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Adapting to Climate Change: helping key sectors to adapt to climate change

Statutory Guidance to Reporting Authorities 2009

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Contents

1. What is this guidance?	
Who are reporting authorities?	4
Using this guidance	5
Working together	6
2. Why is it important that organisations adapt?	7
How might climate change impact on the UK?	7
What evidence is there available about the future climate?	8
What is adaptation?	9
The benefits of adaptation	9
3. How is Government helping organisations to adapt?	11
Reporting to the Secretary of State	11
What should the reports include?	13
What will happen to the reports?	16
Devolution	16
4. What issues might you need to consider?	18
Getting started	18
Risk assessment	19
Using evidence and dealing with uncertainties	19
Interconnectivity, interdependencies and barriers to adaptation	20
5. What action might you need to take?	21
Developing an adaptation plan	21
What to take into account when developing an action plan	22
Possible adaptation measures	23
Sustainable development and adaptation	25
Cost benefit analysis	26
6. How does adaptation become ‘business as usual’?	27
Evaluation in the context of climate change	27
Monitoring and evaluation in practice	27
Annex A: Legal Basis	29
Annex B: Cover sheet	30
Annex C: Prompts to support a reporting authority’s risk assessment and action plan	36

1. What is this Guidance?

This chapter outlines the purpose of this guidance, who should have regard to it, and how it should be used.

- 1.1 This Guidance is issued by the Secretary of State to reporting authorities under powers contained in the Climate Change Act 2008 (the Act). The legal basis for this Guidance is set out in Annex A. Its purpose is to provide reporting authorities with guidance about:
- assessing the current and projected impacts of climate change in relation to the authorities' functions;
 - preparing proposals and policies for adapting to climate change in the exercise of their functions; and
 - co-operating with other reporting authorities for that purpose.
- 1.2 All reporting authorities are required to have regard to this Guidance when reporting to the Secretary of State. However, this Guidance aims to be more broadly applicable and to help all organisations that are interested in addressing the risks of climate change to their operations and increasing their adaptive capacity to manage these risks.
- 1.3 This Guidance therefore aims to be helpful for all the relevant sectors and levels of reporting authority and, for this reason the Guidance does not prescribe a particular methodology of either assessing risk or of developing a programme of measures. Rather, it seeks to inform reporting authorities about adaptation to climate change, and points them in the direction of useful tools that a reporting authority can use to develop their own tailored report to the Secretary of State as well as providing steers on approaches that an authority may wish to take. It will be up to each authority to decide how to approach the detail of the task set them in their Direction.
- 1.4 This Guidance will, in the long term, be supported by a web-based directory of case studies, examples and sources of further information¹, showing how different sectors can take different approaches to delivering against the Guidance.

Who are reporting authorities?

- 1.5 The Government believes that all bodies should be considering the risks presented by climate change. Under the Act, reporting authorities – bodies with functions of a public nature and statutory undertakers; such as the utility companies - can be directed by the Secretary of State to produce a report on

¹ <http://www.defra.gov.uk/adaptation>

how their organisation is assessing and acting on the risks and opportunities from a changing climate.

- 1.6 This power is the primary lever available to the Government to influence behaviour on the assessment and management of climate change risks within the wider public sector. While the legal definitions are complex, the intent is to include those responsible for providing services and infrastructure to the public.
- 1.7 Potential reporting authorities' work as a whole has a significant impact on the ability of the UK to adapt to a changing climate. Some key authorities, given their importance to ongoing daily life and vulnerability to climate change, will be asked to report on the risks to their organisations from climate change. We expect that all bodies, those that are directed to report, and others, should exercise their powers and duties in the way best calculated to contribute to the achievement of an adapting society, economy and natural environment. The risk assessments of individual reporting authorities will inform future iterations of the UK Climate Change Risk Assessment (CCRA).
- 1.8 While this document provides generic guidance on the process of risk assessment and adaptive management, reporting authorities are also encouraged to be outcome-oriented in terms of designing adaptation responses that demonstrably reduce risk over time whilst retaining organisational flexibility for the future.
- 1.9 Further information about reporting authorities is published in our strategy for use of the reporting power².

Using this Guidance

- 1.10 Following this Guidance should aid authorities in developing a managed, adaptive approach to climate change risks, but most of all, lead to the changing climate becoming a key consideration in organisations' planning processes and decisions. There is useful information throughout this document, and we would encourage organisations to read the whole document before starting to develop their risk assessments or adaptation plans.
- 1.11 Adapting to climate change is not a one-off exercise; it is an ongoing process that needs to become an everyday part of doing business. For many organisations, adapting to climate change will become a key strategic issue considered alongside other corporate business risks.
- 1.12 As far as is possible, the use of the reporting power and this Guidance seeks to utilise existing regulatory reporting to minimise regulatory burdens on organisations. If there are several frameworks through which an authority can

² <http://www.defra.gov.uk/environment/climate/legislation/reporting.htm>

meet the requirements of this Guidance, the authority need only bring together those reports to respond to the Secretary of State.

- 1.13 In the longer term, supporting this Guidance will be a wide range of additional information that may be useful on sector specific issues and broader information on methodologies that may be useful to authorities. This information will be made available on the Adapting to Climate Change website³, which will be updated on regular basis, as officials are made aware of new material⁴.
- 1.14 This Guidance will be updated as understanding of adaptation risk assessment and methodologies develops, and particularly as other subject or sector specific guidance begins to take on the need to adapt.

Working together

- 1.14 Climate change is likely to affect nearly every part of an organisation, and beyond that have repercussions on other stakeholders. Some authorities may be asked to report jointly to reflect their specific circumstances and inter-relationships with other key stakeholders.
- 1.15 Where this is the case the Direction to report will set out how reporting authorities are expected to report jointly. However, we would expect all authorities to take into account the needs of other stakeholders in their own programme as they prepare to adapt to a changing climate.
- 1.16 For this reason authorities may need to work in partnership with other organisations to adapt, and their process should include some form of consultation with interested parties, particularly when considering what measures to take to adapt.

³ www.defra.gov.uk/adaptation

⁴ If you are aware of any recent advances in this area within your own sector, please let us know at acc_reportingpower@defra.gsi.gov.uk

2. Why is it important that organisations adapt?

This chapter outlines the evidence that is available to reporting authorities on future climate, an explanation of the impacts of climate change, and a definition and benefits of adapting to climate change impacts.

- 2.1 The Earth's climate is changing. Rising global temperatures will bring increased temperatures, changes in weather patterns, rising sea levels and increased frequency and intensity of extreme weather across the globe.
- 2.2 We need to avoid making the problem worse, so mitigating climate change is a priority. But cutting greenhouse gas emissions now will not have any effect on the climate system for the next 30-40 years due to the time lag in the climate system. Additionally we already face some inevitable changes due to past emissions. All of us - individuals, businesses, Government and public authorities - will need to adapt our plans and behaviour to respond to the challenges of climate change.
- 2.3 Changing our plans and behaviour to respond to the impacts of climate change is known as 'adaptation'. Adapting to climate change should involve making decisions that are sustainable, made at the right time, which maximise the benefits and opportunities, and that minimise the potential costs that a changing climate presents.
- 2.4 Adaptation needs to be built into planning and business risk management now to build resilience and to ensure the continued and improved success of businesses, Government policies, and social and environmental operations.

How might climate change impact on the UK?

- 2.5 Just as the weather and the effect it has on the natural environment and society varies across the country, the impacts of climate change will vary from place to place, business to business and organisation to organisation. There will be both positive and negative impacts on nearly every aspect of our economy, society and natural environment.
- 2.6 The UK Climate Impacts Programme (UKCIP) has undertaken a series of regional studies for each part of the UK, and identified a range of possible future impacts⁵. The most widely anticipated impacts that UKCIP has identified are:
 - an increase in the risk of flooding and erosion;
 - greater pressure on drainage systems;
 - water supply shortages;
 - increased water demand;
 - increased summer cooling demands;

⁵ http://www.ukcip.org.uk/images/stories/Pub_pdfs/MeasuringProgress.pdf

- significant changes in weather paths affecting consumption and transport;
- international supply chain effects on imports and exports;
- loss of many important habitats for wildlife;
- summer water shortages and low stream flows;
- increased risk of subsidence (in areas where subsidence is already a problem);
- increased demand for summer cooling;
- buildings becoming uncomfortably hot; and
- a range of health issues.

2.7 These impacts are very high level and the impacts at an organisational level will vary considerably depending on the organisation, its activities and location, dependencies on other systems affected by climate change, and planning timescales.

What evidence is available about the future climate?

2.8 The UK Climate Projections (UKCP09) were released in June 2009 and are the latest update to an ongoing series of projections for the UK. UKCP09 give probabilistic projections of climate change up to the end of the present century over both land and sea for 3 greenhouse gas emissions scenarios. They provide information on variables such as precipitation, temperature, cloud, sea level rise, storm surge, and sea surface temperatures. There are a large number of pre-prepared maps and graphs alongside extensive web based guidance that organisations will need to adhere to in using the Projections. Tailored projections data is available through an interactive user interface. There are also accompanying scientific reports which explain the methodology, assumptions and limitations of the science. The outputs are based on the Met Office Hadley Centre's methodology for quantifying uncertainty in future climate projections.

2.9 The UKCP09 Projections are likely to be a useful tool for some organisations in undertaking assessments of their risks from climate change. They will allow decision makers to consider a range of possible future climates, as well as an estimate of the uncertainties surrounding those changes. This is the first time that this has been attempted for projections of UK climate. Considered alone, they will not set out the risks for organisations, but need to be brought together with other pertinent information; for example, studies that look at impacts associated with different degrees of climate change, and information that each organisation has of its vulnerability to different degrees of climate change, which is essential in order to make best use of the Projections.

2.10 Further guidance on the use of the Projections is available on the project website⁶. This guidance and associated supporting information will be continually updated as more experience is gained on how the Projections

⁶ <http://ukclimateprojections.defra.gov.uk>

might be used by reporting authorities and others. Because this is the first time that probabilistic projections have been produced, there will be a period of learning as to how decision makers can best understand and make use of them which coincides with when the first round of reporting will take place.

What is adaptation?

- 2.11 Adapting to climate change means adapting the way we do things - in all areas of our lives - to respond to the changing circumstances. It means not only protecting against impacts, but also making us better able to take advantage of any potential benefits.
- 2.12 The Intergovernmental Panel on Climate Change (IPCC) defines adaptation as "any adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities".
- 2.13 For planning decisions with long lifetimes e.g. designing new infrastructure, it is important to plan adaptation strategies early to cope with higher temperatures, changing rainfall patterns and the other potential changes that will not occur for years to come. That might mean ensuring services, buildings and transport links are robust against flooding, storm damage, heat waves and subsidence. Because of the uncertainty inherent in projections of future climate, adaptation strategies designed now should be able to cope with a range of possible future changes, and be flexible where possible to incorporate new knowledge and information in the future.
- 2.14 When adapting to climate change, in many cases there will be a number of different possible adaptation options available to a particular organisation at a particular time. Retaining flexibility in adaptation responses will be essential for organisations, so as to develop organisational resilience and not become locked into a single response.

The benefits of adaptation

- 2.15 Adapting to climate change should result in both private and public opportunities along with net benefits. For example, in terms of:
- offsetting damages, e.g., reduced damage to private built assets due to flooding; reduced discomfort in buildings; reduced disruption of infrastructure and public facility services; reduced loss of coastal biodiversity in the face of sea level rise;
 - productivity gains from a more efficient use of scarce resource (e.g. water); and
 - revenues from new business opportunities, for example from exploiting longer summer season (e.g. tourist/leisure facilities), or longer growing seasons for specific crops (e.g. grapes).

- 2.16 Adaptation might also result in ancillary benefits, for example on health (e.g. flood defences would reduce the risk of contaminated water), and the environment (e.g., when measures also preserve and strengthen the resilience of natural ecosystems). Resilience against climate disruption is also likely to build resilience against other disruptions.
- 2.17 Risk assessment is a valuable mechanism to capture business opportunities that might arise from climate change and to identify those which can be secured with relative ease.
- 2.18 To some extent, adaptation will occur autonomously. However, some barriers might prevent individuals and the environment from adapting in the appropriate way. This is why it is important that the Government gathers information, so that it can assess the extent to which it has a role to work alongside the public sector, statutory undertakers - such as utilities companies, regulatory authorities and others, to break down these barriers.

3. How is Government helping organisations to adapt?

This chapter outlines the process reporting authorities should go through to report to the Secretary of State, what a report to the Secretary of State should include, what the Government will do with the reports once received, and the effect of this Guidance in Wales, Scotland and Northern Ireland.

Reporting to the Secretary of State

- 3.1 Every report to the Secretary of State should include information on the current effects and projected impacts of climate change that may have an effect on the body in question, and a proposed programme of adaptation measures. Where directed to do so, the report should contain information on progress by the reporting authority against its proposed adaptation programme.
- 3.2 Box 1 outlines the stages that would we expect a reporting authority to follow, and definitions of each stage. The process set out below should not be seen as having a start and end, but as a constant cyclical, iterative process that authorities should undergo in order to embed adaptation into their core planning processes.

Box 1: Outline of process

Stage 1: Assessing risks, identifying threats and opportunities (see Chapter 4)

A reporting authority should have an appreciation of the potential climate impacts on its operations and/or functions for specified periods into the future, given the current best evidence. This assessment should include identifying the threats and opportunities to an organisation that may arise from future climate change. From an understanding of current vulnerability and projected impacts, it will be possible to identify threats and opportunities, and their consequences.

The risk assessment should generate priority areas for action based on the organisation's vulnerability to these risks. These priorities should be established and evidenced using a rigorous risk-based approach in order to ensure that impacts are dealt with in a prioritised and proportionate fashion, and so to reduce risks to the organisation over time to a residual level (the residual risk).

The approach adopted should be flexible given that our knowledge of future climate risks will undoubtedly change over time as knowledge and understanding improves, and given that there will always be inherent uncertainties when dealing with future unknowns.

Stage 2: Developing adaptation plans (see Chapter 5)

The risk assessment should generate a priority list of risks for which a range of possible adaptation responses can be developed. The uncertainties and interdependencies that are an inevitable feature of the risk assessment mean that organisations will need to be flexible as they generate their adaptation responses.

Some issues will require immediate practical adaptation responses, or changes to existing regulatory frameworks; while others will require more extended periods of investigation. These might include research, cost – benefit appraisal and other types of capacity building initiatives.

The resulting programme of adaptation responses should be assessed against sustainability principles (economic, social and environmental) and whether they would be viable in a low carbon economy.

Stage 3: Implementing the adaptation plan, embedding adaptation into existing structures and monitoring the effects (see Chapter 6).

Having prepared a programme for adaptation responses, the next step is delivering adaptation actions, as well as an ongoing evaluation of their effectiveness in reducing the residual risk to the organisation. This process, which could include further risk assessment and analysis of other adaptation options, should assess, avoid and minimise any adverse impacts.

It is important that adaptation becomes part of the way that reporting authorities carry out their functions. Adapting to climate change is not a single, one-off exercise. It is ongoing and needs to be embedded into the core of each authority's business, not undertaken as a standalone activity.

- 3.3 In this Guidance we have adopted a middle ground between a narrow template (that would squeeze out subtleties, undervalue the diversity of approaches, and impose unnecessary constraints on those reporting), and free form responses (that would fail to provide guidance for those who need it, and would create data that is incomparable across organisations and so fail to meet Government's assessment and policy planning needs).
- 3.4 An organisation may follow any process that it deems fit in its individual circumstances, as long as a report to the Secretary of State provides the information set out in the Direction from the Secretary of State, and has regard to this Guidance.
- 3.5 The Climate Change Act makes it obligatory for reporting authorities directed to carry out the following actions:
 - a. to have regard to this Statutory Guidance
 - b. to have regard to the most recent information on climate change risk and the Government's programme on adaptation;
 - c. to have regard to relevant guidance issued by Welsh Ministers, where relevant; and
 - d. to have regard to the report when carrying out their functions other than their devolved functions.
- 3.6 The Direction requires authorities to provide:
 - a. a summary of the statutory and other functions of the reporting authority;

- b. the methodology used to assess the current and projected impacts of climate change in relation to those functions and the findings of the assessment of the current and projected impact of climate change in relation to those functions;
- c. a statement of which policies and proposals the reporting authority has decided to pursue and its plans for implementing these policies and proposals; and
- d. the timescales for implementation of these policies and proposals.

3.7 In addition the authority should include:

- a. a reference to whether or not the reporting authority has scoped potential policies and proposals for adapting to climate change and assessed their costs and benefits;
- b. if a policy referred to above has been implemented, a description of the policies and proposals that were considered and their costs and benefits;
- c. a reference to any other policies that the reporting authority has already implemented.

3.8 Regulatory authorities should consider helping others adapt in the right way by setting the right underlying framework for effective adaptation, and creating information needed to make effective decisions. There is more detail about this in chapter 5.

3.9 Having regard to chapters 4-6 of this Guidance should assist an authority to achieve these requirements. When evaluating the reports the Secretary of State will be assessing the extent to which these are taken into account.

3.10 We leave the format to the discretion of each organisation, although we have outlined a cover sheet for the report at annex B. We would require each authority to send the Secretary of State one hard copy of the report, as well as an electronic copy emailed to acc_reportingpower@defra.gsi.gov.uk.

What should the reports include?

3.11 Each report should cover the areas outlined in Box 2 with an appropriate level of detail. It is expected that reports will demonstrate the approach and method which is proportionate to the size of organisation and in order to be 'fit for purpose' in this regard. Reports should take an organisational rather than a solely site specific approach to their risk assessment and adaptation plans. Where an organisation operates outside the UK, information on these aspects is welcomed but not legally required in the reports.

Box 2. What to include in a report?

1. Functions impacted by climate change

- a. What are your organisation's functions, mission, aims, and objectives?
- b. Which of these will be affected by the current and possible future impacts of climate change?
- c. Have you assessed the climate thresholds above which climate change and weather events will pose a threat to your organisation? If so what were the main results?
- d. Who are your organisation's key stakeholders? Do you need to assess the impacts of climate change on them?

2. Approach

- a. What evidence, methods and expertise have you used to evaluate future climate impacts? List sources and references.
- b. How do you quantify, or otherwise estimate or characterise the impact and likelihood of risks occurring at various points in the future?
- c. How have you evaluated the costs and benefits of proposed adaptation options?

3. Summary of risks which affect functions, mission, aims, and objectives

- a. List all the organisations' strategic risks from climate change on a likelihood/consequence matrix – including thresholds where applicable.
- b. What short and long term impacts of climate change have you identified and how are each factored into the adaptation programme? Quantify the likelihood and consequences as far as possible (including an assessment of the level of confidence (e.g. high/medium/low) in the calculations) and disaggregate these risks to different locations where appropriate.
- c. What are your high priority climate related risks and why (stating level of impact to business, likelihood, costs and timescales)?
- d. What opportunities due to the effects of climate change which can be exploited, have been found?

4. Actions proposed to address risks

- a. What are the adaptation actions for the top priority risks (stating timescales)?
- b. How will the adaptation actions be implemented (stating level of responsibility, investment and timescales)?
- c. How much do you expect these adaptation measures to cost and what benefits do you anticipate will result from them?
- d. How much do you expect them to reduce risk by, and on what timescales?
- e. How will you ensure the management of climate change risks is embedded in your organisation?

5. Uncertainties and assumptions

- a. What are the main uncertainties in the evidence, approach and method used in the adaptation programme and in the operation of your organisation?
- b. What assumptions have been made when devising the programme for adaptation?

6. Barriers to adaptation and interdependencies

- a. What are the barriers to implementing your organisation's adaptation programme?
- b. How will these barriers be addressed?
- c. What/who are the interdependencies (including the stakeholders stated in response to question 1d)?

7. Monitoring and evaluation

- a. How will the outcome of the adaptation programme be monitored?
- b. How will the thresholds, above which climate change impacts will pose a risk to your organisation, be monitored and incorporated into future risk assessments?
- c. How will the residual risks of impacts from climate change on your organisation and stakeholders be monitored?
- d. How will you ensure that the management of climate change risks is firmly embedded in your organisation?
- e. How will you enable your management of climate change risk to be flexible?
- f. Has the production of this report led to a change in your management of climate risks?

- 3.12 A cover sheet for the report is attached at Annex B. The purpose of this cover sheet is to provide a structure for your executive summary, allowing consistency in headline reporting to ensure that key messages are included and easily analysed by Government. It should identify the key risks due the impact of climate change to your organisation, how your organisation plans to

prepare and adapt to alleviate these risks and any barriers which your organisation may face. This summary does not constitute a report, but should enable you to highlight the key, high level messages that you should address.

- 3.13 The core of the report is flexible depending on each reporting authority's circumstances. To assist you we have attached at Annex C a series of prompts to assist you in developing your report.

What will happen to the reports?

- 3.14 All of the reports will be made public, subject to some excisions for information deemed by your organisation, and agreed with the Secretary of State, to be commercially in confidence or restricted on security grounds. We would expect some level of public scrutiny, particularly from regulators and other stakeholders of reporting authorities with an interest in their performance. To this end, the assumptions made in the risk assessments and adaptation responses prepared by reporting authorities are expected to be well-evidenced and justified.
- 3.15 The Secretary of State will consider whether an authority has reported in compliance with its Direction and this Statutory Guidance, and whether it will be asked to readdress any issues in its report. The Government will also analyse the reports to compare across organisations how advanced adaptation plans are in order to assess the status of the UK's adaptive capacity and identify areas of strength and deficit. This may also provide information on further work that needs to be done, for example, increasing guidance or identifying research gaps, or whether there are issues relating to how the regulatory framework that supports adaptation that need to be addressed. The Adapting to Climate Change Programme will also use the data in its overall assessment of UK risks alongside the UK Climate Change Risk Assessment, which will help prioritise the National Adaptation Programme. Finally, the reports will be used to inform future strategies for using the reporting power and to help Government analyse the effectiveness of reporting on authorities' preparation for the effects of climate change.

Devolution

- 3.16 The Secretary of State has the power to issue Guidance and Directions to reporting authorities in Wales, Scotland and Northern Ireland, in relation to their reserved functions in Scotland, non-devolved functions in Wales and reserved and excepted functions in the case of Northern Ireland. Additionally, for some reporting authorities or functions, the Secretary of State may need to consult or seek the consent of the government of devolved administrations before issuing Guidance or Directions, as required by section 64 of the Act.
- 3.17 Reserved functions (and excepted functions in the case of Northern Ireland), which the Secretary of State may issue Directions on, include amongst other matters, constitutional, economic and defence issues, and some energy

supply and distribution and transport matters. The exact scope of these functions in Scotland, Wales and Northern Ireland is not identical.

- 3.18 The Act confers the power to issue Directions to the Welsh Ministers in relation to reporting authorities' devolved functions, similarly to the Secretary of State's power. Welsh Ministers may also produce Guidance equivalent to this Guidance.
- 3.19 The Act does not give any powers to the Northern Ireland Executive or Scottish Ministers which mirror the powers available to the Secretary of State.
- 3.20 This Guidance therefore applies to all reporting authorities, some of which may operate only in England, and some may operate in other parts of the UK if some aspect of their work is overseen by the UK Government.

4 What issues might you need to consider?

This chapter covers what reporting authorities should take into account when assessing risks, and identifying threats and opportunities.

- 4.1 Reporting authorities will need an appreciation of the potential impacts of the climate on its operations and/or functions for specified periods into the future, based on the current best evidence and projections. From this understanding of potential impacts it will be possible to identify priority areas for action in the short term and the need for further exploration in the longer term (paragraph 2.6 outlines some of the risks that you could consider).
- 4.2 The process set out below and in Annex C should assist an organisation in developing a risk assessment, and so identify and prioritise the threats and opportunities to address in its action plan. However, we would not expect every authority to follow this process in its entirety. It is up to any authority to determine what works best for them and this will enable them to report to the Secretary of State, and embed the approach within their own processes effectively.
- 4.3 In the long-term, there is likely to be sustained change in the climate such as higher average temperatures throughout the year. However, changes in extremes and anomalies – exceeding a certain threshold - are likely to be more noticeable, being the most damaging impacts.

Getting started

- 4.4 Engagement with others is useful at an early stage to help share information and resources. It may also be useful to find out the present position of associated organisations and draw them into the process of identifying risks because these may be shared across organisational boundaries. The UK Climate Impacts Programme has produced a number of decision making tools designed to help organisations plan adaptation strategies⁷.
- 4.5 It may be advisable to establish an inter-departmental dialogue within your organisation, as some business functions will be more aware of the potential impacts of climate change than others. Those close to service delivery may be more aware of climate impacts on their operations, for example.
- 4.6 You should also take stock of any existing policies and procedures that are currently related to climate change impacts, and consider the effect the weather currently has on your operations and the achievement of your organisation's objectives and how this might change in the future.

⁷ http://www.ukcip.org.uk/index.php?option=com_content&task=view&id=74&Itemid=187

Risk assessment

- 4.7 Developing a list of potential impacts of future weather and climate is a fundamental part of developing a programme for adapting to the risks of climate change. In brief, a reporting authority's risk assessment should generate a suite of priority actions that will inform an adaptation plan. Implementation of a flexible programme of responses is expected to reduce any residual risk over time.
- 4.8 Climate impacts vary in time, space, nature of onset, duration, and persistence. The effect of impacts on organisations varies with organisational structure, function, dependencies, planning and investment timescales, exposure to liabilities and many other factors. Consequently organisational climate adaptation plans will vary enormously, from relatively minor elements of risk registers for those organisations with few exposures, to full strategic programmes for those with major potential exposures. An added dimension is variation in the state of recognition and planning for climate impacts.
- 4.9 Priorities should be established using a rigorous and well-evidenced risk-based approach in order to ensure that impacts are dealt with in a prioritised and proportionate fashion. Where possible, these risks should include any climate changes that impact overseas but will have significant knock on impacts on an authority's functions.
- 4.10 An authority's approach should be informed by the business risk management procedures that are generally used across the authority. These should be:
- documented;
 - evidenced;
 - justified;
 - repeatable;
 - should individually assess and then combine the 'likelihood of the occurrence of the impacts' with an assessment of the 'severity of the impact'; and
 - express where accountability lies.

Using evidence and dealing with uncertainties

- 4.11 Every organisation should use the best available evidence to inform its risk assessment, including currently available material such as sector resilience plans. However, we do not expect all authorities to explore scientific analysis of climate change impacts in depth. The approach should be proportionate to the size and nature of the organisation and the types of risks it faces. For example, organisations that would face the same risk with a mean temperature rise of 2 degrees compared to 4 degrees can plan a strategy without doing an analysis of the probability associated with each. Organisations should only use detailed information where this reflects their sensitivity to different future climates.

- 4.12 The timescales involved in looking at the short and/or long-term will depend on the context of the policy, programme or project and each authority should take its own view on what timescales should be assessed, e.g. where infrastructure has a long asset life then a longer timescale must be considered when considering risks.
- 4.13 Some authorities may need to consider some of the more extreme potential changes in climate (such as those outlined under UKCP09 high++ scenario for sea level rise and storm surge) because of the nature of their functions. Each organisation is well placed to consider its own particular circumstances i.e. nature of impacts of climate change on its work, whether it is dealing, for example, with low risk, but high impact events or medium risk, but low impact events.
- 4.14 Whilst the risk assessments will necessarily embody significant uncertainty, reporting authorities are encouraged to quantify the likelihood and consequences of impacts and opportunities wherever possible. This is expected to assist with the prioritisation of risks and also help organisations consider the extent of climate change risks alongside other business risks they face.
- 4.15 It is important to note that while tools such as the UK Climate Projections begin to quantify uncertainty, the results are not absolute and do not include processes or changes that cannot currently be modelled (methane release from tundra for example). As such the Projections provide a conservative estimate of the uncertainty in future climate, and strategies to deal with the level of quantified risk should include flexibility to respond as knowledge improves and projections change in future. Organisations should develop a range of adaptation responses and retain an organisation's flexibility over which future course of action to follow.

Interconnectivity, interdependencies and barriers to adaptation

- 4.16 A risk assessment should also consider the possibility of 'knock-on' impacts; that is, interconnected and interdependent consequences for the business and other stakeholders.

5. What action might you need to take?

This chapter covers what reporting authorities should take into account when developing an adaptation plan.

- 5.1 The risk assessment process will generate a priority list of risks for which a range of possible adaptation responses can be developed. In some cases only a few sensible options will exist – in others serious consideration will be required to assess the benefits of different adaptation responses. Adaptation measures will be aimed at adjusting an activity to account for the effects of climate change, or at addressing barriers to individuals and organisations adapting optimally within the institutional framework they face. It is expected that implementation of the adaptation measures will reduce the residual risk posed by climate change to organisations. Monitoring of the residual risk is required to ensure the measures are having the desired effect.
- 5.2 Some issues will require immediate practical adaptation responses while others will require more extended periods of investigation. These might include research, cost – benefit appraisal and other types of capacity building initiatives.
- 5.3 A programme of action should be the outcome of this work. The principal purpose of this programme is to ensure continuity of service across the whole organisation. This will build on the risk based approach outlined in chapter 4.
- 5.4 There are many difficulties associated with defining a particular adaptation measure as being good, acceptable, or successful, given that its success or otherwise may not be tested in practice for many years. Following the principles in this chapter will help to inform the selection process.
- 5.5 It is essential that a reporting authority considers the costs and benefits (which should be where possible quantifiable) of various potential responses to adaptation impacts before finalising its programme of adaptation measures.

Developing an adaptation plan

- 5.6 For each action the plan should ideally set out:
 - a timetable for implementation;
 - a statement of accountability for its implementation;
 - responsibilities for the delivery and management of actions, including the resourcing (people, time, funds) of the adaptation programme;
 - monitoring and reporting the delivery of the actions by reference to risk reduction; and
 - a timetable for reviewing the plan to enable the plan to change course as new knowledge presents itself.
- 5.7 Where adaptation requires a long lead time (for example planning large infrastructure with a lifetime of decades), the authority should highlight in its report that investigations have started or that actions are included in the forward looking work programme.

- 5.8 Uncertainty over the future impacts of climate change means the ability to use and value flexibility is critical. HM Treasury Green Book⁸ promotes the idea of using ‘real options analysis’⁹, which provides a framework to incorporate the uncertainty of climate change and the value of flexibility into decision making. The UKCIP’s risk, uncertainty and decision making framework similarly suggests a decision pathway that deals with uncertainty and flexibility of approach.

What to take into account when developing an action plan

- 5.9 In developing a programme of measures, we would expect an authority to take into account the principles of sustainable adaptation. The authority should assess the, social, economic, and environmental sustainability of the overall plan before adopting it (see section on ‘sustainable adaptation’, paragraphs 5.17 to 5.22).
- 5.10 Mitigation of and adaptation to climate change are not mutually exclusive. In many cases it is possible to combine measures to reduce carbon emissions with those to build resilience to climate change - for example to develop passive cooling for new buildings that is not reliant on electricity. We would expect authorities to take the need to mitigate their emissions into account when developing programmes of measures. In some cases it may be necessary to undertake measures that lead to increased emissions; however the authority should ensure that there are no viable alternatives first.
- 5.11 In developing a programme of measures it is vital that you consider and demonstrate how you will build resilience into these processes, rather than adaptation being considered as a one-off activity. In doing so an authority should consider developing indicators of how it is building its resilience to climate change.
- 5.12 It may be useful to distinguish between two sorts of adaptation action, both of which have been found valuable:

Process based

Building adaptive capacity describes many of the adaptation responses that authorities will undertake, especially in the first instance, to plan for adaptation. New project management systems need to be put in place, data on future climate will need to be assembled and shared, research will be commissioned, and training and staff development will be required. All of these activities can be seen as building adaptive capacity.

⁸ Green Book : www.hm-treasury.gov.uk/data_greenbook_index.htm

⁹ Supplementary Green Book Guidance ‘Accounting for the effects of Climate Change’ : <http://www.defra.gov.uk/environment/climate/documents/adaptation-guidance.pdf>

Outcome based

Practical adaptation actions are generally illustrated by physical examples such as increasing the height of a flood defence wall, installing external shading above south-facing facades, or increasing the size of drains and gutters. But it can also include non-physical actions, such as installing early warning systems on local flooding.

Possible adaptation measures

- 5.13 Flexibility should be a strong component of any strategy. The options outlined below are not mutually exclusive – a mix of measures may be appropriate. For example, a flood defence strategy may include; built flood defences to make buildings more resilient (preventing losses), insurance against any flood damage (sharing losses), and allowing some areas to flood (bearing losses).
- 5.14 Every organisation should consider delivering adaptation actions through a number of different strategies, such as:

Bearing losses and managing impacts

- When the benefits of taking adaptive action do not justify the costs, accepting the risk and bearing any consequences and costs that result from climate change may be appropriate.
- Devising strategies to manage impacts that arise.
- Repairing damages might be viable, particularly if the impact is small and infrequent.

Sharing risks

- Insurance can spread risk and losses across society.
- Diversifying to help reduce dependency on any one outcome.
- Ensure incentive structures and contracts accurately reflect risk.
- Where there are cross-cutting effects and interdependencies across activities or the wider economy, co-ordinated action to help reduce costs and spread risks.

Preventing losses or reducing consequences

- Structural or technological methods to reduce the probability of damage occurring, such as building flood defences.
- Measures to enhance resilience to reduce consequences and impacts, and shorten recovery time.
- Avoiding impacts by changing location of an activity.
- Regulatory or institutional changes.
- Incentives to adapt.
- Increasing the range of climate conditions under which activities remain viable.
- Emergency, contingency or disaster planning to deal with extremes – such as the Department of Health Heatwave plan.

Exploiting opportunities

- Taking advantage of any positive effects of climate change.

- 5.15 Well-designed adaptation measures should be effective, efficient and equitable. What this means in practice is outlined in more detail below and in HM Treasury's Green Book guidance¹⁰.

Effective

The measure should reduce the risks from climate change and not introduce perverse effects. They should be context specific, implementable, and enforceable.

Effective measures will incorporate flexibility to adjust in the future to cope with a range of climate scenarios, as well as socio-economic, technical and other changes. Measures that lock the adaptation process into one particular pathway should be justifiable given that the future is uncertain.

Efficient

The expected reduction in social, economic and environmental damage from climate change should justify the costs of implementing the measure.

Measures should be timed appropriately. Activities that are flexible or renewed and changed often can adapt over time to changes in climate. Activities with long lead times and lifetimes are more likely to be locked into their design and performance window. Climate change should be incorporated into their design. Unanticipated climate change could lead to costs through poor performance, need for retrofitting, or early abandonment.

Equitable

Some of the groups that are most vulnerable to the effects of climate change may also be least able to adapt to the effects of climate change.

It will not be possible to avoid all of the costs imposed by climate change. The distributional consequences of different options should be considered to ensure that individuals or groups do not bear a disproportionate share of those costs.

- 5.16 Adaptation measures can be aimed at helping others to adapt in the right way, and delivering adaptation actions. Helping others adapt in the right way means creating the underlying framework to deliver adaptive actions. For regulatory authorities this is particularly important and any regulatory authority should consider helping others adapt in the right way by:

Setting the right underlying framework for effective adaptation

Individuals and organisations take decisions within the regulatory and institutional framework they face. This framework should give the correct

¹⁰ http://www.hm-treasury.gov.uk/d/green_book_complete.pdf

incentives for effective adaptation, addressing market failures, most commonly by amending existing, or creating new, instruments to account for climate risk and adaptation. These could be regulations, standards, codes or guidance. Market based instruments may be appropriate.

Creating information needed to make effective decisions

It is important that individuals and organisations are informed about the likely consequences of climate change, so they can assess the potential impacts and risks they face. Using education, information, or training can help communicate the effects of climate change. Research can help improve knowledge of the effects of climate change, and how this will affect an activity, as well as key thresholds and interdependencies. Learning from experience will be a source of information by monitoring progress, collecting data and evaluating outcomes.

Sustainable development and adaptation

- 5.17 Sustainable adaptation aims to ensure that adaptation measures do not contribute to the causes or consequences of climate change, and that action in one place or sector does not unreasonably limit the ability of another one to successfully adapt. Sustainable adaptation is an essential partner to sustainable development. It will ensure that we are best placed both to minimise the threats posed by the impacts of climate change and to capitalise on potential opportunities presented by it.
- 5.18 The success of an adaptive measure depends upon assessing its impacts on the natural environment, society and the economy. Sustainable adaptation is therefore underpinned by the following principles which form a part of the Government's sustainable development strategy that all UK government departments have adopted¹¹:
- using sound science responsibly;
 - living within environmental limits;
 - ensuring a strong, healthy and just society;
 - promoting good governance; and
 - achieving a sustainable economy.
- 5.19 For an adaptation measure to be successful it must be accepted by the people it is likely to directly affect; consequently the wellbeing and health of people should be central aims. No particular group of people should be disproportionately affected especially vulnerable groups such as the elderly or chronically ill. Consulting those directly affected by an adaptation measure could increase the likelihood that it will be accepted. People should be

¹¹ More information about these principles can be found here:
<http://www.defra.gov.uk/sustainable/government/what/principles.htm>

informed, involved and empowered wherever they come into contact with operations; this could be at the point of delivery when providing a service or as a part of a wider adaptation strategy where the community is more central to operations¹².

- 5.20 Any options consideration and action plan should take into account its impact on the environment. For example, adaptation measures should ideally not contribute to future climate change by increasing emissions of greenhouse gases. A logical first step would be to ensure that adaptation measures are not energy intensive and instead rely on energy efficient and resource efficient technologies. Adaptation measures should seek to avoid damage to the natural environment, for example loss of semi-natural habitat vital for wildlife's adaptation to climate change.
- 5.21 There can be significant cost advantages to adapting to possible changes in climate before they happen, rather than responding to them as they happen. By adapting sustainably to minimise threats and capitalise on potential opportunities, it is possible to create an economy, society and natural environment that is more sustainable and operate more successfully in the future.
- 5.22 The most effective methods by which to implement sustainable adaptation programmes will vary across different organisations in different sectors. Additionally sustainable adaptation itself is a developing area where experience will teach useful lessons.

Cost benefit analysis

- 5.23 The Government's approach to incorporating adaptation in cost-benefit analysis is set out in the Green Book and the Supplementary Guidance on accounting for climate risks¹³.
- 5.24 The underlying principles should be widely applicable, but reporting organisations are likely to have their own systems for appraising investments (although public sector organisations should use the Green Book as a basis). They may want to tailor the approach set out in the Supplementary Guidance to be consistent with their systems, or create a different approach. Given the diversity of circumstances, it would not be desirable to be more prescriptive than that.

¹² See paragraphs 1.14-1.16 "Working Together" for more on working with stakeholders.

¹³ <http://www.defra.gov.uk/environment/climate/documents/adaptation-guidance.pdf>

6. How does adaptation become 'business as usual'?

This chapter covers how reporting authorities should implement their adaptation plan, embed adaptation into existing structures and monitor the effects.

- 6.1 Adapting to climate change is a process. That's why it needs to be built in to normal planning and risk management processes, whether in business, government or any other sphere. That way, organisations can make sustainable adaptation decisions, at the right time and in order to maximise the benefits and minimise the costs.
- 6.2 It is important that adaptation becomes part of the way that authorities carry out their functions. Embedding adaptation is therefore at the core of the business. It should be built into each authority's:
- business planning processes;
 - business risk management;
 - investment decisions; and
 - gateway reviews and audit.
- 6.3 Evaluation examines the processes and outcomes of a policy, programme or project against what was expected, and is designed to ensure lessons learned are fed back into the decision-making process. The aim is to assess how successful, or otherwise, a policy, programme or project has been:
- Has it been effective in terms of achieving specific outcomes?
 - What factors determined why it was, or was not, effective?

Evaluation in the context of climate change

- 6.4 Evaluating adaptation measures will often be complex, with a range of factors that need to be explained. It will be important to learn from experience in order to assess the performance of the measure, and ensure that future measures continue to be effective.
- 6.5 The long time frames over which the effects of climate change will occur means that it will often be difficult initially to assess the success of measures in terms of outcomes. Emphasis should be placed on monitoring and evaluating processes. This will be important to understand the contextual factors and mechanisms that underlie an activity's success, and develop the evidence base for evaluating outcomes.

Monitoring and evaluation in practice

- 6.6 The aim of an evaluation is to assess to what extent an activity has been successful, in what circumstances, and why. A framework for evaluation is to

assess how a measure has performed against the principles of good adaptation described in this document, including:

- **Effectiveness.** Has the measure achieved the desired outcome? Have there been unintended consequences? Was there sufficient flexibility?
- **Efficiency.** Did the benefits outweigh the costs?
- **Equity.** Did the measure impose significant disproportionate costs on individuals, groups or the natural environment?

6.7 As stated above, evaluation should be a continuous process. It should focus on developments in knowledge and information on changes in climate and adaptation processes, and the implications of these on an authority's functions.

6.8 Factors that may influence points at which to evaluate progress include:

- the provision of new climate information (such as new climate projections). This may occur at regular intervals; and
- the availability of new research, for example, that resolves uncertainty about the effectiveness of an adaptation measure.

6.10 If adaptation measures are found to be ineffective or inefficient then they should be revised as appropriate.

Annex A: Legal basis

1. Section 61 of the Climate Change Act provides that the Secretary of State may give reporting authorities Guidance about:
 - (a) assessing the current and projected impact of climate change in relation to the authorities' functions;
 - (b) preparing proposals and policies for adapting to climate change in the exercise of their functions; and
 - (c) co-operating with other reporting authorities for that purpose.

This section does not apply to devolved functions.

2. Reporting authorities are required to have regard to the Guidance in developing risk assessments and programmes for adapting.
3. The Secretary of State has the power to update this Guidance. However, it is intended that the Guidance contained in this document remains in place for some time – years rather than months - to reduce the regulatory uncertainty that frequent changes could produce, but also because of the broad nature of the Guidance which reduces the need for change.
4. If at any point, a reporting authority foresees any potential difficulties in reconciling the objectives set out in this Guidance with its statutory functions, then it is encouraged to seek early dialogue and discussion with the Adapting to Climate Change Programme on these issues.

Annex B –Statutory Guidance: Cover sheet

The purpose of this cover sheet is to provide a structure for your executive summary, allowing consistency in headline reporting to ensure that key messages are included and easily analysed by Government. It should identify briefly the key risks due the impact of climate change to your organisation, how your organisation plans to prepare and adapt to mitigate these risks and any barriers which your organisation may face. The core of the report is flexible depending on each reporting authority’s circumstances. Where quantitative responses are not possible qualitative responses are acceptable.

1. Information on organisation	
<p>Name of organisation</p>	
<p>Organisation’s functions, mission, aims, and objectives affected by the impacts of climate change</p> <p>A summary of your organisational purpose and key strategic priorities which are or will be affected by climate change is important when identifying risks to your organisation.</p>	

2. Business preparedness before Direction to report was issued	
<p>Has your organisation previously assessed the risks from climate change?</p> <p>Have you a baseline assessment of the risks of climate change to your business currently? The requirements of the Direction can build upon any existing risk assessment you have in place. Please include a summary of findings from your previous risk assessment(s) in your report.</p>	
<p>If so, how were these risks and any mitigating action incorporated into the operation of your organisation?</p> <p>It is useful to understand whether, and to what extent climate change risks are already incorporated into your business risk management processes at the strategic level.</p>	

3. Identifying risks due to the impacts of climate change

What evidence, methods, expertise and level of investment have been used when investigating the potential impacts of climate change?

What evidence have you assimilated to inform your risk assessment? What has been your approach (quantitative, qualitative, scenario based)? What resource (£ / person / days) have been assigned to this assessment? Briefly summarise your approach – in house staff, professional advisors, research expertise?

4. Assessing risks

How does your organisation quantify the impact and likelihood of risks occurring?

Provide here a brief summary of the methodological approach to quantification where this has been possible and your categorisation of likelihood and impact. State what criteria you have used to characterise the significance of the risks (high, medium, low, negligible) and how these have been derived. What level of confidence do you have in the analysis?

5. Uncertainties and assumptions

What uncertainties have been identified in evaluating the risks due to climate change?

Where are the key uncertainties in the analysis of the impacts of climate change and what impact do these have on the prioritisation

<p>of adaptation responses and risks for your organisation. How have these uncertainties been quantified and, in brief, what are the implications for the action plan?</p>	
<p>What assumptions have been made?</p> <p>The key strategic business assumptions and methodological assumptions that underpin your analysis of impacts, action plan and analysis of risks. Well-evidenced and justified assumptions are important to the credibility of and confidence in the risk assessment.</p>	

6. Addressing current and future risks due to climate change – summary (one line is required per risk)							
Business function	Climate variable (e.g. increase in temperature)	Primary impact of climate variable (e.g. health)	Threshold(s) above which this will affect your organisation	Likelihood of threshold(s) being exceeded in the future and confidence in the assessment	Potential impacts on organisation and stakeholders	Proposed action to mitigate impact	Timescale over which risks are expected to materialise and action is planned

7. Barriers to implementing adaptation programme

<p>What are the main barriers to implementing adaptive action?</p> <p>What do you see as the key challenges to implementation of your action plan? How will these be resourced and addressed? Briefly, what additional work is required?</p>	
<p>Has the process of doing this assessment helped you identify any barriers to adaptation that do not lie under your control?</p> <p>Interdependencies may arise where others' actions are likely to impact on your ability to manage your own climate change risks. Briefly comment on where this is the case.</p>	

8. Report and review

<p>How will the outcome of the adaptation programme be monitored and evaluated and what is the timetable for this?</p> <p>Adaptation programmes are expected to reduce the residual risk to organisations from climate change. What measures will you put in place to monitor this?</p>	
<p>How do you propose to monitor the thresholds above which impacts will pose a threat to your organisation (including the likelihood of these thresholds being exceeded and the scale of the potential impact)?</p> <p>It is possible that the current risk appetite within your organisation will change on account of the climate change risks identified. How will this be monitored?</p>	

<p>How will the benefits of the programme be realised and how will this feed into the next risk assessment and options appraisal?</p> <p>Briefly state your plans for the next iteration of your climate change risk assessment.</p>	
<p>How have you incorporated flexibility into your approach?</p> <p>State whether your approach leaves you open to exploring different pathways in future or whether any of the measures have locked the approach into one particular path, with justification</p>	

9. Recognising opportunities

<p>What opportunities due to the effects of climate change and which the organisation can exploit have been identified?</p> <p>The risk assessment is also expected to generate opportunities for organisations, have these been captured? What are the key ones and the expected net benefits?</p>	
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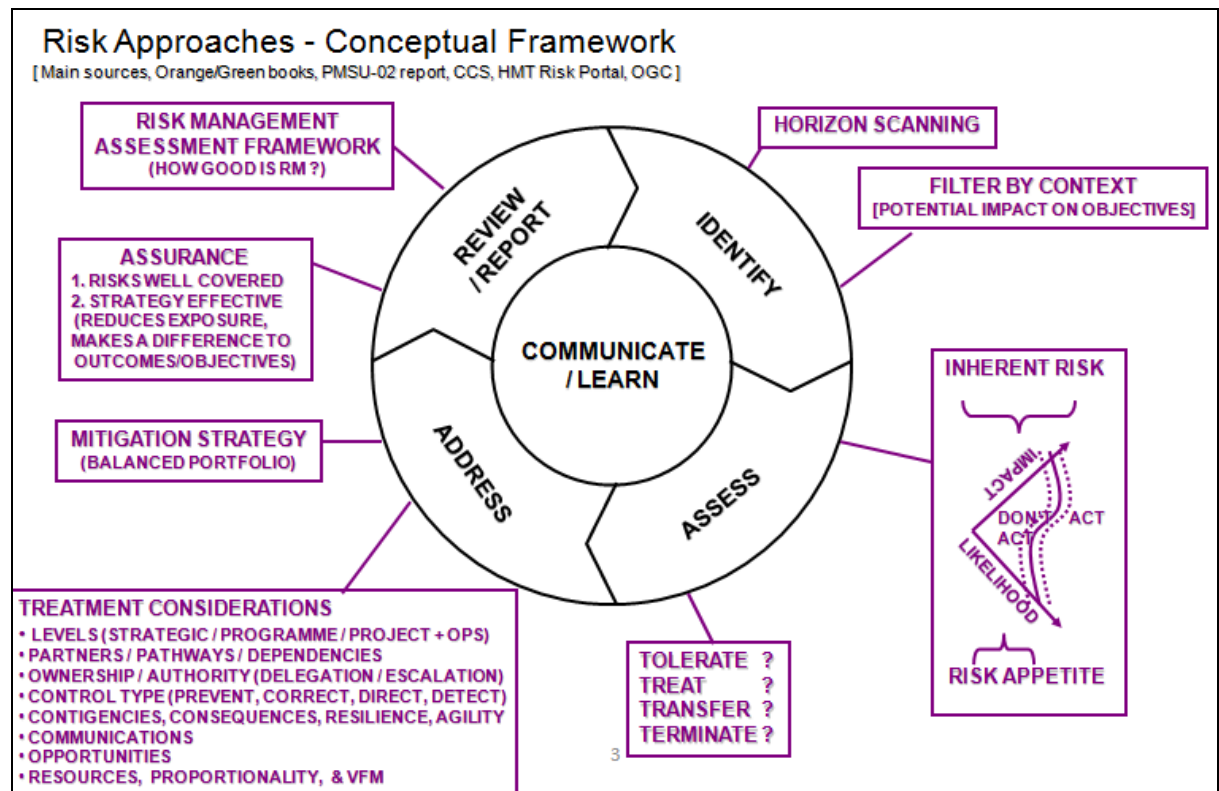
10. Further comments / information

<p>Do you have any further information or comments which would inform Defra (e.g. feedback on the process, the statutory guidance, evidence availability, issues when implementing adaptation programmes, challenges, etc)?</p>	
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Annex C - Prompts to support a reporting authority's risk assessment and action plan

1. The approach outlined below is based on a generic synthesis of the Government's risk guidance (summarised in Diagram 1). The approach should allow organisations to easily extract from existing plans, whilst providing a guide on approach to organisations that need this.

Diagram 1



2. Given the varying relevance of questions to organisations of different types (particularly the difference between a regulator and a regulated industry), it is not an expectation that all organisations will address all elements of all the prompts below.
3. The prompts are designed to tease out data from different types of organisations (e.g. to distinguish those driven by outcome, output, activity), so are not mutually exclusive.

Table 2 - Prompts

Identifying Risks
Functions impacted by climate change:
<ul style="list-style-type: none"> • What strategic outcomes are your organisation trying to achieve and over what time periods? • What monitoring and evaluation processes does your organisation have in place to measure performance against these strategic outcomes? • What is the current level of business preparedness for managing the current impacts of climate change and/or extreme weather events?
Approach:
<ul style="list-style-type: none"> • What are the current processes in place to assess business risks in your organisation? • Are there any existing policies that currently relate to climate change impacts? • Have you discussed/consulted stakeholders on climate change risks and the options available to you to adapt to these? • Have you considered the size of your organisation and its functions to ensure your approach is proportionate to these risks? • Have you identified the evidence, research and tools available on impacts of a changing climate that are applicable to your organisation? • Have you quality assured the evidence/expertise that you have used? • Can you describe the process by which your organisation assesses all potential primary and secondary climate effects that may impact on your organisational objectives in the short and/or long term?
Assessing Risks
Identifying risks which impact on organisations functions:
<ul style="list-style-type: none"> • How does your organisation assess the business, social, economic, and environmental impacts of climate risks? • How do you plan to quantify, or otherwise estimate the level of impact and the likelihood of an event occurring? • What are the main criteria against which climate impacts and risks are assessed (e.g. for risks; impact on ability of organisation to continue its daily business, impact on ability to deliver against objectives, impact on ability to retain market share, etc.)? • What are the opportunities arising from climate change and how can these benefit your organisation?
Addressing Risks
Actions to mitigate risks:
<ul style="list-style-type: none"> • How do you intend to use the risk assessment to inform your adaptation programme? • For your top priority risks, what are the proposed options for action and what analysis was carried out to support this? • Have you developed a SMART¹⁴ programme of action that will take into account the short term and longer term effects of climate change? • Does the programme of action lead to increased greenhouse gas

¹⁴ Specific, Measurable, Achievable, Relevant and Time Specific

emissions? If so, are there any alternative viable alternatives? Or, have the emissions been included as a cost in any cost-benefit analysis?

- How has your organisation ensured adaptation measures are effective, cost and time efficient and equitable?
- How will adaptation be built into the overall decision making processes of your organisation?
- How will your organisation ensure there is a strategic corporate commitment to the adaptation programme? What form will this commitment take?

Uncertainties and assumptions:

- What are the main uncertainties in the evidence, approach and method used in the adaptation programme?
- What are the main uncertainties in the operation of your organisation?
- What assumptions have been made when devising the programme for adaptation?

Barriers to adaptation and interdependencies:

- What are the barriers to implementing your organisations adaptation programme?
- What/who are the interdependencies?

Review and Report

Proposals for monitoring:

- How will the outcome of the adaptation programme be monitored?
- How will the potential risks of impacts from climate change be monitored over time?
- How will the results of the monitoring and evaluation be communicated to the rest of the organisation?
- What processes will be in place to modify the adaptation programme in light of findings from this evaluation?

Next steps:

- How will the benefits of the programme be realised and how will this feed into the next risk assessment and options choice?
- Are there any areas which are still to be investigated (e.g. longer term impacts)?
- When/how will the risks due to the impact of climate change be re-assessed and incorporated into the adaptation programme?