

SA2: Assess Current and Likely Future Impacts

Scoping impacts

The objective of this stage is to identify climate risks to local authority services and to consider whether any potential threats and opportunities arising from projected climate changes require adaptation responses. It is primarily intended to be used for looking at individual service sectors, but a similar approach can also be used for looking at areas of an authority's corporate role, or, more generally considering climate risks across an authority as a whole.

Scoping has two main aims:

- to identify potential climate impacts.
- to identify any threats and opportunities that require adaptation responses.

The output of this stage will be a prioritised list of climate impacts on the services under consideration. This will serve as the basis for developing appropriate adaptation responses at the next stage of the overall process.

The scoping process outlined here represents a fairly simple approach to analysing climate risks and identifying adaptation responses. This should be suitable for the majority of local authority service sectors, but for certain activities, such as major developments, or infrastructure projects, a more rigorous approach will be necessary and you are advised to consult the Scottish Climate Change Impacts Partnership or UKCIP website, in particular the publication *Climate adaptation: Risk, uncertainty and decision-making*.

Please note that although the process is described here in a step-by-step sequence, it really should be treated iteratively with earlier stages being revisited and re-assessed as the process proceeds. In particular, any apparently significant risks identified during the preliminary assessment should be considered in more detail before proceeding to the next stage of developing adaptation responses.

Issues to be considered in scoping impacts

There are some useful general principles for good climate adaptation that should be born in mind as you work through the following stages. Many of these are principles for good decision-making more generally.

- Work in partnership where appropriate – try to involve all relevant stakeholders throughout the process
- Recognise that there are many uncertainties that may affect your decisions, particularly those with long-term implications. The climate projections themselves have significant uncertainties, although it should be noted that all the UKCIP02 scenarios are fairly consistent through to around 2040 and only begin to diverge significantly from the middle of the century onwards. There may also be considerable uncertainties about non-climate factors that could affect the adaptation response you make. The next package of climate change information for the UK, called UKCIP08 is due for release shortly.
- Frame your objectives carefully before you start – in most cases the primary aim of adaptation will be to maintain, and ideally enhance, the existing objectives of the service area in question. In some cases, changes to climate may affect the objectives of a service, for instance when climate impacts affect the demand for a particular service.
- Take a balanced approach to managing climate and non-climate risks.
- Focus on actions that will help address the priority climate impacts you identify.
- Try to find no-regret adaptation options.
- Try to find win-win options.
- Review your adaptation strategy regularly.

The adaptation strands of this Action Pack make extensive use of tools developed by UKCIP and provide links to these and other useful resources. In particular, a set of service sector guidelines has been prepared to support this tool together with a set of check lists for recording progress through the process.

Do you need to consider climate change impacts for all services?

While climate change will impact on most services, it will not impact on all. If the answer to all the following questions is no, then it may not be necessary to go through the whole scoping procedure, although it is still probably worth working through the first couple of sections to confirm that you have not missed any less obvious factors.

- Is the sector currently affected by weather or climate, either directly or indirectly?
- Does the sector involve taking decisions with long-term consequences (decades or longer) for land-use, built assets or people?
- Does the sector involve infrastructure or business areas that are sensitive to changes in weather or climate?
- Is the sector vulnerable to disruption of external factors such as utility supplies and transport infrastructure?
- Is it critical to the aims and objectives of the service sector to maintain continuity of service during extreme events?

Identify potential impacts

The objective of this section is to identify the impacts climate changes may have on council services. Although many of the projected impacts may represent **threats** to the effective running of services, it is important to also consider any **opportunities** presented by changing conditions.

The climate of the UK is projected to change significantly over the coming century. The main changes are expected to be:

- Milder and wetter winters.
- Warmer and drier summers.
- An increased number of extreme weather events, particularly heavy rainfall and heat waves.

Note that the first two factors represent long-term changes to the average climate and the third represents an increased risk of disruption to normal service provision.

There are many possible approaches to identifying and assessing potential climate impacts on services. In many cases there will be sufficient in-house expertise to determine potential impacts on particular service areas. An outline checklist is available for recording this information.

Generally it is best to pool expertise by way of brainstorming sessions or more formal workshops involving relevant officers. Such work could be undertaken by the climate change team you will have established. Other stakeholders should be consulted where practical, particularly for service areas identified internally as being particularly vulnerable to climate impacts, or when external stakeholders have a significant role.

Identify the significant climate variables for the locality

As a starting point for a Climate Change Adaptation Action Plan, you should consider the production of a Local Climate Impacts Profile (LCLIP) based on historical climate data, local knowledge, present day monitoring and projected future climate – UKCIP has produced guidance on preparing a LCLIP. However, you may not wish to delay the process of identifying climate risks until a full LCLIP has been completed. The following section outlines the identification of important local climate factors in the absence of a full LCLIP. Any information collected and its interpretation should be recorded carefully so that it can be shared amongst those undertaking assessment of different service sectors and incorporated into an LCLIP in future.

For initial assessments it may be enough to consider the broad directions of changes in variables. These can be summarised as follows:

Long-term / seasonal averages

- Warmer, drier summers (spring, autumn too).
- Milder, wetter winters.
- Rising sea levels.

Extremes

- More very hot days.
- More intense downpours of rain.
- Shorter return periods for high water levels at coast.
- Uncertain changes in storms – possible increase in winter.



Based on knowledge of local conditions and experience of the recent past, consider the way that weather impacts on the service at present and over the recent past and which of these changes are likely to impact on services in your area. Clearly, rises in sea level, or increased risk of storm surges, are likely to be highly significant to many authorities with coastlines, or tidal estuaries, but not to inland authorities which may be vulnerable to fluvial flooding in the event of periods of heavy rain. On a smaller scale, minor flooding incidents in urban areas during recent storms may indicate vulnerabilities due to inadequate, or poorly maintained, drainage systems, or excessive impervious surfaces that may cause significant problems in the future if no actions are taken. A simple *pro forma* checklist is available for recording this information. If as a result of this initial consideration, there appears to be significant potential impacts on the services under consideration, it may be necessary to look in more detail at projected climate changes as set out in the UKCIP02 Climate Change Scenarios.

Identifying potential threats and opportunities to service

In order to identify and assess potential impacts it is useful to consider how climate change may affect various aspects of service provision. The following list of factors is a modified version of material originally prepared for analysing business applications. It provides a useful framework for considering both direct and indirect impacts on local authority service provision:

- **Logistics:** vulnerability of supply chain, utilities and transport infrastructure.
- **Finance:** implications for investment, insurance and stakeholder reputation.
- **Demand:** changing demand for services.
- **Process:** impacts on the processes of service delivery.
- **People:** implications for workforce, customers/clients and changing lifestyles.
- **Premises:** impacts on building design, construction, maintenance and facilities management.
- **Management implications:** how will climate risks and impacts be managed effectively?

The service sectors guidelines provide some suggestions of potential impacts on local authority services. These are not intended to be comprehensive, but to provide a list of potential impacts and to serve as a catalyst for further consideration.

Identifying climate impacts requiring adaptation responses

The next step is to identify potential climate impacts on local services that may require adaptation responses and to assign some degree of priority in respect of other factors that may affect service provision. This involves several phases:

- Estimating the likelihood and consequences of potential climate impacts
- Ranking potential climate impacts by their significance
- Comparing climate impacts with other relevant risks and opportunities
- Identifying potential climate impacts that require adaptation responses

In assessing the need to respond to potential climate impacts, it is important to consider the timescales over which the impacts may operate in comparison with the timescales over which any decisions about adaptation responses will function. To take a simple example, climate projections suggest that the average thermal growing season will lengthen, but that soil moisture content will be reduced during the summer period. This will have significant implications for the management of green space. It is probable that current mowing regimes for parks and sports fields will be inappropriate at some time in the future. Mowing will probably have to be extended in spring and autumn, and possibly be continued throughout the winter, but may not need to be as frequent over the summer period. But given that decisions about mowing regimes have relatively short lead times, set by maintenance schedules, or agreements with external contractors, a suitable adaptation response may be to monitor mowing arrangements, to review them at some time in the future, or even simply to ignore the issue until it becomes more pressing. However, any landscaping or planting decisions with an intended lifetime of more than a few years should take account of projected climate changes in their design, selection of species and future water requirements. In fact, given the pressure on water resources, all landscaping and planting decisions should be taken with a view to minimising watering requirements.

Estimating the likelihood and consequence of impacts

In general, it will not be possible, nor necessary, to estimate the precise quantitative likelihood or consequences of potential climate impacts on council services. Any major, large-scale projects that are likely to be climate sensitive will require a more rigorous assessment of risk than outlined here. UKCIP has produced some more detailed guidance on risk assessment and costing together with some sector specific information which should be consulted for more major projects or strategic decisions.

The following simplified diagram forms the basis for a more qualitative estimation of risk. For each of the threats and opportunities identified at the previous section, assign a value of low, medium or high for its likelihood and its consequence and enter it into the matrix. It is probably clearer to use separate matrices for threats and opportunities, or multiple matrices if you have identified a large number of risks.

Likelihood of hazard	High			
	Med			
	Low			
		Low	Med	High

Magnitude of consequence

When completing the matrix, consider the following factors to estimate the likelihood of a hazard:

- Climate risk based on the current local climate and projected future changes over a relevant period. In the first instance, the summary trend information may be sufficient, but if it appears that there may be significant affects, then more detailed scenarios (or the Local Climate Impacts Profile if one has been prepared) should be consulted.
- The likely climate sensitivity of the service sector, or the specific aspect of it being considered (this is known as the 'exposure unit' in risk assessment terminology). There may be specific aspects of the climate that a particular exposure unit is sensitive to, for instance, insect species may be sensitive to weather conditions during a specific period of year, which may have implications for environmental health for pest species, or conservation management for beneficial species.
- The vulnerability of the exposure unit to climate change. Any exposure unit will have a coping range, generally with a critical threshold above which there are unacceptable impacts. Typical examples are sea walls, or other flood defence systems, and any flooding events that indicate vulnerability when the threshold is exceeded. In effect, adaptation aims to reduce vulnerability by increasing the critical threshold.

The output of this section should be a likelihood/consequence matrix (or several matrices if a large number of impacts have been identified). These should be accompanied by a record of the reasons for these assessments and, ideally an indication of the level of confidence, especially for any high consequence hazards identified.

Identify the most significant impacts

This step is quite straightforward once any likelihood/consequence matrices have been produced. Draw up a rank order listing of the significant threats and opportunities to the service sector being considered. Keep in mind the aims and objectives of the services under consideration. The main function of any adaptation measures will be to maintain, and ideally enhance, the capacity to deliver the aims and objectives of the services provided under changing climate conditions.

For instance, consider how any extreme events may affect the capacity to maintain the continuity of the services under consideration. The priority given to this may well vary according to the nature of the service area. For instance, maintaining functioning fire, or other emergency, service is clearly critical. Whereas for library services, protecting stock against damage may have a higher priority than continuity of service.

The output of this section should be a list in rank order of significance of threats and opportunities to service sector, together with relevant notes and comments.

Compare estimated climate impacts with other risks

Before moving to develop adaptation responses to projected climate changes, it is important to consider non-climate related factors in order that any measures taken are reasonable and proportional. Bearing in mind that the processes of identifying climate impacts outlined above is fairly broad-brush and qualitative, it is probably appropriate to treat other factors at a similar level of detail. In many cases the knowledge and experience of relevant officers should be sufficient to identify appropriate comparisons, via brainstorming sessions or workshops. Note that other factors could interact with climate risks and may combine to make things better or worse. For instance, if in the future large-scale housing developments are built in areas where water is already scarce, the risks of not being able to cope are increased if summers become drier.

This checklist is based on the *HM Treasury (2001) The Orange Book. Management of risk - a strategic overview* provides a framework for considering other risk factors.

Output: a rank ordered list of potential climate-related risks compared to other risk factors for the service sector, with appropriate notes.

Identify impacts that may require adaptation responses

The final part of this stage in the process involves pulling together all the above information in order to identify those climate impacts, and the threats and opportunities they represent, to decide which, if any, require responding to. This inevitably requires a degree of judgement and should be related to the broader aims and policies of the authority in addition to the specific aims and objectives of the service sector under consideration.

Remember to bear in mind the timescales over which impacts may become significant when considering priorities for action. A projected impact may be highly significant over the long-term, but may require no immediate action for a service with a relatively short planning horizon and, hence, be assigned a low priority. On the other hand, relatively minor impacts in future may well be worth considering for decisions that have long term implications.

There will probably be some significant impacts that obviously need some kind of response and some that clearly do not. In general, it is probably wiser, at least in the first instance, to consider possible adaptation responses to all, or most, non-trivial impacts, and leave the decision as to whether, or not, to adapt to the appraisal stage. Some of the low priority impacts may be amenable to win-win, or low regret, approaches and so may still be worth adapting to.



CHECKLIST

- Have you identified the potential climate change adaptation issues that may affect your Local Authority's services?
- Have you established some general principles to govern your work on adaptation?
- Have you considered the different aspects of your services that may need to be addressed with regard to climate change e.g. in terms of people, premises, etc
- Have you evaluated the likely climate change impacts on your area and the potential effects of these on your services? Which of these will require an adaptation response?

The final output from this complete stage should be a list of local climate impacts, and the risks and opportunities these represent to your services, prioritised in order of those identified as requiring consideration for adaptation.

