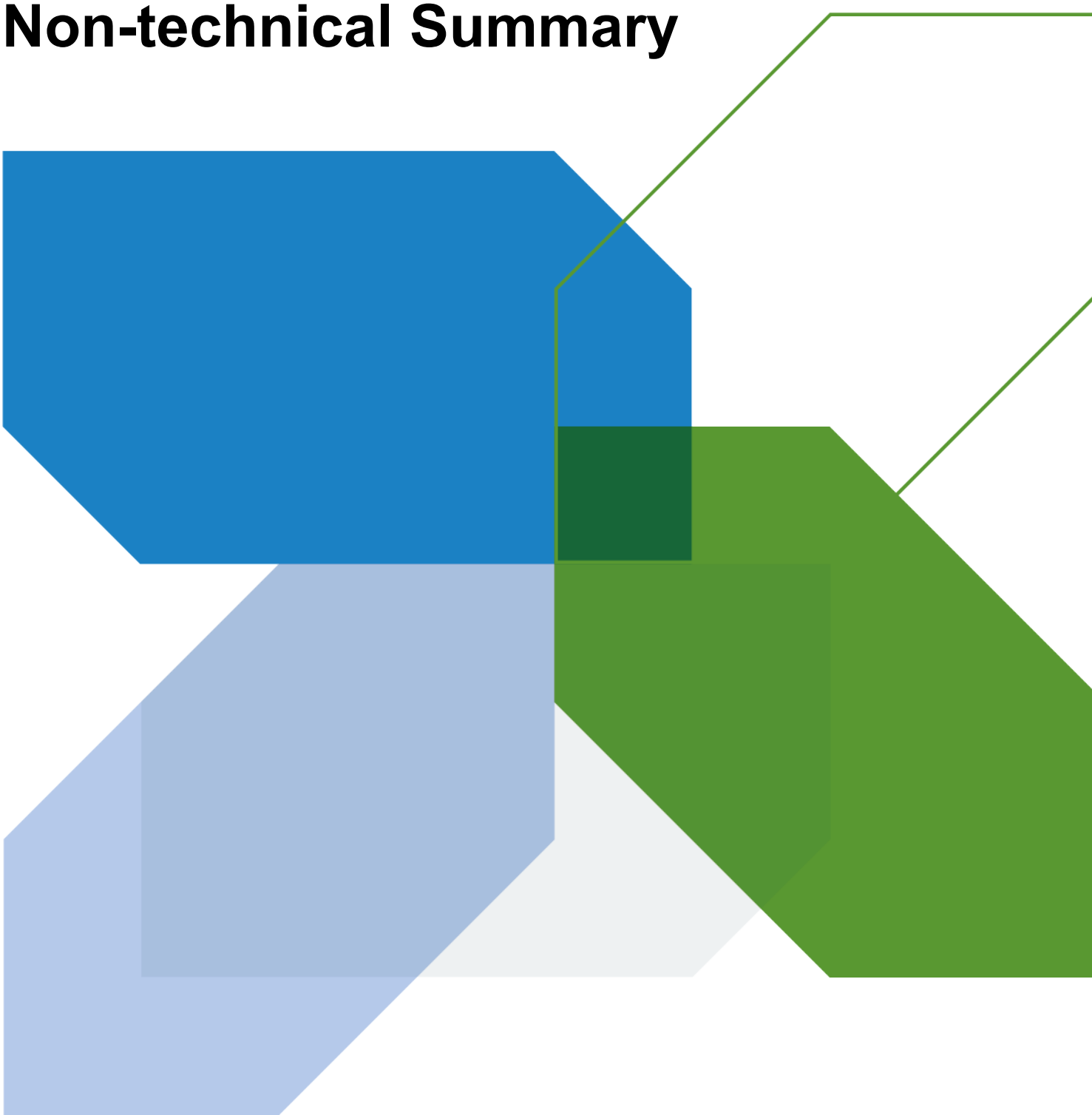
Department for Transport

Climate Risk Assessment Guidance for the Transport Sector- Non-technical Summary



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Non-technical summary

This document is a non-technical summary of the Climate Change Risk Assessment Guidance for the Transport Sector published by the Department for Transport in Autumn 2024.

Accessible, safe, and reliable transport infrastructure is fundamental to day-to-day life. Climate change has the potential to disrupt operations and damage the transport network, through hazards such as flooding, subsidence, high and low temperatures, and other extreme weather.

Climate Change Risk Assessments (CCRAs) can help organisations understand the current and future effects of climate change and prioritise adaptation action.

This guidance provides a step-by-step approach to completing a CCRA for the UK transport sector. The principles within the guidance can be applied to an assessment at an asset, scheme or organisation-level. It is suitable for use across the sector but focusses on ports, airports and local highways where the evidence base is currently comparatively less well developed.

The steps required to carry out a CCRA are summarised as a flowchart in Figure 1 and discussed in turn below. Following these steps will allow users to complete the template in Table 1 for each climate hazard and draft a report setting out the key findings.

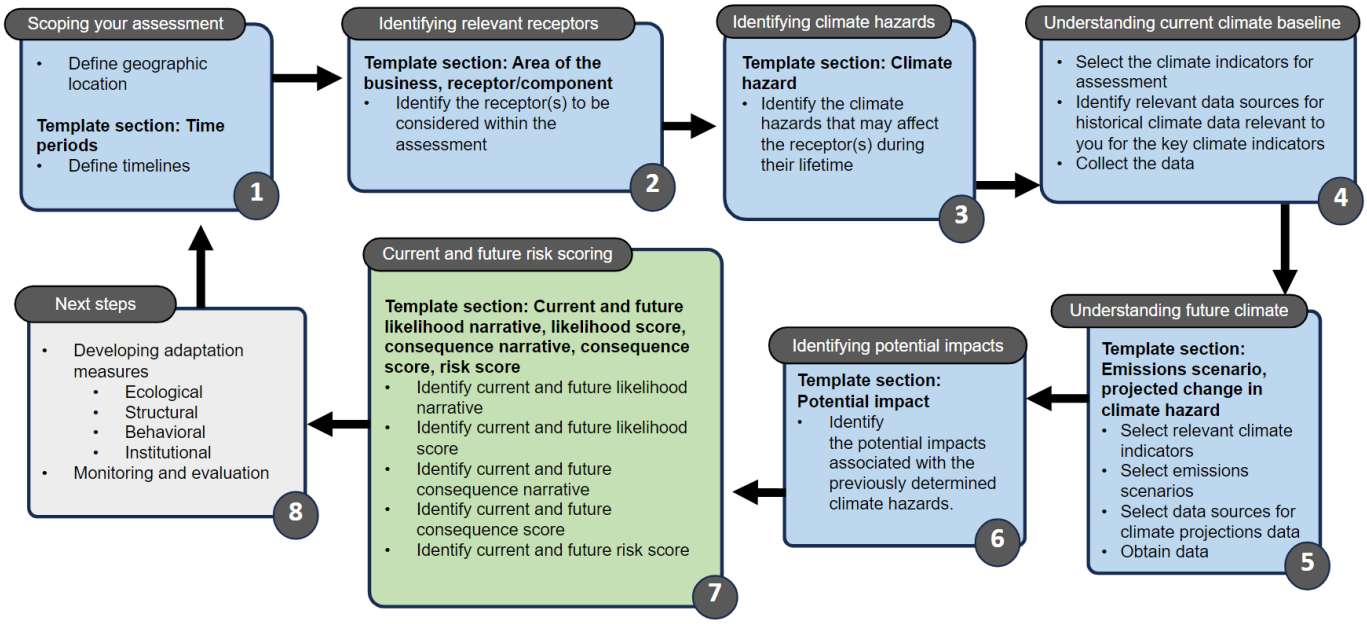


Figure 1 Flow diagram to outline the steps to undertake a CCRA

Example

Scope & potential impact	Area of the business	
	Receptor / component	
	Climate hazard	
	Projected change in climate hazard	
	Potential impact	
Risk assessment Time period: *Current* Emissions scenario: *N/A*	Likelihood narrative	
	Likelihood score	
	Consequence narrative	
	Consequence score	
	Risk score	
Risk assessment Time period: *[Future time period]* Emissions scenario: *[As selected]*	Likelihood narrative	
	Likelihood score	
	Consequence narrative	
	Consequence score	
	Risk score	

Table 1 CCRA Template

Effective collaboration will enhance the quality and relevance of your CCRA - you should identify a working group for the CCRA process drawing on relevant internal expertise. This could include colleagues working on risk management, asset design and maintenance and operations.

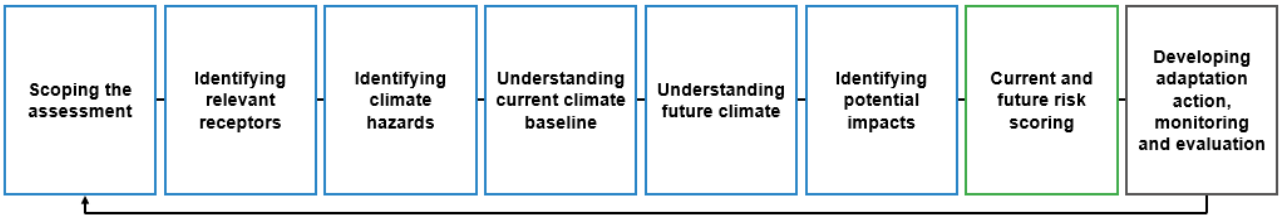


Figure 2 CCRA steps

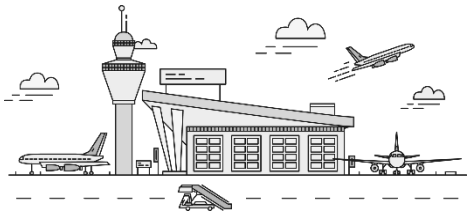
Step 1 Scoping the assessment

When carrying out a CCRA, it is important to define which assets or parts of your organisation should be considered in the assessment (referred to in this guidance as 'receptors') and how far into the future you want to consider.

Defining the physical boundaries of your assessment

To determine the physical boundaries of the assessment, you should first decide whether to carry out an asset- or scheme-level assessment or an organisation-level assessment. An organisation-level assessment is likely to focus on risks to business functions rather than specific assets or systems.

Then you will need to decide which direct and indirect impacts should be in-scope. Direct impacts are the immediate impacts caused by climate change while indirect impacts cascade through interconnected systems. When looking at how climate change may affect your assets, sometimes you might just look at the direct impacts, but other times you might need to think about both the direct impacts and the knock-on, indirect impacts.



For example, if you are assessing an airport, you are likely to include not just the terminal and the runway, but also the extra buildings and services which are part of the airport. This way, you get a full picture of what could be impacted. You may also include surrounding infrastructure.

You should include a description of the area you are assessing in your report. You can do this by highlighting it on a map, or using any geospatial systems your organisation is familiar with.

Defining how long your asset needs to be resilient for

Understanding how long your asset needs to be resilient for is an important part of scoping your CCRA. When you are carrying out a CCRA for an asset, you should choose a length of time that aligns with how long that asset is expected to be in use. You should also consider any planned replacement cycles for the asset.

For example, if a road needs to be resurfaced every eight to twelve years and replaced every 30 years, the CCRA may look to assess climate risks in the mid-2030s and mid-2050s.

For an organisation-level assessment where there is not an asset-specific maintenance or replacement cycle, you may wish to select a range of timescales.

Professional judgement is needed to determine the time period relevant for your assessment. You should record how long your asset needs to be resilient for in your CCRA report.

More detail on scoping the assessment can be found on page 9 of the full guidance report.

Step 2 Identifying receptors

A 'receptor' is anything that could be affected by a climate-related hazard, such as an asset or an organisation. When identifying receptors to include in your assessment, you need to think about:

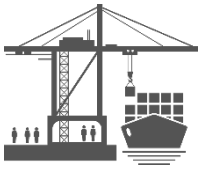
- what is at risk? This could be anything such as building(s), the infrastructure and utilities that go with them and processes such as maintenance activities.
- who is at risk? This includes everyone from transport users, staff and construction workers to the people living nearby.
- how much detail is needed? Sometimes you may look at something as one single piece, but other times you need to zoom in and look at each component on its own. You may also wish to group similar receptors together or look at them separately.
- which stages of the project are included? Projects have different stages: construction, operation and decommissioning. If relevant, you may need to think about risks at each stage.

More detail on identifying receptors can be found on page 13 of the full guidance document.

Step 3 - Identifying climate hazards

A climate hazard is a physical event related to climate which could have an impact on people, assets or activities. Hazards can be acute and sudden, or chronic and based on trends over time. Different organisations will face different hazards.

For example, ports may have more risks related to sea level rise and strong winds, while airports may struggle more with winds and flooding as they are usually built on flat land.



When identifying hazards to include in your assessment, it is important to consider:

- whether there are location-specific risks? For example, if your receptor is on a coastline, it may be more exposed to storm surges or coastal flooding.
- what has happened there before? You should look at whether the area has had issues with weather or extreme events in the past. For example, is the area prone to flooding?

- what is the nature of the receptors you are assessing? This could be anything from buildings to processes that might get hit by bad weather. For example, tall buildings and overhead lines are more likely to be affected by strong winds and storms.

- what may happen long term? You should consider which hazards could happen during the lifetime of the asset or system.

More detail on identifying climate hazards, including a table of examples of climate hazards, can be found on page 18 of the full guidance document.

Step 4 - Understanding the current climate baseline

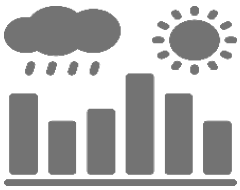
You can think of the climate baseline as a weather report for the past 20 years. Understanding current climate risks is an essential step to assessing and contextualising how risk might change in the future.

Not all weather and climate data will be relevant for every assessment. For example, if you are looking at an airport which is far away from the coast, you will not need to consider how sea levels are changing.

To understand current climate, you should identify past weather records. These can include:

- evidence from past events: You should look for information about past extreme weather events in the area, and how much they cost financially, such as the money spent on repairing damage, or losses from not being able to operate.

- weather logs: You should look for records and datasets of daily weather details such as how much it rained or how windy it was. The Met Office provide weather station data, available here: Historic station data - Met Office



You may find it beneficial to present these findings in a table or graph.

You should summarise this information on the current climate baseline within your report, clearly identifying the most relevant weather conditions for the assessment.

Further sources of current climate information can be found on page 22 of the full guidance document.

Step 5 - Understanding future climate

Once you have established the current climate conditions for your area, the next step is to assess how this might change in the future.

Climate projections are a set of data which help us understand what the weather and climate might be like in the future. The latest Met Office climate projections are the 2018 UK Climate Projections (UKCP18).

UKCP18 projections show us how the climate might change depending on the trajectory of greenhouse gas emissions. They use different 'what if' scenarios called 'representative concentration pathways' (RCPs), to show possible changes in the climate.

The projected change in global temperature by 2100 associated with each RCP scenario is summarised below:

Representative Concentration Pathway (RCP)	Projected change in temperature by 2081-2100
RCP2.6	1.6°C
RCP4.5	2.4°C
RCP6.0	2.8°C
RCP8.5	4.3°C

Climate projections are not predictions or forecasts but simulations of potential scenarios. It is a good idea to assess climate risks using at least two emissions scenarios, covering a spectrum of possible future climate outcomes to help manage uncertainty.

UKCP18 includes various products such as the probabilistic, global, regional, local and derived projections. You need to determine which UKCP18 products are most relevant for your study. Each has its advantages and disadvantages; however, the probabilistic projections may be particularly helpful to understand the probability of outcomes occurring.

The choice of which emission scenario(s) to adopt will depend on your organisation's risk appetite and the criticality of potential risks.

There are various sources for obtaining UKCP18 data, including:

- the Climate Risk Indicators tool (CRI) - a user-friendly portal which is particularly helpful for first-time users of climate data;
- the Climate Data Portal - the Met Office's portal for accessing and downloading climate datasets in a range of easy-to-use formats; and
- the UKCP User Interface - the Met Office's portal for accessing UKCP18 data, providing a broader range of climate data.

An overview of the different UKCP18 products and step-by-step guidance for extracting data can be found in Annex A of the full guidance document.

Step 6 - Identifying potential impacts

For each of the climate hazards included in the assessment, the potential impacts of the hazards occurring should be identified, including where relevant the interdependencies and cascading impacts.

Some examples of impacts include:

- a heatwave can lead to the impact of an overheated boat engine, potentially leading to stranded passengers and crew, and consequent repair and compensation costs
- extreme wind and storm events may lead to the impact of debris or other obstructions in the road may occur, including fallen trees
- extreme rainfall can lead to the impact that roads may get flooded and cut off access

Further examples of potential impacts for ports, airports and local highways can be found in Annex C of the full guidance document.

Step 7 - Current and future risk scoring

This step will help you to understand the level of risk you face now and in the future. Understanding current risks is important because it provides a starting point you can use to measure how risks may change over time.

In this guidance we suggest scoring risks based on the current and future likelihood, and consequence of hazards occurring. Each risk should be separately assessed. Where an organisation has their own criteria for determining risk levels these should be used.

Scoring current likelihood

Current likelihood relates to the expected frequency of risks occurring over the receptor's lifetime, based on today's climate.

This could be informed by evidence about the frequency with which this impact has occurred over the life of the asset, or similar assets, to date. It could also be informed by wider information such as the design standard and condition of assets, for example poorly maintained assets may be less resilient to climate change.

An example of current likelihood scoring criteria can be found in Table 9 on page 39 of the full guidance document.

Scoring current consequence

Current consequence refers to the extent to which the receptor has been (or is expected to be) affected, either positively or negatively, each time the climate hazard occurs. The impacts can be direct or indirect and can be in relation to various areas including finance, health and safety, environment, performance and reputation.

To understand the current consequence level, you can look at:

- evidence for the impact of this climate hazard occurring for the same or similar receptor(s)
- studies, analysis or modelling about what could happen
- professional judgement based on experience and knowledge

An example of current consequence scoring criteria can be found in Table 10 on page 40 of the full guidance document.

Current risk scoring

The current risk score is then determined by combining the likelihood and consequence scores. Table 2 below provides an example of how likelihood and consequence scores could be multiplied to obtain an overall 'risk' score.

		Consequence				
		Minor (1)	Limited (2)	Moderate (3)	Significant (4)	Catastrophic (5)
Likelihood	Very high (5)	5	10	15	20	25
	High (4)	4	8	12	16	20
	Moderate (3)	3	6	9	12	15
	Low (2)	2	4	6	8	10
	Very low (1)	1	2	3	4	5

Table 2: Illustrative example of a risk scoring matrix

Scoring future likelihood

Future likelihood relates to the expected frequency of the risk occurring over the assessment period(s) as defined in Step 1. When establishing future likelihood you may wish to consider:

- if the impact has occurred previously and how often
- climate projections to understand whether receptors are likely to become more exposed to climate change over time
- the frequency with which the hazard has occurred for similar receptors, particularly those which are already more exposed to the hazard

An example of future likelihood scoring criteria can be found in Table 12 on page 43 of the full guidance document.

Scoring future consequence

You should score future consequence in a similar way to current consequence. Consideration should be given to whether future consequence should differ from the current consequence, for example the consequence should be higher where transport usage is expected to increase over time or where outcomes could worsen due to increasingly extreme weather events.

An example of consequence scoring criteria can be found in Table 12 on page 45 of the full guidance document.

Future risk scoring

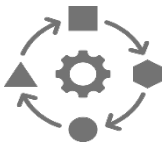
As per the current risk score, quantifying the future risk involves combining the likelihood and consequence scores. For consistency the same methodology used for current risk scoring should be used for future risk scoring.

Step 8 Developing adaptation measures, monitoring and evaluation

Once you have completed your CCRA, it is a good idea to start planning ways to mitigate the most serious risks, known as adaptation measures. These measures are not just physical measures and can also include changes in ways of working to adapt to future climate.

As part of considering the case for adaptation measures you may wish to update the CCRA using a scenario with the measures in place to understand how risk scores may change.

It is also important to revisit your CCRA at regular intervals, to ensure it remains up-to-date. We suggest doing this either every 5 years, or sooner if there are big changes in your organisation before then.



Completed template example

		Example
Scope & potential impact	Area of the business	Ports
	Receptor / component	Water channels
	Climate hazard	Sea level rise
	Projected change in climate hazard	Rising average sea level
	Potential impact	Episodic sedimentation infill of dredged areas such as berths and approach channels
Risk assessment Time period: current	**Likelihood narrative**	The impact has previously never occurred
	Likelihood score	1
	Consequence narrative	Delays to service and financial cost of maintenance requirements and dredging of water channels to restore previous conditions and allow for vessel berthing and docking.
	Consequence score	3
	Risk score	3
Risk assessment Time period: 2050s, Emission scenario: medium (RCP6.0)	**Likelihood narrative**	Projections indicate that sea level will rise by 0.3m. The impact has previously never occurred.
	Likelihood score	2
	Consequence narrative	As per current consequence.
	Consequence score	3
	Risk score	6