tornado". The cardboard packaging was picked up by the wind with one item found around 15 m away from the garden in a local car park. The heavy patio umbrella was lifted from its stand and struck the householder in the face, causing a significant cut, before becoming embedded in the house wall. Two others in the garden escaped without injury.

Recorded information

Data was available for the flight of the helicopter. Figure 1 shows the landing site of the helicopter and its track rearwards on its departure. It also shows the garden in which the injury occurred.

Figure 1

The location of the helicopter and garden in which the incident occurred

Aircraft information

The speed of the downwash produced by a helicopter is a function of weight, air density and rotor diameter. The rotor downwash reaches its maximum velocity between 1.5 and 2 times the rotor diameter below the helicopter before beginning to dissipate. This maximum velocity can be twice the speed at the rotor head. It is possible to calculate the speed of the downwash at the rotor and estimate the height below the helicopter at which the maximum downwash speed will be reached.

G-KSST is a AW169 with a rotor diameter of 12.12 m. The AW169 has a maximum takeoff weight of 4,800 kg, although on this flight it was operated below that weight at 4,272 kg. Calculations of the velocity of the rotor downwash at the rotor head showed that at the time of the departure this would have been around 44 kph (27 mph). The maximum velocity would have been reached around 24 m (80 ft) below the helicopter, with the maximum speed dissipating from this height. The physical layout of the area under the downwash can affect both the velocity of the downwash and the rate of dissipation, with alleyways, small roads between fences and hedges, and houses causing the downwash to be accelerated or directed in a particular direction.

Analysis

The crew of G-KSST performed a takeoff decision point departure, which saw the helicopter climb backwards to 200 ft agl from the landing site. This departure took it towards the tall trees at the end of a residential garden. As the helicopter transitioned into forward flight, the garden of the house was affected by the downdraft which blew around a number of items, including a patio umbrella which struck one person in the face causing a significant cut.

With the helicopter at 200 ft agl the velocity of the rotor downwash should not have been significant, but local effects, such as funnelling by the physical geography of the location, may have further accelerated the air causing the significant downwash experienced in the garden.

Conclusion

Downwash from helicopters can be a significant risk, especially operating in an urban environment. Although the height of the helicopter meant that the downwash should not have been of a significant magnitude, the event caused a significant injury as items in the garden were blown around.