TORRO SITE INVESTIGATION

SUMMARY REPORT

Pulborough, West Sussex

7 June 2025

Report number: SI20250607_Pulborough

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Date: 26 June 2025

Document status: Final

Document history:

Author	Version	Type	Date	Comments
Horton, S.	0.1	Initial draft		
Smart, D.	0.2	Revision	23/06/2025	Added brief meteorological analysis with images.
Horton, S.	0.3	Revision	25/6/2025	Added further reports from 7 June 2025. Added additional intensity ratings
Smart, D.		Revision	26/06/2025	Minor revisions. Approved.

Keywords: tornado, Pulborough, West Sussex, Line Convection, Cycling

How to cite: Horton, S (2025). TORRO site investigation summary report: Pulborough, West Sussex, 07 June 2025.

https://www.torro.org.uk/pdf/SI/SI20250607_Pulborough.pdf

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Site Investigation summary

Cause of damage:	Tornado
Strength:	T2
Track Length:	1.3km
Maximum measured Width:	55m
Time/ duration	1655 UTC +/-5min
Map Location/postcode	RH20 XXX

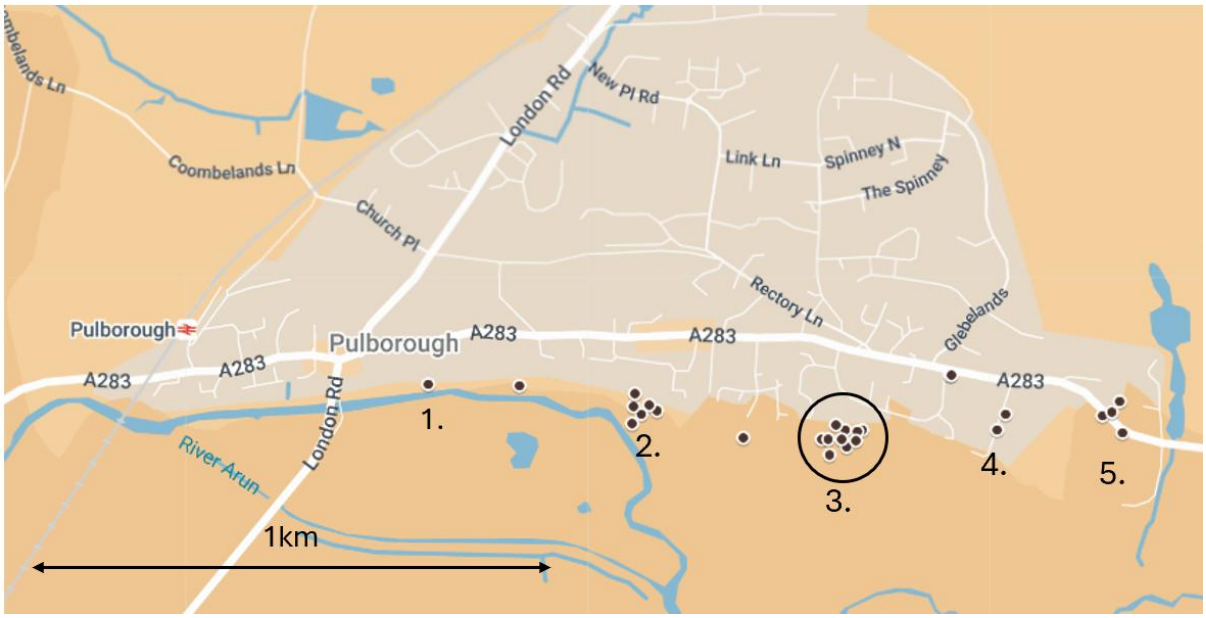

Figure 1: Damage track of the Pulborough tornado (2025). Note the circled area is where the worst damage occurred. Numbers refer to key damage indicators below. Map data ©2025 Google

Key damage indicators

1. A main trunk of a willow tree snapped and fell southwards to block the River Arun. (Approx location: 50.9566, -0.5098.) Note this location is estimated from satellite imagery and a report from a stand-up paddle boarder). This was the most westerly point of damage. **Intensity rating: T2**

2. A cluster of damage was found around trees and hedges. This ranged from minor; a hedgerow evidently partially pushed over to the SE, to a tree which had large, snapped branches around 5m up from the ground (located: 50.9562, -0.5043). These branches appeared to have been snapped to the N and NW. **Intensity rating: T1-T2**

3. A willow had fallen E (location: 50.9557, -0.4990). Although it had a large trunk diameter (estimate 60cm) it appeared to be in poor condition and the main trunk contained substantial rot. A densely packed copse of crack willow trees (centred around 50.9557, -0.4982), suffered substantial damage, with several trees either splitting down to the base through their trunks, or with main boughs at the tops of the trees snapping. The fall direction ranged from N through to SE. It was difficult to plot each tree individually, even with drone imagery, due to the dense nature of the plantation, so some of the tree positions are estimated. **Intensity rating: T2**

   Between the individual fallen willow tree and the willow tree copse, a clear area of flattened grasses was evident, around 30m wide across the track of the tornado.

   Witnesses to the event directly to the north of the copse described the event as lasting 30 seconds to a minute. One said, "*all hell broke loose*". She heard debris hitting her house and feared it would be damaged. She thought there might have been hail, but it is possible that this was the sound of debris. She looked towards the copse but her sight of it was obscured due to debris. Willow tree debris was found around 60m to the N of the copse.

4. It was impossible to access areas directly east of the copse, but in general damage found afterwards was sporadic and less intense. At 50.9568, -0.4955 a large tree branch was found alongside the A283. There were scattered twigs and small branches, primarily consisting of debris from a copper beech tree at 50.9561, -0.4940. **Intensity rating: T0-T1**

5. At around 50.95627, -0.49085 twisted branches could be seen high up in trees. A witness living close to these trees said that she had cleared a lot of debris off the road. She described a train like noise and said that the winds were "5-10 times stronger than any storm I've heard before". The most westerly damage was found at 50.9557, -0.4908. It consisted of branches up to 4m long lying on the path from a tree above. **Intensity rating: T1**

Meteorological summary

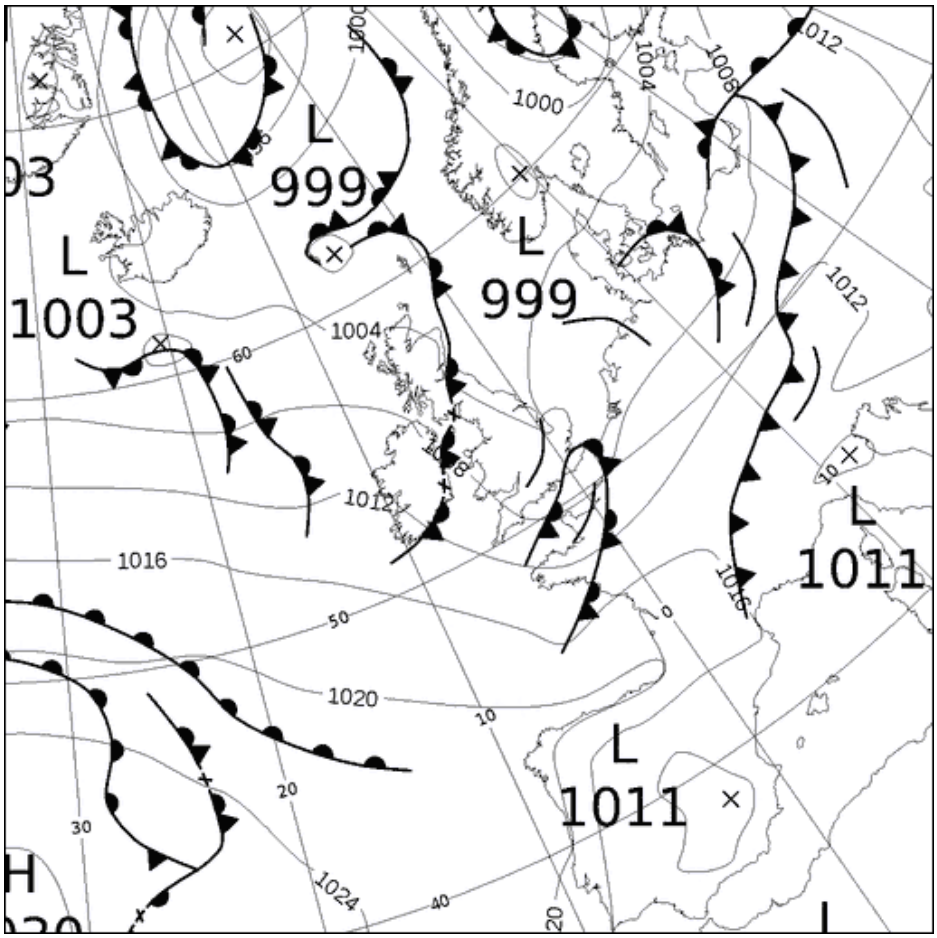

Figure 2: Section of UKMO ASXX 1800 UTC 07 June 2025. Original: Crown copyright.

On the afternoon of the 7th of June, the southern UK was under the influence of low pressure with wave-like disturbances moving eastward on the equatorward flank of a complex multi-centred trough and associated with a 25ms^{-1} jet max at 300hPa. The feature apparently associated with the tornado is marked as a trough and occluded front on the 18Z Met Office analysis and at the time of the event was undergoing modest development to form a 1002 hPa low centre in the southern North Sea by 00Z on the 8th. The tornado event may be collocated with the analysed trough rather than the occlusion. Water vapour satellite imagery (not shown) supports the idea of multiple short-wave features being present.

The rainband associated with the tornado exhibited elements of line convection with some evidence of rearward trailing stratiform precipitation. Rather amorphous cell development is also apparent. At the time of the event there is some evidence for a dry-air incursion notch in the rear of the rainband. This suggests the involvement of downward penetrating `dynamically active' air (possibly high potential vorticity air of upper tropospheric-lower stratospheric origin). Dual-pol and Doppler data are available from the Chenies radar some

distance to the north. Unfortunately radar 'spoking' artefacts in the vicinity of Pulborough clutter the 1621 and 1631 scans, but thereafter a break in the line convection eastwards of Pulborough and a Doppler velocity couplet moving west-northwestwards are apparent. The velocity couplet passed a few kilometres south of Gatwick Airport before dissipating. Comparing PPI imagery at various elevations (not shown) suggests the circulation was shallow- only 2 to 4km in height (consistent with most observations of line convection in the UK).

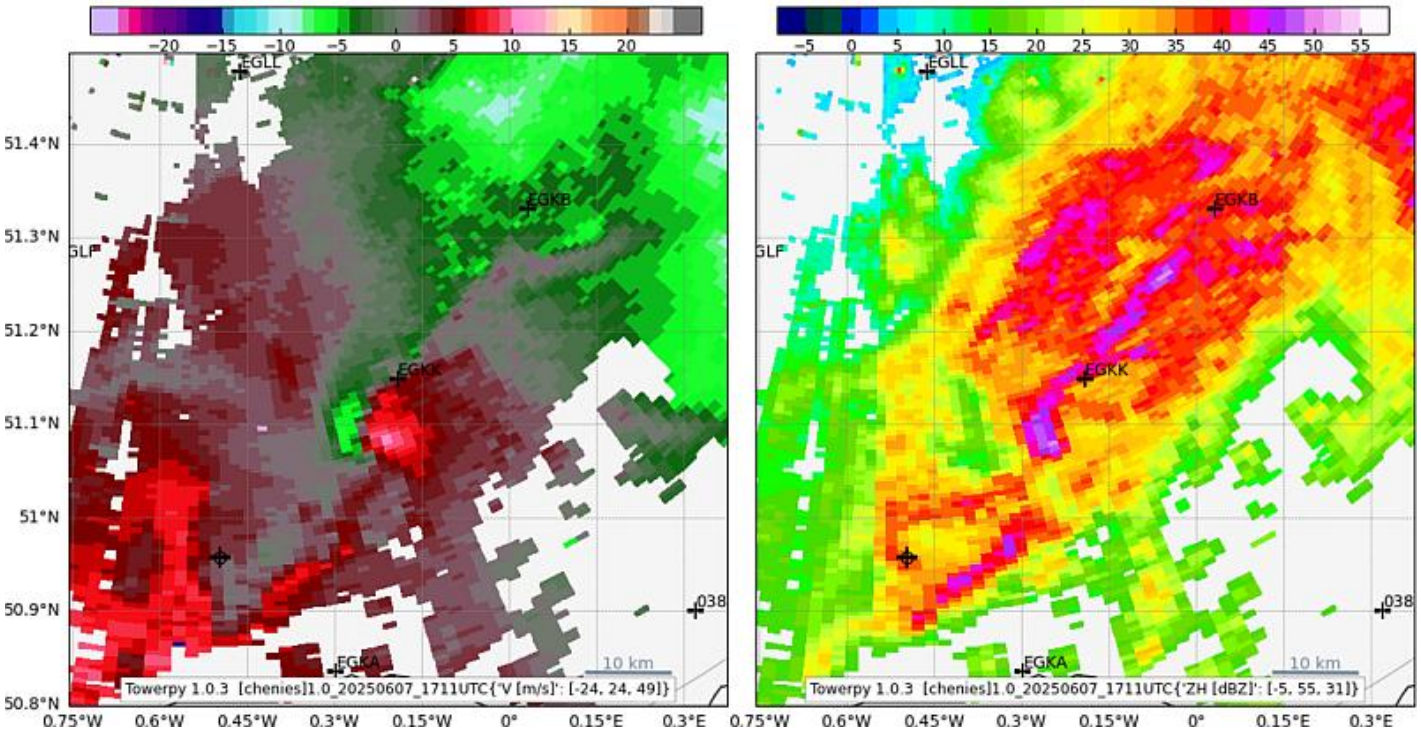

Figure 3: Velocity and reflectivity images from a scan by the Chenies radar timed at 1711 UTC. The location of Pulborough is indicated by the target marker at lower-left and Gatwick Airport (EGKK) by the cross marker. A chevron of weaker reflectivity (green shades) possibly associated with the dry-air incursion can be seen. The images were produced by the Towerpy software package using Met Office data archived at CEDA.

The west-east orientation of the Pulborough tornado track appears, at first sight, at odds with the west-northwestwards motion of this 'misoscale' circulation. One possibility is that this case may have some resemblance to the 'mesoscale hook' features identified by Clark and Young. Alternatively, it may simply be a case of misoscale development resembling that along classical ana-cold fronts.

Comments

1 A Met Office Yellow warning for thunderstorms covering 0800-2000 UTC.
2 Video was supplied to TORRO which showed part of the copse of willow trees leaning towards the E, being blown by high winds with small debris flying.
3 Relevant forum thread: TORRO Forum ACCESS RESTRICTED TO TORRO MEMBERS.
4 Other relevant events on this day:
    - A damage report was received from a member of public located in Coneyhurst, West Sussex RH14 9DN (around 5 miles NE of Pulborough) at 18:15: "*Fencing ripped out, Pool lid ripped of stable moved 1ft off concrete base, General destruction*". No further information was given.
    - A report was given from location 51.0403, -0.2429 of a waterspout: "*2 anglers fishing had there (sic) shelters/bivies ripped from the ground, the contents picked up and scattered over an adjacent field, everything was soaked and trashed. A tree next to them was smashed and split in two.*" A photo showed a willow tree split in half, with branches on the ground next to it. Both this and the above report were approximately consistent with the track of the radar-detected velocity couplet, but the exact relationship is unclear. It is possible there was an element of 'cycling'associated with tornadogenesis in this case.
    - A lightning strike hit a tree setting fire to it on Hayling Island. Source - https://www.itv.com/news/meridian/2025-06-08/tree-struck-by-lightning-as-storms-hit-south-of-england.
    - Funnel clouds were seen at Gwynedd and Bathgate Hills, West Lothian.

Thank you to the members of public who contacted TORRO and all those who aided the site investigation.