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CLIENT REPORT

BRE Integrated Dwelling Level Housing Stock Modelling and Database for Babergh District Council, East Suffolk Council, Ipswich Borough Council, Mid Suffolk District Council, West Suffolk Council and Suffolk County Council

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Executive summary

- The Suffolk Councils, comprising of Babergh District Council, East Suffolk Council, Ipswich Borough Council, Mid Suffolk District Council, West Suffolk Council and Suffolk County Council commissioned BRE to undertake a series of modelling exercises on their housing stock, resulting in a county level housing stock modelling report and access to a database for each Local Authority, enabling them to obtain specific information whenever required.

- The main aims of this work were to provide estimates of:
  - The percentage of dwellings meeting each of the key indicators[1] for Suffolk overall and broken down by tenure and then mapped by ward (private sector stock only)
  - Information relating to Local Authority Housing Statistics (LAHS) reporting for the private sector stock – Energy Performance Certificate (EPC) ratings, HMOs and category 1 hazards
  - Information relating to HHSRS Category 2 hazards
  - 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)

- BRE Housing Stock Models were used to provide such estimates at dwelling level with a focus on private sector housing. The key indicators provide the local authorities within Suffolk with detailed information on the likely condition of the stock and the geographical distribution of properties of interest.

- A stock modelling approach has been developed and used by BRE for many years and the most recent models (v6) have been updated to make use of the results of the 2019 English Housing Survey (EHS)[2]. The models also make use of Experian and Ordnance Survey (OS) data. OS AddressBase Plus is used as a basis for the list of all dwellings in the authority and applying improved geo-modelling[3] is used to determine the dwelling type and floor area from OS Mastermap. The energy model that lies at the heart of the modelling process are based on the 2012 version of SAP[4], and the methods for imputing the inputs to this model incorporate information sources from additional sources. These include the age of postcodes (to improve dwelling age data) and data from Xoserve to determine whether the dwelling is on the gas network. These dwelling level models are used to estimate the likelihood of a particular dwelling meeting the criteria for each of the 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.

- Furthermore, the Suffolk Councils provided additional sources of "local data" – LLPG, Tenancy Deposit Scheme (TDS), mandatory licensable HMOs, non-licensable HMOs, Enforcement and Empty Dwelling data. Energy Performance Certificate (EPC) data is also integrated by BRE. Information on the thermal characteristics from 'actual' observed inputs for 221,932 dwellings (64% of the stock), were used in preference to modelled or imputed inputs. These data sets were then

[1] Housing Health and Safety Rating System (HHSRS) category 1 hazards, excess cold hazards, fall hazards, disrepair, fuel poverty, low income households.

[2] 2019 is the latest available data. Prior to the v6 models EHS 2018 data was used.

[3] 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

[4] Note that the carbon emission factors applied are the updated factors published in the SAP10.1 consultation[4] which take into account the reduction in carbon emissions from grid electricity in recent years. Only the carbon emission factors from SAP10.1 have been used in the modelling; the energy cost prices use the existing SAP12 figures.

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incorporated into the BRE Housing Stock Model to produce an integrated Housing Stock Condition Database (HSCD).

- The headline results are provided on the following page:

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Headline results for Suffolk

18% of private sector stock in Suffolk is estimated to have a category 1 hazard. In Suffolk, the greatest proportion is in Mid Suffolk (25%) and the lowest is in Ipswich (12%). *See the full results.*

11% of private sector stock is estimated to have an excess cold hazard. The highest proportions are in Mid Suffolk (20%) and the lowest are in Ipswich (3%). *See the full results*

7% of private sector stock is estimated to have a falls hazard. The highest proportions are in Ipswich (9%) and the lowest are in West Suffolk (6%). *See the full results*

4% of private sector stock is estimated to be in disrepair. The highest proportions are in Ipswich (5%) and the remaining four authorities are all slightly lower at 4%. *See the full results*

For the private sector stock, fuel poverty figures are fairly consistent across the local authorities at 12% and 11% for the fuel poverty 10% and fuel poverty Low Income High Costs definitions respectively. *See the full results*

14% of the private sector stock in the region is estimated to be occupied by low income households. The figures are very consistent across all five authorities with Babergh, East Suffolk, Ipswich and West Suffolk with 14% and Mid Suffolk with 13% . *See the full results*

The average SimpleSAP rating is 58 across all five authorities, with the lowest ratings in Babergh and Mid Suffolk (both 56) and the highest in Ipswich and West Suffolk (both 60). *See the full results*

In relation to EPCs, the majority of properties in the private rented sector fall in bands C, D and E. Overall, 9.9% of dwellings are estimated to fall into bands F and G. Babergh has the highest estimated proportion of private rented stock falling into bands F and G at 13.5 %, and Ipswich has the lowest at 3.9%. *See the full results*

In the private sector stock there are an estimated 81,218 dwellings with solid walls, 43,278 dwellings with un-insulated cavity walls and 43,996 dwellings with less than 100mm of loft insulation. *See the full results*

The HMO modelling indicates there are an estimated 6,327 dwellings that have the potential to be HMOs, of which 1,311 have the potential to come under the Mandatory Licensing scheme (from the data supplied by the Suffolk Councils there are 347 licensed HMOs). *See the full results*

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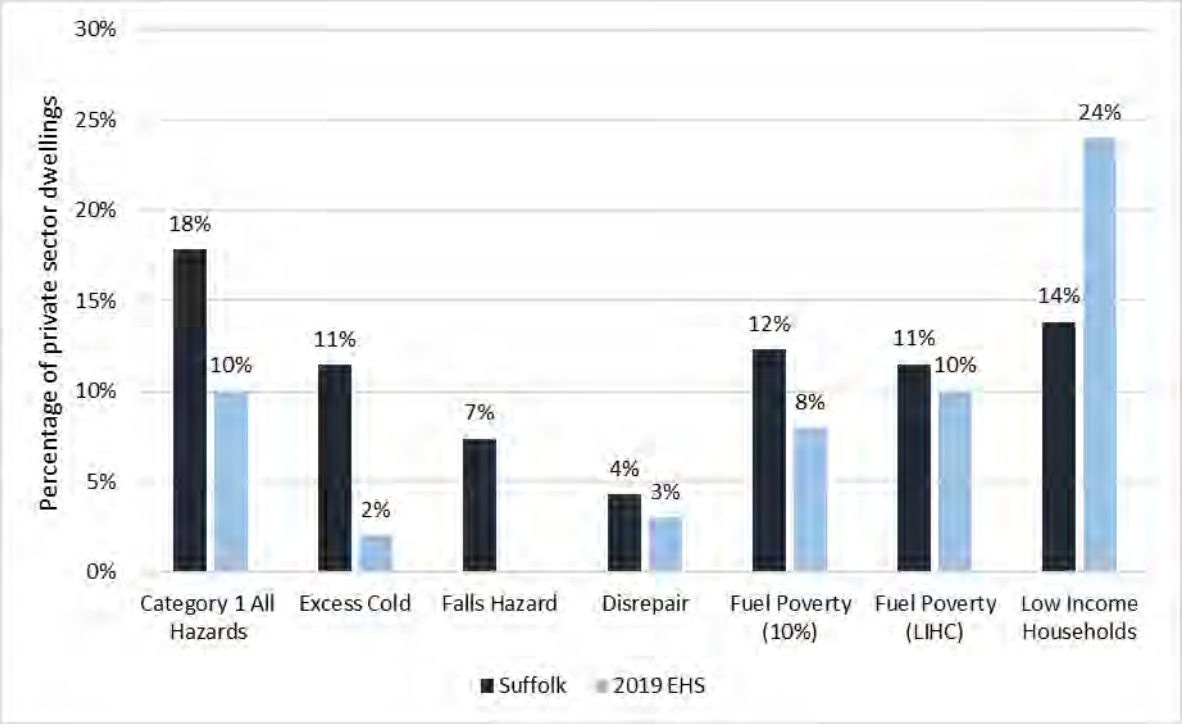
Key illustrations of headline results

The chart below shows the percentage of private sector dwellings in Suffolk failing each of the key indicators compared to the percentage for England as a whole (2019 EHS data). Suffolk has higher levels of all variables except low income households compared to England as a whole.

Comparison of Suffolk with England (EHS 2019), percentage of private sector dwellings failing each of the indicators



N.B. 2019 Regional & England data no longer includes Falls Hazards as a separate variable.

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The following table shows the percentage of private rented stock falling into each of the EPC ratings bands (based on SimpleSAP) for Suffolk overall and by local authority. Whilst the majority of properties in the private rented sector fall in bands C, D and E, 9.9% overall are estimated to fall into bands F and G. Babergh has the highest estimated proportion of private rented stock falling into bands F and G at 13.5%, and Ipswich has the lowest at 3.9%.

Percentage of private rented stock falling into each of the EPC ratings bands (based on SimpleSAP) by local authority

Distribution of EPC rating bands by local authority - private rented sector						
EPC rating band	**Babergh**	**Mid Suffolk**	**East Suffolk**	**Ipswich**	**West Suffolk**	***Suffolk***
(92-100) A	0.0%	0.0%	0.0%	0.0%	0.0%	***0.0%***
(81-91) B	1.1%	1.6%	0.5%	2.0%	2.7%	***1.6%***
(69-80) C	22.2%	26.0%	18.4%	27.4%	32.6%	***25.3%***
(55-68) D	43.6%	37.0%	48.9%	45.3%	42.3%	***43.4%***
(39-54) E	19.6%	19.4%	22.9%	21.4%	15.8%	***19.8%***
(21-38) F	10.6%	12.3%	7.3%	3.4%	5.5%	***7.8%***
(1-20) G	2.9%	3.7%	2.0%	0.5%	1.2%	***2.1%***

The map overleaf shows the distribution of category 1 hazards across the Suffolk councils, as defined by the Housing Health and Safety Rating System (HHSRS). The highest concentrations are mainly across a central band of Babergh running north to south as well as two wards in the East, the outermost wards of East Suffolk running north to west as well as one south easterly ward, and the majority of Mid Suffolk. In West Suffolk the worst performing wards are found in the north east and the south of the Local Authority area. Meanwhile, Ipswich has relatively low levels of category 1 hazards.

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Percentage of private sector dwellings in Suffolk with the presence of a HHSRS category 1 hazard. N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound

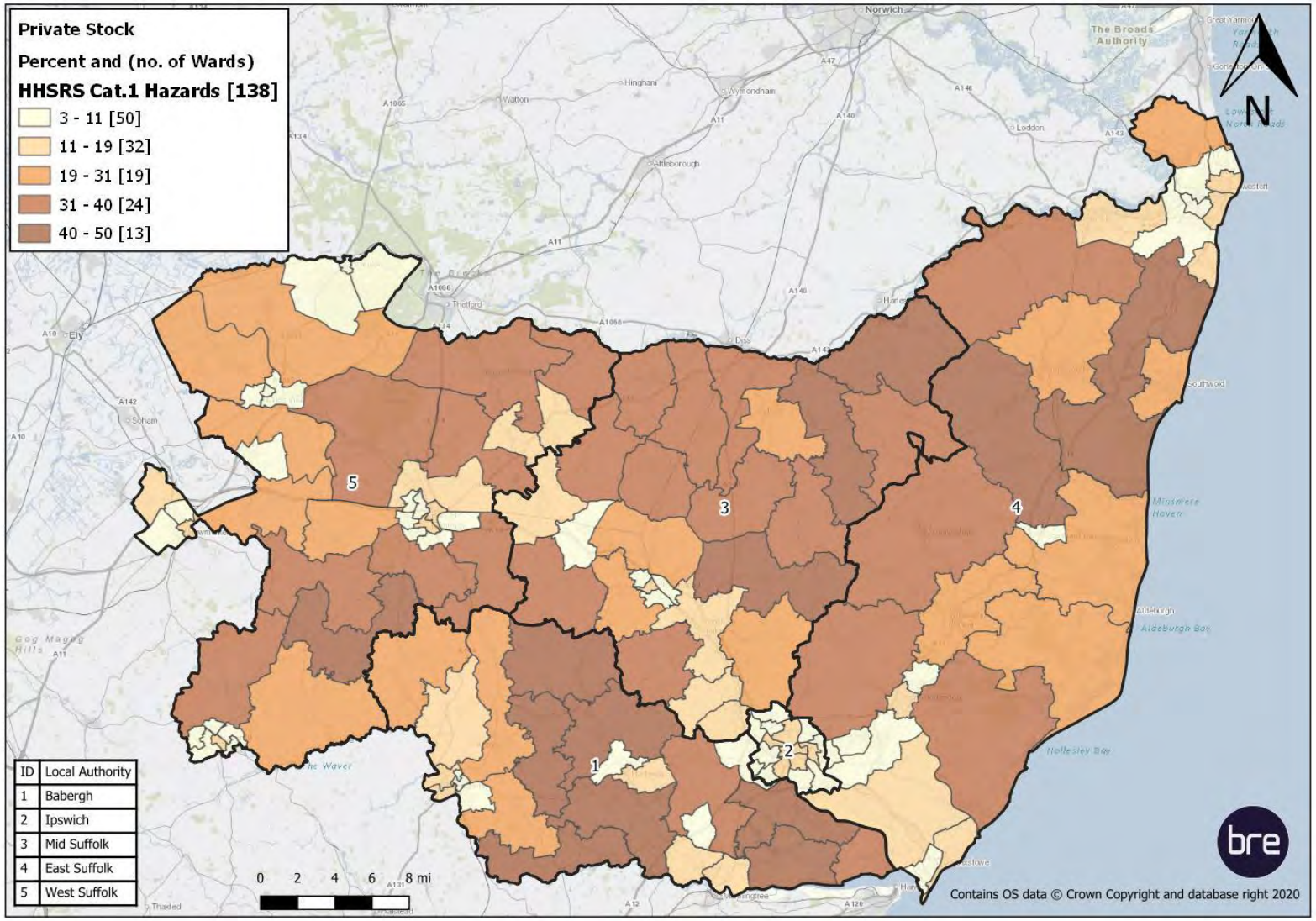

Table of Contents

1. Introduction 12
1.1 Project Aims 13
2. Policy background 14
2.1 Housing Act 2004 14
2.2 Key housing strategy policy areas and legislation 14
2.2.1. Private rented sector 14
2.2.2. Health inequalities 14
2.2.3. Integrated care 15
2.2.4. Public Health Outcomes Framework 15
2.2.5. Joint Strategic Needs Assessment (JSNA) and Joint Health and Wellbeing Strategies 16
2.2.6. Energy Act 2011 16
2.2.7. Empty homes 16
2.3 Other policy areas 17
2.3.1. The Housing and Planning Act 2016 17
2.3.2. The Welfare Reform and Work Act 2016 and the Welfare Reform Act 2012 18
2.3.3. Localism Act 2011 19
2.3.4. Potential increase in private rented sector properties 19
2.4 Local Authority Housing Statistics (LAHS) and EPC ratings 19
2.5 The Energy Company Obligation (ECO) 20
2.5.1. Previous scheme – ECO3 20
2.5.2. Current scheme – ECO4 21
2.6 The Green Homes Grant (GHG) 21
2.7 Sustainable Warmth – Local Authority Delivery and Home Upgrade Grant 22
2.8 Heat and Buildings Strategy 22
3. Overview of the BRE Dwelling Level Housing Stock Modelling approach 23
3.1 Overview 23
4. Summary results for the Suffolk Councils from the BRE Dwelling Level Housing Stock Models and Database 27
4.1 Breakdown of the housing stock by tenure – validation 28
4.2 Other national datasets relating to tenure 31
4.3 Overview of Suffolk 32
4.4 Comparison of the Suffolk Councils with England 34
4.5 Comparison of the key indicators across the Suffolk Councils local authorities 35
4.5.1. Presence of a HHSRS category 1 hazard 35
4.5.2. Presence of category 1 hazard for excess cold 37
4.5.3. Presence of category 1 hazard for falls 39
4.5.4. Information on Category 2 hazards 41

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4.5.5. Dwelling in Disrepair 49
4.5.6. Fuel poverty 52
4.5.7. Dwellings occupied by low income households 57
4.5.8. SimpleSAP 59
4.6 Comparison of information relating to LAHS reporting 61
4.6.1. Cost of mitigating category 1 hazards in the Suffolk Council's private sector stock 61
4.6.2. EPC Ratings 61
4.7 Energy efficiency variables for Suffolk 64
4.8 Energy planning variables – private sector stock 69
4.9 Housing standards variables for HMOs 75
4.9.1. Houses in Multiple Occupation (HMOs) in the Suffolk Council's private sector stock 75
5. Conclusion and recommendations 79

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List of Tables

Table 1: Housing Standards Variables split into categories 12
Table 2: Integrated EPC Records 24
Table 3: Overview of the Suffolk Councils housing stock by tenure for each local authority 33
Table 4: Percentage of dwellings estimated to have a HHSRS category 1 hazard by local authority and tenure 35
Table 5: Percentage of dwellings estimated to have a HHSRS category 1 hazard for excess cold by local authority and tenure 37
Table 6: Percentage of dwellings estimated to have a HHSRS category 1 hazard for falls by local authority and tenure 39
Table 7: The numbers and proportions of dwellings with a high category 2 hazard in each tenure. 41
Table 8: Total number of dwellings and total number and overall percentage of category 2 hazards by ward for the private sector stock, in Babergh 42
Table 9: Total number of dwellings and total number and overall percentage of category 2 hazards by ward for the private sector stock, in East Suffolk 43
Table 10: Total number of dwellings and total number and overall percentage of category 2 hazards by ward for the private sector stock, in Ipswich 44
Table 11: Total number of dwellings and total number and overall percentage of category 2 hazards by ward for the private sector stock, in Mid Suffolk 45
Table 12: Total number of dwellings and total number and overall percentage of category 2 hazards by ward for the private sector stock, in West Suffolk 46
Table 13: Percentage of dwellings estimated to be in disrepair by local authority and tenure 50
Table 14: Percentage of dwellings estimated to be in fuel poverty by local authority and by tenure – Low Income High Costs (LIHC) definition 53
Table 15: Percentage of dwellings estimated to be in fuel poverty by local authority and by tenure – 10% definition 53
Table 16: Percentage of dwellings estimated to be occupied by low income households by local authority and by tenure 57
Table 17: SimpleSAP rating by local authority and by tenure 59
Table 18: Estimated costs to mitigate all category 1 hazards in private sector stock, for each local authority and Suffolk as a whole. 61
Table 19: Percentage of private sector stock falling into each of the EPC ratings bands (based on SimpleSAP) by local authority 62
Table 20: Percentage of private rented stock falling into each of the EPC ratings bands (based on SimpleSAP) by local authority 62
Table 21: Number and percentage of private sector dwellings with solid walls and with un-insulated cavity walls, by local authority, The Suffolk Councils overall and compared to the national figure (EHS 2019) ... 65
Table 22: Number and percentage of private sector dwellings with less than 100mm of loft insulation, by local authority, the Suffolk Councils overall and compared to the national figure (EHS 2019) 65
Table 23: Modelled data for average energy efficiency variables per dwelling by local authority – owner occupied stock 70
Table 24: Modelled data for average energy efficiency variables per dwelling by local authority – private rented stock 70
Table 25: Summary of modelled estimated potential HMOs within the Suffolk Councils' private sector stock. 76

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List of Figures

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) 26
Figure 2: Tenure split – comparison of BRE Housing Stock Condition Database outputs with 2021 Census figures for the Suffolk Councils. 28
Figure 3: Overview of the Suffolk Councils housing stock showing percentage split by tenure 33
Figure 4: Comparison of the Suffolk Councils with England (EHS 2019), percentage of private sector dwellings failing each of the indicators 34
Figure 5: A representation of the Low Income High Costs definition of fuel poverty 52

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1. Introduction

The Suffolk councils, comprising of Babergh District Council, East Suffolk Council, Ipswich Borough Council, Mid Suffolk District Council, West Suffolk Council and Suffolk County Council commissioned BRE to undertake a series of modelling exercises on their housing stock, resulting in a county level housing stock modelling report and access to a database for each Local Authority.

The Local Authorities within Suffolk provided additional sources of "local data" – LLPG, Tenancy Deposit Scheme (TDS) data, mandatory licensable HMO data, licensable HMO data and Enforcement and Empty Dwelling data for integration. The BRE Model also integrates Energy Performance Certificate (EPC) data and, as a result of this 221,932 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 records, which account for 49.1% of the total housing stock in Suffolk.

The BRE Housing Stock Model data is provided to each council via the online Housing Stock Condition Database (HSCD) to enable them to obtain specific information whenever required.

The BRE Housing Stock Models provide the council with dwelling level information on various Housing Standards Variables, focussing on private sector housing. These variables provide each authority 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 Department for Levelling Up, Housing and Communities (DLUHC, formerly MHCLG) Local Authority Housing Statistics (LAHS) reporting of costs of mitigating hazards, numbers of Houses in Multiple Occupation (HMOs) as well as providing information relating to estimated Energy Performance Certificate (EPC) ratings (based on SimpleSAP).

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 models have been updated to make use of the results of the 2019

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English Housing Survey (EHS)[5]. The models also make use of Experian and Ordnance Survey (OS) data. OS AddressBase Plus is used as a basis for the list of all 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[6]. 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.

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

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[7].

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

1.1 Project Aims

The main purpose of this project was to provide data on key private sector housing indicators for each of the local authorities within Suffolk. The main aims were therefore to provide estimates of:

- The percentage of dwellings meeting each of the key indicators for the overall and broken down by tenure and then mapped by ward (private sector stock only)
- Information relating to LAHS reporting for the private sector stock - EPC ratings, HMOs and category 1 hazards
- Information relating to category 2 hazards
- Energy planning variables (SimpleCO2, energy and heat demand, energy and heat cost)
- Energy efficiency variables for the private sector stock (wall and loft insulation)

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 Suffolk covering each of the main aims above.

[5] 2018 is the latest available data. Prior to the v5 models EHS 2015 data was used.

[6] The OS data has been used to update a number of the model inputs – the main value of the OS data is the ability to determine the dwelling type with much greater confidence – see **0** for more information.

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

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2.Policy background

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

2.1 Housing Act 2004

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

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

2.2 Key housing strategy policy areas and legislation

2.2.1. Private rented sector

Following the introduction of the Levelling Up agenda and the associated white paper's reference to improving housing conditions, there have been a number of recent reforms to the quality expectations and regulation of the Private Rented Sector. Chief among these is the "Fairer Private Rented Sector White Paper 2022"[8], which details the government's plans to improve the standard of living for tenants. It aims to reduce the number of homes that contain HHSRS Cat 1 hazards through landlord compliance with a legally binding Decent Homes Standard, whilst also providing tenants with a more secure and flexible form of tenure through the abolition of Section 21 'no fault' evictions, the introduction of periodic tenancies and extended grounds for possession rights. These changes will become legally binding through the introduction of the Renters Reform Bill, which was announced in June 2022.

2.2.2. Health inequalities

Housing is a key determinant of health and well-being, and poor housing conditions continue to cause preventable deaths and contribute to health inequalities[9]. These inequalities include exposure to cold, damp living conditions which are known to exacerbate health problems, in particular cardiovascular and respiratory illnesses. Furthermore, overcrowding, inaccessibility for those with disabilities and a lack of safety and security are all common problems that lead to health inequality. The Government's "Improving Health through the Home" paper highlights the need for consolidated thinking by people, communities

[8] A fairer private rented sector, DLUHC, 2022

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

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and organisations.[10] This builds on the findings from the government's white paper "Choosing Health"[11], which 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 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.

An example in this area is the work carried out by Liverpool City Council in partnership with Liverpool Primary Care Trust – the "Healthy Homes Programme". This has identified over 3,800 hazards and led to an estimated £4.8 million investment by landlords, delivering sustainable health improvements and enhancing community wellbeing.

2.2.3. Integrated care

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

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

It is therefore essential that departments providing or regulating housing work with other council departments and health organisations to provide services that are integrated and take full account of the needs of the individual. The Better Care Fund[13] seeks to achieve this through the delivery of health and social care that is centred around the individual. The four partners involved, namely the Department of Health and Social Care, DLUHC, NHS England and the Local Government Association, work in a unique way to help local areas plan and implement integrated health and social care services across the country. By pooling their budgets, they are able to offer three core grant and funding opportunities, which are the Disabled Facilities Grant, the Improved Better Care Fund and the Winter Pressures Funding. Of these, the Disabled Facilities Grant is relevant to housing in that it enables adaptations to be made to the home, such as ramps, stairlifts and suitable heating systems, which allows older and disabled people to maintain independence in their home.

2.2.4. Public Health Outcomes Framework

The Public Health Outcomes Framework "Healthy lives, healthy people: Improving outcomes and supporting transparency"[14] 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

[10] Improving health through the home, Public Health England, 2017

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

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

[13] NHS England » Grants and funding

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

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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"[15].

2.2.6. Energy Act 2011

The Energy Act 2011, which was subsequently updated in 2016, requires that 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[16]. 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 also apply to all domestic rented properties regardless of whether there has been a change in tenancy (again exemptions may apply but these must be registered by the landlord on the PRS exemptions register).

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[17] empty homes. There is no longer any separate funding for empty homes under the 2015-18 Affordable Homes Programme[18]. Since 2013, councils have been able to charge a premium on the Council Tax bills of owners of empty homes, which was updated in 2018 to allow councils to charge up to 200% of the normal council tax bill if a property is unoccupied between 2 and 4 years, which rises to 300% if unoccupied for 5 years and 400% for 10 years[19]. Furthermore, local authorities have a range of powers and incentives at their disposal to bring empty homes back into use. These include, Empty

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

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

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

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

[19] Why am I paying an empty homes premium on my council tax? (parliament.uk)

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Dwelling Management Orders, Council Tax exemptions and premiums, and measures to secure the improvement of empty properties[20].

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.[21]

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

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

The latest available information for each of the Local Authorities within the Suffolk Councils for 2023, collected by DLUHC , identifies 9,484 vacant dwellings across all tenures. This represents a vacancy rate of approximately 3% in Suffolk. In 2022 the number of vacant dwellings was 8,983, and 5 years ago in 2019 the figure was 8,531. Furthermore, around 3,015 (0.9%) dwellings are long-term vacant (6 months or more) in Suffolk (2023 figures).

2.3 Other policy areas

The following policy areas, whilst not directly relating to environmental health services, will influence 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[22] introduced legislation for government to implement the sale of higher value local authority homes, starter homes, pay to stay and several other measures, mainly intended to promote home ownership and boost levels of housebuilding in England. 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

[20] https://commonslibrary.parliament.uk/research-briefings/sn03012/

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

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

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- To replace the need for social rented and intermediate housing on new sites with the provision of Starter Homes that are sold at a reduced cost to first time buyers
- Changing the definition of 'affordable homes' to include starter homes
- Increasing the site size threshold before affordable housing can be requested

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

- Allowing local authorities to apply for a banning order to prevent a particular landlord/letting agent from continuing to operate where they have committed certain housing offences
- Creating a national database of rogue landlords/letting agents, which will be maintained by local authorities
- Allowing tenants or local authorities to apply for a rent repayment order where a landlord has committed certain offences (for example continuing to operate while subject to a banning order or ignoring an improvement notice). If successful, the tenant (or the authority if the tenant was receiving universal credit) may be repaid up to a maximum of 12 months' rent
- Introducing a new regime giving local authorities an alternative to prosecution for offences committed under the Housing Act 2004, including all HMO offences. Effectively, local authorities 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[23] 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 several 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[24] (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

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

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

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arrears on their rental payments, then authorities may be met with reluctance from landlords when requiring improvements to properties.

2.3.3. Localism Act 2011

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

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

2.3.4. Potential increase in private rented sector properties

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

2.4 Local Authority Housing Statistics (LAHS)[25] 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 [26, 27]. Since 1 April 2020, landlords can no longer continue letting a property which is already let if

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

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

[27] 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.

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it has an EPC rating of F or G[28]. Furthermore, since 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 4.3.**

2.5 The Energy Company Obligation (ECO)

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

- 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[29, 30] as a transition period between the end of ECO2 and a new scheme.
- ECO3[31]- launched in October 2018 and ended on 31 March 2022, although between 1 April 2022 and 30 June 2022 an 'ECO3 interim delivery period' was devised
- ECO4 – launched in July 2022 and extends until 31 March 2026

2.5.1. Previous scheme – ECO3

ECO3 had 4 phases, the last of which terminated in March 2022. However, with the exception of new and replacement oil/LPG heating systems, measures were able to continue to be installed under the ECO3 scheme in what the government termed the 'ECO3 interim delivery period' which was designed to bridge the gap between ECO3 officially ending and ECO4 commencing. The scheme focussed on Affordable Warmth (the Carbon Emissions Reduction Obligation – CERO – has been removed) so that low income and vulnerable households were the recipients of the main benefits. The scope of the Affordable Warmth group was expanded to include other benefits (e.g. Child Benefit, Personal Independence Payment, etc.). In terms of measures and improvements, the focus was 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 were not eligible under ECO3, and suppliers were still able to meet up to 10 – 20% of their obligation through "innovative measures". Energy companies could 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

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

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

30 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/586266/ECO_Transition_Final_Stage_IA__For_Publication_.pdf

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

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provides a valuable contribution to the evidence base increasingly being required to support competitive funding bids to central government for housing improvements.

2.5.2. Current scheme – ECO4

ECO4 aligns with the new Sustainable Warmth Strategy for England, and the Low Income and Low Energy Efficiency (LILEE) metric[32] and will continue to operate as a supplier obligation.

The main objective for this phase of the scheme is to improve the least energy efficient housing stock occupied by low income and vulnerable households. This will contribute to progressing towards the target of improving as many fuel poor homes as reasonably practical to EPC band C by 2030, with an interim milestone of band D by 2025. ECO4 aims to focus more on owner occupied households which aligns better with other policies aimed at decarbonising the housing stock. One aspect of the new scheme, known as ECO4 Flex, allows energy suppliers to achieve up to 50% of their obligation by installing energy saving measures in either owner occupied or private rented homes. Under this process local authorities are able to declare that certain households meet the eligibility criteria of living in a cold home and being on a low income, which helps to identify and support those most at risk of fuel poverty. ECO4 Flex is optional and neither local authorities nor energy suppliers are required to participate.

Additionally, the ECO+ scheme is currently under consultation, with the intention to provide support for households that are not in receipt of any other government assistance to improve the energy efficiency of their homes37. The £1 billion scheme will predominantly be for households who are in the lower Council Tax bands and living in inefficient homes (with an EPC rating of D or below) who will benefit from measures including loft insulation and cavity wall insulation. Around a fifth of the funding will be targeted to help the most vulnerable, including those in fuel poverty. In addition to this the government have introduced an £18 million public information campaign, designed to help households save money on their energy bills by promoting the government's advice around reducing the temperature of the water that is used in radiators (boiler flow temperature), turning down radiators in empty rooms and draught proofing windows and doors.

2.6 The Green Homes Grant (GHG)

The Department for Business, Energy and Industrial Strategy (BEIS) launched the Green Homes Grant (GHG) in September 2020 which enabled homeowners and residential landlords to apply for up to £5,000 of funding towards the cost of installing energy efficient improvements to the home. Under the GHG, improvements could include insulation to reduce energy use or installing low-carbon heating to reduce the amount of CO_2 produced by a dwelling. The vouchers scheme closed to new applicants on March 2021[33]. Furthermore, £200m of funding is available for the installation of eligible measures under the Local Authority Delivery (LAD) competition[34] to support low income households (an annual income of no more than £30,000) living in the least energy efficient properties (i.e. EPC Bands E, F or G).

[32] Fuel poverty trends 2021 – GOV.UK (www.gov.uk)

[33] Green Homes Grant: make energy improvements to your home – GOV.UK (www.gov.uk)

[34] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/919905/green-homes-grant-la-delivery.pdf

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2.7 Sustainable Warmth – Local Authority Delivery and Home Upgrade Grant

Sustainable Warmth[35] brings together the two fuel poverty schemes, Local Authority Delivery (LAD) and Home Upgrade Grant (HUG), into a single local authority funding opportunity. The LAD funding provides a total of £200 million and is designed to support low-income homes heated by mains gas. HUG funding totals £150 million for low-income households that do not use mains gas for space heating.

2.8 Heat and Buildings Strategy

The Heat and Buildings Strategy[36] was published in October 2021 and outlines the Government's ambition to decarbonise buildings through energy efficiency measures and low-carbon heating technologies in order to support their Net Zero goals.

The Government aims to have no new gas boilers sold by 2035 and plans to work with industry to reduce the cost of heat pumps by 25-50% or more by 2025. By 2030, they hope that heat-pumps will be similar in price to boilers and plan to support early-switchers with Boiler Upgrade Scheme grants of up to £5,000. The Government recognised that we currently do not have the capacity to support such a rapid heating transition and so it announced a £60m heat pump innovation fund to support its reiterated objective to install 600,000 heat pumps per year by 2028. They also plan to invest £336 million over 2022/23 to 2024/25 into a broader Heat Network Transformation Programme to develop low-carbon heat networks and enable local areas to deploy heat network zoning.

[35] Apply for the Sustainable Warmth competition – GOV.UK (www.gov.uk)

[36] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1032119/heat-buildings-strategy.pdf

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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 DLUHC English Housing Survey (EHS)[37]. 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[38] software, named "SimpleCO_2", that can calculate energy outputs from a reduced set of input variables.

The modelled dwelling level data provided for the Suffolk Councils 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.

Suffolk also provided (an) additional source(s) of local data which was/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:

- 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.
- TDS data – each council provided three tenancy deposit scheme datasets to improve the private rented sector tenure status.
- HMO data – each council provided a list of HMOs and licensed HMOs which were added to the modelled HMOs.
- Enforcement data – each council provided lists of addresses where category 1 hazards were found and the council issued an enforcement notice. This data was used to help inform the condition of the housing stock, as it was assumed that where an enforcement notice was issued the hazard(s) had been fixed and the property was free from disrepair.
- Empty Dwellings Data – each council provided a list of known empty dwellings in order for these dwellings to be identified in the HSCD .

[37] The most recent survey used in the housing stock models is 2018.

[38] 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.

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Furthermore, BRE integrated Energy Performance Certificate (EPC) data into the BRE Housing Stock Model and Database:

- **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 licensing requirements the EPC data is only used to inform the energy efficiency aspects of the model.

The number and proportion of EPC records integrated is summarised in **Table 2**.

Table 2: Integrated EPC Records

Local authority	No. of useable records (and % of all stock)
Babergh	25,135 (61%)
Mid Suffolk	22,705 (61%)
West Suffolk	55,600 (68%)
Ipswich	41,208 (67%)
East Suffolk	77,284 (63%)
Suffolk	221,932 (64%)

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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[39]) 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[39]) 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.

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

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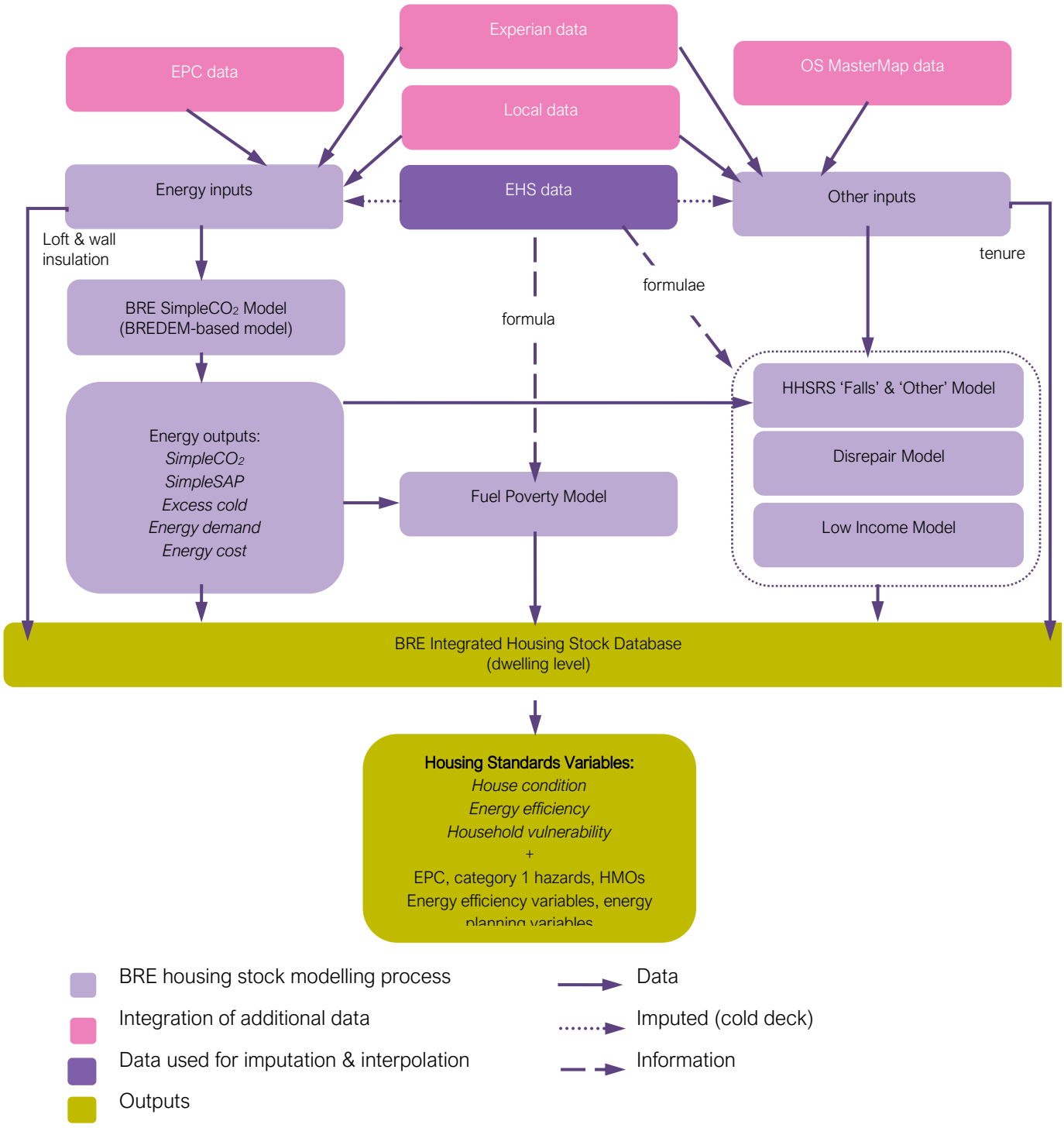
Figure 1: Simplified flow diagram of overall BRE housing stock modelling approach (N.B. the EHS data is only used to inform the mathematical algorithms of the model – it does not provide data)



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4. Summary results for the Suffolk Councils from the BRE Dwelling Level Housing Stock Models and Database

As described in the previous section, the housing stock modelling process consists of a series of different stock models with the main output being the database. The results provided in this section are a high level summary for the Suffolk Councils as a whole.

The first sub-section below provides a map of the local authorities making up the Suffolk Council's area and a table summarising the tenure split for each local authority. The second section provides a comparison of The Suffolk Councils with England based on the 2019 English Housing Survey (EHS).

The results are then displayed in the remaining sub-sections and include maps of a number of variables, thus enabling quick observation of the geographical distribution of areas of interest. The maps show the percentages of dwellings by ward for each local authority that are estimated to have met the requirements for each of the variables. The ranges shown in the map keys are defined based on the Jenks' Natural Breaks algorithm of the COA statistics[40]. 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. 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 within local authorities there can be large differences between the results at ward level.

The sub-sections are as follows:

- Comparison of the key indicators across the local authorities within the Suffolk Councils (see Appendix A for full definitions):
    - Presence of HHSRS category 1 hazard
    - Presence of category 1 hazard for excess cold
    - Presence of category 1 hazard for falls
    - Dwellings in disrepair (Decent Homes Standard)
    - Fuel poverty (10% and Low Income High Costs definitions)
    - Dwellings occupied by low income households
    - SimpleSAP rating
    - Presence of HHSRS category 2 hazard
- Comparison of information relating to LAHS reporting:
    - EPC ratings
    - Cost of mitigating category 1 hazards
- Comparison of energy efficiency variables (wall and loft insulation)
- Comparison of energy planning variables (SimpleSAP, SimpleCO2, Energy demand and cost, electricity demand and cost, heat demand and cost)
- Modelled HMOs

[40] Natural breaks classes are based on natural groupings inherent in the data.

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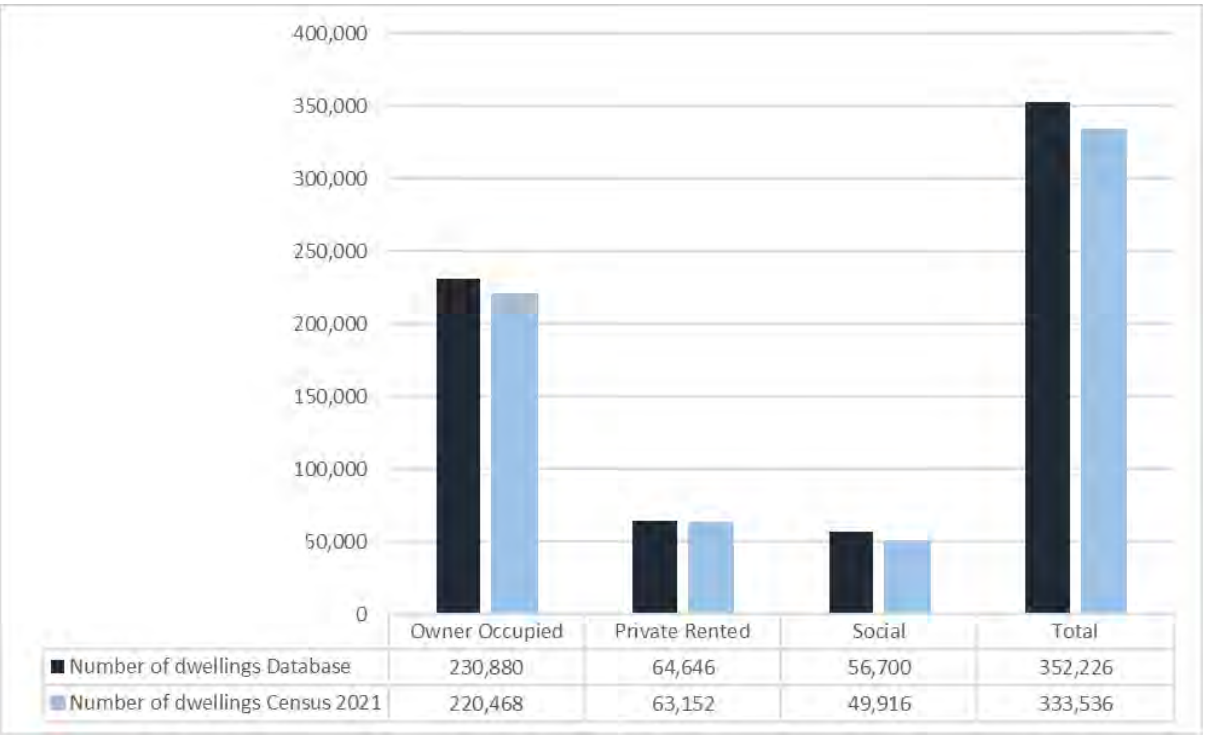
4.1 Breakdown of the housing stock by tenure – validation

Providing the results split by tenure is useful since it can influence 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 the Suffolk Councils 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 2021 Census figures. The results of the validation exercise show the differences between the tenure split from the database compared to the Census figures, giving confidence that the integrated database provides a good overview of the housing stock in the Suffolk Councils (see Figure 2). Furthermore, Map 1, Map 2 and Map 3 show the geographical distributions of the private sector stock for both the database and the Census 2021 data, as well as the Census 2011 for further comparison. The maps look similar, again giving confidence in the integrated database.

Figure 2: Tenure split – comparison of BRE Housing Stock Condition Database outputs with 2021 Census figures for the Suffolk Councils.



	Owner Occupied	Private Rented	Social	Total
Number of dwellings Database	230,880	64,646	56,700	352,226
Number of dwellings Census 2021	220,468	63,152	49,916	333,536

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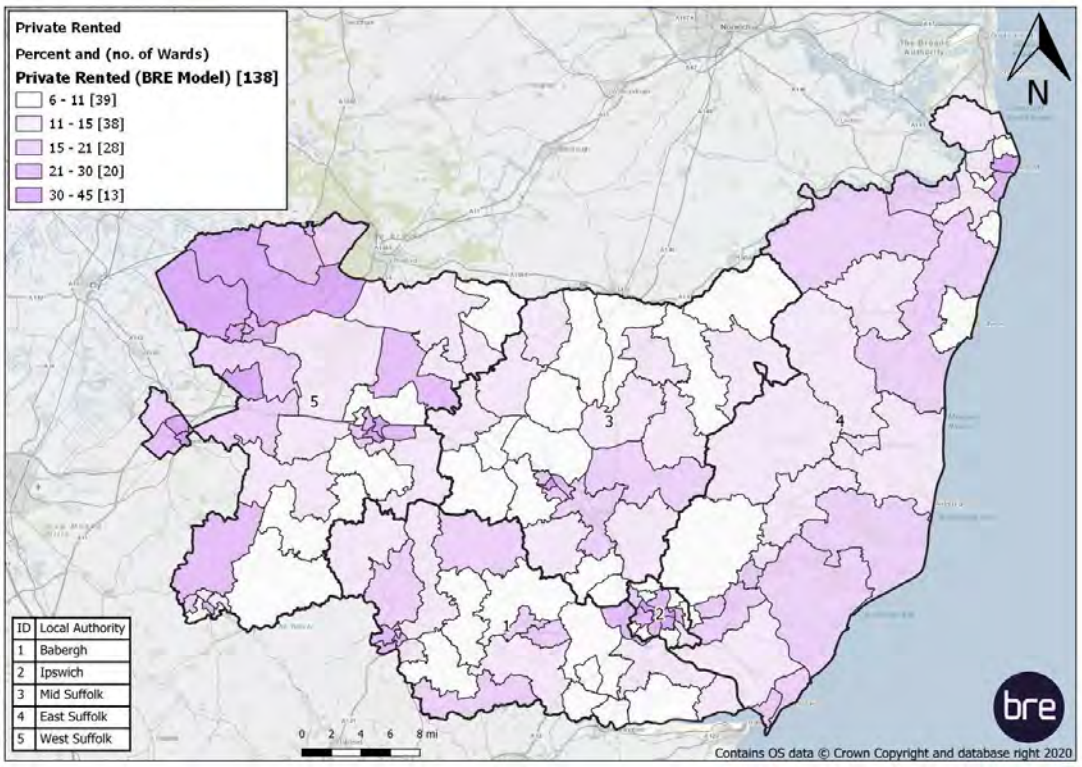
Map 1 : Distribution of estimated percentage of private rented dwellings in the Suffolk Councils – based on database. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound*



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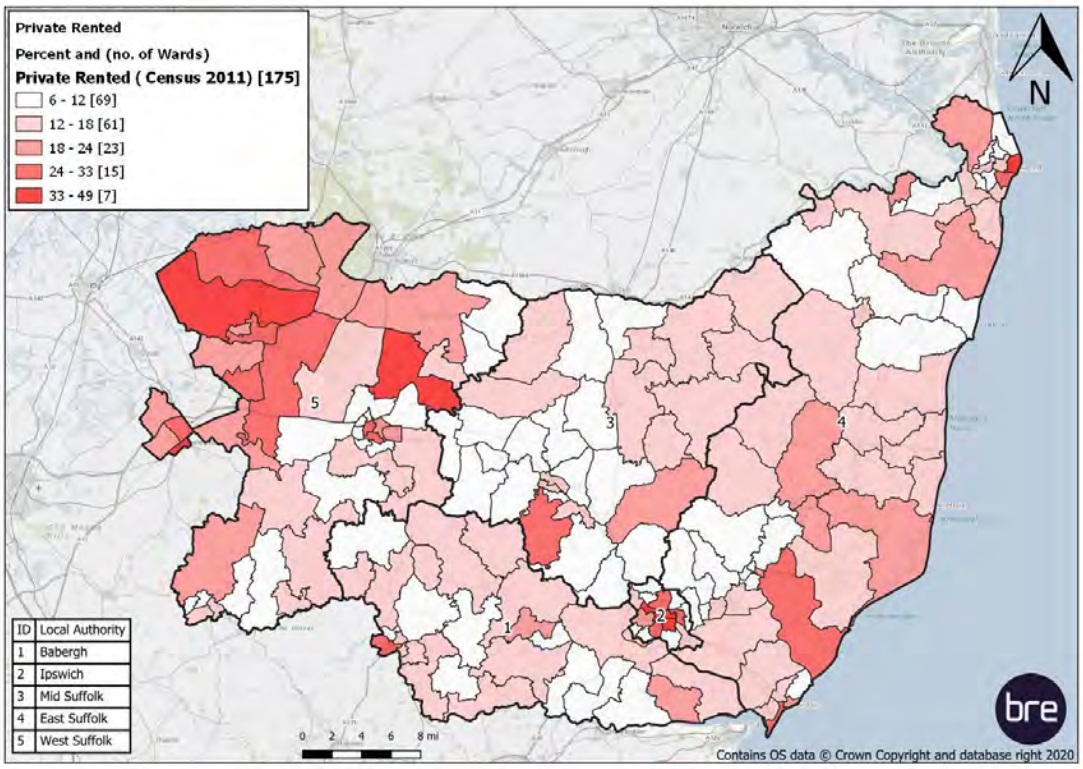
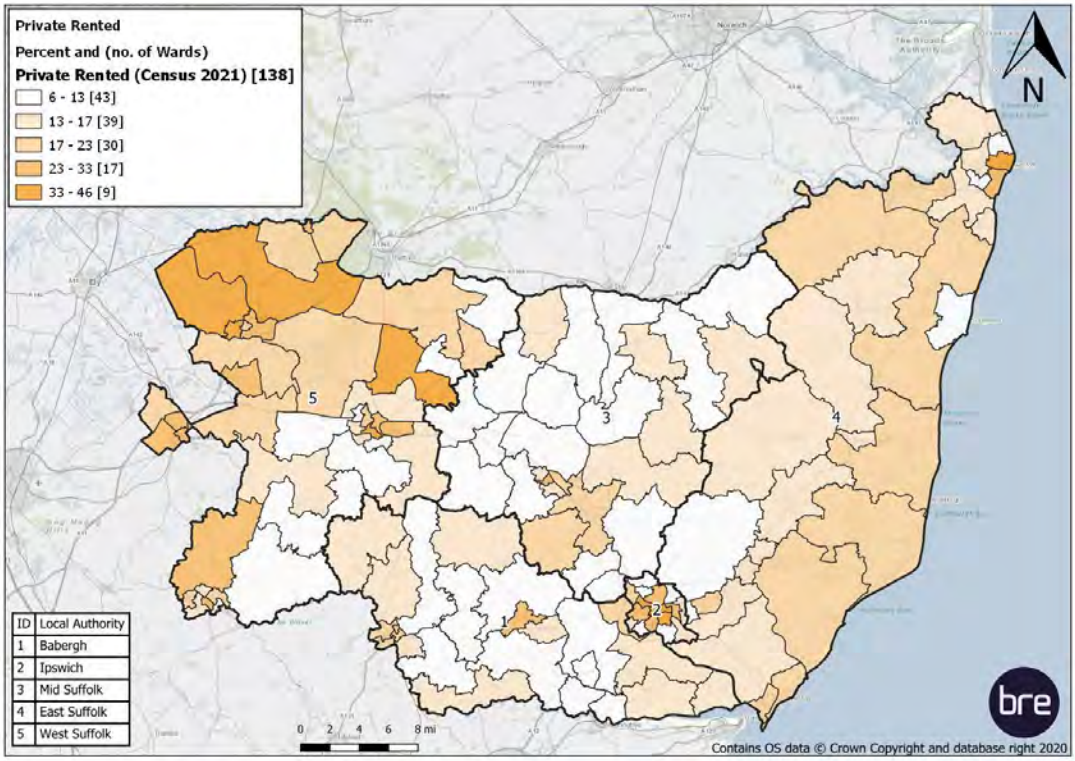
Map 2: Distribution of estimated percentage of private rented dwellings in the Suffolk Councils – based on 2011 Census Data (Neighbourhood Statistics). *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound*



Map 3: Distribution of estimated percentage of private rented dwellings in the Suffolk Councils – based on 2021 Census Data (Neighbourhood Statistics). *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound*



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4.2 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 DLUHC returns[41] and Office for National Statistics (ONS) data[42]. These datasets are not used directly in the model but are reported here for the purposes of comparison.

The DLUHC returns provide estimates of the tenure split by private sector and social sector only, with the former being based on projections from the 2021 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[43].

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)[44] which is then benchmarked to the DLUHC 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.

It is important to note that the ONS data is not an official statistic and that a disclaimer[45] must be used when reproducing the data (note that the "***dwelling stock by tenure***" in the disclaimer refers to the DLUHC returns data).

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

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

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

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

[45] 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[41] 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."

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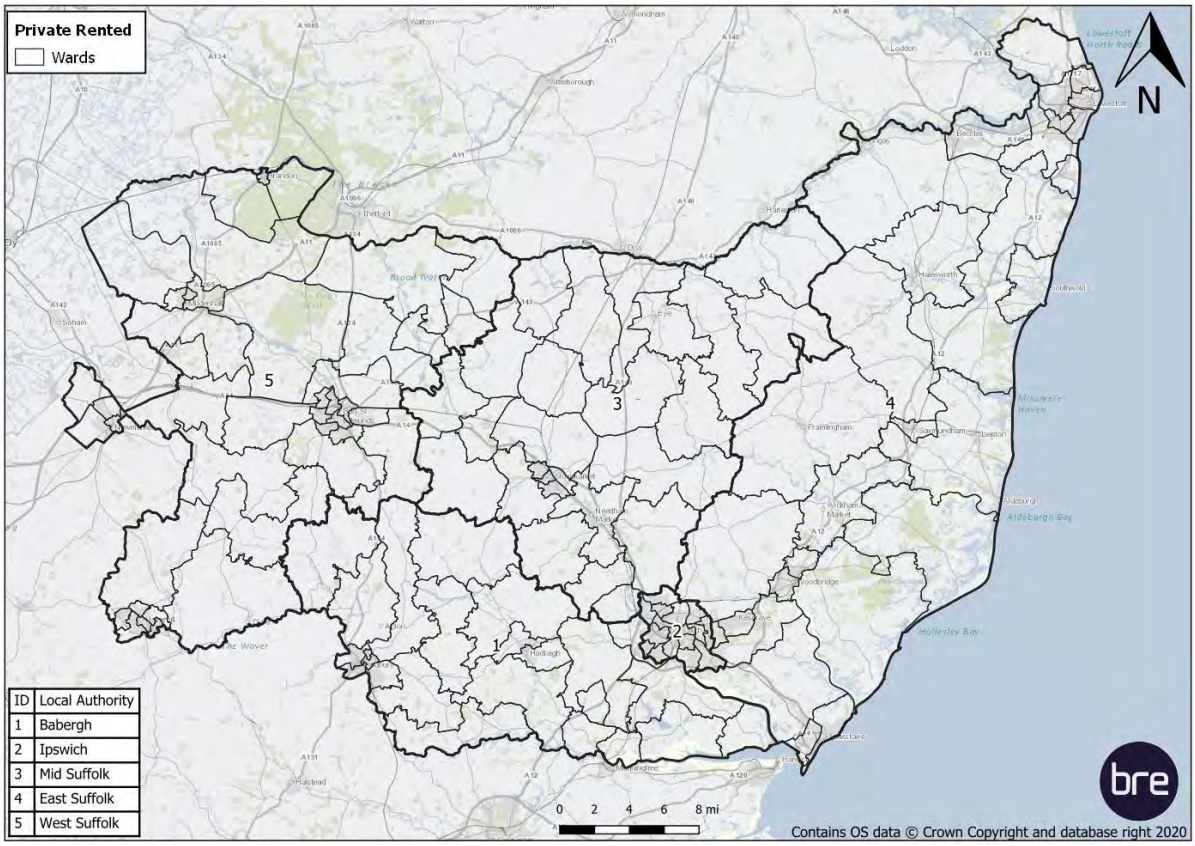
4.3 Overview of Suffolk

Map 4 below shows the five local authorities making up the Suffolk. The majority of data in this report is shown as a high level summary separated into local authorities; however, each commissioning local authority has been provided with a database (HSCD) which provides data at more disaggregated levels, e.g. Census Output Area (COA).

Map 4: The local authorities in Suffolk



ID	Local Authority
1	Babergh
2	Ipswich
3	Mid Suffolk
4	East Suffolk
5	West Suffolk

Table 3 provides an overview of the housing stock in the Suffolk Councils broken down by local authority and tenure and Figure 2 shows the percentage split by tenure.

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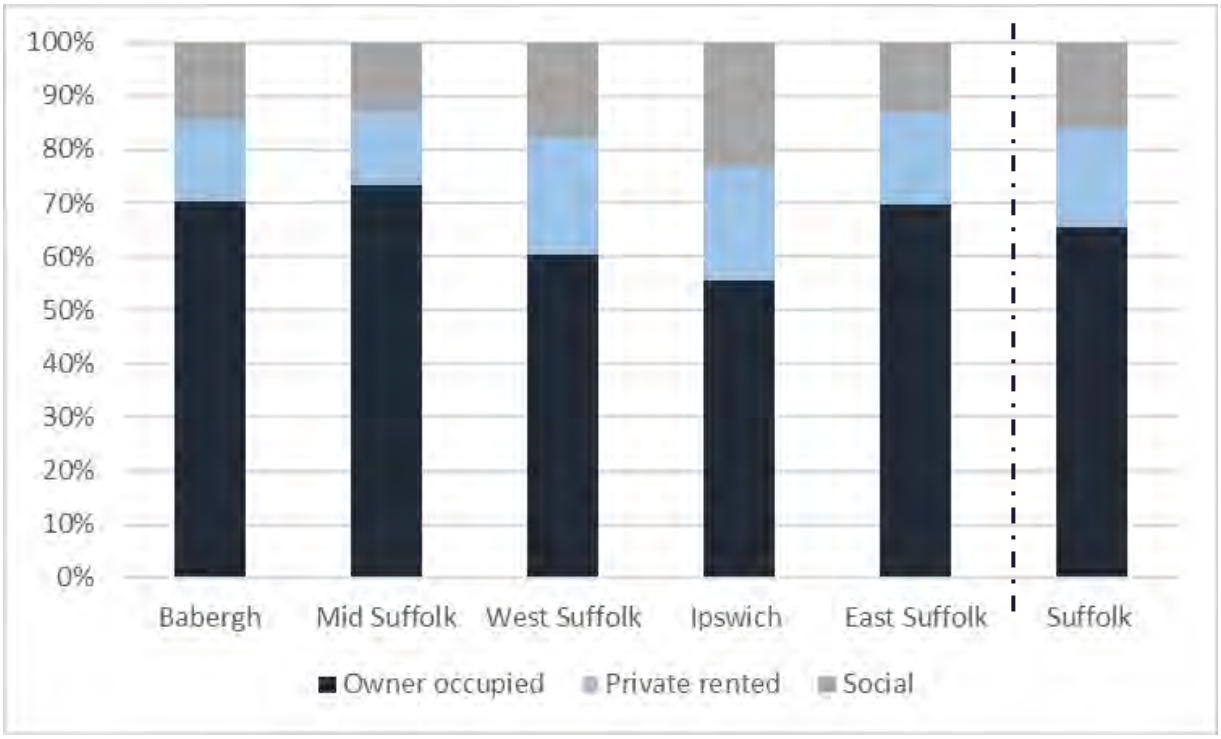
Table 3: Overview of the Suffolk Councils housing stock by tenure for each local authority

Local authority	No. of dwellings			
	Private sector stock		Social	TOTAL
	Owner occupied	Private rented		
Babergh	28,797	6,332	5,812	40,941
Mid Suffolk	33,175	6,357	5,768	45,300
West Suffolk	49,571	18,031	14,520	82,122
Ipswich	34,131	12,884	14,439	61,454
East Suffolk	85,206	21,042	16,161	122,409
Suffolk	*230,880*	*64,646*	*56,700*	*352,226*

Figure 3: Overview of the Suffolk Councils housing stock showing percentage split by tenure



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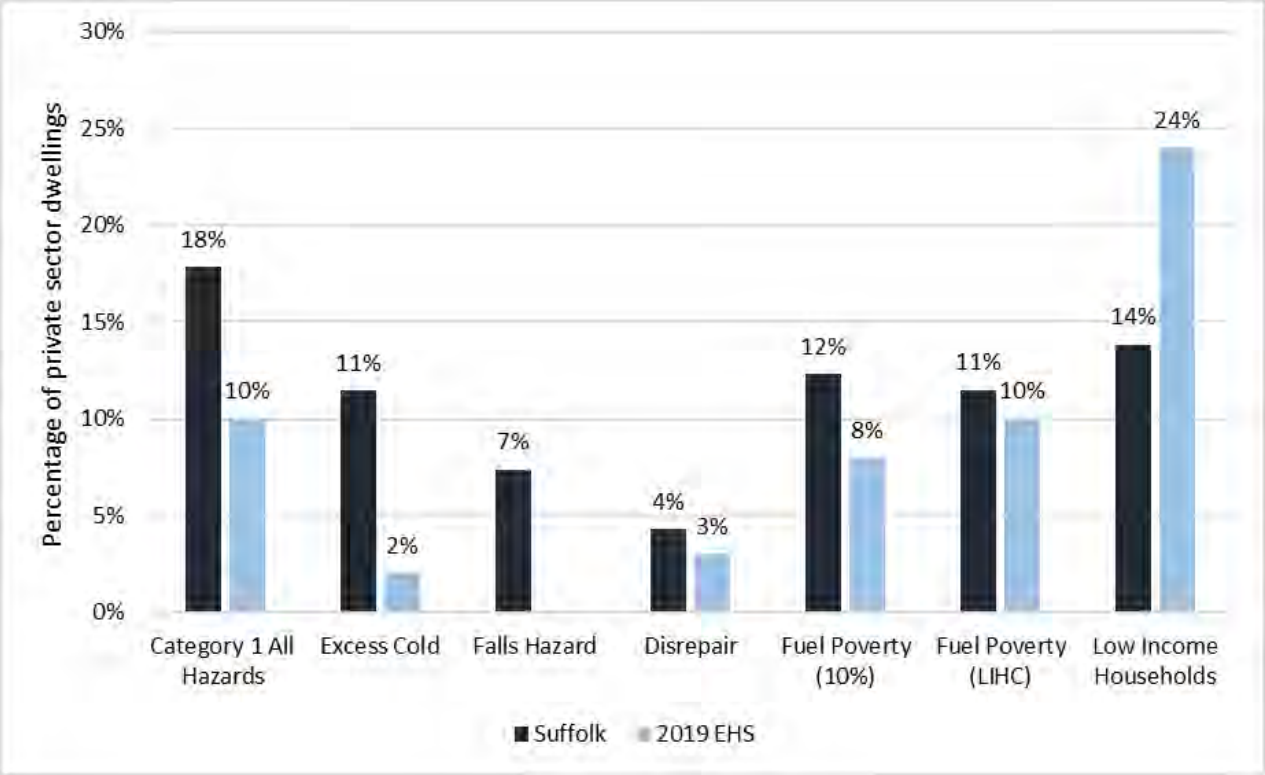
4.4 Comparison of the Suffolk Councils with England

Figure 4 shows the percentage of private sector dwellings in the Suffolk Councils failing each of the key indicators compared to the percentage for England as a whole (2019 EHS data). Suffolk's private sector stock has higher than average levels of category 1 hazards, excess cold, disrepair, and both definitions of fuel poverty. Low income households, however, are lower across Suffolk than England as a whole.

Figure 4: Comparison of the Suffolk Councils with England (EHS 2019), percentage of private sector dwellings failing each of the indicators



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4.5 Comparison of the key indicators across the Suffolk Councils local authorities

The following sub-sections provide the results for each of the key indicators.

4.5.1. Presence of a HHSRS category 1 hazard

Table 4 shows the percentage of dwellings estimated to have a HHSRS category 1 hazard by local authority and tenure, and for Suffolk overall. The overall figure for Suffolk is 16%. The greatest proportions of category 1 hazards overall are found in Mid Suffolk (22%) and the lowest levels are in Ipswich (10%). When looking at each tenure, the social stock has the lowest levels of category 1 hazards in each of the local authorities. Within the private sector stock Mid Suffolk has the highest levels of category 1 hazards and Ipswich has the lowest levels.

The maps within this report are produced at ward level, covering all five local authorities. However, should a particular local authority or ward need to be investigated in more granular detail then HSCD will provide data and maps at other geographic levels, including COA. Using the first map below (Map 5) as an example, it can be seen that all five local authorities across the region are split into wards, and, in this instance, there are 13 wards that have 40 - 50% of private sector dwellings estimated to have the presence of a category 1 hazard. The outputs in the lightest and darkest colours on the maps show the extreme ends of the range, with the darker colours showing the higher concentrations of hazards. The maps also highlight the differences between wards and which specific areas might warrant attention.

Table 4: Percentage of dwellings estimated to have a HHSRS category 1 hazard by local authority and tenure

Local authority	Percentage of dwellings with HHSRS category 1 hazards				
	Private sector stock			% of social	% of all stock
	% of private sector	% of owner occupied	% of private rented		
Babergh	22%	23%	20%	5%	**20%**
Mid Suffolk	25%	26%	18%	5%	**22%**
West Suffolk	16%	17%	12%	4%	**14%**
Ipswich	12%	11%	14%	2%	**10%**
East Suffolk	18%	18%	18%	4%	**16%**
Suffolk	***18%***	***18%***	***16%***	***4%***	***16%***

Map 5 shows that the highest concentrations of category 1 hazards are mainly found in a central band of Babergh running north to south as well as two wards in the East, the outermost wards of East Suffolk running north to west as well as one south easterly ward, and the majority of Mid Suffolk. In West Suffolk the worst performing wards are found in the north east and the south of the Local Authority area. Meanwhile, Ipswich performs relatively well, with none of the worst performing wards in the area.

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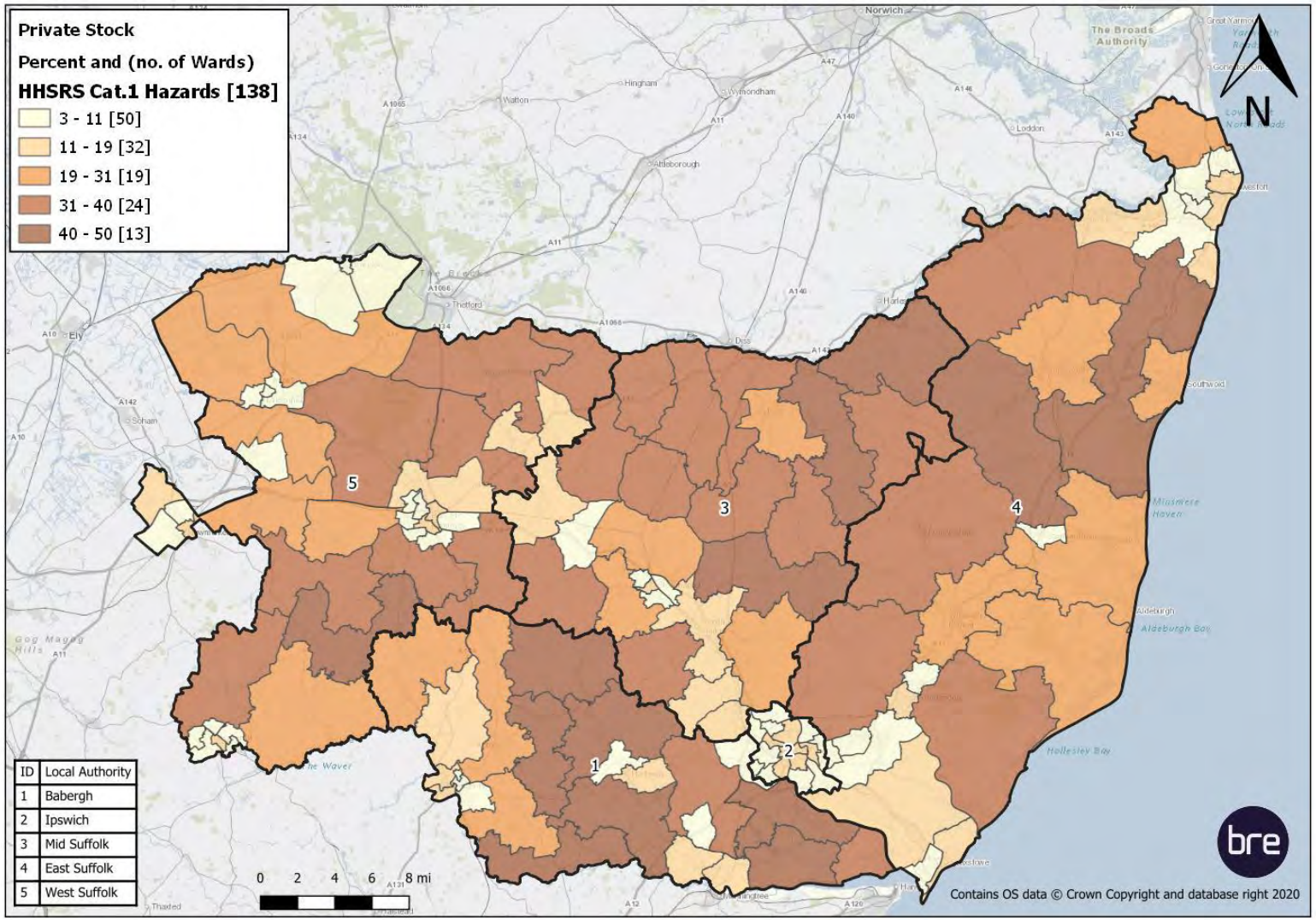
Map 5: Percentage of private sector dwellings in the Suffolk Councils estimated to have a HHSRS category 1 hazard *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound*



4.5.2. Presence of category 1 hazard for excess cold

The percentage of dwellings estimated to have the presence of a category 1 hazard for excess cold is shown in Table 5, for Suffolk overall and broken down by local authority and tenure. The average figure for Suffolk overall is 10%. The greatest proportions of excess cold hazards are found in Mid Suffolk (18%) and the lowest levels are in Ipswich (3%). When looking at each tenure, the social stock has the lowest levels of excess cold hazards in each of the local authorities, which is to be expected. Focussing on the private sector, the owner occupied stock has higher levels of excess cold than the private rented stock in Babergh, Mid Suffolk, West Suffolk and East Suffolk, whereas in Ipswich the private rented sector has a higher level of excess cold.

Table 5: Percentage of dwellings estimated to have a HHSRS category 1 hazard for excess cold by local authority and tenure

Local authority	Percentage of dwellings with category 1 hazard for excess cold				
	Private sector stock			% of social	% of all stock
	% of private sector	% of owner occupied	% of private rented		
Babergh	16%	17%	12%	4%	**15%**
Mid Suffolk	20%	21%	13%	4%	**18%**
West Suffolk	10%	12%	6%	3%	**9%**
Ipswich	3%	3%	4%	1%	**3%**
East Suffolk	11%	12%	9%	3%	**10%**
Suffolk	***11%***	***12%***	***8%***	***3%***	***10%***

Map 6 shows the geographical distribution of private sector dwellings across the Suffolk Councils which are estimated to have a category 1 hazard for excess cold. The greatest concentration of excess cold is scattered across the westernmost parts of Suffolk, especially the north of East Suffolk, the north east and east of Mid Suffolk and one ward towards the north of Babergh. Ipswich and the south of East Suffolk are the areas with the lowest proportions of excess cold.

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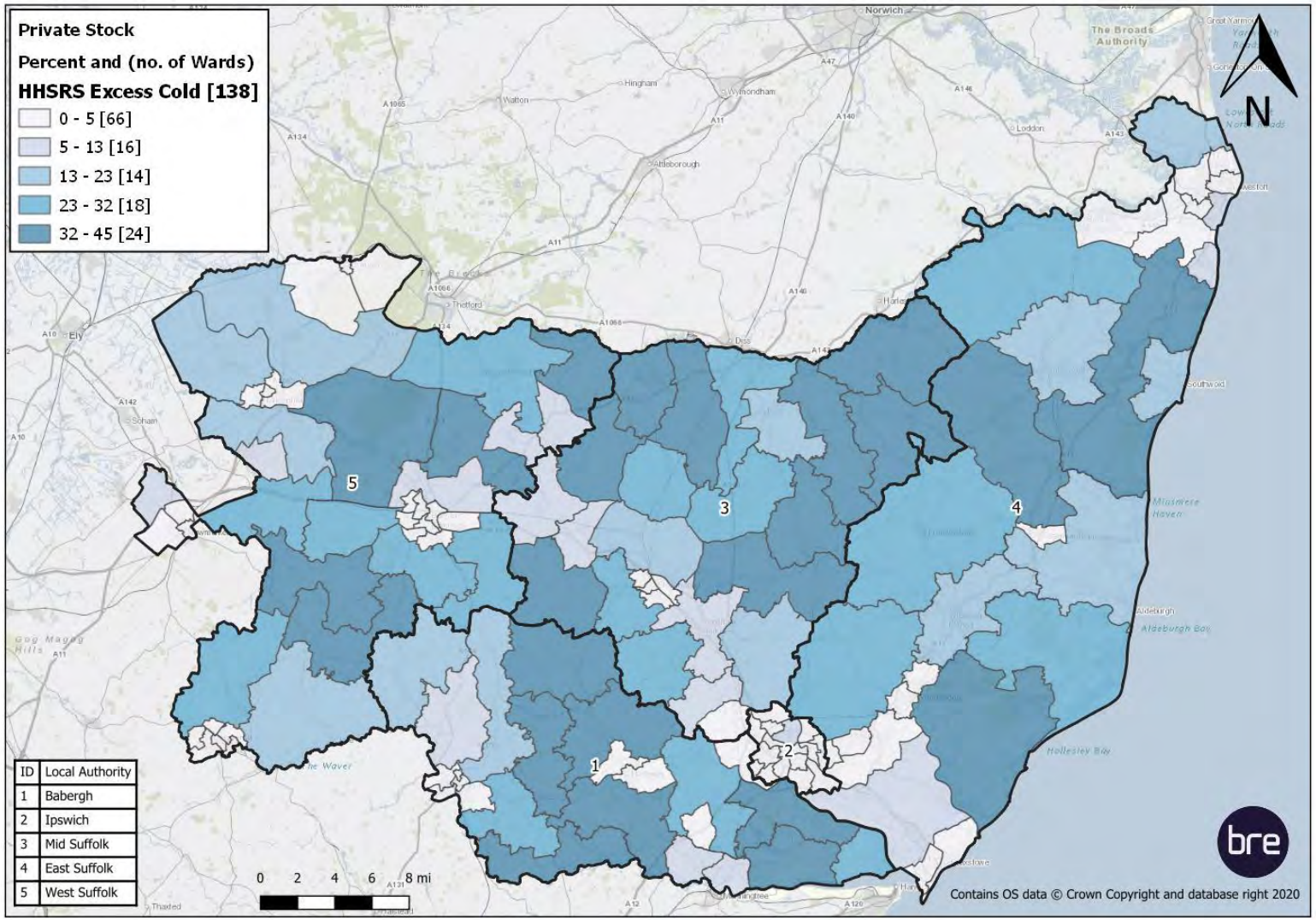
Map 6: Percentage of private sector dwellings in the Suffolk Councils with the presence of a HHSRS category 1 hazard for excess cold. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound*



4.5.3. Presence of category 1 hazard for falls

Table 6 shows the percentage of dwellings estimated to have a category 1 hazard for falls by local authority and tenure, and for Suffolk overall. The average figure for Suffolk overall is 6%. The greatest proportions of falls hazards are found in Ipswich, Babergh and East Suffolk (all 7%) and the lowest levels are in West Suffolk (5%). When looking at each tenure, the social stock has the lowest levels of falls hazards in each of the local authorities. Focussing on the private sector, the owner occupied stock has slightly higher levels of falls hazards than the private rented stock in Babergh, whereas Mid Suffolk and West Suffolk have similar levels of falls hazard in both tenures and Ipswich and East Suffolk have higher levels of falls hazard in the private rented stock.

Table 6: Percentage of dwellings estimated to have a HHSRS category 1 hazard for falls by local authority and tenure

Local authority	Percentage of dwellings with category 1 hazard for falls				
	Private sector stock			% of social	% of all stock
	% of private sector	% of owner occupied	% of private rented		
Babergh	7%	7%	8%	1%	**7%**
Mid Suffolk	7%	7%	7%	1%	**6%**
West Suffolk	6%	6%	6%	1%	**5%**
Ipswich	9%	9%	10%	1%	**7%**
East Suffolk	7%	7%	9%	1%	**7%**
Suffolk	***7%***	***7%***	***8%***	***1%***	***6%***

Map 7 shows the geographical distribution of private sector dwellings across the Suffolk Councils estimated to have a category 1 hazard for falls. In general, higher proportions of falls hazards are distributed across much of Suffolk. In Babergh, the highest concentrations are found in the central and southern wards, whereas in Ipswich the highest concentrations are found in the north of the local authority. There are a number of wards in Mid Suffolk that have higher levels of falls hazards, especially in the centre, east and north of the ward. East Suffolk's northernmost ward has high levels of falls, as does a band throughout the easternmost wards in addition to one ward towards the north west. West Suffolk has the lowest levels of falls hazards across the five local authorities, although there are a small number of wards in the south that have high levels of falls hazards.

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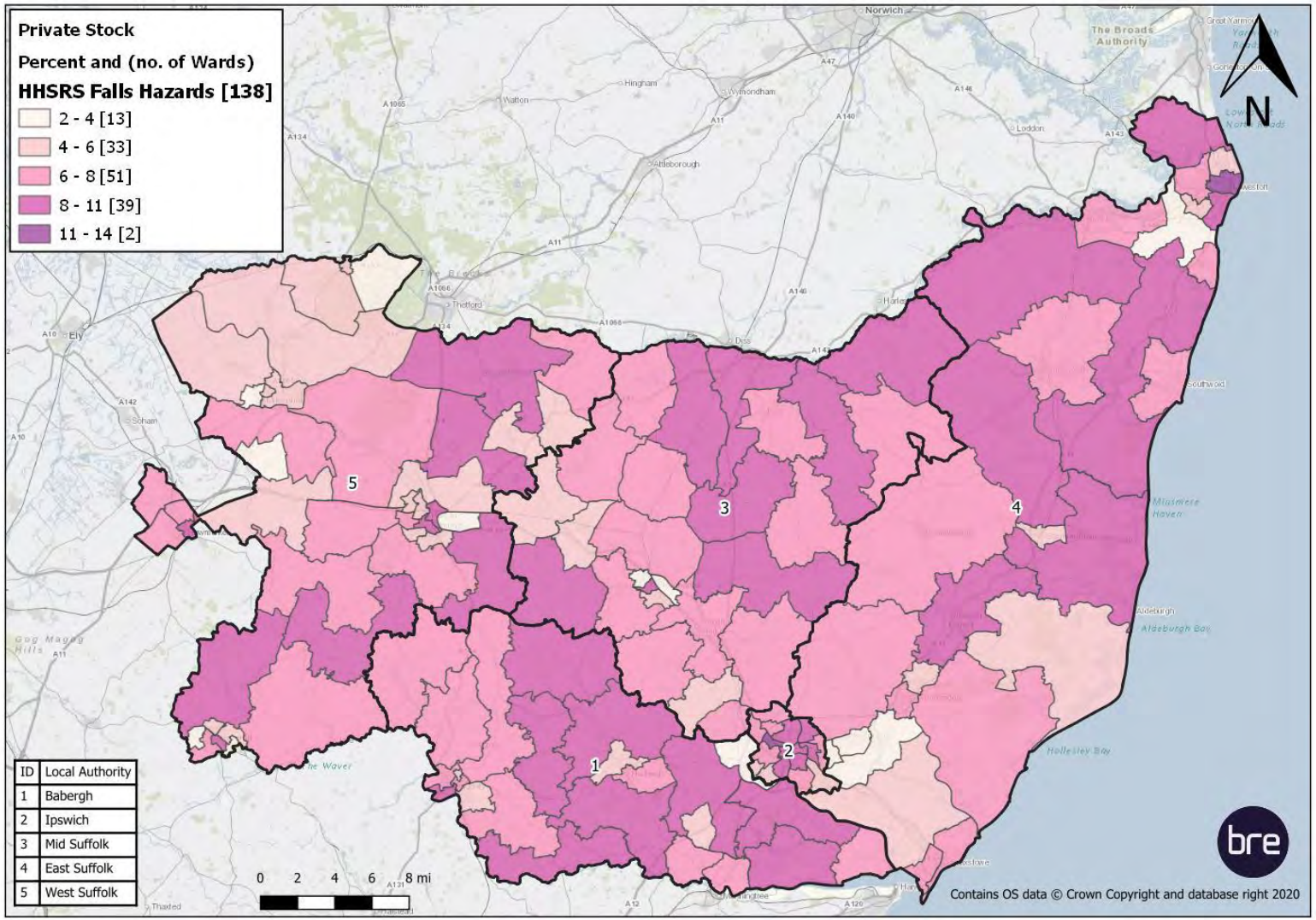
Map 7: Percentage of private sector dwellings in the Suffolk Councils with the presence of a HHSRS category 1 hazard for falls. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound*



4.5.4. Information on Category 2 hazards

The category 2 hazards included in the modelling are termed 'high category 2' hazards in that for most hazards the definition includes those hazards is bands D or E, with the exception of the falls hazard where only band D is considered, as band E is the average rating for this particular hazard, see Appendix A for further information.

Table 7 gives information on the numbers and percentages of category 2 hazards in each of the councils within Suffolk. Overall, the social tenure has the lowest levels of category 2 hazards. Within the private sector stock Ipswich has the highest levels for both the owner occupied stock and the private rented stock, meanwhile the lowest levels are found in West Suffolk for the private rented stock and both West Suffolk and East Suffolk for the owner occupied stock.

Information on category 2 hazards at ward level for each of the councils can be found in Table 8 to Table 12

Error! Reference source not found. 8 shows that the highest concentrations of category 2 hazards are found in Babergh and Mid Suffolk. Within these two councils, the central northern to southern wards and two eastern wards of Babergh have the highest levels of category 2 hazards. Meanwhile, in Mid Suffolk the highest concentrations of category 2 hazards are quite spread across the area in a couple of central wards, two north eastern wards, and two western wards. In East Suffolk, high concentrations of category 2 hazards are found in the northernmost tip of the ward and towards the south, in Ipswich the highest concentrations are found in the centre of the council and for West Suffolk there are two south eastern wards where high concentrations of category 2 hazards are found.

Table 7: The numbers and proportions of dwellings with a high category 2 hazard in each tenure.

Local Authority	Indicator	Private sector stock				Social stock	
		Owner occupied		Private rented			
		No.	%	No.	%	No.	%
Mid Suffolk	No. of dwellings	33,164	-	6,374	-	5,762	-
	HHSRS category 2 hazards	9,765	29%	1,602	25%	772	13%
East Suffolk	No. of dwellings	85,133	-	21,191	-	16,145	-
	HHSRS category 2 hazards	23,401	27%	6,076	29%	2,673	17%
Babergh	No. of dwellings	28,680	-	6,467	-	5,794	-
	HHSRS category 2 hazards	8,295	29%	1,744	27%	867	15%
Ipswich	No. of dwellings	34,090	-	12,930	-	14,433	-
	HHSRS category 2 hazards	10,608	31%	3,938	30%	2,339	16%
West Suffolk	No. of dwellings	49,430	-	18,219	-	14,473	-
	HHSRS category 2 hazards	13,358	27%	4,228	23%	2,488	17%

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Table 8: Total number of dwellings and total number and overall percentage of category 2 hazards by ward for the private sector stock, in Babergh

Ward	Dwellings	HHSRS category 2 hazards
Assington	90	33
		(27%)
Box Vale	78	42
		(35%)
Brantham	89	31
		(26%)
Brett Vale	123	67
		(35%)
Bures St. Mary & Nayland	137	74
		(35%)
Capel St. Mary	70	14
		(17%)
Chadacre	278	101
		(27%)
Copdock & Washbrook	96	45
		(32%)
East Bergholt	103	32
		(24%)
Ganges	115	47
		(29%)
Great Cornard	438	111
		(20%)
Hadleigh North	183	15
		(8%)
Hadleigh South	394	141
		(26%)
Lavenham	210	102
		(33%)
Long Melford	319	152
		(32%)
North West Cosford	138	57
		(29%)
Orwell	102	73
		(42%)
South East Cosford	80	46
		(37%)
Sproughton & Pinewood	514	99
		(16%)
Stour	85	49
		(37%)
Sudbury North East	181	45
		(20%)
Sudbury North West	390	165
		(30%)
Sudbury South East	232	69
		(23%)
Sudbury South West	278	134
		(33%)

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Table 9: Total number of dwellings and total number and overall percentage of category 2 hazards by ward for the private sector stock, in East Suffolk

Ward	Dwellings	HHSRS category 2 hazards
Aldeburgh And Leiston	707	324
		(31%)
Beccles And Worlingham	982	421
		(30%)
Bungay And Wainford	521	226
		(30%)
Carlford And Fynn Valley	249	107
		(30%)
Carlton And Whitton	414	91
		(18%)
Carlton Colville	519	81
		(14%)
Deben	261	165
		(39%)
Felixstowe East	1,025	440
		(30%)
Felixstowe West	856	296
		(26%)
Framlingham	396	170
		(30%)
Gunton And St Margarets	334	97
		(23%)
Halesworth And Blything	412	180
		(30%)
Harbour And Normanston	1,911	1,169
		(38%)
Kelsale And Yoxford	170	89
		(34%)
Kesgrave	1,050	103
		(9%)
Kessingland	166	80
		(33%)
Kirkley And Pakefield	1,205	737
		(38%)
Lothingland	162	94
		(37%)
Martlesham And Purdis Farm	486	70
		(13%)
Melton	257	41
		(14%)
Orwell And Villages	465	148
		(24%)
Oulton Broad	668	225
		(25%)
Rendlesham And Orford	386	141
		(27%)
Rushmere St Andrew	101	4
		(4%)
Saxmundham	260	57
		(18%)
Southwold	164	67
		(29%)
Wickham Market	199	102
		(34%)
Woodbridge	524	220
		(30%)
Wrentham, Wangford And Westleton	265	131
		(33%)

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Table 10: Total number of dwellings and total number and overall percentage of category 2 hazards by ward for the private sector stock, in Ipswich

Ward	Dwellings	HHSRS category 2 hazards
Alexandra	1,770	739
		(29%)
Bixley	213	103
		(33%)
Bridge	733	363
		(33%)
Castle Hill	198	72
		(27%)
Gainsborough	243	84
		(26%)
Gipping	730	242
		(25%)
Holywells	1,033	408
		(28%)
Priory Heath	434	97
		(18%)
Rushmere	247	111
		(31%)
Sprites	217	62
		(22%)
St. John's	726	350
		(33%)
St. Margaret's	641	346
		(35%)
Stoke Park	148	49
		(25%)
Westgate	1,037	689
		(40%)
Whitehouse	452	179
		(28%)
Whitton	170	44
		(21%)

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Table 11: Total number of dwellings and total number and overall percentage of category 2 hazards by ward for the private sector stock, in Mid Suffolk

Ward	Dwellings	HHSRS category 2 hazards
Bacton	77	30
		(28%)
Battisford & Ringshall	132	21
		(14%)
Blakenham	98	17
		(15%)
Bramford	89	36
		(29%)
Chilton	389	68
		(15%)
Claydon & Barham	276	86
		(24%)
Combs Ford	333	101
		(23%)
Debenham	148	57
		(28%)
Elmswell & Woolpit	264	51
		(16%)
Eye	124	59
		(32%)
Fressingfield	83	48
		(37%)
Gislingham	89	60
		(40%)
Haughley, Stowupland & Wetherden	149	59
		(28%)
Hoxne & Worlingworth	86	47
		(35%)
Mendlesham	124	67
		(35%)
Needham Market	371	122
		(25%)
Onehouse	67	34
		(34%)
Palgrave	80	25
		(24%)
Rattlesden	85	48
		(36%)
Rickinghall	149	57
		(28%)
St Peter's	343	150
		(30%)
Stonham	113	95
		(46%)
Stow Thorney	600	73
		(11%)
Stradbroke & Laxfield	119	47
		(28%)
Thurston	262	69
		(21%)
Walsham-le-Willows	122	75
		(38%)

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Table 12: Total number of dwellings and total number and overall percentage of category 2 hazards by ward for the private sector stock, in West Suffolk

Ward	Dwellings	HHSRS category 2 hazards
Abbeygate	878	404
		(32%)
Bardwell	112	55
		(33%)
Barningham	62	24
		(28%)
Barrow	102	36
		(26%)
Brandon Central	302	103
		(25%)
Brandon East	236	33
		(12%)
Brandon West	268	61
		(19%)
Chedburgh & Chevington	97	51
		(34%)
Clare, Hundon & Kedington	270	111
		(29%)
Eastgate	350	144
		(29%)
Exning	129	72
		(36%)
Haverhill Central	277	128
		(32%)
Haverhill East	192	63
		(25%)
Haverhill North	204	44
		(18%)
Haverhill South	216	82
		(28%)
Haverhill South East	104	20
		(16%)
Haverhill West	384	52
		(12%)
Horringer	96	27
		(22%)

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Table 12 cont: Total number of dwellings and total number and overall percentage of category 2 hazards by ward for the private sector stock, in West Suffolk

Ward	Dwellings	HHSRS category 2 hazards
Iceni	981	105
		(10%)
Ixworth	91	32
		(26%)
Kentford & Moulton	170	82
		(33%)
Lakenheath	986	256
		(21%)
Manor	216	69
		(24%)
Mildenhall Great Heath	244	67
		(22%)
Mildenhall Kingsway & Market	343	101
		(23%)
Mildenhall Queensway	368	46
		(11%)
Minden	340	122
		(26%)
Moreton Hall	987	105
		(10%)
Newmarket East	731	317
		(30%)
Newmarket North	560	248
		(31%)
Newmarket West	548	186
		(25%)
Pakenham & Troston	195	76
		(28%)
Risby	135	56
		(29%)
Rougham	87	66
		(43%)
Southgate	188	65
		(26%)
St Olaves	212	71
		(25%)
Stanton	103	24
		(19%)
The Fornhams & Great Barton	145	40
		(22%)
The Rows	930	251
		(21%)
Tollgate	623	129
		(17%)
Westgate	290	90
		(24%)
Whepstead & Wickhambrook	72	41
		(36%)
Withersfield	167	73
		(30%)

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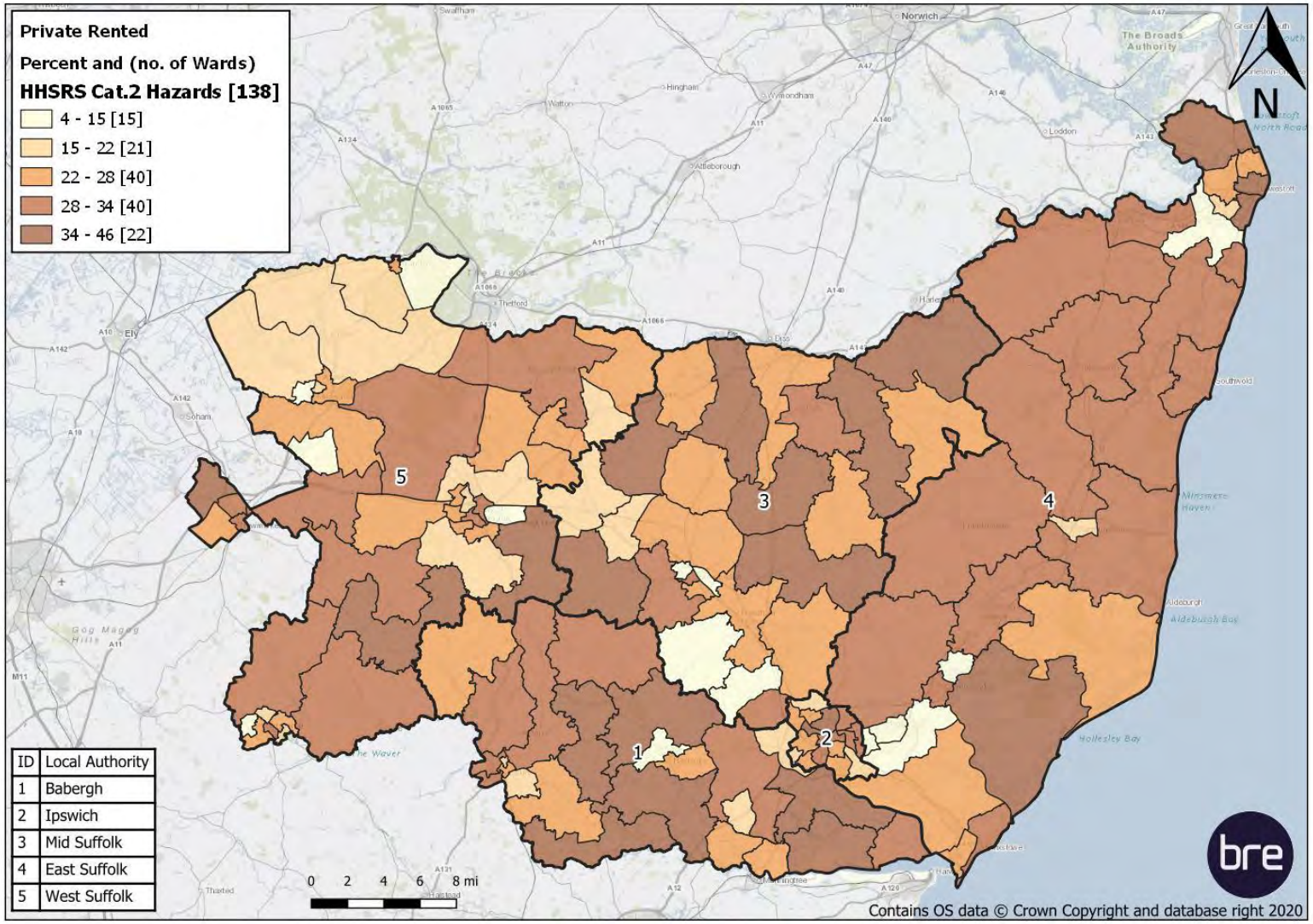
Map 8: Percentage of private sector dwellings in the Suffolk Councils with the presence of a HHSRS category 2 hazard. N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound



4.5.5. Dwelling in Disrepair

This indicator is based on the former Decent Homes Standard which 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).

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.

Table 13 shows the percentage of dwellings estimated to be in disrepair by local authority and tenure and for Suffolk overall. The average figure for Suffolk overall is 4%, and there is much consistency in this figure across all five local authorities. The greatest proportion of disrepair is found in Ipswich (5%) and the remaining four local authorities all average 4%. When looking at each tenure, the social stock has the lowest levels of disrepair across all the local authorities. Focussing on the private sector, the private rented stock has higher levels of disrepair than the owner occupied stock in all five local authorities, but the overall levels are very similar across these tenures in all five local authorities.

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Table 13: Percentage of dwellings estimated to be in disrepair by local authority and tenure

Local authority	Percentage of dwellings in disrepair				
	Private sector stock			% of social	% of all stock
	% of private sector	% of owner occupied	% of private rented		
Babergh	4%	4%	5%	1%	**4%**
Mid Suffolk	4%	4%	5%	1%	**4%**
West Suffolk	4%	3%	4%	1%	**3%**
Ipswich	5%	5%	7%	1%	**4%**
East Suffolk	4%	4%	6%	1%	**4%**
Suffolk	***4%***	***4%***	***5%***	***1%***	***4%***

Map 9 shows the geographical distribution of private sector dwellings across Suffolk estimated to be in disrepair. Areas with higher concentrations are scattered across all five local authorities with no obvious pattern. Ipswich in particular has higher concentrations of disrepair in the majority of wards, as does Babergh, especially in the central wards. The majority of disrepair in East Suffolk spans the westernmost wards, whereas in East Suffolk there is a tendency for the higher levels of disrepair to be in the more northern wards with the exception of three wards in the south. West Suffolk has the lowest levels of disrepair across all five local authorities, especially in the north west, where levels of disrepair are relatively low.

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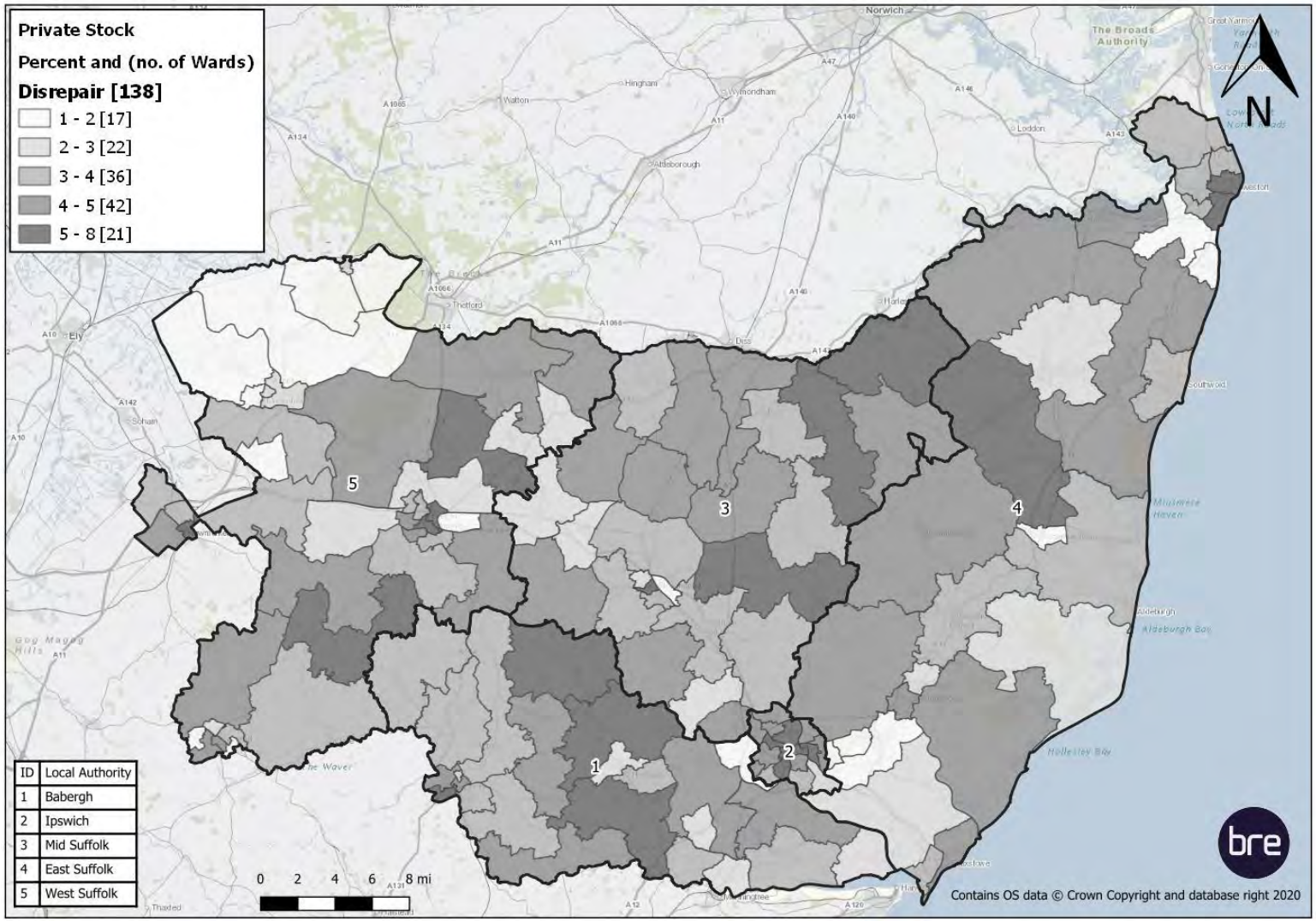
Map 9: Percentage of private sector dwellings in the Suffolk Councils in disrepair. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound*



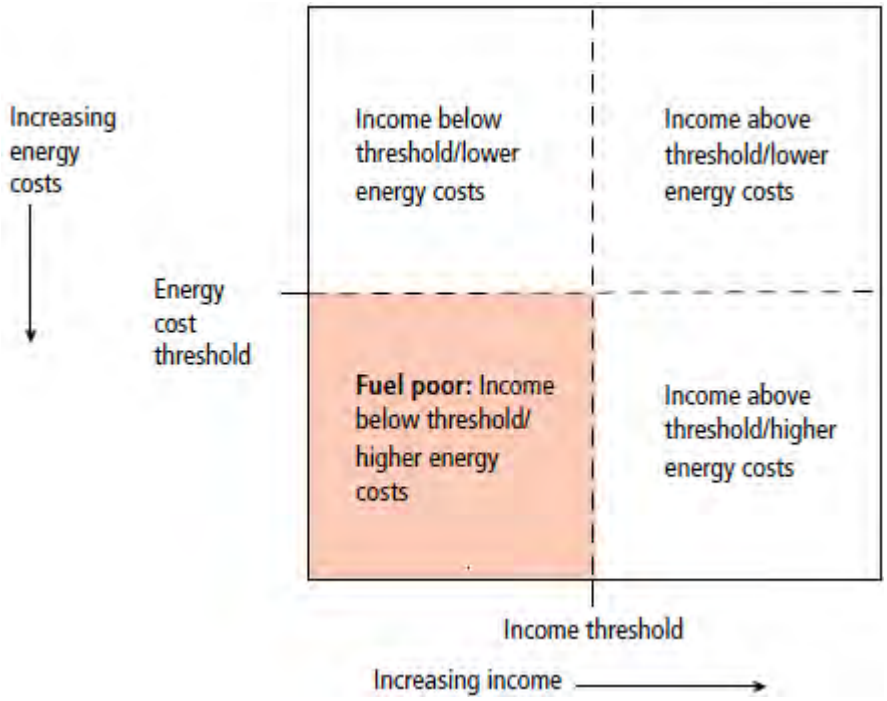
4.5.6. Fuel poverty

This report covers both the original definition and the more recent definition of fuel poverty. The original definition states that a household is said to be in fuel poverty if it spends more than 10% of its income on fuel to maintain an adequate level of warmth (defined as 21°C for the main living area, and 18°C for other occupied rooms in the 2012 Hills Fuel Poverty Review)[46]. For the purposes of this report this is termed "fuel poverty (10%)".

The fuel poverty definition then changed to 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 5 below). For the purposes of this report this is termed "fuel poverty (Low Income High Costs)".

Figure 5: 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.

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

[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

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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.

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Table 14 and Table 15 show the results based on the LIHC and 10% definitions respectively. In general, the estimated percentages are different depending on the definition. The private rented and social stock have higher proportions of fuel poverty under the fuel poverty Low Income High Costs definition, whereas the owner occupied stock has a higher proportion under the fuel poverty 10% definition. The overall Suffolk average is 12% for both definitions.

Table 14: Percentage of dwellings estimated to be in fuel poverty by local authority and by tenure – Low Income High Costs (LIHC) definition

Local authority	Percentage of dwellings in fuel poverty (low income high costs definition)				
	Private sector stock			% of social	% of all stock
	% of private sector	% of owner occupied	% of private rented		
Babergh	11%	9%	22%	10%	**11%**
Mid Suffolk	11%	9%	21%	9%	**11%**
West Suffolk	13%	9%	22%	10%	**12%**
Ipswich	7%	4%	13%	13%	**12%**
East Suffolk	13%	10%	26%	9%	**13%**
Suffolk	***11%***	***9%***	***22%***	***15%***	***12%***

Table 15: Percentage of dwellings estimated to be in fuel poverty by local authority and by tenure – 10% definition

Local authority	Percentage of dwellings in fuel poverty (10% definition)				
	Private sector stock			% of social	% of all stock
	% of private sector	% of owner occupied	% of private rented		
Babergh	13%	14%	13%	8%	**13%**
Mid Suffolk	16%	16%	14%	9%	**15%**
West Suffolk	10%	11%	9%	8%	**10%**
Ipswich	12%	11%	13%	7%	**11%**
East Suffolk	12%	12%	14%	10%	**12%**
Suffolk	***12%***	***12%***	***12%***	***9%***	***12%***

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Map 10 and Map 11 show the results based on the LIHC and 10% definitions respectively. For the fuel poverty low income high cost definition the highest levels are found in East Suffolk and West Suffolk. The majority of the north of East Suffolk as well as two wards in the south have notably high levels of fuel poverty Low Income High Costs. Meanwhile, for West Suffolk there are a concentration of wards towards the north west of the local authority as well as small clusters in the east, west and south, that show higher levels of fuel poverty Low Income High Costs. The rural nature of some of the wards in this area may be a contributary factor to the prevalence There are also small pockets of higher levels in Mid Suffolk and Babergh, however, Ipswich has the lowest levels of fuel poverty Low Income High Costs.

For the fuel poverty 10% definition the picture is slightly different, with Mid Suffolk having the highest levels overall. There are also small areas of Babergh and East Suffolk that have higher concentrations of fuel poverty 10%. Both Ipswich and West Suffolk have comparatively low levels of fuel poverty 10%.

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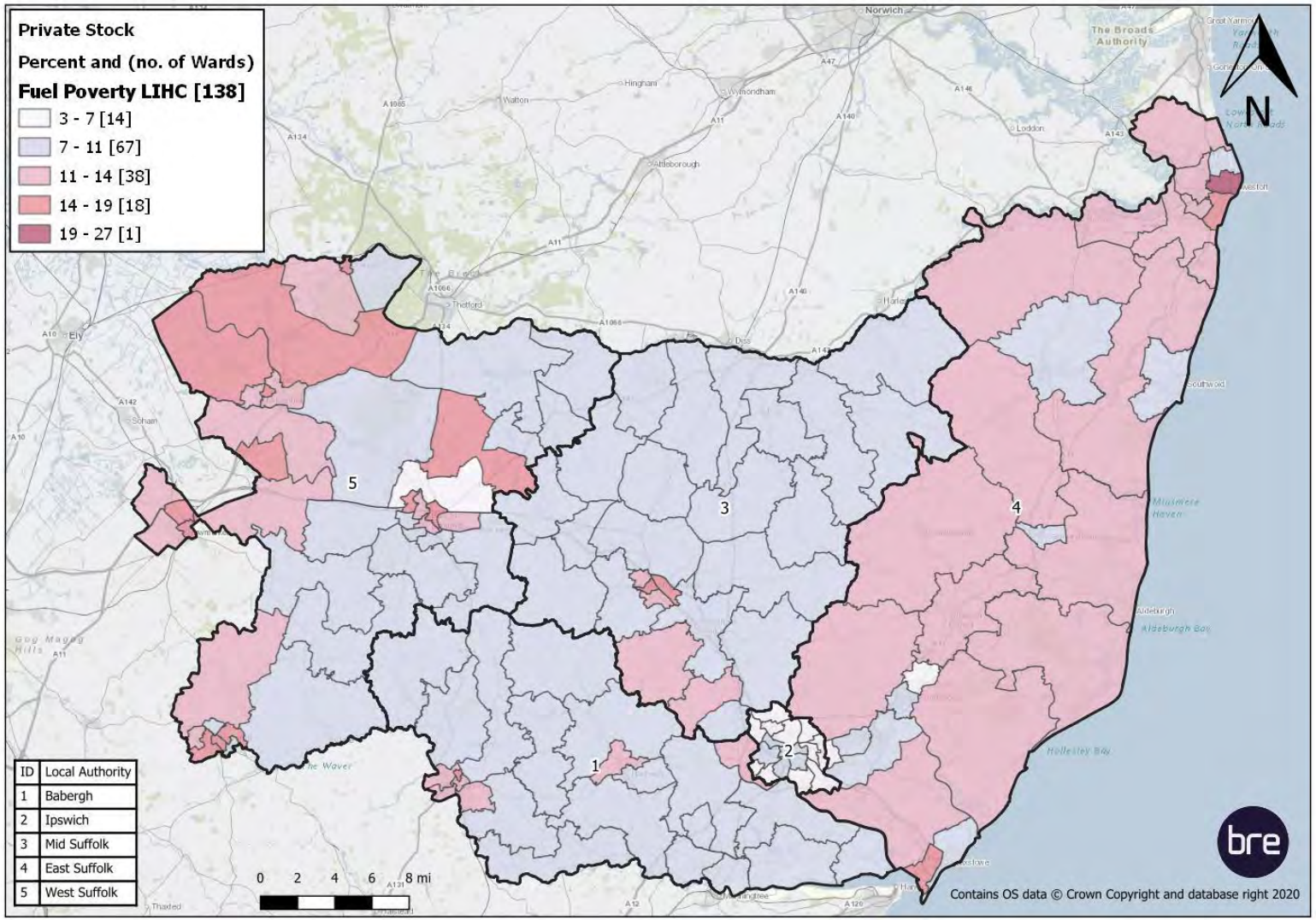
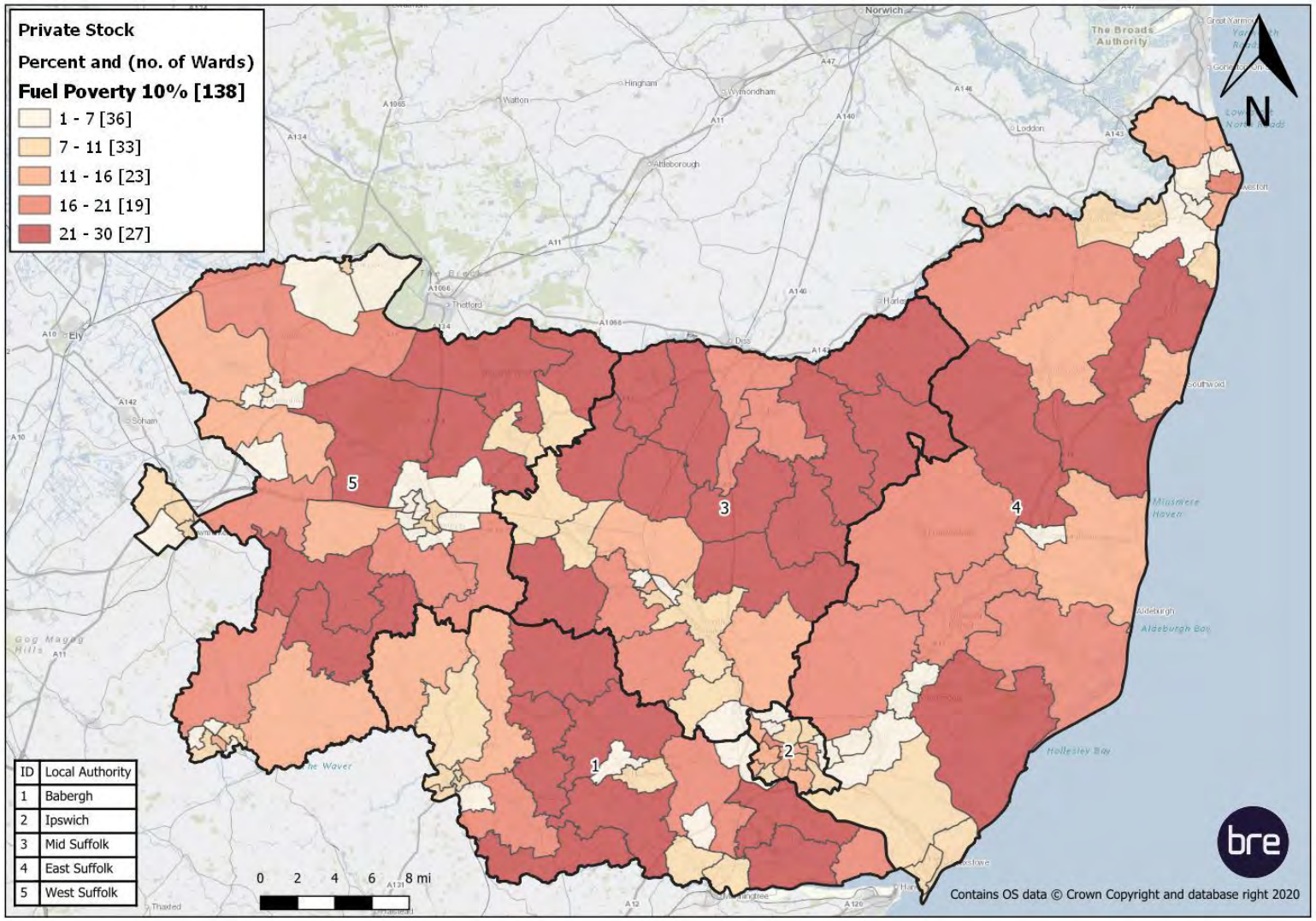
Map 10: Percentage of private sector dwellings in the Suffolk Councils occupied by households in fuel poverty - Low Income High Costs definition. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound*



Map 11: Percentage of private sector dwellings in the Suffolk Councils occupied by households in fuel poverty – 10% definition. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound.*



4.5.7. Dwellings occupied by 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

Table 16 shows the percentage of dwellings estimated to be occupied by low income households by local authority and tenure, and for Suffolk overall. The average for Suffolk overall is 22% and naturally the highest levels of low income households are found in the social sector, followed by the private rented sector and then the owner occupied sector.

Table 16: Percentage of dwellings estimated to be occupied by low income households by local authority and by tenure

Local authority	Percentage of dwellings on low incomes				
	Private sector stock			% of social	% of all stock
	% of private sector	% of owner occupied	% of private rented		
Babergh	14%	13%	17%	64%	**21%**
Mid Suffolk	13%	13%	17%	66%	**20%**
West Suffolk	14%	13%	17%	63%	**23%**
Ipswich	14%	13%	18%	61%	**26%**
East Suffolk	14%	13%	17%	64%	**20%**
Suffolk	***14%***	***13%***	***17%***	***63%***	***22%***

Map 12 shows the geographical distribution of private sector dwellings in Suffolk on low incomes. The greatest numbers are found in Ipswich and West Suffolk, with slightly lower levels found in majority of East Suffolk, Babergh and Mid Suffolk.

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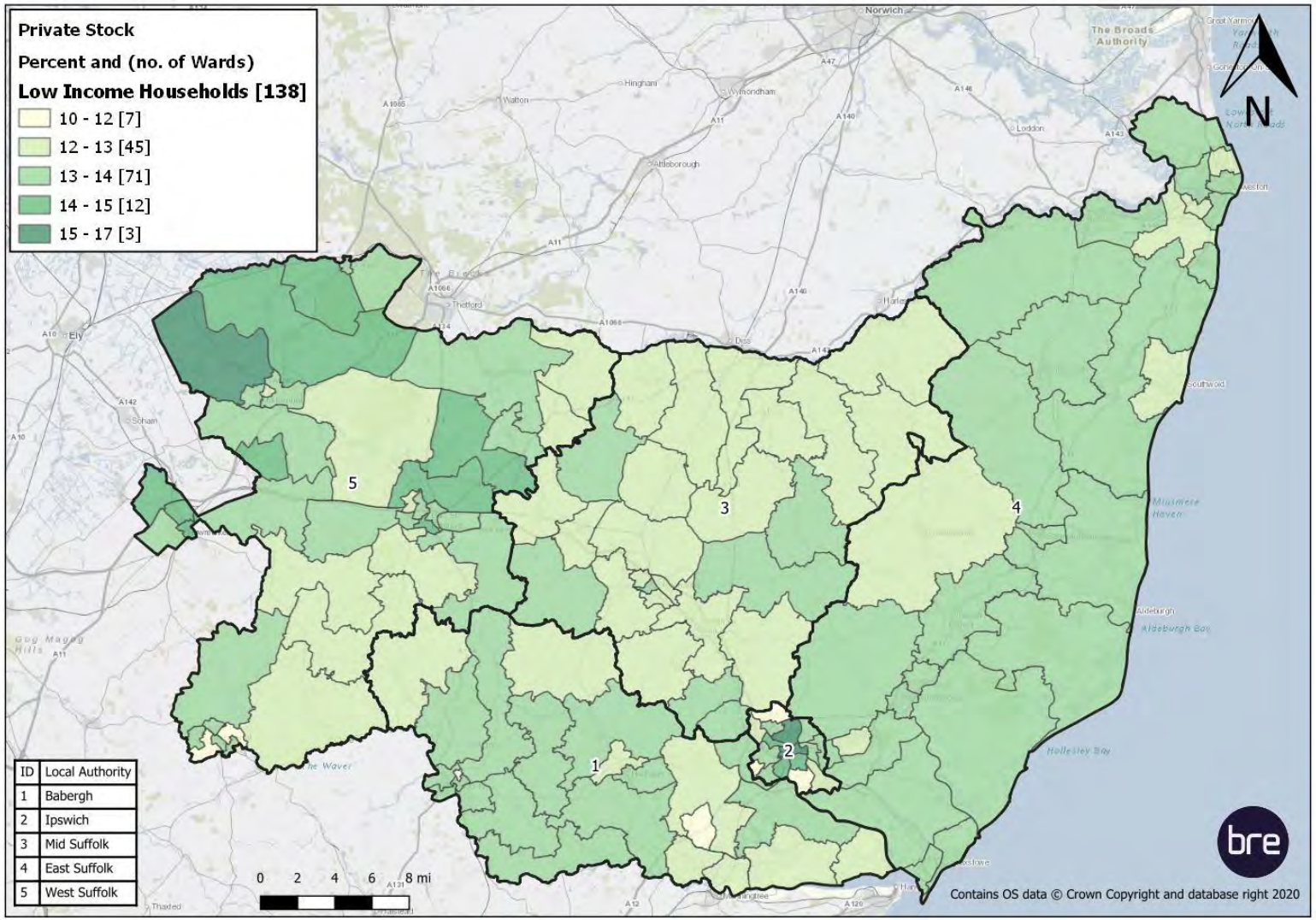
Map 12: Percentage of private sector dwellings in the Suffolk Councils occupied by low income households. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound.*



4.5.8. SimpleSAP

Lower SimpleSAP ratings can occur in areas with larger, older homes where little work has been done by the occupiers to improve energy performance. The size of the home itself is not a factor in SimpleSAP, but these homes are more likely to be semi-detached or detached, and therefore have larger heat loss areas.

The SimpleSAP ratings for the Suffolk Councils broken down by local authority and tenure are shown in Table 17. The average SimpleSAP score for the Suffolk Councils is 58. Each of the five authorities follows the same pattern whereby the highest SimpleSAP scores overall are found in the social stock, followed then by the private rented stock and the lowest SimpleSAP scores are found in the owner occupied stock.

Map 13 shows the geographical distribution of average SimpleSAP ratings – in general, rural areas tend to have the lowest ratings. As they are in a rural location, properties in these wards may also not be connected to the mains gas network leading to a decrease in SimpleSAP score.

Table 17: SimpleSAP rating by local authority and by tenure

Local authority	Average SimpleSAP rating				
	Private sector stock			Social	All stock
	Average private sector	Owner occupied	Private rented		
Babergh	56	55	57	63	**56**
Mid Suffolk	56	54	57	62	**55**
West Suffolk	60	58	62	65	**60**
Ipswich	60	59	61	67	**61**
East Suffolk	57	56	58	62	**57**
Suffolk	***58***	***56***	***59***	***64***	***58***

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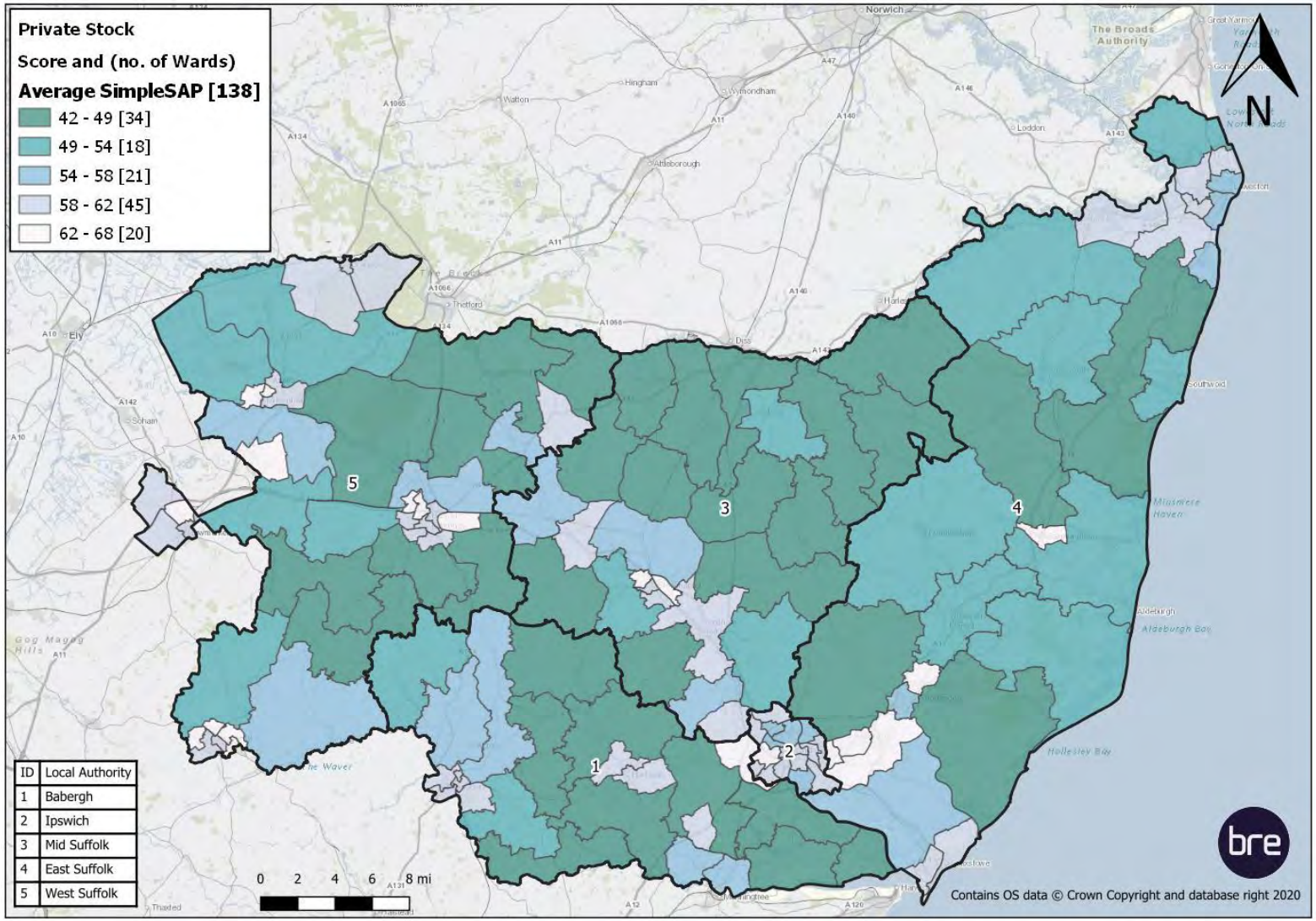
Map 13: Average SimpleSAP ratings per dwelling in the Suffolk Councils private sector stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound*



4.6 Comparison of information relating to LAHS reporting

The following sub-sections show the results for EPC ratings and the cost of mitigating category 1 hazards.

4.6.1. Cost of mitigating category 1 hazards in the Suffolk Council's private sector stock

Table 18 shows the total cost of mitigating all hazards within the dwellings in each local authority and the total sum of mitigating hazards overall. The costs are based on the average cost of mitigating category 1 hazards for the region using EHS 2019 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 18: Estimated costs to mitigate all category 1 hazards in private sector stock, for each local authority and Suffolk as a whole.

Local authority	Total Cost
Babergh	£29,736,171.00
Mid Suffolk	£37,182,907.00
West Suffolk	£45,501,249.00
Ipswich	£22,962,180.00
East Suffolk	£69,796,226.00
Suffolk	£205,178,733.00

4.6.2. EPC Ratings

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.

It should be noted that the data reported here are based on the results from the BRE SimpleCO_2 engine. This approach has been taken, as opposed to using the lodged EPC/SAP ratings to ensure consistency of outputs since the EPC records do not cover the whole stock (64% of the stock is covered and EPC ratings are modelled for the remaining stock).

Table 19 shows the Bands A – G and corresponding percentage of dwellings falling in each category for the private sector stock. The percentage of private sector dwellings with an EPC rating below Band C for

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the Suffolk Councils overall is 78.3% and below Band E is 12.7%. The local authority with the highest level of F and G properties is Babergh and the lowest is Ipswich.

Table 20 shows the Bands A – G and corresponding percentage of dwellings falling in each category for the private rented stock. The percentage of private rented sector dwellings with an EPC rating below Band C for the Suffolk Councils overall is 73.1% and below Band E is 9.9%. The local authority with the highest level of F and G properties is Babergh and the lowest is Ipswich.

Table 19: Percentage of private sector stock falling into each of the EPC ratings bands (based on SimpleSAP) by local authority

Distribution of EPC rating bands by local authority - private sector						
EPC rating band	Babergh	Mid Suffolk	East Suffolk	Ipswich	West Suffolk	*Suffolk Consortia*
(92-100) A	0.0%	0.0%	0.0%	0.0%	0.0%	***0.0%***
(81-91) B	0.9%	1.4%	0.6%	0.9%	1.7%	***1.1%***
(69-80) C	19.2%	21.7%	16.7%	19.3%	25.7%	***20.5%***
(55-68) D	41.8%	34.9%	49.1%	51.3%	43.3%	***44.1%***
(39-54) E	20.9%	21.4%	21.9%	24.9%	18.5%	***21.5%***
(21-38) F	13.2%	15.7%	8.7%	3.0%	8.6%	***9.8%***
(1-20) G	4.0%	4.9%	3.0%	0.5%	2.3%	***2.9%***

Table 20: Percentage of private rented stock falling into each of the EPC ratings bands (based on SimpleSAP) by local authority

Distribution of EPC rating bands by local authority - private rented sector						
EPC rating band	Babergh	Mid Suffolk	East Suffolk	Ipswich	West Suffolk	*Suffolk Consortia*
(92-100) A	0.0%	0.0%	0.0%	0.0%	0.0%	***0.0%***
(81-91) B	1.1%	1.6%	0.5%	2.0%	2.7%	***1.6%***
(69-80) C	22.2%	26.0%	18.4%	27.4%	32.6%	***25.3%***
(55-68) D	43.6%	37.0%	48.9%	45.3%	42.3%	***43.4%***
(39-54) E	19.6%	19.4%	22.9%	21.4%	15.8%	***19.8%***
(21-38) F	10.6%	12.3%	7.3%	3.4%	5.5%	***7.8%***
(1-20) G	2.9%	3.7%	2.0%	0.5%	1.2%	***2.1%***

The distribution of dwellings with EPC ratings below band E is shown in Map 14. These are for the private rented stock only since this is affected by the rules on minimum standards.

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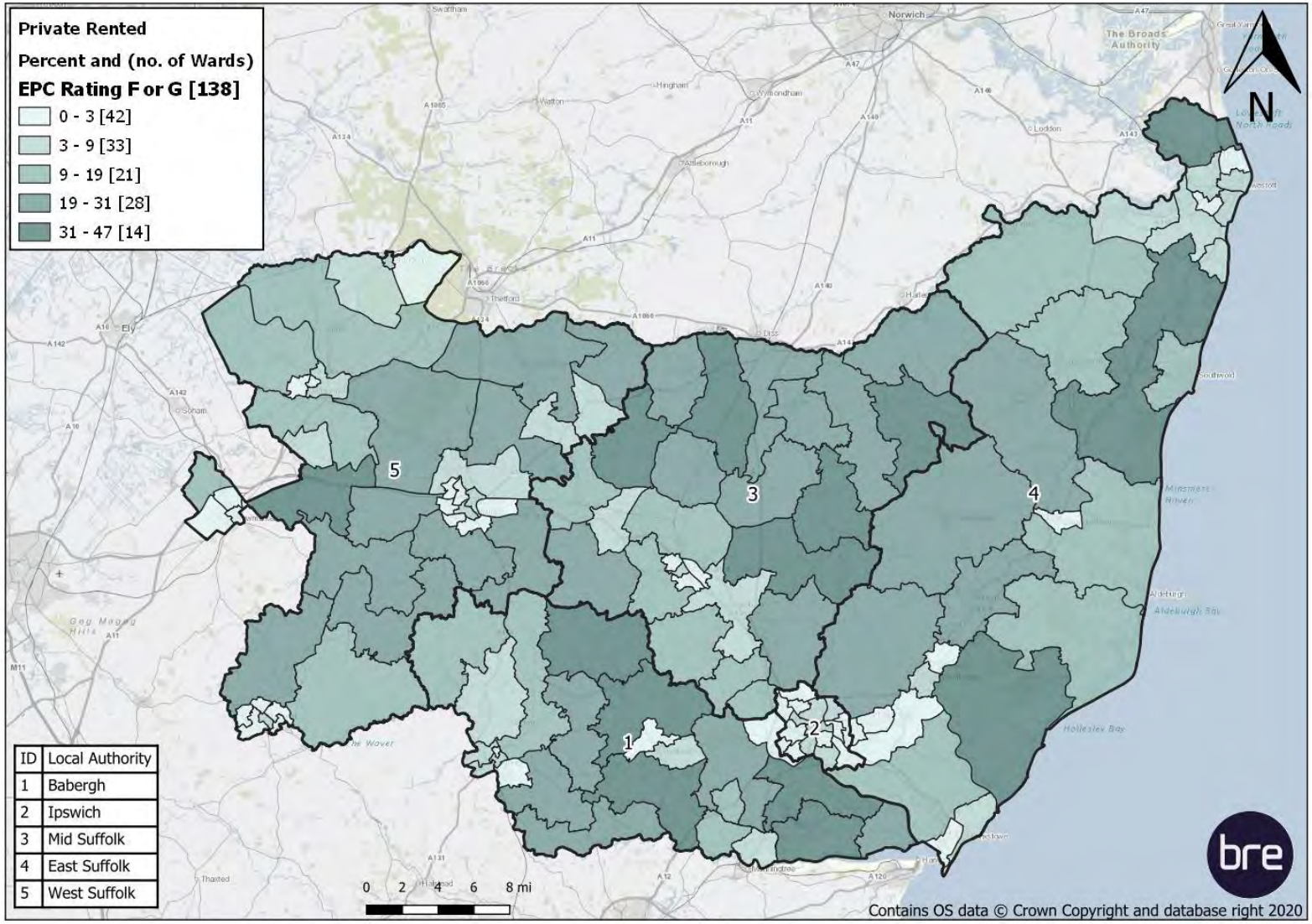
Map 14: Distribution of dwellings with F or G EPC ratings in the private rented stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound*



4.7 Energy efficiency variables for Suffolk

Section 2.5 provides an overview of the ECO policy – two of the main energy efficiency improvements that falls 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 Suffolk. The BRE Models have been used to determine the following variables for the Suffolk Councils:

- 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 21 and Table 22 summarise these results for the private stock in the Suffolk Councils, broken down by local authority and for Suffolk as a whole. The results show that the greatest proportion of private sector dwellings with solid walls are in Ipswich (35%) and the lowest are in West Suffolk (20%). Suffolk overall has 27% of private stock with solid walls. Ipswich has the highest proportion of un-insulated cavity walls (17%) and Mid Suffolk and West Suffolk have the lowest levels (14%). Overall, 15% of private sector dwellings have un-insulated cavity walls in Suffolk.

Looking at loft insulation (Table 22), Ipswich has the highest proportion of private sector dwellings with less than 100mm of insulation (18%), and Mid Suffolk has the lowest proportions (13%). Overall levels in Suffolk are 15%.

Map 15, Map 16 and Map 17 show the distribution of dwellings with solid walls, un-insulated cavities and less than 100mm of loft insulation, respectively. For the solid walls and uninsulated cavity walls, there are relatively high concentrations of both across all the local authorities. For the loft insulation below 100mm, there are a small number of wards in Ipswich as well as two wards in East Suffolk that have particularly high levels of dwellings with low levels of loft insulation.

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Table 21: Number and percentage of private sector dwellings with solid walls and with un-insulated cavity walls, by local authority, The Suffolk Councils overall and compared to the national figure (EHS 2019)

Local authority	Solid Walls		Uninsulated cavity walls	
	No. of dwellings	Percentage of dwellings	No. of dwellings	Percentage of uninsulated cavity walls
Babergh	9,219	26%	5,246	15%
Mid Suffolk	9,829	25%	5,383	14%
West Suffolk	13,255	20%	9,775	14%
Ipswich	16,646	35%	8,204	17%
East Suffolk	32,269	30%	14,670	14%
Suffolk	***81,218***	***27%***	***43,278***	***15%***

Table 22: Number and percentage of private sector dwellings with less than 100mm of loft insulation, by local authority, the Suffolk Councils overall and compared to the national figure (EHS 2019)

Local authority	Loft insulation	
	No. of dwellings with less than 100mm loft insulation	Percentage of dwellings with less than 100mm loft insulation
Babergh	5,413	15%
Mid Suffolk	5,154	13%
West Suffolk	9,352	14%
Ipswich	8,255	18%
East Suffolk	15,822	15%
Suffolk	***43,996***	***15%***

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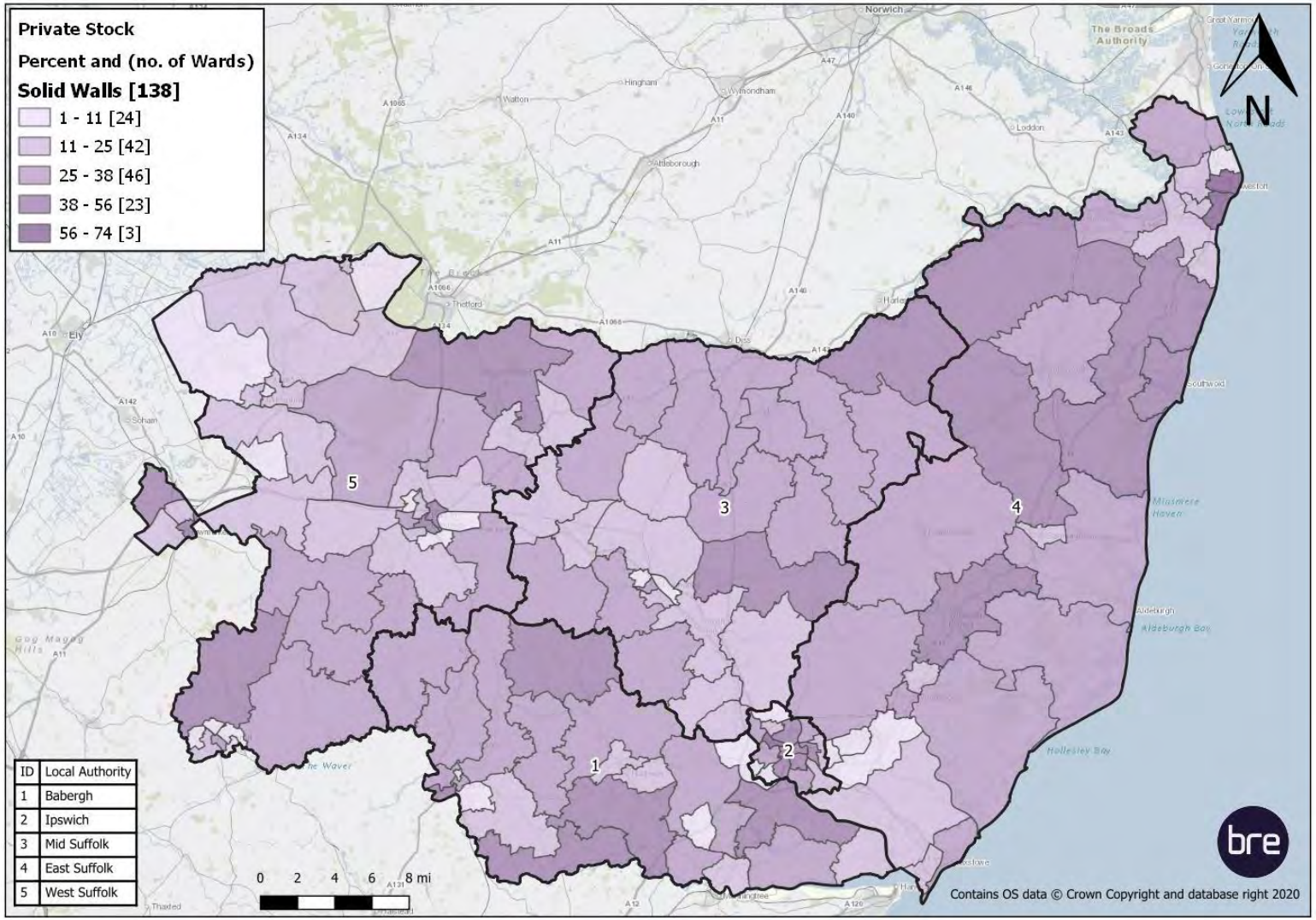
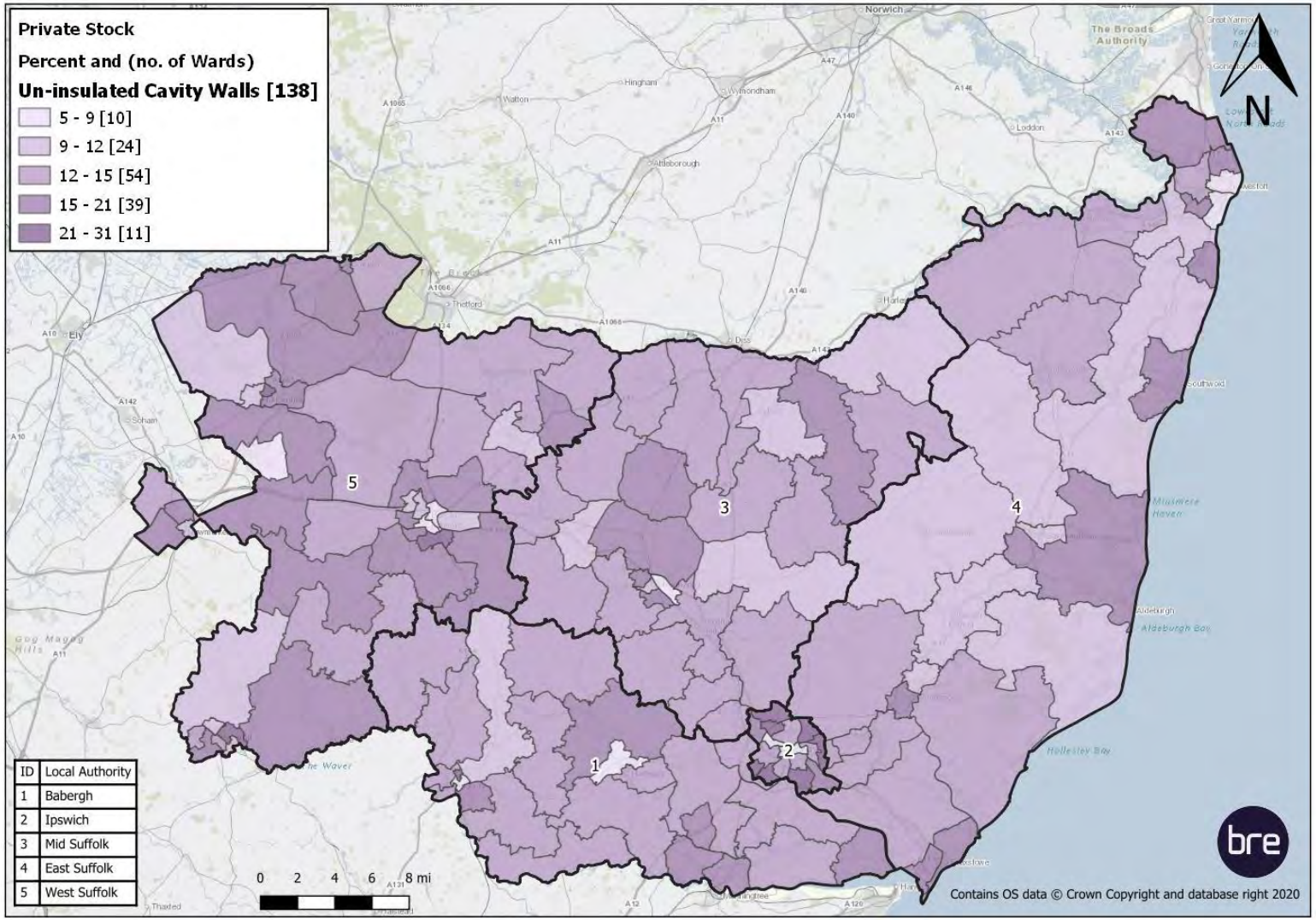
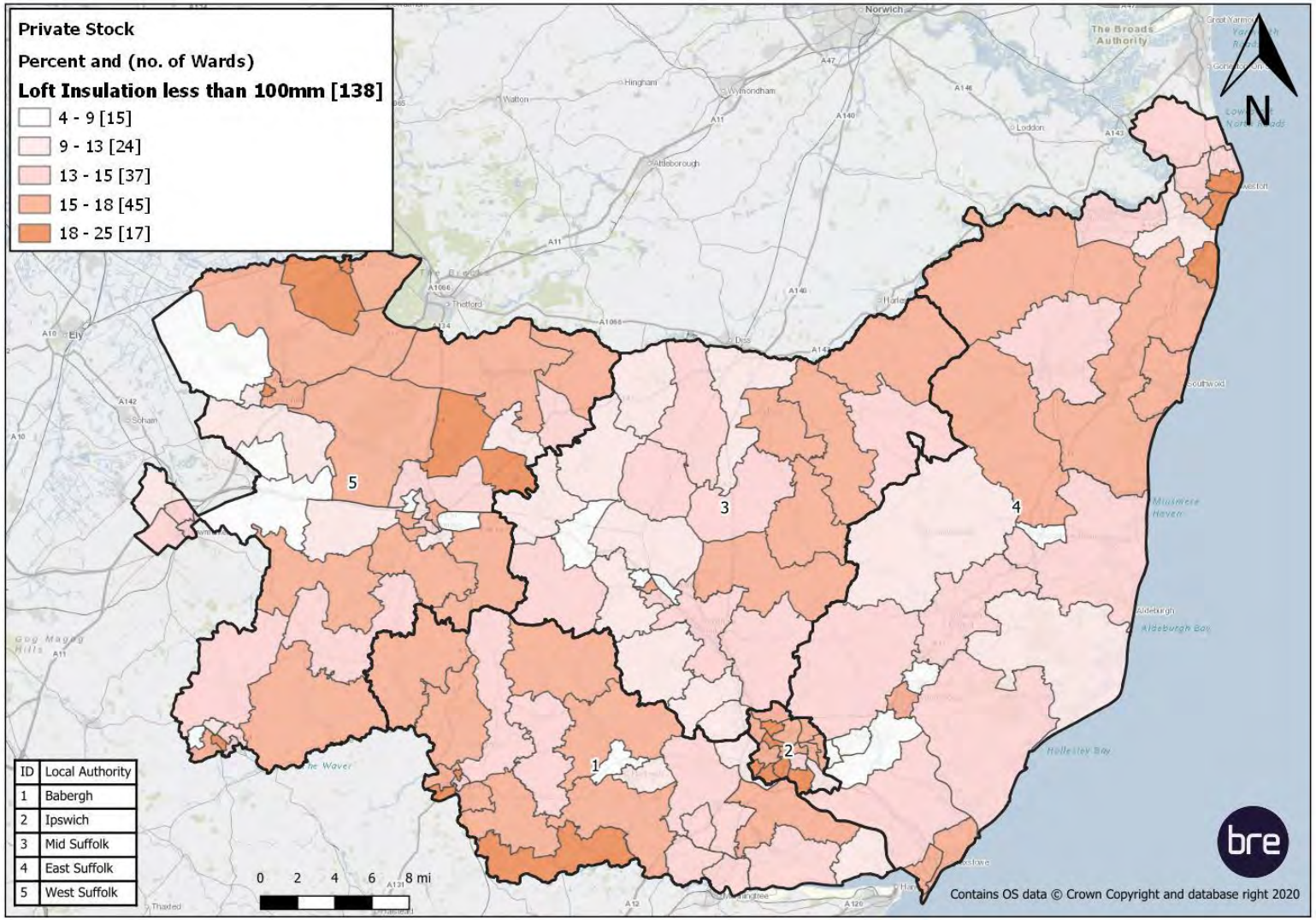
Map 15: Distribution of solid walls - private sector dwellings in the Suffolk Councils *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound*



Map 16: Distribution of un-insulated cavities - private sector dwellings in the Suffolk Councils *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound*



Map 17: Distribution of dwellings with less than 100mm loft insulation - private sector dwellings in the Suffolk Councils *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound*



4.8 Energy planning variables – private sector stock

This section provides estimates of a number of energy-related variables: SimpleSAP, notional SimpleCO_2, notional energy demand and cost, notional electricity demand and cost, notional heat demand and cost.

Table 23 and Table 24 show the results by local authority for the owner occupied stock and the private rented stock, respectively.

It is clear that the owner occupied stock has the highest average figures for the majority of variables, other than the SimpleSAP, which may in part be due to owner occupied dwellings tending to be larger, detached and more rural than those in the other tenures. Overall electricity demand is generally higher in the private rented stock which could be related to there being more flats in the sector and the higher propensity for electric heating; however, this is not the case for all the authorities e.g. Babergh which has higher electric demand in the owner occupied stock.

Map 18 to Map 21 shows the geographical distribution of average energy demand, energy cost, heat demand and heat cost in the private sector stock for the Suffolk Councils. Demand is generally highest in the rural areas, most likely due to larger houses being located in these areas, compared to more flats in the urban areas which will have a lower average energy demand.

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.

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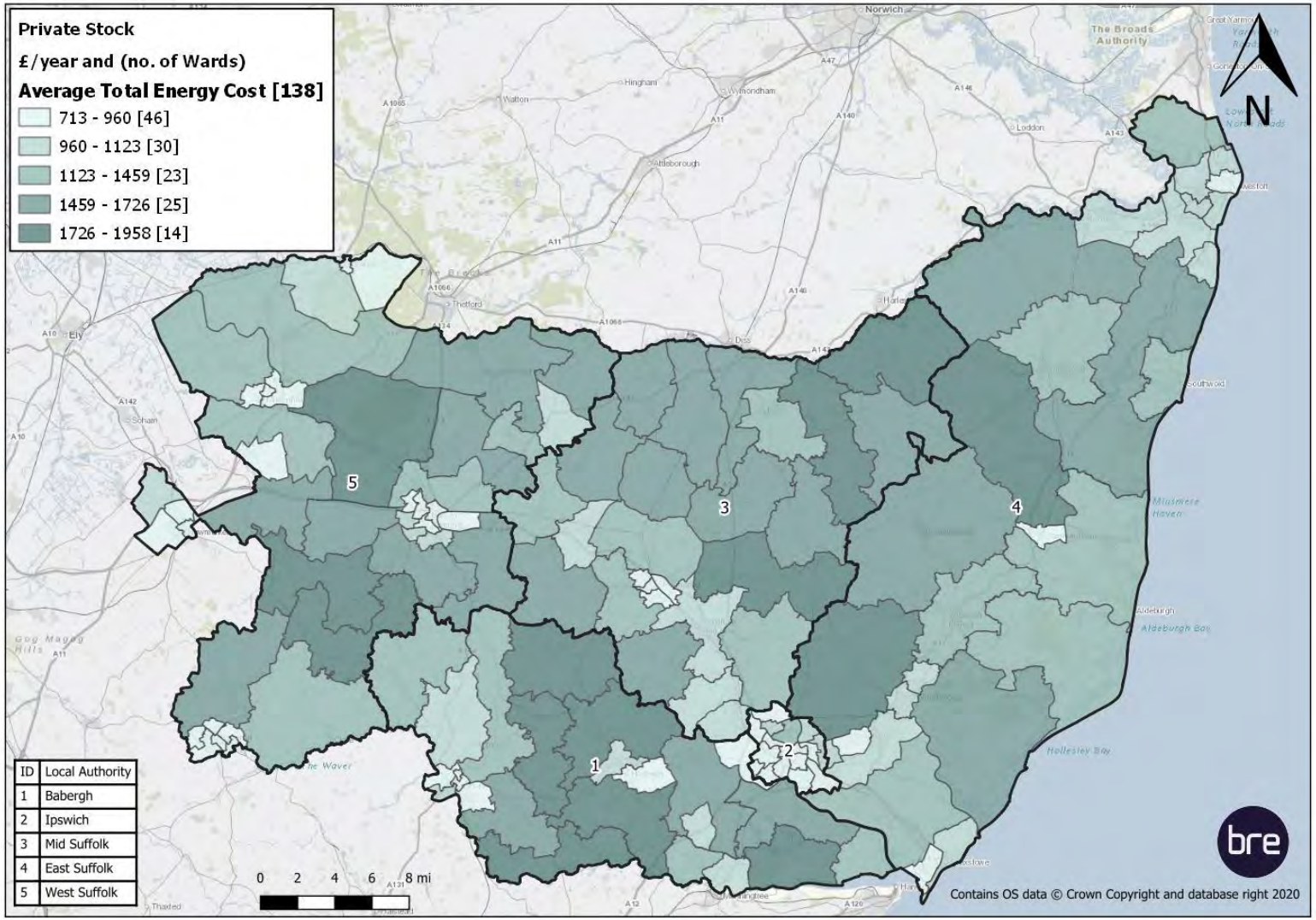
Table 23: Modelled data for average energy efficiency variables per dwelling by local authority – owner occupied stock

Local authority	SimpleSAP	SimpleCO$_2$ (t/yr)	Energy demand (kWh/yr)	Energy cost (£/yr)	Electricity demand (kWh/yr)	Electricity cost (£/yr)	Heating demand (kWh/yr)	Heating cost (£/yr)
Babergh	55	5.61	24,593	1,326	3,140	327	15,121	939
Mid Suffolk	54	5.67	23,747	1,368	3,964	394	14,872	987
West Suffolk	58	5.01	22,393	1,191	2,878	297	13,540	810
Ipswich	59	4.60	22,358	1,010	1,402	164	12,881	638
East Suffolk	56	5.32	24,498	1,232	2,635	280	14,895	850
Suffolk	***56***	***5***	***23,518***	***1,225***	***2,804***	***292***	***14,262***	***845***

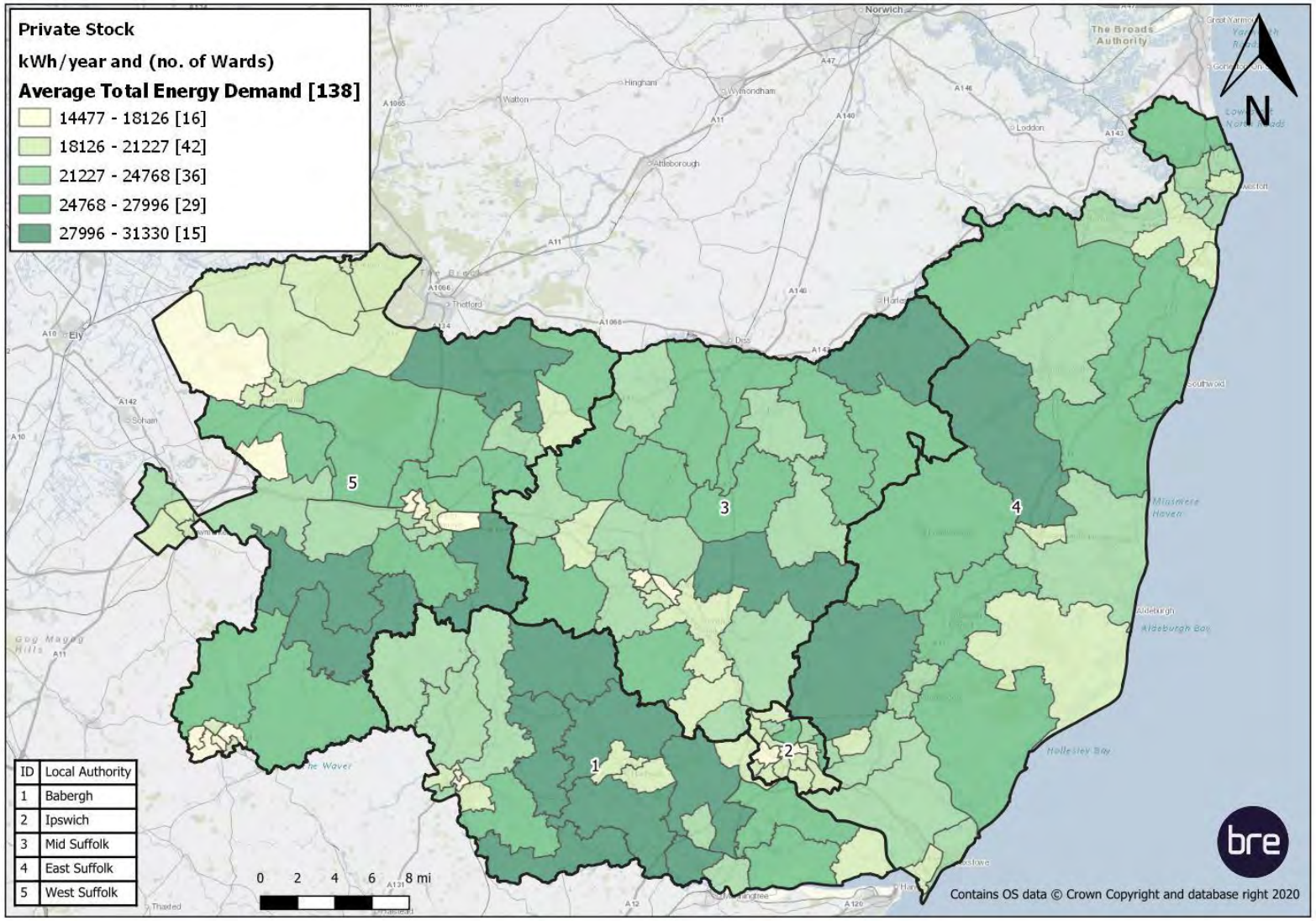
Table 24: Modelled data for average energy efficiency variables per dwelling by local authority – private rented stock

Local authority	SimpleSAP	SimpleCO$_2$ (t/yr)	Energy demand (kWh/yr)	Energy cost (£/yr)	Electricity demand (kWh/yr)	Electricity cost (£/yr)	Heating demand (kWh/yr)	Heating cost (£/yr)
Babergh	57	4.13	18,767	1,029	2,820	290	11,670	694
Mid Suffolk	57	4.12	18,346	1,074	3,967	372	11,809	743
West Suffolk	62	3.57	16,459	898	2,378	255	10,136	562
Ipswich	61	2.99	15,084	790	2,362	256	8,770	476
East Suffolk	58	3.79	18,133	945	2,600	262	11,189	619
Suffolk	***59***	***4***	***17,358***	***947***	***2,825***	***287***	***10,715***	***619***

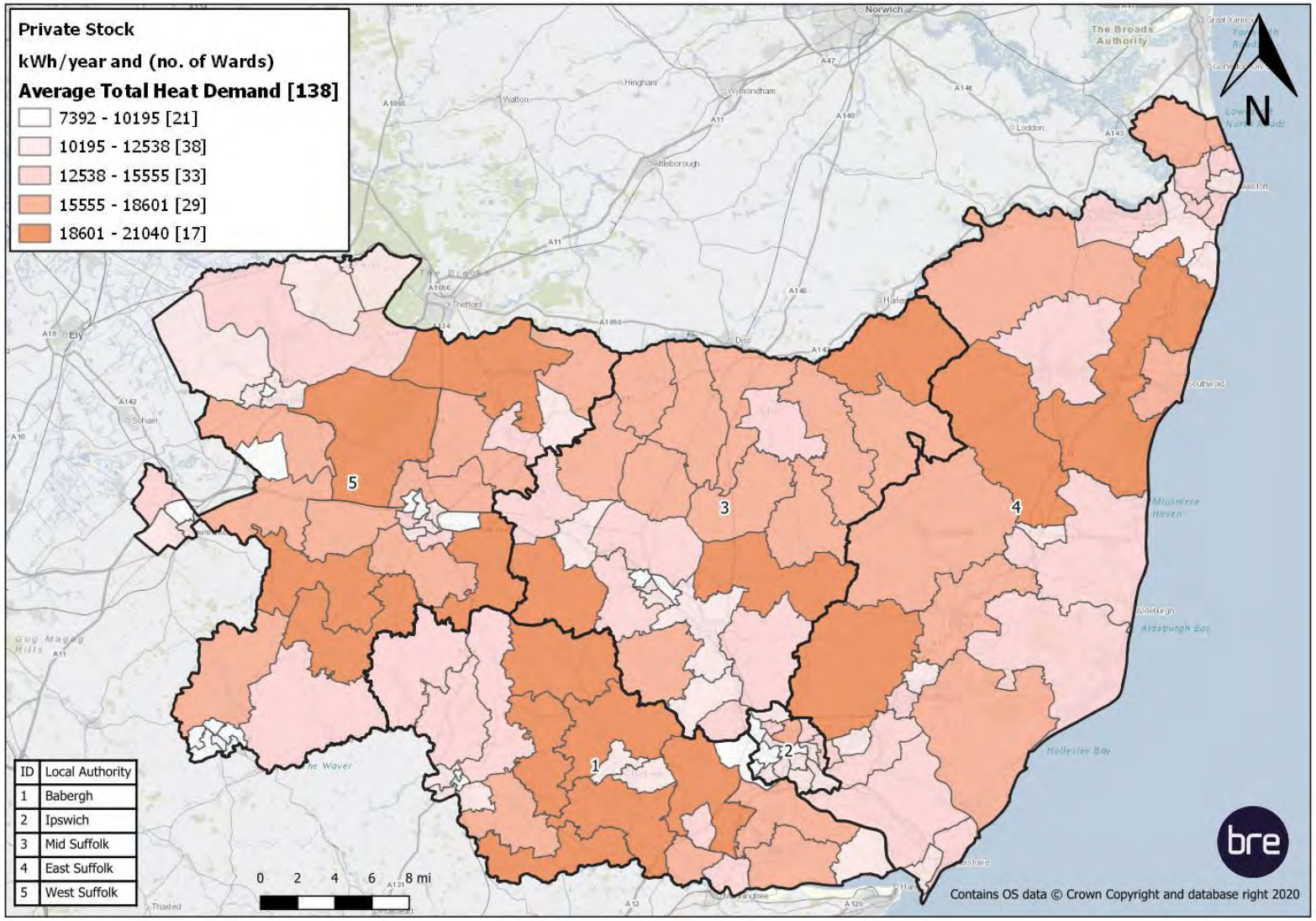
Map 18: Average total energy cost (£/year) – private sector stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound*



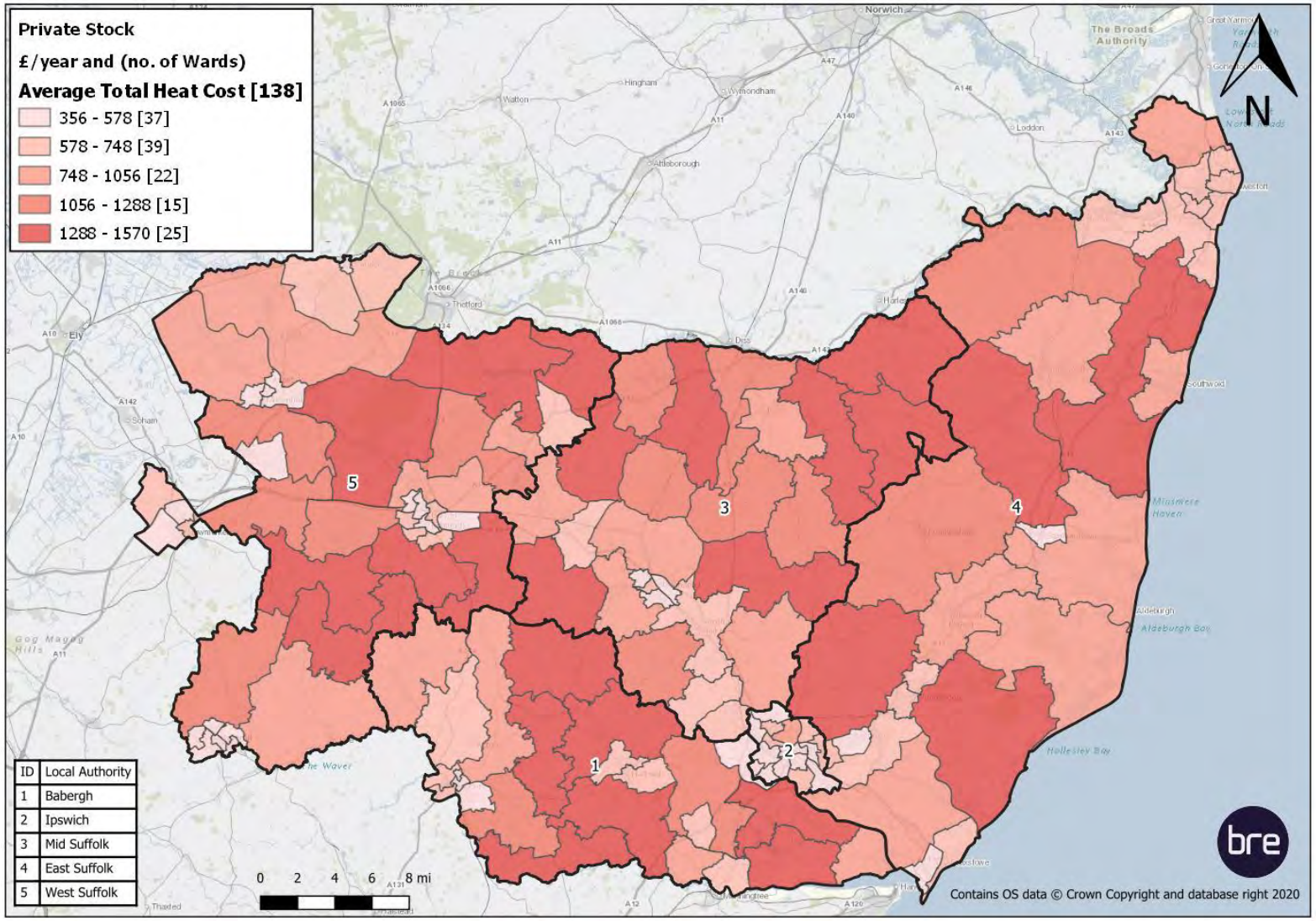
Map 19: Average total energy demand (kwh/year) – private sector stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound*



Map 20: Average total heat demand (kWh/year) – private sector stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound*



Map 21: Average total heat cost (£/year) – private sector stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound*



4.9 Housing standards variables for HMOs

4.9.1. Houses in Multiple Occupation (HMOs) in the Suffolk Council's private sector stock

The Housing Act 2004 introduced a new set of definitions for HMOs in England from 6 April 2006. The definition is a complex one and the bullet points below, which are adapted from web pages provided by the National HMO Network, 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 government publication "Houses in Multiple Occupation and residential property licensing reform" provides guidance to local authorities on changes to rules on licensing HMOs. From 1 October 2018, mandatory 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. From 1 October 2018, the extension came into effect and those dwellings that falls 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 SimpleCO2 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 1 October 2018 definition)

- 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

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In order to estimate the number of potential licensable HMOs, the data provided by the council has been integrated into the BRE model to provide a list of known licensable HMO addresses. This is used alongside our HMO Model that provides additional addresses which the modelling suggests have the potential to be an HMO based on various criteria. This therefore provides a list of known licensable HMOs (provided by the council) as well as a list of other properties which may have the potential to be a licensable HMO. Consequently, the tables below indicate where the HMOs are likely to be located, however, it is important to clarify that this is modelled data and as such provides an informed indication of where HMOs may be found.

Table 25 summarises the results for the private sector stock in each local authority and Suffolk overall, showing that there are 1,311 dwellings in Suffolk that are estimated to have the potential to be an HMO.

Table 25: Summary of modelled estimated potential HMOs within the Suffolk Councils' private sector stock.

Local authority	No. of private sector dwellings	HMOs provided by each council	Total HMOs	Total Mandatory Licensable HMOs
Babergh	35,129	16 licensed	399	83
Mid Suffolk	39,532	6 licensed	346	87
West Suffolk	67,602	99 licensed and 139 non-licensed	1,967	493
Ipswich	47,015	176 licensed	1,850	351
East Suffolk	106,248	50 licensed	1,765	297
Suffolk	***295,526***	***486 (347 licensed and 139 non-licensed)***	***6327***	***1311***

N.B.: The third column displays how many either licensable or non-licensable HMO records were provided by each council, the fourth column displays the total number of HMOs that result from the council's data and the BRE modelled outputs combined together and the fifth column displays the total number of potentially mandatory licensable HMOs, which incorporates the data provided by the council and the modelled BRE dwellings. As it is not compulsory to keep a record of non-licensable HMOs only one council provided this information.

Map 22 and Map 23 show the count of HMOs and the count of licensable HMOs respectively. Generally, Ipswich has the highest number of HMOs, followed by East Suffolk and West Suffolk. There are a very small number in Babergh and Mid Suffolk. The levels of HMOs and licensable HMOs are generally low across the whole of the Suffolk Councils.

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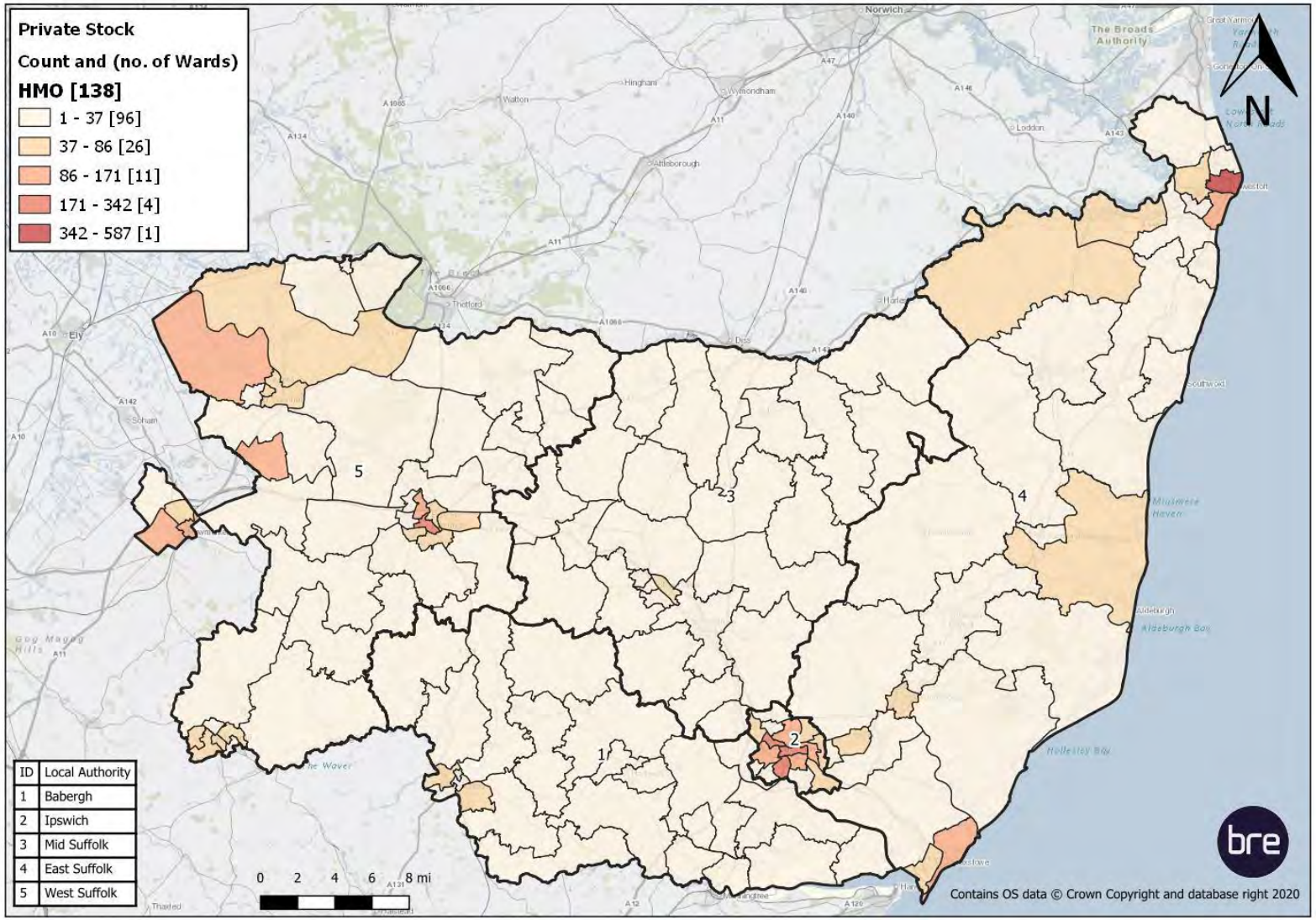
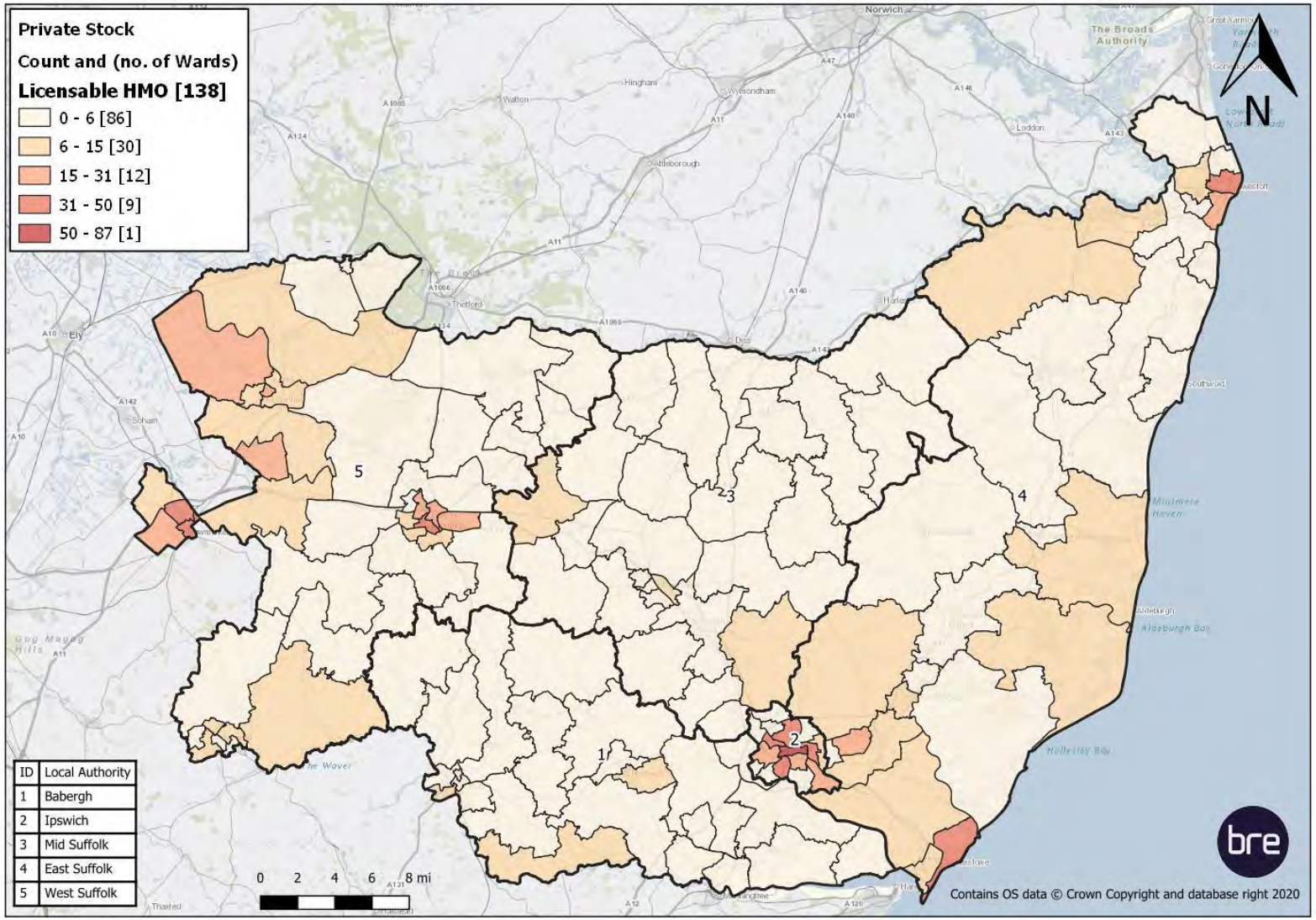
Map 22: Count of HMOs. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound*



Map 23: Count of mandatory licensable HMOs. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound*



5. Conclusion and recommendations

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 councils to enable them to obtain specific information wherever required.

The integrated stock models and database provides the councils with dwelling level information for the following:

- The percentage of dwellings meeting each of the key indicators for Suffolk overall and broken down by tenure and then mapped by ward (private sector stock only)
- Information relating to Local Authority Housing Statistics (LAHS) reporting for the private sector stock – Energy Performance Certificate (EPC) ratings, HMOs and category 1 hazards
- Information relating to HHSRS Category 2 hazards
- 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)

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

In relation to the comparison of the variables in the private sector stock (category 1 hazards, excess cold, falls hazard, disrepair, fuel poverty and low income households) between Suffolk and England, based on 2019 EHS data, Suffolk has higher levels of all variables except low income households compared to England as a whole. The variable of particular note is excess cold, where the average for Suffolk is 11% compared to an average of 2% for England.

Additionally, when looking at the detail further in relation to tenure, the social stock performs best for all variables, with the exceptions of low income households and fuel poverty (Low Income High Costs), which is to be expected. Within the private sector stock, the owner occupied stock has higher levels of category 1 hazards and excess cold, which could be attributable the rural nature of areas of Suffolk that have the potential for larger, detached houses that are difficult to heat. The owner occupied and private rented stock performs similarly for fuel poverty (10%) definition, and the private rented stock has higher levels of falls hazard, disrepair and fuel poverty (Low Income High Costs).

Looking further again into the detail to compare the data between councils, in relation to Category 1 hazards and excess cold the highest levels are found in Mid Suffolk and the lowest in Ipswich. The situation for falls hazard is slightly different, with a more consistent picture across all five authorities, similar levels are found in Babergh, Ipswich and East Suffolk with slightly lower levels in Mid Suffolk and West Suffolk. For disrepair, again the picture across the whole of Suffolk is very consistent with Babergh, East Suffolk, Ipswich and Mid Suffolk having very similar amounts of disrepair and West Suffolk only very slightly lower than the others. Looking to fuel poverty, the consistency across the authorities continues in the Low Incomes High Costs definition, where all five authorities were within 2% of each other. For the 10% definition, the highest levels are reported in Mid Suffolk and the lowest in West Suffolk. Finally, for low income households the highest levels are reported in Ipswich and the lowest in Mid Suffolk and East Suffolk.

In relation to the energy performance of Suffolk, the average SimpleSAP score was 58 across all five authorities, with the lowest ratings in Babergh and Mid Suffolk (both 56) and the highest in Ipswich and West Suffolk (both 60). There are also relatively high levels of EPCs in bands F and G when compared to England. Comparing the five authorities, Babergh has the highest estimated proportion of private rented stock falling into bands F and G at 13.5 %, and Ipswich has the lowest at 3.9%. Additionally, a relatively high proportion of the overall stock in Suffolk has either solid walls or uninsulated cavity walls, as well as low levels of loft insulation, so there is scope for retrofit schemes to help improve the condition of these dwellings.

These findings could be combined with local intelligence to help identify additional areas for targeting assistance for the private rented sector stock and the environment. The results can also be combined with other datasets, for example, health data, which can help determine where vulnerable people might be living, or where improvements to housing may result in improvements to health. For instance, Mid

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Suffolk has high levels of category 1 hazard and excess cold, which warrants further investigation. Meanwhile Ipswich has high levels of falls hazards, disrepair and fuel poverty (Low Income High Costs) so these areas might benefit from funding sources that are predominantly targeted towards those on low incomes and fuel poverty, such as:

- Social Housing Decarbonisation Fund – a 10 year £3.8bn fund to improve the energy performance of social rented homes. The scheme funds a fabric first approach to ensure participating homes achieve an EPC of Band C, after which a low carbon heating system can be installed.
- Energy Company Obligation (ECO) and LA Flex – energy suppliers must promote measures that improve the ability of low income, fuel poor and vulnerable households to heat their homes. This includes measures that result in heating savings, such as the installation of insulation or the upgrade of an inefficient heating system. Local Authorities can use LA Flex to help homeowners and tenants in the private rented sector who are in fuel poverty or on low incomes to improve the energy efficiency of their homes.
- Local Authority Delivery (LAD) Scheme – this includes £500 million funding allocated to local authorities to improve the energy efficiency of homes occupied by low-income households, helping reduce fuel poverty and contribute towards the UK's commitment to net zero by 2050. This is done through improving the energy performance of homes with EPCs of E, F or G.
- Home Upgrade Grant (HUG) – the second wave of this scheme has recently been introduced and aims to provide grants to Local Authorities for either improving the energy performance of fuel poor homes and to allow for a transition to low carbon heating systems in owner occupied and private rented sector fuel poor homes that do not use gas for space heating.

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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 lowest 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).

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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°C for the main living area, and 18°C for other occupied rooms). This broad definition of fuel costs also includes modelled spending on water heating, lights, appliances, and cooking.

The fuel poverty ratio is defined as:

*Fuel poverty ratio = Fuel costs (usage * price)*

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

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The government has recently set out a more recent definition of fuel poverty - the Low Income High Costs (LIHC) definition[49]. Under this 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.

4. High category 2 hazards:

According to the strict definitions of the HHSRS a category 2 hazard is any hazard that is not a category 1 hazard. This definition, however, would identify all dwellings without a category 1 hazards, even those that were generally considered safe. Instead, the definition used here is restricted to hazards of band D or E (see 1.a above), with the exception of the falls on the level hazard, where only band D is considered (as E is the average rating for falls on the level). This definition is therefore referred to as “high” category 2 hazards as it excludes the lesser hazards. The hazards included are as follows:

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

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Hazard / hazard group	Details of hazards
Excess cold	**SimpleSAP ≤ 48 but excluding category 1 excess cold hazards which are ≤ 33**
Overcrowding	**Using stock model definition and removing outliers/extremes**
Hazards in "Falls" Model	**Falls on stairs** **Falls on the level** **Falls associated with baths**
Hazards in 'Other' Model	**Damp Excess Heat** **Carbon monoxide and fuel combustion products** **Uncombusted fuel gas** **Volatile Organic Compounds Entry by Intruders** **Lighting Noise** **Domestic hygiene, Pests and refuse Food Safety** **Personal hygiene, Sanitation and Drainage Water Supply** **Falling between Levels** **Electricity hazards** **Fire** **Flames and hot surfaces Collision and entrapment Explosions** **Position and operability of amenities** **Structural collapse and falling elements**

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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

Table 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 BRE SimpleCO_2 Model 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.

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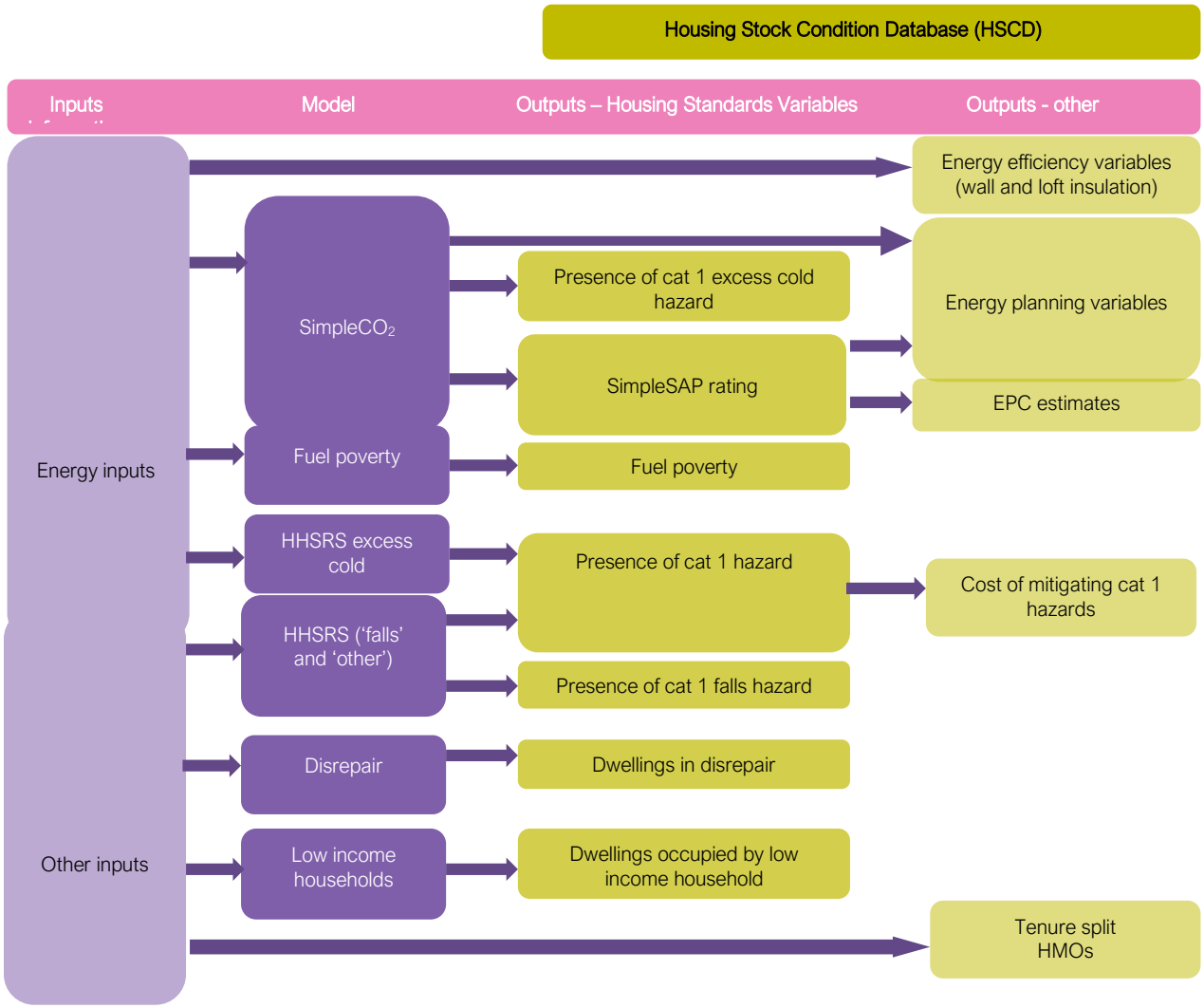
Table B. 1: Address matching results and impact on the modelling processSimplified data flow for the housing stock modelling approach



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B. 1 BRE SimpleCO_2 Model

BRE have developed a variant of the BREDEM[50] 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[51] 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

[50] 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.

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

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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 far more complex e.g. dwellings with particular characteristics such as larger dwellings are more likely to be assigned with oil as a fuel than smaller dwellings.

The reason for taking this approach is to ensure that the national proportions in the data source are the same as those found in the stock nationally (as predicted by the EHS or other national survey). Whilst there is the possibility that some values assigned will be incorrect for a particular dwelling (as part of the assignment process must 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 d2021 Tools 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 always kept in mind 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.

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.

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The presence of a category 1 hazard failure is the only exception to this as it is found by combining excess cold, falls 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, Suffolk 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: Address matching results and impact on the modelling process

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 several 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: Address matching results and impact on the modelling process provides the address matching results for the three data sources provided by Suffolk and the resulting impact on the modelling process.

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

Babergh:

Data source	Total no. of records	No. (and %) of addresses matched	Notes / impact on the modelling process
EPC data	37,599– total records available	27,767 (73.85% of de-duplicated)	Data de-duplicated for multiple EPCs – 28,437 remaining
			Final number matched to modelled data and useable – 25,135
LLPG data	43,127 – total received	40,941 (94.91% of records provided)	BLPU classes checked and duplicate UPRNs removed – 43,125 remaining
			Remaining cases once address fields checked – 40,947
TDS data	3588 – total received	2,099 (58.50% of records provided)	Remaining cases once duplicate UPRN's removed – 2,099
Empty Homes data	1,077– total received	897 (??% of records provided)	Remaining cases once duplicate UPRN's removed – 897
Enforcements and Grants data	49 – total received	45 (91.84% of records provided)	Remaining cases once duplicate UPRN's removed – 45
HMO data	16 – total received	16 (100% of records provided)	Remaining cases once duplicate UPRNs removed – 16

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East Suffolk:

Data source	Total no. of records	No. (and %) of addresses matched	Notes / impact on the modelling process
EPC data	80,764 – total records available	79,766 (98.76% of de-duplicated)	Data de-duplicated for multiple EPCs – 80,763 remaining
			Final number matched to modelled data and useable – 77,284
LLPG data	124,899 – total received	122,501 (98.08% of records provided)	BLPU classes checked and duplicate UPRNs removed – 122,617 remaining
			Remaining cases once address fields checked – 122,501
TDS data	8674 – total received	6867(79.16% of records provided)	Remaining cases once duplicate UPRN's removed – 6867
Empty Homes data	2973 – total received	2679 (90.11% of records provided)	Remaining cases once duplicate UPRN's removed – 2679
Enforcements and Grants data	292 – total received	123(42.12% of records provided)	Remaining cases once duplicate UPRN's removed – 123
HMO data	50 – total received	50 (100% of records provided)	Remaining cases once duplicate UPRNs removed – 50

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Ipswich:

Data source	Total no. of records	No. (and %) of addresses matched	Notes / impact on the modelling process
EPC data	42,847 – total records available	42,218(98.53% of de-duplicated)	Data de-duplicated for multiple EPCs – 42,847 remaining
			Final number matched to modelled data and useable – 41,201
LLPG data	64,434 – total received	61,454 (95.34% of records provided)	BLPU classes checked and duplicate UPRNs removed – 61,467 remaining
			Remaining cases once address fields checked – 61,467
TDS data	7,034– total received	762(10.89% of records provided)	Remaining cases once duplicate UPRN's removed –762
Empty Homes data	2,197 – total received	2,188 (99.59% of records provided)	Remaining cases once duplicate UPRN's removed – 2,188
Enforcements and Grants data	39 – total received	34 (87.18% of records provided)	Remaining cases once duplicate UPRN's removed – 34
HMO data	182 – total received	172(94.51% of records provided)	Remaining cases once duplicate UPRNs removed – 172

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Mid Suffolk:

Data source	Total no. of records	No. (and %) of addresses matched	Notes / impact on the modelling process
EPC data	41,862 – total records available	34,473 (82.35% of de-duplicated)	Data de-duplicated for multiple EPCs – 32,286 remaining
			Final number matched to modelled data and useable – 27,705
LLPG data	48,359 – total received	45,309 (93.69% of records provided)	BLPU classes checked and duplicate UPRNs removed – 48,359 remaining
			Remaining cases once address fields checked –45,309
TDS data	3,564 – total received	1975 (55.42% of records provided)	Remaining cases once duplicate UPRN's removed – 1975
Empty Homes data	1,229 – total received	1052 (85.60% of records provided)	Remaining cases once duplicate UPRN's removed – 1,052
Enforcements and Grants data	44 – total received	25 (56.82% of records provided)	Remaining cases once duplicate UPRN's removed – 25
HMO data	6 – total received	6 (100% of records provided)	Remaining cases once duplicate UPRNs removed – 6

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West Suffolk:

Data source	Total no. of records	No. (and %) of addresses matched	Notes / impact on the modelling process
EPC data	58,645 – total records available	57,863 (98.67% of de-duplicated)	Data de-duplicated for multiple EPCs – 58,645 remaining
			Final number matched to modelled data and useable – 55,600
LLPG data	82,861 – total received	82,122 (99.11% of records provided)	BLPU classes checked and duplicate UPRNs removed – 82,828 remaining
			Remaining cases once address fields checked – 82,122
TDS data	10,742– total received	7,798 (72.59% of records provided)	Remaining cases once duplicate UPRN's removed – 7,798
Empty Homes data	1,923 – total received	1923 (100.00% of records provided)	Remaining cases once duplicate UPRN's removed –1,923
Enforcements and Grants data	55 – total received	23 (41.82% of records provided)	Remaining cases once duplicate UPRN's removed – 23
HMO data	384 – total received	238 (61.97% of records provided)	Remaining cases once duplicate UPRNs removed – 238

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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 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. For this reason, the tenure variable supplied in the database is NOT based on EPC data; however, the calculations used to determine the SimpleSAP rating and other energy characteristics of the dwelling do make use of the EPC tenure.

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

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

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

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

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B.4 OS MasterMap information

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– 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[52])

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[53]. 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:

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:

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

[53] Houses have one residential address point and blocks of flats have two or more

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Detached – where a single address is within a dwelling footprint and that footprint is not attached to any other building footprint[54].

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.

B.5 Household Composition

Household Composition information is available within the HSCD, and the categories included are based on the Experian Household Composition definitions as follows:

1. Families
2. Extended Family
3. Extended Household
4. Pseudo Family
5. Single Male
6. Single Female
7. Male Homesharers
8. Female Homesharers
9. Mixed Homesharers
10. Abbreviated Male Families
11. Abbreviated Female Families
12. Multi-occupancy Dwelling.

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

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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**: Methodology for the BRE Integrated Dwelling Level Housing Stock Modelling approach

The HSDC has been designed to allow local authorities to access their local area data. There are several 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

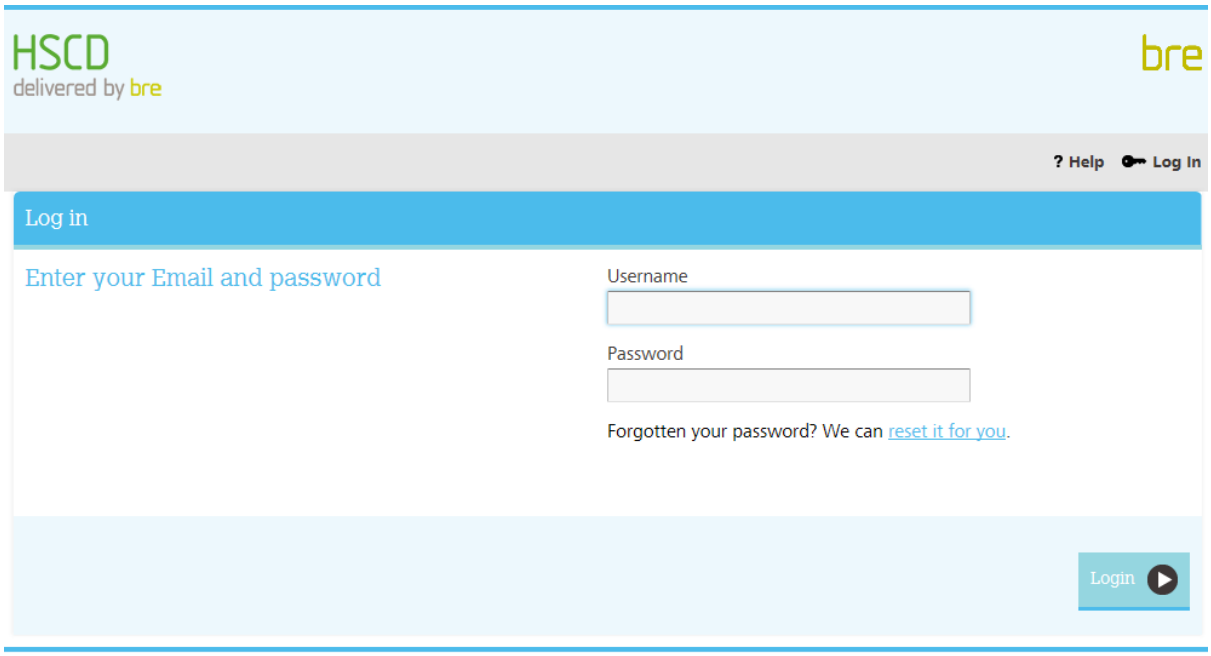

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Figure C. 2: Home page (note screenshot below is sample data)

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

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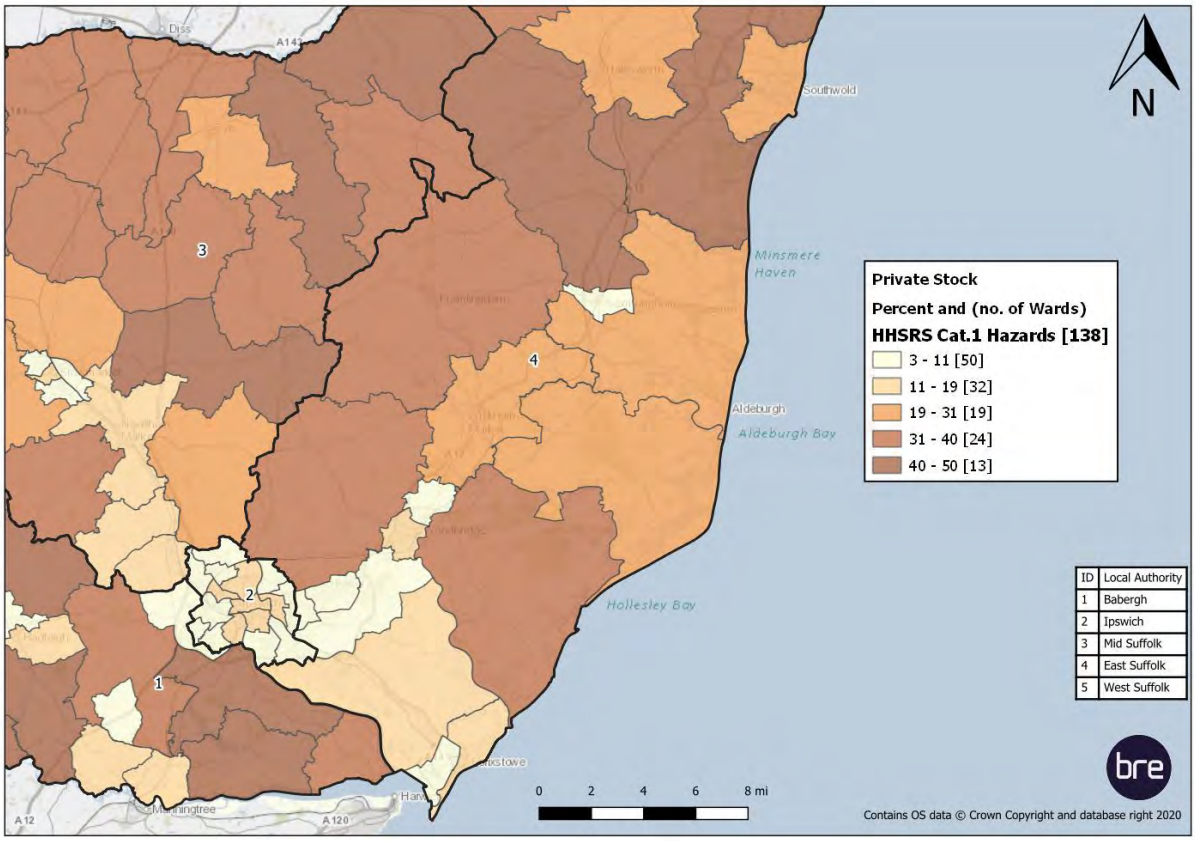
Appendix D: Additional Maps

This Appendix provides close up maps for each variable, focussing in on the urban area of Suffolk. These maps show the clear urban – rural divide in many of the Housing Standards Variables. The larger maps included above in the report do not always allow for the appreciation that smaller and denser COAs in urban areas are very different in their hazards to the surrounding rural COAs which are larger and are immediately more eye-catching.

Map D. 1: Suffolk category 1 hazards in the east– private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound.* Return to main report



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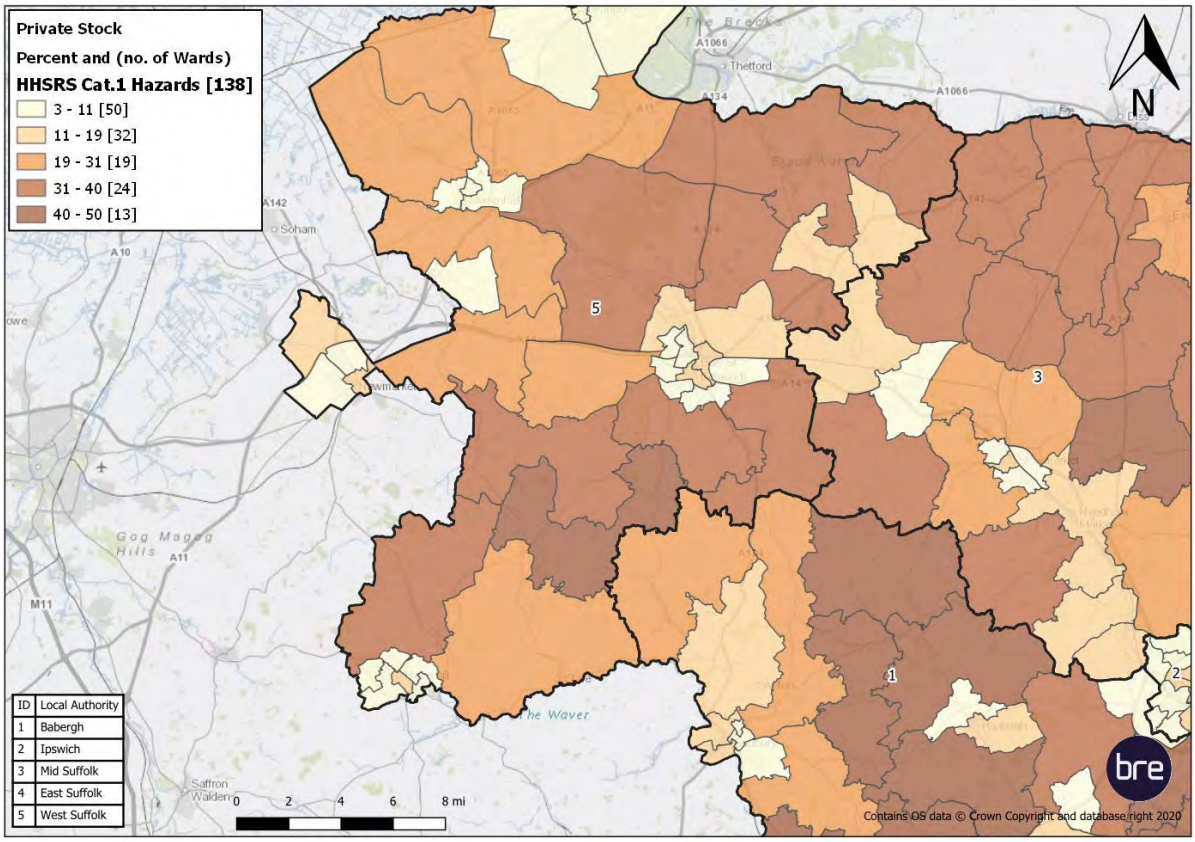
Map D. 2: Suffolk category 1 hazards in the west – private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound. Return to main report.*



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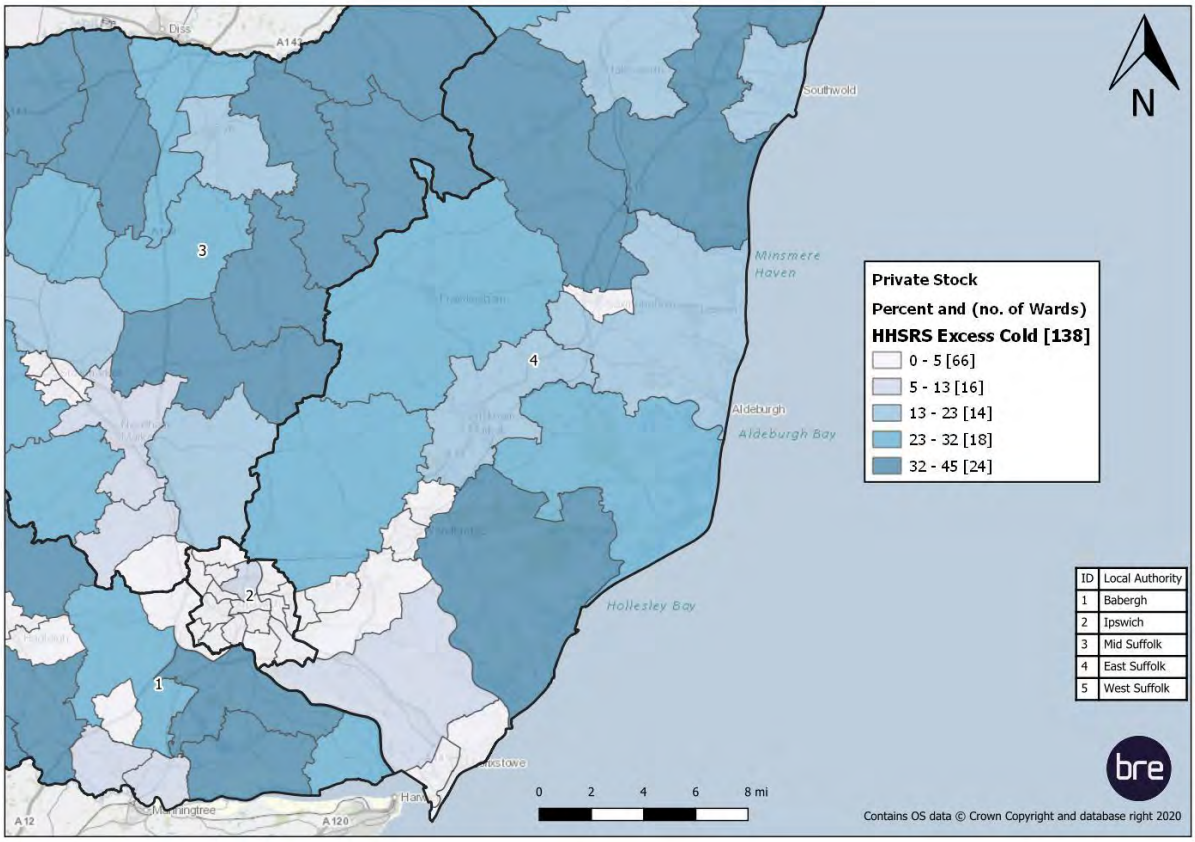
Map D. 3: Suffolk households with excess cold in the east – private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound. Return to main report*



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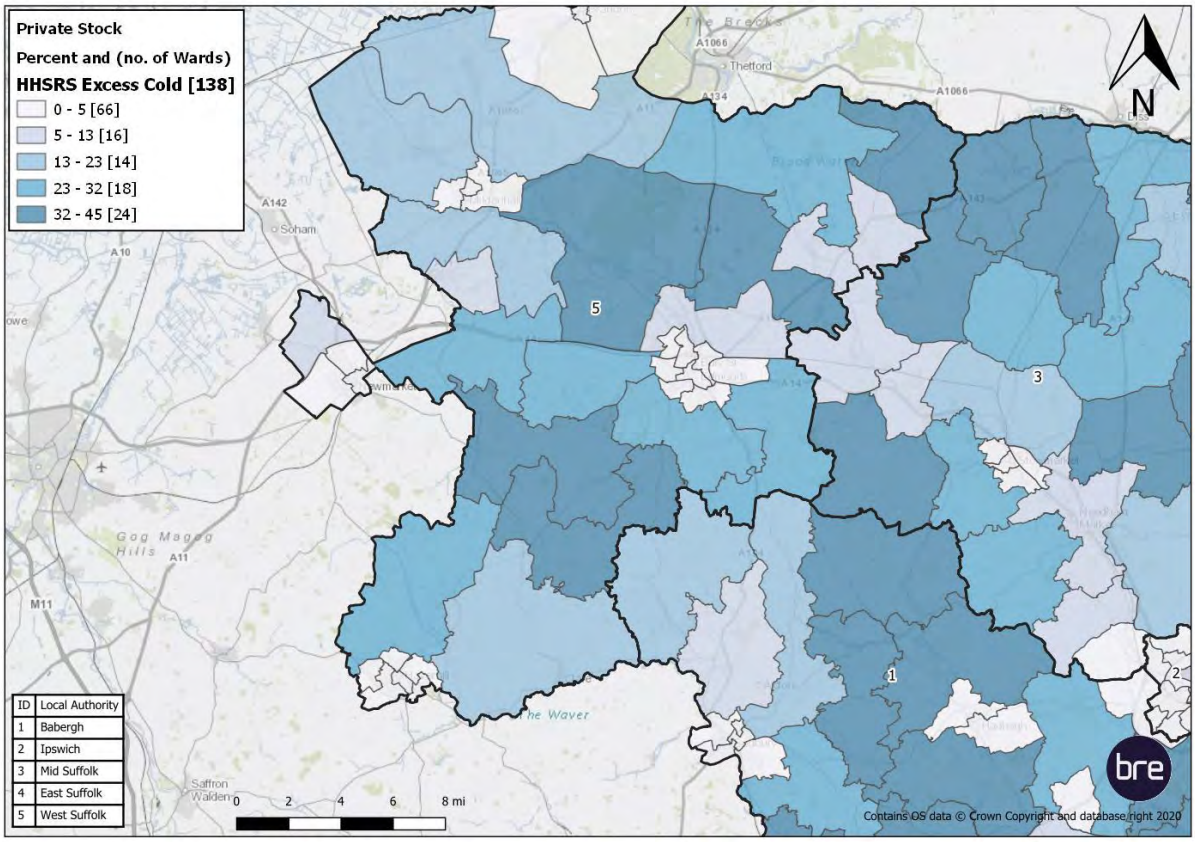
Map D. 4: Suffolk households with excess cold in the west– private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound. Return to main report*



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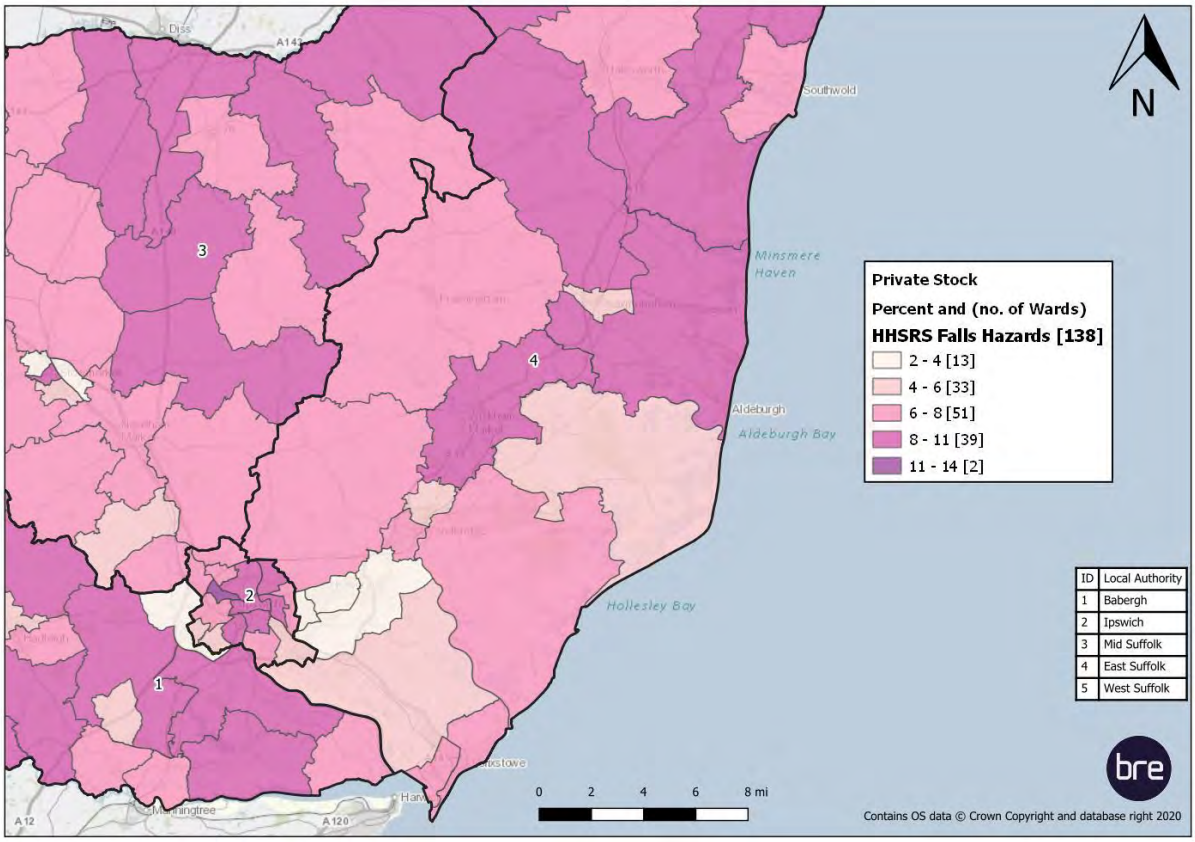
Map D. 5: Suffolk households with falls hazards in the east – private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound. Return to main report*



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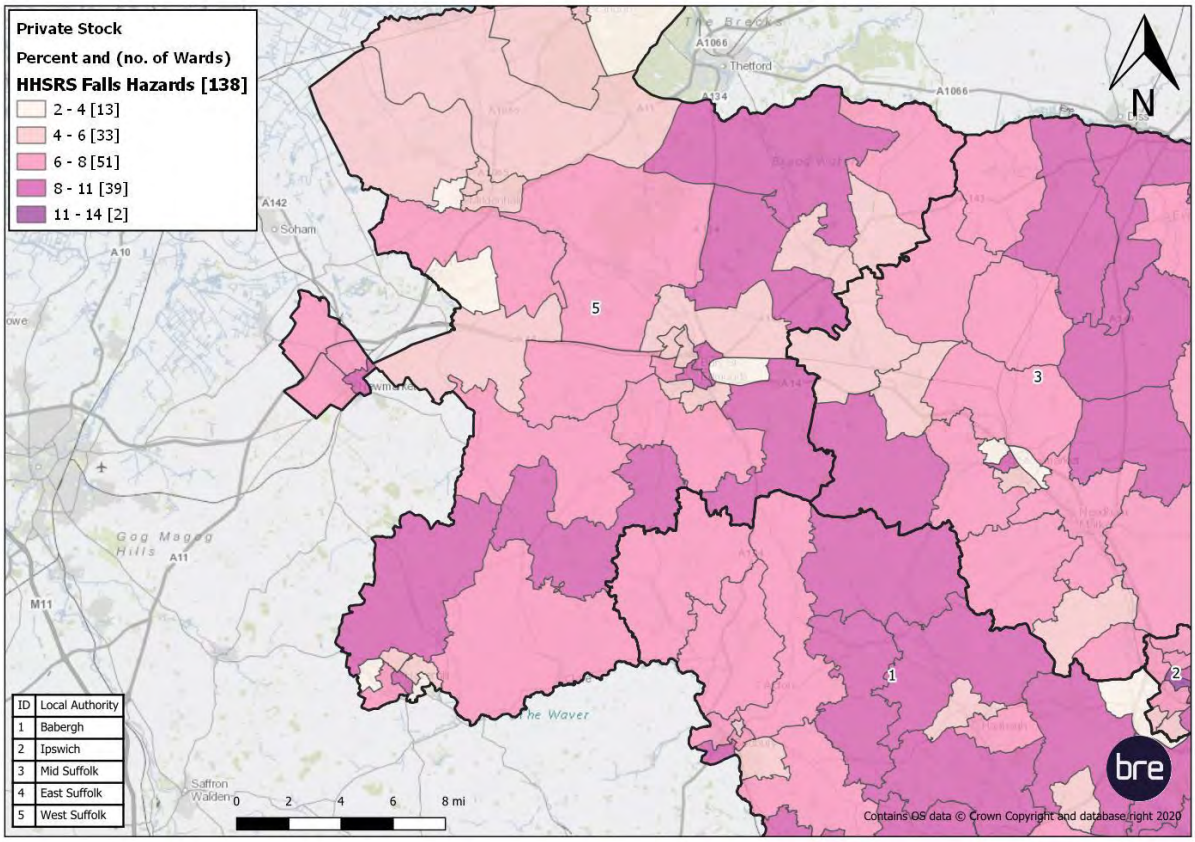
Map D. 6: Suffolk households with falls hazards in the west – private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound. Return to main report*



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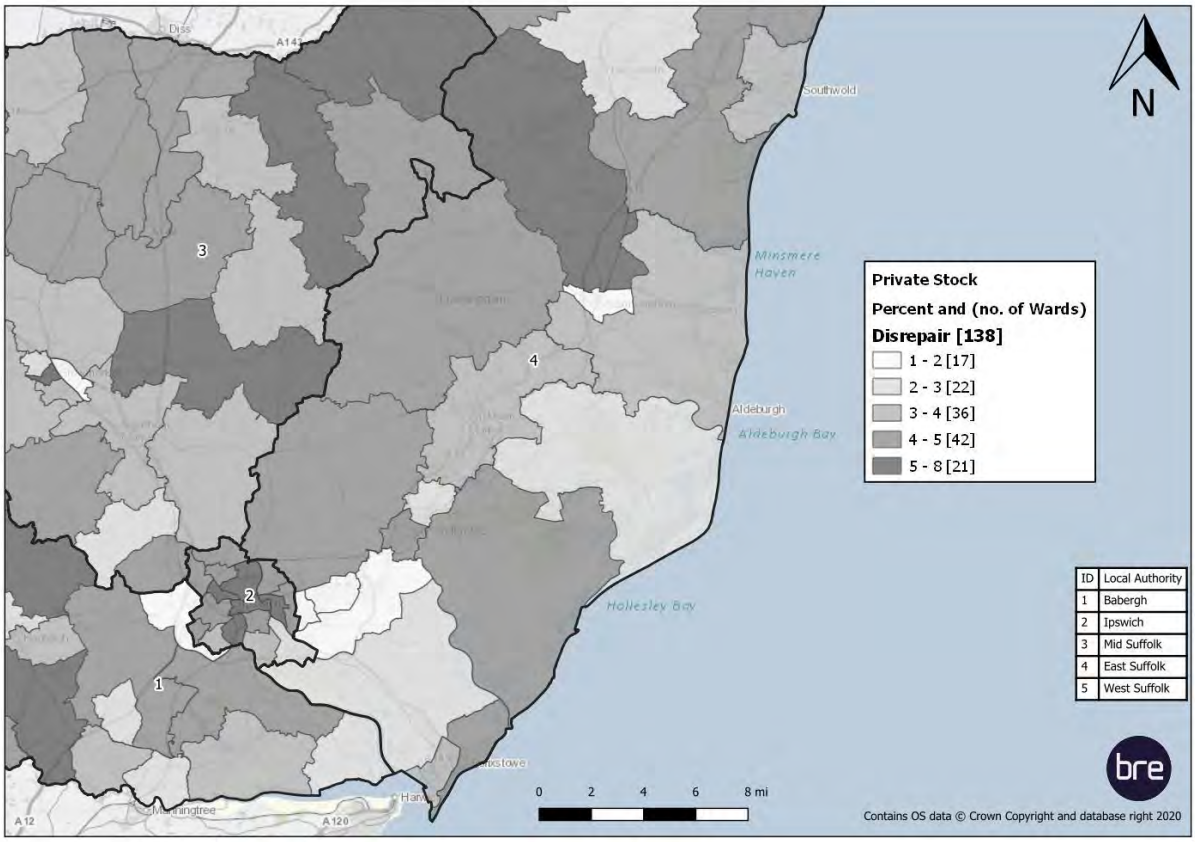
Map D. 7: Suffolk households in disrepair in the east – private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound.* *Return to main report*



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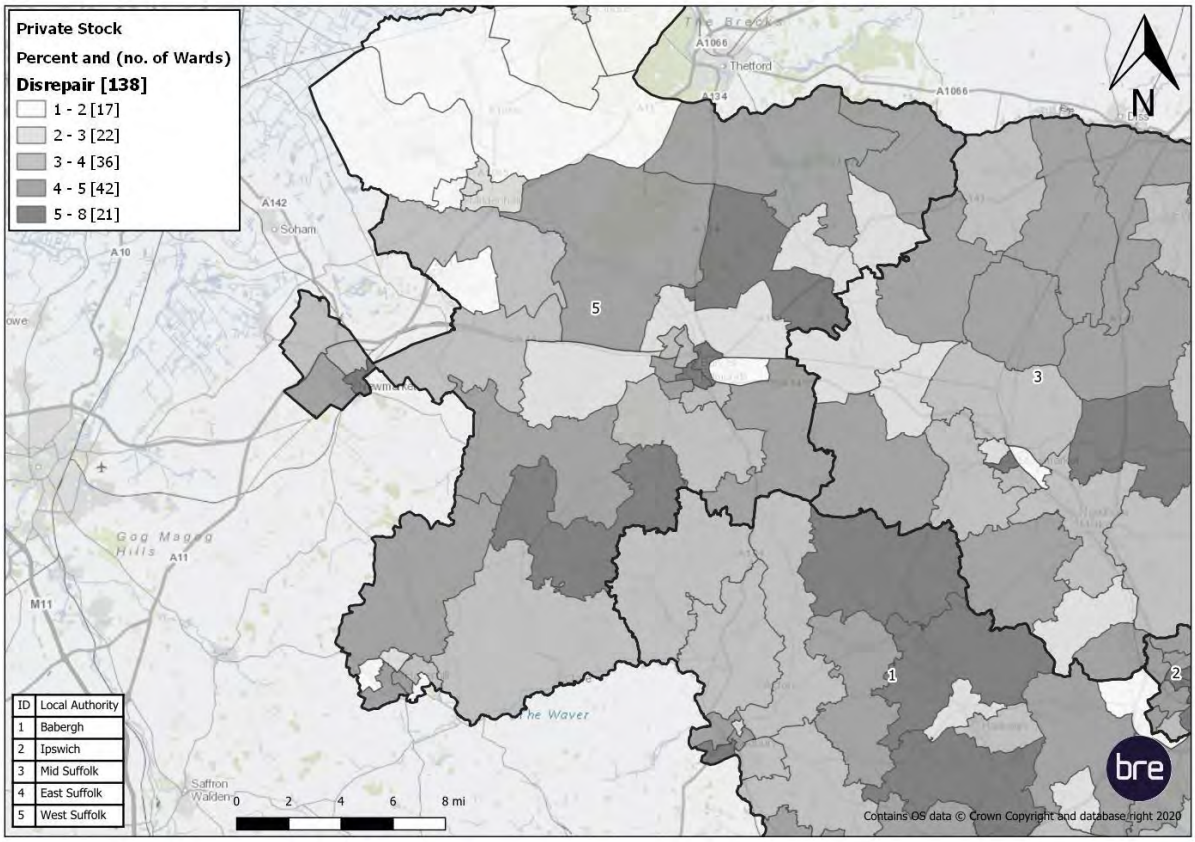
Map D. 8: Suffolk households in disrepair in the west – private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound. Return to main report*



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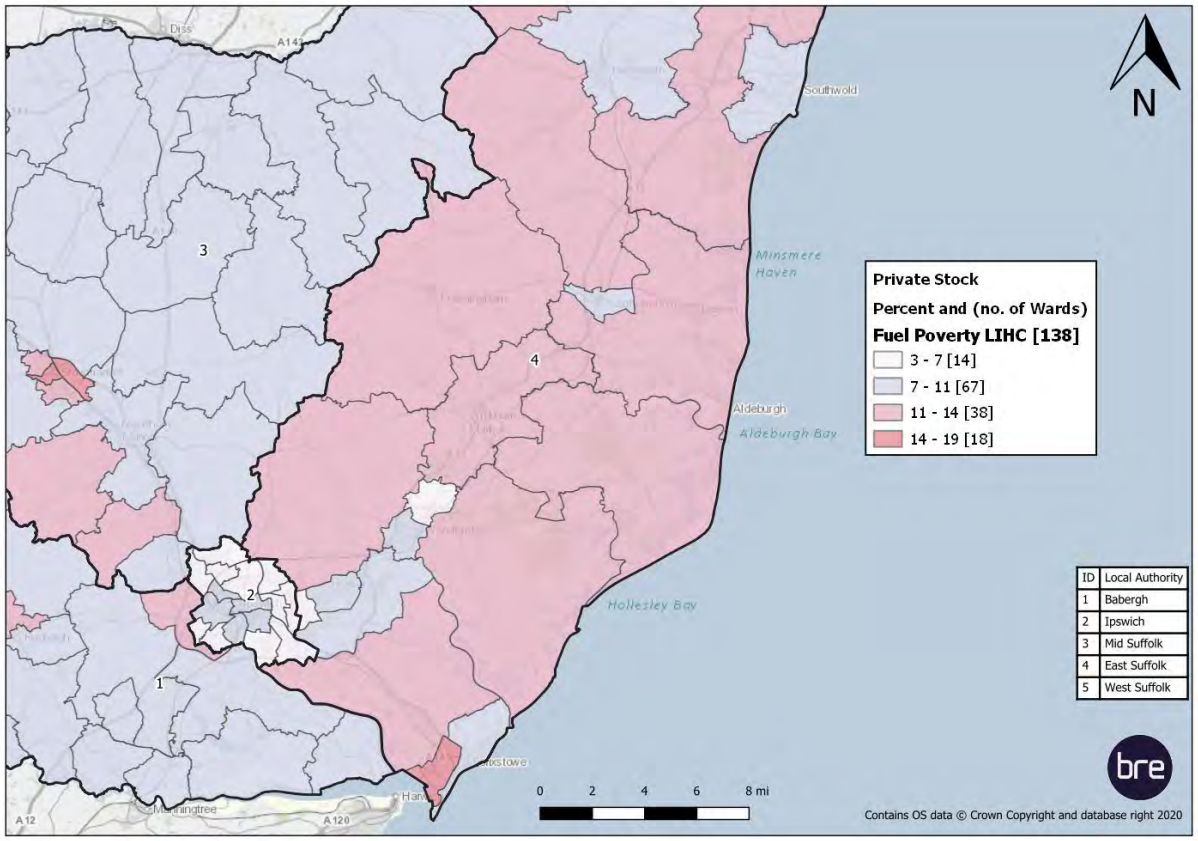
Map D. 9: Suffolk households in fuel poverty (LIHC definition) in the east – private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound.* *Return to main report*



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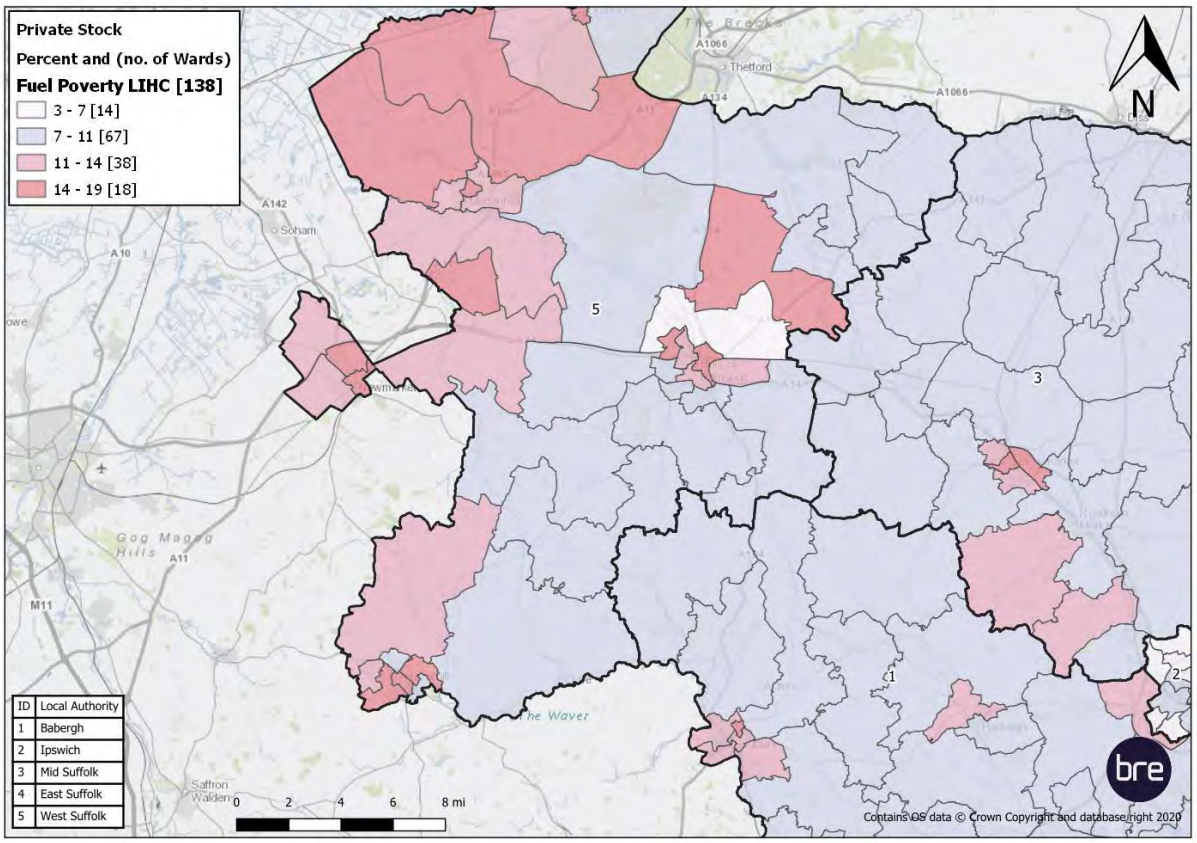
Map D. 10: Suffolk households in fuel poverty (LIHC definition) in the west – private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound. Return to main report*



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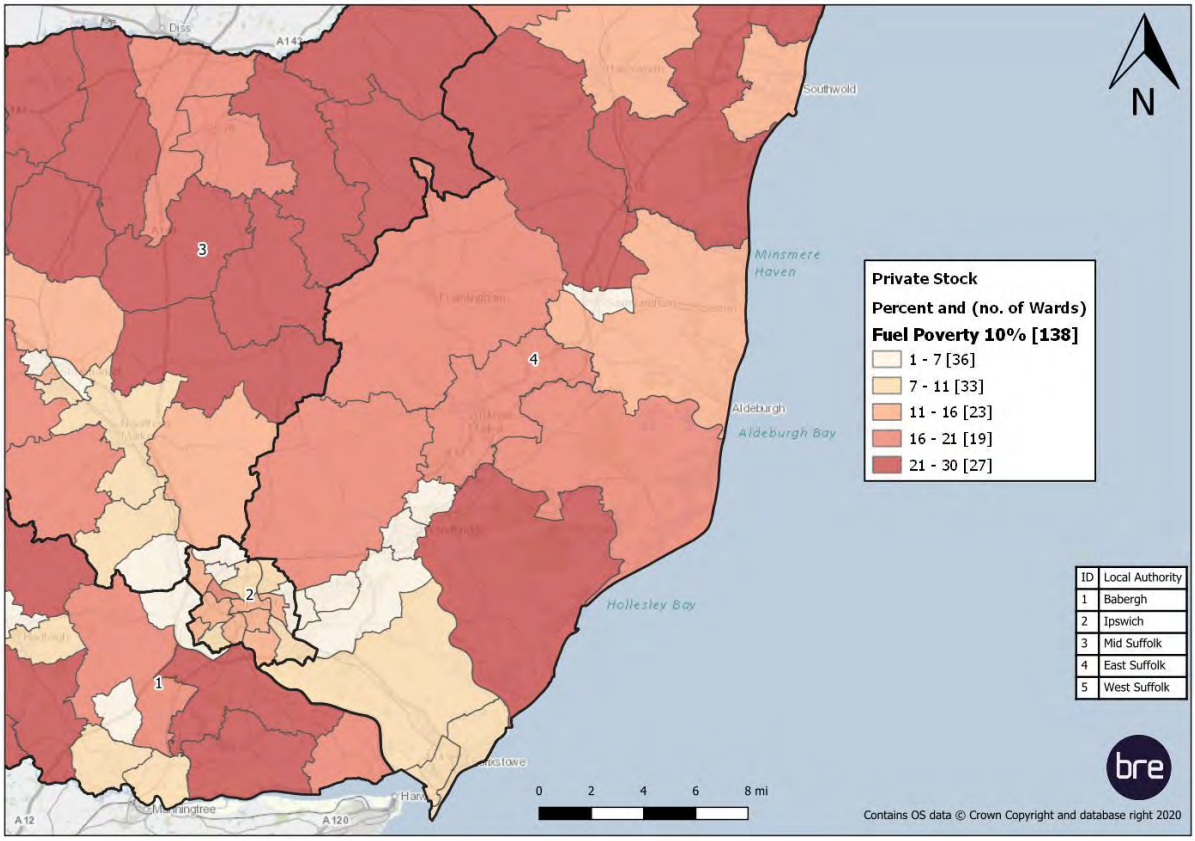
Map D. 11: Suffolk households in fuel poverty (10% definition) in the east– private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound. Return to main report*



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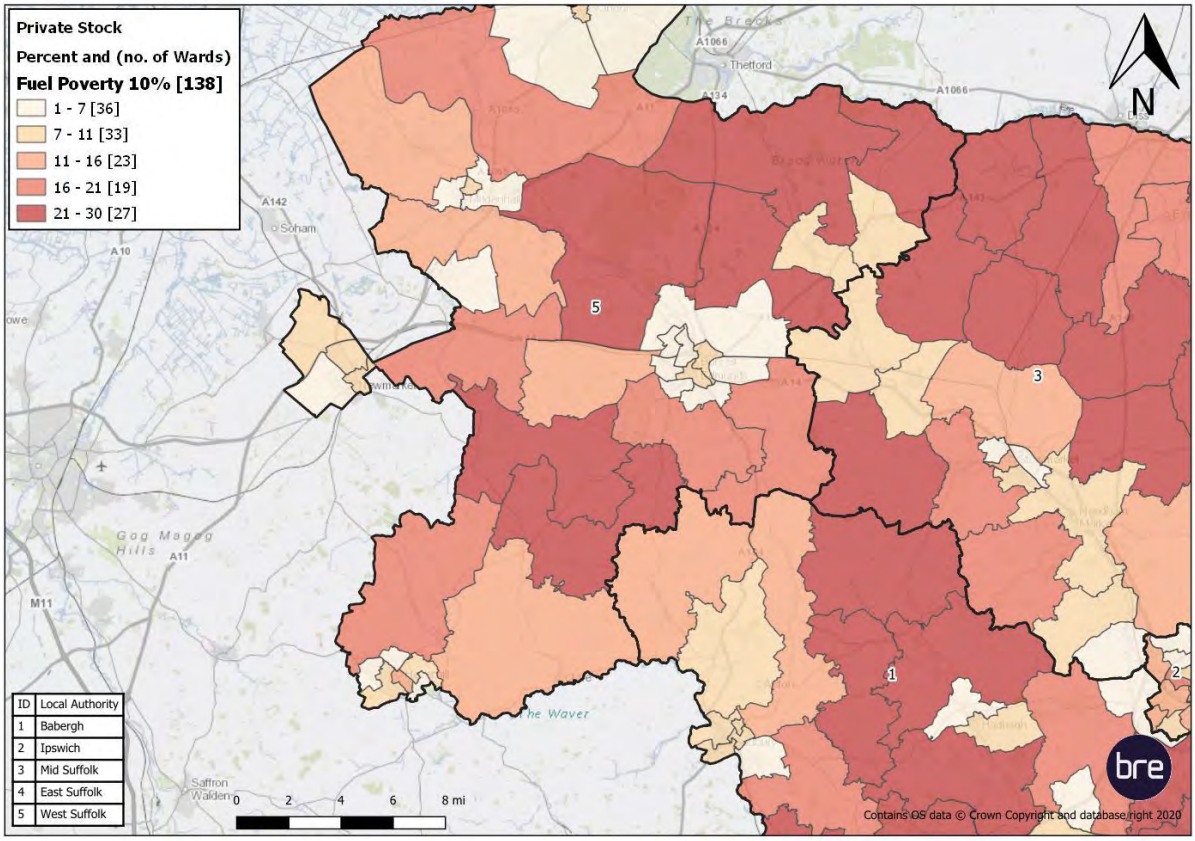
Map D. 12: Suffolk households in fuel poverty (10% definition) in the west – private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound. Return to main report*



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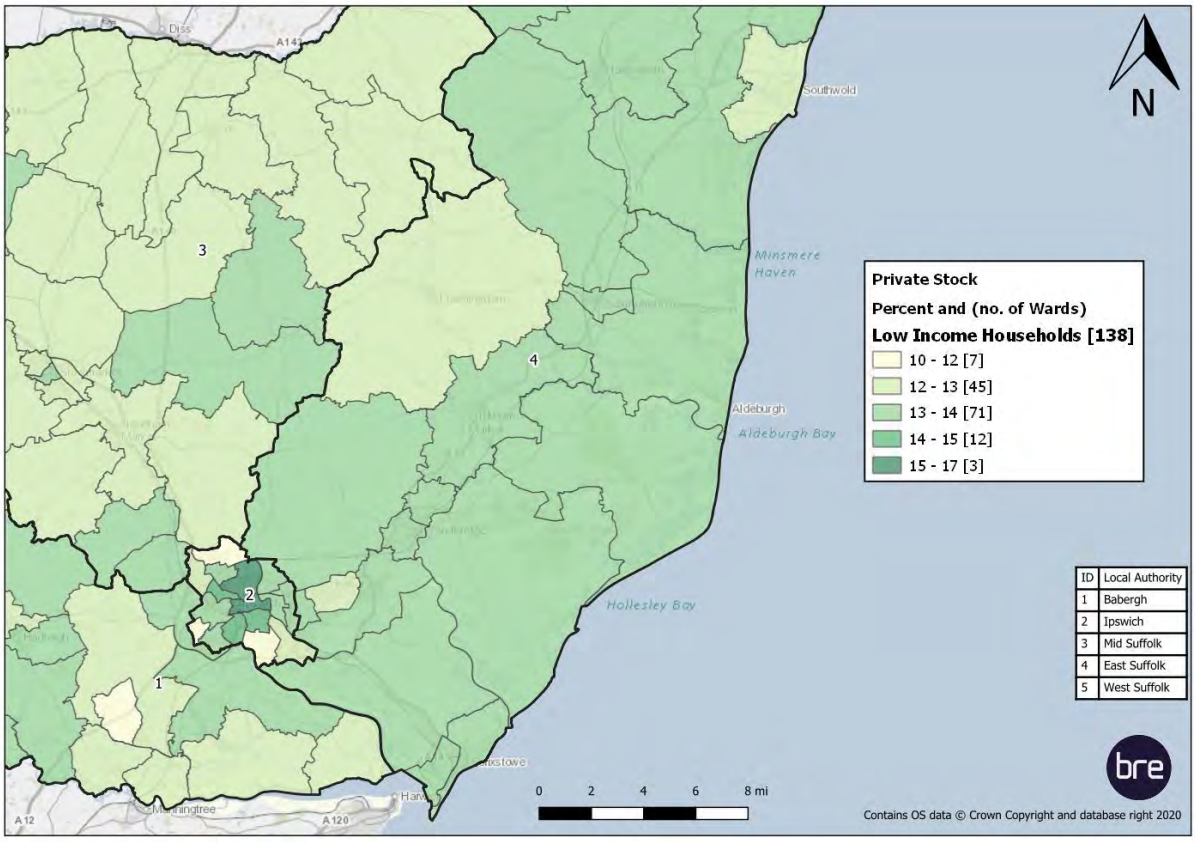
Map D. 13: Suffolk households in low income – private stock in the east. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound. Return to main report*



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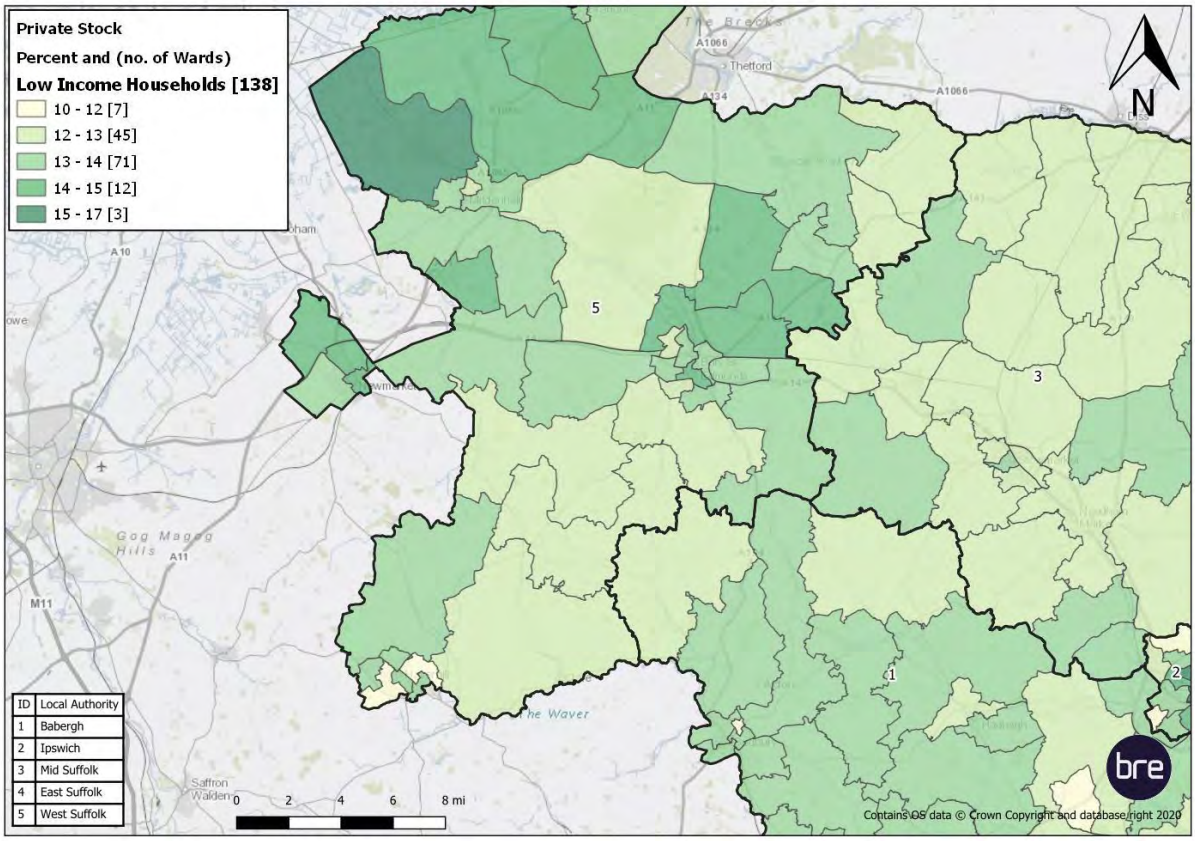
Map D. 14: Suffolk households in low income in the west – private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound. Return to main report*



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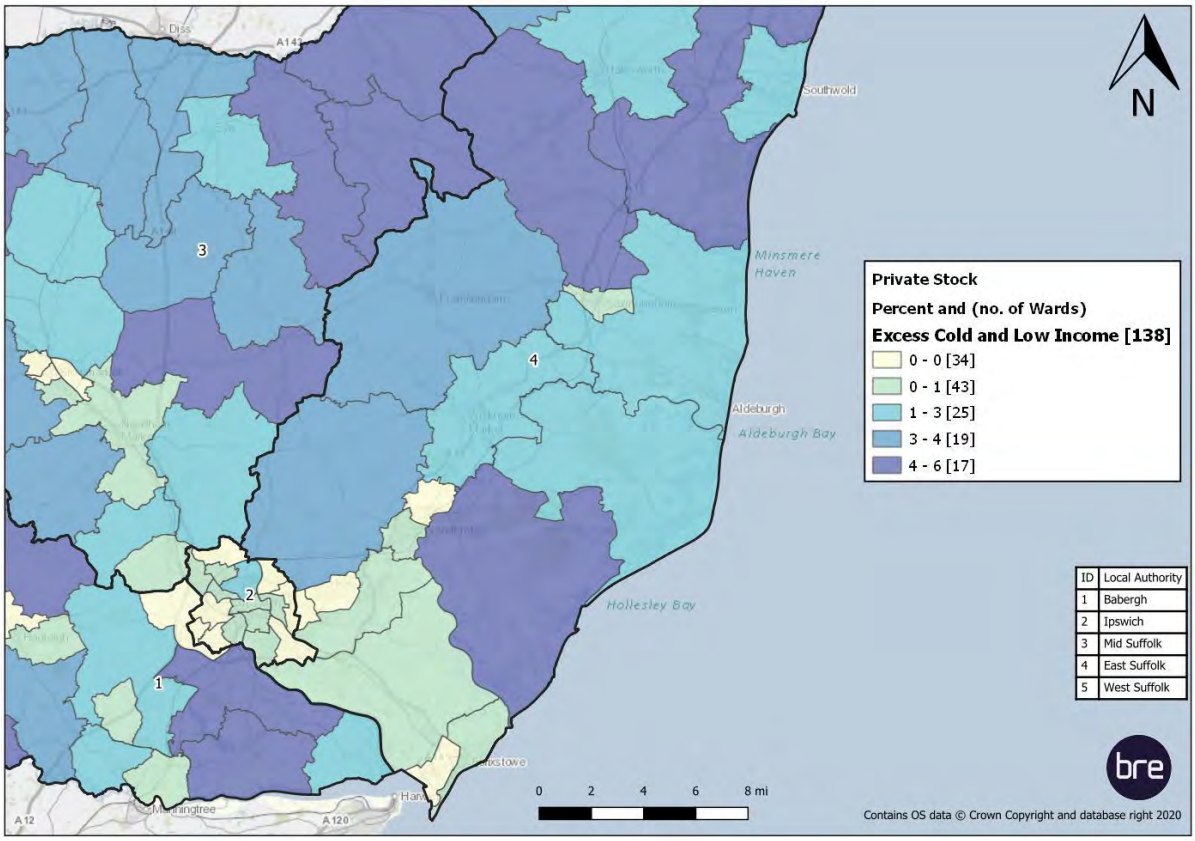
Map D. 15: Suffolk households with excess cold and in low income in the east – private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound. Return to main report*



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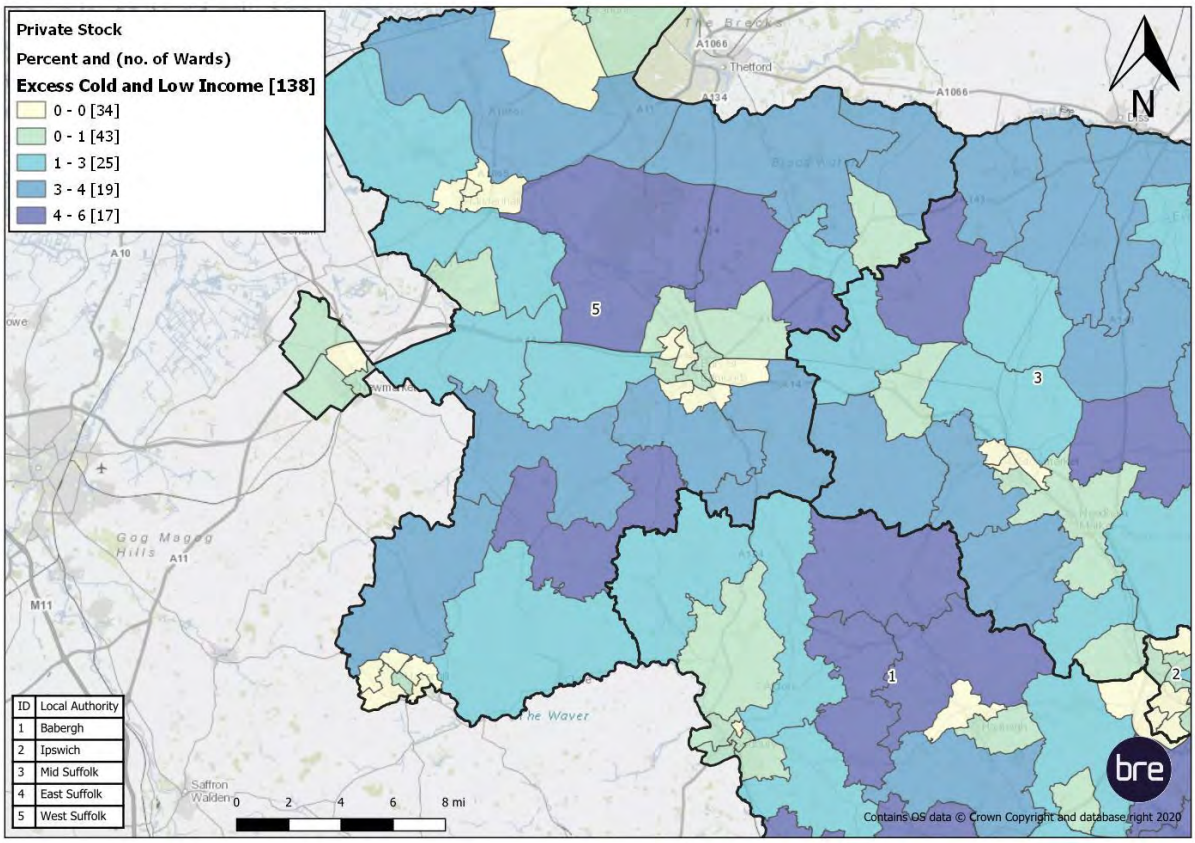
Map D. 16: Suffolk households with excess cold and in low income in the west – private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound. Return to main report*



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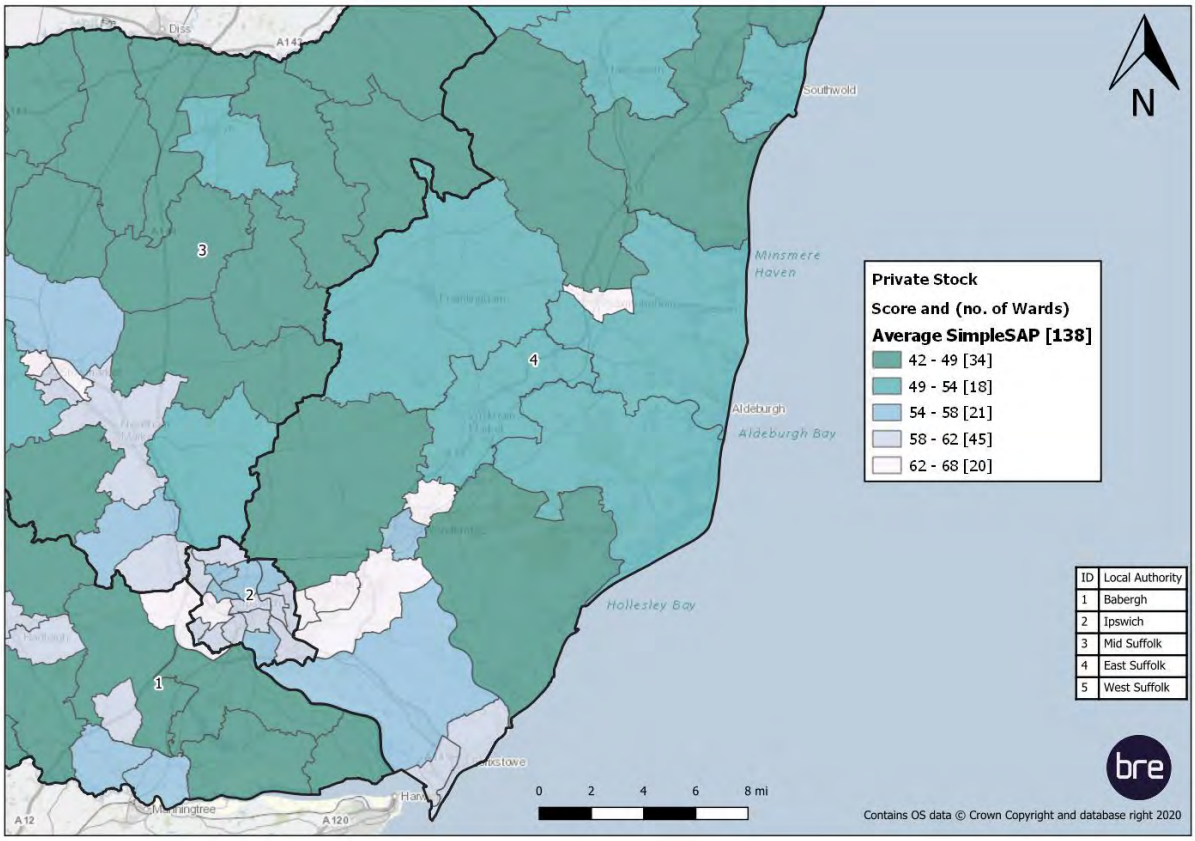
Map D. 17: Suffolk average SimpleSAP households in the east – private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound. Return to main report*



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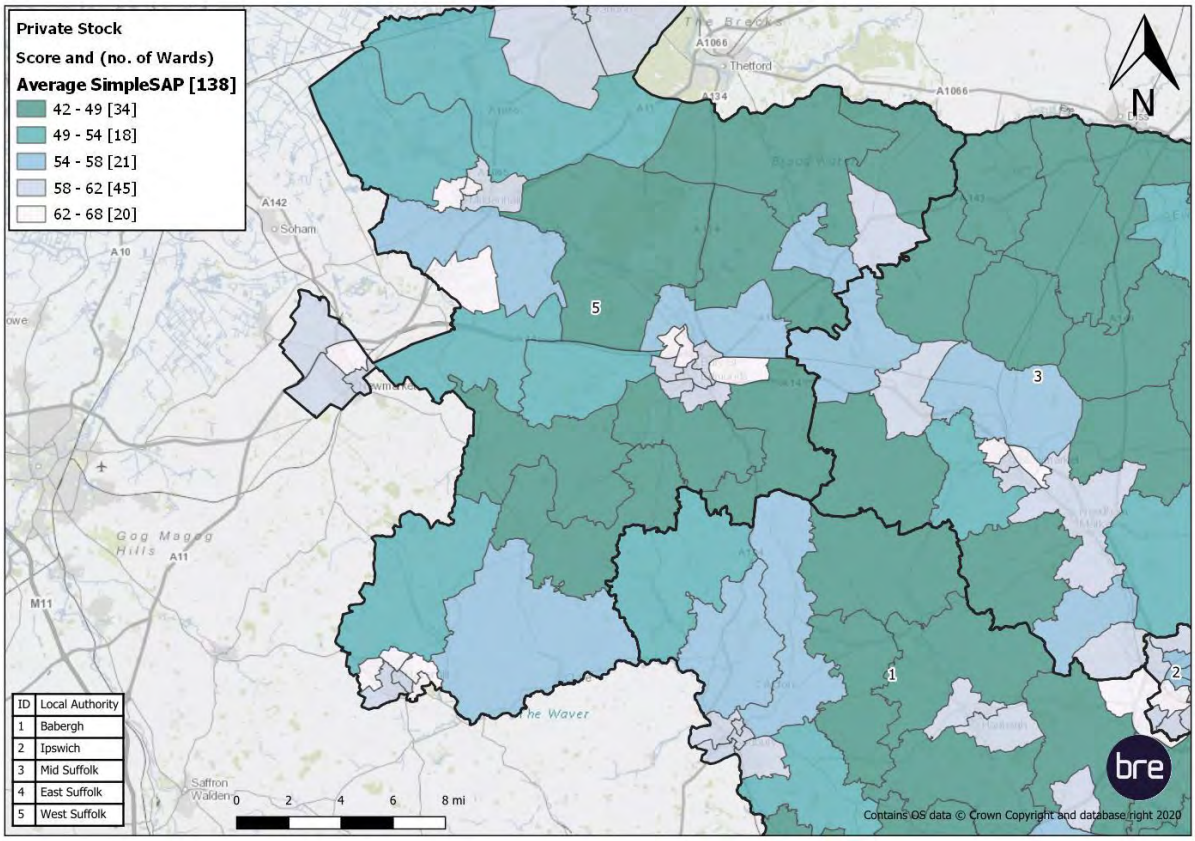
Map D. 18: Suffolk average SimpleSAP households in the west – private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound.* *Return to main report*



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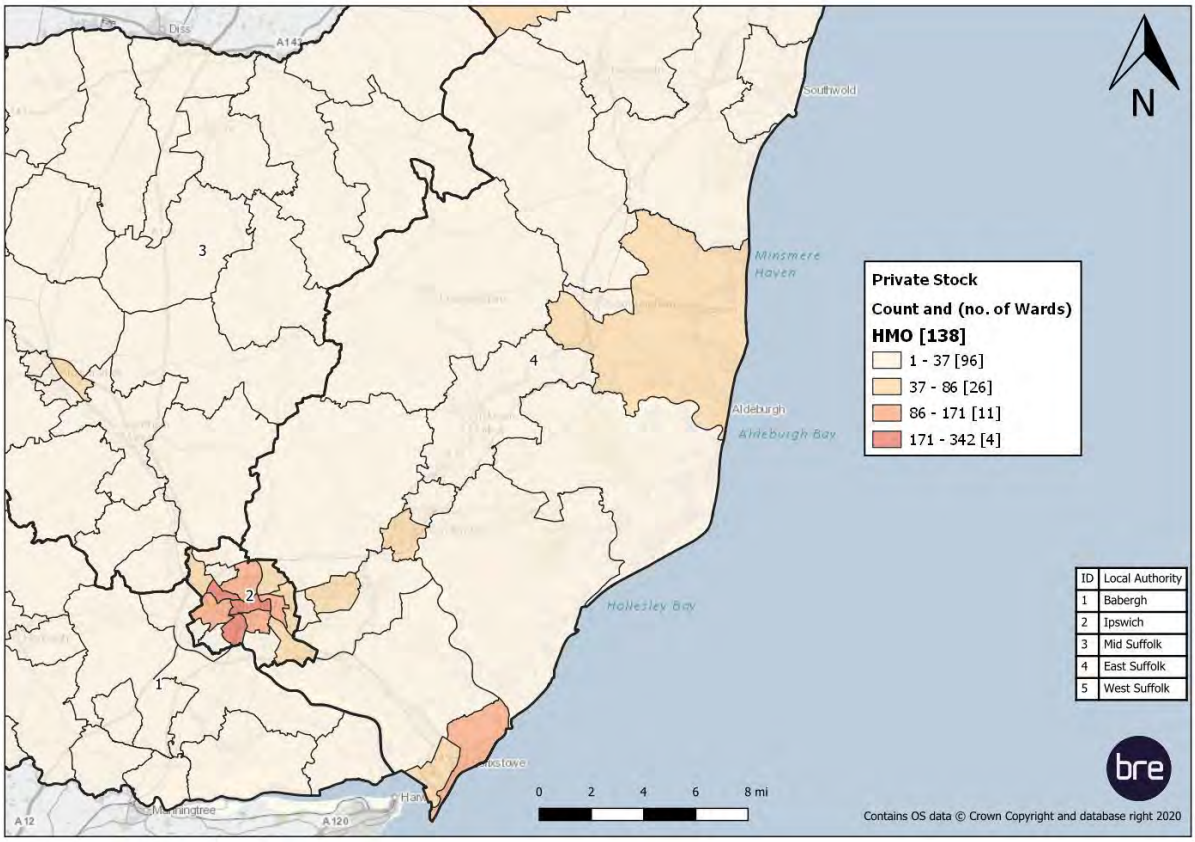
Map D. 19: Suffolk HMOs in the east. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound.* *Return to main report*



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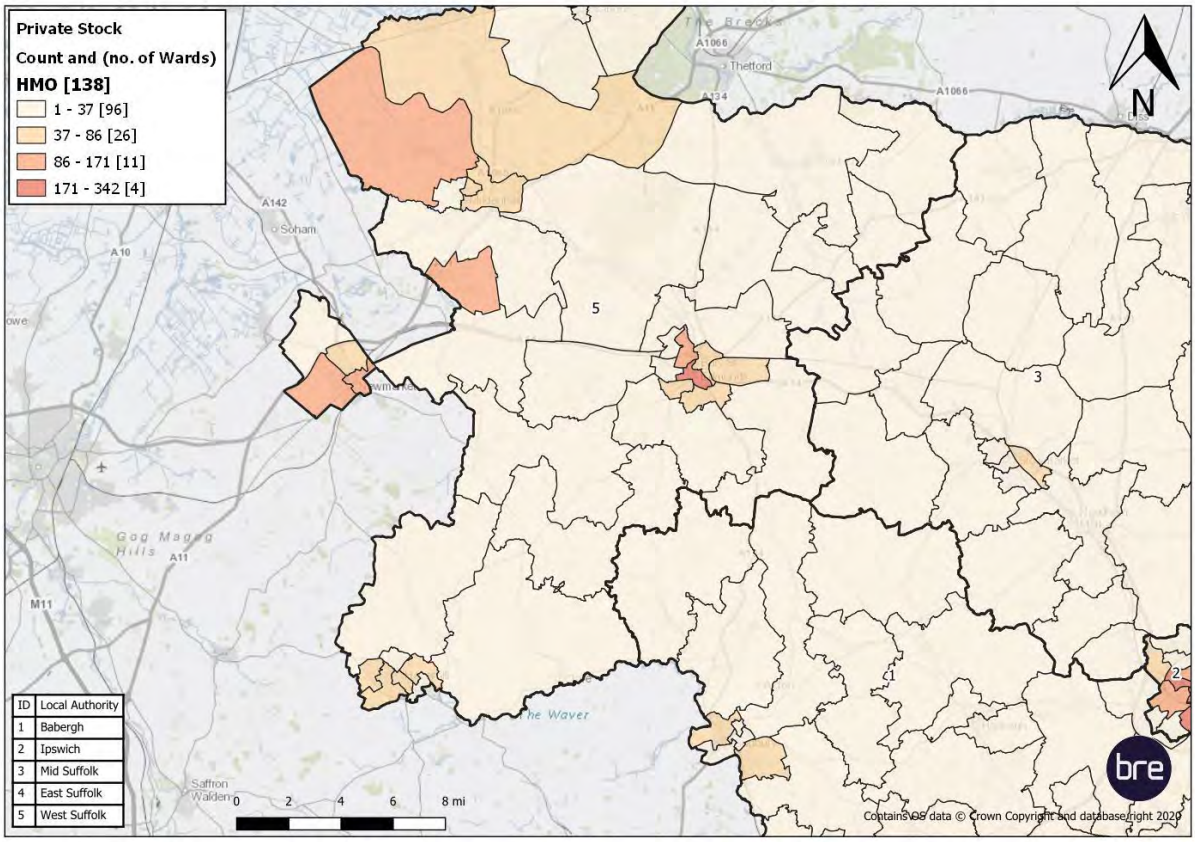
Map D. 20: Suffolk HMOs in the west. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound. Return to main report*



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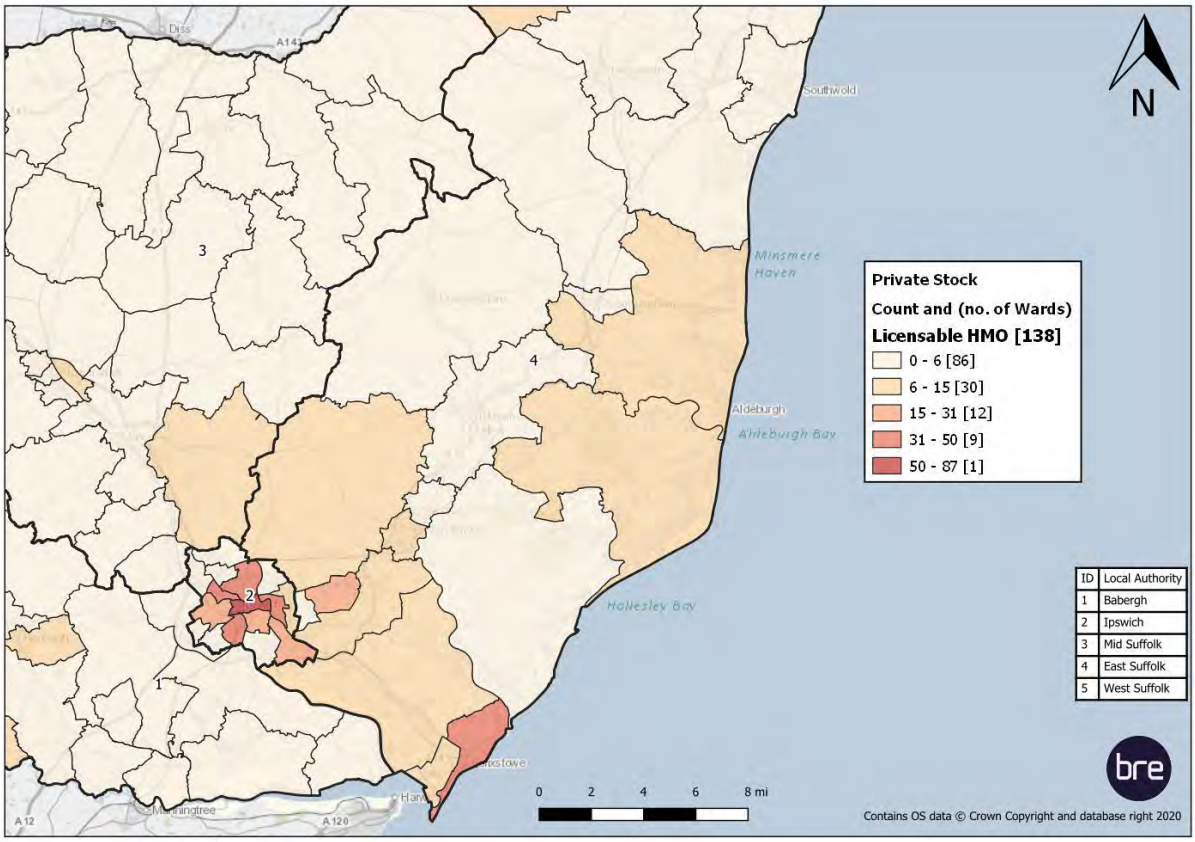
Map D. 21: Suffolk mandatory licensable HMOs in the east. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound.* *Return to main report*



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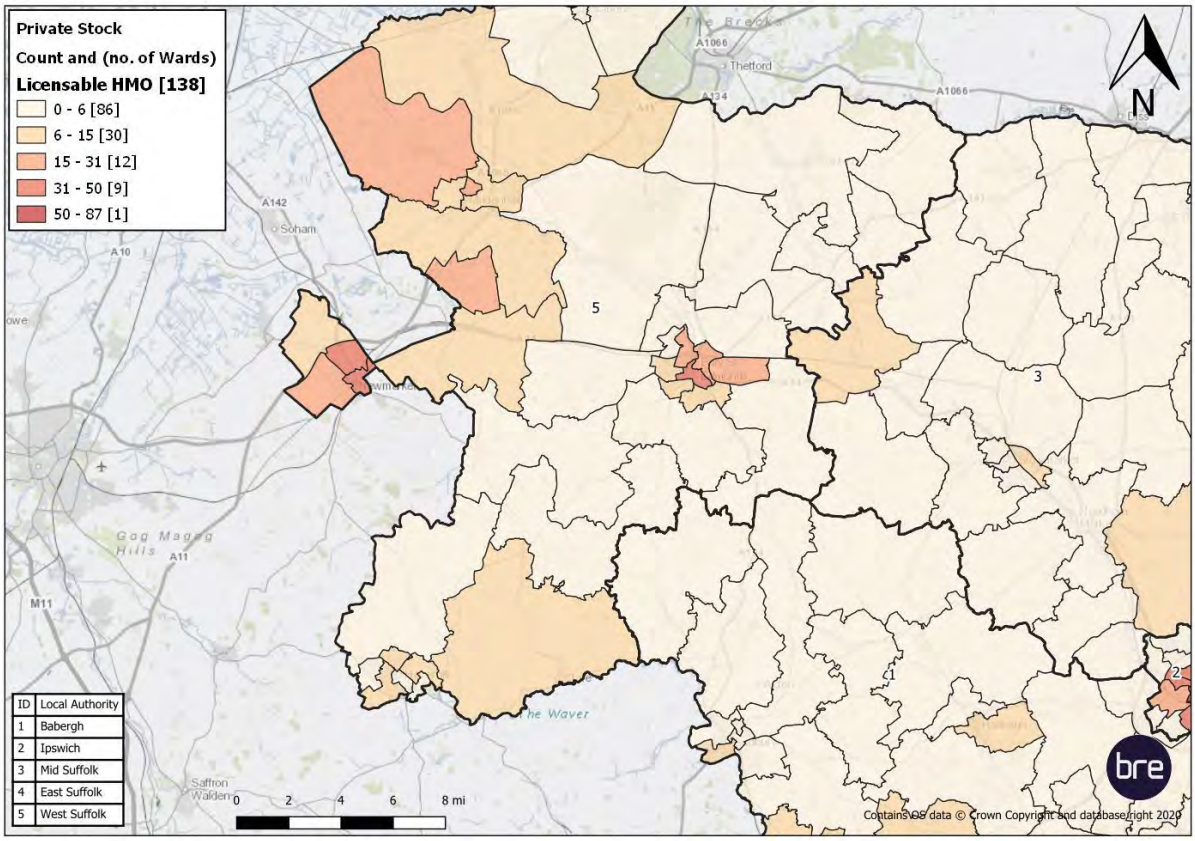
Map D. 22: Suffolk mandatory licensable HMOs in the west. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound. Return to main report*



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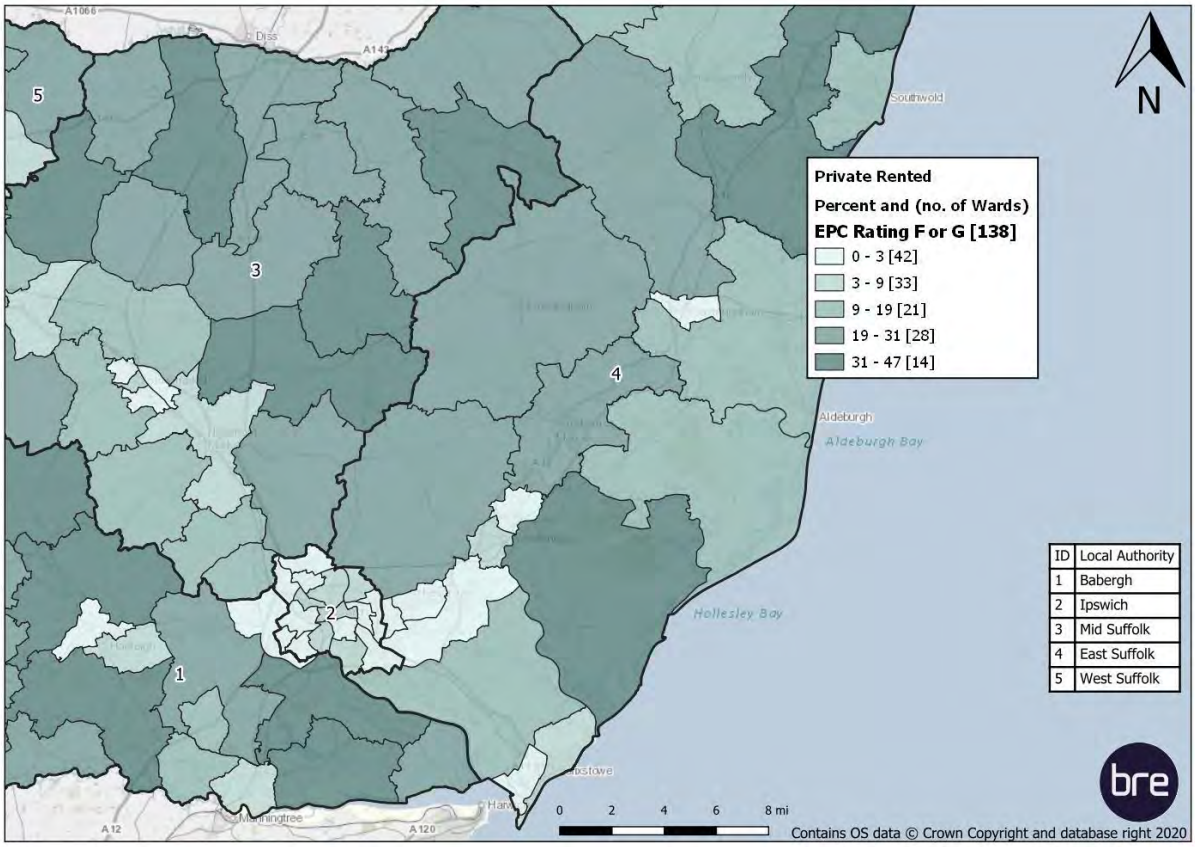
Map D. 23: Suffolk households with EPC ratings F or G in the east– private rented. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound.* *Return to main report*



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Map D. 24: Suffolk households with EPC ratings F or G in the west – private rented. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound.* *Return to main report*

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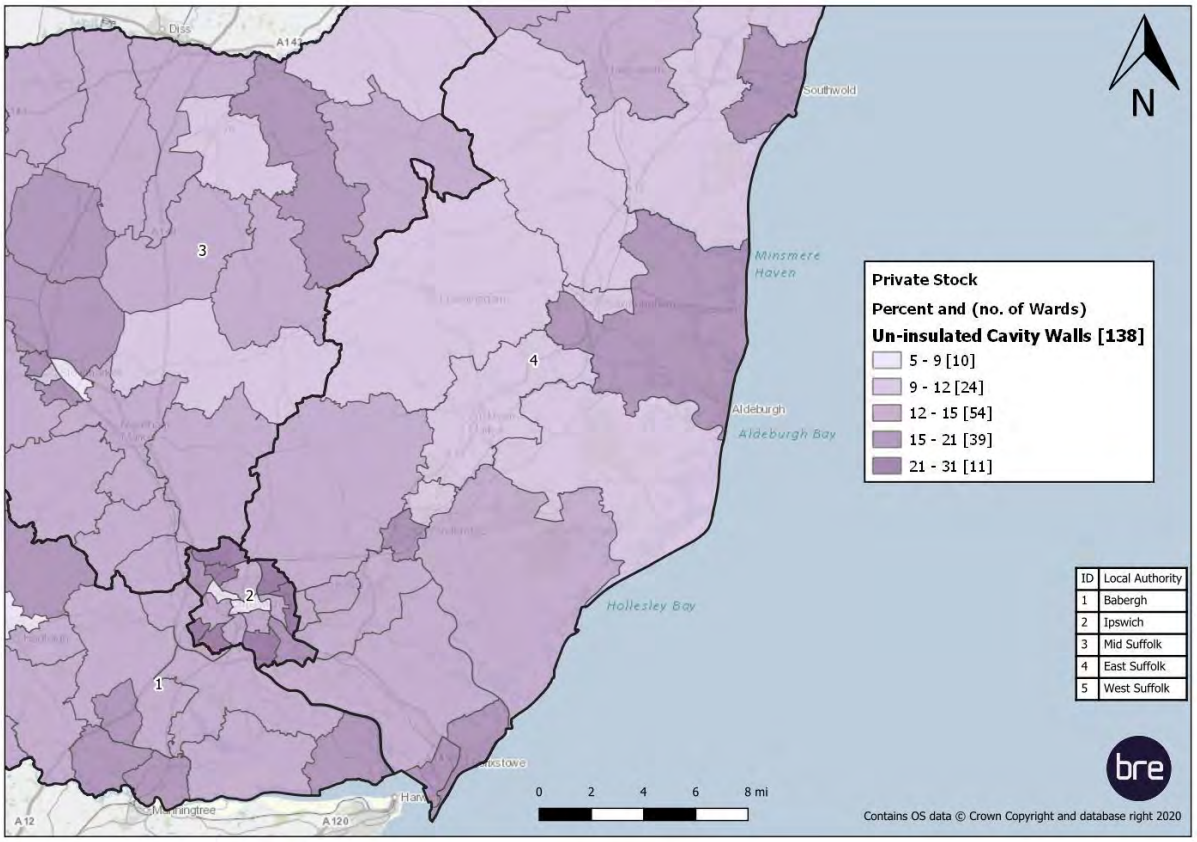
Map D. 25: Suffolk un-insulated cavity wall households in the east – private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound.* Return to main report



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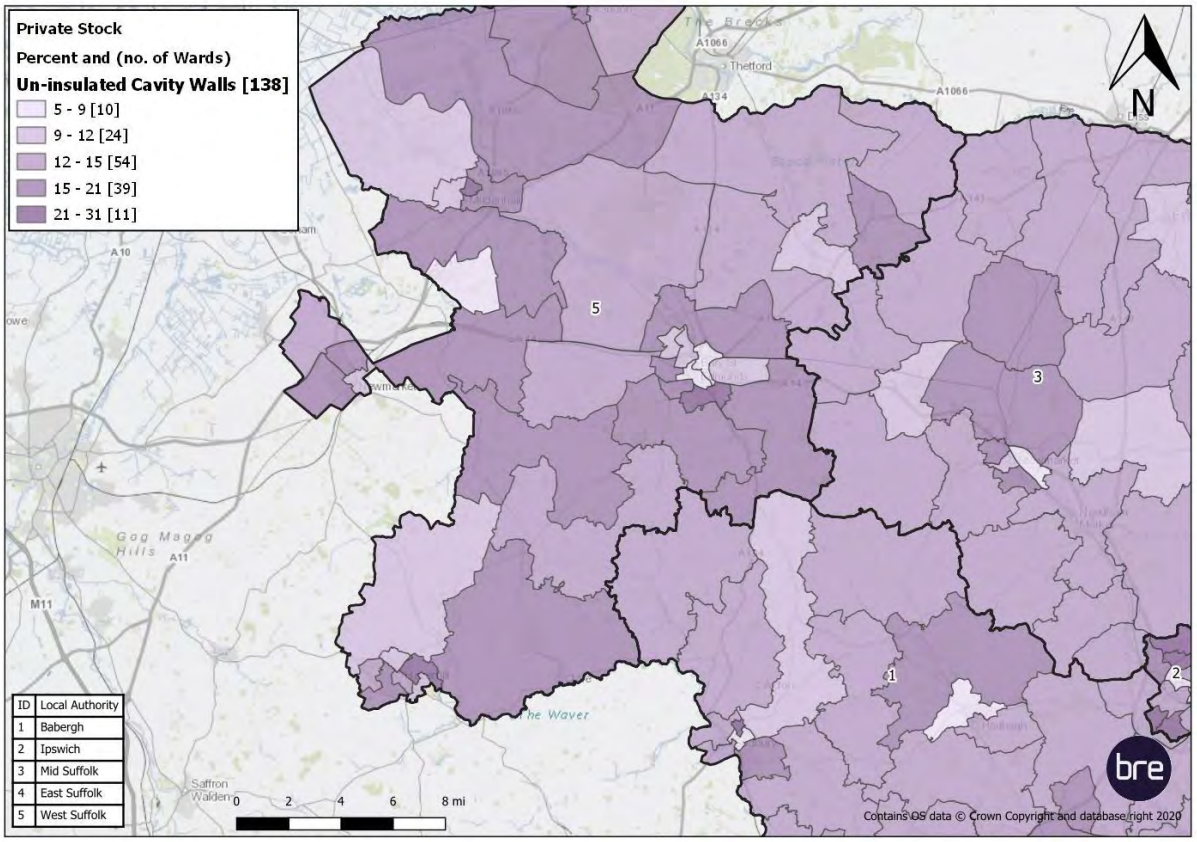
Map D. 26: Suffolk un-insulated cavity wall households in the west – private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound.* *Return to main report*



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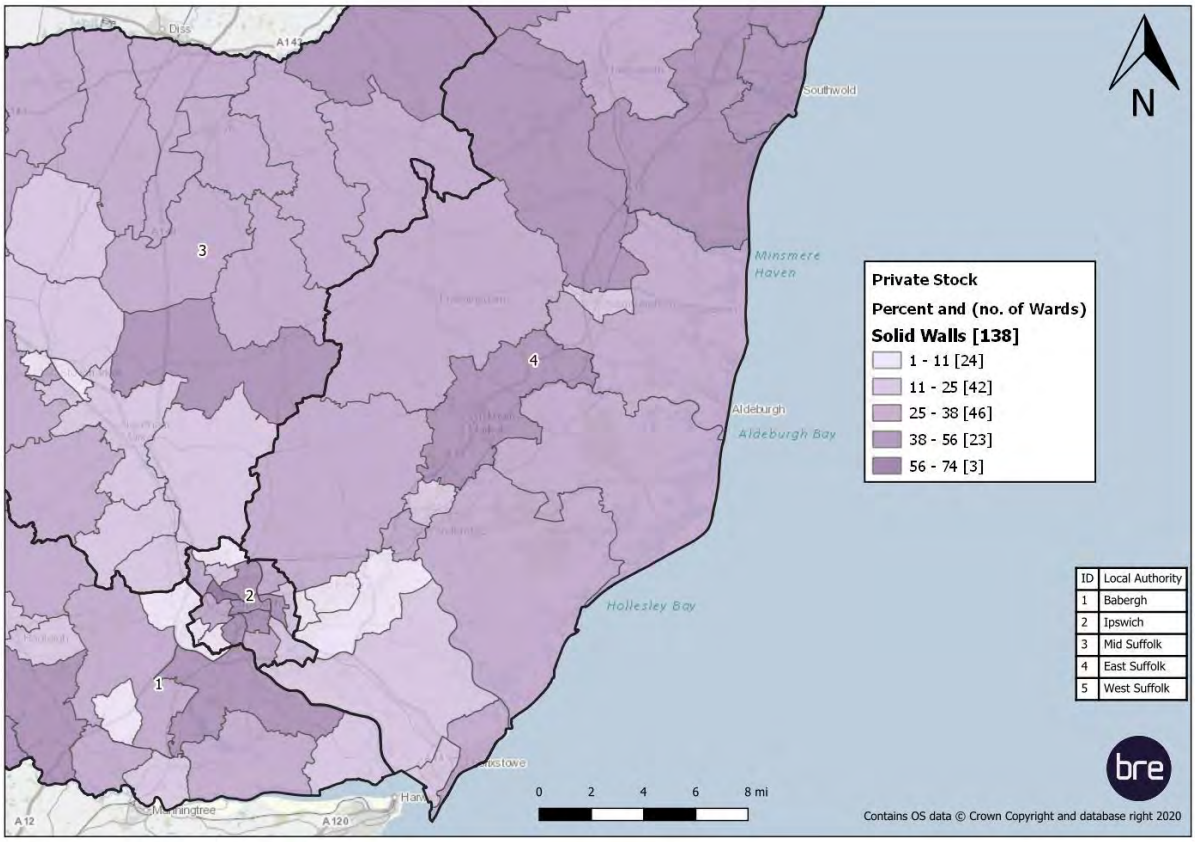
Map D. 27: Suffolk solid wall households in the east– private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound.* *Return to main report*



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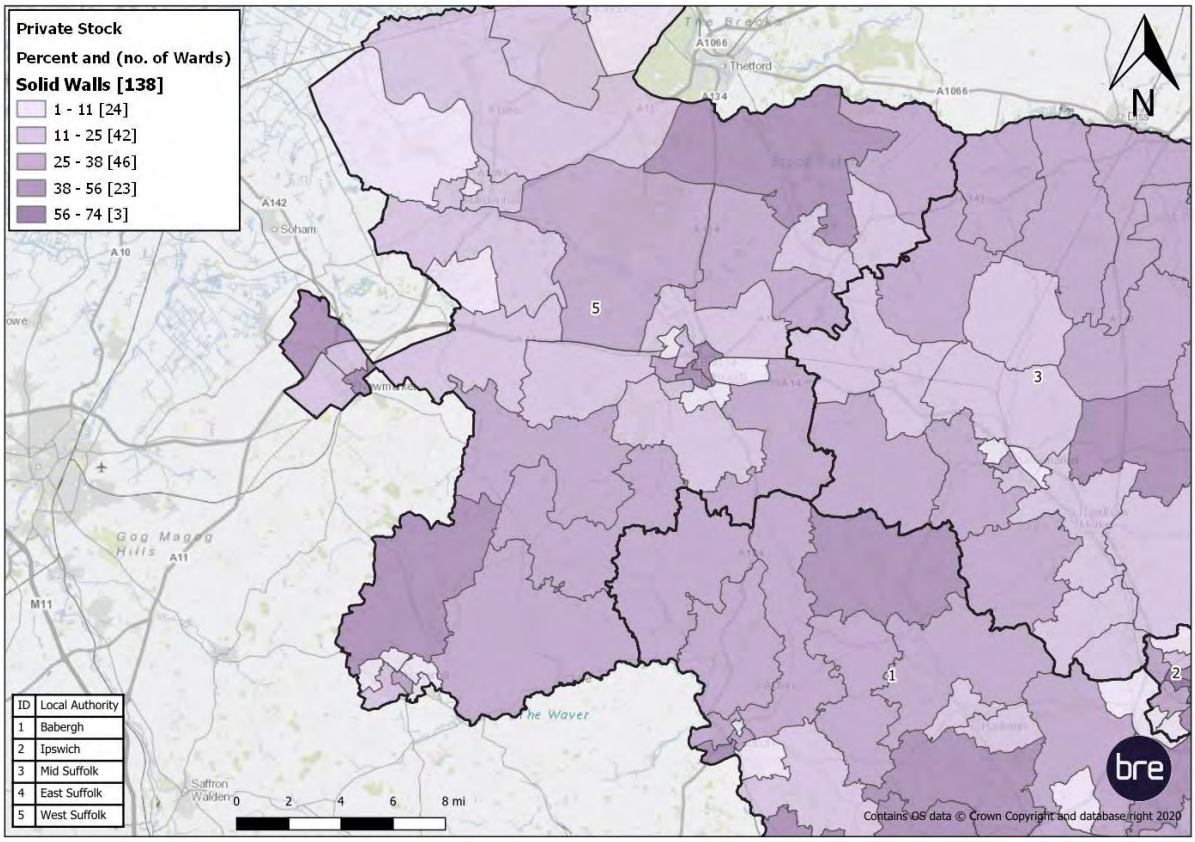
Map D. 28: Suffolk solid wall households in the west– private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound.* *Return to main report*



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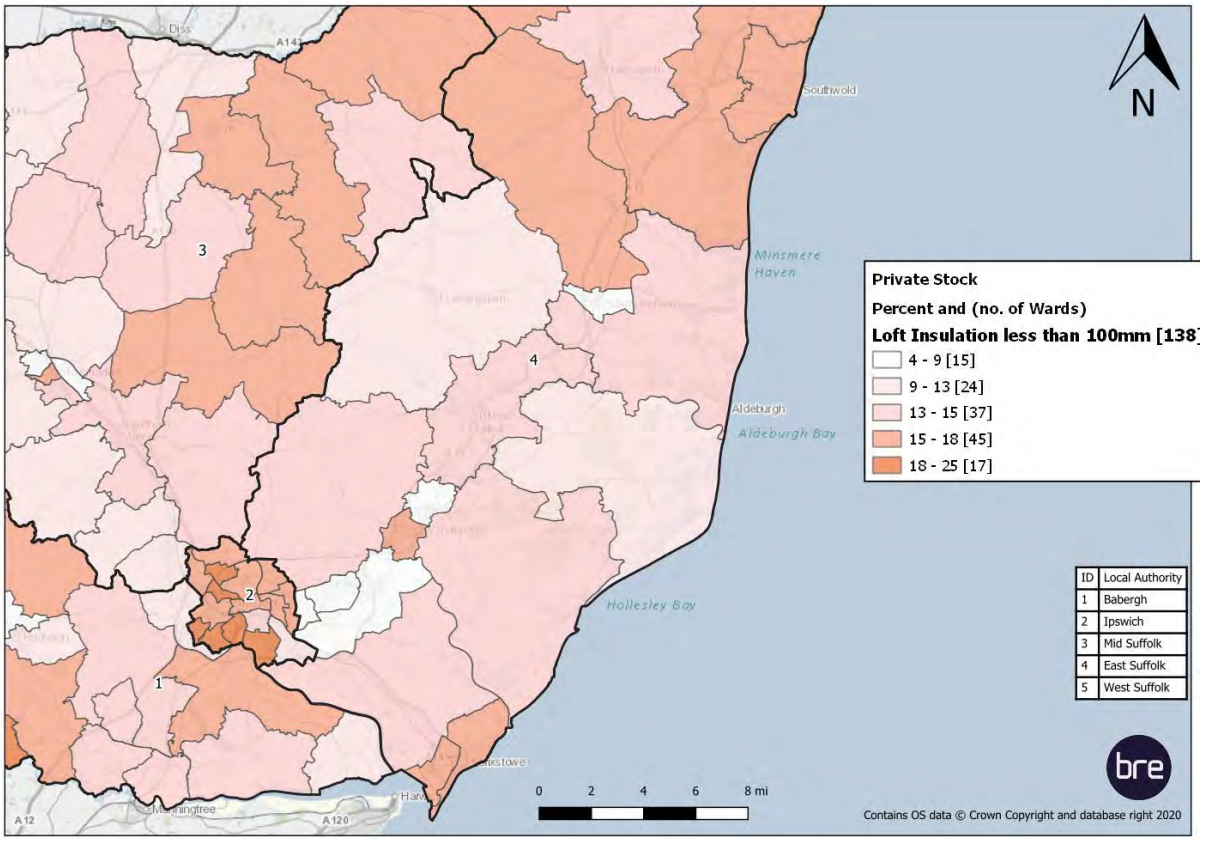
Map D. 29: Suffolk households with less than 100mm loft insulation in the east– private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound.* *Return to main report*



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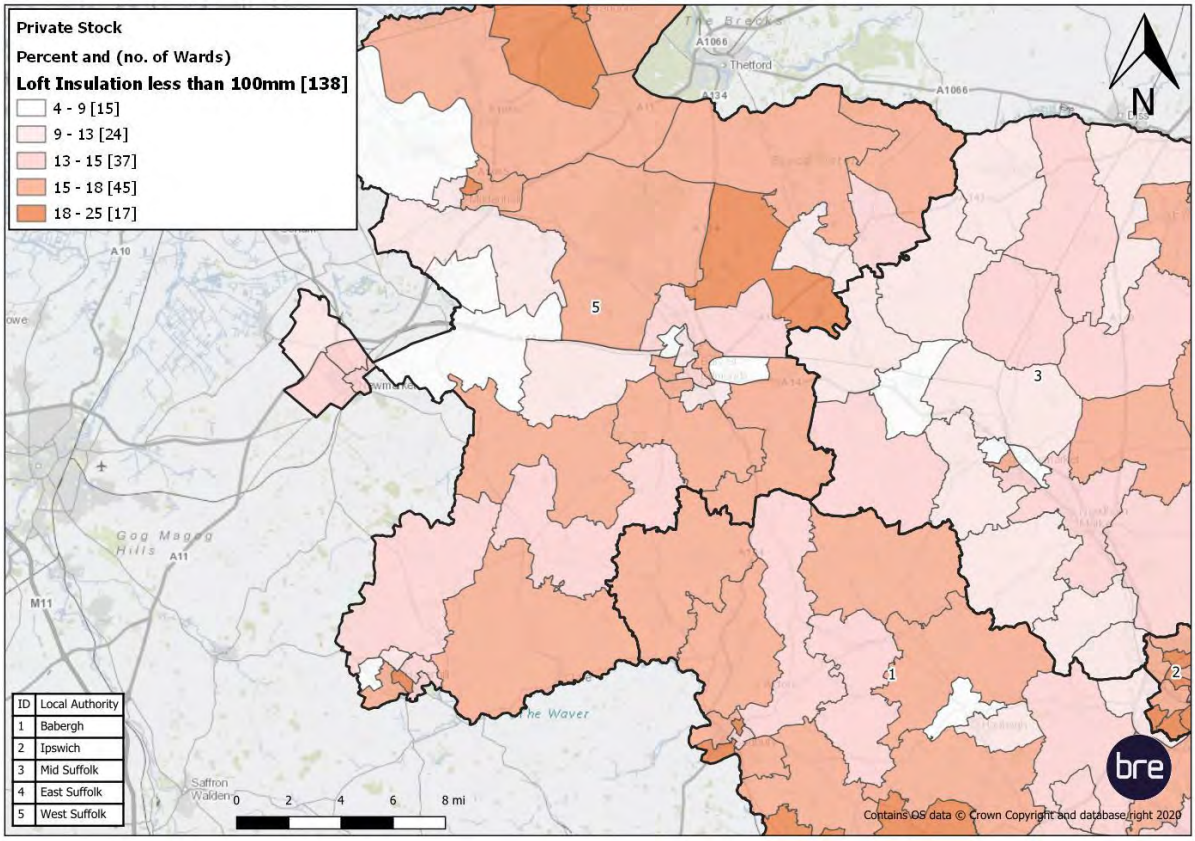
Map D. 30: Suffolk households with less than 100mm loft insulation in the west – private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound.* *Return to main report*



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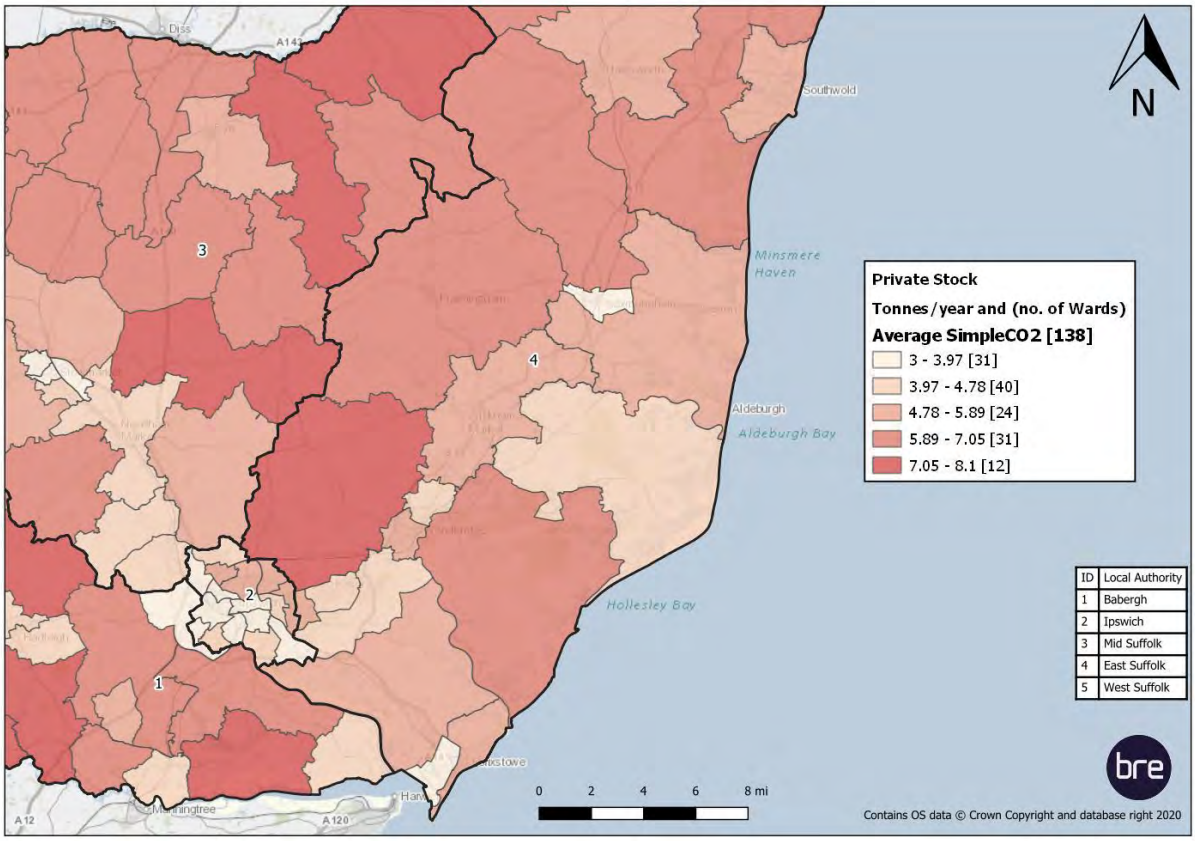
Map D. 31: Suffolk household SimpleCO2 in the east– private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound.* *Return to main report*



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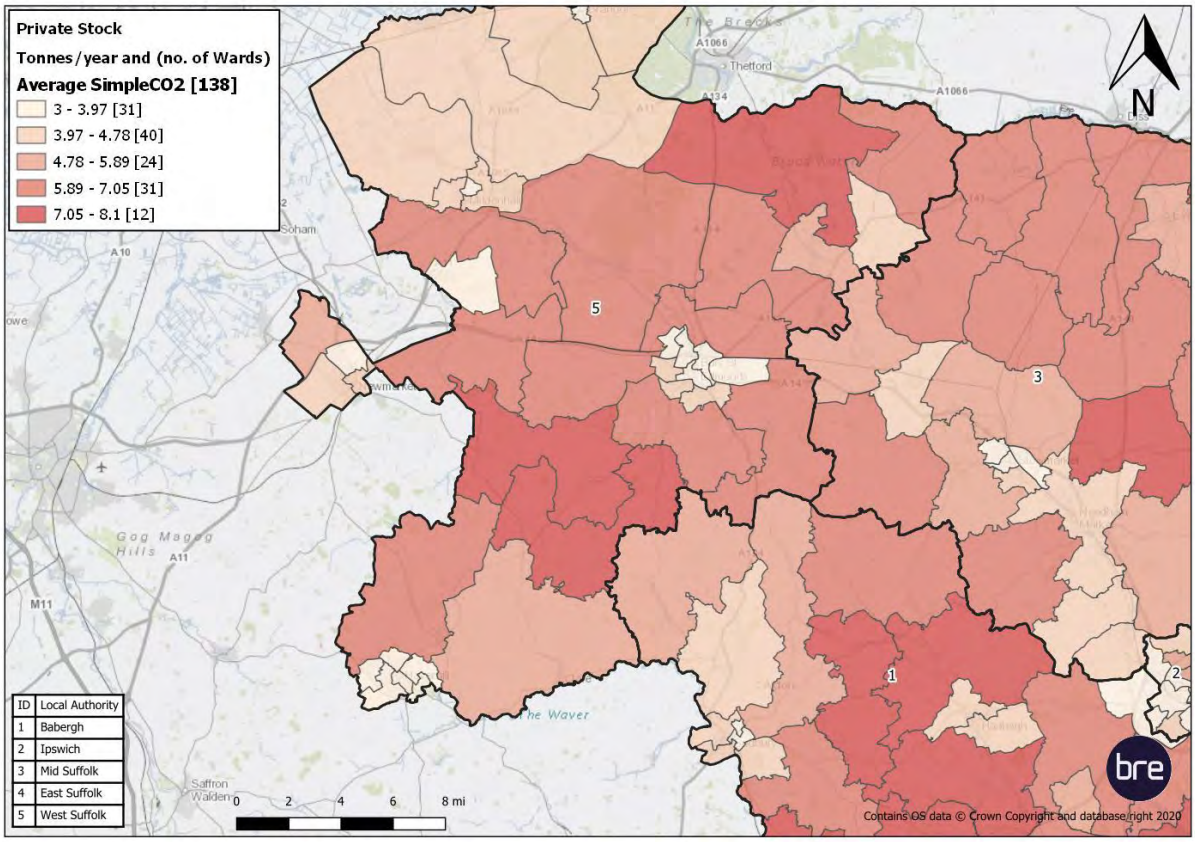
Map D. 32: Suffolk household SimpleCO2 in the west – private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound.* *Return to main report*



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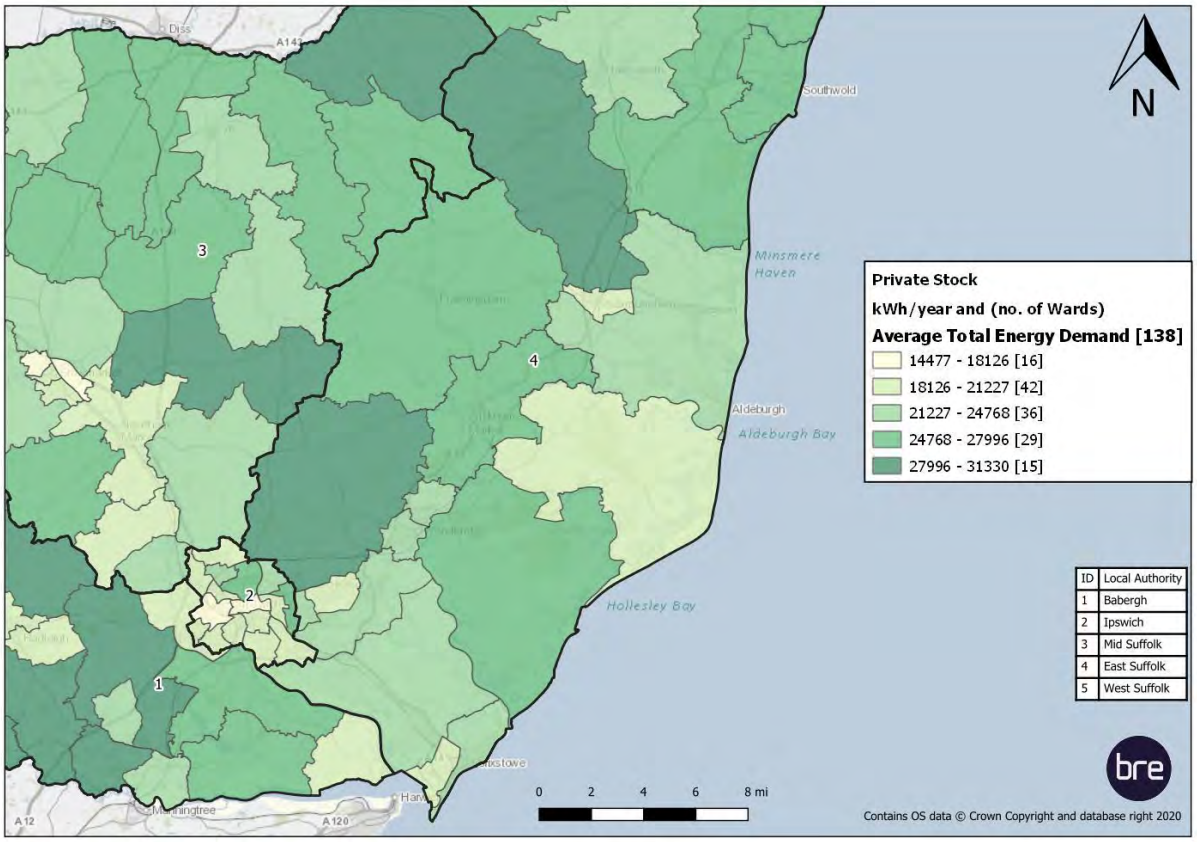
Map D. 33: Suffolk total energy demand in the east– private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound.* *Return to main report*



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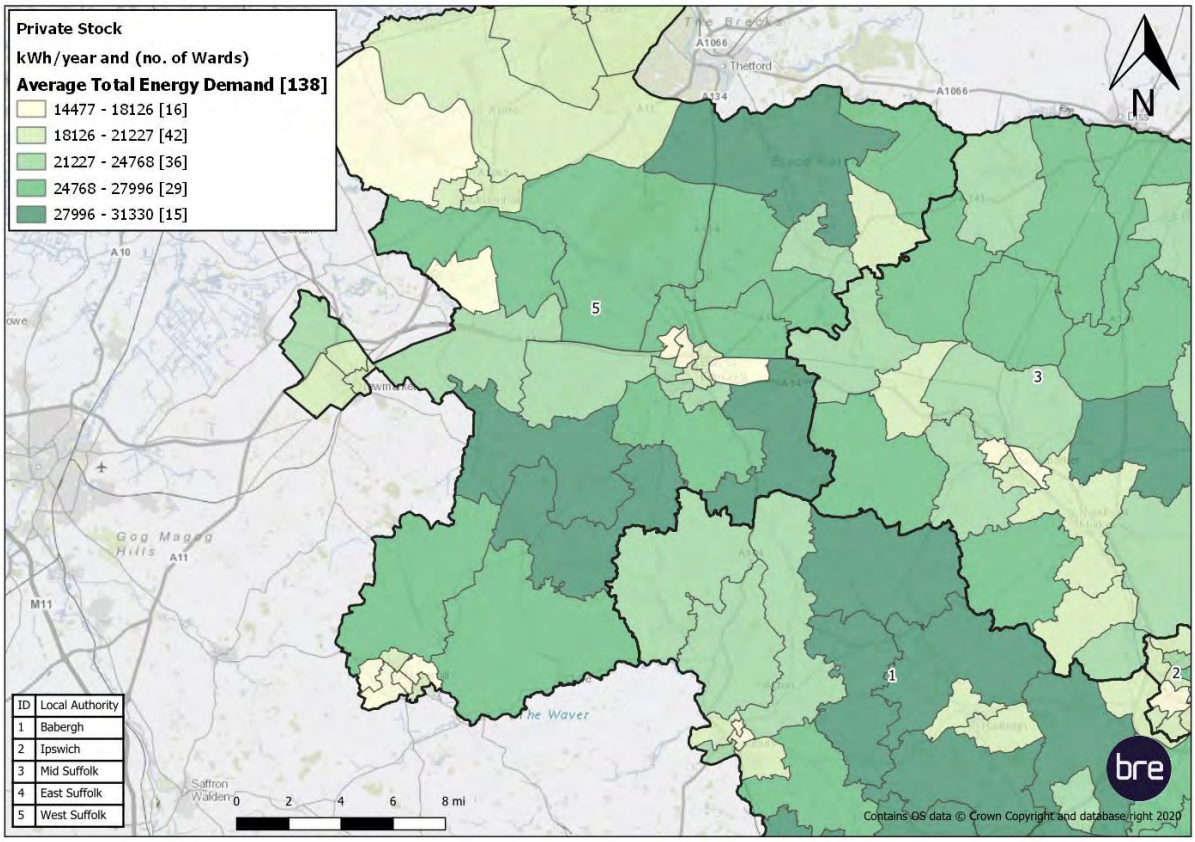
Map D. 34: Suffolk total energy demand in the west– private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound.* *Return to main report*



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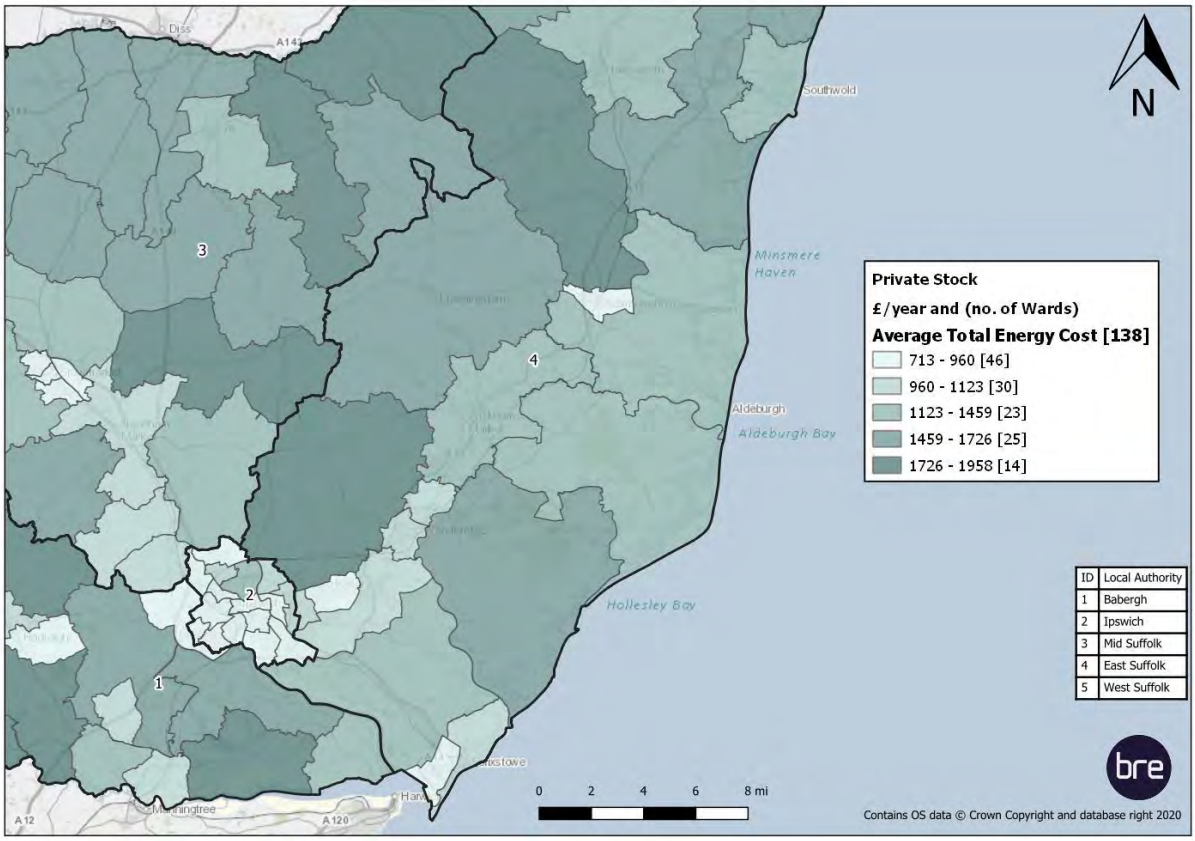
Map D. 35: Suffolk total energy cost in the east – private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound.* *Return to main report*



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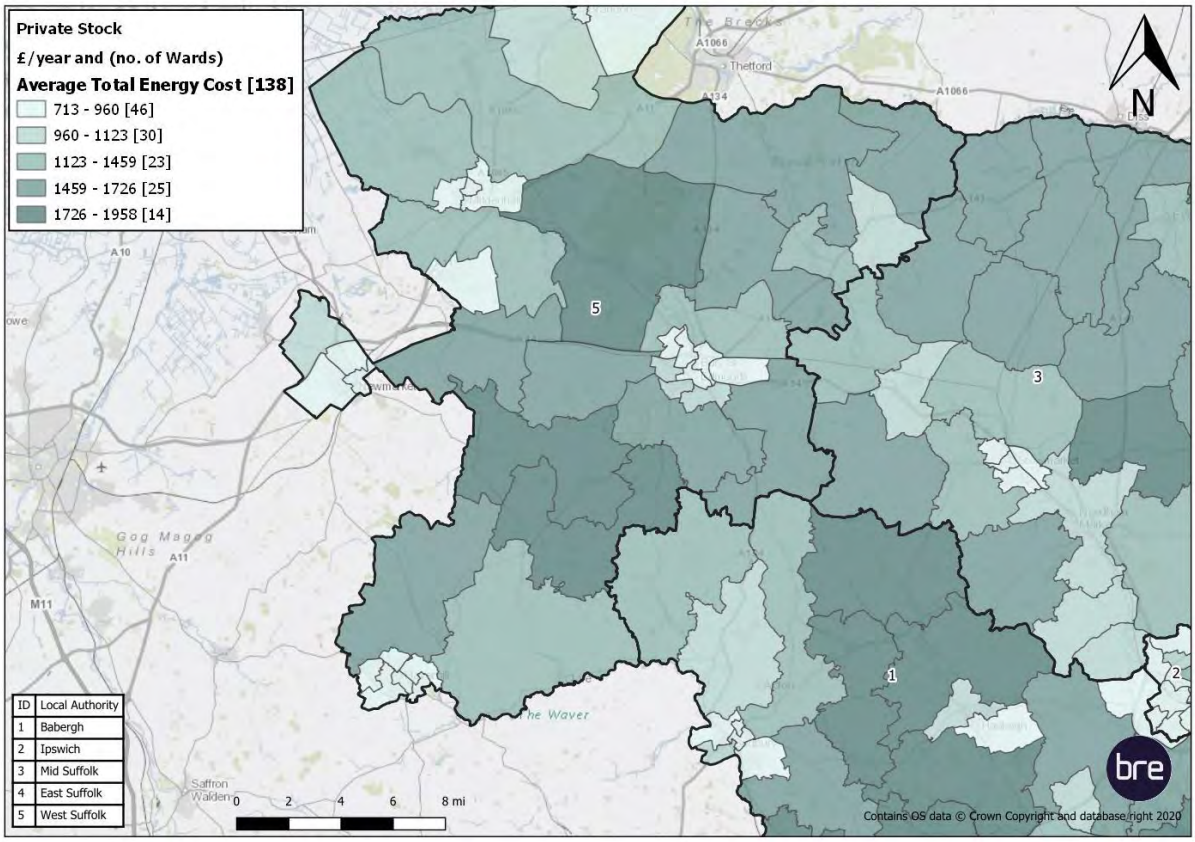
Map D. 36: Suffolk total energy cost in the west– private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound.* *Return to main report*



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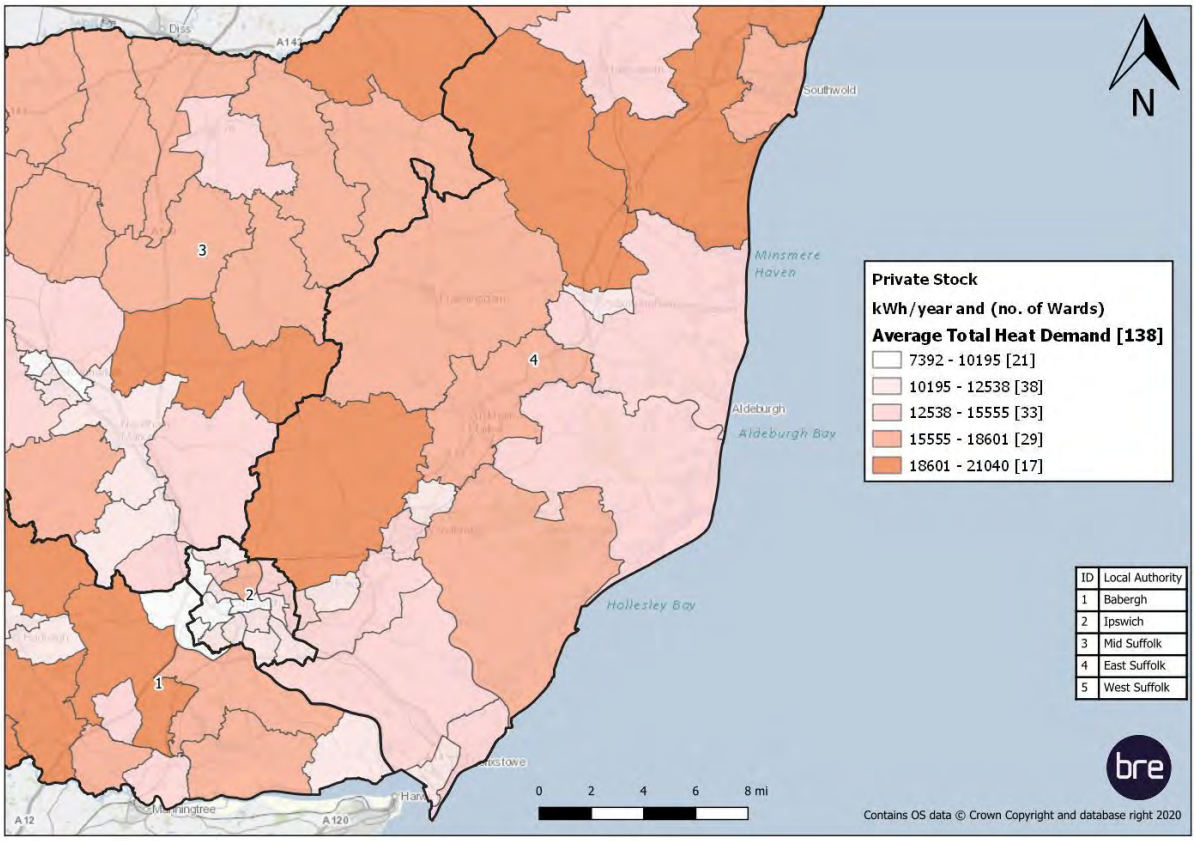
Map D. 37: Suffolk total heat demand in the east – private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound.* *Return to main report*



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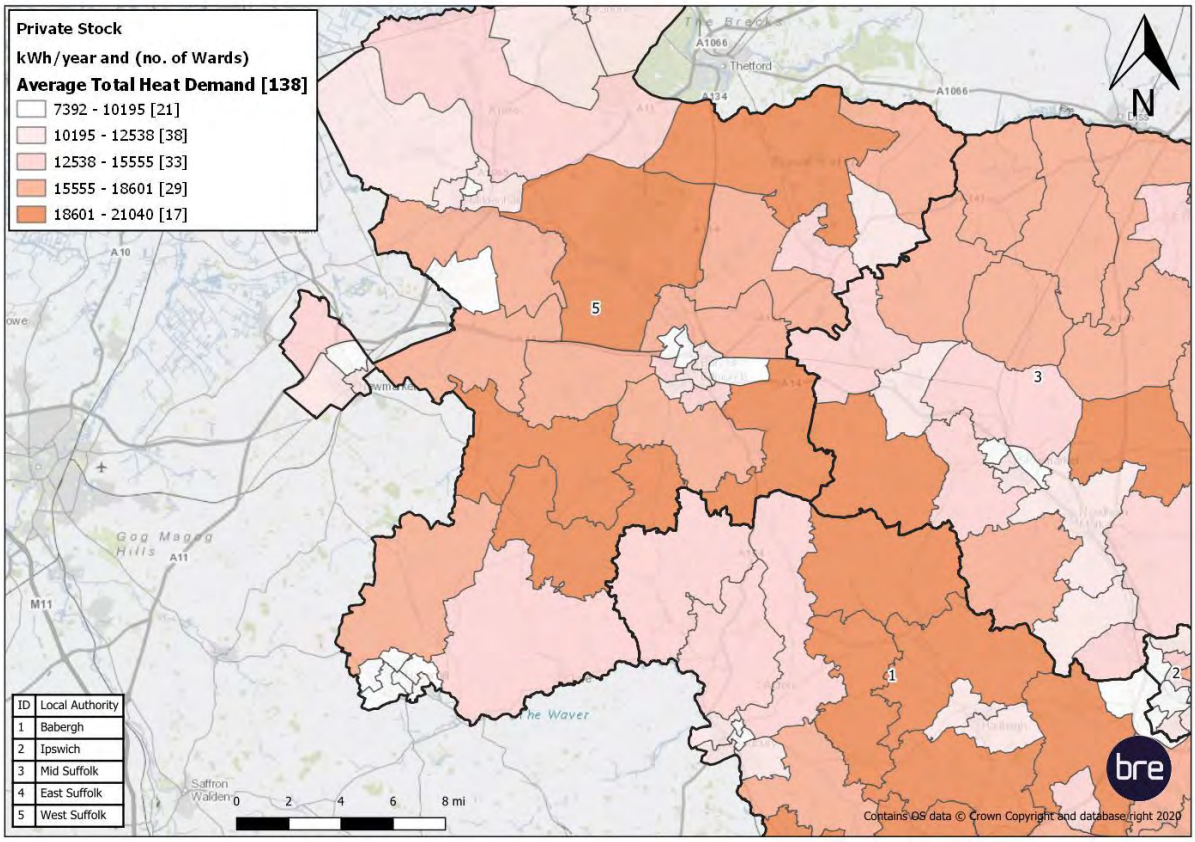
Map D. 38: Suffolk total heat demand in the west– private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound.* *Return to main report*



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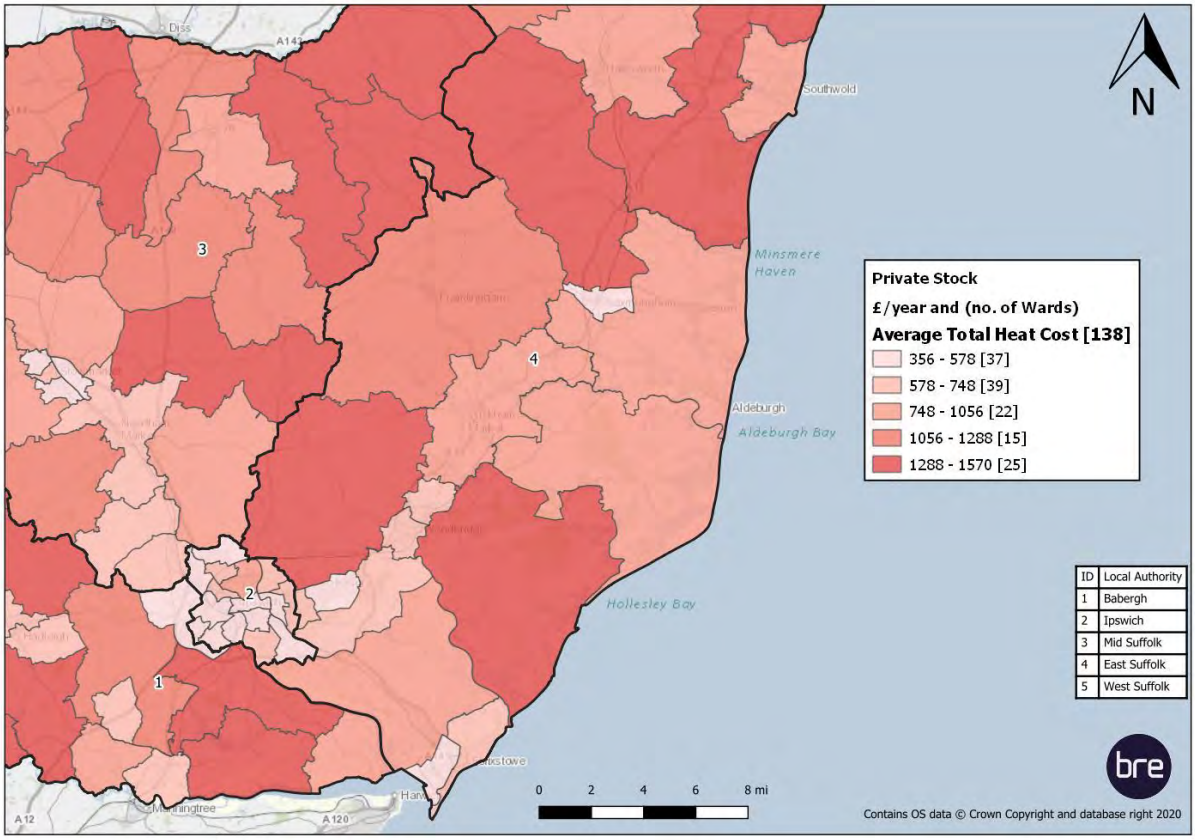
Map D. 39: Suffolk total heating cost in the east – private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound.* *Return to main report*



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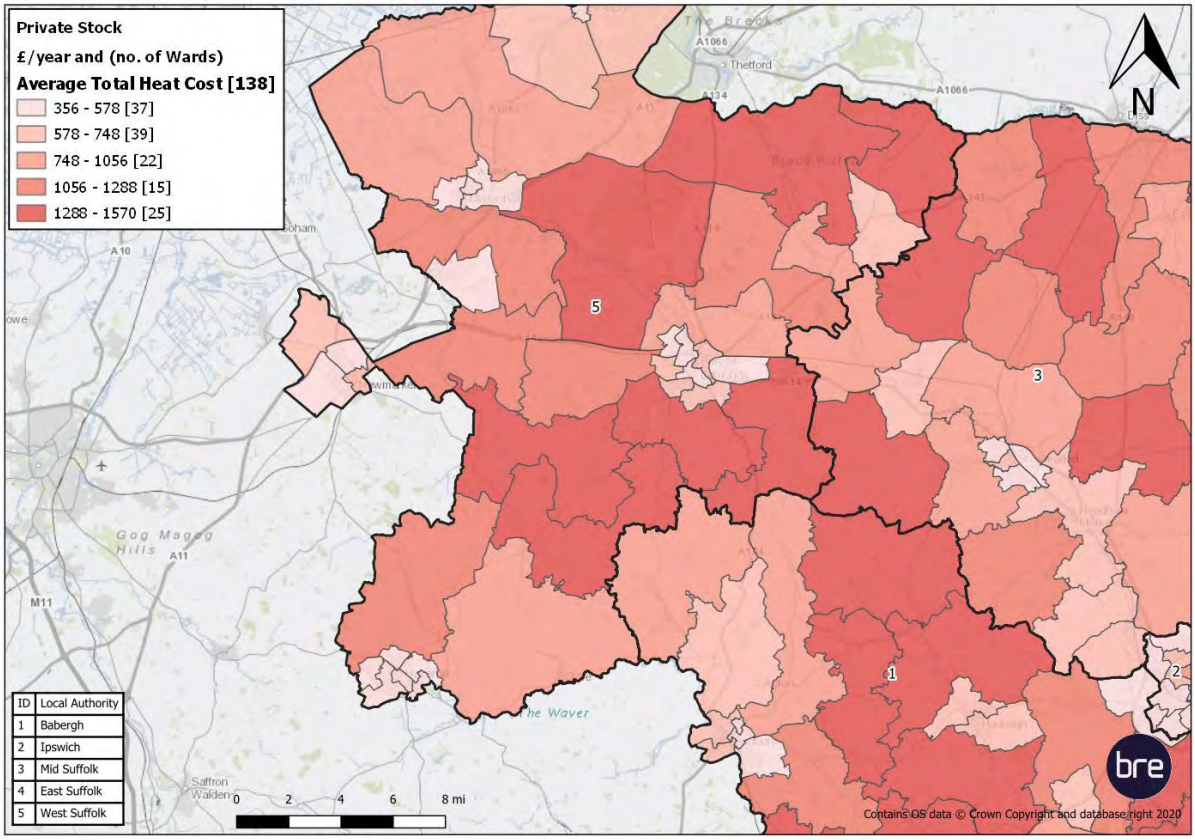
Map D. 40: Suffolk total heating cost in the west – private stock. *N.B. in the legend, values are greater than the lower bound and less than or equal to the upper bound.* *Return to main report*



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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
DLUHC	Department for Levelling Up, Housing and Communities (previously MHCLG)
ECO	Energy Companies Obligation
	Places legal obligations on the larger energy suppliers to deliver energy efficiency measures to domestic energy users
EHS	English Housing Survey
	A continuous national survey commissioned by the Department for Levelling Up, Housing and Communities (DLUHC). 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

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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

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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 falls hazards (excl. falling between levels)
OS	Ordnance Survey
Poor housing	Dwellings where a category 1 hazard is present
Private sector housing	Housing not owned by the local authority or a housing association
SAP	Standard Assessment Procedure Method system for measurement of energy rating of residential buildings.
SimpleSAP	An estimate of a residential dwelling's likely SAP score, it is not based on the full required range of data for a SAP calculation or a reduced data SAP calculation (RDSAP), it should only ever be considered an estimate of the SAP score, and used as a guide
UPRN	Unique Property Reference Number A unique 12 digit number assigned to every unit of land and property recorded by local authorities as part of their LLPG
Vulnerable persons	Persons who are more likely to be affected by the particular hazard as defined by the HHSRS Operating Guidance

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