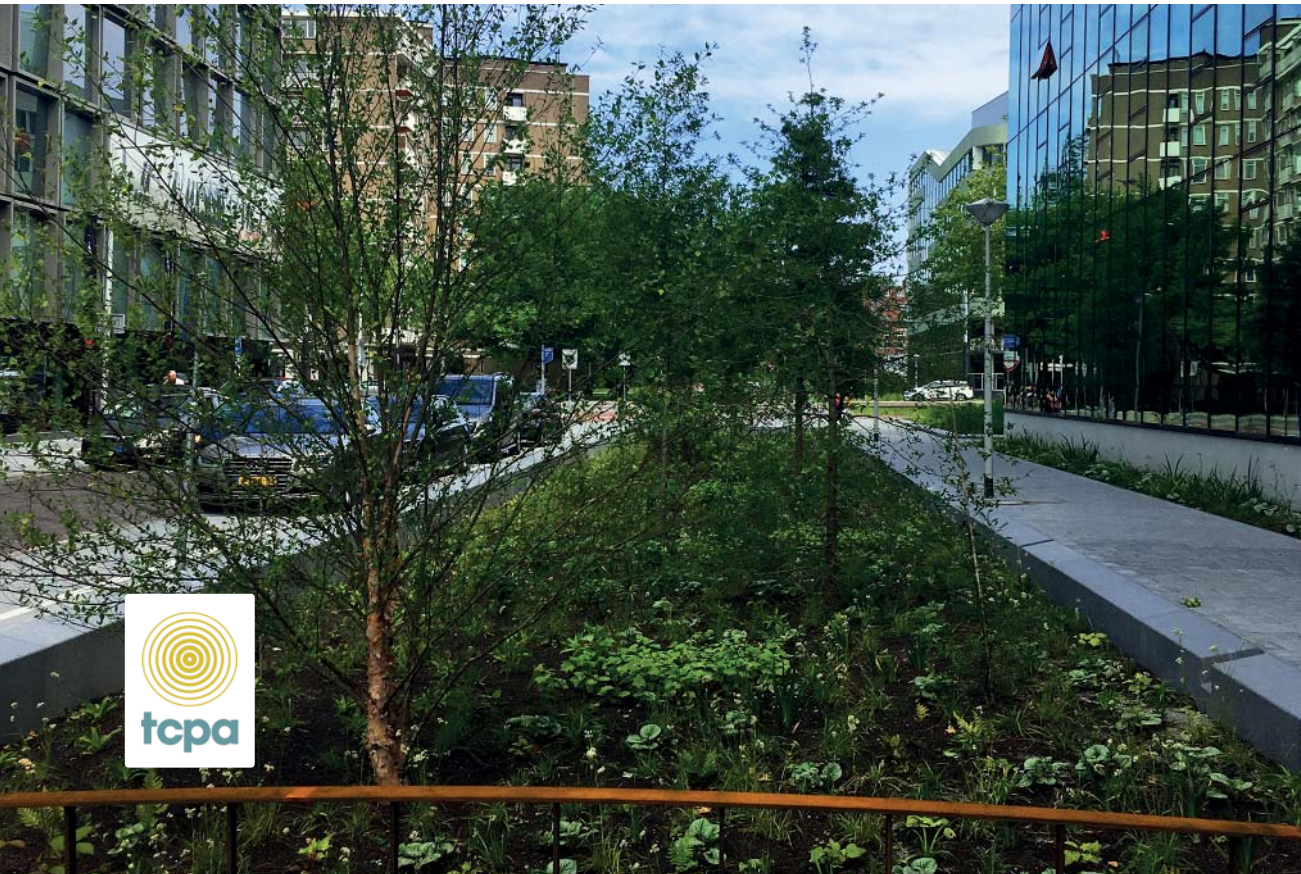


Garden City Standards for the 21st Century

Practical Guides for Creating Successful New Communities

guide 14

building climate-
resilient new
communities





Practical Guides for Creating Successful New Communities

Guide 14: Building Climate-Resilient New Communities

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**The Lady Margaret
Paterson Osborn Trust**

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Cover photograph: Sustainable drainage system in Amsterdam

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building climate-resilient new communities

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The TCPA Practical Guides

Across the UK there is a shortage of housing, and it is increasingly understood that we need to plan and build new large-scale developments, in addition to renewing existing towns and villages. At the same time, many people worry that any new places built will be no more than soulless, unattractive dormitory suburbs. How can we prevent such outcomes? How can we ensure that new large-scale developments become socially and economically successful places – places that will improve over time, and in which people will want to live for generations to come? The answer lies in the Garden City development model – a proven way of funding, creating and maintaining successful high-quality places. A true Garden City is a place created following the Garden City Principles, set out in the box below.

National planning policy guidance on a range of issues has been greatly reduced, so practical advice about how to create successful new places is more important than ever. The Guides – on location and consent; finance and delivery; design and masterplanning; masterplanning for net-zero energy; homes for all; planning for arts and culture; planning for green and prosperous places; creating health-promoting environments; long-term stewardship; ‘edible’ Garden Cities; people, planning and power; modern methods of construction; sustainable transport; and building climate-resilient new communities – are not detailed handbooks but instead set out the scope of opportunities for ambitious councils who want to create high-quality, large-scale new developments, whether or not they are able to follow all the Garden City Principles.

The Guides highlight key points for consideration and offer signposts to sources of further detailed information. They are ‘living’ documents that will be periodically updated to reflect key policy changes. Although they are focused on policy in England, the principles and key recommendations can be applied across the UK. The Practical Guides will help anyone attempting to create great places, for everyone, whether or not they describe what they are trying to achieve as a ‘Garden City’. Links to each of the Practical Guides can be found in Annex 1 on pages 23 and 24 of this Guide.

The Garden City Principles

A Garden City is a holistically planned new settlement that enhances the natural environment and offers high-quality affordable housing and locally accessible work in beautiful, healthy and sociable communities. The Garden City Principles are an indivisible and interlocking framework for delivery, and include:

- Land value capture for the benefit of the community.
- Strong vision, leadership and community engagement.
- Community ownership of land and long-term stewardship of assets.
- Mixed-tenure homes and housing types that are genuinely affordable.
- A wide range of local jobs in the Garden City within easy commuting distance of homes.
- Beautifully and imaginatively designed homes with gardens, combining the best of town and country to create healthy communities, and including opportunities to grow food.
- Development that enhances the natural environment, providing a comprehensive green infrastructure network and net biodiversity gains, and that uses zero-carbon and energy-positive technology to ensure climate resilience.
- Strong cultural, recreational and shopping facilities in walkable, vibrant, sociable neighbourhoods.
- Integrated and accessible transport systems, with walking, cycling and public transport designed to be the most attractive forms of local transport.

The TCPA has produced an extensive set of policy and practical resources on Garden Cities, which can be found at <http://www.tcpa.org.uk/pages/garden-cities.html>

Summary

New Garden Cities and large-scale developments must be places that address climate change mitigation and adaptation. They must have a long-term vision to deal with climate change impacts within a local democratic context, allowing communities to participate in forming and implementing solutions to the problems that we face. Climate adaptation must be a foundational principle in how we plan for new growth.

This Practical Guide outlines the crucial overarching requirements of a successful adaptation strategy:

- **Recognise the unique challenges in planning for climate adaptation:** Climate adaptation requires the radical re-making of places to respond to the complex and dynamic impacts of climate change.
- **Work from the right evidence base:** There is a wide range of data available on flood risk, heat stress and the water cycle that can be used to ensure that assessments are up to date.
- **Put climate justice at the heart of decision-making:** Public participation is a vital Garden City principle and must be at the heart of planning for new communities, especially in developing workable adaptation measures.
- **Select resilient sites for new development:** Site selection should be based on the fullest possible range of adaptation evidence – and the site chosen should be intrinsically resilient to the impacts of climate change, and should, in particular, reduce the need for expensive flood defence measures.
- **Make the social and economic case to decision-makers for climate resilience standards:** Heat stress or flood events can have devastating impacts on quality of life. Avoiding negative outcomes on people's lives is the primary objective of robust adaptation policy.
- **Use masterplans and design codes to drive the effective delivery of adaptation solutions:** The masterplan is the guiding hand which can ensure that adaptation policy is effectively delivered.

This Practical Guide also provides recommendations on how masterplanning can be carried out to ensure climate change adaptation:

- **Build multi-functionality into adaptation measures:** Adaptation measures should be multi-functional, addressing a range of social issues.
- **Tackle the issue of overheating in homes and other buildings:** It is vital to combat overheating in homes and other buildings, while ensuring energy efficiency.
- **Minimise flood risk and increase flood resilience:** New developments should be steered away from current and future flood risk areas. They should be made flood resilient for their entire lifetime, and care must be taken to ensure that new development does not increase flood risk elsewhere.
- **Deal with water scarcity:** Maintaining an adequate supply of water and ensuring adequate drainage capacity requires integrated planning in which local planning authorities work closely with developers and water companies.

Finally, the Practical Guide outlines recommendations on the delivery of adaptation measures, focusing on designing to reduce air temperatures, flood damage to property, and water use.

1

Introduction



Our future survival depends on stabilising global temperature increases to no more than 1.5°C above pre-industrial levels. Even if we succeed, through radical reductions in carbon emissions, a range of climate impacts are already locked into the global climate system, which will see increasing sea levels and severe weather events. Climate change adaptation must therefore be a foundational principle in how we plan for new growth.

Planning for new and renewed communities has a vital role to play in dealing with the climate crisis – by delivering renewable energy systems, ensuring that there are high levels of energy efficiency in buildings, implementing sustainable transport systems, and delivering a whole range of resilience measures, from strategic flood defences to green infrastructure to aid urban cooling. Above all, planning can take the long view, not just addressing the needs of today but also preparing for a changing climate, looking 100 years ahead and beyond. New communities will also play a unique role in relocating existing vulnerable communities as they become unviable in the face of the impacts of climate change.

New Garden Cities must be beacons of best practice in delivering places that are fit for the future and environmentally, socially and economically sustainable. New large-scale communities must necessarily be places that address climate change mitigation and adaptation if they are to have a sustainable future. They must have a long-term vision to deal with climate change impacts within a local democratic context, allowing communities to participate in forming and implementing solutions to the problems that we face.

There are already commitments from local authorities to tackle the climate change challenge, with 300 of 404 of district, county, unitary and metropolitan councils having declared a 'climate emergency'. Building places that fully address the challenges of climate change is the crucial starting point in building for the future and avoiding the expensive costs of retrofitting energy systems or flood defence measures that would otherwise become necessary. Ultimately, new communities offer a unique opportunity to combine the actions

necessary to deal with the climate crisis in a way that creates greener, ecologically rich, healthy and vibrant communities. Comprehensive action through masterplans and design codes can help to make the most of this opportunity.

1.1 The purpose of this Practical Guide

Focusing on adaptation measures,¹ this Practical Guide provides local authorities and other practitioners with guidance on how to deliver sustainable, large-scale new communities. It is one of a series of TCPA Practical Guides (including case study material) for local authorities and practitioners on creating successful new communities, which together form a holistic approach to issues such as energy efficiency, sustainable transport, green infrastructure, and long-term stewardship.² The TCPA has also issued a wide range of other publications which complement this Practical Guide, focusing on planning and delivering sustainable places in the face of climate change – including:

- *The Climate Crisis – A Guide for Local Authorities on Planning for Climate Change*, produced by the RTPI and the TCPA – see <https://www.tcpa.org.uk/planning-for-climate-change>
- PERFECT Expert Papers and Factsheets produced by the international, TCPA-led PERFECT project on green infrastructure – see <https://www.tcpa.org.uk/perfect>
- *20-Minute Neighbourhoods – Creating Healthier, Active, Prosperous Communities*, which sets out introductory principles and guidance on delivering compact and connected neighbourhoods – see <https://www.tcpa.org.uk/guide-the-20-minute-neighbourhood>

1 The National Planning Policy Framework (<https://www.gov.uk/government/publications/national-planning-policy-framework--2>) defines climate change adaptation as: *'Adjustments made to natural or human systems in response to the actual or anticipated impacts of climate change, to mitigate harm or exploit beneficial opportunities'*

2 The TCPA's Practical Guides for Creating Successful New Communities are available at <https://www.tcpa.org.uk/guidance-for-delivering-new-garden-cities>

2

Policy context

This Section outlines the policies and legislation specifically relevant to climate change adaptation in relation to building new communities in England. A comprehensive list of UK policies that impact on planning for climate change is provided in the TCPA and the RTPI's October 2021 publication, *The Climate Crisis: Guidance for Local Authorities on Planning for Climate Change*.³

Planning and Compulsory Purchase Act 2004

The Planning and Compulsory Purchase Act 2004 (as amended by Section 182 of the Planning Act 2008), sets out a duty on development plan-makers to mitigate and adapt to climate change.⁴ Local planning authorities are bound to ensure that, taken as whole, plan policy contributes to the mitigation of, and adaptation to, climate change.

Flood and Water Management Act 2010

The Flood and Water Management Act 2010 addresses the threats of flooding and water scarcity and outlines organisational responsibilities for managing flood risk.⁵

National Planning Policy Framework

The National Planning Policy Framework (NPPF), most recently updated in July 2021,⁶ sets out the key national planning priorities for England. It is non-statutory guidance but is a powerful material consideration in plan-making and development management decision-making. Paragraph 152 of the NPPF states that the planning system should support the transition to a low-carbon future in a changing climate, taking full account of flood risk and coastal change.

Paragraph 153 of the NPPF states that:

'Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures. Policies should support appropriate measures to ensure the future resilience of communities and infrastructure to climate change impacts, such as providing space for physical protection measures, or making provision for the possible future relocation of vulnerable development and infrastructure.'

Footnote 53, relating to this paragraph, sets out an expectation that strategies should be in line with the Climate Change Act 2008. Since compliance with national law and policy is central

3 *The Climate Crisis – A Guide for Local Authorities on Planning for Climate Change*. RTPI and TCPA, Oct. 2021. <https://www.tcpa.org.uk/planning-for-climate-change>

4 Planning and Compulsory Purchase Act 2004. https://www.legislation.gov.uk/ukpga/2004/5/pdfs/ukpga_20040005_en.pdf
Section 19 of the 2004 Planning and Compulsory Purchase Act, as amended by Section 182 of the Planning Act 2008 (available at <https://www.legislation.gov.uk/ukpga/2008/29/section/182>), states that: *'Development plan documents must (taken as a whole) include policies designed to secure that the development and use of land in the local planning authority's area contribute to the mitigation of, and adaptation to, climate change.'*

5 Flood and Water Management Act 2010. https://www.legislation.gov.uk/ukpga/2010/29/pdfs/ukpga_20100029_en.pdf

6 *National Planning Policy Framework*. Ministry of Housing, Communities and Local Government, Jul. 2021. <https://www.gov.uk/government/publications/national-planning-policy-framework--2>

to the soundness test of local development plans, compliance with the Climate Change Act is a clear obligation on both the Planning Inspectorate and local planning authorities. Furthermore, paragraph 73 of the NPPF says that ‘strategic policy-making authorities should [...] set clear expectations for the quality of the places to be created and how this can be maintained (such as by following Garden City principles)’. The TCPA’s Garden City Principles can be viewed in full on the TCPA website.⁷

The NPPF is accompanied by online Planning Practice Guidance, which is periodically updated to include interpretations of Ministerial Statements relevant to planning. The key sections relating to adaptation are those on climate change and flood risk and coastal change.⁸

National Flood and Coastal Erosion Risk Management Strategy for England

One of the core ambitions of the National Flood and Coastal Erosion Risk Management Strategy for England⁹ is to make ‘today’s growth and infrastructure resilient in tomorrow’s climate: making the right investment and planning decisions to secure sustainable growth and environmental improvements, as well as infrastructure resilient to flooding and coastal change’. It calls for a broad range of actions to achieve climate-resilient places – most importantly the avoidance of inappropriate development in floodplains. It also supports using nature-based solutions to slow the flow of, or store, flood waters, and making the best land use and development choices in managing flooding and coastal change, such as allowing space for water within the design of a new development.

Garden Communities prospectus

The government’s *Garden Communities* prospectus¹⁰ includes the following among the key qualities required from ‘garden communities’:

‘Future proofed – designed to be resilient places that allow for changing demographics, future growth, and the impacts of climate change including flood risk and water availability, with durable landscape and building design planned for generations to come...’

National Model Design Code

The National Model Design Code¹¹ provides detailed guidance on the production of design codes, guides and policies to promote successful design. It includes information for local planning authorities on how to ensure that developments respond to the impacts of climate change, are energy efficient, embed circular economy principles, and reduce carbon emissions – including measures that local planning authorities can include within their own design codes to create environmentally responsive and sustainable places.

7 The Garden City Principles are available at <https://www.tcpa.org.uk/garden-city-principles>

8 ‘Climate change’ (<https://www.gov.uk/guidance/climate-change>) and ‘Flood risk and coastal change’ (<https://www.gov.uk/guidance/flood-risk-and-coastal-change>). *Planning Practice Guidance*. Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government

9 *National Flood and Coastal Erosion Risk Management Strategy for England*. Environment Agency, Jul. 2020. <https://www.gov.uk/government/publications/national-flood-and-coastal-erosion-risk-management-strategy-for-england--2>

10 Garden Communities. Ministry of Housing, Communities and Local Government, Aug. 2018. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/805688/Garden_Communities_Prospectus.pdf

11 *National Model Design Code. Parts 1 & 2*. Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government, Jul. 2021 (updated Oct. 2021). <https://www.gov.uk/government/publications/national-model-design-code>

3 Overarching principles

While national-level policy is crucial, solutions need to be locally driven to meet the needs of the new development, its context, and the local population. Local authorities should follow the overarching principles set out below, within the context of the Garden City Principles, to deliver new places that can be adjusted in response to the impacts of climate change.

New Garden Cities must be places with a long-term vision for dealing with climate change impacts. The planning process has a crucial role to play in dealing holistically with design options through a masterplan and delivering the multi-functional benefits of adaptation measures. But it must operate within a local democratic context, allowing communities to participate in forming and implementing solutions to the problems that we face.

This Section outlines the overarching requirements of a successful adaptation strategy and sets out principles for strategic planning for climate adaptation.

3.1 Recognise the unique challenges in planning for climate adaptation

Climate adaptation requires the radical re-making of places to respond to the complex and dynamic impacts of climate change. There are four high-level factors to bear in mind when developing strategic adaptation policy for new settlements:

- **Place:** Climate impacts play out very differently across the diverse physical and social geography of the UK. This requires fine-grained responses to the physical characteristics of a new site.
- **People:** Climate impacts affect different people in different ways, with consequences that are particularly significant for social groups least equipped to be resilient. Adaptation solutions also have direct and lasting impacts on everyday lives, so taking action means working with communities and communicating an effective narrative for change.
- **Space:** Building resilience requires interlocking measures, from major spatial-scale coastal realignment to the detailed design of buildings. An understanding of the interdependence of decisions on such matters is vital in determining long-term solutions – such interdependence is often driven by catchments and coastal systems that do not fit with local government boundaries.
- **Time:** Building resilience requires thinking about the very long term. A new development should be planned to avoid significant vulnerability to impacts arising from climate change over at least the next 100 years.¹² For some critical infrastructure, longer periods will be appropriate.

Because of its visible impact, flood risk is often the top priority in any adaptation strategy. Nevertheless, planning for flood risk is not always carried out with sufficient grasp of the long-term risks, nor of the opportunities to design resilient places. Furthermore, successful adaptation policy involves much more than simply addressing flood risk and must take account of a range of severe and complex climate impacts. Dealing with this reality requires holistic planning over the long term, based on an understanding of how such changes will interact and affect people's health and wellbeing. Building climate resilience requires an inter-organisational, inter-departmental local response in which the local development plan

¹² UKCP18 (UK Climate Projections) sea level rise figures include exploratory projections out to the year 2300, which could be useful in understanding the long-term sustainability of coastal communities or developments such as major infrastructure, new settlements, and major urban extensions

can be an integrating aspect. Above all, climate adaptation must be understood as the main priority for long-term planning to secure climate resilience, and must be accepted as being of equal importance to other priorities, such as meeting housing need.

3.2 Work from the right evidence base

There is a wide range of data on climate impacts, broadly falling into three main themes: flood risk data, including sea level rise; heat stress data; and water cycle/availability data.¹³ The Environment Agency is a key partner in any new large-scale development, but it has legal responsibility for only some kinds of flooding, and not for heat stress at all. Data contained in strategic flood risk assessments and other assessments of future climate impacts form the foundation of a robust evidence base. However, it is vital that these assessments are up to date and use the latest data available – for example, the Environment Agency’s ‘climate change (flood risk) allowances’¹⁴ are periodically updated, and this might significantly change the level of identified risk and vulnerability of planned new development to flooding. The increased prevalence of surface water flooding and the patchy nature of data on its future impacts should also be borne in mind. Local authorities may also draw on catchment abstraction management strategies, water resource management plans, river basin management plans, water cycle studies, and other vulnerability assessments on water availability. Local planning authorities may also have regard to the Climate Change Risk Assessment contained in the National Adaptation Programme.¹⁵

Evidence of overheating is another vital part of the evidence base. There is a large amount of evidence available on the negative impacts of heat stress on public health, on the health inequality issues that arise, and on the design benefits of, for example, green infrastructure. The third independent Climate Change Risk Assessment (CCRA3)¹⁶ provides a general overview of impact scenarios and the risks from increasing temperatures. However, the urban heat island effect can have highly localised consequences, and so local analysis is important and could be the subject of a knowledge partnership with a higher-education body. Where detailed evidence is not available, there are a series of no-regret measures in urban design, detailed below, which should be incorporated into design codes or guides.

3.3 Put climate justice at the heart of decision-making

Public participation is a core Garden City principle, and has to be at the heart of planning for new communities. Developers and local authorities should engage with the existing and new local communities to develop adaptation measures that will work best on the ground. Partnership working with residents and actors in the public and private sectors should be a fundamental part of the process of developing climate change strategies from the outset.¹⁷

13 *Independent Assessment of UK Climate Risk*. Climate Change Committee, Jun. 2021. <https://www.theccc.org.uk/publication/independent-assessment-of-uk-climate-risk/>

14 *Flood Risk Assessments: Climate Change Allowances*. Environment Agency, Feb. 2016 (updated Oct. 2021). <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#what-climate-change-allowances>

15 *The National Adaptation Programme and the Third Strategy for Climate Adaptation Reporting: Making the Country Resilient to a Changing Climate*. Department for Environment, Food and Rural Affairs, Jul. 2018. <https://www.gov.uk/government/publications/climate-change-second-national-adaptation-programme-2018-to-2023>

16 See the Independent Assessment of UK Climate Risk (CCRA3) website, at <https://www.ukclimaterisk.org/>

17 *Climate Change Adaptation by Design: A Guide for Sustainable Communities*. TCPA, 2007. https://www.ukcip.org.uk/wp-content/Wizard/CC_by_design.pdf

Case study
Responding to the climate emergency – Langarth and West Carclaze
Garden Villages, Cornwall

LHC Design and EcoBos



Computer-generated image of part of the West Carclaze development

Cornwall Council is a leading local authority in addressing climate change across all its activities, including housing delivery. In January 2019, the council declared a climate emergency and since then has set an ambitious agenda to pursue environmental sustainability. It has committed to delivering a 'Carbon Neutral Cornwall' by 2030,^A has applied a 'biodiversity net gain' requirement to all major planning applications and major council projects,^B and has engaged 3,000 residents on what they think should be the council's climate change priorities.

In July 2019, the Cornwall Council's Cabinet unanimously approved a Climate Change Plan detailing the operational aspects of achieving the carbon-neutral vision. The council has also adopted a decision-making wheel, based on Kate Raworth's 'Doughnut economics' model.^C In February 2021 the council published its *Climate Emergency Development Plan Document*,^D seeking ways to respond to the climate emergency by expanding the Local Plan approach and supporting the action needed to meet the 2030 carbon-neutral target. Promoters of new developments will need to show that they will deliver energy-efficient sustainable buildings and places in which communities can lead resilient and lower-impact lives. The document outlines policies on natural climate solutions, rural development and diversification, town centre regeneration, design and density, sustainable transport, renewable energy and sustainable construction, and coastal change and flooding. In line with this guidance, Langarth and West Carclaze Garden Villages will be putting the council's ambitions and policies into practice.

Practical Guide 11: *People, Planning and Power*¹⁸ provides detail on the development of successful participation strategies. Additionally, new communities should adopt climate justice as a core planning principle to ensure that development outcomes prioritise the needs of those particularly vulnerable to climate impacts.

18 *People, Planning and Power*. Guide 11. Practical Guides for Creating Successful New Communities. TCPA, Mar. 2019. <https://www.tcpa.org.uk/tcpa-pg-guide-3-masterplanning>

Langarth Garden Village, located on the edge of Truro, is being planned to deliver 3,550 new homes over a 20-to-25-year period, accommodating between 8,000 and 10,000 residents in a net-zero-carbon community, and with 35% of the homes affordable to local people. The masterplan, developed with representatives of the local community and key partners alongside the Truro and Kenwyn Neighbourhood Plan, provides for a new community with green infrastructure at its heart (designed to achieve Building with Nature accreditation), with 5 hectares of new trees (forming part of a forest for Cornwall) and integrating existing green networks within 117 hectares of green infrastructure.

Initiatives to ensure adaptability to climate change include measures such as providing high levels of insulation in buildings, using heat pump technology and solar panels to reduce energy use, embedding short- and long-term water storage capacity and drainage systems, creating walkable neighbourhoods and easy car-free access to services and recreational opportunities, supporting local food growing, and establishing a long-term stewardship approach to future management and monitoring of the performance of the development.

West Carclaze, being developed by Eco-Bos Development Ltd, will deliver 1,500 homes over the next 15 years. The site is on higher ground in the China Clay area of Cornwall, with mining relics and previously disturbed ground found frequently across the site. Adapting to wetter and windier climate conditions alongside greater temperature variations is a key consideration for the design of the site and new homes. Homes are being designed with a fabric-first approach, incorporating renewable energy and heat pump technology, all geared towards creating comfortable living conditions for residents.

The site includes a series of lakes created as part of the former mining activities, which will be actively incorporated into the sustainable drainage strategy, based on strict parameters, alongside a network of natural swales and green spaces. The layout and design of developed areas and open spaces will create micro-climates and spaces that encourage outdoor use in all seasons. Tree and woodland planting will aid carbon capture and reduce exposure to the elements, with species chosen for their suitability for the locality.

- A See Cornwall Council's 'Carbon Neutral Challenge' webpage at <https://www.cornwall.gov.uk/environment/climate-emergency/the-carbon-neutral-challenge/>
- B See Cornwall Council's 'Biodiversity net gain in Cornwall' webpage at <https://www.cecenvironment.co.uk/ecology-services/biodiversity-net-gain-a-guide>
- C Further information on what Cornwall Council is doing and on the decision-making wheel is set out on 'Case Study 2: Cornwall Council – Responding to the climate emergency', in *Bystanders or Innovators? How Local Authorities Can Use Place Making to Drive the Green Recovery*. APSE and TCPA, Jul. 2021. <https://www.apse.org.uk/apse/index.cfm/research/current-research-programme/bystanders-or-innovators-how-local-authorities-can-use-place-making-to-drive-the-green-recovery/>
- D *Climate Emergency Development Plan Document*. Pre-Submission Consultation. Cornwall Council, Feb. 2021. <https://www.cornwall.gov.uk/media/ytsowko1/climate-emergency-dpd.pdf>

3.4 Select resilient sites for new development

Choosing the right location is the starting point for a large-scale new community and can determine its success, providing the opportunity to create sustainable places, build to the highest sustainability standards, take advantage of economies of scale, and make better use of new and existing infrastructure.¹⁹

¹⁹ *Design and Masterplanning*. Guide 3. Practical Guides for Creating Successful New Communities. TCPA, Dec. 2017. <https://www.tcpa.org.uk/tcpa-pg-guide-3-masterplanning>

Site selection should be based on the fullest possible range of adaptation evidence – and the site chosen should be intrinsically resilient to climate impact, and should, in particular, reduce the need for expensive flood defence measures. Regardless of the current level of flood risk, sites should also offer space for the effective management of surface water flooding, with the capacity to accommodate future adaptive pathways. Sites requiring significant flood defences or other resilience measures will have significantly weaker economic viability and will require greater consideration of emergency planning responses in case those defences fail. Further guidance is set out in Practical Guide 1: *Locating and Consenting New Garden Cities*.²⁰

There is an important relationship between the design standards of new homes and resource systems and site selection. For example, limited water availability can be mitigated by design requirements that can drastically reduce the need for potable water.

3.5 Make the social and economic case for climate resilience standards

Heat stress or flood events can have devastating impacts on people's lives, and avoiding such outcomes should be a primary objective of robust adaptation policy. There are also very powerful economic factors related to investment and insurance that support this aim. This is particularly important for the affordability and availability of insurance, which is crucial to economic investment. Flood Re²¹ was established to reduce the cost of flood insurance for those homes most at risk while other measures are being put in place to reduce that risk. However, any new home built after 2009 is not covered by this scheme, and so occupants of these homes will struggle to get affordable insurance if their home floods or is in an area at high risk. To ensure the availability of affordable insurance cover, new homes must be built with high standards of intrinsic resilience.

Decision-makers must be aware of the overwhelming importance of ensuring that new homes are built to be low carbon, energy and water efficient, and climate resilient. Most importantly, they must recognise that the costs of building developments that meet those aims are not prohibitive, and that designing homes to such standards is much more cost-effective than subsequent retrofitting. The Climate Change Committee has published research calling for a statutory requirement to reduce 'overheating risks in new builds [...], alongside more ambitious water efficiency standards, property-level flood protection in flood risk areas, and increasing requirements for greenspace and sustainable transport in planning and guidance'.²² It is crucial that the shared ambition of building resilient homes becomes a priority for decision-makers.

3.6 Use masterplans and design codes to drive adaptation delivery

The principles of successful masterplanning are set out in Practical Guide 1: *Locating and Consenting New Garden Cities*.²³ The masterplan is the guiding hand that can ensure that adaptation policy is effectively delivered. Crucially, along with design codes, it provides a way of ensuring that the multi-functional benefits of climate adaptation solutions are secured in a holistic manner.

20 *Locating and Consenting New Garden Cities*. Guide 1. Practical Guides for Creating Successful New Communities. TCPA, Nov. 2017. <https://www.tcpa.org.uk/tcpa-pg-guide-3-masterplanning>

21 See the Flood Re website, at <https://www.floodre.co.uk/>

22 *UK Housing: Fit for the Future?* Climate Change Committee, Feb. 2019. <https://www.theccc.org.uk/publication/uk-housing-fit-for-the-future/>

23 *Design and Masterplanning*. Guide 3. Practical Guides for Creating Successful New Communities. TCPA, Dec. 2017. <https://www.tcpa.org.uk/tcpa-pg-guide-3-masterplanning>

4

Recommendations for masterplanning

Climate change adaptation must be embedded throughout the masterplanning process for new large-scale development, to address key issues such as overheating, flood risk and water management in an integrated manner.

This Section of this Practical Guide sets out recommendations on ways in which this can be done. Planning authorities must always bear in mind that extreme weather events have both physical impacts and a social dimension.

4.1 Build multi-functionality into adaptation measures

Local planning authorities should consider requiring adaptation measures to be multi-functional in addressing a range of social issues. For example, the provision of high-quality green infrastructure in a development should not only help to combat overheating, flooding and soil erosion, but will also offer a range of mental and physical wellbeing benefits for residents.²⁴

New communities are in a unique position to ensure the functionality of adaptation measures given the data and the range of examples of successful implementation that are available. It is likely that most of the infrastructure associated with a new community will be delivered as part of the masterplan, and thus masterplanning provides a significant opportunity to build resilience measures into the infrastructure design. Incorporating green infrastructure into strategic linear infrastructure can help to improve an asset's resilience,²⁵ which in turn improves the resilience of the new community as a whole.²⁶ Guidance on planning and investing in green infrastructure in new communities is available in Practical Guide 7: *Planning for Green and Prosperous Places*.²⁷

4.2 Tackle the issue of overheating in homes and other buildings

With the global temperature set to increase by between 1°C and 5°C by the end of the century, new communities will need to address the overheating of homes, while maintaining high energy efficiency requirements – requiring good design and the integration of green infrastructure into the new community to combat the urban heat island effect. The overall layout and orientation of a development can also have a big impact on the risk of overheating – for example by allowing air movement throughout a development, ensuring that shading is

24 *Green Infrastructure and Climate Adaptation*. European Commission.

https://ec.europa.eu/environment/nature/ecosystems/pdf/Green%20Infrastructure/GI_climate_adaptation.pdf

25 *Delivering Green Infrastructure along Linear Assets. Scoping Study Phase 1*. C771. CIRIA (Construction Industry Research Association), 2018. https://www.ciria.org/Resources/Free_publications/Delivering_green_infrastructure_along_linear_assets_Scoping_study_p1_C771.aspx

26 Further information on the link between green infrastructure and climate adaptation is provided in *Green Infrastructure and Climate Change*. Factsheet 3. PERFECT project. TCPA, 2019.

https://www.interregeurope.eu/fileadmin/user_upload/tx_tevprojects/library/file_1551964879.pdf

27 *Planning for Green and Prosperous Places*. Guide 7. Practical Guides for Creating Successful New Communities. TCPA, Jan. 2018.

<https://www.tcpa.org.uk/Handlers/Download.ashx?IDMF=db632de1-38cc-468a-9401-0599b0bea52b>

available, and making sure that public spaces are not ‘sun traps’. UKGBC’s *New Homes Policy Playbook*²⁸ provides guidance on avoiding overheating.

New buildings should be designed for energy efficiency, with care taken over orientation, shading, albedo, fenestration, insulation and green roofs and walls to reduce the effect of high temperatures. Design solutions should not lead to additional energy costs.

Local planning authorities must ensure that guidance contained in design codes is consistent with the need to tackle overheating, and should consider referencing assessment frameworks or guidance on avoiding overheating in local development plan policy. CIBSE has published guidance on a design methodology for the assessment of the risk of overheating in homes.²⁹ Where technical assessment regimes are not yet in place, the Good Homes Alliance’s *Overheating in New Homes*³⁰ provides a non-technical guide and tool for assessing and mitigating overheating.

Evidence shows that green infrastructure can cool the air by 2°C-8°C, helping to reduce heat-related stress and premature human deaths during high-temperature events.³¹ Street tree planting and green infrastructure should be used to mitigate the urban heat island effect and deliver multiple other benefits. Green infrastructure should be planned as part of wider green infrastructure networks to deliver urban cooling and local access to shady outdoor space, as well as optimising its many other benefits. The Forest Research publication *The Role of Urban Trees and Greenspaces in Reducing Urban Air Temperatures*³² includes a summary of design strategies to maximise the cooling potential of green infrastructure.

4.3 Minimise flood risk and increase flood resilience

Large-scale developments will be built out over a period of 30-50 years, so they should be steered away from areas of both current and possible future flood risk. It is important to consider not just current flood risk but how the spatial pattern of risk could change in the future, ensuring that the development will be safe and flood resilient for its lifetime and will not increase risk elsewhere. Anywhere can be affected by surface water flooding, although of course it is much more common in dense, hard-surfaced urban areas. New buildings and developments should be designed to incorporate the resilience standards necessary to deal with increased surface water flooding events. Integrating green and blue infrastructure into new developments can also reduce surface water flood risk.³³

28 *The New Homes Policy Playbook: Driving Sustainability in New Homes – A Resource for Local Authorities*. UKGBC (UK Green Building Council), Feb. 2021.

<https://www.ukgbc.org/ukgbc-work/new-homes-policy-playbook/>

29 *Design Methodology for the Assessment of Overheating Risk in Homes*. TM59. CIBSE (Chartered Institution of Building Services Engineers), May 2017.

<https://www.cibse.org/knowledge/knowledge-items/detail?id=a0q000000DVrTdQAL>

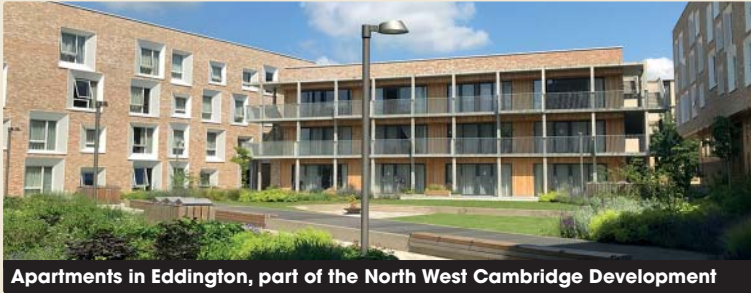
30 *Overheating in New Homes: Tool and Guidance for Identifying and Mitigating Early Stage Overheating Risks in New Homes*. Good Homes Alliance, Jul. 2019. <https://goodhomes.org.uk/wp-content/uploads/2019/07/GHA-Overheating-in-New-Homes-Tool-and-Guidance.pdf>

31 KJ Doick and T Hutchings: *Air Temperature Regulation by Urban Trees and Green Infrastructure*. Forestry Commission, Feb. 2013. https://www.researchgate.net/publication/259889679_Air_temperature_regulation_by_urban_trees_and_green_infrastructure

32 *The Role of Urban Trees and Greenspaces in Reducing Urban Air Temperatures*. Forest Research, Jan. 2019. <https://www.forestresearch.gov.uk/research/role-urban-trees-and-greenspaces-reducing-urban-air-temperatures/>

33 *Sustainable Drainage Systems: Non-Statutory Technical Standards for Sustainable Drainage Systems*. Department for Environment, Food and Rural Affairs, Mar. 2015. <https://www.gov.uk/government/publications/sustainable-drainage-systems-non-statutory-technical-standards>

Case study Greater Cambridge overheating policy



Greater Cambridge
Shared Planning

Apartments in Eddington, part of the North West Cambridge Development

Greater Cambridge Shared Planning, the joint planning service for South Cambridgeshire District Council and Cambridge City Council, is involved in the delivery of several large-scale communities that will together provide up to 49,000 new homes. In addition to the Greater Cambridge area's two current adopted Local Plans, which set out the planning policies and land allocations, there is also a Sustainable Design and Construction Supplementary Planning Document (SPD),^A adopted in January 2020. The SPD sets out principles that new developments must consider. The SPD's climate change adaptation section requires consideration of the following measures within planning applications:

- architectural approaches to design out issues such as overheating;
- the role of green infrastructure;
- the use of resilient architecture and construction to minimise impacts;
- the role of materials in minimising microclimatic effects; and
- the use of sustainable drainage systems (SuDS) and flood-resilient architecture.



The cooling hierarchy, adapted from *Low Energy Cooling. Good Practice Guide 5*. Islington Borough Council, 2012

The SPD is particularly strong in its recommendations on overheating, highlighting which types of properties are at higher risk. It suggests that the councils' preferred approach to overheating is for design to follow the cooling hierarchy (shown above) to ensure that minimal energy is used for cooling. It also recommends that thermal modelling be undertaken to gauge the performance of the proposed development, with buildings designed and built to meet CIBSE's latest overheating standards.^B The SPD also outlines further detailed guidance on overheating. The councils' active efforts in tackling overheating in new homes are resulting in adaptation measures being set out within planning applications. Greater Cambridge Shared Planning is now aiming to integrate the guidance from the SPD into policy in the emerging Greater Cambridge Local Plan.^C

A *Greater Cambridge Sustainable Design and Construction Supplementary Planning Document*. Greater Cambridge Shared Planning, Jan. 2020. <https://www.cambridge.gov.uk/media/8157/greater-cambridge-sustainable-design-and-construction-spd.pdf>

B See *Guide A: Environmental Design*. GVA/15. CIBSE (Chartered Institution of Building Services Engineers), Mar. 2015. <https://www.cibse.org/knowledge/knowledge-items/detail?id=a0q2000008179JAAS>; *The Limits of Thermal Comfort: Avoiding Overheating in European Buildings*. TM52. CIBSE, Oct. 2013. <https://www.cibse.org/knowledge/knowledge-items/detail?id=a0q2000008175AAC>; and *Design Methodology for the Assessment of Overheating Risk in Homes*. TM59. CIBSE, May 2017. <https://www.cibse.org/knowledge/knowledge-items/detail?id=a0q000000DvTtQAL>

C See the Greater Cambridge Shared Planning 'Greater Cambridge Local Plan' website, at <https://www.gretercambridgeplanning.org/emerging-plans-and-guidance/greater-cambridge-local-plan/>

Planning authorities should take advantage of opportunities to reduce overall flood risk through natural flood management, on which there is extensive data, case studies and evidence.³⁴ They should safeguard land that might be needed for future flood risk management infrastructure and should require developer contributions to flood and coastal risk management infrastructure.

Local planning authorities should ensure that flood risk assessment advice on the local development plan received from the relevant environment agencies is adhered to during delivery of the new community. The sequential test³⁵ should be applied to steer development away from flood risk areas, and property flood resilience measures should be used to mitigate against any residual risk of flooding, including in existing buildings (undergoing change of use/conversions, etc.).³⁶

Green infrastructure can contribute to river, surface and coastal flood prevention. The impact of river flooding can be reduced through large-scale tree planting upstream of urban areas, and vegetation and the soil around and beneath it have the capacity to absorb and store water. Multi-functional sustainable drainage systems (SuDS) should be delivered as part of new development to prevent surface water flooding.³⁷ Permeable paving, water butts, rain gardens, ponds, green roofs and even whole parks designed to accommodate flood water can all form part of a SuDS scheme.³⁸ Additionally, when local authorities are identifying opportunities for on- and off-site biodiversity net gain, approaches that also reduce flood risk should be sought – CIEEM has published detailed guidance on delivering biodiversity net gain through development.³⁹

4.4 Reduce water use

Drought and water supply will be increasingly problematic in the UK, and large-scale new developments have the potential to exacerbate the difficulties. Maintaining an adequate supply of water, while also ensuring adequate drainage capacity, requires careful and integrated planning, and local planning authorities must work closely with water companies, lead local flood authorities (LLFAs), the Environment Agency, and others.

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- 34 See 'Natural flood management – part of the nation's flood resilience'. Press Release. Environment Agency, Oct. 2017. <https://www.gov.uk/government/news/natural-flood-management-part-of-the-nations-flood-resilience>; *Natural Flood Management Handbook*. Scottish Environment Protection Agency (undated). <https://www.sepa.org.uk/media/163560/sepa-natural-flood-management-handbook1.pdf>; and 'Maps for Natural Flood Management'. Webpage. Natural Resources Wales. <https://naturalresources.wales/flooding/managing-flood-risk/maps-for-natural-flood-management/?lang=en&wdLOR=c9C5D6F27-CE1E-4566-BFDD-16C819B36395>
- 35 *Flood Risk Assessment: The Sequential Test for Applicants. Guidance*. Environment Agency/Department for Environment, Food and Rural Affairs, Apr. 2012 (updated Feb. 2017). <https://www.gov.uk/guidance/flood-risk-assessment-the-sequential-test-for-applicants>
- 36 CIRIA has produced a code of practice for property flood resilience and guidance for planners – *Code of Practice for Property Flood Resilience*. C790F. CIRIA (Construction Industry Research and Information Association). https://www.ciria.org/CIRIA/Item_Detail.aspx?WebsiteKey=3f18c87a-d62b-4eca-8ef4-9b09309c1c91&iProductCode=C790F&Category=FREEPUBS&OrderLineId=9812564b-73b6-45b6-bcb0-f250c041726b
- 37 CIRIA has produced technical guidance on the delivery of SuDS – *The SuDS Manual*. C753. CIRIA (Construction Industry Research and Information Association), Dec. 2015. <https://www.ciria.org/ItemDetail?iProductCode=C753&Category=BOOK&WebsiteKey=3f18c87a-d62b-4eca-8ef4-9b09309c1c91>
- 38 *Green Infrastructure and Climate Change*. Factsheet 3. PERFECT project. TCPA, 2019. https://www.interregeurope.eu/fileadmin/user_upload/tx_tevprojects/library/file_1551964879.pdf
- 39 *Biodiversity Net Gain: Good Practice Principles for Development*. CIEEM (Chartered Institute of Ecology and Environmental Management), CIRIA (Construction Industry Research Association) and IEMA (Institute of Environmental Management and Assessment), Dec. 2016; and *Biodiversity Net Gain: Good Practice Principles for Development. A Practical Guide*. CIEEM, CIRIA and IEMA, Feb. 2019. <https://cieem.net/i-am/current-projects/biodiversity-net-gain/>

Case study

Harrogate Borough Council and sustainable drainage systems

Harrogate Borough Council's Local Plan sets out a policy requirement aimed at ensuring that there is no increase in the flow rate of surface water run-off from developments, prioritising the incorporation of SuDS to manage surface water drainage.^A

One outcome of this policy is the incorporation of SuDs within a new settlement in the Green Hammerton/Cattal area that will provide a minimum of 3,000 new houses, employment space, plus amenities and two primary schools. The council's emerging preferred option for the location of the new settlement is centred around Cattal railway station, near to the River Nidd. The Environment Agency's flood risk map shows that the majority of the site lies in flood zone 1, its lowest flood risk category, but that a small area falls within flood zones 2 and 3.^B The SuDs scheme will reduce the likelihood of surface water flooding and manage increased wastewater and drainage demands.

The scoping report for the development^C considers that the new settlement is unlikely to generate significant flood risk. However, climatic factors have been scoped into the Strategic Environmental Assessment as the council recognises that mitigation and resilience are important national and local priorities.

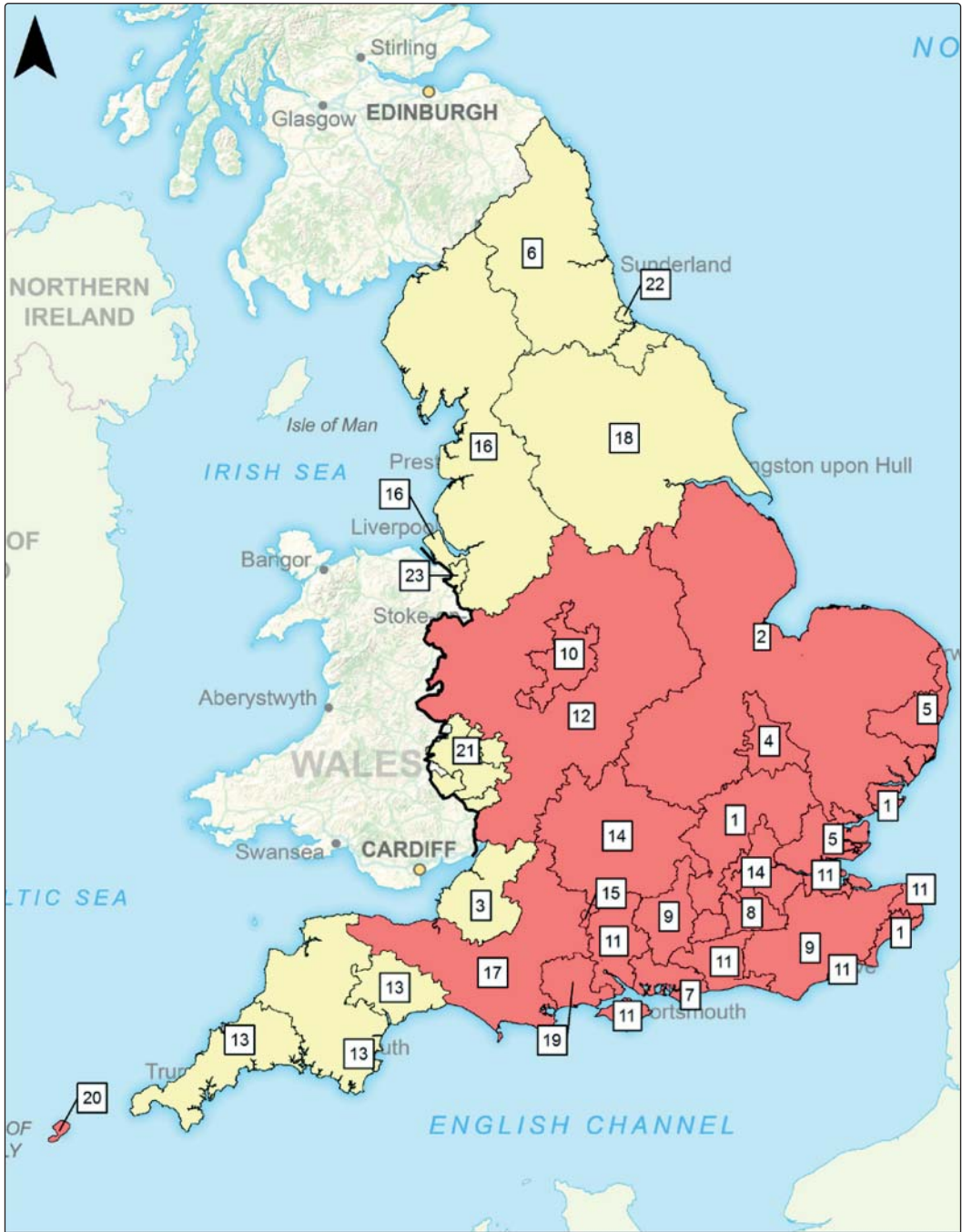
- A Policy CC1: Flood Risk and Sustainable Drainage, in *Harrogate District Local Plan 2014-2035*. Harrogate Borough Council, Mar. 2020. <https://www.harrogate.gov.uk/downloads/download/98/harrogate-district-local-plan-2014-2037>
- B Although areas in flood zone 3 have a comparatively high risk of flooding, only areas in flood zone 3b are in the functional floodplain
- C *Green Hammerton/Cattal New Settlement DPD: Strategic Environmental Assessment Scoping Report*. Harrogate Borough Council, Aug. 2018. <https://www.harrogate.gov.uk/downloads/file/200/sea-scoping-report>

Integrated water management is a concept that draws together the management of both too much and too little water. CIRIA's *Delivering Better Water Management through the Planning System*⁴⁰ identifies the critical success factors for integrated water management and outlines planning policies necessary to deliver high-quality environmental, social and economic outcomes.

Local authorities should use their local area's water stress determination⁴¹ to decide whether to set strong requirements for the use of new water sources in new developments (see the map on the following page). Local authorities could also consider certification schemes for the masterplanning stage, such as BREEAM Communities, to ensure that water efficiency and site-wide design approaches are considered at an early stage.

40 *Delivering Better Water Management through the Planning System*. C787F. CIRIA (Construction Industry Research Association), Nov. 2019. <https://www.ciria.org/ItemDetail?iProductCode=C787F&Category=FREEPUBS>

41 *Water Stressed Areas – Final Classification 2021*. Environment Agency, Jul. 2021. <https://www.gov.uk/government/publications/water-stressed-areas-2021-classification>



Water Stress Map	Notes
— England Wales Boundary	1. Affinity Water
Not Serious	2. Anglian Water
Serious	3. Bristol Water
	4. Cambridge Water
	5. Essex and Suffolk
	6. Northumbrian Water
	7. Portsmouth Water
	8. Sutton and East Surrey
	9. South East Water
	10. South Staffordshire
	11. Southern Water
	12. Severn Trent Water
	13. South West Water
	14. Thames Water
	15. Veolia Water
	16. United Utilities
	17. Wessex Water
	18. Yorkshire Water
	19. Bournemouth WRZ
	20. Isles of Scilly WRZ (South West Water)
	21. DCWW
	22. Hartlepool WRZ (Anglian Water)
	23. Chester WRZ (Severn Trent Water)



Environment Agency water scarcity map

Source: *Updating the Determination of Water Stressed Areas in England. Consultation Document.* Environment Agency, Feb. 2021. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/958639/Water_Stress_Consultation_V1.0_accessible.pdf

5

Recommendations for delivery

While the masterplan and overall layout for a new development are of crucial importance, many adaptation solutions lie in the detailed design and delivery of neighbourhoods and individual buildings. Guidance produced by UKCIP⁴² explains how to implement adaptation through the design of development to manage factors such as high temperatures, flood risk, water resources and water quality, and ground conditions.

5.1 Design to reduce air temperatures

The drive to build more energy-efficient homes has often had the knock-on effect of making newly built homes more prone to overheating. Currently, up to 20% of the housing stock in England is at risk of overheating,⁴³ and this problem will only increase with the increasing risk of heatwaves. But increased energy performance does not have to result in overheating. New buildings should be designed for energy efficiency, with care taken over orientation, shading, albedo, fenestration, insulation and green roofs and walls to reduce the effect of high temperatures. Design solutions should not lead to additional energy cost. Local planning authorities must ensure that guidance contained in design codes is consistent with the need to tackle overheating, and should consider referencing assessment frameworks or guidance on avoiding overheating in local development plan policy. CIBSE has published guidance on a design methodology for the assessment of the risk of overheating in homes.⁴⁴ Where technical assessment regimes are not yet in place, the Good Homes Alliance's *Overheating in New Homes*⁴⁵ provides a non-technical guide and tool for assessing and mitigating overheating.

5.2 Design to reduce flood damage to property

Flood risk reduction should be considered at a development scale (see Section 4 on masterplanning, above), but individual buildings should be designed to be resilient to any residual risk of flooding. BRE has published guidance on flood-sensitive design⁴⁶ and CIRIA's code of practice for property flood resilience⁴⁷ also includes guidance for planners. Some property-level protection measures may be built into a home during construction; others are dependent on the actions of the occupants.

42 *Climate Change Adaptation by Design: A Guide for Sustainable Communities*. TCPA, 2007. https://www.ukcip.org.uk/wp-content/Wizard/CC_by_design.pdf

43 *Overheating in Homes: The Big Picture*. Zero Carbon Hub, Jun. 2015. <https://www.zerocarbonhub.org/sites/default/files/resources/reports/ZCH-OverheatingInHomes-TheBigPicture-01.1.pdf>

44 *Design Methodology for the Assessment of Overheating Risk in Homes*. TM59. CIBSE (Chartered Institution of Building Services Engineers), May 2017. <https://www.cibse.org/knowledge/knowledge-items/detail?id=a0q000000DVrTdQAL>

45 *Overheating in New Homes: Tool and Guidance for Identifying and Mitigating Early Stage Overheating Risks in New Homes*. Good Homes Alliance, Jul. 2019. <https://goodhomes.org.uk/wp-content/uploads/2019/07/GHA-Overheating-in-New-Homes-Tool-and-Guidance.pdf>

46 *Six Steps to Flood Resilience: Guidance for Local Authorities and Professionals*. BRE, Aug. 2013. <https://www.bre.co.uk/filelibrary/pdf/projects/flooding/Six-Steps-Professional-web-Aug2013.pdf>

47 *Code of Practice for Property Flood Resilience*. C790F. CIRIA (Construction Industry Research Association), Jan. 2021. <https://www.ciria.org/ItemDetail?iProductCode=C790F&Category=FREEPUBS>

5.3 Design to reduce water use

Innovative approaches involving rainwater harvesting and greywater recycling can significantly reduce the volumes of both treated water supplied to a site and wastewater entering the sewerage system. There are various techniques for increasing the water efficiency of new buildings and development:

- the efficient use of water;
- rainwater harvesting (for example for flushing toilets and irrigation); and
- re-using greywater or other wastewater.

A partnership between developers, water companies and planners is needed to achieve high levels of water efficiency – relevant guidance is given in the 'Water supply, wastewater and water quality' section of Planning Practice Guidance.⁴⁸ Planners can facilitate water efficiency through planning policy to support long-term ambitions to reduce demand.

Assessment frameworks can be useful tools to encourage the use of water efficiency measures. For example, for commercial development, rainwater harvesting and greywater recycling can count towards BREEAM scores.

⁴⁸ 'Water supply, wastewater and water quality'. *Planning Practice Guidance*. Department for Levelling Up, Housing and Communities, and Ministry of Housing, Communities and Local Government.
<https://www.gov.uk/guidance/water-supply-wastewater-and-water-quality>

6 Funding opportunities

Housing Infrastructure Fund

The Housing Infrastructure Fund (HIF) is one of a range of measures aimed at increasing housing supply. Central to the fund is the provision of infrastructure to unlock new housing sites. So far, £4 billion has been allocated to local authorities to fund physical infrastructure such as roads, community facilities, and utilities. The scheme is informed by a suite of environmental and ecological initiatives assessing the impact of infrastructure. Funding can be used to create physical infrastructure that makes new homes more resilient and adaptable to climate change, such as green infrastructure (parks and green corridors) or blue infrastructure (flood defences and sustainable drainage systems).

Further information is available at

<https://www.gov.uk/government/publications/housing-infrastructure-fund>

Section 106 agreements

Section 106 agreements can be used to secure the works, provisions and contributions required from developers to mitigate the impact of development. Appropriate review mechanisms over the course of delivery should be in place to take account of changes in the viability and delivery of the new development.

Flood and coastal erosion risk management projects

The National Flood and Coastal Erosion Risk Management Strategy for England sets out the overarching approach to flooding and coastal risk management. Risk management authorities (RMAs) are required to act in consistency with the strategy, and as such can develop flood and coastal erosion risk management (FCERM) projects. RMAs can apply for grant-in-aid funding for a wide range of FCERM projects aimed at reducing flood or coastal erosion risks across several connected areas, including initiatives that range from building new flood and coastal defences to carrying out recycling work to counteract longshore drift.

Further information is available at

<https://www.gov.uk/guidance/develop-an-fcerm-project-proposal>

Biodiversity net gain

Biodiversity net gain policy will require developers in England to create an increase in biodiversity of at least 10%, either on the site being developed or, if that is impossible, elsewhere. The aims are to ensure that the loss of biodiversity through development is halted and that ecological networks are restored. The policy is being introduced through the Environment Bill and, depending on the Bill's progress through Parliament, is likely to become a legal requirement from the end of 2023. Development sites' biodiversity contribution will have to be assessed before work begins in order to provide a baseline measure – the third iteration of a government-developed 'biodiversity metric' was launched in July 2021.

Further information and guidance is available at

<https://naturalengland.blog.gov.uk/2021/09/21/biodiversity-net-gain-more-than-just-a-number/>

7

Sources of further information

Garden Communities Toolkit

Homes England

<https://www.gov.uk/guidance/garden-communities>

Green Infrastructure Guidance

NE176. Natural England, Jan. 2009

<https://publications.naturalengland.org.uk/publication/35033>

The New Homes Policy Playbook

UKGBC (UK Green Building Council), Feb. 2021

<https://www.ukgbc.org/ukgbc-work/new-homes-policy-playbook/>

Interactive Policy Map

Highlights leading examples of domestic retrofit and new home policies and initiatives from local and combined authorities across the UK. UKGBC (UK Green Building Council)

<https://www.ukgbc.org/interactive-policy-map/>

UK Housing: Fit for the Future?

Climate Change Committee, Feb. 2019

<https://www.theccc.org.uk/publication/uk-housing-fit-for-the-future/>

Design Methodology for the Assessment of Overheating Risk in Homes

TM59. CIBSE (Chartered Institution of Building Services Engineers), May 2017

<https://www.cibse.org/knowledge/knowledge-items/detail?id=a0q0O00000DVRtDQAL>

Design Support and PHPP (Passivhaus Planning Package) Tools

Passivhaus Trust

https://passivhaus.org.uk/design_support.php

Overheating in New Homes: Tool and Guidance for Identifying and Mitigating Early Stage Overheating Risks in New Homes

Good Homes Alliance, Jul. 2019

<https://goodhomes.org.uk/wp-content/uploads/2019/07/GHA-Overheating-in-New-Homes-Tool-and-Guidance.pdf>

Delivering Green Infrastructure along Linear Assets. Scoping Study Phase 1

C771. CIRIA (Construction Industry Research Association), 2018

https://www.ciria.org/Resources/Free_publications/Delivering_green_infrastructure_along_linear_assets_Scoping_study_p1_C771.aspx

National Flood and Coastal Erosion Risk Management Strategy for England

Environment Agency, Jul. 2020

<https://www.gov.uk/government/publications/national-flood-and-coastal-erosion-risk-management-strategy-for-england--2>

UK Adaptation Policy

Webpage. Climate Change Committee

<https://www.theccc.org.uk/preparing-for-climate-change/uk-adaptation-policy/>

Annex 1 Links to the Practical Guides

Practical Guides for Creating Successful New Communities, produced by the TCPA.



Guide 1: Locating and Consenting New Garden Cities

November 2017

<https://www.tcpa.org.uk/guide-1-locating-and-consenting-new-garden-cities>



Guide 2: Finance and Delivery

November 2017

<https://www.tcpa.org.uk/guide-2-finance-and-delivery>



Guide 3: Design and Masterplanning

December 2017

<https://www.tcpa.org.uk/tcpa-pg-guide-3-masterplanning>



Guide 4: Masterplanning for Net-Zero Energy

November 2020 Edition (First Edition published March 2016)

<https://www.tcpa.org.uk/tcpa-practical-guides-guide-4-masterplanning-for-net-zero-energy>



Guide 5: Homes for All

March 2016

<https://www.tcpa.org.uk/Handlers/Download.ashx?IDMF=9035701f-5875-45f6-8600-f9800c9bbac8>



Guide 6: 'I'd Love to Live There!' Planning for Culture and the Arts

February 2016

<https://www.tcpa.org.uk/Handlers/Download.ashx?IDMF=d8948067-d1e2-44ea-8227-687609c0bdc5>



Guide 7: Planning for Green and Prosperous Places

January 2018

<https://www.tcpa.org.uk/Handlers/Download.ashx?IDMF=db632de1-38cc-468a-9401-0599b0bea52b>



Guide 8: Creating Health-Promoting Environments

December 2017

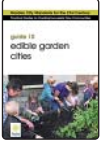
<https://www.tcpa.org.uk/tcpa-practical-guides-guide-8-health>



Guide 9: Long-Term Stewardship

December 2017

<https://www.tcpa.org.uk/tcpa-pgs-guide-9-stewardship>



Guide 10: Edible Garden Cities

August 2019

<https://www.tcpa.org.uk/tcpa-pgs-guide-10-ediblegc-download>



Guide 11: People, Planning and Power

March 2019

<https://www.tcpa.org.uk/tcpa-practical-guides-guide-11-people-planning-and-power>



Guide 12: Modern Methods of Construction

April 2020

<https://www.tcpa.org.uk/tcpa-practical-guides-guide-12-modern-methods-of-construction>



Guide 13: Sustainable Transport

September 2020

<https://www.tcpa.org.uk/tcpa-practical-guides-guide-13-sustainable-transport>