Department for Transport

Met Office

Issued May 2025

Transport hazard summary series

Storms

Storms in the UK can bring a mix of strong winds, heavy rainfall, flooding, lightning, and storm surges, all of which can cause widespread disruption to transport networks and lead to significant damage.

Climate change is expected to increase winter rainfall and may also lead to more frequent and intense windstorms in the coming decades. To address these challenges, the transport system must be equipped with resilience measures to withstand current and future threats.

The Department for Transport, Met Office and partners have created this series of **transport hazard summaries** to explain natural hazards and other hazards that are not the result of malicious acts, their impacts and how they may change in future. This summary introduces storms and their impact on transport, focusing on the impacts of strong winds and lightning, providing guidance to help decision makers manage and adapt to associated risks. Different forms of flooding are covered in separate transport hazard summaries.

In 2022, Storm Eunice broke England's gust speed record with a 122mph gust in the Isle of Wight, surpassing the previous 1979 record. Inland, gusts were widely close to 70mph, causing major transport disruption*

* Met Office, 'Storms Dudley, Eunice and Franklin', February 2022, available at: **www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2022/2022_01_storms_dudley_eunice_franklin_r1.pdf**

What types of storms are there?

Storms can broadly be split into two categories:

Windstorms

Often named to increase awareness if significant impacts are anticipated.

Seasonality
Most common from October to March in the UK, driven by Atlantic low-pressure systems

Duration
Hours to days

Size
Large, spanning hundreds to thousands of kilometres

Associated with strong winds, turbulence, heavy rain, and flooding. In the UK, windstorms are typically named when they may cause significant, widespread disruption.

Thunderstorms

Sometimes called summer storms, or convective storms.

Seasonality
Most common from May to August in the UK but possible anytime

Duration
Short-lived, lasting a few hours

Size
Small, affecting several kilometres – multiple thunderstorms can occur across an area

Associated with localised intense rain, lightning, hail, and flash flooding, strong wind gusts and turbulence. On rare occasions they can be associated with tornadoes, with around 30 reported in the UK each year. These are very localised and generally weak.*

---

* Mulder, K. J. and Schultz, D. M., 'Climatology, storm morphologies, and environments of tornadoes in the British Isles: 1980–2012', 2015, Monthly Weather Review, 143 (6), pages 2224 to 2240, available at: **https://centaur.reading.ac.uk/51053/**

How are storm events changing with climate change?

The number of storms in the UK varies significantly from year to year, making it difficult to predict how climate change might affect their frequency. However, as global temperatures continue to rise, most projections suggest a slight increase in the number of windstorms and a modest rise in their intensity, particularly in terms of wind speeds.* Projections more clearly show increases in rainfall intensity and therefore flooding, which we discuss in the surface water flooding and river flooding transport hazard summaries.† For more information on climate projections and emissions scenarios, see 'The changing climate' transport hazard summary.

Between 1969 and 2023, the number of stormy days ranged between 4 and 34 each year (estimated by counting the days when wind gusts over 58 mph were recorded at 20 or more UK locations due to large-scale Atlantic storms). This demonstrates the significant year-to-year variation in the number of storms, with no clear overall increase or decrease throughout the period.‡

UK climate projections indicate a small increase in winter wind speed as the global warming levels increase. However, these changes are small compared to yearly variability.*

The number of windstorms passing over the UK during winter is projected to increase in a high emissions scenario.*

While overall summer rainfall in the UK is projected to decrease as global temperatures increase, lightning events during UK summers are projected to increase in a high emissions scenario and extreme summer rainfall events from thunderstorms are projected to become more frequent.§

---

* Met Office, 'UKCP Storms Factsheet', 2023, available at: **www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-factsheet-storms.pdf**

† Met Office, 'UK and Global extreme events - Heavy rainfall and floods', available at: **www.metoffice.gov.uk/research/climate/understanding-climate/uk-and-global-extreme-events-heavy-rainfall-and-floods**

‡ Kendon, M., Doherty, A., Hollis, D. and others, State of the UK Climate 2023', International Journal of Climatology, volume 44(S1), pages 1 to 117, available at: **https://rmets.onlinelibrary.wiley.com/doi/10.1002/joc.8553**

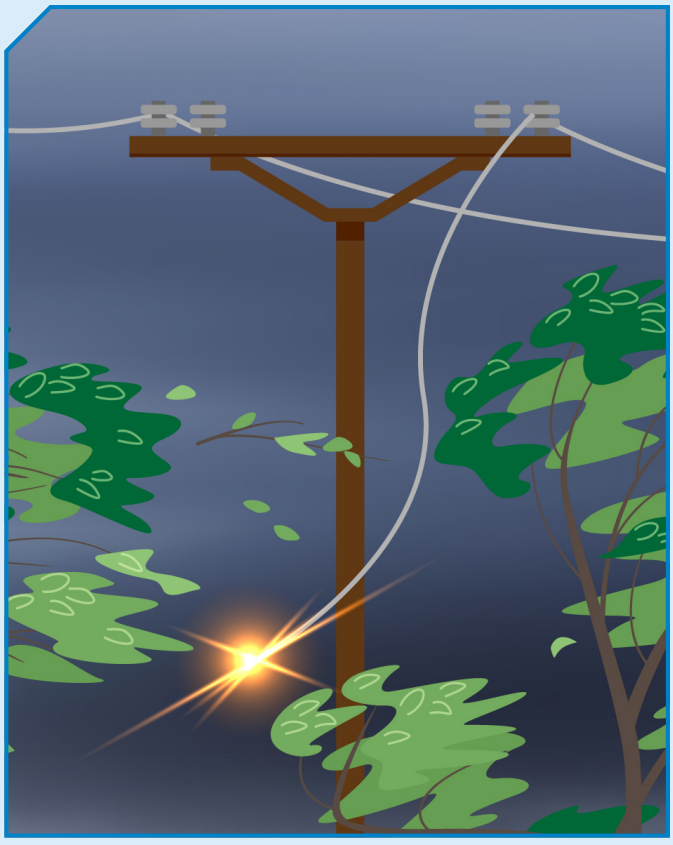
§ Kendon, E.J., Fischer, E.M. & Short, C.J. 'Variability conceals emerging trend in 100yr projections of UK local hourly rainfall extremes', Nat Commun volume 14, 1133, 2023, available at: **https://doi.org/10.1038/s41467-023-36499-9**

Direct impacts on transport from storms

Below are examples of some of the most common impacts from storms. Flooding impacts are covered in separate transport hazard summaries, however they should also be anticipated to occur during storm events.

Human health and safety

- Strong winds can knock people over, overturn high-sided vehicles and send debris flying from trees and buildings which could strike pedestrians, cyclists or vehicles.
- Falling trees can injure or even lead to fatalities if they fall on people in vehicles or pedestrians.
- Heavy rainfall can reduce visibility for drivers, leading to delays and a higher risk of accidents.



Infrastructure

- Strong winds can damage buildings, overhead lines, communication towers, and critical transport infrastructure, causing widespread service disruptions.
- Lightning strikes can damage structures and electrical equipment, leading to further disruptions.

Interdependencies: Storms can damage communication networks, power lines and substations, disrupting traffic signals, rail systems, and other transport infrastructure. This can cause widespread delays and secondary impacts. As transport relies on stable electricity and communication networks, disruptions in one sector can quickly cascade into others.

Vehicle performance and operations

- Strong winds can force closures of transport routes and bridges, restricting operations and often necessitating rerouting with few alternatives.
- To maintain safety, wind limits are enforced for operations at transport hubs such as airports and ports. For example, at the Port of Dover, all shipping is suspended when sustained winds exceed 55 knots in a specific direction.*
- Severe turbulence from thunderstorms impacts aviation, leading to flight diversions and rerouting. A risk of lightning can prevent re-fuelling at airports.
- Heavy rain and hail reduce visibility and can increase braking distances and the risk of aquaplaning and skidding. Large hail could damage vehicles.
- Rail networks impose speed restrictions during high winds to prevent derailments, and fallen trees can block rail lines and roads, disrupting travel.
- High winds, large waves and sea swell can disrupt loading and unloading of passenger ferries and cargo ships as docking becomes hazardous, potentially suspending operations at ports.

---

* Port of Dover, 'Operating Safety Limitations', available at: **www.portofdover.com/port-information/safety-emergency/operating-safety-limitations/**

Storm Eunice – case study

In February 2022, three consecutive windstorms impacted the UK within a week, storms Dudley, Eunice and Franklin. The most powerful, Storm Eunice, combined exceptional strong winds and heavy rainfall.* The storm's severity caused widespread damage, leading to significant transport disruption across multiple modes. Strong winds from Storm Franklin hampered recovery efforts.

Hundreds of flights around the UK were cancelled, causing significant disruption for air travellers. Many aircraft struggled to land in the strong winds, exacerbating delays.

Extremely strong winds led to train cancellations across the UK. Disruption continued for several days as strong winds continued to limit repair work.†

The Port of Dover and three major bridges, the Humber and both Severn Bridges, closed, causing significant disruption to freight. This was the first time that both Severn Bridges had closed at the same time.

* Met Office, 'Storms Dudley, Eunice and Franklin', February 2022, available at: **www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2022/2022_01_storms_dudley_eunice_franklin_r1.pdf**

† Network Rail, 'Knock-on impact of Storm Eunice impacting services in Hertfordshire', 2022, available at: **www.networkrailmediacentre.co.uk/news/knock-on-impact-of-storm-eunice-impacting-services-in-hertfordshire**

Hazards associated with storms

Coastal erosion

During storms, coastlines can erode from large waves and sea swells impacting and removing sediment, potentially impacting coastal transport infrastructure.

Cold weather hazards

Storms in winter can bring a variety of cold weather hazards such as heavy snow and hail, creating dangerous conditions for transport.

Dam collapse

While very rare, extreme rainfall events can lead to dam overtopping or, similarly to landslides, weaken soils and potentially lead to dam collapses, causing catastrophic flooding downstream.

Flooding

Heavy rainfall from storms can lead to surface water flooding and river flooding. Storm surges and large waves can lead to coastal flooding.

Landslides

Intense rainfall can saturate soil, increasing the risk of landslides that can damage or block transport infrastructure.

Subsidence, soil degradation and sinkholes

Repeated cycles of heavy rainfall and drying can contribute to subsidence and soil degradation, weakening the ground supporting transport infrastructure.

Further information on these hazards can be found in our series of Transport hazard summaries: **www.gov.uk/government/collections/transport-hazard-summaries**

Risk mitigation and adaptation

While the UK has mitigation measures informed by past storms, fully addressing extreme events remains challenging due to their unpredictability and increasing severity. Examples of mitigations and adaptation are:

- designing or adapting infrastructure to be resilient to outages to power supplies, communications and signalling due to wind damage – for example, the availability of backup power supplies
- improving vegetation management by regularly inspecting and trimming trees near transport routes to reduce risks from falling debris
- applying speed restrictions on roads and railways and closing bridges to high sided vehicles
- pre-emptively closing routes and carrying out checks for damage and debris before re-opening

Questions for decision makers

- Which assets and infrastructure may be exposed and vulnerable to strong winds or lightning and can they be made more resilient?
- How can you make sure that you are aware when wind speeds are expected to exceed the limits that your transport services can be safely operated in?
- How can public communication be handled during storms to pre-emptively reduce the risk?
- How can you prepare for impacts and hazards associated with storms occurring concurrently such as wind damage, blocked routes, flooding and landslides?
- Are resources and equipment available to respond to storm events and stabilise the situation?
- How can you prepare for successive storms over a short period?

Further reading

How storms and flooding affect the railway – Network Rail

Lessons learned from extreme-weather emergencies on UK highways – DfT and the Local Government Technical Advisers – lessons from 2015 to 2020, covering all seasons of weather

Named storms and low pressure systems in the UK – Met Office

Stay safe in thunder and lightning – Met Office

Types of weather – Met Office

UK Storm Centre – Met Office

Weather warnings guide – Met Office

What is a storm surge? – Met Office YouTube channel

Climate information and risk assessment

Please see 'The changing climate' and 'Transport hazards, risks and resilience' transport hazard summaries for more information on identifying and planning for risks to transport and where to find climate data, including more detail on projected changes on a regional level.

OGL **© Crown copyright 2025.** Any enquiries regarding this publication should be sent to us via **www.gov.uk/government/organisations/department-for-transport**