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BRE Client Report

BRE Integrated Dwelling Level Housing Stock Modelling and Database for Herefordshire Council

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Date: **28 June 2019**

Report Number: **P104090-1034** Issue: **2**

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Executive summary

- Herefordshire Council commissioned BRE to undertake a series of modelling exercises on their housing stock which required BRE to produce an integrated stock model which includes tenure data provided by Herefordshire Council. The BRE models also integrate Energy Performance Certificate (EPC)[1] data. As a result of this, 32,858 addresses have had their imputed energy characteristics replaced with observed characteristics from the EPC data for the purposes of the energy model. The use of this observed data will lead to more accurate energy models for these cases, which account for 39.2% of the total stock in Herefordshire.
- This report describes the work and the results obtained from the integrated model and Housing Stock Condition Database (HSCD). The database is also provided to the council to enable them to obtain specific information whenever required.
- The detailed housing stock information provided in this report will facilitate the delivery of Herefordshire Council's housing strategy and enable a targeted intervention approach to improving housing. In addition to this there are also several relevant government policies – the Housing Act 2004, Housing Strategy Policy, Local Authority Housing Statistics (LAHS) and the Energy Companies Obligation (ECO).
- The main aims of this work were to provide estimates of:
    - The percentage of dwellings meeting each of the key indicators[2] for Herefordshire overall and broken down by tenure and then mapped by Census Output Area (COA) (private sector stock only)
    - Information relating to LAHS reporting for the private sector stock - category 1 hazards and Houses in Multiple Occupation (HMOs) as well as information on EPC ratings
- In addition, Herefordshire Council requested the following information:
    - Property type and dwelling age information
    - Estimates of numbers of Class 4 HMOs
    - Owner occupied sector ability to afford necessary renovations
    - A breakdown of housing indicators at locality and Primary Care Network Area levels
- BRE Housing Stock Models were used to provide such estimates at dwelling level and focussing on private sector housing. The key indicators provide Herefordshire with detailed information on the likely condition of the stock and the geographical distribution of properties of interest.

[1] EPCs are an indication of how energy efficient a building is - with a rating from A (very efficient) to G (inefficient). They are required whenever a property is built, sold or rented.

[2] Presence of a HHSRS category 1 hazard, presence of a category 1 hazard for excess cold, presence of a category 1 hazard for falls, dwellings in disrepair, fuel poverty (10% and Low Income High Cost definitions), dwelling occupied by a low income household and SimpleSAP rating.

- A stock modelling approach has been developed and used by BRE for many years and the most recent 2017 models have been updated to make use of the results of the 2014 English Housing Survey (EHS)[3]. The models also make use of Experian and Ordnance Survey (OS) data. OS AddressBase Plus is used as a basis for the list of all dwellings in the authority, and applying improved geo-modelling[4] is used to determine the dwelling type and floor area from OS Mastermap. The energy model that lies at the heart of the modelling process are based on the 2012 version of SAP, and the methods for imputing the inputs to this model incorporate information sources from additional sources. These include the age of postcodes (to improve dwelling age data) and data from Xoserve to determine whether the dwelling is on the gas network. These dwelling level models are used to estimate the likelihood of a particular dwelling meeting the criteria for each of the key indicators. These outputs can then be mapped to provide the authority with a geographical distribution of each of the key indicators which can then be used to target resources for improving the housing stock.
- Furthermore, Herefordshire Council provided an additional source of "local data" relating to tenure. Energy Performance Certificate (EPC) data is also integrated by BRE. These data sets were then incorporated into the BRE Housing Stock Model to produce an integrated Housing Stock Condition Database (HSCD).
- The headline results are provided on the following page:

[3] 2014 is the latest available data. Prior to the 2017 models EHS 2012 data was used.

[4] The OS data has been used to update a number of the model inputs – the main value of the OS data is the ability to determine the dwelling type with much greater confidence – see **Appendix B** for more information.

Headline results for Herefordshire

There are 83,765 dwellings in Herefordshire, 68% are owner occupied, 18% private rented and 14% social rented.

19,358 dwellings in the private sector have category 1 Housing Health and Safety Rating System (HHSRS) hazards. This equates to 27% of properties. *See full results*

3,813 dwellings in the private rented sector have category 1 HHSRS hazards. This equates to 25% of properties in the private rented sector. *See full results*

The highest concentrations of all HHSRS hazards in the private sector are found in the wards of Birch, Castle and Golden Valley North. *See full results*

The highest concentrations of fuel poverty (Low Income High Costs definition) in the private sector are found in the wards of Birch, Old Gore and Golden Valley South and for excess cold the highest concentrations are in Birch, Castle and Golden Valley South. *See full results*

The average SimpleSAP rating for all private sector dwellings in Herefordshire is 52, which is worse than both England (60) and West Midlands (58). For owner occupied stock the figure is 51 and for private rented stock it is 54. *See full results*

Maps by Census Output Area (COA) have been provided for the above key indicators. *See maps*

The total cost of mitigating category 1 hazards in Herefordshire's private sector stock is estimated to be £54.0 million – with £43.4 million in the owner occupied sector, and £10.6 million in the private rented sector. *See full results*

There is an estimated total of 1,590 HMOs in Herefordshire, of which approximately 544 would come under the mandatory licensing scheme. *See full results*

23.8% (17,149) of *private sector* dwellings and 20.6% (3,131) of *private rented* dwellings in Herefordshire are estimated to have an EPC rating below band E. *See full results*

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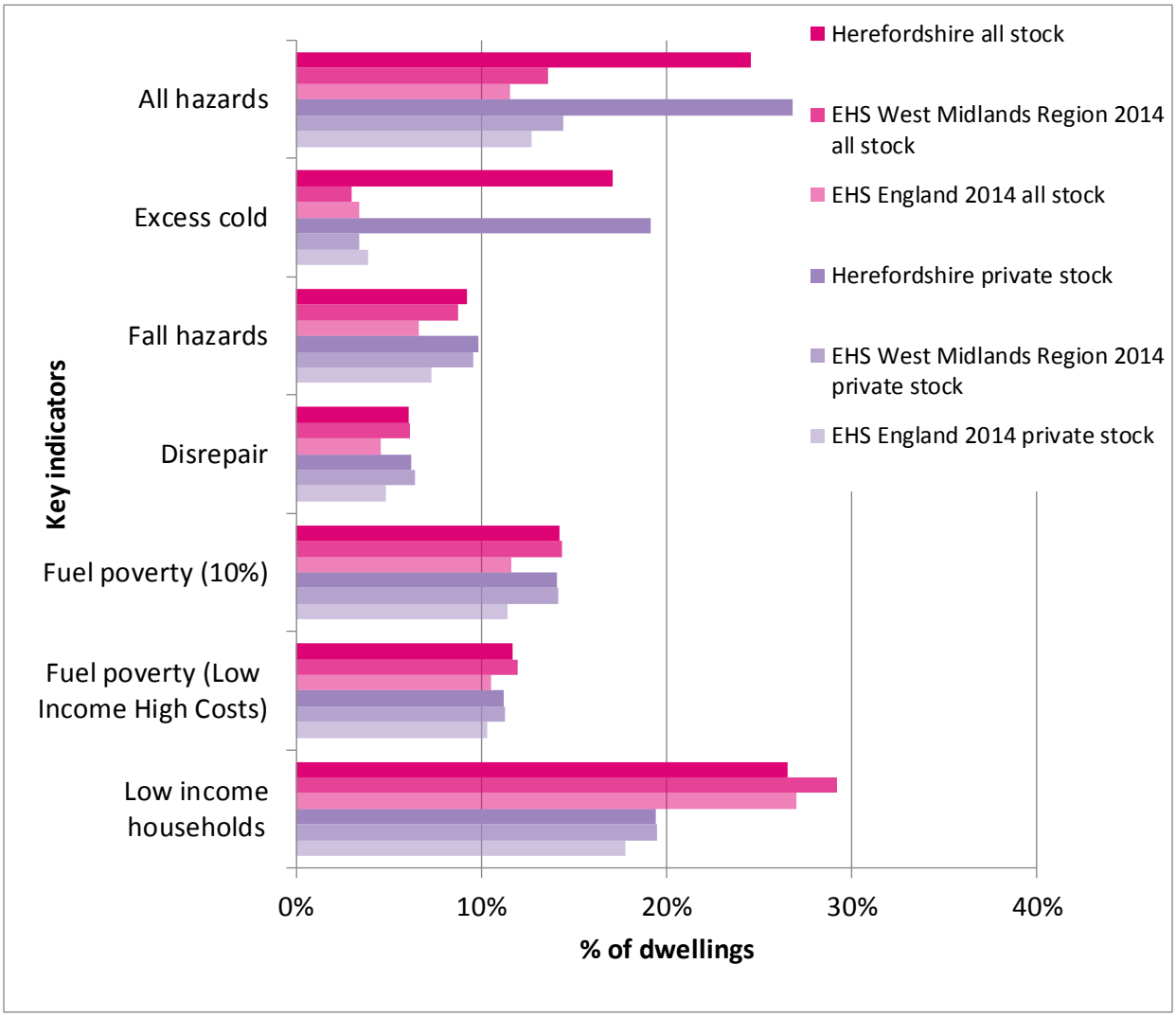
Key illustrations of headline results

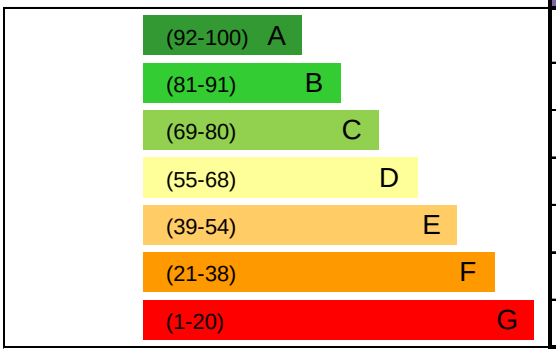
- The table below shows the results for 7 of the key indicators in Herefordshire compared to regional data and England (EHS 2014) - split into all stock and private sector stock. The data shows that the performance of the housing stock in Herefordshire compared to the EHS England average is generally worse with Herefordshire performing significantly worse for all hazards and excess cold and slightly worse for the remaining indicators, with the exception of low income households for which there are similar levels. Compared to the regional average, again Herefordshire has significantly higher levels of all hazards and excess cold but levels of fall hazards, disrepair and fuel poverty are similar and levels of low income households are slightly lower.

Estimates of the percentage of dwellings meeting the key indicator criteria assessed by the housing stock models and database for all stock and private sector stock – Herefordshire compared to the West Midlands and England (EHS 2014)



- The table below shows the number and percentage of Herefordshire's private rented stock falling into each of the EPC ratings bands (based on SimpleSAP). The number of private rented dwellings in Herefordshire with a rating below band E (i.e. bands F and G), is estimated to be 3,131 (20.6%). Compared to England, there is a significantly greater proportion of dwellings in bands E, F and G and lower proportions in bands C and D.

Number and percentage of Herefordshire's private rented stock falling into each of the EPC ratings bands (based on SimpleSAP)



	Herefordshire		2014 EHS England
	Count	Percent	Percent
(92-100) A	0	0.0%	1.4%
(81-91) B	74	0.5%	
(69-80) C	2,957	19.5%	23.8%
(55-68) D	5,927	39.1%	48.9%
(39-54) E	3,086	20.3%	18.3%
(21-38) F	2,290	15.1%	5.4%
(1-20) G	841	5.5%	2.1%

- The map overleaf shows the distribution of category 1 hazards, as defined by the Housing Health and Safety Rating System (HHSRS). The highest concentrations are generally in the more rural parts of the Herefordshire area, in particular the wards of Birch (labelled as ward number 5), Castle (ward number 11) and Golden Valley north (ward number 17).

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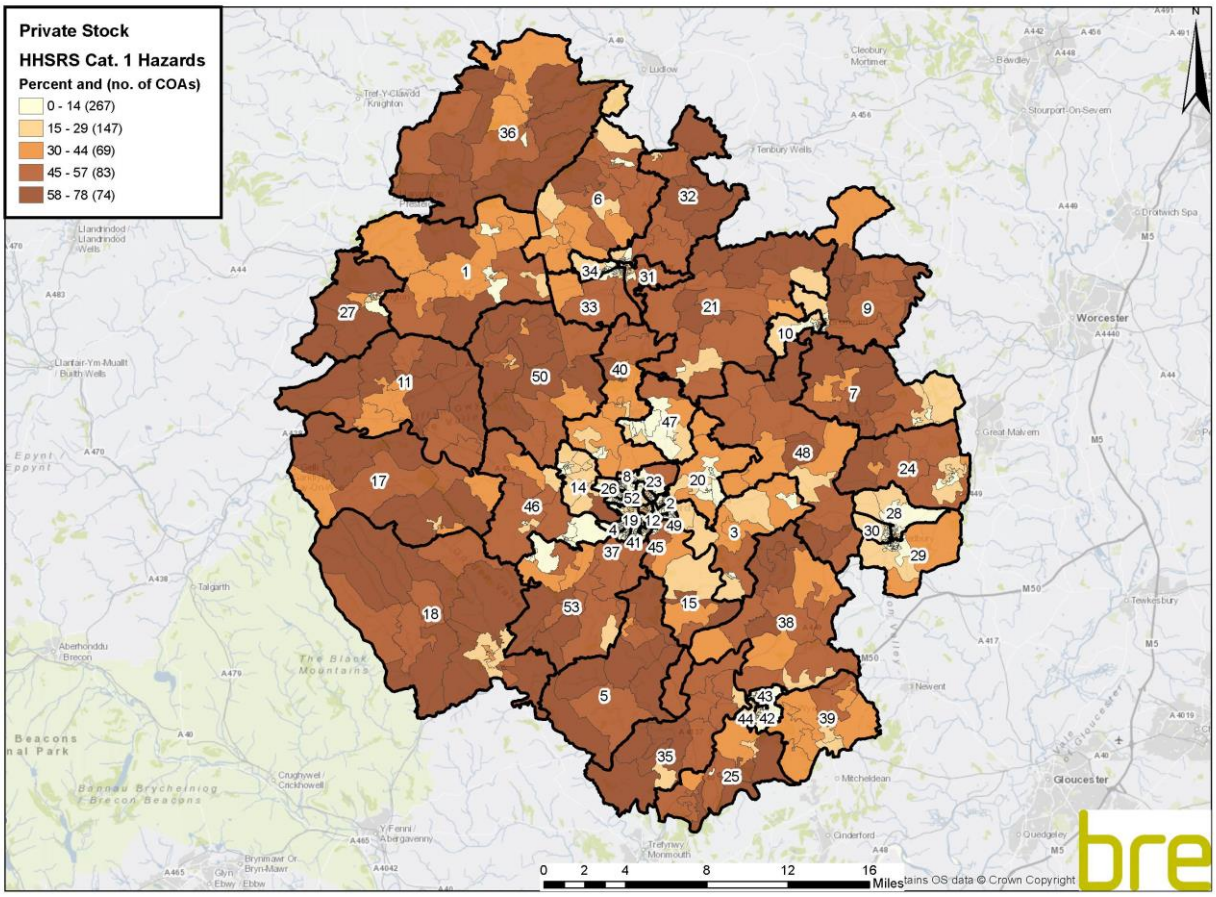
Percentage of private sector dwellings in Herefordshire with the presence of a HHSRS category 1 hazard
See ward key



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1 Introduction

Herefordshire Council commissioned BRE to undertake a series of modelling exercises on their housing stock. BRE have integrated data provided by the authority into the models to produce an integrated database and corresponding report. This report describes the modelling work and provides details of the results obtained from the integrated dwelling level model and database.

This current report covers the BRE Integrated Dwelling Level Stock Models and Database. Herefordshire Council provided tenure data. The BRE Model also integrates Energy Performance Certificate (EPC) data and as a result of this, 32,858 addresses have had their imputed energy characteristics replaced with observed characteristics from the EPC data for the purposes of the energy model. The use of this observed data will lead to more accurate energy models for these cases, which account for 39.2% of the total housing stock in Herefordshire.

This report describes that work and the results obtained from the integrated model and database. The integrated database is also provided to the council to enable them to obtain specific information whenever required. This database is now in an online format.

The stock models and database provide the council with dwelling level information on various key housing indicators, focussing on private sector housing. The key indicators provide Herefordshire Council with detailed information on the likely condition of the stock and the geographical distribution of properties of interest. These properties are likely to be suitable targets for energy efficiency improvements or other forms of intervention, such as mitigating Housing Health and Safety Rating System (HHSRS) hazards. The key indicators are split into categories related to house condition, energy efficiency and household vulnerability as shown in **Table 1** (see **Appendix A** for full definitions).

Table 1: Key indicators split into categories

Indicator	House condition indicators	Energy efficiency indicators	Household vulnerability indicators
Presence of HHSRS cat 1 hazard	✓		
Presence of cat 1 hazard for excess cold	✓	✓	
Presence of cat 1 hazard for falls	✓		
Dwellings in disrepair	✓		
Fuel Poverty (10% and Low income, High cost definitions)			✓
Dwellings occupied by low income households			✓
SimpleSAP rating		✓	

N.B. Presence of category 1 hazard for falls does NOT include the hazard of falling between levels

The single indicators shown in **Table 1** can also be combined within the database to provide powerful information on the housing stock, for example dwellings suffering from excess cold and also occupied by households on a low income. The true potential of the database lies in its ability to produce combined indicators such as this, as it allows council officers to explore the stock and to assess the likely scope of any programmes they might wish to implement.

It is also possible to extract other information from the database which is of use to local authorities. This information includes estimates relating to the Ministry of Housing, Communities and Local Government's (MHCLG) Local Authority Housing Statistics (LAHS) reporting of costs of mitigating hazards, numbers of Houses in Multiple Occupation (HMOs) as well as providing information relating to Energy Performance Certificate (EPC) ratings.

The key indicators and other information are derived from the Housing Stock Condition Database (HSCD) which is made up of a series of Dwelling Level Stock Models. The BRE Dwelling Level Stock Models have been used for many years to provide key housing indicators to local authorities. The most recent 2017 models have been updated to make use of the results of the 2014 English Housing Survey (EHS)[5]. The models also make use of Experian and Ordnance Survey (OS) data. OS AddressBase Plus is used as a basis for the list of all dwellings in the authority, and applying improved geo-modelling[6] is used to determine the dwelling type and floor area from OS Mastermap. The energy model that lies at the heart of the modelling process is based on the 2012 version of SAP, and the methods for imputing the inputs to this model incorporate information sources from additional sources. These include the age of postcodes

[5] 2014 is the latest available data. Prior to the 2017 models EHS 2012 data was used.

[6] The OS data has been used to update a number of the model inputs – the main value of the OS data is the ability to determine the dwelling type with much greater confidence – see **Appendix B** for more information.

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(to improve dwelling age data) and data from Xoserve to determine whether the dwelling is on the gas network. These dwelling level models are used to estimate the likelihood of a particular dwelling meeting the criteria for each of the key indicators. These outputs can then be mapped to provide the authority with a geographical distribution of each of the key indicators which can then be used to target resources for improving the housing stock.

As described above, in this particular case, the database was further enhanced by the addition of local data sources which were identified by Herefordshire Council. These local data sources were incorporated into the stock models to produce the integrated database.

The information in the database can be used to ensure the council meets various policy and reporting requirements. For example, local housing authorities are required to review housing conditions in their districts in accordance with the Housing Act 2004[7].

Furthermore, having this information available will also help to facilitate the delivery of Herefordshire Council's housing strategy. It will enable a targeted intervention approach to improving housing; therefore allowing the council to concentrate their resources on housing in the poorest condition or with the greatest health impact.

1.1 Project aims

The main aim of this project was to provide data on key private sector housing indicators for Herefordshire. The main aims of this work were therefore to provide estimates of:

- The percentage of dwellings meeting each of the key indicators for Herefordshire overall and broken down by tenure and then mapped by Census Output Area (COA) (private sector stock only)
- Information relating to LAHS reporting for the private sector stock - category 1 hazards and HMOs, plus information on EPC ratings

In addition, Herefordshire Council requested the following information:

- Property type and dwelling age information
- Estimates of numbers of Class 4 HMOs
- Owner occupied sector ability to afford necessary renovations
- A breakdown of housing indicators at locality and Primary Care Network Area levels

This report looks firstly at the policy background and why such information is important for local authorities. Secondly, it provides a brief description of the overall stock modelling approach and the integration of the local data sources. Finally, this report provides the modelling results for Herefordshire covering each of the main aims above.

[7] http://www.legislation.gov.uk/ukpga/2004/34/contents

2 Policy background

The detailed housing stock information provided in this report will facilitate the delivery of Herefordshire Council's housing strategy and enable a targeted intervention approach to improving housing. This strategy needs to be set in the context of relevant government policy and legislative requirements. These policies either require reporting of housing-related data by local authorities, or the use of such data to assist in meeting policy requirements. The main policies and legislative requirements are summarised in the following sub-sections.

2.1 Housing Act 2004

The Housing Act 2004[7] requires local housing authorities to review housing statistics in their district. The requirements of the Act are wide-ranging and also refer to other legislation which between them covers the following:

- Dwellings that fail to meet the minimum standard for housings (i.e. dwellings with HHSRS category 1 hazards)
- Houses in Multiple Occupation (HMOs)
- Selective licensing of other houses
- Demolition and slum clearance
- The need for provision of assistance with housing renewal
- The need to assist with adaptation of dwellings for disabled persons

2.2 Key housing strategy policy areas and legislation

2.2.1 Private rented sector

In the report "Laying the Foundations: A Housing Strategy for England"[8] Chapters 4 and 5 focus on the private rented sector and empty homes.

New measures are being developed to deal with rogue landlords and to encourage local authorities to make full use of enforcement powers for tackling dangerous and poorly maintained dwellings. The report encourages working closely with landlords whilst still operating a robust enforcement regime (e.g. Landlord Forums and Panels across the country).

There has been significant growth in the private rented sector in Herefordshire in recent years from 9% of the total stock in 2001 to 17% in 2011[9] - so that 8% of the stock has changed over that time period to now being private rented. This is similar to the change of 9% seen in England as a whole. The analysis for this current report estimates that 18% of the stock in Herefordshire is now privately rented, implying a further increase since 2011.

[8] Laying the Foundations: A Housing Strategy for England, CLG, 2011

[9] https://www.ons.gov.uk/census#censusdataandbackground

2.2.2 Health inequalities

The government's white paper "Choosing Health"[10] states that the key to success in health inequalities will be effective local partnerships led by local government and the NHS working to a common purpose and reflecting local needs. Housing is a key determinant of health, and poor housing conditions continue to cause preventable deaths and contribute to health inequalities[11]. An example in this area is the work carried out by Liverpool City Council in partnership with Liverpool Primary Care Trust – the "Healthy Homes Programme". This has identified over 3,800 hazards and led to an estimated £4.8 million investment by landlords, delivering sustainable health improvements and enhancing community wellbeing.

2.2.3 Integrated care

It has been recognised by central government that to fully address the health needs of the population, services need to become more integrated and there needs to be better communication between different providers. Housing is a key aspect of this:

"Many people with mental and physical disabilities, complex needs, long-term conditions and terminal illness also need to access different health care, social care, housing and other services, such as education, and often simultaneously"[12].

It is therefore essential that departments providing or regulating housing work with other council departments and health organisations to provide services that are integrated and take full account of the needs of the individual.

2.2.4 Public Health Outcomes Framework

The Public Health Outcomes Framework "Healthy lives, healthy people: Improving outcomes and supporting transparency"[13] sets out desired outcomes for public health and how they will be measured. Many of the measurements have links to housing, some of the more relevant being:

- Falls and injuries in over 65's
- Fuel poverty
- Excess winter deaths

2.2.5 Joint Strategic Needs Assessment (JSNA) and Joint Health and Wellbeing Strategies

The JSNA and joint health and wellbeing strategy allow health and wellbeing boards to analyse the health needs of their local population and to decide how to make best use of collective resources to achieve the priorities that are formed from these. The Department of Health document "Joint Strategic Needs Assessment and joint health and wellbeing strategies explained - Commissioning for populations" says

[10] Choosing Health: Making healthy choices easier, Department of Health, 2004

[11] The health impacts of poor private sector housing, LACORS, 2010

[12] Integrated Care: Our Shared Commitment, Department of Health, 2013

[13] Healthy lives, healthy people: Improving outcomes and supporting transparency, Department of Health, 2013

"This will ensure better integration between public health and services such as housing and education that have considerable impact on the wider determinants of health"[14].

2.2.6 Energy Act 2011

The Energy Act 2011 requires that from 2016 reasonable requests by tenants for energy efficiency improvements will not be able to be refused. Furthermore, from 2018 it will be unlawful for landlords to rent out properties that do not reach a minimum standard of energy efficiency (set at Energy Performance Certificate rating E[15]). While there will be various caveats to these powers, they will provide a new minimum standard for rented accommodation. Part of this current project for Herefordshire Council includes provision of a private rented sector variable that should assist in identifying such dwellings.

2.2.7 Empty homes

The need to bring empty private sector dwellings back into use is a key government objective that is part of a wider strategy to tackle housing affordability. It is generally accepted that in a time of housing shortage, empty dwellings represent a wasted resource.

Empty homes brought back into use will qualify for the New Homes Bonus where, for the following 6 years, the government will match fund the Council Tax on long term empty properties brought back into use. Between 2012-15, £100 million of capital funding was available from within the Affordable Homes Programme to tackle problematic[16] empty homes. There is no longer any separate funding for empty homes under the 2015-18 Affordable Homes Programme, although they are legitimate forms of Affordable Rent provision that could be included in bids for the 2015-18 Affordable Homes Programme[17].

There are a number of issues in dealing with private sector vacant dwellings including the transient nature of vacant dwellings and their difficulty of identification. Properties are being continually bought and sold, let and modernised, which means that at any given time a proportion of the stock will be naturally vacant. The only dwellings that tend to be of most interest to local authorities are those that are not turning over in the normal way.

Whilst the data provided by this project cannot necessarily assist with the actual identification of empty homes, the database provided would be the logical place for such information to be stored should it be gathered from other sources.

The latest available information for Herefordshire for 2018, collected by MHCLG[18], identifies 947 vacant dwellings across all tenures. In 2017 the figure was slightly higher at 976, and 5 years ago in 2013 the figure was 1,720. The 2018 figures represent a vacancy rate of approximately 1% in Herefordshire. Furthermore, around 261 (0.3%) dwellings are long-term vacant (6 months or more) in Herefordshire.

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[14] Joint Strategic Needs Assessment and joint health and wellbeing strategies explained: Commissioning for populations, Department of Health, 2011

[15] http://www.legislation.gov.uk/uksi/2015/962/contents/made

[16] Properties that are likely to remain empty without direct financial support from government.

[17] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/343896/affordable-homes-15-18-framework.pdf

[18] https://www.gov.uk/government/collections/dwelling-stock-including-vacants

2.3 Other policy areas

The following policy areas, whilst not directly relating to environmental health services, will have an effect on demand and local authorities will need to be aware of the possible impact in their area.

2.3.1 The Housing and Planning Act 2016

The Housing and Planning Act 2016[19] introduces legislation for government to implement the sale of higher value local authority homes, starter homes, pay to stay and a number of other measures, mainly intended to promote home ownership and boost levels of housebuilding in England. Although many of the measures have yet to be implemented or come into effect, the following policy changes will have a significant impact on the way councils deliver their Housing Services:

- The introduction of Pay to Stay where households earning over £31,000 have to pay higher levels of rent for their social housing
- Extension of the Right-to-Buy scheme to housing associations through a voluntary agreement, funded by the sale of higher value council properties when they become vacant
- The ending of lifetime tenancies – all new tenants will have to sign tenancies for a fixed term up to 10 years although there will be exemptions for people with disabilities and victims of domestic abuse, and families with children under nine years old can have a tenancy that lasts until the child's 19th birthday
- Changes to planning measures so that the government can intervene where councils have not adopted a Local Plan
- To replace the need for social rented and intermediate housing on new sites with the provision of Starter Homes that are sold at a reduced cost to first time buyers
- Changing the definition of 'affordable homes' to include starter homes
- Increasing the site size threshold before affordable housing can be requested

The Act also includes a package of measures to help tackle rogue landlords in the private rented sector. This includes:

- Allowing local authorities to apply for a banning order to prevent a particular landlord/letting agent from continuing to operate where they have committed certain housing offences
- Creating a national database of rogue landlords/letting agents, which will be maintained by local authorities
- Allowing tenants or local authorities to apply for a rent repayment order where a landlord has committed certain offences (for example continuing to operate while subject to a banning order or ignoring an improvement notice). If successful the tenant (or the authority if the tenant was receiving universal credit) may be repaid up to a maximum of 12 months' rent
- Introducing a new regime giving local authorities an alternative to prosecution for offences committed under the Housing Act 2004, including all HMO offences. Effectively, local authorities will have a choice whether to prosecute or impose a penalty with a maximum fine of £30,000. The local authority can also retain the money recovered, which is not currently the case with fines imposed in the magistrates' court

2.3.2 The Welfare Reform and Work Act 2016 and the Welfare Reform Act 2012

The Welfare Reform and Work Act 2016[20] gained royal assent in March 2016. The Act introduces a duty to report to Parliament on progress made towards achieving full employment and the three million

[19] http://www.legislation.gov.uk/ukpga/2016/22/contents/enacted/data.htm

[20] http://www.legislation.gov.uk/ukpga/2016/7/contents/enacted

apprenticeships target in England. The Act also ensures reporting on the effect of support for troubled families and provision for social mobility, the benefit cap, social security and tax credits, loans for mortgage interest, and social housing rents. These include the following:

- Overall reduction in benefits – a four year freeze on a number of social security benefits
- Benefit cap reduction – the total amount of benefit which a family on out of work benefits can be entitled to in a year will not exceed £20,000 for couples and lone parents, and £13,400 for single claimants, except in Greater London where the cap is set at £23,000 and £15,410 respectively
- Local Housing Allowance rent cap – this is the locally agreed maximum benefit threshold for a dwelling or household type within a defined geographical area. Therefore, if rises in rent outstrip growth in income, renters may find it increasingly difficult to pay
- A 1% reduction in social rents per year for 4 years to reduce the housing benefit bill

In addition, the Welfare Reform Act 2012[21] (which is in parts amended by the 2016 Act discussed above) covers areas of environmental health services – in particular the sections relating to the under occupation of social housing, and the benefit cap. Whilst this will mainly affect tenants in the social rented sector it will undoubtedly have an impact on private sector services. Social tenants may find themselves being displaced into the private sector, increasing demand in this area, and the tenants of Registered Providers (RP's) and some private landlords may have greater trouble affording rent payments. If tenants are in arrears on their rental payments then authorities may be met with reluctance from landlords when requiring improvements to properties.

2.3.3 Localism Act 2011

The Localism Act allows social housing providers to offer fixed term, rather than secure lifetime, tenancies. As with the Welfare Reform Act, this has a greater direct impact on the social rented sector, however, there is some concern this may lead to greater turnover of tenancies meaning such that some traditional social tenants may find themselves in the private rented sector.

Both of these policy changes above may increase the number of vulnerable persons in private sector properties. If this occurs any properties in this sector in poor condition are likely to have a far greater negative impact on the health of those occupiers.

2.3.4 Potential increase in private rented sector properties

Policies such as the Build to Rent and the New Homes Bonus are aimed at increasing the supply of properties. As the private rented sector is already growing, it is reasonable to assume that many of the new properties being built will be rented to private tenants. Local authorities will need to be aware of the potential impact on the demand for their services and how their perception of their local area may have to change if large numbers of properties are built.

2.4 Local Authority Housing Statistics (LAHS)[22] and EPC ratings

The purpose of these statistics is twofold – firstly to provide central government with data with which to inform and monitor government strategies, policies and objectives as well as contributing to national statistics on housing, secondly, to the local authorities themselves to help manage their housing stock. Local authorities are required to complete an annual return which covers a wide range of housing-related

[21] http://www.legislation.gov.uk/ukpga/2012/5/contents/enacted

[22] https://www.gov.uk/government/publications/completing-local-authority-housing-statistics-2012-to-2013-guidance-notes

issues. Of particular relevance to this current project is “Section F: Condition of dwelling stock” which, amongst other things, requests the following information:

- Estimates of the number of HMOs and the number of mandatory licensable HMOs

Whilst the LAHS no longer requires reporting of total number of dwellings and number of private sector dwellings with category 1 HHSRS hazards and the estimated costs of mitigating these, this information is still of use to understand the extent of these hazards within a local authority.

The LAHS no longer requires reporting of average EPC ratings of the private sector stock and the proportion below a certain rating; however, this information remains pertinent due to the Energy Act 2011. Under this act new rules mean that from 2018 landlords must ensure that their properties meet a minimum energy efficiency standard - which has been set at band E - by 1 April 2018[23, 24]. Furthermore, from 1 April 2016, tenants in F and G rated dwellings have been able to legally request an upgrade to the dwelling to a minimum of a band E. Results relating to LAHS statistics and EPC ratings can be found in **Section 4.2**.

2.5 The Energy Company Obligation (ECO)

The Energy Companies Obligation (ECO) requires energy companies to assist in the installation of energy efficiency measures in Great Britain to low income and vulnerable households or those living in hard-to-treat (HTT) properties. Under the ECO, energy companies are obliged to meet targets expressed as carbon or costs saved. There have been several ECO schemes to date, with the latest scheme commencing in December 2018:

- ECO1 - ran from January 2013 to March 2015
- ECO2 - launched on 1 April 2015 and ended on 31 March 2017
- ECO2t - was an 18 month extension to the ECO2 scheme until September 2018[25, 26] as a transition period between the end of ECO2 and a new scheme.
- ECO3[27]- the new scheme commenced on 3 December 2018 and runs until 31 March 2022

2.5.1 Current scheme – ECO3

ECO3 focuses on Affordable Warmth (the Carbon Emissions Reduction Obligation – CERO – will be removed) so that low income, vulnerable and fuel poor households are the recipients of the main benefits. This will be delivered through one obligation, the Home Heating Cost Reduction Obligation (HHCRO)

[23] http://www.legislation.gov.uk/uksi/2015/962/contents/made

[24] Although landlords will still be able to rent out F and G rated properties after this date they will not be able to renew or sign a new contract.

[25] Energy Company Obligation (ECO): Help to Heat: https://www.gov.uk/government/consultations/energy-company-obligation-eco-help-to-heat

[26] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/586266/ECO_Transition_Final_Stage_IA__For_Publication_.pdf

[27] https://beisgovuk.citizenspace.com/home-local-energy/eco3-2018-2022/supporting_documents/ECO3%20consultation.pdf

where obligated suppliers must mainly promote measures which improve the ability of low income, vulnerable and fuel poor households to heat their homes. This includes actions that result in heating savings such as the replacement of a broken heating system or the upgrade of an inefficient heating system. Up to 25% of the obligation can be met through measures delivered under Local Authority Flexible Eligibility, where local authorities are encouraged to use their expertise to identify the most vulnerable households in their areas. Suppliers will also need to meet at least 15% of their obligation by delivering measures in rural areas.

In terms of measures and improvements, the focus will be on replacing electric storage heaters with central heating, improve 17,000 solid wall dwellings every year, replace broken heating systems (maximum of 35,000 per year), encourage the replacement of heating systems only when also installing certain types of insulation. In addition, Renewable Heat Incentive measures would not be eligible under ECO3, and suppliers would be able to meet up to 10 – 20% of their obligation through “innovative measures”.

The results for the basic energy efficiency variables are covered in this report and assist in the identification of dwellings which may benefit from energy efficiency improvements. Such information also provides a valuable contribution to the evidence base increasingly being required to support competitive funding bids to central government for housing improvements.

3 Overview of the BRE Dwelling Level Housing Stock Modelling approach

3.1 Overview

This section provides a simplified overview of the BRE dwelling level housing stock modelling approach. More detail on the methodology is provided in **Appendix B**.

A stock modelling approach has been developed and used by BRE for many years and dwelling level models are used to estimate the likelihood of a particular dwelling meeting the criteria for each of the key indicators (and other outputs of interest). These outputs can then be mapped to provide the council with a geographical distribution of each of the key indicators which can then be used to target resources for improving the housing stock. The process itself is actually made up of a variety of data sources, calculations and models.

The models are principally informed by the Ministry of Housing, Communities and Local Government's (MHCLG) English Housing Survey (EHS)[28]. The survey is not used to supply data for the database, but rather it allows the identification of patterns in the housing stock, so that this knowledge can be applied, in the form of mathematical algorithms, to impute key indicators and energy characteristics from other data available at the national level. The particular approach for Herefordshire, however, makes significant use of the Experian UK Consumer Dynamics Database of dwelling and household indicators as inputs to the models. One example is the BRE SimpleCO_2 Model which is based on dwelling level inputs from Experian and expands on these using imputation techniques to provide sufficient information to calculate the likely energy efficiency of each dwelling in the stock. Some of the key housing indicators, such as HHSRS excess cold category 1 hazards and BRE's SimpleSAP[29], can be directly inferred from this data.

Furthermore, Herefordshire Council provided an additional source of local data relating to tenure which was then incorporated into the BRE Housing Stock Model and Database, as well as EPC data, to produce an integrated housing stock model and database. The additional data provided and how it was used is as follows:

- **EPC data** – EPCs contain data on key dwelling energy characteristics (e.g. wall type and insulation, loft insulation, heating types etc.) and where these were available they were used in preference to the modelled data. It should be noted that to comply with bulk EPC data licencing requirements the EPC data is only used to inform the energy efficiency aspects of the model.
- **Tenure data –** the council provided lists of addresses recorded on private rented sector tenure deposit schemes – Deposit Protection Service (DPS), My Deposits and Tenure Deposit Scheme (TDS). This data was used to inform the tenure variable.

Figure 1 shows a simplified flow diagram of the overall BRE housing stock modelling approach and how the additional data is incorporated to produce the integrated Housing Stock Condition Database (HSCD).

[28] The most recent survey used in the housing stock models is 2014.

[29] A Simplified version of the SAP model that produces an output broadly comparable to SAP. The SimpleSAP model is distinct from both full SAP and RD SAP in that uses a smaller, simplified set of inputs.

The process is made up of a series of data sources and models which, combined with various imputation and regression techniques and the application of other formulae, make up the final database. The database is essentially the main output of the modelling and provides information on the key indicators and other data requirements (e.g. energy efficiency variables). More detailed information on the data sources and models is provided in **Appendix B**, but to summarise:

The data sources are:
EHS, EPC, Experian, Ordnance Survey (OS) MasterMap, other local data (if available)

The Models are:
SimpleSAP, Fuel Poverty, HHSRS (all hazards, falls hazards and excess cold), Disrepair and Low Income Households.

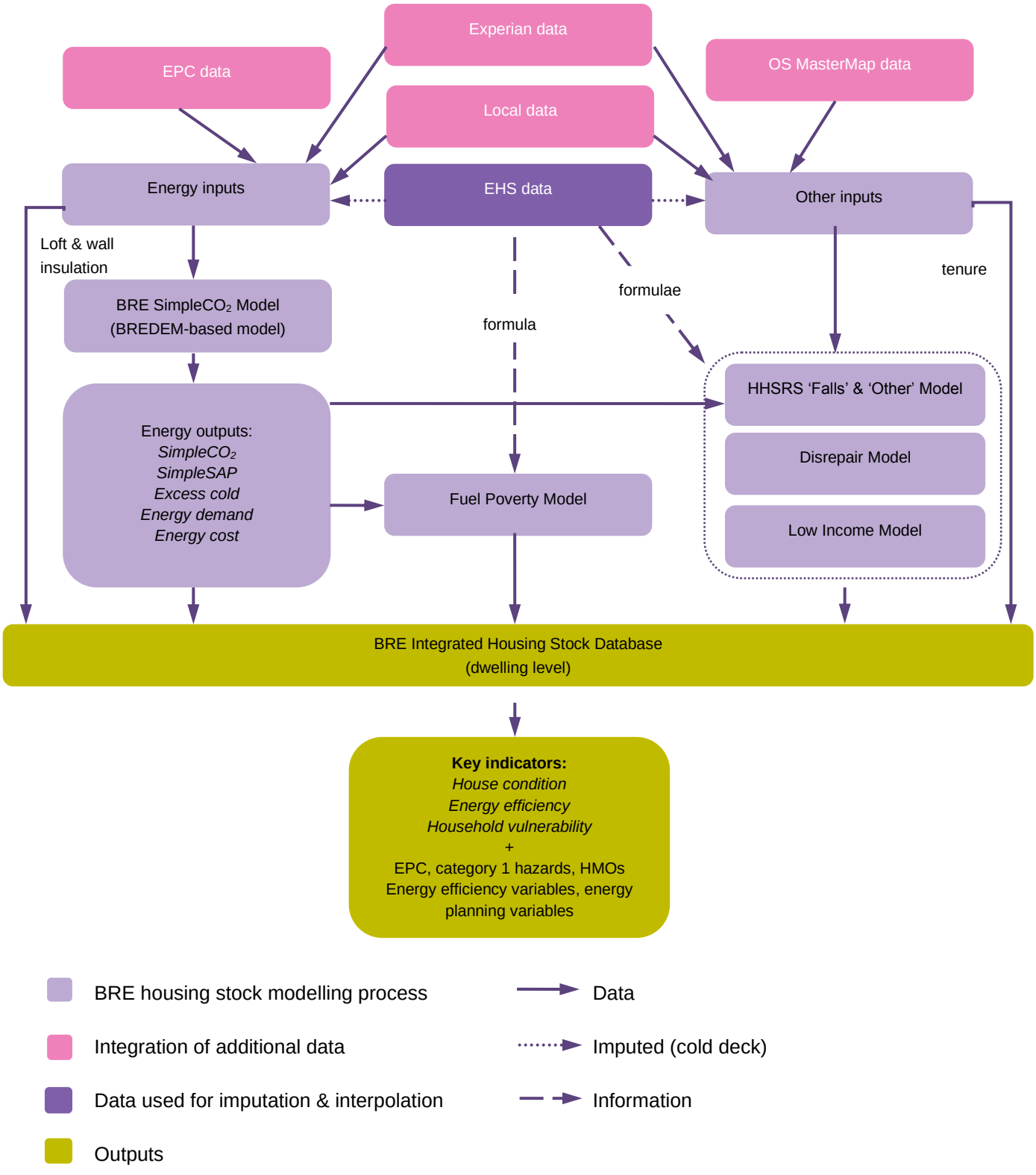
The data sources and models are linked as shown in the flow diagram and the modelling process itself can be divided into “energy inputs” and “other inputs”, which are summarised as follows:

Energy inputs - are developed from Experian, EPC and other local data sources (if available). The EHS data is used to impute (using cold deck imputation[30]) and interpolate where there are gaps in the data. The “energy inputs” are then fed into the SimpleCO_2 Model to produce the “energy outputs” for the database plus information on excess cold for the HHSRS Model and information on energy costs for the Fuel Poverty Model.

Other inputs – are developed from Experian, OS MasterMap and other local data sources. The EHS data is used to impute (using cold deck imputation[30]) and interpolate where there are gaps in the data. The “other inputs” are then fed into the HHSRS, Disrepair, and Low Income Models (note that tenure data is fed directly into the database). Information from the EHS also feeds into the Fuel Poverty, HHSRS, Disrepair and Low Income Models.

[30] Cold deck imputation is a process of assigning values in accordance with their known proportions in the stock.

Figure 1: Simplified flow diagram of overall BRE housing stock modelling approach (N.B. the EHS data is only used to inform the mathematical algorithms of the model – it does not provide data)



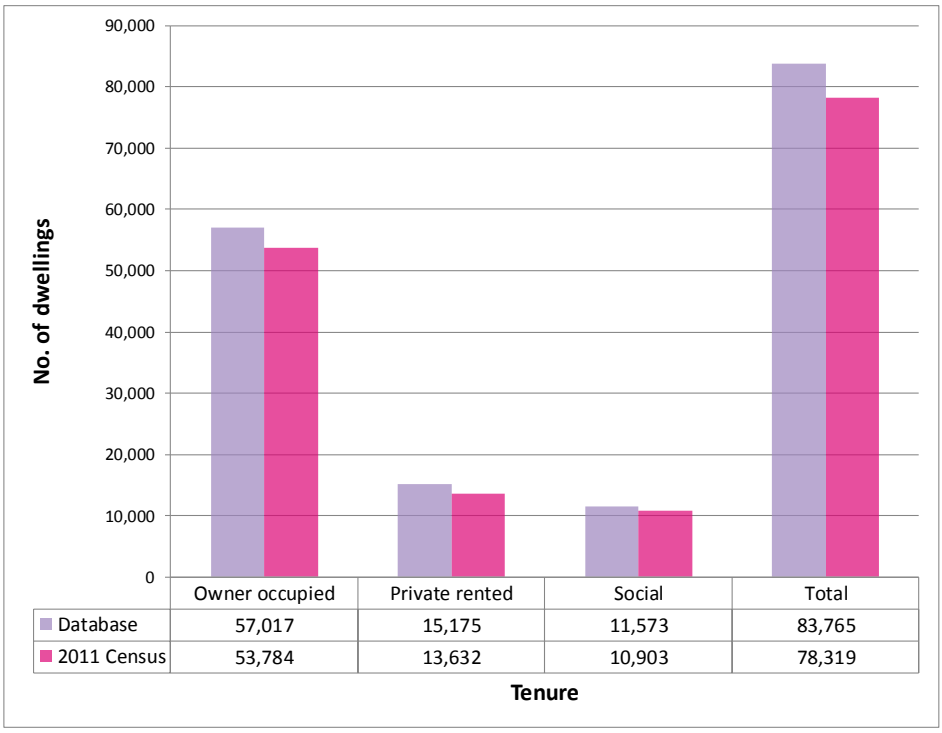
3.2 Breakdown of the housing stock by tenure - validation

Providing the results split by tenure is useful since it can have an effect on how resources and improvement policies are targeted. This report is particularly focussed on private sector stock which is made up of owner occupied and private rented dwellings. The remainder of the housing stock consists of social housing.

The total number of dwellings in Herefordshire from the integrated housing stock condition database is based on OS AddressBase, therefore the model is based on this value. The tenure split within the integrated database is derived from the purchased Experian tenure variable for addresses where tenure has not been supplied by the council.

Since it is possible for private rented dwellings to become owner occupied and vice versa relatively easily, it is difficult to accurately predict the actual tenure split at any given point in time. A validation process was undertaken to compare the tenure split from the database to the 2011 Census figures[31]. The results of the validation exercise show the differences between the tenure split from the database compared to the Census figures. There has been a noticeable increase in the size of the stock, mainly comprised of increases in the size of the owner occupied and, to a lesser extent, the private rented tenure (see **Figure 2**). Furthermore, **Maps 1** and **2** show the geographical distributions of the private rented sector which look similar, again giving confidence that the integrated database provides a good overview of the housing stock in Herefordshire.

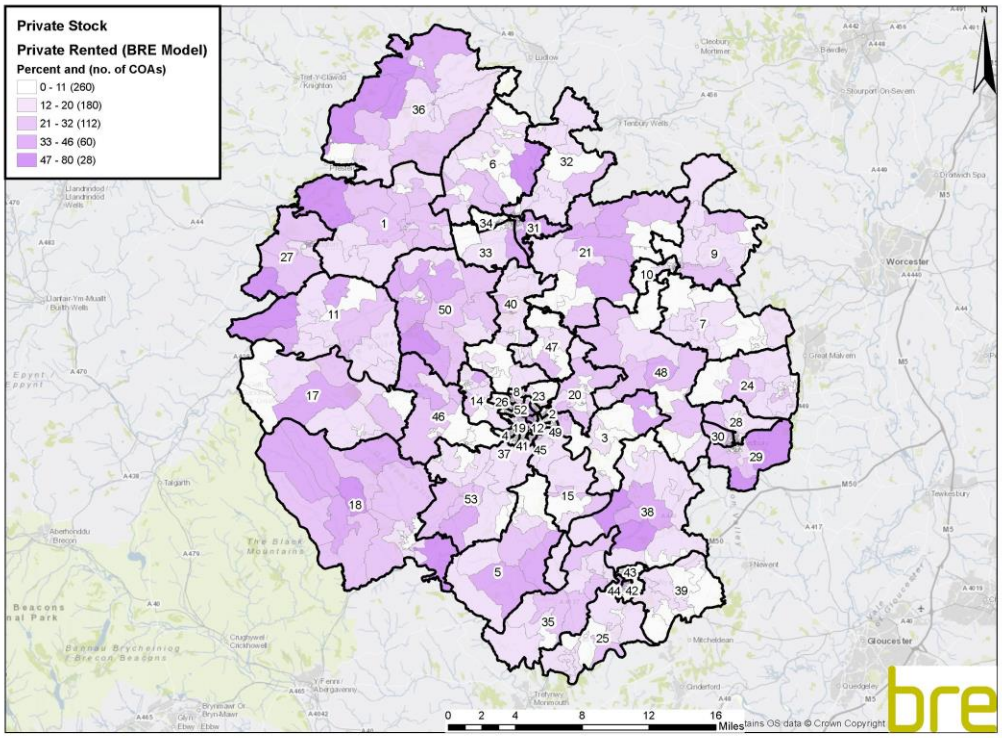
Figure 2: Tenure split – comparison of BRE Housing Stock Condition Database outputs with 2011 Census figures for Herefordshire



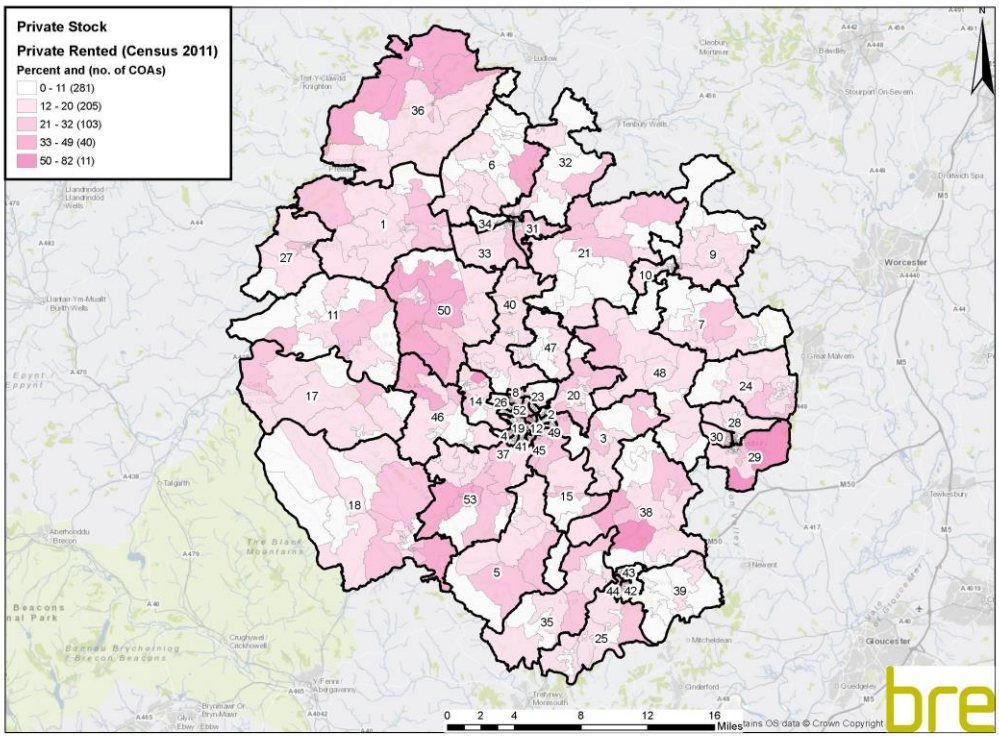
	Owner occupied	Private rented	Social	Total
Database	57,017	15,175	11,573	83,765
2011 Census	53,784	13,632	10,903	78,319

[31] http://www.ons.gov.uk/ons/datasets-and-tables/index.html

Map 1: Distribution of estimated percentage of private rented dwellings in Herefordshire – based on database *See ward key*



Map 2: Distribution of estimated percentage of private rented dwellings in Herefordshire – based on 2011 Census Data (Neighbourhood Statistics) *See ward key*



3.2.1 Other national datasets relating to tenure

In addition to the Census data there are other national datasets available which provide information on tenure; these are MHCLG returns[32] and Office for National Statistics (ONS) data[33]. These datasets are not used directly in the model but are reported here for the purposes of comparison.

The MHCLG returns provide estimates of the tenure split by private sector and social sector only, with the former being based on projections from the 2011 census as a starting point, and the latter being based on Local Authority Housing Statistics. The tenure split used in the BRE Housing Stock Model is compared to this at an early stage of the project in order to ensure the tenure split is consistent[34].

The ONS data provides subnational (local authority level) data on the dwelling stock broken down into tenure. The ONS split between owner occupied and private rented stock is based on their Annual Population Survey (APS)[35] which is then benchmarked to the MHCLG returns. The APS is based on "persons who regard the sample address as their main address and also those who have lived in the dwelling for more than 6 consecutive months, even if they do not regard this as their principal dwelling". This methodology may under-estimate the proportion of private rented dwellings for several reasons:

1. By only including those people who have lived in a dwelling for more than 6 consecutive months, the number of private rented households may be under-estimated as there tends to be a higher turnover in this sector.
2. By only including persons who regard the sample address as their main address there are two groups where this may have an impact on the estimated figures:
    a. Students renting away from home who assume their parents' address to be their main residence.
    b. Commuter areas where households may have a city flat during the week and also have a suburban family home which they class as their first residence. Commuter towns close to large cities may also have higher levels of private rented stock with a high turnover of tenants near rail stations for example.

In addition, the ONS dataset uses EHS data but this is limited to using the occupancy rate to allow for vacant dwellings as their APS is based on individuals and therefore does not account for vacant dwellings.

[32] https://www.gov.uk/government/statistical-data-sets/live-tables-on-dwelling-stock-including-vacants

[33] https://www.ons.gov.uk/peoplepopulationandcommunity/housing/articles/researchoutputssubnationaldwellingstockbytenureestimatesengland2012to2015/2017-12-04#methodology

[34] This comparison is checked early on in the project through email correspondence with the authority.

[35] https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/methodologies/annualpopulationsurveyapsqmi

It is important to note that the ONS data is not an official statistic and that a disclaimer[36] must be used when reproducing the data (note that the "***dwelling stock by tenure***" in the disclaimer refers to the MHCLG returns data).

Table 2 shows the latest tenure splits for the DCLG and the ONS data for Herefordshire. Since the ONS data is benchmarked to the MHCLG returns, the figures for the private sector stock match. Both the numbers, and the proportions, are very similar to the BRE Model estimates.

Table 2: Comparison of MHCLG, ONS and BRE Database figures on tenure split for Herefordshire *N.B. DCLG data does not break down private sector into owner occupied and private rented and ONS data does not provide an estimate for social stock*

Tenure	Number of dwellings			% of all stock		
	2015 MHCLG	2015 ONS	BRE Database	2015 MHCLG	2015 ONS	BRE Database
Owner occupied	72,500	58,145	57,017	86%	69%	68%
Private rented		14,355	15,175		17%	18%
Social	11,420	-	11,573	14%	-	14%

[36] ONS Disclaimer: *"We are producing these Research Outputs to provide the tenure breakdown of dwellings within the private sector at the subnational level, which are currently only available at the country level. However, these Research Outputs are not official statistics and must not be reproduced without this disclaimer. Research Outputs are produced to provide information about new methods and data sources being investigated. There are official statistics available on* ***dwelling stock by tenure***[32] *for local authorities, which you should refer to if you require official statistics. These provide the total private sector stock for each area, but do not provide a breakdown of owner-occupied and privately-rented dwellings."*

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4 Results from the BRE Dwelling Level Housing Stock Models and Housing Stock Condition Database (HSCD)

As described in the previous section, the housing stock modelling process consists of a series of different stock models with the main output being the database. The results in this section have been obtained from interrogating the database at the level of the local authority as a whole to give a useful overview for Herefordshire. Information at ward level, however, is provided in the maps, in **Section 4.2.4,** and can also be obtained from the database which has been supplied as part of this project (see **Appendix C** for instructions). The database can be interrogated at local authority, ward, medium super output area (MSOA), lower super output area (LSOA), census output area (COA), postcode or dwelling level.

The first sub-section below provides a map of the wards in Herefordshire and a summary of the stock profile in Herefordshire looking at dwelling age and type. The results are then displayed in the following sub-sections:

- Key indicators:
  - Herefordshire – regional and national comparisons
  - Key indicators by tenure for Herefordshire
  - Key indicators mapped by COA for Herefordshire private sector stock
  - Analysis of owner occupied sector – disrepair and low income households
  - Ward level results for the key indicators

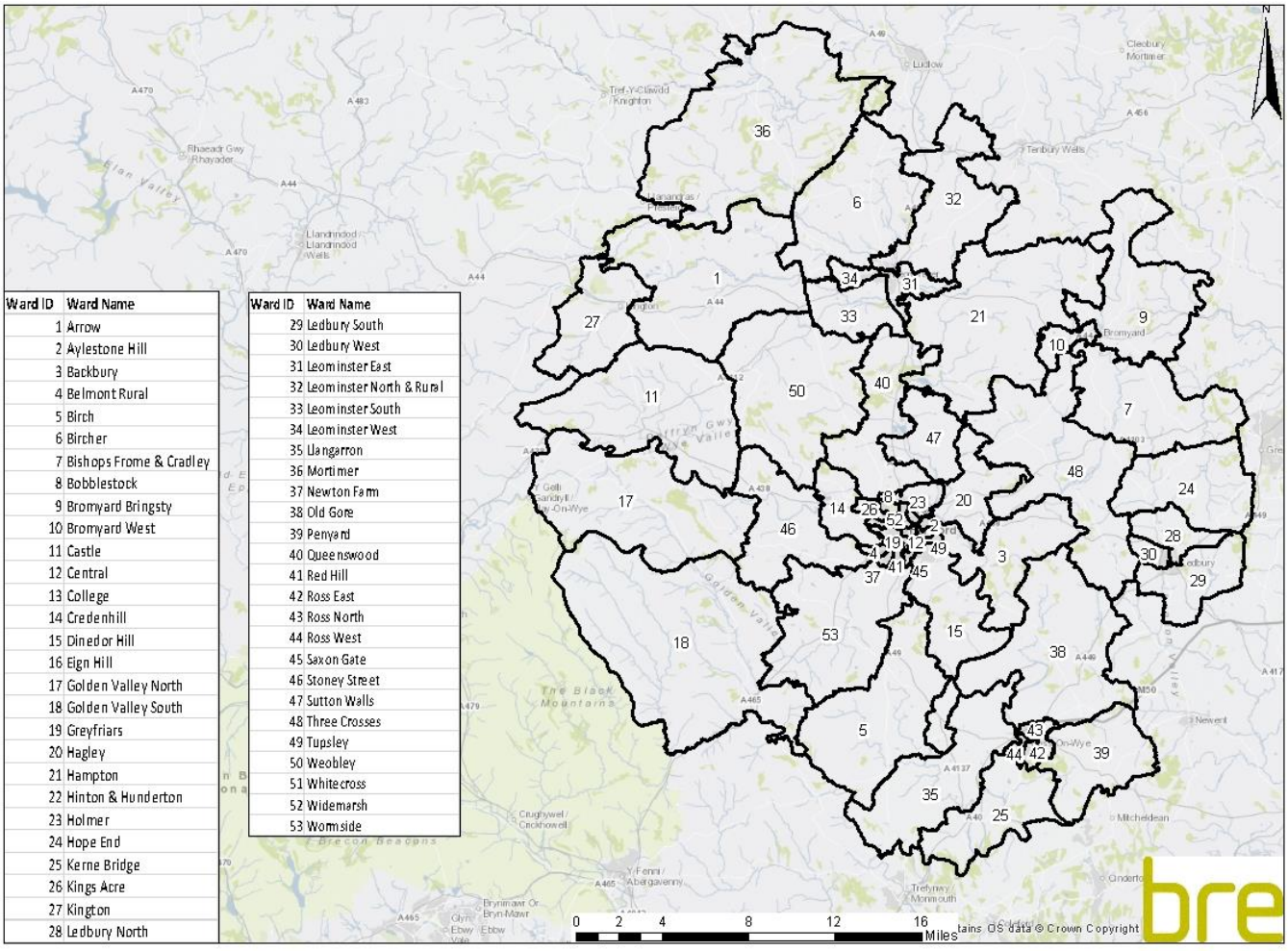
- Information relating to LAHS reporting and EPC ratings:
  - Category 1 hazards
  - HMOs
  - EPC ratings

4.1 Overview of Herefordshire

Map 3 below shows the 53 wards in Herefordshire. The data in the report is separated into wards and then further divided into Census Output Areas (COAs). These typically comprise around 125 households and usually include whole postcodes, which have populations that are largely similar. Where the COAs are smaller in size on the map this typically represents a more densely populated area since each COA represents a similar number of dwellings.

It should be noted that some residential addresses are not considered suitable for modelling and these have been removed. These include caravans and house boats which, whilst covered by the EHS, are quite uncommon, and the energy models and other housing indicators were not developed with dwellings such as these in mind. Residential institutions (e.g. care homes) have also been removed as it is not entirely appropriate to apply the usual models to these dwellings. The removal of these addresses may result in a COA not appearing to contain any dwellings due to the fact that all c.125 households are made up of caravans for example.

Map 3: The wards in Herefordshire



Ward ID	Ward Name
1	Arrow
2	Aylestone Hill
3	Backbury
4	Belmont Rural
5	Birch
6	Bircher
7	Bishops Frome & Cradley
8	Bobblestock
9	Bromyard Bringsty
10	Bromyard West
11	Castle
12	Central
13	College
14	Credenhill
15	Dinedor Hill
16	Eign Hill
17	Golden Valley North
18	Golden Valley South
19	Greyfriars
20	Hagley
21	Hampton
22	Hinton & Hunderton
23	Holmer
24	Hope End
25	Kerne Bridge
26	Kings Acre
27	Kington
28	Ledbury North

Ward ID	Ward Name
29	Ledbury South
30	Ledbury West
31	Leominster East
32	Leominster North & Rural
33	Leominster South
34	Leominster West
35	Llangarron
36	Mortimer
37	Newton Farm
38	Old Gore
39	Penyard
40	Queenswood
41	Red Hill
42	Ross East
43	Ross North
44	Ross West
45	Saxon Gate
46	Stoney Street
47	Sutton Walls
48	Three Crosses
49	Tupsley
50	Weobley
51	Whitecross
52	Widemarsh
53	Wormside

4.1.1 Stock profile – dwelling age and type

This section provides background information on the dwelling type and age profiles for the total housing stock in Herefordshire.

Figure 3 shows the distribution of dwelling age in Herefordshire and compares this to national and regional distributions. The majority (28%) of dwellings in Herefordshire were built before 1919, a much higher proportion than for England (11%) and the West Midlands (9%). The proportion of dwellings built in the other time periods is similar to the national and regional figures, with the exception of dwellings aged between 1900 – 1944 and 1965 – 1974 where proportions in Herefordshire are lower.

Figure 4 compares the distribution of dwelling type with national and regional averages. The majority (40%) of dwellings in Herefordshire are detached, a much higher proportion that the national average (25%) and the regional average (25%). The second most common dwelling type in Herefordshire is semi-detached at 22%, much lower than the national average (28%) and the regional average (33%).

Given the prevalence of detached houses in Herefordshire, **Figure 5** provides more details on the age of these dwellings. The majority (39%) of detached dwellings were built pre-1900, compared to only 8% nationally and regionally.

Figure 3: Dwelling age profile for the housing stock in Herefordshire, compared to national and regional figures – all stock

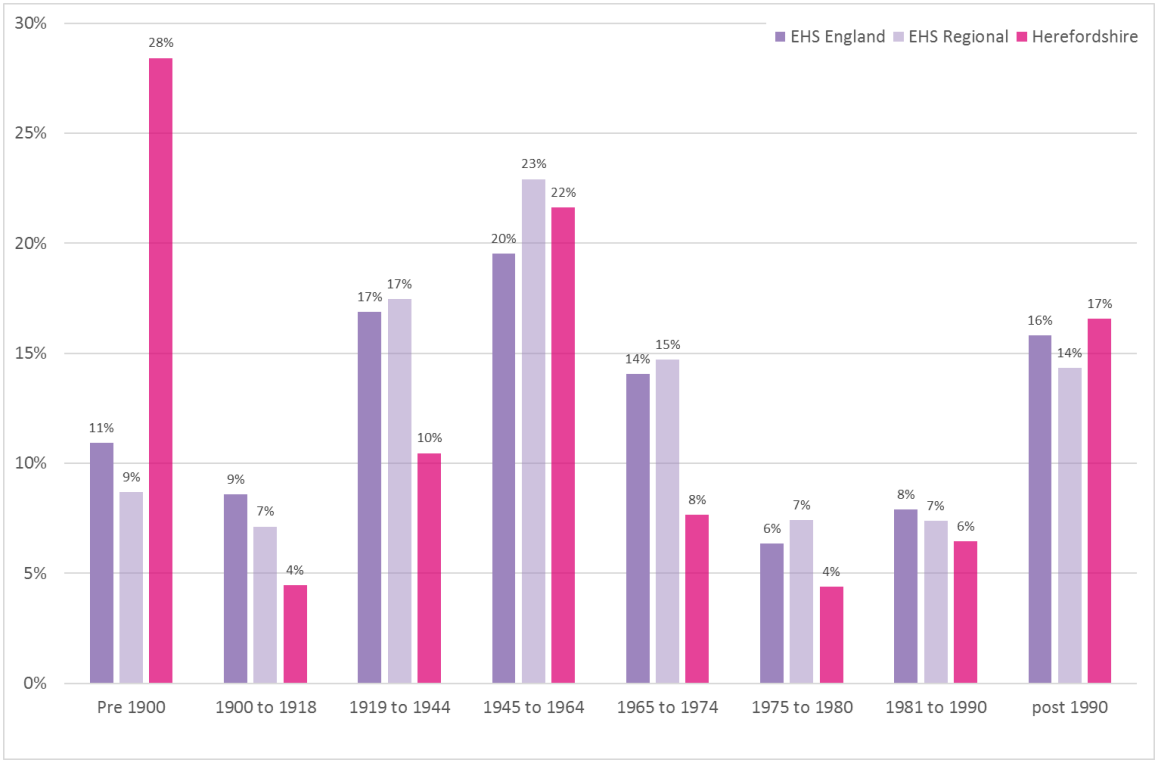


Figure 4: Dwelling type profile for the housing stock in Herefordshire compared to national and regional figures – all stock

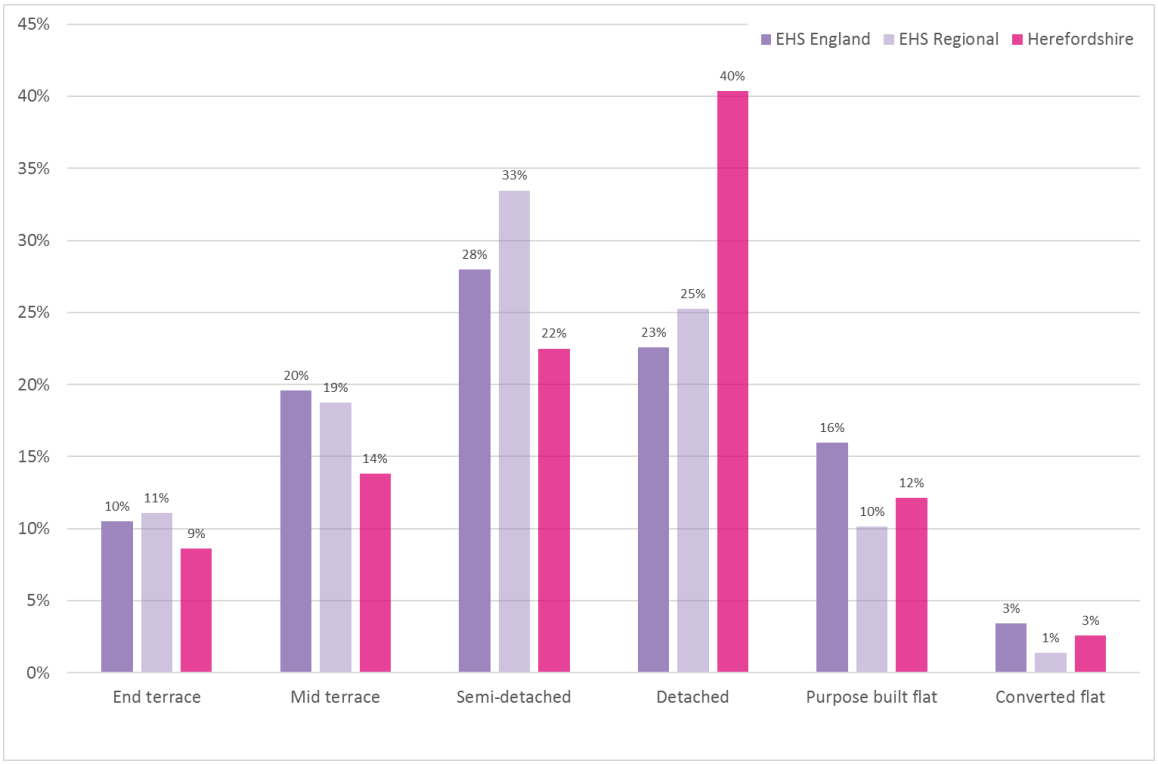


Figure 5: Dwelling age profile for detached houses in Herefordshire compared to national and regional figures – all stock

4.2 Key indicators

4.2.1 Herefordshire – regional and national comparisons

Table 3 and **Figure 6** show the results for each of the key indicators in Herefordshire compared to the West Midlands region and to England (EHS 2014) and split into all stock and private sector stock. **Figure 7** shows the results of the SimpleSAP ratings.

For all stock, the performance of the housing stock in Herefordshire compared to the EHS England average is generally worse. Herefordshire performs significantly worse for all hazards (25% compared to 12%) and for excess cold hazards (17% compared to 3%). Herefordshire performs slightly worse for the remainder of the indicators, with the exception of low income households where Herefordshire has the same levels as the England average.

When comparing Herefordshire to the West Midlands region, the picture is similar with Herefordshire again having significantly higher levels of all hazards and excess cold. For the other indicators levels are very similar with the exception of low income households which is slightly lower in Herefordshire.

Comparing Herefordshire to the EHS England average figures for the private sector stock Herefordshire again has significantly higher levels of all hazards and excess cold. Herefordshire has slightly higher levels for all the other indicators.

Compared with the regional average, the private stock again has higher rates of all hazards (27% compared to 14%) and excess cold (19% compared to 3%), similar levels of the other indicators and slightly lower levels of low income households (19% compared to 20%).

The average SimpleSAP ratings in Herefordshire (**Figure 7**) are significantly lower than the England and regional averages, for both all stock and the private sector stock.

Table 3: Estimates of the numbers and percentage of dwellings meeting the key indicator criteria assessed by the Housing Stock Models and Housing Stock Condition Database for all stock and private sector stock – Herefordshire compared to the West Midlands and England (EHS 2014)

Indicator		All stock				Private sector stock			
		Herefordshire (no.)	Herefordshire (%)	2014 EHS Regional (%)	2014 EHS England (%)	Herefordshire (no.)	Herefordshire (%)	2014 EHS Regional (%)	2014 EHS England (%)
No. of dwellings		83,765	-	-	-	72,192	-	-	-
HHSRS category 1 hazards	All hazards	20,572	25%	14%	12%	19,358	27%	14%	13%
	Excess cold	14,326	17%	3%	3%	13,851	19%	3%	4%
	Fall hazards	7,748	9%	9%	7%	7,103	10%	10%	7%
Disrepair		5,100	6%	6%	5%	4,518	6%	6%	5%
Fuel poverty (10%)		11,942	14%	14%	12%	10,174	14%	14%	11%
Fuel poverty (Low Income High Costs)		9,797	12%	12%	11%	8,110	11%	11%	10%
Low income households		22,257	27%	29%	27%	14,016	19%	20%	18%

N.B. the information on hazards refers to the number of dwellings with a hazard of the stated type. Because of this there is likely to be some overlap – for example, some dwellings are likely to have excess cold and fall hazards but this dwelling would only be represented once under 'all hazards'. The number of dwellings under 'all hazards' can therefore be less than the sum of the excess cold plus fall hazards.

Figure 6: Estimates of the percentage of dwellings meeting the key indicator criteria assessed by the Housing Stock Models and Housing Stock Condition Database for all stock and private sector stock – Herefordshire compared to the West Midlands and England (EHS 2014)

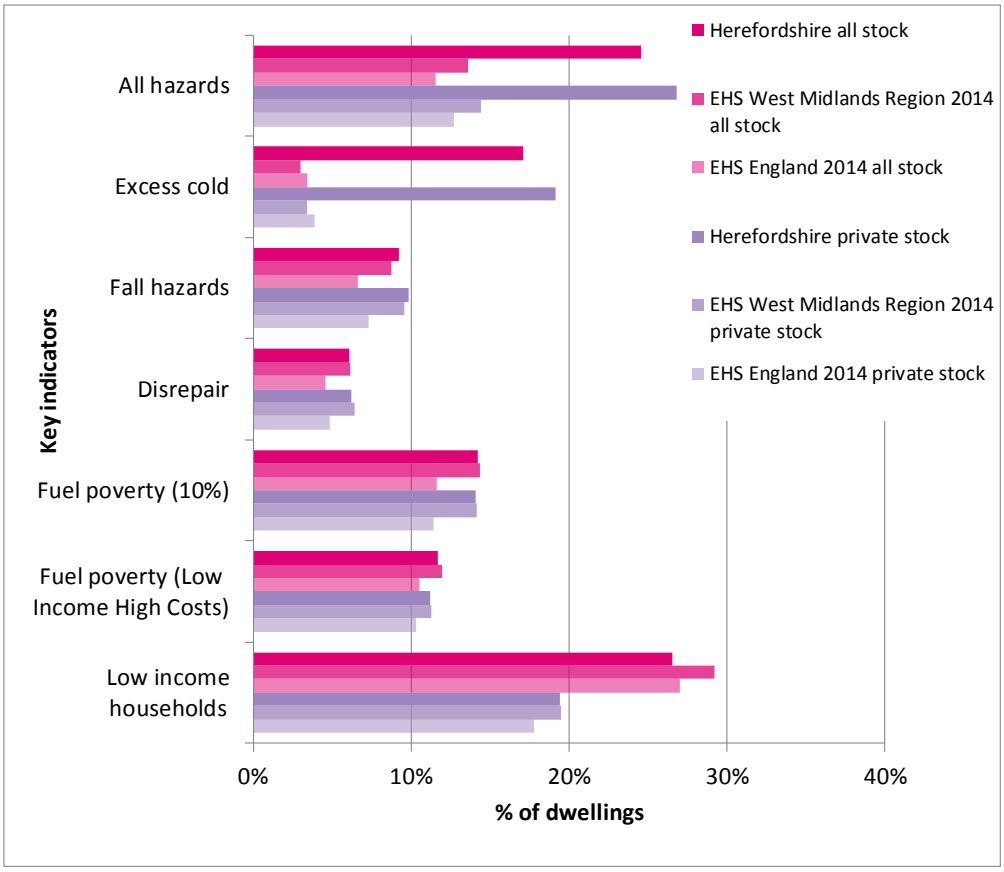
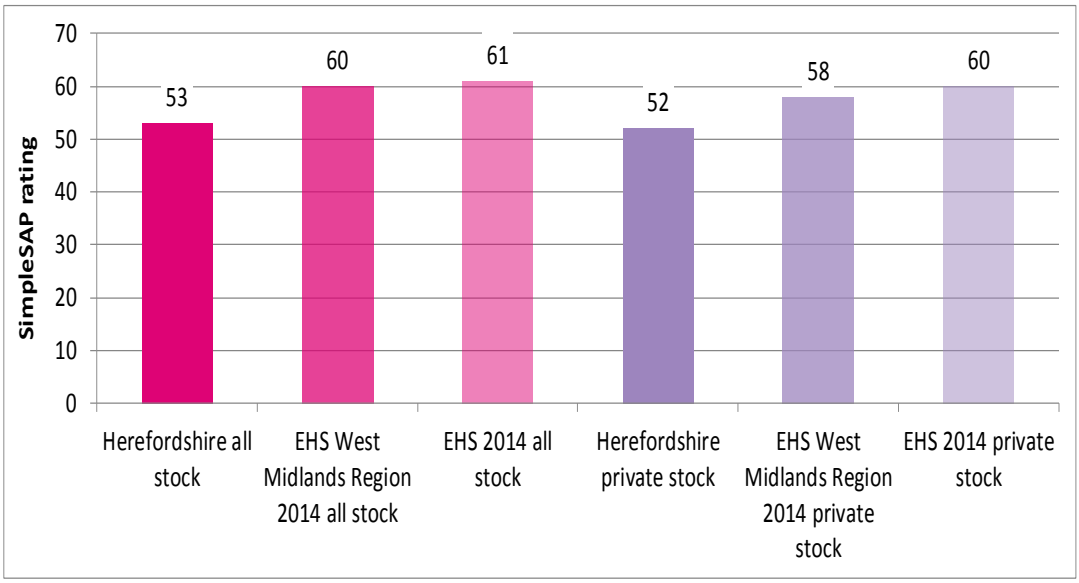


Figure 7: Average SimpleSAP ratings for all stock and private sector stock – Herefordshire compared to the West Midlands and England (EHS 2014)



4.2.2 Key indicators by tenure – Herefordshire

The private sector stock can be further split by tenure – owner occupied and private rented - with the difference between total private sector stock and total housing stock being the social housing stock. **Table 4** and **Figure 8** below show the results for each of the key indicators split by tenure and **Figure 9** shows the SimpleSAP ratings by tenure.

The social stock is generally better than the private sector stock across the majority of indicators including SimpleSAP. Social stock tends be more thermally efficient than the private stock partly due to the prevalence of flats, and partly due to being better insulated owing to the requirements placed on social housing providers, for example through the Decent Homes Programme. As would be expected, the social stock is significantly worse than the private sector stock for the low income households indicator and marginally worse for fuel poverty (both indicators).

The social data should be treated with some caution as the social rented stock, particularly when largely comprising stock owned by a single landlord, is more difficult to model than the private sector. This is because the decisions of an individual property owner usually only affect a single dwelling out of the thousands of private sector stock whereas the policies and decisions of a single landlord can have a very great effect on a large proportion of the social stock. The social rented results are therefore best considered as a benchmark which takes account of the age, type, size and tenure against which the landlord's own data could be compared.

Focussing on the tenures within the private sector stock, the owner occupied stock has slightly higher levels of all hazards and excess cold. Levels for the other indicators are similar, with the exception of low income households which is much higher in the private rented stock (30% compared to 17% in the owner occupied stock).

Table 4: Estimates of the numbers and percentage of dwellings meeting the key indicator criteria assessed by the Housing Stock Models and Housing Stock Condition Database by tenure for Herefordshire

Indicator		Private sector stock				Social stock	
		Owner occupied		Private rented			
		No.	%	No.	%	No.	%
No. of dwellings		57,017	-	15,175	-	11,573	-
HHSRS category 1 hazards	All hazards	15,545	27%	3,813	25%	1,214	10%
	Excess cold	11,376	20%	2,475	16%	475	4%
	Fall hazards	5,502	10%	1,601	11%	645	6%
Disrepair		3,317	6%	1,201	8%	582	5%
Fuel poverty (10%)		8,145	14%	2,029	13%	1,768	15%
Fuel poverty (Low Income High Costs)		6,029	11%	2,081	14%	1,687	15%
Low income households		9,435	17%	4,581	30%	8,241	71%

N.B. the information on hazards refers to the number of dwellings with a hazard of the stated type. Because of this there is likely to be some overlap – for example, some dwellings are likely to have excess cold and fall hazards but this dwelling would only be represented once under 'all hazards'. The number of dwellings under 'all hazards' can therefore be less than the sum of the excess cold plus fall hazards.

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Figure 8: Estimates of the percentage of dwellings meeting the key indicator criteria assessed by the Housing Stock Models and Housing Stock Condition Database by tenure for Herefordshire

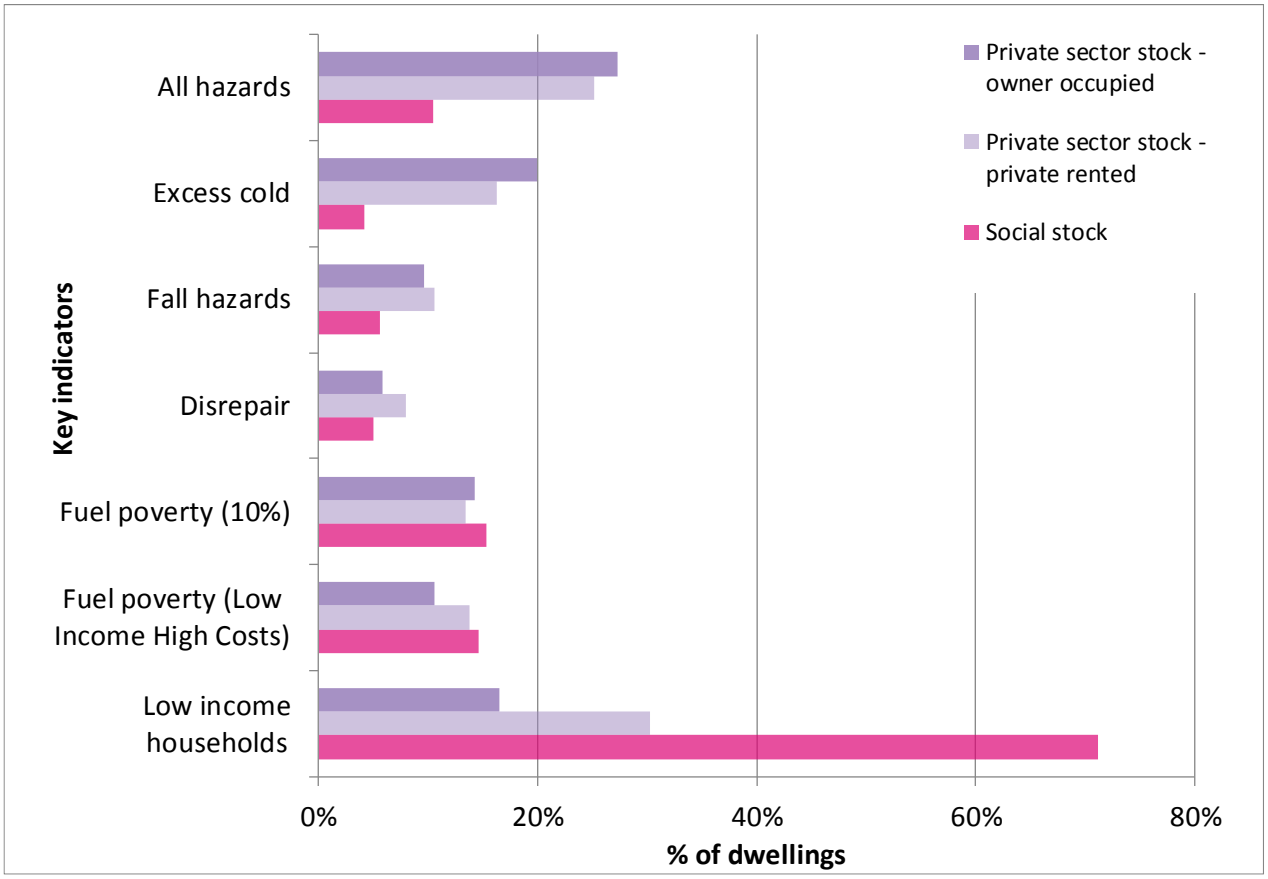
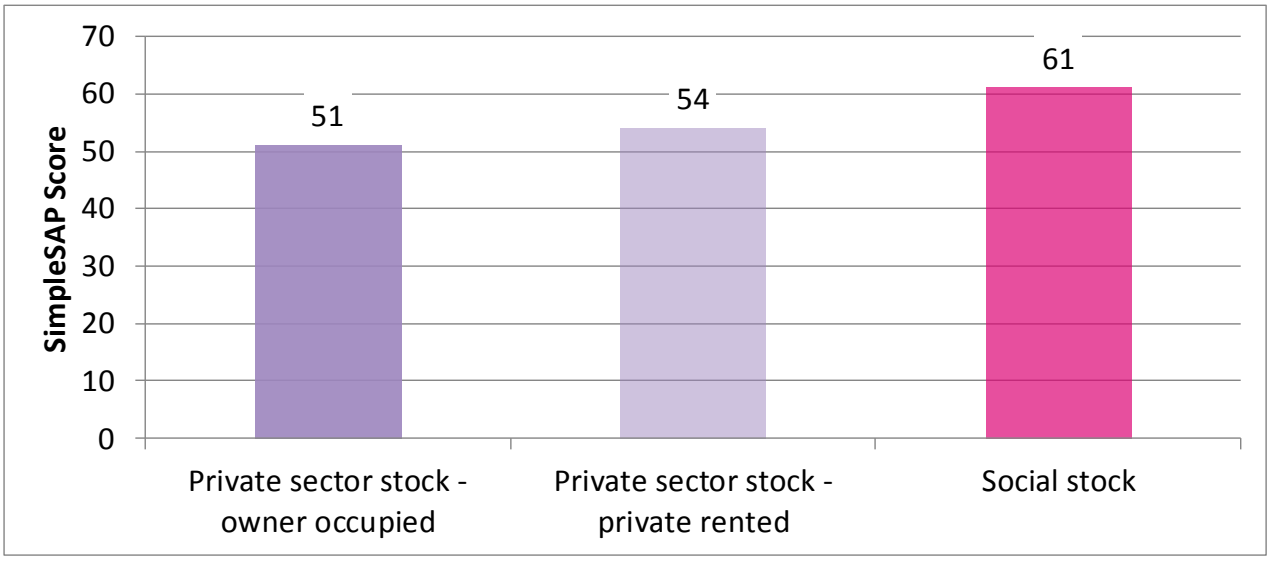


Figure 9: Average SimpleSAP ratings by tenure for Herefordshire



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4.2.3 Key indicators mapped by Census Output Area (COA) – Herefordshire private sector stock

Some of the key indicators are also provided in map form below along with a brief description of each indicator[37], thus enabling quick observation of the geographical distribution of properties of interest. The maps show the percentages of private sector dwellings in each Census Output Area (COA) that are estimated to have each of the key indicators.

The ranges shown in the map keys are defined based on the Jenks' Natural Breaks algorithm of the COA statistics[38]. The outputs in the lightest and darkest colours on the maps show the extreme ends of the range, highlighting the best and the worst areas.

Maps at COA level are provided for the following key indicators in **Map 4** to **Map 12** below. Note that the key for the ward names is too large to fit on the same page as the map due to the high number of wards in Herefordshire. The key can be found on **Map 3** and in **Appendix E**:

- **HHSRS**
  - The presence of a category 1 HHSRS hazard
  - The presence of a category 1 hazard for excess cold
  - The presence of a category 1 hazard for falls
- **Levels of disrepair**
- **Levels of fuel poverty** (Low Income High Costs and 10% definitions)
- **Low income households**
  - Dwellings occupied by low income households
  - Dwellings with a category 1 excess cold hazard that are occupied by a low income household
- **The average SimpleSAP[39] rating**

In addition, maps have been provided for HMOs and EPC ratings.

These maps are extremely useful in showing the geographical distribution for single key indicators. Maps can also be produced for a combination of indicators, such as dwellings with an excess cold hazard which are also occupied by low income households, as shown in **Map 11**. **Appendix D** provides close up maps for each indicator, focussing on the urban areas of Hereford in the centre, Leominster and Bromyard to the north east and Ledbury and Ross-on-Wye to the south east

[37] See **Appendix A** for full definitions.

[38] The natural breaks classification method is a data clustering method determining the best arrangement of values into different classes. It is achieved through minimising each class's average deviation from the class mean while maximising each class's deviation from the means of the other groups. The method seeks to reduce the variance within classes and maximise variance between classes thus ensuring groups are distinctive.

[39] Important note: Whilst it is possible to provide "SimpleSAP" ratings from the "SimpleCO_2" software, under no circumstances must these be referred to as "SAP" as the input data is insufficient to produce an estimate of SAP or even RdSAP for an individual dwelling that meets the standards required by these methodologies.

The maps are produced at COA level, which is typically made up of 125 households, usually including whole postcodes and having similar sized populations. Using the first map below (**Map 4**) as an example, it can be seen that each ward is split into several COAs and, in this instance there are 74 COAs that have 58 - 78% of private sector dwellings estimated to have the presence of a category 1 hazard.

The maps also highlight the differences between areas, showing that the results for some areas are much worse than for others and these are the specific areas which might warrant attention. The maps also show that even within wards there can be large differences between the results at COA level.

4.2.3.1 HHSRS

The Housing Health and Safety Rating System (HHSRS) is a risk-based evaluation tool to help local authorities identify and protect against potential risks and hazards to health and safety from any deficiencies identified in dwellings. It was introduced under the Housing Act 2004[7] and applies to residential properties in England and Wales.

The HHSRS assesses 29 categories of housing hazard. Each hazard has a weighting which will help determine whether the property is rated as having a category 1 (serious) hazard[40].

The HHSRS category 1 hazards map (**Map 4**) shows that there are concentrations of high levels of category 1 hazards scattered across the area but with higher concentrations generally in the more rural areas. The data behind the map shows that the wards with the highest levels overall are Birch, Castle and Golden Valley North (ward numbers 5, 11 and 17). **Map D. 1** focusses in on Hereford, **Map D. 2** shows the north eastern towns in more detail and **Map D. 3** shows the south eastern towns. Levels of hazards in these urban areas are low compared to the high levels in the surrounding rural areas.

Looking at the hazard of excess cold in Herefordshire there are again higher concentrations in the more rural areas, reflecting the distribution of the category 1 hazards map since excess cold forms part of that – see **Map 5**. The data behind the map shows that the highest levels overall are in Birch, Castle and Golden Valley South (ward numbers 5, 11 and 18), but there are also higher concentrations elsewhere – for example in the wards of Golden Valley North (17), Kerne Bridge (25), Llangarron (35), Mortimer (36), Old Gore (38), Three Crosses (48) and Weobley (50) which all have over 40% of private dwellings estimated to have an excess cold hazard. **Map D. 5** and **Map D. 6** provide more detail for the urban areas and show that these have low levels of excess cold. Levels of excess cold are higher in the towns of Ledbury and Ross-on-Wye compared to Leominster and Bromyard.

The high levels of excess cold found in the rural areas could be due to larger, older detached houses being more common in these areas. These types of houses have higher levels of heat loss and are less likely to have insulation. The prevalence of older detached houses is discussed in detail in **Section 4.1.1** which showed that 40% of Herefordshire's dwellings stock is detached (compared to less than 25% nationally and regionally) and that 29% of these detached dwellings were built pre-1900 (compared to 8% nationally and regionally). Furthermore, many of these rural areas do not have connection to the mains gas network which means they have a greater likelihood of suffering from excess cold. Overall, around a third of dwellings in Herefordshire are not connected to the gas network. This varies between ward and for those with high levels of excess cold the proportions without a mains gas connection are significantly

[40] Housing Health and Safety Rating System Operating Guidance, ODPM, 2006

higher – for example, in Birch ward 97% of dwellings are not connected, in Castle ward the figure is 99% and in Golden Valley South ward it is 99%.

The levels of falls hazards in Herefordshire are not notably higher than the national and regional averages and therefore do not have such an influence on the overall distribution of category 1 hazards. The distribution of fall hazards is shown in **Map 6** which indicates that the high concentrations are scattered across the district. The data behind this shows that the wards with the highest levels of fall hazards are Greyfriars, Central and Castle (ward numbers 19, 12 and 11). **Map D. 7** shows that in Greyfriars ward (19) in Hereford there are higher levels of falls hazards in COAs to the north east of this ward, and in Central ward higher levels are across central parts. **Map D. 8** and **Map D. 9** show the other urban areas in more detail.

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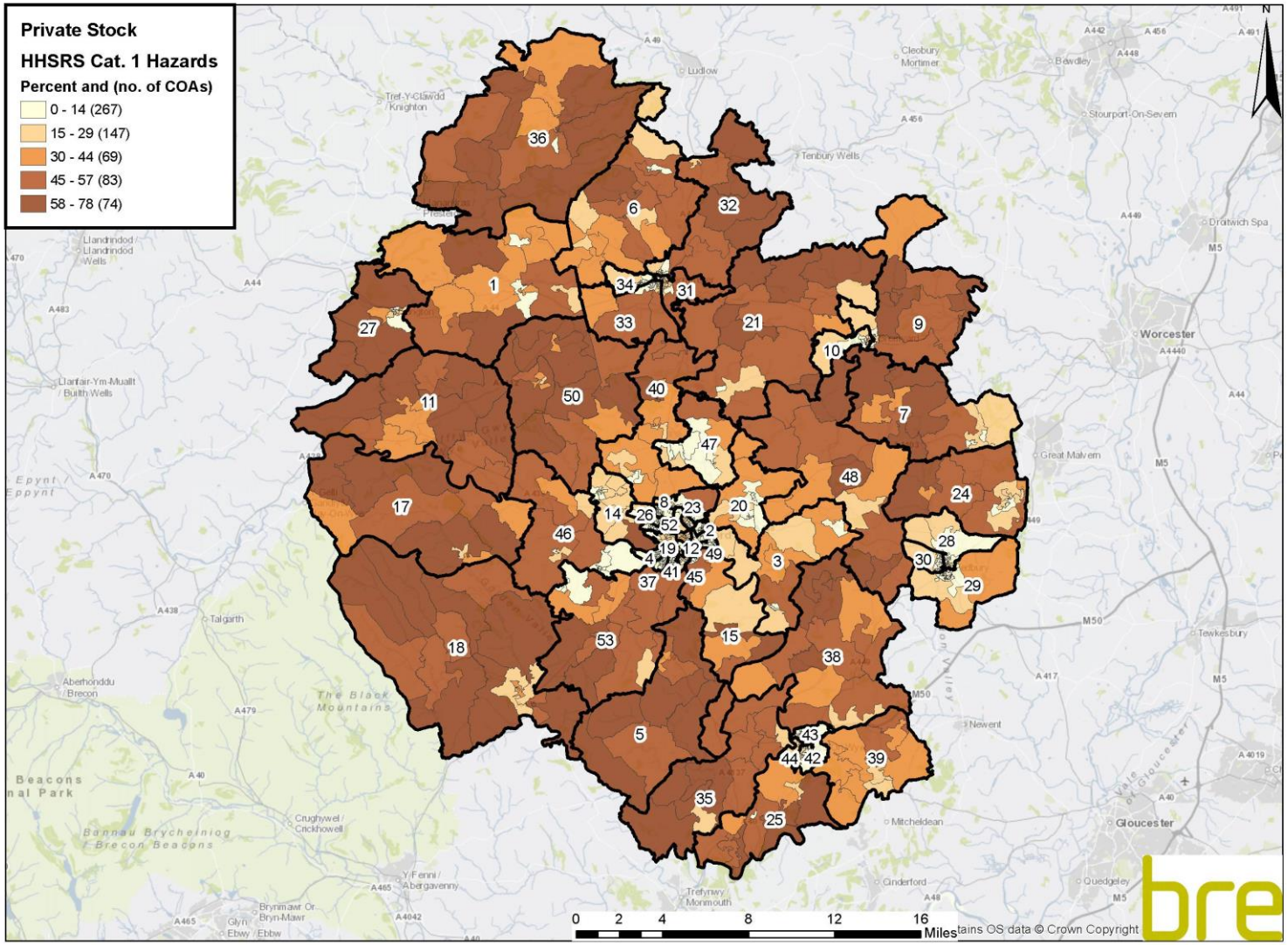
Map 4: Percentage of private sector dwellings in Herefordshire with the presence of a HHSRS category 1 hazard *See ward key*



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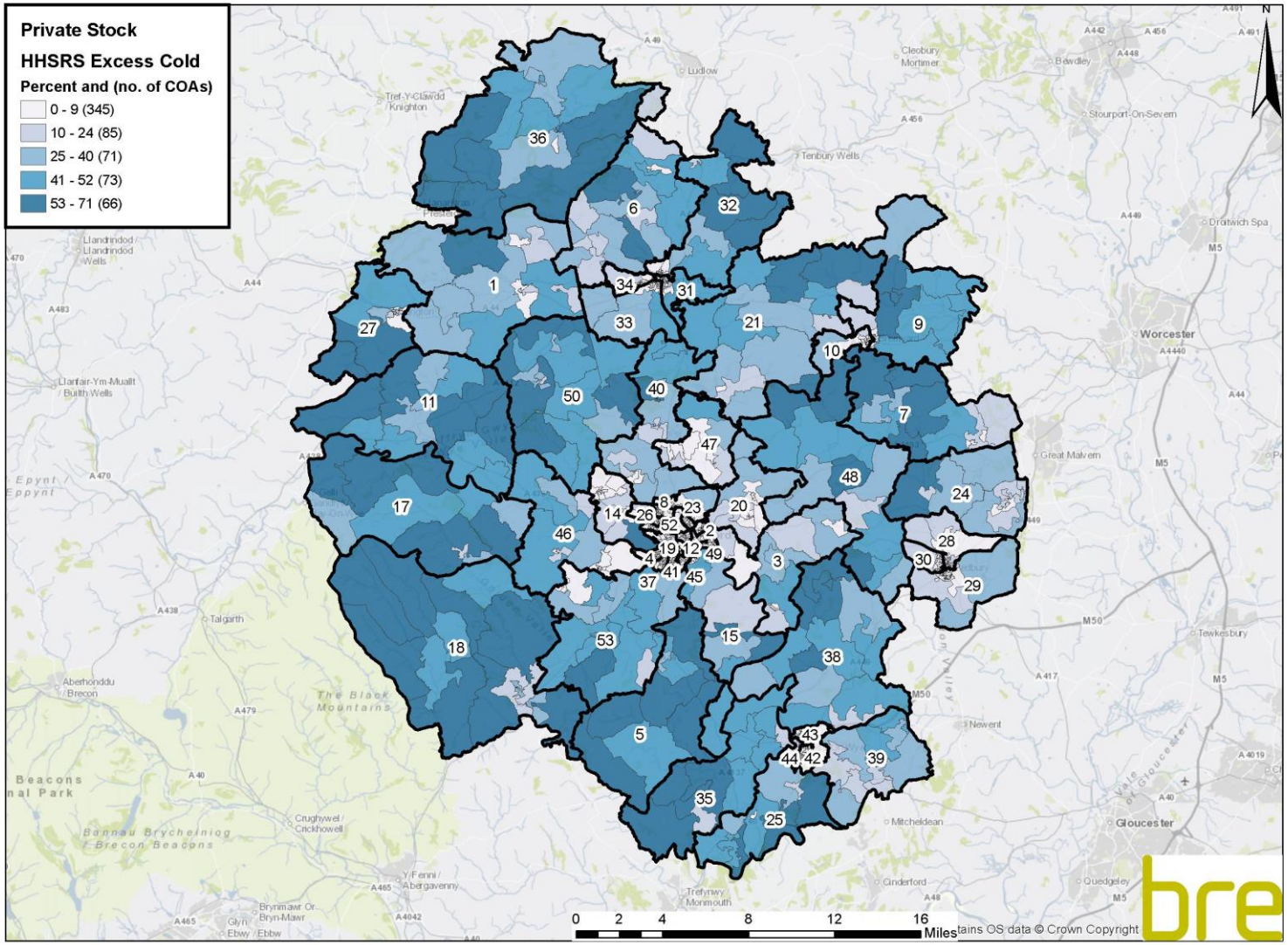
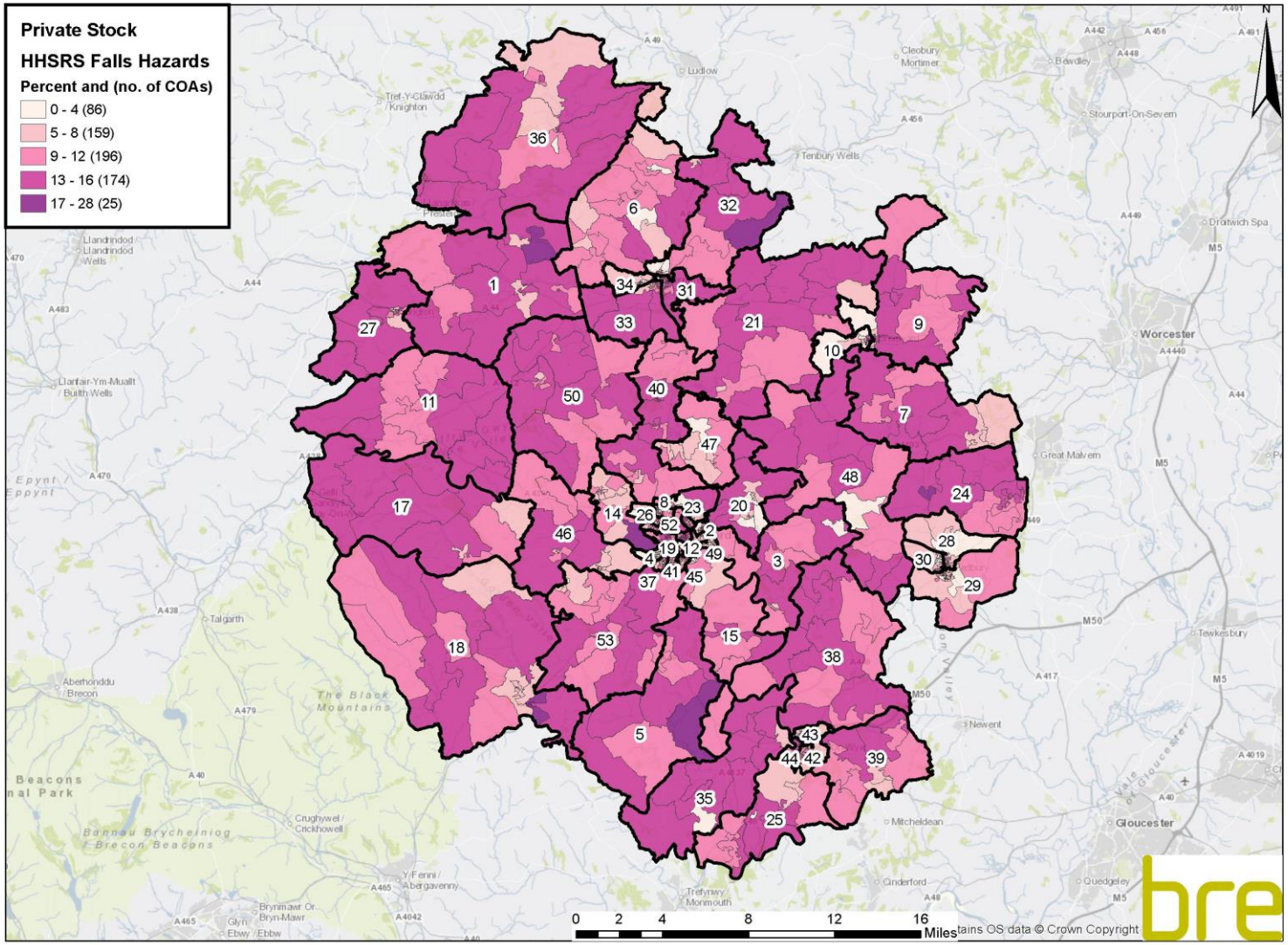
Map 5: Percentage of private sector dwellings in Herefordshire with the presence of a HHSRS category 1 hazard for excess cold *See ward key*



Map 6: Percentage of private sector dwellings in Herefordshire with the presence of a HHSRS category 1 hazard for falls *See ward key*



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4.2.3.2 Disrepair

The disrepair indicator used in this report is based on the disrepair component of the Decent Homes Standard[41,42]. A dwelling fails the disrepair component if:

- One or more key building components are old and, because of their condition, need replacing or major repair; or
- Two or more other building components are old and, because of their condition, need replacement or major repair.

Key building components are those which, if in poor condition, could have an immediate impact on the integrity of the building and cause further deterioration in other components. They are the external components plus internal components that have potential safety implications and include:

- External walls
- Roof structure and covering
- Windows/doors
- Chimneys
- Central heating boilers
- Electrics

If any of these components are old, and need replacing or require major repair, then the dwelling is not in a reasonable state of repair.

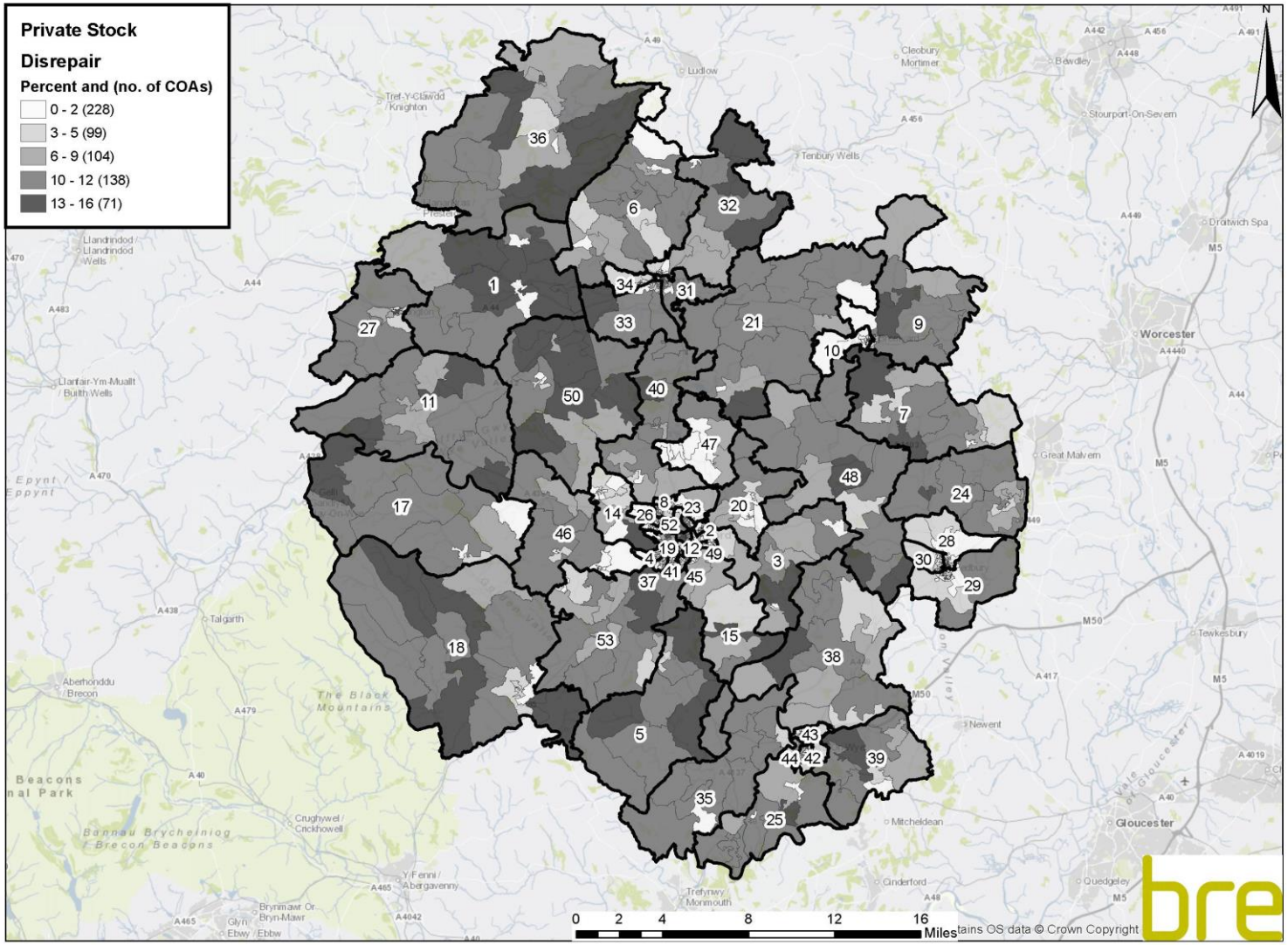
Other building components are those that have a less immediate impact on the integrity of the dwelling. Their combined effect is therefore considered, with a dwelling failing the disrepair standard if two or more elements are old and need replacing or require immediate major repair.

Map 7 shows the distribution of dwellings estimated to be in disrepair in Herefordshire and indicates that there are pockets of higher levels of disrepair across the area. The data behind the map shows that the highest levels overall are in the wards of Central, Greyfriars and Castle (ward numbers 12, 19 and 11). In Castle ward there are higher levels of the majority of COAs. **Map D. 10** shows Hereford in more detail – there are higher levels across the much of Central ward and to the north east of Greyfriars ward. There are also higher levels to the south east of Widemarsh ward (ward number 52). **Map D. 11** and **Map D. 12** show that there are COAs in the central parts of these urban areas which have higher levels of disrepair**.**

[41] https://www.gov.uk/government/publications/a-decent-home-definition-and-guidance

[42] There are 4 components to the Decent Homes Standard – HHSRS, disrepair, modernisation and thermal comfort

Map 7: Percentage of private sector dwellings in Herefordshire in disrepair *See ward key*

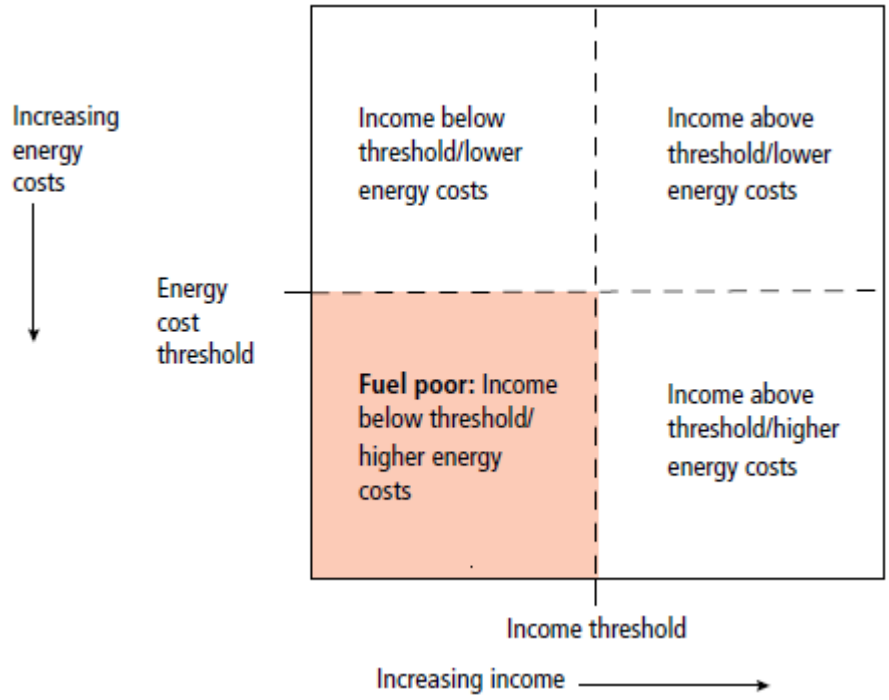


4.2.3.3 Fuel poverty

The current fuel poverty definition is known as the Low Income High Costs indicator. This is a dual indicator which firstly provides an indication of the number of households in fuel poverty and secondly an indication of the cost (in £) to remove households from fuel poverty – this cost is referred to as the Fuel Poverty Gap[43].

A household is said to be in fuel poverty if they have required fuel costs that are above average (the national median level) and were they to spend that amount they would be left with a residual income below the official poverty line (see the shaded area in **Figure 10** below). For the purposes of this report this is termed "fuel poverty (Low Income High Costs)".

Figure 10: A representation of the Low Income High Costs definition of fuel poverty[44]



As the Low Income High Cost fuel poverty indicator is a relative measure, it provides a steady trend in the number of fuel poor households over time. A change in income will only have an impact on fuel poverty if households with low incomes and high costs see relatively larger income changes (increases or decreases) than the overall average change in income.

In contrast, the fuel poverty gap is more responsive to changes in energy prices and the economy, therefore providing a clearer measure of the depth of fuel poverty among those fuel poor households. This measure is therefore more useful for identifying trends in fuel poverty over time.

Map 8 shows that, based on the Low Income High Costs definition, there are areas of higher concentrations in the more rural parts of Herefordshire. There are noticeably lower concentrations around

[43] DECC, Annual Fuel Poverty Statistics Report, 2016 – England (National Statistics), 20 June 2016

the urban areas, particularly around the outskirts of Hereford. The wards with the highest concentrations overall are Birch, Old Gore and Golden Valley South (ward numbers 5, 38 and 18). There are high concentrations across most of Birch ward. In Old Gore the COAs with the highest levels are in central and western parts of this ward. In Golden Valley South the highest levels are across western and central COAs of this ward. **Map D. 13** shows that whilst levels are generally higher in the more rural areas, there are still some COAs with higher levels in Hereford – for example northern parts of Red Hill (41) and Saxon Gate (45) wards. **Map D. 14** shows some pockets of higher levels in urban areas such as to the north of Leominster and **Map D. 15** shows some COAs with higher levels in central parts of Ledbury.

The national indicators for the fuel poverty gap are expressed as the average fuel poverty gap, which is the average amount of money required to lift a fuel poor household out of fuel poverty (£371 in England in 2014). The aggregated fuel poverty gap – i.e. the total amount of money required to lift *all* fuel poor households out of fuel poverty in England is £882 million (in 2014).

Figure 11 provides the national average fuel poverty gap figures by SAP band for private sector stock. By using the bandings based on the SimpleSAP model it is possible to estimate the aggregated fuel poverty gap within each band for the fuel poor households in Herefordshire. **Figure 12** shows similar estimates for the private rented sector. The estimated aggregated fuel poverty gap for fuel poor households in the private sector in Herefordshire is £6.73 million, of which £1.47 million is from the private rented sector.

The 1,109 private rented households living in dwellings with a SimpleSAP rating of F or G would require increases in income totalling £1.15 million per year to lift them out of fuel poverty.

Figure 11: Aggregated fuel poverty gap figures for the private sector stock in Herefordshire by SAP band

	Avg fuel poverty gap (England 2014)	Herefordshire	
		Fuel poor households	Aggregated fuel poverty gap
	£	Count	£
(92-100) A (81-91) B (69-80) C	215	0	-
(55-68) D	217	784	170,128
(39-54) E	481	2,347	1,128,907
(21-38) F (1-20) G	1,090	4,979	5,427,110

Figure 12: Aggregated fuel poverty gap figures for the private rented sector stock in Herefordshire by SAP band

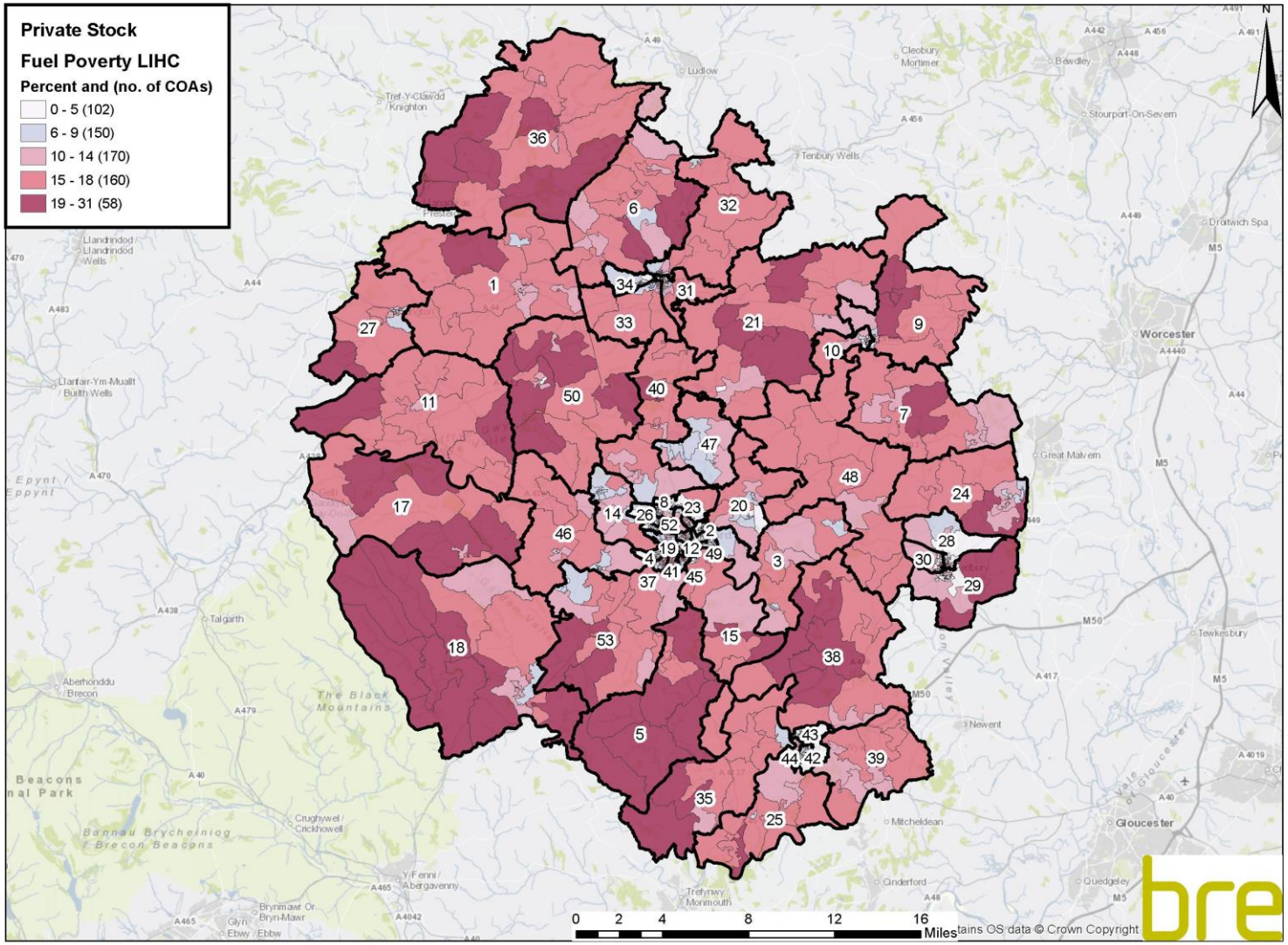
	Avg fuel poverty gap (England 2014)	Herefordshire	
		Fuel poor households	Aggregated fuel poverty gap
	£	Count	£
(92-100) A (81-91) B (69-80) C	192	0	-
(55-68) D	188	277	52,076
(39-54) E	387	695	268,965
(21-38) F (1-20) G	1,033	1,109	1,145,597

For completeness of information, and comparison with previous data, this report also includes an analysis of fuel poverty using the original definition. This states that a household is said to be in fuel poverty if it spends more than 10% of its income on fuel to maintain an adequate level of warmth (defined as 21°C for the main living area, and 18°C for other occupied rooms in the 2012 Hills Fuel Poverty Review[44]). For the purposes of this report this is referred to as “fuel poverty (10% definition)”.

Map 9, **Map D. 16**, **Map D. 17** and **Map D. 18** show the distribution of households in fuel poverty using the 10% definition. There is a similar pattern to the distribution of fuel poverty using the Low Income High Costs definition, with perhaps an even more notable urban rural split.

[44] Hills J, Getting the measure of fuel poverty – Final Report of the Fuel Poverty Review, London: LSE, 2012

Map 8: Percentage of private sector dwellings in Herefordshire occupied by households in fuel poverty - Low Income High Costs definition *See ward key*



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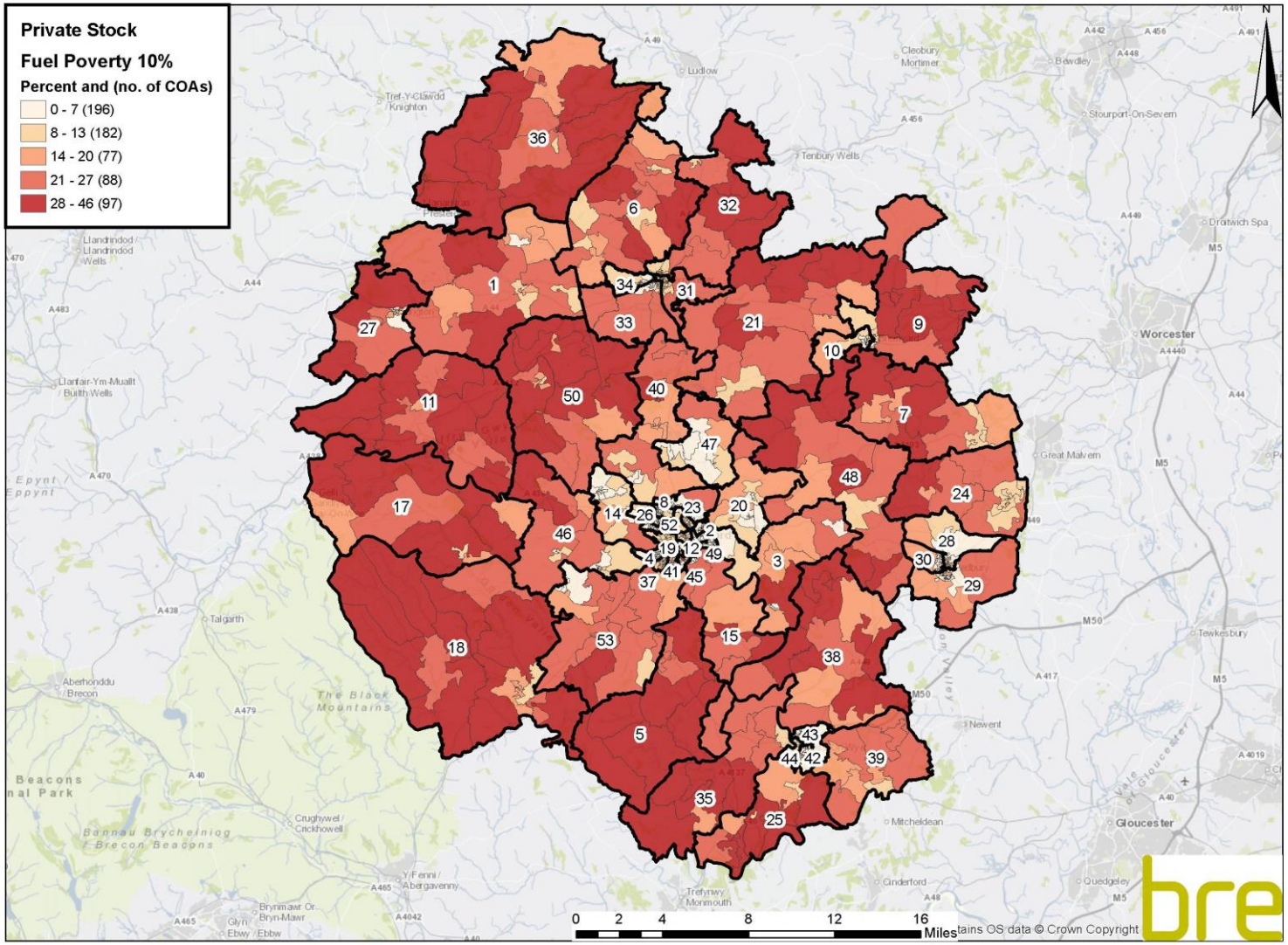
Map 9: Percentage of private sector dwellings in Herefordshire occupied by households in fuel poverty – 10% definition *See ward key*



4.2.3.4 Low income households

A low income household is defined as a household in receipt of:

- Income support
- Housing benefit
- Attendance allowance
- Disability living allowance
- Industrial injuries disablement benefit
- War disablement pension
- Pension credit
- Child tax credit
- Working credit

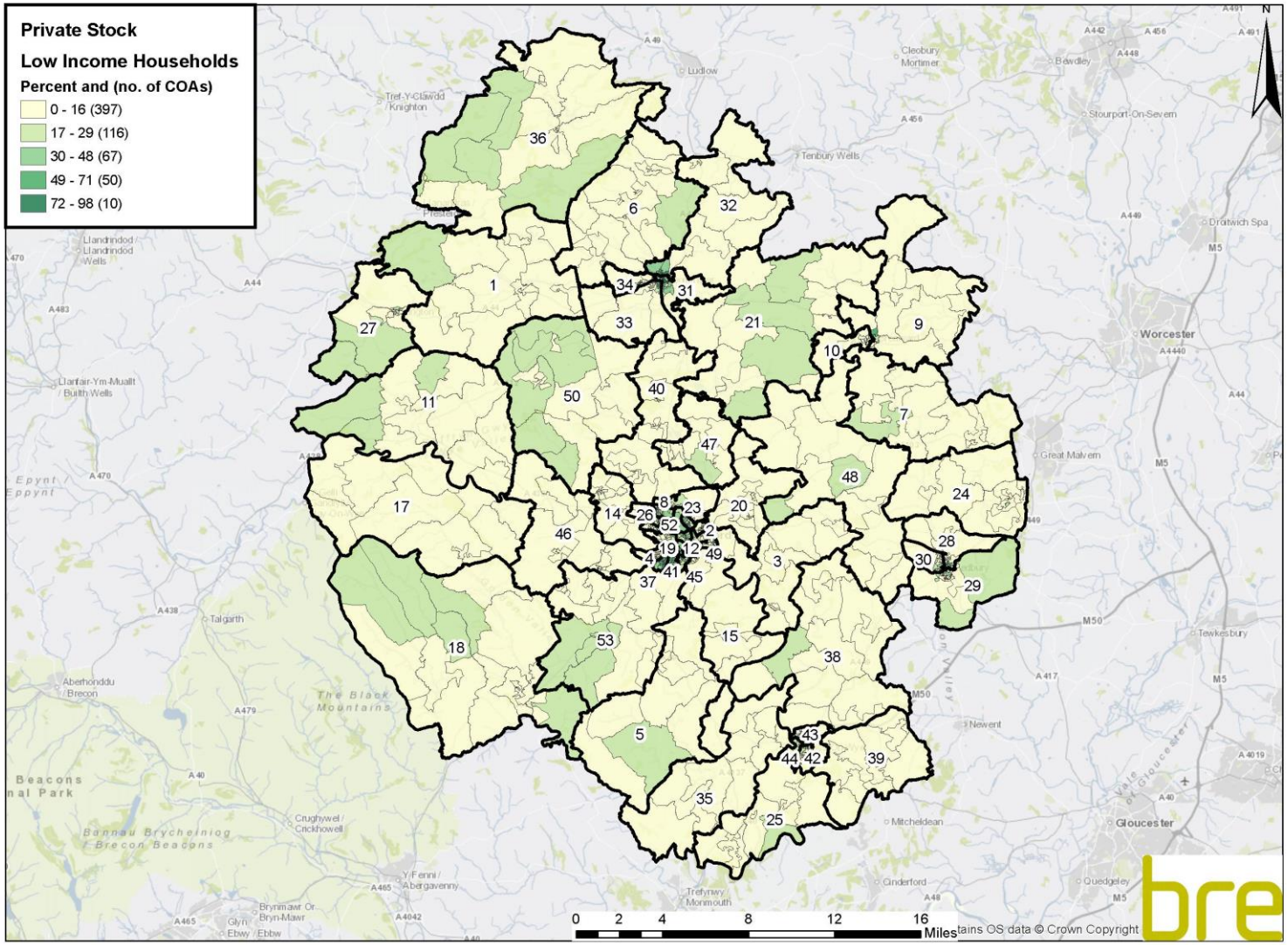
For child tax credit and working tax credit, the household is only considered a low income household if it has a relevant income of less than £15,860.

The definition also includes households in receipt of Council Tax reduction and income based Job Seekers Allowance.

Map 10 clearly shows that concentrations of low income households are clustered around the urban areas of Herefordshire. The highest levels overall are found in Hereford in the wards of Newton Farm, Hinton & Hunderton and Widemarsh (ward numbers 37, 22 and 52). **Map D. 19** shows this in more detail – in Newton Farm and Hinton & Hunderdon there are high levels across much of these wards, in Widemarsh the highest levels are to the central south and south west of this ward. **Map D. 20** and **Map D. 21** show that there are pockets of high concentrations of low income households across these urban areas

Map 11, **Map D. 22**, **Map D. 23** and **Map D. 24** provide an additional layer of information, with the data for low income households being combined with HHSRS excess cold data. This provides a vital picture of where vulnerable people are likely to be living in poor housing. The maps indicate that there are pockets of both low income and excess cold scattered across Herefordshire but mainly towards the more rural areas.

Map 10: Percentage of private sector dwellings in Herefordshire occupied by low income households *See ward key*



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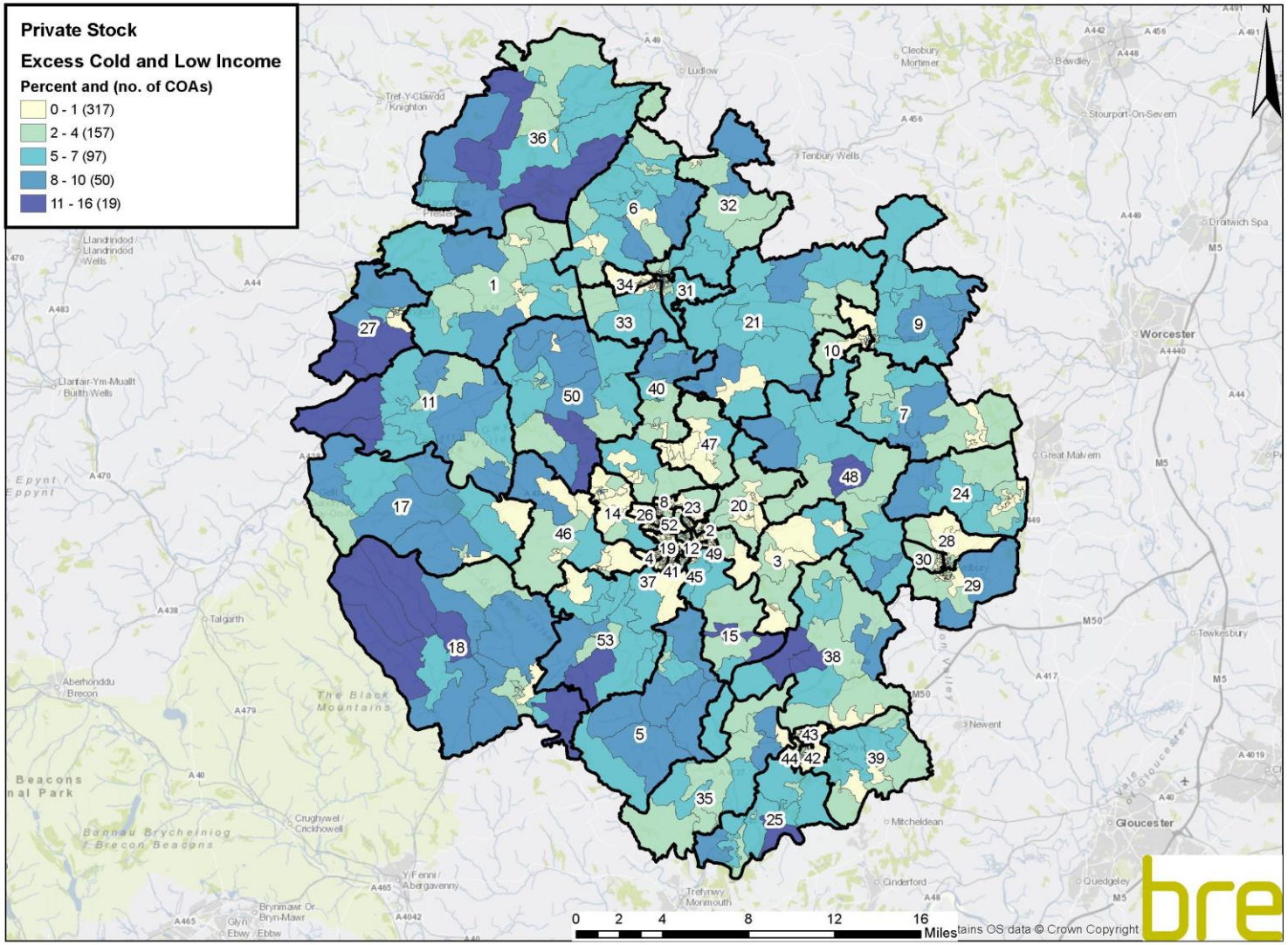
Map 11: Percentage of private sector dwellings in Herefordshire with both the presence of a HHSRS category 1 hazard for excess cold and occupied by low income households *See ward key*



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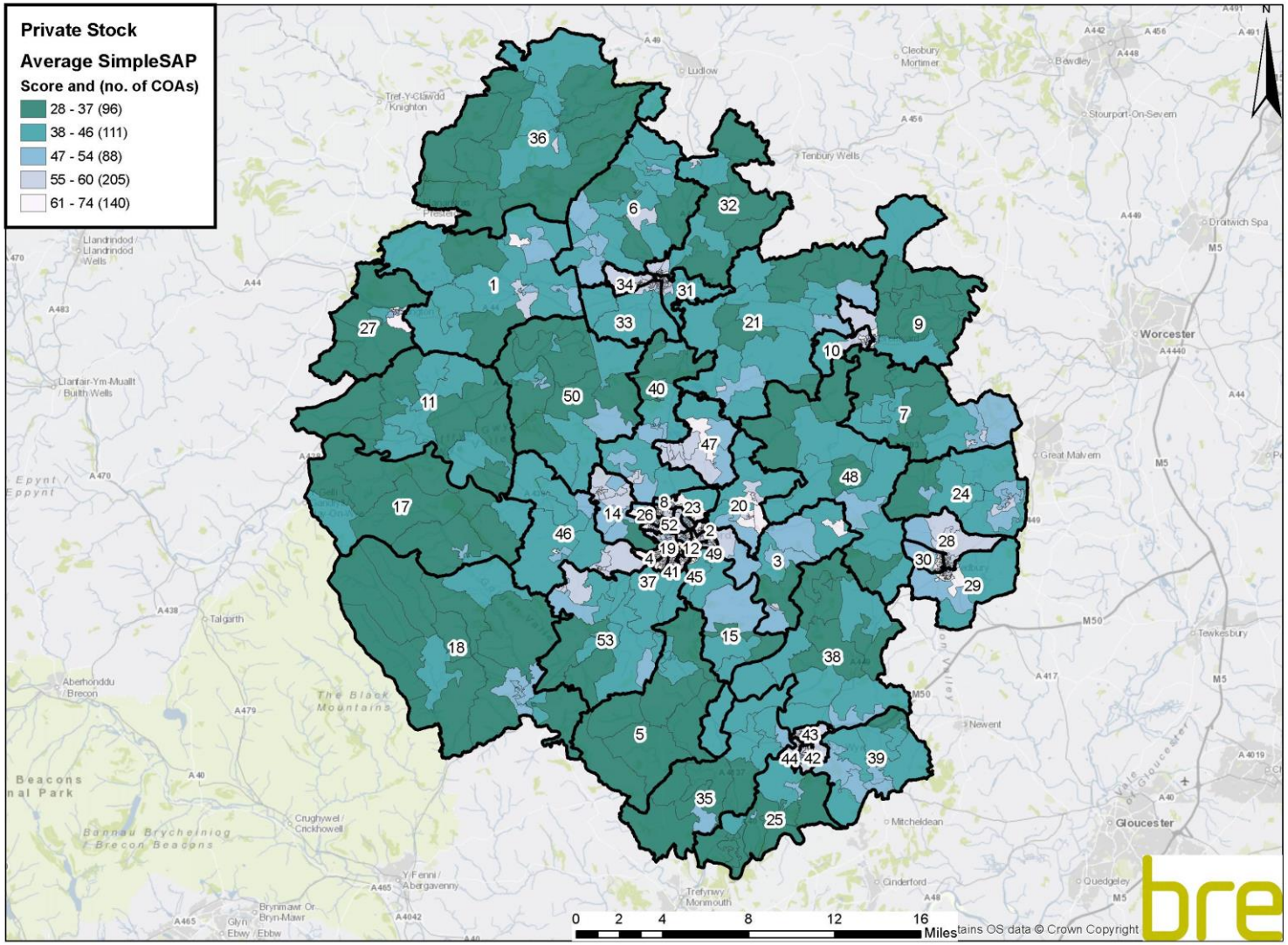
4.2.3.5 SimpleSAP

The average SimpleSAP map (**Map 12**) shows that areas with lower average SimpleSAP ratings are clustered throughout the area with a noticeable tendency towards rural parts of Herefordshire. Whilst no particular ward obviously dominates, the data behind the map shows that the wards with the lowest average SimpleSAP ratings are Birch, Castle and Golden Valley North (ward numbers 5, 11 and17).

These areas of lower average SimpleSAP ratings reflect those areas suffering from higher levels of excess cold and indicate that the poor average SimpleSAP ratings of dwellings in these areas, as well as properties being off the gas network is contributing to the high levels of excess cold in Herefordshire. Lower SimpleSAP ratings can occur in areas with larger, older homes where little work has been done by the occupiers to improve energy performance. The size of the home itself is not a factor in SimpleSAP, but these homes are more likely to be semi-detached or detached, and therefore have larger heat loss areas. The prevalence of older detached houses is discussed in detail in **Section 4.1.1** which showed that 40% of Herefordshire's dwellings stock is detached (compared to less than 25% nationally and regionally) and that 29% of these detached dwellings were built pre-1900 (compared to 8% nationally and regionally).

Map D. 25, **Map D. 26** and **Map D. 27** provide more details for urban areas of Herefordshire.

Map 12: Average SimpleSAP ratings per dwelling in Herefordshire private sector stock *See ward key*



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4.2.4 Analysis of owner occupied sector and ability to undertake renovations

This section looks at the extent to which households in the private owned sector may be able to afford to undertake any necessary renovations themselves. The analysis looks at the owner occupied sector only and then determines which of those dwellings are likely to be in disrepair, which are likely to be on a low income, and looks at those dwellings which have both disrepair and low income. This provides an estimate of owner occupied dwellings which may require some form of renovation (disrepair) but where the occupier may not be able to afford to carry out those repairs due to being on a low income.

Table 5 shows levels of disrepair and low income households separately by ward, followed by the numbers and percentages of dwellings with both disrepair and low income, and finally the proportion of those dwellings in disrepair which are also occupied by a low income household. For example, looking at Arrow ward, there are an estimated 111 owner occupied dwellings in disrepair (9% of owner occupied tenure in this ward), and there are 154 dwellings with low income households (13%). However, only 19 dwellings (2%) have both disrepair and low income households in this ward. This equates to 17% of those dwellings in disrepair also being a low income household.

The wards with the highest proportions of dwellings which are both in disrepair and occupied by low income households are Central and Widemarsh (both 4%). However, the proportions for this indicator are generally low since levels of disrepair are not notably high in Herefordshire. Looking at the proportions of dwellings which are in disrepair also being occupied by a low income household, the highest levels are in Newton Farm (57%), Bromyard West (54%), Whitecross (52%), Widemarsh (50%) and Hinton & Hunderton (41%).

Map 13 shows the distribution of owner occupied dwellings which have both disrepair and low income households. **Map D. 28** to **Map D. 30** provide more information for the urban areas of Herefordshire.

In Herefordshire overall, only 1% of owner occupied dwellings are estimated to be in disrepair and occupied by a low income household. This equates to 22% of those dwellings in disrepair being occupied by a low income household.

Table 5: Owner occupied sector levels of disrepair and low income households by ward

Ward	Dwellings	Disrepair	Low income households	Disrepair and low income	Disrepair and low income (% of disrepair)
Arrow	1,224	111 (9%)	154 (13%)	19 (2%)	17%
Aylestone Hill	1,067	29 (3%)	178 (17%)	6 (1%)	21%
Backbury	968	68 (7%)	95 (10%)	7 (1%)	10%
Belmont Rural	1,175	2 (0%)	201 (17%)	0 (0%)	0%
Birch	1,062	111 (10%)	123 (12%)	27 (3%)	24%
Bircher	1,436	90 (6%)	177 (12%)	25 (2%)	28%
Bishops Frome & Cradley	1,091	82 (8%)	130 (12%)	11 (1%)	13%
Bobblestock	1,130	19 (2%)	280 (25%)	0 (0%)	0%
Bromyard Bringsty	1,071	95 (9%)	144 (13%)	16 (1%)	17%
Bromyard West	963	28 (3%)	127 (13%)	15 (2%)	54%
Castle	1,023	104 (10%)	119 (12%)	14 (1%)	13%
Central	861	98 (11%)	201 (23%)	33 (4%)	34%
College	837	46 (5%)	279 (33%)	15 (2%)	33%
Credenhill	973	33 (3%)	106 (11%)	7 (1%)	21%
Dinedor Hill	1,195	51 (4%)	190 (16%)	5 (0%)	10%
Eign Hill	1,307	53 (4%)	187 (14%)	11 (1%)	21%
Golden Valley North	1,093	91 (8%)	127 (12%)	21 (2%)	23%
Golden Valley South	1,050	91 (9%)	131 (12%)	20 (2%)	22%

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Table 5 cont.: Owner occupied sector levels of disrepair and low income households by ward

Ward	Dwellings	Disrepair	Low income households	Disrepair and low income	Disrepair and low income (% of disrepair)
Greyfriars	1,179	119 (10%)	232 (20%)	39 (3%)	33%
Hagley	1,231	47 (4%)	129 (10%)	9 (1%)	19%
Hampton	1,182	104 (9%)	143 (12%)	25 (2%)	24%
Hinton & Hunderton	741	37 (5%)	387 (52%)	15 (2%)	41%
Holmer	1,235	27 (2%)	155 (13%)	9 (1%)	33%
Hope End	1,243	121 (10%)	132 (11%)	15 (1%)	12%
Kerne Bridge	1,147	111 (10%)	138 (12%)	25 (2%)	23%
Kings Acre	1,047	18 (2%)	154 (15%)	4 (0%)	22%
Kington	989	63 (6%)	127 (13%)	20 (2%)	32%
Ledbury North	1,132	47 (4%)	182 (16%)	8 (1%)	17%
Ledbury South	1,028	20 (2%)	168 (16%)	3 (0%)	15%
Ledbury West	1,038	16 (2%)	147 (14%)	4 (0%)	25%
Leominster East	1,098	62 (6%)	315 (29%)	15 (1%)	24%
Leominster North & Rural	1,146	79 (7%)	273 (24%)	17 (1%)	22%
Leominster South	1,032	56 (5%)	213 (21%)	12 (1%)	21%
Leominster West	970	16 (2%)	160 (16%)	1 (0%)	6%
Llangarron	1,167	103 (9%)	123 (11%)	16 (1%)	16%
Mortimer	1,144	102 (9%)	143 (13%)	21 (2%)	21%

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Table 5 cont.: Owner occupied sector levels of disrepair and low income households by ward

Ward	Dwellings	Disrepair	Low income households	Disrepair and low income	Disrepair and low income (% of disrepair)
Newton Farm	668	7 (1%)	396 (59%)	4 (1%)	57%
Old Gore	1,001	80 (8%)	114 (11%)	16 (2%)	20%
Penyard	1,212	112 (9%)	139 (11%)	20 (2%)	18%
Queenswood	1,180	103 (9%)	135 (11%)	23 (2%)	22%
Red Hill	982	34 (3%)	314 (32%)	9 (1%)	26%
Ross East	1,216	56 (5%)	202 (17%)	15 (1%)	27%
Ross North	1,078	18 (2%)	221 (21%)	3 (0%)	17%
Ross West	1,110	40 (4%)	175 (16%)	9 (1%)	23%
Saxon Gate	994	47 (5%)	204 (21%)	16 (2%)	34%
Stoney Street	1,092	57 (5%)	121 (11%)	8 (1%)	14%
Sutton Walls	1,097	37 (3%)	128 (12%)	10 (1%)	27%
Three Crosses	1,159	111 (10%)	148 (13%)	18 (2%)	16%
Tupsley	1,147	13 (1%)	129 (11%)	4 (0%)	31%
Weobley	1,112	94 (8%)	137 (12%)	22 (2%)	23%
Whitecross	1,017	29 (3%)	187 (18%)	15 (1%)	52%
Widemarsh	620	46 (7%)	286 (46%)	23 (4%)	50%
Wormside	1,057	83 (8%)	129 (12%)	21 (2%)	25%

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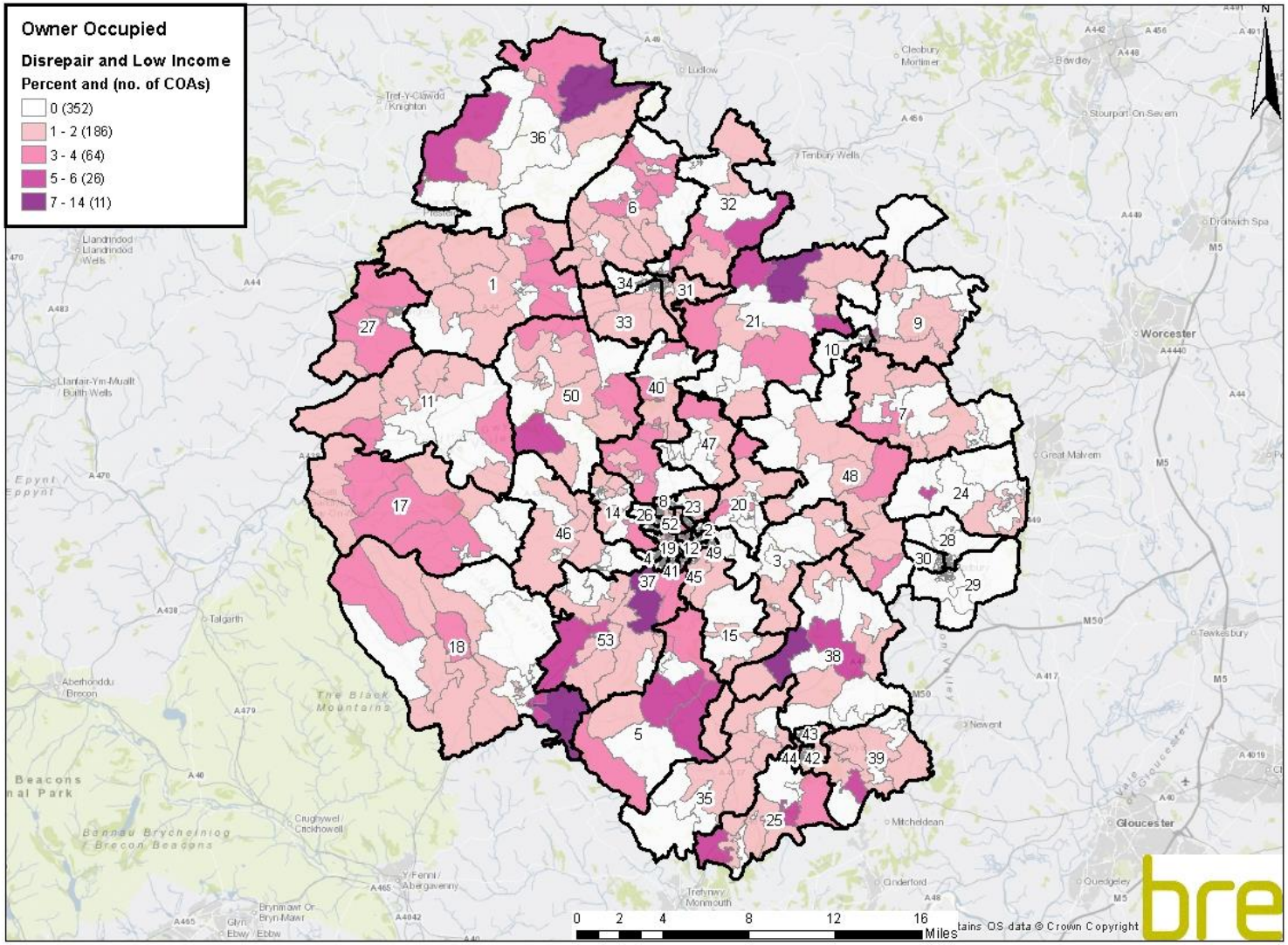
Map 13: Dwellings which are in disrepair and occupied by low income households - owner occupied sector *See ward key*



4.2.5 Ward level results for the key indicators

The previous maps have provided a visual representation of the key indicators at Census Output Area (COA) level. The following tables provide the complete set of figures at ward level for the key indicators; firstly, for the total stock (**Table 6**) and secondly, for the private sector stock (**Table 7**), owner occupied sector stock (**Table 8**) and private rented sector stock (**Table 9**). This allows a direct comparison between the wards in Herefordshire.

Table 6: *Total stock* – number and percentage of dwellings failing each of the key indicators, and average SimpleSAP ratings by ward

Ward	Dwellings	HHSRS category 1 hazards			Disrepair	Fuel poverty		Low income households	Average SimpleSAP
		All hazards	Excess cold	Fall hazards		10%	LIHC		
Arrow	1,698	623 (37%)	467 (28%)	199 (12%)	164 (10%)	310 (18%)	247 (15%)	280 (16%)	47
Aylestone Hill	1,428	175 (12%)	48 (3%)	126 (9%)	38 (3%)	99 (7%)	111 (8%)	330 (23%)	59
Backbury	1,268	338 (27%)	230 (18%)	133 (10%)	90 (7%)	178 (14%)	153 (12%)	165 (13%)	52
Belmont Rural	1,654	55 (3%)	6 (0%)	47 (3%)	2 (0%)	57 (3%)	71 (4%)	345 (21%)	65
Birch	1,359	780 (57%)	707 (52%)	167 (12%)	143 (11%)	388 (29%)	252 (19%)	200 (15%)	36
Bircher	1,741	617 (35%)	513 (29%)	163 (9%)	117 (7%)	338 (19%)	266 (15%)	257 (15%)	45
Bishops Frome & Cradley	1,375	497 (36%)	425 (31%)	141 (10%)	107 (8%)	271 (20%)	212 (15%)	218 (16%)	45
Bobblestock	1,727	130 (8%)	36 (2%)	90 (5%)	29 (2%)	106 (6%)	108 (6%)	515 (30%)	62
Bromyard Bringsty	1,561	626 (40%)	508 (33%)	175 (11%)	139 (9%)	343 (22%)	236 (15%)	409 (26%)	45
Bromyard West	1,454	191 (13%)	80 (6%)	107 (7%)	44 (3%)	128 (9%)	130 (9%)	392 (27%)	60
Castle	1,441	761 (53%)	662 (46%)	187 (13%)	160 (11%)	385 (27%)	256 (18%)	229 (16%)	39
Central	1,912	407 (21%)	130 (7%)	248 (13%)	240 (13%)	228 (12%)	225 (12%)	703 (37%)	57
College	1,641	213 (13%)	61 (4%)	150 (9%)	99 (6%)	162 (10%)	171 (10%)	942 (57%)	59
Credenhill	1,373	238 (17%)	126 (9%)	123 (9%)	48 (3%)	127 (9%)	142 (10%)	227 (17%)	56
Dinedor Hill	1,618	421 (26%)	356 (22%)	115 (7%)	69 (4%)	236 (15%)	186 (11%)	321 (20%)	51
Eign Hill	1,655	203 (12%)	45 (3%)	149 (9%)	82 (5%)	125 (8%)	105 (6%)	340 (21%)	60
Golden Valley North	1,438	705 (49%)	616 (43%)	169 (12%)	119 (8%)	360 (25%)	244 (17%)	221 (15%)	40
Golden Valley South	1,564	787 (50%)	701 (45%)	174 (11%)	148 (9%)	403 (26%)	274 (18%)	267 (17%)	39

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Table 6 cont.: *Total stock* – number and percentage of dwellings failing each of the key indicators, and average SimpleSAP ratings by ward

Ward	Dwellings	HHSRS category 1 hazards			Disrepair	Fuel poverty		Low income households	Average SimpleSAP
		All hazards	Excess cold	Fall hazards		10%	LIHC		
Greyfriars	1,809	355 (20%)	92 (5%)	249 (14%)	205 (11%)	181 (10%)	192 (11%)	427 (24%)	57
Hagley	1,559	248 (16%)	149 (10%)	120 (8%)	66 (4%)	137 (9%)	145 (9%)	215 (14%)	56
Hampton	1,547	670 (43%)	543 (35%)	181 (12%)	142 (9%)	333 (22%)	247 (16%)	237 (15%)	44
Hinton & Hunderton	1,862	221 (12%)	56 (3%)	146 (8%)	119 (6%)	293 (16%)	235 (13%)	1,331 (71%)	60
Holmer	1,609	154 (10%)	77 (5%)	86 (5%)	35 (2%)	84 (5%)	70 (4%)	338 (21%)	63
Hope End	1,669	518 (31%)	349 (21%)	204 (12%)	160 (10%)	269 (16%)	226 (14%)	320 (19%)	49
Kerne Bridge	1,425	706 (50%)	634 (44%)	155 (11%)	132 (9%)	367 (26%)	239 (17%)	233 (16%)	39
Kings Acre	1,453	114 (8%)	27 (2%)	89 (6%)	24 (2%)	91 (6%)	107 (7%)	344 (24%)	61
Kington	1,695	452 (27%)	315 (19%)	166 (10%)	128 (8%)	236 (14%)	199 (12%)	347 (20%)	53
Ledbury North	1,731	234 (14%)	114 (7%)	136 (8%)	83 (5%)	189 (11%)	145 (8%)	550 (32%)	58
Ledbury South	1,539	185 (12%)	100 (6%)	99 (6%)	36 (2%)	132 (9%)	97 (6%)	385 (25%)	60
Ledbury West	1,510	125 (8%)	51 (3%)	75 (5%)	29 (2%)	82 (5%)	110 (7%)	315 (21%)	60
Leominster East	1,915	363 (19%)	170 (9%)	190 (10%)	134 (7%)	251 (13%)	219 (11%)	866 (45%)	57
Leominster North & Rural	1,809	549 (30%)	427 (24%)	170 (9%)	107 (6%)	327 (18%)	257 (14%)	659 (36%)	50
Leominster South	1,561	324 (21%)	166 (11%)	166 (11%)	93 (6%)	194 (12%)	185 (12%)	559 (36%)	55
Leominster West	1,272	133 (10%)	60 (5%)	82 (6%)	21 (2%)	91 (7%)	100 (8%)	270 (21%)	60
Llangarron	1,501	706 (47%)	617 (41%)	180 (12%)	133 (9%)	349 (23%)	240 (16%)	195 (13%)	40
Mortimer	1,573	745 (47%)	643 (41%)	183 (12%)	150 (10%)	394 (25%)	268 (17%)	259 (16%)	40

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Table 6 cont.: *Total stock* – number and percentage of dwellings failing each of the key indicators, and average SimpleSAP ratings by ward

Ward	Dwellings	HHSRS category 1 hazards			Disrepair	Fuel poverty		Low income households	Average SimpleSAP
		All hazards	Excess cold	Fall hazards		10%	LIHC		
Newton Farm	1,772	150 (8%)	23 (1%)	111 (6%)	31 (2%)	201 (11%)	215 (12%)	1,161 (66%)	64
Old Gore	1,428	657 (46%)	586 (41%)	173 (12%)	123 (9%)	347 (24%)	253 (18%)	217 (15%)	40
Penyard	1,486	567 (38%)	469 (32%)	160 (11%)	134 (9%)	304 (20%)	231 (16%)	222 (15%)	45
Queenswood	1,472	489 (33%)	359 (24%)	164 (11%)	132 (9%)	241 (16%)	207 (14%)	216 (15%)	48
Red Hill	1,730	184 (11%)	39 (2%)	139 (8%)	58 (3%)	210 (12%)	197 (11%)	924 (53%)	60
Ross East	1,898	271 (14%)	112 (6%)	163 (9%)	92 (5%)	174 (9%)	148 (8%)	557 (29%)	59
Ross North	1,659	141 (8%)	36 (2%)	97 (6%)	34 (2%)	116 (7%)	114 (7%)	539 (32%)	62
Ross West	1,705	225 (13%)	97 (6%)	127 (7%)	71 (4%)	149 (9%)	124 (7%)	508 (30%)	60
Saxon Gate	1,849	200 (11%)	50 (3%)	151 (8%)	80 (4%)	181 (10%)	178 (10%)	720 (39%)	62
Stoney Street	1,515	390 (26%)	278 (18%)	149 (10%)	81 (5%)	226 (15%)	200 (13%)	286 (19%)	51
Sutton Walls	1,363	219 (16%)	138 (10%)	102 (7%)	46 (3%)	128 (9%)	139 (10%)	213 (16%)	56
Three Crosses	1,536	759 (49%)	653 (43%)	182 (12%)	152 (10%)	390 (25%)	263 (17%)	244 (16%)	40
Tupsley	1,367	90 (7%)	18 (1%)	76 (6%)	15 (1%)	62 (5%)	63 (5%)	259 (19%)	61
Weobley	1,626	751 (46%)	652 (40%)	182 (11%)	144 (9%)	402 (25%)	284 (17%)	332 (20%)	41
Whitecross	1,383	160 (12%)	28 (2%)	124 (9%)	42 (3%)	103 (7%)	114 (8%)	413 (30%)	60
Widemarsh	1,547	210 (14%)	45 (3%)	152 (10%)	110 (7%)	183 (12%)	175 (11%)	958 (62%)	61
Wormside	1,483	540 (36%)	436 (29%)	156 (11%)	120 (8%)	281 (19%)	222 (15%)	277 (19%)	47

N.B. the information on hazards refers to the number of dwellings with a hazard of the stated type. Because of this there is likely to be some overlap – for example, some dwellings are likely to have excess cold and fall hazards but this dwelling would only be represented once under 'all hazards'. The number of dwellings under 'all hazards' can therefore be less than the sum of the excess cold plus fall hazards.

Table 7: *Private sector stock* – number and percentage of dwellings for each of the key indicators, and average SimpleSAP ratings by ward

Ward	Dwellings	HHSRS category 1 hazards			Disrepair	Fuel poverty		Low income households	Average SimpleSAP
		All hazards	Excess cold	Fall hazards		10%	LIHC		
Arrow	1,578	610 (39%)	458 (29%)	193 (12%)	159 (10%)	302 (19%)	231 (15%)	237 (15%)	46
Aylestone Hill	1,260	164 (13%)	48 (4%)	117 (9%)	33 (3%)	85 (7%)	87 (7%)	224 (18%)	59
Backbury	1,122	323 (29%)	222 (20%)	125 (11%)	83 (7%)	166 (15%)	142 (13%)	124 (11%)	51
Belmont Rural	1,579	54 (3%)	6 (0%)	46 (3%)	2 (0%)	52 (3%)	65 (4%)	293 (19%)	65
Birch	1,303	770 (59%)	700 (54%)	163 (13%)	140 (11%)	381 (29%)	241 (18%)	181 (14%)	35
Bircher	1,658	596 (36%)	495 (30%)	159 (10%)	113 (7%)	322 (19%)	248 (15%)	230 (14%)	45
Bishops Frome & Cradley	1,242	475 (38%)	411 (33%)	131 (11%)	95 (8%)	252 (20%)	186 (15%)	160 (13%)	44
Bobblestock	1,609	117 (7%)	31 (2%)	84 (5%)	23 (1%)	94 (6%)	95 (6%)	424 (26%)	62
Bromyard Bringsty	1,367	603 (44%)	500 (37%)	163 (12%)	128 (9%)	302 (22%)	201 (15%)	218 (16%)	43
Bromyard West	1,109	162 (15%)	73 (7%)	90 (8%)	35 (3%)	82 (7%)	89 (8%)	165 (15%)	58
Castle	1,327	717 (54%)	631 (48%)	174 (13%)	143 (11%)	360 (27%)	225 (17%)	189 (14%)	38
Central	1,677	375 (22%)	122 (7%)	230 (14%)	209 (12%)	182 (11%)	191 (11%)	497 (30%)	57
College	1,148	166 (14%)	46 (4%)	118 (10%)	63 (5%)	90 (8%)	101 (9%)	449 (39%)	58
Credenhill	1,162	211 (18%)	114 (10%)	109 (9%)	41 (4%)	104 (9%)	111 (10%)	141 (12%)	55
Dinedor Hill	1,494	407 (27%)	347 (23%)	110 (7%)	65 (4%)	225 (15%)	168 (11%)	268 (18%)	51
Eign Hill	1,561	192 (12%)	40 (3%)	144 (9%)	76 (5%)	103 (7%)	96 (6%)	246 (16%)	60
Golden Valley North	1,318	687 (52%)	607 (46%)	162 (12%)	114 (9%)	346 (26%)	219 (17%)	178 (14%)	38
Golden Valley South	1,478	767 (52%)	686 (46%)	168 (11%)	142 (10%)	389 (26%)	253 (17%)	236 (16%)	38

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Table 7 cont.: *Private sector stock* – number and percentage of dwellings for each of the key indicators, and average SimpleSAP ratings by ward

Ward	Dwellings	HHSRS category 1 hazards			Disrepair	Fuel poverty		Low income households	Average SimpleSAP
		All hazards	Excess cold	Fall hazards		10%	LIHC		
Greyfriars	1,706	336 (20%)	87 (5%)	236 (14%)	184 (11%)	170 (10%)	173 (10%)	377 (22%)	57
Hagley	1,443	240 (17%)	148 (10%)	114 (8%)	62 (4%)	129 (9%)	128 (9%)	166 (12%)	56
Hampton	1,486	661 (44%)	537 (36%)	177 (12%)	138 (9%)	324 (22%)	234 (16%)	213 (14%)	43
Hinton & Hunderton	953	133 (14%)	38 (4%)	93 (10%)	46 (5%)	102 (11%)	112 (12%)	497 (52%)	59
Holmer	1,424	146 (10%)	74 (5%)	82 (6%)	31 (2%)	62 (4%)	57 (4%)	202 (14%)	62
Hope End	1,469	500 (34%)	345 (23%)	191 (13%)	147 (10%)	241 (16%)	198 (13%)	178 (12%)	47
Kerne Bridge	1,334	687 (51%)	619 (46%)	150 (11%)	128 (10%)	346 (26%)	217 (16%)	177 (13%)	38
Kings Acre	1,235	103 (8%)	26 (2%)	80 (6%)	20 (2%)	68 (6%)	81 (7%)	223 (18%)	60
Kington	1,431	420 (29%)	296 (21%)	151 (11%)	111 (8%)	208 (15%)	162 (11%)	235 (16%)	51
Ledbury North	1,502	216 (14%)	108 (7%)	127 (8%)	74 (5%)	138 (9%)	113 (8%)	321 (21%)	57
Ledbury South	1,308	175 (13%)	99 (8%)	92 (7%)	34 (3%)	108 (8%)	77 (6%)	241 (18%)	59
Ledbury West	1,319	107 (8%)	46 (3%)	65 (5%)	20 (2%)	64 (5%)	73 (6%)	203 (15%)	60
Leominster East	1,683	335 (20%)	163 (10%)	175 (10%)	115 (7%)	196 (12%)	174 (10%)	648 (39%)	57
Leominster North & Rural	1,442	520 (36%)	416 (29%)	153 (11%)	98 (7%)	278 (19%)	201 (14%)	409 (28%)	47
Leominster South	1,290	292 (23%)	157 (12%)	146 (11%)	75 (6%)	151 (12%)	139 (11%)	319 (25%)	54
Leominster West	1,153	123 (11%)	59 (5%)	75 (7%)	19 (2%)	75 (7%)	77 (7%)	208 (18%)	59
Llangarron	1,431	688 (48%)	606 (42%)	173 (12%)	128 (9%)	339 (24%)	224 (16%)	175 (12%)	40
Mortimer	1,483	723 (49%)	631 (43%)	174 (12%)	139 (9%)	376 (25%)	244 (16%)	226 (15%)	39

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Table 7 cont.: *Private sector stock* – number and percentage of dwellings for each of the key indicators, and average SimpleSAP ratings by ward

Ward	Dwellings	HHSRS category 1 hazards			Disrepair	Fuel poverty		Low income households	Average SimpleSAP
		All hazards	Excess cold	Fall hazards		10%	LIHC		
Newton Farm	830	73 (9%)	9 (1%)	63 (8%)	9 (1%)	63 (8%)	81 (10%)	491 (59%)	63
Old Gore	1,304	626 (48%)	563 (43%)	163 (13%)	112 (9%)	324 (25%)	224 (17%)	176 (13%)	39
Penyard	1,365	556 (41%)	463 (34%)	153 (11%)	129 (9%)	289 (21%)	209 (15%)	170 (12%)	44
Queenswood	1,353	457 (34%)	339 (25%)	154 (11%)	120 (9%)	221 (16%)	181 (13%)	174 (13%)	47
Red Hill	1,146	144 (13%)	37 (3%)	107 (9%)	39 (3%)	108 (9%)	122 (11%)	421 (37%)	59
Ross East	1,658	262 (16%)	110 (7%)	156 (9%)	89 (5%)	139 (8%)	121 (7%)	343 (21%)	59
Ross North	1,366	112 (8%)	30 (2%)	80 (6%)	23 (2%)	67 (5%)	78 (6%)	311 (23%)	62
Ross West	1,439	206 (14%)	89 (6%)	116 (8%)	64 (4%)	106 (7%)	101 (7%)	267 (19%)	59
Saxon Gate	1,357	166 (12%)	45 (3%)	130 (10%)	57 (4%)	103 (8%)	129 (10%)	316 (23%)	60
Stoney Street	1,284	368 (29%)	269 (21%)	136 (11%)	74 (6%)	199 (15%)	164 (13%)	159 (12%)	50
Sutton Walls	1,244	211 (17%)	136 (11%)	96 (8%)	44 (4%)	117 (9%)	124 (10%)	164 (13%)	56
Three Crosses	1,458	733 (50%)	633 (43%)	175 (12%)	143 (10%)	373 (26%)	242 (17%)	215 (15%)	39
Tupsley	1,235	87 (7%)	18 (1%)	73 (6%)	14 (1%)	45 (4%)	55 (4%)	147 (12%)	61
Weobley	1,448	714 (49%)	628 (43%)	170 (12%)	133 (9%)	359 (25%)	235 (16%)	213 (15%)	40
Whitecross	1,175	142 (12%)	27 (2%)	112 (10%)	34 (3%)	78 (7%)	86 (7%)	217 (18%)	59
Widemarsh	1,166	185 (16%)	38 (3%)	136 (12%)	94 (8%)	118 (10%)	135 (12%)	577 (49%)	59
Wormside	1,280	515 (40%)	425 (33%)	143 (11%)	107 (8%)	253 (20%)	190 (15%)	177 (14%)	45

N.B. the information on hazards refers to the number of dwellings with a hazard of the stated type. Because of this there is likely to be some overlap – for example, some dwellings are likely to have excess cold and fall hazards but this dwelling would only be represented once under 'all hazards'. The number of dwellings under 'all hazards' can therefore be less than the sum of the excess cold plus fall hazards.

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Table 8: *Owner occupied sector stock* – number and percentage of dwellings for each of the key indicators, and average SimpleSAP ratings by ward

Ward	Dwellings	HHSRS category 1 hazards			Disrepair	Fuel poverty		Low income households	Average SimpleSAP
		All hazards	Excess cold	Fall hazards		10%	LIHC		
Arrow	1,224	470 (38%)	356 (29%)	143 (12%)	111 (9%)	230 (19%)	161 (13%)	154 (13%)	46
Aylestone Hill	1,067	143 (13%)	45 (4%)	100 (9%)	29 (3%)	75 (7%)	64 (6%)	178 (17%)	58
Backbury	968	270 (28%)	185 (19%)	105 (11%)	68 (7%)	140 (14%)	115 (12%)	95 (10%)	51
Belmont Rural	1,175	40 (3%)	6 (1%)	34 (3%)	2 (0%)	41 (3%)	47 (4%)	201 (17%)	64
Birch	1,062	639 (60%)	587 (55%)	131 (12%)	111 (10%)	314 (30%)	195 (18%)	123 (12%)	35
Bircher	1,436	510 (36%)	428 (30%)	132 (9%)	90 (6%)	274 (19%)	206 (14%)	177 (12%)	45
Bishops Frome & Cradley	1,091	429 (39%)	374 (34%)	115 (11%)	82 (8%)	227 (21%)	155 (14%)	130 (12%)	44
Bobblestock	1,130	87 (8%)	22 (2%)	64 (6%)	19 (2%)	66 (6%)	60 (5%)	280 (25%)	62
Bromyard Bringsty	1,071	500 (47%)	426 (40%)	125 (12%)	95 (9%)	248 (23%)	156 (15%)	144 (13%)	42
Bromyard West	963	144 (15%)	70 (7%)	77 (8%)	28 (3%)	77 (8%)	80 (8%)	127 (13%)	58
Castle	1,023	559 (55%)	494 (48%)	131 (13%)	104 (10%)	274 (27%)	161 (16%)	119 (12%)	38
Central	861	195 (23%)	66 (8%)	119 (14%)	98 (11%)	98 (11%)	88 (10%)	201 (23%)	56
College	837	130 (16%)	39 (5%)	91 (11%)	46 (5%)	72 (9%)	66 (8%)	279 (33%)	57
Credenhill	973	179 (18%)	99 (10%)	89 (9%)	33 (3%)	90 (9%)	90 (9%)	106 (11%)	55
Dinedor Hill	1,195	331 (28%)	286 (24%)	88 (7%)	51 (4%)	179 (15%)	128 (11%)	190 (16%)	51
Eign Hill	1,307	153 (12%)	35 (3%)	114 (9%)	53 (4%)	86 (7%)	68 (5%)	187 (14%)	60
Golden Valley North	1,093	578 (53%)	511 (47%)	132 (12%)	91 (8%)	290 (27%)	180 (16%)	127 (12%)	38
Golden Valley South	1,050	545 (52%)	489 (47%)	113 (11%)	91 (9%)	273 (26%)	164 (16%)	131 (12%)	38

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Table 8 cont.: *Owner occupied sector stock* – number and percentage of dwellings for each of the key indicators, and average SimpleSAP ratings by ward

Ward	Dwellings	HHSRS category 1 hazards			Disrepair	Fuel poverty		Low income households	Average SimpleSAP
		All hazards	Excess cold	Fall hazards		10%	LIHC		
Greyfriars	1,179	239 (20%)	72 (6%)	162 (14%)	119 (10%)	130 (11%)	107 (9%)	232 (20%)	55
Hagley	1,231	201 (16%)	128 (10%)	93 (8%)	47 (4%)	111 (9%)	101 (8%)	129 (10%)	56
Hampton	1,182	528 (45%)	433 (37%)	138 (12%)	104 (9%)	259 (22%)	175 (15%)	143 (12%)	43
Hinton & Hunderton	741	107 (14%)	31 (4%)	76 (10%)	37 (5%)	87 (12%)	91 (12%)	387 (52%)	58
Holmer	1,235	136 (11%)	72 (6%)	73 (6%)	27 (2%)	58 (5%)	51 (4%)	155 (13%)	62
Hope End	1,243	436 (35%)	307 (25%)	161 (13%)	121 (10%)	207 (17%)	163 (13%)	132 (11%)	46
Kerne Bridge	1,147	622 (54%)	563 (49%)	131 (11%)	111 (10%)	309 (27%)	184 (16%)	138 (12%)	37
Kings Acre	1,047	91 (9%)	21 (2%)	70 (7%)	18 (2%)	59 (6%)	61 (6%)	154 (15%)	60
Kington	989	283 (29%)	204 (21%)	96 (10%)	63 (6%)	141 (14%)	106 (11%)	127 (13%)	51
Ledbury North	1,132	156 (14%)	82 (7%)	93 (8%)	47 (4%)	97 (9%)	74 (7%)	182 (16%)	57
Ledbury South	1,028	114 (11%)	56 (5%)	69 (7%)	20 (2%)	70 (7%)	42 (4%)	168 (16%)	61
Ledbury West	1,038	92 (9%)	44 (4%)	52 (5%)	16 (2%)	57 (5%)	52 (5%)	147 (14%)	59
Leominster East	1,098	209 (19%)	102 (9%)	110 (10%)	62 (6%)	134 (12%)	107 (10%)	315 (29%)	57
Leominster North & Rural	1,146	452 (39%)	371 (32%)	123 (11%)	79 (7%)	234 (20%)	152 (13%)	273 (24%)	46
Leominster South	1,032	234 (23%)	124 (12%)	115 (11%)	56 (5%)	116 (11%)	98 (9%)	213 (21%)	54
Leominster West	970	103 (11%)	51 (5%)	61 (6%)	16 (2%)	59 (6%)	58 (6%)	160 (16%)	60
Llangarron	1,167	570 (49%)	510 (44%)	142 (12%)	103 (9%)	283 (24%)	182 (16%)	123 (11%)	39
Mortimer	1,144	574 (50%)	501 (44%)	132 (12%)	102 (9%)	293 (26%)	177 (15%)	143 (13%)	39

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Table 8 cont.: *Owner occupied sector stock* – number and percentage of dwellings for each of the key indicators, and average SimpleSAP ratings by ward

Ward	Dwellings	HHSRS category 1 hazards			Disrepair	Fuel poverty		Low income households	Average SimpleSAP
		All hazards	Excess cold	Fall hazards		10%	LIHC		
Newton Farm	668	59 (9%)	7 (1%)	52 (8%)	7 (1%)	56 (8%)	65 (10%)	396 (59%)	63
Old Gore	1,001	493 (49%)	447 (45%)	122 (12%)	80 (8%)	256 (26%)	160 (16%)	114 (11%)	39
Penyard	1,212	505 (42%)	426 (35%)	135 (11%)	112 (9%)	260 (21%)	182 (15%)	139 (11%)	43
Queenswood	1,180	398 (34%)	294 (25%)	133 (11%)	103 (9%)	190 (16%)	150 (13%)	135 (11%)	48
Red Hill	982	123 (13%)	31 (3%)	93 (9%)	34 (3%)	95 (10%)	98 (10%)	314 (32%)	58
Ross East	1,216	186 (15%)	79 (6%)	114 (9%)	56 (5%)	90 (7%)	82 (7%)	202 (17%)	58
Ross North	1,078	91 (8%)	27 (3%)	64 (6%)	18 (2%)	55 (5%)	58 (5%)	221 (21%)	61
Ross West	1,110	149 (13%)	68 (6%)	83 (7%)	40 (4%)	74 (7%)	69 (6%)	175 (16%)	59
Saxon Gate	994	124 (12%)	37 (4%)	96 (10%)	47 (5%)	80 (8%)	82 (8%)	204 (21%)	59
Stoney Street	1,092	295 (27%)	214 (20%)	112 (10%)	57 (5%)	161 (15%)	132 (12%)	121 (11%)	50
Sutton Walls	1,097	193 (18%)	128 (12%)	84 (8%)	37 (3%)	106 (10%)	108 (10%)	128 (12%)	55
Three Crosses	1,159	610 (53%)	530 (46%)	138 (12%)	111 (10%)	305 (26%)	186 (16%)	148 (13%)	39
Tupsley	1,147	81 (7%)	16 (1%)	68 (6%)	13 (1%)	41 (4%)	50 (4%)	129 (11%)	61
Weobley	1,112	551 (50%)	488 (44%)	126 (11%)	94 (8%)	279 (25%)	160 (14%)	137 (12%)	39
Whitecross	1,017	123 (12%)	24 (2%)	98 (10%)	29 (3%)	69 (7%)	71 (7%)	187 (18%)	59
Widemarsh	620	99 (16%)	26 (4%)	69 (11%)	46 (7%)	66 (11%)	64 (10%)	286 (46%)	59
Wormside	1,057	416 (39%)	344 (33%)	115 (11%)	83 (8%)	204 (19%)	147 (14%)	129 (12%)	45

N.B. the information on hazards refers to the number of dwellings with a hazard of the stated type. Because of this there is likely to be some overlap – for example, some dwellings are likely to have excess cold and fall hazards but this dwelling would only be represented once under 'all hazards'. The number of dwellings under 'all hazards' can therefore be less than the sum of the excess cold plus fall hazards.

Table 9: *Private rented sector stock* – number and percentage of dwellings for each of the key indicators, and average SimpleSAP ratings by ward

Ward	Dwellings	HHSRS category 1 hazards			Disrepair	Fuel poverty		Low income households	Average SimpleSAP
		All hazards	Excess cold	Fall hazards		10%	LIHC		
Arrow	354	140 (40%)	102 (29%)	50 (14%)	48 (14%)	72 (20%)	70 (20%)	83 (23%)	46
Aylestone Hill	193	21 (11%)	3 (2%)	17 (9%)	4 (2%)	10 (5%)	23 (12%)	46 (24%)	61
Backbury	154	53 (34%)	37 (24%)	20 (13%)	15 (10%)	26 (17%)	27 (18%)	29 (19%)	49
Belmont Rural	404	14 (3%)	0 (0%)	12 (3%)	0 (0%)	11 (3%)	18 (4%)	92 (23%)	66
Birch	241	131 (54%)	113 (47%)	32 (13%)	29 (12%)	67 (28%)	46 (19%)	58 (24%)	38
Bircher	222	86 (39%)	67 (30%)	27 (12%)	23 (10%)	48 (22%)	42 (19%)	53 (24%)	44
Bishops Frome & Cradley	151	46 (30%)	37 (25%)	16 (11%)	13 (9%)	25 (17%)	31 (21%)	30 (20%)	47
Bobblestock	479	30 (6%)	9 (2%)	20 (4%)	4 (1%)	28 (6%)	35 (7%)	144 (30%)	63
Bromyard Bringsty	296	103 (35%)	74 (25%)	38 (13%)	33 (11%)	54 (18%)	45 (15%)	74 (25%)	48
Bromyard West	146	18 (12%)	3 (2%)	13 (9%)	7 (5%)	5 (3%)	9 (6%)	38 (26%)	63
Castle	304	158 (52%)	137 (45%)	43 (14%)	39 (13%)	86 (28%)	64 (21%)	70 (23%)	38
Central	816	180 (22%)	56 (7%)	111 (14%)	111 (14%)	84 (10%)	103 (13%)	296 (36%)	58
College	311	36 (12%)	7 (2%)	27 (9%)	17 (5%)	18 (6%)	35 (11%)	170 (55%)	61
Credenhill	189	32 (17%)	15 (8%)	20 (11%)	8 (4%)	14 (7%)	21 (11%)	35 (19%)	57
Dinedor Hill	299	76 (25%)	61 (20%)	22 (7%)	14 (5%)	46 (15%)	40 (13%)	78 (26%)	53
Eign Hill	254	39 (15%)	5 (2%)	30 (12%)	23 (9%)	17 (7%)	28 (11%)	59 (23%)	60
Golden Valley North	225	109 (48%)	96 (43%)	30 (13%)	23 (10%)	56 (25%)	39 (17%)	51 (23%)	39
Golden Valley South	428	222 (52%)	197 (46%)	55 (13%)	51 (12%)	116 (27%)	89 (21%)	105 (25%)	39

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Table 9 cont.: *Private rented sector stock* – number and percentage of dwellings for each of the key indicators, and average SimpleSAP ratings by ward

Ward	Dwellings	HHSRS category 1 hazards			Disrepair	Fuel poverty		Low income households	Average SimpleSAP
		All hazards	Excess cold	Fall hazards		10%	LIHC		
Greyfriars	527	97 (18%)	15 (3%)	74 (14%)	65 (12%)	40 (8%)	66 (13%)	145 (28%)	59
Hagley	212	39 (18%)	20 (9%)	21 (10%)	15 (7%)	18 (8%)	27 (13%)	37 (17%)	56
Hampton	304	133 (44%)	104 (34%)	39 (13%)	34 (11%)	65 (21%)	59 (19%)	70 (23%)	43
Hinton & Hunderton	212	26 (12%)	7 (3%)	17 (8%)	9 (4%)	15 (7%)	21 (10%)	110 (52%)	62
Holmer	189	10 (5%)	2 (1%)	9 (5%)	4 (2%)	4 (2%)	6 (3%)	47 (25%)	67
Hope End	226	64 (28%)	38 (17%)	30 (13%)	26 (12%)	34 (15%)	35 (15%)	46 (20%)	49
Kerne Bridge	187	65 (35%)	56 (30%)	19 (10%)	17 (9%)	37 (20%)	33 (18%)	39 (21%)	45
Kings Acre	188	12 (6%)	5 (3%)	10 (5%)	2 (1%)	9 (5%)	20 (11%)	69 (37%)	62
Kington	442	137 (31%)	92 (21%)	55 (12%)	48 (11%)	67 (15%)	56 (13%)	108 (24%)	52
Ledbury North	370	60 (16%)	26 (7%)	34 (9%)	27 (7%)	41 (11%)	39 (11%)	139 (38%)	58
Ledbury South	280	61 (22%)	43 (15%)	23 (8%)	14 (5%)	38 (14%)	35 (13%)	73 (26%)	55
Ledbury West	281	15 (5%)	2 (1%)	13 (5%)	4 (1%)	7 (2%)	21 (7%)	56 (20%)	64
Leominster East	585	126 (22%)	61 (10%)	65 (11%)	53 (9%)	62 (11%)	67 (11%)	333 (57%)	58
Leominster North & Rural	296	68 (23%)	45 (15%)	30 (10%)	19 (6%)	44 (15%)	49 (17%)	136 (46%)	54
Leominster South	258	58 (22%)	33 (13%)	31 (12%)	19 (7%)	35 (14%)	41 (16%)	106 (41%)	55
Leominster West	183	20 (11%)	8 (4%)	14 (8%)	3 (2%)	16 (9%)	19 (10%)	48 (26%)	59
Llangarron	264	118 (45%)	96 (36%)	31 (12%)	25 (9%)	56 (21%)	42 (16%)	52 (20%)	43
Mortimer	339	149 (44%)	130 (38%)	42 (12%)	37 (11%)	83 (24%)	67 (20%)	83 (24%)	41

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Table 9 cont.: *Private rented sector stock* – number and percentage of dwellings for each of the key indicators, and average SimpleSAP ratings by ward

Ward	Dwellings	HHSRS category 1 hazards			Disrepair	Fuel poverty		Low income households	Average SimpleSAP
		All hazards	Excess cold	Fall hazards		10%	LIHC		
Newton Farm	162	14 (9%)	2 (1%)	11 (7%)	2 (1%)	7 (4%)	16 (10%)	95 (59%)	65
Old Gore	303	133 (44%)	116 (38%)	41 (14%)	32 (11%)	68 (22%)	64 (21%)	62 (20%)	42
Penyard	153	51 (33%)	37 (24%)	18 (12%)	17 (11%)	29 (19%)	27 (18%)	31 (20%)	47
Queenswood	173	59 (34%)	45 (26%)	21 (12%)	17 (10%)	31 (18%)	31 (18%)	39 (23%)	46
Red Hill	164	21 (13%)	6 (4%)	14 (9%)	5 (3%)	13 (8%)	24 (15%)	107 (65%)	60
Ross East	442	76 (17%)	31 (7%)	42 (10%)	33 (7%)	49 (11%)	39 (9%)	141 (32%)	60
Ross North	288	21 (7%)	3 (1%)	16 (6%)	5 (2%)	12 (4%)	20 (7%)	90 (31%)	64
Ross West	329	57 (17%)	21 (6%)	33 (10%)	24 (7%)	32 (10%)	32 (10%)	92 (28%)	59
Saxon Gate	363	42 (12%)	8 (2%)	34 (9%)	10 (3%)	23 (6%)	47 (13%)	112 (31%)	62
Stoney Street	192	73 (38%)	55 (29%)	24 (13%)	17 (9%)	38 (20%)	32 (17%)	38 (20%)	47
Sutton Walls	147	18 (12%)	8 (5%)	12 (8%)	7 (5%)	11 (7%)	16 (11%)	36 (24%)	59
Three Crosses	299	123 (41%)	103 (34%)	37 (12%)	32 (11%)	68 (23%)	56 (19%)	67 (22%)	42
Tupsley	88	6 (7%)	2 (2%)	5 (6%)	1 (1%)	4 (5%)	5 (6%)	18 (20%)	61
Weobley	336	163 (49%)	140 (42%)	44 (13%)	39 (12%)	80 (24%)	75 (22%)	76 (23%)	41
Whitecross	158	19 (12%)	3 (2%)	14 (9%)	5 (3%)	9 (6%)	15 (9%)	30 (19%)	60
Widemarsh	546	86 (16%)	12 (2%)	67 (12%)	48 (9%)	52 (10%)	71 (13%)	291 (53%)	60
Wormside	223	99 (44%)	81 (36%)	28 (13%)	24 (11%)	49 (22%)	43 (19%)	48 (22%)	44

N.B. the information on hazards refers to the number of dwellings with a hazard of the stated type. Because of this there is likely to be some overlap – for example, some dwellings are likely to have excess cold and fall hazards but this dwelling would only be represented once under 'all hazards'. The number of dwellings under 'all hazards' can therefore be less than the sum of the excess cold plus fall hazards.

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4.3 Information relating to LAHS reporting and EPC ratings

4.3.1 Cost of mitigating category 1 hazards in the Herefordshire private sector stock

Table 10 shows the total number of dwellings with HHSRS category 1 hazards in Herefordshire's private sector stock, the average cost of mitigating hazards per dwelling and the total cost for mitigating all hazards within those dwellings. The costs are based on the average cost of mitigating category 1 hazards for the region using EHS 2014 data. The EHS costs are determined following a surveyor's assessment of the hazard. For each hazard the surveyor is given a range of common treatments that they can specify in order to treat the hazard. Where quantities are required the surveyor may specify them. The treatment recommended by the surveyor is then costed using a standard set of prices.

Table 10: Estimated costs to mitigate all category 1 hazards in private sector stock, split into tenure

Tenure	No. of hazards	Total cost (£)	Total cost (£)
Private Sector	19,358	54,011,978	54,011,978
Owner occupied	15,545	43,373,086	43,373,086
Private rented	3,813	10,638,892	10,638,892

4.3.2 Houses in Multiple Occupation (HMOs) in Herefordshire's private sector stock

The Housing Act 2004 introduced a new set of definitions for HMOs in England from 6 April 2006[45]. The definition is a complex one and the bullet points below, which are adapted from web pages provided by the National HMO Network[46], provide a summary:

- An entire house or flat which is let to 3 or more tenants who form 2 or more households and who share a kitchen, bathroom or toilet
- A house which has been converted entirely into bedsits or other non-self-contained accommodation and which is let to 3 or more tenants who form two or more households and who share kitchen, bathroom or toilet facilities
- A converted house which contains one or more flats which are not wholly self-contained (i.e. the flat does not contain within it a kitchen, bathroom and toilet) and which is occupied by 3 or more tenants who form two or more households
- A building which is converted entirely into self-contained flats if the conversion did not meet the standards of the 1991 Building Regulations and more than one-third of the flats are let on short-term tenancies

The recently published "Houses in Multiple Occupation and residential property licensing reform"[47] provides guidance to local authorities on changes to rules on licensing HMOs. From 1 October 2018, mandatory

[45] See Sections 254-258 of the Housing Act (http://www.legislation.gov.uk/ukpga/2004/34/contents)

[46] National HMO Network http://www.nationalhmonetwork.com/definition.php

licensing of HMOs will be extended to cover all relevant HMOs regardless of the number of storeys (compared to the previous definition which limited this to buildings of 3 or more storeys). Purpose built flats will only require a licence where there are fewer than 3 flats in the block. The requirement for the HMO to be occupied by five or more persons in two or more households will remain[48]. From 1 October 2018, the extension will come into effect and those dwellings that fall under the new definition will require a licence. As this reform is due to come into force later this year, the figures for the updated definition have been included in this report.

To be classified as an HMO the property must be used as the tenants' only or main residence and it should be used solely or mainly to house tenants. Properties let to students and migrant workers will be treated as their only or main residence and the same will apply to properties which are used as domestic refuges.

The LAHS requires estimates of the number of HMOs and the number of mandatory licensable HMOs.

- Number of private sector HMOs
    - Modelled using specific criteria from a number of Experian data sources and information derived from the SimpleCO_2 model. The criteria include privately rented dwellings with 3 or more bedrooms occupied by male/female/mixed home sharers, mixed occupancy dwellings or classified as the following Experian Mosaic classifications:
        - Renting a room
        - Career Builders
        - Flexible Workforce
        - Bus Route Renters
        - Learners and earners
        - Student scene
- Number of mandatory licensable HMOs under the Government's new definition, as of 1 October 2018
    - This has been modelled using the above criteria for HMOs plus the dwelling must have 4 or more bedrooms. This will apply to both houses and converted flats.
    - Purpose built flats where there are up to two flats in the block and one or both have 4 or more bedrooms.

In addition to the total number of HMOs and the number of mandatory licensable HMOs, Herefordshire Council also requested information on Class 4 HMOs. Under the Town and Country Planning Order 1987[49] classes of use are defined for which planning permission needs to be obtained. A standard dwelling would be a Class 3, but an HMO with up to 6 residents living together is a Class 4. To predict numbers of Class 4 HMOs in Herefordshire, the number of bedrooms was adjusted to reflect up to 6 residents sharing.

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[47] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/670536/HMO_licensing_reforms_response.pdf

[48] In addition, new mandatory licence conditions will be introduced relating to national minimum sleeping room sizes and provision of waste disposal.

[49] http://www.legislation.gov.uk/uksi/1987/764/contents/made

Table 11 summarises the results for the private sector stock in Herefordshire, while **Map 14** shows the geographic distribution of HMOs, **Map 15** shows the distribution of mandatory licensable HMOs and **Map 16** shows the distribution of Class 4 HMOs.

The maps show the majority of HMOs to be concentrated in the urban areas of Herefordshire – in particular Hereford, Leominster and Ross-on-Wye.

Map D. 31, **Map D. 32** and **Map D. 33** provide more details for these urban areas.

Licensable HMOs tend to be more scattered across Herefordshire with some high concentrations in both rural and urban locations. **Map D. 34**, **Map D. 35** and **Map D. 36** provide more details for the urban areas of Herefordshire.

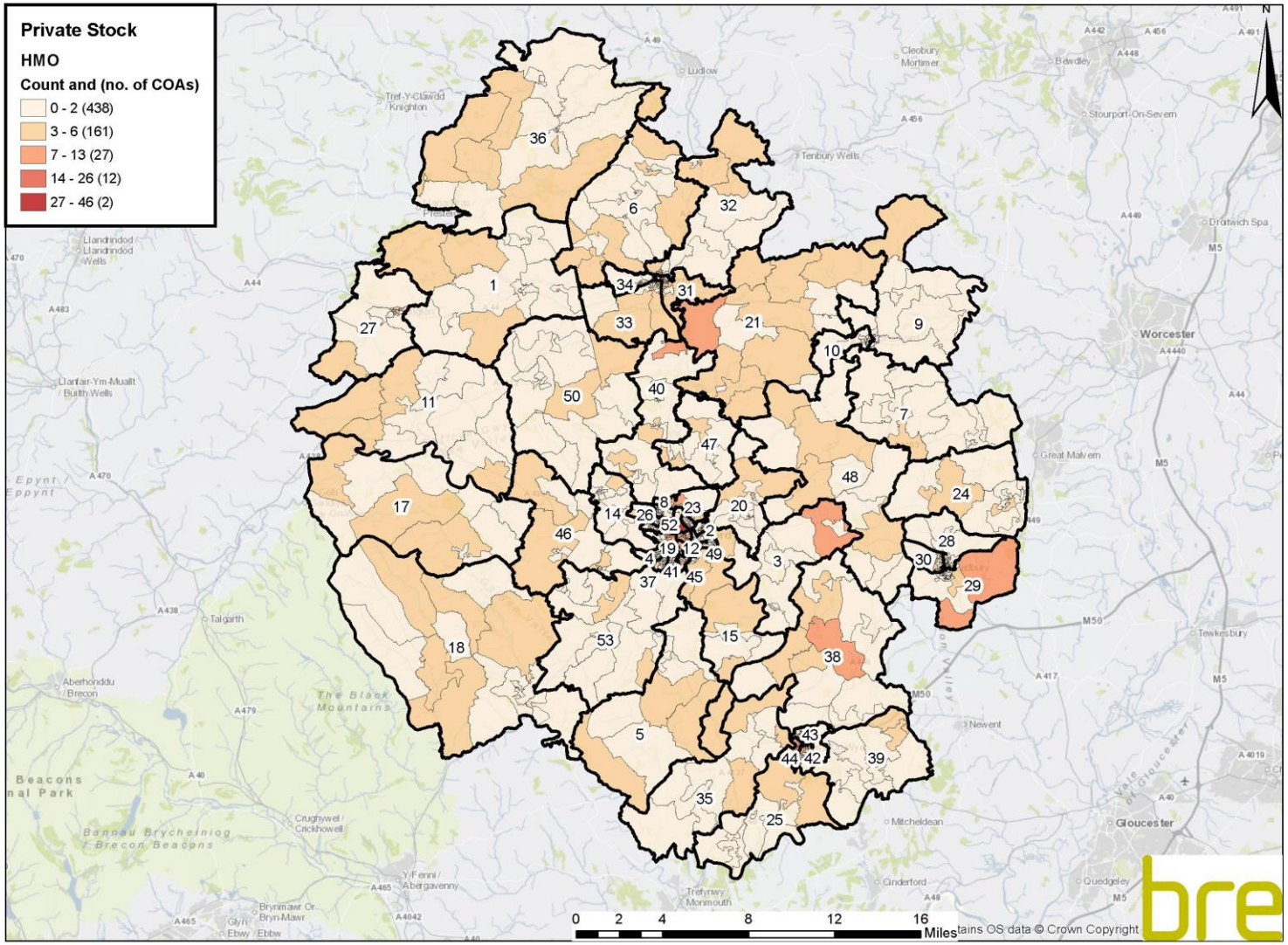
Class 4 HMOs show a similar distribution to the HMOs since they constitute a major sub-set of standard HMOs. **Map D. 37**, **Map D. 38** and **Map D. 39** provide more details for the urban areas of Herefordshire.

As previously mentioned, ward level data on HMOs is available in the accompanying Housing Stock Condition Database (HSCD) and **Appendix C** provides guidance on how to use the database.

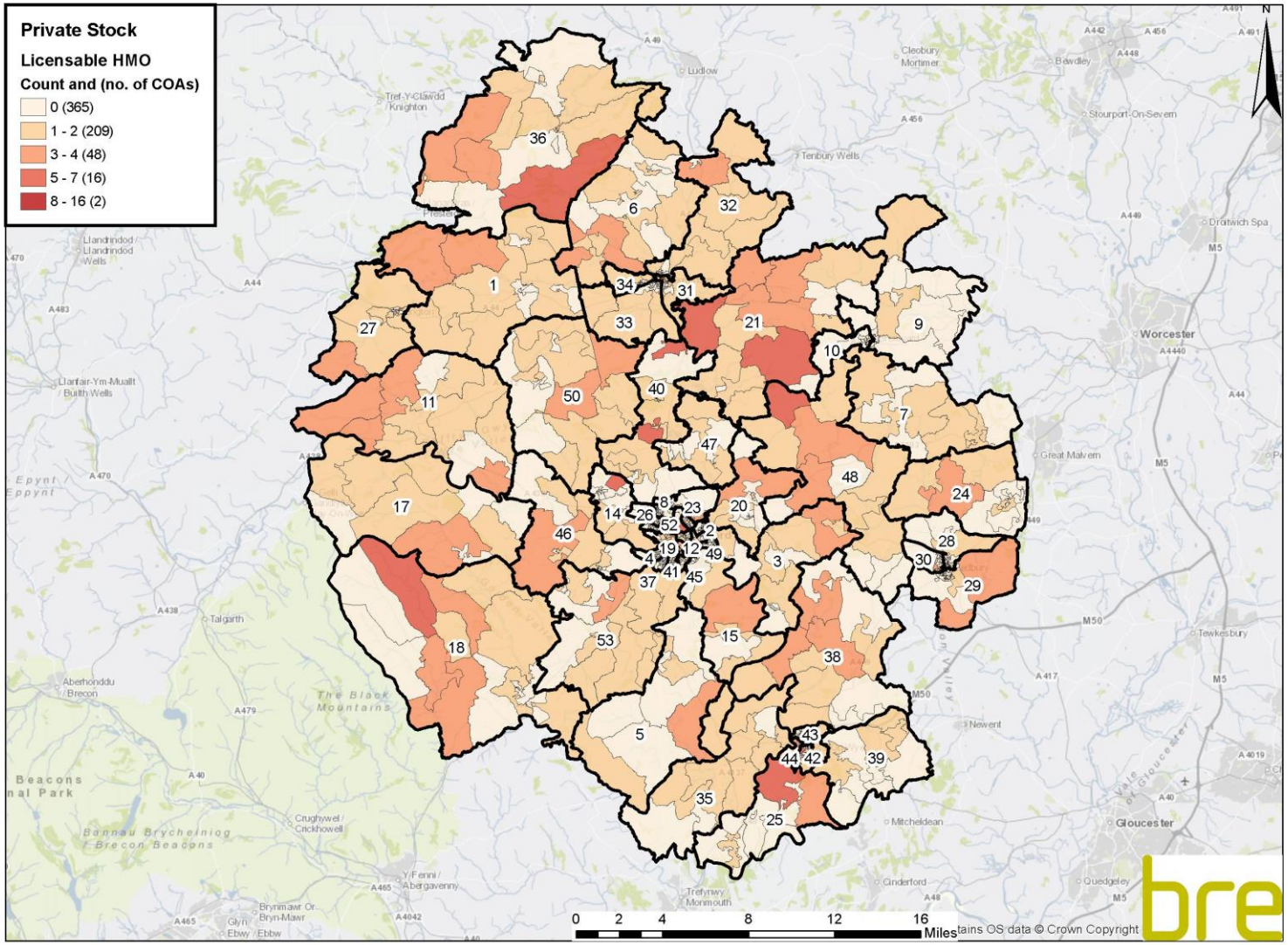
Table 11: Summary of HMOs within the Herefordshire private sector stock

Herefordshire	No. of private sector dwellings	HMOs	Class 4 HMOs	Mandatory Licensing Scheme HMOs
	72,192	1,590	1,499	544

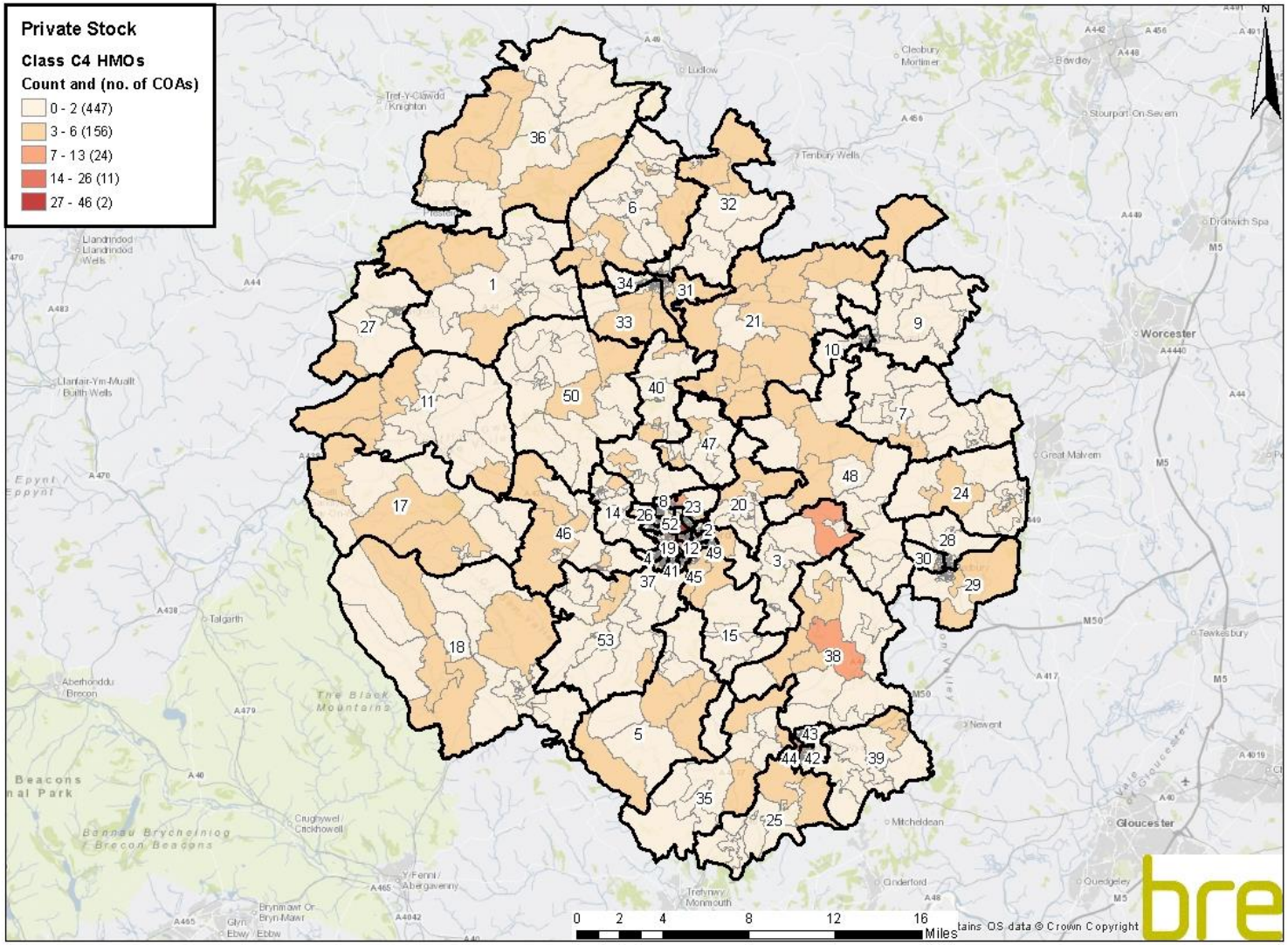
Map 14: Count of HMOs *See ward key*



Map 15: Count of mandatory licensable HMOs *See ward key*



Map 16: Count of class 4 HMOs *See ward key*



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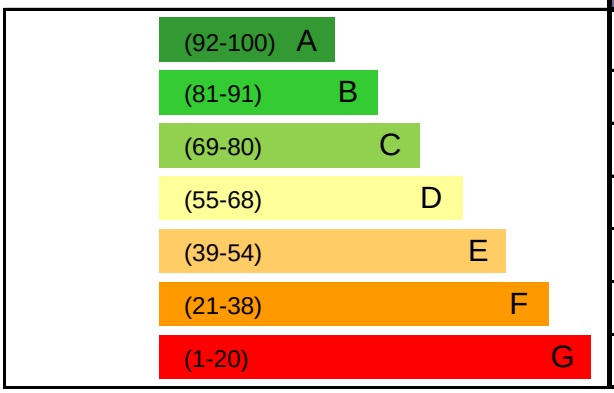
4.3.3 EPC ratings in the Herefordshire private sector stock

An Energy Performance Certificate (EPC) is required whenever a new building is constructed, or an existing building is sold or rented out. An EPC is a measure of the energy efficiency performance of a building and is rated from band A – G, with A representing the best performance. The EPC ratings correspond to a range of SAP ratings from 1 – 100, with 100 being the best. It is possible, therefore, to give a dwelling an EPC rating based on the SAP rating.

Figure 13 below shows the bands A – G and corresponding SAP ratings in brackets. The first two columns show the number and percentage of Herefordshire's private sector stock falling into each of the EPC ratings bands. The third column shows the comparable figures for the private sector stock in England.

The estimated average SimpleSAP for the private sector stock in Herefordshire is 52 which corresponds to an EPC rating of D. The number of private sector dwellings with an EPC rating below band E is estimated to be 17,149 (23.8%). Herefordshire has a higher proportion of dwellings in bands E, F and G and lower proportions in bands A - D.

Figure 13: Number and percentage of Herefordshire's *private sector stock* falling into each of the EPC ratings bands (based on SimpleSAP), compared to England (EHS) figures *N.B. England figures report band A and B together*



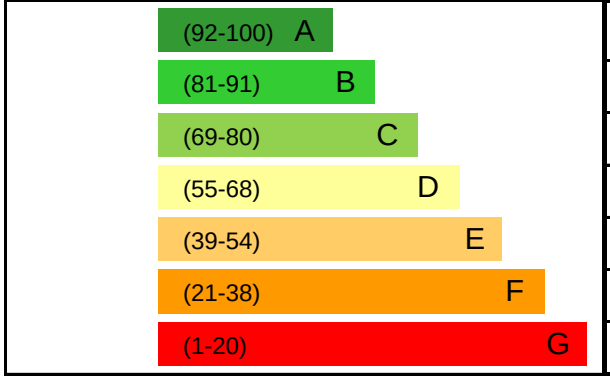
	Herefordshire		2014 EHS England
	Count	Percent	Percent
(92-100) A	0	0.0%	1.0%
(81-91) B	292	0.4%	
(69-80) C	11,683	16.2%	20.9%
(55-68) D	27,479	38.1%	52.6%
(39-54) E	15,589	21.6%	19.1%
(21-38) F	12,538	17.4%	5.0%
(1-20) G	4,611	6.4%	1.5%

Under the Energy Act 2011, new rules mean that from 2018 landlords must ensure that their properties meet a minimum energy efficiency standard - which has been set at band E - by 1 April 2018[15, 50].

Figure 14 shows the breakdown of SimpleSAP results into the A – G bands for the private rented stock only and compared to the figures for this tenure in England as a whole. The number of private rented dwellings in Herefordshire with a rating below band E (i.e. bands F and G), is estimated to be 3,131 (20.6%). Compared to England, there are a greater proportion of dwellings in bands E, F and G and lower proportions in bands A - D.

The distribution of dwellings with EPC ratings below band E is shown in **Map 17** and maps zooming in on each of the more urban areas in central, north east and south east Herefordshire are provided in **Map D. 40**, **Map D. 41** and **Map D. 42**, respectively. These are for the private rented stock only, since this is affected by the new rules on minimum standards. Under the legislation, which came into force in 2018, these properties would not be eligible to be rented out to new tenancies.

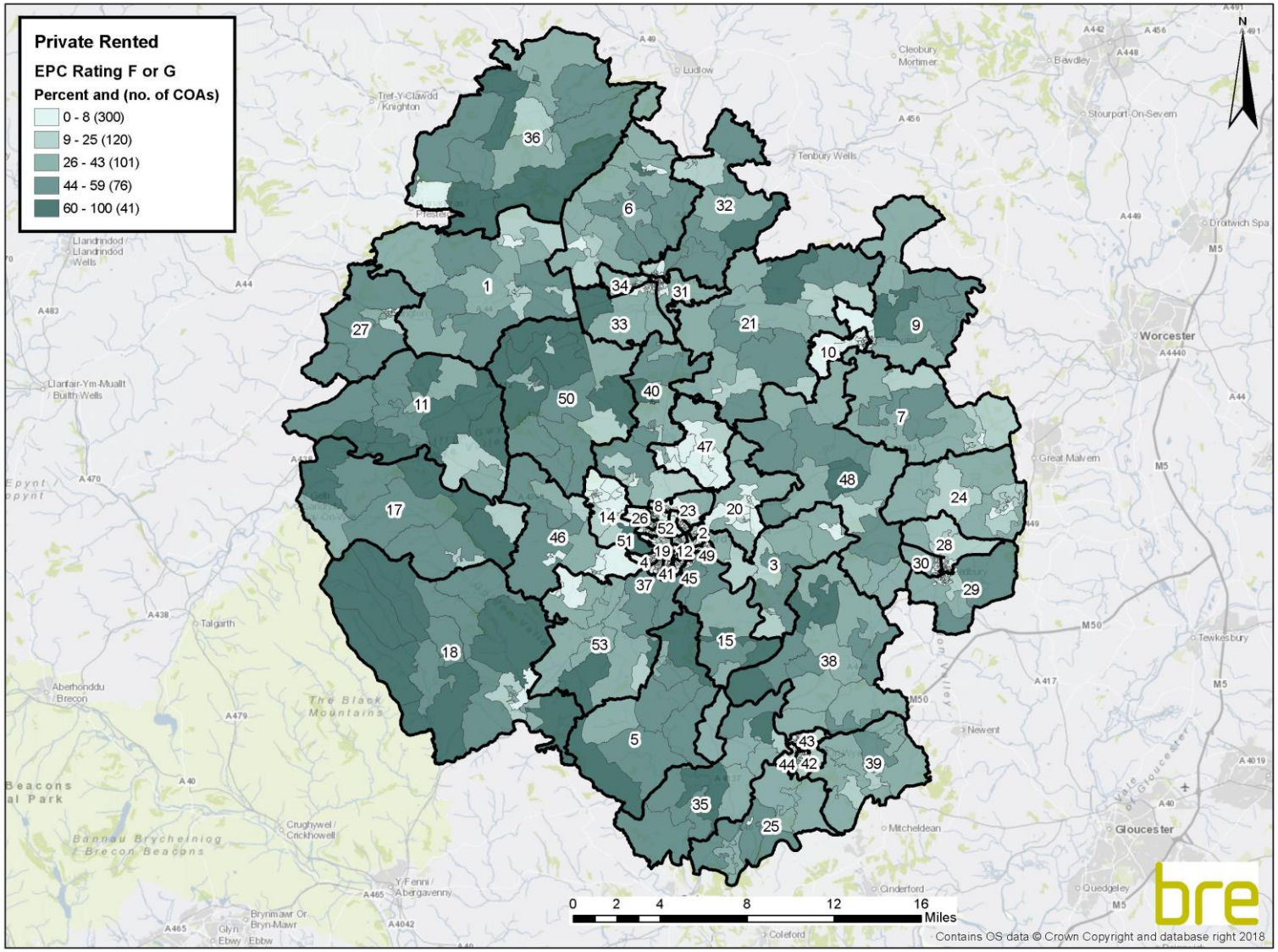
Figure 14: Number and percentage of Herefordshire's *private rented stock* falling into each of the EPC ratings bands (based on SimpleSAP), compared to England (EHS) figures *N.B. England figures report band A and B together*



	Herefordshire		2014 EHS England
	Count	Percent	Percent
(92-100) A	0	0.0%	1.4%
(81-91) B	74	0.5%	
(69-80) C	2,957	19.5%	23.8%
(55-68) D	5,927	39.1%	48.9%
(39-54) E	3,086	20.3%	18.3%
(21-38) F	2,290	15.1%	5.4%
(1-20) G	841	5.5%	2.1%

[50] Although landlords will still be able to rent out F and G rated properties after this date they will not be able to renew or sign a new contract.

Map 17: Distribution of dwellings with F or G EPC ratings in the private rented stock *See ward key*



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5 Key Indicators at Locality and Primary Care Network Areas

5.1 Localities – Herefordshire, regional and national comparisons

Within Herefordshire there are 9 localities, identified in **Map 18**.

Map 18: Boundaries of the 9 localities in Herefordshire

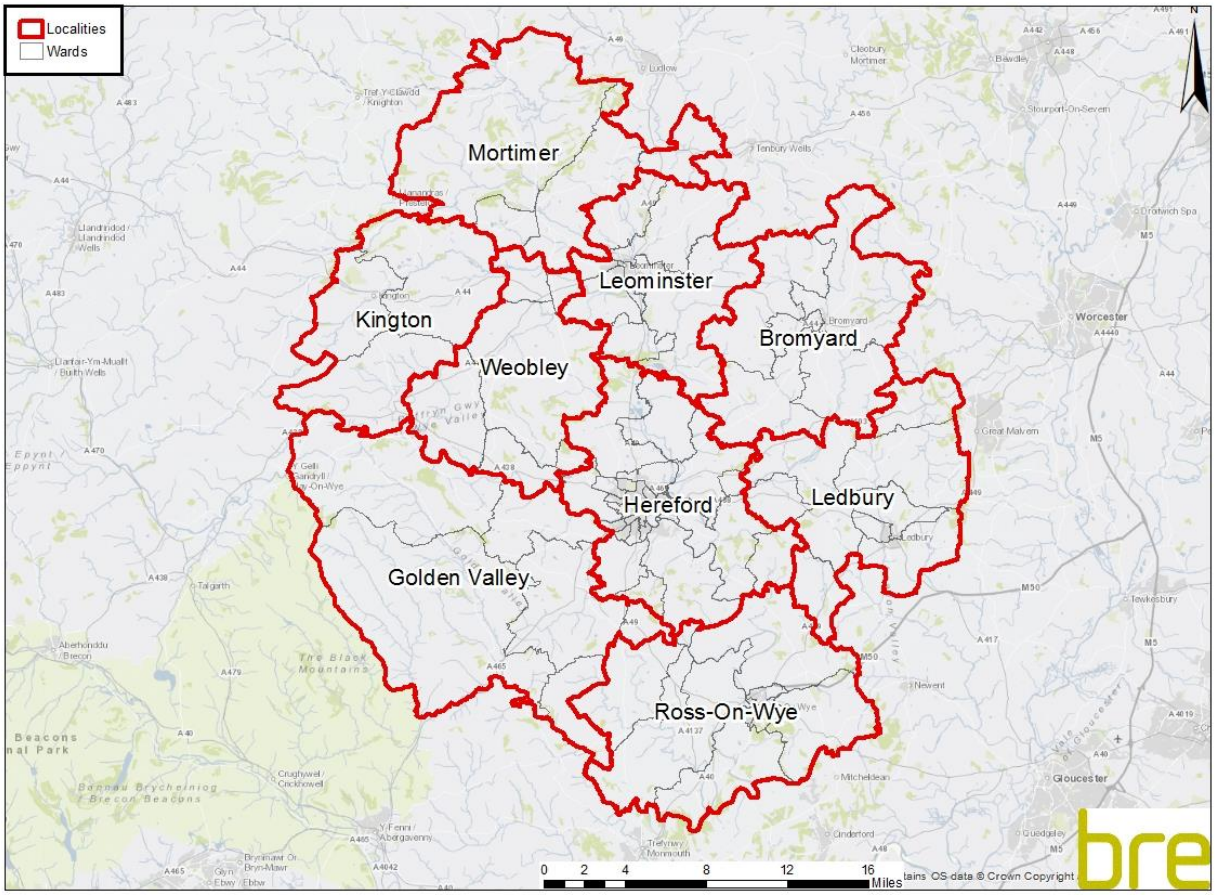

Table 12 and **Table 13** show the results for the key indicators for each of the 9 localities in Herefordshire compared to Herefordshire overall, the West Midlands region and to England (EHS 2014), split into all stock and private sector stock, respectively.

For all stock, the performance of the localities compared to the EHS England average is generally worse. Localities perform notably worse for all hazards (14-42% compared to 12%), excess cold hazards (6-36% compared to 3%), and average SimpleSAP (43-59 compared to 61). Localities perform slightly worse for the remainder of the indicators, with the exception of low income households where localities perform better than the England average. When comparing localities to the West Midlands region, the picture is similar with localities having notably higher levels of all hazards and excess cold. For the other indicators levels are very similar with the exception of low income households which is greatly varied across localities.

Comparing localities, Golden Valley has the highest levels of all hazards and excess cold (36% and 42%, respectively) as well as levels of fuel poverty. Levels of disrepair are highest in Kington (9%), and the proportion of low income households is greatest in Leominster (34%). Compared to the other localities, Hereford has lower levels of all hazards and excess cold hazards, most likely due to this being a more urban locality where issues relating to excess cold, such as larger older detached houses and connection to the gas network, are less common.

For the private stock, Herefordshire, West Midlands regional average and EHS England average is generally better than locality performance. Comparing locality private stock to the EHS England average shows a similar picture to all stock. Localities perform significantly worse for all hazards (16-45% compared to 13%), excess cold hazards (7-39% compared to 4%), and average SimpleSAP (43-58 compared to 60). Indicators are slightly worse for the remainder of the private stock, with the exception of low income households where localities perform better than the England average.

When comparing localities to the West Midland region, the localities perform slightly worse or equal to regional averages for falls, disrepair, low income households and fuel poverty (LIHC definition). Localities perform notably worse than the West Midlands region for all hazards, excess cold and average SimpleSAP. When comparing localities with Herefordshire overall, the results show that Hereford, Leominster and Ledbury are better than Herefordshire overall. The exception is low income household levels where Hereford and Leominster have higher levels than Herefordshire overall. Excluding low income households, Hereford performs better than the Herefordshire average in all categories. Leominster, Ledbury also outperform or have equal results to the Herefordshire average in most categories.

Table 12: Total stock – number and percentage of dwellings failing each of the key indicators, and average SimpleSAP ratings by locality, compared to Herefordshire, regional and national figures

Localities	Dwellings	HHSRS category 1 hazards			Disrepair	Fuel poverty		Low income households	Average SimpleSAP
		All hazards	Excess cold	Fall hazards		10%	LIHC		
Bromyard	4,851	1,755 (36%)	1,414 (29%)	505 (10%)	364 (8%)	948 (20%)	695 (14%)	1,090 (22%)	47
Golden Valley	6,449	2,700 (42%)	2,303 (36%)	699 (11%)	510 (8%)	1,419 (22%)	1,022 (16%)	1,110 (17%)	43
Hereford	34,136	4,906 (14%)	2,144 (6%)	2,825 (8%)	1,645 (5%)	3,355 (10%)	3,221 (9%)	11,223 (33%)	59
Kington	3,709	1,364 (37%)	1,068 (29%)	412 (11%)	335 (9%)	702 (19%)	535 (14%)	681 (18%)	47
Ledbury	8,596	1,810 (21%)	1,241 (14%)	725 (8%)	465 (5%)	1,078 (13%)	893 (10%)	1,920 (22%)	54
Leominster	7,484	1,732 (23%)	1,102 (15%)	709 (9%)	438 (6%)	1,053 (14%)	919 (12%)	2,515 (34%)	54
Mortimer	3,864	1,561 (40%)	1,294 (33%)	416 (11%)	321 (8%)	818 (21%)	599 (16%)	591 (15%)	43
Ross-On-Wye	11,209	3,384 (30%)	2,640 (24%)	1,078 (10%)	745 (7%)	1,847 (16%)	1,375 (12%)	2,486 (22%)	50
Weobley	3,467	1,360 (39%)	1,120 (32%)	379 (11%)	277 (8%)	722 (21%)	538 (16%)	641 (18%)	45
Herefordshire	83,765	20,572 (25%)	14,326 (17%)	7,748 (9%)	5,100 (6%)	11,942 (14%)	9,797 (12%)	22,257 (27%)	53
2014 EHS Regional		(14%)	(3%)	(9%)	(6%)	(14%)	(12%)	(29%)	60
2014 EHS England		(12%)	(3%)	(7%)	(5%)	(12%)	(11%)	(27%)	61

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Table 13: Private stock – number and percentage of dwellings failing each of the key indicators, and average SimpleSAP ratings by locality, compared to Herefordshire, regional and national figures

Localities	Dwellings	HHSRS category 1 hazards			Disrepair	Fuel poverty		Low income households	Average SimpleSAP
		All hazards	Excess cold	Fall hazards		10%	LIHC		
Bromyard	4,192	1,676 (40%)	1,379 (33%)	466 (11%)	333 (8%)	837 (20%)	586 (14%)	631 (15%)	45
Golden Valley	5,783	2,613 (45%)	2,258 (39%)	658 (11%)	480 (8%)	1,334 (23%)	908 (16%)	799 (14%)	42
Hereford	28,211	4,400 (16%)	2,019 (7%)	2,513 (9%)	1,346 (5%)	2,453 (9%)	2,466 (9%)	6,553 (23%)	58
Kington	3,304	1,286 (39%)	1,016 (31%)	381 (12%)	299 (9%)	648 (20%)	463 (14%)	522 (16%)	46
Ledbury	7,548	1,712 (23%)	1,200 (16%)	675 (9%)	419 (6%)	932 (12%)	748 (10%)	1,211 (16%)	53
Leominster	6,424	1,604 (25%)	1,055 (16%)	641 (10%)	381 (6%)	873 (14%)	729 (11%)	1,716 (27%)	53
Mortimer	3,620	1,517 (42%)	1,265 (35%)	401 (11%)	302 (8%)	785 (22%)	552 (15%)	507 (14%)	43
Ross-On-Wye	10,046	3,263 (32%)	2,582 (26%)	1,017 (10%)	702 (7%)	1,664 (17%)	1,209 (12%)	1,650 (16%)	49
Weobley	3,064	1,287 (42%)	1,077 (35%)	351 (11%)	256 (8%)	648 (21%)	449 (15%)	427 (14%)	44
Herefordshire	72,192	19,358 (27%)	13,851 (19%)	7,103 (10%)	4,518 (6%)	10,174 (14%)	8,110 (11%)	14,016 (19%)	52
2014 EHS Regional		(14%)	(3%)	(10%)	(6%)	(14%)	(11%)	(20%)	58
2014 EHS England		(13%)	(4%)	(7%)	(5%)	(11%)	(10%)	(18%)	60

Table 14 and **Table 15** show the results for each of the 9 localities in Herefordshire compared to Herefordshire overall, split into owner occupied and private rented stock respectively.

Table 14: Owner occupied – number and percentage of dwellings failing each of the key indicators, and average SimpleSAP ratings by locality, compared to Herefordshire

Localities	Dwellings	HHSRS category 1 hazards			Disrepair	Fuel poverty		Low income households	Average SimpleSAP
		All hazards	Excess cold	Fall hazards		10%	LIHC		
Bromyard	3,421	1,405 (41%)	1,180 (34%)	377 (11%)	257 (8%)	703 (21%)	467 (14%)	441 (13%)	45
Golden Valley	4,715	2,110 (45%)	1,826 (39%)	522 (11%)	369 (8%)	1,074 (23%)	703 (15%)	557 (12%)	42
Hereford	22,127	3,486 (16%)	1,695 (8%)	1,937 (9%)	961 (4%)	1,974 (9%)	1,782 (8%)	4,498 (20%)	57
Kington	2,403	936 (39%)	747 (31%)	265 (11%)	198 (8%)	464 (19%)	312 (13%)	305 (13%)	46
Ledbury	6,048	1,399 (23%)	995 (16%)	536 (9%)	320 (5%)	748 (12%)	553 (9%)	824 (14%)	53
Leominster	4,893	1,232 (25%)	830 (17%)	471 (10%)	262 (5%)	663 (14%)	509 (10%)	1,045 (21%)	53
Mortimer	3,007	1,278 (43%)	1,074 (36%)	324 (11%)	235 (8%)	656 (22%)	437 (15%)	364 (12%)	42
Ross-On-Wye	7,992	2,688 (34%)	2,177 (27%)	804 (10%)	536 (7%)	1,350 (17%)	938 (12%)	1,119 (14%)	48
Weobley	2,411	1,011 (42%)	852 (35%)	266 (11%)	179 (7%)	513 (21%)	328 (14%)	282 (12%)	44
Herefordshire	57,017	15,545 (27%)	11,376 (20%)	5,502 (10%)	3,317 (6%)	8,145 (14%)	6,029 (11%)	9,435 (17%)	51

Table 15: Private rented – number and percentage of dwellings failing each of the key indicators, and average SimpleSAP ratings by locality compared to Herefordshire

Localities	Dwellings	HHSRS category 1 hazards			Disrepair	Fuel poverty		Low income households	Average SimpleSAP
		All hazards	Excess cold	Fall hazards		10%	LIHC		
Bromyard	771	271 (35%)	199 (26%)	89 (12%)	76 (10%)	134 (17%)	119 (15%)	190 (25%)	48
Golden Valley	1,068	503 (47%)	432 (40%)	136 (13%)	111 (10%)	260 (24%)	205 (19%)	242 (23%)	41
Hereford	6,084	914 (15%)	324 (5%)	576 (9%)	385 (6%)	479 (8%)	684 (11%)	2,055 (34%)	60
Kington	901	350 (39%)	269 (30%)	116 (13%)	101 (11%)	184 (20%)	151 (17%)	217 (24%)	46
Ledbury	1,500	313 (21%)	205 (14%)	139 (9%)	99 (7%)	184 (12%)	195 (13%)	387 (26%)	55
Leominster	1,531	372 (24%)	225 (15%)	170 (11%)	119 (8%)	210 (14%)	220 (14%)	671 (44%)	54
Mortimer	613	239 (39%)	191 (31%)	77 (13%)	67 (11%)	129 (21%)	115 (19%)	143 (23%)	44
Ross-On-Wye	2,054	575 (28%)	405 (20%)	213 (10%)	166 (8%)	314 (15%)	271 (13%)	531 (26%)	52
Weobley	653	276 (42%)	225 (34%)	85 (13%)	77 (12%)	135 (21%)	121 (19%)	145 (22%)	45
Herefordshire	15,175	3,813 (25%)	2,475 (16%)	1,601 (11%)	1,201 (8%)	2,029 (13%)	2,081 (14%)	4,581 (30%)	54

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5.2 Primary Care Network Areas

Within Herefordshire there are also 4 Primary Care Network Areas (PCNA), identified in **Map 19**.

Map 19: Boundaries of the 4 Primary Care Network Areas in Herefordshire

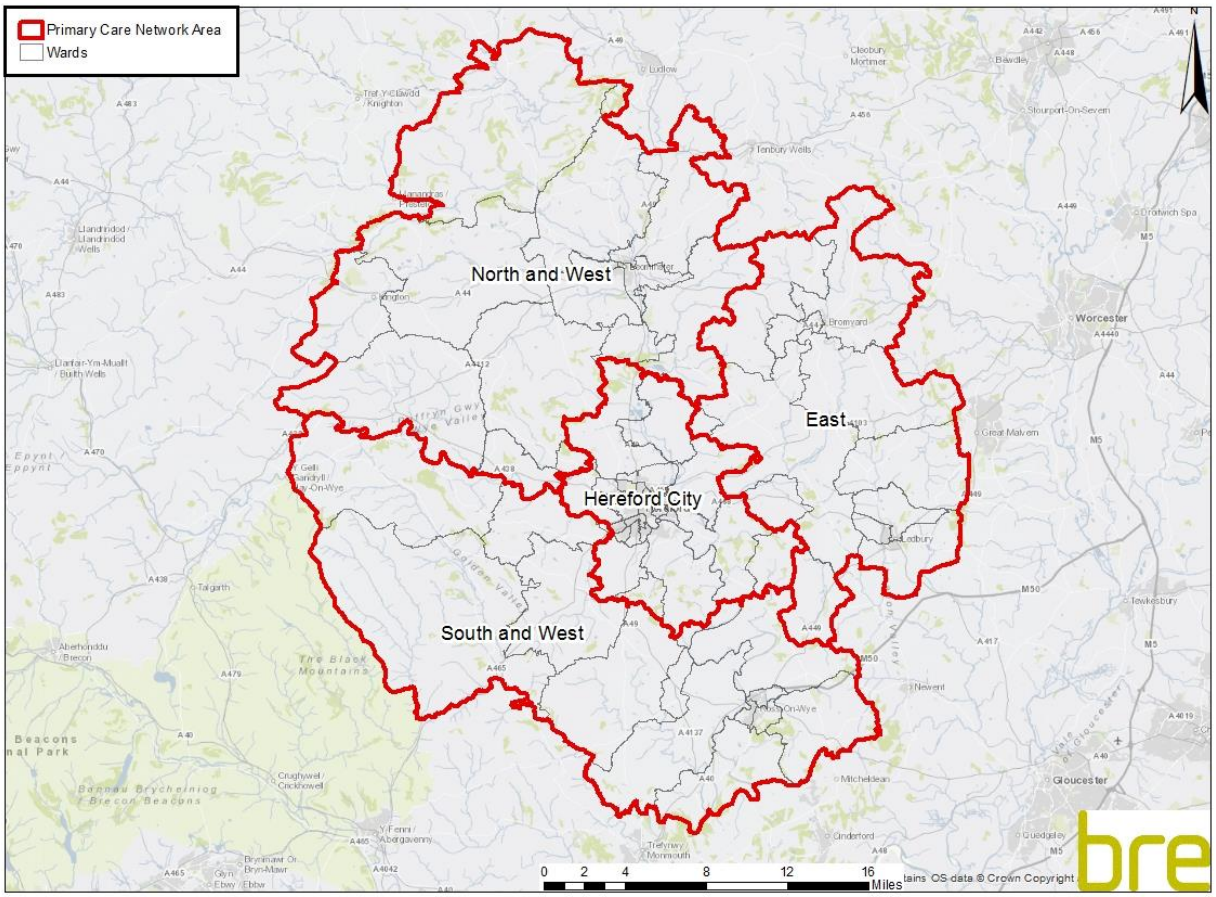

Table 16 and **Table 17** show the results for each of the 4 Primary Care Network Areas in Herefordshire compared to Herefordshire overall, the West Midlands region and to England (EHS 2014), split into total stock and private stock.

For all stock, the performance of the PCNAs compared to the EHS England average is generally worse. Low income households are the exception, where levels are slightly lower than the England average (20-24% compared to 27%). However, this excludes Hereford City which has a higher proportion of low income households (33%). When comparing PCNAs to the West Midlands region, the picture is similar with PCNAs having significantly high level of all hazards and excess cold. For the other indicators, PCNAs results are slightly elevated compared to the West Midlands averages.

For the private stock the performance of Herefordshire, West Midlands regional average and EHS England average is generally better than PCNA performance. Comparing PCNA private stock to the EHS England average shows a similar picture to all stock. PCNAs perform notably worse for all hazards (15-47% compared to 13%), excess cold hazards (7-31% compared to 4%), fuel poverty 10% definition (15-19% compared to 11%) and average SimpleSAP (46-58 compared to 60). The exception is Hereford City

which has lower levels of fuel poverty (both definitions) than the EHS England average. Indicators are slightly worse for the remainder

When comparing PCNAs to the West Midlands region, Hereford City has slightly lower levels of disrepair and fuel poverty (both definitions). However, all other PCNAs perform worse than the West Midlands region for all hazards, excess cold, fuel poverty (10% definition) and average SimpleSAP. When comparing PCNAs with Herefordshire, results are generally consistent across all indicators, although Hereford City generally has lower levels of all indicators except low income households. All other PCNAs perform worse than, or the same as, Herefordshire overall.

Table 16: Total stock – number and percentage of dwellings failing each of the key indicators, and average SimpleSAP ratings by Primary Care Network Area, compared to Herefordshire, regional and national figures

Primary Care Network Area	Dwellings	HHSRS category 1 hazards			Disrepair	Fuel poverty		Low income households	Average SimpleSAP
		All hazards	Excess cold	Fall hazards		10%	LIHC		
East	13,657	3,665 (27%)	2,735 (20%)	1,261 (9%)	852 (6%)	2,081 (15%)	1,624 (12%)	3,041 (22%)	51
Hereford City	33,917	4,807 (14%)	2,063 (6%)	2,796 (8%)	1,620 (5%)	3,306 (10%)	3,188 (9%)	11,187 (33%)	59
North and West	18,529	6,013 (32%)	4,580 (25%)	1,917 (10%)	1,370 (7%)	3,294 (18%)	2,589 (14%)	4,430 (24%)	49
South and West	17,662	6,087 (34%)	4,948 (28%)	1,774 (10%)	1,258 (7%)	3,261 (18%)	2,396 (14%)	3,599 (20%)	48
Herefordshire	83,765	20,572 (25%)	14,326 (17%)	7,748 (9%)	5,100 (6%)	11,942 (14%)	9,797 (12%)	22,257 (27%)	53
2014 EHS Regional		(14%)	(3%)	(9%)	(6%)	(14%)	(12%)	(29%)	60
2014 EHS England		(12%)	(3%)	(7%)	(5%)	(12%)	(11%)	(27%)	61

Table 17: Private stock – number and percentage of dwellings failing each of the key indicators, and average SimpleSAP ratings by Primary Care Network Area compared to Herefordshire, regional and national figures

Primary Care Network Area	Dwellings	HHSRS category 1 hazards			Disrepair	Fuel poverty		Low income households	Average SimpleSAP
		All hazards	Excess cold	Fall hazards		10%	LIHC		
East	11,946	3,487 (29%)	2,659 (22%)	1,172 (10%)	774 (6%)	1,824 (15%)	1,369 (11%)	1,872 (16%)	50
Hereford City	27,995	4,302 (15%)	1,938 (7%)	2,484 (9%)	1,322 (5%)	2,404 (9%)	2,434 (9%)	6,518 (23%)	58
North and West	16,417	5,690 (35%)	4,409 (27%)	1,775 (11%)	1,237 (8%)	2,953 (18%)	2,191 (13%)	3,174 (19%)	48
South and West	15,834	5,879 (37%)	4,845 (31%)	1,672 (11%)	1,185 (7%)	2,993 (19%)	2,116 (13%)	2,452 (15%)	46
Herefordshire	72,192	19,358 (27%)	13,851 (19%)	7,103 (10%)	4,518 (6%)	10,174 (14%)	8,110 (11%)	14,016 (19%)	52
2014 EHS Regional		(14%)	(3%)	(10%)	(6%)	(14%)	(11%)	(20%)	58
2014 EHS England		(13%)	(4%)	(7%)	(5%)	(11%)	(10%)	(18%)	60

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Table 18 and **Table 19** show the estimated figures for the owner occupied and private rented tenures.

Table 18: Owner occupied – number and percentage of dwellings failing each of the key indicators, and average SimpleSAP ratings by Primary Care Network Area, compared to Herefordshire

Primary Care Network Area	Dwellings	HHSRS category 1 hazards			Disrepair	Fuel poverty		Low income households	Average SimpleSAP
		All hazards	Excess cold	Fall hazards		10%	LIHC		
East	9,636	2,888 (30%)	2,243 (23%)	939 (10%)	594 (6%)	1,501 (16%)	1,045 (11%)	1,286 (13%)	50
Hereford City	21,954	3,410 (16%)	1,631 (7%)	1,914 (9%)	944 (4%)	1,932 (9%)	1,759 (8%)	4,474 (20%)	57
North and West	12,717	4,454 (35%)	3,500 (28%)	1,327 (10%)	873 (7%)	2,295 (18%)	1,585 (12%)	1,997 (16%)	47
South and West	12,710	4,793 (38%)	4,002 (31%)	1,322 (10%)	906 (7%)	2,417 (19%)	1,640 (13%)	1,678 (13%)	46
Herefordshire	57,017	15,545 (27%)	11,376 (20%)	5,502 (10%)	3,317 (6%)	8,145 (14%)	6,029 (11%)	9,435 (17%)	51

Table 19: Private rented - number and percentage of dwellings failing each of the key indicators, and average SimpleSAP ratings by Primary Care Network Area, compared to Herefordshire

Primary Care Network Area	Dwellings	HHSRS category 1 hazards			Disrepair	Fuel poverty		Low income households	Average SimpleSAP
		All hazards	Excess cold	Fall hazards		10%	LIHC		
East	2,310	599 (26%)	416 (18%)	233 (10%)	180 (8%)	323 (14%)	324 (14%)	586 (25%)	52
Hereford City	6,041	892 (15%)	307 (5%)	570 (9%)	378 (6%)	472 (8%)	675 (11%)	2,044 (34%)	60
North and West	3,700	1,236 (33%)	909 (25%)	448 (12%)	364 (10%)	658 (18%)	606 (16%)	1,177 (32%)	49
South and West	3,124	1,086 (35%)	843 (27%)	350 (11%)	279 (9%)	576 (18%)	476 (15%)	774 (25%)	48
Herefordshire	15,175	3,813 (25%)	2,475 (16%)	1,601 (11%)	1,201 (8%)	2,029 (13%)	2,081 (14%)	4,581 (30%)	54

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6 Conclusion and recommendations

5.1 Conclusion

Herefordshire Council commissioned BRE to undertake a series of modelling exercises on their housing stock to provide an integrated housing stock condition database, making use of available local data sources (tenure data) plus the EPC data which have been integrated into BRE's standard housing stock condition database. The integration of this data source serves to further increase the accuracy of the models by removing the need to rely on imputed data for the 32,858 cases where EPC data is available, and instead using observed data from the surveys. This leads to more accurate SimpleSAP ratings, more accurate excess cold data (and therefore HHSRS data), and more accurate fuel poverty data for around 39.2% of the stock in Herefordshire.

This report describes the modelling work and provides details of the results obtained from the dwelling level model and database. The housing stock condition database is also provided to the council to enable them to obtain specific information whenever required. This database is now in an online format.

The integrated stock models and database provide the council with dwelling level information, focussing on private sector housing, for the following:

- The percentage of dwellings meeting each of the key indicators for Herefordshire overall and broken down by tenure and then mapped by COA (private sector stock only)
- Information relating to LAHS reporting for the private sector stock - category 1 hazards and HMOs as well as information on EPC ratings

In addition, Herefordshire Council requested the following information:

- Property type and dwelling age information
- Estimates of numbers of Class 4 HMOs
- Owner occupied sector ability to afford necessary renovations
- A breakdown of housing indicators at locality and Primary Care Network Area levels

Some of the key findings of this report are as follows:

- The performance of the housing stock in Herefordshire compared to the EHS England average is generally worse with Herefordshire performing significantly worse for all hazards and significantly worse for excess cold.
- The private rented sector is generally worse than the social sector, but similar to the owner occupied sector, with the exception of all hazards and excess cold which are higher in the owner occupied stock.
- 20.6% of dwellings in the private rented sector are estimated to have an EPC below band E. Under new legislation these properties would not be eligible to be rented out to new or renewed tenancies.

Such information will facilitate the decision making process for targeting resources to improve the condition of housing and to prevent ill health resulting from poor housing conditions. Furthermore, the results of this project provide Herefordshire with information which will assist in housing policy and strategy development whether these are inspired locally, arise from obligations under the Housing Act 2004 or as responses to government initiatives such as MHCLG's Housing Strategy Policy and ECO.

5.2 Recommendations

Programmes designed to tackle disrepair for example group repair schemes, regeneration or enforcement interventions could be considered with a focus on areas of greatest disrepair such as Central ward with 12% disrepair and 22% containing category 1 hazards, Birch ward with 11% disrepair and 59% hazards or Castle ward with an estimated 11% of private sector homes in disrepair and 54% with category 1 hazards. These findings could be combined with local intelligence to help identify areas for targeting assistance for physical improvements to private sector stock and the environment. Furthermore, programmes aimed at increasing household income through job creation, benefit entitlement checks and other initiatives should also be considered, with a particular focus on areas containing high proportions of low income households like Newton Farm (59%), Hinton & Hunderton (52%) and Widemarsh (49%).

The use of additional local data in this project has enhanced the housing stock models and Housing Stock Condition Database (HSCD). The addition of any further local data, were it to become available, would potentially further enhance the models and database.

Examples of such data are:

- **LLPG data**

The Unique Property Reference Number (UPRN) from the LLPG could be used to uniquely identify all properties, while the address details from the LLPG can be used to merge the BRE Models and the EPC data using address matching.

- **Households on benefits**

Data regarding any households in receipt of either Council Tax reduction or Housing Allowance could be used to enhance the low income model, making the targeting of individual low income households more accurate.

- **Local repair schemes**

Data from any local repair schemes, including the use of repair grants, could be used to enhance the Disrepair Model.

- **Local energy improvement schemes**

Any local schemes to improve the energy efficiency of dwellings, including national schemes for which local data has been made available to Herefordshire Council, could be used to further enhance the energy models (SimpleSAP, excess cold, fuel poverty).

- **HMO data**

Lists of HMOs and licensed HMOs could be integrated with the modelled HMOs.

Furthermore, Herefordshire Council could also commission BRE to carry out an analysis of the condition of the housing stock and its health impact, through a Health Impact Assessment (HIA). The results of this would be provided in a separate report providing a cost benefit analysis of mitigating Housing Health and Safety hazards within the stock.

bre

Appendix A Definitions of the key indicators

1. **House condition indicators**
   a. **The presence of a category 1 hazard under the Housing Health and Safety Rating System (HHSRS) – reflecting both condition and thermal efficiency**
   Homes posing a category 1 hazard under the HHSRS – the system includes 29 hazards in the home categorised into category 1 – band A to C (serious) or category 2 – band D onwards (other) based on a weighted evaluation tool. Note that this includes the hazard of excess cold which is also included as one of the energy efficiency indicators.

   The 29 hazards are:

1 Damp and mould growth	16 Food safety
2 Excess cold	17 Personal hygiene, Sanitation and Drainage
3 Excess heat	18 Water supply
4 Asbestos	19 Falls associated with baths etc.
5 Biocides	20 Falling on level surfaces etc.
6 Carbon Monoxide and fuel combustion products	21 Falling on stairs etc.
7 Lead	22 Falling between levels
8 Radiation	23 Electrical hazards
9 Uncombusted fuel gas	24 Fire
10 Volatile Organic Compounds	25 Flames, hot surfaces etc.
11 Crowding and space	26 Collision and entrapment
12 Entry by intruders	27 Explosions
13 Lighting	28 Position and operability of amenities etc.
14 Noise	29 Structural collapse and falling elements
15 Domestic hygiene, Pests and Refuse	

   b. **The presence of a category 1 hazard for falls (includes "falls associated with baths", "falling on the level" and "falling on stairs")**
   The HHSRS Falls Model includes the 3 different falls hazards where the vulnerable person is over 60 as listed above.

   c. **Dwellings in disrepair (based on the former Decent Homes Standard criteria for Disrepair)**
   The previous Decent Homes Standard states that a dwelling fails this criterion if it is not found to be in a reasonable state of repair. This is assessed by looking at the age of the dwelling and the condition of a range of building components including walls, roofs, windows, doors, electrics and heating systems).

2. **Energy efficiency indicators:**
   a. **The presence of a category 1 hazard for excess cold (using SAP ratings as a proxy measure in the same manner as the English House Condition Survey)**
   This hazard looks at households where there is a threat to health arising from sub-optimal indoor temperatures. The HHSRS assessment is based on the most low income group for this hazard – persons aged 65 years or over (note that the assessment requires the hazard to

be present and potentially affect a person in the low income age group should they occupy that dwelling. The assessment does not take account of the age of the person actually occupying that dwelling at that particular point in time).

The English Housing Survey (EHS) does not measure the actual temperatures achieved in each dwelling and therefore the presence of this hazard is measured by using the SAP rating as a proxy. Dwellings with a SAP rating of less than 33.52 (SAP 2012 methodology) are considered to be suffering from a category 1 excess cold hazard.

b. An estimate of the SAP rating which, to emphasise its origin from a reduced set of input variables, is referred to as "SimpleSAP"

The Standard Assessment Procedure (SAP) is the UK Government's standard methodology for home energy cost ratings. SAP ratings allow comparisons of energy efficiency to be made, and can show the likely improvements to a dwelling in terms of energy use. The Building Regulations require a SAP assessment to be carried out for all new dwellings and conversions. Local authorities, housing associations, and other landlords also use SAP ratings to estimate the energy efficiency of existing housing. The version on which the Average SAP rating model is based is SAP 2012.

The SAP ratings give a measure of the annual unit energy cost of space and water heating for the dwelling under a standard regime, assuming specific heating patterns and room temperatures. The fuel prices used are the same as those specified in SAP 2012. The SAP takes into account a range of factors that contribute to energy efficiency, which include:

- Thermal insulation of the building fabric
- The shape and exposed surfaces of the dwelling
- Efficiency and control of the heating system
- The fuel used for space and water heating
- Ventilation and solar gain characteristics of the dwelling

3. Household vulnerability indicators:

a. Fuel poverty - 10% definition

This definition states that a household is said to be in fuel poverty if it spends more than 10% of its income on fuel to maintain an adequate level of warmth (usually defined as 21^{o}C for the main living area, and 18^{o}C for other occupied rooms). This broad definition of fuel costs also includes modelled spending on water heating, lights, appliances and cooking.

The fuel poverty ratio is defined as:

$$\textit{Fuel poverty ratio} = \frac{\textit{Fuel costs (usage * price)}}{\textit{Full income}}$$

If this ratio is greater than 0.1 then the household is in fuel poverty.

The definition of full income is the official headline figure and in addition to the basic income measure, it includes income related directly to housing (i.e. Housing Benefit, Income Support for Mortgage Interest (ISMI), Mortgage Payment Protection Insurance (MPPI), Council Tax reduction).

Fuel costs are modelled, rather than based on actual spending. They are calculated by combining the fuel requirements of the household with the corresponding fuel prices. The key goal in the modelling is to ensure that the household achieves the adequate level of warmth set out in the definition of fuel poverty whilst also meeting their other domestic fuel requirements.

b. Fuel poverty - Low Income High Costs definition

The government has recently set out a new definition of fuel poverty which it intends to adopt under the Low Income High Costs (LIHC) framework[51]. Under the new definition, a household is said to be in fuel poverty if:

- They have required fuel costs that are above average (the national median level)
- Were they to spend that amount they would be left with a residual income below the official poverty line

c. Dwellings occupied by a low income household

A household in receipt of:

- Income support
- Housing benefit
- Attendance allowance
- Disability living allowance
- Industrial injuries disablement benefit
- War disablement pension
- Pension credit
- Child tax credit
- Working credit

For child tax credit and working tax credit, the household is only considered a low income household if it has a relevant income of less than £15,860.

The definition also includes households in receipt of Council Tax reduction and income based Job Seekers Allowance.

[51] https://www.gov.uk/government/collections/fuel-poverty-statistics

Appendix B Methodology for the BRE Integrated Dwelling Level Housing Stock Modelling approach

This Appendix provides a more detailed description of the models which make up the overall housing stock modelling approach and feed into the housing stock condition database. The process is made up of a series of data sources and Models which, combined with various imputation and regression techniques and the application of other formulae, make up the final Housing Stock Condition Database (HSCD). The database is essentially the main output of the modelling and provides information on the key indicators and other data requirements (e.g. energy efficiency variables). An overview of the approach and a simplified flow diagram are provided in **Section 3** of this report.

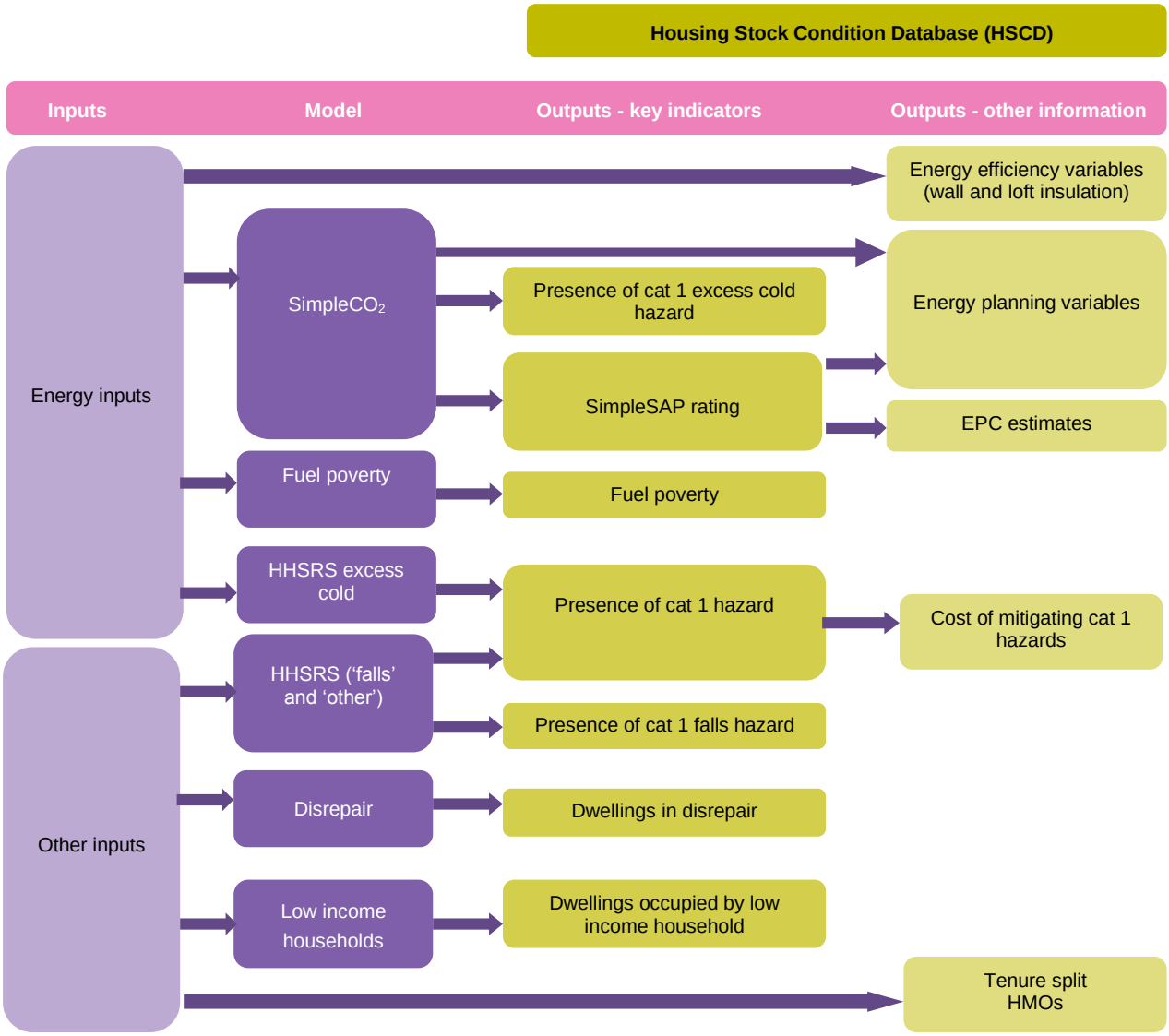
The models making up the overall housing stock modelling approach are:

- SimpleCO_2 Model
- Fuel Poverty Model
- HHSRS (all hazards, falls hazards and excess cold) Models
- Disrepair Model
- Low Income Households Model

Figure B.1 shows the data flows for the stock modelling approach, showing which models each of the outputs in the database (split into the key indicators and other information) come from. The exception is the energy efficiency variables (if used) which come directly from the energy inputs, and the tenure and HMO data (if used) which come directly from the other inputs.

Section B.1 describes the SimpleCO_2 Model in more detail, **Section B.2** provides more information on the other four models and **Section B.3** gives details of the OS MasterMap/geomodelling approach.

Figure B.1: Simplified data flow for the housing stock modelling approach



B.1 BRE SimpleCO_2 Model

BRE have developed a variant of the BREDEM[52] software, named "SimpleCO_2", that can calculate outputs from a reduced set of input variables. These outputs are indicative of the full BREDEM outputs and the minimum set of variables the software accepts is information on:

- Tenure
- Dwelling type
- Location of flat (if a flat)
- Dwelling age
- Number of storeys
- Number of rooms
- Loft insulation
- Level of double glazing
- Main heating type
- Boiler type (if a boiler driven system)
- Heating fuel
- Heating system
- Heating controls
- Water heating
- Hot water cylinder insulation
- Solar hot water
- PV panels
- Internal floor area

The Experian UK Consumer Dynamics Database is used as a source for some of these variables (tenure, dwelling age) and they are converted into a suitable format for the SimpleCO_2 software. The dwelling type is derived using information from OS Mastermap and the number of storeys from OS experimental height data. The remaining pieces of data are inferred from the EHS using other tenure, dwelling age and type, other Experian data (number of bedrooms), other OS data (i.e. dwelling footprint) and data from Xoserve[53] which indicates whether the dwelling is in a postcode which is on the gas network. As the characteristics of a dwelling cannot be determined through access to observed data, a technique known as cold deck imputation is undertaken. This is a process of assigning values in accordance with their known proportions in the stock. For example, this technique is used for predicting heating fuels because the Xoserve data only confirms whether a dwelling is on the gas network or not. Fuel used by dwellings not on the gas network is unknown, so in most cases this information will be assigned using probabilistic methods. The process is actually far more complex e.g. dwellings with particular characteristics such as larger dwellings are more likely to be assigned with oil as a fuel than smaller dwellings.

[52] Building Research Establishment Domestic Energy Model, BRE are the original developers of this model which calculates the energy costs of a dwelling based on measures of building characteristics (assuming a standard heating and living regime). The model has a number of outputs including an estimate of the SAP rating and carbon emissions.

[53] Xoserve is jointly owned by the five major gas distribution Network companies and National Grid's gas transmission business. It provides transportation transactional services on behalf of all the major gas Network transportation companies.

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The reason for taking this approach is to ensure that the national proportions in the data source are the same as those found in the stock nationally (as predicted by the EHS or other national survey). Whilst there is the possibility that some values assigned will be incorrect for a particular dwelling (as part of the assignment process has to be random) they ensure that examples of some of the more unusual types of dwelling that will be present in the stock are included.

Whilst this approach is an entirely sensible and commonly adopted approach to dealing with missing data in databases intended for strategic use, it raises issues where one of the intended uses is planning implementation measures. It must therefore be kept in mind at all times that the data provided represents the most likely status of the dwelling, but that the actual status may be quite different. That said, where EPC data has been used, the energy models (which use EPC data) are likely to be more accurate.

It is important to note that some variables have been entirely assigned using cold decking imputation techniques. These include presence of cavity wall insulation and thickness of loft insulation as there is no reliable database with national coverage for these variables.

The "SimpleCO_2" software takes the combination of Experian and imputed data and calculates the "SimpleSAP" rating for each dwelling in the national database. The calculated "SimpleSAP" ratings are the basis of the estimates of SAP and excess cold. How the other key variables are derived is discussed later in this Appendix.

Because the estimates of "SimpleSAP" etc. are calculated from modelled data it is not possible to guarantee the figures. They do, however, provide the best estimates that we are aware can be achieved from a data source with national coverage and ready availability. The input data could, however, be improved in its:

- accuracy for example through correcting erroneous values,
- depth of coverage, for example by providing more detailed information on age of dwellings,
- breadth by providing additional input variables such as insulation.

Improving any of these would enhance the accuracy of the output variables and for this reason it is always worth considering utilising additional information sources where they are available. Using EPC data will go some way towards meeting these improvements by providing more accurate data.

B.2 Housing Condition and Low Income Household Models

This section provides further information on the remaining four models – fuel poverty, HHSRS, disrepair and low income households. These models are discussed together since the approach used for each one is broadly the same.

These models are not based solely on the thermal characteristics of the dwelling, and in some cases are not based on these characteristics at all. A top down methodology has been employed for these models, using data from the EHS and statistical techniques, such as logistic regression, to determine the combination of variables which are most strongly associated with failure of each standard. Formulae have been developed by BRE to predict the likelihood of failure based on certain inputs. The formulae are then applied to the variables in the national Experian dataset to provide a likelihood of failure for each dwelling. Each individual case is then assigned a failure/compliance indicator based on its likelihood of failure and on the expected number of dwellings that will fail the standard within a given geographic area. Thus if the aggregate values for a census output area are that 60% of the dwellings in the area fail a particular standard then 60% of the dwellings with the highest failure probabilities will be assigned as failures and the remaining 40% as passes.

The presence of a category 1 hazard failure is the only exception to this as it is found by combining excess cold, fall hazards and other hazards such that failure of any one of these hazards leads to failure of the standard.

B.3 Integrating local data sources

As mentioned in the main body of the report, Herefordshire identified a number sources of data which were used to update the BRE dwelling level models to provide an integrated housing stock condition database. Their data sources are shown in **Table B.1**.

To allow these data sources to be linked to the BRE Dwelling Level Stock Models, an address matching exercise was required to link each address to the Experian address key. Address matching is rarely 100% successful due to a number of factors including:

- Incomplete address or postcodes
- Variations in how the address is written e.g. Flat 1 or Ground floor flat
- Additions to the main dwelling e.g. annexes or out-buildings

Experience indicates that, for address files in good order, match rates are around 75% - 95%. **Table B.1** provides the address matching results for the three data sources provided by Herefordshire and the resulting impact on the modelling process.

Table B.1: Address matching results and impact on the modelling process

Data source	Total no. of records	No. (and %) of addresses matched	Notes / impact on the modelling process
EPC data	46,610 – total records available	39,497 (84.7% of records provided)	Data de-duplicated for multiple EPCs and final number matched to modelled data and useable – 39,497 remaining
DPS tenure data	3,070 – total received	2,102 (68.5% of records provided)	Data de-duplicated for multiple EPCs and final number matched to modelled data and useable - 2,102
My Deposits tenure data	296 – total received	209 (70.6% of records provided)	Data de-duplicated for multiple EPCs and final number matched to modelled data and useable - 209
TDS tenure data	5,387 – total received	3,639 (67.6% of records provided)	Data de-duplicated for multiple EPCs and final number matched to modelled data and useable - 3,639

The Housing Stock Condition Database (HSCD) was also updated using the Ordnance Survey (OS) MasterMap data which enables the measurement of the footprint of the building and provides information on the number of residential addresses within the building, and to see which other buildings each address is attached to or geographically close to.

The stage at which the local data sources are included in the modelling process depends on whether or not the data includes information which can be used as an input into the SimpleCO_2 model. The simplified flow diagram in **Figure 1** in the main report shows how these data sources are integrated into the standard modelling approach.

The following sections consider each of the data sources and how they are used to update the SimpleCO_2 inputs and/or stock model outputs.

EPC data

If there are discrepancies in the energy data for the same dwelling case, arising from different energy data sources, then, if available, the EPC data will be used. If no EPC data source is available for that case, then the data with the most recent date will be taken.

Some of the energy data provided includes tenure data, in which case the housing stock condition database has been updated accordingly. However EPC cases do not include tenure data, they only include the reason for the EPC.

Therefore:

- If the reason given was a sale then the dwelling was assumed to be owner occupied.
- If the reason given was re-letting and the tenure of the let was specified (i.e. private or social) then the tenure was changed to that indicated.
- If the reason for the sale did not indicate tenure then the tenure was left unchanged.

It is important to note that the modified tenure created from the EPC data should only ever be used for work relating to energy efficiency and carbon reduction. This is a legal requirement stemming from the collection of the data, and is a licence condition of the data suppliers, Landmark. For this reason the tenure variable supplied in the database is NOT based on EPC data; however, the calculations used to determine the SimpleSAP rating and other energy characteristics of the dwelling do make use of the EPC tenure.

Where the energy data provides information on loft insulation, wall insulation, the location of a flat within a block and floor area this information will be used in favour of any imputed information, as long as the OS data is in agreement with the dwelling type.

Where energy data on wall type is present for a dwelling in a block of flats, terrace or semi-detached, that data is extrapolated to the rest of the block or terrace. If multiple dwellings with energy data are present then the most common wall type is used. Note that where the energy data indicates a wall type that is not the predominant one, this data will not be overwritten with the predominant type – the data reported in the energy database will always be used even if this results in two different wall types being present in a terrace or a block of flats.

For flats it is assumed that all flats in the block will have the same level of double glazing and as the case for which we have energy data for. If there are multiple flats in the block with energy data showing different levels of double glazing, an average will be used.

It is assumed that all flats in a block share the same heating type, boiler type if present, fuel type and heating controls. Where there are multiple types present, the predominant type is used. Flats are assumed to have the same hot water source, and if one flat benefits from solar hot water it is assumed that all flats in the block do.

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B.4 OS MasterMap information

The OS data has been used to update a number of the SimpleCO_2 model inputs. The most valuable use of the OS data is the ability to determine the dwelling type with much greater confidence.

The existing dwelling type is replaced with a new dwelling type derived from OS data. By looking at the number of residential address points it can be inferred whether the building is a house or block of flats (houses have one residential address point and blocks of flats have two or more).

Houses - where the dwelling is a house the number of other buildings it is attached to can be observed and the following assumptions made:

- If there are no other dwellings attached, the house is detached.
- If two dwellings are joined to one another, but not to any other dwellings, they are semi-detached.
- If they are attached to two or more other dwellings, they are mid terraced.
- If they are attached to only one dwelling, but that dwelling is a mid-terrace, they are an end-terrace.

Flats - if the building is a block of flats, its exact nature is determined by its age and the number of flats in the block and the following assumptions made:

- If there are between two and four flats in the block (inclusive) and the dwelling was built before 1980 then it is a conversion.
- Otherwise it is purpose built.

This information can also be used to reconcile discrepancies within blocks of flats, terraced and semi-detached houses. These discrepancies occur in variables such as dwelling age, location of flat in block, number of storeys, loft insulation, wall insulation, wall type and floor area.

Looking at dwelling age, although the OS data does not itself provide any information on age, it does allow reconciliation of age data within semi-detached, terraces and blocks of flats.

Where a group of buildings are all attached in some way, such as a terrace, it is logical to assume that they were built at the same time. Therefore the age of each building is replaced with the most common age among those present. Where the most common age occurs in equal numbers, this is resolved by looking at the average age of houses in the same postcode.

If one dwelling has an age that is notably newer than its neighbours, then the age is not changed, as it is assumed that the original dwelling was destroyed and rebuilt.

Figure B. 2 and **Figure B. 3** below show how the initial base data is adjusted using the OS data to produce more consistent and reliable results.

Considering the number of storeys and the location of a flat in its block, if the OS data reveals that the dwelling type is significantly different from the original value – specifically if a house becomes a flat, or vice versa then the variables are adjusted. If this is the case a new location for the flat within the block or the number of storeys will be imputed using the same method as before, but taking into account the revised dwelling type.

Similarly with floor area, loft insulation and wall type - if the dwelling type or location of a flat within a block changes as a result of OS data then the variables are calculated using the same method of imputation as the original models, but taking into account the new data.

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Figure B. 2: Dwelling level map showing the base data, prior to using the OS data

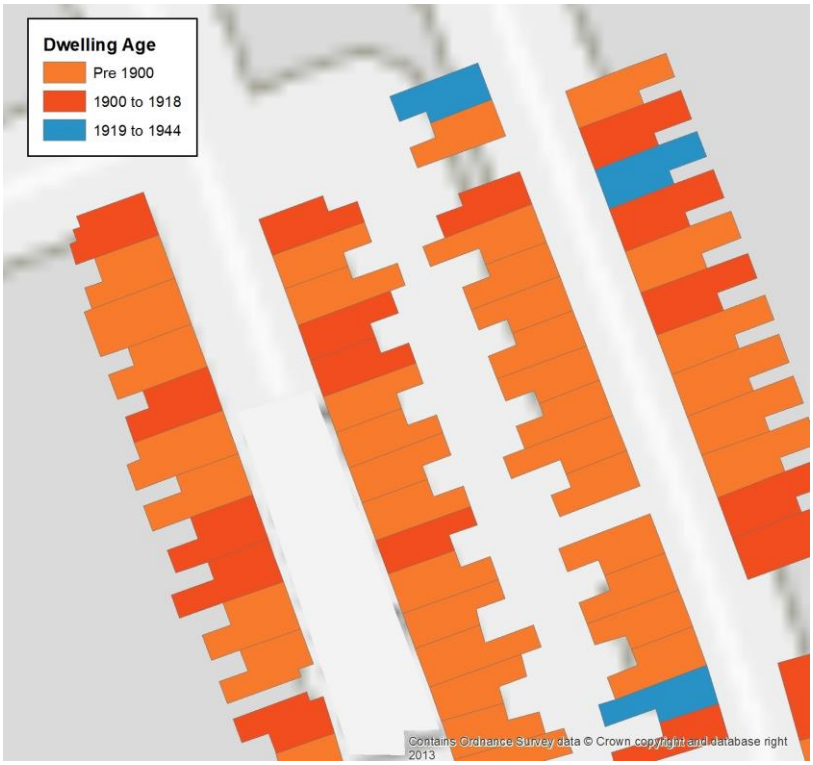
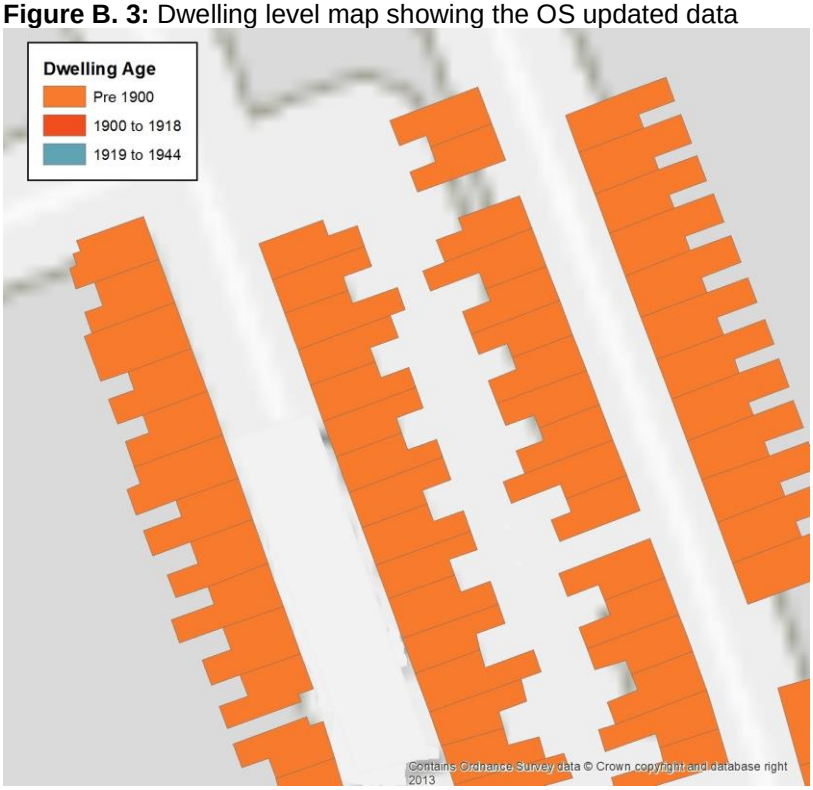


Figure B. 3: Dwelling level map showing the OS updated data



Appendix C Using the BRE Integrated Dwelling Level Housing Stock Database

The BRE Housing Stock Condition Database (HSCD) is the final output of the overall stock modelling approach described in **Section 3** and **Appendix B**. The HSDC has been designed to allow local authorities to access their local area data. There are a number of different options for summarising or investigating the data and generating lists of properties of interest.

C.1 Overview

The Housing Stock Condition Database (HSCD) is now online. You can access it in www.hscd.bre.co.uk with the credentials sent to you by email.

To ensure data security the interface will automatically open on the login page shown in **Figure C. 1**. Should you forget your password details, these can be reset and emailed to you using the function provided on the login page.

Upon login, the home page will open with a dashboard showing the key indicators for your housing stock, similar to that shown in

Figure C. 2.The navigation pane is along the top and is visible on all pages; the options shown on the navigation pane will depend upon the options purchased.

Figure C. 1: Login screen

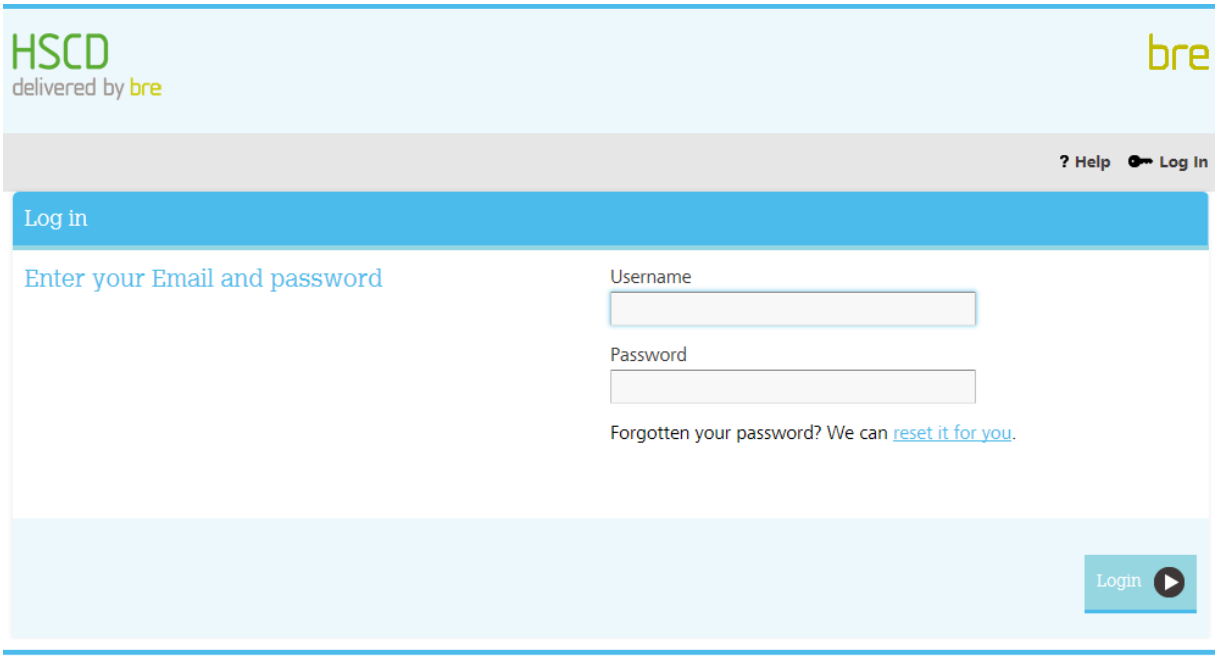
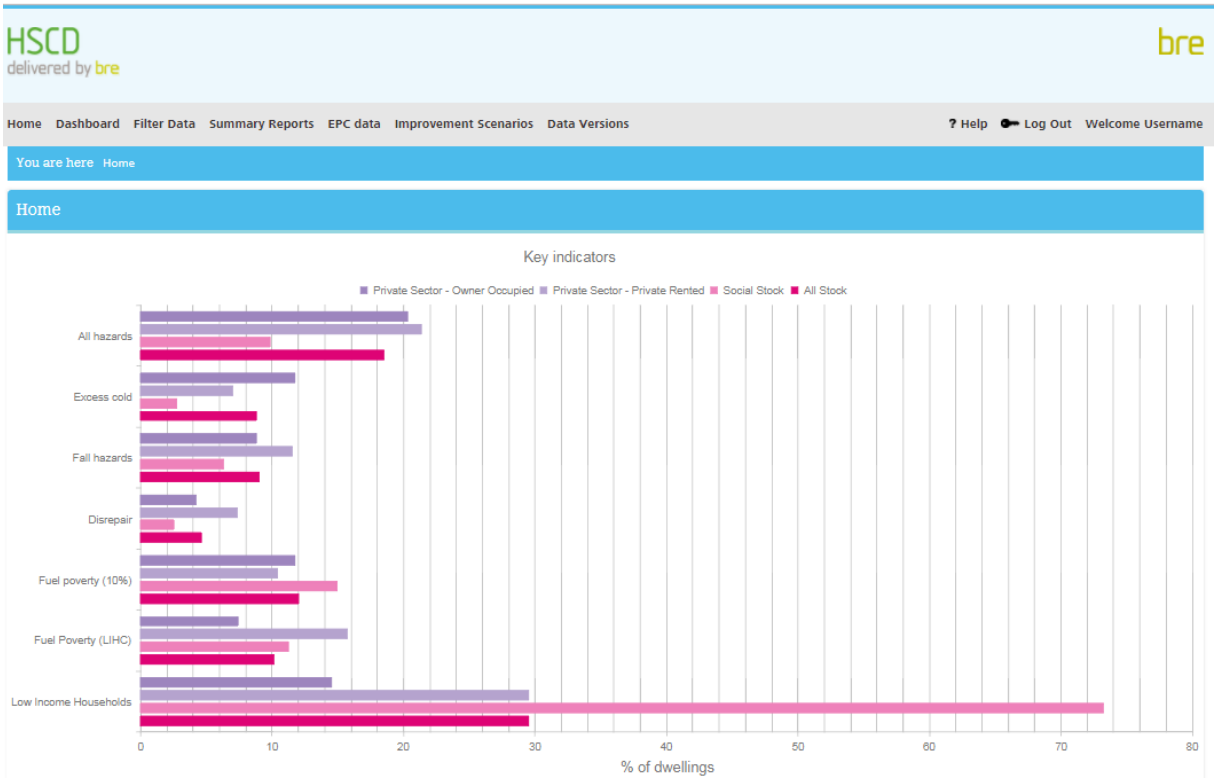


Figure C. 2 Home page (note screenshot below is sample data)



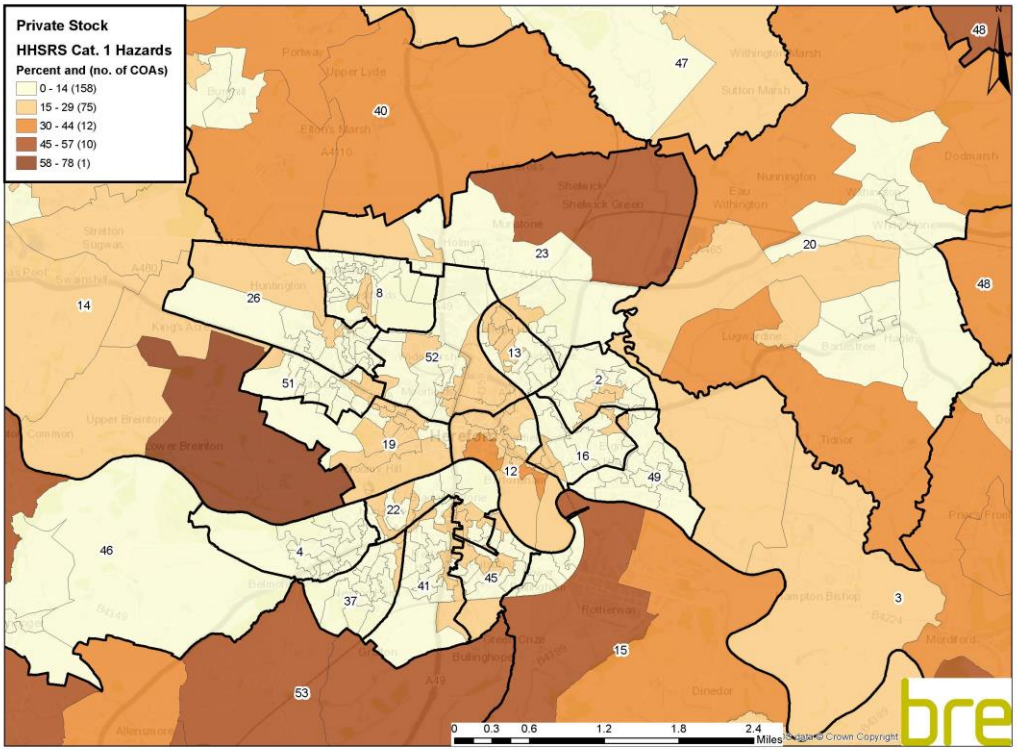
Please refer to the user guide accessible via the log in page under the help button.

Appendix D Additional Maps

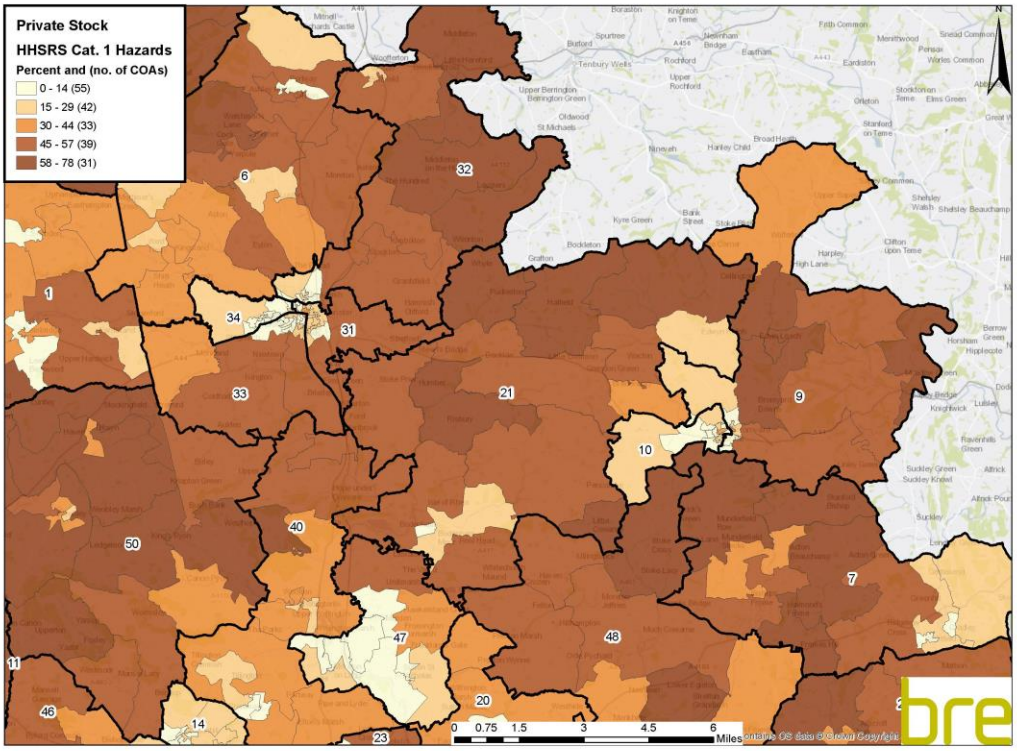
This Appendix provides close up maps for each indicator, focussing in on the urban areas of Herefordshire – Hereford in the centre, Leominster and Bromyard to the north east and Ledbury and Ross-on-Wye to the south east. These maps show the clear urban – rural divide in many of the housing indicators. The larger maps included above in the report do not always allow for the appreciation that smaller and denser COAs in urban areas are very different in their hazards to the surrounding rural COAs which are larger and are immediately more eye-catching.

Due to the size of the Herefordshire area and the large number of wards it was not possible to fit the ward key onto the map, it is therefore provided separately in **Appendix E**.

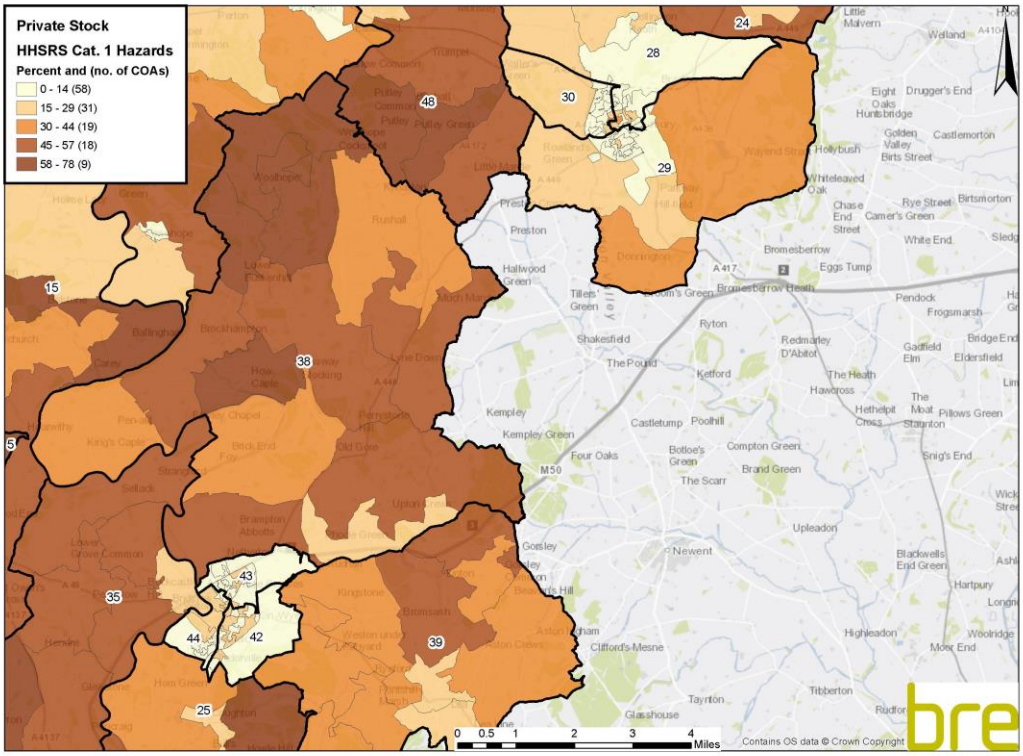
Map D. 1: Central Herefordshire category 1 hazards – private stock *Return to main report*



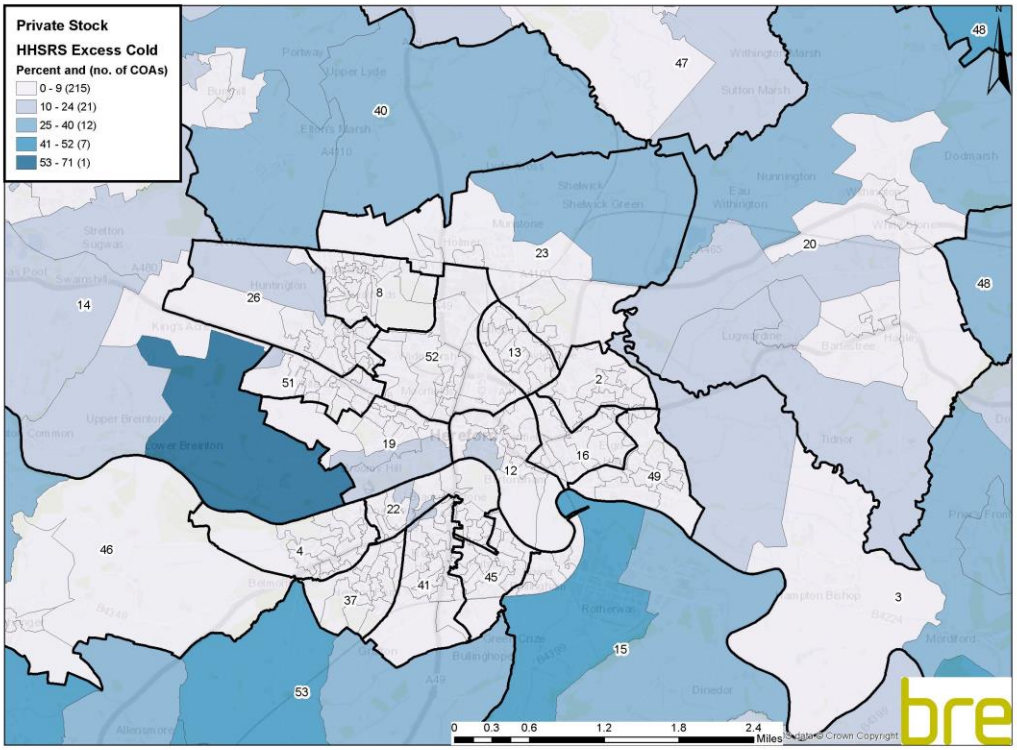
Map D. 2: North east Herefordshire category 1 hazards – private stock *Return to main report*



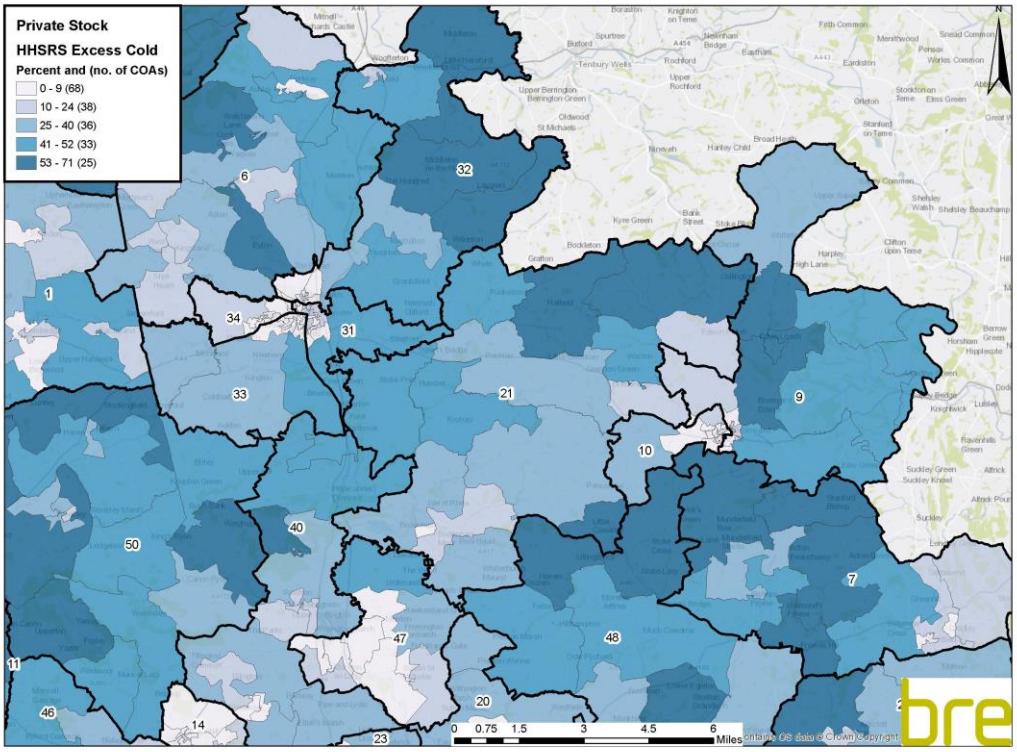
Map D. 3: South east Herefordshire category 1 hazards – private stock *Return to main report*



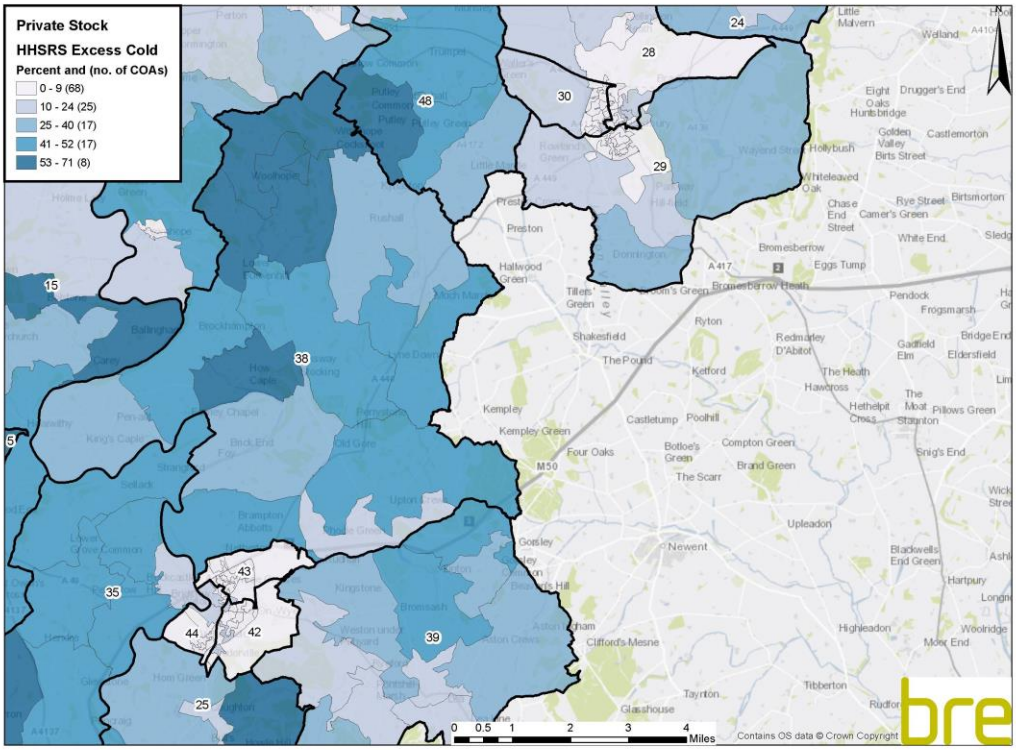
Map D. 4: Central Herefordshire households with excess cold – private stock *Return to main report*



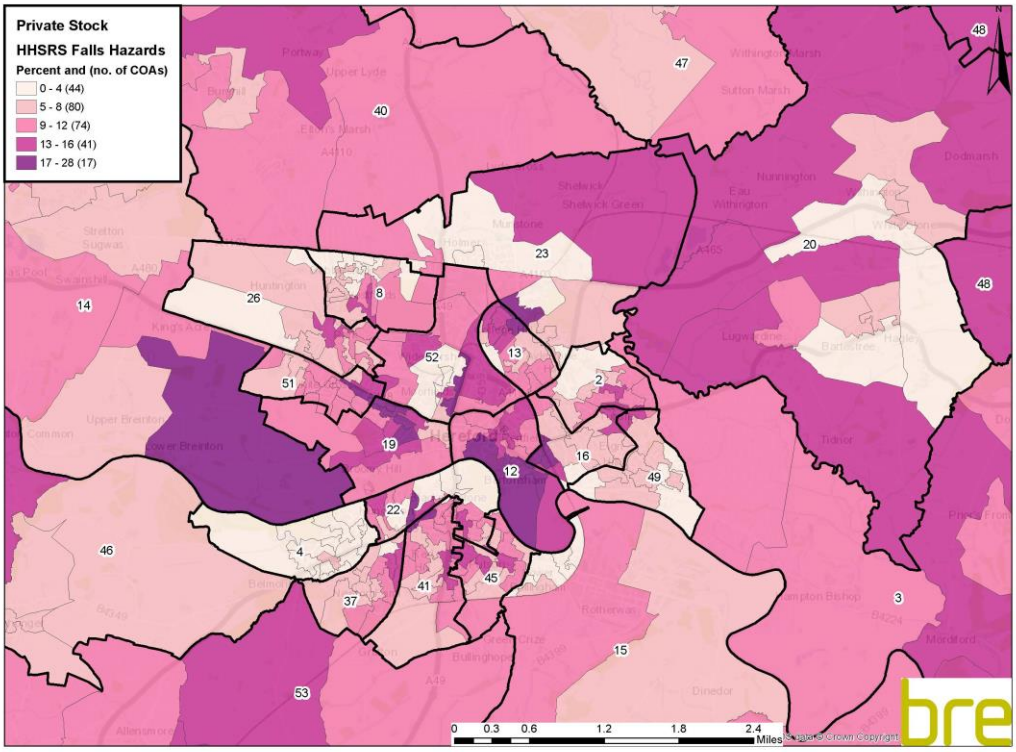
Map D. 5: North east Herefordshire households with excess cold – private stock *Return to main report*



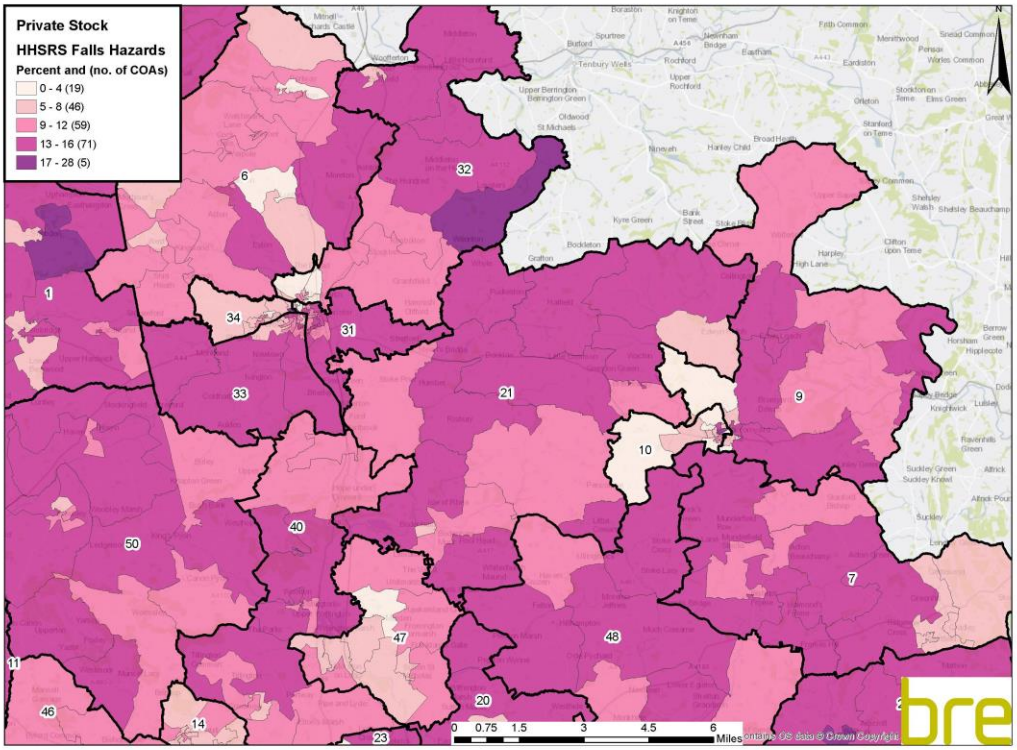
Map D. 6: South east Herefordshire households with excess cold – private stock *Return to main report*



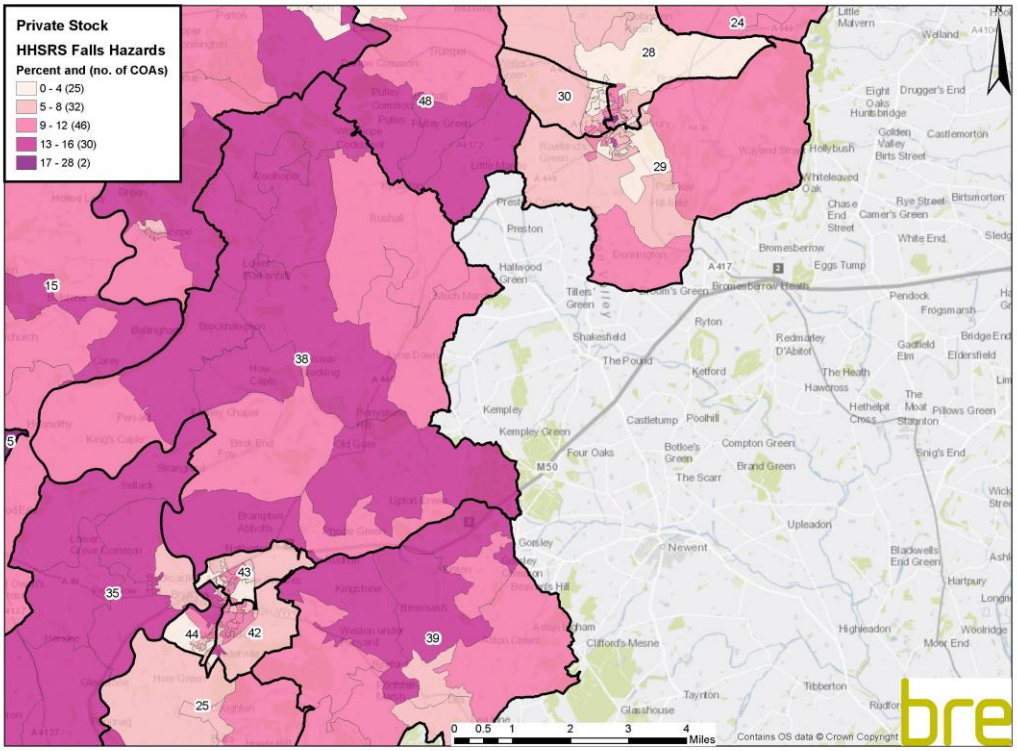
Map D. 7: Central Herefordshire households with falls hazards – private stock *Return to main report*



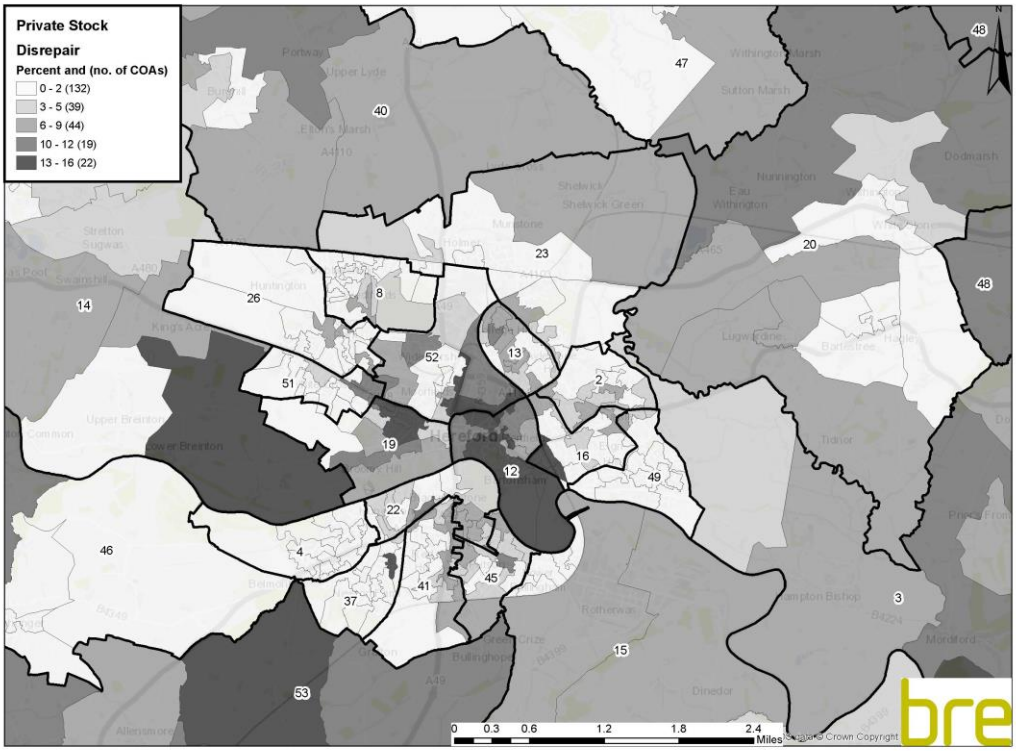
Map D. 8: North east Herefordshire households with falls hazards – private stock *Return to main report*



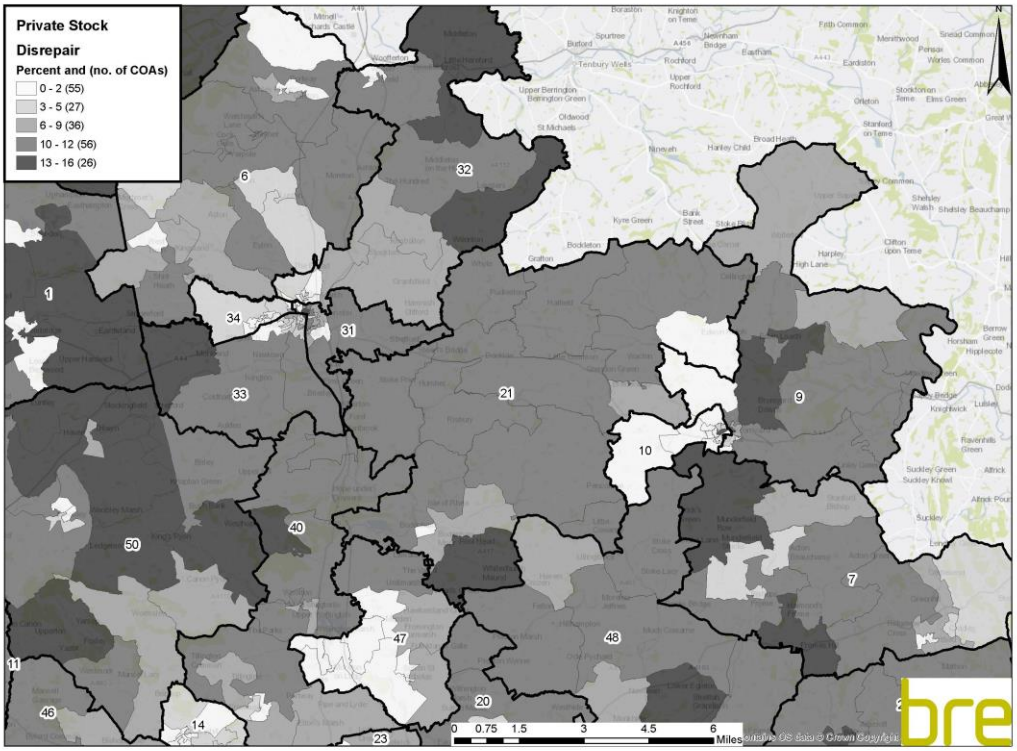
Map D. 9: South east Herefordshire households with falls hazards – private stock *Return to main report*



Map D. 10: Central Herefordshire households in disrepair – private stock *Return to main report*

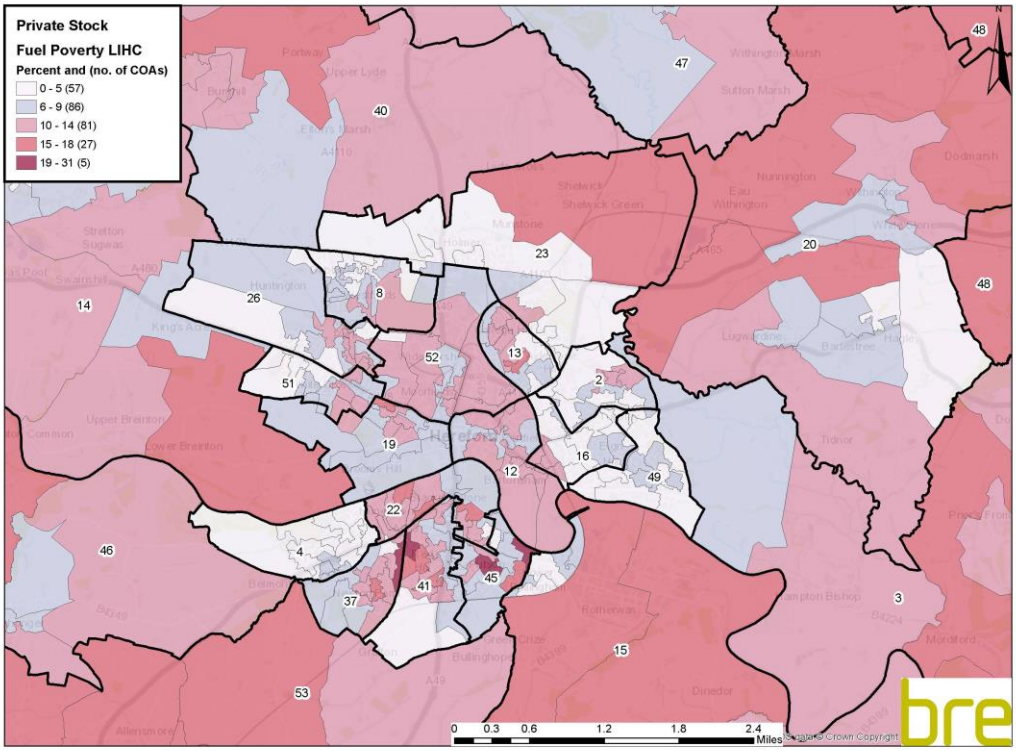


Map D. 11: North east Herefordshire households in disrepair – private stock *Return to main report*

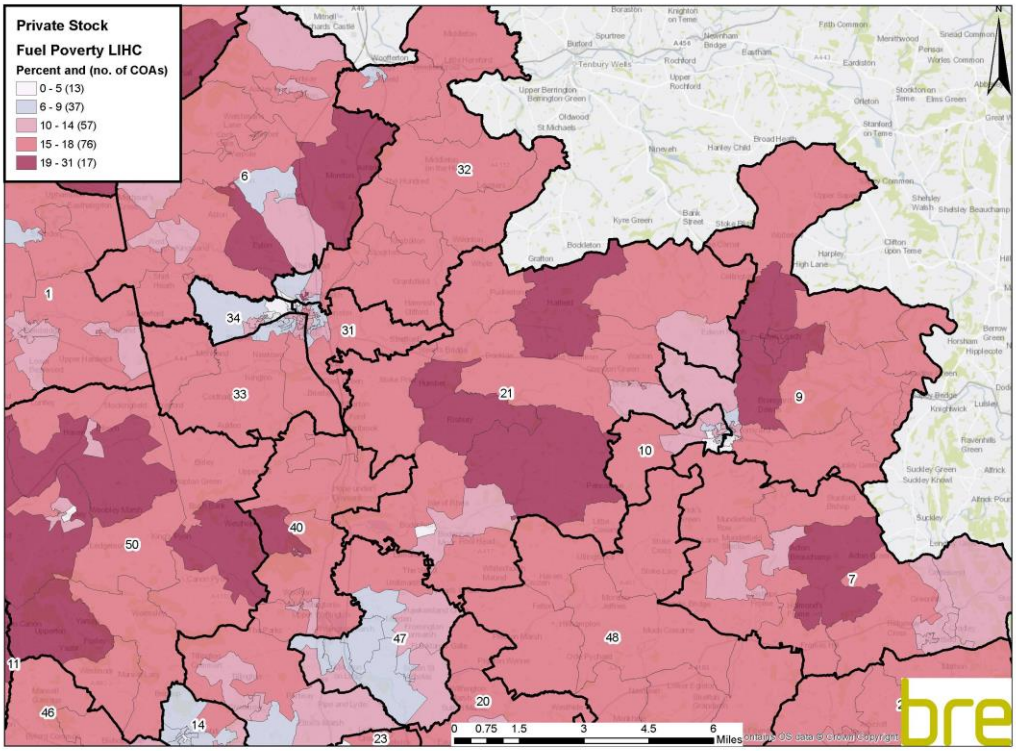


Map D. 12: South east Herefordshire households in disrepair – private stock *Return to main report*

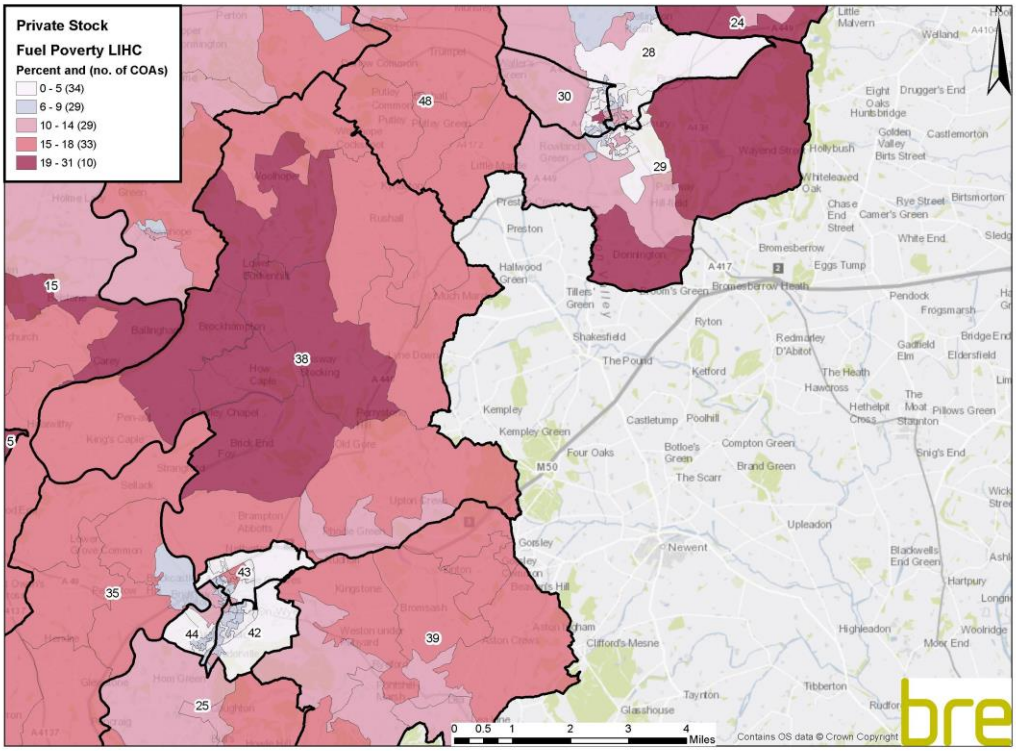
Map D. 13: Central Herefordshire households in fuel poverty (LIHC definition) – private stock *Return to main report*



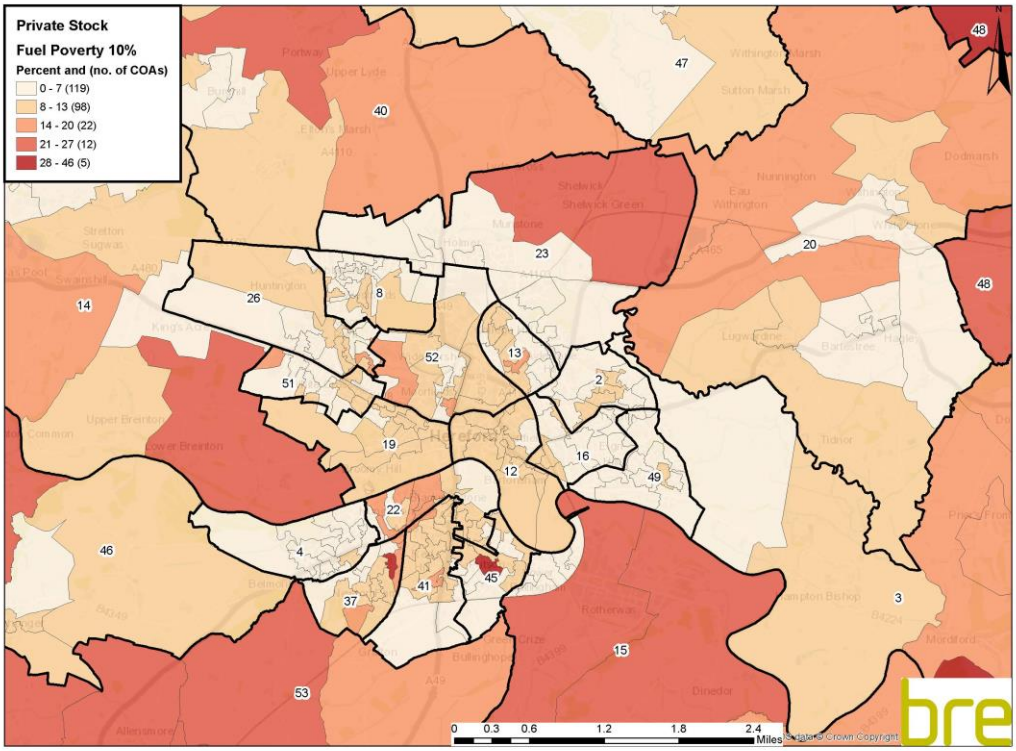
Map D. 14: North east Herefordshire households in fuel poverty (LIHC definition) – private stock *Return to main report*



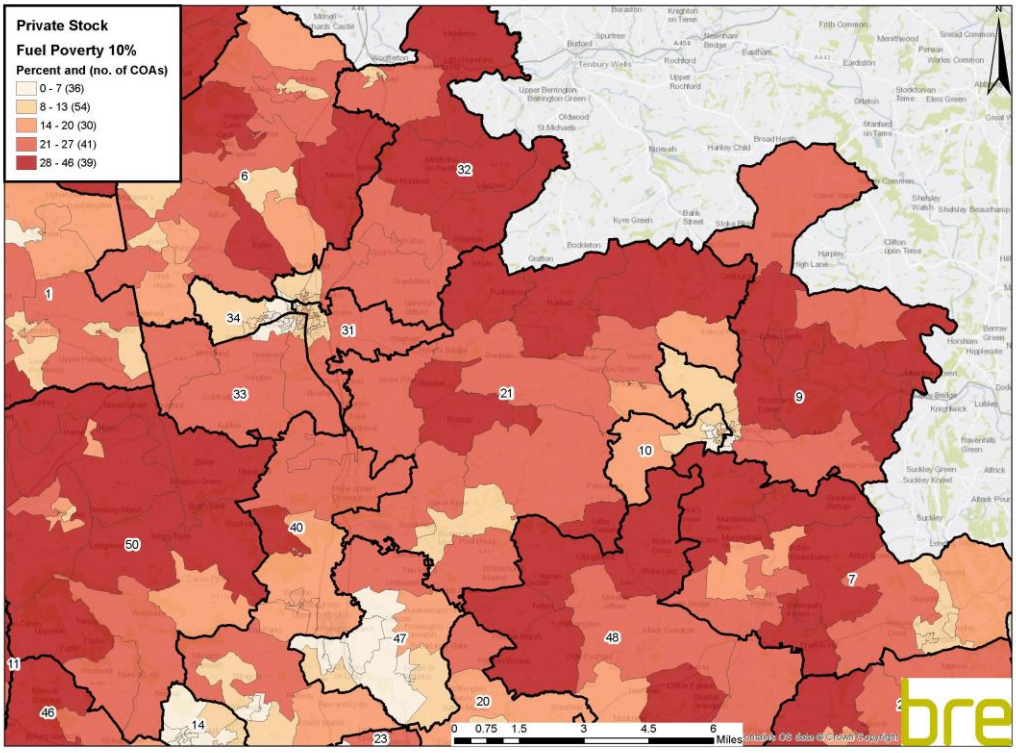
Map D. 15: South east Herefordshire households in fuel poverty (LIHC definition) – private stock *Return to main report*



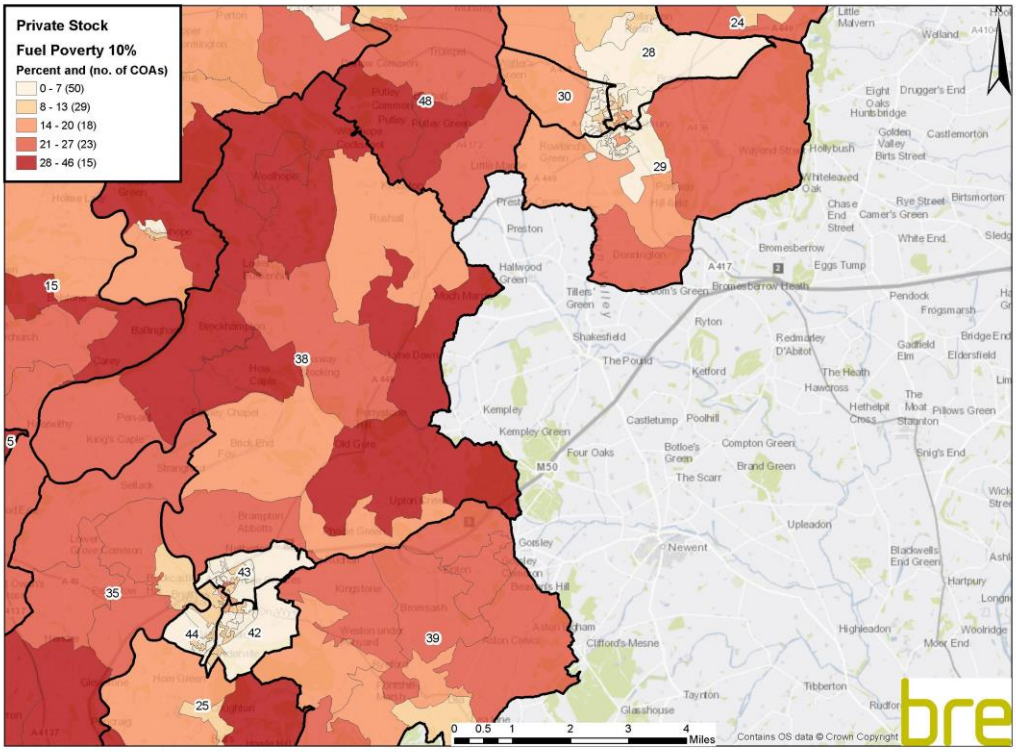
Map D. 16: Central Herefordshire households in fuel poverty (10% definition) – private stock *Return to main report*



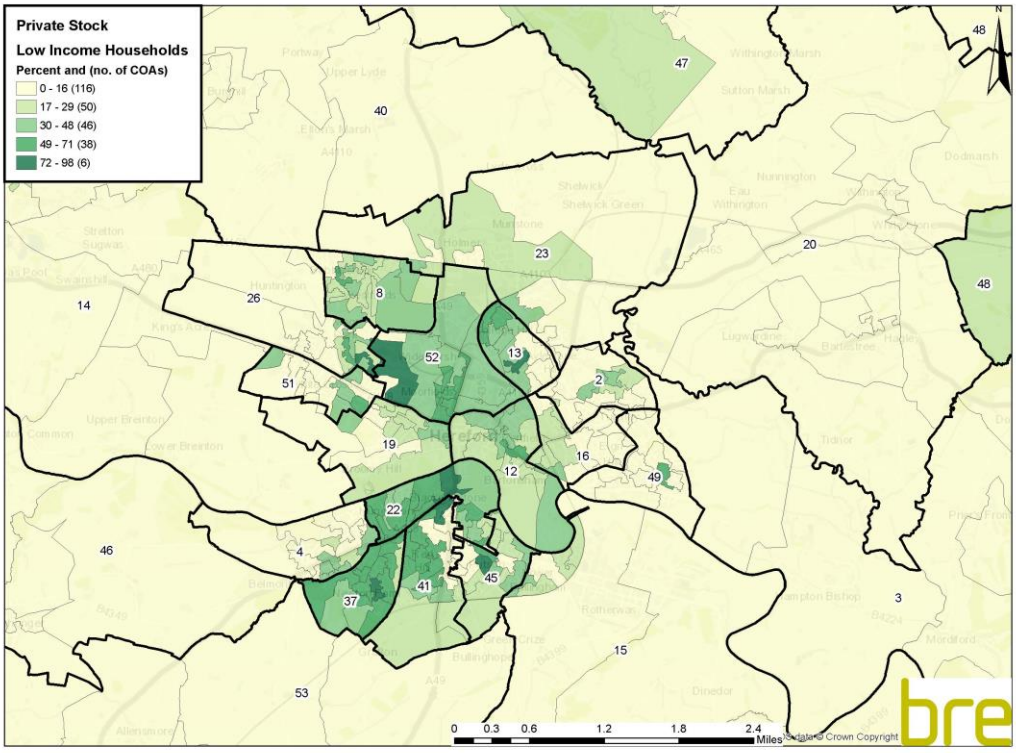
Map D. 17: North east Herefordshire households in fuel poverty (10% definition) – private stock *Return to main report*



Map D. 18: South east Herefordshire households in fuel poverty (10% definition) – private stock *Return to main report*

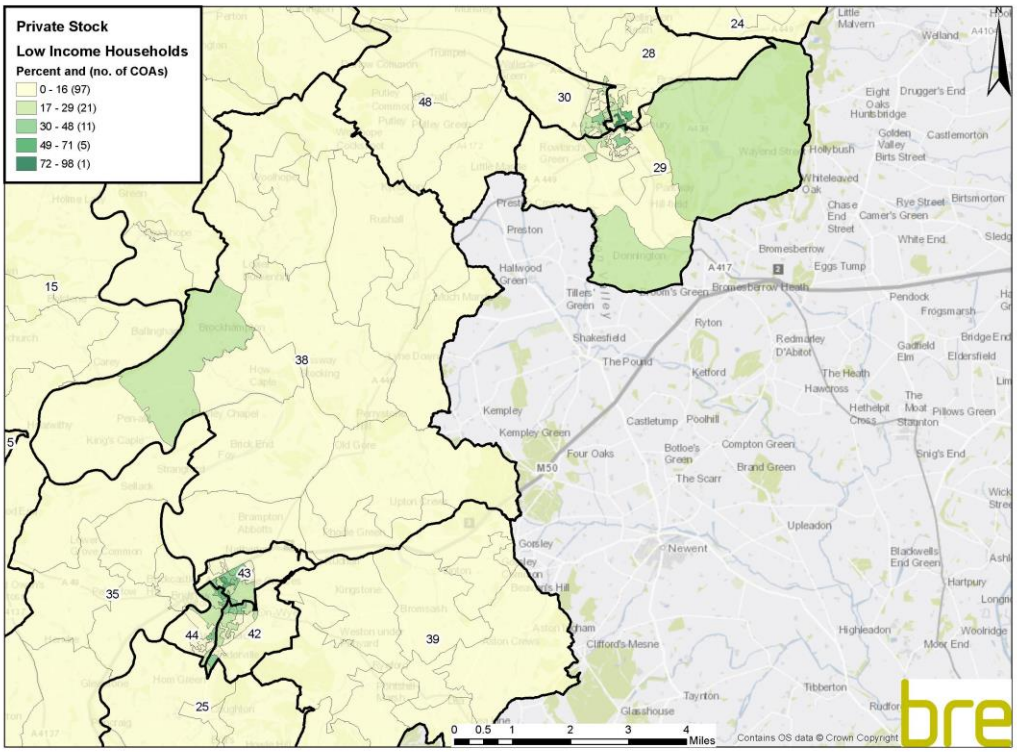


Map D. 19: Central Herefordshire households in low income – private stock *Return to main report*

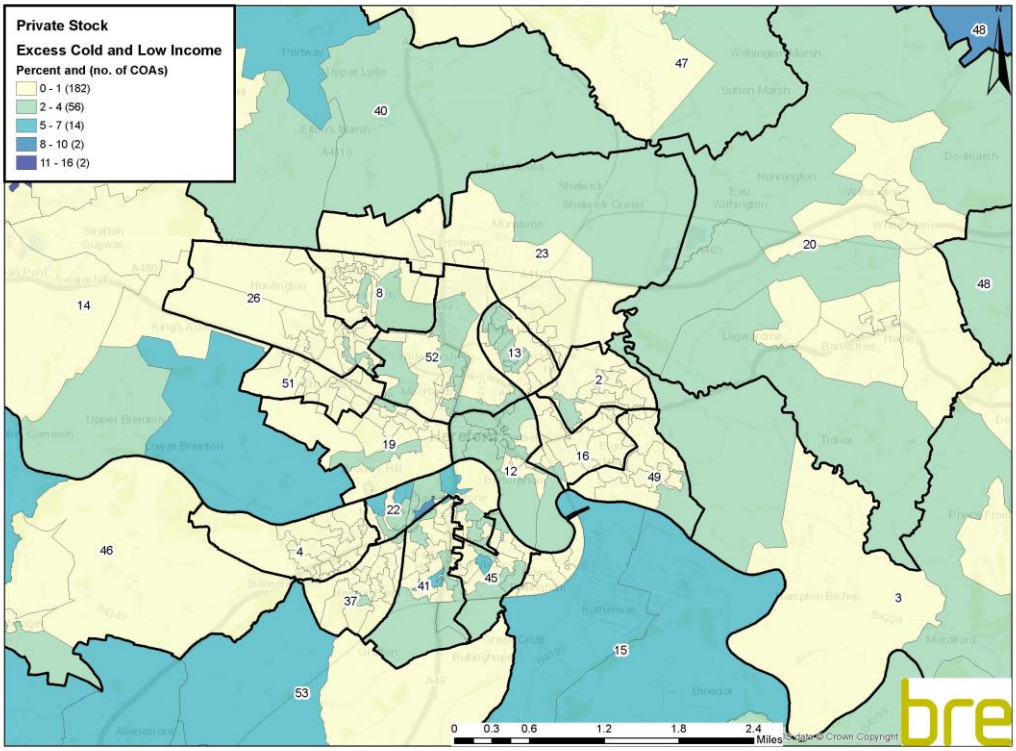


Map D. 20: North east Herefordshire households in low income – private stock *Return to main report*

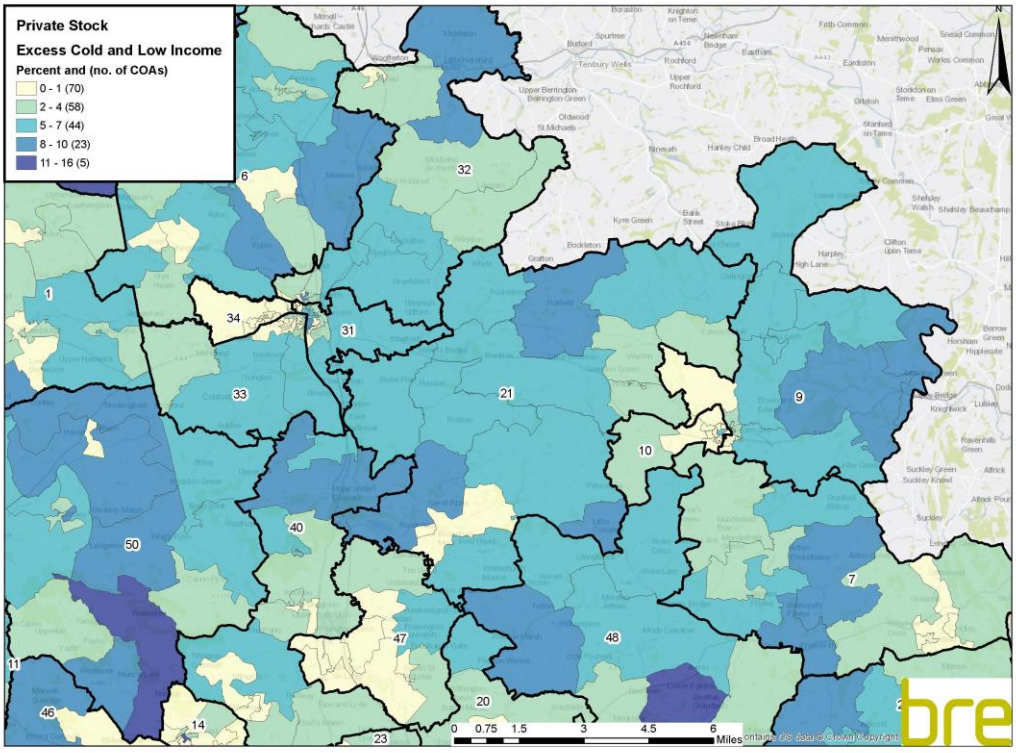
Map D. 21: South east Herefordshire households in low income – private stock *Return to main report*



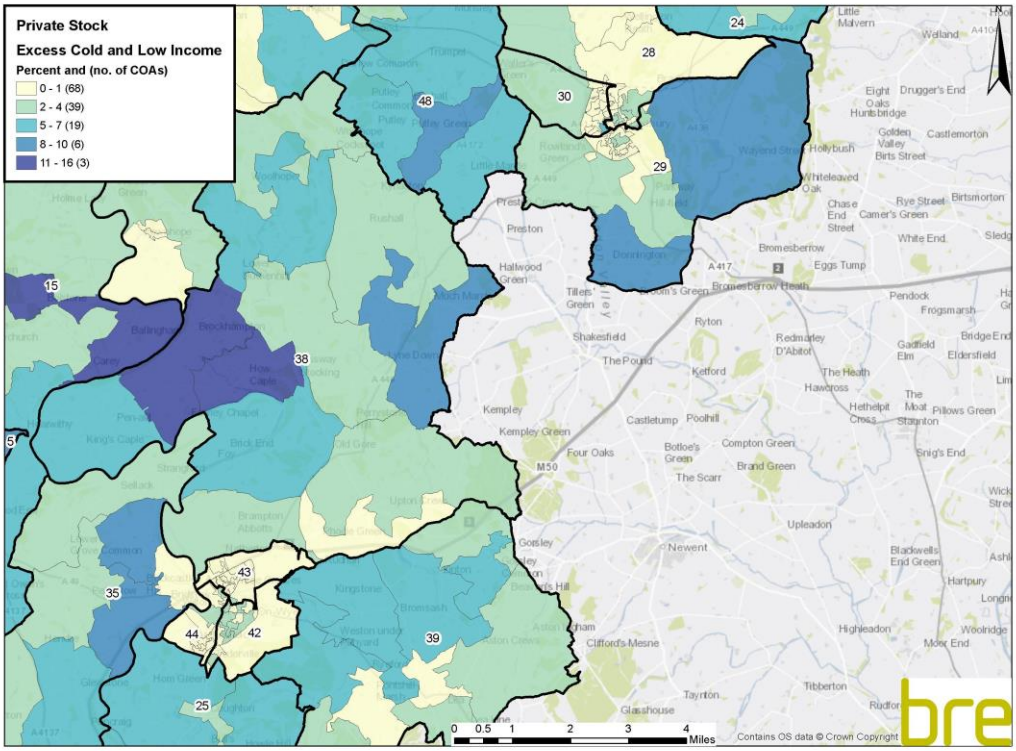
Map D. 22: Central Herefordshire households with excess cold and in low income – private stock *Return to main report*



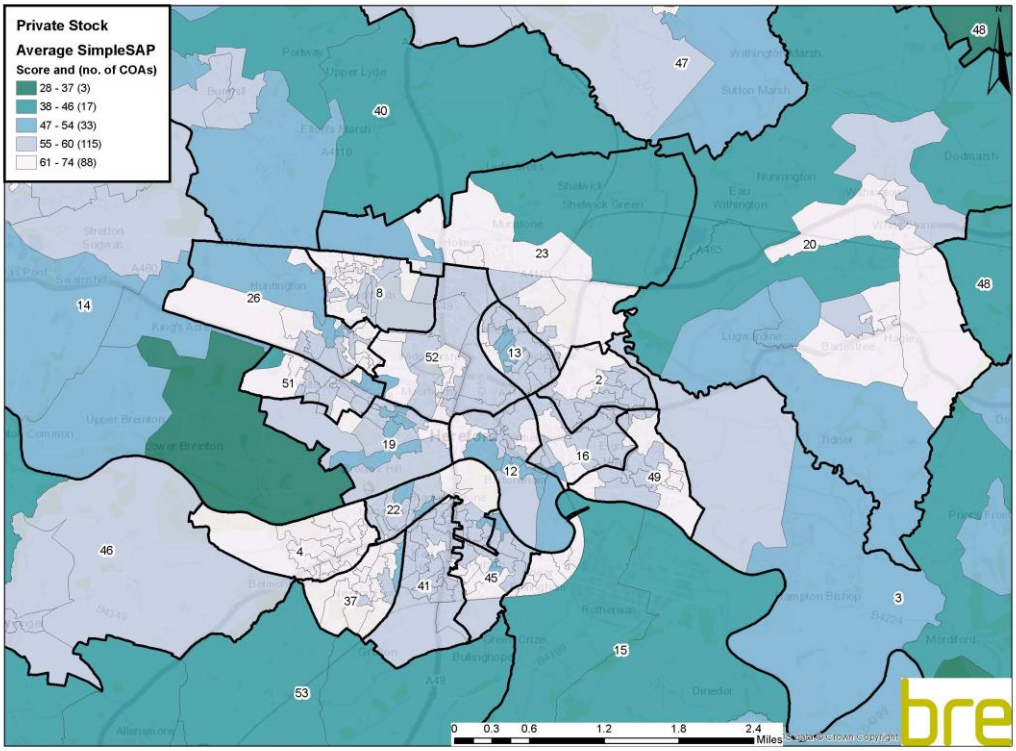
Map D. 23: North east Herefordshire households with excess cold and in low income – private stock *Return to main report*



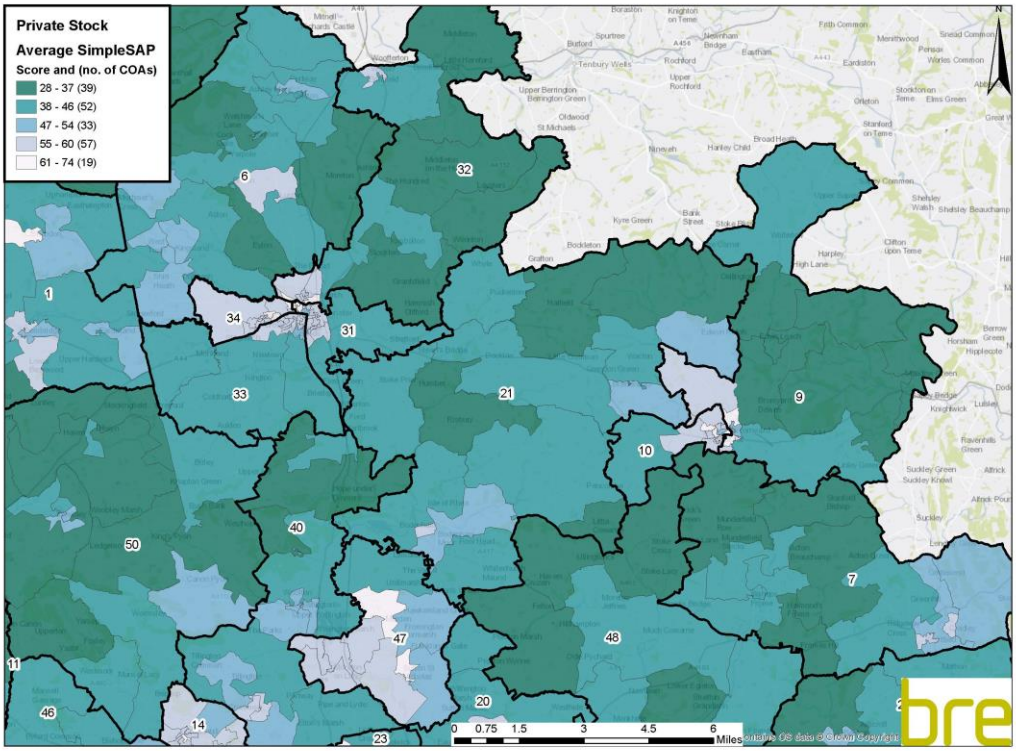
Map D. 24: South east Herefordshire households with excess cold and in low income – private stock *Return to main report*



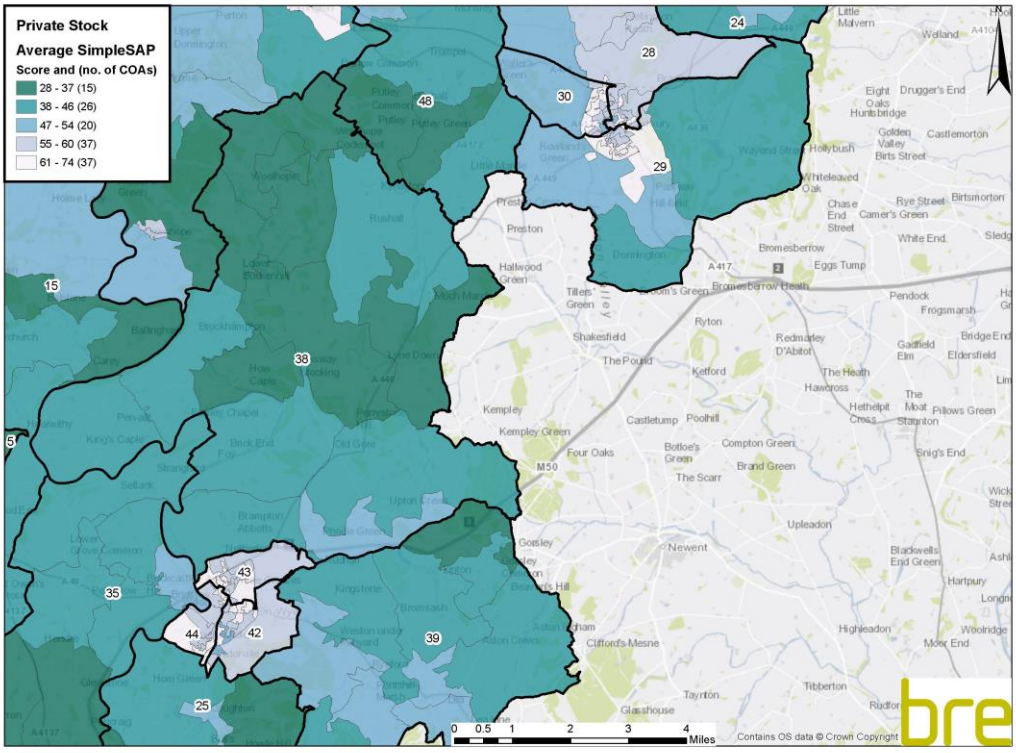
Map D. 25: Central Herefordshire average SimpleSAP households – private stock *Return to main report*



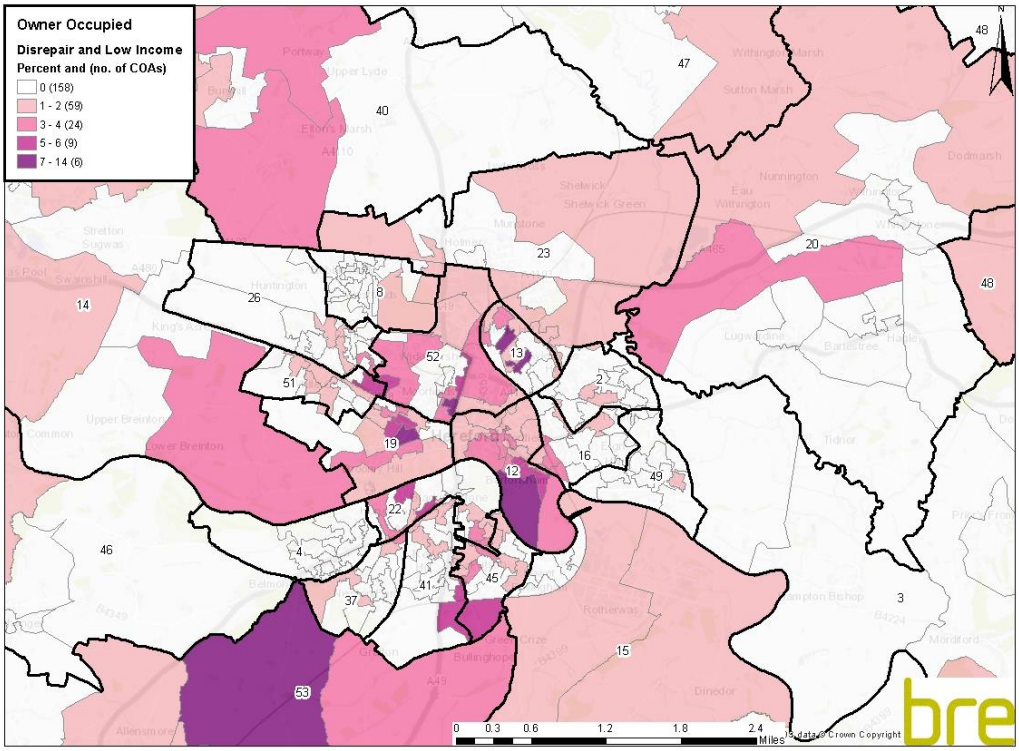
Map D. 26: North east Herefordshire average SimpleSAP households – private stock *Return to main report*



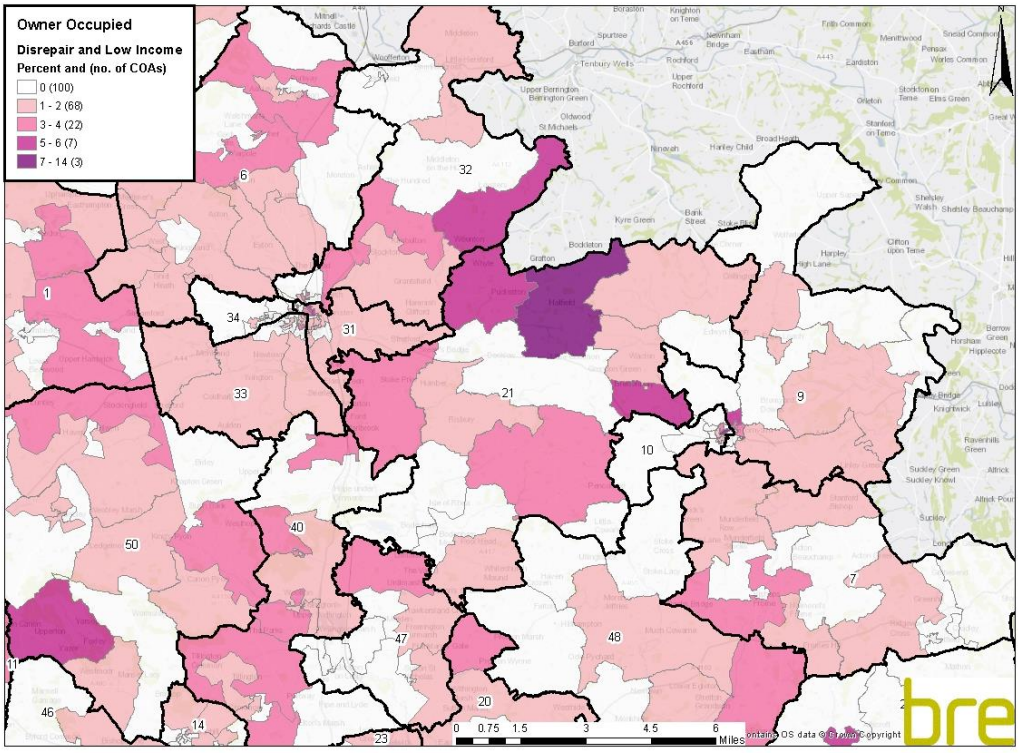
Map D. 27: South east Herefordshire average SimpleSAP households – private stock *Return to main report*



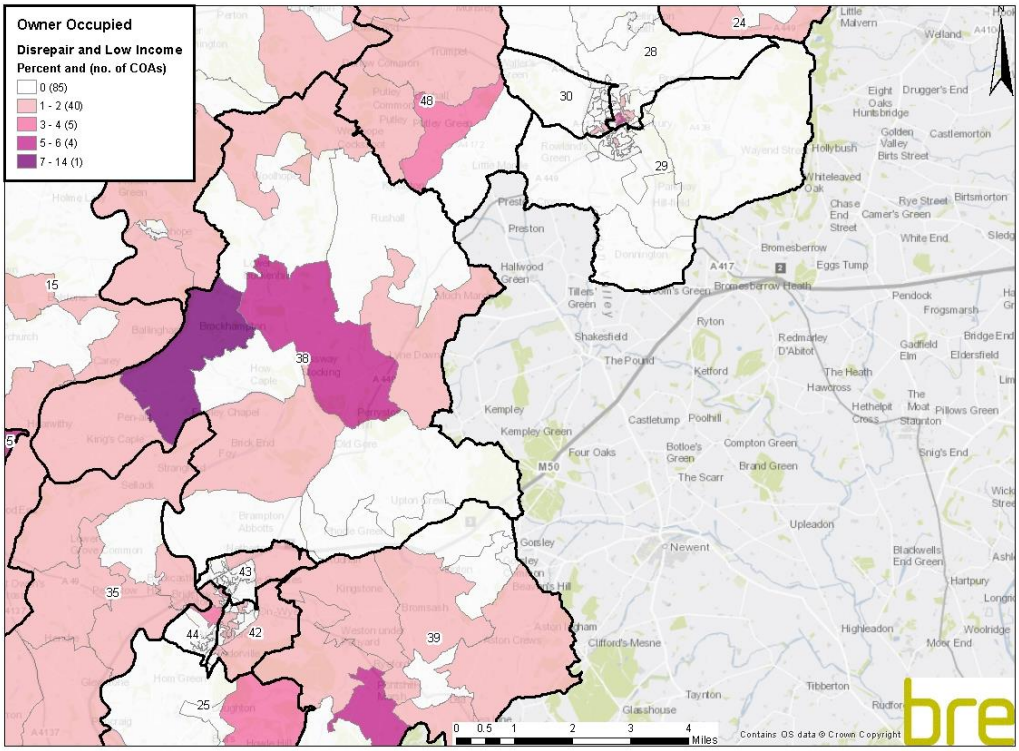
Map D. 28: Central Herefordshire – owner occupied dwellings with disrepair and low income households
Return to main report



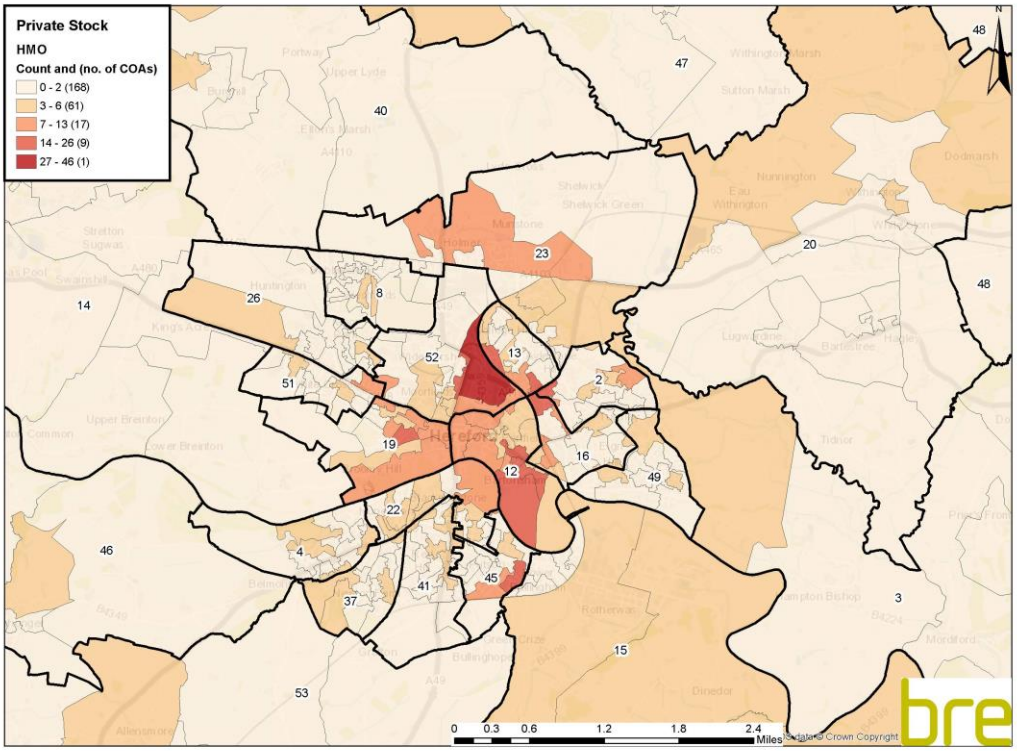
Map D. 29: North east Herefordshire - owner occupied dwellings with disrepair and low income households *Return to main report*



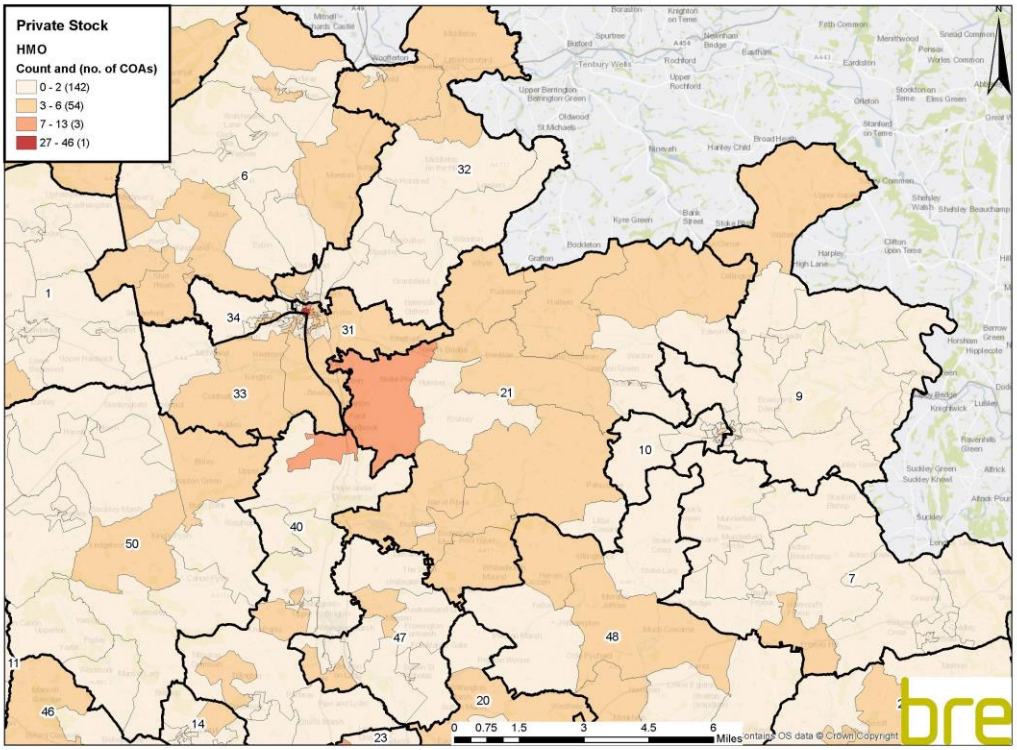
Map D. 30: South east Herefordshire - owner occupied dwellings with disrepair and low income households *Return to main report*



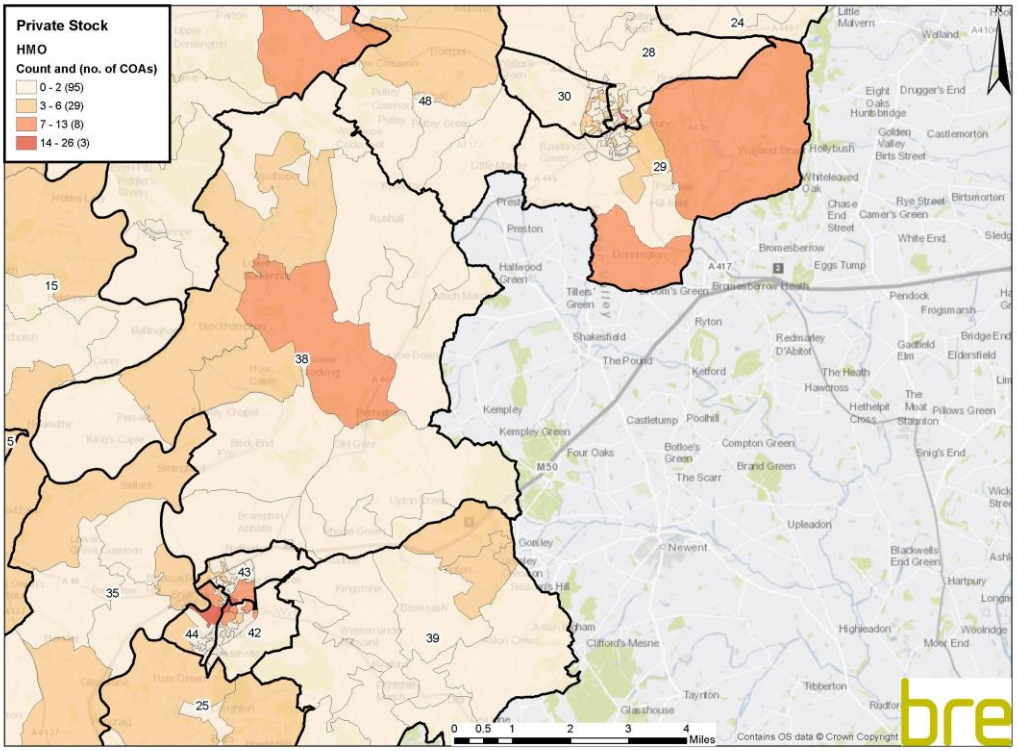
Map D. 31: Central Herefordshire HMOs *Return to main report*



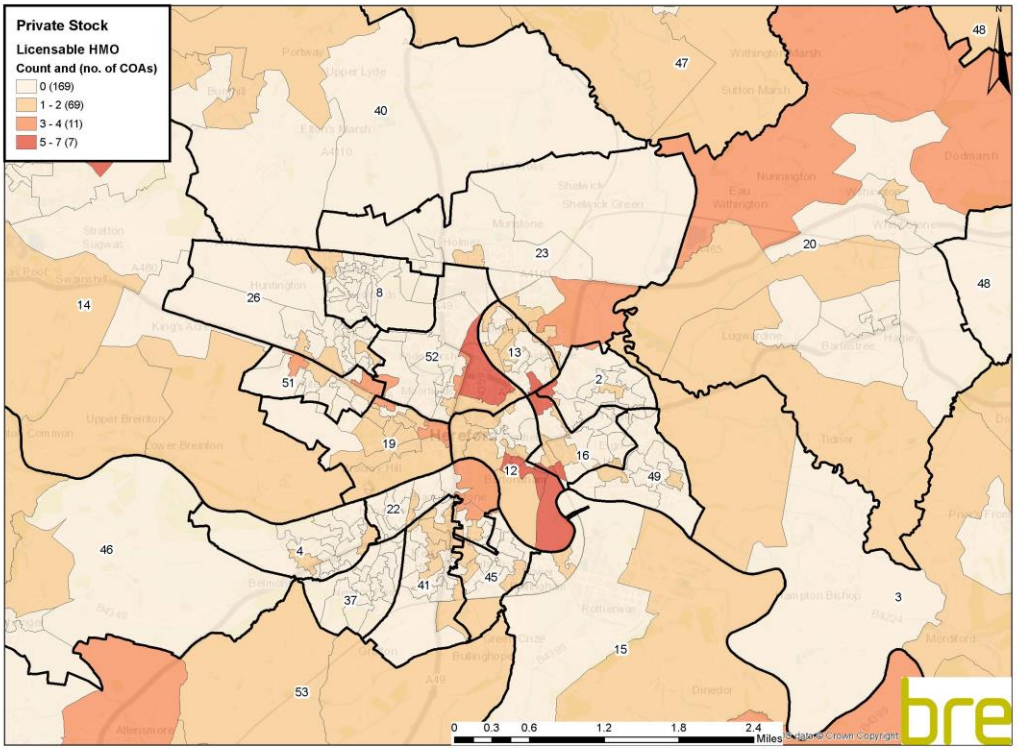
Map D. 32: North east Herefordshire HMOs *Return to main report*



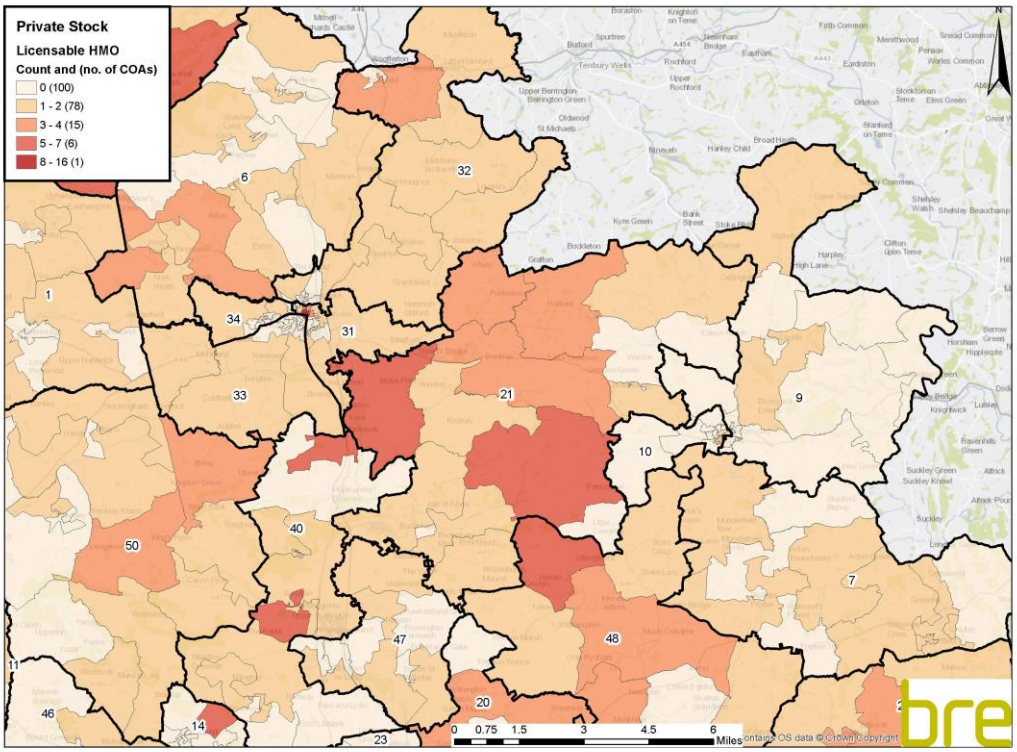
Map D. 33: South east Herefordshire HMOs *Return to main report*



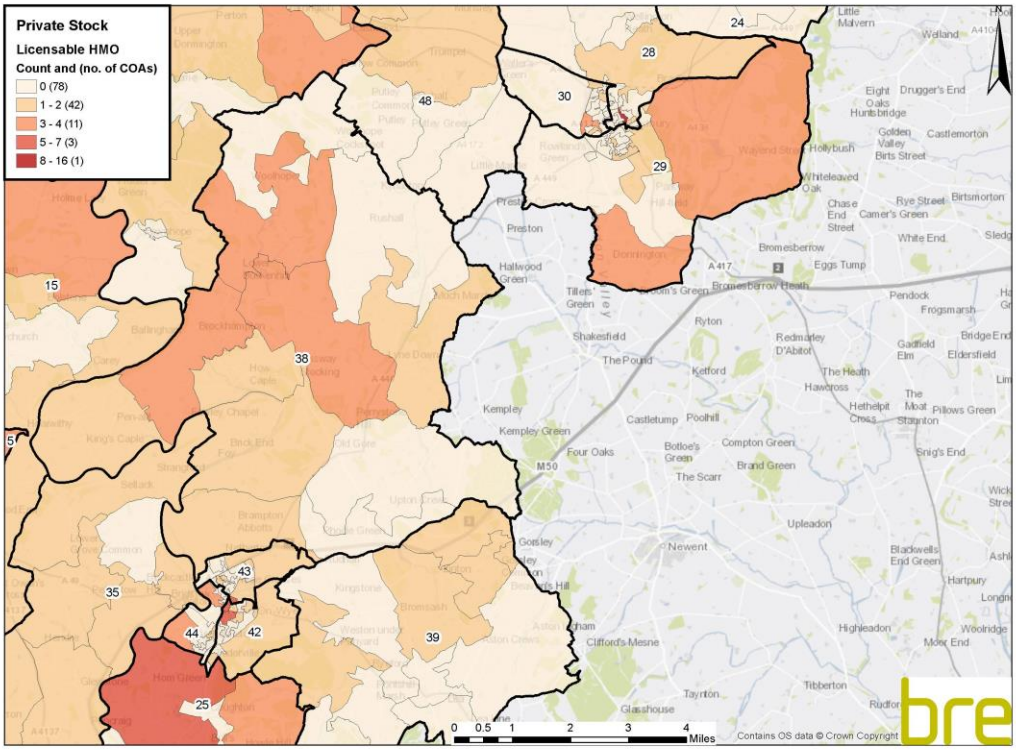
Map D. 34: Central Herefordshire mandatory licensable HMOs *Return to main report*



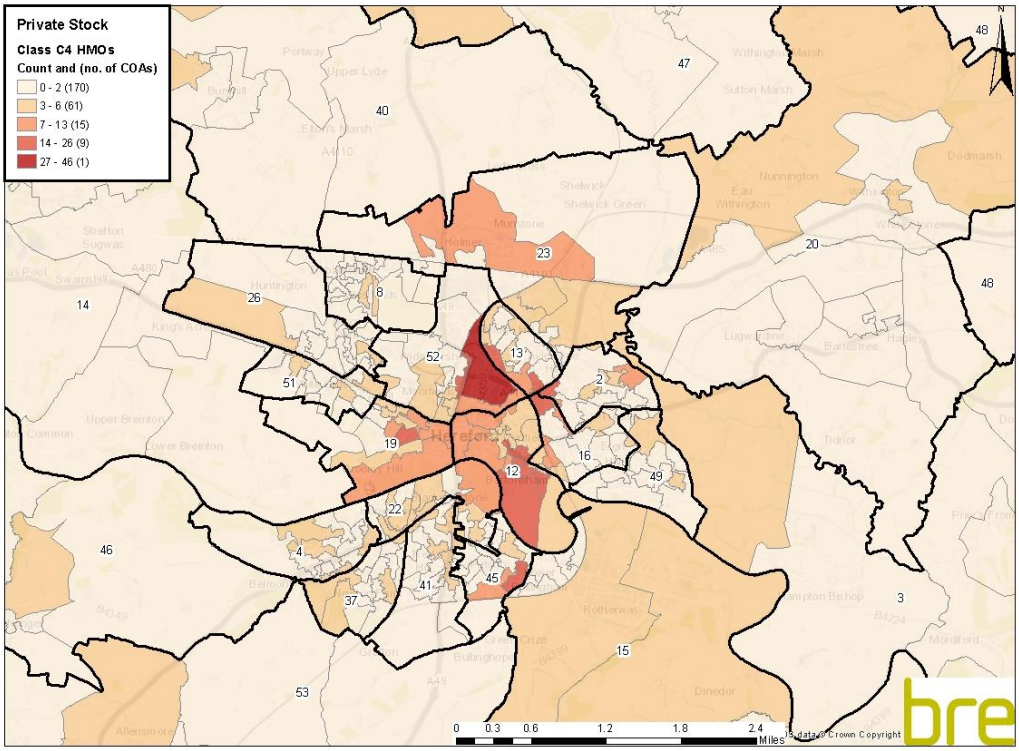
Map D. 35: North east Herefordshire mandatory licensable HMOs *Return to main report*



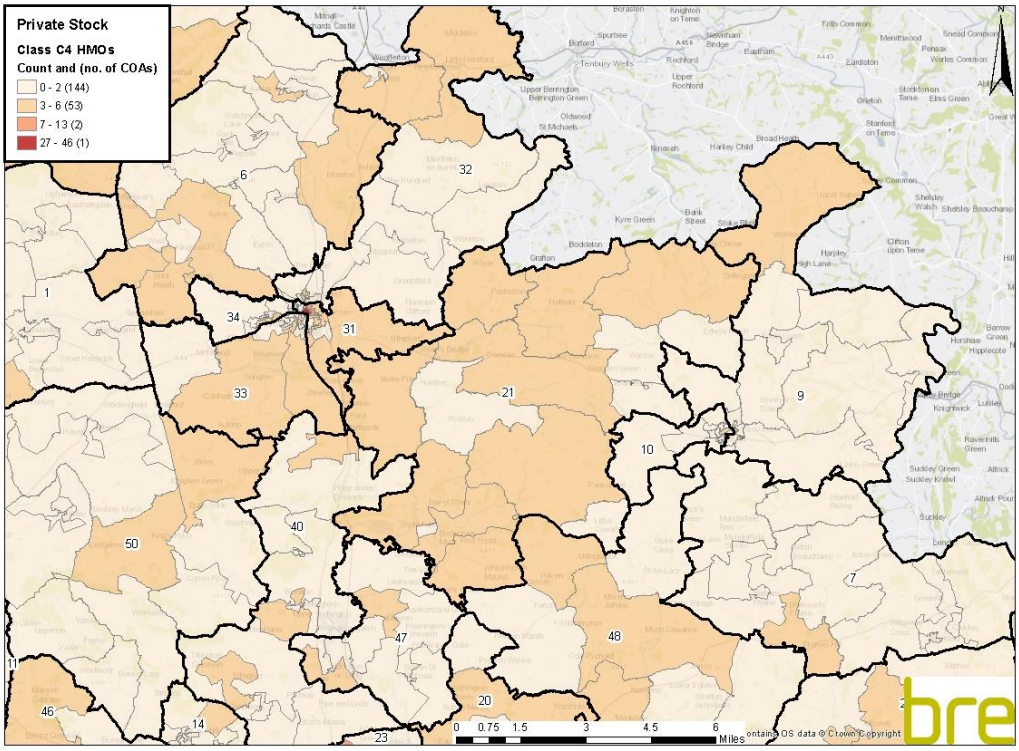
Map D. 36: South east Herefordshire mandatory licensable HMOs *Return to main report*



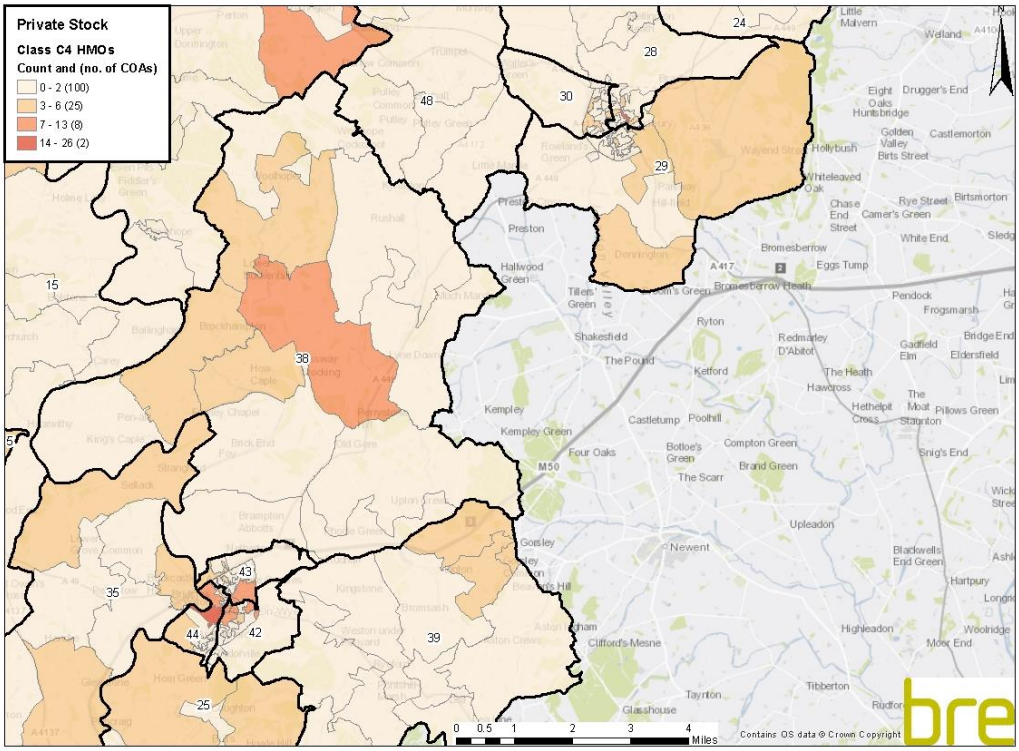
Map D. 37: Central Herefordshire class 4 HMOs *Return to main report*



Map D. 38: North east Herefordshire class 4 HMOs *Return to main report*



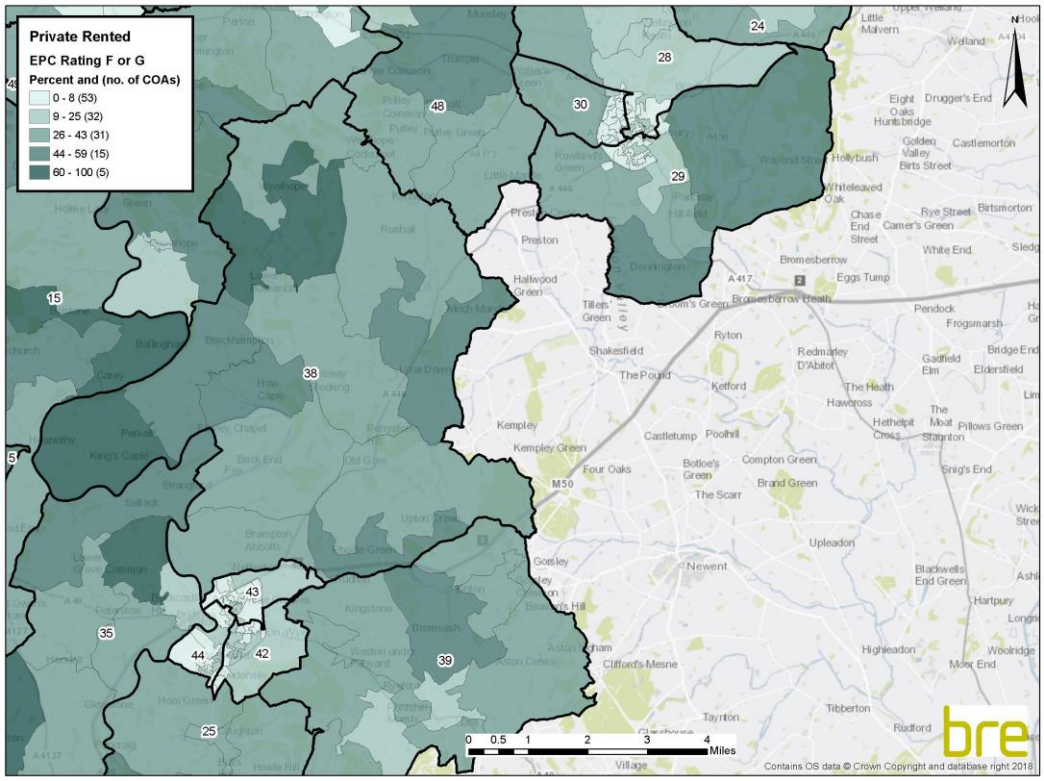
Map D. 39: South east Herefordshire class 4 HMOs *Return to main report*



Map D. 40: Central Herefordshire households with EPC ratings F or G – private rented *Return to main report*

Map D. 41: North east Herefordshire households with EPC ratings F or G – private rented *Return to main report*

Map D. 42: South east Herefordshire households with EPC ratings F or G – private rented *Return to main report*



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Appendix E Ward key for maps

The table below provides the key for the ward names to be used with the maps.

No.	Ward name	No.	Ward name
1	Arrow	28	Ledbury North
2	Aylestone Hill	29	Ledbury South
3	Backbury	30	Ledbury West
4	Belmont Rural	31	Leominster East
5	Birch	32	Leominster North & Rural
6	Bircher	33	Leominster South
7	Bishops Frome & Cradley	34	Leominster West
8	Bobblestock	35	Llangarron
9	Bromyard Bringsty	36	Mortimer
10	Bromyard West	37	Newton Farm
11	Castle	38	Old Gore
12	Central	39	Penyard
13	College	40	Queenswood
14	Credenhill	41	Red Hill
15	Dinedor Hill	42	Ross East
16	Eign Hill	43	Ross North
17	Golden Valley North	44	Ross West
18	Golden Valley South	45	Saxon Gate
19	Greyfriars	46	Stoney Street
20	Hagley	47	Sutton Walls
21	Hampton	48	Three Crosses
22	Hinton & Hunderton	49	Tupsley
23	Holmer	50	Weobley
24	Hope End	51	Whitecross
25	Kerne Bridge	52	Widemarsh
26	Kings Acre	53	Wormside
27	Kington		

Glossary of terms

BREDEM	BRE Domestic Energy Model
Category 1 hazard	Hazards with a HHSRS score of > 1,000. A dwelling with a category 1 hazard is considered to fail the minimum statutory standard for housing
CLG	Department for Communities and Local Government
COA	Census Output Area Designed for statistical purposes, built from postcode units, approximately 125 households
Disrepair	Based on former Decent Homes Standard criteria which states that a dwelling fails this if it is not in a reasonable state of repair – this is based on the dwelling age and condition of a range of building components including walls, roofs, windows, doors, electrics and heating systems
ECO	Energy Companies Obligation Places legal obligations on the larger energy suppliers to deliver energy efficiency measures to domestic energy users
EHS	English Housing Survey A continuous national survey commissioned by the Ministry of Housing, Communities and Local Government (MHCLG). It collects information about people's housing circumstances and the condition and energy efficiency of housing in England
EPC	Energy Performance Certificate Present the energy efficiency of domestic properties on a scale of A (most efficient) to G (least efficient)
Fuel poverty	The original definition of fuel poverty states that a household is in fuel poverty if it needs to spend more than 10% of their income on fuel to maintain an adequate level of warmth (10% definition). The new definition now adopted by government is that a household is said to be in fuel poverty if they have fuel costs that are above average and were they to spend that amount they would be left with a residual income below the official poverty line (Low Income High Costs definition)
GIS	Geographic Information System A system designed to capture, store, manipulate, analyse, manage and present spatial or geographical data
HHSRS	Housing Health and Safety Rating System A risk assessment tool to help local authorities identify and protect against potential risks and hazards to health and safety related deficiencies in dwellings, covering 29 categories of hazards

HIA	Health Impact Assessment A formal method of assessing the impact of a project, procedure or strategy on the health of a population
HMO	Houses in Multiple Occupation An entire house or flat which is let to 3 or more tenants who form 2 or more households and who share a kitchen, bathroom or toilet A house which has been converted entirely into bedsits or other non-self-contained accommodation and which is let to 3 or more tenants who form two or more households and who share kitchen, bathroom or toilet facilities A converted house which contains one or more flats which are not wholly self-contained (i.e. the flat does not contain within it a kitchen, bathroom and toilet) and which is occupied by 3 or more tenants who form two or more households A building which is converted entirely into self-contained flats if the conversion did not meet the standards of the 1991 Building Regulations and more than one-third of the flats are let on short-term tenancies In order to be an HMO the property must be used as the tenants' only or main residence and it should be used solely or mainly to house tenants. Properties let to students and migrant workers will be treated as their only or main residence and the same will apply to properties which are used as domestic refuges
HSM	Housing Stock Model Desktop based modelling used to determine the condition of the housing stock
Jenks' Natural Breaks	The natural breaks classification method is a data clustering method determining the best arrangement of values into different classes. It is achieved through minimising each class's average deviation from the class mean while maximising each class's deviation from the means of the other groups. The method seeks to reduce the variance within classes and maximise variance between classes thus ensuring groups are distinctive
JSNA	Joint Strategic Needs Assessment An assessment of the current and future health and social care needs of the local community
LACORs	Local Authority Coordinators of Regulatory Services – now renamed Local Government Regulation
LAHS	Local Authority Housing Statistics National statistics on housing owned and managed by local authorities
LIHC	Low Income High Cost

	Measure of fuel poverty, considers a household to be in fuel poverty if required fuel costs are above average, or if they were to spend that amount they would be left with a residual income below the official poverty line
LLPG	Local Land and Property Gazetteer
	An address database maintained by local authorities
LSOA	Lower Super Output Area
	Designed for statistical purposes, built from census output areas, approximately 400 households
MHCLG	Ministry of Housing, Communities and Local Government
MSOA	Medium Super Output Area
	Designed for statistical purposes, built from lower super output areas, approximately 2,000 households
NHS	National Health Service
Older people	People over 65 for the excess cold hazard, people over 60 for the fire and fall hazards (excl. falling between levels)
OS	Ordnance Survey
Poor housing	Dwellings where a category 1 hazard is present
Private sector housing	Housing not owned by the local authority or a housing association
SAP	Standard Assessment Procedure
	Method system for measurement of energy rating of residential buildings.
SimpleSAP	An estimate of a residential dwelling's likely SAP score, it is not based on the full required range of data for a SAP calculation or a reduced data SAP calculation (RDSAP), it should only ever be considered an estimate of the SAP score, and used as a guide
UPRN	Unique Property Reference Number
	A unique 12 digit number assigned to every unit of land and property recorded by local authorities as part of their LLPG
Vulnerable persons	Persons who are more likely to be affected by the particular hazard as defined by the HHSRS Operating Guidance

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