# CASSINGTON TORNADO 2021

# Report by the Tornado and Storm Research Organisation (TORRO)

On 31st October 2021, a tornado went through the village of Cassington. This report covers the findings from a site investigation conducted by Sarah Horton (TORRO) over two days following the event

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## Introduction

On 31st October 2021 a swathe of damage occurred across England, from the south coast, up through the Midlands and into Lincolnshire. It was associated with a small low pressure - a mesolow. Much of the damage across the country was straight-line winds, but some areas were hit by brief embedded tornadoes. This site investigation looks at the village of Cassington, Oxfordshire.

TORRO was alerted to the damage at Cassington by a member of the public. After an appeal on a local facebook community group, many areas of damage were identified. Residents submitted photographs, maps of damage and eyewitness accounts.

Most residents that were spoken to likened the noise to jet engines, or like a noise that they had not heard before. Some compared it to the planes at nearby RAF Brize Norton. Those who saw the tornado spoke about how difficult it was to see anything. They described levels of horizontal rain that some said they had not witnessed before. They also described a 'mist' that was impossible to see through. Some, however, said that they could see branches and debris swirling.

Several people commented that afterwards they found their houses and cars were covered in shredded leaves and other debris. Large projectiles were found to have flown some considerable distance. One lady said that she had left windows open and afterwards the carpets were covered with moss from the roof. She described it as looking like 'the floor of a woodland' after the event.

The site investigation took place five days after the event and so much of the roof damage had been repaired (sometimes only temporary repairs) and tree branches had been cleared away. As a result, less damage was evident than might have been otherwise. It was also noted that much of the housing was of sturdy stone construction and therefore damage to houses may have been less than expected given the level of tree damage evident.

Notably, the path followed by this tornado had some overlap with a tornado that crossed the area in May 2012. A brief note of this is included in Appendix B.

## Detailed Site Investigation undertaken 5/11/2021 and 6/11/2021

The detailed site investigation is discussed from south to north (the approximate direction of travel of the tornado), rather than in order of investigation.

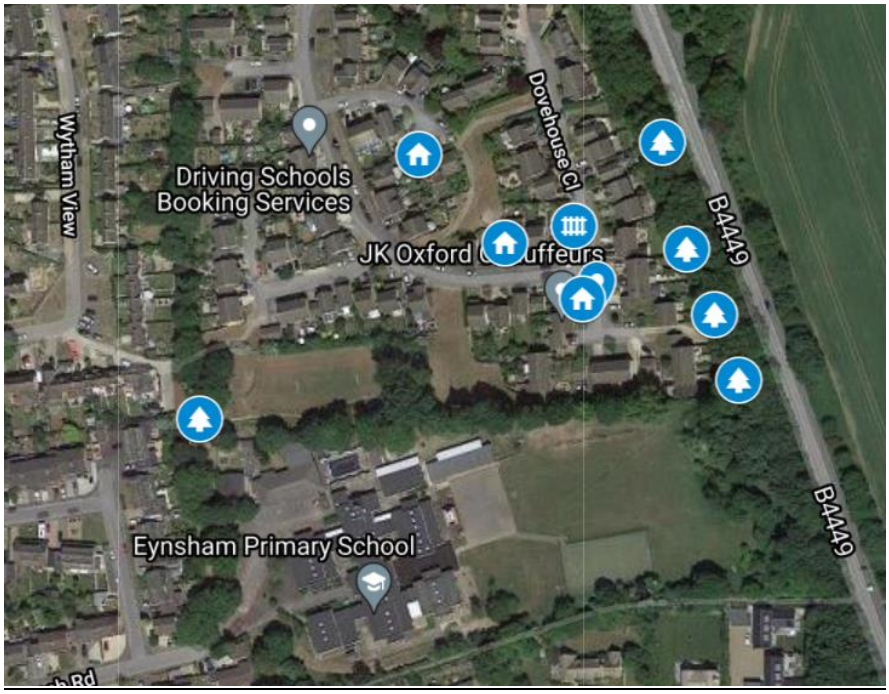
Where tornado strength is metioned (T numbers) a description of the TORRO tornado Scale is given in Appendix A.

Blue markers on maps are sites that have been visited or verified. Points were marked on Google My Maps[1] during the time of the investigation. Red markers are identified by members of the public

[1] [redacted]

| | |
|---|---|
| | Garden furniture |
| | Garden walls and fences |
| | Eye witness report |
| | Tree and Vegetation |
| | House or substantial outbuilding |

Eynsham




The most south-western point of damage found was close to Eynsham Primary school and consisted of large branches from a tree. These had been tidied into a pile and so direction of fall could not be ascertained.

There was some tile damage to houses close to the B4449. One garden wall had partially collapsed. Several large trees had lost branches or snapped high up.

Estimated strength at this point T1 Width 120m.


Land bordering the A40 near the Cassington Turn.


Note that much of the tree damage shown here is indicative. Such was the density of felled trees, it was impossible to walk through much of it. Damage to the bottom left of the image was less severe than damage through the woodland shown. The yellow markers are a few examples of debris that travelled. The Purple marker indicates a particularly notable example.

To the south of Eynsham road in the field, many trees were damaged. The line gives a good indicator of the width of the tornado at this point. c. 160m

The purple marker shown on the map is where this branch impaled the ground. It was over 1m long and around 15cm in diameter. It was embedded around 20cm deep. It had travelled around 40m before becoming embedded. Other tree debris was scattered across the field.

The line of trees bordering the south of the A40 had suffered substantial damage.

Two extremely large poplar trees had been completely uprooted alongside the River Evenlode. There was much evidence of twisting on broken branches. Debris had been scattered to the north.

Further trees had come down on the border of woodland next to the A40, west of the river. On the east of the river there was a clear path of damaged and felled trees through the woodland.

Access was given to this woodland by the owners of the property and a tour was given of the damage. The trees shown are merely an indicative sample as it was too dangerous to walk through some of it and access was blocked by the fallen trees.

Large tree branches had become projectiles. There was clear evidence of a twisting force having been applied to them.

Power lines that crossed the open fields had come down in three places. The poles had been recently replaced. Power was not restored to parts of the village until 2nd November, because access through the fallen trees was impossible without mechanical diggers. This evidence suggests a T3 tornado of width of around 150m

Cassington Village centre.


As with the previous map, some damage will not have been marked. Village residents were extremely helpful in helping to identify damage, both online and in person during the site visit. On the south-eastern side of Eynsham road, very little damage was found despite speaking to residents.

From the road some damage was evident to large trees and a fence.

In Hollow Furlong, one witness said that she saw branches and leaves swirling on the eastern side of the property. Afterwards leaves were plastered to the window. Tiles had come off from both sides of a garage.

In Williams Court, roof tiles travelled approximately 20-30m denting a car. Another car had its windscreen smashed from falling tiles.

Polytunnels on land behind the Red Lion pub had suffered no visible damage.

In the centre of the village many houses had lost some tiles or suffered fence or wall damage with some brick walls being blown over entirely. There were reports of a collapsed chimney, but this was not seen on the site investigation. One house in Bell Lane lost part of its roof. A garage door had been ripped off. Cladding came off the school and travelled approximately 200m.

Many large trees had suffered severe damage throughout the village. Trees lay in different directions. One resident said “Our apple tree fell towards the north west. Our big ash tree fell towards the north east.”

One resident described his window smashing, gutters being removed, roof felt lifting and damage to trees and plants. He found carpet underlay in his garden, origin unknown.

In The Tennis, there were two collapsed walls opposite each other. One had collapsed to the SW, the other to the NE.

A resident in The Tennis described a complex mix of damage. As well as the wall collapsing, part of the garage roof had come off, a large, substantial walk-in animal run had collapsed and travelled SW into the neighbour's property. Other items that had been moved included a very heavy picnic bench and a planted Belfast sink.

The neighbour's house was plastered to second floor level with hay and other debris. It had to be power-washed to remove the hay. In this one location, some damage was identified to have occurred in a SW direction with others occurring in a NNE direction.

An interesting small detail was that grass that had overgrown a path had peeled upwards.

Credit: Caroline Norton.

Damage in central Cassington village was generally commensurate with a tornado of strength T2, although there were some elements suggesting T3 in places. Width remained around 160m

North-west of Lynton Lane.

As before, the descriptions of tree damage are only indicative. In this case not all trees could be accessed due to being on private land.

The damage in this area was similar to the damage at the A40 end of Cassington. Numerous large trees, including sycamores and oaks, were either felled, or badly damaged. In the field to the north east of the village there was damage along the periphery, in the centre and throughout the wooded area.

It was clear that the trees had been twisted by the winds. They lay generally in a north-easterly direction.

Property owners on Lynton Lane showed the damage that their wooded area had received. The trees had been planted by the gentleman in 1973/1974 and consisted of a mix of tree types. They estimated that they had lost around twenty of their trees.

The tornado in this area was around a T3 strength and approximately 150m wide.

A footpath led to another tree boundary. Most of the damaged trees could not be accessed as they were on private land, but the front edge contained a number of snapped trees. On the back edge of this there were some trees that had clearly fallen to the north east.

Beyond these trees very little damage could be seen. The path was walked between Cassington and Yarnton and only a small amount of minor hedge damage and one snapped tree were observed. The land around Worton Hall was explored as best as possible and a drive was taken around Yarnton. It is understood that there was some tree damage in Yarnton but this was not observed, so provisionally the path of the tornado is measured as ending at the boundary of Worton.

## Conclusions

A moderate to strong tornado passed through the village of Cassington. It at times caused damage commensurate with a T3 tornado, indicating wind speeds of up to 42-51 m/s (93-114 mph). It looks to have started in Eynsham and provisionally the path is being measured as ending at the boundary of Worton. It had a width of around 160m and a provisional length of 3km.

A clear path was seen through woodland at both ends of the village as well as through the village. Many trees were lost, a good number of which had sentimental value. Tree damage showed strong elements of twist to wood fibres. Heavy projectiles travelled some distance. Many houses sustained some roof damage. Other property was damaged too, including cars, outbuildings, walls and windows. Some houses were coated in debris following the event. Witness accounts support the fact that it was a tornado.

| Tornado Classification | |
|---|---|
| Tornado strength | T3 |
| Track length | L4 |
| Track Width | W6 |
| Track Area | A5 |

## Acknowledgments

TORRO would like to thank members of the public for their support in this Site Investigation. Their generosity of sharing photographs, accounts and maps made the task much easier. We would also like to thank landowners for granting us access to their land and for giving tours of the damage.

# Appendix A

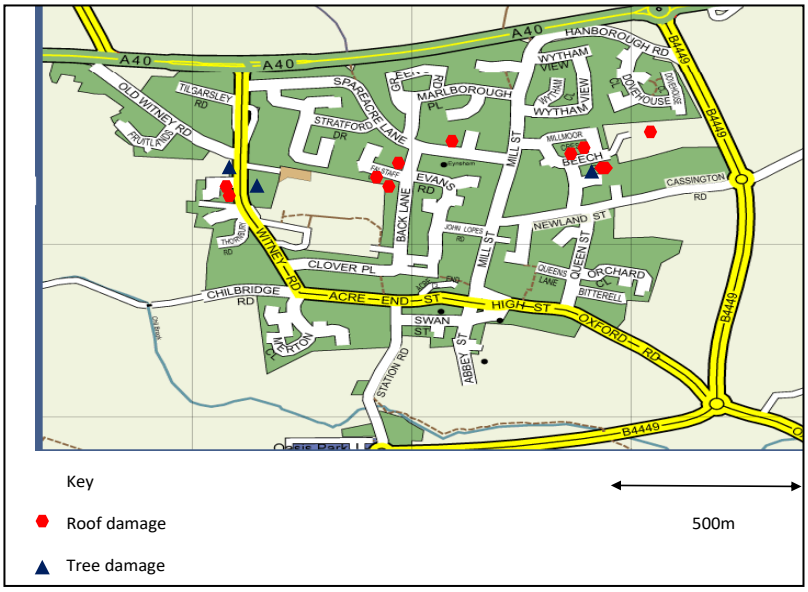
## The International Tornado Intensity Scale

| Tornado Intensity | Description Of Tornado & Windspeeds | Description Of Damage (for guidance only) |
|---|---|---|
| **T0** | Light Tornado<br>17 - 24 m s-1<br>(39 - 54 mi h-1) | • Loose light litter raised from ground level in spirals.<br>• Tents, marquees, awnings seriously disturbed.<br>• Some exposed tiles, slates on roofs dislodged. Twigs snapped; trail visible through crops.<br>• Wheelie bins tipped and rolled.<br>• Garden furniture & pots disturbed. |
| **T1** | Mild Tornado<br>25 - 32 m s-1<br>(55 - 72 mi h-1) | • Deck chairs, small plants, heavy litter becomes airborne.<br>• Minor damage to sheds.<br>• More serious dislodging of tiles, slates.<br>• Chimney pots dislodged. Wooden fences flattened.<br>• Slight damage to hedges and trees.<br>• Some windows already ajar blown open breaking latches. |
| **T2** | Moderate Tornado<br>33 - 41 m s-1<br>(73 - 92 mi h-1) | • Heavy mobile homes displaced. Light caravans blown over.<br>• Garden sheds destroyed. Garage roofs torn away and doors imploded.<br>• Much damage to tiled roofs and chimneys. Ridge tiles missing.<br>• General damage to trees, some big branches twisted or snapped off, small trees uprooted.<br>• Bonnets blown open on cars.<br>• Weak or old brick walls toppled.<br>• Windows blown open or glazing sucked out of frames. |
| **T3** | Strong Tornado<br>42 - 51 m s-1<br>(93 - 114 mi h-1) | • Mobile homes overturned / badly damaged. Light caravans destroyed. Garages and weak outbuildings destroyed.<br>• House roof timbers considerably exposed. Some of the bigger trees snapped or uprooted.<br>• Some heavier debris becomes airborne causing secondary damage breaking windows and impaling softer objects.<br>• Debris carried considerable distances. Garden walls blown over.<br>• Eyewitness reports of buildings physically shaking.<br>• Mud sprayed up the side of buildings |
| **T4** | Severe Tornado<br>52 - 61 m s-1<br>(115 - 136 mi h-1) | • Motorcars levitated. Mobile homes airborne / destroyed.<br>• Sheds airborne for considerable distances. Entire roofs removed from some houses.<br>• Roof timbers of stronger brick or stone houses completely exposed. Gable ends torn away. |

| Tornado Intensity | Description Of Tornado & Windspeeds | Description Of Damage (for guidance only) |
|---|---|---|
| | | • Numerous trees uprooted or snapped. Traffic Signs folded or twisted.<br>• Some large trees uprooted and carried several yards.<br>• Debris carried up to 2km leaving an obvious trail. |
| **T5** | Intense Tornado<br>62 - 72 m s-1<br>(137 - 160 mi h-1) | • Heavier motor vehicles (4x4, 4 Tonne Trucks) levitated.<br>• Wall plates, entire roofs and several rows of bricks on top floors removed.<br>• Items sucked out from inside house including partition walls and furniture.<br>• Older, weaker buildings collapse completely.<br>• Utility poles snapped. |
| **T6** | Moderately-Devastating Tornado<br>73 - 83 m s-1<br>(161 - 186 mi h-1) | • Strongly built houses suffer major damage or are demolished completely.<br>• Bricks and blocks etc. become dangerous airborne debris.<br>• National grid pylons are damaged or twisted.<br>• Exceptional or unusual damage found, e.g. objects embedded in walls or small structures elevated and landed with no obvious damage. |
| **T7** | Strongly-Devastating Tornado<br>84 - 95 m s-1<br>(187 - 212 mi h-1) | • Brick and Wooden-frame houses wholly demolished.<br>• Steel-framed warehouse-type constructions destroyed or seriously damaged.<br>• Locomotives thrown over.<br>• Noticeable de-barking of trees by flying debris. |
| **T8** | Severely-Devastating Tornado<br>96 - 107 m s-1<br>(213 - 240 mi h-1) | • Motorcars carried great distances.<br>• Some steel framed factory units severely damaged or destroyed.<br>• Steel and other heavy debris strewn over a great distances.<br>• A high level of damage within the periphery of the damage path. |
| **T9** | Intensely-Devastating Tornado<br>108 - 120 m s-1<br>(241 - 269 mi h-1) | • Many steel-framed buildings demolished<br>• Locomotives or trains hurled some distances.<br>• Complete debarking of any standing tree-trunks.<br>• Inhabitants survival reliant on shelter below ground level. |
| **T10** | Super Tornado<br>121 - 134 m s-1<br>(270 - 299 mi h-1) | • Entire frame houses and similar buildings lifted bodily from foundations and carried some distances.<br>• Destruction of a severe nature, rendering a broad linear track largely devoid of vegetation, trees and man made structures. |

# Appendix B

Some may remember the tornado that hit the same area in on 7th May 2012. For interest a map and summary are included for ease of comparison. During that site investigation Cassington was not explored. A discontinuous 17km path was found.


Note how close this path overlapped the start of the Cassington tornado.

Cokethorpe School. This tree had snapped in two places.

| Site | Estimated Strength | Path Width | Track Length |
|---|---|---|---|
| Cokethorpe School to Richworth Linear Fisheries | T4 | 200m | 1.6km |
| South Leigh | T1 | 50m (Est.) | 0.5km (Est.) |
| Eynsham | T2 | 70m | 1.0km |
| Yarnton | T1 | 50m | <0.5km (Est.) |
| Kidlington | T2 | 70m | 1.2km |