

BRE Client Report

The condition of private housing in York - BRE Integrated Dwelling Level Housing Stock Modelling and Database

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Executive summary

- City of York 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 Energy Performance Certificate (EPC)¹ and Local Land and Property Gazetteer (LLPG)² data provided by York. As a result of this, 23,853 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 23,853 cases, which account for 27% of the stock in York. In addition, the integrated stock model also incorporates data on Houses in Multiple Occupation (HMOs) provided by the council.
- This report describes the work and the results obtained from the integrated model and database. The database is also provided to the council to enable them to obtain specific information whenever required.
- The council has also commissioned a Health Impact Assessment (HIA), the results of which are provided in a separate report.
- The detailed housing stock information provided in this report will facilitate the delivery of York'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 ECO.
- The main aims of this work were to provide estimates of:
 - The percentage of dwellings meeting each of the key indicators³ for York 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 Houses in Multiple Occupation (HMOs) as well as information on EPC ratings
 - The basic energy efficiency variables for the private sector stock (wall and loft insulation)
 - Energy planning variables (SimpleCO₂, energy and heat demand, energy and heat cost)
 - Potential energy/carbon savings from improvement scenarios

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 A Local Land and Property Gazetteer (LLPG) is a collection of address and location data created by a local authority.

³ 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.



- BRE Housing Stock Models were used to provide such estimates at dwelling level and focussing on private sector housing. The key indicators provide York with detailed information on the likely condition of the stock and the geographical distribution of properties of interest.
- A stock modelling approach has been developed and used by BRE for many years and the most recent 2014 models have been updated to make use of the results of the 2011 English Housing Survey (EHS)⁴ and additionally now incorporate a technique known as geomodelling⁵ which makes use of Ordnance Survey (OS) data. 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, York provided several additional sources of “local data” - Energy Performance Certificate (EPC), Local Land and Property Gazetteer (LLPG), and data on Houses in Multiple Occupation (HMOs). These data sets were then incorporated into the BRE Housing Stock Model to produce an integrated housing stock database.
- The headline results are provided on the following page:

⁴ 2011 is the latest available data. Prior to the 2014 models EHS 2009 data was used.

⁵ 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 York

11,444 dwellings in the private sector have category 1 Housing Health and Safety Rating System (HHSRS) hazards. This equates to 15% of properties. *See full results*

3,711 dwellings in the private rented sector have category 1 HHSRS hazards. This equates to 23% 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 Guildhall, Micklegate and Clifton. *See full results*

The highest concentrations of fuel poverty in the private sector are found in the wards of Clifton, Guildhall and Micklegate and for excess cold the highest concentrations are in Wheldrake, Guildhall and Rural West York. *See full results*

The average SimpleSAP rating for all private sector dwellings in York is 59, which is better than both England (55) and Yorkshire and The Humber (56). For owner occupied stock the figure is also 59 and for private rented stock it is 56. *See full results*

Maps by COA have been provided for the above key indicators. *See maps*

The total cost of mitigating category 1 hazards in York's private sector stock is estimated to be £24.2 million. *See full results*

The BRE Model estimates a total of just over 2,500 HMOs in York. *See full results*

6.5% (4,845) of private sector dwellings and 10.0% (1,588) of private rented dwellings in York are estimated to have an EPC rating below band E. *See full results*

In the private sector stock, there are an estimated 22,608 dwellings with un-insulated cavity walls and 10,037 dwellings with less than 100mm of loft insulation. *See full results*

Analysis of the energy efficiency variables indicates that the owner occupied stock has the highest average figures for all variables (SimpleCO₂, energy and heat demand, energy and heat cost). *See full results*

A series of 8 improvement scenarios have been analysed and the greatest savings are from the scenario based on a package of work with low cost measures, improved heating, double glazing, solid wall insulation and solar hot water - this results in a 33% reduction in average annual heating costs. However, it should be noted that a scenario involving only low cost measures and improved heating still offers significant savings of 23% of heating costs.

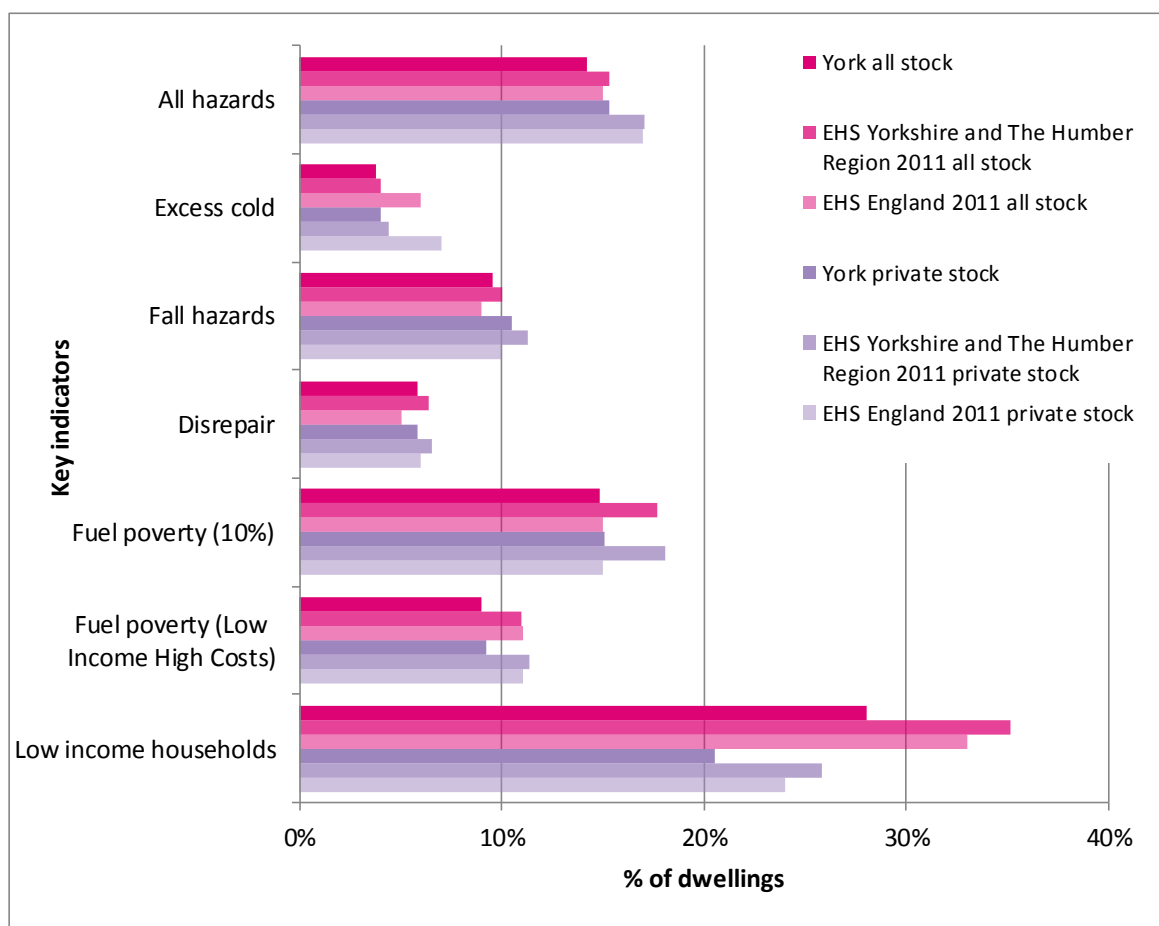
See full results



Key illustrations of headline results

- The table below shows the results for 7 of the key indicators in York compared to regional data and England (EHS 2011) - split into all stock and private sector stock. The data shows that the housing stock in York generally performs better than the EHS England average with the exception of falls hazards and disrepair where the figures are similar. A similar picture can be seen when comparing with the regional average – with the exception of falls hazards and disrepair where York also performs better than the regional average.

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 – York compared to Yorkshire and The Humber and England (EHS 2011)



- The table overleaf shows the number and percentage of York’s private rented stock falling into each of the EPC ratings bands (based on SimpleSAP). This shows that the majority of properties in the private rented sector fall in the bands D and E.

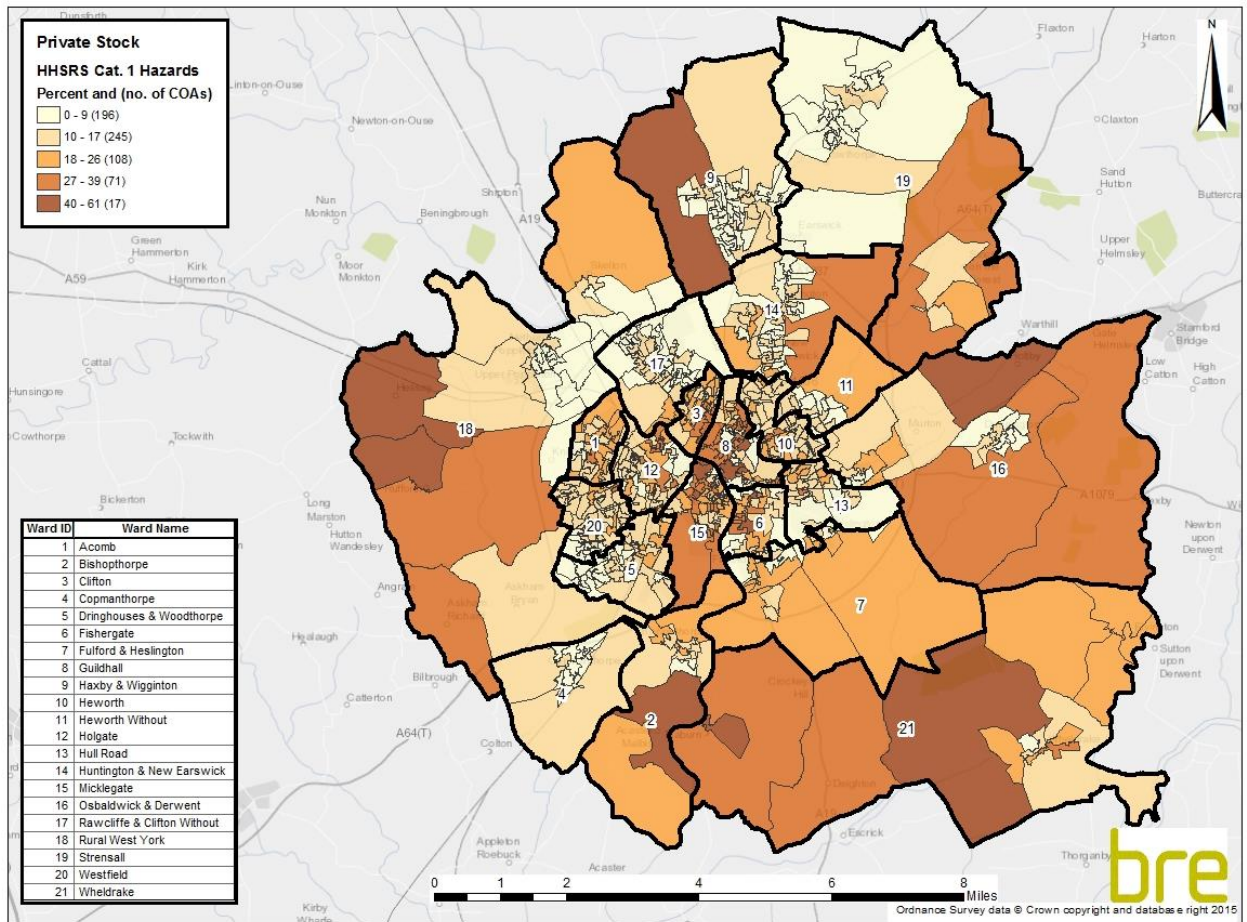


Number and percentage of York's private rented stock falling into each of the EPC ratings bands (based on SimpleSAP)

	Count	Percent
(92-100) A	0	0.0%
(81-91) B	87	0.5%
(69-80) C	2,912	18.3%
(55-68) D	6,259	39.3%
(39-54) E	5,060	31.8%
(21-38) F	1,120	7.0%
(1-20) G	468	2.9%

- The map below shows the distribution of category 1 hazards, as defined by the Housing Health and Safety Rating System (HHSRS), across the local authority area. The map shows that there are concentrations of high levels of hazards in Guildhall, Micklegate and Clifton wards.

Percentage of private sector dwellings in York with the presence of a HHSRS category 1 hazard





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1 Introduction

City of York Council commissioned BRE to undertake a series of modelling exercises on their housing stock. This report describes the modelling work and provides details of the results obtained from the dwelling level model and database. The integrated database is also provided to the council to enable them to obtain specific information whenever required.

The council has also commissioned a Health Impact Assessment (HIA), the results of which are provided in a separate report.

This current report covers the BRE Integrated Dwelling Level Stock Models and Database. City of York Council provided Energy Performance Certificate (EPC) and Local Land and Property Gazetteer (LLPG) data. As a result of this, 23,853 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 23,853 cases, which account for 27% of the stock in York. In addition, the integrated stock model also incorporates data on 2,475⁶ Houses in Multiple Occupation (HMO) provided by the council.

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 York 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 indicators related to house condition, energy efficiency and household vulnerability as shown in **Table 1** (see **Appendix A** for full definitions).

⁶ A list of 2,874 potential HMOs was provided of which some were duplicates and a small number could not be matched.

**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 Department for Communities and Local Government's (DCLG) 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 and basic energy efficiency variables.

The key indicators and other information are derived from the Housing Stock Database 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 2014 models have been updated to make use of the results of the 2011 English Housing Survey (EHS)⁷ and additionally now incorporate a technique known as geomodelling⁸ which makes use of Ordnance Survey (OS) data. The models also make significant use of the Experian UK Consumer Dynamics Database of dwelling and household indicators as inputs to the models. As described above, in this particular case, the database was further enhanced by the addition of local data sources which were identified by York. These local data sources were incorporated into the stock models to produce the integrated database.

⁷ 2011 is the latest available data. Prior to the 2014 models EHS 2009 data was used.

⁸ 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.



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 2004⁹.

Furthermore, having this information available will also help to facilitate the delivery of York'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 York. Furthermore, York also requested estimates for several other housing-related elements. The main aims of this work were therefore to provide estimates of:

- The percentage of dwellings meeting each of the key indicators for York 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, plus information on EPC ratings
- The basic energy efficiency variables for the private sector stock (wall and loft insulation)
- Energy planning variables
- Potential energy/carbon savings from improvement scenarios

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 York covering each of the main aims above.

⁹ <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 York'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 2004⁹ 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"¹⁰ 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 York in recent years from 9% of the total stock in 2001 to 19% in 2011¹¹ - so that 10% of the stock has changed over that time period to now be private rented. This is higher than the change of 9% seen in England as a whole.

¹⁰ Laying the Foundations: A Housing Strategy for England, CLG, 2011

¹¹ <https://www.gov.uk/government/collections/dwelling-stock-including-vacants>



2.2.2 Health inequalities

The government's white paper "Choosing Health"¹² 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 inequalities¹³. 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"¹⁴.

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"¹⁵ 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

¹² Choosing Health: Making healthy choices easier, Department of Health, 2004

¹³ The health impacts of poor private sector housing, LACORS, 2010

¹⁴ Integrated Care: Our Shared Commitment, Department of Health, 2013

¹⁵ 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”¹⁶.

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 (likely to be set at Energy Performance Certificate rating E¹⁷). 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 York includes provision of a private rented sector variable that should assist in identifying such dwellings.

2.2.7 Empty homes

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. In addition, from 2012-15, £100 million of capital funding from within the Affordable Homes Programme will be available to tackle problematic¹⁸ empty homes. 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 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.

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.

The latest information for York collected by DCLG¹⁹ identifies 847 vacant dwellings across all tenures. This represents a vacancy rate of approximately 1% in York, compared to a figure of 3% in England. Furthermore, 0.2% (194) of these dwellings are long-term vacant (6 months or more) in York compared to a figure of 1% for England as a whole.

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.

¹⁶ Joint Strategic Needs Assessment and joint health and wellbeing strategies explained: Commissioning for populations, Department of Health, 2011

¹⁷ <https://www.gov.uk/getting-a-green-deal-information-for-householders-and-landlords>

¹⁸ Properties that are likely to remain empty without direct financial support from government.

¹⁹ <https://www.gov.uk/government/collections/dwelling-stock-including-vacants>



2.3.1 Welfare Reform Act 2012

The key parts of this act for environmental health services are 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.

2.3.2 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.

2.3.3 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)²⁰ 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 issues. Of particular relevance to this current project is “Section F: Condition of dwelling stock” which, amongst other things, requests the following information:

- Total number of dwellings and number of private sector dwellings with category 1 HHSRS hazards and the estimated costs of mitigating these
- Estimates of the number of HMOs and the number of mandatory licensable HMOs

Whilst the LAHS no longer requires reporting of average EPC ratings of the private sector stock and the proportion below a certain rating, 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. Subject to Parliamentary approval, this minimum standard has been set at

²⁰ <https://www.gov.uk/government/publications/completing-local-authority-housing-statistics-2012-to-2013-guidance-notes>



band E by 1 April 2018^{21, 22}. Furthermore, from 1 April 2016, tenants in F and G rated dwellings may 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)²³ was originally designed to sit alongside the Green Deal in situations where additional financial support was required for householders. Whilst funding for the Green Deal and the Home Improvement Fund has recently been withdrawn²⁴, the ECO will continue to run until March 2017. The 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 (from 1 January 2013 - 31 March 2015 and recently extended to March 2017²⁵). The 3 different ECO obligations are:

- Carbon Emissions Reduction Obligation (CERO)
- Carbon Saving Community Obligation (CSCO)
- Home Heating Cost Reduction Obligation (HHCRO) or Affordable Warmth

ECO2 is now underway and runs from April 2015 to March 2017 – the 3 obligations remain as above and have similar pro-rated targets as ECO but with some different definitions and routes to achieving targets.

An understanding of the ECO criteria is pivotal to building a local authority's strategy for leveraging in finance to improve the energy efficiency of the stock. Of particular interest are properties with HTT cavities and their role in the Carbon Emissions Reduction Obligation. Despite the recent changes in ECO2, this obligation has by far the greatest savings target attached to it and HTT cavities are a particular focus of energy company interest due to their relatively low cost to install improvements compared to solid wall insulation which is the other key criterion for CERO eligibility. 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.

²¹ <https://www.gov.uk/government/consultations/private-rented-sector-energy-efficiency-regulations-domestic>

²² 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.

²³ The Electricity and Gas (Energy Companies Obligation) Order 2012, Statutory Instrument No. 3018, 4 December 2012 (<http://www.legislation.gov.uk/ukxi/2012/3018/part/4/made>)

²⁴ Funding has been withdrawn as of 23 July 2015; however, there will be no impact on existing Green Deal Finance Plans or Green Deal Home Improvement Funds -<https://www.gov.uk/government/news/green-deal-finance-company-funding-to-end>

²⁵ Although energy companies have been able to count measures delivered since October 2012 against their targets.



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 Department for Communities and Local Government's (DCLG) English Housing Survey (EHS)²⁶. 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 York, 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 SimpleCO₂ 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 SimpleSAP²⁷, can be directly inferred from this data.

Furthermore, York provided several additional sources of local data which were then incorporated into the BRE Housing Stock Model and Database 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. energy demand, excess cold, SimpleSAP) 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.
- **Other Local data**
 - **Local Land and Property Gazetteer (LLPG) data** – the Unique Property Reference Number (UPRN) from the LLPG is used to uniquely identify all properties, while the address details from the LLPG are used to merge the BRE models and EPC data using address matching.

²⁶ The most recent survey used in the housing stock models is 2011.

²⁷ 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 it uses a smaller, simplified set of inputs.



- **HMO data** – the council provided a list of properties which were recorded as being HMOs or licensed HMOs. The UPRNs were matched to the LLPG data and these HMOs were then added to our modelled outputs.

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 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 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:

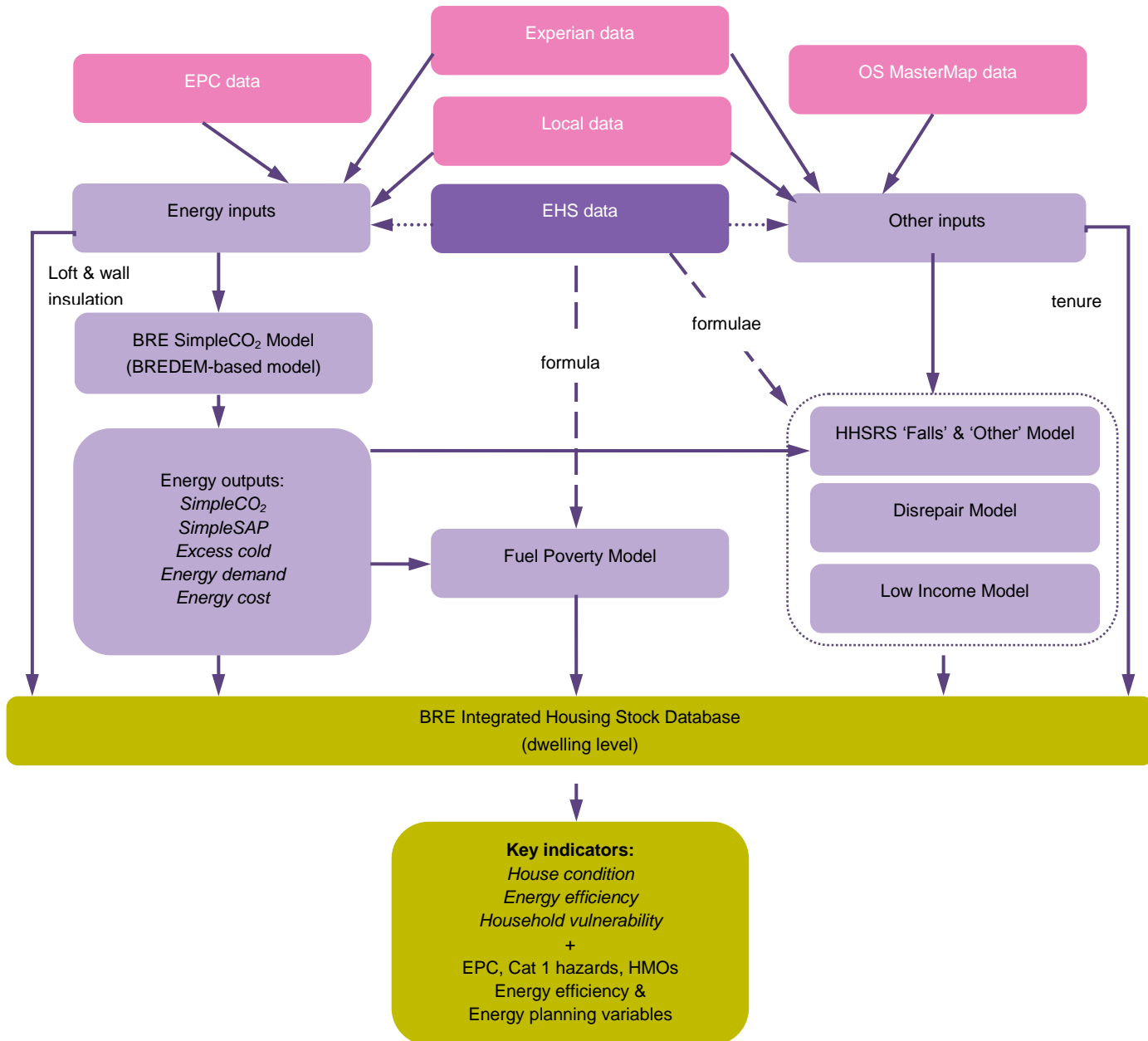
Energy inputs - are developed from Experian, EPC and other local data sources (if available). The EHS data is used to impute (using cold deck imputation²⁸) and interpolate where there are gaps in the data. The “energy inputs” are then fed into the SimpleCO₂ Model to produce the “energy outputs” for the 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 imputation²⁸) 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.

²⁸ 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)



- BRE housing stock modelling process
- Integration of additional data
- Data used for imputation & interpolation
- Outputs
- Data
- Imputed (cold deck)
- Information



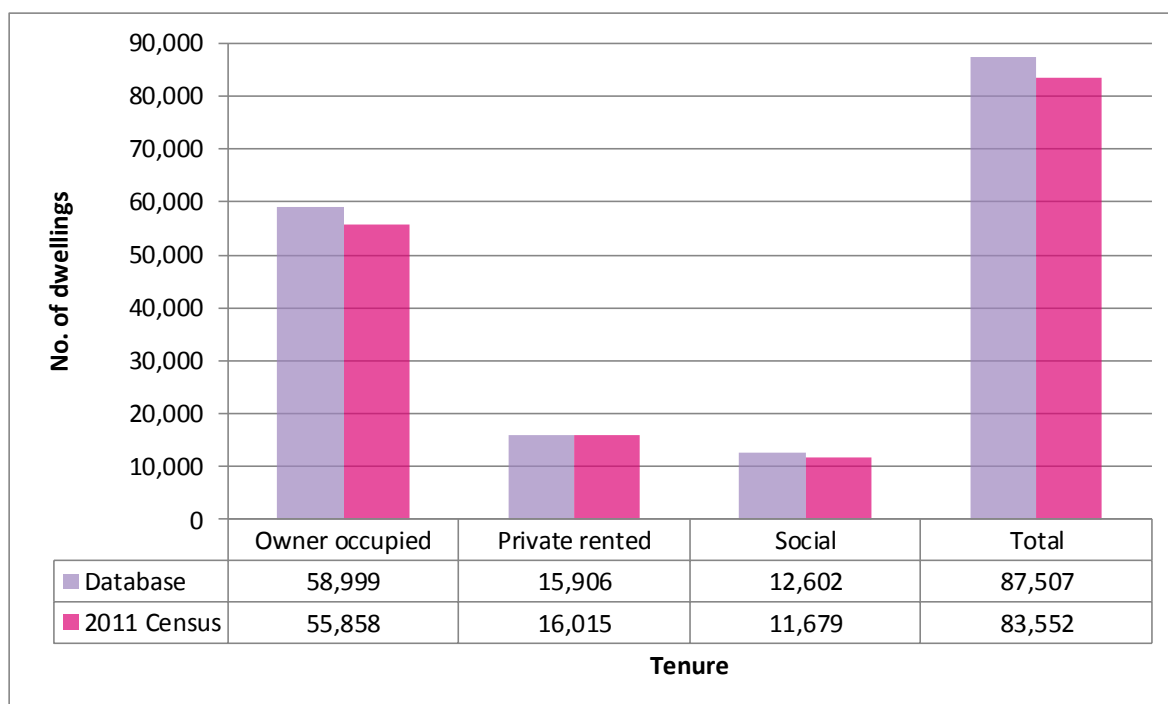
3.2 Breakdown of the housing stock by tenure - validation

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 York from the integrated database is based on the LLPG data provided by York; therefore the model is based on this value. The tenure split within the integrated database is derived from the purchased Experian tenure variable.

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 figures²⁹. The results of the validation exercise show that the differences between the tenure split from the database compared to the Census figures are relatively small (see **Figure 2**), suggesting that the database should provide a good overview of the housing stock in York. Furthermore, **Maps 1** and **2** show that the geographical distributions look very similar, again giving confidence that the integrated database provides a good overview of York’s housing stock.

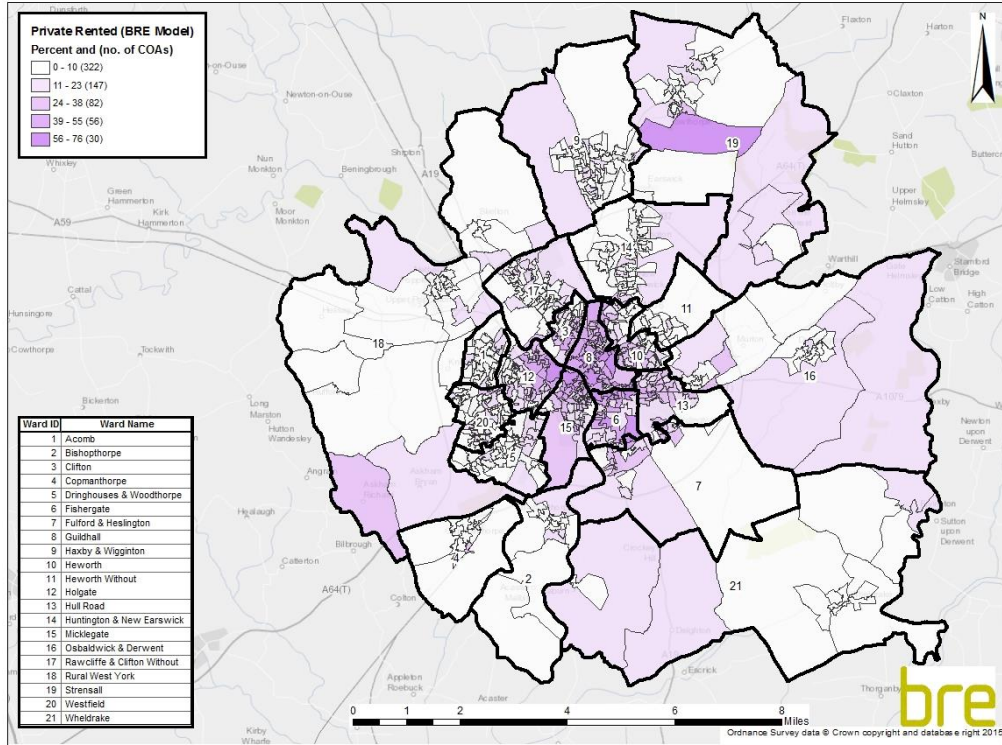
Figure 2: Tenure split – comparison of BRE Housing Stock Database outputs with 2011 Census figures for York



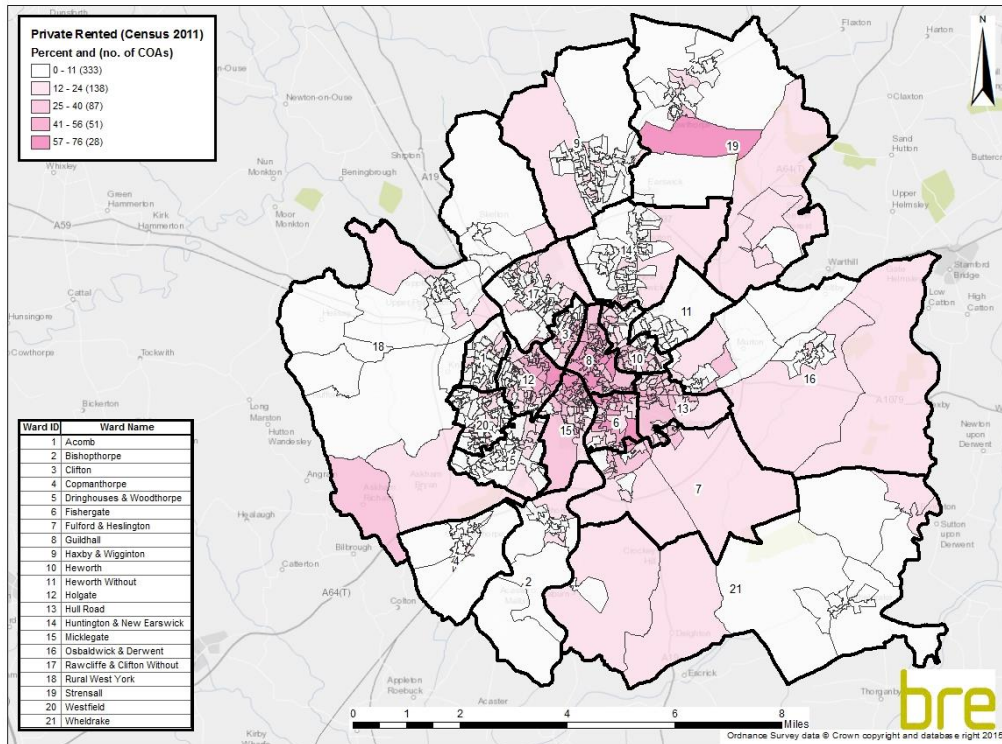
²⁹ <http://www.ons.gov.uk/ons/datasets-and-tables/index.html>



Map 1: Distribution of estimated percentage of private rented dwellings in York – based on database



Map 2: Distribution of estimated percentage of private rented dwellings in York – based on 2011 Census Data (Neighbourhood Statistics)





4 Results from the BRE Dwelling Level Housing Stock Models and Database

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 York. 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 first sub-section below provides a map of the wards in York as well as additional information on dwelling age. The results are then displayed in the following sub-sections:

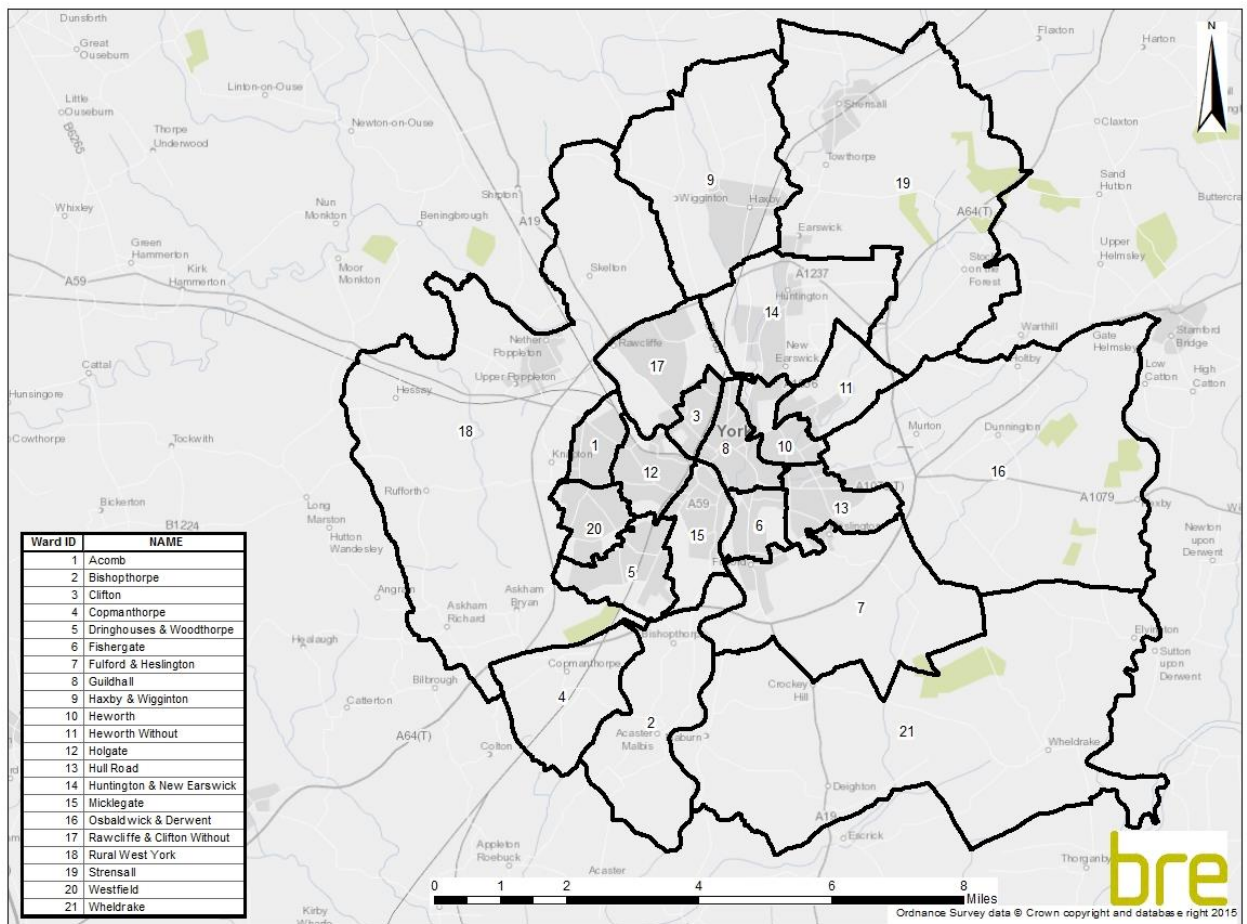
- Key indicators:
 - York – regional and national comparisons
 - Key indicators by tenure for York
 - Key indicators mapped by COA for York private sector stock
 - Ward level results for the key indicators
- Information relating to LAHS reporting and EPC ratings:
 - Category 1 hazards
 - HMOs
 - EPC ratings
- Basic energy efficiency variables for York (wall and loft insulation)
- Energy planning variables for York
- Potential energy/carbon savings from improvement scenarios



4.1 Overview of York

Map 3 below shows the 21 wards in York. 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.

Map 3: The wards in York



4.1.1 Additional information on dwelling age

York City Council requested an additional variable on dwelling age to be provided from the Experian data set. **Figure 3** shows the dwelling age profile across the whole of the area; it is clear that the majority of dwellings were built between 1919 and 1944 and over half of all dwellings were built between 1919 and 1964. **Figure 4** shows the dwelling age profile by ward which provides a means of identifying areas with properties of certain ages; for example, Guildhall and Mickelgate wards have large proportions of pre-1900 dwellings.



Figure 3: Dwelling age profile for York, all stock

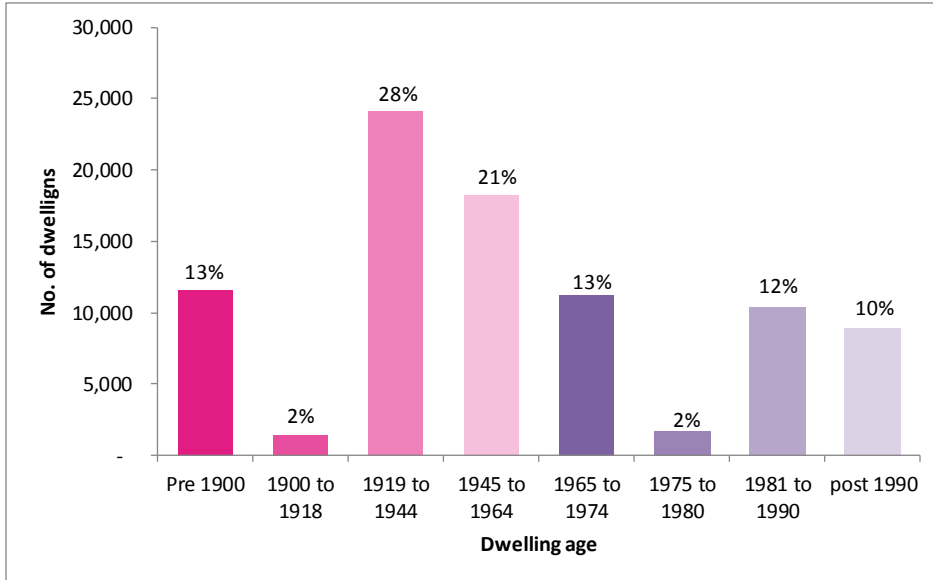
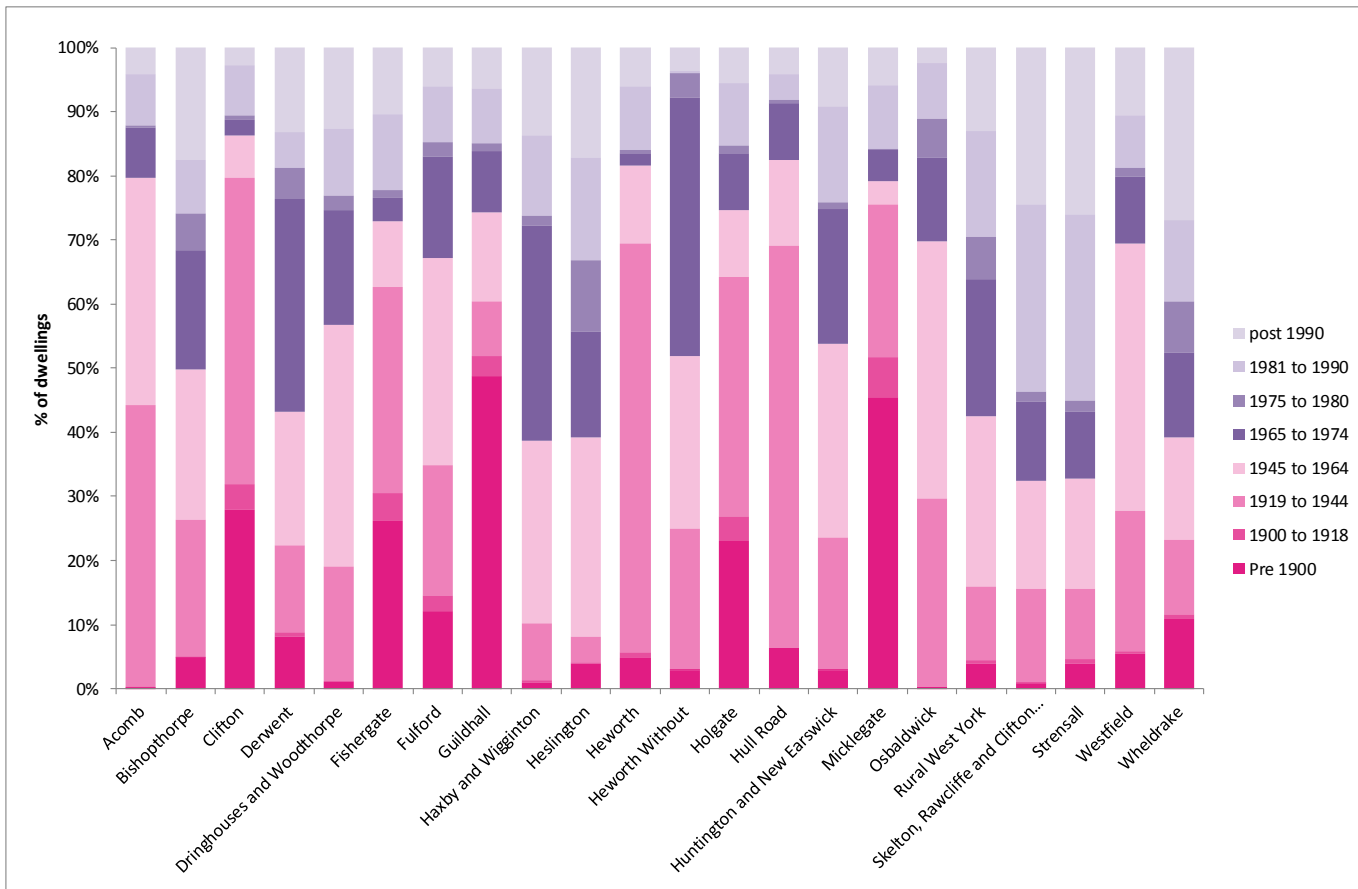


Figure 4: Dwelling age profiles by ward, all stock





4.2 Key indicators

4.2.1 York – regional and national comparisons

Table 2 and **Figure 5** show the results for each of the key indicators in York compared to England (EHS 2011) and split into all stock and private sector stock. **Figure 6** shows the results of the SimpleSAP ratings.

For all stock, York performs better than the EHS England average for excess cold (4% compared to 6%) , fuel poverty – Low Income High Costs definition (9% compared to 11%) and low income households (28% compared to 33%). York performs slightly worse for disrepair (6% compared to 5%).

For all stock compared to the regional figures for the EHS Yorkshire and The Humber, the figures are generally similar for all the indicators, with the exception of fuel poverty (both definitions) and low income households where York performs better.

Comparing York to the EHS England average figures for the private sector stock a similar picture emerges. The exception is disrepair which when comparing all stock, York performed worse than England; however, when only looking at the private stock, York has the same levels as the England average. York generally shows a slightly better performance than the region of Yorkshire and The Humber for most of the indicators – except excess cold which is the same (4%).

The average SimpleSAP ratings in York (**Figure 6**) are higher than those for the regional and England averages for both all stock and the private sector stock.

Table 2: Estimates of the numbers and percentage of dwellings meeting the key indicator criteria assessed by the Housing Stock Models and Database for all stock and private sector stock – York compared to Yorkshire and The Humber and England (EHS 2011)

Indicator	All stock				Private sector stock			
	York (no.)	York (%)	2011 EHS Regional (%)	2011 EHS England (%)	York (no.)	York (%)	2011 EHS Regional (%)	2011 EHS England (%)
No. of dwellings	87,507	-		-	74,905	-		-
HHSRS category 1 hazards	12,434	14%	15%	15%	11,444	15%	17%	17%
Excess cold	3,289	4%	4%	6%	3,020	4%	4%	7%
Fall hazards	8,355	10%	10%	9%	7,846	10%	11%	10%
Disrepair	5,114	6%	6%	5%	4,376	6%	7%	6%
Fuel poverty (10%)	12,951	15%	18%	15%	11,317	15%	18%	15%
Fuel poverty (Low Income High Costs)	7,851	9%	11%	11%	6,896	9%	11%	11%
Low income households	24,536	28%	35%	33%	15,394	21%	26%	24%

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 5: 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 – York compared to Yorkshire and The Humber and England (EHS 2011)

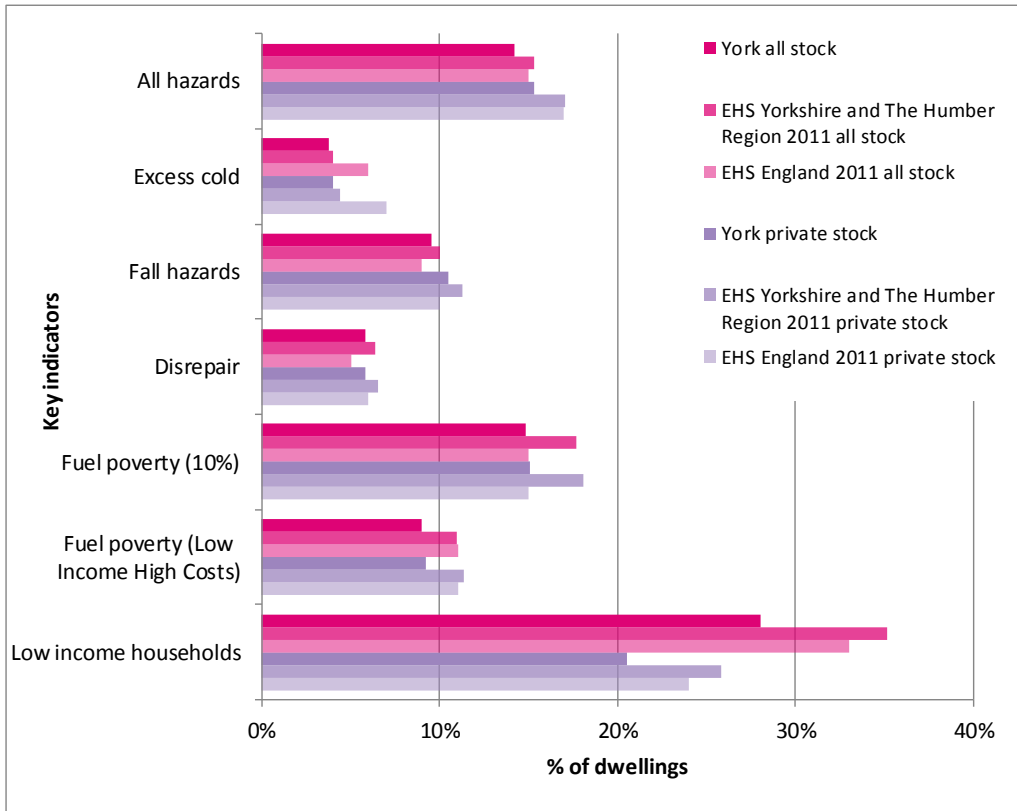
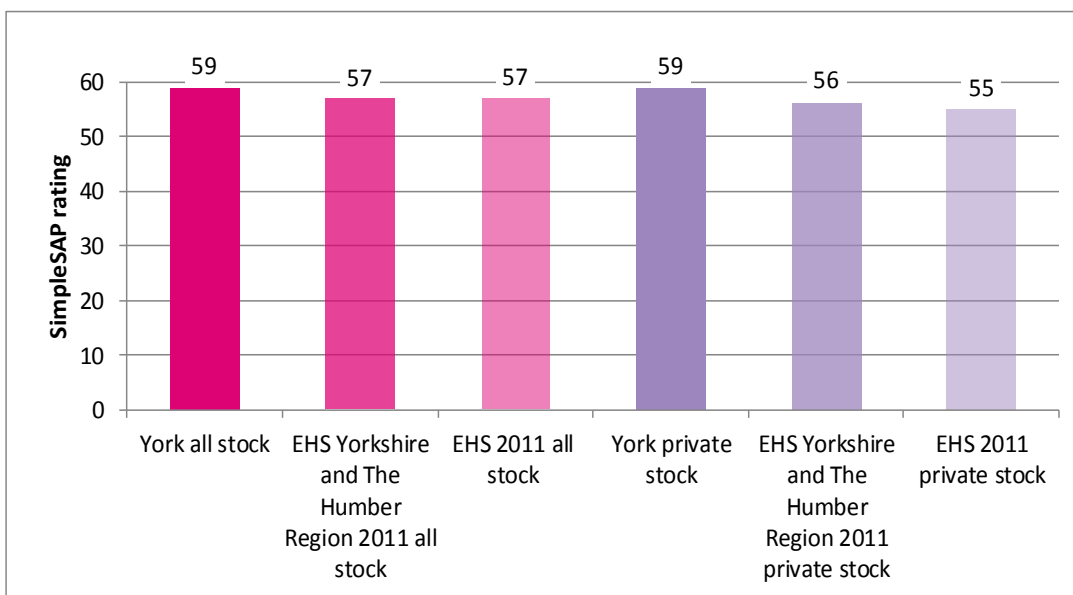


Figure 6: Average SimpleSAP ratings for all stock and private sector stock – York compared to Yorkshire and The Humber and England (EHS 2011)





4.2.2 Key indicators by tenure – York

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 3** and **Figure 7** below show the results for each of the key indicators split by tenure and **Figure 8** 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 to 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 worse than the private sector stock for the low income households indicator. For fuel poverty; however, the private rented tenure shows the highest levels for both definitions.

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 private rented stock is significantly worse than the owner occupied stock across all the indicators, including energy efficiency (SimpleSAP). In particular the private rented stock is worse than the owner occupied stock for fuel poverty (Low Income High Costs definition) and low income households and for total number of hazards (including both excess cold and fall hazards).

Table 3: Estimates of the numbers and percentage of dwellings meeting the key indicator criteria assessed by the Housing Stock Models and Database by tenure for York

Indicator	Private sector stock				Social stock		
	Owner occupied		Private rented		No.	%	
	No.	%	No.	%			
No. of dwellings	58,999	-	15,906	-	12,602	-	
HHSRS category 1 hazards	All hazards	7,733	13%	3,711	23%	990	8%
	Excess cold	1,932	3%	1,088	7%	269	2%
	Fall hazards	5,472	9%	2,374	15%	509	4%
Disrepair	2,804	5%	1,572	10%	738	6%	
Fuel poverty (10%)	7,844	13%	3,473	22%	1,634	13%	
Fuel poverty (Low Income High Costs)	3,754	6%	3,142	20%	955	8%	
Low income households	9,946	17%	5,448	34%	9,142	73%	

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 7: Estimates of the percentage of dwellings meeting the key indicator criteria assessed by the Housing Stock Models and Database by tenure for York

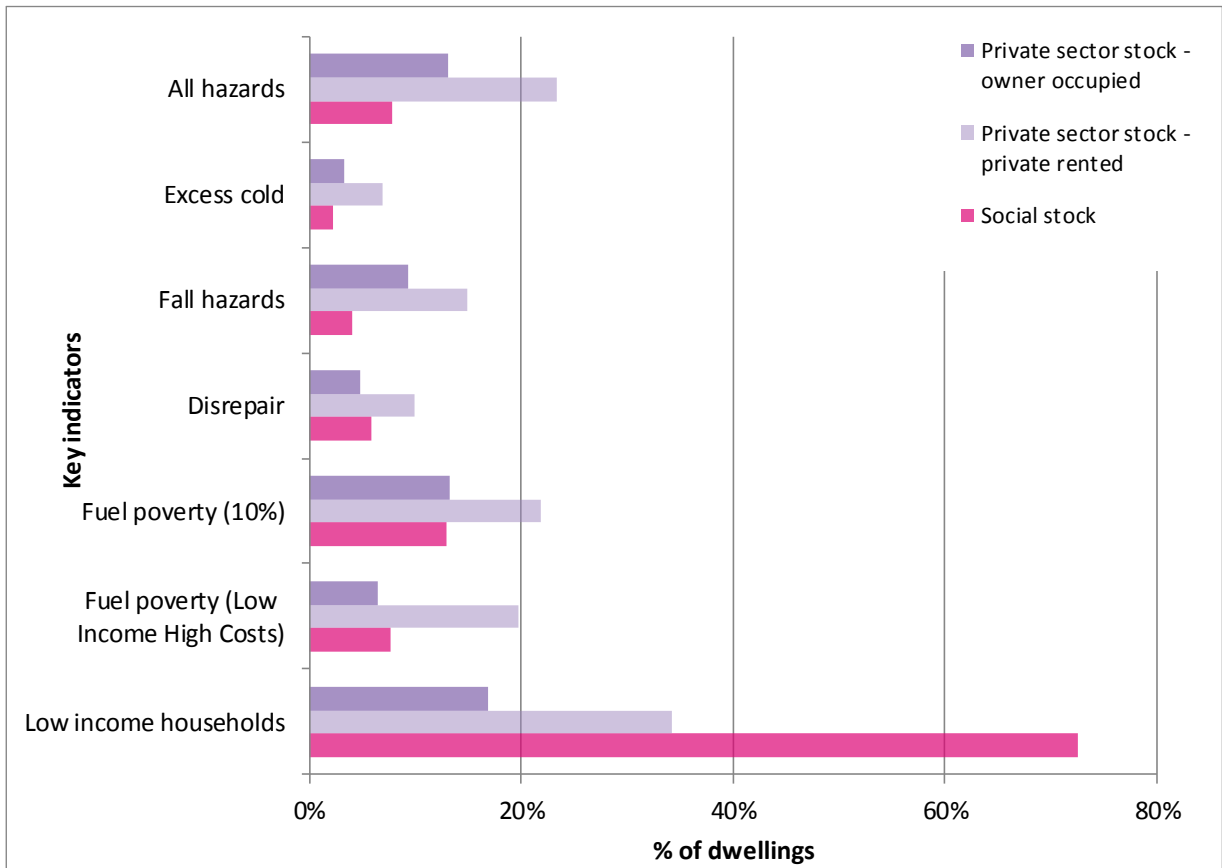
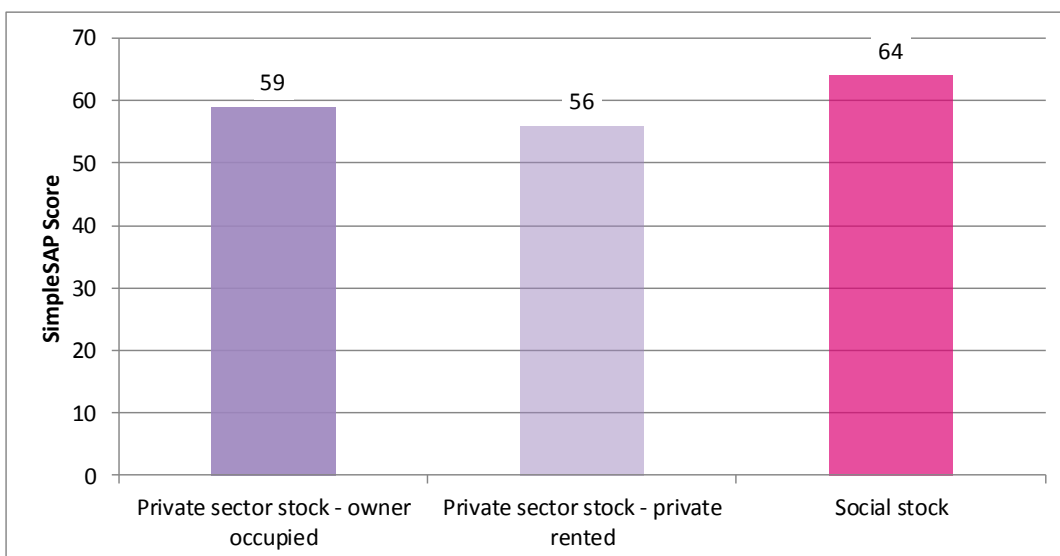


Figure 8: Average SimpleSAP ratings by tenure for York





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

Some of the key indicators are also provided in map form below along with a brief description of each indicator³⁰, 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 statistics³¹. 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 11** below:

- **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 fuel poverty**
- **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 SimpleSAP³² rating**

In addition, maps have been provided for HMOs, EPCs, levels of wall and loft insulation, energy demand/cost and heat demand/cost.

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 10**. As York is the main town in this area, maps zooming in on the urban area of York are provided in **Appendix D**.

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 17 COAs that have 40 - 61% of private sector dwellings estimated to have the presence of a category 1 hazard.

³⁰ See **Appendix A** for full definitions.

³¹ 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.

³² Important note: Whilst it is possible to provide "SimpleSAP" ratings from the "SimpleCO₂" 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 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 2004⁹ 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) hazard³³.

The HHSRS category 1 hazards map (**Map 4**) shows that there are concentrations of high levels of category 1 hazards in the more urban areas of Guildhall, Micklegate and Clifton. **Map D. 1** shows this in more detail – for example there are concentrations of high levels of hazards in central parts of Guildhall and to the north of Micklegate. It is reasonable to expect that areas with greater numbers of older properties will record higher levels of excess cold and falls hazards.

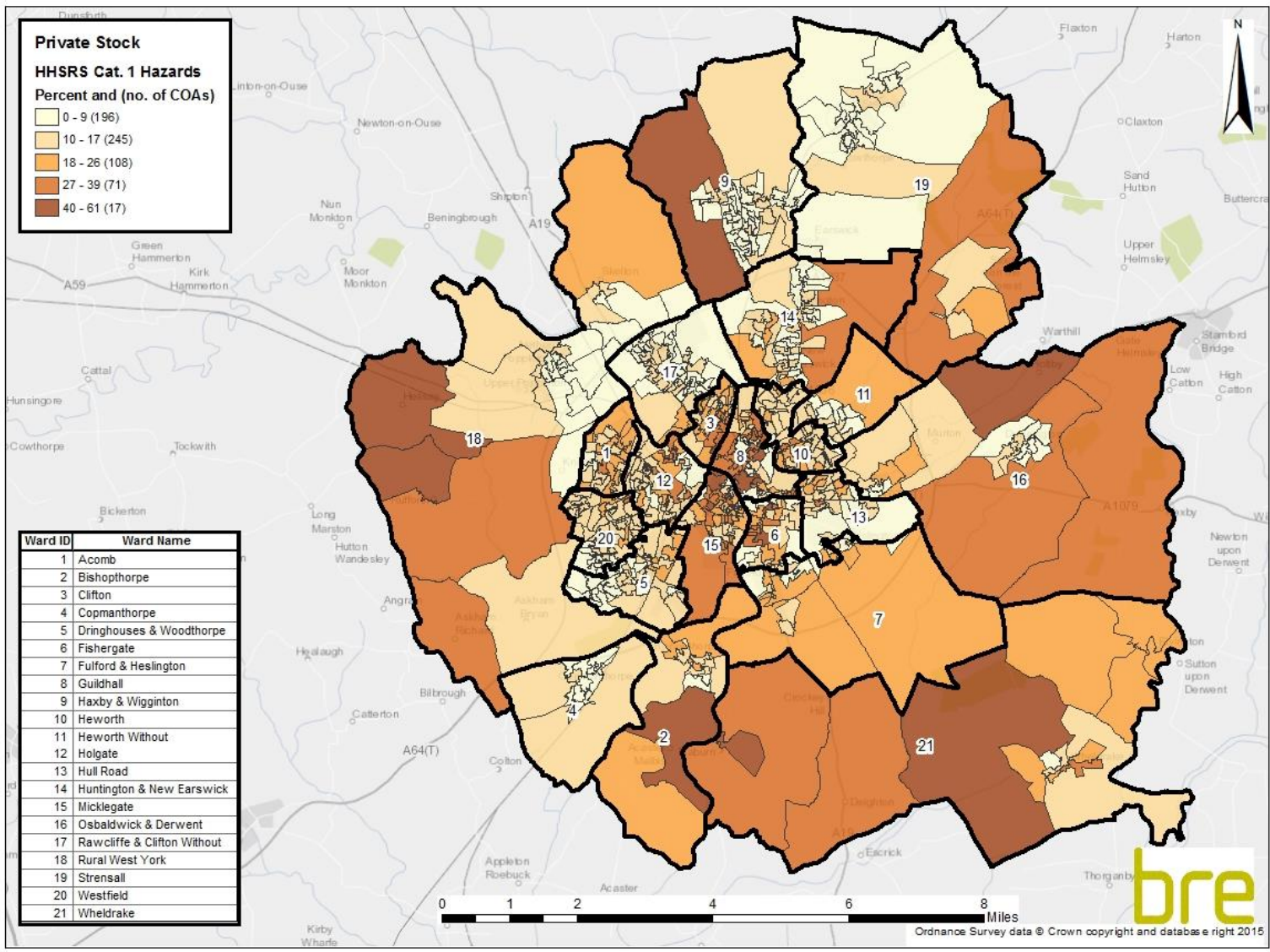
There are relatively low levels of excess cold hazards in York, so when looking at concentrations of excess cold, this is only relative to York as a whole. There are high concentrations in Wheldrake, Guildhall and Rural West York wards – see **Map 5**. Wheldrake has one of the older stock profiles in the outlying rural wards. More rural areas tend to have older detached properties which tend to have poorer levels of energy efficiency and may not be connected to the gas network thereby making it more costly and difficult to adequately heat increasing the risk of excess cold hazard. Generally lower levels of excess cold are seen in the more urban areas with the exception of Guildhall (which has higher levels in the central COAs) and Micklegate (which has higher levels to the north) – see **Map D. 2**.

The distribution of falls hazards is shown in **Map 6** which indicates that the high concentrations are found in the urban area of York. **Map D. 3** shows that the highest levels are scattered throughout the urban area – for example there are several COAs with high levels in the wards of Guildhall, Micklegate, Clifton, Fishergate and Holgate.

³³ Housing Health and Safety Rating System Operating Guidance, ODPM, 2006

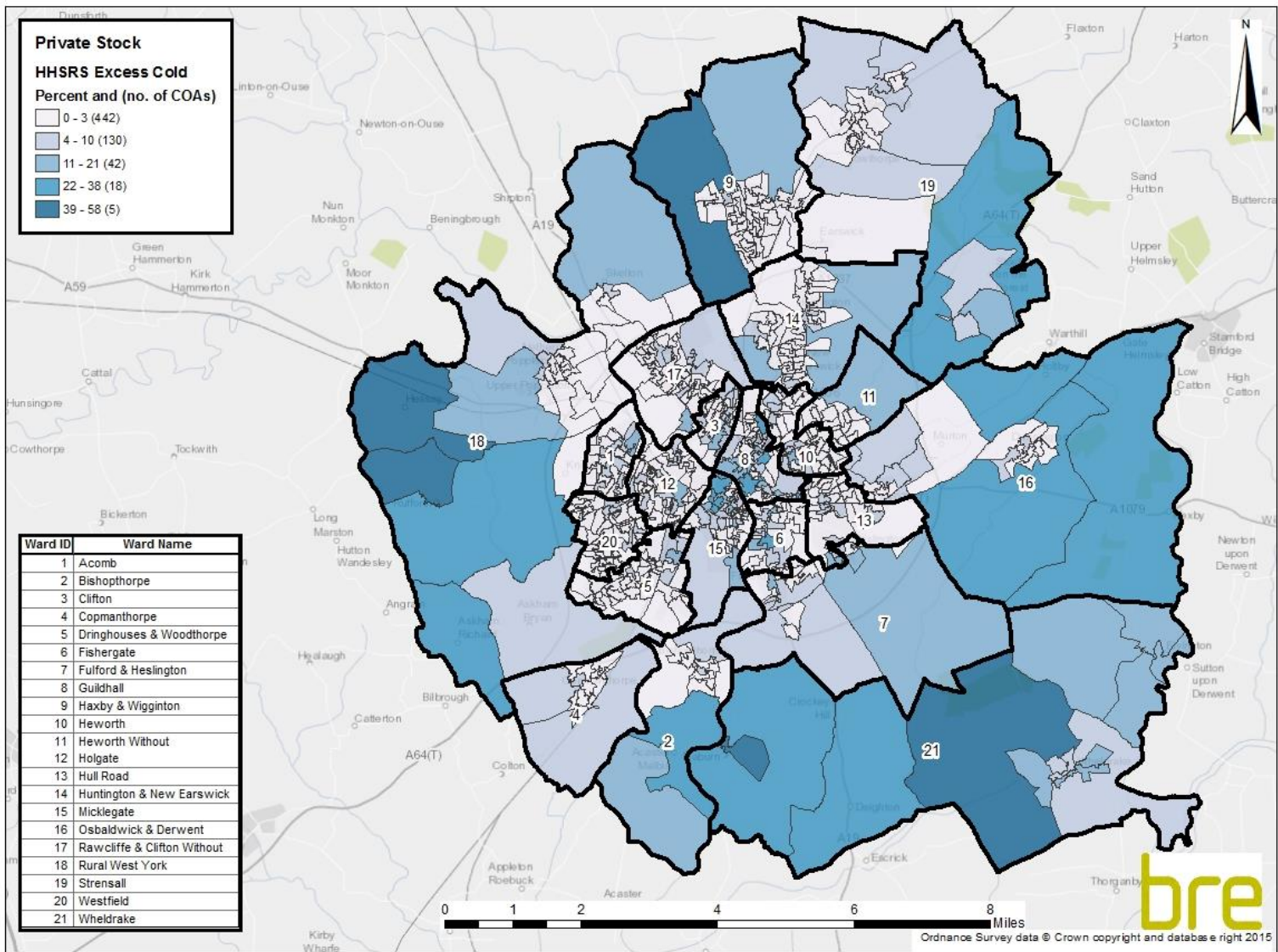


Map 4: Percentage of private sector dwellings in York with the presence of a HHSRS category 1 hazard



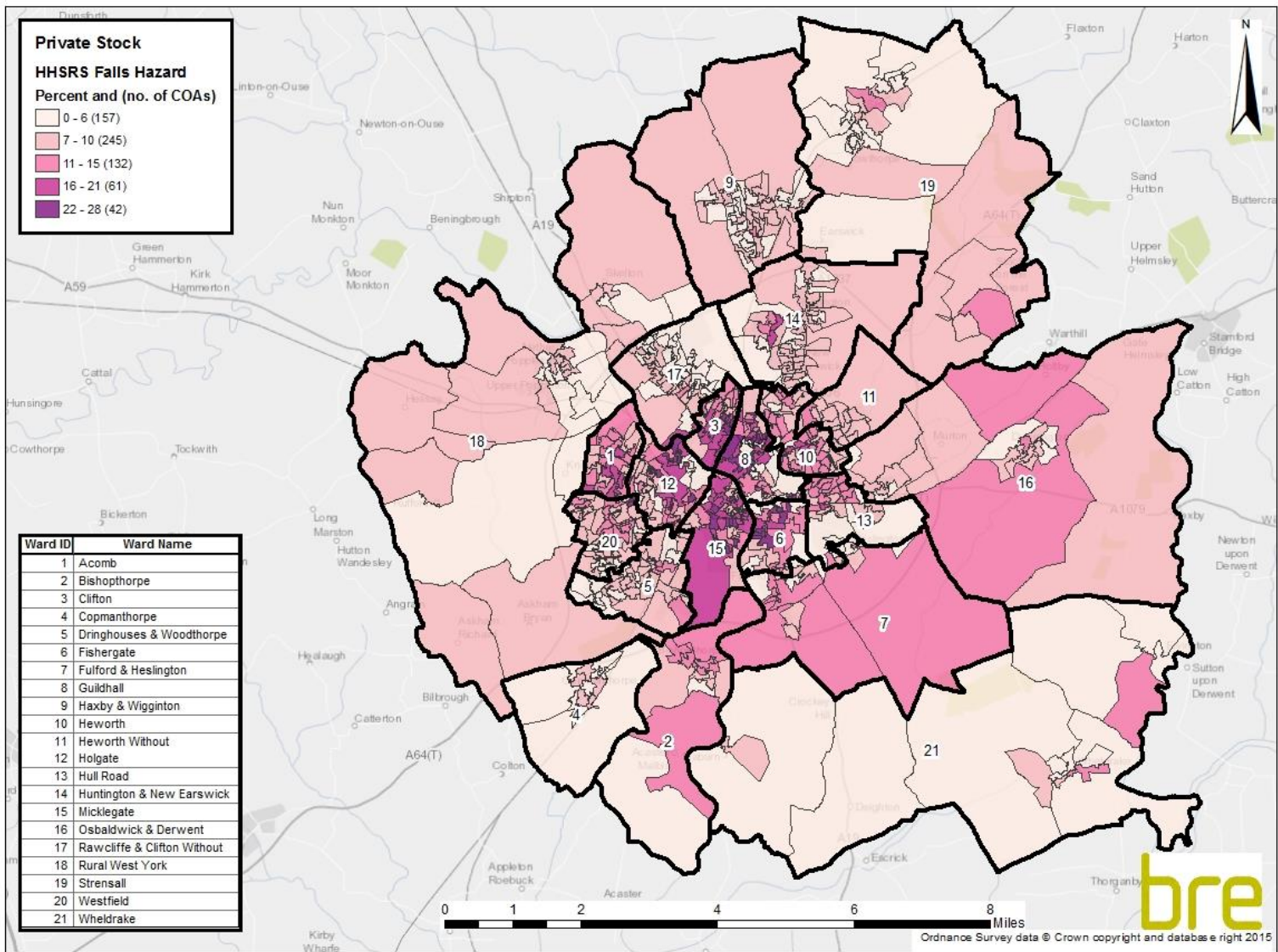


Map 5: Percentage of private sector dwellings in York with the presence of a HHSRS category 1 hazard for excess cold





Map 6: Percentage of private sector dwellings in York with the presence of a HHSRS category 1 hazard for falls





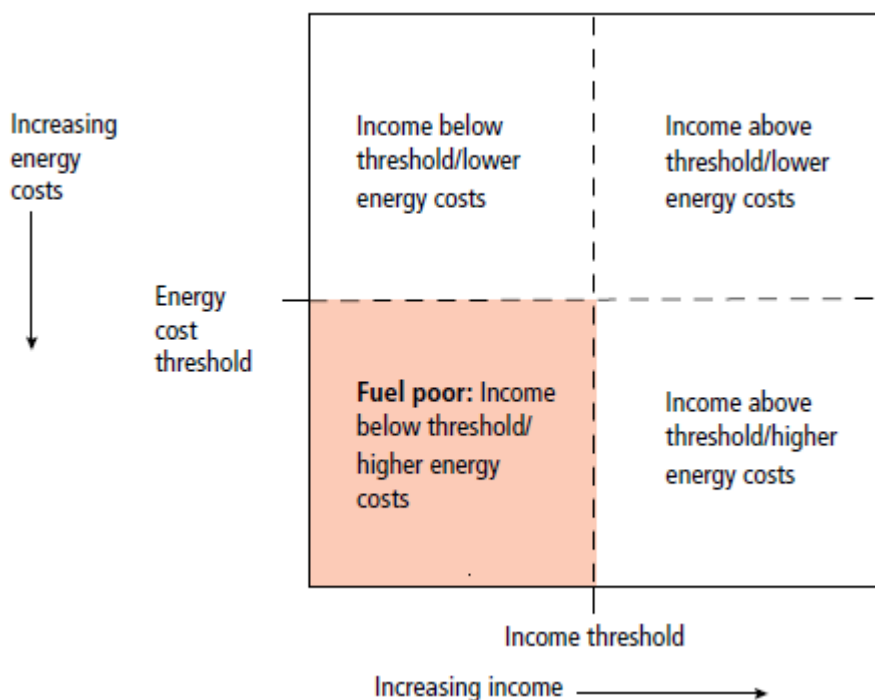
4.2.3.2 Fuel poverty

This report covers both the original definition and the new definition of fuel poverty which is currently being rolled out by government.

The original 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 (defined as 21°C for the main living area, and 18°C for other occupied rooms in the 2012 Hills Fuel Poverty Review)³⁴. For the purposes of this report this is termed “fuel poverty (10%)”.

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) 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 9** below). For the purposes of this report this is termed “fuel poverty (Low Income High Costs)”.

Figure 9: A representation of the Low Income High Costs definition of fuel poverty³⁴



A report produced by DECC³⁵ states that under the 10% fuel poverty indicator, increasing household income potentially removes households from fuel poverty as they will be spending a smaller proportion of their income on fuel. Reducing income has the opposite effect potentially pushing households into fuel poverty. Decreasing fuel prices and/or improvements made to the energy efficiency of the home can remove households from fuel poverty, while rising prices will have the opposite effect.

As the low income high cost indicator is a relative measure, it provides a much steadier trend in the number of fuel poor households over time than the 10% indicator. Whereas an increase in income is likely

³⁴ Hills, J. Getting the measure of fuel poverty - Final Report of the Fuel Poverty Review, London: LSE., 2012

³⁵ Fuel Poverty Report – Updated August 2013, Department of Energy and Climate Change, 2013



to reduce the extent of fuel poverty under the 10% definition, under the low income high cost indicator, 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.

The 10% indicator tends to be very responsive to changes in prices, such that these usually dominate the indicator, outweighing other factors such as income and energy efficiency.

Map 7 shows that, based on the fuel poverty 10% definition, there are pockets of higher concentrations in central York and in the less built up surrounding areas. The wards with the highest concentrations overall are Guildhall, Micklegate and Clifton. **Map D. 4** zooms in on central York and it can be seen that the highest areas are to the west of Guildhall.

For comparison, **Map 8** shows the results based on the fuel poverty Low Income High Costs definition, which overall shows a similar pattern to the 10% definition although more of the central wards show areas of higher levels of fuel poverty – see **Map D. 5**.

4.2.3.2.1 What type of property is in fuel poverty under the Low Income High Costs Definition?

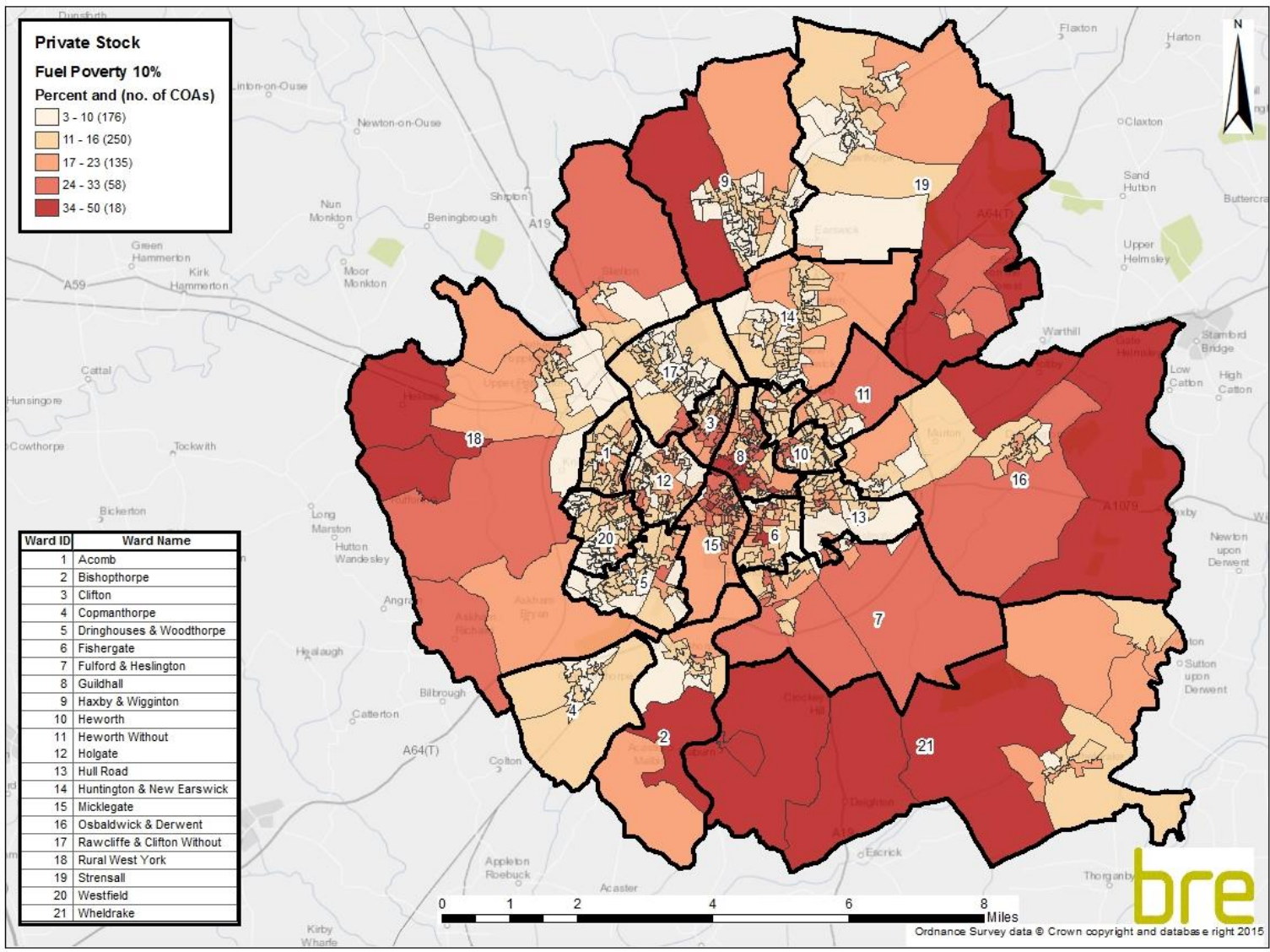
The Hills Fuel Poverty Review³⁴ provides useful figures that show the likely composition of a fuel poor household under this definition:

- 76% of fuel poor households have an EPC rating of E to G
- 20% of fuel poor households are rural
- 82% of fuel poor households live in houses as opposed to flats or bungalows
- A third of fuel poor households are found in a fifth of the most deprived households
- Fuel poverty is spread fairly evenly between regions, including London
- 34% of fuel poor households contain a person with a long term illness or disability
- 10% of fuel poor households contain a person over the age of 75
- 20% of fuel poor households contain a person under the age of 5

These figures should be considered when analysing the map showing the percentage of private sector dwellings in York occupied by households in fuel poverty under the Low Income High Costs definition.

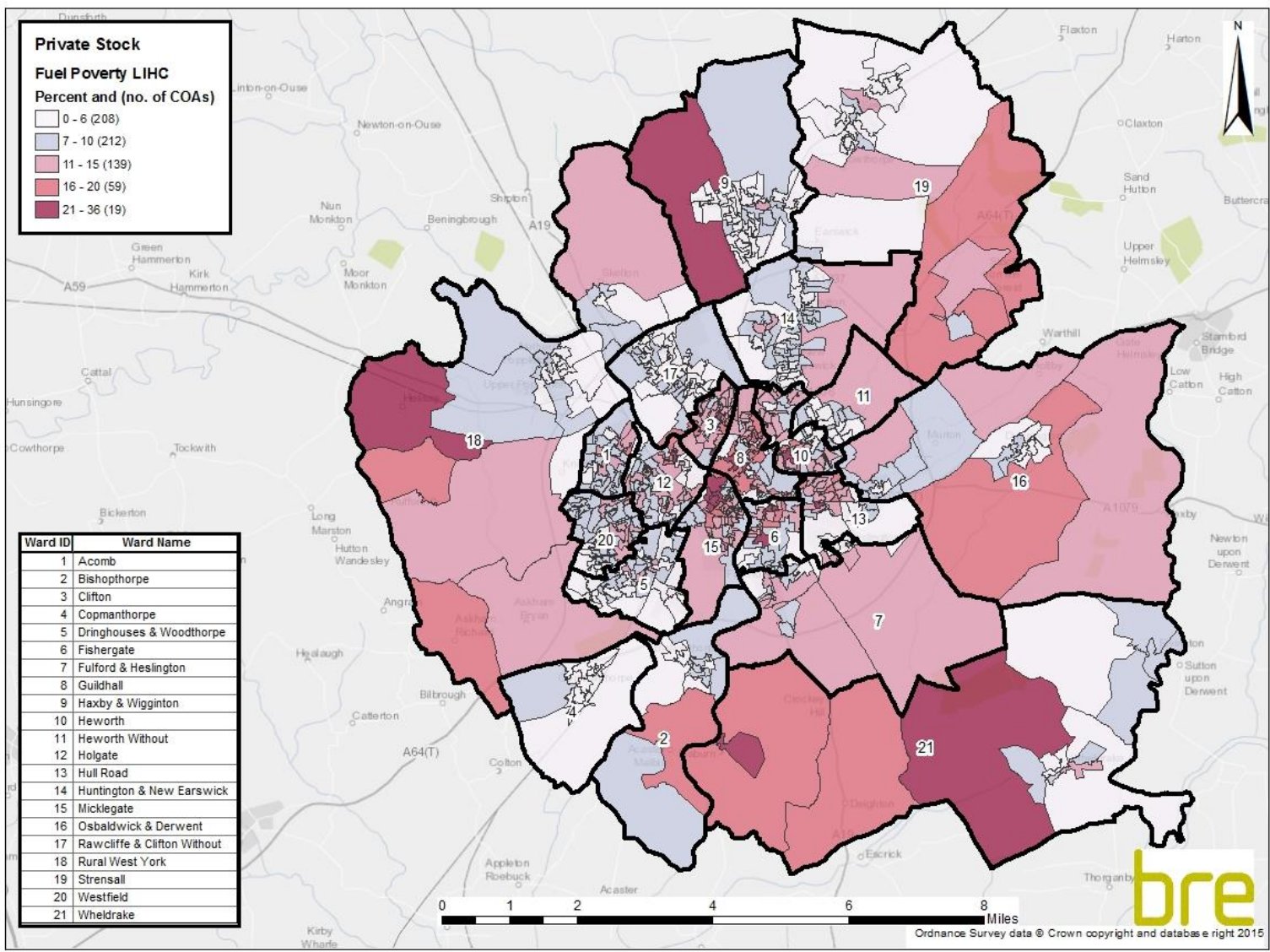


Map 7: Percentage of private sector dwellings in York occupied by households in fuel poverty - 10% definition





Map 8: Percentage of private sector dwellings in York occupied by households in fuel poverty – Low Income High Costs definition





4.2.3.3 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 £15,050.

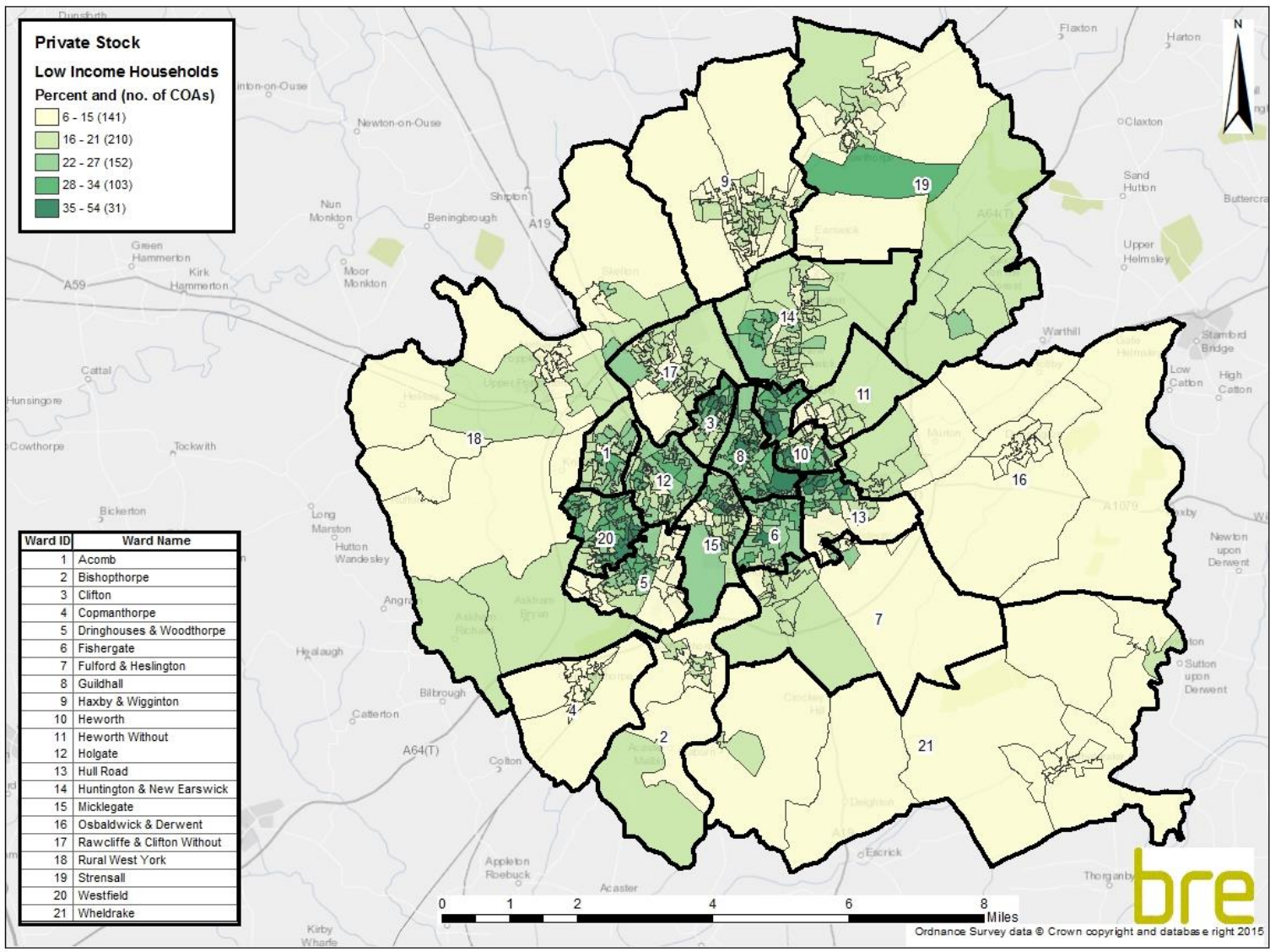
The definition also includes households in receipt of Council Tax benefit and income based Job Seekers Allowance.

Map 9 clearly shows that concentrations of low income households are higher in the urban areas making up the City of York. The highest levels overall are found in the Guildhall, Heworth and Westfield wards. The map zooming in on York (**Map D. 6**) shows that the higher levels are found scattered across Guildhall, to the north, west and south of Heworth and to the south east of Westfield. There are also pockets of high levels elsewhere – for example to the north west of Hull Road.

Map 10 provides 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 map indicates that there are pockets of both low income and excess cold across the district including both less built up areas (e.g. to the west of Haxby and Wigginton ward) and more urban areas. **Map D. 7** zooms in on York and shows that there are pockets of high levels of both indicators across these wards – particularly Guildhall, the north of Micklegate, the south of Heworth and Clifton.

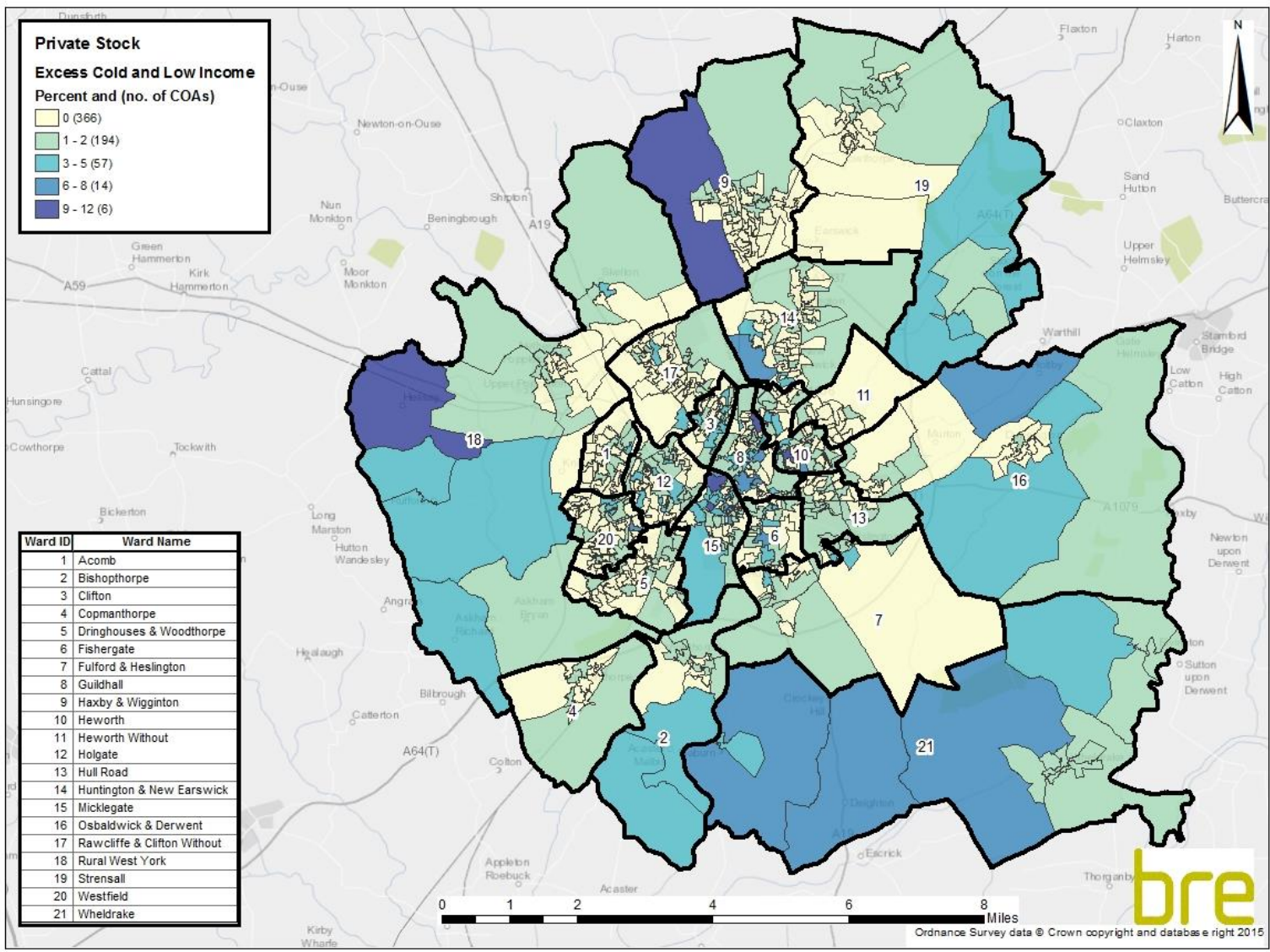


Map 9: Percentage of private sector dwellings in York occupied by low income households





Map 10: Percentage of private sector dwellings in York with both the presence of a HHSRS category 1 hazard for excess cold and occupied by low income households



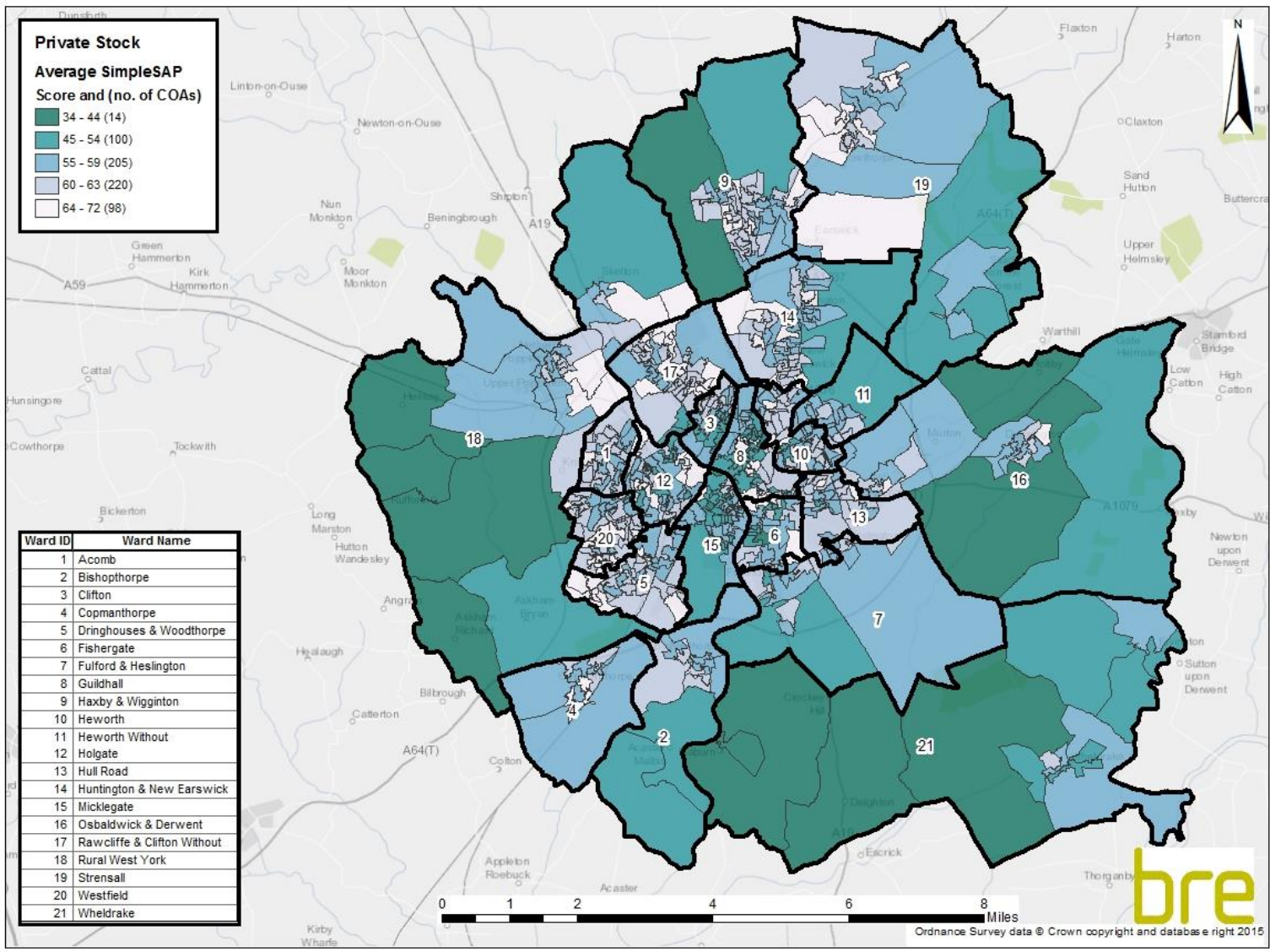


4.2.3.4 SimpleSAP

The average SimpleSAP map (**Map 11**) shows that areas with lower average SimpleSAP ratings are distributed across the district. Whilst no particular ward obviously dominates, the data behind the map shows that the wards with the lowest average SimpleSAP ratings are Wheldrake, Micklegate and Clifton. **Map D. 8** zooms in on the urban area of York in order to show the detailed areas of Micklegate and Guildhall in particular. 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.



Map 11: Average SimpleSAP ratings per dwelling in York private sector stock





4.2.4 Ward level results for the key indicators – total stock and private sector stock

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 4**) and secondly, for the private sector stock (**Table 5**). This allows a direct comparison between the wards in York.



Table 4: 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		
Acomb	3,815	428 (11%)	66 (2%)	318 (8%)	191 (5%)	473 (12%)	330 (9%)	1,147 (30%)	61
Bishopthorpe	1,829	258 (14%)	114 (6%)	142 (8%)	54 (3%)	268 (15%)	137 (7%)	332 (18%)	57
Clifton	4,431	918 (21%)	211 (5%)	627 (14%)	443 (10%)	821 (19%)	570 (13%)	1,639 (37%)	57
Copmanthorpe	1,743	142 (8%)	31 (2%)	106 (6%)	44 (3%)	162 (9%)	83 (5%)	248 (14%)	61
Dringhouses & Woodthorpe	5,257	535 (10%)	103 (2%)	393 (7%)	190 (4%)	598 (11%)	326 (6%)	1,245 (24%)	62
Fishergate	3,875	706 (18%)	156 (4%)	498 (13%)	296 (8%)	660 (17%)	439 (11%)	1,069 (28%)	58
Fulford & Heslington	1,594	205 (13%)	58 (4%)	141 (9%)	93 (6%)	249 (16%)	130 (8%)	340 (21%)	59
Guildhall	6,910	1,525 (22%)	499 (7%)	894 (13%)	689 (10%)	1,515 (22%)	885 (13%)	2,384 (35%)	57
Haxby & Wigginton	5,349	440 (8%)	83 (2%)	335 (6%)	147 (3%)	581 (11%)	286 (5%)	972 (18%)	61
Heworth	5,912	828 (14%)	141 (2%)	604 (10%)	426 (7%)	851 (14%)	601 (10%)	2,253 (38%)	61
Heworth Without	1,887	199 (11%)	47 (2%)	153 (8%)	89 (5%)	260 (14%)	125 (7%)	311 (16%)	58
Holgate	5,916	976 (16%)	184 (3%)	730 (12%)	447 (8%)	902 (15%)	602 (10%)	1,676 (28%)	59
Hull Road	3,607	461 (13%)	80 (2%)	319 (9%)	246 (7%)	491 (14%)	366 (10%)	1,309 (36%)	60
Huntington & New Earswick	5,734	612 (11%)	109 (2%)	455 (8%)	244 (4%)	683 (12%)	396 (7%)	1,718 (30%)	61
Micklegate	6,654	1,519 (23%)	422 (6%)	1,019 (15%)	656 (10%)	1,433 (22%)	879 (13%)	1,860 (28%)	56
Osbalwick & Derwent	3,445	491 (14%)	162 (5%)	312 (9%)	147 (4%)	507 (15%)	256 (7%)	699 (20%)	58
Rawcliffe & Clifton Without	5,235	396 (8%)	96 (2%)	271 (5%)	154 (3%)	500 (10%)	276 (5%)	1,120 (21%)	62
Rural West York	3,115	453 (15%)	254 (8%)	221 (7%)	97 (3%)	525 (17%)	265 (9%)	555 (18%)	57
Strensall	3,277	311 (9%)	117 (4%)	211 (6%)	95 (3%)	410 (13%)	218 (7%)	644 (20%)	61
Westfield	6,370	677 (11%)	80 (1%)	506 (8%)	316 (5%)	755 (12%)	532 (8%)	2,788 (44%)	63
Wheldrake	1,552	354 (23%)	276 (18%)	100 (6%)	50 (3%)	307 (20%)	149 (10%)	227 (15%)	52

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 5: 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		
Acomb	3,253	393 (12%)	63 (2%)	296 (9%)	158 (5%)	395 (12%)	273 (8%)	730 (22%)	61
Bishopthorpe	1,735	250 (14%)	111 (6%)	138 (8%)	51 (3%)	254 (15%)	128 (7%)	269 (16%)	57
Clifton	3,385	813 (24%)	186 (5%)	577 (17%)	349 (10%)	678 (20%)	471 (14%)	824 (24%)	55
Copmanthorpe	1,674	140 (8%)	30 (2%)	105 (6%)	43 (3%)	157 (9%)	79 (5%)	207 (12%)	61
Dringhouses & Woodthorpe	4,719	505 (11%)	99 (2%)	374 (8%)	172 (4%)	533 (11%)	288 (6%)	852 (18%)	61
Fishergate	3,481	675 (19%)	146 (4%)	480 (14%)	280 (8%)	610 (18%)	414 (12%)	807 (23%)	57
Fulford & Heslington	1,454	199 (14%)	55 (4%)	137 (9%)	86 (6%)	234 (16%)	124 (9%)	256 (18%)	58
Guildhall	5,554	1,379 (25%)	438 (8%)	835 (15%)	574 (10%)	1,284 (23%)	791 (14%)	1,446 (26%)	55
Haxby & Wigginton	5,100	427 (8%)	80 (2%)	327 (6%)	140 (3%)	548 (11%)	269 (5%)	803 (16%)	61
Heworth	4,538	711 (16%)	111 (2%)	546 (12%)	332 (7%)	668 (15%)	486 (11%)	1,200 (26%)	60
Heworth Without	1,868	198 (11%)	46 (2%)	152 (8%)	89 (5%)	257 (14%)	124 (7%)	300 (16%)	58
Holgate	5,184	921 (18%)	172 (3%)	700 (14%)	402 (8%)	808 (16%)	552 (11%)	1,165 (22%)	58
Hull Road	2,847	401 (14%)	74 (3%)	284 (10%)	188 (7%)	408 (14%)	307 (11%)	726 (26%)	59
Huntington & New Earswick	4,568	526 (12%)	94 (2%)	407 (9%)	187 (4%)	557 (12%)	320 (7%)	890 (19%)	60
Micklegate	5,784	1,441 (25%)	398 (7%)	978 (17%)	589 (10%)	1,295 (22%)	811 (14%)	1,278 (22%)	54
Osbalwick & Derwent	3,183	454 (14%)	148 (5%)	296 (9%)	137 (4%)	465 (15%)	239 (8%)	521 (16%)	58
Rawcliffe & Clifton Without	4,841	382 (8%)	87 (2%)	267 (6%)	148 (3%)	469 (10%)	258 (5%)	870 (18%)	62
Rural West York	2,889	422 (15%)	235 (8%)	211 (7%)	90 (3%)	489 (17%)	242 (8%)	409 (14%)	56
Strensall	3,056	298 (10%)	112 (4%)	203 (7%)	90 (3%)	381 (12%)	201 (7%)	490 (16%)	60
Westfield	4,315	570 (13%)	72 (2%)	435 (10%)	223 (5%)	532 (12%)	378 (9%)	1,166 (27%)	61
Wheldrake	1,477	339 (23%)	263 (18%)	98 (7%)	48 (3%)	295 (20%)	141 (10%)	185 (13%)	52

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.



4.3 Information relating to LAHS reporting and EPC ratings

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

The costs to mitigate all category 1 hazards in York are provided in detail in the accompanying Health Impact Assessment (HIA) report. The total mitigation costs for York's private sector stock and split into tenure are shown in **Table 6**.

Table 6: Estimated costs to mitigate all category 1 hazards in private sector stock, split into tenure

HHSRS cat 1 hazards	Total private stock (£)	Owner occupied (£)	Private rented (£)
	24,199,400	15,815,229	8,384,171

4.3.2 Houses in Multiple Occupation (HMOs) in the York private sector stock

The Housing Act 2004 introduced a new set of definitions for HMOs in England from 6 April 2006³⁶. The definition is a complex one and the bullet points below, which are adapted from web pages provided by the National HMO Network³⁷, 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

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 SimpleCO₂ model. The criteria include privately rented dwellings with 2 or more bedrooms occupied by mixed home sharers, mixed occupancy dwellings or classified as students and other transient singles in multi-let houses. In the event that a

³⁶ See Sections 254-258 of the Housing Act (<http://www.legislation.gov.uk/ukpga/2004/34/contents>)

³⁷ National HMO Network <http://www.nationalhmonetwork.com/definition.php>

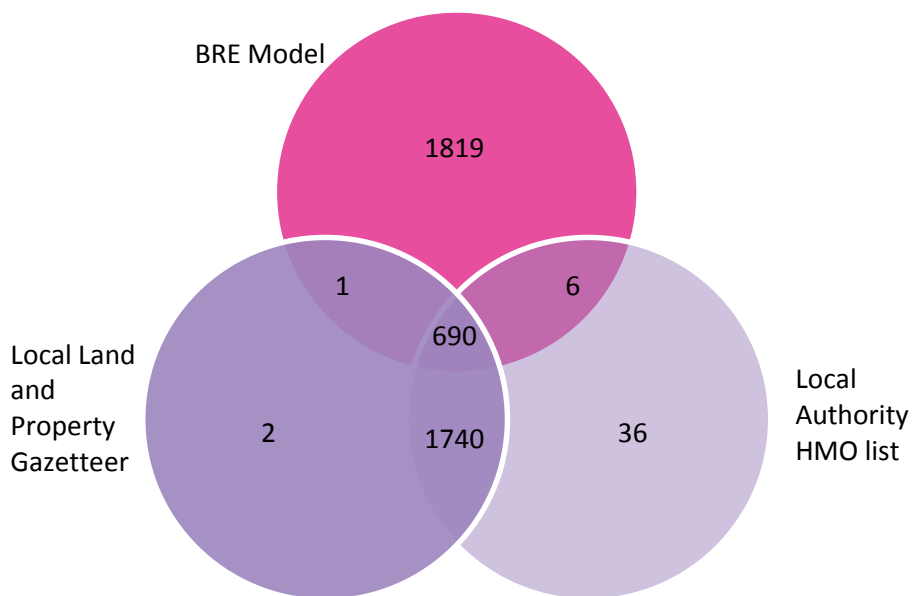


household is classified as students or other transient singles, but the tenure is owner occupied or social rented, the tenure will be considered to be private rented for the purposes of determining HMO status.

- Number of mandatory licensing scheme HMOs
 - This has been modelled using the above criteria for HMOs plus the dwelling must be occupied by 5 or more persons and have 3 or more storeys.

Due to this project involving the production of an Integrated Database, the HMO data provided by York City Council has been incorporated into this work. As BRE relies on the analysis of social data sets at dwelling level to estimate whether individual dwellings are HMOs, there will inevitably be differences at this household level when compared to known HMOs as identified by the local authority. This is mainly due to the accuracy of the social data where changes of householders and tenure occur frequently. However, it is a useful means to estimate total numbers of HMOs. **Figure 10** shows the estimates produced from each method at dwelling level. There is an overlap of 690 dwellings where all three sources identify the same property address as being an HMO.

Figure 10: Numbers of HMOs determined from different data sources



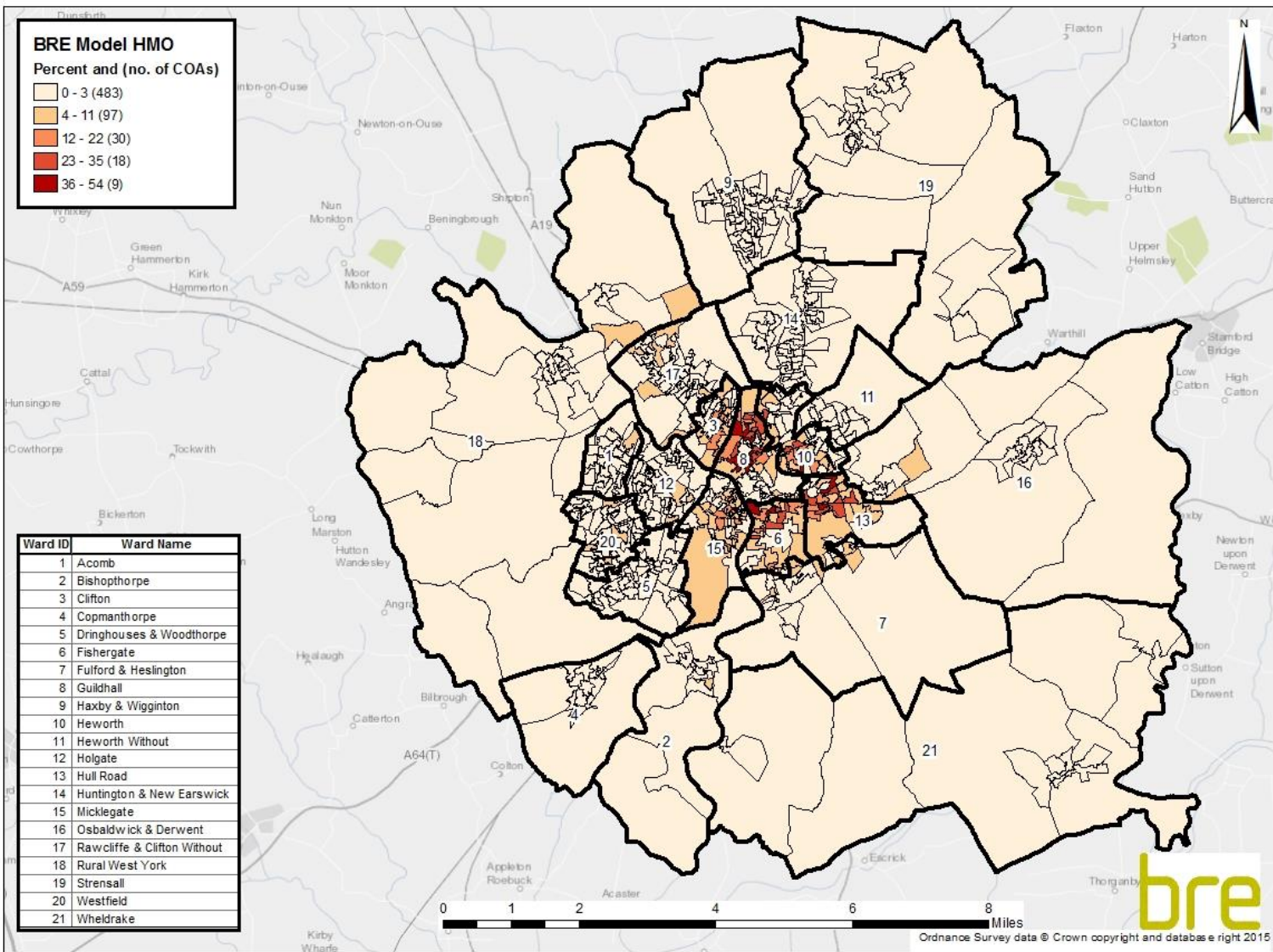
The number of HMOs estimated to be in each ward is provided in **Table 7**. This shows the estimates from both the BRE Model and the data provided by the council. The totals at the bottom of the table therefore include the overlap as shown in the Venn diagram in **Figure 10**. It is clear that whilst there are some difference in overall numbers, both the model and the council data show that the wards of Fishergate and Hull Road have the highest proportions of HMOs.

**Table 7:** Summary of HMOs from BRE model and LA data provided by York City Council, by ward

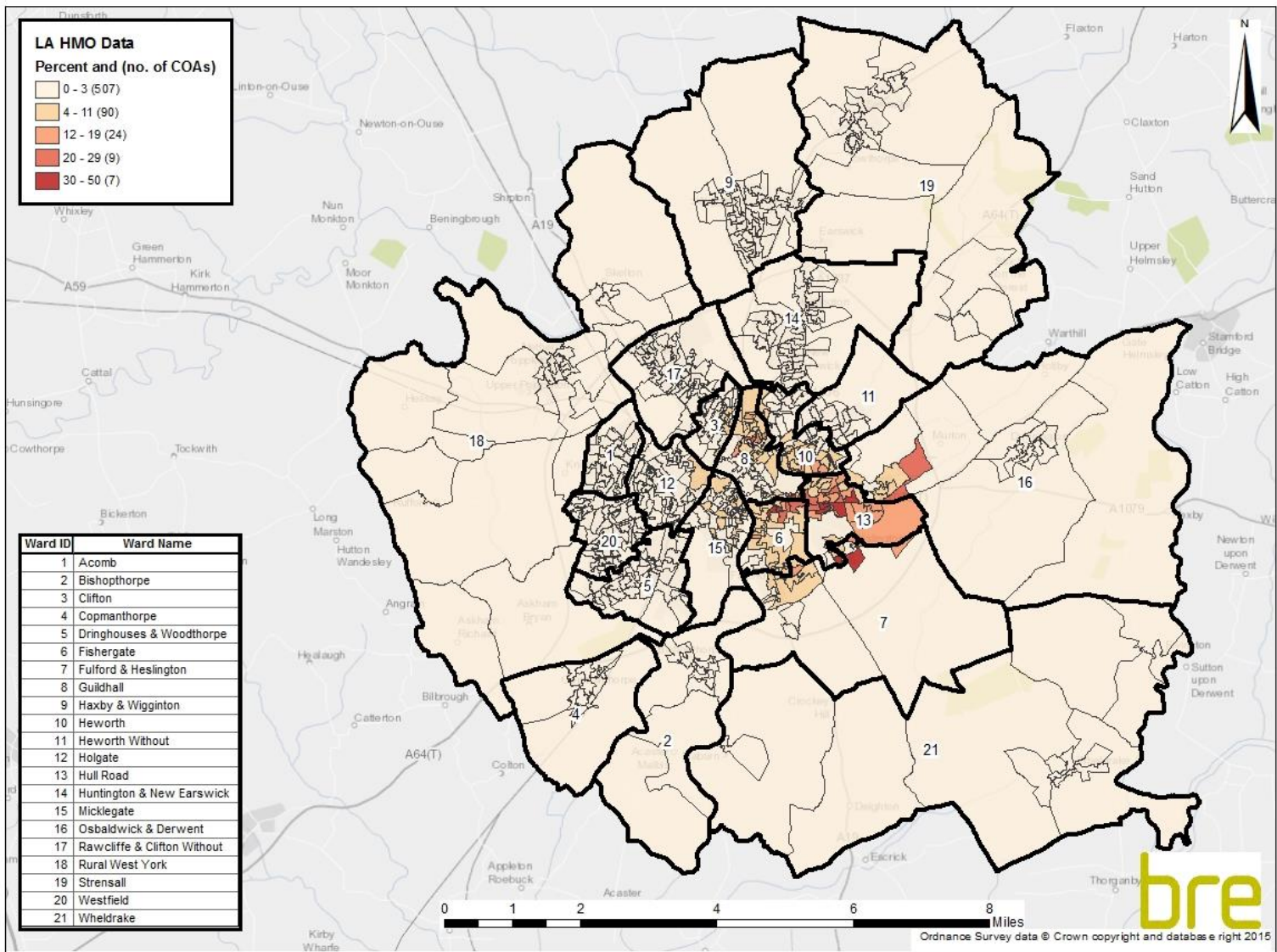
Ward	Dwellings	No. of HMOs		% HMOs	
		BRE Model	LA Data	BRE Model	LA Data
Acomb	3,815	29	11	1%	0%
Bishopthorpe	1,829	14	3	1%	0%
Clifton	4,431	186	125	4%	3%
Copmanthorpe	1,743	1	0	0%	0%
Dringhouses & Woodthorpe	5,257	30	12	1%	0%
Fishergate	3,875	376	437	10%	11%
Fulford & Heslington	1,594	35	63	2%	4%
Guildhall	6,910	620	469	9%	7%
Haxby & Wigginton	5,349	9	4	0%	0%
Heworth	5,912	279	255	5%	4%
Heworth Without	1,887	6	4	0%	0%
Holgate	5,916	51	58	1%	1%
Hull Road	3,607	362	694	10%	19%
Huntington & New Earswick	5,734	31	13	1%	0%
Micklegate	6,654	298	173	4%	3%
Osbalwick & Derwent	3,445	39	95	1%	3%
Rawcliffe & Clifton Without	5,235	51	10	1%	0%
Rural West York	3,115	17	5	1%	0%
Strensall	3,277	12	4	0%	0%
Westfield	6,370	63	33	1%	1%
Wheldrake	1,552	7	4	0%	0%
Total	87,507	2,516	2,472	3%	3%

Map 12 shows the geographic distribution of the BRE modelled HMOs, and **Map 13** shows the distribution of the HMOs provided by York City Council. These maps show that the high concentrations of HMOs are in the same areas (i.e. the urban area of York) regardless of the data sources and therefore provide information on which areas could be focussed on. **Map D. 9** and **Map D. 10** zoom in on the urban area of York for BRE modelled HMOs and HMO data provided by the council respectively. Both show that there are high concentrations in the Fishergate and Hull Road wards.

Map 12: Percentage of HMOs based on BRE modelled data



Map 13: Percentage of HMOs based on data provided by York City Council





4.3.3 EPC ratings in the York private sector stock

EPC ratings are based on a banding system of A – G, where A is the best performing and G is the worst. Each band has a corresponding range of SAP ratings associated with it so that a dwelling with a SAP rating of 69 would fall into EPC band C. **Figure 11** shows the bands A – G and corresponding SAP ratings in brackets. The columns show the number and percentage of York’s private sector stock falling into each of the EPC ratings bands.

The estimated average SimpleSAP for the private sector stock in York is 59 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 4,845 (6.5%).

Figure 11: Number and percentage of York’s *private sector stock* falling into each of the EPC ratings bands (based on SimpleSAP)

	Count	Percent
(92-100) A	0	0.0%
(81-91) B	207	0.3%
(69-80) C	13,561	18.1%
(55-68) D	37,314	49.8%
(39-54) E	18,978	25.3%
(21-38) F	3,585	4.8%
(1-20) G	1,260	1.7%

Under the Energy Act 2011, new rules mean that from 2018 landlords must ensure that their properties meet a minimum energy efficiency standard. Subject to Parliamentary approval, this minimum standard has been set at band E by 1 April 2018^{38, 39}.

Figure 12 overleaf shows the breakdown of SimpleSAP results into the A – G bands for the private rented stock only. The number of private rented dwellings in York with a rating below band E (i.e. bands F and G), is estimated to be 1,588 (10.0%). The distribution of *private rented* dwellings with EPC ratings below band E is shown in **Map 14** and a map zooming in on the urban area of York is provided in **Map D. 11**. These are for the private rented stock only, since this is affected by the new rules on minimum standards. Under proposed legislation these properties would not be eligible to be rented out after 2018.

³⁸ <https://www.gov.uk/government/consultations/private-rented-sector-energy-efficiency-regulations-domestic>

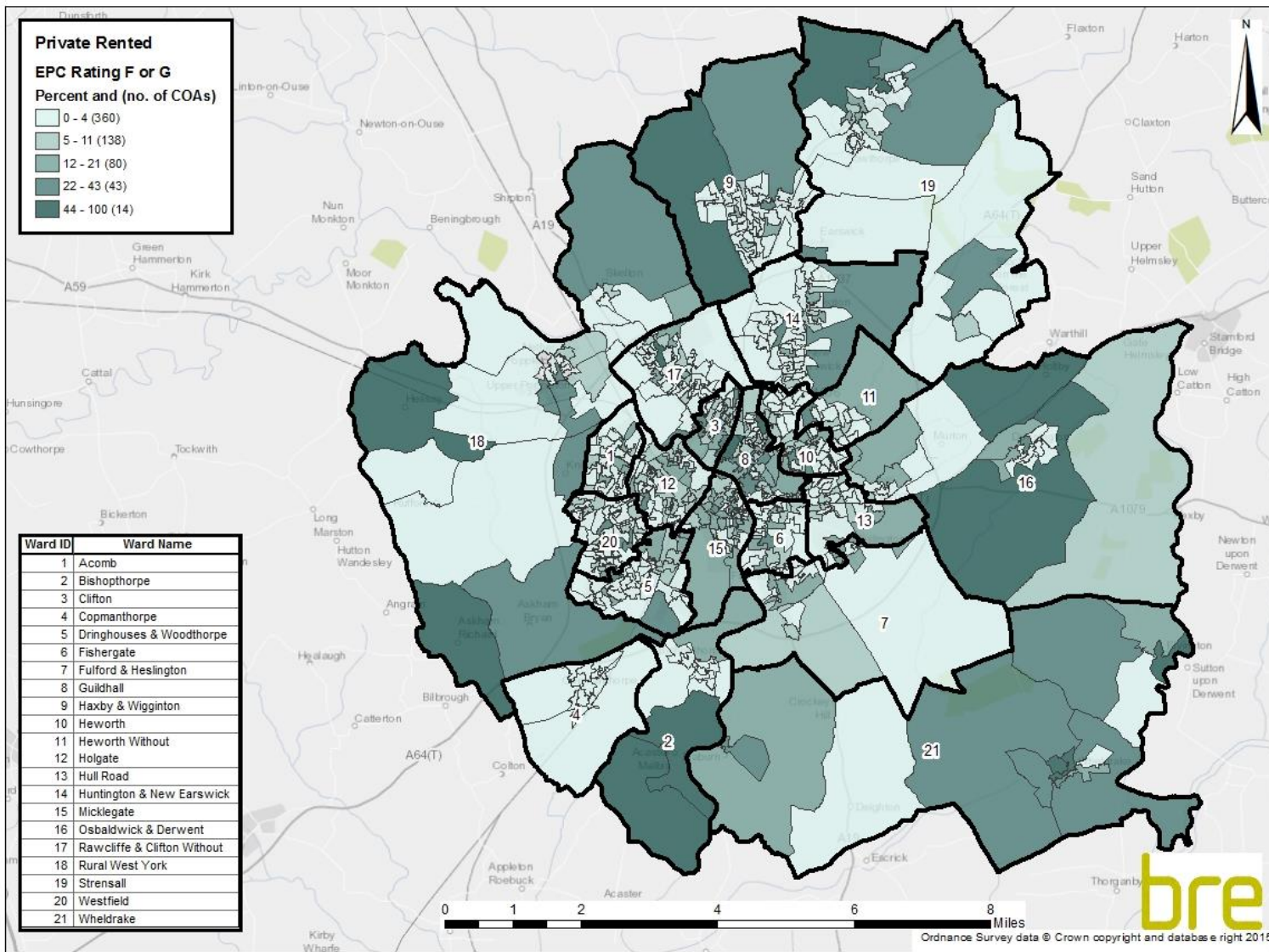
³⁹ Although landlords will still be able to rent out F and G rated properties after this date they will not be able to renew or sign a new contract.



Figure 12: Number and percentage of York's *private rented stock* falling into each of the EPC ratings bands (based on SimpleSAP)

	Count	Percent
(92-100) A	0	0.0%
(81-91) B	87	0.5%
(69-80) C	2,912	18.3%
(55-68) D	6,259	39.3%
(39-54) E	5,060	31.8%
(21-38) F	1,120	7.0%
(1-20) G	468	2.9%

Map 14: Distribution of dwellings with F or G EPC ratings in the private rented stock





4.4 Basic energy efficiency variables for York

Section 2.5 provides an overview of the Green Deal and ECO policies – it should be noted that whilst funding for the Green Deal and the Home Improvement Fund has recently been withdrawn⁴⁰, the ECO will continue to run until March 2017. Two of the main energy efficiency improvements that fall under these policies are insulation of cavity walls and lofts. An understanding of the numbers and geographical distribution of dwellings which would be suitable for such improvements is a useful step in targeting resources in York. The BRE Models have been used to determine the following variables for York:

- Wall type and presence of cavity wall insulation
 - Solid wall
 - Insulated cavity wall
 - Un-insulated cavity wall
- Presence and level of loft insulation
 - No loft
 - Loft with no insulation
 - Level of loft insulation – 50, 100, 150, 200, 250+ mm loft insulation

Table 8 shows the modelled results in terms of the numbers and percentages of dwellings in York's private sector stock (ward level data can be obtained from the database supplied alongside this report). It also shows the percentage figures for the Yorkshire and The Humber region and for England overall to enable comparison. The results indicate that a proportion of the private sector stock in York could benefit from energy efficiency improvements with an estimated 22,608 dwellings (30%) having un-insulated cavity walls. Furthermore, there are an estimated 10,037 dwellings (13% of York's private sector stock) which have less than 100mm of loft insulation with 3,283 (4%) having no loft insulation at all. In York, it is estimated that 82% of the housing stock have cavity walls – this is higher than both the regional and national figures and it is also estimated that a greater proportion of these have been insulated in York. However, there are still opportunities for implementing the ECO in dwellings without cavity wall insulation which still represent almost a third of the housing stock. The distribution of these dwellings is shown in **Map 15** to **Map 17** with maps zooming in on the urban area of York provided in **Appendix D**.

Map 15 shows that the prevalence of un-insulated cavities is scattered throughout the district. **Map D. 12** shows the COAs with the highest levels in the urban area of York. Whilst the Guildhall and Micklegate wards have dwellings with some of the lowest levels of un-insulated cavity walls, this is predominantly due to the fact that these areas mainly consist of solid walls (see **Map D. 13**).

Map 16 shows that there are pockets of areas with solid walls distributed throughout the county; however, most of these are concentrated in the urban area of York. **Map D. 13** zooms in on this area and indicates that there tends to be a higher prevalence of solid walls in Guildhall and Micklegate, to the north west of Fishergate, south and east of Clifton and central parts of Holgate.

⁴⁰ Funding has been withdrawn as of 23 July 2015; however, there will be no impact on existing Green Deal Finance Plans or Green Deal Home Improvement Funds -<https://www.gov.uk/government/news/green-deal-finance-company-funding-to-end>



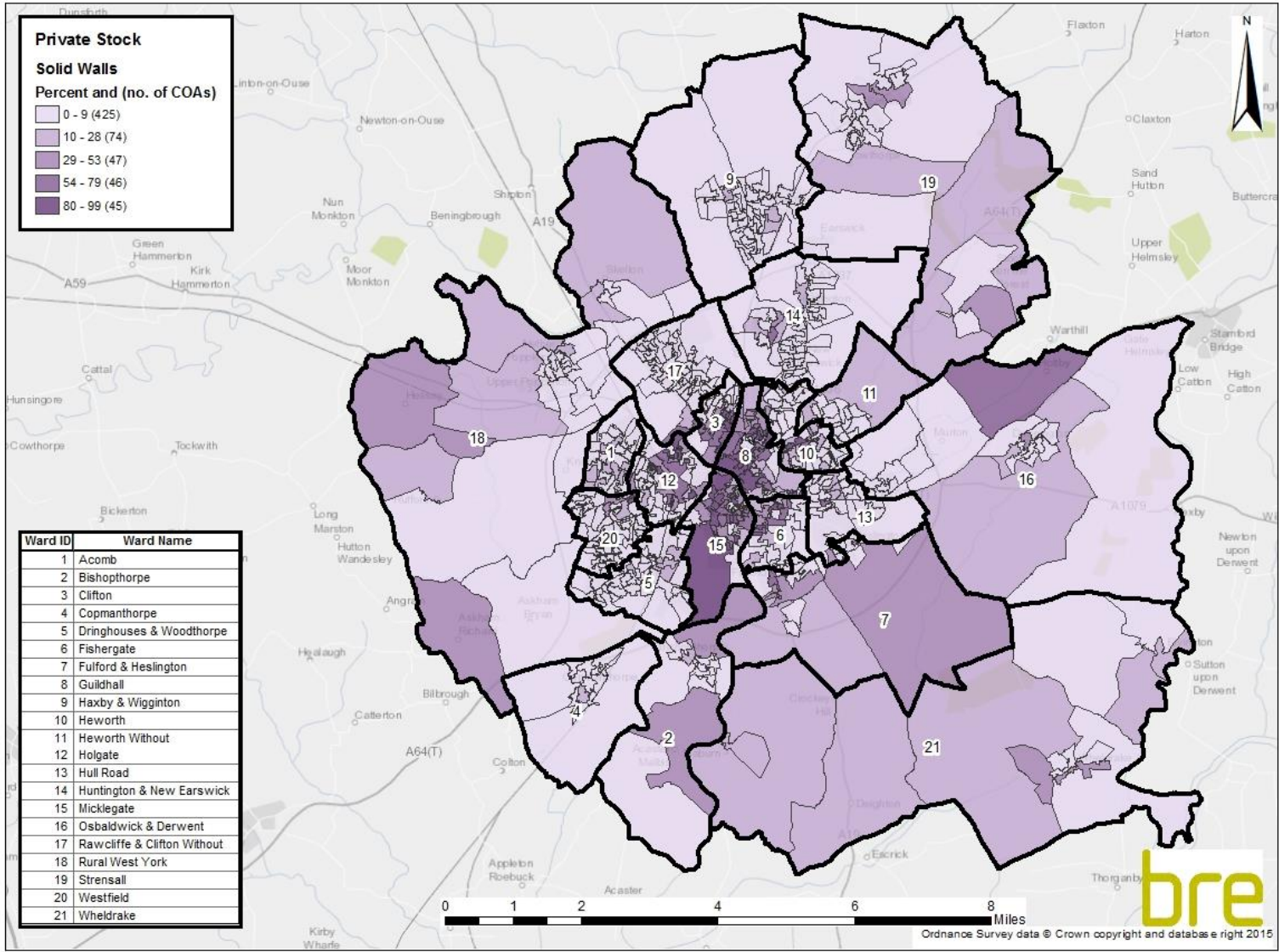
Map 17 shows that areas with lower levels of loft insulation (100mm or less) are again mainly concentrated in the urban area of York. **Map D. 14** shows this in more detail and indicates that the lowest levels of loft insulation are scattered across this area.

Table 8: Estimates of the numbers and percentage of dwellings for each of the energy efficiency variables assessed for the private sector stock in York and compared to the Yorkshire and The Humber region and national figure (EHS 2011)

Variable		Private stock		2011 EHS Regional (private stock)	2011 EHS England (private stock)
		No.	%	%	%
No. of private sector dwellings		74,905	-		-
Wall type	Solid	13,839	18%	31%	33%
	Insulated cavity	38,458	51%	38%	32%
	Un-insulated cavity	22,608	30%	30%	35%
Level of loft insulation	No loft	4,954	7%	4%	8%
	No insulation	3,283	4%	5%	3%
	50mm	6,754	9%	3%	11%
	100mm	21,041	28%	17%	37%
	150mm	12,404	17%	25%	17%
	200mm	11,331	15%	12%	13%
	250+mm	15,138	20%	34%	11%

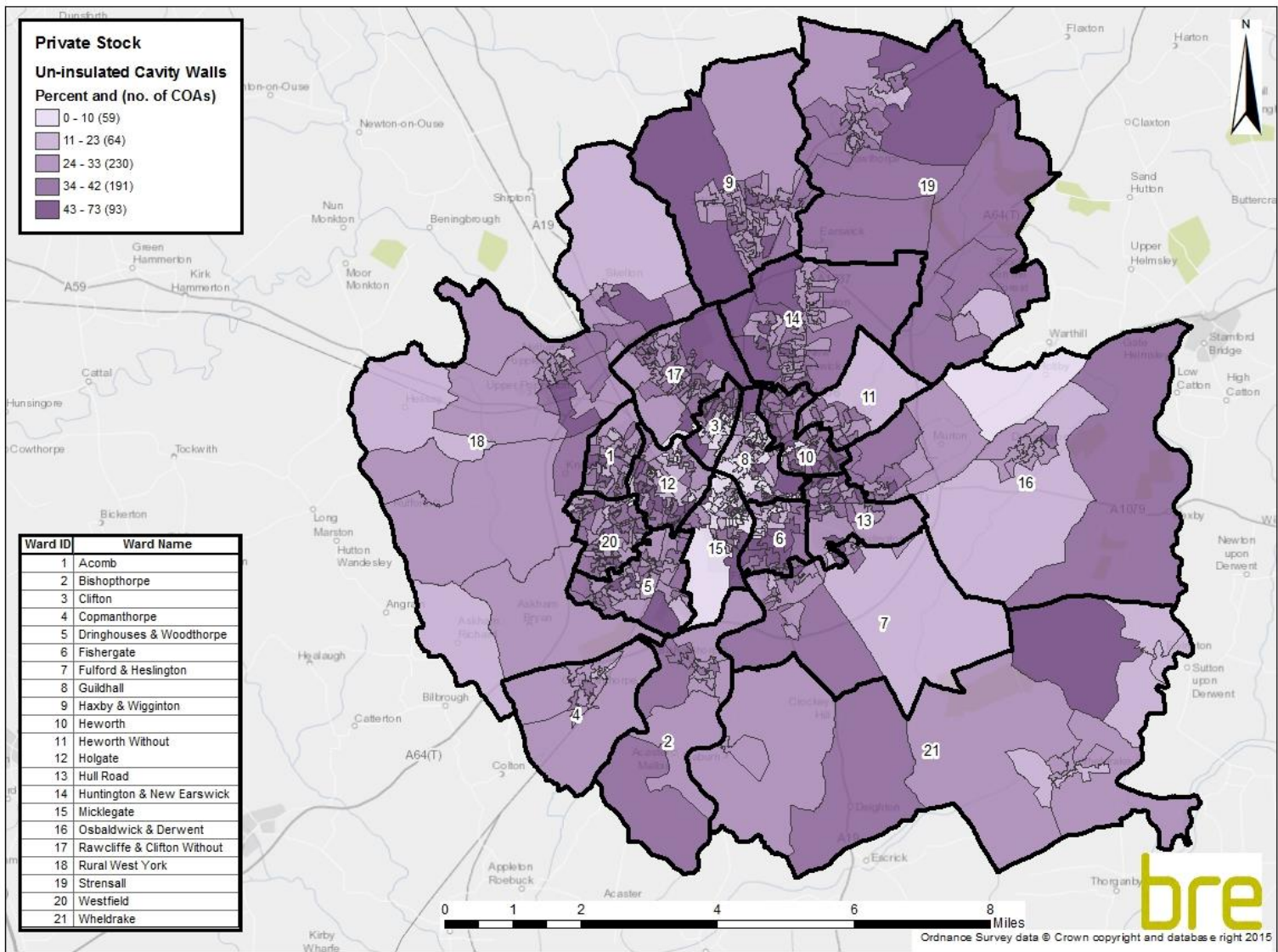


Map 15: Energy efficiency variables - percentage of private sector dwellings in York with un-insulated cavity walls



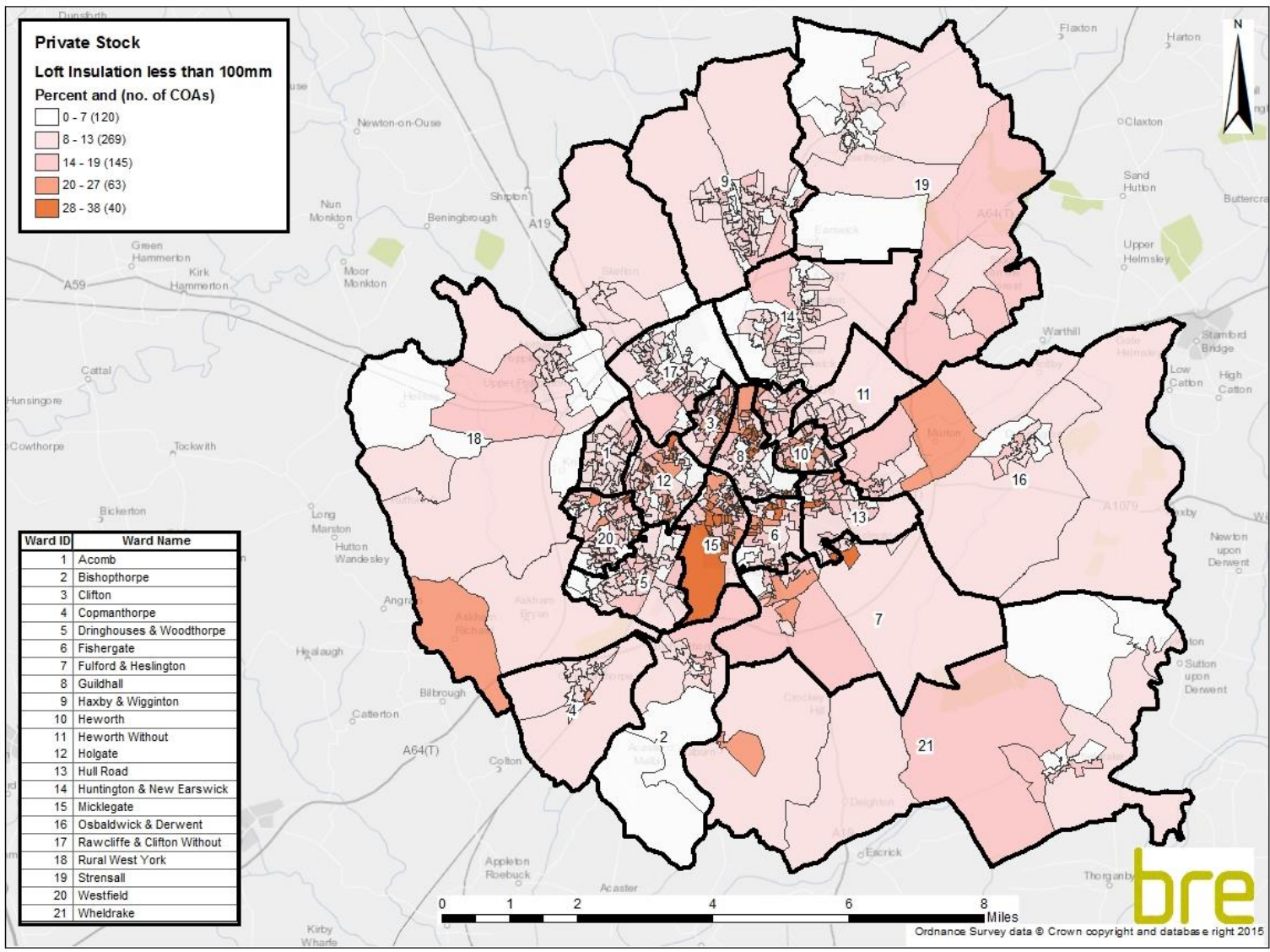


Map 16: Energy efficiency variables - percentage of private sector dwellings in York with solid walls





Map 17: Energy efficiency variables – percentage of private sector dwellings in York with less than 100mm or no loft insulation





4.5 Energy efficiency variables for York

In addition to the energy efficiency key indicators, the “energy outputs” part of the housing stock modelling approach (see **Figure 1**) provides the database with estimates of a number of other energy efficiency variables. These variables are: SimpleSAP, notional SimpleCO₂, notional energy demand and cost, notional heat demand and cost. **Table 9** shows the energy efficiency variables in terms of the average figure per dwelling in York, split by tenure. It is clear that the owner occupied stock has the highest average figures for all the variables which may, in part, be due to owner occupied dwellings being larger than those in the other tenures. Such information provides a useful picture of the local housing stock and can also be useful in planning infrastructure projects such as district heating schemes, or for projects seeking to lever in ECO funding.

Table 9: Modelled data for average energy efficiency variables per dwelling by tenure in York

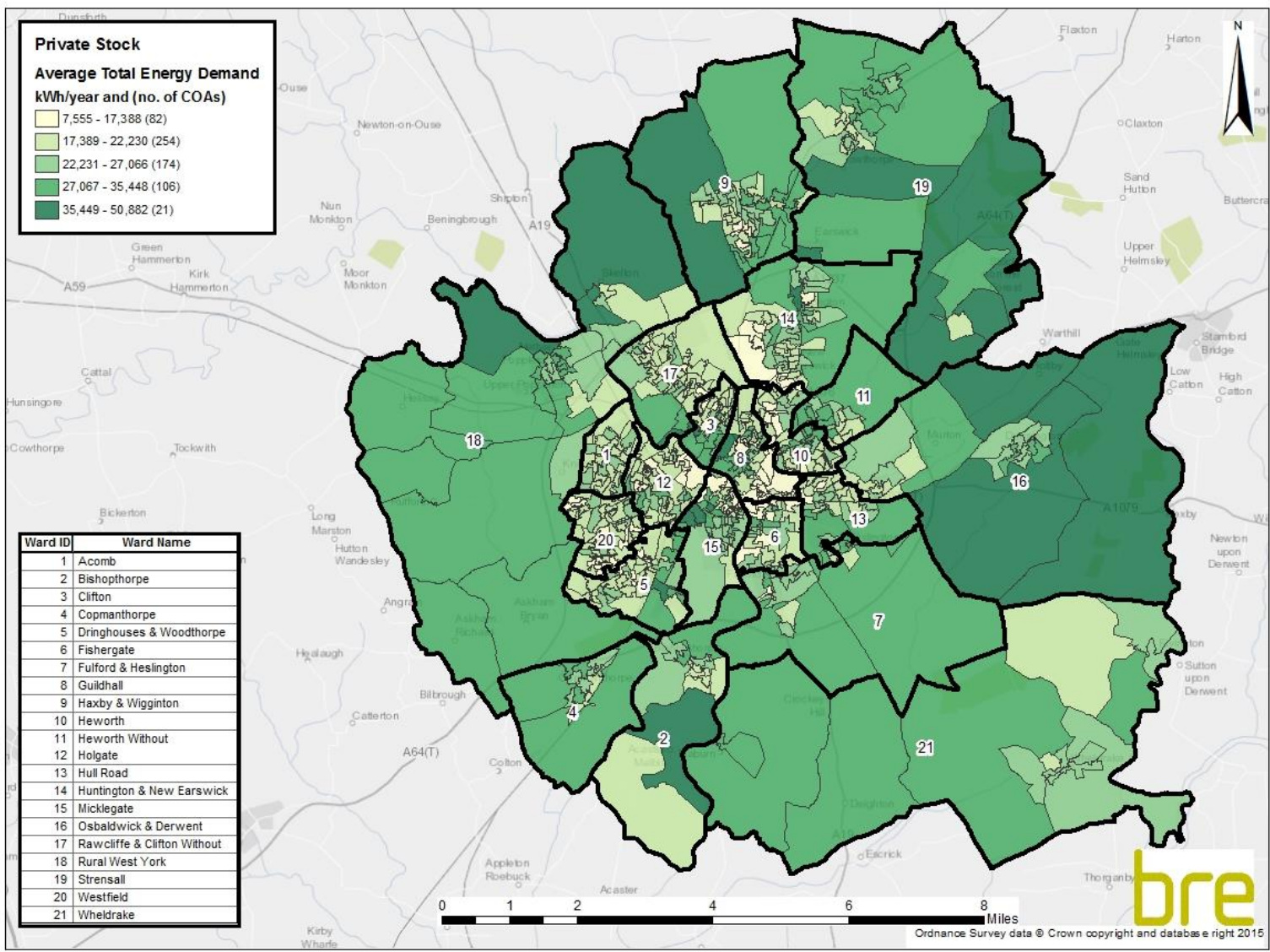
Energy efficiency variable	Tenure		
	Owner occupied	Private rented	Social
No. of dwellings	58,999	15,906	12,602
SimpleSAP	59	56	65
SimpleCO ₂ (t/yr)	5.40	5.21	3.87
Energy demand (kWh/yr)	23,612	21,231	16,080
Energy cost (£/yr)	1,324	1,247	932
Heat demand (kWh/yr)	12,231	11,143	8,018
Heat cost (£/yr)	823	781	511

Map 18 and **Map 19** show the average total energy demand and the average total energy cost per year for York. Both maps show similar patterns since higher energy demand is generally likely to result in higher energy costs. In general energy demand and cost seems to be higher in rural areas which is most likely a result of there being larger detached houses in these areas. **Map D. 15** and **Map D. 16** focus in on the urban area of York.

Map 20 and **Map 21** show the average total heat demand and the average total heating cost per year for York. These show a similar pattern to the energy demand and energy cost maps. **Map D. 17** and **Map D. 18** focus in on the urban area of York.

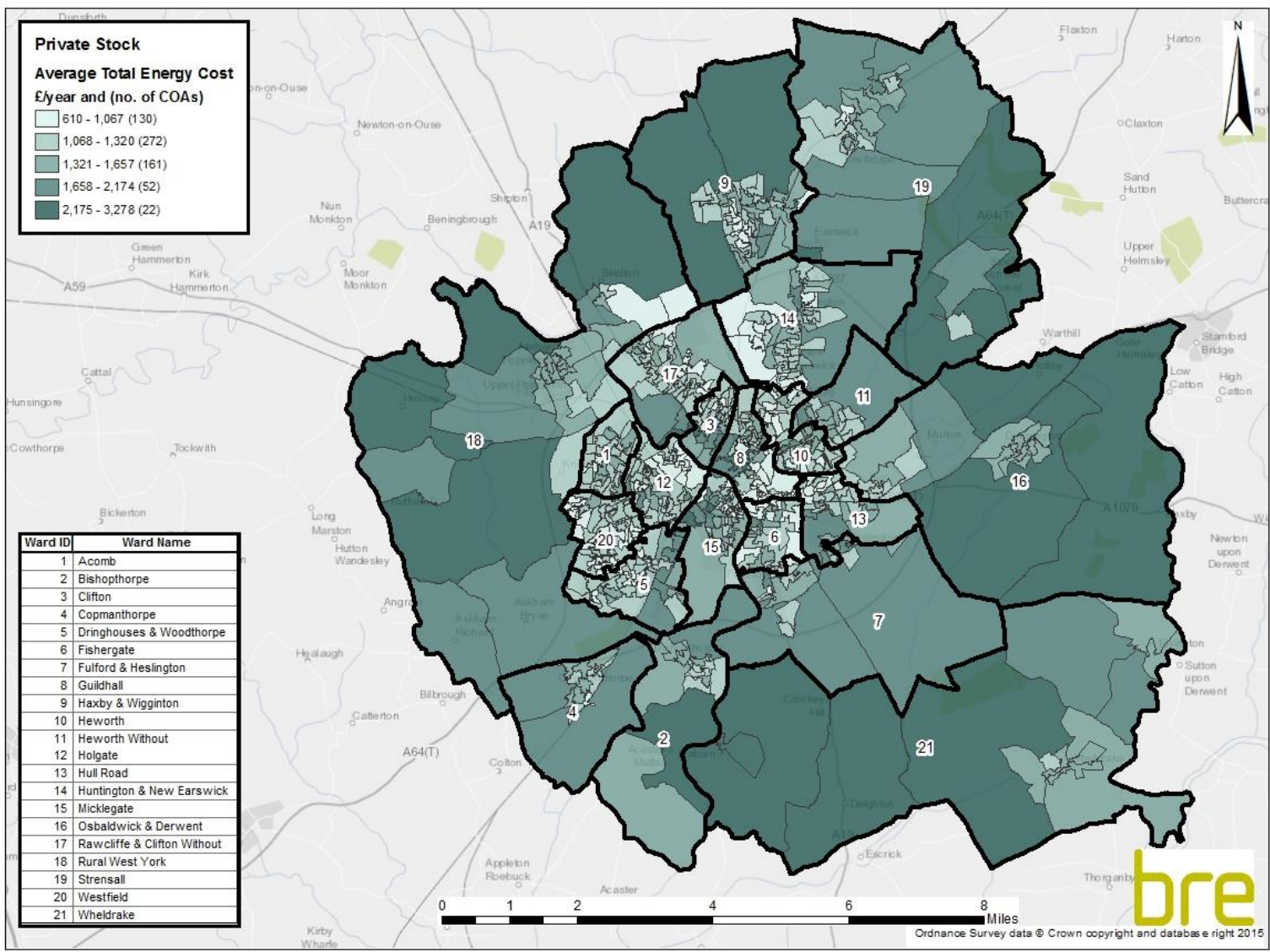


Map 18: Average total energy demand (kWh/year) – private sector stock



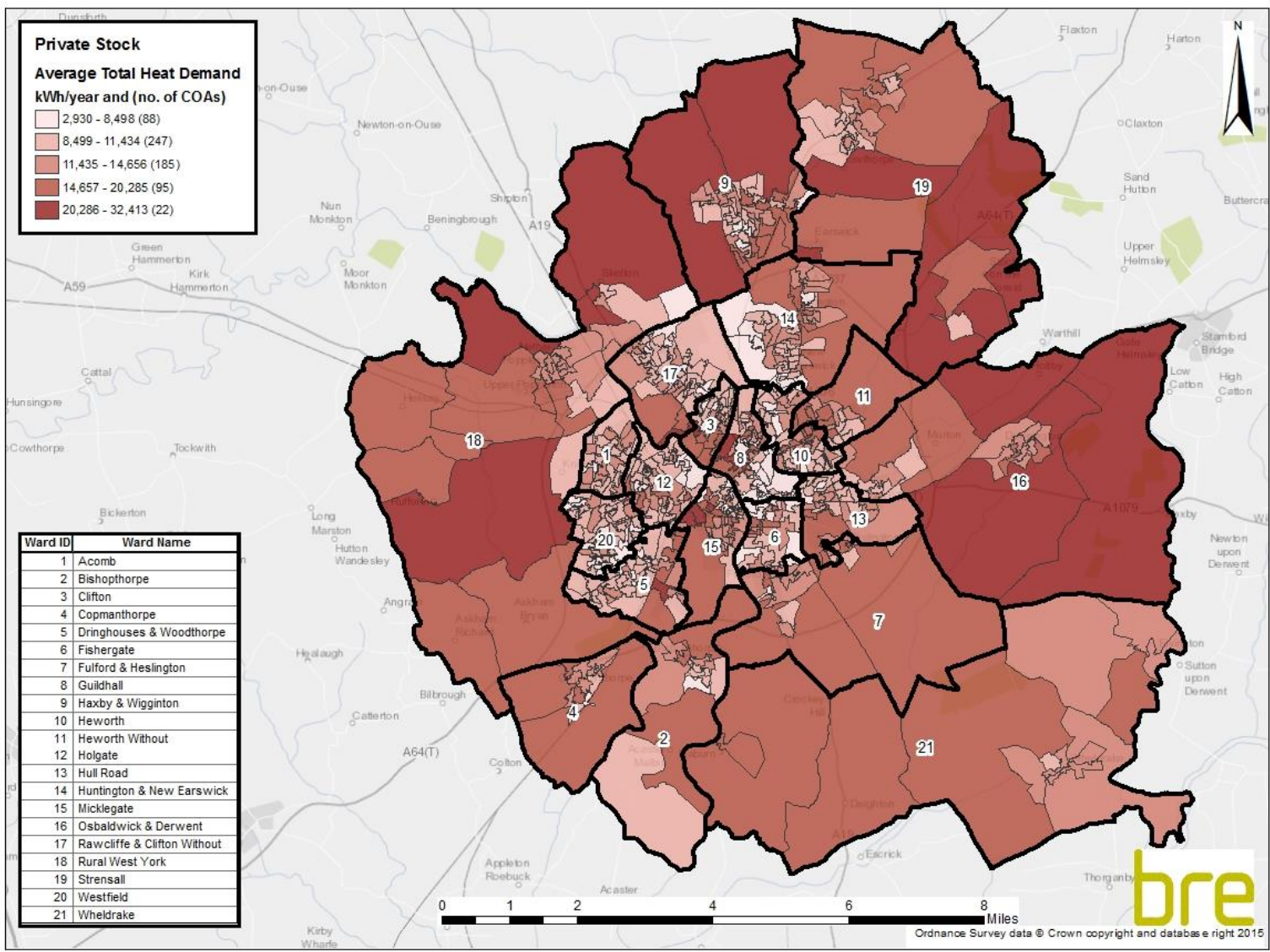


Map 19: Average total energy cost (£/year) – private sector stock



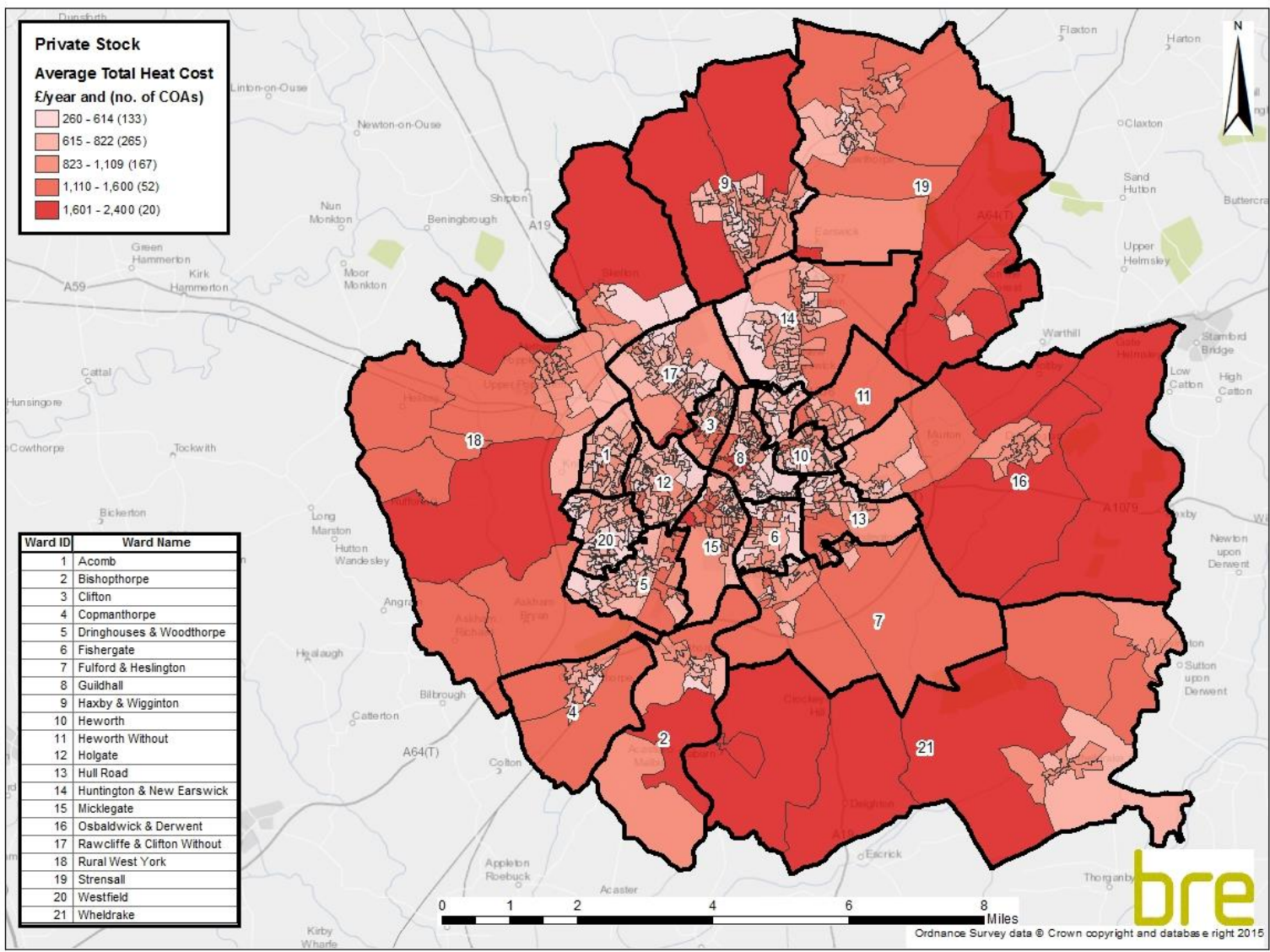


Map 20: Average total heat demand (kWh/year) – private sector stock





Map 21: Average total heat cost (£/year) – private sector stock





4.6 Improvement Scenarios – potential savings in York

For strategic planning purposes it is helpful for local authorities to have some idea as to what energy efficiency improvements could be made to the local housing stock, what the impact of those improvements would be, and what they would cost. A total of eight improvement scenarios - examining the possibilities of improving the energy efficiency of the stock - have been produced. The improvement scenarios use various combinations of the following measures:

- Low cost measures (LCM)
- Double glazing (DG)
- Solid wall insulation (SW)
- Heating (H)
- Solar hot water (SHW)
- Photovoltaics (PV)

Eight scenarios were constructed which use various combinations of these measures and have been selected by BRE as representative of likely packages of work undertaken to improve a property. The eight scenarios are as follows:

- Scenario 1: Low cost measures
- Scenario 2: Low cost measures + double glazing
- Scenario 3: low cost measures + double glazing + solid wall insulation
- Scenario 4: Low cost measures + heating
- Scenario 5: Low cost measures + heating + double glazing
- Scenario 6: Low cost measures + heating + double glazing + solid wall insulation
- Scenario 7: Low cost measures + heating + double glazing + solid wall insulation + solar hot water
- Scenario 8: Photovoltaics

The details of the individual measures are as follows:

Low cost measures:

- Where the dwelling has a loft but there is less than 200mm of loft insulation, add loft insulation to bring the level to 250mm
- Where the dwelling has un-insulated cavity walls, insulate them
- Where the dwelling has an un-insulated hot water cylinder, insulate it with a foam jacket
- Where the heating system does not have the most effective controls

Double glazing:

The dwelling will be upgraded to have double glazing throughout.

Solid wall insulation:

Where the dwelling has solid walls, these will be insulated with external wall insulation.

Heating:

A heating system deemed to be inefficient will be replaced by a more efficient one where possible. The method for determining which systems should be replaced and what they need to be replaced with is complex, but in summary the following factors are taken into account:

- Whether the dwelling is on the gas network
- The current heating system
- The current fuel
- The size of the dwelling



Solar hot water:

This measure involves installing solar hot water panels to supplement hot water supply. Due to the difficulty in assessing the suitability of each dwelling roof the methodology simply assumes that the dwellings are suitable – therefore, the results reported here will be an over-estimate.

Photovoltaics:

This involves installing 2 5kW photovoltaic panels. As for solar hot water, the methodology assumes all dwellings are suitable, thus resulting in an over-estimate of the savings available.

The savings estimated from each scenario are calculated by comparing them to the baseline situation for each of the energy variables (shown in **Section 4.5 Table 9**) and a revised SAP rating and energy consumption figures are calculated for each scenario.

Table 10 shows the impact of each of the improvement scenarios on the energy variables considered in the stock model and **Figure 13** focusses on the change in energy cost, compared to the baseline, which can be expected from each of the scenarios. It can be seen that scenario 7, which is based on the package of work with low cost measures, heating, double glazing, solid wall insulation and solar hot water, provides a large percentage of savings as follows:

- 33% reduction in average annual heating cost
- 23% reduction in average annual energy cost
- 29% reduction in average annual SimpleCO₂ emissions
- 12 point improvement in average SimpleSAP rating

It is interesting to note, however, that looking at scenario 4, which only involves low cost measures and heating, still offers significant savings of between 10% and 23%.

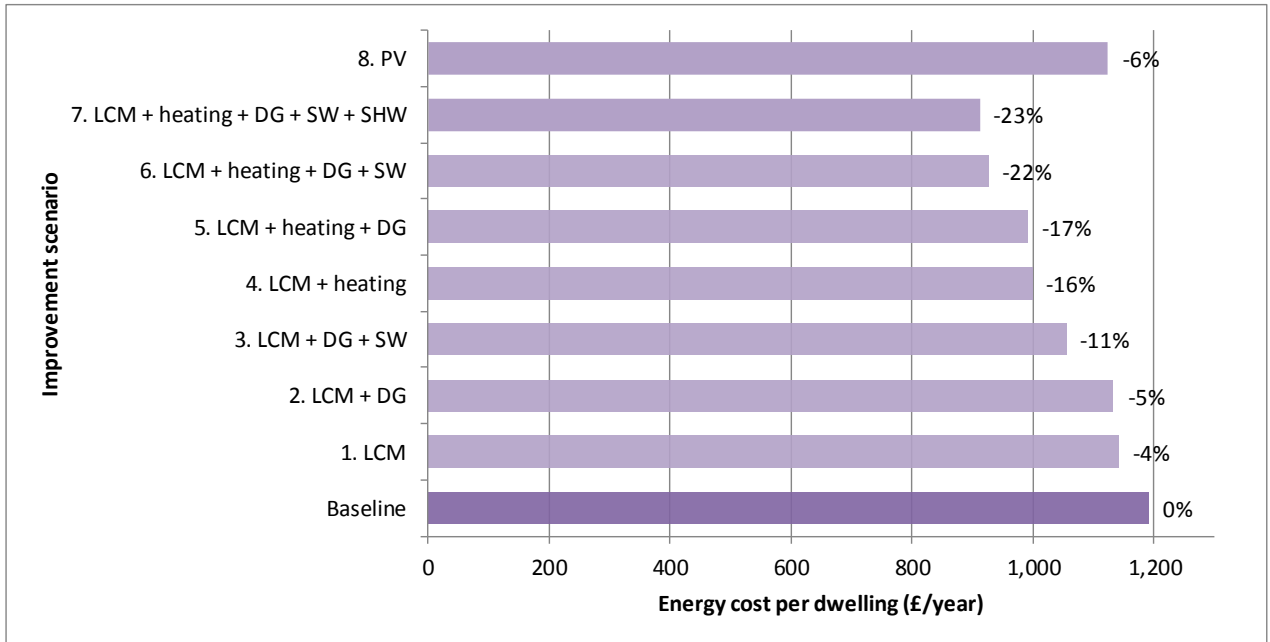
The results provided here are for the total housing stock in York; however, more detailed results can be generated at ward or dwelling level by using the database provided as part of this project.

Table 10: Results of the improvement scenarios analysis – showing the average change in energy output variables compared to the baseline for the total housing stock in York

Scenario	Improvement measure(s)	Average improvement per property compared to baseline					
		Average improvement (SimpleSAP points)	Average improvement (%)				
			SimpleSAP	SimpleCO ₂ (tonnes/year)	Energy demand (kWh/year)	Energy cost (£/year)	Heat demand (kWh/year)
-	(Baseline)	59	5.15	20,167	1,192	10,740	725
1	LCM	+4	-10%	-2%	-4%	-9%	-9%
2	LCM + DG	+4	-11%	-3%	-5%	-10%	-10%
3	LCM + DG + SW	+7	-18%	-11%	-11%	-21%	-21%
4	LCM + heating	+9	-21%	-15%	-16%	-10%	-23%
5	LCM + heating + DG	+9	-21%	-15%	-17%	-11%	-24%
6	LCM + heating + DG + SW	+11	-27%	-22%	-22%	-22%	-33%
7	LCM + heating + DG + SW + SHW	+12	-29%	-24%	-23%	-22%	-33%
8	PV	+7	-10%	5%	-6%	7%	7%



Figure 13: Change in energy cost by scenario, including percentage change compared to the baseline





5 Conclusion and recommendations

5.1 Conclusion

The City of York Council commissioned BRE to undertake a series of modelling exercises on their housing stock to provide an integrated housing stock database, making use of available local data sources (EPC, LLPG) which have been integrated into BRE's standard housing stock database. The integration of these data sources serves to further increase the accuracy of the models by removing the need to rely on imputed data for the 23,853 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 27% of the stock in York. In addition, the integrated stock model also incorporates data on Houses in Multiple Occupation (HMOs).

This report describes the modelling work and provides details of the results obtained from the dwelling level model and database. The database is also provided to the council to enable them to obtain specific information whenever required.

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 York 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
- The basic energy efficiency variables for the private sector stock (wall and loft insulation)
- Energy planning variables
- Potential energy/carbon savings from improvement scenarios

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

- Levels of most of the key indicators are lower in York than in England or the Yorkshire and The Humber region
- The private rented sector is considerably worse than other tenures across all the key indicators including SimpleSAP
- 10% of dwellings in the private rented sector are estimated to have an EPC below band E. Under proposed legislation these properties would not be eligible to be rented out after 2018.

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 York 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 DCLG's Housing Strategy Policy and ECO.

A list of 2,874 potential HMOs was provided of which some were duplicates and a small number could not be matched, leaving 2,475 records. Using a revised set of data as discussed and requested by York Council, the BRE HMO Model estimates just over 2,500 HMOs in York.



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 Guildhall with an estimated 10% of homes in disrepair and 25% of homes containing category 1 hazards (private sector stock). 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 Guildhall and Heworth (both 26%).

The use of additional local data in this project has enhanced the housing stock models and database. 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:

- **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 York, could be used to further enhance the energy models (SimpleSAP, excess cold, fuel poverty).

Further assistance can be provided in the form of a Healthy Homes Advisory Service. This involves assisting the local authority in using the data from stock modelling and the health impact assessment to proactively assist vulnerable residents living in the poorest quality housing in the local authority area. The toolkit will allow York to target the poorest quality housing and maximise the joint working opportunities with health and community groups in the area.



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 31.5 (SAP 2005 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 2005.

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 averaged over the previous 3 years across all regions in the UK. 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°C for the main living area, and 18°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:

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

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 Benefit (CTB)).



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) framework⁴¹. 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 £15,050.

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

⁴¹ <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 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 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). 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:

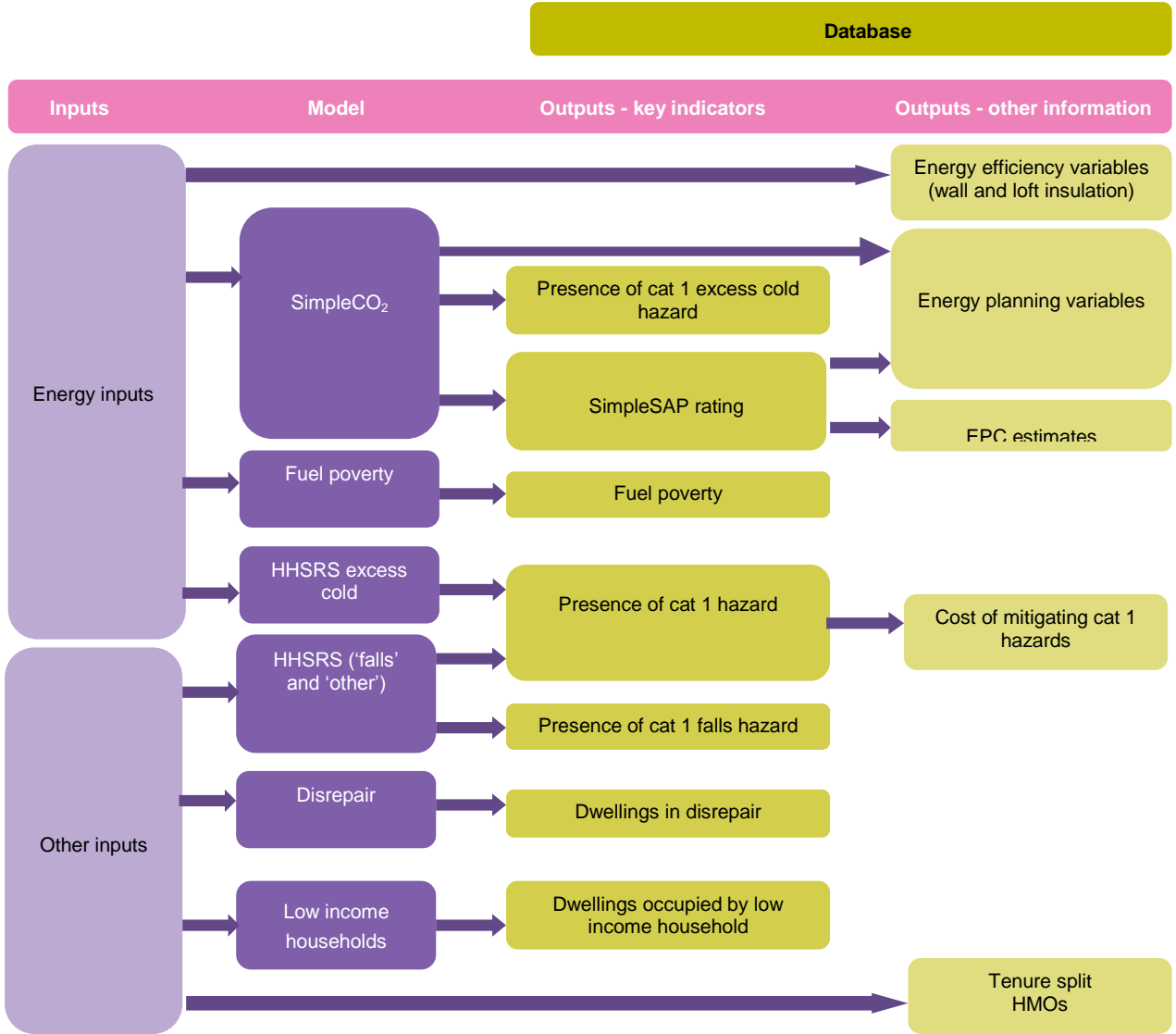
- SimpleCO₂ Model
- Fuel Poverty Model
- HHSRS (all hazards, falls hazards and excess cold) Models
- Disrepair Model
- Low Income Households Model

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 SimpleCO₂ 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 SimpleCO₂ Model

BRE have developed a variant of the BREDEM⁴² software, named “SimpleCO₂”, 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:

- Dwelling type
- Dwelling age
- Number of bedrooms
- Heating fuel
- Heating system
- Tenure

The Experian UK Consumer Dynamics Database is used as a source of these variables and they are converted into a suitable format for the SimpleCO₂ software. However, these variables alone are insufficient for the software to calculate the “SimpleSAP” rating or carbon emissions estimate (one of the outputs of the SimpleCO₂ Model). Additional variables are required and as these values cannot be precisely inferred then 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 as the Experian 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.

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.

⁴² 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.



The “SimpleCO₂” 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, York identified a number of sources of data which were used to update the BRE dwelling level models to provide an integrated database. Their data sources were:

- The Local Land and Property Gazetteer (LLPG)
- Energy Performance Certificates (EPCs)
- Houses in Multiple Occupation (HMOs)



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 York 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
LLPG	93,943	87,417 (93%)	Original number of records greater than Experian records, the 93% is what was matched against the 84,054 dwellings Experian has for the local authority
EPC data	30,472	23,853 (78%)	Several duplicate cases, where the same property has had multiple EPC surveys.
HMOs	2,874	2,475 (86%)	Duplicates removed and small number of records not matched

The database 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 SimpleCO₂ 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 SimpleCO₂ inputs and/or stock model outputs.

LLPG

The LLPG has been used to form the backbone of the database and the UPRN field should allow the council to merge any additional data they require into the BRE stock model database.

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 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.

HMO data

The HMO dataset has been used to update the modelled HMO and licensable HMO lists. Where a dwelling was included on the HMO list it has been identified as a HMO. Where a dwelling had been marked as a “student household” it was also added to the licensable HMO list.

B.4 OS MasterMap information

The OS data has been used to update a number of the SimpleCO₂ 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.



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

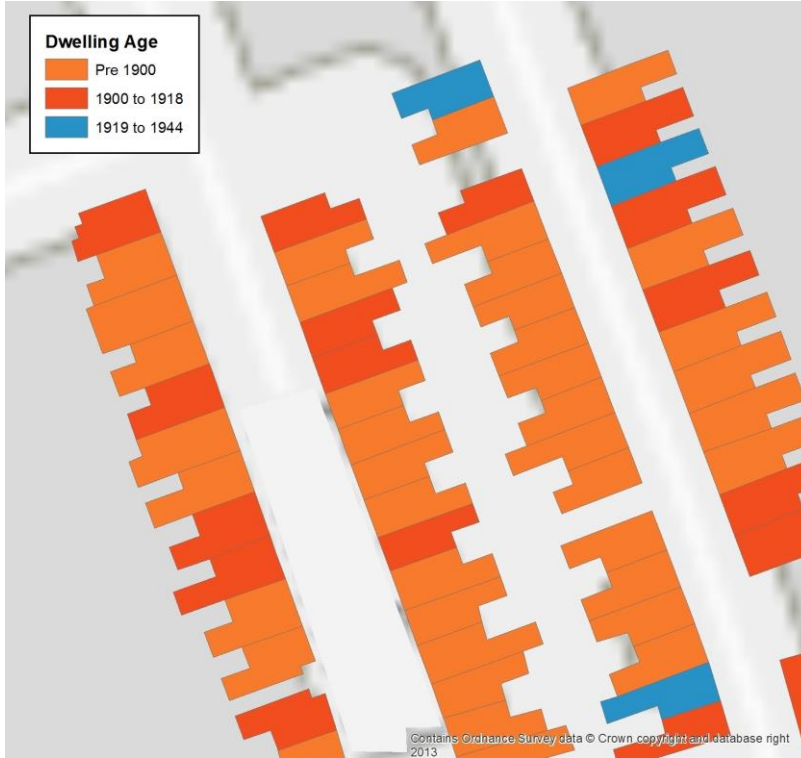
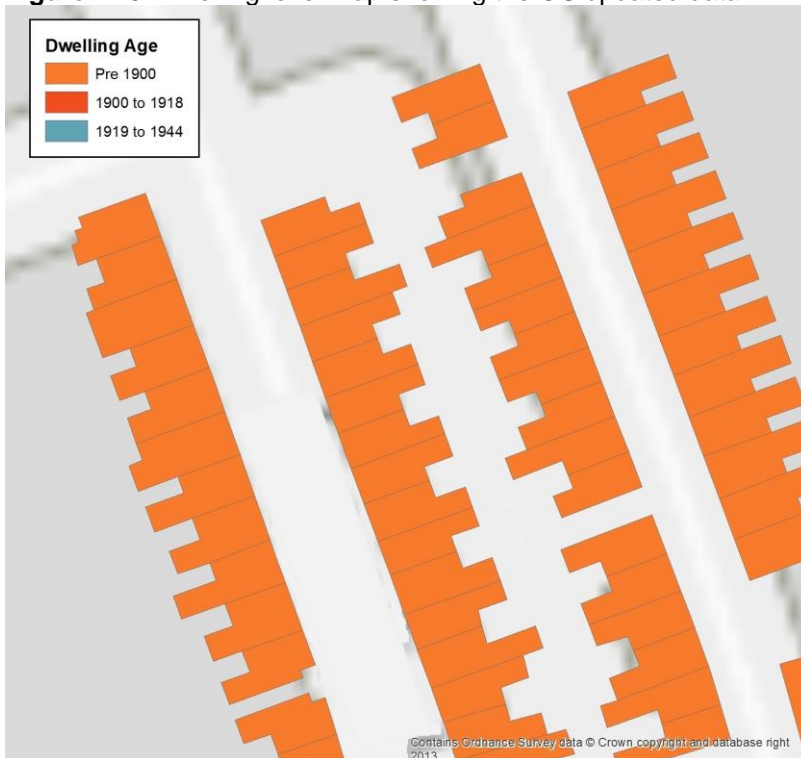


Figure B. 3: Dwelling level map showing the OS updated data





Appendix C Using the BRE Integrated Dwelling Level Housing Stock Database

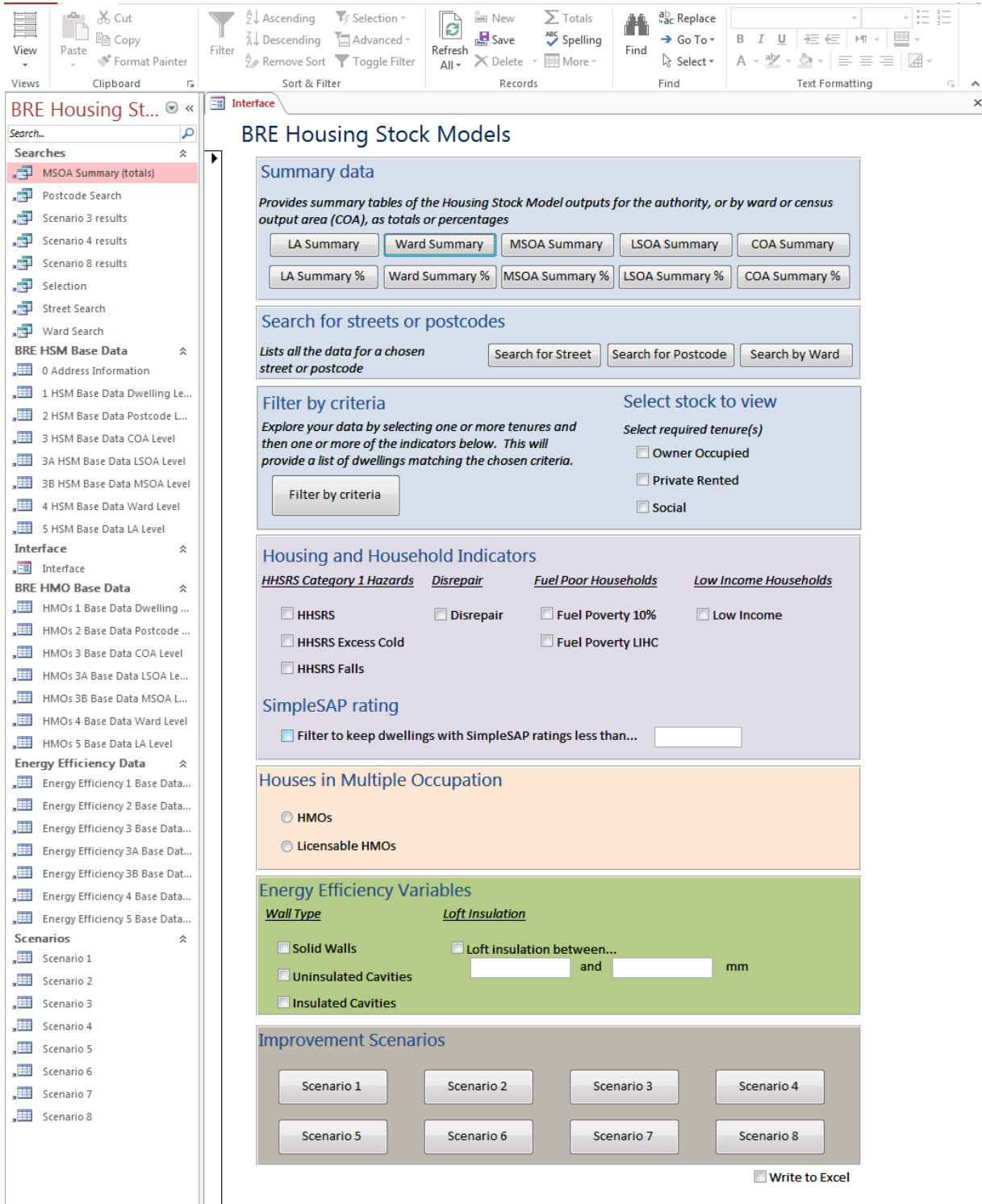
The BRE Integrated Dwelling Level Housing Stock Database is the final output of the overall stock modelling approach described in **Section 3** and **Appendix B**. The database has been designed to provide local authorities with a number of different options for summarising or investigating their data and generating lists of properties of interest. This Appendix provides details of how to use the database.

C.1 Overview

The database will automatically open on the interface screen as shown in **Figure C. 1** overleaf.



Figure C. 1: BRE dwelling level housing sock database – opening interface screen





On the left hand side of the database is a vertical column known as the “navigational pane”. Under the heading “BRE Integrated Models” there are 11 tables which hold the BRE Housing Stock Model data, plus one table holding the EPC data used in the modelling, and one table holding the metadata that identifies the extent of EPC use and cloned cases. The tables are as follows (note that tables in the database with the UPRN in the first column can be used to match the address details to the housing stock model data if required):

**Table C. 1:** Summary of information provided in each table in the database

Table Name	Description	Unique ID
0 LLPG Address Information	Address details as provided in the LLPG (building names, house numbers, postcodes), COA and ward for each address	Yes
1 HSM Integrated Data Dwelling Level	Dwelling level housing stock model data and Experian tenure variable ⁴³ . SimpleSAP results: score out of 100 All other indicators: 0 = pass the standard, 1 = fail	Yes
2 HSM Integrated Data Postcode Level	Summary information and statistics for each of the aggregated levels specified. 5 “stock levels” are provided – all, private, owner occupied, private rented, social	No
3 HSM Integrated Data COA Level		
3A HSM Integrated Data LSOA Level		
3B HSM Integrated Data MSOA Level		
4 HSM Integrated Data Ward Level		
5 HSM Integrated Data LA Level		
6 HSM Integrated Data HMOs	Information on HMOs	Yes
EPC Data	The raw EPC data provided to BRE, but with a UPRN code attached to allow linking to the BRE Models	Yes
M1 Metadata	Indicates the cases where EPC data was used, how much EPC data was used, whether a case uses cloned data, and what the source was of that cloned data (if the source is the same as the UPRN then the case is not a clone)	Yes

⁴³ If the Experian tenure variable has been purchased



Under the heading “BRE HMO Base Data” there are 7 tables which hold the HMO and Licensable HMO data. The tables are as follows:

Table C. 2: Summary of information provided in each table in the database

Table Name	Description
HMOs 1 Base Data Dwelling Level	Dwelling level HMO data 0 = Non HMO, 1 = HMO
HMOs 2 Base Data Postcode Level	Summary information and statistics for each of the aggregated levels specified. 5 “stock levels” are provided – all, private, owner occupied, private rented, social
HMOs 3 Base Data COA Level	
HMOs 3A Base Data LSOA Level	
HMOs 3B Base Data MSOA Level	
HMOs 4 Base Data Ward Level	
HMOs 5 Base Data LA Level	

Under the heading “BRE Energy Efficiency Base Data” there are 7 tables which hold the energy efficiency data. The tables are as follows:

Table C. 3: Summary of information provided in each energy efficiency table in the database

Table Name	Description
Energy efficiency 1 Base Data Dwelling Level	Dwelling level Green Deal data Wall type & insulation level 0 = not indicated type, 1 = indicated type Loft insulation = description of insulation level Energy performance data for each dwelling, including the estimated CO ₂ emissions in tonnes, the energy demand of the dwelling, the energy cost, the heat demand and the heating cost.
Energy efficiency 2 Base Data Postcode Level	Summary information and statistics for each of the aggregated levels specified in the form of the total number of dwellings with the specified wall type & insulation level, or the number of dwellings with the specified level of insulation 5 “stock levels” are provided – all, private, owner occupied, private rented, social
Energy efficiency 3 Base Data COA Level	
Energy efficiency 3A Base Data LSOA Level	
Energy efficiency 3B Base Data MSOA Level	
Energy efficiency 4 Base Data Ward Level	
Energy efficiency 5 Base Data LA Level	



Table C. 4: Summary of information provided in each table in the database – improvement scenarios

Table Name	Description
Scenario 1	SimpleSAP, SimpleCO ₂ , energy consumption, heat demand, energy cost and heating cost at the dwelling level for each of the eight improvement scenarios
Scenario 2	
Scenario 3	
Scenario 4	
Scenario 5	
Scenario 6	
Scenario 7	
Scenario 8	

C.2 Using the database

The rest of the screen is the main interface which has been developed with a number of standard queries that will present the user with information likely to be of use when reviewing data in order to design a housing stock strategy. There are 3 main sections to the interface: “Summary data”, “Search for street or postcode” and “Filter by criteria”. These sections are described in more detail below.

C2.1 “Summary data”

These options allow the user to generate summaries of their data at different levels of aggregation. The three different levels of aggregation are;

- Local authority
- Ward
- MSOA
- LSOA
- COA

There are two types of summaries available at each level - totals and percentages:

- Totals give the user the total number of dwellings that fail a particular standard, for example, the total number of dwellings that have a HHSRS category 1 hazard in the authority.
- Percentages tell the user the percentage of dwellings that fail a criterion, for example, the percentage of dwellings suffering from HHSRS category 1 excess cold hazards.

C2.2 “Search for streets or postcodes”

These options allow the user to search for particular areas, either by street name or postcode. By clicking on a search button the user will be asked to type in either a street or postcode. A table will then be shown which provides a list of all dwellings in the street or postcode requested.

If the full name of the street is not known, wildcard characters can be used to search for close matches. A wildcard character is one that can stand in for any other letter or group of letters. Access uses an asterisk (*) as the wildcard character. For example entering “Abbey*” will return any street name starting with



“Abbey”, for example, “Abbey Road”, “Abbey Close”, “Abbeyfield” etc. Wildcard characters can be used at both the beginning and the end of the search text. For example, by entering “*Abbey*” would find “Abbey Road”, “Old Abbey Road” etc.

The street names used are those provided in the Local Land and Property Gazetteer. It can sometimes be the case that a street name can be written differently across databases (e.g. “Rose Wood Close” or “Rosewood Close”). If a road name does not appear to be present, try using wildcard characters to check for alternatives.

The postcode search facility works in a similar manner. Entering “BN15 0AD” will find all dwellings in that exact post code, but entering “BN15*” will find all dwellings whose postcode begins with BN15.

Note: always close the results of an existing search before starting a new one. Clicking the button when the results of an existing search are still open will simply return to the results of that search. A search, or any other table, can be closed by clicking the “x” in the top right corner of the table window.

C2.3 “Filter by criteria”

This section allows the user to select dwellings based on one or more criteria / key indicators of interest.

First, the user needs to select which tenure(s)⁴⁴ they are interested in by using the “Select stock to view” on the right hand side of the box.

The default setting is that no tenures are selected, so the user will need to select at least one in order to get any results. Multiple tenures can be selected, so for the results for all the private stock select both owner occupied and private rented.

Once one or more of the tenures has been selected, choose one or more of the indicators of interest either by selecting an indicator e.g. HHSRS Cat.1 hazards will return dwelling with fail HHSRS, or for SimpleSAP enter a rating to select dwellings on and below the rating.

Once a tenure(s) and indicator(s) have been selected clicking the ‘Filter by criteria’ button will return the addresses matching the chosen criteria.

As with the searches, close the results of an existing selection before starting a new one.

C.3 Creating Excel files

Whilst it is possible to copy the data from any of the queries accessed from the interface screen, an option has been added to make this process easier. To output results to Excel click the “Write to Excel” check box at the bottom right of the screen. As long as this box is checked, clicking any of the summary data, search or criteria selection buttons will cause the resulting data to be written to Excel instead of being displayed.

If this option is selected when any button is clicked the database requests a format for the output data. Once the appropriate file format is selected, click “OK” and choose a file name and location and click “OK” to save the file.

⁴⁴ If the Experian tenure variable has not been purchased this section is locked and only private sector stock is shown.

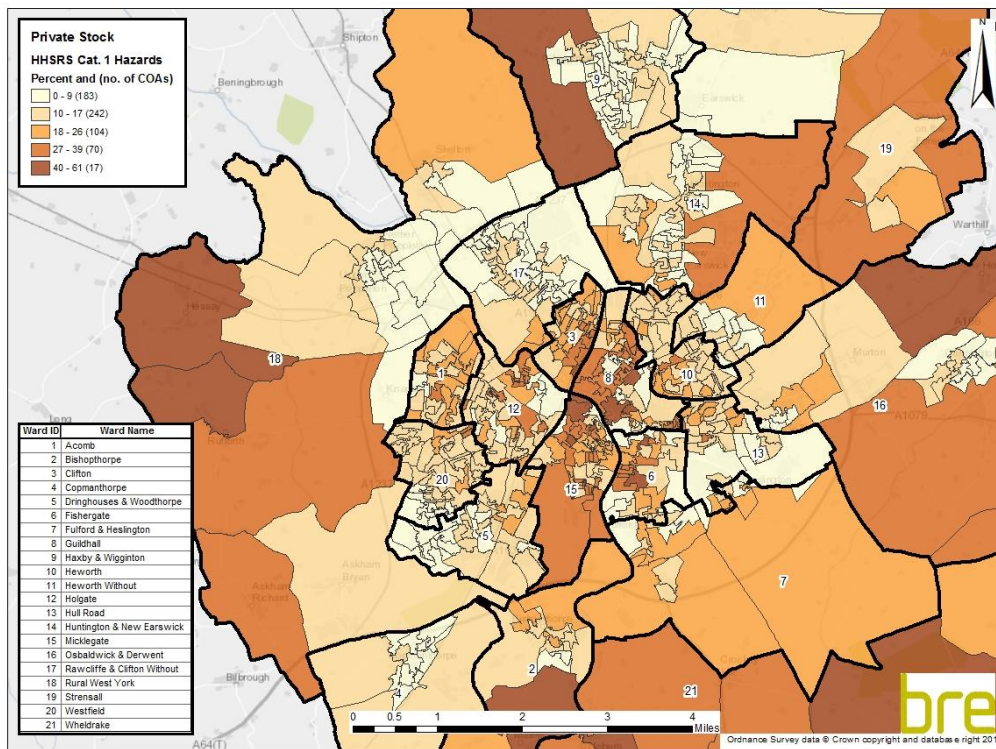


This function means it is possible to rapidly export summary tables for inclusion in reports, or lists of dwellings which can be used to target improvement programmes.

Appendix D Additional Maps

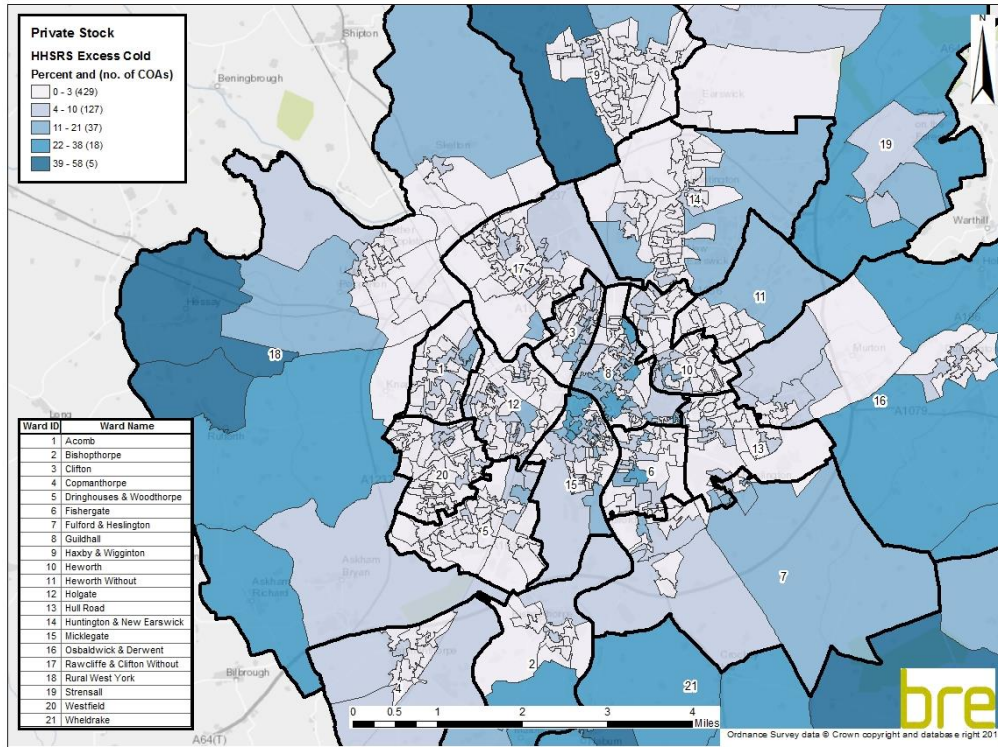
This Appendix provides close up maps of some of the more urban area of York. These maps show the clear urban – rural divide in many of the housing indicators. The larger maps included above in the report do not always allow for the appreciation that smaller and denser COAs in urban areas are very different in their hazards to the surrounding rural COAs which are larger and are immediately more eye-catching.

Map D. 1: Urban York category 1 hazards – private stock [Return to main report](#)

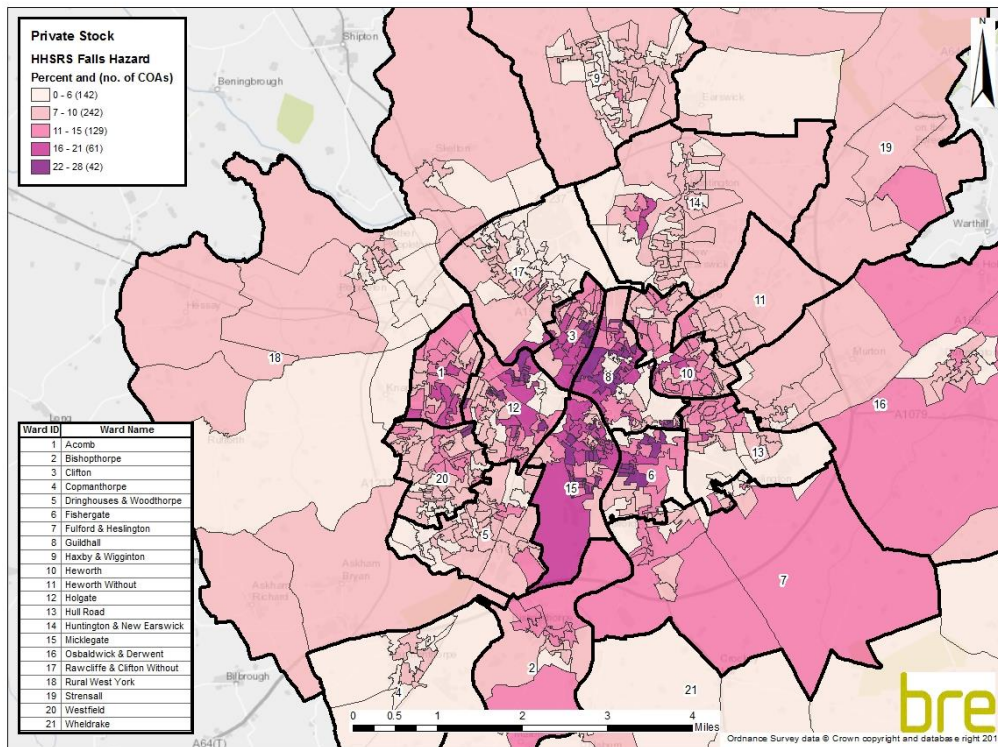




Map D. 2: Urban York households with excess cold – private stock [Return to main report](#)

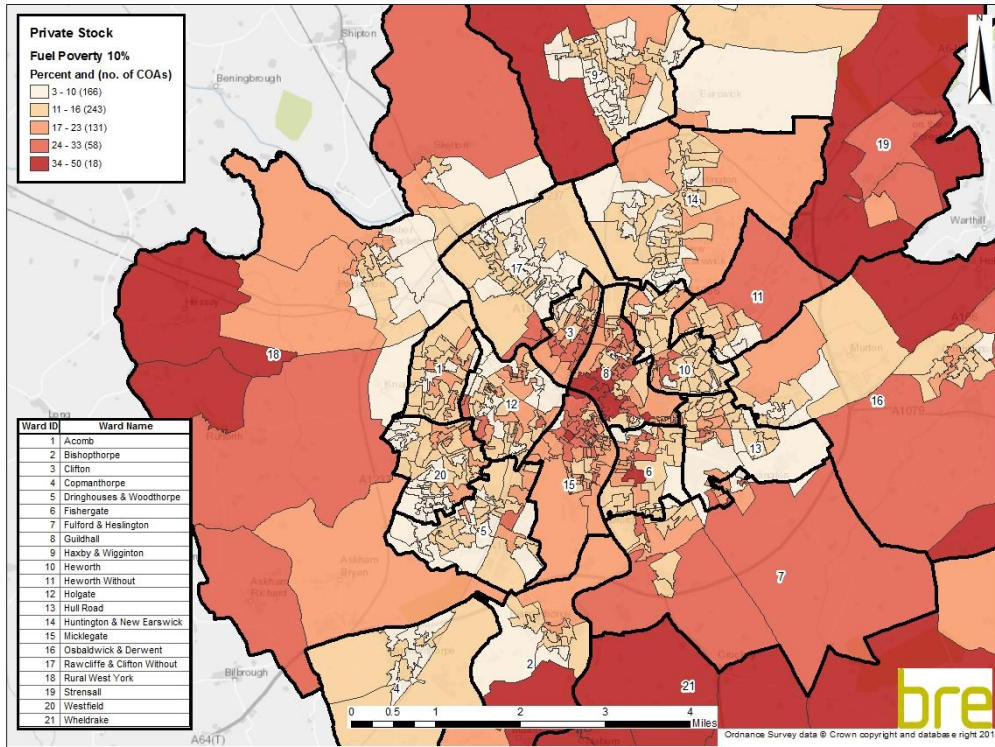


Map D. 3: Urban York households with falls hazards – private stock [Return to main report](#)

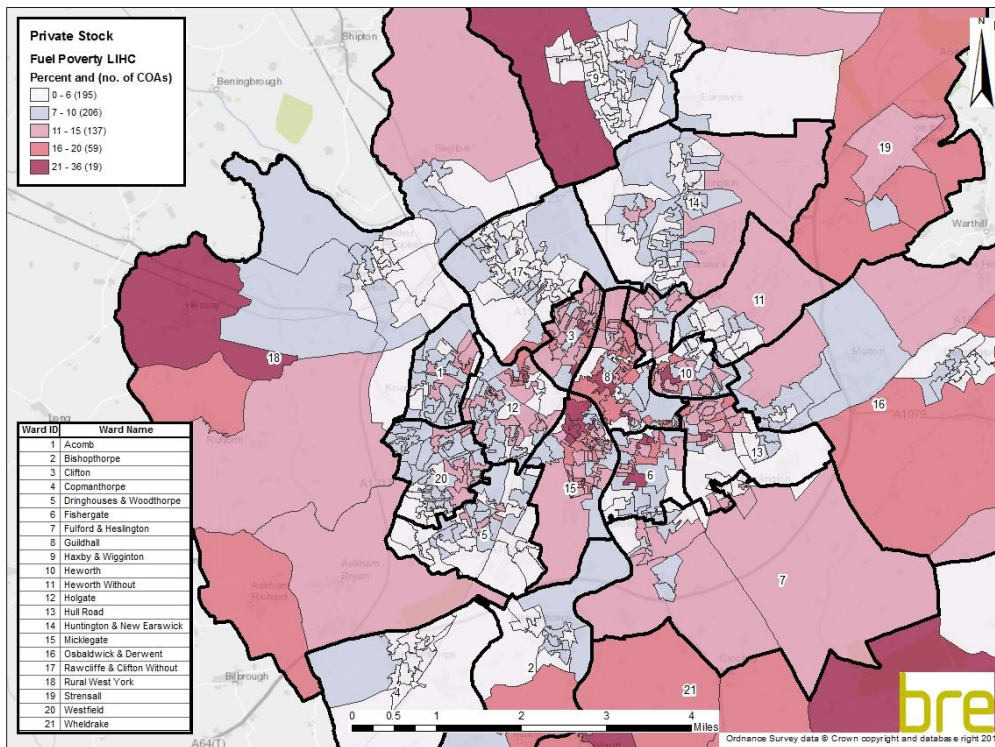




Map D. 4: Urban York in fuel poverty (10% definition) – private stock [Return to main report](#)

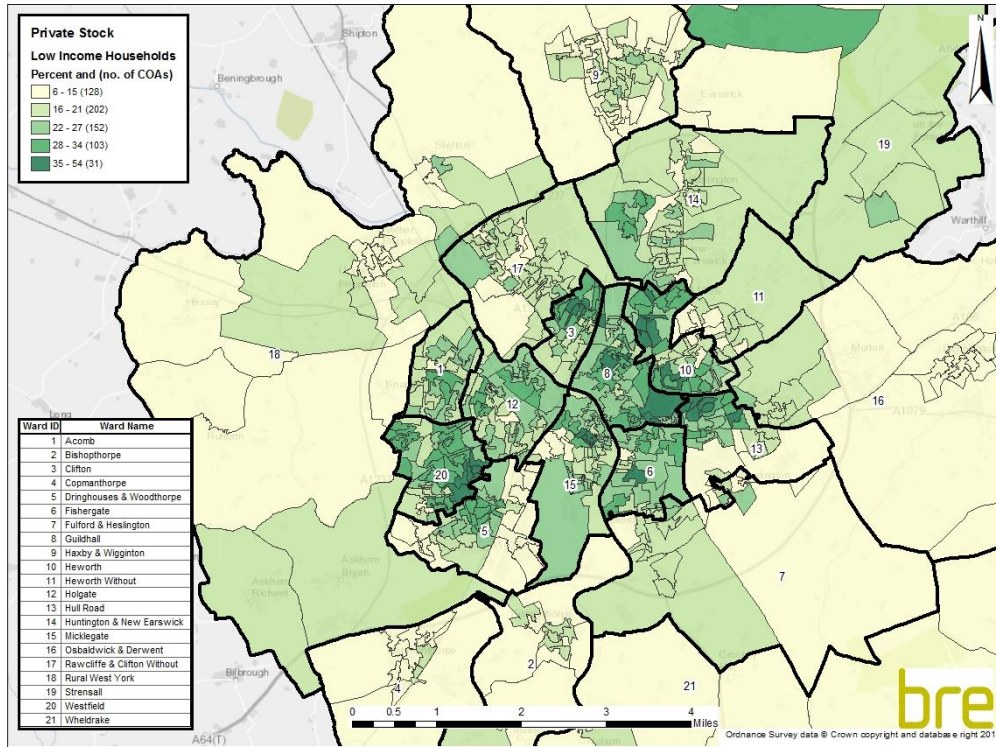


Map D. 5: Urban York in fuel poverty (LIHC definition) – private stock [Return to main report](#)

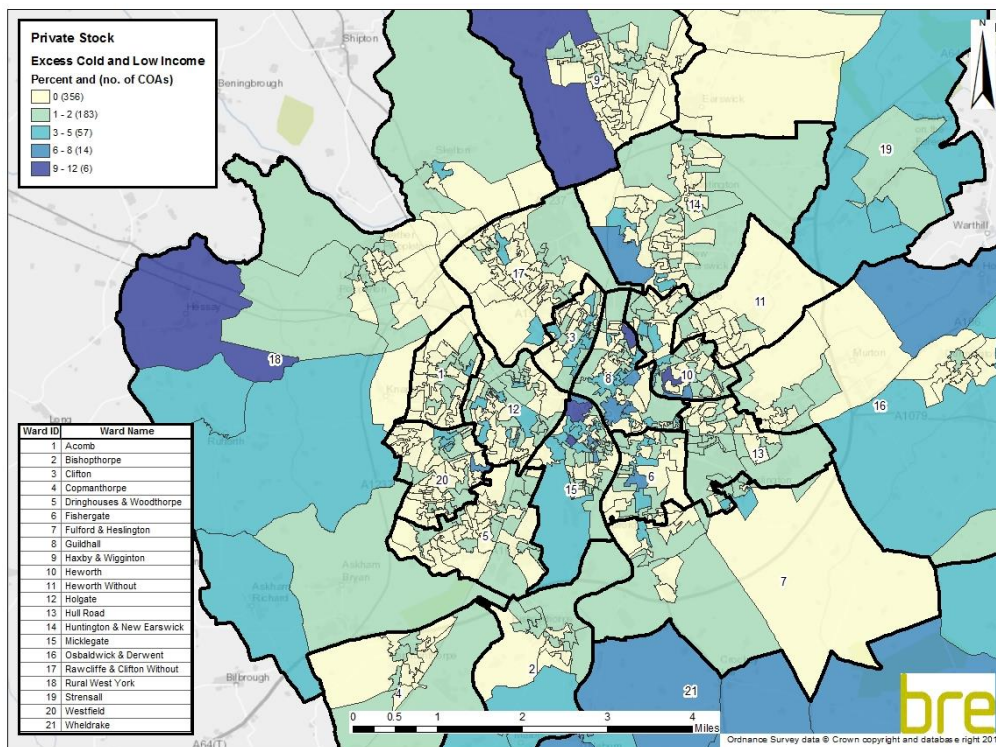




Map D. 6: Urban York households in low income – private stock [Return to main report](#)

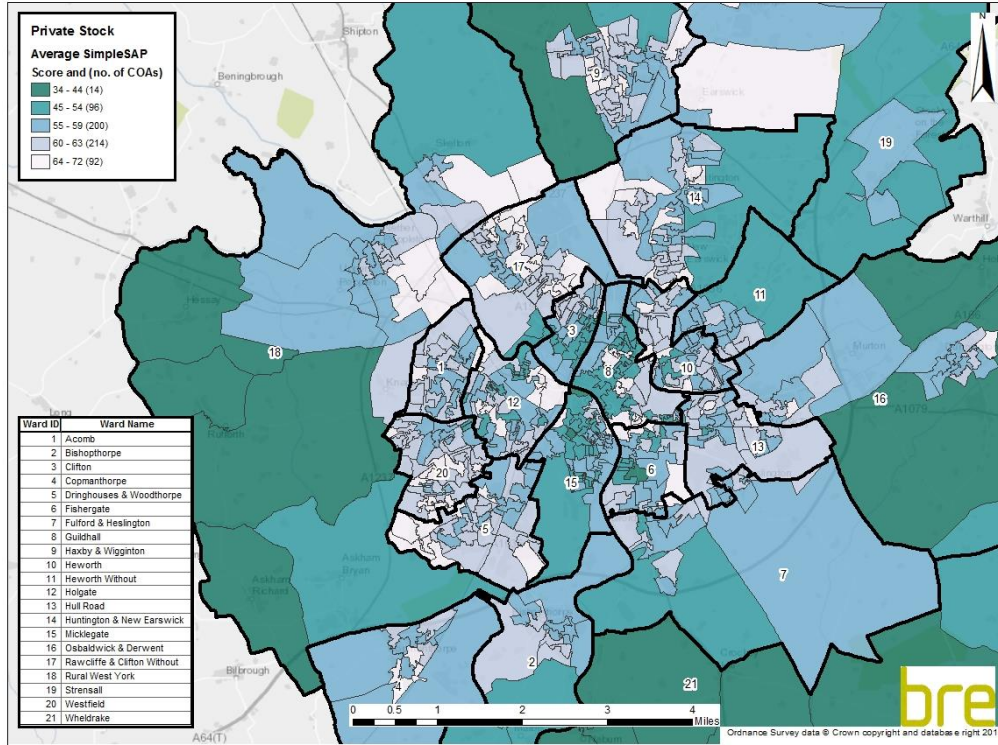


Map D. 7: Urban York households with excess cold and in low income – private stock [Return to main report](#)

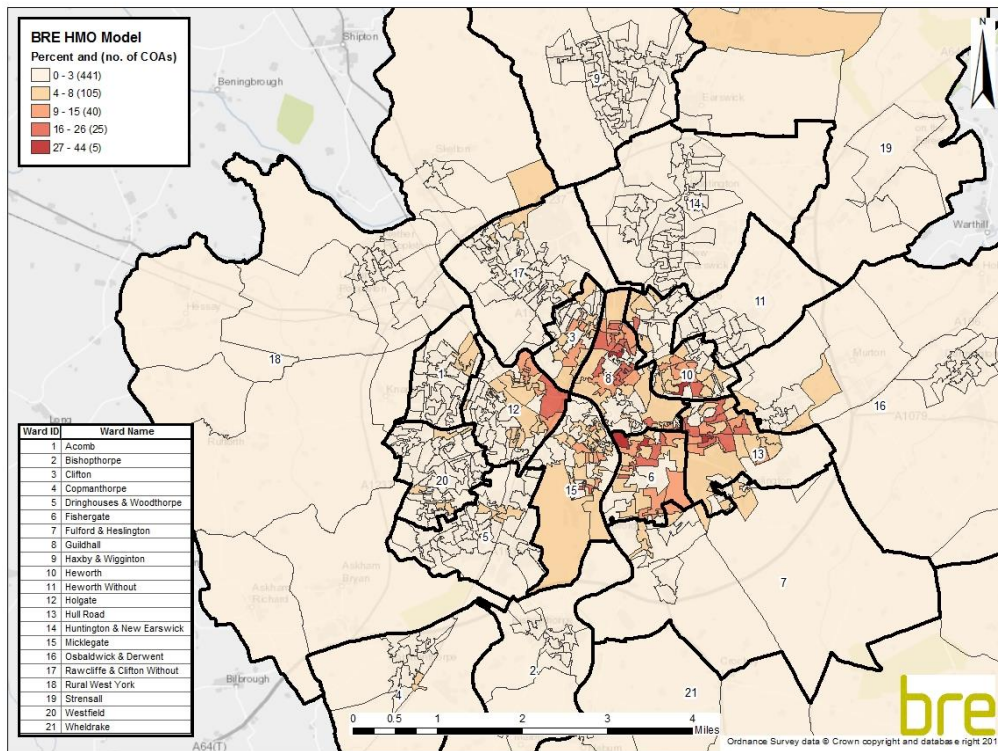




Map D. 8: Urban York average SimpleSAP households – private stock [Return to main report](#)

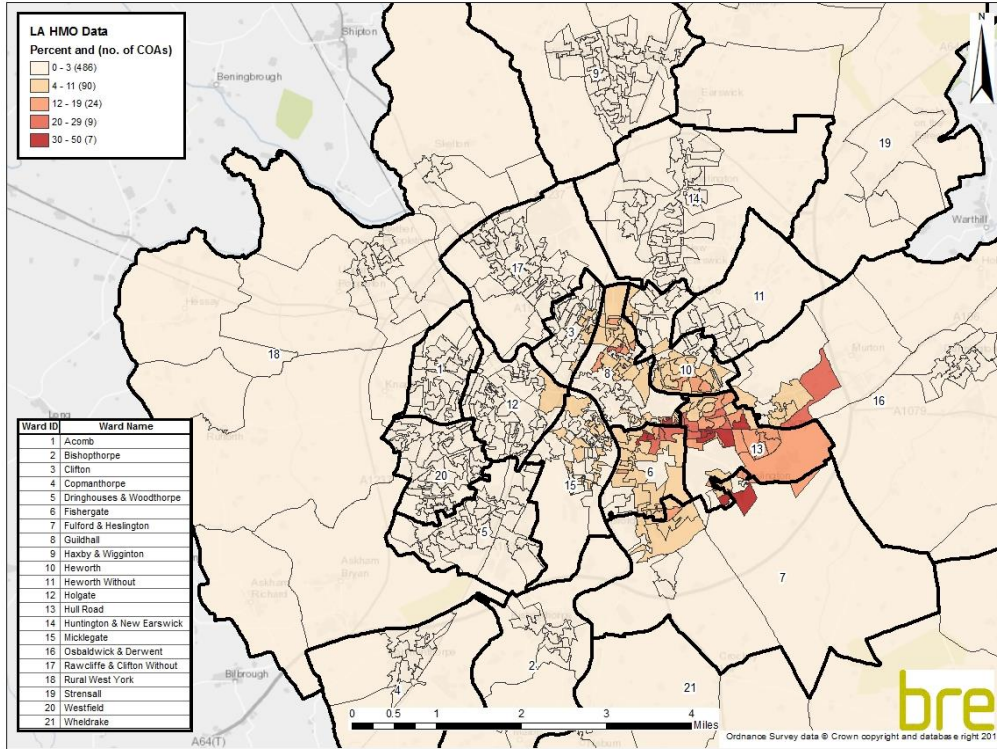


Map D. 9: Urban York HMO households based on BRE modelled data [Return to main report](#)

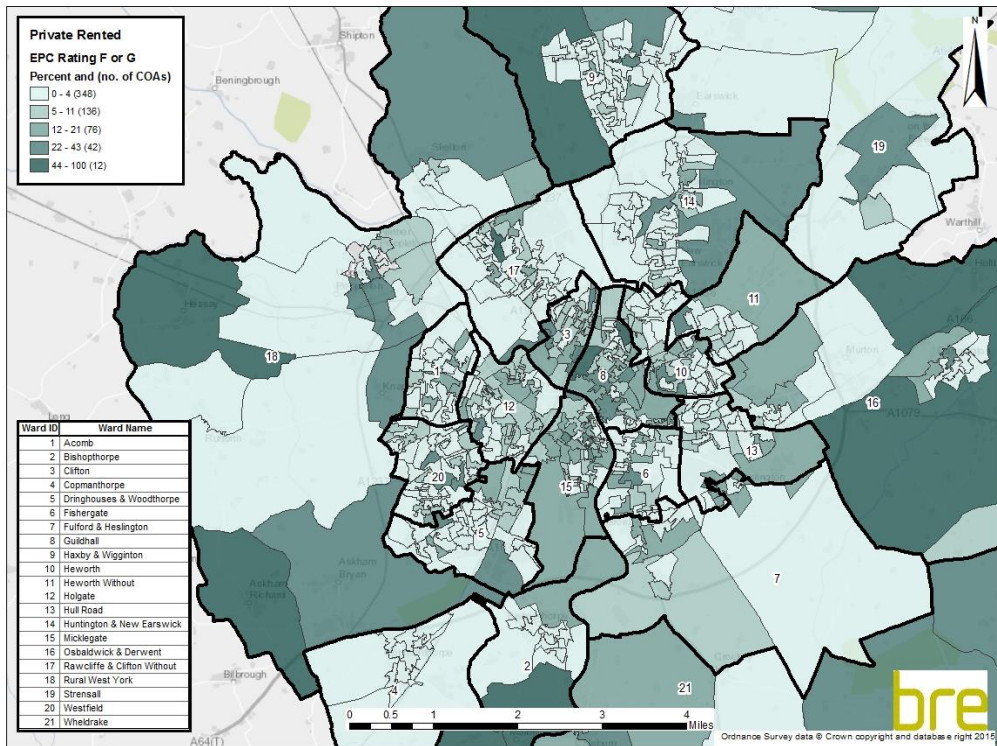




Map D. 10: Urban York HMOs based on data provided by City of York Council [Return to main report](#)

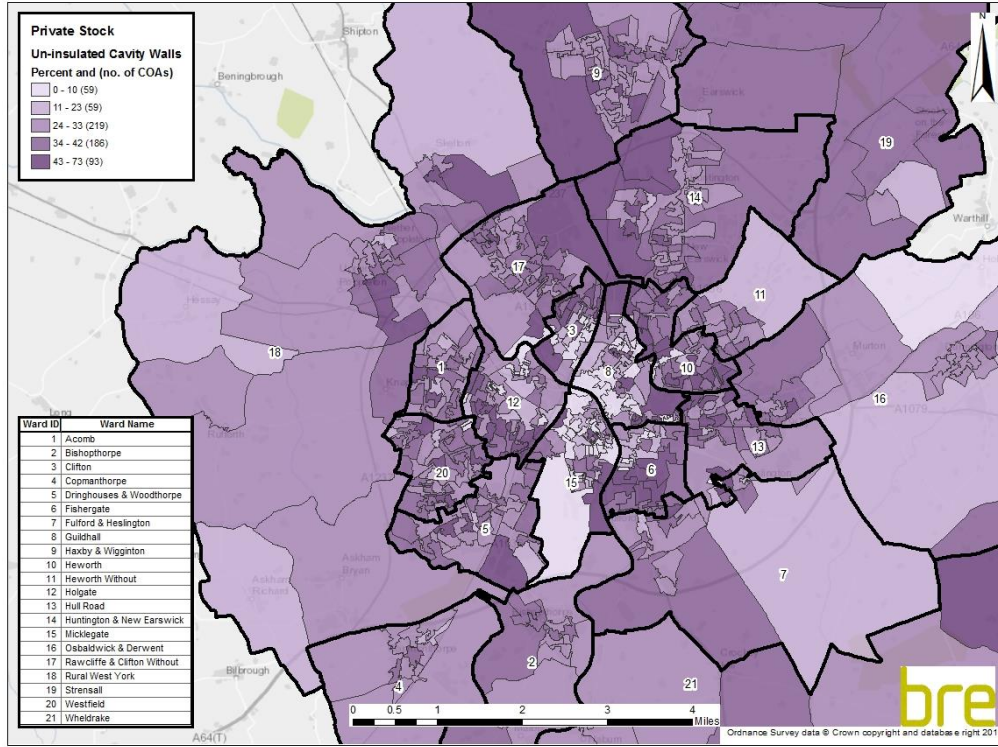


Map D. 11: Urban York households with EPC ratings F or G – private rented stock [Return to main report](#)

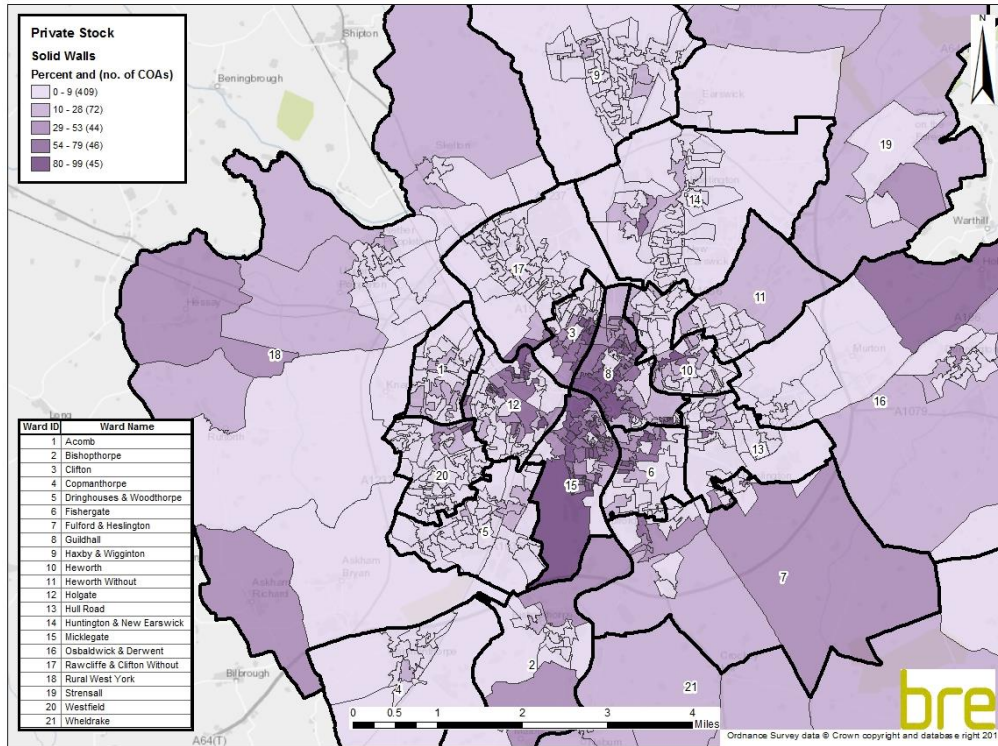




Map D. 12: Urban York un-insulated cavity wall households – private stock [Return to main report](#)

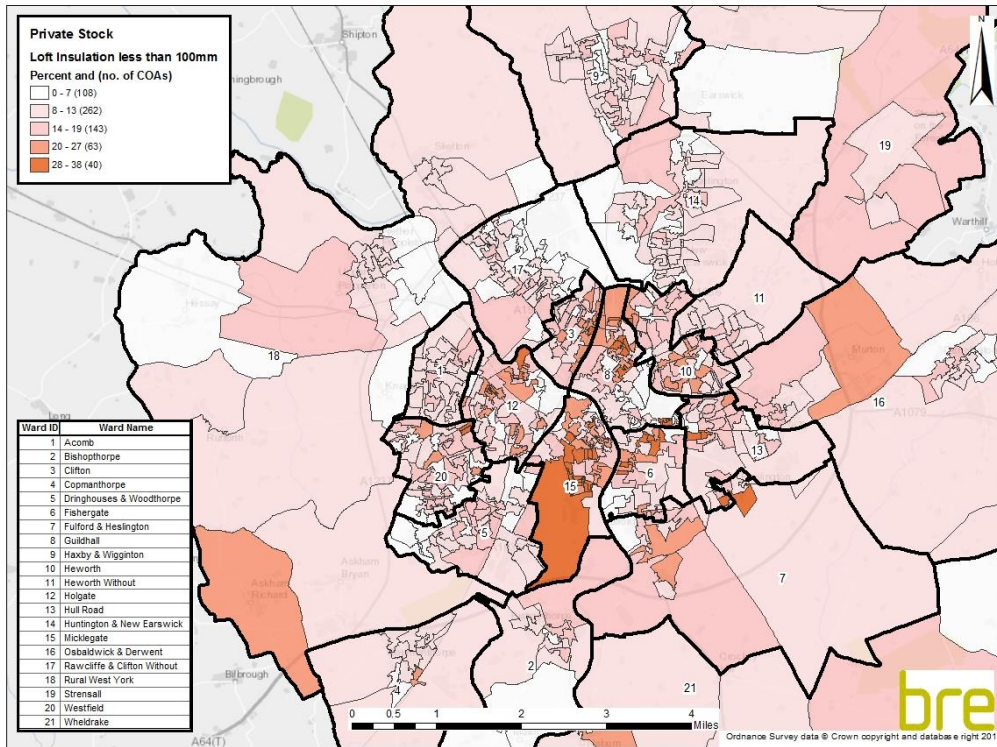


Map D. 13: Urban York solid wall households– private stock [Return to main report](#)

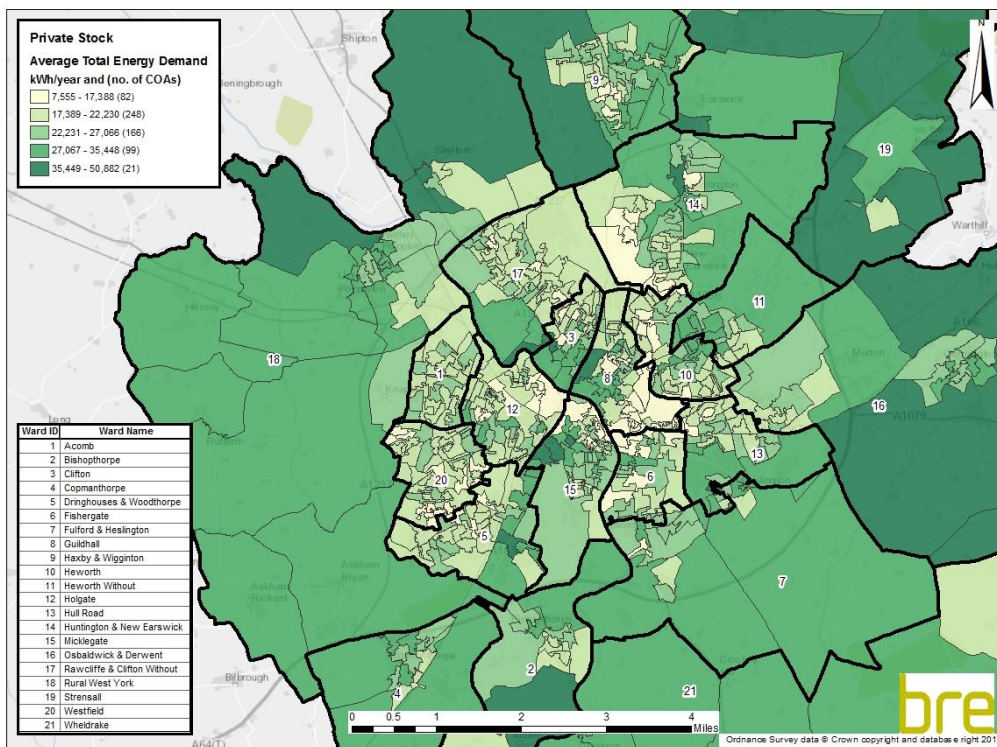




Map D. 14: Urban York households with less than 100mm loft insulation – private stock [Return to main report](#)

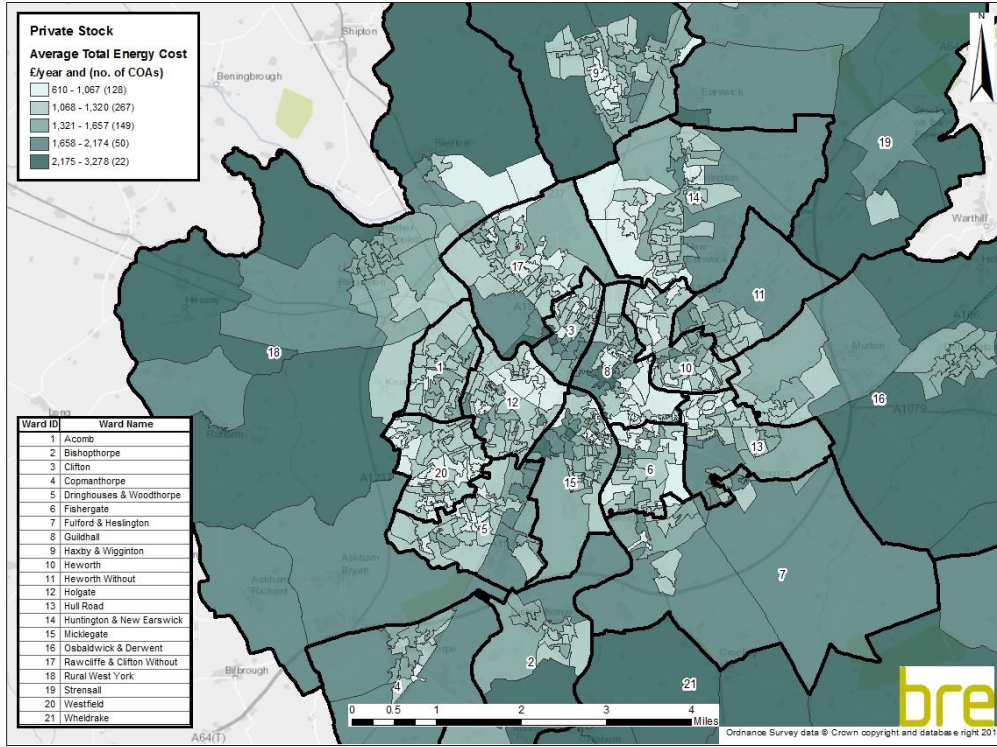


Map D. 15: Urban York total energy demand – private stock [Return to main report](#)

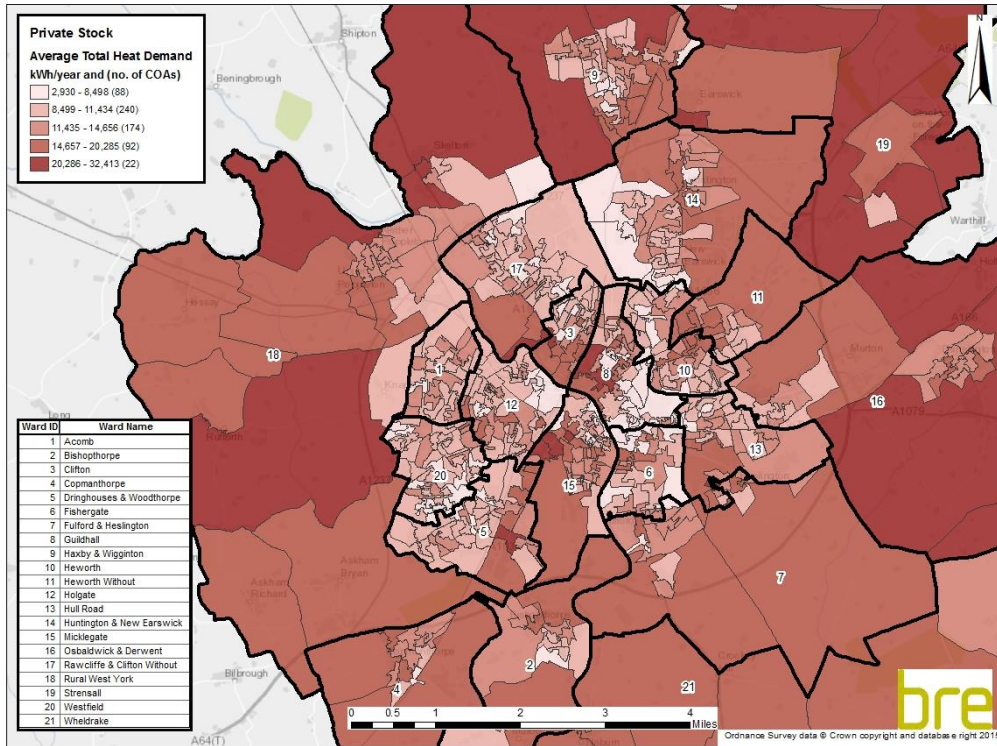




Map D. 16: Urban York total energy cost – private stock [Return to main report](#)

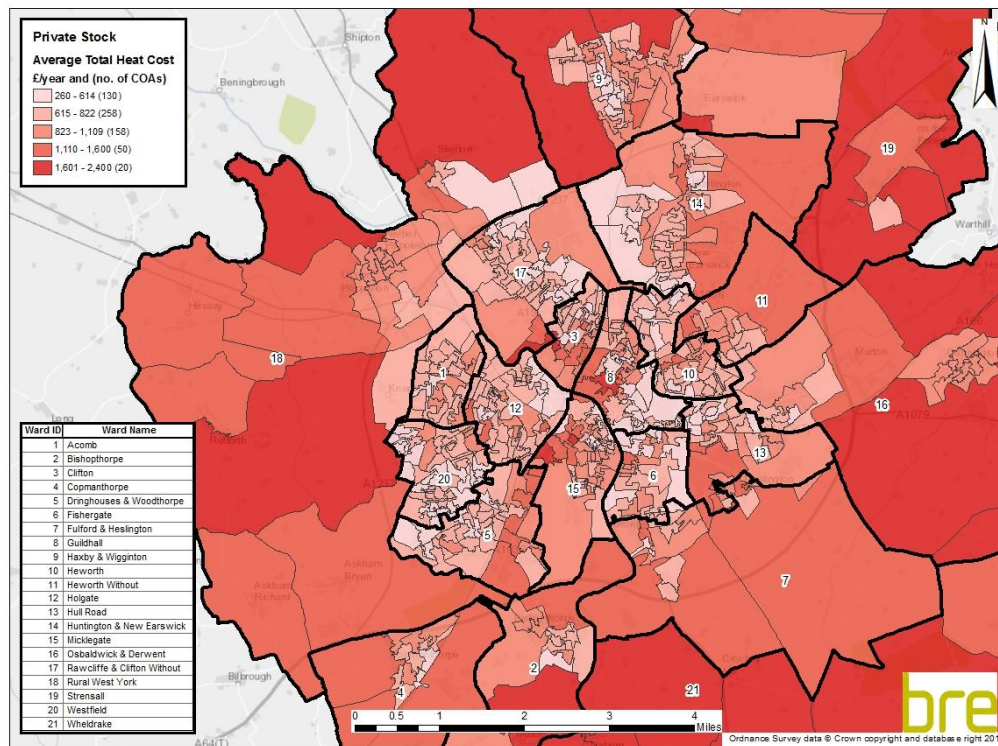


Map D. 17: Urban York total heat demand – private stock [Return to main report](#)





Map D. 18: Urban York total heating cost – private stock [Return to main report](#)





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
DCLG	Department for Communities and Local Government
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 Department for Communities and Local Government (DCLG). 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	<p>Houses in Multiple Occupation</p> <p>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</p> <p>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</p> <p>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</p> <p>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</p> <p>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</p>
HSM	<p>Housing Stock Model</p> <p>Desktop based modelling used to determine the condition of the housing stock</p>
Jenks' Natural Breaks	<p>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</p>
JSNA	<p>Joint Strategic Needs Assessment</p> <p>An assessment of the current and future health and social care needs of the local community</p>
LACORs	<p>Local Authority Coordinators of Regulatory Services – now renamed Local Government Regulation</p>
LAHS	<p>Local Authority Housing Statistics</p> <p>National statistics on housing owned and managed by local authorities</p>
LIHC	<p>Low Income High Cost</p> <p>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</p>



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
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