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Exploring the role of private rented households on rate of crime and anti-social behaviour in Nottingham

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1.0 ABSTRACT

- 1.1 Output areas¹ in Nottingham with high proportions of private rented households, both including and excluding houses in multiple occupation (hereafter referred to as HMOs), were compared with all other Nottingham output areas. The crime and anti-social behaviour rate was significantly higher in output areas with a proportion of privately rented households above the city average compared to other output areas. A positive correlation exists between the proportion of households that are private rented and the rate of crime and anti-social behaviour.

2.0 INTRODUCTION

- 2.1 Crime and disorder is not evenly distributed across individuals or areas (Pease & Tseloni, 2014). Unravelling the factors that explain this uneven distribution is key to developing robust and effective crime prevention strategies. Recent evidence acknowledges the role of household characteristics and area characteristics in jointly explaining variation in crime, particularly burglary and theft (Tseloni, 2006).
- 2.2 Private rented status as well as age, length of residence, inner city living and population density have been shown to be individually associated with crime. Whilst older age and higher residency length have a protective effect on crime, high levels of private rented households is associated with increased risk of personal and property crimes (Tseloni, Ntzoufras, Nicolaou & Pease, 2010). Household tenure status has also been cited as a contributory factor in cross-national publications (Tseloni, Wittebrood, Farrell & Pease, 2004).
- 2.3 This local study aims to explore whether an association exists between density of private rented households and crime and anti-social behaviour rates in Nottingham. The results will be included in Nottingham City Council's selective licensing application to the Department for Communities and Local Government.

¹ The output area is the lowest geographical level at which census estimates are provided.

3.0 METHODOLOGY

- 3.1 The rates of crime and anti-social behaviour² in output areas where the proportion of households that were private rented, including HMOs³, exceeded 19% (the national average proportion of private rented households) was compared to the rate of crime and anti-social behaviour in the remaining output areas. The exposure variable was binary, output areas were categorised as private rented if the proportion of households that were private rented exceeded the average and non-private rented if the proportion of households that were private rented was less than or equal to the average. The outcome variable, rate of crime and anti-social behaviour, was continuous.
- 3.2 The volume of households and private rented households per output area was sourced from the Census 2011 whereas the volume of HMO licenses and expected licenses was sourced from up to date Nottingham City Council records. As a result, subtracting HMO licenses and expected licenses from private rented households resulted in a minus figure for some output areas (27 of 996 output areas, 2.7%). Output areas affected by this issue were changed so that the volume of private rented households was zero.
- 3.3 In order to assess the effect of HMOs, the method described in 3.1 was repeated for output areas where the proportion of households that were private rented, excluding HMOs, exceeded 16.6% (the average proportion of private rented households excluding other-multi person households).
- 3.4 Table 1 below shows the volume of output areas in Nottingham broken down by the two thresholds for private rented including and excluding HMOs.

Table 1: Breakdown of output areas

Threshold	Private Rented	Non-Private Rented	Nottingham Overall
% households that are private rented including HMOs exceeds 19%	389	607	996
% households that are private rented excluding HMOs exceeds 16.6%	354	642	996

- 3.5 Rate ratios were calculated to determine the size of the effects and two sample t-tests for unequal variances were conducted to determine whether the effects were statistically significant. Simple linear regression analyses were also undertaken to assess the degree of association between the proportion of households that were private rented, either including or excluding HMOs, and the rate of crime and anti-social behaviour per household.

4.0 RESULTS

- 4.1 A statistically significantly higher crime and anti-social behaviour rate was observed in output areas in which the proportion of private rented households (including HMOs) exceeded 19%. The rate in these output areas also exceeded the overall rate for Nottingham. Table 2 shows the associated crime and anti-social behaviour rates per household for the private rented sector (including HMOs) output areas, the remaining

² Police recorded crime and anti-social behaviour calls to the police from 2013 to 2015 rate per household (according to Census 2011).

³ Defined as HMO applications and expected HMO applications.

output areas and the overall rate in Nottingham. The greatest effect was observed in all crime, where the rate in private rented output areas was increased more than two fold.

Table 2: Crime and anti-social rate per household (HMOs included as private rented)

Crime/ ASB	PR inc. HMO Rate	Non PR inc. HMO rate	Rate Ratio	Nottingham Rate
All crime	1.18	0.50	2.36*	0.73
Anti-social behaviour	0.57	0.32	1.78*	0.41
Burglary	0.11	0.06	1.83*	0.08
Criminal damage	0.11	0.09	1.22*	0.09
Noise-related anti-social behaviour	0.19	0.11	1.73*	0.15
Violence	0.23	0.12	1.92*	0.16

* Denotes statistical significance (p<0.05)

- 4.2 Crime and anti-social behaviour rates were also higher for output areas in which the proportion of private rented households (excluding HMOs) exceeded 16.6%. The rate difference was statistically significant in all cases with the exception of noise-related anti-social behaviour. The size of the effect was reduced slightly compared to the previous results in which HMOs were included in the private rented calculation. As with the previous results, the greatest effect was observed in all crime, where the rate in private rented output areas was more than double that of other areas. Table 3 shows the associated crime and anti-social behaviour rates per household for the private rented sector (excluding HMOs) output areas, the remaining output areas and the overall rate in Nottingham.

Table 3: Crime and anti-social rate per household (HMOs excluded as private rented)

Crime/ ASB	PR exc. HMO Rate	Non PR exc.. HMO rate	Rate Ratio	Nottingham Rate
All crime	1.15	0.55	2.09*	0.73
Anti-social behaviour	0.53	0.35	1.51*	0.41
Burglary	0.09	0.07	1.29*	0.08
Criminal damage	0.11	0.09	1.22*	0.09
Noise-related anti-social behaviour	0.17	0.13	1.31	0.15
Violence	0.23	0.13	1.77*	0.16

* Denotes statistical significance (p<0.05)

- 4.3 It was found that rate of crime and anti-social behaviour was positively correlated with the proportion of private rented households per output area. One percentage increase in private rented households including HMOs is expected to increase crime and anti-social behaviour rates by 3% and 9% respectively. An increase in private rented households excluding HMOs is expected to increase crime by 2% and anti-social behaviour by 7%. Results from the four simple regression analyses are summarised in Table 4 below.

Table 4: Regression results

Independent Variable	Dependent Variable	Correlation Coefficient (a)	Slope (b)
% Private rented households (inc. HMOs)	Crime rate	0.22	0.03*
% Private rented households (exc. HMOs)	Crime rate	0.16	0.02*
% Private rented households (inc. HMOs)	ASB rate	0.20	0.09*
% Private rented households (exc. HMOs)	ASB rate	0.15	0.07*

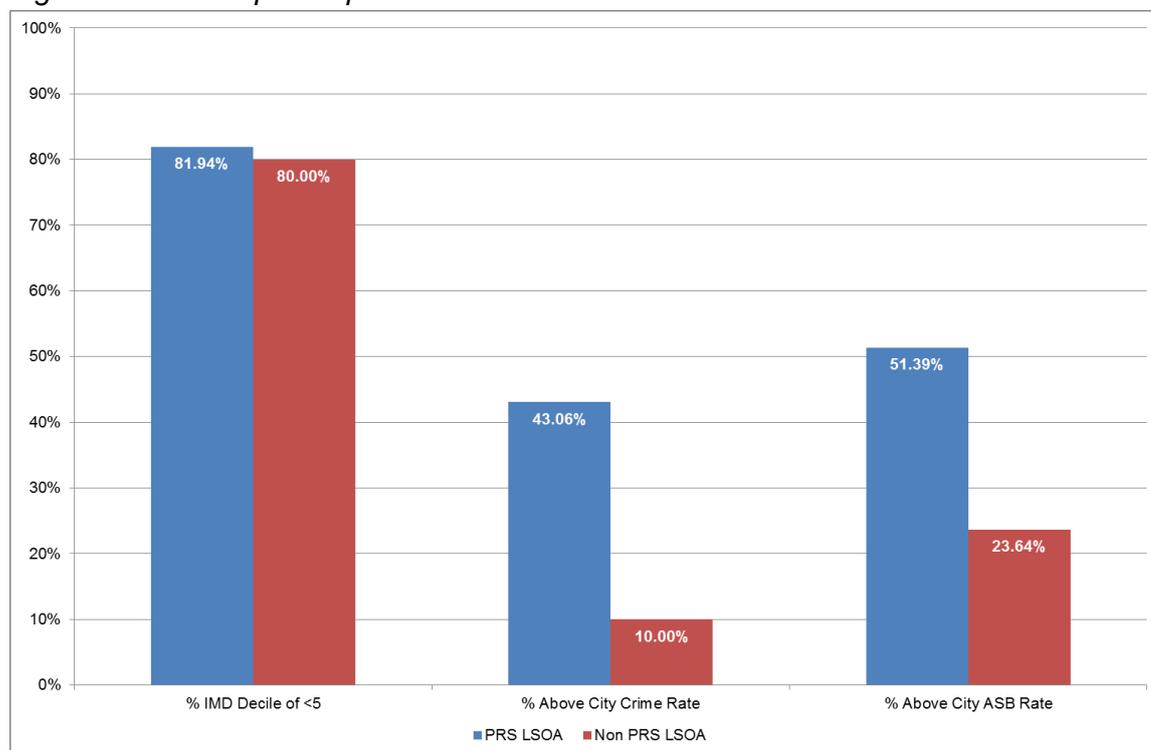
* Denotes statistical significance (p<0.05)

- 4.4 An assessment of Lower Super Output Areas (LSOAs) in which the proportion of private rented households exceeded the average showed that high levels of crime⁴, anti-social

⁴ A high crime rate was defined as a rate of crime per household that exceeded the rate of crime per household of Nottingham overall using 2015 data.

behaviour⁵ and level of deprivation⁶ were more common in these LSOAs compared to all other LSOAs. This assessment is illustrated below in Figure 1.

Figure 1: Lower super output area assessment



- 4.5 Appendix A includes maps by output area of private rented household (including and excluding HMOs), crime rate and anti-social behaviour rate. These maps provide some further evidence for a correlation between private rented households and disorder.

5.0 DISCUSSION

- 5.1 Notwithstanding the identified effect of the private rented sector on anti-social behaviour and crime there are a number of considerations that should be taken into account in the interpretation of these findings. The observed correlation does not necessarily mean that private rented households cause higher rates of crime and anti-social behaviour. It is likely that other variables associated with private rented sector households lead to increased risk. Examples of these other variables include tenants' age, household composition and area's population density. Further analysis is required in order to explore this in more detail and this should ideally be completed at an individual level. It is also important to note that recorded crime and anti-social behaviour statistics are not a perfect measure of the true level of crime that occurs. The amount of crime and anti-social behaviour that is reported may vary from area to area.
- 5.2 In epidemiological terms, this ecological study design can be used to test a hypothesis but is at risk of ecological fallacy; where findings for the groups may not apply to individuals in the group. It cannot be ascertained from this analysis whether the

⁵ A high anti-social behaviour rate was defined as a rate per household that exceeded the rate of Nottingham overall using 2015 data.

⁶ A high level of deprivation was defined as a deprivation decile of 1 or 2 where 1 is highest and 10 is lowest.

individuals who were victims of crime or anti-social behaviour were those living in privately rented households. This is a recognised limitation of the study and should be taken into consideration when interpreting its findings.

- 5.3 Whilst the exact nature of the relationship remains unclear, the evidence outlined in this paper suggests an association between increased crime and anti-social behaviour rates in areas which have a comparatively high proportion of private rented households. Whilst the effect is greatest when HMOs are included as private rented sector households, the effect remains statistically significant when HMOs are removed from the private rented sector category.

REFERENCES:

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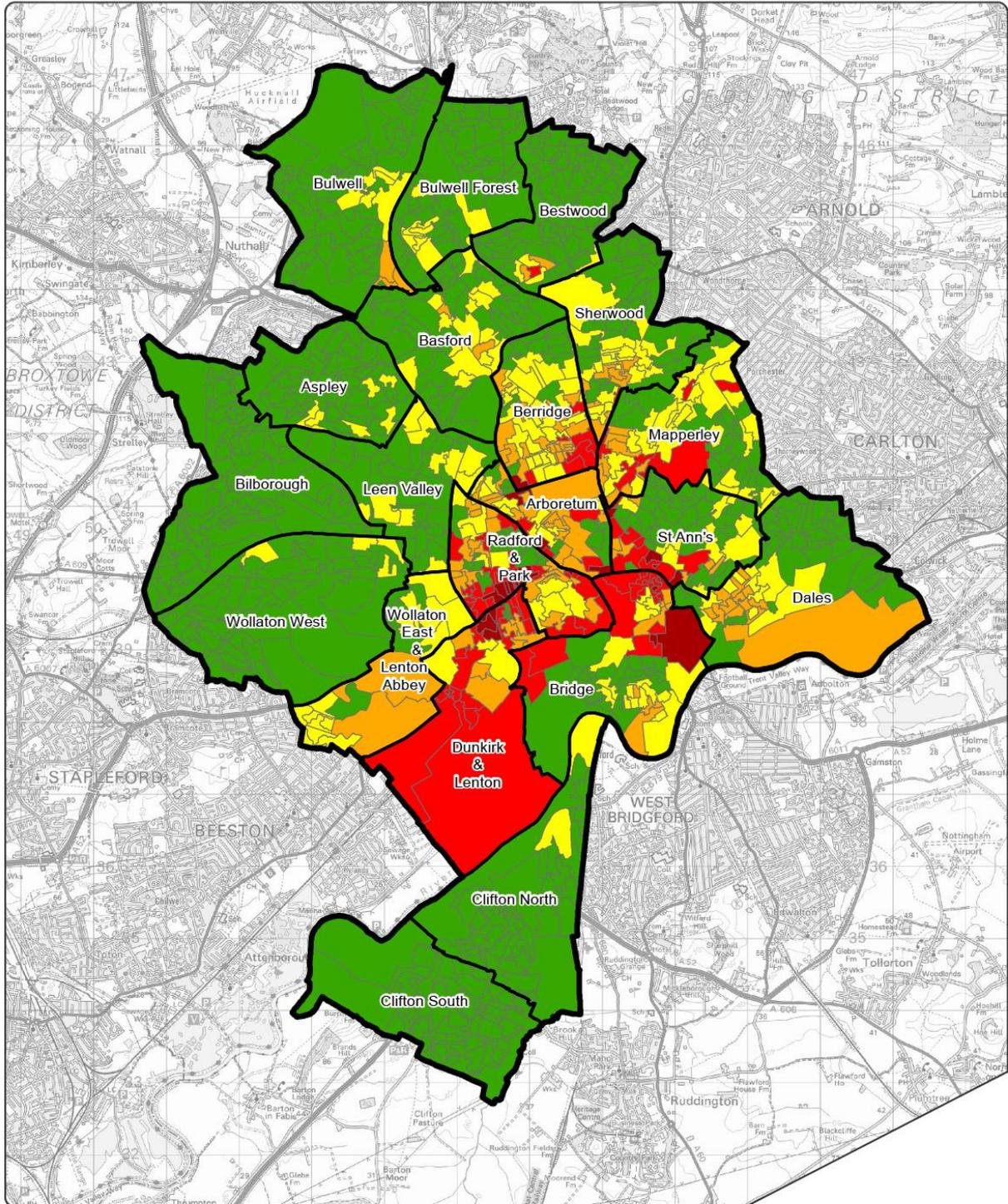
Tseloni, A. (2006) Multilevel modelling of the number of property crimes: Household and area effects. *Journal of the Royal Statistical Society Series A-Statistics in Society*, 169, Part 2, 205-233.

Tseloni, A., Ntzoufras, I., Nicolaou, A. and Pease, K (2010) Concentration of personal and household crimes in England and Wales. *European Journal of Applied Mathematics, Special Issue on Mathematical Models for Criminality*, 21, 325-348.

Tseloni, A., Wittebrood, K., Farrell, G. and Pease K. (2004) Burglary victimisation in the U.S., England and Wales, and the Netherlands: Cross-national comparison of routine activity patterns. *British Journal of Criminology*, 44, 66-91.

APPENDIX A: MAPS

Nottingham City_Proportion of Properties in Private Rented Sector_ by Output Area



Key



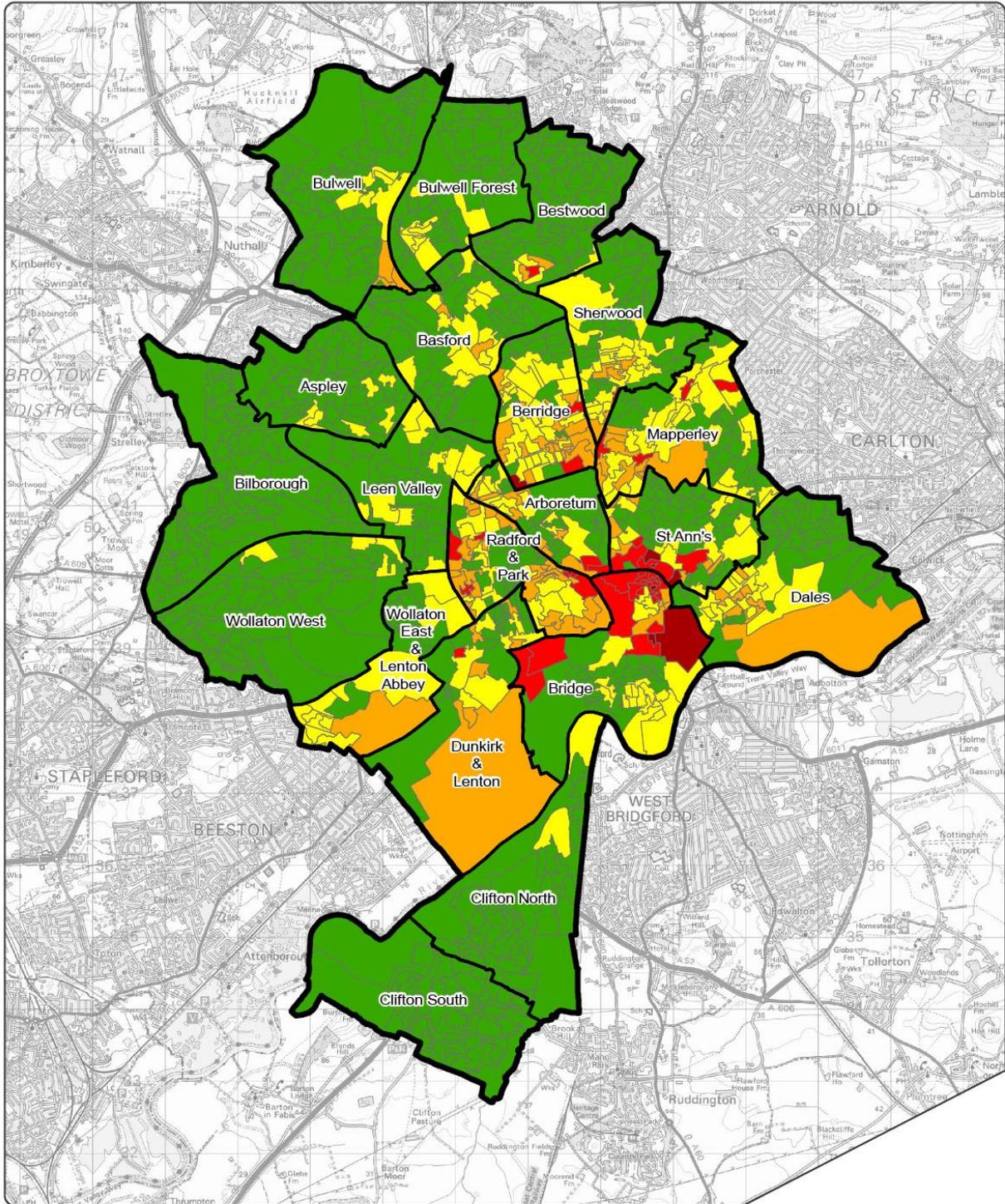
* Census Data 2011.
 The proportion of Privately Rented Sector (PRS) properties in England is 19% of the total housing stock (DCLG English Housing Survey 2013_2014).
 Output areas with up to 19% of properties in the PRS are shown in green on the map. Area with more than 19% of properties in the PRS are shown in yellow, orange, red or brown.



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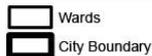


Nottingham City_Proportion of Properties in Private Rented Sector (Excluding HMO)_ by Output Area



Key

Proportion of Properties in Private Rented Sector (Excluding HMO)



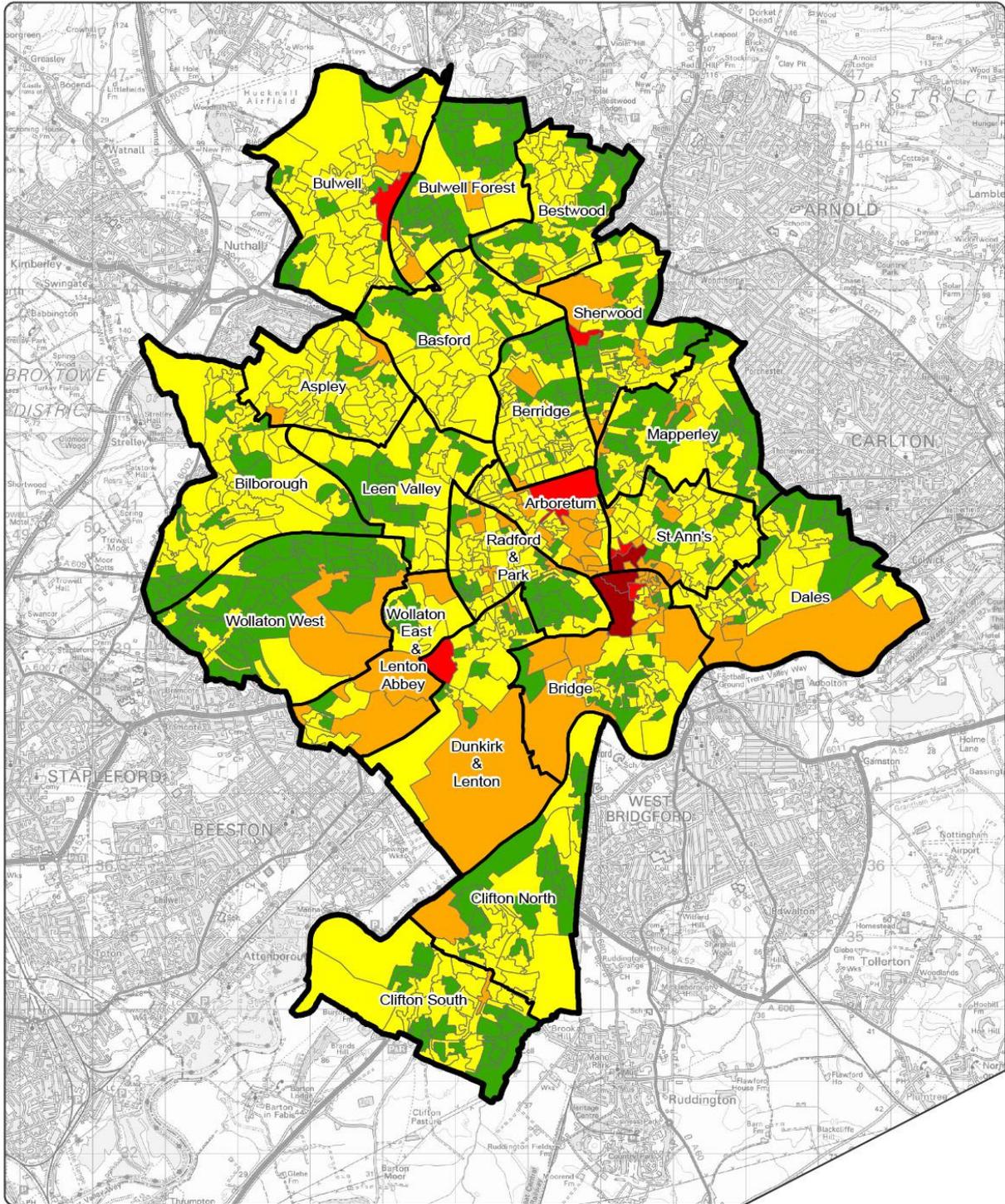
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* Census Data 2011.



Nottingham City_Crime_Rate per Household 2015_ by Output Area



Key

Crime Rate Range	Symbol
0.000000 - 0.112000	Green square
0.112426 - 0.530864	Yellow square
0.535714 - 1.938776	Orange square
2.468468 - 4.962264	Red square
7.333333 - 11.411765	Dark red square

Wards	Thin black outline
City Boundary	Thick black outline

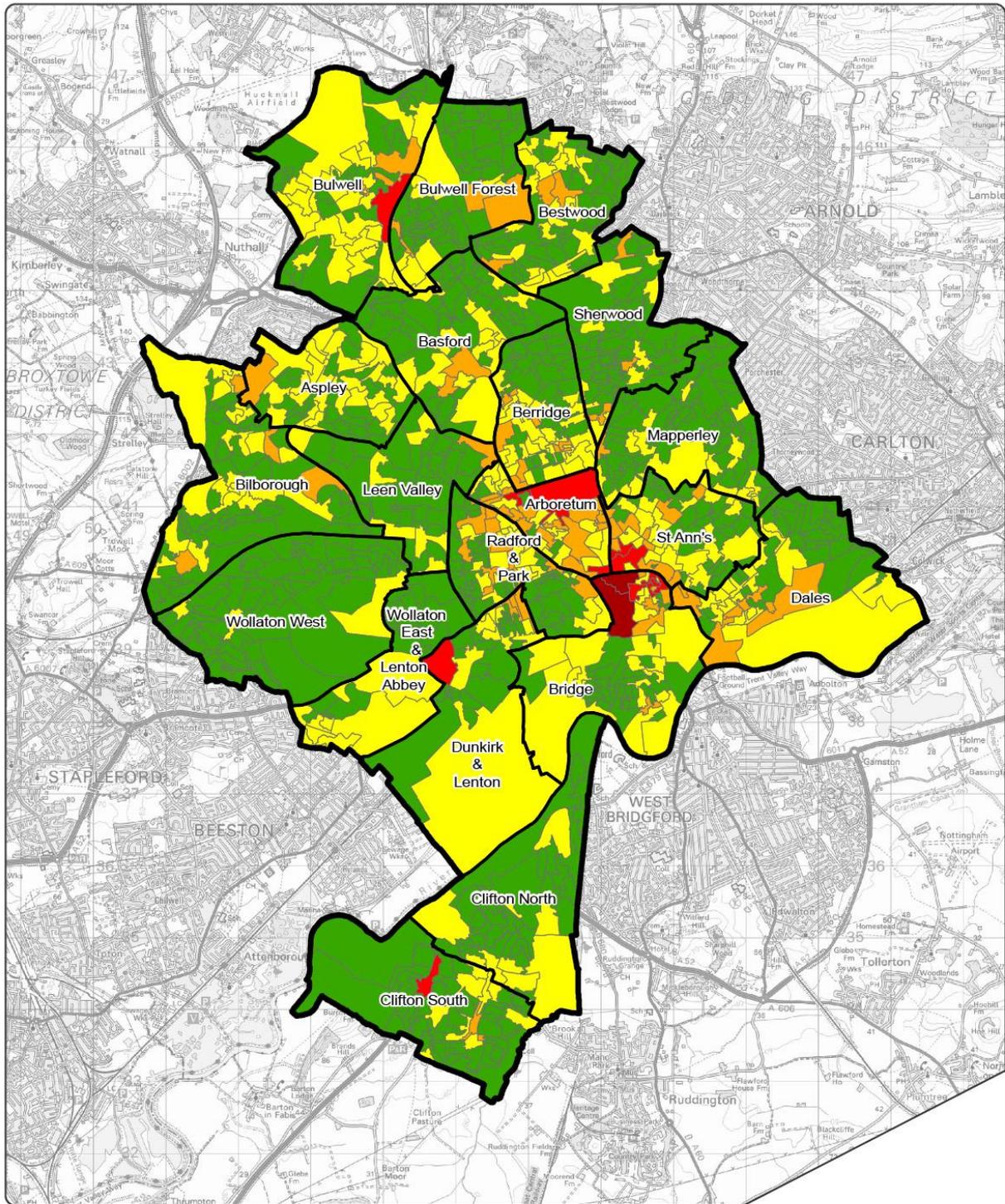
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*CDP Local Data 2015:
 The key for this dataset has been created using the classification 'Natural Breaks (Jenks)' to cluster the data. This method reduces variance within classes and maximises variance between classes. Class breaks are shown using values from the dataset.



Nottingham City_Anti Social Behaviour (ASB)_Rate By Household 2015_ by Output Area



Key

- 0.000000 - 0.121212
- 0.121739 - 0.296610
- 0.304762 - 0.730769
- 0.792793 - 1.573643
- 4.266667 - 4.857143

- Wards
- City Boundary

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0 0.25 0.5 1
 Miles



*CDP Local Data 2015:
 The key for this dataset has been created using the classification 'Natural Breaks (Jenks)' to cluster the data. This method reduces variance within classes and maximises variance between classes. Class breaks are shown using values from the dataset.

