Birmingham City Council

Private Rented Sector: Housing Stock Condition and Stressors Report

April 2022

Executive Summary

Metastreet were commissioned by Birmingham City Council to review housing stock in the City and assess housing stressors related to key tenures, in particular the private rented sector.

The detailed housing stock information provided in this report will facilitate the development and delivery of Birmingham City Council's housing strategy and enable a targeted approach to tackling poor housing.

The main aim of this review was to investigate and provide accurate estimates of:

- Current levels of private rented sector (PRS) properties and tenure change over time.
- Levels of serious hazards that might amount to a Category 1 hazard (HHSRS) or high scoring Category 2 hazards.
- Other housing related stressors, including antisocial behaviour (ASB), service demand, population and deprivation linked to the PRS.
- Assist the council to make policy decisions, including the possible introduction of property licensing schemes under Part 3 of the Housing Act 2004.

Metastreet has developed a stock-modelling approach based on metadata and machine learning to provide insights about the prevalence and distribution of a range of housing factors. This approach has been used by several councils to understand their housing stock and relationships with key social, environmental and economic stressors.

The housing models are developed using unique property reference numbers (UPRN), which provide detailed analysis at the property level.

Data records used to form the foundation of this report include:

Council tax	Electoral register	Other council interventions records	Tenancy deposit data
Housing benefit	Private housing complaints and interventions records	ASB complaints and interventions records	Energy Performance data

Key Findings

- Birmingham City Council's PRS has grown significantly over the last decade and is now calculated to be 24.7% (111,811) of housing stock
- Poor housing conditions are prevalent in the PRS.
- There are 23,173 private rental properties in Birmingham that are likely to have a serious home hazard (Category 1, HHSRS), representing 21% of the PRS stock, significantly higher than the national average (12%)
- Using the Energy Performance Certificate records it has been possible to calculate that 17,657 PRS properties in Birmingham have an E, F, and G rating
- 2,217 PRS properties have an F and G rating, these properties are likely to fail the Minimum Energy Efficiency Standard (MEES) statutory requirement
- Private rented properties have high levels of ASB reported incidents, over a 5-year period 11,122 ASB incidents have been linked to PRS properties
- Birmingham administered 73,278 housing benefit claims relating to PRS households between 2016-2021
- Birmingham is the 7th most deprived local authority in England (Figure 5), with nearly half of the City within the bottom 10% most deprived nationally. Birmingham has a high proportion of high deprivation wards. 60 out of 69 wards have aggregated IMD rankings below the national average. 26 wards are in the lowest 20% nationally.
- Birmingham has a significantly higher proportion in fuel poverty (21.1%) than the national average (13.8%).

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Introduction & Project Objectives

Metastreet were commissioned by Birmingham City Council to review its housing stock with a focus on the following key areas:

- Residential property tenure
- Housing profile
- Distribution of the PRS
- Condition of housing stock in the PRS
- Housing related stressors, including Anti-Social Behaviour (ASB), service demand and council interventions

The report provides the council with the evidence base for developing housing policy and service interventions. The report also satisfies the council's responsibility to review its housing stock as set out under Part 1, Section 3 of the Housing Act 2004.

The first section of the report details the findings of the stock and tenure modelling, including an introduction to the methodology. A combination of Birmingham City Council's data warehouse, machine learning and modelling techniques have been used to pinpoint tenure and predict property conditions within its PRS housing stock. An advanced property level data warehouse has been used to facilitate the analysis.

For the purposes of this review, it was decided that a ward-level summary is the most appropriate basis to assess housing conditions across Birmingham, derived from property level data.

Three separate predictive tenure models (Ti) have been developed as part of this project which are unique to Birmingham, they include:

- Private rented sector (PRS)
- Owner occupiers
- Serious PRS housing hazards

The appendices to the report contain a summary of the data and a more detailed report methodology. This report version excludes HMO analysis.

1 Birmingham City Council Overview

Birmingham is a city and metropolitan borough in the West Midlands, England. It is the second-largest city, second-largest metropolitan area and third-largest urban area in the United Kingdom. It covers an area of 111.8 km² [1].

1.1 Population

The Office of National Statistics (ONS) population estimate for Birmingham, as at 2021, was 1,140,525. This makes Birmingham one of the most populous cities in the UK (Figure 1)[2].

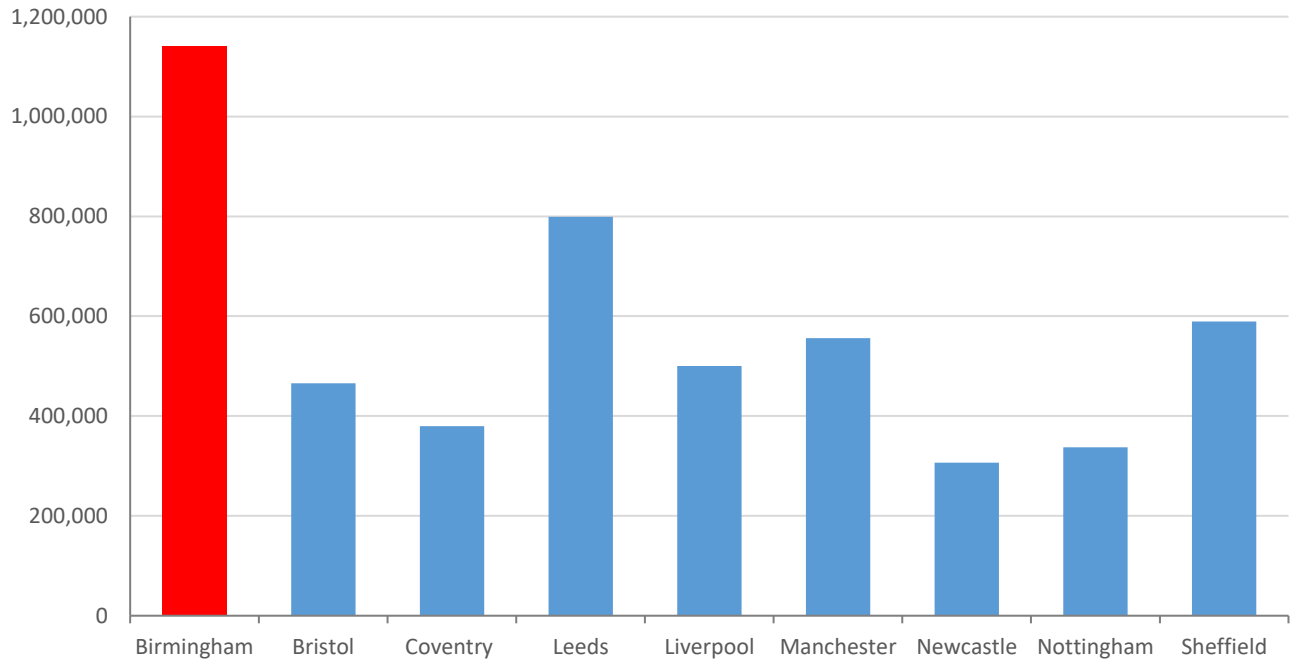


Figure 1. Population estimates of large UK cities (Source: ONS 2021).

After a period of population decline, Birmingham's population has grown steadily over the last decade (Figure 2).

[1] Birmingham Wikipedia (March 2022) https://en.wikipedia.org/wiki/Birmingham
[2] Population estimates 2018 ONS https://Birmingham.gov.uk/council/key-statistics-and-data/data/population/https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/adhocs/008264midyearpopulationestimatesformajortownsandcities2016

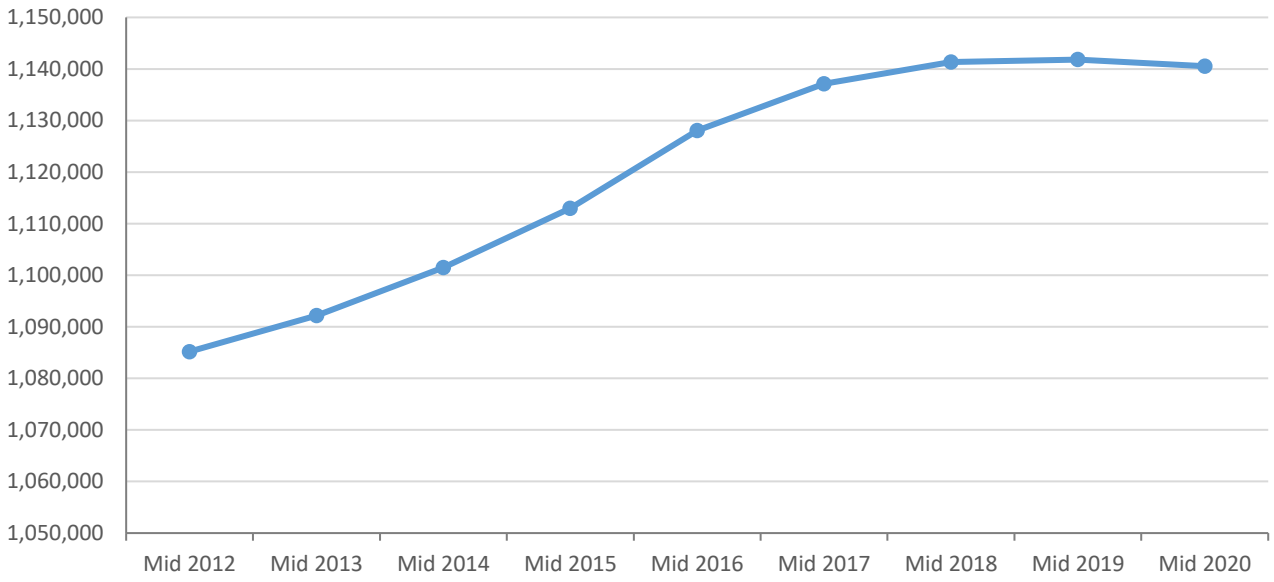


Figure 2. Population change between mid 2012 - mid 2020 (Source: ONS 2021).

1.2 Migration

Birmingham has seen net positive international migration since 2012 (Figure 3)[3].

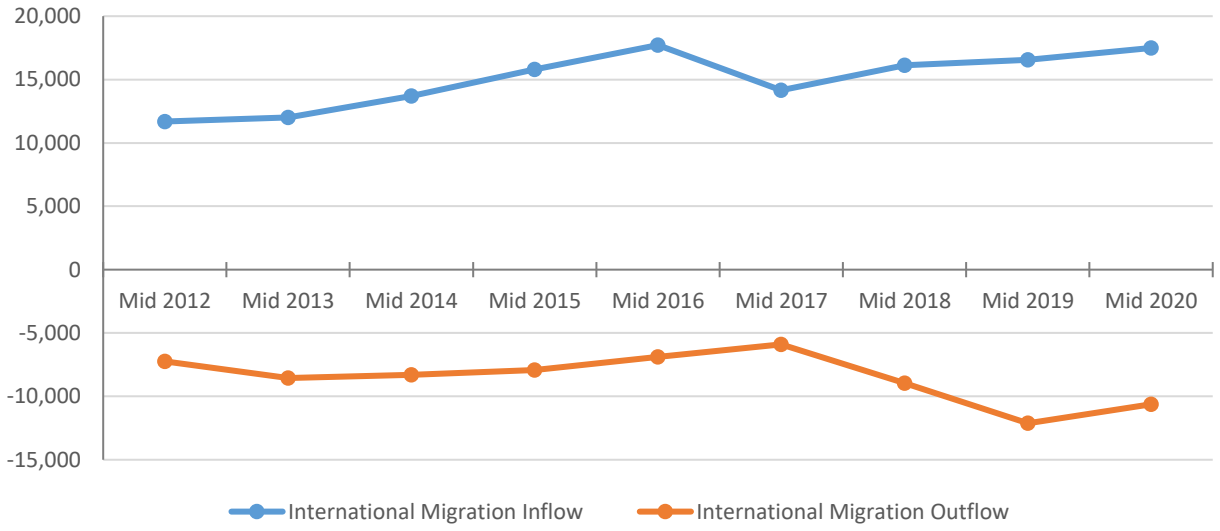


Figure 3. Birmingham international migration flow between mid 2012 - mid 2020 (Source: ONS 2021).

[3] Population estimates 2021 ONS
https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/migrationwithintheuk/datasets/localareamigrationindicatorsunitedkingdom

Internal migration within the UK overall has been net negative for Birmingahm since 2012.

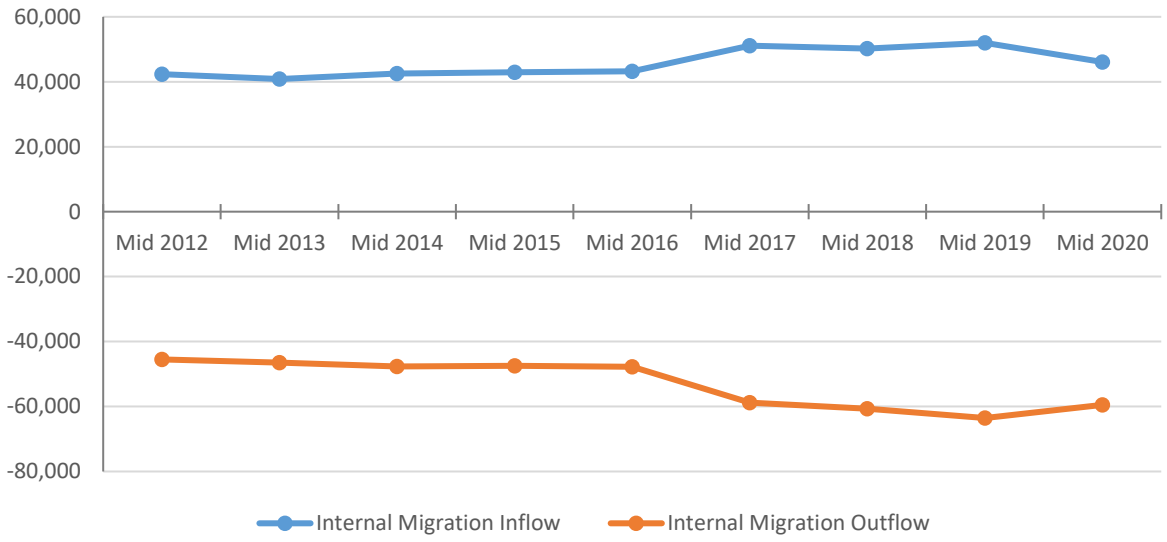


Figure 4. Birmingham internal migration flow between mid 2012 - mid 2020 (Source: ONS 2021).

1.3 Deprivation

The Indices of Multiple Deprivation 2019 (IMD2019) provide a set of relative measures of deprivation for LSOAs (Lower-layer Super Output Areas) across England, based on seven domains of deprivation. [4].

The proportion of LSOAs in most deprived 10% nationally provides a measure of the presence of serious deprivation in any given local authority area. Using this measure Birmingham is the **7th** most deprived local authority in England (Figure 5), with nearly half of the city within the bottom 10% most deprived nationally.

[4] ONS2019 https://www.gov.uk/government/statistics/english-indices-of-deprivation-2019,

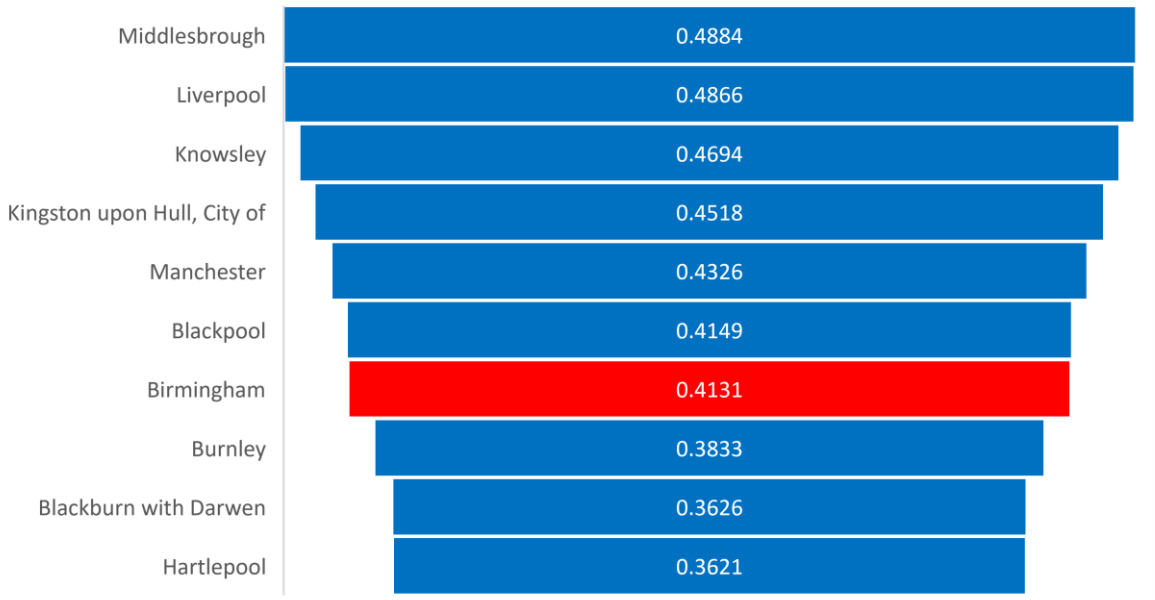


Figure 5. The proportion of LSOAs in most deprived 10% (rank of 10 authorities with the highest proportion of LOSAs in bottom 10% nationally) (Source: IMD2019).

To analyse data at the ward level, LSOA have been matched to wards using an Open Geoportal Portal lookup table[5]. Average IMD2019 decile aggregated reveals a ward level deprivation picture (Figure 6). 1.0 on the graph represents the most deprived 10% areas and 5.0 represents 50% most deprived.

Birmingham has a high proportion of high deprivation wards. 60 out of 69 wards have aggregated IMD rankings below the national average. 26 wards are in the lowest 20% nationally.

[5] ONS2019 http://geoportal.statistics.gov.uk/datasets/8c05b84af48f4d25a2be35f1d984b883_0/data

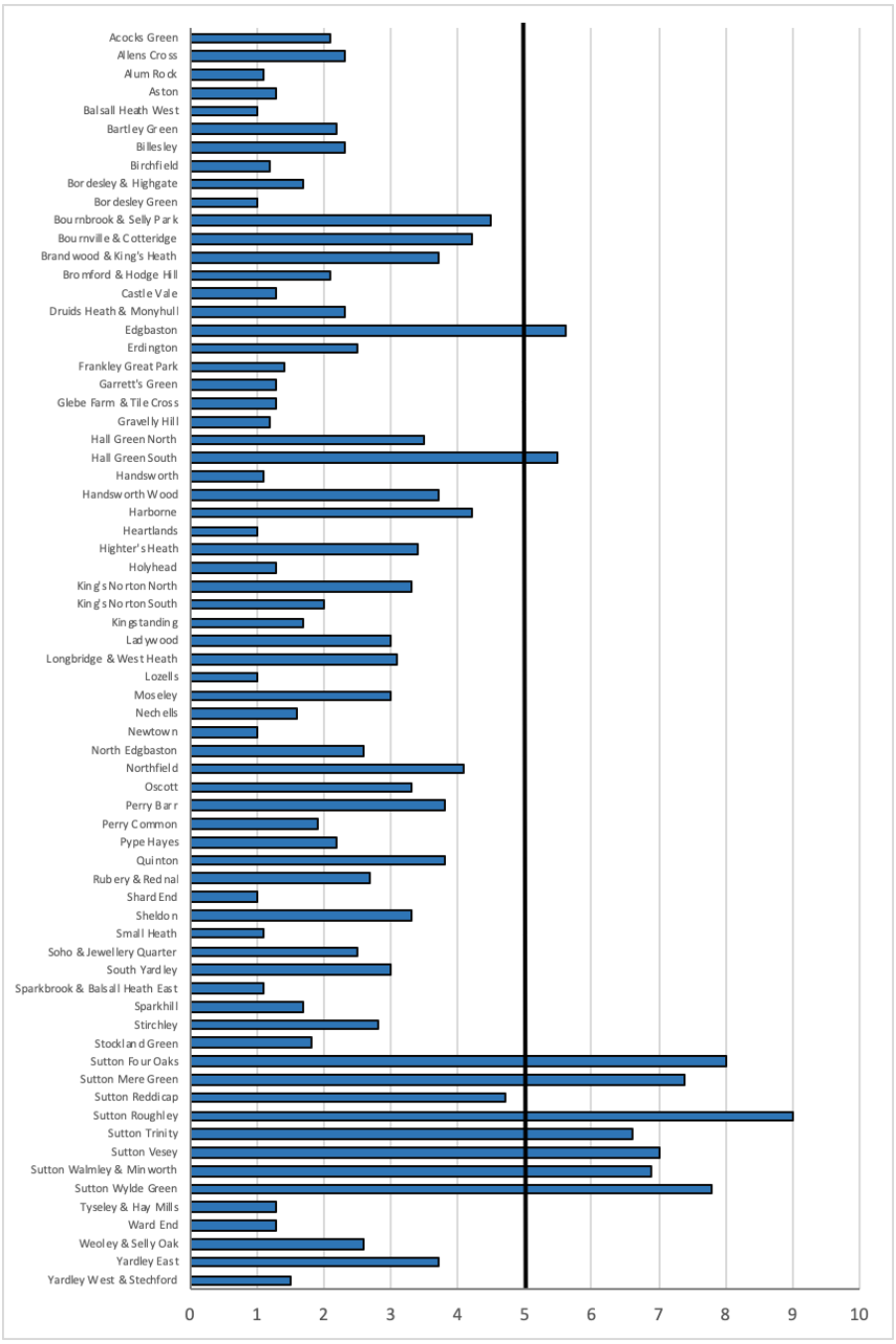
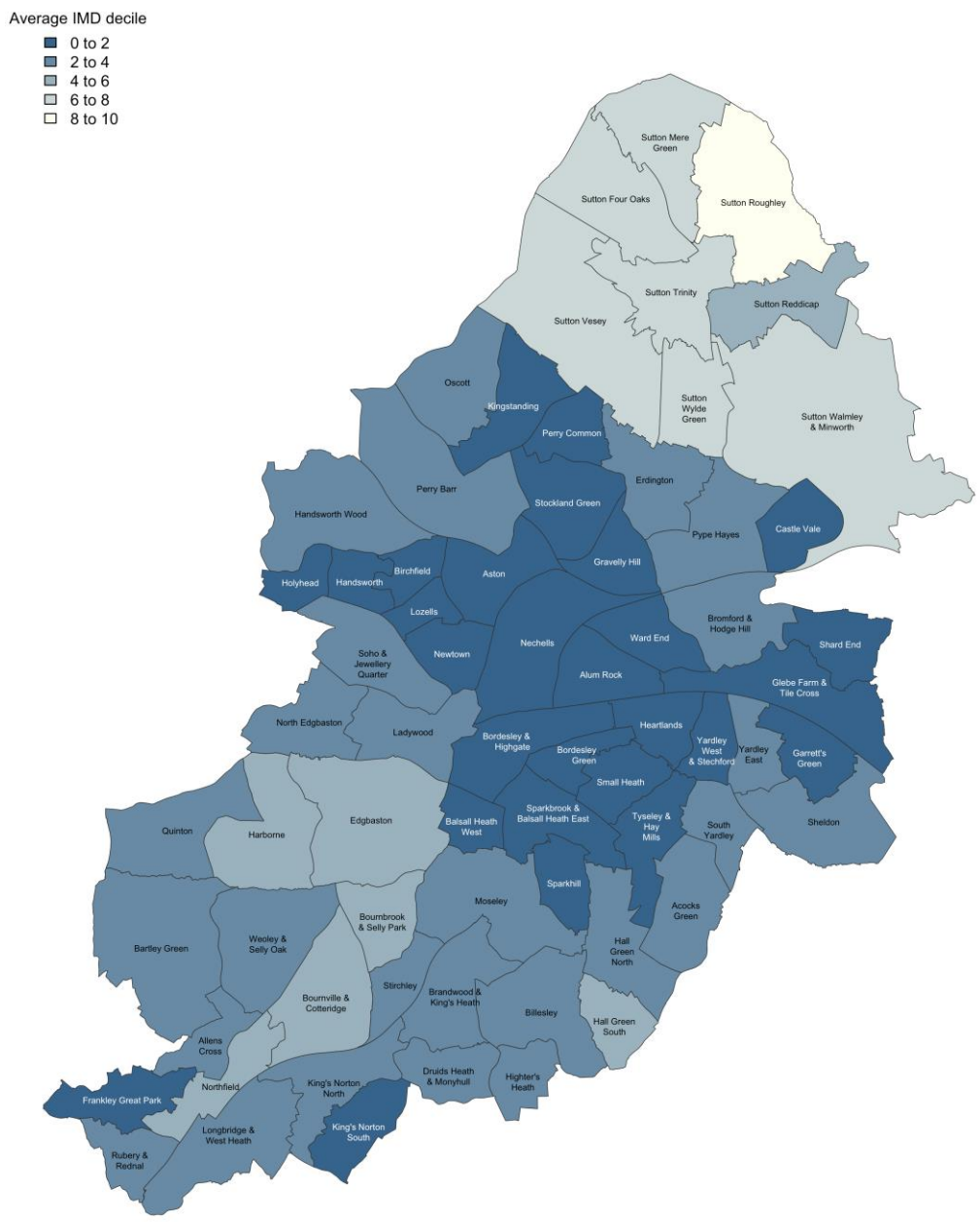


Figure 6. Average IMD (2019) decile by ward (Source: IMD 2019). Horizontal line shows the national average (5.0)

Central and western wards are more deprived than northern wards.



Map 1. Distribution of Average IMD (2019) decile by ward (Source: IMD 2019, map by MS).

1.4 Fuel Poverty

Fuel poverty is defined by the Warm Homes and Energy Conservation Act. A household is considered to be fuel poor 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.

The fuel poverty score was produced by the Department for Business, Energy & Industrial Strategy using 2019 data and published in 2021. Birmingham has a significantly higher proportion in fuel poverty (21.1%) than the national average (13.8%). In fact, Birmingham has the highest fuel poverty rate of any UK core city (Figure 7). [6]

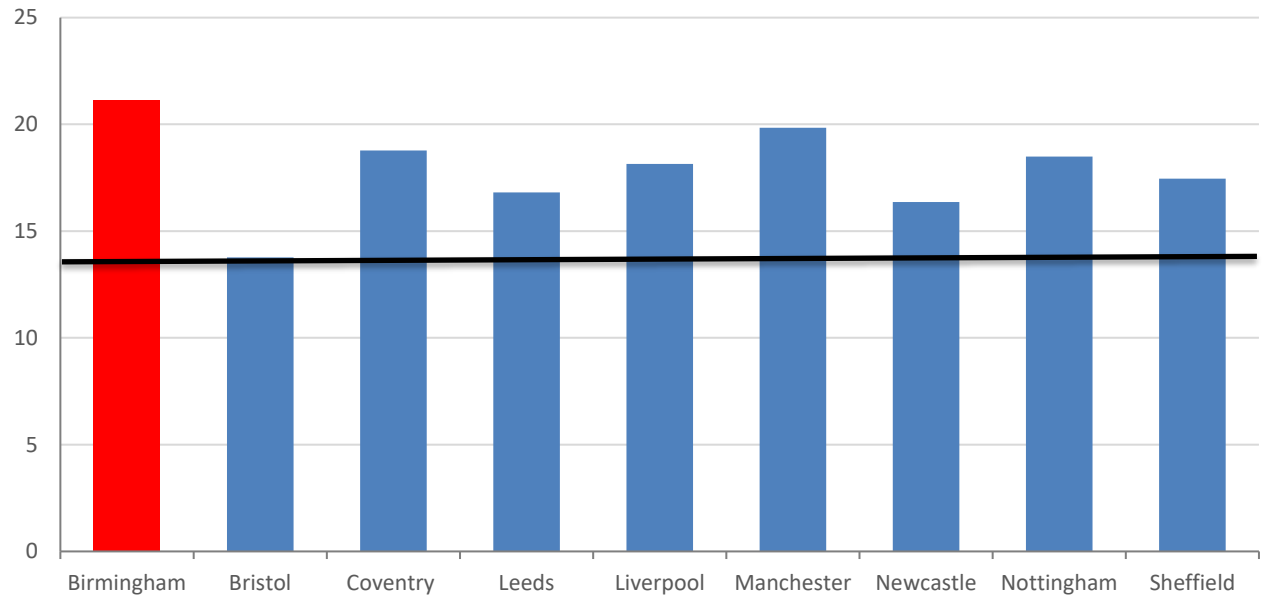


Figure 7. Proportion of households in fuel poverty (%) by English cities (BEIS 2021). ***Horizontal line shows England average (13.8%).***

1.5 Homelessness

Statutory homelessness acceptances include those who the local authority has determined are legally entitled to assistance. To be accepted as statutorily homeless by the local authority you must be found legally and unintentionally homeless, be eligible for assistance and in priority need.

[6] Department for Business, Energy & Industrial Strategy 2021 https://www.gov.uk/government/statistics/sub-regional-fuel-poverty-data-2021

Homelessness returns to government for the financial year 2020-2021 show Birmingham has an average homelessness acceptance rate when compared to English Cities (Figure 8)[7].

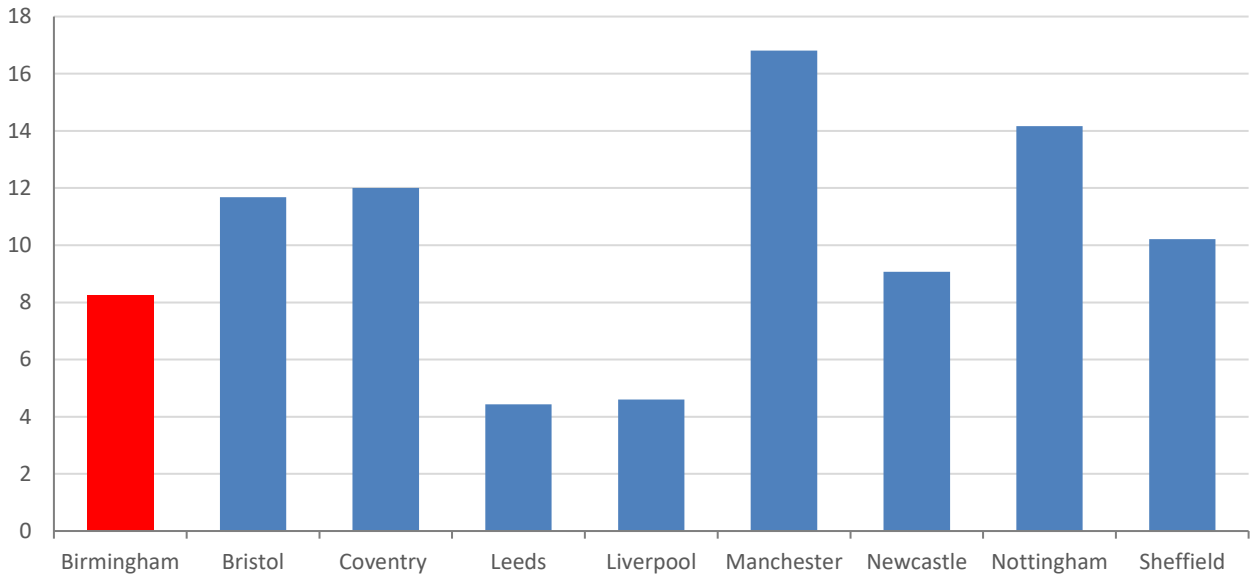


Figure 8. Homelessness acceptances per 1,000 households by English cities (Source: DLUHC & MHCLG 2022)

1.6 Housing affordability

The chart below shows median monthly rents recorded between 1 October 2020 to 30 September 2021 for all bedroom categories by key English cities (Figure 9)[8].

[7] Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government 2022 https://www.gov.uk/government/statistical-data-sets/live-tables-on-homelessness

[8] Valuation Office Agency (VOA) 2021 https://www.ons.gov.uk/peoplepopulationandcommunity/housing/bulletins/privaterentalmarketsummarystatisticsinengland/october2020toseptember2021

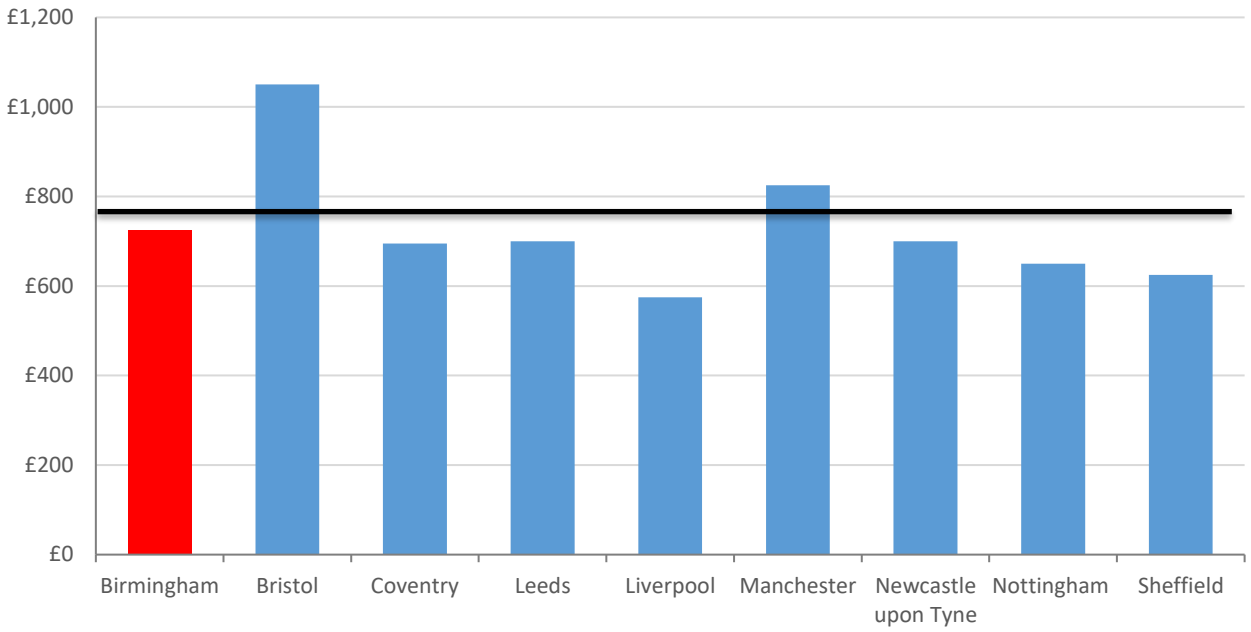


Figure 9. Median monthly rents recorded between 1 October 2018 to 30 September 2019 for English cities Horizontal line shows England average (£755). (Source: VOA 2021).

Median rents in Birmingham (£725) are 4% below the English average of£755 (Figure 9).

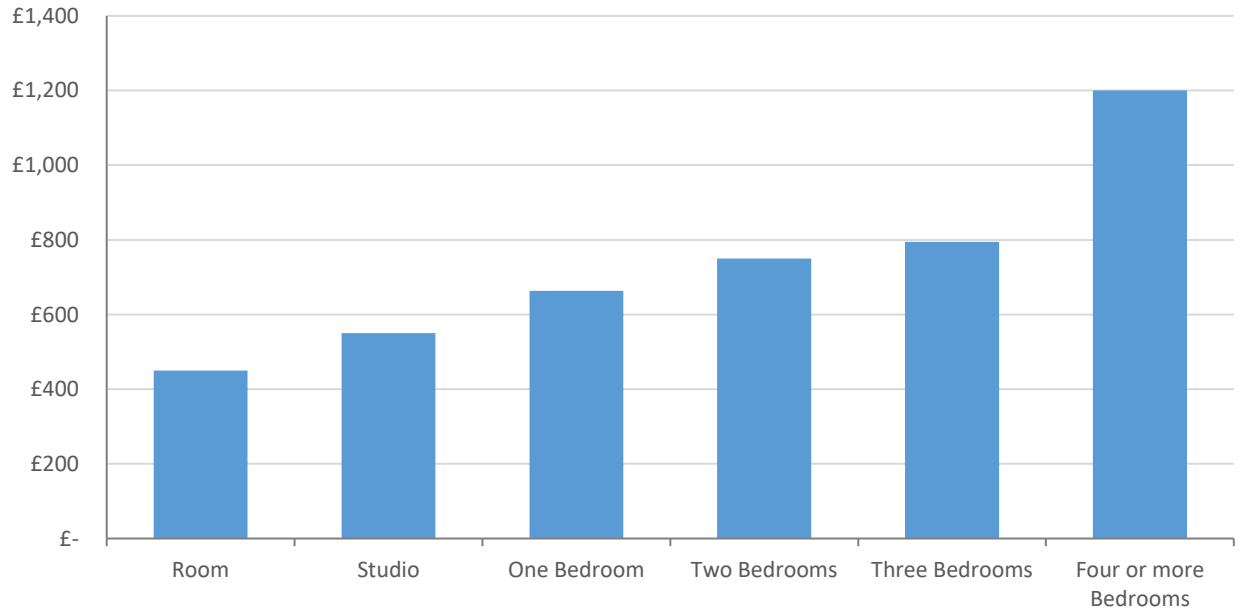


Figure 10. Birmingham median monthly rents recorded between 1 October 2018 to 30 September 2019 for all bedroom categories (Source: VOA 2021).

2 Results of housing stock and stressor modelling

Tenure Intelligence (Ti) uses council held data and publicly available data to identify tenure and analyse property stressors, including property conditions and ASB.

2.1 Methodology

Data trends at the property level are analysed using mathematical algorithms to help predict the tenure of individual properties using factors such as occupant transience and housing benefit data. Metastreet have worked with the council to create a residential property data warehouse. This has included linking millions of cells of council and externally held data to 450,00 + unique property reference numbers (UPRN).

Machine learning is used to make predictions for each tenure and property condition based on a sample of known tenures and outcomes. Results are analysed to produce a summary of housing tenure and stressors linked to housing. To achieve the maximum accuracy, unique models are built for each council, incorporating individual city data and using known outcomes to train predictive models.

Once the data warehouse was created, statistical modelling was used to determine tenure using the methodology outlined below. All council held longitudinal data is for 5 consecutive years, from April 2016 – March 2021.

Different combinations of risk factors were systematically analysed for their predictive power in terms of key outcomes. Risk factors that duplicated other risk factors but were weaker in their predictive effect were systematically eliminated. Risk factors that were not statistically significant were also excluded through the same processes of elimination.

For each UPRN a risk score was calculated using logistic regression. The selected risk factors have a better or worse than evens chance of being predictive.

A number of predictive models were developed as part of this project which are unique to Birmingham. Known and recorded stressors linked to individual properties have been modelled to calculate population level incidences and rates.

It is important to note that this approach can never be 100% accurate as all statistical models include some level of error and housing tenure is dynamic. A more detailed description of the methodology and the specific factors selected to build bespoke predictive models for this project can be found in Appendix 2.

Metastreet was asked to exclude properties that have been licenced under part 2 of the Housing Act 2004 from the stressor results. Therefore, the results in the following section exclude licenced houses in multiple occupation (HMO) from the stressor results, unless stated otherwise.

2.2 Results - Private Rented Sector

2.2.1 Population and distribution

There are a total of 452,754 residential properties in Birmingham. Of these, 24.7% (111,811) are PRS, 52.1% (235,760) are owner occupied, and 23.2% (105,183) socially rented (Figure 13).

Birmingham is likely to have the largest PRS population, measured by the number of dwellings, of any housing authority in England.

Birmingham City Council's PRS is now calculated to be 24.7% (111,811) of housing stock (including known HMOs) (Figure 11). This compares to 17% of households in 2011 (ONS)[9]. The growth of the PRS has come mostly from a proportional reduction in owner occupation, from 60% (2011) to 52% (2022) (Figure 12).

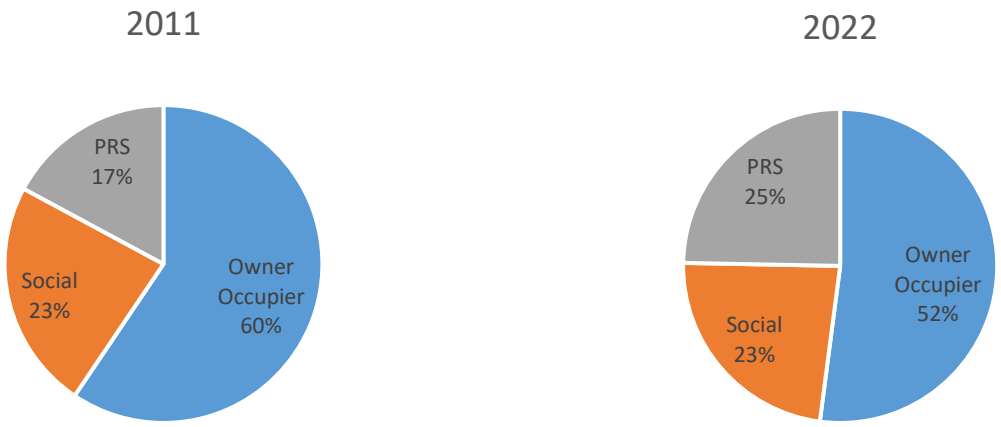


Figure 11. Tenure profile 2011 & 2022 (Source: ONS & Ti 2022).

[9] ONS Census 2011
https://www.ons.gov.uk/peoplepopulationandcommunity/housing/adhocs/003049ct02592011censustenureofdwellingbyaccommodationtypeofdwellingalldwellingsnationaltolocalauthority

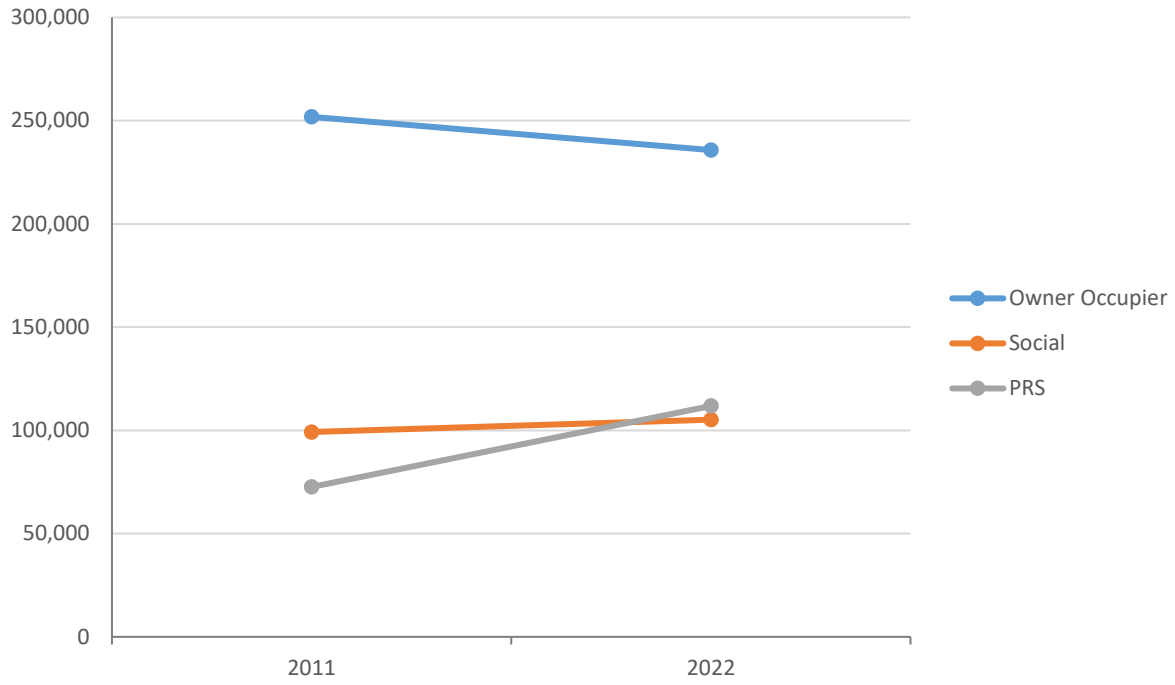


Figure 12. Key tenures as a percentage of total housing stock, 2011 & 2022 (Source: ONS & Ti 2022).

This increase is part of a nationwide trend. The PRS in the UK has grown from 9.4% of housing stock in 2000 [10]. It is now the second largest housing tenure in England, with a growing number of households renting from a population of around 1.5 million private landlords[11] .

The PRS in Birmingham are distributed across all 69 wards (Figure 13). The number of PRS per ward ranges from 7,577 (Ladywood) to 409 (Castle Vale).

[10] The profile of UK private landlords Scanlon K & Woodhead C CML research. LSE London. December 2017 www.cml.org.uk
[11] Landlord Licensing. Interim report-overview of the incidence and cost of HMO & discretionary schemes in England. February 2015. www.landlords.org.uk

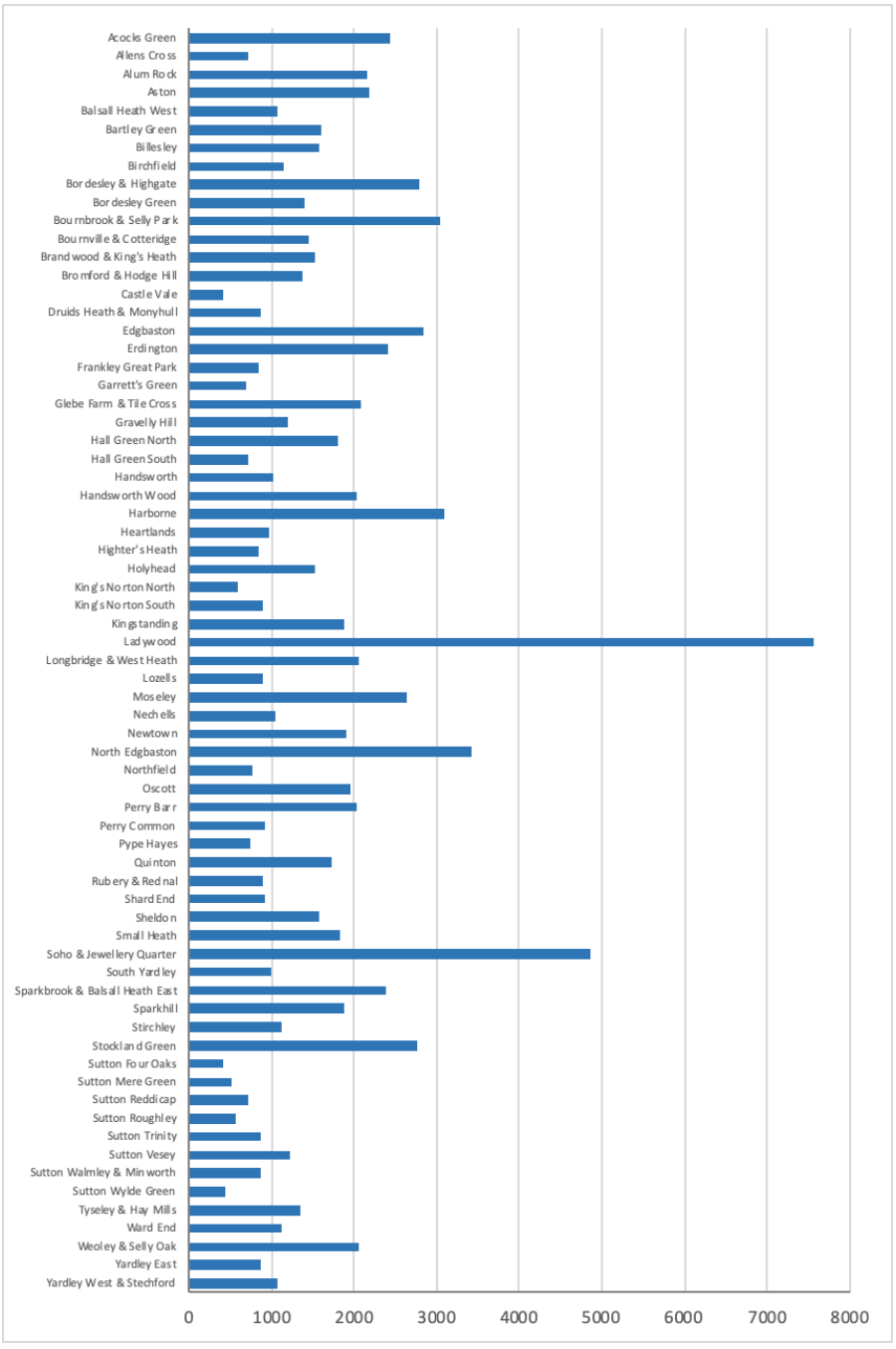


Figure 13. Number of PRS dwellings by ward (Source: Ti 2022).

The percentage of PRS properties in each ward ranges between 45.3% (Bournebrook & Selly Park) and 9.6% (Castle Vale) (Figure 14). Therefore, 42 out of 69 Birmingham City Council wards have a higher percentage PRS than the national average (19%)[12].

[12] English Housing Survey headline report 2020 to 2021 https://www.gov.uk/government/statistics/english-housing-survey-2020-to-2021-headline-report

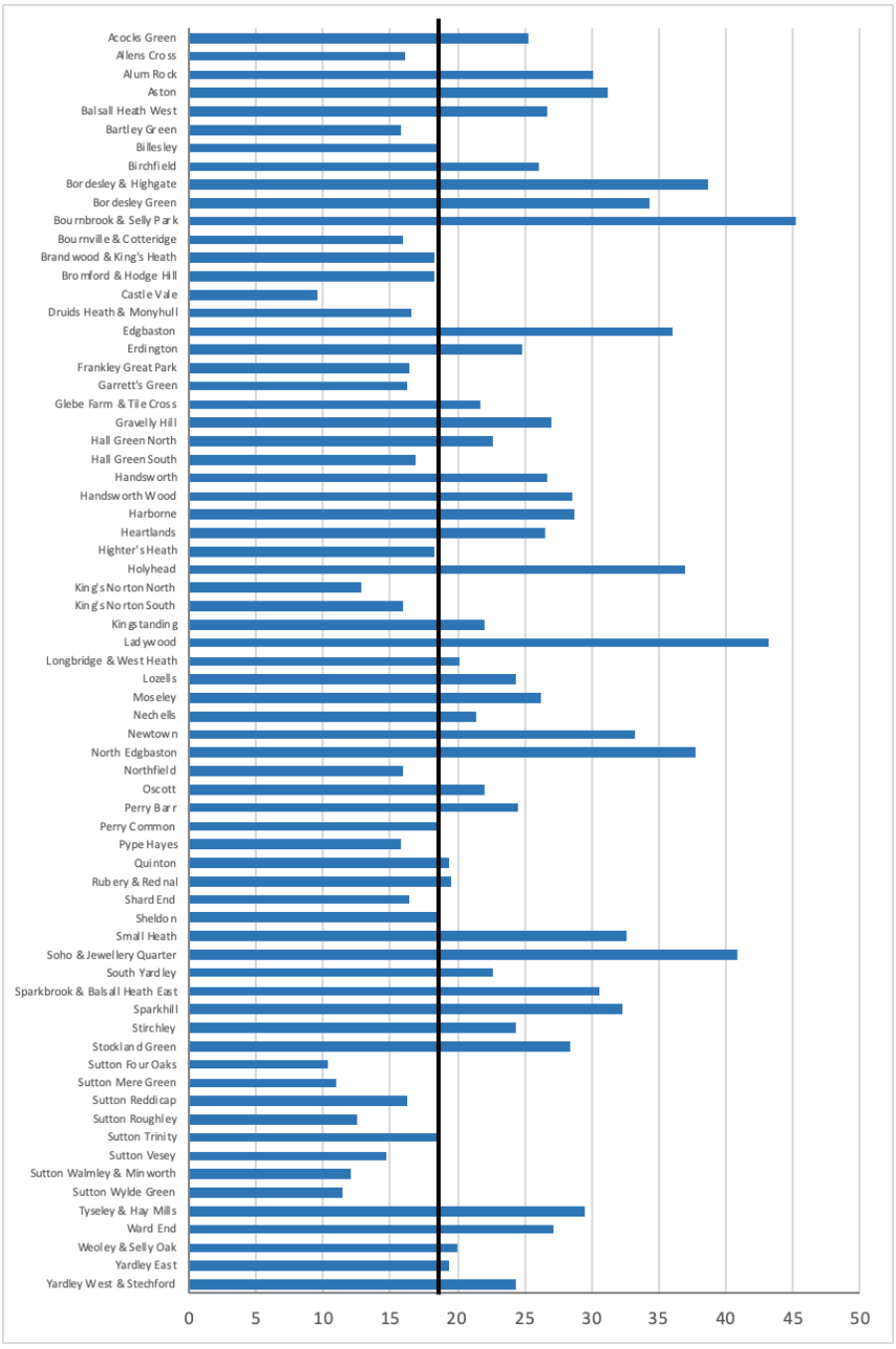


Figure 14. Percentage of PRS dwellings by each ward (Source Ti 2022). ***Black line represents national average in 2019 (19%).***

Numbers of PRS dwellings range from 409 to 7577, whilst the PRS percentage compared to the total housing stock ranges from 9.6 to 45.3 (Table 1).

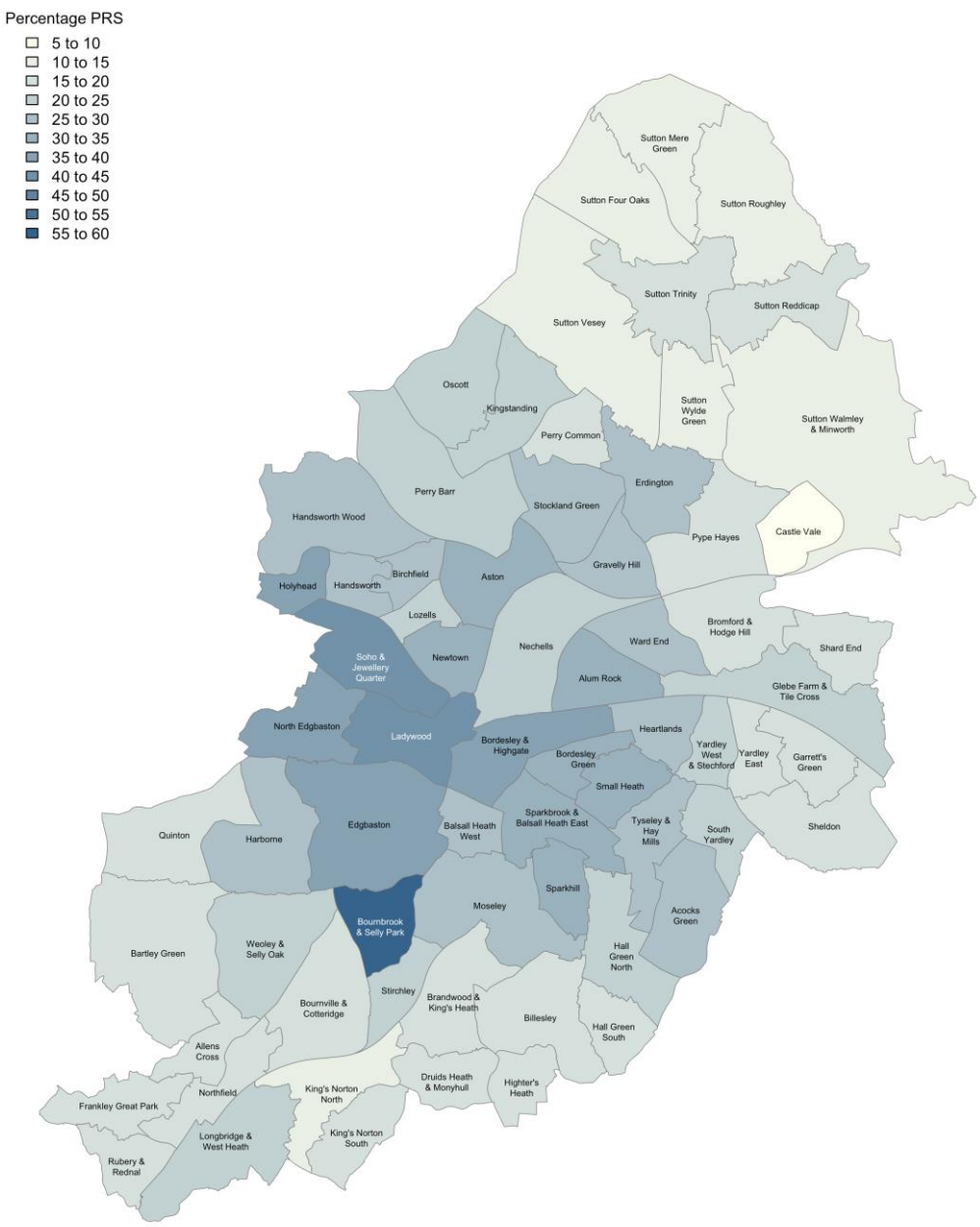
Table 1. Percentage and number of PRS properties by ward (Source Ti 2022).

Ward	PRS (predicted)	% PRS
Acocks Green	2448	25.2
Allens Cross	718	16.1
Alum Rock	2147	30.1
Aston	2195	31.2
Balsall Heath West	1084	26.7
Bartley Green	1609	15.8
Billesley	1566	18.8
Birchfield	1158	26.1
Bordesley & Highgate	2797	38.6
Bordesley Green	1407	34.3
Bournbrook & Selly Park	3051	45.3
Bournville & Cotteridge	1448	16.0
Brandwood & King's Heath	1537	18.4
Bromford & Hodge Hill	1366	18.3
Castle Vale	409	9.6
Druids Heath & Monyhull	870	16.6
Edgbaston	2844	36.1
Erdington	2409	24.8
Frankley Great Park	851	16.4
Garrett's Green	682	16.3
Glebe Farm & Tile Cross	2085	21.8
Gravelly Hill	1201	26.9
Hall Green North	1815	22.6
Hall Green South	706	17.0
Handsworth	1024	26.8
Handsworth Wood	2035	28.5
Harborne	3085	28.7
Heartlands	976	26.5
Highter's Heath	833	18.2
Holyhead	1534	37.0
King's Norton North	600	12.8
King's Norton South	887	15.9
Kingstanding	1887	22.0
Ladywood	7577	43.3
Longbridge & West Heath	2054	20.2
Lozells	902	24.4
Moseley	2627	26.2
Nechells	1038	21.4
Newtown	1897	33.2
North Edgbaston	3424	37.7

Northfield	769	16.0
Oscott	1947	22.1
Perry Barr	2032	24.5
Perry Common	916	18.7
Pype Hayes	756	15.8
Quinton	1741	19.3
Rubery & Rednal	901	19.5
Shard End	912	16.4
Sheldon	1584	18.4
Small Heath	1832	32.5
Soho & Jewellery Quarter	4861	40.9
South Yardley	998	22.7
Sparkbrook & Balsall Heath East	2393	30.5
Sparkhill	1870	32.2
Stirchley	1114	24.3
Stockland Green	2772	28.4
Sutton Four Oaks	427	10.3
Sutton Mere Green	509	11.0
Sutton Reddicap	727	16.2
Sutton Roughley	572	12.5
Sutton Trinity	882	18.8
Sutton Vesey	1233	14.7
Sutton Walmley & Minworth	876	12.1
Sutton Wylde Green	443	11.4
Tyseley & Hay Mills	1357	29.5
Ward End	1117	27.1
Weoley & Selly Oak	2052	19.9
Yardley East	870	19.3
Yardley West & Stechford	1070	24.3

*Data excludes known HMOs (licenced Housing Act 2004, Part 2)

PRS properties are widely distributed across the City, with higher concentrations in the middle and western wards (Map 2).



Map 2. PRS properties as percentage of housing stock (Source: Ti 2022, map by MS).

2.2.2 Housing conditions

Housing conditions are affected by the level of maintenance and quality of repair, the age of the property, thermal efficiency, and type of construction. Category 1 hazards have a physiological or psychological impact on the occupant which may result in medical treatment. [13]

[13] Housing Health Safety Rating System (HHSRS), Operation Guidance, 2006, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/15810/142631.pdf

In 2020, 12% of private rented dwellings in England had at least one Category 1 hazard; this was a lower proportion than the average for the total housing stock (21%) in Birmingham [14].

There is a notable gradient of risk with age of the property, the risk being greatest in dwellings built before 1900, and lowest in the more energy efficient dwellings built after 1980[15].

A housing authority property age profile can have an impact on housing conditions. Birmingham has a significant proportion of its residential housing stock built pre 1900 (11.9%). A high proportion of the housing stock was built before the Second World War (48.6%) (Figure 15). [16] .

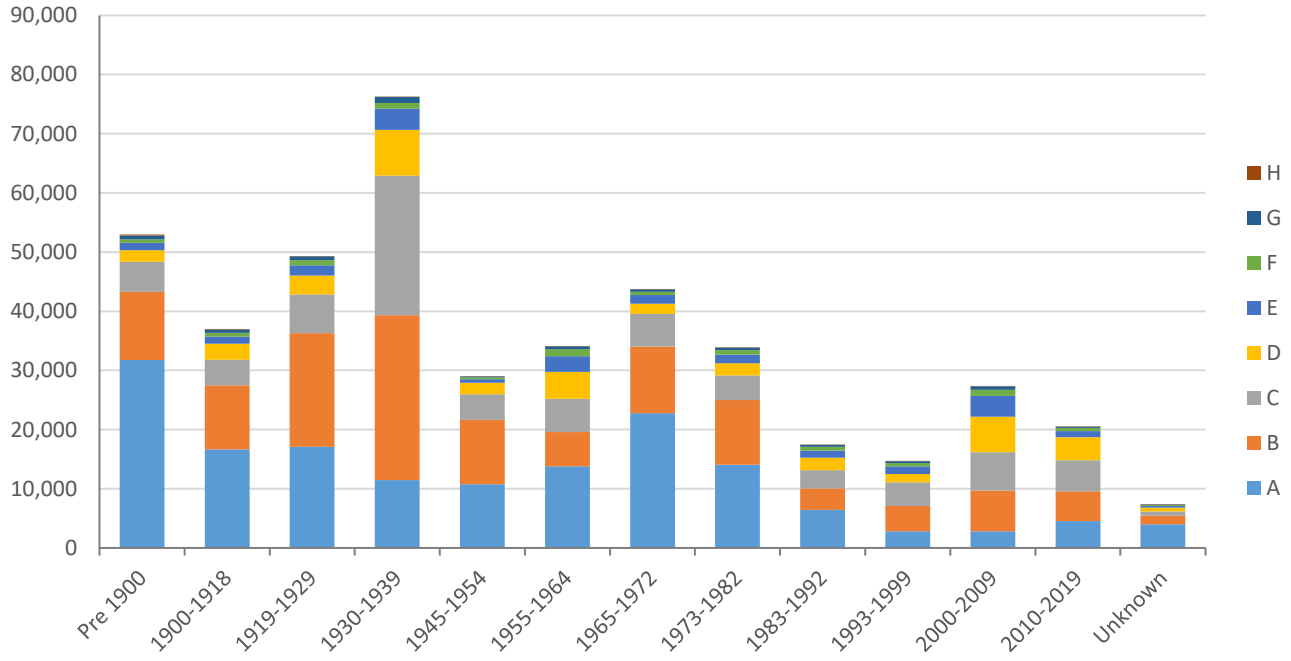


Figure 15. Housing Stock Age Profile and Council Tax band (A-H) (Source: VOA 2019).

A property type profile offers an indication of housing density, construction type and other social economic indicators across an area. Property types in Birmingham are shown in Figure 16. The most common property type are Houses (35%), while bungalows and annexes are the least common property type (2% & 1%) respectively.

[14] English Housing survey Headline Report 2020-21, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1060141/2020-21_EHS_Headline_Report_revised.pdf
[15] Housing Health and Safety Rating System (HHSRS), Operation Guidance, 2006, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/15810/142631.pdf
[16] https://www.gov.uk/government/statistics/council-tax-stock-of-properties-2019

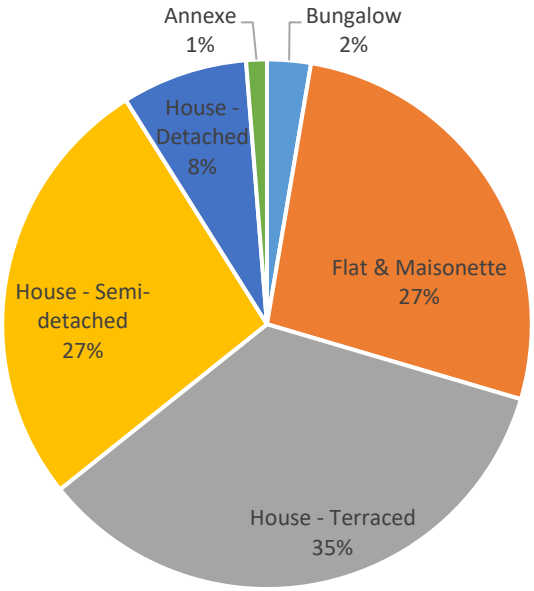


Figure 16. Property type as a percent of total (Source: EPC data 2022).

Using a sample of properties that are known to have at least 1 serious housing hazard (Category 1, HHSRS), it is possible to predict the number of PRS properties with at least 1 serious hazard across the City (Figure 17). This methodology is focussed on identifying Category 1 hazards, however, it is also likely to identify some high scoring Category 2 hazards.

There are **23,173** private rental properties in Birmingham that are likely to have a serious home hazard (Category 1, HHSRS). This represents **21%** of the PRS stock, significantly higher than the national average (12%). PRS properties with serious hazards are distributed across the City. North Edgbaston (698) and Stockland Green (692) have the highest number of properties with at least one Category 1 hazard (HHSRS).

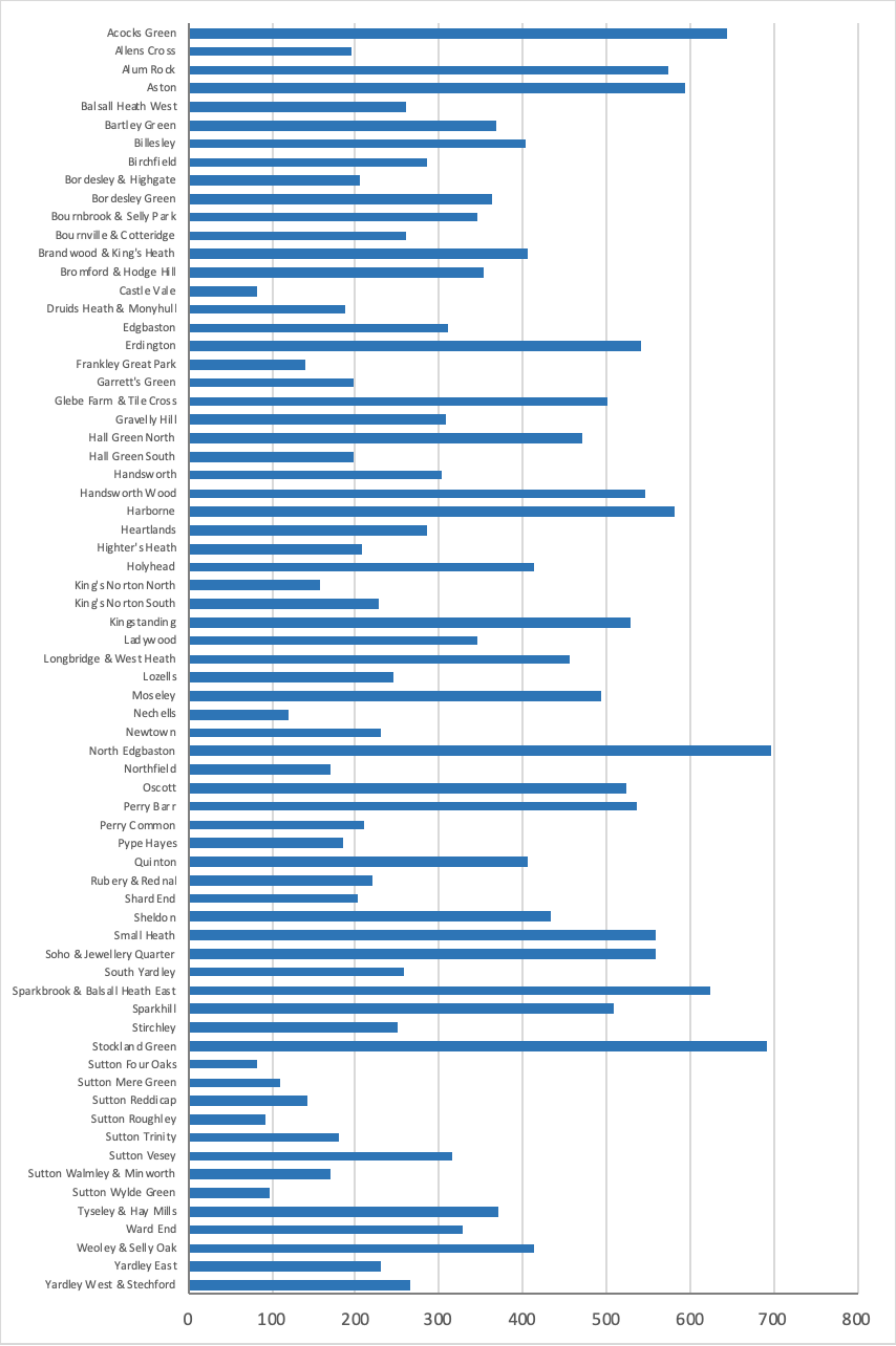
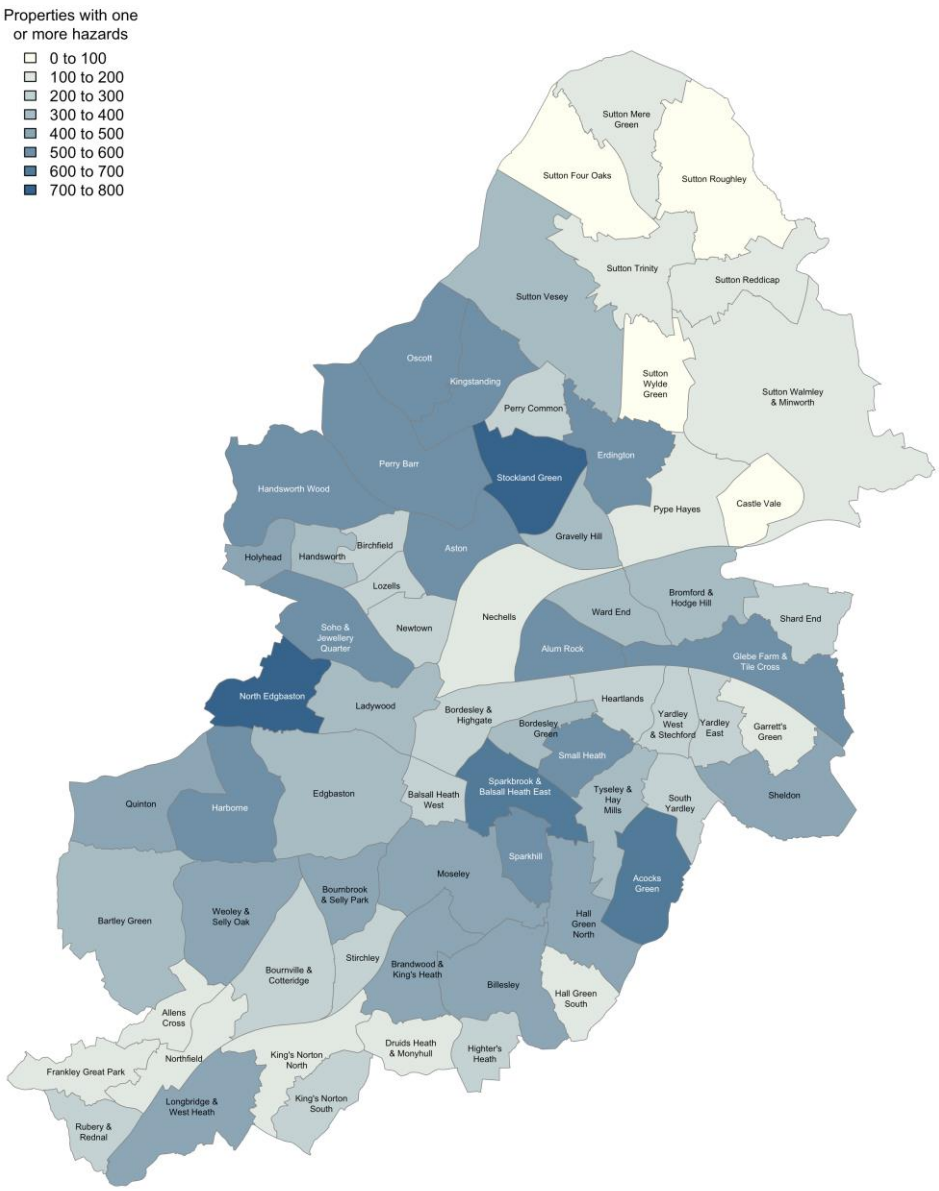


Figure 17. Predicted number of Category 1 hazards by ward (Source: Ti 2022).

Category 1 hazards in the PRS are distributed across the whole City (Map 3). Concentrations of properties with serious hazards can be found in the central and northwest wards.



Map 3. Distribution of PRS properties with Category 1 hazards (Source: Ti 2022, map by MS).

The rates of serious hazards per 1,000 PRS properties reveals a wider distribution across Birmingham (Figure 18).

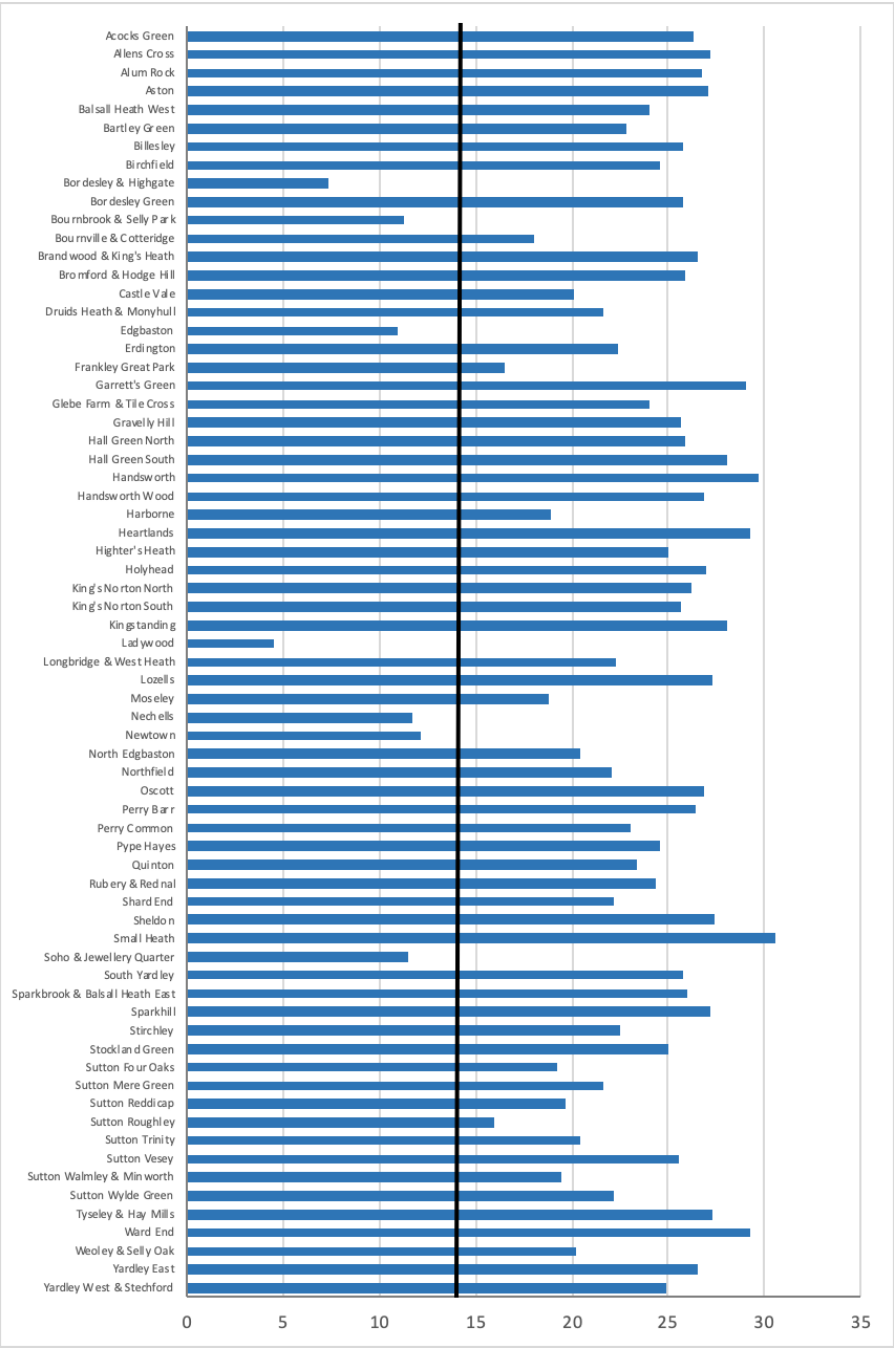


Figure 18. Percentage of PRS properties predicted to have at least one Category 1 hazards by ward (Source: Ti 2022) ***Vertical line shows UK average (12%)***

Complaints made by PRS tenants to the council about poor and inadequate property conditions are a direct indicator of lower quality and poorly managed PRS. Birmingham received **4,058** tenant complaints related to 110,316 private rented properties over a 5-year period (Figure 19). This equates to 3.7% of all rented properties in Birmingham. Stockland Green (182); and Soho & Jewellery Quarter (157) have the highest number of complaints.

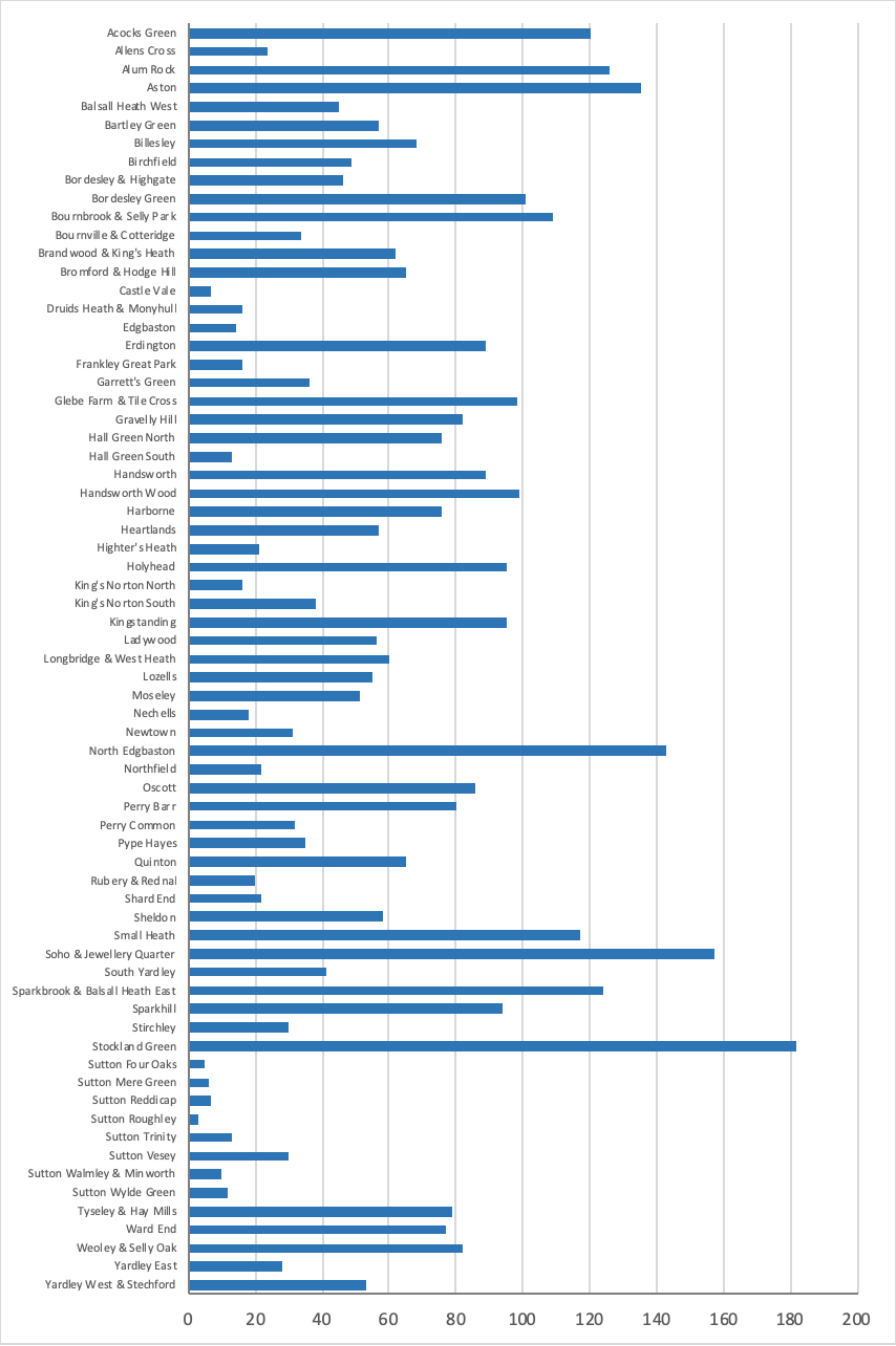
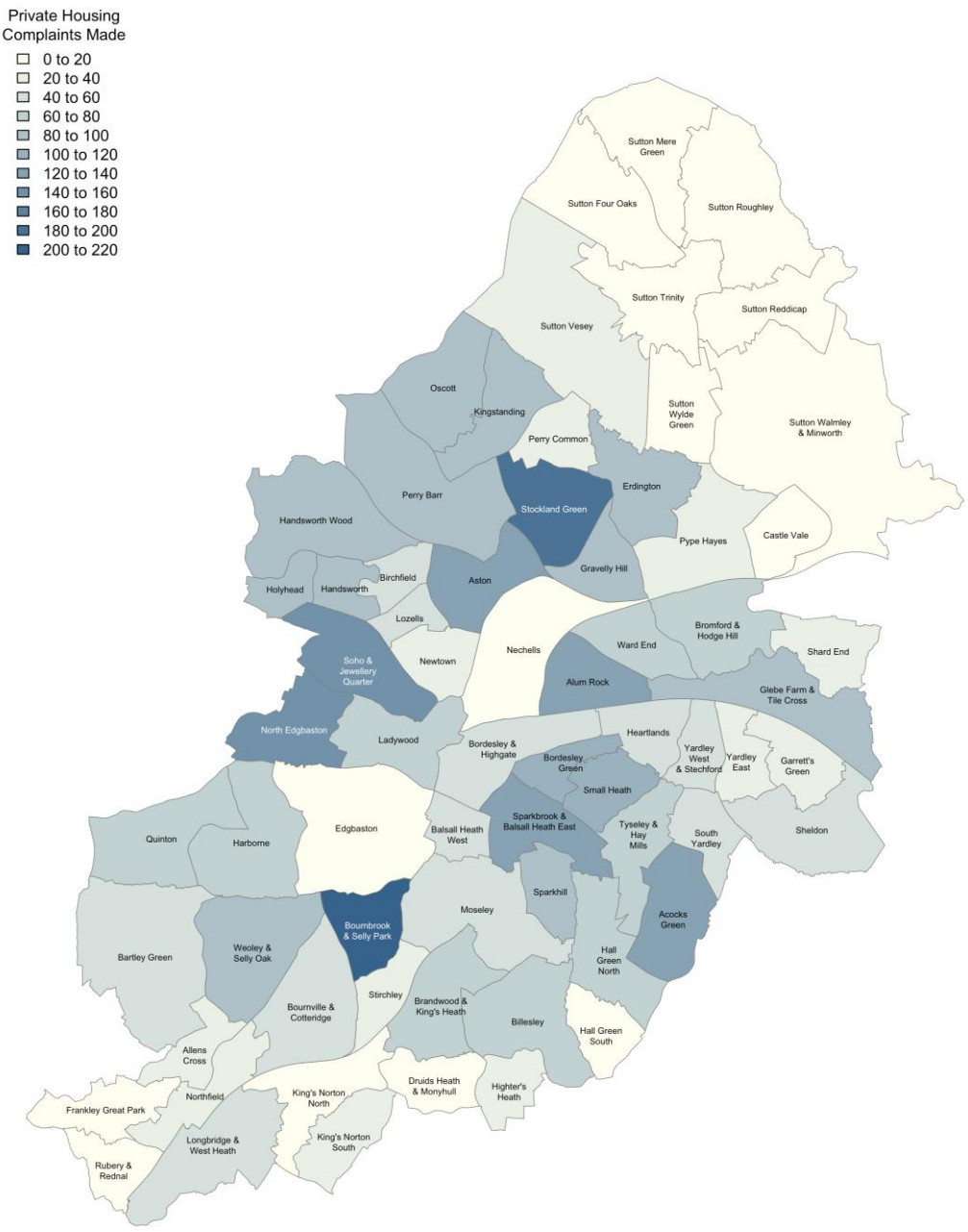


Figure 19. PRS complaints made by private tenants to the Council (2016-21) (Source Ti 2022).



Map 4. Distribution of PRS complaints made by private tenants to the Council (Source: Ti 2022, map by MS).

An EPC rating is an assessment of a property's energy efficiency. It is primarily used by buyers or renters of residential properties to assess the energy costs associated with heating a house or flat. The rating is from A to G. A indicates a highly efficient property, G indicates low efficiency.

The energy efficiency of a dwelling depends on the thermal insulation of the structure; on the fuel type; and the size and design of the means of heating and ventilation. Any disrepair or dampness to the dwelling and any disrepair to the heating system may affect their efficiency. The exposure and orientation of the dwelling are also relevant.

As part of this project 74,918 ratings were matched to PRS properties (Figure 20). All figures have been modelled from this data.

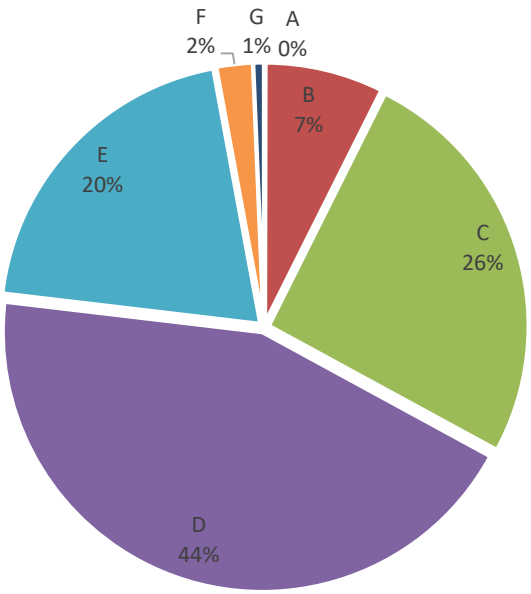


Figure 20. Distribution of current Energy Performance Certificate ratings in PRS (Rating A-G) (Source: Ti 2022).

The Minimum Energy Efficiency Standard (MEES) came into force in England and Wales on 1 April 2018. The regulation applies to PRS properties and mandates that all dwellings must have an EPC rating of E and above to be compliant.

Using the EPC records it has been possible to calculate that 17,657 PRS properties in Birmingham have an E, F, and G rating. 2,217 PRS properties have an F and G rating (Figure 20). These properties are likely to fail the MEES statutory requirement.

EPC records also shows the potential rating. This means the assessment calculates how energy efficient the property could be if the reasonable improvements the EPC recommends were made (Figure 21).

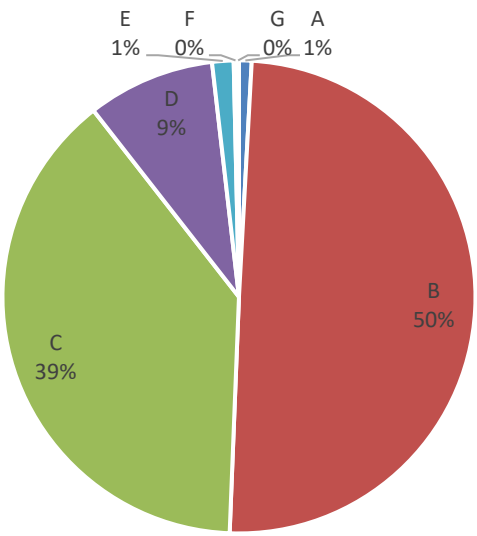


Figure 21. Distribution of potential Energy Performance Certificate ratings in PRS (Rating A-G) (Source: Ti 2022).

The statistical evidence shows that there is a continuous relationship between indoor temperature and vulnerability to cold-related death. The colder the dwelling, the greater the risk. The percentage rise in deaths in winter is greater in dwellings with low energy efficiency ratings. There is a gradient of risk with the age of the property, the risk being greatest in dwellings built before 1850, and lowest in the more energy efficient dwellings built after 1980[17]. Therefore, the sizeable number of F and G properties present a serious risk to the occupants' health, particularly if over the age of 65.

[17] Housing Health and Safety Rating System, Operation Guidance, 2006
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/15810/142631.pdf

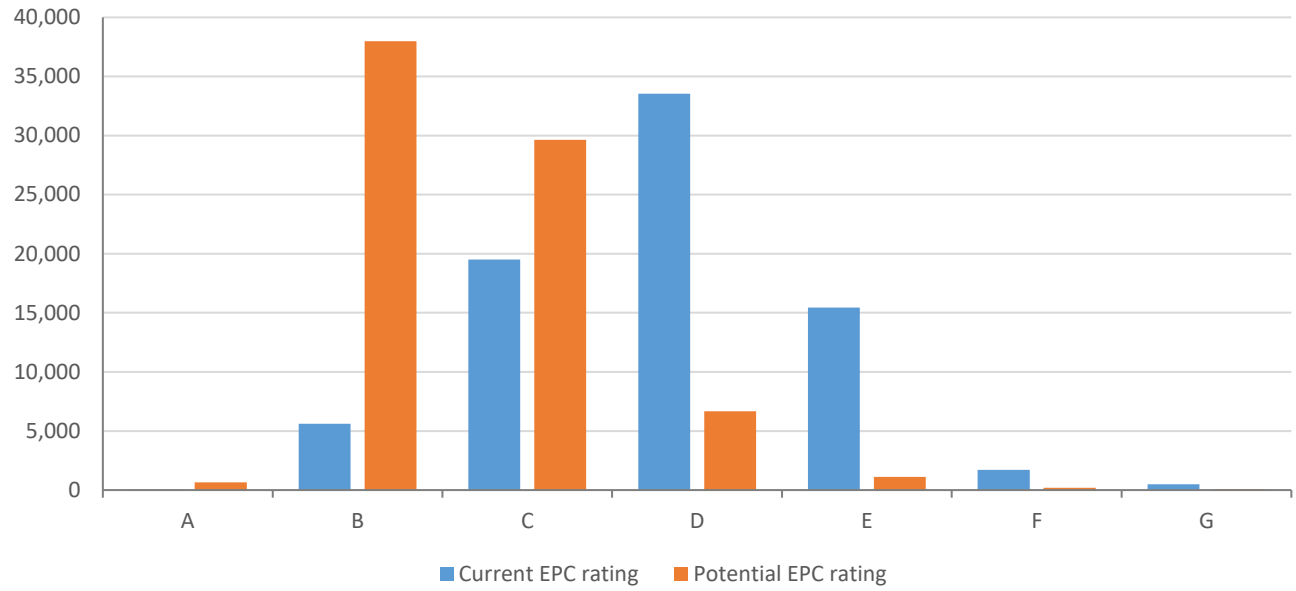


Figure 22. Current and potential Energy Performance Certificate ratings in PRS compared (Rating A-G) (Source: Ti 2022).

The average energy efficiency score for all matched addresses is 62.6, equivalent to a D rating. The average potential energy efficiency is 78.9, equivalent to a C rating.

2.2.3 PRS enforcement interventions

Birmingham uses a wide range of statutory housing and public health notices to address poor housing standards in the PRS. Housing prosecutions are used as a last resort to address breaches of legislation where the council's enforcement policy and public interest tests are met. Each prosecution represents a considerable amount of work on the council's behalf and many cases are contested by the defendant. Over a 5-year period Birmingham City Council issued 254 prosecutions and financial penalty notices (Figure 23).

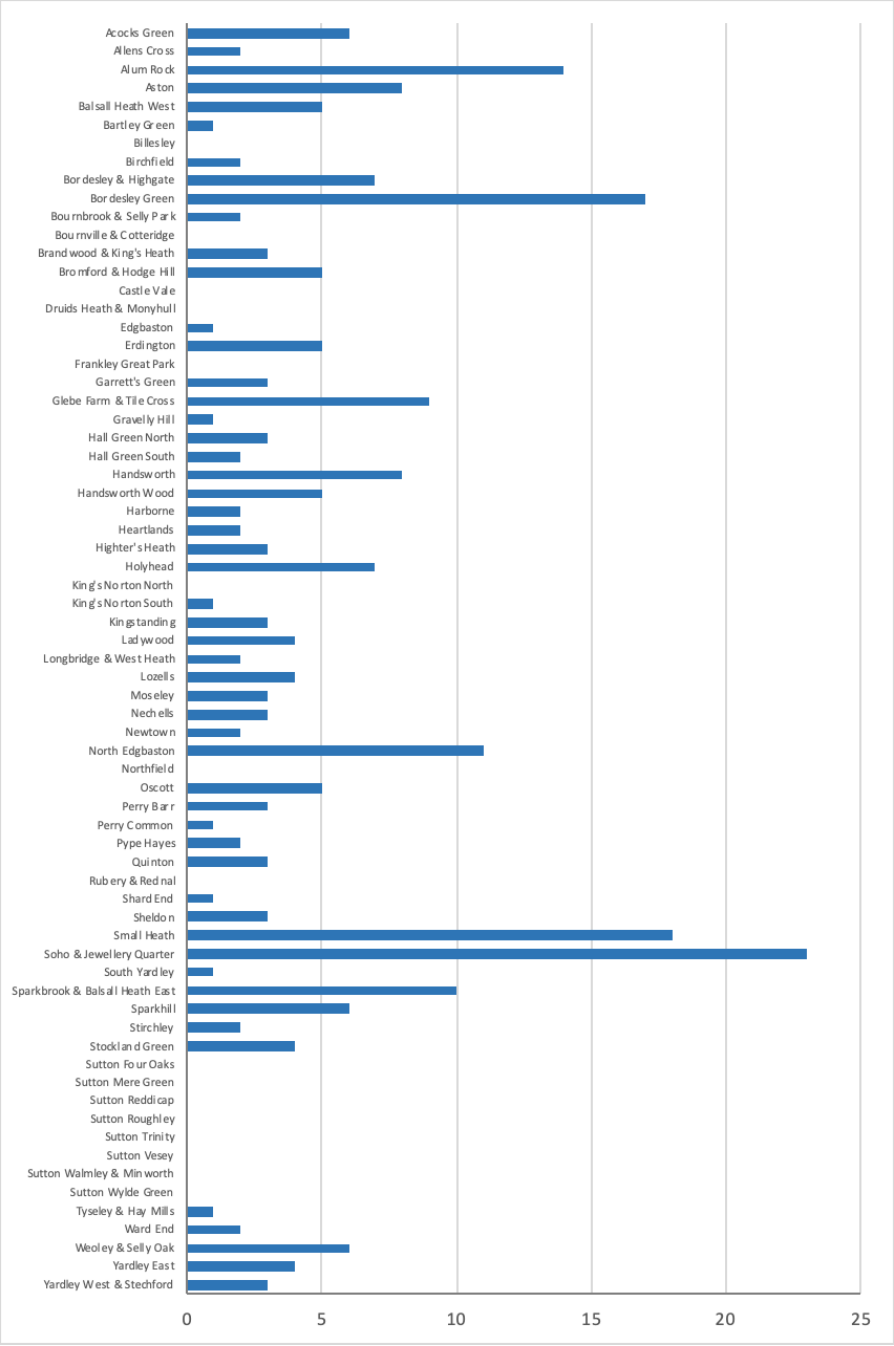
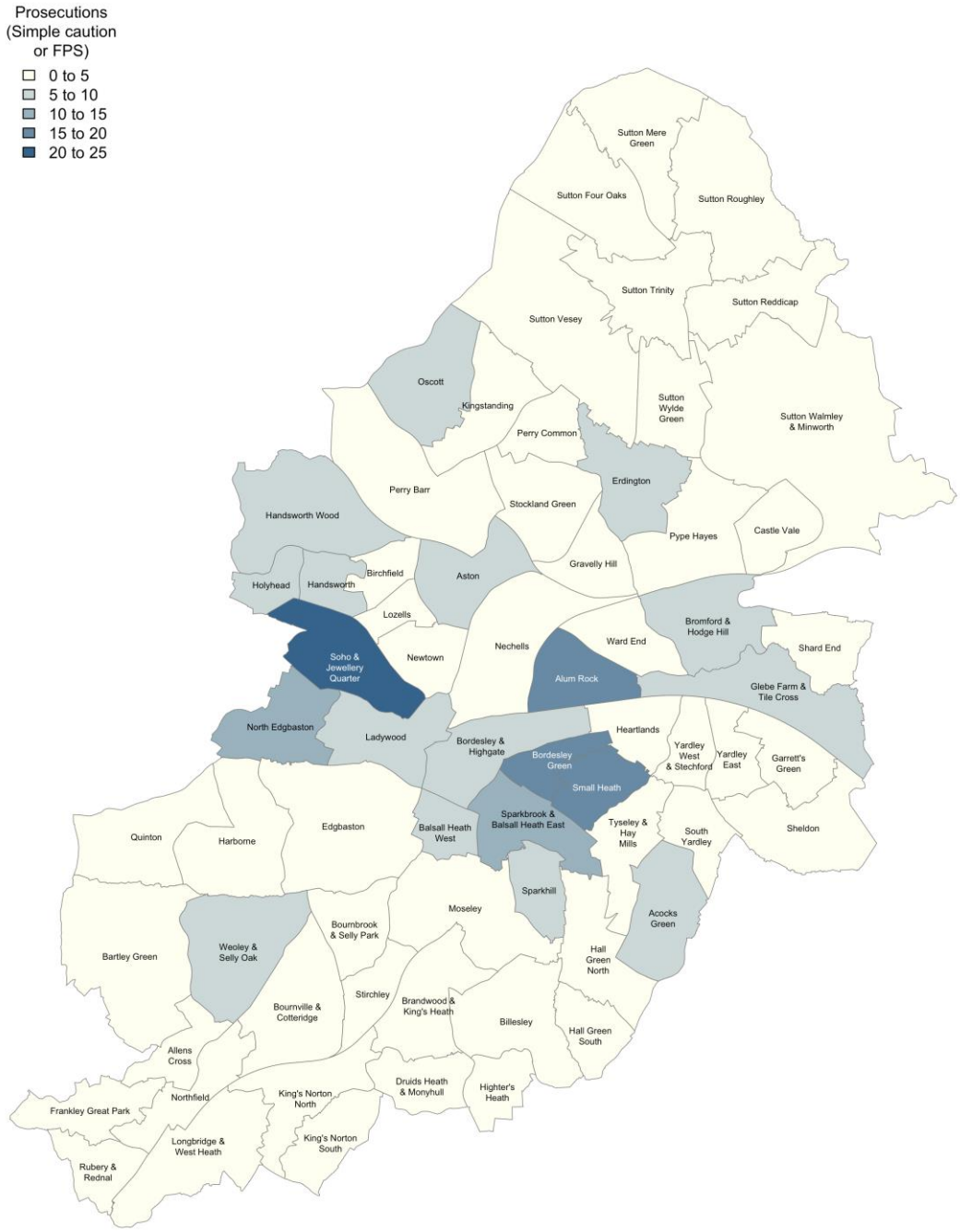


Figure 23. Housing prosecutions, simple cautions, and fixed penalty notices by ward (Source: Ti 2022).

Soho & Jewellery Quarter (23) and Small Heath (14) wards have the highest number of prosecutions.



Map 5: Housing prosecutions, simple cautions, and fixed penalty notices by ward (Source: Ti 2022, map by MS).

2.2.4 Anti-social behaviour (ASB)

The number of ASB incidents that resulted in an intervention by the council are shown below. They relate to ASB associated with residential premises only. For example, ASB incidents investigated on a street corner that cannot be linked to a residential property are excluded.

It is important to note that ASB can be subject to recording issues and therefore results do not include all reported ASB incidents, for the purpose of this report only ASB incidents investigated by a council officer have been included.

Private rented properties have high levels of ASB reported incidents (Figure 24). Over a 5-year period (2016-2021) 111,22 ASB incidents have been linked to PRS properties. Bromford & Hodge Hill (468) has the highest number of properties subject to one or more ASB incidents.

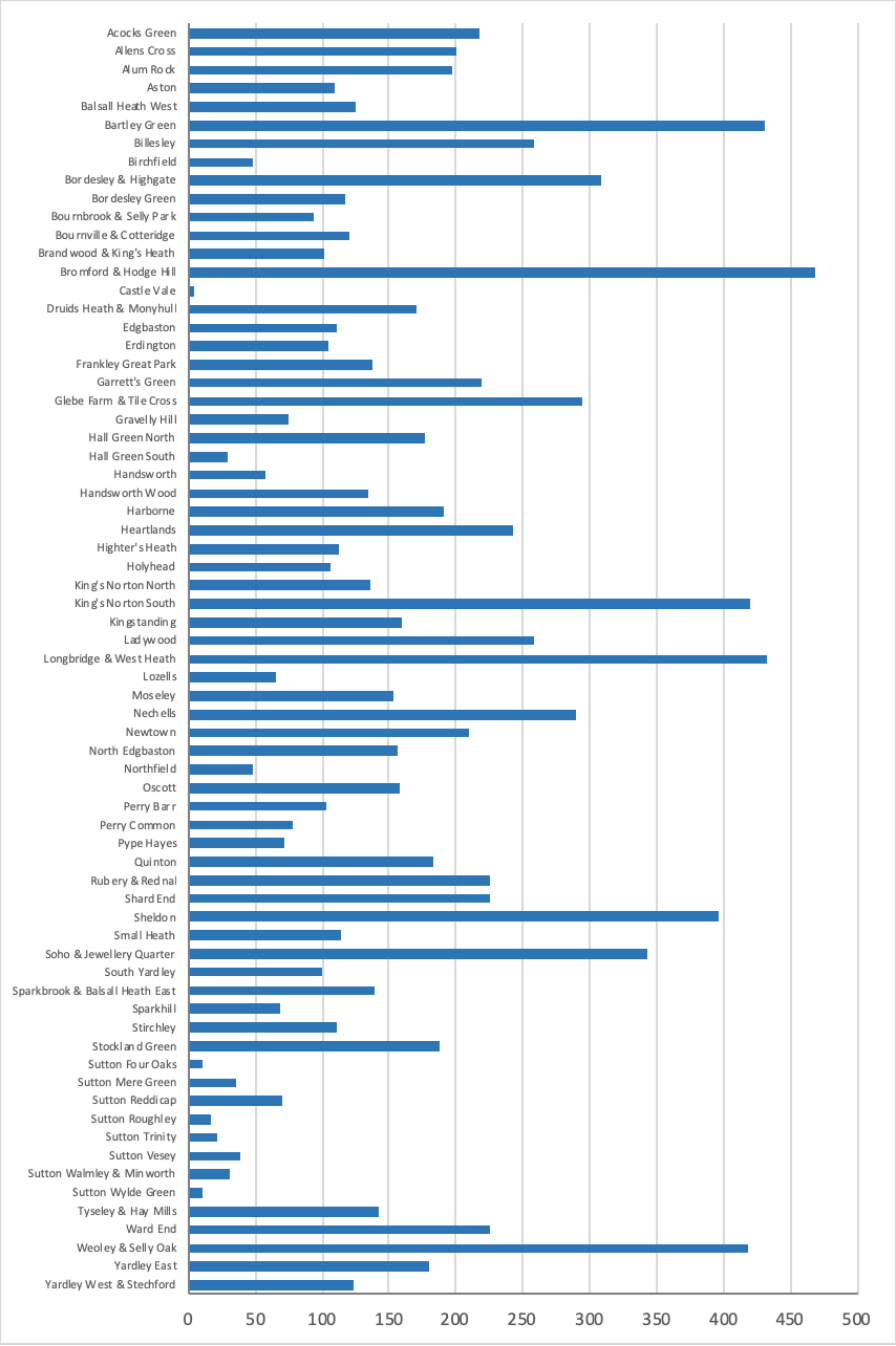


Figure 24. PRS properties subject to one or more ASB incidents (Source Ti 2022).

Between 2016-2021 a total of **11,122** ASB incidents were reported to Birmingham Council linked to PRS properties. Bromford & Hodge Hill (468) has the highest number of ASB investigations. Bartley Green has the highest number of repeat ASB incidents (Figure 25).

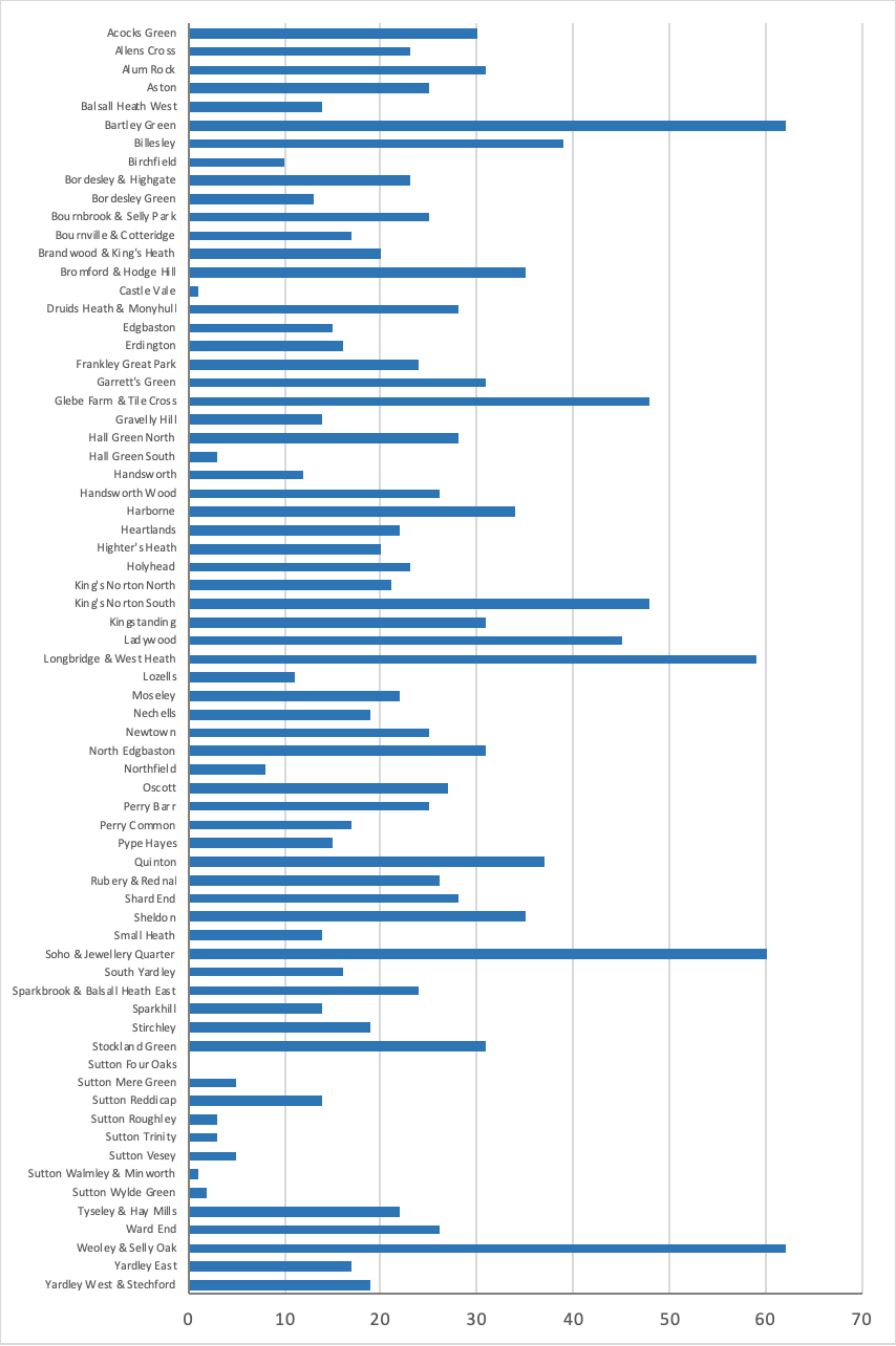
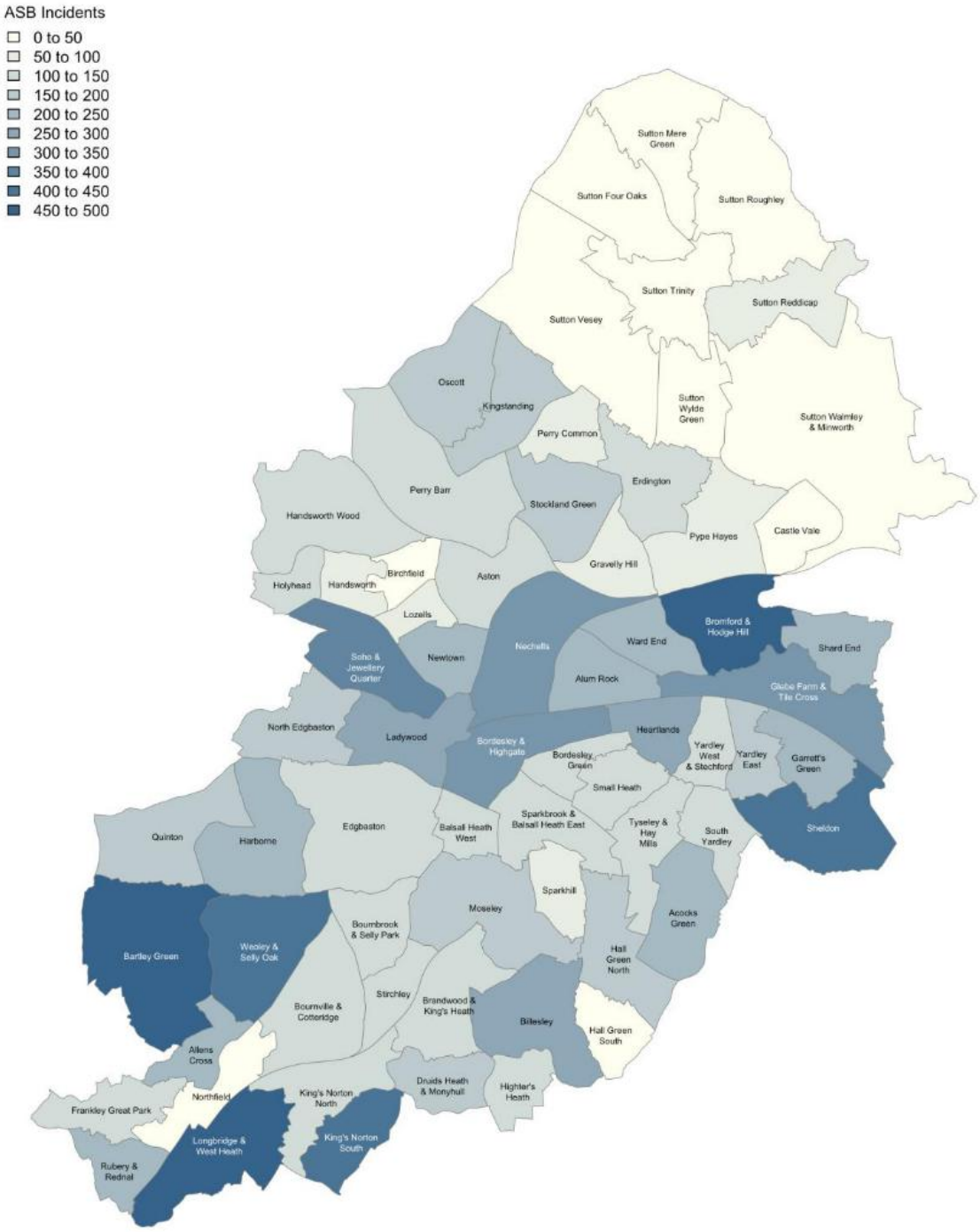


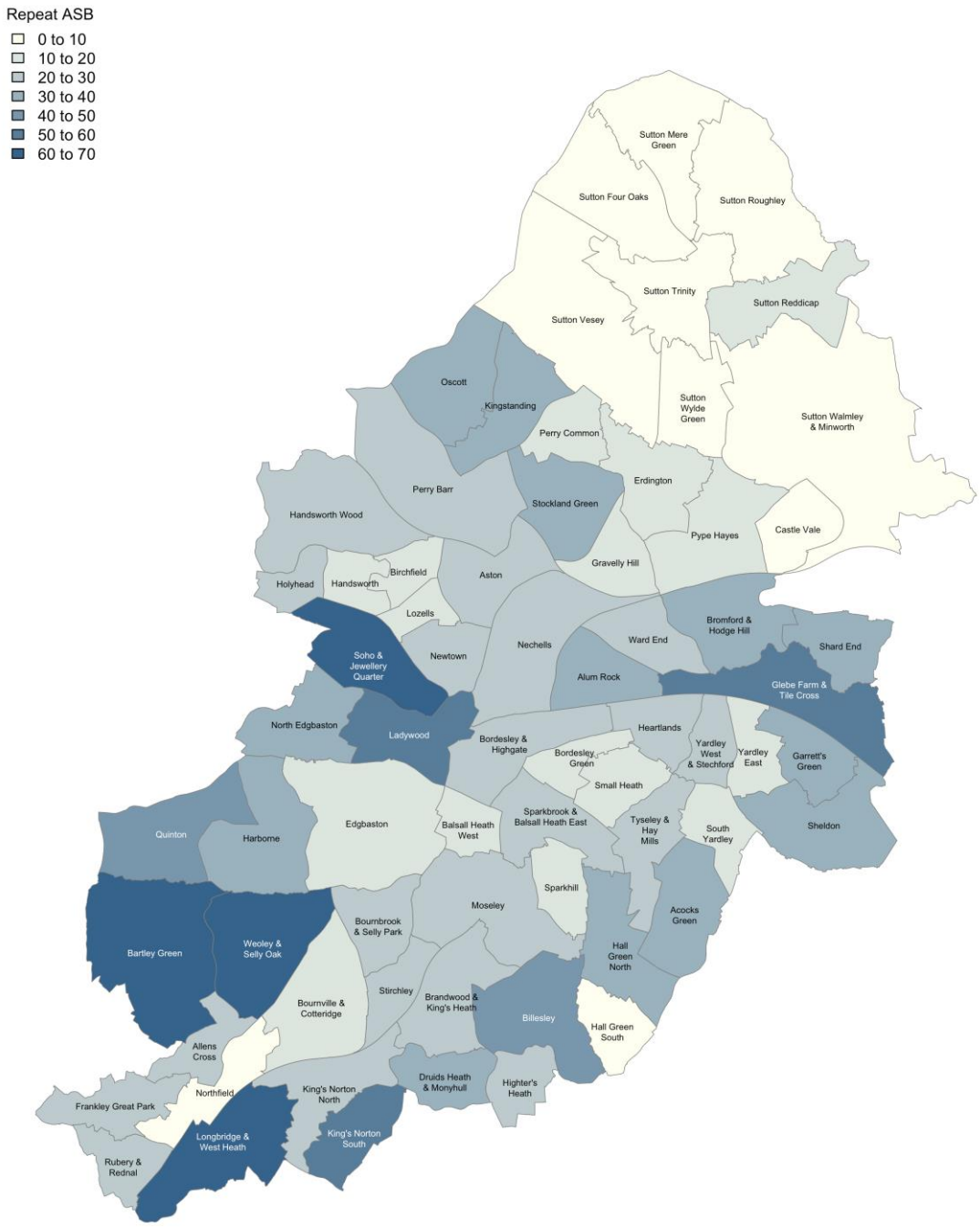
Figure 25. PRS properties subject to two or more ASB investigations (Source Ti 2022).

PRS properties subject to one or more ASB investigations across Birmingham are shown in Map 6.



Map 6. PRS properties subject to one or more ASB investigations (Source: Ti 2022, map by MS).

Repeat ASB incidents for a single property can be an indicator of properties that are poorly managed by their owners.



Map 7. PRS properties subject to two or more ASB investigations (Source: Ti 2022, map by MS).

ASB in the PRS expressed as investigations per 100 dwellings, shows a wide range of values across wards. Using this measure, King's Norton South (47.4%) and Bromford & Hodge Hill (34.3%) wards have the greatest number of ASB investigations proportional to the size of the PRS (Figure 26).

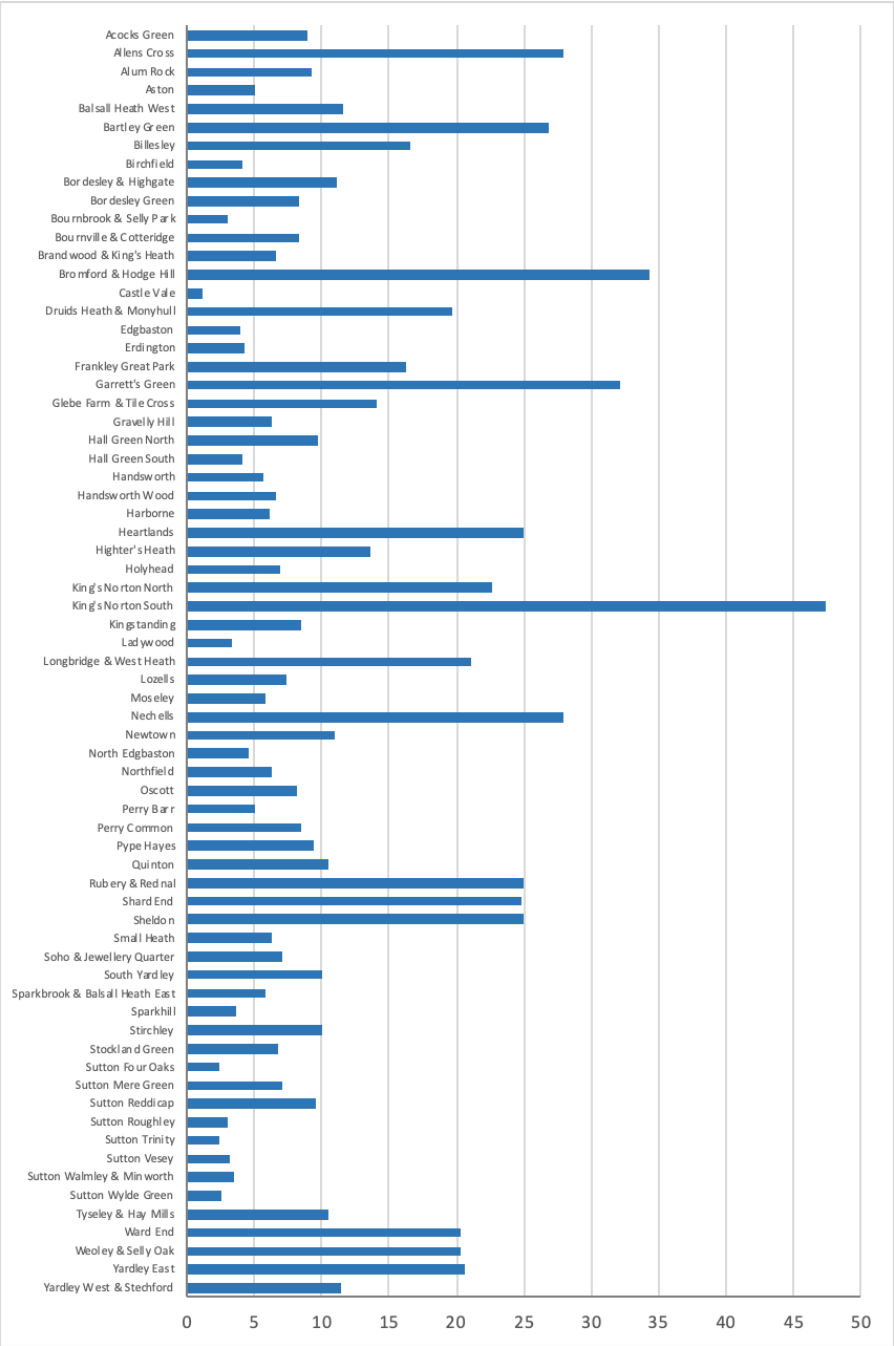


Figure 26. ASB as percentage of PRS per ward (Source: Ti 2022).

ASB can be split into various sub-categories, Noise and Neighbour Nuisance account for nearly half of all ASB complaints linked to PRS properties (Figure 27).

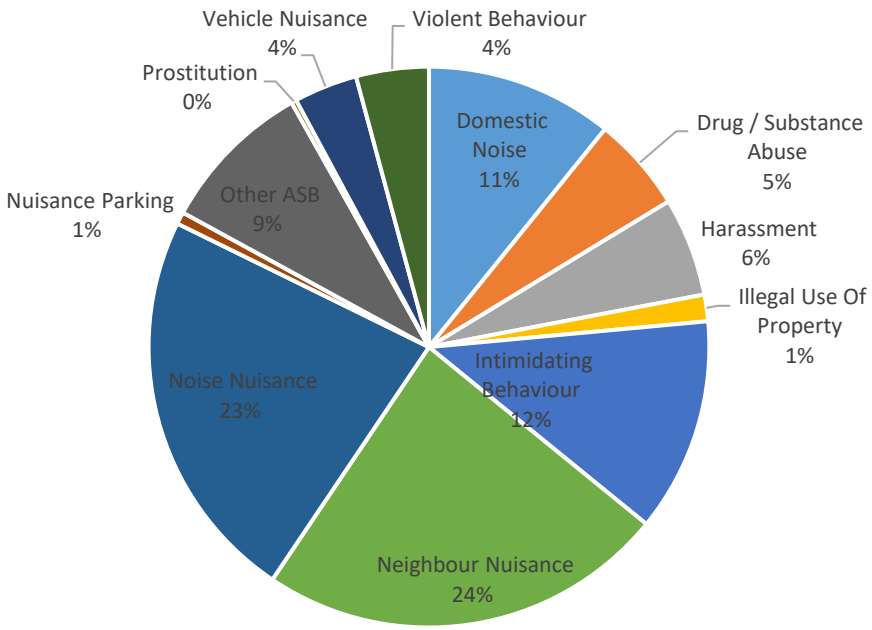


Figure 27. Types of ASB linked to PRS properties (Source: Ti 2022).

2.2.5 PRS and financial vulnerability

Housing benefit payments related to the PRS can be an indicator of financially vulnerable households and deprivation. Birmingham administered 73,278 housing benefit claims relating to PRS households between 2016-2021 (Figure 28). Housing benefit payments are distributed across all wards. Aston (2,669), Stockland Green (2,623) and Sparkbrook & Balsall Heath East (2,590) wards received the most payments.

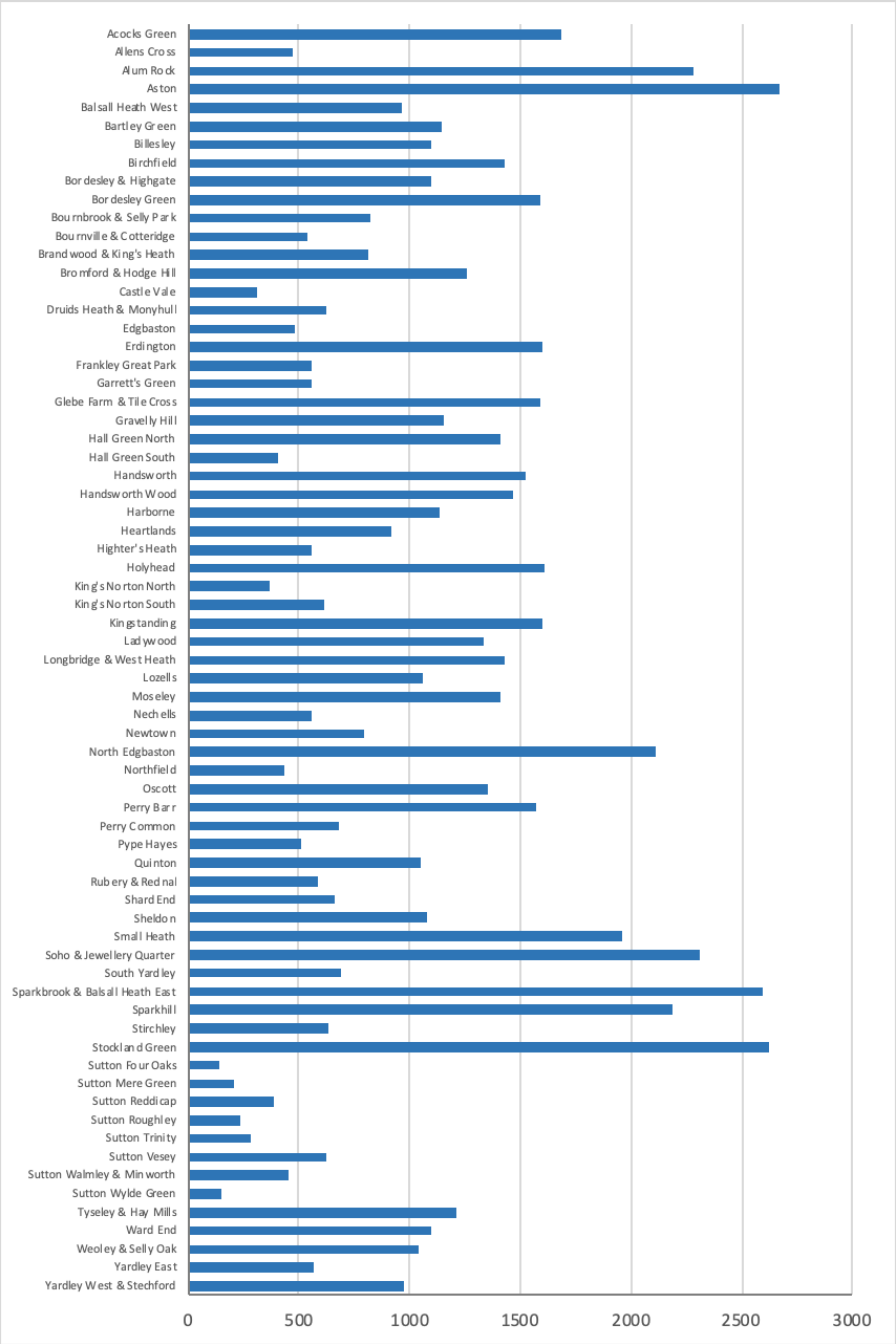


Figure 28. PRS housing benefit payments by ward (Source: Ti 2022).

3 Conclusions

Birmingham City Council's PRS has grown significantly over the last decade and is now calculated to be 24.7% (111,811) of housing stock (Figure 11). This compares to 17% of households in 2011 (ONS).

There are a total of 452,754 residential properties in Birmingham. Of these, 24.7% (111,811) are PRS, 52.1% (235,760) are owner occupied, and 23.2% (105,183) socially rented (Figure 13).

Poor housing conditions are prevalent in the PRS. There are 23,173 private rental properties in Birmingham that are likely to have a serious home hazard (Category 1, HHSRS). This represents 21% of the PRS stock, significantly higher than the national average (12%). PRS properties with serious hazards are distributed across the City. North Edgbaston (698) and Stockland Green (692) have the highest number of properties with at least one Category 1 hazard (HHSRS).

Using the EPC records it has been possible to calculate that 17,657 PRS properties in Birmingham have an E, F, and G rating. 2,217 PRS properties have an F and G rating (Figure 20). These properties are likely to fail the MEES statutory requirement.

Private rented properties have high levels of ASB reported incidents (Figure 24). Over a 5-year period (2016-2021) 111,22 ASB incidents have been linked to PRS properties. Bromford & Hodge Hill (468) has the highest number of properties subject to one or more ASB incidents. Noise and Neighbour Nuisance account for nearly half of all ASB complaints linked to PRS properties (Figure 27).

Birmingham administered 73,278 housing benefit claims relating to PRS households between 2016-2021 (Figure 28).

Birmingham is the 7th most deprived local authority in England (Figure 5), with nearly half of the City within the bottom 10% most deprived nationally. Birmingham has a high proportion of high deprivation wards. 60 out of 69 wards have aggregated IMD rankings below the national average. 26 wards are in the lowest 20% nationally.

Birmingham has a significantly higher proportion in fuel poverty (21.1%) than the national average (13.8%). Birmingham has the highest fuel poverty rate of any UK core city

Appendix 1 – Ward summaries

Table 2. Ward summary overview (Source Ti 2022).

Ward	PRS dwellings	% PRS	No. serious hazards (HHSRS)	ASB incidents linked to PRS
Acocks Green	2448	25.2	644	218
Allens Cross	718	16.1	195	200
Alum Rock	2147	30.1	574	197
Aston	2195	31.2	595	110
Balsall Heath West	1084	26.7	260	125
Bartley Green	1609	15.8	367	431
Billesley	1566	18.8	404	259
Birchfield	1158	26.1	285	48
Bordesley & Highgate	2797	38.6	205	309
Bordesley Green	1407	34.3	362	117
Bournbrook & Selly Park	3051	45.3	345	93
Bournville & Cotteridge	1448	16.0	261	121
Brandwood & King's Heath	1537	18.4	407	102
Bromford & Hodge Hill	1366	18.3	353	468
Castle Vale	409	9.6	82	5
Druids Heath & Monyhull	870	16.6	188	171
Edgbaston	2844	36.1	310	111
Erdington	2409	24.8	540	104
Frankley Great Park	851	16.4	140	138
Garrett's Green	682	16.3	198	219
Glebe Farm & Tile Cross	2085	21.8	500	295
Gravelly Hill	1201	26.9	308	75
Hall Green North	1815	22.6	470	177
Hall Green South	706	17.0	198	29
Handsworth	1024	26.8	304	58
Handsworth Wood	2035	28.5	547	134
Harborne	3085	28.7	582	191
Heartlands	976	26.5	286	243
Highter's Heath	833	18.2	208	113
Holyhead	1534	37.0	414	106
King's Norton North	600	12.8	157	136
King's Norton South	887	15.9	228	420
Kingstanding	1887	22.0	529	159
Ladywood	7577	43.3	346	258
Longbridge & West Heath	2054	20.2	457	432
Lozells	902	24.4	246	66
Moseley	2627	26.2	493	153
Nechells	1038	21.4	121	290
Newtown	1897	33.2	231	209
North Edgbaston	3424	37.7	698	157
Northfield	769	16.0	170	48
Oscott	1947	22.1	523	158

Perry Barr	2032	24.5	536	103
Perry Common	916	18.7	211	78
Pype Hayes	756	15.8	186	71
Quinton	1741	19.3	407	183
Rubery & Rednal	901	19.5	219	225
Shard End	912	16.4	202	226
Sheldon	1584	18.4	434	396
Small Heath	1832	32.5	559	114
Soho & Jewellery Quarter	4861	40.9	559	343
South Yardley	998	22.7	257	100
Sparkbrook & Balsall Heath East	2393	30.5	623	139
Sparkhill	1870	32.2	508	69
Stirchley	1114	24.3	251	111
Stockland Green	2772	28.4	692	187
Sutton Four Oaks	427	10.3	82	10
Sutton Mere Green	509	11.0	110	36
Sutton Reddicap	727	16.2	143	70
Sutton Roughley	572	12.5	91	17
Sutton Trinity	882	18.8	180	21
Sutton Vesey	1233	14.7	315	39
Sutton Walmley & Minworth	876	12.1	170	31
Sutton Wylde Green	443	11.4	98	11
Tyseley & Hay Mills	1357	29.5	371	142
Ward End	1117	27.1	327	226
Weoley & Selly Oak	2052	19.9	414	418
Yardley East	870	19.3	231	180
Yardley West & Stechford	1070	24.3	266	123

*Data excludes known HMOs (licenced Housing Act 2004, Part 2)

Appendix 2 - Tenure Intelligence (Ti) – stock modelling methodology

This Appendix explains at a summary level Metastreet's Tenure Intelligence (Ti) methodology (Figure 29).

Ti uses a wide range of data to spot trends at the property level. Machine learning is used in combination with expert housing knowledge to accurately predict a defined outcome at the property level.

Council and external data have been assembled as set out in Metastreet's data specification to create a property data warehouse. Houses in multiple occupation (HMO) licenced under part 2 of the Housing Act 2004 have been excluded from the primary data and stressor results.

Machine learning is used to make predictions of defined outcomes for each residential property, using known data provided by Birmingham.

Results are analysed by skilled practitioners to produce a summary of housing stock, predictions of levels of property hazards and other property stressors. The results of the analysis can be found in the report findings chapter.

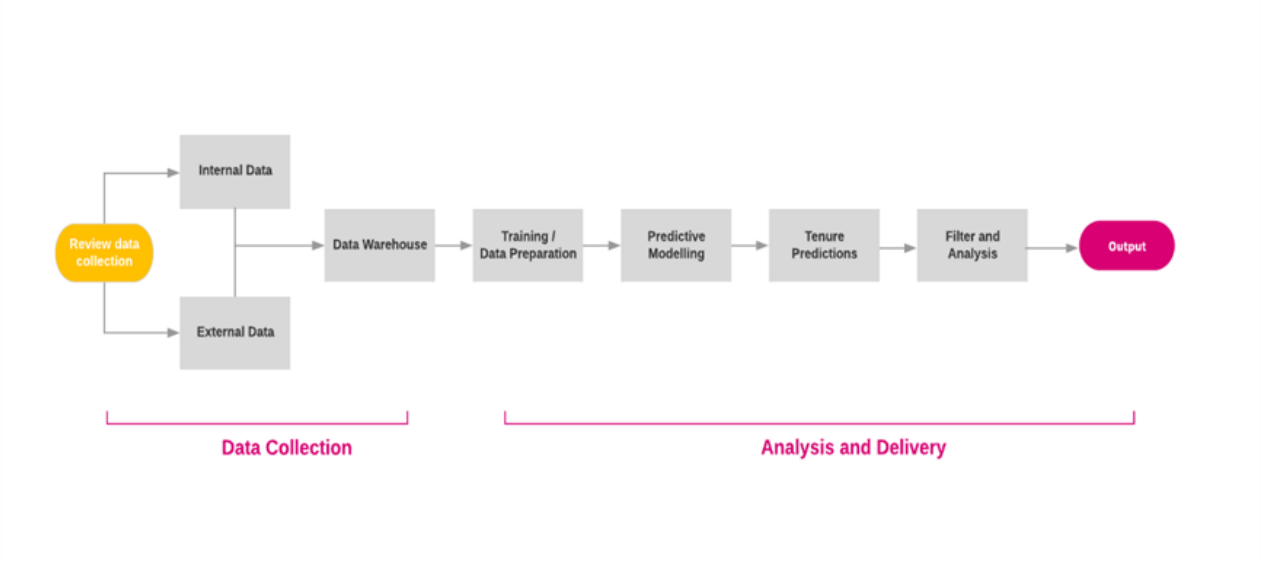


Figure 29. Summary of Metastreet Tenure Intelligence methodology.

Methodology

Metastreet has worked with Birmingham to create a residential property data warehouse based on a detailed specification. This has included linking approximately 16 million + cells of data to 452,754 unique property references, including council and externally sourced data. Properties that were identifiable as shell addresses were set aside. All longitudinal data is 5 consecutive years, from April 2016 – March 2021.

Once the property data warehouse was developed, the Ti model was used to predict tenure and stock condition using the methodology outlined below.

Machine learning was utilised to develop predictive models using training data provided by the council. Predictive models were tested against all residential properties to calculate risk scores for each outcome. Scores were integrated back into the property data warehouse for analysis.

Many combinations of risk factors were systematically analysed for their predictive power using logistic regression. Risk factors that duplicated other risk factors but were weaker in their predictive effect were eliminated. Risk factors with low data volume or higher error are also eliminated. Risk factors that were not statistically significant are excluded through the same processes of elimination. The top 5 risk factors for each model have the strongest predictive combination.

Three predictive models have been developed as part of this project. Each model is unique to Birmingham; they include:

- Owner occupiers
- Private rented sector (PRS)
- PRS housing hazards

Using a D^2 constant calculation it is possible to measure the theoretical quality of the model fit to the training data sample. This calculation has been completed for each model. The D^2 is a measure of "predictive capacity", with higher values indicating a better model.

Based on the modelling each residential property is allocated a probability score between 0-1. A probability score of 0 indicates a strong likelihood that the property tenure type is *not* present, whilst a score of 1 indicates a strong likelihood the tenure type *is* present.

Predictive scores are used in combination to sort, organise and allocate each property to one of 4 categories described above. Practitioner skill and experience with the data and subject matter is used to achieve the most accurate tenure split.

It is important to note that this approach cannot be 100% accurate as all mathematical models include error for a range of reasons. The D^2 value is one measure of model "effectiveness". The true test of predictions is field trials by the private housing service. However, error is kept to a minimum through detailed post analysis filtering and checking to keep errors to a minimum.

A continuous process of field testing and model development is the most effective way to develop accurate tenure predictions.

The following tables include detail of each selected risk factors for each model. Results of the null hypothesis test are also presented as shown by the Pr(>Chi) results. Values of <0.05 are generally considered to be statistically significant. All the models show values much smaller, indicating much stronger significance.

Owner occupier model

The owner occupier model shows each of the 5 model terms to be statistically significant, with the overall model showing a "predictive capacity" of around 81% (Table 3).

Table 3. Owner occupier predictive factors.

Risk factors selected	**Pr(>Chi)***
Length.of.current.account	2.2e-16
Accounts.over.5.years	2.2e-16
Council.Tax.band	2.2e-16
EPC Tenure	2.2e-16
ASB count	7.394e-05
Training data, n= 2047	
D^2 test = 0.81 **	

* Pr(>Chi) = Probability value/null hypothesis test, ** D^2 test = Measure of model fit

PRS predictive model

The PRS model shows that each of the 5 model terms is statistically significant, with the overall model having a "predictive capacity" of around 85% (Table 4).

Table 4. PRS predictive factors.

Risk factors selected	**Pr(>Chi)**
Accounts.over.5.years	2.2e-16

Benefit.claims.over.last.5.years	2.2e-16
Length.of.current.account	2.2e-16
Housing benefit	2.2e-16
Total service requests	2.2e-16
Training data, n= 2047	
D^2 test = 0.85	

Category 1 (HHSRS) hazards model

Numerous properties where the local housing authority has taken action to address serious hazards were sampled for training data, including poor housing conditions. Specifically, this included Housing Act 2004 Notices served on properties to address Category 1 hazards. The model results show that each of the model terms is statistically significant, with the overall model having a "predictive capacity" of around 91% (Table 5).

Table 5. Category 1 (HHSRS) hazard predictive factors.

Risk factors selected	**Pr (>Chi)**
CURRENT_ENERGY_EFFICIENCY	2.2e-16
Benefit.claims.over.last.5.years	2.2e-16
ASB.count	0.0056803
Length.of.current.account	8.771e-05
Private.Housing.complaint.made	2.333e-12
Training data, n= 402	
D^2 test = 0.90	

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