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Birmingham City Council

Houses in Multiple Occupation (HMO): Stressors Report

May 2022

META STREET

Executive Summary

Metastreet were commissioned by Birmingham City Council to review Houses in Multiple Occupation in the city and assess stressors related to this sub-tenure.

The information provided in this report will facilitate the development and delivery of Birmingham's housing strategy and enable a targeted approach to tackling poor housing in the private rented sector (PRS).

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

- Information on the number of Houses in Multiple Occupation (HMOs) as a subset of the PRS
- Other housing related stressors, including antisocial behaviour (ASB), tenant/property complaints and waste incidents linked directly to HMOs
- Assist the council to make policy decisions

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.

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	Nuisance waste records	Tenancy deposit data
Housing benefit	Property complaints and interventions records	ASB complaints and interventions records	Energy Performance data

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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:

- Distribution of HMOs

- Housing condition in HMOs (HHSRS)

- Other housing related stressors, including Anti-Social Behaviour (ASB), complaints, and waste

From the original Birmingham data frame developed in 2021 to identify privately rented properties and stressors, a separate updated data frame focused on HMO has been developed specifically for this project. The data frame includes some of the original data but has been refreshed where possible. New training data has been used to build the predictive models.

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, built up from property level data.

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

- Houses in multiple occupation (HMO)
- Private housing
- Category 1 (HHSRS)

The appendices to the report contain a summary of the data and a more detailed report methodology.

1   Houses in Multiple Occupation

HMOs identified as part of this study are HMOs that share basic amenities ("section 254 HMOs") The Housing Act 2004 defines HMOs as a "dwelling of 3 or more persons not forming a single household".   Section 254 HMOs are categorised as buildings or flats that are occupied by two or more households and 3 or more persons that share a basic amenity, such as bathroom, toilet, or cooking facilities. This type of rented property represents the cheapest rental accommodation; rented by room with the sharing of amenities (usually kitchen/bathroom).

1.1   HMO Population & Distribution

The modelling estimates that there are 11,933 HMOs in the city, figure 1 shows that they are distributed across all wards.

Bournbrook & Selly Park has the highest number of HMOs (1159), followed by Soho & Jewellery Quarter (418) & North Edgbaston (414).
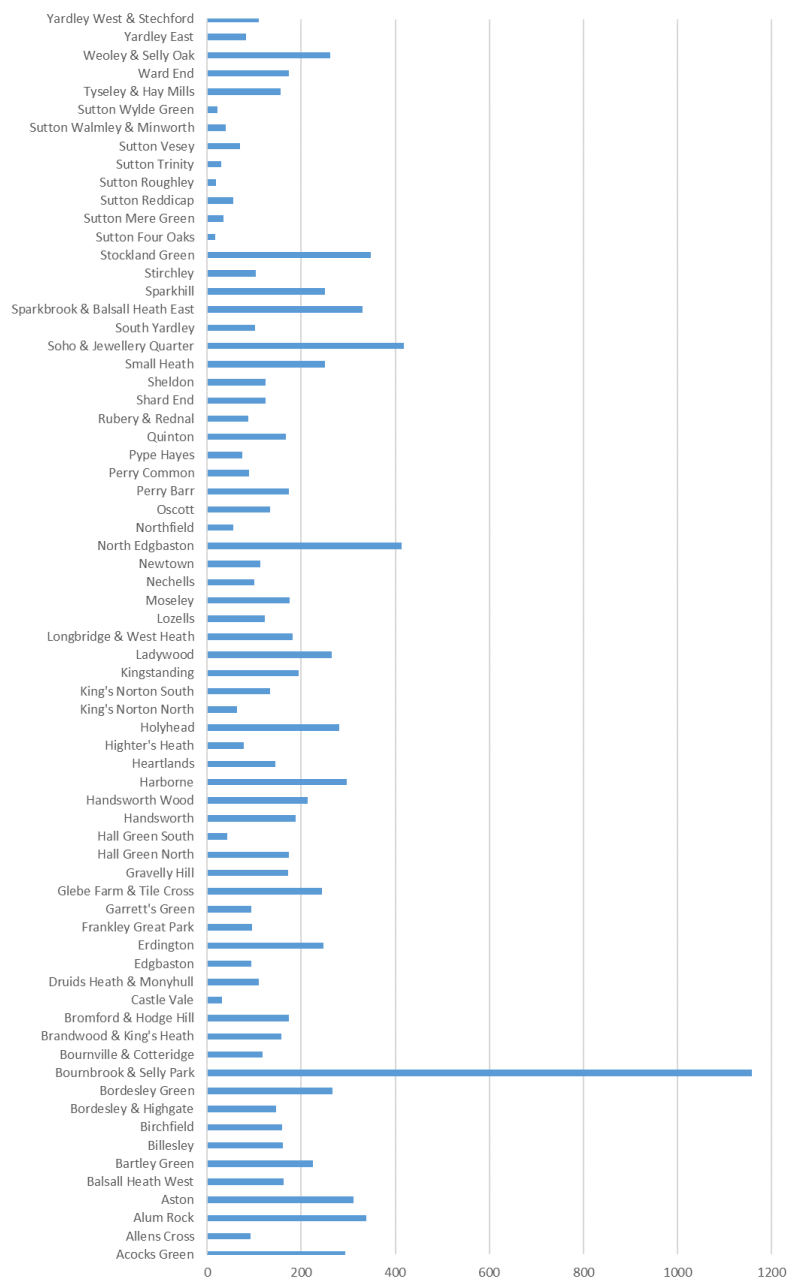
Figure 1. Number of shared amenities HMOs (s254) by ward (Source Ti 2022).

1.2 HMO & Energy Performance

An Energy Performance Certificate (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 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. It has been calculated using the matched addresses that **215** HMOs have an F and G rating and are therefore likely to fail the MEES statutory requirement.
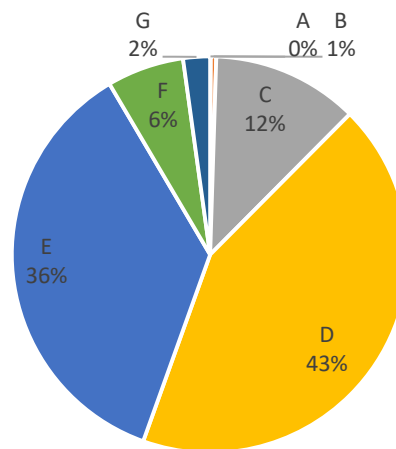
Figure 2. Distribution of current Energy Performance Certificate ratings in HMOs (Rating A-G) (Source: Ti 2022).

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 Therefore it is possible to compare current against potential EPC rating for any given housing population area (Figure 3).
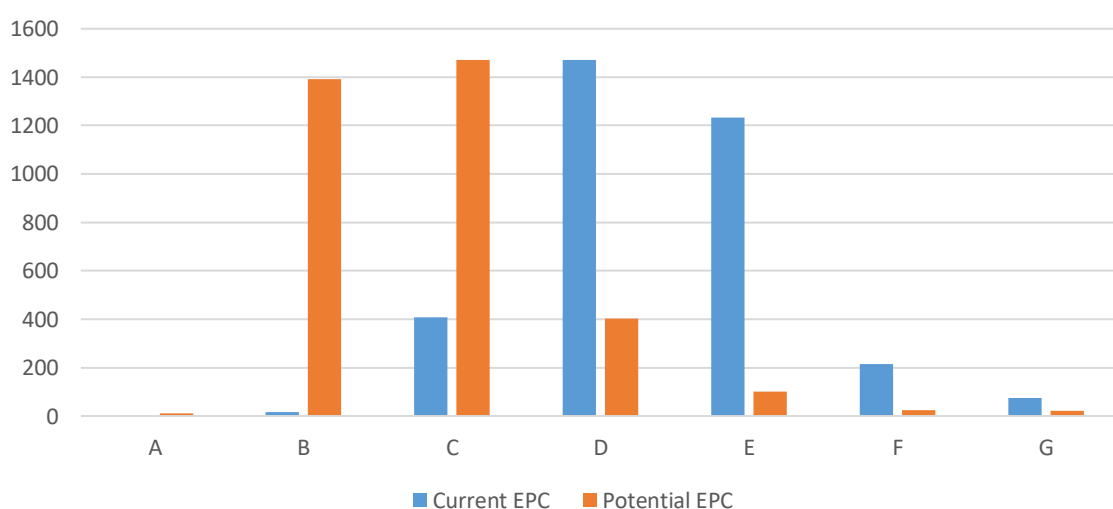
Figure 3. Current and Potential Energy Performance Ratings (EPC) linked to HMOs by ward (Source Ti 2022).

1.3   HMO & Tenant/Property Complaints

Complaints made by tenants & others about HMOs are common and are distributed across all wards, the council has received 1,441 complaints over the 5 years. Complaints regarding poor property conditions and inadequate property management can be an indicator of low-quality properties. Figure 4 shows the number of complaints received by Birmingham City Council linked to HMOs. Bournbrook & Selly Park (153) and Stockland Green (74) received the most complaints.
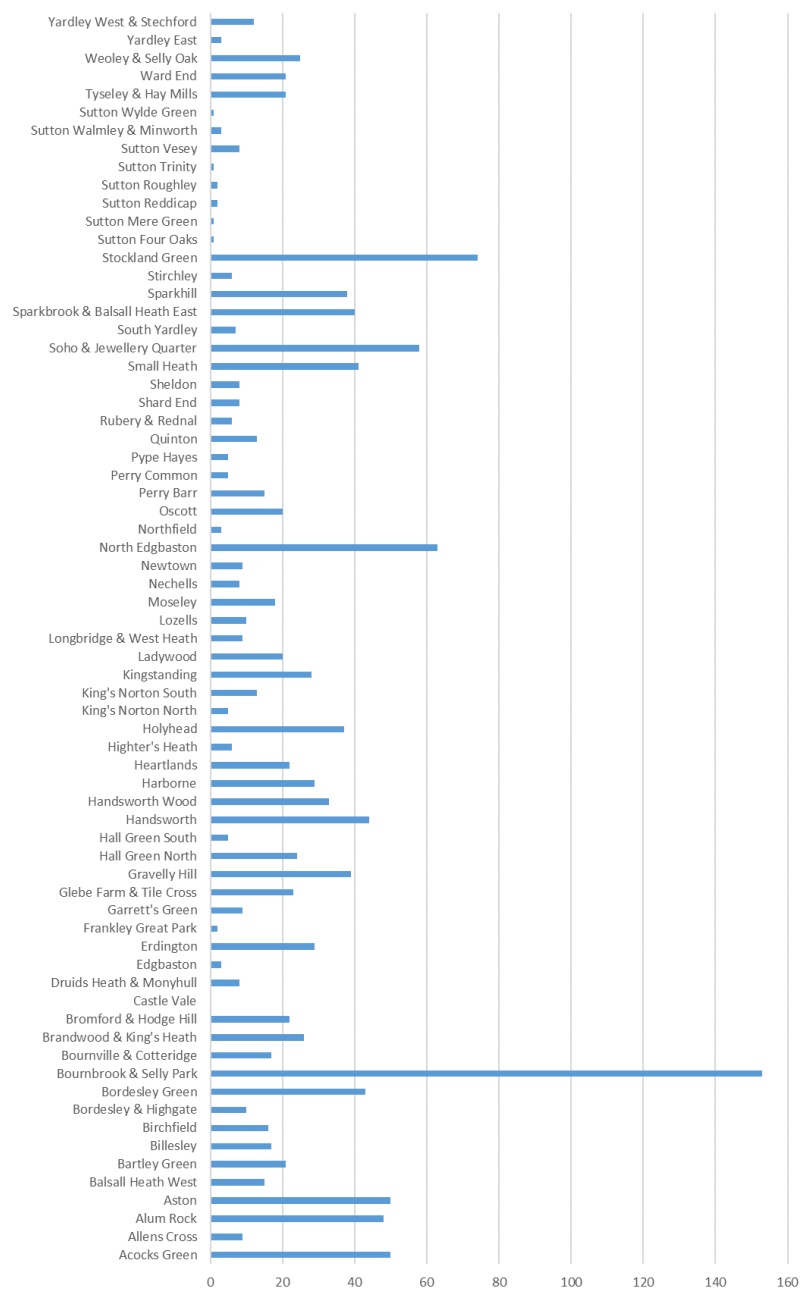
Figure 4. Complaints by ward linked to HMOs (s254) (Source Ti 2022).

1.4   HMO & Hazards (HHSRS)

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 HMOs with at least 1 serious hazard across the City. This methodology is focussed on identifying Category 1 hazards, however, it is also likely to identify some high scoring Category 2 hazards.

There are 5,866 HMOs in Birmingham that are likely to have a serious home hazard (Category 1, HHSRS). This represents 49.1% of the HMO stock, significantly higher than the national average (12%) for the PRS as a whole. HMOs properties with serious hazards are distributed across the City. Bournbrook & Selly Park (231) and Soho & Jewellery Quarter (196) have the highest number of properties with at least one Category 1 hazard (HHSRS).
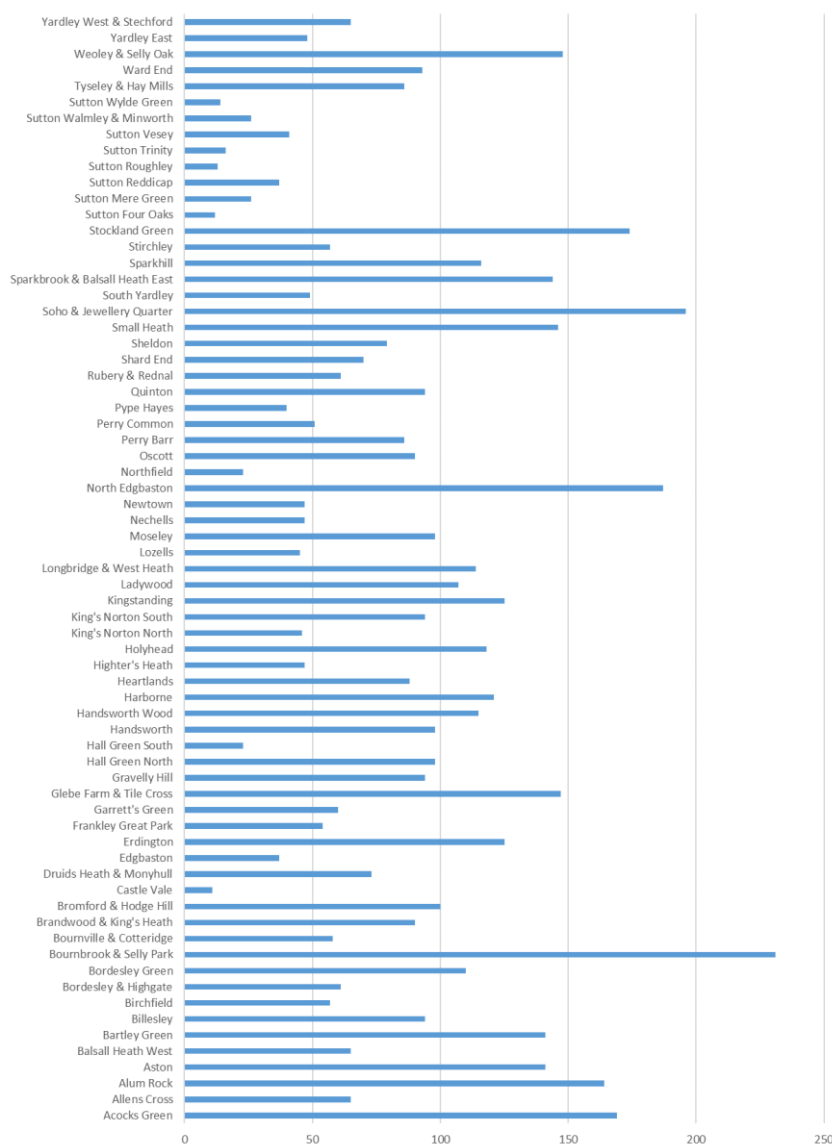
Figure 5. Category 1 hazards linked to HMOs (Source Ti 2022).

1.5   HMO & Waste Incidents

The number of waste incidents that have been recorded by the council over the last 5 years and have been linked to HMOs are shown below (Figure 6). Waste incidents not linked to residential premises are excluded from these figures.

They relate to waste that has not been properly disposed of, including dumped rubbish and accumulations of waste. Incidents that could not be linked to an individual HMO have been put aside. For example, waste incidents reported on a street corner that cannot be linked to a residential property are excluded.

The study linked 28,490 records to 6,848 HMOs. The original pool of waste data linked to a residential property included 106,831 records. Therefore, 26.7% of all waste records have been attributed to HMOs in Birmingham. Soho & Jewellery Quarter (1,496) and Bordesley Green (1,297) have the highest number of waste incidents linked to HMOs.
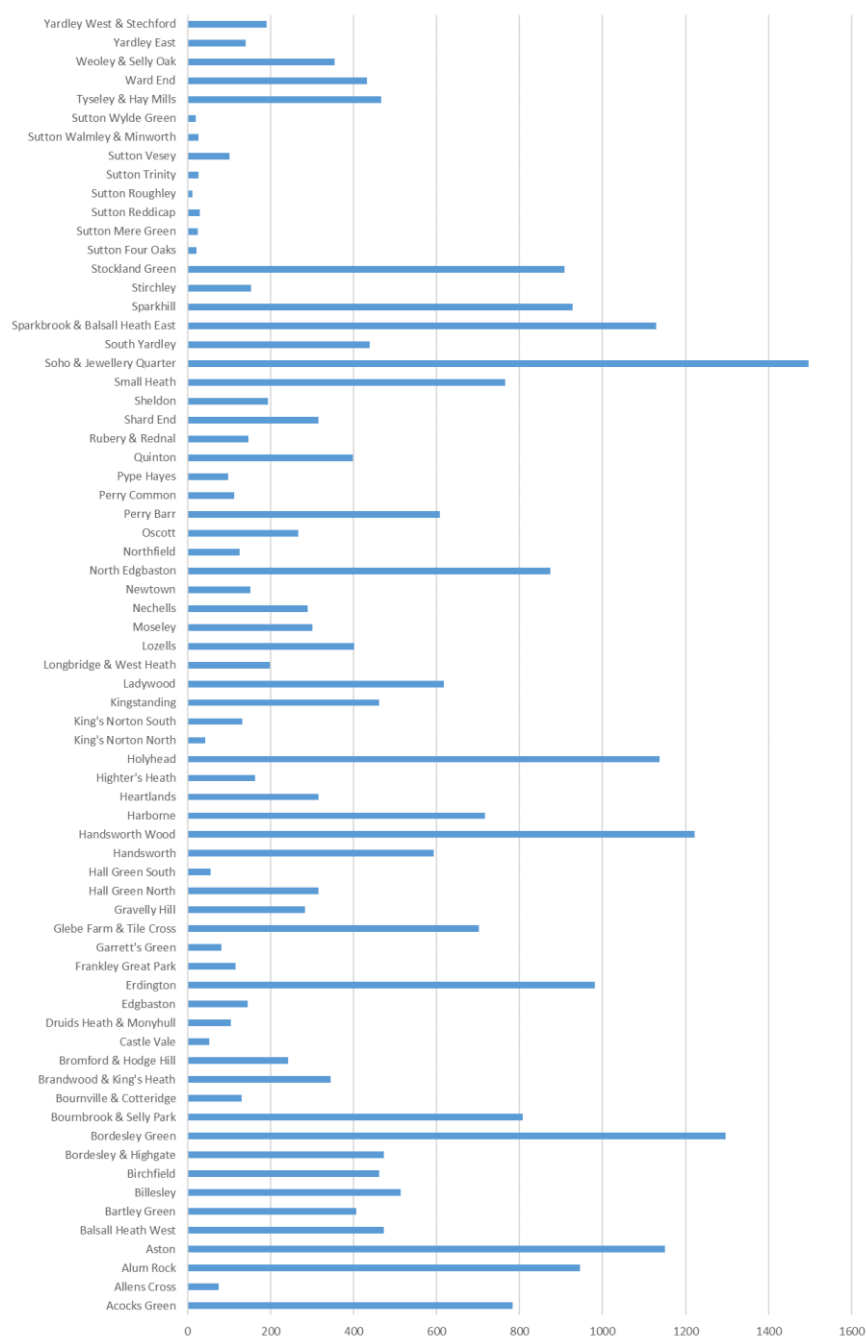
Figure 6. Waste records linked to HMOs (s254) (Source Ti 2022).

1.6   HMO & Anti-Social Behaviour (ASB)

Over a 5-year period, 11,241 ASB incidents have been linked to 4,107 HMOs in Birmingham. 1,599 HMOs were the source of two or more incidents over the same period.

A high level of ASB can be used as a proxy indicator of poor property management. HMO properties typically have higher levels of transience which can result in higher waste production, more noise and other issues if the property is not managed well.

Figure 7 shows the number of ASB incidents (11,241) associated with HMO premises (ASB incidents not linked to residential premises are excluded from these figures). Bromford & Hodge Hill (468) & Bartley Green (435) have the highest recorded level of ASB.
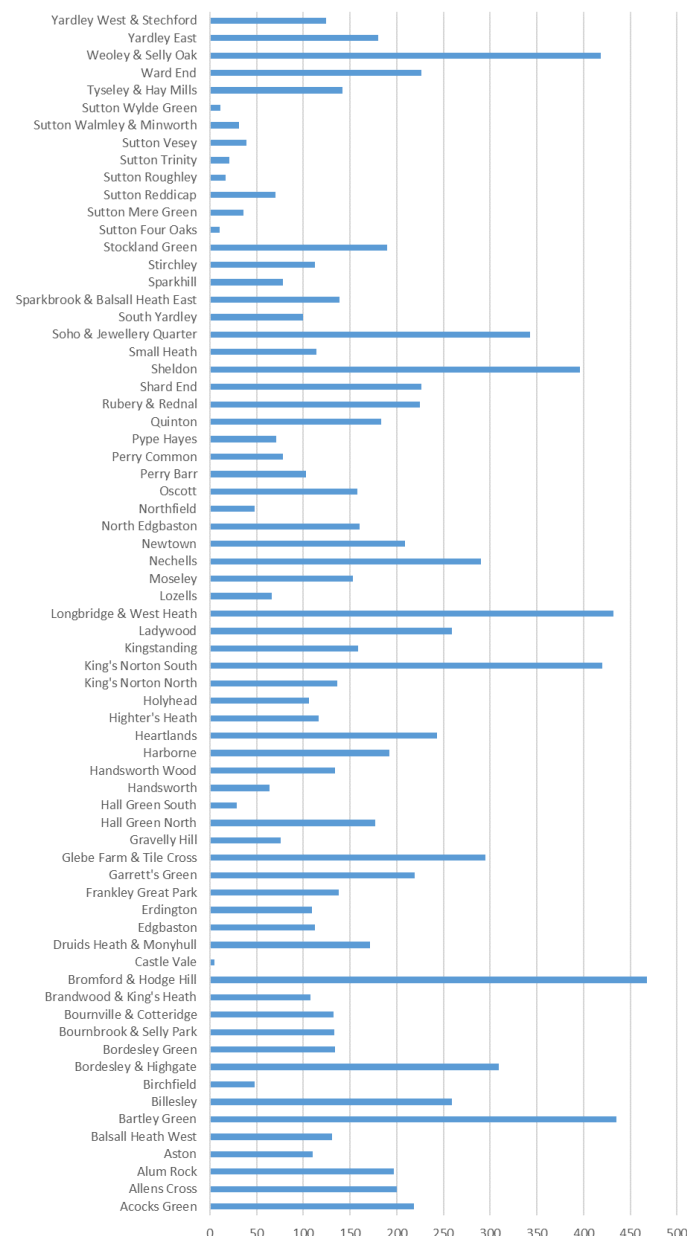
Figure 7. Number of ASB incidents linked to s254 HMOs by ward (Source Ti 2022).

ASB incidents in Birmingham in the PRS can be split into various sub-categories including noise, neighbour nuisance, harassment, vehicle nuisance, intimidation, drug and substance misuse (Figure 8).
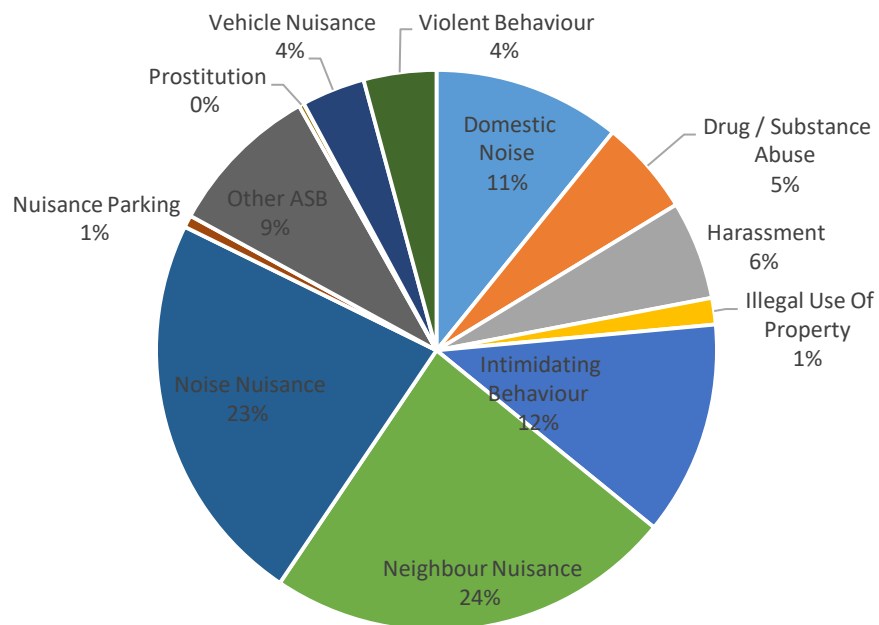
Figure 8. Types of ASB linked to PRS (Source: Ti 2022).

Repeat ASB incidents start to identify a pattern of poor behaviour at any given property. 1,599 HMOs were the source of two or more incidents over the same period (Figure 9).
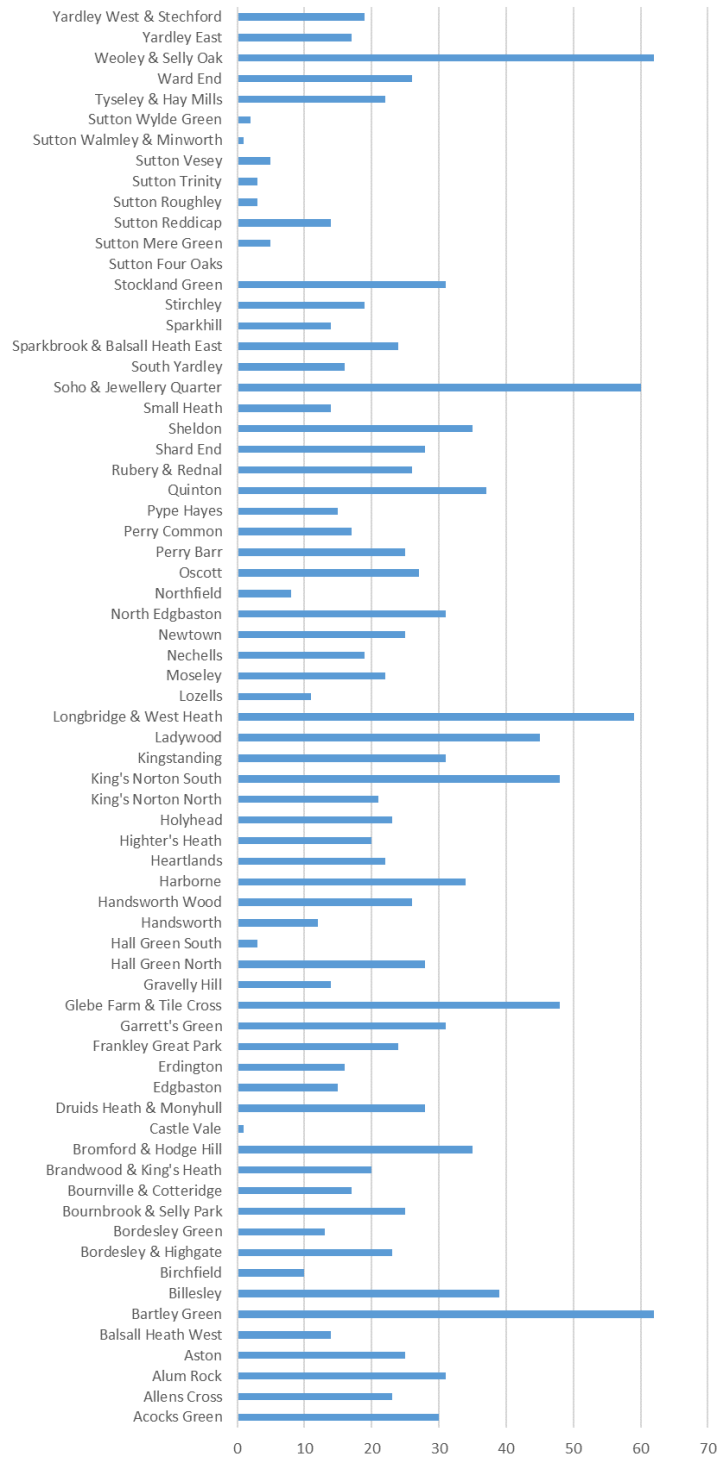
Figure 9. Two or more ASB incidents linked to (s254) HMOs by ward (Source Ti 2022).

2   Conclusions

Birmingham City is predicted to have 11,933 HMOs that share basic amenities ("section 254 HMOs") distributed across all 69 wards. Bournbrook & Selly Park has the highest number of HMO (1,159), followed by Soho & Jewellery Quarter (418) & North Edgbaston (414)

It was found that 215 HMOs have an F and G rating and are therefore likely to fail the MEES statutory requirement.

Complaints made by tenants/others about HMOs are common and are distributed across all wards, the council has received 1,441 complaints about HMOs over the 5 years. Bournbrook & Selly Park (153) and Stockland Green (74) received the most complaints.

The study predicts that 5,866 HMOs in Birmingham are likely to have a serious home hazard (Category 1, HHSRS). This represents 49.1% of the HMO stock, significantly higher than the national average (12%) for the PRS as a whole.

The study linked 28,490 waste records to 6,848 HMOs. Soho & Jewellery Quarter (1,496) and Bordesley Green (1,297) have the highest number of waste incidents linked to HMOs. The original pool of waste data linked to a residential property included 106,831 records. Therefore, 26.7% of all waste records have been attributed to HMOs.

Over a 5 year period to March 2021, 11,241 ASB incidents have been linked to 4,107 HMOs in Birmingham. Bromford & Hodge Hill (468) & Bartley Green (435) have the highest recorded level of ASB. 1,599 HMOs were the source of two or more incidents over the same period.

Appendix 1 – Ward summaries

Table 1. Ward summary overview (Source Ti 2022).

Wards	No. HMOs	Complaint recorded (HMOs)	ASB incidents (HMOs)	Repeat ASB incidents (HMOs)	Waste issues linked to HMOs
Acocks Green	293	50	218	30	784
Allens Cross	92	9	200	23	75
Alum Rock	339	48	197	31	945
Aston	311	50	110	25	1,151
Balsall Heath West	163	15	131	14	473
Bartley Green	225	21	435	62	407
Billesley	161	17	259	39	514
Birchfield	159	16	48	10	461
Bordesley & Highgate	146	10	309	23	473
Bordesley Green	267	43	134	13	1,297
Bournbrook & Selly Park	1159	153	133	25	808
Bournville & Cotteridge	118	17	132	17	130
Brandwood & King's Heath	157	26	108	20	345
Bromford & Hodge Hill	173	22	468	35	242
Castle Vale	32	0	5	1	52
Druids Heath & Monyhull	109	8	171	28	104
Edgbaston	93	3	112	15	145
Erdington	248	29	109	16	982
Frankley Great Park	95	2	138	24	115
Garrett's Green	94	9	219	31	81
Glebe Farm & Tile Cross	244	23	295	48	702
Gravelly Hill	172	39	76	14	283
Hall Green North	174	24	177	28	316
Hall Green South	43	5	29	3	56
Handsworth	188	44	64	12	593
Handsworth Wood	213	33	134	26	1,222
Harborne	297	29	192	34	717
Heartlands	145	22	243	22	316
Highter's Heath	77	6	116	20	162
Holyhead	280	37	106	23	1137
King's Norton North	64	5	136	21	43
King's Norton South	133	13	420	48	132
Kingstanding	194	28	159	31	461

Ladywood	265	20	259	45	618
Longbridge & West Heath	182	9	432	59	199
Lozells	123	10	66	11	401
Moseley	176	18	153	22	300
Nechells	100	8	290	19	289
Newtown	113	9	209	25	151
North Edgbaston	414	63	160	31	874
Northfield	56	3	48	8	125
Oscott	134	20	158	27	267
Perry Barr	174	15	103	25	607
Perry Common	89	5	78	17	113
Pype Hayes	75	5	71	15	97
Quinton	168	13	183	37	398
Rubery & Rednal	87	6	225	26	147
Shard End	124	8	226	28	315
Sheldon	124	8	396	35	194
Small Heath	251	41	114	14	766
Soho & Jewellery Quarter	418	58	343	60	1,496
South Yardley	101	7	100	16	439
Sparkbrook & Balsall Heath East	331	40	139	24	1,129
Sparkhill	251	38	78	14	928
Stirchley	103	6	112	19	153
Stockland Green	348	74	190	31	908
Sutton Four Oaks	17	1	10	0	21
Sutton Mere Green	34	1	36	5	24
Sutton Reddicap	56	2	70	14	29
Sutton Roughley	19	2	17	3	11
Sutton Trinity	29	1	21	3	27
Sutton Vesey	70	8	39	5	101
Sutton Walmley & Minworth	39	3	31	1	27
Sutton Wylde Green	22	1	11	2	19
Tyseley & Hay Mills	156	21	142	22	466
Ward End	174	21	226	26	433
Weoley & Selly Oak	261	25	418	62	355
Yardley East	82	3	180	17	140
Yardley West & Stechford	109	12	124	19	191

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

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

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.

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. The results of the analysis can be found in the report findings chapter.

Figure 10. 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 millions of cells of data to thousands of unique property references, including council and externally sourced data. All longitudinal council held data is 5 consecutive years, from April 2016 – March 2021 unless otherwise stated.

From the original data frame developed for the PRS, a separate updated data frame focused on HMO has been developed. However it is important to note that properties licenced under part 2 of the Housing Act 2004 (HMOs) were excluded from the PRS stressor report but have been included in this report. Moreover, additional data has been used in this updated study, including waste

incidents. Therefore, the PRS and HMO studies are different and should not be compared like for like.

HMOs (s254) properties have been identified from the total PRS population. Once the property data warehouse was created, 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 follow up project. Each model is unique to Birmingham; they include:

- Houses in Multiple occupation (HMO)

- PRS housing hazards

- Category 1 (HHSRS) hazards model

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 3 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.

HMO (House in Multiple Occupation) model

This model predicts the likelihood that a UPRN will be a HMO (Table 2). Each of the 5 model terms is statistically significant and the overall model has a "predictive capacity" of around 61%.

Table 2. HMO predictive factors.

Risk factors selected	Pr(>Chi)
Number of habitable rooms	5.072e-11
ASB records	2.2e-16
Rubbish records	2.2e-16
Private Housing complaint made	2.2e-16
Accounts.over.5.years	0.0015464
Training data, n= 1032	
D^2 test = 0.61	

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 3).

Table 3. 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 90% (Table 4).

Table 4. 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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Metastreet Ltd

6-8 Cole Street

London

SE1 4YH