Research to Survey Local Authority Action on Climate Change Adaptation

Final Report

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Executive Summary

Introduction

The Adaptation Sub-Committee (ASC) of the Committee on Climate Change has a statutory duty to report to Parliament with an independent assessment of the UK Government's progress in implementing the National Adaptation Programme (NAP) in 2015 - two years after the NAP was published.

The NAP identifies local government as having a key role in leading and supporting local places to become more resilient to a range of future climate risks and to be prepared for the opportunities arising from a changing climate. The NAP identifies the priorities for local government as raising awareness, building capacity and making the case for action on climate change.

This study, undertaken by JBA Consulting and LUC between December 2014 and April 2015, provides an evidence review of local authorities (LAs)' and Local Enterprise Partnerships (LEPs)' current activities on adaptation planning. The study findings will be used by the ASC to inform NAP progress reporting in July 2015 alongside research from other sources, for example research commissioned by the Environment Agency into LA climate change adaptation and the Climate Ready support service.

Research Approaches

The study comprised three strands:

- Web-based survey of a sample of LAs (90 single/lower tier and 6 upper tier) currently considered to be at high climate risk. The purpose of the survey was to assess the degree to which LAs have:
- identified current and potential future climate risks which are likely to affect their areas
- taken account of these risks in the development of local plans and policies to ensure the resilience of local communities.
- Review of planning applications to identify the extent to which relevant local planning policies on climate change adaptation have been applied in deciding planning applications and imposing conditions on any permitted development
- Web-based survey of a sample of 16 LEPs to assess the degree to which current climate risk and future climate change is accounted for in local strategies and investment decisions.

LA Sample

A sample of 90 single/lower tier LAs was selected on the basis of high current climate risk in relation to; river, coastal or surface water flooding; coastal erosion; heat stress and/or water scarcity. This sampling recognises that adapting to climate change is more important in some areas than others. The number of LAs with each climate risk is shown in the table below; as some LAs had multiple risks, the total adds up to more than 90.

Table i-i: Sample survey LAs with climate risks

Climate risk	Number of LAs
River & coastal flooding	24
Surface water flooding	23
Coastal erosion	22
Heat	23
Water stress	20

The number of LAs which were identified by the research methodology as having one or more climate risks is shown below:

Table i-ii LAs with one or more climate risks

Research Methodology Climate Risk	No. LAs with high climate risk	% of sample (n=90)
Single risk	72	80%
Two risks	15	17%
Three risks	3	3%

The sample of 90 LAs includes a mix of lower/single tier, urban/rural and coastal/non-coastal authorities:

Table i-iii: Profile of LA sample

Profile of all LA sample (n = 90)			
Urban	Rural	Lower Tier	Single Tier
55	35	40	50
% of 90 LAs			
61%	39%	44%	56%
Coastal LAs (n=37)			
16	21	25	12
% of 37 LAs			
43%	57%	37%	32%

The English Index of Multiple Deprivation (IMD) ranks all LAs in England according to their level of deprivation from least to most deprived based on seven domains. In order to categorise the LAs in the research sample, we identified their national ranking and then assigned the national rankings within five categories.

Table i-iv: IMD deprivation level of LA sample

IMD Deprivation Level (Research Methodology)	No LAs (n = 90)	% of 90
Very high	25	28%
High	26	29%
Medium	16	18%
Low	14	15%
Very low	9	10%

A team of assessors from JBA and LUC reviewed key documents online for each of the sample LAs and recorded findings in relation to climate risks identified and adaptation activities planned. Documents included climate change specific strategies and plans; 'general' LA documents e.g. corporate strategies, Green Infrastructure (GI) strategies and transport strategies; emergency planning and health/social care strategies and plans; flood risk plans; and land use planning documents. In addition, six counties (in which a number of the high risk LAs are located) were surveyed in the same manner.

Review of Planning Applications

Ten of the highest climate risk LAs were selected for further analysis. These LAs were identified from the web review as having at least one planning policy designed to address climate change and reflecting a range of geographical locations. 100 planning applications were reviewed in total; 10 planning applications from each LA. The planning applications were selected on the basis of climate risk: for flooding these were selected from the list of those that the Environment Agency had been consulted on; for other climate risks a random sample was selected. Key documents, such as the planning application form, flood risk assessment, planning officer's report, Environment Agency and water company responses were then reviewed for each application to assess the degree to which the relevant planning and climate change policies had been applied in the development management decision-making process.

Web Survey of LEPs

A sample of 16 LEPs was selected by identifying those LEPs whose boundaries include the LAs at highest climate risk. For each LEP, key documents (the Strategic Economic Plans, European Structural and Investment Funds Strategy and the Growth Deal) were reviewed and the climate risks (current and future) recorded, as well as any adaptation activities identified. In addition, the level of investment targeted towards adaptation activity was captured.

Limitations

The research approach provides an overview of trends at the time of the evidence review, but there are a number of limitations that need to be taken into account when reviewing the results.

The results of the survey provide a broad snapshot of climate adaptation evidence identified from over 3,000 documents that were available online in February and March 2015. This will require updating on a regular basis to provide an assessment of trends over time.

The focus has been on breadth rather than depth of evidence; evidence of current climate risks, future climate change and adaptation actions were recorded, but the data was not interrogated in terms of the appropriateness or likely effectiveness of the activities proposed. It is important to stress that this study is not an audit assessing the degree to which LAs are meeting statutory or policy requirements, but provides an overview of how current and climate risks are being accounted for in LA plans and activities in the public domain.

The research revealed that adaptation actions may be explicit in some documents, for example within a stand-alone GI strategy and implicit in other cases, for example GI referenced as an action to address surface water flooding within a Surface Water Management Plan. The research approach drew out examples of both types of actions.

Some LAs continued to maintain separate climate change strategies and action plans, post the requirement for adaptation reporting (NI 188), whilst others have promoted climate change adaptation as implicit and explicit actions within other strategies and plans. The research has sought to identify at a broad scale the extent to which high climate risk LAs are considering climate change adaptation measures in their local plans, policies and strategies; and has drawn out explicit and implicit actions, rather than making detailed comparisons between LAs which would require a more in depth, qualitative approach.

The planning applications review has enabled a broad overview of the degree to which the development management process takes those climate risks into account that are set out in strategic and development management policies. However, the review could not capture climate risks addressed at the pre-application stage which may have influenced final design and it must be recognised that some risks, such as heat stress and water scarcity, may be more appropriately addressed through building regulations and previous related requirements such as the Code for Sustainable Homes.

Findings and Analysis

Web Survey of LAs

Climate Change Specific Documentation

The survey revealed that 38 (42% of the 90 survey sample) of lower/single tier LAs assessed had a climate change strategy or adaptation plan. Of these LAs, around two-thirds identify river and coastal or surface water flood risks, three quarters refer to heat and nearly 80% identify water stress as a climate risk. The main adaptation activities identified within these 38 strategies/plans were climate change awareness raising (89%), GI (68%), water efficiency (63%) and SuDS (63%).

As the requirement to report on adaptation (NI188) was withdrawn in 2010, it is encouraging that nearly half of the adaptation plans and strategies have been developed since 2011, although at a declining rate, suggesting that the motivation for adaptation activity has continued. With the exception of coastal LAs, it is interesting to note that more LAs identified themselves as being at risk of specific climate impacts in their climate strategies and adaptation action plans than the number of high climate risk LAs identified through the study methodology.

General documentation

Almost one-third of corporate strategies refer to climate risks, of which three quarters identify proposed climate adaptation actions. These are high-level strategies, which often set out LA values rather than referring to outcomes of a risk assessment or considering the detail of extreme weather. As a result, climate risks are referred to in a fairly generic way rather than from a detailed risk assessment and therefore highlight the likely impacts of climate change, in general, rather than specifically for that area.

GI has a significant role to play in helping to adapt to climate change and can provide a range of climate change services in relation to flood alleviation, passive cooling and water resources management. The evidence review identified 17 GI strategies at a lower/single tier level (19% of 90 LAs sample) with 13 (76% of the 17) identifying climate risks, of which 11 (65% of the 17) included climate change adaptation actions; natural flood management, GI and SuDS measures. 11 strategies (65% of the 17) included adaptation actions to address future climate change. In addition, GI as an adaptation action was identified in several other strategies and plans related to health, transport and planning.

Ten GI strategies were identified at an upper spatial scale, accounting for an additional 19 LAs. All of these had been produced during the period 2005-2011, possibly influenced by the regional planning system in place during this timescale. Previous Regional Spatial Strategies included a focus on GI and a large body of evidence was built up in some regions, for example the North West, regarding the benefits of GI including for climate change adaptation.

Considering GI and biodiversity strategies in combination, water scarcity was identified by 57% of LAs. This is higher than other strategies and plans, which may be explained by the important role that water availability has for maintaining biodiversity which will be relevant for all LAs regardless of whether they are considered to be at high risk of water scarcity.

Reference to climate change in transport strategies tends to be focused on mitigation due to the role that public transport can play in contributing towards a reduction in the use of fossil fuel. However, recent extreme weather events and their impact on transport infrastructure, which then impacts lives and livelihoods, is recognised with two-thirds of the 48 strategies reviewed identifying climate risks (predominantly flooding and heat).

Emergency Planning and Health/Social Care

50 Joint Strategic Needs Assessments (JSNAs) reviewed had been produced by single tier LAs, with 13 specifically referring to climate risks. All of the emergency plans and community risk registers reviewed referred to climate risks, principally flooding, which in the main was referred to generically rather than identifying the source of flooding. By their nature, emergency plans are intended to address immediate-short term risks which is likely to explain the minimal reference to climate change.

Flood Risk Documents

As would be expected, the main climate risk identified in these documents was flooding. All of the LAs identified by the research methodology as being at high risk of flooding also identified the relevant source of flooding (river/coastal and/or surface water). Water stress was identified by just over a third of LAs in this category, with 10% referencing heat as a climate risk. Of the 37 coastal LAs in the survey sample, 29 identified coastal erosion as a climate risk (78%).

Local Authorities with Multiple References to Climate Change and Adaptation Action

The evidence review identified several LAs with multiple strategies and plans considering climate risks and adaptation actions for current and future climate change. These were all produced by single tier LAs. In particular Durham Council, City of Leeds and The City of Brighton and Hove identified risks and actions in their corporate strategies, climate change strategies and plans, JSNAs, emergency plans, biodiversity, transport and flood risk plans.

The county councils of East Sussex, Kent, Lincolnshire, Suffolk, West Sussex and the Greater London Authority all had a wide range of strategies and plans identifying climate risks and adaptation actions on a joint basis for the respective LAs within their localities.

Local Planning

The review of local planning documents revealed:

- 82 Local Plans (91% of the sample of 90 LAs) included strategic policies that identified proposed climate adaptation measures.
- Of the 82 Local Plans, 64 were adopted and included strategic policies with climate change adaptation actions. 41 were adopted before the publication of the National Planning Policy Framework (NPPF) and 23 were adopted post NPPF.
- In pre NPPF Local Plans, of the adaptation actions reviewed, 60% address current climate risks and 40% future climate change. In post-NPPF Local Plans, of the adaptation actions reviewed, the same proportions were identified. This would appear to indicate that NPPF has not affected the number of climate adaption measures within strategic policies.
- 54% of plans adopted post NPPF clearly evidence application of the sequential test compared with 46% pre NPPF. 42 Inspectors' reports were identified for adopted Local Plans, of which 32 (76%) identified climate change risks in relation to the assessment of soundness.
- Flood risk is the dominant climate risk considered in planning documents with every LA reviewed having a SFRA online; 91% of these included climate change allowances and 79% include climate related recommendations.
- Almost 60% of published SA/SEAs included climate risk related recommendations and just over 75% of AMRs referred to climate risks (predominantly flooding); these largely referred to current climate risks rather than future climate change,
- Two LPAs had adopted CIL Charging Schedules and Infrastructure Plans which referenced climate risk; both were focused on investment in measures to alleviate flood risk.

Review of Planning Applications

The review revealed that flooding is the only commonly identified climate risk identified by planning officers in their justification for recommendations to the planning committee. References to flooding rarely distinguished between river/coastal and surface water risks.

Reference to future climate change is implicit within most committee reports. While the fact that it is considered is important, more explicit references to increases in climate risk would help ensure that decisions are fully informed and that all parties in the process understand properly the issues relating to a give development proposal.

The analysis of conditions related to adaptation measures indicated that flood risk is the most commonly considered climate risk, with property level protection, sustainable drainage and flood incident management being the main measures recommended. Water scarcity and heat stress were rarely referred to as considerations in the decision. These may be addressed by local plan policies, through pre-application discussions or via building regulation or previous standards such as the Code for Sustainable Homes.

These findings suggest that flood risk is a critical issue in the decision-making process, with almost no proposals at risk of flooding, or likely to increase flooding elsewhere (which were included within the review), being granted consent without conditions designed to mitigate these risks.

The review confirms the importance of the Environment Agency's input to the development management process for proposals which are in locations at risk of flooding, or which have potential to increase flood risk elsewhere. Environment Agency responses suggested issues relating to climate risk are more likely to be addressed in relation to major non-residential development and residential development proposals appear more likely to result in objections on the grounds of climate risk. The Environment Agency is more likely to object or require conditions relating to climate risk for major rather than minor residential development.

Web Survey of LEPs

All of the LEPs, which were selected on the basis of river and coastal flooding or surface water flooding, highlighted flooding in at least one strategic document although this was often without referral to source. Three of the four LEPs at risk of coastal erosion identified this risk in their strategic documents; the one LEP identified as being at risk of heat stress reflected this in its European Structural Investment and Funding Strategy, but only two of the five LEPs at risk of water scarcity acknowledged this in any of their strategic documentation. This may be because water scarcity is considered to be either a high level concern to be addressed by water companies or a more householder focused issue in terms of water efficiency and conservation. The analysis did not revealed any differences in terms of identification of climate risks associated with geography or the size of population of the LEP area.

14 of the 16 LEPs identify adaptation activities in one or more of their strategic documents. Flood defence and green infrastructure were the main activity identified. Flood defence is crucial to protecting infrastructure and economic growth, and green infrastructure addresses multiple climate risks as well as improving the general aesthetics and liveability of an area contributing towards an improved image and helping to encourage inward investment.

Comparing the identification of risks with specific adaptation activities, it is clear that flood related risks are matched with appropriate flood alleviation actions such as flood defence, green infrastructure and sustainable drainage. However, of the three LEPs highlighted as having areas of water scarcity, none identified specific water efficiency actions, but two highlighted GI, which can assist with the management of scarce water resources. Half of the LEPs reviewed identified actions to address future climate change in their strategic documents; these covered flood defences, GI, water efficiency and passive cooling.

LEPs have a clear role in terms of ensuring a sustainable and effective transport system in their areas and climate resilient infrastructure has been highlighted by a number of LEPs as a priority for investment. Three LEPs are investing a combined total of almost £40m on climate resilient transport infrastructure recognising the importance of infrastructure to economic growth and the impacts that climate risks could have

3% of the total Growth Deal investment for the 16 LEPs (£92m of £3,0bn) and 2% of their combined European Structural Fund allocations (£48m from a total £2.6bn) are directed towards climate change adaptation; it should be recognised that these are not the only available sources of investment and the majority of LEPs in the sample (nine) had decided not to access funds from the European Structural Funds Climate Change Adaptation Thematic Objective as it is not mandatory.

Conclusions - key messages

The study has revealed that LA place-making functions and service delivery are taking climate risks into account; however, in the main these relate to current risks rather than future climate change and flood risk dominates. This is not surprising as flooding is the main current and future climate risk identified for the UK, has had the most obvious recent impacts and flood risk management is enshrined in legislation and policy via the Flood and Water Management Act 2010 and the NPPF.

Across the various aspects of the survey, it appears that coastal LAs and LEPs tend to be most active in identifying climate risks and adaptation activities; this can probably be explained by the obvious risk presented and the catastrophic effects that would result from major tidal flooding or coastal erosion incidents.

There is evidence of some mainstreaming of climate risks and climate change into strategies and plans such as JSNAs, but even with the survey focusing on high risk authorities, it is still the minority that are accounting for climate risks in strategies where there is not a mandatory requirement to do so.

From the planning applications review, it appears that the development management process is most effective in ensuring that flood risk associated with planning applications is addressed. Issues of water scarcity and heat risk are rarely highlighted through the development management process.

The LEP review provides positive evidence that climate risks are being taken into account in the development of plans for local economies, but implementation, which is affected by planning decisions along with other local requirements, will be key in ensuring that future investment is resilient to current risks and future climate change

Recommendations for future reviews

This study has provided a useful snapshot of current LA planned climate change adaptation activity. It would be beneficial to repeat the study on a regular basis, say every three years, in order to understand if climate change is increasingly being taken into account and also if proposed actions are being implemented on the ground and what effects these are having.

The broad-based nature of the survey and short timescale within which it was conducted, meant that no assessment of appropriateness or likely effectiveness of the proposed climate change activities was undertaken. In future, the survey could potentially be supplemented with a number of case studies, looking in more depth at the degree to which proposed climate change activities are likely to address the key climate risks evident in the locality.

The study reviewed 90 single/lower tier LAs and just six upper tier LAs, but a number of the documents reviewed e.g. Local Flood Risk Management Strategies and transport strategies (particularly Local Transport Plans) are produced by upper/single tier LAs. A future review should include all the upper tier LAs that link to those lower tier LAs in the sample to ensure more comprehensive coverage.

As a general comment, it would be helpful in future for a review to tie together more closely the determination of the planning applications against relevant policies (e.g. on water efficiency, heat) in the local plans for the area, and/or noted where particular plan policies were limited, out of date, or absent.

This review has provided a snapshot of current priorities in LEP strategies; it would be interesting to review action on the ground after three years and assess the degree to which proposals have been put into practice. In addition, it is difficult to generalise from the 16 LEPs to all LEPs across England due to the fact that the majority were coastal and located in the south east of England as this is where climate risks are focused. A review of the key documentation for all LEPs would provide a more comprehensive overview.

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Abbreviations

AAP ..... Area Action Plan
AMR ..... Authority Monitoring Plan
APR ..... Adaptation Reporting Power
ASC ..... Adaptation Sub-Committee
BAP ..... Biodiversity Action Plan
CC ..... Climate Change
CCG ..... Clinical Commissioning Group
CCRA ..... UK Climate Change Risk Assessment
CIL ..... Community Infrastructure Levy
DCLG ..... Department for Communities and Local Government
Defra ..... Department for Environment, Food and Rural Affairs
DH ..... Department of Health
EA ..... Environment Agency
EAFRD ..... European Agricultural Fund for Rural Development
EAHF ..... Estimated Annual Households Flooded
EMFF ..... European Maritime and Fisheries Fund
ERDF ..... European Regional Development Fund
ESF ..... European Social Fund
ESIF ..... European Structural and Investment Fund strategies
FIM ..... Flood Incident Management
FRA ..... Flood Risk Assessment
GI ..... Green Infrastructure
HWB ..... Health and Wellbeing Board
IMD ..... Index of Multiple Deprivation
JBA ..... JBA Consulting
JHWS ..... Joint Health and Wellbeing Strategy
JSNA ..... Joint Strategic Needs Assessment
LA ..... Local authority
LAAP ..... Local Adaptation Advisory Panel
LCLIP ..... Local Climate Impacts Profile
LEP ..... Local Enterprise Partnerships
LGA ..... Local Government Association
LLFA ..... Lead Local Flood Authority
LPA ..... Local Planning Authority
LTP ..... Local Transport Plan
LUC ..... Land Use Consultants
NaFRA ..... National Flood Risk Assessment
NAP ..... National Adaptation Programme
NCERM ..... National Coastal Erosion Risk Map
NFM ..... Natural Flood Management
NHS ..... National Health Service

NI ..... National Indicator

NPPF ..... National Planning Policy Framework

OS ..... Ordnance Survey

PA ..... Planning Act 2008

PCPA ..... Planning and Compulsory Purchase Act

PLP ..... Property Level Protection

PPCPA ..... Planning and Compulsory Purchase Act 2004

PPS ..... Planning Policy Statement

RDA ..... Regional Development Agency

RERC ..... Rural Evidence Research Centre

SA ..... Sustainability Appraisal

SEA ..... Strategic Environmental Assessment

SEP ..... Strategic Economic Plans

SFRA ..... Strategic Flood Risk Assessment

SMP ..... Shoreline Management Plan

SuDS ..... Sustainable urban drainage

SWIMS ..... Severe Weather Impacts Monitoring Systems

UKCIP ..... UK Climate Impacts Programme

UKCP09 ..... UK Climate Projections 2009

1 Introduction and Context

1.1 Introduction

The Adaptation Sub-Committee (ASC) of the Committee for Climate Change has a statutory duty to report to Parliament with an independent assessment of the UK Government's progress in implementing the National Adaptation Programme (NAP). The ASC is required to submit this statutory report in 2015, two years after the NAP was published in July 2013.

The NAP highlights the role that local government plays in leading and supporting local places to become more resilient to a range of future risks and to be prepared for the opportunities from a changing climate. There are a number of objectives and actions in the NAP that aim to increase local authority awareness of climate risks and help to build their adaptive capacity. These cover six policy areas:

- Built environment
- Infrastructure
- Healthy and resilient communities
- Agriculture and forestry
- Natural environment
- Business

Priorities for local government within the NAP focus on raising awareness, building capacity and making the case for action on climate change in order to provide a framework for action. The NAP sets a number of objectives within the six policy areas that relate to local authorities. The Local Government chapter outlines the following:

- Objective 28: To raise and maintain the profile of adaptation with local authorities and promote action to embed climate resilience across local authority services and responsibilities.
- Objective 29: To support local government to build a credible business case for action and take well-informed decisions both internally across service areas and externally with their local communities and businesses.
- Objective 30: To ensure the policy framework for local government supports councils to increase community resilience in partnership with local and regional players.
- Objective 31: To support sector-led activities, which allow councils to make local commitments to address their own unique challenges and opportunities arising from a changing climate.

A review of Local Enterprise Partnerships (LEPs) was also included within the study due to their important role in defining local economic policies and directing investment.

JBA Consulting and LUC have been commissioned by the ASC to assist in measuring progress with the implementation of the NAP through an evidence review of local authorities' (LAs) current activities on adaptation planning.

1.2 Climate Change Context

LA drivers to consider climate change risks and plan for climate change impacts have been in place for a number of years.

The ***Climate Change Act, 2008*** introduced a statutory target of reducing carbon dioxide emissions to at least 80% below 1990 levels by 2050, with an interim target of 34% by 2020. The Act also created a framework for climate change adaptation.

The ***Adaptation Sub-Committee (ASC)*** is a sub-committee of the Committee on Climate Change (CCC), established under the UK's Climate Change Act 2008. The ASC provides expert advice and scrutiny through the CCC, ensuring that the Government's programme for adaptation enables the UK to prepare effectively for the impacts of climate change.

The ***UK Climate Change Risk Assessment (CCRA)*** was published in 2012. It was the first assessment of its kind for the UK and the first in a five year cycle. It provides underpinning

evidence that can be used by Government to help inform priorities for action and appropriate adaptation measures.

The ***National Adaptation Programme (NAP)*** is the Government's long term strategy to address the main risks and opportunities identified in the CCRA. The first NAP was published in July 2013, focussing on four key areas: raising awareness of the need for climate change adaptation, increasing resilience to current climate extremes, taking timely action for long-lead time measures, and addressing major evidence gaps.

The ***UK Adaptation Reporting Power (APR)*** under the Climate Change Act 2008 gives government the power to ask certain organisations to produce reports on the impacts of climate change on their organisation and their adaptation proposals. The APR applies to organisations that are responsible for essential services and infrastructure, such as energy or transport companies. Nearly 90 organisations, primarily infrastructure providers, reported under the first round; second round reporting is expected by 2016. Organisations report on a voluntary basis; those that reported in the first round will be expected to provide a progress update.

Between 2008 and 2010, LA performance was assessed using the National Performance Framework and a set of national indicators (NI), including ***NI188: adapting to climate change***. LAs were required to report against a process-based framework to help their preparations for a changing climate. The rationale behind NI188 was to ensure LAs were sufficiently prepared to manage risks to service delivery, the public, local communities, local infrastructure, businesses and the natural environment from a changing climate, and to make the most of new opportunities. The indicator measured progress on assessing and managing climate risks and opportunities, and incorporating appropriate action into strategic planning. In 2010, the Department for Communities and Local Government (DCLG) announced it would end central performance monitoring via Local Area Agreements and the National Indicator (NI) set; therefore, LAs are no longer required to report on their adaptation work.

To coincide with the publication of the UK CCRA 2012 and given the importance of local adaptation action, the Department for Environment, Food and Rural Affairs (Defra) commissioned the ***Climate Change Partnerships*** across England to produce an information pack to highlight key risks and opportunities from climate change within each area. There are nine regional Climate Change Partnerships in England providing locally relevant information to stakeholders, including regional climate change risk assessments. The Partnerships also work collectively through the Climate UK[1] network. This provides access to a range of national and locally commissioned reports and toolkits to support climate change preparedness and adaptation.

UK Climate Impacts Programme (UKCIP)[2] has provided climate change data and support tools to organisations, including LAs, to inform decision making for climate change adaptation actions.

Support is provided to LAs through a number of agencies including the Environment Agency via its Climate Ready support service, the Local Government Association (LGA) and the Local Adaptation Advisory Panel (LAAP).

1.3 Planning Policy Framework

In 2012, the National Planning Policy Framework (NPPF) set out the Government's planning policies for England and how these are expected to be applied. The NPPF has a central presumption in favour of sustainable development, which should be implemented via plan-making and decision taking. Section 10 of the NPPF identifies the need to meet the challenge of climate change, flooding and coastal change and states that LPAs should adopt proactive strategies mitigate and adapt to climate change.

In order for Local Plans to be found 'sound', they should take account of climate change over the longer term including factors such as flood risk, coastal change, water supply and changes to biodiversity and landscape and enable the delivery of sustainable development.

[1] http://climateuk.net/home
[2] http://www.ukcip.org.uk/

The NPPF policy is based on planning legislation of the Planning and Compulsory Purchase Act (PCPA) 2004 and Planning Act 2008. Section 19 (1A) of the PCPA as amended by the Planning Act 2008 states that the development plan documents must (taken as a whole) include policies designed to secure that the development and use of the land in the local planning authorities area contribute to the mitigation of, and adaptation to climate change, local development and must carry under part (5) carry out an appraisal of the sustainability of the proposals in each document.

Paragraph 99 of the NPPF states that: 'Local Plans should take account of climate change over the longer term, including factors such as flood risk, coastal change, water supply and changes to biodiversity and landscape. New development should be planned to avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure.'

Climate Change Planning Practice Guidance accompanies NPPF and relates to specific paragraphs of the NPPF and provides more detailed guidance.

1.4 Research Objectives

The purpose of the research was to review LA and Local Enterprise Partnership (LEP) action and activity in relation to three key areas:

1) Understanding of current climate risks and how these may manifest themselves in the future and the impacts these could have for communities and for the design and delivery of council services.

2) Understanding the degree to which current plans and policies take account of future climate change risks and address these.

3) Development and implementation of appropriate policies and actions to address the identified risks and ensure the resilience of local communities and the delivery of local authority services.

1.5 Research Approach

The research has sought to identify the extent to which LAs and LEPs are considering current and future climate risks in their strategies and plans through a review of publicly available documentation. The research approach has included a quantitative high level assessment of a range of key documents including Local Plans, statutory and general strategies and policies. The review of the source documents identified whether there was an understanding of climate risk(s) and if the policies and plans in place took these into account. The approach also considered whether adaptation actions were planned to adapt to climate risks.

The key aspects to the research approach included:

- Identification of 90 single and lower tier LAs and six upper tier LAs in areas with a relatively high level of risk from one or more climate impacts.
- Identification of 16 LEPs in areas with a relatively high level of risk from one or more climate impacts.
- Web review of 90 high climate risk local authorities
    - Over 20 general documents per authority reviewed to build a broad picture of LA climate change awareness and proposed adaptation actions.
    - 10 planning related documents per LA reviewed to provide evidence of climate change preparedness and adaptation within statutory plans.
- Review of 100 planning applications
    - 10 planning applications in 10 high climate risk LAs with at least one planning policy designed to address climate risk reviewed for evidence of applying the policy.

- Web review of 16 Local Enterprise Partnerships
    - Web review of at least 3 documents per LEP to identify if there is evidence of climate risk/change and adaptation action being taken into account in investment priorities.

The research was undertaken during a six week period in February and March 2015 during which time over 3,000 strategies, plans and policies were reviewed.

1.6 Purpose of the Report and Target Audience

The project findings will form part of a suite of evidence that will inform ASC's statutory report to Parliament on progress with the implementation of the NAP by assessing local action on adaptation in England to climate change, in particular the:

- extent to which LAs are considering climate change risks on their communities and on the delivery of their functions and
- the extent to which LEPs are taking climate change into account in their investment priorities.

The evidence will also be of interested to other stakeholders including DCLG, Defra, Environment Agency Climate Ready Service and local authorities.

1.7 Structure of the Report

The remainder of the report is set out in the following sections:

- Section 2 explains the methodology adopted to identify the LAs, LEPs and planning applications for local authorities (LAs) at high climate risk.
- Section 3 provides further detail on the research approaches for each aspect of the study
- Section 4 sets out the findings from the web review of LA general documents
- Section 5 sets out the findings from the web review of LA Local Plans and planning documents
- Section 6 sets out the findings from the web review of LA flood risk documents
- Section 7 discusses the findings from the review of 100 planning applications
- Section 8 presents the findings from the web review of LEPs
- Section 9 provides the study conclusions and recommendations for re-running the review in the future.

2 Identification and Selection of LAs, Planning Applications and LEPs at Climate Risk

This Section explains the methodology adopted to identify the LAs, LEPs and planning applications at high climate risk. Further detail on the methodology applied to identify LAs is provided in Appendix A.

2.1 Introduction

The project brief set out the requirement to understand the adaptation actions being undertaken or planned by LAs and LEPs that were at risk from one or more climate impacts:

- River / Coastal Flooding
- Surface Water Flooding
- Coastal Erosion
- Water Scarcity / Drought
- Heat Stress

Our approach identified LAs at risk of one or more climate impacts to produce a sample which was representative of the five individual risks and those with multiple risks. The sample included a spread of other characteristics such as geographical spread, urban/rural mix, lower and single tier authorities and varying levels of deprivation. A random sample approach was not used; it was considered that those LAs currently at high climate risks were likely to be considering and planning for climate change more than others at lower risk which should provide more evidence of adaptation. This is summarised in section 2.2, with further detail on the selection approach for each climate risk provided in Appendix A.

The client brief suggested the research sample size should be 20-30% of LAs in England. Including counties (upper tier authorities), the population sample was 433 LAs; with the research sample agreed at 90 LAs.

To determine the 90 LAs for the sample, LAs were classified by the individual climate risks outlined in the bullets above; generating five lists with LAs ranked by highest to lowest climate risk. These lists were amalgamated to provide a composite list of combined climate risks to establish the survey sample of 90 LAs.

In addition to the 90 LAs, six counties (upper tier authorities) were also included in the evidence review; these were selected on the basis of their geographic area including at least four lower tier LAs from the list of 90.

A range of documents, including local plans and policies were reviewed to identify climate change risks and adaptation actions in these high risk authorities. This is discussed further in section 3.

The web review of local plan documents informed the selection of ten LPAs for a more detailed review of 100 planning applications. This review sought to identify whether Local Plan policies addressing climate risks e.g. water scarcity adaptation measures, SuDS schemes, were being implemented in the determination of planning applications and setting of planning conditions.

From the list of 90 local authorities identified for the web survey, we identified a sample of 16 LEPs facing a high level of climate risk. The intelligence obtained via the review process sought to understand the degree to which evident climate change adaptation awareness and action was linked to specific types of risk, severity of risk and/or multiple risks. In addition, we sought to understand the degree to which LEPs were investing in either climate adaptation projects directly and/or ensuring the climate resilience of all of their investments. Our approach to identifying the highest climate risk LAs and LEPs is outlined in the following sections, with further detail provided in Appendix A.

2.2 Identification of High Climate Risk Local Authorities

To determine the 90 LAs for the survey sample from the population sample of 433 LAs (including upper tier authorities), LAs were initially classified by five individual climate risks. This generated five lists with LAs ranked by highest to lowest climate risk. These lists were

amalgamated to provide a composite list of combined climate risks to establish the survey sample of 90 LAs. The methodology used to rank LAs by climate risk is briefly discussed below, with further detail presented in Appendix A.

2.2.1 River/Coastal Flooding

The project brief required the use of the Preliminary Estimated Annual Households Flooded (EAHF) index. The underlying data, prepared by HR Wallingford (2014) for the ASC, using the Environment Agency's 2013 National Flood Risk Assessment (NaFRA), and OS MasterMap address layer, 2013, was filtered to identify the top ranking local authorities (Appendix A).

22 LAs (24%) of the sample of 90 LAs were identified as being at high risk of river and/or coastal flooding.

2.2.2 Surface Water

LAs at high risk of surface water flooding were selected using an existing dataset prepared by HR Wallingford (2012) for the ASC, which had analysed the number of properties at risk for the periods 2001, 2008 and 2011. LAs were selected from the 200yr deep dataset and ranked based on high to low risk. These were cross-checked against the 2008 dataset. The same high risk LAs appeared in both rankings, with the exception of Basildon and Dacorum Councils, which only appeared in one period. These were included in the final selection of LAs.

24 LAs (26%) of the sample of 90 LAs were identified as being at high risk of surface water flooding.

2.2.3 Coastal Erosion

A dataset was provided by the ASC, prepared by HR Wallingford (2012), which had analysed the number of properties in zones of coastal erosion defined by the National Coastal Erosion Risk Map (NCERM) by LA for the years: 2001, 2008 and 2011. The dataset included a list of LAs providing a count of properties behind eroding coastlines for 2011. This list was ranked to provide a sample of the LAs at most risk of coastal erosion.

22 LAs (24%) of the sample of 90 LAs were identified as being at high risk of coastal erosion.

2.2.4 Water Scarcity/Drought (Water Stress)

The publication 'Water stressed areas - final classification, July 2013'[3] identifies water stress areas by water company, based on a review of current (at the time of publication) and future water usages and climate change scenarios. The study considers areas that might become stressed in the future by identifying four future scenarios for climate change and water demand, calculating the water stress status for individual water bodies under each, and combining the results to provide a 'Final Stress' classification. These water stressed areas are largely located within the south east of England and London.

We developed a combined approach to identify the sample of LAs in this climate risk category based on two factors:

- Location within a water company area with a 'Final Stress' climate risk classification of serious from the above report and;
- Location in an area with two or more water stressed Water Resource Zones[4] within their locality.

20 LAs (22%) of the sample of 90 LAs were identified as being at high risk of water stress.

[3] Environment Agency/Natural Resources Wales - Water stressed areas - final classification
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/244333/water-stressed-classification-2013.pdf

[4] The aggregation of water body results to water resource zones is based on the water stress results for those water bodies which have public water supply (PWS) abstractions that supply each zone.

2.2.5 Heat

Two datasets from the UKCP09 projections, and ONS (both publicly available) were used to identify LAs at risk of extreme high temperatures:

- UKCP09 data for mean day maximum temperatures (°C) for 2050 under the medium emissions scenario.
- This data was overlaid with the population density map from ONS used to populate local authority boundaries with the most dense category (23,700+ per km^2) producing 78 authorities. Population density was selected as a contributing aspect to the urban heat island effect.

The two datasets were merged to produce a sample list of 44 local authorities. This included those authorities that are both predicted to be susceptible to temperatures of 24°C and over by 2050s and currently the most densely populated. Birmingham and Manchester do not appear in the ranking based on the UKCP09 heat data; however, these locations were included in the rankings due to population density and local intelligence concerning evidence of the urban heat island effect. We considered that local authorities would be most likely to view themselves as vulnerable to heat stress in relation to high absolute temperatures rather than a change in temperature although we acknowledge this is an alternative analytical approach that could have been adopted.

23 LAs (26%) of the sample of 90 LAs were identified as being at high risk of extreme high temperatures in the future.

2.3 LA Survey Sample

The final ranked lists of local authorities by climate risk were amalgamated to produce one sample list of 90 for the evidence review (Appendix A).

Table 2-1: Profile of LA sample

Profile of all LA sample (n = 90)			
Urban	Rural	Lower Tier	Single Tier
55	35	40	50
% of 90 LAs			
61%	39%	44%	56%
Coastal LAs (n=37)			
16	21	25	12
% of 37 LAs			
43%	57%	37%	32%

2.3.1 Index of multiple deprivation

The English Index of Multiple Deprivation (IMD) ranks areas from least to most deprived based on seven domains. The IMD ranks all LAs in England (326 in total) according to their level of multiple deprivation. In order to categorise the LAs in the sample, we identified their national ranking and then assigned the national rankings within five specific categories.

- LAs with national rankings from 1 – 65 = very high deprivation
- LAs with national rankings from 66 – 130 = high deprivation
- LAs with national rankings from 131 – 195 = medium deprivation
- LAs with national rankings from 196 – 261 = low deprivation
- LAs with national rankings from 262-326 = very low deprivation

Table 2-2: IMD deprivation level of LA sample

IMD Deprivation Level	No LAs (n = 90)	% of 90
Very high	25	28%
High	26	29%
Medium	16	18%
Low	14	15%
Very low	9	10%

2.3.2 Multiple risks

18 LAs in the survey sample of 90 (20%) are currently subject to more than one of the high climate risks. The following table provides a summary of the multiple risk LAs.

Table 2-3: LAs with one or more climate risks

Research Methodology Climate Risk	No. LAs with high climate risk	% of sample (n=90)
Single risk	72	80%
Two risks	15	17%
Three risks	3	3%

2.3.3 Geographic Spread

The geographic spread of the sample LAs is presented in Figures 2-1 and 2-2 below, the LA identification numbers can be found in Appendix A, Table A-6.

2.4 Vulnerability Check

In addition to identifying a sample of LAs at highest current climate risk, it was agreed with the ASC that we would take the vulnerability of communities into account. The Joseph Rowntree Foundation study Climate Change, Justice and Vulnerability[5] identified that communities are not just vulnerable as a result of climate risk (e.g. living on a flood plain). Community vulnerability is also impacted by other factors such as physical characteristics (e.g. living in top floor or basement flats), personal characteristics (e.g., age and health) and ability to prepare, respond and recover (determined by individual characteristics such as income, previous experience of flooding and social networks).

The Climate Just[6] website includes maps of climate disadvantaged communities in England. Climate disadvantage has been identified as a function of (a) the likelihood and degree of exposure to a hazard and (b) individual or group vulnerability with regard to such hazards. A range of data sources were used in establishing socio-spatial vulnerability indices, including Environment Agency flood data in NaFRA 2010 and UKCP09 climate projections.

The Climate Just maps illustrate how the personal, social and environmental factors that help to explain uneven impacts on people and communities come together in particular neighbourhoods, showing where negative social impacts are more likely. Flood disadvantage shows how flood-related social vulnerability combines with the potential for exposure to flooding. It accounts for both the likelihood of coming into contact with a flood and also the severity of negative impacts on the health and wellbeing of local communities that could occur as a result of that contact. Heat socio-spatial vulnerability refers to mapped social vulnerability with respect to heat-related hazard.

[5] http://www.jrf.org.uk/sites/files/jrf/climate-change-social-vulnerability-summary.pdf
[6] http://www.climatejust.org.uk/

The key conclusions in the report and presented on the Climate Just website are that the most socially vulnerable neighbourhoods in the UK tend to be in urban or coastal locations. There is a north-south divide in extreme socially deprived flood-vulnerability in England, while nearly a quarter of London neighbourhoods are classed as extremely socially heat-vulnerable. Yorkshire and Humberside is assessed to be the most flood disadvantaged English region. Many socially deprived neighbourhoods are also socially vulnerable to climate events. The final list of LAs includes several in coastal locations, in inner London boroughs and in Yorkshire and Humberside. As such, we were satisfied that the sample of LAs included those with the most vulnerable communities.

Figure 2-1: Map of evidence review local authorities (excluding London)

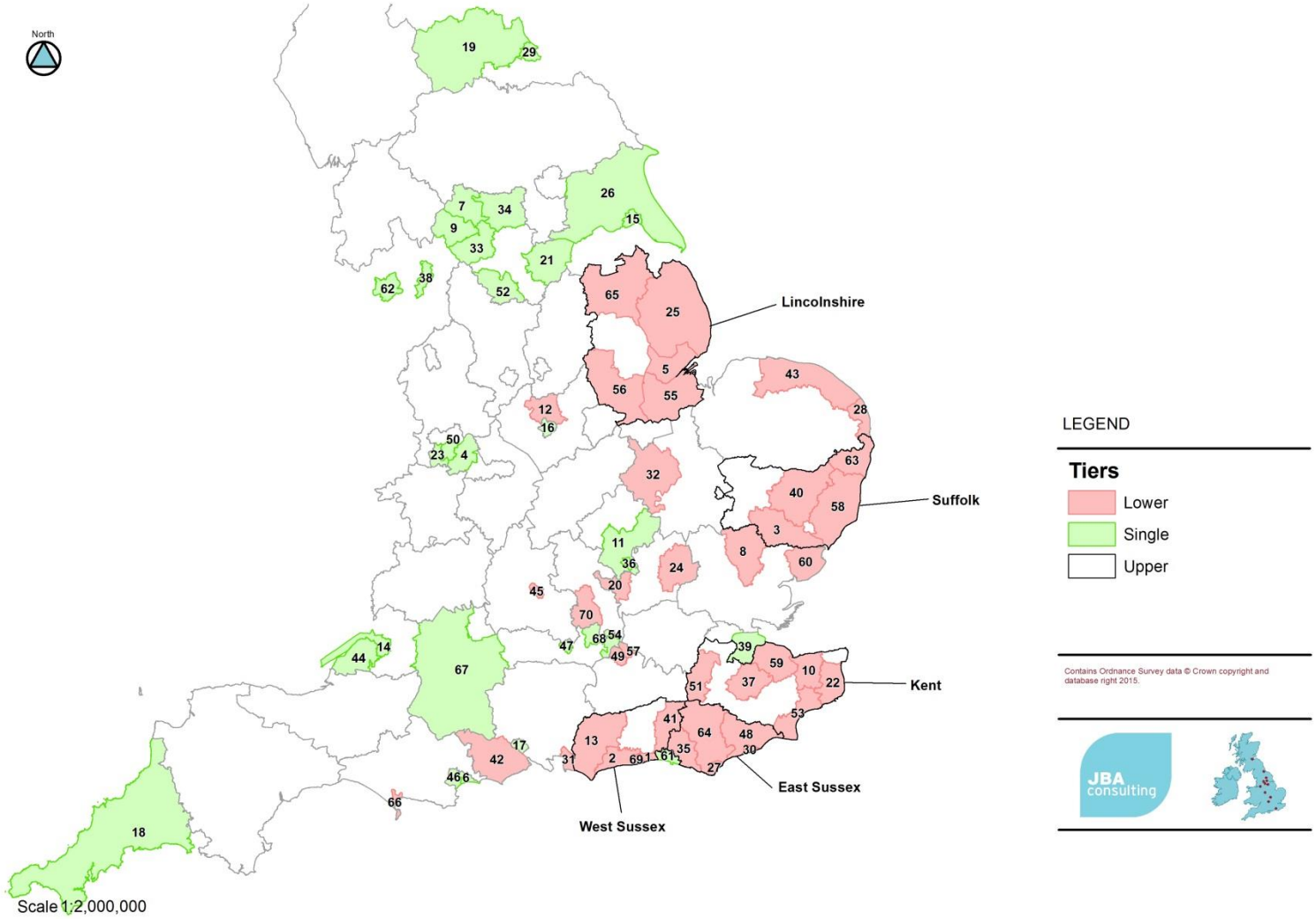
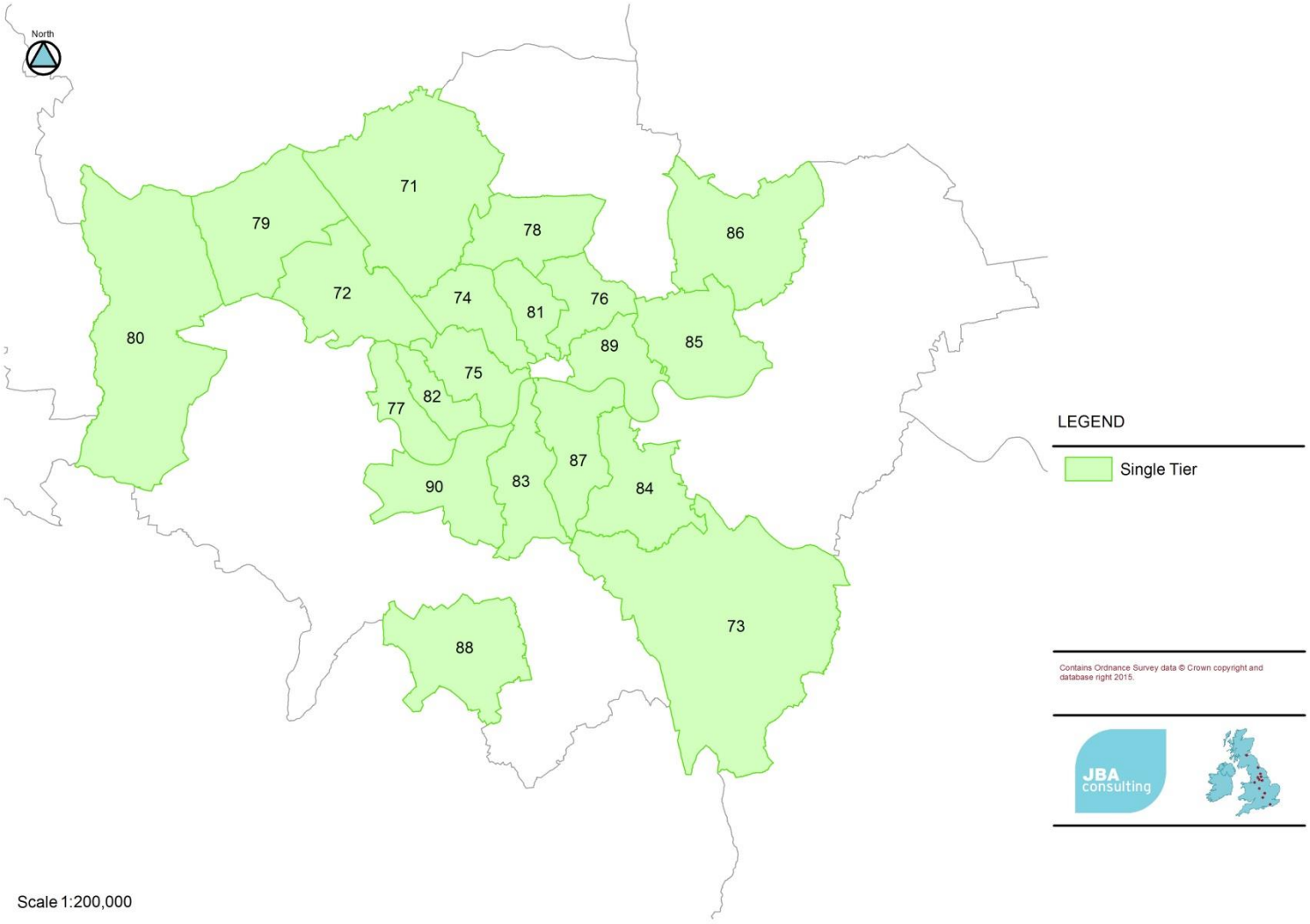


Figure 2-2: Map of evidence review - London local authorities



2.5 Upper Tier

It was agreed that a number of upper tier authorities should be included in the review due to their differing roles and responsibilities from lower/single tier authorities. In addition, we considered it would be beneficial to understand how lower and upper tier authorities were addressing climate change adaptation in the same areas. The table below lists the upper tier LAs that had the most constituent lower tier LAs within the sample. These six were included in the web review.

Table 2-4: Upper tier authorities included in web review

County Council	Number of districts which appear in the climate risk sample
East Sussex	5
Kent	6
Greater London Authority	20
Lincolnshire	5
Suffolk	4
West Sussex	5

2.6 Planning Applications Review

The web review of local plans together with our identification of LA areas with the highest climate risk outlined in section 2.2 above were used to select ten LPAs and from these to identify around 10 planning applications per LPA to review. The review sought to identify whether Local Plan policies addressing climate risks were being implemented in the determination of planning applications and setting of planning conditions.

LPAs were selected based on:

- highest climate risk and demonstrating a range of climate risks, including some with more than one risk;
- having at least one planning policy designed to address climate risk identified via the web review.
- Including a mix of geographies (urban, semi-urban and rural LA areas).

The choice of planning applications from the identified LPAs was based on the likely presence of climate risk at the proposed development site as shown in Table 2-5. There was however, no straightforward way to identify planning applications in areas at risk of coastal erosion and therefore, it was agreed that as these should largely be addressed at the strategic level, there was no need to include this climate risk within the planning applications review.

Table 2-5: Planning application selection

Climate risk	Basis of planning application selection
River/ coastal flooding	Selected based on applications determined in the LPA (2013 and 2014) which the Environment Agency was consulted on in relation to flood risk.
Surface water flooding	
Heat stress	Assumed to apply equally throughout the LPA area, therefore planning applications were chosen at random.
Water scarcity	

Where LPAs had policies addressing more than one climate risk, planning applications in relation to each climate risk were selected in equal proportions. So, for example, if an LPA has been identified with surface water flooding, heat and water stress risks then six applications were selected on a random basis (and investigated in relation to heat and water stress) and four were reviewed based on the Environment Agency consultation in relation to flood risk.

Applications were required to have been determined by the LPAs in 2014 if possible and/or 2013 if an adequate sample could not be identified from 2014 alone. This selection process was intended to ensure that the most up to date evidence was used in assessing the degree to which climate change adaptation was being implemented through the development management process since the publication of the NPPF in 2012.

2.7 Local Enterprise Partnerships

LEPs are partnerships between LAs and businesses, established in 2011 by the Department for Business, Innovation and Skills (BIS). They help determine local economic priorities and lead economic growth and job creation within the local area and decide priorities for investment in roads, buildings and facilities in the area. 39 LEPs have been created in England, they generally cover several LAs, but some LAs are included in more than one LEP area.

From the list of 90 local authorities identified for the research sample outlined in section 2.3 above, we identified a sample of sixteen LEPs facing a high level of risk from:

- River/coastal/surface water flooding
- Coastal erosion
- Water scarcity/drought
- Heat stress

16 LEPs have been surveyed; selection was based on identifying LEPs whose boundaries include the highest climate risk LAs. For each of the climate risks (other than water stress) we identified the top five ranking LAs and the LEPs in which they were situated. As water stressed LAs were not ranked, we identified all LAs that were at multiple climate risk including water stress.

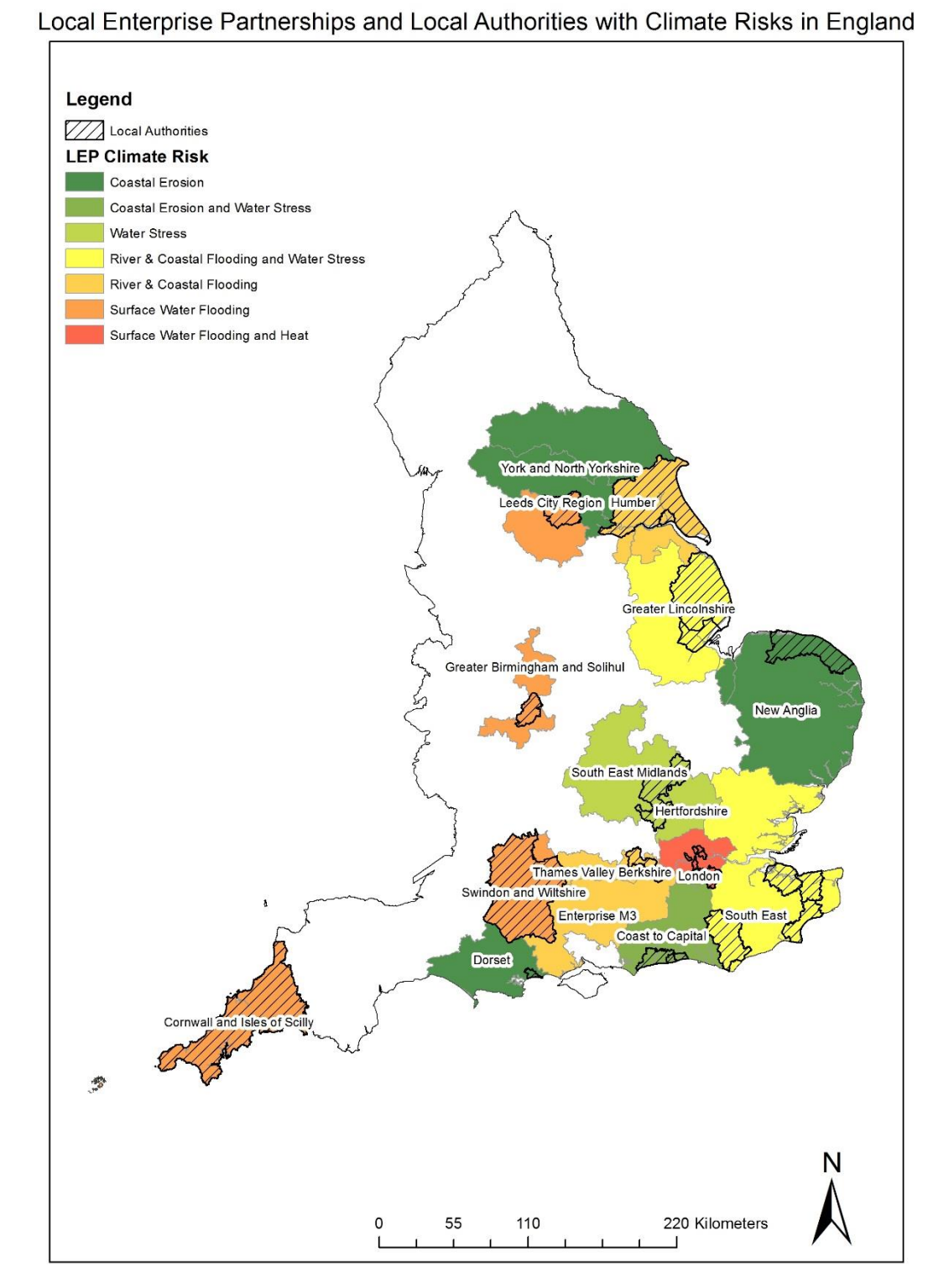
The number of constituent high climate risk authorities within the selected LEPs ranges from one to six, summarised below:

Table 2-6: Evidence Review LEPs

LEP	Local Authorities at High Climate Risk
Coast to Capital	Adur, Arun, Worthing
Cornwall and the Isles of Scilly	Cornwall
Dorset	Bournemouth
Enterprise M3	Runnymede
Greater Birmingham and Solihull	Birmingham
Greater Lincolnshire	Boston, East Lindsey
Hertfordshire	Dacorum
Humber	City of Kingston upon Hull
Leeds City Region	Leeds
London	Bromley, Islington, Kensington and Chelsea, Hackney, Tower Hamlets, Lambeth
New Anglia	North Norfolk
South East	Shepway, Swale, Canterbury, Wealden
South East Midlands	Central Bedfordshire
Swindon and Wiltshire	Wiltshire
Thames Valley Berkshire	Windsor and Maidenhead
York and North Yorkshire	East Riding of Yorkshire

The following map shows the selected LEPs and the relevant LAs plus the identified climate risks.

Figure 2-3: Selected LEPs and Constituent LAs with High Climate Risks[7]



[7] LEPs are shown as discrete entities rather than overlapping due to potential confusion regarding climate risks: none of the high risk LAs are within the areas that overlap

3 Research Approaches

3.1 Introduction

The evidence review approach involved three stages:

- Using a web based approach to identify evidence of the extent to which current and future climate risks are being accounted for in strategic planning and decision-making across the sample of 90 lower and single tier LAs and six upper tier LAs.
- Reviewing in detail 100 planning applications from 10 LPAs to assess the extent to which they have accounted for current and future climate risks and put in place relevant resilience measures
- Using a web based approach to identify evidence of the extent to which a sample of LEPs are accounting for current and future climate risks in their planning and delivery.

3.2 Web Review of Evidence - LAs

The web review involved an assessment of the sample of the 90 LAs to identify the degree to which they were accounting for current and future climate risks in their decision-making and local planning. This stage of the evaluation included a high level assessment of key documents including Local Plans, statutory and general plans and policies that were readily available in the public domain and whether these identified the risks and had adaptation plans in place.

In summary the source documents within the 'general and statutory' category comprised:

Climate Change Plans: LCLIP, Climate Change Strategy, Climate Change Risk Assessment, Climate Change Adaptation Strategy / Action Plan, Severe Weather Impacts Monitoring Systems (SWIMS)

General LA documents: Corporate Strategy, Green Infrastructure Strategy, Highway/Transport Strategy, Tourism Strategy, Natural Environment/Biodiversity/Land Use Strategies

Emergency Planning & Health/Social Care: Emergency Plan, Heatwave Plan, Joint Strategic Needs Assessment

Flood Risk Plans: Flood Risk Management Strategy/Plan, Surface Water Management Plan, Drainage Strategy, Shoreline Management Plan(s), Water Cycle Study

The review sought to identify from the source documents whether there was an understanding of climate risk(s) and if the policies and plans in place took these into account. The review also sought to identify whether any adaptation actions were being taken or were planned to adapt to the identified climate risks.

The web review of strategic planning policy identified those local authorities with Local Plan documents that had at least reached the 'Published' stage, even if at draft stage, following publication of the National Planning Policy Framework (NPPF) in March 2012. If the Local Plan had not reached this stage then we reviewed the previously adopted Local Plan/Core Strategy.

The review of Local Plan documents comprised:

- Core Strategy/Local Plan Part 1
- Development Management policies
- Allocations Plan
- Local Investment/Infrastructure Plan
- Strategic Environmental Assessment/Sustainability Appraisal of the Plan
- Annual Monitoring Report
- Community Infrastructure Levy Charging Schedule.

3.2.1 Rural/Urban Classification

The rural-urban classification of each local authority followed the definitions set by the Office for National Statistics; http://www.ons.gov.uk/ons/guide-method/geography/products/area-classifications/rural-urban-definition-and-la/rural-urban-local-authority--la--classification--england-/index.html

The LA classification was introduced in 2005 as a Department for Environment, Food and Rural Affairs (Defra) initiative and was delivered by the Rural Evidence Research Centre (RERC) at Birkbeck College.

For the purposes of this project, the assessment has categorised each LA as either 'Rural' or 'Urban' rather than the six categories in the published classification, which included three sub categories of either urban or rural Local Authorities.

3.2.2 Document dates

The date of a document was recorded as the year of publication where available. If no specific publication date was found and the document covered a time period, e.g. 2006 to 2021, the document date was taken as the start date, i.e. 2006. The only exception was LCLIPs which are historic documents recording weather events over a specific time period; the date captured for these would be the final date (so a 2007-2010 LCLIP would be recorded as 2010).

3.2.3 Web review search terms

To identify relevant documents the research team included a range of search terms in the web review analysis:

- Climate Change
- Adaptation / Climate Change Adaptation
- Awareness
- Coastal Erosion
- Drought
- Emergency Planning Measures
- Extreme Weather
- Flood / Flooding / Flood Defence / Flood Risk / Flood Incident Management (flood warnings/alerts)
- Green Infrastructure
- Heat / Heat Stress / Heatwaves / Overheating – included references to heat waves (or heatwaves), warmer temperatures, hot dry summers, overheating
- High Winds
- Natural Flood Management
- Passive Cooling
- Property Level Protection
- Research
- Severe Weather
- Storms / Storm / Tidal Surges
- Training
- UKCP09
- Water Scarcity - also included competition for water, droughts, low water availability
- Weather.

3.2.4 Climate change objectives and actions

Evidence of climate change activity has been collated based on proposals, requirements or commitments within strategies and plans to undertake specific activity or implement certain measures.

Key adaptation actions and measures were recorded in the web review template under 12 headings:

- Climate change research, awareness raising or training – this also included references to educate/education and training
- Emergency planning
- Flood defence
- Flood incident management
- Green infrastructure (GI)
- Natural flood management
- Passive cooling
- Property Level Protection (PLP) for flood risk
- SuDS and sustainable drainage - also included references to permeable paving and surfaces
- Water efficiency measures - including water metering, water consumption, low flow showers, rainwater recycling/harvesting.

3.2.5 LA Local Plans

Local plans are prepared in line with national policy NPPF, section 20 of the Planning and Compulsory Purchase Act 2004 and the Town and County Planning (Local Planning) England 2012.

The chronological stages of Local Plan development are:

- Initial Evidence Gathering & Consultation
- Published
- Submitted
- Found Sound
- Adopted

The Planning Inspectorate maintains a national database of Local Plan (LP) progress[8], which was used to identify those LPAs whose local plans had reached the 'Published' stage or later (i.e. excluding the 'Initial Evidence Gathering & Consultation' stage). If the Local Plan had not reached 'Published' stage then the previously adopted Local Plan/Core Strategy was reviewed. We were ideally looking for plans adopted post 2007 (post publication of Planning Policy Statement 25 (PPS25) in December 2006), although earlier dated documents were reviewed if the adopted plan was still valid and no plan had been adopted post 2007.

The review of Local Plan documents included not only the Core Strategy/Local Plan Part I (containing strategic policies and any strategic site allocations) but also the document containing development management polices (Local Plan Part 2) to identify any reference to adaptation actions and/or resilient design features. The location of these policies within the Local Plan development plan documents would vary on whether it was pre or post NPPF. In Local plans published before NPPF these policies were likely to be contained either in standalone Development Plan Documents or a combined Site Allocations and Development Policies document. Post-NPPF, they were likely to be found in a Local Plan Part II or as part of a single Local Plan that contained both strategic and development management policies.

Documents highlighted within local plan policies and development management policies were only included in the planning policy survey if they were relevant to climate change; for example, Area Action Plans (AAPs) were only reviewed if they were specifically targeting climate change/risks.

Where pre-2012 adopted Local Plans were still in place and there was a range of saved policies and documents, e.g. SFRA, SEA, SA that post-date the plan, these were reviewed, even if they were in draft format.

[8] http://www.planningportal.gov.uk/uploads/pins/local_plans/LPA_Core_Strategy_Progress.pdf

3.3 Planning Applications Review Approach

For each selected planning application the review process sought to answer the following broad question:

To what extent have relevant local planning policies on climate change adaptation been applied in deciding the planning application and imposing conditions on any permitted development?

The requirements of local planning policies with regard to addressing climate risks were identified through the web review of each LPA's Local Plan. The next step involved assessing the implementation of Local Plan policies at planning application scale. The review sought to identify whether the planning officer's reports (and if appealed, the appeal decision) referred to the local strategic or development management policies identified by the web review as implicitly or explicitly relating to climate risk. For example, if a development management policy referenced a specific climate change risk, such as water scarcity, but did not directly associate this with climate change, then there was considered to be an implicit link. However, if water scarcity was specifically referred to in the context of climate change, then an explicit link would be implied.

It also recorded the types of climate risk addressed via the types of adaptation measures required by conditions. Consultation responses by the Environment Agency and local water company were also examined in relation to specific climate risks (likely to be limited to flooding (all sources) and water scarcity) and specific flood risk concerns highlighted in objections made by the Environment Agency. The key documents that reviewed and the key questions that were analysed through the review are summarised below:

Table 3-1: LPA Planning Application Evidence Review

Evidence/Source document supporting planning application	Key questions
Planning application form	• Type of application • Scale • Location • Whether flood risk identified
Flood Risk Assessment (FRA)	• Was an FRA submitted with the application? • Did the FRA apply the climate change allowances in the NPPF?
Environment Agency (EA) consultation response	• What was the EA's initial response in relation to climate risk (objection, conditions etc.)? • If EA initially objected in relation to climate risk, what were the reasons (e.g. unsatisfactory FRA)? • Was any initial EA objection regarding climate risk subsequently withdrawn?
Water company consultation response	• What was the water company's initial response in relation to climate related issues (objection, conditions etc.)? • To which climate related issues did the response relate (surface water flooding/ capacity of local drainage network or water scarcity/ drought)?
Planning officer's report	• Are local planning policies which address climate risk cited in the reasons for the decision and if so, to which climate risks do they relate? • Do the Sequential Test and, if relevant, the Exception Test, take account of climate change? (may also be evidenced from FRA).
Decision notice (and any appeal decision)	• If permitted: - to which climate risks do planning conditions relate? - what types of adaption measure are conditioned? • If refused, to which climate risks does refusal relate?
Other	• Any other comments in relation to climate change adaptation, e.g. changes to original application required to provide climate change adaptation

3.4 LEP Review

The research questions tested via the survey related to the content of the LEP's key strategic objectives, strategies and plans and the degree to which proposed investments were supporting climate change adaptation. The documents reviewed were: Strategic Economic Plans (SEPs), Growth Deals and European Structural and Investment Fund strategies (ESIF strategies). The same web search terms (see 3.2.3) were used to identify climate risks and adaptation action within the documentation.

The intelligence obtained via the review process sought to understand the degree to which evident climate change adaptation awareness and action was linked to specific types of risk, severity of risk and/or multiple risks. In addition, we sought to understand the degree to which LEPs were investing in either climate adaptation projects directly and/or ensuring the climate resilience of all of their investments. It was also agreed with the ASC that for documents identifying investment, the amount of investment directed towards climate risk and climate change specific activity would be captured. Finally, the ASC requested that we consider the size of LEP in relation to the degree to which they are actively addressing climate risk. This was addressed by categorising the LEPs by population size; originally it had been suggested that the number of staff employed could be used as a proxy for size, but this information was not available on the majority of websites.

3.5 Limitations

The research approach provides an overview of trends at the time of the evidence review, but there are a number of limitations that need to be taken into account when reviewing the results.

The results of the survey provide a broad snapshot of climate adaptation evidence identified from over 3,000 documents that were available online in February and March 2015. During the survey period when documents were re-visited during the quality review stages several examples of changes were noted such as plans being adopted, websites upgraded, etc. showing how quickly the evidence will date. Therefore it will require updating on a regular basis to provide an assessment of trends over time. With the survey of land use planning documents, it must be noted that the assessors were reviewing documents that had reached the 'submitted' stage since 2007; this could mean that LAs have draft documents that have been produced more recently, but are only at an early stage (e.g. consultation) and so have not been taken into account.

The focus has been on breadth rather than depth of evidence; evidence of current climate risks, future climate change and adaptation actions were recorded, but the data was not interrogated in terms of the appropriateness or likely effectiveness of the activities proposed. It is important to stress that this study is not an audit assessing the degree to which LAs are meeting statutory or policy requirements, but provides an overview of how current and climate risks are being accounted for in LA plans and activities in the public domain.

The research team acknowledges that not all LA strategies and plans are available in the public domain; however, the research approach was to quantitatively review a broad range of evidence in a short timeframe providing a baseline against which future reviews can be assessed.

The research revealed that adaptation actions may be explicit in some documents, for example within a stand-alone GI strategy and implicit in other cases, for example GI referenced as an action to address surface water flooding within a Surface Water Management Plan. The research approach drew out examples of both types of actions.

Some websites were easier to navigate than others and in some cases documents could not be found in the public domain. This was particularly the case with planning documents where core strategies were updated but saved policies were set out in one or earlier development plans.

Some LAs continued to maintain separate climate change strategies and action plans, post the requirement for adaptation reporting (NI 188), whilst others have promoted climate change adaptation as implicit and explicit actions within other strategies and plans. As the research is

intended to be a broad review investigating the extent to which high climate risk LAs are considering climate change adaptation measures in their local plans, policies and strategies, making direct comparisons between LAs in terms of their overall approach to adaptation as represented by the whole suite of strategies, documents and plans is not possible.

The planning applications review has enabled a broad overview of the degree to which the development management process takes those climate risks into account that are set out in strategic and development management policies. However, the review could not capture climate risks addressed at the pre-application stage which may have influenced final design and it must be recognised that some risks, such as heat stress and water scarcity, may be more appropriately addressed through building regulations and previous related requirements such as the Code for Sustainable Homes.

4 Web Review Findings - Local Authority General Survey

4.1 Introduction

The documents reviewed in this category were selected to provide an overview of climate change awareness and lower/single tier LA preparedness. The evidence review sought to identify from the sample of 90 LAs how many had demonstrated an understanding of climate change risks at the local level by publishing strategies and/or adaptation action plans that identified these risks.

The review sought to draw out evidence across a range of strategies and plans, so that a broad picture of awareness and action could be drawn out, rather than focussing on a limited number of documents. These strategies and plans also covered a broad timeframe, pre and post NI188 and NPPF (see section 1).

Regional climate change data and risk assessments are available to local authorities through the regional Climate Change Partnerships and Climate UK; this data has not been included in the data analysis. Where LAs had not published local strategies, evidence of higher spatial scale documents were sought at a county level.

The research approach did not evaluate the relevance or quality of the reviewed documents, but looked for evidence of awareness of climate change risks (now and in the future) and whether plans were in place to address these.

4.2 Climate Change Strategies and Adaptation Plans

4.2.1 Local Climate Impacts Profile (LCLIP)

The LCLIP provides a local evidence base of weather events and consequences. The LCLIP records types of weather events, what happened, impacts and an indication of costs. It comprises an evidence base of media articles of historic impacts. It is a simple tool initially developed by UKCIP which was designed to help organisations to assess their exposure to the weather. The LCLIP involves a backwards look to identify how an area has been affected by extreme weather events; it is not concerned with looking forward and considering climate projections.

Of the 90 LAs assessed:

- 19 LAs had prepared a LCLIP at the lower/single-tier level.
- 12 of the 19 LCLIPs had been published during the period 2009-2011. Only one LCLIP had been published after 2011.

The review also identified an additional 25 LAs with LCLIPs at a county-wide scale, comprising 9 counties. All of these documents were dated 2009/2010 and prepared as part of a supporting evidence base for NI188 reporting. In the case of Kent County Council, a LCLIP prepared in 2010 led to the development of a Severe Weather Monitoring System (SWIMS) (section 4.2.3 below).

Risks identified across the LCLIPs included flooding, coastal erosion, heat and water stress. Other extreme weather events noted were storms and gales. Coastal LAs in East Anglia and the south-east in particular made reference to high winds and storms. One LCLIP specifically referred to sea level rise and five noted risks from tornados and lightning. Of the six counties surveyed, four had LCLIPs that identified extreme weather events in relation to surface water flooding, water stress and heat. The main climate adaptation measures related to climate change research, awareness raising and training.

4.2.2 Local climate change risk assessments

Undertaking local climate change risk assessments enable LAs to gain an understanding of current and future risks; however, they are rarely undertaken as stand-alone documents but conducted as part of the evidence base for an adaptation strategy or plan. Only four risk

assessments were found at the local/single-tier level; however, 31 LAs referred to risk assessments that had been carried out at the county level.

In addition Climate UK publicised nine regional summaries of the UK CCRA in 2012 via the regional Climate Change Partnerships. Collectively, these regional reports cover the whole of England and whilst they are at a fairly broad scale, do provide an overview of risks for all LAs.

4.2.3 Severe Weather Impacts Monitoring Systems (SWIMS)

SWIMS is a web-based tool that provides a financial local evidence base of types of weather events and consequences. It was originally developed by Kent County Council and provides a valuable decision-support tool for service providers. It helps to identify the impact of severe weather on services, communities, reputation and the environment. By using the tool, organisations can build up a picture of their vulnerability to severe weather and develop business cases for taking appropriate action. Climate UK has been leading the roll-out of a Severe Weather Impacts Monitoring system (SWIMS) across the UK. The only evidence of a completed SWIMS in our sample of 90 LAs was by Kent County Council. The research team understands that other LAs are using SWIMS; however, registration is required to access the SWIMS site and no other evidence was found in the public domain.

4.2.4 Climate Local

The Local Government Association's Climate Local[9] initiative provides advice and tools to help build capacity on climate change adaptation for LAs. It is supported by the Environment Agency Climate Ready service, to promote LA action on climate change. The initiative was launched in June 2012, to support LAs in reducing carbon emissions and increasing resilience to climate change. This support aligns with NPPF and NAP objectives.

Signing up to Climate Local requires LAs to produce a Climate Local action plan outlining commitments and actions they will undertake on carbon reduction and/or climate resilience.

The LGA commissioned an evaluation of the Climate Local programme in 2014[10]. An analysis of Climate Local action plans identified a total of 1,903 individual actions; these were predominantly focused on low carbon pathway activity. 1321 (69%) of all actions related to this theme, while 491 (26%) of the actions fell under the climate resilience theme.

The evidence review did not undertake any analysis in relation to Climate Local authorities, however, by 9 February 2015 99 LAs had signed up to Climate Local (including county councils).

- 21 of the 90 high climate risk LAs (23%) reviewed as part of this evidence project were Climate Local signatories.
- 12 of the 21 Climate Local signatory LAs had a climate change strategy or adaptation plan at a lower/single tier level (reviewed further in section 4.2.5).
- Four of the six upper tier authorities reviewed were Climate Local signatories, of which three had a climate change strategy or adaptation plan at a county-wide level.

4.2.5 Local climate change strategies, adaptation strategies, adaptation action plans

Local climate change strategies set out objectives for climate change mitigation and adaptation at a LA level. In some cases, these also incorporate objectives for climate change adaptation actions. Some LAs produce adaptation strategies and action plans as separate documents; in this case the research has only recorded the LA once in the evaluation figures, i.e. it has not been double counted.

[9] http://www.local.gov.uk/climate-local

[10] http://www.local.gov.uk/documents/10180/6869714/CL+-+Evaluation+report+-+Final+report.pdf/35ced18e-80ad-44a9-afab-52a18163b488

The research identified 38 lower/single tier LAs (42% of the sample of 90 LAs) with either a climate change strategy or adaptation action plan setting out proposed climate change adaptation activity:

- 11 LAs had a climate change strategy only which included proposed climate change adaptation actions.
- 12 LAs had a climate change adaptation strategy or action plan only.
- 15 LAs had both a climate change strategy and separate adaptation strategy/plan with proposed actions. For the purposes of the research, the findings from each review were combined and counted once in the evaluation figures.

In addition seven LAs indicated that they were planning to develop a strategy or plan (four climate change strategies, two climate change adaptation plans and one indicating both a climate change strategy and adaptation plan).

The research assessed whether LAs identified by the research methodology as being at highest climate risk were reflecting this level of risk in their climate change strategies and action plans. The analysis also identified where LAs that were not identified as being at high climate risk by the research methodology were including specific reference to differing climate risks in their documents. This is presented in Table 4-1 below:

Table 4-1: Comparison of climate risks at lower/single tier level in strategies and adaptation plans with CC actions

CC Strategies, Adaptation Action Plans and Strategies identifying climate risks and adaptation actions 38 Lower/single tier LAs					
	Climate Risk				
	River & coastal flooding	Surface water flooding	Heat	Water Stress	Coastal erosion
(i) High climate risk LAs (research methodology)	8	11	14	4	11
(ii) LAs identifying same climate risk as research methodology	6	5	6	3	4
(iii) Additional LAs identifying climate risk	17	19	23	27	5
No. LAs identifying climate risk	**23**	**24**	**29**	**30**	**9**
% of 38 LAs with climate risk	**61%**	**63%**	**76%**	**79%**	**24%**

To provide some further explanation on the above table, taking river and coastal flooding as an example, of the 38 LAs that identified a climate change strategies and/or an adaptation strategy/action plans:

- 8 of the 38 LAs (i) were identified by the research methodology as being at the highest risk of river and coastal flooding.
- Of these 8 LAs (ii), 6 had produced a climate change strategy with adaptation actions, climate change adaptation strategy or action plan referring to river and coastal flooding.

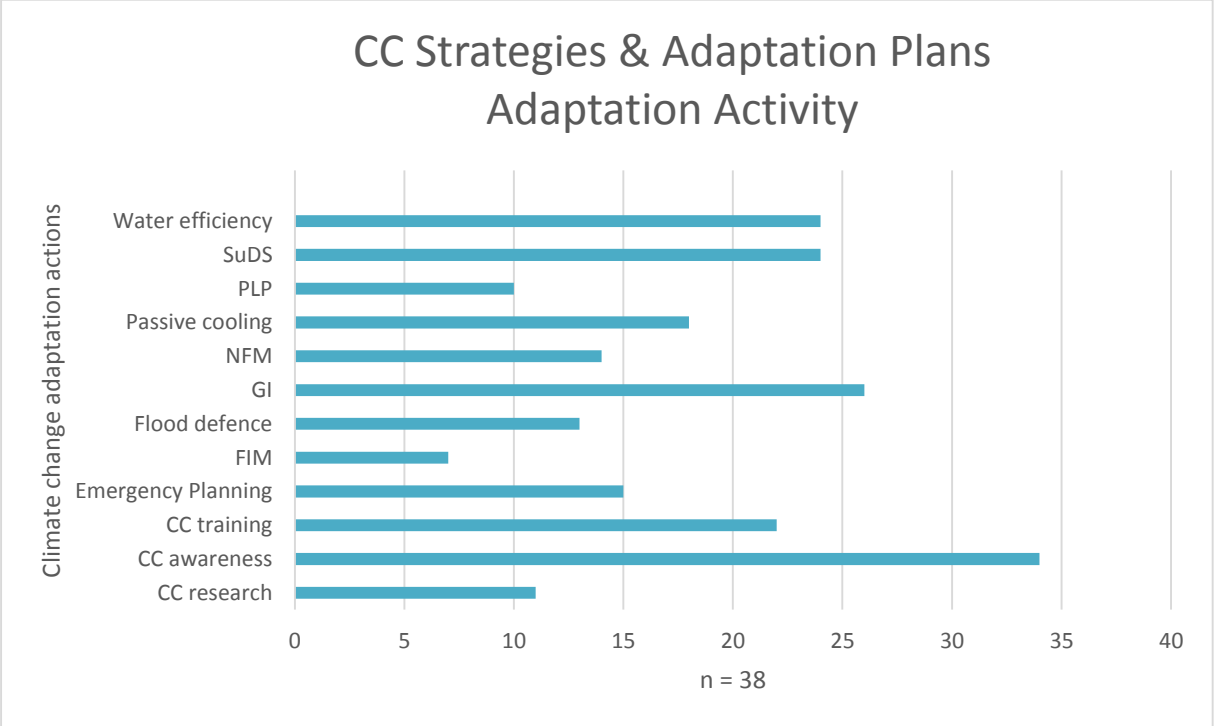
- In addition, 17 LAs (iii) identified river and coastal flooding as a climate risk in their climate change strategy or action plan.
- 61% of the 38 LAs producing a climate change strategy or action plan with proposed actions had identified river and coastal flooding as a local climate risk.

It should be noted that 9 LAs had two or more climate risks (8 LAs had two climate risks and one had three), therefore the number of LAs identified with individual risks totals more than 38. Each climate risk has been analysed separately.

In addition to the above LAs identifying specific climate risks, four LAs identified by the research methodology as being at high flood risk (either river/coastal or surface water) did not draw out these specific risks but referred to general flooding in their strategies and action plans.

The 38 climate change strategies and action plans all included proposed activities to address current and/or future climate risks. Most included multiple activities, as reflected in Figure 4-1 below.

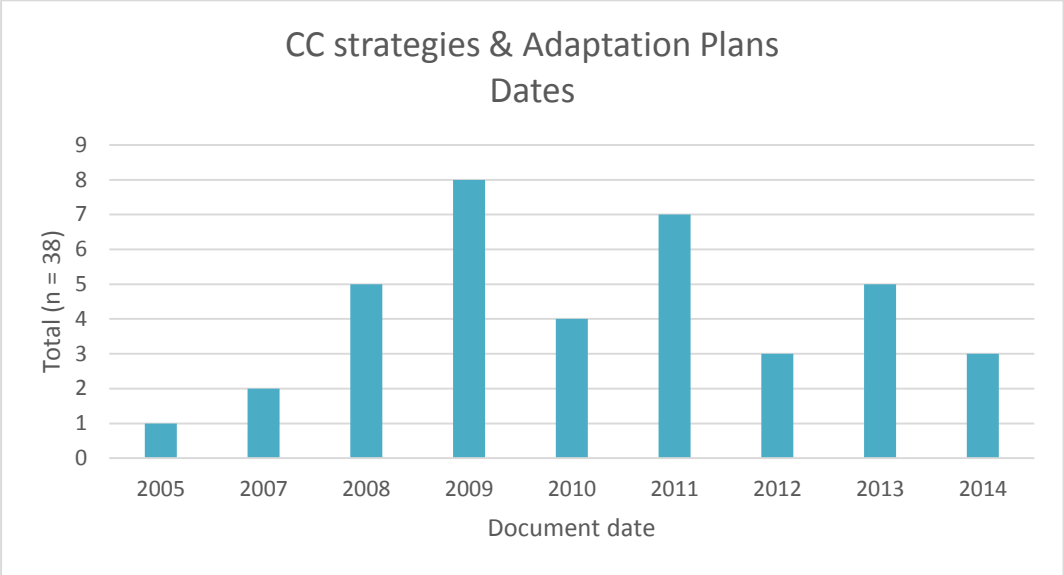
Figure 4-1: Adaptation objectives in local climate change strategies and plans



The main climate change adaptation objective reflected in nearly all documents related to awareness raising activity. Other planned actions included Green infrastructure (GI), water efficiency and SuDS.

The 38 climate change strategies and action plan documents were produced between 2005 and 2014, with 47% of the 38 documents dated 2011 onwards, as shown in Figure 4-2 below:

Figure 4-2: Dates of local climate change strategies and adaptation plans including proposed CC activity



The profile of the 38 LAs with either a local climate change strategy or adaptation strategy/action plan is summarised in Table 4-2 below.

Table 4-2: Profile of LAs with a CC strategy and/or action plan

Profile of LAs with a local CC strategy and/or action plan (n = 38)				
Urban	**Rural**		**Lower Tier**	**Single Tier**
27	11		11	27
% of 38 LAs				
71%	29%		29%	71%

- 71% of the 38 LAs with CC strategies or adaptation action plans were urban LAs.
- In addition 71% of these LAs were single tier authorities.
- 16 of the 38 LAs with climate change strategies or plans were in a coastal location, representing 43% of the 37 high risk coastal LAs included in the sample of 90.
- 66% of LAs with a very high/high deprivation level produced climate strategies and adaptation plans, as shown in Table 4-3 below.

Table 4-3: IMD deprivation level of LAs with a CC strategy and/or adaptation strategy/action plan

IMD Deprivation Level	No LAs (n = 38)	% of 38
Very high	14	37%
High	11	29%
Medium	5	13%
Low	8	21%
Very low	0	-

Comparing the figures with the LA sample profile of 90 LAs suggests that more adaptation strategies/plans are being produced by single tier LAs, in deprived, urban and coastal areas than is reflected by the sample as a whole.

In addition, 18 LAs (20% of the 90 LA sample) had strategies or plans at an upper tier level, comprising seven county councils in East Anglia, the south-east and along the south coast. All upper tier adaptation strategies and plans were produced in the period 2011-2014.

Of the six upper tier authorities reviewed separately, three had climate change adaptation strategies or plans. Climate risks included river and coastal flooding, heat and water stress. The main adaptation activities proposed in the strategies/plans are GI, emergency planning, water efficiency and climate change research.

4.2.6 Overview

LAs have no statutory requirements placed upon them to prepare climate change strategies and plans. As the requirement to report on adaptation (NI188) was withdrawn in 2010, it is encouraging that adaptation plans and strategies have continued to be developed since 2011, although at a declining rate.

In the survey 42% of lower/single tier LAs have climate change strategies or adaptation plans. Urban, coastal, high deprivation and single tier authorities are over-represented compared with the characteristics of the sample of 90 LAs surveyed suggesting that these areas view adaptation as more of a priority than others. Seven county councils also have strategies and/or plans in place at a county-wide level representing more rural areas.

With the exception of coastal LAs, it is interesting to note that more LAs identified themselves as being at risk of specific climate impacts in their climate strategies and adaptation action plans than the number of high climate risk LAs identified through the study methodology.

4.3 LA General Strategies and Plans

4.3.1 Corporate Strategies

LA corporate strategies or plans set out overall aims and objectives and highlight what the LA is going to do, why and how it will be undertaken. Often they include commitments in terms of customer care. The actual documents vary hugely from detailed strategies to a set of values. The evaluation review sought to identify documents that included specific reference to climate change risks. The evaluation also looked for evidence of proposed adaptation actions to respond to climate change.

The research identified 77 corporate strategies at lower/single tier level (86% of the sample of 90 LAs).

- 24 documents refer to local climate risks (31% of the 77 corporate strategies).
- 17 of the 24 also include proposed climate adaptation actions.

Table 4-4: Climate risks in LA corporate strategies

Corporate strategies identifying climate risks 24 Lower/single tier LAs					
	Climate Risk				
	River & coastal flooding	Surface water flooding	Heat	Water Stress	Coastal erosion
(i) High climate risk LAs (research methodology)	10	5	3	4	5
(ii) LAs identifying same climate risk as research methodology	4	1	2	0	2
(iii) Additional LAs identifying climate risk	3	0	3	5	2
No. LAs identifying climate risk	**7**	**1**	**5**	**5**	**4**
% of 24 LAs with climate risk	**29%**	**4%**	**21%**	**21%**	**17%**

In addition to the above, nine LAs identified as high flood risk by the research methodology (river and coastal and/or surface water flooding) did not include reference to the specific risk in their corporate strategies but did refer to non-specific general flooding as a risk. In addition three LAs not identified as high risk by the research methodology referred to non-specific flooding in corporate strategies.

The corporate strategies included limited references, with 17 documents including proposed adaptation activities to address climate current and future risks. Six documents referred to flood defence actions, five to GI, four to water efficiency and emergency planning and three to PLP measures.

Corporate strategies including reference to climate adaptation actions were dated between 2010 and 2015.

Table 4-5: Dates of corporate strategies including climate adaptation actions

Date of Corporate Strategy	Number of LAs (n=17)
2010	2
2012	4
2013	3
2014	6
2015	2

One third of the corporate strategies included reference to climate risks; non-specific flooding was referred to in half of the documents. These are high level strategies, which often set out LA values rather than referring to outcomes of a risk assessment or considering the detail of extreme weather. In the main, climate risks are referred to in a fairly generic way rather than as a result of a detailed risk assessment and therefore highlight the likely impacts of climate change, in general, rather than specifically for that area.

4.3.2 Green Infrastructure Strategies / Plans

Green infrastructure (GI) relates to a network of multi-functional green space, urban and rural, which is capable of delivering a wide range of environmental and quality of life benefits for local communities. GI includes parks, open spaces, playing fields, woodlands, street trees, allotments and private gardens and help to address climate change by offering adaptation opportunities, for example cool refuges during heatwaves and supporting flood risk management planning with temporary storage capacity.

GI is accommodated in a range of strategies and plans, evidence of GI as a proposed climate adaptation action has been reviewed in other sections, for example within climate change strategies and flood risk plans. Many LAs have produced stand-alone GI strategies recognising the benefits of green infrastructure for health, the environment and the economy. Often these have been produced as part of the evidence base for the development of local plans. There is not a statutory requirement to produce these strategies, but the NPPF section 10 states that *'When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure'.*

The evidence review identified:

- 17 GI strategies at a lower/single tier level (19% of 90 LAs sample) with 13 (76% of the 17) identifying climate risks, of which 11 (65% of the 17) included climate change adaptation actions.
- 11 strategies (65% of the 17) included adaptation actions to address future climate change. Seven strategies (64% of the 11) proposed natural flood management, ten strategies (91% of the 11) proposed GI and five strategies (45% of the 11) included SuDS measures.

Table 4-6: Profile of LAs with a GI strategy identifying climate risk

Profile of LAs with a GI strategy identifying climate risks (n=13)				
Urban	**Rural**		**Lower Tier**	**Single Tier**
5	8		6	7
% of 13 LAs				
39%	61%		46%	54%

The dates of GI strategies including climate change adaptation actions are presented below, one document was undated and is not included in the table.

Table 4-7: Dates of GI strategies including climate change adaptation actions

Date of GI Strategy	Number of LAs (n=11)
2009	2
2010	0
2011	4
2012	0
2013	2
2014	2

Four lower/single tier LAs indicated that GI strategies were being planned.

Ten GI strategies were identified at an upper spatial scale, accounting for 19 LAs. All of these had been produced during the period 2005-2011, possibly influenced by the regional planning system in place during this timescale. Previous Regional Spatial Strategies included a focus on GI and a large body of evidence was built up in some regions, for example the North West, regarding the benefits of GI including for climate change adaptation.

Of the six upper tier authorities reviewed separately, two authorities had a GI strategy with climate objectives covering flood defence, natural flood management, water efficiency and SuDS.

It is recognised that the absence of a dedicated GI strategy does not necessarily indicate an absence of GI as this may be covered in other documents such as local plans and flood risk management plans. The research sought to draw out as part of the overarching evidence base the number of LAs with separate strategies identifying specific climate risks.

4.3.3 Natural Environment / Biodiversity Strategies and Plans

In 1992, at the Earth Summit in Rio, the UK government, along with 150 other countries, signed the Convention on Biological Diversity. This resulted in the launch of the UK Biodiversity Action Plan (UK BAP), in 1994. Local Biodiversity Action Plans (LBAPs) followed the recognition that "biodiversity is ultimately lost or conserved at the local level." They identify priorities for action and give guidance on implementing targets to reverse the loss of habitats and species. BAPs form part of the preparation and evidence base of the statutory process of Local Plans, which have to take due regard of the protection of species and habitats under the many forms of Wildlife and Countryside legislation. Local BAPs are aimed at conserving the fauna, flora and habitats - collectively referred to as biodiversity - of a defined area, usually along LA boundary lines, although they can be undertaken for a number of authorities and generally at upper tier rather than lower tier level.

The evidence review identified:

- 40 natural environment/biodiversity strategies (44% of the LA sample of 90) at a lower/single tier level which included one or more climate risks.
- Table 4-8: Profile of LAs with a natural environment/biodiversity strategy

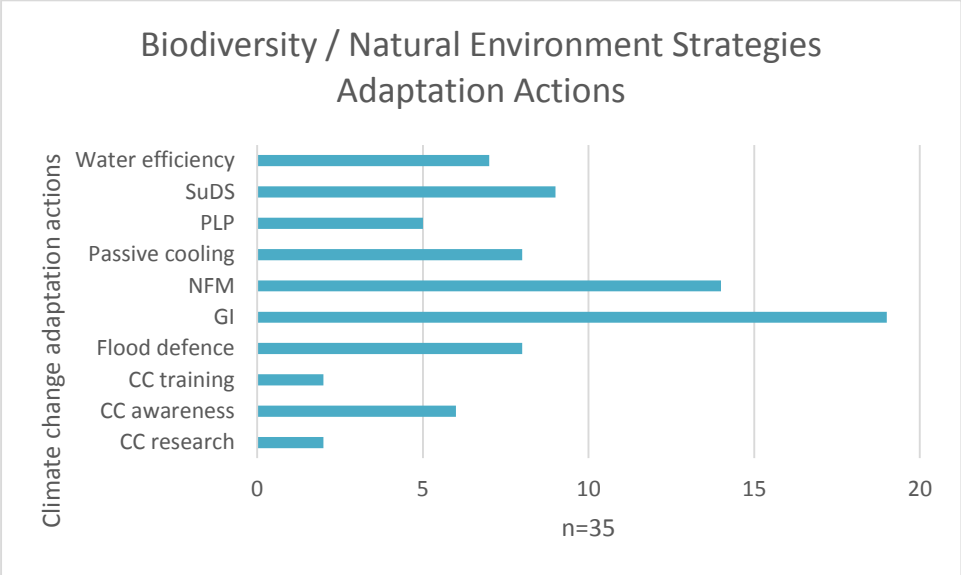
Table 4-8: Profile of LAs with a natural environment / biodiversity strategy identifying a climate risk

Profile of LAs with a natural environment / biodiversity strategy identifying climate risks (n=40)				
Urban	**Rural**		**Lower Tier**	**Single Tier**
30	10		12	28
% of 40 LAs				
75%	25%		30%	70%

35 strategies (88% of the 40 strategies with climate risks) included proposed climate change adaptation actions. Multiple actions were identified for LAs; therefore the numbers in Figure 4-3 below are greater than 35.

Of the 35 strategies with proposed climate adaptation actions, half were prepared in the period 1997-2009 and half in the period 2010-2015.

Figure 4-3: Biodiversity / natural environment strategies with adaptation actions



Of these strategies, four had specific reference to GI and NFM; three to flood defence and two to water efficiency as adaptation measures in response to future climate change. In addition, 29 LAs had strategies at the upper tier spatial scale (9 counties); published 1998-2014.

The research reviewed the extent to which LAs identified climate risks within either a GI or a natural environment/biodiversity strategy.

Table 4-9: Climate risks in LA environmental strategies

GI / biodiversity strategies identifying climate risks 51 Lower/single tier LAs					
	Climate Risk				
	River & coastal flooding	Surface water flooding	Heat	Water Stress	Coastal erosion
(i) High climate risk LAs (research methodology)	11	17	16	9	10
(ii) LAs identifying same climate risk as research methodology	5	6	6	5	6
(iii) Additional LAs identifying climate risk	17	13	18	24	4
No. LAs identifying climate risk	**22**	**19**	**24**	**29**	**10**
% of 51 LAs with climate risk	**43%**	**37%**	**47%**	**57%**	**20%**

In addition to the LAs identifying a specific flood risk, 18 LAs referred to non-specific general flooding as a climate risk.

The analysis reveals that considerably more LA strategies have identified water scarcity as a key climate risk than was revealed by our research methodology (of the 51 LAs with environmental strategies, our research methodology suggested 9 LAs (18%) were subject to water stress whilst 29 (57%) of the LAs with environmental strategies reviewed referred to water stress). This can probably be explained by the fact that GI and biodiversity strategies cover a broad and widely embraced agenda and the impact of water scarcity on biodiversity can be crucial regardless of whether LAs are at particularly high risk of this climate impact now and in the future. It is notable, however, that the majority of strategies are focusing on current climate risks rather than future climate change.

4.3.4 Highway / Transport Strategies and Plans

Some local authorities produce highway or transport strategies, but generally these are within Local Transport Plans (LTPs) which are statutory requirements and linked to funding for major schemes and generally be produced at a single or upper tier level. The third round of LTPs, which took effect from April 2011, will run until 2020 or beyond; LAs can decide when to review their LTP. The system is currently undergoing change, but the main LA led documents will be the most recent LTP that they have produced. With regard to climate change adaptation, the 2009 guidance (still current) for states:

"in addition to measures to reduce greenhouse gas emissions, it is important that local authorities put in place measures to improve the resilience of local transport to the impacts of climate change, such as flooding and deterioration of roads, in line with the Government's Adapting to Climate Change Programme, NI 188: Adapting to Climate Change and the UK Climate Projections".

The evidence review identified:

- 48 transport strategies and/or local transport plans (53% of the sample of 90 LAs) were at a lower/single tier level, of which 33 included reference to climate risks (69% of the 48 plans).
- The 33 strategies included references to climate change actions:
    - The main actions related to climate change research, awareness raising and training.
    - 36% referenced SuDS measures or GI as a current climate and future climate adaptation measure.

Table 4-10: Profile of LAs with a highway/transport strategy identifying climate risk

Profile of LAs with a highway/transport strategy identifying climate risks (n=33)				
Urban	**Rural**		**Lower Tier**	**Single Tier**
27	6		3	30
% of 33 LAs				
82%	18%		9%	91%

21 of the transport strategies identifying climate risks were published in 2011 (64% of the 33 strategies).

Heat has been identified as the key climate risk by a large proportion of LAs. This can probably be explained by the fact that any general reference to climate change will refer to increasing temperatures.

In addition 10 upper tier transport strategies were identified that applied to 17 lower tier LAs.

Of the six upper tier authorities reviewed separately, three authorities had a transport strategy with climate change adaptation objectives relating to flood defence.

The majority of transport strategies were prepared by single tier urban LAs. Reference to climate change in transport strategies tends to be dominated by the mitigation agenda due to the role that public transport can play in contributing towards a reduction in the use of fossil fuel. However, recent extreme weather events and their impact on transport infrastructure which then impacts lives and livelihoods is recognised with 33 of the 48 strategies reviewed identifying climate risks. These predominantly related to flooding and heat, although 12 strategies specifically referenced storms as a climate risk. One-third of the strategies highlighted climate change awareness as the main proposed actions in relation to future climate change, another third referenced GI as a proposed action, and another one-third identifying SuDS measures as a climate change adaptation action.

4.3.5 Tourism Strategies

There is no specific requirement for LAs to produce tourism strategies although a number choose to, especially where tourism is particularly important for the local economy. Climate change could have a particular impact on tourism in the UK as much of it is weather dependent; opportunities as well as challenges should be considered. For example a key impact of flooding in some key regional tourist destinations is the wider publicity given after extreme weather events suggesting that these areas were not 'open for business'. In some areas, the strategic responsibility for the management and promotion of tourism has been taken on by LEPs.

The evidence review found published tourism strategies for 36 lower/single tier LAs. Only nine of these noted climate risks (identifying flood risk, coastal erosion, water stress and heat). However very few adaptation activities were identified suggesting that current climate risks and future climate change is generally not taken into account in planning for tourism at the LA scale.

4.4 Health/Social Care

4.4.1 Joint Strategic Needs Assessment

The Health and Social Care Act 2012 amended the Local Government and Public Involvement in Health Act 2007 to introduce duties and powers for health and wellbeing boards in relation to Joint Strategic Needs Assessments (JSNAs) and Joint Health and Wellbeing Strategies (JHWSs). Local authorities (upper tier/single tier) and clinical commissioning groups (CCGs) have equal and joint duties to prepare JSNAs and JHWSs, through the health and wellbeing board.

JSNAs are assessments of the current and future health and social care needs of the local community. The policy intention is for health and wellbeing boards to also consider wider factors that impact on their communities' health and wellbeing, and local assets that can help to improve outcomes and reduce inequalities.

The Department of Health (DH), the Sustainable Development Unit, Public Health England, and the Environment Agency have produced guidance[11] to assist Health and Wellbeing Boards (HWBs) in integrating climate change adaptation (i.e. measures to reduce negative impacts) into the local health economy. It also highlights how Joint Strategic Needs Assessments (JSNA) and Joint Health and Wellbeing Strategies (JHWS) can be used to achieve this aim, for the benefit of communities.

The evidence review has sought to identify whether local JSNAs have identified the potential implications of climate change for health and social care needs and whether there is any evidence of planning for these impacts. JSNAs are statutory documents but it is not mandatory that they cover climate change.

National Heatwave Plan

The Heatwave Plan for England is a plan intended to protect the population from heat-related harm to health. It aims to prepare for, alert people to, and prevent, the major avoidable effects

[11] Under the Weather: Improving Heath, Wellbeing and Resilience in a Changing Climate (2014) - http://www.climatechangenorthwest.co.uk/news/under-weather-adaptation-toolkit-health-and-wellbeing-boards

on health during periods of severe heat in England. It recommends a series of steps to reduce the risks to health from prolonged exposure to severe heat for:

- the NHS, local authorities, social care, and other public agencies
- professionals working with people at risk
- individuals, local communities and voluntary groups

The Heatwave Plan has been published annually since 2004, following the devastating pan-European heatwave in 2003. The Heatwave Plan was significantly re-shaped in 2012 from previous years. There have since been changes to reflect the changes in the health care and public health landscape, to align the Heatwave plan more closely with the Cold Weather Plan and to link planning for severe heat with the Public Health Outcomes Framework. It is a collaborative plan supported by NHS England to protect and promote the health of the population. Amongst the key recommendations are that local plans are adapted as appropriate to the local context.

Local Heatwave Plans

Some local NHS Trusts have put local heatwave plans into place; these have not been analysed in the survey as they are not led by LAs. However, Health and Wellbeing Boards should build heatwave concerns into their local strategies and JSNAs. The review of emergency plans also included awareness of heat and heatwave actions; analysis of these is included in section 4.5 below.

JSNAs are produced by single tier authorities; they are not produced at a lower tier. Of the sample of 90 LAs, 50 are single tier LAs, of which 26% (13 LAs of 50) had a JSNA in the public domain that identified climate change risks.

The evidence review revealed the following:

- 50 JSNAs produced by single tier LAs were reviewed, of which 13 included references to climate risks (26% of the 50 JSNAs).
- Nine of the 13 JSNAs included reference to heat and non-specific flooding as a climate risk.
- Eight of the 13 JSNAs included references to proposed climate change adaptation actions. Two of these also included specific actions to address future climate change in relation to GI, flood defence, FIM and emergency planning.
- Only one JSNA referred to passive cooling as an adaptation measure. Six JSNAs identified GI as an adaptation action.

Table 4-11: Profile of LAs with a JSNA identifying climate risks

Profile of LAs with a JSNA identifying climate risks (n=13)				
Urban	**Rural**		**Lower Tier**	**Single Tier**
10	3		-	13
% of 13 LAs				
77%	23%		-	100%

In addition, seven LAs had JSNAs at the upper tier spatial scale (two counties).

LAs highlighted several climate risks in their JSNAs over and above the climate risks identified for this study. These included; storms, sea level rise, air quality issues and food security. Two JSNAs noted an objective to identify communities and individuals who are vulnerable to climate risks.

Of the six upper tier authorities reviewed separately, six JSNAs were identified but none identified climate risks.

4.5 Emergency Planning

The Civil Contingencies Act, 2004 and accompanying non-legislative measures, delivers a single framework for civil protection in the UK. Part 1 of the Act and supporting Regulations and statutory guidance 'Emergency Preparedness' establish a clear set of roles and responsibilities for those involved in emergency preparation and response at the local level. The Act divides local responders into 2 categories, imposing a different set of duties on each. Those in Category 1 are organisations at the core of the response to most emergencies (the emergency services, local authorities (single tier, lower tier and upper tier), NHS bodies). Category 1 responders are subject to the full set of civil protection duties. Amongst other requirements, Category 1 responders are required to put in place emergency plans and business continuity management arrangements The risk assessment process set out in the Act covers civil emergencies which could occur in a five year time horizon, which it is accepted may be too short a window within which to plan for future climate change.

The Civil Contingencies Act 2004 requires emergency responders in England and Wales to co-operate in maintaining a public Community Risk Register. These are approved and published by Local Resilience Forums (which are established around police force boundaries), which include representatives from local emergency responders as well as public, private and voluntary organisations. The Act requires each Category 1 responder (including LAs) to arrange to publish all or part of its risk assessments. It can do this (by agreement with its Local Resilience Forum partners) by publishing all or part of the Community Risk Register.

Whilst all LAs (single tier, lower tier and upper tier) are expected to have emergency plans in place and implement these when required, in practice these are not always publicly available and websites tend to provide information on how others should put together emergency plans e.g. local community groups. Most do have publicly availably community risk registers. For the evidence review, where emergency plans could not be found online community risk registers have been assessed as an alternative, although it should be recognised that these are led by Local Resilience Forums which LAs are part of, but as one of many multi-agency partners. As Local Resilience Forums are established at the police force boundary level, each community risk register will cover several LAs.

The emergency plans and community risk registers were reviewed to establish whether they identify climate risks and/or recognise that future climate change will need to be addressed.

- 30 emergency plans/community risk registers (34% of the LA sample of 90) were publicly available at a single/lower tier level. All of these made reference to climate risks, principally flooding. 11 plans noted other severe weather events, in particular snow and wind.
- In addition, 54 LAs had emergency plans/community risk registers at an upper tier level.
- Adaptation actions related to current climate risks, in particular flood incident management, flood defence and PLP. Of the 10 LAs identified by the research methodology with heat as a climate risk, only one included passive cooling as a proposed adaptation action. There was very little reference to adapting to future climate change.

Of the six upper tier authorities reviewed separately, four emergency plans identified climate change adaptation actions relating to flood defence, flood incident management and emergency planning.

4.5.1 Climate risk comparisons

Comparisons were made between the LA climate risks established by the research methodology and climate risks identified through the review of emergency planning and health care documents (JSNAs and emergency plans/community risk registers) for lower tier and single tier authorities. These are presented in the following table:

Table 4-12: Climate risks in emergency planning and health care documents

JSNAs and Emergency planning documents identifying climate risks 37 Lower/single tier LAs					
	Climate Risk				
	River & coastal flooding	Surface water flooding	Heat	Water Stress	Coastal erosion
(i) High climate risk LAs (research methodology)	*9*	13	11	5	9
(ii) LAs identifying same climate risk as research methodology	5	6	6	3	-
(iii) Additional LAs identifying climate risk	18	11	13	11	2
No. LAs identifying climate risk	**23**	**17**	**19**	**14**	**2**
% of 37 LAs with climate risk	**62%**	**46%**	**51%**	**38%**	**5%**

In addition to the above, 10 documents refer to non-specific flooding as a climate risk.

Considering JSNAs and emergency plans together (37 LAs), 62% of the strategies referred to river and coastal flooding, with nearly half (46%) specifically referring to surface water risks. Just over half noted heat as a specific climate risk (51%), with over one third referring to water stress risks (38%). Specific coastal erosion risks were only mentioned by two LAs, which is unsurprising for these types of documents.

4.5.2 Overview (JSNAs and Emergency Plans/Community Risk Registers)

Just over a quarter of single tier JSNAs reviewed referred to climate risks with a sixth setting out specific objectives in relation to climate risks. Climate related objectives referred to GI, research, awareness raising, training, also flood defence, flood incident management and emergency planning. The fact that more than 25% of JSNAs highlight climate risks should be viewed as a positive start in a policy area, which appears to be gaining momentum. The Joseph Rowntree Foundation has undertaken substantial research and provided resources to support better recognition of the potential impacts of climate change for vulnerable communities and the NHS is building climate change into its plans and strategies.

All of the emergency plans and community risk registers reviewed made reference to climate risks, principally flooding which in the main was referred to generically rather than identifying the source of flooding. 11 Plans noted other severe weather events, in particular snow and wind. Objectives and actions were unsurprisingly flood related including measures such as flood incident management, flood defence and PLP. By their nature emergency plans are

intended to address immediate-short term risks which meant there was minimal reference to future climate change.

5 Web Review - Planning

5.1 Introduction

The NPPF sets out the Government's planning policies for England and explains how these are expected to be applied. The NPPF has a central presumption in favour of sustainable development which should be implemented via plan-making and decision taking. Section 10 Paragraph 94 sets out the need to meet the challenge of climate change, flooding and coastal change stating that 'LPAs should adopt proactive strategies taking full account of flood risk, coastal change and water supply and demand considerations'. The requirements of local authorities to adopt proactive strategies to mitigate and adapt to climate change fall in line with the provisions and objectives of the Climate Change Act 2008.

5.2 Local Plans

Local Plans are at the centre of the planning system and key to delivering sustainable development and must be consistent with principles and policies of the NPPF, including the presumption in favour of sustainable development. The requirements of the local development documents or "Local Plan" are set out in The Town and Country Planning (Local Planning) England Regulations 2012. Paragraph 152 of the NPPF states that each LPA must prepare a local plan for its area. Local Plans should make it clear what is intended to happen over the life of the plan, where and when this will occur and how it will be delivered.

The preparation of Local Plans involves several stages, and for the purposes of the research project it was agreed that if the Local Plan had not reached 'Published' stage, the previously adopted Local Plan/Core Strategy was reviewed. The research team looked for plans adopted post 2007 (post publication of Planning Policy Statement 25 (PPS25) in December 2006), although earlier dated documents were recorded if they were the adopted version still in force at the time of the evidence review. The table below identifies the current status of each of the adopted plans; adopted plans have been separated to record those adopted pre and post NPPF and these were highlighted separately in order to identify whether attention to climate risks had changed since the publication of the national framework.

Table 5-1: Local Plans Pre and Post-NPPF

Local Plan Stage				
Local Authorities (n=90)	Published	Submitted	Adopted Pre-NPPF	Adopted Post-NPPF (2012 onwards)
Total	6 (7%)	12 (13%)	49 (54%)	23 (25%)
Lower Tier	3	5	23	9
Single Tier	3	7	26	14

42 Inspectors' reports were identified for adopted Local Plans, of which 32 (76%) identified climate change risks in relation to the assessment of soundness, with 59% of the 32 adopted pre-NPPF and 41% post-NPPF.

5.2.1 Local Plan Strategic Policies

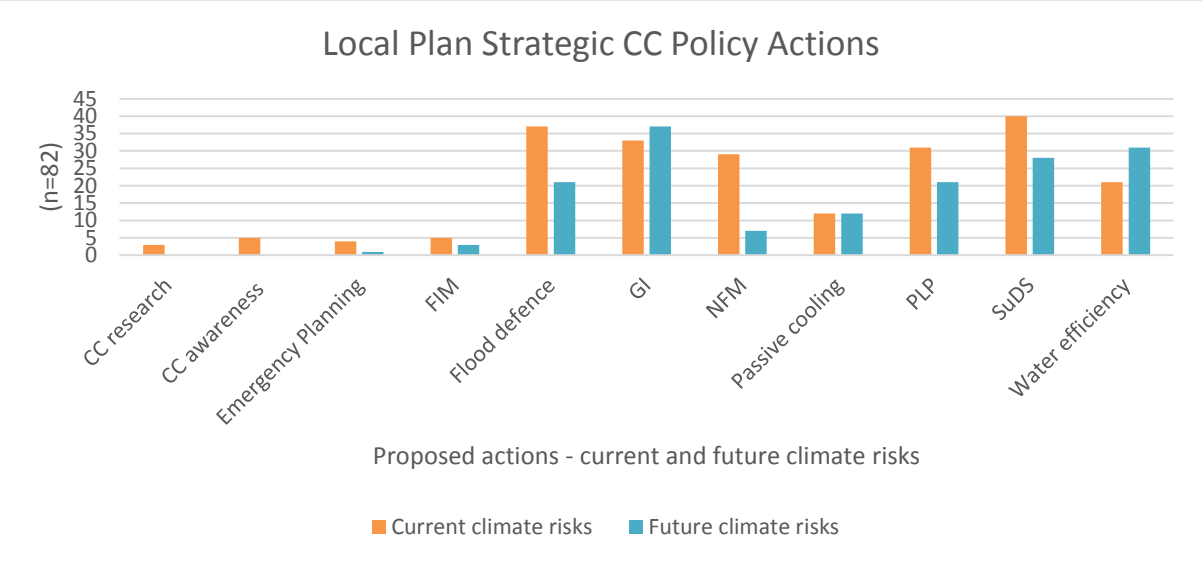
The review revealed that 82 Local Plans (91%) at published, submitted or adopted stage included strategic policies with measures relating to proposed actions to address either current or future climate risks.

Of the 82 Local Plans, 64 were adopted and included strategic policies with climate change adaptation actions. Of the 64 adopted Local Plans, 41 were pre-NPPF and 23 post-NPPF.

In pre-NPPF Local Plans of the adaptation actions reviewed 60% address current climate risks and 40% future climate change. In post-NPPF Local Plans of the adaptation actions reviewed the same figures were identified, with 60% addressing current climate risks and 40% future climate change. This would appear to indicate that NPPF has not affected the number of climate adaption measures within strategic policies.

The main future climate adaptation actions included in strategic policies were GI, SuDS, water efficiency and flood defence measures. 37 strategic policies (45% of the 82) included GI actions, with around one-third including water efficiency measures and SuDS and one quarter referring to flood defence and PLP. Multiple actions were identified for LAs; therefore the total number of actions in the figure is more than 82.

Figure 5-1: Local Plan strategic policies with CC actions



5.2.2 Development management policies

The development management policies, in addition to strategic policies and site allocations, set out the policy context and criteria for planning applications and the detail that planning applications can be assessed against. The policies should ensure that development contributes to the wider strategic aims of the LPA's strategic policies, providing further detail to deliver long-term spatial plans. Many of the development management policies will be from earlier saved plans and therefore may not make reference to climate change even though more recently updated strategic policies do include such references.

The research approach sought to identify specific development management policies that included objectives for climate change adaptation.

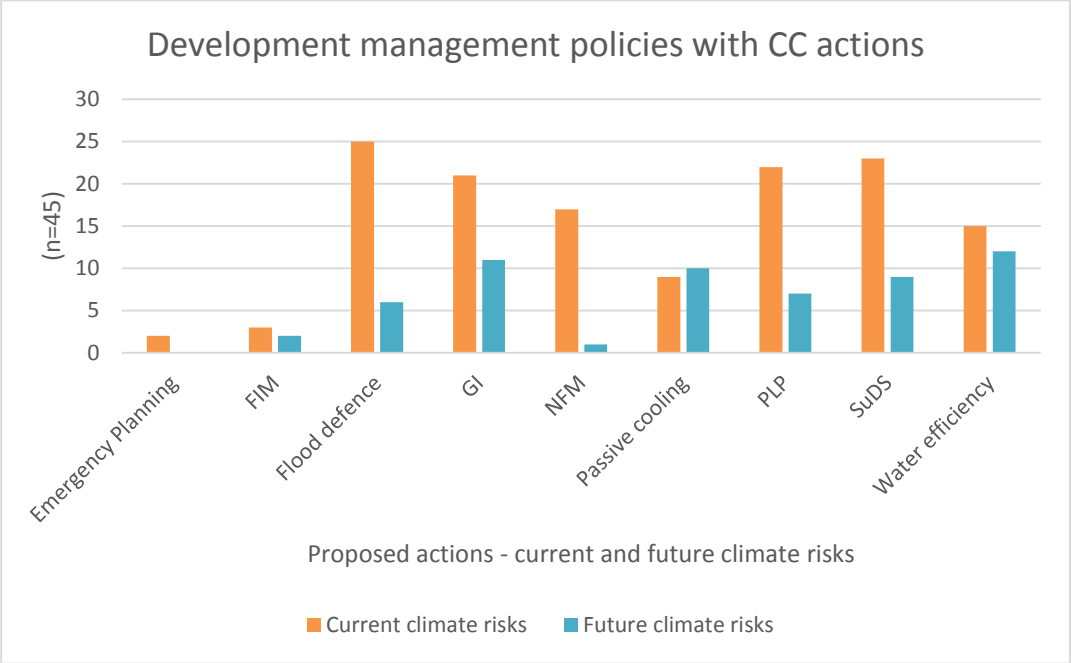
- 45 lower/single tier LAs included climate objectives in their development management policies[12].
- The majority of these were urban (60% urban / 40% rural),
- 19 were coastal LAs representing half of all coastal LAs in the LA sample of 90,

The main adaptation activities identified related to flood related aspects (flood defence, PLP, natural flood management and SuDS) plus GI which can address flooding, heat and water scarcity. The majority of objectives are focused on current climate risks rather than future climate change.

Multiple actions were identified for LAs; therefore the numbers in the figure below are greater than 45 in total.

[12] Development management policies were not identified for all LPAs as these have only been required under recent plan making processes.

Figure 5-2: Development management policies with CC actions



5.2.3 Local Plan Allocations

24 (26% of the sample of 90 LPAs) considered climate risks in their local plan allocations. These LAs also had Local Plan strategic policies including climate change actions. 29% (7 of the 24) referred to river and coastal flooding and 29% referred to surface water flooding. There were only two references to current heat and water stress risks.

Not all Local Plans include specific allocations documents, the evidence review process only recorded if the document referred to climate risks and if these were specifically referred to in relation to allocations. Therefore, the low figures may reflect that only a small number of LAs had Local Plan allocations, rather than a small number focusing on climate risks.

Of the 66 LAs that did not specifically refer to climate change in their local plan allocations, 58 LAs had strategic policies with climate adaptation actions (88% of the 66 LAs).

5.2.4 Area Action Plans

Only six LPAs had prepared Area Action Plans (AAPs) which addressed current or future climate change adaptation actions. All six identified SuDS as an adaptation measure. Five of the six LPAs with climate focused AAPs were London boroughs which were all identified as being at risk of heat stress. Adaptation activities focused on GI, flood defence and water efficiency, but there was no explicit mention of passive cooling although this is one of the target outcomes of GI.

5.2.5 Spatial Strategy & Sequential Test / Exception Test

The sequential test is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. Flood zones defined in the SFRA for the LPA area provide the basis for applying the test. Paragraph 101 of the NPPF sets out the aim of the Sequential Test in regards to steering new development to areas with the lowest probability of flooding. The Strategic Flood Risk Assessment (SFRA) will provide the basis of applying this test as a sequential approach should be used in areas known to be at risk from any form of flooding. If following the application of the Sequential Test, it is not possible to locate the development in zones with a lower probability of flooding and the development is consistent with wider sustainability objectives, the Exception Test can be applied. The Exception Test requires proposed development to show that it will provide wider sustainability benefits to the community that outweigh flood risk and that it will be safe for its lifetime without increasing flood risk elsewhere and where possible reduce flood risk overall.

The review has sought to identify whether the sequential test approach has been applied by LPAs in the plan-making process.

The survey identified 29 LAs with spatial strategies identifying future flood risk (one-third of the sample of 90 LAs) which have included reference to the consideration of the sequential / exception test. Of these, seven included specific reference to climate change in the sequential / exception test (a quarter of the 29 LAs).

Not all Local Plans include spatial strategies, the evidence review process only recorded if the document referred to the sequential test and if this was specifically referred to. Therefore, the low figures may reflect that only a small number of LAs had spatial strategies, rather than a small number focusing on the sequential test.

5.2.6 Strategic Flood Risk Assessment (SFRA)

Paragraph 100 of the NPPF states that Local Plans should be supported by SFRAs and develop policies to manage risk from all sources. They allow the LPA to understand the risk of flooding from all sources (including surface water and groundwater) and their impacts on potential location of development sites, and where possible avoid flood risk to people and property and manage any residual risk, taking into account the impacts of climate change.

SFRAs are expected to include an evaluation of the effects of climate change on all sources of flooding and consider appropriate policies for development in or adjacent to flood risk areas. SFRAs form part of the evidence base for Local Plans made publicly available on LA websites.

The web review of SFRAs looked for evidence of whether climate change allowances were included in accordance with technical guidance note of NPPF (cancelled in March 2014.and replaced by Environment Agency guidance) NPPF guidance and also if adaptation measures were recommended.

Every LPA in the survey had an SFRA on their website. 82 of these (91%) included climate change allowances and 71 (79%) included climate related adaptation recommendations.

5.2.7 Sustainability Appraisal / Strategic Environmental Assessment

Sustainability Appraisal (SA) and Strategic Environmental Assessment are tools used at the plan-making stage to assess the likely effects of the plan when judged against reasonable alternatives. A SA of the proposals in each Local Plan is required by section 19 of the Planning and Compulsory Purchase Act 2004 and incorporates the required strategic environmental assessment. This applies to any of the documents that can form part of a Local Plan, including core strategies, site allocation documents and area action plans.

SEA alone may be required in some circumstances, usually where either neighbourhood plans or supplementary planning documents could have significant environmental effects.

The review included searches for evidence of actions to address climate change in SA documents or SEAs where relevant.

- 84 LAs published a SA/SEA, with 83 of the 84 identifying climate change risks
- 48 (57%) included climate recommendations.
- In addition to the climate risks identified within the study, seven LAs also referenced sea level rise, with air quality specifically mentioned by four LAs.

5.2.8 Supplementary Planning Documents

Supplementary Planning Documents, although not statutory have to undertake a formal preparation process and adoption. The research project identified SPDs that included actions addressing climate risks.

- 19 LAs (21% of total 90 sample LAs) included SPDs that focused on climate risks. The LAs were mainly urban, single tier:
  - 74% urban, 26 % rural
  - 90 % single tier, 10% lower tier
  - 4 coastal LAs (11% of the 37 coastal LAs in the sample).
- 63% of the objectives within the 19 LA SPDs related to flood risk.
- 14% of the 19 LA SPDs included heat objectives.
- 11% of the 19 LA SPDs included water stress objectives.

5.2.9 Community Infrastructure Levy

The Community Infrastructure Levy (CIL) came into force in April 2010. It allows local authorities in England and Wales to raise funds from developers undertaking new building projects in their area. The money can be used to fund a wide range of infrastructure that is needed as a result of development. This includes new or safer road schemes, flood defences, schools, hospitals and other health and social care facilities, park improvements, green spaces and leisure centres.

The evidence review sought to identify if LA CIL Charging Schedules provided evidence of expenditure with clear priorities relating to addressing climate risks, either direct or indirect, for example through Green Infrastructure investment.

30 LAs (33% of the total sample) had an adopted CIL Charging Schedule, but only two of these included reference to specific climate adaptation actions; both included GI and flood defence.

5.2.10 Infrastructure/ Investment Plans

LPAs have the ability to produce Infrastructure and/or Investment Plans which set out their communities' current and future needs and spending priorities for infrastructure and service delivery. These plans are used to inform local policy and strategy, funding bids, spending priorities and decisions on future investment. They also have a specific use in informing CIL Charging Schedules.

Only eight LPAs were identified that had infrastructure or investment plans including CC adaptation objectives. Half of these were lower tier and half single tier LPAs with over half scoring high or very high in the IMD. More than half referred to investment in flood defences, with other intended adaptation activities including GI, PLP, SUDS and water efficiency measures. With such a small sample, it could be misleading to drawn any overarching conclusions, but it is likely that the majority of investment focused on climate risks will be invested in flood risk management.

5.2.11 Authority Monitoring Report (AMR)

The AMR forms part of the Local Plan. The requirement for a LA to produce an AMR is set out in the Localism Act (2011). The Act requires every LA to produce a series of reports containing a range of information including progress and effectiveness of the Local Plan and the extent to which the planning policies set out in the Local Plan documents are being achieved.

This is a statutory document reporting on monitoring and assessment against key performance indicators; it should refer to climate change. The published AMRs were reviewed; in most cases these related to the period 2013-2014, although for a few LAs these related to earlier time periods.

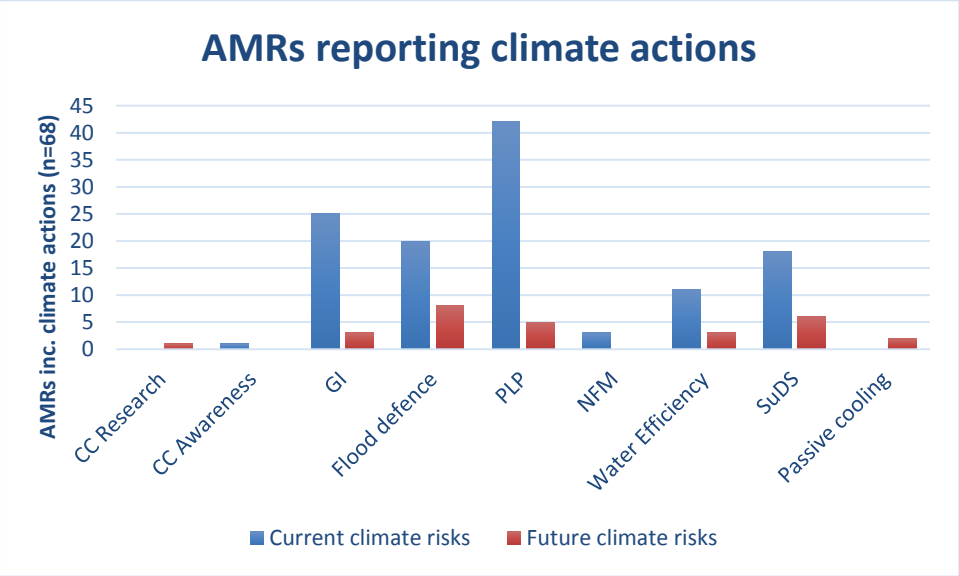
- 89 AMRs were reviewed.
- 68 (76%of the 89) included proposed climate actions as an AMR action.
- 32 lower tier / 36 single tier LAs

- 42 urban / 26 rural LAs.
- 29 coastal LAs.
- 38 very high/high deprivation LAs (43%)

Most LAs reported on actions against current climate risks and some references to future climate risks (climate change adaptation actions) were recorded, principally in relation to flood defence, SuDS and PLP, as shown in Figure 5-3 below.

Multiple actions were identified for LAs; therefore the numbers in the figure below are greater than 68.

Figure 5-3: Annual Monitoring Reports including climate actions



5.3 Overview

From the review of Local Plans, it is evident that climate risks are being taken into account, however, there has been no apparent increase in climate change adaptation activity highlighted by strategic policies since the introduction of the NPPF. The review of planning documents has revealed a number of useful findings:

- 82 Local Plans (91%) reviewed included strategic policies that identified proposed adaptation measures.
- Of the 82 Local Plans, 64 were adopted and included strategic policies with climate change adaptation actions. Of the 64 adopted Local Plans, 41 were pre-NPPF and 23 post-NPPF.
- In pre-NPPF Local Plans, of the adaptation actions reviewed, 60% address current climate risks and 40% future climate change. In post-NPPF Local Plans, of the adaptation actions reviewed, the same figures were identified. This would appear to indicate that NPPF has not affected the number of climate adaption measures within strategic policies.
- 54% of plans adopted post NPPF clearly evidence application of the sequential test compared with 46% pre NPPF. 42 Inspectors' reports were identified for adopted Local Plans, of which 32 (76%) identified climate change risks in relation to the assessment of soundness, with 59% of plans adopted pre-NPPF and 41% post-NPPF.
- Flood risk is the dominant climate risk considered in planning documents with every LA reviewed having a SFRA online; 91% of these included climate change allowances and 79% include climate related recommendations.
- Almost 60% of published SA/SEAs included climate risk related recommendations and just over 75% of AMRs referred to climate risks (predominantly flooding); these largely referred to current climate risks rather than future climate change,

- A small minority of LPAs had adopted CIL Charging Schedules and Infrastructure Plans which referenced climate risk; both were focused on investment in measures to alleviate flood risk.

6 Web Review - Flood Risk Documents

6.1 Introduction

Climate change is projected to cause increases in flooding as a result of sea level rise and increased precipitation (both amount and intensity). The main impacts of climate change on flooding and coastal erosion are projected to include increased flows in rivers, especially in winter and flash flooding in summer in small catchments and urban areas. Sewer capacity will be exceeded more often and surface water flooding will become more common. Sea level rise will lead to increased wave heights and an increasing risk of inland flooding at periods of high tides combined with river flooding.

Impacts for LAs include:

- Wetter milder winters - increased flood risk and increased groundwater levels
- Hotter drier summers - may lead to reduced soil moisture and the risk of more rapid run-off during summer storms.
- Increased frequency of short intense rainfall events - increased flood risk and urban drainage systems may be overwhelmed
- Increase in sea level and storm surges - increased coastal flooding and pressure on coastal defences.

Local Flood Risk is defined within the Flood & Water Management Act 2010 and includes flooding from surface runoff, groundwater and ordinary watercourses.

Lead Local Flood Authorities (LLFAs) were created under the Flood & Water Management Act 2010; these are established at the upper and single tier level. LLFAs are responsible for "managing the risk of flooding from surface water, groundwater and ordinary watercourses" and for "developing, maintaining and applying a strategy for local flood risk management in their areas and for maintaining a register of flood risk assets."

6.2 Local Flood Risk Management Strategies

LLFAs must develop local strategies for flood and coastal erosion risk management (FCERM) that are consistent with the national strategy for FCERM. A local strategy must cover local flood risk, which is likely to include some or all risks from; river and coastal flooding, surface water flooding and groundwater flooding.

Lower tier authorities are not expected to produce these strategies; they are to be produced by upper tier LAs on behalf of their districts. However, single tier LAs are required to produce local flood risk management strategies.

18 of the 50 single tier LAs reviewed (36%) had produced a local flood risk management strategy; these included references to river and coastal flooding and surface water and two referred to the risk of coastal erosion. 14 of these were in urban locations, four rural and four coastal.

All of the strategies had been prepared post-2012.

In terms of adaptation actions to plan for future climate risks, five strategies included specific reference to flood defence measures, two included PLP and SuDS measures and there was only one reference to GI as an adaptive action.

6.3 Surface Water Management Plans / Drainage Strategies

Historically the split in responsibilities between LAs and water companies has meant that there has not been a common approach to the management of drainage systems in urban areas. The Flood & Water Management Act (2010) has gone some way in addressing these issues, giving LLFAs responsibility for the management of local flood risk, including surface run-off. It is important to note that LLFAs can delegate responsibility for the production of SWMPs to lower tier LAs.

Many LAs at the greatest risk of surface water flooding have developed Surface Water Management Plans (SWMPs), which assess surface water flood risks and provide action plans to minimise future risk.

The evidence review sought to identify any SWMPs that included climate risks and any adaptation actions at a local level. This revealed that 37 (41% of LA sample of 90) LAs had published a SWMP or drainage strategy at a lower and single tier level, 33 (89% of 37) of which identified climate risks primarily related to flood risk. Two SWMPs also referred to water stress as a climate risk.

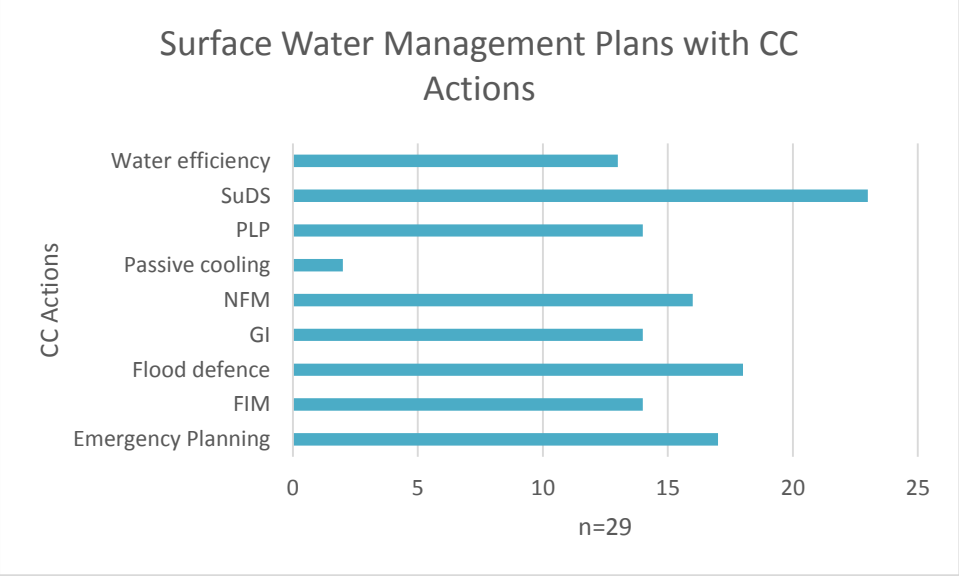
Table 6-1: Profile of LAs with SWMPs identifying climate risks

Profile of LAs with a SWMP identifying climate risks (n = 33)				
Urban	**Rural**		**Lower Tier**	**Single Tier**
23	10		11	22
% of 33 LAs				
70%	30%		33%	66%

One third of the 33 SWMPs identifying climate risks had been produced at a lower tier level.

Of the 33 SWMPs identifying climate risks, 29 (88% of 33) identified proposed climate actions, again as would be expected in SWMPs most of these relate to flood risk, however, it is also interesting to note there is limited references to water efficiency, GI and passive cooling measures. Multiple actions were identified for LAs; therefore the numbers in the figure below are greater than 29.

Figure 6-1: SWMPs with climate actions



Several SWMPs made specific reference to proposed adaption actions to address future climate change; including flood defence measures (5), PLP (3), SuDS (3) and NFM (2). There was only one reference to GI, FIM, CC research, emergency planning, and water efficiency as a response to future climate change.

6.4 Shoreline Management Plan (SMP)

SMPs provide a large-scale assessment of the risks associated with coastal processes and help reduce these risks to people and the developed, historic and natural environments. Coastal processes include tidal patterns, wave height, wave direction and the movement of beach and seabed materials.

SMPs help in identifying the locations most at risk of flooding and coastal erosion currently and use climate change projections to identify locations at risk in the future. In addition, they provide recommendations on managing future risks.

- 37 LAs with SMPs were identified (all of the 37 coastal LAs in the survey sample), 32 LAs with a single SMP, five LAs with two SMPs. All identified flooding and coastal erosion as climate risks, with sea level rise included in nine SMPs. Sediment movement was referenced in three SMPs.
- Climate objectives identified related to GI, flood defence, PLP, flood incident management, natural flood management and emergency planning, Figure 6-2 below.

Multiple actions were identified for LAs; therefore the numbers in the figure below are greater than 37.

Figure 6-2: SMPs with CC actions

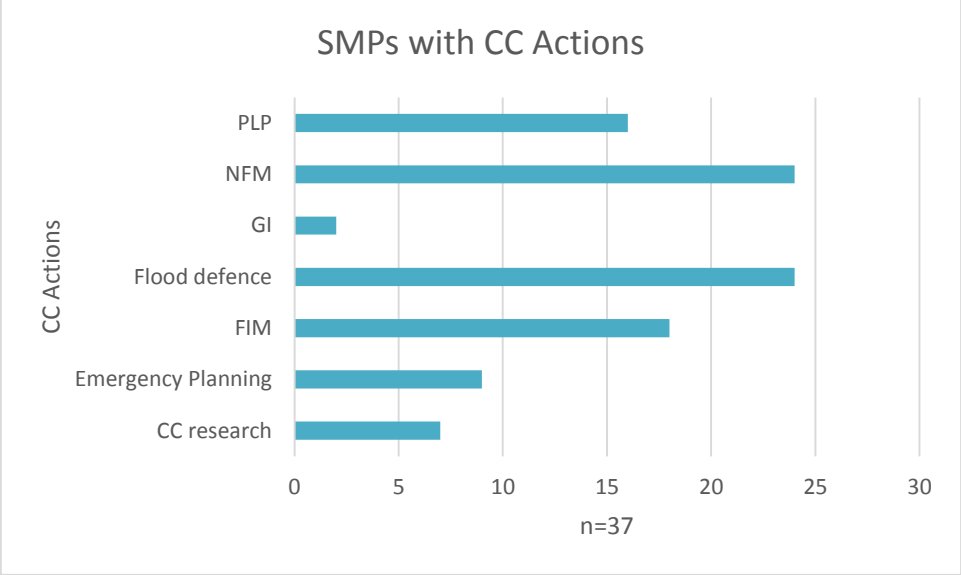


Table 6-2: Profile of coastal LAs with SMPs

Profile of coastal LAs with a SMP identifying climate risks (n = 37)				
Urban	**Rural**		**Lower Tier**	**Single Tier**
16	21		25	12
% of 36 LAs				
43%	57%		68%	32%

6.4.1 Coastal Change Management Area

A CCMA will only be defined where rates of shoreline change are significant over the next 100 years, taking account of climate change. They do not need to be defined where the accepted SMP policy is to hold or advance the line (maintain existing defences or build new defences) for the whole period covered by the plan. The SMP should provide the primary source of evidence in defining the CCMA and inform land allocation within it.

The evidence review identified nine Local Plans/Core Strategy documents which included reference to CCMAs. Eight of these were for lower tier LPAs and one for single tier.

6.5 Water Cycle Study

A water cycle study is a voluntary study that uses water and planning evidence to understand environmental and infrastructure capacity. The study provides evidence for Local Plans and sustainability appraisals and is usually done at an early stage of plan-making.

The evidence review revealed that 12 LPAs had prepared water cycle studies, principally in rural areas (just one had been produced by an urban LPA). The majority of these included proposed climate actions related to water efficiency and SuDS, with additional objectives covering GI, flood defence, natural flood management and PLP. Four SMPs had specific actions relating to future climate change for flood defence; GI was included in two SMPs, with one reference to water efficiency and SuDS.

6.6 Climate risk comparisons

Comparison was made of the LA climate risks established by the research methodology with climate risks identified in the climate change documents for lower tier and single tier authorities. 48 LAs had one or more flood related documents; the combined results are presented in the table below.

Table 6-3: Climate risks in flood risk documents

LFRMS / SWMP / drainage strategies and water cycle studies identifying climate risks 48 Lower/single tier LAs					
	Climate Risk				
	River & coastal flooding	Surface water flooding	Heat	Water Stress	Coastal erosion
(i) High climate risk LAs (research methodology)	14	17	14	12	9
(ii) LAs identifying same climate risk as research methodology	14	17	2	7	5
(iii) Additional LAs identifying climate risk	32	29	3	10	25
No. LAs identifying climate risk	**46**	**46**	**5**	**17**	**30**
% of 48 LAs with climate risk	**96%**	**96%**	**10%**	**35%**	**63%**

6.7 Overview

As would be expected of these documents the majority of climate risks related to flooding. All the LAs identified by the research methodology as being at high risk of flooding also identified their specific flood risks. Due to the nature of the plans under review, it is unsurprising that more LAs identified flood risk than had been highlighted in the research methodology. This is because our identification of climate risks selected those at highest risk, not at any level of risk,

and SWMPs, SMPs and water cycle studies should not only be produced for those at the highest levels of risk.

In this category of documents there were no references to non-specific general flooding, all documents referred to specific sources. Water stress was identified by just over a third of LAs in this category, with 10% referencing heat as a climate risk

Of the 37 coastal LAs in the survey sample, 29 identified coastal erosion as a climate risk (78%).

7 Planning Applications Analysis

7.1 Introduction

While the extent to which plans and strategies reflect current and future climate risks provides one measure of LAs' action on climate change, analysis of planning applications provides an insight into the way that policies are being translated into development management decisions and activity on the ground.

This part of the work focused on a sample of planning applications in LPA areas facing high levels of future climate risk (as defined in section 2 of this report) and where these risks are reflected in the adopted local planning policy framework. It is not designed to be representative of planning applications more generally since it concentrates on areas of highest risk and does not consider circumstance where suitable planning policies are not in place.

For each selected planning application the review process sought to answer the following broad question:

To what extent have relevant local planning policies on climate change adaptation been applied in deciding the planning application and imposing conditions on any permitted development?

7.2 Measuring effectiveness

In simple terms, the development management process involves the assessment of planning applications against all relevant policies as material considerations in the adopted local plan, and the NPPF in accordance with section 38 of the Planning and Compulsory Purchase Act 2004. Planning applications are submitted to LPAs, the number and type of applications can vary and they are often referred to as major or minor applications[13]. Planning applications are assessed by planning offers and subject to statutory consultation, whereby a final report is drafted taking into account policy and material planning considerations and any infrastructure requirements required by s106 or the Community Infrastructure Levy (CIL). There is likely to be a proportion of planning applications depending on type, or scale or responding consultations that will need to be considered by the LPA's planning committee.

Proposals which conform to policy will normally be granted planning consent. For applications which conflict with policy, the LPA will consider whether modification or restrictions can be practically implemented and if so, the extent of these that would be required to bring the proposed development in line with policy. These changes may then be specified as a planning condition, or sought through a planning obligation which must be adhered to in order to gain planning consent. There may be applications which clearly contradict policy and would be refused planning consent unless there are sufficient material considerations that demonstrate otherwise. If an application is refused, the applicant has the right to appeal or submit an amended application. Appeal involves applicant challenging the decision with a Planning Inspector by written representations, hearing or enquiry process on the basis of the development plan, unless material considerations (including the NPPF) dictate otherwise. The considerations and outcomes are summarised against the development plan and other material considerations in the Inspectors Report.

During the decision management process, LPAs are required, where appropriate, to consult with the Environment Agency and other flood risk management authorities with respect to issues such as flood risk. The Environment Agency has a number of 'standard' reasons for objecting on the basis of development being at risk of flood risk; none of these refer to climate change. In addition, water companies may make comments or lodge objections with respect to issues relating to water scarcity and the impact on water supplies, as well as any drainage issues that could affect the public sewer network infrastructure or capacity.

LPAs should identify the climate risks that apply to their area and reflect these in the adopted policy framework. This should have the effect of influencing the location and design of planning

13 Application types are often referred to as major or minor applications, where major applications for dwellings (10 or more units and greater than 0.5ha site area) and major manufacturing or warehousing or major retail and distribution (including servicing) applies to gross floor space of 1,000 square metres or more or the site area was 1 ha or more

applications so that climate risks are minimised. For example, Local Plans should reflect the NPPF Sequential and Exception Tests in its flood risk policies steering inappropriate development away from areas of existing flood risk, which could increase risk over the long term. Policies may also require that proposed development incorporates appropriate resilience or resistance measures to manage flood risk, where development is deemed appropriate. Sites at existing flood risk will be required to undertake a site specific Flood Risk Assessment. Applicants will be expected to demonstrate the assessment of risk and consideration of changes to the built development, design form and layout plus identify suitable adaptation measures such as sustainable drainage, water retention, re-use of grey water, passive cooling and natural shading into their proposal, with input from the LPA and consultees. The level of influence of policy in determining applicants' locational decisions cannot always be identified from examination of casework documents, as the quality and type varies significantly. It is likely, therefore, that this aspect of adaptation is under-represented within the sample. It may be the case that not all measures are referred to as adaptation or resilient, but are integrated into the design.

The development management process should consider planning applications which do not address future climate risks adequately as material planning considerations. The development process assesses applications against a broad range of policies and other material considerations, so factors other than climate risk will also have an important bearing on decisions.

For applications which do identify and raise issues around climate risk, these should clearly express the level of risk and how this is to be managed. Planning applications which do not identify, address or manage those risks sufficiently may require the imposition of conditions to obtain this additional information. For some applications, the number of conditions or changes required to make the proposed development acceptable may be such that it would form a different proposal. In these cases, the current scheme is clearly unacceptable against the consideration of future climate policy and balance of other material planning considerations and planning permission should be refused.

It may be the case that some planning application are granted planning permission despite unresolved issues relating to climate risk even when the Local Plan contains a robust climate change policy because of the breadth of policy and weight afforded to other material considerations in relation to this particular type of application.

Table 7-1 summarises the assessment approach which focused on the extent to which current and future climate risks were identified in the planning application, the decision-making process and the development management outcome.

Table 7-1: Climate risk and the development management process – measuring effectiveness

Extent	Characteristics of planning application	Climate risks in the decision making process	Climate risks and the development management outcome
Significant Extent	Future climate risk is explicitly referenced and reflected in proposed location or integral to the design of the development proposal.	No climate risk related objections from relevant statutory consultees and/or No concerns raised in planning officer's report to committee.	No climate risk related planning conditions required to allow the proposal to go ahead, or Application not refused on grounds of climate risk.
Moderate Extent	Development proposal raises majority of issues in relation to future climate risk.	Climate risk related objections from relevant statutory consultees and/or Climate related concerns raised in planning officer's report to committee.	Climate risk related planning conditions required to allow the proposal to go ahead, or Application refused on grounds of climate risk.
Least Extent	Development proposal raises some issues in relation to future climate risk.	Climate risk related objections from relevant statutory consultees and/or Climate related concerns raised in planning officer's report to committee.	No climate risk related planning conditions attached to planning consent, or Application not refused on grounds of climate risk.

7.3 Methodology

The analysis of Local Plans, together with the identification of the LA areas with the highest climate risks, was used to inform the selection of ten LPAs from which a sample of 100 planning applications (determined since the beginning of 2013) could be selected for analysis. This review sought to identify how Local Plan policies addressing climate risks and requiring adaptation measures were being implemented in the determination of planning applications and setting of planning conditions. The approach for selection of the LPAs and planning applications is set out in more detail in Appendix A.

The selected LPAs:

- demonstrated high climate risk from the original sample of 90 LPAs and displayed a range of climate risks, with some highlighting more than one risk;
- had at least one planning policy designed to address climate risk as identified via the web review; and
- included a mix of geographies (urban, semi-urban and rural LPA areas).

As noted above, the review distinguished between implicit and explicit references to future climate change. An implicit reference to climate change was recorded where documents (for example Planning Officer Reports) identified a climate change related risk such as fluvial flooding as a consideration in the planning decision but made no explicit reference to the effects of climate change on that risk. An explicit reference was recorded where documents specifically identified climate change as a factor in the level of risk, for example stating that existing flood

risk at the site was likely to increase in the future as a result of climate change. The review also included other kinds of measures which had the potential to deliver adaptation benefit, and again reviewed these in implicit or explicit terms. For example, GI measures may be identified within applications or conditions, but their inclusion may not be specifically justified on climate change adaptation grounds.

7.4 Results

7.4.1 Flood risk

Eight LPAs were selected on the basis of high levels of risk from river, coastal and surface water flooding.

River and coastal flooding

Within the sample of 100 planning applications, there were 24 applications in LPA areas where river or coastal flooding had been identified as a key climate risk (as recorded on planning application forms). 14 of these were for residential development.

The review of applications explored the extent to which planning officers' committee reports highlighted the risk of river and coastal flooding as a key issue in the development management process. In all but two cases (one for residential development), river and coastal flooding were identified as key issues within the officer's report suggesting that this climate risk is taken into account in relation to most applications where this is a relevant issue.

The review also considered the extent to which references to the risk of river and coastal flooding in committee reports made reference to the future effects of climate change. In only two of the 24 cases was there explicit reference to the effects of future climate change. Moreover, this finding was confined to a single LPA. Both applications were for residential development.

Much more common (three of the four LPA areas included in the sample with river and coastal flood risk) were implicit references to future climate change (19 cases overall, of which ten were residential). This implies that the likelihood that existing flood risks are likely to increase with climate change, while present in the minds of most planning officers (and captured within SFRAs which were in place in most cases), may not be communicated clearly to elected members, developers and the wider public. It may also suggest that decisions are being based on existing flood risk rather than anticipation of how this could change in the future.

Committee reports for two planning applications (in the same LPA area) made no reference to river and coastal flood risk, though it should be noted that a SFRA was in place, suggesting that officers may have considered that flood issues were sufficiently addressed at a strategic level.

Planning decisions reflected the high profile afforded to river and coastal flooding within committee reports. Only one application was granted consent without conditions relating to flood risk. 16 applications (nine residential) were granted consent with conditions relating to flood risk and six applications (five residential) were refused consent on grounds which included flood risk. No applications were refused on grounds which did not include flood risk. This suggests that where applications do come forward in areas of high flood risk, the development management process is effective in either addressing this risk through the use of conditions or by refusing consent.

The Environment Agency is a statutory consultee in relation to proposals which are located in an area at risk of flooding or which could increase the risk of flooding elsewhere. It is therefore important to explore the influence of the Agency's advice on development management decisions. It is worth noting that the Environment Agency has standard reasons for objections, none of which refer to climate change.

In only three planning application cases (one residential), did the Environment Agency not object or comment. Of these one was granted consent without any reference to climate risk, another, for residential development, was granted consent with conditions relating to the climate risk and one was refused on grounds of climate risk.

In 11 cases (seven residential) the Environment Agency's decision not to object was subject to the relevant climate risk being adequately addressed in a condition attached to any planning consent. Of these, nine were granted consent with conditions relating to climate risk and two were refused permission on grounds of climate risk.

The Environment Agency objected to ten applications (six of which were residential) on grounds of flood risk. Four of these were refused consent on grounds of climate risk with the remaining six being granted consent with conditions relating to the climate risk. In most cases these conditions related directly to the issues raised by the Environment Agency, though in two cases objections concerned process issues (sequential test, inadequate flood risk assessment) which were rectified to the satisfaction of the LPA.

This review confirms the importance of the Environment Agency's inputs to the development management process for applications that have the potential to increase the risk of river or coastal flood risk. Outcomes, including the use of conditions, are closely aligned with the Agency's advice.

The review was unable to assess the extent of LPAs' policies in discouraging applications for development in areas at risk from flooding as this would have required consultation with planning officers and developers which was not agreed as part of the research method.

Surface water flooding

Within the sample, there were 30 planning applications that raised issues in relation to increases in surface water runoff in LPA areas where flooding had been identified as a key climate risk through this study. 18 of these applications were for residential development.

The review of applications explored the extent to which planning officers' committee reports highlighted the risk of surface water flooding as a key issue in the development management process. In only one case did the committee report fail to make reference to surface water flooding (though the issue was addressed in the conditions that were attached to the subsequent planning consent). In all other cases, surface water flooding was recorded as a factor in the committee report.

Again, the review examined the extent to which consideration of surface water flooding was set within the context of future climate change. In 27 of the 30 cases (15 for residential development), references to the effects of future climate change on the risk of surface water flooding were implicit, with no explicit examples found in the sample. This again raises concerns about wider awareness of climate change and surface water flood risk and the basis on which decisions are being made. However, implicit reference to climate risks was quite evenly represented across four of the five local authorities at risk from surface water flooding. This suggests that most of the LPAs sampled are competent in implementing the development management process to address climate risk.

The weight attached to surface water flooding in committee reports is reflected in the pattern of planning decisions. Only one application, for residential development, was granted consent without any conditions relating to surface water flooding. 19 applications (ten for residential development) were granted consent with conditions relating to surface water flooding and nine (seven for residential development) were refused on the basis of surface water flooding. All refusals identified surface water flooding as a factor in the decision. This suggests that there is a vital link between the content of the committee report and the outcome of planning applications which should impact on the management of the climate risk affecting the LPA in question.

Once again, since the Environment Agency is a statutory consultee in relation to proposals which are at risk of or could increase the risk of surface water flooding, the review explored the influence of the Agency on development management decisions. Most consultation responses do not distinguish between current and future flood risk.

- In only three cases (one residential) did the Environment Agency not object or comment. Of these, two (one residential) were granted consent with conditions relating to current or future climate risk and one was refused on grounds of current or future surface water flood risk.

- In 13 (nine residential) cases the Environment Agency's decision not to object was conditional on the risk of surface water flooding being adequately addressed in a condition attached to any planning consent. Of these, 11 (six residential) were granted consent with conditions relating to climate risk and two, both for residential development, were refused on grounds of climate risk.
- The Environment Agency objected to 13 applications (eight residential) on grounds of flood risk. Six (four residential) of these were refused consent on grounds of climate risk with the remaining seven (four residential) being granted consent with conditions relating to the climate risk.

Again, this confirms the importance of the Environment Agency's inputs to the development management process for applications that have the potential to be affected by or increase the risk of surface water flooding. Outcomes, including the use of conditions, are closely aligned with the Agency's advice. It should be noted that since April 2015 LLFAs are primarily responsible for assessing and managing local flood risks and have recently been made statutory consultees for major developments with surface water flood risk.

Finally as with river and coastal flooding, it should be noted that the review was unable to assess the effectiveness of LPA policies in discouraging applications for inappropriate development in areas at risk from flooding as this would require consultation with planning officers and developers.

7.4.2 Heat

Applications from a number of LPAs were reviewed to identify the extent to which the effects of increased risk of heat waves are being addressed through the development management process. Within areas likely to experience higher summer temperatures and more frequent heatwaves it might be expected that applications would be required to include measures such as passive ventilation and shading, green infrastructure such as planting to providing cooling and shade on or off site. The survey examined 15 applications (all but one for residential development) from two LPAs where heat was identified as a key climate risk. Only one of these LPAs referred to the need for new development to take account of heat waves within the relevant part of the local plan.

The random selection of planning applications within the sample LPAs (15 in total) produced only one example where the risk of overheating was identified as an issue within the committee report. This reference made implicit reference to future climate change. There were no examples of committee reports providing explicit reference to the likelihood of more frequent and extreme summer temperatures in the future.

Conditions relating to overheating were attached to consents in only four cases, though none covered aspects such as passive cooling, shading etc., instead relating to issues such as the specification of drought resistant plants or air quality concerns.

Six applications were granted consent without conditions relating to heat risk while a further five were refused consent on grounds other than overheating.

Again, there would appear to be some link between the inclusion of a specific climate risk which is relevant to a LPA and the subsequent development management outcome.

It is likely that the low number of applications where overheating appeared to be an issue may reflect a number of factors:

- Increasing adherence to the Code for Sustainable Homes[14] which encourages energy efficiency (e.g. passive over mechanical ventilation);
- The role of building standards as opposed to the planning system in regulating issues such as ventilation;
- The potential inclusion of aspects such as external landscaping which will assist in adaptation to higher summer temperatures, without specific reference to climate risks.

[14] The Code for Sustainable Homes is an environmental assessment method for rating and certifying the performance of new homes in England, Wales and Northern Ireland. Introduced in 2006, it sets a national standard for use in the design and construction of new homes, aiming to encourage continuous improvement in sustainable home building. From 2016 the Code will be incorporated into Building Regulations.

Nevertheless, it appears that despite the known impacts on human health, the risks associated with heat waves and higher summer temperatures are not being fully translated from planning policy to development management decisions. This may reflect the timescales associated with projected increases in summer maxima temperatures relative to the more immediate impacts associated with flooding. It may also be a consequence of the less visible impacts of higher temperatures.

7.4.3 Water scarcity

Within the sample of 100 planning applications, there were 15 applications located in areas at risk of water scarcity. Water conservation measures could include rain water harvesting, recycling, use of water efficient equipment and the specification of drought resistant plant species for landscaping purposes. However, the planning practice guidance notes that planning for water supply would normally be addressed through the local plan - "water supply is therefore unlikely to be a consideration for most planning applications".

The sample of 15 applications (11 of which were for residential development) was drawn from LPA areas where local plan policies make explicit reference to the need to improve water efficiency (e.g. Sevenoaks Council Local Plan Core Strategy Policy SP2). However, the review suggests that the risk of current and future water scarcity is rarely considered explicitly during the development management process. That said, internal and external water consumption are addressed within the Code for Sustainable Homes, so it is likely that a larger number of residential developments are adapting to water scarcity without it emerging as a key issue during the development management process.

The sample of planning applications identified only one case where water scarcity was noted as an issue in planning officers' committee reports, though even here the reference was confined to the wording of a proposed planning condition requiring water conservation and recycling measures and there was no explicit consideration of how future climate change could increase this climate risk. Several other consents included conditions relating to other climate risks (e.g. flooding), but none addressed the issue of water scarcity.

Of the 15 cases reviewed, one (for a residential development) was granted consent with conditions relating to water scarcity. 11 applications (six residential) were granted consent without conditions relating to water scarcity and four (all of which were for residential development) were refused on grounds that did not include water scarcity.

Water companies made no comments or objections in relation to water scarcity, though issues of flooding were raised in a number of cases.

Although the review of planning applications identified very few examples where water scarcity was a significant issue during the determination process, it is likely that the issue is being addressed through Building Regulations and application of the Code for Sustainable Homes, rather than through the development management system.

7.4.4 Adaptation measures required within planning conditions

Analysis across the 72 consented planning applications reviewed (i.e. not restricting analysis to applications where specific risks had been identified) provides a snapshot of the range of adaptation measures specified within planning conditions. Table 7-2 shows the number of consents with each type of condition (some consents had more than one relevant planning condition, so the total number adds up to more than 72).

Table 7-2: adaptation related conditions for consented planning applications

Subject of planning condition	Number of planning application, cases
Amended flood risk assessment	1
Restrictions in the use of the property (to address flood risk)	4
Property level protection (to address flood risk)	20
Water efficiency measures	2
Sustainable drainage systems	25
Passive cooling measures	0
Flood warning emergency plan	10
Other	25

7.4.5 Scale and type of planning application

Table 7-3 presents the results according to the broad type (residential and non-residential) and scale of planning application (see Appendix A.8 for the definition of minor and major development), showing the extent to which climate risk is reflected in planning decisions and conditions. Four applications where scale unknown were excluded.

The table shows that:

- Just over half the applications in the sample were granted consent subject to planning applications relating to the climate risk in question. Major developments were slightly more likely to have such conditions, particularly in the case of non-residential development;
- residential developments (major or minor) are more likely than non-residential developments to be granted planning consent without conditions relating to the climate risk in question;
- residential developments appear to be more likely to be refused consent on grounds of climate risk than non-residential schemes.

Table 7-3: development management outcomes by type and scale of development

	Non residential		Residential		Total	
	Major	**Minor**	**Major**	**Minor**	**Major**	**Minor**
Granted without conditions relating to climate risk	**1**	**3**	**7**	**8**	**8**	**11**
Granted with conditions relating to climate risk	14	8	15	13	29	21
Refused on the grounds of climate risk	1	1	3	6	4	7
Refused on other grounds	1	2	6	7	7	9
Total	17	14	31	34	48	48

Analysis of Environment Agency inputs to the development management process highlights the following:

- a high level of potential concern with respect to major, non-residential development proposals, with the Agency objecting on grounds of climate risk in around a third of cases and not objecting provided climate risk is addressed through a planning condition in just over 40% of cases;
- significant, though lower levels of concern for minor non- residential development where the Agency objected in around a third of cases (most of which were granted with relevant conditions) and did not object (subject to conditions relating to climate risk) in around 14% of cases;
- While the Agency made fewer outright objections to major residential developments (20%), its decision not to object was subject to a requirement for relevant planning conditions in around a 40% of cases;
- The pattern was less clear for minor residential development with the Agency either objecting or requiring conditions relating to climate risk in around a quarter and a third of applications respectively. In most cases, this was reflected in the use of planning conditions;
- It appears that most Environment Agency objections were successfully dealt with through the use of conditions, with few applications to which the Agency objected either being granted consent without relevant conditions, or refused on grounds of climate risk. The numbers are small, so no clear patterns across scales or types of development can be discerned.

7.5 Overview

Future climate change is recognised implicitly within most committee reports. While the fact it is considered is important, more explicit references to increases in climate risk and assessments of these risks would help ensure that decisions are fully informed and that all parties in the process understand properly the issues relating to a give development proposal.

The analysis of conditions and identified adaptation measures indicates that flood risk is the most commonly considered climate risk. In addition, flooding is the most commonly identified climate risk when planning officers explain the reasons for their decision or the decision they are recommending to the planning committee. These findings suggest that flood risk is a critical issue in the decision making process, with almost no proposals (within the sample) at risk of flooding, or likely to increase flooding elsewhere, being granted consent without conditions designed to mitigate these risks. The review confirms the importance of the Environment Agency's input to the development management process for proposals which are in locations at risk of flooding, or which have the potential to increase flood risk elsewhere. However, references to flooding frequently fail to distinguish between river/coastal and surface water risks.

Water scarcity and heat stress are rarely or never referred to as considerations in the decision to grant or refuse planning permission. Water scarcity, in particular, tends to be dealt with through local plan policies or mechanisms such as the Code for Sustainable Homes.

Analysis according to the type and size of planning applications suggests that issues relating to climate risk are more likely to be addressed in relation to major non-residential development. This is reflected in Environment Agency responses. However, residential development proposals appear to more likely to be refused consent on grounds of climate risk than non-residential schemes. The Environment Agency is more likely to object or require conditions relating to climate risk for major rather than minor residential development.

In terms of the extent criteria defined at the outset of this section, and subject to provision about the effectiveness of the policy framework in avoiding inappropriate applications and role of mechanisms such as the Code for Sustainable Homes in encouraging the take up of adaptation measures in new development, it is clear that the development management process is most effective in ensuring that surface water flood risk and river/coastal flood risks associated with planning applications are properly addressed. Issues of water scarcity and heat risk are significantly less well addressed through the development management process.

8 Web Review Findings - Local Enterprise Partnerships

8.1 Introduction

Local Enterprise Partnerships (LEPs) are partnerships between local authorities and businesses which help determine local economic priorities and lead economic growth and job creation within local areas as well as identifying priorities for investment to support economic growth. Lord Heseltine's 'No Stone Unturned' 2012 report[15] on generating growth recommended the devolution of government funds into a single pot. Many of the report's recommendations have been adopted by the Government with the creation of a Single Growth Fund for LEPs in June 2013.

39 LEPs have been established across the country; these all include more than one single or low tier authority area although some cover just one upper tier authority such as Hertfordshire. They take many different forms and vary in size, capacity and governance with staff numbers ranging from less than five to over 40.

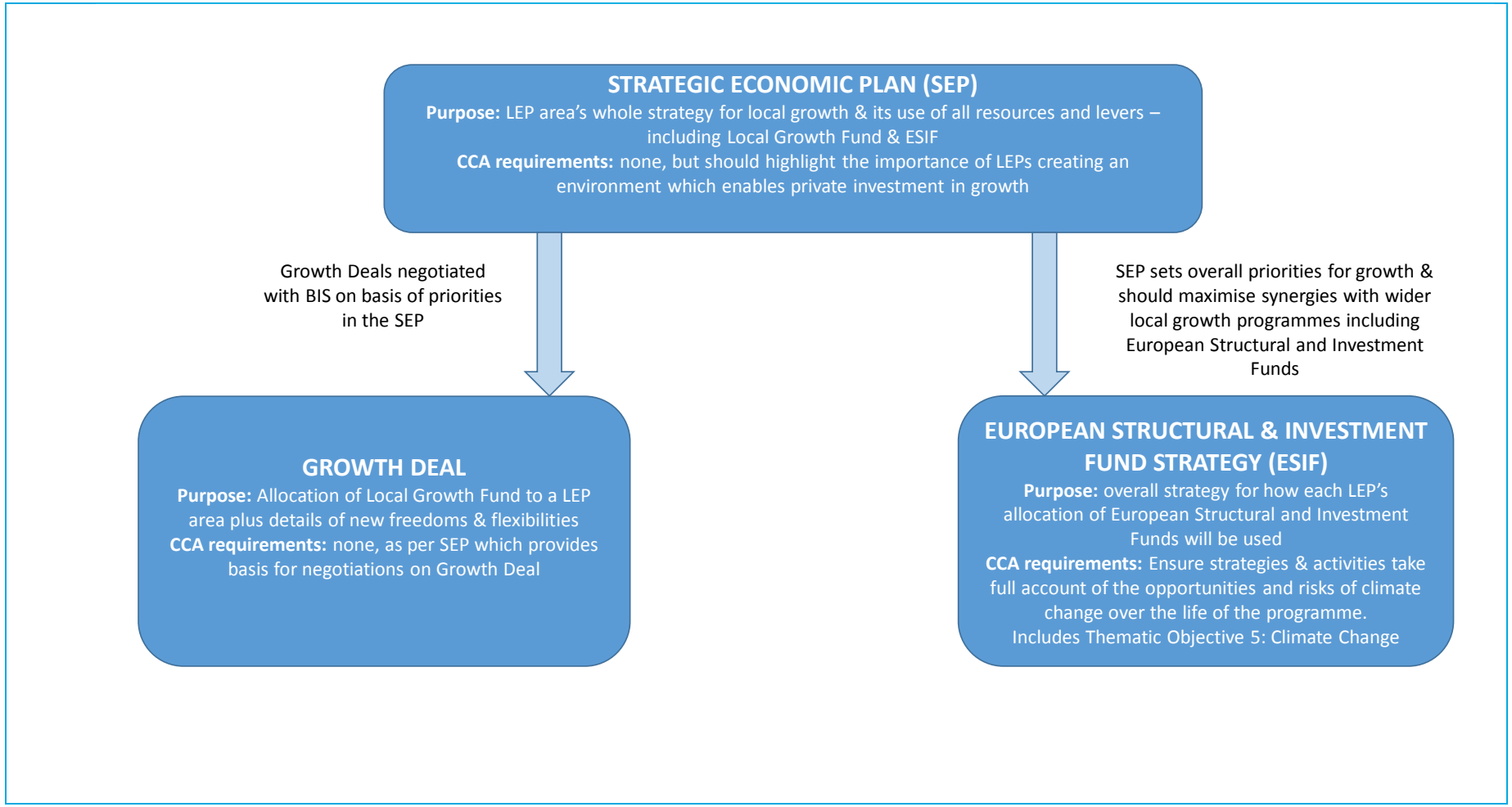
Government has negotiated Growth Deals with each LEP; these enable LEPs to seek freedoms, flexibilities and influence over resources from Government; and a share of the new Local Growth Fund to target their identified growth priorities. Alongside the Local Growth Fund (£2bn 2015/16), every LEP is responsible for developing investment plans for over £5 billion of European Structural and Investment Funds for England for the period 2014-2020.

The three documents reviewed for each LEP were their Strategic Economic Plan (SEP), European Structural and Investment Fund (ESIF) Strategy and Growth Deal. Initially it was proposed to also consider separate LEP strategies, business plans and tourism strategies; however as the majority of LEPs have not provided (or made available online) such documents, it was decided to focus on the three key strategic documents. We also undertook a brief review of Enterprise Zones relevant to the LEPs under review. This took the form of reviewing any published documents available on the internet promoting the individual enterprise zones related to the 16 selected LEPs to identify if these highlighted any current climate risks, future climate change or climate adaptation measures.

Before setting out the findings from reviewing these plans in relation to consideration of climate risks (now and in the future) and climate change adaptation activity, below is a brief summary of the context in terms of the guidance provided to the LEPs for the development of their key strategies and plans. The following diagram sets out the relationship between SEPs, Growth Deals and ESIFs and specific guidance for each in relation to climate change adaptation requirements.

[15] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/34648/12-1213-no-stone-unturned-in-pursuit-of-growth.pdf

Figure 8-1: Relationship between SEPs, Growth Deals and ESIFs



8.1.1 Strategic Economic Plans

All LEPs were required to develop SEPs for local growth, based on a strong rationale, value for money and partnerships for delivery. These were the key documents used to negotiate the content of Growth Deals with Government. Plans are expected to be based on the drivers and barriers to growth specific to each LEP, but to have regard to national policy on growth, including for example housing, transport, skills, industrial strategy, flooding and rural economies. No set format was prescribed for SEPs, in line with the principles of localism, but key assessment criteria were set out which cover: ambition and rationale for intervention for the local area; value for money; and delivery and risk.

Growth Fund and SEP guidance[16] highlights the importance of LEPs creating an environment which enables private investment in growth – supporting confidence and making it attractive for businesses to invest. In addition, SEP guidance highlights the importance of plans for each LEP area having regard 'to national policy on growth, including for example housing, transport, skills, industrial strategy, flooding and rural economies'.

8.1.2 Growth Deals

Through Growth Deals, LEPs can seek freedoms, flexibilities and influence over resources from Government; and a share of the new Local Growth Fund to target their identified growth priorities. Growth Deals are intended to be a partnership between the Government and LEPs in which they negotiate the content of the deals on the basis of the LEP's SEP.

Growth Deal announcements were analysed in terms of investigating the investments that were being made. The strategic context and justification for these investments is provided by the LEPs' SEPs. The Local Growth Fund is just one of the investment options available to LEPs and they are expected to draw on other resources to fund the priorities identified in their SEPs. These will include: private sector investment, LA funding, resources from revolving funds such as Growing Places Fund and also from Enterprise Zones retained business rates and City Deals, support from the Department for Transport's Local Sustainable Transport Fund (resource – separate from the capital element that is included in the Local Growth Fund), use of Public Works Loan Board project rate, match funding from other local partners such as housing associations and universities and colleges and surplus and redundant public sector assets.

8.1.3 European Structural and Investment Fund Strategies

The European Structural and Investment Funds available in England are: European Regional Development Fund (ERDF), European Social Fund (ESF), European Agricultural Fund for Rural Development (EAFRD) which is directed at rural areas, and European Maritime and Fisheries Fund (EMFF). ERDF, ESF and part of the EAFRD have been brought together into a 'Structural and Investment Fund Growth Programme'[17]. The majority of the funding in the Structural and Investment Fund Growth Programme (£5 billion) will be allocated to LEP areas.

Each LEP is required to develop a European Structural and Investment Fund Investment Strategy (ESIF Strategy) which forms part of its wider SEP. Each LEP area will receive a seven year notional funding allocation from the Structural and Investment Fund Growth Programme. A set of top priorities for the Growth Programme have been established based on the Europe 2020 goals, the spending levels set out in the EU regulations and the EU structural reform agenda to deliver growth and jobs. These priorities are: innovation/research and development; support for micro, small and medium sized enterprises; the low carbon economy; and skills, employment and social inclusion.

The overarching ESIF Strategy for the UK includes 11 Thematic Objectives; the EU has set out mandatory proportions of funding that should be dedicated to specific objectives as set out in the following table:

16 https://www.gov.uk/government/publications/growth-deals-initial-guidance-for-local-enterprise-partnerships

17 EMFF will not be included within the Structural and Investment Funds Growth Programme but will be aligned with it as much as possible and available to Local Enterprise Partnerships on a competitive basis

Table 8-1: ESIF Thematic Objectives and Earmarked Spend Requirements[18]

Thematic Objective	Earmarked Requirement
1. Innovation	At least 80% ERDF
2. ICT	
3. Small and medium sized enterprises Competitiveness	
4. Low Carbon	At least 20% ERDF
5. Climate Change Adaptation	No spending minimum
6. Environmental Protection	No spending minimum
7. Sustainable Transport	No spending minimum
8. Employment	At least 80% of ESF allocation per programme on up to 4 investment priorities within these 4 thematic objectives
9. Social Inclusion	
10. Skills	
11. Institutional Capacity	

Allocations do not need to align exactly with the requirements at individual LEP level, but collectively should reflect the national requirement. Ensuring national alignment was taken into account in negotiations between Government and individual LEPs in deciding their allocations. Thematic Objective 5 is concerned with Promoting Climate Change Adaptation, Risk Prevention and Management, but in reality the actual wording of the related EU Growth Programme Framework priority is firmly flood and coastal erosion risk management focused. There is no mandatory allocation proportion of funding that has to be allocated to this objective. However, the guidance[19] does state that other aspects of climate resilient growth will be delivered through integrating adaptation action within the other thematic objectives (particularly Thematic Objective 4 – Low Carbon and Thematic Objective 6 – Protecting the Environment and Promoting Resource Efficiency). In addition, the guidance states that LEPs 'will be expected to ensure their strategies and activities to implement them take full account of the opportunities and risks of climate change over the life of the programme e.g. specific investments will need to be resilient to the impacts of climate change'.

8.1.4 Enterprise Zones

LEPs were given the opportunity to designate an Enterprise Zone and 24 were awarded. These zones are specific geographical areas within LEP boundaries and provide opportunities for tax incentives, such as business rate discounts and enhanced capital allowances, and simplified local planning regulations, enabling, for example, Local Development Orders that grant automatic planning permission for certain development (such as new industrial buildings or changing how existing buildings are used) within specified areas. Eight of the 16 LEPs reviewed have designated Enterprise Zones.

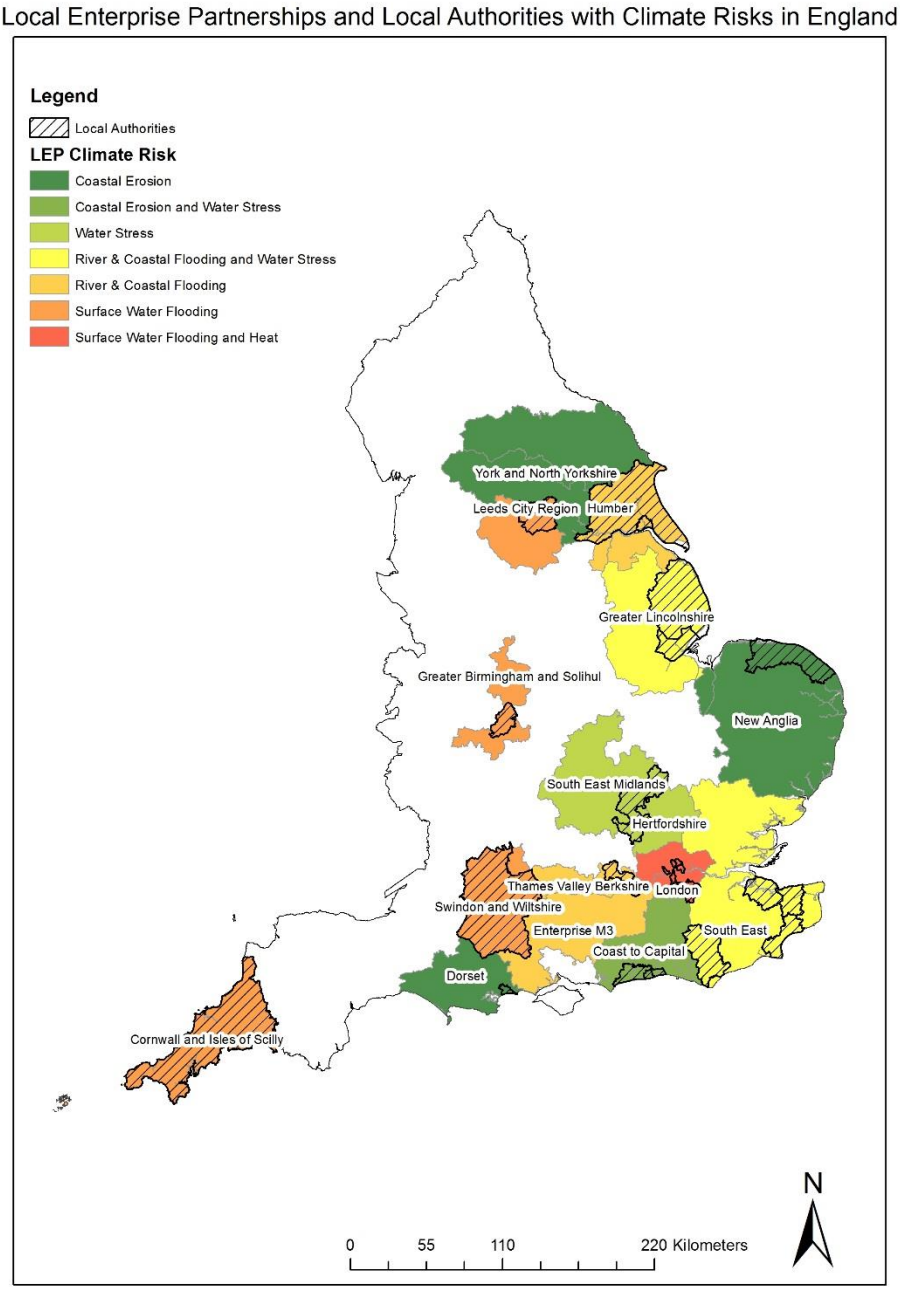
8.2 Evidence Review

16 LEPs have been surveyed; selection was based on identifying LEPs whose boundaries include the highest risk LAs. The following map shows the selected LEPs and the relevant LAs plus the identified climate risks. The number of constituent high climate risk authorities within the selected LEPs ranges from one to six.

[18] Derived from Areas for Investment Table in Appendix A of the ESIF Strategy Preliminary Guidance to LEPs Technical Annex - https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/190880/13-747an-structural-and-investment-fund-strategies-preliminary-guidance-to-leps-technical-annex.pdf

[19] ibid

Figure 8-2: Selected LEPs and Constituent LAs with High Climate Risks[20]



SEPs and ESIF strategies were reviewed to identify the degree to which climate risks were taken into account and the inclusion of any specific climate change adaptation activities. ESIF strategies and Growth Deals were analysed to identify the amount of investment being directed towards climate change adaptation. Findings were analysed in relation to the size (population) of LEPs and their location. It had been initially intended to also consider the number of employees by LEP, but less than half provided this information online. Finally, a brief review has been undertaken of the Enterprise Zones associated with the LEPs within the survey to identify the degree to which these are addressing climate risk.

[20] LEPs are shown as discrete entities rather than overlapping due to potential confusion regarding climate risks: none of the high risk LAs are within the areas that overlap

8.3 Findings and Analysis

8.3.1 Identification of climate risks

The table overleaf sets out the climate risks identified for each LEP through this study (i.e. identified high risk LAs within the LEP areas) and the climate risks identified in SEPs and ESIF strategies, and Growth Deal allocations. It should be noted that the Growth Deal documents analysed were not produced by the LEPs themselves, but Government (Cabinet Office and Deputy Prime Minister's Office)[21]. Growth Deal documents only referred to climate risks in terms of agreed allocation in measures to address them, such as flood defences. As such, it cannot be expected that these would refer to climate risks in detail.

The table shows that all LEPs identified the climate risk for which they were included in the review in at least one of their strategic documents other than Hertfordshire and South East which did not highlight water stress in any of their documents. However, water stress could be viewed as outside the remit of LEPs and the responsibility of water companies at the strategic scale, and individuals and businesses at the micro-scale. But seven LEPs do identify water stress in one or more of their strategies although only two of these were considered within the study on the basis of water stress.

Not all of the LEPs included in the study on the basis of river and coastal or surface water flooding identified these risks in their strategic documents; however they all referred to either the specific source of flooding or generic flooding (without reference to source). As LEPs tend to cover a fairly large area and the documents reviewed are of a strategic nature, this could be considered appropriate as the generic term is capturing several sources of flooding in different areas. This could also explain why some LEPs use even more generic terminology to cover climate risks such as extreme weather and climate change as a catch-all.

Nine of the 16 LEPs reviewed are coastal, but only four of these were assessed through the study methodology as being at high risk from coastal erosion. Three of the four highlighted coastal erosion in their SEPs, two of these also identified coastal erosion in their ESIF strategies and none in their Growth Deal documentation as no investment was targeted towards action to mitigate coastal erosion. Coast to Capital did not highlight coastal erosion in any of its strategic documents, which may be explained by the fact that the LEP is largely non-coastal with just the high risk LA in question having a shoreline. Coastal erosion risks for this LA may not feature in high level documents as these were deemed to be addressed elsewhere such as through the Shoreline Management Plan.

The London LEP area includes five LAs at risk of future heat stress. This climate risk was not highlighted in the Growth and Jobs Plan for London (there is no SEP as arrangements are different for London due to the existence of the Greater London Authority). However, heat stress is referred to in the ESIF strategy for the capital.

In addition, to the climate risks that were highlighted in the study, LEPs also made reference to additional climate risks covering non-specific climate change, sea level rise, storms and tidal surge.

Within our sample, there is a strong representation of south east LEPs as this is where climate risk is currently focused, along with the coast in other parts of the country. The analysis has not revealed any differences in terms of identification of climate risks associated with geography or the size of population of the LEP area.

In considering the degree of alignment between climate risks identified by the study and those highlighted in LEP strategic documents, it is important to be aware of several factors. Firstly, that this study has identified the LAs at highest climate risk and LEPs have been selected on the basis that these LAs fall within them. However, this does not mean that these are the only climate risks that affect these areas. Several LEPs (for example New Anglia) are subject to multiple climate risks, but only one LA has been highlighted through our analysis as being at particularly high risk (North Norfolk in the case of New Anglia).

[21] See https://www.gov.uk/government/publications/coast-to-capital-growth-deal for an example

Table 8-2: Comparison of climate risks identified by the study and those highlighted in LEP documents

LEP	Risks Identified by the Study					Risks Identified in LEP Documents						
	Coastal Erosion	R&C[22] Flooding	SW[23] Flooding	Heat	Water Stress	Coastal Erosion	R&C Flooding	SW Flooding	Generic flooding	Heat	Water Stress	Other
Coast to Capital	✓				✓		SEP	SEP	Growth Deal			
Cornwall & Isles of Scilly			✓			SEP			SEP, ESIF	SEP		ESIF (climate change & severe weather)
Dorset	✓					SEP	SEP					
Enterprise M3		✓							SEP, ESIF	ESIF	ESIF	
Greater Birmingham & Solihull			✓						ESIF			
Greater Lincolnshire		✓			✓	ESIF			SEP, ESIF. Growth Deal	SEP, ESIF	SEP, ESIF	ESIF (Sea level rise, storm surge)
Hertfordshire					✓		ESIF	ESIF		ESIF		ESIF (storms)
Humber		✓				SEP, ESIF	SEP, ESIF	SEP, ESIF	Growth Deal		SEP	SEP (tidal surge), ESF (storms)
Leeds City Region			✓				SEP, ESIF	ESIF		ESIF	ESIF	
London			✓	✓					ESIF	ESIF	ESIF	SEP (climate change)
New Anglia	✓					SEP, ESIF	SEP	SEP	ESIF	SEP	SEP	SEP (extreme weather), ESIF (tidal surge)
South East		✓			✓		ESIF		SEP, Growth Deal			
South East Midlands					✓				SEP, ESIF	SEP	SEP	ESIF (extreme weather, climate change)
Swindon & Wiltshire			✓						SEP			ESIF (climate change)
Thames Valley Berkshire		✓						ESIF	SEP			
York, North Yorkshire & East Riding	✓					SEP, ESIF			SEP, ESIF, Growth Deal			SEP (& ESIF Sea level rise).

[22] R&C Flooding = River & Coastal Flooding
[23] SW Flooding -= Surface Water Flooding

Second, the selection of LAs was based on current climate risks and LEP strategic documents are forward facing and have, therefore, picked up the implications of future climate change such as sea level rise.

Third, the context and purpose of the specific documents must be taken into consideration. SEPs are broad based documents for which there is no specific guidance in relation to accounting for climate change, although providing the appropriate conditions for growth should take such risks into account. And flood risk is highlighted in relation to the need to have regard to national policies including those in relation to flood risk. Similarly, not all LEPs have identified an allocation of funding under the Climate Change Adaptation Thematic Objective in their ESIF strategies and therefore may not focus on climate risks.

8.3.2 Climate Change Adaptation Activities

The following table presents the planned adaptation actions identified in the strategic documents compared with the climate risks that the study identified for each LEP. In this table, LEPs with multiple risks are set out separately.

The table shows the clear dominance of flood defence and green infrastructure as the main adaptation activities planned by LEPs. Flood defence is crucial to protecting infrastructure and economic growth, and green infrastructure addresses multiple climate risks: flood risk (evapotranspiration and reduction of surface run off), heat (passive cooling via the provision of shade), water efficiency (retention of water). Green infrastructure is also recognised as improving the general aesthetics and liveability of an area contributing towards overall image and helping to encourage inward investment.

Two of the three LEPs with multiple climate risks also highlight multiple adaptation actions. The Coast to Capital LEP, which has identified climate risks in relation to coastal erosion and water scarcity, plans adaptation activities focused on flood defence, emergency planning, flood incident management, green infrastructure, property level protection and water efficiency. The Greater Lincolnshire LEP, whose climate risks are identified as river and coastal flooding and water scarcity, reveals planned adaptation activity in relation to flood defence, natural flood management, emergency planning, flood incident management, sustainable drainage, green infrastructure and passive cooling.

In addition, two LEPs in particular with single climate risks Leeds City Region (surface water flooding) and New Anglia (coastal erosion) are planning numerous adaptation activities linked to these climate risks and others. Leeds City Region's SEP and ESIF strategy documents identify actions in relation to climate change research and awareness, flood defence, green infrastructure, property level protection, natural flood management, sustainable drainage, emergency planning, passive cooling and water efficiency. New Anglia's SEP and ESIF strategy documents highlight climate change awareness, flood defence, natural flood management, sustainable drainage and water efficiency plus capacity building and resilience support for businesses and communities.

Comparing the identification of risks with specific adaptation activities, it is clear that flood related risks are matched with appropriate flood alleviation actions such as flood defence, green infrastructure and sustainable drainage. However, of the three LEPs highlighted as having areas of water scarcity, none identified specific water efficiency actions, but two highlighted green infrastructure in their SEPs and one of these also highlighted green infrastructure in its ESIF strategy. The review also recorded which of the adaptation activities were planned specifically in relation to addressing future climate change as opposed to current climate risk. Eight LEPs identified actions to address future climate change in their strategic documents. Four highlighted flood defences (three in SEPs and one in its ESIF strategy), five identified green infrastructure (one in its SEP, three in their ESIF strategies and one in both its SEP and ESIF strategy (Leeds City Region)), one identified water efficiency in its SEP and one passive cooling in its ESIF strategy.

Table 8-3: LEP Climate Risks and Adaptation Activities[24]

LEP	Climate Risk	Awareness	Research	Training	Flood Defence	NFM	Emergency Planning	FIM	SUDS	GI	PLP	Water Efficiency	Passive Cooling	Other
Coast to Capital	Coastal Erosion & Water Stress				SEP, GD		GD	GD		SEP	SEP	SEP		Transport resilience
Cornwall & IoS	SWF	SEP, ESIF			SEP					SEP, ESIF				Climate resilient infrastructure
Dorset	Coastal Erosion				SEP									
Enterprise M3	RCF				SEP			SEP		SEP				Transport resilience
Birmingham & Solihull	SWF													
Greater Lincolnshire	RCF, Water Stress	SEP			SEP, ESIG, GD	ESIF, GD	ESIF	ESIF	ESIF	SEP, ESIF		SEP	SEP, ESIF	Crop irrigation
Hertfordshire	Water Stress													
Humber	RCF			SEP	SEP, ESIF, GD	ESIF		SEP	SEP, ESIF		SEP			
Leeds City Region	SWF	ESIF	SEP		SEP, ESIF	ESIF	ESIF		SEP, ESIF	SEP	ESIF	SEP	ESIF	
London	SWF, Heat					ESIF				ESIF			ESIF	
New Anglia	Coastal Erosion	ESIF			ESIF	SEP, ESIF			SEP	ESIF		SEP, ESIF		Capacity building & resilience support for businesses & communities
South East	RCF, Water Stress				SEP	ESIF	SEP			SEP				
South East Midlands	Water Stress	ESIF								SEP, ESIF				
Swindon & Wiltshire	SWF	ESIF								ESIF				
Thames Valley Berkshire	RCF				SEP	ESIF				ESIF				
York, N Yorks & East Riding	Coastal Erosion		ESIF		SEP, ESIF, GD					SEP, ESIF, GD		SEP		

[24] Abbreviations: SWF = Surface Water Flooding, RCF = River & Coastal Flooding, NFM = Natural Flood Management, FIM = Flood Incident Management, GI = Green Infrastructure, PLP = Property Level Protection, GD = Growth Deal

In total, 14 of the 16 LEPs identified adaptation activities in one or more of their strategic documents. It is evident from the table that activity is focused on flood risk, specifically flood defence, green infrastructure (which can also have a water efficiency and passive cooling role) and natural flood management. These were also the activities in which LEPs were most explicit in identifying that actions were to address future climate change, although the majority of actions, including for flood related activities appeared to focus on current risk.

It is evident from the table that activity is focused on flood risk, specifically flood defence, green infrastructure (which can also have a water efficiency and passive cooling role) and natural flood management. These were also the activities in which LEPs were most explicit in identifying that actions were to address future climate change, although the majority of actions, including for flood related activities appeared to focus on current risk.

Five LEPs identified actions which were not included within our categories. Three focused on climate resilient infrastructure, one on crop irrigation and one focused on capacity building to ensure resilient communities and businesses. LEPs have a clear role in terms of ensuring a sustainable and effective transport system in their areas and climate resilient infrastructure, both in terms of transport and water have been highlighted by a number of LEPs as a priority for investment. Such projects demonstrate the growing recognition of the impacts that climate risks can have on the economy.

Coastal LEPs identify the most adaptation activities and have the most consistent prioritisation of these in both SEPs and ESIFs. This is probably because climate risks affecting coastlines (flooding and erosion) are likely to have the most catastrophic effects on lives and livelihoods plus are already evident. There was no evident difference in adaptation activities being undertaken in relation to the size of the LEP (using population as a proxy).

New Anglia has been designated as a Green Economy Pathfinder LEP as Norfolk and Suffolk are considered to be *'uniquely equipped to capitalise upon local strengths as a Green Economy Pathfinder . . .trailblazing approaches to current private sector growth barriers and providing Green Economy expertise'.* Whilst the focus of the Green Pathfinder project is on renewable energy, low carbon good and services and the natural environment based on the success of the Wild Anglia Local Nature Partnership; information online in relation to the Pathfinder makes little reference to climate change adaptation. However, the strategic documents for New Anglia highlight the most climate risks of any LEP in the sample and numerous adaptation activities are identified in both the SEP and ESIF strategy (but none in its Growth Deal). Interestingly New Anglia did not originally plan to include specific investment or activities within Thematic Objective 5 Climate Change Adaptation in its ESIF strategy[25], but following consultation on the draft revealed that substantial concern had been expressed over the lack of inclusion of any financial allocations for protecting the environment, climate change and sustainable transport and it was suggested that the draft did not respond to the real flood risk challenges faced by the two counties. Due to the level of concern, the LEP accepted the need to revise the draft and included a financial allocation for the climate change thematic objective. This is a positive move in terms of both local stakeholders highlighting the need for the LEP to include a financial allocation for climate change adaptation and the LEP itself responding to the concerns and changing its allocation to address them.

The South East Midlands LEP (SEMLEP) states in its ESIF strategy[26] that all programme activities will be designed to promote mitigation and adaptation approaches to climate change and contribute to a more resource efficient regional economy. In addition, it specifically requires that programme activities involving capital investments in land and/or buildings should incorporate climate change adaptation measures at design stage. Whilst the ESIF strategy guidance states that LEP strategies and activities should take account of climate change, the requirements specified by SEMLEP were the most explicit in requiring capital investments to be climate resilient.

[25] http://www.newanglia.co.uk/wp-content/uploads/2014/01/New-Anglia-LEP-EU-Investment-Strategy-January-2014-Final-version-for-Government-310114.pdf

[26] http://www.semlep.com/european-funding-2014-2020/

8.4 Investment Allocations

Growth Deal announcements and ESIF strategies were reviewed to identify the degree to which investment was being allocated towards climate change adaptation. The following table summarises this investment:

Table 8-4: LEP investment allocations

Adaptation Activity	Growth Deal		ESIF Strategies	
	No. of LEPs	Investment £m	No. of LEPs	Investment £m
Flood defence	4	60.5	2	16.5
Climate resilient transport infrastructure	1	31	1	8
Climate Change, Flood Risk Management & Green Infrastructure			4	21.25
Community and SME capacity building to foster resilience to climate change, coastal erosion & flood risk			1	2
TOTAL	4	91.5	10	47.8
TOTAL INVESTMENT	16	3045	16	2570
% investment for adaptation activities		3%		2%

The above table reveals that a quarter of LEPs identify climate risks and proposed adaptation activities in their Growth Deals, and well over half do so in their ESIF strategies. All of the LEPs targeting Growth Deal investment towards adaptation are coastal LEPs.

It should be noted that LEPs have a number of funding streams available to them including locally raised finance and therefore the funding identified above does not reflect the full amount targeted at climate change adaptation. In addition, a number of LEPs (e.g. Hertfordshire) have noted within their ESIF strategies that whilst they consider flood risk management to be a priority, the level of funding that would be available for Thematic Objective 5: Climate Change (once the mandatory proportions for other objectives have been met) would not produce effective outcomes within the LEP area when compared with the outcomes which can be achieved through directing the same funding through other ERDF activities. They refer to the need to look for funding elsewhere to meet recognised flood risk issues.

In some Growth Deals, adaptation activities are identified, but no funding allocation is included as the proposal relates more to Government commitments, freedoms and flexibilities. For example, Greater Lincolnshire's Growth Deal states that *'Defra will support the continuing development of a strong strategic partnership approach between the LEP, the Lincolnshire Flood Risk and Drainage Management Partnership, and the risk management authorities in the Greater Lincolnshire LEP area, in which the LEP will play a prominent role. The partnership will enable the LEP and local risk management authorities to determine local priorities and make decisions on the use of national and locally raised funding allocated to their area so as to give greater certainty and flexibility'.*

8.5 Enterprise Zones

Eight of the 16 LEPs reviewed have designated Enterprise Zones. Five of these include a focus on green technologies and/or renewable energy clearly indicating the strength of the low carbon economy. Information online regarding Enterprise Zones is largely of a promotional nature as it is targeted towards potential investors and tenants. The information online does not highlight climate risks; however, there is a clear aspiration within the information available to provide sustainable, high quality, water and green spaces (particularly Leeds, London, South East Midlands) which may include climate adaptation measures such as natural flood management and SUDS.

8.6 Conclusion

The analysis of a sample of 16 LEPs has shown that current climate risks are being taken into account, particularly flooding and coastal erosion, but there appears to be less consideration given to the implications of future climate change. Proposals for adaptation activity are identified in at least one of the strategic documents reviewed for 14 of the 16 LEPs with the main activities being flood defence, green infrastructure and natural flood management. Three LEPs are investing a combined total of almost £40m on climate resilient transport infrastructure recognising the importance of infrastructure to economic growth and the impacts that climate risks could have.

3% of the total Growth Deal investment for the 16 LEPs (£92m of £3,0bn) and 2% of their combined European Structural Fund allocations (£48m from a total £2.6bn) are directed towards climate change adaptation; it should be recognised that these are not the only available sources of investment and the majority of LEPs in the sample (nine) had decided not to access funds from the European Structural Funds Climate Change Adaptation Thematic Objective as it is not mandatory. Overall it is positive to see the LEPs recognising the potential impacts that climate risks could have for their local economies, but implementation, which is affected by planning decisions along with other local requirements, will be key in ensuring that future investment is resilient to current risks and future climate change.

9 Conclusions

9.1 Introduction

Local government plays a major role in shaping local places and supporting local communities, many of whom are vulnerable. In recent years, extreme weather has affected services provided by LAs and these events are projected to increase in the future with climate change. As such, it is important that LAs are prepared for climate change in relation to the delivery of services and also that they ensure the delivery of place-making functions such as planning, highways and green infrastructure take account of, and are adapted to current climate risks and future climate change.

LAs should play an important role using planning and other policy levers to ensure buildings and infrastructure in their localities are resilient to climate change. Land use planning can be used to steer developments to areas of lowest climate risk consistent with achieving sustainable development objectives, infrastructure planning can provide resilient roads and related infrastructure, and building design can incorporate a range of options to improve climate resilience. In addition, health, social care and business continuity functions should be sufficiently resilient to ensure minimal impacts on service delivery, particularly for vulnerable communities, during periods of extreme weather now and in the future.

This study has provided a broad snapshot of current climate change adaptation planning and implementation across a sample of LAs and LEPs. As both samples focused on those areas considered to be at highest current climate risk and with the highest number of properties at risk, it can be assumed that the survey would reveal more climate related planning and action than would be evident across all LAs as those at lower climate risk are less likely to prioritise such activity.

Some LAs continued to maintain separate climate change strategies and action plans, post the requirement for adaptation reporting (NI 188), whilst others have promoted climate change adaptation as implicit and explicit actions within other strategies and plans. The research has sought to identify at a broad scale the extent to which high climate risk LAs are considering climate change adaptation measures in their local plans, policies and strategies; and has drawn out explicit and implicit actions, rather than making detailed comparisons between LAs which would require a more in depth, qualitative approach.

The conclusions from the survey are set out under four broad themes: strategically planning for climate change; creating climate resilient places; providing climate resilient services; and supporting climate resilient local economies. A number of key messages from the survey analysis then follows.

9.2 Strategically Planning for Climate Change

The survey revealed that 42% (38 of 90) of lower/single tier LAs have a strategy that addresses climate change adaptation. Of these LAs, 61% identify river or coastal flooding, 63% surface water flood risks, 76% refer to heat, and 79% identify water stress as climate risks. Of the coastal LAs in the survey, 24% specifically refer to coastal erosion as a climate risk in their strategies.

The key adaptation activities identified within climate change strategies were climate change awareness raising, training and research with two-thirds including climate activities relating to GI, water efficiency measures and SuDS and around half proposing measures relating to flood defence, natural flood management and emergency planning.

71% of the 38 LAs with climate change and climate change adaptation strategies or adaptation action plans were urban, single tier LAs, with 66% of these LAs with an IMD ranking as very high or high in our LA sample.

In addition, 18 LAs (20% of the LA sample of 90) have a strategy or action plan at a county-wide level, produced in the period 2011 to 2014.

LAs are not required to take any particular approach to adaptation. Some LAs develop specific adaptation action plans and others have decided to take a more cross-cutting or mainstreaming approach and build adaptation into more general or topic-specific strategies and plans such as corporate strategies and green infrastructure plans. As the analysis has involved a review of a large number of strategies and plans for a large sample of LAs, it has not been possible to track results through individual LAs and identify if those that did not have an adaptation strategy or plan did actually include adaptation actions in other documents.

As the requirement to report on adaptation (NI188) was withdrawn in 2010, it is encouraging that nearly half of the adaptation plans and strategies have been developed since 2011 suggesting that the motivation for adaptation activity has continued. With the exception of coastal LAs, it is interesting to note that more LAs identified themselves as being at risk of specific climate impacts in their climate strategies and adaptation action plans than the number of high climate risk LAs identified through the study methodology.

9.3 Creating Climate Resilient Places

This section focuses on evidence from the survey in relation to land use planning, transport, green infrastructure/biodiversity and flood risk management.

Reference to climate change in transport strategies tends to be focused on the mitigation agenda due to the role that public transport can play in contributing towards a reduction in the use of fossil fuel. However, recent extreme weather events and their impact on transport infrastructure which then impacts lives and livelihoods is recognised with two-thirds of the 48 strategies reviewed identifying climate risks (predominantly flooding and heat).

Of the 38 LAs (42% of the population sample), with climate change strategies and/or action plans, 90% highlighted climate change awareness raising as an adaptation action. Around one-third of the 38 LAs also identified GI, SuDs and water efficiency measures as adaptation actions.

GI has a significant role to play in helping to adapt to climate change and can provide a range of climate services including flood alleviation, passive cooling and water resources management. GI strategies included specific references to climate change and adaptation actions, in particular natural flood management, SuDS, passive cooling and SuDS. Of the 17 LAs with GI strategies, approximately two-thirds were produced by rural LAs. Ten strategies were identified at the upper spatial scale, relating to a further 19 LAs; all of these had been produced during the period 2005-2011, possibly influenced by the regional planning system in place during this timescale. Previous Regional Spatial Strategies included a focus on GI and a large body of evidence compiled in some regions, for example the North West, regarding the benefits of GI including for climate change adaptation. The main climate adaptation objectives included in biodiversity/land use strategies related to GI and flood risk management; however, only a small number of strategies/plans identified objectives to address future climate change as opposed to current climate risks.

The review of flood risk plans revealed that just over one-third of the sample LAs have a SWMP in place, and a smaller proportion have water cycle studies. These identify appropriate flood-related adaptation activities, but tend to focus on current climate risk rather than future climate change. All of the coastal LAs in the sample are covered by one or more SMPs referencing climate risks with an expected focus on flooding and coastal erosion; sediment movement was also cited as a risk by three LAs.

91% of Local Plans reviewed included strategic policies which identified proposed adaptation measures. Adaptation activities identified within Local Plans adopted prior to the publication of the NPPF were intended to address both current and future climate change although there was a bias towards current risk (60% of the adaptation references). In post-NPPF Local Plans, of the adaptation actions reviewed, the same proportions were identified, with 60% addressing current climate risks and 40% future climate change. This would appear to indicate that NPPF has not affected the number of climate adaption measures within strategic policies.

Flood risk is the dominant climate risk considered in planning documents with every LA reviewed having a SFRA online; 91% of these included climate change allowances and 79% included climate related recommendations.

76% of AMRs reviewed (68 of 89) referred to climate adaptation actions, although these largely referred to current climate risks rather than future climate change. The main actions related to PLP, flood defence, GI, SuDS and water efficiency measures.

Only two LPAs had adopted CIL Charging Schedules and Infrastructure Plans, which referenced climate risk; both were focused on investment in measures to alleviate flood risk.

Consideration of climate risks in planning documents is mainly focused on current flood risk with much less specific consideration given to longer term climate change and other climate risks such as heat stress and water scarcity. The review of local plan strategic policies identified that the main adaptation action referencing future climate change was GI (45% of strategic policies), with over one-third proposing water efficiency measures (38%) and almost one-half proposing SuDS (49%).

These findings are reflected in the review of a sample of planning applications which revealed the main climate risk to be identified as flooding (often with no distinction regarding the source) with climate change tending to be implicit in planning officer and committee reports, and conditions. The review confirms the importance of the Environment Agency's input to the development management process for proposals which are in locations at risk of flooding, or which have potential to increase flood risk elsewhere.

The review conclusions suggest that flood risk is a critical issue in the plan making and development management decision-making process; the review of 100 applications suggested that it would be difficult to obtain planning permission for inappropriate development in areas of flood risk. However, there was minimal consideration of other climate risks such as water scarcity and heat stress, and climate change is rarely referred to explicitly in decision-making, although it is possible that these elements are addressed at the plan making stage or through pre-application discussions or building regulations.

9.4 Providing Climate Resilient Services

Almost one-third of corporate strategies refer to climate risks, of which just under three quarters identify proposed climate adaptation actions. These are high-level strategies, which often set out LA values rather than referring to outcomes of a risk assessment or considering the detail of extreme weather. However, in the main climate risks are referred to in a fairly generic way and therefore highlight the likely impacts of climate change, in general, rather than specifically for that area. This may explain the high proportion of LAs that refer to water stress (or drought) in terms of a potential long-term impact of climate change.

All JSNAs reviewed had been produced by single tier LAs, with just over a quarter referring to climate risks, of which nearly two-thirds set out specific objectives in relation to climate risks.

All of the emergency plans and community risk registers reviewed made reference to climate risks, principally flooding which in the main was referred to generically rather than identifying the source of flooding. By their nature, emergency plans are intended to address immediate-short term risks which meant there was minimal reference to climate change.

The evidence review identified several LAs with multiple strategies and plans considering climate risks and adaptation actions for current and future climate change. These were all produced by single tier LAs. In particular Durham Council, City of Leeds and The City of Brighton and Hove identified risks and actions in their corporate strategies, climate change strategies and plans, JSNAs, emergency plans, biodiversity, transport and flood risk plans.

The County Councils of Kent, Lincolnshire, Suffolk, and West Sussex and the Greater London Authority all had a wide range of strategies and plans identifying climate risks and adaptation actions on a joint basis for the respective LAs within their localities.

9.5 Supporting Climate Resilient Economies

The analysis of a sample of 16 LEPs reveals that current climate risks are being taken into account, particularly flooding and coastal erosion, but there appears to be less consideration given to the implications of future climate change. Proposals for adaptation activity are identified in at least one of the strategic documents reviewed for 14 of the 16 LEPs with the main activities being flood defence, GI and natural flood management. Three LEPs are investing a combined total of almost £40m in climate resilient transport infrastructure recognising the importance of infrastructure to economic growth and the impacts that climate risks could have.

3% of the total Growth Deal investment for the 16 LEPs (£92m of £3.0bn) and 2% of their combined European Structural Fund allocations (£48m from a total £2.6bn) are directed towards climate change adaptation. It should be recognised that these are not the only available sources of investment and the majority of LEPs in the sample (nine) had decided not to access funds from the European Structural Funds Climate Change Adaptation Thematic Objective as it is not mandatory. Overall it is positive to see the LEPs recognising the potential impacts that climate risks could have for their local economies, but implementation, which is affected by planning decisions along with other local requirements, will be key in ensuring that future investment is resilient to current risks and future climate change.

9.6 Final Comments

The study has revealed that LA place-making functions and service delivery are considering climate risks; however, the focus tends to be on current risks, particularly flooding, rather than future climate change. This result is not surprising as flooding is the main current and future climate risk identified for the UK and has had the most obvious recent impacts. Flood risk

management is enshrined in legislation and policy via the Flood and Water Management Act and the NPPF.

The study has revealed that there is a significant difference between LAs and in some cases within LAs - for example having a GI strategy, which makes comprehensive reference to climate change adaptation and a corporate strategy and transport strategy, which make very little reference to the issue. Climate change adaptation is heavily dependent on the local context and on the severity of local climate risks. This lack of consistency across (and between) LAs makes it difficult to form a thorough assessment of the degree to which local government, as a whole, is prepared for current climate risks and future climate change; it does, however, provide a broad overview of LA activity.

There is evidence of some mainstreaming of climate risks and climate change into strategies and plans such as JSNAs, but even with the survey focusing on high risk authorities, it is still the minority that are accounting for climate risks in strategies where there is not a mandatory requirement to do so.

It is recognised that in the case of the review of land use planning strategies and plans, some current climate risks may be addressed at the pre-application stage, for example through building regulations.

Across the various aspects of the survey, coastal LAs and LEPs appear to place the highest priority on identifying climate risks and adaptation activities; this can probably be explained by the obvious risk presented and the catastrophic effects that would result from major tidal flooding or coastal erosion incidents.

Recommendations for future review

This study has provided a useful snapshot of planned LA climate change adaptation activity. It would be beneficial to repeat the study on a regular basis, say every three years, in order to understand if climate change is increasingly being taken into account and if proposed actions are being implemented on the ground and what effects these are having.

The broad-based nature of the survey and short timescale within which it was conducted, meant that no assessment of appropriateness or likely effectiveness of the proposed climate change activities was undertaken. In future, the survey could potentially be supplemented with a number of case studies, looking in more depth at the degree to which proposed climate change activities are likely to address the key climate risks evident in the locality.

The study reviewed 90 single/lower tier LAs and just six upper tier LAs, but a number of the documents reviewed e.g. Local Flood Risk Management Strategies and transport strategies (particularly Local Transport Plans) are produced by upper/single tier LAs. A future review should include all upper tier LAs that link to those lower tier LAs in the sample to ensure more comprehensive coverage.

As a general comment, it would be helpful in future for a review to tie together more closely the determination of the planning applications against relevant policies (eg, on water efficiency, heat) in the local plans for the area, and/or noted where particular plan policies were limited, out of date, or absent.

This review has provided a snapshot of current priorities in LEP strategies; it would be interesting to review action on the ground after three years and assess the degree to which proposals have been put into practice. In addition, it is difficult to generalise from the 16 LEPs to all LEPs across England because the majority were coastal and located in the south east of England, where climate risks are focused. A review of the key documentation for all LEPs would provide a more comprehensive overview.

Appendices

A Identification and Selection of LAs and LEPs at High Climate Risk - Methodology

A.1 Introduction

The project brief set out the requirement to understand the adaptation actions being undertaken or planned by local authorities and LEPs that are already at risk from one or more climate impacts:

- River / Coastal Flooding
- Surface Water Flooding
- Coastal Erosion
- Water Scarcity / Drought
- Heat Stress

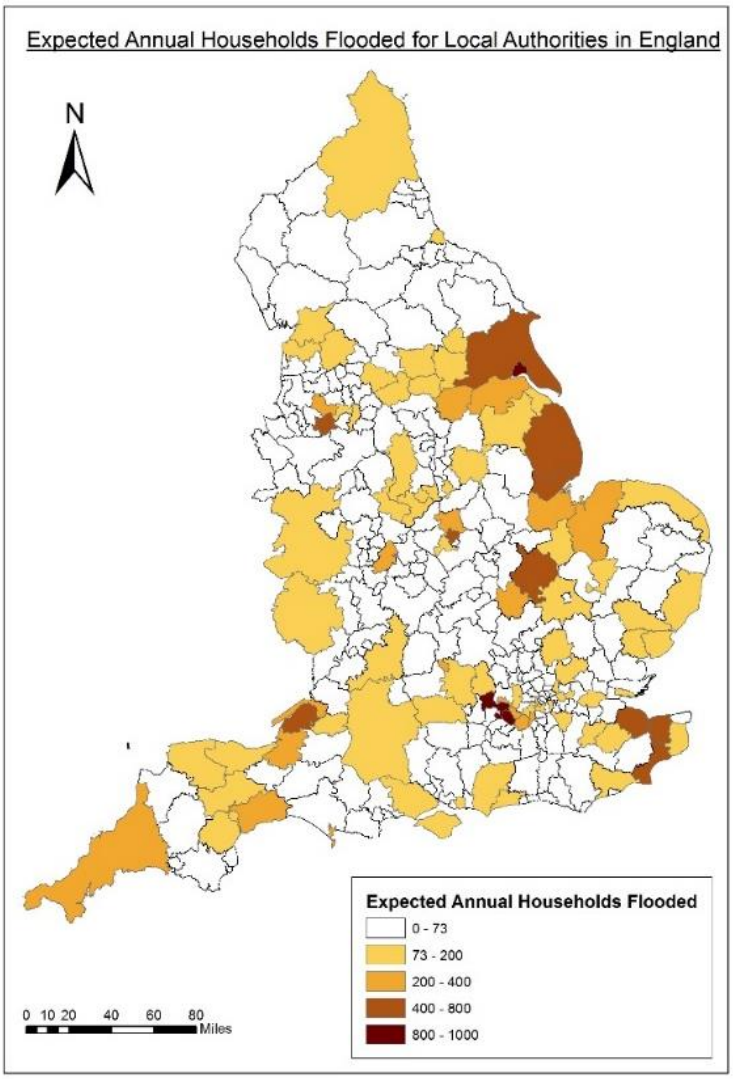
Our approach has identified local authorities at risk of one or more climate impacts to produce a sample which is representative of the five individual risks and those with multiple risks. The sample includes a spread of other characteristics such as geographical spread, urban/rural mix, single tier and multi-tier authorities and varying levels of vulnerability to climate change.

A.2 River/Coastal Flooding

The project brief required the use of the Preliminary Estimated Annual Households Flooded (EAHF) index. The underlying data, prepared by HR Wallingford (2014) for the ASC, using the Environment Agency's 2013 National Flood Risk Assessment (NaFRA), and OS MasterMap address layer, 2013, has been filtered to identify the top ranking local authorities (Table A-1).

The map below has been produced by JBA using the EAHF data analysed for the ASC by HR Wallingford for river and coastal flooding to illustrate the geographical distribution of the top ranking authorities.

Figure A-1: Expected Annual Households Flood (EAHF) for Local Authorities in England



The top ranking local authorities at the highest risk of river/coastal flooding by Expected Annual Households Flooded:

Table A-1: Coastal / Fluvial Flooding - Top ranking Local Authorities by EAHF

Coastal / Fluvial Flooding Top ranking Local Authorities - EAHF based on NaFRA counts	Single / Lower	Upper
City of Kingston upon Hull	Single	
Runnymede	Lower	Surrey
Windsor and Maidenhead	Single	
Boston	Lower	Lincolnshire
Shepway	Lower	Kent
Warrington	Single	
Swale	Lower	Kent
Canterbury	Lower	Kent
North Somerset	Single	
Huntingdonshire	Lower	Cambridgeshire
East Lindsey	Lower	Lincolnshire
City of Leicester	Single	
East Riding of Yorkshire	Single	
Spelthorne	Lower	Surrey
Doncaster	Single	
City of Bristol	Single	
Weymouth and Portland	Lower	Dorset
Oxford	Lower	Oxfordshire
South Holland	Lower	Lincolnshire
Charnwood	Lower	Leicestershire
Cornwall	Single	
Slough	Single	

A.3 Surface Water

Our approach to identifying at risk local authorities used an existing dataset prepared by HR Wallingford (2012) for the ASC, which had analysed the number of properties at risk for the periods 2001, 2008 and 2011. This is data that local authorities are familiar with, providing a good measure of relative risk at the local authority scale for planning purposes and was available to local authorities at the time of publication of the draft surface water management plan guidance in 2009, updated in 2010.

It was agreed with the ASC that 2011 data concerning 200 year risk for surface water should be used as this data was readily available within the project timeframe. Local authorities were selected from the 200yr deep dataset and ranked based on high to low risk. These were cross-checked against the 2008 dataset. The same high risk authorities appeared in both rankings, with the exception of Basildon and Dacorum Councils, which only appeared in one period. These were included in the final selection of local authorities for review, presented below:

Table A-2: Surface water risk - High risk Local Authorities

High risk Local Authorities 2008 & 2011 properties at risk of flooding, 200 yr deep dataset	Lower / Single	Upper
Birmingham	Single	
Cornwall	Single	
Leeds	Single	
Bromley London Borough	Single	
Wiltshire	Single	
Medway	Single	
Bradford	Single	
Croydon London Borough	Single	
Kirklees	Single	
Calderdale	Single	
The City of Brighton and Hove	Single	
Sheffield	Single	
Barnet London Borough	Single	
Wycombe	Lower	Buckinghamshire
County Durham	Single	
Dudley	Single	
East Riding of Yorkshire	Single	
City of Bristol	Single	
Luton	Single	
Central Bedfordshire	Single	
Harrow London Borough	Single	
Lewisham London Borough	Single	
Brent London Borough	Single	
Basingstoke and Deane	Lower	Hampshire
City of Leicester	Single	
Basildon	Lower	Essex
Dacorum	Lower	Hertfordshire

A.4 Coastal Erosion

A dataset was provided by the ASC, prepared by HR Wallingford (2012), which had analysed the number of properties in zones of coastal erosion defined by the National Coastal Erosion Risk Map (NCERM) by local authority for the years: 2001, 2008 and 2011. The dataset included a list of authorities providing a count of properties behind eroding coastlines for 2011. This list was ranked to provide a sample of the local authorities at most risk of coastal erosion. Consideration was given to the relative priority of properties with and without coastal protection under present and future policy. It was proposed that the fact that properties may or may not have protection should not be taken into account as the project brief required a list of authorities at current climate risk and local authorities should still be taking coastal erosion risk into account even if there is protection in place.

The list of local authorities at highest risk of coastal erosion based on the above data is presented below:

Table A-3: Coastal erosion risk - Local Authorities ranked based on properties at risk

Coastal Erosion Local Authorities located behind eroding coastlines Ranked based on properties at risk 2011	Lower / Single	Upper
Arun District	Lower	West Sussex
Worthing District	Lower	West Sussex
Bournemouth	Single	
North Norfolk District	Lower	Norfolk
East Riding of Yorkshire	Single	
Adur District	Lower	West Sussex
Eastbourne District	Lower	East Sussex
Suffolk Coastal District	Lower	Suffolk
Cornwall	Single	
Hastings District	Lower	East Sussex
Rother District	Lower	East Sussex
Tendring District	Lower	Essex
Poole	Single	
Great Yarmouth District	Lower	Norfolk
Chichester District	Lower	West Sussex
Wealden District	Lower	East Sussex
Hartlepool	Single	
Waveney District	Lower	Suffolk
New Forest District	Lower	Hampshire
Havant District	Lower	Hampshire
Isle of Wight	Single	
City of Southampton	Single	
Shepway District	Lower	Kent

A.5 Water Scarcity/Drought

There was no publicly available national dataset identifying local authorities at risk of water scarcity/drought.

The publication 'Water stressed areas - final classification, July 2013'[27] identifies water stress areas by water company, based on a review of current (at the time of publication) and future water usages and climate change scenarios. These water stressed areas are largely in the south east of England and London.

We developed a combined approach to identify the sample of local authorities in this climate risk category. Local authorities were identified based on two factors:

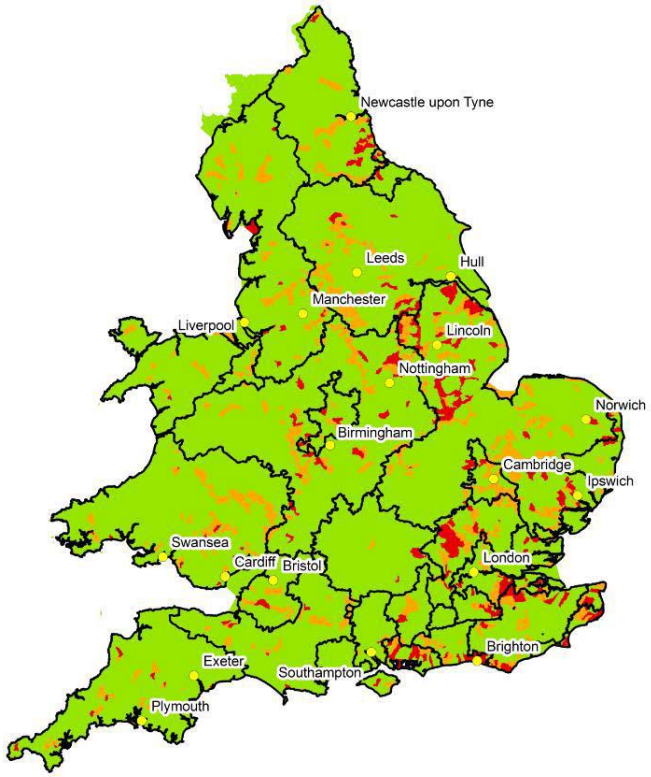
- Location within a water company area with a 'Final Stress' climate risk classification of serious (Figure A-2) and;
- Location in an area with a classification of 'serious' at a water body scale (Figure A-3).

[27] Environment Agency/Natural Resources Wales - Water stressed areas - final classification https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/244333/water-stressed-classification-2013.pdf

FigureA-2: Water Company Stress Areas

Water Company Area	2013 Classification					
	Current Stress	Future Scenario 1	Future Scenario 2	Future Scenario 3	Future Scenario 4	Final Stress
Affinity Water (formerly Veolia Water Central)	S	S	S	S	S	Serious
Affinity Water (formerly Veolia Water East)	S	S	S	S	S	Serious
Affinity Water (formerly Veolia Water South East)	S	S	S	S	S	Serious
Anglian Water	S	S	S	S	S	Serious
Bristol Water	M	M	M	M	M	Not Serious
Cambridge Water	M	M	M	M	M	Not Serious
Cholderton & District Water	M	M	M	M	M	Not Serious
Dee Valley Water	M	M	M	M	M	Not Serious
Dwr Cymru Welsh Water	M	M	M	M	M	Not Serious
Essex & Suffolk Water	S	S	S	S	S	Serious
Northumbrian Water	M	M	M	M	M	Not Serious
Portsmouth Water	M	S	M	S	M	Not Serious
Sembcorp Bournemouth Water	L	M	M	M	L	Not Serious
Severn Trent Water	M	M	M	M	M	Not Serious
South East Water	S	S	S	S	S	Serious
South Staffordshire Water	M	M	M	M	M	Not Serious
South West Water	M	M	M	M	M	Not Serious
Southern Water	S	S	S	S	S	Serious
Sutton & East Surrey Water	S	S	S	S	S	Serious
Thames Water	S	S	S	S	S	Serious
United Utilities	M	M	M	M	M	Not Serious
Veolia Water Projects	M	M	M	M	M	Not Serious
Wessex Water	M	M	M	M	M	Not Serious
Yorkshire Water	M	M	M	M	M	Not Serious

Figure A-3: Water Body Stress Map (Figure 2 from EA Report - Map showing final water body stress classification at a water body scale)



Using the two sources outlined above local authorities were identified in areas at the highest risk of water stress. The local authorities in Table A-4 below are in areas with two or more water stressed Water Resource Zones (WRZs) within their locality.

Figure A-4: Local Authorities in water stressed areas

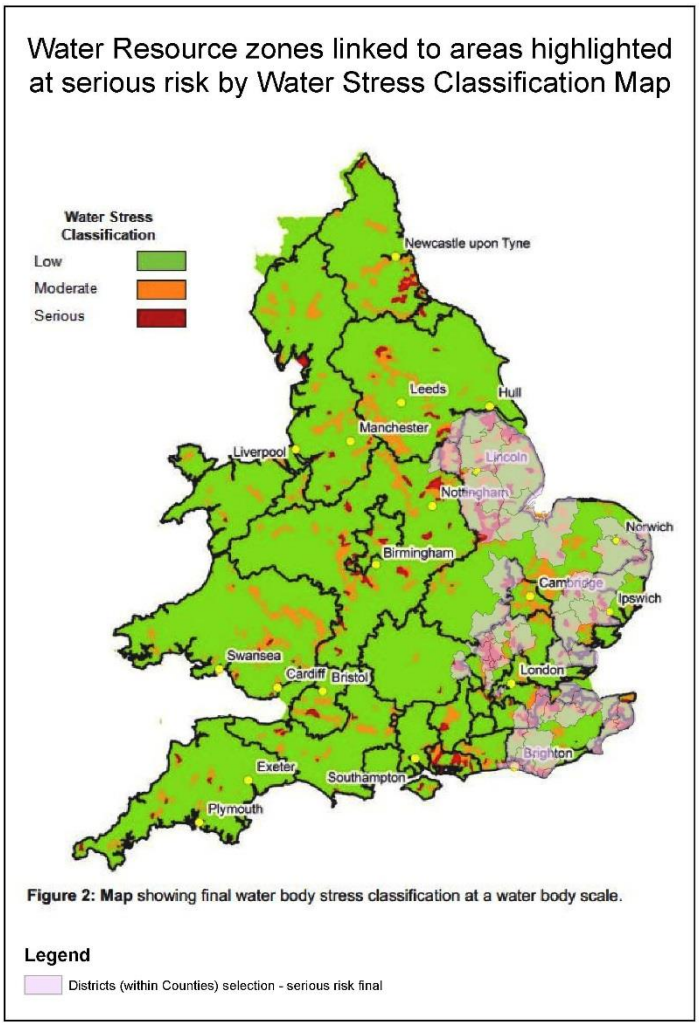


Table A-4: Water stress- Local Authorities in water stressed areas

Local Authority	Water Company / Companies	Lower / Single	Upper	No WRZs
Adur	Southern	Lower	West Sussex	2
Babergh	Anglian	Lower	Suffolk	2
Braintree	Anglian	Lower	Essex	2
Canterbury	Veolia Water South East Southern Water	Lower	Kent	3
Central Bedfordshire	Anglian Veolia Water Central	Single		3
Dacorum	Thames Veolia Water Central	Lower	Hertfordshire	3
Dover	Veolia Water South East Southern Water	Lower	Kent	2
East Hertfordshire	Thames Veolia Water Central	Lower	Hertfordshire	2
East Lindsey	Anglian	Lower	Lincolnshire	2
Hillingdon London Borough	Veolia Water Central	Single		2
Lewes District	Sutton & East Surrey Water Southern	Lower	East Sussex	2
Maidstone	South East Water	Lower	Kent	2
Mid Suffolk	Anglian	Lower	Suffolk	2
Mid Sussex	Sutton & East Surrey Water Southern	Lower	West Sussex	2
Sevenoaks	Sutton & East Surrey Water Thames Water South East Water	Lower	Kent	3

Local Authority	Water Company / Companies	Lower / Single	Upper	No WRZs
Shepway	Veolia Water South East	Lower	Kent	2
South Kesteven	Anglian	Lower	Lincolnshire	2
Swale	Southern South East	Lower	Kent	2
Wealden	Sutton & East Surrey Water South East	Lower	East Sussex	2
West Lindsey	Anglian	Lower	Lincolnshire	3

A.6 Heat

In selecting local authorities and their understanding of heat risk, data from the UKCP09 website, which is readily available to all councils, was used.

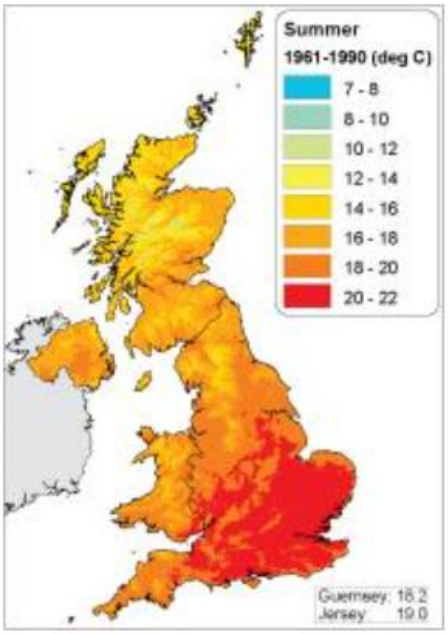
Local authorities at risk of extreme high temperatures were identified based on the use of two datasets:

- UKCP09 data for mean day maximum temperatures (°C) for 2050 under the medium emissions scenario.
- This data was overlaid with the population density map from ONS used to populate local authority boundaries with the most dense category (23,700+ per km2) producing 78 authorities. Population density was selected as a contributing aspect to the urban heat island effect.

The two datasets were merged to produce a sample list of 44 local authorities. This included those authorities that are both predicted to be susceptible to temperatures of 24°C and over by 2050s and currently are the most densely populated. Birmingham and Manchester do not appear in the ranking based on the UKCP09 heat data; however, these locations were included in the rankings due to population density and local intelligence concerning evidence of the urban heat island effect. We considered that local authorities would be most likely to view themselves as vulnerable to heat stress in relation to high absolute temperatures rather than a change in temperature although we acknowledge this is an alternative analytical approach that could have been adopted.

The list of highest risk authorities based on the above methodology is presented in Table A-5 below.

Figure A-5:UKCP09 maximum temperatures 2050 medium emissions scenario[28]



Summer

[28] © UK Climate Projections 2009

Table A-5: Heat risk - Local Authorities ranked based on population density

Heat Local Authorities identified to be at risk of high temperatures ranked by population density (100s per km^2)	Lower / Single
Islington	Single
Kensington and Chelsea	Single
Hackney	Single
Tower Hamlets	Single
Lambeth	Single
Hammersmith and Fulham	Single
City of Westminster	Single
Camden	Single
Southwark	Single
Wandsworth	Single
Haringey	Single
Newham	Single
Lewisham	Single
Brent	Single
Waltham Forest	Single
Ealing	Single
Greenwich	Single
Merton	Single
Redbridge	Single
City of Southampton	Single
Harrow	Single
Manchester	Single
Sutton	Single
Slough	Single
Birmingham	Single
Reading	Single
Bexley	Single
Sandwell	Single
City of Wolverhampton	Single
Dudley	Single
Walsall	Single

A.7 Local Authority Sample

The sample list of 90 local authorities below identifies the relevant climate risks for each authority. Figures 2-1 and 2-2 are included in the main report.

Table A-6: Local Authority web review sample list

Figure 2-1 & 2-2 No.	LA name	River/coastal flooding	Surface water flooding	Coastal erosion	Heat	Water scarcity	Total No. risks	Lower	Upper	Single / London	Coast
1	Adur			1		1	2	Lower	West Sussex		✓
2	Arun			1			1	Lower	West Sussex		✓
3	Babergh					1	1	Lower	Suffolk		✓
4	Birmingham		1		1		2			Single	
5	Boston	1					1	Lower	Lincolnshire		✓
6	Bournemouth			1			1			Single	✓
7	Bradford		1				1			Single	
8	Braintree					1	1	Lower	Essex		
9	Calderdale		1				1			Single	
10	Canterbury	1				1	2	Lower	Kent		✓
11	Central Bedfordshire		1			1	2			Single	
12	Charnwood	1					1	Lower	Leicestershire		
13	Chichester			1			1	Lower	West Sussex		✓
14	City of Bristol	1	1				2			Single	✓
15	City of Kingston upon Hull	1					1			Single	✓
16	City of Leicester	1	1				2			Single	
17	City of Southampton			1	1		2			Single	✓
18	Cornwall	1	1	1			3			Single	✓
19	County Durham		1				1			Single	✓
20	Dacorum		1			1	2	Lower	Hertfordshire		
21	Doncaster	1					1			Single	

Figure 2-1 & 2-2 No.	LA name	River/coastal flooding	Surface water flooding	Coastal erosion	Heat	Water scarcity	Total No. risks	Lower	Upper	Single / London	Coast
22	Dover					1	1	Lower	Kent		✓
23	Dudley		1				1			Single	
24	East Hertfordshire					1	1	Lower	Hertfordshire		
25	East Lindsey	1				1	2	Lower	Lincolnshire		✓
26	East Riding of Yorkshire	1	1	1			3			Single	✓
27	Eastbourne			1			1	Lower	East Sussex		✓
28	Great Yarmouth			1			1	Lower	Norfolk		✓
29	Hartlepool			1			1			Single	✓
30	Hastings			1			1	Lower	East Sussex		✓
31	Havant			1			1	Lower	Hampshire		✓
32	Huntingdonshire	1					1	Lower	Cambridgeshire		
33	Kirklees		1				1			Single	
34	Leeds		1				1			Single	
35	Lewes					1	1	Lower	East Sussex		✓
36	Luton		1				1			Single	
37	Maidstone					1	1	Lower	Kent		
38	Manchester				1		1			Single	
39	Medway		1				1			Single	✓
40	Mid Suffolk					1	1	Lower	Suffolk		
41	Mid Sussex					1	1	Lower	West Sussex		
42	New Forest			1			1	Lower	Hampshire		✓
43	North Norfolk			1			1	Lower	Norfolk		✓
44	North Somerset	1					1			Single	✓
45	Oxford	1					1	Lower	Oxfordshire		
46	Poole			1			1			Single	✓

Figure 2-1 & 2-2 No.	LA name	River/coastal flooding	Surface water flooding	Coastal erosion	Heat	Water scarcity	Total No. risks	Lower	Upper	Single / London	Coast
47	Reading				1		1			Single	
48	Rother			1			1	Lower	East Sussex		✓
49	Runnymede	1					1	Lower	Surrey		
50	Sandwell				1		1			Single	
51	Sevenoaks					1	1	Lower	Kent		
52	Sheffield		1				1			Single	
53	Shepway	1		1		1	3	Lower	Kent		✓
54	Slough	1			1		2			Single	
55	South Holland	1					1	Lower	Lincolnshire		✓
56	South Kesteven					1	1	Lower	Lincolnshire		
57	Spelthorne	1					1	Lower	Surrey		
58	Suffolk Coastal			1			1	Lower	Suffolk		✓
59	Swale	1				1	2	Lower	Kent		✓
60	Tendring			1			1	Lower	Essex		✓
61	The City of Brighton and Hove		1				1			Single	✓
62	Warrington	1					1			Single	
63	Waveney			1			1	Lower	Suffolk		✓
64	Wealden			1		1	2	Lower	East Sussex		✓
65	West Lindsey					1	1	Lower	Lincolnshire		
66	Weymouth and Portland	1					1	Lower	Dorset		✓
67	Wiltshire		1				1			Single	
68	Windsor and Maidenhead	1					1			Single	
69	Worthing			1			1	Lower	West Sussex		✓

Figure 2-1 & 2-2 No.	LA name	River/coastal flooding	Surface water flooding	Coastal erosion	Heat	Water scarcity	Total No. risks	Lower	Upper	Single / London	Coast
70	Wycombe		1				1	Lower	Buckinghamshire		
71	Barnet London Borough		1				1			Single	
72	Brent London Borough		1		1		2			Single	
73	Bromley London Borough		1				1			Single	
74	Camden London Borough				1		1			Single	
75	City of Westminster London Borough				1		1			Single	
76	Hackney London Borough				1		1			Single	
77	Hammersmith and Fulham London Borough				1		1			Single	
78	Haringey London Borough				1		1			Single	
79	Harrow London Borough		1		1		2			Single	
80	Hillingdon London Borough					1	1			Single	
81	Islington London Borough				1		1			Single	
82	Kensington and Chelsea London Borough				1		1			Single	
83	Lambeth London Borough				1		1			Single	
84	Lewisham London Borough		1		1		2			Single	
85	Newham London Borough				1		1			Single	
86	Redbridge London Borough				1		1			Single	
87	Southwark London Borough				1		1			Single	
88	Sutton London Borough				1		1			Single	

Figure 2-1 & 2-2 No.	LA name	River/coastal flooding	Surface water flooding	Coastal erosion	Heat	Water scarcity	Total No. risks	Lower	Upper	Single / London	Coast
89	Tower Hamlets London Borough				1		1			Single	
90	Wandsworth London Borough				1		1			Single	

A.8 Selection of Planning Applications for Web Review

The ten LPAs selected for the planning application review, and the basis for their selection, were as follows:

Table A-7 Selection Basis for Local Planning Authorities

LA name	River / coastal flooding	Surface water flooding	Coastal erosion	Heat	Water scarcity
City of Bristol	✓	✓			
City of Leicester	✓	✓			
Dudley		✓			
East Riding of Yorkshire	✓	✓	✓		
Sevenoaks					✓
Slough	✓			✓	
Suffolk Coastal			✓		
Swale	✓				✓
Brent London Borough		✓		✓	
Lewisham London Borough		✓		✓	

Planning applications were then selected from the chosen LPAs based on the likely presence of climate risk at the proposed development site as shown in Table A-8.

Table A-8 Planning application selection

Climate risk	Basis of planning application selection
River/ coastal flooding	The list of LPAs selected on the basis of river/coastal flood risk was sent to the Environment Agency (EA) who then provided a list of all applications determined within that LPA (since 2014) which the EA were consulted on in relation to flood risk.
Surface water flooding	The list of LPAs selected on the basis of surface water flood risk was sent to the EA who then provided a list of all applications determined in that LPA (since 2014) which the EA were consulted on in relation to flood risk.
Coastal erosion	The list of LPAs selected on the basis of coastal erosion was be sent to the EA who then provided a list of all applications determined in that LPA (since 2014) which the EA were consulted on in relation to tidal flooding.
Heat stress	It was assumed to apply equally throughout local authority area therefore planning applications were chosen at random from the LPA online planning website.
Water scarcity	It was assumed to apply equally throughout local authority area therefore planning applications were chosen at random from the LPA online planning website.

For the purposes of the planning application review each application was identified as being selected under one of the following categories:

- river or surface water flooding (EA consulted re. any type of flood risk);
- coastal erosion (EA consulted re. tidal flood risk); or
- heat or water scarcity (random).

The final identification of the ten planning applications per LPA involved the following process:

- a list of flood and coastal erosion planning applications, which the EA had been consulted on, was obtained;
- for LPAs with policies addressing one climate risk:

+ Heat and water scarcity: LUC selected planning applications on a random basis, ensuring a mix of major and minor planning applications and geographic spread (if possible).

+ Flood and coastal erosion: LUC selected from EA consultation lists ensuring a mix of major and minor applications (if possible) and a geographic spread (if appropriate);

- for LPAs with policies addressing more than one climate risk:

+ Planning applications in relation to each climate risk were chosen in equal proportions. So, for example, if an LPA identified surface water flooding, heat and water scarcity risks then six applications were selected on a random basis (and investigated in relation to heat and water scarcity) and four with regards to surface water from the EA list;

- it was ensured that all applications selected had final decisions and had been determined since the beginning of 2013. This was in order to provide the most up to date evidence on whether and how climate change adaptation was being implemented through the development management process since the publication of the NPPF in 2012.

The selection of planning applications was designed to provide a spread of residential and non-residential proposals or major and minor scale. Major developments are defined as those which:

- comprise more than ten residential units;
- have floorspace greater than 1000m2; or
- have site area greater than 1 hectare.

The sample of 100 planning applications was broken down as follows:

Table A-9: breakdown of planning application sample by size and type

	Major development	Minor development	Missing data	TOTAL
Residential	31	34		65
Non residential	16	15	4	35
TOTAL	47	49	4	100

While carrying out the planning application reviews in a number of cases the necessary documents were not available online or following contact with the LPA. Where adequate information could not be gleaned from available documentation replacement planning applications were selected.

Where the same issue applied to all planning applications within a particular LPA, replacements were selected from one of the other nine LPAs, using the same selection basis as above, and focusing on the same climate risks. For example, the applications which were originally selected from Slough LPA all had to be replaced due to insufficient available documentation. The applications selected for 'River or surface water flooding' were replaced with applications from East Riding of Yorkshire LPA, while those selected on the basis of 'Heat or Water Scarcity' were replaced with applications from the London Borough of Brent.

For each selected planning application the overarching aim was to answer the following broad question:

'To what extent have relevant local planning policies on climate change adaptation been applied in deciding the planning application and imposing conditions on any permitted development?'

The requirements of local planning policies with regard to addressing climate risks were previously identified through the web review of each LPA's Local Plan. The review of the planning applications therefore represented the next step in assessing the implementation of Local Plan policies at planning application scale. The review identifies whether the planning officer's reports (and if appealed, the appeal decision) refers to the local strategic or development management policies identified by the web review as implicitly or explicitly relating to climate risk. It also records the types of climate risk to which any conditions for permitted development relate and the adaptation measures required. Consultation responses by the Environment Agency and local water company were also examined to identify which type of climate risk these related to, if any. Where relevant, any objection by the Environment Agency, for climate risk related reasons, was noted.

The key documents that were reviewed and the key questions which were asked through the review are summarised below:

Table A-10: LPA Planning Application Evidence Review

Evidence/Source document supporting planning application	Key questions
Planning application form	Type of application Scale Location Whether flood risk identified
Flood Risk Assessment (FRA)	Was an FRA submitted with the application? Did the FRA apply the climate change allowances in the NPPF?
Environment Agency (EA) consultation response	What was the EA's initial response in relation to climate risk (objection, conditions etc.)? If EA initially objected in relation to climate risk, what were the reasons (e.g. unsatisfactory FRA)? Was any initial EA objection regarding climate risk subsequently withdrawn?
Water company consultation response	What was the water company's initial response in relation to climate related issues (objection, conditions etc.)? To which climate related issues did the response relate (surface water flooding/ capacity of local drainage network or water scarcity/ drought)?
Planning officer's report	Are local planning policies which address climate risk cited in the reasons for the decision and if so, to which climate risks do they relate? Do the Sequential Test and, if relevant, the Exception Test, take account of climate change? (may also be evidenced from FRA)
Decision notice (and any appeal decision)	If permitted: to which climate risks do planning conditions relate? what types of adaption measure are conditioned? If refused, to which climate risks does refusal relate?
Other	Any other comments in relation to climate change adaptation, e.g. changes to original application required to provide climate change adaptation

A.8.1 Overview of the sample of planning applications

Table A-11 provides an overview of the planning application sample.

As noted above, the original intention was to examine ten applications from each local authority, focused on the climate risk (or split between multiple risks where relevant). As the study progressed it became clear that some LPAs did not publish key documents (such as committee reports) on their on-line planning application websites. Where it proved impractical to obtain these documents within the timeframe available for the work, it was necessary to reallocate the 'quota' of applications to another of the planning authorities with similar characteristics in terms of geography, climate risk and policy. This explains why the total numbers of applications considered for the London Borough of Brent and East Riding of Yorkshire are higher and those for the London Borough of Lewisham are lower.

Table A-11: Planning applications LPA sample

Local Planning Authority	River or surface water flooding	Coastal erosion	Heat or water scarcity	Total
Bristol City Council	10			10
Dudley Metropolitan Borough Council	10			10
East Riding of Yorkshire Council	15			15
Leicester City Council	10			10
London Borough of Brent	10		14	24
London Borough of Lewisham			1	1
Sevenoaks District Council			11	11
Suffolk Coastal District Council		10		10
Swale Borough Council	5		4	9
Total	60	10	30	100

Table A-12 shows the extent to which climate risk was a factor in Environment Agency objections, Water Company objections and the preparation of Committee Reports for each of the Local Planning Authorities included in this part of the review. It shows that in 28% of cases the Environment Agency objected on the grounds of climate risk, that Water Companies did not object in any cases and that climate risk was a key issue in Committee Reports in just over 70% of cases. There are significant variations between different planning authorities, though for the most part this reflects the different climate risks analysed in each.

Table A-12: Planning applications review - objection grounds

Local Planning Authority	EA objection on grounds of climate risk	WC objection on grounds of climate risk	Climate Risk key issue in Committee Report	Total Number of Planning Applications
Bristol City Council	2	0	9	10
Dudley Metropolitan Borough Council	4	0	8	10
East Riding of Yorkshire Council	5	0	12	15
Leicester City Council	7	0	10	10
London Borough of Brent	2	0	12	24
London Borough of Lewisham	0	0	1	1
Sevenoaks District Council	0	0	3	11
Suffolk Coastal District Council	6	0	9	10
Swale Borough Council	2	0	7	9
Total	28	0	71	100

Table A-13 shows the overall outcomes for the sample of 100 planning applications. This shows that that just over 70% of applications were granted conditional planning consent. 28% of applications were refused planning consent. Of these, one was appealed but subsequently dismissed.

Table A-13: Planning application outcomes

Local Planning Authority	Approved with conditions	Refused	Granted on appeal	Refused on appeal	Total
Bristol City Council	6	4			10
Dudley Metropolitan Borough Council	9	1			10
East Riding of Yorkshire Council	10	5		1	15
Leicester City Council	9	1			10
London Borough of Brent	14	10			24
London Borough of Lewisham	1				1
Sevenoaks District Council	9	2			11
Suffolk Coastal District Council	8	2			10
Swale Borough Council	6	3			9
Total	72	28	0	1	100

A.9 Evidence Review Framework - Local Enterprise Partnership

LEPs are partnerships between local authorities and businesses, established in 2011 by the Department for Business, Innovation and Skills. They help determine local economic priorities and lead economic growth and job creation with the local area. They decide priorities for investment in roads, buildings and facilities in the area. 39 LEPs have been created in England and generally cover several local authorities, occasionally overlapping in more than one LEP area. Local authority leaders are represented on LEP boards.

Table A-14: LEP Evidence Review Framework

Source	Evidence		
	Why? (To demonstrate understanding of CC impacts)	**What? (Are plans in place to address CC impacts?)**	**Adaptation Action Evidence**
LEP strategy	Overarching strategy. Does it evidence of awareness of current and future climate risks?	Does strategy directly address climate risks?	Evidence of specific actions being undertaken
Strategic Economic Plan and Growth Plan	Long-term Growth Plan detailing strategic, over-arching ambitions? Does it evidence awareness of current and future climate risks	Does Plan directly address climate risks? Are there adaptation priorities?	Evidence of specific actions being undertaken
Growth Deal	Brings together local, national and private funding as well as new freedoms and flexibilities to focus on agreed priorities.	Does the Deal directly address climate risks? Are there adaptation priorities?	Evidence of specific actions being undertaken.
LEP Business Plan	Focuses on how the LEP will deliver it objectives. Does the Plan evidence awareness of current and future climate risks	Does Plan directly address climate risks? Are there adaptation priorities?	Evidence of specific actions being undertaken
EU Investment Strategy	Sets out priorities for investing EU Structural Funds allocation. Does it evidence awareness of current and future climate risks	Does the Strategy include priorities to address climate risks and adaptation priorities/actions?	Evidence of specific actions being undertaken
Local Growth Fund Settlement	Detail overall programmes and individual projects that will be supported by the LEP; these may be targeted at climate change adaptation (e.g. flood risk management projects) and should all be resilient to future climate change.	Do individual projects agreed through the Growth Fund incorporate or target climate change adaptation	N/A
LEP Tourism Strategies	Climate change brings both opportunities and challenges for domestic tourism. Many LEPs have taken over responsibility for strategic tourism priorities from local authorities.	Do strategies or plans consider the potential impact of climate change on tourism and identify measures to capitalise upon or mitigate its effects?	Evidence of understanding of risks/ opportunities and development of actions to address these

The approach to identifying which LEPs should be reviewed was intended to ensure inclusion of those LEPs in which the LAs at highest climate risk were located. For each of the climate risks (other than water stress) we identified the top 5 ranking LAs and the LEPs in which they are situated. As water stressed LAs are not ranked, we have identified all LAs that are at multiple climate risk including water stress.

Local authorities at highest climate risk and the LEPs in which they are situated[29]:

- River and coastal flooding
    - City of Kingston upon Hull (Humber)
    - Runnymede (Enterprise M3)
    - Windsor and Maidenhead (Thames Valley Berkshire)
    - Boston (Greater Lincolnshire)
    - Shepway (South East)
- Surface water flooding
    - Birmingham (Greater Birmingham and Solihull)
    - Cornwall (Cornwall and the Isles of Scilly)
    - Leeds (Leeds City Region)
    - Bromley (London)
    - Wiltshire (Swindon and Wiltshire)
- Coastal Erosion
    - Arun (Coast to Capital)
    - Worthing (Coast to Capital)
    - Bournemouth (Dorset)
    - North Norfolk (New Anglia)
    - East Riding of Yorkshire (York and North Yorkshire)
- Heat
    - Islington (London)
    - Kensington and Chelsea (London)
    - Hackney (London)
    - Tower Hamlets (London)
    - Lambeth (London)
- Water stress (not ranked). Instead we identified those local authorities that have multiple risks including water stress, which are:
    - Shepway (South East)
    - Central Bedfordshire (South East Midlands)
    - Adur (Coast to Capital)
    - East Lindsey (Greater Lincolnshire)
    - Swale (South East)
    - Canterbury (South East)
    - Dacorum (Hertfordshire)
    - Wealden (South East)

Those highlighted are the 16 LEPS that were included in the web review.

29 LEP/LA location identified from BIS (2012) Local authority (district/unitary) areas covered by LEPs. - https://www.gov.uk/government/publications/local-enterprise-partnerships-local-authority-mapping

Table A-15: Evidence Review LEPs

LEP	Local authorities at high climate risk
Coast to Capital	Adur, Arun, Worthing
Cornwall and the Isles of Scilly	Cornwall
Dorset	Bournemouth
Enterprise M3	Runnymede
Greater Birmingham and Solihull	Birmingham
Greater Cambridge & Greater Peterborough	
Greater Lincolnshire	Boston, East Lindsey
Greater Manchester	
Hertfordshire	Dacorum
Humber	City of Kingston upon Hull
Leeds City Region	Leeds
Leicester and Leicestershire	
London	Bromley, Islington, Kensington and Chelsea, Hackney, Tower Hamlets, Lambeth
New Anglia	North Norfolk
North Eastern	
Oxfordshire	
Sheffield City Region	
Solent	
South East	Shepway, Swale, Canterbury, Wealden
South East Midlands	Central Bedfordshire
Swindon and Wiltshire	Wiltshire
Tees Valley	
Thames Valley Berkshire	Windsor and Maidenhead
West of England	
York and North Yorkshire	East Riding of Yorkshire

B Evidence Framework – Web Review

B.1 Evidence Review Framework - Local Authority Survey

The sources of evidence for the web review of 90 local planning authorities and the rationale for including the evidence is presented in Table B-1 below.

Table B-1: Research evidence sources used in web review

Sources	Evidence				LA level applicability
	Why (To demonstrate understanding of current and future climate risks)	**What (Are plans in place to address current and future climate risks?)**	**Adaptation Action (Any evidence of action to address current and future climate risks? – To be captured as a dropdown list of options in the survey template)**	**Statutory / Additional**	
Climate change plans					
LCLIP Local Climate Impacts Profile	Local evidence of weather events and consequences. Provides evidence base of types of weather events, what happened, impacts and indication of costs.	Spreadsheet and supporting media articles of historic impacts.	N/A	Additional	All
CCRA Climate Change Risk Assessment	Provides evidence of understanding of CC risks at local authority, upper, regional level.	Supporting Local Authority Adaptation Action Plans	N/A	Additional	All
SWIMS Severe Weather Impacts Monitoring Systems	Local evidence of weather events and consequences. Provides financial evidence base of types of weather events, identifies key risks and issues, informs business and resilience planning.	Online data capture facility	N/A	Additional	All
Climate Change Adaptation Strategy	Identification of specific impacts linked to CCRA and LCLIP (if they have them)	Strategy content setting out objectives and plans for climate change adaptation.	Refer to action plan	Additional	All
Climate Change Adaptation Action Plan	Identification of specific impacts linked to CCRA and LCLIP (if they have them).	Plan of action to deliver climate change adaptation.	Should include evidence of delivery on the ground	Additional	All
Corporate Plans					
Corporate Strategy/Plan	Does this include reference to CCRA/strategy if there is one or more generally to addressing climate change	May include specific objectives/actions	May identify previous activity that has been undertaken	Additional	All

Sources	Evidence				LA level applicability
	Why (To demonstrate understanding of current and future climate risks)	**What (Are plans in place to address current and future climate risks?)**	**Adaptation Action (Any evidence of action to address current and future climate risks? – To be captured as a dropdown list of options in the survey template)**	**Statutory / Additional**	
Health/Social Care & Emergency Planning					
Emergency Plan	Does this identify need to think ahead in terms of climate change and/or recognise that future climate change will need to be addressed through the emergency plan? Has climate change be identified as an element for consideration when reviewing/updating Emergency Plans?	Any planned activities with a more future facing approach to address climate change	N/A Plans unlikely to evidence action on the ground. Is there evidence of planning for increasing emergencies due to climate change?	Statutory document but not mandatory to include climate change	All
Joint Strategic Needs Assessment	Have potential implications of climate change for health and social care needs been identified?	Plans to address CC impacts on health and social care	May include some evidence of activity on the ground	Statutory document but not mandatory that covers climate change	Health and Wellbeing Boards (Single and upper tier)
Heatwave Plan	Have potential implications of future increase in temperatures been taken into account in the plan?	Plans to address impacts of increased heat risk for local communities	Will include evidence of planned activity and maybe some activity that has been undertaken.	Not statutory as separate document, but should be addressed within Emergency Plan. Not required to cover climate change.	All
Land-use Planning					
Local Plan Part 1 Post 'Published' stage	Local Plans need to reflect NPPF requirements to adopt proactive strategies to mitigate and adapt to CC. Does the LP refer to any Supplementary Guidance in regards to climate change?	Local Plan includes CC adaptation and mitigation, in strategic objectives, strategic policies, spatial policy, borough wide policies and development management policies (Recorded using list of	Unlikely. Plans do not identify delivery on the ground	Statutory document and should consider climate change	Local Planning Authority (lower and single)

Sources	Evidence				LA level applicability
	Why (To demonstrate understanding of current and future climate risks)	**What (Are plans in place to address current and future climate risks?)**	**Adaptation Action (Any evidence of action to address current and future climate risks? – To be captured as a dropdown list of options in the survey template)**	**Statutory / Additional**	
		options and stage – 'Published', 'Submitted', 'Found Sound', 'Adopted').			
Core Strategy Post PPS25 2007 onwards	Does this core strategy include reference to Climate change / climate change strategy?	Strategic objectives, strategic policies or Borough wide Policies which evidence on the need to address climate change	N/A Plans do not evidence delivery on the ground	Statutory and should address climate change	Local Planning Authority (Single and lower tier)
Development Management Policies and Plans	Does the Local Plan / Core Strategy include DMPs focussed on climate change adaptation?	Site allocations, adoption statement.	N/A Plans do not evidence delivery on the ground	Statutory	Local Planning Authority (Single and lower tier)
Sequential Test / Exception Test	Has the sequential/exception test been conducted taking climate change into account?	An assessment of the SFRA outcomes in regards to CC Site Plan Allocation or Development Plan Document	Is there evidence of probability of flooding taking CC into account? Inspectors reports in regards to flood risk and climate change	Statutory document – should consider climate change	Local Planning Authority (Single and lower tier)
SFRA Strategic Flood Risk Assessment	NPPF requires that SFRA applies the climate change allowances for projected increases in peak river flow/sea level rise	SFRA outcomes in relation to CC Local Plan Policies, Site Plan Allocations Document include references to SFRA and climate change Does the SFRA include climate change allowances in accordance with NPPF	Unlikely Plans do not identify delivery on the ground.	Statutory document – should consider climate change	Local Planning Authority (Single and lower tier)

Sources	Evidence				LA level applicability
	Why (To demonstrate understanding of current and future climate risks)	**What (Are plans in place to address current and future climate risks?)**	**Adaptation Action (Any evidence of action to address current and future climate risks? – To be captured as a dropdown list of options in the survey template)**	**Statutory / Additional**	
		guidance? Recommendations- management of flood risk, flood resilience measures, sequential test for allocations and compatible/low risk uses (Capture in list of options)			
Coastal Change Management Area	LPAs should reduce risk from coastal change - avoid inappropriate development in vulnerable areas or adding to impacts of coastal physical changes. Identify any area likely to be affected as a Coastal Change Management Area in regards to climate change?	Coastal Change Management Area designations which takes climate change into place Shoreline Management Plan which take climate change into account.	Unlikely Plans do not identify delivery on the ground	Statutory where relevant (i.e. for coastal authorities – should cover climate change	Coastal Local Planning Authority (Single and lower tier)
SA Sustainability Appraisal of Local Plan and other plans/strategies?	Integral part of Local Plan development to assess how the plan contributes to sustainable development. Is there a baseline assessment on climate change?	Sustainability Appraisal Reports which identify need to address climate change	Unlikely to cover delivery on the ground	Statutory and should cover climate change	Local Planning Authority (Single and lower tier)
SEA Strategic Environmental Assessment of plans and projects	Integral and iterative assessment of significant plans and projects. Is there a baseline assessment on climate change?	Environmental Reports which identify need to address climate change	Unlikely to cover delivery on the ground	Statutory for plans and projects of certain size/ significance and should cover climate change	All
CIL Community Infrastructure Levy Charging Schedules	Do these provide evidence of expenditure relating to Climate risk, e.g. Green Infrastructure.	Adopted CIL Charging schedule with clear priorities that address	Charging schedule unlikely to evidence previous activity.	Additional	Local Planning Authority (Single and lower tier)

Sources	Evidence				LA level applicability
	Why (To demonstrate understanding of current and future climate risks)	**What (Are plans in place to address current and future climate risks?)**	**Adaptation Action (Any evidence of action to address current and future climate risks? – To be captured as a dropdown list of options in the survey template)**	**Statutory / Additional**	
		CC			
Annual Monitoring Report	The central document in reporting on monitoring and assessment of the local plan on a set of key performance indicators.	Key Performance Indicators and additional indicators relating to CC	Monitoring Report	Statutory and should refer to climate change	Local Planning Authority (Single and lower tier)
Flooding, coastal erosion and water management					
LFRMS Local Flood Risk Management Strategy	Strategic Framework for local flood risk management, including surface water, groundwater and ordinary watercourse flooding. Should take climate change into account	Local Flood Risk Management Strategy and Local Measures which address climate change	Should evidence delivery on the ground	Statutory and should refer to climate change	LLFA (Single and upper tier)
FRMP Flood Risk Management Plan	Flood Risk Regulations 2009 requirement for Local Authorities identified at significant risk by Preliminary Flood Risk Assessment 2011. Do the objectives specifically refer to climate change?	Flood Risk Management Plan (by 2015) which incorporates need to address climate change. Should set out how the authority will work with communities to manage the risk.	May evidence activity already underway	Statutory for significant risk areas and should refer to climate change	LLFA (Single and upper tier)
SWMP Surface Water Management Plan	Guidance/simplified overarching framework to allow different organisations/shared understanding for most suitable solutions which address climate change	Surface Water Management Plan policies which outlines the preferred surface water management strategy in a given location.	May have some evidence of existing delivery on the ground	Additional	LLFA (Single and upper tier)
SMP Shoreline Management Plan	Identify most sustainable approach to managing the flood coastal erosion risks short, (0-20) medium (20-50)	Shoreline Management Plan Policy. Large-scale assessment of the risks associated with	May have some evidence of existing delivery on the ground	Additional	Coastal upper tier and lower tier

Sources	Evidence				LA level applicability
	Why (To demonstrate understanding of current and future climate risks)	**What (Are plans in place to address current and future climate risks?)**	**Adaptation Action (Any evidence of action to address current and future climate risks? – To be captured as a dropdown list of options in the survey template)**	**Statutory / Additional**	
	and long term (50-100) years which address climate change	coastal evolution and a policy framework to address these risks.			
Water Cycle Studies	Impact of a development or strategy on the water cycle taking account impacts of climate change. Uses water and planning evidence and the expertise to understand environmental and infrastructure capacity.	Assessment on water cycle for site or local authority area which addresses climate change.	Water Cycle Study	Additional	Local Planning Authority (single and lower tier)
Local Strategies and Plans					
Green Infrastructure Strategies / Plans	Green infrastructure provides adaptation opportunities, e.g. cool refuges, water management.	Local plans and policies. May not be explicitly stated, but implicit in actions	SuDS	Additional	All
Highway / Transport Strategies & Plans	Do highway maintenance and forward plans include climate risks?	Do plans consider climate change, e.g. increased flood risk, surface water, impacts of heat (tarmac melting)?		Additional	Single & Upper tier
Drainage Strategies	Do maintenance and forward plans include climate risks?	Do plans consider climate change, e.g. increased flood risk, surface water?	SuDs guidance	Additional	Single & Upper tier
Tourism Strategies	Plan for impacts on visitors due to opportunities and risks.	Tourism strategy, local plans and policies.	May include some evidence	Additional	All
Natural environment / biodiversity Strategies and Plans	Plan for impact on natural environment and biodiversity	Local plans and policies. May not be explicitly stated, but implicit in actions	May include some evidence	Additional	All

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