

Accident

Aircraft Type and Registration:	DJI Inspire 2 (UAS registration n/a)	
No & Type of Engines:	4 DJI 3512 electric motors	
Year of Manufacture:	2016 (Serial no: 095XDAX002024M)	
Date & Time (UTC):	8 February 2020 at 1328 hrs	
Location:	Sampson House, London	
Type of Flight:	Aerial Work	
Persons on Board:	Crew - N/A	Passengers - N/A
Injuries:	Crew - N/A	Passengers - N/A
Nature of Damage:	Extensive damage	
Commander's Licence:	N/A	
Commander's Age:	39 years	
Commander's Flying Experience:	More than 1,000 hours (of which 430 were on type) Last 90 days - 30 hours Last 28 days - 7 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Synopsis

During an operation to take photographs at height on a construction site the drone became erratic. The remote pilot attempted to land the drone immediately, but it became uncontrollable. The remote pilot then attempted to fly the drone away from obstructions, but it collided with a concrete structure on the site and was catastrophically damaged.

It is likely the loss of control and collision were caused by the drone not correctly setting the 'home-point' despite this appearing to the remote pilot to be correctly positioned on the transmitter screen. This combined with poor GPS and compass following from the beginning of the flight lead to erratic manoeuvring and a subsequent attempt at a fly away.

Despite the confined nature of the construction site within a heavily built up area, the operator had taken all the required mitigations and safety measures to ensure that there was no risk to any other persons even when control of the drone was lost.

History of the flight

The remote pilot had completed five flights at the site on the day of the accident from a takeoff and landing area (TOAL) at the north of the site (Figure 1). To ensure safe flight in relation to a crane, the TOAL was then moved to the south quadrant. Pre-flight checks on the drone indicated that a full GPS signal had been acquired and that the new 'home-point'

had been set correctly. However, during the initial flight checks the drone became erratic. The remote pilot attempted to land the drone immediately but when the landing gear was lowered, control of the drone deteriorated further. An attempt was made to climb the drone and direct it towards the River Thames away from railways, roads and buildings close to the site, but it collided with a concrete core at the centre of the site where it fell within the sterile area. Figure 1 shows the TOAL for the first five flights (in blue), the TOAL used for the accident flight (in yellow), and the concrete core into which the drone collided. Figure 2 shows the damage to the drone after it fell to the ground.

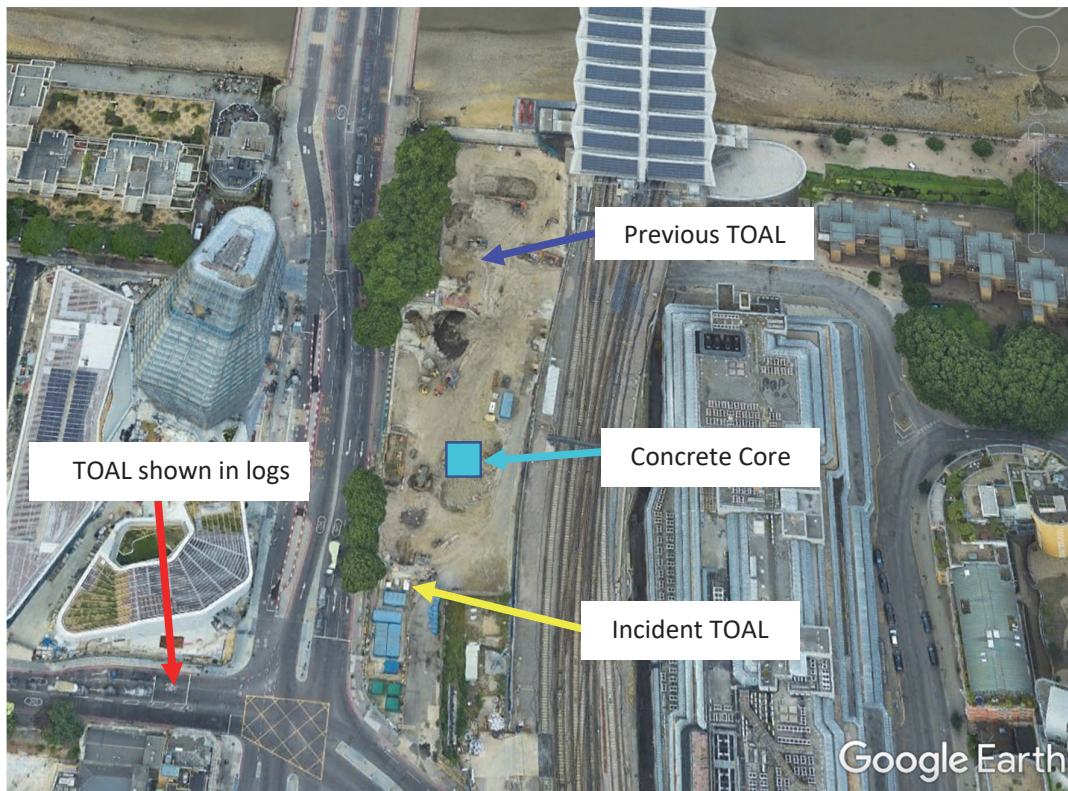


Figure 1

The area of operation of the drone showing the TOALs for the flights and the collision structure

Subsequent examination of the flight logs showed that the 'home-point' set by the drone for the accident flight was outside of the site (shown in red in Figure 1). The data showing distance flown was also incorrect. The logs showed that the GPS and compass had poor signal strength once the flight had commenced. The remote pilot commented that he may have missed that the drone was showing the incorrect home position before takeoff as he may have relied on the messages showing the drone was ready for flight provided on the interface and the navigational lighting.



Figure 2
Damage to the drone

Accident site

The site is a construction site in central London which is constrained to the north by the River Thames, to the east by railway tracks, and by numerous roads and buildings to the south and west. The site is also located on the edge of Restricted Area EGR 158 airspace which required specific permission for the flight. During the preparation for the flights the remote pilot had gained the correct permissions for flight using the NATS Air User Portal¹. He had also stationed staff members outside the site to ensure that no vehicles or pedestrians were present during takeoff, low altitude flight or landings. The construction site was sterile with only minimal staff and no work occurring in the operational zone of the drone. All these safety preparations ensured that when control of the drone was lost and it collided with a structure, no persons or vehicles were put at risk.

Analysis

Due to a position error, as well as poor GPS and compass signal strength, the drone became erratic and uncontrollable after takeoff before colliding with a concrete structure within the sterile zone of the operation.

Due to the significant pre-flight preparation and planning, as well as safety mitigations in place for the flight, the loss of control and subsequent collision did not cause any risk to people on the ground despite the built-up nature of the surrounding area.

Footnote

¹ <https://aup.nats.aero/> [accessed 16 April 2020]