

Greater Cambridge Sustainable Design and Construction Supplementary Planning Document

Adopted January 2020



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Forewords

This supplementary planning document sets out the standards required to meet the visions, objectives and policies of the Cambridge and South Cambridgeshire Local Plans as sustainably as possible. It comes at a critical time in the approach to climate change and the environmental crisis by both local and national government, and after Parliament revised the 2008 Climate Change Act to bring carbon reductions to 100% by 2050, a target that both local authorities recognised earlier in the year.

The consequences of the increased emphasis on zero carbon will influence every aspect of decision making with the Greater Cambridge Shared Planning Service, and it is within this context that this SPD offers guidance on the implementation of the adopted local plans. It provides criteria and check lists and includes important design considerations which can be taken into account early in the design process, including adaptation strategies, the role of green infrastructure, biodiversity, health and wellbeing, and much more. This will help to ensure improved design and quality of new developments while reducing environmental impact as we deliver the new homes and businesses we need.

Cambridge and South Cambridgeshire local authorities are combining planning services, and this is one of the first documents to show how the two authorities can work together to provide guidance across the Greater Cambridge area. I would like to thank the authors for their hard work which has resulted in a set of policies that clearly express the seriousness with which both local authorities take the issues of sustainable design and construction.

Katie Thornburrow

Cambridge City Council executive councillor for Planning Policy and Open Spaces

The adopted 2018 Cambridge and South Cambridgeshire Local Plans contains a suite of policies setting out where and how new developments should be built in a sustainable and environmentally friendly way.

This SPD provides more specific guidance on how the policies should be implemented to ensure that the environmental and social impact on our area and communities is minimised. This is of particular importance now at a time when Climate change is the greatest long-term challenge facing human development. In addition, within the Greater Cambridge area we are seeing levels of social exclusion that continue to give rise for concern.

Both Cambridge City Council and South Cambridgeshire District Council have set out their aspirations for the Greater Cambridge area to be net zero carbon by 2050. In addition, one of South Cambridgeshire's corporate objectives is to be "Green to our core". Therefore, recognising that half of all the country's carbon emissions come from the energy used in the construction, occupation and operation of buildings means that a high standard of construction is absolutely vital if these targets are to be achieved.

The SPD sets out the guidance to assist applicants in producing their Sustainability Statement and associated Checklist, together with other documents required to support planning applications. The checklist enables applicants to show that specific design guidance has been considered on issues such as carbon and energy reduction, water conservation, biodiversity, reduction of light and noise pollution, flood reduction, sustainable drainage methods, heritage assets conservation, design principles supporting walkable and inclusive communities and much more.

The work that has gone into this SPD shows just how well the two authorities are working together to provide great guidance for our areas. I am grateful to the officers for their dedication and hardwork in producing this comprehensive document.

I encourage the developers and their agents to embrace the guidance in this SPD so that together with the Greater Cambridge Planning Service, we can deliver great places for our residents, places and homes that support their sense of wellbeing and builds community, and enables us all to adapt positively to our changing climate so that this area continues to be one of the best places to live well into the future.

Cllr Dr. Tumi Hawkins
Lead Cabinet Member for Planning
South Cambridgeshire District Council

Section 1: Introduction

Context

- 1.1 In the period to 2031, Greater Cambridge has plans to grow significantly, supporting the nationally important economic contribution the area makes. The Cambridge and South Cambridgeshire Local Plans set out proposals for 33,500 new homes and seeks to ensure that sufficient land is available to allow the forecast of 44,100 new jobs. Set against this context of a growing and highly successful area is the need to ensure that growth is implemented as sustainably as possible. This will help ensure that Greater Cambridge reduces its environmental impact – minimising carbon emissions, flood risk, pollution and pressure on resources such as water. In order to achieve this, the Cambridge and South Cambridgeshire Local Plans (2018) set out visions and objectives for the Greater Cambridge area to 2031 for new development to help support the transition to a more environmentally sustainable and successful low carbon economy and respond to the challenges posed by our changing climate.

What is sustainable design and construction?

- 1.2 Buildings are responsible for almost half of the UK's carbon emissions, half of the water consumption, about one third of landfill waste and one quarter of all raw materials used in the economy. The construction industry therefore has an important role to play in delivering sustainable development, which lies at the heart of the planning system.
- 1.3 Sustainable design and construction seeks to lower consumption of resources, both in the construction of new buildings and in their use, providing a means of implementing sustainable development at the scale of individual sites and buildings. It takes account of the resources used in construction, and of the environmental, social and economic impacts of the construction process itself and how buildings are designed and used. It is increasingly recognised that one of the most important factors in delivering a successful development scheme is ensuring that the principles of sustainable design and construction form a key part of development briefs, and are therefore integrated into the design from the outset.

What are the benefits of sustainable design and construction?

- 1.4 In helping to protect the environment, sustainable construction also has goals of creating a healthier and high quality living environment. As such, the benefits of sustainable construction run across the three dimensions of sustainable development, as summarised in Table 1.1 below.

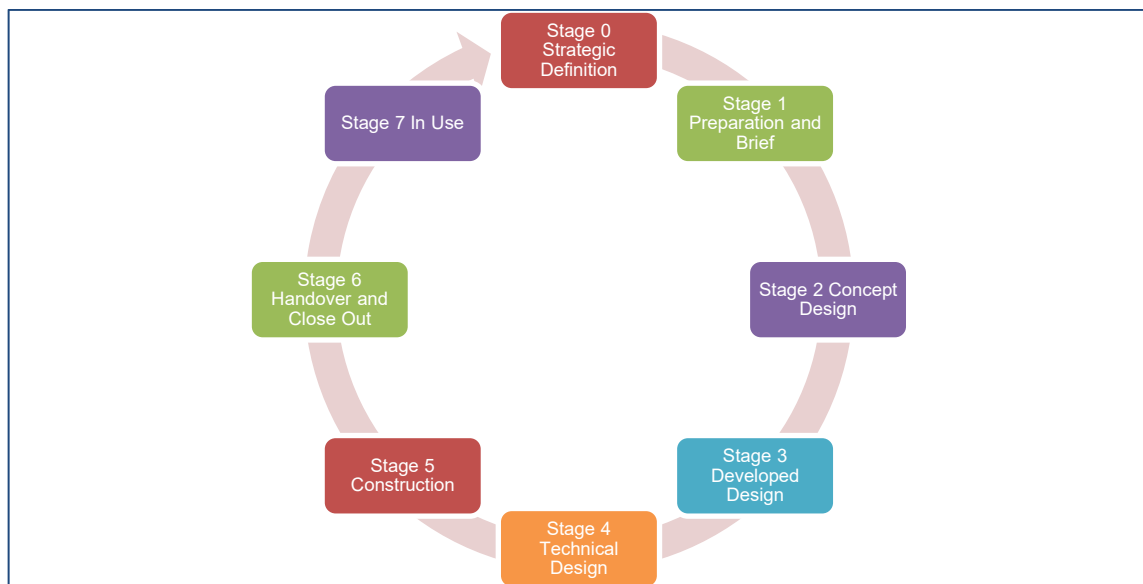
Table 1.1: Sustainable development and the benefits of sustainable design and construction

SUSTAINABLE DEVELOPMENT ROLE	BENEFITS
Environmental	<p>Sustainable design and construction contributes to the protection and enhancement of the natural, built and historic environment by:</p> <ul style="list-style-type: none"> • Using natural resources prudently, ensuring that materials are responsibly sourced, consumption of resources such as energy and water are minimised and enabling the reuse and recycling of resources at the end of a buildings life cycle; • Minimising waste and pollution and enhancing air quality; • Ensuring the implementation of climate change mitigation measures to reduce greenhouse gas emissions as part of new developments; • Ensuring that new and existing communities are capable of adapting to our changing climate.
Social	<p>The integration of the principles of sustainable design and construction into construction projects can lead to many social benefits including:</p> <ul style="list-style-type: none"> • Helping to reduce fuel bills and tackle fuel poverty through the construction of highly energy efficient new homes and retrofitting existing buildings, which can have subsequent impacts on peoples' health and wellbeing, overcoming health issues associated with buildings that have inadequate levels of insulation, heating control and ventilation; • By ensuring that new and existing communities are capable of adapting to our changing climate, health risks associated with extreme weather events can be minimised.
Economic	<ul style="list-style-type: none"> • Ensuring that new development contributes to the development of Greater Cambridge as an environmentally sustainable area will help us make the transition towards a zero carbon economy that is more resilient to energy market fluctuation and our changing climate. The more prudent use of resources will also secure the long term sustainability of growth. • Enabling business to improve productivity, enhance the rental and investment value of their buildings and demonstrate performance against Corporate Social Responsibility aims.

Sustainable design and construction as part of the holistic design process

- 1.6 The guidance set out in this Supplementary Planning Document (SPD) should form an integral part of the design process so that minimum policy requirements are met, and where possible exceeded, in the most elegant, timely and cost effective way possible. It is therefore recommended that the guidance set out in this SPD is referred to from the very start of the design process, including in early discussions with the client. If sustainable design is not fully considered from the outset, then problems, delays and increased costs can result. For example, if overheating analysis is left until late in the design process and the analysis then reveals that overheating will occur, it is often too late to integrate architectural responses into the proposals to mitigate this risk. Subsequent amendments to proposals could lead new planning or design issues. Similarly, meeting the BREEAM requirements outlined in section 3.8 of this SPD requires early consideration in order for a range of credits to be achieved.
- 1.7 The RIBA Plan of Work 2013 organises the process of briefing, designing, constructing, maintaining, operating and using building projects into 8 key stages, as illustrated in figure 1 below. Within each of these key stages are a series of sustainability checkpoints, helping to ensure sustainable construction is integrated into the design process from Stage 0 (Strategic Definition) through to Stage 7 (In Use). The guidance within this SPD should be used to inform these sustainability checkpoints, particularly in relation to stages 0 through to 4, which are of particular relevance to town planning.

Figure 1: Stages in the RIBA Plan of Work 2013 (adapted from RIBA (2013) RIBA Plan of Work 2013 Overview)



Legislative and Policy context

- 1.8 Climate change is the greatest long-term challenge facing human development. The Stern Review (2006) outlined the economic impacts of climate change and concluded that “the benefits of strong, early action considerably outweigh the costs”. Spatial planning can make a major contribution to tackling climate change in shaping both new and existing communities in ways that reduce carbon emissions and enable these

communities to adapt to a changing climate. Spatial planning has the potential to deliver the right development in the right place; development that integrates the principles of sustainable design and construction.

- 1.9 The Climate Change Act 2008 (as amended) contains a statutory target of securing a reduction in carbon dioxide levels of 100% below 1990 levels by 2050, with an interim target of a 35% reduction by 2020. Half of all the country's carbon emissions come from the energy used in constructing, occupying and operating buildings. A high standard of construction is therefore vital if these targets are to be achieved. Section 182 of the Planning Act 2008 introduced a duty on local planning authorities to include policies that make a contribution to both climate change mitigation and adaptation in their plans. This sets a clear legal framework for the role of planning and local policy in responding to climate change.
- 1.10 The UN Paris Agreement on climate change sets out that in order to avoid climate change's worst impacts, it is vital to secure climate stabilisation at less than 2°C global temperature increase above pre-industrial levels. However, the latest science indicates that 1.5°C is a more realistic target to avoid these worst extremes, and even then there will still be significant impacts through severe weather incidents and sea level rise. Above all, the latest IPCC report¹ illustrates the vital need to reduce climate change emissions now by transforming our energy systems, reducing emissions by 45% by 2030 and ultimately achieving net zero emissions by 2050. This report has led to the Committee on Climate Change recommending Government adopts a new emissions target for the UK: net zero greenhouse gas emissions by 2050². The built environment has a clear role to play in helping to deliver these national targets.

National Policy

- 1.11 The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally-prepared plans for housing and other development can be produced, with section 14 of the Framework giving consideration to the role of planning in responding to our changing climate. This sets out a clear role for planning in supporting "the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure"³.
- 1.12 Crucially, the revised NPPF retains the key link between planning policy and the provisions of the Climate Change Act 2008. This means all local plans have a duty to

¹ IPCC (2018). Global Warming of 1.5°C – Summary for Policymakers. Available online at: <https://www.ipcc.ch/sr15/chapter/summary-for-policy-makers/>

² Committee on Climate Change (May 2019). Net Zero: The UK's contribution to stopping global warming. Available online at: <https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/>

³ MHCLG (February 2019). National Planning Policy Framework. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/779764/NPPF_Feb_2019_web.pdf

reduce the carbon emissions associated with new development, contributing to England's carbon reduction targets as set out in the Climate Change Act.

- 1.13 Further guidance on the policies contained in the NPPF is provided in the National Planning Practice Guidance (NPPG), which has been taken into consideration in the production of this SPD.

Local Policy

- 1.14 In order to support the achievement of sustainable development, sections 4 and 7 of the Cambridge Local Plan (2018) and chapters 4, 6 and 9 of the South Cambridgeshire Local Plan (2018) contains a series of policies related to the role of planning in responding to climate change and managing resources. These policies seek to ensure that Greater Cambridge develops in the most sustainable way possible, delivering our social and economic aspirations without compromising the environmental limits of the area for current and future generations.

- 1.15 This SPD specifically provides guidance on the implementation of the following policies:

Cambridge Local Plan (2018):

Section 4: Responding to climate change and managing resources

- Policy 28: Carbon Reduction, Community Energy Networks, Sustainable Design and Construction and Water Use
- Policy 30: Energy Efficiency Improvements in Existing Dwellings;
- Policy 31: Integrated water management and the water cycle;
- Policy 32: Flood Risk
- Policy 33: Contaminated land
- Policy 34: Light pollution control
- Policy 35: Protection of human health from noise and vibration
- Policy 36: Air quality, odour and dust

Section 7: Protecting and enhancing the character of Cambridge

- Policy 63: Works to a Heritage Asset to Address Climate Change
- Policy 69: Protection of sites of biodiversity and geodiversity importance
- Policy 70: Protection of priority species and habitats
- Policy 71: Trees

South Cambridgeshire Local Plan (2018):

Chapter 4: Climate Change

- Policy CC/1: Mitigation and Adaptation to Climate Change
- Policy CC/3: Renewable and Low Carbon Energy in New Developments
- Policy CC/4: Sustainable Design and Construction
- Policy CC/5: Sustainable Show Homes.
- Policy CC/6: Construction Methods

Chapter 6: Protecting and enhancing the Natural and Historic Environment

- Policy NH/4: Biodiversity Clause 7 of the policy relates to climate change impacts on biodiversity.
- Policy NH/15: Heritage Assets and Adapting to Climate Change

Chapter 9: Promoting successful communities

- Policy SC/10: Lighting proposals

- Policy SC/11: Noise Pollution
- Policy SC/12: Contaminated Land
- Policy SC/13: Air Quality
- Policy SC/15: Odour and Other Fugitive Emissions to Air

1.16 For the full text of the above policies please see:

- Cambridge Local Plan (2018). Available online at: <https://www.cambridge.gov.uk/local-plan-2018>
- South Cambridgeshire Local Plan (2018). Available online at: <https://www.scambs.gov.uk/planning/local-plan-and-neighbourhood-planning/the-adopted-development-plan/south-cambridgeshire-local-plan-2018/>

1.17 In addition to planning policy, both Cambridge City Council and South Cambridgeshire District Council have set out their aspirations for the areas to be net zero carbon by 2050. Corporate policies supporting this aspiration are either in place, or are in the process of being developed and wider policies around issues such as fuel poverty, tackling inequality and protecting and enhancing biodiversity are also in place. The Local Plans (2018) and the guidance contained within this SPD support these corporate policies. On the issue of net zero carbon, while the guidance in this SPD will help to support the transition towards this goal, further detail will be considered as part of work on the Joint Greater Cambridge Local Plan.

1.18 The councils will, however, be supportive of proposals that seek to futureproof developments so that they can be more easily adapted to support the transition to net zero carbon in the future. For example, we would encourage heating systems to be designed to operate at a lower temperature of 55°C or lower in the final heating circuit. This would make it easier to install heat pumps or district heating in the future. With regards to water efficiency, we would encourage developers to provide ‘stage 1 fit’ pipework for rainwater harvesting so that residents can purchase their own rainwater harvesting systems without incurring the significant expense of an interior retrofit.

How to use this SPD and submission requirements

1.19 The guidance in this SPD should assist applicants in producing their **Sustainability Statement**⁴ and associated **Sustainability Checklist** as well as other documents required to support planning applications. Each of the sections of the SPD contains guidance on the integration of sustainable design and construction into the design of new developments and the information that should be submitted with applications to demonstrate compliance with adopted policy in the 2018 local plans. The SPD is divided into the following sections:

- Section 2 – outlines the importance of integrating sustainable design and construction with urban design to ensure the delivery of high quality new development and to maximise the opportunities to enhance the environmental performance of new development. This section is applicable to schemes in both Cambridge and South

⁴ As required by Policy 28 of the Cambridge Local Plan 2018 and policy CC/1 of the South Cambridgeshire Local Plan 2018

Cambridgeshire. This section also gives consideration to the role of new development in promoting sustainable modes of transport.

- Section 3 policy implementation – provides technical guidance on the information that needs to be submitted alongside planning applications to demonstrate compliance with the policies. Colour coding has been applied to this section of the SPD to denote which guidance relates to which area, as detailed in paragraph 1.23 below.
- Section 4: further approaches to sustainable design and construction - The purpose of this section is to encourage developers to go further than current policy requirements, particularly for strategic sites and new settlements that have policy requirements to demonstrate excellence in sustainable development and exceed baseline policy requirements. This section is applicable to schemes in both Cambridge and South Cambridgeshire.
- Appendices – the SPD provides a series of appendices including the sustainability checklist, proformas for the submission of carbon calculations and guidance on environmental health matters such as emissions standards for gas Combined Heat and Power.

1.20 The **Sustainability Checklist** (see Appendix 1) provides the questions that applicants need to respond to in their **Sustainability Statement** and other relevant documents. Where the scheme is utilising the Councils pre-application discussion service, the **Checklist** will be provided to applicants after the first pre-application meeting in order that the requirements can be integrated into the design of the proposals from the earliest possible stage. It should be submitted alongside the **Sustainability Statement** as part of the planning submission. Applications are unlikely to be registered if these documents have not been submitted.

1.21 The **Sustainability Statement** should take the form of a report with accompanying plans and drawings to illustrate and expand upon the information contained in the **Sustainability Checklist**. Applicants are advised to:

- Structure the report in the same order and with the same themes headings as the **Checklist**;
- Be succinct when describing the nature of technologies or measures being proposed, providing a summary of proposals and cross referencing to information contained in other more detailed technical reports where appropriate;
- Concentrate on demonstrating and quantifying what impact implementing the proposed measures is likely to have on the overall impact of the development
- Reference how measures have been integrated into the design of the development.

1.22 For developments in Cambridge, the **Sustainability Statement** should be integrated into the **Design and Access Statement** for all major developments. For developments in South Cambridgeshire, the **Sustainability Statement** should form a stand-alone document.

1.23 In addition to the Sustainability Checklist and Sustainability Statement, tables 1.2 and 1.3 below provide a summary of the requirements for applications in Cambridge and those in South Cambridgeshire. Where each authorities have similar policies, shared guidance on

policy implementation has been provided, denoted by purple sub-headings throughout section 3 of the document. Where guidance only applies to policies in Cambridge, sub-headings are in green, and for guidance for South Cambridgeshire, sub-headings are in orange. For cross boundary applications, early engagement with the planning service should be undertaken in order to agree which local plan policies related to sustainable design and construction should apply. Historically, for such sites, the policies from the Cambridge Local Plan have been applied.

Table 1.2: Summary of requirements for applications in Cambridge

TOPIC	REQUIREMENT	EVIDENCE REQUIRED	SECTION OF SPD AND CHECKLIST
Energy and carbon reduction	<p>Policy 28:</p> <ol style="list-style-type: none"> All Residential development – 44% reduction on Part L 2006 (19% reduction on Part L 2013) All Non-residential – mandatory requirements for Ene01 associated with BREEAM ‘excellent’ <p>Policy 30:</p> <ol style="list-style-type: none"> Householder application – home energy questionnaire 	<ol style="list-style-type: none"> Residential development – Carbon Reduction Statement Non-residential development – BREEAM Pre-Assessment Householder applications – home energy questionnaire 	<ol style="list-style-type: none"> Section 3.2, paragraphs 3.2.2 – 3.2.7 plus carbon reduction template in Appendix 2. Sustainability Checklist En.1 and En.3 Section 3.2, paragraph 3.2.8. Sustainability Checklist En.2 and En.3 Section 3.2, paragraphs 3.2.9 – 3.2.13 plus the Home Energy Questionnaire in Appendix 4
Water	<p>Policy 28:</p> <ol style="list-style-type: none"> All Residential development – 110 litres/person/day All Non-residential development – maximum BREEAM credits for Wat01 	<ol style="list-style-type: none"> Residential development – Water Conservation Strategy Non-residential development – BREEAM pre-assessment 	<ol style="list-style-type: none"> Section 3.3, paragraphs 3.3.2 – 3.3.3. Sustainability Checklist Wat.1 and Wat.3 Section 3.3, paragraphs 3.3.4 – 3.3.6. Sustainability Checklist Wat.2 and Wat.3
Climate change adaptation	<p>Policy 28:</p> <p>All development should integrate measures into the design of developments to enable adaptation to climate risks including:</p>	<ul style="list-style-type: none"> Sustainability Statement Design and Access Statement Surface Water Drainage Strategy 	<p>Section 3.4, paragraphs 3.4.6 – 3.4.40. Sustainability Checklist Ca.1, Ca.2,</p>

TOPIC	REQUIREMENT	EVIDENCE REQUIRED	SECTION OF SPD AND CHECKLIST
	<ul style="list-style-type: none"> Overheating Flood risk 		Ca.3, Ca.4, Ca.5, Ca.6 and Ca.7
Biodiversity	<p>Policies 69 and 70: All development proposals should seek to conserve and enhance biodiversity</p>	<ul style="list-style-type: none"> Preliminary Ecological Assessment; and Protected Species Scoping Survey 	Section 3.5, paragraphs 3.5.3 – 3.5.16. Sustainability Checklist Bio.1, Bio.2, Bio.3, Bio.4, Bio.5, Bio.6, Bio.7, Bio.8, Bio.9 and Bio.10
Pollution: light pollution	<p>Policy 34: All development proposals including external lighting or changes to existing lighting should reduce the potential impacts of that lighting</p>	<ul style="list-style-type: none"> An Assessment of the Need for Lighting Lighting Impact Assessment 	Section 3.6, paragraphs 3.6.2 - 3.6.36 plus Appendix 6. Sustainability Checklist Pol.1, Pol.2, Pol.3, Pol.4, Pol.5 and Pol.6
Pollution: contaminated land	<p>Policy 33: All major development and any development proposals on land subject to contamination or land that is suspected to be contaminated. Developers are responsible for ensuring that a proposed development will be safe and 'suitable for use' for the purposes for which it is intended.</p>	<ul style="list-style-type: none"> Contaminated land assessment 	Section 3.6, paragraphs 3.6.37 – 3.6.42 plus Appendix 7. Sustainability Checklist Pol.7
Pollution: Noise	<p>Policy 35: Development will be permitted where it is demonstrated that: a. it will not lead to significant adverse effects and impacts, including cumulative effects and construction phase impacts wherever applicable, on health and quality of life/amenity from noise and vibration; and b. adverse noise effects/impacts can be minimised by appropriate reduction and/or mitigation measures secured through the use of conditions or planning obligations, as appropriate (prevention through high quality acoustic design is preferable to mitigation).</p>	<ul style="list-style-type: none"> Noise Impact Assessment or Acoustic Assessment/Report Acoustic Design Statement 	Section 3.6, paragraphs 3.6.43 – 3.6.132 plus Appendix 8. Sustainability Checklist Pol.8, Pol.9, Pol.10, Pol.11, Pol.12, Pol.13 and Pol.14

TOPIC	REQUIREMENT	EVIDENCE REQUIRED	SECTION OF SPD AND CHECKLIST
Pollution: Air Quality	<p>Policy 36: Development must ensure that it does not adversely impact on air quality or expose sensitive users to poor air quality and does not lead to significant adverse effects on health, amenity and the environment from polluting or malodorous emissions, or dust or smoke emissions to air.</p>	<ul style="list-style-type: none"> • Air Quality Statement (for all development other than householder) • Air Quality Assessment 	<p>Section 3.6, paragraphs 3.6.174 – 3.6.173. Sustainability Checklist Pol.15, Pol.16, Pol.17, Pol.18, Pol.19, Pol.20, pol.21, Pol.22, Pol.23, Pol.24, Pol.25 and Pol.26</p>
Pollution: Odour and other fugitive emissions	<p>Policy 36: Development must ensure that it does not adversely impact health, amenity and the environment from polluting or malodorous emissions, or dust or smoke emissions to air</p>	<ul style="list-style-type: none"> • Odour Impact Risk Assessment or Detailed Odour Impact Assessment 	<p>Section 3.6, paragraphs 3.6.182 – 3.6.206. Sustainability Checklist Pol.27, Pol.28 and Pol.29</p>
Sustainable Drainage Systems and Flood Risk	<p>Policies 31 and 32: All scales of new development needs to utilise SuDS in order to reduce the rate of discharge into watercourses and mitigate the risk of surface water flooding. A Site Specific Flood Risk Assessment is required:</p> <ul style="list-style-type: none"> • For proposals of 1 ha or greater in Flood Zone 1 • For all proposals for new development (including minor development and change of use) in Flood Zones 2 and 3; or • In an area within Flood Zone 1 which has critical drainage problems; or • Where proposed development, or a change of use to a more vulnerable class, may be subject to other forms of flooding 	<ul style="list-style-type: none"> • Surface Water Drainage Strategy • A Site Specific Flood Risk Assessment • Surface Water Drainage Pro-forma (Appendix F) of the Cambridgeshire Flood and Water SPD 	<p>Section 3.7, paragraphs 3.7.1 – 3.7.13 and the Cambridgeshire Flood and Water SPD. Sustainability Checklist SuDS.1</p>
Construction Standards (BREEAM)	<p>Policy 28: All new non-residential development to achieve BREEAM 'excellent'</p>	<ul style="list-style-type: none"> • BREEAM Pre-Assessment 	<p>Section 3.8, paragraphs 3.8.1 – 3.8.7. Sustainability Checklist Cs.1 and Cs.2</p>

TOPIC	REQUIREMENT	EVIDENCE REQUIRED	SECTION OF SPD AND CHECKLIST
Heritage Assets	Policy 63: Where works to improve the environmental performance of a heritage asset are proposed, evidence is required to demonstrate that the works will not harm the building's integrity or significance.	Information can be included in the Design and Access Statement or Heritage Statement	Section 3.10, paragraphs 3.10.1 – 3.10.7. Sustainability Checklist Ha.1, Ha.2, Ha.3 and Ha.4
Construction waste and occupation phase waste management	Policy 28: All new development should include measures to reduce construction waste and ensure that provision is made for storage capacity for waste, both internal and external	Construction waste: Site Waste Management Plans (secured via conditions) Occupation phase waste management: <ul style="list-style-type: none"> Recap Waste Management Design Guide Toolkit (as required by Policy CS28 of the Cambridgeshire Minerals and Waste Core Strategy). Proposals in Cambridge should also submit Cambridge City Council's Waste and Recycling Provision Checklist. 	Section 3.11, paragraphs 3.11.1 – 3.11.10. Sustainability Checklist Wr.1, Wr.2 and Wr.3

Table 1.3: Summary of requirements for applications in South Cambridgeshire

TOPIC	REQUIREMENT	EVIDENCE REQUIRED	SECTION OF SPD AND CHECKLIST
Energy and carbon reduction	Policy CC/3: 10% onsite renewable or low carbon energy for all new residential development and major non-residential development	Energy Statement	Section 3.2, paragraphs 3.2.14 – 3.2.38 plus the Energy Statement Form in Appendix 5. Sustainability Checklist En.1, En.2, En.3, En.4, En.5, En.6, En.7, En.8 and En.9
Water	Policy CC/4: 1. All residential development – 110 litres/person/day	1. Residential development – Water Conservation Strategy	1. Section 3.3, paragraphs 3.3.2 – 3.3.3. Sustainability

TOPIC	REQUIREMENT	EVIDENCE REQUIRED	SECTION OF SPD AND CHECKLIST
	2. Non-residential development – 2 BREEAM credits for Wat01	2. Non-residential development – BREEAM pre-assessment	Checklist Wat.1 and Wat.3 2. Section 3.3, paragraphs 3.3.7 – 3.3.9. Sustainability Checklist Wat.2 and Wat.3
Climate change adaptation	Policy CC/1: Integrate measures into the design of developments to enable adaptation to climate risks including: <ul style="list-style-type: none"> Overheating Flood risk 	<ul style="list-style-type: none"> Sustainability Statement Design and Access Statement Surface Water Drainage Strategy 	Section 3.4, paragraphs 3.4.6 – 3.4.40. Sustainability Checklist Ca.1, Ca.2, Ca.3, Ca.4, Ca.5, Ca.6 and Ca.7
Biodiversity	Policies NH/4 and NH/5: All development proposals should seek to conserve and enhance biodiversity	<ul style="list-style-type: none"> Preliminary Ecological Assessment; and Protected Species Scoping Survey 	Section 3.5, paragraphs 3.5.3 – 3.5.16. Sustainability Checklist Bio.1, Bio.2, Bio.3, Bio.4, Bio.5, Bio.6, Bio.7, Bio.8, Bio.9 and Bio.10
Pollution: light pollution	Policy SC/10: All development proposals including external lighting or changes to existing lighting should reduce the potential impacts of that lighting	<ul style="list-style-type: none"> An Assessment of the Need for Lighting Lighting Impact Assessment 	Section 3.6, paragraphs 3.6.2 0 3.6.36 plus Appendix 6. Sustainability Checklist, Pol.1, Pol.2, Pol.3, Pol.4, Pol.5 and Pol.6
Pollution: contaminated land	Policy SC/12: All major development and any development proposals on land subject to contamination or land that is suspected to be contaminated. Developers are responsible for ensuring that a proposed development will be safe and 'suitable for use' for the purposes for which it is intended.	<ul style="list-style-type: none"> Contaminated land assessment 	Section 3.6, paragraphs 3.6.37 – 3.6.42 plus Appendix 7. Sustainability Checklist Pol.7
Pollution: Noise	Policy SC/11: Development will be permitted where it is demonstrated that: <ol style="list-style-type: none"> it will not lead to significant adverse effects and impacts, including cumulative effects and construction phase impacts 	<ul style="list-style-type: none"> Noise Impact Assessment or Acoustic Assessment/Report Acoustic Design Statement 	Section 3.6, paragraphs 3.6.43 – 3.6.132 plus Appendix 8. Sustainability Checklist Pol.8, Pol.9,

TOPIC	REQUIREMENT	EVIDENCE REQUIRED	SECTION OF SPD AND CHECKLIST
	<p>wherever applicable, on health and quality of life/amenity from noise and vibration; and</p> <p>b. adverse noise effects/impacts can be minimised by appropriate reduction and/or mitigation measures secured through the use of conditions or planning obligations, as appropriate (prevention through high quality acoustic design is preferable to mitigation).</p>		Pol.10, Pol.11, Pol.12, Pol.13 and Pol.14
Pollution: Air Quality	<p>Policy SC/13: Development must ensure that it does not adversely impact on air quality or expose sensitive users to poor air quality and does not lead to significant adverse effects on health, amenity and the environment from polluting or malodorous emissions, or dust or smoke emissions to air.</p>	<ul style="list-style-type: none"> • Air Quality Assessment • Low Emission Strategy 	Section 3.6, paragraphs 3.6.174 – 3.6.181. Sustainability Checklist Pol.15 and Pol.16
Pollution: Odour and other fugitive emissions	<p>Policy SC/14: Development must ensure that it does not adversely impact health, amenity and the environment from polluting or malodorous emissions, or dust or smoke emissions to air</p>	<ul style="list-style-type: none"> • Odour Impact Risk Assessment or Detailed Odour Impact Assessment 	Section 3.6, paragraphs 3.6.182 – 3.6.206. Sustainability Checklist Pol.17, Pol.18 and Pol.19
Sustainable Drainage Systems and Flood Risk	<p>Policies CC/7, CC/8 and CC/9: Refer to the Cambridgeshire Flood and Water SPD A Site Specific Flood Risk Assessment is required:</p> <ul style="list-style-type: none"> • For proposals of 1 ha or greater in Flood Zone 1 • For all proposals for new development (including minor development and change of use) in Flood Zones 2 and 3; or • In an area within Flood Zone 1 which has critical drainage problems; or • Where proposed development, or a change of use to a more vulnerable 	<ul style="list-style-type: none"> • Surface Water Drainage Strategy and Adoption Statement • Site Specific Flood Risk Assessment • Surface Water Drainage Pro-forma (Appendix F) of the Cambridgeshire Flood and Water SPD 	Refer to the Cambridgeshire Flood and Water SPD . Sustainability Checklist SuDS.1

TOPIC	REQUIREMENT	EVIDENCE REQUIRED	SECTION OF SPD AND CHECKLIST
	class, may be subject to other forms of flooding		
Sustainable Show Homes	Policy CC/5: For residential development where a show home is being provided, measures to enhance the environmental performance of homes should be installed and made available to new home buyers to enhance the specification of their new home	<ul style="list-style-type: none"> Sustainability Statement 	Section 3.9, paragraphs 3.9.1 – 3.9.4. Sustainability Checklist SuSh.1
Heritage Assets	Policy NH/15: Where works to improve the environmental performance of a heritage asset are proposed, evidence is required to demonstrate that the works will not harm the building's integrity or significance.	Information can be included in the Design and Access Statement or Heritage Statement	Section 3.10, paragraphs 3.10.1 – 3.10.7. Sustainability Checklist Ha.1, Ha.2, Ha.3 and Ha.4
Construction waste and occupation phase waste management	Policies CC/6 and HQ/1: All new development should include measures to reduce construction waste and ensure that provision is made for storage capacity for waste, both internal and external	<p>Construction waste: Site Waste Management Plans (secured via conditions)</p> <p>Occupation phase waste management:</p> <ul style="list-style-type: none"> Recap Waste Management Design Guide Toolkit (as required by Policy CS28 of the Cambridgeshire Minerals and Waste Core Strategy). 	Section 3.11, paragraphs 3.11.1 – 3.11.10. Sustainability Checklist Wr.1, Wr.2 and Wr.3

Status of this document

- 1.24 This is the adopted version of the Greater Cambridge Sustainable Design and Construction SPD, approved for adoption at Cambridge City Council's Planning and Transport Scrutiny Committee by the Executive Councillor for Planning Policy and Open Spaces on 14 January 2020, and at South Cambridgeshire District Council's Cabinet on the 8 January 2020.
- 1.25 The SPD is a material consideration in the determination of planning applications.

Section 2: The importance of urban design

2.1 Introduction

LOCATION:	Cambridge and South Cambridgeshire
POLICY:	<ul style="list-style-type: none">Cambridge Local Plan (2018) Policy 56: Creating successful places, Policy 57: Designing new buildings, Policy 80: Supporting sustainable access to developmentSouth Cambridgeshire Local Plan (2018) Policy HQ/1: Design principles, Policy T1/2: Planning for sustainable travel
SCALE OF DEVELOPMENT:	All scales (except householder)
TYPE OF DEVELOPMENT:	Residential and non-residential development
SUBMISSION REQUIREMENTS:	Design and Access Statement, Transport Assessments
LINK TO THE SUSTAINABILITY CHECKLIST:	T.1, T.2, T.3, T.4, T.5, T.6

- 2.1.1 Designing and delivering more sustainable forms of development requires consideration at a strategic scale, before moving down to consider the more detailed site specific design and construction elements. Development sites come in a wide variety of sizes and levels of complexity and both are crucial in determining whether proposals fit into existing movement frameworks and can tie into existing services and facilities or whether these need to be provided or improved as part of the development.
- 2.1.2 Good urban design and sustainable design and construction are mutually inclusive. Integrating the two concepts will maximise the opportunities for creating sustainable forms of development, whether it is a new settlement and urban extension or development within an established community. Well considered and integrated movement patterns and land uses with appropriate densities combine to promote sustainable and inclusive patterns of development that ensure, safe, sustainable, liveable and mixed use places are created which provide good access for all to homes, jobs and key services. The layout and form of development also impacts on wider issues such as microclimate and drainage and is crucial in determining the capacity of new and existing communities to adapt to our changing climate.

2.2 Achieving more sustainable development forms

- 2.2.1 Sustainability encompasses social, economic and environmental factors. When considered holistically, good design and planning can help achieve socially inclusive places which promote vitality, ensure the viability of services and decrease energy demands and reliance on car based trips.

Walkable neighbourhoods

- 2.2.2 The creation of attractive places in which to live and work lies at the heart of sustainable development practice.
*'A successful and sustainable local neighbourhood is a product of the distances people have to walk to access daily facilities, the presence of a sufficient range of such facilities to support their needs, and places and spaces where a variety of activities can take place.'*⁵
- 2.2.3 Historically places developed which had shops and other services within walking distance of the majority of the population, as most movements were pedestrian based. As a result, the density of development in the most 'accessible' parts of the settlement was higher. Such an arrangement provides the basis for a modern interpretation of this traditional form – the 'walkable neighbourhood'. This term describes an area within which it is possible and indeed desirable to walk (and cycle or use of other sustainable means) to access services and facilities. Typically this is based on maximum distances of 400 metre (5 minute) and 800 metre (10 minute) walking catchments. This 'catchment' area can be used to help structure districts of new settlements or urban extensions or to help work out how development can be successfully tied into existing areas. Research has shown that *'the maximum distance that people are prepared to walk is generally considered to be around 2000 metres although the optimum is 800 metres (a comfortable ten-minute walk)'*⁶.
- 2.2.4 When defining the catchment of an area or planning how new services and facilities can be best integrated to serve development, the actual walking catchment must be defined as opposed to the theoretical one. The accessibility and therefore availability of services and facilities will be influenced by how directly they connect with the rest of the development area and whether any barriers to movement, such as railway lines, main roads etc. exist. In addition, proposals should undertake a comprehensive analysis of the site and surrounding area to establish the proximity of existing services and facilities. This will need to be included in the **Design and Access Statement** required in support of a planning application.

Movement framework

- 2.2.5 The movement framework describes the way in which the different modes of walking, cycling and public transport, along with private vehicles (including servicing and deliveries) all fit together. The aim should be to make it easy and more attractive to walk, cycle or take the bus through the provision of well integrated, safe and connected routes as well as secure and convenient cycle parking. The way in which routes and associated facilities are planned will inform the location of activity nodes and the appropriate distribution of density. Crucial to creating sustainable development forms is making services and facilities accessible to the widest number of people, whilst reducing dependence on the private car.
- 2.2.6 A thorough understanding of the context of a development and the relationship to existing services and facilities, including public transport connections and links to cycle

⁵ Llewelyn-Davies (2000) The Urban Design Compendium. www.nationalarchives.gov.uk, p39

⁶ Rudlin and Falk (1999) Building the 21st Century Home, Architectural Press, p220

networks, will be crucial in achieving well-integrated and well-connected sustainable forms of development. This should be demonstrated in the Design and Access Statement required in support a planning application.

Land use and ‘activity nodes’

- 2.2.7 The term ‘activity node’ describes a location where services and facilities are centred due to good accessibility on foot, by bicycle or public transport and where population density is increased to take advantage of proximity to the services and facilities provided. The location of an activity node is influenced by where movement corridors pass and by how they connect to the wider area.
- 2.2.8 The range of services and facilities that an activity node provides is one of the most important factors in helping to ensure vitality and viability of places. The scale of the node and the range of services and facilities supported is based on the catchment population and numbers of people living in and passing through an area. A more vibrant and sustainable form of development will result from blurring the distinction between uses and designing places that make walking, or cycling, to the local centre and bus stop as convenient as possible.
- 2.2.9 The activity node will consist of a *‘series of interlinked activity generators – bus stops, supermarkets, community/religious buildings, cafes, shops and small scale offices’*⁷.

Density profile

- 2.2.10 As with traditional settlements, population densities should increase around key activity nodes and along the main public transport corridors. When considering the development density of a site, it should be remembered that the density will not be uniform across a site but will need to respond to the constraints and opportunities that exist and in particular, increase around key activity nodes and along public transport links and access points.

Development blocks

- 2.2.11 Land use, density and movement are interlinked and thereby form the basic structuring principles of a sustainable community or place. A connected grid essentially allows for the creation of a ‘permeable’ neighbourhood which offers a choice of route to all users whilst focusing key services and facilities on the main routes.
- 2.2.12 The spaces in between the ‘network’ formed by the streets are called ‘development blocks’. When considering change over time, it is often the street network which remains as the enduring element of places, whilst buildings come and go. It is therefore important to consider the planning and integration of new and existing routes in development proposals.

⁷ Barton, Grant and Guise (2003) *Shaping Neighbourhoods, A guide for health, sustainability and vitality*. Spon Press, London and New York, p198

2.2.13 Two aspects of the development block, the size and shape, must be considered which will be dependent on the location of the block in terms of its surrounding context.

2.2.15 **Development Block: Size.** Closer towards the centres of towns and cities, and especially in the historic cores of places, block sizes are typically smaller due to the greater frequency of streets brought about by the need to maximise accessibility. In more central areas a robust block size capable of accommodating a range of uses and able to adapt over time will be 60-80m. Further out from the core a block size of between 80-90m represents the more robust size. When considering residential development blocks, a typical dimension of 100m x 200m will create a development parcel capable of accommodating a variety of residential dwelling types and capable of accommodating a variety of residential dwelling types and capable of accommodating a variety of parking, garden spaces and other functions in the block interior. When considering more rural settlements, the overall scale or extent of the settlement will be important in determining how accessible a place it is. The same principles of finer grain and smaller development parcels on high streets and other accessible routes will apply. Many South Cambridgeshire villages have a linear morphology with the main shops and services organised along the principal street with a series of smaller development parcels extending back from this route.

2.2.16 **Development Block: Shape.** Good urban design principles advocate the creation of a 'deformed grid' to produce a series of connected streets and with buildings orientated to front on to streets and spaces. Whilst uniform rectangular blocks may be the easiest form to plan and develop, in reality and especially when fitting new development into existing settlements, blocks will need to be 'deformed' to meet the constraints of the site such as existing roads, topography and watercourses, as well as to help create a higher degree of visual interest.

Mixing uses

2.2.17 Mixed use developments can happen at a variety of scales, from an individual building through to a block or development site. Such mixing of complementary uses can occur horizontally, with complementary uses occurring side by side, or vertically with different uses on different floors of the same building. In the past, planning has tended to 'zone' individual uses rather than the mixed approach of more traditional places, which has resulted in the fragmentation of places and the increased dependence on the private car to access services and facilities. 'Good neighbour principles' need to be adhered to and the servicing requirements of different uses and users needs to be considered. However, when well resolved, the result will be a development that promotes the vitality and viability of places through extending uses throughout the day and which are ultimately more resource and energy efficient.

Robust and adaptable places and buildings

2.2.18 One of the fundamental ingredients of a 'sustainable place' is the ability to accommodate change over time and so reduce the need for demolition and rebuilding.

- 2.2.19 Consideration needs to be given to different scales, from the large-scale such as the overall layout and size of development blocks, through to the small-scale, which considers building depths and internal organisation of dwellings. Consideration will be applicable to both new developments as well as the redevelopment of existing buildings and places.
- 2.2.20 The rate and scale at which places develop is significantly faster today than in the past. The gradual evolution of settlements through the building and rebuilding of plots within development blocks still occurs, but in the case of urban extensions and new settlements, the scale and rate of development means that it is difficult to predict the nature and demand of users into the future. Buildings therefore need to be adaptable to be capable of reuse and conversion to meet the changing social and technological needs of communities as they grow and as places respond to changing market and economic conditions. Buildings and communities also need to be adaptable to our changing climate, giving consideration to issues such as rising temperatures and extreme weather events such as flash flooding and storms.
- 2.2.21 **Building size:** The depth and width of buildings will have a marked effect on the sustainability of a development in terms of the flexibility of the building and therefore the potential for it to adapt to future needs, as well as the way in which it performs in relation to overall energy efficiency.
- 2.2.22 The depth of a building has direct implications in terms of lighting, ventilation and robustness. A shallow building can reduce the need for artificial lighting and mechanical ventilation, therefore reducing energy demands. In terms of optimum depths of buildings, it is generally acknowledged that a depth of between 9 to 13m creates the most robust and adaptable form.
- 2.2.23 **Increased floor to ceiling heights at ground floor level:** In some instances where future needs in terms of services and facilities, such as shops, cannot be accurately predicted or at the time of construction there is insufficient demand to make retail space viable, the design of buildings with increased floor to ceiling heights at the ground floor (typically 3.75m) can allow for the building to be adapted relatively easily to retail uses, with adequate clearance for service provision and other needs.
- 2.2.24 **Adaptable internal space:** Enabling the internal layout of buildings to be altered with relative ease is an important consideration in making buildings adaptable for different uses in the future. The most important consideration in the design of the structure is to ensure that there is maximum flexibility for the alteration of internal partitions, for example by ensuring that the load bearing elements of the building are in the external frame of the structure.
- 2.2.25 **Built form and climate change adaptation:** The layout of development from overall block scale down to individual buildings can impact on the microclimate that a site experiences. At the early stages of masterplanning solar orientation, prevailing wind direction, topography and drainage need to be understood to positively inform the scale and massing of development, orientation of private amenity space and location of open spaces.

2.2.26 Opportunities for adaptation exist at a range of different scales from conurbation or catchment scale, right down to the scale of individual buildings. The Town and Country Planning Association (TCPA)⁸, describes these opportunities as follows:

- **Conurbation or catchment scale:** Climate change adaptation at this scale will potentially serve the whole city and is likely to include a variety of land uses. Opportunities for creating cost-effective and integrated solutions as part of an overarching climate change strategy may be greatest at this scale.
- **Neighbourhood scale:** This scale involves developments of discrete groups of dwellings, including a mix of uses, and can vary in size from an individual block to a large estate. Consideration will need to be given to adapting the public realm and spaces between buildings and developments. Solutions can be developed through a site brief or masterplan.
- **Building scale:** Smaller developments including individual dwellings, apartment blocks or commercial buildings provide opportunities for integrating climate change adaptation into or around buildings. Attention will need to be given to the design of the building, its surroundings, and how it is used and managed, in order to maximise current and future climate adaptation potential. Design or building codes provide useful tools.

Further consideration of climate change adaptation is given in section 3.4 of this SPD.

2.3 Transport, Movement and Accessibility

2.3.1 Transport accounts for 27% of the UK's carbon emissions, making it the largest emitter of carbon by sector⁹. Road transport accounts for 90% of these emissions. Not only does road transport have implications for carbon emissions, but it is also one of the biggest contributors to poor air quality in our towns and cities. The Greater Cambridge area already has three air quality management areas (AQMA) in place, one covering Cambridge city centre, and two in South Cambridgeshire along the A14 and M11.

2.3.2 In response to these challenges, Government has launched its Road to Zero Strategy, which sets out its mission to put the UK at the forefront of the design and manufacturing of zero emission vehicles, and for all new cars and vans to be effectively zero emission by 2040. The sale of new conventional petrol and diesel cars and vans will end by 2040, by which time the majority of new cars and vans sold will be 100% zero emission and all new cars and vans to have significant zero emission capability. By 2050 we want almost every car and van to be zero emission. At least 50%, and as many as 70%, of new car sales and up to 40% of new van sales will need to be ultra low emission by 2030.

2.3.3 Planning has its part to play in facilitating this transition to zero emissions vehicles, but it also has a wider role to play in facilitating development that makes best use of walking, cycling and public transport to enable people to go about their lives without having to rely on the use of private cars. Within the Greater Cambridge area, the Greater Cambridge Partnership are in the process of delivering a wide range of sustainable

⁸ TCPA (2007) Climate change adaptation by design: A guide for sustainable communities.

⁹ HM Government (July 2018). The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy.

transport infrastructure projects to help shift the focus of peoples trips from private vehicles to a greater share of public transport and cycle trips. In many cases these projects are focussed around growth areas such as the new settlements at Waterbeach, Bourn Airfield and Northstowe as well as key employment areas such as the Cambridge Biomedical Campus.

- 2.3.4 Within Cambridge, all major schemes are likely to be close to public transport and cycle networks due to the compact form and scale of development. In South Cambridgeshire many of the existing larger villages also benefit from existing public transport routes, with proposals in place to enhance these as well as enhancing cycle routes to villages surrounding the city via Greater Cambridge Partnerships Greenways project (see figure 2). However, good design is required to ensure the full potential of public transport, walking and cycling will be realised.
- 2.3.5 When considering new development, proposals should structure places around the principles of walkable neighbourhoods, highlighted in section 2.2 above, and so reduce the dependence on private cars. All developments, irrespective of size, create the opportunity to ensure the impacts from trips generated by the development are minimised and to support the patronage of public transport and other more sustainable modes of transport.

“Research suggests net densities of 100 persons per hectare (pph) are necessary to sustain a good bus service (LGMB, 1995). Taking the 800m (10 minute) walking distance as a starting point (generating a walkable neighbourhood of 97.5 ha), this equates to 45 units/ha if the average UK household size of 2.2 is applied.”¹⁰

- 2.3.6 Planning applications will need to provide evidence that the design and layout of developments will help to reduce the number of trips generated through development forms that link movement, land use and density, as part of Design and Access Statements, with greater detail provided in Transport Assessments. A thorough understanding of the context of the development and its relationship to existing services and facilities including public transport connections and cycle infrastructure, will be crucial in achieving well integrated and well connected forms of development.
- 2.3.7 Where car free developments or developments with reduced parking allocations (lower than levels suggested by Local Plan policy) are proposed, connectivity to public transport and local amenities based on the walkable neighbourhoods principles (section 2.2 above) will be key. Other measures such as car clubs and provision for off-gauge bikes such as cargo bikes, bikes with trailers and 3 wheeled bikes will be necessary to minimise overspill parking in neighbouring communities.
- 2.3.8 There is much information available on good and best practice measures to enable more sustainable transport modes. Table 2.1 below provides suggestions of some of the possible ways in which more sustainable transport objectives can be met. The table is not intended to be exhaustive and not all measures will be applicable to all sites. Many of these measures will have multiple knock-on effects, many of which should be positive.

¹⁰ Llewelyn-Davies (2000). The Urban Design Compendium. English Partnerships

For example, establishing a car club on a site will help reduce CO₂ emissions, improve air quality and potentially provide a greater developable area or more land for open space through reduced land take for private car parking.

- 2.3.9 Following on from work with the Design Council, South Cambridgeshire District Council is in the process of developing a toolkit to help deliver an increase in active travel as part of new developments. Developers should make reference to this toolkit once it is available.

Figure 2: The Greater Cambridge Greenways (image courtesy of Greater Cambridge Partnership)

Greenways plan

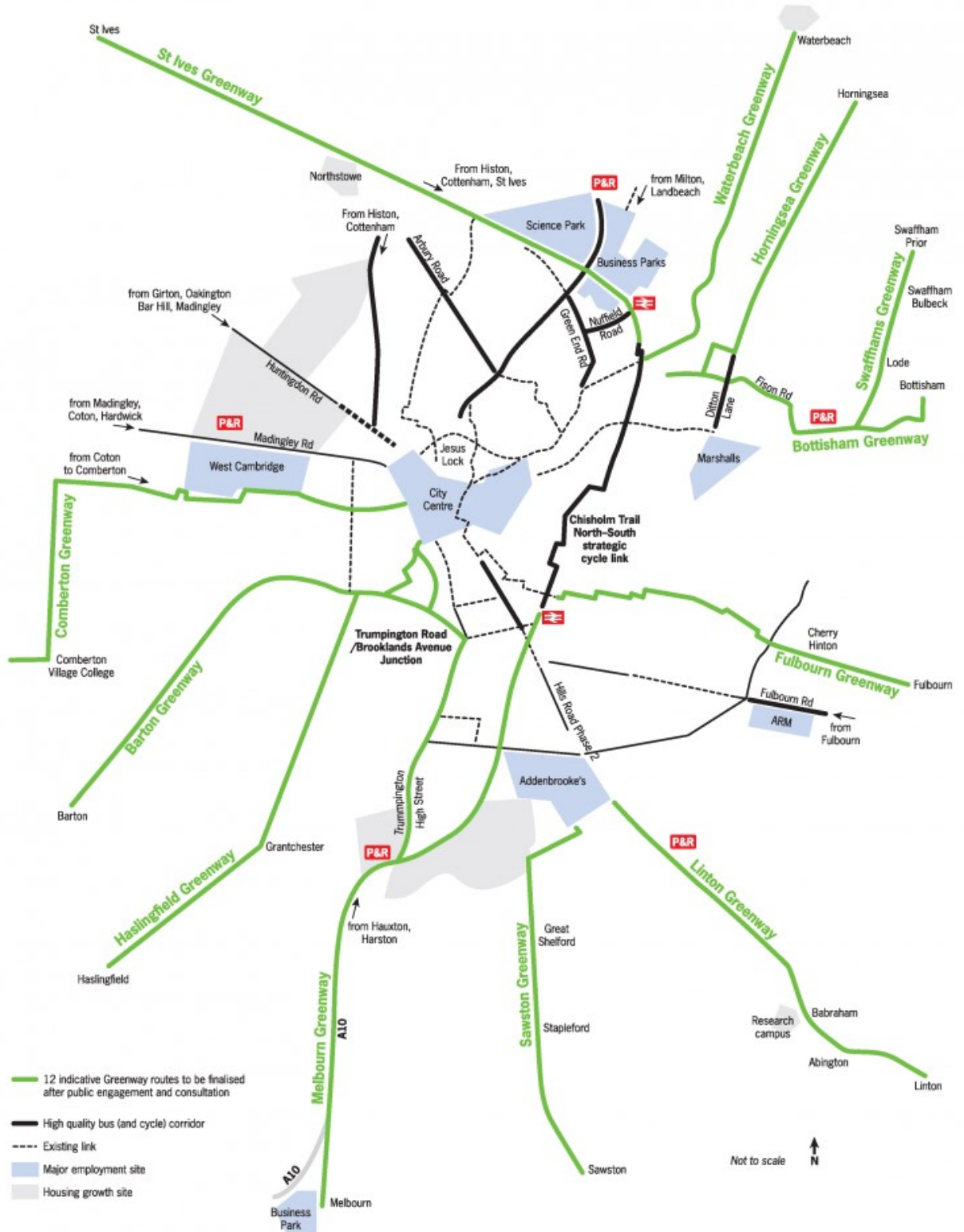


Table 2.1: Potential measures to meet sustainable transport objectives

OBJECTIVE	POTENTIAL MEASURES
1. Reduce the need for travel by private car	<ul style="list-style-type: none"> • Mixed use developments; • Complementary uses with surrounding area; • Ensuring daily needs of occupants can be met within walking and cycling distance; • Providing an onsite car club; • Provide parking for off gauge bikes • Provide travel plans for development; • Provide travel information packs for building occupants.
2. Prioritising walking and cycling	<ul style="list-style-type: none"> • Cycle and pedestrian infrastructure is ready prior to occupation of dwellings on new developments • Designing footpaths and cycle ways along 'desire lines' to principal likely destinations both in the vicinity of the development and the wider area; • Locating cycle parking for maximum speed of access from buildings, making it more convenient than car parking; • Ensuring cycle parking is safe and secure; • Ensuring paths are safe and well lit, with natural surveillance from surrounding buildings; • Minimising disruption of footpaths and cycle paths from the road network and car park layouts; • Incorporating traffic calming measures; • Ensuring that all transport modes are integrated so that there are good walking and cycling routes to and from bus stops and that sufficient safe and secure cycle parking is provided at bus stops.
3. Integrating new and existing pedestrian and cycle networks successfully	Existing networks should be used as a starting point for design.
4. Retaining and improving existing networks	<ul style="list-style-type: none"> • Minor upgrading of junctions, signage and/or pavements and cycle ways; • Re-routing sections of cycle paths where necessary.
5. Ensuring these networks are in place prior to first occupation	
6. Developing an appropriate car parking and cycle parking strategy	<p>For developments in Cambridge:</p> <ul style="list-style-type: none"> • See Policy 82 and Appendix L of the Cambridge Local Plan 2018 <p>For developments in South Cambridgeshire:</p> <ul style="list-style-type: none"> • See Policy TI/3 of the South Cambridgeshire Local Plan 2018

OBJECTIVE	POTENTIAL MEASURES
7. Ensuring both existing and proposed high quality sustainable transport links (both public transport and cycle paths/bridleways) are not inhibited by the development	
8. Choosing the most suitable location for sustainable modes (non-residential only)	
9. Using the sequential approach to ensure that non-residential development is located in areas easily accessible by sustainable mode	
10. Consider freighting options using sustainable modes (e.g. bike couriers)	
11. Ensuring accessibility for all	<ul style="list-style-type: none"> • Locate disabled parking spaces close to the entrances to buildings; • Ensure spaces and routes are not obstructed; • Provide dropped kerbs, shallow inclines and cambers, flat thresholds; • Ensure all housing in urban extensions and new settlements are within 400 metres of high quality public transport networks; • Provide seating along key routes to public transport stops and key facilities within developments (Ambulant disabled people can often only travel 100 metres and 50 metres without seated rests).
12. Ensuring all housing within urban extensions and new settlements are within 400m of public transport networks	
13. Ensuring transport infrastructure minimises impact on wildlife, landscape and amenity	<ul style="list-style-type: none"> • Use of Sustainable Drainage Systems (SuDS) to improve the quality of surface water run-off from roads; • Using existing vegetation or planting to reduce long distance views of roads; • Use of home zones and other traffic calming measures; • Routing transport infrastructure away from known wildlife migration routes or integrating mitigation

OBJECTIVE	POTENTIAL MEASURES
	measures into schemes to enable continued use of routes (e.g. wildlife crossings underneath and over roads and paths).
14. Supporting the transition to low emission vehicles	<ul style="list-style-type: none"> • Provision of electric vehicle charging points for all new developments (see section 3.6 Air Quality for further guidance)

Further guidance

- Ministry of Housing and Local Government and Department for Transport (2007) Manual for Streets. Available online at: <https://www.gov.uk/government/publications/manual-for-streets>
- Cambridgeshire County Council (2014). Transport Strategy for Cambridge and South Cambridgeshire. Available online at: <https://www.cambridgeshire.gov.uk/residents/travel-roads-and-parking/transport-plans-and-policies/cambridge-city-and-south-cambs-transport-strategy/>
- Cambridge City Council (2010). Cycle Parking Guide for New Residential Development. Available online at: <https://www.cambridge.gov.uk/media/6771/cycle-parking-guide-for-new-residential-developments.pdf>

Section 3: Policy Implementation

3.1 Introduction

- 3.1.1 This section of the SPD provides guidance on the implementation of policies contained within the Cambridge Local Plan (2018) and the South Cambridgeshire Local Plan (2018). It provides guidance on the information that needs to be submitted with applications to demonstrate compliance with policy, the format that this information should take, and guidance on possible approaches to policy compliance. Where appropriate, links to additional guidance will be provided.
- 3.1.2 The guidance contained in this section is split into the following topic areas:
- Energy and carbon reduction;
 - Water efficiency;
 - Climate change adaptation;
 - Biodiversity and geodiversity;
 - Pollution:
 - Light pollution;
 - Contaminated land;
 - Noise pollution (including vibration);
 - Air quality; and
 - Odour and other fugitive emissions to air;
 - Sustainable drainage systems;
 - Construction Standards (BREEAM).
 - Sustainable Show Homes;
 - Climate change and heritage assets;
 - Construction waste and occupation phase waste management
- 3.1.3 It is recognised that this SPD has been produced at a time of changing national policy, particularly in relation to carbon reduction from new development and measures to support electric vehicles. Changes to Building Regulations may have implications for the implementation of adopted policies in the Cambridge and South Cambridgeshire local plans. In light of this, further technical guidance on the implementation of affected policies may be produced once such changes are brought in.

Viability considerations

- 3.1.4 As part of the process of developing the 2018 Cambridge and South Cambridgeshire Local Plans, the viability of all of the policy requirements has been tested as part of the examination process. With regards to the policies considered by this SPD, the requirements set out in these policies were all found to be viable, with some, for example the water efficiency requirements for new residential development, being found to have minimal impact on viability.
- 3.1.5 Integrating sustainability considerations early in the development process can go some way to ensure that policy requirements can be achieved in a cost effective manner. Nevertheless, it is recognised that viability considerations can change and are influenced

by many factors. Technical feasibility may also have a bearing on the ability of proposals to fully meet policy requirements in some situations. In such situations, we would strongly recommend that the applicant seek early engagement with the councils in order to consider and agree in principle alternative ways in which the aims of the councils' sustainability policies and objectives can be achieved, even if full policy compliance is not possible. Such an upfront approach can help to minimise delays after the formal submission of planning applications.

3.2 Energy and Carbon Reduction

- 3.2.1 Buildings are responsible for almost half of the UK's carbon emissions, and as such the way in which we design buildings has an important role to play in supporting the transition to a low, and indeed zero carbon society. Across the Greater Cambridge area, the respective 2018 local plans include specific policies to reduce the energy demand and carbon emissions associated with new, and in the case of Cambridge, existing homes.

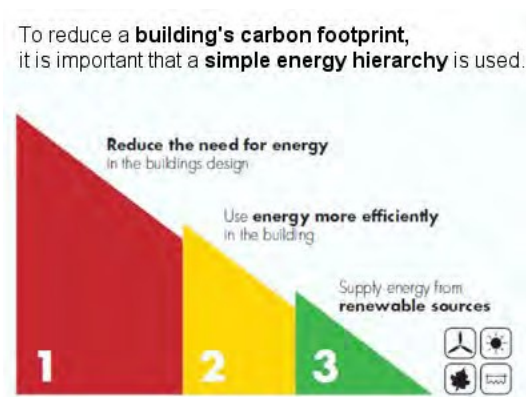
Carbon reduction in new development - Cambridge

LOCATION:	Cambridge
POLICY:	Policy 28: Carbon reduction, community energy networks, sustainable design and construction and water use
SCALE OF DEVELOPMENT:	All new development
TYPE OF DEVELOPMENT:	Residential and non-residential development
SUBMISSION REQUIREMENTS:	Carbon Reduction Statement (residential development) BREEAM pre-assessment (non-residential development)
LINK TO SUSTAINABILITY CHECKLIST	En.1, En.2, En.3

Policy overview

- 3.2.2 Policy 28 sets carbon reduction requirements for all new development in Cambridge, with separate requirements for residential and non-residential development. Policy 28, as drafted in 2011, requires all new residential development is required to reduce emissions by 44% compared to a Building Regulations 2006 baseline. Under Part L 2013, this policy requirement is now equivalent to a 19% reduction in Part L 2013, which is the level of carbon reduction that must be demonstrated as a minimum in submitted Carbon Reduction Statements. The SPD shall hereafter refer to a 19% reduction on Part L 2013. For new non-residential development, the requirement is to meet the mandatory credits required for achievement of BREEAM 'excellent' under the Ene 01 credit. What these requirements have in common is that they both require new development to follow the hierarchical approach to reducing energy demand and associated carbon emissions, as illustrated in figure 3 below.

Figure 3: The energy hierarchy



3.2.3 Following the energy hierarchy requires a three-pronged approach, often referred to as Be Lean, Be Clean and Be Green. In essence, this approach:

- Minimises the energy demand of new buildings through fabric performance and energy efficiency measures;
- Utilises energy more efficiently in buildings, for example through the use of underfloor heating so only very low return temperatures are needed or through the use of passive design to reduce reliance on mechanical ventilation;
- Supplies energy from new, renewable energy sources.

3.2.4 While policy 28 is focussed on reducing carbon emissions from energy use within buildings themselves, new developments should also strive to reduce carbon emissions from other sources including transport related emissions through the promotion of sustainable modes of transport and low or zero emissions vehicles (see chapter 2), and through utilising construction materials with low embodied energy.

Submission requirements – residential development

3.2.5 For all new residential development, the requirement is for a 19% reduction on a Part L 2013 compliant baseline. This is equivalent to meeting the energy requirements of level 4 of the now withdrawn Code for Sustainable Homes, and the implementation of this policy follows the methodology for assessing this requirement.

3.2.6 In order to demonstrate compliance, applicants should submit a **Carbon Reduction Statement**, setting out how the policy requirements will be met. The Statement should be structured around the Be Lean, Be Clean and Be Green hierarchy, with the levels of carbon reduction achieved at each stage of the hierarchy shown. This Statement can either be part of the Sustainability Statement or can be submitted as a standalone document.

3.2.7 Table 3.1 below sets out the information that should be included within the Carbon Reduction Statement, while Appendix 2 contains a carbon reduction template which should be used to provide a summary of the calculations. In some cases, for example at the outline application stage, it may not be possible to provide detailed carbon calculations in line with Building Regulations methodology. In such cases, the Carbon

Reduction Statement should outline the general approach using benchmarks where possible, with more detailed carbon calculations being secured through a planning condition requiring the submission of Carbon Reduction Statements at the reserved matters stage.

Table 3.1: Carbon Reduction Statement and Calculation requirements

CALCULATION BASIS	NOTES
<p>As the policy requirement is derived from the energy requirements of Level 4 of the now withdrawn Code for Sustainable Homes, the carbon reduction requirement should be applied to each unit or residential building envelope proposed as part of a development.</p>	<p>Where a building contains multiple dwellings (e.g. apartment blocks or terraced housing), it is acceptable to assess this issue based on the average energy performance of all dwellings within the building. The area weighted average DER and TER must be calculated in accordance with the block averaging methodology defined in clauses 2.7 and 2.16 of Approved Document L1A</p>
<p>The Target Emission Rate (TER) and Dwelling Emission Rate (DER) should be derived from the calculations carried out for Building Regulations compliance (Part L).</p>	
<p>Sample SAP calculations should be appended to the Carbon Reduction Statement as evidence of compliance in addition to submission of the carbon reduction template.</p>	<p>Applicants will need to be mindful of Government’s intention to ban gas boilers in new homes from 2025 in a bid to tackle climate change¹¹. Coupled with the proposed changes to the carbon intensity of electricity in SAP 10, which takes into account the decarbonisation of electricity, a long terms view of the carbon emissions associated with gas forms of heating should be taken into consideration. Where possible we would recommend that SAP 10</p>

¹¹ HM Treasury (2019). Spring Statement 2019. Available online at: <https://www.gov.uk/government/topical-events/spring-statement-2019>

CALCULATION BASIS	NOTES
	carbon intensity figures be utilised.
Alongside the carbon reduction template, the main body of the Statement should include a summary of the measures proposed to reduce carbon emissions following the energy hierarchy (be lean, be clean and be green).	See Appendix 2 for the carbon reduction template
Where renewable energy technologies are proposed to meet some of the carbon reduction requirement they should be an integral part of the design, and the location and indicative layout of those technologies should be shown on relevant drawings (for example, roof plans should show the layout of any proposed photovoltaic panels). Final layouts will be secured by way of a planning condition as appropriate. Applicants wishing to use Combined Heat and power (CHP) are advised to adhere to the emissions standards set out in Appendix 3 as well as giving consideration to the guidance contained within paragraphs 3.2.28 – 3.2.32 of this SPD on best practice for the specification and use of gas CHP.	See emissions standards for gas CHP set out in Appendix 3 Policy 31 of the Cambridge Local Plan (2018) requires all flat roofs to be green or brown roofs. Solar panels can be combined with green or brown roofs, and there are benefits from doing so. Where solar panels are proposed, biosolar roofs should be incorporated under and in-between the panels. An array layout will be required incorporating a minimum of 0.75m between rows of panels for access and to ensure establishment of vegetation.
Where required, mitigation measures have been proposed to maintain amenity and prevent nuisance	Consideration should be given to whether the proposed technologies will give rise to issues such as noise or air quality impacts as part of relevant assessments, with mitigation measures proposed where required.
Where SAP calculations are yet to be completed, for example at the outline planning application stage, the Carbon Reduction Statement should set out the general approach to meeting policy requirements, with a planning condition used to secure submission of carbon calculations once SAP calculations have been carried out.	

Submission requirements – non-residential development

3.2.8 For non-residential development, the carbon reduction requirements set out in policy 28 are linked to the requirement for achievement of BREEAM ‘excellent’. BREEAM ‘excellent’ includes mandatory requirements related to carbon reduction and energy efficiency (under Ene 01), which will need to be met for the requirements of policy 28 to be complied with. Compliance with the policy should be demonstrated by submission of a **BREEAM pre-assessment**, completed by an accredited BREEAM Assessor, which clearly demonstrates achievement of the BREEAM ‘excellent’ standard.

Energy efficiency in existing homes in Cambridge

LOCATION:	Cambridge
POLICY:	Policy 30: Energy Efficiency Improvements in Existing Dwellings
SCALE OF DEVELOPMENT:	Householder applications
TYPE OF DEVELOPMENT:	Works to existing homes that require planning permission
SUBMISSION REQUIREMENTS:	Home Energy Questionnaire (see Appendix 4)

Policy overview

3.2.9 Policy 30 requires applications for extensions to existing dwellings and/or the conversion of ancillary residential floorspace to living accommodation to be accompanied by cost-effective improvements to the energy efficiency of the existing dwelling. The requirements of this policy will apply where the following measures have not already been implemented:

- a. cavity wall insulation;
- b. loft insulation of 150mm or more (in non-converted roof spaces);
- c. the replacement of F and G rated boilers with an A-rated condensing boiler;
- d. heating controls upgrade; and
- e. draught stripping of doors, windows and letter boxes.

3.2.10 In order for Cambridge to contribute to meeting national carbon reduction targets, there is a need to reduce energy demand and associated carbon emissions in existing homes as well as new ones. The Council’s 2009 Housing Stock Survey found that of a total stock of 41,500 dwellings, there was scope for energy efficiency improvements in 95% of properties, including measures such as loft insulation, cavity wall insulation and cylinder insulation. Energy efficiency improvements typically provide relatively cost-effective carbon reduction, but can also help reduce energy bills for residents, which will become increasingly important in the face of rising energy costs.

3.2.11 An ideal time in which to carry out improvements to the energy efficiency of existing homes is when building works such as extensions and loft conversions are being carried out. Policy 30 seeks to take advantage of the opportunity that such works presents for the implementation of cost effective energy efficiency improvements. The measures included within the policy have a simple payback of seven years or less, and are relatively simple to install with limited disruption, as outlined in table 3.2 below. Where the measures listed in the policy have already been undertaken, then no further measures

will be required, although we would encourage home owners to consider whether further improvements could be made as part of proposed building works.

Table 3.2: Measures for implementation under Policy 30 (Figures based on information from the Energy Savings Trust)

Loft Insulation				
	Loft Insulation (0 to 270mm)		Loft insulation (100 to 270mm)	
Approximate saving per year	Up to £180		£25	
Installation cost	Around £300*		Up to £300*	
Time taken to pay for itself	Up to two years		Up to twelve years	
DIY cost	From £250**		From £150**	
Time taken to pay for itself	From two years		From five years	
Carbon dioxide saving per year	Around 730 kg		Around 110 kg	
<p>These are estimates based on insulating a gas-heated, semi-detached home with three bedrooms, showing savings when you insulate an uninsulated loft, and when you top up 100mm of insulation to 270mm. (The recommended depth for mineral wool insulation is 270mm but other materials need different depths).</p> <p>*Average unsubsidised professional installation costs, loft top up assumed to be up to £300 although these may vary.</p> <p>**DIY costs are based on average retailer costs for insulation up to 270mm or more, based on a 44m² loft.</p>				
Cavity Wall Insulation				
Measure	Annual saving	Installation cost	Payback time	Carbon dioxide saving per year
Cavity wall insulation	Up to £140	£450 to £500	Under 4 years	Around 560kg

These are estimated figures based on insulating a gas-heated, semi-detached home with three bedrooms. The average installed cost is unsubsidised.

Replacement Boilers

Savings will be dependent on how old and inefficient your existing boiler is:

Old boiler rating	Annual saving	Carbon dioxide saving per year
G (< 70%)	£310	1,200kg
F (70–74%)	£205	810kg

These are estimated figures based on installing a new A-rated condensing boiler and full set of heating controls in a gas-heated, semi-detached gas heated home with three bedrooms.

The costs for replacing a boiler will vary, but a straightforward gas boiler replacement will typically cost around £2,300.

Heating Controls

Whatever the age of your boiler, the right controls will let you set your heating and hot water to come on and off when you need them, heat just the areas of your home you want, and decide how warm you want each area to be. Here are the average savings you could make in a typical three-bedroom semi-detached home, heated by gas:

- Install a room thermostat if you didn't have one before: £70 and 280kg carbon dioxide a year.
- Fit a hot water tank thermostat: £30 and 130kg carbon dioxide a year.
- Fit a hot water tank insulation jacket: £45 and 170kg carbon dioxide a year.

DRAUGHT PROOFING

DIY draught proofing typically costs around £100 for materials, while professional draught proofing may cost around £200. Full draught proofing could save an average of £55 per year, although the focus for this policy will be draught proofing of doors and letter boxes.

Submission requirements

3.2.12 Where planning permission is required to undertake works to existing homes, applicants will be required to submit a **home energy questionnaire**, set out in Appendix 4, which will identify suitable measures that will be implemented. Where a property has recently

had an Energy Performance Certificate (EPC) prepared, this should also be submitted alongside the questionnaire, and the Council would count measures identified within the EPC towards meeting the requirements of policy 30 subject to evidence being provided that these measures have been implemented (e.g. receipts for work or photographic evidence). A planning condition will then be used to secure the implementation of the identified energy efficiency measure(s).

Further guidance

3.2.13 Cambridge City Council. Greening your home booklet. Available online at:

<https://www.cambridge.gov.uk/media/3242/greening-your-home.pdf>

The Energy Savings Trust website contains lots of information on saving money at home, including renewable energy, home insulation and energy efficiency. Their home improvements guide includes information on how to combine energy efficiency improvements while undertaking major works to your home such as loft conversions and extensions. For further information go to: <https://www.energysavingtrust.org.uk/home-energy-efficiency/home-improvements>

- BSI (2019). PAS 2035/2030: 2019. Retrofitting dwellings for improved energy efficiency. Specification and guidance. Specification for the installation of energy efficiency measures in existing dwellings and insulation in residential park homes. Available online at: https://shop.bsigroup.com/ProductDetail/?pid=000000000030390699&_ga=2.47214575.996413101.1561645187-1834974640.1559206354
- Guidance for landlords of domestic private rented property is available online at: <https://www.gov.uk/guidance/domestic-private-rented-property-minimum-energy-efficiency-standard-landlord-guidance>
- Sustainable Traditional Buildings Alliance (2015). Planning responsible retrofit of traditional buildings. Available online at: <http://www.sdfoundation.org.uk/downloads/Guide-1-Planning-Responsible-Retrofit-2015-08.pdf>
- Sustainable Traditional Buildings Alliance Responsible Retrofit Guidance Wheel. Available online at: <http://www.responsible-retrofit.org/wheel/>
- Sustainable traditional Buildings Alliance (2016). What is whole house retrofit. Available online at: <http://www.sdfoundation.org.uk/downloads/What-is-Whole-House-Retrofit-Dec2016.pdf>
- Building Regulations Approved Document L1B: Conservation of fuel and power in existing dwellings. Available online at: https://www.planningportal.co.uk/info/200135/approved_documents/74/part_1_-_conservation_of_fuel_and_power/2

Renewable and low carbon energy in new developments in South Cambridgeshire

LOCATION:	South Cambridgeshire
POLICY:	Policy CC/3: Renewable and Low Carbon Energy in New Developments
SCALE OF DEVELOPMENT:	All scales of residential development and new non-residential buildings of 1,000m ² or more ¹²
TYPE OF DEVELOPMENT:	New Residential and non-residential development
SUBMISSION REQUIREMENTS:	Energy Statement
LINK TO THE SUSTAINABILITY CHECKLIST:	En.1, En.2, En.3, En.4, En.5, En.6, En.7, En.8, En.9

Policy overview

- 3.2.14 Criterion 1 of policy CC/3 is a Merton rule style policy that seeks at least a 10% reduction in carbon emissions associated with regulated energy use from a development. This is calculated using the baseline for the building as defined by Building Regulations. The reduction in emissions should be provided through the installation of on-site renewable or low carbon technologies, which provide some of the energy needs of the development. The choice of technology should respond to the specific characteristics of the development proposed, and further guidance on the types of technologies that will be considered by the local planning authority is provided in paragraphs 3.2.26 to 3.2.27 below.
- 3.2.15 To meet criterion 1 of the policy a development should be designed to meet Part L of Building Regulations and, once this has been established, the anticipated carbon emissions of the development can be identified. Using this carbon emissions figure as the baseline, a developer should then calculate the amount of carbon emissions that should be met through the provision of renewable or low carbon technologies to deliver at least a 10% reduction calculated by reference to that baseline.
- 3.2.16 Criterion 3 of the policy applies to new settlements and growth areas and seeks to promote site wide approaches to renewable and low carbon energy. An example of this in practice is the district heating network at the University of Cambridge's Eddington development. For this scale of technology to be realised it is important that the feasibility and viability of such systems is considered as part masterplanning and the outline application stage.
- 3.2.17 Applicants are encouraged to consider how they are going to meet this policy as early as possible in the design process. This is to ensure that the proposed renewable or low carbon energy systems are successfully integrated into the layout and design of the development and that costs are kept to a minimum. Early consideration also enables the applicant to weigh up the potential advantages of increasing the energy efficiency of their development in order to reduce the size of the 10% requirement. Improving energy efficiency as much as possible should be the aim of all submissions.

¹² Note that for mixed use schemes that include residential development but where the non-residential elements fall below the 1,000m² threshold, the policy requirement will apply to the residential units only.

3.2.18 The policy also allows for passive solar design measures that reduce the overall energy consumption of the development to be used towards meeting the 10% renewables requirement. Details of what these measures are and how they are treated are dealt in paragraphs 3.2.33 to 3.2.36.

Submission requirements

3.2.19 The information required is generally known as an **Energy Statement**. The information that will need to be submitted will depend on whether an outline, reserved matters or full planning application is being made. The requirements for each are set out in table 3.3 below. Applicants are advised that all on-site energy requirements need to be included. This includes street lights, car park lighting, heating and lighting of communal areas and lifts.

3.2.20 Applicants should use the appropriate Energy Statement form provided in Appendix 5 to provide the information regarding their calculation, along with the other information required set out in tables 3.3 and 3.4 below.

Your calculations

3.2.21 In order to ensure consistency across all submissions, the information in your Energy Statement and accompanying information will be assessed to ensure that it complies with the information in tables 3.3 and 3.4.

Table 3.3: Submission Requirements

OUTLINE:	FULL:
<ul style="list-style-type: none"> ▪ Establish the 10% CO₂ reduction from energy use on the site that needs to be met using benchmarks (form in Appendix 5); ▪ Provide initial feasibility work into which options are relevant to the development. 	<ol style="list-style-type: none"> 1. Establish the site wide carbon emissions of the proposal, set out in Kg/CO₂/annum, based on the Part L Building Regulations compliant scheme, using either the Dwelling Emission Rate (DER) for all residential floorspace and/or the Building Emission Rate (BER) for all non-residential floorspace. It is by reference to this baseline figure that the minimum 10% reduction from renewable and/or low carbon energy should be calculated (form in Appendix 5); 2. Provide feasibility work to justify why the option selected has been chosen; 3. Indicate which technology or technologies have been selected and demonstrate how they will meet the agreed minimum 10% CO₂ emissions reduction (including size and predicted system output); 4. Provide visual information to show how the technology(s) has/have been successfully integrated into the development and include technology(s) on relevant drawings (e.g. roof plans).
RESERVED MATTERS:	
<ol style="list-style-type: none"> 1. Revise the 10% requirement if SAP or SBEM calculations have been carried out, and/or contribution from passive solar design measures have been quantified (optional); 2. Indicate which technology or technologies have been selected and demonstrate how they will meet the agreed minimum 10% CO₂ emissions reduction (including size and predicted system output); 3. Provide visual information to show how the technology(s) has/have been successfully integrated into the development and include technology(s) on relevant drawings (e.g. roof plans). 	

Table 3.4: Calculation requirements

CALCULATION BASIS	NOTES
The 10% requirement has been calculated in kg/CO ₂ not kWh (please convert all kg/C to Kg/CO ₂).	This is the common approach of LPAs to this policy, as it is aimed at reducing CO ₂ emissions, and this varies with fuel type.
If electric heating is going to be specified, SAP 10 carbon intensity figures should be taken into consideration.	At present, SAP calculations include lower carbon intensity figures for gas than electricity, which is not reflective of the real world carbon intensity of gas 'vs' electricity. SAP 10 carbon intensity figures should, therefore, be utilised for schemes proposing to utilise electric heating in order to obtain a more accurate prediction of carbon emissions associated with electrical forms of heating.
If gas Combined Heat and Power (CHP) is proposed, a long term view of carbon emissions should be taken into consideration with reference to emissions factors in SAP 10	At present, SAP calculations include lower carbon intensity figures for gas than electricity, which is not reflective of the real world carbon intensity of gas 'vs' electricity. SAP 10 carbon intensity figures should, therefore, be utilised for schemes proposing to utilise gas CHP in order to obtain a more accurate prediction of carbon emissions associated with gas CHP 'vs' electrical forms of heating.
The contribution of passive solar design has been calculated as accurately as possible.	This can be carried out using dynamic thermal modelling.
The feasibility work is reasonable and gives evidence that the most appropriate option will be selected.	
The technology(s) has/have been successfully integrated into the design	
Where required, mitigation measures have been proposed to maintain amenity and prevent nuisance	Consideration should be given to whether the proposed technologies will give rise to issues such as noise or air quality impacts as part of relevant assessments, with mitigation measures proposed where required.

Feasibility work

- 3.2.22 At the outline submission stage, information should be submitted which shows that all options have been considered, including possible measures to improve the energy efficiency of the building.
- 3.2.23 The primary aim is to provide a hierarchy of likely feasible options, in order to demonstrate that a reasonable approach is being taken to selecting options, rather than finally rule out options, unless this is necessary. For an office development, for example, this may mean having technologies such as heat pumps or photovoltaic panels at the top of the list. Solar thermal may be nearer the bottom as hot water demands are so low that this technology alone would not make a substantial contribution to reducing carbon emissions. Indicating likely feasible options does not preclude opting for any later in the design process.
- 3.2.24 However, there may be situations where particular technologies cannot be used on a site. For example, wind access may have been proven to be insufficient to make a wind turbine a feasible option. Likewise, a site may be too small and constrained to permit borehole machinery to install a vertical ground source heat pump. There may not be sufficient car parking, landscape, or other open space on site for a horizontal system to be installed.
- 3.2.25 If applicants have concerns about a particular technology or fuel, such as the availability or distance biomass fuel will have to travel, they are encouraged to raise this as part of the pre-application process so that discussions can take place prior to formal submission of a planning application. Such concerns should not necessarily preclude the use of the technology, though, in certain areas, it may push it further down the applicants list of preferred options.

Selection of technologies

- 3.2.26 In general, the choice of technology will be left to the applicant. However, if there were concerns that the particular option being advocated would not result in the 10% reduction in carbon emissions required, then the applicant would be notified of this at the earliest opportunity. Further information would then be required to demonstrate that it will or if this is not possible, a revised option would need to be submitted.
- 3.2.27 Renewable and/or low carbon systems that will be considered include:
- Solar thermal hot water systems;
 - Photovoltaic panels (pv);
 - Wind turbines;
 - Heat pumps (ground/air/water source);
 - Geothermal;
 - Gas fired Combined Heat and Power (CHP);
 - Biomass (boilers/stoves/community heating/CHP);
 - Anaerobic digestion.

If you wish to use a technology that is not referenced above you should seek early engagement with officers during as part of the pre-application process to discuss your proposals.

Combined Heat and Power (CHP) and heat networks

- 3.2.28 CHP is essentially a technology that produces electricity close to the point of use and captures the waste heat that is ordinarily lost to provide heating, hot water and sometimes even cooling for buildings through a district heating system. As the majority of the cost of this system is in the infrastructure, it is particularly important to ensure that it is installed at the new build or large-scale redevelopment stage.
- 3.2.29 Correctly specified gas fired CHP can be considered a low carbon technology and as such can be considered as an approach to meeting the requirements of policy CC/3. Evidence will need to be provided to demonstrate that the system has been designed in line with the latest best practice guidance (see paragraph 2.3.32 below) and the levels of carbon reduction associated with the use of the technology can be demonstrated to exceed the requirements of policy CC/3. In some cases, post occupancy evaluation may be required to verify carbon performance. Once the infrastructure is installed, the type of fuel used can be altered more easily than the infrastructure being put in later, and therefore has the potential to be changed over to a renewable fuel. However, there are some important considerations that must be factored in to determining whether CHP will be feasible for a particular development. Applicants will also need to be mindful of Government's intention to ban gas boilers in new homes from 2025 in a bid to tackle climate change¹³. Coupled with the proposed changes to the carbon intensity of electricity in SAP 10, which takes into account the decarbonisation of electricity, a long terms view of the carbon emissions associated with gas CHP should be taken into consideration.
- 3.2.30 Key is to ensure that the proposed development has a consistent year round heat demand as CHP operates more efficiently if it is run constantly. As such it is important to ensure that any CHP is sized to the year round base heating demand and not sized to meet the 10% requirement. For more information on sizing a CHP system see [CIBSE Applications Manual AIM12 Combined Heat and Power for Buildings](#) (2013).
- 3.2.31 It is also important to ensure that the use of CHP does not impact on air quality. CHP can lead to a localised worsening of air quality as fuel combustion gives rise to air pollutants if not correctly specified, installed and maintained. Applicants wishing to use CHP are advised to adhere to the guidance set out in Appendix 3 of this SPD. The emissions standards referenced in this guidance will normally be secured through the use of a planning condition.
- 3.2.32 CHP and heat networks are complex systems to install and operate, and as such it is imperative to ensure that they are designed and installed by specialist contractors following best practice guidance. It is also important to ensure that pricing for customers

¹³ HM Treasury (2019). Spring Statement 2019. Available online at: <https://www.gov.uk/government/topical-events/spring-statement-2019>

is fair and does not contribute to fuel poverty. As such, the Council will require evidence that any proposals for heat networks, regardless of whether these are powered by CHP or another technology, have been designed in line with [CIBSE/ADE Guide CP1: Heat Networks: Code of Practice for the UK](#) (2015) or a successor document. By following this Code of Practice this will also help to reduce the risk of heat networks inadvertently contributing to unwanted internal heat gains which can lead to overheating in summer and shoulder months (for further information on overheating see section 3.4).

Passive solar design

- 3.2.33 Passive solar design is designing a building to take maximum advantage of the light and heat from the sun and natural ventilation, and can if designed correctly, significantly reduce the overall energy consumption of a building. This can be achieved by the location, grouping, orientation and layout of buildings along with landscape features and the appropriate use of thermal mass and natural ventilation within a building. However, it must be considered early in the design process.
- 3.2.34 Passive solar design measures should not be confused with energy efficiency measures, which are also intended to reduce the energy requirements of the building in use.
- 3.2.35 If at the reserved matters stage or full application stage passive solar design features have been incorporated into the design and their contribution to the overall reduction in the development's energy demands can be robustly demonstrated, for example through the use of dynamic thermal modelling, this can be considered as part of the delivery of the 10% requirement. These features will be subject to condition, in the same way that active renewable or low carbon energy systems would be.
- 3.2.36 If passive solar design features are agreed to meet part of the 10% requirement at outline application stage and it is subsequently proven that some or all of the measures are no longer feasible at the reserved matters stage, then the requirement to meet the 10% requirement using active renewable or low carbon systems will still apply.

Site wide approaches to energy

- 3.2.37 Development in growth areas and new settlements offer opportunities to consider site wide approaches to renewable and low carbon energy provision, as recognised by criterion 3 of policy CC/3. For example, in some sites, the mix of uses and densities may enable the use of district heating, or provide opportunities for the development of larger scale renewable energy installations adjacent to new development, such as solar arrays coupled with battery storage and electric vehicle charging provision to create a smart grid approach to energy infrastructure. Such approaches will also assist development in transitioning to a low and zero carbon future as once the infrastructure is in place to support site wide energy approaches, the technologies that sit behind such infrastructure can more easily be upgraded in light of advances in technology.
- 3.2.38 In light of these opportunities, the Energy Statement and associated energy feasibility assessment should give consideration to the technical feasibility and viability of site wide approaches to energy provision. This should not just consider the energy generation

technologies that form part of these site wide approaches but also the infrastructure required to support such systems, such as heat networks and smart energy grids, and the phasing of infrastructure delivery. Where appropriate, provision should be included on relevant plans, such as phasing plans. Where heat networks are being considered, the guidance contained within paragraphs 3.2.28 to 3.2.32 of this SPD should be followed.

3.3 Water Efficiency

3.3.1 There is a finite supply of water in the Greater Cambridge area, and irrespective of climate change, action is required now to ensure the availability of water for future uses, including potable water supply and food production, without having a detrimental impact on the environment. Water supply in the area is managed by South Staffordshire Water (Cambridge Region). As part of their Water Resource Management Plans a potential deficit in water supplies post 2035 has been identified. While there remains some uncertainty around the full extent and impact of this deficit, there is likely to be less water available and therefore a greater need for demand management and water efficiency in the area. As a result, designing new developments for optimal sustainable water consumption will become even more important. The 2018 Cambridge and South Cambridgeshire Local Plans set out the following requirements for water efficiency in all new developments.

Water efficiency in residential development

LOCATION:	Cambridge and South Cambridgeshire
POLICY:	<ul style="list-style-type: none"> Cambridge Local Plan (2018) Policy 28: Carbon reduction, community energy networks, sustainable design and construction and water use South Cambridgeshire Local Plan (2018) Policy CC/4: Water efficiency
SCALE OF DEVELOPMENT:	All residential development
TYPE OF DEVELOPMENT:	Residential
SUBMISSION REQUIREMENTS:	Sustainability Statement to include water efficiency specifications
LINK TO THE SUSTAINABILITY CHECKLIST:	Wat.1 and Wat.3

Policy overview

3.3.2 Both the 2018 Cambridge and South Cambridgeshire Local Plans include a requirement for all new residential development to meet a minimum water efficiency standard of no more than 110 litres/person/day. This level is in line with the optional water efficiency requirement contained within Part G of Building Regulations, and has the support of South Staffordshire Water (Cambridge Region) and the Environment Agency. Given the level of water stress facing the area, the Councils will be supportive of schemes that seek to integrate site wide approaches to water reuse in order to deliver greater water efficiency as part of an integrated approach to water management. We would recommend early engagement with the areas water companies for any schemes looking to utilise such an approach.

Submission requirements

- 3.3.3 In order to demonstrate compliance with both the Cambridge and South Cambridgeshire policies, the submission of a **Sustainability Statement** is required. This should include a water efficiency specification for each dwelling type, based on the Water Efficiency Calculator Methodology or the Fittings Approach (replicated in Table 3.5 below) set out in Part G of the Building Regulations 2010 (2015 Edition with 2016 amendments) or successor documents.

Table 3.5: Extract of Table 2.2 Maximum fittings consumption optional level from Part G of the Building Regulations 2010 (2015 edition with 2016 amendments)

Water fitting	Maximum Consumption
WC	4/2.6 litres dual flush
Shower	8 l/min
Bath	170 litres
Basin taps	5 l/min
Sink taps	6 l/min
Dishwasher	1.25 l/place setting
Washing machine	8.17 l/kilogram

Water efficiency in non-residential developments - Cambridge

LOCATION:	Cambridge
POLICY:	Policy 28: Carbon reduction, community energy networks, sustainable design and construction and water use
SCALE OF DEVELOPMENT:	All non-residential development
TYPE OF DEVELOPMENT:	Non-residential development
SUBMISSION REQUIREMENTS:	BREEAM pre-assessment
LINK TO THE SUSTAINABILITY CHECKLIST:	Wat.2

Policy overview

- 3.3.4 The requirements for all new non-residential development in Cambridge are for full credits related to category Wat 01 of BREEAM to be achieved. This equates to a 55% improvement over baseline water consumption figures. In order to achieve this level of water efficiency, the use of water harvesting or recycling technologies will be required, alongside other water efficiency measures. Early consideration of the implications of this policy requirement is therefore required, and where possible consideration should be

given to the integration of water re-use as part of the drainage strategy for sites, in line with the requirements of policy 31 of the Cambridge Local Plan (2018) (see section 3.7).

Submission requirements

- 3.3.5 In order to demonstrate compliance with the policy, a **BREEAM pre-assessment**, carried out by an approved BREEAM assessor should be submitted as part of the planning application. This will need to demonstrate that maximum BREEAM credits for Wat 01 are being targeted, with compliance secured through the use of a planning condition. The assessment of the efficiency of the building's domestic water consuming components should be undertaken using the BREEAM Wat 01 calculator.

Further guidance

- 3.3.6 For further guidance on the BREEAM Assessment please see <https://www.breem.com/>

Water efficiency in non-residential development – South Cambridgeshire

LOCATION:	South Cambridgeshire
POLICY:	Policy CC/4: Water efficiency
SCALE OF DEVELOPMENT:	All scales of non-residential development
TYPE OF DEVELOPMENT:	Non-residential development
SUBMISSION REQUIREMENTS:	Sustainability Statement to include water efficiency specifications
LINK TO THE SUSTAINABILITY CHECKLIST:	Wat.2

Policy overview

- 3.3.7 Policy CC/4 of the South Cambridgeshire Local Plan (2018) requires all scales of non-residential development to achieve a minimum of 2 BREEAM credits for Wat 01. This equates to a 25% improvement over baseline building water consumption. This level of water efficiency can be relatively easily achieved using low flow toilets, taps and other fittings.

Submission requirements

- 3.3.8 In order to demonstrate compliance with the policy, a **Sustainability Statement** should be submitted as part of the planning application. This should include an assessment of the building's water efficiency performance using the BREEAM Wat 01 calculator, with implementation of the measures identified secured through the use of a planning condition.

Further guidance

- 3.3.9 For further guidance on the BREEAM Assessment please see <https://www.breem.com/>

3.4 Climate change adaptation

- 3.4.1 The global climate is changing, with greenhouse gas emissions from human activity the dominant cause. The global increase in temperature of 0.85°C since 1880 is mirrored in the UK climate, with higher average temperatures and some evidence of more extreme weather events.¹⁴
- 3.4.2 Climate change adaptation is a term that describes measures that can be put into place to help us adapt the changes in our climate that are now inevitable. These changes range from increased temperatures and drought conditions to extreme weather events such as intense periods of rainfall and subsequent flash flooding.
- 3.4.5 The NPPF is clear that planning has an important role to play in ensuring that new and existing communities are capable of adapting to our changing climate. It sets out that new development should be planned to avoid increased vulnerability to the range of impacts arising from climate change, taking account the long-term implications of issues such as flood risk, coastal change, water supply, biodiversity and landscapes and the risk of overheating from rising temperatures¹⁵. This section of the SPD provides further guidance on the range of measures that can be integrated into all scales of development in order to comply with policy requirements.

LOCATION:	Cambridge and South Cambridgeshire
POLICY:	<ul style="list-style-type: none">• Cambridge Local Plan (2018) Policy 28: Carbon reduction, community energy networks, sustainable design and construction and water use• South Cambridgeshire Local Plan (2018) Policy CC/1: Mitigation and Adaptation to Climate Change
RELATED POLICIES	Cambridge Local Plan (2018): <ul style="list-style-type: none">• Policy 31: Integrated water management and the water cycle• Policy 32: Flooding• Policy 59: Designing landscape and the public realm• Policy 71: Trees South Cambridgeshire Local Plan (2018): <ul style="list-style-type: none">• Policy CC/7: Water quality• Policy CC/8: Sustainable Drainage Systems• Policy CC/9: Managing Flood Risk• Policy HQ/1: Design Principles• Policy NH/7: Ancient Woodlands and Veteran Trees
SCALE OF DEVELOPMENT:	All development proposals
TYPE OF DEVELOPMENT:	Residential and Non-residential development

¹⁴ Committee on Climate Change (2016). UK Climate Change Risk Assessment 2017 Synthesis report: priorities for the next five years.

¹⁵ HM Government (2018). National Planning Policy Framework (paragraphs 149 and 150)

SUBMISSION REQUIREMENTS:	Sustainability Statement and Design and Access Statement and other documents as relevant to the proposal (e.g. Arboricultural Impact Assessments, Surface Water Drainage Strategy, Site Specific Flood Risk Assessments).
LINK TO THE SUSTAINABILITY CHECKLIST:	Ca.1, Ca.2, Ca.3, Ca.4, Ca.5, Ca.6, Ca.7

Policy overview

- 3.4.6 Both the 2018 Cambridge and South Cambridgeshire Local Plans require climate change adaptation to be embedded into development proposals. The key principle is to ensure that adaptability is designed into all new developments from the outset, so that residents and building occupiers do not have to rely on complex systems and technologies that are expensive to maintain. It is also important to look to measures beyond buildings themselves, seeking opportunities within the landscape setting of new developments for adaptation. This will often require a multidisciplinary approach to design in order to maximise benefits, recognising the role of all members of the design team in responding to climate change.
- 3.4.7 Adaptation measures can be implemented at a variety of scales, and consideration should be given to the following measures:
- Taking architectural approaches to design out issues such as overheating;
 - The role of green infrastructure;
 - Implementing resilient architecture and construction to minimise impacts;
 - The role of materials in minimising microclimatic effects;
 - The use of Sustainable Drainage Systems (SuDS) and flood resilient architecture (see section 3.7 and the [Cambridgeshire Flood and Water SPD](#)).

Submission requirements

- 3.4.8 Compliance with the policy requirements for both Cambridge and South Cambridgeshire should be demonstrated via the submission of a **Sustainability Statement** alongside other relevant documents, for example Drainage Strategies, Landscape Strategies and Tree Surveys and Arboricultural Impact Assessments. Where appropriate, adaptation measures should also be shown on relevant drawings, for example where external shading is proposed to help reduce the risk of overheating, this shading should be shown on elevations. Further guidance on possible adaptation strategies is provided below.
- 3.4.9 When considering adaptation measures it will be important to ensure that they are appropriate for the context in which the development sites and that they do not conflict with other strategies. For example, in areas of poor air quality or high external noise levels, careful consideration will need to be given to ventilation strategies to ensure that buildings do not overheat and that good levels of indoor air quality, noise and thermal comfort control are maintained. In such circumstances, the importance of designing out the risk of overheating, for example through the use of building overhangs or external shading becomes even more important.

Adaptation Strategies – Overheating

3.4.10 The UK’s Climate Change Risk Assessment and the evidence underpinning it identifies the risks to health, wellbeing and productivity from high temperatures as one of the six priority risk areas for action, as illustrated in figure 4 below. Overheating in the built environment is already an issue in relatively cool summers, with research indicating that 20% of homes in England already experience overheating. With temperatures set to rise as a result of our changing climate, this risk is likely to increase unless measures are put in place to mitigate the risk of overheating in buildings.

Figure 4: The Adaptation Sub-Committee’s assessment of the top six areas of inter-related climate change risks for the UK¹⁶.

<p>Flooding and coastal change risks to communities, businesses and infrastructure (Ch3, Ch4 Ch5, Ch6)</p>	<p>MORE ACTION NEEDED</p>
<p>Risks to health, wellbeing and productivity from high temperatures (Ch5, Ch6)</p>	
<p>Risk of shortages in the public water supply, and for agriculture, energy generation and industry (Ch3, Ch4, Ch5, Ch6)</p>	
<p>Risks to natural capital, including terrestrial, coastal, marine and freshwater ecosystems, soils and biodiversity (Ch3)</p>	
<p>Risks to domestic and international food production and trade (Ch3, Ch6, Ch7)</p>	
<p>New and emerging pests and diseases, and invasive non-native species, affecting people, plants and animals (Ch3, Ch5, Ch7)</p>	<p>RESEARCH PRIORITY</p>
<p>NOW -----> RISK MAGNITUDE -----> FUTURE LOW MEDIUM HIGH</p>	

3.4.11 Some properties are at a higher risk of overheating than others, for example:

- Flats with south and west facing facades due to excess solar gains;
- Flats on top floors due to heat gain through the walls and roof;
- Single aspect flats as there is no allowance for cross ventilation;
- Properties with district heating or other communal heating systems where excess internal gains arise from poorly placed or poorly insulated pipe work;
- Properties with restricted window openings due to noise and air quality issues.
- Buildings with heat recovery systems that are installed without a summer bypass mode leading to inadvertent excess internal heat gains in the summer and shoulder months.
- Buildings with poorly designed thermal mass coupled with insufficient secure ventilation provision to enable night purge to take place.

In these cases it is important that consideration is given to ways in which to mitigate the potential for overheating early in the design process.

3.4.12 A common approach to overheating in the past has been a reliance on air conditioning. However, this is energy intensive with high associated levels of carbon emissions. It also

¹⁶ Image replicated from Committee on Climate Change (2016). *UK Climate Change Risk Assessment 2017 Evidence Report: Synthesis Report*

places a cost burden on residents and building occupiers, not only in terms of energy bills but also the maintenance of such systems. It is therefore important that the design of all new buildings, and the redevelopment of existing buildings, responds to the issue of overheating by designing out risk as far as possible to reduce the cooling load of buildings. Consideration of overheating must be included in the **Sustainability Statement and Design and Access Statement**.

3.4.13 The Councils' preferred approach to overheating is that the design of developments should follow the cooling hierarchy, illustrated in figure 5 below, to ensure that energy use associated with cooling is minimised. The cooling hierarchy takes the following approach:

- **Passive Design:** Minimise internal heat generation through energy efficient design and reduction of the amount of heat entering the building in the summer and shoulder months through consideration of orientation, overhangs and shading, albedo, fenestration, insulation and green roofs. Where heat is to be managed within the building through exposed internal mass and high ceilings, provision must be made for secure night time ventilation to enable night purge to take place;
- **Passive/natural cooling:** use of outside air, where possible pre cooled by soft landscaping, a green roof or by passing it underground to ventilate and cool a building without the use of a powered system. This includes maximising cross ventilation, passive stack and wind-driven ventilation and enabling night purge ventilation. Single aspect dwellings should be avoided for all schemes as effective passive ventilation can be difficult or impossible to achieve. Windows and/or ventilation panels should be designed to allow effective and secure ventilation.
- **Mixed mode cooling:** with local mechanical ventilation/cooling provided where required to supplement the above measures using (in order of preference):
 - i) low energy mechanical cooling (e.g. fan powered ventilation with/without evaporative cooling or ground coupled cooling);
 - ii) air conditioning – not a preferred approach as these systems are energy intensive;
- **Full building mechanical ventilation/cooling system**, ensuring the lowest carbon/energy options and are only considered after all other elements of the hierarchy have been utilised.

Figure 5: The cooling hierarchy (adapted from Islington Borough Council (2012) Low Energy Cooling. Good Practice Guide 5)



3.4.14 We would recommend that thermal modelling be undertaken to understand the performance of a proposed new development, with buildings designed and built to meet CIBSE's latest overheating standards¹⁷. As part of this, consideration should also be given to future climate scenarios, for example using CIBSE future weather data. Where officers have concerns about the potential for overheating, a planning condition may be used to secure overheating analysis, for example for a sample of units on a site.

Further guidance

3.4.15 For further detailed guidance on overheating see:

- Good Homes Alliance (2019). Tool and guidance for identifying and mitigating early stage overheating risks in new homes. Available online at: <https://goodhomes.org.uk/overheating-in-new-homes>
- Islington Borough Council (2012) Low Energy Cooling. Good Practice Guide 5. Available online at: <https://www.islington.gov.uk/~media/sharepoint-lists/public-records/planningandbuildingcontrol/publicity/publicconsultation/20122013/20121220goodpracticeguide5lowenergycooling>
- CIBSE Guides (note there is a charge to access these documents for non-members):
 - See GVA/15 CIBSE Guide A: Environmental Design (2015). Available online at: <https://www.cibse.org/knowledge/knowledge-items/detail?id=a0q20000008179JAAS>
 - CIBSE TM52: The Limits of Thermal Comfort: Avoiding Overheating in European Buildings (2013). Available online at: <https://www.cibse.org/Knowledge/knowledge-items/detail?id=a0q2000000817f5AAC>
 - CIBSE TM59: Design Methodology for the Assessment of Overheating Risk in Homes (2017). Available online at: <https://www.cibse.org/knowledge/knowledge-items/detail?id=a0q0000000DVrTdQAL>

¹⁷ See GVA/15 CIBSE Guide A: Environmental Design (2015), CIBSE TM52: The Limits of Thermal Comfort: Avoiding Overheating in European Buildings (2013) and CIBSE TM59: Design Methodology for the Assessment of Overheating Risk in Homes (2017)

Adaptation Strategies – The role of green infrastructure

3.4.16 Green Infrastructure is our natural life-support system. It is the network of natural and manmade features such as open spaces, woodlands, hedgerows, landscapes, rights of way, waterways, historic parks and private gardens, which link and serves our communities and countryside. Within an urban context, it includes allotments, cemeteries, and features such as green and brown roofs as well as tree canopy cover. Green infrastructure provides a wide range of social, environmental and economic benefits, including:

- Improving people's mental and physical health;
- Reducing air pollution and improving water quality;
- Protecting against climate change, for example by reducing flood risk, dealing with storm water at source, storing water for times of drought, storing carbon, or preventing soil erosion;
- Providing jobs and contributing to economic competitiveness;
- Increasing biodiversity;
- Encouraging local food growing, healthy eating and healthy food environments;
- Encouraging active travel and safer roads; and
- Using limited land efficiently by providing multiple benefits simultaneously¹⁸.

3.4.17 From an adaptation perspective, green infrastructure has the potential to enhance the adaptive capacity of an area, for example through the integration of sustainable drainage features (blue infrastructure) and through enhancing urban cooling. Green spaces and water bodies help to lower air temperatures and are on average one degree cooler than the surrounding urban area¹⁹. Modelling carried out in Manchester as part of the SCORCHIO project predicted that increasing the area of green infrastructure in the city by 10% would reduce the maximum surface temperature by 2.2°C compared to no change in green space, with similar results found by modelling projects carried out in Birmingham (BUCCANEER project) and London (LUCID project). In a warming climate, finding ways of providing free cooling will become increasingly important, and all new developments, regardless of scale, can play a role in enhancing adaptive capacity through the provision of green and blue infrastructure.

Enhancing the tree canopy

3.4.18 Trees provide many benefits to the built environment: they sequester carbon, reduce noise, absorb particulate pollution, provide cooling and shade, and reduce surface water runoff. They are also an integral part of the creation of high quality, sustainable development. Trees have psychological benefits in reducing stress and providing spaces for relaxation and contact with nature. From a climate change adaptation perspective it is the role that trees play in shade and cooling through evapotranspiration that is of greatest interest.

¹⁸ P Massini and H Smith (December 2018). PERFECT Expert Paper 2. Planning for Green Infrastructure – the green space factor and learning from Europe. Published by the Town and Country Planning Association.

¹⁹ <https://www.mui.manchester.ac.uk/cure/research/projects/past-projects/scorchio/>

- 3.4.19 Both the 2018 Cambridge and South Cambridgeshire Local Plans include policies to encourage the planting of trees as part of new developments, as well as the retention of existing trees. Increasing tree canopy cover is a cost-effective and sustainable remedy to heat stress, storm water attenuation and air pollution that results in improvements to human well-being, as well as the role that trees play in delivering a wide range of other ecosystem services to the Greater Cambridge area as a whole.
- 3.4.20 Heat reduction, energy savings, surface water runoff, air quality, environmental justice, social well-being, or some combination of these and other factors will influence how many trees should be added, what kind of trees, and where to situate them. For example, to cut energy use for cooling a building, large trees must be placed close enough to shade the structure, particularly on the west side; to boost economic development, trees can be added to car parks, which invites more leisurely shopping; to capture surface water runoff, engineered tree pits may be most effective.
- 3.4.21 The quality of the trees to be retained and planted on site is an important consideration. Quality covers:
- Tree health – a healthy tree provides more benefits than a tree in poor condition;
 - Age and species diversity – provide long-term resilience;
 - Mature size - large trees bring more benefits than small trees;
 - Location – to avoid future conflicts;
 - Other factors – all intended to maximise the desired ecosystem services.
 - The use of native species of local provenance where possible in order to maximise benefits for biodiversity; and
 - Adopting appropriate biosecurity measures during development projects to reduce the risks associated with invasive non-native species.

Retention of existing trees – submission requirements

- 3.4.22 Planning policy seeks to ensure the retention of existing trees on development sites wherever suitable, unless there are demonstrable public benefits accruing from the proposal which clearly outweigh the current and future amenity value of the trees. When considered early on in the design of new development, significant removal of existing trees can be avoided. Developments should seek to:
- a. preserve, protect and enhance existing trees and hedges that have amenity value as perceived from the public realm;
 - b. provide appropriate replacement planting, where felling is proved necessary; and
 - c. provide sufficient space for trees and other vegetation to mature and give consideration to ongoing maintenance.
- 3.4.23 Where there are trees within an application site, or on land adjacent to it that could influence or be affected by the development, information will be required as to which trees are to be retained/lost, including whether any are ancient or veteran. A Tree Survey should be carried out before any layouts are developed, following the guidance contained within BS 5837: 2012 “Trees in relation to design, demolition and construction – Recommendations”. In accordance with the British Standard consideration should also be given to safeguarding space for replacement or new planting. The information from

this survey should be used to inform a viable and sustainable layout of the proposed development.

- 3.4.24 Once layouts are fixed, an **Arboricultural Impact Assessment** should be prepared identifying significant vegetation on and adjacent to the site, the quality and value of that vegetation, the effect that stages of the development could have on individuals, the significance of such impact in landscape terms and any appropriate methods to be adopted in order to mitigate any potentially negative impacts. Depending on the density and complexity of new development it may also be necessary to prepare and submit for approval a methodology for the protection of trees agreed to be retained. This would take the form of an **Arboricultural Method Statement**.

Tree planting in new developments – considerations

- 3.4.25 It is important to ensure that new development provides sufficient space to accommodate a level of replacement and new tree planting appropriate to the size of the development site and in accordance with the right tree right place principle. At its most basic, this means that appropriate space is made available for species that will contribute most to amenity and that the correct species of tree is chosen for the space made available, with consideration given to the final size of the tree at maturity.
- 3.4.26 When considering new planting, soil requirements should be assessed. There is a direct relationship between how well a tree can grow above ground and the health and resources of the root system below. Trees need soil in which to grow and that soil needs to provide for the tree for many years if it is to reach its potential. Too often trees are planted in a small pit which is surrounded by compacted inhospitable soil; as a result many trees barely grow in size, die early or break out of the available rooting volume. The volume and quality of soil, and the way it is provided will dictate the size to which a tree can grow and can reduce conflict between tree roots and adjacent light structures. It is often considered that a tree needs approximately 0.6m³ of soil for each 1m² of canopy projection.
- 3.4.27 The first step when planning to plant a tree is identifying the planting location. This will determine what attributes the selected tree must have and influences all subsequent decisions. This decision ultimately determines whether the tree will thrive and fulfil its true potential and provide all its possible benefits. Tree planting locations should always be one of the first and most important decisions when considering space allocation in the built environment.
- 3.4.28 The urban design of new developments has to take into account many competing constraints, it is imperative that Arboriculturists and Landscape Architects coordinate with Urban Designers from an early stage and throughout the design process to ensure the target can be met in an appropriate manner. Trees are important in streets, gardens, open spaces and other areas. To ensure that their benefits are maximised throughout a development, their distribution must be appropriately balanced, taking account of the effect they can offer in different locations.

Green/brown roofs

- 3.4.29 At an individual building scale, green infrastructure can take the form of features such as green/brown roofs. For new development in Cambridge, all flat roofs are required to be green or brown roofs in line with the requirements set out in policy 31 of the Cambridge Local Plan (2018). Policy CC/8 of the South Cambridgeshire Local Plan (2018) encourages the use of green roofs. A green roof is created when vegetation is established on a roof structure, and can be established at any scale. There are many types of green roof, but they can broadly be placed into two categories; intensive systems or extensive systems.
- 3.4.30 An intensive system includes those type of green roof that are used as recreational spaces. These roofs often include features similar to those found within traditional parks and gardens, such as shrubs, trees, paving, lawns, rooftop allotments and even water features.
- 3.4.31 Extensive green or biodiverse roofs are normally intended to be viewed from another location as visual or ecological features and may not be accessible. However access for maintenance should be incorporated with the introduction of walkways and suitable edge guards. Green roofs using hardy, drought tolerant species of plants such as sedums and wildflowers fall within this category. A brown or biodiverse roof is designed to create a habitat for a specific type of flora or fauna. This may be chosen to replicate or enhance the pre-development surroundings. For instance, particular plant species may be required to attract a specific type of bird, butterfly or insect. Biodiverse roofs in their most extreme scenario, are left without vegetation, with the growing medium selected to allow the indigenous plant species to colonise the area over time.
- 3.4.32 Green roofs offer multiple benefits including reducing storm water runoff and velocity and volumes, providing evaporative cooling and prolonging the life of the roof by preventing the deteriorating effects of UV. The additional insulation provided by green roofs can also help to reduce the internal cooling loads of buildings by up to 2°C. Contrary to popular belief, green roofs can also be combined with renewable energy systems such as solar panels. Solar panels work more efficiently at a set operating temperature. Once there is a deviation either above or below this level, electricity generation becomes less efficient. As a green roof is more able to maintain a more constant temperature around the panels than a traditional flat roof, their combined use can help to maximise the efficiency and power output of solar panels. Where solar panels are proposed, biosolar roofs should be incorporated under and in-between the panels. An array layout will be required incorporating a minimum of 0.75m between rows of panels for access and to ensure establishment of vegetation.
- 3.4.33 The maintenance and management of green roofs is also simple and limited. Maintenance is concentrated in the first 5 years of establishment, where bi-monthly checks for unwanted self-seeded species are necessary, with watering also required during establishment at prolonged times of drought. Thereafter, yearly checks are required for unwanted self-seeded species.

Further guidance – green infrastructure

3.4.34 For further guidance on Green Infrastructure, please see:

- Cambridgeshire Green Infrastructure Strategy (2011). Available online at: <https://www.cambridge.gov.uk/cambridgeshire-green-infrastructure-strategy>
- Planning for Green and Prosperous Places. TCPA (January 2018). Available online at: <https://www.tcpa.org.uk/Handlers/Download.ashx?IDMF=db632de1-38cc-468a-9401-0599b0bea52b>
- BS 5837:2012 “Trees in relation to design, demolition and construction – Recommendations”. In accordance with the British Standard consideration should also be given to safeguarding space for replacement or new planting.
- Benefits of Green Infrastructure - Report by Forest Research. Available online at: <https://knowledgebase.permaculture.org.uk/resources/books/benefits-green-infrastructure-report-forest-research>

3.4.35 When specifying green roofs, we would recommend that applicants follow the guidance contained within the Green Roof Organisation’s (GRO) Green Roof Code (2014) or successor document, available online at:

<https://livingroofs.org/wp-content/uploads/2016/03/grocode2014.pdf>

3.4.36 Further guidance is also available in the Greater London Authority (2008) Living roofs and walls technical report, available online at:

<https://www.london.gov.uk/sites/default/files/living-roofs.pdf>

Adaptation strategies – the role of materials

3.4.37 In addition to the role of green infrastructure in helping to cool our environment, there is also a role for the choice of materials in helping to reduce overheating. Roofs and pavements cover about 60 % of urban surfaces, and absorb more than 80 % of the sunlight that contacts them. This energy is converted to heat, which results in hotter, more polluted cities, and higher energy costs.²⁰ Consideration should be given to specifying new or replacement roofs and pavements with cool materials that are more reflective to help the built environment both mitigate and adapt to climate change.

3.4.38 The Global Cool Cities Alliance (GCCA)²¹ notes that cool materials are measured by how much light they reflect (solar reflectance) and how efficiently they radiate heat (thermal emittance). A cool roofing surface is both highly reflective and highly emissive to minimise the amount of light converted into heat and to maximise the amount of heat that is radiated away. Increasing the reflectance of our buildings and paved surfaces, whether through white surfaces or reflective coloured surfaces can reduce the temperature of the built environment. By way of example:

²⁰ Ibid., and US EPA (October 2008). Reducing urban heat islands: a compendium of strategies.

²¹ The Global Cool Cities Alliance (January 2012). A practical guide to cool roofs and cool pavements

- Most roofs are dark and reflect no more than 20% of incoming sunlight (i.e., these surfaces have a reflectance of 0.2 or less); while a new white roof reflects about 70 to 80% of sunlight (i.e., these surfaces have a reflectance of 0.7 to 0.8).
- New white roofs are typically 28 to 36 degrees Celsius cooler than dark roofs in afternoon sunshine while aged white roofs are typically 20 to 28 degrees Celsius cooler.²²

3.4.39 While the choice of material is influenced by a number of factors, applicants are recommended to give consideration to the role of cool materials alongside wider strategies such as green infrastructure, integration of sustainable drainage systems to help cool the built environment and enable new and existing communities to adapt to our changing climate.

Further guidance – cool materials

3.4.40 For further guidance on cool materials, see:

- Global Cool Cities Alliance (January 2012). A Practical Guide to Cool Roofs and Cool Pavements. Available online at: https://www.coolrooftoolkit.org/wp-content/pdfs/CoolRoofToolkit_Full.pdf

3.5 Biodiversity and Geodiversity

3.5.1 Biodiversity is an essential part of sustainable development and the conservation and enhancement of biodiversity should be considered as a key element of good design. Greater Cambridge is one of the fastest growing areas within England, with plans for significant additional development and major infrastructure to provide tens of thousands of new homes and significant new employment opportunities over the coming decades. It is important that, in planning for this growth, steps are taken to ensure the conservation and enhancement of the natural environment, which plays a pivotal role in our economy and well-being, providing wide-ranging benefits such as clean water and air, food, timber, carbon capture, flood protection and recreation.

3.5.2 National policy promotes the role of new development in the preservation, restoration and re-creation of priority habitats, ecological networks and the protection and recovery of priority species populations. All scales of development offer opportunities to enhance biodiversity, from simple solutions such as the integration of nest boxes through to the opportunities that larger scale developments offer for the integration of green infrastructure with biodiversity enhancement at its heart. Recent changes to national planning policy have placed increasing importance on the role of new development in securing net gains in biodiversity. More widely, government has included this within the 25 Year Environment Plan, with the Spring Statement announcing that the forthcoming Environment Bill will mandate the delivery of biodiversity net gain from new development. The Councils have signed up to the Natural Cambridgeshire Doubling Nature Vision, which seeks to double the area of rich wildlife habitats and natural green space across Cambridgeshire and Peterborough.

²² Comparing a dark roof with a solar reflectance of 0.2 with a new white roof with a solar reflectance of 0.8 and an aged white roof with a solar reflectance of 0.55.

LOCATION:	Cambridge and South Cambridgeshire
POLICY:	<ul style="list-style-type: none"> • Cambridge Local Plan (2018) Policy 69: Protection of sites of biodiversity and geodiversity importance • Cambridge Local Plan (2018) Policy 70: Protection of priority species and habitats • South Cambridgeshire Local Plan (2018) Policy NH/4: Biodiversity • South Cambridgeshire Local Plan (2018) Policy NH5: Sites of biodiversity or geological importance.
RELATED POLICIES	<p>Cambridge Local Plan (2018):</p> <ul style="list-style-type: none"> • Policy 7: The River Cam • Policy 8: Setting of the City • Section Three: City Centre, Areas of Major Change, Opportunity Areas and site specific proposals (various policies) • Policy 31: Integrated water management and the water cycle • Policy 52: Protecting garden land and the subdivision of existing dwelling plots • Policy 57: Designing new buildings • Policy 58: Altering and extending existing buildings • Policy 59: Designing landscape and the public realm • Policy 66: Paving over front gardens • Policy 71: Trees <p>South Cambridgeshire Local Plan (2018):</p> <ul style="list-style-type: none"> • Chapter 3: Strategic Sites (various policies) • Policy CC/7: Water Quality • Policy CC/8: Sustainable Drainage Systems • Policy HQ/1: Design Principles • Policy NH/3: Protecting Agricultural land • Policy NH/6: Green Infrastructure • Policy NH/7: Ancient Woodlands and Veteran Trees
SCALE OF DEVELOPMENT:	All development proposals should seek to conserve and enhance biodiversity and geodiversity. See further detail below for specific submission requirements.
TYPE OF DEVELOPMENT:	Residential and Non-residential development
SUBMISSION REQUIREMENTS:	Ecological Impact Assessment and Protected Species Scoping Survey. Note that these surveys will also need the outline the approach to securing biodiversity net gain.
LINK TO THE SUSTAINABILITY CHECKLIST:	Bio.1, Bio.2, Bio.3, Bio.4, Bio.5, Bio.6, Bio.7, Bio.8, Bio.9

Policy overview

- 3.5.3 Both the 2018 Cambridge and South Cambridgeshire Local Plans, alongside national planning policy in the NPPF, requires new development to protect and enhance biodiversity, giving consideration to the conservation status of species and habitats and recognising the role that a multifunctional approach to the design of developments has to play in helping to enhance biodiversity. The existing ecology of the site will need to be properly understood prior to submitting a planning application otherwise it is not possible to deliver effective species and habitat conservation.

Submission requirements

- 3.5.4 When undertaking development, the majority of sites, whether infill, greenfield or brownfield, will be considered as having potential to support biodiversity. For developments that will either directly or indirectly impact a designated site of biodiversity or geodiversity importance, or a protected species or a priority species or priority habitat, a **Ecological Impact Assessment** and **Protected Species Survey** will need to be submitted with the application. This includes refurbishment works which may impact species using the existing building such as bats and swifts. If the application involves any of the development proposals shown in table 3.6 (Column 1), a Protected Species Survey must be submitted with the application, while table 3.7 below lists the sites, habitats and features for which such a survey will be required.
- 3.5.5 Exceptions for when a Ecological Impact Assessment and Protected Species Surveys may not be required include:
- a. Following consultation by the applicant at the pre-application stage, the LPA has stated in writing that no Protected Species Surveys and Ecological Impact Assessments are required.
 - b. If it is clear that no Priority Species are present, despite the guidance in the above table indicating that they are likely, the applicant should provide evidence with the planning application to demonstrate that such species are absent (*e.g.* this might be in the form of a letter or brief report from a suitably qualified and experienced person, or a relevant local nature conservation organisation).
 - c. If it is clear that the development proposal will not affect any Priority Species present, then only limited information needs to be submitted. This information should, however, (i) demonstrate that there will be no significant effect on any Priority Species present and (ii) include a statement acknowledging that the applicant is aware that it is a criminal offence to disturb or harm protected species should they subsequently be found or disturbed.
 - d. *International and National Sites:* A survey and assessment will not be required where the applicant is able to provide copies of pre-application correspondence with Natural England, where the latter confirms in writing that they are satisfied that the proposed development will not affect any statutory sites designated for their national or international importance.
 - e. *Regional and Local Sites and Priority Habitats:* A survey and assessment will not be required where the applicant is able to provide copies of pre-application correspondence with the District Council's Ecology Officer, confirming that they are satisfied that the proposed development will not affect any regional or local sites

designated for their local nature conservation importance or any other Priority Habitats or listed features.

3.5.6 In some situations, it may be appropriate for an applicant to provide a Protected Species survey and report for only one or a few of the species shown in the table above e.g. those that are likely to be affected by a particular activity. Applicants should make clear which species are included in the report and which are not because exceptions apply.

3.5.7 All ecological surveys and assessments should be carried out:

- By suitably experienced, trained and qualified ecologists;
- At appropriate times of year, in suitable weather conditions – surveys conducted outside optimal times may be unreliable
- To published guidelines and methodologies from the Chartered Institute of Ecology and Environmental Management (CIEEM) with reference to Natural England's standing advice for protected species
- To an appropriate level of scope and detail

Appointing an ecologist to survey a site early in the design process will be important in order to avoid costly delays later. They will also be able to advise on enhancement options, working in collaboration with other disciplines including architects, landscape architects and drainage consultants.

3.5.8 Assessment should detail the possible impacts upon the application site's wildlife and how the applicant has taken account of such impacts. We would advocate the use of the ecological mitigation hierarchy, which is a tool that guides users towards limiting as far as possible the negative impacts on biodiversity from development projects. It is a sequential approach that emphasises best practice of **avoiding** and **minimising** any negative impacts, and then **restoring** sites no longer used by a project, before finally considering **offsetting** residual impacts. Where proposals are being made for mitigation and/or compensation measures, full details of how such measures will be effective need to be proved with the application.

3.5.9 Where appropriate, accompanying plans should indicate any significant wildlife habitats or features and the location of habitats or any species protected under the Wildlife and Countryside Act 1981 (as amended), the Conservation of Habitats and Species Regulations 2017, or The Protection of Badgers Act 1982.

3.5.10 Applications for development that affects areas designated for their biodiversity interest will require special consideration to ensure any impact is not considered significant or detrimental to the sites special interest. Development likely to affect a European site will need to be accompanied by sufficient information to enable the LPA, as Competent Authority under the provisions of the Conservation of Habitats and Species Regulations 2017 (as amended), to record its decision with regard to likely significant effect and to undertake Appropriate Assessment where necessary. Designated sites include:

- European designated sites - Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and Ramsar sites.

- Nationally designated sites - Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNR) and Marine Conservation Zone (MCZ).
- Locally designated sites - e.g. County Wildlife Sites (CWS).
- A Water Framework Directive (WFD) assessment may also be required for development projects that could impact on WFD waterbodies. A project should not lead to the deterioration in current waterbody status or prevent a waterbody from achieving the required status.

3.5.11 The Partnership for Biodiversity in Planning have developed guidance aimed at householders and small scale developers called the Wildlife Assessment Checklist. This free tool enables users to undertake a simple check at the pre-planning application stage to ascertain whether there are any protected and priority wildlife species and statutory designated sites that might be impacted by a development project. This helps to provide clarification for applicants as to whether a proposed site needs professional ecological advice and further assessment. While the tool does not replace the need to use a qualified professional ecologist, and it does not always pick up local designations and species data, it is a useful tool to ensure early consideration of ecology. The tool can be accessed via the following weblink:

<https://www.biodiversityinplanning.org/wildlife-assessment-check/>

Securing biodiversity net gain

3.5.12 National policy now requires a measurable net gain in biodiversity to be provided by development. Net gain is an approach to development that aims to leave the natural environment in a measurably better state than beforehand. Development that adopts a biodiversity net gain approach seeks to make its impact on the environment positive, delivering improvements through habitat creation or enhancement after avoiding or mitigating harm as far as possible.

3.5.13 Net gain can be secured at a variety of different scales, from householder applications right up to new settlements, albeit the scale of improvement will differ. At a householder scale options can include the integration of nest boxes for birds and bats, integration of sustainable drainage systems such as rain gardens and the use of green and biodiverse roofs (see paragraphs 3.4.29 – 3.4.33).

3.5.14 Major development offers greater opportunities for delivering biodiversity net gain with options ranging from building scale approaches (nest boxes, green and biodiverse roofs) through to the integration of opportunities for biodiversity into green and blue infrastructure and habitat creation, both on and offsite. The approach to securing net gain in biodiversity should be outlined using the DEFRA Biodiversity Offsetting metric.

3.5.15 In addition to the DEFRA Biodiversity Offsetting metric, the Natural Cambridgeshire Local Nature Partnership (LNP) has developed the Developing with Nature Toolkit. Launched in October 2018, the toolkit comprises a simple list of 10 Things to do for Nature, a scoring matrix, guidance notes and links to background information, including a summary map of Greater Cambridgeshire strategic GI and ecological network priorities, plus links to reference materials and publications. Primarily aimed at major developments requiring

an EIA, the toolkit is intended for use from the very outset of planning new developments, and ideally at the time of selecting sites to acquire for development. The toolkit, which the Councils' would encourage all promoters of major developments to use, is available online at:

<https://naturalcambridgeshire.org.uk/wp-content/uploads/2018/10/nc-developing-with-nature-toolkit.pdf>

Table 3.6: Local Requirement for Priority Species: criteria and indicative thresholds (trigger list) for when a Protected Species Survey (and Ecological Impact Assessment) is required

Column 1	Species likely to be affected and for which a survey will be required													
	Bats	Barn Owls	Breeding Birds	Gt. Crested Newts	Otters			Water Vole	Badger	Reptiles	Amphibians	Schedule 8 Plants & Fungi		Other BAP species
Proposals for development that will trigger a Protected Species survey														
Proposed development which includes the modification conversion, demolition or removal of buildings and structures (especially roof voids) involving the following: <ul style="list-style-type: none"> all agricultural buildings (e.g. farmhouses and barns) particularly of traditional brick or stone construction and/or with exposed wooden beams greater than 20cm thick; all buildings with weather boarding and/or hanging tiles that are within 200m of woodland and/or water; pre-1960 detached buildings and structures within 200m of woodland and/or water; pre-1914 buildings within 400m of woodland and/or water; pre-1914 buildings with gable ends or slate roofs, regardless of location; all tunnels, kilns, ice-houses, adits, military fortifications, air raid shelters, cellars and similar underground ducts and structures; all bridge structures (especially over water and wet ground). 	•	•	•											
Proposals involving lighting of churches and listed buildings or flood lighting of green space within 50m of woodland, water, field hedgerows or lines of trees with obvious connectivity to woodland or water.	•	•	•											
Proposals affecting woodland, or field hedgerows and/or lines of trees with obvious connectivity to woodland or water bodies.	•		•			•	•		•			•		

Proposed tree work (felling or lopping) and/or development affecting: <ul style="list-style-type: none"> old and veteran trees that are older than 100 years; trees with obvious holes, cracks or cavities, trees with a girth greater than 1m at chest height; 	• • •		• • •															• • •
Proposals affecting gravel pits or quarries and natural cliff faces, or caves.	•		•						•									•
Major proposals within 250m* of a pond or Minor proposals within 100m* of pond (Note: A major proposals is one that is more than 10 dwellings or more than 0.5 hectares or for non-residential development is more than 1000m ² floor area or more than 1 hectare)				•														•
Proposals affecting or within 25*m of rivers, streams, lakes, or other aquatic habitats such as reedbeds, or fen.	•		•	•	•			•			•		•					•
Proposals affecting 'derelict' land (brownfield sites), allotments and railway land.			•	•					•	•	•							•
Proposed development affecting any buildings, structures, feature or locations where <u>Priority Species are known to be present</u> **.	•	•	•	•	•	•	•	•	•	•	•	•	•					•
<p>* Distances may be amended to suit local circumstance on the advice of the local Natural England team and/or Local Biodiversity Partnership</p> <p>** Confirmed as present by either a data search (for instance via the Biological Records Centre or as notified to the developer by the local planning authority, and/or by Natural England, the Environment Agency or other nature conservation organisation.</p>	Bats	Barn Owls	Breeding Birds	Great Crested Newt	Otters			Water Vole	Badgers	Reptiles	Amphibians	Schedule 8 Plants & Fungi						Other BAP species

Table 3.7: Local Requirements for Designated Sites and Priority Habitats: criteria (trigger List) for when a Ecological Impact Assessment is required

1. DESIGNATED SITES (as shown on the Policies Map)	
Internationally designated sites	Special Protection Area (SPA) Special Area of Conservation (SAC) Ramsar Site
Nationally designated sites	Site of Special Scientific Interest (SSSI) National Nature Reserve (NNR)
Regionally and locally designated sites	County Wildlife Sites (CWS) Local Nature Reserve (LNR) City Wildlife Site (CiWS) Protected Roadside Verges (PRSV)
2. PRIORITY HABITATS (Habitats of Principal Importance for Biodiversity under S.41 of the NERC Act 2006)	
<ul style="list-style-type: none"> ▪ Ancient and/or species-rich hedgerows ▪ Floodplain grazing marsh ▪ Fen, marsh, swamp and reedbeds ▪ Purple moor grass and rush pastures ▪ Lowland beech and yew woodland ▪ Lowland calcareous grassland (e.g. species-rich chalk and limestone grasslands) ▪ Lowland heathland and/or dry acid grassland ▪ Lowland meadows (e.g. species-rich flower meadows) ▪ Lowland mixed deciduous woodland (ancient woodland) ▪ Lowland wood-pasture and parkland ▪ Rivers and streams (e.g. chalk streams) ▪ Standing open water and canals (e.g. lakes, reservoirs, ponds, aquifer fed fluctuating water bodies) ▪ Wet woodland 	
3. OTHER BIODIVERSITY FEATURES	
(as identified by the Cambridgeshire and Peterborough Biodiversity Partnership)	
<ul style="list-style-type: none"> ▪ Secondary woodland and mature/veteran trees ▪ Caves and disused tunnels (e.g. roosts for bats) ▪ Trees and scrub used for nesting by breeding birds ▪ Previously developed land with biodiversity interest (i.e. brownfield sites) ▪ Urban green space (e.g. parks, allotments, flower-rich road verges and railway embankments, mature gardens) 	

Further guidance

3.5.16 Further guidance on integrating biodiversity considerations into new developments is available as follows:

- Detailed Greater Cambridge specific guidance will be included in the forthcoming Greater Cambridge Biodiversity Supplementary Planning Document.
- CIRIA (2019). Biodiversity Net Gain – Principles and Guidance for UK construction and developments (RP1048). Available online at: https://www.ciria.org/Research/Projects_underway2/Biodiversity_Net_Gain.aspx
- Cambridgeshire and Peterborough Biodiversity Action Plan – priority species. Available online at: <http://www.cpbiodiversity.org.uk/biodiversity-action-plans/priority-species>
- The British Standards Institute Biodiversity – Code of practice for planning and development (BS42020:2013)
- Circular 06/05: Biodiversity and Geological Conservation - Statutory Obligations and Their Impact Within The Planning System. Available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7692/147570.pdf
- Cambridgeshire County Wildlife Site Register. For details of individual sites see Cambridgeshire and Peterborough Environmental Records Centre (CPERC), available online at: <http://www.cperc.org.uk/>
- Cambridgeshire Opportunity Mapping (currently in production should be available March 2019)
- CIEEM Guidelines for Ecological Impact Assessment (EcIA)(September 2018). Available online at: <https://cieem.net/resource/guidelines-for-ecological-impact-assessment-ecia/>
- Action for Swifts. Guidance for including bird boxes in residential developments. Available online at: <https://docs.google.com/document/d/1J9UBWBtdkV6C5EgyxAJIT-PFAia9g2mMiYHf9YKmbBc/edit>
- DEFRA (2012). Technical Paper: The metric for biodiversity offsetting pilot in England. Available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69531/pb13745-bio-technical-paper.pdf
- Natural Cambridgeshire (2019). Doubling Nature. A Vision for the Natural Future of Cambridgeshire and Peterborough in 2050. Available online at: <https://naturalcambridgeshire.org.uk/wp-content/uploads/2019/07/Doubling-Nature-LR.pdf>

3.6 Pollution

3.6.1 The planning system has an important role to play in ensuring that new and existing development does not contribute, or be put at risk from, unacceptable levels of pollution. Where possible, development should also help to improve local environmental conditions such as air quality and remediate and mitigate contaminated and unstable land. This section of the SPD provides further guidance in relation to policies on light pollution, contaminated land, noise pollution (including vibration), air quality and odour and other fugitive emissions. The sections below are technical in nature and detail the Councils preferred approach to assessment and requirements for mitigation, as appropriate. However, it is acknowledged that care should be taken to avoid various requirements being applied as absolute rigid standards or thresholds, as specific circumstances may justify some variation being allowed. Providing full justification is provided for any deviation from requirements detailed in the SPD, then the Councils will consider the particular circumstances of each case on its merits. However, ultimately unacceptable adverse impact on health and quality of life/ amenity should not arise.

Light Pollution

LOCATION:	Cambridge and South Cambridgeshire
POLICY:	<ul style="list-style-type: none">• Cambridge Local Plan (2018) Policy 34: Light Pollution Control• South Cambridgeshire Local Plan (2018) Policy SC/9: Lighting Proposals
SCALE OF DEVELOPMENT:	All development proposals including external lighting or changes to existing lighting
TYPE OF DEVELOPMENT:	Residential and Non-residential development
SUBMISSION REQUIREMENTS:	An Assessment of the Need for Lighting Lighting Impact Assessment
LINK TO THE SUSTAINABILITY CHECKLIST:	Pol.1, Pol.2, Pol.3, Pol.4, Pol.5 and Pol.6

Policy overview

3.6.2 The purpose of the Councils' light pollution policies is to ensure that all external lighting schemes are well designed, reducing the incident of light pollution in both rural and urban areas, maximising energy efficiency and ensuring public safety and perception of public safety.

3.6.3 Light pollution is the term used to describe any adverse effect of artificial lighting and includes and can occur as:

- **Sky Glow** - upward light, the orange glow visible around urban areas resulting from the scattering of artificial light by dust particles and water droplets in the sky. Effects can

be seen many miles from the polluting lights. Streetlights are the main cause of sky glow.

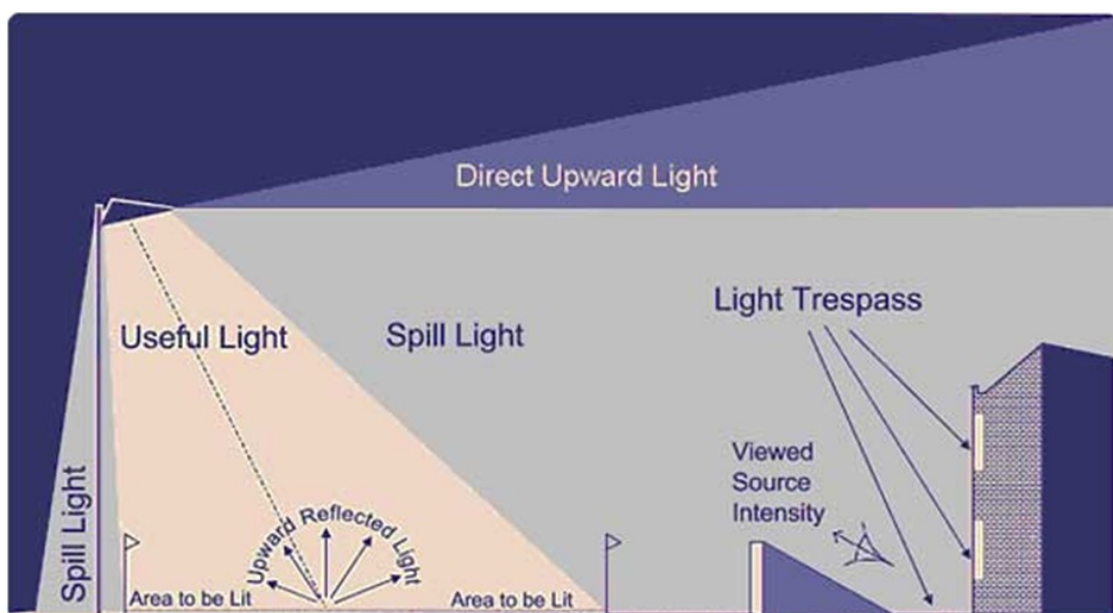
- **Glare** - visual source intensity, the uncomfortable brightness of a light source when viewed against a dark sky. It is light shining into the eye preventing a person from seeing the illuminated area properly. For example, an over-powerful 'security' floodlight at the wrong angle.
- **Light Trespass or Light Nuisance** - light spillage beyond the boundary of the property on which a light is located. Light is not only illuminating its target area, but also lighting another area where it is not wanted. This is most commonly found with security floodlights shining over a wide area.

3.6.4 Figure 6 below shows a number of examples of light pollution, from upward light, which produces a sky glow effect and obstructs the observation of the night sky, to light trespass into windows that is obtrusive and causes a nuisance. Under the Environmental Protection Act 1990 artificial lighting can be classified as causing a statutory nuisance in certain circumstances when 'artificial light emitted from premises so as to be prejudicial to health or a nuisance'. The cumulative effect of light pollution from a number of sources is known as 'sky glow'. The NPPF paragraph 180 c) states that planning decisions should 'limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.'

3.6.5 Impacts from light pollution, that good lighting design seeks to avoid, include:

- Disruption of natural habitats of a wide range of wildlife, impacting on feeding, breeding and migration patterns;
- Unacceptable impact to local residential amenity;
- Wastage of energy leading to an increase in energy consumption and associated carbon emissions;
- Reduction in the visibility of the night sky.

Figure 6: Light Pollution Pattern and Effects (c) Institute of Lighting Engineers



- 3.6.6 Therefore it is necessary to try to find a balance between the need for lighting and the negative implications associated with it. Lighting in itself may not need planning permission but the Councils will use planning powers where appropriate to manage the effects of lighting to achieve the objective of this part of the SPD which is to reduce excessive, intrusive and unnecessary lighting in both rural and urban areas.
- 3.6.7 The local planning authority (LPA) will therefore expect that the design and layout of artificial light be considered ideally at the design stage of a scheme to prevent potential harmful effects of the development on occupiers and neighbours in terms of visual privacy, outlook and disturbance. Artificial lighting should only illuminate the intended area and not affect or affect the amenity of neighbours. By establishing the objectives of any lighting scheme and agreeing requirements and guidelines a compromise can be met to reduce the impact of any scheme and potentially save energy and expense to the Applicant/Developer.
- 3.6.8 In order to avoid adverse effects on existing businesses with levels of artificial light related to their operation, the Council will apply the 'agent of change principle' where light sensitive uses are proposed in close proximity to them. The agent of change principle identifies that the party responsible for a change should also be responsible for managing the impact of that change.
- 3.6.9 This is particularly relevant in cases where residential development is proposed near to an established sports, leisure, transport / warehouse or entertainment use. New residents moving into the new residential development, for example, have the potential to make complaints with regards to glare or light trespass which could have an impact on the future operation of the existing uses / premises.
- 3.6.10 Development sensitive to high levels of artificial light proposed near to an existing use which generate artificial light that could lead to unacceptable glare or light trespass be accompanied by a lighting impact assessment and shall include necessary measures at the design stage to mitigate the anticipated lighting effects of the existing lighting. The Council may seek to secure mitigation measures through the use of design / layout and or planning conditions if necessary. In some case mitigation may only be practicable or achievable of site at source off-site and in these circumstance S106 obligations may be required.

Will a Lighting Scheme Require Planning Permission?

- 3.6.11 Planning permission is usually required for lighting structures and equipment that is likely to substantially affect the external appearance of a building. Planning permission is not required for carrying out maintenance that affects only the interior of a building or does not materially affect its external appearance. Temporary lighting schemes also generally do not require planning permission.
- 3.6.12 Large-scale lighting installations such as the floodlighting of external recreational and sporting facilities/pitches are clearly a form of development, which comes within this

statutory definition and would require planning permission. Listed building consent is required for lighting schemes if it is deemed that the character of the building would be materially affected by the lighting. Advice should be sought from the LPA prior to installation.

3.6.13 Examples of where planning permission is usually required include:

- illuminated advertisements, although there are some exceptions, such as those indicating medical services and some commercial advertisements on the front of business premises;
- the erection of columns to support lighting or other similar structures;
- floodlighting of external recreational and sporting facilities / pitches; and
- external lighting as part of domestic, industrial or commercial scheme.

3.6.14 Some proposals for new development, but not all, may have implications for light pollution. The Councils would advise prospective applicants to check with the planning department before installing any lighting scheme. Applicants are encouraged to submit details of lighting schemes (nature and extent), including light distribution/photometry polar and horizontal/vertical isolux drawings, as part of the planning application in order to demonstrate that the proposed scheme is appropriate in terms of its purpose and setting. In so doing, the LPA aims to minimise potential pollution from glare and spillage to neighbouring properties, roads and rural areas.

3.6.15 For further information on land uses/developments with general lighting advice and requirements please see Appendix 6.

Submission requirements

3.6.16 A number of factors will be taken into consideration when determining of planning applications for proposals that include lighting. These are:

1. An assessment of the need for lighting;
2. The location of the proposal in relation to neighbouring uses

3.6.17 For all lighting proposals, the applicant should identify the purpose and use of the lights, the potential users of the lighting scheme (e.g. for recreation facilities) and the hours the lights will be in operation (summer-time and winter-time). The hours of operation will be expected to be kept to a working minimum and applicants should demonstrate this in their application. Keeping the use of the lighting to a minimum will reduce the impact the lighting may have on the environment.

The Design of the Lighting Proposed (General lighting requirements)

3.6.18 To achieve the necessary minimisation of obtrusive light the applicant should adhere to the following general principles taken from the Institute of Lighting Professionals, Guidance Notes for the Reduction of Obtrusive Light, GN01: 2011.

- i. Lighting is to be directed downwards wherever possible to illuminate its target. If there is no alternative to up lighting, then the use of shields and baffles will help reduce spill light to a minimum. Up lighting is a particularly bad form of obtrusive light and contributes to sky glow;

- ii. Lighting is to be designed so as to minimise the spread of light near to, or above the horizontal. Again any light that shines above the horizontal line of the light adds to the sky glow effect;
- iii. Lighting should be designed to the correct standard for the task and should not over light. 'Over' lighting is a cause of obtrusive light and also represents a waste of money and energy;
- iv. The main beam angle of all lights proposed directed towards any potential observer is kept below 70 degrees. It should be noted that the higher the mounting height, the lower the main beam angle could be. This will help reduce the effect of glare and light spill on neighbouring dwellings, passing motorists, pedestrians, etc.;
- v. Lighting should be directed to minimise and preferably avoid light spillage onto neighbouring properties;
- vi. Wherever possible use floodlights with asymmetric beams that permit the front glazing to be kept at or near parallel to the surface being lit;
- vii. The lights used should be the most efficient taking into account cost, energy use, colour rendering and the purpose of the lighting scheme required. All lighting schemes should meet British Standards.
- viii. Good design, correct installation and ongoing maintenance are essential to the effectiveness of lighting schemes.

3.6.19 Artificial lighting should be sited in the most appropriate locations to cause minimal disturbance to occupiers and wildlife, while still illuminating the intended area. This includes considering any occupiers located above the lighting source.

3.6.20 Consideration should be given to lighting associated with buildings of special historic and architectural interest in order to avoid harm to the significance of the heritage asset and that of the wider area, including conservation areas. This applies both to the lighting of such buildings and the impact of the lighting installation when seen by day.

3.6.21 Artificial lighting on and off site shall meet the Obtrusive Light Limitations for Exterior Lighting Installations for an appropriate Environmental Zone as set out in table 3.8 below. Any mitigation measures to reduce and contain potential artificial light spill (light intrusion into windows) and glare (luminaire intensity – viewed source intensity) as appropriate shall be detailed.

Table 3.8: Obtrusive light limitations for exterior lighting installations (taken from the Institute of Lighting Professionals - Guidance Notes for the Reduction of Obtrusive Light - GN01:2011)

Obtrusive Light Limitations for Exterior Lighting Installations – General Observers						
Environmental Zone	Sky Glow ULR [Max %](1)	Light Intrusion (into Windows) Ev [lux]		Luminaire Intensity I [candelas] (3)		Building Luminance Pre-curfew
		Pre- curfew	Post- curfew	Pre- curfew	Post- curfew	Average, L [cd/m2]
E1: Natural - Intrinsically dark	0	2	0 (1*)	2,500	0	0
National Parks, Areas of Outstanding Natural Beauty etc.						
E2: Rural - Low district brightness	2.5	5	1	7,500	500	5
Village or relatively dark outer suburban locations						
E3: Suburban - Medium district brightness	5.0	10	2	10,000	1,000	10
Small town centres or suburban locations						
E4: Urban- High district brightness	15	25	5	25,000	2,500	25
Town/city centres with high levels of night-time activity						

ULR = Upward Light Ratio of the Installation - is the maximum permitted percentage of luminaire flux that goes directly into the sky.

Ev = Vertical Illuminance in Lux - measured flat on the glazing at the centre of the window.

I = Light Intensity in Candelas (cd)

L = Luminance in Candelas per Square Metre (cd/m²)

Curfew = the time after which stricter requirements (for the control of obtrusive light) will apply 10pm to 7am

* = **Permitted only from** Public road lighting installations

- 3.6.22 Applicants are encouraged to submitted full lighting design details at the application stage if possible. The level of information should be proportionate to the degree of lighting proposed. However, it is acknowledged that lighting is often a detailed design matter and in many circumstances may not have been finalised for all applications at the submission stage.
- 3.6.23 As lighting design and levels is a relatively precise engineering discipline, when lighting is low to medium level and there is confidence that acceptable lighting levels can be secured a condition will be imposed requiring that prior to the installation of any lighting an artificial lighting scheme or details will be submitted in writing for approval by the LPA.
- 3.6.24 For specific lighting schemes or with large-scale substantial artificial lighting installations such as the floodlighting of external recreational and sporting facilities/pitches or transport interchanges, the application should be accompanied by that information normally required for any other planning proposal and additionally the information set out below:
- A statement setting out why a lighting scheme is required, the proposed users, and the frequency and length of use in terms of hours of illumination;
 - A site survey showing the area to be lit relative to the surrounding area, the existing landscape features together with proposed landscaping features to mitigate the impacts of the proposed lighting;
 - The design details of lights and associated infrastructure, including:
 - the number of lights;
 - details of the make and catalogue number of any luminaires/floodlights - lighting levels, lux and lumen details, lamp types, wattage;
 - plans showing the area to be lit and the layout of lights, including orientation of beams of light;
 - the height of lighting columns;
 - the mounting location, height and orientation of the luminaires/floodlights specified;
 - control systems including types and location of sensors, times lighting will be on; and
 - the need for the lighting, that is, an explanation of what activity the lighting is supporting.
 - A technical report prepared by a qualified Lighting Engineer or lighting company setting out the type of lights, performance, height and spacing of lighting columns. Modelled light levels (vertical and horizontal isolux contours) to be achieved over the intended area, at the site boundaries and, for large schemes, 50m outside of the boundary of the site should be superimposed on a plan / map of the site and its surrounding area.

Glare luminaire intensity (viewed source intensity at the direction of receptor) calculations should also be included.

- 3.6.25 For further technical advice regarding sports floodlighting, guidance can be obtained from Sport England's 'Design Guidance Note Artificial Sports Lighting - Updated guidance for 2012' and also the Chartered Institute of Building Services Engineers (CIBSE) 'Lighting Guide 04: Sports Lighting - LG4'. In coming to a decision on the merits of a particular proposal, the Council will take into account the use of the facility and the likely benefits to the general public. Consideration will be given to the relationship between the use of the facility and the interests of conservation, amenity and safety. Where the impact of a proposal is considered to be unacceptable or cannot be mitigated through ameliorative measures, the protection of those recognised interests will prevail.
- 3.6.26 Any proposal for the display of illuminated advertisements should be accompanied by that information normally required for any other planning proposal and additionally the information set out below:
- Details of the proposed location, positioning and dimensions of the sign face;
 - The sign face maximum luminance in candelas per square metres;
 - The number, size and type of light sources and details of the sign face materials;
 - The type of illumination – internal or external; static or intermittent;
- 3.6.27 For certain major and Environmental Impact Assessment (EIA) development outline or full planning applications and in particular where lighting has the potential to have a significant adverse impact, a more detailed **lighting impact assessment** or strategy may be required at the determination stage. If this is the case the lighting impact assessment or strategy should be undertaken having regard to and in accordance with the Institute of Lighting Professionals 'PLG04 - Guidance on Undertaking Environmental Lighting Impact Assessments'.
- 3.6.28 Such applications can be provided with different levels of design detail. Typically there are three stages:
1. Preliminary investigation: without specific lighting design or levels
 2. Provisional design: indicative design meeting task lighting requirements and standards
 3. Final design: with full details and calculation data – isolux contours
- 3.6.29 The preliminary investigation will typically link into an outline planning application, having only general proposals for potential layouts of roads and buildings and so on. It is not possible, therefore, to undertake any actual lighting design, nor assess this fully. The preliminary and final site designs will require the appropriate lighting components to be developed and evaluated.
- 3.6.30 For each of the three planning stages listed in paragraph 3.6.28, the lighting assessment should generally follow the sequence set out below, which in turn follows the structure set out for the overall EIA:
- Background - Site description, in short form
 - Method of assessment, site visit and evaluation procedures

- Consideration of national and local planning policy, legislation and industry standards /best practice technical guidance
- Baseline assessment- what exists prior to any development and its visual impact
 - Environmental zone appropriate for the area, viewpoints
- Proposed development – nature of the associated lighting proposals and designs
- Residual effects – what changes in the lit scene are expected (good and bad) and significance of effects. They will include such elements as:
 - Illumination of roads and accesses, parking areas, buildings and so on
 - Spill light
 - Source intensity
 - Light presence
 - Effects on wildlife and so on
- Potential mitigation – what is proposed to eliminate or limit lighting problems
 - Mitigation strategies should be an inherent part of a professional lighting design. The formulation of a design approach for the development should therefore naturally involve both achieving the target lighting values and limiting spill light, in addition to minimising glare and light presence.
- Conclusions – including identification of any aspects / areas where there is a lack of information at the time of the report
- Appendices

3.6.31 PLG04 focuses on the lighting assessment aspects of such development applications in a holistic way. While most of the impacts are effects on people and their perception of the surroundings, assessments must also include impact on wildlife. This may involve consultation with specialists producing the ecological sections of the EIA and with the Council's Ecologists.

The role of planning conditions

3.6.32 Where planning conditions are used to secure the submission of a detailed lighting scheme and control lighting levels, these conditions may require:

- Compliance with an acceptable artificial lighting scheme design that has been submitted;
- Approval of a detailed lighting scheme, requiring light levels to be in accordance with obtrusive light limitations for exterior lighting installations;
- Limiting the time of use of the lighting: Lighting schemes could be turned off when not needed ('part-night lighting') to reduce any potential adverse effects e.g. when a business is closed or, in outdoor areas, switching-off at more sensitive night times between 10 or 11pm and 7am or 8am;
- Limiting the light levels to a designed uniformity;
- Limiting the use of lighting schemes to identified uses or users;
- Specifying lamps, luminaires and columns;
- Specifying the need for full horizontal cut-off;
- The design, height and position/angle of the lighting;
- The retention of screening vegetation;
- The use of planting and bunding to contain lighting effects;

- The future maintenance of the lighting schemes and post-installation compliance checks in accordance with the original design and planning approval;
- In exceptional circumstances, the granting of temporary planning permission to enable a review of lighting impacts after installation.
- It may be necessary to condition a planning approval to allow the LPA to monitor the development and enforce the condition if necessary.

3.6.33 For single householder and other minor applications with relatively low level lighting conditions may simply require approval of the location, height and position/angle of the lighting luminaire model / type to be installed.

3.6.34 For applications with a higher degree of lighting it is likely that a condition will be imposed to require that prior to the installation of any artificial lighting an external and internal artificial lighting scheme with detailed impact assessment shall be submitted to and approved in writing by the local planning authority. The scheme shall include details of any artificial lighting of the site (external and internal building lighting) and an artificial lighting impact assessment with predicted lighting levels at proposed and existing residential properties shall be undertaken (including horizontal / vertical isolux contour light levels and calculated glare levels).

3.6.35 Modelling software can be used for the planning, calculation, modelling and visualisation of outdoor lighting based on the project's architectural drawings. A common software assessment technique that the Council would recommend the use of is the "outdoor site lighting performance (OSP) method" which is a comprehensive method for predicting and measuring three different aspects of light pollution: glow, trespass and glare.

Further guidance

3.6.36 For further guidance on designing lighting proposals please see:

- Institute of Lighting Professionals, Guidance Notes for the Reduction of Obtrusive Light, GN01: 2011. Available online at: <https://www.theilp.org.uk/documents/obtrusive-light/>
- Professional Lighting Guide - PLG04: Guidance on Undertaking Environmental Lighting Impact Assessments. For further information please see: <https://www.theilp.org.uk/resources/ilp-general-reports/plg04/>
- BRE Digest 529 - Obtrusive light from proposed developments, BRE 2013. For further information please see: <https://www.brebookshop.com/details.jsp?id=327145>
- BS EN 12464-2:2014- Light and lighting. Lighting of work places. Outdoor work places. Available from BSI: <https://shop.bsigroup.com/>
- Guide on the limitation of the effects of obtrusive light from outdoor lighting installations. Vienna, Commission Internationale de l'Eclairage (CIE 150 -2003, International Commission on Illumination).
- PLG 05: Brightness of Illuminated advertisements. For further information please see: <https://www.theilp.org.uk/resources/ilp-general-reports/plg05-the-brightness-of-illuminated-advertisements/>
- Guidance Note 8/18 Bats and artificial lighting (ILP, 12 September 2018). Available online at:

- <https://www.theilp.org.uk/documents/guidance-note-8-bats-and-artificial-lighting/>
- Sport England’s Design Guidance Note Artificial Sports Lighting - Updated guidance for 2012. Available online at: <https://www.sportengland.org/facilities-planning/design-and-cost-guidance/artificial-sports-facilities/>
- CIBSE - Lighting Guide 04: Sports Lighting - LG4 and other guides and publications. For further information please see: <https://www.cibse.org/Society-of-Light-and-Lighting-SLL/Lighting-Publications>

Contaminated Land

LOCATION:	Cambridge and South Cambridgeshire
POLICY:	<ul style="list-style-type: none"> • Cambridge Local Plan (2018) Policy 33: Contaminated Land • South Cambridgeshire Local Plan (2018) Policy SC/11: Contaminated Land
SCALE OF DEVELOPMENT:	All major development and any development proposals on land subject to contamination or land that is suspected to be contaminated
TYPE OF DEVELOPMENT:	Residential and Non-residential development
SUBMISSION REQUIREMENTS:	Contaminated Land Assessment
LINK TO THE SUSTAINABILITY CHECKLIST:	Pol.7

Policy overview

- 3.6.37 Land contamination is a material consideration for the purposes of planning. Developers are responsible for ensuring that a proposed development will be safe and ‘suitable for use’ for the purposes for which it is intended. A **Contaminated Land Assessment** is required for all major developments as well as any development where there has been a previous potentially contaminative use.
- 3.6.38 The contaminated land regime in Part IIA of the Environmental Protection Act 1990 was introduced specifically to address the historical legacy of land contamination. It focuses on the identification and remediation of land which is in such a condition by reason of contamination that it gives rise to significant harm or the significant possibility of significant harm to certain named receptors, or gives rise to pollution of controlled waters or the likelihood of such pollution. It applies where there is unacceptable risk, assessed on the basis of the current use (including any use that already has the benefit of planning permission but might not yet be implemented, including development permitted under the General Permitted Development Order) and the relevant circumstances of the land.
- 3.6.39 The Part IIA regime extends to natural contamination, that is, naturally occurring substances in the ground that might pose a risk to the receptor. In the context of Cambridge and South Cambridgeshire this is usually limited to carbon dioxide, which is frequently found above the chalk.

Submission requirements

- 3.6.40 A phased approach to site investigation and risk assessment is required to ensure that resources are targeted to the areas most likely to be contaminated. Not all sites will require all of these phases to be carried out. A general overview of submission requirements is presented below, with further and more detailed guidance provided in Appendix 7, which incorporates the Joint Cambridge City Council and South Cambridgeshire District Council Developers Guide to Contaminated Land. Early consultation with the LPA is recommended to ensure that site investigation strategies and remediation proposals are acceptable.
- 3.6.41 To summarise, the submission requirements related to contaminated land are as follows:
- The contaminated land assessment must include a desk study and must be submitted to the LPA for approval. The desk study must detail the history of the site's past land use and must propose a site investigation strategy based on the information presented by the desk study. This strategy must be approved by the LPA prior to investigations commencing on-site.
 - The site investigation, including all of the relevant and necessary soil, gas, and water (surface and groundwater) sampling, must be carried out by a competent person with the relevant qualifications, accreditation, and experience in accordance with a quality assured sampling and analysis methodology.
 - A site investigation report detailing all of the investigative works and sampling, together with the results of all analyses, risk assessment to relevant receptors, and a proposed remediation strategy must be submitted to the LPA. The LPA will approve the remediation works as required prior to any remedial work commencing on-site. The works must be of such a nature as to render harmless the identified contamination with respect to the proposed end use and the surrounding environment (including controlled waters).
 - The approved remediation works must be carried out in full under a quality assurance scheme in order to demonstrate compliance with the approved methodology and current best practice.
 - If during the works contamination is encountered which has not previously been identified then all site works must cease immediately and the LPA notified as soon as possible. The newly discovered contamination must be fully assessed and a remediation scheme agreed with the LPA. Site work can only restart with the consent of the LPA.
 - Upon completion of the works a closure report must be submitted to the LPA for approval. The closure report must include full details of the remediation works undertaken and must include all relevant quality assurance certificates to show that the works have been carried out as agreed with the LPA. Details of any post-remediation sampling and analysis must be included in the closure report together with the necessary documentation detailing what waste materials have been removed off-site.

Further guidance

3.6.42 Please note that this list is a summary list only of the key guidance documents that are available.

- British Standards Institution (2011) Investigation of Potentially Contaminated Sites, Code of Practice, BS: 10175:2011
- British Standards Institution (2010) Amendment 2: Code of Practice for Site Investigation, BS5930:1999+
- British Standards Institution (2007) Specification for Topsoil and Requirements for Use, Code of Practice, BS: 3882:2007
- British Standards Institution (2002) Soil quality. Sampling. Guidance on sampling techniques, Code of Practice, BS: 10381:2002
- Chartered Institute for Environmental Health (2008), The Local Authority Guide to Ground Gas
- CIRIA Report C665 (2007) Assessing Risks Posed by Hazardous Ground Gases to Buildings
- CIRIA Report C685 (2009) The VOCs Handbook
- CL:AIRE and Chartered Institute for Environmental Health (2008) Guidance on Comparing Soil Contamination Data with a Critical Concentration
- CL:AIRE (2011) Definition of Waste: Development Industry Code of Practice
- Department of the Environment (1989) Waste Management Paper No 27, Landfill Gas
- Department of the Environment (1995) Industry Profiles
- Environment Agency (2010) Guiding Principles for Land Contamination
- Environment Agency (2004) Model Procedures for the Management of Land Contamination (CLR 11)
- Environment Agency (2006) Remedial Targets Methodology, Hydrogeological Risk Assessment for Land Contamination
- Environment Agency (2010) Petroleum Hydrocarbons in Groundwater: Supplementary Guidance for Hydrogeological Risk Assessment
- Environment Agency (2002) Technical Advice to Third Parties on Pollution of Controlled Waters for Part IIA EPA 1990
- Environment Agency (2005) Science Report P5-080/TR3, The UK Approach for Evaluating Human Health Risks from Petroleum Hydrocarbons for Soil
- Environment Agency (2003) MCERTS Performance Standard for Laboratories Undertaking Chemical Testing of Soil
- Environment Agency (2009) Science Report SC050021/SR2, Human Health Toxicological Assessment of Contaminants in Soil, Background to the CLEA Model
- Environment Agency (2009) Science Report SC050021/SR3, Updated
- Environment Agency (2009) CLEA Software Handbook version 1.04
- Environment Agency, National House Building Council and Chartered Institute for Environmental Health (2008) Guidance for the Safe Development of Housing on Land Affected by Contamination, R&D Publication 66:2008
- Health and Safety Executive (1991) Protection of Workers and the General Public during the Development of Contaminated Land
- Raybould JG, Rowan DL and Barry DL, 1995, CIRIA Report C150, Methane Investigation Strategies
- Welsh Assembly Government (2006) Statutory Guidance on Contaminated Land

- Welsh Local Government Association (2012) Requirements for Chemical Testing of Imported Materials for Various End Uses
- Wilson S, Oliver S, Mallett H, Hutchings H and Card G, 2007, CIRIA Report C665, Assessing Risks Posed by Hazardous Ground Gases to Buildings

Noise Pollution (including vibration)

LOCATION:	Cambridge and South Cambridgeshire
POLICY:	<ul style="list-style-type: none"> • Cambridge Local Plan (2018) Policy 35: Protection of human health and quality of life from noise and vibration • South Cambridgeshire Local Plan (2018) Policy SC/10: Noise Pollution
SCALE OF DEVELOPMENT:	All noise sensitive and noise generating developments
TYPE OF DEVELOPMENT:	Residential and Non-residential development
SUBMISSION REQUIREMENTS:	Noise Impact Assessment or Acoustic Assessment/Report with an Acoustic Design Statement where required
LINK TO THE SUSTAINABILITY CHECKLIST:	Pol.8, Pol.9, Pol.10, Pol.11, Pol.12, Pol.13 and Pol.14

Policy overview

- 3.6.43 Noise in society is defined as unwanted sound, which is unpleasant and causes disturbance/annoyance. It is an unavoidable part of everyday life and is commonly caused by environmental noise originating from various sources including transportation (road traffic, railway and aircraft), leisure/recreational and industrial, trade/commercial and business premises.
- 3.6.44 Noise can have a significant effect on the environment, including sensitive ecological receptors, human health and wellbeing including sleep disturbance, the amenity/quality of life experienced and enjoyed by individuals and communities and the utility of noise sensitive land uses. Consequently, noise can be a material planning consideration when new developments have the potential to create noise and when new developments would be sensitive to the existing noise conditions. Noise within the living and working environment is a key aspect of sustainable development.
- 3.6.45 The planning process is the primary mechanism for local authorities to prevent serious conflicts between different land uses. Many developments can generate significant amounts of noise or are sensitive to the impact of noise. It is the responsibility of LPAs to ensure that developments are appropriately located and designed so that they do not have an unacceptable impact on local communities and that noise sensitive developments are not subjected to unacceptably high levels of noise.
- 3.6.46 It is important that good acoustic design is considered at an early stage in the development management process. This guidance is intended to help protect occupiers of new or existing noise sensitive buildings from existing or introduced noise sources

respectively and to seek to protect and improve the residential amenity of the area overall. It is government policy that noise should not be considered in isolation or separately from the economic, social and other environmental dimensions of proposed development.

3.6.47 Appendix 8, Annex A summarises the types of development and instances when an **acoustic assessment/report** is likely to be required for both (i) New Noise Sensitive Development (NSD) and (ii) Noise Generating Development (NGD). Appendix 8, Annex B details what a typical report should include and where details of acoustic consultants (Suitably Qualified and Competent Persons) may be obtained from.

3.6.48 NPPF policies are supplemented by additional advice contained in the NPPG. The NPPG does not provide numerical values for the different noise effect levels, instead recognising that ‘the subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation’.

3.6.49 It therefore remains for local authorities to consider the NPPG noise exposure hierarchy and seek to align it with significance criteria, having regard to national and industry standards, codes of practice and best practice technical guidance such as British Standards, World Health Organisation guidance and other relevant sources of information.

3.6.50 The long term vision and aims of the Government’s policy on noise is contained in the Noise Policy Statement for England (NPSE) (March 2010) which is to “promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development”. With regard to acoustic design and noise control, the NPPF provides a set of overarching aims and broad principles for the consideration of noise (and vibration) in accordance with the NPSE to be applied in the planning process as follows:

- Avoid significant adverse effects of noise on people living and working in the LPAs;
- Mitigate and reduce to a minimum the adverse effects of noise within the context of sustainable development;
- Prevent development which is unacceptable in terms of noise
- Encourage good acoustic design as far as is reasonably practical;
- Improve living and working conditions where the acoustic environment already has a significant adverse effect on people’s quality of life; and
- Improve and enhance the acoustic environment and promote soundscapes that are appropriate for the local context, including the promotion of a vibrant acoustic environment where this is appropriate and the protection of relative tranquillity and quietness which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason, and are valued.

3.6.51 The NPSE and NPPG uses the following ‘noise exposure observed effect level’ terms when determining the significance of any noise impact - NOEL, LOAEL and SOAEL:

- **NOEL – No Observed Effect Level:** The level of noise exposure below which no effect can be detected. In simple terms, no effect on health and quality of life detectable due to noise.
- **LOAEL – Lowest Observed Adverse Effect Level:** The level of noise exposure above which adverse effects on health and quality of life can be detected.
- **SOAEL - Significant Observed Adverse Effect Level:** The level of noise exposure above which significant adverse effects on health and quality of life occur.

3.6.52 In terms of planning, increasing noise exposure results in a corresponding increasing 'observed effect level' and the likely planning actions and outcomes of these, based on the likely average response are explained in detail in NPPG and are summarised in table 3.9 'Noise Exposure Effect Level Hierarchy' below.

Table 3.9: - Noise Exposure Level Hierarchy (NOELs, LOAELs, SOAELs and Unacceptable Adverse Effect)

Perception	Examples of effects / outcomes	Increasing effect level	Planning Action
No Effect			
Not noticeable	No Effect	No Observed Effect	No specific measures required
No Observed Effect Level (NOAEL)			
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level (LOAEL)			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

3.6.53 In determining whether noise is a material planning consideration the LPA will take account of the impact and effect on the acoustic environment and quality of life and in doing so will require that developments aim for:

1. A noise level between the **No Observed Effect Level (NOEL)** - this is the level of noise exposure below which no effect at all on health or quality of life can be detected) and the **Lowest Observed Adverse Effect Level (LOAEL)** - this is the level of noise exposure above which adverse effects on health and quality of life can be detected). Conditions may be attached.

If 1 cannot be achieved then:

2. If the assessment results in a level between the **Lowest Observed Adverse Effect Level** and the **Significant Observed Adverse Effect Level (SOAEL)** - this is the level of noise exposure above which significant adverse effects on health and quality of life occur), mitigation will be necessary to reduce to a minimum the adverse effects of noise and therefore conditions will be attached.

If 1 and 2 cannot be achieved then:

3. If the assessment results in a **Significant Observed Adverse Effect Level (SOAEL)** after mitigation, it is likely that the application will be recommended for refusal.

3.6.54 In summary following the SPD guidance will lead to the choice of one of four possible planning recommendations regarding the acoustic acceptability of the development proposal, as follows:

Planning Outcome

- A. Planning consent may be granted without any need for noise conditions - where a potential residential development site poses no or a negligible risk from a noise perspective, the GCPS will typically not require any specific measures ("**Grant Consent - No Objection on Noise Grounds**");
- B. Planning consent may be granted subject to the inclusion of suitable noise conditions in order to mitigate and reduce to a minimum the adverse effects of noise for example to address specific acoustic design aspects of a particular site or require a noise insulation scheme ("**Grant Consent - No Objection – Minimise Noise**");
- C. Planning consent should be refused on noise grounds in order to avoid significant adverse effects of noise ("**Refusal / Object - Avoid on Noise Grounds**");
- D. Planning consent should be refused on noise grounds in order to prevent unacceptable adverse effects of noise ("**Refusal / Object - Prevent on Noise Grounds**").

Existing Business and Agent of Change Principle

3.6.55 Existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because future noise sensitive uses are subsequently permitted (including by a change of use) and where people may object to the inevitable noise that is produced.

3.6.56 This is particularly important for existing industrial, trade/commercial or business premises that generate noise, where the introduction of noise sensitive receptors such as residential premises could result in complaints from future occupiers, which could be considered a statutory noise nuisance under the Environmental Protection Act 1990. If a statutory nuisance was ever witnessed as a result of the introduction of new residents being exposed to unacceptable noise from commercial activities/plant, the local authority would have a duty to serve a legal notice on the offending premises responsible for any

statutory noise nuisance, requiring abatement. If abatement works or restrictions were required this may result in unreasonable restrictions being placed on the existing business and/or substantial abatement of the noise adding to the costs and administrative burdens.

- 3.6.57 In order that existing businesses do not have unreasonable restrictions put onto them because of changes in nearby land uses, the LPA will apply the 'agent of change' principle which identifies the person or business responsible for the change is also responsible for managing the impact of the change.
- 3.6.58 It is important to note that the statutory nuisance regime is not intended to secure a high level of amenity but is a basic safeguarding standard intended to deal with excessive emissions. Nuisance does not equate to loss of amenity/quality of life. Significant loss of amenity will often occur at lower levels of emission than would constitute a statutory nuisance. It is therefore important for planning authorities to consider properly, loss of amenity from emissions in the planning process in its wider context and not just from the narrow perspective of statutory nuisance. Where statutory nuisance arises from commercial or industrial uses, the defence of best practicable means is also available together with reasonable excuse. Thus, it follows that a LA may not be able to require the complete abatement of a statutory nuisance. Broader amenity issues therefore need to be considered under the planning regime when considering individual applications.
- 3.6.59 The LPA will therefore expect proposed new noise sensitive developments to follow good acoustic design principles and to incorporate adequate mitigation measures and to work with existing businesses to ensure appropriate acoustic standards in the new developments and to ensure a statutory noise nuisance does not arise.
- 3.6.60 In certain exceptional circumstances if significant and unacceptable adverse noise impacts cannot be avoided on noise sensitive development sites as a result of existing industrial commercial or business noise sources off-site and relating to land not in control of the applicant then a Grampian condition or S106 agreement may be required with a third party for mitigation measures to reduce these noise sources to an acceptable level. This may allow delivery of otherwise unacceptable development. However, this approach is only likely to be acceptable where there is a reasonable degree of certainty and prospect of securing and delivering between all parties concerned.

Submission requirements: Noise Sensitive Development (NSD)

- 3.6.61 This includes any proposed NSD located in a noisy environment or near to a specific existing or reasonable foreseeable future noise generating source e.g. near to a busy road, railway line, noisy commercial/industrial premises including building services plant/equipment, Licenced Premises and general activities associated with the night time economy. NSD include residential properties, residential institutions, educational establishment (schools/libraries), hospitals, offices, workshops, laboratories, hotels as well as noise sensitive land valued for their amenity such as local green open spaces, certain parks and gardens.

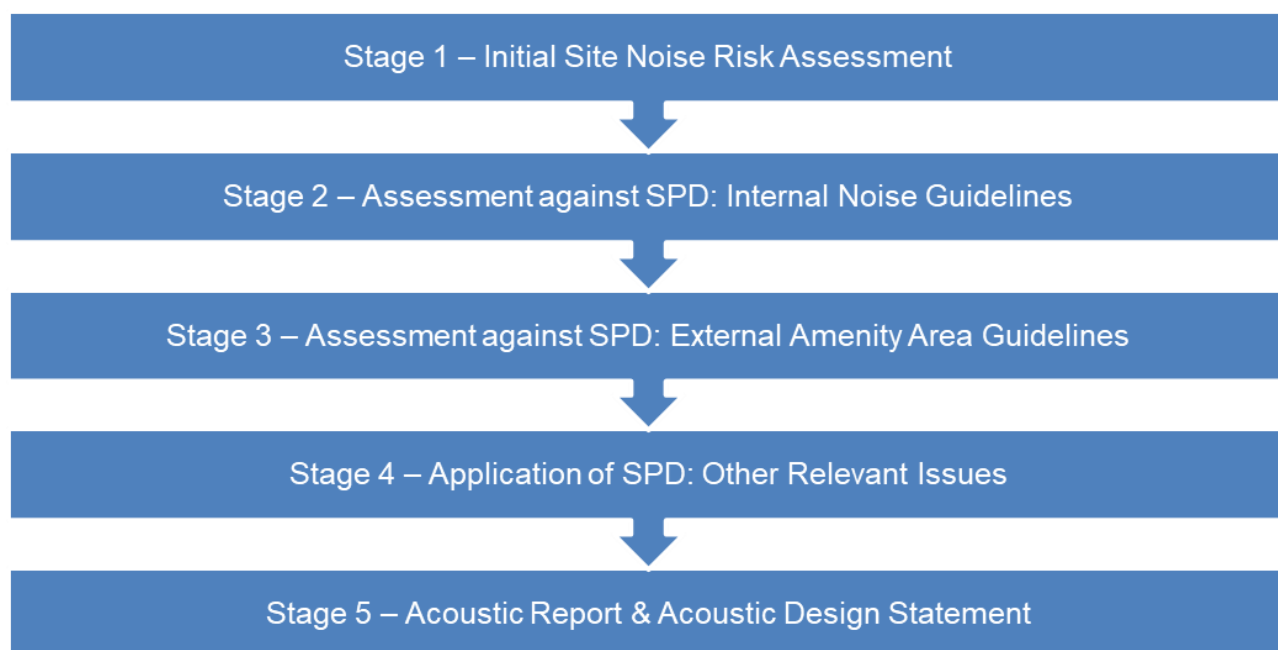
- 3.6.62 The LPA will consider carefully in each case whether proposals for new NSD, including by a change of use would be incompatible with existing activities. Such new NSD will not normally be permitted in areas which are, or are expected to become, subject to high levels of noise or an otherwise unacceptable acoustic environment. When determining planning applications for development which will be exposed to an existing noise source, the LPA will consider both the likely noise exposure at the time of the application and any change that may reasonably be expected in the foreseeable future e.g. from future intensification of transportation noise sources or future changes in commercial/industrial activities or positive regeneration effects. Where the application site is considered to be otherwise suitable then the principle requirement will be to secure and achieve appropriate acoustic standards through the application of good acoustic design.
- 3.6.63 There will be a general presumption against new NSD that is likely to experience significant adverse effects from noise unless it can be demonstrated that the economic and/or social and/or environmental benefits associated with the proposed development outweigh the adverse effects.
- 3.6.64 For NSD the noise assessment shall follow the general approach detailed into the document 'ProPG: Planning and Noise - Professional Practice Guidance on Planning and Noise - New Residential Development, May 2017' <https://www.ioa.org.uk/publications/propg> as summarised in the process diagram figure 7 below.

Stage 1 – Initial Site Noise Risk Assessment

- 3.6.65 An initial **noise risk assessment** of the proposed development site should be conducted by a competent acoustic/noise consultant and practitioner at the earliest opportunity, before any planning application is submitted to determine the noise climate of the site when considering “anonymous noise”, without proposed mitigation, prior to development. The noise levels apply to steady relatively constant external noise as it affects the internal acoustic environment from sources without a specific character, commonly termed “anonymous noise”. Occupants are usually more tolerant of noise without a specific character than, for example, that from neighbours which can trigger complex emotional reactions. For simplicity, only noise without character is considered.
- 3.6.66 The noise risk assessment should provide an indication of the likely risk of adverse noise effects in terms of NOELs, LOAELs and SOAELs as a result of the existing noise climate with no subsequent noise mitigation or control to take place as part of the development proposal.
- 3.6.67 The risk assessment should not include consideration of any new or additional mitigation measures that may subsequently be included in development proposals for the site and proposed as part of a subsequent planning application. In other words, the risk assessment should include the acoustic effect of any existing site features that will remain (e.g. retained buildings, changes in ground level) and exclude the acoustic effect of any site features that will not remain (e.g. buildings to be demolished, fences and barriers to be removed) if development proceeds.

3.6.68 The noise risk assessment may be based on measurement or prediction (or a combination) as appropriate, and should aim to describe noise levels over a “typical worst case” 24 hour day either now or in the foreseeable future having regard to weekdays and weekends. Among other considerations, diurnal patterns can have a major influence on sound levels and, for example, the middle of the night can be distinctly different (and potentially of lesser importance) compared to the start or end of the night-time period for sleep purposes. Furthermore, in this general context it can also be necessary to separately assess weekends and weekday periods. Care should be taken so that the risk assessment includes the combined external free-field noise level from all relevant sources of transport noise that affect the site.

Figure 7: Noise Sensitive Development - Noise Assessment Process



3.6.69 The assessment may also include industrial/commercial noise where this is present but is “not dominant” (i.e. where the effect would not be rated as adverse if a BS4142:2014 assessment was to be carried out). Where industrial/commercial noise is considered to be “dominant” and is considered “non-anonymous”, due regard should be had to the guidance in BS4142:2014.

3.6.70 The indicative noise levels at the Initial Site Noise Risk Assessment are considered to be appropriate in most circumstances as they should give a broad indication of the extent of the noise challenge at a potential residential development site. The approach is intended to give the developer, the noise practitioner, and the decision maker an indication only of the likely suitability of the site for new residential development from a noise perspective.

3.6.71 It should be noted, however, that these levels could be varied (by local agreement) to suit local and project context without undermining the overall approach. In the final column, the initial noise risk assessment is aligned with pre-planning application guidance that reflects the increasing importance of good acoustic design as the noise risk increases.

Initial Site Noise Risk Assessment - Guideline “Absolute” Sound Levels for “anonymous noise”

3.6.72 For sites affected by relatively ‘anonymous noise’ such as transport noise the LPA will consider the noise effect levels and planning consideration/advice given in table 1 titled Guideline “Absolute” Sound Levels for “anonymous noise” in Appendix 8, Annex C.

Initial Site Noise Risk Assessment - Guideline “Relative” Sound Levels for “non-anonymous noise”

3.6.73 For sites affected by dominant ‘non-anonymous noise’ such as industrial, commercial or business noise the LPA will consider the noise effect levels and planning consideration/advice given in table 2 titled ‘Guideline “Relative” Sound Level Standards for “non-anonymous noise’ in Appendix 8, Annex C

Stage 2 – Internal Design Noise Levels

3.6.74 For steady external “anonymous” noise sources the LPA will normally expect applicants to achieve the design internal ambient noise levels contained in BS8233:2014 - Guidance on sound insulation and noise reduction for buildings (recreated as table 3.10 below and to consider the impact and effect of any noise events) in all noise-sensitive rooms. It should be noted that the acoustic performance of the building envelope will be reduced in the event windows are opened for ventilation or cooling and thermal comfort control purposes, therefore reducing attenuation/insulation, as the noise reduction across an openable window (outside to inside) is typically no more than 10 to 15 dB(A).

3.6.75 Most residents value the ability to open windows at will at the occupant’s choice, for a variety of reasons at any time, and the LPA normally requires that designers principally aim, through the use of good acoustic design, to achieve the internal noise level guidelines in noise-sensitive rooms with windows open.

Table 3.10: Internal Ambient Noise Levels for Dwellings

Situation / Activity	Location	07:00 – 23:00 hrs.	23:00 – 07:00 hrs.
Resting, listening and communicating	Living room	35 dB LAeq,16 hour	
Dining	Dining room/area	40 dB LAeq, 16 hour	
Sleeping (daytime resting)	Bedroom	35 dB LAeq,16 hour	30 dB LAeq, 8 hour
Sleeping	Bedroom		45 dB LAMax (several times in any one hour)

Notes:

(i) Table 3 provides recommended levels for overall noise in the design of a building. These are the sum total of structure-borne and airborne noise sources. Groundborne noise is assessed

- separately and is not included as part of these targets, as human response to groundborne noise varies with many factors such as level, character, timing, occupant expectation and sensitivity.
- (ii) The levels shown in Table 3 are based on the existing guidelines issued by the WHO and assume normal diurnal fluctuations in external noise. In cases where local conditions do not follow a typical diurnal pattern, for example on a road serving a port with high levels of traffic at certain times of the night, an appropriate alternative period, e.g. 1 hour, may be used, but the level should be selected to ensure consistency with the levels recommended in Table 4 of BS8233.
 - (iii) These levels are based on annual average data and do not have to be achieved in all circumstances. For example, it is normal to exclude occasional events, such as fireworks night or New Year's Eve.
 - (iv) Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or L_{Amax,F}, depending on the character and number of events per night. Sporadic noise events could require separate values.
 - (v) If relying on closed windows to meet the guide values, there needs to be appropriate alternative ventilation provision that does not compromise the façade insulation or the resulting noise level. If applicable, any room should have adequate ventilation (e.g. trickle ventilators should be open) during assessment. If there is noise from a mechanical ventilation system, the internal ambient noise levels should be reported separately with the system operating and with it switched off.
 - (vi) Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved. The more often internal L_{Aeq} levels start to exceed the internal L_{Aeq} target levels by more than 5 dB, the more that most people are likely to regard them as "unreasonable". Where such exceedances are predicted, applicants should be required to show how the relevant number of rooms affected has been kept to a minimum. Once internal L_{Aeq} levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as "unacceptable" by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing "unacceptable" noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form
 - (vii) The noise levels apply to steady external noise as it affects the internal acoustic environment from sources without a specific character, previously termed "anonymous noise". Occupants are usually more tolerant of noise without a specific character than, for example, that from neighbours which can trigger complex emotional reactions. For simplicity, only noise without character is considered in Table 3.
 - (viii) Noise has a specific character if it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content, in which case lower noise limits might be appropriate.

Stage 3 – Design Noise Levels for External Amenity Spaces

- 3.6.76 The sound level within a residential building is not the only consideration and most residents will also expect a reasonable degree of peaceful enjoyment of their gardens or balcony and adjacent amenity areas. The acoustic environment of external amenity areas shall always be assessed and noise levels should ideally not be above the range 50 to 55 dB L_{Aeq}, 16hr for "anonymous noise". It may be necessary to carefully locate and design amenity areas and/or to provide acoustic screening in order to meet this aim.

3.6.77 Developers are encouraged to enter into pre application discussion where noise levels in proposed amenity spaces are likely to be above 55 dB LAeq,16hr. In such cases development should be designed to achieve the lowest practicable levels in these external amenity spaces and the availability of reasonable access to an outdoor recreational area away from but close to the development site, that meets the above target external levels will be taken into account in deciding whether the scheme is acceptable in noise terms. Soundscape management techniques, including psychological masking, may also help to provide a suitable outdoor acoustic environment in otherwise noisy locations. It is accepted that, in some circumstances it may be appropriate to vary, or not to apply, these goals in order to meet wider planning objectives.

Stage 4 – Assessment of Other Relevant Issues

3.6.78 The fourth element of the preferred process is an assessment of other relevant issues. For this element the SPD reflects and extends the advice contained in Government policy and guidance documents such as the NPSE and Noise Action Plans. Government guidance in the NPPG – Noise already lists examples of acoustic factors that influence whether noise could be a concern – these include:

- the source and absolute level of the noise;
- the time of day noise occurs;
- the number, frequency and pattern of noise events;
- the spectral content of the noise (i.e. whether or not the noise contains particular high or low frequency content);
- the character of the noise (i.e. the presence of tones or other features such as impulsiveness),
- possible cumulative impacts from several sources as well as local topology and topography.

3.6.79 The NPPG also mentions some wider acoustic-related factors such as the planned character of the area (this should include consideration of the acoustic environment); the possible need to keep windows closed “most of the time” to keep out the noise; the possible need to provide acoustically suitable outdoor amenity space; and the potential effect on an existing business.

3.6.80 It is recommended that these factors and the following additional issues should always be included as part of a systematic assessment of other relevant issues before making a judgement about the noise aspects of a particular planning proposal for new residential development. Not all of the issues discussed will arise in each and every planning application and some may already have been addressed as an inherent part of good acoustic design. In addition, the LPA may add other relevant issues depending on local circumstances and priorities.

3.6.81 Design measures taken to reduce intrusion by noise may have unintended adverse consequences for the building or the nearby environment and may affect the attractiveness of the living environment for the occupants. Examples include sealed up balconies that result in a lack of connection with the external environment, environmental noise fences/barriers that remove views or prevent crossing roads and

create significant visual impacts or secured by design issues, specialist ventilation/thermal comfort measures that affect personal control over the internal environment etc. Such unintended consequences should normally be avoided by good acoustic design.

3.6.82 Some wider planning objectives may have unforeseen acoustic implications. For example, the encouragement of 'active frontages' that overlook public footpaths etc. to promote natural surveillance and ensure 'safe by design' could result in some residential units facing recreational areas (MUGAs), noisy streets/roads or railways. The encouragement of active outdoor lifestyles may require the careful protection of amenity spaces from sources of transport noise. The creation of vibrant mixed use commercial and residential neighbourhoods can introduce particular challenges that will need to be overcome by careful acoustic design.

Ventilation and Cooling Design

3.6.83 Ideally, the internal design noise levels in table 3.10 should be met with windows open. Where the LPA accepts that there is a justification that the internal target noise levels can only be practically achieved with windows closed, which is likely to be the case in some areas, special care must be taken to design the accommodation so that it provides good standards of acoustics, ventilation and thermal comfort without unduly compromising other aspects of the living environment.

3.6.84 It is often necessary to open windows during the warmer months of the year to achieve comfortable internal temperatures and to facilitate effective thermal comfort control. Windows might need to remain open for extended periods to cool the internal habitable rooms including bedrooms. This is often referred to as summer cooling and essentially means an increased flow of air through habitable rooms to cool these spaces and is a form of thermal comfort control. This is not discussed in detail in BS8233 or Approved Documents E or F of the Building Regulations which do not consider external noise impacts. However the requirements related to "purge ventilation" and the purpose of purge ventilation are comparable to the purpose of opening windows for reasons of cooling i.e. the internal environment is not comfortable and rapid air changes should serve to improve that comfort.

3.6.85 When windows are provided there is also a reasonable expectation by occupiers that they can open them for any reason at any time. Where the internal noise levels cannot be achieved with windows open, alternative ventilation such as mechanical ventilation heat recovery system (MVHR) or an acoustically treated passive free area of sufficient size should be provided. It is important to note this is not a request for air conditioning. It is a requirement to offer the option of alternative adequate ventilation with windows closed due to the local noise climate and for anonymous noise only. These arrangements will not be acceptable when there is a potential for a statutory noise nuisance to arise due to noise from industrial trade or business premises.

3.6.86 This ventilation system must:

- Be capable of providing air changes at volumes equivalent to an open window for the purposes of rapid cooling and ventilation. A ventilation rate of 2 - 4 air changes per hour (ACH) is required to achieve effective thermal comfort control.
- Not compromise the façade insulation or the resulting internal noise level.
- Operate at a level to comply with a noise rating curve NR25 or lower so as not to dissuade use.
- Have full operational controls for occupants.
- If whole house MVHR - the system should have a Summer Bypass to ventilate and provide good levels of fresh air, without the heat recovery by physically bypassing the heat exchanger for at least 90% of air volume flow.

Submission requirements: Outline Planning Permission for NSD

- 3.6.87 Details submitted as part of an outline application for NSD must be treated by the LPA as forming part of any subsequent “full” application. If material planning considerations, conditions cannot be used to reserve consideration of these details for subsequent approval unless the applicant has made it clear that they were only illustrative. It is therefore recommended that an initial site noise risk assessment should be undertaken and that LPAs should not grant outline planning permission for new residential developments at sites considered to pose a medium or high noise risk (LOAEL to SOAEL) without first being satisfied with a reasonable degree of confidence that good acoustic design can be secured to overcome the acoustic challenges.
- 3.6.88 In particular, where a site is considered medium or high risk (LOAEL to SOAEL) following an **initial site noise risk assessment**, it is recommended that the examination of acoustically critical design issues such as site layout, building heights, materials, landform contouring, detailed design and landscaping, the location of vehicle and pedestrian access, boundary treatments, amenity spaces etc. should not be left for agreement at a later stage as these are important fundamental design issues. Any changes in acoustically critical issues following grant of outline consent should be fully assessed in an updated **noise assessment** and **acoustic design statement**.

Other Noise Sensitive Development

- 3.6.89 New housing is the most common type of residential development in the LPA. However, the general principles outlined above will be applied to other types of residential development such as residential institutions, care homes etc. However there are other types of noise sensitive development.
- 3.6.90 **Schools and other Educational Establishments:** Many, but not all, activities undertaken at schools (including “free schools”), and other educational establishments are considered to be noise sensitive. The sound insulation criteria for schools formulated for the prevention of noise break-in is set out in Building Bulletin 93, Acoustic Design of Schools, Performance Standards, February 2015. Developers should adhere to these criteria. For schools due regard should also be given to ‘Acoustics of Schools: a design guide, November 2015’ published jointly by the Institute of Acoustics (IOA) and the Association of Noise Consultants (ANC).

- 3.6.91 Because some activities at educational establishments are also likely to generate noise then any such applications will be assessed on a case by case basis. Ancillary noise sources such as plant, air extraction, entertainment noise and the provision of MUGAs for school/after-school or community use should be considered using the appropriate guidance set out in this document.
- 3.6.92 **Hospitals and other Healthcare Buildings:** Advice on the acoustic design of and requirements for hospitals and other healthcare buildings is contained in Health Technical Memorandum 08-01: Acoustics.
- 3.6.93 **Hotels and Guesthouse:** The LPA does not prescribe noise and vibration standards for hotel bedrooms although it is recommended that hotels are designed to meet the criteria provided in BS 8233:2014. Other types of noise sensitive development will be dealt with on a case by case basis using similar principles and with reference to any authoritative specialist acoustic design guidance.

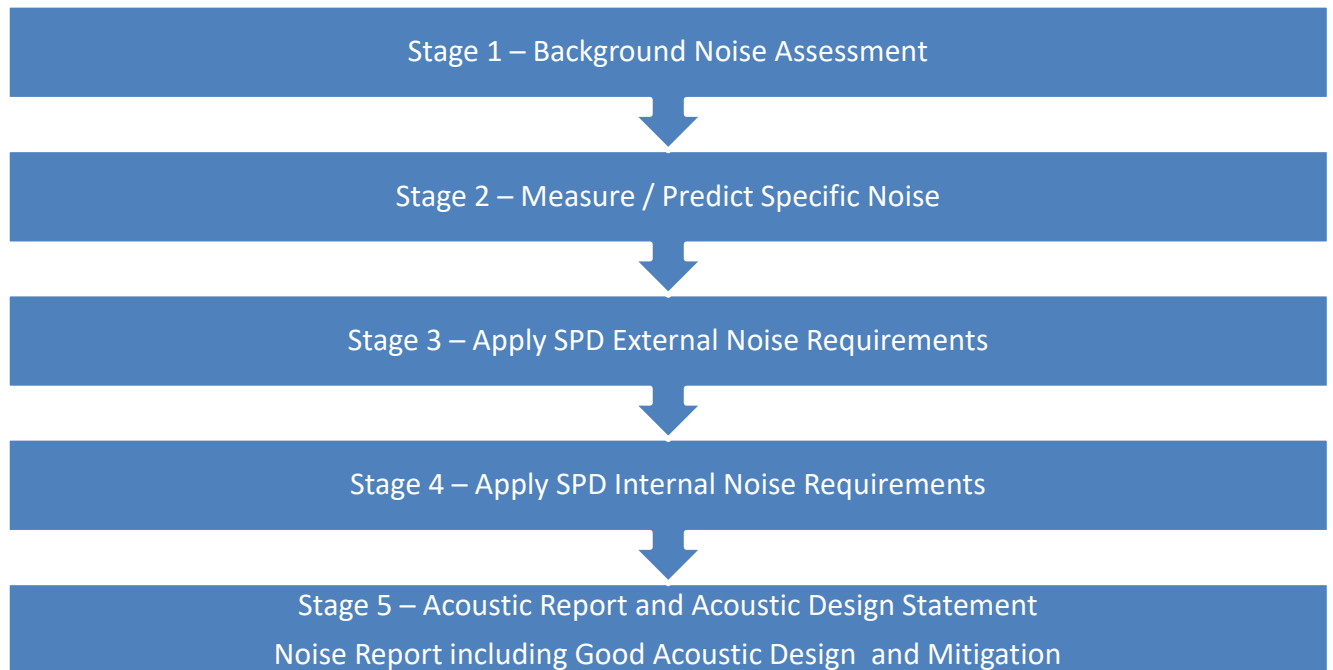
Submission requirements: Noise Generating Development (NGD)

- 3.6.94 NGD includes:
- new heating, ventilation, and air conditioning (HVAC) including combustion appliance / exhaust stacks and flues and air handling/refrigeration / chiller units, machinery, plant and equipment and extractor fans at new and existing premises;
 - uses likely to create significant noise such as food/drink/entertainment and leisure uses, industrial uses, day nurseries, gyms, places of worship, schools and colleges and agricultural users / buildings;
 - uses likely to generate a significant amount of traffic (defined as road traffic movements greater than 5% of Annual Average Daily Traffic); and
 - developments emitting low frequency noise (e.g. electricity substations and wind turbines / farms).
- 3.6.95 The LPA recognises the contribution of industrial, trade/commercial or business developments in helping to achieve wider sustainable development goals. However, there are many kinds of industrial and commercial developments that have the potential to generate noise. The LPA will consider carefully in each case whether proposals for new NGD that may generate or lead to an increase in noise (including by a change of use) would be incompatible with existing noise sensitive activities and any noise sensitive activities that may reasonably be expected in the foreseeable future. The applicant will be expected to demonstrate, as part of the planning application, that noise has been mitigated and reduced to a minimum and that the principles of good acoustic design have been followed.
- 3.6.96 For schemes that may generate noise, developers must consider the cumulative noise impact from their proposed scheme and the existing acoustic environment and where appropriate the future cumulative impact of any already permitted or proposed noise generating development in the vicinity.

- 3.6.97 There will be a general presumption against noise generating development which gives rise to significant adverse effects from noise unless it can be demonstrated that the economic and/or social and/or environmental benefits associated with the proposed development outweigh the adverse effects.
- 3.6.98 Some of the most commonly occurring noise issues with commercial developments are associated with building services plant / equipment, usually air-conditioning equipment or kitchen ventilation / extraction systems. In addition to operational plant/equipment noise, noise associated with deliveries or collections and an increase in traffic noise levels may also impact on local residents.
- 3.6.99 An assessment of the impact of noise from these types of development will be required. Applicants should be aware that the LPA will always seek to encourage good acoustic design and will prevent development where unacceptable acoustic conditions are anticipated at nearby noise sensitive premises as a result of noise from new or intensified industrial, trade / commercial or business development. The process diagram in figure 8 below describes the stages that the assessment of noise for NGD should follow.
- 3.6.100 All industrial and commercial development with the potential to generate noise will need to be assessed and, where relevant, controlled by planning conditions in order to protect residential amenity/quality of life. Conditions may be used, for example for a noise insulation scheme to restrict noise levels and to control hours of operation. The most relevant standard for assessing new industrial, trade/commercial or business development is BS4142:2014 - Methods for Rating and Assessing Industrial and Commercial Sound. The methods described use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.
- 3.6.101 The standard is applicable to the determination of the following:
- rating levels for sources of sound of an industrial and/or commercial nature;
 - ambient, background and residual sound levels, for the purposes of:
 - (i) assessing sound from proposed, new, modified or additional source(s) of sound of an industrial and/or commercial nature;
 - (ii) assessing sound at proposed new dwellings or premises used for residential purposes.
- 3.6.102 The significance of sound of an industrial and/ or commercial nature depends upon both the margin by which the rating level (L_{Ar},Tr) of the specific sound source exceeds the background sound level (LA₉₀) and the context in which the sound occurs. The greater this difference, the greater the magnitude of the impact as follows:
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context
 - A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context
 - The lower the rating level is relative to the measured background sound level the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact

3.6.103 As NPPG does not provide numerical values for the different noise effect levels table 3.11 below details the approach and noise criteria requirements that will be adopted for assessing NGD that is industrial and/or commercial nature typically “non-anonymous noise” in external private residential amenity areas.

Figure 8: Noise Generating Development – Noise Assessment Process



3.6.104 The LPA will not impose unreasonable restrictions on businesses but applicants should be aware that it is usually simpler and less expensive to be proactive and design in noise management and noise control measures at the planning stage rather than wait for complaints to arise.

3.6.105 In addition to an assessment of NGD external noise as detailed above, in some cases it will also be necessary to predict internal noise levels at the closest and/or worse affected noise sensitive premises and to demonstrate the means of achieving suitable internal noise levels within noise sensitive rooms (with windows partially open for ventilation where this is the norm for the building likely to be affected, with windows closed where this is part of the mitigation of the existing noise climate and the potentially affected noise sensitive building is provided with adequate alternative means of ventilation). This is particular important during night-time periods when external amenity areas are not in use.

Table 3.11: New Noise Generating Development - External Noise Standards for “non-anonymous noise”

Noise Significance Risk	Noise Significance of Effect	BS4142 Outcome rating level (L _A ,T _r) minus (-) background level (L _A 90)	Planning Advice
None	NOEL	$L_{A,T_r} - L_{A90,T} \leq -10$	Sound is likely to be inaudible and have no discernible impact on health or quality of life. No objection from a noise perspective and no specific noise measures required.
Minimal	NOEL to LOAEL	$L_{A,T_r} - L_{A90,T}$ is > -10 & ≤ -5	Where the rating level of noise is below the background noise level by at least 5dB, this indicates that the proposed NGD is likely to be acceptable from a noise perspective. The LPA will seek this level of compliance in most noise sensitive areas and/or where there is a requirement to mitigate creeping background effects.
Low	NOEL to LOAEL	$L_{A,T_r} - L_{A90,T}$ is > -5 & ≤ 0	Where the rating level of noise is equal to, or below the background noise level by up to 5dB, this indicates that the proposed NGD may be acceptable from a noise perspective but will be more context dependent, i.e. extent and effect on noise sensitive receivers (externally and internally). Compliance within this range is more applicable to less sensitive sites or where there is no requirement to mitigate creeping background effects.
Medium	LOAEL to SOEL	$L_{A,T_r} - L_{A90,T}$ is > 0 & $\leq +5$	Where the rating level of noise is equal to, or above the background noise level by up to 5dB, this indicates that the proposed NGD is less likely to be acceptable from a noise perspective and will be context dependent, i.e. extent and effect on noise sensitive receivers (externally and internally). Compliance within this range is typically only applicable to non-sensitive sites or where there are overriding other reasons why development should be considered. It will typically be necessary for the applicant to confirm how adverse impacts from the NGD will be mitigated and minimised. It is less likely that planning consent will be granted. Acceptable only if

Noise Significance Risk	Noise Significance of Effect	BS4142 Outcome rating level (L _{Ar,Tr}) minus (-) background level (LA ₉₀)	Planning Advice
			there are overriding economic or social reasons for development to proceed
High	SOEL	L _{Ar,Tr} – LA _{90,T} is > + 5 & +10	Where the rating level of noise is above the background noise level by more than 5dB, this indicates that the proposed NGD is unlikely to be acceptable from a noise perspective and planning consent is likely to be refused on noise grounds.
Very High	SOEL and unacceptable	L _{Ar,Tr} – LA _{90,T} is > +10	Where the rating level of noise is above the background noise level by more than 10dB, this indicates that the proposed NGD is unacceptable from a noise perspective and planning consent shall be refused on noise grounds.

Note:

- (i) Certain acoustic features e.g. Tonality, Impulsivity, Intermittency or sound features characteristics that are otherwise readily distinctive against the residual acoustic environment, can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. For example sound with prominent impulses has been shown to be more annoying than continuous types of sound (without impulses or tones) with the same equivalent sound pressure level.
Where such features are present at the assessment location, a character correction may need to be added to the specific sound level to obtain the rating level. Full justification for selecting and not selecting character corrections will need to be provided.
- (ii) All terms as defined in BS4142

3.6.106 In some cases, e.g. for steady continuous noise without a specific character, the guidance on suitable internal noise levels found in table 4 of BS8233 may be relevant. The application should demonstrate that these levels can be complied with. In other cases, it may be necessary to seek to achieve better standards in nearby dwellings, for example where the proposed industrial or commercial development may emit noise with tonal, impulsive or other discrete characteristics the LPA may consider it appropriate to apply a character correction penalty for internal noise standards. In such circumstances the advice given in table 3.10 of this SPD should be considered.

NGD and Creeping Background /Ambient Noise Levels

3.6.107 Creeping outdoor background and ambient noise levels may occur in situations where there are an increasing number of NGD/sources in an area, each of which makes a small contribution to an overall deteriorating and locally unacceptable situation. Typically, this may occur, where there are multiple mechanical services e.g. HVAC

installations on a number of industrial/commercial premises in close proximity to residential development. Furthermore, it may also be necessary to prevent creeping outdoor background noise levels affecting any specially designated quiet and/or tranquil areas in the LPA.

3.6.108 To limit such creeping ambient noise levels the LPA has the following general requirement for operational noise from all operational plant and equipment:

‘the rating level (in accordance with BS4142:2014) from all plant, equipment and vents etc. (collectively) associated with this application should be less than or equal to the existing background level (L90) at the boundary of the premises subject to the application and having regard to noise sensitive premises.

Tonal/impulsive sound frequencies should be eliminated or at least considered in any assessment and should carry an additional correction in accordance with BS4142:2014. This is to prevent unreasonable disturbance to other premises. This requirement applies both during the day (07:00 to 23:00 hrs over any one hour period) and night time (23:00 to 07:00 hrs over any one 15 minute period).

It is recommended that the agent/applicant submits an acoustic prediction survey/report in accordance with the principles of BS4142: 2014 "Methods for rating and assessing industrial and commercial sound" or similar, concerning the effects on amenity rather than likelihood for complaints. Noise levels shall be predicted at the application site boundary having regard to neighbouring premises.’

3.6.109 The LPA would also welcome the use of long-term maintenance agreements to ensure that equipment maintains acceptable noise levels over its lifetime and the use of timers to limit any unnecessary operation of the equipment.

Specific Noise Generating Development Uses - Industrial, Trade / Commercial or Business

3.6.110 Common sources of NGD include the following:

- Sound Insulation between Commercial and Residential Development – General
- Delivery and Collections
- Places of Entertainment (Food Restaurants, Clubs, Pubs and Bars)
- Multi Use Games Areas and Artificial Grass Pitches
- Gyms
- Nurseries / Childcare Facilities
- Wind Turbines
- Agricultural buildings

3.6.111 Further detailed technical advice including the noise requirements, typical good acoustic design and noise mitigation measures relating to these specific noise sources are included in Appendix 8 Annex D.

Good Acoustic Design

- 3.6.112 Following the principles of good acoustic design can deliver good acoustic conditions that can greatly increase the overall comfort level of a space, while poor acoustics can result in unhealthy living conditions and environments. Acoustic design can be applied to almost every design project with obvious benefits, including functionality. Building and design professionals can apply to and integrate good acoustic solutions into all projects. Considering acoustics is paramount to the collective health and safety and quality of life of those who live, work and play within the spaces created by building and design professionals.
- 3.6.113 It should be remembered that good acoustic design is a process that begins as soon as land is under consideration for development. The timeline for good acoustic design stretches from the conceptual design stage, through quality control during construction, and beyond to post construction performance testing.
- 3.6.114 Both internal and external spaces should be considered in the acoustic design process. Care should be taken to ensure that acoustic mitigation measures do not result in an otherwise unsatisfactory development. Good acoustic design must be regarded as an integrated part of the overall design process and sustainable development.
- 3.6.115 There should be a commitment to good acoustic design and a hierarchy of noise management should be followed to reduce noise impacts, including the following (but not limited to), in descending order of preference:
- Maximising the spatial separation of noise source(s) and receptor(s).
 - Investigating the necessity and feasibility of reducing existing noise levels and relocating existing noise sources (possible S106 agreement if noise sources off site).
 - Using existing topography and existing structures (that are likely to last the expected life of the noise-sensitive scheme) to screen the proposed development site from significant sources of noise.
 - Incorporating noise barriers as part of the scheme to screen the proposed development site from significant sources of noise - such as landscaping, fencing and solid balconies to reflect/shield sound.
 - Using the layout of the scheme to reduce noise propagation across the site.
 - Creating setbacks.
 - Using the shape and orientation of buildings to reflect and or shield noise to protect the most sensitive uses
 - Locating noise sensitive areas/rooms away from the parts of the site most exposed to noises and careful internal configuration of internal rooms to reduce the noise exposure of noise-sensitive rooms.
 - Stacking similar room use (such as kitchens and living rooms) above each other.
 - Positioning non-residential uses closer to the noise source in mixed use developments
 - Anti-vibration foundations/vibration reducing separation trenches
 - Incorporating 'sound proof' construction/cladding materials e.g. absorptive materials/finishes to soffits

- Using the building envelope to mitigate noise to acceptable levels - insulating and soundproofing doors, walls, windows, floors and ceilings with an appropriate level of acoustic performance
- Alternative forms of ventilation if internal noise levels exceeded with a partially open window to negate the need to ventilate passively e.g. mechanical ventilation systems and acoustically attenuated free areas

3.6.116 In instances where noise mitigation measures and noise insulation schemes are necessary in addition to good acoustic design, proposals will be expected to include appropriate attenuation to alleviate or mitigate the impact of noise and vibrations to an acceptable level. Where noise mitigation has not been proposed adequately, but is considered necessary, the LPA will consider the use of planning conditions or a legal agreement to secure.

3.6.117 Examples of mitigation as part of a noise insulation scheme include:

- reducing the noise emitted at its point of generation (e.g. by using quiet machines and/or quiet methods of working);
- containing the noise generating equipment (e.g. by insulating buildings which house machinery and/or providing purpose-built barriers around the site);
- use of acoustic enclosures / silencers
- protecting any surrounding noise-sensitive buildings (e.g. by improving sound insulation in these buildings and/or screening them by purpose-built barriers);
- ensuring an adequate distance between source and noise-sensitive buildings or areas;
- screening by natural barriers, buildings, or non-critical rooms in the development.
- limiting the operating time of the source;
- restricting activities allowed on the site;
- specifying an acceptable noise limit;
- use of noise management plans;
- restricting window openings;
- sound proofing internal and external walls; and
- using cladding specifically designed for sound reduction.

3.6.118 Further advice on good acoustic design for NSD and NGD is given in Appendix 8, Annex E.

Vibration

3.6.119 Vibrations transmitted through the structure of a building can be detected by its occupants and can result in adverse effects. Depending on the timing and the nature of the vibration, occupants may have disturbed sleep or struggle to work efficiently. Vibration at higher magnitudes can even act to damage a building over time.

3.6.120 Human response to vibration varies with the magnitude, the frequency and duration of exposure. Significant vibration within the LPA (apart from temporary construction works) is most likely to be generated by railways and possibly certain industrial uses that incorporate impact driven processes or activities such hydraulic and mechanical presses or forging processes. Road traffic is unlikely to generate significant

vibration where the road surface is in reasonable repair. Consequently, the LPA will normally require a vibration assessment where railways, either surface or underground, are within 30m of a proposed development site or close to industrial uses with impact driven processes. The need for a vibration assessment at other sites will also be assessed on a case by case basis.

3.6.121 Apart from construction, raw vibration acceleration (ms^{-2} rms) shall be measured at foundation level in each of the three orthogonal directions x, y and z in better frequency resolution than 1/3 octave. The Vibration Dose Values (VDV measured in $\text{ms}^{-1.75}$) should be calculated and assessed from the measured acceleration levels in accordance with 'BS6472-1:2008 - Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting.' For residential development, the VDV vibration thresholds after any required mitigation should not exceed the levels in table 3.12 below (taken from Table 1 of BS 6472-1:2008).

Table 3.12: Residential Development – Vibration Dose Values

07:00 – 23:00 16 hour day	23:00-07:00 8 hour night
< 0.2 $\text{ms}^{-1.75}$	< 0.1 $\text{ms}^{-1.75}$

3.6.122 The VDV's given above are for in-property levels of exposure. Measurements made on an undeveloped site should allow for transfer functions from the ground into foundations, and amplification of vibration magnitudes in suspended floors. Where a site has existing buildings, vibration should, if possible, be measured on the foundations, ground beams or pile caps, as well as on the ground. Measurements made within existing buildings need to be corrected to derive VDV which would apply to the new buildings on the same site.

3.6.123 Ground / structural borne vibration which can result in re-radiated noise, as a result of vibration from adjacent railways and other sources, shall not exceed 30 dB $L_{Amax}(slow)$ within habitable residential rooms. Where it is predicted that noise from this source will exceed 30dB $L_{Amax}(slow)$, proposals to mitigate re-radiated noise to acceptable levels shall be submitted to and approved in writing by the LPA. However, due to the high cost of mitigating vibration effects, this should be subject to early discussion with the LPA.

3.6.124 All building services plant and equipment such as air conditioning and air handling plant can generate vibration which in turn can re-radiate as noise within buildings. All services and equipment plant shall be supported on proprietary anti-vibration mounts. Any permission granted for the installation of services and equipment plant will normally contain a condition necessary to control plant vibration.

3.6.125 The content of a vibration assessment report shall follow the format suggested in Annex A (informative) of BS 6472-1:2008.

Construction and Demolition Work

3.6.126 The Control of Pollution Act 1974 is primary legislation which can deal with the control of noise from construction sites. However in certain situations, for instance where there is a proposal for a substantial development or infrastructure project, a Noise and Vibration Demolition and Construction Environmental Management Plan, detailing the management and control of noise and vibration, will be required as part of planning consent.

Noise and Vibration Demolition and Construction Environmental Management Plans

3.6.127 The Noise and Vibration Demolition Environmental Management Plan (DMP) and Construction Environmental Management Plan (CEMP) or a combined Demolition and Construction Environmental Management Plan (DCEMP) will typically include an acoustic report undertaken by a suitably qualified and experienced consultant. They are expected for major developments and the LPA will assess the need for them for smaller developments on a case-by-case basis.

3.6.128 These documents should be undertaken in accordance with:

- BS 5228-1:2009+A1:2014 - Code of practice for noise and vibration control on construction and open sites. Noise
- BS 5228-2:2009+A1:2014 - Code of practice for noise and vibration control on construction and open sites. Vibration

3.6.129 These documents set out the measures that a contractor will take both on-site and off-site, in order to reasonably minimise the detrimental effects of construction and incorporate mechanisms that overlap with other regulatory regimes (particularly highways and environmental protection). Most are 'umbrella' documents managing all impacts of the demolition, excavation and construction processes.

3.6.130 Besides ensuring that measures under these different service areas are coordinated in one document, DCEMPs represents a proactive approach to addressing construction issues. Their purpose is to encourage developers to work with the LPA and local people in managing the construction process with a view to ensuring that problems are foreseen and addressed with appropriate mitigation.

3.6.131 They should include all the information below:

- **Baseline Noise Assessment** – undertaken for at least 24-hours under representative conditions to determine the pre-existing ambient noise environment against which to judge any impact.
- **Noise predictions and the significance of noise effects** – Predictions should be included for each phase of the demolition, and construction, vehicle movements and an assessment of the significance of noise effects must be included based on the guidance in BS 5228 and best practical means shall be used to mitigate noise.
- **Piling** – Where piling forms part of the construction process, a lower noise and vibration method such as continuous flight auger (CFA) or press-in piling must be utilised wherever possible, particularly in built-up and environmentally sensitive

areas. Good practice guidelines including best practical means to mitigate vibration should be followed.

- **Vibration Predictions and the significance of vibration effects** – Predictions should be included for each phase of demolition, and construction, and an assessment of the significance of vibration effects must be included e.g. as per BS 5228.
- **Noise and Vibration Monitoring** – Permanent real time web enabled and/or periodic noise and vibration monitoring should be undertaken for the duration of the demolition and construction phases which may result in a significant impact and at request of the LPA following substantiated complaints. The location, number of monitoring stations and the measurement data must be agreed in advance with the LPA prior to the start of construction.
- **Community relations / engagement** – The steps that will be taken to notify and update residents and businesses that may be affected by the construction of the proposed development.
- **Provision of additional mitigation** – If best practicable means mitigation applied, i.e. all reasonable measures have been taken to reduce the noise/vibration levels but levels are still such that widespread community disturbance or unacceptable interference with activities or sleep is likely to occur for a prolonged period, then consideration of noise insulation to affected properties or temporary or permanent re-housing (TRH).

Further guidance

3.6.132 For further guidance on noise, please see:

- BS 4142:2014 - Methods for rating and assessing industrial and commercial sound
- BS 8233:2014 - Guidance on sound insulation and noise reduction for buildings
- BS 5228-1:2009+A1:2014 - Code of practice for noise and vibration control on construction and open sites. Noise
- BS 5228-2:2009+A1:2014 - Code of practice for noise and vibration control on construction and open sites. Vibration
- BS 6472-1:2008 - Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting
- BS 5502-32:1990 - Buildings and structures for agriculture. Guide to noise attenuation. All available online at: <https://www.bsigroup.com/en-GB/>
- Noise Policy Statement for England (NPSE, March 2010). Available online at: <https://www.gov.uk/government/publications/noise-policy-statement-for-england>
- World Health Organisation (WHO):
 - ‘Guidelines for Community Noise’, 1999
 - ‘Night noise guidelines for Europe’, 2009
 - ‘Environmental Noise Guidelines for the European Region, 2018’. All available online at: <http://www.euro.who.int/en/health-topics/environment-and-health/noise>
- ProPG: Planning and Noise - Professional Practice Guidance on Planning & Noise - New Residential Development, May 2017 with Supplementary Document 1 (Policy and Guidance) and 2 (Good Acoustic Design). Available online at: <https://www.ioa.org.uk/publications/propg>

- Sport England - Design Guidance Note 'Artificial Grass Pitch (AGP) Acoustics - Planning Implications, New Guidance for 2015'. Available online at: <https://www.sportengland.org/media/4515/agp-acoustics-planning-implications.pdf>
- Acoustic design of schools: performance standards - Building bulletin 93 (Department for Education (DfE), February 2015). Available online at: <https://www.gov.uk/government/publications/bb93-acoustic-design-of-schools-performance-standards>
- Acoustics of Schools: a design guide (IOA / ANC, November 2015). Available online at: <https://www.ioa.org.uk/publications/schools-acoustics-guide>
- Health Technical Memorandum 08-01: Acoustics. Available online at: <https://www.gov.uk/government/publications/guidance-on-acoustic-requirements-in-the-design-of-healthcare-facilities>
- IEMA Guidelines for Environmental Noise Impact Assessment (IEMA, 2014). Available online at: <https://www.iema.net/event-reports/2016/01/07/Launch-Webinar-IEMA-Guidelines-for-Environmental-Noise-Impact-Assesment-2014/>
- 'The Assessment and Rating of Noise from Wind Farms' and 'A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine – Noise, 2013 with Supplementary Guidance Notes 1 to 6 (Institute of Acoustics, various dates). Available online at: <https://www.ioa.org.uk/publications/wind-turbine-noise>
- Guide B4: Noise and Vibration Control for Building Services Systems (GVB4/16, CIBSE 2016). Available online at: <https://www.cibse.org/>

Air Quality - Cambridge

LOCATION:	Cambridge
POLICY:	Policy 36: Air quality, odour and dust
SCALE OF DEVELOPMENT:	All scales of development (apart from householder)
TYPE OF DEVELOPMENT:	Residential and Non-residential development
SUBMISSION REQUIREMENTS:	Air Quality Statement (see templates below) Air Quality Assessment (where one or more of the criteria set out in the Sustainability Checklist are met)
LINK TO THE SUSTAINABILITY CHECKLIST:	Pol.15, Pol.16, Pol.17, Pol.18, Pol.19, Pol.20, Pol.21, Pol.22, Pol.23, Pol.24, Pol.25 and Pol.26

Policy overview

3.6.133 Every new development will have an impact on air quality, usually (but not always) by increasing emissions from buildings or from traffic generation. There is no safe level of air pollution; Cambridge City Council's policy is to reduce pollution wherever possible.

3.6.134 The planning system has an important role to play in driving forwards improvements in local air quality, minimising exposure to pollution, and improving the health and well-being of the population. Whilst land-use planning and development controls rarely provide immediate solutions to improving air quality, they can ensure that future problems are prevented or minimised. Consideration of air quality in the development design will lead to lower emissions and an improved environment. Good design at the outset is the most effective and straightforward way to a low emission development.

3.6.135 The National Planning Policy Framework (NPPF) 2019 states that planning policies and decisions should contribute to and enhance the natural and local environment. Development should, wherever possible, help to improve local environmental conditions such as air quality. Planning decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local Air Quality Action Plan. An Air Quality Action Plan is a legal requirement for councils with an Air Quality Management Area, which sets out the councils' planned actions to meet the National Air Quality Objectives.

3.6.136 The 2018 Cambridge Air Quality Action Plan²³ has three key priorities. These are in line with the principles of the NPPF and re-iterate Cambridge City Council's continued commitment to improve air quality now and in the future.

- Priority 1 – Reduce emissions in the central areas of Cambridge. Source apportionment shows that traffic emissions are the main source of air pollution in the city and that a reduction in emissions is required to meet the National Air Quality Objectives.
- Priority 2 – Reduce emissions across Cambridge. The planned growth in population and economic activity in the Greater Cambridge area could threaten the success of an Air Quality Action Plan if just considering short term objectives.
- Priority 3 – Keep emissions low in the future. Keeping emissions low and reducing emissions further will improve public health for all who live, work and visit Cambridge.

Planning for new development has a key role to play in achieving these priorities.

3.6.137 Pollution to air can arise from many sources and activities, including traffic and transport, industrial processes, domestic and commercial premises, energy generation, agriculture, waste storage/treatment and construction sites. This section relates to air pollution from all potential sources, in any potential form and includes temporary dust pollution.

3.6.138 The primary local impacts on air quality in Cambridge are from road transport, as well as some contribution from domestic, commercial and industrial heating sources. One of the most effective ways to improve air quality or to reduce the impact of new developments is to reduce the need to travel, as well as rule out the use of solid fuels or

²³ <https://www.cambridge.gov.uk/air-quality-action-plan>

oil for heating, and to encourage non-emitting heating sources or optimised gas systems where appropriate²⁴.

3.6.139 There is no safe level of air pollution (COMEAP, 2018)²⁵; developments coming forwards should be assessed for air quality impact and ensure that effective mitigation will be in place. Developers should aim for an 'air quality neutral'²⁶ development; air quality positive developments will be welcomed.

3.6.140 Applicants should consider air quality issues as early as possible in the design process to ensure that appropriate measures are integrated into the development in line with the requirements set out in the Cambridge Air Quality Action Plan, which has been produced in line with the requirements of Part IV of the Environment Act 1995; Local Air Quality Management.

3.6.141 Theme 5 of the Cambridge Air Quality Action Plan (Maintaining Low Emissions) introduced the requirement for installation of electric vehicle charge points and low emission boilers to mitigate the impact of additional development in Cambridge, as well as the provision of car clubs where appropriate. The development management measures are listed in table 3.13 below.

Table 3.13: Development Control measures to improve air quality

Electric Vehicle Charge Points Provision

- Any new or replacement car park will have EV Charge Points
- Intensification of use at a site will require additional EV charge point provision
- A site-wide EV charging strategy for large-scale Major sites – detailing the location and phasing of the charge point installations
- One slow EV Charge Point for each dwelling with allocated parking
- At least one slow EV Charge Point for every two dwellings with communal parking (at least half of all non-allocated parking spaces to have electric vehicle slow charging points)
- At least one slow EV Charge Point for every two parking spaces in non-residential developments
- At least one rapid EV Charge Point for every 1,000m² non-residential floor space (as per Institute of Air Quality Management guidance) or one fast EV Charge Point for every 1,000m² non-residential floor space (if the installation of a rapid charge point is technically impossible due to grid supply constraints evidence must be provided)
- Large scale major developments will also have at least one rapid EV charge point, or at least one fast EV charge point (if the installation of a rapid charge point is technically impossible due to grid supply constraints evidence must be provided)

²⁴ See Appendix 3, which sets out emissions standards for schemes looking to utilise Combined Heat and Power.

²⁵ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/734799/COMEAP_NO2_Report.pdf

²⁶ https://www.london.gov.uk/sites/default/files/gla_migrate_files_destination/Sustainable%20Design%20%26%20Construction%20SPG.pdf

- Installation of passive charge points - electric vehicle charging infrastructure for future activation - at all vehicle parking spaces without active charge points (to provide 100% coverage)

Combinations of provision can be proposed, depending upon the requirements of the future site users.

Car Club provision, where appropriate

- A minimum of one car club vehicle per 500 parking spaces in new residential developments; a minimum of one vehicle per 10,000 m² in non-residential developments
- Car clubs should prioritise the use of electric vehicles
- A site-wide car club strategy for large-scale Major sites – detailing the location and phasing of the charge point installations.

There may be other sites where car club provision is appropriate, for example, major development sites with little or no parking.

Energy sources

- Encourage the installation of zero-emission heating sources, such as electric heating, ground-source and air-source heat pumps
- All gas boilers to have low NO_x emissions (boilers that meet a dry NO_x emission rating of 40mg/kWh)
- Minimum emission standards for CHP emissions (Spark ignition engine: less than 150 mgNO_x/Nm³, Compression ignition engine: less than 400 mgNO_x/Nm³, Gas turbine: less than 50 mgNO_x/Nm³)

3.6.142 The Cambridge Air Quality Action Plan is a flexible document and will evolve to respond to funding and policy changes. However, the national policy background may change shortly after publication of this SPD. The UK Government is considering tightening UK standards to match World Health Organisation standards²⁷ in the forthcoming Environment Bill²⁸ and as set out in the Clean Air Strategy 2019²⁹, with a change in focus towards prevention of pollution. The intention is to improve public health and the environment. Therefore, the applicant should always refer to the Cambridge City Council's Air Quality Guidance for Developers web page³⁰, which will be updated as changes are made. Early engagement with the Development Management and Environmental Quality and Growth teams as part of the pre-application process is, therefore recommended.

Submission requirements

3.6.143 The developer has the responsibility for providing information to enable the local planning authority to make a decision. Where uncertainty exists over the likely impact

²⁷ <https://www.who.int/airpollution/publications/agg2005/en/>

²⁸ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/766849/draft-environment-bill-governance-principles.pdf

²⁹ <https://www.gov.uk/government/publications/clean-air-strategy-2019>

³⁰ <https://www.cambridge.gov.uk/air-quality-guidance-for-developers>

upon air quality or the expected levels of pollution, the Local Planning Authority will take a precautionary approach.

- 3.6.144 Any air quality issue may be a material planning consideration. However, air quality will be a material consideration where any of the following apply:
- there is an adverse effect on air quality in an Air Quality Management Area
 - pollution levels within the Air Quality Management Area will have a significant adverse effect on the proposed use/users
 - the development will lead to the declaration of a new Air Quality Management Area
 - the development will interfere with, or not be consistent with the implementation of the current Air Quality Action Plan (or any future Air Quality Strategy)
 - any sources of emissions to air, odours and fugitive dusts generated by the development are not adequately mitigated
 - any impacts on the proposed use from existing poor air quality, odour and emissions are not appropriately monitored and mitigated by the developer.

What air quality information is required to support a planning application?

- 3.6.145 Figure 9 below sets out the air quality information required to support applications of different scales, from householder through to major developments.

Air Quality Statements

- 3.6.146 To establish whether air quality impacts are acceptable, all large-scale major, small-scale major and minor planning applications (but not householder developments) are required to identify sources of emissions to air from the development in the form of an **Air Quality Statement**. Tables 3.14 and 3.15 provide Air Quality Statement Templates for completion and submission with all minor and major applications.
- 3.6.147 An Air Quality Statement sets out the existing air quality at the site, qualitatively identifies sources of emissions to air arising from the proposed development with any likely impact on air quality and confirms that basic and appropriate mitigation measures will be in place. The Statement will require approval by the Local Planning Authority. A template is provided below and a downloadable version is available from the website³¹.
- 3.6.148 Details of air quality mitigation should be provided at the point of application. Development will only be permitted if the impact on air quality is acceptable and mechanisms are in place to mitigate adverse impact and prevent further exposure to poor air quality. Pre-application discussions are recommended so that the developer can be confident that their application includes all relevant information.
- 3.6.149 Consideration of air quality and air pollution will be relevant during both the operational and the development phase. Development may give rise to air pollution as well as, for example, air quality issues associated with demolition, construction and remediation of contamination.

³¹ <https://www.cambridge.gov.uk/air-quality-guidance-for-developers>

Figure 9: Flow Diagram – what air quality information do I need to submit to support my application?

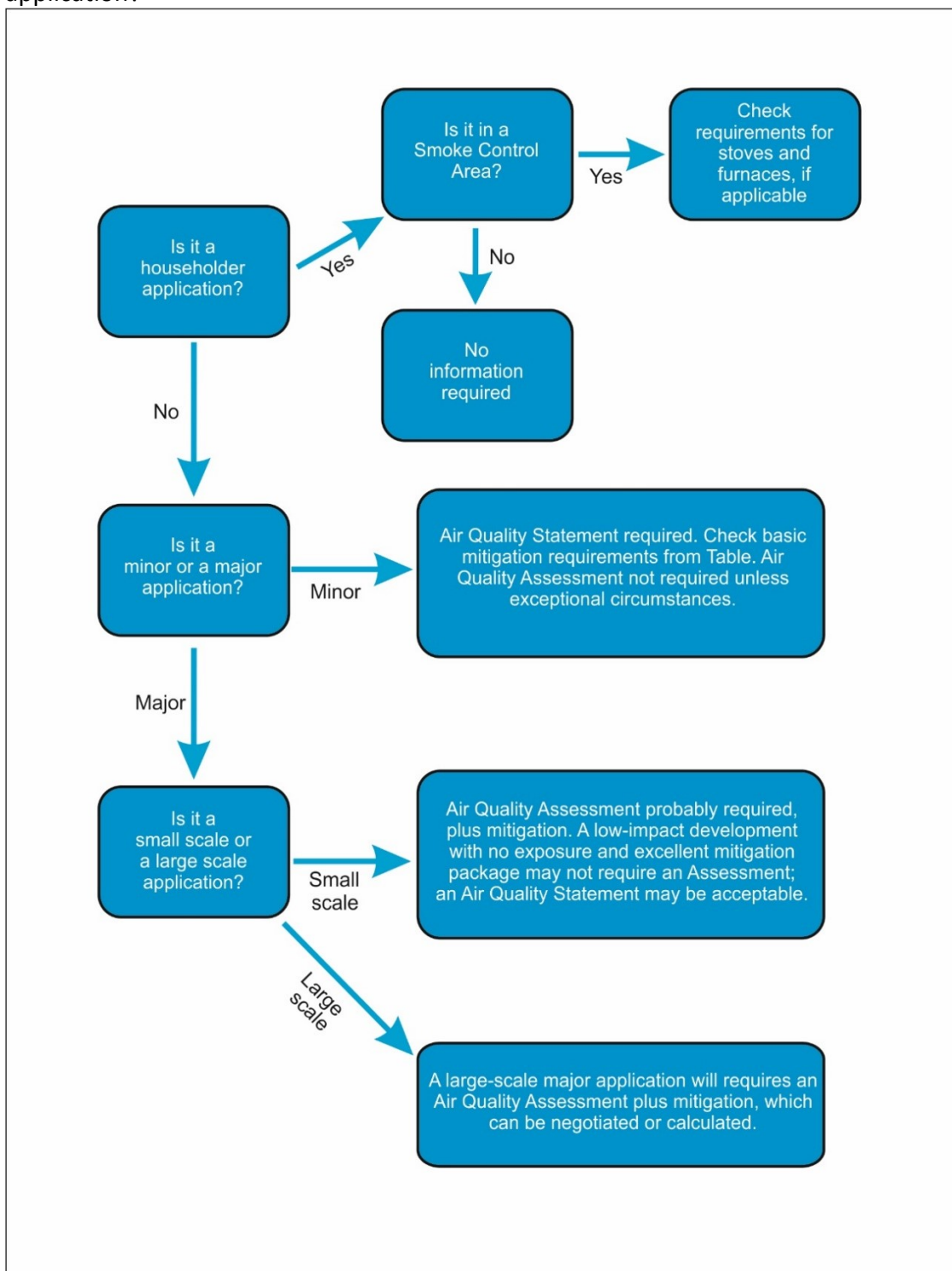


Table 3.14: Air Quality Statement template for minor developments

Name and address of site	
Description of proposed development	
<ul style="list-style-type: none"> Size (e.g., number of units or area in Ha) 	

<ul style="list-style-type: none"> Type (e.g., residential or commercial) Proximity to pollution sources, such as roads, industrial areas 	
<p>Additional information about the proposal</p> <ul style="list-style-type: none"> Parking arrangements including reserved spaces for EV/car clubs/disabled; comparison of current and proposed provision Heating provision, type and fuel, location of flue vent Is the site in the Air Quality Management Area? Is the site in a Smoke Control Area? Layout if site adjacent to busy road 	
Basic Mitigation Proposed	<p>If yes, provide details</p> <p>If no, state reason why not</p>
1. Electric heating or low NO _x ³² boilers	Yes/No
2. low emission standards for CHP ³³ , where appropriate	Yes/No
3. EV charge points where there are car parking spaces (number, type)	Yes/No
4. Dust Management Plan (see template below – ref to figure)	Yes/No

Table 3.15: Air Quality Statement Template for major development

Name and address of site	
<p>Description of proposed development</p> <ul style="list-style-type: none"> Small-scale or large-scale Major site GFA compared with existing Type (residential, commercial, academic, research, other) Proximity to pollution sources 	
<p>Additional information</p> <ul style="list-style-type: none"> AADT trip generation Parking arrangements including reserved spaces for EV/car 	

³² Low NO_x boilers - ., individual gas fired boilers that meet a dry NO_x emission rating of ≤40mg/kWh

³³ CHP - Spark ignition engine: less than 150 mgNO_x/Nm³, Compression ignition engine: less than 400 mgNO_x/Nm³, Gas turbine: less than 50 mgNO_x/Nm³

clubs/disabled; comparison of current and proposed provision <ul style="list-style-type: none"> • Heating provision, type and fuel, location of flue vent • Is the site in the Air Quality Management Area? • Is the site in a Smoke Control Area? • Is a detailed Air Quality Assessment provided? • Layout if adjacent to busy road 	
Design Features	Please provide details about the design features selected to deliver no/very low air quality impact (see examples in Table 3.17).
Mitigation Proposed	Please provide details about the mitigation features selected to deliver no/very low air quality impact (see examples in Table 3.18).
1. Electric heating or low NOx boilers	Yes/No
2. Low-emission standards for CHP, where appropriate	Yes/No
3. EV charge points where there are car parking spaces (number, type) or EVCP strategy	Yes/No
4. Demolition and construction or Dust Management Plan	Yes/No
5. Other Mitigation Measures	Please provide details about the design features selected to deliver no/very low air quality impact if the air quality impact cannot be designed out.
Offset offered	Please provide details about the features selected to offset the remaining air quality impact (see examples in Table 3.19).

3.6.150 Developers of all major planning applications should also complete the air quality questions within the Sustainability Checklist (See Appendix 1). If one or more of these criteria are met a detailed **Air Quality Assessment** including dispersion modelling may be required. Further guidance should be sought from the Environmental Quality and Growth team. Given the time required for dispersion modelling and monitoring of air quality for a detailed assessment as well as collection of traffic data to support the planning application, discussions should be sought with the local authority well before submission of a planning application.

Detailed Air Quality Assessment

- 3.6.151 If a detailed **Air Quality Assessment** with dispersion modelling is required, it should be carried out in line with the best practice guidance set out in the latest industry-prepared best guidance documents. At present, these are the IAQM document “Planning for Air Quality” (2017)³⁴ and the Defra document “Local Air Quality Management; Technical Guidance TG16” (2018). The latest available emission factors, background maps and conversion factors shall be used. Guidance may be updated to reflect changes in Government policy; the latest version of the relevant guidance should be consulted. The assessment may be incorporated into the full Environmental Statement if required for an Environmental Impact Assessment.
- 3.6.152 An Air Quality Assessment might not be required if the mitigation package (see below) is comprehensive and demonstrates that it will adequately offset any additional emissions produced by the development, or preferably lower emissions from the footprint of the site. In this case an Air Quality Statement may be sufficient. An example template is provided below and a downloadable version is available from the website³⁵. Early discussion with the Environmental Quality and Growth team is strongly recommended.

Cumulative Impact

- 3.6.153 A single development may have a very small impact on air quality, but many developments will, together, have a larger impact. For this reason it is important that:
- All developments, including minor developments, do not contribute to air pollution
 - The cumulative impact of all developments is considered
- 3.6.154 Air quality assessments are required to consider the cumulative impact of known future developments within an area. With considerable growth planned for the Cambridge sub-region, most large developments will need to consider the traffic impact from those developments contained in the Local Plan. These scenarios will have to be quantified with the same level of traffic flow.

Dust

- 3.6.155 Temporary emissions of dust during the construction phase are of concern as they add to the overall exposure of particulate matter to residents, visitors and site workers. Cambridge City Council, in association with the Cambridge Forum for the Construction Industry, runs a ‘Considerate Contractor Scheme’³⁶ designed to ensure that construction can progress without making life unpleasant for people who live and work nearby.
- 3.6.156 Each site and operation will need its own separate consideration and the amount of detail required will depend upon the type and scale of the development. For Minor applications, details in simple terms of the operations to be undertaken and the dust control and mitigation measures to be adopted shall be submitted by the applicant. Each

³⁴ Land-Use Planning & Development Control: Planning for Air Quality, IAQM and EPUK, 2017

³⁵ <https://www.cambridge.gov.uk/air-quality-guidance-for-developers>

³⁶ <https://www.cambridge.gov.uk/considerate-contractor-scheme>

stage should be considered through demolition, site preparation, ground works, construction as well as materials storage, transport and handling, both on and off site. This could be in the form of a written statement or a table of activities and mitigation, and will be included in the Air Quality Statement if there will be demolition or earthworks. The activities should be selected from the table 3.16 below.

Table 3.16: Example of approach to consideration of dust as part of Minor applications

Operation / Activity	Site Control Methods
All dust generating activities on-site	<ul style="list-style-type: none"> All site operatives to be made aware of the requirements to minimise airborne dust Site hoarding and screening to be erected Consideration of weather conditions –activities and mitigation to be reviewed on dry and windy days
Demolition	<ul style="list-style-type: none"> Consideration of demolition methodology Minimise drop heights Watering / spraying of the structures during demolition
Stockpiles	<ul style="list-style-type: none"> Stockpiles to be located away from most sensitive boundaries Stockpiled materials to be covered and / or damped down Stockpiled materials to be below the height of the site hoarding
Vehicles	<ul style="list-style-type: none"> Vehicle engines to be switched off when not in use and not left running unnecessarily Vehicle maintenance in accordance with the manufacturer’s specifications
Plant and equipment	<ul style="list-style-type: none"> Choice of plant and equipment and method of work to reflect best practicable means for control of dust Cutting and grinding: use of water sprays or local extraction Equipment to be maintained in accordance with the manufacturer’s specifications
Handling of waste materials	<ul style="list-style-type: none"> Use of enclosed chutes and covered skips Minimise drop heights from chutes Use of fine water sprays during waste handling activities Material leaving the site to be loaded onto covered wagons or skips
Burning of waste	<ul style="list-style-type: none"> The burning of waste will be prohibited on site
General housekeeping	<ul style="list-style-type: none"> Internal access routes and hard-standing will be cleaned / damped down on a regular basis

3.6.157 For Major applications, a detailed dust management plan may be required to ensure that temporary emissions of dust are minimised. This may form part of a Construction Environmental Management Plan (CEMP). The risk of dust emissions from a demolition/construction site is assessed on a site-by site basis and the need for a detailed

Dust Risk Assessment or a Dust Management Plan is judged based on various factors, including:

- the activities being undertaken (demolition, number of vehicles and plant etc.)
- the duration of these activities
- the size of the site
- the proximity of receptors to the activities
- the adequacy of the mitigation measures.

3.6.158 A dust management plan should reference and have regard to national and industry best practical technical guidance.

- The document 'Guidance on the assessment of dust from demolition and construction'³⁷ (IAQM, 2014) includes Dust and Air Emissions Mitigation Measures in section 8.2 for consideration including measures specific to demolition, earthworks, construction and track out.
- The GLA document 'Control of dust and emissions during construction and demolition'³⁸ (2016) provides details of undertaking a dust risk assessment which identifies suitable mitigation measures to be implemented. For major developments, we may require a risk assessment in accordance with this document.
- Guidance on dust monitoring is given in the document Guidance on Monitoring in the Vicinity of Demolition and Construction Sites³⁹, version 1.1 (IAQM, 2018). A commitment to undertake dust monitoring is also required for major sites. Whilst it may not be necessary to undertake continuous dust monitoring, agreement should be reached on when it will be undertaken. For example, spot checks could be undertaken on a regular basis at site boundary locations closet to sensitive receptors.

3.6.159 Longer term continuous monitoring of dust may need to be undertaken when agreed target levels are likely to exceeded, or upon the receipt of substantiated complaints.

3.6.160 It will be essential that the control methods prevent a statutory nuisance and any offence under Part III of the Environmental Protection Act 1990. However it is expected that controls should go beyond that minimal level of compliance and be more in line with the provisions of the Considerate Contractor Scheme.

3.6.161 It will be essential to detail if mobile crushing and screen equipment is used and if so to confirm that it will be used in accordance with the manufacturer's instructions. In most cases such plant will need to be permitted for use by the Pollution Prevention and Control Act 1999. Such plant is usually hired. A copy of the permit from the local authority home base for the plant should be provided to the City Council prior to it being used on site.

Smoke

³⁷ <http://iaqm.co.uk/text/guidance/construction-dust-2014.pdf>

³⁸ https://www.london.gov.uk/sites/default/files/gla_migrate_files_destination/Dust%20and%20Emissions%20SPG%208%20July%202014_0.pdf

³⁹ https://iaqm.co.uk/text/guidance/guidance_monitoring_dust_2018.pdf

3.6.162 Open fires and wood-burning stoves have risen in popularity over recent years, however, smoke from burning causes particulate air pollution. The Clean Air Act 1995⁴⁰ is the legislation that regulates emissions from stoves. There are currently three Smoke Control Areas in Cambridge⁴¹. New legislation and/or guidance is expected from Defra in 2019. Developers are recommended to:

- Ensure that any applications are compliant with the Clean Air Act 1995 if their site is in a Smoke Control Area and
- Check our website⁴² to ensure adherence with the latest guidance

How to approach improving air quality in Cambridge

3.6.163 In line with NPPF, which states that development should contribute to and enhance the environment, there is a hierarchy within the approach to air quality improvements that should be followed, as illustrated in figure 10 below.

Figure 10: Hierarchical approach to air quality improvements as part of new development



3.6.164 The role of integrating the air quality impacts into a good development design at the outset of the design process cannot be understated. Effective planning can reduce the need to travel by car to the workplace, schools, shopping and leisure facilities by ensuring new dwellings are located in areas where such facilities are readily available, or where alternative transport modes are available. Careful consideration to building design and layout can assist in minimising exposure to future occupants. Policies that enforce high building standards can play an important role in reducing emissions from services that provide heating and hot water. Some examples of design features that can be incorporated are provided in table 3.17 below. The lists in these tables are not exhaustive and additional measures may be proposed for consideration. The standard mitigation measures required for both minor and major developments are highlighted in bold.

⁴⁰ <https://www.legislation.gov.uk/ukpga/1993/11/contents>

⁴¹ <https://www.cambridge.gov.uk/smoke-pollution>

⁴² <https://www.cambridge.gov.uk/smoke-pollution>

Table 3.17: Design measures to help reduce air quality impacts

- **Installation of electric vehicle charge points⁴³**
- Car free development
- Reduced car parking provision/parking restrictions
- Reserved parking for EV/car clubs
- Design/layout of the development to promote walking, cycling and public transport
- Design and layout of infrastructure to increase separation, for example, set buildings back from the roadside
- Locate habitable spaces away from busy roads
- Arrange site to separate polluting and sensitive uses
- Arrange site to centrally locate trip attractors
- Ensure high quality walking and cycling routes
- Plan mixed-use developments where appropriate
- Home Zones
- Consider impact on local road network
- Avoid creation of non-dispersive canyons
- **Install combined heat and power (CHP) to the emissions standards set out in Appendix 3**
- **Provision of efficient electric heating, low or ultra low NOx boilers only**
- Incorporation of solar thermal and/or PV technology to reduce emissions
- Incorporation of air source or ground source heat pumps to reduce emissions

3.6.165 Initially the development design and location should be looked at in terms of air quality impacts. If design cannot fully reduce the impact to an acceptable level then mitigation measures may be used to either protect receptors or minimise the need for vehicle use. Cambridge City Council recommends that a mitigation package is submitted for approval as part of an Air Quality Statement or Air Quality Assessment in support of the planning application. Some examples of mitigation features that can be incorporated are provided in table 3.18 below. The standard mitigation measures required for both minor and major developments are highlighted in bold.

Table 3.18: Mitigation measures

- **Dust Management Plan , where appropriate (for major sites, this may be incorporated into a Construction and Environmental Management Plan)**
- Support access to a car share scheme, with financial incentives and promotion
- Provision of bike hire scheme, including E-bikes and off-gauge bikes
- Travel planning
- Mechanical ventilation with clean air intake, if appropriate
- Eco-driving training, where appropriate
- Low emission fleet strategy
- Large-scale major developments could consider:
 - Support measures to reduce the need to travel:

⁴³ The UK Electric Vehicle Supply Equipment trade association has useful information. <http://ukevse.org.uk/>

- Alternative working practices – flexitime, teleworking, homeworking, videoconferencing, compressed work periods.
- Local sourcing of staff, products and raw materials.
- Development and use of hub distribution centres employing low emission deliveries.
- Provision of discounted on-site shopping, eating, child-care, banking facilities.
- Support measures to reduce polluting motorised vehicle use:
 - Use of pooled low emission vehicles – cars, vans, taxis, bicycles.
 - Provision of dedicated low emission shuttle bus including managed pick-up and drop-off.
 - Contribution to the emerging low emission vehicle refuelling infrastructure.
 - Contribution to site low emission waste collection services.
 - Incentives for the take-up of low emission vehicle technologies and fuels.
- Measures to support improved public transport:
 - Provision of new or enhanced public transport services to the site.
 - Shuttle services to public transport interchange, rail station or park and ride facilities.
 - Support improving information systems for public transport.
 - Supporting city free bus expansion schemes.
 - Promoting low emission bus service provision.
 - Support air quality monitoring programmes.
 - Subsidised bus passes
- Further measures to promote walking and cycling:
 - Improvements to district walking and cycling networks including lighting, shelters, and information points and timetables.
 - Support cycle training and awareness schemes.
 - Guaranteed ride home in emergencies.
 - Support secure and safe cycle parking facilities.
 - Installation of charge points for EV bikes
 - Provision of pool EV bikes
- Measures to promote sustainable travel plans:
 - Support local travel to school and school travel plans initiatives.
 - Marketing aimed at persuading a switch to sustainable modes with incentives
 - Promotion of subsidised/sponsored travel plan measures
 - Supporting community/local organisation groups to promote sustainable travel

3.6.166 Many developments will require a mix of design and mitigation measures that have been tailored to be appropriate for the site. The design and mitigation package should be presented with the planning application. Standard mitigation is required for minor sites and highlighted in bold in the boxes above. The design and mitigation measures can be secured by relevant planning conditions.

3.6.167 Offsetting by providing money for schemes that improve overall air quality should be a last resort but may need to be combined with good design and mitigation in some circumstances. Appropriate contributions can be negotiated or contributions can be

calculated using Defra's damage cost approach⁴⁴. Table 3.19 below provides some examples of possible offsetting measures. Early discussion with the Development Management team and the Environmental Quality and Growth Team is recommended if offsetting/contributions will be required.

Table 3.19: Possible offsetting measures

- Financial contribution towards traffic management measures
- Financial contribution towards improvements in public transport facilities and/or support for new services
- Financial contribution towards improvements in walking and cycling facilities
- Financial contribution towards air quality improvement projects

3.6.168 Framework developer contribution procedures provides clarity for developers and planners, speeds up the negotiation process, and is considered to be a fair and transparent process for all types of development. This approach has the added advantage of being able to ensure that mitigation is in place for the cumulative impacts of a number of smaller developments, which can jointly lead to a slowly increasing air pollution baseline. The basic concept of the approach is that best practice is to reduce emissions and exposure and that this is incorporated at the outset, at a scale commensurate with emissions.

3.6.169 One approach that has been widely used to quantify the costs associated with pollutant emissions from transport is:

- Identify the additional trip rates generated by proposed development (trips/annum)
- Assume an average distance travelled of 10km/trip
- Calculate the additional NOx and PM emissions, based of emission factors in the Emissions Factor Toolkit at 35 kph
- Multiply the calculated emissions by 5 (for 5 year total)
- Use HM Treasury and Defra IGCB damage cost approach⁴⁵ to provide a valuation of the excess emissions, using the currently applicable values for each pollutant⁴⁶
- Sum the NOx and PM costs

3.6.170 The cost calculated by these means provides a basis for defining the financial commitment required for offsetting the emissions reductions or the contribution provided by the developers as 'planning gain'.

3.6.171 Air Quality emissions from buildings can also be significant if the energy demand is high, for example high tech research facilities. Building emissions can and should be designed out at the initial development design phase, with consideration to site-wide approaches to energy.

3.6.172 This is an approach that can be used for Cambridge planning applications.

⁴⁴ <https://www.gov.uk/guidance/air-quality-economic-analysis>

⁴⁵ <https://www.gov.uk/guidance/air-quality-economic-analysis>

⁴⁶ <https://www.gov.uk/guidance/air-quality-economic-analysis#damage-costs-approach>

Further guidance

- 3.6.173 For further guidance on air quality please see:
- Cambridge City Council (2018). Air Quality Action Plan. Available online at: <https://www.cambridge.gov.uk/media/3807/air-quality-action-plan.pdf>
 - IAQM and EPUK, (2017). Land-Use Planning and Development Control: Planning for Air Quality. Available online at: <http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf>
 - Defra (2018). Local Air Quality Management; Technical Guidance TG16. Available online at: <https://iaqm.defra.gov.uk/documents/LAQM-TG16-February-18-v1.pdf>
 - IAQM (2014). Guidance on the assessment of dust from demolition and construction. Available online at: <http://iaqm.co.uk/text/guidance/construction-dust-2014.pdf>
 - GLA (2016). Control of dust and emissions during construction and demolition. Available online at: https://www.london.gov.uk/sites/default/files/gla_migrate_files_destination/Dust%20and%20Emissions%20SPG%208%20July%202014_0.pdf
 - IAQM (2018). Guidance on Monitoring in the Vicinity of Demolition and Construction Sites, version 1.1. Available online at: https://iaqm.co.uk/text/guidance/guidance_monitoring_dust_2018.pdf

Air Quality – South Cambridgeshire

LOCATION:	South Cambridgeshire
POLICY:	Policy SC/12: Air Quality
SCALE OF DEVELOPMENT:	All major development requiring a Transport Assessment and a Travel Plan Any development where air quality is likely to be a significant issue
TYPE OF DEVELOPMENT:	Residential and Non-residential development
SUBMISSION REQUIREMENTS:	<ul style="list-style-type: none">• Air Quality Assessment• Low Emission Strategy
LINK TO THE SUSTAINABILITY CHECKLIST:	Pol.15 and Pol.16

Policy overview

- 3.6.174 Policy SC/12 seeks to ensure that new development does not exacerbate, or be impacted by air pollution and pollution from odour and other fugitive emissions to air. Air quality issues within South Cambridgeshire have been linked directly to the volume of traffic that runs through the district, specifically along the A14. The A14 is congested on a regular basis between Bar Hill (to the west of Cambridge) and Milton (to the north north-east of Cambridge). This has resulted in the declaration of an Air Quality Management

Area (AQMA) for nitrogen dioxide (NO₂) and PM₁₀ along a stretch of the A14 between Bar Hill and Milton. The Joint Air Quality Action Plan for Huntingdonshire, Cambridge City and South Cambridgeshire incorporates priority actions for tackling air quality issues through the land use planning process. Cambridge has also recently adopted its new Air Quality Action Plan, covering the period from 2018 to 2023⁴⁷, which will need to be taken into consideration for cross boundary applications. The requirements set out in these documents, along with successor documents, will need to be taken into consideration when developing planning proposals.

Submission requirements

3.6.175 A Low Emission Strategy (LES) will need to be submitted alongside planning applications for major developments requiring a Transport Assessment and a Travel Plan and developments with significant transport implications as follows:

- In particularly congested locations and/or generating large number of trips;
- Where there are particular travel problems; or
- That will have an adverse impact on an existing, or will result in the declaration of a new, Air Quality Management Area, or an unacceptable adverse impact on local air quality.

3.6.176 An LES provides a package of measures to help mitigate the transport impacts of development on local air quality and on climate change. They complement other design and mitigation options, such as travel planning and the provision of public transport infrastructure. Strategies are often secured through a combination of planning conditions and planning obligations. They may incorporate policy measures and/or require financial investments in and contributions to the delivery of low emission transport projects and plans, including strategic monitoring and assessment activities.

3.6.177 Table 3.20 below sets out the Council’s preferred sustainable transport measures to be included within any LES to support planning applications for Major developments. These measures are taken from South Cambridgeshire District Council’s emerging Air Quality Strategy.

Table 3.20: Sustainable Transport Measures to be included in Low Emission Strategy

CATEGORY	MEASURES
Electric and Low Emission Vehicles Uptake	
Residential developments	<ol style="list-style-type: none"> 1. Charging Point (standard or fast where possible) for all private and allocated parking spaces 2. Charging Point (Fast or Rapid where possible) for every 10 communal parking spaces

⁴⁷ Available online at: <https://www.cambridge.gov.uk/air-quality-action-plan>

CATEGORY	MEASURES
Commercial Developments	<ol style="list-style-type: none"> 1 Rapid Charging Point/station Per 1000m² of floorspace or per 20 parking spaces or 2. Allocated fast Charging Point for 50% of proposed parking spaces
Supporting Infrastructure	<ol style="list-style-type: none"> 1. Provision of infrastructure to facilitate additional charging points 2. Support for other Low Emission technologies is welcome and considered on site-by-site basis
Behavioural Change and Travel Plan	
Modal Shift Facilities and Incentives	<ol style="list-style-type: none"> 1. Phasing of the cycling/pedestrian infrastructure 2. Membership for Car Share and Car Hire schemes 3. Subsidised Bus and Rail Pass 4. Discount Vouchers/arrangements for shops (local) to assist with cycling uptake i.e. purchase, servicing , repairs and training 5. Promoting non-idling 6. Electric Shuttles, or other low emission alternative, to local facilities i.e. schools & public transport hubs (funded long-term) 7. Sheltered bus stops 8. Provision of Car Share Scheme 9. Provision of a Car Club Scheme 10. Provision of Bike-sharing schemes 11. Secure bike storage facilities (site wide) 12. Sufficient bike storage within housing and apartment blocks 13. Parking enforcement for non-allocated spaces 14. Personalised Active Travel Plans
Parking Provision (In line with cycle parking requirements set out in policy TI/3)	
Parking Allocation and Facilities	<ol style="list-style-type: none"> 1. Non-idling policy 2. Priority Parking Bays for Low Emission Vehicles (with provision of Charging Points) 3. Priority Parking Bays for Car Share Schemes 4. Secure and sheltered parking area for cycles 5. Provision of charging points for electric bikes and provision for off-gauge bikes
Public Transport	

CATEGORY	MEASURES
Support for Sustainable and Low Emission Public Transport	<ol style="list-style-type: none"> 1. Participation in district wide public transport schemes 2. Contributions for sustainable transport infrastructure enhancement, such as new guided busways, cycle routes, train stations etc. 3. Contributions for Low Emission Buses or Retrofitting the existing fleet (serving the area of the development) 4. Participation in Greater Cambridgeshire Partnerships projects near the development 5. Sheltered bus stops 6. Local Shuttles to public transport hubs
Offsetting Emissions	
Financial contributions	Appropriate mitigation contributions can be calculated using Defra's damage cost approach (Guidance). Offsetting should be a last resort and will be considered on site-by-site basis.

3.6.178 In addition to the measures outlined in table 3.20 above, there are a range of additional measures that can be incorporated into new developments that will have additional benefits in terms of improving air quality as well as meeting other policy requirements set out in the South Cambridgeshire Local Plan (2018). Some of the measures which could be included are outlined in table 3.21 below. Note that this table is not exhaustive.

Table 3.21: Additional measures which can assist with improving air quality

CATEGORY	MEASURES	LINKS TO LOCAL PLAN POLICY AND/OR RELEVANT GUIDANCE IN THIS SPD WHERE APPROPRIATE
Renewable and low carbon energy	At least 10% of the buildings carbon emissions through the use of on-site renewable and/or low carbon energy	South Cambridgeshire Local Plan (2018) Policy CC/3 Section 3.2 (paragraphs 3.2.14 – 3.2.38)
Combined Heat and Power (CHP) – emissions standards	Any gas fired CHP should meet an emissions standard of:	Section 3.2 (paragraph 3.2.31) and Appendix 3
Gas boiler efficiency		

CATEGORY	MEASURES	LINKS TO LOCAL PLAN POLICY AND/OR RELEVANT GUIDANCE IN THIS SPD WHERE APPROPRIATE
	<ul style="list-style-type: none"> • Spark ignition engine: less than less than 150 mgNO_x/Nm³ • Compression ignition engine: less than 400 mgNO_x/Nm³ • Gas turbine: less than 50 mgNO_x/Nm³ <p>A low NOx boiler would meet a dry NOx emission rating of 40mg NOx /kWh</p>	
Biomass boilers	A standalone checklist should be obtained from Environmental Services for all biomass boilers	South Cambridgeshire Local Plan (2018) Policy SC/12
Optimised design	<p>New development should be designed to minimise public exposure to pollution sources by</p> <ul style="list-style-type: none"> • Locating habitable rooms away from busy roads • Avoiding building configuration along busy roads that inhibits effective pollution dispersion (street canyons), • Considering the proximity of sensitive receptors such as schools to busy roads. • Introducing green infrastructures and barriers to reduce pollutants 	
Construction standards	Many measures to enhance the sustainability and energy efficiency of the built environment also have the	South Cambridgeshire Local Plan (2018) – Chapter 3 Strategic Sites. Can assist with those sites that have

CATEGORY	MEASURES	LINKS TO LOCAL PLAN POLICY AND/OR RELEVANT GUIDANCE IN THIS SPD WHERE APPROPRIATE
	<p>additional benefit of delivering mutually beneficial air quality objectives. Construction standards such as BREEAM and Home Quality Mark (HQM) include consideration of air quality. While not specifically required by policy in the South Cambridgeshire Local Plan (2018), use of these construction standards is fully supported.</p>	<p>policy criteria related to exceeding baseline policy requirements set out in the climate change chapter of the Local Plan (2018).</p>
<p>Building ventilation</p>	<p>The preference should be for buildings to be naturally ventilated wherever possible.</p> <p>Sealed fascia's with active ventilation or active air filtration should only be used in cases where other options are not available, for example in areas around AQMA's or areas that could suffer from excessive noise. Care must be taken in designing such systems that the thermal comfort of building users can be guaranteed, with consideration given to future climate scenarios. Note that this should not preclude mechanical extract systems in bathrooms and kitchens, and the Council would be supportive of the use of Mechanical Ventilation with Heat Recovery (MVHR) to supplement natural ventilation, where systems</p>	<p>Section 3.4 (Climate change adaptation, paragraphs 3.4.10 – 3.4.15)</p>

CATEGORY	MEASURES	LINKS TO LOCAL PLAN POLICY AND/OR RELEVANT GUIDANCE IN THIS SPD WHERE APPROPRIATE
	are correctly specified, installed and maintained.	
Construction Phase		
Construction dust monitoring	Monitoring will be requested on a site by site basis. In line with best practice guidance (see further guidance below).	South Cambridgeshire Local Plan (2018) policy SC/12)
Construction vehicles	Any diesel-powered machines used on, or otherwise serving the site, must be run on ultra-low sulphur diesel (also known as ULSD 'cleaner diesel' or 'green diesel'). "Ultra-low sulphur diesel" means fuel meeting the specification within BS EN 590 .	
Construction road layout	Using design measures including speed restrictions and traffic management.	South Cambridgeshire Local Plan (2018) Policy CC/6: Construction Methods
Construction Environmental Management Plan (CEMP)	<p>A CEMP will cover impacts to air quality mainly associated with dust and odour. The CEMP will also cover more general environmental health issues such as noise and light pollution.</p> <p>Site activities include plant emissions – measures could include switch-off policy, plant maintenance and alternative fuel use.</p>	South Cambridgeshire Local Plan (2018) Policy CC/6: Construction Methods

3.6.179 An **Air Quality Assessment** will be required for applications where air quality is likely to be a significant issue. This could either be from:

- Emissions to the air arising from the proposed development including changes in traffic generation / distribution / composition, combustion appliances or other point sources of air pollution and the potential effect on local air quality, public health, the environment or amenity.
- Where a development would adversely affect air quality in a designate AQMA, or lead to the declaration of a new or increase an existing AQMA, or render unworkable elements of the Council's Air Quality Action Plan.
- Proposed introduction of a sensitive use (e.g. residential) into an area of poor air quality.
- Proposed introduction of a sensitive use (e.g. schools and care homes) near busy roads where pollution from traffic is of concern.

3.6.180 The exact level of assessment to be included in the Air Quality Assessment will need to be discussed with officers from the Air Quality team on a case by case basis. These discussions will need to take place at an early stage in the design of the development to ensure that all possible mitigation measures are integrated into the scheme.

Further guidance

3.6.181 For further guidance on the assessment of air quality as part of the planning application process see:

- Land-Use Planning and Development Control: Planning for Air Quality, January 2017 - Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM). Available online at: <http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf>
- Guidance on the assessment of dust from demolition and construction, v1.1 June 2016 - Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM). Available online at: <https://iaqm.co.uk/text/guidance/construction-dust-2014.pdf>
- Guidance on Monitoring in the Vicinity of Demolition and Construction Sites, October 2018 - Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM). Available online at: https://iaqm.co.uk/text/guidance/guidance_monitoring_dust_2018.pdf
- National Planning Practice Guidance (NPPG) – Air Quality. Available online at: <https://www.gov.uk/guidance/air-quality--3>
- National Clean Air Strategy 2019. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/770715/clean-air-strategy-2019.pdf
- Department for Environment, Food and Rural Affairs (Defra) Damage Cost Guide: <https://www.gov.uk/guidance/air-quality-economic-analysis#damage-costs-approach>
- Greater Cambridgeshire Partnership <https://www.greatercambridge.org.uk/>
- [Cambridgeshire Local Transport Plan](#)
- [South Cambridgeshire Community Transport Strategy](#)

Odour and Other Fugitive Emissions to Air

LOCATION:	Cambridge and South Cambridgeshire
POLICY:	Cambridge: Policy 36: Air quality, odour and dust South Cambridgeshire: Policy SC/14: Odour and Other Fugitive Emissions to Air
SCALE OF DEVELOPMENT:	All Major Development (add details),
TYPE OF DEVELOPMENT:	Residential and Non-residential
SUBMISSION REQUIREMENTS:	<ul style="list-style-type: none">• Odour impact risk assessment or detailed odour impact assessment
LINK TO THE SUSTAINABILITY CHECKLIST:	For applications in Cambridge see Pol.27, Pol.28 and Pol.29 For applications in South Cambridgeshire see Pol.17, Pol.18 and Pol.19

Policy context

- 3.6.182 Potential odour impacts/effects associated with new development can be a material planning consideration, as odours can have an unacceptable adverse impact/effect on amenity, quality of life and living conditions. Impact on amenity as a result of odour annoyance can occur when a person exposed to an odour perceives the odour as unwanted and it detracts from the overall character or enjoyment of an area. Odours can give rise to unpleasantness, annoyance, nuisance or complaints. Due to chemical complexity and smell variety, it is difficult to completely eliminate all odour / smells. The odour effect that the planning process needs to be concerned with is the negative adverse appraisal by and effect on a human receptor as a result of odour exposure.
- 3.6.183 Odours arising from industrial, trade or business premises can also be considered a statutory nuisance by local councils under the Environment Act 1990, if they unreasonably and substantially interfere with the use or enjoyment of a home or other premises. It is important to note that loss of amenity or disamenity does not equate directly to nuisance and significant loss of amenity will often occur at lower levels of odour exposure than would constitute a statutory nuisance. Nuisance is not intended to secure a high level of amenity but is a basic safeguarding standard intended to deal with excessive emissions. It is therefore important for the planning authorities to consider properly, loss of amenity from emissions in the planning process in its wider / broader context and not just from the narrow perspective of statutory nuisance.
- 3.6.184 Odour is a complex issue that air quality professionals are frequently required to assess, particularly in respect to planning. Potential odour impacts may need to be assessed when considering a new development planning application for:

- i. **Odour Generating Development** - a source, process, activity or use that may generate / release odours (odorous activities) and in particular when near existing sensitive uses / premises, or
- ii. **Odour Sensitive Development** - a new sensitive use / premises that is being proposed near to an existing / established odorous source, process, activity or use (often referred to / known as 'encroachment').

3.6.185 The planning system should ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development.

3.6.186 Ideally, significant sources of odour generating development should be separated from odour sensitive users of the neighbouring land (sensitive receptors). If this is not practicable or achievable, it may be possible to employ odour abatement / control and mitigation measures and other design solutions to make a proposed development acceptable in principle from a land-use perspective.

Submission requirements

3.6.187 New proposals for odour generating developments may require an odour impact risk assessment statement or detailed odour impact assessment to be submitted, either as a stand-alone assessment or as part of an Environmental Statement if 'Environmental Impact Assessment' development, to accompany the planning application to determine if the proposals are acceptable. Odours can be associated with a wide range of activities. Typical examples of potentially odorous activities are:

- sewage / wastewater and sludge treatment works
- intensive livestock and animal rearing / farming
- processing / rendering of animals / animal by-products
- landfill and waste disposal and recycling sites
- solid waste management, handling and treatment plants (for example compost windrows turning)
- biofuels and anaerobic digestion facilities
- food production and manufacturing sector
- pet food processing
- foundry emissions
- some industrial processes such as B2 - General industrial
- 'sui generis' uses such as launderettes and nail bars
- the majority of hot food premises

3.6.188 An odour impact assessment may also be required for any development that will introduce new receptors to an area that may be subject to odour. In all cases where the generation of odours from the development can be readily anticipated, the LPA shall expect to be provided with objective evidence that demonstrates that odour emissions will be adequately controlled to prevent any significant loss of amenity to neighbouring sensitive land uses. The degree of detail provided in such assessments should be proportionate to the risk of odour impact, taking account of factors including the

proximity of receptors, the scale of the proposed activity and the nature of the proposed development.

3.6.189 Careful consideration should be given to the location of new odour sensitive developments such as residential developments, schools and hospitals near to existing odour sources at industrial type premises / activities. Encroachment of odour sensitive development around such odour sources may lead to problems with the site becoming the subject of complaint, essentially creating a problem where there was not one before. In order to avoid adverse effects on existing businesses with odour generation the LPA will apply the 'agent of change principle' where odour sensitive uses are proposed in close proximity to them. The agent of change principle identifies that the party responsible for a change should also be responsible for managing the impact of that change. The LPA may seek to secure mitigation measures through the use of design / layout and or planning conditions if necessary. In some case mitigation may only be practicable or achievable off- site at source and in these circumstance s106 obligations may be required.

3.6.190 Ideally a robust screening process at the application submission stage should help to identify new developments where adverse odour impacts may arise. Screening should aim to identify applications where odours are a potential issue, whether the application site is the source, or the application site is close to potential odour sources. At the pre-application stage, sources of odour from or near to proposed developments need to be identified and assessed for potential impact.

Content of an odour impact assessment for planning

3.6.191 An assessment of the impact and resulting effects of an odour source, process, activity or use on surrounding users of the land should usually seek to identify and contain the following key elements:

- A description of existing baseline odour conditions (including complaints history) where relevant.
- A description of the location of receptors (either existing or proposed) and their relative sensitivities to odour effects. Sensitivity to odours is based upon the level of expected amenity and the length of time users would be exposed to odour (Uses such as residential, hospitals, schools are classified as high sensitivity because users would expect enjoyment of a high level of amenity and would be present for extended periods of time. Places of work and retail premises are classified as medium sensitivity and industrial and farm use, roads / footpaths are low sensitivity.
- Details of potential odour sources (whether existing or proposed), including the activities and materials involved (including a brief outline of quantities, durations, methods of handling and storage, etc.) and the resulting potential for generating odours, covering fugitive sources, diffuse sources and point sources as applicable. Undertake odour source- evaluation, management, treatment and control.
- A description of control/mitigation and design measures incorporated into the scheme proposals (including: management controls and, where appropriate, odour abatement engineering controls).

- Depending on the nature of the proposals prediction or observation (or combination of both), using appropriate assessment tools, of the likely odour impact and resulting effects at relevant sensitive receptors, and taking into account:
 - the likely magnitude of odour emissions (after control by measures incorporated into the scheme, if applicable);
 - the likely meteorological characteristics at the site;
 - the dispersion and dilution afforded by the pathway to the receptors and the resulting magnitude of odour that could result;
 - the sensitivity of the receptors either existing or proposed; and
 - the potential cumulative odour effects with any odours of a similar character, (e.g. if odours from kitchen waste are in addition to an existing municipal solid waste throughput.)
 - consideration and justification for any odour benchmark/odour assessment acceptability criteria used
- Where odour modelling has been used the report should contain full details of the input data and modelling options used to allow a third party to reproduce the results.
- Where odour effects are assessed as significant, details of appropriate further design, mitigation and odour abatement control measures that could allow the proposal to proceed without causing significant loss of amenity.
- The residual odour impacts and their effects on a receptor of a particular sensitivity.
- A conclusion on the significance of the residual effect, i.e. whether “significant” or “not significant” and whether there is likely to be an unacceptable adverse impact on amenity / quality of life.

3.6.192 Assessing the odour impact of particular activity can be a complex process and is dependent on the complexity of the activity and the systems in operation concerned. We would therefore recommend that applicants and their consultants to consult with the environmental health as part of the pre-application process to gain agreement on the approach and methodology that will be used and what elements should be included.

**Submission Requirements - Level of Odour Assessment / Risk Assessment Required:
Low to Medium Risk Developments - Hot Food Premises**

3.6.193 For small scale developments such as a new hot food takeaway, a relatively simple risk assessment based approach is likely to be appropriate, providing it is carried out in a thorough manner. An example of an Odour Risk Assessment Protocol for commercial kitchens is provided in the document ‘Control of Odour and Noise from Commercial Kitchen Exhaust Systems - An update to the 2004 report prepared by NETCEN for DEFRA (EMAQ, 5-9-2018)’.

3.6.194 A simple risk assessment approach is suggested as a means of determining odour control requirements based on the height of flue discharge, proximity of sensitive receptors, size of kitchen and type of cooking (odour and grease/smoke loading). Odour controls systems will need to include an adequate level of odour control and stack dispersion or a combination. The equipment installed to remove cooking odours from the extract air will depend upon the level of control required and will need to deal with the two main phases of contaminants within cooking emissions: the particulate (grease,

small food and smoke particles) and gaseous (odour vapour/volatile organic compounds). The aim of any ventilation/extraction is to ensure that no nuisance, disturbance or loss of amenity is caused by odour or smoke/fumes, food droplets to nearby properties. A suitably qualified and experienced person with specialist knowledge of ventilation schemes should undertake the design and installation of a ventilation system. Designing and installing appropriate ventilation systems may involve considerable expense. In circumstances where the end user of the premises is unknown, or where the specific type of food to be cooked is unknown, the installation should be designed to achieve the highest level of odour control in order to cater for a worst case scenario.

- 3.6.195 Additionally, the visual appearance of the flue may be important and the flue itself may require a separate planning permission. This is important not least because possible odour mitigation measures could in themselves impact on other land use planning requirements and amenity or quality of life implications. The installed systems must not appear as an incongruous feature in the street scene and this could be a constraining factor. To be acceptable the proposed extraction system will have to be:
- Located preferably to minimise its visual impact on the street scene
 - Of a colour, finish and design to blend in with the buildings to which it is attached, incorporating cladding where appropriate; and
 - Installed within the building where practicable and particularly where the proposal is within a conservation area or within the setting of a listed building.

- 3.6.196 To enable the LPA to assess the suitability of a ventilation scheme, the following information should be provided:
- Information on premises: the following information should be supplied:
 - i. the number of meals to be served per day;
 - ii. the method(s) of preparation and cooking;
 - iii. the types of meal served; and
 - iv. proposed hours of operation of the business and any ventilation plant.
 - Plans and drawings: a scaled plan showing the internal arrangement of the premises and the dimensions/location of the ventilation system should be provided. The plan must contain external elevations of the buildings showing the dimensions, route; and exhaust termination characteristics (i.e. appearance) of the ductwork in relation to the building. The location of all filters and the fan must be clearly marked. Where the location of a filter is shown the type must be clearly identified and cross-referenced to the detailed product specification.
 - Pre-filters - A copy of the manufacturer's product data sheet should be supplied
 - Electrostatic precipitators (where proposed) A copy of the manufacturer's product data
 - Carbon Filters (where proposed) - The details and type of carbon filter units should be identified
 - Odour counteractant or neutralising system (where proposed) - The details and type of counteractant or neutralising system should be identified
 - Cooker hood characteristics – dimensions, dwell time of the gases in the carbon filtration zone, efflux velocity
 - System Operation - extract rate, dwell time of the gases in the carbon filtration zone, efflux velocity

- Flue Design: the height and velocity of the final discharge stack are the two important factors. Generally, the greater the flue height, the better the dispersion and dilution of odours. The discharge stack should:
 - i. discharge the extracted air not less than 1 m above the roof ridge of any building within 15 m of the vent serving the commercial kitchen. Additional odour control measures may still be required depending on cooking type and frequency.
 - ii. If (i) cannot be complied with for planning reasons, then the extracted air shall be discharged not less than 1 m above the roof eaves or dormer window of the building housing the commercial kitchen. A high level of odour control measures than those required in part (i) may be required.
 - iii. If (i) or (ii) cannot be complied with for planning reasons or ownership or structural constraints, then an exceptionally high level of odour control measures than those required in part (i) or (ii) may be required in order to reduce odours, such as an increase in efflux velocity and additional filters, etc. The final discharge should be vertically upwards with a jet cowl or similar, unimpeded by flue terminals, such as rain cowls/caps. The number of bends in the ducting should be minimised and the ducting should have a smooth internal surface.
- Maintenance schedule for all systems.

Submission Requirements - Level of Odour Assessment / Risk Assessment Required: Medium to Higher Risk Developments

- 3.6.197 For higher risk odour generating uses, such as a new sewage treatment works or when odour sensitive uses are proposed near such uses, a more rigorous approach to evaluating odour impact may be appropriate. For such proposals odour assessment should be undertaken in accordance with the Institute of Air Quality Management document 'Guidance on the assessment of odour for planning (IAQM, Version 1.1 - July 2018)' and Environment Agency 'H4 Odour Management Guidance, March, 2011'.
- 3.6.198 Environmental health officers must be contacted prior to any odour assessment for agreement on the most suitable method.
- 3.6.199 The odour impact information, statement and assessment as appropriate, that has been submitted will be assessed and relative weight given to the significance of any odour impacts/effects. If unacceptable odours cannot be prevented by means of an effective design and mitigation planning permission will not normally be granted.
- 3.6.200 If it is concluded that odour/fume generation can be abated to an acceptable level then a planning condition may be imposed requiring the submission of the final design and specific details of an odour mitigation scheme and odour management plan (odour overview, source identification, control/mitigation including maintenance, monitoring, complaints handling and review) as necessary, in writing for approval by the LPA.

Odours – Planning and Industrial Pollution Prevention and Control Regimes

3.6.201 Following the granting of planning consent, some potentially odorous new developments e.g. industrial or waste activities may be required to operate under separate pollution control regimes such as an Environmental Permit, whereby on-going pollution control of many (though not always all) of the operations will be regulated by the Environment Agency or other agencies. Therefore the council should be contacted prior to any planning application or permit application being submitted for an agreement on the type and scale of any assessment that may be required. Even with effective operational pollution regulation in place some residual odour can remain and there may be some situations where such residual effects would make a development an unsuitable use of land at its proposed location. For sites that will be subject to an Environmental Permit it is still necessary, therefore, for the Planning Authority to consider at the planning stage whether the proposed development at the site will be a suitable use of the land - in particular, with regard to the likely residual effects of odour on nearby sensitive users.

3.6.202 Where a development requiring planning permission will also require a permit, it is recommended that the operator makes both applications in parallel, whenever possible, to allow a consistent approach. This will allow the council to begin its formal considerations early on, thus allowing it to co-ordinate both the planning process and permit application process. Joint pre planning discussions with the Environment Agency, the planning authority and the developer are also recommended in order that all interrelated issues can be considered at an early stage. This is particularly important where fundamental issues exist which may affect whether the development is acceptable. Guidance for developments requiring planning permission and environmental permits, October 2012, is available on the Environment Agency website: <https://www.gov.uk/government/organisations/environment-agency>

Odour Control Mitigation

3.6.203 Before an adverse effect (such as disamenity, annoyance, nuisance or complaints) can occur, there must be odour exposure. For odour exposure to occur all three links in the source-pathway-receptor chain must be present:

- a. an emission **source** - a means for the odour to get into the atmosphere
- b. a **pathway** - for the odour to travel through the air to locations off site
- c. the presence of **receptors** (people) that could experience an adverse effect, noting that people vary in their sensitivities to odour.

3.6.204 The option of preventing and controlling odours relies on an ability to intervene effectively at one or more stages of the 'Source-Pathway-Receptor' process, as follows:

- Preventing the release of odorous air to the atmosphere by containment and odour control
- Preventing the formation of odorants in solid and liquid material within a process;
- Preventing the transfer of odorants from a mixture to gas phase [air] and reducing concentration by abatement and control;
- Preventing the transportation of odorants from the source reaching receptors: anything that increases dilution and dispersion of an odorous pollutant plume as it

travels from source to receptor will reduce the concentration at the receptor, and hence reduce exposure.

- Influencing the quality of the odour to reduce the perception of odours as a nuisance by receptors;
- Implementation of an odour management plan (ongoing odour overview, source identification, control / mitigation including maintenance, monitoring, complaints handling and review)
- Prevent or reduce exposure to odour at receptor location, and
- Ensuring effective communication

3.6.205 Table 3.22 below provides examples of odour control and mitigation measures. Where mitigation measures are required, these should be detailed within the Odour Impact Assessment.

Table 3.22: Examples of odour control measures

Odour Source	Proactive / Planned Measures
Sewage treatment	<p>Closed-containment process over high emission areas</p> <p>Odour control systems / filters</p>
Paints and solvents	<p>Ventilation design</p> <p>Solvent extraction and recovery systems</p> <p>Vents located away from residents</p>
Animals, livestock and poultry	<p>Site assessment and building design for odour control;</p> <p>Stocking density planned and agreed</p>
Storage and spills	<p>Design of containment and covered areas for moving liquid</p>
<p>Hot food takeaways, food processing and commercial kitchens and;</p> <p>Industrial/chemical processes</p>	<p>Ventilation design – high level of discharge to facilitate the adequate dispersion and dilution of odours;</p> <p>Extraction and filtration / odour abatement and control systems;</p> <p>Vents located away from residents</p>

Further guidance

3.6.206 For further guidance please see:

- Institute of Air Quality Management. Guidance on the assessment of odour for planning (IAQM, Version 1.1 - July 2018). Available online at: <http://www.iaqm.co.uk/text/guidance/odour-guidance-2014.pdf>
- Environment Agency - H4 Odour Management Guidance. Available online at: <https://www.gov.uk/government/publications/environmental-permitting-h4-odour-management>
- Control of Odour and Noise from Commercial Kitchen Exhaust Systems - An update to the 2004 report prepared by NETCEN for DEFRA (EMAQ, 5-9-2018). Available from: <https://ee.ricardo.com/downloads/air-quality/control-of-odour-and-noise-from-commercial-kitchen-exhaust-systems>
- DW 172: Specification for Kitchen Ventilation Systems - Building Engineering Services Association (BESA, Second Edition 2018). Available from: <https://www.thebesa.com/knowledge/shop/products/dw-172-specification-for-kitchen-ventilation-systems/>
- Protecting our Water, Soil and Air: A Code of Good Agricultural Practice for farmers, growers and land managers (Defra, updated 27 July 2018). Available online at: <https://www.gov.uk/government/publications/protecting-our-water-soil-and-air#history>
- Technical Guidance Note IPPC SRG 6.02 (Farming) 'Odour Management at Intensive Livestock Installations', (Environment Agency, May 2005. Available online at: <https://www.gov.uk/government/publications/intensive-farming-introduction-and-chapters>

3.7 Sustainable Drainage Systems and flood risk

- 3.7.1 Sustainable drainage systems (SuDS) re-create the benefits of natural drainage systems by integrating water management into the design of new developments to create and enhance the public realm, streets and open spaces that we all value. SuDS allow for the delivery of high quality surface water drainage whilst at the same time supporting the growth of the Greater Cambridge area and enabling the area to cope with severe rainfall, enhancing the adaptive capacity of the area. Policies within the 2018 Cambridge and South Cambridgeshire Local Plan place the emphasis on the use of SuDS over traditional underground piped drainage systems.
- 3.7.2 This section of the SPD focuses on guidance for the implementation of SuDS policy in the Cambridge Local Plan (2018). This guidance supplements the wider guidance on flooding and drainage provided for in the [Cambridgeshire Flood and Water SPD](#). For applications in South Cambridgeshire, further guidance on policy implementation, alongside drainage checklists, is provided in the [Cambridgeshire Flood and Water SPD](#).

LOCATION:	Cambridge
POLICY:	Policy 31: Integrated water management and the water cycle Policy 32: Flood risk (criterion a. and b.)

SCALE OF DEVELOPMENT:	All scales of development
TYPE OF DEVELOPMENT:	Residential and Non-residential development
SUBMISSION REQUIREMENTS:	<ol style="list-style-type: none"> 1. Surface Water Drainage Strategy; and 2. A Site Specific Flood Risk Assessment is required: <ul style="list-style-type: none"> • For proposals of 1 ha or greater in Flood Zone 1 • For all proposals for new development (including minor development and change of use) in Flood Zones 2 and 3; or • In an area within Flood Zone 1 which has critical drainage problems; or • Where proposed development, or a change of use to a more vulnerable class, may be subject to other forms of flooding (for example if a proposed development is in an area of significant surface water flood risk)⁴⁸.
LINK TO THE SUSTAINABILITY CHECKLIST:	SuDS.1

Policy context

- 3.7.3 Policy 31 of the Cambridge Local Plan (2018) was developed in response to the high level of surface water flood risk facing Cambridge. Evidence contained in the Surface Water Management Plan⁴⁹ and Strategic Flood Risk Assessment for Cambridge⁵⁰ has found there is little or no capacity in our rivers and watercourses that eventually receive surface water run-off from Cambridge and that it needs to be adequately managed so that flood risk is not increased elsewhere. As a result all scales of new development needs to utilise SuDS in order to reduce the rate of discharge into these watercourses and hence mitigate the risk of surface water flooding. This approach differs from national policy in that it applies the requirement for SuDS to all scales of development, recognising the cumulative impact that development in an urban context has on flood risk.
- 3.7.4 Chapter 6 of the Cambridgeshire Flood and Water SPD sets out further guidance on how to integrate SuDS into the design of new developments. The purpose of this section of the Sustainable Design and Construction SPD is to provide additional guidance on implementation to supplement the Cambridgeshire Flood and Water SPD in light of the specific requirements set out in policy 31, including:
- A requirement for all flat roofs to be green or brown roofs (see section 3.4 of this SPD);
 - there is no discharge from the developed site for rainfall depths up to 5 mm of any rainfall event (Interception);

⁴⁸ For further guidance on Site Specific Flood Risk Assessments see: <https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications>

⁴⁹ Cambridge and Milton Surface Water Management Plan (2011), Cambridgeshire Flood Risk Partnership

⁵⁰ Cambridge and South Cambridgeshire Level 1 Strategic Flood Risk Assessment (2010)

- the run-off from all hard surfaces shall receive an appropriate level of treatment in accordance with Sustainable Drainage Systems guidelines, SUDS Manual (CIRIA C753), to minimise the risk of pollution;
- All hard surfaces are to be permeable where practical.

- 3.7.5 In addition to the above, policy 32 (flood risk), includes the following requirements:
- a. the peak rate of run-off over the lifetime of the development, allowing for climate change, is no greater for the developed site than it was for the undeveloped site;
 - b. the post-development volume of run-off, allowing for climate change over the development lifetime, is no greater than it would have been for the undeveloped site. If this cannot be achieved then the limiting discharge is 2 litre/s/ha for all events up to the 100-year return period event⁵¹;
 - c. the development is designed so that the flooding of property in and adjacent to the development would not occur for a 1 in 100 year event, plus an allowance for climate change and in the event of local drainage system failure;
 - d. the discharge locations have the capacity to receive all foul and surface water flows from the development, including discharge by infiltration, into water bodies and into sewers;
 - e. there is a management and maintenance plan for the lifetime of the development, which shall include the arrangements for adoption by any public authority or statutory undertaker and any other arrangements to secure the operation of the scheme throughout its lifetime; and
 - f. the destination of the discharge obeys the following priority order:
 - firstly, to ground via infiltration;
 - then, to a water body;
 - then, to a surface water sewer.

Discharge to a foul water or combined sewer is unacceptable.

- 3.7.6 In order for these requirements to be met, it will be important to ensure that the drainage requirements of a site are considered from the outset of the design of new developments. The layout and scale of development should be informed by the surface water drainage requirements and not vice versa.

Submission requirements

- 3.7.7 In order to demonstrate compliance with the requirements of policy 31, a **Surface Water Drainage Strategy** will need to be submitted. This document will then be assessed by Cambridge City Council's sustainable drainage engineers and/or Cambridgeshire County Council in their role as Lead Local Flood Authority. A Flood Risk Assessment will also be required for some sites, and further detail on the requirements related to this can be

⁵¹ Where the pre-development peak rate of run-off for the site would result in a requirement for the post-development flow rate to be less than 5 litre/s at a discharge point, a flow rate of up to 5 litre/s may be used where required to reduce the risk of blockage. If discharge is to be pumped then this allowance does not apply.

found in Chapter 4 of the [Cambridgeshire Flood and Water SPD](#) or the government website: <https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications>.

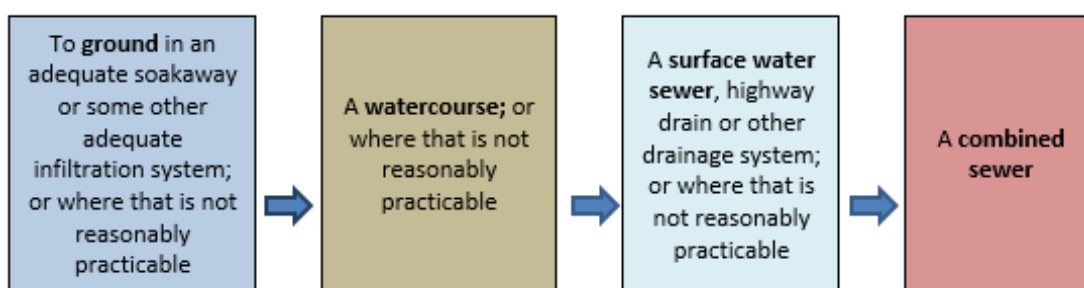
3.7.8 The Surface Water Drainage Strategy should set out how the proposed surface water scheme has been determined following the drainage hierarchy (see figure 11), and should include the following information:

- Pre-development runoff rates;
- Post development runoff rates with associated storm water storage calculations in line with the requirements set out in paragraph 3.7.6 above;
- Discharge location(s);
- Drainage calculations to support the design of the system;
- Drawings of the proposed surface water drainage scheme including sub catchment breakdown where applicable;
- Maintenance and management plan of surface water drainage system (for the lifetime of the development) including details of future adoption by the sewerage undertaker or other body;
- Completed drainage proforma included within the [Cambridgeshire Flood and Water SPD](#) – the applicant must ensure that the surface water strategy contains the appropriate level of information in relation to the points covered in the proforma.
- For householder applications, a more simplified summary of the information that needs to be submitted with applications is provided in the Government’s standing advice for flood risk assessment, available online at: <https://www.gov.uk/guidance/flood-risk-assessment-standing-advice#what-to-include-in-your-assessment>.

If the drainage hierarchy cannot be followed, it should be clearly demonstrated why it is not technically feasible to do so.

3.7.9 SuDS must be shown on all relevant plans submitted, in order to demonstrate how SuDS integrate with planned public open spaces, landscaping, roads, trees and buildings. Plans should identify multifunctional SuDs, for example those which enhance biodiversity or improve water quality.

Figure 11: Surface water drainage hierarchy (adapted from the Cambridgeshire Flood and Water SPD)



Note: in all instances adequate stormwater storage will need to be provided in order that no properties are flooded at the 100 year event (with climate change) and there is no runoff from site from rainfall events less than 5mm depth.

3.7.10 All surface water drainage schemes should be underpinned by the following design principles in order to ensure that they offer effective drainage and are capable of being maintained for the lifetime of the development:

1. PERFORMANCE

- Reduce flood risk taking climate change into account. All development proposals in Cambridge should apply a 40% climate allowance to drainage calculations.
- Improve water quality
- Deliver biodiversity benefits to contribute to a net gain in biodiversity (see section 3.6)
- Provide amenity for residents

2. HIGH QUALITY DESIGN

- Micro managed bespoke design
- Integration with wider landscape setting
- Use of robust, low impact materials
- Designed to be attractive all year round

3. EASE OF MAINTENANCE

- Simple surface features
- Minimise use of grills and other engineered features
- Shallow gradients
- Robust appropriate planting for ease of maintenance but not at the expense of biodiversity (unless erosion prevention is a priority)
- A preference for outfalls to be gravity led unless certain site conditions apply. A pumped solution will only be considered acceptable if it can be clearly demonstrated that all other options are unfeasible. Where a pumped outfall is required, evidence will need to be submitted alongside the Surface Water Drainage Strategy to clearly demonstrate that the pumped system will be maintained, and where appropriate adopted by the relevant statutory undertaker, in perpetuity. The use of a pumped outfall should not prevent the use of upstream SuDS.

4. INTEGRATED APPROACH TO HEALTH AND SAFETY

- Easily identifiable features and risk
- Shallow gradients
- Planting and design used to create barriers where necessary

3.7.11 Use of these principles will form part of the Council's assessment of the proposed Surface Water Drainage Strategy, alongside the design principles set out in Table 6.1 of the Cambridgeshire Flood and Water SPD.

3.7.12 While the primary overriding function of SuDS is to provide effective drainage, a SuDS design team should be multi-disciplinary and have:

- A strong landscape and urban design influence to guide the form and shape of the SuDS, especially in the early stages of the developments design;
- Drainage engineers with the expertise to ensure that the proposed design will provide effective drainage and enhance water quality;
- Ecologists providing advice on how to maximise biodiversity benefits.

An effective SuDS team will work through these issues from early in the schemes development to find the most appropriate way to deal with any conflicting design aims.

Further guidance

3.7.13 For further guidance on the use and design of SuDS please see:

- Cambridgeshire Flood and Water SPD. Available online at: <https://www.cambridge.gov.uk/cambridgeshire-flood-and-water-spd>
- Cambridge City Council. Sustainable Drainage: Cambridge Design and Adoption Guide. Available online at: <https://www.cambridge.gov.uk/sustainable-drainage-systems-suds>
- CIRIA (2016). The SuDS Manual C753. Available online at: https://www.ciria.org/Resources/Free_publications/SuDS_manual_C753.aspx
- For more information on sustainable drainage systems, including case studies and a link to the **B**enefits **E**STimation Tool (BEST) for blue-green infrastructure see: <https://www.susdrain.org/>
- For the Susdrain developers hub see: https://www.susdrain.org/community/Developers_Hub
- Historic England 'Preserving Archaeological Remains' guidance (2016). Available online at: <https://historicengland.org.uk/images-books/publications/preserving-archaeological-remains/>
- Anglian Water's Surface Water Policy, SuDs Adoption Handbook and Sewers for Adoption Version 8 (or successor document). Available online at: https://www.anglianwater.co.uk/siteassets/developers/aw_suds_manual_aw_fp_web.pdf

3.8 Construction Standards (BREEAM)

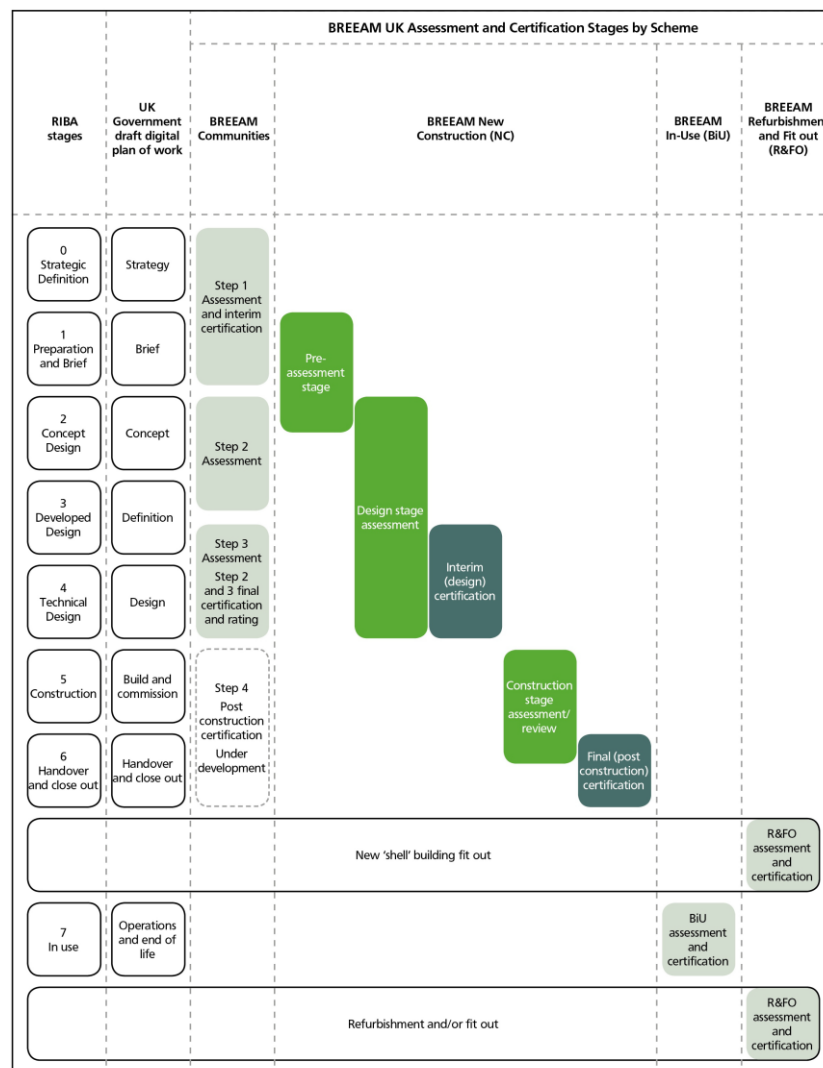
LOCATION:	Cambridge
POLICY:	Policy 28: Carbon reduction, community energy networks, sustainable design and construction, and water use
SCALE OF DEVELOPMENT:	All scales of development
TYPE OF DEVELOPMENT:	Non-residential development
SUBMISSION REQUIREMENTS:	BREEAM Pre-Assessment demonstrating achievement of BREEAM 'excellent'.
LINK TO THE SUSTAINABILITY CHECKLIST:	Cs.1, Cs.2

Policy context

3.8.1 Policy 28 of the Cambridge Local Plan (2018) sets construction standards for all new non-residential development, utilising the Building Research Establishment's (BRE) Environmental Assessment Methodology (BREEAM). The requirement is for all new non-

residential development to achieve the BREEAM 'excellent' rating. Achievement of this rating will require early integration of the BREEAM requirement into the design of proposals in order to optimise cost effective means of achieving the 'excellent' rating. The integration of BREEAM into the RIBA Plan of Work 2013 is illustrated in figure 12 below.

Figure 12: The integration of BREEAM assessment and certification stages and the RIBA Plan of Work 2013 (image courtesy of the BRE)



3.8.2 The use of BREEAM helps designers and clients measure and reduce the environmental impacts of their buildings, creating high value, lower risk assets. The BREEAM methodology has the following aims:

- To mitigate the lifecycle impacts of buildings on the environment;
- To enable buildings to be recognised according to their environmental benefit;
- To provide a credible, environmental label for buildings; and
- To stimulate demand and create value for sustainable buildings, building products and supply chains.

3.8.3 The BREEAM requirements set out in policy 28 apply to new build development only. For projects involving the re-use of existing buildings, the policy supports the development of bespoke assessment methodologies to assess the environmental impact of the proposals. Early engagement with the Council’s Sustainability Consultant is recommended in such cases in order that the scope of the bespoke assessment methodology can be agreed prior to the submission of a planning application. The Council will also be open to approaches to deliver high standards of sustainable construction in new non-residential development other than BREEAM, for example use of the Passivhaus standard. For schemes wishing to use alternative standards, early engagement with the Council as part of pre-application discussions is strongly recommended.

Submission requirements – new build non-residential development

3.8.4 Proposals for new build development should be assessed using the latest version of the BREEAM New Construction scheme available at the time of development. For all full and reserved matters applications a **BREEAM pre-assessment**, carried out by a BRE Accredited BREEAM Assessor should be submitted with the planning application to demonstrate that the required BREEAM ‘excellent’ rating can be achieved. Formal BREEAM certification will then be secured via the use of planning conditions. For outline applications, submission of a BREEAM pre-assessment as part of future reserved matters applications will be secured via a planning conditions.

3.8.6 Where full achievement of the policy requirements is not possible due to technical feasibility or viability considerations, early engagement with the Council’s Sustainability Consultant is strongly recommended in order that alternative approaches to delivering the aims of the policy can be agreed ahead of submission of a planning application.

Further guidance

3.8.7 For further guidance on BREEAM please see <https://www.breeam.com/>

3.9 Sustainable Show Homes

LOCATION:	South Cambridgeshire
POLICY:	CC/5: Sustainable Show Homes
SCALE OF DEVELOPMENT:	All residential development where a show home is being provided.
TYPE OF DEVELOPMENT:	Residential
SUBMISSION REQUIREMENTS:	Sustainability Statement
LINK TO THE SUSTAINABILITY CHECKLIST:	SuSh.1

Policy context

3.9.1 Policy CC/5 requires that where a show home is being provided, measures to enhance the environmental performance of homes should be installed and made available to new home buyers to enhance the specification of their new home. The measures must be offered at a price, including cost of delivery and/or installation that reflects the same profit margin to the developer as other standard buyer's options or extras.

Submission requirements

3.9.2 In order to demonstrate compliance with the policy, the Sustainability Statement should include an outline of the measures proposed to be installed as part of the Show Home as well as details of how these features will be marketed to home buyers. The requirements will be secured through the S106 agreement for the development.

3.9.3 Previous Enhanced show homes at Trumpington Meadows and the Cambourne 950 development included the following measures:

- renewable technologies such as solar panels;
- rainwater harvesting and greywater recycling devices;
- windows and doors from sustainably sourced materials, with significantly improved 'u' values (e.g. triple glazing);
- mechanical ventilation and heat recovery;
- smart energy metering and management systems;
- low energy internal and external light fittings;
- water efficient toilets and other sanitary ware fixtures or fittings;
- white goods with high energy efficiency ratings and low water consumption;
- raised growing beds, composting and enhanced recycling bins;
- sustainably sourced and low embodied energy flooring and wall finishes, kitchens and furniture.

3.9.4 The exact measures will need to be agreed on a case by case basis, with consideration given to the baseline specification for the development. Consideration should also be given to how these additional features will be marketed to new home buyers, ensuring that sales staff are able to answer queries about the options being offered. In some cases, where the level of sustainable construction is already quite high, it may be more appropriate for the sustainable show home to be used to provide guidance to residents on how to use the technologies within their home.

3.10 Works to a heritage asset to address climate change

LOCATION:	Cambridge and South Cambridgeshire
POLICY:	Cambridge: <ul style="list-style-type: none">• Policy 63: Works to a heritage asset to address climate change South Cambridgeshire: <ul style="list-style-type: none">• Policy NH/15: Heritage assets and adapting to climate change

SCALE OF DEVELOPMENT:	Any application involving works to heritage assets to enhance their environmental performance
TYPE OF DEVELOPMENT:	Residential and non-residential
SUBMISSION REQUIREMENTS:	Information can be included in the Design and Access Statement or Heritage Statement
LINK TO THE SUSTAINABILITY CHECKLIST:	Ha.1, Ha.2, Ha.3, Ha.4

Policy context

3.10.1 Both the 2018 Cambridge and South Cambridgeshire Local Plans include policies that are supportive of works to heritage assets to enhance their environmental performance where those works safeguard the heritage significance of those assets. Historic buildings and settlements often have sustainable forms of construction and design, and they can inform and inspire the best modern, sustainable development. Their survival reflects their success and adaptability. The Councils aim, therefore, is to ensure that a heritage asset is maintained in a good state of repair and that its significance and continued potential for adaptability is maintained by ensuring that alterations to address climate change or reduction of carbon emissions are sensitive.

3.10.2 Due to the nature of construction of historic buildings, it would be difficult to match the performance of modern structures. However, vernacular design and traditional construction have evolved over time and deal with local conditions. Adaptive re-use of a building gives significant carbon savings in terms of embodied energy in the fabric of the building, so the focus will be on enhancing the performance of traditional buildings as much as practicable without damaging their significance. Acceptable levels of intervention will vary dependent upon the impact on the significance of the heritage asset in question. Works should avoid harm to a building's integrity or significance. Listed buildings, buildings in conservation areas and scheduled monuments are exempted from the need to comply with energy efficiency requirements of the Building Regulations where compliance would unacceptably alter their character and appearance. Special considerations under Part L are also given to locally listed buildings, buildings of architectural and historic interest within registered parks and gardens and the curtilages of scheduled monuments, and buildings of traditional construction with permeable fabric that both absorbs and readily allows the evaporation of moisture.

Submission requirements

3.10.3 When considering ways to reduce a building's carbon footprint, it is important that the energy hierarchy (see Section Four, figure 3) is adopted. Prior to looking at alternative means of generating energy, it is important to investigate and put into practice all possible means of conserving energy. The Chartered Institution of Building Services Engineers' (CIBSE) guidance on building services in historic buildings sets out four principal aims when seeking to enhance the sustainability of heritage assets:

- Aim 1 – preserve historic fabric;
- Aim 2 – extend the beneficial use of older buildings;

- Aim 3 – reduce carbon emissions, using the hierarchical approach; and
- Aim 4 – specify environmentally conscious materials.

3.10.4 Applications for works to heritage assets will need to demonstrate a thorough understanding of the building in question via the submission of the following information:

- surveys of existing construction, to include walls, floors, ceilings and roofs;
- submission of baseline energy consumption data before and after improvements have taken place (submission of data post improvement would be secured via a planning condition);
- measured data of existing environmental performance of the building's fabric;
- an indication of any national performance standards being targeted as a result of works; and
- recommendations on the environmental performance measures to be implemented in order to achieve the standard.

This information can be submitted as part of the Design and Access Statement for the proposal or as part of the Heritage Statement.

Further guidance

3.10.5 The Historic England website has a range of guidance on how to approach environmental improvement projects in heritage assets. For further detail, please see:

<https://historicengland.org.uk/advice/technical-advice/energy-efficiency-and-historic-buildings/>

3.10.6 If your home is a heritage asset, further guidance from English Heritage is available via:

<https://historicengland.org.uk/advice/your-home/saving-energy/>

3.10.7 Further guidance is also available from CIBSE:

- CIBSE (2002). HIST Guide to Building Services for Historic Buildings. Available online (for a fee) at: <https://www.cibse.org/Knowledge/knowledge-items/detail?id=a0q2000000817ocAAC>
- BSI (2019). PAS 2035/2030: 2019. Retrofitting dwellings for improved energy efficiency. Specification and guidance. Specification for the installation of energy efficiency measures in existing dwellings and insulation in residential park homes. Available online at: https://shop.bsigroup.com/ProductDetail/?pid=000000000030390699&_ga=2.47214575.996413101.1561645187-1834974640.1559206354
- Sustainable Traditional Buildings Alliance (2015). Planning responsible retrofit of traditional buildings. Available online at: <http://www.sdfoundation.org.uk/downloads/Guide-1-Planning-Responsible-Retrofit-2015-08.pdf>
- Sustainable Traditional Buildings Alliance Responsible Retrofit Guidance Wheel. Available online at: <http://www.responsible-retrofit.org/wheel/>
- British Standards Institute (2013). BS 7913:2013. Guide to the conservation of historic buildings. Available online at: <https://shop.bsigroup.com/ProductDetail/?pid=000000000030248522>

- Historic England (2017). Energy Efficiency and Historic Buildings - Application of Part L of the Building Regulations to historically and traditionally constructed buildings. Available online at: <https://historicengland.org.uk/images-books/publications/energy-efficiency-historic-buildings-pt/>

3.11 Construction waste and recycling and waste facilities

LOCATION:	Cambridge and South Cambridgeshire
POLICY:	<p>Cambridge:</p> <ul style="list-style-type: none"> • Policy 28: Carbon reduction, community energy networks, sustainable design and construction, and water use • Policy 57: Designing new buildings <p>South Cambridgeshire:</p> <ul style="list-style-type: none"> • Policy CC/6: Construction methods • Policy HQ/1: Design principles
SCALE OF DEVELOPMENT:	All development (except householder)
TYPE OF DEVELOPMENT:	Residential and non-residential
SUBMISSION REQUIREMENTS:	<p>Construction waste: Site Waste Management Plans (secured via conditions)</p> <p>Occupational phase waste management:</p> <ul style="list-style-type: none"> • Recap Waste Management Design Guide Toolkit (as required by Policy CS28 of the Cambridgeshire Minerals and Waste Core Strategy). • Proposals in Cambridge should also submit Cambridge City Council’s Waste and Recycling Provision Checklist.
LINK TO THE SUSTAINABILITY CHECKLIST:	Wr.1, Wr.2, Wr.3

Policy context

3.11.1 One third of all waste in the UK is generated by the construction and demolition sector, making it the largest contributor to waste nationally. All new development must be designed to reduce construction waste and to make it easier for future occupants to maximise levels of recycling and reduce waste being sent to landfill. Storage capacity for waste, both internal and external, should be an integral element of the design of new developments.

3.11.2 Cambridgeshire County Council are responsible for detailed planning policy related to waste, in their role as the Minerals and Waste Local Planning Authority⁵². However, both the 2018 Cambridge and South Cambridgeshire Local Plans include policies to support the

⁵² <https://www.cambridgeshire.gov.uk/business/planning-and-development/planning-policy/adopted-minerals-and-waste-plan/>

minimisation of construction waste and to ensure that waste facilities are integrated into the design of new developments in order to enable residents and building occupants to maximise levels of recycling and reduce the amount of waste being sent to landfill.

Submission requirements – Construction waste

- 3.11.3 The Sustainability Statement should outline the measures that will be taken to reduce construction waste and to maximise the amount of construction waste that is recycled. For schemes utilising construction methodologies such as BREEAM, reference can be made to credits being targeted under the waste section of the methodology. In some cases, notably for major developments, planning conditions may be used to secure the submission and implementation of Site Waste Management Plans.
- 3.11.4 There are a range of methods that can be implemented to reduce construction waste. WRAP (Waste and Resources Action Programme) have identified five key principles that design teams can use during the design process to reduce waste:
- Design for reuse and recovery;
 - Design for off-site construction;
 - Design for materials optimisation;
 - Design for waste efficient procurement; and
 - Design for deconstruction and flexibility
- 3.11.5 These are principles that should be applied to all scales of development and to all disciplines within the built environment, not only considering the construction of new buildings but also wider infrastructure including landscape design (including sustainable drainage) and civil engineering projects.

Further guidance

- 3.11.6 WRAP has produced a number of guides for the construction sector, including:
- Designing out waste: landscape opportunities, available online at http://www.wrap.org.uk/sites/files/wrap/Designing_out_Waste_landscape_opportunities.pdf
 - Designing out waste: A design team guide for civil engineering, available online at [http://www.wrap.org.uk/sites/files/wrap/Designing%20out%20Waste%20-%20a%20design%20team%20guide%20for%20civil%20engineering%20-%20Part%201%20\(interactive\)1.pdf](http://www.wrap.org.uk/sites/files/wrap/Designing%20out%20Waste%20-%20a%20design%20team%20guide%20for%20civil%20engineering%20-%20Part%201%20(interactive)1.pdf)
 - Designing out waste: A design team guide for buildings, available online at: <https://www.modular.org/marketing/documents/DesigningoutWaste.pdf>
 - DEFRA (2009). Code of Practice for the Sustainable Use of Soils on Construction Sites. Available online at: <https://www.gov.uk/government/publications/code-of-practice-for-the-sustainable-use-of-soils-on-construction-sites>
- 3.11.7 Further guidance is available from:
- UK Green Building Council (2019). Circular construction guidance for construction clients: How to practically apply circular economy principles at the project brief stage.

Available online at: <https://www.ukgbc.org/wp-content/uploads/2019/04/Circular-Economy-Report.pdf>

- For further guidance on BREEAM please see <https://www.breeam.com/>

Submission requirements: occupational phase waste management

3.11.8 In line with the requirements of the Cambridgeshire Minerals and Waste Core Strategy, all new development is required to follow the guidance set out in the RECAP Waste Management Design Guide SPD, and applicants should submit the associated RECAP Waste Management Toolkit as part of their planning proposals. For applications in Cambridge, developers should also refer to Cambridge City Council's guidance on household waste and recycling facilities in new developments, which supplements and, in some cases, includes requirements that are additional to the RECAP Waste Management Design Guide. The City Council's Waste and Recycling Provision Checklist should also be submitted.

Further guidance

3.11.9 For the RECAP Waste Management Design Guide SPD and RECAP Waste Management Toolkit, please see: <https://www.cambridgeshire.gov.uk/business/planning-and-development/planning-policy/recap-waste-management-design-guide/>

3.11.10 For Cambridge specific information, please see:

- Waste and recycling guide for new developments, available online at: <https://www.cambridge.gov.uk/waste-and-recycling-guide-for-developers>
- Waste and recycling checklist for developers, available online at: <https://www.cambridge.gov.uk/media/2795/waste-and-recycling-provision-checklist.pdf>

Section 4: Further approaches to sustainable design and construction

4.1.1 In addition to meeting the policy requirements as set out in Section 3 of this SPD, there are many other ways in which developments can contribute to sustainable development and enhance the health and wellbeing of residents and building users. These approaches are considered to be an important aspect of high quality, sustainable new development and in cases where policies require proposals to exceed Local Plan requirements, for example policies for new settlements in South Cambridgeshire, some of these elements could be considered as demonstrating best or exemplar practice in sustainable design. They are also well related to the Cambridgeshire Quality Charter for Growth⁵³ and can be considered as ways in which the 4 C's of this charter, community, character, connectivity and climate, can be met, as well as having relevance to wider corporate priorities around tackling fuel poverty and health and wellbeing.

4.1.2 Applicable to schemes across Cambridge and South Cambridgeshire, it is recommended that consideration of the following issues should be included within the Sustainability Statement:

- Health and wellbeing;
- The role of modern methods of construction;
- Measures to encourage low carbon lifestyles such as integrating opportunities for food growing into new developments;
- The integration of smart technologies; and
- Responsible sourcing of building materials and embodied carbon.

LOCATION:	Cambridge and South Cambridgeshire
POLICY:	<p>Cambridge:</p> <ul style="list-style-type: none"> • Policy 28: Carbon reduction, community energy networks, sustainable design, and construction and water use. <p>South Cambridgeshire:</p> <ul style="list-style-type: none"> • Policy SS/6: Waterbeach New Town (criterion 12) • Policy SS/7: New Village at Bourn Airfield (criterion 9) • Policy SS/8: Cambourne West (Criterion 13) • Policy HQ/1: Design Principles (criteria k, l and m) • Policy SC/2: Health Impact Assessment
SCALE OF DEVELOPMENT	All development (except householder)
TYPE OF DEVELOPMENT	Residential and non-residential
SUBMISSION REQUIREMENTS	<ul style="list-style-type: none"> • Sustainability Statement • Health Impact Assessment (for applications in South Cambridgeshire only)

⁵³ https://www.cambridge.gov.uk/media/2950/cambridgeshire_quality_charter_2010.pdf

4.2 Health and wellbeing

- 4.2.1 The design of the built environment has a significant role to play in the health and wellbeing of residents and workers. High quality developments, built to be future-proofed and enhance the local environment can deliver multiple benefits for new and existing residents. Many of the policies contained within the 2018 Cambridge and South Cambridgeshire Local Plans seek to ensure that new developments enhance the health and wellbeing of those who live and work in the Greater Cambridge Area. More specifically, Policy SC/2 of the South Cambridgeshire Local Plan (2018) requires the submission of a **Health Impact Assessment** for proposals of 20 or more dwellings or 1,000m² or more of new floorspace, and further guidance will be contained in an update to the South Cambridgeshire Health Impact Assessment SPD and updates to both Councils Affordable Housing SPDs.
- 4.2.2 This section is divided into the external environment of healthy neighbourhoods and internal spaces of healthy homes. A large number of factors influence and improve health and wellbeing, not only how neighbourhoods and the buildings in them (particularly homes) are designed and constructed. However it is clear that poor design and construction quality can have a direct impact on ill health.
- 4.2.3 In a neighbourhood, the built environment plays a significant role in whether or not a person becomes socially isolated. Public Health England note that social isolation can cause a range of mental and physical health impacts⁵⁴. Our built environment plays a significant role in whether or not a person becomes socially isolated. Physical access to friends and family, health services, community centres and shops, open spaces and other places and spaces enable individuals to build and maintain their social relationships. Poor transport links create barriers to social inclusion, whereas effective transport links benefit social cohesion, enabling individuals to play a more active role in their community. In designing new developments, we need to be aware of the elements that can create barriers to social inclusion and maximise opportunities for people to build social relationships to create healthy neighbourhoods, as illustrated in figure 13 below. This can include:
- Designing the built environment to make streets conducive to walking and cycling, whilst also ensuring that those with limited mobility are catered for, to help encourage social connectivity;

⁵⁴ PHE (2015). Local action on health inequalities. Reducing social isolation across the lifecourse. Practice resource: September 2015. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/461120/3a_Social_isolation-Full-revised.pdf

- Engaging with the local community in the design of public spaces to ensure that they meet the needs of residents is important in building a sense of ownership and belonging;
- Designing the public realm for safety with consideration given to natural surveillance, appropriate lighting and good visibility of key routes so that users of spaces feel safe;
- Giving consideration to the role that community development officers can play in helping to assist with community development, particularly in large new developments.

4.2.4 Where new communities are being built, facilities and amenities need to be in place to support new residents early on in the development, as well as enabling surrounding communities to access facilities. However, planning for new infrastructure alone will not build a community and new residents need to be supported to ensure they are able to integrate well to create a sustainable community.

4.2.5 Access to a range of open spaces, both private and communal, is an important element of well-designed new developments that help to create healthy communities with a good quality of life. It is well documented that people's experience of their local green space can affect their physical, mental and social health. All scales of development present opportunities to create and improve the public realm, open space and landscaped areas that that are dispersed throughout the development and equitable to all residents, respond to their context and the development as a whole and are designed as an integral part of the scheme. These spaces can take many forms, including:

- Private amenity spaces – gardens, balconies, terraces and roof terraces/gardens;
- Formal and informal space, with consideration given to these spaces being multifunctional, seeking not just to provide residential amenity but also biodiversity enhancement and the integration of sustainable drainage;
- Spaces that can become a focal point for communities that encourage social interaction and recreation, for example shared spaces and play areas. Consideration should be given to ways in which residents can be engaged in the upkeep of communal green spaces, for example areas that are set aside for food growing.

Figure 13: What makes a healthy neighbourhood (Infographic developed by PRP for UK-GBC)



4.2.6 The distinction between the public and private realms should be clear, with careful consideration to boundary treatments and the role of materials and landscape features in delineating these spaces e.g. the use of Sustainable Drainage Systems (SuDS) such as rills to mark the boundary between the public and private realm.

4.2.7 In flatted schemes, the aim should be to ensure that all flats have access to communal space that:

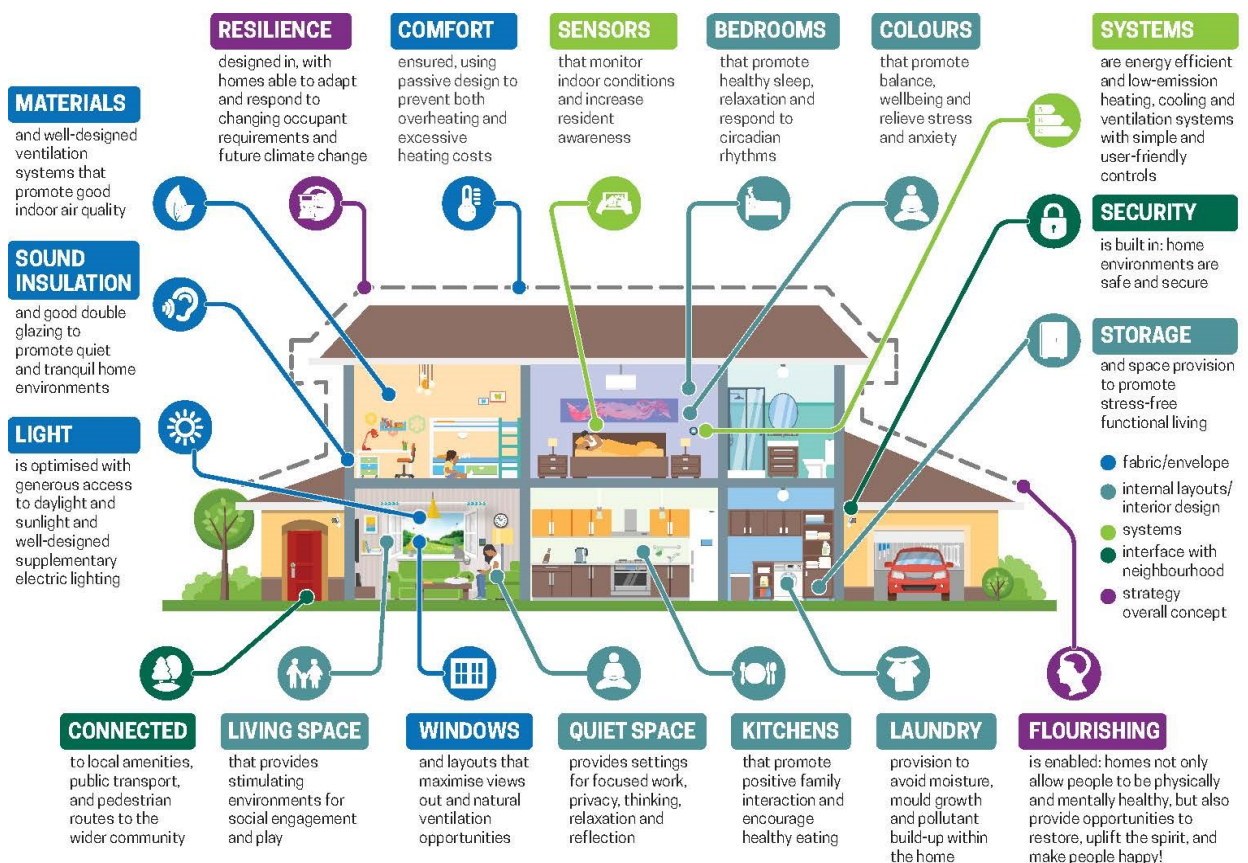
- Is overlooked by surrounding development;
- Is accessible to all residents of the block;
- Is designed to take advantage of direct sunlight;
- Has suitable management in place.

4.2.8 Biophilic design is another approach that can enhance health and wellbeing. Biophilic designs are those that connect people to nature and natural processes, enabling them to act in more productive ways. Examples of biophilic design, which can take place at a building or site wide scale, include:

- Providing natural space with naturalised or planted areas around buildings and ensuring that windows overlook these areas;
- Routing access paths through planted areas;
- Bringing nature and planting inside buildings, including the use of green roofs;
- The use of natural materials.

4.2.9 Moving on to the internal spaces of buildings, given we spend around 65% of our time at home⁵⁵ and around 90% of our time inside buildings⁵⁶ the quality of the internal environment can have a significant impact on health and wellbeing. Numerous research studies have shown the effects on mental health, social wellbeing and physical health. figure 14 below provides an illustration of the various factors that go into making a healthy home. All of these factors are worth considering, but focus is given below to a few examples felt to be of particular significance in Cambridge homes.

Figure 14: What makes a healthy home (infographic developed by PRP for UK-GBC)



4.2.10 The quality of the air we breathe whether outside or inside the home can have significant health implications, but air pollution is usually associated with the external environment. However internal air quality can be of poor quality due to infiltration of external pollutants (e.g. nitrogen dioxide and particulates from vehicles) and build-up of internal contaminants such as cleaning products, VOCs and formaldehyde given off by furnishings and building

⁵⁵ <https://www.ashrae.org/resources-publications/free-resources/10-tips-for-home-indoor-air-quality>

⁵⁶ APPG for Healthy Homes and Buildings. Building our future. Laying the foundations for healthy homes and buildings. White Paper. October 2018. Available online at: <https://healthyhomesbuildings.org.uk/>

materials, and the carcinogenic acetaldehyde from fabric softeners in drying laundry. Increasing levels of moisture is also an air quality issue as it results in levels of spores and dust mites that exacerbate health conditions such as asthma and allergies. There are a number of recommendation for the design of homes that ensure the maintenance of good air quality, such as dedicated laundry drying spaces, accessible windows (or other ventilation means) to allow trickle as well as purge ventilation, a home user guide to simply explain and advise how to operate and maintain the property, etc. Much of this good practice will also reduce energy use (see more information on moisture below). More examples are given in UK Green Building Council's Health and Wellbeing report⁵⁷.

- 4.2.11 The ability to use and control natural light in our homes has a huge beneficial effect on wellbeing. Good levels of daylight and sunlight are shown to improve sleep, reduce anxiety and limit conditions like SAD (seasonal affective disorder). But designs should ensure problems of glare and overheating are not created, or that shading with curtains or blinds is essential. The use of as much natural light as possible during daylight hours will reduce the need for artificial light and thereby lower energy use. The design of artificial lighting should be carefully considered to enhance the home and be adaptable, adjustable and low energy.
- 4.2.12 Thermal comfort is a key factor in maintaining good health. The impact of cold housing specifically was estimated to cause a fifth of excess deaths in winter 2014-15 in England and Wales and at the other end of the scale overheating poses significant health risks (this is dealt with in other sections of this SPD). The fabric of buildings, insulation levels, orientation, glazing size and position and design of heating systems are all critical elements that will effect thermal levels in a home. In addition, the provision of comprehensive but simple information on how heating, ventilation and hot water systems operate should enable residents to easily make adjustments to suit their needs and keep energy consumption reasonable.
- 4.2.13 Moisture is produced from a range of sources in the home. Cooking, washing, showering, drying clothes, even breathing, add significant quantities of moisture to the indoor air. The increased airtightness of homes has reduced the ability of this moisture to escape, leading to problems with damp, condensation and mould. All these cause direct health problems with the increases in mould spores, bacteria, dust mites as well as the indirect effects of damage to furnishings and fittings. Minimising the production of moisture and then controlling ventilation and air circulation is key – allowing moisture-filled air to escape outside, especially in areas like kitchens and bathrooms. Drying clothes indoors can add the equivalent of 10-15 litres of water to the air in the average home, so it is recommended to provide space to dry clothes outside, removing this source of moisture. Reducing moisture levels will also reduce energy consumption as damper air takes more energy to heat. Clear information on the operation of ventilation systems and devices is recommended and any ongoing maintenance requirements clarified, as well as guidelines for maintaining adequate heating levels etc.
- 4.2.14 The same can be said of the buildings in which we work, and the impacts of 'sick building syndrome' have been well documented and recognised by the NHS. Data compiled and

⁵⁷ <https://www.ukgbc.org/ukgbc-work/health-wellbeing-homes/>

published by the UK Green Building Council notes that there are 570,000 hours lost to workplace absence caused by poor building design, and 30.7% of people do not consider that the design of their workplace enables them to work productively⁵⁸.

- 4.2.15 For schemes utilising the BREEAM standard, credits are available under the health and wellbeing section, covering issues such as visual comfort, thermal comfort and indoor air quality. The WELL Building Standard, developed by the International WELL Building Institute also provides an approach that explores how design, operations and behaviours within the places we live, work, learn and play can be optimised to advance human health and wellbeing.
- 4.2.16 The Councils will be supportive of the integration of measures into the design of new developments that seek to enhance health and wellbeing, and we would recommend that consideration of some of the approaches referenced above be included with Sustainability Statements and Design and Access Statements.

Further guidance

- UK Green Building Council (July 2016). Health and wellbeing in homes. Available online at: <https://www.ukgbc.org/sites/default/files/08453%20UKGBC%20Healthy%20Homes%20Updated%2015%20Aug%20%28spreads%29.pdf>
- For further information on the International WELL Building Institute and the WELL Standard, see: <https://www.wellcertified.com/>
- For information on Biophilic design and the BRE's Biophilic Office research project, see: <https://www.bregroup.com/services/research/the-biophilic-office/>
- South Cambridgeshire District Council (2011). Health Impact Assessment Supplementary Planning Document. Available online at: <https://www.scambs.gov.uk/planning/local-plan-and-neighbourhood-planning/health-impact-assessment-spd/>

4.3 Modern Methods of Construction

- 4.3.1 Modern Methods of Construction (MMC) utilises a range of approaches, such as off-site manufacturing and improvements to the supply-chain, and is intended to produce more, better quality homes in less time. Compared to more traditional forms of house building, MMC can improve predictability of work and costs, mitigate material shortages and the impact of developments on the local area. According to the Government's Industrial Strategy, MMC has the potential to reform the residential construction sector so as to meet its target of 300,000 new homes each year, and 1 million between 2017 and 2020.
- 4.3.2 From a sustainable design and construction perspective, some of the potential benefits of modern methods of construction include:
- Improved energy performance;
 - Reduced construction waste, with some research suggesting off-site construction can generate up to 80% less waste compared to site-based building methods.

⁵⁸ Data from: <https://www.ukgbc.org/health-and-wellbeing/>

4.3.3 The Councils will be supportive of the use of modern methods of construction as part of new developments, particularly where these deliver high quality design that exceeds baseline policy requirements for carbon reduction and helps to speed up the delivery of homes in the Greater Cambridge area.

4.4 Food growing as part of new developments

4.4.1 Policies in both the 2018 Cambridge and South Cambridgeshire Local Plans make recommendations for allotment provision as part of open space standards for new developments⁵⁹. In many cases where provision of allotment on-site is not possible, planning contributions are sought. However, in addition to formal allotment provision, new developments offer the opportunity to think more creatively about incorporating opportunities for food growing into design.

4.4.2 The inclusion of food growing areas extends beyond conventional provision of gardens and allotments in that it can also include the creative use of roofs, balconies, atriums and courtyards where external space is limited. It could also include the use of edible plants as part of the landscaping of new developments, rather than the use of ornamental trees and shrubs.

4.4.3 There are many benefits associated with food growing as part of new developments, including:

- Improving the physical and mental wellbeing of residents;
- Increasing biodiversity;
- Supporting low carbon lifestyles by reducing carbon emissions associated with long distance food transportation; and
- Greening the urban landscape.

4.4.4 Provision of food growing will need to be considered and integrated with other uses for open space, for example provision of sport and play facilities and access to open space. Consideration will also need to be given to the on-going management of the growing space and who will harvest the produce.

Technical and practical considerations

4.4.5 The following technical issues need to be taken into consideration as the starting point for food growing whatever the scale or circumstances or features being considered:

- **Land:** how much external land, if any, is available on the site, or can be made available through the design process?
- **Use of building:** is there potential to incorporate growing spaces within, around and on the building? Design of balconies can provide small spaces for individuals to grow a limited selection of plants and are particularly suited to high density residential developments. It is critical to consider aspect. North facing balconies overshadowed by other high density buildings are unlikely to be suitable for food growing. Planting

⁵⁹ Cambridge Local Plan (2018) Policy 68: Open space and recreation provision through new development. South Cambridgeshire Local Plan (2018) Policy SC/7: Outdoor play space, informal open space and new development.

containers / window boxes can be incorporated into balcony design. Railings and structures joining neighbouring balconies can also be designed to support climbing / espaliered plants. Loading capacity for containers should be addressed at the design stage. Designing buildings with atriums or courtyards with adequate exposure to sunlight can create deliberate opportunities for food growing. Such situations will often create micro-climates allowing high value tender plants such as tomatoes and citrus fruits to be cultivated. Ground level beds or planters can be used. Care must be given in internal spaces to providing irrigation systems and allowing for water run-off.

- **Aspect and light:** Ideally growing spaces should be south facing. Food plants require exposure to direct sunlight during the growing period. If this is limited it may not prohibit food growing but it may restrict the choice of plants to those which require less light.
- **Water:** Any food growing will need a reliable water supply. Incorporating rainwater collection into any design is desirable, but easy access to mains water may also be necessary. Consideration should also be given to water delivery and storage systems to ensure risk of Legionella is controlled.
- **Wind:** Exposure to strong winds in locations such as balconies and roof terraces can damage plants and hinder their growth. Adequate protection needs to be planned into any growing space to allow crops to thrive.
- **Soil/growing medium:** An essential component for growing food which will vary according to the setting. Rooftop or container growing may require a more lightweight growing medium.
- **Compost:** All food growing requires on-going inputs to maintain the fertility of the growing medium. Provision of on-site composting is one option to provide this and will also help manage organic 'waste' generated within the development.
- **Contaminated Land:** Soil in urban settings may need to be checked for contamination and quality. Any site must be made safe for its existing use. The suitability of the land for growing food should be assessed as previous or current land use could have created contamination of the soil. It is the developer's responsibility to ensure any risks posed are appropriately managed. Depending on the circumstances, soil contamination can be overcome by use of containers or raised beds.
- **Access:** Depending on who the site will be used by (elderly people, children, etc.) adequate access must be planned for. In addition, heavyweight materials such as compost and tools may need to be taken to the site – a particular issue for rooftop or balcony growing.
- **Storage:** Adequate provision for the storage of tools and associated equipment will need to be integrated into the design.
- **Management and Maintenance:** Who will be growing the food and will there be a need to provide on-going management of the growing areas by a caretaker or external contractor?

4.4.6 Where creative approaches to food growing are proposed as part of new development, we would recommend early engagement with the local planning authority to ensure that all the above considerations are taken into account.

4.5 Smart technologies

- 4.5.1 Digital technology now underpins almost all aspects of modern living in every sphere across work, travel, leisure and health; and increasingly it impacts on the economic strength, sustainability and quality of life of all parts of the UK and beyond. Emerging “smart cities” technology, which is set to have an even greater economic impact in future, builds on this to utilise digital connectivity, sensors and data in innovative ways to support: efficient resource management; environmental management, traffic congestion and other city/town management challenges.
- 4.5.2 As new developments are planned and built within the Greater Cambridge area, there is an opportunity to embed technology into the way developments are planned, built and managed, helping to ensure that they can meet their sustainability objectives and help create better places to live. There are a number of areas identified where technology can play a role. Although separated out, it is important that different ‘systems’ within a development are considered as a whole e.g. electric vehicles are part of the mobility system but can also be part of the smart grid and impact on air quality. The key areas to consider are;
- Planning/construction – Advances in data collection, analysis and modelling can help in the planning and construction phases of developments. New concepts such as digital twins can support better understanding of the impacts of developments. Monitoring of sites, particularly transport (movement of cars, bikes, pedestrians etc.) can support the planning authority in understanding the impact of the development and performance against set thresholds. This can create a more dynamic relationship where data can support development phases being brought forward if impacts are less than anticipated or early intervention where thresholds are being missed.
 - Future Mobility – New advances in mobility are supporting a move away from the car. New mobility models are emerging with shared and on-demand vehicles giving more flexibility than traditional public transport. Autonomous Vehicles are beginning to operate on campuses and segregated environments supporting first/last mile journeys. Micromobility models including shared bike schemes and in the future shared scooters make it easier for residents to access and use sustainable modes. To help residents use public transport new ‘mobility as a Service’, platforms are being developed which make the booking and payment for multi modal journeys easy as well as giving travellers information in real time. These technologies can reduce car movements and support increased trips by sustainable modes.
 - Smart Grids - Smart cities can use technology to intelligently provide low or zero carbon areas by supplying carbon-free public transport, smart grids, green infrastructure and more energy efficient homes. Technology is instrumental in transitioning to a low carbon economy and in doing so contributing to climate adaptation and mitigation. Close to 70% of energy gets wasted before reaching the place of consumption. ICT enabled solutions in smart cities in the form of smart grids and meters have the potential to deliver energy more efficiently while also making better use of existing grid infrastructure, which is already highly constrained in

Greater Cambridge. Smart technology can also be used to target congestion and bolster the use of electric and hybrid vehicles.

- Environment – Environmental sensors can be deployed to measure a number of environmental factors across a development. They can measure water levels and flows, measure waste and have been deployed particularly in underground bins and they can measure the air quality and noise impacts of a development. All this data can be used to support mitigation works and give a much better understanding of the performance of buildings and development.

4.5.3 Smart city concepts are not just applicable to cities but to communities on a variety of scales, helping these communities become Smart Places. The Smart Places Initiative, which forms part of the Connecting Cambridgeshire Programme led by Cambridgeshire County Council, is looking at how smart solutions can be used in areas of Cambridgeshire. Working with communities, local authorities, town councils, businesses and academia, the project is seeking to use data from sensors and other devices in villages, towns and cities to provide the local area with information to help influence behaviours and improve economic strength, sustainability and quality of life for local residents.

4.5.4 The Councils will be supportive of schemes that look to integrate smart technologies into the design of transport and energy infrastructure, smart home technologies and other technologies that will help to enhance the quality of life of those living and working in the Greater Cambridge area as well as improving the environmental performance of new development. Collaboration with the Smart Cambridge Initiative at Cambridgeshire County Council would also be supported.

Further guidance

4.5.5 For further guidance on smart technologies and the Smart Places and Smart Cambridge Initiative see: <https://www.connectingcambridgeshire.co.uk/smart-places/smart-cambridge/>

4.6 Responsible sourcing of building materials and embodied carbon

4.6.1 The construction industry is the single largest user of materials in the UK. 420 million tonnes of materials are consumed in construction annually. In addition to this, about 10% of national energy consumption is used in the production and transport of construction products and materials.

4.6.2 There are a wide range of environmental impacts associated with material production, use and waste. These include:

- Climate change as a result of greenhouse gas emissions;
- Acid deposition;
- Ozone depletion;
- Air pollution (including smog);
- Low-level ozone creation;
- Water eutrophication;
- Habitat loss and deforestation;

- Fossil fuel depletion;
 - Minerals extraction;
 - Water wastage.
- 4.6.3 Certification schemes exist to increase both public and industry confidence that risks are being minimised or avoided and their use ensures that specifiers are able to demonstrate the responsible nature of their selection decisions. Areas for consideration include:
- The use of legally harvested and traded timber and the use of recognised certification schemes for other construction materials, with reference to the BRE's Green Guide;
 - Development of sustainable procurement plans to guide developer teams towards the specification of responsibly sourced materials;
- 4.6.4 An emerging area for consideration in selecting construction materials is the embodied carbon locked within those materials. Embodied carbon refers to carbon dioxide emitted during the manufacture, transport and construction of building materials, together with end of life emissions. Consideration of embodied carbon is likely to become increasingly important as we transition to a low and indeed zero carbon society.
- 4.6.5 The UK Green Building Council⁶⁰ has highlighted that there remains a significant, and still largely untapped, opportunity to address the embodied carbon of a building or project, alongside its operational efficiency, of a building. The greatest opportunity for impact on embodied carbon comes at the design stage, in particular in the building structure. If opportunities are not taken at this early stage, the embodied carbon savings are lost for the entire lifetime of the building.
- 4.6.6 The Councils will be supportive of measures to consider the embodied carbon of materials used within the built environment, including the specification of building materials with lower embodied energy. We would recommend early engagement as part of the pre-application process for schemes looking to utilise materials with low embodied carbon.

Further guidance

- 4.6.7 For further guidance on the responsible sourcing of materials and embodied carbon, please see:
- Green book live. Available online at: <http://www.greenbooklive.com/>
 - RICS professional standards and guidance, UK. Whole life carbon assessment for the built environment, 1st edition, November, 2017. Available online at: <https://www.rics.org/globalassets/rics-website/media/news/whole-life-carbon-assessment-for-the--built-environment-november-2017.pdf>
 - WRAP Embodied Carbon Database: <http://ecdb.wrap.org.uk/Default.aspx>

⁶⁰ <https://www.ukgbc.org/sites/default/files/Tackling%20embodied%20carbon%20in%20buildings.pdf>

Appendix 1: Sustainability Checklist

1a –Sustainability checklist for applications in Cambridge

CODE	CHECKLIST	SUMMARY OF APPROACH
TRANSPORT – SPD SECTION 2		
T.1	Have you demonstrated that the development is in the most suitable location for access by public transport, walking and cycling, reducing the need to travel by private car?	
T.2	Have you demonstrated how the development proposals give priority for walking and cycling over cars, linking the development with the surrounding walking and cycling network including planned projects?	
T.3	Will the proposed walking and cycling provision be in place by first occupation of the development so that sustainable travel patterns can be established at an early stage?	
T.4	Where car parking is provided, has provision been made for electric vehicle charging?	
T.5	Have any ‘softer’ measures been included, to encourage uptake of more sustainable modes of transport?	
T.6	Does the development inhibit the expansion of high quality public transport/cycling and walking routes?	
ENERGY AND CARBON REDUCTION – SPD SECTION 3.2		
En.1	For residential schemes have you followed the energy hierarchy in order to achieve the 19% reduction on Part L 2013 requirement set out in policy 28?	

CODE	CHECKLIST	SUMMARY OF APPROACH
En.2	For non-residential development, have you carried out a BREEAM pre-assessment and met the mandatory energy requirements for BREEAM 'excellent' within Ene 01?	
En.3	How will you ensure that where renewable/low carbon technologies have been included in the approach to meeting the above carbon reduction requirements, these will be successfully integrated into the design of the development?	
WATER EFFICIENCY – SPD SECTION 3.3		
Wat.1	For residential development have you prepared a Sustainability Statement setting out how your proposal will meet the requirement for potable water use of no more than 110 litres/person/day?	
Wat.2	For non-residential development have you included information to demonstrate that your proposal will be able to meet the requirement for achievement of 5 credits from Wat01 of the BREEAM assessment?	
Wat.3	Have you given consideration to water re-use as part of the sustainable drainage strategy for the site as part of an integrated approach to water management?	
CLIMATE CHANGE ADAPTATION – SPD SECTION 3.4		
Ca.1	Have you integrated measures to design out the risk of overheating, giving priority to architectural approaches in line with the cooling hierarchy?	
Ca.2	Have you undertaken overheating analysis following the CIBSE methodology and utilising future climate scenarios?	
Ca.3	Have you considered the role of green infrastructure and cool materials in enhancing the adaptive capacity of your proposal?	

CODE	CHECKLIST	SUMMARY OF APPROACH
Ca.4	Where your proposal has flat roofs, have these been designed as green or brown roofs in line with the requirements of policy 31?	
Ca.5	Where there are existing trees on your site, including ancient and veteran trees, how has the retention of these trees informed the layout of your development?	
Ca.6	How have you integrated the planting of new trees into your proposals, giving consideration to the right tree in the right place principle?	
Ca.7	Where you are proposing to utilise thermal mass to help regulate internal temperatures, has this thermal mass been designed to be exposed and what is the strategy to enable night purge ventilation?	
BIODIVERSITY AND GEODIVERSITY – SPD SECTION 3.5		
Bio.1	Has a Preliminary Ecological Assessment and Protected Species Scoping Survey ⁶¹ been conducted, with sufficient detail given the nature and size of the site and the proposed development?	
Bio.2	If a protected or priority species and/or habitats have been identified, has a specialist been engaged to conduct a detailed survey? https://events.cieem.net/ProfessionalDirectory/Professional-Directory.aspx	
Bio.3	Has/will all the relevant information from these surveys been provided?	

⁶¹ Surveys should be carried out in accordance with CIEEM guidance: <https://cieem.net/resource/guidance-on-preliminary-ecological-appraisal-gpea/>

CODE	CHECKLIST	SUMMARY OF APPROACH
Bio.4	Has the Mitigation hierarchy been followed, demonstrating how existing habitats and species have been protected in the proposed ecological and landscape strategy? http://www.csbi.org.uk/our-work/mitigation-hierarchy-guide/	
Bio.5	Has the mitigation hierarchy been followed, demonstrating how any potentially adverse effects have been mitigated?	
Bio.6	Has the mitigation hierarchy been followed, demonstrating that adequate compensation measures have been proposed on or offsite, where it is agreed that damage is unavoidable ?	
Bio.7	Has it been demonstrated that the proposals will deliver biodiversity net gain, with use of the DEFRA Biodiversity Offsetting metric?	
Bio.8	For major development, has the Natural Cambridgeshire Local Nature Partnership (LNP) Developing with Nature Toolkit been adopted?	
Bio.9	Has a suitable biodiversity management and monitoring strategy for the site been proposed?	
Bio.10	<u>For development likely to affect a European site, what information have you provided to enable the local planning authority, as Competent Authority under the provisions of the Conservation of Habitats and Species Regulations 2017 (as amended) to record its decision with regard to likely significant effect, including undertaking Appropriate Assessment where necessary?</u>	
POLLUTION – SPD SECTION 3.6		
LIGHT POLLUTION		

CODE	CHECKLIST	SUMMARY OF APPROACH
Pol.1	For all development with artificial lighting has a statement of the need for lighting been submitted and have the principles of an external lighting strategy that meets the requirements of the local plan policy/SPD been set out?	
Pol.2	Will the final detailed external lighting design / scheme be in accordance with the guidance and principles set out in the light pollution section of the SPD?	
Pol.3	Has the development taken measures to reduce light pollution impacts on character, residential amenity and biodiversity?	
Pol.4	For substantive large-scale lighting installations such as the floodlighting of external recreational and sporting facilities/pitches or transport interchanges has a detailed lighting assessment been undertaken by a qualified Lighting Engineer or lighting company in accordance with Section 3.6.24 of the SPD?	
Pol.5	For Environmental Impact Assessment (EIA) development has a lighting impact assessment been undertaken having regard to and in accordance with the Institute of Lighting Professionals 'PLG04 - Guidance on Undertaking Environmental Lighting Impact Assessments'?	
Pol.6	For any proposal for the display of illuminated advertisements has the relevant information been provided?	
CONTAMINATED LAND		
Pol.7	Is the development site's land use history known? Is the site potentially affected by land contamination (including ground water contamination) that could result in unacceptable risks e.g. a previous potentially contaminative industrial or similar use on site or ground gases?	

CODE	CHECKLIST	SUMMARY OF APPROACH
	If yes, as a minimum, has a land contamination desk top study with risk assessment and site walk-over been undertaken and included with the application?	
NOISE		
Pol.8	For major Noise Sensitive Development (NSD) located in a noisy environment or near to a specific existing noise generating source e.g. near to a busy road, railway line, noisy commercial/industrial premises including building services plant/equipment has an appropriate acoustic assessment /report been undertaken in accordance with the noise assessment process and submission requirements set out in the noise section of the SPD?	
Pol.9	For Noise Generating Development (NGD) such as industrial commercial/trade or business premises and uses including plant and equipment has an appropriate acoustic assessment/report been undertaken in accordance with the noise assessment process and submission requirements set out in the noise section of the SPD?	
Pol.10	Has an 'Acoustic Design Statement' been included demonstrating that the principles of good acoustic design and noise mitigation will be followed for both NSD and NGD?	
Pol.11	Has the development taken measures to reduce existing noise and enhance the existing soundscape of the site?	
Pol.12	For all development has the impact of demolition construction noise/vibration been assessed and mitigation proposed?	

CODE	CHECKLIST	SUMMARY OF APPROACH
Pol.13	For substantial development or infrastructure projects has a Noise and Vibration Demolition and Construction Environmental Management Plan been provided?	
Pol.14	If the proposals are likely to generate a significant amount of traffic (defined as road traffic movements greater than 5% of Annual Average Daily Traffic) has a noise impact assessment of any increase in local traffic noise been undertaken?	
AIR POLLUTION - <i>If the answer to any of the questions below is yes, then an Air Quality Assessment is likely to be required and further guidance should be sought from the Environmental Quality and Growth team</i>		
Pol.15	Will the development require an Environmental Impact Assessment?	
Pol.16	Will the proposals interfere with the Air Quality actions stated in the Local Transport Plan ⁶² or Local Air Quality Action Plan? ⁶³	
Pol.17	Is the development part of a large scale major redevelopment that might result in long-term construction generating HGV flows more than 100 movements per day and/or demolition and construction dust?	
Pol.18	Will the development significantly alter the road or rail network? For example, <ul style="list-style-type: none"> • realign roads, i.e. changing the proximity of receptors to traffic lanes • Introduce a new road • Introduce a new junction • Remove an existing junction near to relevant receptors. 	

⁶² Currently in preparation

⁶³ <https://www.cambridge.gov.uk/air-quality-action-plan>

CODE	CHECKLIST	SUMMARY OF APPROACH
	<ul style="list-style-type: none"> • Change/introduce a junction that causes traffic to significantly accelerate or decelerate, e.g. traffic lights, or roundabouts. • Introduce or change a bus station 	
Pol.19	<p>Will the development significantly alter flows or speeds on busy roads greater than 10,000 vehicles per day or any road within an AQMA? Where 'significantly' is defined as including any of the following:</p> <ul style="list-style-type: none"> • Change in average vehicle speed of 5kph or a significant increase in congestion • A change in the modal split to a greater percentage of Heavy Duty Vehicles (HDVs) • A change of PSV and/or HDV flows of more than 25 AADT within or adjacent to an AQMA, more than 100 AADT elsewhere. • Cause a significant change in Light Duty Vehicle (LDV) traffic flows on local roads with relevant receptors. (LDV = cars and small vans <3.5t gross vehicle weight). A change of LDV flows of more than 100 AADT within or adjacent to an AQMA, more than 500 AADT elsewhere. 	
Pol.20	Does the development provide more than 50 new parking spaces or more than 25 if it is within an existing AQMA?	
Pol.21	Does the development have an underground car park with extraction system where the ventilation extract for the car park will be within 20 m of a relevant receptor and coupled with the car park having more than 100 movements per day.	
Pol.22	Is the development within an AQMA and a sensitive development (Residential, school, healthcare, childcare etc.)?	

CODE	CHECKLIST	SUMMARY OF APPROACH
Pol.23	For commercial development, does the development include a prescribed industrial process under the PPC regulations ⁶⁴ , including MCPD ⁶⁵ ?	
Pol.24	Is the development a sensitive development close to an existing prescribed process or other source of air pollution, such as a busy road?	
Pol.25	May the development create a street canyon or reduce dispersion of pollutants?	
Pol.26	Does the energy strategy for your proposal introduce Combined Heat and Power (CHP) plant, other centralised boilers, or generators? Do these conform with the emissions standards set out in Appendix 3 of this SPD?	
ODOUR AND OTHER FUGITIVE EMISSIONS TO AIR		
Pol.27	For all industrial, commercial or business uses that generate odours or if substantial ventilation or extraction equipment is proposed has an overarching outline ventilation statement/strategy been provided?	
Pol.28	For low to medium odour risk generating developments such as hot food premises/commercial kitchens has an appropriate odour risk assessment been undertaken including the provision of the information requested in paragraphs 3.6.193 – 3.6.196 of the SPD?	
Pol.29	For higher risk odour generating uses, such as a new sewage treatment works or when odour sensitive uses are proposed near such uses, has a detailed odour assessment been undertaken in accordance with the Institute of Air Quality Management document	

⁶⁴ <https://www.gov.uk/government/publications/local-authority-pollution-control-general-guidance-manual>

⁶⁵ <https://www.gov.uk/government/consultations/improving-air-quality-reducing-emissions-from-medium-combustion-plants-and-generators>

CODE	CHECKLIST	SUMMARY OF APPROACH
	'Guidance on the assessment of odour for planning (IAQM, Version 1.1 - July 2018)'?	
SUSTAINABLE DRAINAGE SYSTEMS – SPD SECTION 3.7		
SuDS.1	Have you completed the pre-application Checklist (Appendix E) and Surface Water Drainage Pro-forma (Appendix F) of the Cambridgeshire Flood and Water SPD	
CONSTRUCTION STANDARDS (BREEAM) – SPD SECTION 3.8		
Cs.1	If your proposal involves the re-use/re-development of existing buildings, have you developed a bespoke approach to sustainable construction standards and what form does this bespoke approach take?	
Cs.2	Where BREEAM has been used, has a BREEAM pre-assessment been prepared for submission with your planning application?	
HERITAGE ASSETS AND CLIMATE CHANGE – SPD SECTION 3.10		
Ha.1	Where works to a heritage asset to address climate change are proposed, have you undertaken studies to ensure that your proposals are based on a thorough understanding of the building's historic evolution and construction (where these matters relate to the heritage significance of the asset), architectural and historic significance?	
Ha.2	Have you undertaken an assessment of the building's existing environmental performance, and how have your proposals been informed by this work?	
Ha.3	Have you developed a building monitoring and management strategy in order to assess the ongoing impact of the implemented measures on the asset's historic fabric?	
Ha.4	How have you factored in the potential for remediation works	

CODE	CHECKLIST	SUMMARY OF APPROACH
	should ongoing monitoring identify that measures are leading to harm to the heritage asset?	
RECYCLING AND WASTE FACILITIES CONSTRUCTION WASTE – SPD SECTION 3.11		
Wr.1	Has the size and location of recycling and waste facilities, both for storage and collection, been factored into the design of the proposals using the requirements set out in the RECAP Waste Management Design Guide SPD and associated Toolkit?	
Wr.2	Have you completed Cambridge City Council’s Waste and recycling checklist for developers?	
Wr.3	Have measures been put in place to: <ul style="list-style-type: none"> • Reduce the amount of construction waste generated by the proposals, including the use of single-use plastics where alternative options exist; and • Re-use and recycle remaining construction waste (Non-residential schemes should refer to the BREEAM assessment)	
OTHER SUSTAINABILITY CONSIDERATIONS – SPD SECTION 4		
Osc.1	Has a target been set for improving the environmental impact of materials used in constructing the development, with consideration given to the embodied carbon of materials? Non-residential schemes should refer to the BREEAM assessment. Residential schemes should give consideration to use of the Green Guide to Specification, certification schemes for specific materials with further information available at: http://www.greenbooklive.com/	
Osc.2	Has consideration been given to providing food growing opportunities as part of the development, in the form of a private	

CODE	CHECKLIST	SUMMARY OF APPROACH
	amenity space of the appropriate size and aspect? Have long term management and maintenance arrangements been considered in the design of these spaces?	
Osc.3	Have measures been integrated into the design to create healthy indoor environments, given consideration to issues such as daylight, ventilation and humidity control and the use of materials with low toxicity?	
Osc.4	For non-residential development, has consideration been given to creating a healthy indoor working environment, giving consideration to elements such as biophilic design?	
Osc.5	Has consideration been given to the role of smart technologies in the design of your proposals, giving consideration to the role that such technologies could play in both the construction and operational phases of the development?	
Osc.6	Have you considered measures to enable residents/building owners to more easily retrofit their property in the future e.g. low temperature heating systems or 'stage 1 fit' pipework for rainwater harvesting?	

1b – Sustainability checklist for applications in South Cambridgeshire

CODE	CHECKLIST	SUMMARY OF APPROACH
TRANSPORT – SPD SECTION 2		
T.1	Have you demonstrated that the development is in the most suitable location for access by public transport, walking and cycling, reducing the need to travel by private car?	
T.2	Have you demonstrated how the development proposals give priority for walking and cycling over cars, linking the development with the surrounding walking and cycling network including planned projects?	
T.3	Will the proposed walking and cycling provision be in place by first occupation of the development so that sustainable travel patterns can be established at an early stage?	
T.4	Where car parking is provided, has provision been made for electric vehicle charging?	
T.5	Have any 'softer' measures been included, to encourage uptake of more sustainable modes of transport?	
T.6	Does the development inhibit the expansion of high quality public transport/cycling and walking routes?	
ENERGY AND CARBON REDUCTION – SPD SECTION 3.2		
En.1	Has the 10% CO ₂ reduction required been established using SAP/SBEM calculations or other appropriate benchmarks?	
En.2	Has the Energy Statement form been completed (see Appendix 5)?	
En.3	Has initial feasibility work into renewable options for the development been provided?	
En.4	Has the contribution that passive solar design will make to the energy requirements of the development been provided (optional)?	

CODE	CHECKLIST	SUMMARY OF APPROACH
En.5	Has it been clearly indicated which technology(s) has been chosen and demonstrated how this/these meet the 10% CO ₂ reduction requirement?	
En.6	Has visual information been provided to show the technology(s) has/have been successfully integrated into the development?	
En.7	Have you demonstrated how any adverse impacts on residential amenity (e.g. air quality impacts or noise) can be mitigated in accordance with Section 3.5 of this SPD? Where gas CHP is proposed, evidence will need to be provided to demonstrate that it meets the emissions standards set out in Appendix 3 of this SPD.	
En.8	For large scale development likely to take place over a number of years, have you taken into consideration Government proposals to stop new housing from having gas boilers from 2025?	
En.9	For growth areas and new settlements, has consideration been given to site-wide approaches to renewable and low carbon energy provision?	
WATER EFFICIENCY – SPD SECTION 3.3		
Wat.1	For residential development have you prepared a Sustainability Statement setting out how your proposal will meet the requirement for potable water use of no more than 110 litres/person/day?	
Wat.2	For non-residential development have you included information to demonstrate that your proposal will be able to meet the requirement for achievement of 2 credits from Wat01 of the BREEAM assessment?	
Wat.3	Have you given consideration to water re-use as part of the sustainable drainage strategy for the site as part of an integrated approach to water management?	

CODE	CHECKLIST	SUMMARY OF APPROACH
CLIMATE CHANGE ADAPTATION – SPD SECTION 3.4		
Ca.1	Have you integrated measures to design out the risk of overheating, giving priority to architectural approaches in line with the cooling hierarchy?	
Ca.2	Have you undertaken overheating analysis following the CIBSE methodology and utilising future climate scenarios?	
Ca.3	Have you considered the role of green infrastructure and cool materials in enhancing the adaptive capacity of your proposal?	
Ca.4	Where there are existing trees on your site, including ancient and veteran trees, how has the retention of these trees informed the layout of your development?	
Ca.5	How have you integrated the planting of new trees into your proposals, giving consideration to the right tree in the right place principle?	
Ca.6	What other measures have been incorporated into the development to enable it to cope with predicted climate change impacts, without increasing the use energy consuming ventilation and cooling?	
Ca.7	Where you are proposing to utilise thermal mass to help regulate internal temperatures, has this thermal mass been designed to be exposed and have you developed a strategy to enable night purge ventilation?	
BIODIVERSITY AND GEODIVERSITY – SPD SECTION 3.5		

CODE	CHECKLIST	SUMMARY OF APPROACH
Bio.1	Has a Preliminary Ecological Assessment and Protected Species Scoping Survey ⁶⁶ been conducted, with sufficient detail given the nature and size of the site and the proposed development?	
Bio.2	If a protected or priority species and/or habitats have been identified, has a specialist been engaged to conduct a detailed survey? https://events.cieem.net/ProfessionalDirectory/ProfessionalDirectory.aspx	
Bio.3	Has/will all the relevant information from these surveys been provided?	
Bio.4	Has the mitigation hierarchy been followed, demonstrating how existing habitats and species have been protected in the proposed ecological and landscape strategy? http://www.csbi.org.uk/our-work/mitigation-hierarchy-guide/	
Bio.5	Has the mitigation hierarchy been followed, demonstrating how any potentially adverse effects have been mitigated?	
Bio.6	Has the mitigation hierarchy been followed, demonstrating that adequate compensation measures have been proposed on or offsite, where it is agreed that damage is unavoidable ?	
Bio.7	Has it been demonstrated that the proposals will deliver biodiversity net gain, with use of the DEFRA Biodiversity Offsetting metric?	

⁶⁶ Surveys should be carried out in accordance with CIEEM guidance: <https://cieem.net/resource/guidance-on-preliminary-ecological-appraisal-gpea/>

CODE	CHECKLIST	SUMMARY OF APPROACH
Bio.8	For major development, has the Natural Cambridgeshire Local Nature Partnership (LNP) Developing with Nature Toolkit been adopted?	
Bio.9	Has a suitable biodiversity management and monitoring strategy for the site been proposed?	
Bio.10	<u>For development likely to affect a European site, what information have you provided to enable the local planning authority, as Competent Authority under the provisions of the Conservation of Habitats and Species Regulations 2017 (as amended) to record its decision with regard to likely significant effect, including undertaking Appropriate Assessment where necessary?</u>	
POLLUTION – SPD SECTION 3.6		
LIGHT POLLUTION		
Pol.1	For all development with artificial lighting has a statement of the need for lighting been submitted and have the principles of an external lighting strategy that meets the requirements of the local plan policy/SPD been set out?	
Pol.2	Will the final detailed external lighting design / scheme be in accordance with the guidance and principles set out in the light pollution section of the SPD?	
Pol.3	Has the development taken measures to reduce light pollution impacts on character, residential amenity and biodiversity?	
Pol.4	For substantive large-scale lighting installations such as the floodlighting of external recreational and sporting facilities/pitches or transport interchanges has a detailed lighting assessment been undertaken by a qualified Lighting Engineer or lighting company in accordance with Section 3.6.24 of the SPD?	

CODE	CHECKLIST	SUMMARY OF APPROACH
Pol.5	For Environmental Impact Assessment (EIA) development has a lighting impact assessment been undertaken having regard to and in accordance with the Institute of Lighting Professionals 'PLG04 - Guidance on Undertaking Environmental Lighting Impact Assessments'?	
Pol.6	For any proposal for the display of illuminated advertisements has the relevant information been provided?	
CONTAMINATED LAND		
Pol.7	<p>Is the development site's land use history known? Is the site potentially affected by land contamination (including ground water contamination) that could result in unacceptable risks e.g. a previous potentially contaminative industrial or similar use on site or ground gases?</p> <p>If yes, as a minimum, has a land contamination desk top study with risk assessment and site walk-over been undertaken and included with the application?</p>	
NOISE POLLUTION		
Pol.8	For major Noise Sensitive Development (NSD) located in a noisy environment or near to a specific existing noise generating source e.g. near to a busy road, railway line, noisy commercial/industrial premises including building services plant/equipment has an appropriate acoustic assessment /report been undertaken in accordance with the noise assessment process and submission requirements set out in the noise section of the SPD?	
Pol.9	For Noise Generating Development (NGD) such as industrial commercial/trade or business premises and uses including plant	

CODE	CHECKLIST	SUMMARY OF APPROACH
	and equipment has an appropriate acoustic assessment/report been undertaken in accordance with the noise assessment process and submission requirements set out in the noise section of the SPD?	
Pol.10	Has an 'Acoustic Design Statement' been included demonstrating that the principles of good acoustic design and noise mitigation will be followed for both NSD and NGD?	
Pol.11	Has the development taken measures to reduce existing noise and enhance the existing soundscape of the site?	
Pol.12	For all development has the impact of demolition construction noise/vibration been assessed and mitigation proposed?	
Pol.13	For substantial development or infrastructure projects has a Noise and Vibration Demolition and Construction Environmental Management Plan been provided?	
Pol.14	If the proposals are likely to generate a significant amount of traffic (defined as road traffic movements greater than 5% of Annual Average Daily Traffic) has a noise impact assessment of any increase in local traffic noise been undertaken?	
AIR QUALITY		
Pol.15	Air Quality: How have you incorporated practical measures to mitigate the transport impacts of development on local air quality into the development (i.e. Low Emission Strategy for major developments)?	
Pol.16	Have you undertaken an air quality impact assessment if the development is in particularly congested location or where there are particular travel problems, if generating large number of trips, if near or within the Air Quality Management Area?	

CODE	CHECKLIST	SUMMARY OF APPROACH
ODOUR AND OTHER FUGITIVE EMISSIONS		
Pol.17	For all industrial, commercial or business uses that generate odours or if substantial ventilation or extraction equipment is proposed has an overarching outline ventilation statement/strategy been provided?	
Pol.18	For low to medium odour risk generating developments such as hot food premises/commercial kitchens has an appropriate odour risk assessment been undertaken including the provision of the information requested in paragraphs 3.6.193 – 3.6.196 of the SPD?	
Pol.19	For higher risk odour generating uses, such as a new sewage treatment works or when odour sensitive uses are proposed near such uses, has a detailed odour assessment been undertaken in accordance with the Institute of Air Quality Management document 'Guidance on the assessment of odour for planning (IAQM, Version 1.1 - July 2018)'?	
SUSTAINABLE DRAINAGE SYSTEMS – REFER TO THE CAMBRIDGESHIRE FLOOD AND WATER SPD		
SuDS.1	Have you completed the pre-application Checklist (Appendix E) and Surface Water Drainage Pro-forma (Appendix F) of the Cambridgeshire Flood and Water SPD	
SUSTAINABLE SHOW HOMES – SPD SECTION 3.9		
SuSh.1	For residential developments that will include a show home, have you given consideration to the range of measures that will be incorporated into the Show Home to enable home buyers to purchase additional options to enhance the environmental performance of their new home?	
HERITAGE ASSETS AND CLIMATE CHANGE – SPD SECTION 3.10		
Ha.1	Where works to a heritage asset to address climate change are	

CODE	CHECKLIST	SUMMARY OF APPROACH
	proposed, have you undertaken studies to ensure that your proposals are based on a thorough understanding of the building's historic evolution and construction (where these matters relate to the heritage significance of the asset), architectural and historic significance?	
Ha.2	Have you undertaken an assessment of the building's existing environmental performance, and how have your proposals been informed by this work?	
Ha.3	Have you developed a building monitoring and management strategy in order to assess the ongoing impact of the implemented measures on the asset's historic fabric?	
Ha.4	How have you factored in the potential for remediation works should ongoing monitoring identify that measures are leading to harm to the heritage asset?	
RECYCLING AND WASTE FACILITIES – SPD SECTION 3.11		
Wr.1	Has the size and location of recycling and waste facilities, both for storage and collection, been factored into the design of the proposals using the requirements set out in the RECAP Waste Management Design Guide SPD and associated Toolkit?	
Wr.2	Has it been shown that the average and maximum distances for building users to move their waste to the storage/collection points is within the guidelines set out in the relevant guidance? If these targets are exceeded, have justification and mitigation measures been proposed?	
Wr.3	Have measures been put in place to:	

CODE	CHECKLIST	SUMMARY OF APPROACH
	<ul style="list-style-type: none"> • Reduce the amount of construction waste generated by the proposals, including the use of single-use plastics where alternative options exist; and • Re-use and recycle remaining construction waste 	
OTHER SUSTAINABILITY CONSIDERATIONS – SPD SECTION 4		
Osc.1	<p>Has a target been set for improving the environmental impact of materials used in constructing the development, with consideration given to the embodied carbon of materials?</p> <p>Non-residential schemes should refer to the BREEAM assessment. Residential schemes should give consideration to use of the Green Guide to Specification, certification schemes for specific materials with further information available at: http://www.greenbooklive.com/</p>	
Osc.2	<p>Has consideration been given to providing food growing opportunities as part of the development, in the form of a private amenity space of the appropriate size and aspect? Have long term management and maintenance arrangements been considered in the design of these spaces?</p>	
Osc.3	<p>Have measures been integrated into the design to create healthy indoor environments, given consideration to issues such as daylight, ventilation and humidity control and the use of materials with low toxicity?</p>	
Osc.4	<p>For non-residential development, has consideration been given to creating a healthy indoor working environment, giving consideration to elements such as biophilic design?</p>	

CODE	CHECKLIST	SUMMARY OF APPROACH
Osc.5	Has consideration been given to the role of smart technologies in the design of your proposals, giving consideration to the role that such technologies could play in both the construction and operational phases of the development?	
Osc.6	For new settlements covered by policies within Chapter 3 of the Local Plan, how do you plan to meet policy requirements to exceed baseline sustainable design and construction requirements established by the Local Plan? This could include the use of the BREEAM Communities certification scheme in light of the supporting text to policy CC/1	
Osc.7	Have you considered measures to enable residents/building owners to more easily retrofit their property in the future e.g. low temperature heating systems or 'stage 1 fit' pipework for rainwater harvesting?	

Appendix 2: Carbon reduction template for inclusion in Carbon Reduction Statement for residential development – Cambridge developments only.

Notes:

1. The table should be completed for each unit proposed as part of a development in line with the methodology for calculating compliance with Ene01 of the withdrawn Code for Sustainable Homes. Where a building contains multiple dwellings, it is acceptable to assess this issue based on the average energy performance of all dwellings within the building (e.g. for apartments or terraced housing). The area weighted average DER and TER must be calculated in accordance with the block averaging methodology defined in clauses 2.7 and 2.16 of Approved Document L1A. For dwellings where area weighting does not apply, the carbon reduction requirement should be achieved for each unit.
2. The Target Emission Rate (TER) and Dwelling Emission Rate (DER) should be derived from the calculations carried out for Building Regulations compliance (Part L).
3. Sample SAP calculations should be appended to the Carbon Reduction Statement as evidence of compliance in addition to submission of the table.
4. Alongside the table below, the main body of the Statement should include a summary of the measures proposed to reduce carbon emissions following the energy hierarchy (be lean, be clean and be green). Where renewable energy technologies are proposed to meet some of the carbon reduction requirement, the location and layout of those technologies should be shown on relevant drawings (for example, roof plans should show the layout of any proposed photovoltaic panels).
5. Where SAP calculations are yet to be completed, the Carbon Reduction Statement should set out the general approach to meeting policy requirements, with a planning condition used to secure submission of carbon calculations once SAP calculations have been carried out.

Unit number/address	Target Emission Rate (TER)	Dwelling Emission Rate (DER)	% Improvement on Part L 2013

Appendix 3: Gas Fired Combined Heat and Power (CHP)

Advice note for developers in Cambridge and South Cambridgeshire on reducing the impact on Air Quality

Background

1. Combined Heat and Power (CHP) is the co-production of electricity and heat and is considered to be a low carbon technology.
2. Policies 28 and 29 of the Cambridge Local Plan (2018) and policy CC/3 of the South Cambridgeshire Local Plan (2018) are committed to sustainable design and construction with all developments being designed to minimise carbon and other greenhouse gas emissions. Gas fired CHP is a low carbon technology and may be a viable solution for meeting these policy requirements. However despite these benefits, CHP can lead to a localised worsening of air quality as fuel combustion gives rise to air pollutants if not correctly specified, installed and maintained.
3. The city has an Air Quality Management Area (AQMA) for nitrogen dioxide (NO₂) as levels exceed health based standards as agreed with the EU. The AQMA extends across much of the central part of the city⁶⁷. The Air Quality Action Plan (AQAP) 2018 - 2023⁶⁸ outlines measures to improve and maintain air quality across the city despite pressures from continued growth. Some of these measures will be delivered via the planning process. Air quality issues within South Cambridgeshire have been linked directly to the volume of traffic that runs through the district, specifically along the A14. The A14 is congested on a regular basis between Bar Hill (to the west of Cambridge) and Milton (to the north north-east of Cambridge). This has resulted in the declaration of an Air Quality Management Area (AQMA) for nitrogen dioxide (NO₂) and PM₁₀ along a stretch of the A14 between Bar Hill and Milton.
4. There is no single piece of legislation that covers the installation of CHP systems and their associated emissions. This advice note assumes that the installations discussed fall outside the scope of wider regulatory control such as Part 'A' and 'B' permitted industrial process (>20MW_{th})⁶⁹. The Medium Combustion Plant Directive (MCPD) came into force in 2018. All existing and new plant between 1-50 MW_{th}; will need to be registered and meet set emission limits. Although this is regulated through the Environment Agency impact on air quality will continue to be assessed through the planning process.

⁶⁷ www.cambridge.gov.uk/air-pollution

⁶⁸ www.cambridge.gov.uk/air-quality-action-plan

⁶⁹ www.cambridge.gov.uk/industrial-licences-and-permits

5. As part of the planning process it is important to consider impacts on air quality not only within and near the boundary of the AQMA but also in areas undergoing extensive development. The emissions from CHP should be considered alongside the wider emissions associated with the development such as plant installation, traffic impacts and where relevant the potential for cumulative impact of multiple CHP plants in a small geographical area, which could lead to localised hotspots of poor air quality.
6. This advice note focusses solely on gas fired CHP and therefore assumes that the pollutants of interest are nitrous oxides (NO_x). If fuel sources other than gas are being considered please contact the Environmental Quality & Growth team at Cambridge City Council or the Air Quality Team at South Cambridgeshire District Council ⁷⁰ as soon as possible to discuss the implications. In these cases installations may fall under other regulatory regimes and other pollutants such as particulate matter (PM) and sulphur dioxide (SO₂) may need to be considered.
7. The use of biomass CHP should be very carefully considered due to the potential impact on air quality within the local area. The use of biomass combustion is unlikely to be supported within an AQMA or where it may impact on residents unless it can be clearly demonstrated that there will be no adverse impact on air quality. Consideration will also need to be given to the responsible sourcing of biomass fuel and of the transportation impacts of fuel delivery.

Minimising Emissions

8. It is important to give thought to the design and specification of the system including potential emissions early in the design phase. This will minimise the conflict that gas fired
9. CHP can have with wider air quality issues on the area and help overcome any concerns regarding the health impacts of the proposed development. This advice note has been developed to assist with this process.
10. All CHP installed will meet the following emission standards. This will be secured through a planning condition:
 - Spark ignition engine: less than 150mgNO_x/Nm³
 - Compression ignition engine: less than 400mgNO_x/Nm³
 - Gas turbine: less than 50 mg NO_x/Nm³

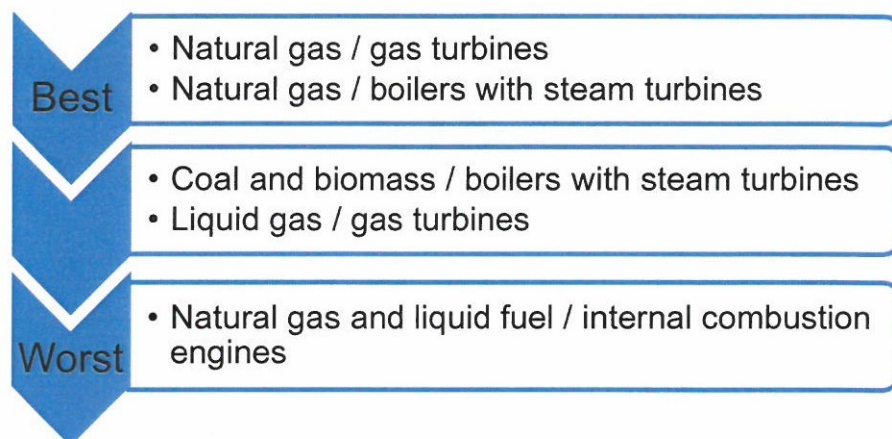
⁷⁰ Email: egg@cambridge.gov.uk; Tel: 01223 457900, Email: Air.quality@scambs.gov.uk; Tel: 03450 450063

11. Giving thought to the wider environmental impacts of the system early on and ensuring the system is optimised for the proposed use not only helps reduce issues later on, but also helps minimise costs. The retrofitting of abatement equipment at a late stage is likely to be far more costly than giving time and consideration at the planning stage.
12. The impact on air quality will depend on many factors including emissions, size and type of plant, flue design and dispersion, what it is replacing, whether it represents intensification of site and whether abatement equipment will be installed. The emissions from CHP should be considered alongside other emissions associated with the development including additional plant installation and traffic impacts.

Type and Design of the Plant

13. The plant consists of the prime mover which provides the power for the system, electrical generator and heat recovery equipment (this captures waste heat from the prime mover most often for use as heating and hot water (HHW)). CHP can also include cooling. In this case it is known as combined cooling, heat and power (CCHP) and the design will then include absorption chillers.
14. The type of prime mover has a major impact on the emissions of a system with standards applying to this and not the CHP system as a whole. The two most common prime movers used for gas fired CHP are the internal combustion engine and the gas turbine. Gas turbines produce the lowest emissions and are the most electrically efficient of the two, with modern gas turbines typically incorporating low NO_x burners as standard. They are therefore unlikely to require further abatement features to be in line with emission standards. The combustion engine typically has higher NO_x emissions and should be specified with lean burn technology. Catalytic converters can be installed to reduce NO_x emissions but require further capital outlay. Figure 1 below gives an indicative look at common prime movers and relative NO_x emissions.

Figure 1: Indicative Relative NO_x Emissions Performance of Common CHP Prime mover Technology/Fuel Combinations⁷¹



15. CHP is typically sized to meet base loads; over-specified systems run less efficiently and produce higher emissions. How the system will deal with variable heat loads is also an important part of the design which again will influence emissions. Will it have a heat store or will peaking plant be used? Where peaking plant is installed, emissions should also be considered; and low NO_x boilers in line with BREEM should be installed to minimise the emissions of the wider development.⁷²

Dispersion of Emissions

16. Consideration should be given at an early stage to the location and the height of the chimney or flue serving the CHP plant. Ideally the chimney should be designed as high as possible to aid dispersion and consideration should be given to the height of surrounding buildings and the impact they may have on dispersion.
17. Under the Clean Air Act (CAA) 1993 details of all new 'furnaces' installed should be submitted to the Local Authority. In some cases a chimney height calculation will need to be completed. For further information visit the Cambridge City Council website at:
www.cambridge.gov.uk/chimney-height-approval.

⁷¹ CHP: Air Quality Guidance for Local Authorities; EPUK 2012

⁷² Appliances that meet a dry NO_x emission rating of 40mg/kWh – BREEM (www.breem.org)

18. Dispersion modelling may be required for some developments; particularly those within or adjacent to the AQMA or larger developments outside the AQMA. This may form part of an Air Quality Assessment or be standalone depending on the scale and wider air quality impacts of the development over and above those of the CHP installation. Please see both the Air quality in Cambridge: Developer's Guide⁷³ and 'Land Use Planning and Development Control: Planning for Air Quality'; IAQM 2017 (or as superseded) for further information on when an Air Quality Assessment will be required.

Conclusion

19. It is important to consider the design of the proposed CHP system at an early stage. This should include:

- Consideration for the type of prime mover and system design to minimise emissions
- Will further abatement equipment be required to meet emission standards?
- Has consideration been given to the flue design and dispersion of emissions?
- Depending on the scale and location of the development will dispersion modelling be required?

20. This information is typically available in the manufacturer's specification and as part of the plant design.

21. The recommended emission standards have been established to minimise the impact of wider development on air quality within the local area. These emissions should be considered alongside other emissions from the development, for example plant and associated traffic. In some cases an Air Quality Assessment may be required; see the Developers Guide for further information.

⁷³ Available online at: <https://www.cambridge.gov.uk/media/3453/air-quality-developers-guide.pdf>

Appendix 4: Home Energy Questionnaire



Greater Cambridge Shared Planning Service Home Energy Questionnaire

This form should be completed for any planning application involving works to an existing home in Cambridge, in line with the requirements of policy 30 of the Cambridge Local Plan 2018. This policy aims to promote the application of energy efficiency to existing homes as part of wider works to extend properties, taking advantage of the opportunities that such works present to make your home warmer and helping to reduce your energy bills. You'll also be helping the environment by reducing greenhouse gas emissions. The information in this questionnaire will be used by officers in the planning service to ensure that, where applicable, you are able to meet the requirements of the policy, delivery of which would be secured by a planning condition. If you have a recently completed Energy Performance Certificate, you can submit this along with the questionnaire to indicate the recommended measure you are planning to implement as part of the works. For further guidance on the implementation of policy 30, see section 3.2 paragraphs 3.2.8 – 3.2.13 of the Greater Cambridge Sustainable Design and Construction SPD.

Property address:

..... Postcode:

Email:

Planning application reference number (if known):

1. Property type:

House

Bungalow

Flat

Maisonette

2. Built form:

Detached Semi-detached Mid Terrace End terrace

3. Property age:

Pre 1921 1930-1990 1991-2007 2007 onwards

4. Is the property a Listed Building?

Yes No

5. Does your property have cavity walls?

Yes No Don't know

6. If you answered yes to Question 6, is the cavity insulated?

Yes No Don't know

If you have un-insulated cavity walls, cavity wall insulation is one of the measures that you could install in order to meet the requirements of policy 30.

7. Do you have a loft space?

Yes No

8. If you answered yes to Question 7, how deep is the insulation in your loft space?

No insulation Less than 150mm More than 150mm

If you answered less than 150 mm, adding more insulation to your loft is one of the measures that you could implement in order to meet the requirements of policy 30.

9. Do you have a gas boiler?

Yes

No

10. If you answered yes to Question 9, what is the efficiency of your boiler? You can find this out on the following website: <https://www.homeheatingguide.co.uk/efficiency-tables> (see the find my boiler option)

Response: _____

If your boiler is F or G rated. Replacing your boiler with an A-rated boiler is one of the measures that you could implement in order to meet the requirements of policy 30.

11. What are the main heating controls in your home (tick all that apply)?

None

Room thermostat (temperature control)

Programmer (time clock)

Thermostatic radiator valves (TRV's)



Image of a TRV

Full zone control (multiple room thermostats)

If you answered none to this question, heating controls are one of the measures that you could implement in order to meet the requirements of policy 30.

12. Does your home benefit from draught proofing?

Yes

No

If you answered no to this question, draught proofing of doors, windows and letterboxes are one of the measures that you could implement in order to meet the requirements of policy 30

In light of your answers to questions 5 – 12 above, which of the following measures do you intend to install in line with the requirements of policy 30? Where all measures have already been implemented, no further measures will be required. Note that a planning condition will be used to secure implementation of recommended measures. If you would like to suggest alternative measures than those listed below (e.g. hot water cylinder insulation (at least 80mm thick) or replacing old storage or electric heaters (10 years or older) with new more efficient models) please contact your case officer to discuss alternative options.

MEASURE	ALREADY INSTALLED	WILL BE INSTALLED
Cavity wall insulation		
Loft insulation (above 150mm)		
Replacement of F and G rated boiler with an A-rated boiler		
Heating controls		
Draught proofing to doors, windows and letter boxes		

Your completed form should be submitted as part of your planning application to:

Planning Application Support
Cambridge City Council
PO BOX 700
Cambridge CB1 0JH

Appendix 5: Carbon Reduction Proformas for applications in South Cambridgeshire

Carbon Calculation Proforma (Outline Application)

Applicant name:

Use Class:

(Please use a separate sheet for each use if there is more than one)

Proposed Floor area:

(For each use)

Calculation of carbon emissions for buildings:

1	2	3	4	5	6	7
Development type:	kWh per m ² per annum	Proposed area (m ²)	Total kWh per annum	kWh conversion factor to Carbon Dioxide	Total CO ₂ per annum	10% minimum kg/CO ₂ /annum
Electricity						
Gas						
Total (kg CO₂ for electricity + gas)						

Carbon Calculation Proforma (Reserved Matters/Full Application)

Applicant name:

Application type (Reserved Matters/Full):

Use Class:

Proposed floor area:

Part 1: Part L Compliant Carbon Emissions for Buildings from SAP/SBEM Calculations

1	2	3	4	5
Development Type:	SAP/SBEM Kg/CO ₂ /m ²	Proposed Area (m ²)	Total Kg/CO ₂ /annum	10% minimum Kg/CO ₂ /annum

Level of carbon reduction associated with proposed renewable/low carbon energy technology (ies) (Kg/CO ₂ /annum):	
Technology 1:	Kg/CO ₂ /annum
Technology 2:	Kg/CO ₂ /annum

Appendix 6: Requirements for Specific Lighting Schemes

1. Below is a list of land uses/developments with general lighting advice and requirements. This has been adapted from the Department of the Environment and the Countryside Commission publication, *Lighting in the Countryside: Towards Good Practice*, 1997.

Advertisements

2. Paragraph 2 of Part 2 of Schedule 3 of the Town and Country Planning (Control of Advertisement Regulations 2007) states that "the permitted levels of luminance for advertisements where the illuminated area is not more than 10 square metres, should be 600 candela per square metre and where the illuminated area is more than 10 square metres, 300 candela per square metre".
3. Acceptable lighting levels for illuminated advertisements / signs are also given in PLG05 - THE BRIGHTNESS OF ILLUMINATED ADVERTISEMENTS 'Brightness of Illuminated.
4. Signs should not be positioned where they may affect the clarity of traffic signs or disturb those living close by;
5. Position promotional lighting/signs so that they are not visible from the open rural areas i.e. concentrate at public.

Security Lighting

6. Passive infrared detectors should control lighting. Avoid sensors that can be tripped by road or footway users. Lamps of higher intensity create too much light, more glare and darker shadows;
7. For all-night lighting at low brightness use a an LED porch light of 9W (600 lumen);
8. Lighting should be directed downwards to illuminate its target and mounted below the property boundary height so as to reduce light spill;
9. Develop an integrated approach to security lighting, balancing levels of light with other lighting in and around the site to avoid glare and light spill as well as dark spots.

Commercial and Industrial Developments

10. Avoid use of lights simply to create a 'presence' at night;
11. Concentrate lights where they are needed and establish a clear hierarchy, with minimum lighting around the outer, perimeter of the complex.

Decorative Building Lighting

12. Keep lighting understated and aim to enhance rather than swamp architectural character;
13. Ensure light is directed only at the structure, re-siting lights and using baffles and shielding where possible;
14. Minimise up-lighting where it distorts architectural detailing;
15. Consider timing of lighting to maximise the visual beauty of the building to the public at night-time but not to floodlight the building at dusk or nightfall;
16. Consider the choice of surface materials being illuminated, the reflectance value may be high causing reflected light to generate excessive sky glow.

Agricultural/Horticultural Uses

17. Mount lights below the roof height of buildings and direct light downwards, to where it is needed reducing light spillage;
18. Avoid use of sensors that can be tripped by animals;
19. As far as possible, position lights so that they are shielded by buildings and are not visible from the surrounding countryside;
20. The potential impact of light from glasshouses will be considered as part of the planning application.

Lighting railway stations and road/rail Interchanges

21. Design the lights for the station as a whole, balancing the need for lighting in different areas and considering the impact of light in views from the surrounding countryside;
22. Concentrate on lighting to enhance the architectural character of the station building rather than on creating an 'urban' level of light on the platform and in the station forecourt;
23. Direct car park and security floodlights downwards and to where the light is required.

Mineral Extraction

24. Mount lights below the roof height of buildings, and perimeter fencing, and direct light downwards, to where it is required;

25. Position lights so that they are shielded by buildings or permanent plant and are not visible from the surrounding rural areas;
26. Avoid lights mounted on the side of the buildings that shine directly out, dazzling users of the facility.

Petrol Filling Stations

27. Canopy lights should be positioned to avoid light spill from the sides of the canopy;
28. Avoid the use of dish diffusers, which cause additional glare;
29. Reduce lighting or avoid it during daylight hours;
30. Integrate design for promotional signage with that of the canopy;
31. Avoid lighting internal fascia around canopy;
32. Design and position signs so that they are visible only from the carriageway and not from the surrounding landscape.

Car Parks

33. Direct lighting downwards and design equipment to control levels of light spill and glare;
34. Site lighting equipment carefully, making use of the backdrop provided by any existing vegetation and introducing new planting within the car park to help integrate the lighting structures and minimise the visual impact of both equipment and lighting;
35. Use new hedgerows or tree planting to help minimise the impact of car park lights around the car park boundaries;
36. All vegetation needs to be maintained and trimmed once it has been established otherwise it will block out the light.
37. All of the above lighting schemes should be balanced with securing safe and efficient operation of the proposed facility especially where external guidance expresses the need for defined illumination levels for Health & Safety reasons. Lighting installations which require higher illumination levels for Health and Safety reasons can still be designed following the spirit of the guidance from the Institute of Lighting Professionals.

Appendix 7: The Development of Potentially Contaminated Sites in Cambridge and South Cambridgeshire: A Developers Guide

Introduction

1. Land contamination is often the unintended result of past industrial/commercial land use and, since it can negatively impact upon human health, property, and/or the wider environment, land contamination is a material planning consideration.
2. This guidance document has been prepared jointly by the Environmental Health Departments of Cambridge City Council and South Cambridgeshire District Council (the Greater Cambridge Councils) for developers and other organisations who are involved in the redevelopment of potentially contaminated sites. The purpose of this guide is to provide developers, planning agents, and other relevant parties with an overview of the information required by the Greater Cambridge Shared Planning Service when assessing potentially contaminated sites in the planning and development control system across the Greater Cambridge area.
3. Please note that this guidance is not an exhaustive list of requirements and developers are encouraged to speak with the Contaminated Land Officers at the relevant Council.
4. **Important note** - Legislation, guidance, and practical methods are all subject to change and it is the responsibility of the developer to follow the latest good practice and legislative requirements. All reasonable precautions have been taken to ensure that the information contained within this document is accurate at the time of publication. However, the Greater Cambridge Councils cannot assume legal responsibility for any loss or damage caused to person, land, or property for persons relying on this information.
5. This document replaces all developers contaminated land guidance notes previously issued by Cambridge City Council and South Cambridgeshire District Council.

Planning Policy

6. There is a range of national, regional, and local planning policies that, along with other legislation, set out requirements for dealing with contaminated land.
7. At the national level, the overarching national planning policy document is the National Planning Policy Framework (NPPF, 2018) whose purpose is to encourage sustainable development, including the reuse of brownfield land. Under the NPPF the potential for land contamination is a material planning consideration intended to ensure that land is made suitable for its proposed use.

8. At the local level, Local Plans have been adopted by both [Cambridge City Council](#) and [South Cambridgeshire District Council](#) that set out policies and proposals for future development and land use in the Greater Cambridge area. The Plans set out a vision for Greater Cambridge and objectives for its achievement. These Plans provide a means of guiding change over long periods of time and establishes a framework against which planning applications can be assessed. Land contamination is specifically referenced by Policy 33 Contaminated Land in Cambridge City Council’s Local Plan 2018 and by Policy SC/11: Contaminated Land in South Cambridgeshire District Council’s Local Plan 2018 (see Appendix 1 for policy wording).

The Planning Procedure

Role of the Developer

9. The developer is responsible for ensuring that any proposed development is safe and suitable for use for the purpose for which it is intended. In order to fulfil this responsibility the developer will be required to undertake a process of risk assessment in order to determine the severity of any contamination and the degree of harm that it poses to future site users and to the wider environment. The NPPF requires this site investigation has to be prepared by a ‘competent person’. Whilst the term ‘competent person’ has not been defined further, the developer must consider the full range of technical expertise that is likely to be required when sourcing consultants or advisors to undertake the risk assessment process. It is highly recommended that the selected consultants should have professional indemnity insurance.
10. A development is more likely to be successful, and considerable effort and expense spared, if appropriately qualified experts with relevant environmental experience are used at appropriate stages.
11. After the completion of the risk assessment process, which may include remediation, the development site, as a minimum, should not be capable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990 (see Table 1 below).

Table 1: Definition of Contaminated Land under Part 2A of the Environmental Protection Act 1990)

[Part 2A of the Environmental Protection Act 1990](#) requires Local Authorities to inspect their areas for potentially contaminated land and, if necessary, to ensure that any contamination is remediated. Part 2A introduced a legal definition of *contaminated land* whereby contamination is assessed and defined in the context of a site’s current use and where the contamination must be capable of causing either significant harm, or the significant possibility of significant harm, to human health and/or to other specified receptors. Where contaminated land is identified, details of the

contamination and any remediation undertaken are placed on a Public Register. The narrow definition of the term *contaminated land* means that the number of sites that will be determined as legally defined contaminated land by Local Authorities is likely to be very small.

A site that contains contaminants which, in its current use, do not have the potential to cause significant harm will fall outside of Part 2A. It is government policy that these sites will be dealt with through the planning and development control system as and when they are brought forward for development. In such circumstances the developer must provide the Council with enough information to enable it to decide that the site will be suitable for use. For some sites that are identified as contaminated land under Part 2A, redevelopment of the land may be a cost effective solution for securing remediation. In such circumstances action taken under the planning regime to ensure that land is suitable for use would also satisfy the Part 2A regime and turn a liability into an asset.

The Greater Cambridge Councils' Part 2A strategies may be viewed on their respective websites – [Cambridge City Council](#) and [South Cambridgeshire District Council](#).

Role of the Greater Cambridge Shared Planning Service

12. On any site where there is the potential for contamination to exist, the Greater Cambridge Shared Planning Service will work in consultation with the Environmental Health Department from the relevant Council to ensure that application sites are appropriately investigated, managed, and, if required, remediated.
13. When considering planning applications on sites where land contamination is a reasonable possibility, or known to exist, the Greater Cambridge Shared Planning Service has to be satisfied that the proposed development will remove all unacceptable risks to human health, property, ecosystems, and water quality, and will not introduce new risks. In doing this, full consideration will be given to both the historical and existing use of the site, the current circumstances of the land, the proposed end use, and the potential for contamination to be encountered during development works. The Greater Cambridge Shared Planning Service, through the imposition of planning conditions, will ensure that the developer undertakes the appropriate risk assessment and, if deemed necessary, the remediation of land contamination in line with all good practice procedures and guidance.

Role of the Environment Agency

14. The Environment Agency (EA) are a statutory consultee in the planning process and they provide expertise to the Greater Cambridge Shared Planning Service on the issues of

flooding and the potential for land contamination to pollute surface waters and groundwater (controlled waters).

15. It is important to note that for sites where contamination poses a risk to controlled waters, planning conditions will not be discharged until both the Council's Contaminated Land Officer and the Environment Agency have recommended approval for all appropriate contamination risk assessment reports.

The Contaminated Land Risk Assessment Procedure

16. The site investigation procedure aims to identify the potential for contamination and aims to identify areas that may require remediation to make the site suitable for use. In order to achieve these aims the site investigation procedure is sub-divided into distinct phases that are intrinsically linked together with the results from each phase being used to inform and to design the next subsequent phase of site investigation. Typically these sub-divisions comprise of a Phase 1 desk study, a Phase 2 intrusive site investigation, a Phase 3 remediation proposal, and a Phase 4 verification report.
 - The Phase 1 desk study establishes whether there have been any former contaminative uses on the site or adjacent properties which could impact upon the development;
 - The Phase 2 intrusive site investigation determines the nature, extent, and severity of contamination using risk-based criteria.
 - The Phase 3 remediation proposal uses the results from Phase 2 to inform remedial options, health and safety issues, potential impacts on the environment, and a remediation work plan;
 - The Phase 4 verification report provides a summary of remediation work carried out together with relevant documentary evidence and, if required, post-remediation test results.
17. The site investigation procedure involves specialist technical knowledge and it is essential that all phases of the site investigation procedure are conducted by competent and experienced persons (who should hold recognised and appropriate qualifications). It is essential that developers conduct their site investigations in accordance with the latest good practice.
18. Examples of current good practice may be found in the following documents:
 - Environment Agency (2004). Model Procedures for the Management of Land Contamination CLR 11
 - BS 10175:2001 British Standard Institute (2001) Investigation of Potentially Contaminated Sites – Code of Practice, British Standard Institute, London.
 - Environment Agency (2001) Secondary Model Procedure for the Development of Appropriate Soil Sampling Strategies for Land Contamination. R&D Technical Report P5-066/TR. Water Research Centre, Swindon.

- Environment Agency (2000) Technical Aspects of Site Investigation (2 Vols.). Research and Development Technical Report P5-065/TR. Water Research Centre, Swindon.
- Environment Agency (2000) Guidance for the Safe Development of Housing on Land Affected by Contamination. The Stationary Office, London.

19. Please note that good practice is constantly evolving and the onus is on the developer to use the most up to date version of any relevant document.

The Phase 1 Desk Top Studies

Purpose and scope

20. The purpose and scope of the Phase One desk study has to be clearly defined. A map of the site must be included showing its location, as well as plans of the current and planned layouts of the site.
21. The desk study must describe the condition of the land and uses of the site (both past and present) and its immediate environment (again both past and present). The aim is to establish whether there have been any potentially contaminative uses of the site or nearby land. All documentary evidence must be referenced and summarised where appropriate.
22. There are many former land uses that are potentially contaminating and some sites may have had more than one use, either simultaneously or separated in time. Lists of potentially contaminative land uses are available, some of which also have 'profiles' indicating the possible contaminants that might be present. Such understanding is crucial in defining the need for, and scope of, any subsequent review, investigation, and remediation. Experience and consideration of site histories must be used to predict the principal contaminants associated with each particular industry (see Annex A).
23. A site is evaluated initially by compiling a site history (see Annex B) with a view to determining the possibility of soil and groundwater contamination (including by gases). The Councils expect to be provided with such information in full and may require it in advance of a planning decision or as a condition of a grant of permission.

Assessment of environmental setting

24. A traceable assessment of the environmental setting must include:
- Information on geology, hydrogeology and hydrology.
 - Information from the Environmental Agency on controlled waters, abstractions, pollution incidents, water quality classification, landfill sites within 250m.
 - Information on ecosystems, heritage, and other interests.

Review of earlier studies

25. A review of any previous studies, ongoing monitoring, remediation work etc. should be provided for both the site and for any adjacent sites.

Reconnaissance

26. A site walkover should be undertaken wherever possible (and safe) to confirm the information in the desk study, to locate and record the position and condition of relevant site features, and to plan further site investigation works (if appropriate). Anecdotal evidence from local interviews may provide additional useful information.

Conceptual Site Model

27. A Conceptual Site Model (CSM) of the site must be produced which provides a clear interpretation of all plausible pollutant linkages discovered at the site. Receptors include humans, controlled waters, wildlife, and buildings. Pathways include direct contact, inhalation, and off-site migration into watercourses etc. The CSM will largely depend upon the previous site use(s) and the proposed end-use of the site. In some circumstances there may be a large number of plausible pollutant linkages whilst in others there may only be a small number.
28. The CSM should provide a working description of the relevant physical, chemical, and biological characteristics of the site including:
- Geology, Hydrogeology, and Hydrology.
 - Ecology.
 - Land use – historic, current and proposed (including adjacent land).
 - Identifying potential – Sources of contamination, Pathways and Receptors (i.e., significant pollutant linkages).
29. The CSM that is developed as part of the Phase 1 desk study must provide sufficient detail to determine what will be needed as part of the Phase 2 intrusive site investigation. Documentary evidence such as historical maps, photographs, and former site layouts etc. must be appended to the desk study in order to demonstrate how the CSM has been formulated.

Recommendations for Phase Two (where appropriate)

30. Aims and objectives for Phase Two of the investigation must be clearly stated and any health and safety issues must be highlighted.
31. It is recommended that developers consult with the relevant Environmental Health Department regarding the scope and the content required of Phase 1 assessments.

Failure to demonstrate familiarity with a site's former uses and published information on their potential for contamination during Phase 1 will be regarded as a significant failing by the developer/consultant.

The Phase 2 Intrusive Site Investigation

Objectives, scope and execution

32. If site history or other information from the Phase 1 desk study indicates that contamination is possible, the developer/site owner must engage the services of an appropriately experienced environmental consultant to undertake further site assessment – the Phase 2 intrusive site investigation. It is expected that the objectives, scope, and execution of the Phase 2 investigation be agreed in advance with the relevant Environmental Health Department and the resulting report(s) submitted in full. The expected contents of such reports are provided in Annex C for reference.
33. The Phase 2 investigation must be guided by the CSM produced by the Phase 1 study with the aim of further characterising the suspected contamination on the site. Each site is unique and must be dealt with on a site specific basis.
34. The Phase 2 investigation may consist of targeted sampling of suspected 'hot-spots' of contamination, randomised sampling using a statistically valid sampling strategy across the whole site, or a combination of the both. Every precaution must be taken to ensure that site investigations do not mobilise contaminants or create new pathways. All visibly contaminated or odorous material encountered during a site investigation must be investigated and fully documented.
35. The Phase 2 report must include full descriptions of all surface and intrusive ground investigations, an assessment of ground conditions and its implications for contaminated land, the source, distribution, and concentration of contaminants. This information must then be used to re-evaluate the CSM. Further investigative work may be required.

Quality Assurance Quality Control

36. Good quality assurance and quality control procedures must be followed during the collection of soil samples. After the samples have been collected they must be sent for the appropriate analytical testing at a laboratory that holds MCERTS accreditation for each contaminant. The quality assurance, quality control data, and limits of detection for all tests carried out must be included with the results of the chemical analysis and appended to the Phase 2 report.
37. Whilst many organisations are capable of undertaking some or all parts of a site assessment, the Councils will rigorously assess the report's contents and an assessment will be made as to the authority of the compiling organisation(s), their professional

affiliations, and their demonstrable expertise. Submitted reports must contain a sufficient level of detail that is presented in a rational, ordered, and efficient manner such that accurate judgements can be made on the risk posed by land contamination.

Assessing the Risks

38. When a Phase 2 investigation is required at a site, a risk assessment must be performed. In the first instance the significance of each contaminant must be compared against the most up-to-date and appropriate Generic Assessment Criteria (GACs), e.g. LQM/CIEH Suitable 4 Use Levels, Defra Category 4 Screening Levels, WHO/Drinking Water Guidelines, Environment Agency Environmental Quality Standards (EQS).
39. The use of particular (site specific) GACs, especially 'in-house' GACs, must be fully justified in the Phase 2 report.
40. Following the initial risk assessment against the appropriate GACs, a decision must be taken about the next course of action. This may be to either design an appropriate remediation scheme on the basis of the available data, or to carry out a more comprehensive site-specific risk assessment using an industry standard model.

Types of risk assessment model

41. The CLEA model uses probabilistic techniques to assess the risks to human health from a contaminant, taking into account long-term exposure, ground conditions etc. There are a number of other risk assessment tools that have been developed for assessing risk to different receptor groups (e.g. SNIFFER, RBCA, RiscHuman, Landsim). The Environment Agency has developed a site-specific model that assesses the risk posed to groundwater by leaching contaminants known as CONSIM.
42. It should be noted that not all contaminants may be covered by the most commonly used GACs and that certain GACs may not always be appropriate for assessing potential risks to human health and the wider environment in conditions found in the UK. Some allowance may have to be made to reflect assumptions that were made when the GACs were derived in order to make them more appropriate for UK conditions.
43. These models are not appropriate for all circumstances and clear explanation of the choice, type, and limitations of any risk assessment model must be included in the Phase 2 report. The risk assessor must justify each of the input parameters and effectively communicate their output.
44. The Councils will require further information where there is not sufficient confidence in the conclusions presented in a report (for example where an investigation has not been carried out in accordance with current good practice).

Phase 3 Remediation Strategy

Selection of options

45. The Phase 2 investigation may confirm possible pollutant linkages, and if so, must propose an appropriate remediation (scheme/selection of potential schemes) that will ensure safe redevelopment. The remediation options proposed must be related to the significant pollutant linkages that have been identified and must indicate the receptor(s) being protected.
46. There may be a number of remediation options, for example:
 - To remove or treat soil or groundwater with contaminant levels above certain concentrations.
 - To biodegrade hydrocarbons to acceptable levels.
 - To block the pathway between the source and a receptor.
 - To cap the site, limiting the potential for contact with contaminated soil.
47. The selection of the remediation strategy must be discussed in full with the advantages and disadvantages of each option outlined and reasons given for the chosen option, or combination of options.

Other factors

48. It should be noted that the remediation works might also require a waste management licence or mobile plant licence. When designing the remediation strategy, the Phase 3 report must also cover details such as the measures proposed to protect workers and the public and to ensure effective dust and odour control.
49. On larger or complex sites, an off-site impact assessment, monitoring, and a risk communication strategy will be required. Remediation strategies on such sites will need to include consideration and control of impacts during the remediation programme as well as the site situation post-remediation.
50. During remediation works, if any unsuspected contamination is identified then the relevant Environmental Health Department must be contacted immediately in order to agree a suitable strategy for the treatment or removal of the contaminated material.
51. The Councils will require that an environmental consultant, or an appropriately qualified project manager, must supervise any agreed required remediation of a contaminated site, including the documented identification, handling, and fate of contaminated material. The appointed persons or organisations will be responsible for the certification of the site remediation work and for its compliance with the agreed remediation plan,

the recommendations of the consultant, and the requirements of other regulatory agencies, such as the Environment Agency.

52. It is expected that the means for demonstrating compliance will be agreed in advance and would typically require an agreement on the appropriate means of inspection, testing, and quality assurance. Compliance with an agreed remediation strategy or materials management plan will be expected before any planning conditions can be discharged.

Phase 4 Verification/Validation Report

53. It is important that remediation is undertaken in accordance with the approved remediation strategy and that accurate documentary evidence is maintained so that it can be summarised and appended to a Phase 4 Post-Remediation Verification Report. This report must identify actions carried out during the remediation works and the methods of validation testing, together with documentary records of implementation. This report must provide an accurate summary of the:
- Types of measures – testing (in-situ/lab), monitoring, inspection etc.
 - Number of samples/rate of testing/monitoring/locations.
 - Supervision during the remediation.
54. The documentary evidence must include copies of waste transfer notes, photographs, and results of chemical analysis of soils/groundwater undertaken during remediation (including each batch of soils and materials to be tested prior to being brought onto the site, from off-site sources). The Phase 4 report must be submitted at the end of any remediation work.

Unexpected Contamination

55. During development it is not uncommon for previously unidentified and unexpected contamination to be discovered. The Councils will typically use a planning condition to cover this scenario that specifies the actions to be taken should such contamination be discovered. However unexpected contamination can also occur on sites where no such condition has been put in place. Upon the discovery of unexpected contamination all site works must stop immediately and the Councils must be notified as soon as possible. The Councils will then require that the contamination be assessed in full and a remediation strategy drawn up if required. Site works must only be restarted once the Councils have given written consent.

Materials Management Plan

56. Imported/recycled materials for backfill and capping - In order to ensure the quality assurance of imported/recycled material to be used for piling, engineering, and

landscaping purposes, the Councils expect that a Materials Management Plan is submitted. This will need to detail proposals on the source, quantity and independent verification of all such material. The Councils expect that the materials are independently tested for a full suite of contaminants (including metals and petroleum hydrocarbons) prior to importation. Material imported for landscaping should be tested at a frequency of 1 sample every 20m³ or one per lorry load, whichever is greater. Material imported for other purposes and/or material that originates from a clean (virgin) source can be tested at a lower frequency subject to justification and prior approval from the relevant Contaminated Land Officer. For further information please refer to the Material Management Plan Explanatory Note in Annex D

Key Points

57. To summarise

- It is important to identify the potential for contamination to be present at an early stage in order that unexpected costs and delays can be avoided later should a potential problem be identified during development works.
- Specialist advice from a suitably qualified consultant is required to assess contaminated land issues.
- The Phase 1 investigation should produce a 'conceptual model' that characterises all plausible pollutant linkages. This will form the basis of any subsequent work undertaken as part of a Phase 2 investigation.

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Annex A: Examples of Potentially Contaminating Site Uses

Please note that this list is not exhaustive and other potentially contaminating activities must be considered.

- Analysis – laboratory sites.
- Any area where persistent pesticide treatments may have been applied.
- Areas where biological materials have been bred, used or stored.
- Agricultural: fertilisers, garden sprays, pesticides, herbicides, cat and dog dusting powders.
- Battery manufacturers including any site where lead cell accumulators were destroyed for scrap.
- Brake lining manufacturers or repairers.
- Chemical Manufacturers
- Defence works
- Dry cleaning establishments
- Electroplaters
- Fuel depots
- Galvanisers
- Gas works
- Gun clubs
- Industrial cleaners
- Industrial: glues, paints, household cleaners, bleaches, sprays, pool chemical, bitumen, oils and greases, petroleum, petrochemicals, stores.
- Landfills
- Lime burners
- Market gardens, other areas where agricultural chemicals may have been used.
- Metal foundries
- Metal spraying
- Metal treatment, heat treatment, picklers
- Mining and extractive industry
- Patent medicine producers and stores.
- Pest controllers in particular chemical stores and area where vehicle and tanks are washed.
- Petroleum and petrochemical industries
- Pharmaceutical drug manufacturers
- Plasters manufacturers and moulders
- Printers
- Railway yards
- Scrap yards
- Service stations (including mechanical repairers)
- Stock dipping (e.g. sheep, cattle)

- Tanners, carriers and fellmongers
- Transport depots
- Underground storage tanks for fuel, chemical storage and liquid waste
- Warehousing and storing
- Waste storage
- Wood treatment
- Wool hide and skin merchants (e.g. drying, scouring)

Annex B: Information for Compiling a Site History

Please note that this list is not exhaustive and other sources of information may be available.

Include in Site History

- proposed, present and past land uses
- processes carried out on site (and location if applicable)
- waste disposal practices and chemical spills
- earthmoving activities, including filling, carried out on site
- site description, and legal identifiers
- past and present land use, zoning per Development Plan

Sources of Information

- past and current owners of the site
- past and current employees of the site and neighbouring sites
- aerial and ground level photographs of the site
- past involvement with Government authorities
- past involvement with consultants
- trade and street directories
- local literature, including street directories
- technical literature, including building and related permits
- local knowledge of residents
- previous land uses
- products manufactured
- raw materials used
- waste produced
- chemical storage and transfer areas
- disposal locations
- product spills and losses
- geological survey maps
- sewer and underground service plans

Site Inspection

Indicators of the possible presence of contaminants are:

- disturbed or discoloured soil
- disturbed or affected vegetation
- presence of chemical containers or holding tanks
- chemical odour

- quality of surface water

Annex C: Contaminated Site Assessment Reports – suggested content/format

Phase 1 – Desk Study:

Site identification

- Purpose and aims of study
- Scaled map showing position of site relative to sheets and adjoining properties
- Details of surface features and existing structures above and below ground
- Photographs, where appropriate

Ownership

- As listed on title documents

Party requesting assessment

- Owner or occupier of land (developer)

Party conducting assessment

- Environmental consultant

Proposed use

- Map of proposed development (if known)
- Type: residential/recreational/industrial

History of site (See Appendix Three)

- Full history
- Sources of information
- Map (s) detailing past activities

Site Inspection – walkover

- Relevant geological factors
- Local topography
- Soil types
- Evidence of possible contamination
- Potentially contaminating features and installations

Site Inspection – research

- Information from the Environmental Agency on abstractions, pollution incidents, water quality classification, landfill sites, soil leaching potential, water resource status, current and future use of local groundwater, hydrogeology including depth and distribution of aquifers.
- Information from South Cambridgeshire District Council on former landfill sites, private water supplies, contaminated land, pollution incidents.
- Information from other bodies e.g. BGS, Landmark etc.
- Review of previous studies.
- Preliminary assessment on likely risks and recommendations for intrusive works if appropriate.
- Conceptual site model

Phase 2 – Intrusive Investigations:

Initial comments

- Review of previous studies

Investigations

- Rationale for sampling methodology (e.g. screening knowledge of previous land use)
- Rationale for choice of analytes
- Scaled map of sampling locations
- Methods of investigation (e.g. number of boreholes, depths, pattern)
- Sampling methods, storage, maintenance of sample integrity
- Field measurements, instruments, and methods
- Laboratories used
- Analytes and analytical techniques (including extraction methods)
- Quality assurance methods for specific analytes
- Table of results
- Map displaying significant results
- Borehole log and soil profile (including description of fill)

Conclusions

- Discussion of ground conditions, (soil, gas, water, made ground)
- Discussion of soil/gas/water contamination
- Preliminary conclusions (e.g. most significant results, dispersion of contaminants, properties of contaminants that may affect health or environmental risk such as volatility or water solubility)

- Uncertainties relating to conclusions (e.g. adequacy of site characterisation, likelihood of missing significant contamination)
- Changes to site conceptual model from initial study
- Risk assessment, justifying choice of model if used
- Recommendations for further investigations if required
- Recommendations for remediation

Annex D: Material Management Plan (MMP) Explanatory Note

The Councils use the following condition with respect to the submission of a MMP:

Prior to importation or reuse of material for the development (or phase of) a Materials Management Plan (MMP) shall be submitted to and approved in writing by the Local Planning Authority. The MMP shall:

- a) Include details of the volumes and types of material proposed to be imported or reused on site.*
- b) Include details of the proposed source(s) of the imported or reused material.*
- c) Include details of the chemical testing for ALL material to be undertaken before placement onto the site.*
- d) Include the results of the chemical testing which must show the material is suitable for use on the development.*
- e) Include confirmation of the chain of evidence to be kept during the materials movement, including material importation, reuse placement and removal from and to the development.*

All works will be undertaken in accordance with the approved document.

Q: Why has this condition been attached to the planning permission?

A: This condition is used to ensure that no unsuitable (i.e. contaminated) material is brought onto the development site.

Q: Is this condition 'prior to commencement'?

A: No, this condition is prior to the importation of any soils and/or aggregates. In other words, prior to discharge of this condition, development can proceed except the spreading of imported materials.

Q: What material does the condition relates to?

A: The term material refers to any material used for piling, engineering, and landscaping purposes. This could include (but is not limited to):

- Topsoil/Subsoil
- Crushed Concrete
- Limestone
- Sands and Gravels
- 6F2 Material
- Type 1 and Type 2 Material

The condition does not refer to construction materials (bricks, stones etc.).

Q: I am not importing or reusing any material for landscaping/engineering/piling purposes. Do I still need to submit a MMP?

A: In this case you do not need to submit a MMP. You should apply for the discharge of the condition after the development has been completed and will need to demonstrate in writing that no material was imported or reused on site.

Q: What are the sources of material?

A: The term 'sources' refers to the suppliers of the material that will be used for piling/engineering/landscaping purposes.

Q: Can we discharge parts of the condition if we have some of the information?

A: The condition cannot be partially discharged. All the information required by the condition need to be included in the MMP.

Q: When do I need to provide the information and discharge this condition?

A: You need to provide the information and discharge this condition before any material (associated with this condition) is placed around the development. We would therefore advise the applicant that they apply for the discharge of the condition once they have ALL the information available.

Q: I have already undertaken chemical testing in line with BS3882:2015 and know that the material is suitable for landscaping. Do I need to do additional testing and why?

A: Yes you need to do additional chemical testing. Chemical testing in line with BS3882: 2015 relates only to the suitability of the imported material for plant growth (nutrient content) and often overlooks many contamination parameters. In order to comply with this condition you need to undertake chemical testing to show that the material is free from contamination with respect to human health. That includes testing for substances such as polycyclic aromatic hydrocarbons, petroleum hydrocarbons, and the full list of heavy metals.

Q: What testing frequency is required?

A: All soils imported for gardens and/or landscaping must be tested at a frequency of 1 sample per 20m³ or 1 sample per lorry load, whichever is greater. This testing must include a full suite of contaminants including metals and petroleum hydrocarbons prior to importation. Material imported for other purposes may be tested at a lower frequency subject to prior approval from the Councils.

Q: Do I need to test materials from a clean source?

A: If the material originates from a reliably clean and/or natural source (such as British Sugar or from a virgin quarry) the developer must contact the Councils so that a less onerous way forward can be agreed, such as the submission of delivery notes and proprietary testing certificates in lieu of further testing.

Q: How much detail should I include in the Material Management Plan?

A: The amount of detail included presented in the Material Management Plan will depend on the size of the development and volume of material brought into the site. For small developments it may be sufficient to include details of the suppliers of the material, the volumes of the material and the proposed chemical testing. For large developments it may be more appropriate to submit a Material Management Plan in line with the CL:AIRE Definition of Waste Code of Practice.

Appendix 8: Further technical guidance related to noise pollution

Annex A: Quick reference guides – When is an acoustic report required?

(i) NEW NOISE SENSITIVE DEVELOPMENT (NSD) / USES		
Type of development	Noise Report required?	Comments
New residential development and extensions to existing residential dwellings (C3 – Dwellinghouses and C4 - Houses in multiple occupation use classes)	Close to a major highway (motorways, A-class & major or busy B roads)	<p>YES</p> <p>Noise report will normally be required for residential development in proximity to a major or busy road.</p> <p>A site specific ground and airborne vibration assessment may also be required on a case by case basis, when abutting or very close to a road/carriageway.</p> <p>A noise report is unlikely to be required when noise levels fall below 50dBA LAeq16hr.</p>
	Near to a railway	<p>YES</p> <p>Noise report will normally be required for any property within several hundred meters from a major railway line.</p> <p>A site specific ground and airborne vibration assessment may also be required when within 30m of a railway line.</p> <p>A noise report is unlikely to be required when noise levels fall below 50dBA LAeq16hr.</p>
	Within the predicted 57dB contour of an airport with both a single or twin wide spaced runway	<p>YES</p> <p>Noise report will normally be required. Noise reports can be found via the DfT website.</p>
	Close to existing or proposed NGD such as agricultural, industrial, trade, commercial or business premises	<p>YES</p> <p>Noise report will normally be required.</p> <p>A site specific ground and airborne assessment may also be required on a case by case basis.</p>
	10+ houses in a rural/ suburban environment	<p>MAYBE</p> <p>In certain circumstances, a noise report will be required. Please consult with Environmental Health Department.</p>
Change of use to residential	<p>MAYBE</p> <p>Noise report may be required, for example if there are existing noise sources in close proximity. Please consult with the LPA.</p>	

Hotels, guest houses, etc (C1 uses)	MAYBE		
Residential institutions: C2 uses (care homes, hospitals, nursing homes, residential colleges, etc), and C2a uses (secure residential institutions including prisons, secure hospitals)	MAYBE	It is the responsibility of the developer to ensure hotel rooms meet reasonable noise standards. However, if the hotel/ guest house includes long term residential accommodation for staff or is an aparthotel, a noise report may be required.	Hotels, guest houses and residential institutions can also present a new noise source. Consequently, if such a development is proposed in close proximity to existing residential uses, a noise report may be required.

(ii) NEW / ADDITIONAL NOISE GENERATING DEVELOPMENT (NGD) SOURCES		
Type of development	Noise Report required?	Comments
INDUSTRIAL TYPE USES (e.g. B2 general industrial uses, B8 storage or distribution uses, Waste management sites, Minerals development, access roads & haul roads)	YES	Noise report will normally be required. Please consult with LPA if there are no existing noise sensitive premises in close proximity. A site specific ground and airborne vibration assessment may also be required on a case by case basis. However, noise may need to be controlled/mitigated limit creeping background noise levels in the general area. Includes new development and changes of use. Also includes changes in operations or layout, extensions or new equipment at existing sites.
ENTERTAINMENT/ FOOD & DRINK, ETC (e.g. A3 uses - restaurants/ cafes, A4 - drinking establishments, A5 - hot food a takeaway, D2 uses e.g. cinemas, concert halls, swimming baths, skating rinks, gymnasiums, sports halls. Also dance halls, casinos, theatres, amusement centres).	YES	Noise report will normally be required. Please consult with LPA if there are no existing noise sensitive premises in close proximity. However, noise may need to be controlled/mitigated to limit creeping background noise levels in general area. Includes new heating, ventilation, and air conditioning (HVAC) including combustion appliance / exhaust stacks and flues and air handling/refrigeration / chiller units, machinery, plant and equipment and extractor fans at new and existing.

		The noise impact of car parking / vehicular movements should also be considered
OUTDOOR SPORTS AND RECREATION Including some D2 class uses, also multi-use games areas, motor sports and shooting ranges.	YES	Noise report will normally be required.
COMMERCIAL USES A1 and A2 uses (shops and financial/ professional services, etc)	MAYBE	<p>Noise report will normally be required in the following circumstances:</p> <ul style="list-style-type: none"> - The application involves the introduction of new uses and the development is greater than small scale (e.g. a new supermarket or several shops, a new office block/ industrial estate, a new school/ library), or - The application includes heating, ventilation, and air conditioning (HVAC) including combustion appliance / exhaust stacks and refrigeration / chiller machinery, plant and equipment and extractor fans at new and existing sites etc, or - The development would involve activities during unsociable hours (including deliveries), or - The development would involve particularly noisy processes, activities and sources (including during construction) or is proposed in proximity to noise-sensitive premises.
OFFICES, ETC B1 uses (including offices, light industry)	MAYBE	
NON-RESIDENTIAL INSTITUTIONS D1 uses (non-residential institutions, e.g. day centres, schools, libraries, places of worship, training centres)	MAYBE	
OTHER Other Sui Generis uses, e.g. theatres, scrap yards, petrol filling stations, car / vehicle washing facilities, laundrettes, taxi businesses scrap yards, retail warehouse clubs, nightclubs and casinos, beauty salons and Nail Bars	MAYBE	
TRANSPORT SCHEMES e.g. new roads, rail, port and airport development, including extensions / alterations to existing schemes	YES	Early consultation with the Local Planning Authority/Environmental Health department would be expected.
WIND TURBINES	YES	Early consultation with the local planning authority/ environmental health department would be expected. Micro wind turbines may not require planning permission, however in some cases they may cause a statutory noise nuisance to neighbours. Please contact the Environmental Health Department

Annex B: General Requirements for Acoustic Reports and Assessments

1. Developers should also seek guidance from the Council's Environmental Health team prior to any acoustic survey work being carried out in order so they can advise on the best methodology for the proposed development and any bespoke reporting for developments.
2. Assessments should be carried out and produced by a suitably qualified and competent consultant and conform to the standards in *BS7445 1-3:2003 Description and measurement of environmental noise* (or any later replacement guidance).
3. Noise surveys on site should be carried out for appropriate duration to ensure representative noise levels are ascertained. They should be undertaken for typically 5 to 7 days and should include weekends.
4. Monitoring locations should be agreed in advance.
5. As assessment and guidance for noise and vibration control is always evolving, applicants must ensure that they consider amendments or updates to existing noise guidance.
6. The appropriate amount and detail of information required will depend on the specific circumstances of a proposal.
7. It should be noted that noise assessment and report writing is a skilled operation and should be undertaken only by competent persons. Notwithstanding the inevitable technical content of the subject matter the best acoustic reports are written using plain English and should be possible for a lay person to understand. The acoustic report should be well structured and precise in its use of language and presentation of data.
8. A typical acoustic report should include the following information.
 - (i) **Introduction**
 - a. Outline the scope, aims and objectives of the report.
 - b. Include the site address or other location details.
 - c. Include a brief description of the development proposal it relates to (with the correct case reference number).
 - d. Clearly identify the client and/or person who commissioned the survey(s).
 - (ii) **Executive Summary**

This should contain the summary of the whole report and a clear statement regarding delivery of the aims and objectives.
 - (iii) **Title Page**

Shall have a title page identifying the person and organisation undertaking the survey and writing the report and their qualifications and contact details, the date of

the report, and shall be signed by the author and quality control reviewers. Document references i.e. revision and version numbers should be included to indicate the development of the report and its status e.g. draft for comment, final etc.

(iv) Contents Page

Here the contents of the report shall be listed.

(v) Methodology

- a. Clearly identify applicable guidelines and standards from this SPD.
- b. Detail any other standards / policies to be used and give a brief outline of why they have been chosen.
- c. Provide detail and justification where accepted standards have not been used.
- d. Outline the process to be followed.

(vi) Site Description and Noise Measurements

- a. A brief qualitative description of the site and its surroundings is useful here.
- b. Labelled and annotated photographs are often very useful in communicating the nature and character of the site and its environs.
- c. Details of how any noise survey was carried out and any observations made during the survey e.g. on typical or unusual noise sources making up the acoustic environment.
- d. Detail the location, dates and times of all measured data and provide suitable summaries of results obtained. Clearly state the height above ground, ground conditions and proximity of any acoustic reflecting surfaces (i.e. façade, free-field or reverberant conditions). Photographs of noise measuring equipment in-situ may be useful here.
- e. Clearly state the reasons for the chosen measurement positions.
- f. Provide clear explanations for any unusual or anomalous results.
- g. Provide details of the equipment used i.e. make model and serial numbers of sound level meters, field calibrators etc.; details of equipment calibration history; details of field calibration.
- h. Detail the weather conditions during the survey period. Include wind speed, wind direction, temperature and precipitation. Average wind speeds above 5 m/sec and persistent heavy rain are not conducive to effective noise measurements, although intermittent light rain and gusts over 5 m/sec can be tolerated.

(vii) Noise Predictions

Where it has been necessary to predict noise levels, then a brief explanation of how this has been undertaken, the data used, the software used, the prediction standards used, and any assumptions made are required. Details of any validation checks should be included.

(viii) Noise Source Emission Levels

Whether the scheme is noise sensitive or is likely to generate noise the report should include the following:

- Details of the type, number, location and spatial relationship of noise sources and receptors

- Details of the noise emission from each noise source, at and/or within each noise sensitive receiver
- Details of how the noise emission levels were derived.

(ix) Assessment

- a. Give details of the assessment made based on measured and/or predicted data.
- b. State any assumptions made.
- c. Show any calculations to sufficient detail that they could be checked for accuracy (possibly in an Appendix).

(x) Outcome of Pre-Survey Discussions with the LPA, Including Potential Noise Conditions

Here the report should discuss the outcome of any pre-survey discussions with the LPA, including any acoustic standards the LPA wishes to see used on the scheme; and the details and justification of any alternatives the applicant may wish to propose.

(xi) Mitigation

The report should clearly identify any mitigation measures that may be required in order to comply with the guidance and standards in this SPD.

All proposed noise management measures that have been considered and their effectiveness should be presented and discussed so as to enable informed recommendations on suitable mitigation measures.

(xii) Recommendations and Conclusions

This section should clearly reflect the scope, aims and objectives of the report. Where the report is supporting a planning application then it should normally recommend what noise management measures should be taken by the developer in order to demonstrate that:

- a. The adverse effects of noise as a consequence of the new development have been mitigated and minimised in accordance with the guidance in this SPD.
- b. Good acoustic design principles have been considered and applied given the particular circumstances of the proposed development in accordance with the guidance in this SPD.

(xiii) Appendices

The amount of material included in any Appendices should be proportionate to the assessment and may typically include the following:

- a. Plans, maps, photographs showing site location and monitoring/prediction locations,
- b. Unabridged details of noise monitoring where critical to recommendations and conclusions,
- c. Details of any calculations relied upon,
- d. Copies of equipment calibration certificates.

9. Note:

Further practical guidance on undertaking and reporting environmental noise and vibration measurements can be found in the “ANC Green Book” - Environmental Noise Measurement Guide and the “ANC Red Book” - Measurement and Assessment

of Groundborne Noise and Vibration: both available from the Association of Noise Consultants.

Assessment by Suitably Qualified and Competent Person

10. The assessment of noise is a complex task requiring specialist training, experience, techniques and equipment. Consequently, noise surveys, impact assessments, mitigation design and report writing is best carried out by suitably qualified and competent persons with appropriate knowledge, skills and experience. The LPA is not able to endorse or recommend the services of individual consultants.

11. However, details of acoustic consultants may be obtained from:

The Institute of Acoustics

Silbury Court, 406 Silbury Boulevard, Milton Keynes, MK9 2AF

Tel: +44 (0) 300 999 9675

Email: ioa@ioa.org.uk

The Association of Noise Consultants

19 Omega Business Village, Thurston Road, Northallerton, DL6 2NJ

Tel: +44 (0)20 8253 4518

Email: info@theanc.co.uk

The Chartered Institute of Environmental Health

Chadwick Court, 15 Hatfields, London, SE1 8DJ

Tel: +44 (0)20 7827 5800

Annex C: Summary of Noise Effect Levels and Planning Outcomes / Advice for “Absolute anonymous noise” and “Relative non-anonymous noise”

Table 1: Guideline “Absolute” Sound Levels for “anonymous noise”¹

		≤40dB	41 - 45dB	46 - 50dB	51 - 55dB	56 - 60dB	60-69dB	>69+dB
Absolute Sound Level	Absolute Level:							
	Daytime Effect:²	NOEL	NOEL	NOEL	LOAEL	SOAEL	SOAEL+	Unacceptable Adverse Effect
	Evening Effect:³	NOEL	NOEL	LOAEL	SOAEL	SOAEL	SOAEL+	Unacceptable Adverse Effect
	Night-time Effect:⁴	NOEL	LOAEL	SOAEL	SOAEL	SOAEL	SOAEL+	Unacceptable Adverse Effect
	Effect / Impact Description:	No observed effect on health or quality of life.	Sleep disturbance in bedrooms with window open.	Speech intelligibility within living areas with windows open resulting in moderate annoyance. Greater potential for sleep disturbance and adverse health impact.	Increased potential for sleep disturbance, including significant adverse health effects. Gardens and amenity spaces affected.	Noticeable and disruptive Significant adverse health effects likely to all habitable rooms. Occupants unable to open windows due to noise ingress and unable to enjoy garden / amenity areas.	Noticeable and disruptive High risk of significant adverse health impact. Unable to use garden and amenity space or have windows open for ventilation.	Noticeable and very disruptive Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects
Mitigation Considerations:	A1 Use design, layout and landscaping	A2	A3 Protect habitable room facades from	A4 Bedroom facades to be protected through	A5	A6	Unavoidable and/or an inability to mitigate effect	

	(DLL) to create and preserve areas of amenity and tranquillity to enhance the noise environment.	Protect bedroom facades from noise through DLL. Provide minimum double-glazing with trickle vents to bedrooms.	noise through DLL with greater protection for bedrooms. Provide higher spec double-glazing with trickle-vents to all habitable rooms.	DLL to bring below LOAEL. Provide higher spec double-glazing with trickle vents to all habitable rooms. Protection of gardens and amenity space through DLL and acoustic barriers / fencing.	Bespoke assessment of noise mitigation needs, including consideration of: alternative to open window ventilation provision to protect internal noise environment. Protection of garden / amenity areas through DLL to bring below LOAEL.	Bespoke assessment of noise impact and mitigation, including : DLL, protection of building envelope and provision of alternative amenity space	of noise leading to psychological stress or physiological effects
Planning Consideration:	"Grant Consent - No Objection on Noise Grounds" No specific measures required	"Grant Consent - No Objection – Minimise Noise" No objection in principle subject to the inclusion of suitable noise conditions: Approved Plans and/or conditions to include satisfactory window acoustic performance specification to bedrooms with facades exposed to LOAEL noise.	"Grant Consent - No Objection – Minimise Noise" No objection in principle subject to the inclusion of suitable noise conditions mitigating and reducing noise to a minimum. Approved Plans and/or conditions to include satisfactory window acoustic performance specification to all habitable rooms with	"Grant Consent - No Objection – Minimise Noise" No objection in principle subject to the inclusion of suitable noise conditions mitigating and reducing noise to a minimum. Details of noise mitigation to be included as part of planning approval process.	"Refusal / Object - Avoid on Noise Grounds" Possibly Object - Should avoid but may be possible to mitigate and reduce noise to a minimum. Details of noise mitigation to be included as part of planning approval process. Conditions required to secure implementation of mitigation / acoustic control	"Refusal / Object - Avoid on Noise Grounds" Possibly Object - Presumption against planning permission being granted. Avoid Unless detailed noise impact assessment and approved noise mitigation control measures implemented through conditions.	"Refusal / Object - Prevent on Noise Grounds" Object: Prevent - Planning consent should be refused on noise grounds regardless of other considerations ("prevent").

			facades exposed to LOAEL to SOAEL noise.	Conditions required to secure implementation of mitigation / acoustic control measures within the noise report. Refusal if noise report is inadequate.	measures within the noise report. Refusal if noise report is inadequate.	Possible post completion verification of mitigation measures required. Refusal if noise report is inadequate.	
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Notes:

- The absolute sound level $dBLA_{eq}(T)$, includes the combined external free-field noise level from all sources of transport noise and may also include industrial/commercial noise where this is present but not “dominant”. T of $dBLA_{eq}(T)$ is the reference time period for the relevant Day, Evening or Night-time period see notes 2 to 4 below.
 - ²Day is from 07:00 to 19:00 and the reference time period (T) is 8 hours.
 - ³Evening is from 19:00 to 23:00 and the reference time period (T) is 4 hours.
 - ⁴Night is from 23:00 to 07:00 and the reference time period (T) is 8 hours.
- For the specific purposes of the assessment, industrial/commercial noise should be taken as “dominant” where the effect would be likely to be rated as adverse if a BS4142:2014 assessment was to be carried out. The judgement on whether or not to undertake a BS4142 assessment should be proportionate to the level of risk. In low risk cases a subjective judgement of dominance, based on audibility, would normally be sufficient.
- It should always be clearly stated whether an industrial/commercial noise contribution has been included or excluded from the assessment.
- $LA_{eq,16hr}$ is for daytime 0700 – 2300, $LA_{eq,8hr}$ is for night-time 2300 – 0700.
- $L_{Amax,F}$ criteria will place the site in SOEL, regardless of other acoustic criteria, if the maximum noise level is likely to be exceeded more than 10 times a night (2300 – 0700).

Table 2: Guideline “Relative” Sound Level Standards for “non-anonymous noise”⁵

		< -10dB	-10dB to -5dB	-5dB to 0dB	+1dB to +5dB	+6dB to +10dB	> +10dB
Relative Sound Level	Relative (Rating) Level:						
	Effect:	NOEL	NOEL	NOEL	LOAEL	SOAEL	Unacceptable Adverse Effect
	Effect / Impact Description:	Sound is likely to be inaudible and have no discernible impact on health or quality of life.	Sound will become audible, although should not cause a change in behaviour or have an adverse impact on health or quality of life.	Sound will become more noticeable, particularly if the sound has characteristics which make it distinguishable from general environmental noise. However this should not result in a change in behaviour or adverse impact on health, although the context and attitude to the noise source could influence the subjective response to the sound.	Sound from the source is likely to be noticeable and can give rise to an adverse response, such as annoyance and behaviour change, for example having to close windows to cut out unwanted noise.	Sound is increasingly likely to be noticeable and intrusive resulting in significant adverse impacts such as sleep disturbance, annoyance and have an adverse health impact.	Sound is very likely to be very noticeable and intrusive resulting in unacceptable significant adverse impact on health and quality of life.
Mitigation Considerations:	R1 Use good design, layout and landscaping (DLL) principles to create and preserve areas of amenity and tranquillity to enhance the noise environment and consider if sound reduction at source can be	R2 Use principles outlined in R1	R3 Use principles outlined in R1, with particular emphasis on protecting bedrooms and other habitable rooms from the noise, for example by separation from noise source, orientation of buildings and by the	R4 Use principles in R1 and additional structural mitigation such as an acoustic barrier ⁶ , or other structure and higher spec double glazing to	R5 Bespoke assessment of noise mitigation needs, including consideration of alternative to open window ventilation provision to protect internal noise environment and protection of garden / amenity areas through	R6 Bespoke assessment of noise impact and mitigation, including DLL, protection of building envelope and provision of alternative amenity space	

	achieved within the design of the development.		provision of higher spec double glazing with trickle vents to habitable rooms.	habitable rooms with trickle ventilation.	DLL to bring below LOAEL.	
Planning Consideration:	<p>“Grant Consent - No Objection on Noise Grounds”</p> <p>No objection and no specific noise measures required.</p>	<p>“Grant Consent - No Objection – Minimise Noise”</p> <p>No objection, but developers should consider good design principles to preserve and enhance the noise environment.</p>	<p>“Grant Consent - No Objection – Minimise Noise”</p> <p>Consider good design principles to preserve and enhance the noise environment, with particular emphasis on protecting habitable rooms.</p>	<p>Approved Plans and/or conditions to include structural noise mitigation and satisfactory window specification to all habitable rooms with facades exposed to LOAEL noise. Potential refusal if noise mitigation not included.</p>	<p>Details of noise mitigation to be supplied as part of planning approval process.</p> <p>Conditions required to implement control measures within the noise report.</p> <p>Refusal if noise report is inadequate.</p>	<p>Presumption against planning permission being granted, unless detailed noise impact assessment and approved mitigation measures implemented through conditions. Post completion verification of mitigation measures required.</p>

5 The relative sound describes the difference between a specific and identifiable sound source compared to the background noise when the specific noise is not present. The methodology in BS4142:2014 - *Method for Rating Industrial and Commercial Sound* should be used to determine the relative sound level and is comparable to the Rating level within the Standard.

6 Acoustic barriers for R4 mitigation should break the line of sight between the noise source and receiver, be of solid construction with no gaps and with a minimum superficial density of 4kgm⁻¹. Acoustic barriers for R5 mitigation or above should be tailored to achieve the specific noise mitigation for the site.

Annex D: Specific Noise Generating Development Uses - Industrial, Trade / Commercial or Business – Noise Requirements

1. Common sources of NGD include the following:
 - Sound Insulation between Commercial and Residential Development – General
 - Delivery and Collections
 - Places of Entertainment (Food Restaurants, Clubs, Pubs and Bars)
 - Multi Use Games Areas and Artificial Grass Pitches
 - Gyms
 - Nurseries
 - Wind Turbines
 - Agricultural buildings

Sound Insulation between Commercial and Residential Development - General

2. The requirements of the Building Regulations are usually deemed to be adequate for the control of sound insulation internally between dwellings. However, the LPA encourages applicants to adopt higher standards. In particular, the requirements of the Building Regulations can be inadequate where certain types of commercial use adjoin residential use.
3. The level of sound insulation performance required will be dependent upon the use type, for example a higher level of airborne sound insulation performance will typically be required for a proposed commercial catering unit located below a residential flat than will be required for a small café. Higher standards would also be appropriate when D1 and D2 use classes, such a dental surgery, a day nursery or a gym adjoins residential premises. The examples in Table 1 demonstrate the typical range that may need to be applied dependent on the circumstances (more stringent values may apply in some cases).

Table 1: Sound Insulation Examples - Commercial to Residential

Performance Standards for separating walls, separating floors and stairs that have a separating function		
Commercial to Residential	Airborne Sound Insulation Performance $D_{nTw} + C_{tr}$ dB	Impact Sound Transmission Performance $L_{nTw} + C_{tr}$ dB
Walls	48-60	

4. If, as a result of a planning application, a situation arises where a residential use and a commercial use will share a separating floor or wall then an assessment of the required sound insulation performance of the floor or wall should be submitted together with the construction details proposed to achieve the required standard of sound insulation.
5. In certain circumstances airborne and impact sound insulation tests may also be required by the LPA in order to demonstrate that the sound insulation performance standard has been achieved.
6. A high level of airborne and impact sound insulation, often only achievable by complex design methods that structurally isolate the noise generating and noise sensitive premises, will be required in situations such as where music and dancing or gym or health and fitness activities adjoin a residential use. Each case will take into account the specific circumstances of the proposed development, and the example limits in Table 5 may not be appropriate for assessing performance as they do not take account of the full extent of low frequency noise transmission. The following type of information would be considered in such applications:
 - Establish the noise and vibration transfer paths from source to noise sensitive receiver.
 - Establish the potential airborne and impact noise and vibration transfer magnitudes from source to noise sensitive receiver.
 - Design sound isolation and insulation treatment such as a totally isolated /floating floor on a resilient underlayment or spring-isolated floor and wall treatment which mitigates and minimises adverse noise and vibration effects and is appropriate for the types of activity being undertaken within the proposed development. An acoustic floating floor, isolated internal walls and ceiling results in a room that is completely decoupled from the surrounding building structure.
 - Undertake post completion testing to demonstrate how noise and vibration has been controlled adequately.

Delivery and Collections

7. In certain situations the noise impact from deliveries and collections will need to be determined and form part of the noise assessment. The GCPS recognises that there is sometimes a need to reduce congestion and air pollution and the retiming of deliveries is one method to assist with this sustainability objective. The LPA will therefore apply a risk based approach to applications where vehicle delivery-noise may be a source of disturbance. Where applications are for retiming of deliveries, the use of quiet technology is also encouraged in the context of wider sustainability aims.

8. The Council expects that deliveries and refuse collections to be carried out between the daytime hours 07:00-23:00hrs. Developments requiring deliveries outside of these times should provide an acoustic report to demonstrate there will be no adverse impact in relation to noise, with particular reference to residential occupiers as a result of these activities. When preparing the assessment, regard should be given to *BS4142 Method for rating and assessing industrial and commercial sound*. Developers are however encouraged to discuss their proposals with the Council's Noise team before conducting their acoustic report.
9. It is possible that restrictions on operating hours will be imposed and these will reflect the sensitivity of the area and be in the context of wider sustainability aims.
10. Where Sunday or late night and early morning deliveries/collections or retiming of deliveries are proposed, the applicant should specifically demonstrate the need for this and what measures will be implemented to prevent undue disturbance to neighbours. Further guidance on managing noise from deliveries and collections is also available at: 'Noise Abatement Society's Silent Approach™ Quiet Night Time Delivery Scheme' and 'Freight Transport Association Guidance Delivering the Goods – a toolkit for improving night-time deliveries'.
11. A Delivery Noise/Service Yard Management Plan may also be required and should include details of:
 - Times and frequency of deliveries and collections;
 - Effective enclosure and sealing of loading bays and service areas and/or locations away from noise sensitive premises;
 - Vehicle movements, including forklift vehicles;
 - Quiet reversing methods; preference will be given to broadband reversing alarms or alternative quiet safety methods for reversing;
 - Good practice working methods to minimise noise from the use of cages, trolleys, pallets and forklift vehicles - mitigation measures, such as barriers, low noise wheels on cages, low noise surfaces on tail lift decking and delivery routes for trolleys, silent electronically operated shutters etc.

Places of Entertainment (Food Restaurants, Clubs, Pubs and Bars)

12. It is recognised that clubs, public houses, bars and other places of entertainment help to achieve wider sustainable development goals. However, places of entertainment can also cause significant levels of noise disturbance and pose particular noise issues, not least because associated activities are often at their peak in the evening and late at night. Developers will need to bear in mind not only the noise that is generated within the premises from music but also the attendant problems of noise that may be made by customers arriving, leaving and congregating

outside the venue including external smoking areas, deliveries and collections and the use of car parks and access roads. Developers will need to bear in mind and incorporate noise mitigation at the design stage.

13. It is expected that all applications for this type of premises should properly address noise issues. As a general principle, music and noise from customers activity (talking, shouting and applauding) emanating from entertainment premises (including external areas such as balconies, gardens and smoking areas) should not be audible within any noise sensitive premises. Developers should assess the likely impact of the new entertainment premises upon the noise environment. The premises must be designed so to ensure that music and associated noise is controlled, so as to be inaudible inside any residential premises within the vicinity.
14. Inaudibility is defined by the Institute of Acoustics' Good Practice Guide on the Control of Noise from Pubs and Clubs 2003 as:
 - Entertainment Noise Level, LAeq (1 minute) should not exceed Representative Background Noise Level, LA90.
 - Entertainment Noise Level, L10 (5 minutes) should not exceed Representative Background Noise Level, L90, in any 1/3 octave band from 40Hz to 160Hz.or:

The use of Noise Rating (NR) curves, as discussed in the DEFRA document, *'Noise from Pubs and Clubs, Phase 1'* (2005), is an alternate way of establishing acceptable levels in noise sensitive premises where low frequency noise may be an issue. The following NR curves should be achieved:

 - NR 20 in bedrooms (23:00 to 07:00 hours).
 - NR 25 in all habitable rooms (07:00 to 23:00 hours).
 - Noise rating curves should be measured as a 15 minute linear Leq at the octave band centre frequencies 31.5 to 8 KHz.
15. All noise levels shall be taken with windows open or closed (whichever makes the music seem louder), or with alternatively provided acoustic ventilation over and above "background" ventilation. Other noise sources from these developments, such as air conditioning plant and kitchen odour extraction systems shall be treated as industrial type NGD.
16. Proposed developments will be assessed on a case by case basis and the design criteria may be modified depending on the nature of the business, frequency, time, duration and number of entertainment events and sensitivity of the area. It is expected that any likelihood of structure borne sound (and vibration) transmission problems will be separately assessed and that effective control measures will be included in proposals. Developers are encouraged to enter into pre-application discussions with the LPA to discuss these issues at an early stage.

17. Some commercial developments including fast food restaurants, night clubs and public houses can have particular impacts, not least because activities are often at their peak in the evening and late at night.

Multi Use Games Areas and Artificial Grass Pitches

18. Both Multi Use Games Areas (MUGA's) and Artificial Grass Pitches (AGP's) are becoming a more common feature in school and community redevelopments and play a key role in developing sporting opportunities for school children and the wider community. However, if inappropriately located and operated they can cause noise and other forms of disturbance to residents and businesses located in the vicinity of the development.
19. Outdoor MUGAs generally consist of one or numerous floodlit all-weather, or 3G pitches upon which football, rugby, hockey etc. is played. Where an outdoor MUGA is to be considered, the planning authority should consider its operating times, its frequency of use, the MUGA's orientation and line of sight to dwellings.
20. Recent guidance has been produced by Sports England 'Design Guidance Note Artificial Grass Pitches – Acoustics – Planning Implications, New Guidance for 2015' <https://www.sportengland.org/media/4515/agp-acoustics-planning-implications.pdf>
21. This guidance provides information on the application of appropriate noise criteria as detailed below in Table 2 below, assessment methods as well as examples of noise mitigation measures that can be implemented.

Table 2: MUGA & AGP - External Noise Standards

Noise Impact From MUGA or AGP	Development Outcome
50dB(A) LAeq, 1 hour	Normally acceptable

22. The LPA would expect that in most cases for any new or modified MUGAs or AGPs the Sports England guidance is applied and the application should demonstrate that these levels can be complied with. In other cases, it may be necessary to seek to achieve better standards due to particular sensitivity of the location or hours of

proposed use. In such cases it is recommended that early discussions are undertaken between the applicant and the LPA.

23. Developers should assess the likely impact of the new MUGA upon the noise environment. The MUGA must be designed so to ensure that noise associated with it is controlled, so as to be inaudible inside any residential premises within the vicinity.
24. The external noise level should not exceed 50 dB LAeq,T. at the boundary of the nearest noise sensitive premises, in accordance with World Health Organisation Guidelines of Community Noise 1999 and Sports England guidance. It is recognised, however, that the detrimental noise impact of a MUGA often may only become significant over a lengthy period of time; and that sound measurement data compiled over a relatively short time period may not accurately reflect the impact of a noise that will recur day upon day throughout the year and in particular the impact of peak noise occurrences such as loud voices / shouting, referee whistles and the impulsive noises such as ball impacts on fencing and backboards.
25. This being the case the measured or predicted sound level of < 50 dB LAeq,T will not necessarily be accepted as a *de facto* demonstration that noise from a proposed MUGA will not have an adverse noise impact.
26. This being the case, the MUGA Noise Level, LAeq (1 minute) should not exceed Representative Background Noise Level, LA90 to mitigate the impact of Lmax / peak noise occurrences such as loud shouting, referee whistles and the impulsive noise such as ball impacts on backboards.
27. Developers must also consider the following noise mitigation measures:
 - The use of bunds and environmental acoustic barriers to remove any direct line of sight and to reduce noise levels;
 - The provision of perimeter netting to prevent impact noise;
 - Use of neoprene dampeners on welded mesh fencing;
 - Padding and other dampening to backboards
 - Restrictions on hours and days of use;
 - User-management controls & codes of conduct;
 - Maximising any distances to nearby noise-sensitive premises.

Gyms

28. In recent years the popularity of leading a healthy lifestyle and the demand for gyms to be convenient and with 24 hours access locally, has led to an unprecedented development of commercial gyms, personal training gyms and specialist gyms. Whilst this is a positive the level of noise pollution generated by gyms, including

amplified music, structure borne sound from weights and plant equipment, has the potential to give rise to noise complaints.

29. Therefore, the presence of gyms in the built environment must be considered to ensure that they can mutually co-exist alongside the existing and future residential demand on city centres. Each type of gym comes with its separate issues related to noise impact and should be assessed against what activities are proposed to be undertaken within the gym.
30. Gyms should ideally be located away from residential units. However, this is not often possible and gyms are increasingly being located in mixed-use developments adjacent to habitable areas. In these cases high acoustic performance separating wall and floor constructions will normally be required to ensure that neighbouring residents are adequately protected
31. The noise that gyms generate can be broadly separated in to a number of categories;
 - Noise Breakout – This includes noise breaking out of the façade of the building from amplified music, patrons and general operations of a gym.
 - Plant Noise – Gyms will commonly require some sort of heat recovery system to regulate the temperature within the premises so external air conditioning units are common. The air handling units will be externally mounted and will generate noise that requires assessing.
 - Structure-borne Impact Noise Transfer (structurally reradiated high impulsive noise) – Fixed Weight Machines and Weight Drops can be from free weights, typically ranging up to a max of 45 - 50kg but also heavier weights from deadlifting activities which can range up to 50kg – 200kg.
 - Airborne Noise Transfer – Amplified music breaking through an adjoining partition floor or wall to neighbouring [residential dwellings](#) or commercial premises.
32. To appropriately mitigate the risk of complaints in relation to noise from gyms it is imperative that appropriate acoustic design targets are implemented. Minimum standards within the Building Regulations Part E are not suitable for gyms adjacent to commercial or residential premises and an increased level of sound insulation is required.
33. It is recommended that early discussions are undertaken with the Environmental Health Department to discuss the specific application and the sound insulation between commercial and residential development. Where gym premises structurally adjoin dwellings, ideally any airborne and structure borne noise shall be 'inaudible' inside the closest sensitive dwelling. Inaudibility is difficult to quantify as it dependent on the background sound level at the receptor, which cannot be

accurately assessed if the development is not yet constructed. In this scenario the following design criteria inside neighboring rooms are normally recommended:

- Daytime (07:00 – 23:00): NR15 L_{Max} for 31.5Hz, 63Hz and 125Hz / NR20 L_{Max} for 250 Hz – 8kHz
- Night (23:00 – 07:00hrs): NR10 L_{Max} for 31.5Hz, 63Hz and 125Hz / NR15 L_{Max} for 250 Hz – 8kHz
- Noise Breakout – The building envelope needs to be appropriately soundproofed, this will include the appropriate specification of the façade build up, glazed areas and doors.
- Plant Noise – Plant equipment needs to be located in an appropriate location and may also need acoustic enclosures or screening to mitigate the noise emissions.
- Structure Borne Noise – Free weights areas will need appropriate acoustic gym flooring to mitigate the impact from weights being dropped. Cardio machines will need appropriate isolation from the floor slab to mitigate vibration transfer (these are typically built into the machine). Specialist weights areas, that use greater than 50kg weights, will likely require helical spring systems in order to mitigate the weights being dropped from head height.
- Noise Breakthrough – Adjoining walls will need to be appropriately designed to mitigate airborne sound transference to adjoining residential and commercial spaces.

Nurseries / Childcare Facilities

34. While the councils are supportive of proposals for new nurseries and childcare facilities, it is important to ensure that they are integrated and designed to mitigate any potential for unacceptable adverse noise impact on/disruption to surrounding communities. Developers should assess the likely impact of any new nursery upon the noise environment and in particular in close proximity to residential premises. Nursery and similar uses can have large numbers and groups of children present and internal and external activities and external play areas can generate high levels of noise including regular individual peak noise occurrences such as loud voices, shouting and screaming.
35. Developers must consider the following noise mitigation measures:
 - Restrictions on hours and days of use;
 - Restrictions on the number of children using the nursery and its external play areas;
 - The use of acoustic barriers to remove line of sight and adsorptive barriers to reduce reflected noise;
 - The implementation of sound airborne and impact sound insulation measures where the proposed nursery adjoins noise-sensitive premises;
 - The layout of external play areas in relation to neighbouring noise-sensitive premises;

- User-management controls;
36. Certain developments may be comprised of mixed residential and commercial / business uses. If nurseries and similar are proposed with residential units above then careful consideration should be given to good acoustic design to separate noisy activities such external play areas from noise sensitive uses. Residential habitable rooms and private external amenity areas should not be located directly above or in the direct line of sight of such noise sources. Also a high level of airborne sound insulation will be required for intervening walls and ceilings / floors and stairs between different floor levels for different uses structurally adjoined / connected.

Wind Turbines / Farms

Small to Medium Sized Wind Turbines (up to and including 50kW)

37. The Applicant/Developer must ensure that the assessment methodology used should demonstrate the following operational noise limits:
- Daytime:
- The predicted daytime level of noise arising from the operating turbine should not exceed 35 dB LA90, 10 min at the façade of the nearest noise sensitive premises (free-field conditions).
- or
- The predicted daytime level of noise arising from the operating turbine should not be >5 dB above background noise level (LA90) at the façade of the nearest noise sensitive premises; whichever is the greater (free-field conditions). The expected noise levels arising from an operating turbine should be compared with notional background noise levels that are considered representative of rural areas.
- Night Time:
- The predicted night time level of noise arising from the operating turbine should not exceed 43 dB LA90, 10 min at the façade of the nearest noise sensitive premises (free-field conditions).
- or
- The predicted night time level of noise arising from the operating turbine should not be >5 dB above background noise level (LA90) at the façade of the nearest noise sensitive premises; whichever is the greater (free-field conditions). The expected noise levels arising from an operating turbine should be compared with notional background noise levels that are considered representative of rural areas.

Intermediate to Large Turbines (>50kW)

38. For applications for wind turbines greater than 50kW, the assessment procedures detailed in ETSU-R-97 'The Assessment and Rating of Noise from Wind Farms', and the Institute of Acoustics' "A good practice guide to the application of ETSU-R-97 for the assessment and rating of wind turbine noise' (2013) should be followed.
- In the case of single turbines, or where large separation distances are involved, it will be permissible to show compliance with a noise level of 35 dB LA90, 10 min at the nearest noise sensitive premises (free-field conditions).
 - It will be deemed acceptable if the daytime noise level is no more than 5 dB above the background level (LA90), or 35 dB (LA90, 10 min), at the façade of the nearest noise sensitive premises (free-field conditions); whichever is the greater.
 - It will be deemed acceptable if the night time noise level is no more than 5 dB above the background level (LA90), or 43 dB (LA90, 10 min), at the façade of the nearest noise sensitive premises (free-field conditions). Whichever is the greater.
 - It will be deemed acceptable if the daytime or night time noise level is no more than 5 dB above the background level (LA90), or 45 dB (LA90, 10 min), at the façade of any dwelling occupied by person(s) having a financial interest in the wind turbine(s) (free-field conditions); whichever is the greater.
 - In certain circumstances the potential for amplitude modulation (AM) of the aerodynamic noise from turbine blades, sometimes referred to as "swish" or "thump" may also require specific consideration. This may require an acoustic character correction to be applied to noise limits.

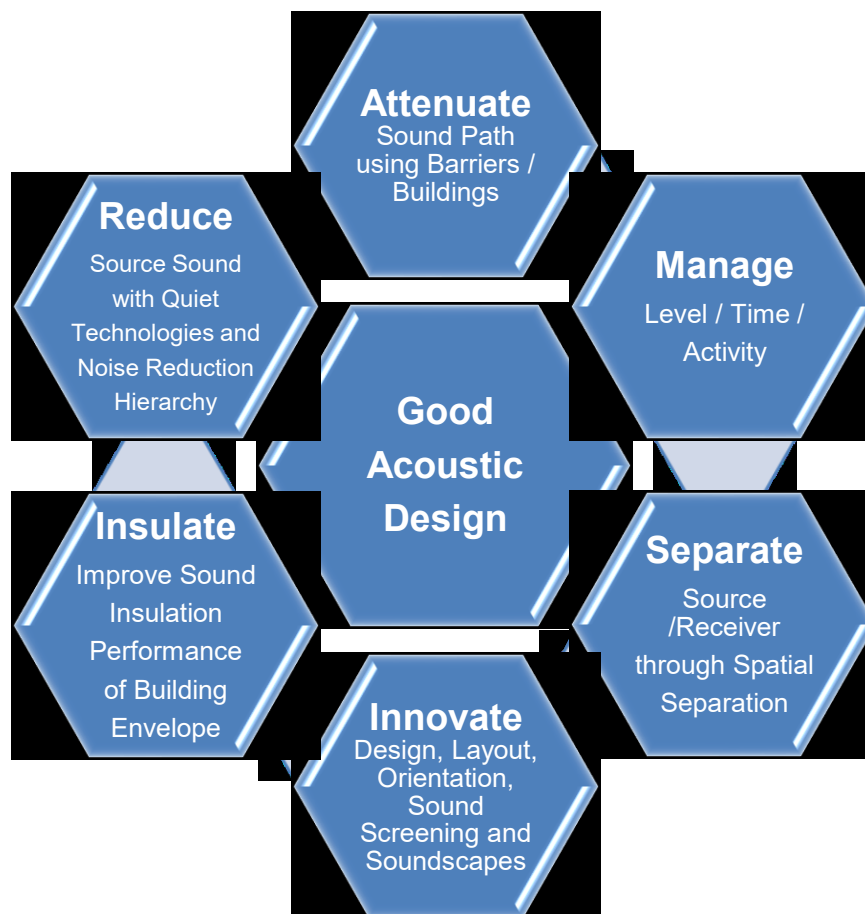
Agricultural buildings

39. For buildings and structures for agricultural use noise attenuation should be in accordance with 'BS 5502-32 Buildings and structures for agriculture. Guide to noise attenuation'.

Annex E: Good Acoustic Design

1. The use of good acoustic design is an inherent part of the recommended approach that is described in the SPD and will help to deliver planning and noise policy objectives. Good acoustic design should help produce sustainable buildings that provide healthy and quality living conditions for future occupants, that are sensitive to the likely expectations of future occupants and to the acoustic characteristics of the location, that are efficient in the use of resources and energy both during construction and subsequent occupation, and that are matched by an appearance that demonstrates good aesthetics as far as possible. Good acoustic design is about more than the numbers. It is a holistic design process that creates places that are both comfortable and attractive to live in, where acoustics is considered integral to the living environment. Figure 1 below presents the areas that should be considered when applying good acoustic design.

Figure 1: Good Acoustic Design Principles



Noise Sensitive Development – Good Acoustic Design

2. In the context of this SPD, good acoustic design is that which will achieve good acoustic standards, as far as is reasonably practicable, both internally (inside noise sensitive parts of the building(s) and externally (in spaces to be used for amenity purposes). Consideration of what is reasonable will include the practicability and availability of technical solutions as well as the associated costs and financial implications, legal requirements and health and safety issues.
3. Good acoustic design must also provide an integrated solution whereby good acoustic design principles are aligned with, or do not otherwise conflict with, other design aspects that will affect living conditions and the quality of life of the inhabitants or other sustainable design objectives and requirements. Solely relying on sound / noise insulation scheme for the building envelope to achieve acceptable acoustic conditions in new residential development, when other means may be available to achieve good acoustic standards or to reduce the need to rely on sound insulation of the building envelope is not regarded as good acoustic design.

Good Acoustic Design Critical Steps

4. The following questions illustrate the types of consideration that will help to achieve the good acoustic design of a noise sensitive scheme:
 - Has noise from the surrounding area been taken into consideration in arranging the site layout? For example, have residential units been located as far away as practicable from an adjacent noise source?
 - Is it practicable to use screening by existing structures or methods incorporated into the proposal to reduce noise levels affecting the sensitive facades and parts of the scheme?
 - Where practicable has the surrounding acoustic environment been taken into account in relation to the internal layout of residential units? Are bedrooms located on the quieter facades? Are gable ends and non-noise sensitive facades orientated towards the dominant source in preference to noise sensitive facades?
 - Will there be part of the habitable space in each unit which does not overlook the significant noise source? Have sensitive rooms been placed on the quietest façade? NB: Single aspect units where all the habitable space overlooks the significant noise source should be avoided.
 - Has consideration been given to suitable noise insulation of the external building envelope to mitigate unacceptable external noise? Remember that this is not currently covered by Building Regulations and can be overlooked if not considered at the planning stage. How will this affect the residential amenity and utility of the proposed scheme?
 - Has consideration been given to the acoustic quality of private or communal outdoor spaces within the scheme? What measures have been included to enhance the

acoustic quality of any outdoor amenity spaces? Where access to private or communal quiet outdoor amenity space cannot be, or has not been, provided within a scheme then is there ready access to a suitable quiet outdoor amenity space nearby?

5. The LPA will consider the use of Section 106 agreements to contribute to the improvement and enhancement of the acoustic environment; including, engagement by developers with the owners and operators of existing noise generating land uses to explore how noise emissions at source or on the transmission pathway beyond the proposed noise sensitive site boundary may be reduced or better managed. It is recognised that it may not always be possible to achieve good acoustic standards in all rooms within noise sensitive developments or at all external amenity spaces associated with new residential development. Where it is not possible to achieve good standards in every respect, the acceptability of the proposed development will be considered having regard to:
 - The degree (extent and magnitude) to which good acoustic standards cannot be achieved and whether acceptable acoustic standards can be achieved instead;
 - Measures which may help to off-set adverse impacts on certain parts of the dwelling or building. For example, whether there is access to a habitable room/s on a relatively quiet façade (i.e. a façade where noise is at least 15 dBA lower than the most exposed façade) or access to a relatively quiet external amenity space¹; and
 - Whether the achievement of good acoustic standards will give rise to undesirable consequences for other aspects of the living or working environment. For example, having to keep windows closed may result in adverse consequences on the comfort and health of occupants, and having to provide acoustic barriers or screens may result in significant visual impacts.

Noise Generating Development – Good Acoustic Design and Noise Control Measures

6. A mitigation hierarchy should be used as part of the design process. Noise control measures applied at source will be preferred to noise control on the transmission path from source to receiver. Façade protection measures represent the least preferred method of noise control. Noise control measures should be proportionate and reasonable and may include one or more of the following:
 - Engineering: reduction of noise at point of generation / source (e.g. by using quiet machines and/or quiet methods of working); containment of noise generated (e.g. by insulating buildings which house machinery and/or providing purpose-built barriers around the site);
 - Lay-out: adequate distance between source and noise-sensitive building or area and/or incorporating good design to minimise noise transmission through the use of screening by natural barriers, other buildings, or non-critical rooms in a building;
 - Administrative: limiting operating time of source; restricting activities and noise limits.

7. Early consultation between the applicant and the LPA about the possible use of noise control measures is desirable and may enable the measures to be incorporated into the design of the proposal before it is formally submitted for determination. This is likely to reduce costs in the long run and will help facilitate quicker decision making. The LPA may, otherwise, or in addition, seek further clarification on noise control measures which may introduce delays, and they may ensure that adequate noise control measures are included by applying planning conditions.
8. The NPPF places emphasis on good design in managing and mitigating the environmental impacts both from and on new development. This SPD recognises the importance of good acoustic design and noise problems can often be prevented or resolved through the careful design of noise sensitive and noise generating development at an early stage in the planning process.
9. The overall goal of this SPD is to encourage and reward good acoustic design and to ensure that noise is appropriately taken into account and that the measures used to mitigate and manage the impact of noise do not unacceptably compromise other planning objectives.

Good Acoustic Design Critical Steps

10. The following questions illustrate the types of consideration that will help to achieve the good acoustic design of a noise generating scheme:
 - Has the noise sensitivity and the typical existing acoustic environment of the surrounding area been taken into consideration in arranging the site layout? Have noise generating activities and/ or plant been located as far away as possible from noise sensitive receptors?
 - Is it practicable to use screening by existing structures or are other methods incorporated into the proposal to reduce noise from the scheme affecting the sensitive façades and other parts of nearby noise sensitive land uses?
 - Has consideration been given to including appropriate noise insulation of the building envelope to parts of the scheme that will generate noise? Are any doors and windows in sensible locations as regards noise impact on any neighbours? What about the roof or ceiling construction, it's often an acoustic weak point in commercial buildings?
 - Has the need to appropriately manage noise emissions from the site been taken into account in selecting plant and equipment?

Acronyms

AGPS	Artificial grass pitches
AQMA	Air Quality Management Area
BREEAM	Building Research Establishment Environmental Assessment Method
CEMP	Construction Environmental Management Plan
CFA	Continuous flight auger
CHP	Combined Heat and Power
DCEMP	Demolition and Construction Environmental Management Plan
DER	Dwelling Emission Rate
EIA	Environmental Impact Assessment
EPC	Energy Performance Certificate
EV	Electric vehicle
HQM	Home Quality Mark
IPCC	Intergovernmental Panel on Climate Change
LES	Low Emission Strategy
LOAEL	Lowest Observed Adverse Effect Level
LPA	Local Planning Authority
MMC	Modern Methods of Construction
MUGA	Multi Use Games Area
MVHR	Mechanical Ventilation with Heat Recovery
NGD	Noise Generating Development
NOEL	No Observed Effect Level
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPSE	National Policy Statement England
NSD	Noise Sensitive Development
PV	Photovoltaic panel
SAP	Standard Assessment Procedure
SOAEL	Significant Observed Adverse Effect Level
SPD	Supplementary Planning Document
SuDS	Sustainable Drainage Systems
TER	Target Emission Rate
VDV	Vibration Dose Value
VOC	Volatile Organic Compound

Glossary

Acid deposition	Also known as acid rain, this is caused by emissions of sulphur dioxide and nitrogen oxides from fossil fuel use which can be converted into nitric and sulphuric acid once in the atmosphere. Often carried long distances by prevailing winds, these cause great harm to water bodies and ecosystems.
Activity node	A location where services and facilities are centred due to good accessibility on foot, by bicycle or public transport and where population density is increased to take advantage of proximity to the services and facilities provided.
Biophilic design	Biophilic designs are those that connect people to nature and natural processes, enabling them to act in more productive ways.
Biosolar roof	Dual technology roofs combining green roofs with photovoltaic panels.
Climate change adaptation	Initiatives and measures to reduce the vulnerability of natural and human systems to actual or predicted climate change effects.
Climate change mitigation	Action to reduce the impact of human activity on the climate system, primarily through reducing greenhouse gas emissions.
District heat networks	District heating is a system for distributing heat generated in a centralised location for residential and commercial heating requirements. The heat is often obtained from a co-generation plant burning fossil fuels but increasingly biomass, although heat-only boiler stations, geothermal heating and central solar heating are also used, as well as nuclear power.
Electric vehicle charging	Electric Vehicle Charging: A comprehensive definition of the different types of charging is set out in the “Charging Electric Vehicles” Energy Saving Trust, 2019 publication (available online at: https://www.energysavingtrust.org.uk/transport/electric-cars-and-vehicles/charging-electric-vehicles and https://www.energysavingtrust.org.uk/sites/default/files/23465-EST%2BDFT-Charging%20Electric%20Vehicles%20-%20Best%20Practice%20Guide-WEB.pdf).

A slow charge point has a power rating of 3 – 7kW; it takes 4 – 8 hours for a charge using a Type 1 or Type 2 connector. A fast charge point has a power rating of 7 – 22kW; it takes 2 - 4 hours for a charge using a Type 1 (max 7kW) or Type 2 connector. A rapid charge point has a power rating up to 50kW; it takes 25 – 40 minutes for a charge using a Type 2, CCS or CHAdeMO connector.

Fuel poverty

Households are considered to be in fuel poverty when they have to spend more than 10 per cent of their household income on fuel to keep their home in a 'satisfactory' condition.

Heritage asset

A building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions because of its heritage interest. Heritage asset is a term that includes designated heritage assets, listed buildings, world heritage sites, conservation areas, scheduled monuments, protected wreck sites, registered parks and gardens and battlefields) and non-designated assets which are identified by the local planning authority. Non-designated heritage assets include sites of archaeological interest, buildings, structures or features of local heritage interest listed by, or fulfilling criteria for listing by the local planning authority.

Integrated water management

This is the coordinated development and management of water, land and related resources in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems. It considers the multiple benefits that can be derived from the management of water such as biodiversity enhancement and climate change adaptation.

Large scale major development

For dwellings, a largescale major development is one where the number of residential units to be constructed is 200 or more. Where the number of residential units to be constructed is not given in the application a site area of 4 hectares or more should be used as the definition of a largescale major development. For all other uses a largescale major development is one where the floor space to be built is 10,000 square metres or more, or where the site area is 2 hectares or more.

Microgeneration

A term used for the generation of low carbon or renewable energy at a micro scale. The primary source of current

renewable microgeneration is solar energy (photovoltaic cells for electricity generation and solar thermal panels for the generation of hot water). Other technologies include micro wind turbines, micro hydro, micro combined heat and power (CHP), heat pumps and small-scale biomass.

Minor development	For dwellings, minor development is one where the number of dwellings to be constructed is between 1 and 9 inclusive. Where the number of dwellings to be constructed is not given in the application, a site area of less than 0.5 hectares should be used as the definition of a minor development. For all other uses, a minor development is one where the floor space to be built is less than 1,000 square metres or where the site area is less than 1 hectare.
Net zero carbon	<p>A “net-zero” target refers to reaching net-zero carbon emissions by a selected date, but differs from zero carbon, which requires no carbon to be emitted as the key criteria.</p> <p>Net-zero refers to balancing the amount of emitted greenhouse gases with the equivalent emissions that are either offset or sequestered. This should primarily be achieved through a rapid reduction in carbon emissions, but where zero carbon cannot be achieved, offsetting through carbon credits or sequestration through rewilding or carbon capture and storage needs to be utilised.</p>
Off gauge bike	A term used to denote bikes that are larger than standard bikes, for example those with trailers. These bikes require additional space for parking both in terms of width and length.
Passive solar design	An element of energy efficient building design that involves optimising heating and lighting gain from the sun, thus reducing the need for space heating, lighting and potentially also cooling. Passive solar design must be carefully balanced with the need to avoid overheating in the summer and shoulder (spring and autumn) months.
Regulated energy use	Building energy consumption resulting from the specification of controlled, fixed building services and fittings, including space heating and cooling, hot water, ventilation and lighting.
Setting of a heritage asset	The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive

or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral.

Significance of heritage assets

The value of a heritage asset to this and future generations because of its heritage interest. The interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting. For World Heritage Sites, the cultural value described within each site's Statement of Outstanding Universal Value forms part of its significance.

Small scale major development

For dwellings, a small scale major development is one where the number of residential units to be constructed is between 10 and 199 (inclusive). Where the number of dwellings to be constructed is not given in the application a site area of 0.5 hectare and less than 4 hectares should be used as the definition of a smallscale major development. For all other uses a small scale major development is one where the floor space to be built is 1,000 square metres and up to 9,999 square metres or where the site area is 1 hectare and less than 2 hectares.

Sustainable Drainage Systems (SuDS)

Development normally reduces the amount of water that can infiltrate into the ground and increases surface water run-off due to the amount of hard surfacing used. Sustainable drainage systems control surface water run-off by mimicking natural drainage processes through the use of surface water storage areas, flow limiting devices and the use of infiltration areas or soakaways.

Sustainable modes of transport

Sustainable modes of transport include walking, cycling and public transport.

Thermal mass

The property of some materials like stone and concrete to store heat whilst abundant and to release it slowly, flattening out daily temperature variations, thereby reducing the overall need for active heating and/or cooling systems. However, just including large amounts of concrete in the construction will not necessarily mean the material is utilising its potential thermal mass properties, unless specifically located and designed to do so. Thermal mass must also be combined with a means of secure ventilation to enable night purge ventilation to take place

in order to ensure that the use of thermal mass does not contribute to overheating.

Urban Heat Island Effect

Describes the increased temperature of urban air compared with rural surroundings. The term 'heat island' is used because warmer city air lies in a 'sea' of cooler rural air.

Walkable neighbourhood

Areas typically based on 400m (five-minute walking time) catchments. The Urban Design Compendium (2000) Paragraph 3.1.2 describes the principles of 'The Walkable Neighbourhood', describing what facilities should be within a five- and ten-minute walk from home.

Water eutrophication

Caused by the enrichment of an ecosystem with chemical nutrients, typically compounds containing nitrogen or phosphorous. Frequently the result of nutrient pollution such as the release of sewage effluent into rivers. It generally promotes excessive plant growth and decay, favours certain weedy species over others and is likely to cause severe reductions in water quality.