

Home Quality Mark

Technical Manual

SD232: 1.0 (Beta England) – 2015



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TERMS AND CONDITIONS

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ABOUT THIS DOCUMENT

This publication is the technical manual for the Home Quality Mark™. Its primary purpose is to support the assessment and rating of new homes by licensed Home Quality Mark assessors, in accordance with the scheme processes and procedures⁽¹⁾; and in doing so enable BRE Global Ltd to make a certification decision in accordance with BS EN ISO/IEC 17065:2012, the international standard to which it is accredited by UKAS⁽²⁾.

The technical manual also acts as a reference for any stakeholder involved in the procurement of a new home which is being (or has been) assessed against the standard. This includes home owners and occupiers, clients and housing developers, the financial sector, comparison websites, project team members and the wider stakeholder group.

In undertaking an assessment and determining an HQM rating the HQM assessor must use this technical manual alongside the assessment tools provided and with reference to the scheme Operations Manual (SD5070).

Changes to this document

This technical manual is subject to revision and can be reissued from time-to-time by BRE. A schedule of the publication date for each issue of this manual is provided below. A detailed list of all additions and deletions is available separately on request to BRE.

Scheme Document No.	Issue No.	Date of Issue
SD232	1.0 (Beta England)	22/08/2016

INTRODUCTION TO THE HOME QUALITY MARK

What is the Home Quality Mark?

The Home Quality Mark (HQM) is a voluntary and customer focused assessment and certification scheme. It recognises new homes where performance meets best practice standards that is often significantly above that required by regulation. It defines a rigorous evidence based, relevant and independent voluntary standard for new homes built on tried and tested processes commonly used in the UK and internationally.

Through a simple and accessible 5 star rating supported by a number of performance indicators representing key home occupier priorities, HQM:

- gives consumers a means of comparing running costs, environmental footprint and a measure of a healthier and more ethically constructed home, helping them to make informed choices when buying or renting with confidence;
- enables house-builders to evaluate their operations and differentiate their products by supporting performance claims and articulating the benefits of new homes to their customers and others;
- enables public and private sector landlords to set priorities and monitor performance against these in new build properties throughout the design and construction phases, ensuring that the properties they take on, meet their expectations and the needs of their tenants.

The Home Quality Mark builds on best practice in the housing sector, drawing together a range of complimentary quality and performance standards and combining this with the latest scientific research. It provides a rigorous, credible and achievable performance label of new homes against a broad range of societal, industry and occupier concerns.

HQM is developed and operated by BRE and is part of the BREEAM⁽³⁾ family of quality and sustainability standards. As such, it benefits from over 25 years of experience in the evaluation and certification of performance in homes and other buildings within the UK and internationally.

What makes a Home Quality Mark home different?

Our homes are important to us. In the UK we typically spend well over 50% of our time in and around them and they represent the biggest single financial commitment in terms of their purchase and running costs. They have a major impact on our health and wellbeing as well as saying a lot about us as individuals, our priorities and our interests.

HQM measures performance across a wide range of financial, wellbeing, environmental and social issues giving an overview of whole home performance and its impact on the occupier in a way that other standards are unable to do.

A home that has a certified Home Quality Mark rating will stand out because;

- There is a greater level of confidence in the performance and quality of the home.
- The home has been built to enhance performance beyond that required by regulation.
- The home and its surroundings have been built to consider issues not covered by regulations, reducing the risks of unintended consequences.

The Mark enables consumers to make a smart choice and provides home builders and others with the tools to differentiate their new homes by providing;

- A star rating, scored out of 5 stars
- Indicators of performance, ranked on a 5 point scale.

The star rating gives an overall picture of the homes quality, with 5 stars being an outstanding home of this era. The indicators focus on specific aspects of interest to home occupants in three key areas, including living costs (my costs), health & wellbeing (my wellbeing) and environmental footprint (my footprint);

My Cost

Providing an indication of the overall costs of living in the home. This takes account of;

- Energy Costs
- Durability of Materials
- Maintenance
- Performance of the home in extreme weather
- Access to transport and amenity



This indicator could influence mortgages, insurance and financing for development.

My Wellbeing

Provides an indication of how the home will impact the occupier's health and wellbeing. This takes account of;

- Quality of living space (air, temperature, light and noise)
- Local amenity



My Footprint

Provides an indication of how the home will impact the environment in its construction and use. This takes account of;

- Local and Global emissions in use
- Impact of the homes construction



The overall star rating and indicators are presented as a HQM 'scorecard'. This scorecard provides those buying and renting new homes with an easy to understand comparator of householder costs, positive impacts on health and wellbeing, and environmental footprint.

HQM Application

What can HQM assess?

The Home Quality Mark can be used to assess the life cycle environmental, social and economic impacts of new build homes in England, Wales, Scotland and Northern Ireland only.

For the purpose of HQM, a home is defined as a self-contained residential unit designed to accommodate a single household. It will therefore contain all the spaces that the household requires for living, sleeping, food preparation and hygiene. This definition of a home is the same as that used to define a 'dwelling' in The Building Regulations 2010, Approved Document L1A 2013 edition.

A new-build home is one that is a new standalone structure or a part of one that will come into operation and use for the first time after its completion.

The HQM is not appropriate for the refurbishment of existing homes or for new build projects containing rooms for multiple residential purposes such as student and key worker accommodation, care homes, sheltered housing or other multi-residential building types. The BREEAM UK Domestic Refurbishment and BREEAM UK Non-Domestic New Construction schemes can be used to assess these types of project respectively. Please refer to the technical manuals for these schemes for a detailed description of their scope and applicability before proceeding. Further details of these schemes and the technical manuals can be found at www.breeam.com

When does the HQM assessment take place?

Timing the engagement with HQM is essential for ensuring seamless integration with the procurement process for a new home. This requires careful and timely consideration of assessment issues by the stakeholders in the design and construction process to ensure they can be properly addressed without impacting on costs or performance in other areas. Without this engagement with the supply chain the ability to achieve the desired star rating for the new home is likely to be compromised.

An HQM assessment is a two stage process to ensure that opportunities are identified during the design stage (interim assessment and certificate) and implementation is confirmed during construction (final assessment and certificate).

While final certification occurs at the post-construction stage, to ensure the specified level of performance is achieved in the most cost-effective way and consumers are given the highest degree of confidence in the HQM rating, interim assessment and certification at the design stage is highly recommended. To reflect this, the 'Interim' and 'Final' status is clearly displayed on the certificate.

In many cases it will be possible to carry out much of the design stage interim assessment based on generic home-type or corporate level information. Where this is possible it will help to keep assessment costs down and build confidence in the ability to meet rating targets. The final rating represents the 'as-built' performance of the new home and is based predominantly on an assessment of the completed home and its surrounding site by an HQM assessor. It will help reduce the likelihood of the home not performing to the levels it was designed to meet.

Pre-assessments can be carried out in the early stages of the design process and prior to a formal, application for a certified assessment and rating. Although the scheme is voluntary, this will often be useful to support an outline or detailed planning application or tender bid by demonstrating the likely performance of proposals. Users should note that Pre-assessments are not formal assessments certified by BRE Global, therefore HQM performance based on a pre-assessment is not verified and a HQM star rating and performance must not be communicated as such.

Ensuring Trust in the Mark

It is important that developers and their customers can have trust in the integrity and rigour of HQM. As a formal third party certification scheme, robustness and fairness are key aspects that underpin the method. HQM provides confidence in two ways:

Creation and operation of the Mark

The credibility and consistency of the HQM assessment and rating is a fundamental part of the scheme. As the UK's leading building science centre BRE is owned by the BRE Trust. A registered charity that works to improve the quality and sustainability of our buildings and built environment for the wider public benefit, promoting best practice and developing knowledge and understanding throughout the sector. BRE is independent from those interest groups involved in the design and construction of new homes.

BRE is highly respected as a world leading authority in building performance research, testing, evaluation, standard setting and certification with over 90 years of experience operating both within the UK and internationally. The 'science-based' content and independent application in accordance with recognised International Standards⁽⁴⁾ underpin both the creation and operation of HQM. BRE Global, the BRE's certification body and operators of HQM, is accredited by the United Kingdom Accreditation Service (UKAS) against these standards to ensure independence, competence and impartiality.

A key aspect of this impartiality is the open and accountable governance structure. The operation of HQM (as with all our assurance activities) is overseen by an independent Governing Body and a broad cross-industry Standing Panel who provide peer and market review as well as technical and operational oversight of our activities. The Governing Body represents a breadth of stakeholder interests to ensure, among other things, that BRE Global acts in a manner that is beyond reproach, operates our processes correctly, treats our customers fairly and is always acting for the public good.

Process of certification

Independence is a key feature of HQM as it provides confidence to the consumer. Assessors are trained and licensed by BRE to undertake the HQM assessment and determine a rating. To view a current list of HQM assessors visit www.greenbooklive.com

The HQM assessor will evaluate the design, specification and construction of a new home using the criteria and methodologies defined in this technical manual and its supporting assessment tools.

Once an assessment is complete and has achieved a positive outcome in the BRE Global quality assurance procedure, one certificate will be issued per home. The certificate provides formal verification that the HQM assessor has completed their assessment in accordance with the requirements of the scheme and its quality standards. In turn providing confidence to the consumer (or any other interested party) in the HQM rating and performance of the new home.

Anyone wishing to verify a certified assessment and rating of a new home against the HQM can do so by either checking its HQM certificate, which will contain the scheme's certification mark, or by searching the project listings on Green Book Live⁽⁵⁾.

OVERVIEW OF HQM TECHNICAL CONTENT

This section provides an overview of the detailed technical assessment issues and supporting guidance, which makes up the majority of this manual. This detail is separated into three core parts;

HQM evidence requirements - This section provides guidance to assessors and project teams on the types and forms of evidence required to demonstrate compliance with HQM criteria. It should be referenced in conjunction with the evidence section in each individual assessment issue.

HQM assessment issues - This section includes the technical sections and all the assessment issues and criteria (see below for more detail).

Appendices - The Appendices provide supporting information on HQM scoring and rating methodology and benchmarks, and supporting guidance for HQM application including post-construction stage assessment issue exceptions.

HQM assessment issues and criteria

The 35 assessment issues that define HQM are categorised into three sections:

- My Home on page 48 – includes issues that address the provision of living spaces that are comfortable, healthy, cost effective and have reduced environmental impacts.
- Our surroundings on page 6 – includes issues that address the ability of homes to work with current and future surroundings.
- Knowledge Sharing on page 141 – includes issues that address the processes that enhance understanding and co-operation between the designer, constructor, client and householder.

Each assessment issue has a number of 'credits' available and this number reflects the issues importance relative to other issues in the scheme. The HQM assessor awards the appropriate number of credits where it is demonstrated that the new home meets the issue criteria. The sum of these credits determines the star rating and performance against each of the HQM indicators (refer to Appendix A for a description of the scoring and rating methodology and benchmarks).

Each of the assessment issues that define HQM is structured as follows:

- **Aim:** This outlines the intention of the issue.
- **Benefit:** This describes the key benefits and values for the householder.
- **Context:** This outlines why the issue is relevant to the development of quality homes in sustainable communities.
- **Credit Summary:** This summarises the key topics being assessed in the issue including the credits available and groups criteria by topic.
- **Criteria:** This details the criteria the issue assesses and the relevant number of HQM credits that can be awarded.
- **Methodology:** This details any methodologies to follow or use in achieving and determining compliance with the criteria and the number of credits to award.
- **Compliance Notes:** These notes provide additional guidance that supports the application and interpretation of the assessment criteria, including how to assess compliance in specific situations.
- **Evidence:** This outlines typical examples of the type of information that must be provided by the developer and given to the HQM assessor. This enables the assessor to independently verify the development's performance against the assessment criteria and award the relevant number of credits. See also Appendix C – HQM evidence requirements on page 201.
- **Checklists, Tables & Illustrations:** includes any supporting assessment information and guidance in the form of checklists, tables and illustrations.
- **Definitions:** This contains the definitions of terminology used throughout the issue.

HQM ASSESSMENT ISSUES

HQM sections, category, assessment issues and available credits				
Section	Category	Assessment Issue	No. Credits Available	
 Our surroundings	Transport and Movement	01 Accessible Public Transport	16	
		02 Alternative Sustainable Transport Options	15	
		03 Local Amenities	19	
	Outdoors	04 Ecology	30	
		05 Recreational Space	20	
	Safety and Resilience	06 Flood Risk	18	
		07 Managing the Impact of Rainfall	16	
		08 Security	10	
		09 Indoor Pollutants	10	
		10 Daylight	16	
 MyHome	Comfort	11 Internal and External Noise	4	
		12 Sound Insulation	8	
		13 Temperature	20	
		14 Ventilation	12	
		Energy and Cost	15 Energy and cost	62
			16 Decentralised Energy	10
			17 Impact on Local Air Quality	11
	Materials	18 Responsible sourcing of construction products	31	
		19 Environmental Impact from Construction Products	31	
		20 Life Cycle Costing of Construction Products	18	
		21 Durability of Construction Products	10	
	Space	22 Drying Space	3	
		23 Access and Space	10	
		24 Recyclable Waste	10	
Water	25 Water Efficiency	10		
 Knowledge Sharing	Home Delivery	26 Commissioning and Performance	10	
		27 Quality Improvement	10	
		28 Considerate Construction	4	
		29 Construction Energy Use	5	
		30 Construction Water Use	5	
		31 Site Waste	15	
	User Experience	32 Aftercare	10	
		33 Home Information	5	
		34 Smart Homes	7	
	Future Learning	35 Post-Occupancy Evaluation	9	

OUR SURROUNDINGS

This section discusses the following.

Transport and Movement	7
01 Accessible Public Transport	8
02 Alternative Sustainable Transport Options	12
03 Local Amenities	16
Outdoors	19
04 Ecology	20
05 Recreational Space	27
Safety and Resilience	32
06 Flood Risk	33
07 Managing the Impact of Rainfall	38
08 Security	45

TRANSPORT AND MOVEMENT

This section discusses the following.

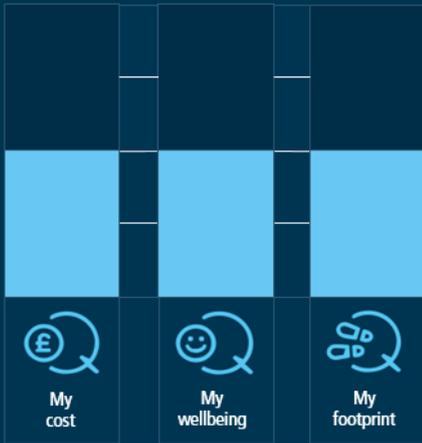
01 Accessible Public Transport	8
02 Alternative Sustainable Transport Options	12
03 Local Amenities	16

01 ACCESSIBLE PUBLIC TRANSPORT

Max credits

16

Indicators (Average)



Aim

To recognise and encourage developments with good proximity to public transport networks, in turn promoting ease of access for occupants.

Benefit

- Promotes active travel, helping to improve people’s health.
- Reduces occupants’ carbon footprint and associated negative environmental impacts.
- Provides cost savings when compared to the cost of owning and running a car⁽⁶⁾.

Context

Transport accounts for around a quarter of UK greenhouse gas emissions, significantly affecting air quality at the roadside⁽⁷⁾. Public transport offers a route to addressing transport-related greenhouse gas emissions and will contribute towards the UK’s long term goal of reducing greenhouse gas emissions by at least 80% compared to 1990 levels by 2050. The emissions from trains and buses can be up to eight times lower than car travel⁽⁸⁾. Furthermore we have all experienced poor access to public transport and traffic congestion, adding in some cases, hours onto our travel times. It is not just about having capacity in our public transport, but also about ensuring that the public transport is accessible for all and operates at convenient times to meet our needs. The National Planning Policy Framework places significant emphasis on sustainable transport options stating that planning should “make the fullest possible use of public transport, walking and cycling, and focus on significant development in locations which are or can be made sustainable”⁽⁹⁾.



Credit Summary

Criterion number	Title	Credits
crit 1, crit 2	01 Access to public transport	up to 16 credits
Total credits available		16

Criteria

01 Access to public transport

up to 16 credits

crit 1 Homes are awarded credits based on the accessibility to public transport nodes. Credits are awarded based on the Public Transport Accessibility Index (AI) as shown in Table 1.

Table 1 Public Transport Accessibility Index (AI) scores and associated number of credits

Credits	AI Score in Rural Locations	AI Score in Urban Locations
4	1	2
8	2	4
12	4	8
16	6	12

crit 2 The Accessibility Index is determined by entering the following information in to the HQM Transport calculator:

crit 2.a: The distance (m) from the homes main entrance to each compliant public transport node

crit 2.b: The public transport types serving the compliant transport node, e.g. bus or rail

crit 2.c: The average number of services stopping per hour at each compliant node during peak and off peak times.

Methodology

Accessibility Index

The methodology for calculating the Accessibility Index uses Transport for London’s Public Transport Accessibility Level (PTAL) method, itself based on a methodology developed in 1992 by the London Borough of Hammersmith and Fulham. For a detailed description of the PTAL methodology see the 'Measuring Public Transport Accessibility Levels Summary'⁽¹⁰⁾ document.

Distance to transport node

Distance should not be measured 'as the crow flies' and must be measured via a safe pedestrian route from the main entrance of the home (communal entrance of the building for an apartment block) to the nearest compliant transport node.

Multiple transport nodes

Where there is more than one transport node serving the home, located at different proximities, e.g. one node at 400m and another at 600m, then each node should be assessed.

Services that operate from more than one node within proximity of the home, i.e. two separate bus stops served by the same bus, must be considered only once - at the node in closest proximity to the home. Different services at the same node can be considered as separate.

Calculating the average number of services

For the purpose of the calculation, the frequency of public transport is the average number of services per hour. This is calculated by determining the number of stopping services at the node during the peak times divided by the number of hours within that period.

For example: in rural locations within proximity of a bus stop with 12 stopping services during the peak periods (i.e. the 6 hours of peak time as defined in CN1 on the facing page), the average number of services is $12/6 = 2$ services per hour at peak times (equivalent to an average service frequency of approximately 30 minutes).

Multiple services

Where a transport node is served by more than one service going to a local urban centre, the frequency between services can be used as the frequency for assessment. For example, where there are three services, each with a 30 minute frequency but each follows on 10 minutes after the other, the frequency used for assessment purposes would be 10 minutes.

Bidirectional routes

Routes will be bidirectional; however for the purpose of calculating the index, consider only the direction with the highest frequency (in accordance with the PTAL methodology).

Homes in Greater London

Transport for London hosts a Planning Information Database that allows users to search for a specific London location by street name, coordinates or postcode and then calculate the accessibility index (AI) for that location. The total AI is confirmed for the Point of Interest (POI) within the summary report, which can be downloaded and used as evidence of compliance for the assessed home or apartment block. Please refer to www.webptals.org.uk.

Compliance Notes

Criterion Reference	Compliance Note	
crit 2	CN1 Peak and off-peak service times	<p>For weekdays the following peak and off peak hours apply:</p> <ol style="list-style-type: none"> 1. Peak hours: between 06:30–09:30 and 16:00–19:00. 2. Off-peak hours: between 09:30–16:00 and 19:00–06:30. <p>During off-peak hours, the service level of public transport should not reduce to less than a quarter of the on-peak service. Rural location services between midnight and 5am are exempt from this requirement.</p> <p>For weekends all times in the day are considered off-peak.</p>
crit 1, crit 2	CN2 Phased or multiple home development	See Appendix D – Post-construction stage assessment issue exceptions on page 207.
crit 1, crit 2	CN3 For homes being assessed as part of a larger development	The AI can either be calculated for each home or where the client does not want to assess the AI for each home, the calculation should assume the 'worst case', i.e. by using the home which is furthest away from each transport node to determine the AI.

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
crit 1, crit 2	01 General Evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	
crit 1	02 AI calculation	A copy of the completed AI calculator and documentary evidence supporting the data used to complete the calculator or TFL output.	

Checklists, Tables & Illustrations

None.

Definitions

Accessibility Index

A measure that provides an indicator of accessibility and density of the public transport networks for an individual home. The index can be influenced by the proximity and diversity of the public transport network and the frequency of service at the accessible node.

Compliant public transport nodes

A compliant node includes buses, trams, trains, tubes and other types of public transport. The service stopping at each node must provide transport from, or onward travel to, either an urban centre, major transport node or a community focal point, e.g. doctor's surgery, library, school or village centre. Only local services should be assessed and any national public transport services should be excluded from the analysis, unless such a service can be said to provide a local commuter service.

Rural locations

A rural location is defined as being any settlement or land that does not meet the definition of urban below.

Safe pedestrian routes

Pedestrian routes on the development site, within control of the developer are deemed to be safe and accessible for all pedestrian users (including people with disabilities, the elderly and children), where they take into account physical limitation of those who may

use them, for example providing steps appropriately supported by sloped access and dropped curbs positioned at crossing points. These routes and associated spaces are appropriately sized, with good visibility of the route ahead. Alongside these principles they should also meet the following requirements:

1. Where required, lighting design must be in accordance with BS 5489-1:2013 Lighting of roads and public amenity areas⁽¹¹⁾ (rural areas are exempt from this requirement).
2. At crossing points there must be appropriate pedestrian crossings (e.g. zebra or pelican crossings) in place or a clear line of sight for at least 50m in each direction on roads with a 30mph speed limit or 100m in each direction on roads with a speed limit of greater than 30mph).
3. On roads with a speed limit of 30mph (or higher) there is a clearly defined footpath.
4. All footpaths provided should be at least 900mm wide. In rural areas, on single track roads, a grass verge is acceptable in place of a footpath.
5. In clearly defined home zones, it is acceptable for the pedestrian's routes to use the road.



Pedestrian routes that are outside of the development site and therefore not within the control of the developer do not need to meet the above requirements, however it must be demonstrated that there is a pedestrian route that allows access to the transport nodes.

Urban locations

An urban area with a population of 10,000 people or more, located within a tract of predominantly built-up land. This definition applies to the expected post-development population.

02 ALTERNATIVE SUSTAINABLE TRANSPORT OPTIONS

Max credits

15

Indicators (Average)



Aim

To provide alternative sustainable transport options and the associated facilities to reduce dependency on traditionally fuelled cars.

Benefit

- Cost savings compared with maintaining and running a traditionally fuelled car.
- Encourages active travel, improving people’s health.
- Encourages clean travel and therefore help to improve the air quality of the local area (i.e. electric cars, cycling etc.).

Context

Supporting the provision of alternative sustainable transport options can play a critical role in allowing people to travel around their local area, while reducing associated congestion, carbon emissions and improving air quality. The UK Government is supporting a move towards alternative means of sustainable transport, through for example the cycling delivery plan and providing grants for “plug in cars”⁽¹²⁾. Statistics published by the Department for Transport showed that 5% of people “were thinking about buying an electric car or van”⁽¹³⁾. We need to ensure that the infrastructure is there to support people in making the move to alternative sustainable transport.



Credit Summary

Criterion number	Title	Credits
crit 1–crit 3	01 Cycle storage	up to 6 credits
crit 4	02 Cycle networks	for 3 credits
crit 5–crit 6	03 Electric charging points	for 4 credits
crit 7–crit 8	04 Car clubs	for 2 credits
Total credits available		15

Criteria

01 Cycle storage

up to 6 credits

- crit 1 Where cycle storage is provided for individual homes or in a communal setting, credits can be awarded based upon the size of the home and the number of cycle spaces provided, as detailed in Table 2.
- crit 2 Compliant cycle storage is associated with the home or within close proximity to the homes entrance (communal entrance of the building for an apartment block).

Table 2 Number of cycle spaces per home and the associated credits

Home size	3 credits	6 credits
Studios or 1 bedroom	1 cycle space for every two homes is provided (where the assessment is only covering one home then one cycle space is required)	1 cycle space per home
2 and 3 bedrooms	1 cycle space per home	2 cycle spaces per home
4 bedrooms and above	2 cycle spaces per home	4 cycle spaces per home



Where the cycle storage is provided in a communal location, the number of communal spaces provided must be demonstrated to meet the above requirements for all homes served by the communal location.

- crit 3 There is a safe pedestrian route from the cycle storage to the entrance of the home (communal entrance of the building for an apartment block).

02 Cycle networks

for 3 credits

- crit 4 The home is connected to a safe cycle route via a safe pedestrian route.

03 Electric charging points

for 4 credits

- crit 5 The home has access to a dedicated electric charging point or a communal charging point, located within close proximity to the home via a safe pedestrian route.
- crit 6 Home information is provided for electric charging points (see 33 Home Information on page 176).

04 Car clubs

for 2 credits

- crit 7 The home has access to one of the following:
- Car pool
 - Lift sharing scheme
 - Community electric vehicle hire
- crit 8 Home information is provided on car club options (see 33 Home Information on page 176).

Methodology

None.

Compliance Notes

Criterion Reference	Compliance Note	
crit 1	CN1 Cycle storage locations	<p>Cycles may be stored in any of the following locked structures:</p> <ol style="list-style-type: none"> 1. Garage or shed 2. Internal private spaces, such as dedicated space in a utility room 3. External or internal communal cycle store 4. Proprietary system. <p>Communal cycle storage should meet the following:</p> <ol style="list-style-type: none"> 1. Spaces in racks, that are covered overhead and where the racks are fixed to a permanent structure (building or hardstanding). <p>Where the location is external to the home, access from the bike storage area to a pedestrian or cycle route is not permitted through the home.</p>
crit 1	CN2 Cycle storage requirements	<p>The distance between each cycle rack and surrounding obstructions (e.g. walls) allows for bikes to be easily stored and accessed. Cycle racks must be a minimum of:</p> <ol style="list-style-type: none"> 1. 2m long ×0.75m wide for one bike 2. 2m long ×1.5m wide for two bike 3. 2m long ×2.5m wide for four bikes 4. If hanging systems are provided, the space requirements are flexible but the system must allow each cycle to be removed independently. <p>Cycle storage in communal locations has adequate lighting. The lighting must be controlled during daylight hours.</p>
crit 4	CN3 Cycle route	<p>A compliant cycle route should meet one or more of the following:</p> <ol style="list-style-type: none"> 1. Cyclists can share the road with vehicles on single track roads . 2. Cyclists can share the road with vehicles on roads with low traffic volumes and speeds (20mph). 3. Shared cyclist and pedestrian routes need to be a minimum of 3m wide. 4. Dedicated cycle lanes (segregated or unsegregated from roads), with one-way cycle lanes being a minimum of 1.5m wide and two-way cycle lanes a minimum of 3m wide)⁽¹⁴⁾.
crit 5	CN4 Communal car charging point	<p>Where a dedicated charging point is not provided for the home, it is possible to demonstrate compliance through the provision of communal charging points, where the following are met:</p> <ol style="list-style-type: none"> 1. The total number of parking spaces on the development site is determined 2. The number of communal electric charging points provided is more than or equal to 5% of the total number of parking spaces on the development site 3. Spaces contributing to the 5% must be communal 4. The number of spaces provided should be rounded up to the nearest whole number. <p>For example, if a development has 90 private car parking spaces without electrical charging points, and 10 communal car parking spaces, then in order to gain the available credits, five of the communal spaces would require an electrical car charging point.</p>
crit 1–crit 8	CN5 Phased or multiple home development	See Appendix D – Post-construction stage assessment issue exceptions on page 207.

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
crit 1–crit 8	01 General Evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	

Checklists, Tables & Illustrations

None.

Definitions

Adequate Lighting

Internal lighting should provide an illuminance (lux) level appropriate to the tasks undertaken. This can be demonstrated through a lighting design strategy that provides illuminance levels in accordance with the SLL Code for Lighting 2012⁽¹⁵⁾ and any other relevant industry standard.

External lighting is designed to provide illuminance levels that enable users to perform outdoor visual tasks efficiently and accurately, especially during the night. To demonstrate this, external lighting provided is specified in accordance with BS5489-1:2013 Lighting of roads and public amenity areas⁽¹⁶⁾.

The lighting must be controlled to avoid operation during daylight hours, where there is sufficient daylight in or around the facility.

Close Proximity

Within 50m of the homes entrance (communal entrance of the building for an apartment block), or alternatively no further from the homes entrance (communal entrance of the building for an apartment block) when compared to the nearest car parking space. This should be measured via the available pedestrian route and not 'as the crow flies'.

Safe pedestrian routes

Pedestrian routes on the development site, within control of the developer are deemed to be safe and accessible for all pedestrian users (including people with disabilities, the elderly and children), where they take into account physical limitation of those who may use them, for example providing steps appropriately supported by sloped access and dropped curbs positioned at crossing points. These routes and associated spaces are appropriately sized, with good visibility of the route ahead. Alongside these principles they should also meet the following requirements:

1. Where required, lighting design must be in accordance with BS 5489-1:2013 Lighting of roads and public amenity areas⁽¹⁷⁾ (rural areas are exempt from this requirement).
2. At crossing points there must be appropriate pedestrian crossings (e.g. zebra or pelican crossings) in place or a clear line of sight for at least 50m in each direction on roads with a 30mph speed limit or 100m in each direction on roads with a speed limit of greater than 30mph).
3. On roads with a speed limit of 30mph (or higher) there is a clearly defined footpath.
4. All footpaths provided should be at least 900mm wide. In rural areas, on single track roads, a grass verge is acceptable in place of a footpath.
5. In clearly defined home zones, it is acceptable for the pedestrian's routes to use the road.

Note: Pedestrian routes that are outside of the development site and therefore not within the control of the developer do not need to meet the above requirements, however it must be demonstrated that there is a pedestrian route that allows access to the alternative sustainable transport option

Walking distance

Walking distance for the purpose of this issue is 650m via a safe pedestrian route. This should be measured via the route and not 'as the crow flies'.

03 LOCAL AMENITIES

Max credits

19

Indicators (Average)



Aim

To ensure occupants have access to a range of key amenities in the local area and to reduce dependency on private transport.

Benefit

- Helps to reduce the need for travel, reducing occupiers' carbon footprint and costs.
- Encourages active travel, helping to improve people's health.
- Promotes community cohesion and sense of place.

Context

With the increase in out-of-town shopping centres and the increasing dependency on private transport to get around, there has been a decline in town centres that provide everyday amenities within a walkable distance or via good public transport options⁽¹⁸⁾. Where new homes are planned for an area they should be supported by appropriate local amenities, saving occupants travel time, money and helping to promote community cohesion and a sense of place⁽¹⁹⁾.



Credit Summary

Criterion number	Title	Credits
crit 1	01 Key local amenities	for 12 credits
crit 2–crit 3	02 Beneficial local amenities	for 7 credits
Total credits available		19

Criteria

01 Key local amenities

for 12 credits

crit 1 Three or more of the following amenities are located within walking distance of the home, via safe pedestrian routes:

crit 1.a: Administrative services, e.g. post office, bank or cash point etc.

crit 1.b: Health services, e.g. GP, health centre, pharmacy, etc.

crit 1.c: Small scale retail services, e.g. grocers, butchers, corner shops, etc.

02 Beneficial local amenities

for 7 credits

crit 2 crit 1 has been achieved.

crit 3 Two or more of the following amenities are located within 30 minutes of the home via safe pedestrian routes (calculated using the assumed walking speed) or via public transport:

crit 3.a: Purpose built recreation or leisure facilities

crit 3.b: Primary or early education facilities or school, e.g. nursery or primary school

crit 3.c: Large scale retail, e.g. restaurants, cinemas, clothes shops, etc.

crit 3.d: One or more community facilities, e.g. community hall or a library, etc.

Methodology

None.

Compliance Notes

Criterion Reference	Compliance Note	
crit 1–crit 3	CN1 Local amenities	The number of local amenities can include several different amenities from the same group; however it cannot include more than one of the same type of amenity. For example a post office and a cash machine (both administrative amenities) can be counted, however having two cash machines cannot be counted twice.
crit 1–crit 3	CN2 Collective amenities	One type of amenity may also exist within or as part of another amenity, e.g. a grocery store in a petrol station, cash point or pharmacy in a supermarket etc. It is not a requirement of this issue that each amenity is 'standalone'.
crit 1–crit 3	CN3 Phased or multiple home development	See Appendix D – Post-construction stage assessment issue exceptions on page 207.
crit 1–crit 3	CN4 For homes being assessed as part of a larger development	For homes being assessed as part of a larger development the 'worst case' can be used to determine the number of credits awarded, i.e. by using the home which is furthest away from each local amenity.

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
crit 1–crit 3	General evidence		One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.

Checklists, Tables & Illustrations

None.

Definitions

Assumed walking speed

Walking speed for the purpose of this issue must be assumed to be 3mph (1 mile every 20 minutes).

Community facilities

Internal spaces which are inclusive to the majority of users who will occupy the home or development. The facility will serve to facilitate community activities.

Safe pedestrian routes

Pedestrian routes on the development site, within control of the developer are deemed to be safe and accessible for all pedestrian users (including people with disabilities, the elderly and children), where they take into account physical limitation of those who may use them, for example providing steps appropriately supported by sloped access and dropped curbs positioned at crossing points. These routes and associated spaces are appropriately sized, with good visibility of the route ahead. Alongside these principles they should also meet the following requirements:

1. Where required, lighting design must be in accordance with BS 5489-1:2013 Lighting of roads and public amenity areas⁽²⁰⁾ (rural areas are exempt from this requirement).
2. At crossing points there must be appropriate pedestrian crossings (e.g. zebra or pelican crossings) in place or a clear line of sight for at least 50m in each direction on roads with a 30mph speed limit or 100m in each direction on roads with a speed limit of greater than 30mph).
3. On roads with a speed limit of 30mph (or higher) there is a clearly defined footpath.
4. All footpaths provided should be at least 900mm wide. In rural areas, on single track roads, a grass verge is acceptable in place of a footpath.
5. In clearly defined home zones, it is acceptable for the pedestrian's routes to use the road.

Note: Pedestrian routes that are outside of the development site and therefore not within the control of the developer do not need to meet the above requirements, however it must be demonstrated that there is a pedestrian route that allows access to the local amenity.

Walking distance

Walking distance for the purpose of this issue is 650m via safe pedestrian routes. This should be measured via the route and not 'as the crow flies' from the main entrance of the home (communal entrance of the building for an apartment block) to the amenity.

OUTDOORS

This section discusses the following.

04 Ecology	20
05 Recreational Space	27

04 ECOLOGY

Max credits

30

Indicators (Average)



Aim

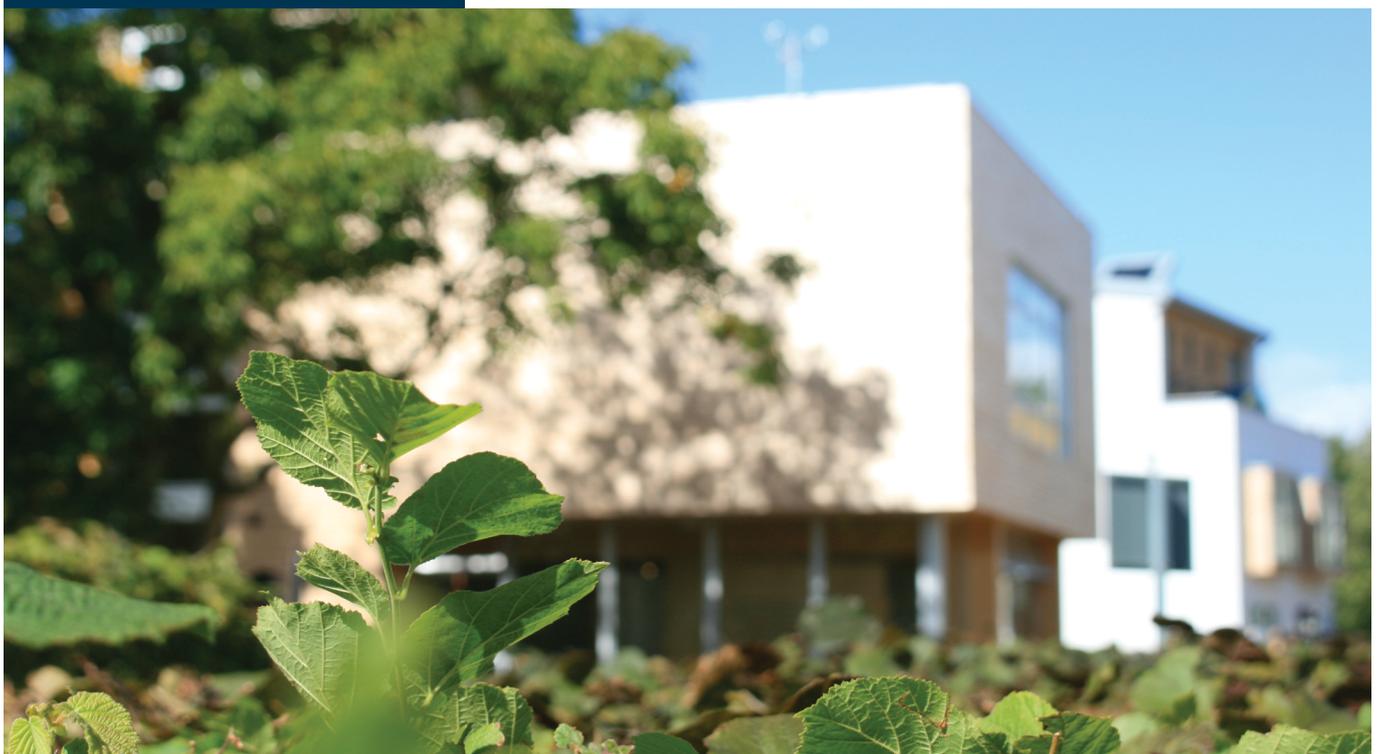
To identify existing land use and ecology on site in order to ensure that ecological value is maintained, protected and enhanced, while any risks to the ecological value are eliminated or managed effectively throughout the development and into occupation.

Benefit

- Minimises a developments environmental impact.
- Helps to improve the health and wellbeing of the occupants⁽²¹⁾ and their awareness of the benefits of interacting with the natural environment.
- Encourages ongoing maintenance plans to ensure the desired environmental and health benefits continue.

Context

The National Planning Policy Framework (NPPF)⁽²²⁾ promotes “the preservation, restoration and re-creation of priority habitats, ecological networks and the protection and recovery of priority species populations, linked to national and local targets.” Biodiversity is essential for primary production and nutrient and water cycling, which in turn supports the provision of food. There is also evidence in support of the health and wellbeing benefits of having access to the natural environment, demonstrating a reduced risk of heart disease, improvements in self-esteem and reduced depression.⁽²³⁾ Furthermore, interaction with the natural environment is important for increasing people’s awareness of the benefits it can provide⁽²⁴⁾.



Credit Summary

There are two routes to assessing this issue; foundation and comprehensive routes. These routes represent varying degrees of rigour. The route selected will depend on whether or not a suitably qualified ecologist will be employed on site. More credits are available through the more rigorous comprehensive route, recognising that a suitably qualified ecologist has been employed and influenced the ecology on site.

Criterion number	Title	Credits
crit 1	01 Previously developed lands	for 6 credits
crit 2	02 Appointing an expert	for 2 credits
crit 3	03 Early appointment	for 2 credits
crit 4–crit 22	04 Routes of rigour (follow 04A or 04B) - Survey and recommendations	up to 20 credits
crit 4–crit 9	04A Foundation route	up to 7 credits
crit 10–crit 22	04B Comprehensive route	up to 20 credits
Total credits available		30

Criteria

01 Previously developed lands for 6 credits

crit 1 At least 75% of the proposed development's footprint is on an area of land which has previously been occupied by industrial, commercial or domestic buildings or fixed surface infrastructure

02 Appointing an expert for 2 credits

crit 2 A suitably qualified ecologist or a local wildlife professional is appointed.

03 Early appointment for 2 credits

crit 3 The appointment of the suitably qualified ecologist or local wildlife professional takes place early in the process, prior to site clearance and construction.



A suitably qualified ecologist must be appointed in order to assess the home via the Comprehensive route—see crit 10 to crit 22

04 Routes of rigour (follow 04A or 04B) - Survey and recommendations up to 20 credits

04A Foundation route up to 7 credits

Local Wildlife Professional's Survey for 2 credits

crit 4 crit 2 has been achieved.

crit 5 The local wildlife professional carries out an ecology survey of the site, identifies applicable local best practise guidance and provides recommendations to protect, maintain and enhance ecology on site. Recommendations are grouped as high priority or desirable by the local wildlife professional.

Maintaining and enhancing ecological value up to 4 credits

crit 6 crit 4 and crit 5 have been achieved.

crit 7 Credits are awarded based on the implementation of recommendations identified by the local wildlife professional, as shown in Table 3. All high priority recommendations for protection and maintenance must be implemented prior to awarding credits for the implementation of any enhancement recommendations.

Table 3 Available credits through implementation of ecology recommendations

Proportion of recommendations implemented	Credits available (Foundation Route)	Credits available (Comprehensive Route)
Recommendations relating to the protection and maintenance of ecology		
All high priority recommendations	1	3
All high priority and desirable recommendations	2	5
Recommendations relating to enhancing ecology		
All high priority recommendations	1	3
All high priority and desirable recommendations	2	5

Local biodiversity records **for 1 credit**

- crit 8 crit 4 and crit 5 have been achieved.
- crit 9 Information collected as part of the ecology survey and any new ecology on site arising from enhancement is added to the local biodiversity records centre database by the local wildlife professional.

04B Comprehensive route **up to 20 credits**

Ecologist’s survey **for 3 credits**

- crit 10 crit 2 has been achieved.
- crit 11 The suitably qualified ecologist carries out an ecology survey of the site and confirms that the scope of the ecology survey is in line with BF1678.
- crit 12 The survey should contain recommendations to protect, maintain and enhance ecology on site. Recommendations are grouped as high priority or desirable by the suitably qualified ecologist.

Maintaining and enhancing ecological value **up to 10 credits**

- crit 13 crit 10 to crit 12 have been achieved.
- crit 14 Credits are awarded based on the implementation of recommendations identified by the suitably qualified ecologist, as shown in Table 3 above. All high priority recommendations for protection and maintenance must be implemented prior to awarding credits for the implementation of any enhancement recommendations.



Recommendations relating to invasive or diseased species are awarded credits under crit 15 to crit 17.

Protecting against invasive or diseased species on site **for 2 credits**

- crit 15 crit 10 to crit 12 have been achieved.
- crit 16 Where diseased or invasive species (in addition to those dealt with by legislation) have been identified as posing a specific risk, the recommendations of a suitably qualified ecologist have been followed and carried out in line with best practice guidance.
- crit 17 Plant species used for landscaping purposes are either: native species OR non-native species which do not pose an invasive risk or contribute to the invasive risk of another species, as confirmed by a suitably qualified ecologist

Maintaining ecology in communal areas **for 3 credits**

- crit 18 crit 10 to crit 12 above have been achieved.
- crit 19 The suitably qualified ecologist produces an Ecology Management Strategy to be passed onto those who will have the responsibility of maintaining ecology in communal areas.
- crit 20 Where the developer will not be responsible for the longer term management of the site, a landscape management company, or equivalent, are appointed. The contract with the management company (or equivalent) should:
 - crit 20.a: Cover three years as a minimum

crit 20.b: Outline the responsibilities for parties involved, for example the local authority, the developer or the landscaping management company appointed.

Local biodiversity records

for 2 credits

crit 21 crit 10 to crit 12 on the previous page have been achieved.

crit 22 Information collected as part of the ecology survey and any new ecology on site arising from enhancement is added to the local biodiversity records centre database by the suitably qualified ecologist.

Methodology

None.

Compliance Notes

Criterion Reference	Compliance Note	
crit 5 and crit 11	CN1 Survey	<p>For both the foundation and comprehensive routes the survey can include the use of existing information where deemed appropriate (up-to-date and from a reliable source) by the Suitably qualified ecologist on page 26 or the Local wildlife professional on page 26.</p> <p>The comprehensive route survey should be carried out in line with BF1678. The foundation route can also follow BF1678, but where this is not feasible it should cover the following as a minimum:</p> <ol style="list-style-type: none"> 1. The survey should identify species and broad habitats on site and make recommendations in line with CN2. 2. The survey should account for the whole site and be completed at an appropriate time, in terms of seasons, when it is possible to determine the presence, or evidence of the presence, of different plant and animal species.
crit 5 and crit 12	CN2 Recommendations	<ol style="list-style-type: none"> 1. Recommendations made by the Suitably qualified ecologist on page 26 or Local wildlife professional on page 26 should address: <ol style="list-style-type: none"> a. Both the construction and operation phase b. Any negative impacts and constraints identified in the ecology survey c. The likelihood of the desired outcomes d. Long-term maintenance or management implications e. The relationship with landscaping objectives and site maintenance approaches that may have an impact on ecology on site. <p>AND promote, where appropriate, the</p> <ol style="list-style-type: none"> f. Protection and mitigation of site ecology g. Enhancement of ecology h. The removal or limitation of invasive or diseased species i. Local, regional and national planning policies j. Integration of ecological design within built structures. 2. Recommendations relating to the Construction phase on page 25 ensure that: <ol style="list-style-type: none"> a. Areas of the site that are to be protected are marked-off accordingly b. All those working on site have been briefed on the protection measures put in place and the areas that are not accessible.
crit 5 and crit 12	CN3 Protection of trees and hedges	Where recommendations have been made regarding the protection of trees and hedges, they should be in accordance with BS 5837:2012 Trees in relation to

Criterion Reference	Compliance Note	
		design, demolition and construction ⁽²⁵⁾ .
crit 5 and crit 12	CN4 Protection of watercourses and wetland areas	Where recommendations have been made regarding the protection of watercourses and wetlands, they should be in accordance with Pollution Prevention Guidelines 05.
crit 5 and crit 12	CN5 Cases where protection is not required	Protection is not required (with the exception of Protected species on page 26) where: <ol style="list-style-type: none"> 1. The Suitably qualified ecologist on page 26 confirms that the feature in question does not add to the ecological value of the site (this also applies to plots with no ecology present). <p>Or where;</p> <ol style="list-style-type: none"> 2. Protection would not be viable as the result of low abundance or poor condition or health (e.g. diseased) of the species.
crit 5 and crit 12	CN6 Integration of ecological design within or on built structures	Where deemed appropriate by the Suitably qualified ecologist on page 26 or Local wildlife professional on page 26, ecological solutions are integrated within or on built structures. This could be demonstrated through: <ol style="list-style-type: none"> 1. Green roofs or walls 2. Vegetated car parking bays 3. Vegetated SuDS systems 4. Bird or bat boxes fixed to or integrated within the building.
crit 19 and crit 20	CN7 Maintaining ecology in communal areas	For the purposes of maintaining ecology, a communal area refers to all vegetated or landscaped parts of the development site that are not considered to be a private garden. For example: communal gardens, street and parking landscaping, green infrastructure, play areas, parks etc.
crit 19	CN8 Ecology Management Strategy	The following should be considered in the Ecology Management Strategy for maintaining ecology in communal areas, where applicable, <ol style="list-style-type: none"> 1. The species and habitats of local and national importance on site (identified in the ecology survey) and advice on how to manage these. 2. The site conditions identified in the ecology survey (e.g. soil type, drainage, exposure the sun, wind etc.) and the species that would be suited to these conditions. 3. The recommendations implemented on site to protect, maintain and enhance the ecological value of the communal areas and any associated long term management approaches to ensure the impact of the recommendations are realised. 4. Any additional practical guidance for the long term management of ecology on site (e.g. pruning regimes for flowering species).
crit 15–crit 17	CN9 No invasive or diseased species on site.	crit 15–crit 17 on page 22 cannot be awarded by default where there are no invasive or diseased species present on site. The aim of these criteria is centred on protection and the removal of current risks and therefore the aim is not met where there are no invasive or diseased species on site.
crit 7, crit 14, crit 16, crit 17	CN10 Phased or multiple home development	See Appendix D – Post-construction stage assessment issue exceptions on page 207.
crit 5 and crit 11	CN11 Best practice guidance	Best practice guidance (as mentioned in BF1678) can be sought from the Non-Native Species Secretariat online portal under their management and guidance section.

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
crit 1–crit 22	01 General Evidence	One or more of the appropriate evidence types listed in Appendix C – HQM	

Criterion Reference	Title	Design Stage	Post Construction Stage
		evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	
crit 5, crit 11 and crit 12	02 Ecology survey	A signed copy of the ecology survey.	Where applicable, this should include a copy of BF1678. Where applicable, written confirmation from the third party verifier of the ecology report—see BF1678 (Section B, Comprehensive route—Part 2).

Checklists, Tables & Illustrations

None.

Definitions

Biodiversity Action Plans (BAPs)

Biodiversity action plans operate at different levels across the UK. For the purposes of this issue we are referring to local biodiversity action plans developed and managed by local authorities, which outline species and habitats of local importance, including actions and initiatives to protect and support these.

Construction phase

The construction phase includes site clearance, preparation and construction works.

Construction zone

The construction zone includes any land used for buildings, hardstanding, landscaping, site access or where construction work is carried out (or land is being disturbed in any other way), plus a 3m boundary in every direction around these areas. It also includes any areas used for temporary site storage and buildings. If it is not known exactly where buildings, hardstanding, site access, temporary storage and buildings will be located, it must be assumed that the construction zone is the entire development site.

Desirable recommendations

Desirable recommendations for the ecology on site are determined by the local wildlife professional or SQE and will include approaches that are not deemed to be high priority but will still contribute to the overall ecological value of the site and surrounding area.

Enhancement opportunities

Enhancement is often considered to be the next step following on from the mitigation hierarchy and is considered to be a measure that contributes towards a net gain in biodiversity for the site. A measure should only be considered as enhancement when it results in an improvement over and above what is required to achieve mitigation or compensation. Enhancement can be in relation to improving the condition of an existing species, the introduction of a new species, the creation of an entirely new habitat that contributes towards a net gain in biodiversity or an intervention that improves the links between natural spaces within or beyond the site boundary⁽²⁶⁾.

Habitat connectivity

Habitat connectivity refers to the degree to which the size and distribution of patches of habitat facilitate animal movement and other ecological flows. Better habitat connectivity improves the relative ease with which species can move through the landscape.

High priority recommendations

High priority recommendations for the ecology on site are determined by the local wildlife professional or SQE and will include approaches they deem as priority in order to maintain, protect and enhance the current ecological value of the site. High priority recommendations identified might include:

- Those recommendations likely to have the largest impact and ensure legal compliance.
- Recommendations linked to species of local significance (BAP species) /priority species and habitat.
- Recommendations that will impact not only on the site but also the connectivity in surrounding areas.

Invasive species

Invasive species are non-indigenous or non-native species (e.g. plants or animals) that adversely affect the habitats they invade economically, environmentally or ecologically⁽²⁷⁾.

Irreplaceable natural habitat

Areas of irreplaceable natural habitat are those that are of particular significance in terms of age, uniqueness or species diversity and therefore there is the possibility that once lost they cannot be replaced. Ancient woodland is a good example of irreplaceable natural habitat⁽²⁸⁾.

Keystone species

A keystone species is a plant or animal that plays a unique and crucial role in the way an ecosystem functions. Without keystone species, the ecosystem would be dramatically different or cease to exist altogether⁽²⁹⁾.

Local wildlife professional

A local wildlife professional can be an individual or group working for organisations such as The Wildlife Trust, National Trust, Woodland Trust, The Royal Horticultural Society, a biodiversity officer from the local authority etc. to inform the adoption of locally relevant ecological measures that enhance the ecological value of the site. The local wildlife professional should have a minimum of three years' experience (within the last five years) working in the field of ecology in the local area. This experience must clearly demonstrate a practical understanding of local factors affecting ecology in relation to construction and the built environment including, acting in an advisory capacity to provide recommendations for ecological protection, enhancement, restoration and mitigation measures.

Mitigation hierarchy

The mitigation hierarchy is a recognised and a generally accepted approach to protection and maintenance of the ecological value of a site where possible. The hierarchy favours avoidance of ecological harm or protection to avoid harm, followed by mitigating unavoidable impacts and considers compensation as a last resort. Recommendations for maintaining the ecological value of the site should be made in line with mitigation hierarchy, avoidance should always be the first option and should only be ruled out where it has been confirmed that it is not feasible. Furthermore compensation measures should be implemented on site and ideally timed so that the compensation measure is established before the loss occurs⁽³⁰⁾.

Previously developed land

For the purposes of this issue HQM defines previously developed land as that which is or was occupied by a permanent structure, including any associated fixed surface infrastructure. The definition excludes:

- Land that is or has been occupied by agricultural or forestry buildings
- Land that has been developed for minerals extraction or waste disposal by landfill purposes where provision for restoration has been made through development control procedures.
- Land in built-up areas such as parks, recreation grounds and allotments which, although they may feature paths, pavilions and other buildings, has not been previously occupied.
- Land that was previously occupied but where the remains of the permanent structure or fixed surface structure have blended into the landscape in the process of time (to the extent that it can reasonably be considered as part of the natural surroundings).

Priority species and habitats

"Species and habitats identified as being most threatened and in need of conservation action. In England, Wales and Scotland habitats and species of principle importance for the conservation of biodiversity" are listed respectively in section 41 and 42 of NERC Act 2006; in section 2 of Nature Conservation (Scotland) Act 2004; and in Northern Ireland, Priority Species List 2010."⁽³¹⁾ Please note that this is different from the expert's grouping of high, medium and low priorities.

Protected species

"Species identified as species of European Community interest and in need of strict protection or protected by national wildlife legislation."⁽³²⁾

Suitably qualified ecologist

A suitably qualified ecologist is defined as an individual who:

1. Holds a degree or equivalent qualification (e.g. N/SVQ Level 5) in ecology or a related subject.
2. Is a practising ecologist, with a minimum of three years' relevant experience (within the last five years). Such experience must clearly demonstrate a practical understanding of factors affecting ecology in relation to construction and the built environment, including acting in an advisory capacity to provide recommendations for ecological protection, enhancement and mitigation measures. Examples of relevant experience are ecological impact assessments, Phase 1 and 2 habitat surveys, and habitat restoration experience should also be demonstrated to be complementary to the habitat type identified for the site.
3. Is covered by a professional code of conduct and subject to peer review. Peer review is defined as the process employed by a professional body to demonstrate that potential or full members maintain a standard of knowledge or experience required to ensure compliance with a code of conduct and professional ethics.

05 RECREATIONAL SPACE

Max credits

20

Indicators (Average)



Aim

To provide occupants with access to outdoor recreational space, promoting community cohesion, activity and wellbeing.

Benefit

- Encourages the facilitation of activities that can have a physical, mental and social benefits for occupants.
- Increases social cohesion and sense of place in the local community⁽³³⁾.
- Encourages cost savings and reduced environmental impact through the provision of growing space⁽³⁴⁾.
- Adds to the desirability of the home helping to increase its value⁽³⁵⁾.

Context

The provision of recreational space promotes society's interaction with the natural environment. This is important because it increases people's awareness of the benefits that recreational space can provide (i.e. promoting exercise, reducing stress levels etc.)⁽³⁶⁾. The provision of recreational space is a key consideration in the National Planning Policy Statement⁽³⁷⁾ as a result of the direct benefits to people identified above but also through indirect benefits such as alleviating flood risk. Furthermore the health benefits of recreational space are beginning to be recognised by organisations such as the NHS; improving the health of communities could in turn result in significant cost savings here⁽³⁸⁾.



Credit Summary

Criterion number	Title	Credits
crit 1	01 Accessible public recreational space	for 4 credits
crit 2	02 Private space	up to 6 credits
crit 3	03 Communal space	up to 2 credits
crit 4–crit 5	04 Management strategy	for 3 credits
crit 6–crit 8	05 Growing space	for 2 credits
crit 9–crit 10	06 Expert input	for 1 credit
crit 11–crit 13	07 Initial planting	for 2 credits
Total credits available		20

Criteria

01 Accessible public recreational space for 4 credits

crit 1 The home is within walking distance of public recreational space.

02 Private space up to 6 credits

crit 2 Private external space is provided that is clearly associated with the home. Credits are awarded for private external space based on the areas detailed in Table 4 below.

Table 4 Private external space requirements

Number of bedrooms per home	1 credit	3 credits	6 credits
Up to two	Balcony or roof terrace 5m ² (minimum depth of 1.5m)	50m ²	70m ²
Three to four	1 m ² per additional bedroom	10m ² per additional bedroom	20m ² per additional bedroom
Five and above		5m ² per additional bedroom	10m ² per additional bedroom



Requirements are cumulative (similar to the application of tax bands). For example a 6 bedroom home would be awarded 3 credits for providing 80m² of private external space (50m² + 10m² + 10m² + 5m² + 5m²).

03 Communal space up to 2 credits

crit 3 The home is within close proximity to communal space. Credits are awarded for communal space based on the areas detailed in Table 5 below.

Table 5 Communal external space requirements.

1 credit	2 credits
10m ² per bedroom	15m ² per bedroom

04 Management strategy for 3 credits

crit 4 crit 3 is achieved.

crit 5 Suitable management and maintenance arrangements are in place for communal space before practical completion of the project (this can form part of the Ecology Management Strategy).

05 Growing space for 2 credits

crit 6 The local authority and local growing initiatives or groups (where present) have been consulted to determine the demand for and suitable types of growing space in the local area.

crit 7 The outputs of the consultation feed into the provision of dedicated growing space.

crit 8 Where growing space is provided in a communal area, suitable management and maintenance arrangements are in place.

06 Expert input**for 1 credit**

crit 9 crit 6–crit 8 are achieved.

crit 10 Expert advice is sought at the design stage to inform the design of the growing space.

07 Initial planting**for 2 credits**

crit 11 crit 6–crit 8 are achieved.

crit 12 Growing space is planted with edible species ready for the handover phase, which:

crit 12.a: Are suitable to the location and season

crit 12.b: Will require low maintenance

crit 13 Home information is provided to occupants on the growing space (see 33 Home Information on page 176).

Methodology

None.

Compliance Notes

Criterion Reference	Compliance Note	
crit 1	CN1 Public recreational spaces	For the purpose of HQM public recreational spaces can include the following where they over 1 hectare in size and are within 1 km of the home: <ol style="list-style-type: none"> 1. Green park spaces 2. Woodland 3. Nature reserves, SSSI etc. OR The following where they are within 650m of the home: <ol style="list-style-type: none"> 1. Play park 2. Sports fields 3. Tennis courts⁽³⁹⁾
crit 3	CN2 Communal spaces	Where credits have been awarded for private space or growing space, the area of private or growing space provided cannot contribute towards the area of communal space – this must be provided in addition. For the purposes of this issue only external communal spaces are considered.
crit 5 and crit 8	CN3 Suitable management and maintenance arrangements	Suitable management and maintenance arrangements include any of the following: <ol style="list-style-type: none"> 1. The appointment of a management and maintenance company covering 3 years after occupation 2. Responsibilities for management and maintenance are agreed with the local authority 3. Responsibilities for management and maintenance are agreed with a community association.
crit 7	CN4 Dedicated growing space	The growing space provided should, where applicable: <ol style="list-style-type: none"> 1. Be a clearly designated growing space, e.g. use of planting or fencing around the perimeter or in the case of communal areas contain signage 2. Ideally be south facing and not in an area that is heavily shaded 3. Contain suitable soil conditions and depths 4. Sheltered from the wind on the perimeter, e.g. trees, hedges or other boundary protection 5. Designed to be accessible to all users, for example through the provision

Criterion Reference	Compliance Note	
		<p>of raised beds</p> <p>6. Be located near to a rain water collection system, such as a rainwater butt.</p> <p>Growing space can be provided in private plots or in a communal location on the development site. Where communal growing space is provided it should be:</p> <ol style="list-style-type: none"> 1. Located within 500m of the entrance from all homes on site⁽⁴⁰⁾. 2. A minimum of 50m² for every 10 homes⁽⁴¹⁾. 3. Have clear ownership arrangements, e.g. the communal space is clearly divided into sub plots allocated to homes on the development site.
crit 10	CN5 Expert input	<p>Expert input may be provided by a suitably qualified ecologist or a landscape architect, a representative from a local growing initiative or group or a local wildlife expert (see 04 Ecology on page 20). The expert advice should include:</p> <ol style="list-style-type: none"> 1. Additional design advice relating to compliant growing spaces. 2. Species suitable for initial planting, taking account of the local weather and soil conditions. 3. How growing space can complement the biodiversity within the area, for example providing additional habitat. <p>Where expert input has been provided by a suitably qualified ecologist or a local wildlife expert complete BF1678, Section B Comprehensive route Part 1 and Section B Foundation route respectively.</p>
crit 12	CN6 Low maintenance	<p>Low-maintenance plants can survive in the local conditions with minimal external input. For example where:</p> <ol style="list-style-type: none"> 1. Little or no watering is required outside of natural rainfall 2. They can withstand local wind speeds 3. Little or no pruning is required 4. Minimal physical exertion is needed to obtain the harvest. <p>Some examples of low maintenance crops that may be appropriate include apple trees, tomato plants and, strawberry plants etc.</p>
crit 3–crit 5 and crit 7–crit 13	CN7 Phased or development of multiple homes	See Appendix D – Post-construction stage assessment issue exceptions on page 207.

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
crit 1–crit 13	01 General Evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	
crit 6	02 Consultation outputs	Documentary evidence of the consultation process, including the content and the findings from this.	Written confirmation from the designer.
crit 10	03 BF1678 – Guidance for relating an ecology survey to the Home Quality Mark	Where expert input has been provided by a suitably qualified ecologist or a local wildlife expert, a completed version of BF1678 – Guidance for relating an ecology survey to the Home Quality Mark, Section B Comprehensive route Part 1 and Section B Foundation route respectively, must be submitted.	

Checklists, Tables & Illustrations

None.

Definitions

Close proximity

For the purposes of this issue, close proximity is defined as a location no more than 100m from the main entrance to the home (communal entrance of the building for an apartment block) via a safe pedestrian route.

Communal space

Space that is accessible to the occupants of several homes and clearly associated with the development. Each individual space contributing to the total area of communal space should be over 50m².

Growing space

For the purposes of HQM growing space can be considered as any one or more of the following:

- Allotments
- Community gardens or community orchards
- Roof top growing space
- Raised beds dedicated for growing food (this is a particularly useful approach where the soil conditions are poor as they can be artificially filled with good quality soil)
- Greenhouse or polytunnel
- Intensive green roofs and walls

Intensive green roofs

Intensive green roofs are designed to be accessible for food growing. Intensive green roofs will require deeper soil levels to support shrubs, perennials and even trees. Beds for growing can be incorporated into the roof at the time of design and construction or they can be added as containers after construction. Loading capacity for green roofs should be addressed at the design stage⁽⁴²⁾.

Private space

Space that is accessible only to the occupants of an individual home and is accessible directly from an entrance to the home.

Safe pedestrian routes

Pedestrian routes on the development site, within control of the developer are deemed to be safe and accessible for all pedestrian users (including people with disabilities, the elderly and children), where they take into account physical limitation of those who may use them, for example providing steps appropriately supported by sloped access and dropped curbs positioned at crossing points. These routes and associated spaces are appropriately sized, with good visibility of the route ahead. Alongside these principles they should also meet the following requirements:

1. Where required, lighting design must be in accordance with BS 5489-1:2013 Lighting of roads and public amenity areas⁽⁴³⁾ (rural areas are exempt from this requirement).
2. At crossing points there must be appropriate pedestrian crossings (e.g. zebra or pelican crossings) in place or a clear line of sight for at least 50m in each direction on roads with a 30mph speed limit or 100m in each direction on roads with a speed limit of greater than 30mph).
3. On roads with a speed limit of 30mph (or higher) there is a clearly defined footpath.
4. All footpaths provided should be at least 900mm wide. In rural areas, on single track roads, a grass verge is acceptable in place of a footpath.
5. In clearly defined home zones, it is acceptable for the pedestrian's routes to use the road.



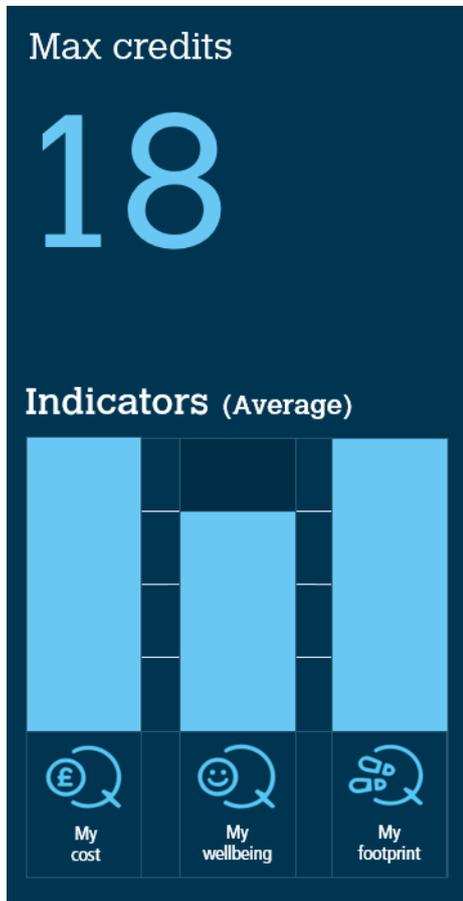
Pedestrian routes that are outside of the development site and therefore not within the control of the developer do not need to meet the above requirements, however it must be demonstrated that there is a pedestrian route that allows access to the recreational space.

SAFETY AND RESILIENCE

This section discusses the following.

06 Flood Risk	33
07 Managing the Impact of Rainfall	38
08 Security	45

06 FLOOD RISK



Aim

To promote housing development in low flood risk areas, or where located in areas of high or medium flood risk, encourage measures to minimise the impact of flooding.

Benefit

- Promotes better location of developments.
- Encourages measures to protect the home to reduce the cost impact if a flooding event does occur.
- Helps protect the environment against the transport of harmful substances found in the home during a flood event.

Context

In the winter months of 2013/2014 severe weather across the UK resulted in widespread flooding, during which thousands of households were impacted and claims are expected to be around £427.5 million⁽⁴⁴⁾. The Met Office has suggested that under future climate change projections, the UK may see an increase in flood risk from various sources.

The best way to prevent flooding is to locate housing developments in areas at a low risk of flooding. However, land availability coupled with the current demand to provide more housing can prevent this being possible. In these scenarios, installation of appropriate flood resistance and resilience measures is the key to reducing the environmental, social and economic impact of a flooding event. Designing-in these measures can help reduce the impact of a flooding event and the need for costly remedial or retrofit works.



Credit Summary

Criterion number	Title	Credits
crit 1–crit 4	01 Flood risk (follow 01A or 01B)	up to 18 credits
crit 1	01A Low risk	for 18 credits
crit 2–crit 4	01B Medium or high risk	for 16 credits
Total credits available		18

Criteria

01 Flood risk (follow 01A or 01B)		up to 18 credits
01A Low risk		for 18 credits
crit 1	Where a site-specific flood risk assessment (FRA) confirms the development site is situated in a flood zone by country that is defined as having a low annual probability of flooding from all sources of flooding (in accordance with current best practice national planning guidance). The flood risk assessment (FRA) must take all current and future sources of flooding into consideration.	
01B Medium or high risk		for 16 credits
crit 2	Where a site-specific flood risk assessment (FRA) confirms the development site is situated in a flood zones by country that is defined as having a medium or high annual probability of flooding and is not in a functional flood plain (in accordance with current best practice national planning guidance). The flood risk assessment (FRA) must take all current and future sources of flooding into consideration.	
crit 3	To increase the resilience and resistance of the development to flooding, one of the following must be achieved:	
	crit 3.a: The ground level of all habitable parts of the home and access to both the site and homes, are designed so that they are at least 600mm threshold above the design flood level of the flood zone by country in which the development site is located	
	crit 3.b: The final design of the building and the wider site reflects the recommendations made by an appropriately qualified professional in accordance with the hierarchy approach outlined in section 5 of BS 8533:2011 ⁽⁴⁵⁾ .	
crit 4	Home information relating to flood resilience measures in place (see 33 Home Information on page 176) must be provided.	

Methodology

None.

Compliance Notes

Criterion Reference	Compliance Note	
crit 1–crit 3	CN1 Alternative standards and recommendations from an appropriate statutory body	<p>None of the credits can be awarded where the assessed development has proceeded against the recommendation of the statutory body on the basis that the flooding implications are too great (this includes a recommendation given by the statutory body even where such a recommendation cannot be or is not statutorily enforced).</p> <p>Where the local authority (or other statutory body) has set more rigorous criteria than those above, these must be met in order to achieve the relevant credits.</p>
crit 1–crit 2	CN2 Existing flood resilience measure	<p>In an area protected by existing flood resilience measures (designed to withstand a certain magnitude of flooding) the appropriate number of flood risk credits can be awarded where the resilience measures reduce the risk to 'low' or 'medium' and the following condition is met:</p> <p>The relevant agency confirms that, as a result of such resilience measures, the risk of a flood event occurring from a particular source is reduced to low or medium risk. If firm confirmation is not provided then the credits cannot be awarded.</p> <p>Please note that flood risk from all sources must be 'low' or 'medium' for credits</p>

Criterion Reference	Compliance Note	
		<p>to be awarded.</p> <p>A statutory body's local or regional office may be able to provide more information on existing resilience measures in the area in which the assessed development is located.</p>
crit 1–crit 2	CN3 Third party defences	<p>There are many landscape feature defences, owned by third parties, which due to their location act as a flood defence by default, e.g. motorway, railway embankments, walls etc. It can be assumed that such embankments will remain in place for the lifetime of the development, unless the assessor or project team have reason to believe otherwise.</p> <p>For walls, assurance must be sought that the wall is likely to remain for the design life (60 years) of the homes.</p>
crit 1–crit 2	CN4 Level of detail required in the FRA for smaller sites	<p>For developments of less than 1 ha (10,000m²), the level of detail required in an acceptable FRA will depend on the size and density of build. This will range from a brief report for small, low-density developments, to a more detailed assessment for a high-density development of 2000–10,000m².</p> <p>For example, for very small developments (2000m² and less), an acceptable FRA could be a brief report carried out by the contractor's engineer confirming the risk of flooding from sources of flooding, including information obtained from the Environment Agency, water company or sewerage undertaker, other relevant statutory authorities, site investigation and local knowledge.</p>
crit 1–crit 2	CN5 Credits have been achieved in SE03 Flood Risk Assessment in BREEAM Communities	<p>Where two credits have been achieved for SE03 Flood Risk Assessment in a certified BREEAM Communities assessment, then 18 credits can be awarded by default for sites located in low risk flood zones.</p> <p>Where one credit has been achieved for SE03 Flood Risk Assessment in a certified BREEAM Communities assessment and crit 4 has been met, then 16 credits can be awarded by default for sites located in high or medium risk flood zones.</p>
crit 2–crit 3	CN6 Functional flood plain	<p>Credits for locating the assessed development in a flood zone of 'medium or high annual probability' cannot be awarded where the homes are located in the functional flood plain.</p> <p>A functional flood plain is defined in the current best practice national planning guidance for each country. If the building being assessed is, or has been, defined as a 'water-compatible development', confirmation should be provided from the local planning authority that they are satisfied with the proposals before credits can be awarded.</p>
crit 3	CN7 600mm threshold	<p>It is accepted that for homes located in medium and high risk flood zones, areas of the car park and site access may be allowed to flood and therefore fall below the 600mm threshold. In such cases credits are still achievable provided one safe access route to the site and the ground floor of the habitable parts of the home can be maintained (i.e. they are 600mm above the design flood level) to ensure the homes and the site do not become an 'island' in the event of a flood.</p> <p>Where the development has been permitted and the ground levels of the topography and infrastructure immediately adjacent to the development site fall below the 600mm threshold, credits can still be awarded, provided there are no other practical solutions for access to the site above this level, and the assessed homes (and access to them) on the development site meet the assessment criteria. As much of the external site area as possible (or as required by an appropriate statutory body) should be designed at or above the threshold.</p>
crit 3	CN8 Phased or multiple home development	See Appendix D – Post-construction stage assessment issue exceptions on page 207.

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
crit 1–crit 4	01 General Evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	

Checklists, Tables & Illustrations

Table 6 Flood zone by country

Definition	England	Wales	Scotland
Low annual probability of flooding	Zone 1—less than 1 in 1000 chance of river and sea flooding (<0.1%).	Zone A—considered to be at little or no risk. Zone B—if site levels are greater than the flood levels used to define adjacent extreme flood outline.	Little or no risk area. As defined for England.
Medium annual probability of flooding	Zone 2—between 1 in 100 and 1 in 1000 chance of river flooding (1% – 0.1%) and between a 1 in 200 and 1 in 1000 chance of sea flooding (0.5% – 0.1%).	Zone B—if site levels are not greater than the flood levels used to define adjacent extreme flood outline. Zone C—equal to or greater* than 0.1% (river, tidal or coastal flooding). * For the purposes of HQM assume upper probability of flooding no greater than that specified for England Zone 2.	Low to medium risk area Watercourse, tidal or coastal flooding in the range 0.1% – 0.5% (1:1000– 1:200).
High annual probability of flooding	Zone 3a—high probability 1 in 100 or greater chance of river flooding (> 1%) and a 1 in 200 or greater chance of flooding from the sea (> 0.5%). Zone 3b The Functional Floodplain Land where water has to flow or be stored in times of flood.	Zone C1—* *for the purposes of HQM assume the same lower and upper probability of flooding as that specified for England Zone 3a. Zone C2— * *for the purposes of HQM assume the same as that for England Zone 3b.	Medium to high risk areas Annual probability of watercourse, tidal or coastal flooding: greater than 0.5% (1:200).

Please note: Northern Ireland PPS15 does not categorise flood risk zones and there are no similar publicly available flood maps covering Northern Ireland (NI). Assessments in NI will therefore need to rely on-site-specific flood risk assessment (FRA), or other relevant data or surveys, to determine the extent of flood risk for a specific development, and use the same definitions as those outlined for England. The Northern Ireland Department of Environment or Rivers Agency may offer further advice or recommendations in this respect www.doeni.gov.uk and www.riversagency.ni.gov.uk

Definitions

Appropriately qualified professional

For the purposes of this issue, a professional or team of professionals with qualifications and experience to recommend relevant site-specific flood prevention measures. Suitable professionals may be found in a variety of disciplines, such as engineering, landscape design or hydrology or a combination.

Where complex flooding calculations and prevention measures are required, this must be a specialist hydrological engineer.

Current best practice national planning guidance

These are current at the time of publication:

- Planning Practice Guidance - Flood Risk and Coastal Changes – England;
- Planning Policy Statement 15 – Northern Ireland;
- Scottish Planning Policy 7 – Scotland; and
- Technical Advice Note 15 – Wales.

Design flood event

A design flood event is a historic or notional flood event of a given annual probability, against which the suitability of a proposed development is assessed and mitigation measures, if any, are designed.

Design flood level

The maximum estimated water level during the design storm event including an allowance for climate change in line current best practice national planning guidance. The design flood level for a site can be determined through either known historical data or modelled for the specific site.

Flood risk assessment (FRA)

This is a study to assess the risk of a site flooding, and to assess the impact that any changes or development on the site will have on flood risk to the site and elsewhere.

A FRA should be prepared according to relevant planning policy and technical guidance documents. The FRA must account for future climate change and detail any necessary adaptation measures where or if required.

Where more than five years have passed since the FRA was carried out, evidence would be required to demonstrate that the basis of the FRA has not changed in that time.

Flood zones by country

See Table 6 on the previous page.

Habitable parts of the home

All spaces (e.g. living and dining rooms, kitchens, bathrooms, bedrooms etc.) that are integral for the home occupants to continue living in the home in the event of a flood occurring.

Sources of flooding

The FRA must detail the risk of flooding from the following sources:

1. Streams and Rivers: Flooding that can take place from flows that are not contained within the channel due to high levels of rainfall in the catchment.
2. Coastal or Estuarine: Flooding that can occur from the sea due to a particularly high tide or surge, or a combination of both.
3. Groundwater: Where the water table rises to such a height where flooding occurs. This is most common in low-lying areas underlain by permeable rock (aquifers), usually due to extended periods of wet weather.
4. Sewers and highway drains: Combined, foul or surface water sewers and highway drains that are temporarily overloaded due to excessive rainfall or blockage.
5. Surface water: The net rainfall falling on a surface (on or off the site) which acts as run-off which has not infiltrated into the ground or entered into a drainage system.
6. Infrastructure failure: Canals, reservoirs, industrial processes, burst water mains, blocked sewers or failed pumping stations.

07 MANAGING THE IMPACT OF RAINFALL

Max credits

16

Indicators (Average)



Aim

To encourage the management of rainfall from new developments in order to help reduce the risk of flooding, as well as the impact on the local environment and that downstream of the site, by minimising the rate and volume of run-off and improving run-off water quality.

Benefit

- Helps acceptance of new development in the community and improves cohesion.
- Encourages methods to clean run-off, thus protecting the environment against transfer of pollutants found on hard surfaces (e.g. oil).

Context

This issue builds upon the requirements within 'Sustainable Drainage systems: non-statutory technical standards', for the design, maintenance and operation of sustainable drainage systems⁽⁴⁶⁾.

Flooding in the United Kingdom is an increasing occurrence due to a range of factors including; development encroaching on areas prone to flooding, decreasing permeability of the landscape through increased hard surface areas, and increased rainfall. Flooding is likely to become more severe as a result of climate change. Development can impact flood risk through increased run-off especially from hard surfaces. The Met Office has predicted a very significant increase in the incidence of flooding over the next century as a result of climate change⁽⁴⁷⁾.

The rate of run-off has a major impact on the local environment through variations in water levels, flow rates and water quality. More widely, the overall volume of water run-off is a key factor in controlling flooding risks downstream.



Credit Summary

There are two routes to assessing this issue; foundation and comprehensive routes. These routes represent varying degrees of rigour. The route selected will depend on the number of credits sought. More credits are available through the more rigorous comprehensive route, recognising that an appropriate consultant has been employed to reduce rates or volume of run-off.

Criterion number	Title	Credits
crit 1	01 Home information	prerequisite
crit 2–crit 9	02 Routes of rigour (follow 02A or 02B) - Managing the rate and volume of run-off	up to 12 credits
crit 2	02A Foundation route	up to 3 credits
crit 3–crit 9	02B Comprehensive route	up to 12 credits
crit 10–crit 14	03 Water quality	for 2 credits
crit 15	04 Designing for maintenance and operation	for 2 credits
Total credits available		16

Criteria

01 Home information

prerequisite

crit 1 Rainfall management home information (see 33 Home Information on page 176) must be provided.

02 Routes of rigour (follow 02A or 02B) - Managing the rate and volume of run-off

up to 12 credits

02A Foundation route

up to 3 credits

crit 2 The reduction in impermeable area of the development site is calculated in accordance with the Methodology section and achieves the following:

Table 7 Reduction in impermeable area and associated number of credits

Reduction in impermeable area	Credits
≥ 25%	1
> 50%	3

02B Comprehensive route

up to 12 credits

crit 3 An appropriately qualified professional is appointed to carry out, demonstrate or confirm the development site's compliance with crit 4–crit 9 on the facing page.

Peak-rate of run-off

up to 5 credits

crit 4 Drainage measures are specified to ensure that the peak rate of run-off from the site to the watercourses (natural or municipal) is no greater for the developed site than it was for either:

crit 4.a: The pre-development site for 3 credits;

– OR

crit 4.b: An equivalent run-off for a greenfield run-off rate site for 5 credits.

crit 5 This should comply at the 1-year and 100-year return period events.

crit 6 Calculations include an allowance for climate change; this should be made in accordance with current best practice national planning guidance.

Volume of run-off

up to 7 credits

crit 7 Drainage design measures are specified to ensure that the post development volume of run-off, for the 100-year 6-hour event is no greater than it was for either the:

crit 7.a: The re-development site for 4 credits

– OR

crit 7.b: Greenfield volume of run-off site for 7 credits

crit 8 Calculations include an allowance for climate change; this should be made in accordance with current best practice national planning guidance.

crit 9 Any additional predicted volume of run-off for this event is prevented from leaving the site by using infiltration or other sustainable Urban Drainage Systems (SuDS) techniques.

03 Water quality

for 2 credits

crit 10 The water quality credits are only available where at least 3 credits are sought in the comprehensive route.

crit 11 An appropriately qualified professional is appointed to carry out, demonstrate or confirm the development site's compliance with crit 12–crit 14 below.

crit 12 In areas with a low risk source of watercourse pollution, an appropriate level of pollution prevention treatment (See CN9 on page 42) is provided using appropriate sustainable Urban Drainage Systems (SuDS) techniques.

crit 13 Where there is a high risk of contamination or spillage of substances such as petrol and oil (see CN10 on page 42) for a list of areas), separators (or an equivalent system) are installed in surface water drainage systems.

crit 14 All water pollution prevention systems have been designed and installed in accordance with the recommendations of documents such as Pollution Prevention Guideline 3 (PPG 3)⁽⁴⁸⁾ or where applicable the SuDS manual⁽⁴⁹⁾.

04 Designing for maintenance and operation

for 2 credits

crit 15 Agreements put in place for the ownership, long term operation and maintenance of all SuDS for the design life of the development.

Methodology

Calculations

Calculating peak rate of run-off

Peak rate of run-off calculations should be carried out for the range of storm durations up to and including the 6 hour storm. The peak rate of run-off for the storm event will then be the 'worst case' run-off rate for the range of storm durations.

Key publications that should be referred to for guidance on calculating the peak rate of run-off include:

1. The SuDS Manual
2. Preliminary rainfall run-off management for developments
3. National planning policy guidance or statement for the specific country
4. IH Report 124, Flood estimation for small catchments (Marshall and Bayliss, 1994)
5. Flood Estimation Handbook (Centre for Ecology and Hydrology, 1999)

Greenfield sites of less than 50 ha

The calculation of greenfield run-off rates must be in accordance with IH Report 124, Flood estimation for small catchments (Marshall and Bayliss, 1994). The pro-rata method on the size of catchment detailed in Table 4.2 in The SuDS Manual, CIRIA C697 (2007) must be followed.

Greenfield sites of 50 ha to 200 ha

The calculation of greenfield run-off rates must be in accordance with IH Report 124, Flood estimation for small catchments (Marshall and Bayliss, 1994). Flood Estimation Handbook (Centre for Ecology and Hydrology, 1999) can be used for these sites as an alternative, where there is a preference to do so, but only if the catchment is considered to be suitable for its application.

Greenfield sites of more than 200 ha

The calculation of greenfield run-off rates must be in accordance with the Flood Estimation Handbook (Centre for Ecology and Hydrology, 1999) and any subsequent updates. Where the Flood Estimation Handbook is not considered appropriate for the development, IH Report

124 can be used.

Brownfield sites

The calculation of brownfield run-off rates should be as follows:

- If the existing drainage is known then it should be modelled using best practice simulation modelling, to determine the 1-year and 100-year peak flow rates at discharge points (without allowing surcharge of the system above cover levels to drive greater flow rates through the discharge points)
- If the system is not known, then the brownfield run-off should be calculated using the greenfield run-off models described above but with Soil Type 5.

Calculating volume of run-off

Refer to Chapter 4, Section 4.5.5 of The SuDS Manual (CIRIA C697, 2007) for guidance on calculating the additional volume of run-off created by the development for the 1 in 100 year, 6 hour storm event.

Calculating the reduction in impermeable area

1. Calculate the surface area within the development site pre-development and post-development which does not allow water to pass into the ground.
2. Calculate the reduction in impermeable area:

$$\frac{\text{pre-development impermeable area} - \text{post-development impermeable area}}{\text{pre-development impermeable area}} \times 100$$

Compliance Notes

Criterion Reference	Compliance Note	
crit 2–crit 9	CN1 Discharges directly to a tidal estuary or the sea	crit 2–crit 9 on the previous page can be deemed to be met and 12 credits achieved by default if the site discharges rainwater directly to a tidal estuary or the sea. The site must discharge run-off directly into the Tidal estuary or the sea, if these criteria are to be awarded by default. Typically, this would mean that drainage pipes would only carry run-off from the site and that they would not need to cross privately owned land outside the boundary of the development before reaching the sea. Please see Tidal estuary on page 44.
crit 2–crit 9	CN2 Discharges directly to a surface water body	Where the drainage system discharges directly to a surface water body (e.g. reservoir) that can accommodate uncontrolled surface water discharges without any impact on flood risk from that surface water body, crit 2–crit 9 on the previous page can be deemed to be met and 12 credits are achieved by default. Typically, this would mean that drainage pipes would only carry run-off from the site and that they would not need to cross privately owned land outside the boundary of the development before reaching the surface water body. Where this compliance note is used to demonstrate compliance, please contact BRE Global Ltd with the details of your chosen solution to demonstrate compliance before proceeding.
crit 4–crit 6	CN3 Peak rate of run-off	Where the pre-development or greenfield peak rate of run-off for the site would result in a requirement for the post-development flow rate to be less than 5L/s at a discharge point, a flow rate of up to 5L/s may be used where required to reduce the risk of blockage.
crit 4–crit 9	CN4 Derelict Sites	If the site has been derelict for over five years, the Appropriate Consultant must assess the previous drainage network and make reasonable assumptions to establish probable flow rates and volumes. To do this they should use best practice simulation modelling, to determine the 1-year and 100-year peak flow rates at the relevant discharge points. To complete the calculations, a site visit prior to development will be required unless accurate data already exist from a previous survey. The resultant professional report can then be used to determine

Criterion Reference	Compliance Note	
		the pre-development volumes and rates of run-off. Without this professional input, the site must be deemed greenfield pre-development, assuming Soil Type 5 for the calculation of the pre-development site run-off.
crit 4–crit 14	CN5 Sustainable Urban Drainage Systems (SuDS)	Where SuDS are specified, they should be designed in accordance with the CIRIA SuDS manual.
crit 4–crit 14	CN6 Alternative standards set by a statutory body	<p>Where a statutory body (or local authority) has set more or less onerous requirements or equivalent alternative requirements, these requirements must be met in order to achieve the relevant credits.</p> <p>Below are examples of standards set by statutory bodies:</p> <ol style="list-style-type: none"> 1. Minimum flow rate or maximum storage requirement set by the statutory body: Where the statutory authority has exercised their statutory powers and set specific minimum flow rate and maximum storage requirements that are less onerous than the specific rate of run-off standard, the statutory requirements will take precedent over the rate of run-off requirements within this issue. 2. Maximum flow rate set by the statutory body: If a maximum flow rate is set that can be discharged, the peak rate of run-off requirement within the rate of run-off requirement will still apply unless the maximum flow rate set is more onerous (lower rate) than the HQM. <p>In both the above examples, all other criteria will still be applicable. Evidence should be provided to confirm that this is the case and should be formal documentation from the statutory authority. This should include evidence such as planning approvals, conditions or correspondence from a statutory body setting out specific requirements, i.e. sewerage undertaker, Environment Agency etc.</p> <p>For guidance where alternative standards set by a statutory body are not covered here, please contact HQM technical support. These scenarios will be reviewed on a case-by-case basis.</p>
crit 4–crit 14	CN7 Phased or multiple home development	See Appendix D – Post-construction stage assessment issue exceptions on page 207.
crit 7–crit 9	CN8 Rainwater harvesting	BS 8515 Rainwater harvesting systems: Code of Practice, Annex A ⁽⁵⁰⁾ should be followed where rainwater harvesting systems are used for stormwater control. To ensure flood risk is not increased if the rainwater harvesting system is, for some reason, not utilised, the exceedance flow route capacity provided in accordance with CIRIA report C635 should ignore the beneficial effect of the rainwater harvesting system.
crit 12	CN9 Appropriate level of pollution prevention treatment	In all cases an appropriately qualified professional should use their professional judgment to determine the most appropriate strategy for minimising watercourse pollution.
crit 12–crit 13	CN10 Areas that are a source of pollution	For the purpose of assessing the watercourse pollution credit, areas that present a risk of watercourse pollution include vehicle manoeuvring areas, car parks, waste disposal facilities, delivery and storage facilities or plant areas.
crit 2–crit 9	CN11 Impermeable area	This includes all areas on the development site that do not allow water to pass into the ground. Impermeable footpaths less than 1.5 m wide which have free drainage to soft landscaped areas on both sides may be excluded.

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
crit 1–crit 15	01 General Evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	
crit 2	02 Impermeable area calculations	Pre-development and post-development impermeable area calculations and	

Criterion Reference	Title	Design Stage	Post Construction Stage
		change in impermeable area calculation	
crit 4–crit 6	03 Rate of run-off calculations	Calculation results for the pre-development, greenfield and post-development peak rate of run-off.	
crit 7–crit 9	04 Volume of run-off calculations	Calculation results for the pre-development, greenfield and post-development volume of run-off.	
crit 15	05 Maintenance agreement	No 'specific' evidence applies at Design Stage	Agreements for the ownership, long term operation and maintenance of all specified SuDS.

Checklists, Tables & Illustrations

None.

Definitions

Appropriately qualified professional

For the purposes of this issue, a professional or team of professionals with the skills and experience to champion the use of SuDS within the overall design of the development at an early stage.

The professional or team of professionals must be capable of understanding the site's particular surface water management needs and opportunities. In addition, they must have knowledge and experience in using SuDS-based solutions to influence the holistic design of a development's drainage system and provide the robust hydraulic design calculations referred to in key guidance documents such as The SuDS manual (CIRIA C697, 2007) and Preliminary rainfall run-off management for developments (EA/Defra, 2007).

Suitable professionals may be found in a variety of disciplines, such as engineering, landscape design or hydrology or a combination. Geotechnical advisers or specialists may be required for SuDS techniques that allow infiltration.

Current best practice national planning guidance

These are current at the time of publication:

- Planning Practice Guidance - Flood Risk and Coastal Changes– England
- Planning Policy Statement 15 – Northern Ireland
- Scottish Planning Policy 7 - Scotland
- Technical Advice Note - Wales.

Discharge point

The discharge point is the point at which the run-off from the site leaves the site boundary and enters a watercourse.

Development Site

There are a number of options for assessment:

1. The individual home and its associated hardstanding areas can be assessed independently where the run-off is being dealt with on a home-by-home basis (i.e. each home has its own dedicated sub-catchment that serves only that home).
2. Where assessing groups of homes within a larger development, the drainage assessment must incorporate the local sub-catchment serving all of those homes and there must be a single drainage strategy for all the homes within the group.
3. Where assessing the run-off from a larger site consisting of a number of non-residential buildings or homes, the assessment must take into account the drainage from the local sub-catchment serving all those non-residential buildings or homes. Note that proportioning cannot be used to calculate the percentage of run-off discharging into the local sub-catchment resulting from just the assessed homes.
4. Where highways form part of development site, refer to Highways that form part of development site on the facing page.

Greenfield run-off rate

The rate of run-off that would occur from the site in its undeveloped and therefore undisturbed state.

Greenfield volume of run-off

The volume of run-off that would occur from the site in its undeveloped and therefore undisturbed state.

Highways that form part of development site

The following guidance should also be used where applicable:

1. Where new non-adoptable highways are built, all of the area of the highway must be included in the development site area.
2. Where homes are built beside existing highways or where adoptable highways are built, the area of the highway does not need to be included in the development site area.
3. Where the drainage serving both the adoptable or non-adoptable highway (be it existing or new) and housing combines before leaving the site boundary, it is not regarded as an 'adoptable' highway for the purposes of this scheme. In this instance the development site area must include the highway.

The same development site area must be consistently used throughout the issue when completing the assessment of this issue.

Pre-development

The state of the site under assessment immediately prior to purchase of the site by the client or developer (or, where the client has owned or occupied the site for a number of years, its current state).

Treatment

Improving the quality of water by physical, chemical or biological means.

Tidal estuary

A tidal estuary is defined as a semi-enclosed coastal body of water which has a free connection with the open sea and within which seawater is measurably diluted with fresh water derived from land drainage. An estuary should be unconstrained tidal waters, i.e. there should be no barriers or constricted shorelines that would restrict the free flow of water into the open sea in any conditions. The impact on the total volume of run-off from the site (and other sites which may in future discharge into the estuary) should be insignificant in terms of the overall water levels in the estuary. Tidal rivers (i.e. where no or limited measurable seawater content is present during normal tidal movements) cannot be included as part of the estuary for the purposes of HQM.

Surface water run-off

Water flow over the ground surface to a drainage system. This occurs if the ground is impermeable, is saturated or if the rainfall is particularly intense.

Volume of run-off

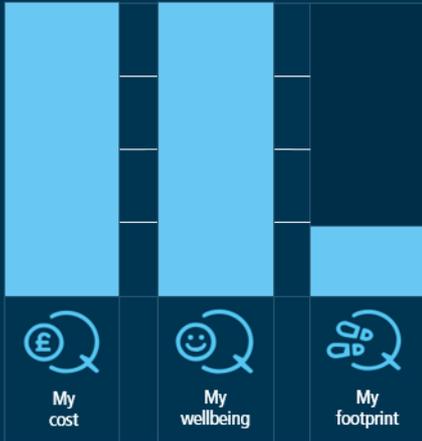
The volume of run-off that is generated by rainfall occurring on the site. This is typically measured in cubic metres. Additional predicted volume of run-off is the difference between the volumes of run-off; pre-development, greenfield and post development.

O8 SECURITY

Max credits

10

Indicators (Average)



Aim

To promote the design of developments where people feel safe and secure, and where crime and the fear of crime does not undermine quality of life or community cohesion.

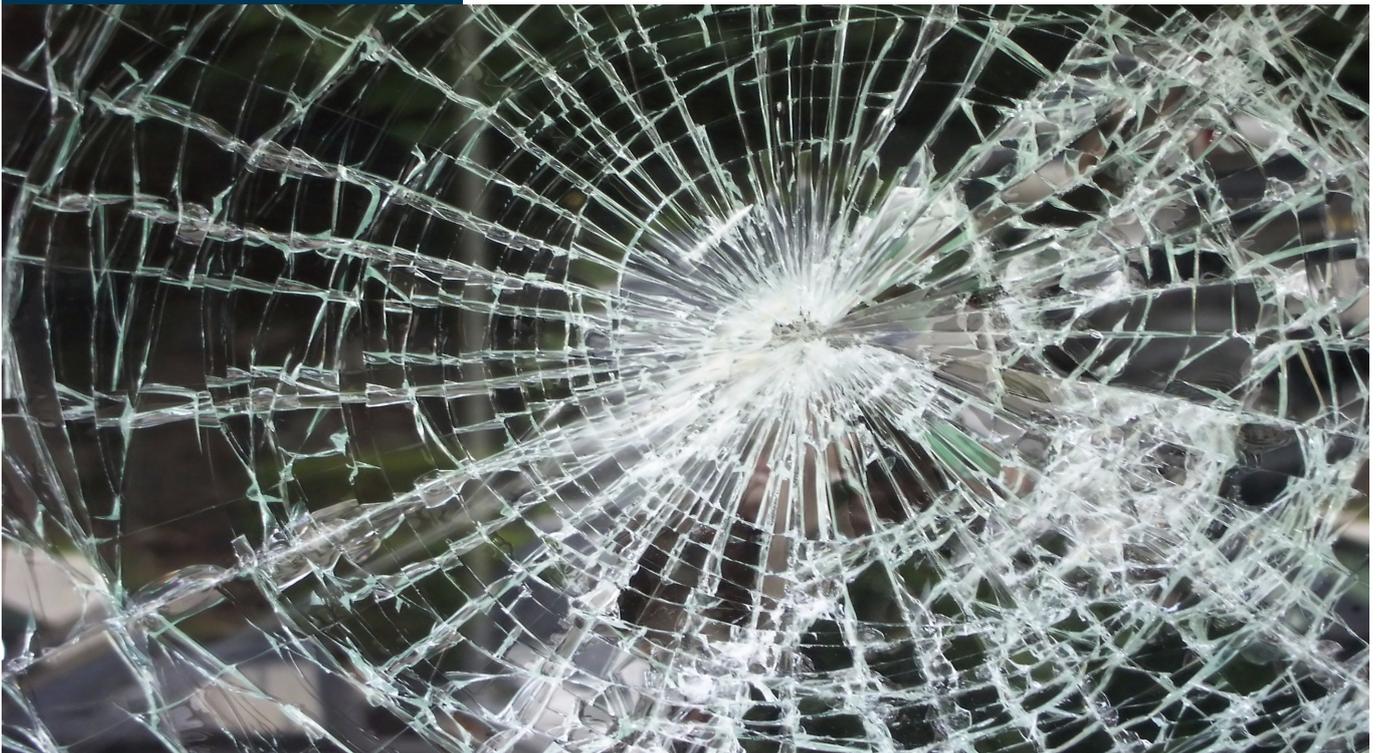
Benefit

- Reduce the costs associated with crime for the occupiers.
- Improve the health and wellbeing of the occupiers by limiting stress from the fear of crime.
- Help limit costs for the police.

Context

Feelings of safety and security are essential to successful, sustainable communities. Freedom from crime and the fear of crime has a major impact on the quality of life.

This issue builds upon the requirements of Approved Document Q-Security-Dwellings⁽⁵¹⁾. The approved document sets out reasonable standards for doors and windows to resist physical attack by a casual or opportunist burglar by being both sufficiently robust and fitted with the appropriate hardware. This issue takes into account a wider scope.



Credit Summary

Criterion number	Title	Credits
crit 1	01 Prerequisite	prerequisite
crit 2–crit 4	02 Security features	for 10 credits
Total credits available		10

Criteria

01 Prerequisite		prerequisite
crit 1	A Suitably Qualified Security Specialist (SQSS) conducts an evidence-based Security Needs Assessment (SNA) during or prior to Concept Design (RIBA Stage 2 or equivalent).	
02 Security features		for 10 credits
crit 2	The (SQSS) develops a set of recommendations or solutions during or prior to Concept Design (RIBA Stage 2 or equivalent). These recommendations or solutions aim to ensure that the homes, and external areas within the sites boundary are designed and specified to address the issues identified in the preceding (SNA).	
crit 3	The recommendations or solutions proposed by the (SQSS) are implemented (see CN2 below).	
crit 4	Home information relating to the implemented security measures (see 33 Home Information on page 176) must be provided.	

Methodology

None.

Compliance Notes

Criterion Reference	Compliance Note	
crit 2	CN1 Late consultation with SQSS.	Where a SQSS was consulted at a later stage than RIBA stage 2, these credits may still be achievable. If the SQSS confirms that the implementation of security measures have not been restricted, impaired or are possible as a result of their later involvement (i.e. everything that would have been recommended can still be implemented), then the credits can still be awarded (provided all other compliance requirements are met).
crit 3	CN2 Implementing recommendations or solutions	When confirming whether the recommendations or solutions set out by the SQSS have been implemented at the post construction stage, it may be necessary for the HQM Assessor to use one or more of the following evidence types, supplied by the design team: Desk-based evidence, e.g. manufacturer's literature or certificates etc. Site-based evidence, e.g. site inspection report or photographs etc.
crit 3	CN3 Phased or multiple-home development	See Appendix D – Post-construction stage assessment issue exceptions on page 207.

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
crit 1–crit 4	01 General Evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	

Checklists, Tables & Illustrations

None.

Definitions

Architectural Liaison Officer (ALO)

An ALO is the same as the Crime Prevention Design Advisor (see below) and is the title given to the same role in some police forces, www.securedbydesign.com.

Crime Prevention Design Advisor (CPDA)

A Crime Prevention Design Advisor is a specialist crime prevention officer, trained at the Home Office Crime Reduction College, who deals with crime risk and designing out crime advice for the built environment. In addition to physical security measures, the officer will consider defensible space, access, crime and movement generators, all of which can contribute to a reduction in crime and disorder, www.securedbydesign.com.

Secured by Design (SBD)

A police initiative that seeks to encourage the construction industry to adopt crime prevention measures in the design of developments, to assist in reducing the opportunity for, and fear of, crime. Secured by Design is owned by the Association of Chief Police Officers (ACPO) and has the support of the Home Office Crime Reduction and Community Safety Group and other Government Departments. The Association of Chief Police Officers for England, Wales and Northern Ireland (ACPO) and the Association of Chief Police Officers for Scotland (ACPOS) endorse and support the Secured by Design programme.

Security Needs Assessment (SNA)

The project and site-specific assessment of security needs, including:

1. A visual audit of the site and surroundings, identifying environmental cues and features pertinent to the security of the proposed development.
2. Formal consultation with relevant stakeholders, including the suitably qualified security specialist (as applicable), in order to obtain a summary of crime and disorder issues in the immediate vicinity of the proposed development. Crime data are also publicly accessible at www.police.uk.
3. Identify security risks specific to the proposed development and its inhabitants or users.
4. Identify any detrimental effects the development may have on its surroundings and the existing community.

The purpose of the assessment is to aid decision-making and allow the identification and evaluation of security recommendations or solutions. Secured by Design may help the SQSS when developing the recommendations or solutions addressing the issues raised in the SNA. Any deviation from those recommendations shall be justified, documented and agreed with a suitably qualified security specialist.

Suitably Qualified Security Specialist (SQSS)

An individual achieving any of the following can be considered to be 'suitably qualified' for the purposes of compliance with HQM:

1. Crime Prevention Design Advisors (CPDA) or Architectural Liaison Officers (ALO), or
2. A specialist registered with a HQM-recognised third party accreditation scheme for security specialists.
3. A practising security consultant who meets the following requirements:
 - a. Minimum of three years relevant experience within the last five years. This experience must clearly demonstrate a practical understanding of factors affecting security in relation to construction and the built environment, relevant to the type and scale of the project being undertaken.
 - b. Hold a suitable qualification relevant to security.
 - c. Maintains (full) membership to a relevant professional body or accreditation scheme that meets the following:
 - i. Has a professional code of conduct, to which members must adhere; and
 - ii. ongoing membership is subject to peer review.

When appointing the suitably qualified security specialist, consideration should be given to the appropriateness of the individual to carry out the security needs assessment, based on the size, scope and security needs of the development.

Organisations, associations or scheme operators who wish to have their membership recognised as a 'third party accreditation scheme for security specialist's, should review their current status (and therefore their members) against the requirements above and, where they feel they are compliant, contact BRE Global with the relevant information or evidence.

MY HOME

This section discusses the following.

Comfort	49
09 Indoor Pollutants	50
10 Daylight	56
11 Internal and External Noise	61
12 Sound Insulation	67
13 Temperature	72
14 Ventilation	77
Energy and Cost	81
15 Energy and cost	82
16 Decentralised Energy	91
17 Impact on Local Air Quality	96
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18 Responsible sourcing of construction products	103
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COMFORT

This section discusses the following.

09 Indoor Pollutants	50
10 Daylight	56
11 Internal and External Noise	61
12 Sound Insulation	67
13 Temperature	72
14 Ventilation	77

09 INDOOR POLLUTANTS

Max credits

10

Indicators (Average)



My
cost



My
wellbeing



My
footprint

Aim

To maximise occupant comfort and minimise detrimental impacts on health arising from indoor air pollutants emitted from the building.

Benefit

- Reduce the risk of pollutants emitted from a new home on an occupants' health.
- To raise awareness of indoor pollutants to occupants, so they can make better choice with furnishings and cleaning products.

Context

Building materials, coatings and furnishings are significant sources of indoor air pollution, in particular, formaldehyde and volatile organic compounds (VOCs). A wide range of VOCs can be emitted from building materials, especially during the first two years of a new building (52). The amount of pollution emitted into indoor air can be reduced by selecting building materials, coatings and furnishings with low pollutant content and low emission performance.

Household products (e.g. air fresheners, cleaning fluids, polishes) and cosmetics (e.g. deodorants, powders, and bathing products) are also potential significant sources of indoor air pollution, but lie outside the scope of the HQM.



Credit Summary

Criterion number	Title	Credits
crit 1	01 Minimising emissions from building product types	up to 4 credits
crit 2	02 Minimising airborne formaldehyde from all sources	for 3 credits
crit 3	03 Minimising airborne TVOCs (total volatile organic compounds) from all sources	for 3 credits
Total credits available		10

Criteria

01 Minimising emissions from building product types

up to 4 credits

crit 1 Credits are awarded where building product types meets the emission limits, testing requirements and additional requirements listed within Table 9 on page 53. The quantity of credits awarded is based upon how many building product types within Table 9 meet these requirements. (see Table 8).

Table 8 Quantity of building product types that need to meet the requirements in order to receive credits

Quantity of building products types	Credits
1	1
3	2
All	4

02 Minimising airborne formaldehyde from all sources

for 3 credits

crit 2 The formaldehyde concentration in indoor air is measured post construction (but pre-occupancy) and does not exceed 0.1 mg/m³ (100 µg/m³), averaged over 30 minutes⁽⁵³⁾.

03 Minimising airborne TVOCs (total volatile organic compounds) from all sources

for 3 credits

crit 3 The TVOC concentration in indoor air is measured post construction (but pre-occupancy) and does not exceed 0.3 mg/m³ (300 µg/m³), averaged over 8 hours.⁽⁵⁴⁾, with no individual compound exceeding 0.03 mg/m³ (30 µg/m³).

Methodology

Minimising emissions from building product types – calculation method

See Table 9 on page 53.

Minimising airborne formaldehyde, and airborne TVOCs, from all sources – calculation method

Measurements should be made after completing the building and before its occupation. Before sampling, rooms should be intensively ventilated for 15 minutes and then outer doors and windows closed for at least 8 hours (or overnight) before sampling begins. The outer envelope of the building should remain closed (all windows, doors, trickle vents and other controllable openings) throughout the sampling process. All internal doors and openings within the building should be opened⁽⁵⁵⁾.

The indoor temperature must be uniform and at the level expected for occupation for the duration of the test. If necessary, the home should be heated before and during the test to ensure correct operation of the sampling tubes⁽⁵⁶⁾. Any heating action taken, and the temperature achieved in each location, should be noted in the test report. Active (pumped) sampling tubes for measuring formaldehyde and TVOCs should be placed in the main bedroom and in the main living area, at about head height (1.50m), at least 1m from a wall, and away from known sources of formaldehyde such as particle board or Medium Density Fibre board (MDF).⁽⁵⁷⁾ Three sampling tubes should be placed in each room for each of the formaldehyde and TVOC measurements (i.e. six per room if both parameters are being measured).

The formaldehyde sampling strategy should be in accordance with BS EN ISO 16000-2⁽⁵⁸⁾, and BS ISO 16000-3⁽⁵⁹⁾. The TVOC sampling strategy should be in accordance with BS EN ISO 16000-5:2007⁽⁶⁰⁾ and BS EN ISO 16017-1⁽⁶¹⁾ or BS ISO 16000-6⁽⁶²⁾.

The sampling tubes should be exposed for 30 minutes at an air pump rate 0.5 to 1.2 L/minute⁽⁶³⁾, then sealed and returned, appropriately labelled, to an accredited laboratory for analysis. The average concentration from the six samples for each testing parameter should be recorded with its standard deviation. Reporting should be in accordance with BS ISO 16000-3⁽⁶⁴⁾.

Compliance Notes

Criterion Reference	Compliance Note	
crit 1–crit 3	CN1 Accreditation of organisations performing sampling or laboratory analysis	<p>All organisations used for sampling and analysis of indoor air or for analysis of emissions from building products must be accredited to ISO/IEC 17025⁽⁶⁵⁾ with specific accreditation covering:</p> <ol style="list-style-type: none"> 1. Sampling: Pumped sampling for formaldehyde in air; pumped sampling for VOCs in air. 2. Chemical analysis: Determination of formaldehyde; determination of VOCs.
crit 1–crit 3	CN2 Non-VOC emitting products	Inherently non-VOC emitting products such as brick, natural stone, concrete, ceramic tile, glass, metal surfaces, etc. do not need to be assessed and can be deemed fully compliant with the criteria, unless organic-based coatings, binders, or sealants are used in their production or finishes.
crit 1–crit 3	CN3 Paints used in wet areas	Evidence must be provided to show that paints used in wet areas protect against mould growth. Evidence could include appropriate test results (e.g. fungal or algal resistance testing) or manufacturer's product information or declaration. There are British standard tests which could be used: BSEN 15457 ⁽⁶⁶⁾ and BSEN 15458 ⁽⁶⁷⁾ .
crit 2 and crit 3	CN4 Representative sampling of indoor air	Representative sampling of indoor air is permitted where there are multiple homes on a site that incorporate the same building products or materials specification. In such cases, at least 1 in 10 homes must be sampled in accordance with the Methodology section. Where there are differences in the size, type, layout or location of homes on a site, the representative sampling must cover each of the different home 'groups' found on the site (e.g. 1-bed apartment, 2-bed mid-terrace, 3-bed semi-detached, 4-bed detached, etc.). The accredited organisation performing the sampling should advise on grouping of homes and the most appropriate homes to sample on a site.
crit 1	CN5 Self-declaration of emission levels from building products	Self-declaration by manufacturers of emission levels from building products is acceptable if testing has been performed by an accredited laboratory in accordance with CN1 above.
crit 1	CN6 Third party certification schemes for emission levels from building products	Third party certification schemes for emission levels from building products can be used as evidence to demonstrate compliance with the criteria. BREEAM Guidance Note 'GN22: BREEAM Recognised Schemes for VOC Emissions from Building Products' (available to assessors through BREEAM Projects) lists a number of such schemes that have been assessed to show equivalent or better performance than the criteria. If assessors, clients or scheme operators wish to seek recognition of other schemes not currently listed, please contact the HQM office (hqm@bre.co.uk) for details of the application process.
crit 2 and crit 3	CN7 Minimising airborne formaldehyde and TVOCs from all sources (post construction)	Sampling and laboratory analysis should only be performed by organisations accredited to ISO/IEC 17025 ⁽⁶⁸⁾ (see CN1 above). The two functions may be carried out by different accredited organisations. Measurements should be made after completing the building, but before its occupation following the protocol set out in the Methodology on the previous page section.
crit 1	CN8 Testing requirements for emission limits	The testing requirements for formaldehyde and TVOC emission limits are based on standardised emission test chamber methods. Compliance with the emission limits shall be demonstrated after 28 days in a test chamber or earlier, as stipulated in the relevant testing requirements standard. Compliance may be achieved by alternative means from those in Table 9 on the next page, providing this is agreed in advance by BRE Global. Perforator, flask, desiccator and other extraction based test methods are specifically excluded.
crit 1	CN9 Products used in small quantities for ad hoc purposes	All products specified for a project that fall within one of the product types listed in Table 9 on the next page must be assessed under this issue. However, it is accepted that it may be difficult to control the specification of some products (e.g. sealants) that are used in small quantities for ad hoc purposes such as

Criterion Reference	Compliance Note	
		'making good'. As such, any products used in this way do not need to be assessed for this issue. The HQM assessor should use their judgment to determine whether products being used or intended to be used for ad hoc purposes will be used in significant quantities and therefore need to be assessed for this issue
crit 1	CN10 Scope of assessment for product types installed or applied within a building	Only products that are installed or applied in parts of the building where their emissions are likely to affect indoor air quality need to be assessed. For the purposes of this issue, this means any product installed or applied inside of the inner surface of the building's infiltration, vapour or waterproof membrane or, where not present, inside of the inner surface of the building envelope's interior facing thermal insulation layer .

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
crit 1–crit 3	01 General Evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	
crit 1	02 Emissions from building products	Product emission test results demonstrating appropriate testing methods by an accredited laboratory. Where applicable for paints and varnishes, evidence of protection against mould growth.	
crit 2	03 Indoor air quality testing for formaldehyde	Refer to general evidence requirement above.	Results of indoor air quality testing for formaldehyde, demonstrating appropriate testing methods by an accredited laboratory. Where representative sampling is undertaken, details of the sampling strategy employed on the site, including any grouping of homes.
crit 3	04 Indoor air quality testing for TVOCs	Refer to 01 General Evidence above	Results of indoor air quality testing for TVOCs, demonstrating appropriate testing methods by an accredited laboratory. Where representative sampling is undertaken, details of the sampling strategy employed on the site, including any grouping of homes.

Checklists, Tables & Illustrations

Table 9 Emission criteria by building product type

Building Product type	Emission limits			Testing requirement	Additional requirements
	Formaldehyde	Total volatile organic compounds (TVOCs)	Category 1A and 1B carcinogens		
See CN2				See CN1 and CN8	
Interior paints & varnishes	0.06 mg/m ³	1.0 mg/m ³	0.001 mg/m ³	BSEN 16402 ⁽⁶⁹⁾ or BSEN ISO 16000-9 ⁽⁷⁰⁾ or PD CEN 16516 ⁽⁷¹⁾ or	Paints used in wet areas (e.g. bathrooms, kitchens, utility rooms) should protect against mould growth (see CN5 on the previous page).

Building Product type	Emission limits			Testing requirement	Additional requirements
	Formaldehyde	Total volatile organic compounds (TVOCs)	Category 1A and 1B carcinogens		
				CDPH Standard Method v1.1 ⁽⁷²⁾	
Wood-based products	0.06 mg/m ³ (Non-MDF) 0.08 mg/m ³ (MDF)	1.0 mg/m ³	0.001 mg/m ³	BSEN ISO 16000-9 (73) or PD CEN 16516 ⁽⁷⁴⁾ or CDPH Standard Method v1.1 ⁽⁷⁵⁾ or BSEN 717-1 ⁽⁷⁶⁾ (formaldehyde emissions only)	N/A
Flooring materials	0.06 mg/m ³	1.0 mg/m ³	0.001 mg/m ³	BSEN ISO 10580 (77) or BSEN ISO 16000-9 (78) or PD CEN 16516 ⁽⁷⁹⁾ or CDPH Standard Method v1.1 ⁽⁸⁰⁾	N/A
Ceiling, wall and insulation materials	0.06 mg/m ³	1.0 mg/m ³	0.001 mg/m ³	BSEN ISO 16000-9 (81) or PD CEN 16516 (82) or CDPH Standard Method v1.1 ⁽⁸³⁾	N/A
Interior adhesives & sealants	0.06 mg/m ³	1.0 mg/m ³	0.001 mg/m ³	BSEN 13999 (Parts 1-4) ⁽⁸⁴⁾ or BSEN ISO 16000-9 (85) or PD CEN 16516 ⁽⁸⁶⁾ or	N/A

Building Product type	Emission limits			Testing requirement	Additional requirements
	Formaldehyde	Total volatile organic compounds (TVOCs)	Category 1A and 1B carcinogens		

CDPH Standard Method v1.1 ⁽⁸⁷⁾

Definitions

Category 1A and 1B carcinogens

Carcinogenic compounds detectable by the VOC emission testing requirements in Table 9 on page 53 and that are classified as category 1A or 1B carcinogens in accordance with Regulation EC No. 1272/2008 on classification, labelling and packaging of substances and mixtures⁽⁸⁸⁾, which are listed as Carcinogenic VOCs in Annex G.2 of Draft BSEN 16516⁽⁸⁹⁾.

TVOC

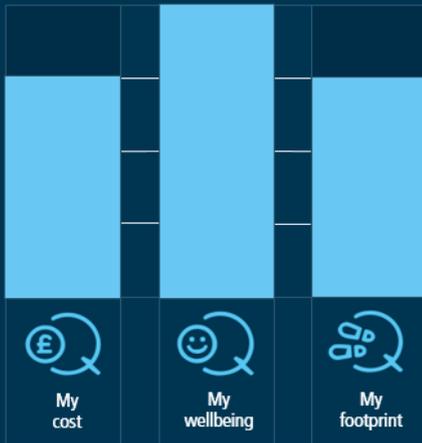
Sum of the concentrations of identified and unidentified volatile organic compounds eluting between and including n-hexane and n-hexadecane on a gas chromatographic column⁽⁹⁰⁾.

10 DAYLIGHT

Max credits

16

Indicators (Average)



Aim

To promote good daylighting, thereby improving the occupants' quality of life and reducing the amount of energy used to light the home.

Benefit

- Provides mental and physical benefits to the occupier.
- Helps lower energy costs and environmental impact by reducing the need for artificial light.

Context

Evidence indicates that good daylight is one of the most sought-after qualities of a home. Daylight has important health benefits. Exposure to high levels of light during the day aids maintenance of circadian rhythms, especially in elderly people. This improves the quantity and quality of sleep and may benefit the cardiovascular system. Daylight has also been shown to improve mood and reduce depression, including seasonal affective disorder (SAD). Daylight provision is often associated with view out, which provides contact with the outside and a further benefit to mood.

HQM awards credits for meeting and improving upon the minimum average daylight factor suggested in BS8206-2.



Credit Summary

Criterion number	Title	Credits
crit 1	01 Average daylight factor (kitchens)	for 6 credits
crit 2	02 Average daylight factor (living spaces)	up to 6 credits
crit 3	03 View of sky	for 4 credits
Total credits available		16

Criteria

01 Average daylight factor (kitchens)

for 6 credits

crit 1 All kitchens achieve a minimum average daylight factor of at least 2%.

02 Average daylight factor (living spaces)

up to 6 credits

crit 2 Credits will be awarded based upon the minimum average daylight factor achieved for all living rooms, dining rooms and studies (see Table 10 below).

Table 10 Minimum average daylight factors and associated credits

Minimum average daylight factor	Credits
1.5 %	2
1.8 %	4
2.0 %	6

03 View of sky

for 4 credits

crit 3 80% of the working plane in each kitchen, living room, dining room and study receives direct light from the sky.

Methodology

None.

Compliance Notes

Criterion Reference	Compliance Note
crit 1–crit 3	<p>CN1 Calculation procedures</p> <p>Average daylight factor</p> <p>Calculation procedures for the average daylight factor are detailed in BS8206 Part 2⁽⁹¹⁾ and in 'Site layout planning for daylight and sunlight: a guide to good practice'⁽⁹²⁾ These publications give a formula for calculating the average daylight factor. It is important that external obstructions are correctly modelled (see Average daylight factor on page 59).</p> <p>As an alternative to using the formula for the average daylight factor, computer simulation software can be used. It should use an overcast sky model with a minimum grid size of 250mm, extending over the whole working plane. Computer simulation is recommended for more complex room geometries, for example those with light shelves or redirecting glazing.</p> <p>No-sky line</p> <p>Plotting of the no-sky line or estimating the percentage of the working plane that receives direct light from the sky can be carried out using the methodology given in Definitions on the facing page, using the guidance in Appendix D – Post-construction stage assessment issue exceptions on page 207⁽⁹³⁾, or using specialist computer simulation software.</p> <p>The methodology given in the definitions section of this issue is intended for situations where the external obstruction is wide, directly opposite the window, and parallel to it. It will give worst case results in situations where the external</p>

Criterion Reference	Compliance Note	
		obstruction is directly opposite the window but is discontinuous. It cannot be used where the external obstruction is not parallel to the window (for example an extension next door which projects from the line of the window wall). In these cases the guidance in Appendix D – Post-construction stage assessment issue exceptions on page 207 ⁽⁹⁴⁾ , or specialist computer simulation software, should be used.
crit 1–crit 3	CN2 Site or room level	<p>Calculations for this issue can be completed at either:</p> <ol style="list-style-type: none"> 1. Site level – calculations are completed for a subset of selected worst case homes or rooms on the site. Credits are awarded to all homes based on the performance of these worst case rooms (or homes). To identify worst case rooms for the daylight calculation: <ol style="list-style-type: none"> a. Where rooms A and B have the same layout and window, and room A is more heavily obstructed (being on a lower floor, or with a greater angle of obstruction due to a larger or closer building opposite), then if room A complies, room B will too. Where rooms C and D have the same obstruction, room shape and size, but room D has a larger glazed area, then if room C complies, room D will too. Where rooms E and F have the same obstruction and window, but room F has smaller internal area, then if room E complies, room F will too. <p>OR</p> <ol style="list-style-type: none"> 2. Room level – calculations are completed for all relevant rooms on site. Credits are awarded according to the performance of the actual rooms. <p>This decision is left to the design team and is likely to be dependent on the particular site being assessed.</p>

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
crit 1–crit 3	01 General evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	
crit 1–crit 2	02 Daylighting calculations	Daylighting calculations.	
crit 3	03 View of sky calculations	View of sky calculations.	

Checklists, Tables & Illustrations

None.

Definitions

θ Angle of visible sky

The angle of visible sky θ is the angle subtended, in the vertical plane normal to the window, by the visible sky from the centre of the window.

For long obstructions parallel to the window:

Where:

$$\theta = 90 - a - b$$

$$\tan(a) = \frac{H}{D}$$

$$\tan(b) = \frac{T_w}{H_w}$$

H_w = the height of the window

T_w = the thickness of the wall

D = the distance from the window to the obstruction

H = the height of the obstruction above the mid-height of the window

Note: Where external obstructions are of complex geometry and cannot be approximated by a continuous object, it is advisable to use the methodology in 'Site layout planning for daylight and sunlight: a guide to good practice'(BRE 2011). Individual trees can be ignored.

Average daylight factor

The average daylight factor can be calculated using the following equation:

$$\text{Daylight Factor} = \frac{MW \theta T}{A(1 - R^2)}$$

Where:

W = total glazed area of windows or rooflights (not including frames)

A = total area of all the room surfaces (ceiling floor, walls and windows)

R = area-weighted average reflectance of the room surfaces

M = a correction factor for dirt

T = glass transmittance factor

θ = angle of visible sky

Guide values for a typical home with light-coloured walls are as follows (for more accurate values, refer to BS 8206 Part 2⁽⁹⁵⁾):

$R=0.5$

$M=0.96$ (vertical glazing that can be cleaned easily)

0.88 (vertical glazing with a balcony or overhang above)

0.92 (sloping glazing)

0.88 (horizontal glazing)

$T=0.68$ (double glazing with low-emissivity coating)

0.6 (triple glazing)

No-skyline

Step 1:

Plotting of the no-sky line or estimating the percentage of the working plane that receives direct light from the sky can be carried out using the methodology below, where the obstruction is opposite the window. As an approximation, obstructions that are parallel to the window can be considered infinite. The no-sky line will then be parallel to the window at a distance 'd' from the window wall, which can be calculated as follows:

$$d = \frac{xh}{y}$$

Where:

h = height of the window head above the working plane (0.85m above the floor)

y = height of the obstruction above the window head

x = distance from the window to the obstruction

Step 2:

Calculate the percentage (P) of d of the room depth.

$$P = \left(\frac{d}{\text{room depth}} \right) \times 100$$

Any room where $P \geq 80$ meets crit 3 on page 57.



Note : Where obstructions are not horizontal, parallel to the window or considered infinite, 'Site layout planning for daylight and sunlight: a guide to good practice'⁽⁹⁶⁾ gives a more accurate methodology.

Open-plan rooms

Where two rooms form part of the same large space (e.g. an open plan kitchen-dining room), as no solid partition is present to block the distribution of the daylight, calculate the average daylight factor for the whole space (i.e. as one room).

Credits must be awarded by comparing the average daylight factor for the whole space to the relevant assessment criteria.

Sun pipes

As a general rule, sun pipes should be treated as roof lights, i.e. if there are no obstructions use a θ of 180°. There are a wide range of light pipes on the market with different reflective linings and some include lenses or mirrors etc. If no transmission factor is stated, use $T=0.5$ for a 1m length pipe and $T=0.25$ for a 2m length pipe.

Two windows facing different obstructions

When two or more windows in a room face different obstructions (e.g. vertical windows and roof lights) or differ in transmittance, the average daylight factor must be calculated separately for each window, and the results summed.

Window below working plane

If part of a window lies below the working plane, the average daylight factor for that part of the window must be calculated separately from the part of the window above the working plane.

The average daylight factor for the part of the window below the working plane must be calculated and multiplied by an additional correction factor before being added to the average daylight factor for the part of the window above the working plane.

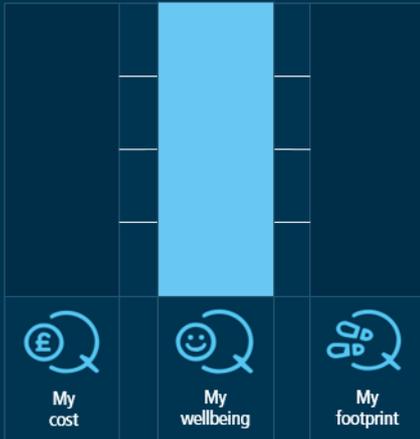
The default correction factor is 0.15; Appendix C of 'Site layout planning for daylight and sunlight: a guide to good practice'⁽⁹⁷⁾ gives additional correction factors for special situations.

11 INTERNAL AND EXTERNAL NOISE

Max credits

4

Indicators (Average)



Aim

To reduce noise disturbance to occupants in internal and external areas of homes by promoting low levels of sound from external noise sources and building services.

Benefit

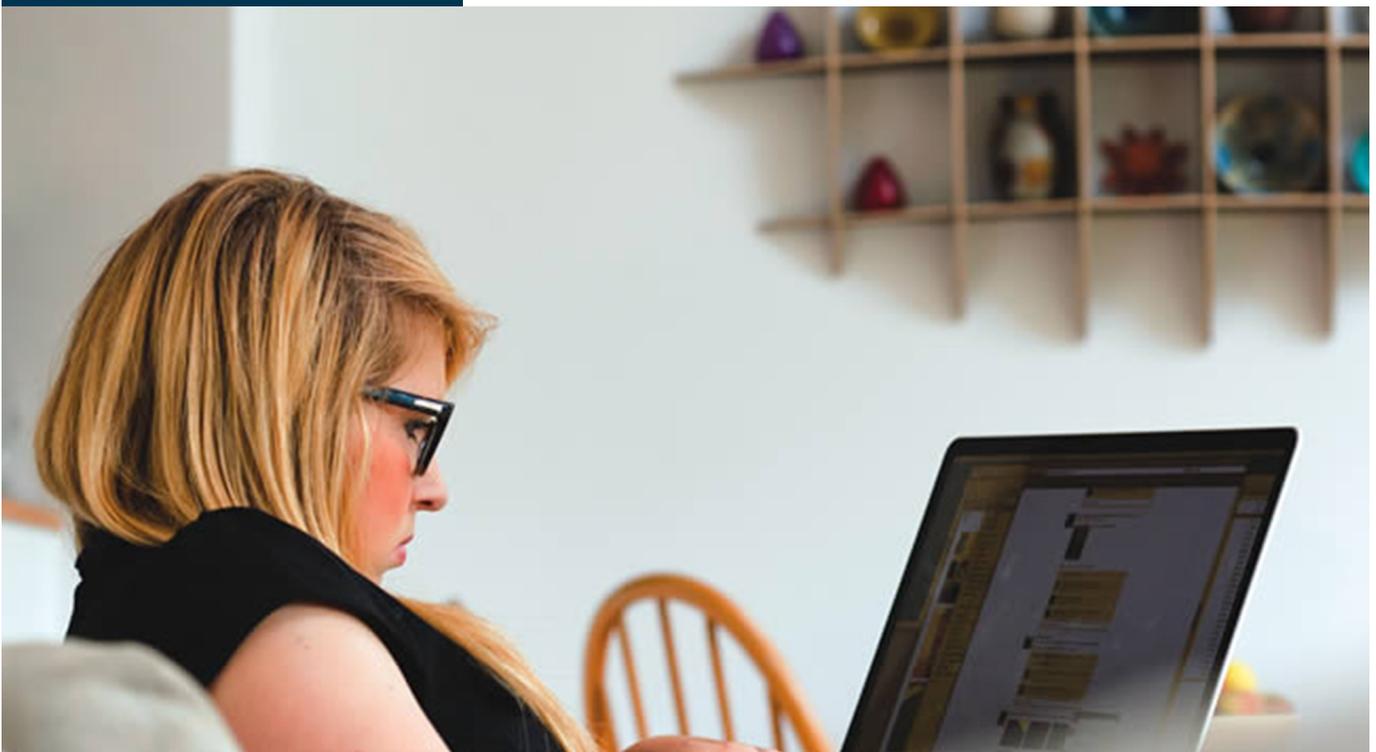
- Improves health and wellbeing of the occupants
- Reduces costs to the local authority by reducing complaints
- Helps community cohesion

Context

An important underlying quality of any home is the management of noise to improve comfort, health and wellbeing. A home should provide a quiet environment to allow for effective rest and to enable people to use their home without compromising other sound sensitive spaces or activities.

It is widely recognised that noise exposure indirectly affects health and wellbeing, as it causes adverse feelings in most people affected. This can result in psychological stress, anxiety, irritability, sleep disorders and other biological effects. These in turn can increase other risk factors such as blood pressure and might even lead to clinical symptoms, including insomnia and cardiovascular diseases.

It is general practice to develop and demonstrate the noise control strategy to the satisfaction of the local planning authority but spaces are not always commissioned once completed. The lack of acoustic commissioning can mean there is potential for a performance gap between the intended and achieved outcome.



Credit Summary

Criterion number	Title	Credits
crit 1	01 Suitably qualified acoustician	prerequisite
crit 2	02 Internal noise levels	for 2 credits
crit 3	03 External noise levels	up to 2 credits
Total credit available		4

Criteria

01 Suitably qualified acoustician		prerequisite
crit 1	A Suitably Qualified Acoustician (SQA) is appointed.	
02 Internal noise levels		for 2 credits
crit 2	The home has been designed and built to meet the internal noise requirements outlined in Table 11 on page 65 in accordance with the methodology section. This ensures the internal comfort of occupants and limits disturbance from all sources of environmental noise and integral building services.	
03 External noise levels		up to 2 credits
crit 3	The noise levels of external Functional Spaces do not exceed the requirements in Table 12 on page 65 in accordance with the methodology section.	

Methodology

Internal noise levels

For measurements of internal noise, the following procedures should be used:

- Generally the measurements of internal noise should be undertaken by a SQA. However, it may be convenient to do this at the same time as other testing such as pre-completion sound insulation testing required for HQM or regulatory purposes. In this case the measurements may be verified by the SQA, if they are made by others.
- At least one in ten homes on a development should be subject to on-site acoustic testing.
- The properties selected for testing shall be those considered by the SQA to be most exposed to environmental noise sources. The selection criteria should be outlined in the report from the SQA detailing the results of the measurements. Where it is not clear which properties would be most exposed to environmental noise, the number of properties tested should be increased to ensure the worst case is tested.
- Measurements should be made in at least one bedroom and one other habitable room for each home tested. The rooms selected should be those in which noise levels are expected to be greatest, and so generally on the façade most exposed to environmental noise.
- Windows should be closed for the measurements, but trickle vents (if required for the ventilation strategy) should be open during the measurements.
- External and internal doors should be shut during the measurements.
- Noise from building services should be included in the measurements, where they are required for normal ventilation and heating purposes, i.e. heat pumps, boilers, active ventilation systems etc.
- Extract fans within nearby bathrooms, WCs and en-suites should be running when making measurements within bedrooms.
- Noise from occupants and white goods should not be included in the measurements.
- If the rooms are not carpeted or furnished then the results of the measurements should be corrected in accordance with BS 8233:2014⁽⁹⁸⁾.
- Measurements need not be made over the full day (07:00–23:00 hours) if a shorter measurement period can be used. In this case, measurements should be made when external noise levels are representative of normal conditions throughout the periods.
- Measurement periods of less than 30 minutes may give representative values for internal noise levels and may be utilised where this is the case. However measurement periods shorter than 5 minutes should not be used. The actual duration of measurement shall be determined by the SQA and included within the measurement report.

13. Measurements should be taken in a minimum of three locations in rooms at a height of 1.2m above the floor level and at least 1 m away from any surface.
14. Compliance with the day time criteria is through on-site measurement.
15. Compliance with the night-time criteria can be assumed for bedrooms, provided that they comply with the daytime criteria. This is subject to confirmation from a SQA that any building services noise will not elevate the room levels to above the limit. It may be convenient to quantify the building services noise through a short measurement during the day time period.
16. ANC Guidelines – Noise Measurement in Buildings Parts 1 and 2 may be used as a source of good practice for undertaking measurements within the home.

External noise levels

For measurements of noise in external Functional Spaces, the following procedures should be used:

1. Generally the measurements of external noise should be undertaken by a SQA. However, it may be convenient to do this at the same time as other testing such as pre-completion sound insulation testing required for HQM or regulatory purposes. In this case the measurements may be verified by the SQA if they are made by others.
2. Sufficient measurements should be made in order to determine a reasonable average for the external functional space. The number of measurement points should be determined by the SQA and take account of the general usable space.
3. It may not be necessary to measure the noise in every external functional space; in this case representative sampling as defined by the SQA would be appropriate.
4. Noise from environmental sources (e.g. traffic noise) should be included and also any mechanical or electrical plant associated with the home or the neighbouring properties such as the external units of a heat pump. Any plant should be running at normal operating duty.
5. Measurements need not be made over the full day (07:00–23:00 hours) if a shorter measurement period can be used. In this case, measurements should be made when external noise levels are representative of normal conditions throughout the periods.
6. Measurement periods of less than 30 minutes may give representative values for external noise levels and may be utilised where this is the case. However measurement periods shorter than 5 minutes should not be used. The actual duration of measurement shall be determined by the SQA and detailed within the measurement report.
7. If existing external noise level data are available, then calculations by a SQA may also be used to demonstrate compliance with the criteria. External data may take the form of existing noise survey data or local noise modelling or mapping. If this approach is used then the SQA must take into account any new noise sources introduced as part of the development or associated with the home itself and outline the modelling or calculation basis within their report.
8. Where noisy activities in the vicinity are occurring that would not be expected to be present when the home is occupied, e.g. construction activities then the measurements should be made in the absence of the noise source. This may mean that the activity is temporarily suspended for the testing, or the testing is done when the activity is not taking place.
9. Where measurements of environmental noise were required as part of the planning process, the noise levels within external functional spaces can be calculated by a SQA. Full account must be taken of any new sources introduced as part of the development, i.e. mechanical or electrical plant that have the potential to increase noise levels. The report detailing the assessment of external noise should detail the results of the previous survey and the calculation methods used.
10. The ANC Green Book: Environmental Noise Measurement Guide and BS 7445⁽⁹⁹⁾ are sources of available good practice and relevant definitions for the measurement of external noise.

Compliance Notes

Criterion Reference	Compliance Note	
crit 2–crit 3	CN1 Verification of measurements and calculations by an SQA	<p>Where a SQA is verifying the acoustic measurements and calculations carried out by another acoustician who does not meet the SQA requirements, they must, as a minimum, have read and reviewed the report and confirm in writing that they have found it to:</p> <ol style="list-style-type: none"> 1. Represent sound industry practice. 2. Be appropriate given the building being assessed and scope of works proposed. 3. Avoid invalid, biased and exaggerated results.
crit 2–crit 3	CN2 Measurement tolerance	When determining the internal and external noise levels associated with the home a degree of tolerance is allowed to account for measurements of uncertainty

Criterion Reference	Compliance Note
	<p>and variability in sound levels as follows:</p> <p>For internal noise levels, a tolerance of + 3 dB is allowed for an individual room. However the targets in Table 11 on the facing page should be achieved by the average of rooms within each group.</p> <p>The targets in Table 12 on the facing page should be achieved by the average of all measurements considered necessary to evaluate the overall noise level of the external functional space as a whole.</p>
crit 2	<p>CN3 Internal Noise Levels</p> <p>Heating and ventilation systems, and supporting infrastructure (pipes, outlets, fans, pumps etc.) can increase noise levels within the home. The following building services have the potential to elevate noise levels, but their impact can generally be mitigated against through careful placement, design, system selection and appropriate commissioning of:</p> <ol style="list-style-type: none"> 1. Mechanical ventilation systems 2. Heat pumps (split unit systems) 3. Boilers and heating systems.

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
All	01 General evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 section can be used to demonstrate compliance.	
crit 2	02 Internal noise levels	<ol style="list-style-type: none"> 1. Calculations or assessment from the SQA taking into account the external noise level and contributions from intended building services (if any) showing that the noise limits presented in Table 11 on the facing page are likely to be achieved, or 2. Confirmation from an appropriate party that states, no noise-related planning conditions have been imposed and that the home will be naturally ventilated, but also does not have any heating or ventilation systems that have the potential to cause noise disturbance. 	Testing results from the SQA demonstrating the noise limits presented in Table 11 on the facing page have been met in line with the methodology section.
crit 3	03 External noise levels	<ol style="list-style-type: none"> 1. Calculations or assessment from the SQA taking into account the external noise level and contributions from intended building services either associated with or close to the home showing that the noise limits presented in Table 12 on the facing page are likely to be achieved, or 2. Confirmation from an 	Testing results from the SQA demonstrating the noise limits presented in Table 12 on the facing page have been met in line with the methodology section.

Criterion Reference	Title	Design Stage	Post Construction Stage
		appropriate party that states no noise-related planning conditions have been imposed and that no additional noise sources, such as, electrical or mechanical plant are intended to be introduced in the vicinity. Or Evidence demonstrating that no external functional spaces exist	

Checklists, Tables & Illustrations

Table 11 Internal noise levels

Time of day	Habitable rooms	Non-habitable rooms
	$L_{Aeq,T}$	$L_{Aeq,T}$
Day (07:00–23:00)	35dB	35dB
Night (23:00–07:00)	30dB (Bedrooms only)	35dB

Table 12 Noise levels of external functional space

Time of day	Credits	Requirements
		$L_{Aeq,T}$
Day (07:00–23:00)	1	55dB
Day (07:00–23:00)	2	50dB

Definitions

Suitably Qualified Acoustician (SQA)

An individual achieving all the following items can be considered to be 'suitably qualified' for the purposes of a HQM assessment:

1. Holds a degree, PhD or equivalent qualification in acoustics or sound testing.
2. Has a minimum of three years relevant experience (within the last five years). Such experience must clearly demonstrate a practical understanding of factors affecting acoustics in relation to construction and the built environment; including, acting in an advisory capacity to provide recommendations for suitable acoustic performance levels and mitigation measures.
3. An individual who holds a recognised acoustic qualification and membership of an appropriate professional body. The primary professional body for acoustics in the UK is the Institute of Acoustics.

An SQA may have to use their professional judgment to make decisions to ensure the appropriateness of the noise measurements for the homes or development type. The SQA is ultimately responsible for the noise testing results.

Where a suitably qualified acoustician is verifying the acoustic measurements or calculations carried out by another acoustician who does not meet the SQA requirements, they must, as a minimum, have read and reviewed the report and confirm in writing that they have found it to:

1. Represent sound industry practice
2. Be appropriate given the building being assessed and scope of works proposed
3. Avoid invalid, biased and exaggerated recommendations. Additionally, written confirmation from the third party verifier that they comply with the definition of a Suitably Qualified Acoustician is required

External Functional Spaces

For the purposes of this issue, this includes:

1. A private garden
2. A communal garden or courtyard
3. Balconies
4. Roof terraces
5. Patios

The above list is not exhaustive.

12 SOUND INSULATION

Max credits

8

Indicators (Average)



Aim

To reduce noise disturbances by promoting good levels of sound insulation between neighbouring homes and different rooms within the home.

Benefit

- Improves community cohesion by limiting disturbances from neighbours
- Helps overall health and wellbeing
- Reduces complaints to local authorities, thus reducing their costs.

Context

An important underlying quality of any home is the management of noise to maximise comfort and privacy. This should allow rooms to be used as intended, without compromising sound sensitive spaces or activities.

Sound insulation is embedded within the current national building regulations, and minimum performance requirements are provided. The performance requirements vary across the UK but are found within Approved Document E (England and Wales)⁽¹⁰⁰⁾, Section 5 of the Technical Handbook (Scotland)⁽¹⁰¹⁾ and Technical Booklet G (Northern Ireland)⁽¹⁰²⁾. Within the relevant national building regulations, the issue of sound is split into two parts; firstly that of sound insulation between adjacent homes, and secondly between rooms within homes.



Credit Summary

Criterion number	Title	Credits
crit 1–crit 2	01 Sound insulation between homes	up to 4 credits
crit 2–crit 3	02 Sound insulation between rooms	up to 4 credits
Total credits available		8

Criteria

01 Sound insulation between homes

up to 4 credits

crit 1 It must be demonstrated that the home achieves the targets set out in Table 14 on page 70 for airborne and impact sound insulation taking into account both separating walls and floors between homes either through:

- A programme of pre-completion testing by a Compliant Test Body (see CN1 on the facing page) in accordance with the Methodology section

OR

- Where all relevant building elements have been registered with Robust Details Limited; please see www.robustdetails.com for relevant constructions capable of achieving the performance targets given in Table 14 on page 70.

02 Sound insulation between rooms

up to 4 credits

crit 2 The targets set out in Table 15 on page 70 for airborne sound insulation are met, and this is demonstrated through testing with an acoustics laboratory in accordance with the methodology section.

crit 3 Suitably Qualified Acoustician (SQA) must pass on critical information to relevant construction professionals outlining key issues that have the potential to reduce sound insulation during the construction process, including as a minimum:

crit 3.a: Information on the means to ensure that sockets, switches, down lights and other services or other perforations maintain the acoustic performance where otherwise it may be compromised.

crit 3.b: Guidance relating to appropriate junction details at the head, foot and perimeter of the partition or floor.

Methodology

Sound insulation between homes

Where pre-completion acoustic testing is the preferred route for achieving the credits, as a minimum, one set of tests for every 10 homes in a group (houses, apartments or bungalows are defined as the groups) and each sub-group (typically these are different construction type groups) is required.

In the event of less than 10 properties, one set of tests is carried out.

Usually one unit should be “selected” to determine the number of tests required as follows:

Table 13 Number of tests forming a set of tests

Group Type	Airborne tests, separating walls	Airborne tests, separating floors	Impact tests, separating floors	Total
Houses or bungalows	2	0	0	2
Apartments	2	2	2	6

The actual number of tests possible may be limited by the layout, where this is the case then the compliant test body should clearly identify why the full number of tests was not feasible within the test report or covering correspondence.

Tests should be carried out in accordance with the test standards referenced by the relevant national regulations.

Sound insulation between rooms

Testing should be undertaken within an acoustic laboratory accredited by UKAS (or European equivalent) to BS EN ISO IEC 17025⁽¹⁰³⁾ with the relevant part of BS EN ISO 10140⁽¹⁰⁴⁾ included on their schedule of accreditation. The evidence submitted should include full details of the tested construction and this must match the construction intended for use at the development.

Compliance Notes

Criterion Reference	Compliance Note	
crit 1	CN1 Sound insulation between home	<ol style="list-style-type: none"> In the case of pre-completion acoustic testing, this should only be undertaken by a compliant test body. In the event of a test failure, documented evidence is required to show how widespread the issues are. This should include a report from a SQA identifying the issues, and an extended test series is also required to show how the root cause of the issues has been satisfactorily established. Post remedial works testing is required to demonstrate that the requirements have been met, and clear statements should be included in the report stating what remediation works were undertaken.
crit 2	CN2 Sound insulation between rooms	<p>In terms of laboratory acoustic testing, the test evidence should be from a laboratory accredited by UKAS (or European equivalent) for testing in accordance with BS EN ISO 10140-1, 2, & 5⁽¹⁰⁵⁾ (or previously BS EN ISO 140-3:1995⁽¹⁰⁶⁾)</p> <p>Checks must be undertaken to ensure that the laboratory test report evidence submitted relates to the proposed and built construction (including all key components such as stud type and make, joist type, principle dimensions, board and insulation type and make)</p> <p>When the construction matches one of the specifications for internal walls or floors outlined in the Scottish Government Building Standards Division publication "Example Construction and Generic Internal Constructions for use with Section 5: Noise - of the Technical Handbooks" then the construction can be considered to achieve 43 dB, R_w, and further laboratory test evidence is not required unless a higher performance value is being claimed.</p> <p>The criteria applies to internal walls and floors covered by the scope of Approved Document E - Resistance to the passage of sound (2003 Edition incorporating 2004, 2010, 2013 and 2015 amendments).</p>
crit 1	CN3 Detached home	Where a home is detached, crit 1 on the previous page is met and four credits can be awarded by default.

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
crit 1	01 Sound insulation between homes	<p>Where pre-completion acoustic testing will be carried out;</p> <p>A letter from the relevant party confirming the intent to:</p> <ol style="list-style-type: none"> Meet the relevant sound insulation performance levels using the methodology prescribed. Use a compliant test body to complete testing. <p>OR</p> <p>Where Robust Details will be used;</p> <ol style="list-style-type: none"> Confirmation that the Robust Details chosen will achieve the required performance standards for sound insulation (as applicable). 	<p>Where pre-completion acoustic testing has been carried out; copies of the sound insulation field test results or a letter of confirmation that the required sound insulation performance standards as detailed in the assessment criteria have been achieved.</p> <p>OR</p> <p>Where Robust Details have been used, completed Robust Details Ltd Compliance Certificate signed by the developer for all relevant constructions relating to the plots being assessed.</p>

Criterion Reference	Title	Design Stage	Post Construction Stage
		2. Confirmation that the relevant plots are registered with RDL (the Purchase Statement).	
crit 1	01 Sound insulation between homes	Intended layout demonstrating homes are detached	Confirmation that homes are detached.
crit 2	02 Sound insulation between rooms	Confirmation of the intended construction and either: <ol style="list-style-type: none"> Laboratory test report OR <ol style="list-style-type: none"> Confirmation of which construction is being used from "Example constructions and generic details". OR <ol style="list-style-type: none"> Published manufacturer's data reference 	As for design stage, however review and compare against as-built.
crit 2	02 Sound insulation between rooms	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	
All	03 General evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	

Checklists, Tables & Illustrations

Table 14 Sound insulation levels for separating walls and floors

Credits*	Airborne sound insulation $D_{nT,w} + C_{tr}$ (dB) (minimum values)	Impact sound insulation $L'_{nT,w}$ (dB) (maximum values)
	Separating walls and floors	Separating floors only
1	48	59
3	50	57
4	53	54

Table 15 Sound insulation levels for internal walls and floors

Credits*	Airborne sound insulation R_w (dB) (minimum values)
2	43
3	45
4	48

* Credits should be awarded based on the worst performing wall or floor.

Definitions

Compliant Test Body

This includes companies which are:

- UKAS accredited to undertake testing to BSEN ISO 140-4 & 7:1998 (Tests to these standards are accepted for the purposes of the HQM, although these standards have been superseded by BSEN ISO 16283-1:2014. Tests to BSEN ISO 16283-1:2014 will be accepted as well.); or
- A member of the ANC pre-completion registration scheme; or

3. Organisations that can provide evidence that they are a member of a scheme that follow the relevant principles of BSEN ISO/IEC 17024 (Conformity assessment – General requirements for bodies operating certification of persons) in relation to acoustics; or
4. Organisations that can provide evidence that they comply with the requirements of BSEN ISO/IEC 17025 in relation to acoustics.

Suitably Qualified Acoustician (SQA)

An individual achieving all the following items can be considered to be 'suitably qualified' for the purposes of a HQM assessment:

1. Holds a degree, PhD or equivalent qualification in acoustics or sound testing.
2. Has a minimum of three years relevant experience (within the last five years). Such experience must clearly demonstrate a practical understanding of factors affecting acoustics in relation to construction and the built environment; including, acting in an advisory capacity to provide recommendations for suitable acoustic performance levels and mitigation measures.
3. An individual who holds a recognised acoustic qualification and membership of an appropriate professional body. The primary professional body for acoustics in the UK, is the Institute of Acoustics.

A SQA may have to use their professional judgment to make decisions to ensure the appropriateness of the noise measurements for the home or development type. The SQA is ultimately responsible for the noise testing results.

Where a suitably qualified acoustician is verifying the acoustic measurements or calculations carried out by another acoustician who does not meet the SQA requirements, they must, as a minimum, have read and reviewed the report and confirm in writing that they have found it to:

1. Represent sound industry practice
2. Be appropriate given the building being assessed and scope of works proposed
3. Avoid invalid, biased and exaggerated recommendations. Additionally, written confirmation from the third party verifier that they comply with the definition of a Suitably Qualified Acoustician is required.

13 TEMPERATURE

Max credits

20

Indicators (Average)



Aim

To evaluate a home's risk of high uncontrollable temperatures early in the design for both current and project future climate scenarios.

Benefit

- Reduce the risk to occupier comfort, health and wellbeing from uncontrollably high indoor temperatures.
- Encourages future proofing of the home protecting its value
- Reduces the impact on the environment and costs through wasted heat or from additionally required air-conditioning.

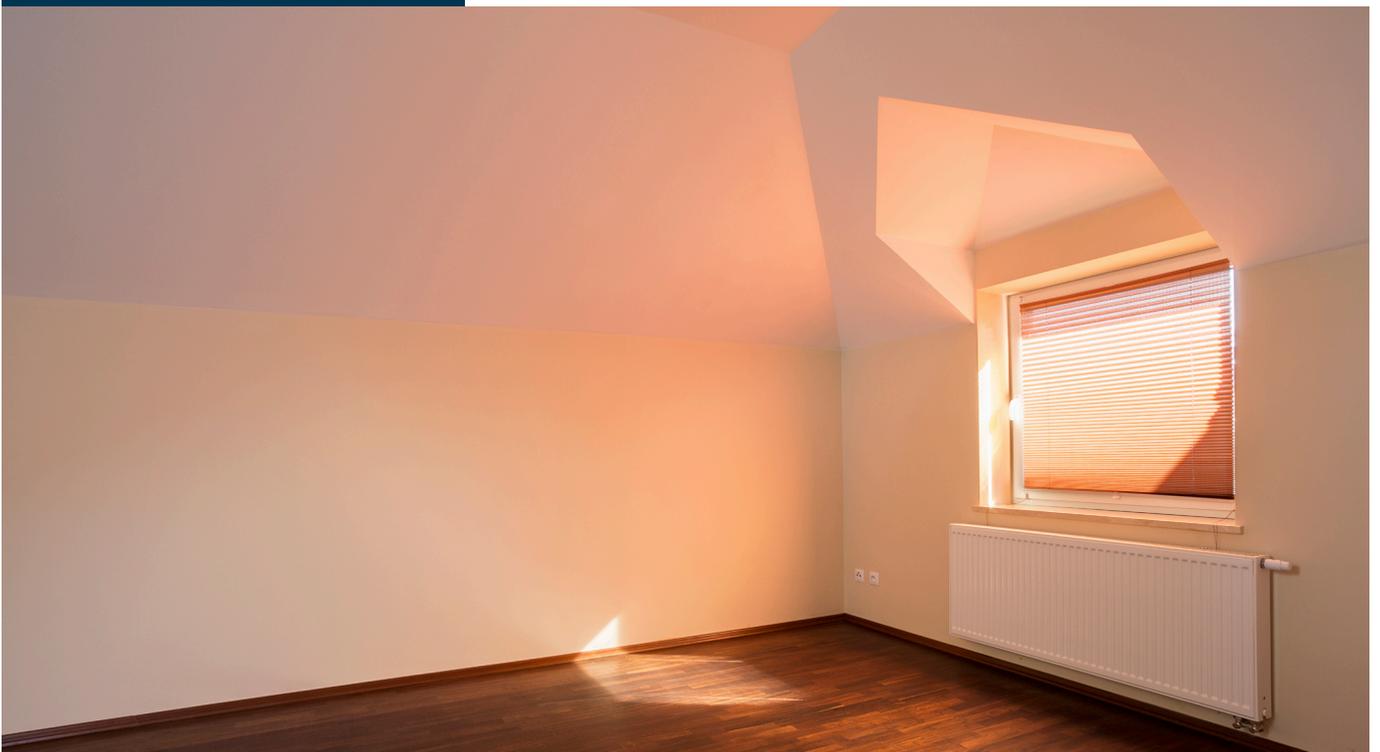
Context

Effective temperature regulation is an integral part of ensuring a comfortable home environment.

Achieving this is dependent on the home being designed to allow for seasonal changes, occupier preferences and global climate change, which are expected throughout the lifetime of the home.

The importance of effective temperature regulation has been emphasised by the increased risk of overheating⁽¹⁰⁷⁾, which is partly as a result of making homes more energy efficient through greater insulation and reduced air leakage. If the risk of a home overheating is not managed appropriately, the results can be fatal⁽¹⁰⁸⁾.

As such, encouraging thorough consideration of temperature, early in the design process, is essential for revealing when homes are at risk of overheating and implementing appropriate measures to manage this.



Credit Summary

There are two routes to assessing this issue; foundation and comprehensive routes. These routes represent varying degrees of rigour. The route selected will depend on whether or not compliant thermal modelling has been undertaken. More credits are available through the more rigorous comprehensive route, recognising that compliant thermal modelling represents current industry best practice.

Criterion number	Title	Credits
crit 1	01 Home information	Prerequisite
crit 2–crit 10	02 Routes of rigour (follow 02A or 02B) - Temperature analysis	up to 20 credits
crit 2–crit 4	02A Foundation route	up to 9 credits
crit 5–crit 10	02B Comprehensive route	up to 20 credits
Total credits available		20

Criteria

01 Home information		Prerequisite
crit 1	Home information is provided to the occupant relating to the temperature controls (see 33 Home Information on page 176).	
02 Routes of rigour (follow 02A or 02B) - Temperature analysis		up to 20 credits
02A Foundation route		up to 9 credits
Current conditions		for 5 credits
crit 2	The HQM high temperature tool has been completed using the current weather data files, and the output confirms that the threshold temperature is below 22 °C.	
Predicted climate change environment		for 4 credits
crit 3	crit 2 is achieved.	
crit 4	The HQM high temperature tool has been completed using projected climate change weather data and the output confirms that the threshold temperature is below 22 °C.	
02B Comprehensive route		up to 20 credits
Current conditions		for 12 credits
crit 5	Thermal modelling has been carried out using software in accordance with CIBSE AM11 ⁽¹⁰⁹⁾ Building Energy and Environmental Modelling.	
crit 6	The software used to carry out the simulation at the detailed design stage provides full dynamic thermal analysis.	
crit 7	The modelling demonstrates that: <ol style="list-style-type: none"> 1. For air-conditioned buildings: <ol style="list-style-type: none"> a. Summer operative temperature ranges in the home are in accordance with the criteria set out in CIBSE Guide A Environmental design⁽¹¹⁰⁾, Table 1.5 2. For naturally ventilated or free running buildings: <ol style="list-style-type: none"> a. The building is designed to limit the risk of overheating, in accordance with the adaptive comfort methodology outlined in CIBSE TM52: The limits of thermal comfort: avoiding overheating in European buildings⁽¹¹¹⁾. 	
Predicted climate change environment		for 8 credits
crit 8	crit 5–crit 7 are achieved.	
crit 9	The thermal modelling demonstrates that the relevant requirements set out in crit 7 are achieved for a projected climate change environment (see Definitions on page 75).	
crit 10	Where thermal comfort criteria are not met for the projected climate change environment, the project team demonstrates how the building has been adapted, or designed to be easily adapted in the future using passive design solutions in order to subsequently meet the requirements under crit 9	

Methodology

Foundation route

The foundation route requires the completion of the HQM high temperature reporting tool. Once completed and uploaded into the BREEAM projects online HQM assessment tool a 'Threshold temperature' output will be generated (through the HQM high temperature reporting tool) based on which credits are awarded.

The information used to determine the threshold temperature output is based on the Standard Assessment Procedure (SAP) inputs AND additional bolt-on inputs (through the HQM high temperature reporting tool).

For each assessed home:

1. Upload the HQM SAP ml file into the BREEAM projects online HQM assessment tool
 - a. Within the online HQM assessment tool, link the file to the relevant homes
2. Complete the additional bolt-on inputs in the HQM high temperature reporting tool
 - a. Upload the HQM high temperature reporting tool into the BREEAM projects online HQM assessment tools
 - b. Within the online HQM assessment tool, link the file to the relevant homes
3. Award credits according to the calculated threshold temperature.

The calculation methodology to determine the threshold temperature is described in the HQM Temperature supporting document

Comprehensive route

The comprehensive route in this issue requires the completion of compliant full dynamic simulation modelling. Please see crit 5–crit 10 on the previous page, the compliance notes and relevant definitions for further details of this route.

Compliance Notes

Criterion Reference	Compliance Note	
crit 5–crit 10	CN1 Comprehensive route - Smaller and more basic building designs	Under the comprehensive route, for smaller and more basic building designs with less complex heating or cooling systems, an alternative less complex means of analysis may be appropriate (such methodologies must still be in accordance with CIBSE AM11).

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
crit 1–crit 10	01 General Evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	
crit 2–crit 4	02 HQM high temperature tool	A copy of the completed HQM high temperature tool and documentary evidence supporting the data used to complete the tool.	As per design stage, but based on as-built evidence.
crit 5–crit 10	03 Thermal modelling output	A copy of the thermal modelling output and documentary evidence supporting the data used to complete the model. AND System specifications demonstrating that the worst case scenario will be met	As per design stage, but based on as-built evidence.

Checklists, Tables & Illustrations

None.

Definitions

Passive design

Passive design uses layout, fabric and form to reduce or remove mechanical cooling, heating, ventilation and lighting demand. Examples of passive design include optimising spatial planning and orientation to control solar gains and maximise daylighting, manipulating the building form and fabric to facilitate natural ventilation strategies and making effective use of thermal mass to help reduce peak internal temperatures.

HQM high temperature reporting tool

This is a reporting tool that feeds into a calculation methodology to identify a home's Threshold temperature. This has been developed by BRE solely for use within the foundation route of the 'Temperature' issue of the HQM assessment. The intention of this tool and accompanying calculation methodology is to support the offering of capped credits to homes whose circumstances make them less likely to be at risk of overheating during summer months, where full dynamic thermal analysis is not completed.

It assesses and scores the building on key factors that affect overheating risk on a whole house basis, and should not be treated as a detailed tool to identify the presence or absence of localised overheating.

The identified threshold temperature for the home uses data from SAP outputs and additional bolt-on inputs relating to the following topics:

- Surroundings
- Provision of mechanical ventilation
- Capacity for natural ventilation
- Solar gains
- Heat gains from communal heating
- User factors.

The calculation methodology to determine the threshold temperature is described in the HQM Temperature supporting document. Please note: this tool and accompanying calculation methodology will produce an estimated output founded on basic information inputs. To establish the overheating risk of a home, BRE Global would always recommend completing full dynamic thermal modelling in accordance with best practice.

Projected climate change weather data

Dynamic thermal simulation software packages currently provide the facility for building designs to be assessed under external climatic conditions specific to geographic location. Industry standard weather data for the UK is available in the form of Test Reference Years (TRYs) and Design Summer Years (DSYs) provided by CIBSE.

This weather data enables thermal analysis of building designs under current climatic conditions, yet no account is taken of projected variations in weather data that will occur during the building's lifecycle as a result of climate change. The following probabilistic DSY weather data files should be used to establish the projected climate change environment against which the design is evaluated:

Free running buildings

- Time period: 2050s
- Emissions scenario: Medium (A1 B)

Mechanically ventilated or mixed mode buildings

- Time period: 2030s
- Emissions scenario: Medium (A1 B).

The above weather files represent the minimum requirements to perform thermal modelling under a climate change scenario and subsequently demonstrate compliance. Where design teams feel that added consideration of building occupant risk or sensitivity to overheating is necessary, weather files can be used that exceed the minimum requirements outlined above. The time periods indicated above have been selected to represent the building services life cycle likely to be present in each building services strategy type. A shorter time period is chosen for mechanically ventilated or mixed mode building types due to consideration of mechanical servicing equipment lifespan (before major upgrade or replacement is required), and to avoid over-specification of plant which could lead to inefficient operation.

A range of alternative probabilistic weather files produced in accordance with the UK climate impacts programme (UKCIP) 2009 projections have been produced to be compatible with simulation software packages. These weather files provide the opportunity to evaluate the impact of varying climate change scenarios on building design performance throughout its life cycle.

Projected climate change weather files are currently available in TRYs and DSYs and according to three projected time periods; 2030s, 2050s and 2080s, and for each period, two 'emissions scenarios' are available; Medium Emissions (A1 B) and High Emissions

(A1 F1).

The PROMETHEUS project at Exeter University has produced a number of future weather files specific to different locations across the UK, created using the UKCP09 weather generator. Weather files produced under the PROMETHEUS project are available at emps.exeter.ac.uk

Thermal dynamic analysis

Thermal comfort analysis tools can be subdivided into a number of methods of increasing complexity. The most complex of these and the one that provides greatest confidence in results is the full dynamic model. This type of model enables annual heating or cooling loads, overheating risks and control strategies to be assessed.

Threshold temperature

The calculated mean 24-hour internal temperature during the warmest summer months, including an increment related to the thermal mass.

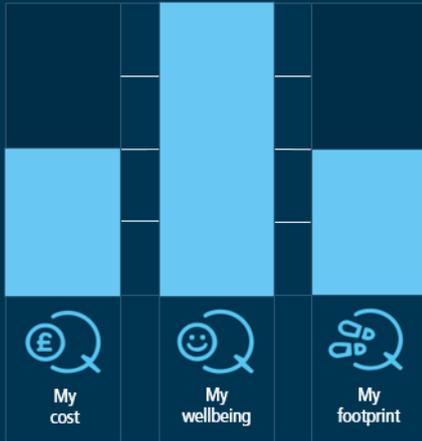
For details of how the threshold temperature is calculated, please refer to the HQM temperature guidance note.

14 VENTILATION

Max credits

12

Indicators (Average)



Aim

To encourage specification of adequate and appropriate ventilation systems, and provision of any associated operational support to reduce the risk of pollutant and moisture build up indoors that can negatively impact occupant health.

Benefit

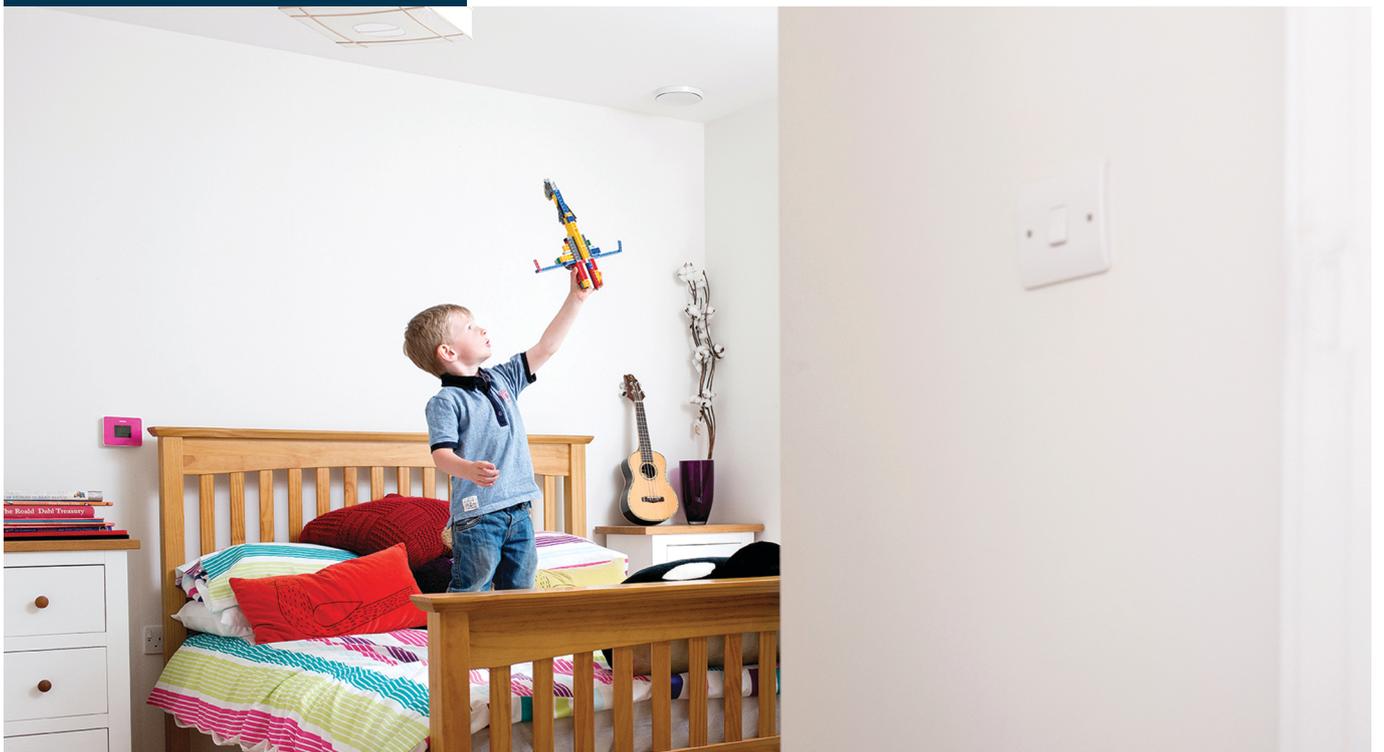
- Encourages designs that reduce the risk of pollutant and moisture build up in the home and the negative health impacts associated with this.
- Ensures that ventilation systems are easy to control, thus reducing costs.
- Rewards easy maintenance of systems.

Context

It is widely accepted that the quality of the indoor environment can impact occupant health.

The quality of the indoor environment is a complex combination of both externally and internally generated pollutants, which may be compounded by occupant behaviour. Personal preferences also have a significant impact on the acceptability of ventilation levels. The design of the ventilation system must therefore be robust, and controllable by the occupants, so that a healthy internal environment can be achieved and maintained.

Increasing levels of building airtightness means that the ventilation system must be capable of providing effective continuous ventilation to all areas of a home, for all levels of likely occupancy and without nuisance to avoid issues of poor air quality, stuffiness and high pollutant levels including VOCs and mould spores.



Credit Summary

Criterion number	Title	Credits
crit 1	01 Home information	prerequisite
crit 2–crit 3	02 Ventilation air intakes	for 4 credits
crit 4–crit 6	03 Ventilation rates	for 4 credits
crit 7–crit 9	04 Maintenance and controls	for 4 credits
Total credits available		12

Criteria

01 Home information		prerequisite
crit 1	Home information is provided to the occupant in accordance with Part 2, Item 9 of the Home Information issue (see 33 Home Information on page 176).	
02 Ventilation air intakes		for 4 credits
crit 2	crit 1 has been achieved.	
crit 3	The home's ventilation air intakes should avoid drawing in pollution in accordance with CIBSE TM21 ⁽¹¹²⁾ .	
03 Ventilation rates		for 4 credits
crit 4	crit 1 to crit 3 have been achieved.	
crit 5	The following is achieved according to the specified ventilation system: For System 1 and System 2 (see Definitions on page 80): 1. The total equivalent area of background ventilators is sized in accordance with the relevant local building regulations for ventilation, and based on assumed worst case occupancy, i.e. two occupants in all bedrooms (see CN2 on the facing page). For System 3 and System 4 (see Definitions on page 80) the specified ventilation system has the capacity to achieve: 2. The applicable minimum ventilation rate (see Methodology below) during continuous operation 3. A boost air flow rate of at least 25% greater than the applicable minimum ventilation rate.	
crit 6	crit 2 within the Internal and External Noise issue has been achieved (see 11 Internal and External Noise on page 61).	
04 Maintenance and controls		for 4 credits
crit 7	crit 1 to crit 6 are achieved.	
crit 8	Any required maintenance of any part of the ventilation system can be completed safely by the occupant.	
crit 9	For mechanical continuous ventilation systems (e.g. MVHR, MEV), controls are provided that enable sufficient control of the background continuous ventilation rate to meet varying occupancy levels without having to enable 'boost' mode.	

Methodology

Applicable minimum ventilation rate

- Identify the minimum ventilation rate for the home according to:
 - Number of bedrooms (see Table 16 on page 80), AND
 - Size of the home.
- Identify the applicable minimum ventilation rate. This is the larger of the two minimum ventilation rates calculated in step 1 above.
- Ensure the design of the ventilation system has the capacity to achieve the applicable minimum ventilation rate determined above.
- At post construction, test the ventilation system to ensure that the applicable minimum ventilation rate has been achieved (in accordance with the criteria).

Minimum ventilation rate – according to number of bedrooms

To calculate the minimum ventilation rate according to the number of bedrooms, please refer to Table 16 on page 80.

Minimum ventilation rate – according to size of the home

1. Calculate the area m² of floor space of all habitable rooms:
 - a. Living rooms
 - b. Dining rooms
 - c. Bedrooms
 - d. Any other habitable rooms.
2. Calculate the total area m² of floor space of all rooms identified above
3. Calculate minimum ventilation rate according to size as below:

$$MVR = 0.6 \times TFS$$

Where:

MVR = minimum ventilation rate according to size (*L/s*)

TFS = total m² of floor space of all habitable rooms

Compliance Notes

Criterion Reference	Compliance Note
CN1 Safely by the occupant	<p>Any specified ventilation system requiring maintenance must be designed to allow occupants to easily complete the work in a safe manner, to prevent systems becoming redundant or being unable to function to their designed intention.</p> <p>As a minimum, the occupant must be able to complete the required maintenance for any specified ventilation system in accordance with manufacturer's instructions and any other safety regulations.</p> <p>The accessibility and practicalities required to allow for 'easy' completion of any maintenance are key considerations. As these are likely to be dependent on the system installed, HQM does not prescribe these, but sets out below the minimum aspects that must be considered:</p> <ol style="list-style-type: none"> 1. The needs for access must consider the likely lifetime of each component (i.e. ducts 25+ years, etc.) 2. Location and accessibility of all system components 3. Location of access points to all 'built in' components 4. Occupants should not require specialised tools in order to carry out any required maintenance. <p>The assessor must be satisfied that the design has considered the above and is in keeping with the aim of this issue.</p>
CN2 Ventilation rates for System 1 and System 2	<p>In order to size the required area of background ventilators, a correction should be made to the standard areas listed in the respective building regulations for England, Wales and Northern Ireland to account for the assumed worst case occupancy levels, in accordance with the guidance notes given in the respective regulations. No correction is necessary for projects in Scotland.</p>

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
All criteria	01 General Evidence	One or more of the appropriate evidence types listed in Appendix C – HQM	

Criterion Reference	Title	Design Stage	Post Construction Stage
		evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	
crit 5	02 Inspection checklist and air flow measurement test sheet	Written commitment from the developer to achieve the requirements of crit 5 on page 78.	Completed and signed copies of part 1 and part 3 of the "Inspection checklist and air flow measurement test sheet" from the Domestic Ventilation Compliance Guide ⁽¹¹³⁾ demonstrating that the requirements of crit 5 on page 78 have been met.

Checklists, Tables & Illustrations

Table 16 Minimum ventilation rate – according to number of bedrooms

Number of bedrooms	Assumed maximum occupancy	Minimum ventilation rate (L/s)
1	2	13
2	4	21
3	6	29
4+	8 + 2 additional occupants per additional bedroom	37 + 8L/s per additional bedroom



The National Affordable Homes Agency guidance may be useful.⁽¹¹⁴⁾

Definitions

Building regulations for ventilation

The following table lists the building regulations applied for ventilation in each of the four countries of the UK:

Country	Ventilation regulations
Scotland	Technical Handbook 2015 Domestic - Environment
Northern Ireland	Technical Booklet K (Ventilation), October 2012
England and Wales	Approved Document F: Means of Ventilation, 2010 edition (incorporating further 2010 amendments)

Habitable rooms

This is a room used for home purposes, but which is not solely a kitchen, utility room, bathroom, cellar or sanitary accommodation.

Number of bedrooms

The as-built number of bedrooms should be used for the purpose of calculations and must be consistent with other issues assessed based on the number of bedrooms.

System 1

As defined in Approved Document F (2010)⁽¹¹⁵⁾, a system 1 ventilation system is background ventilators and intermittent extract fans.

System 2

As defined in Approved Document F (2010), a system 2 ventilation system is passive stack ventilation (PSV).

System 3

As defined in Approved Document F (2010), a system 3 ventilation system is continuous mechanical extract (MEV).

System 4

As defined in Approved Document F (2010), a system 4 ventilation system is continuous mechanical supply and extract with heat recovery (MVHR).

Ventilation

This is defined as the supply and removal of air (either by natural or mechanical means, or both) to and from a space or spaces in a building.

Ventilation rate

The ventilation rate is a measurement of the speed of air movement given in litres per second

ENERGY AND COST

This section discusses the following.

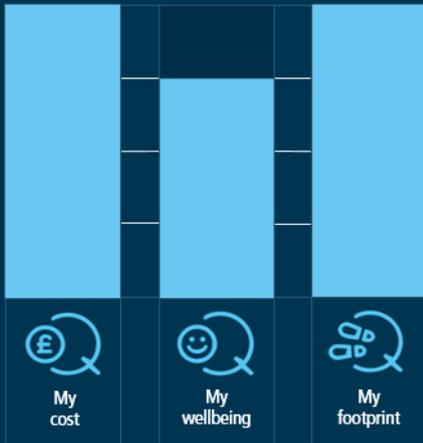
15 Energy and cost	82
16 Decentralised Energy	91
17 Impact on Local Air Quality	96

15 ENERGY AND COST

Max credits

62

Indicators (Average)



Aim

To improve energy performance and reduce costs associated with the running of the home and encourage increased rigour in calculating these.

Benefit

- Helps to reduce energy costs for occupants.
- Helps protect against the health and wellbeing implications of unaffordable energy bills.
- Limits the environmental impact of operating a home.

Context

It is well established that the energy efficiency of homes has significant impacts on human health with estimates of around 2.33 million households in England suffering from fuel poverty (2014)⁽¹¹⁶⁾. It is also a major contributor to global CO₂ emissions with homes contributing a significant proportion of the UK's total carbon emissions.

This makes reducing CO₂ emissions and energy costs a key challenge for homes in the UK and an essential part of meeting the Government's target to reduce CO₂ emissions by 80% by 2050⁽¹¹⁷⁾ (against 1990 levels).

This issue focuses on encouraging energy efficient design and construction and ensuring that homeowners and tenants are well informed on how their home should be operated so that the home's energy performance potential can be realised in practice.



Credit Summary

There are two routes to assessing this issue; foundation and comprehensive routes. These routes represent varying degrees of rigour. The route selected will depend on the provision of data to be input into the energy calculations, and the chosen route will be applied to both the 'Energy performance' and 'Cost' elements of this issue. More credits are available through the more rigorous comprehensive route, recognising that specification data has been used within the energy calculations in place of some assumptions.

Criterion number	Title	Credits
crit 1	01 Home information	prerequisite
crit 2–crit 3	02 Routes of rigour (follow 02A or 02B) – Energy performance	up to 42 credits
crit 2	02A Foundation Route	up to 30 credits
crit 3	02B Comprehensive Route	up to 42 credits
crit 4–crit 5	03 Towards carbon negative	up to 6 credits
crit 6–crit 7	04 Routes of rigour (follow 04A or 04B) – Cost	up to 14 credits
crit 6	04A Foundation Route	up to 9 credits
crit 7	04B Comprehensive Route	up to 14 credits
Total credits available		62

Criteria

01 Home information

crit 1 Home information is provided to the occupant relating to energy efficiency (see 33 Home Information on page 176).

02 Routes of rigour (follow 02A or 02B) – Energy performance

up to 42 credits

02A Foundation Route

up to 30 credits

crit 2 Calculate a home energy performance ratio (HEPR) via the foundation route (see Methodology on page 85). Compare the HEPR achieved with the benchmarks in Table 17 below (as appropriate) and award the corresponding number of credits.

02B Comprehensive Route

up to 42 credits

crit 3 Calculate a HEPR via the comprehensive route (see Methodology on page 85). Compare the HEPR achieved with the benchmarks in Table 17 below (as appropriate) and award the corresponding number of credits.

Table 17 HEPR benchmark scale

Credits	HEPR (via foundation route)	HEPR (via comprehensive route)
1	0.03	0.021
2	0.06	0.043
3	0.09	0.064
4	0.12	0.086
5	0.15	0.107
6	0.18	0.129
7	0.21	0.150
8	0.24	0.171
9	0.27	0.193
10	0.3	0.214
11	0.33	0.236
12	0.36	0.257
13	0.39	0.279
14	0.42	0.300
15	0.45	0.321
16	0.48	0.343
17	0.51	0.364
18	0.54	0.386

Credits	HEPR (via foundation route)	HEPR (via comprehensive route)
19	0.57	0.407
20	0.6	0.429
21	0.63	0.450
22	0.66	0.471
23	0.69	0.493
24	0.72	0.514
25	0.75	0.536
26	0.78	0.557
27	0.81	0.579
28	0.84	0.600
29	0.87	0.621
30	0.9 AND zero net regulated CO ₂ emissions	0.643
31		0.664
32		0.686
33		0.707
34		0.729
35		0.750
36		0.771
37		0.793
38		0.814
39		0.836
40		0.857
41		0.879
42		0.9 AND zero net regulated CO ₂ emissions



The four countries of the UK have their own building regulations for energy and while they use the same methodology and approved calculation software, each country has different definitions of the notional building and set different requirements for regulatory compliance, i.e. baseline performance. This is accounted for in the HEPR calculation methodology through the 'translator curves' defined for each country. Therefore, the HEPR and the HQM credits are determined by comparing the assessed buildings modelled operational energy performance relative to the regulatory baseline for the country in which the building is located (see definitions).

03 Towards carbon negative

up to 6 credits

crit 4 The building achieves a HEPR \geq 0.9 and zero net regulated CO₂ emissions.

crit 5 A percentage of the buildings unregulated operational energy consumption (as calculated in SAP - Section 16) equivalent to those stipulated in Table 18 is generated by carbon neutral on site or near site sources (see Definitions on page 87).

Table 18 Towards carbon negative benchmark scale

Credits	Percentage of the building's unregulated operational energy consumption
1	10%
2	20%
3	40%
4	60%
5	80%
6	> 100% (i.e. carbon negative)

04 Routes of rigour (follow 04A or 04B) – Cost

up to 14 credits

04A Foundation Route

up to 9 credits

crit 6 Calculate a cost output via the foundation route (see Methodology below). Compare the cost output achieved with the benchmarks in Table 19 (as appropriate) and award the corresponding number of credits.

04B Comprehensive Route

up to 14 credits

crit 7 Calculate a cost output via the comprehensive route. Compare the cost output achieved with the benchmarks in Table 19 (as appropriate) and award the corresponding number of credits.

Table 19 Cost output benchmark scale

Credits	Cost output (via foundation route)	Cost output (via comprehensive route)
1	0.1	0.064
2	0.2	0.129
3	0.3	0.193
4	0.4	0.257
5	0.5	0.321
6	0.6	0.386
7	0.7	0.45
8	0.8	0.514
9	0.9	0.579
10		0.643
11		0.707
12		0.771
13		0.836
14		0.9

Methodology

Selecting the rigour route

The HQM energy engine will complete the calculations required to assess against crit 2–crit 7 above of this issue. However, prior to completing these calculations the assessor will be required to identify the desired rigour route against which the home is to be assessed. For the purposes of this issue, the selection of the rigour route determines the inputs required.

For this issue there are two rigour routes: the foundation route, and the comprehensive route.

Credits are capped where the foundation route is selected. Maximum credits can only be achieved by following the comprehensive route.

Note: the rigour route selected will be applied consistently across the Energy Forecast and Cost issue (i.e. if the foundation route is selected, it will be applied to both the '02 Energy Performance' and '04 Cost' criteria).

Foundation route

The information used in this route is based on standard SAP inputs ONLY.

For each assessed home:

1. Upload the HQM SAP XML file into the BREEAM projects online HQM assessment tool
 - a. Within the online HQM assessment tool, link the file to the relevant homes
2. Where relevant, upload the BRUKL Output Document: Compliance with Building Regulations output document into the BREEAM projects online HQM assessment tool
 - a. Within the online HQM assessment tool, link the output document to the relevant homes

Comprehensive route

The information used in this route is based on SAP inputs AND additional bolt-on inputs.

For each assessed home:

1. Upload the HQM SAP XML file into the BREEAM projects online HQM assessment tool
 - a. Within the online HQM assessment tool, link the file to the relevant homes
2. Where relevant, upload the BRUKL Output Document: Compliance with Building Regulations output document into the BREEAM projects online HQM assessment tool
 - a. Within the online HQM assessment tool, link the output document to the relevant homes
3. Complete the additional bolt-on inputs (see Table 20) in the HQM energy reporting tool
 - a. Upload the HQM energy reporting tool file into the BREEAM projects online HQM assessment tool
 - b. Within the online HQM assessment tool, link the file to the relevant homes

Identifying the scope of the energy calculations

For the purposes of the HQM, the energy calculations used to assess against crit 2–crit 7 on the previous page must be carried out at the individual home level. Energy averaging cannot be applied.

However, where homes are served by heated common areas (assessed under ADL2a), these must be included in the energy calculations.

In these cases, a copy of the BRUKL Output Document: Compliance with Building Regulations output document for the heated common area must be input into the calculations and linked to the relevant homes (i.e. those served by the heated common area).

For the purposes of the HQM assessment, the performance of the heated common areas will be distributed equally across the total number of homes served by this area and reflected in the individual home's outputs.

The methodology summarised above will be described in greater detail in CS091 (HQM Energy Forecast and Cost supporting document).

Calculation methodologies

Details of the calculation methodologies used to determine the outputs required to demonstrate compliance against crit 2–crit 7 on the previous page through both the foundation and comprehensive routes is provided in CS091.

Compliance Notes

Criterion Reference	Compliance Note	
All	CN1 Energy averaging	Energy averaging is not permitted for the purposes of the HQM assessment. As the HQM assessment is completed at the home level, the scorecard must present the performance of the individual home to allow for comparison between homes.
All	CN2 Heated common areas	Heated common areas assessed under ADL2a must be included in the energy calculations. Details of how to do this are provided in Methodology on the previous page
All	CN3 Renewable and low carbon installations	Where included as part of the project and therefore assessed under this HQM issue, the installation of low or zero carbon technologies (LZCT) can be used to offset CO ₂ emissions arising from regulated and, in the case of crit 4–crit 5 on page 84, Unregulated energy consumption. The LZCT technology can be installed on site or near site (see definitions) where a private wire arrangement is in place.
All	CN4 Building assessed as part of a larger development	Where the building under assessment forms part of a larger development and either a new or existing LZCT installation is provided for the whole site, then the amount of LZCT energy generation counted for in this issue, and subsequent CO ₂ emissions saved, should be proportional to the building's energy consumption compared to the total energy consumption for the site.
All	CN5 SAP - Section 16	Section 16 of SAP extends the SAP calculations to account for CO ₂ emissions associated with unregulated operational energy consumption. It calculates the CO ₂ emissions from appliances and cooking. Section 16 also allows for site-wide electricity generating technologies. Outputs from section 16 should be used to determine the percentage of the building's unregulated operational energy consumption figure required for crit 4–crit 5 on page 84.
All	CN6 Phased or multiple home development	See Appendix D – Post-construction stage assessment issue exceptions on page 207.

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
All	01 General Evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	
crit 2–crit 7	02 HQM energy reporting tool	A copy of the completed HQM energy reporting tool and documentary evidence supporting the data used to complete the tool.	As per design stage, but based on as-built evidence
crit 2–crit 7	03 SAP outputs	Copies of the SAP output documents used in the HQM energy tool	As per design stage, but based on as-built evidence

Checklists, Tables & Illustrations

Checklists, Tables & Illustrations

Table 20 Comprehensive route 'bolt-on' calculations

Bolt-on topics	Required data
Internal lighting	For each light: <ul style="list-style-type: none"> – No. of bulbs – Efficacy (lm/W) – Circuit Watts/lamp
Hot water	For all baths and showers: <ul style="list-style-type: none"> – No. of fittings – Flow rate of each fitting.
Appliances	The kWh/annum or kWh/cycle figure (taken from the EU energy label) for each of the following appliances (where specified): <ul style="list-style-type: none"> – Fridge – Freezer – Fridge/freezer – Wine storage appliance – Washer/dryer – Washing machine – Tumble drier – Dishwasher – Oven.

Definitions

Accredited energy assessor

A person registered with an accredited energy assessment scheme provider. The scheme provider will be licensed by the relevant Government department to accredit competent persons in the energy assessment of non-domestic or domestic buildings for the purposes of demonstrating compliance with the Building Regulations in the country of origin. The energy assessor should be appropriately accredited for the building being assessed.

- For a full list of approved accreditation schemes or organisations for energy assessors and links to registers of accredited energy assessors, visit:
 - Wales: www.ndepregister.com (non-domestic), www.epcregister.com (domestic)
 - Scotland: www.scotland.gov.uk

- Northern Ireland: www.epbniregisternd.com (non-domestic), www.epbniregister.com (domestic)
- England: www.ndepcregister.com (non-domestic), www.epcregister.com (domestic)

Approved building energy calculation software

Software approved for the purpose of demonstrating compliance with the energy efficiency and carbon emission requirements of the building regulations.

For domestic buildings, this refers to approved SAP software a list of which can be found at the following:

1. Wales, England and Scotland: www.bre.co.uk/sap2012
2. Wales, England and Scotland: www.bre.co.uk/sap2012

For non-domestic buildings, this refers to approved SBEM software's (and its interface iSBEM, as well as third party software approved by the relevant Government department), a list of which can be found at the following:

1. Wales, Northern Ireland and England: www.ncm.bre.co.uk
2. Scotland: www.scotland.gov.uk

BREDEM

The Building Research Establishment Domestic Energy Model (BREDEM) is a calculation methodology to estimate the energy consumption of a home based on its characteristics. It complies with the principles given in BS EN 13790:2008. Energy performance of buildings. Calculation of energy use for space heating and cooling⁽¹¹⁸⁾.

The output of a BREDEM calculation is in the form of estimated fuel requirements for various end uses, which can be converted readily into fuel costs or CO₂ emissions using suitable conversion factors. BREDEM is therefore suited to various energy modelling tasks, such as stock modelling and the assessment of the potential benefits of energy efficiency improvements.

Building Regulations

Building regulations set standards for the design and construction of buildings to ensure the safety and health of people in or about those buildings. They also include requirements to ensure that fuel and power is conserved and facilities are provided for people, including those with disabilities, to access and move around inside buildings.

In Scotland, they also aim to secure the welfare and convenience of persons in or about buildings and to further the achievement of sustainable development. See the definition of building regulations for energy for details of the relevant documents for each country.

Building regulations for energy

The following table lists the current building regulations applied for energy in each of the four countries of the UK:

Country	Domestic energy regulations	Non-domestic Energy Regulations (used to assess communal areas)
Scotland	Technical Handbook 2013 Domestic, Section 6 Energy	Technical Handbook 2013 Non-Domestic, Section 6 Energy
Northern Ireland	Technical Booklet F1 (Conservation of fuel and power in dwellings), October 2012	Technical Booklet F2 (Conservation of fuel and power in buildings other than dwellings), October 2012
England	Approved Document L1A: Conservation of fuel and power in new dwellings, 2013 edition – for use in England	Approved Document L2A: Conservation of fuel and power in new buildings other than dwellings, 2013 edition – for use in England
Wales	Approved Document L1A: Conservation of fuel and power, New dwellings, July 2014 – for use in Wales	Approved Document L2A: Conservation of fuel and power, New buildings other than dwellings, July 2014 – for use in Wales

Carbon negative building

A building or site that generates, surplus to its own energy demand, an excess of renewable or carbon neutral energy and exports that surplus via the national grid to meet other, off-site energy demand, i.e. the building is a net exporter of zero carbon energy. Surplus in this respect means the building or site generates more energy via renewable or carbon neutral sources than it needs to meet its own regulated and unregulated energy needs.

This definition of carbon negative focuses only on energy and carbon dioxide emissions resulting from the operational stage of the building life cycle, as this is the stated aim of this assessment issue. It does not take into account the embodied carbon, in terms of carbon fixing, or emissions resulting from the manufacture or disposal of building materials and components. These impacts and benefits are dealt with in Environmental impact of construction products.

Carbon neutral

Carbon neutral means that, through a transparent process of calculating building operational emissions, reducing those emissions and offsetting residual emissions, net carbon emissions equal zero. This includes carbon emissions from both regulated and

unregulated energy consuming plan and systems. Also see the definition of zero net regulated carbon (CO₂) emissions .

Cost output

The cost output is unique to the HQM and is calculated by the HQM energy tool using modelled outputs from approved building energy calculation software , against which cost credits are awarded.

It is an output based on the energy cost factor metric taken from the SAP assessment.

When calculating the cost output, a home's actual performance is compared against the relevant national building regulations compliance standard (i.e. a baseline), and the comparison is expressed as a percentage improvement.

The percentage improvement is then compared against a best practice performance level for modelled stock of house types, and then 'translated' into a cost output.

A description of how to obtain a home's cost output is summarised in Methodology on page 85. Greater detail of how the cost output is defined and calculated is provided in the HQM energy guidance document.

Dwelling Emission Rate (DER)

The DER is the estimated CO₂ emissions per m² per year (kg CO₂/m²/year) for the home as designed. It accounts for energy used in heating, fixed cooling, hot water and lighting.

Energy cost factor

This is the total predicted regulated energy of running the home per annum, multiplied by a cost deflator accounting for inflation for the year of construction, and divided by floor area.

Energy demand

The building energy provided for end uses in the building such as space heating, hot water, space cooling, lighting, fan power and pump power. Energy demands are the same as room loads. One of the outputs from the Building Regulations Output Document is for heating and cooling energy demand only, not for any other building energy uses. Heating and cooling energy demands are influenced by factors including building fabric heat loss, air permeability, glazing and shading.

Home energy performance ratio (HEPR)

A metric that is unique to the HQM that is calculated by the HQM energy tool using modelled outputs from approved building energy calculation software, against which HEPR credits are awarded.

It is a ratio that defines the performance of a HQM assessed home in terms of its:

1. Heating and cooling energy demand (the fabric performance)
2. Primary energy consumption (system efficiency)
3. Total resulting CO₂ emissions.

For each metric, the home's actual performance is compared against the relevant National Building Regulations compliant standard (i.e. a baseline), and the comparison expressed as a percentage improvement.

The percentage improvement for each metric is then compared against a best practice performance level for modelled stock of house types, and then 'translated' into a ratio of performance for each metric. These ratios are then weighted for each metric and added together to determine a single overall HEPR.

A description of how to obtain a home's HEPR is summarised in Methodology on page 85. Greater detail of how the HEPR is defined and calculated is provided in the HQM energy guidance document.

HQM energy reporting tool

A reporting tool used for the purposes of the HQM assessment to compile energy related data to feed into the calculations in order to determine the number of credits that can be awarded for crit 2–crit 5 on page 84 of this issue (Energy forecast and cost).

Low or zero carbon technologies (LZCT)

A low or zero carbon technology provides a source of energy generation from renewable energy sources or from a low carbon source such as combined heat and power (CHP) or a ground source heat pump (GSHP).

Near-site LZCT

A low or zero carbon source of energy generation located near to the site of the assessed building. The source is most likely to be providing energy for all or part of a local community of buildings, including the assessed building, e.g. decentralised energy generation linked to a community heat network or renewable electricity sources connected via private wire.

Notional building

A hypothetical building of the same size, shape, orientation and shading as the actual building, with the same activities, zoning and system types and exposed to the same weather data, but with pre-defined specified properties for the building fabric, fittings and services.

The notional building is concurrent with the building regulations for energy for each country, and a percentage improvement is applied to define the compliant building target carbon dioxide emissions rate (TER).

On-site LZCT

A low or zero carbon source of energy generation which is located on the same site as the assessed building.

Primary energy

Energy from fossil fuel and renewable sources that has not undergone any conversion or transformation process. Primary energy is transformed by the means of energy generation used and its transmission to the building.

Primary energy consumption

This refers to the direct use at the source, or supply to users without transformation, of crude energy, that is, energy that has not been subjected to any conversion or transformation process.

Private wire arrangement

In the context of the HQM for low or zero carbon technology installations, a private wire arrangement is where any electricity generated on or in the vicinity of the site is fed directly to the building being assessed, by dedicated power supplies. If electricity is generated which is surplus to the instantaneous demand of the building, this electricity may be fed back to the national grid. The carbon benefit associated with any electricity fed into the grid in this manner can only be allocated against an individual installation or building. In cases where a building is supplied by a communal installation, no carbon benefit can be allocated to buildings which are not connected to the communal installation.

Regulated energy

This is building energy consumption resulting from the specification of controlled, fixed building services and fittings, including space heating and cooling, hot water, ventilation and lighting.

Standard assessment procedure (SAP)

The standard assessment procedure (SAP) is the methodology used by the Government to assess and compare the energy and environmental performance of homes. Its purpose is to provide accurate and reliable assessments of home energy performances that are needed to underpin energy and environmental policy initiatives.

SAP works by assessing how much energy a home will consume, when delivering a defined level of comfort and service provision. The assessment is based on standardised assumptions for occupancy and behaviour. This enables a like-for-like comparison of home performance. Related factors, such as fuel costs and emissions of carbon dioxide (CO₂), can be determined from the assessment. SAP quantifies a home's performance in terms of: energy use per unit floor area, a fuel-cost-based energy efficiency rating (the SAP Rating) and emissions of CO₂ (the Environmental Impact Rating). These indicators of performance are based on estimates of annual energy consumption for the provision of space heating, domestic hot water, lighting and ventilation. Other SAP outputs include estimates of appliance energy use, the potential for overheating in summer and the resultant cooling load.

Target emission rate (TER)

The target emission rate is the maximum allowable CO₂ emissions per m² (Kg CO₂/m²/year) arising from energy used in heating, cooling, hot water and lighting which would demonstrate compliance with Criterion 1 of AD L1A.

For domestic buildings, the TER is calculated using the SAP methodology according to the requirements defined in AD L1A.

For non-domestic buildings, the TER is calculated in accordance with the National Calculation Methodology (NCM) and Simplified Buildings Energy Model (SBEM).

The Simplified Building Energy Model (SBEM)

SBEM is software developed for DCLG by BRE. SBEM is a computer program that provides an analysis of a building's energy consumption. It calculates monthly energy use and carbon dioxide emissions of a building (excluding homes) based on a description of the building geometry, construction, use and HVAC and lighting equipment.

SBEM is accompanied by a basic user interface, iSBEM. There also exists alternative approved software 'front-end' interfaces for SBEM (see definition of Approved building energy calculation software).

Unregulated energy

This is the energy consumption of the home that is not 'controlled', i.e. energy consumption from aspects of the home on which building regulations do not impose a requirement.

For the purposes of the HQM assessment, this includes energy associated with appliances and cooking (as outlined in SAP section 16).

Zero net regulated carbon (CO₂) emissions

The annual building net regulated CO₂ emissions (kg CO₂/m²/yr) arising as a result of annual energy consumption from fixed building services, i.e. space heating and cooling, domestic hot water, ventilation and lighting, also referred to as controlled services and fittings, as a result of requirements imposed on such systems by the Building Regulations.

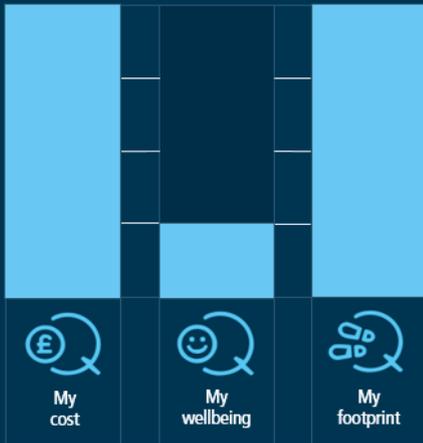
In aiming to achieve a zero regulated carbon status, the building energy modelling can take account of contributions of energy generated from on-site and near-site renewable and low carbon installations. Energy generated and supplied from off-site renewable and low carbon installations cannot be used to meet this definition.

16 DECENTRALISED ENERGY

Max credits

10

Indicators (Average)



Aim

To maximise the cost and carbon saving benefits of generation from Low and Zero Carbon Technologies (LZCTs) by encouraging best practice when selecting and installing these systems, or alternatively provide the infrastructure for these systems to be retrofitted in a cost effective and efficient way.

Benefit

- Reduce the occupant’s costs by encouraging the best installation of the most effective technologies.
- Reduce warranty claims to house builders.
- Protect consumers from fluctuating energy costs and incentives.

Context

The Decentralised Energy issue recognises good practice in relation to the installation of LZCTs and integration of design features to support potential future retrofits. Credits are awarded in relation to the decision-making process, looking at who completed the feasibility study and how detailed it is, as well as whether recommendations will be implemented and if there are any retrofit and performance monitoring features. Please note direct performance benefits from installing LZCTs will be recognised within the energy performance and cost issue as a result of the energy calculations.



Credit Summary

Criterion number	Title	Credits
crit 1	01 Home information	Prerequisite
crit 2	02 Feasibility study	for 2 credits
crit 3–crit 4	03 Implementation of feasibility study findings	up to 6 credits
crit 3	03A Installation	for 6 credits
crit 4	03B Infrastructure	for 3 credits
crit 5	04 Monitors and controls	for 2 credits
Total credits available		10

Criteria

01 Home information	prerequisite
crit 1 Providing relevant home information regarding any LZCT system installations or retrofit options available to the householder is a prerequisite for this issue (see 33 Home Information on page 176).	
02 Feasibility study	for 2 credits
crit 2 An independent assessment prepared by an appropriately qualified professional (AQP) is carried out to establish the most feasible recognised local (on-site LZCT or near-site LZCT) low or zero carbon (LZC) energy sources for the building or development, as well as any suitable infrastructure for future retrofit (CN2 and CN4 on the facing page).	
03 Implementation of feasibility study findings	up to 6 credits
03A Installation	for 6 credits
crit 3 Where LZCTs are designed and installed in line with the feasibility study findings (CN2 below).	
03B Infrastructure	for 3 credits
crit 4 Where the feasibility study confirms the installation of LZCTs is not currently a viable option, appropriate infrastructure is installed to allow the future retrofit of LZCTs in accordance with the feasibility study recommendations (CN4 on the facing page).	
04 Monitors and controls	for 2 credits
crit 5 Where monitoring and control systems have been installed to display the operational status and availability of installed LZCTs to occupants, via an accessible device or devices (CN5 on page 94).	

Methodology

None.

Compliance Notes

Criterion Reference	Compliance Note	
All criteria	CN1 Phased or multiple home development	See Appendix D – Post-construction stage assessment issue exceptions on page 207.
crit 2	CN2 Feasibility study	The feasibility study should cover as a minimum: <ol style="list-style-type: none"> 1. Energy generated from LZCT per year. 2. Carbon dioxide savings from LZCTs per year. 3. Life cycle cost of the potential specification, accounting for payback. 4. Local planning criteria, including land use and noise. 5. Feasibility of exporting heat or electricity from the system. 6. Take into account any available green tariffs (Feed-In Tariff and Renewable Heat Incentive) and other grants.

Criterion Reference	Compliance Note	
		<ol style="list-style-type: none"> 7. All technologies appropriate to the site and energy demand of the development. 8. Reasons for excluding other technologies. 9. Where appropriate to the building type, connecting the proposed building to an existing local community CHP system or source of waste heat or power OR specifying a building or site CHP system or source of waste heat or power with the potential to export excess heat or power via a local community energy scheme.
crit 2 and crit 3	CN3 Recognised LZCTs options (119)(120)(121)	<p>Eligible technologies must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (www.eur-lex.europa.eu/en).</p> <p>The following requirements must also be met:</p> <ol style="list-style-type: none"> 1. There must be a direct supply of energy produced to the building under assessment. 2. Where covered by the Microgeneration Certification Scheme (MCS), technologies under 50kWe or 45kWth must be MCS (or equivalent) certified products installed by MCS (or equivalent) certified installers. 3. Combined heat and power (CHP) schemes above 50kWe must be certified under the CHPQA standard. CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. 4. Air source heat pumps can only be considered as a renewable technology when used in heating mode. Refer to Annex VI of Directive 2009/28/EC for more detail on accounting for energy from heat pumps. 5. Where MCS or CHPQA certification is not available, the design team must investigate the availability of alternative accreditation schemes in line with the Directives listed above, or an equivalent country or regional directive or standard. Where an alternative accreditation scheme exists it should be used for the purpose of verifying compliance of the specified LZCT. If no alternative accreditation scheme exists, the design team must demonstrate they have investigated the competence of the installer selected to install the LZCT and are confident that they have the skill and competence to install the technology appropriately.
crit 4	CN4 LZCT Infrastructure ⁽¹²²⁾	<p>The following should be provided to allow for the future installation of LZCT options:</p> <p>Photovoltaics (PV):</p> <ol style="list-style-type: none"> 1. Architectural drawings and electrical diagrams detailing the proposed and installed system components. 2. Designated area for mounting the inverter and balance of system components. 3. Designated conduit area for the DC cable run from the proposed array location to the proposed inverter location. 4. Designated conduit area for the AC cable run from the proposed inverter location to electrical service panel. 5. Labelled slot for monitoring and metering equipment. 6. Labelled slot for a circuit breaker or a pre-install circuit breaker. 7. Confirmation of the space and load (weight) capability, e.g. loft floors, gable walls etc. are strong enough for panel retrofit.

Criterion Reference	Compliance Note
	<p>8. If applicable, confirmation that the landscape planting uses low-growth trees and bushes, to avoid any potential shading issues in future.</p> <p>Solar Thermal (ST):</p> <ol style="list-style-type: none"> 1. Architectural drawings and plumbing diagrams detailing the pre-installed and proposed system components. 2. Designated area adjacent to the twin coil cylinder for mounting the balance of system components or pumping package. 3. Designated conduit area from utility room to the attic space below the proposed array space. 4. An electrical outlet near the designated wall area. 5. A solar bypass valve on the cold water feed of the water heater. 6. If applicable, confirmation that the landscape planting uses low-growth trees and bushes, to avoid any potential shading issues in future. <p>District Heating (DH option):</p> <ol style="list-style-type: none"> 1. Heating and hot water systems sized based on a maximum flow temperature of 70°C and a return temperature of 40°C. 2. Designated area for the Hydraulic interface unit (HIU). 3. Provision of an electrical outlet and lighting near the designated wall area and a fused spur on a dedicated circuit to feed the HIU. 4. Heating system primary pipework arranged and shown on schematics to facilitate the future connection to the DH pipework. For example, main flow and return primary pipework to be routed from the designated area into the building heat emitter system. 5. Designated area for pipework conduit <p>For LZCT options not covered above, please consult BRE Global.</p>
crit 5	<p>CN5 Accessible device</p> <p>For the purposes of meeting the accessibility part of the monitors and controls criteria of this issue, a web or mobile interface must be available to occupants that meet the WCAG2.0 (ISO/IEC 40500) accessibility standards.</p> <p>Where only a visual display unit is installed, an additional device must have been installed that meets an equivalent level of accessibility to ensure it is usable by people with disabilities.</p>

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
All	01 General Evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	
All	02 Feasibility study	A copy of the feasibility study and a summary of the required criteria in line with CN1 on page 92.	
crit 3 and crit 4	03 Installation and commissioning certificates	Copies of the relevant architectural drawings, plumbing and electrical diagrams in line with CN2 on page 92 and CN3 on the previous page.	
crit 4	04 Infrastructure	Evidence demonstrating CN4 on the previous page has been met.	

Checklists, Tables & Illustrations

None

Definitions

Appropriately qualified professional (AQP)

In order to complete the feasibility study the individual will have acquired substantial expertise or a recognised qualification for undertaking assessments, designs and installations of low or zero carbon solutions in the domestic buildings sector and is not professionally connected to a single low or zero carbon technology, manufacturer or installer. In order to complete the design and specification of the mechanical and electrical details, the individual will have acquired the relevant industry training and qualifications.

Competent Persons Scheme (CPS)

Competent Person Schemes (CPS) allow individuals and enterprises to self-certify that their work complies with the Building Regulations as an alternative to submitting a building notice or using an approved inspector. A Competent Person must be registered with a scheme that has been approved by The Department for Communities and Local Government (DCLG). Schemes authorised by the DCLG are listed on its website at www.communities.gov.uk.

Near-site LZCT

A low or zero carbon source of energy generation located near to the site of the assessed building. The source is or will be providing energy for all or part of a local community of buildings, including the assessed building, e.g. decentralised energy generation linked to a community heat network or renewable electricity sources connected via private wire.

On-site LZCT

A low or zero-carbon source of energy generation which is located on the same site as the assessed building.

Recognised evaluation tools and methodologies

Tools and methodologies recommended by the relevant professional bodies and trade associations.

17 IMPACT ON LOCAL AIR QUALITY

Max credits

11

Indicators (Average)



Aim

To promote the use of heating and hot water generating appliances with minimal impact on local air quality.

Benefit

- Reduces the impact on local air quality helping to protect human health.
- Reduces the risk of impact on sensitive ecosystems.

Context

The quality of the air we breathe impacts our health and those in our community, particularly the young. There are significant numbers of premature deaths and diseases associated with poor air quality. The World Health Organisation estimates that there are 500,000 premature deaths across Europe per year associated with, or as a result of poor air quality⁽¹²³⁾.

Combustion processes in vehicle engines, power generation, homes and industry generate air pollutants, including carbon dioxide, nitrous oxides (NO_x), sulphur oxides (SO_x) and small particulates, (particles smaller than 10 and 2.5 microns, respectively). These emissions are managed by local authorities through the Local Air Quality Management (LAQM) framework, as part of the Environment Act (1995).

While the main sources of air pollutants are dominated by road transport and large combustion plants; homes and the choice of heating and hot water systems do have an impact. NO_x levels vary considerably across the UK, with levels in urban areas and close to major roads being many times greater than in rural areas. This means that emissions from heating systems will have a much greater impact in areas where NO_x emissions are already high. This issue considers fuel types and if a site is connected to the gas grid.



Credit Summary

Criterion number	Title	Credits
crit 1–crit 5	01 Impact on local air quality	up to 11 credits
Total credits available		11

Criteria

01 Impact on local air quality

up to 11 credits

Consider which of the following fuel types have been installed to meet the home’s hot water and heating demand, then go straight to the appropriate criteria:

1. Natural gas - crit 1
2. Electricity - crit 2

Where the home is on a development that is off mains gas:

3. Oil - crit 3
4. Biomass (solid wood fuel only) - crit 4
5. Multiple appliances with a mixture of fuel types - crit 5

01A Natural gas

up to 11 credits

- crit 1 A natural gas fired appliance has been installed to meet the home’s hot water and heating demand. Under normal operating conditions, a NO_x emission level (measured on a dry basis at 0% excess O₂) is in line with the levels seen in Table 21 (also see CN2, CN3, CN4, CN5 and CN6).

Table 21 Dry NO_x emission levels (mg/kWh) and associated credits

Credits	Dry NO _x emission level (mg/kWh)
8	≤ 56 dry NO _x
11	≤ 40 dry NO _x

01B Electricity

for 11 credits

- crit 2 Where the heating or hot water demand is met using electricity, it is assumed that this will have zero impact upon the local air quality. Subsequently maximum credits can be awarded (also see CN2, CN3, CN4, CN5 and CN6 on page 100).

01C Oil (not connected to the gas grid)

for 5 credits

- crit 3 An oil-fired appliance has been installed to meet the home’s hot water and heating demand. Under normal operating conditions, a NO_x emission level (measured on a dry basis at 0% excess O₂) of ≤ 120 mg/kWh has been achieved (also see CN2, CN3 and CN4 on page 99).

01D Biomass (not connected to the gas grid)

for 5 credits

- crit 4 A biomass (solid wood fuel only) appliance has been installed to meet the home’s hot water and heating demand. Under normal operating conditions, a NO_x emission level (measured on a dry basis at 0% excess O₂) of ≤ 200 mg/m³ has been achieved (also see CN2, CN3 and CN4 on page 99).

01E Multiple appliances with a mixture of fuel types (not connected to the gas grid)

for 5 credits

- crit 5 Multiple appliances with a mixture of fuel types have been installed to meet the home’s hot water and heating demand. The NO_x emission level (measured on a dry basis at 0% excess O₂), under normal operating conditions, have met the eco-design limits for the relevant fuel types (also see CN2, CN3, CN4, CN5, CN7 and CN8 on page 100).

Methodology

Conversion factors for natural gas boilers

Manufacturers should supply dry NO_x emissions data in mg/kWh. Where this is not possible the assessor should use the following conversion factors to convert figures in mg/m³, ppm or wet NO_x (derived using data from BS EN 297:1994). It should be noted that these conversion factors assume worst-case efficiencies and are likely to give a high estimate. This could have the effect of lowering the number of credits achieved.

1. Figures in mg/m³ should be multiplied by 0.859 in order to show emissions in mg/kWh. A conversion may also be necessary for data not calculated at 0% excess oxygen.
2. Figures in parts per million (ppm) should be multiplied by 1.76 in order to show emissions in mg/kWh. A conversion may also be necessary for data not calculated at 0% excess oxygen.
3. Figures in mg/MJ should be multiplied by 3.6 in order to show emissions in mg/kWh (1 kWh = 3.6 MJ). A conversion may also be necessary for data not calculated at 0% excess oxygen.

Wet NO_x conversion factor for natural gas boilers

The criteria are based on dry NO_x values; almost all manufacturers will quote emissions measured on a dry basis. However, if wet NO_x figures are supplied, these will need to be converted to dry. The following formula should be used to determine the wet NO_x conversion factor:

$$\text{Conversion factor } c = 100 / (100 - y)$$

Where y is the % water vapour content measured in the gas. This figure should be obtained from the manufacturer.

Excess oxygen correction for natural gas boilers

If a NO_x emission rate is quoted by the manufacturer in mg/m³ or ppm, then it should be established at what % oxygen this emission was made. The greater the amount of excess oxygen in the flue gases at the time of measurement, the more 'diluted' the NO_x. It is therefore important to convert any emission rate back to 0% excess oxygen. For the purpose of this assessment, use the following conversion factors for the most frequently used rates supplied by manufacturers:

% excess O ₂	Conversion (c)
3%	x1.17
6%	x1.4
15%	x3.54

$$\text{Conversion factor } c = 20.9 / (20.9 - x)$$

Where x = % excess O₂ (NOT excess air) and 20.9 is the percentage of O₂ in the air.

Conversion of solid wood emissions reported in g/GJ to mg/m³, based on Renewable Heat Incentive (RHI) emission criteria guidance⁽¹²⁴⁾:

Figures in g/GJ (@ O₂ 0%) should be multiplied by 3.953 in order to show emissions in mg/m³ (dry gas at 0°C, 101.3 kPa).

Calculating the average NO_x emission levels from multiple systems

Where there are multiple sources of heat generation, an average NO_x emission rate should be calculated based on the ratio of heat output (kW) from each heat source.

The following formula must be used for such cases:

$$\text{Average NOX} = (N_1 (H_1 / HT) + N_2 (H_2 / HT)) \dots + (N_n (H_n / HT))$$

Where:

Terms	Description
N1	NO _x emissions rate for source 1
N2	NO _x emissions rate for source 2
Nn	NO _x emissions rate for source n
HT	Total heat output from all sources
H1	Heat output from source 1
H2	Heat output from source 2
Hn	Heat output from source n

Calculating NO_x emission levels from combined heat and power (CHP) systems

Where a CHP system is specified, it is only necessary to consider the heat-related NO_x emissions for the assessment of this issue. NO_x emissions associated with heat generation should be calculated using the following formula:

$$X = A \times (B / (B + C))$$

Where:

Term	Description
X	NO _x emissions per unit of heat generated (mg/kWh _{heat}).
A	NO _x emissions per unit of fuel input (mg/kWh _{fuel input}).
B	Heat output, kW
C	Electrical output, kW

Access to the gas grid

In order to determine whether a home has access to the gas grid, the following check can be applied.

Homes located within an off-gas grid postcode are deemed non-connectable to the gas supply. A list of these postcodes has been released by government⁽¹²⁵⁾ as part of the National Energy Efficiency Data Framework (NEED). It might be possible for homes with a postcode not listed within the NEED database to be deemed non-connectable to the gas supply. Relevant evidence would need to be provided and be assessed on a case-by-case basis (see 04 Financial assessment for off gas mains connection on the facing page).

Homes not connected to the gas grid

Where the home is on a development that is not connected to the gas grid credits can still be awarded. This is to recognise that systems off mains gas offer reduced scope for the selection of low NO_x solutions.

Compliance Notes

Criterion Reference	Compliance Note	
All	CN1 Phased or multiple home development	See Appendix D – Post-construction stage assessment issue exceptions on page 207
All	CN2 NO _x Figures	Where NO _x data are provided in different units or at a level of excess oxygen greater than zero, the manufacturer or supplier must be asked to convert this to comply with the HQM criteria. Alternatively, the assessor may adjust the figure using the relevant correction factors provided in Methodology on the previous page. Note that the conversion factors provided do not apply where combined heat and power (CHP) systems are being assessed. Where CHP systems are used, the information must be obtained from the system manufacturer.
All	CN3 District Heating (DH)	In the case of a District Heating System, the dry NO _x rating figure in mg/kWh for the community heating system should be used to assess the credit. In practice, this figure may be very high, therefore preventing achievement of the credits. The figure cannot be scaled down based on the number of homes served by the system since the same amount of NO _x will be produced in supplying 1 kWh whether or not the system services 1 home or 100 homes. Where district heating systems are due to be commissioned within 18 months of completion of the home, then they should be used as the heat energy source for calculations under this credit, rather than the interim heat energy supply measure (which should also be noted).
All	CN4 Open Flue	No credits may be awarded for open flue heating or hot water systems.
crit 2	CN5 NO _x emissions for electric heating and systems using grid electricity	Electric heating systems do not result in emissions at the point of use and are therefore considered to not impact on local air quality. Although NO _x will be emitted from the power plants generating the electricity, these emissions are already controlled by legislation, in particular the Large Combustion Plant Directive ⁽¹²⁶⁾ . Furthermore, the house builder or occupier has no influence on the types of power plants used to generate electricity. For these reasons it is appropriate to award electric heating systems with the maximum number of credits. Any electricity used for heating that is generated on-site from renewable

Criterion Reference	Compliance Note	
		sources, e.g. solar thermal, wind or solar PV should also be awarded maximum credits.
crit 2	CN6 Heat Pumps	Where the heating or hot water demand is met using a heat pump (brine or water to water or air to water) then the NO _x emissions for the local air quality can be considered to be 0 mg/kWh.
crit 3–crit 5	CN7 Zero NO _x Emission Energy Sources	Any zero NO _x emission energy source which directly contributes to the total space heating and hot water energy supply can be added to the total space heating and hot water energy.
crit 3–crit 5	CN8 Other Systems	For any other system not covered, or for clarification on how to estimate dry NO _x levels, please contact HQM Technical Support.

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
All	01 General Evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	
All	02 NO _x data for heating and hot water system	Manufacturer's data for dry NO _x emissions should be supplied in mg/kWh. Where this is not possible, the assessor should use the conversion factors given in the Methodology section to convert figures in mg/m ³ , ppm or wet NO _x (derived using data from BSEN 297:1994).	
All	03 District Heating and CHP activation	The communal system (e.g. CHP, District Heating etc.) must be the primary heating energy source for the home once in operation. Evidence to confirm that future activation of such plant will occur within a reasonable period must be provided (it might be part of the planning consent or form part of energy sales contracts).	
crit 3–crit 5	04 Financial assessment for off gas mains connection	Confirmation from the authorised gas transporter in line with their Gas Act obligations ⁽¹²⁷⁾ to develop and maintain an efficient and economical pipeline system for the conveyance of gas (Gas Act, section 9(1)(a)) and to comply with any reasonable request to connect to its system any premises or any pipeline system operated by an authorised transporter (Gas Act, section 9(1)(b)).	

Checklists, Tables & Illustrations

None.

Definitions

Areas off mains gas

This relates to any properties which do not have access to mains gas. Research by the Department of Energy and Climate Change (DECC) showed that areas which have no gas supply can be found across all of the UK. This includes urban areas where these properties are most likely near a gas connection, but without a gas connection within the property (e.g. blocks of apartments). For more rural areas they are usually without a gas supply because of the distance from the gas network. For HQM this relates to any properties which do not have access to gas in the local area, also see the definition for off-gas grid postcode.

Ecodesign Directive

The Ecodesign Directive 2009/125/EC⁽¹²⁸⁾ is a framework directive which sets minimum requirements for certain energy consuming products. The objective is to reduce greenhouse gas emissions and other adverse environmental impacts throughout the life cycle of a product with emphasis placed on the design and development stages of a product with a view to improving its energy efficiency. For HQM the benchmarks and limits within of the Directive for Lot 1 are used for natural gas and oil and Lot 15 for solid fuel products (www.eceee.org/ecodesign/products).

Local Air Quality Management (LAQM)

The Department for Environment, Food & Rural Affairs (Defra) provides details about the latest regulations and measures addressing air quality. Although the UK Government leads on international and European legislation, air quality is a devolved matter; hence administrations in Scotland, Wales and Northern Ireland are responsible for their own air quality policy and legislation. The Environment Agency works with local authorities, the Highways Agency and others to manage the Government's Air Quality Strategy in England and Wales. The strategy sets air pollution standards to protect people's health and the environment. The

Environment Agency regulates the release of pollutants into the atmosphere from large and complex industrial processes, as well as emissions from some large-scale food processing factories, and pig and poultry rearing activities. Local authorities are responsible for reviewing and assessing air quality, to check they meet national air quality objectives. If they are falling short, they must declare an Air Quality Management Area (LAQM) and produce an action plan showing what they are going to do to improve air quality to acceptable levels.

NO_x emissions for electric heating and systems using grid electricity

Electric heating systems do not result in emissions at the point of use and are therefore considered to not have an impact on local air quality. Although NO_x will be emitted from the power plants generating the electricity, these emissions are already controlled by legislation, in particular the Large Combustion Plant Directive. Furthermore, the house builder or occupier has no influence on the types of power plants used to generate electricity. For these reasons it is appropriate to award electric heating systems with the maximum number of credits. Any electricity used for heating that is generated on-site from renewable sources, e.g. solar thermal, wind or solar PV should also be awarded maximum credits.

Off Gas Grid Postcode

Homes which are deemed non-connectable to the gas supply, as per data released by the Department of Energy and Climate Change, 2013. It might be possible for homes with a postcode not listed within the NEED database to be deemed non-connectable to the gas supply. Relevant evidence would need to be provided and be assessed on a case-by-case basis (see 04 Financial assessment for off gas mains connection on the previous page).

MATERIALS

This section discusses the following.

18 Responsible sourcing of construction products	103
19 Environmental Impact from Construction Products	112
20 Life Cycle Costing of Construction Products	120
21 Durability of Construction Products	123

18 RESPONSIBLE SOURCING OF CONSTRUCTION PRODUCTS

Max credits

31

Indicators (Average)



Aim

To improve environmental, economic and social sustainability of construction products by recognising and encouraging the selection of products with responsible sourcing certification.

Benefit

- Helps consumers understand the environmental, economic and social issues in the supply chain of the construction products used in their home.
- Reduces risk of environmental, economic and social issues in the supply chain of construction products.
- Reduces the impact of the housebuilding and construction product industries.

Context

Sustainability challenges occur in the supply chain of most construction products. These may be either environmental (e.g. toxicity or biodiversity), economic (e.g. corruption) or social (e.g. slave labour, equality) or issues that affect all three, such as climate change. The complete supply chain of construction products may extend globally into regions where tackling these issues is particularly challenging. Responsible sourcing certification is a mechanism for the robust reporting on the performance of construction products with regards to a broad range of these issues.



Credit Summary

There are 3 routes to assessing this issue; Foundation route, Intermediate route and Comprehensive route on page 110. These routes represent varying degrees of rigour. The route selected will depend on whether quantity information is available. More credits are available through the more rigorous comprehensive route.

Criterion number	Title	Credits
crit 1	01 Legally harvested and legally traded timber	prerequisite
crit 2–crit 4	02 Product procurement policy and product environmental information	for 3 credits
crit 5	03 Responsible sourcing of construction products assessment	up to 28 credits
Total credits available		31

Criteria

01 Legally harvested and legally traded timber prerequisite

crit 1 All timber and timber based products used in the buildings meet the definition of Legally harvested and traded timber on page 111

02 Product procurement policy and product environmental information for 3 credits

crit 2 By the end of RIBA stage 2 (or equivalent), the client or developer has a documented policy and procedure that sets out procurement requirements for all suppliers and trades to adhere to relating to the responsible sourcing of construction products (see CN3 on page 109).

crit 3 The documented policy and procedure must be disseminated to all relevant internal and external personnel and included within the construction contract to ensure that they are enforceable on the assessed project.

crit 4 The documented policy and procedure must encourage the specification of products with responsible sourcing certification over similar products without certification.

03 Responsible sourcing of construction products assessment up to 28 credits

crit 5 The home has been assessed to either the foundation route, intermediate route or comprehensive route in accordance with the methodology. Credits are awarded according to Table 22.

Table 22 Credit allocation table

% of available points achieved	Credits
≥ 5	2
≥ 10	3
≥ 15	4
≥ 20	5
≥ 25	6
≥ 30	8
≥ 35	10
≥ 40	13
≥ 45	16
≥ 50	19
≥ 55	22
≥ 60	25
≥ 65	28

Methodology

Responsible sourcing of construction products assessment

To determine the number of credits achieved for crit 5 on the previous page, either the foundation route, intermediate route or comprehensive route must be followed (see Definitions on page 110 for more information on the different routes). The responsible sourcing score is calculated at the whole building level. This means that a separate calculation is required for each building to determine the responsible sourcing score and associated credits. Where the building comprises more than one home (e.g. semi-detached, clustered, terrace and apartments) specific calculations are not required for each home – the building's score and credit award is used for each home in the building.

For all routes, the HQM materials tool is used according to the following steps.

1. For each construction product in the building* that is in scope (see Scope of assessment on the next page):

*For semi-detached, clustered, terrace and apartment homes types, 'the building' means the whole building or block and landscaping associated with it. For detached homes, 'the building' means the detached home only and landscaping associated with it.



Note: For the foundation route, only the following steps are required: Step 1.1, Step 1.3, Step 1.5, Step 1.6, Step 1.7 and Step 1.9. For the foundation route and comprehensive route, Step 1.4 is optional.

Step 1.1. Estimate if the quantity is above the cut-off volume (see CN5 on page 109). If it is, enter the construction product in the HQM materials tool and assign it a 'location and use' category, then proceed to the next step. If not, the construction product need not be entered.

Step 1.2. (Comprehensive route only): Estimate the quantity (mass or volume) in the building.

Step 1.3. Obtain the BREEAM recognised responsible sourcing certification schemes (RSCS) certification or environmental management system (EMS) certification, if any (see CN1 on page 108). Compare the certification with BREEAM Guidance Note 18 (GN18): BREEAM Recognised Responsible Sourcing Certification (available to assessors through BREEAM Projects) and obtain the certification scheme score. Where the construction product has no certification, it is non-compliant with the broken chain requirements (see CN2 on page 109) or the certification type is not listed in Guidance Note 18, the score is 0.

Where the construction product is a reused product, obtain the score from Guidance Note 18 for these products.

Step 1.4. (Optional, if not followed go to Step 1.5): Where a constituent construction product has a better certification score (see CN1 on page 108) than the overall construction product and it complies with the broken chain requirements (see CN2 on page 109), the following steps should be followed:

Step 1.4.1. Identify the material categories that make up an estimated $\geq 80\%$ of the constituent construction product's volume.

Step 1.4.2. Include each identified materials category in the HQM materials tool (by creating new entries).

Step 1.4.3. If $\geq 5\%$ of the volume is unaccounted for in Step 1.4.1, include the 'Other' material category.

Step 1.4.4. (Comprehensive route): For each material category following the comprehensive route and identified in Step 1.4.1, enter the building-wide quantity into the HQM materials tool. This may be based on a % of the overall construction product's quantity estimated in Step 1.1.

Step 1.4.5. For each material category (including 'Other'), enter the constituent's certification score identified in Step 1.4 into the HQM materials tool.

Step 1.5. Identify the materials category(ies) that make up an estimated $\geq 80\%$ of the product's volume (excluding quantities entered for Step 1.4.1, if applicable).

Step 1.6. Include each identified materials category in the HQM materials tool (by duplicating the entry made in Step 1.1).

Step 1.7. If $\geq 5\%$ of the volume is unaccounted for in Step 1.5 (and Step 1.4.1, if applicable), include the 'Other' material category.

Step 1.8. (Comprehensive route only): For each material category following the comprehensive route and identified in step 1.5, enter the building-wide quantity into the HQM materials tool. This may be based on a % of the overall construction product's quantity estimated in Step 1.1.

Step 1.9. For each material category (including 'Other'), enter overall construction product's certification score (from step 1.3) into the HQM materials tool.

2. For each home in the building:

Step 2.1. Enter the credit result produced by the HQM materials tool (from Step 1.9) into the BREEAM Projects online HQM assessment tool. For semi-detached, clustered, terraced and apartment building types, the same credit result is used for each home in the building.

Scope of assessment

Table 23 below, based on the New Rules of Measurement (NRM) classification system, indicates the building elements that must be included in the scope of the assessment. Including these elements (and only these) is necessary to ensure an appropriate level of comparability. All construction products that are installed as part of one or more of these building elements are in-scope and must be included in the HQM materials tool. For each building element the respective 'Location and use' category, for use in the HQM materials tool, is provided in the table.

For external works building elements, only construction product (and their quantities) that are for the private use of the building occupants should be included in the scope.

Table 23 Scope of assessment, common building element designation, location and use categories

RICS NRM Level 2 Element	RICS NRM Level 3 Sub-element	BREEAM 'Location and use' category	To be included	
1 Substructure				
1	Substructure	1 Standard foundations	7. Structure, primary and secondary	✓
		2 Specialist foundation systems		✓
		3 Lowest floor construction		✓
		4 Basement excavation	N/A	
		5 Basement retaining walls	7. Structure, primary and secondary	✓
2 Superstructure				
1	Frame	1 Steel frames	7. Structure, primary and secondary	✓
		2 Space decks		✓
		3 Concrete casings to steel frames		✓
		4 Concrete frames		✓
		5 Timber frames		✓
		6 Other frame systems		✓
2	Upper Floors	1 Floors	3. Floor (including floor finishes)	✓
		2 Balconies		✓
		3 Drainage to balconies	11. Other	✓
3	Roof	1 Roof structure	6. Roof (including roof finishes)	✓
		2 Roof coverings		✓
		3 Specialist roof systems		✓
		4 Roof drainage		✓
		5 Rooflights, skylights and	2. Door, window	✓

RICS NRM Level 2 Element	RICS NRM Level 3 Sub-element	BREEAM 'Location and use' category	To be included
		openings	
	6	Roof features	6. Roof (including roof finishes)
4	1	Stair and ramp structures	7. Structure, primary and secondary
	2	Stair and ramp finishes	3. Floor (including floor finishes)
	3	Stair, ramp balustrades and handrails	11. Other
	4	Ladders, chutes, slides	
5	1	External enclosing walls above ground floor level	8. External wall
	2	External enclosing walls below ground level	7. Structure, primary and secondary
	3	Solar, rain screening	8. External wall
	4	External soffits	
	5	Subsidiary walls, balustrades, handrails, railings and proprietary balconies	11. Other
	6	Façade access, cleaning systems	
6	1	External windows	2. Door, window
	2	External doors	
7	1	Walls and partitions	5. Internal partition, internal walls (including finishes)
	2	Balustrades and handrails	11. Other
	3	Moveable room dividers	5. Internal partition, internal walls (including finishes)
	4	Cubicles	
8	1	Internal doors	2. Door, window
3 Internal Finishes			
1	1	Finishes to walls	5. Internal partition, internal walls (including finishes)

RICS NRM Level 2 Element		RICS NRM Level 3 Sub-element		BREEAM 'Location and use' category	To be included
2	Floor Finishes	1	Finishes to floors	3. Floor (including floor finishes)	✓
		2	Raised access floors		✓
3	Ceiling Finishes	1	Finishes to ceilings	1. Ceiling (including ceiling finishes)	✓
		2	False ceilings		✓
		3	Demountable suspended ceilings		✓
4 Fittings, Furnishings and Equipment					
1	Fittings, Furnishings and Equipment	2	Domestic kitchen fittings and equipment	11. Other	✓
5 Services					
N/A					
6 Complete Buildings and Building Units					
To be broken down into other classifications.					
8 External Works					
2	Roads, Paths and Pavings	1	Roads, paths and pavings	10. Hard landscaping	✓
		2	Special surfacings and pavings		✓

The material categories, for use in the HQM materials tool, must be in accordance with Table 24 below. For each construction product, identify the closest matching category.

Table 24 Materials categories

Material category	Uniclass equivalent code
1. Timber or timber-based	P5
2. Concrete or cementitious	P2*
3. Metal	P4
4. Stone or aggregate	P1, P3*
5. Clay-based	P33
6. Gypsum	P232
7. Glass	P314
8. Plastic, polymer, resin, paint, chemicals and bituminous	P7, P34
9. Animal fibre or skin, cellulose fibre	P6
10. Other	

*Except subsets listed separately.

Compliance Notes

Criterion Reference	Compliance Note	
All	CN1 Checking responsible sourcing claims	Confirmation of manufacturers and suppliers claims should be sought from the relevant responsible sourcing scheme provider. Many of the organisations who administer these schemes will, via their website, list companies and products that have been certified against their standards, including the scope of any such certification. Some schemes, including BES 6001 via www.greenbooklive.com , will provide downloadable copies of the relevant certificate, which can in turn be

Criterion Reference	Compliance Note	
		used as evidence for this issue.
All	CN2 Broken chain requirements	<p>To recognise responsible sourcing certification where it does exist in the supply chain, while reducing the risks associated with a broken chain, it is permissible to use the upstream certification score in the HQM materials tool where the downstream risk to responsible sourcing is considered to be low. Specifically, it is acceptable for the following types of organisations in the supply chain (that are downstream of the organisation with certification) not to have their own responsible sourcing certification:</p> <ol style="list-style-type: none"> 1. Organisations that only handle or transport, or 2. Organisations that only fabricate, assemble or install and are using a recognised quality management system to ensure the mixing and substitution of the certified upstream source with uncertified sources has not occurred <p>And</p> <ol style="list-style-type: none"> 3. Are operating in a jurisdiction that can demonstrate relatively robust and well enforced environmental, social and economic controls. For example: <ul style="list-style-type: none"> – States which are members of the EU – States that have declared adherence to the OECD Guidelines for Multinational Enterprises.
crit 2–crit 4	CN3 Documented product procurement policy	This may be prepared and adopted at an organisational level or be site or project specific. It is recommended (but not a requirement) that the documented policy follows the principles of BS 8900-1:2013 ⁽¹²⁹⁾ Managing sustainable development of organisations – Guide or BS 8903:2010 ⁽¹³⁰⁾ Principles and framework for procuring sustainably – Guide. This policy may form a part of a broader Sustainable Procurement Plan or be in the form of a standalone document
crit 5	CN4 Quantities precision	<p>The degree of tolerance accepted for estimating quantities is $\pm 20\%$ of the final installed quantity.</p> <p>It is not necessary for the assessor to submit calculations in order to justify estimates. In particular, the cut-off estimation for many construction products – that are clearly below the cut-off volume – may be done without the need for any calculations at all (see CN5 below).</p>
crit 5	CN5 Cut-off volume exclusion threshold	Any construction product which clearly accounts for less than 0.1 m^3 per 100 m^2 GIFA (see definitions) can be excluded from the assessment. The volume considered should be taken as the construction product's overall external dimensions, including any internal voids or air spaces. Minor fixings (e.g. brackets, nails, screws etc.), adhesives, seals and ironmongery would normally fall below this threshold (see CN4 above).

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
All	01 General evidence	See Appendix C – HQM evidence requirements on page 201 for a list of general evidence types that can be used to demonstrate compliance with the relevant criteria for this issue.	
crit 1	02 Legally harvested and legally traded timber	Evidence that all timber and timber based products used in the building meet the definition of 'legally harvested and legally traded timber'.	
crit 2–crit 4	03 Documented product procurement policy	<ul style="list-style-type: none"> – A copy of the documented product procurement policy. – Evidence that the policy is disseminated, or a written commitment to do so. 	<ul style="list-style-type: none"> – Evidence that the policy was disseminated. – Evidence that the policy was included in the construction contract.

Criterion Reference	Title	Design Stage	Post Construction Stage
		<ul style="list-style-type: none"> – Evidence that the policy is included in the construction contract, or a written commitment to do so. – Evidence that there is a policy to encourage the specification of products with responsible sourcing certification 	
crit 5	04 Responsible sourcing of construction products	<ul style="list-style-type: none"> – A copy of the completed HQM materials tool. – A copy of all responsible sourcing certificates. – A copy of all EMS certificates. – For affected certified construction products, evidence on how the broken chain requirements are met. 	

Checklists, Tables & Illustrations

None.

Definitions

BREEAM recognised responsible sourcing certification schemes (RSCS)

These are third party schemes evaluated by BRE Global for recognition under BREEAM. Refer to BREEAM Guidance Note 18 (GN18): BREEAM Recognised Responsible Sourcing Certification (available to assessors through BREEAM Projects). Refer to the BREEAM website for information on the evaluation criteria and the process for the evaluation and acceptance of schemes, including application and appeals.

Broken chain

Where a construction product (or constituent construction product) is certified but is supplied via one or more downstream organisations that have no relevant certification. In this situation, unless the broken chain requirements are met, the certification is not accepted by BREEAM.

Comprehensive route

The comprehensive route provides a more accurate measurement of the risks in the building design associated with construction products by taking account of the quantity of each construction product within a location and use category. It requires quantities to be entered into the HQM materials tool rather than using the lowest 'location and use' category score per material category. The improvement in rigour justifies the comprehensive route having the potential to produce better scores than the foundation route.

Constituent construction product

A manufacturer specific construction product (i.e. with a manufacturer reference number) that is not specified by the designer or selected by the constructor but is used in the manufacture of a specified construction product.

Construction product

A manufacturer specific construction product (i.e. with a manufacturer reference number) that is specified by the designer (e.g. architect, engineer, interior designer, quantity surveyor, landscape architect etc.) or selected by the constructor (principal or sub-contractor), and installed on the project.

Foundation route

The foundation route does not require the quantities of each construction product to be entered into the HQM materials tool. This reduces the time taken per construction product but, because the varying quantities of each construction product in the building cannot be taken into account when the credit score is calculated, the lowest 'location or use' category score per material category is used for the overall materials category score.

Gross Internal Floor Area (GIFA)

Gross internal floor area as defined by the RICS (www.rics.org).

Intermediate route

The intermediate route is a mixture of the foundation route and the comprehensive route. For example, the foundation route may be used for the 'Timber or timber-based' category and the comprehensive route for the 'Metal' category.

Legally harvested and traded timber

HQM follows the UK Government's definition of 'legally harvested and traded timber', as outlined in the Central Point of Expertise on Timber (CPET) 5th Edition report⁽¹³¹⁾ on the UK Government Timber Procurement Policy.

To be considered 'legally harvested and traded timber' all sources of timber used on a project assessed under the HQM scheme must fulfil the requirements set out by CPET available from: www.gov.uk/guidance.

New Rules of Measurement (NRM)

NRM provides a standard set of measurement rules and essential guidance for the cost management of construction projects and maintenance works. For more information visit www.rics.org.

IMPACT Compliant tools currently use NRM classification as a default.

Reused construction products

Construction products that can be extracted from the waste stream and used again without further processing, or with only minor processing, that does not alter the nature of the construction product (e.g. cleaning, cutting, fixing to other construction products).

19 ENVIRONMENTAL IMPACT FROM CONSTRUCTION PRODUCTS

Max credits

31

Indicators (Average)



My cost



My wellbeing



My footprint

Aim

To reduce the burden on the environment from construction products by recognising and encouraging measures to optimise construction product efficiency and the selection of products with a low environmental impact (including embodied carbon) over the life cycle of the building.

Benefit

- Helps consumers understand the overall environmental impact of their home.
- Ensures all CO₂ emissions are taken into account in the design, not just operational emissions.
- Reduces the impact of the housebuilding and construction product industries

Context

The introduction of Part L into the Building Regulations has led to reductions in the CO₂ operational energy consumption of homes. As a result, CO₂ emissions from other aspects of buildings, such as embodied emissions, are becoming increasingly important in terms of reducing overall CO₂ emissions.

In addition to CO₂, there are several other embodied environmental impacts associated with construction products and the processes that occur during and after construction that should be considered during design.



Credit Summary

There are two routes to assessing this issue; Foundation route and Comprehensive route on page 115. These routes represent varying degrees of rigour. Both routes are accepted for calculating the home's environmental impact. The foundation route uses a tool that requires basic design information to be entered and is appropriate for standard or simple designs. The comprehensive route requires the use of an IMPACT compliant tool and more detailed design information and can be used for any home. This gives greater accuracy and hence a higher score can be awarded where this route is followed.

Criterion number	Title	Credits
crit 1–crit 4	01 Product procurement policy and product environmental information	up to 8 credits
crit 5–crit 6	02 Routes of rigour (follow 02A or 02B) – Building life cycle assessment	up to 23 credits
crit 5	02A Foundation Route	up to 8 credits
crit 6	02B Comprehensive Route	up to 23 credits
Total credits available		31

Criteria

01 Product procurement policy and product environmental information

up to 8 credits

for 3 credits

- crit 1 By the end of RIBA stage 2 (or equivalent), the client or developer has a documented policy and procedure that sets out procurement requirements for all suppliers and trades to adhere to relating to the sourcing of construction products with lower environmental impact (see CN1 on page 117).
- crit 2 The documented policy and procedure must be disseminated to all relevant internal and external personnel and included within the construction contract to ensure that they are enforceable on the assessed project.
- crit 3 The documented policy and procedure must encourage the specification of products with Environmental Product Declaration (EPD) over similar products without EPD.

Up to 5 credits

- crit 4 Where a range of products specified at the Design Stage (DS) and installed by the Post Construction Stage (PCS) are covered by verified EPD (see CN2 on page 118). The credits are awarded on the basis of the number of products covered across product categories according to Table 25 below.

Table 25 Environmental Product Declaration (EPD) credit allocation

Number of EPD	Credits
2	1
4	2
6	3
8	4
10	5

02 Routes of rigour (follow 02A or 02B) – Building life cycle assessment

up to 23 credits

02A Foundation Route

up to 8 credits

- crit 5 The home is assessed using the HQM materials tool in accordance with Methodology on the facing page. This route is suitable for the assessment of standard, simple homes or buildings. Credits are awarded according to Table 26 on the facing page

Table 26 Building life cycle assessment credit allocation table

Homes Impact Benchmarks* (Ecopoints per Occupant)	Houses		Apartments		Credits	
	Detached	Terraced, Semi, Clustered	Low rise	High rise	Foundation route	Comprehensive Route
Threshold benchmark	≤ 117	≤ 87	≤ 97	≤ 142	1	5
	≤ 114	≤ 85	≤ 95	≤ 138	1	6
	≤ 111	≤ 83	≤ 93	≤ 135	1	7
	≤ 109	≤ 81	≤ 91	≤ 132	2	8
	≤ 107	≤ 79	≤ 89	≤ 130	2	9
	≤ 105	≤ 78	≤ 87	≤ 128	2	10
	≤ 103	≤ 77	≤ 84	≤ 126	3	11
	≤ 101	≤ 76	≤ 81	≤ 124	3	12
	≤ 99	≤ 75	≤ 79	≤ 122	3	13
	≤ 97	≤ 74	≤ 78	≤ 120	4	14
	≤ 95	≤ 71	≤ 76	≤ 118	4	15
	≤ 93	≤ 69	≤ 73	≤ 115	4	16
	≤ 91	≤ 67	≤ 71	≤ 112	5	17
	≤ 89	≤ 65	≤ 69	≤ 108	5	18
	≤ 86	≤ 63	≤ 66	≤ 104	6	19
	≤ 83	≤ 61	≤ 66	≤ 100	6	20
	≤ 80	≤ 58	≤ 61	≤ 95	7	21
	≤ 77	≤ 55	≤ 60	≤ 90	7	22
	≤ 74	≤ 52	≤ 58	≤ 85	8	23

*The home's impact benchmark is a reference of average environmental impact for a home in the UK as calculated using an IMPACT compliant tool and average construction data for homes built since 2006. The unit used for comparison is BRE Ecopoints (based on a range of EN 15804 indicators) and national average occupancy for the type of home being assessed. Occupancy is based on the number of bedrooms, see CN3 on page 118.

02B Comprehensive Route

up to 23 credits

crit 6 The home has been assessed using an IMPACT compliant tool in accordance with the methodology. Credits are awarded according to Table 26 above.

Methodology

To determine the number of credits achieved for the building life cycle assessment, either the foundation route or comprehensive route must be followed.

Foundation route

The HQM materials reporting tool is suitable for the assessment of standard, simple homes or buildings. It is not suitable for non-standard or complex homes or buildings. If significant issues are encountered in modelling the actual design in the HQM materials reporting tool, such as selecting constructions that are similar to those in the design or where the design requires greater control over the way quantities are entered, then the comprehensive route should be followed.

Method for detached, semi-detached, clustered and terrace home types

Each home shall be modelled separately in the HQM materials reporting tool as follows:

Step 1: Identify the elements that form the home and are in-scope, based on the Scope of assessment on page 116.

Step 2: In a copy of the HQM materials reporting tool, for each of the elements identified in step 1, select the elemental construction description that is the most similar to the actual elemental construction. If an element has more than one type of construction, then select an elemental construction for each type.

Step 3: For each of the elemental constructions, enter the total quantity in the home (see CN5 on page 118). Enter any further information required by the tool. Semi-detached, clustered and terrace only: For party elements (e.g. walls, foundations), adjust the quantity of these elements by multiplying by the home's % share of the overall building's Gross internal floor area (GIFA). For example, if the building's GIFA is 400m² and the home's is 100m² then the % share is 25%.

Step 4: A total Ecopoints result for the home is generated by the HQM materials reporting tool.

Step 5: Input the total Ecopoints result into the BREEAM Projects online HQM assessment tool. Enter any further information required by the tool. The BREEAM Projects online HQM assessment tool will calculate the credit award for the home based on Table 26 on the previous page.

Method for apartment home types

For apartments, to streamline the process, the complete building can be modelled in the HQM materials reporting tool and then each home's result produced as follows:

Step 1: Identify the elements that form the building and are in scope, based on the Scope of assessment.

Step 2: In a copy of the HQM materials reporting tool, for each of the elements identified in step 1, select the elemental construction description that is the most similar to the actual elemental construction. If an element has more than one type of construction, then select an elemental construction for each type.

Step 3: For each of the elemental constructions, enter the total quantity in the building (see CN5 on page 118). Enter any further information required by the tool.

Step 4: The total Ecopoints result for the building is generated by the HQM materials reporting tool

Step 5: Adjust the Ecopoints score from step 4 by multiplying it by the home's % share of the building's total GIFA. For example, if the building's GIFA is 400m² and the home's is 100m² then the % share is 25%.

Step 6: For each home, input the Ecopoints result from step 5 into the BREEAM Projects online HQM assessment tool. Enter any further information required by the tool. The BREEAM Projects online HQM assessment tool will calculate the credit award for the home based on Table 26 on the previous page.

Comprehensive route

All home types

The comprehensive route requires the use of an IMPACT compliant tool. It is suitable for simple and complex buildings. The complete building is modelled in the IMPACT compliant tool as follows:

Step 1: Using an IMPACT compliant tool, produce a building Life Cycle Assessment (LCA) model for the building (see CN5 and CN6 on page 118). Ensure all of the in-scope elements are included, based on the 'Scope of assessment' section, below. The building elemental constructions shall be categorised in the IMPACT compliant tool as closely as possible to the classification system shown in Scope of assessment on the facing page.

Step 2: Obtain the total Ecopoints result for the building, excluding internal wall or partition, internal floor finish and internal wall finish elements.

Step 3: Obtain the total Ecopoints result for each home for just the internal wall or partition, internal floor finish and internal wall finish elements.

Step 4: Adjust the Ecopoints score from step 2 by multiplying it by the home's % share of the building's or the block's total GIFA. For example, if the building's GIFA is 400m² and the home's is 100m² then the % share is 25%.

Step 5: For each home, input the sum of the Ecopoints results from step 3 and step 4 into the BREEAM Projects online HQM assessment tool. Enter any further information required by the tool. The BREEAM Projects online HQM assessment tool will calculate the credit award for the home based on Table 26 on the previous page.

Step 6: From the IMPACT compliant tool, export or extract all of the elemental construction descriptions (used in the model) and their respective classifications, quantities, total CO₂ and Ecopoints. Produce a simple Constructions Schedule according to the following example

(note: the elemental construction descriptions in this example are not prescriptive). Depending on the IMPACT compliant tool used, the data required for this Constructions Schedule may be readily exportable.

Table 27 Example Constructions Schedule

Elemental construction description	Classification	Quantity in the building or home	Total CO ₂	Total Ecopoints
External wall type 1 (Brick, insulation, block, mortar, plasterboard, paint)	2.5.1	1000m ²	456	34
East façade (Blogs System type 1)	2.5.1	500m ²	2222	555
Foundation type 1 (RC 35)	1.1.1	2000m ³	455	44

If required, the Constructions Schedule can be used by those who do not have access to the IMPACT compliant tool to compare what is modelled with other sources of design information (bills of quantities, drawings, specifications etc.), and to see the breakdown of environmental impact

Scope of assessment

Table 28 below indicates the building elements that must be included in the model. Inclusion of these elements (and only these) is necessary to ensure an appropriate level of comparability with the benchmark home.

If following the Foundation route on page 114, the constructions available in the HQM materials reporting tool may cover more than one item identified in the table below. A completed HQM materials reporting tool (that includes one or more constructions for each building element identified as present in the building) is compliant with these scope requirements.

In addition, the table shows the classification codes that must be used for the comprehensive route, based on the New Rules of Measurement (NRM) classification system. For example, the code for 'Standard foundations' is '1.1.1'.

If an element is not present in the building, it does not need to be included in the model.

Table 28 Scope of assessment

RICS NRM Level 2 Element		RICS NRM Level 3 Sub-element		To be included
1 Substructure				
1	Substructure	1	Standard foundations	✓
		2	Specialist foundation systems	✓
		3	Lowest floor construction	✓
		4	Basement excavation	
		5	Basement retaining walls	✓
2 Superstructure				
1	Frame	1	Steel frames	✓
		2	Space decks	✓
		3	Concrete casings to steel frames	✓
		4	Concrete frames	✓
		5	Timber frames	✓
		6	Other frame systems	✓
2	Upper Floors	1	Floors	✓
		2	Balconies	
		3	Drainage to balconies	
3	Roof	1	Roof structure	✓
		2	Roof coverings	✓
		3	Specialist roof systems	✓
		4	Roof drainage	
		5	Rooflights, skylights and openings	✓
		6	Roof features	

RICS NRM Level 2 Element		RICS NRM Level 3 Sub-element		To be included
4	Stairs and Ramps	1	Stair and ramp structures	✓
		2	Stair and ramp finishes	
		3	Stair, ramp balustrades and handrails	
		4	Ladders, chutes, slides	
5	External Walls	1	External enclosing walls above ground floor level	✓
		2	External enclosing walls below ground level	✓
		3	Solar, rain screening	✓
		4	External soffits	✓
		5	Subsidiary walls, balustrades, handrails, railings and proprietary balconies	
		6	Façade access, cleaning systems	
6	Windows and External Doors	1	External windows	✓
		2	External doors	✓
7	Internal Walls and Partitions	1	Walls and partitions	✓
		2	Balustrades and handrails	
		3	Moveable room dividers	
		4	Cubicles	
8	Internal Doors	1	Internal doors	✓
3 Internal Finishes				
1	Wall Finishes	1	Finishes to walls	✓
2	Floor Finishes	1	Finishes to floors	✓
		2	Raised access floors	✓
3	Ceiling Finishes	1	Finishes to ceilings	✓
		2	False ceilings	✓
		3	Demountable suspended ceilings	✓
4 Fittings, Furnishings and Equipment				
5 Services				
8 External Works				

Table 29 Materials categories

Material category	Uniclass equivalent code
1. Timber or timber-based	P5
2. Concrete or cementitious	P2*
3. Metal	P4
4. Stone or aggregate	P1, P3*
5. Clay-based	P33
6. Gypsum	P232
7. Glass	P314
8. Plastic, polymer, resin, paint, chemicals and bituminous	P7, P34
9. Animal fibre or skin, cellulose fibre	P6
10. Other	

*Except subsets listed separately.

Compliance Notes

Criterion Reference	Compliance Note	
crit 1–crit 3	CN1 Documented product procurement policy	This may be prepared and adopted at an organisational level or be site or project specific. It is recommended (but not a requirement) that the documented policy follows the principles of BS 8900-1:2013 Managing sustainable development of organisations – Guide ⁽¹³²⁾ or BS 8903:2010 Principles and framework for

Criterion Reference	Compliance Note	
		procuring sustainably – Guide ⁽¹³³⁾ . This policy may form a part of a broader Sustainable Procurement Plan or be in the form of a standalone document
crit 4	CN2 Environmental Product Declaration (EPD) classification	<p>Each EPD shall be classified according to Table 29 on the previous page. For each EPD, select the classification that is the closest match. Only two EPDs per material category may be counted. This is to encourage a range of EPDs from different construction product sectors.</p> <p>Where a product and its associated EPD is comprised of more than one material, the assessor should decide which material category the EPD should be allocated to at their own discretion. Where an EPD covers more than one material, it must only be counted once.</p> <p>EPD certificates must be valid (unexpired) at the point of specification.</p> <p>The EPD must be compliant with ISO 14025⁽¹³⁴⁾, ISO 21930⁽¹³⁵⁾ or EN 15804⁽¹³⁶⁾.</p>
crit 5–crit 6	CN3 Number of bedrooms	The number of bedrooms entered into the BREEAM Projects online HQM assessment tool must be consistent with other issues assessed based on the number of bedrooms. Where there are rooms that can be converted to bedrooms at a future date, these rooms should not be considered as bedrooms for the purpose of this issue.
crit 5–crit 6	CN4 Gross Internal Floor Area (GIFA)	The Gross Internal Floor Area (GIFA) reported for the home should match throughout the HQM assessment.
crit 5–crit 6	CN5 Quantities precision and exclusions	<p>Quantities are to be within $\pm 10\%$ of the actual quantities.</p> <p>Minor fixing (e.g. brackets nails, screws etc.), adhesive, seals and ironmongery items may be excluded</p>
crit 6	CN6 IMPACT compliant tool requirements	<p>The following requirements apply when using IMPACT compliant tool:</p> <ol style="list-style-type: none"> 1. The LCA data used must be the following version: 'IMPACT_CMP_15804 Dataset_V3'. 2. The data must be compliant with EN 15804⁽¹³⁷⁾. 3. All elemental constructions are to be created by the user from individual products using the closest matching product data in the tool. Pre-calculated element level constructions are not acceptable (such as Green Guide specifications). 4. Where default values for the following product parameters are known to differ from the design they should be adjusted accordingly: Thickness; Density; Adjustments; Site wastage; Service life. A precision of $\pm 10\%$ on actual values is acceptable. 5. The study period is set at 60 years.

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
All	01 General evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	
crit 1–crit 3	02 Documented product procurement policy	<ul style="list-style-type: none"> – A copy of the documented product procurement policy. – Evidence that the policy is disseminated, or a written commitment to do so. – Evidence that the policy is included in the construction contract, or a written 	<ul style="list-style-type: none"> – Evidence that the policy was disseminated. – Evidence that the policy was included in the construction contract.

Criterion Reference	Title	Design Stage	Post Construction Stage
			commitment to do so.
			– Evidence that there is a policy on EPD.
crit 4	03 Environmental Product Declaration certificates and details		– A schedule of specified products in the building with accepted EPD, and their product categories. – The EPD certificates.
crit 5	04 Foundation Route		– The completed HQM materials tool.
crit 6	05 Comprehensive Route		– The IMPACT compliant tool name. – The version of the data used in the IMPACT compliant tool for modelling the building. – A copy of the IMPACT compliant tool model in its native format OR, if stored on the tool provider's online server, written permission for BRE to access the model. – A copy of the Constructions Schedule in .XLS, .XLSX or .CSV format.

Checklists, Tables & Illustrations

None.

Definitions

Comprehensive route

A detailed route that uses an IMPACT compliant tool to determine the Ecopoints for the home. Greater modelling detail is possible through this route compared with the foundation route. Therefore, more credits are available to recognise the level of rigour.

Ecopoints

Ecopoints are used as the metric for assessing this issue. It is an indicator that is made up of broad set of individual environmental indicators which are then combined into a single value. For more information about Ecopoints, visit www.bre.co.uk or contact BRE.

Environmental Product Declaration (EPD)

An EPD is an independently verified environmental label (i.e. ISO Type III label) according to the requirements of ISO 14025⁽¹³⁸⁾

High rise

High rise is considered to be a building that is 18 meters or over.

IMPACT (Integrated Material Profile And Costing Tool)

IMPACT is a specification and database for software developers to incorporate into their tools to enable consistent Life Cycle Assessment (LCA) and Life Cycle Costing (LCC). IMPACT compliant tools work by allowing the user to attribute environmental and cost information to drawn or scheduled items in the BIM.

Further information about IMPACT is available from: www.impactwba.com

IMPACT compliant tool

An IMPACT compliant tool is a tool that has been tested for compliance with the IMPACT specification, and is listed here: www.impactwba.com

New Rules of Measurement (NRM)

NRM provides a standard set of measurement rules and essential guidance for the cost management of construction projects and maintenance works. For more information visit www.rics.org.

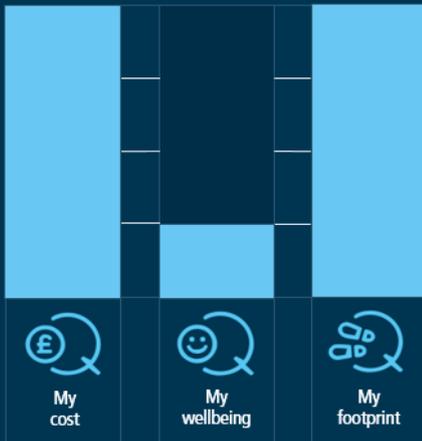
IMPACT Compliant tools currently use NRM classification as a default.

20 LIFE CYCLE COSTING OF CONSTRUCTION PRODUCTS

Max credits

18

Indicators (Average)



Aim

To encourage economic sustainability by recognising and encouraging the use and sharing of life cycle costing analysis to reduce maintenance and operational costs.

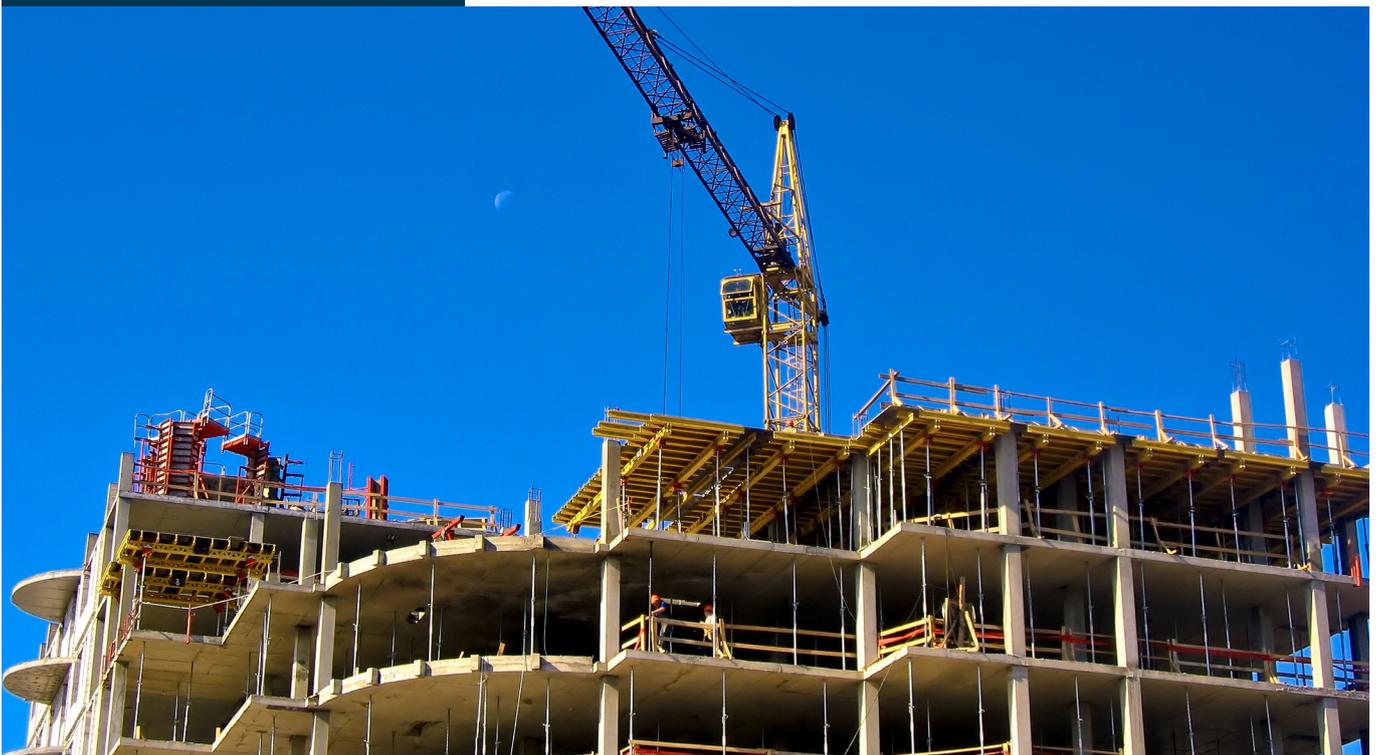
Benefit

- Reduces maintenance and operational costs for the homeowner.
- Better informs the homeowner of the running costs of the home.
- Better informs the homeowner of the relationship of purchase price to running costs.

Context

Life cycle cost (LCC) analysis is useful for the homeowner because it can provide information on the maintenance and operational costs of the home before and after purchase. As a result, the homeowner will be better informed about the running costs of the home.

As HQM is centred on being a consumer focused standard, this issue presents opportunities for developers to utilise the information that may be found in a LCC analysis with the focus being on the impact on the in-use stages which directly affect homeowners, occupants and management facilities.



Credit Summary

Criterion number	Title	Credits
crit 1–crit 3	01 Homeowner's life cycle cost report	for 9 credits
crit 4	02 Component level life cycle cost optimisation	for 9 credits
Total credits available		18

Criteria

01 Homeowner's life cycle cost report

for 9 credits

- crit 1 At the end of process stage 2/RIBA stage 2, a life cycle cost (LCC) analysis (to PD 156865:2008)⁽¹³⁹⁾ is produced by a suitably qualified cost consultant at a level of detail suitable to inform the homeowner of key maintenance and operational costs. The scope is as defined in Methodology below. It is kept updated up to the end of process stage 4/RIBA stage 4.
- crit 2 A homeowner's report, based on the most up-to-date LCC analysis (see crit 1), is available to potential homeowners prior to a commitment to purchase. The report includes a summary which requires no expert knowledge to understand and, as a minimum, includes:
- crit 2.a: Costs (current prices) broken down according to the items listed in Methodology below, reported at intervals of 1 year, up to year 60.
- crit 2.b: A summary highlighting the most significant findings of the LCC analysis including significant planned maintenance, as determined by the cost consultant
- crit 3 A final version of the homeowner's report (see crit 2) is included within the 'Home Information' (see 33 Home Information on page 176). It must be updated based on the final LCC analysis at the end of process stage 4/RIBA stage 4 (see crit 1).

02 Component level life cycle cost optimisation

for 9 credits

- crit 4 By the end of process stage 4/RIBA stage 4, a component level LCC appraisal (to PD 156865:2008)⁽¹⁴⁰⁾ is carried out and appropriate examples are provided by the design team to demonstrate how the component level LCC optimisation has been used to influence building and systems design or specification to reduce the overall maintenance and operational costs to the homeowner. The analysis is provided as a report to the client.

Methodology

Scope

The LCC shall include the following items from PD 156865:2008⁽¹⁴¹⁾, Table 3.1 'UK LCC data structure and definitions'. Items not applicable to the home may be denoted 'N/A' in the LCC analysis and report.

2.0 Maintenance costs

- 2.1 Major replacement costs
- 2.4 Minor replacement, repairs and maintenance costs
- 2.5 Unscheduled replacement, repairs and maintenance costs
- 2.6 Grounds maintenance

3.0 Operation costs

- 3.1 Cleaning costs*
- 3.2 Utilities costs
- 3.3 Administrative costs*
- 3.4 Overhead costs*

*if outside the control of the homeowner or occupant, for example, when included in a service charge.

Compliance Notes

Criterion Reference	Compliance Note
All	CN1 Pre-defined specifications Where the building is constructed to a pre-defined standard specification, the

Criterion Reference	Compliance Note
	LCC plan for this specification may be used to demonstrate compliance.

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
All	01 General evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	
crit 2–crit 3	02 Homeowner's life cycle cost report	<ul style="list-style-type: none"> – A copy of the homeowner's report. – Evidence that it is available to potential purchasers, such as a website link or marketing materials. 	A copy of the 'Home information' including the final homeowner's report.
crit 4	03 Component level life cycle cost optimisation	A copy of the component level LCC optimisation report.	

Checklists, Tables & Illustrations

None

Definitions

Component Level LCC analysis

A component level LCC is commonly used for cost planning specification choices of systems, elements and products during design development.

Life cycle cost (LCC)

The cost of an asset, or its parts throughout its life cycle, while fulfilling the performance requirements; a methodology for systematic economic evaluation of life cycle costs over a period of analysis, as defined in the agreed scope.

Process stage

Process stages are referred to in the PD156865⁽¹⁴²⁾ guidance. This corresponds to the RIBA stages in the RIBA plan of work.

21 DURABILITY OF CONSTRUCTION PRODUCTS

Max credits

10

Indicators (Average)

Indicator	Average Score
My cost	8
My wellbeing	3
My footprint	5

My cost My wellbeing My footprint

Aim

To recognise and encourage adequate protection of exposed elements of the building and landscape, therefore minimising the frequency of replacement and achieving product optimisation.

Benefit

- Helps developers to build new homes that are robust enough to last their intended lifetime.
- Helps demonstrate and communicate that construction products have been considered and specified according to site location to minimise replacement.
- Helps to reduce maintenance costs for occupiers, homeowners and facilities management.

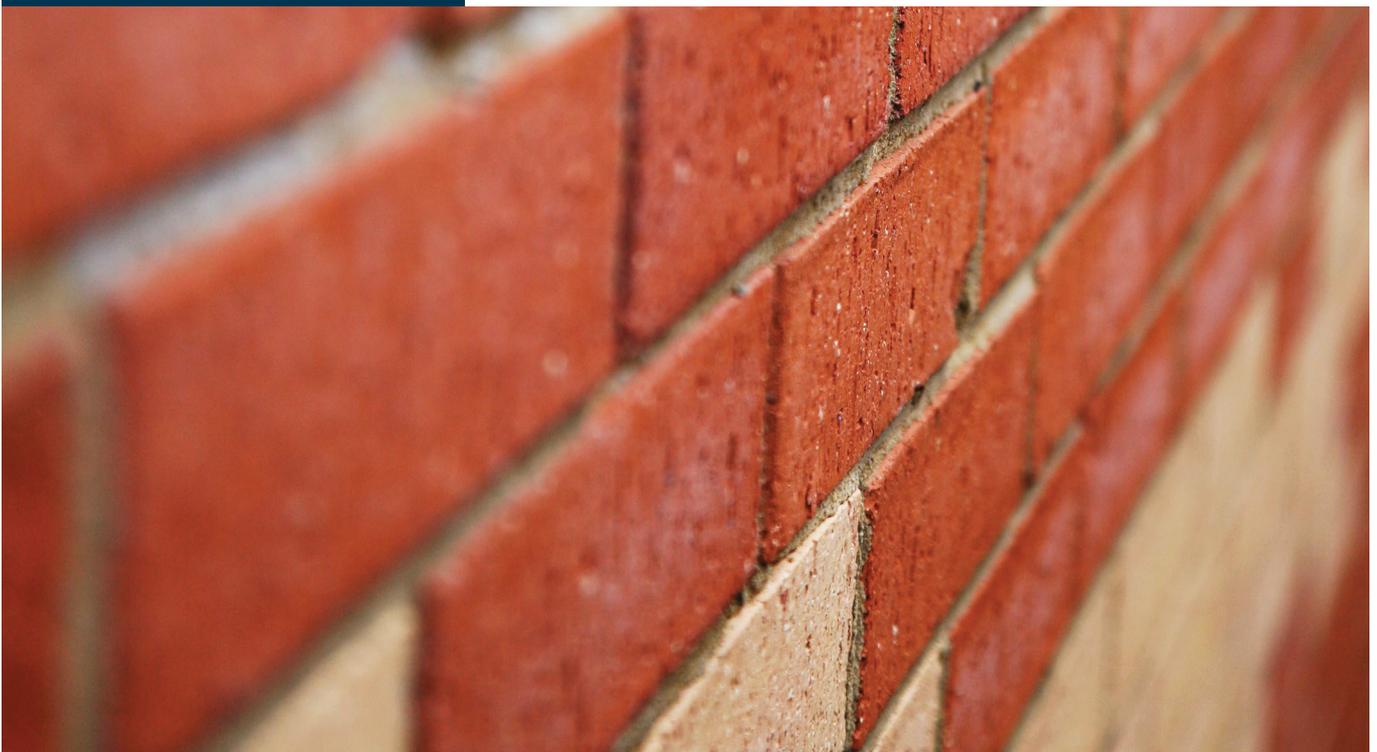
Context

This issue encourages designers to consider the effects of climatic changes on material durability and usage and to declare such considerations.

It is important to consider climate change, as it can significantly accelerate the deterioration of materials used in a building. The impact can be mitigated by good design and specification so that stakeholders can have increased confidence in the durability of their new home.

Consideration of any likely “wear and tear” within the home and measures to reduce this is also important. This can mean less frequent material replacement or maintenance.

The performance of a home within this issue is relative to the risk it is subject to. For example, performance in coastal areas would account for different factors to inner city locations.



Credit Summary

Criterion number	Title	Credits
crit 1–crit 2	01 Integral elements	for 7 credits
crit 3–crit 5	02 Finishing elements	for 3 credits
Total credits available		10

Criteria

01 Integral elements

for 7 credits

- crit 1 The relevant integral building elements at risk of severe material degradation have been identified.
- crit 2 Appropriate measures have been incorporated into the design and specification to limit the degradation effects identified (see Methodology below) (see CN2 on page 126).

02 Finishing elements

for 3 credits

- crit 3 crit 1 and crit 2 have been achieved.
- crit 4 The relevant finishing building elements at risk of cosmetic material degradation have been identified.
- crit 5 Appropriate measures have been incorporated into the design and specification to limit the degradation effects identified (see Methodology below) (see CN2 on page 126).

Methodology

General

The primary focus for assessing this issue is to determine how the selection of materials has mitigated degradation. Credits are not given for demonstrating how the factor that causes the degradation has been reduced (such as measures that reduce humidity).

The following steps outline the process to assess criteria:

step 1. Identify from Table 30 below, the applicable elements that are relevant to the home.

Table 30 Applicable Elements

Applicable building elements	
Integral elements	Surface elements
<ul style="list-style-type: none"> – Substructure: <ul style="list-style-type: none"> – foundations – lowest floor – basement and retaining walls – Superstructure: <ul style="list-style-type: none"> – external finishes – external fixings – external walls – external openings – stairs – roof – roof drainage – upper floors and balconies – internal walls – Services: <ul style="list-style-type: none"> – piped supply systems (within ownership boundary) – External works: 	<ul style="list-style-type: none"> – External finishes: <ul style="list-style-type: none"> – cladding – render – Internal finishes: <ul style="list-style-type: none"> – floor coverings and finishes – wall finishes – skirting boards – architraves – trimmings – hinges and handles – sockets and switches – towel rails and radiators – Built-in fittings: <ul style="list-style-type: none"> – sanitary fittings – built-in wardrobes, cupboards and stores

Applicable building elements	
Integral elements	Surface elements
<ul style="list-style-type: none"> – boundary fences (within ownership boundary) – hardstanding, paving, car parking (within ownership boundary) 	

Step 2. Identify from Table 31 below, the factors that are likely to cause material degradation effects (listed in Table 32 below) in the identified applicable building elements (established from step 1).

Table 31 Factors to consider

Factors to consider	
Integral elements	Surface elements
(Including, but not limited to the following)	(Including, but not limited to the following)
Environmental agents, including: <ul style="list-style-type: none"> – Solar radiation – Temperature variation – Humidity, water or moisture – Hard water – Extreme weather conditions: <ul style="list-style-type: none"> – high wind speeds – flooding – driving rain – snow – Biological agents, including: <ul style="list-style-type: none"> – vegetation – pests, insects – Pollutants, including: <ul style="list-style-type: none"> – air contaminants – ground contaminants – Social agents, including: <ul style="list-style-type: none"> – Malicious damage (e.g. graffiti, arson) 	Environmental agents, including: <ul style="list-style-type: none"> – Hard water – Water, moisture Social agents, including: <ul style="list-style-type: none"> – Accidental damage – Abrasion (wear and tear)

Table 32 Material degradation effects

Material degradation effect	
Integral elements	Surface elements
(including, but not limited to the following)	(including, but not limited to the following)
<ul style="list-style-type: none"> – Corrosion – Limescale build-up – Dimensional change, e.g. swelling or shrinkage, thermal expansion – Rotting – Leaching – Melting – Salt crystallisation – Abrasion – Blockage 	<ul style="list-style-type: none"> – Blistering – Staining or marking – Fading or discolouration – Limescale build-up – Corrosion – Leaching – Scratches – Dimensional change, e.g. swelling or shrinkage, thermal expansion

Material degradation effect	
Integral elements	Surface elements
<ul style="list-style-type: none"> – Fatigue, shatter and breakage – Combustion 	

Step 3. Confirm that the design and specification incorporates ways to limit these degradation effects.

Step 4. Assessors should use their professional judgment in determining whether the design team have adequately demonstrated that they have designed and specified materials or measures which will be effective in preventing unnecessary deterioration, thus reducing frequent replacements, repairs and maintenance throughout the life cycle of the home.

Step 5. At post construction stage, where the design and specification measures installed differ from the proposal at design stage, the assessor must ensure that these measures still meet the aims of the criterion.

Compliance Notes

Criterion Reference	Compliance Note	
All	CN1 Common areas	Where there are common areas associated with the home, the relevant integral and surface building elements within common areas should form part of the assessment of this issue.
All	CN2 Performance over Building Regulations	Appropriate measures must be in relation to performance beyond the guidance contained within the building regulations approved documents. This includes accounting for future changes in the risk associated with the factor, such as changes in assumptions around weather related to climate change predictions and influenced by the project's specific circumstances.

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
All	01 General evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	
crit 2 and crit 5	02 Appropriate measures	Appropriate measure documentation	As per design stage and based on as-built information

Checklists, Tables & Illustrations

None.

Definitions

Appropriate measures

An appropriate measure is determined by reviewing the following information as a minimum:

- What factor the element will withstand;
- How the element has been designed to withstand it.
- Declared service life and design life
- A 'plain English' statement of how the design will help the building owner or occupier.
- A clear graphical or written description of the element's location in the home.
- Supporting information showing that the element is likely to do what is being claimed such as a combination of information listed within the manufacturer's technical specification literature, manufacturer's declaration of performance, third party certification or appropriate calculations provided by members of the design team where necessary.

Design life

Service life intended by the designer, which a product is anticipated to last.

Service life⁽¹⁴³⁾.

The period of time after installation during which a building, or its part, meets or exceeds the performance requirements

SPACE

This section discusses the following.

22 Drying Space	128
23 Access and Space	131
24 Recyclable Waste	134

22 DRYING SPACE

Max credits

3

Indicators (Average)



Aim

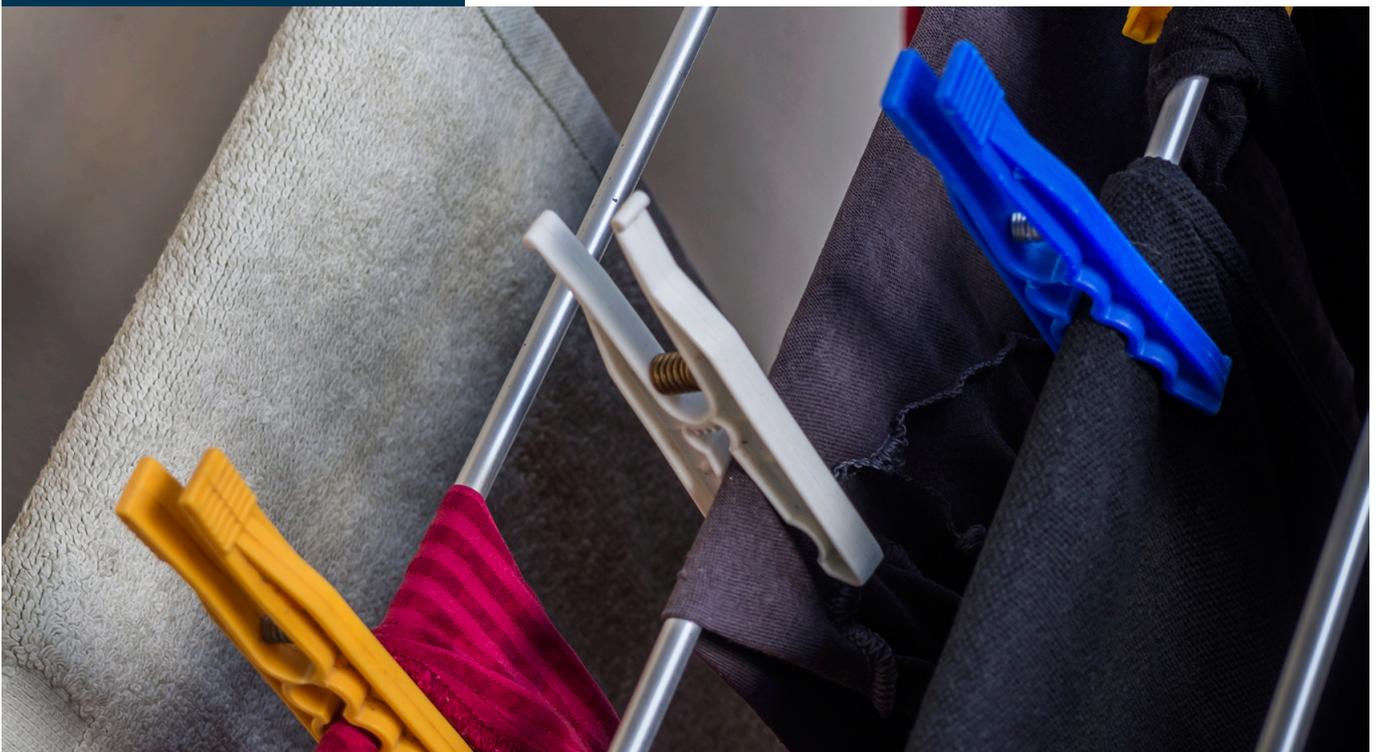
To provide sufficient and convenient drying space that does not negatively impact on the air quality, and subsequently the health of the occupants, while simultaneously reducing the need for mechanical drying.

Benefit

- Reduce energy costs and emissions associated with drying clothes mechanically
- Helps to protect the internal environment against moisture build up.

Context

Providing adequate drying space has been identified by numerous organisations, including the World Health Organisation, as a key preventative measure for reducing indoor moisture levels⁽¹⁴⁴⁾. This subsequently improves the wellbeing of the occupants by reducing the risk of condensation build up and mould growth associated with respiratory illnesses⁽¹⁴⁵⁾. Providing adequate drying space also reduces the need for tumble dryers, thus reducing carbon emissions and supporting the UK's long term goal of reducing greenhouse gas emissions by at least 80% compared to 1990 levels by 2050.



Credit Summary

Criterion number	Title	Credits
crit 1	01 Adequate external drying space	for 1 credit
crit 2–crit 3	02 Adequate internal drying space	for 2 credits
Total credits available		3

Criteria

01 Adequate external drying space

for 1 credit

crit 1 An adequate external drying space is provided. The drying space is secure and can accommodate a drying length of:

crit 1.a: 4m+ for a home with one to two bedrooms.

crit 1.b: 2m+ per bedroom for a home with three or more bedrooms.

02 Adequate internal drying space

for 2 credits

crit 2 An adequate internal drying space is provided. The drying space is secure and can accommodate a drying length of:

crit 2.a: 4m+ for a home with one to two bedrooms.

crit 2.b: 2m+ per bedroom for a home with three or more bedrooms.

crit 3 The provision of drying space does not compromise the ventilation strategy for the home (See 14 Ventilation on page 77).

Methodology

None.

Compliance Notes

Criterion Reference	Compliance Note	
crit 2	CN1 Adequate internal drying space	<p>Compliant drying space can take one of the following forms:</p> <ol style="list-style-type: none"> 1. A heated space with controlled intermittent extract ventilation. Extract ventilation must achieve a minimum extract rate of 30L/s and be controlled according to the requirements for intermittent extract ventilation defined in building regulations Approved Document F. 2. Where whole house continuous extract ventilation is specified. Extract ventilation must achieve a minimum extract rate of 8L/s and be controlled according to the requirements for continuous extract ventilation defined in building regulations Approved Document F. <p>Spaces used for drying space should not affect the access or function of that space. For example retractable hanging lines over a bath would not comply. However a pulley clothes horse or tidy dry fitted to the ceiling in a hall would comply as it does not impede the function or access. Where the drying line over hangs a hall way it should have an integrated drip catcher.</p> <p>Note: An unheated space not covered by Building Regulations may also be acceptable, where calculations by an appropriate member of the Chartered Institution of Building Services Engineers (CIBSE), or equivalent professional, confirms that ventilation is adequate to allow drying in normal climatic conditions and to prevent condensation or mould growth.</p>
crit 2	CN2 Inadequate internal drying space	<p>Internal drying spaces in the following rooms do not comply:</p> <ol style="list-style-type: none"> 1. Living rooms 2. Kitchens 3. Dining rooms 4. Bedrooms

Criterion Reference	Compliance Note	
crit 1–crit 2	CN3 Secure space	<p>Radiators and towel rails do not comply as they have been designed to serve another function.</p> <p>This is an enclosed space that:</p> <ol style="list-style-type: none"> 1. Is accessible only to the residents of the home 2. Is accessed directly from an external door of the home 3. Has permanent fixings or fittings. <p>For houses in multiple occupation (HMOs), communal drying space may be provided if such space is enclosed, is only accessible to the residents of the HMO and has a secure entrance.</p>

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
crit 1–crit 3	01 General Evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	

Checklists, Tables & Illustrations

None.

Definitions

None.

23 ACCESS AND SPACE

Max credits

10

Indicators (Average)



Aim

To provide sufficient and effective internal space that is accessible to all and supports the function of the home.

Benefit

- Ensures homes are accessible for all.
- Helps future-proof the home against expensive retrofit measures.
- Improves occupants wellbeing by providing enough space for their functional needs.

Context

Accessible space is a key factor when deciding to buy a new home. Spaces need to be well designed and adequately sized to meet every day and future needs. To accommodate this, homes need to allow flexibility and accessibility for all types of users and their associated requirements. The UK government have streamlined the approach to setting space standards for new homes. The new nationally described space standard replaces the existing different space standards used by local authorities⁽¹⁴⁶⁾. Furthermore new optional building regulations requirements for access have also been introduced⁽¹⁴⁷⁾.



Credit Summary

Criterion number	Title	Credits
crit 1	01 Nationally described space standards	for 4 credits
crit 2–crit 3	02 Flexible design	for 2 credits
crit 4	03 Accessible design	for 4 credits
Total credits available		10

Criteria

01 Nationally described space standards for 4 credits

crit 1 The home meets the Technical Housing Standards - Nationally Described Space Standard⁽¹⁴⁸⁾.

02 Flexible design for 2 credits

crit 2 Internal functional space within the home offers flexible design options that meet every day needs and long term demands.

crit 3 Home information is provided to occupants relating to the flexible design options present within the home (see 33 Home Information on page 176).

03 Accessible design for 4 credits

crit 4 The Internal functional space and External spaces associated with the home meet the optional requirements of either the building regulations Approved Document Part M - Access to and use of buildings, Category 2 – Accessible and adaptable dwellings OR Category 3 – Wheelchair user dwellings⁽¹⁴⁹⁾.

Methodology

None.

Compliance Notes

Criterion Reference	Compliance Note	
crit 2	CN1 Flexible design options	<p>Flexible design options are intended to meet every day and long term requirements and allow potential adaptations in the future. In order to achieve the credits, two or more examples of flexible design must be provided. Below are a few examples of what would be considered flexible design options:</p> <ol style="list-style-type: none"> 1. All internal functional spaces have at least one non-load bearing wall, making them relatively easy to adapt or expand, for example creating an open plan kitchen and living space. 2. The option to change room functionality easily within a home while maintaining compliance with the nationally described space standard (for example changing a study into a bedroom). 3. Services such as radiators and electrics have been situated in areas which enable any applicable modifications to take place (such as those listed above). 4. Alternatively, if it is felt the project provides a different example (to those listed) which successfully meets the principles set out above, then please contact BRE Global to discuss this.

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
crit 1–crit 4	01 General Evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	
crit 1–crit 4	02 Written confirmation	Written confirmation from the designer.	

Checklists, Tables & Illustrations

None.

Definitions

External spaces

For the purposes of this issue, external space includes not only the approach to the home (e.g. driveway) but also access to other functional spaces around or outside the home (e.g. access to the waste storage, parking and external drying space).

Internal functional space

This refers to internal spaces defined in the nationally described space standard, which includes occupied space such as:

1. Bedrooms
2. Kitchens
3. Living rooms
4. Dining rooms
5. Bathrooms

24 RECYCLABLE WASTE

Max credits

10

Indicators (Average)



My cost



My wellbeing



My footprint

Aim

To provide sufficient recyclable waste storage and disposal options to support the reduction of waste to landfill.

Benefit

- Enables and encourages occupants to recycle thus reducing their environmental footprint.
- Provides convenient well integrated waste storage areas in suitable locations.

Context

The EU Waste Framework Directive requires member states to promote waste recycling, this framework is currently under review. As part of this review the European Commission is starting to develop its future policies on areas like recycling targets. In order to encourage the reduction of waste to landfill, it is important to provide sufficient storage areas within the home that reflect the recyclable waste streams that are collected by the local waste authority. This makes it as clear and convenient as possible for the occupant to separate waste accordingly⁽¹⁵⁰⁾⁽¹⁵¹⁾⁽¹⁵²⁾.



Credit Summary

Criterion number	Title	Credits
crit 1	01 Consultation with the waste collection authority	for 2 credits
crit 2–crit 3	02 Recyclable waste	for 5 credits
crit 4–crit 5	03 Composting	for 3 credits
Total credits available		10

Criteria

01 Consultation with the waste collection authority

for 2 credits

crit 1 The waste collection authority is consulted to determine the waste collection patterns, identifying the:

crit 1.a: number of recyclable streams (including composting)

crit 1.b: type and size of waste collection containers (e.g. dedicated wheelie bins, boxes, communal bins etc.).

02 Recyclable waste

for 5 credits

crit 2 Dedicated internal space, with fixed units to store recyclable waste, is provided. The number of internal recyclable waste facilities should reflect the number of recyclable waste streams collected by the waste collection authority.

crit 3 The combined capacity of internal recyclable waste facilities should be a minimum of:

crit 3.a: 30 litres for homes with 1–2 bedrooms

crit 3.b: 40 litres for homes with 3 or more bedrooms.

03 Composting

for 3 credits

crit 4 All homes are provided with composting facilities, for garden or food waste, in the form of one or more of the following:

crit 4.a: Individual home-composting facilities.

crit 4.b: Local communal facilities within close proximity of the home.

crit 4.c: Composting collection services run by the waste collection authority.

crit 5 All homes are provided with internal composting waste storage that is a minimum of 10 litres in volume.

Methodology

None.

Compliance Notes

Criterion Reference	Compliance Note	
crit 3	CN1 Frequency of collection	Where collection frequencies are greater than once a week then the size of recyclable waste storage can be amended accordingly.
crit 3	CN2 Minimum volume for internal recycling bins	Each individual bin (provided for different recycling streams) must be a minimum of 10L in volume.
crit 2–crit 5	CN3 Apartments over five storeys	For apartments over five storeys where communal chutes are being used, these should be compliant with BS 1703:2005 Refuse chutes and hoppers - Specification ⁽¹⁵³⁾ – waste should be carried no more than 30m from the home entrance (excluding vertical distance).
crit 2, crit 4 and crit 5	CN4 Recycling and composting facilities	All recycling and composting waste facilities must be: <ol style="list-style-type: none"> 1. Located in a dedicated position. 2. Easily accessible to all users. 3. Integrated within the design of the home achieving reduced visual impact. 4. Storage locations are durable, low maintenance and cleanable.

Criterion Reference	Compliance Note	
		5. Managing odour and noise issues.
		6. Addressing health and safety issues (including fire and vermin).
crit 4	CN5 Phased or multiple home development	See Appendix D – Post-construction stage assessment issue exceptions on page 207.

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
crit 1–crit 5	01 General Evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	
crit 1	02 Consultation Outputs	Documentary evidence of the consultation process, including the content and findings from this.	

Checklists, Tables & Illustrations

None.

Definitions

Close Proximity

Within 50m from the main entrance to the homes via a safe pedestrian route.

Safe pedestrian routes

Pedestrian routes on the development site, within control of the developer are deemed to be safe and accessible for all pedestrian users (including people with disabilities, elderly and children), where they take into account physical limitation of those who may use them, for example providing steps appropriately supported by sloped access and dropped curbs positioned at crossing points. These routes and associated spaces are appropriately sized, with good visibility of the route ahead. Alongside these principles they should also meet the following requirements:

1. Where required, lighting design must be in accordance with BS 5489-1:2013 Code of practice for the design of road lighting. Lighting of roads and public amenity areas⁽¹⁵⁴⁾ (rural areas are exempt from this requirement).
2. At crossing points there must be appropriate pedestrian crossings (e.g. zebra or pelican crossings) in place or a clear line of sight for at least 50m in each direction on roads with a 30mph speed limit or 100m in each direction on roads with greater than 30mph speed limit).
3. On roads with a speed limit of 30mph (or higher) there is a clearly defined footpath.
4. All footpaths provided should be at least 900mm wide. In rural areas, on single track roads, a grass verge can be accepted in place of a footpath.
5. On clearly defined home zones, it is acceptable for the pedestrians' routes to use the road.



Pedestrian routes that are outside of the development site and therefore not within the control of the developer do not need to meet the above requirements however it must be demonstrated that there is a pedestrian route that does allow access to the alternative sustainable transport option.

Waste Streams

Waste streams refers to the provision of different waste collections for different types of waste, for example paper, plastic, glass, food waste and general waste are all types of waste streams.

WATER

This section discusses the following.

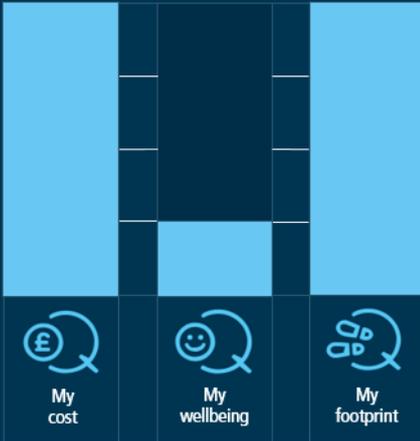
25 Water Efficiency	138
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25 WATER EFFICIENCY

Max credits

10

Indicators (Average)



Aim

To reduce the consumption of mains water in the home through efficient fixtures and fittings and water recycling systems.

Benefit

- Reduces occupant costs for both water bills and energy bills (through hot water).
- Minimises environmental impact by ensuring that valuable resources are used efficiently.

Context

The availability of water to meet occupier demands is a basic expectation for any home. We need to efficiently use our water supplies to minimise the impact of homes on water stress, thus ensuring availability for all. This is mainly influenced by how people use water in the home, but can be aided by providing water efficient fittings and water recycling systems in order of priority within our homes.

This issue builds upon the requirements of Approved Document G of the building regulations by firstly encouraging water efficiency, and then recycling and rainwater collection.



Credit Summary

Criterion number	Title	Credits
crit 1	01 Water efficient fittings	up to 8 credits
crit 2–crit 3	02 Water recycling	for 2 credits
Total credit available		10

Criteria

01 Water efficient fittings

up to 8 credits

crit 1 Five credits are awarded where the home has achieved:

crit 1.a: The optional fittings standard (see Table 33 on the facing page) set by the optional water efficiency requirement in the water efficiency standards in the building regulations Approved Document Part G⁽¹⁵⁵⁾, and

crit 1.b: A modelled water consumption of less than or equal to 110 litres per person per day calculated in accordance with the methodology section without using rainwater or greywater recycling systems.

OR

Eight credits are awarded where the home has achieved:

crit 1.c: The advanced fittings standard set out in Table 33 on the facing page, and

crit 1.d: A modelled water consumption of less than or equal of 100 litres per person per day calculated in accordance with the methodology section without using rainwater or greywater recycling systems.

02 Water recycling

for 2 credits

crit 2 crit 1 has been achieved.

crit 3 Rainwater or greywater recycling systems have been specified and it is demonstrated that there is sufficient water supplied by these systems to offset the demand for WC flushing for the home in accordance with Methodology below.

Methodology

The Appendix A of Approved Document G⁽¹⁵⁶⁾, should be used to calculate and demonstrate:

1. The modelled water consumption in litres per person per day.
2. The total demand for WC flushing has been met by water supplied by rainwater and greywater recycling systems.

Compliance Notes

Criterion Reference	Compliance Note	
crit 1	CN1 Water fittings efficiency performance data	<p>The water efficiency of fittings should be determined from the figure quoted on the European Water Label (see www.europeanwaterlabel.eu).</p> <p>Products that do not have a European Water Label can be recognised. However, in order for such products to be recognised, the following evidence for the purposes of HQM is required:</p> <ol style="list-style-type: none"> 1. Confirmation of the water consumption figure (e.g. from manufacturers literature etc.) 2. Confirmation that the water consumption figure has been calculated in line with the methodology used for the European water label
crit 3	CN2 Rainwater recycling is specified	<p>Where rainwater recycling systems are specified, the system has been designed and installed in accordance with BS 8515:2009+A1:2013 - Rainwater harvesting systems. Code of practice⁽¹⁵⁷⁾.</p> <p>To demonstrate compliance with crit 1.b and crit 1.d above, water collected by rainwater recycling systems must supply the WCs in the home. Where this is not the case, the rainwater recycling system is not reducing the potable water</p>

Criterion Reference	Compliance Note	
		consumption within the home and therefore cannot contribute to compliance with the criteria for this assessment issue.
crit 3	CN3 Greywater recycling is specified	Where greywater recycling systems are specified, the system has been designed and installed in accordance with BS 8525-1:2010 - Greywater systems. Code of practice ⁽¹⁵⁸⁾ . To demonstrate compliance with crit 1.b and crit 1.d on the previous page, water collected by greywater recycling systems must supply the WCs in the home. Where this is not the case, the greywater recycling system is not reducing the potable water consumption within the home and therefore cannot contribute to compliance with the criteria for this assessment issue.
crit 3	CN4 Phased or multiple home development	See Appendix D – Post-construction stage assessment issue exceptions on page 207.

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
crit 1–crit 3	01 Water Efficiency Calculator for Newhomes	A completed copy of the tool	
crit 1–crit 3	02 Data used to complete the Calculator tool.	Documentary evidence supporting the data used to complete the calculator tool.	
crit 1–crit 3	03 General Evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	

Checklists, Tables & Illustrations

Table 33 Water fittings standards

Water fitting	Building regulations Part G2 optional fittings standard	Advanced fittings standard
WCs	≤ 4/2.6 litres dual flush	4/2 litres dual flush (maximum 3 litres effective flushing volume)
Showers	≤ 8L/min	≤ 6L/min
Baths	≤ 170 litres	≤ 170 litres
Basin taps	≤ 5L/min	≤ 5L/min
Kitchen sink taps	≤ 6L/min	≤ 6L/min
Dishwashers	≤ 1.25L/place setting	≤ 1.25L/place setting
Washing machines	≤ 8.17L/kilogram	≤ 8.17L/kilogram

Definitions

None.

KNOWLEDGE SHARING

This section discusses the following.

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29 Construction Energy Use	155
30 Construction Water Use	160
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HOME DELIVERY

This section discusses the following.

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30 Construction Water Use	160
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26 COMMISSIONING AND PERFORMANCE

Max credits

10

Indicators (Average)

		
My cost	My wellbeing	My footprint

Aim

To ensure that homes and the systems within them are performing as designed.

Benefit

- Ensures occupier costs and energy efficiency are as close to design as possible.
- Increase the build quality of the home and reduce the likelihood of snagging.
- Helps to maintain customer satisfaction and the overall image of the industry.

Context

Conducting rigorous testing and commissioning throughout the key stages of development is important for ensuring that the quality standards sought at design stage are realised. This is a key means of reducing the performance gap⁽¹⁵⁹⁾.

Although all controlled services that fall under the scope of Building regulations need commissioning (i.e. parts F, L and J), commissioning strategies are frequently over-optimistic in practice and, where not effectively managed at an appropriate time, can delay project completion, cause problems during handover and result in poor performance⁽¹⁶⁰⁾.

Likewise, testing building fabric helps to reveal early problems with home performance that may be resolved through remedial works, prior to handover and is an important part of informing better future design⁽¹⁶¹⁾.

This issue therefore recognises where systems in homes have been commissioned in line with best practice, and where building fabric has been tested above and beyond the minimum requirements set by building regulations.



Credit Summary

Criterion number	Title	Credits
crit 1–crit 2	01 Commissioning and testing strategy	Prerequisite
crit 3–crit 6	02 Commissioning building services and control systems	5
crit 7–crit 8	03 Testing building fabric	5
Total credits available		10

Criteria

01 Commissioning and testing strategy prerequisite

crit 1 There is a schedule of commissioning and testing that identifies and includes a suitable timescale for commissioning of all building services and control systems and testing building fabric, in line with appropriate commissioning best practice guidance.

crit 2 The principal contractor accounts for the commissioning and testing programme, responsibilities and criteria within their budget and main programme of works, allowing for the required time to complete all commissioning and testing activities prior to handover.

02 Commissioning building services and control systems for 5 credits

crit 3 crit 1 and crit 2 have been achieved.

crit 4 Appropriate project team members have been appointed to conduct and manage commissioning activities

crit 5 Where applicable, the building systems listed below are commissioned in line with appropriate commissioning best practice guidance:

crit 5.a: Hot water

crit 5.b: Heating

crit 5.c: Ventilation (e.g. MVHR)

crit 5.d: Comfort cooling

crit 5.e: Low and zero carbon technologies.

crit 6 For buildings with complex building services and systems (e.g. communal systems with a centralised plant), a specialist commissioning manager must be appointed to conduct and manage commissioning activities (CN1 below).

03 Testing building fabric for 5 credits

crit 7 crit 1 and crit 2 have been achieved.

crit 8 Where post-construction testing and inspection of the integrity of building fabric is carried out, in accordance with an appropriate standard (CN2 on the facing page) and includes the quality assurance of at least one of the following:

crit 8.a: Continuity of insulation

crit 8.b: Avoidance of thermal bridging

crit 8.c: Air leakage paths.

Methodology

None.

Compliance Notes

Criterion Reference	Compliance Note	
crit 6	CN1 Specialist commissioning manager	For the purposes of meeting crit 6 above (where applicable), a specialist commissioning manager must be appointed during the design stage (by either the client or the principal contractor) who is responsible for:

Criterion Reference	Compliance Note	
		<ul style="list-style-type: none"> – Undertaking design reviews and giving advice on suitability for ease of commissioning – Providing commissioning management input to construction programming and during installation stages – Management of commissioning, performance testing, handover, post-handover stages. <p>Any seasonal commissioning that is undertaken for these complex services and systems, should be carried out over the course of one year from the date of home completion, in accordance with commissioning best practice (see seasonal commissioning) and must include the following:</p> <ul style="list-style-type: none"> – Testing of all building services under full load conditions, i.e. heating equipment in mid-winter, cooling or ventilation equipment in mid-summer, and under part load conditions (spring, autumn) – Re-commissioning of systems (following any work needed to serve revised loads), and incorporating any revisions in operating procedures into the operations and maintenance (O&M) manuals. <p>Where seasonal commissioning is conducted during occupancy, it is possible that this may contribute to meeting some of the criteria outlined in 32 Aftercare on page 172.</p>
crit 8	CN2 Appropriate standard	<p>For the purposes of crit 8 on the previous page, post-construction testing must be specifically carried out on the particular home being assessed, in accordance with the appropriate standards outlined below:</p> <p>Airtightness testing must be carried out by professionals with membership of ATTMA (Air Tightness Testing and Measurement Association) or IATS (Independent Air Tightness Testing Scheme) attained at organisational level maintaining UKAS accreditation (as airtightness testing laboratories to ISO 17025).</p> <p>Airtightness testing is required by Building Regulations but this may only happen on a sampling basis and would need to be performed on the specific home being assessed, for the purposes of meeting crit 8 on the previous page. This may happen at post-construction, or earlier (e.g. prior to first fix), when there is often more opportunity to carry out remedial works and resolve any problems revealed by the test or survey reports.</p> <p>Thermographic survey must be carried out by a professional holding a valid Level 2 certificate in thermography (as defined by the UKTA website www.ukta.org). Where a Level 2 thermographer is not available at the site, the survey may be undertaken by a Level 1 thermographer and then the images interpreted by a Level 2 thermographer.</p> <p>The thermographic survey must cover 100% of the treated spaces, unless it is a large complex building. The survey must ensure that all elements of the building fabric that enclose an internal heated or conditioned (treated) zone of the building, will be tested. This includes internal walls separating treated and untreated zones.</p> <p>Other acceptable testing methods</p> <p>Where a method for investigating fabric performance is being used that is not listed above (e.g. co-heating or heat flux testing), details of the method must be sent to BRE in order to consider if the method is acceptable for the purposes of this issue.</p>
crit 6	CN3 Phased or multiple home development	See Appendix D – Post-construction stage assessment issue exceptions on page 207.

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
All	01 General Evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	
crit 1	02 Commissioning and testing strategy	Copy of the commissioning and testing strategy.	
crit 8	03 Thermographic survey	Refer to General evidence requirement above.	Thermographic survey and level 2 thermography certificate (where a thermographic survey has been carried out).
crit 8	04 Test results	Refer to General evidence requirement above.	Test or survey results from the post construction testing performed.

Checklists, Tables & Illustrations

None.

Definitions

Commissioning best practice

For guidance on commissioning, refer to the sources below (where appropriate for systems installed):
BSRIA Commissioning Guides: Application Guide 1/91:

- Commissioning HVAC Systems: Guidance on the division of responsibilities (TM1/88.1)
- Commissioning of Air Systems (BG49/2013)
- Pre-Commission Cleaning of Pipework Systems (BG29/2012)
- Commissioning Water Systems (BG 2/2010)
- Commissioning Job Book - A framework for managing the commissioning process (BG 11/2010)
- Seasonal Commissioning (BG 44/2013)
- Domestic ventilation systems – a guide to measuring air flow rates (BG 46/2015).

CIBSE Commissioning Codes: Set of Seven Codes (2003):

- CIBSE Commissioning Code A: Air Distribution Systems (1996 confirmed 2006). ISBN: 9780900953736
- CIBSE Commissioning Code B: Boilers. ISBN: 9781903287293
- CIBSE Commissioning Code C: Automatic Controls. ISBN: 9781903287132
- CIBSE Commissioning Code L: Lighting (SLL Commissioning Code L). ISBN: 9781903287323
- CIBSE Commissioning Code M: Commissioning Management. ISBN: 9781903287330
- CIBSE Commissioning Code R: Refrigerating Systems. ISBN: 9781903287286
- CIBSE Commissioning Code W: Water Distribution Systems. ISBN: 9781906846152.

CSA

- www.csa.org.uk

The institute of engineering and technology:

- Photovoltaics (PV): IET code of practice.

Commissioning parts from Microgeneration certification scheme guidance:

- Solar Thermal (ST): MIS3001 and associated references
- Small Wind: MIS3003 / BWEA standards (now Renewable UK)
- Biomass: MIS3004
- Heat pumps: MIS3005
- Micro-CHP: MIS3007.

BRE Trust:

- Wiltshire, R, Williams, J, & Woods, P, (2014) A technical guide to district heating, BRE Trust.

Where other LZCTs are present that are not mentioned above, please contact BRE for further guidance on how to proceed for the purposes of this issue

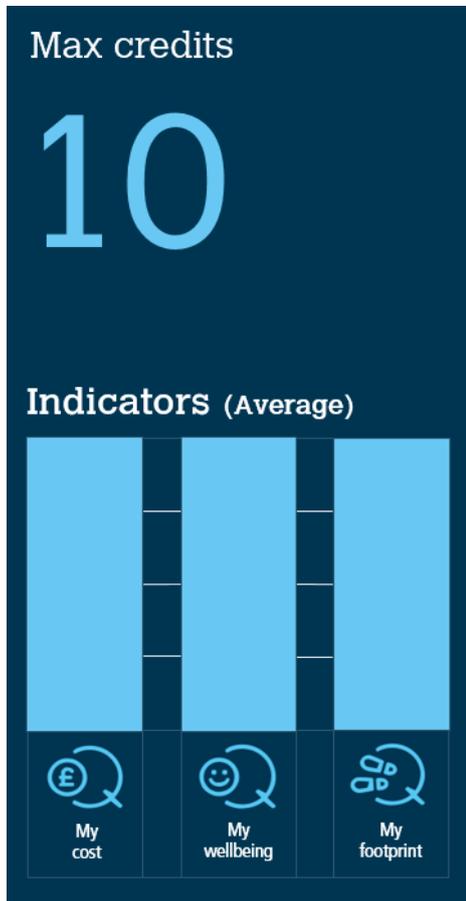
Remedial works

Where systems or services fail commissioning or are not performing as expected, remedial works are the measures taken to ensure systems and services pass commissioning. These measures may involve performing repairs and adjusting settings appropriate to the particular home being commissioned. These measures may also involve providing guidance or advice to occupants, where poor performance is partly due to how they are interacting with their systems or services (e.g. where seasonal commissioning carried out). The remedial works implemented must be in accordance with the recommendations made by the Commissioning strategy.

Specialist commissioning manager

A specialist commissioning manager is considered as someone who is a specialist contractor, rather than a general sub-contractor, with qualifications, experience and knowledge relevant to the building services and control systems of the particular development being assessed. For further guidance relating to this, please refer CIBSE commissioning Part M (2003). The commissioning specialists association can also provide guidance relating to the appointment of a specialist commissioning manager: www.csa.org.uk

27 QUALITY IMPROVEMENT



Aim

To encourage procedures that improve the overall quality of the home and reduce the 'performance gap'.

Benefit

- Reduce the gap between the designed and actual performance of the home and maximise its potential in relation to cost, wellbeing and the environment.
- Increase the build quality of the home and reduce the likelihood of snagging.

Context

The gap between designed and actual performance is well recognised by industry and government as a key challenge to improving the quality of homes. Among others, Zero Carbon Hub's research⁽¹⁶²⁾ and the principles of soft landings (developed by BSRIA⁽¹⁶³⁾ and Government⁽¹⁶⁴⁾), identify methods of reducing this gap. This includes promoting collaborative working, applying lessons learned from previous projects and ensuring a 'golden thread' of quality control is maintained throughout the project to ensure a quality development.

This issue considers ways of resolving some of the key causes of the performance gap including: unclear allocation of responsibilities, poor communication between stakeholders (including trades and professionals) and lack of skills, knowledge and experience regarding approaches to reducing common causes of gaps in performance⁽¹⁶⁵⁾. This issue focuses on overcoming these challenges.



Credit Summary

Criterion number	Title	Credits
crit 1–crit 3	01 Collaborative working	for 2 credits
crit 4–crit 5	02 Quality control	for 5 credits
crit 6	03 Feedback from previous projects	for 3 credits
Total credits available		10

Criteria

01 Collaborative working

for 2 credits

- crit 1 Prior to completion of the Concept Design (RIBA Stage 2), the project delivery stakeholders have:
- crit 1.a: Met to identify and define their roles, responsibilities and contributions for each of the key phases of project delivery, ensuring the following are formally agreed :
- crit 1.a.i: HQM performance targets
 - crit 1.a.ii: End user requirements (where known)
 - crit 1.a.iii: Aims of the design and design strategy
 - crit 1.a.iv: Particular installation and construction requirements or limitations
 - crit 1.a.v: Maintainability and adaptability of the proposals
 - crit 1.a.vi: Feedback and lessons learnt from previous projects applied to the strategy (where applicable, see 03 Feedback from previous projects)
 - crit 1.a.vii: Requirements for the production of project and end user documentation
 - crit 1.a.viii: Requirements for commissioning, testing, aftercare support and post occupancy evaluation (where pursued, see respective issues).
- crit 1.b: Outlined the general and specific risks to the project, relating to typical sources of poor performance including the following (where applicable): junctions (between elements, openings, balconies and complex features), cold bridging, cavity trays and correct usage of materials specified.
- crit 1.c: Established a set of actions for managing risks of poor performance (crit 1.b), by adapting design or introducing procedures to ensure appropriate site operatives are aware of how to manage these risks during construction and handover.
- crit 2 A written performance strategy has been produced that summarises the considerations in crit 1, including: specific targets, roles, responsibilities and the required actions for carrying out the agreements in crit 1.a and the measures in crit 1.c.
- crit 3 Relevant aspects of the performance strategy and key considerations (CN1) are disseminated to site operatives in a way that is specific to particular roles and responsibilities (e.g. via toolbox talks, briefings, meetings, BIM, graphic examples of good workmanship on site etc.). The performance strategy and key considerations are also freely accessible to site operatives.

02 Quality control

for 5 credits

- crit 4 Where crit 1 to crit 3 above are met and;
- crit 5 An Appropriately qualified professional has been appointed during the feasibility stage (stage 1), preparation and brief stage, as defined by the RIBA plan of work 2013 or equivalent) to:
- crit 5.a: Facilitate the stakeholder collaboration process outlined in crit 1
 - crit 5.b: Contribute to or provide approval for the performance strategy in crit 2
 - crit 5.c: Appropriately disseminate the performance strategy to site operatives specified in crit 3
 - crit 5.d: Liaise between project delivery stakeholders during key phases and assist site operatives during construction and handover, to ensure the performance strategy is applied in practice

- crit 5.e: Monitor design and construction quality throughout the key phases of the development, in line with the performance strategy targets
- crit 5.f: Ensure adjustments, remedial works or mitigation measures (crit 1.c) are carried out where monitoring indicates that the performance strategy targets or any key considerations (CN1 below) are not being met
- crit 5.g: Formally report progress of the performance strategy targets to the project delivery stakeholders prior to preparation and brief stage, completion of design stage and completion of post-construction stage (as a minimum)
- crit 5.h: Attend key design team meetings during the Concept Design, Developed Design and Technical Design stages, as defined by the RIBA Plan of Work 2013.

03 Feedback from previous projects

for 3 credits

crit 6 Where it has been demonstrated that lessons learnt from previous developments, within two years prior to the assessed home’s design completion, have been incorporated into the design of the home being assessed. Acceptable examples of feedback sources include: Post-occupancy evaluation , pilot sites, research projects, warranty claims, aftercare support, consumer feedback and seasonal commissioning activities.

Methodology

None.

Compliance Notes

Criterion Reference	Compliance Note
crit 1	<p>CN1 Key considerations</p> <p>The Zero Carbon Hub (2014) outlines the following general guidance regarding key considerations relating to reducing the performance gap, which must form part of what is disseminated to site operatives in crit 3 on the previous page:</p> <ul style="list-style-type: none"> – The importance of closely following the details within the drawings and specification – Feeding information back to the site management team where drawings are inadequate – Sequencing the installation of specific materials into difficult areas such as complex roof construction and loft eaves – Helping individuals to understand their role in maintaining items such as the airtight barrier.

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
All	01 General Evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	
crit 5	02 Reports	Copies of the reports produced as part of the quality control criteria.	
crit 5	03 Declaration	Declaration or contract confirming the appropriately qualified professional is independent from the site being assessed.	
crit 6	04 Feedback	In addition to general evidence, the following are examples of evidence that may contribute to meeting this criterion: case studies, written POE reports, statistics or results relating to performance of previous projects carried out by developer etc.	

Checklists, Tables & Illustrations

None

Definitions

Appropriately qualified professional

For the purposes of the quality control criteria, an appropriately qualified professional (AQP) refers to a professional or team of professionals who must meet the following as a minimum:

- Have a good level of knowledge, clear understanding and relevant experience of:
 - HQM; in terms of meeting technical criteria as well as understanding the assessment and certification process (e.g. they may be a qualified HQM Assessor)
 - Benefits of building to HQM, in both the short and long term (e.g. for all stakeholders in terms of economic, environmental and, health and wellbeing)
 - Design and construction of domestic buildings in relation to the particular home being assessed
 - Theoretical and practical approaches to reducing the performance gap (including key considerations listed in CN1 on the previous page)
 - Monitoring progress of meeting performance strategy targets (crit 2 on page 149) and ensuring design specifications are applied in practice.
- Be an effective communicator who is competent at:
 - Articulating the benefits of building HQM to project delivery stakeholders and site operatives
 - Facilitating the roles and responsibilities outlined in the performance strategy
 - Chairing meetings, presenting to different stakeholders and writing formal reports.
- The AQP must also be subject to ongoing training and competency requirements to ensure that their knowledge is maintained (e.g. continuous professional development).

Overall, the AQP role is to facilitate between stakeholders as well as monitor performance and verify that targets are being met. It must therefore be assured that the AQP's performance is not judged on the assessed home meeting a certain standard. Rather, the AQP should be judged on effectively carrying out the roles and responsibilities outlined in crit 5 on page 149. This helps to ensure that where monitoring indicates performance strategy targets are not being met; effective measures are taken to improve quality. The independence requirement might mean the AQP is employed at the company group level or they may be an architect separate from the developer. This may be someone internal to the developer, (e.g. a quality manager), an external consultant or a sustainability champion.

BREEAM accredited professional (AP)

An individual trained and qualified by BRE as a specialist in built environment sustainability, environmental design and assessment. The role of the BREEAM AP is to facilitate the project team's efforts to successfully schedule activities, set priorities and negotiate the trade-offs required to achieve a target BREEAM rating when the design is formally assessed. Only qualified individuals who are members of BRE's associated membership scheme comply with the BREEAM requirements. This membership ensures an adequate level of competence is maintained through regular Continuing Professional Development (CPD) in key relevant areas. For a list and contact details of BREEAM accredited Professionals, visit www.greenbooklive.com.

Formally agreed

The term 'formally agreed' relates to the performance strategy targets (crit 2 on page 149). In addition to the strategy itself, formal agreements may include a contract or letters of appointment with the architect and with other relevant project team members.

HQM performance targets

HQM performance targets refer specifically to the HQM star rating and key performance indicators targeted. Although individually targeted HQM issues or credits may be traded over the course of the project as it evolves, it is recommended that these are targeted or prioritised to ensure that the agreed performance target is achievable, and achieved without potentially costly alterations to the design at a later stage.

Key design team meetings

Key design team meetings can be defined as those where fundamental decisions that influence or affect the building's proposed design and its construction in accordance with the design (and therefore the building's sustainability impacts and HQM performance), are discussed and made. These meetings would typically include representatives from at least three of the parties listed below.

1. Representatives of the client or developer
2. The principal contractor
3. The architect
4. Structural engineers
5. Building services engineers
6. Cost consultants

7. Environmental consultants
8. Project management consultants.

Key phases

The definition of key phases of project delivery includes the following:

1. Concept Design
2. Developed Design
3. Construction
4. Commissioning and Handover
5. In-use occupation.

Post occupancy evaluation

Post-Occupancy Evaluation (POE) is the umbrella term for the process of obtaining feedback on the performance of a recently completed new building or refurbishment. Over time the value of POE has been recognised not only as a one off evaluation of a recently completed project but as an ongoing assessment process for any building in use that should be conducted at regular intervals over the building's lifecycle.

For further guidance regarding POEs, please refer to the references outlined in 35 Post-Occupancy Evaluation on page 187.

Project delivery stakeholders

The purpose of the collaborative working criteria is to reflect the need to consider the input of all the major project stakeholders from the earliest practical stage, to ensure smooth and successful delivery of the project's sustainability objectives.

Project delivery stakeholders therefore include the client, the building occupier or their representative (where known), the design team and the principal contractor. With regards to contractors' involvement, it ensures their input in terms of formulating sustainable design solutions, commenting or inputting on the practicality and buildability of (one or more) design solutions and their impact on programming, cost etc.

It is recognised that traditionally for some projects, the contractor for the works might not be appointed at the early stages of the project and therefore compliance with crit 1 on page 149 would not be possible. In these instances, to ensure the aim of the criterion is upheld crit 1 will be met, provided that a suitably experienced person with substantial construction or contracting experience in projects similar to the proposed works is involved prior to appointment of the contractor.

A suitably experienced person could be a contractor appointed as a consultant for this stage or a construction project manager.

Sustainability champion

Individuals who are trained and qualified to provide HQM or BREEAM related advice to the design team to facilitate timely and successful target setting, scheduling, prioritisation and monitoring of HQM and BREEAM compliance relating to the design of the building. The sustainability champion should encourage an integrated design and construction process that uses HQM or BREEAM as a framework for establishing, agreeing and achieving the desired level of sustainability performance for the project.

Members of formal schemes approved by BRE Global in connection with the provision of design advice. At present the following schemes are deemed to satisfy this requirement: BREEAM accredited professional (AP) Membership Scheme who are either a licensed assessor for a domestic scheme or have equivalent experience.

Providers of schemes or qualifications not listed, who feel their members meet this definition and who would like to be listed as approved membership schemes, should contact BRE Global.

28 CONSIDERATE CONSTRUCTION

Max credits

4

Indicators (Average)



Aim

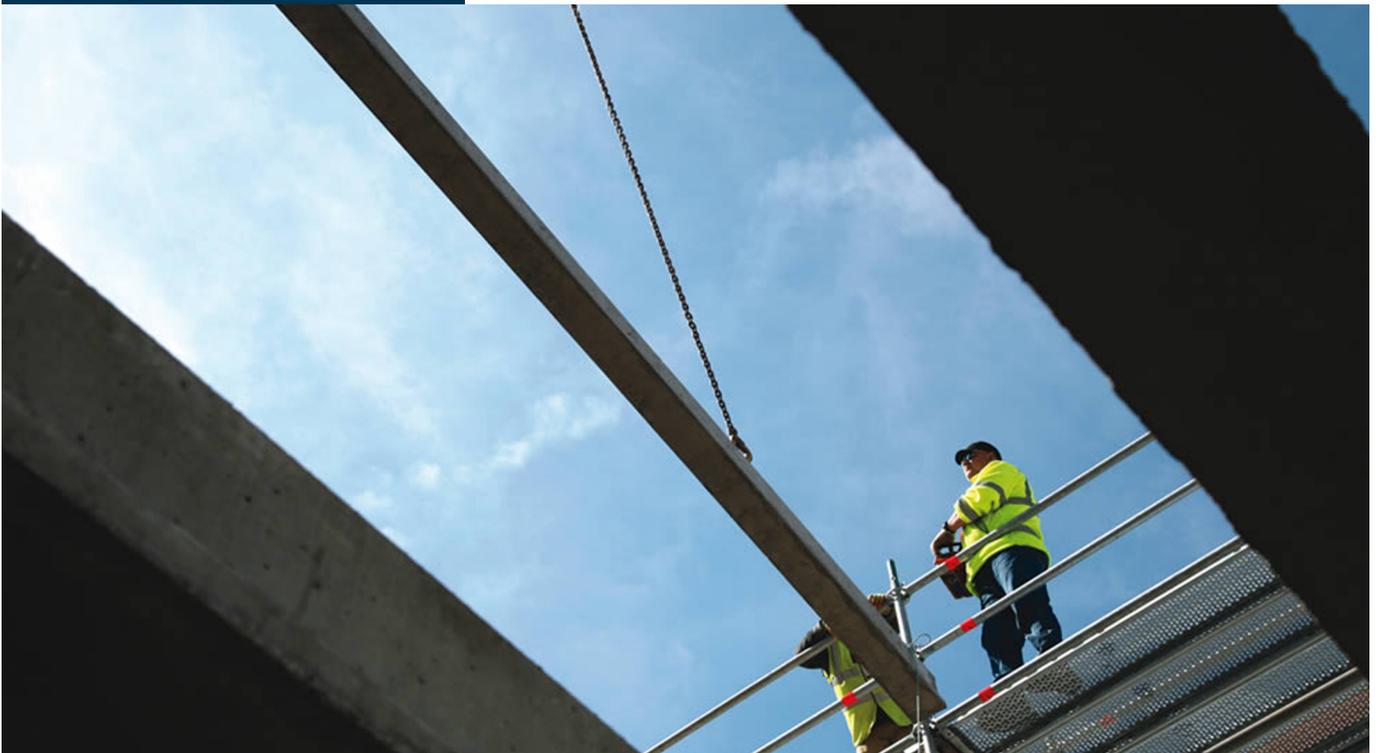
To promote the environmentally and socially considerate, and accountable management of construction sites.

Benefit

- Improve the responsibility of the construction industry.
- Help to promote community acceptance of the new development, before occupants have moved in.

Context

The construction industry has a huge impact on all our lives, with most construction work taking place in sensitive locations⁽¹⁶⁶⁾. Sites are encouraged to care about appearance, respect the community, protect the environment, secure everyone's safety and value their workforce through this issue.



Credit Summary

Criterion number	Title	Credits
crit 1	01 Considerate Construction	up to 4 credits
Total credits available		4

Criteria

01 Considerate Construction

up to 4 credits

crit 1 Where the principal contractor has used a 'compliant' organisational, local or national considerate construction scheme and their performance against the scheme has been confirmed by independent assessment and verification. Refer to Definitions below for a list of compliant schemes and therefore how performance, as determined by a compliant scheme, translates into HQM credits.

Methodology

None

Compliance Notes

Criterion Reference	Compliance Note	
crit 1	CN1 Phased or multiple home development	See Appendix D – Post-construction stage assessment issue exceptions on page 207.

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
All	01 Considerate Construction	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	Scheme certificate and compliance report.

Checklists, Tables & Illustrations

None.

Definitions

Compliant organisational, local or national considerate construction schemes

The following are defined as compliant schemes for the purpose of this HQM issue:

Considerate Constructors Scheme.

To achieve HQM credits using the Considerate Constructors Scheme (CCS)⁽¹⁶⁷⁾ and its Code of Considerate Practice, the principal contractor must achieve scheme certification and a CCS score as follows:

1. Two credits: a CCS score of 25* or greater
2. Four credits: a CCS score of 35** or greater

* A score of at least 5 in each of the five sections must be achieved.

** A score of at least 7 in each of the five sections must be achieved.

A site can be visited by a CCS Monitor more than once and the CCS Certificate will be awarded based on the results of the CCS Monitor's final visit. At the final stage of the HQM assessment, the number of HQM credits awarded should therefore be based on the final visit and the subsequent Monitor's report and certified CCS score.

Where a considerate construction or constructors scheme exists and is not listed as a HQM compliant scheme, the scheme administrator or operator should apply to BRE Global Ltd. for details on how to achieve recognition as a compliant scheme.

Considerate Constructors Scheme (CCS)

The Considerate Constructors Scheme⁽¹⁶⁸⁾ (CCS) is a national initiative set up by the UK construction industry to improve its image.

The scheme is a self-financing, independent organisation owned by the Construction Umbrella Bodies (Holdings) Ltd (made up of the Construction Products Association and the Construction Industry Council). Sites and companies that register with the scheme sign up and are monitored against a Code of Considerate Practice, designed to encourage best practice beyond statutory requirements.

29 CONSTRUCTION ENERGY USE

Max credits

5

Indicators (Average)



Aim

To reduce the amount of energy consumed during the construction process and associated emissions.

Benefit

- Reduces environmental impact by ensuring responsible use of energy during construction
- Helps reduce construction costs.

Context

Carbon emissions from on-site activities are responsible for a third of the construction sector’s emissions. By monitoring energy consumption, through methods such as metering, sites are able to identify inefficiencies in their processes⁽¹⁶⁹⁾. This issue recognises where developers take measures to reduce their energy consumption for on-site activities.

There are factors, such as the ability to secure grid connection, weather considerations and the type of works required on-site, that may be outside the project’s control. This can lead to a wide variation in energy consumption across the housing sector. Due to this wide variation it is not possible to set benchmarks at present.



Credit Summary

Criterion number	Title	Credits
crit 1	01 Contractor's energy efficiency checklist	for 2 credits
crit 2	02 Energy monitoring and reporting	for 2 credits
crit 3	03 Detailed monitoring and reporting	for 1 credit
Total credits available		5

Criteria

Credits will be awarded where the house builder has taken active measures to identify, set targets, monitor and report the amount of energy that has been consumed during the construction phases of the .

01 Contractor's energy efficiency checklist for 2 credits

crit 1 The contractor's energy efficiency checklist⁽¹⁷⁰⁾ (see Table 34 on page 158) has been completed with a full record of decisions actions or justifications for all points. In cases where the contractor has not been appointed at the time of design stage assessment, see CN1 on the facing page.

02 Energy monitoring and reporting for 2 credits

crit 2 Target, monitor and report data on the principal contractor's and subcontractors' metered energy consumption as a result of the use of construction plant, equipment (mobile and fixed) and site accommodation.

03 Detailed monitoring and reporting for 1 credit

crit 3 Conduct the monitoring and reporting of data in crit 2 on a weekly basis.

Methodology

Contractor's energy efficiency checklist

The contractor's energy efficiency checklist (see Table 34 on page 158) should be completed at both pre-construction and construction stage.

- step 1 The HQM Assessor is to distribute the contractor's energy efficiency checklist to the individual responsible, and also raise awareness of the potential for pursuing the requirements outlined in crit 2–crit 3 above to monitor and report energy consumption on site. The consideration process on the checklist must be commenced during the mobilisation stage or earlier where possible.
- step 2 In order to be eligible for the credits available in crit 1 above, the contractor is to consider and justify their chosen actions regarding the points listed on the checklist. When assessing the checklist, the HQM Assessor should assume that all points are possible until they are discounted by a justification from the contractor before awarding this credit. The answer 'Not Applicable' by itself would not be sufficient without an accompanying reason.

Energy monitoring and reporting

step 1 Where energy monitoring is being carried out and reported, a method is established for how this will be reported back

- Establish whether the contractor has procedures in place which allows them to capture the required information.
- Establish the designated individual who will be responsible for overseeing monitoring and reporting and how this will be communicated during the build.

step 2 Check the frequency of monitoring the contractor wishes to maintain throughout the project to ascertain eligibility for crit 3 above (see CN4 on the facing page)

- Establish the start and end dates for monitoring and reporting.
- Establish the targets for each fuel type.
- Establish if any intermediate measurements will be taken. Where detailed monitoring and reporting is possible (see CN4 on the facing page) then the project may be eligible for the credits available in crit 3 above.
- Establish the method of scoping that the readings will relate to. This could be as simple as a total reading for a whole project for each fuel type or, where practical, it could be a reading per sub-meter, per project phase, per block, per storey, per plot, per trade or any

other grouping that the contractor can effectively manage. This detail does not influence the credits, it only declares the scope to the assessor so evidence can also be organised accordingly.

- Collate the information that demonstrates the energy monitoring and reporting has been carried out.

Compliance Notes

Criterion Reference	Compliance Note	
crit 1	CN1 Contractor not yet appointed	At the design stage, where a contractor has not been appointed and there is no suitable individual to undertake the completion of the checklist, the client should appoint an individual to assume responsibility for ensuring inclusion of the requirements of this criterion before the credit can be awarded. This compliance note does not apply at the post construction stage. In order to award this credit at the post construction stage, the requirement must be followed up as soon as it becomes available and included in Appendix D – Post-construction stage assessment issue exceptions on page 207, and must be completed before site construction activity commences.
crit 2–crit 3	CN2 Energy reporting	Principal contractor's and subcontractors' energy consumption should be reported in kWh (and where relevant, litres of fuel used).
crit 2–crit 3	CN3 Phased or multiple home development	See Appendix D – Post-construction stage assessment issue exceptions on page 207.
crit 3	CN4 Detailed monitoring and reporting	In instances where there are no sources of energy being metered on the site, then the credits cannot be awarded.

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
All	01 General Evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	
crit 1	02 Energy efficiency checklist	<p>Energy efficiency checklist (pre-construction stage).</p> <p>Submit the completed checklist before activities start on site.</p> <p>OR</p> <p>Where a contractor hasn't been appointed, a letter from the client or their representative containing:</p> <ul style="list-style-type: none"> – Confirmation that the Energy efficient measures listed on the checklist will be undertaken. <p>AND</p> <ul style="list-style-type: none"> – Submit the completed checklist before activities start on site to continue eligibility to post construction. 	<p>Energy efficiency checklist (construction stage items)</p> <ul style="list-style-type: none"> – Submit the completed pre-construction stage checklist before activities start on-site – Submit additional construction stage items.
crit 2	03 Site Monitoring	<p>A copy of the specification or procedure confirming:</p> <ul style="list-style-type: none"> – Procedures are in place to monitor and report energy consumption – Name and job title of the designated individuals. 	<p>Monitoring records or report confirming:</p> <ul style="list-style-type: none"> – Type of energy sources utilised on-site (i.e. electricity, fuel etc) – Recorded energy consumption for each energy source.

Criterion Reference	Title	Design Stage	Post Construction Stage
		OR	
		A letter from the client or their representative containing: <ul style="list-style-type: none"> – Confirmation that the specification will contain a clause on monitoring energy consumption – An outline of the detailed requirements that will be included in that specification clause. 	
crit 3	04 Detailed monitoring and reporting	To demonstrate compliance the following must be provided: <ul style="list-style-type: none"> – Each meter reading that has been taken, clearly displaying the units of measurement – The date on which the reading was taken – Photographic evidence of meter readings for the duration of the project – The scope of each reading. 	

Checklists, Tables & Illustrations

Table 34 Contractor’s energy efficiency checklist.

Stage	Energy efficiency action (see Definitions for further detail on where to find more information about what each title entails)	Record of decisions and actions taken
Pre-construction phase	Plan the energy requirements of the project	To be completed by contractor. For example, at design stage - established monitoring at a weekly frequency For example, at post construction – monitoring was carried out on the first working day of the week throughout the project. Not applicable is not valid for this point.
	Procure low CO ₂ site accommodation	To be completed by contractor. For example, obtain EPC rating of C or higher for site accommodation.
	Specify energy efficient plant	To be completed by contractor.
	Secure early, high capacity, electricity grid connection	To be completed by contractor.
	Co-ordinate monitoring with phasing programme of work and set the intervals at which the reporting will be taken at.	To be completed by contractor. The action against this point will determine eligibility for crit 3 on page 156.
	*Other energy efficiency actions can be added to this checklist	
Construction phase	Deploy the right size generators (if generators are needed)	To be completed by contractor.
	Manage energy in a site office efficiently	To be completed by contractor.
	Consider energy saving measures	To be completed by contractor
	Consider installing intelligent and efficient temporary electrics	To be completed by contractor

Stage	Energy efficiency action (see Definitions for further detail on where to find more information about what each title entails)	Record of decisions and actions taken
	Consider techniques which avoid forced drying of wet trades	To be completed by contractor.
	Monitor and manage energy use	To be completed by contractor The action against this point will determine eligibility for crit 2–crit 3 on page 156.
	*Other energy efficiency actions can be added to this checklist	

Definitions

Constructing Excellence and reporting of construction site impacts

Constructing Excellence publishes the construction industry key performance indicators (KPIs)⁽¹⁷¹⁾ based on data collected by the Department for Business, Innovation and Skills via a voluntary quarterly survey returned by contractors throughout the UK. The Office of National Statistics also reports the annual results in the Construction Statistics Annual. One of the key performance indicators is the 'amount of CO₂ emissions caused by the energy used during the construction process per £100,000 of project value (kgCO₂ /£100k)'. Information collated by contractors as part of their voluntary submissions to Constructing Excellence may also serve to help demonstrate compliance with this HQM issue.

Energy consumption

This is the energy that is used by the construction plant, equipment (mobile and fixed) and site accommodation for the development as a whole from start on site up until practical completion.

Energy efficiency action

A list of actions that a contractor is to consider, and justify their chosen actions against in order to complete the checklist. For further information on the items included in the checklist see the Green Construction Board - How to reduce CO₂ on construction sites crib sheet. For further general information, see www.greenconstructionboard.org

Mobilisation

The project stage which occurs after the appointment of the main contractor and preparatory work is undertaken prior to activities starting on site.

Practical completion

For the purposes of this issue, this is to broadly align with the term that is generally understood within the industry found within many standard forms of contract. For clarification it should satisfy the following point:

- The building has received a completion certificate from the contract administrator.
- All works will have finished on the home and it is practical for occupation. This also includes the external works within the deeds boundary of the home.

Tools for monitoring and targeting construction site impacts

BRE's online environmental reporting tool, SMARTWaste, enables users to capture, monitor and target a project's on-site energy consumption and produce a CO₂ footprint, water consumption and responsible sourcing of timber. Transport and CCS data can also be collected. The system can be used as a tool to help meet the criteria of this issue and as a source of evidence for demonstrating compliance. It is available through the SMARTWaste Membership scheme by developing tailor-made versions of SMARTWaste. More details on the tool and membership are available at www.smartwaste.co.uk

30 CONSTRUCTION WATER USE

Max credits

5

Indicators (Average)



Aim

To encourage the efficient use of water and to conserve resources.

Benefit

- Helps reduce construction costs.
- Ensures responsible use of resources.

Context

Water resources are under severe stress throughout much of the UK, therefore reducing site water usage can help alleviate this⁽¹⁷²⁾. Furthermore, this is also cost effective as it decreases the associated wastewater disposal and treatment costs (e.g. sewer discharge, tanker removal)⁽¹⁷³⁾. This issue can help to reduce the risk of potential water shortages during periods of drought and help to reduce energy consumption where water is heated or cooled.

There are factors, such as weather considerations and the type of works required on-site, which may be outside the project’s control. This can lead to a wide variation in water consumption across the housing sector. Due to this wide variation, it is not possible to set benchmarks at present.



Credit Summary

Criterion number	Title	Credits
crit 1	01 Contractor's water efficiency checklist	for 2 credits
crit 2	02 Water monitoring and reporting	for 2 credits
crit 3	03 Detailed monitoring and reporting	for 1 credit
Total credits available		5

Criteria

01 Contractor's water efficiency checklist for 2 credits

crit 1 The contractor's water efficiency checklist⁽¹⁷⁴⁾ (see Table 35 on page 163) has been completed with a full record of decisions actions or justifications for all points. In cases where the contractor has not been appointed at the time of design stage assessment, see CN1 on the facing page.

02 Water monitoring and reporting for 2 credits

crit 2 Target, monitor and report data on the principal contractor's and subcontractors' potable water consumption (m³) arising from the use of construction plant, equipment (mobile and fixed) and site accommodation.

03 Detailed monitoring and reporting for 1 credit

crit 3 Conduct the monitoring and reporting of data in crit 2, on a weekly basis.

Methodology

Contractor's water efficiency checklist

The contractor's water efficiency checklist should be completed at both the pre-construction and construction stages (see Table 35 on page 163).

- step 1 The HQM Assessor is to distribute the contractor's water efficiency checklist to the individual responsible, and also raise awareness of the requirements outlined in crit 2–crit 3 above to monitor and report water consumption on site. The consideration process on the checklist must be commenced during the mobilisation stage or earlier, where possible.
- step 2 In order to be eligible for the credits available in crit 1 above, the contractor is to consider and justify their chosen actions regarding the points listed on the checklist. When assessing the checklist, the HQM Assessor should assume that all points are possible until they are discounted by a justification from the contractor before awarding this credit. The answer 'Not Applicable' by itself would not be sufficient without an accompanying reason.

Water monitoring and reporting

- step 1 Where water monitoring is being carried out and reported, a method is established for how this will be reported back
- Establish whether the contractor has procedures in place which allows them to capture the required information.
 - Establish the designated individual who will be responsible for overseeing monitoring and reporting, and how this will be communicated during the build.
- step 2 Check the frequency of monitoring the contractor wishes to maintain throughout the project to ascertain eligibility for crit 3 above (see CN3 on the facing page)
- Establish the start and end dates for monitoring and reporting.
 - Establish the targets for water consumption.
 - Establish if any intermediate measurements will be taken. Where detailed monitoring and reporting is possible (see CN3 on the facing page), then the project may be eligible for the credits available in crit 3 above.
 - Establish the method of scoping that the readings will relate to. This could be as simple as a total reading for a whole project for each fuel type or, where practical, it could be a reading per sub-meter, per project phase, per block, per storey, per plot, per trade or any other grouping that the contractor can effectively manage. This detail does not influence the credits, it only declares the scope to the assessor so evidence can also be organised accordingly.
 - Collate the information that demonstrates that water monitoring and reporting has been carried out.

Compliance Notes

Criterion Reference	Compliance Note	
crit 1	CN1 Contractor not yet appointed	At the design stage, where a contractor has not been appointed and there is no suitable individual to undertake the completion of the checklist, the client should appoint an individual to assume responsibility for ensuring inclusion of the requirements of this criterion before the credit can be awarded. This compliance note does not apply at the post construction stage. In order to award this credit at the post construction stage, the requirement must be followed up as soon as it becomes available and included in the Post Construction Evidence, and must be completed before site construction activity commences.
crit 2–crit 3	CN2 Phased or multiple home development	See Appendix D – Post-construction stage assessment issue exceptions on page 207.
crit 3	CN3 Detailed monitoring and reporting	In instances where water is not being metered on the site, then the credit cannot be awarded.

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
crit 1–crit 3	01 General Evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	
crit 1	02 Water efficiency checklist	<p>Water efficiency checklist. Submit the completed checklist before activities start on site.</p> <p>OR</p> <p>Where a contractor hasn't been appointed, a letter from the client or their representative containing:</p> <ul style="list-style-type: none"> – Confirmation that the water efficient measures listed on the checklist will be undertaken. <p>AND</p> <ul style="list-style-type: none"> – Submit the completed checklist before activities start on-site to continue eligibility to post construction. 	<p>Water efficiency checklist (construction stage items)</p> <ul style="list-style-type: none"> – Submit the completed checklist before activities start on site.
crit 2	03 Site Monitoring	<p>A copy of the specification or procedure confirming:</p> <ul style="list-style-type: none"> – Procedures are in place to monitor and report water consumption – Name and job title of the designated individuals. <p>OR</p> <p>A letter from the client or their representative containing:</p> <ul style="list-style-type: none"> – Confirmation that the specification will contain a clause on monitoring water consumption 	<p>Monitoring records or report confirming:</p> <ul style="list-style-type: none"> – Recorded water consumption.

Criterion Reference	Title	Design Stage	Post Construction Stage
		<ul style="list-style-type: none"> - An outline of the detailed requirements that will be included in that specification clause. 	
crit 3	04 Detailed monitoring and reporting	<p>To demonstrate compliance the following must be provided:</p> <ul style="list-style-type: none"> - Each meter reading that has been taken, clearly displaying the units of measurement - The date on which the reading was taken - Photographic evidence of meter readings for the duration of the project - The scope of each reading. 	

Checklists, Tables & Illustrations

Table 35 Contractor's water efficiency checklist

Water efficiency action	Record of decisions or actions taken
Consider installing trigger guns to hoses.	To be completed by contractor.
Consider the use of efficient dust suppression techniques (general and road) such as fan misting systems.	To be completed by contractor.
Consider waste efficient wheel washing, e.g. drive on systems.	To be completed by contractor.
For washing out and cleaning – consider efficient systems such as high pressure (low flow) washers.	To be completed by contractor.
For site accommodation, consider the use of water efficient fittings for urinals, toilets and taps.	To be completed by contractor.
Consider installing a rainwater harvesting system.	To be completed by contractor.
*Other water efficiency actions can be added to this checklist.	To be completed by contractor.

Definitions

Mobilisation

The project stage which occurs after the appointment of the main contractor and preparatory work is undertaken prior to activities starting on site.

Tools for monitoring and targeting construction site impacts

BRE's online environmental reporting tool, SMARTWaste, enables users to capture, monitor and target a project's on-site energy consumption and produce a CO₂ footprint, water consumption and responsible sourcing of timber. Transport and CCS data can also be collected. The system can be used as a tool to help meet the criteria of this issue and as a source of evidence for demonstrating compliance. It is available through the SMARTWaste Membership scheme by developing tailor-made versions of SMARTWaste. More details on the tool and membership are available at www.smartwaste.co.uk

Credit Summary

Criterion number	Title	Credits
crit 1–crit 3	01 Product procurement policy	for 1 credit
crit 4–crit 6	02 Construction resource efficiency	up to 8 credits
crit 7–crit 8	03 Diversion of construction waste from landfill	up to 4 credits
crit 9–crit 10	04 Diversion of excavation waste from landfill	for 2 credits
Total credits available		15

Criteria

01 Product procurement policy

for 1 credit

- crit 1 By the end of RIBA stage 2 (or equivalent), the client or developer has a documented policy and procedure that sets out procurement requirements for all suppliers and trades to adhere to relating to opportunities for minimising construction waste on-site (see CN1 on the facing page).
- crit 2 The documented policy and procedure must be disseminated to all relevant internal and external personnel and included within the construction contract to ensure that they are enforceable on the assessed project.
- crit 3 The documented policy and procedure must encourage the specification of products which can help to minimise waste arisings (for example, consider materials that can be reused once the home has been deconstructed, consider recycling or take-back arrangements and packaging recycling or minimisation⁽¹⁷⁵⁾).

02 Construction resource efficiency

up to 8 credits

- crit 4 A resource management plan (RMP) has been developed covering the non-hazardous waste related to on-site construction and where applicable, dedicated off-site manufacture or fabrication (including demolition and excavation waste) generated by the building's design and construction.
- crit 5 Where construction waste related to on-site construction, and dedicated off-site manufacture or fabrication (excluding demolition and excavation waste) meets or is lower than the benchmarks identified in Table 36 below, then the associated credits are awarded.

Table 36 Site Waste Reduction Performance credit allocation

Waste generated per 100m ² (project wide gross internal floor area (GIFA)) for new build residential projects		
m ³ per 100m ²	Tonnes per 100m ²	Credits
≤ 13.9	≤ 8.5	2
≤ 8.1	≤ 4.9	4
≤ 4.8	≤ 2.9	6
≤ 3.5	≤ 1.9	8



Volume (m³) is actual volume of waste (not bulk volume).

- crit 6 Where existing buildings on the site will be demolished a pre-demolition audit of any existing buildings, structures or hard surfaces is completed.

03 Diversion of construction waste from landfill

up to 4 credits

- crit 7 Waste materials will be sorted into separate key waste groups (according to the waste streams generated by the scope of the works) as per Table 38 on page 168. This can be either on-site, or through a licensed contractor for recovery.
- crit 8 Credits are awarded for the project's performance with regards to the diversion of non-hazardous construction and demolition (where applicable) waste from landfill. The associated benchmarks are outlined in Table 37 on the facing page.

Table 37 Diversion from landfill credit allocation

Type of waste	Percentage diverted from landfill (by Volume)	Percentage diverted from landfill (by Tonnage)	Credits
Construction	70%	80%	2
Demolition	80%	90%	
Construction	85%	90%	4
Demolition	85%	95%	

04 Diversion of excavation waste from landfill for 2 credits

crit 9 Maximum credits have been achieved from crit 8 on the previous page.

crit 10 At least 95% (either by volume or tonnage) of excavation waste is diverted from landfill.

Methodology

None.

Compliance Notes

Criterion Reference	Compliance Note	
crit 1–crit 3	CN1 Documented product procurement policy	This may be prepared and adopted at an organisational level or be site or project specific. It is recommended (but not a requirement) that the documented policy follows the principles of BS 8900-1:2013 ⁽¹⁷⁶⁾ Managing sustainable development of organisations – Guide; BS 8903:2010 ⁽¹⁷⁷⁾ Principles and framework for procuring sustainably – Guide or BS 8895 ⁽¹⁷⁸⁾ Designing for Material Efficiency in Buildings Part 1 and 2. This policy may form a part of a broader Sustainable Procurement Plan or be in the form of a standalone document.
crit 4	CN2 Resource Management Plan records	The project waste arisings should be recorded and include construction, demolition and excavation waste. Note that the performance benchmarks for the award of credits do not include demolition and excavation waste.
crit 5	CN3 Phased or multiple home development	See Appendix D – Post-construction stage assessment issue exceptions on page 207.
crit 6	CN4 Pre-demolition audit	The pre-demolition audit is undertaken to determine if, in the case of demolition, refurbishment or reuse is feasible and, if not, to maximise the recovery of material from demolition for subsequent high-grade or high-value applications. The audit must be referenced in the RMP (see Definitions on page 169) and cover: <ol style="list-style-type: none"> 1. Identification of the key refurbishment or demolition materials 2. Potential applications and any related issues for the reuse and recycling of the key refurbishment and demolition materials in accordance with the waste hierarchy.
crit 7–crit 10	CN5 Limited site space for segregation and storage	Where space on site is too limited to allow materials to be segregated, a waste contractor may be used to separate and process recyclable materials off site. Similarly manufacturers' take-back schemes could also be used. Where this is the case, evidence must be produced which demonstrates that segregation of materials is carried out to the agreed levels and that materials are reused or recycled as appropriate. Such evidence could be Environment Agency or Scottish Environment Protection Agency or Environment Agency Wales or Northern Ireland Environment Agency Waste Return Forms.
crit 7–crit 10	CN6 Waste collation from multiple satellite sites	In cases where the constructor has adopted a strategy that includes multiple sites which collates the waste in a centralised location, the assessment is based on the combined sites as if they are one development site. Sites that are not undertaking a HQM assessment which are collated in this manner are to be included in the assessment.

Criterion Reference	Compliance Note	
crit 7–crit 10	CN7 Waste from temporary support structures	Any waste generated on-site for the purposes of the development (excluding demolition and excavation waste) must be taken account of in the assessment of this issue. If temporary support structures, or any other materials or systems brought to facilitate the construction of the building, enter the waste stream (albeit for recycling), then they will need to be classified as construction waste, and therefore contribute to the construction waste, and be assessed against the benchmark for this issue. If the support structure or system or material is reused by the contractor (or any other contractor) on other sites and therefore has not entered the waste stream, then such items can be excluded from calculations. The same principle would apply to timber formwork where used.

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
All	01 General Evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	
crit 1–crit 3	02 Documented product procurement policy	<ul style="list-style-type: none"> – A copy of the documented product procurement policy. – Evidence that the policy is disseminated, or a written commitment to do so. – Evidence that the policy is included in the construction contract, or a written commitment to do so. – Evidence that there is a policy on waste minimisation. 	<ul style="list-style-type: none"> – Evidence that the policy was disseminated. – Evidence that the policy was included in the construction contract.
crit 4 and crit 6	03 Resource Management plan and pre-demolition audit	A copy of the Resource Management plan and where relevant, pre-demolition audit.	
crit 5	04 Construction resource efficiency	<p>A projected waste benchmark</p> <p>AND</p> <p>A copy of the specification or procedure confirming:</p> <ul style="list-style-type: none"> – Procedures are in place to monitor and minimise construction waste – Name and job title of the designated individuals. <p>OR</p> <p>A letter from the client or their representative containing:</p> <ul style="list-style-type: none"> – Confirmation that the specification will contain a clause on reporting and minimising construction waste – An outline of the detailed requirements that will be included in that specification clause. 	<p>Monitoring records or report confirming:</p> <ul style="list-style-type: none"> – Monitoring actions carried out by the designated individual – The total waste arising for the development – Comparison of the total waste arising against the benchmark.

Criterion Reference	Title	Design Stage	Post Construction Stage
crit 7–crit 10	05 Diversion of construction waste and excavation waste from landfill	<p>Projected waste diversion figures. A copy of the specification or procedure confirming:</p> <ul style="list-style-type: none"> – Procedures are in place to divert wastes from landfill – Targets that will be set and reviewed regularly – Name and job title of the designated individual. <p>OR</p> <p>A letter from the client or their representative containing:</p> <ul style="list-style-type: none"> – Confirmation that the specification will contain a clause on diverting wastes from landfill – An outline of the detailed requirements that will be included in that specification clause. 	<p>A copy of the main contract programme showing:</p> <ul style="list-style-type: none"> – Actions taken to divert waste from landfill. <p>Monitoring records or report confirming:</p> <ul style="list-style-type: none"> – Monitoring actions carried out by the designated individual – The total waste arising for the development (broken down by demolition, excavation and construction) and the amount that has been diverted from landfill – Evidence of waste transfer stations recycling rates – A comparison of the estimated figures in the pre-demolition audit with the actual figures.

Checklists, Tables & Illustrations

Table 38 Waste groups

European Waste Catalogue	Key group	Examples
170102	Bricks	Bricks
170101	Concrete	Pipes, kerb stones, paving slabs, concrete rubble, precast and in situ
170604	Insulation	Glass fibre, mineral wool, foamed plastic
1501	Packaging	Paint pots, pallets, cardboard, cable drums, wrapping bands, polythene sheets
170201	Timber	Softwood, hardwood, board products such as plywood, chipboard, medium density fibreboard (MDF)
1602	Electrical and electronic equipment	Electrical and electronic TVs, fridges, air-conditioning units, lamps equipment
200301	Canteen or office	Office waste, canteen waste, vegetation
1301	Oils	Hydraulic oil, engine oil, lubricating oil
1703	Asphalt and tar	Bitumen, coal tars, asphalt
170103	Tiles and ceramics	Ceramic tiles, clay roof tiles, ceramic, sanitary ware
1701	Inert	Mixed rubble or excavation material, glass
1704	Metals	Radiators, cables, wires, bars, sheet
170802	Gypsum	Plasterboard, plaster, fibre cement sheets
170101	Binders	Render, cement, mortar
170203	Plastics	Pipes, cladding, frames, non-packaging sheet
200307	Furniture	Tables, chairs, desks, sofas
1705	Soils	Soils, clays, sand, gravel, natural stone
Most relevant EWC	Liquids	Non-hazardous paints, thinners, timber treatments
Most relevant EWC	Hazardous	Defined in the Hazardous Waste List (HWL) of the European Waste Catalogue (EWC)
Most relevant EWC	Floor coverings (soft)	Carpets, vinyl flooring

European Waste Catalogue	Key group	Examples
Most relevant EWC	Architectural features	Roof tiles, reclaimed bricks, fireplaces
1 70904 (Mixed)	Mixed or other	Efforts should be made to categorise waste into the above categories wherever possible.

Definitions

Best practice construction waste management plan (see RMP)

Best practice is a combination of commitments to:

1. Design out waste (materials optimisation).
2. Reduce waste generated on site.
3. Develop and implement procedures to sort and reuse or recycle construction and demolition waste on site and off site (as applicable).
4. Follow guidance from:
 - a. Defra (Department of Environment, Food and Rural Affairs)
 - b. BRE (Building Research Establishment Ltd)
 - c. WRAP (Waste and Resources Action Programme). It is expected that WRAP guidance will no longer be available from the WRAP website from April 2016 onwards.
 - d. Welsh Government.

Diversion from landfill

Actions to avoid waste being disposed of in landfill include:

1. Reusing the material on-site (in situ or for new applications)
2. Reusing the material on other sites
3. Community reuse and recycling
4. Salvaging or reclaiming the material for reuse
5. Returning material to the supplier via a 'take-back' scheme
6. Recovery of the material from site by an approved waste management contractor and recycled or sent for energy recovery.

Resource Management Plan (RMP)

The aim of the RMP is to promote resource efficiency and to prevent illegal waste activities. Resource efficiency includes minimising waste at source and ensuring that clients, designers and principal contractors assess the use, reuse and recycling of materials and products on and off the site. A compliant RMP should be written in line with best practice (see Definitions above) and defines:

1. A target benchmark for resource efficiency, i.e. m³ of waste per 100m² or tonnes of waste per 100m².
2. Procedures and commitments for minimising non-hazardous waste in line with the target benchmark.
3. Procedures for minimising hazardous waste.
4. A waste minimisation target and details of waste minimisation actions to be undertaken (consider those actions listed within the waste minimisation definition).
5. Procedures for estimating, monitoring, measuring and reporting hazardous and non-hazardous site waste. If waste data are obtained from licensed external waste contractors, the data needs to be reliable and verifiable, e.g. by using data from EA/SEPA/EA Wales/NIEA Waste Return Forms.
6. Procedures for sorting, reusing and recycling construction waste into defined waste groups (see additional guidance section), either on-site or through a licensed external contractor.
7. Procedures for reviewing and updating the plan.
8. The name or job title of the individual responsible for implementing the above.

A Site Waste Management Plan is a form of Resource Management Plan and for HQM should be written in line with best practice (see definition of best practice construction waste management plan (see RMP) above)

Waste hierarchy

The order of priority for the management of waste where waste generation could or does occur. This is listed in descending order of environmental preference in The Waste (England and Wales) Regulation 2011⁽¹⁷⁹⁾ as:

- Prevention
- Reuse
- Recycle
- Recover

Waste minimisation

This term encompasses two elements of the waste hierarchy:

Waste reduction or prevention = using less material in design, manufacture and installation, keeping products for longer, using no hazardous materials

Reuse = using products again for the same purpose for which they were conceived, which may require checking, cleaning or repairing (preparing for reuse).

Types of waste minimisation actions include:

1. Consider implementing BS 8895:2013 Designing for material efficiency in building projects, Parts 1 and 2.
2. Set and report against waste reduction targets
3. Design for standardisation of components
4. Avoid waste from excavation or groundworks and consider opportunities for zero cut and fill
5. Return packaging for reuse
6. Consider community reuse of surplus or offcuts
7. Include waste minimisation initiatives and targets in tenders or contracts and engage with the supply chain
8. Consider use of BIM (Building Information Modelling)
9. Design for off-site or modular build
10. Design for flexibility, adaptability and future deconstruction
11. Design to use fewer materials
12. Use of reusable temporary elements such as shuttering and protection.

This list is not exhaustive and other waste minimisation actions can be taken.

USER EXPERIENCE

This section discusses the following.

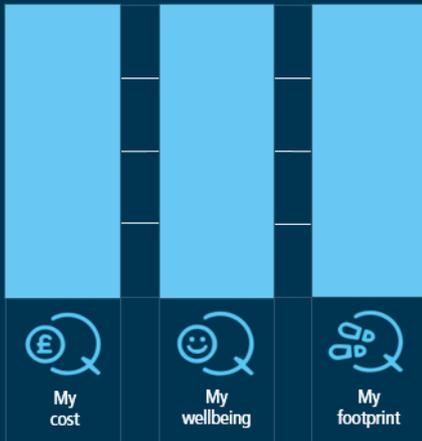
32 Aftercare	172
33 Home Information	176
34 Smart Homes	182

32 AFTERCARE

Max credits

10

Indicators (Average)



Aim

To provide aftercare support during early occupancy of the home, in addition to the provision of construction warranties, to help occupants resolve any early problems and manage their home in the most efficient and comfortable way.

Benefit

- Ensures home systems are working efficiently and helps to identify and resolve problems in a timely manner.
- Helps occupants feel happy, comfortable and confident in their new home.
- Allows the developer to have a closer relationship with their consumer.

Context

Moving home is considered to be one of the most stressful events many people go through and probably the biggest financial investment of their lives. A smooth handover can have a huge impact on an occupant's satisfaction and experience of settling into their new home.

This issue links with industry and government efforts to produce better buildings by following the principle of soft landings⁽¹⁸⁰⁾. This issue recognises the aftercare available and awards credits depending on the level of support being offered to occupants.

Providing support helps occupants to learn how to operate their home in the best way⁽¹⁸¹⁾, and gives occupants an opportunity to report and resolve any problems that arise during the early stages of occupation. This communication between the developer and occupants helps to better inform future projects and improve customer satisfaction.



Credit Summary

Aftercare contains the only mandatory criterion within Home Quality Mark. In order for a home to become certified under the Home Quality Mark this mandatory criterion must be achieved.

Criterion number	Title	Credits
crit 1	01 Building warranty	Mandatory
crit 2–crit 3	02 Basic aftercare support	Prerequisite
crit 4	03 4-6 week visit	3
crit 5	04 Remote support	3
crit 6	05 On-site support	4
Total credits available		10

Criteria

01 Building warranty Mandatory

crit 1 The home is covered by a building warranty, from a warranty provider who is a member of and fully complies with “The Consumer Code for Home Builders” (consumercodeforhomebuilders.com) or is recognised by the Trading Standards Institute.

02 Basic aftercare support prerequisite

crit 2 Home information is provided relating to the aftercare support that is available to the occupant (see 33 Home Information on page 176).

crit 3 Where a commitment has been made to provide occupants with an initial visit to show them around their home on the first day of occupation and the following information is communicated:

crit 3.a: Verbal confirmation of aftercare commitments detailed in the aftercare part of 33 Home Information on page 176

crit 3.b: Introduction to the home information and quick start guide (see 33 Home Information on page 176)

crit 3.c: Where crit 4 below is pursued, a date for the 4-6 week visit is arranged (where this has been accepted by the occupant and hasn't been confirmed by this point already).

03 4-6 week visit for 3 credits

crit 4 Where a commitment has been made to offer a home visit to be carried out between the first 4 to 6 weeks of occupation and where this visit is provided, includes the following:

crit 4.a: Demonstration of ventilation (e.g. MVHR) and heating systems, and general advice of how to conserve energy including when to open windows, put the heating on, carry out maintenance etc.

crit 4.b: Demonstration of how to use and maintain low and zero carbon technologies (LZCT) (where installed). This must also include guidance on how to easily check when LZCTs are working properly and the support available when they are not (e.g. MCS, warranties etc.)

crit 4.c: Demonstration of how to use any installed smart meters or other monitors and controls.

crit 4.d: Where post occupancy evaluations (POEs) have been committed to (see 35 Post-Occupancy Evaluation on page 187), details regarding what a POE is, how they can get involved and the benefits of being involved (to the occupant specifically and for industry in general).

04 Remote support up to 3 credits

crit 5 Where a commitment has been made to provide remote support (CN4 on the facing page) to the occupants of the home being assessed. The amount of credits awarded is based on the amount of time the support will be available for, outlined in CN4 on the facing page.

Table 39 Remote support timescales and credits available

Time period of remote support	Credits
First year of occupation	2
First three years of occupation	3

05 On-site support

up to 4 credits

crit 6 Where a commitment has been made to provide on-site support (CN5 below) to the occupants of the home being assessed. The amount of credits awarded is based on the amount of time the support will be available for, outlined in Table 40 below.

Table 40 On-site support timescales and credits available

Time period of on-site support	Credit
First year of occupation	3
First three years of occupation	4

Methodology

None.

Compliance Notes

Criterion Reference	Compliance Note	
crit 1–crit 6	CN1 Aftercare support	<p>To achieve credits in this issue, any support provided must:</p> <ol style="list-style-type: none"> 1. Cover all parts of the home (i.e. all building fabric, systems and services etc.) 2. Be available for the whole duration of time specified in the criteria 3. Be free for occupants to use. Credits are not available where aftercare support is offered as an optional feature of the home at an additional cost to occupants. <p>Examples of who may carry out aftercare support include: independent organisation, housing association, letting agent, landlord and the developer.</p>
crit 1–crit 6	CN2 Aligning with other relevant requirements	<p>Where relevant, aftercare support should align with other relevant requirements (e.g. housing association management requirements), in order to prevent duplication of work or contradiction of handover requirements.</p>
crit 1–crit 6	CN3 Change of occupancy	<p>The aftercare support must be arranged in a way that it is available to whoever occupies the home, during the time the support is specified as being available for. This means that in the event that a home changes occupancy before the arranged aftercare support is due to finish, the support must still be available to any new occupants for the time originally agreed to.</p>
crit 5	CN4 Remote support	<p>Remote support is support that occupants can use to get basic, whole home advice that will help them to get the best use out of their home and to resolve any problems that may arise.</p> <p>Examples of remote support include (but are not limited to):</p> <ol style="list-style-type: none"> 1. Helplines (e.g. troubleshooting service) 2. Interactive communication links (e.g. online portal) 3. Customer service 4. Mobile app. based support.
crit 6	CN5 On-site support	<p>This applies to aftercare where on-site support is available to help occupants resolve problems and get the most out of their home. Examples of on-site support include (but are not limited to):</p> <ol style="list-style-type: none"> 1. Call-out service 2. Ongoing maintenance and management arrangements 3. Periodic walkabouts 4. Resident on-site attendance. <p>On-site support does not need to consist of an individual or service located on-site at all times but this support must be available on request (e.g. a call-out</p>

Criterion Reference	Compliance Note
	service).

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
crit 1 - crit 6	01 General evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	



BRE will contact developers to ensure any aftercare or POE commitments made to achieve these credits have been undertaken. In the event that aftercare or POE commitments are not undertaken or completed, BRE may suspend or withdraw the assessment’s HQM certificate and its Green Book Live listing. Alternatively, BRE may re-issue the HQM certificate with an updated rating and score based on the withdrawal of the affected credits (at the clients own expense).

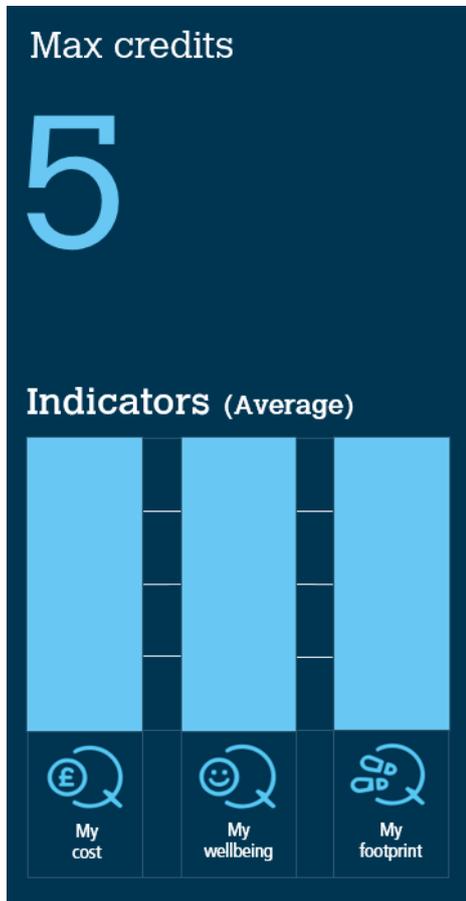
Checklists, Tables & Illustrations

None.

Definitions

None.

33 HOME INFORMATION



Aim

To provide occupants with useful, accessible information that helps them to get the most out of their home and engage with their local environment and community.

Benefit

- Help consumers manage their homes in the most cost effective manner.
- Provide occupants with ways to ensure their homes are operating in a healthy manner.
- Allow all to make the most of their community.

Context

Designing homes that are intuitive and simple to use is the best way of ensuring occupants get the most out of their home. However, providing occupants with relevant information, is an additional way of helping people in their new home and community, where this information is clear, accessible and user-friendly⁽¹⁸²⁾. This issue recognises where this type of information is provided via written guides, videos, websites, or other media, in order to help translate the design benefits of homes directly to the people living in them.



Credit Summary

Criteria relating to home information are separated into two main parts:

- Part one outlines the core home information criteria. Credits are awarded for the Home Information issue where these criteria are met.
- Part two outlines the home information that is specific to particular issues within HQM, where pursued. Credits are awarded for part two where issue-specific home information (where applicable) is provided, in addition to the core home information criteria in part one.

Criterion number	Title	Credits
crit 1	01 Core home information	for 2 credits
crit 2–crit 3	02 Issue specific home information	for 3 credits
Total credits available		5

Criteria

01 Core home information

for 2 credits

- crit 1 Where it can be demonstrated that home information will be provided to occupants of all homes from the first day of moving in and meets the following:
- crit 1.a: Available in an accessible format (CN1 on page 180)
- crit 1.b: Available in both a hard and soft copy
- crit 1.c: Written using plain English that is jargon free (e.g. Plain English campaign⁽¹⁸³⁾) and;
- crit 1.d: Includes the following content:
- crit 1.d.i: Operational and maintenance information for all home systems (CN2 on page 180) within the home or building (where present)
 - crit 1.d.ii: Includes contact details for local emergency services (e.g. local police station, hospitals, fire brigades etc.) and for the person or company responsible for any queries regarding the home (e.g. this may include landlords, warranty providers, management companies, housing associations etc.).
 - crit 1.d.iii: A quick start guide where all home information is briefly summarised and can be used to direct readers to the section of home information they need where further information is needed (e.g. a simple index or 'crib' sheet)
 - crit 1.d.iv: Key health and safety information and emergency procedures specific to the home
 - crit 1.d.v: Contains the assessed home's HQM scorecard issued by BRE Global Ltd..

02 Issue specific home information

for 3 credits

- crit 2 Where crit 1 above is met.
- crit 3 Where relevant criteria have been met, within specific issues (listed in column 1 of the below table), the information listed in column 2 of Table 41 below, is provided as part of the home information supplied to occupants. Issue specific information must also be provided in line with crit 1.

Table 41 Information required where various issues are pursued.

Issue	Relevant part of the issue	Information required (where relevant credits from issues in column 1 are pursued) regarding:
02 Alternative Sustainable Transport Options	03 Electric charging points on page 13	1. a. The location of the charging point. b. How to operate and maintain the system. c. An overview of the reasons for the use of electric charging points (e.g. environmental and economic savings).
	04 Car clubs on page 13	2. a. The location and distance to the nearest car club

Issue	Relevant part of the issue	Information required (where relevant credits from issues in column 1 are pursued) regarding:
		<ul style="list-style-type: none"> b. Contact details for those responsible for running the car club c. An overview of the reasons for the use of car clubs (e.g. environmental and economic savings).
05 Recreational Space	07 Initial planting on page 29	<ul style="list-style-type: none"> 3. <ul style="list-style-type: none"> a. Maintenance requirements relating to the growing space provided. b. Access restrictions (e.g. allotments closed after daylight hours). c. Information regarding the types of produce that have been planted and information on those that would grow well in the soil conditions.
06 Flood Risk	01B Medium or high risk on page 34	<ul style="list-style-type: none"> 4. <ul style="list-style-type: none"> a. Information regarding the flood resilience measures in place within the site boundary. b. Operation and maintenance guidance of the flood resilience measures in place (where they are not passive features).
07 Managing the Impact of Rainfall	07 Managing the Impact of Rainfall on page 38	<ul style="list-style-type: none"> 5. <ul style="list-style-type: none"> a. Information regarding any specific drainage systems or strategies and how they should best be operated and maintained (if required). b. Where the home user is not responsible for operation or maintenance then this information should be passed onto the person or body responsible for maintenance. c. An overview of the reasons for their use (e.g. environmental and economic savings) and restrictions on making alterations. d. Emergency contact information must also be provided for the company or persons responsible for managing the drainage systems or strategies installed.
08 Security	08 Security on page 45	<ul style="list-style-type: none"> 6. <ul style="list-style-type: none"> a. Information regarding security features in the home and how to use them b. A summary of the Security Needs Assessment (SNA) and the recommendations implemented where criteria 1, 2 and 3 of the security issue have been met.
13 Temperature	13 Temperature on page 72	<ul style="list-style-type: none"> 7. <ul style="list-style-type: none"> a. Details of all temperature control measures in the home b. Instructions for the occupier on how to control the temperature of their home c. Details of any maintenance required for any temperature control measures.
14 Ventilation	14 Ventilation on page 77	<ul style="list-style-type: none"> 8. <ul style="list-style-type: none"> a. Information regarding the designed ventilation system and its design intent. b. Operational information on all ventilation systems including the location of any associated monitors and controls and how these should be used, including any automatic or manual control functions and guidance relating to how systems should be operated during summer and winter. c. Information regarding any required maintenance (including actions and frequency).
15 Energy and cost	15 Energy and cost on page 82	<ul style="list-style-type: none"> 9. <ul style="list-style-type: none"> a. Details of all parts of the energy strategy for the home b. Details of any energy performance targets or levels incorporated into the homes design (i.e. Passivhaus, HQM, low bills etc.) c. Instructions for the occupier on how to operate their home efficiently d. General information for the EU energy labelling scheme.
16 Decentralised Energy	16 Decentralised Energy on page 91	<ul style="list-style-type: none"> 10. <ul style="list-style-type: none"> a. Operation and maintenance guidance for low and zero carbon technologies (LZCT) systems and infrastructure installed, including

Issue	Relevant part of the issue	Information required (where relevant credits from issues in column 1 are pursued) regarding:
		<p>simple guidance of how to check their LZCT systems are performing correctly and what to do when they are not.</p> <ul style="list-style-type: none"> b. Any support that is available from the designer or installer or manufacturer during occupancy (e.g. warranties in place or MCS services where applicable). c. The design intent of each LZCT installed. d. How systems can be expanded or adapted in the future (where options are available). e. Advice of ways that occupants can adjust their patterns of energy use to optimise the use of energy from LZCTs.
20 Life Cycle Costing of Construction Products	20 Life Cycle Costing of Construction Products on page 120	<p>11.</p> <ul style="list-style-type: none"> a. A simple outline of the cost appraisal showing the specific maintenance and living costs associated with the building fabric. b. Include any specific manufacturer advice that can help the homeowner understand how to care for and get the most out of the products. c. An outline of what may be required if maintenance will be needed on a product that has been specified. d. A year-on-year projected expenditure in a graphic form or the raw data that could feed into a graphic form. The format of this data should at least include the year, the element or component and the expected cost. e. A copy of the final version of the homeowner's report (in accordance with 20 Life Cycle Costing of Construction Products: crit 3 on page 121).
23 Access and Space	02 Flexible design on page 132	<p>12.</p> <ul style="list-style-type: none"> a. Information regarding any functional flexibility that has been designed into the spaces within the home and any opportunity to expand spaces.
32 Aftercare	32 Aftercare on page 172	<p>13.</p> <ul style="list-style-type: none"> a. A summary of all types of aftercare support available to the occupants, including how long the support is available for and how they can use it. b. Information relating to any specific visits that will be available to the occupants including approximate timescales and what they will cover. This includes any demonstrations carried out as part of basic aftercare support or the 4–6 week visit, where pursued c. Contact details for the company and the persons responsible for carrying out aftercare support.
34 Smart Homes	03 4-6 week visit on page 173	<p>14.</p> <ul style="list-style-type: none"> a. a. Written confirmation of the 4–6 week visit available to them, including what this involves and how they can arrange a date for this visit.
34 Smart Homes	34 Smart Homes on page 182	<p>15.</p> <ul style="list-style-type: none"> a. a. Information regarding the options for retro-fit available (e.g. smart meters, heat meters etc.).
34 Smart Homes	02 Basic starter solutions on page 183	<p>16.</p> <ul style="list-style-type: none"> a. How to operate and maintain devices installed b. How to interpret information from devices installed c. Contact details to help where devices malfunction where available (examples include: warranty provider, manufacturers, maintenance management plan providers etc.).



Issue specific information does not need to be provided where the relevant credits have not been



pursued within these issues, e.g. where the ‘alternative sustainable transport options’ issue has not been pursued, the information relating to this issue that is specified in the above table, does not need to be provided, for the purposes of meeting part 2 of this issue.

Methodology

None.

Compliance Notes

Criterion Reference	Compliance Note	
crit 1	CN1 Accessible format	<p>Written information provided to occupants must be communicated using clear and appropriate language (e.g. avoidance of jargon). This information must also be provided in an appropriate format for users where particular needs are known (e.g. foreign languages, Braille, audio etc.) or must be available on request where this is not known.</p> <p>Home information must also be user friendly and have a layout that is easy to navigate so that the occupants can find the information they need (e.g. by using a simple index or ‘crib’ sheet).</p> <p>The form that the digital version of the home information should take is flexible, in order to recognise the different ways this information can be provided (e.g. online portal, interactive website, mobile apps etc.).</p>
crit 1	CN2 Home systems	<p>For the purposes of criterion crit 1.d.i on page 177, information may be required for the following home systems (where present):</p> <ol style="list-style-type: none"> 1. Preparatory systems 2. Wall and barrier systems 3. Roof, floor and paving systems 4. Damp-proofing, waterproofing and plaster finishing systems 5. Signage, fittings, furnishings and equipment (FF&E) and general finishing systems 6. Flora and fauna systems (e.g. living roof systems) 7. Disposal systems (e.g. SuDS) 8. Piped supply systems 9. Heating, cooling and refrigeration systems 10. Ventilation and air-conditioning systems 11. Electrical systems 12. Communications, security, safety, control and protection systems. <p>Please note, the above systems are taken from the National Building Specification (NBS) Uniclass list and may not all apply to the specific development being assessed. They have been included for completeness and it is the assessor’s responsibility to ensure that relevant, simple operational and maintenance guidance are provided to occupants for the systems present in the home, that may fall under the above top level categories. For guidance of what systems may be included under the above headings, please go to the NBS BIM toolkit website where you can either download a copy of the full Uniclass list or use the search function on the website, toolkit.thenbs.com</p>

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
crit 1–crit 3	01 General evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	
crit 1	02 Home information	Refer to the General evidence requirements	Copy of the home information content that will be provided to all homes.
	03 Confirmation supplied	Refer to the General evidence requirements	Confirmation that the home information has been provided to all homes.

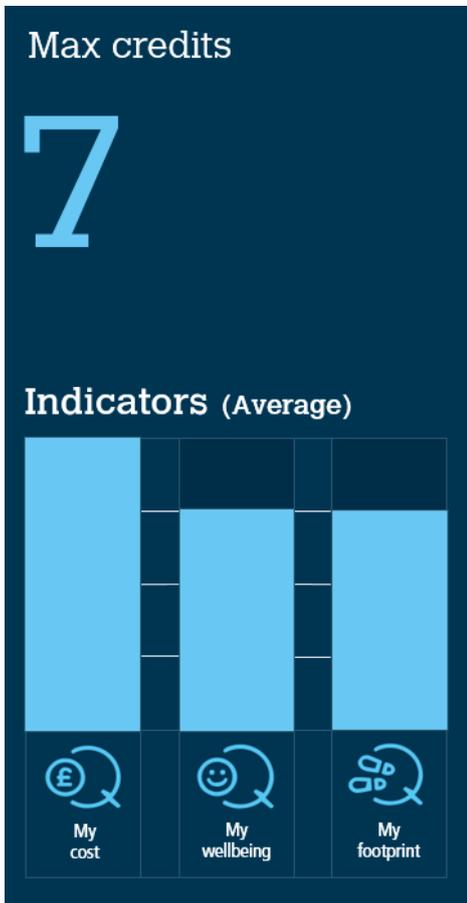
Checklists, Tables & Illustrations

None.

Definitions

None.

34 SMART HOMES



Aim

To help occupants live in their home in the most cost effective, healthy and environmentally friendly way by ensuring good levels of digital connectivity.

Benefit

- Enable homes and their occupants to be part of the digital revolution.
- Promote increased controllability in the home to allow it to adapt to occupier needs.
- Ensure homes are better maintained to provide a good healthy environment.

Context

Smart technologies are rapidly providing exciting and innovative ways of making homes more intuitive and easy to manage efficiently and comfortably. Digital connectivity (broadband, 3G/4G) is fundamental to getting the most out of smart home technologies and the Government has targeted for at least 95% of homes to have a superfast broadband connection (i.e. more than 24 Mbps) by 2017⁽¹⁸⁴⁾.

This issue recognises homes that are well connected⁽¹⁸⁵⁾ and the installation of systems that provide occupants with useful information about their home and the ability to manage their home using accessible, smart devices. Given the progressive nature of smart home technologies, this issue also recognises where installed systems allow for the easy plug-in of technologies, as they become available in the future. All of this is important for ensuring that smart systems are simple to use and accessible, so that occupants can really benefit from using smart home systems⁽¹⁸⁶⁾.



Credit Summary

Criterion number	Title	Credits
crit 1	01 Connectivity	for 1 credit
crit 2–crit 6	02 Basic starter solutions	for 2 credits
crit 7–crit 9	03 Advanced starter solutions	for 3 credits
crit 10–crit 12	04 Controls	for 1 credit
Total credits available		7

Criteria

01 Connectivity

for 1 credit

crit 1 Where a good indoor signal (CN1 on the facing page) is available to the home for at least two of the following:

crit 1.a: 3G or 4G

crit 1.b: Broadband

crit 1.c: Digital television.

02 Basic starter solutions

for 2 credits

crit 2 crit 1 has been achieved.

crit 3 Sensors and transmitters are installed that:

crit 3.a: Monitor the home's electricity and primary heating fuel consumption

crit 3.b: Monitor internal temperature levels in the main living room as a minimum (CN3 on the facing page);
And are either:

crit 3.c: Self-charging (e.g. fixed to incoming mains supply or supplies);
Or

crit 3.d: Have a 2-year battery life (as a minimum) and are capable of alerting occupants when battery life is low.

crit 4 The installed sensors and transmitters (crit 3) are wirelessly linked with an accessible (CN4 on page 185) device that displays information to occupants (e.g. visual display unit or smart phone optimised app or website), at no additional cost. This device must be able to:

crit 4.a: Display current and cumulative electricity consumption, primary heating fuel consumption and internal temperature levels (over a weekly, monthly and yearly basis)

crit 4.b: Have cost factors inputted into the devices for electricity and primary heating fuel consumption so that current cost (in pounds and pence) and account balance information can be displayed.

crit 5 Installation of a mains isolation switch to allow for secondary meter installation or other third party devices by the homeowner to ensure that systems are not restricted to a single manufacturer.

crit 6 Home information is provided relating to the devices installed (see 33 Home Information on page 176).

03 Advanced starter solutions

3 credits

crit 7 crit 2–crit 6 have been achieved.

crit 8 Sensors or transmitters (crit 3) installed are also able to monitor:

crit 8.a: Humidity in the kitchen, bathroom and a main bedroom

crit 8.b: CO₂ in the main living room and a main bedroom

crit 8.c: External temperature

crit 8.d: Motion sensors at the main entrances to detect occupancy or unexpected movement (i.e. for security)

crit 8.e: Water consumption.

- crit 9 The devices installed for displaying information to occupants (crit 4) are also able to:
- crit 9.a: Display current humidity, CO₂ and external temperature levels
 - crit 9.b: Display both current and cumulative water consumption (over a weekly, monthly and yearly basis)
 - crit 9.c: Generate customisable reports and produce accessible historic data (e.g. downloadable CSV file).

04 Controls

for 1 credit

- crit 10 Where a home system is installed that provides intuitive and remote control via an accessible interface (CN4 on the next page) for at least one of the following:
- crit 10.a: Heating systems or ventilation for maintaining a comfortable internal temperature
 - crit 10.b: Lighting for security (e.g. pre-setting lighting to come on at certain times) as well as for energy savings and comfort levels (e.g. allowing occupants to turn off or dim lights remotely)
 - crit 10.c: Security systems (e.g. connecting with security cameras, door and window controls, and alarm systems)
 - crit 10.d: Other (CN5 on the next page).
- crit 11 The home system allows for the future plug-in of other smart devices via a wireless connection.
- crit 12 Home information is provided relating to the devices installed and the retrofit options available to occupants (see 33 Home Information on page 176).

Methodology

None.

Compliance Notes

Criterion Reference	Compliance Note	
crit 1	CN1 Good signal strength	<p>A good signal strength can be considered as being met for each of the three aspects of connectivity referred to in crit 1 on the previous page, as follows:</p> <p>3G or 4G: Where predicted 3G or 4G coverage is confirmed using the mobile coverage checker provided by Ofcom; www.ofcom.org.uk</p> <p>Broadband: Where it can be demonstrated that the home’s address will have access to download speeds of more than 24Mbps (e.g. confirmation from a broadband provider).</p> <p>For more information on good broadband signal strength, please see the government’s guidance on ‘superfast’ broadband: www.gov.uk/guidance/broadband-delivery-uk and their signal strength address checker: gosuperfastchecker.culture.gov.uk</p> <p>Please note that the above has been referenced in order to provide further guidance; confirmation of access to superfast broadband from the address checker is not sufficient evidence for demonstrating good broadband signal strength.</p> <p>Digital TV: Where it can be demonstrated that there is a good predicted signal for digital TV at the home’s address: www.digitaluk.co.uk/coveragechecker;</p> <p>OR</p> <p>Where a post-construction aerial check indicates good signal.</p>
crit 1	CN2 Future assurance of strong signal	Where a mobile operator reports that a strong indoor signal for 3G/4G or broadband will be available within 12 months of occupation, crit 1 on the previous page can be considered as met.
crit 3	CN3 Temperature sensor location	For the purposes of the basic starter solutions criteria, homes over 150m ² must have temperature sensors in a main bedroom, in addition to the main living

Criterion Reference	Compliance Note	
		room.
crit 4	CN4 Accessible device	<p>For the purposes of meeting the starter solutions criteria, devices must be installed that link with a web or mobile interface that meet the WCAG2.0 (ISO/IEC 40500) accessibility standards (www.w3.org; www.iso.org).</p> <p>Where the above is not met, (e.g. only a visual display unit is installed), a device must have been installed that meets an equivalent level of accessibility to ensure it is usable by people with disabilities.</p>
crit 10	CN5 Other controls	<p>Where other forms of home controls are present that are not listed in crit 10 on the previous page, please contact BRE for consideration.</p> <p>Due to the innovative nature of smart home systems, the examples provided are by no means a full list of all of the types of controls that are, and will be, available.</p> <p>Rather than prescribing the exact devices and features that should be provided, this part of the issue intends to recognise where home systems are capable of providing a basis for occupants to easily build upon. This is to allow for the easy future plug-in of devices that meet the particular needs or interests of occupants and to allow for the easy instalment of other systems or devices that become available in the future.</p>
crit 3–crit 11	CN6 Minimum number of electrical sockets	<p>Installed devices relating to this issue (e.g. visual display units, sensors, transmitters, signal repeaters, hubs etc.) must not reduce the minimum number of electrical sockets available to occupants that are required legally or by the design. Additionally, installed devices must not impede the access or functioning of any other switches or control devices.</p>

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
crit 1–crit 12	01 General evidence		One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.
crit 1	02 Telecommunications map		Telecommunications map indicating the home is located in an area that is likely to have sufficient signal for 3G or 4G data services, see http://www.ofcom.org.uk/mobile-coverage .

Checklists, Tables & Illustrations

None.

Definitions

None.

FUTURE LEARNING

This section discusses the following.

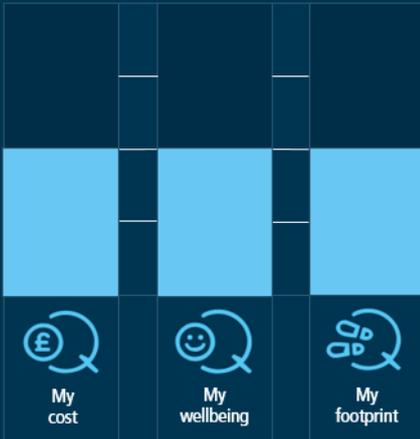
35 Post-Occupancy Evaluation	187
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35 POST-OCCUPANCY EVALUATION

Max credits

9

Indicators (Average)



Aim

To ensure that a home is meeting its expected performance during occupation and to collect valuable information for both occupants and the building industry.

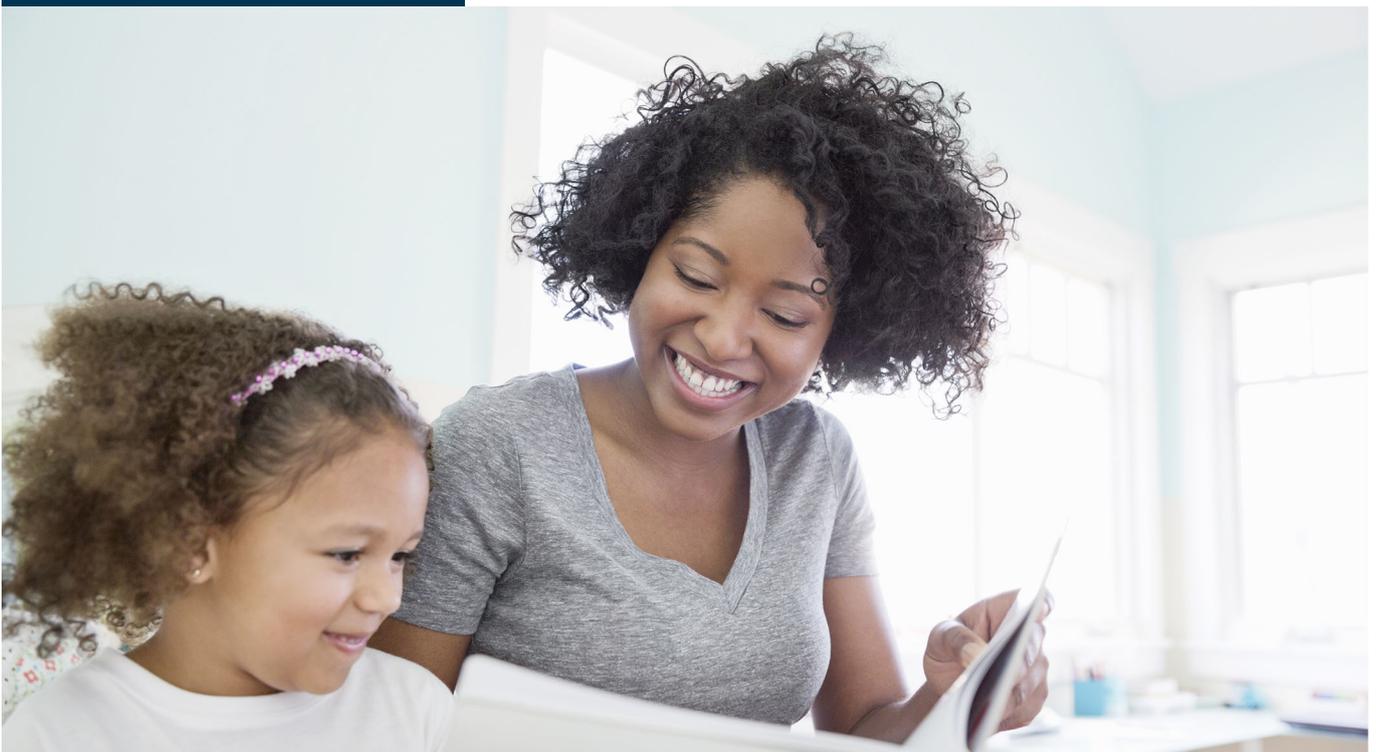
Benefit

- Collect 'real life' data to help financial industries recognise high performing homes.
- Greater understanding of how homes perform during occupation ensures better designs and process for future consumers.
- Helps industry to learn from both positive and negative experiences.

Context

Homes that do not perform as designed can result in: increased maintenance costs, poor occupant satisfaction, damaged industry reputation and whole life issues. Post occupancy evaluations (POEs) are increasingly recognised by building experts and government as effective ways to maximise performance and better inform the construction industry as a whole⁽¹⁸⁷⁾.

POEs involve the systematic collection of data and information from buildings. The information and data are collected by monitoring environmental conditions (e.g. temperature, noise, overheating risk), energy and water consumption audits, forensic walk-throughs and obtaining feedback from residents (e.g. occupant satisfaction questionnaires, interviews and focus groups)⁽¹⁸⁸⁾.



Credit Summary

There are 2 routes to assessing this issue; foundation and comprehensive routes. These routes represent varying degrees of rigour. The route selected will depend on whether a commitment or contractual agreement is in place. More credits are available through the more rigorous comprehensive route, recognising the increased robustness of a contractual agreement.

Criterion number	Title	Credits
crit 1–crit 8	01 Routes of rigour (follow 01A or 01B) - POE	up to 9 credits
crit 1–crit 4	01A Foundation Route	up to 6 credits
crit 5–crit 8	01B Comprehensive Route	up to 9 credits
Total credits available		9

Criteria

01 Routes of rigour (follow 01A or 01B) - POE		up to 9 credits
01A Foundation Route		up to 6 credits
Basic POE		for 3 credits
crit 1	Where a commitment has been made for an appropriately qualified professional to collect occupant feedback (POE 1 - see Methodology below), between 12 and 18 months after occupation and;	
crit 2	Where a commitment has been made to appropriately disseminate the POE results and lessons learnt to key stakeholders (CN1 on the facing page), in order to share good practice.	
Enhanced POE		for 3 credits
crit 3	crit 1 and crit 2 above have been achieved.	
crit 4	Where a commitment has been made for the appropriately qualified professional to undertake at least one other POE method.	
01B Comprehensive Route		up to 9 credits
Basic POE		for 4 credits
crit 5	Where the developer has appointed an independent party (CN2 on page 190) who is contractually obliged to collect occupant feedback between 12 and 18 months after occupation and;	
crit 6	To appropriately disseminate the POE results and lessons learnt to key stakeholders (CN1 on the facing page), in order to share good practice.	
Enhanced POE		for 5 credits
crit 7	crit 5 and crit 6 above have been achieved.	
crit 8	Where an independent party (CN2 on page 190) is contractually obliged to undertake at least one other POE method and disseminate the results as part of crit 6.	

Methodology

Table 42 Methods that may be used to conduct a post occupancy evaluation

Method	Requirements
POE 1. Occupant feedback	<p>This involves the collection of feedback directly from occupants and may be in the form of questionnaires, focus groups, interviews etc.</p> <p>The exact format of occupant satisfaction feedback is flexible but it must provide occupants with an opportunity to give feedback on the following aspects of their home, as a minimum:</p> <ol style="list-style-type: none"> 1. Thermal comfort (during summer and winter) 2. Actual temperature levels (where available) 3. Ventilation and air quality (during summer and winter) 4. Lighting

Method	Requirements
	5. Noise 6. Actual energy and water consumption (e.g. from energy bills) 7. Satisfaction with energy and water efficiency 8. Satisfaction with low and zero carbon technologies (LZCTs) installed (e.g. their contribution to energy savings) (where present) 9. Actual amount of energy generated from low and zero carbon technologies (where present) 10. Connectivity, smart meters and controls (where present) 11. Access, space and layout 12. Overall comfort 13. Overall quality 14. Opportunity to provide open-ended responses
POE 2. Energy audit	Monitoring of energy (e.g. gas, electricity etc.) consumption data, in kWh/person or kWh/m ² , for at least one year, recorded at least every hour.
POE 3. Water audit	Monitoring of water consumption data, in litres per person, for at least one year, with readings recorded at least every hour.
POE 4. Forensic walk-through	A thorough inspection undertaken to check the home’s operation, identify problems with the home itself as well as any operational practices (e.g. occupant behaviour). This is conducted between 12 and 18 months of occupation.
POE 5. LZCT performance monitoring	Technical review of installed LZCTs to determine if performance (e.g. energy generated) is in line with design intent, as specified by the installer and relevant guidance from the manufacturer.
POE 6. Humidity monitoring	Relative humidity must be measured in a living room and at least one bedroom, over the course of at least one year and readings must be recorded at least every hour.
POE 7. Temperature monitoring	Temperature must be measured in °C Temperature must be measured in a living room and at least one bedroom, over the course of at least one year and readings must be recorded at least every hour.



While monitoring humidity and temperature is less common as part of a POE compared to monitoring energy and water usage for instance, monitoring these aspects of the home can be useful where occupants have expressed problems with poor ventilation or overheating, for example. As these types of problems can have significant health implications, they have been included as types of data that may be useful to collect as part of a POE. Monitoring humidity and temperature may therefore be most appropriate as part of a whole house research project or case study or where occupant feedback identifies particular problems associated with these aspects in their home.

Compliance Notes

Criterion Reference	Compliance Note
crit 2 and crit 6	CN1 Appropriately disseminated This will vary depending on the type of data or information collected as part of the POE but may be in the form of a written summary, follow up meetings, case study or analysis of POE results that is disseminated to key stakeholders including (where appropriate): <ul style="list-style-type: none"> – Occupants – BRE – Developer – Designers (e.g. architects and structural engineers) – Principal contractor – Management companies. Examples of the types of acceptable content for dissemination include:

Criterion Reference	Compliance Note	
		<p>Occupants: A user-friendly written summary or follow up interview, or meeting or focus group may be appropriate ways to disseminate useful findings to occupants (e.g. simple ways they can reduce energy consumption, what LZCTs may benefit them, what to do in the event of overheating etc.).</p> <p>BRE: POE results (excluding confidential information) as part of the evidence to confirm compliance and help to shape HQM in the future so that technical requirements more closely reflect performance in use.</p> <p>Developers, designers and principal contractor: A report or analysis of the POE findings, in order to help inform future energy strategies and better quality design and construction. This report may also help stakeholders support their claims of quality in use.</p> <p>Management companies: Occupant feedback on building services and control systems, to help inform future maintenance.</p>
crit 5–crit 8	CN2 Independent party	To comply with the 'independent party' element of Route 2 (01B), the client or design team needs to demonstrate that they have appointed a party independent of the design process (e.g. an external organisation) to conduct the POE, using a compliant method listed in Methodology on page 188. The party must also have the suitable expertise for carrying out the POE methods selected.
crit 1–crit 8	CN3 Formally offer	<p>Details of any POE offer must be formally offered in an accessible format (CN4 below) to occupants within the first 6 weeks of occupancy, with all reasonable effort being made to encourage occupant involvement. These details must include the following (where appropriate):</p> <ol style="list-style-type: none"> 1. Details of the actions to be carried out with the occupant's permission 2. Benefits of the POE to the occupants, including any services available to them as part of the POE (e.g. incentives or if the Aftercare issue has been pursued), to encourage occupant involvement 3. Broader reasons for POEs to be carried out and importance for house building 4. Approximate timescales for any home visits or opportunities for occupant feedback (e.g. questionnaires, interviews, focus groups etc.) 5. Contact details for the company and persons responsible for carrying out POEs. <p>Where occupants haven't responded to the first invitation, they should be reminded of the POE offer, what it involves and why they may be interested.</p> <p>This commitment is to ensure that occupants get the most out of any support available to them and to encourage their involvement with POEs.</p>
All	CN4 Accessible format	Written information provided to occupants must be communicated using clear and appropriate language (e.g. avoidance of jargon). This information must also be provided in an appropriate format for users where particular needs are known (e.g. foreign languages, Braille, audio etc.) or must be available on request where this is not known.

Evidence

Criterion Reference	Title	Design Stage	Post Construction Stage
All	01 General evidence	One or more of the appropriate evidence types listed in Appendix C – HQM evidence requirements on page 201 can be used to demonstrate compliance with these criteria.	
All	02 Confirmation of POE offer to all occupants	Refer to general evidence requirement above.	A copy of the correspondence and the POE offer that will be provided to occupants (see CN3 above).

Criterion Reference	Title	Design Stage	Post Construction Stage
crit 5–crit 8	03 Contract	The contractual agreement between the developer and the independent party, confirming: <ul style="list-style-type: none"> – What will be carried out as part of the POE – How the occupant will be contacted to ask for their permission – Timescales for carrying out the POE – The independent party responsible for carrying out the POE 	



BRE will contact developers to ensure any aftercare or POE commitments made to achieve these credits have been undertaken. In the event that aftercare or POE commitments are not undertaken or completed, BRE may suspend or withdraw the assessment’s HQM certificate and its Green Book Live listing. Alternatively, BRE may re-issue the HQM certificate with an updated rating and score based on the withdrawal of the affected credits (at the client’s own expense).

Checklists, Tables & Illustrations

None.

Definitions

Appropriately qualified professional

For the purposes of route 1, a professional or team of professionals who have the relevant skills and experience to carry out the specific POE methods chosen.

They must also be either:

Independent from the design process (in line with all other relevant criteria), and

Or

Where the POE is to be carried out by an organisation involved with the design of the building such as the project architect, then they must present the assessor with evidence that robustly demonstrates independence of the POE process. HQM has not attempted to define what form this evidence must take; the onus is on the design team or relevant individual to clearly demonstrate to the HQM assessor a credible level of independence.

Post-occupancy evaluation

Post-occupancy evaluation (POE) is the umbrella term for the process of obtaining feedback on the performance of a recently completed new building or refurbishment. Over time, the value of POE has been recognised not only as a one-off evaluation of a recently completed project but as an ongoing assessment process for any building in use that should be conducted at regular intervals over the building’s lifecycle.

APPENDICES

This section discusses the following.

Appendix A – HQM scoring and rating methodology	193
Appendix B – HQM application: supporting guidance	200
Appendix C – HQM evidence requirements	201
Appendix D – Post-construction stage assessment issue exceptions	207

APPENDIX A – HQM SCORING AND RATING METHODOLOGY

There are two elements to the scoring approach taken within HQM. There are a single overarching Star Rating and a set of three occupant focused Indicators which represent the degree to which the home meets the requirements set out in each of the 35 distinct issues within HQM.

How the Star Rating is calculated

The Star Rating provides a simple comparative measure of the overall quality and performance of a new build home. This is based on a total HQM score which is calculated out of a maximum available 500 credits all of which are of equal value. The relative importance of different issues and criteria is based on the scoring methodology that underpins all BREEAM schemes, albeit tailored to the needs of the new build housing sector.

In this version of the scheme there is one mandatory criterion. This is the requirement for a building warranty (32 Aftercare: crit 3 on page 173) which refers to and applies at all star ratings. If the mandatory criterion is not achieved, a HQM certificate cannot be issued.

To achieve an HQM Star rating, a minimum total number of credits must be achieved as highlighted in Table 43 below. In HQM, all credits are equal (i.e. one credit is equal to one credit throughout the scheme).

Table 43 Minimum credits required for each Star Rating

	1 Star	2 Star	3 Star	4 Star	5 Star
Minimum total credits	150	225	275	375	400
Percentage	30	45	55	75	80

How the Indicators are calculated

The second element of scoring in Home Quality Mark are the Indicators which reflect key areas of concern to the householder. The respective scores for each of these Indicators are generated in parallel with the overall HQM score. The relative contribution of each assessment issue to the Indicator scores is confirmed in the information box at the top of each issue, alongside the total number of credits available.

Each issue was rated in terms of the likelihood that it will impact householders living costs (My cost), health and wellbeing (My wellbeing), and environmental footprint (My footprint). The ratings are classed as “No, Low, Medium, High or Very High Impact” this was determined through a series of workshops and questionnaires.

The Indicators are scored out of 5 and are awarded on the basis of the total minimum number of points as highlighted in Table 44 below.

Table 44 Minimum number of points required for each Indicator band

	Indicator bands	Indicators				
		1	2	3	4	5
 My cost		81	121	148	202	215
 My wellbeing		82	123	150	205	219
 My footprint		121	182	222	303	323
Percentage		30	45	55	75	80

Each issue is classed as No, Low, Medium, High or Very High Impact which is calculated using a decimal as shown in Table 45 below

Table 45 Issue Impact Decimals

No	Low	Medium	High	Very High
0	0.25	0.5	0.75	1

Detail

Table 46 Detail of the scoring

Categories	Issues	Criteria	Criteria Credits	Either or	Total issue Credits	Indicators		
						My cost	My wellbeing	My footprint
Our surroundings (144 Credits)								
Transport and Movement	Accessible Public Transport	Public Transport Index	16		16	0.5	0.5	0.5
		Alternative Sustainable Transport Options	Cycle Storage	6		15	0.5	0.75
	Cycle Networks		3		0.5		0.75	0.5
	Electric Charging points		4		0.5		0.25	0.5
	Car Clubs		2		0.5		0.25	0.5
	Local Amenities	Key Local Amenities	12		19	0.75	0.5	0.5
		Beneficial Amenities	7			0.75	0.5	0.5
Outdoors	Ecology	Previously developed land	6		30	0	0	1
		Appointing an expert	2			0	0.5	1
		Early appointment	2			0	0.5	1
		Survey (Fdtn)	2			0	0.5	1
		Ecological value (Fdtn)	4	7		0	0.5	1
		Biodiversity records (Fdtn)	1			0	0.5	1
		Ecologist's survey (Comp)	3			0	0.5	1
		Ecological value (Comp)	10			0	0.5	1
		Invasive or diseased (Comp)	2	20		0	0.5	1
		Communal areas (Comp)	3			0	0.5	1
		Biodiversity records (Comp)	2			0	0.5	1
	Recreational Space	Public recreational space	4		20	0.5	0.75	0.5
		Private space	6			0.5	0.75	0.5
		Communal space	2			0.5	0.75	0.5
Management		3		0.5		0.75	0.5	

Categories	Issues	Criteria	Criteria Credits	Either or	Total issue Credits	Indicators			
						My cost	My wellbeing	My footprint	
		strategy							
		Growing space	2			0.5	0.75	0.5	
		Expert input	1			0.5	0.75	0.5	
		Initial planting	2			0.5	0.75	0.5	
Safety and Resilience	Flood Risk	Flood Risk- Low Risk	18						
		Flood Risk- Medium or High	16		18	1	0.75	1	
	Managing the Impact of Rainfall	Managing Rate & Volume (Fdtn)	3	3			0.25	0.25	1
		Peak Rate Run Off (Comp)	5				0.25	0.25	1
		Volume Run Off (Comp)	7		16	16	0.25	0.25	1
		Water Quality (Comp)	2	16			0.25	0.25	1
	Security	Maint. & Operation (Comp)	2				0.25	0.25	1
		SQ Security Specialist	0			10	1	1	0.25
			Security Features	10			1	1	0.25
	MyHome (286 Credits)								
Comfort	Indoor pollutants	Min emissions 1 product type	1	1					
		3 building product types	2	2		10	0.25	1	0
		All building product types	4	4					
		Min formaldehyde all sources	3				0.25	1	0
		Minimising TVOC all sources	3				0.25	1	0
	Daylight	ADF kitchens	6				0.75	1	0.75
		ADF living spaces	6			16	0.75	1	0.75
		View of sky	4				0	1	0
	Internal and External Noise	Internal noise levels	2			4	0	1	0
		External noise Levels	2				0	1	0
	Sound insulation	Between homes	4			8	0	1	0

Categories	Issues	Criteria	Criteria Credits	Either or	Total issue Credits	Indicators				
						My cost	My wellbeing	My footprint		
	Temperature	Between rooms	4			0	1	0		
		Current Conditions (Fdtn)	5	5		1	1	1		
		Current Conditions (Comp)	12	12		20	1	1	1	
		Predicted CC (Fdtn)	4	4			1	1	1	
		Predicted CC (Comp)	8	8			1	1	1	
	Ventilation	Ventilation air intakes	4				0.25	1	0	
		Ventilation rates	4			12	0.5	1	0.5	
		Maintenance & controls	4				0.75	1	0.75	
	Energy and Cost	Energy Forecast and Cost	Energy Performance (Fdtn)	30	30			1	0.75	1
			Energy Performance (Comp)	42	42		62	1	0.75	1
Towards carbon negative			6				1	0.75	1	
Cost (Fdtn)			9	9			1	0.75	1	
Cost (Comp)			14	14			1	0.75	1	
Impact on Local air quality		Gas Grid / Electricity	11	11		11	0	1	1	
		Off Gas grid	5	5						
Decentralised energy		Feasibility Study	2				1	0.25	1	
		Installation	6	6						
		Infrastructure	3	3		10	1	0.25	1	
	Monitoring and Controls	2				1	0.25	1		

Categories	Issues	Criteria	Criteria Credits	Either or	Total issue Credits	Indicators		
						My cost	My wellbeing	My footprint
Materials	Responsible Sourcing of Construction Products	Legal Timber	0		31	0	0	1
		Sustainable procurement plan	3			0	0	1
		RSM	28			0	0	1
	Environmental Impact from Construction Products	Procurement and Information	8		31	0	0	1
		Life cycle assessment (Fdn)	8	8		0	0	1
		Life cycle assessment (Comp)	23	23		0	0	1
	Life Cycle Costing of Construction Products	Elemental	9		18	1	0.25	1
		Component	9			1	0.25	1
	Durability of Construction Products	Integral Elements	7		10	1	0.25	1
		Finishing Elements	3			1	0.25	1
Space	Drying Space	External drying space	1		3	0.75	0.5	0.75
		Internal drying space	2			0.75	0.5	0.75
	Access and Space	National space standards	4		10	0	1	0
		Flexible design	2			0.5	0.5	0.5
		Accessible design	4			0.5	1	0.5
	Recyclable Waste	Consultation with authority	2		10	0	0	1
		Recyclable waste	5			0	0	1
		Composting	3			0	0	1
	Water	Water Efficiency	Water Efficient Fittings	8		10	1	0.25
Water Recycling			2		1		0	1
Knowledge sharing (80 Credits)								

Categories	Issues	Criteria	Criteria Credits	Either or	Total issue Credits	Indicators			
						My cost	My wellbeing	My footprint	
Home Delivery	Commissioning and Performance	Strategy	0			1	1	1	
		Building Services and Control	5		10	1	1	1	
		Fabric	5			1	1	1	
	Quality Improvement	Collaborative working	2			1	1	1	
		Quality control	5		10	1	1	1	
		Feedback previous projects	3			1	1	1	
	Considerate Construction	Compliance	2			4	0	0.25	0.75
		Exceeds	4						
	Construction Energy Use	Checklist	2				0	0	1
		Monitoring & Reporting	2		5		0	0	1
		Detailed Mon. & Report.	1				0	0	1
	Construction Water Use	Checklist	2				0	0	1
		Monitoring & Reporting	2		5		0	0	1
		Detailed Mon. and Report.	1				0	0	1
	Site Waste	Procurement – Waste Min.	1				0	0	1
		Resource Efficiency	8		15		0	0	1
		Div. Construction Landfill	4				0	0	1
		Div. Excavation	2				0	0	1
User Experience	Aftercare	Basic (Mandatory Criteria)	0			1	1	1	
		4-6 week visit	3		10	1	1	1	
		Remote support	3			1	1	1	
		On-site support	4			1	1	1	
	Home information		5		5	1	1	1	
	Smart Homes	Connectivity	1				1	0.75	0.75
		Basic Starter Solutions	2				1	0.75	0.75
		Advanced Started Solutions	3		7		1	0.75	0.75
Alerts and Controls		1				1	0.75	0.75	
Future	Post Occupancy	Basic POE	3	3	9	0.25	0.25	0.25	

Categories	Issues	Criteria	Criteria Credits	Either or	Total issue Credits	Indicators		
						My cost	My wellbeing	My footprint
learning	Evaluation	(Fdt)						
		Basic POE (Comp)	4	4		0.25	0.25	0.25
		Enhanced POE (Fdt)	3	3		0.25	0.25	0.25
		Enhanced POE (Comp)	5	5		0.25	0.25	0.25
Total Credits available					500			
Maximum Points available						269	273.25	404.25

APPENDIX B – HQM APPLICATION: SUPPORTING GUIDANCE

How many homes can be included in a single HQM assessment?

In the first instance clients are advised to consult a licensed HQM assessor on how best to categorise and classify their project for assessment, registration and certification purposes (BRE Global can assist HQM assessors where required).

At least one HQM assessment must be undertaken for each project or site seeking to apply the scheme, regardless of the proposed number of homes on the site.

The number and type of homes and phases of the project are important factors in deciding how to apply the scheme on a single site. For example, separate assessments can be undertaken for each phase of a project, with HQM certification sought to coincide with completion and sale or handover of each phase. Alternatively, separate assessments can be undertaken for each home or house type, or a group of homes or house types, to recognise the performance of each separately.



The performance of each home or house type is recognised within the methodology and therefore within a single assessment, however poorer performing homes or house types could bring down the performance of those performing relatively better, and therefore the performance of the assessment as a whole.

Pre-approval of HQM assessment issues and criteria

HQM has been designed to encourage pre-approval of solutions and processes that are 'deemed to satisfy' parts (criteria) of the scheme. This type of approval provides clients and designers with greater flexibility while maintaining the robustness of the process and its outcome.

Pre-approvals is designed to complement the assessment process, enabling the HQM assessor to award a number of credits in a specific project or site HQM assessment without additional verification. This is because the 'standard' applied solution has previously been verified through the pre-approvals process.

The performance of any pre-approved solution or procurement process is combined with the assessment of issues that are influenced by project specific factors to produce the overall HQM rating and scorecard for the project. The approach therefore reduces repetition in the application of the scheme for the house-builder across multiple projects, or multiple homes or house types on a single larger project.

There are a number of ways in which pre-approvals can be applied;

- Pre-Approval within My Home on page 48 for common elements of house design and where elements of the home are manufactured off-site.
- Pre-Approval of company processes, quality control and customer support systems for issues within the Knowledge Sharing on page 141 section.
- Site outline scoring within the Our surroundings on page 6 section, linking with BREEAM Communities for larger scale developments.
- Recognition of established certification schemes to provide evidence of compliance across issues where these have been pre-approved as being comparable to the HQM requirements.

For further information on HQM pre-approvals contact the HQM team at BRE.

Post-Construction Review Assessments

Where an assessment of a project has been certified at the 'interim' design stage, a post-construction review assessment of the same project can be completed to verify its design performance 'as-built' (for final certification). Where certification of a design stage assessment has not been sought, a full 'post-construction' assessment can be undertaken, with verification based on the project's 'as-built' performance (for final certification).



A post-construction review or assessment is based predominantly on evidence collated during one or more visits to a site during or after completion (and typically before handover). HQM assessors can refer to the scheme Operations Manual (SD5070) for guidance on site visits.

APPENDIX C – HQM EVIDENCE REQUIREMENTS

This section provides guidance to assessors and project teams on the types of evidence required to demonstrate compliance with HQM issues.

Why does HQM require evidence?

HQM is a third party assessment and certification scheme operated in accordance with international standards. Operating to international standards ensures that certification schemes such as HQM are run in a consistent and reliable manner. The HQM assessor's assessment report and the BRE Global quality assurance process are the fundamental tenets of HQM, ensuring consistency of and confidence in, the HQM rating awarded by the assessor.

To maintain this consistency and credibility all certification decisions must be based on verified and credible project information that is traceable, i.e. evidence based. This is not only important for ensuring compliance with the international standards to which HQM operates, but also in terms of managing risk to clients and HQM assessors in the event that a certification outcome is challenged.

The assessment report and the HQM assessor role

It is the HQM assessor who determines the HQM rating and the assessment report is the formal record of an assessor's audit against the criteria defined in the technical manual for the HQM scheme. The HQM certificate issued by BRE Global provides assurance that the service provided by the assessor (that is, the process of producing the assessment report) has been conducted in accordance with the requirements of the scheme. The purpose of the certificate is therefore to give confidence to the client in the assessor's performance and processes in determining a HQM rating.

It is the role of the assessor to gather project information and use it to assess performance against the HQM scheme in a competent and impartial manner. To award a HQM credit, the assessor must be satisfied beyond reasonable doubt, that the evidence gathered demonstrates unambiguous compliance with all relevant criteria defined in the HQM scheme. All evidence must be appropriately referenced in the formal report produced by the assessor and made available on request from BRE Global Ltd for quality assurance checks.

Clear, ordered and well-referenced evidence for each HQM issue and criterion facilitates efficient quality assurance and certification.

Evidence Types

Evidence should not necessarily need to be prepared specifically for the purpose of the HQM assessment. In many instances, the assessor should be able to source readily available and prepared project information for the purpose of demonstrating compliance. For this reason, HQM aims to avoid being prescriptive on the type of evidence required, although some issues do require specific documents to be provided.

The assessor and project team will find that many assessment issues will require more than one piece or type of information to demonstrate compliance with one criterion, or alternatively, one piece of information may be sufficient to demonstrate compliance with multiple criteria or assessment issues.

To assist project teams and the HQM assessor in their collation of evidence at each stage of assessment, the different types of documentation that can be used as evidence of compliance are listed below.

These evidence types fall broadly in to three categories:

1. General evidence type
2. Specific evidence type
3. Other evidence type

For some assessment issues, the assessor is likely to require a mixture of general and specific evidence types.

1. General Evidence

General evidence includes a broad list of defined information commonly produced for a building project. One or a mix of these types of information can be used to demonstrate compliance for one or more of the HQM issues and criteria, as deemed appropriate by the HQM assessor for the stage of assessment.

General HQM evidence types are listed in Table 48 on page 205 and are not specifically listed in the 'Evidence' section found within each HQM issue. Note, not all general evidence types will be appropriate for all issues and it is the responsibility of the assessor to ensure that the evidence provided specifically demonstrates compliance and is fully referenced in the assessment reporting tool.

2. Specific Evidence

Specific evidence is defined as information that must be provided to verify compliance with the relevant criteria for the HQM credit sought. In all cases it will be the only type of evidence that will be accepted by BRE Global Ltd for that particular issue or criterion. Where specific evidence is not provided and appropriately referenced in the assessment report, the quality assurance checks will identify a non-conformity and certification will be delayed. An example of specific evidence would be a copy of the relevant SAP output documents from the approved SAP software for the HQM issue 'Energy forecast and cost', which is listed in the 'Evidence' section for this issue.

Where required, specific evidence is defined and listed for each HQM issue in the 'Evidence' section for both design and post construction stages of assessment. Although the 'Evidence' section lists the specific evidence required to demonstrate compliance with particular criteria, simply submitting this evidence may not be sufficient to demonstrate full compliance. Additional 'general evidence types' may also be required. For example; to demonstrate compliance with criteria 1-3 of the Water Efficiency issue at design stage, a copy of the Water Efficiency Calculator for New Dwellings and documentary evidence supporting the data used to complete the calculator tool is required. However, in addition to this, further evidence is required, i.e. general evidence types such as letters of commitments, specifications, drawings etc. must be provided confirming the water fittings and systems entered into the tool are to be installed. Note, not all HQM issues will have specific evidence requirements.

3. Other evidence Types

Other types of evidence can still be used to demonstrate compliance where an information type provided by a client or design team is not listed in Table 48 on page 205 or the 'Evidence' table for each issue. To avoid non-conformities and delays in certification, undefined alternative types of evidence must demonstrate credible, robust and traceable assurance to the same level as, or better than, specified or general evidence types. If in doubt, please contact the HQM technical team prior to accepting such evidence.

Written commitments at Design Stage

At the design stage of assessment, it is permissible to use letters or emails to demonstrate intent to comply with particular HQM criteria (provided they meet the requirements for communication records below). Such evidence must also make clear the actions and evidence (or an understanding thereof) that will be undertaken and provided to ensure the project's on going compliance, particularly at the final stage of assessment, i.e. post-construction. This is to ensure that the party who makes the commitment is clearly aware of the actions and evidence that needs to be supplied to demonstrate compliance with HQM at the post-construction stage of assessment. For example, in many circumstances it would not be acceptable for the design team to copy and paste the HQM criteria into a formal commitment. The commitment should specifically detail how criteria are to be achieved in the context of the assessment, and often copying and pasting the HQM criteria will not provide this level of detail.

While letters of commitment can play a role in demonstrating compliance, they are not a replacement for more formal and established types of project information. The assessor must not award credits where they have a reason to doubt the validity or intent of written commitments, or where it is reasonable to expect formal design or specification information to be available to confirm compliance.

Post Construction stage evidence

There are two types of assessment that can be carried out at the post construction stage;

1. A post construction review of a design stage assessment, or
2. A post construction assessment (where no design stage assessment has been carried out)

The 'post construction stage' evidence section in each issue assumes that a design stage assessment has been completed. Where a design stage assessment has not been completed, the assessor will need to review both the 'design stage' and 'post construction stage' evidence listed in the evidence section and ensure sufficient evidence is submitted with the assessment to demonstrate compliance with the criteria.

Evidence supplied at the post construction stage must be reflective of the completed building and must therefore demonstrate what has actually been implemented or constructed. For example if flood resilience measures have been specified at design stage, evidence at the post construction stage would need to demonstrate that these have actually been installed. Appropriate evidence may be a site inspection report with supporting photographs or as-built drawings showing the location of the flood resilience measures.

For a large or phased development, there are some issues that will not be complete when a post construction stage assessment for the first homes is completed. For example, these could include some ecology credits or community-based facilities. It is possible to certify the first homes without certain issues being complete based on written commitments. The details of these exceptions are highlighted in Appendix D – Post-construction stage assessment issue exceptions: Table 49 on page 207. This is not intended to be a comprehensive list; its purpose is to provide guidance to assessors on the type of exceptions that are acceptable.

Written commitments at Post Construction

Written commitments cannot be used to demonstrate compliance at the post construction stage of assessment. The only exception to this is where the criteria require an action to take place post construction, i.e. after handover and possibly during the building operation. An example could be a written commitment from the building owner or occupier making a commitment to conduct a post occupancy evaluation. As with letters of commitment at the design stage, the HQM assessor must not award HQM credits where they have a reason to doubt the validity or intent of written commitments or where it is reasonable to expect a formal documentation, e.g. a schedule of services or professional services contract.

Written confirmation at Post Construction

Where a post construction review of a design stage assessment is carried out, written confirmation validating that nothing has changed since the design stage assessment can be provided as evidence within the post construction review. Where anything has changed since the design stage assessment or where the design stage assessment evidence was in the form of a written commitment or where full detailed documentary evidence was not provided, written confirmation is not acceptable.

Where a post construction stage assessment is carried out without an associated design stage assessment, written confirmation is not an option to demonstrate compliance.

Evidence Principles

HQM assessors and the BRE Global Ltd Quality Assurance team work to the evidence principles in Table 47 below.

As described above, where specific evidence is stated in the ‘evidence’ section within each assessment issue, this must be sourced and verified by the HQM assessor.

Where no specific evidence has been listed for an issue or specific criterion, this means that there are potentially a number of different types of ‘general’ project information, as per Table 48 on page 205 that can be sourced by the HQM assessor and used to demonstrate compliance. It is the HQM assessor’s responsibility to source and verify the Table 48 on page 205 for each relevant criterion, where compliance and credits are being claimed by the project team.

In determining the appropriateness of any evidence type for each issue, the principles outlined in Table 47 below must be considered by HQM assessors. Where the evidence meets the principles outlined in Table 47 below and, where appropriate, the guidance provided in Robustness of Evidence on the next page, such evidence is admissible for the purpose of the assessment and the BRE Global Quality Assurance checks.

These principles are not listed in a hierarchical order and are all equally important when considering which evidence type to submit to demonstrate compliance for each issue or criterion.

Table 47 HQM Evidence principles

	Principle	Objective		A question to ask to check
1	Evidence provided for all criteria for all credits sought	Evidence must demonstrate that ALL relevant* criteria and sub-criteria for each credit sought are achieved and where relevant, is provided to support compliance notes, definitions etc.	Completeness	Are all criteria and sub-criteria covered? Have all relevant compliance notes and definitions been addressed?
2	Unambiguous assessment	The assessment must demonstrate unambiguous compliance and the evidence must support this assessment. Evidence (and supporting notes) must clearly demonstrate to a third party reviewer that the criteria have been met.	Independent review compatibility	If a third party (e.g. BRE Global) reviewed my report with the submitted evidence, would they be able to confirm compliance and award the same credits I have?

	Principle	Objective		A question to ask to check
3	Robust	<p>a. When selecting the Evidence type, always ensure it is robust and is relevant to the stage of assessment.</p> <p>b. The selected Evidence contains all the relevant basic information, with the necessary constituent parts to be deemed robust.</p> <p>(see Robustness of Evidence below section for further details on both of the above)</p>	Proof that evidence is robust and from a reliable source	<p>Is this the most robust form of evidence available to demonstrate compliance with this criterion?</p> <p>Does the evidence contain all the relevant basic information?</p> <p>Is it fully auditable?</p> <p>Is it the latest revision?</p>
4	Use existing evidence	Use existing project information to demonstrate compliance. In most cases evidence shouldn't need to be 'created' for HQM compliance purposes.	Minimises evidence and reduces time and cost of compliance	<p>Does robust evidence meeting the above principles already exist that I can use?</p> <p>If I need to ask for more evidence, is the project seeking credits where compliance is not adequately demonstrated?</p>

*Where the assessor or design team deem specific criteria 'not relevant' to the assessment, a full justification should be collated and then submitted as a technical query for review by BRE Global Ltd.

Robustness of Evidence

Robust evidence provides confirmation that the assessment has been carried out correctly and the building complies with the criteria for the HQM credits sought. The assessor should consider the following when gathering project information and evaluating whether the evidence provided is as 'robust' as possible:

- Is there more than one piece of evidence that could be used to demonstrate compliance?
- Where there is more than one piece of evidence, is the chosen evidence the most robust and appropriate piece of evidence to demonstrate that a particular criterion has been achieved?

Minimum Level of Information

Any evidence submitted for a HQM assessment must be robust in terms of its source and its traceability. Below is a list of the minimum Level of Information (LOI) the assessor must expect to see when certain types of evidence are submitted:

Communication records:

Any communication records used as evidence must provide clear confirmation of the site name, author's identity and role, the date and recipient's identity.

Formal letters of correspondence:

Must be on company or organisation headed notepaper with a signature (electronic signatures are acceptable) and must provide clear confirmation of the site name. Ideally letters should be a secured document.

Meeting minutes:

Must provide clear confirmation of the site name and include date, location and attendee information (names, organisations and roles), along with a record of the meeting and agreed actions.

Drawings:

All drawings must have the building or site name, phase (if applicable), title of drawing, date, revision number and a scale.

Specification:

It must be clear that the specification relates to the project under assessment, and it must have a date and revision number. Where sections of a specification are provided the assessor should reference the extract and as a minimum submit the front page of the specification detailing the project name, revision number and date.

Site Inspection report:

A site inspection report must include the building or site name, date, author, and summary text to detail what was witnessed and confirm compliance. The report must include sufficient information to create an audit trail that justifies the conclusions reached, particularly where the site report is the only evidence supplied at post construction stage. A simple statement confirming compliance will not be sufficient. Photographs may be useful as supporting evidence in a report, though it is unlikely that a photograph on its own will demonstrate compliance.

Please note that for some issues a visual inspection cannot be undertaken to verify whether compliance has been achieved with the criteria, e.g. Water Efficiency, Responsible Sourcing etc.

For other types of evidence not listed, the assessor should use the above as a guide for the sort of evidence that is suitable. As a minimum in most cases the evidence used to assess compliance should always contain key information such as the project name, the author, date, revision numbers etc.

Table 48 General Evidence Types

Ref.	Document or Evidence Type	Description or notes
E1	As constructed information	Information produced at the end of a project to represent what has been constructed. This will comprise a mixture of ‘as-built’ information or drawings and surveys from specialist subcontractors and the ‘final construction issue’ from design team members.
E2	Building Information Model (BIM)	The BIM (or BIM files) used for the project containing relevant information or evidence of compliance. This could include outputs in a neutral format such as IFC or COBie and native format (e.g. BIM authoring software). Note: The assessor should be able to intelligibly view any native software formats and upon request by BRE Global provide neutral formats.
E4	HQM assessor’s site inspection report	A formal report based on the HQM assessor’s own survey of the site or building to confirm compliance with HQM criteria. During the site inspection an attempt should be made to check as many issues as possible. However it is unlikely that all issues could be checked during one site visit. Different specifications of the home will be completed at different times therefore the site inspection will need to be planned in discussion with the client to identify when would be most appropriate. At least one site visit must be carried out for every assessment. An assessor’s site inspection report will be distinct from their formal HQM assessment report, serving as a form of evidence of compliance in its own right, and it may include photographs taken by the assessor as part of the survey. Assessors may ask others to complete the site inspection on their behalf. If so, it is the responsibility of the assessor to ensure that their representative is: <ul style="list-style-type: none"> – competent – able to carry out the task – impartial.
E5	Building Contracts	The building contract or excerpts and clauses from it. In some instances, the Building Contract may contain design duties for specialist subcontractors or design team members.
E6	Certificates of compliance (third party)	Examples include ISO14001, BES6001, FSC (Forest Stewardship Council), other BREEAM recognised RSCS (Responsible Sourcing Certification Scheme) certificates, EPC (Environmental Profile Certificate), EPD (Environmental Product Declaration), Considerate Constructors certificate, Passivhaus, DOP (Declarations of Performance Certificates) etc.
E7	Communication records	Formal communication records between or from relevant project stakeholders or other third parties confirming an appointment, action or outcome. This may be in the form of a letter, meeting minutes, email correspondence, publication or other form of media (see also additional guidance on following pages).
E8	Communication Strategy	The strategy that sets out when the project team will meet, how they will communicate effectively and the protocols for issuing information between the various parties, both informally and at information exchanges. This may be covered by the employer information requirements.
E9	Computer aided	Examples include thermal modelling, flooding, life cycle assessment, life cycle costing, ventilation

Ref.	Document or Evidence Type	Description or notes
	modelling results or outputs	modelling, daylighting etc.
E10	Construction Specification	The specification for the project or building ⁽¹⁸⁹⁾ .
E11	Construction stage data and information	For example, purchase orders, metering data, log books, commissioning records or reports etc.
E12	Contractual tree	A diagram that clarifies the contractual relationship between the client and the parties undertaking the roles required on a project.
E13	Cost information	Project costs, including the cost estimate and life cycle costs.
E14	Design drawings ⁽¹⁹⁰⁾	Developed and Technical Design, including the coordinated architectural, structural and building services design. Site plans, drainage designs.
E15	Design programme	A programme setting out the strategic dates in relation to the design process. It is aligned with the Project Programme but is strategic in its nature, due to the iterative nature of the design process, particularly in the early stages.
E16	Design responsibility matrix	A matrix that sets out who is responsible for designing each aspect of the project and when. This document sets out the extent of any performance specified design.
E17	Feasibility Study	Studies undertaken to test the feasibility of the Initial Project Brief of the site or in a specific context and to consider how site-wide issues will be addressed.
E18	Final project brief	The Initial Project Brief amended so that it is aligned with the Concept Design and any briefing decisions made during this stage.
E19	Other third party information	For example, maps, public transport timetables, product data or details, manufacturers' literature, PDS (Product Data Sheets), Government /EU standards or codes, EU labelling, CE Marking Labels, Curriculum Vitae (CV).
E20	Professional services contract	An agreement to provide professional or consulting services such as, designing, feasibility studies, or legal or technical advice.
E21	Professional specialist reports	Professional reports resulting from specialist surveys, studies or test results, e.g. contaminated land, ecology, flood risk assessment, surface water run-off report, site investigation, acoustics, indoor air quality plan, low and zero carbon technologies study, transport analysis, commissioning reports, passive design analysis report, life cycle assessment, landscape and habitat management plan etc.
E22	Project execution or quality plan	The Project Execution Plan is produced in collaboration between the project lead and lead designer, with contributions from other designers and members of the project team. The Project Execution Plan sets out the processes and protocols to be used to develop the design.
E23	Project programme	The overall period for the briefing, design, construction and post completion activities of a project.
E24	Project roles table	A table that sets out the roles required on a project as well as defining the stages during which those roles are required and the parties responsible for carrying out the roles.
E25	Project Strategy	The strategies developed in parallel with the Concept Design to support the design and, in certain instances, to respond to the Final Project Brief as it is concluded. Examples include strategies for sustainability, acoustics, handover, maintenance and operational, fire engineering, building control, technology, health and safety, construction, travel plan, sustainable procurement plan.
E26	Risk Assessment	The Risk Assessment considers the various designs and other risks on a project and how each risk will be managed and the party responsible for managing each risk.
E27	Schedule of services	A list of specific services and tasks to be undertaken by a party involved in the project, which is incorporated into their professional services contract.
E28	Strategic or initial project brief	The brief prepared following discussions with the client to ascertain the project objectives, the client's business case and, in certain instances, in response to site feasibility studies.

APPENDIX D – POST-CONSTRUCTION STAGE ASSESSMENT ISSUE EXCEPTIONS

For developments that are either phased, or contain multiple homes, there are some issues that will not be complete when a post-construction stage assessment for the first homes is completed. For example, these could include some ecology credits or community-based facilities. It is possible to certify the first homes without certain issues being complete based on written commitments. The details of these exceptions are highlighted in Table 49 below. This is not intended to be a comprehensive list; its purpose is to provide guidance to assessors on the type of exceptions that are acceptable.

Table 49 Post-construction stage exceptions

Categories	Issues	Exception
Transport and Movement	01 Accessible Public Transport	Where new transport facilities will be provided, but at a later stage than the home being assessed, the assessment can consider such facilities, provided that a commitment has been made to provide these transport facilities. This can be demonstrated either within the general contract specification or in the form of a Section 106 agreement. This must outline that the transport facilities will be available for use by the time 60% of the development (either within a phase or over all phases) has been completed and is ready for occupation.
	02 Alternative Sustainable Transport Options	Where communal facilities will be provided, but at a later stage than the home being assessed, communal facilities must be provided prior to 60% of the development being completed. However, in instances where it is deemed that the occupants of the development require these facilities at an earlier time, then they must be provided as such. When the facilities are being provided at a later stage than the home being assessed, then written confirmation from the developer demonstrating that these facilities will be completed is required to demonstrate compliance with the relevant criteria.
	03 Local Amenities	Where local amenities will be provided, but at a later stage than the home being assessed, these must be provided prior to 60% of the development being completed. However, in instances where it is deemed that the occupants of the development require these facilities at an earlier time, then they must be provided as such. When the facilities are being provided at a later stage than the home being assessed, then written confirmation from the developer demonstrating that these facilities will be completed is required to illustrate compliance with the relevant criteria.
Outdoors	04 Ecology	Where recommendations have been laid out in an ecological survey, all protection measures must be implemented prior to any work being undertaken on site. However, recommendations related to enhancing the ecology must be undertaken prior to 60% of the development being completed. When the enhancement recommendations are being undertaken at a later stage than the home being assessed, then written confirmation from the developer demonstrating that these recommendations will be undertaken is required to demonstrate compliance with the relevant criteria.
	05 Recreational Space	Communal space must be provided prior to 60% of the development being completed. When the facilities are being provided at a later stage than the home being assessed, then written confirmation from the developer demonstrating that these facilities will be completed is required to demonstrate compliance with the relevant criteria.

Categories	Issues	Exception
Safety and Resilience	06 Flood Risk	All site-wide flood resilience measures should be planned and a programme for their construction finalised which indicates that they will be operational before more than 60% of the homes on a development site are completed or certified.
	07 Managing the Impact of Rainfall	Site-wide SuDS may not be fully installed when initial phases are released, but evidence of the devices to be used and any relevant calculations need to be available. They need to be operational before more than 60% of the homes are completed or certified.
	08 Security	Security recommendations or solutions to external areas within the boundary of the site may not be implemented when initial phases are released, but evidence of the features to be used needs to be available. They need to be operational before more than 60% of the homes are completed or certified.
Energy and Cost	15 Energy and cost	Centralised energy supply infrastructure on multi-phase developments may not be commissioned in the first phase but should be operational before more than 60% of the homes are completed or certified. This requirement is variable where there is an alternative statutory requirement in place for the system to be operational at a different stage. For centralised energy supply infrastructure; the infrastructure to allow a future connection must be provided to each home for credits to be awarded, regardless of the percentage of total homes completed.
	15 Energy and cost Bolt-on calculation: Appliances	White goods may not be fitted owing to security risk until just prior to handover to new residents. Orders must be in place.
	16 Decentralised Energy	Centralised energy supply infrastructure on multi-phase developments may not be commissioned in the first phase but should be operational before more than 60% of the homes are completed or certified. This requirement is variable where there is an alternative statutory requirement in place for the system to be operational at a different stage. For centralised energy supply infrastructure; the infrastructure to allow a future connection must be provided to each home for credits to be awarded, regardless of the percentage of total homes completed.
	17 Impact on Local Air Quality	Centralised energy supply infrastructure on multi-phase developments may not be commissioned in the first phase but should be operational before more than 60% of the homes are completed or certified. This requirement is variable where there is an alternative statutory requirement in place for the system to be operational at a different stage. For centralised energy supply infrastructure; the infrastructure to allow a future connection must be provided to each home for credits to be awarded, regardless of the percentage of total homes completed.
Space	24 Recyclable Waste	Where communal composting facilities will be provided, but at a later stage than the home being assessed, these must be provided prior to 60% of the development being completed. When the facilities are being provided at a later stage than the home being assessed, then written confirmation from the developer demonstrating that these facilities will be completed is required to demonstrate compliance with the relevant criteria.
Water	25 Water Efficiency	Communal grey water or rainwater systems may not be installed but should be operational before more than 60% of the homes the systems are serving have been completed or certified.
Home Delivery	26 Commissioning and Performance	Centralised energy supply infrastructure or other centralised systems that fall under the scope of the commissioning part of this issue, which are on multi-phase developments, may not be commissioned in the first phase but should be operational before more than 60% of the homes are completed or certified. This

Categories	Issues	Exception
		<p>requirement is variable where there is an alternative statutory requirement in place requiring the system to be operational at a different stage.</p> <p>For community heating systems; the infrastructure to allow a future connection must be provided to each home for credits to be awarded, regardless of the percentage of total homes completed.</p>
28 Considerate Construction		<p>The Considerate Constructors Scheme (CCS) makes provision for phased developments within their registration process, allowing each phase to be registered separately. They make this provision to allow for very large developments that may go on over several years.</p> <p>The situation with HQM phasing is different, in that it is possible that HQM homes will be released for sale (and therefore require HQM certificates) gradually, perhaps only a few at a time. We recognise that it would be unreasonable to expect final CCS certificates to be issued for all of these releases (which would require each of these groups of a few homes to be registered separately with CCS).</p> <p>Credits for phased developments can be based on the latest site monitor’s report from CCS and a firm commitment from the developer. Where homes are to be released before the first site monitor’s visit, credits can be awarded based on a firm commitment from the contractor or developer.</p> <p>When the final homes, being assessed using HQM, are submitted for Post Construction Stage Assessment, the CCS site monitor’s report AND the final CCS certificate must be included in the evidence. Please note this means that where HQM assessed homes form part of a larger phased development and construction will not be completed on the site before the final HQM home is assessed, the development will need to be registered with CCS as more than one phase, with HQM homes forming a separate phase.</p> <p>If on submission of the final CCS certificate with the final HQM assessed homes, the CCS certificate does not meet the level stated in the commitment, BRE reserves the right to withdraw HQM certificates or reduce the level achieved.</p>
29 Construction Energy Use		<p>For phased developments, evidence should be provided to demonstrate that the proposed monitoring strategy has been implemented up to the completion date for the phase being certified. Where there is no sub-metering of individual phases, then as a minimum, a reading for the site as a whole on the date that the respective phase is completed should be submitted.</p>
30 Construction Water Use		<p>For phased developments, evidence should be provided to demonstrate that the proposed monitoring strategy has been implemented up to the completion date for the phase being certified. Where there is no sub-metering of individual phases, then as a minimum, a reading for the site as a whole on the date that the respective phase is completed should be submitted.</p>
31 Site Waste		<p>It is recommended that where work is phased, contractors should look to monitor and record waste arisings for each respective phase individually.</p> <p>However, where this is not possible and earlier phases are finalising their Post-Construction Stage report, the waste that has been generated up until that point can be divided by the site-wide GIFA of the buildings that have been handed over.</p> <p>Additional appropriate supporting evidence must support the timing of the measurement and handover. Subsequent phases should include all phases that precede it in the calculation methodology, especially when phases have overlapped.</p>

REFERENCES

- 1 The Operations Manual (SD5070) provides detailed procedural guidance for licensed HQM assessors.
- 2 The United Kingdom Accreditation Service. See the section 'Ensuring Trust in the Mark' for more detail.
- 3 BREEAM is the World's first and most widely used measure of sustainability in the built environment: www.breeam.com
- 4 BRE Global Ltd is accredited by UKAS to BS EN ISO/IEC 17065:2012 General requirements for bodies operating product certification systems for certification activities associated with the assessment of environmental performance (of
- 5 Certified projects are listed on www.greenbooklive.com and www.breeam.com/projects
- 6 Sustrans. Why use public transport. Sustrans. [Online] [Cited: 15 October 2015.] <http://www.sustrans.org.uk/change-your-travel/reducing-your-car-use/why-use-public-transport>.
- 7 Department of Energy and Climate Change. 2015. 2013 UK Greenhouse Gas Emissions, Final Figures. 2015.
- 8 Sustrans. Why use public transport. Sustrans. [Online] [Cited: 15 October 2015.] <http://www.sustrans.org.uk/change-your-travel/reducing-your-car-use/why-use-public-transport>.
- 9 Department for Communities and Local Government. 2012. National Planning Policy Framework. 2012.
- 10 Transport for London. 2010. Measuring Public Transport Accessibility Levels - PTALs - Summary. 2010.
- 11 BS 5489-1:2013. Lighting of roads and public amenity areas. 2013
- 12 UK Government. 2015. Plug-in car grant. Gov.uk. [Online] 26 August 2015. [Cited: 15 October 2015.] <https://www.gov.uk/government/publications/plug-in-car-grant>.
- 13 Department for Transport. 2015. Public attitudes towards electric vehicles: 2015. 2015.
- 14 Department for Transport. 2008. Cycle Infrastructure Design - Local Transport Note 2/08. 2008.
- 15 Society of Light and Lighting. 2012. The SLL Code for Lighting. CIBSE. Page Bros. Norwich. 2012.
- 16 BS 5489-1:2013. Lighting of roads and public amenity areas. 2013
- 17 BS 5489-1:2013. Lighting of roads and public amenity areas. 2013.
- 18 Portas, Mary. 2011. The Portas Review: An independent review into the future of our high streets. 2011.
- 19 World Green Building Council. Research Note: Access to Amenities.
- 20 BS 5489-1:2013 Lighting of roads and public amenity areas. 2013
- 21 Natural England. 2009. Our National Health Service. 2009
- 22 Department for Communities and Local Government. 2012. National Planning Policy Framework. 2012.
- 23 Natural England. 2009. Our National Health Service. 2009.
- 24 UK National Ecosystem Assessment. 2014. UK National Ecosystem Assessment: Synthesis of the Key Findings. 2014
- 25 BS 5837:2012 Trees in relation to design, demolition and construction. Recommendations. 2012
- 26 BSI. 2013. BS 42020:2013 - Biodiversity. Code of practice for planning and development. 2013. Institute of Ecology and Environmental Management. 2006. Guidelines for ecological impact assessment in the United Kingdom. 2006.
- 27 BSI. 2013. BS 42020:2013 - Biodiversity. Code of practice for planning and development. 2013. Institute of Ecology and Environmental Management. 2006. Guidelines for ecological impact assessment in the United Kingdom. 2006.
- 28 National Geographic. Education - Keystone species. [Online] [Cited: 04 September 2015.] <http://education.nationalgeographic.com/education/encyclopedia/keystone-species>
- 29 BSI. 2013. BS 42020:2013 - Biodiversity. Code of practice for planning and development. 2013. Institute of Ecology and Environmental Management. 2006. Guidelines for ecological impact assessment in the United Kingdom. 2006. Newton, J, et al. 2011. CIRIA C691 - Working with wildlife: guidance for the construction industry. 2011.
- 30 BSI. 2013. BS 42020:2013 - Biodiversity. Code of practice for planning and development. 2013. Institute of Ecology and Environmental Management. 2006. Guidelines for ecological impact assessment in the United Kingdom. 2006.
- 31 Joint Nature Conservation Committee. UK BAP priority species. [Online] [Cited: 04 September 2015.] <http://jncc.defra.gov.uk/page-5717>.
- 32 BSI. 2013. BS 42020:2013 - Biodiversity. Code of practice for planning and development. 2013. Institute of Ecology and Environmental Management. 2006. Guidelines for ecological impact assessment in the United Kingdom. 2006.
- 33 Groundwork UK. 2015. Learning Report: Growing and Green Space. 2015. Natural England. 2009. Our National Health Service. 2009.
- 34 Commission for Architecture and the Built Environment. 2009. Open space strategies: Best practice guidance. 2009. Faculty of Public Health. 2004. Food Poverty and Health. 2004.
- 35 Forestry Commission. 2012. Research Report: Economic benefits of greenspace. 2012. Faculty of Public Health. 2010. Great Outdoors: How Our Natural Health Service Uses Green Space To Improve Wellbeing. 2010.
- 36 Natural England. 2009. Our National Health Service. 2009.
- 37 Department for Communities and Local Government. 2012. National Planning Policy Framework. 2012.
- 38 Forestry Commission. 2012. Research Report: Economic benefits of greenspace. 2012.
- 39 Commission for Architecture and the Built Environment. 2009. Open space strategies: Best practice guidance. 2009.
- 40 Brighton and Hove City Council. 2011. Food Growing and Development. 2011.
- 41 Allot more allotments. 2012. Allotments and the law. Allot more allotments. [Online] 15 March 2012. <http://www.allotmoreallotments.org.uk/legislation.htm>.
- 42 Brighton and Hove City Council. 2011. Food Growing and Development. 2011.

- 43 BS 5489-1:2013 Lighting of roads and public amenity areas.2013.
- 44 The Met Office. The Met Office. The Met Office. [Online] www.met-office.gov.uk.
- 45 BS 8533:2011 Assessing and managing flood risk in development. Code of practice.2011.
- 46 Department for Environment, Food & Rural Affairs. 2015. Sustainable Drainage Systems: non-statutory technical standards. 2015.
- 47 The Met Office. The Met Office. The Met Office. [Online] [Cited: 03 November 2015.] <http://www.metoffice.gov.uk>
- 48 Environment Agency; Scottish Environment Protection Agency; Environment and Heritage Service. 2006. Pollution Prevention Guideline (PPG) 3: Use and design of oil separators in surface water drainage systems. 2006.
- 49 CIRIA. 2007. C697: The SuDS Manual. 2007.
- 50 BS 8515:2009 Rainwater harvesting systems - code of practice.2009.
- 51 Approved Document Q: Security - Dwellings (2015 Edition).2015.
- 52 Yu, C and Crump, D. 2002. BRE Digest 464, Part 1: VOC emissions from building products: sources, testing and emission data. BRE Watford. : IHS BRE Press., 2002.
- 53 World Health Organisation (WHO). 2010. Guidelines for indoor air quality: Selected pollutants. Geneva : World Health Organisation, 2010
- 54 HM Government. 2010. Approved Document F Ventilation. 2010.
- 55 BSI. 2006. BS EN ISO 16000-2:2006. Indoor air. Sampling strategy for formaldehyde. 2006. BSI. 2007. BS EN ISO 16000-5:2007. Indoor air - Part 5: Sampling strategy for volatile organic compounds (VOCs). 2007
- 56 BSI. 2006. BS EN ISO 16000-2:2006. Indoor air. Sampling strategy for formaldehyde. 2006. BSI. 2011. BS ISO 16000-3:2011. Indoor air. Determination of formaldehyde and other carbonyl compounds in indoor air and test chamber air. Active sampling method. 2011.
- 57 BSI. 2006. BS EN ISO 16000-2:2006. Indoor air. Sampling strategy for formaldehyde. 2006.
- 58 BSI. 2006. BS EN ISO 16000-2:2006. Indoor air. Sampling strategy for formaldehyde. 2006.
- 59 BSI. 2011. BS ISO 16000-3:2011. Indoor air. Determination of formaldehyde and other carbonyl compounds in indoor air and test chamber air. Active sampling method. 2011.
- 60 BSI 2007 BS EN ISO 16000-5:2007 Indoor air - Part 5: Sampling strategy for volatile organic compounds (VOCs) 2007..
- 61 BSI. 2001. BS EN ISO 16017-1:2001. Indoor air. Indoor, ambient and workplace air. Sampling and analysis of volatile organic compounds by sorbent tube/thermal desorption/capillary gas chromatography. Pumped sampling. 2001.
- 62 BSI. 2011. BS ISO 16000-6:2011. Indoor air. Part 6 Determination of volatile organic compounds in indoor and test chamber air by active sampling on Tenax TA® sorbent, thermal desorption and gas chromatography using MS or MS-FID. 2011.
- 63 BSI. 2011. BS ISO 16000-3:2011. Indoor air. Determination of formaldehyde and other carbonyl compounds in indoor air and test chamber air. Active sampling method. 2011.
- 64 BSI. 2011. BS ISO 16000-3:2011. Indoor air. Determination of formaldehyde and other carbonyl compounds in indoor air and test chamber air. Active sampling method. 2011.
- 65 BSI. 2005. BS EN ISO/IEC 17025:2005. General requirements for the competence of testing and calibration laboratories. 2005.
- 66 BSI. 2007. BS EN 15457:2007. Paints and varnishes. Laboratory method for testing the efficacy of film preservatives in a coating against fungi. 2007.
- 67 BSI. 2014. BS EN 15458:2014. Paints and varnishes. Laboratory method for testing the efficacy of film preservatives in a coating against algae. 2014.
- 68 BSI. 2005. BS EN ISO/IEC 17025:2005. General requirements for the competence of testing and calibration laboratories. 2005.
- 69 BSI. 2013. BS EN 16402:2013. Paints and varnishes – assessment of emissions of substances from coatings into indoor air - sampling conditioning and testing. 2013.
- 70 BSI. 2006. BS EN ISO 16000-9:2006. Indoor air. Part 9: Determination of the emission of volatile organic compounds from building products and furnishing- emission test chamber method. 2006.
- 71 BSI. 2013. PD CEN/TS 16516:2013. Construction products – assessment of release of dangerous substances – determination of emissions into indoor air. 2013.
- 72 California Department of Public Health (CDPH). 2010. Standard method for the testing and evaluation of volatile organic chemical emissions from indoor sources using environmental chambers. Version 1.1 (emission testing method for California Specification 01350). 2010.
- 73 BSI. 2006. BS EN ISO 16000-9:2006. Indoor air. Part 9: Determination of the emission of volatile organic compounds from building products and furnishing- emission test chamber method. 2006.
- 74 BSI. 2013. PD CEN/TS 16516:2013. Construction products – assessment of release of dangerous substances – determination of emissions into indoor air. 2013.
- 75 California Department of Public Health (CDPH). 2010. Standard method for the testing and evaluation of volatile organic chemical emissions from indoor sources using environmental chambers. Version 1.1 (emission testing method for California Specification 01350). 2010.
- 76 BSI. 2004. BS EN 717-1:2004. Wood-based panels - Determination of formaldehyde release - Part 1: Formaldehyde emission by the chamber method. 2004
- 77 BSI. 2012. BS EN ISO 10580:2012. Resilient, textile and laminate floor coverings - Test method for volatile organic compound (VOC) emissions. 2012.
- 78 BSI. 2006. BS EN ISO 16000-9:2006. Indoor air. Part 9: Determination of the emission of volatile organic compounds from building products and furnishing- emission test chamber method. 2006.

- 79** BSI. 2013. PD CEN/TS 16516:2013. Construction products – assessment of release of dangerous substances – determination of emissions into indoor air. 2013.
- 80** California Department of Public Health (CDPH). 2010. Standard method for the testing and evaluation of volatile organic chemical emissions from indoor sources using environmental chambers. Version 1.1 (emission testing method for California Specification 01350). 2010.
- 81** BSI. 2006. BSEN ISO 16000-9:2006. Indoor air. Part 9: Determination of the emission of volatile organic compounds from building products and furnishing- emission test chamber method. 2006.
- 82** BSI. 2013. PD CEN/TS 16516:2013. Construction products – assessment of release of dangerous substances – determination of emissions into indoor air. 2013.
- 83** California Department of Public Health (CDPH). 2010. Standard method for the testing and evaluation of volatile organic chemical emissions from indoor sources using environmental chambers. Version 1.1 (emission testing method for California Specification 01350). 2010.
- 84** BSI. 2013. BSEN 13999-1:2013. Adhesives – short term method for measuring the emission properties of low-solvent or solvent free adhesives after application. Part 1: General procedure. 2013. BSI. 2013. BSEN 13999-2:2013. Adhesives – short term method for measuring the emission properties of low-solvent or solvent free adhesives after application. Part 2: Determination of volatile organic compounds. 2013. BSI. 2009. BSEN 13999-3:2007+A1:2009. Adhesives – short term method for measuring the emission properties of low-solvent or solvent free adhesives after application. Part 3: Determination of volatile aldehydes. 2009. BSI. 2009. BSEN 13999-4:2007+A1:2009. Adhesives – short term method for measuring the emission properties of low-solvent or solvent free adhesives after application. Part 4: Determination of volatile diisocyanates. 2009.
- 85** BSI. 2006. BSEN ISO 16000-9:2006. Indoor air. Part 9: Determination of the emission of volatile organic compounds from building products and furnishing- emission test chamber method. 2006.
- 86** BSI. 2013. PD CEN/TS 16516:2013. Construction products – assessment of release of dangerous substances – determination of emissions into indoor air. 2013.
- 87** California Department of Public Health (CDPH). 2010. Standard method for the testing and evaluation of volatile organic chemical emissions from indoor sources using environmental chambers. Version 1.1 (emission testing method for California Specification 01350). 2010
- 88** European Union. 2008. Regulation (EC) No 1272/2008 . of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006. s.l. : Official Journal of the European Union, 2008.
- 89** BSI. 2015. Annex G.2 Draft BSEN 16516. Construction products – assessment of release of dangerous substances – determination of emissions into indoor air. 2015.
- 90** BSI. 2013. PD CEN/TS 16516:2013. Construction products. Assessment of release of dangerous substances. Determination of emissions into indoor air. 2013.
- 91** BSI. 2008. BS8206-Part 2. Lighting for buildings. Code of practice for daylighting. London : s.n., 2008.
- 92** P.J. Littlefair, BRE Trust. 2011. Site layout planning for daylight and sunlight: a guide to good practice, 2nd edition. 2011.
- 93** P.J. Littlefair, BRE Trust. 2011. Site layout planning for daylight and sunlight: a guide to good practice, 2nd edition. 2011.
- 94** P.J. Littlefair, BRE Trust. 2011. Site layout planning for daylight and sunlight: a guide to good practice, 2nd edition. 2011.
- 95** BSI. 2008. BS8206-Part 2. Lighting for buildings. Code of practice for daylighting. London : s.n., 2008.
- 96** P.J. Littlefair, BRE Trust. 2011. Site layout planning for daylight and sunlight: a guide to good practice, 2nd edition. 2011.
- 97** P.J. Littlefair, BRE Trust. 2011. Site layout planning for daylight and sunlight: a guide to good practice, 2nd edition. 2011.
- 98** BSI. 2014. BS8233. Guidance on sound insulation and noise reduction for buildings. s.l. : BSI, 2014.
- 99** BSI. 2003. BS 7445-1. Description and measurement of environmental noise. Guide to quantities and procedures. s.l. : BSI, 2003. BSI. 1991. BS 7445-2. Description and measurement of environmental noise. Guide to the acquisition of data pertinent to land use. s.l. : BSI, 1991.
- 100** HM Government. 2013. Approved Document E: Resistance to the passage of sound 2003 edition, with amendments 2004, 2010 and 2013. 2013.
- 101** The Scottish Government. 2013. Technical Handbook 2013 - Section 5 Noise. 2013.
- 102** Department of Finance and Personnel. 2012. Technical Booklet G Resistance to the passage of sound. 2012.
- 103** BSI. 2005. BSEN ISO/IEC 17025. General requirements for the competence of testing and calibration laboratories. 2005.
- 104** BSEN ISO 10140-2:2010. Acoustics. Laboratory measurement of sound insulation of building elements. Measurement of airborne sound insulation. 2011.
- 105** BSI. 2015. BSEN ISO 10140-1:2010+A1. Acoustics. Laboratory measurement of sound insulation of building elements. Measurement of impact sound insulation. 2015. BSI. 2010. BSEN ISO 10140-2. Acoustics. Laboratory measurement of sound insulation of building elements. Measurement of airborne sound insulation. 2010. BSI. 2014. BSEN ISO 10140-5:2010+A1. Acoustics. Acoustics. Laboratory measurement of sound insulation of building elements. Requirements for test facilities and equipment. 2014
- 106** BSI. 1995. BSEN ISO 140-3 Acoustics. Measurement of sound insulation in buildings and of building elements. Laboratory measurement of airborne sound insulation of building elements. 1995.
- 107** Zero Carbon Hub. March 2015. Overheating in homes - drivers of change. March 2015.
- 108** NHBC. 2012. Overheating in new homes - a review of the evidence. 2012.
- 109** CIBSE. 1998. CIBSE Applications Manual AM11 Building energy and environmental modelling. 1998.
- 110** CIBSE. 2015. CIBSE Guide A Environmental Design, 8th Edition. 2015.

- 111 CIBSE TM52: The limits of thermal comfort: avoiding overheating in European buildings. 2013
- 112 CIBSE. 1999. TM21: Minimising pollution at air intakes. 1999.
- 113 Department for Communities and Local Government. July 2011. Domestic Ventilation Compliance Guide - 2010 Edition (with 2011 amendments). July 2011.
- 114 The National Affordable Homes Agency. Updated April 2008. 721 Housing Quality Indicators (HQI) Form, Version 4 - Published May 2007. Updated April 2008.
- 115 Approved Document F - Ventilation (2010 Edition). 2010
- 116 Department of Energy & Climate Change. 2014. Annual Fuel Poverty Statistics Report. 2014.
- 117 Climate Change Act 2008: Chapter 27.
- 118 BS EN ISO 13790:2008 Energy performance of buildings. Calculation of energy use for space heating and cooling. 2008.
- 119 European Union. 2009. Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC. s.l.: www.eur-lex.europa.eu/en, 2009.
- 120 The Microgeneration Certification Scheme. MCS Standards. The Microgeneration Certification Scheme. [Online] <http://www.microgenerationcertification.org/mcs-standards/mcs-standards>.
- 121 Department of Energy & Climate Change. Combined Heat & Power Quality Assurance Programme. Gov.uk. [Online] <https://www.gov.uk/guidance/combined-heat-power-quality-assurance-programme>.
- 122 Wiltshire, Robin, Williams, Jonathan and Woods, Paul. 2014. A technical guide to district heating. s.l.: BRE Trust, 2014.
- 123 World Health Organization. 2013. Health risks of air pollution in Europe – HRAPIE project; New emerging risks to health from air pollution – results from the survey of experts. 201
- 124 Department for Environment, Food & Rural Affairs. 2012. Conversion of biomass boiler emission concentration data for comparison with Renewable Heat Incentive emission criteria. 2012
- 125 Department of Energy and Climate Change. 2013. Off gas data December 2013. Gov.uk. [Online] 19 December 2013. <https://www.gov.uk/government/statistics/off-gas-data-december-2013>.
- 126 European Union. 2001. Directive 2001/80/EC on the limitation of emissions of certain pollutants into the air from large combustion plants. 2001.
- 127 HM Government. 1986. Gas Act 1986 - Chapter 44. 1986
- 128 European Union. 2009. Ecodesign Directive. Directive 2009/125/EC of the European Parliament and of the Council with regard to eco-design requirements. 2009.
- 129 BSI. 2013. BS 8900-1:2013. Managing sustainable development of organisations. Guide. 2013.
- 130 BSI. 2010. BS 8903:2010. Principles and framework for procuring sustainably. Guide. 2010.
- 131 Central Point of Expertise on Timber. 2013. Definition of Legal and Sustainable for Timber Procurement: Fifth Edition. 2013.
- 132 BSI. 2013. BS 8900-1:2013. Managing sustainable development of organisations. Guide. 2013.
- 133 BSI. 2010. BS 8903:2010. Principles and framework for procuring sustainably. Guide. 2010.
- 134 BSI. 2010. BS EN ISO 14025:2010. Environmental labels and declarations - Type III environmental declarations, Principles and procedures. s.l.: BSI, 2010.
- 135 ISO. 2007. ISO 21930:2007. Sustainability in building construction - Environmental declaration of building products. 2007
- 136 BSI. 2013. BS EN 15804:2012+A1:2013. Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products. s.l.: BSI, 2013
- 137 BSI. 2013. BS EN 15804:2012+A1:2013. Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products. s.l.: BSI, 2013.
- 138 BSI. 2010. BS EN ISO 14025:2010. Environmental labels and declarations - Type III environmental declarations, Principles and procedures. s.l.: BSI, 2010.
- 139 BSI, BCIS. 2008. Standardized Method of Life Cycle Costing for Construction Procurement. PD 156865. s.l.: BSI, 2008.
- 140 BSI, BCIS. 2008. Standardized Method of Life Cycle Costing for Construction Procurement. PD 156865. s.l.: BSI, 2008.
- 141 BSI, BCIS. 2008. Standardized Method of Life Cycle Costing for Construction Procurement. PD 156865. s.l.: BSI, 2008.
- 142 BSI, BCIS. 2008. Standardized Method of Life Cycle Costing for Construction Procurement. PD 156865. s.l.: BSI, 2008
- 143 BSI, BCIS. 2008. PD 156865. Standardized Method of Life Cycle Costing for Construction Procurement. s.l.: BSI, 2008.
- 144 World Health Organisation Europe. 2009. Damp and Mould: Health risks, prevention and remedial actions. 2009.
- 145 Menon, Rosalie and Porteous, Colin. 2011. Design Guide: Healthy Low Energy Home Laundering. 2011.
- 146 Department for Communities and Local Government. 2015. Technical housing standards - nationally described space standard March 2015. 2015.
- 147 HM Government. 2015. Approved Document M - Volume 1: Dwellings. 2015.
- 148 Department for Communities and Local Government. 2015. Technical housing standards - nationally described space standard March 2015. 2015.
- 149 HM Government. 2015. Approved Document M - Volume 1: Dwellings. 2015.
- 150 HM Government. 2003. Household Waste Recycling Act 2003. 2003.
- 151 WRAP. 2014. Barriers to recycling: A review of evidence since 2008. 2014.
- 152 WRAP. 2013. Reducing Household Food Waste in the UK. 2013.
- 153 BS 1703:2005 Refuse chutes and hoppers - Specification. 2005
- 154 BS 5489-1:2013 Code of practice for the design of road lighting. Lighting of roads and public amenity areas. 2013

- 155 HM Government. 2015. Approved Document G - Sanitation, hot water safety and water efficiency. 2015.
- 156 HM Government. 2015. Approved Document G - Sanitation, hot water safety and water efficiency. 2015.
- 157 BS 8515:2009+A1:2013 Rainwater harvesting systems. Code of practice. 2009.
- 158 BS 8525-1:2010 - Greywater systems. Code of practice. 2010.
- 159 Zero Carbon Hub. 2014. Closing the gap between design & as-built performance. End of term report, July. 2014.
- 160 CIBSE. 2003. Commissioning Code M: Commissioning Management. . 2003.
- 161 BSRIA. 2010. Commissioning Job Book - A framework for managing the commissioning process (BG 11/2010). 2010.
- 162 Zero Carbon Hub. 2014. Closing the gap between design & as-built performance. End of term report, July. 2014.
- 163 Bonn, R. & Usable Buildings Trust. 2014. Soft landings framework. s.l. : BSRIA Limited, 2014.
- 164 BSRIA. 2015. Soft Landings & Government Soft Landings: A Convergence Guide for Construction Projects. 2015.
- 165 Zero Carbon Hub. 2014. Closing the gap between design & as-built performance. End of term report, July. 2014.
- 166 Considerate Constructors Scheme. Considerate Constructors Scheme. Considerate Constructors Scheme. [Online] www.ccscheme.org.uk
- 167 Considerate Constructors Scheme. Considerate Constructors Scheme. Considerate Constructors Scheme. [Online] www.ccscheme.org.uk
- 168 Considerate Constructors Scheme. Considerate Constructors Scheme. Considerate Constructors Scheme. [Online] www.ccscheme.org.uk
- 169 Waste & Resource Action Programme. The Business Case for improving energy efficiency during construction.
- 170 Strategic Forum for Construction. How to reduce CO₂ on construction sites.
- 171 Centre for Construction Innovation. Construction Industry Key Performance Indicators. [Online] www.ccinw.com.
- 172 WRAP. The Business Case for improving water efficiency during construction.
- 173 WRAP. 2012. Water Efficiency in Construction - Auditing of water use on construction sites. 2012.
- 174 WRAP. The Business Case for improving water efficiency during construction.
- 175 BSI. 2013. BS 8895 Designing for material efficiency in building projects - Part 1: Code of practice for Strategic Definition and Preparation and Brief. s.l. : BSI, 2013.
- 176 BSI. 2013. BS 8900-1:2013. Managing sustainable development of organisations. Guide. 2013.
- 177 BSI. 2010. BS 8903:2010. Principles and framework for procuring sustainably. Guide. 2010.
- 178 BSI. 2013. BS 8895 Designing for material efficiency in building projects - Part 1: Code of practice for Strategic Definition and Preparation and Brief. s.l. : BSI, 2013. BSI. 2015. BS 8895 Designing for material efficiency in building projects – Part 2: Code of practice for concept design and developed design. s.l. : BSI, 2015.
- 179 HM Government. The Waste (England and Wales) Regulations 2011 - Statutory Instrument No.988.
- 180 Bunn, R. & Usable Buildings Trust. 2014. Soft landings framework. Bracknell : BSRIA Limited. Available at: <https://www.bsria.co.uk/services/design/soft-landings/>, 2014.
- 181 NHBC. 2011. How occupants behave and interact with their homes. The impact on energy use, comfort, control and satisfaction. Milton Keynes : NHBC Foundation., 2011.
- 182 NHBC. 2011. How occupants behave and interact with their homes. The impact on energy use, comfort, control and satisfaction . Milton Keynes : NHBC Foundation, 2011.
- 183 Plain English Campaign. 2015. Plain English Campaign. Plain English. [Online] 2015. <http://www.plainenglish.co.uk/>.
- 184 Department for Culture, Media & Sport. 2015. UK Next Generation Network Infrastructure Deployment Plan. 2015.
- 185 Department for Culture, Media & Sport. 2015. UK Next Generation Network Infrastructure Deployment Plan. 2015.
- 186 NHBC. 2011. How occupants behave and interact with their homes. The impact on energy use, comfort, control and satisfaction. Milton Keynes : NHBC Foundation, 2011.
- 187 NHBC. 2011. How occupants behave and interact with their homes. The impact on energy use, comfort, control and satisfaction. . Milton Keynes : NHBC Foundation, 2011. Jaunzens, D. et al. 2003. Digest 478 Building performance feedback: getting started. s.l. : IHS BRE Press, 2003. BSRIA. 2010. Commissioning Job Book - A framework for managing the commissioning process (BG 11/2010). 2010. Domestic energy use, lifestyles and POE: past lessons for current problems. Vale, B and Vale, R. 2010. 5, s.l. : Building Research & Information, 2010, Building Research & Information, Vol. 38, pp. 578-588.
- 188 Bonn, R. & Usable Buildings Trust. 2014. Soft landings framework. s.l. : BSRIA Limited, 2014.
- 189 For the purpose of HQM the specific clause of the specification must be referenced within the report.
- 190 Evidence in the form of design drawings must be presented in a clear, professional working format with clearly identified legends indicating revision number, date, title, owner etc. (where appropriate).