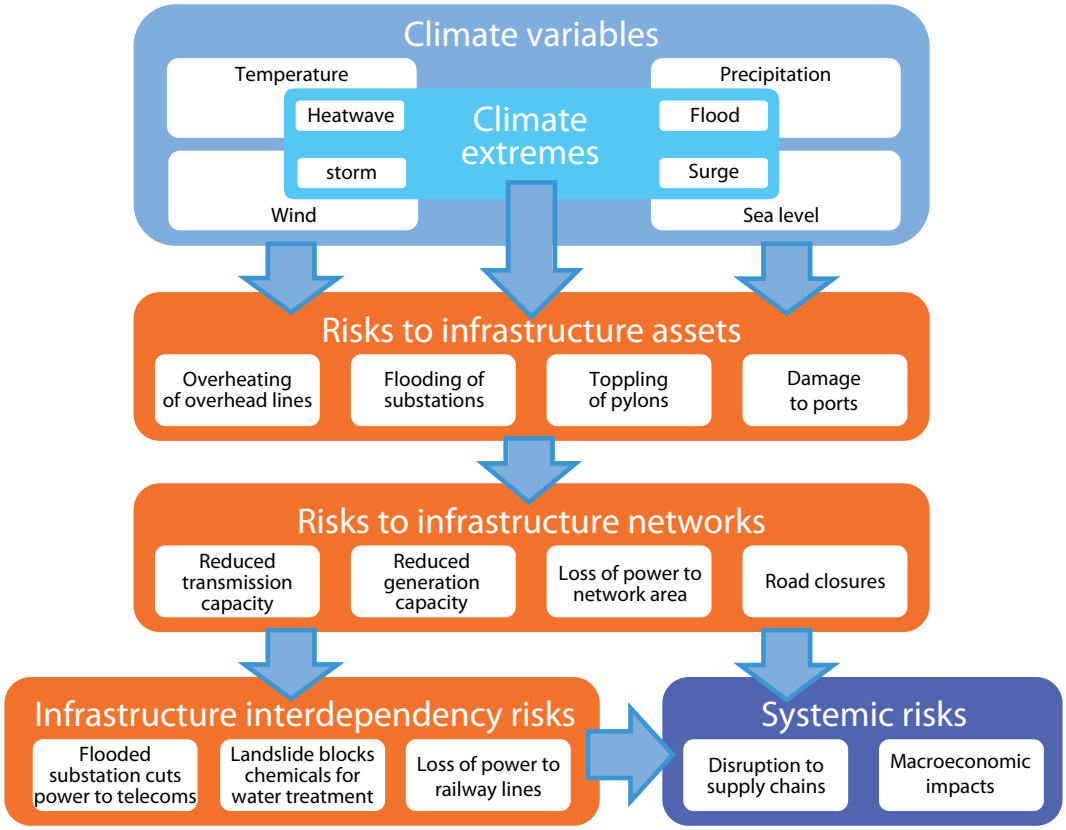
# Infrastructure | Chapter 4

**Extreme events, such as the winter storms of 2013/14 and 2015/16, can cause severe damage to essential services, such as water and energy supplies, transportation and communication networks. As well as being costly to recover, the loss of infrastructure services can have significant impacts on people's health and wellbeing, and local economic activity.**

Climate change is expected to lead to an increase in the frequency and severity of severe weather including flooding, heatwaves and drought.

Example relationships between climate variables and infrastructure impacts




**Increasing frequency and severity of flooding represents the most significant climate change risk to UK infrastructure.**

All infrastructure sectors are already exposed to multiple sources of flooding, and the number of assets exposed to significant levels of flood risk could double by the 2080s with projected changes in the UK climate.

Coastal infrastructure, particularly ports, is at risk from rising sea levels and a corresponding increase in the height of storm surges. Infrastructure networks near rivers will be exposed to higher flows and erosion of bridge foundations. The collapse of ageing bridges in recent flood events highlights the potential for knock-on impacts, as bridges often carry gas pipelines as well as electricity, telephone and data cables.

**Changes in temperature and rainfall will place additional pressure on infrastructure, in particular the rail, road, water and energy sectors.**

High temperatures increase the risk of railway track buckling, electricity cables sagging, and road tarmac softening and rutting. Components such as signalling equipment can overheat and fail. Changing rainfall patterns and increased evapotranspiration, coupled with population growth, are projected to lead to water demand exceeding the available supply across large areas of England and some other parts of the UK by the 2050s in some scenarios. Increasing investment and adaptation will be needed to manage this risk.

Projected increases in heavy rainfall events will also increase the risk of slope and embankment failure affecting transport and road networks.

**Increases in maximum wind speeds experienced during storms could have significant implications for infrastructure networks.**

Whilst projections remain uncertain, overhead power and data network cabling, offshore infrastructure and transport networks could become increasingly disrupted.

**There is evidence that significant adaptation steps have been implemented, or are underway, across most infrastructure sectors.**

This is primarily in response to recent extreme weather events. Reporting of risks and adaptation activity has improved, but remains incomplete and inconsistent.

**Whilst understanding of the risks to individual infrastructure sectors has improved over the last few years, the impacts of climate change could be amplified by interdependencies between infrastructure sectors.**

Understanding of interdependencies is less comprehensive, and current governance arrangements mean that responsibilities for assessing and managing risks from interdependencies are unclear.

Urgency of additional action to support infrastructure resilience

| Risk/opportunity | Urgency score | Rationale for scoring |
|---|---|---|
| In1: Risks of cascading failures from interdependent infrastructure networks | More action needed | More action needed to enhance arrangements for information sharing in order to improve understanding of critical risks arising from interdependencies. |
| In2: Risks to infrastructure services from river, surface water and groundwater flooding | More action needed | More action needed to manage increasing risk to existing assets and networks and ensure increased risk is accounted for in design and location of new infrastructure. |
| In3: Risks to infrastructure services from coastal flooding and erosion | More action needed (research priority in Northern Ireland & Scotland) | More action needed to manage increasing risk to existing networks (including flood and coastal erosion risk management infrastructure), from sea-level rise and increased rate of erosion. |
| In4: Risks of sewer flooding due to heavy rainfall | More action needed | More action needed to deliver sustainable drainage systems, upgrade sewers where appropriate, and tackle drivers of increasing surface runoff (e.g. impermeable surfacing in urban areas). |
| In5: Risks to bridges and pipelines from high river flows and bank erosion | Research priority | More research needed on implications of projected changes in river flows on future risk of scour/erosion. |
| In6: Risks to transport networks from slope and embankment failure | More action needed | More action needed to locate and remediate slopes, embankments and cuttings at risk of failure. |
| In7: Risks to hydroelectric generation from low or high river flows | Watching brief | Monitor impacts and be ready to adapt operations as necessary. |
| In8: Risks to subterranean and surface infrastructure from subsidence | Watching brief | Monitor changes in temperature and rainfall patterns to update assessments of subsidence risk. |
| In9: Risks to public water supplies from drought and low river flows | More action needed (sustain current action in Northern Ireland & Scotland) | New policies and stronger co-ordinated, cross-sector effort needed to deliver more ambitious reductions in water consumption and establish strategic planning of new water-supply infrastructure. More action needed to put in place reforms of the water abstraction licencing regime. |
| In10: Risks to electricity generation from drought and low river flows | Watching brief | Continue to monitor risks including as a result of deploying carbon capture and storage.<br>Ensure appropriate siting of new infrastructure including use of suitable cooling technologies. |
| In11: Risks to energy, transport and digital infrastructure from high winds and lightning | Research priority | More research needed on the implications of increased vegetation growth rates on future risks of damage from falling trees in storms. |
| In12: Risks to offshore infrastructure from storms and high waves | Research priority (watching brief in Northern Ireland & Wales) | More research needed to assess climate risks to existing and planned off-shore renewable energy infrastructure. |
| In13: Risks to transport, digital and energy infrastructure from extreme heat | Sustain current action | Continue current actions to reduce risks, including maintenance and renewal of infrastructure networks. |
| In14: Potential benefits to water, transport, digital and energy infrastructure from reduced extreme cold events | Sustain current action | Continue current actions to reduce risks, including to maintain current cold-weather planning and response capabilities. |

**Note:** The urgency categories are defined as follows:

- ***More action needed:*** New, stronger or different government policies or implementation activities – over and above those already planned – are needed to reduce long-term vulnerability to climate change.
- ***Research priority:*** Research is needed to fill significant evidence gaps or reduce the uncertainty in the current level of understanding in order to assess the need for additional action.
- ***Sustain current action:*** Current or planned levels of activity are appropriate, but continued implementation of these policies or plans is needed to ensure that the risk continues to be managed in the future. This includes any existing plans to increase or change the current level of activity.
- ***Watching brief:*** The evidence in these areas should be kept under review, with long-term monitoring of risk levels and adaptation activity so that further action can be taken if necessary.

**www.theccc.org.uk/uk-climate-change-risk-assessment-2017**