Natural England Commissioned Report NECR004

Climate change and biodiversity adaptation: the role of the spatial planning system

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Introduction

Natural England commission a range of reports from external contractors to provide evidence and advice to assist us in delivering our duties. The views in this report are those of the authors and do not necessarily represent those of Natural England.

Background

Increasing the capacity of the natural environment to adapt to climate change is a key priority for Natural England. The planning system is starting to consider climate change issues, though policies and plans are tending to focus on mitigation (ie preventing the causes) rather than adaptation (ie adapting to the changes).

Natural England commissioned this report to help identify the role the planning system could play in assisting biodiversity adaptation to climate change. The guidance has already been approved for internal use to provide policy implementation guidance to Natural England staff.

It is now being published because it is be relevant to regional and local planning bodies, developers and others involved in spatial planning processes and is referenced in the *Practice Guide* to accompany the new *Climate Change Planning Policy Statement* that can be seen at URL : **www.hcaacademy.co.uk/planning-and-climate-change**.

The key points addressed by the guidance are:

- The context for Natural England's engagement with climate change, including the likely impacts on biodiversity and the barriers to adaptation.
- The opportunities for facilitating biodiversity adaptation through spatial planning and development control, including regional and local plans and sustainability appraisals.

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Further information
This report can be downloaded from the Natural England website: **www.naturalengland.org.uk**. For information on Natural England publications contact the Natural England Enquiry Service on 0845 600 3078 or e-mail **enquiries@naturalengland.org.uk**.

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Summary

The project sought to identify the role the planning system could play in assisting biodiversity adaptation to climate change. Its primary purpose was to provide policy implementation guidance for Natural England staff, though it will also be of use to regional and local planning bodies, developers and others involved in spatial planning processes. The key points addressed by the guidance are:

- The context for Natural England's engagement with climate change, including the likely impacts on biodiversity and the barriers to adaptation.
- The opportunities for facilitating biodiversity adaptation through spatial planning and development control, including regional and local plans and Sustainability Appraisal.

The guidance uses the 12 inter-dependent guiding principles for effective biodiversity adaptation developed by Defra and the UK Biodiversity Partnership (2007) as a basis for identifying opportunities within the planning system.

Contents

1 Introduction 1

Context and role of this guidance 1

Why spatial planning should address climate change 1

2 Part A: Biodiversity adaptation to climate change: the context for action and engagement 3

Climate change - need for understanding 3

Climate change characteristics, dealing with uncertainty and 'no-regret' responses 3

'No regret', and 'low-regret' actions 5

'Multiple-benefit' actions and green infrastructure 5

3 How is climate change likely to affect biodiversity? 7

4 Biodiversity adaptation to climate change and barriers to its success 10

What is adaptation to climate change? 10

What is adaptation in the context of biodiversity? 10

Barriers to biodiversity adaptation success 11

Core actions to affect biodiversity adaptation to climate change 11

5 Key 'adaptation hooks' in legislation and national planning policy 13

6 Part B: Opportunities for improved biodiversity adaptation through the spatial planning system and development casework 16

Overarching principles of spatial planning in the context of biodiversity adaptation 16

Limitations and realistic goals 17

Overarching principles for environmentally sensitive plans and policies 17

7 Spatial plans: Regional Spatial Strategy and Development Plan documents 19

Integration of Defra core adaptation principles into Spatial Plans 21

Checklist of core actions and aspirations in relation to Development Plan preparation 31

8 Sustainability Appraisal (incorporating Strategic Environmental Assessment) 32

The scoping report 32

The sustainability report 33

Checklist of core actions and aspirations in relation to Natural England's engagement within sustainability appraisal 35

9 Development control casework 36

Broad principles 36

Applying the DEFRA principles for biodiversity adaptation within development control scenarios 36

Checklist of core actions and aspirations in relation to development control casework: 38

10 References 40

Appendices

Appendix 1 UKCIP02 headline climate change scenarios 41

Appendix 2 Detailed expansion of predicted 'biodiversity responses' to climate change: Defra (2007) 43

Appendix 3 Defra guiding principles to facilitate adaptation of biodiversity to climate change 44

Conserving existing biodiversity 44

Reduce sources of harm not linked to climate change 45

Develop ecologically resilient and varied landscapes 45

Establishing ecological networks through habitat protection, restoration and creation 46

Make sound decisions based on analysis 46

Integrate adaptation and mitigation measures into conservation management, planning and practice 46

Appendix 4 Key opportunities for addressing biodiversity adaptation within the Regional Spatial Strategy and Local Development Framework processes 48

Opportunities within Local Development Frameworks process 50

List of tables

Table 1 Summary of Defra Guiding Principles to facilitate adaptation of biodiversity to climate change 12

Table 2 Key LDF Documents appropriate for integration of biodiversity adaptation objectives 19

Table 3 Opportunities for integration of Biodiversity Adaptation Measures in Spatial Plans 21

Appendix 1:

Table A The UK will continue to get warmer… 41

Table B Summers will continue to get hotter and drier… 41

Table C Winters will continue to get milder and wetter… 42

List of figures

Figure 1 Headline climate change characteristics for England by 2100 4

Figure 2 Key climate change implications for UK Biodiversity 8

Figure 3 Specific responses by biodiversity and ecosystems to climate change 9

Figure 4 Illustration of spatial plans with other key strategies 17

Figure 5 Setting out the key elements of the Sustainability Appraisal process, and the key opportunities for addressing biodiversity adaptation 35

Appendix 4:

Figure A Key opportunities for addressing biodiversity adaptation within the RSS preparation process 49

Figure B Key stages of engagement for Natural England within the LDD preparation process 50

1 Introduction

Context and role of this guidance

1.1 Climate change is a genuinely global phenomenon. It is beyond reasonable doubt that the earth's atmosphere is warming up, with significant implications for all life and natural systems on the planet.

1.2 Natural England will seek to maximise the ability of biodiversity to adapt to those changes. Primarily this will be in respect to building resilience in the natural environment, which, as the climate changes, will help to retain a healthy natural environment that benefits society and the economy.

1.3 This guidance illustrates how adaptation aspirations can be met through interaction within development plan and development control casework situations.

1.4 It is presented in two parts. Part A sets out a summary of contextual information necessary to positively influence the spatial planning system.

1.5 Part B sets out detailed guidance for the direct intervention in the plan making and development control processes in England. Including:

- The characteristics of climate change in England.
- Its likely effects on biodiversity and why spatial planning needs to urgently act in response to those serious threats.
- A description of what biodiversity adaptation is and means.
- Key sources of international and national legislation which can support biodiversity adaptation strategies.
- Key opportunities and approaches for facilitating biodiversity adaptation within Development Plans, Sustainability Appraisal and Development Control casework scenarios.

1.6 The guidance cannot present prescriptive action or rigid processes for engagement. Each spatial plan, and each development proposal will have its own varied characteristics and circumstances – environmental and procedural, which will require specifically tailored responses.

1.7 Implications of climate change on coastal environments are likely to be pronounced. However, this guidance does not address this specific area.

Why spatial planning should address climate change

1.8 Climate change will affect the wellbeing and diversity of England's wild species and habitats, as well as impacting upon other important environmental issues such as landscape, water quality and supply, energy use, food production and loss of land and risk to life from rising sea levels and flooding events. The government has made it clear that spatial planning has a core role to play in both addressing the causes of climate change, and addressing its impacts which are now inevitable.

1.9 Adaptation to climate change is a key strategic priority alongside more energy efficient development and renewable energy generation.

1.10 Natural England will seek to champion climate change adaptation opportunities and support innovative and authoritative actions towards protecting the natural environment from harm from climate change. We must work with the inevitability of change to maximise species and habitat survival in the face of the pressures it will bring. To do so Natural England officers and others involved in the planning system must:

- Be fully cogent with the likely characteristics of climate change across the country.
- Seek to recognise how those changes and threats might manifest themselves across the natural environment.
- Champion and implement biodiversity adaptation strategies accordingly and immediately.

1.11 Spatial Planning – the preparation and implementation of Regional Spatial Strategies (RSS) and Local Development Frameworks (LDF) - affords some significant opportunity to address climate change issues at regional and local levels. It is a system designed to specifically reflect the land use implications of aspirations and initiatives of key public bodies, and this opportunity should be grasped.

1.12 Headline Action Boxes are presented in Part B of the guidance for bullet point summaries of actions detailed within the body of the guidance. These cover biodiversity adaptation opportunities within spatial planning in relation to:

- Development Plans (RSS and LDF).
- Sustainability Appraisal / Strategic Environmental Assessment (Link).
- Development Control Casework.

2 Part A: Biodiversity adaptation to climate change: the context for action and engagement

Climate change - need for understanding

2.1 To deliver biodiversity adaptation it is important to understand the core elements of climate change in the English context and to highlight its impact upon ecosystems and species and promote measures to adapt to its negative effects. This chapter presents a brief précis of the characteristics of climate change at a level appropriate to informing decision making in spatial planning.

2.2 Brief but evidence-based statements of the most up-to-date climate change scenarios will help reinforce the importance of taking clear and targeted action to counter harmful environmental impacts. Natural England's developing work on the impacts of climate change at Joint Character Area scale is an example of specific and robust evidence.

2.3 Climate change will affect everywhere, everybody and every ecosystem. Sometimes its impact may be significant, at other times marginal. It may bring about some beneficial change, but shifts in temperature, precipitation patterns or sea level change are more likely to bring about significant undesirable pressures and impacts across the natural environment.

Climate change characteristics, dealing with uncertainty and 'no-regret' responses

2.4 Predicting the implications and potential impacts of climate change is extremely complex.

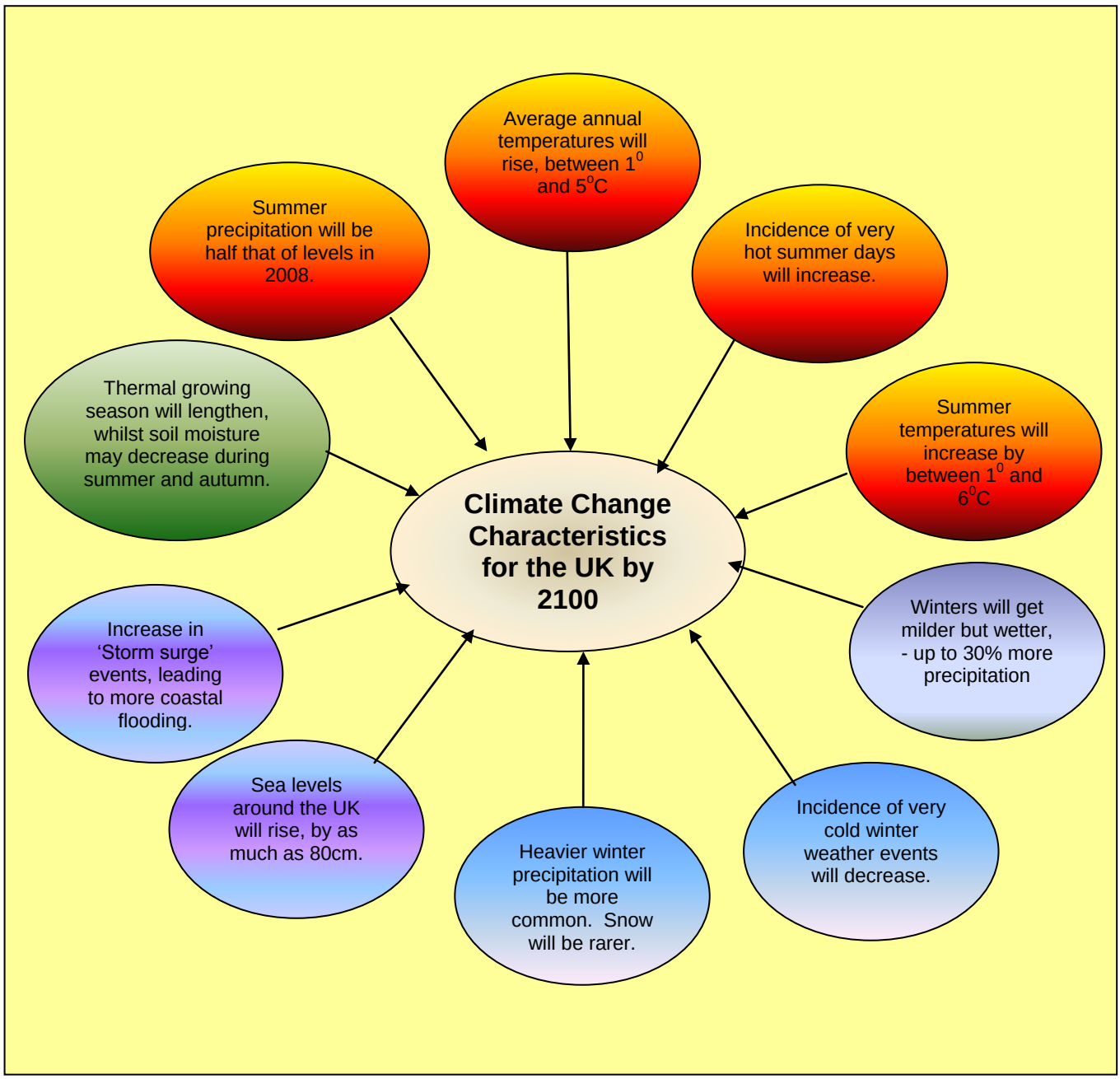
2.5 The Hadley Centre and the Tyndall Centre, lead in climate change monitoring and research in the UK, particularly through applying extremely powerful computer modelling systems. They afford us with far more robust climatic predictions of what might occur in the UK and across the globe than previously possible. Nevertheless, it remains an area where degrees of uncertainty are inherent.

2.6 The Hadley Centre prepares climate change prediction scenarios under the United Kingdom Climate Impact Programme (UKCIP) - the definitive climate change forecasts for the UK. These form the core evidence base upon which UK policy is being developed and sets the context for Natural England's work on biodiversity adaptation and are summarised at Appendix 1.

2.7 To help inform engagement within the spatial planning system when seeking to facilitate biodiversity adaptation, it is helpful to pick out the key trends and messages which UKCIP02[1]

[1] 'UKCIP08' will replace 'UKCIP02' predictions and constitute the most up-to-date climate change forecast scenarios for the UK and offers a more detailed understanding of recent climatic trends. UKCIP08 will offer a finer degree of detail then predecessor models, and advances understanding of likely climate change scenarios at more

headline indicators present. Figure 1 summarises the likely principal changes in the UK climate by 2100.



Source, UKCIP 2002

Figure 1 Headline climate change characteristics for England by 2100

localised level of detail. UKCIP08 scenarios will assist in anticipating the likely changes climate change will bring, and to develop policy responses accordingly.

The range and severity of these predicted characteristics of climate change have the potential to cause very significant change within most component parts of the natural environment, and force the need for adaptation by the current spectrum of biodiversity in England.

'No regret', and 'low-regret' actions

2.8 There will always be some degree of uncertainty about the precise effects of climate change in the UK, as well as how well biodiversity will adapt to this change naturally. However, these doubts should not be confused with uncertainty as to whether climate change will occur or not.

2.9 UK climate has begun to change and will continue changing, and its impacts will become increasingly significant. It is therefore critically important for the sustainability of UK biodiversity that marginal doubts do not divert attention or support for urgent action being taken at local, regional and national scales to support the ability of biodiversity to adapt to change.

2.10 The principles for assisting biodiversity to adapt to changing climatic conditions as set out in this guidance can be considered to be '**no-regret**', or '**low-regret**' actions. The benefits to be accrued by the natural environment and biodiversity resource from adopting and implementing such actions and strategies - which importantly contribute to our wider quality of life and improved sustainable development performance, may be considerable They may also serve to counter problems not associated with climate change, such as public health and economic well-being.

2.11 Implementing aspirational and proactive biodiversity adaptation strategies as set out in Part B of this guidance, will be of significant benefit to the natural environment regardless of the scale or rate of climate change. Should climate change manifest itself at the less significant end of the UKCIP forecast range, then benefits to our biodiversity resource would still be significant and likely to outweigh costs associated with implementing those strategies. The principles established for facilitating adaptation to climate change will not normally be expensive relative to development costs - and in comparison to adaptation of our built environment and infrastructure to climate change, extremely good value.

'Multiple-benefit' actions and green infrastructure

2.12 This guidance focuses on securing measures which will specifically facilitate biodiversity's adaptation to a changing climate in England.

2.13 However, it is important to acknowledge that some adaptation measures are likely to be multi-beneficial, and present positive outcomes in respect to environmental, social and economic well being. The specific measures associated with enhancing biodiversity adaptation to climate change will normally integrate with and complement very closely the range of benefits to society and economic prosperity which can be advocated through a *Green Infrastructure* approach to development planning and conservation. Green infrastructure can be generally characterised as green spaces which:

- Are linked together as coherent networks.
- Are accessible whenever possible.
- Are multi-functional, offering informal recreation and non-motorised movement corridors.
- Link places people live with the best areas of undeveloped natural and semi-natural places as well as formal open spaces.
- Present important habitats, ecological networks and stepping stones for wildlife movement within and across settlements and rural hinterlands.
- Allow natural processes to operate, such as watercourses, flood plains and ground water storage.
- Reinforce landscape character.
- Set attractive contexts for development.
- Offer opportunities for physical activity, benefiting community health.

- Afford space for quiet contemplation and relaxation for growing communities.

2.14 The multi-facetted benefits of green infrastructure and a healthy natural environment in general are likely to be widespread, long-term and help set a positive context for sustainable economic performance and societal well-being.

2.15 Green infrastructure should to be viewed as a vital element of achieving more sustainable communities. Consideration of community need for green infrastructure should be integrated into growth proposals from the earliest stages of planning and design.

2.16 The objectives for climate change adaptation by biodiversity focus mainly on securing more connected networks of green and semi-natural landscapes within which natural processes can function and species more able to move and relocate to more appropriate 'climate space'. These actions as detailed in Part B of the guidance are fully compatible with the wider green infrastructure approach to planning.

2.17 Whilst Part B focuses exclusively on securing biodiversity adaptation gains through the planning system, it will be appropriate and mutually beneficial if adaptation measures are sought within a co-ordinated package of green infrastructure aspirations.

3 How is climate change likely to affect biodiversity?

3.1 Even with some degree of uncertainty, it is clear that the climate of the UK will continue to change in a significant way – regardless of changes made to emissions levels in the meantime. This will have significant implications for England's biodiversity.

3.2 In 2007, the Intergovernmental Panel on Climate Change (IPCC) produced its *Fourth Assessment Report*, a wide-ranging review of the scientific research and evidence into the science of climate change, its impacts and options for adaptation and mitigation.

3.3 It suggests that Europe's natural systems and biodiversity will be substantially affected by climate change and the great majority of organisms and ecosystems are likely to have difficulty in adapting. Key findings include:

- Sea-level rise is likely to cause an inland migration of beaches and loss of up to 20% of coastal wetlands.
- Mountain communities face up to a 60% loss of species under high-emissions scenarios by 2080.
- A large percentage of the European flora (one study found up to 50%) is likely to become vulnerable, endangered or committed to extinction by the end of this century.
- Growing season adjustments may result in intensified agricultural practice in areas currently uncultivated or used at low intensity.
- Loss of arctic and tundra habitats and shifts in boreal forest may have implications for migratory species in Britain.

3.4 Key climate change implications for habitats and species across the UK are summarised in Figure 2.

3.5 As well as landscape scale impacts on broad habitat types, individual species will be affected by climate change. The joint Defra - UK Biodiversity Partnership, *Guide to Conserving Biodiversity in a Changing Climate* (2007) classifies the impacts and effects of climate change on biodiversity into five categories. It is useful to summarise these in the context of this guidance, as set out in Figure 3. (For a fuller description see Appendix 2.)

3.6 Defra emphasises that the impacts set out in Figure 3 are complex but identify observable trends - although levels of understanding are still relatively low.

3.7 Nevertheless, it is clear that even at the lower extent of climate change scenarios, the implications for our biodiversity and habitats could be very significant. Each species will show individualistic responses to climate change impacts, but the messages are clear, **climate change is now affecting the distribution, composition and abundance of biodiversity in the UK**.

3.8 Further research has been carried out in order to forecast what other impacts on biodiversity climate change might affect. The *Modelling Natural Resource Responses to Climate Change* (MONARCH) (2007) joint project by partners including Natural England and UKCIP investigated the likely impacts of climate change on 50 UKBAP species and 12 habitat types. This research has indicated that there will be winner and loser species in terms of climate space (that is, not having regard to other barriers to movement or change) within England as the climate alters.

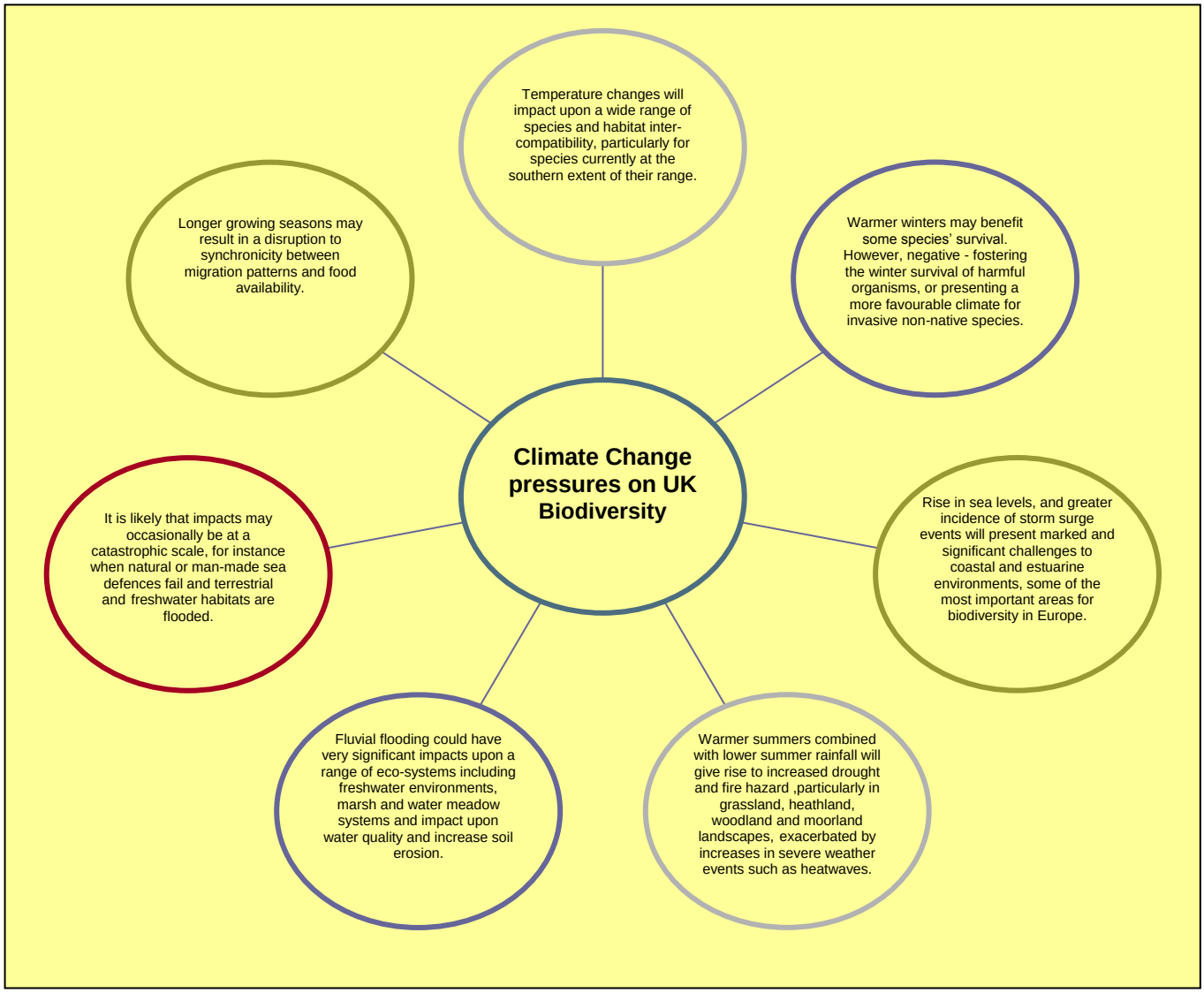


Figure 2 Key climate change implications for UK Biodiversity

3.9 Details of the project's findings can be viewed at URL: **www.defra.gov.uk/wildlife-countryside/biodiversity/index.htm**

3.10 The ability for species to survive changing climatic conditions will be influenced by many other factors than just natural adaptability. Perhaps the most important of these will be the ability to disperse unhindered through robust networks of suitable habitat, avoiding physical barriers and hostile land uses, and for appropriate habitats to be accessible within areas where more favourable climatic conditions are encountered. **Facilitating species' movement and enhancing the amount and distribution of suitable habitat should be a key aspiration for spatial planning.**

3.11 Left to natural processes, it is becoming clear that many species and habitat types will find it difficult or impossible to successfully adapt to climate change pressures without intervention. In the UK this intervention is likely to be primarily through direct land and habitat management and indirectly through spatial planning activity. The increase in rate of climate change over natural changes within significantly 'fragmented' landscapes in which habitats are pressured or isolated, means that natural adaptation is less likely to be successful than it has been historically.

3.12 Increasingly, evidence suggests that within lowland England there are 'islands' of rich and improving biodiversity interest reflecting localised sound conservation management, but that the outward spread of those species beyond those special sites is becoming more and more limited

due to fragmented landscapes and loss of semi-natural spaces. To not take positive and co-ordinated action which facilitates wildlife movement and colonisation to 'climate space' may have very serious consequences in respect to future species abundance and distribution.

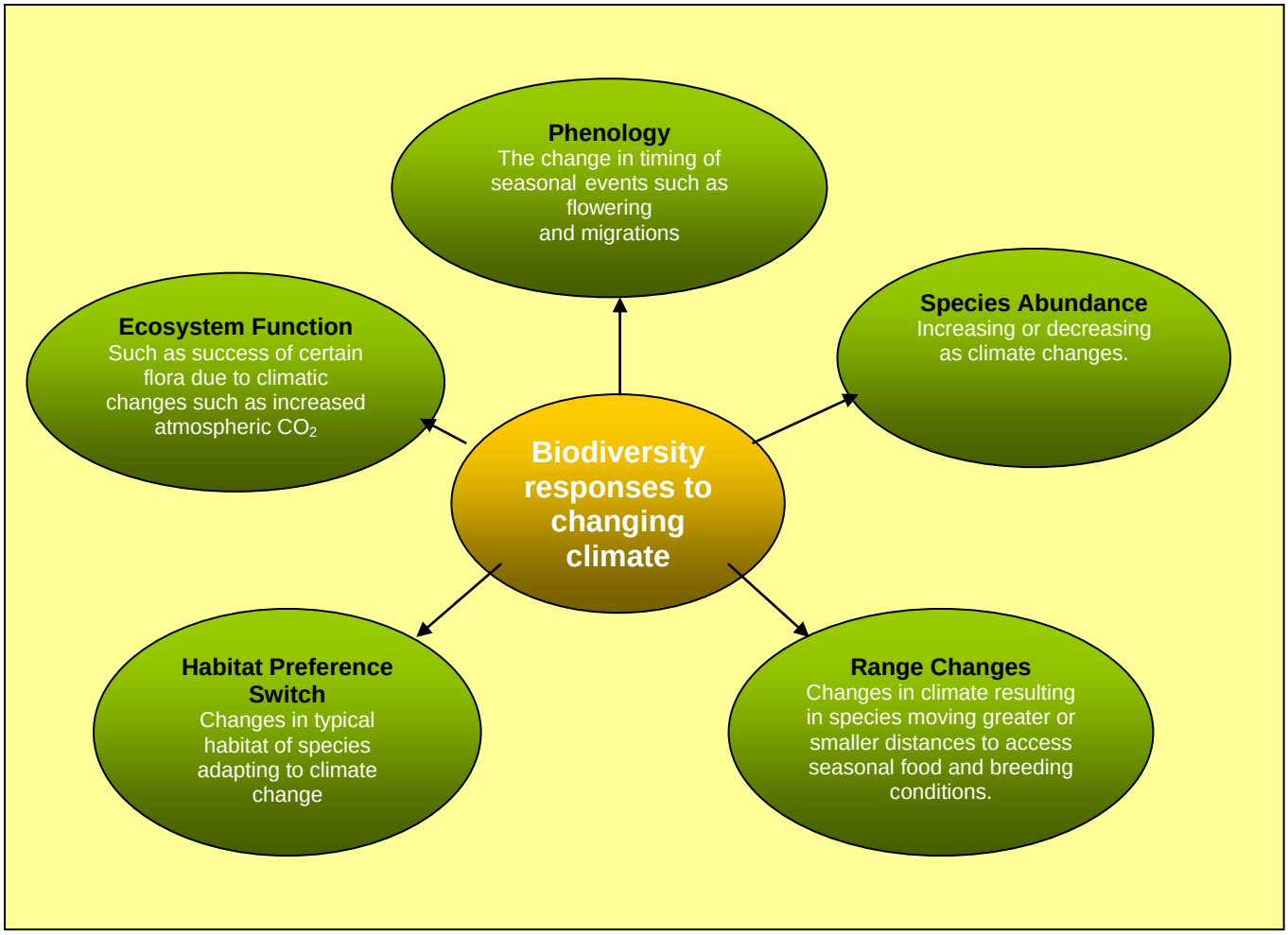


Figure 3 Specific responses by biodiversity and ecosystems to climate change

4 Biodiversity adaptation to climate change and barriers to its success

What is adaptation to climate change?

4.1 Concern over environmental consequences of climate change are frequently focused on issues such as security of water supply, food production, storm damage, fluvial and coastal flooding, temperature extremes, air quality and infrastructure resilience to these changes. The dangers presented to wildlife and landscapes by climate change should be seen to take an equal profile in public policy terms and decision makers should seek actions which facilitate the adaptation of biodiversity within a changing climate.

4.2 Barriers to success may be experienced as a consequence of low understanding of the concept beyond the conservation community. **It is unlikely that planning officers within the UK will be well acquainted with the detail of biodiversity adaptation principles, and so advice should be provided by or sought from Natural England**.

4.3 The UK Sustainable Development Strategy – *Securing the Future* (2005) notes that our well-being is inextricably linked to the quality of our air, water, soils and biological resources. It is therefore critical that these objectives are pursued in full awareness of the changes to the climate in which biodiversity exists, and in doing so adaptation strategies which facilitate the sustainability of the natural environment should demand stronger political support and improved public profile.

What is adaptation in the context of biodiversity?

4.4 It is important that there is a coherent and consistent definition of what adaptation means in the context of biodiversity.

4.5 The *Planning and Climate Change Supplement to Planning Policy Statement 1* (PPS1) (2007) refers to adaptation as:

'..adjustments to natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.'

4.6 Defra (2006) states that:

'Adaptation is about increasing the resilience and therefore reducing the vulnerability of natural systems so that they can accommodate and respond to climate change'.

4.7 In the context of Natural England's role biodiversity adaptation can be seen as:

'…the process by which ecosystems and their component species, seek to adapt to the impacts of climate change, particularly through movement and colonisation of areas where conditions, including climatic conditions, are conducive to continued survival.'

4.8 Adaptation to climate change is a natural response. Spatial planning should seek to break down the barriers to this process. Advocating the very positive cross-sector and cost-to-value characteristics of adaptation orientated conservation objectives and actions will be important in embedding the concept within the planning and development process.

4.9 It is important to recognise that even with significant intervention to enhance the adaptation opportunities of biodiversity to climate change, it is likely that some species, in some areas, will be unable to move or adapt and will become locally extinct. **The objective is to minimise such losses**.

Barriers to biodiversity adaptation success

4.10 Natural England was a key partner within the international project 'BRANCH' – **B**iodiversity **R**equires **A**daptation in **N**orth West Europe under a **C**hanging **C**limate (INTEREG IIIB funded). It examined how spatial planning can help biodiversity adapt to climate change.

4.11 The project's evidence showed that Europe's fragmented landscapes and lack of available space for wildlife to shift, present significant barriers to the natural adaptation by species and habitats. It confirmed that there is an urgent need for planners to provide opportunities for biodiversity to respond to the impacts of climate change.

4.12 The absence of well-connected wildlife networks across many parts of North West Europe and physical barriers such as urbanisation, transport infrastructure and intensive agricultural practice are restricting species' ability to move with appropriate 'climate space'. Moreover, where movement is possible, the amount and quality of appropriate habitat type for moving species is often insufficient for robust and sustainable colonies to establish.

4.13 Combating these barriers should be a core objective for an adaptation strategy.

Core actions to affect biodiversity adaptation to climate change

4.14 Defra and the UK Biodiversity Partnership (2007) have developed 12 inter-dependent guiding principles required in order to facilitate effective adaptation of biodiversity to climate change. These principles can guide the approach to enhancing biodiversity's ability to adapt to climate change through the spatial planning system. Accordingly they form the core objectives for the actions presented within Part B of the guidance.

4.15 These key principles are presented in more detail at Appendix 3. It sets out an important outline of the fundamental physical measures which will facilitate biodiversity adaptation to climate change.

Table 1 Summary of Defra Guiding Principles to facilitate adaptation of biodiversity to climate change

1	Conserve existing biodiversity	The richness of future biodiversity, in a changing world, will depend upon the diversity we conserve today
1a	Conserve protected areas and other high quality habitats	These areas will remain important because they have characteristics which will continue to favour high biodiversity: for example, low-nutrient soils.
1b	Conserve range and ecological variability of habitats and species	It is impossible to predict which localities will continue to have climatic conditions suitable for a given species or habitat; by conserving the current range and variability we will reduce the probability of all localities being lost, although some losses will be inevitable.
2	Reduce sources of harm not linked to climate	Climate change is one of many threats to biodiversity and by reducing other sources of harm we will help natural systems maintain their biodiversity in the face of climate change.
3	Develop ecologically resilient and varied landscapes	Ensure landscapes remain varied, and allowing space for physical processes to take place, we will increase their ability to retain biodiversity.
3a	Conserve and enhance local variation within sites and habitats	Maintain diversity in the landscape in terms of features such as vegetation structure, slope, aspect and water regime will increase the chances that species whose current habitat becomes inhospitable will be able to spread locally into newly favourable habitat.
3b	Make space for the natural development of rivers and coasts	Changing rainfall patterns and rising sea levels will affect our rivers and coasts. By allowing natural processes of erosion and deposition to take place we will increase the potential for wildlife to naturally adapt to these changes.
4	Establish ecological networks through habitat protection, restoration and creation	Some species will need to move some distance from their current locality if they are to survive climate change; creating new habitat, restoring degraded habitat, or reducing the intensity of management of some areas between existing habitat, will encourage this.
5	Make sound decisions based on analysis	Adopt an evidence-based approach which recognises that biodiversity is constantly changing.
5a	Thoroughly analyse causes of change	Not all change will be due to climate change and by thoroughly analysing the causes of change we will identify those situations where climate-change adaptation is needed.
5b	Respond to changing conservation priorities	Regularly review conservation targets to ensure resources are directed towards genuine conservation priorities as some species increase, others decline and habitats change in Character.
6	Integrate adaptation and mitigation measures into conservation management, planning and practice	When reviewing conservation management plans consider the impacts of climate change – for example more frequent summer fires and floods – and make changes as appropriate. Where they can be identified, reduce release of greenhouse gases to the atmosphere.

5 Key 'adaptation hooks' in legislation and national planning policy

5.1 Where legislation and policy in respect to climate change exists it is primarily focused on climate change mitigation - that is addressing its causes, principally targeting reductions in greenhouse gas emissions. Specific policy or guidance in respect to adaptation in the natural environment lags behind, but there are elements of existing policy which can be utilised and new policy and guidance is emerging in respect of adaptation.

5.2 Current UK legislation relating to the natural environment now places great emphasis on ecological enhancement, in response to a greater understanding of landscape and ecological function, and the need to take a whole-system approach rather than purely focusing on the individual elements of ecological systems that are most under threat. This philosophy can be applied to the well-being of the biodiversity in the context of the threats presented by climate change. Moreover, it sits comfortably with some of the core actions for successful adaptation set out in Part B of this guidance.

5.3 Some key elements of national policy or law which can support actions which will facilitate enhanced adaptation of biodiversity in the face of climate change are:

- Section 40 of the Natural Environment and Rural Communities Act 2006;

"Every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity…..Conserving biodiversity includes, in relation to a living organism or type of habitat, restoring or enhancing a population or habitat."

- Section 37, the Conservation (Natural Habitats, &c.) Regulations 1994;

"For the purposes of the planning enactments,… Policies in respect of the conservation of the natural beauty and amenity of the land shall be taken to include policies encouraging the management of features of the landscape which are of major importance for wild flora and fauna. Such features are those which, by virtue of their linear and continuous structure (such as rivers with their banks or the traditional systems of marking field boundaries) or their function as stepping stones (such as ponds or small woods), are essential for the migration, dispersal and genetic exchange of wild species."

- Section 74 of the Countryside and Rights of Way Act 2000;

"It is the duty of any Minister of the Crown, any Government department and the National Assembly for Wales in carrying out his or its functions, to have regard so far as is consistent with the proper exercise of those functions, to the purpose of conserving biological diversity in accordance with the Convention."

5.4 Recent government guidance places strong emphasis on the enhancement of biodiversity as well as its protection, and gives very clear guidance on the importance of biodiversity enhancement in spatial planning.

- Planning Policy Statement 1 (PPS1) – Delivering Sustainable Development;

This states that the protection, enhancement, restoration, recreation and sensitive long term management of biodiversity assets is a firmly embedded part of sustainable development. The key principles of PPS1 at paragraph 13 advise that social and economic benefits are to be achieved together with benefits for the environment, and neither is given precedent over the other. Biodiversity enhancement is an integral part of sustainable development and Local Development Frameworks should clearly include a vision for biodiversity when establishing issues and objectives for the local area.

- Planning and Climate Change – Supplement to PPS1;

Published in late 2007 the Supplement presents a national policy update in respect to the importance and role of the planning system in respect to climate change issues, including adapting to its unavoidable consequences. Whilst focusing on mitigation of climate change causes it recognises the need for adaptation strategies to be addressed by 'spatial strategies', which includes the objective of conserving and enhancing biodiversity, recognising that distribution of habitats and species will be affected by climate change. It goes on to stress that climate change considerations should be integrated into all spatial planning matters, and that 'mitigation and adaptation should not be considered independently of each other, and new development should be planned with both in mind.

It supports the selection of sites for development where they help deliver enhanced green space, green infrastructure, and biodiversity amongst other things.

Importantly the Statement makes it clear that the impact of development upon biodiversity, including its ability to adapt to likely changes in climate is an important consideration for the planning system.

- Planning Policy Statement 9 (PPS9) – Biodiversity and Geological Conservation;

At paragraph 1, PPS 9 sets out key principles when considering biodiversity and geological conservation in planning decisions and emphasises the importance of habitat, species and geological features as an integral part of spatial planning.

"Development plan policies and planning decisions should be based upon up-to-date information about the environmental characteristics of their areas. It seeks to ensure that Plan policies should: Aim to maintain, and enhance restore or add to biodiversity and geological conservation interests; Take a strategic approach to the conservation, enhancement and restoration of biodiversity and geology: and, Promote opportunities for the incorporation of beneficial biodiversity and geological features."

Paragraphs 9 to 11 offer strong support for protecting from development habitats of biodiversity importance and designating regional and local sites. These can present some basic building blocks which can underpin adaptation and habitat defragmentation initiatives.

PPS9 paragraph 12 also specifically advises on the need to restore and reconnect fragmented habitats, a central plank of adaptation strategies and this should serve as a powerful lever in Natural England's support for a shift to adaptation priorities. Importantly it states:

"Networks of natural habitats provide a valuable resource. They can link sites of biodiversity importance and provide routes or stepping stones for the migration, dispersal and genetic exchange of species in the wider environment. Local authorities should aim to maintain networks by avoiding or repairing the fragmentation and isolation of natural habitats through policies in plans. Such networks should be protected from development, and, where possible, strengthened by or integrated within it."

- The Good Practice Companion to Planning Policy Statement 9 '*Planning for Biodiversity and Geological Conservation: A guide to Good Practice'*;

Paragraph 5.36 states that:

"Development control decisions which embrace biodiversity and geological conservation can be of broad benefit to communities by creating employment through new projects, creating cost effective naturally functioning utilities (such as for flood relief and drainage), enhancing the local economy through tourism and improving local surroundings which enhance quality of life."

Improving the 'quality of life' is now an underpinning theme of our planning system and the UK Sustainable Development Strategy, both for our present and future communities. The natural environment is an intrinsic part of that theme. Planning documents at a regional and local level should reflect this integrated and holistic approach.

Local Planning Authorities have made a very important contribution to protecting our most sensitive habitats and species from significant harm, and this should continue to be the case. There is clear requirement for the overall promotion of well-being to the ecological resource, and the fact that significant threats are now emerging from climate change does not alter this objective. However, in order to take biodiversity work forward, and truly focus efforts on restoring and enhancing our natural environment as a functioning system which is robust in the face of climate change, we need to look beyond site-by-site or species-by-species protection, and take a far wider view.

Spatial planning legislation and policy is in place to facilitate the sustainable development of local communities, economy and the environment. Facilitating the restoration and enrichment the natural environment is a fundamental part of that concept, drives policy formulation, and should be integrated into every planning control decision made.

- Proposed Local Government Performance Framework;

The Government is proposing a series of 198 indicators to monitor local authority performance. These include indicators for environmental performance that address biodiversity and climate change matters. The indicators will direct local authorities focus in carrying out its duties, including its planning functions, increasingly towards climate change adaptation matters. This will apply to the district in broad terms, but include adaptation by the local environment. It remains unclear how the final indicators will influence local planning activity however.

5.5 Part B of this guidance examines in detail where biodiversity adaptation aspirations can be facilitated through the spatial planning system.

6 Part B: Opportunities for improved biodiversity adaptation through the spatial planning system and development casework

6.1 Part A of this guidance has established the background and context for the role of spatial planning in furthering the ability of species and habitats to adapt more freely to climate change impacts. The spatial planning system presents a series of important opportunities through which biodiversity adaptation aspirations can be furthered.

6.2 In examining the opportunities for enhanced effectiveness of spatial planning in this respect the core Defra principles (Chapter 4) are taken as key underpinning principles. By applying and integrating these within the spatial planning system and processes, advancement of adaptation aspirations may be furthered. This approach sets the framework for part B of the guidance.

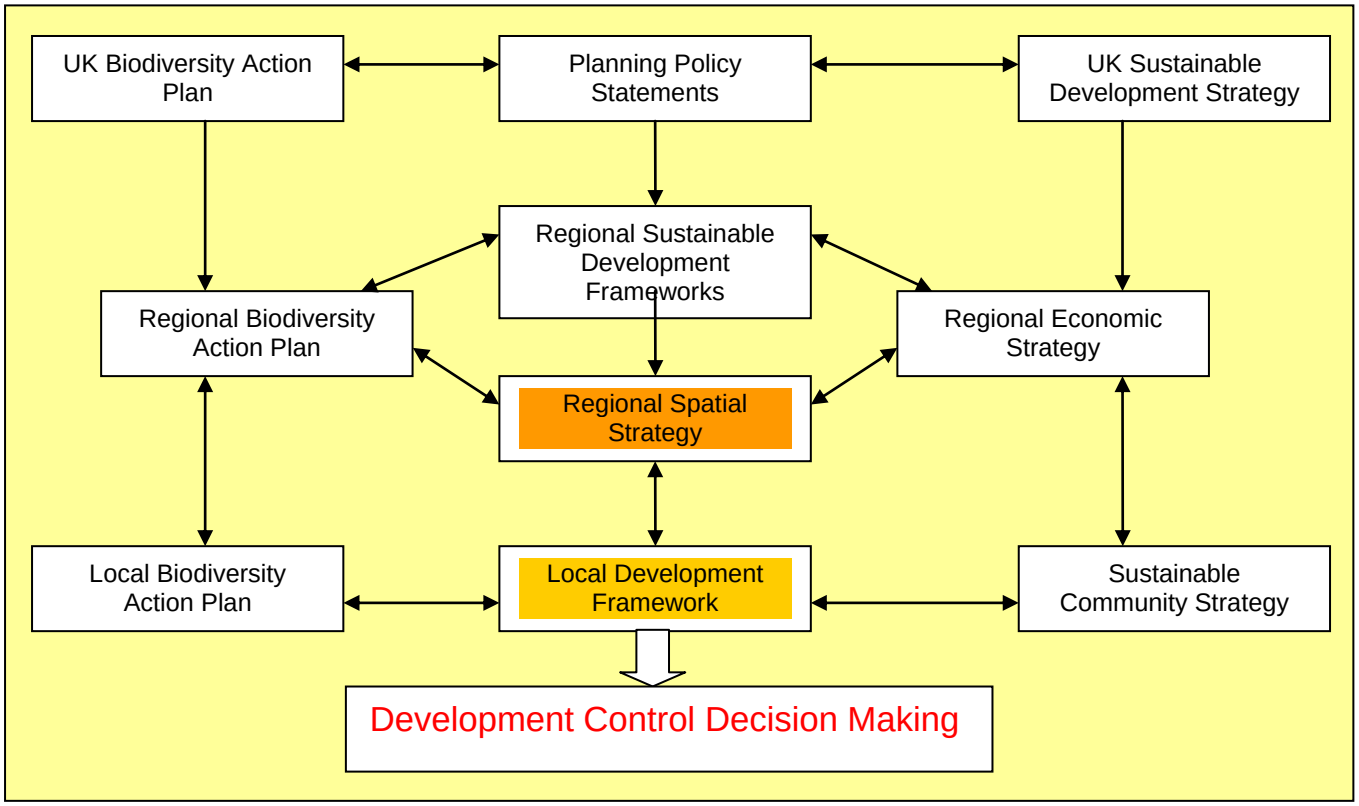
6.3 Part B examines the opportunities for adaptation principles to be embraced and furthered through:

- Spatial Plans – Regional Spatial Strategy and Local Development Frameworks.
- Sustainability Appraisal (incorporating Strategic Environmental Assessment).
- Development Control.

Overarching principles of spatial planning in the context of biodiversity adaptation

6.4 Following the enactment of the Planning and Compulsory Purchase Act 2004, the planning system in England evolved from a strictly 'land use' system to a 'spatial' planning system. Spatial planning as a concept is frequently misinterpreted as being a system which looks at spatial units or parcels of land in determining and proposing land uses. In fact the system of spatial planning is more complex than this. It primarily relates to reflecting the land use requirements and aspirations of other agreed plans and strategies within the 'development plan', that is, the regional Spatial Strategy, and local Development Frameworks. For example, reflecting the requirements of regional economic and housing strategies and meeting aspirations of Sustainable Community Strategies prepared by Local Strategic Partnerships.

6.5 Figure 4 illustrates some basic inter-relationships between statutory plans and processes in respect to biodiversity, and shows how biodiversity orientated plans can directly affect the content of the Development Plan.



Source: Countryside Agency and others, 2005. Environmental Quality and Spatial Planning – Guidance to Help in the preparation of Regional Spatial Strategies and Local Development Frameworks.

Figure 4 Illustration of spatial plans with other key strategies

Limitations and realistic goals

6.6 It is important to recognise that spatial planning policy and practice is only one influence on the achievement of adaptation success. As such it cannot be relied upon as a tool which can be expected to deliver all the actions necessary to further the adaptation agenda. Spatial planning is not a panacea for all climate change adaptation problems.

6.7 The ability of biodiversity to adapt to climate change impacts will be more substantially influenced by land management plans and actions which spatial planning and development control will normally have only a minor influence upon. The role of agri-environment schemes in particular should be significant. There is a need therefore to focus efforts on those aspects of the spatial planning system where advantage can be gained as part of a wider, multi-sectoral strategy for the facilitation of biodiversity adaptation. Whenever possible, planning policy and development control decisions should be reached which help further land management and conservation strategies already in place.

Overarching principles for environmentally sensitive plans and policies

6.8 This guidance sets out in detail specific stages and actions to further the adaptation agenda within the spatial planning system. However it is also important to recognise that there are overarching plan characteristics which can be adopted to deliver more environmentally sensitive development plans. '*Environmental Quality in Spatial Planning'* (EQSP) (2005) is guidance prepared by English Nature in partnership with The Countryside Agency, English Heritage and the Environment Agency, and sets out a series of principles and measures for more environmentally responsive development plans. Key elements are for plans to be:

- Evidence based – responding to real, rather than perceived issues.
- Visionary and objectives led – policies follow strategic aims and goals.
- Realistically ambitious – seek to achieve significant change where required difference.

- Better connected – with other initiatives, such as English Nature strategies.
- Integrated – polices within the plan being mutually supportive and internally consistent.
- Respecting ability of the environment to accommodate change (pertinent in respect to biodiversity adaptation).
- Spatially variable – locally responsive within a plan area.
- Criteria based policies – set specific tests to pass before planning permission is granted.
- Focus on environmental sustainability.

6.9 These principles are now supported by Natural England's and improving spatial planning's effectiveness in respect to biodiversity adaptation will be likely to be furthered if the principles of EQSP are established in across development plans.

7 Spatial plans: Regional Spatial Strategy and Development Plan documents

7.1 The Planning and Compulsory Purchase Act 2004 establishes 'the development plan' as comprising the Regional Spatial Strategy (RSS) and Development Plan Documents (DPDs) as set out within Local Development Frameworks (LDF). A core aspect of the 'new breed' of spatial plans is that they should embrace and support the 'land use' requirements of strategies and aspirations of other public interests, such as those of Natural England.

7.2 Both types of plan are required to comply with government policy for spatial planning as set out in Planning Policy Statements (PPS). The PPS series now includes the Climate Change Supplement to PPS1 'Delivering Sustainable Development' (2007). This overtly promotes the need for plans to recognise the need to facilitate biodiversity adaptation to climate change.

Table 2 Key LDF Documents appropriate for integration of biodiversity adaptation objectives

Key LDF Components	Main Function	Applicable to Biodiversity Adaptation content?
Core strategy (LDD)	Sets strategic policy and distribution strategy and spatial objectives for the plan area. Must comply with RSS. Level of detail in CS can vary between LPAs, with some devolving detail to other DPDs, whilst other present a detailed suite of policies.	**Yes**. Core Strategy presents the main platform for the inclusion of biodiversity adaptation focused policy. It will address biodiversity matters for the plan area, and in doing so should highlight climate change pressures and land-use measures for facilitating improved species adaptation, including for example, identification of broad areas for habitat re-connection.
Site Allocations Document (LDD)	Identifies specific sites for development and allocates land uses such as housing, employment retail and leisure uses. May identify site specific constraints to be addressed through development, or present 'development briefs' for each allocation as appropriate.	**Possible….** Site allocations DPD should reflect Core Strategy principles in respect to 'natural environment' constraints and minimise impacts upon recognised environmental assets. Where 'development briefs' are presented within the DPD, it may be appropriate to address landscape and habitat connectivity issues where these are relevant.

Table continued…

Key LDF Components	Main Function	Applicable to Biodiversity Adaptation content?
Area Action Plans (LDD) - but not mandatory to prepare as part of LDF	Detailed policy and proposals for specific spatial units where there is need for focused regeneration or development, or for enhanced conservation measures.	**Possible…** Area Action Plans have not been brought forward by the majority of LPAs in the first phase of LDF preparation. This may change as the system becomes more established. AAPs for conservation are even less common than for those proposing regeneration initiatives. Nevertheless, biodiversity adaptation measures could be integrated within such plans, particularly in terms of regenerating brownfield or 'problem' sites where 'green infrastructure', habitat connectivity and ecological networks could be embraced, and multi-beneficial.
Development Control Policies (LDD)	Sets out the detailed standards for development otherwise acceptable in principle. Will address issues such as access standards, neighbourliness and other specific development specific considerations.	**Yes.** The DCP DPD will present opportunities for specific policy requiring measures to be integrated within developments which will further biodiversity well-being, and consequently facilitate adaptation. For example policy could seek to ensure that linear developments, such as new roads incorporate biodiversity tunnels or 'green bridges' where they are likely to contribute to habitat fragmentation. DCP may also develop policy on Planning Conditions and Planning Obligations which will be important tools in the delivery of biodiversity measures.
Proposals Map (LDD)	Gives cartographic representation to DPD policies, including recognition of important environmental (including biodiversity) designations.	**Yes.** In as far as showing spatial distribution of policy application. May specify specific areas for landscape and habitat enhancement / de-fragmentation should policy be established in this respect.
Supplementary Planning Guidance	Builds upon a 'parent policy' in LDD and presents finer degree of detail or spatial specificity.	**Yes.** In as far as applying parent policy principles to a specific type or area of development. For example a design guide, or countryside design statement could incorporate detailed principles for biodiversity adaptation measures, such as building design or development layout, or setting appropriate landscape principles which will help re-connect important habitats or create new ones which help 'close the gaps'.

7.3 The most important LDF documents are Core Strategies, which will set the policy context for the whole plan area, and Site Allocations DPDs, which may also present important opportunity to further adaptation and landscape de-fragmentation measures if development is proposed over areas where habitat reconnection or enrichment is considered to be a priority.

Integration of Defra core adaptation principles into Spatial Plans

7.4 This section examines in more detail which elements of the Defra biodiversity adaptation objectives might be integrated within emerging policy, and in what context, for both RSS and LDDs.

Table 3 Opportunities for integration of Biodiversity Adaptation Measures in Spatial Plans

	Defra Core Adaptation Goals	Regional Spatial Strategy	Local Development Documents
1	Conserve existing biodiversity. The richness of future biodiversity, in a changing world, will depend upon the diversity we conserve today.	PPS 9 sets main Government objectives for biodiversity and spatial plans. RSS *must* seek to incorporate biodiversity objectives of a strategic level. Such objectives will be well established in RSS.	LDFs must seek this objective in all cases. PPS 9 sets main Government objectives for biodiversity and spatial plans in this respect. Development plans have steadily improved in their coverage of biodiversity issues and the basis for developing established policy base into adaptation planning is likely to be well established in most Local plans and emerging LDFs.
1a	Conserve Protected Areas and other high quality habitats. These areas will remain important because they have characteristics which will continue to favour high biodiversity: for example, low-nutrient soils, semi-ancient woodlands.	RSS must seek to embed this objective at a strategic level, that is, set policy reflecting national guidance but reflecting regional distinctiveness and circumstances. Regional 'environmental asset maps' should be included within RSS, and reflect distribution and extent of designated sites and sites for which there are regionally significant conservation aspirations – to be addressed in policy. PPS9 calls for broad areas for habitat restoration and recreation to be identified, which might be interpreted to include measures necessary to enable reversal of fragmentation and restoration of semi-natural habitats and wildlife networks and stepping stones.	PPS 9 sets main Government objectives for biodiversity and spatial plans. LDF Proposals Maps must identify international and nationally important sites and set policy affording appropriate levels of protection for national and local sites (N2K sites are protected by law and hence policy is not required). PPS9 now allows for a more widespread recognition of locally important habitats, (paragraphs 9-12) and protected sites and LDFs should seek to reflect the conservation objectives in the LDD. Additional protection of such sites will help preserve richest biodiversity features and act as 'hubs' within defragmented, 'adaptation friendly' landscapes.

Table continued…

	Defra Core Adaptation Goals	Regional Spatial Strategy	Local Development Documents
1b	Conserve range and ecological variability of habitats and species. It is impossible to predict which localities will continue to have climatic conditions suitable for a given species or habitat; by conserving the current range and variability we will reduce the probability of all localities being lost, although some losses will be inevitable.	RSS policy is unlikely to be able to directly influence to any significant degree this objective beyond those broad biodiversity conservation and enhancement principles and actions secured under objective 1a. Indirect benefit are likely from actions seeking to achieve Defra objective 1a.	LPAs must be encouraged to consider appropriate levels of protection from harmful development of those habitat types which are locally significant, but which do not enjoy current conservation designations, and particularly those which are locally important because of their scarcity. These may include habitats and species which are significant locally, even if nationally of lower concern. LBAPs may present the most authoritative and up-to-date data in this respect. Core strategy policy will be the most appropriate place for such objectives to be established in the plan. This will be limited however to the protection of important spaces and habitats. Proactive management and habitat reconnection and creation may be secured through Planning Condition and Planning Obligations in respect of development proposals. The Community Infrastructure Levy may also present funding opportunities for securing positive adaptation actions in relation to other developments.

Table continued…

	Defra Core Adaptation Goals	Regional Spatial Strategy	Local Development Documents
2	Reduce sources of harm not linked to climate. Climate change is one of many threats to biodiversity and by reducing other sources of harm we will help natural systems maintain their biodiversity in the face of climate change.	Overarching sustainability, biodiversity and other environmental policies will be prominent within the strategic chapter(s) of the RSS. These should present a policy suite which seeks to protect and enhance the wider environment and natural processes from harm from development, and restore historic losses or degradation where possible. Government policy and other guidance means that increasingly these will address climate change issues and seek to deliver development within the environmental capacity to do so. Some sources of harm to wider environmental assets may be beyond the remit and scope of the RSS to address directly, such agricultural practice, water management regimes and emissions.	Overarching sustainability, biodiversity and other environmental policies will be prominent within the Core Strategy of the LDF. Natural England would expect such policies present a policy suite which seeks to protect and enhance the wider environment and natural processes from harm from development, and restore historic losses or degradation where possible. Government policy, legislation and other guidance means that increasingly these will address climate change issues and seek to work within environmental capacity. Plans should establish policy suites where 'low regret' and 'win-win' outcomes are facilitated and prioritised. The precautionary principle should be integrated within policy where environmental outcomes are unclear. Where development is deemed necessary and environmental harm is predicted mitigation should be fully pursued and compensatory measures secured so as to afford 'net gain' outcomes.

Table continued…

	Defra Core Adaptation Goals	Regional Spatial Strategy	Local Development Documents
3	Develop ecologically resilient and varied landscapes. Ensuring landscapes remain varied, and allowing space for physical processes to take place, we will increase their ability to retain biodiversity	Mostly influenced by agricultural and land management practice. RSS should address landscape at a regional or sub-regional level. Strategic Sustainability and Landscape policy parameters should evolve or be expanded to address the biodiversity function of landscapes. Broad sustainability and environmental capacity policies should seek to address landscape-scale ecosystem robustness and defragmentation at a strategic level.	Core Strategies, Site Specific Allocation and Area Action Plan DPDs can set specific aspirations for protecting or enhancing functionality of spatial units. It will be difficult to specify particular actions which will be uniformly appropriate across a plan area. Policy should therefore seek to establish a range of actions or protection measures which it may be appropriate to secure through the planning process, dependent on the site itself and influenced by consultation with stakeholders. Landscape considerations within DPDs will increasingly be influenced by, or cross refer to Landscape Character Assessments (LCAs). Natural England might seek to promote a widening of LCA remits to address landscape biodiversity functionality, and to recognise fragmentation and isolation of important habitat types. This may be achieved through closer integration or referencing to LBAP priorities. Policy for development may then be prepared which seeks to address landscape and habitat connectivity aspirations through development proposals which serve to deliver benefits in accordance with LCA and LBAP aspirations.

Table continued…

	Defra Core Adaptation Goals	Regional Spatial Strategy	Local Development Documents
3a	Conserve and enhance local variation within sites and habitats.	Mostly a matter influenced by agricultural and land management practice.	Mostly a matter influenced by agricultural and land management practice.
	Maintaining diversity in the landscape in terms of features such as vegetation structure, slope, aspect and water regime will increase the chances that species whose current habitat becomes inhospitable will be able to spread locally into newly favourable habitat.	Unlikely to be directly influenced by RSS although overarching sustainability and biodiversity policies should seek to set as part of detailed scope for LDF policy and proposals.	Where elements of a particular site of significant environmental value in their own right, Core Strategy conservation policy is likely to afford opportunities to address such matters. LDF policy may be able to set out principles for site development which have full regard for retaining the integrity and structure of habitats that they might otherwise affect. This could potentially be an area to address within Development Control Policy LDDs.

Table continued…

	Defra Core Adaptation Goals	Regional Spatial Strategy	Local Development Documents
3b	Make space for the natural development of rivers and coasts. Changing rainfall patterns and rising sea levels will affect our rivers and coasts. By allowing natural processes of erosion and deposition to take place we will increase the potential for wildlife to naturally adapt to these changes.	This adaptation objective relates to natural processes and the desirability for them to operate unhindered wherever possible. RSS should establish clear policy on coastal matters which will usually be of regional significance, and set clear scope for LDF policy in respect to the freshwater environments. Coastal and river corridor issues will frequently cross local authority boundaries and RSS should play an important role in establishing a consistent approach across neighbouring LDF areas. Strategic distribution of development in coastal areas and on functional flood plains in particular should be robustly controlled by the RSS. 'Coastal squeeze' is a recognised impact where rising sea levels encroach towards established development or other investment with flood defence infrastructure, hence seriously affecting the extent and functionality of coastal habitats in between. Strategic spatial distribution of new development should seek to avoid and decrease this phenomenon in future.	LDFs should develop RSS policy at the local level, having regard to strategic objectives and principles whilst applying to specific local conditions or development issues/pressures. Core Strategy policy should set out how development will be controlled or permitted in respect to coastal and riparian environments, emphasising the need to prioritise conservation and the maintenance of natural processes. Spatial planning determines that other agencies plans and initiatives should be given spatial representation in development plans. Accordingly, objectives of River Basin Management Plans (Environment Agency), or Integrated Coastal Zone Management Plans / Shoreline Management Plans (coastal partnerships) may present appropriate direction to be incorporated within the development plans at a local level. Functionality of natural systems, and avoidance of coastal squeeze should be emphasised when engaging within LDF processes. New development which will exacerbate existing problems or lead to the need for flood defence or interruption to natural processes at a later time should be avoided. Where proposals seek to realign coastlines through managed re-alignment or re-establish or create functional flood plains, opportunities for habitat creation and enhancement should be highlighted and secured.

Table continued…

	Defra Core Adaptation Goals	Regional Spatial Strategy	Local Development Documents
4	Establish ecological networks through habitat protection, restoration and Creation. Some species will need to move some distance from their current locality if they are to survive climate change; creating new habitat, restoring degraded habitat, or reducing the intensity of management of some areas between existing habitats, will encourage this.	Whilst the achievement of de-fragmented landscapes will be particularly dependent on agricultural and land management practice, spatial planning at the regional scale may help set aspirational objectives in this respect. RSS may designate specific areas or present region-wide policy where establishment and re-connection of ecological networks is clearly promoted (for example as in RSS West Midlands Biodiversity Enhancement Areas). RSS could be prepared so as to indicate key strategic ecological networks which connect habitat rich sites or localities across those areas which have a reduced biodiversity resource. Such opportunity mapping may be presented in respect to strategic regional environmental assets maps. Within these areas, LDFs would be expected to deliver landscape and habitat enhancement and reconnection through control of inappropriate development, and maximising gains from that developed permitted. Major land management projects which seek such objectives are likely to be most effective tools in respect to such aspirations. Where these are established regional policy can encourage affected LDFs to facilitate achievement of project aspirations through appropriate control of development.	Where strategic biodiversity and habitat networks are identified within RSS or Sub-Regional Strategy, they should be represented at a locally specific level of detail through Core Strategies and on the Proposals Map. However where RSS does not present a lead, it will be possible for LPAs to identify the core habitat assets of the district, seeking where appropriate to recognise diversity in habitat type, and identify barriers to connectivity thereof (see objective 3). Locally specific evidence base would facilitate this objective's transposition into the LDF. Policy which seeks enhancement and protection of such networks through control over development proposals could be incorporated within Core Strategy. This can seek to ensure that development does not harm or further fragment important assets or recognised interlinkages. Where development would result in residual harm appropriate compensatory measures should be delivered through the development. This could be in relation to appropriate landscaping schemes, or design features within the scheme which serves to facilitate species movement. Where specific land management projects are in place or proposed, spatial plans should be responsive to its land-use implications and aspirations, and as such Core Strategy policy for biodiversity and/or for landscape should be developed which includes specific criteria to this end.

Table continued…

Defra Core Adaptation Goals	Regional Spatial Strategy	Local Development Documents
	The ability to secure such profile within RSS will be facilitated by preparation of a robust evidence base which illustrates current limitations on ecological networks to function, particularly in the context of climate change. RSS should also ensure that design policy has full regard to the need to re-connect habitats and ecological networks, and to mitigate and compensate for fragmentation caused by development, particularly at the strategic scale or by linear projects such as transport infrastructure.	The Community Infrastructure Levy may also present funding opportunities for securing positive adaptation actions in relation to developments.

Table continued…

	Defra Core Adaptation Goals	Regional Spatial Strategy	Local Development Documents
5	Make sound decisions based on analysis. Adopt an evidence-based approach which recognises that biodiversity is constantly changing.	Natural England in partnership with the Regional Planning Body and other environmental stakeholders will have a significant role in respect to furthering regional scale understanding and interpretation of threats and opportunities in respect of biodiversity adaptation. Dependency on a sound evidence base is only good practice, and an underpinning principle of spatial planning. Resistance to 'firmer' environmental constraints on development from the development sector should be met with a firm evidence base before the aspirations for adaptation are likely to be accommodated within RSS. Consideration should be given to the commissioning of regional scale studies to evaluate threats and opportunities for species' migration in the light of climate change pressures.	One core characteristic of spatial planning at the local level is to have policy developed upon a sound understanding of the evidence base. The 'front loading', or evidence gathering phases of LDF preparation will be an important opportunity for Natural England and partner bodies to highlight adaptation issues and provide related evidence. Understanding within Planning Authorities of the specific implications on climate change and the need for adaptation is likely to be limited and variable. Understanding of ecological networks at the local level will vary considerable between local authority areas. Embedding the principles of defragmented landscapes, 'biodiversity networks' or 'stepping stones' will be considerably enhanced if presented in the context of robust evidence to support the theoretical principles. In doing so, the 'no regret' and 'low regret' concepts should be emphasised, allowing for an approach which should be ecologically and landscape beneficial regardless of the actual extent of climate change impacts experienced within the plan area.
5a	Thoroughly analyse causes of change. Not all change will be due to climate change and by thoroughly analysing the causes of change we will identify those situations where climate-change adaptation is needed.	Linked with Objective 5. Not clearly applicable to RSS policy. 'No' and 'low regret' approaches can partially mitigate this issue.	Linked with Objective 5. Not clearly applicable to LDF policy. 'No' and 'low regret' approaches can partially mitigate this issue.

Table continued…

	Defra Core Adaptation Goals	Regional Spatial Strategy	Local Development Documents
5b	Respond to changing conservation priorities. Regularly review conservation targets to ensure resources are directed towards genuine conservation priorities as some species increase, others decline and habitats change in character.	RSS is subject to regular review over relatively short timescales which would allow for refinement of policy in the face of altering priorities on the ground. However RSS policy for biodiversity adaptation, such as multi-functional landscape management and de-fragmentation, and protection/ enhancement of strategic ecological networks should be prepared so as to be flexible. Regional policy should ensure LDFs allow for changes to detailed priorities within the overall objective of removing barriers to adaptation driven by climate change.	LDFs are required to be reviewed regularly. In addition, where changing circumstances are significant, individual elements of the LDF can be amended in a more responsive way than was normally the case for Local Plans. This affords opportunity for improved reactivity by spatial plans to significant change, including those within the natural environment.
6	Integrate adaptation and mitigation measures into conservation management, planning and practice. When reviewing conservation management plans consider the impacts of climate change – for example more frequent summer fires and floods – and make changes as appropriate. Where they can be identified, reduce release of greenhouse gases to the atmosphere	Not directly relevant to RSS preparation. Where conservation management objectives present clear spatial planning implications, it will be appropriate for the stakeholders promoting such conservation measures to seek to incorporate their spatial aspirations with the development plan. At the regional scale this is only likely to be relevant where landscape scale projects or initiatives are underway, and where complimentary planning policy will further its objectives. Examples of such projects could include ‘regional parks’ such as the Nene Valley project, or the Great Fen project in the East of England which benefit from facilitating and protective policy established within their respective RSS.	Not directly relevant to LDF preparation. Where conservation management objectives present clear spatial planning implications, it will be appropriate for the stakeholders promoting such conservation measures to seek to incorporate their spatial aspirations with the development plan. For example, development proposals should be designed so as to complement local land management objectives, such as increasing permeability of development by species though integrated green spaces and habitat type, and through measures such as ‘green bridges’ or tunnels in respect to linear features such as new roads. Policy in Core Strategy, Site Specific Allocations, Area Action Plans and Development Control Policy DPDs may reflect such requirements for development.

Checklist of core actions and aspirations in relation to Development Plan preparation

- Ensure **RPBs and LPAs are well informed in respect to climate change**, its relevant **legal and policy framework and the need for specific biodiversity focused action**.
- Establish a **sound evidence base of local biodiversity issues**, anticipating increased impacts of climate change on local conditions over a **long term perspective**.
- Consideration of species movements and ecological networks should have regard to **conditions and trends within neighbouring plan areas**.
- In this respect set context for **'No and Low Regret' policy framework**.
- **Engage in engagement processes from earliest stages** so as to establish early and influential shaping of policy.
- For **RSS statutory consultees such as Natural England should expect to be a key player at all stages** of plan evolution and debate.
- Seek to **embed ESQP principles** within plan making, particularly in respect to 'integrated policies' where policy and proposals present a complimentary approach to adaptation across the plan.
- Well established **'non-adaptation' policies on natural environment and biodiversity** – that is, protection of designated sites, are likely to be highly beneficial to adaptation objectives. Seek for these to be prepared to aspirational standards. Protected and areas managed for biodiversity should be enlarged wherever possible.
- Wherever possible, **significant protection should be afforded to the functionality of natural processes**, particularly in relation to watercourses and coasts.
- Plans should acknowledge the existence, role, and need for **enhanced ecological networks**. Plans may **identify specific areas for focused action** in this respect, or present an area-wide approach dependent on local (and neighbouring area/regional) characteristics.
- Policies and proposals should seek to **avoid further fragmentation of landscapes**, particularly from strategic scale development and linear features, and recognise where key ecological networks exist in which additional control over development should be applied.
- Policy should require that new development is **located, designed and implemented so as to minimise landscape and habitat fragmentation**, and to **deliver enhancements** to permeability, habitat provision and **integrate improved linkages** between significant local sites.
- Policy should recognise that **landscaping associated with all scales of development** can and should **present biodiversity adaptation benefits**.
- Habitat diversity and function **within development sites should be maintained** where possible, and compensated for where mitigation cannot avoid losses.
- Seek to **reflect and compliment LBAP and land management programme priorities** (such as Farm Stewardship objectives) within spatial plan policy and proposals where relevant to land use.
- Ensure plans present **clear requirements for developer contributions or actions** (for example through Planning Obligations) in relation to meeting biodiversity adaptation aspirations.

8 Sustainability Appraisal (incorporating Strategic Environmental Assessment)

8.1 Sustainability Appraisal (which incorporates the specific requirements of Strategic Environmental Assessment (SEA)) must be undertaken in respect to all development plan documents, including the Regional Spatial Strategy. Assessing the likely and significant effects of plans, proposals and strategies on flora and fauna is a mandatory consideration under the SEA Directive (and Regulations). Planning Authorities must have due regard to biodiversity within their appraisal process.

8.2 Several key opportunities arise within the Scoping and Sustainability Report stages which allow for integration of biodiversity adaptation considerations within the process, and hence ultimately influence the content and the environmental sensitivity, of the plan.

The scoping report

8.3 The scoping report must identify the environmental objectives established at International, EU, or national levels and which are relevant to the spatial plan. Those objectives should be clearly set out within the report, often as an appendix. Key 'higher tier' aspirations for adaptation in the light of climate change may be included within those considerations. Most pertinent to RSS and LDFs will be reference to the Climate Change Bill (and Act as appropriate), Climate Change Supplement to PPS1, and PPS9 (see chapter 4). If these or subsequent adaptation-relevant objectives are not addressed, it is likely that the Sustainability Appraisal methodology, and the emerging plan itself will be deficient in this respect.

8.4 Scoping reports are required to outline the environmental characteristics of the plan area, and set out any specific environmental problems and how those environmental issues may evolve in the absence of the plan being appraised. This assessment is required to examine specific elements of the environment under the SEA Directive. Two key categories are 'Flora and Fauna' and 'Climatic Factors' (Appendix I of the SEA Directive). This stage will be important in the subsequent stage of setting the sustainability framework (see below).

8.5 The scoping report should also seek to ensure that climate change, and its likely impacts upon the biodiversity of the plan area, are fully embedded in the understanding of local or regional conditions. It will be appropriate to outline climate change issues for biodiversity under either the Biodiversity category of the assessment, or under Climatic Factors. The scoping report should also highlight the need for the plan to have regard to biodiversity adaptation aspirations.

8.6 Hence, the scoping report's description of environmental condition and problems should include:

- Recognition that climate change will have significant impacts upon local (or regional) biodiversity and without action, the implications of climate change for the biodiversity resource is likely to harmful.
- Acknowledgement that species and habitats will seek to adapt to climate change, but are likely to be constrained in their ability to do so by fragmented landscapes and insufficient or poorly distributed semi-natural habitat space.
- In the absence of the plan improved adaptation will be disadvantaged and the impacts of climate change will be greater than with a proactive policy framework in place.

8.7 The third important opportunity within the scoping report for integration of biodiversity adaptation measures is in respect to setting of the sustainability framework. This is the framework of tests against which plan policy and proposals are assessed for their sustainability performance. The responsible authority (Regional Planning Body or Local Planning Authority) will prepare individual tests - or 'sustainability criteria' for all broad aspects of the environment to comply with SEA requirements, including 'Flora and Fauna' and Climatic Factors'. The sustainability criteria will be used to assess the emerging policies and proposals impact upon biodiversity and climatic factors amongst other areas.

8.8 It is likely that only one, two or perhaps three criteria will be developed in respect to biodiversity, natural systems and climate change impacts on the 'natural environment'. It is therefore very important that those tests are appropriately focused and detailed so as to meet the challenge for plans to be responsive to its adaptation agenda and aspirations.

8.9 **Natural England will make robust comment in respect to the appropriateness of the environmental criteria when consulted at the scoping report stage and propose changes where they are considered to be deficient in respect to climate change adaptation issues.**

The sustainability report

8.10 The sustainability report is the main output in the overall sustainability appraisal process. It will set out the full details of the issues covered by the plan (RSS or LDDs), relevant higher tier policy and obligations, and environmental issues within the plan area as developed in the scoping report. Its central function is to anticipate the likely impacts of the emerging plan in respect to sustainable development, and to suggest how the plan might be changed to address plan deficiencies in such respects. It should explicitly state how the plan has been influenced by the sustainability appraisal.

8.11 The strength of the sustainability report on biodiversity adaptation will to a significant degree depend upon the focus of the sustainability framework and scope set out within the scoping report (see above). If the scoping report is weak in respect to adaptation issues and criteria, the sustainability report is unlikely to identify such weaknesses in the plan being appraised.

8.12 If Natural England is not convinced by the findings of the sustainability report officers will take a view as to the rigour at which the assessment has been carried out and whether the detailed findings have been appropriately interpreted and presented as recommendations for change to the plan. If it does not meet Natural England's expectations in either respect then we will clearly refer to this in its response to the plan at Submission Stage.

8.13 Spatial plans prepared under the *Planning and Compulsory Purchase Act 2004* are considered at Examination against a series of 'tests of soundness' (see PPS 11 and PPS12). Tests 3 (LDDs) and 10 (RSS) require plans to have been subject to a satisfactory sustainability appraisal. If Natural England considers the sustainability appraisal to be deficient, then it is proper that a formal objection to the plan and process be made accordingly. Objection could therefore be made if, in Natural England's opinion, insufficient weight has been afforded to the issue of climate change impact upon biodiversity, or where this has been recognised, but the plan has failed to be modified sufficiently to counter, or reduce that threat.

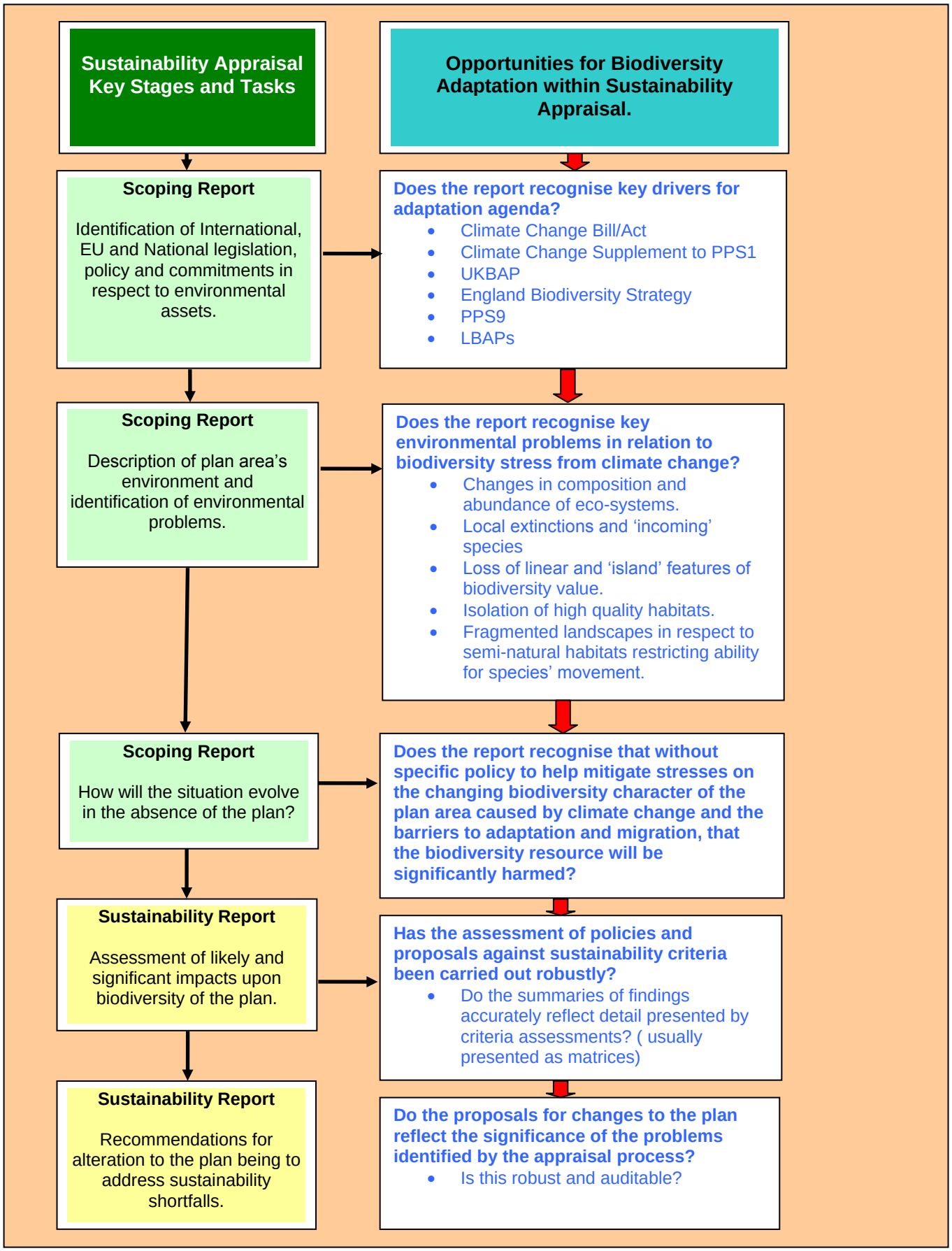

Sustainability Appraisal Key Stages and Tasks
Opportunities for Biodiversity Adaptation within Sustainability Appraisal.
Scoping Report
Identification of International, EU and National legislation, policy and commitments in respect to environmental assets.
Does the report recognise key drivers for adaptation agenda?
Climate Change Bill/Act
Climate Change Supplement to PPS1
UKBAP
England Biodiversity Strategy
PPS9
LBAPs
Scoping Report
Description of plan area's environment and identification of environmental problems.
Does the report recognise key environmental problems in relation to biodiversity stress from climate change?
Changes in composition and abundance of eco-systems.
Local extinctions and 'incoming' species
Loss of linear and 'island' features of biodiversity value.
Isolation of high quality habitats.
Fragmented landscapes in respect to semi-natural habitats restricting ability for species' movement.
Scoping Report
How will the situation evolve in the absence of the plan?
Does the report recognise that without specific policy to help mitigate stresses on the changing biodiversity character of the plan area caused by climate change and the barriers to adaptation and migration, that the biodiversity resource will be significantly harmed?
Sustainability Report
Assessment of likely and significant impacts upon biodiversity of the plan.
Has the assessment of policies and proposals against sustainability criteria been carried out robustly?
Do the summaries of findings accurately reflect detail presented by criteria assessments? (usually presented as matrices)
Sustainability Report
Recommendations for alteration to the plan being to address sustainability shortfalls.
Do the proposals for changes to the plan reflect the significance of the problems identified by the appraisal process?
Is this robust and auditable?

Figure 5 Setting out the key elements of the Sustainability Appraisal process, and the key opportunities for addressing biodiversity adaptation

Checklist of core actions and aspirations in relation to Natural England's engagement within sustainability appraisal

- Sustainability appraisal offers an important opportunity to further influence the plan. Natural England is a statutory consultee in the process.
- Natural England should ensure appreciation of plan area environmental conditions are accurate and appropriate to the spatial grain of the plan.
- Recognition of environmental problems and issues should overtly refer to harm to biodiversity caused by climate change.
- The Sustainability Framework proposed within the scoping report should incorporate a criterion which makes specific reference to the need to facilitate biodiversity adaptation.
- Where possible ensure that appraisal outcomes or summaries within the sustainability report are robust by assessment sustainability matrices.
- Check to ensure that proposed changes to the plan to address sustainability appraisal findings are sufficiently robust.
- Where the sustainability appraisal is, in Natural England's opinion, not prepared to a satisfactory standard, objection to the it can be made, with the potential to deem the plan 'unsound'.

9 Development control casework

Broad principles

9.1 Important opportunities for biodiversity adaptation may arise through development control, particularly in respect to strategic scale proposals, such as those associated with 'sustainable urban extensions'.

9.2 PPS9 makes it clear that the development control process is an important factor in respect to securing biodiversity enhancement and protection. It is therefore also an important process through which biodiversity's adaptation to climate change can be assisted.

9.3 It must be assumed that in any particular development proposal the Local Planning Authority will have proper regard to the development plan. Biodiversity and other 'natural environment' considerations and objectives should be well established in local planning policy, and it would be expected that these will be given full weight by the planning authority.

9.4 PPS 9, and its companion *Guide to Good Practice* document afford clear authority for LPAs to seek to secure protection and enhancement of the biodiversity resource through development proposals, and for these not to be limited to sites designated for biodiversity interest, but rather to the whole plan area. In doing so it promotes the RTPI (1999) 5-Point approach to development control decision making which emphasises the importance of:

- Information – be full aware of the biodiversity characteristics of the site, its significance and likely impacts of the proposal on it.
- Avoidance – to seek to avoid adverse effects on biodiversity from development where possible, including consideration of alternative sites.
- Mitigation of harm – minimise unavoidable harm.
- Compensation for harm – off-set residual harm through compensatory measures.
- Provide new benefits – secure net biodiversity gains through development even where the proposal would not have negative implications for the existing resource.

9.5 Adopting such principles within casework should help secure overarching benefits for the biodiversity resource of a plan area, and indirectly would be likely to enhance adaptation by species in the light of climate change pressures.

Applying the DEFRA principles for biodiversity adaptation within development control scenarios

9.6 In respect of development control, it is unlikely that the full range of measures and objectives contained in the Defra principles for biodiversity adaptation will be directly applicable to specific development scenarios.

9.7 Defra objectives '1 - Conserve existing biodiversity', '1a - Conserve Protected Areas and other high quality habitats', '2 - Reduce sources of harm not linked to climate', and '3b - Make space for

the natural development of rivers and coasts' should be covered under most established suites of planning policy, and dealt with accordingly within development control casework. The remaining relevant objectives from the Defra series which are unlikely to enjoy policy status, and are relevant to site specific issues can be summarised as:

- Conserving the range of habitat types within specific sites.
- Establish ecological networks through protection, enhancement and creation of habitats.
- Develop ecologically varied and resilient landscapes.

9.8 Whilst both planning authorities and developers will be familiar with protection of existing assets and to a lesser degree 'designing-in biodiversity' principles, they are likely to be less familiar with the biodiversity adaptation agenda, although good general biodiversity practice will facilitate adaptation by species. There is a need therefore for Planning Authorities to secure adaptation objectives into development schemes **in addition** to established biodiversity orientated policy. LPAs have a duty to have regard to the conservation of biodiversity across its area as set out within Section 74 Countryside and Rights of Way Act 2000, and reinforced by Section 40 of the Natural Environment and Rural Communities Act 2006. Development control decisions that contribute to a more robust and enhanced biodiversity resource across a plan area, as opposed to only those designated sites of key importance and special interest, are likely to facilitate biodiversity adaptation benefit.

9.9 In seeking to improve the landscape's permeability by species seeking to adapt to climate change, the connectivity of habitats is critical. As well as seeking to enhance the network of wildlife spaces through development proposals, it is vital that further erosion of sites and features which connect more significant habitat areas, is avoided. Consideration must therefore be given to the connectivity role of features within the landscape which play such a role, but are in themselves not designated for inherent biodiversity value. **The cumulative and synergistic effects** of habitat erosion therefore need to be accounted for within the development control process.

- **Cumulative effects** will be important where a series of similar features, or features which play a complimentary role, are lost or threatened.
- **Synergistic effects** will be important considerations where the loss or damage to a specific landscape feature will result in a critical break in biodiversity networks or stepping stones, causing greater harm than purely by function of its size or condition.

9.10 The relative value of such features will often be difficult to quantify. In the absence of development plan policy setting criteria for such matters, Development Control officers will be limited in how much weight can be afforded to such issues. This does not diminish their importance however. Natural England, alongside local partners such as the Wildlife Trusts will have a role to play in emphasising the importance of features such as:

- unimproved grasslands and pasture
- verges
- hedgerows
- hedgerow trees
- veteran trees
- ditches
- exposed rock faces
- bare earth
- scrub
- small stands of trees
- ponds and other surface water.

in respect of their inherent habitat and connectivity value, within the development control process.

9.11 Developers and LPAs should acknowledge biodiversity adaptation issues which are important in the context of any development site. Application of the following principles will help ensure that development control processes address biodiversity adaptation:

- Ensure **adequate information** is provided in respect to the biodiversity characteristics of the development proposal site. In addition to 'normal' protected species considerations, **ecological surveys should be secured** which outline the habitat variation and any significant biodiversity interest within the site. These will be particularly applicable in areas where biodiversity adaptation is identified as a priority, for example within LBAPs, or where the site is located between other important habitat sites within the locality.
- For larger or sensitive sites, **Development Briefs or Concept Statements** which set preferred parameters for a development should **incorporate biodiversity objectives**. For example, maintaining watercourses within the site, maintain ecological diversity and implement locally appropriate landscaping elements.
- **Seek 'no and low regret' design solutions** to development needs. Where appropriate seek suitable environmental mitigation prior to the commencement of development. Siting, design and conditions for use of proposal to be biodiversity sensitive, and 'net-gain' compensatory measures where residual harm is anticipated should be secured through Planning Condition and Obligation where necessary.
- Seek to maintain **habitat diversity within a site** where development is proposed through encouragement of sensitive design and provision of effective, locally sensitive and multi-structured landscaping.
- Consideration should be given to **securing compensatory habitat creation on or off- site**, addressing LBAP priorities where appropriate. Such provision should address where possible restoration or creation of improved habitat spaces and functional connectivity features which act as linkages, or act as 'stepping stones', between 'higher value' habitats. Compensatory measures should be secured through appropriate use of **Planning Obligations**, and where necessary secure **ongoing management regimes**.
- Seek to **enhance the habitat diversity of a site** where it is currently uniform, in a poor condition or seriously degraded, through landscape restoration measures secured where appropriate through Conditions, or Planning Obligation.
- Ensure wherever possible that linear features, such as roads, walling or means of enclosure are **permeable to species**.
- Where pertinent to the development, seek to secure **sensitive management regimes** in respect to mowing, felling and vegetation trimming/pruning, secured through appropriate use of **Planning Obligations**.
- **Maintain functionality of natural systems, particularly watercourses**. Maintain free from obstruction or artificial channelling and culverting of watercourses, and allow riparian vegetation to establish.
- **Avoid loss of surface water features** within development sites.
- In considering development proposals, ensure that the **cumulative and synergistic** effects of habitat loss, harm or fragmentation are considered in the context of species ability to migrate across the LPA area.

9.12 PPS 9 (paragraph 14) supports a positive contribution to the biodiversity resource to be secured through development proposals. It will often be appropriate for such gains to be secured through robust use of Planning Obligations.

Checklist of core actions and aspirations in relation to development control casework:

- Whilst opportunity may be limited, there will be **opportunities for development control processes to help secure enhanced biodiversity adaptation measures through development proposals**, and to avoid or mitigate those proposals which present potential negative adaptation impacts.

- Effective development control will be significantly enhanced through securing a **positive development plan policy basis** (see previous sections).
- The use of **Master plans or concept statements which are sensitive to biodiversity adaptation aspirations** should be supported.
- Consideration of proposals **should be locally responsive and act upon a sound understanding of site conditions**, where appropriate based on habitat survey information .
- Principles of **avoidance, mitigation and net-gain** should be promoted in all development control decisions.
- Planning Authorities should be reminded of the **importance of non-designated habitats and natural features** in facilitating biodiversity migration and colonisation.
- **Cumulative and synergistic considerations** could be important in decision making, but would **depend on sound evidence base** support.
- Site specific implications of development proposals on **habitat extent, variety and connectivity** should be afforded significant weight in decision making.
- Where harm to recognised ecological networks or features is anticipated, **planning conditions and obligations** should be used to offset that harm where it cannot be mitigated fully. **The Community Infrastructure Levy** may also present funding opportunities for securing positive adaptation actions in relation to development proposals.

9.13 Benefits from good development control practice in relation to biodiversity adaptation will be partially dependent on thorough and **robust monitoring** of its implementation and where necessary the **use of enforcement powers to secure actions are delivered**.

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Appendix 1 UKCIP02 headline climate change scenarios

Table A The UK will continue to get warmer…

Current Trends	Forecast
• Average annual temperature for all regions of the UK has risen by between 0.4 and 0.9 °C since 1914. • The UK has experienced 8 of the 10 warmest years on record since 1990 (based on the Central England Temperature record). • The thermal growing season for plants has increased by up to 30 days since 1900.	• By 2040, average annual temperature for the UK is expected to rise by between 0.5 and 1 °C, depending on region. By 2100, average annual temperature for the UK is expected to rise by between 1 and 5 °C, depending on region and emissions scenario (high confidence). • There is expected to be greater warming in the south and east than in the north and west (high confidence). • There is expected to be greater warming in the summer and autumn than in the winter and spring (medium confidence). • The thermal growing season is expected to continue to lengthen (high confidence), but soil moisture levels in the summer and autumn are expected to decrease (high confidence).

Table B Summers will continue to get hotter and drier…

Current Trends	Forecast
• Average summer temperature for all regions of the UK has risen by between 0.5 and 0.9 °C since 1914. • Total summer precipitation has decreased in most parts of the UK, typically by between 10 and 40% since 1961.	• By 2040, average summer temperature for the UK is expected to rise by between 0.5 and 2 °C, depending on region. By 2100, average summer temperature for the UK is expected to rise by between 1 and 6 °C, depending on region and emissions scenario (high confidence). • By 2100, there is expected to be up to 50% less precipitation in the summer months, depending on region and emissions scenario (medium confidence). • The number of days when buildings require cooling is expected to increase (high confidence).

Table C Winters will continue to get milder and wetter…

Current Trends	Forecast
• Average winter temperature for all regions of the UK has risen by up to 0.7 °C since 1914. • Total winter precipitation has increased in almost all parts of the UK, typically by up to 50% since 1961. • The number of days with snow cover at 9am has decreased in all regions of the UK by between 4 and 20% since 1961.	• By 2040, average winter temperature for the UK is expected to rise by between 0.5 and 1 °C, depending on region. By 2100, average winter temperature for the UK is expected to rise by between 1 and 4 °C depending on region and emissions scenario (high confidence). • By 2100, there is expected to be up to 30% more precipitation in the winter months, depending on region and emissions scenario (high confidence). • Snowfall amounts are expected to decrease across the UK (high confidence), and large parts of the country are expected to experience long runs of winters without snow (medium confidence). • The number of days when buildings require heating is expected to decrease (high confidence).

Table D Some weather extremes will become more common, others less common…

Current Trends	Forecast
• The average duration of summer heat-waves has increased in all regions of the UK by between 4 and 16 days since 1961. • The average duration of winter cold snaps has decreased in all regions of the UK by between 6 and 12 days since 1961. • There has been a trend towards heavier winter precipitation for most parts of the UK since 1961.	• The number of very hot summer days is expected to increase, and high temperatures similar to those experienced in August 2003 or July 2006 (>3 °C above average) are expected to become common by the end of this century, even under the Low Emissions scenario (medium confidence). • The number of very cold winter days is expected to decrease, and low temperatures similar to those experienced in February 1947 or January/February 1963 (>3 °C below average) are expected to become highly uncommon by the end of this century, even under the Low Emissions scenario (medium confidence). • Heavier winter precipitation is expected to become more frequent (high confidence). • Winter storms and mild, wet and windy winter weather are expected to become more frequent (low confidence).

Appendix 2 Detailed expansion of predicted 'biodiversity responses' to climate change: Defra (2007)

- **Phenology** – The change in timing of seasonal events, such as flowering and migrations. Spring events have generally begun earlier than historically observed. For example oak leafing has advanced three weeks in fifty years. Other examples are earlier egg laying by birds, spawning of amphibians and fruiting of certain species such as blackberry. Autumn events such as leaf fall and species migrations also appear to be taking place later, but this is less clear. This raises significant concerns regarding loss of synchronicity between interdependent species, such as some bird species breeding after the peak time of insect abundance.
- **Species abundance** – This may be increase or decrease as climate changes. Evidence exists to support this expected effect.
- **Range changes** – Changes in climate are likely to result in migrating species having to move greater or smaller distances to access seasonal food or breeding conditions. For example wading birds migrating to the UK from northern latitudes have been observed to be feeding further north and east than before, and numbers dropping in the south west as temperatures rise. For non-migrating species, northern extents to current ranges are likely to increase northwards, and this has been observed for a wide range of species of bird, mammal and especially invertebrates, whilst species which have a southern distribution limit within England are retreating northwards and to higher altitudes. Importantly there is evidence of continental species such as bumble bee becoming established as breeding species in England. Each species will display individualistic responses to climate change.
- **Habitat preference switch** – There is evidence that some species which may be less mobile over a large scale area, such as silver spotted skipper butterfly, are changing their habitat preference, to cooler conditions such as taller grasslands. Each species will display individualistic responses to climate change.
- **Ecosystem function** – This area is less well understood but there is evidence of greater biomass within certain habitats, such as woodlands due to increases in temperature and atmospheric carbon dioxide.

Appendix 3 Defra guiding principles to facilitate adaptation of biodiversity to climate change

Conserving existing biodiversity

This is a critical element of an adaptation strategy. Our future biodiversity will depend on the robustness of the resource today. Protection and enhancement of this is already an underpinning element of work in this field, and there is a statutory duty on public bodies to have regard for the conservation of biodiversity in carrying out their core functions under the Countryside and Rights of Way Act 2000. Regard for biodiversity is a material consideration within the planning system, as confirmed by the courts and restated within PPS9. Protection of the highest value assets, recognised through European and National designations is well established.

It is critical that these core elements of our natural heritage should be afforded utmost protection and fostered for their inherent biodiversity value. However climate change will serve to alter the characteristics of those sites and it is important to recognise that they will change and species will move out of or into such sites. It is also important that sites without the benefit protective designation which display valued biodiversity qualities are recognised for the vital role they play, as habitat per se, and as 'stepping stones' within the wider habitat network. In fact these elements, such as river corridors, hedgerow networks, ponds and canals, woodlands and low intensity agriculture are critical capital in our biodiversity resource. They will continue to act a connecting habitats and linkages between protected sites and their functional role recognised as being of high importance to the wider resource.

Defra recognises therefore the utmost need to continue to safeguard the best of existing biodiversity and habitats through the planning system and species protection legislation.

Buffers of semi-natural habitat should be sought around high value sites as protection from intensive agriculture and development, and to expand their significance of chance colonisation by dispersal species.

This core principle should be reinforced through LBAP and other land management partnership schemes and initiatives.

Species resilience to climate change will be enhanced further if the range of ecological situations in which they occur is maintained over their general geographic range. In this way risk of regional extinction will be reduced. Atypical sites as well as typical habitats should be maintained within protected or managed site hierarchies to facilitate species survival.

It is accepted however that it will not be practical to protect and maintain all sites important species to distribution in all areas. This may be because of the vulnerability to climate change at the southern range of existing distribution which it would be unreasonable and unsustainable to seek to resist, and instead a strategy to facilitate migration should be prioritised over maintenance of the status quo. Sites which have a significant community of important species should however be foci for active management and conservation, even for common species.

Reduce sources of harm not linked to climate change

This principle is simple but clearly of great value. Climate change will present changing and increasing stresses on biodiversity distribution and abundance and reducing other sources of harm will raise resilience to climate impacts. In essence this would mean maintaining the established conservation principles favoured by Natural England prior to the emergence of the climate change imperative. For example this could mean encouraging land and site management regimes which address issues such as insensitive and intensive agricultural practice, over grazing, pesticide use, nutrient enrichment of soils and water systems, use and introduction of non-native species and over abstraction of water.

Develop ecologically resilient and varied landscapes

This action is likely to be a fundamental element of any long-term, effective and sustainable biodiversity adaptation strategy. Landscapes are invariably a mixture of land uses and habitat types.

Climate change will alter landscapes directly and indirectly. Landscapes are dynamic entities anyway, but rates of change through climatic shift and man's response to it – such as forestry and agriculture patterns, irrigation practice and other land uses will accelerate changes to landscape composition and character. Landscape responses to climate change will be complex. Consequently habitat composition and distribution will change, with some disappearing and some establishing for the first time.

Stakeholders should seek to encourage habitat diversity in landscapes through encouraging creation of more semi-natural areas, restoring degraded habitats, allowing natural systems to function and redress unsympathetic land uses. In doing so biodiversity will be best able to flourish and adapt. Such landscape composition gives optimal opportunity for species dispersal. Habitats should be connected as far as possible by semi-natural areas and linear features between key sites, and wider areas should be 'permeable' to species dispersal through the network of accessible semi-natural spaces and features and removal or lessening of barrier or hostile spaces between the key sites.

Requirements for successful species dispersal varies enormously dependant on the species itself. Generally, landscape permeability and connectivity will be enhanced through maintaining as broad, dense and rich a mosaic of habitats and semi-natural features as possible, and by removing or mitigating hostile features or land uses.

Defra promotes the following characteristics for dispersal friendly landscapes:

- Diverse and structured vegetation.
- Semi-natural habitat on a range of slope and aspect to allow accessibility of various micro-climatic conditions.
- Uninterrupted semi-natural vegetation over a range of altitude to facilitate vertical dispersal.
- Uninterrupted semi-natural habitat across coastal zones where significant variation in local climate can be observed over short distances.
- Diverse water regimes which can survive the expected drier summers, wetter winters and greater, uneven precipitation events. Variation between water environments and dry land are likely to be most resilient to climate change.

These objectives for dispersal friendly landscapes can be furthered through:

- Removal of upland commercial plantation to allow upward migration.
- Managed vegetation regimes to provide variation in structure, age and biomass but ensuring this does not exacerbate fragmentation.
- Integrating fragmentation mitigation measures into infrastructure development, such as tunnels and green bridges, or introducing semi-natural features to development such as appropriate slope angles on cuttings and embankments to enhance microclimate variation.
- Water management and extraction regimes which are sensitive to water habitats, increasing where possible winter water storage.
- Alter drainage systems to provide variations in wet and dry areas.

- Maximise opportunities to restore and establish semi-natural features wherever possible, increasing variation in the landscape.
- Restore and create buffer and transitional habitats between woodland and grassland and other combinations of spaces.

Defra emphasises the importance of allowing natural processes to function unhindered, particularly the river and coastal processes which are fundamental to habitat creation and variation. In a climate where storm activity and flood risk will increase, alongside a rise in sea level, there will be pressure for artificial management of the water environment to take place, such as sea wall creation and reinforcement and canalising and of water courses and inland flood defences. Where sea defences are developed, there is likely to be an artificial restriction on the creation of existing and evolving inter-tidal habitats, such as mud flat and saltmarsh, normally rich areas for biodiversity and important migratory features. Canalising, dredging or culverting of inland watercourses and increases in flood defences allied with removal of functional floodplains would also be highly disadvantageous to biodiversity and habitat connectivity where such systems normally provide rich habitats and strong linear wildlife corridors.

Establishing ecological networks through habitat protection, restoration and creation

This objective is critical to the effective enhancement of adaptation of biodiversity within most landscapes. Its main objective is to increase in a planned and systematic way the connectivity of habitats, particularly in the most fragmented landscapes, but also in those areas which currently maintain the richest biodiversity interest.

The most fragmented landscapes tend to be found within lowland areas where agriculture and urbanisation predominates. In such areas semi-natural ‘patches’ of habitat value are often dispersed, isolated and relatively small in extent. In order to enhance connectivity planned ecological networks should be established which improve opportunities for dispersal.

Areas of designated sites or high value habitat will be the core to any biodiversity network, as established within the Defra’s objective 1. Population of wider or new areas will be sourced from these sites. In addition it is necessary to restore degraded habitats and also to create new ones, particularly in areas where semi-natural spaces are concentrated.

This is recognised as being more resource intensive than conservation of existing assets, because of the need to plan, capital costs, existing land use and multiple land ownership complications, but will be very important in facilitating adaptation to climate change.

Make sound decisions based on analysis

Hopkins notes that within the UK biodiversity data is of a relatively good and accessible standard and this should be advantageous in planning for biodiversity adaptation. It is important however that methodology for assessing the actual causes of local decline or extinction are developed which recognises the role climate change makes in such events, alongside and in combination with other caused such as agricultural practice.

In understanding the effects of climate change on species protection it is likely that some currently rare and carefully protected and managed species will flourish and spread northwards, whereas others will decline. In such circumstances it will be appropriate to continuously review species management, such as BAP species lists, and for conservation priorities to evolve with changing conditions.

Integrate adaptation and mitigation measures into conservation management, planning and practice

Climate change should now be made a core consideration when preparing or reviewing conservation management plans for sites or species. Emphasis needs to evolve away from site and species focus to more holistic approach to underlying physical processes that support the biodiversity interest.

Therefore attention should be increased in respect of:

- Managing water regimes, especially where droughts are likely to be more frequent;
- Fire risk and control management where sites and areas are likely to become drier and hotter and hence prone to fires;
- Livestock management and mowing regimes in respect of longer growing seasons and shifting flowering times requiring changes to mowing or grazing periods. Summer drought may lessen biomass and water availability for grazing regimes, and should be amended by type of stock or by reduction in livestock head;
- Increased flooding rainfall events may have a significant effect on soil run-off and sediment deposition patterns; and
- Invasiveness of ‘alien’ species as a consequence of climate change.

These issues may have to be addressed at a number of different geographic scales, from individual site management to landscape scale through to regional approaches.

Appendix 4 Key opportunities for addressing biodiversity adaptation within the Regional Spatial Strategy and Local Development Framework processes

The Regional Planning Body (RPB) (usually the Regional Assemblies) is responsible for the initial preparation of RSS and will work closely with a wide range of key stakeholders in doing so. Figure A illustrates the key opportunities for addressing biodiversity adaptation through regional policy.

The importance of setting the appropriate direction at regional level cannot be under-emphasised. The RSS sets the policy framework on which each DPD across the region will need to comply, developing regional policy in the context of local circumstances and environmental conditions.

Engagement from the earliest stages of RSS preparation, often within the context of a regional 'environmental working group' is likely to be beneficial in terms of shaping final policy, and 'bringing on board' other stakeholders.

It is important to recognise that the parallel Sustainability Appraisal process, which should be integrated with the emergence of policy and proposals, will also afford important opportunities to influence how the RRS develops. This is examined in more detail in Chapter 8.

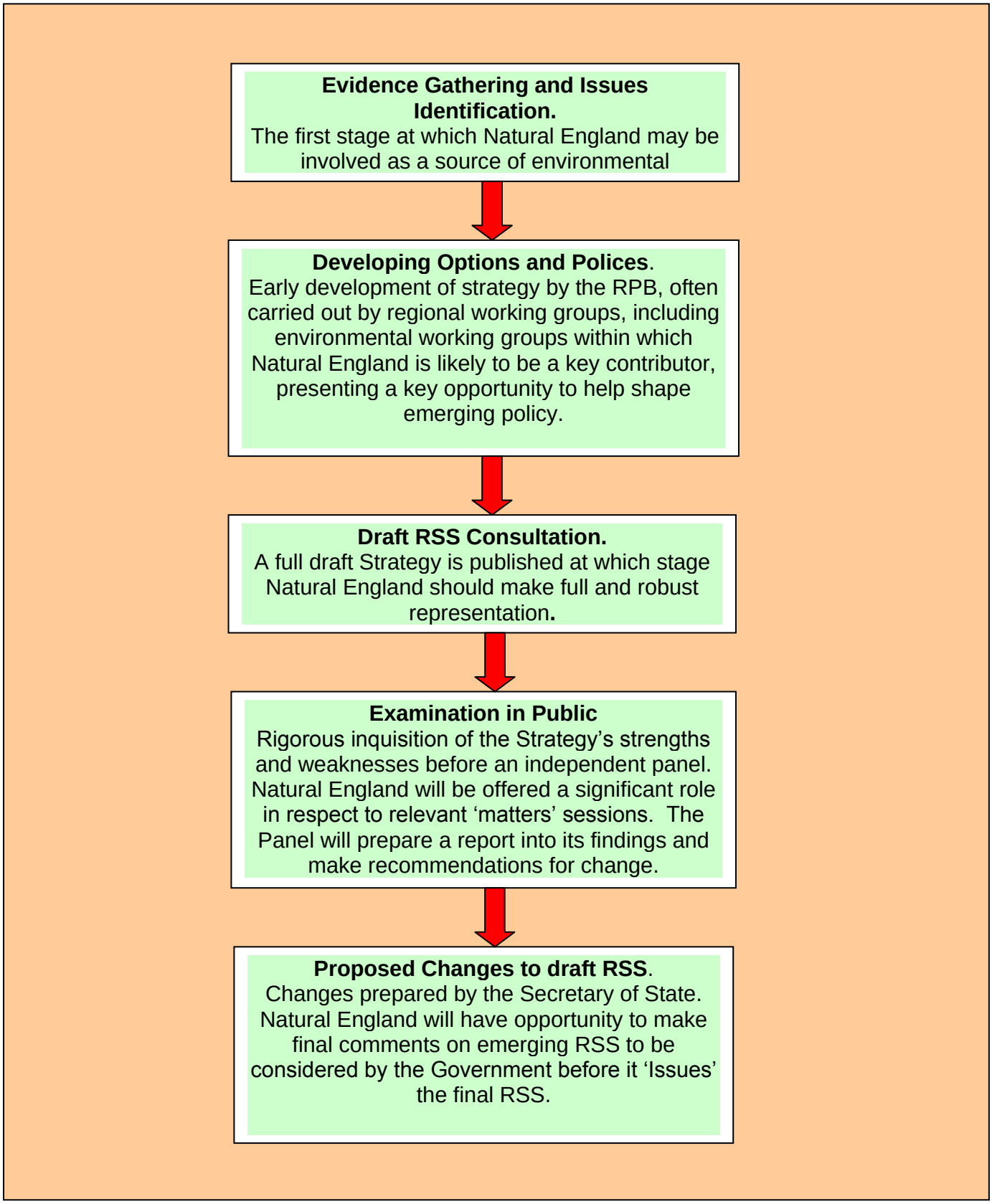

Figure A Key opportunities for addressing biodiversity adaptation within the RSS preparation process

Opportunities within Local Development Frameworks process

Local Development Documents (LDDs) are the Development Plan element of Local Development Frameworks. They replace the Local Plan system. LDFs themselves are the set of plans and documents which include the DPDs, but also procedural documents (Statement of Community Involvement and Local Development Scheme) and non-DPD guidance, such as Supplementary Planning Guidance. Nomenclature for Local development frameworks can be confusing.

Local Development Documents are critical elements of the development plan. They will be the single most important influence on how all planning applications are determined by LPAs. Whilst the RSS sets the strategic framework for LDDs to work within, the LDD will present far more detailed and locally responsive policy than RSS, and allocate or protect specific tracts of land. Getting the right policies in the RSS in respect to biodiversity adaptation will be critical if LDDs are to develop such policy in a locally responsive way. Natural England will work within the LDD process to ensure that local interpretation of biodiversity adaptation matters is effective and appropriate to local conditions.

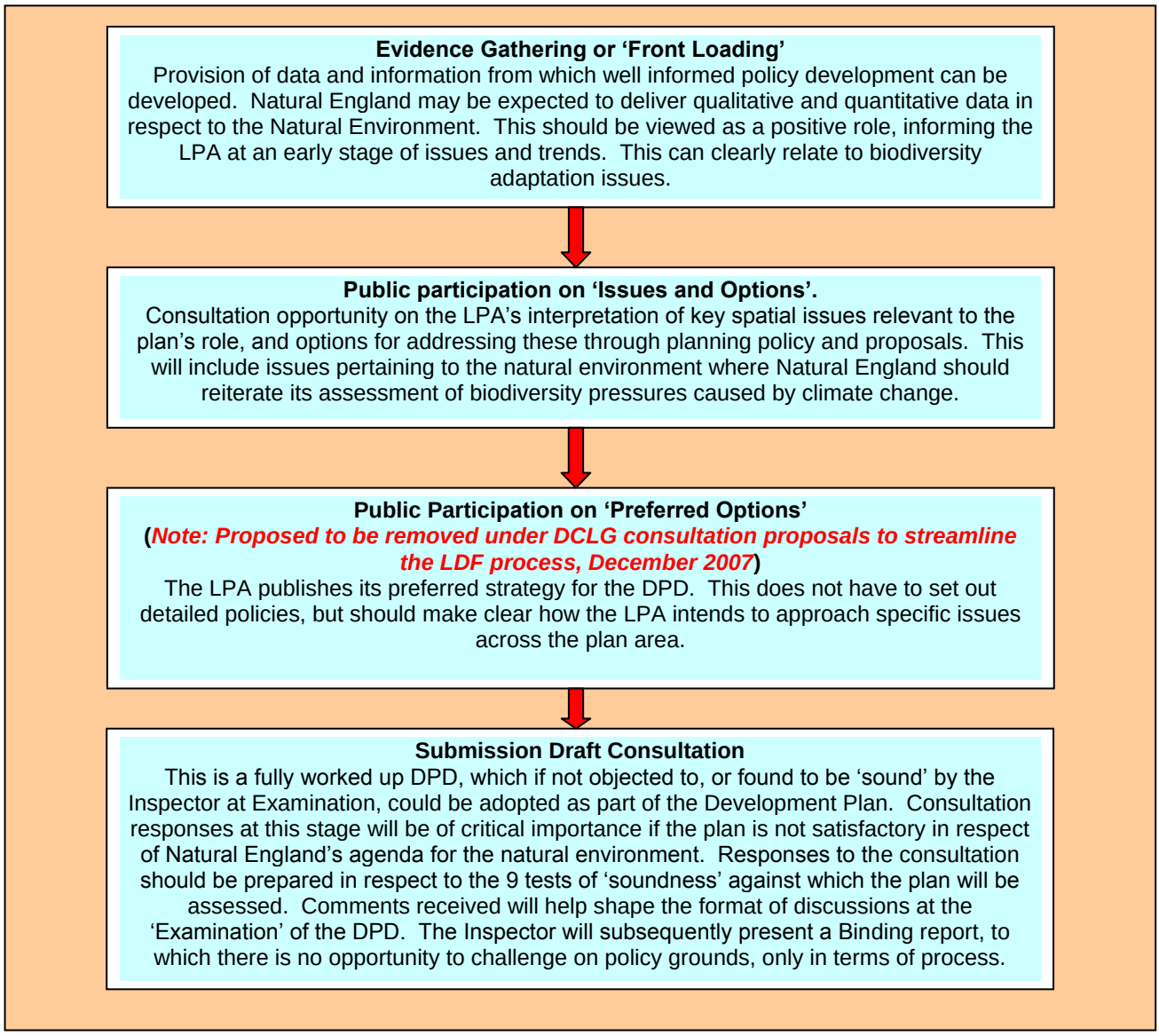

Figure B Key stages of engagement for Natural England within the LDD preparation process

Natural England works for people, places and nature to conserve and enhance biodiversity, landscapes and wildlife in rural, urban, coastal and marine areas.

www.naturalengland.org.uk