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BRE Client Report

BRE Integrated Dwelling Level Housing Stock Modelling and Database for North Norfolk District Council

Prepared for: Graham Connolly, Housing Strategy & Delivery Manager

Date: 25 March 2021

Report Number: P104088-1107 Issue: 2

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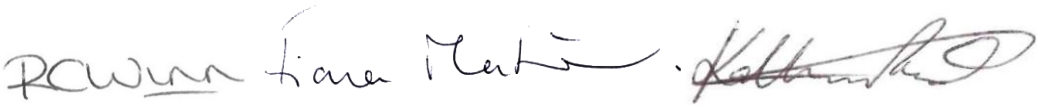
Signature	

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Executive summary

- North Norfolk District Council commissioned BRE to assist with gathering intelligence on the housing stock in their area with a particular emphasis on the private rented stock. The resulting project, including this report, was funded by MHCLG's Private Rented Sector Innovation and Enforcement Grant Fund (2019/20). This funding supports new, innovative, or targeted short-term initiatives to tackle criminal landlords and raise the standard of properties in the Private Rented Sector (PRS) including intelligence gathering projects such as this.

- BRE provide this housing stock intelligence down to dwelling level from which it can be aggregated to provide information to any geographical layer e.g. Ward, Authority, Super Output Area. To provide such a large amount of information at dwelling level, modelling techniques (the BRE Housing Stock Models) have already been developed by BRE and been in use since 2003. Applying these well-established models has allowed this project to be delivered in a short timeframe whilst ensuring value for money.

- The BRE Housing Stock Models have been used to provide North Norfolk with detailed information on the likely tenure, condition and household vulnerability of their stock and the geographical distribution of properties of interest. The information covers the whole of the housing stock providing necessary context to the private rented sector information.

- The models use a range of statistical techniques to predict the likely status of individual dwellings for various condition and energy efficiency indicators. These are described in more detail in **Section 3** but include at the heart of the modelling process an energy model based on SAP which can be used to both predict energy efficiency and model potential improvements.

- Predicting conditions at dwelling level is a challenge, but the increasing availability of dwelling level data which can be used as an input to the models makes this the most logical approach to take. These data include both Experian and Ordnance Survey (OS) data and extensive use is made of these key sources.

- The outputs of the dwelling level models estimate the likelihood of a particular dwelling meeting the criteria for a number of key measures of housing. These outputs can then be mapped to provide the authority with a geographical distribution of each of the variables which can then be used to target resources for improving the housing stock.

- The BRE Housing Stock Models for North Norfolk District Council also include local data, provided by the council, which have been integrated into the models. The facility to integrate such local data is another key reason BRE have adopted a dwelling based approach to stock modelling.

- These data sources are Land and Property Gazetteer (LLPG), tenancy deposit scheme and benefits data. The BRE models also integrate Energy Performance Certificate (EPC)[1] data. As a result of this, for North Norfolk District Council, it was possible to use observed characteristics from the EPC data within the parts of the model relating to energy. The use of this observed data will lead to more accurate energy models for these cases, which account for 24,906 addresses (45.2% of the total stock) in North Norfolk. The council also commissioned the inclusion of Land Registry Commercial and Corporate Ownership Data (CCOD) and Overseas Companies Ownership Data (OCOD).
- In addition, North Norfolk District Council commissioned BRE to undertake additional work to identify private rented stock in their local authority. This additional work involved an innovative approach to Private Rented Sector identification, using a variety of different data sources including the BRE Model, Tenancy Deposit Scheme, Council Tax, Ordnance Survey and Land Registry data. This approach resulted in improved accuracy in identifying private rented sector dwellings across the borough.
- The LLPG data indicated that there are currently an estimated 2,123 holiday homes in North Norfolk. It was requested that these were excluded from the main analysis as they are not residential dwellings.
- Alongside this report, BRE provided North Norfolk District Council with access to the resulting model via an online system known as the Housing Stock Condition Database (HSCD), enabling the council to obtain specific information whenever required. Holiday homes are included on the HSCD so that they can be identified where required by the council.
- The detailed housing stock information in this report and in the HSCD provide the council with a resource for querying and collating information relating to their housing stock. This resource can be used to support the development of strategies and inform housing-related decisions for the area, enabling a targeted intervention approach to improving housing.

Project aims

- The main aims of this work were to provide the council with estimates of:
    - **Dwelling condition and household vulnerability** – more specifically the percentage of dwellings with the presence of each of the Housing Standards Variables (HHSRS[2] category 1 hazard, excess cold, fall hazard, disrepair, fuel poverty, low income households and SimpleSAP rating) for North Norfolk overall and broken down by tenure and then mapped by Census Output Area (COA) (private rented stock)
    - **Other information** - relating to Local Authority Housing Statistics (LAHS) reporting for the private sector stock – cost to mitigate category 1 hazards and potential Houses in Multiple Occupation (HMOs) - and information on EPC ratings
    - **Energy efficiency** variables for the private sector stock (wall and loft insulation)
    - **Energy planning** variables (SimpleCO_2, energy and heat demand, energy and heat cost)

[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] HHSRS is the Housing Health and Safety Rating System – this is a risk assessment tool to help local authorities identify and protect against potential risks and hazards to health and safety deficiencies in dwellings.

- The headline results are provided on the following page:

Headline results for North Norfolk

There are 52,988 dwellings in North Norfolk, 70% are owner occupied, 18% private rented and 12% social rented.

The council requested 16,000 addresses from the Council Tax Register to be submitted to the Land Registry for processing. These addresses were selected across all wards so that a borough-wide sample was submitted. This analysis has resulted in 28,895 dwellings in North Norfolk having evidenced tenure information, either from TDS, CCOD/OCOD, local data identifying second homes and holiday homes, or Land Registry analysis. This is 53.6% across all wards in North Norfolk.

Holiday homes were included within the analysis of tenure evidence as these were identifiable through the LLPG. Including holiday homes increases the stock total in North Norfolk to 55,111; however, as holiday homes are not classed as residential dwellings, these have been excluded from the main analysis within this report The 53.6% figure in the previous paragraph is based on this total of 55,111 dwellings.

12,306 dwellings in the private sector have category 1 Housing Health and Safety Rating System (HHSRS) hazards. This equates to 26% of properties. *See full results*

2,513 dwellings in the private rented sector have category 1 HHSRS hazards. This equates to 27% of properties in the private rented sector. *See full results*

The highest concentrations of all HHSRS hazards in the private rented sector are found in the wards of Priory, Stody and Walsingham.

The highest concentrations of fuel poverty (Low Income High Costs definition) in the private rented sector are found in the wards of Stibbard, Happisburgh and Trunch and for excess cold the highest concentrations are in Priory, Walsingham and Erpingham.

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

Maps by Census Output Area (COA) have been provided for the above Housing Standards Variables for the private rented sector. *See maps*

The total cost of mitigating category 1 hazards in North Norfolk's private sector stock is estimated to be £46.1 million – with £36.7 million in the owner occupied sector, and £9.4 million in the private rented sector. *See full results*

There are an estimated 676 potential HMOs in North Norfolk, of which approximately 191 come under the mandatory licensing scheme. *See full results*

23.2% (10,800) of *private sector* dwellings and 21.1% (1,983) of *private rented* dwellings in North Norfolk are estimated to have an EPC rating below band E. *See full results*

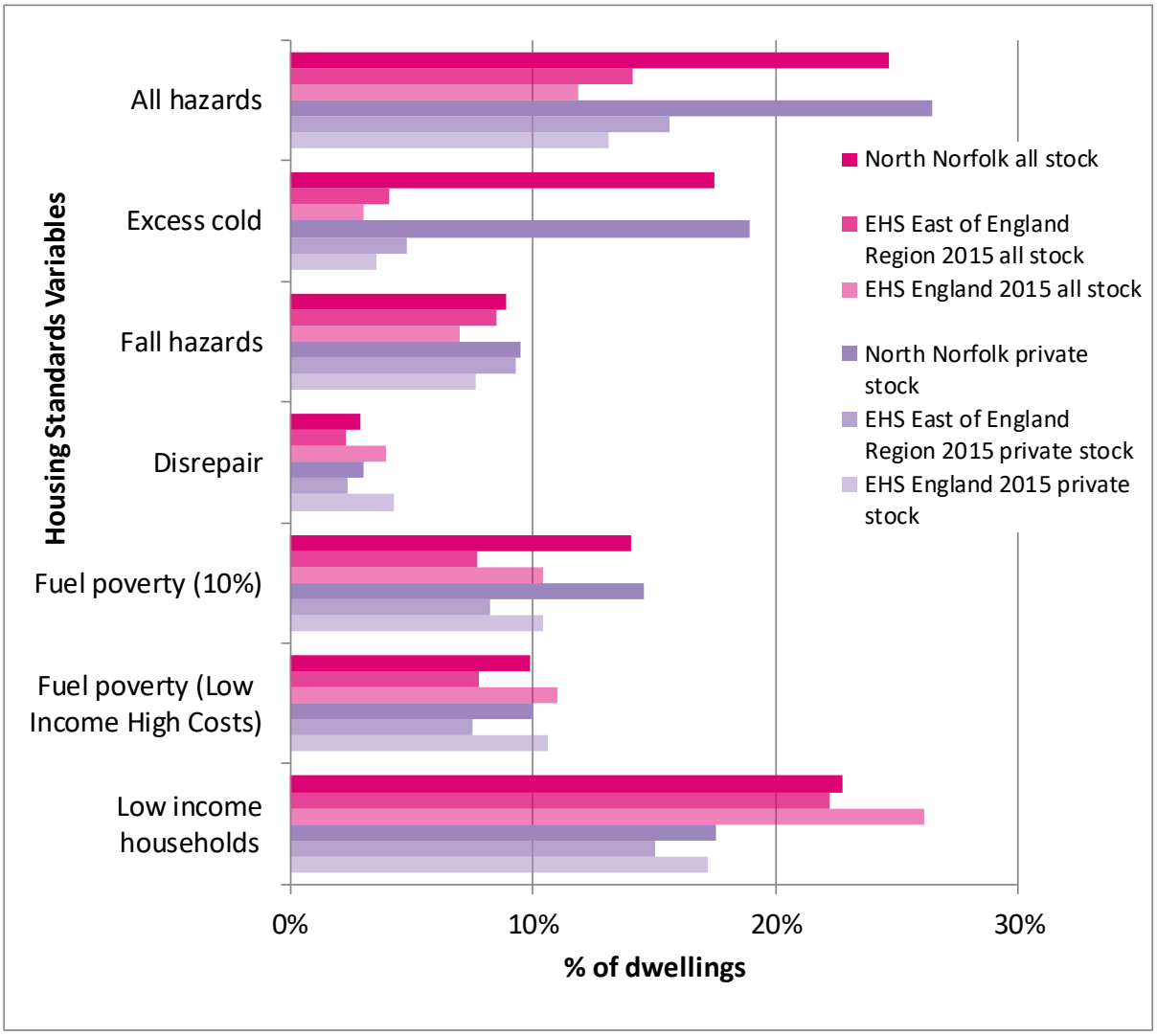
In the private sector stock, there are an estimated 7,075 dwellings with un-insulated cavity walls and 6,252 dwellings with less than 100mm of loft insulation. *See full results*

Analysis of the energy efficiency variables indicates that the owner occupied stock has the highest average figures for the majority of variables (SimpleCO_2, energy and heat demand, energy and heat cost). *See full results*

Key illustrations of headline results

- The table below shows the results for 7 of the Housing Standards Variables in North Norfolk compared to regional data and England (EHS 2015) - split into all stock and private sector stock.

Estimates of the percentage of dwellings with the presence of each of the Housing Standards Variables criteria assessed by the housing stock models and HSCD for all stock and private sector stock – North Norfolk compared to the East of England and England (EHS 2015)



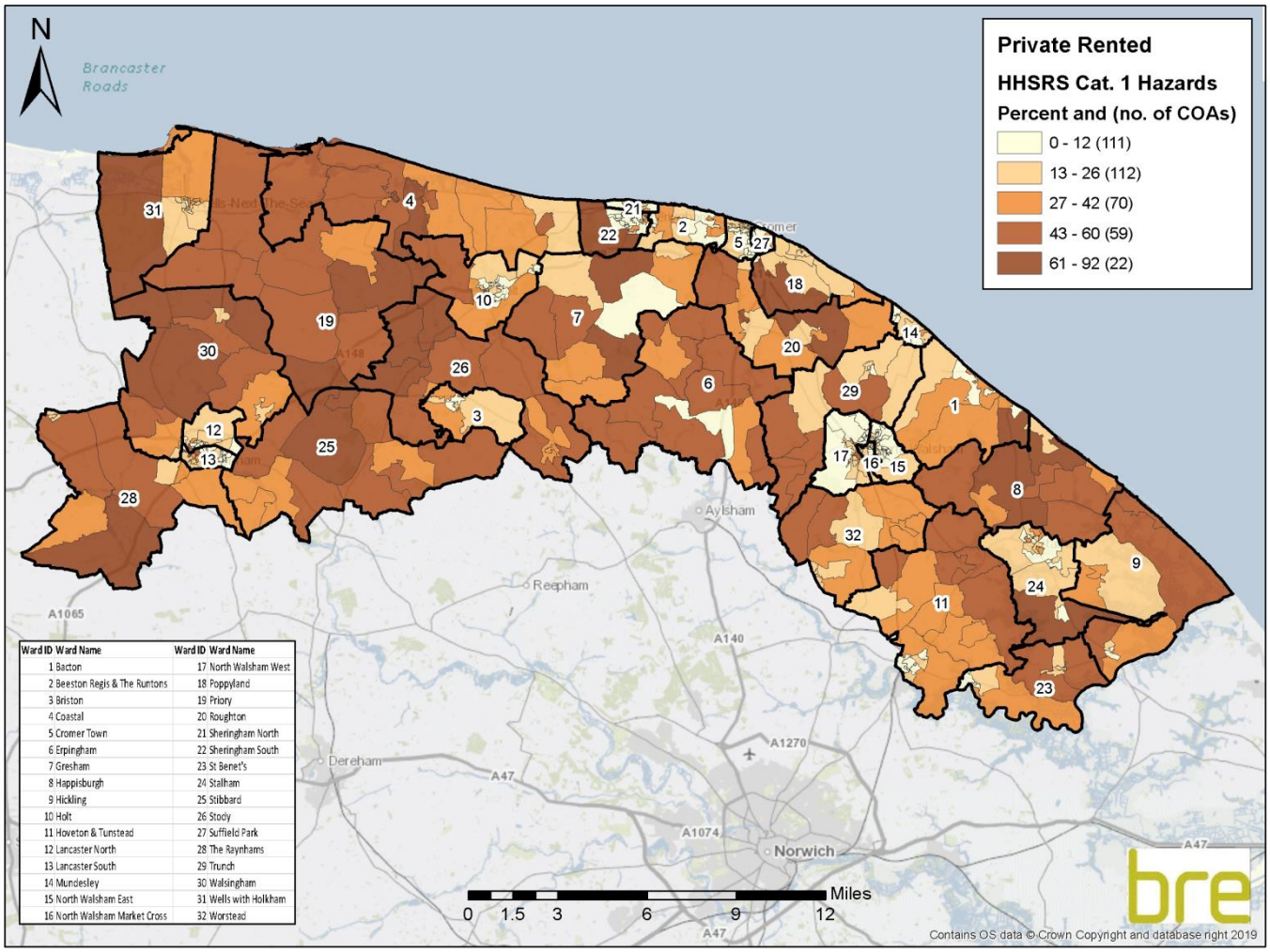
- The table below shows the number and percentage of North Norfolk's private rented stock falling into each of the EPC ratings bands (based on SimpleSAP). The number of private rented dwellings in North Norfolk with a rating below band E (i.e. bands F and G), is estimated to be 1,983 (21.1%).

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

	North Norfolk		2015 EHS England
	Count	Percent	Percent
(92-100) A	0	0.0%	1.2%
(81-91) B	88	0.9%	
(69-80) C	1,984	21.1%	25.3%
(55-68) D	3,245	34.5%	49.1%
(39-54) E	2,099	22.3%	18.1%
(21-38) F	1,510	16.1%	4.5%
(1-20) G	473	5.0%	1.8%

- The map overleaf shows the distribution of category 1 hazards, as defined by the Housing Health and Safety Rating System (HHSRS), in the private rented sector. The data behind this map shows that the highest concentrations are found in the wards of Priory, Stody and Walsingham.

Percentage of private rented sector dwellings in North Norfolk with the presence of a HHSRS category 1 hazard



Ward ID	Ward Name	Ward ID	Ward Name
1	Bacton	17	North Walsham West
2	Beeston Regis & The Runtons	18	Poppyland
3	Briston	19	Priory
4	Coastal	20	Roughton
5	Cromer Town	21	Sheringham North
6	Erpingham	22	Sheringham South
7	Gresham	23	St Benet's
8	Happisburgh	24	Stalham
9	Hickling	25	Stibbard
10	Holt	26	Stody
11	Hoveton & Tunstead	27	Suffield Park
12	Lancaster North	28	The Raynhams
13	Lancaster South	29	Trunch
14	Mundesley	30	Walsingham
15	North Walsham East	31	Wells with Holkham
16	North Walsham Market Cross	32	Worstead

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1 Introduction

North Norfolk District Council commissioned BRE to undertake a series of modelling exercises on their housing stock. BRE have integrated data provided by the authority into the models to produce an integrated model and corresponding report. This report describes the modelling work and provides details of the results obtained from the integrated dwelling level model and database. This report, and the work surrounding it, has been funded by MHCLG's Private Rented Sector Innovation and Enforcement Grant Fund (2019/20). This funding supports new, innovative, or targeted short-term initiatives to address criminal landlords and raise the standard of properties in the Private Rented Sector (PRS).

An important part of the project has been to make use of administrative data provided by North Norfolk District Council where this could improve on the BRE modelled data. These data included Land and Property Gazetteer (LLPG), tenancy deposit scheme and benefits data. The BRE Model also integrates Energy Performance Certificate (EPC) data and, as a result of this, 24,906 addresses have had their imputed energy characteristics replaced with observed characteristics from the EPC data for the purposes of the energy model. The use of this observed data will lead to more accurate energy models for these cases, which account for 45.2% of the total housing stock in North Norfolk. The council also commissioned the inclusion of Land Registry Commercial and Corporate Ownership Data (CCOD) and Overseas Companies Ownership Data (CCOD and OCOD).

The LLPG data indicated that there are currently an estimated 2,123 holiday homes in North Norfolk. It was requested that that these were excluded from the main analysis as they are not residential dwellings.

Furthermore, North Norfolk District Council commissioned BRE to undertake additional work to identify private rented stock in their local authority. This additional work involved an innovative approach to Private Rented Sector identification, using a variety of different data sources including the BRE Model, Tenancy Deposit Scheme, Council Tax, Ordnance Survey, local data identifying second homes and holiday homes and Land Registry data. This approach resulted in improved accuracy in identifying private rented sector dwellings across the borough.

The BRE Housing Stock Model data is provided to the council via the online Housing Stock Condition Database (HSCD) to enable them to obtain specific information whenever required. Holiday homes are included on the HSCD so that they can be identified where required by the council.

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

Table 1: Housing Standards Variables split into categories

Housing Standards Variable	House condition variables	Energy efficiency variables	Household vulnerability variables
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% & 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 variables shown in **Table 1** can also be brought together within the HSCD to provide powerful information on the housing stock; for example, dwellings suffering from excess cold and also occupied by households on a low income. This enables council officers to explore the stock and to assess the likely scope of any programmes they might wish to implement.

The information in this report includes estimates relating to the Ministry of Housing, Communities and Local Government's (MHCLG) Local Authority Housing Statistics (LAHS) reporting of costs of mitigating hazards, numbers of potential Houses in Multiple Occupation (HMOs) as well as providing information relating to Energy Performance Certificate (EPC) ratings.

The Housing Standards Variables and other information are derived from the BRE Dwelling Level Stock Models. These Models have been used for many years to provide key Housing Standards Variables to local authorities. The most recent 2018 models have been updated to make use of the results of the 2015 English Housing Survey (EHS)[3]. The models also make use of Experian and Ordnance Survey (OS) data. OS AddressBase Plus is used as a basis for the list of all residential dwellings in the authority. OS Mastermap is also linked to OS AddressBase to allow dwelling type and floor area to be determined through geographical modelling[4]. Other national data sources used by the Model include; the age of postcodes (to improve dwelling age data) and data from Xoserve to determine whether the dwelling is on the gas network. These dwelling level models are used to estimate the likelihood of a dwelling meeting the criteria for each of the Housing Standards Variables. These outputs can then be mapped to provide the authority with a geographical distribution of each of the variables which can then be used to target resources for improving the housing stock.

[3] 2015 is the latest available data. Prior to the 2018 models EHS 2014 data was used.

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

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

The information in the HSCD can be used to ensure the council meets various policy and reporting requirements. For example, local housing authorities are required to review housing conditions in their districts in accordance with the Housing Act 2004[5].

The detailed housing stock information in this report and in the HSCD provide the council with a resource for querying and collating information relating to their housing stock. This resource can be used to support the development of strategies and inform housing-related decisions for the area, enabling a targeted intervention approach to improving housing.

1.1 Summary of project aims

The main purpose of this project was to provide data on key private sector housing variables for North Norfolk. The main aims were therefore to provide estimates of:

- The percentage of dwellings with the presence of each of the Housing Standards Variables for North Norfolk overall, broken down by tenure and mapped by Census Output Area (COA) (private rented stock)
- Information relating to LAHS reporting for the private sector stock - category 1 hazards and potential HMOs, plus information on EPC ratings
- Energy efficiency variables for the private sector stock (wall and loft insulation)
- Energy planning variables (SimpleCO_2, energy and heat demand, energy and heat cost)

Additional work was also undertaken to identify private rented stock involving an innovative approach to Private Rented Sector identification, using a variety of different data sources including the BRE Model, Tenancy Deposit Scheme, Council Tax, Ordnance Survey and Land Registry data.

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 North Norfolk covering each of the main aims above.

[5] 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 North Norfolk District Council's housing strategy and enable a targeted intervention approach to improving housing. This strategy needs to be set in the context of relevant government policy and legislative requirements. These policies either require reporting of housing-related data by local authorities, or the use of such data to assist in meeting policy requirements. The main policies and legislative requirements are summarised in the following sub-sections.

2.1 Housing Act 2004

The Housing Act 2004[5] 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"[6] 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 North Norfolk in the 10 years between 2001 and 2011 - from 10% of the total stock in 2001 to 17% in 2011[7] - so that 7% of the stock has changed over that time period to now be private rented. This is lower than the change of 9% seen in England as a whole. The analysis for this current report estimates that 18% of the stock in North Norfolk is now privately rented.

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

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

The Private Rented Sector Innovation and Enforcement Grant Fund (2019/20)[8] has been supplied by the Ministry of Housing, Communities and Local Government (MHCLG) to support new, innovative, or targeted short-term initiatives to tackle criminal landlords and raise the standard of properties in the Private Rented Sector (PRS). The grant also promotes the use of legislative powers within the Housing Act 2004 and the Housing & Planning Act 2016 to take enforcement action against criminal landlords.

2.2.2 Health inequalities

The Government's white paper "Choosing Health"[9] states that the key to success in health inequalities will be effective local partnerships led by local government and the NHS working to a common purpose and reflecting local needs. Housing is a key determinant of health, and poor housing conditions continue to cause preventable deaths and contribute to health inequalities[10]. 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"[11].

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"[12] 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

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8 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/844171/PRS_Innovation_and_Enforcement_Grant_Fund_Prospectus.pdf

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

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

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

12 Healthy lives, healthy people: Improving outcomes and supporting transparency, Department of Health, 2013

There have been minor indicator changes for 2019-2022, incorporating moderate to severe falls

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 "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"[13].

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, since 1 April 2018 it became unlawful for landlords to grant a new tenancy or renew an existing tenancy for a property that does not reach a minimum energy efficiency standard (MEES) of Energy Performance Certificate rating band E[14]. While there will be various caveats to these powers, they provide a new minimum standard for rented accommodation. If the EPC rating is an F or G, the landlord must improve the rating to a minimum of EPC E or register an exemption (if applicable) before they are able to let the property. Since 1 April 2020, the regulations apply to all domestic rented properties regardless of whether or not there has been a change in tenancy (again exemptions may apply but these must be registered by the landlord on the PRS exemptions register). Part of this current project for North Norfolk District Council includes provision of a private rented sector variable that should assist in identifying such dwellings.

2.2.7 Empty homes

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

Empty homes brought back into use will qualify for the New Homes Bonus where, for the following 4 years, the government will match the Council Tax raised on long term empty properties brought back into use. This was previously set at 5 years in 2017-19 and 6 years prior to that. Between 2012-15, £100 million of capital funding was available from within the Affordable Homes Programme to tackle problematic[15] empty homes. There is no longer any separate funding for empty homes under the 2015-18 Affordable Homes Programme, although they are legitimate forms of Affordable Rent provision that could be included in bids for the 2015-18 Affordable Homes Programme[16].

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,

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

[14] https://www.gov.uk/government/publications/the-private-rented-property-minimum-standard-landlord-guidance-documents

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

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

let and modernised, which means that at any given time a proportion of the stock will be naturally vacant. The only dwellings that tend to be of most interest to local authorities are those that are not turning over in the normal way.

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

Data for North Norfolk for 2019, collected by MHCLG[17], identifies 1,707 vacant dwellings across all tenures. This represents a vacancy rate of approximately 3% in North Norfolk. In 2018 the number of vacant dwellings was 1,646, and 5 years ago in 2014 the figure was 1,765. Furthermore, around 572 (1%) dwellings are long-term vacant (6 months or more) in North Norfolk (2019 figures).

The Affordable Homes Programme was replaced by the Shared Ownership and Affordable Homes Programme (2016-2021), supporting increased home ownership and aiming to expand supply of affordable homes in England. A total of £4.7 billion is available for the development of Shared Ownership and other affordable homes.[18]

2.3 Other policy areas

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

2.3.1 The Housing and Planning Act 2016

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

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

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

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

[18] https://www.gov.uk/government/collections/shared-ownership-and-affordable-homes-programme-2016-to-2021-guidance

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

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

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

The Welfare Reform and Work Act 2016[20] gained royal assent in March 2016. The Act introduces a duty to report to Parliament on progress made towards achieving full employment and the three million apprenticeships target in England. The Act also ensures reporting on the effect of support for troubled families and provision for social mobility, the benefit cap, social security and tax credits, loans for mortgage interest, and social housing rents. These include the following:

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

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

2.3.3 Localism Act 2011

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

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

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

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

2.3.4 Potential increase in private rented sector properties

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

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

The purpose of these statistics is twofold – firstly to provide central government with data with which to inform and monitor government strategies, policies and objectives as well as contributing to national statistics on housing, secondly, to the local authorities themselves to help manage their housing stock. Local authorities are required to complete an annual return which covers a wide range of housing-related issues. Of particular relevance to this current project is “Section F: Condition of dwelling stock” which, amongst other things, requests the following information:

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

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

The LAHS no longer requires reporting of average EPC ratings of the private sector stock and the proportion below a certain rating; however, this information remains pertinent due to the Energy Act 2011. Under this act, from 1 April 2018 landlords must ensure that their properties meet a minimum energy efficiency standard when they grant a tenancy to new or existing tenants - which has been set at band E [23, 24]. From 1 April 2020, landlords can no longer continue letting a property which is already let if it has an EPC rating of F or G[25]. 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) 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

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

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

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

[25] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/794253/domestic-prs-minimum-standard-guidance.pdf

hard-to-treat (HTT) properties. Under the ECO, energy companies are obliged to meet targets expressed as carbon or costs saved. There have been several ECO schemes to date:

- ECO1 - ran from January 2013 to March 2015
- ECO2 - launched on 1 April 2015 and ended on 31 March 2017
- ECO2t - was an 18 month extension to the ECO2 scheme until September 2018[26, 27] as a transition period between the end of ECO2 and a new scheme.
- ECO3[28]- launched in October 2018 and will run for 3.5 years to the end of March 2022

Current scheme – ECO3

ECO3 has 4 phases terminating in March of each year (2019-2022). The scheme focusses on Affordable Warmth (the Carbon Emissions Reduction Obligation – CERO – has been removed) so that low income and vulnerable households are the recipients of the main benefits. The scope of the Affordable Warmth group will be expanded to include other benefits (e.g. Child Benefit, Personal Independence Payment, etc.).

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

Energy companies can also use the local authority Flexible Eligibility mechanism to achieve up to 25% of their obligation – allowing councils to outline personal criteria to maximise inclusion of vulnerable people in funding for domestic heating and insulation upgrades.

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.

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

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

[28] https://www.gov.uk/government/consultations/energy-company-obligation-eco3-2018-to-2022

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 Housing Standard Variables (and other outputs of interest). These outputs can then be mapped to provide the council with a geographical distribution of each of the variables which can then be used to target resources for improving the housing stock. The process is made up of a variety of data sources, calculations and models.

The models are principally informed by the Ministry of Housing, Communities and Local Government's (MHCLG) English Housing Survey (EHS)[29]. The EHS dataset is used to identify patterns in the housing stock for those which fail a given indicator, for example HHSRS. This knowledge can be applied, using statistical methods, to impute Housing Standards Variables and energy characteristics from other data available at dwelling level which cover the whole of England. To model the energy efficiency of dwellings, BRE have developed a variant of the BREDEM[30] software, named "SimpleCO_2", that can calculate energy outputs from a reduced set of input variables.

The modelled dwelling level data provided for North Norfolk makes significant use of the Experian UK Consumer Dynamics Database of dwelling and household indicators, as well as OS datasets as inputs to the models.

North Norfolk District Council also provided additional sources of local data which were incorporated into the BRE Housing Stock Model and Database, as well as the EPC data, to produce an integrated housing stock model and database. The additional data provided and how it was used is as follows:

- **EPC data** – EPCs contain data on key dwelling energy characteristics (e.g. wall type and insulation, loft insulation, heating types etc.) and where these were available they were used in preference to the modelled data. It should be noted that to comply with bulk EPC data licencing requirements the EPC data is only used to inform the energy efficiency aspects of the model.
- **LLPG data –** the Unique Property Reference Number (UPRN) from the LLPG was used to uniquely identify all properties, while the address details from the LLPG were used to merge the BRE Models and the EPC data using address matching. The LLPG data indicated that there are currently an estimated 2,123 holiday homes in North Norfolk. It was requested that that these were excluded from the main analysis as they are not residential dwellings.

[29] The most recent survey used in the housing stock models is 2015.

[30] 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.

- **Tenancy deposit data –** the council provided tenancy deposit scheme addresses which were used to inform the tenure variable.
- **Second homes -** the council provided data for second homes. These were assumed to be owner occupied and used to inform the tenure variable.
- **Benefits data –** this provides a list of addresses in receipt of various benefits. This was matched into the BRE Model using the UPRN and these addresses were assigned to low income households. The BRE Low Income Households Model was then used to assign the remaining low income households since housing and council tax reductions are only a proportion of total low income households.
- **CCOD & OCOD data** – in addition to the above, HM Land Registry Commercial and Corporate Ownership Data (CCOD) and Overseas Companies Ownership Data (OCOD) was used to inform the tenure variable. For houses with a title number owned by a Registered Provider the dwelling is assumed to be social. This is not the case for flats due to the fact that the leasehold ownership may not correspond to the title ownership so no such assumption can be made.

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

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 Housing Standards Variables and other data requirements (e.g. energy efficiency variables). More detailed information on the data sources and models is provided in **Appendix B**, but to summarise:

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

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

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

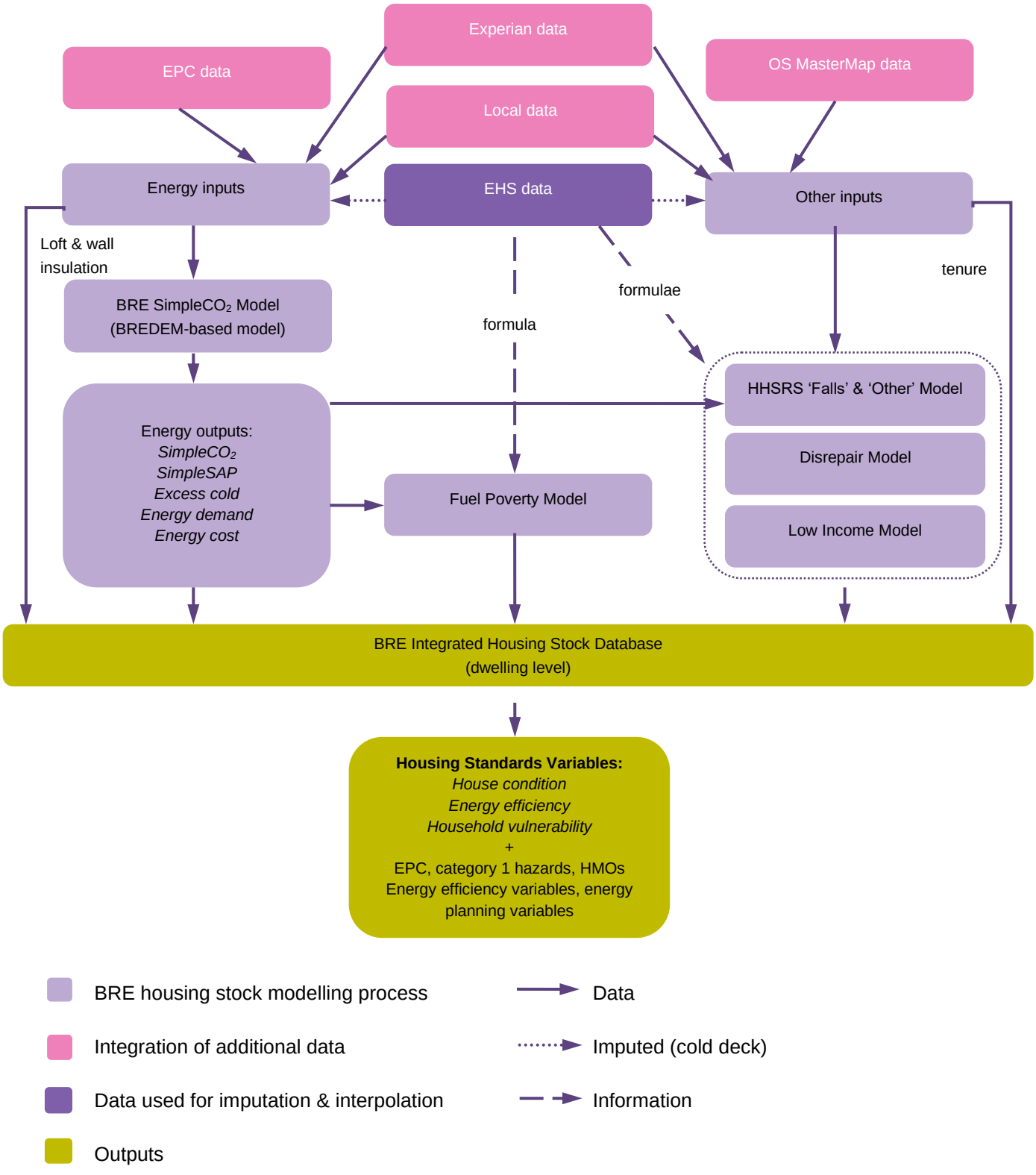
Energy inputs - are developed from Experian, EPC and other local data sources (if available). The EHS data is used to impute (using cold deck imputation[31]) and interpolate where there are gaps in the data. The “energy inputs” are then fed into the SimpleCO_2 Model to produce the “energy outputs” for the database plus information on excess cold for the HHSRS Model and information on energy costs for the Fuel Poverty Model.

Other inputs – are developed from Experian, OS MasterMap and other local data sources. The EHS data is used to impute (using cold deck imputation[31]) 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.

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

An additional part of this project was to use further available evidence to identify private rented stock in North Norfolk. More information about this part of the project is provided in the following section.

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



3.2 Additional Private Rented Sector identification

An additional part of this project was to use further available evidence to identify private rented stock in North Norfolk.

As previously mentioned, HM Land Registry Commercial and Corporate Ownership Data (CCOD) and Overseas Companies Ownership Data (OCOD) were used to inform social tenure[32].

The method used for this part of the project also included a cross-reference of the liable person name on the Council Tax Register address list to determine if this matched with the ownership data help by Land Registry. Where the names did not match between the two datasets, it was assumed that the properties were privately rented.

The council requested 16,000 addresses from the Council Tax Register to be submitted to the Land Registry for processing. These addresses were split equally across the wards to achieve a borough wide sample. This resulted in a total sample of 700 addresses from each ward, where evidence of tenure was available from other sources, these addresses were removed. At this stage of the analysis holiday homes were included in the analysis of tenure evidence. This was to ensure that these records, which were known to the Council, were not included in the sample to send to Land Registry. For the purpose of this analysis it was assumed that these were private rented. This resulted in a number of addresses for each ward which did not have evidence of tenure and where these could be matched to the Council Tax Register data, these addresses were sent to Land Registry for processing. **Table 2** shows these figures for each ward; for example, in Bacton ward from the initial sample of 700 addresses, 231 already had evidence of tenure from other sources, leaving 469 with no evidence of tenure, 465 of these could be matched to the Council Tax Register and therefore, this was the number of records for that ward that was sent to Land Registry.

The aim of the borough wide sampling work was to obtain evidence of tenure for a representative sample of addresses in each ward which could then be used to inform the tenure distribution at ward level. This tenure distribution based on the evidence from the samples was then applied across each of the wards.

This analysis has resulted in 28,895 dwellings in North Norfolk having evidenced tenure information, either from TDS, CCOD/OCOD, local data identifying second homes and holiday homes, or Land Registry analysis. This is 53.6%[33] of dwellings across all wards in North Norfolk.

[32] For houses with a title number owned by a Registered Provider the dwelling is logically assumed to be social rented tenure. This assumption does not always hold true for flats as the leasehold ownership may not correspond to the title ownership information available on CCOD which is freehold based. This issue means the CCOD cannot definitively identify individual flats as being social rented stock even though the freehold is owned by a registered provider. It is, however, a reasonable assumption that the majority of the stock where the freehold remains with the Council will not have been sold leasehold and so it is assumed these are also social rented (unless otherwise instructed).

[33] This is a percentage of the total dwellings including holiday homes i.e. 55,111

bre

Table 2: Summary of ward-level samples of addresses sent to Land Registry

Ward	All stock	Initial Sample	Tenure evidence provided	No Tenure Evidence	Matched to Council Tax Register
Bacton	1,418	700	231	469	465
Beeston Regis & The Runtons	1,445	700	145	555	553
Briston	1,236	700	168	532	531
Coastal	2,136	700	365	335	333
Cromer Town	3,227	700	187	513	508
Erpingham	1,301	700	133	567	566
Gresham	1,280	700	177	523	522
Happisburgh	1,474	700	156	544	541
Hickling	1,433	700	193	507	505
Holt	2,718	700	186	514	507
Hoveton & Tunstead	2,426	700	116	584	584
Lancaster North	1,111	700	144	556	556
Lancaster South	2,800	700	188	512	511
Mundesley	1,811	700	276	424	423
North Walsham East	2,219	700	179	521	520
North Walsham Market Cross	1,418	700	51	649	648
North Walsham West	2,583	700	138	562	561
Poppyland	1,387	700	153	547	545
Priory	1,403	700	290	410	406
Roughton	1,357	700	162	538	534
Sheringham North	1,745	700	244	456	452
Sheringham South	2,631	700	125	575	575
St Benet's	1,391	700	209	491	489
Stalham	2,144	700	150	550	545
Stibbard	1,280	700	154	546	542
Stody	1,289	700	159	541	537
Suffield Park	1,643	700	224	476	476
The Raynhams	1,315	700	168	532	532
Trunch	1,158	700	122	578	575
Walsingham	1,274	700	194	506	502
Wells with Holkham	1,864	700	311	389	387
Worstead	1,194	700	122	578	575
Total	55,111	22,400	5,820	16,580	16,506

Table 3 shows the results of the tenure distribution based on the sample analysis and other evidence of tenure (i.e. TDS, CCOD/OCOD data) at ward level. For example, in Bacton ward there were 581 addresses which had tenure evidence from TDS, CCOD/OCOD, local data identifying second homes and holiday homes, or the Land Registry analysis. The tenure evidence for this sample of 581 addresses indicated that 71.8% of the stock was owner occupied, 24.6% private rented and 3.6% social stock.

Table 3: Summary of results of the estimated tenure distribution based on the sample analysis and other evidence of tenure at ward level

Ward	Sample size	Owner Occupied	Percent Private Rented	Social
Bacton	581	71.8%	24.6%	3.6%
Beeston Regis & The Runtons	628	77.5%	15.3%	7.2%
Briston	665	67.1%	20.2%	12.8%
Coastal	652	62.4%	26.5%	11.0%
Cromer Town	626	59.3%	29.7%	11.0%
Erpingham	601	71.0%	20.5%	8.5%
Gresham	608	66.8%	23.0%	10.2%
Happisburgh	624	75.6%	18.6%	5.8%
Hickling	630	72.5%	17.5%	10.0%
Holt	655	67.2%	18.5%	14.4%
Hoveton & Tunstead	633	70.6%	18.8%	10.6%
Lancaster North	690	69.4%	18.3%	12.3%
Lancaster South	676	61.8%	16.6%	21.6%
Mundesley	670	70.7%	19.3%	10.0%
North Walsham East	681	60.2%	16.7%	23.1%
North Walsham Market Cross	664	67.0%	21.7%	11.3%
North Walsham West	668	65.6%	18.3%	16.2%
Poppyland	642	79.0%	16.2%	4.8%
Priory	638	64.9%	21.9%	13.2%
Roughton	631	67.5%	18.2%	14.3%
Sheringham North	622	65.9%	26.2%	7.9%
Sheringham South	667	76.9%	16.9%	6.1%
St Benet's	646	70.6%	15.8%	13.6%
Stalham	632	63.4%	22.0%	14.6%
Stibbard	622	72.2%	15.3%	12.5%
Stody	599	68.8%	25.7%	5.5%
Suffield Park	643	68.7%	20.4%	10.9%
The Raynhams	655	62.9%	31.6%	5.5%
Trunch	592	73.8%	13.7%	12.5%
Walsingham	628	63.9%	26.3%	9.9%
Wells with Holkham	643	56.0%	28.5%	15.6%
Worstead	621	68.1%	21.7%	10.1%

3.2.1 Impact of analysis on data integrated within the model

The results from the analysis described above were used to inform tenure in the BRE integrated model, the results of which are provided in the remainder of this report. This sub-section provides a summary of the impacts of the analysis on the data overall and looks at the results of tenure distribution for all wards.

While the key objective of this part of the project was to identify private rented sector stock, this has an impact on the overall tenure estimates, resulting in the changes to the tenure data in the model shown in **Table 4**.

Table 4: Impact of analysis on tenure data

Tenure	Total no. of records	%	Increase/Decrease	Previous total no. of records	Previous %
Owner Occupied	37,171	67.4%	this is a decrease of 0.9 percentage points from the baseline	37,664	68.3%
Social Rented	6,447	11.7%	this is a decrease of 0.0 percentage points from the baseline	6,426	11.7%
Private Rented	11,493	20.9%	this is an increase of 0.9 percentage points from the baseline	11,021	20.0%

Table 5 shows the tenure results at ward level as well as giving the percentage of dwellings in each ward with evidence of tenure after the private rented sector identification analysis. For example, in Bacton ward, there is now tenure evidence for 56.6% of dwellings. The proportion of dwellings with evidenced tenure varies from around 38% up to 68%.

Table 5: Summary of tenure distribution after PRS identification and % of all dwellings in each ward with evidence of tenure after this exercise

Ward	Tenure						% of dwellings with evidenced tenure
	Owner occupied		Private rented		Social		
	No.	%	No.	%	No.	%	
Bacton	1,018	71.8%	349	24.6%	51	3.6%	56.6%
Beeston Regis & The Runtons	1,120	77.5%	221	15.3%	104	7.2%	52.2%
Briston	828	67.0%	250	20.2%	158	12.8%	61.2%
Coastal	1,334	62.5%	567	26.5%	235	11.0%	63.7%
Cromer Town	1,914	59.3%	958	29.7%	355	11.0%	41.9%
Erpingham	923	70.9%	267	20.5%	111	8.5%	53.1%
Gresham	855	66.8%	294	23.0%	131	10.2%	55.5%
Happisburgh	1,115	75.6%	274	18.6%	85	5.8%	53.5%
Hickling	1,039	72.5%	251	17.5%	143	10.0%	54.6%
Holt	1,825	67.1%	502	18.5%	391	14.4%	46.3%
Hoveton & Tunstead	1,713	70.6%	456	18.8%	257	10.6%	38.5%
Lancaster North	771	69.4%	203	18.3%	137	12.3%	68.0%
Lancaster South	1,730	61.8%	465	16.6%	605	21.6%	43.5%
Mundesley	1,280	70.7%	350	19.3%	181	10.0%	61.2%
North Walsham East	1,335	60.2%	371	16.7%	513	23.1%	48.2%
North Walsham Market Cross	950	67.0%	308	21.7%	160	11.3%	54.7%
North Walsham West	1,693	65.5%	472	18.3%	418	16.2%	39.8%
Poppyland	1,095	78.9%	225	16.2%	67	4.8%	56.0%
Priory	911	64.9%	307	21.9%	185	13.2%	65.0%
Roughton	916	67.5%	247	18.2%	194	14.3%	55.8%
Sheringham North	1,150	65.9%	457	26.2%	138	7.9%	55.6%
Sheringham South	2,024	76.9%	446	17.0%	161	6.1%	38.1%
St Benet's	982	70.6%	220	15.8%	189	13.6%	61.0%
Stalham	1,359	63.4%	472	22.0%	313	14.6%	43.1%
Stibbard	924	72.2%	196	15.3%	160	12.5%	57.0%
Stody	887	68.8%	331	25.7%	71	5.5%	56.6%
Suffield Park	1,129	68.7%	335	20.4%	179	10.9%	59.2%
The Raynhams	827	62.9%	416	31.6%	72	5.5%	60.0%
Trunch	854	73.7%	159	13.7%	145	12.5%	56.6%
Walsingham	813	63.8%	335	26.3%	126	9.9%	62.4%
Wells with Holkham	1,043	56.0%	530	28.4%	291	15.6%	65.5%
Worstead	814	68.2%	259	21.7%	121	10.1%	56.0%

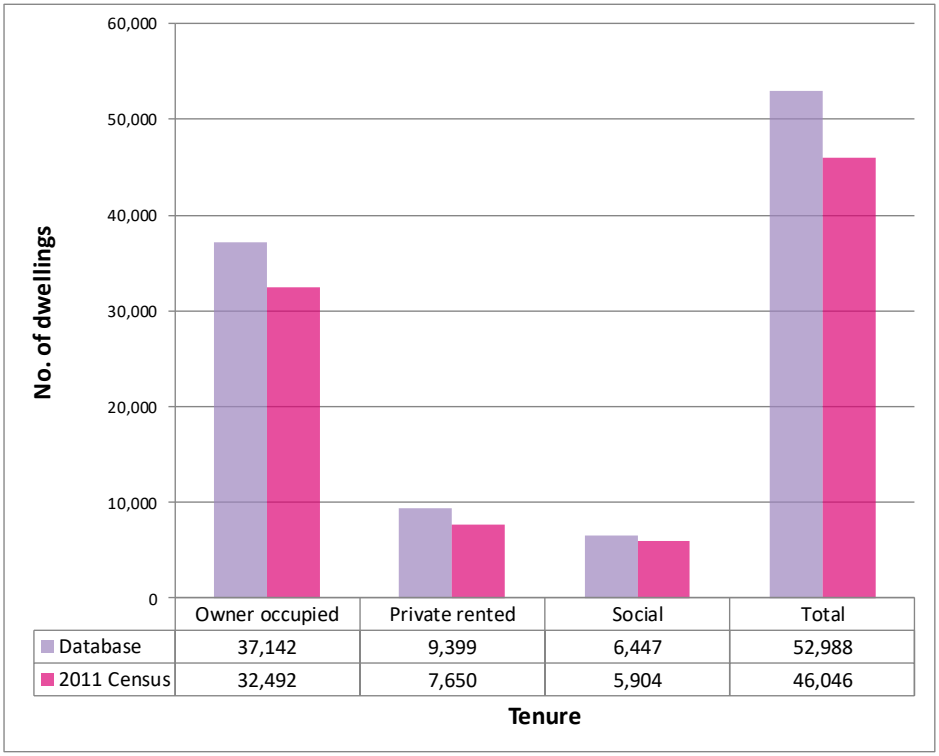
3.3 Breakdown of the housing stock by tenure - validation

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 North Norfolk from the integrated housing stock condition database is based on LLPG data; therefore the model is based on this value. The tenure split within the integrated database is derived from the purchased Experian tenure variable for addresses where tenure has not been supplied by the council.

Since it is possible for private rented dwellings to become owner occupied and vice versa relatively easily, it is difficult to accurately predict the actual tenure split at any given point in time. A validation process was undertaken to compare the tenure split from the database to the 2011 Census figures[34]. The results of the validation exercise show the differences between the tenure split from the database compared to the Census figures (see **Figure 2**). Furthermore, **Maps 1** and **2** show the geographical distributions of the private rented sector which give confidence that the integrated database provides a good overview of the housing stock in North Norfolk.

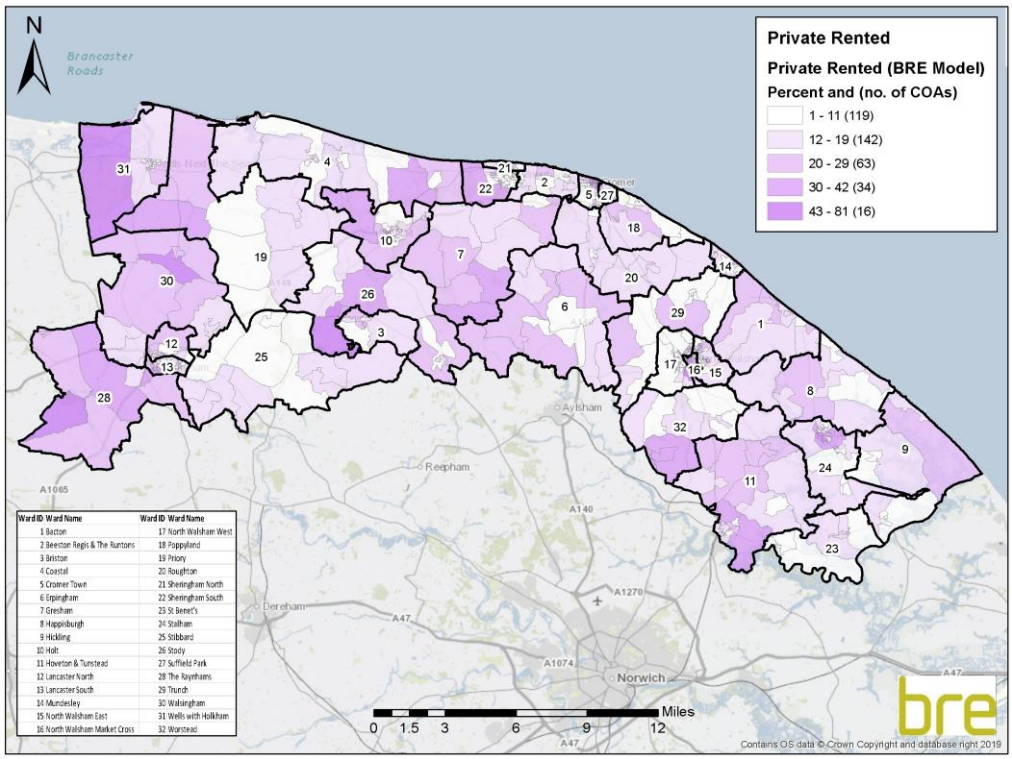
Figure 2: Tenure split – comparison of BRE Housing Stock Condition Database outputs with 2011 Census figures for North Norfolk



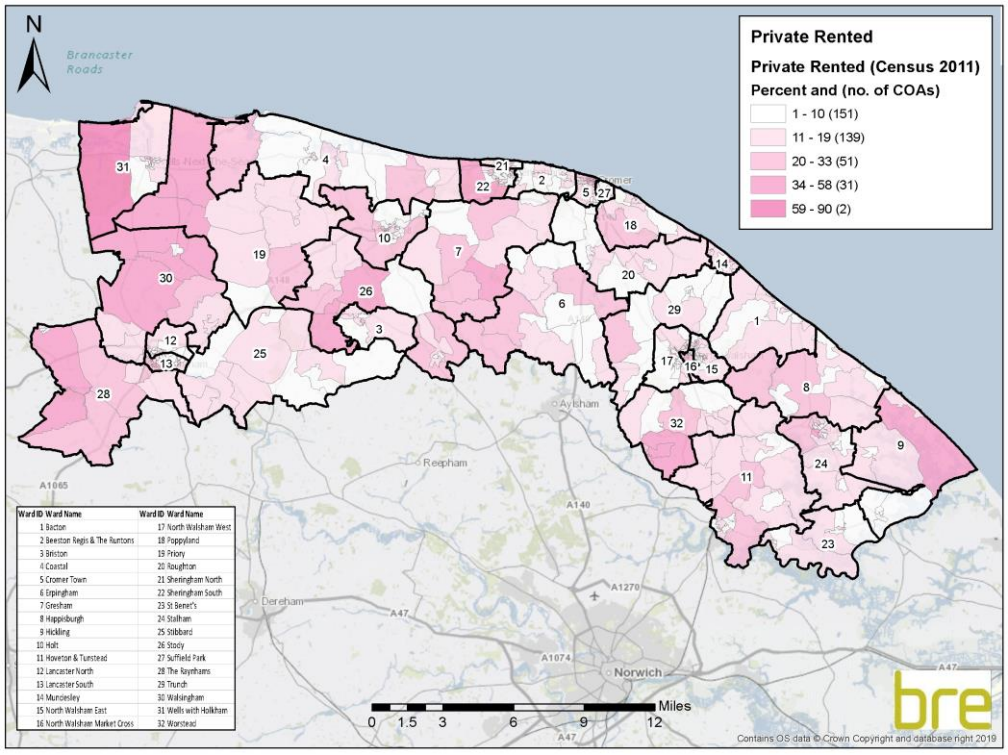
	Owner occupied	Private rented	Social	Total
Database	37,142	9,399	6,447	52,988
2011 Census	32,492	7,650	5,904	46,046

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

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



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



3.3.1 Other national datasets relating to tenure

In addition to the Census data there are other national datasets available which provide information on tenure; these are MHCLG returns[35] and Office for National Statistics (ONS) data[36]. These datasets are not used directly in the model but are reported here for the purposes of comparison.

The MHCLG returns provide estimates of the tenure split by private sector and social sector only, with the former being based on projections from the 2011 Census as a starting point, and the latter being based on Local Authority Housing Statistics. The tenure split used in the BRE Housing Stock Model is compared to this at an early stage of the project in order to ensure the tenure split is consistent[37].

The ONS data provides subnational (local authority level) data on the dwelling stock broken down into tenure. The ONS split between owner occupied and private rented stock is based on their Annual Population Survey (APS)[38] which is then benchmarked to the MHCLG returns. The APS is based on "persons who regard the sample address as their main address and also those who have lived in the dwelling for more than 6 consecutive months, even if they do not regard this as their principal dwelling". This methodology may under-estimate the proportion of private rented dwellings for several reasons:

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

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

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

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

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

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

It is important to note that the ONS data is not an official statistic and that a disclaimer[39] must be used when reproducing the data (note that the "***dwelling stock by tenure***" in the disclaimer refers to the MHCLG returns data).

Table 6 shows the latest tenure splits from the MHCLG data for North Norfolk. Since the ONS data is benchmarked to the MHCLG returns, the figures for the private sector stock match.

As previously mentioned in **Section 2.2.1**, the proportion of private rented stock in North Norfolk from the 2011 Census figures[40] was 17%, and the BRE Database figure of 18% ties in with this given that there is more likely to have been an increase in the private rented stock since 2011.

Table 6: Comparison of MHCLG, ONS and BRE Database figures on tenure split for North Norfolk

Tenure	Number of dwellings			% of all stock		
	2017 MHCLG	2017 ONS	BRE Database	2017 MHCLG	2017 ONS	BRE Database
Owner occupied	49,250	38,553	37,142	89%	69%	70%
Private rented		10,697	9,399		19%	18%
Social	6,300	-	6,447	11%	-	12%

N.B. MHCLG data does not break down private sector into owner occupied and private rented stock and ONS data does not provide an estimate for social stock

[39] ONS Disclaimer: *"We have published these Research outputs to provide an indication of the tenure breakdown of dwellings within the private sector at the subnational level. Research Outputs are produced to provide information about new methods and data sources being investigated. Official statistics on private dwellings by tenure are currently only available at the country level. Statistics on* ***dwelling stock by tenure***[35] *are available for local authorities but do not provide a breakdown of owner-occupied and privately rented dwellings. These statistics are subject to marginal error as they are estimates based on a survey, therefore users should refer to the coefficient of variation (CV) and confidence intervals when making interpretations."*

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

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

As described in the previous section, the housing stock modelling process consists of a series of different stock models with the main output being the HSCD. 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 North Norfolk. Information at ward level, however, is provided in the maps, in **Section 4.2.3** and can also be obtained from the HSCD which has been supplied as part of this project (see **Appendix C** for instructions). The HSCD can be interrogated at local authority, ward, medium super output area (MSOA), lower super output area (LSOA), census output area (COA), postcode or dwelling level.

The first sub-section below provides a map of the wards in North Norfolk. The results are then displayed in the following sub-sections:

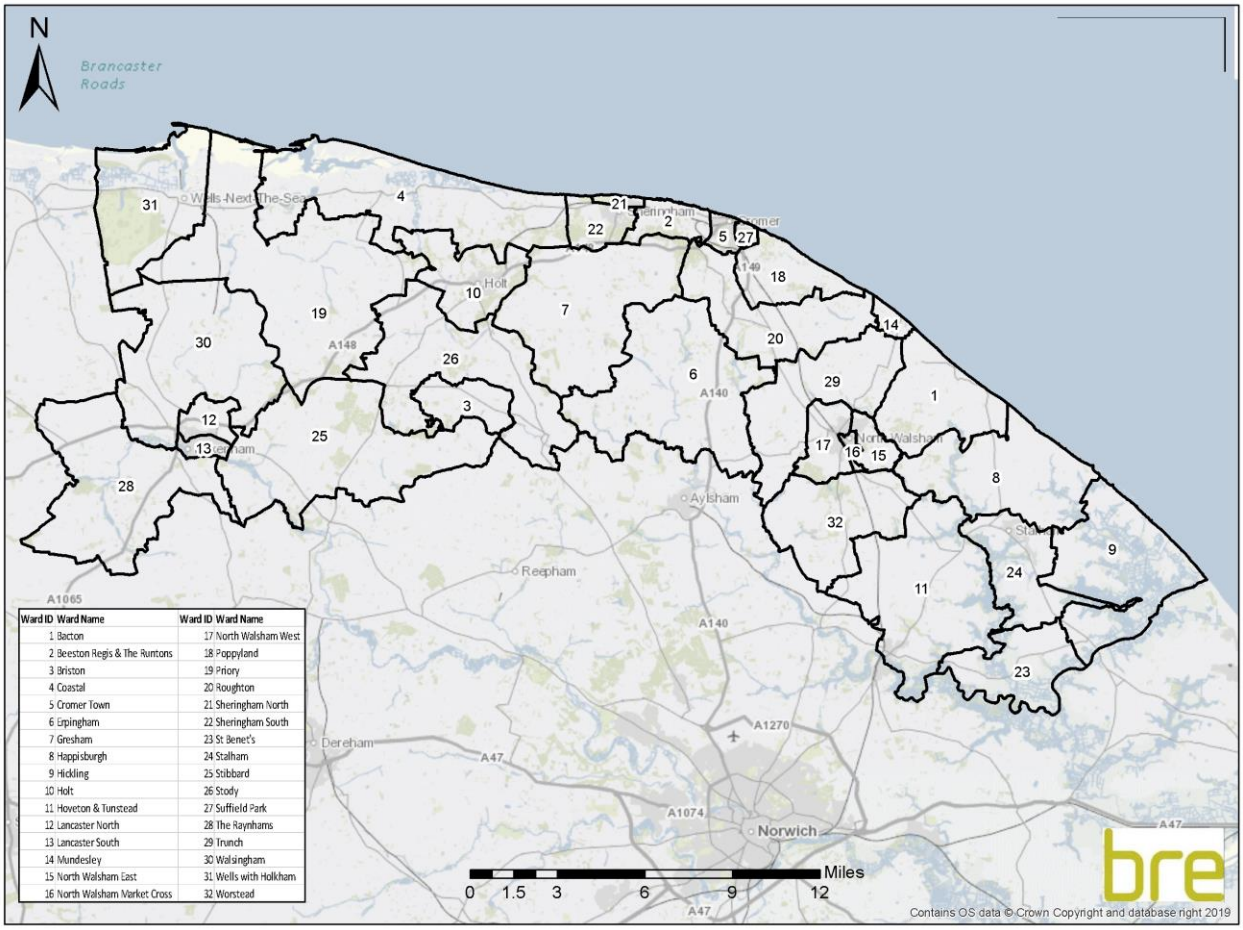
- Housing Standards Variables:
  - North Norfolk – regional and national comparisons
  - Housing Standards Variables by tenure for North Norfolk
  - Housing Standards Variables mapped by COA for North Norfolk private rented sector stock
- Information relating to LAHS reporting and EPC ratings:
  - Category 1 hazards
  - Potential HMOs
  - EPC ratings
- Energy efficiency variables for North Norfolk private sector stock (wall and loft insulation)
- Energy planning variables for North Norfolk (SimpleCO_2, energy and heat demand, energy and heat cost)

4.1 Overview of North Norfolk

Map 3 below shows the 32 wards in North Norfolk. The data in the report is separated into wards and then further divided into Census Output Areas (COAs). These typically comprise around 125 households and usually include whole postcodes, which have populations that are largely similar. Where the COAs are smaller in size on the map this typically represents a more densely populated area since each COA represents a similar number of dwellings.

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

Map 3: The wards in North Norfolk



4.2 Housing Standards Variables

4.2.1 North Norfolk – regional and national comparisons

Table 7 and **Figure 3** show the results for each of the Housing Standards Variables in North Norfolk compared to the East of England region and to England (EHS 2015) and split into all stock and private sector stock. **Figure 4** shows the results of the SimpleSAP ratings.

Table 7: Estimates of the numbers and percentage of dwellings with the presence of each of the Housing Standards Variables assessed by the Housing Stock Models and HSCD for all stock and private sector stock – North Norfolk compared to the East of England and England (EHS 2015)

Variable		All stock				Private sector stock			
		North Norfolk (no.)	North Norfolk (%)	2015 EHS Regional (%)	2015 EHS England (%)	North Norfolk (no.)	North Norfolk (%)	2015 EHS Regional (%)	2015 EHS England (%)
No. of dwellings		52,988	-	-	-	46,541	-	-	-
HHSRS category 1 hazards	All hazards	13,061	25%	14%	12%	12,306	26%	16%	13%
	Excess cold	9,268	17%	4%	3%	8,798	19%	5%	4%
	Fall hazards	4,702	9%	8%	7%	4,424	10%	9%	8%
Disrepair		1,518	3%	2%	4%	1,404	3%	2%	4%
Fuel poverty (10%)		7,439	14%	8%	10%	6,778	15%	8%	10%
Fuel poverty (Low Income High Costs)		5,249	10%	8%	11%	4,659	10%	8%	11%
Low income households		12,042	23%	22%	26%	8,150	18%	15%	17%

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 3: Estimates of the percentage of dwellings with the presence of each pf the Housing Standards Variables assessed by the Housing Stock Models and HSCD for all stock and private sector stock – North Norfolk compared to the East of England and England (EHS 2015)

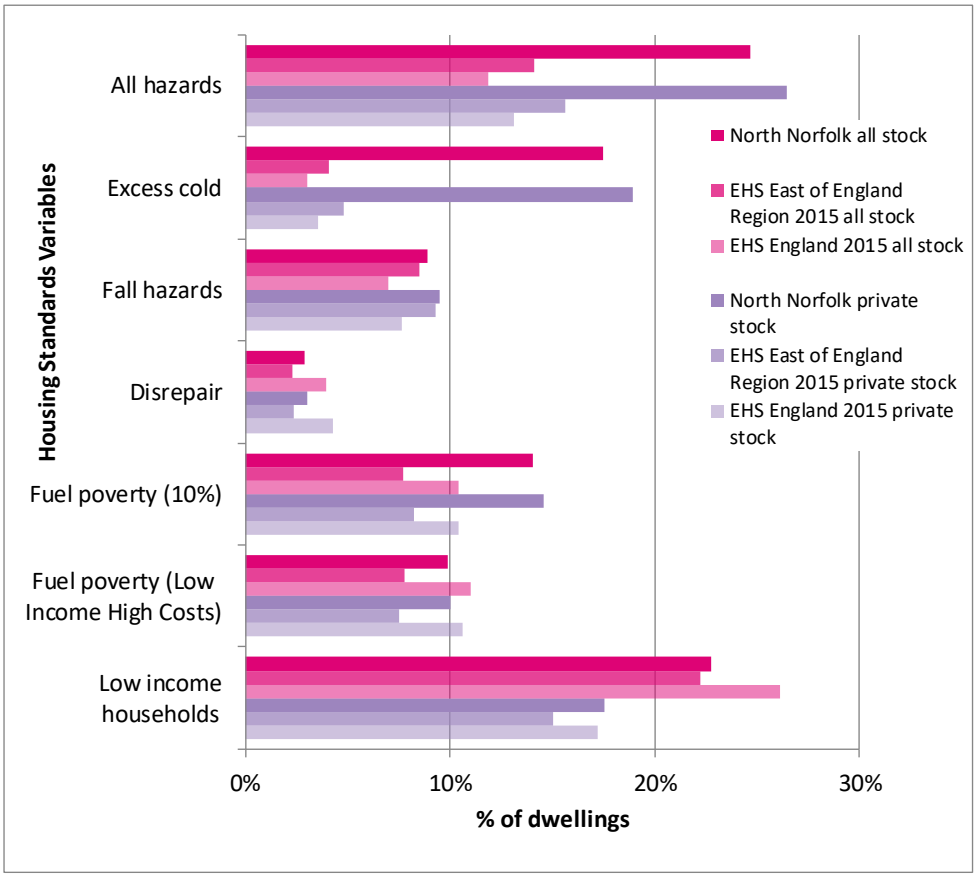
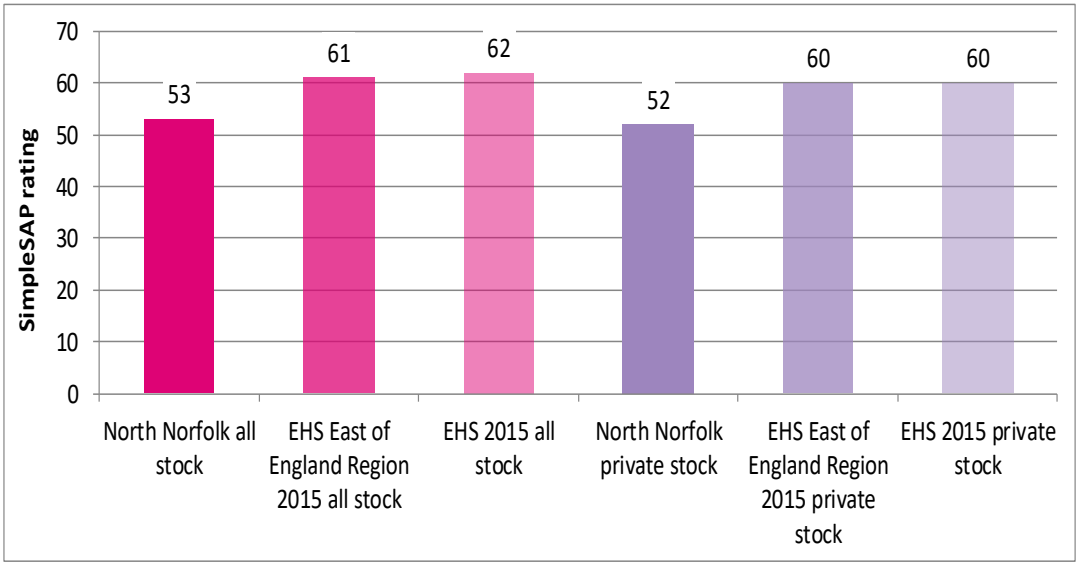


Figure 4: Average SimpleSAP ratings for all stock and private sector stock – North Norfolk compared to the East of England and England (EHS 2015)



4.2.2 Housing Standards Variables by tenure – North Norfolk

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 8 and **Figure 5** below show the results for each of the Housing Standards Variables split by tenure and **Figure 6** shows the SimpleSAP ratings by tenure.

Social stock tends be more thermally efficient than the private stock partly due to the prevalence of flats, and partly due to being better insulated owing to the requirements placed on social housing providers, for example through the Decent Homes Programme.

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.

Table 8: Estimates of the numbers and percentage of dwellings with the presence of each of the Housing Standards Variables assessed by the Housing Stock Models and HSCD by tenure for North Norfolk

Variable		Private sector stock				Social stock	
		Owner occupied		Private rented			
		No.	%	No.	%	No.	%
No. of dwellings		37,142	-	9,399	-	6,447	-
HHSRS category 1 hazards	All hazards	9,793	26%	2,513	27%	755	12%
	Excess cold	7,207	19%	1,591	17%	470	7%
	Fall hazards	3,445	9%	979	10%	278	4%
Disrepair		986	3%	418	4%	114	2%
Fuel poverty (10%)		5,580	15%	1,198	13%	661	10%
Fuel poverty (Low Income High Costs)		3,075	8%	1,584	17%	590	9%
Low income households		3,685	10%	4,465	48%	3,892	60%

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 with the presence of each of the Housing Standards Variables assessed by the Housing Stock Models and HSCD by tenure for North Norfolk

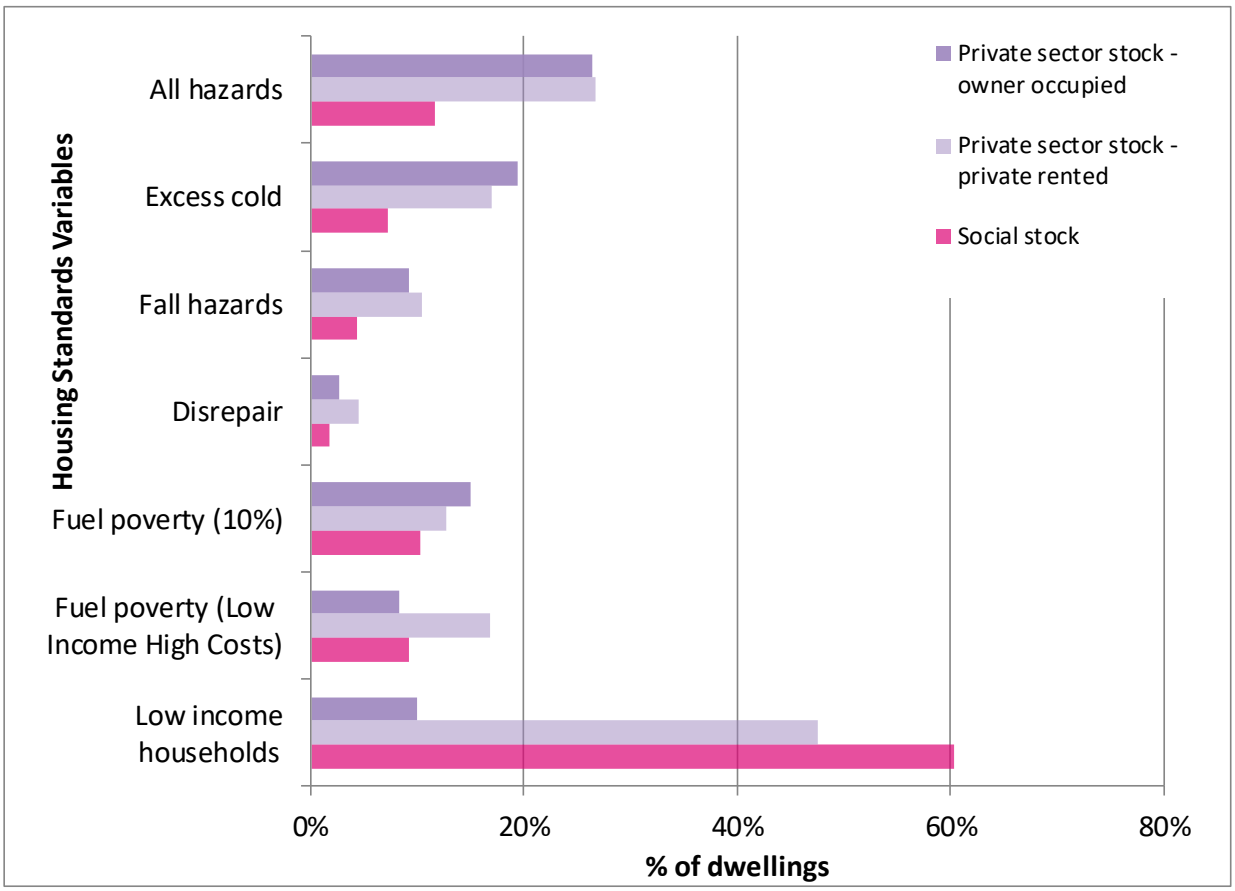
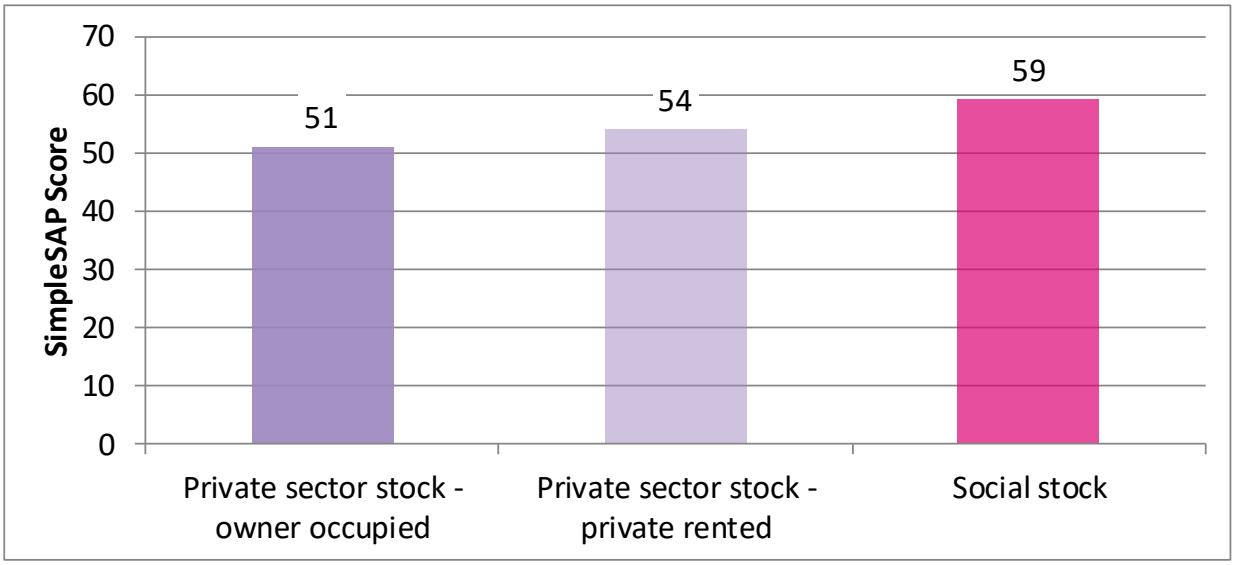


Figure 6: Average SimpleSAP ratings by tenure for North Norfolk



4.2.3 Housing Standards Variables mapped by Census Output Area (COA) – North Norfolk private rented stock

Some of the Housing Standards Variables are also provided in map form below along with a brief description of each variable[41], thus enabling quick observation of the geographical distribution of properties of interest. The maps show the percentages of private rented sector dwellings in each Census Output Area (COA) that are estimated to have each of the Housing Standards Variables.

The ranges shown in the map keys are defined based on the Jenks' Natural Breaks algorithm of the COA statistics[42]. 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 variables in **Map 4** to **Map 12** 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 disrepair**
- **Levels of fuel poverty** (Low Income High Costs and 10% definitions)
- **Low income households**
  - Dwellings occupied by low income households
  - Dwellings with a category 1 excess cold hazard that are occupied by a low income household
- **The average SimpleSAP[43] rating**

In addition, maps have been provided for potential HMOs, EPC ratings, energy efficiency variables (uninsulated cavity walls, solid walls, loft insulation) and energy planning variables (energy demand/cost and heat demand/cost).

These maps are extremely useful in showing the geographical distribution for single variables. Maps can also be produced for a combination of variables, such as dwellings with an excess cold hazard which are also occupied by low income households, as shown in **Map 11**. The HSCD also provides a mapping feature which allows the visualisation of the variables through a variety of geographical levels, tenure and scales against the Google Map background.

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

[42] 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.

[43] Important note: Whilst it is possible to provide "SimpleSAP" ratings from the "SimpleCO$_2$" software, under no circumstances must these be referred to as "SAP" as the input data is insufficient to produce an estimate of SAP or even RdSAP for an individual dwelling that meets the standards required by these methodologies.

The maps are produced at COA level, which is typically made up of 125 households, usually including whole postcodes and having similar sized populations. Using the first map below (**Map 4**) as an example, it can be seen that each ward is split into several COAs and, in this instance there are 22 COAs that have 61-92% of private rented sector dwellings estimated to have the presence of a category 1 hazard.

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

4.2.3.1 HHSRS

The Housing Health and Safety Rating System (HHSRS) is a risk-based evaluation tool to help local authorities identify and protect against potential risks and hazards to health and safety from any deficiencies identified in dwellings. It was introduced under the Housing Act 2004[5] and applies to residential properties in England and Wales.

The HHSRS assesses 29 categories of housing hazard. Each hazard has a weighting which will help determine whether the property is rated as having a category 1 (serious) hazard[44].

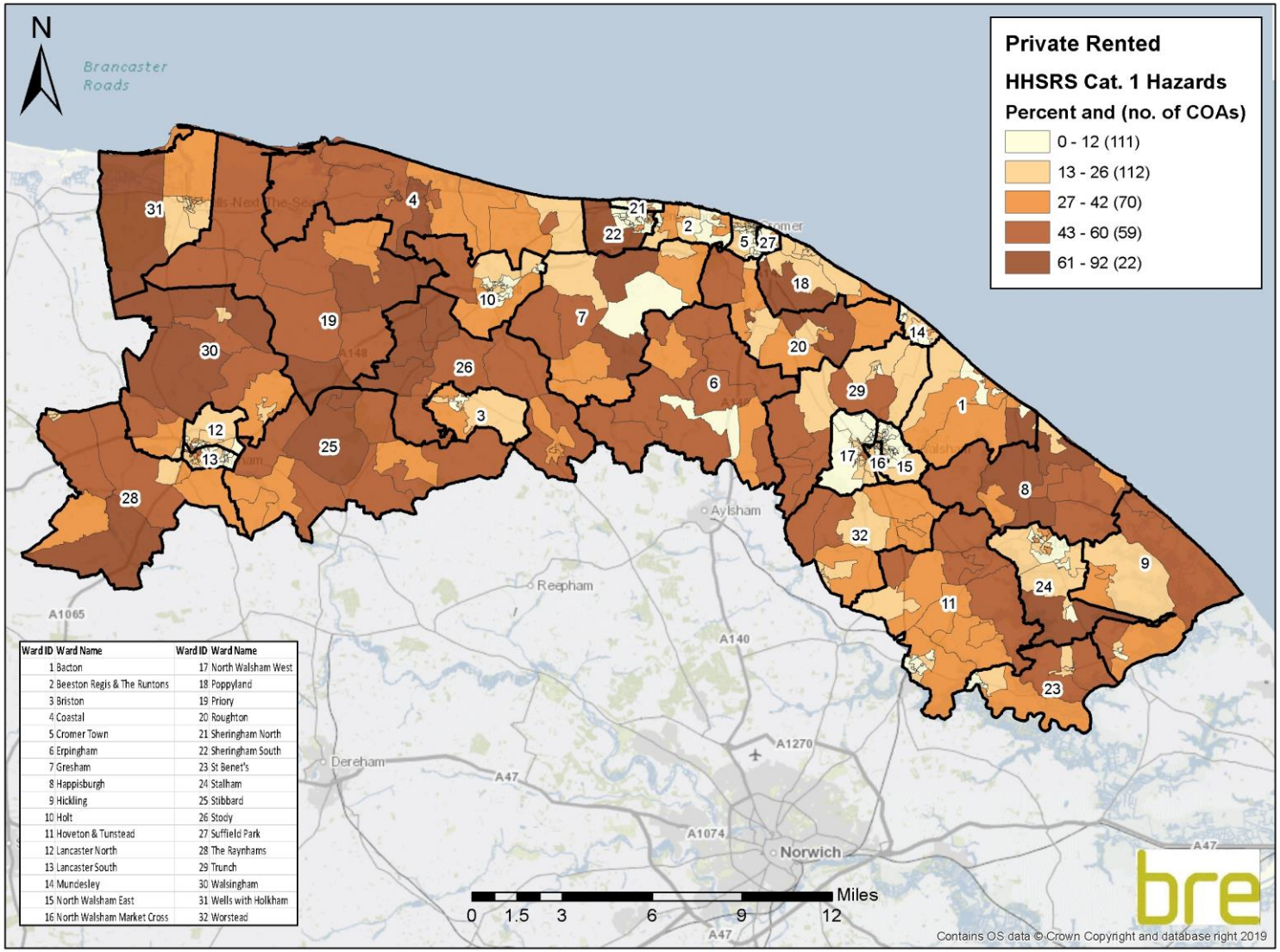
Map 4 shows the distribution of HHSRS category 1 hazards. The data behind this map indicates that the wards with the highest levels overall are Priory, Stody and Walsingham.

The distribution of excess cold hazards in North Norfolk is shown in **Map 5**. The data behind the map shows that the highest levels overall are in the wards of Priory, Walsingham and Erpingham

The distribution of fall hazards is shown in **Map 6** and the background data indicates that higher concentrations are found in Wells with Holkham, The Raynhams and Stody wards.

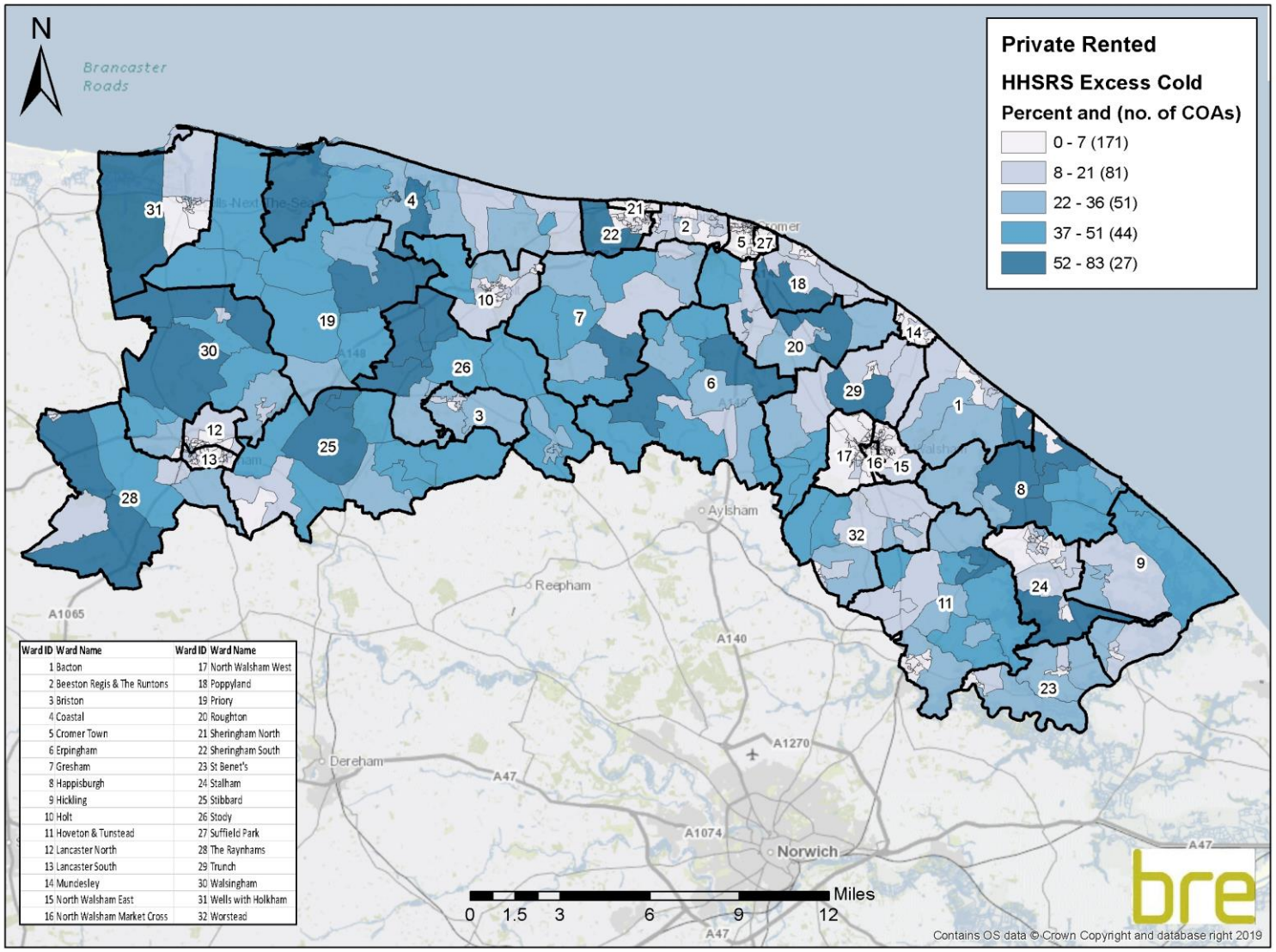
[44] Housing Health and Safety Rating System Operating Guidance, ODPM, 2006

Map 4: Percentage of private rented dwellings in North Norfolk with the presence of a HHSRS category 1 hazard



Ward ID	Ward Name	Ward ID	Ward Name
1	Bacton	17	North Walsham West
2	Beeston Regis & The Runtons	18	Poppyland
3	Briston	19	Priory
4	Coastal	20	Roughton
5	Cromer Town	21	Sheringham North
6	Erpingham	22	Sheringham South
7	Gresham	23	St Benet's
8	Happisburgh	24	Stalham
9	Hickling	25	Stibbard
10	Holt	26	Stody
11	Hoveton & Tunstead	27	Suffield Park
12	Lancaster North	28	The Raynhams
13	Lancaster South	29	Trunch
14	Mundesley	30	Walsingham
15	North Walsham East	31	Wells with Holkham
16	North Walsham Market Cross	32	Worstead

Map 5: Percentage of private rented dwellings in North Norfolk with the presence of a HHSRS category 1 hazard for excess cold



Ward ID	Ward Name	Ward ID	Ward Name
1	Bacton	17	North Walsham West
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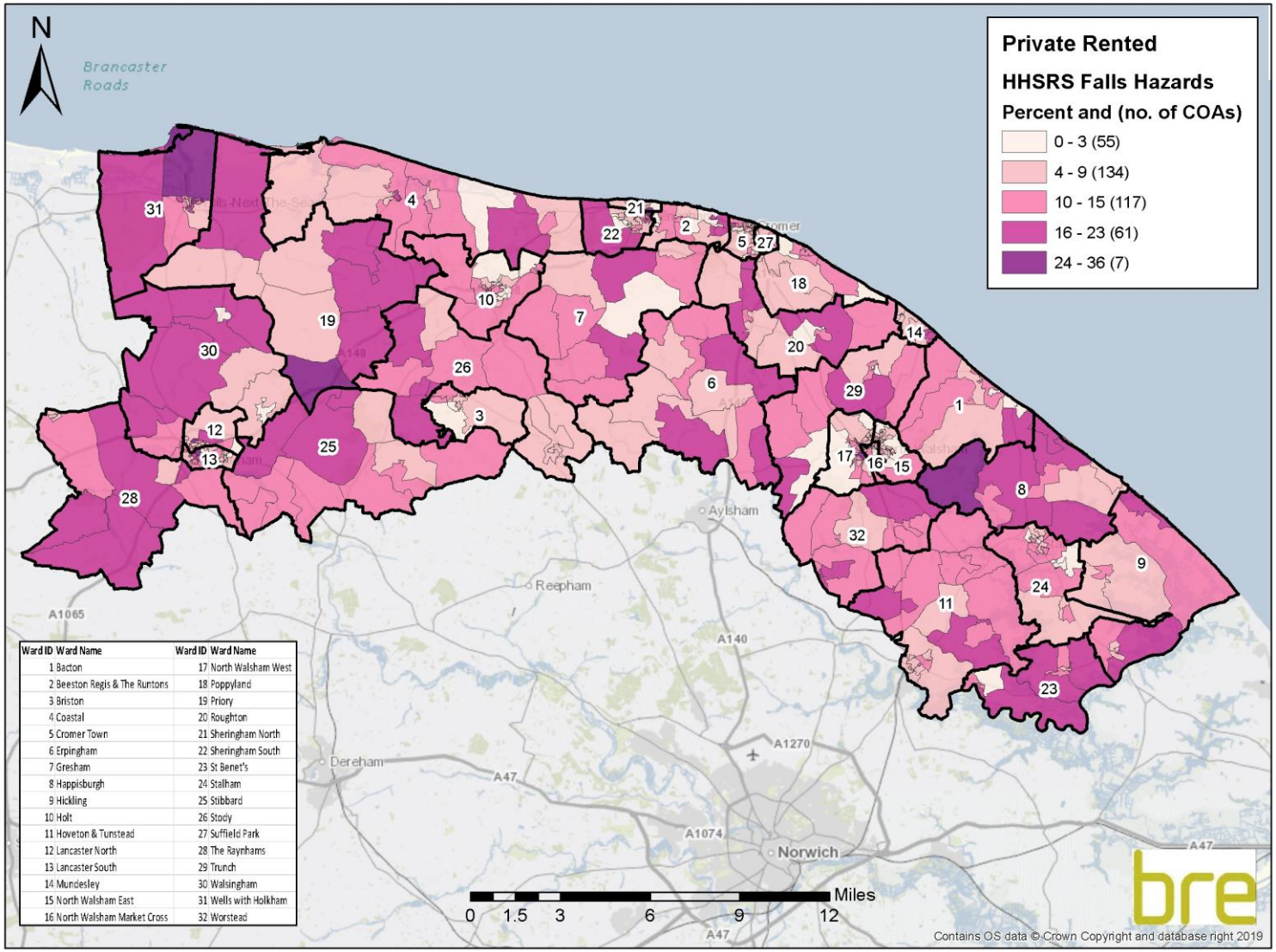
6	Erpingham	22	Sheringham South
7	Gresham	23	St Benet's
8	Happisburgh	24	Stalham
9	Hickling	25	Stibbard
10	Holt	26	Stody
11	Hoveton & Tunstead	27	Suffield Park
12	Lancaster North	28	The Raynhams
13	Lancaster South	29	Trunch
14	Mundesley	30	Walsingham
15	North Walsham East	31	Wells with Holkham
16	North Walsham Market Cross	32	Worstead

Map 6: Percentage of private rented dwellings in North Norfolk with the presence of a HHSRS category 1 hazard for falls



Ward ID	Ward Name	Ward ID	Ward Name
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6	Erpingham	22	Sheringham South
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8	Happisburgh	24	Stalham
9	Hickling	25	Stibbard
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11	Hoveton & Tunstead	27	Suffield Park
12	Lancaster North	28	The Raynhams
13	Lancaster South	29	Trunch
14	Mundesley	30	Walsingham
15	North Walsham East	31	Wells with Holkham
16	North Walsham Market Cross	32	Worstead

4.2.3.2 Disrepair

The disrepair variable used in this report is based on the disrepair component of the Decent Homes Standard[45,46]. A dwelling fails the disrepair component if:

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

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

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

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

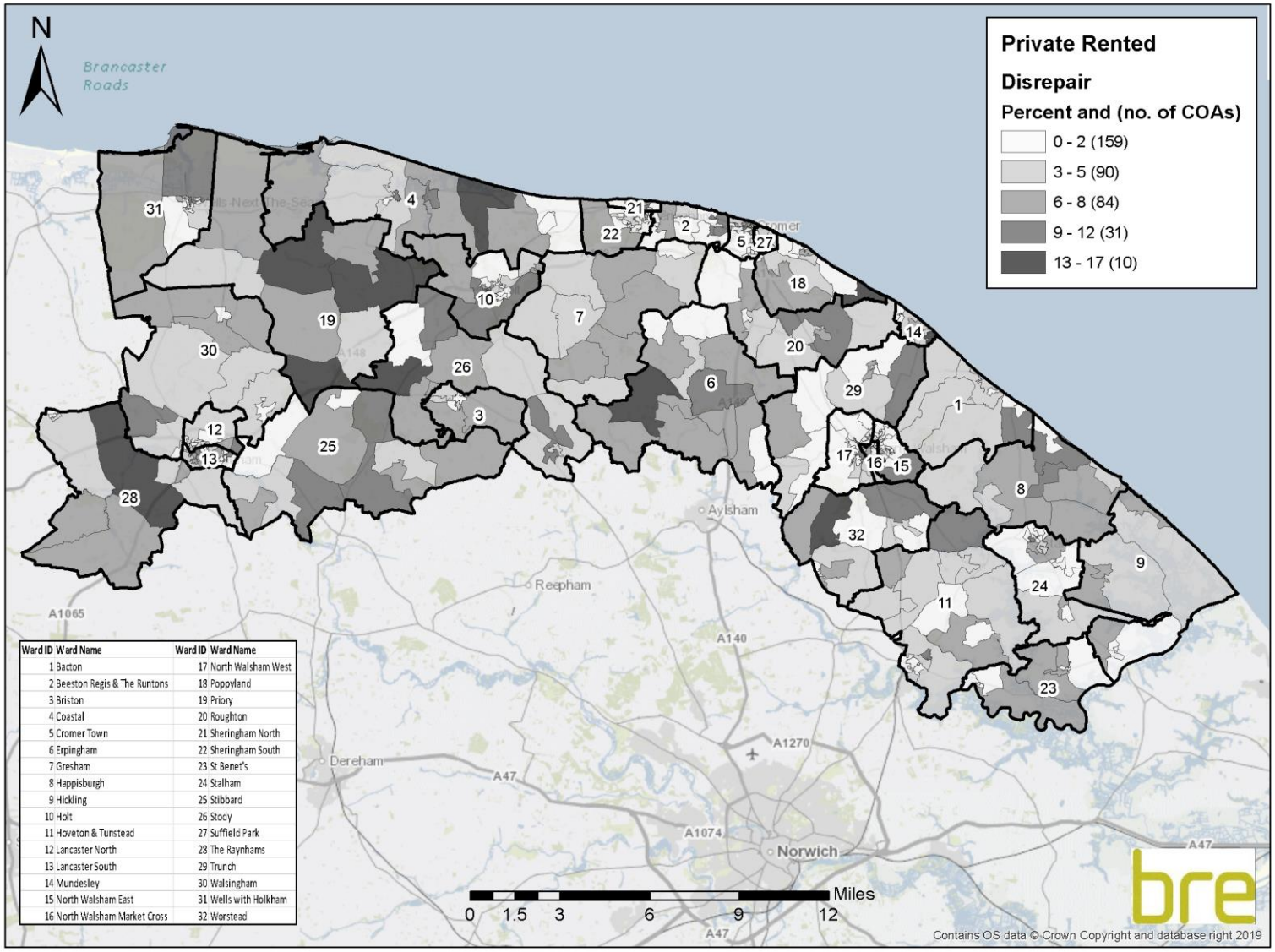
Other building components are those that have a less immediate impact on the integrity of the dwelling. Their combined effect is therefore considered, with a dwelling failing the disrepair standard if two or more elements are old and need replacing or require immediate major repair.

Map 7 shows the distribution of dwellings estimated to be in disrepair in North Norfolk. The data behind the map shows that the highest levels overall are in the wards of Priory, Stody and Sheringham North.

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

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

Map 7: Percentage of private rented dwellings in North Norfolk in disrepair



Ward ID	Ward Name	Ward ID	Ward Name
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9	Hickling	25	Stibbard
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11	Hoveton & Tunstead	27	Suffield Park
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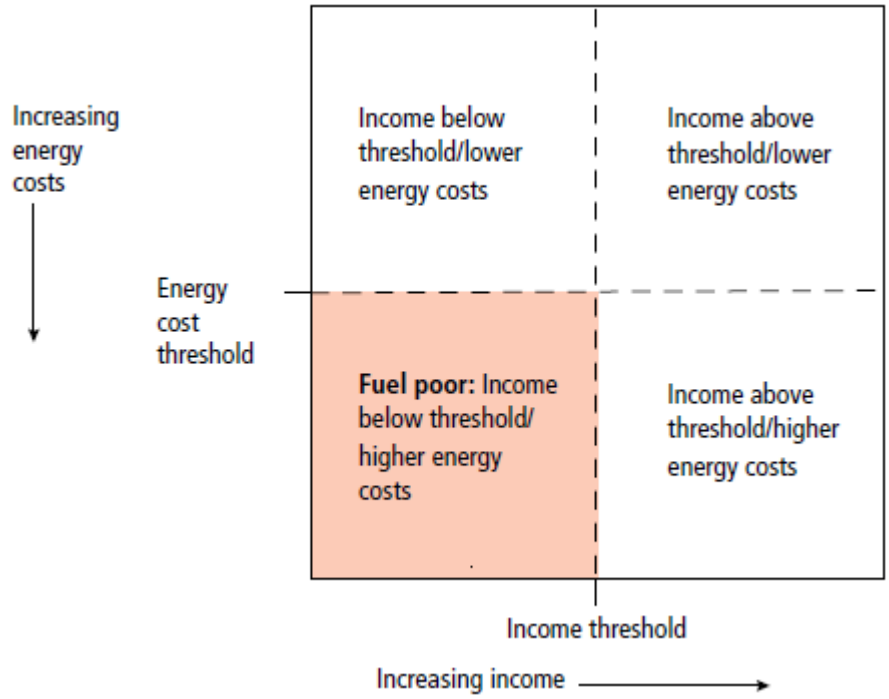
13	Lancaster South	29	Trunch
14	Mundesley	30	Walsingham
15	North Walsham East	31	Wells with Holkham
16	North Walsham Market Cross	32	Worstead

4.2.3.3 Fuel poverty

The current fuel poverty definition is known as the Low Income High Costs variable. This is a dual variable which firstly provides an indication of the number of households in fuel poverty and secondly an indication of the cost (in £) to remove households from fuel poverty – this cost is referred to as the Fuel Poverty Gap[47].

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 7** below). For the purposes of this report this is termed "fuel poverty (Low Income High Costs)".

Figure 7: A representation of the Low Income High Costs definition of fuel poverty[48]



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

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

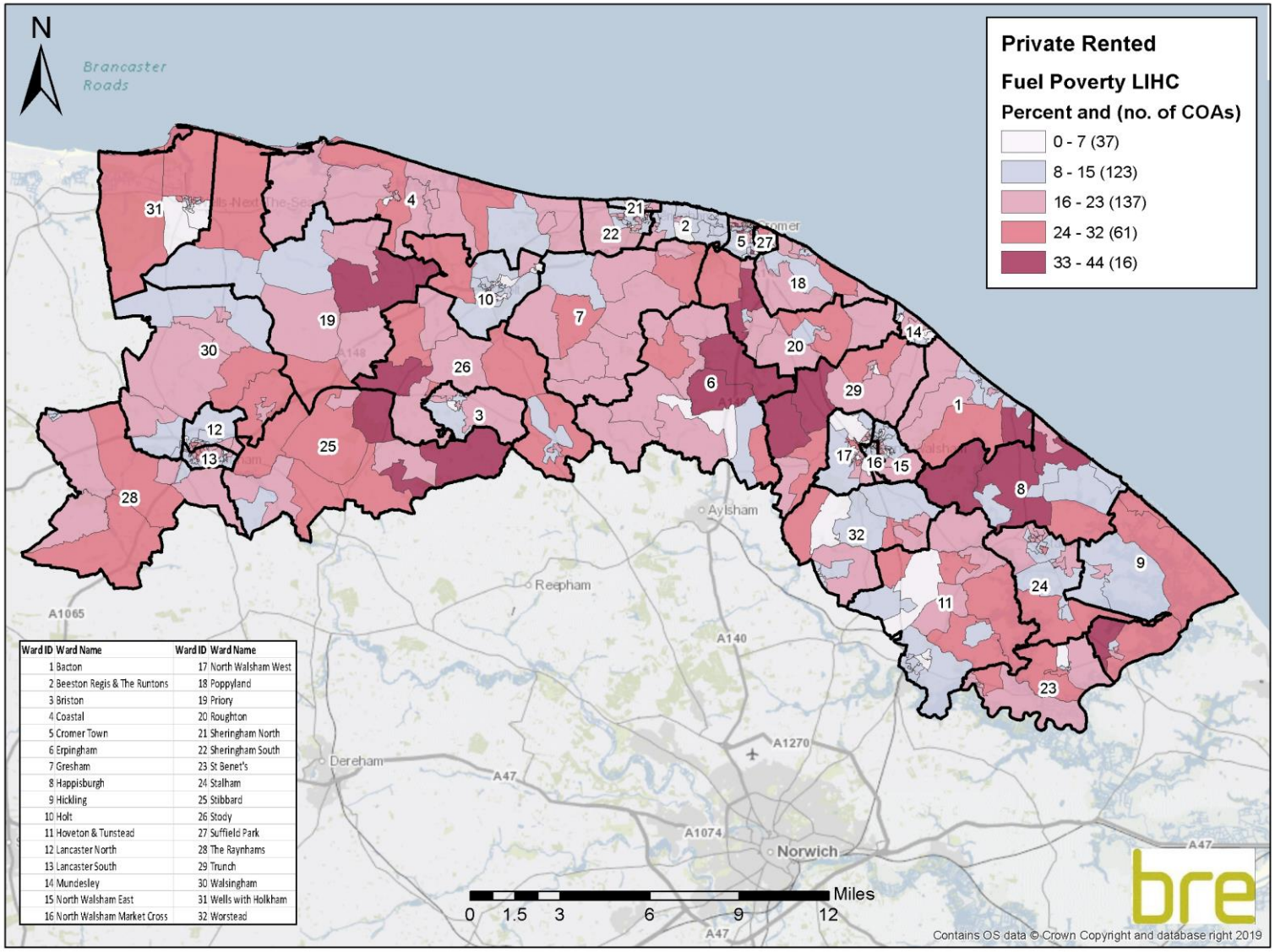
[47] DECC, Annual Fuel Poverty Statistics Report, 2016 – England (National Statistics), 20 June 2016

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

Map 8 shows the distribution of fuel poverty based on the Low Income High Costs definition. The data behind the map shows that the wards with the highest concentrations overall are Stibbard, Happisburgh and Trunch.

For completeness of information, and comparison with previous data, this report also includes an analysis of fuel poverty using the original definition. This states that a household is said to be in fuel poverty if it spends more than 10% of its income on fuel to maintain an adequate level of warmth (defined as 21^{o}C for the main living area, and 18^{o}C for other occupied rooms in the 2012 Hills Fuel Poverty Review[48]). For the purposes of this report this is referred to as “fuel poverty (10% definition)”. **Map 9** shows the distribution of households in fuel poverty using the 10% definition.

Map 8: Percentage of private rented dwellings in North Norfolk occupied by households in fuel poverty - Low Income High Costs definition



Ward ID	Ward Name	Ward ID	Ward Name
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13	Lancaster South	29	Trunch
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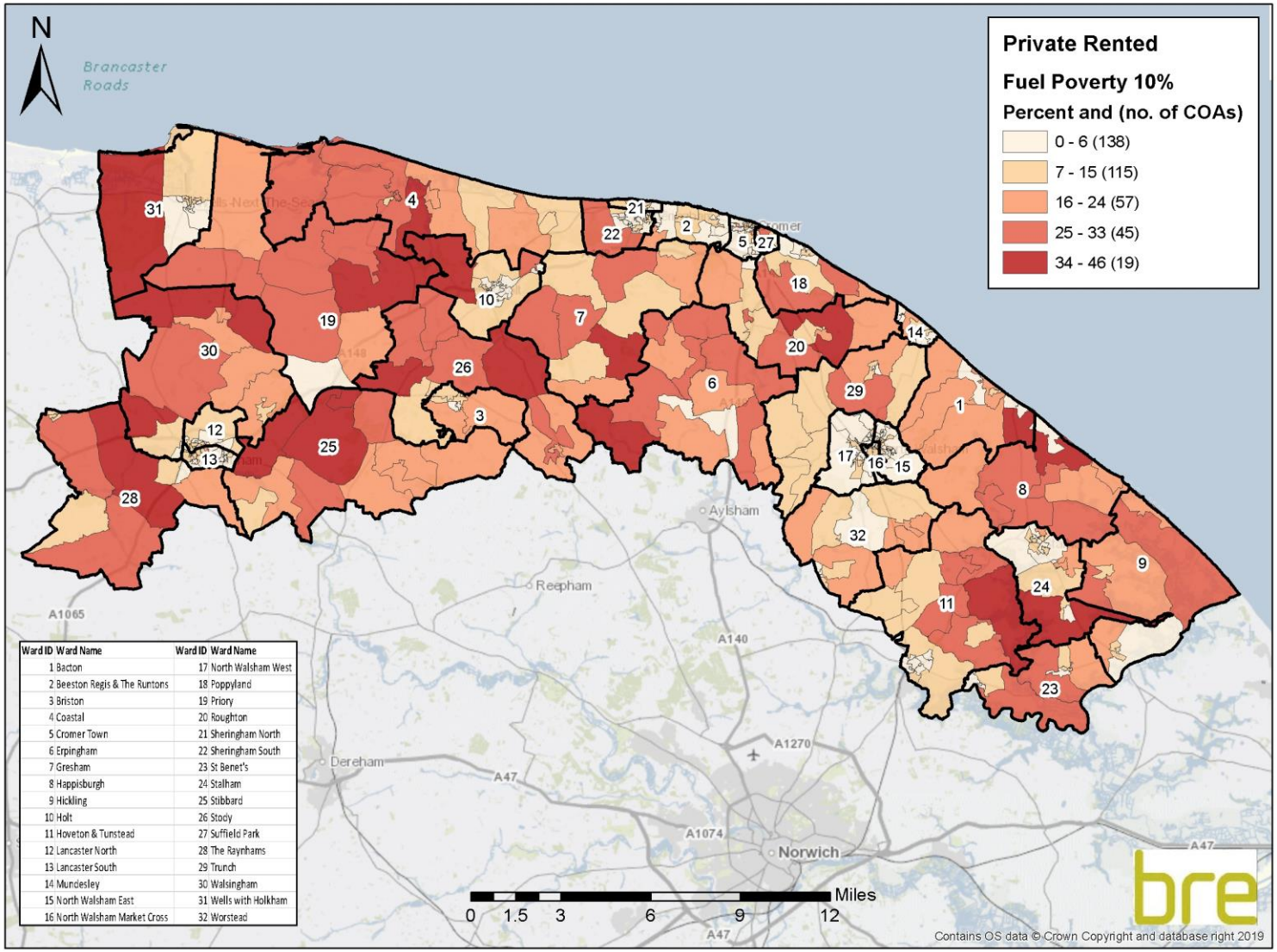
15	North Walsham East	31	Wells with Holkham
16	North Walsham Market Cross	32	Worstead

Map 9: Percentage of private rented dwellings in North Norfolk occupied by households in fuel poverty – 10% definition



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15	North Walsham East	31	Wells with Holkham
16	North Walsham Market Cross	32	Worstead

4.2.3.4 Low income households

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

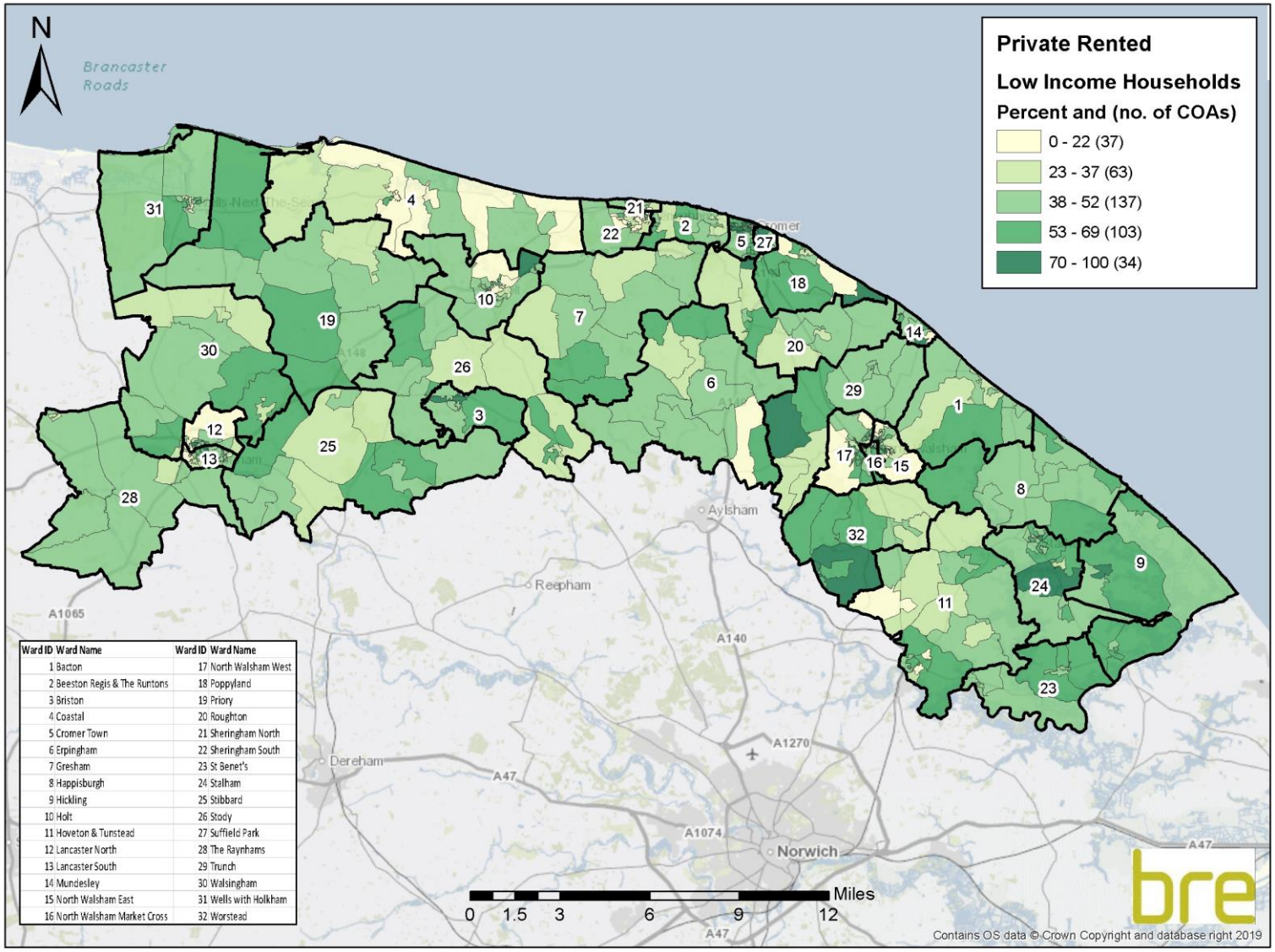
- Means tested benefits or tax credits with a relevant income below the threshold of £16,105
- Attendance allowance
- Disability living allowance
- Personal Independence Payment
- Industrial injuries disablement benefit
- War disablement pension
- Income support or income based Job Seekers Allowance/incapacity benefit that included an income support component
- income based Employment and Support Allowance
- Universal Credit
- Housing related benefits that help pay towards rent
- Any household on a low income that has had their income imputed up to their basic income support entitlement
- Pension credit
- Child tax credit
- Working tax 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 £16,105.

Map 10 shows the distribution of low income households. The wards with the highest levels overall are Worstead, Cromer Town and Suffield Park.

Map 11 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.

Map 10: Percentage of private rented dwellings in North Norfolk occupied by low income households



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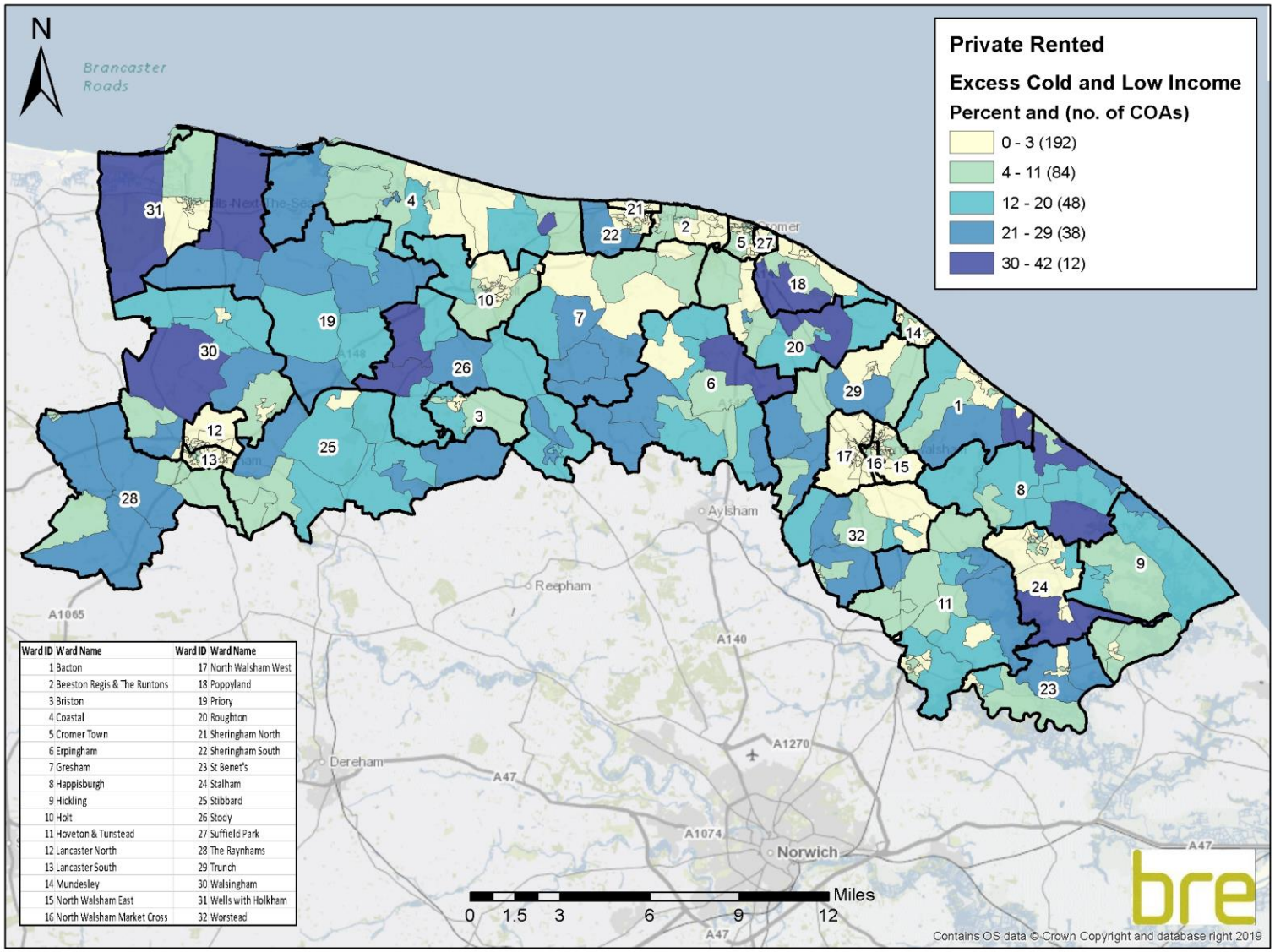
6	Erpingham	22	Sheringham South
7	Gresham	23	St Benet's
8	Happisburgh	24	Stalham
9	Hickling	25	Stibbard
10	Holt	26	Stody
11	Hoveton & Tunstead	27	Suffield Park
12	Lancaster North	28	The Raynhams
13	Lancaster South	29	Trunch
14	Mundesley	30	Walsingham
15	North Walsham East	31	Wells with Holkham
16	North Walsham Market Cross	32	Worstead

Map 11: Percentage of private rented dwellings in North Norfolk with both the presence of a HHSRS category 1 hazard for excess cold and occupied by low income households



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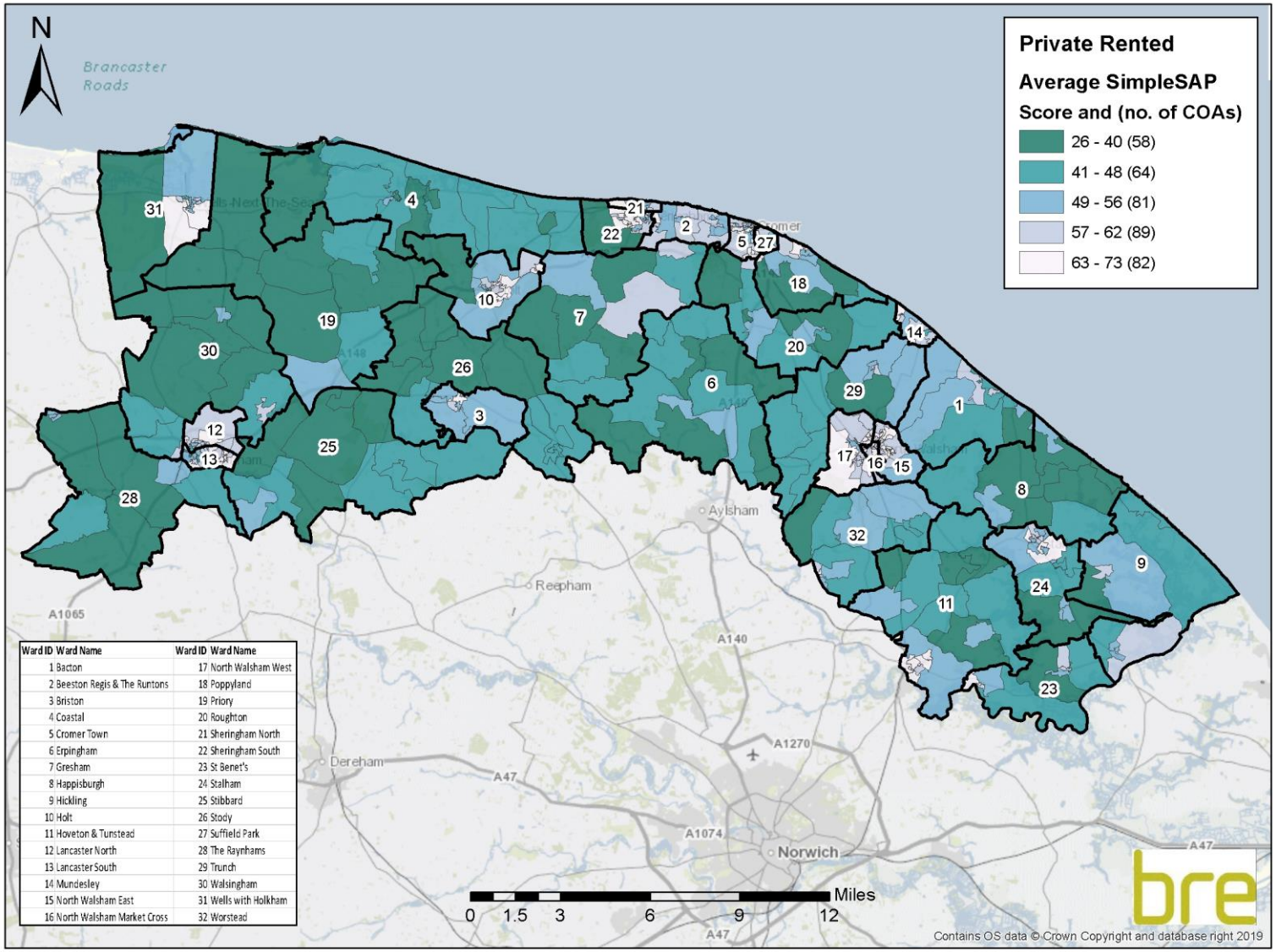
4.2.3.5 SimpleSAP

Map 12 shows the distribution of average SimpleSAP ratings. The data behind the map shows that the wards with the lowest average SimpleSAP ratings are Erpingham, Happisburgh and Priory.

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 12: Average SimpleSAP ratings per dwelling in North Norfolk private rented stock



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4.3 Information relating to LAHS reporting and EPC ratings

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

Table 9 shows the total number of dwellings with HHSRS category 1 hazards in North Norfolk's private sector stock and the total cost for mitigating all hazards within those dwellings. The costs are based on the average cost of mitigating category 1 hazards for the region using EHS 2015 data. The EHS costs are determined following a surveyor's assessment of the hazard. For each hazard the surveyor is given a range of common treatments that they can specify in order to treat the hazard. Where quantities are required the surveyor may specify them. The treatment recommended by the surveyor is then costed using a standard set of prices.

Table 9: Estimated costs to mitigate all category 1 hazards in private sector stock, split into tenure

Tenure	No. of hazards	Total cost (£)
Private Sector	12,306	46,145,165
Owner occupied	9,793	36,721,892
Private rented	2,513	9,423,273

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

The Housing Act 2004 introduced a new set of definitions for HMOs in England from 6 April 2006[49]. The definition is a complex one and the bullet points below, which are adapted from web pages provided by the National HMO Network[50], provide a summary:

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

The recently published "Houses in Multiple Occupation and residential property licensing reform"[51] provides guidance to local authorities on changes to rules on licensing HMOs. Since 1 October 2018, mandatory

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

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

licensing of HMOs was extended to cover all relevant HMOs regardless of the number of storeys (compared to the previous definition which limited this to buildings of 3 or more storeys). Purpose built flats will only require a licence where there are fewer than 3 flats in the block. The requirement for the HMO to be occupied by five or more persons in two or more households will remain[52]. Since 1 October 2018, the extension came into effect and those dwellings that fall under the new definition will require a licence.

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

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

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

Table 10 summarises the results for the private sector stock in North Norfolk, while **Map 13** shows the geographic distribution of potential HMOs and **Map 14** shows the distribution of potential mandatory licensable HMOs. As previously mentioned, ward level data on HMOs is available in the accompanying Housing Stock Condition Database (HSCD) and **Appendix C** provides guidance on how to use the database.

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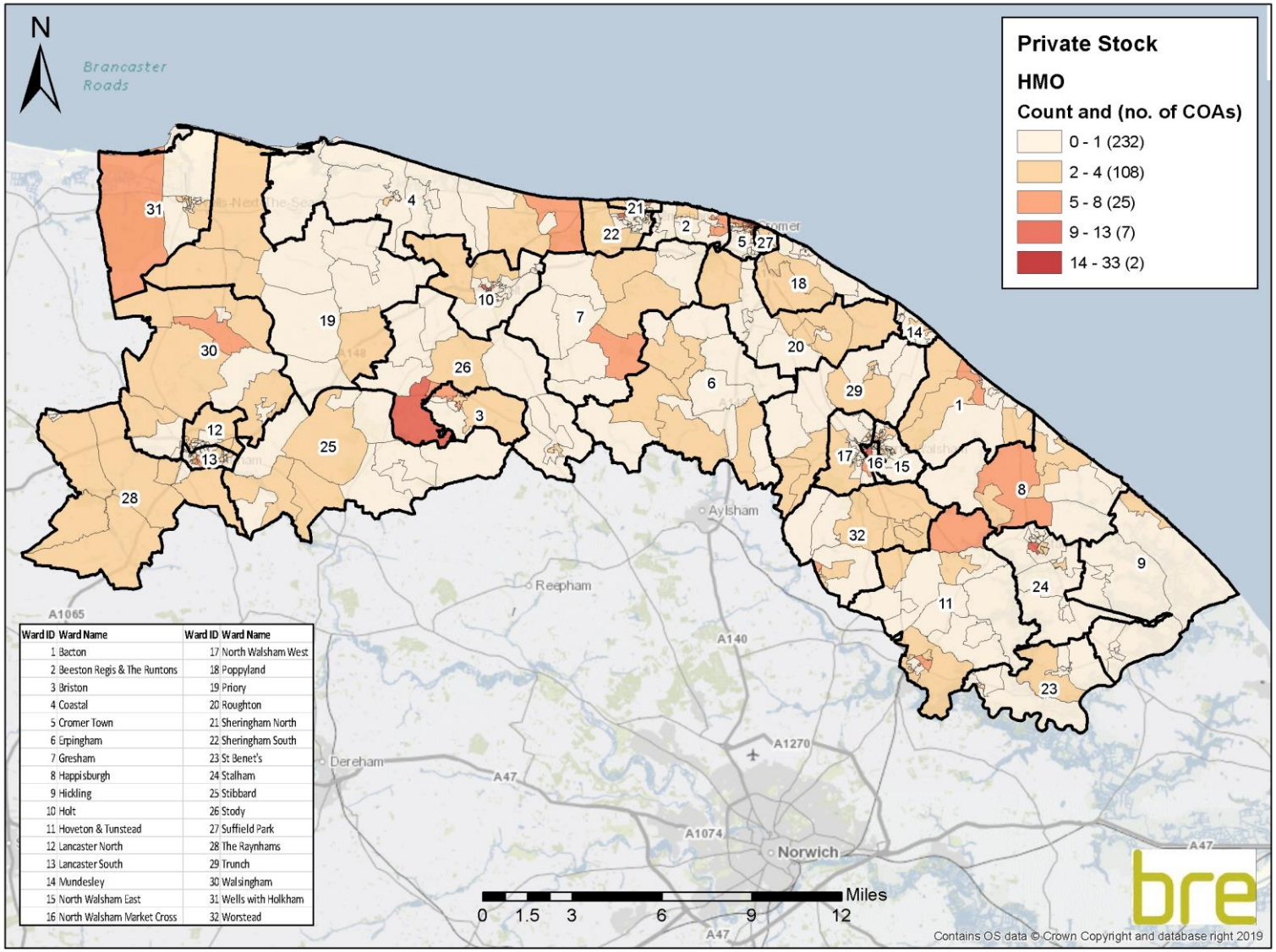
51 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/670536/HMO_licensing_reforms_response.pdf

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

Table 10: Summary of potential HMOs within the North Norfolk private sector stock

North Norfolk	No. of private sector dwellings	HMOs	Mandatory Licensing Scheme HMOs
	46,541	676	191

Map 13: Count of potential HMOs



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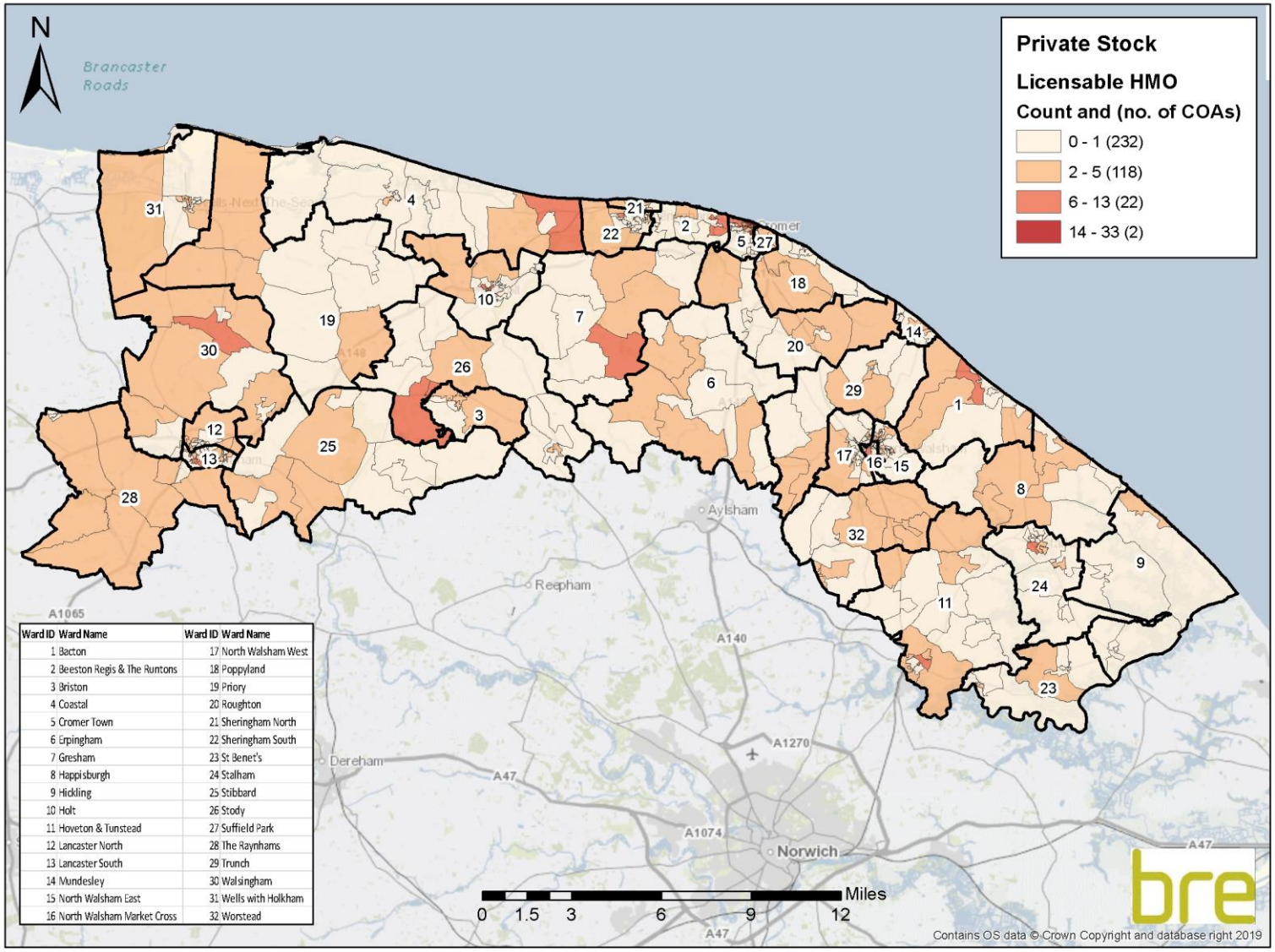
16	North Walsham Market Cross	32	Worstead

Map 14: Count of potential mandatory licensable HMOs



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4.3.3 EPC ratings in the North Norfolk private sector stock

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

Figure 8 below shows the bands A – G and corresponding SAP ratings in brackets. The first two columns show the number and percentage of North Norfolk's private sector stock falling into each of the EPC ratings bands. The third column shows the comparable figures for the private sector stock in England.

The estimated average SimpleSAP for the private sector stock in North Norfolk is 52 which corresponds to an EPC rating of D. The number of private sector dwellings with an EPC rating below band E is estimated to be 10,800 (23.2%).

Figure 8: Number and percentage of North Norfolk's *private sector stock* falling into each of the EPC ratings bands (based on SimpleSAP), compared to England (EHS) figures *N.B. England figures report band A and B together*

	North Norfolk		2015 EHS England
	Count	Percent	Percent
(92-100) A	0	0.0%	1.1%
(81-91) B	293	0.6%	
(69-80) C	7,452	16.0%	23.2%
(55-68) D	16,419	35.3%	51.9%
(39-54) E	11,577	24.9%	18.5%
(21-38) F	8,053	17.3%	4.3%
(1-20) G	2,747	5.9%	1.1%

Under the Energy Act 2011, from 1 April 2018 landlords have to ensure that when they grant a tenancy to a new or existing tenant, their properties must meet a minimum energy efficiency standard – this is currently set at band E[14, 53]. From 1 April 2020, landlords can no longer continue letting a property which is already let if it has an EPC rating of F or G[54].

[53] 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.

[54] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/794253/domestic-prs-minimum-standard-guidance.pdf

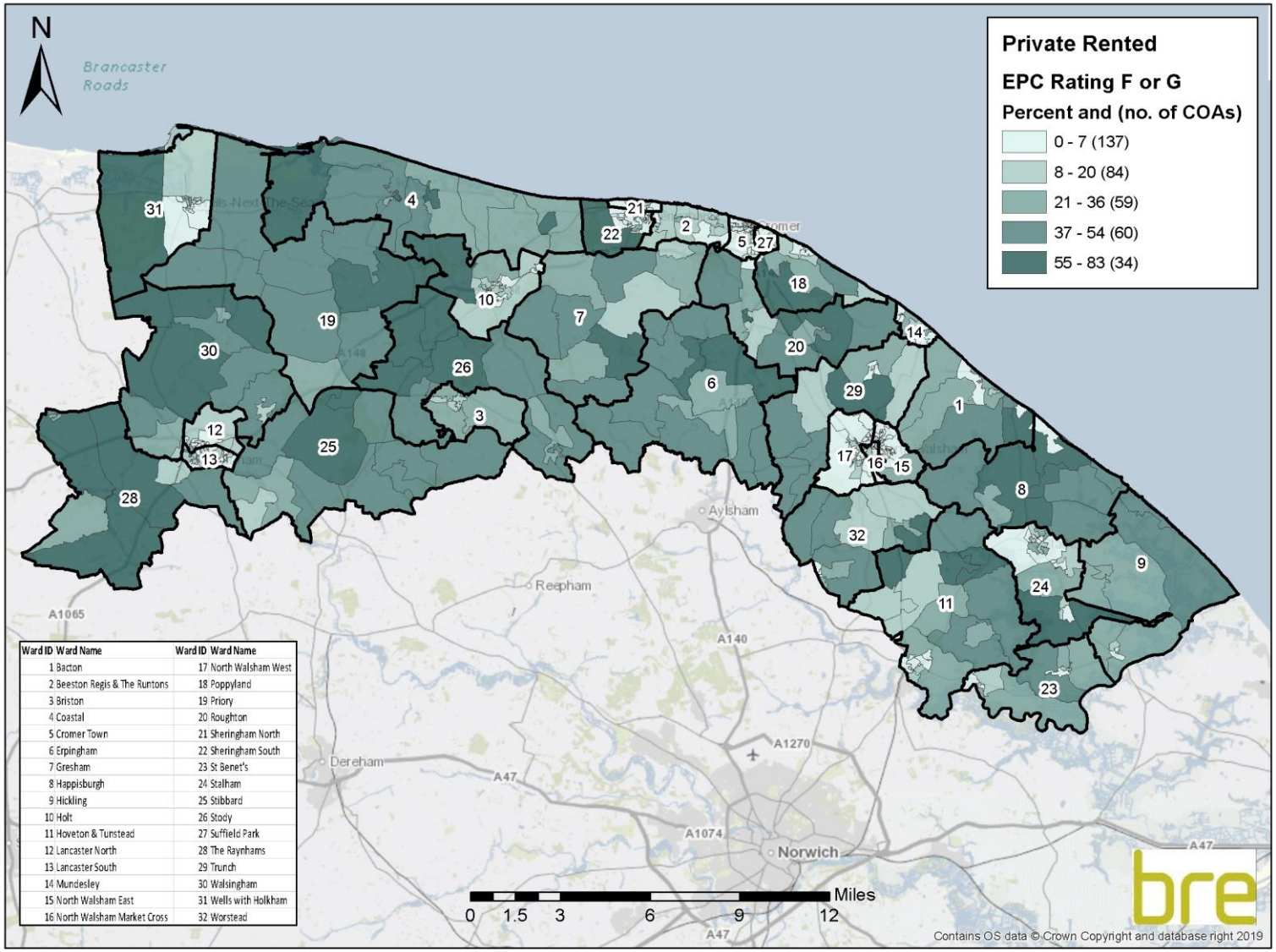
Figure 9 shows the breakdown of SimpleSAP results into the A – G bands for the private rented stock only and compared to the figures for this tenure in England as a whole. The number of private rented dwellings in North Norfolk with a rating below band E (i.e. bands F and G), is estimated to be 1,983 (21.1%).

The distribution of dwellings with EPC ratings below band E is shown in **Map 15**. These are for the private rented stock only, since this is affected by the new rules on minimum standards. Under the legislation these properties are not be eligible to be rented out under new or renewed tenancies, and existing tenancies from 1 April 2020.

Figure 9: Number and percentage of North Norfolk's *private rented stock* falling into each of the EPC ratings bands (based on SimpleSAP), compared to England (EHS) figures *N.B. England figures report band A and B together*

	North Norfolk		2015 EHS England
	Count	Percent	Percent
(92-100) A	0	0.0%	1.2%
(81-91) B	88	0.9%	
(69-80) C	1,984	21.1%	25.3%
(55-68) D	3,245	34.5%	49.1%
(39-54) E	2,099	22.3%	18.1%
(21-38) F	1,510	16.1%	4.5%
(1-20) G	473	5.0%	1.8%

Map 15: Distribution of dwellings with F or G EPC ratings in the private rented stock



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4.3.4 EPC ratings and SimpleSAP ratings in North Norfolk

Some additional work was undertaken to look at the difference between the distribution of SAP ratings when:

- the SAP ratings for all dwellings were estimated using the SimpleSAP methodology only ('modelled SimpleSAP'), and when:
- the SAP ratings for all dwellings with an official lodged EPC certificate were used where available, with the remainder estimated using the SimpleSAP methodology ('modelled SimpleSAP/official lodged EPC')

It is important to note that while the first approach does not include the official lodged EPC rating itself, elements of the EPC survey data are integrated into the Housing Stock Models (e.g. wall type) but as there are limits to the data available for such use, the SAP rating in these instances still needs to be calculated using the BRE SimpleSAP methodology. This also ensures a consistent methodological approach across the entire stock model, whether or not there is an official EPC.

This additional work enabled an understanding of whether the reported SimpleSAP distributions differed from the EPC records and therefore the potential impact on using the reported SimpleSAP distributions for strategic planning purposes.

Table 11 shows the average SimpleSAP ratings for the two approaches, broken down into all stock and private stock. The modelled SimpleSAP/official lodged EPC combination gives an average of 53 for all stock and 52 for private stock – in both cases this is 1 SAP point higher than the modelled SimpleSAP approach.

Table 11: Comparison of average SimpleSAP ratings using modelled SimpleSAP only and using a combination of official lodged EPC rating where available the remainder estimated using the SimpleSAP methodology, by all stock and private stock

Average SAP rating	All stock	Private stock
Modelled SimpleSAP	52	51
Modelled SimpleSAP/official lodged EPC	53	52

Figure 10 compares the numbers and proportions of dwellings in each SAP band for all stock using the two approaches and shows the results are consistent for bands D-G, which are likely to be the focus for strategic planning purposes. For bands A – C the modelled SimpleSAP approach results in a higher proportion of dwellings falling into band C and lower proportions in band A and B. There are two factors which are likely to influence this; firstly, at a national level, Band A is the smallest group as there are not many dwellings falling into this category. As a result, the EHS does not pick up many of these dwellings. This means that when the EHS distributions are applied to the stock models it is less likely that band A dwellings will be identified in the national model. Secondly, while the EPC data available is valuable, it does not contain the full SAP inputs, therefore the inputs accounting for these high SAP values are unavailable for the modelling process.

Figure 10: Comparison of numbers and proportions of dwellings in each SAP band using modelled SimpleSAP only and using a combination of official lodged EPC rating where available the remainder estimated using the SimpleSAP methodology, all stock

	Modelled SimpleSAP		Modelled SimpleSAP/official lodged EPC	
	Count	Percent	Count	Percent
(92-100) A	0	0.0%	46	0.1%
(81-91) B	346	0.6%	2,159	3.9%
(69-80) C	9,491	17.2%	7,959	14.4%
(55-68) D	19,740	35.8%	19,462	35.3%
(39-54) E	13,321	24.2%	13,650	24.8%
(21-38) F	9,183	16.7%	8,971	16.3%
(1-20) G	3,030	5.5%	2,864	5.2%

4.4 Energy efficiency variables for North Norfolk

Section 2.5 provides an overview of the ECO policy – 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 North Norfolk. The BRE Models have been used to determine the following variables for North Norfolk:

- 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 12 and **Table 13** show the modelled results in terms of the numbers and percentages of dwellings in North Norfolk's private sector stock for walls and lofts respectively (ward level data can be obtained from the housing stock condition database supplied alongside this report). They also show the percentage figures for the East of England region and for England overall to enable comparison. The results indicate that a proportion of the private sector stock in North Norfolk could benefit from energy efficiency improvements with an estimated 7,075 dwellings (15%) having un-insulated cavity walls. Furthermore, there are an estimated 6,252 dwellings (13% of North Norfolk's private sector stock) which have less than 100mm of loft insulation with 2,612 (6%) having no loft insulation at all. In North Norfolk, it is estimated that 65% of the housing stock have cavity walls. These types of dwellings are likely to be of particular interest to ECO providers and the distribution of these private sector dwellings is shown in **Map 16** to **Map 18**.

Table 12: Estimates of the numbers and percentage of dwellings for each of the energy efficiency variables for walls assessed for the private sector stock in North Norfolk and compared to the East of England region and national figure (EHS 2015)

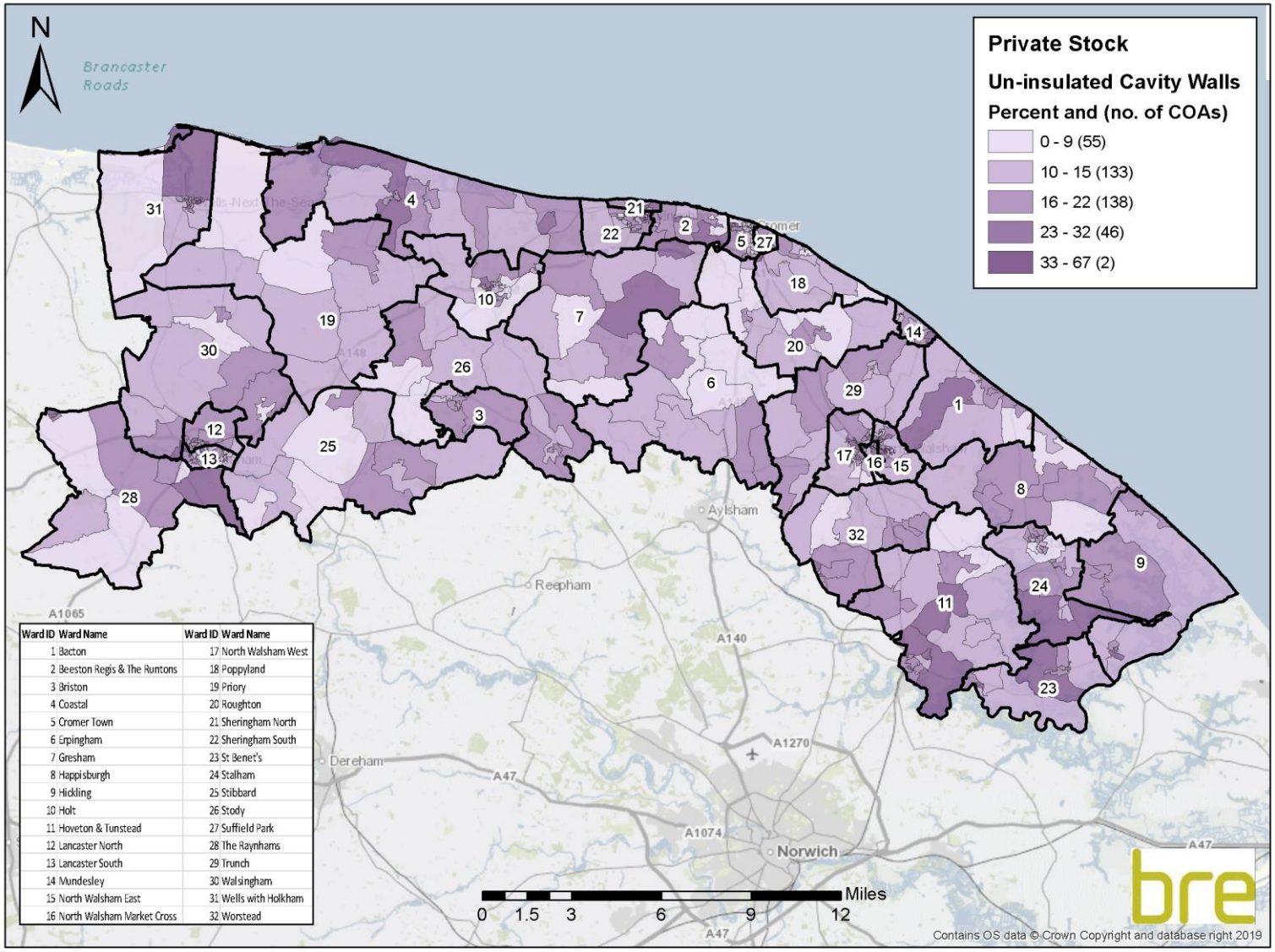
Variable		Private stock		2015 EHS Regional (private stock)	2015 EHS England (private stock)
		No.	%	%	%
No. of private sector dwellings		46,541	-	-	-
Wall type	Solid	15,683	34%	27%	31%
	Insulated cavity	23,219	50%	46%	45%
	Un-insulated cavity	7,075	15%	25%	22%
% of cavity walls only that are uninsulated		-	23%	35%	32%

N.B. in some cases the different wall types do not add up to the total number of private sector dwellings due to the small number of timber-frame and stone buildings

Table 13: Estimates of the numbers and percentage of dwellings for each of the energy efficiency variables for lofts assessed for the private sector stock in North Norfolk and compared to the East of England region and national figure (EHS 2015)

Variable		Private stock		2015 EHS Regional (private stock)	2015 EHS England (private stock)
		No.	%	%	%
No. of private sector dwellings		46,541	-	-	-
Level of loft insulation	No loft	3,794	8%	8%	9%
	No insulation	2,612	6%	3%	3%
	50mm	3,640	8%	6%	6%
	100mm	11,385	24%	28%	25%
	150mm	5,385	12%	15%	19%
	200mm	6,681	14%	14%	14%
	250+mm	13,044	28%	26%	24%
Less than 100mm		6,252	13%	9%	9%

Map 16: Energy efficiency variables - percentage of private sector dwellings in North Norfolk with un-insulated cavity walls



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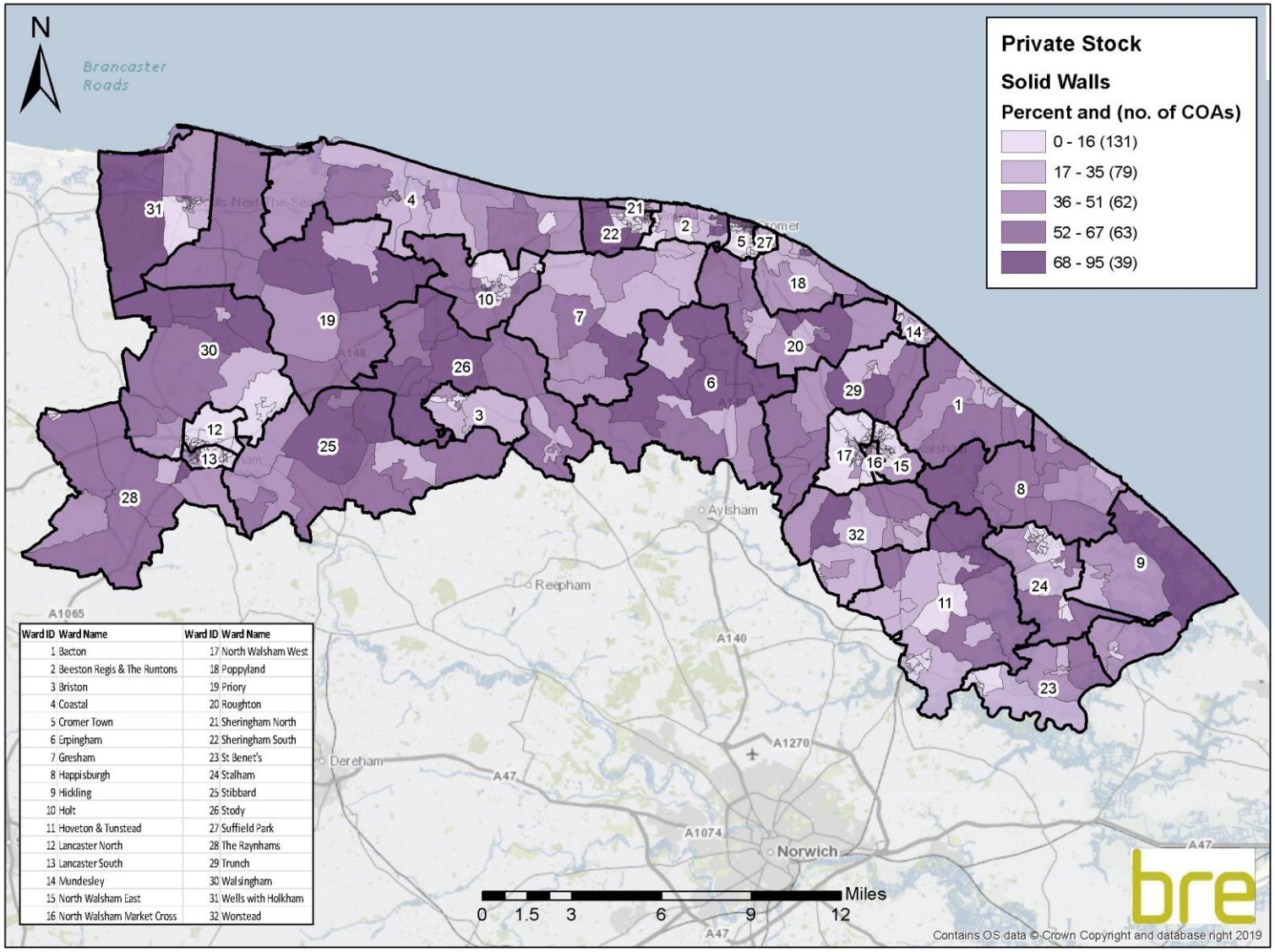
Map 17: Energy efficiency variables - percentage of private sector dwellings in North Norfolk with solid walls



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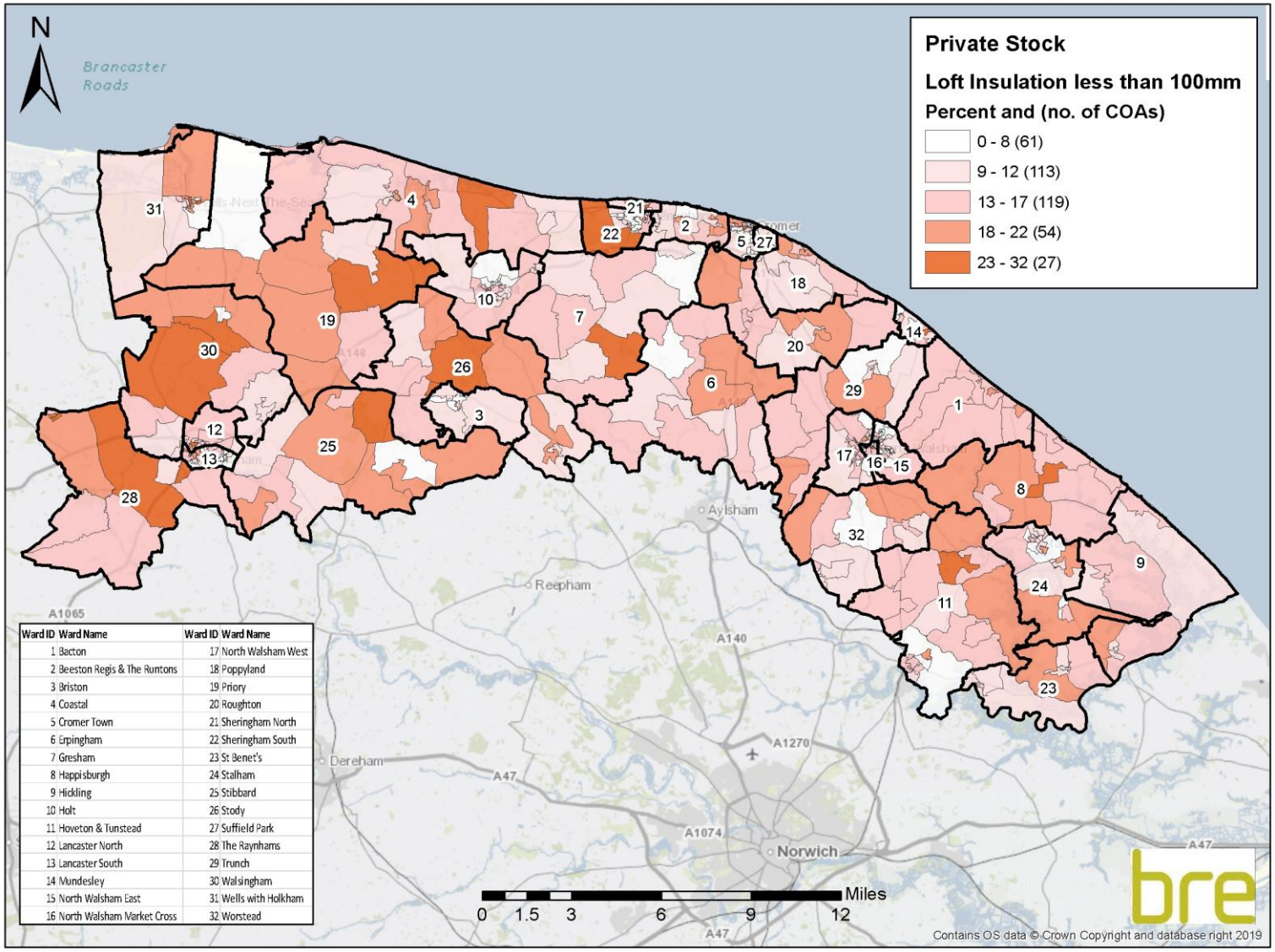
Map 18: Energy efficiency variables – percentage of private sector dwellings in North Norfolk with less than 100mm or no loft insulation



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4.5 Energy planning variables for North Norfolk

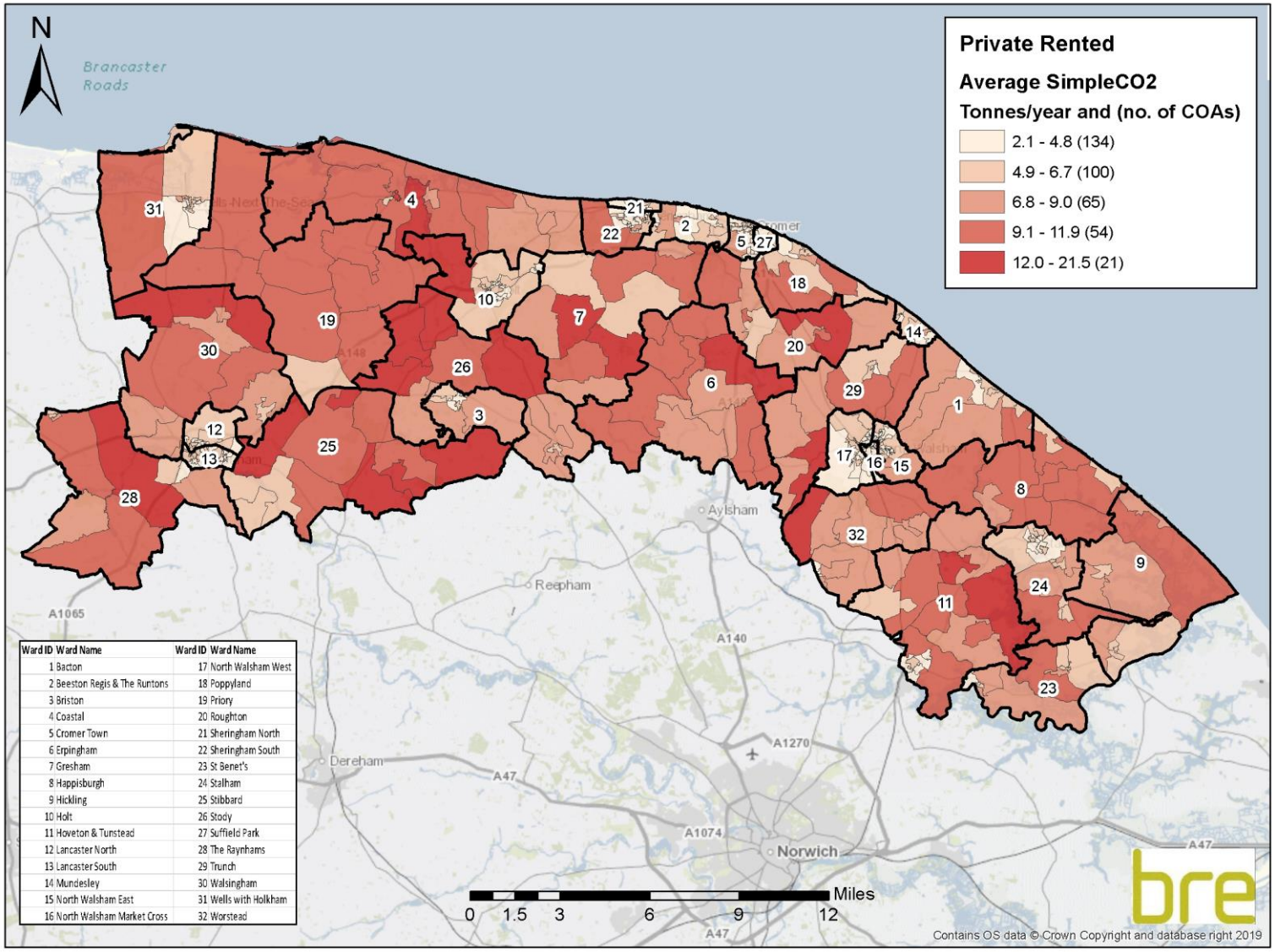
In addition to the energy efficiency Housing Standards Variables, the "energy outputs" part of the housing stock modelling approach (see **Figure 1**) provides the database with estimates of a number of other energy efficiency variables. These variables are: SimpleSAP, notional SimpleCO_2, notional energy demand and cost, notional heat demand and cost. **Table 14** shows the energy efficiency variables in terms of the average figure per dwelling in North Norfolk, split by tenure. 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 14: Modelled data for average energy efficiency variables per dwelling by tenure in North Norfolk

Variable	Tenure		
	Owner occupied	Private rented	Social
No. of dwellings	37,142	9,399	6,447
SimpleSAP	51	54	59
SimpleCO_2 (t/yr)	7.56	6.19	4.58
Energy demand (kWh/yr)	25,284	19,181	14,612
Energy cost (£/yr)	1,420	1,155	854
Electricity demand (KWh)	4,233	4,731	3,411
Electricity cost (£)	411	443	324
Heat demand (kWh/yr)	15,577	12,209	8,396
Heat cost (£/yr)	1,023	801	512

Maps are provided for the private rented sector. **Map 19** shows the average SimpleCO_2 per year for North Norfolk and **Map 20** and **Map 21** show the average total energy demand and the average total energy cost per year. **Map 22** and **Map 23** show the average total heat demand and the average total heating cost per year for North Norfolk.

Map 19: Average Simple CO_2 (tonnes/year) – private rented stock



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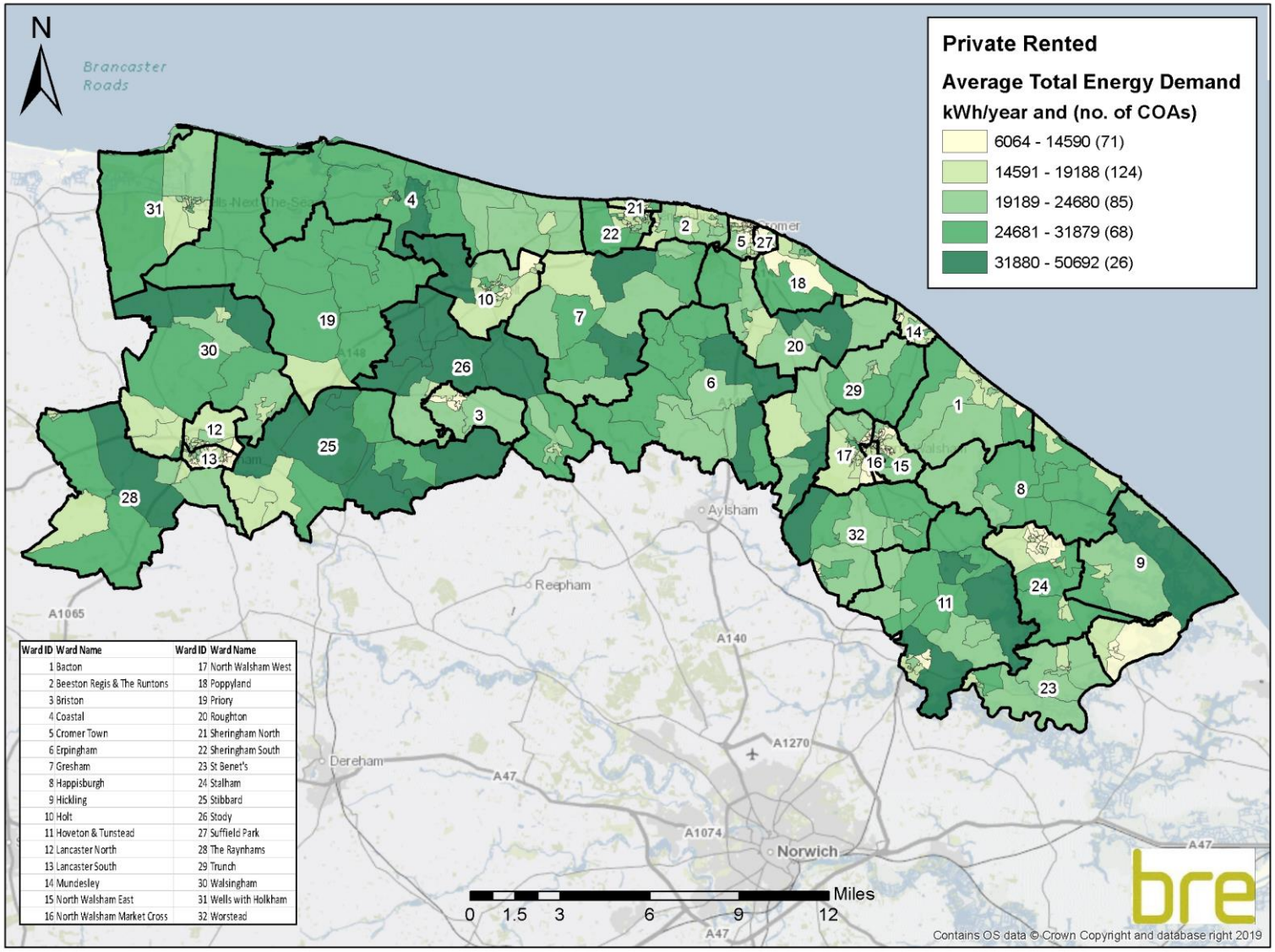
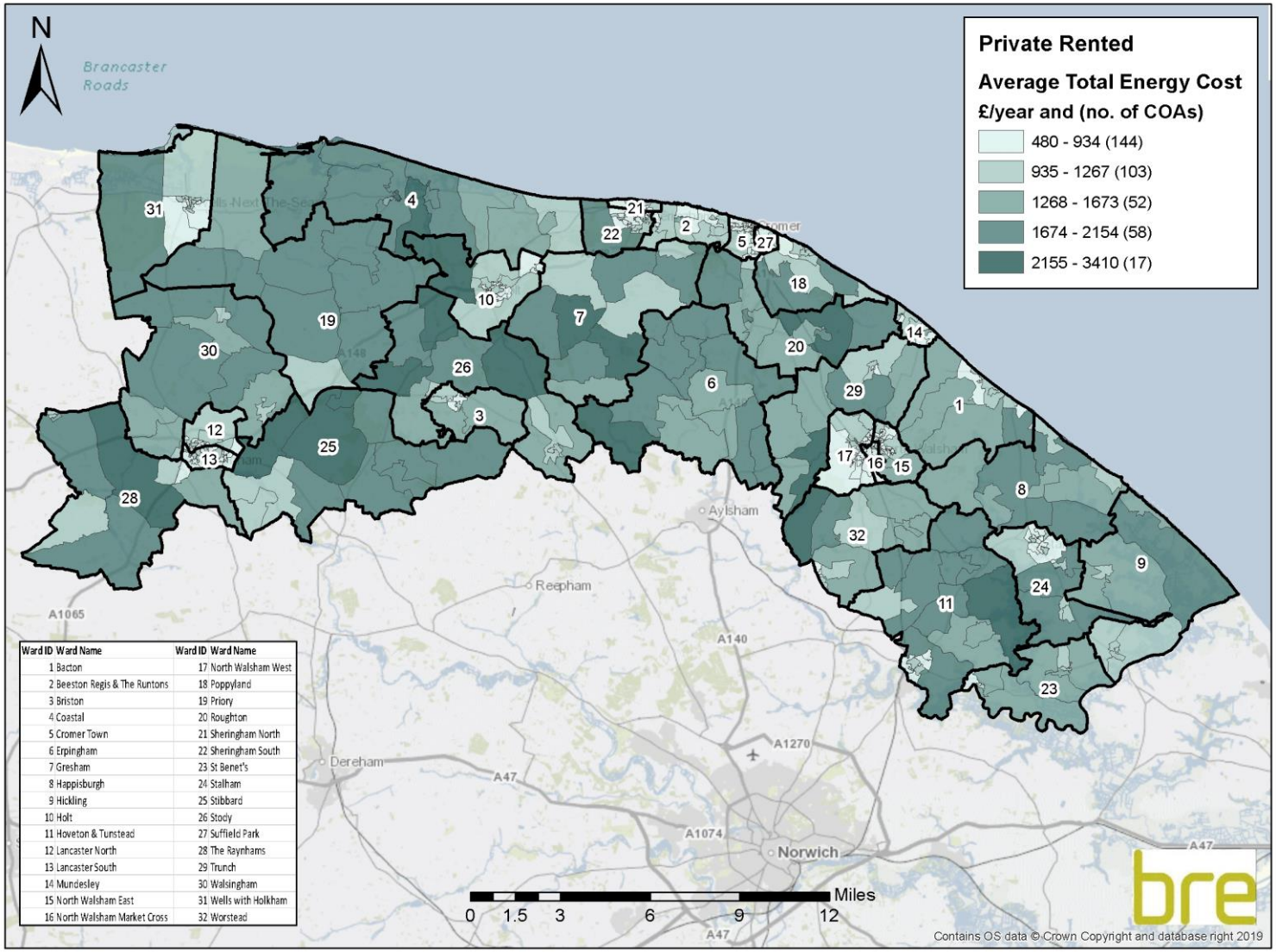
13	Lancaster South	29	Trunch
14	Mundesley	30	Walsingham
15	North Walsham East	31	Wells with Holkham
16	North Walsham Market Cross	32	Worstead

Map 20: Average total energy demand (kWh/year) – private rented stock



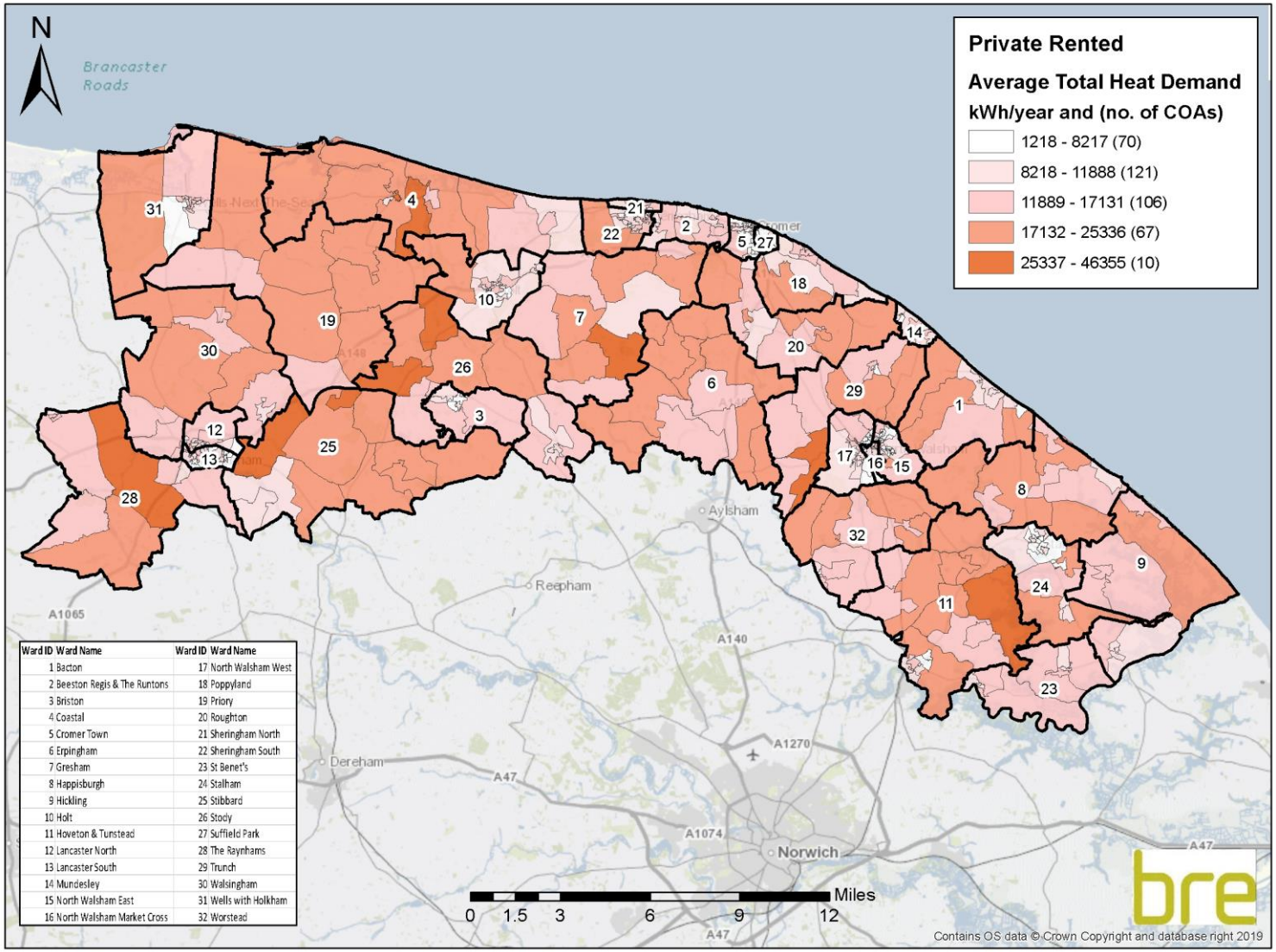
Ward ID	Ward Name	Ward ID	Ward Name
1	Bacton	17	North Walsham West
2	Beeston Regis & The Runtons	18	Poppyland
3	Briston	19	Priory
4	Coastal	20	Roughton
5	Cromer Town	21	Sheringham North
6	Erpingham	22	Sheringham South
7	Gresham	23	St Benet's
8	Happisburgh	24	Stalham
9	Hickling	25	Stibbard
10	Holt	26	Stody
11	Hoveton & Tunstead	27	Suffield Park
12	Lancaster North	28	The Raynhams
13	Lancaster South	29	Trunch
14	Mundesley	30	Walsingham
15	North Walsham East	31	Wells with Holkham
16	North Walsham Market Cross	32	Worstead

Map 21: Average total energy cost (£/year) – private rented stock



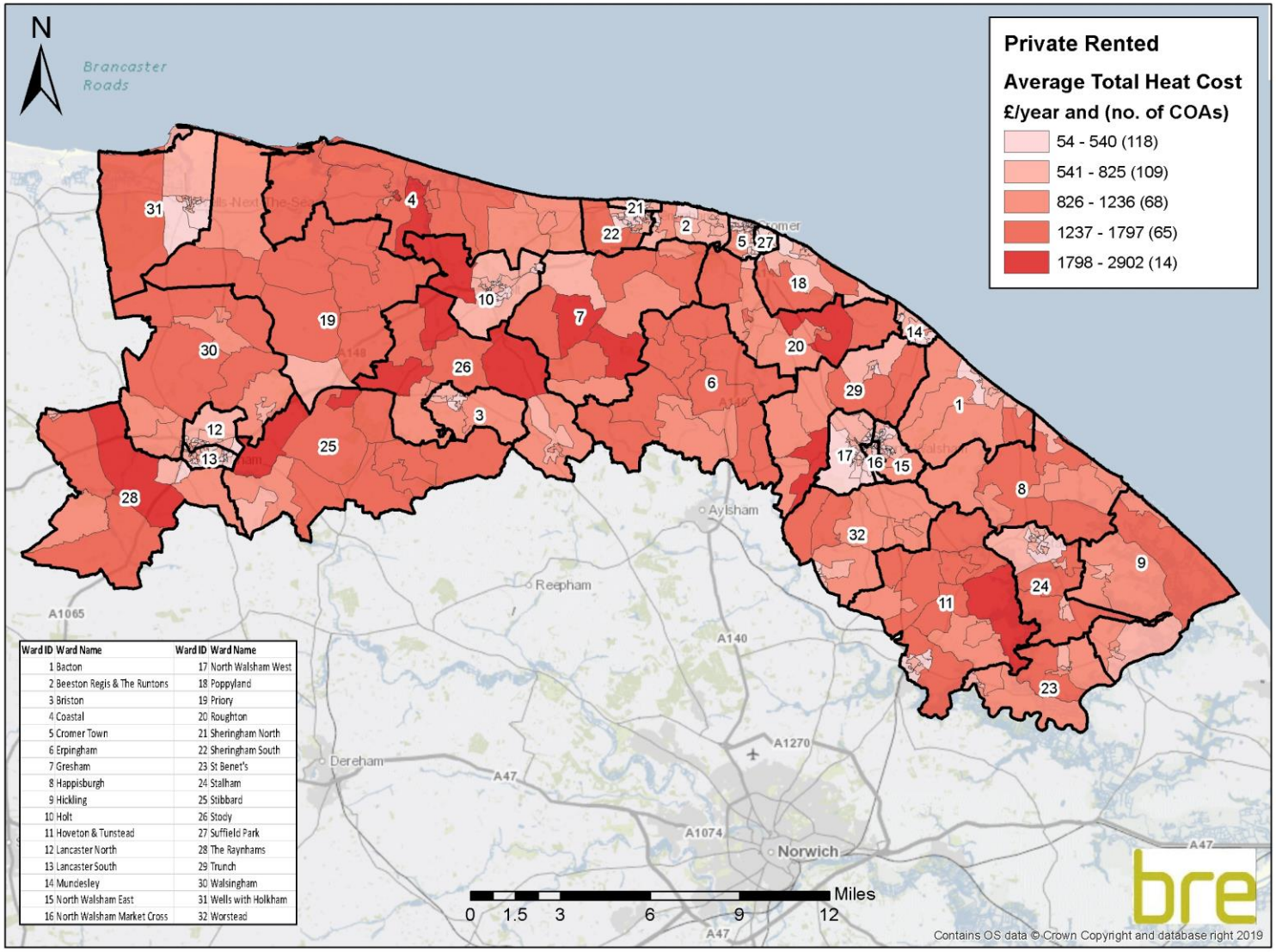
Ward ID	Ward Name	Ward ID	Ward Name
1	Bacton	17	North Walsham West
2	Beeston Regis & The Runtons	18	Poppyland
3	Briston	19	Priory
4	Coastal	20	Roughton
5	Cromer Town	21	Sheringham North
6	Erpingham	22	Sheringham South
7	Gresham	23	St Benet's
8	Happisburgh	24	Stalham
9	Hickling	25	Stibbard
10	Holt	26	Stody
11	Hoveton & Tunstead	27	Suffield Park
12	Lancaster North	28	The Raynhams
13	Lancaster South	29	Trunch
14	Mundesley	30	Walsingham
15	North Walsham East	31	Wells with Holkham
16	North Walsham Market Cross	32	Worstead

Map 22: Average total heat demand (kWh/year) – private rented stock



Ward ID	Ward Name	Ward ID	Ward Name
1	Bacton	17	North Walsham West
2	Beeston Regis & The Runtons	18	Poppyland
3	Briston	19	Priory
4	Coastal	20	Roughton
5	Cromer Town	21	Sheringham North
6	Erpingham	22	Sheringham South
7	Gresham	23	St Benet's
8	Happisburgh	24	Stalham
9	Hickling	25	Stibbard
10	Holt	26	Stody
11	Hoveton & Tunstead	27	Suffield Park
12	Lancaster North	28	The Raynhams
13	Lancaster South	29	Trunch
14	Mundesley	30	Walsingham
15	North Walsham East	31	Wells with Holkham
16	North Walsham Market Cross	32	Worstead

Map 23: Average total heat cost (£/year) – private rented stock



Ward ID	Ward Name	Ward ID	Ward Name
1	Bacton	17	North Walsham West
2	Beeston Regis & The Runtons	18	Poppyland
3	Briston	19	Priory
4	Coastal	20	Roughton
5	Cromer Town	21	Sheringham North
6	Erpingham	22	Sheringham South
7	Gresham	23	St Benet's
8	Happisburgh	24	Stalham
9	Hickling	25	Stibbard
10	Holt	26	Stody
11	Hoveton & Tunstead	27	Suffield Park
12	Lancaster North	28	The Raynhams
13	Lancaster South	29	Trunch
14	Mundesley	30	Walsingham
15	North Walsham East	31	Wells with Holkham
16	North Walsham Market Cross	32	Worstead

5 Conclusion and recommendations

5.1 Conclusion

North Norfolk District Council commissioned BRE to undertake a series of modelling exercises on their housing stock to provide an integrated housing stock condition database, making use of available local data sources (Land and Property Gazetteer (LLPG), tenancy deposit scheme and benefits data) plus the EPC data which have been integrated into BRE's standard housing stock condition model. The integration of this data source serves to further increase the accuracy of the models by removing the need to rely on imputed data for the 24,906 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 45.2% of the stock in North Norfolk. The council also commissioned the inclusion of Land Registry Commercial and Corporate Ownership Data (CCOD) and Overseas Companies Ownership Database (CCOD).

The LLPG data indicated that there are currently an estimated 2,124 holiday homes in North Norfolk. It was requested that these were excluded from the main analysis as they are not residential dwellings.

North Norfolk District Council also commissioned BRE to undertake additional work to identify private rented stock in their local authority. This innovative approach resulted in improved accuracy in identifying private rented sector dwellings across all wards, where a sample of addresses were analysed. This additional work made use of the Council Tax Register and Land Registry data to provide evidence of tenure for these specific areas. This work resulted in 28,895 dwellings in North Norfolk having evidenced tenure information from TDS, commercial ownership information local data identifying second homes and holiday homes or Land Registry analysis. This is 53.6% of dwellings across all wards in North Norfolk[55].

This report, and the work surrounding it, has been financed/funded by MHCLG's Private Rented Sector Innovation and Enforcement Grant Fund (2019/20). This funding supports new, innovative, or targeted short-term initiatives to address criminal landlords and raise the standard of properties in the Private Rented Sector (PRS). This report describes the modelling work and provides details of the results obtained from the dwelling level model and database. The housing stock condition database is also provided to the council to enable them to obtain specific information whenever required. This database is now in an online format, known as the HSCD. Holiday homes are included on the HSCD so that they can be identified where required by the council.

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 with the presence of each of the Housing Standards Variables for North Norfolk overall and broken down by tenure and then mapped by COA (private rented stock)
- Information relating to LAHS reporting for the private sector stock - category 1 hazards and potential HMOs as well as information on EPC ratings
- Energy efficiency for the private sector stock (wall and loft insulation)
- Energy planning variables (SimpleCO_2, energy and heat demand, energy and heat cost).

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

[55] This is a percentage of the total dwellings including holiday homes i.e. 55,111

- The performance of the housing stock in North Norfolk compared to the EHS England average is generally worse with North Norfolk performing notably worse for all hazards and excess cold.
- The private rented sector is generally worse than the social sector, but similar to the owner occupied sector, with the exception of low income households. The private rented sector has similar levels as the owner occupied sector for many variables, although excess cold is slightly lower and fuel poverty (Low Income High Costs definition) and low income households are much higher.
- 21.1% of dwellings in the private rented sector are estimated to have an EPC below band E. Under the legislation these properties would not be eligible to be rented out to new or renewal tenancies. From 1 April 2020 this will also apply to existing tenancies.

The detailed housing stock information in this report and in the HSCD provide the council with a resource for querying and collating information relating to their housing stock. This resource can be used to support the development of strategies and inform housing-related decisions for the area, enabling a targeted intervention approach to improving housing.

5.2 Recommendations

Interventions designed to tackle disrepair, for example home improvement and renewal schemes, landlord accreditation schemes or ultimately targeted enforcement action could be considered with a focus on areas of greatest disrepair in the private rented sector, such as Priory and Stody wards, or areas with high levels of category 1 hazards, such as Priory and Stody wards. These findings could be combined with local intelligence to help identify areas for targeting assistance for physical improvements to private rented 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 Worstead , Cromer Town and Suffield Park.

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

bre

Appendix A Definitions of the Housing Standards Variables

1. **Housing Standards Variables:**
   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 variables.

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

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

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

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

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

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

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

3. Household vulnerability variables:

a. Fuel poverty - 10% definition

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

The fuel poverty ratio is defined as:

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

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

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

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

b. Fuel poverty - Low Income High Costs definition

The government has recently set out a new definition of fuel poverty which it intends to adopt under the Low Income High Costs (LIHC) framework[56]. 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 £16,105.

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

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

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

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

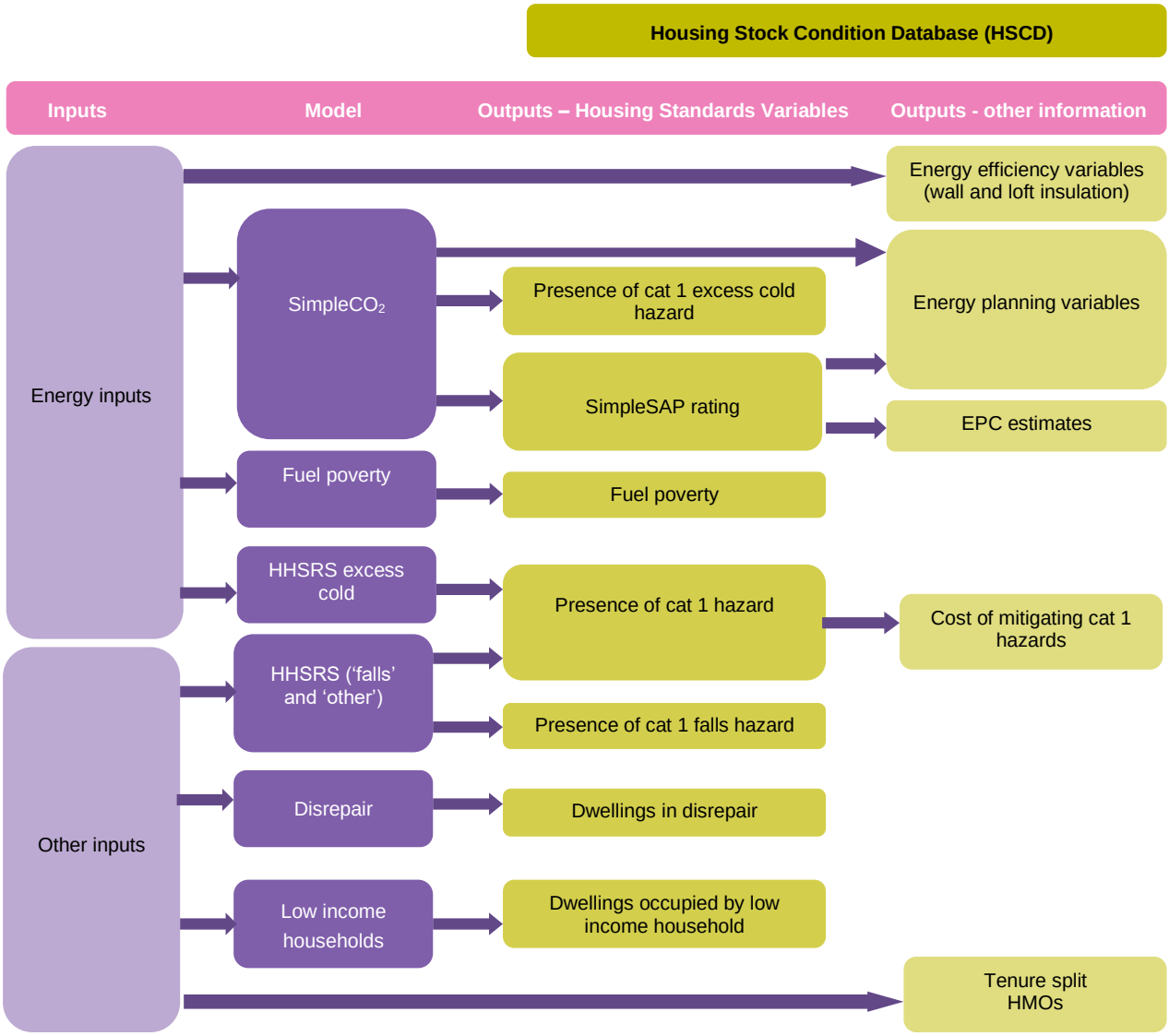
The models making up the overall housing stock modelling approach are:

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

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

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

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



B.1 BRE SimpleCO_2 Model

BRE have developed a variant of the BREDEM[57] software, named "SimpleCO_2", that can calculate outputs from a reduced set of input variables. These outputs are indicative of the full BREDEM outputs and the minimum set of variables the software accepts is information on:

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

The Experian UK Consumer Dynamics Database is used as a source for some of these variables (tenure, dwelling age) and they are converted into a suitable format for the SimpleCO_2 software. The dwelling type is derived using information from OS Mastermap and the number of storeys from OS experimental height data. The remaining pieces of data are inferred from the EHS using other tenure, dwelling age and type, other Experian data (number of bedrooms), other OS data (i.e. dwelling footprint) and data from Xoserve[58] which indicates whether the dwelling is in a postcode which is on the gas network. As the characteristics of a dwelling cannot be determined through access to observed data, a technique known as cold deck imputation is undertaken. This is a process of assigning values in accordance with their known proportions in the stock. For example, this technique is used for predicting heating fuels because the Xoserve data only confirms whether a dwelling is on the gas network or not. Fuel used by dwellings not on the gas network is unknown, so in most cases this information will be assigned using probabilistic methods. The process is actually far more complex e.g. dwellings with particular characteristics such as larger dwellings are more likely to be assigned with oil as a fuel than smaller dwellings.

[57] 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.

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

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

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

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

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

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

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

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

B.2 Housing Condition and Low Income Household Models

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

These models are not based solely on the thermal characteristics of the dwelling, and in some cases are not based on these characteristics at all. A top down methodology has been employed for these models, using data from the EHS and statistical techniques, such as logistic regression, to determine the combination of variables which are most strongly associated with failure of each standard. Formulae have been developed by BRE to predict the likelihood of failure based on certain inputs. The formulae are then applied to the variables in the national Experian dataset to provide a likelihood of failure for each dwelling. Each individual case is then assigned a failure/compliance variable 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, North Norfolk identified a number sources of data which were used to update the BRE dwelling level models to provide an integrated housing stock condition database. Their data sources are shown in **Table B.1**.

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

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

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

Table B.1: Address matching results and impact on the modelling process *N.B. The data below includes holiday homes*

Data source	Total no. of records	No. (and %) of addresses matched	Notes / impact on the modelling process
EPC data	37,689 - total records available	24,906 (79.4% of de-duplicated records)	Data de-duplicated for multiple EPCs – 31,377 remaining
LLPG data	57,735 – total received	55,111 (95.5% of records provided)	BLPU classes checked, address fields checked and duplicate UPRNs removed – 55,111 remaining
Tenancy deposit data	3,444 – total received	2,632 (80.2% of de-duplicated records)	3,283 – remaining records after de-duplication
Second homes	5,451 – total received	5,097 (93.6% useable records)	5,447 – remaining once missing UPRN records removed
Benefits data	7,677 – total received	7,233 (96.3% of de-duplicated records)	Remaining cases once duplicate UPRNs removed – 7,508

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

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

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

EPC data

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

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

Therefore:

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

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

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

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

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

It is assumed that all flats in a block share the same heating type, boiler type if present, fuel type and heating controls. Where there are multiple types present, the predominant type is used. Flats are

assumed to have the same hot water source, and if one flat benefits from solar hot water it is assumed that all flats in the block do.

B.4 OS MasterMap information

OS AddressBase was then linked to the OS MasterMap Topography Layer. OS MasterMap provides a detailed geographical representation of the landscape in Great Britain, including buildings. Once the OS AddressBase is linked to OS MasterMap it is possible to extract the relevant geographical information for the residential buildings in – this involves looking at information about individual dwellings or blocks of flats such as footprint area and attachment to other dwellings.

Figure B. 2 shows that visual identification of dwelling type can be quite simple. The OS MasterMap of the cul-de-sac 'Prince of Wales Gardens' comprises 10 sets of semi-detached properties. BRE use this type of knowledge to create a model to infer dwelling type, which is described in more detail below.

Figure B. 2: OS MasterMap example (source OS website[59])

By looking at the number of residential address points (from OS AddressBase) it is possible to determine whether a building is a house or a block of flats[60]. The dwelling type is then determined based on the spatial relationship of the individual dwelling/block of flats with other dwellings. These spatial relationships are outlined for each resulting dwelling type below:

[59] https://www.ordnancesurvey.co.uk/business-and-government/products/mastermap-products.html

[60] 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 dwelling types allocated as follows:

Detached – where a single address is within a dwelling footprint and that footprint is not attached to any other building footprint[61].

Semi-detached - where a single address is within a dwelling footprint and is joined to one other building footprint.

Terrace - where three or more building footprints are joined to one another.

Mid terrace – where a single address is part of a terrace block and attached to more than one other building footprint.

End terrace – where a single address is part of terrace block and attached to only one other building footprint.

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. The following assumptions are made:

Converted flat –if there are between two and four flats in the block (inclusive) and the dwelling was built before 1980 then it is assumed to be a conversion.

Purpose built flat – all other flats are assumed to be purpose built.

[61] The area of land over which a building is constructed (i.e. the area of the ground floor only, this does not take into account the number of floors in a building)

Appendix C Using the BRE Integrated Dwelling Level Housing Stock Database

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

C.1 Overview

The Housing Stock Condition Database (HSCD) is now online. You can access it in https://hscd.bregroup.com/login.jsp with the credentials sent to you by email.

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

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

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

Figure C. 1: Login screen

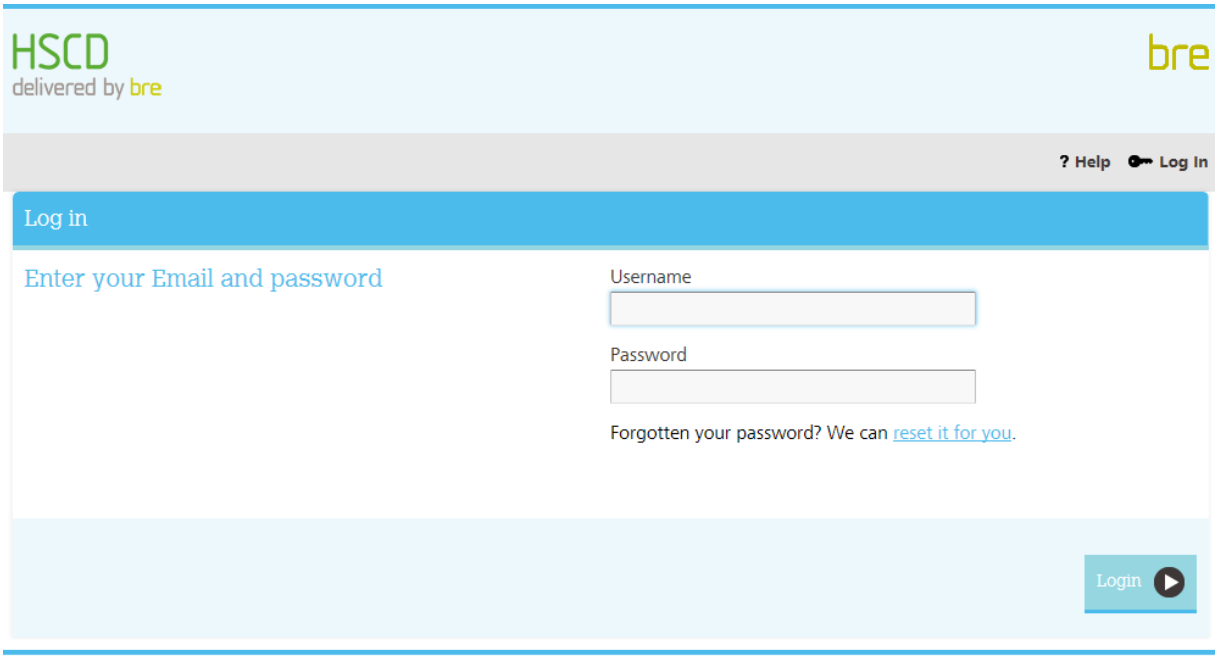
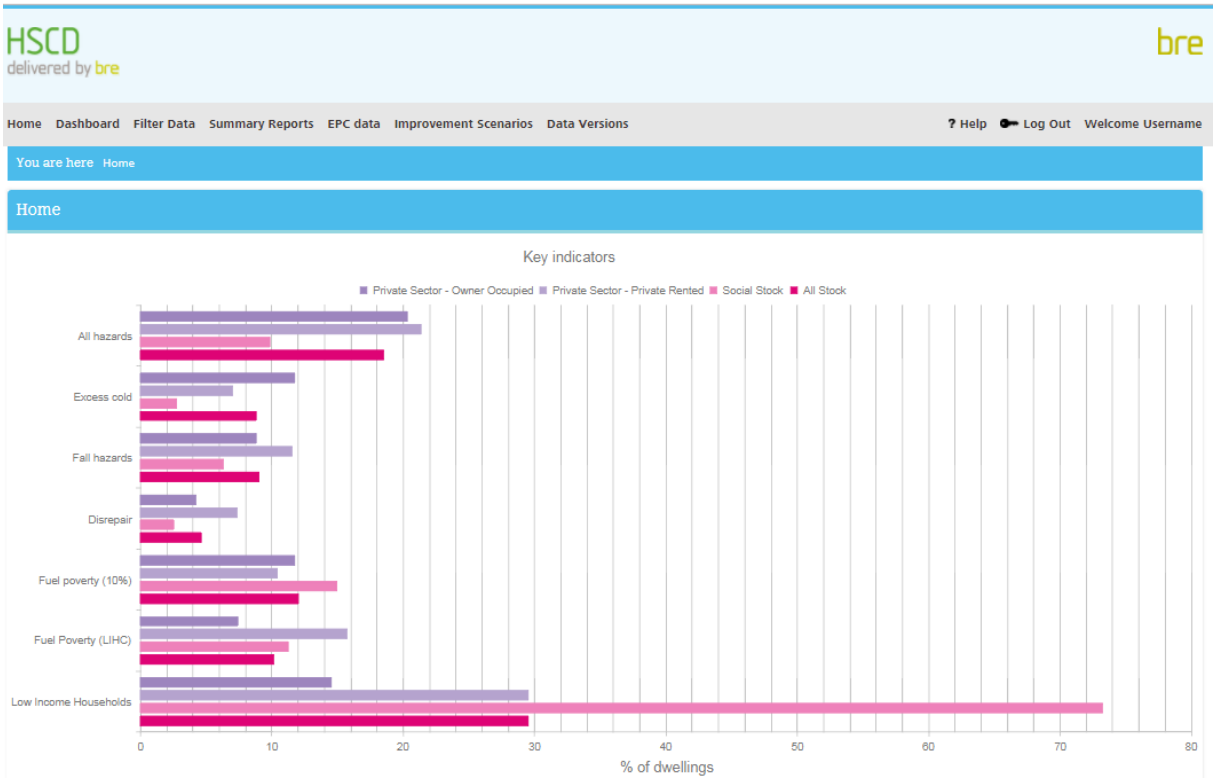


Figure C. 2 Home page (note screenshot below is sample data)



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

Appendix D Contributions

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Glossary of terms

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

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

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