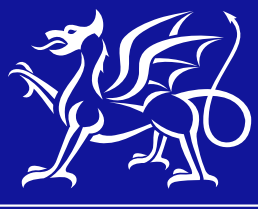

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Research: Planning for Sustainable Buildings

Study to Review the Planning for Sustainable Buildings Planning Policy and Guidance

Final Report

March 2014

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Planning for Sustainable Buildings - Review

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Content

Abbreviations

ACOP	Approved Code of Practice
AI	Accessibility Index
BRE	Building Research Establishment
BUG	Building User Guide
BREEAM	Building Research Establishment Environmental Assessment Method
BSRIA	Building Services Research and Information Association
CIBSE	Chartered Institute of Building Services Engineers
C&D	Construction & Demolition
CIMS Plan	Collections, Infrastructure and Markets Sector Plan
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide equivalent
Code	Code for Sustainable Homes
D&A	Design and Access Statements
DCLG	Department for Communities and Local Government
Eco	Code Assessment – Ecology Section
Ene	BREEAM/Code Assessment- Energy Section
EPRC	Energy Performance Ratio for New Constructions
Green Guide	BRE Green Guide to Specification
Hea	BREEAM/Code Assessment - Health and Wellbeing Section
HTM	Health Technical Memorandum
ILP	Institute of Lighting Professionals
LAMW	Local Authority Municipal Waste
LDP	Local Development Plans
LE	BREEAM Assessment - Land use and Ecology Section
LPA	Local Planning Authority
LZC	Low or Zero Carbon Energy
MM	Mott MacDonald
Man	BREEAM/Code Assessment - Management Section
Mat	BREEAM/Code Assessment - Materials Section
Min	Minimum
MIPPS	Ministerial Interim Planning Policy Statement
NO_X	Nitrogen oxide
nZEB	nearly Zero Energy Building
PfSB	Planning for Sustainable Buildings
POE	Post Occupancy Evaluation
Pol	BREEAM/Code Assessment - Pollution Section
PPW	Planning Policy Wales
Sur	Code Assessment - Surface Water Run-off Section
TAN	Technical Advice Note
Tra	BREEAM Assessment - Transport Section
UDPs	Unitary Development Plans
Was	Code Assessment – Waste Section
Wat	BREEAM/Code Assessment - Water Section
Wst	BREEAM Assessment - Waste Section

Executive Summary

This study has been commissioned by the Welsh Government to review the Planning for Sustainable Buildings (PfSB) national planning policy, contained within Planning Policy Wales (PPW), and assess the continuing need for Technical Advice Note (TAN) 22: Sustainable Buildings, in the context of the introduction of new Building Regulations in 2014. The intention of the Welsh Government is to review the need for the national development management policy, expecting an overall minimum Code for Sustainable Homes/BREEAM standard, but retain in some form the designing for climate change policy and the expectation for Local Planning Authorities to assess strategic sites for opportunities to meet higher sustainable building standards. The intention is to consider the consolidation, where appropriate, of elements of the sustainable building standards into Building Regulations and integrate the appropriate remaining elements into planning policy or guidance.

This study has looked at each individual credit for both BREEAM and Code to ascertain whether any of these design standards are already covered in existing planning policy, regulations or design guidance. It was found that many of the aims of the design criteria required for both BREEAM and Code compliance are addressed to some extent under existing mechanisms. Areas that are not or only partially addressed have been categorised into issues for planning, Building Regulations or other standards. A common theme in the findings was that many of the areas that have been identified as partially addressed could be enhanced using Building Regulations. In addition, areas that are not addressed by planning or regulation could fall into a new design standards document.

Although it has been found that these aspects could be met using planning or regulations, there is a danger that the full level of detail contained within BREEAM or the Code cannot be replicated using these mechanisms. In addition, there will be a need for coordination of these design elements to ensure that the knowledge, understanding and standards are maintained. Therefore consideration should be given to introducing a Sustainable Building Design Guide for Wales, or a Welsh Sustainable Development Assessment.

1. Introduction

1.1 Background

In May 2009 the Welsh Government published the Planning for Sustainable Buildings (PfSB) national planning policy within Planning Policy Wales (PPW) in a new Ministerial Interim Planning Policy Statement (MIPPS). The policy outlined the need for developments falling within the set requirements to achieve a sustainable building standard. In 2010, Technical Advice Note (TAN) 22: Sustainable Buildings was published to act as a separate guidance document. Principally, the policy provides a sustainability framework for Local Planning Authorities (LPAs) when making decisions on individual planning applications and comprises three parts, as follows:

- **Part A –** Designing for climate change. Policy to reinforce the need to give further emphasis on the design of new developments to tackle the causes of climate change and adapt to the current and future effects of climate change.
- **Part B –** National development control policy. Policy which requires new dwellings and major new non-residential developments to achieve a minimum sustainable building standard under Code for Sustainable Homes (Code) for domestic buildings and the Building Research Establishment Environmental Assessment Method (BREEAM) for non-domestic buildings.
- **Part C –** Strategic Sites. Policy that expects LPAs to identify opportunities for higher sustainable buildings standards for strategic sites and include relevant policies in their Local Development Plan (LDP).

The policy was introduced as part of the Government's approach to tackling climate change through the planning system and to help facilitate its zero carbon aspiration. PfSB introduced a higher carbon and sustainability standard for new buildings against a regulatory minimum, using the national voluntary standards; Code for dwellings and BREEAM for non-domestic buildings. Both Code and BREEAM are assessment tools used to grade the sustainability of a project using design targets that require a separate submission of evidence in addition to Building Regulations requirements.

In July 2014, the Welsh Government intends to make amendments to Buildings Regulations, requiring the reduction in greenhouse gas emissions to 8% for new dwellings and 20% for non-domestic buildings, in line with the overall expectations of the existing standards set out in the PfSB policy. As a result, the Minister for Housing and Regeneration has asked for a review of the PfSB national planning policy, contained in the PPW and an assessment of the continuing need for TAN 22.

Since the introduction of both Code and BREEAM building standards, many of the sustainable elements contained within the assessments have become both good practice and industry standard, these are often easily achieved and regarded as 'easy wins'. In addition, many elements or standards that are covered in Code or BREEAM are also requirements of Building Regulations, planning policy or guidance; therefore many components are covered multiple times. Another consideration is that Code, BREEAM and Welsh policy and regulations are constantly evolving to strive towards more sustainable developments, and as neither Code nor BREEAM are maintained by the Welsh Government, it has become increasingly difficult to keep all relevant standards aligned.

In order to simplify and streamline the building process in Wales, the Welsh Government intends to review the national development management policy requiring an overall minimum Code/BREEAM standard (Part

B), and to retain in some form, the designing for climate change policy (Part A) and the expectations for the LPAs to assess strategic sites for opportunities to meet higher sustainable building standards (Part C).

1.2 Planning Policy Wales

The national planning policy of the Welsh Government comprises PPW, TANs, circulars and policy clarification letters. Planning policies are set out in PPW which stipulates the land use requirements of the Welsh Government and provides a framework for the preparation of local development plans (LDP) for the LPAs [1].

1.2.1 Planning for Sustainable Buildings

PfSB national planning policy is contained within PPW[2]. The policy sets out the requirements and standards for climate responsive developments, to minimise carbon dioxide and other greenhouse gas emissions associated with their design, construction, use and eventual demolition[2].

To encourage development proposals to move towards more sustainable and zero carbon buildings in Wales the policy sets forth the requirements to be met by development proposals in Wales, with the following of particular relevance:

- Applications for 5 or more dwellings received on or after **1st September 2009** to meet Code for Sustainable Homes Level 3 and obtain 6 credits under issue *Ene1- Dwelling Emission Rate;*
- Applications for 1 or more dwellings received on or after **1st September 2010** to meet Code for Sustainable Homes Level 3 and obtain 6 credits under issue *Ene1- Dwelling Emission Rate*;
- Dwellings registered under Code for Sustainable Homes (Version 3) will be expected to meet Code for Sustainable Homes Level 3 and obtain 1 credit under issue *Ene1- Dwelling Emission Rate*;
- Applications received on or after **1st September 2009** for non-residential development which will either have a floorspace of 1,000 m^2 or more, or will be carried out on a site having an area of one hectare or more, to meet the Building Research Establishment Environmental Assessment Method (BREEAM) 'Very Good' standard and achieve the mandatory credits for 'Excellent' under issue *Ene1 - Reduction of CO^2_2 Emissions[2].*

The standards outlined in PPW, have been updated in line with the revisions made to Part L of Building Regulations and BREEAM standard in 2010 and 2011 respectively. The latter standards will supersede the 2009 PfSB policy and in effect, these standards set in PPW would need to be updated again, once the new revisions of Part L and BREEAM come in to effect.

Additionally, the PfSB requires LPAs to assess strategic sites for opportunities to require higher sustainable building standards to be required and should be progressed through the LDP, in accordance to the legislation and national policy.

The policy for PfSB is given separate guidance in TAN 22, whereby aspects are detailed to support LPAs and designers/developers to adhere to the policy.

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[1] Planning Policy Wales - http://wales.gov.uk/docs/desh/publications/121107ppwedition5en.pdf Welsh Government 2012

[2] Planning for Sustainable Buildings - http://wales.gov.uk/docs/desh/publications/121107ppw5chapter4en.pdf - Welsh Government 2012

A review will be carried out for TAN 22, to understand which elements would need to be retained if it were to be removed.

1.2.2 TAN 22: Sustainable Buildings

TAN 22 presents material for use by individual planning authorities in the preparation for development plans, while it is also used in decisions on individual planning applications. As discussed above, the guidance note focuses on three key aspects; designing for climate change (Part A), national development control policy (Part B) and strategic sites (Part C).

1.3 BREEAM

BREEAM is an assessment tool used to promote sustainable *non-domestic* developments, encouraging developers to go beyond the standard regulatory requirements and consider higher levels of environmental performance as well as a wider range of factors such as health and ecological impacts. There are a total of forty nine separate issues covered, which are categorised into ten sections, as follows:

- Management
- Health and Well-being
- Energy
- Transport
- Water
- Materials
- Waste
- Land use and ecology
- Pollution
- Innovation

For development proposals, the client, developers and designers are encouraged to consider BREEAM throughout the design process in order to achieve the highest possible rating. Licensed assessors help guide the design team through the process from inception to post construction stage of the project. Credits are awarded for each issue depending on compliance with the criteria. The total number of credits scored is then used to determine the BREEAM rating of the building; “Pass”, “Good”, “Very Good”, “Excellent” or “Outstanding”. These ratings are initially awarded at design stage, then at post construction stage after final commissioning of the building.

Since September 2009, the Welsh PfSB has stated a requirement that planning applications received for developments with floorspace of 1,000m^2 or more, or to be carried out on a site area of a hectare or more, to meet the BREEAM “Very Good” standard and to achieve the mandatory credits for “Excellent” under issue Ene1 Reduction of CO_2 Emissions. Consequently, BREEAM standards now specified as part of the Welsh planning system may require higher standards than regulatory compliance, leading to a scope of issues to be considered. The method to achieving the BREEAM standard(s) is optional for many credit areas, which has meant that some issues are traded off against others in order to achieve the required overall performance and dependant on the development characteristic. Subject to the desired rating of the building, BREEAM sets mandatory credits that need to be achieved for compliance, meaning for the current planning condition of “Very Good” as a minimum, there are credits that need to be achieved by new non-domestic buildings over 1,000m² in size.

1.4 Code for Sustainable Homes

Similarly to BREEAM, the intention of Code is to push *domestic* developments beyond the basic minimum requirements of Building Regulations. As such, it has driven the construction industry towards higher levels of environmental performance in homes and to take into consideration a wider range of factors beyond simply constructional issues, for instance the ecological and health impacts of construction and buildings. There are nine different design categories covered under Code:

- Energy and CO2 emissions
- Water
- Materials
- Surface water run-off
- Waste
- Pollution
- Health and well-being
- Management
- Ecology

Similarly to BREEAM, each category of Code is split into separate issues, where a number of credits are awarded depending on the sustainability credentials of the development. The total number of credits is used to give the dwelling a rating of between 1 and 6 stars, one being the lowest and six the highest award. Evidence is initially submitted at design stage using design drawings, specifications and commitments from the contractor, which are used to provide an initial certificate for compliance. A post construction review is then undertaken in order to award certification of the project. As with BREEAM, Code sets mandatory credits that have to be achieved for a Code Level 3 assessment.

1.5 Overview of report

1.5.1 Aims

This study has been commissioned by the Welsh Government to develop an evidence base for the review of the need for Part B of PfSB, such that new buildings in Wales can be delivered to existing sustainable, low carbon building standards.

The sustainable benefits of standards required by the national development control policy (Part B of the planning policy), are wide-ranging and include areas such as water efficiency, materials and health and well-being. Some of the sustainable features have been found to be addressed to some extent in policy guidance such as TAN 12: Design. However, in order that the positive features that make up a sustainable building are not lost, key features of the national development control policy have been considered for integration into planning or regulations.

As such, with the review of the national development control policy within PfSB, this study has considered the consolidation, where appropriate, of elements of the policy into the Building Regulations where it is possible to do so. However, the remaining elements of the policy which could be retained that are not deemed suitable for incorporation into Building Regulations have been assessed to see if it is feasible for them to be integrated into planning.

This review provides an analysis of the relevant content in PfSB national planning policy and TAN 22, including the requirements of BREEAM and Code, through identifying the components that are already

covered by Building Regulations, planning or other standards. Additionally, this study provides recommendations on which of the remaining components of the PfSB and TAN 22 that can be retained and how best to embed them into planning or Building Regulations.

1.5.2 Objectives

The main objectives set out for this study are as follows:

- Analyse the content of the PfSB national planning policy and TAN 22, including the requirements of BREEAM and Code, to:
  a. Identify the components which are addressed by Building Regulations, planning policy or other regulations, standards or guidance.
  b. Identify the elements which are not addressed through existing regulations or policy.
- Analyse Code and BREEAM lodged assessments of choices made in relation to non-mandatory elements of the sustainable building standards:
  - Consider the findings of the commissioned analysis of current practice in relation to non-mandatory elements of Code (discussed below in 1.5.3) and the additional analysis of BREEAM.
  - Identify the non-mandatory elements of BREEAM and analysis lodged assessment choices from developers/ designers.
- Make recommendations on components of the PfSB national planning policy and TAN 22 which could be retained and how they could be integrated into planning policy, planning guidance or Building Regulations. The study should also identify any existing models for setting standards that might inform inclusion, and any practical issues that would need to be taken into account.

1.5.3 Related work

Under a separate commission, the BRE has undertaken an analysis of Code and lodged assessments of choices made in relation to non-mandatory elements of Code. In addition to meeting an overall score to achieve the current policy level, Code comprises a number of mandatory elements; once these are met, developers and designers are free to choose from remaining categories to obtain the necessary credit to achieve the minimum level expected by the PfSB policy. The work carried out by the BRE has been accounted for within this study and used to facilitate an understanding into which elements within Code are achieved by developments as good practice or as industry standards. A summary of the work carried out by BRE can be found in Appendix B, as well as its incorporation into subsequent analysis found in Section 2.

1.5.4 Report Structure

This review is broken down into the following sections:

Section 1: Introduction

Section 2: Analysis

Section 3: Recommendations

Section 4: Conclusion

2. Analysis

To fulfil the objectives stipulated in **Section 1.5.2**, the study has been broken down into three main tasks. These tasks are prescribed below:

Task 1 — To analyse the content of the PfSB national planning policy and TAN 22, including the requirements of BREEAM and Code, and identify the components, which are addressed by existing Building Regulations, planning policy, planning guidance or other regulatory requirements.

Task 2 — To analyse the PfSB national planning policy and TAN 22 and identify the elements, which are not addressed through Building Regulations, planning policy, planning guidance or other regulatory requirements.

Task 3 — To reflect on the findings of the study, along with the separately commissioned BRE analysis of Code assessment, and make recommendations on the components of the PfSB national planning policy and TAN 22 which could be retained and how they could be integrated into planning policy (PPW), planning guidance (TANs) or Building Regulations.

2.1 Planning for Sustainable Buildings

The Welsh Government are seeking to review the need for the national development management policy expecting an overall minimum Code/ BREEAM standards, which falls under Part B of PfSB. Despite the intention to retain the designing for climate change policy (Part A) and the expectation for LPAs to assess strategic sites for opportunities to meet higher standards (Part C), all content in the PfSB has been reviewed, as provided below.

Aspects of the climate change responsive developments policy (Section 4.12.1 of PPW) are partly covered in Planning for Climate Change in PPW, which identifies that sustainable developments, use of land and provision of environmental infrastructure are a fundamental part to tackling climate change[3]. In addition, as referenced under the relevant points in PfSB, TAN 12: Design addresses the incorporation of effective mitigation and adaptation measures[4]. A proposal to aspire to zero carbon buildings (Section 4.12.2 of PPW) is covered in a Policy Statement for changes to Welsh Building Regulations[5]. Adaption and resilience against climate changes is covered in TAN 15: Development and Flood Risk for sustainable drainage and systems and reduce run-off, as well as TAN 12 Design[6] (Section 4.12.2 and 4.12.3 of PPW).

In PPW, the sustainable building standard requirements to be met by development proposals are set out. This element falls as a BREEAM and/or Code issue, the use of which is under review. Detailed reviews of BREEAM and Code have been undertaken in **Sections 2.3 and 2.4** respectively, and consequently these should be referred to**.**

[3] Planning for Sustainability - Welsh Assembly Government 2012

[4] Technical Advice Note 12, Design - Welsh Assembly Government 2009

[5] *Policy Statement - Welsh Assembly Government announces target for first changes to Welsh Building Regulations*, Welsh Assembly Government, 2010

[6] *Technical Advice Note 15, Development and Flood Risk*, Welsh Assembly Government 2004

LDPs and notable strategic sites are outlined in Section 4.12.5, 4.12.6 and 4.12.7 of PPW. While LDPs are discussed throughout PPW, particularly in Section 2 which looks at development plans, strategic sites are not covered in any other existing mechanism within PPW.

2.2 TAN 22: Planning for Sustainable Buildings

The review aims to analyse the content of TAN 22 and identifies which components are and are not addressed by Buildings Regulations or planning. All elements that relate to Code/ BREEAM national planning control policy requirements have been identified and have subsequently been analysed in the separate Code and BREEAM review that is detailed in **Section 2.3 and 2.4.**

The aspects of TAN 22 have been assessed using the following criteria:

- **Addressed** – Aspects are covered in planning guidance, planning policy or Building Regulations to a sufficient level that would mean information is retained with the removal of TAN 22.
- **Not addressed** – Elements are not covered in guidance, planning policy or Building Regulations and further review will be required.
- **Code/ BREEAM Issue** – Aspects are specific to Code/ BREEAM requirements and therefore will be accounted for in the BREEAM/ Code assessment (**Section 2.3 and 2.4** respectively).

The key components under TAN 22 have been reviewed to establish if they are addressed in other planning guidance, planning policy or Building Regulations, as shown in **Table 2.1**. The subsequent **Section 3** provides a detailed analysis into the elements that are assessed as not addressed.

Table 2.1: TAN 22 review

Chapter	Purpose	Review	Analysis
Chapter 2 – Sustainable Building Standards	This chapter introduces Code for Sustainable Homes (Code) and BREEAM, the nationally recognised quality assured standards to provide a consistent and common framework against which the sustainability of most types of new buildings can be assessed. Information is put into the process of assessment via these tools.	This section falls as a Code and BREEAM issue and will be assessed accordingly.	**Code/ BREEAM Issue**
Chapter 3 – Sustainable Building Design Solutions	This section discusses the design approach, technical and policy constraints to environmentally sustainable design solutions and Design and Access Statements.	Aspects are addressed in TAN 12: Design (2009), while some information on sustainable design is also given in TAN 15: Development and Flood Risk (2004) and TAN 8: Renewable Energy (2005), consequently this section is addressed in planning.	**Addressed in TAN 12 and TAN 15 to a sufficient level that would mean information is retained with the removal of TAN 22.**
Chapter 4 – Low and Zero Carbon Design Solutions - Design Solutions (Section 4.1)	This section describes the relevant design approach for low carbon buildings. This section of TAN 22, which is referenced in TAN 12, details an energy hierarchy through applying a sequential approach for	The TAN 22 Energy Hierarchy is a point of reference for other guidance notes (TAN 12[8]). This aspect should be given further consideration. *This may require integrating into planning or into TAN 12.*	**Addressed in TAN 12 however consideration is needed for integration of energy hierarchy.**

Chapter	Purpose	Review	Analysis
	low and zero carbon design solutions, as represented *figure 9*[7].		**TAN 12 will need updating with removal of TAN 22.**
Chapter 4 – Low and Zero Carbon Design Solutions - Reduce Energy Demand - Passive Design (Section 4.2)	This describes the use of passive design to influence a buildings demand for energy, heat and cooling.	This is covered in guidance with TAN 12 providing advice on passive design.	**Addressed in TAN 12 to a level sufficient for information to be retained.**
Chapter 4 – Low and Zero Carbon Design Solutions - Energy Efficiency Building fabric (Section 4.3)	To consider the design and specifications of a buildings fabric.	This chapter gives reference to the minimum energy efficiency standards stated in Code and BREEAM, which would therefore fall as a BREEAM / Code issue. Additionally, building fabric is also discussed in TAN 12, therefore is covered under guidance notes.	**Code/ BREEAM Issue (under energy) and partially addressed in TAN 12.**
Chapter 4 – Low and Zero Carbon Design Solutions - Low and Zero Carbon (LZC) Energy Technologies (Section 4.4)	The section provides information on the types of LZC technologies that are available.	The provision of low and zero carbon energy technologies is discussed in TAN 12, *section 5.4.9. Practice Guidance: Planning Implications of Renewable and Low Carbon Energy Development* provides information on renewable and low carbon energy technology[9]	**Addressed in *Practice Guidance: Planning Implications of Renewable and Low Carbon Energy Development* and partly addressed in TAN 12.**
Chapter 4 – Low and Zero Carbon Design Solutions - Allowable Solutions (Section 4.5)	The measures permitted for dealing with residual emissions remaining after achieving carbon compliance standard.	TAN 12, Chapter 4, outlines design solutions, however does not discuss the measures for dealing with residual emissions after carbon compliance, as TAN 22 does.	**Partly addressed in TAN 12, however does not cover residual emissions.**
Chapter 4 – Low and Zero Carbon Design Solutions - Energy/ carbon implementation map (section 4.6)	This section states that developers need to establish a minimum carbon standard expected by national planning policy (to meet Code and BREEAM). It requires a feasibility study to be determined to reduce carbon emissions using the energy hierarchy. This is supplemented with an implementation map.	TAN 12, Chapter 4, describes environmental sustainability, which details development through implementation of the energy hierarchy, as detailed in Section 4.1 Design Solution. Reference is made to Code/BREEAM assessment process and conducting LZC feasibility study. The Practice *Guidance: Planning Implications of Renewable and Low Carbon Energy Development* summarises aspects of the feasibility in implementing renewable and low carbon energy technology.	**Code/ BREEAM Issue and addressed in TAN 12 and partly addressed in *Practice Guidance: Planning Implications of Renewable and Low Carbon Energy Development*.**
Chapter 4 – Low and Zero Carbon Design Solutions - Technical and	Described the nationally recognised designations which may impose constraints.	TAN 8: Planning for Renewable Energy covers low carbon energy technologies and associated constraints. TAN 12, discusses renewable energy or low carbon	**Addressed in TAN 12.**

[8] TAN 12: Design - Welsh Assembly Government 2009

[7] TAN 22: Planning for Sustainable Buildings - Welsh Assembly Government, 2010

[9] Practice Guidance: Planning Implications of Renewable and Low Carbon Energy Development - Welsh Assembly Government 2011

Chapter	Purpose	Review	Analysis
policy constraints to LZC energy technologies (section 4.7)		technology	
Chapter 4 – Low and Zero Carbon Design Solutions - Design & access statements - low and zero carbon energy technologies (section 4.8)	Gives guidance on what to include in a design and access (D&A) statements for developments wishing to a achieve carbon reduction.	D&A statements are discussed in detail in TAN 12 and Article 7 of Development Management Procedure in The Town and Country Planning[10].	**Addressed in TAN 12 and PPW.**
Chapter 5 – Policy Implementation Map	It details the roles of LPAs for checking developers' compliance to their sustainable building approach and proposals. The requirements of the developers are also detailed. The policy implementation map is shown in figure 17.	TAN 12 covers the role of LPAs (*section 6),* while the sustainable building standards quality assurance is not fully addressed, it is considered that further guidance is not required since this aspect would no longer be needed following the removal of Code/BREEAM standards. The policy implementation map is shown as a basic version in figure 2 of TAN 12[11].	**Addressed in TAN 12 while further guidance is not considered necessary in regards to the removal of Code/BREEAM standards.**
Chapter 6 - Planning Conditions and Negotiations	Details the conditions to deliver sustainable building standards, with reference to Welsh Office Circular 35/95 and planning conditions in relation to Code and BREEAM. The expectations and enforcement of planning control is also discussed.	Sustainable building standard conditions are covered in Circular 35/95 and addressed in Code and BREEAM. Enforcement is covered in TAN 9, Enforcement of Planning control (1997).	**Code and BREEAM issue.**
Chapter 7 – Local Development Plan - Developing local policies and Strategic Sites	The chapter outlines that LDPs should set out strategic sites that exceed nationally planning policy sustainable building standards, applying policy to local circumstances and explore opportunities. Detail is given for assessing site opportunities and constraints when selecting strategic sites, as well as the factors in assessing the potential for sustainable building standards on strategic sites. The local requirements for sustainable buildings on strategic sites are set out.	PPW under PfSB chapter 4.12.5, describes that LDPs should propose strategic sites. Strategic sites are assessed using the sustainable building standards (Code and BREEAM), which is therefore currently used as a rule of thumb. TAN 12 does offer some guidance for good design however does not specify strategic sites.	**Guidance on strategic sites is not addressed under existing mechanisms and should be considered for integration into TAN 12.**

[10] Article 7, The Town and Country Planning (Development Management Procedure) (Wales) Order 2012, No.801 (W.110) - http://www.legislation.gov.uk/wsi/2012/801/article/7/made

[11] *Technical Advice Note 12, Design* - http://wales.gov.uk/docs/desh/publications/090807tan12en.pdf Welsh Assembly Government 2009

2.3 BREEAM

Within this study, each BREEAM credit under the 2011 version 3.3 of the scheme has been reviewed and categorised depending on whether the requirements under BREEAM can be found within existing mechanisms, namely *not addressed, partially addressed, addressed or out of scope of regulations/ planning.* While each credit is addressed in the analysis below, Appendix A gives a comprehensive commentary into each BREEAM credit, including mandatory credits for a "Very Good" assessment, detailing each of the credits aim(s), requirements, and criteria. It also breaks down where components are already featured (to some extent) within existing planning guidance, planning policy or Building Regulations and identifies those that are not, as well as identifies the possible actions.

For those credits that are not covered under the existing planning policy/guidance or regulations, there is potential for some aspects to be implemented via planning policy, planning guidance or Building Regulations, with relative ease and minor amendments/ enhancements. For other areas there is essentially no obvious or realistic mechanism to encompass the issue, and may not be relevant to planning or Building Regulations. For areas that fall in-between these two scenarios and could be regulated by some means, it will be a matter of establishing if it is reasonable to do so, in light of current industry practices and the additional financial burden that may be placed on the construction sector. Therefore constraints may arise from various avenues relating to technical and financial limitations.

Where potential options exist for BREEAM requirements to be adopted into other existing mechanisms, a further issue may arise as to how practical it is to enforce or verify that the required actions are taken. The enforcement of each of the following routes will therefore need to be considered as a separate exercise, which is given in Recommendations, **Section 3**.

It is noted from analysis of past projects that there are elements of BREEAM that are achieved as good practice and industry standard, this meaning that it has become the norm to conform to such practices. For example, the use of responsibly sourced timber within developments is now considered industry standard since the majority of timber available is now responsibly sourced. Credits that are considered industry standard may not need to be stipulated within national planning policy or regulation. For the elements of BREEAM that are not typically achieved, these will be considered potentially over onerous and therefore are out of the scope of regulation. The BREEAM credits have been split into three categories to generate a hierarchical approach for potential further action:

- **Not addressed under existing mechanisms –** Component is not addressed by existing planning or regulations therefore may not be in the remit of planning and regulations.
- **Partially addressed in existing mechanisms –** Aspects are covered in regulation and planning but not to the same degree specified in BREEAM, consideration should be given as to whether this additional information should be kept within the planning system.
- **Addressed or out of scope of regulations/planning –** Aspects are already covered in existing mechanisms, or the credit is not within the remit of planning or regulations.

This review should be read in conjunction with the detailed analysis found in Appendix A.

Not addressed under existing mechanisms

Man 01: Sustainable Procurement – Construction and Handover (thermographic survey) – the credit requires the principal contractor to commission a thermographic survey, undertake remediation work to the building fabric if needed, and with potentially high remediation costs. This credit is not covered under

current planning or regulations, and the need for this element should be considered further such that it can be retained as a requirement under Welsh Government legislation.

Man 01: Sustainable Procurement – Construction and Handover, and Aftercare – there are 3 Credits available for the commissioning, maintenance and monitoring of the building to limit energy use. The first credit is mandatory for a BREEAM “Very Good” assessment. There is currently no mechanism that fully covers the credits requirements and further consideration is needed.

Man 02: Responsible Construction Practice - Considerate Construction Scheme (CCS) – this credit requires the use of a compliant CCS and to have independent confirmation of exceeding compliance. This credit is not currently addressed in current guidance or regulations and while it is considered that this credit may be difficult to incorporate into the existing mechanisms, it is possible that Value Wales could consider implementing CCS.

Man 04: Stakeholder Participation – Post Occupancy Evaluation – this credit requires that a full review is undertaken of the design, operation and performance after a year of operation. The client is required to make a commitment to carry out dissemination of information gained in order to share lessons learned and good practice. Although this credit is similar to a ’soft landings’ approach, this is not within the remits of regulations or planning.

Hea 04: Water Quality – under the second criterion it requires to have the provision of clean, fresh sources of water for building users. This credit is not currently addressed in current guidance or regulations and consideration is needed to ascertain if it is necessary for it to be integrated into the planning or regulatory system.

Ene 05, 06, 07, 08 – these four energy credits listed, namely energy efficient cold storage, energy efficient transportation systems, energy efficient laboratory systems, and energy efficient equipment respectively, are not covered in planning or Building Regulations. Some aspects of these credits are now considered industry standard, with most manufacturers willing to perform analysis and energy calculations (Ene 06). This may not fall under a government issue, however further consideration should be made.

Wat 01: Water Consumption – this credit aims to reduce the consumption of potable water, with targets based on different building types. For non-domestic buildings a 12.5% reduction is mandatory under BREEAM “Very Good”. This credit is partially covered in planning and regulations for domestic buildings however is not covered for non-domestic buildings, as applicable for BREEAM. This credit may be considered for integration within further amendments in Building Regulations, such that it covers a target for non-domestic buildings.

Wat 02: Water Monitoring – this credit requires the monitoring and management of water consumption to encourage reductions in water consumption. Although water meters are provided by utility companies at site boundaries, neither PPW nor the approved document Part G specify a requirement for metering within buildings. This credit is to be considered further to ascertain if it is necessary for retaining this credit as a requirement within planning or regulations.

Wat 03: Water Leak Detection and Prevention – the credit requires a leak detection system to be installed to reduce the impact of water leaks that may otherwise go undetected. The major aspects of this credit are not covered in current regulation or planning and further consideration may be required.

Mat 01: Life Cycle Impacts – the credit aims to recognise and encourage the use of construction materials with a low environmental impact (including embodied carbon) over the full life cycle of the building. The BRE Green Guide published by the BRE is the main framework document for both BREEAM and Code assessments, however this may not be an appropriate tool for specification rating system, instead there is potential to develop a national material standard to incorporate requirements of this credit. Despite being partly covered in TAN 12 and sourcing timber under regulations, the credit may be considered further such that worthwhile requirements of the credit could be retained.

Mat 02: Hard Landscaping and Boundary Protection – the credit requires at least 80% of all external hard landscaping or that boundary protection achieves an A or A* rating as defined by the Green Guide[12]. This credit is not found to be covered in the existing mechanisms however it is observed that this is generally carried out as good practice therefore may not require implementation into planning or regulations.

Mat 03: Responsible Sourcing of Materials – the credit aims to recognise and encourage the specification of responsibly sourced materials for key building elements, including the use of reasonably sourced timber and the materials specified on the main building elements. This credit is partially covered in TAN 12[13], however due to the scoring mechanism this standard of governance stated within BREEAM would be considered difficult to achieve within the existing planning and regulations, particularly since material types vary alongside the tier levels and requirements change accordingly.

Mat 04: Insulation – although the Non-Domestic Building Services Compliance Guide[14] covers insulation performance for building services, this does not cover embodied impact to the same degree as the Green Guide. Currently the Green Guide is used however this scoring mechanism is not in the planning and regulation requirements; therefore further consideration may be required.

Wst 04: Speculative Floor and Ceiling Finishes – the credit aims to recognise and encourage the use of thermal insulation which has a low embodied environmental impact relative to its thermal properties and has been responsibly sourced. This credit is not currently covered in planning or regulations, and is aimed at speculative shell and core assessment; it is rarely claimed by developments. This credit may be given further consideration to assess if it is necessary for it to remain as a requirement under Welsh governance. One possible option is that it may be retained as a local planning requirement.

Pol 02: NO_x Emissions – the credit is to encourage the supply of heat from a system that minimises NO_x emissions, and therefore reduces pollution of the local environment. The criterions under this credit are not covered in TANs or PPW, and only general minimum thermal efficiencies are covered in regulatory 2nd Tier documents of regulation. However, most new boilers including biomass are able to achieve 1 credit; natural gas systems can generally achieve 2 or 3 credits as an industry standard; while LZC technologies such as heat pumps or biomass may not be able to achieve any credits. Further consideration is needed for this credit as it is not currently covered by regulations, despite often being achieved through industry standard for most installations.

[12]: BREEAM Green Guide – BRE 2013

[13] TAN 12: Design Welsh Assembly Government 2009

[14] Non-Domestic Building Services Compliance Guide http://www.planningportal.gov.uk/uploads/br/non-domestic_building_compliance_guide_2010.pdf Department for Communities and Local Government

Pol 03: Surface Water Run-Off – this credit's aim is to avoid, reduce and delay the discharge of rainfall to public sewers and watercourses, therefore minimising the risk of localised flooding on and off site, watercourse pollution and other environmental damage. In PPW chapter 13 it is recognised that LPAs should identify when assessing development proposals in areas of flood hazard that the development is still at risk from flooding which may threaten human life and cause substantial damage to property, even when mitigation measures are proposed. Local authorities are expected to have a strategic approach to flood risk, which results in development proposals reducing and therefore not increasing flood risk arising from either river and/or coastal flooding and/or from additional runoff from development in any location. TAN 15 already states that sustainable drainage system (SUDS) should be implemented in all new developments to prevent increased runoff compared to the undeveloped site. Currently 4 out of the 5 credits are covered under planning, however the remaining credit which requires the use of oil petrol separator, is not currently covered and should be considered further for it to be retained as a requirement within planning or regulations.

Partially addressed in existing mechanisms

Man 01: Sustainable Procurement – Construction and Handover, and Aftercare 2 and 3. These credits are for setting up a commissioning plan and to have specialist personnel appointed such as commissioning manager for testing building services conditions and re-commissioning of systems, and an external consultant/ facilities manager. This is partially addressed in Building Regulations Part L, this covers commissioning, log books and energy modelling, however does not include seasonal commissioning and setting targets with BRE. It may be possible to be incorporated into Part L by extending the building log book, or within best practice guidance such as The Building Services Research and Information Association (BSRIA) or Chartered Institution of Building Services Engineers (CIBSE).

Man 03: Construction Site Impacts – the credit requires monitoring energy, water, transport, timber procurement and construction site management. Aspects of this credit can be covered by LPAs however the level of monitoring and reporting should be further considered, in relation to the level of governance specified in BREEAM requirements. These are normally specified in contractor's preliminary conditions of contract, therefore it may be considered that a more stringent planning condition is required.

Man 04: Stakeholder Participation – Building User & Post Occupancy Evaluation – the credit aims to help 'design, plan and deliver accessible functional and inclusive buildings in consultation with current and future building users and other stakeholders'. The provision of information to the building occupiers is addressed in Building Regulation Part L; however this is not to the same degree specified in BREEAM. Further consideration may be required to incorporate the requirements under this credit, along with post occupancy evaluations; however it may be possible for this to be merged with BREEAM Man 01 Aftercare, which will explore the possibility of future amendments to Part L, Criterion 5.

Hea 01: Visual Comfort - Internal and External Lighting – to ensure daylighting, artificial lighting and occupant controls are considered at design stage to guarantee best practice visual performance and comfort for building occupants. The majority of credit Hea 01 is either covered in existing mechanisms or cannot be applied to every building type (daylighting and visual arts), however the criteria for internal and external lighting zoning is not addressed to the same standard within regulations.

Hea 02: Indoor Air Quality – the credit requires indoor air quality (IAQ) & laboratory fume cupboard and containment areas. IAQs are predominately for pollutants from external sources entering the building, rather than pollutants from within the building fabric, for example volatile organic compounds, therefore are

unlikely to fall as a planning requirement. Some aspects are covered in Part F of Building Regulations however not to the same extent as specified in BREEAM. For Laboratory Fume Cupboard and Containment Areas (education buildings only), this credit sets high efficiency standards for fume cupboards in labs, although BB88 and BS EN standards are specified, this is not a Building Regulation or planning condition. Further consideration should be given for possible incorporation of this credit.

Hea 05: Acoustic Performance – To ensure the buildings' acoustic performance including sound insulation meet the appropriate standards for its purpose. This credit is addressed in Building Regulations however not to the same level as BREEAM, therefore further consideration may be given for integration into future amendments to Part E, alternatively for its integration as a planning requirement.

Ene 03: External Lighting – the credit aims to recognise and encourage the specification of energy efficient light fittings for external areas. Although general guidance is given in TAN 12, aspects such as zoning, controls, and efficiency levels that are specified under the BREEAM criterion may be lost from the requirements. It is possible for this to be addressed in future amendments to Part L or 2nd tier documents for new builds.

Tra 03: Cyclist Facilities – the credit aims to encourage building users to cycle by ensuring adequate provision of cyclist facilities. Although cycling storage is addressed by planning, it does not include the full facilities required under BREEAM, such as number of showers, lockers and type of storage. Therefore further consideration should be made for the integration of this credit.

Wat 04: Water Efficient Equipment – the credit aims to reduce unregulated water consumption by encouraging specification of water efficient equipment in terms of servicing for internal or external planting. TAN 12 encourages the use of rainwater harvesting, water efficiency through demand management and drainage for surfaces. TAN 12 does not however cover planting that thrives in drier areas or those that can survive with manual watering. Part G mentions water fittings however there is no specification of equipment to be used especially for vehicle washing facilities.

Mat 05: Designing for Robustness - the credit aims is to recognise and encourage adequate protection of exposed elements of the building and landscape, therefore minimising the frequency of replacement and maximising materials optimisation. TAN 12 states that adaptable and flexible developments that can respond to social, technological, economic and environmental conditions/ changes, overtime to minimise the need to demolish and re-build, which then details robust and high quality materials. Although this is covered in guidance, it could be considered to strengthen planning to be comparable to BREEAM standards.

Wst 01: Construction Site Management (Construction Resource) - this credit requires that, in addition to a Site Waste Management Plan (SWMP), key targets are set depending on the size of the development using a m^2/m^3 calculation. This credit is covered in TAN 21 (2014) and through the Welsh Government's Collections, Infrastructure and Markets Sector Plan (CIMS Plan); however this is not to the extent stated in the BREEAM standard.

Wst 02: Recycled Aggregates – the credit requires the use of recycled and secondary aggregates, thereby reducing the demand for virgin material and optimising material efficiency in construction. This credit is broadly covered in TAN 21 (2014), however not to the same extent as BREEAM which refers to specific targets to be achieved.

Pol 01: Impact of Refrigerants – this credit aims to reduce the level of greenhouse gas emissions arising from the leakage of refrigerants from building systems. All PPW, TAN 12 and emission targets within Building Regulations Part L favour the use of natural ventilation; therefore the maximum amount of credits would be achieved when not using mechanical cooling. However, buildings are likely to need some degree of mechanical cooling, which will affect the Pol 01 calculation tool. Without this requirement the pressure of encouraging natural ventilation would be reduced.

Pol 05: Noise Attenuation – the credit aims to reduce the likelihood of noise arising from fixed installations on the new development affecting nearby noise-sensitive buildings. This is largely covered in PPW chapter 13, and TAN 12, however BREEAM has strict targets that need to be met via a noise impact assessment, and attenuation is required to meet these levels. This level of detail is not specified within existing mechanisms.

Addressed or out of scope of regulations/planning

The following BREEAM credits listed in **Table 2.2** are either already covered in existing mechanisms or the credit does not fall within the remit of Government legislation, therefore no action is considered necessary within planning or regulations:

Table 2.2: BREEAM credits addressed by existing mechanisms, or not under the remit of planning/ regulations:

BREEAM Credit	Planning	Regulations	Other documents or comments
Man 01: Sustainable Procurement- Project Brief and Design	TAN 12 Chapter 3 and 4, D&A Statements	-	
Man 01: Project Brief and Design- BREEAM AP 1 to 3	Can be a planning requirement	-	Design Commission for Wales.
Man 04: Stakeholder Participation- Consultation	TAN 12 PPW LPA D&A statements	-	-
Man 04: Stakeholder Participation- Inclusive and accessible design	PPW Chapter 4 TAN 12 PPW Article 7 D&A statements	AD Part M	Design Commission for Wales, CIBSE TM39.
Man 05: Life Cycle Costing and Service Life Planning	-	-	Not at a stage that can be regulated, consequently this should remain as best practice.
Hea 01: Visual Comfort (Daylighting and Visual Arts)	TAN 12	Aids AD Part L compliance	Industry standard while others cannot be regulated or accommodated under planning.
Hea 02: Natural Ventilation (second credit)	Promoted in TAN 12	Promoted in Part L	CIBSE AM, KS, TM.
Hea 03: Thermal Comfort	TAN 12	-	CIBSE Guide A, TM39, HTM, Building Bulletins.
Hea 04: Water Quality – Criterion 1	-	AD Part G	ACOP, CIBSE Part G, LE08. Good practice and industry standard.

BREEAM Credit	Planning	Regulations	Other documents or comments
Hea 06 Safety and Security	TAN 12	-	Secured By Design can be planning consideration for LPA's.
Ene 01: Reduction of CO2 Emissions	-	Part L uplift due in 2014	-
Ene 02: Energy Monitoring	-	Part L	-
Ene 04: Low or Zero Carbon Technologies	PPW Chapter 4 TAN 12 and 8 PPW LDP's	Part L regulation 25 A and 25 B	CIBSE, BSRIA
Tra 01: Public Transport Accessibility	TAN 18 PPW Chapter 8	-	Considered a urban/rural issue
Tra 02: Proximity to Amenities	TAN 18 PPW Chapter 8	-	Considered a rural/urban issue
Tra 03: Cyclist Facilities	TAN 18 PPW Chapter 8	-	-
Tra 04: Maximum Car Parking Capacity	TAN 18 PPW Chapter 8	-	-
Tra 05: Travel Plan	TAN 18 PPW Chapter 8	-	-
Wst 03: Operational Waste	TAN 21 PPW Chapter 4, 12	Part H	-
Wst 04: Speculative Floor and Ceiling Finishes	-	-	Not an issue for regulation or planning
LE 01: Site Selection	TAN 5 PPW Chapter 4	-	-
LE 02: Ecological Value of Site and Protection of Ecological Features	TAN 5 PPW Chapter 4	-	-
LE 03: Mitigating Ecological Impact	TAN 5 PPW Chapter 4	-	-
LE 04: Enhancing Site Ecology	TAN 5 PPW Chapter 4	-	-
LE 05: Long Term Impact on Biodiversity	TAN 5 PPW Chapter 4	-	-
Pol 04: Reduction of Night Time Light Pollution	TAN 12	-	ILP, The Campaign for Dark Skies

2.4 Code for Sustainable Homes

Each Code credit has been reviewed and categorised depending on where it can be found elsewhere within current mechanisms, namely *not addressed, partially addressed,* and *addressed or out of scope of regulations/ planning.* While each credit is addressed in the analysis below, **Appendix B** gives a comprehensive commentary into each Code credit, detailing each of the credit's aim(s), mandatory requirements, criterions, and breaks down where components are already featured within existing planning guidance, planning policy or Building Regulations and identifies the possible action required.

For those credits that are not covered under the existing planning or regulations, there is potential for some aspects to be implemented via planning policy, planning guidance or Building Regulations, with relative ease and minor amendments/ enhancements. For other areas, there is essentially no mechanism to encompass the issue and therefore may not be relevant to planning or Building Regulations. For areas that fall in-between these two scenarios and can be regulated by some means, it will be a matter of asking if it is reasonable to do so. Even where a potential option exists for Code requirements to be adapted or adopted into other existing mechanisms, a further issue will arise as to how practical it is to enforce or verify that the required action is taken. The enforcement of each of the following routes will therefore need to be considered as a separate exercise, which is given in Recommendations in **Section 3**.

Code credits have been split into three categories to generate a hierarchy approach for action:

- **Not addressed under existing mechanisms –** Component is not addressed by existing planning or regulations and may not be in the remit of planning and regulations.
- **Partially addressed in existing mechanisms –** Aspects are covered in regulation and planning however not to the same degree specified in BREEAM, consideration should be given as to whether this additional information should be kept within the planning system.
- **Addressed or out of scope of regulations/planning –** Aspects are already covered in existing mechanisms, or the credit is not within the remit of planning or regulations.

This should be read in conjunction with the detailed review, found in **Appendix B**.

Not addressed under existing mechanisms

Ene 5: Energy Labelled White Goods – the credit aims to promote the provision or purchase of energy efficient white goods, thus reducing the CO_2 emissions from appliance use in the dwelling. The choice of appliance normally falls down to individuals rather than the developer, most schemes simply provide energy efficiency advice to occupants via Home User Guides. The implementation of the EU Energy Related Products Directives will phase out the most inefficient appliances in due course, though the 'best' appliances may still not be otherwise widely chosen due to cost limitations of consumers. CODE Ene 05 is not covered in planning or Building Regulations. However consumers have become more aware of energy consumption of white goods in the home, due to rising energy costs, and EU marketing. This may not fall under a government issue however further consideration is required to assess if the requirement needs to be retained.

Wat 1: Indoor Water Use – the credit aims to reduce the consumption of potable water in the home from all sources, including borehole well water, through the use of water efficient fittings, appliances and water recycling systems, 3 Credits are mandatory for a Code level 3 assessment. This credit is partly covered under Building Regulations Part G, to the level of 125l/pp/day, whereas the minimum mandatory requirements for Code Level 3 is less than 105l/pp/day, therefore although it is covered under Regulation, it is not to the same mandatory standard.

Wat 2: External Water Use - The credit aims to promote the recycling of rainwater and reduce the amount of mains potable water used for external water uses. In order to cover all aspects of this credit, it may be necessary to strengthen Part G and Regulation 17 to formally incorporate 'external' water use into the calculations and to encourage rainwater harvesting/ recycling respectively.

Mat 1: Environmental Impact of Materials - this credit aims to specify materials with lower environmental impacts over their life-cycles for the basic building elements. There are 3 credits that are mandatory for a

Code Level 3 Building. Other than Building Regulations AD7, which requires products to be 'fit for purpose' and CE marked in line with the Construction Products Directive, this is not to the standard specified by the Green Guide and Mat calculation tools used under Code. It is considered that the mandatory credits are not sufficiently covered under the existing mechanisms.

Pol 1: Global Warming Potential (GWP) of Insulants – The credit aims to promote the reduction of emissions of gases with high *GWP* associated with the manufacture, installation, use and disposal of foamed thermal and acoustic insulating materials. Although most projects tend to achieve this credit, action is required since the credit relies heavily on the Green Guide, in line with the Mat 1, 2 and 3 credits, reviewed above.

Pol 2: NO_X Emissions – this credit aims to promote the reduction of nitrogen oxide (NO_X) emissions into the atmosphere. As with BREEAM Pol 02, further consideration is needed as it may be performed as industry standard but is not directly covered by regulations.

Man 2: Considerate Constructors Scheme (CCS) - the aim of the credit is to promote the environmentally and socially considerate and accountable management of construction sites. This credit does not fall under planning or regulation however could be considered within Value Wales.

Partially addressed in existing mechanisms

Ene 6: External Lighting – the credit required the provision of energy efficient external lighting. Similarly to BREEAM Ene 03, efficiency figures may require further consideration which may result in amendments to future versions of Part L.

Mat 2 and 3: Responsible Sourcing of Materials for Basic Building Elements and Responsible Sourcing of Materials Finishing Elements respectively - these credits aim to promote the specification of responsibly sourced materials for the basic building elements and for the finishing elements. As with Mat 01, other than Building Regulations AD7, which requires products to be 'fit for purpose' and CE marked in line with the Construction Products Directive, this is not to the standard specified by the Green Guide and Mat calculation tools used under Code.

Wst 2: Construction Site Waste Management – the credit aims to promote resource efficiency via the effective and appropriate management of construction site waste. Guidance is provided in planning, and through the CIMS Plan, however is not fully covered, therefore strengthening may be considered to include thresholds or calculation tools.

Hea 2: Sound Insulation - to promote the provision of improved sound insulation to reduce the likelihood of noise complaints from neighbours. Noise action plans should be within LDPs. In addition this is covered in Building Regulation Part E, but not to the same level as Code.

Man 1: Home User Guide – the credit aims to promote the provision of guidance enabling occupants to understand and operate their home efficiently. This issue could be addressed by future amendments to Building Regulation Part L, such as extending the building log book to become a user guide.

Man 3: Construction Site Impacts – the credit requires management of construction sites in a manner that mitigates environmental impacts. Similar to the above, this is not addressed in current guidance or regulations however could be addressed by the LPAs if needed.

Addressed or out of scope of regulations/planning

The following Code credits listed in **Table 2.3** are already covered in existing mechanisms, or the credit is not considered to fall within the remit of Government legislation, and therefore no action is required within planning or regulations:

Table 2.3: Code credits addressed by existing mechanisms to a sufficient extent, or not under the remit of planning/ regulations:

CODE Credit	Planning	Regulations	Other document and comments
Ene 1: Dwelling Emission Rate	-	Part L	-
Ene 2: Fabric Energy Efficiency	-	Part L	-
Ene 3: Energy Display Devices	-	Part L	Smart meters to be installed by 2020.
Ene 4: Drying Space	-	-	May not be regarded as an issue for planning/ regulation.
Ene 7: LZC Technologies -	-	Part L regulation 25 A and 25 B	-
Ene 9: Home Office -	-	-	Not an issue for planning or regulation
Sur 1: Management of Surface Water Run-off from Developments	TAN 15 PPW Chapter 13	-	-
Sur 2: Flood Risk	TAN 15 PPW Chapter 13		
Was 1: Storage of Non-recyclable Waste and Recyclable Household Waste	TAN 21 PPW Chapter 4, 12	Part H6	-
Was3: Composting	TAN 21 PPW Chapter 4,12	-	-
Hea 1: Daylighting	Planning through LPA design guides and amenity of future residents.	-	-
Hea 3: Private Space	This is covered in planning and can also be incorporated into LDP's, if necessary.	-	-
Hea 4: Lifetime Homes	PPW Chapter 9 TAN 12	Guidance in Part M	-
Man 4: Security	PPW Chapter 4 and LPA design guides TAN 12	Guidance in Part M	-
Eco 1: Ecological Value of Site	PPW Chapter 4	-	-
Eco 3: Protection of Ecological Features	TAN 5 PPW LPAs	-	-
Eco 2: Ecological Enhancement	TAN 5	-	Possible to be stipulated by planners
Eco 4: Change in Ecological Value of Site	TAN 5	-	-

CODE Credit	Planning	Regulations	Other document and comments
Eco 5: Building Footprint	Can be stipulated by planners	-	-

3. Recommendations

The removal of the national development management policy, expecting an overall minimum BREEAM and Codes standard stipulated within PfSB, TAN 22: Planning for Sustainable Buildings planning guidance would result in sustainable design components that would no longer be a requirement for new buildings. To ensure that the Welsh planning and regulatory system does not lose positive features that make up a sustainable building, key features are to be considered such that they are retained in Building Regulations or planning policy/guidance. As such, any features of BREEAM/ Code that are not currently addressed by existing mechanisms, but may be relevant under planning and regulations, have been considered further and where possible recommendations for potential further action have been given.

As identified in the analysis shown in **Section 2**, important components of TAN 22, BREEAM and Code are not currently covered in the other existing mechanisms, such as planning policy, planning guidance and Building Regulations. For these elements, recommendations are provided for the potential integration of these features into the planning or regulatory system, such that there continues to be a requirement for consideration of the sustainable design component.

3.1 TAN 22

In **Section 2.2** an analysis has been undertaken for PfSB, TAN 22, and the requirements for BREEAM and Code to identify which of their components are already covered by the current planning and/ or regulatory system and identifies which elements are not addressed.

There were several elements identified within TAN 22 which are not covered in the existing mechanisms and with the removal would result in the loss of these valuable components to the system, namely:

- Energy Hierarchy
- Allowable Solutions
- Developing local policies and Strategic Sites

The components in TAN 22 that are not addressed under existing mechanisms and require consideration and any subsequent integration are summarised in **Table 3.1**:

Table 3.1: TAN 22 components that are not covered in existing mechanisms and are to be considered for integration

TAN 22 Element	Review	Potential action
Zero Carbon Design Solutions – Energy Hierarchy	Energy hierarchy is referenced in other guidance notes, including TAN 12, therefore includes detailed information not found in other documents.	• Energy hierarchy to be considered for integrating into planning guidance, which would be most compatible in TAN 12.
Low and Zero Carbon Design Solutions – Allowable Solutions	Design solutions are covered in TAN 12, however does not detail the allowable solutions associated with measures permitted for dealing with residual emissions remaining after a development achieves the carbon compliance standard.	• Subject to still being required following the removal of the national development management policy, Allowable Solutions could be considered in TAN 12, under Chapter 4, Delivering Good Design.
Developing Local Policies and Strategic Sites	PPW under PfSB chapter, 4.12.5 describes that LDPs should propose strategic sites. Strategic sites are assessed using the sustainable building standards (Code and BREEAM), which are therefore currently used as a rule of thumb. TAN 12 does offer some guidance	• TAN 12 already covers similar elements, stipulating good design, associated monitoring and enforcement processes. Therefore there could be potential for strategic sites to fall within the TAN 12 remit.

TAN 22 Element	Review	Potential action
	for good design however does not specify strategic sites.	

3.2 BREEAM and Code

An analysis has been carried out into the elements of BREEAM and Code in **Section 2.3** and **Section 2.4** respectively, identifying the credits that are *not addressed, partially addressed,* and *addressed or out of scope of regulations/ planning*. The former two categories of BREEAM and Code credits are shown below to see how aspects can be taken forward and if necessary, to be integrated into Welsh planning or regulations. A summary of recommended actions for BREEAM and Code credits that fall under *not addressed* and *partially addressed* are summarised and married up where possible in **Table 3.2**.

Table 3.2: Summary of the recommended action for BREEAM and Code credits

BREEAM	Code	Potential action
ACTION		
Man 01: Construction and Handover (thermographic survey)	-	Requirements could be included in the next updated version of Building Regulations
Man 01: Construction and Handover, Aftercare1	-	Building Regulations used to specify commissioning requirements
Man 02: Considerate Construction Scheme	Man 2: Considerate Constructors Scheme	Requirements to be incorporated into PPW
Man 04: Stakeholder participation – Post Occupancy Evaluation	-	Requirements to be integrated into standard or guidance
Hea 04: Water Quality – Second credit – provision of fresh drinking water	-	Implement through Building Regulations
Ene 05, 06, 07, 08	Ene 5 – Energy labelled white goods	Consider incorporating into standard or guidance mechanisms
Wat 01: Water Consumption	Wat 1: Indoor water use, Wat 2: External water use	Amend regulations to cover non-domestic buildings, and Strengthen Part G- For Non Domestic buildings this would need to be building type dependant (e.g. Hospitals etc.)
Wat 04: Water Efficient Equipment	Wat 2 – External water use	Building Regulations to encourage water butts- potential to cover in relevant planning guidance
Wat 02: Water Monitoring	-	Implement requirements through Building Regulations or planning
Wat 03: Water Leak Detection and Prevention	-	Implement requirements through Building Regulations or planning
Mat 01: Life Cycle Impacts	Mat 1: Responsible sourcing of Materials	Implement requirements through standards or guidance- New document to take over Green Guide
Mat 02: Hard landscaping and boundary protection	-	Implement requirements through standards or guidance- New document to take over Green Guide
Mat 04: Insulation	-	Implement requirements through standards or guidance- New document to take over Green Guide
-	Pol 1: Global Warming Potential (GWP) of Insolents	Implement requirements through standards or guidance- New document

BREEAM	Code	Potential action
		to take over Green Guide
Pol 02: NO_X Emissions	Pol 2: NO_X Emissions	Implement requirements through Building Regulations or 2nd tier documents
FURTHER CONSIDERATION		
Man 01: Construction and Handover, and Aftercare 2 and 3	Man 1: Home user guide	Implement commissioning requirements through extending building log book in Building Regulations
Man 03: Construction Site Impacts	Man 3: Construction Site Impacts	It may be possible for planning to address requirements through LPAs
Man 04: Stakeholder participation – Building User Information	-	Merge with BREEAM Man 01 aftercare, to be included in Building Regulations
Hea 01: Visual Comfort – internal & external lighting	-	Implement requirements through Building Regulations: Industry standards for lighting levels but zoning controls are not. Strengthen Building Regulations
Hea 02: Indoor Air Quality, and lab fume cupboards (first and third credit)	-	Implement requirements through Building Regulations which could require IAQ or combine with Mat 03 credit (responsible sourcing of materials)
Hea 05: Acoustic Performance	Hea 2: Sound insulation	Make amendments to Buildings Regulations or implement through planning requirement
Ene 03: External Lighting	Ene 6: External Lighting	To be addressed within Building Regulations
Mat 03: Responsible sourcing of materials	Mat 2: Responsible Sourcing of Materials Basic Building Elements and Mat 3: Responsible Sourcing of Materials Finishing Elements	This is partially covered in planning policy therefore could be implemented through enhancing mechanism and also through Materials Standards.
Mat 05: Designing for Robustness	-	Potential to be implemented through planning guidance
Wst 01: Construction Waste Management Wst 02: Recycled Aggregates	-	Implement requirements through strengthening planning via LPA

3.3 Overall Options for recommendation

For Code and BREEAM requirements of PfSB and TAN 22, four key potential options have been considered that will allow continuity of building standards for new developments:

- Option 1 – to integrate assessment criteria into existing planning policy, Building Regulation, or design guidance.
- Option 2 – to move suitable elements into Building Regulations and the remaining elements added to a new sustainable building guidance document for Wales.
- Option 3 – to consider uplift to regulations and provision of a new assessment tool for Wales.

- Option 4 – a status quo option to retain all current policy and regulations.

.With Option 1, the relevant components that have been assessed as *not addressed* which are not covered in existing mechanisms and thus will be potentially lost from the requirements of new developments. For the majority of these elements, it may be possible for their inclusion within either existing or new design guidance documents. Fewer elements could be moved to Building Regulations, for example water consumption for non-domestic buildings, water monitoring, leak detection, and provision of fresh drinking water to AD Part G, and NO_x emissions and thermographic survey included within Part L. Planning could then be used for management credits for the Considerate Constructor's Scheme.

Additionally for Option 1, the issues assessed as *partially addressed*, the majority could be integrated into existing regulations. These regulations could be uplifted, for example AD Part L for building user information, after care, external lighting, Part E for sound insulation and acoustic performance, sound insulation, Part G for water use, consumption and equipment, and AD 7 used for materials. Only a small number of elements could be suitable for planning, covering elements like the Considerate Constructors Scheme (Man 2 for BREEAM and Code), and guidance used for internal and external lighting and fume cupboards.

With Option 2 suitable elements could be moved into Building Regulations and the remaining elements into a new guidance document. Items could be integrated into uplifted regulation or policy, but in addition a new sustainable building standard for Wales guidance document could be introduced. This may provide a way of keeping uplifts to regulations to a reasonable level, and give LPAs, planners, building control and designers' guidance on standards. An additional benefit to the option is that it would not require revisions to be made to existing TANs, since all relevant information would be retained within this new guidance document.

Option 3, to consider the uplift to regulations and provision of a new assessment tool for Wales, could be implemented by using a new, bespoke Welsh Sustainable Development Assessment (i.e. WSDA) that is governed and controlled by the Welsh Government. This could be developed as a simplified version of the BREEAM and Code documents, by perhaps addressing all non-domestic, domestic, and new and refurbishment projects, for example with just a checklist being issued to Building Control.

Option 4 is status quo, and will involve retaining the current system such that no changes are made.

4. Conclusion

4.1 TAN 22

Currently, strategic sites are assessed using the sustainable building standards (Code and BREEAM) however this link may be detached if a separate criterion for strategic sites is established. With the proposed removal of BREEAM and Code from the sustainable building standards, it may be necessary to establish criteria for a strategic site that will replace the current standards in place, but still achieve the level of sustainability strived for by the Welsh Government. Additionally, there is potential for additional detail on strategic sites to be integrated in to PPW under Chapter 4 Planning for Sustainability.

4.2 BREEAM and Code

It is found that many aspects of BREEAM or Code are covered by existing regulations or policy, however there will be a need for bringing together and coordinating all of these design elements to retain the same high building standards if PfSB and TAN 22 are removed. There is also a need to retain innovation.

A priority is the current mandatory credits within BREEAM “Very Good” and Code Level 3 developments that are not covered by existing mechanisms. For Code mandatory credits, Wat 01 where 105l/pp/day total water use is required, and Mat 1 where 3 Credits are mandatory for using Green Guide rated elements in the building thermal envelope, could potentially be lost as a requirement with the removal of the national development control policy in PfSB. It is possible for Building Regulations to be strengthened to cover Wat 01, however it would be difficult to achieve the same design standard for Mat 01 through Building Regulations or planning.

Mandatory credits for BREEAM “Very Good”, are Man 01 for an appropriate team member to be appointed to monitor and programme commissioning, and setting a water consumption target under Wat 01. Although commissioning standards could possibly be incorporated into Building Regulations, a target for water consumption in non-domestic buildings, varying for different building types like BREEAM would be hard to achieve to the same standard.

The majority of credits within Code and BREEAM are non-mandatory; therefore applicants are free to choose different options to meet the standards. As such, for many of these credits, they may be considered more good practice than an issue for Buildings Regulations or planning policy or guidance.

In Table 3.2, proposals are given for elements that could be incorporated into existing documents; however some consideration could be given to forming a new governing system. The advantage of both BREEAM and Code, for each credit to be claimed, they require very stringent and detailed compliance criteria to be met, and in the case of BREEAM, they are building type dependant. The detail within the criteria is very precise, and failing to meet any single condition will result in the project failing to achieve the credit. In comparison, planning policies set out relatively high level guidance that forms the aspirations of the Welsh Government. In this instance, Policy will then dictate the design of a development through planning policy and guidance. Although the technical performance criteria set by regulations are non-negotiable, they tend to only set minimum building standards, broadly covering all building types under domestic, or non-domestic rather than driving sustainability forward like BREEAM or Code and can cover specific building type elements. Assistance and advice on how to meet standards set by regulation rather than actual design criteria are then given in guidance documents, particularly TANs. Although the main aims of each credit for BREEAM and Code are likely to be covered within the objectives of national planning policy, both

assessment tools are scoring systems, therefore minimum requirements are set for different levels of compliance rather than a single level as in Building Regulations.

An example of this level of detail covered for each BREEAM/ Code credit can be found in most cases, where although the issue has been covered as much as possible in planning mechanisms, for example to encourage cycling within TAN 18, the finer criteria such as the number, type, size and location of cycle storage would not be suitable for regulations. Therefore an assessment of the level and standard of information from both BREEAM and Code that would need to be retained should be considered for the elements that are deemed partly addressed. For areas that could be regulated by some means, it will be a matter of asking if it is reasonable to do so, in light of current industry practices and the additional financial burden that may be placed on the development and construction sectors.

Appendices

Appendix A. BREEAM Summary

Management

- Man 01: Sustainable Procurement.
  The aim of this issue is to ensure that the development is a functional, sustainable asset and is designed and built in accordance with performance expectations. The issue is split into three parts; Project Brief and Design (4 Credits), Construction and Handover (2 Credits), and Occupation (2 Credits). An additional exemplary credit is also available. For a BREEAM Very Good assessment at least one credit is required as mandatory for compliance in Man 01. However the exact criteria that has to be met is slightly ambiguous, most assessments have allowed for the mandatory credit to be the first Commissioning and Aftercare credit.

  - Project Brief and Design - Credit 1 requires that from an early stage in the project (typically RIBA Stage B), the full design team, including the client, designers and contractor are involved in the decision making of the project. Additionally, a schedule of training is identified for relevant building users for the handover and running of the finished building covering the main elements of the Building User Guide in Man 04. This credit is really covered in Tan 12 Chapter 3 and 4 and Approved Document Part L: the design process and delivering good design. The LPA has a dual role to ensure effective stakeholder involvement in developing design policies and guidance and providing information on design issues. LPAs should also help applicants and potential applicants to respond effectively to the planning and design process, through an advisory as well as regulatory role. Pre-application discussions and advice on preparing a design and access statement will create clarity for applicants. TAN 12 chapter 3 and 4 - Delivering Good Design also covers aspects of this credit. In addition design and access statements require the full design team's involvement in contributing to the decision-making process for the project. The Assembly Government established the Design Commission for Wales in 2002, to promote good design. The Commission continues to influence, educate and disseminate design advice to all those involved in the design of the built environment, and could be used or recommended for use in special instances for design review. The last section of the credit requires a schedule of training identified for relevant building occupiers based around handover and occupation plans.. This element of training could be combined with the Building User Guide in Man 04, or within Part L of the Building Regulations.

  - Project Brief and Design – up to 3 credits - requires the appointment of a BREEAM Accredited Professional (AP) to attend meetings throughout the design process. The AP is appointed no later than RIBA Stage B to help set and monitor BREEAM related performance targets throughout project. Project progress is reported and assessed against the established BREEAM targets by attending key meetings throughout construction stages. This is not covered in any existing mechanisms and may not be needed for continuation due to the credits' BREEAM specific requirements. However it is noted that the Design Commission for Wales are an independent body that performs similar duties and therefore this credit could be considered for implementing using this mechanism. This is a BREEAM specific requirement and therefore not addressed in planning or regulations, however this could be implemented in a planning review by the Design Commission for Wales, if needed, therefore no action is required.

  - Construction and Handover (thermographic survey) – 1 credit available where the principle contractor commissions a thermographic survey. Once undertaken this should be followed by

confirmation that there is good continuity of insulation and avoidance of both thermal bridging and air leakage in the development. Remedial work to the building could have large cost implications. This credit is not covered in current policy or regulations; discussion is needed for further action.

- Aftercare – 3 credits - All of the aftercare credits outline commissioning, maintenance and monitoring of the building to help limit energy use. The first mandatory credit is achieved by appointing appropriate team members to monitor and programme all commissioning on behalf of the client at construction stage. All of the projects that we looked at achieved these credits. Commissioning is covered in Regulation 40 of Part L: 'Providing the owner with sufficient information about the building, the fixed services and their management requirements so that the building can be operated in such a manner as to use no more fuel and power than is reasonable in the circumstances'. Part L also mentions a commissioning plan, there is a danger that the element of electing a team member being lost. Two additional credits are awarded when seasonal commissioning is performed either by a specialist or by the facilities manager, depending on the complexity of the building. It requires a mechanism to be in place to monitor the energy and water consumption of the building, which is then compared against benchmarks, where any discrepancies should be analysed and consequent adjustments made to the systems if they are not operating as expected. An exemplary credit is available if there is a commitment that quarterly measurements are taken for the first 3 years of the building's occupation, and figures are used to set energy targets for the building and are reported to BRE Global. To incorporate aspects of criterion including the appointment of personnel for commissioning, training and energy monitoring, considerations could be made to revise Part L accordingly, building logbooks, use of O&M manuals or soft landings.

- This is partially addressed in Part L which covers commissioning, log books, and energy modelling, however does not include seasonal commissioning and setting targets with the BRE. As this is regarded as a mandatory credit, further work will be required to ensure that the full scope could be met within regulations.

- Man 02: Responsible Construction Practices
  The focus is 'to recognise and encourage construction sites which are managed in an environmentally and socially considerate, responsible and accountable manner'. The Considerate Construction Scheme (CCS) or an equal or approved scheme is generally used – 1 to 2 credits. The credit(s) requires the principal contractor to be a member of a CCS and have independent confirmation of exceeding compliance (3rd Exemplary credit).

  - All of the schemes that we looked at achieved two credits. Currently there are no governmental mechanisms that specifically address the CCS however it could be a planning requirement, with the contractor required to undertake a CCS (or equivalent) assessment to demonstrate that they are managing the safety and environmental aspects of the construction in a considerate and appropriate manner. It is unlikely that planners could set specific targets that contractors should score under CCS as done in BREEAM, since this is dependent on having a third party assessment without a defined range of parameters to achieve a given score. A possible option is that it could fall under a Contractor's Corporate Social Responsibility obligations rather than a planning requirement, if the latter is not considered viable. In general, this credit is now largely undertaken as contractor's good practice, and has a high rate of achievement with all projects assessed conforming to a CCS. This credit is not addressed in guidance or regulations and may

be difficult to incorporate into the existing mechanisms. However this may be regarded as industry standard.

- Man 03: Construction Site Impacts
  The aim of this credit is to encourage construction sites to be managed in an environmentally sound manner in terms of resource and energy use and pollution. Up to five credits are available for monitoring each of the following: energy, water, transport, timber procurement and construction site management. Data is collected resulting in all construction processes.

  - Energy and Water Consumption, and Transport of Construction Materials and Waste – Waste aspects of the credit are covered in PPW, Chapter 4, paragraph 4.4.3, it outlines that the waste arising from demolition and construction works should be minimised and opportunities to recycle and reuse such waste should be promoted. PPW Section 4.12.2 also states that development proposals should mitigate the causes of climate change by minimising carbon and other greenhouse gas emissions associated with their design, construction, use and eventual demolition. A majority of projects carry out this as good practice with all projects achieving this credit, however having no obligation to carry out the credit may lead to construction companies no longer monitoring energy and water use onsite. Potentially this credit could be incorporated into planning, although implications may arise in verifying performance without the BREEAM Assessor's review. It could be possible for Building Control to request evidence of meter readings for final regulation sign off if the credit is accommodated via this route. This can be addressed by the LPAs if needed, and this is not considered a Building Regulation issues. The monitoring and reporting of waste is specific to BREEAM while some aspects can be covered by LPAs.

  - Timber Procurement – timber should be sourced in accordance with the UK Government's Timber Procurement Policy – this is comfortably achieved and is considered good practice since most timber available is aligned to the policy. This credit is mandatory, and is already covered in regulation and planning guidance (TAN 12), therefore no is action required.

  - Construction Waste Management - requires the project to operate an Environmental Management System – this is currently not covered as a requirement however is considered it may be possible to become a planning requirement. All projects achieved this credit. The credit is mostly achieved through good practice, however to become regulated it may require amendments to planning. Amendments could be made to TAN 12 or alternatively incorporated into PPW.

- Man 04: Stakeholder Participation
  This credit aims to help 'design, plan and deliver accessible functional and inclusive buildings in consultation with current and future building users and other stakeholders'. It is split into four parts, with a credit available for each of the following: Consultation, Inclusive and Accessible Design, Building User Information, and Post Occupancy Evaluation (POE) and Information Dissemination. Aspects are partially covered by existing mechanisms however there are Stakeholder Participation criterion that goes beyond the requirements currently set out by BREEAM.

  - Consultation requires a consultation plan and feedback for all relevant parties and bodies during design stage. Elements of the credit can be found in TAN 12, which identifies design and access statements for consultation stages of the design, similar to Man1 requirements. Design and

access statements are currently under review and could be modified to incorporate relevant requirements.

- Inclusion and accessible design elements can be found in PPW Chapter 4 which covers aspects of design requirements, stating that they should go beyond aesthetics and also consider social, environmental and economic aspects that apply to all Man 04 credits. Access statements are described as being required for buildings under Article 7 of the Town and Country Planning (Development Management Procedure) (Wales) Order 2012 and under Regulation 6 in the Planning (Listed Buildings and Conservation Areas) (Wales) Regulations 2012. Part M of Building Regulations also details information on aspects of inclusive and accessible design, however not for all BREEAM requirements. Other mechanisms to be considered are the National Register of Access Consultants, Equality Act 2010, and the Design Commission for Wales that could be outlined as a planning requirement in special instances for review. As with Code Credit Hea 2: Lifetime Homes, this is considered to fall under D&A statements, which are currently under review and could be modified to incorporate relevant requirements.

- Building User Guide is one that is highly achieved by most projects. This is partly covered in Part L of the Building Regulations which requires a Building Log-book, however to encompass all BREEAM requirements it may be possible to upgrade to a Building User Guide. If changes are not feasible, it may be possible to use O&M Manuals and HSE Requirements. This is addressed in regulation and planning, but not to same level as BREEAM, therefore action could be to merge with aftercare Credit Man 01 and include for training of staff, within Building Regulations.

- Post Occupancy Evaluation (POE) is a BREEAM criterion that requires a full review of the building performance one year after occupation. This includes a review of the design and construction process, and feedback is sought from a wide range of building users. Although this is moderately achieved, it is not currently covered in any existing mechanism. This credit could be merged with Aftercare Man 01.

Man 05: Life Cycle Costing and Service Life Planning

The overall intention of this credit is to recognise and encourage life cycle costing and service life planning in order to improve design, specification and through-life maintenance and operation. A total of three credits are available, where a Life Cycle Cost (LCC) analysis has been carried out based on the proposals developed during RIBA work stages C/D, the analysis is then updated at RIBA Stage D/E. The credit requires a life cycle cost analysis, based on proposals developed at RIBA work stages and results should be implemented in design specification, as well as a critical appraisal at feasibility stage of building procurement.

- This is relatively hard to achieve, with few projects scoring as a result. There are currently no mechanisms that cover life cycle costing and it is thought difficult to incorporate since this is not yet a matured concept. Notably this is still being encouraged as a best practice, and thus at this time is unlikely to be regulated or accommodated in planning. No action currently required since this requirement is not yet at a stage that could be regulated, consequently this should remain as best practice.

Health and Well Being

- Hea 01: Visual Comfort
  The aim of the credit is to ensure daylighting, artificial lighting and occupant controls are considered at the design stage to ensure best practice visual performance and comfort for building occupants. This credit has a varying number of credits available depending on building type. A pre-requisite for all building types is that all fluorescent and compact fluorescent lamps are fitted with high frequency ballasts. Up to two credits are available for daylighting criteria, where an average daylight factor of 2% is met in 80% of the building (a uniformity of 0.4 or the room depth criterion is also met). A further two credits are available if a view out from 7m in each day-lit space is met and glare control in each space is provided.

  - Pre-requisite - A mandatory pre-requisite on all projects requires high frequency lighting for all fluorescent and compact fluorescent lamps. This has become industry standard over recent years with more developments using LEDs especially in circulation areas. Within TAN 22, the Energy Hierarchy, Steps 1 and 2: Reduce energy demand, and energy efficiency should really cover the use of old technology. Approved Document Part L sets minimum luminaire efficiencies, with an uplift in 2014. No action.

  - Daylighting (criterion 2) - requires 80% of lettable floor area to be adequately lit, with daylight a factor of 2% or a view of the sky from desk height. Due to being dependant of building form and type, only 2 of the 8 projects that we looked at achieved this. TAN 12 outlines the process to achieve daylighting, however does not indicate the requirement, such as information on how to make best use of natural light in developments however no specifications are detailed. The daylighting criterion is often made as a recommendation for design guidance but rarely a condition. It therefore may be considered too onerous to enforce in regulations and no action is needed. Due to building constraints, this credit can only be in guidance.

  - Glare Control and View Out, Internal and External lLghting (criterion 2) - requires buildings to have adequate views out, glare control and lighting levels in line with CIBSE Code of Lighting. There are no existing mechanisms that address this requirement however may be indirectly covered in Part L as clever design helps to limit cooling to the building by reducing solar gain in the summer, and also reduce heating loads in the winter. No action needed.

  - Internal & External Lighting - specify all lighting levels in line with CIBSE Code of Lighting and all relevant Lighting Guides. Lighting is appropriately zoned and occupant controlled in office and circulation spaces. E.g. In offices - zones of 4 workplaces, education - controls for teacher. This credit is largely seen as good practice, and industry standard, all projects achieved it; however there are currently no mechanisms that cover all requirements relating to Visual Comfort. Although internal lighting efficiency is covered within regulations, zoning is not directly regulated. External lighting could be considered under planning under Pol 04.

  - Visual Arts (criterion 1-2) - up to 2 credits are available where an art coordinator has been appointed for the project. An art policy and an art strategy have been prepared for the development at the feasibility/design brief stage i.e. RIBA stage B (or equivalent) and endorsed by the senior management level. Within TAN 12, Chapter 5, it states that public art should be considered early in the design process and be integral to the overall design of a building, public space or place. The choice of artists and the nature of subsequent work should be the subject of

full collaboration from the outset between the artist, the local community and professionals involved in the design process. Engendering a sense of local ownership and public responsibility for artwork is critical to the long-term success of public art projects. Public art professionals should be consulted at the earliest possible stage to identify opportunities and provide professional advice to LPAs and developers. This is considered addressed and no action needed.

- Hea 02: Indoor Air Quality,
  The aim is to recognise and encourage a healthy internal environment through the specification and installation of appropriate ventilation, equipment and finishes. This credit is split into 3 parts: Minimising Sources of Air Pollution (3 credits), Potential for Natural Ventilation (1 Credit), and Laboratory Fume Cupboard and Containment Areas (2 credits).

  - Minimising Sources of Air Pollution - requires an indoor air quality (IAQ) plan to be produced, where emissions from VOC comply with best practice levels and testing and measurements are in accordance with relevant standards. Air intakes serving occupied areas avoid major sources of external pollution and recirculation of exhaust air. For air conditioning and mixed mode systems, intakes and exhausts are over 10m apart and 20m from source of external pollution. For natural ventilation systems, openable windows or vents are 10m from external sources of pollution. This credit has a moderate achievable rate, as it may not be feasible for all projects to achieve in terms of cost. It is covered in Regulation 39 and 42 of Part F of Building Regulations, which outlines nitrogen dioxide, carbon monoxide and humidity levels in Appendix A; however a discussion is needed to see if an IAQ should be a requirement of planning or combine with Mat 03 credit.

  - Natural Ventilation - outlines the need for fresh air capable of being delivered to occupied spaces of the building via a natural ventilation strategy. This is moderately achieved by most projects. The requirement is not addressed in the existing mechanisms; however natural ventilation is promoted indirectly in TAN 12 and Part L with lower building emission rates and Criterion 3: Limiting the effects of solar gain. However like achieving 2% average daylight (Hea 01), site limitations can make this unachievable.

  - Laboratory Fume Cupboard and Containment Areas (Criterion 17 – 22) – requires that ventilation systems are designed in compliance with the latest BS standards and best practice guidance, ducted systems must be greater than 10m/s, with filters located externally and emergency shut off provided. The installation of fume cupboards is not covered in the existing requirements, however may fall under the Part F remit, although it may be more difficult to accommodate since it is very project specific.

- Hea 03: Thermal Comfort
  This is to ensure that appropriate thermal comfort levels are achieved through design and controls are selected to maintain a thermally comfortable environment for occupants within the building.

  - Two credits are available, the first where thermal modelling has been carried out on the project in accordance with CIBSE AM 11, the second credit where the building has been adequately zoned and controlled. TAN 12 addresses thermal mass and natural ventilation. Part L criterion 3 is typically achieved using dynamic simulations in accordance with best practice guidance and CIBSE guide A and AM11. Additionally BS EN 7730:2005 covers the 'Adaptive' overheating assessment that will likely replace current ‘hours over’ criteria. For zoning requirements

temperature control for each 7m length area can be provided, however in some cases is considered over onerous to today's building standards (for instance a control zone when using underfloor heating in large halls). Overheating is addressed in Part L and zoning within CIBSE TM 39. This credit is addressed and no action is necessary.

- Hea 04: Water Quality
  To minimise the risk of water contamination in building services and to ensure the provision of clean, fresh sources of water for building users. One credit available, with the first criterion being mandatory on all projects

  - Credit 1 - which is mandatory for a 'Very Good' assessment, all water systems in the building is designed in compliance with approved codes of practice. Where all water and HVAC systems are designed and installed to CIBSE TM13 or HSE ACoP L8; if humidification is provided, it must be steam type or proven to have no potential Legionella risk; and cooling towers are designed and located in accordance with appropriate guidance. This mandatory credit is considered good practice and industry standard.

  - Credit 2 - provision of fresh, chilled, mains fed drinking water for building occupants (total number of outlets depends on occupant density). Not addressed and discussion needed as there is no planning or regulation for providing chilled mains fed cold water.

- Hea 05: Acoustic Performance
  To ensure the buildings' acoustic performance including sound insulation meets the appropriate standards for its purpose.

  - The credit is split in to two parts; a pre-requisite is that a fully qualified acoustician is appointed by the client at the appropriate design stage. Subsequently the design then has to meet acoustic performance design standards which are building type dependant. Building Regulations, Building Bulletins or HTMs are used as a guide for hospitals, schools and general buildings. As with Code credit Hea 2, PPW section 13.15 says that a careful assessment of predicted noise levels from development should be undertaken where appropriate. Development plan policies should be designed to ensure, as far as is practicable, that noise-sensitive developments, such as hospitals, schools and housing that need to be located close to the existing transportation infrastructure to facilitate access, are designed in such a way as to limit noise levels within and around those developments. This can be down to LPAs as a planning requirement, and addressed in regulation but not to the same standard as BREEAM. Further action to be considered for amendments to Building Regulations Part E or as planning requirements, when necessary.

- Hea 06 Safety and Security
  To recognise and encourage effective design measures that promote low risk, safe and secure access to, and use of the building.

  - There are 2 credits available, firstly for Safe Access, involves having dedicated cycle lanes, footpaths and vehicular access. Depending on the size of the development signage and lighting needs to be provided. The second credit, Security of Site and Building, at concept stage the design team have consulted with a suitably qualified security consultant with regards to the new building design and site layout. Generally Secured by Design or the Safer Parking Scheme are used for compliance. Both credits are covered in TAN 12, in addition, Secured by Design can be

a planning consideration for LPAs, the same can be said for Man 4 security below, therefore no action is required.

Energy

- Ene 01: Reduction of CO_2 Emissions
  This credit aims to recognise and encourage buildings that are designed to minimise energy demand. Up to 15 credits are available; the number awarded is based upon the building's calculated Energy Performance Ratio for New Constructions (EPR_{nc}). An online tool is provided by the BRE, where assessors upload an .inp file, which then generates the EPR_{nc} rating.

  - A high number of credits are claimed here due to the increasing efficiency of non-domestic buildings, in addition to this credit, Part L2A of the Building Regulations is driving buildings to be energy efficient. Due to revisions in Part L in 2014 requiring an 8% reduction in domestic, and a 20% reduction in non-domestic building over current regulations, this BREEAM credit is covered in regulations and no further action is required.

- Ene 02: Energy Monitoring
  The credit aims to encourage the installation of energy sub-metering that facilitates the monitoring of operational energy consumption. There are 2 credits available depending on the building type; all of the projects that we looked at achieved both of these credits.

  The first credit is mandatory for a 'Very Good' rated building and states that major energy consuming systems are monitored using either the BMS or separate accessible energy sub meters with a pulsed output to enable future connection to a BMS. The second credit is available to multi-tenanted areas that provide sub-metering. Part L2A of the Building Regulations outlines metering standards that are contained in the 2nd Tier document CIBSE TM 39. Within this, new buildings over 1000m² are required to have 90% of each fuel metered using automatic collection. All public buildings over 500m² are required to have Display Energy Certificates (DEC's). In addition, Criterion 5 of Part L2A 'Provisions for energy-efficient operation of the building' requires that the owner of the building is provided with adequate information about the building and its fixed building services. A way of showing compliance with this requirement in Criterion 5 is to provide the building owners with a Building Log book. It is then the facilities manager's duty to keep the log book up to date with regards to energy performance and maintenance. There is no action required as iit s considered covered in Building Regulations.

- Ene 03: External Lighting
  'To recognise and encourage the specification of energy-efficient light fittings for external areas of the development'. A single credit is available where light or lamp-lumen efficiencies are met depending on the colour rendering index or lamp type of the external lighting on the project. A time switch or daylight sensor is also required to prevent operation of the lights during the day.

  - TAN 12 Chapter 5 covers this by stating 'The development should take positive steps to provide adequate public lighting, but also to minimise unnecessary light pollution in their schemes for enhancement of the public realm. Consideration should be given to methods of: Directing light more accurately, reducing carbon emission from the energy use of street lighting, reducing glare by use of low profile reflectors and ensuring appropriate rather than excessive levels of illumination'. However, although covered in planning, at present, only internal and not external

lighting efficiency is covered in Building Regulations. Efficiency figures could be addressed in Part L for new builds.

- Ene 04: Low or Zero Carbon Technologies (LZC)
  The aim of this credit is to reduce carbon emissions and atmospheric pollution by encouraging local energy generation from renewable sources to supply a significant proportion of the energy demand. This is split into 3 parts with up to 6 credits available. A feasibility study (1 credit) is required to be carried out at early design stage (RIBA Stage C) of the project (or when a renewable energy supplier contract is in place), then up to 5 credits are available depending on carbon reduction where a LZC technology is specified and installed in line with recommendations. A final credit is awarded for using any of the specified free cooling methods.

  - Much like Ene 01, this credit has many connections with Part L2A of the Building Regulations. AD Part L2A was revised in July of 2013, to include Regulation 25a which states that before construction you must analyse the technical, environmental and economic feasibility of renewables, cogeneration, district heating or heat pumps. Additionally with the 2014 enhancement of a 20% reduction for non-domestic buildings it is likely that a form of LZC will be used as the norm for compliance.

  - PPW paragraph 4.12.2 states that the overall aspiration is to secure zero carbon buildings while continuing to promote a range of low and zero carbon technologies as a means to achieving this. The Energy Hierarchy in TAN 22 (Figure 9) could be reinforced in TAN 12 (i.e. an LZC Feasibility study should be considered). LDPs should promote high standards of energy efficiency, energy conservation and the use of renewable energy.

  - This is fully addressed in Part L Regulation 25a and 25b and planning. LZC technologies will be required to meet the 2014 20% energy reduction target.

- Ene 05: Energy Efficient Cold Storage
  This aims to recognise and encourage the installation of energy efficient refrigeration systems, therefore reducing operational greenhouse gas emissions resulting from the system's energy use. There are 2 credits available, 1 where the refrigeration system, controls and components have been designed in accordance with the ECA list and Code of Conduct. Commissioning detailed within Man 01 must be also achieved. The second credit is awarded where, in addition to the Credit 1 criteria, the Carbon Trust 'Refrigeration Road Map' is used in respect to CO_2e savings through specification of certain design criteria. Further analysis is given under BREEAM Ene 08 below.

- Ene 06: Energy Efficient Transportation Systems
  The credit's aim is to recognise and encourage the specification of energy-efficient transportation systems. Two credits are achieved, initially a single credit is awarded where, with considering lifts, escalators or moving walks, adequate analysis of demand and energy use has been performed to select the system with the lowest energy use. A second credit can be awarded where three energy-efficient features are used on the system. These can include standby mode, energy efficient lighting, variable speed drive or regenerative drive units. Analysis is given under BREEAM Ene 08 below.

- Ene 07: Energy Efficient Laboratory Systems

To recognise and encourage laboratory areas that are designed to minimise the CO_2 emissions associated with their operational energy consumption. Up to 5 credits can be awarded for this depending on the building type and total % of the floor area of the building that are labs. In schools and labs the specified fume cupboards have to either be re-circulating type or have a face velocity less than $0.5m^3/s$. Any systems would also need to meet specified Building Bulletin 88, Enhance Capital Allowance (ECA) and BS EN Standards. This is quite a specialist credit, with not many projects achieving the full 5 credits. Analysis is given under BREEAM Ene 08 below.

- Ene 08: Energy Efficient Equipment
  The aim is to recognise and encourage procurement of energy-efficient equipment to ensure optimum performance and energy savings in operation. Two credits are available where all of the equipment meets the specified standards or good practice. For example all small power and plug in equipment has to qualify for the ECA scheme, or is on the Energy Technology Product List (ETPL), another way to show compliance is for each product to achieve a green tick on the 'Buying Solutions' website.

  - BREEAM Ene 05, 06, 07, 08 are not covered in planning or building regulations, however some aspects of these credits have become industry standard, with most manufactures keen to perform analysis and energy calculations (Ene 06), and tax breaks available for ECA rated products. Additionally, with rising energy costs, and EU marketing, building owners are becoming increasingly aware of the cost of running less efficient equipment, and the relatively short payback times of more expensive and efficient equipment. The choice of equipment doesn't really fall within the remit of either planning or regulations, as with Code credit Ene 5 it may not fall under a government issue however further discussion should be made.

- Ene 09: Drying Space
  To provide a reduced energy means of drying clothes. One credit is available for providing an adequate internal or external space with fixings where, depending on the amount of bedrooms, either 4 or 6m of drying line can be provided.

  - As with Ene 4 for Code, planners could introduce conditions for the provision of either external drying space (washing lines of a prescribed size) or, in lieu of this, an appropriately specified internal drying space. The impacts of excess moisture from indoor clothes drying could become an increasing problem as the airtightness of buildings is improved in order to meet the energy efficiency requirements of the Building Regulations. No action is required since this is not regarded as a governmental issue and can conflict with a well-insulated building design.

Transport

- Tra 01: Public Transport Accessibility
  This credit aims to recognise and encourage development in proximity of good public transport networks, thereby helping to reduce transport-related pollution and congestion. This credit is split into 2 parts with up to 5 credits available for the accessibility index and then an additional credit for a dedicated bus service.

  - PPW Chapter 8 outlines Welsh Government support for a transport hierarchy in relation to new development which would make them accessible in the first instance by walking and cycling, then by public transport, and finally by private motor vehicles. It outlines that design and access

statements should give consideration to accessing developments by modes other than private motor vehicle. TAN 18 Chapter 3 details accessibility stating "any public transport routes through the development that are suitably direct"; "development plans should seek wherever possible to identify locations for such developments, which offer genuine and easy access by a range of transport modes" and "development will facilitate access by new residents to public transport stops, local shops and facilities by walking and cycling". Chapter 7 of TAN 18 states that there should be "enhanced public transport services or infrastructure". PPW and TAN 18 cover the credits by giving guidance; therefore this is covered in planning. Additionally this is very much an urban / rural issue which has meant that not many assessments have claimed these credits.

- Tra 02: Proximity to Amenities

  The aim of this credit is to encourage and reward a building that is located in close proximity to local amenities, thereby reducing the need for extended travel or multiple trips. There is 1 credit available for all building types which need to be located with close proximity to the required amenities, including grocery shops, post-box, and a cash machine.

  - PPW paragraph 8.1.4 states that land use planning should ensure developments are located near to other related uses to encourage multi-purpose trips and reduce the length of journeys. TAN 18 Chapter 3 details that the key aim of development plans is to identify residential sites that are accessible to jobs, shops and that significant new housing schemes contain ancillary uses including local shops, however does not cover proximity to local amenities such as cash machines, pharmacies etc. TAN 18 advices on the need to develop near shops, however again does not specify other types of amenities such as cash points, post boxes etc. As with Tra 01 above, this is a rural/urban issue that is notoriously hard to achieve even in urban areas and therefore is considered covered to the extent necessary in planning.

- Tra 03: Cyclist Facilities

  The credit aims to encourage building users to cycle by ensuring adequate provision of cyclist facilities. Two credits are available; the first is awarded where basic facilities are provided - covered, lit, well positioned storage. The second credit where in addition to storage, showers, changing facilities and lockers are provided (number of each building type and size dependant).

  - PPW states that land use planning should support cycling, and that LPAs should encourage the implementation of specific measures to develop safe cycling, including secure parking and associated facilities where appropriate (such as showers). TAN 18 Chapter 6 covers requirements for cycle arrangements such as the identification of new cycle routes; ensuring that new development encourages cycling by giving careful consideration to location, design, access arrangements, and travel ‘desire lines’. TAN 18 also states that "securing provision of secure cycle parking and changing facilities in all major employment developments, including retail and leisure uses, town centres, transport interchanges, educational and health institutions"; “securing provision of cycle routes and priority measures”; and “adopting minimum cycle parking standards within their parking strategies”. BREEAM cycle facilities requirements for specific buildings are not specified in TAN 18; it more broadly states requirements for cycle arrangements and encourages good practices. Parking Standards for Wales also covers cycling parking provision for different types of development. Although this is covered under planning, it does not include the full facilities required under BREEAM, such as exact number or area of changing and shower facilities, to meet the full BREEAM criteria, individual building type conditions would be required.

- Tra 04: Maximum Car Parking Capacity
  The credit are aimed at encouraging the use of alternative means of transport to the building other than the private car, thereby helping to reduce transport related emissions and traffic congestion associated with the building's operation. There is up to 2 credits available where the building car parking capacity is compared to the maximum car parking capacity permitted, accordingly to BREEAM bench marking credit. This is linked to credit Tra 01 for the accessibility index.

  - PPW paragraph 8.4 covers parking, detailing that LPAs should ensure that new developments provide lower levels of parking than have generally been achieved in the past, also stating that minimum car parking standards are no longer appropriate, and should reflect local public transport provision. TAN 18, Chapter 4 & 9 cover maximum parking standards, as well as the use of parking charges to encourage the use of alternative modes. Chapter 4.9. states "re-use of existing private parking to bring provision down to maximum standards and refuse planning permission for public and private car parks which do not meet the strategic aims of the development plan and RTP", Chapter 4.13 states "Maximum standards should allow developers the discretion to reduce parking levels". This is covered in PPW Chapter 8, TAN 18, Parking Standards for Wales and LPA design guides. This is considered to be addressed to an acceptable extent in planning.

- Tra 05: Travel Plan
  The aim of this credit is to recognise the consideration given to accommodating a range of travel options for building users, thereby encouraging the reduction of user reliance on forms of travel that have the highest environmental impact. There is 1 credit available for developing a travel plan for feasibility stage. The plan needs to be adequately structured and be used to steer the design of the development in order to minimise the use of car based travel.

  - PPW paragraph 8.7.2 states that Transport Assessments (TAs) can form an important basis for the preparation of travel plans. TAN18 Chapter 9 covers travel plans, stating that any existing travel plan should therefore be integrated into the TA process. It is preferable that a TA is undertaken and the travel plan developed as a component of the Transport Implementation Strategy (TIS). Travel plans should relate to targets for the reduction of road traffic and the promotion of walking, cycling and public transport contained in the local Regional Transport Plan (RTP). PPW Chapter 8 notes that cycling should also be encouraged. This credit is covered within planning, no action is required.

Water

- Wat 01: Water Consumption
  This credit aims to reduce the consumption of potable water for sanitary use in new buildings from all sources through the use of water efficient components and water recycling systems. There are up to 5 credits available based on the Wat 01 Calculator, with 1 credit mandatory for 'Very Good'. The calculator takes into consideration efficiency of all water consuming components and grey or rain water systems.

  - PPW paragraph 12.1.4 describes that an objective to meet sustainable development objectives is to protect and improve water resources through increased efficiency and demand management of water, particularly in those areas where additional water resources may not be available. PPW Chapter 12, states "Protect and improve water resources through increased efficiency and

demand management of water. Facilities are established to reduce, re-use, recover and, where necessary, safely dispose of waste". In this respect, PPW gives a slight overview of the BREEAM credit however does not detail water consumption components that should be targeted. TAN 12 briefly discusses sustainable approach to water supply, demand management and drainage. It is stated that "sustainable approach to water supply (rainwater harvesting), demand management (water efficiency) and drainage (e.g. permeable surfaces for pavements/traffic) and its effect on the local water table". Chapter 5.4.9 of TAN 12 states “provision for the collection and use of rainwater and also for the appropriate reuse of rainwater”. Part G or Schedule 1, under section 2 of the requirements, details water efficiency for the prevention of undue consumption of water. Regulation 36 states that consumption must not exceed 125 litres per person per day for a dwelling including external water use. The water consumption must be calculated in accordance with the methodology set out in the Requirement in G2, stating "The Water Efficiency Calculator for New Dwellings" published in September 2009 by the DCLG. BREEAM does not directly state the amount of water consumption (l/person/day), therefore a direct comparison of requirements cannot be made, although the principles are similar. This credit is covered in planning policy and regulations for dwellings however is not covered for non-domestic buildings, BREEAM also has separate standards that are building type dependant – schools/ hospitals etc. Action is required as this mandatory credit is not currently covered in planning or regulations to the same extent as BREEAM, however regulations could be amended such that non-domestic buildings are covered under this requirement.

- Wat 02: Water Monitoring
  This credit is to ensure water consumption can be monitored and managed and therefore encourage reductions in water consumption with 1 credit available and is mandatory for a ‘Very Good’ assessment. BREEAM requires that water meters are specified in the main water supply of each building in addition, sub-metres are provided to water consuming plant of building areas that consume over 10% of the building’s total water demand. All meters need to have a pulsed output to enable connection to a building management system (BMS).

  - PPW covers integrated planning management of water in addition Part G of Building Regulations also details consumption however does not cover water meters. Although there are water meters provided by utility companies at the site boundary, neither PPW nor Part G specify the requirement for metering within the building, therefore action is required as this is mandatory for BREEAM ‘Very Good’.

- Wat 03: Water Leak Detection and Prevention
  The aim is to reduce the impact of water leaks that may otherwise go undetected. There are up to 2 credits available where a leak detection system is installed between the utility meter and the main incoming meter within the building. Additionally, the second credit is to have flow control devices fitted, these have time and volume controls as well as presence detection connected to solenoids and essential control unit.

  - In Part G of the Building Regulations it mentions the use of water fittings, however there is no specification of leak detection of prevention measures. The major aspects of this credit are not covered in regulation or planning. Potentially this could result in water leakage going undetected and therefore action is required.

- Wat 04: Water Efficient Equipment

This credit aims to reduce unregulated water consumption by encouraging specification of water efficient equipment in terms of servicing for internal or external planting. There is 1 credit available where an irrigation method is specified for internal or external planting and/or landscaping. A rainstat should be used on drip-feed irrigation systems. There are no dedicated mains supplied irrigation systems (sprinklers etc.) and all planting can survive on manual watering. An additional criterion is where a vehicle wash system is specified, it uses full or partial reclaim.

- TAN 12 encourages the use of rainwater harvesting, water efficiency through demand management and permeable services for drainage. However it would be difficult to regulate manual watering. Aspects of this credit are noted in planning but not to the same degree as BREEAM.

Materials

Due to the scoring mechanism used in BREEAM Materials, the credits that fall under this section mean that it is difficult to replicate requirements into planning and regulations.

- Mat 01: Life Cycle Impacts
  This credit aims to recognise and encourage the use of construction materials with a low environmental impact (including embodied carbon) over the full life cycle of the building. There are up to 6 credits that are available depending on building type, using the Mat 01 spread sheet tool ascertain the number of credits achieved.

- TAN 12 promotes the incorporation of states that sustainability measures to reduce the environmental impact associated with buildings and minimising the demand for energy. Materials with a low environmental impact (embodied energy) reduced energy inputs, sourced sustainably, locally sourced, and the use of used reclaimed recycle materials are encouraged. Approved document 7, materials & workmanship, covers CE marking of all materials. Assessments tend to score very highly for this credit. Generally credits are achieved with little effort and cost. Although responsible sourced timber is covered in Building Regulations, there are no other types of material specified. Most projects that we looked at scored well in this section, so it could be regarded that this credit has become industry standard. Although there is also a drive to use local materials, these credits would favour the use of larger manufacturers who can afford to get their products certified by the Green Guide. Although the mandatory credits are regulation (timber procurement) a concern is that the scoring mechanism would be lost. A solution could be to develop a national materials standard. Despite some elements being addressed in TAN 12, action is needed to maintain useful requirements of the credit.Mat 02: Hard Landscaping and Boundary Protection
  The aim of this credit is to recognise and encourage the specification of materials for boundary protection and external hard surfaces that have a low environmental impact, taking account of the full life cycle of materials used. There is 1 credit available where at least 80% of all external hard landscaping or boundary protection achieves an A or A* rating as defined by the Green Guide.

  - Although this is not covered in the existing mechanisms, the projects that have been reviewed all scored very highly, and therefore is considered industry standard. However it is noted that larger companies are usually in a better position to achieve this credit, with it less favourable for smaller local companies. Action is required since the credit is not covered however the severity of not being specified as a requirement under existing mechanisms may be unnoticed given that it is generally good practice.

- Mat 03: Responsible Sourcing of Materials
  This credit aims to recognise and encourage the specification of responsibly sourced materials for key building elements. There are up to 3 credits available depending on the score received from the BREEAM Mat 03 calculator. Similarly to credit Man 01, Mat 03 requires that reasonably sourced timber is used on the development. Three credits are available depending on the materials specified on the main building elements and using the Mat 03 calculator. A prerequisite for all projects, including a 'Very Good' assessment, is that all timber used on the project is sourced in accordance with the UK Government's Timber Procurement Policy.

  - As above, TAN 12 recommends using materials with reduced energy inputs, sustainably produced timber, and locally manufactured recycled materials. The projects that were reviewed scored very highly on this, and again credits are achieved with little cost of effort required. This credit is covered in TAN 12, however due to the scoring mechanism this standard of governance is hard to achieve within the existing planning and regulations.

- Mat 04: Insulation
  The credit aims to recognise and encourage the use of thermal insulation which has a low embodied environmental impact relative to its thermal properties and has been responsibly sourced. This credit is divided in 2 parts, pre-requisite that any insulation within external walls, ground floor, roof, or building services is assessed. One credit is available for embodied impact; another credit is available for responsible sourcing. For embodied impact all thermal insulation products used in the building must have a low thermal impact relative to their thermal properties and defined by the Green Guide. For responsible sourcing, 80% of the thermal insulation must be responsibly sourced.

  - Although the non-domestic building compliance guide covers insulation performance for building services, this does not cover embodied impact. Action is required, since the Green Guide is used and the scoring mechanism is not in the planning and regulation requirements.

- Mat 05: Designing for Robustness
  The credit's aim is to recognise and encourage adequate protection of exposed elements of the building and landscape, therefore minimising the frequency of replacement and maximising materials optimisation. There is 1 credit available where the design incorporates suitable and durable protection measures where the vehicular trolley and pedestrian movements occur.

  - TAN 12 mentions adaptable and flexible developments that can respond to social, technological, economic and environmental conditions/changes (e.g. the current and future effects of climate change) over time to minimise the need to demolish and rebuild. Recognising the functionality of business premises is important to ensure they contribute to the economic success of the occupier. However, robust design, high quality materials, flexibility of exterior and interior layout and appropriate landscape treatment such as earth form or planting, can help to integrate new business premises into their surroundings, minimise the need to artificially cool buildings and allow for easier conversion by successive occupiers. Paragraph 5.14.7 of TAN 12 states that "the use of simple, but robust materials, adequate litter bins and avoidance of litter traps or design features which may act as crime and disorder generators can all help to reduce maintenance costs, safeguard appearance and maximise public enjoyment". This is covered in guidance, however could be considered to strengthen planning.

Waste

- Wst 01: Construction Waste Management

  This credit is to promote resource efficiency via the effective management and reduction of construction waste. There are 4 credits available, which are split into 2 parts. Firstly construction resource efficiency worth 3 credits, and secondly diversion resources from landfill is worth another credit. Construction resource efficiency, non-hazardous construction waste generated by the building design and construction meet and exceed efficiency benchmarks. Additionally, there is a compliant Site Waste Management Plan (SWMP). With regards to the diversion of resources to landfill, where BREEAM stipulates that a percentage of the volume will be either 70 or 80% that should be recycled rather than sent to landfill.

  - The Welsh Government has a Collections, Infrastructure and Markets Sector Plan (CIMS Plan) which provides targets for non-hazardous Construction Demolition (C&D) waste (excluding naturally occurring material). These targets relate to the percentage of this waste which should be prepared for reuse, recycling or recovery (minimum of 70%). This target increases to a minimum of 90% by weight by 2019-2020. In addition, PPW states that appropriate facilities should be established to meet the Welsh Government's objectives for waste management. There is a waste hierarchy that is a priority order for the management of waste, that considers, generally, that the best option for management of waste is to (1) prevent it arising and reuse material or products for the purpose originally intended, where no processing is required (prevention and reuse), (2) prepare for re-use, (3) recycle, (4) recover, including energy recovery and finally (5) disposal. TAN 21 (2011), Chapter 1.14, The Waste Framework Directive, described that "member states are required to produce waste management plans, setting out their abilities and capacities to manage their own waste arising using such networks of facilities". Chapter 4 discusses minimising incineration and disposal of waste to landfill. Chapter 10 states "The re-use and recycling of construction and demolition waste not only implements the objective of minimising waste but reduces the demand for primary resources" and "Regional Technical Groups should monitor the extent of landfill operations at exempt sites". It goes on to say that "wherever possible, provision should be made in Unitary Development Plans for sites for recycling facilities to enable storage, separation and processing of materials". This credit falls under the existing policy in PPW and TAN 21, it is also noted that this is now industry standard and nearly all projects reviewed scored full marks. However PPW and TAN 21 does not cover waste levels as specified in BREEAM, and this requirement of monitoring and recording waste will be lost and needs further considering.

- Wst 02: Recycled Aggregates

  This credit is to recognise and encourage the use of recycled and secondary aggregates, thereby reducing the demand for virgin material and optimising material efficiency in construction. There is 1 credit available for using recycling or secondary aggregate on site that accounts for more than 25% weight or volume of the total high grade aggregate. The aggregates are either obtained onsite or from a waste processing site that is within a 30km radius.

  PPW and TAN 21 (2014) paragraph 3.25 encourages the incorporation of re-used or recycled materials or products in to new buildings. PPW also refers to the advice contained in TAN 12 and TAN 22. TAN 21 (2014) paragraph 3.24 also considers that "in circumstances of demolition where there are longer term prospects for a sufficient and economic supply of demolition and construction waste from an appropriate catchment area, it may be appropriate to identify a

permanent recycling repository or “urban quarry” for this purpose”. Previously, when dealing with foundations only, this was an easy credit to achieve, however now all slabs and concrete are now assessed, it has become quite difficult to prove. Recycled aggregates should be encouraged and promoted by LPAs however this does not specify the aggregate recycling rate. This credit is covered in planning policy.

- Wst 03: Operational Waste
  The credit aims to recognise and encourage the provision of dedicated storage facilities for a building’s operational-related recyclable waste streams, so that this waste is diverted from landfill or incineration. One credit is available where there are dedicated spaces to cater for the segregation and storage of operation, recyclable waste of the finished building.

  - PPW Chapter 12 states that decisions on planning applications should have regard to the waste management objectives in the national waste strategy. The environmental impact of proposals for waste management facilities must be adequately assessed, supported by independent surveys where appropriate, to determine whether a planning application is acceptable and, if the adverse impacts on amenity cannot be mitigated, planning permission should be refused. Adequate facilities for the collection, composting and recycling of waste materials should be incorporated into the design of any major development. TAN 21 (2011) states wherever possible provision should be made in Unitary Development Plans for sites for recycling facilities to enable storage, separation and processing of materials and thus encourage more beneficial of inert materials. Additionally approved document Part H covers solid waste storage facilities. This is addressed both by planning, under TAN 21, and Building Regulations, Part H, and no further action is required.

- Wst 04: Speculative Floor and Ceiling Finishes
  The aim of the credit is to encourage the specification and fitting of floor and ceiling finishes selected by the building occupant and therefore avoid unnecessary waste of materials. One credit is available, prior to all fit-out works, where floor and ceiling finishes have only been installed in a show area.

  - This is not covered in planning or regulations, and is rarely claimed by the projects reviewed. Considered a local planning requirement when needed.

Land Use and Ecology

- LE 01: Site Selection
  The aim is to encourage the use of previously developed and/or contaminated land and avoid land which has not been previously disturbed. The assessment is split into 2 parts, with previously developed land as one credit and contaminated land, another credit. For previously developed land, at least 75% of the proposed development footprint is on an area of land which has been previously developed for use in the last 50 years. For contaminated land, the site is deemed to be significantly contaminated as determined by a site investigation.

Interestingly, previously developed land scored very highly in the schemes that we looked at. PPW states that planning policy should promote resource efficiency, with preference for reuse of redeveloped land and buildings. TAN 5 promotes the conservation and enhancement of statutory designated areas and undeveloped coast. For contaminated land, due to unpredictable cost and likelihood it was rarely achieved.

PPW considers contaminated land and notes that development should not take place without an understanding of the risks, therefore appropriate remediation and consideration is given to the potential impact that remediation land contamination might have upon the natural land of the historic environment. This is addressed in PPW and TAN 5.

- LE 02: Ecological Value of Site and Protection of Ecological Features
  The credit aims to encourage development on land that already has limited value to wildlife and to protect existing ecological features from substantial damage during site preparation and completion of construction works. There is one credit available where land within the construction zone is defined as low ecological value using either a BREEAM checklist or a suitable qualified ecologist. In addition, all existing features of ecological value around the construction zone are adequately protected.

  - TAN 5 covers species and habitat protection that should be fully met in all planning decisions, LPA or consultant ecologist should be engaged. Development should contribute to the projection and improvement of the development of the environmental aspects. This is covered under planning policy, and no further action is considered necessary.

- LE 03: Mitigating Ecological Impact
  The aim is to minimise the impact of a building development on existing site ecology. There are 2 credits available, one where the change of the ecological value of the site is classed as minimal, using the BREEAM LE 03/ LE 04 calculator. Another credit is available where the change in ecological value of the site is classes as zero, again using the LE 03/ LE 04 calculator. 1 Credits is mandatory for a BREEAM 'Very Good' assessment.

For both credits, PPW states that the environment should be protected and improved so as to improve the quality to life and protect local and global ecosystems. TAN 5 Chapter 2 discusses mitigation to minimise unavoidable harm by mitigation measures and looking for new opportunities to enhance nature conservation. Planning and guidance partly covers these credits to a standard that is considered sufficient, therefore no further action is required

- LE 04: Enhancing Site Ecology
  This aims to recognise and encourage actions taken to maintain and enhance the ecological value of the site as a result of development. There are 3 credits available, although they're building type dependant. One credit where a suitable qualified ecologist (SQE) has been appointed to report on enhancing and protecting the ecology of the site, and where an ecology report has been produced and recommendations implemented. A second credit is available where the SQE has confirmed that the ecological value of the site has risen up 6 plant species. A final credit where the ecology report will result in an increase in ecological value of over 6 species.

  - This credit is covered in TAN 5 which details new habitats or enhancing existing habitats on or off-site. It also states that ecologists should be employed at the pre-application discussion stage,chapter 6.2.2, "It is considered best practice that such screening should be carried out by a competent ecologist". Guidance within TAN 5 is considered to sufficiently cover this credit , therefore no further action is required.

- LE 05: Long Term Impact on Biodiversity

The aim is to minimise the long term impact of the development on the site and the surrounding area's biodiversity. Building type dependant and up to 3 credits available, where a SQE has provided a landscape and habitat management plan appropriate to the site that covers at least the first 5 years after project completion. A biodiversity champion should also be nominated.

- TAN 5 notes that a Nature Conservation Management Plan may be undertaken to detail how the site will be managed to conserve and enhance nature conservation, including who will manage various parts, the funding, review and adaption for management overtime. It goes on to say: "It is considered best practice that such screening should be carried out by a competent ecologist". Despite the full BREEAM criteria being met under LE 05, this credit is considered to be fully enforceable through planning within TAN 5.

Pollution

- Pol 01: Impacts of Refrigerants
  This credit aims to reduce the level of greenhouse gas emissions arising from the leakage of refrigerants from building systems. Up to 3 credits are available, one credit for the installed systems within the development requiring refrigerants to have a Direct Effect Life Cycle CO_2 or less than 1000 kg of CO_2 per kW cooling capacity, using the Pol 01 calculator. As with the first credit, 2 credits are available if the Direct Effect Life Cycle CO_2 is less than 100 kg of CO_2 per kW cooling capacity, again using the Pol 01 calculator. An additional credit can be awarded were refrigerants are used and are contained in a moderately airtight enclosure and an automated refrigerant leak detection and automatic pump shut down provided. All three credits can be awarded if there are no refrigerants used on the development.

  - TAN 12 favours the natural ventilation that would achieve the maximum 3 credits. This is encouraged by planning policy/guidance and is partially addressed, however would need to be strengthened to meet the same standards as BREEAM.

- Pol 02: NO_X Emissions
  The aim of the credit is to encourage the supply of heat from a system that minimises NO_X emissions, and therefore reduces pollution of the local environment. Building type dependant, with up to 3 credits is available - LZC technologies including heat pumps would be unable to claim any credits. 1 credit is achieved where the installed plant to meet the building's heating demand has, under normal operating conditions, a dry NO_X emission level less than or equal to 100mg/kWh 2 credits can be achieved where it is under 70 mg/kWh, 3 credits provided for under 40mh/kWh.

  - Although these credits are not covered in TANs or PPW, and only general thermal efficiencies are covered in Building Regulations, most new boilers including biomass are able to achieve 1 credit. Then natural gas systems generally achieve either 2 or 3 credits as industry standard. As with Pol 2 for Code, The EcoDesign requirements for Energy Related Products Directive will be implemented for boilers (Lot 1), water heaters (Lot 2) and solid fuel burners (Lot 15) over the coming years. As well as efficiency limits on products for sale in EU, will also set NO_X limits. Likely to be 120 mg/kWh liquid fuels, 70 mg/kWh gas, other fuels, 200 mg/m3. However, even when the Energy Related Products Directive comes into force for boilers and water heaters, it will not set limits as low as Code currently encourages. Further discussion needed as this is industry standard but not directly covered by regulations.

- Pol 03: Surface Water Run-Off
  The aim is to avoid, reduce and delay the discharge of rainfall to public sewers and watercourses, therefore minimising the risk of localised flooding on and off site, watercourse pollution and other environmental damage. There are 5 credits available, which are split into 3 parts. Flood risk can achieve up to 2 credits, surface water runoff 2 credits, and minimising water course pollution has 1 credit. For flood risk, with up to 2 credits awarded, where the assessed development is situated in a flood zone defined by planning policy and technical guidance document as having a low annual probability of flooding which has been confirmed by a site specific Flood Risk Assessment (FRA). 1 credit can be awarded where the assessment is developed in a flood zone that is defined as having a medium to high annual probability of flooding and is not within the functional flood plain. FRA confirms that the development is appropriately flood resilient and the ground level of the building and access routes are designed so they are at least 600ml above the design flood level. For surface water runoff, an appropriate consultant has confirmed for 1 credit, that drainage measures are specified to ensure that the peak rate of run-off from the site is no greater than it was predevelopment, or 1 credit where flooding of a property will not occur due to local drainage failure. Minimise water course pollution has 1 credit, awarded where a sustainable urban drainage system (SUDS) is used where runoff drains are in areas of relative risk of water pollution and an appropriate consultant confirms that there is no discharge on the developed site for rainfall of up to 5ml.

  - PPW Chapter 13 – LPAs should recognise, when assessing development proposals in areas of flood hazard, that the development is still at risk from flooding which may threaten human life and cause substantial damage to property, even when mitigation measures are proposed. With regards to surface water run-off, LPAs should have a strategic approach to flood risk. Development proposals should seek to reduce and certainly not increase flood risk arising from either river and / or coastal flooding or from additional runoff from development in any location. TAN 15 states that a development in one part of a catchment may increase run-off and hence flood risk elsewhere, therefore, the aim should be for new development not to create additional run-off when compared with the undeveloped situation, and for redevelopment to reduce run-off where possible. In addition SUDS should be implemented in all new developments to prevent increased run-off compared to the undeveloped site. Credits 1 - 4 are covered under planning, credit 5 which requires the use of oil petrol separators can also be a condition when advised by Natural Resources Wales.

- Pol 04: Reduction of Night Time Light Pollution
  To ensure that external lighting is concentrated in the appropriate areas and that upward lighting is minimised, reducing unnecessary light pollution, energy consumption and nuisance to neighbouring properties. There is 1 credit available where the external lighting strategy has been designed to meet outline criteria and can be automatically switched off during certain hours to save energy.

  - TAN 12, Chapter 5, states that development should take positive steps to provide adequate public lighting, but also to minimise unnecessary light pollution in their schemes for enhancements in the public realm. Consideration should be given to methods of directing light more accurately, reducing carbon emissions from energy used at street lighting, reducing glare by using low profile reflectors and ensuring appropriate rather than excessive levels of illumination. With regards to lighting, PPW section 13.13 states there is need to retain dark skies where appropriate, protect the natural and historic environment, prevent glare and respect the amenity

of neighbouring land uses and reduce the carbon emissions associated with lighting. This is covered in TAN 12 and no further action is required

- Pol 05: Noise Attenuation
  To reduce the likelihood of noise arising from fixed installations on the new development affecting nearby noise-sensitive building. 1 credit can be awarded by default where there are or will be no noise sensitive areas or buildings within an 800m radius of the assessed development. Where there are or will be noise sensitive areas within 800m a suitable qualified acoustic consultant has carried out a noise impact assessment in compliance with BS7445. Within the report the noise level from the proposed site is measured in the locality of the most exposed noise sensitive development, levels are measured at +5dB during the day and +3dB at night, compared to the background noise level. Any noise levels greater than levels described should have measures installed to attenuate the noise at source.

  - PPW Chapter 13 states that sensitive developments should be located away from existing sources of significant noise. Noise action plans should be within the overall development plan. Additionally, TAN 12 states that opportunities to minimise ambient noise such as traffic should be explored and reflected in the layout and detailed design of the public realm and by use of low noise surfacing materials and natural or man-made barriers for noise. This is largely covered under planning, however may need strengthening.

Appendix B. Code Summary

Energy and Carbon Dioxide Emissions

- Ene 1: Dwelling Emission Rate
  The aim is to limit emissions arising from the operation of a dwelling and its services in line with current policy on the future direction of regulations. In a similar fashion to BREEAM Ene 01, up to 10 credits are awarded depending on the building's energy performance. The number of credits awarded will depend on the Dwelling Emission Rate (DER) and its percentage improvement on the Target Emission Rate (TER) set in SAP.

  - There are 3 mandatory credits outlined in PPW, equating to an 8% improvement of the TER. At the projects looked at, few went beyond this. For both domestic and non-domestic buildings, new minimum requirements in Building Regulations are to be introduced in July 2014, that exceed Code standards. Therefore as with Ene 01 in BREEAM, this issue is covered in the uplift in Approved Document Part L1A.

- Ene 2: Fabric Energy Efficiency
  This credit aims to improve fabric energy efficiency performance, thus future-proofing reductions in CO_2 for the life of the dwelling. Where depending on the fabric energy efficiency of the building (kWh/m²/year- calculated by SAP), up to 9 credits are available.

  - Although there are no minimum standards for Code Level 3, the majority of projects considered score well on this credit, as a good lean design contributes to Ene 1 above. This is encouraged through the Energy Hierarchy within TAN 22 and TAN 12, and indirectly through Ene 1. This is considered to be covered in Part L of the Building Regulations.

- Ene 3: Energy Display Devices
  To promote the specification of equipment to display energy consumption data, thus empowering dwelling occupants to reduce energy use.

  - Up to two credits available. Most projects seek these credits since they are relatively easy and cost effective to implement. However, developers are unlikely to go to the extent of installing visual displays for occupants unless there is a driver to do so, particularly since most offer equivalent information to customers via online portals. Installation certificates from utility companies could potentially be provided to building control as evidence that appropriate meters had been installed. Utility companies are being asked by the government to install smart meters in all homes by 2020; in addition this could be a requirement of Part L1A within Building Regulations. This is covered in Part L and no action is required.

- Ene 4: Drying Space
  The credit aims to promote a reduced energy means of drying clothes, with 1 credit available.

  - All projects that were assessed achieved this credit, as it is relatively easy and cost effective. While Part F of the Building Regulations sets standards for ventilation rates in wet rooms, there may not necessarily be a requirement to provide an indoor drying room in homes unless set as a planning condition. Planners could introduce conditions for the provision of either external drying space (washing lines of a prescribed size) or, in lieu of this, an appropriately specified internal drying space. This could be linked to credit Hea 3: Provision of Private Space, where a condition to provide a private garden could also incorporate external drying space. The impacts of excess

moisture from indoor clothes drying could become an increasing problem as the airtightness of buildings is improved in order to meet the energy efficiency requirements of the Building Regulations. As with the BREEAM Ene 09 credit, no action is required since this is not regarded as a governmental issue and can conflict with a well-insulated building design.

- Ene 5: Energy Labelled White Goods
  To promote the provision or purchase of energy efficient white goods, thus reducing the CO_2 emissions from appliance use in the dwelling. There are 2 credits available, which require specified electrical appliances to comply with the EU Energy Efficiency Labelling Scheme.

  - Very few projects actually provide appliances. Most schemes simply provide energy efficiency advice to occupants via Home User Guides. The implementation of the EU Energy Related Products Directive will phase out the most inefficient appliances in due course, though the 'best' appliances may still not be otherwise widely chosen due to cost limitations on consumers. CODE Ene 5 is not covered in planning or Building Regulations. However consumers have become more aware of energy consumption of white goods in the home, due to rising energy costs, and EU marketing. This may not fall under a government or development issue however further discussion should be made.

- Ene 6: External Lighting
  To promote the provision of energy efficient external lighting, thus reducing CO_2 emissions associated with the dwelling. There are two credits available, for Space Lighting and Security Lighting. Where for external space lighting, fittings are required to meet energy efficient fittings and adequate controls - one credit. The second credit requires that security lighting has to have a maximum wattage of 150W, movement detection, and daylight sensors.

  - As with drying space, all projects tend to achieve this credit as it is relatively easy and cost effective. While external space lighting is already accounted for under Part L of the Building Regulations, it is likely that security lighting would no longer be provided and/ or the energy efficiency not considered by developers if Code were no longer enforced. Since inefficient fittings will be phased out over time, via the Energy Related Products Directive, this is unlikely to be a significant omission. As with Ene 03 in BREEAM, efficiency figures may need to be addressed in Part L for new builds in 2016.

- Ene 7: LZC Technologies
  To limit CO_2 emissions and running costs arising from the operation of a dwelling and its services by encouraging the specification of low and zero carbon energy sources to supply a significant proportion of energy demand.

  - Over half the example projects examined actually sought over 15% CO_2 emissions offset (during 2009 version Code schemes). However, not all projects are able to deliver this level. It helps to take a 'fabric first' approach to the energy efficiency of buildings to give a lower overall energy total to offset. In any case, these requirements will be superseded by the introduction of the Nearly Zero-Energy Building (nZEB) requirements in due course. PPW paragraph 4.12.2 states that the overall aspiration is to achieve zero carbon buildings while continuing to promote a range of LZC technologies. The Energy Hierarchy in TAN 22 and Part L Regulation 25A and 25B also reinforces this statement. Correctly installed renewables will generally receive Microgeneration Certification Scheme (MCS) Certification, which can be provided to building control as evidence

of compliance. In addition, LZC technologies are likely to be required to meet the 2014 8% energy reduction target for new homes and the European Directive of all buildings to be nZEB by 2021. Therefore no action required.

- Ene 8: Cycle Storage
  This aims to promote the wider use of bicycles as transport by providing adequate and secure cycle storage facilities, thus reducing the need for short car journeys and the associated CO_2 emissions. Up to 2 credits are available, depending on the number of bedrooms, 'adequately sized, secure and convenient' individual or communal cycle stores are provided.

  - Cycle storage can form part of a planning requirement with LPAs able to set their own parking standards; in addition there is a policy on maximum parking standards in PPW. PPW paragraph 8.1.4 states that land use planning should support cycling. In Addition paragraph 8.2.2 states that LPAs should encourage the implementation of specific measures to develop safe cycling, including secure parking and associated facilities where appropriate (such as showers). TAN 18 Chapter 6 covers requirements for cycle arrangements such as the identification of new cycle routes; ensuring that new development encourages cycling by giving careful consideration to location, design, access arrangements, travel 'desire lines'; securing provision of secure cycle parking and changing facilities; securing provision of cycle routes and priority measures; and adopting minimum cycle parking standards within their parking. This is therefore considered addressed through the planning system.

- Ene 9: Home Office
  The credit aims to promote working from home by providing occupants with the necessary space and services thus reducing the need to commute. There is 1 credit available.

  - While planners may be able to encourage developers to make provision for a home office, the recent introduction of the 'bedroom tax' for people receiving housing benefit is likely to reduce the instance of 'spare rooms' that could be deemed suitable for a dedicated home office space within social housing. The Home Office aspect is therefore likely to be very difficult to enforce. Due to advances in technology, including high speed broadband, a home office can be easily adapted if needed and this is not an issue for planning of regulation and therefore no action required.

Water

- Wat 1: Indoor Water Use
  To reduce the consumption of *potable water* in the home from all sources, including borehole well water, through the use of water efficient fittings, appliances and water recycling systems. Mandatory for Code Level 3 is 105 l/p/day, whereas Building Regulations Part G limits internal potable water use in dwellings to 120 l/p/day, which is the minimum mandatory performance level under Code. There are up to 5 credits available, depending to the consumption of potable water in the home using the water efficiency calculator for new dwellings.

  - The calculation and procedure is already in place to demonstrate the water usage via building control. However Building Regulation Part G only required that you are to meet 120l/p/day, whereas the minimum standard for Code Level 3 is 105 l/p/day. Code encourages usage to be further limited towards 80 l/p/day. While it may be impractical to set Building Regulations to this

very low level, Part G could be strengthened beyond its current standard (to a level to be agreed via consultation).

- Wat 2: External Water Use
  To promote the recycling of rainwater and reduce the amount of mains potable water used for external water uses. There is one credit available, where a rain water collection system is installed that is of sufficient size.

  - Building Regulations Part G makes an allowance of 5 l/p/day potable water for external use; this does not necessarily promote recycling. External water use is not considered further, as it is acknowledged that the issue is otherwise currently addressed via Code. However, if Code were no longer a requirement, it may be preferable to formally incorporate 'external' water use into the calculations for Part G and Regulation 17 to encourage rainwater harvesting/ recycling, etc. The options for addressing this could then be similar to Code, including the provision of rainwater butts etc. PPW Chapter 12 covers adequate and efficient infrastructure for water, stating the objective to protect and improve water resources through increased efficiency and demand management of water. TAN 12 briefly discusses sustainable approaches to water supply, demand management and drainage. However the use of a water butt is not covered in either regulation or policy. This could be strengthened in Part G of Building Regulations. External water use is therefore only partially addressed.

Materials

- Mat 1: Environmental Impact of Materials
  The aim is to specify materials with lower environmental impacts over their life-cycle. For Code Level 3, a minimum of 3 credits have to be achieved as mandatory credits.

  - Most projects score quite highly in this area, with at least 8 out of 15 credits achieved. Depending on the type of construction some schemes score even higher at 10 credits. It is generally not the role of planners or building control to prescribe the types of materials to be used during construction, with Building Regulations AD7 only requiring products to be 'fit for purpose' and CE marked in line with the Construction Products Directive. Anything additional (e.g. ISO or other certification) may be deemed to influence competitiveness or disadvantage small companies. Though it may be feasible for planners to insist that developers make reference to the Green Guide in some way in design and access statements (relating to environmental sustainability), it is unlikely that planners could set specific targets or material requirements as with Code. As 3 credits are required as a minimum for Code Level 3, without a means of capturing the environmental performance of materials used, this could lead to a significant shortfall in the sustainability standard of construction if Code were to be withdrawn as a requirement.

- Mat 2: Responsible Sourcing of Materials for Basic Building Elements and Mat 3: Responsible Sourcing of Materials Finishing Elements
  These credits are to promote the specification of responsibly sourced materials for the basic building elements and for the finishing elements.

  - There are 6 credits available for Mat 2 and 3 credits for Mat 3, with no minimum standards set for a Code Level 3 build. There is significant variation in how these credits are sought with 30% of schemes not attempting any to 70% of schemes achieving up to 7 over both credits. Developers

are encouraged to go for these credits, but only Approved Document 7 sets requirements for CE marking of construction products, and responsible sourcing of timber, but nothing further. It is unlikely that planners or regulation could set specific targets that contractors should score without Code. Further discussion needed.

Surface Water Run-off

- Sur 1: Management of Surface Water Run-off from Developments
  To design surface water drainage for housing developments which avoid, reduce and delay the discharge of rainfall run-off to *watercourses and public sewers* using SUDS techniques. This will protect receiving waters from pollution and minimise the risk of flooding and other environmental damage in watercourses. 1 credit is mandatory for Code Level 3, therefore all assessments must ensure that run-off rates and annual volumes of run-off post development will be no greater than the previous conditions of the site.

  - Welsh Government have issued a special condition notice relevant for Code projects in Wales to clarify the procedures that should be followed for managing surface water run-off from new developments. It is a planning requirement to meet the statutory undertaker's requests to ensure subsequent adoption of the relevant drainage systems. This already supersedes the requirements of Code but often the different Code requirements confuse developers about their obligations. TAN 15 states that SUDS should be implemented in all new developments to prevent increased run-off compared to undeveloped site which can be set as a planning condition. A solution could be a single standard, led by the planning system via TAN 15. No action is required as with the first four credits of BREEAM Pol 03.

- Sur 2: Flood Risk
  To promote housing development in low *flood risk* areas, or to take measures to reduce the impact of flooding on houses built in areas with a medium or high risk of flooding.

  - Up to 2 credits are available, where the development is located either in an area that has a low probability of flooding (2 credits) or medium to high probability of flooding (1 credit). TAN 15 already requires an assessment of flood risk and dictates that dwellings may not be built in high flood risk areas. It also states that mitigation against flood consequences would be required in other risk zones. While the TAN is not currently as prescriptive as Code, it could potentially be strengthened to incorporate the additional Code requirements. Alternatively, it may be possible for planners to require that the development's approach to flood mitigation and protection be written into design and access statements. However, these would not necessarily cover small developments, which may result in some schemes not receiving appropriate consideration. As in BREEAM Pol 03 credit 1, this is considered covered within planning and no further action is needed.

Waste

- Was 1: Storage of Non-recyclable Waste and Recyclable Household Waste
  The aim is to provide adequate internal and external storage space for non-recyclable waste and recyclable household waste. Up to 4 credits are available for this issue. A mandatory pre-requisite for all projects is that external space must be provided to store waste. Then for two credits a dedicated internal space is provided for storing recycled waste with a total capacity of 60 litres. For an additional two credits, a local authority

collection scheme is available.

  - The projects that were considered generally achieved maximum credits. Developers are required to agree waste management requirements with local planners in line with local authority collection regimes, plus provide adequate space provision for non-recyclable waste (BS 5906) therefore the mandatory elements are already being addressed. There is no specification given in TAN 21, however Building Regulations Part H6 states the requirements for storage of waste for the first two credits. The requirements in Building Regulations Part H could be extended to include adequate space allowance in dwellings for the storage and collection of recyclable waste streams; again in line with the requirements of local authority collections (i.e. there may be little point in providing segregated waste bins for recycling if the local authority actually collects mixed recyclable waste streams).

- Was 2: Construction Site Waste Management
  This credit aims to promote resource efficiency, via the effective and appropriate management of construction site waste, with up to 3 credits available. Under the 2009 Code requirements, all projects achieved these credits. When strengthened in 2010, to require at least 50% or 85% diversion of waste from landfill, projects would typically achieve the 50% target (2/3 credits).

  - While waste management practices across the construction industry are generally improving, many smaller projects and contractors would not make special considerations for waste management if not a requirement of Code or other regulations. Larger companies tend to carry out these actions anyway as part of their CSR and because they have established procedures that may even help to save them money via their waste management practices. It would also be very difficult to enforce and regulate the site waste requirements unless checked by building control or Code assessors' post construction review. Guidance is given in planning however is not fully covered, thus further action may be considered.

- Was 3: Composting
  This is to promote the provision of compost facilities to reduce the amount of household waste sent to landfill. One credit is available where either individual home composting facilities are provided, a community composting service or a local authority collection service is available.

  - Unless linked to local authority waste collection provisions, it is unlikely to be feasible to force developers to install composting facilities in developments. The Welsh Government's municipal waste management plan states the promotion of, and support for, home composting/ treatment of garden waste. The forthcoming revised TAN 21 (2014) is likely to state that adequate facilities and space for the collection of composting and recycling of waste materials, should be incorporated into the design any development. This is covered in the forthcoming TAN 21 and no action is needed.

Pollution

- Pol 1: Global Warming Potential (GWP) of Insolents
  The aim is to promote the reduction of emissions of gases with high *GWP* associated with the manufacture, installation, use and disposal of foamed thermal and acoustic insulating materials. There is 1 credit available where all insulating materials in a dwelling all use substances of GWP of less than 5.

- All projects tend to achieve this credit as it is relatively easy and cost effective. Most manufacturers have looked to phase out high GWP blowing agents from their insulation products in recent years, though a danger is that some may be available and could be used if not otherwise regulated. However, it is difficult to prove the type(s) of insulation used over the entire course of a project without a continued presence on site. Action is required as, like Mat 1 for both Code and BREEAM, this credit relies heavily on the Green Guide.

- Pol 2: NO_X Emissions
  This is to promote the reduction of nitrogen oxide (NO_X) emissions into the atmosphere, with 3 credits available.

  - While efficiency of boilers will be captured in the Part L Building Regulations compliance calculations, NO_X emissions from boilers are not currently captured. The EcoDesign requirements of the Energy Related Products Directive will be implemented for boilers (Lot 1), water heaters (Lot 2) and solid fuel burners (Lot 15) over the coming years. Efficiency limits on products for sale in the EU will also set NO_X limits. Likely to be 120 mg/kWh liquid fuels, 70 mg/kWh gas, other fuels, 200 mg/m3. However, even when the Energy Related Products Directive comes into force for boilers and water heaters, it will not set limits as low as Code currently encourages. As with BREEAM Pol 02, further discussion is needed as this is industry standard but not directly covered by regulations.

Health and Wellbeing

- Hea 1: Daylighting
  The aim is to promote good daylighting and thereby improve quality of life and reduce the need for energy to light the home - up to 3 credits are available. Kitchens need to achieve an average daylight factor of at least 2% (1 Credit), all living rooms dining rooms and studies must achieve a minimum average daylight factor of at least 1.5% (1 Credit) and 80% of the working plane in each kitchen, living room, dining room, study or home office must receive direct light from the sky.

  - There is currently no mechanism to influence daylight standards in buildings, though in the past this aspect was stipulated in the Building Regulations (window area at least 10% of floor area). Design guidance is available; however it is unlikely to be re-introduced in to Building Regulations if it has previously been withdrawn. Daylighting requirements may also come into conflict with other aspects of the building design relating to window areas, such as available solar gains, potential heat loss through windows, risks of overheating and requirements for shading. Rather than in regulations, this issue can be addressed in planning through LPA design guides and policies protecting the amenity of future residents and therefore no action is required.

- Hea 2: Sound Insulation
  The purpose of this credit is to promote the provision of improved sound insulation to reduce the likelihood of noise complaints from neighbours.

  - PPW Chapter 13 states that noise-sensitive developments should be located away from existing sources of significant external noise, and that noise action plans should be within the overall development plan. Although this covers external noise, it is Part E of the Building Regulations that sets requirements and testing schedules for noise insulation within dwellings. Code sets targets in

excess of these base requirements, with up to 4 credits available depending on the impact or airborne sound levels archived that better Building Regulations. Part E could therefore be amended to incorporate the improved target performance set by Code to a level to be agreed following consultation. Revisions could be made to Building Regulations Part E to meet Code standards.

- Hea 3: Private Space
  To improve quality of life by promoting the provision of an inclusive outdoor space which is at least partially private. 1 credit is available where a checklist is completed.

  - Theoretically, planners could set a requirement on dwellings to have an allocated area of private space, similar to the requirements of Code. However, this issue is also likely to be linked to site massing and access issues, which may be captured by a design and access statement. To set precedent for this, it may be necessary to incorporate guidance to planners on this matter in an existing or new TAN. PPW section 11 sets out the Welsh Government's planning objective to promote a more sustainable pattern of development, creating and maintaining networks of facilities and open spaces in places well served by sustainable means of travel, in particular within urban areas. This is therefore considered covered in planning.

- Hea 4: Lifetime Homes
  The aim is to promote the construction of homes that are accessible and easily adaptable to meet the changing needs of current and future occupants. Four credits are available where all principles of Lifetime Homes have been met by the dwelling, or three credits are met apart from when either criteria 2 or 3 is applied to selected pathways. There are no mandatory credits available, and there are significant variations in how these credits are claimed. Social housing schemes typically go for all credits, whilst private developers only go for them if short on credits.

  - PPW section 4.11 states that design should go beyond aesthetics and must include the social, environmental and economic aspects of the development, including its construction, operation and management, and its relationship to its surroundings. Figure 4.4 of PPW includes a diagram showing the objectives of good design, one of which is ensuring ease of access for all. Therefore, the first element of the credit is covered here. Access statements are described as being required for buildings - as laid out in Article 7 of the Town and Country Planning (Development Management Procedure) (Wales) Order 2012 and Regulation 6 of the Planning (Listed Buildings and Conservation Areas (Wales) Regulations 2012, as well as TAN 12. Shared facilities are not mentioned explicitly, although the efficient use of resources should be achieved, as outlined in paragraph 4.11.5 of PPW. Additionally PPW section 9.1.2 sets out how LPAs should promote 'barrier free' housing developments, for example built to Lifetime Home standards. In addition, Part M actually already covers several 'reasonable access' items that are addressed under Lifetime Homes. However, the Lifetime Homes standard goes beyond the requirements of Part M. While Part M offers an obvious mechanism for an increase in the standard, the level that may be deemed acceptable under regulation may not include all aspects of the Lifetime Homes standard, hence the level would likely need to be agreed following consultation. This is considered addressed to the extent necessary in Building Regulation Part M and therefore no action is required.

Management

- Man 1: Home User Guide
  The purpose of this issue is 'to promote the provision of guidance to understand and operate their home efficiently and make the best use of local facilities'. Up to 3 credits are available where a home user guide is provided that meets the criteria of the Man 1, Part 1 and 2 Checklists.

  - As with non-domestic buildings, Part L actually requires that adequate information is provided for domestic home owners to ensure that the building can be operated in such a manner as to use no more fuel and power than is reasonable. As with BREEAM Credit Man 04, Building User Information, the level of information to meet Code requirements, supersedes that of Part L. It is a recommendation that the Part L requirements could be enhanced to include missing elements of that within Code and BREEAM.

- Man 2: Considerate Constructors Scheme
  The aim is to promote the environmentally and socially considerate and accountable management of construction sites. Two credits available depending on the scoring achieved for a Considerate Constructor's Scheme (CCS).

  - This could potentially be made a condition of planning that the contractor must undertake CCS (or equivalent) assessments to demonstrate that they are managing the safety and environmental aspects of the construction in a considerate and appropriate manner. It is unlikely that planners could set specific targets that contractors should score under CCS as done in Code, since it is dependent on 3rd party assessment without a defined range of parameters to achieve a given score. Arguably, this aspect may fall more towards a contractor's Corporate Social Responsibility obligations than a planning requirement. Similarly to BREEAM Man 02, it does not fall under planning or regulation however would need further discussion.

- Man 3: Construction Site Impacts
  The aim is to promote construction sites managed in a manner that mitigates environmental impacts. There are two credits available for this credit, one credit is achieved where two or more energy items are monitored, or two credits where 4 or more of the following energy items are monitored: energy use from site activities, energy use of transport to and from site, water consumption, best practices are followed with regard to dust and water pollution and where at least 80% of site timber is reclaimed, re-used or responsibly sourced.

  - All projects tend to achieve this credit as it is relatively easy and cost effective. If no longer enforced via Code, issues of dust nuisance and protection of groundwater sources from pollution would likely still be covered by existing regulations (under Environmental Health). However, it is quite likely that construction companies would no longer sub meter and monitor energy and water usage on site or emissions associated with transport, apart from larger companies that may continue to do it as part of their CSR. PPW paragraph 4.4.3 outlines that waste arising from demolition and construction works should be minimised, and opportunities to recycle and reuse this waste be promoted. This is not addressed in current guidance or regulations to the extent of Code however could be addressed by LPAs if needed. This is not considered a Building Regulation issue.

- Man 4: Security

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

- As with BREEAM Hea 06, two credits are available. Firstly, at design stage an Architectural Liaison Officer (ALO) or Crime Prevention Design Advisor (CPDA) from the local police force is consulted at design stage and their recommendations are incorporated into the design. The second credit requires that 'Section 2- Physical Security from Secured by Design - New Homes' is completed, although a Secured by Design certification is not required. Security can be linked to design and access statements and the principles of Secured by Design are a planning consideration. PPW states that crime prevention should be a material consideration in planning applications and in addition it can be covered in LPA design guides. No action is required.

Land Use and Ecology

- Eco 1: Ecological Value of Site

To promote development on land that already has a limited value to wildlife, and discourage the development of ecologically valuable sites. A single credit is available by using either the Eco 1 checklist or suitably qualified ecologist to confirm that the building site is of low ecological value.

- Most projects tend to achieve these credits, suggesting that the planning process is actually encouraging new development on previously developed land. PPW section 4.9 states that previously developed (or brownfield) land should, wherever possible, be used in preference to greenfield sites, particularly those of high agricultural or ecological value. TAN 5 promotes the conservation and enhancement of statutorily designated areas and undeveloped coast. Aspects of the criterion and partially covered by TAN 5 and PPW section 4.5.11 describes the ambition of the Welsh Government to see Wales use its fair share of resources. As with BREEAM LE 02 this is outlined in PPW, Chapter 4 with the preference for the reuse of land, no action is required.

- Eco 2: Ecological Enhancement

The aim is to enhance the ecological value of the site. There is 1 credit available where a suitable qualified ecologist has been appointed to recommend features that would positively enhance the ecology of the site. During the planning process, internal ecologists are used to provide advice and recommend requirements for enhancements.

- Most projects tend to target these credits, as it is deemed relatively good value to employ an ecologist and carry out their recommendations. PPW Chapter 5 discusses the need to consider protected species and habitat designations as part of the planning process, and that there is mitigation where necessary. In addition PPW goes on to say: species and habitat protection should be fully met in all planning decisions; a LPA ecologist or a consultant ecologist should be engaged; developments should contribute to the protection and improvement of the environment, and that an ecological survey may be required to inform the planning decision. TAN 5 details new habitats or enhancing existing habitats either on or off site. TAN 5 also states that an ecologist should be employed at the pre-application discussion stage. It is considered that this credit is covered in TAN 5 and PPW..

- Eco 3: Protection of Ecological Features

The aim of the credit is to promote the protection of existing ecological features from substantial damage during the clearing of the site and the completion of construction works. There is 1 credit

available where all existing features of ecological value of the development are protected during construction works.

  - PPW section 4.4.3 states that planning policies, decisions and proposals should contribute to the protection and improvement of the environment, so as to improve the quality of life, and protect local and global ecosystems. TAN 5 Chapter 2 discusses how to minimise unavoidable harm by mitigation measures, offset residual harm by compensation measures and look for new opportunities to enhance nature conservation. This is considered covered in TAN 5 and PPW, additionally LPAs can require ecological surveys of a site where they consider this necessary, performed by qualified ecologists.

- Eco 4: Change in Ecological Value of Site
  The credit aims to minimise reductions and promote improvement in ecological value. There is up to 4 credits available, depending on the overall change in species per hectare.

  - Most projects are able to achieve only a minor negative change or a slight positive change in ecological value; hence mid-range credits are generally achieved. This calculation could perhaps be superseded by the requirement to employ an ecologist to give advice on improving the site. TAN 5 Chapter 4 states that a Nature Conservation Management Plan may be undertaken: describing how the site will be managed to conserve and enhance nature conservation on and off-site including who will manage different parts or elements, how management will be funded, reviewed and adapted over time. TAN 5 deals with the ecology value of the site and can be used for enhancement of ecological value, therefore no action required.

- Eco 5: Building Footprint
  To promote the most efficient use of a building's footprint by ensuring that land and material use is optimised across the development. Up to 2 credits are available depending on the ratio between the net internal floor area to the ground floor area.

  - PPW Chapter 9.1.2 states that LPA's should promote sustainable residential developments, barrier free housing built with the most efficient use of land. However it is unlikely that they would set a specific 'default' building footprint or density ratio, as this would be site specific. It may be that this credit can be stipulated by planning, as planners have the ability to recommend on the density of the development.