ACCIDENT

Aircraft Type and Registration:	DJI Phantom 4 (UAS, registration n/a)	
No & Type of Engines:	4 electric motors	
Year of Manufacture:	2019 (Serial no: 0V2DGC6RA30282)	
Date & Time (UTC):	5 March 2020 at 13:45 hrs	
Location:	Bristol sewage treatment works	
Type of Flight:	Aerial Work	
Persons on Board:	Crew - N/A	Passengers - N/A
Injuries:	Crew - N/A	Passengers - N/A
Nature of Damage:	Destroyed	
Commander's Licence:	Not applicable	
Commander's Age:	20 years	
Commander's Flying Experience:	300 hours (of which 4 were on type) Last 90 days - 70 hours Last 28 days - 24 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot and additional enquiries made by the AAIB	

Synopsis

During an aerial survey of a sewage treatment works, the unmanned aircraft flew into a wind turbine, the height of which the pilot had misjudged.

History of the flight

The unmanned aircraft system (UAS) was being used to conduct an aerial survey of a sewage treatment works that contained four wind turbines in the survey area. The pilot was using the NATS Drone Assist app[1] as part of the flight planning and risk assessment of the flight; however, the app did not mention the wind turbines, so the pilot looked up "wind turbine height" on the internet which returned a height of 328 ft. A search was also made for any guidance material on flying in the vicinity of wind turbines, but none was found. The pilot had been made aware of aeronautical charts during UAS pilot training but did not use them when planning and risk assessing a flight.

Footnote

[1] The NATS Drone Assist app, powered by Altitude Angel, is designed to supplement flight planning activities with additional information to help the user decide where it is safe to fly. '*It presents users with an interactive map of airspace used by commercial air traffic so that you can see areas to avoid or in which extreme caution should be exercised, as well as ground hazards that may pose safety, security or privacy risks when you're out flying your drone.*' - https://dronesafe.uk/safety-apps/ [accessed 20 July 2020]. Many of the hazards it identifies, such as schools, train stations and motorways, may not be visible to the pilot on the ground.

The operator's CAA Permission limited the height of the flights to 400 ft above the surface. It also limited the flying to greater than 50 m (164 ft) from any structure not under the control of the pilot; however, since the operator was also the owner of the wind turbines, this second limitation did not apply. Therefore, the pilot decided to fly the aircraft at 400 ft above the ground to provide clearance of 72 ft between it and the top of the turbine blades, which the pilot assessed to be a sufficient distance. However, the aircraft was destroyed when it flew into a wind turbine which had a height of 413 ft above the ground.

CAA aeronautical charts

CAA aeronautical charts show all known land-sited obstacles above 300 ft agl.[2]

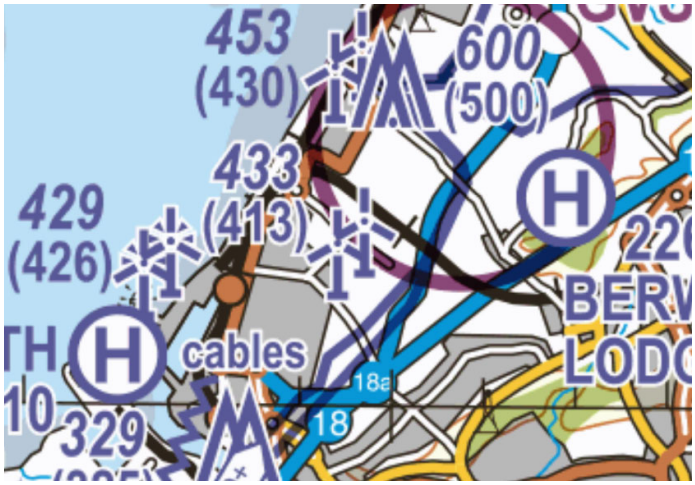

Figure 1

Extract from the CAA 250K aeronautical chart with the wind turbines at the sewage works in the centre of the image

Figure 1 shows the wind turbines, marked 433 (413)[3], at the sewage works, as well as the powerlines (dark blue lines) on the southeast boundary of the works. The same information can be found on apps designed for VFR flying.

Analysis and findings

The pilot was aware of the wind turbines at the site where the aerial survey was to be conducted but was unable to find any accurate information about the height of these either on the app used to plan the flight or from an internet search.

For a UAS pilot flying visual line of sight with the aircraft, tall obstacles may be obvious to see but their actual height is difficult to assess visually. All known ground obstacles greater than 300 ft in height are shown on aeronautical charts. These charts, and apps that use the same obstacle database, are one source of accurate information, and provide a clear

Footnote

[2] A small number of obstacles below 300 ft are shown for landmark purposes.
[3] The first number is the height in feet of an obstacle relative to mean sea level (AMSL) and the second (in parentheses) relative to the ground (AGL).

indication of areas to avoid flying a UAS if limited to flying not above 400 ft. However, for obstacles less than 300 ft, UAS pilots will need to determine their accurate heights from other sources.

UAS pilots are responsible for flying their aircraft within the limitations imposed by their CAA Permission and so must ascertain the accurate height of any hazard or obstacle near the planned flightpath.

Safety action

Having been reminded of the obstacle and airspace information available on aeronautical charts or flight planning apps that have access to this information, the operator has amended its flight planning and risk assessment procedures to include reference to these.