

Heathrow Airport 2019 Summer Noise Contours and Noise Action Plan Contours

ERCD REPORT 2001



Published by the Civil Aviation Authority, 2021

Aviation House, Gatwick Airport South, West Sussex, RH6 0YR

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Summary

Overview

1. This report presents the Heathrow 2019 average summer 16-hour day and 8-hour night L_{Aeq} contours, as well as the 2019 annual L_{day} , $L_{evening}$, L_{night} , L_{den} and $L_{Aeq,6.5h}$ night noise contours to meet the requirements of Heathrow Airport's Noise Action Plan. Contours for the supplementary metrics N65 and N70 annual 16-hour day, and N60 annual 8-hour night, have also been produced. Long-term trends from 2006 to 2019 are examined and comparisons made with the 2006 (base year) and 2018 (previous year) results.
2. Additional diagrams have been produced showing: single mode (i.e. 100% west and 100% east) contours; overflight contours and overflight track density diagrams for aircraft operations up to 4,000 ft AMSL based on the two 'overflight' metric angles proposed by the CAA; noise changes between 2006 and 2019, and noise changes between 2018 and 2019.
3. Although 2019 saw the highest passenger traffic at Heathrow, the L_{den} 55 dB contour had its smallest area over the 14-year study period (2006-2019).

2019 aircraft movements

4. Average summer 16-hour day movements in 2019 at Heathrow decreased by 0.4% from 2018. Average summer 8-hour night movements in 2019 reduced by 1.5%. The Airbus A320neo aircraft type had the highest increase in numbers during the average summer day period (+41.5 movements). For the 2019 average summer night, the Boeing 787-9 had the largest movement increase (+2.5).
5. Aircraft movements over the 2019 annual L_{day} 12-hour period increased by 0.2% from 2018. There was a 1.2% rise in movements over the 2019 annual $L_{evening}$ 4-hour period. Annual L_{night} 8-hour movements were 1.3% lower in 2019. Total movements over the 2019 annual L_{den} average 24-hour period (1312.9) were 0.3% higher than in 2018. Movements were 6% lower for the 2019 $L_{Aeq,6.5h}$ night period compared to 2018.
6. The largest increase in movements over the 2019 annual average 24-hour period was for the Airbus A320neo (+39.1), followed by the Airbus A321neo (+23.5) and Boeing 787-9 (+12.2). The highest movement decreases were for the Airbus A320 with IAE engines (-25.2) and the Boeing 767-300 with Rolls-Royce engines (-17.0).

7. The estimated percentage of aircraft in the Heathrow annual 24-hour traffic mix meeting the ICAO Chapter 4 noise standard has risen from 94% in 2006 to over 99% in 2019. In addition, it is estimated that around 66% of movements in 2019 were compliant with the latest ICAO Chapter 14 noise standard.

2019 summer L_{Aeq} contours

8. The 54 dB $L_{Aeq,16h}$ contour area for the 2019 average summer day (actual runway modal split 80% W / 20% E) was 156.1 km², 1% lower than in 2018 (158.3 km²). Daytime $L_{Aeq,16h}$ contour areas were up to 3% lower in 2019 compared to 2018. This can be attributed mainly to the introduction of quieter aircraft into the fleet mix. Population and household counts within the contours also decreased for the most part.
9. The average summer night 48 dB $L_{Aeq,8h}$ contour area based on the actual runway modal split (80% W / 20% E) was 105.4 km², a 1% decrease from 2018 (106.0 km²). Night-time $L_{Aeq,8h}$ contour areas were up to 7% lower in 2019. This was primarily due to higher proportions of quieter aircraft, which offset higher measured arrival noise levels for noise dominant types such as the Airbus A380 with Rolls-Royce engines. Population and household counts increased at some of the contour levels in 2019 as higher westerly arrival noise extended the contours over parts of west London.

2019 Noise Action Plan contours

10. The 2019 L_{day} and $L_{evening}$ 55 dB contour areas were larger by 0.4% and 2% respectively compared to 2018, but the L_{night} 50 dB area was 1% smaller. The 2019 L_{den} 55 dB contour area of 176.2 km² was 0.3% lower than in 2018 (176.8 km²). The area increases for L_{day} and $L_{evening}$ can be attributed to the increased percentage of westerly operations and higher measured noise levels for certain types in 2019, which offset the effects of higher proportions of quieter aircraft in the fleet mix. For L_{night} , higher measured arrival noise levels for certain types were more than offset by increased proportions of quieter types in the fleet mix and the effects of modal split changes. The L_{den} area was influenced by the higher percentage of westerly operations, a higher proportion of quieter aircraft in the fleet mix, and noise adjustments made to certain types following the 2019 noise measurements.
11. The 2019 $L_{Aeq,6.5h}$ night 48 dB contour area was 5% higher at 33.4 km², even though movements fell by 6%. The area increase was largely caused by 1.5 dB higher measured arrival noise levels for the noise dominant Airbus A380 with Rolls-Royce engines, which more than offset the drop in movements. Population and household counts increased as the contour extended over densely-populated areas around Kew.

Annual contour trends

12. The 2019 annual contour areas were below 2006 base year levels for all the noise metrics considered. For example, the 2019 L_{den} 55 dB contour area of 176.2 km² was 28% smaller than in 2006 (244.7 km²). Population counts were all lower in 2019 except for the L_{night} 50 and 55 dB contours, which was due to the effects of population encroachment around Heathrow. Had the population database remained unchanged from 2006, the population and household counts for all the 2019 contours would have been even lower compared to 2006. For example, the L_{den} 55 dB population count in 2006 was 756,100 and it decreased by 12% to 664,300 in 2019. Had the population remained at 2006 levels in 2019, the 2019 population count would have been 574,500, a decrease of 24% from 2006. This shows that in the period 2006-2019, the reducing contour area meant that 91,800 people were effectively moved out of the L_{den} 55 dB contour. This figure would have been 181,600 had the population not grown.
13. An examination of the long-term trends between 2006 and 2019 showed that the L_{day} 55 dB contour area was fairly steady between 2009 and 2014 after the initial high in 2006, although there was a dip in 2010, and it has gradually declined since 2014, before rising slightly in 2019 from the 2018 level. Populations and households fell to a low in 2010 (when movements were also at a low), having fallen steadily since 2006. After rising in 2011, the population count increased in 2013 due to the major population database update, before decreasing from 2015 through to 2018 in line with the reductions in contour area. However, the population count rose in 2019 from the 2018 level following the area increase. Movements over the L_{day} period have been steady since 2006 apart from a drop in 2010.
14. The area, population and households within the $L_{evening}$ 55 dB contour decreased in 2009 and 2010 from the 2006 level as movements declined, but rose in 2011 as movements then recovered. Since 2011, the area, population and households have followed a downward trend, apart from in 2013 when the population increased after a major update to the population database. Movements declined between 2011 and 2014, before rising in 2015, levelling off in 2016 and 2017, and rising again in 2018 and 2019.
15. The L_{night} 50 dB contour area has been relatively steady between 2011 and 2019, apart from a dip in 2017, having been higher between 2006 and 2010. Movements over the L_{night} period have also been stable since 2006, in the range of 75-78 movements per 8-hour night, except in 2018 and 2019 when the movements reached a higher level of around 81 movements per night. The L_{night} population and household counts followed a downward trend between 2009 and 2012, but have been relatively high since 2013 due to various factors. First there was a major update to the population database in 2013, when data from the 2011 Census was used for the first time, and runway resurfacing works in 2013

and 2014 affected the contour shape. A higher percentage of westerly movements and a reversion to a 'normal' usage split between the northern and southern runways influenced the contour shape in 2015. In 2017 a 10% higher percentage of westerly operations extended the contour over west London, causing a population count increase, though this effect was reversed in 2018 when the westerly mode operations percentage dropped markedly. However, the population count increased again in 2019 following a higher percentage of westerly operations.

16. After the 2006 base year high, L_{den} 55 dB contour areas were fairly steady between 2009 and 2013, but since then they have mostly fallen as the Heathrow fleet continued its switch to more modern and quieter types such as the Airbus A380, Boeing 777-300ER and Boeing 787-8/9. Population and household counts fell between 2006 and 2010, and after rising in 2011 they have generally declined through to 2018, although in 2013 the population count increased following a major update to the population database, and also increased in 2017 as the contour extended over west London due to an 11% westerly shift in the runway modal split. Population and household counts were at their lowest in 2018 as the L_{den} 55 dB area also fell to a low. A higher proportion of westerly operations in 2019 extended the contour over parts of west London, causing an increase in the population count. Movements between 2006 and 2019 have remained at a relatively steady level, in the range of 1,277-1,317 per 24-hour day, apart from a dip in 2010 when movements dropped to 1,246.
17. The $L_{Aeq,6.5h}$ night 48 dB area has generally followed a downward trend since the 2006 base year, apart from a rise in 2010 when movements increased following disruptions to scheduled services. Movements since 2006 have been steady apart from rises in 2010 and 2018. Following two years of population decreases in 2011 and 2012, the population rose in 2013 due to an extension of the contour over west London in line with the northern runway (the southern runway was resurfaced in 2013). However, in 2014 the population count fell to near 2012 levels as the contour area reduced and declined further in 2015 as movements of the Boeing 747-400 with Rolls-Royce engines continued to decrease. Another fall in population and household counts occurred in 2016 as a shift in the arrival runway modal split moved the contour away from populated parts of Kew. However, populations increased again in 2017 as the contour extended back over west London following a higher proportion of westerly arrival operations. In 2018 this reversed as the percentage of westerly operations fell. An extension of the contour over Kew in 2019 resulted in a higher population count.
18. Between the 2006 base year and 2019 there has been a 63% reduction in movements by Boeing 747-400 aircraft over the annual 24-hour period. Newer aircraft types such as the Airbus A380 and Boeing 787-8/9 were not in service in 2006, but by 2019 there were on average 44 daily movements of the Airbus A380 and 125 movements of the Boeing 787-8/9.

Noise change analysis

19. An analysis of L_{den} noise changes between 2006 and 2019, assuming 2006 base year actual runway modal splits, revealed that around 99% of the assessment area (which is the outer 'envelope' of the 2006 and 2019 contours) has experienced noise reductions of up to 3 dB or more. Less than 1% of the area was exposed to increases in noise levels of up to 1 dB.
20. L_{den} noise changes between 2018 and 2019 (assuming the 2018 actual runway modal split) showed that 44% of the assessment area experienced decreases in noise of up to 1 dB. Approximately 56% of the total area considered was exposed to noise increases, all of which were found to be less than 0.5 dB.
21. An analysis of L_{night} noise changes between 2006 and 2019 (assuming the 2006 base year L_{night} actual runway modal split) showed that 95% of the total area experienced reductions in noise levels of up to 3 dB or more.
22. Noise changes for L_{night} between 2018 and 2019 (assuming the 2018 actual runway modal split) indicated that some regions that were exposed to noise increases of less than 1 dB, of which most were less than 0.5 dB. Around 41% of the area assessed experienced reductions of up to 2 dB.

'Noise events above' (N65/N70/N60) contours

23. N65 and N70 annual 16-hour day contours, and N60 annual 8-hour night contours, have been produced for 2019. All the N65 and N70 contour areas have decreased between 2006 and 2019. This reflects the phasing out of the noisiest aircraft types such as the Boeing 747-400, and the introduction of more modern, quieter types, for example the Airbus A380, Boeing 777-300ER and Boeing 787-8/9. However, the N60 night contour areas were higher in 2019, which can be attributed primarily to the 9% higher number of arrival movements in 2019 compared to 2006, which all occurred within the shoulder periods (23:00-23:30 and 06:00-07:00).
24. Despite the area decreases for the N65 and N70 contours, there were some instances of population increases, which can be explained by the population encroachment that occurred in the areas surrounding Heathrow between 2006 and 2019.
25. An analysis of annual 16-hour day N65 changes between 2006 and 2019 (assuming the 2006 base year actual runway modal split) also showed that many areas have experienced reductions of up to 100 or more N65 events. However, there were some locations where the numbers of N65 events in 2019 increased, which were due to higher movement rates on the CPT/GOGSI routes in 2019, a change in the position of the calculated DET (previously DVR) departure mean track, and a higher usage of the southern runway for arrivals in 2019 compared

to 2006. Around 84% of the assessment area experienced decreases of 10 or more N65 events or changes of less than 10 events. Approximately 16% of the assessment area experienced N65 increases of 10 or more events. A similar analysis of N65 changes between 2018 and 2019 (assuming the 2018 actual runway modal split) revealed that around 86% of the assessment area was exposed to decreases of more than 10 events or changes of less than 10 events.

26. An analysis of annual 16-hour day N70 changes between 2006 and 2019 (assuming the 2006 actual runway modal split) indicated some areas where increases in N70 events occurred. These were due to higher movement rates on the westerly CPT/GOGSI SIDs in 2019, a westerly shift in the position of the calculated 2019 DET mean departure track relative to 2006, a higher usage of the southern runway for westerly departures back in 2006, and the northern runway being favoured for westerly arrivals in 2006. Approximately 87% of the assessment area was exposed to decreases of more than 10 N70 events or changes of less than 10 N70 events. This figure rose to 96% when the effects of differences in north-south runway usage were removed.
27. An analysis of annual 16-hour day N70 changes between 2018 and 2019 (assuming the 2018 actual runway modal split) showed that 94% of the area under consideration was exposed to decreases of more than 10 N70 events or changes of less than 10 events.
28. An examination of N60 changes between 2006 and 2019 (assuming the 2006 actual runway modal split) for the annual 8-hour night showed that 52% of the assessment area experienced changes of less than 3 events, or reductions of more than 3 events. For N60 changes between 2018 and 2019 (assuming the 2018 actual runway modal split), 72% of the assessment area was exposed to decreases of more than one N60 event or changes of less than one N60 event.

Chapter 1

Introduction

- 1.1 This report presents the 2019 noise exposure contours generated for London Heathrow Airport. First, 2019 summer period contours are provided, which up until 2015 had been produced by the Environmental Research and Consultancy Department (ERCD) on behalf of the Department for Transport (DfT). Since the 2016 study, ERCD has been commissioned directly by Heathrow Airport Ltd (HAL). Secondly, contours meeting the requirements of the HAL Noise Action Plan have been produced using annual 2019 traffic data. Supplementary metric overflight contours, overflight track density diagrams and 'Number Above' contours (i.e. N65, N70 and N60) have also been generated.
- 1.2 The latest version of the UK civil aircraft noise model, ANCON (v2.4), has been used to estimate the noise exposure around Heathrow Airport. The model calculates the emission and propagation of noise from arriving and departing air traffic and is validated using noise measurements made around Heathrow.
- 1.3 The noise exposure metric used for the summer period is the Equivalent Continuous Sound Level, or $L_{Aeq,16h}$ (07:00-23:00 local time), which is calculated over the 92-day summer period from 16 June to 15 September inclusive. The background to the use of this index is explained in DORA Report 9023 (**Ref 1**). The $L_{Aeq,16h}$ contours in this report have been plotted from 54 to 72 dB in 3 dB steps. This is because the 'Survey of Noise Attitudes' (SoNA 2014) (**Ref 2**) found that the degree of annoyance (based on the percentage of respondents highly annoyed) previously occurring at 57 dB, now occurs at 54 dB. The summer day contours have been plotted from 54 dB since 2016.
- 1.4 Night-time $L_{Aeq,8h}$ contours have also been calculated from 48 to 72 dB in 3 dB steps in accordance with standard practice. Average summer night $L_{Aeq,8h}$ contours were first calculated for Heathrow for 2013 following the publication of the Aviation Policy Framework in March 2013 (**Ref 3**).
- 1.5 'Single mode' L_{Aeq} contours for the 16-hour day and 8-hour night have also been produced. These contours illustrate the noise exposure had the airport operated in fully westerly ('100% W') or easterly ('100% E') modes throughout the period of interest.
- 1.6 'Overflight' contours for the average summer day and night periods, using the definitions for an overflight proposed by the CAA (**Ref 4**), have been produced. Separate overflight diagrams are provided assuming 48.5 and 60-degree elevation angles (measured from the horizontal) as proposed in the CAA report, using radar data up to an altitude of 4,000 ft Above Mean Sea Level (AMSL).

Overflight track density diagrams based on the above overflight metric definitions have also been produced.

- 1.7 Noise Action Plan contours for L_{day} , L_{evening} , L_{night} and L_{den} were based on annual movement data for the 2019 calendar year (1 January to 31 December), whilst the $L_{\text{Aeq},6.5\text{h}}$ night contour was based on data from the combined 2019 summer and 2019-20 winter night quota seasons (i.e. the period from 31 March 2019 to 28 March 2020), for the local time period 23:30-06:00.
- 1.8 Contours for the 2019 annual period have also been produced using the supplementary noise metrics N65 and N70 for the 16-hour day, and N60 for the 8-hour night. Number Above contours indicate the number of aircraft noise events exceeding a certain maximum sound level (L_{Amax}) at a given location. For example, N70 contours show the number of events exceeding 70 dB L_{Amax} .
- 1.9 In summary, noise contours have been produced for the following noise metrics:
- Average summer day $L_{\text{Aeq},16\text{h}}$ (07:00-23:00 local time);
 - Average summer night $L_{\text{Aeq},8\text{h}}$ (23:00-07:00 local time);
 - Annual L_{day} , L_{evening} , L_{night} , L_{den} and $L_{\text{Aeq},6.5\text{h}}$ night;
 - N65 and N70 for the annual average 16-hour day (07:00-23:00 local time); and
 - N60 for the annual average 8-hour night (23:00-07:00 local time).
- 1.10 In regard to the above metrics, the following points can be noted:
- The summer day and night L_{Aeq} contours have been used for modelling airport noise in the UK for many decades.
 - L_{day} , L_{evening} , L_{night} and L_{den} are required by the European Environmental Noise Directive (END) and allow comparison with other EU airports and other transport modes.
 - HAL has advised that tracking the $L_{\text{Aeq},6.5\text{h}}$ night metric is required by Heathrow's Terminal 5 planning consent.
 - Virtually all annoyance and health impact research has been based on noise exposure measured using these time-averaged, L_{Aeq} -based noise metrics.
 - The SoNA report on sleep disturbance from aircraft noise (**Ref 5**) concluded that the noise indicators average summer night $L_{\text{Aeq},8\text{h}}$, annual L_{night} and average summer night N60 are all highly correlated with night-time self-reported sleep disturbance, and that based on exploratory analysis, there is insufficient evidence to change from the current practice of using average summer night $L_{\text{Aeq},8\text{h}}$ noise exposure for UK assessments.

- N60, N65 and N70 are event-based metrics, which some airports use to better understand the number of noise events that occur and the locations where they occur. There are no established dose-response relationships for these metrics.

1.11 The 2019 Noise Action Plan contours are compared with those from 2018 (**Ref 6**) and the 2006 base year (**Ref 7**), to assess the changes in area, population and households enclosed. The long-term contour trends from 2006 to 2019 are also examined.

Chapter 2

Noise modelling methodology

ANCON noise model

- 2.1 The noise contours were calculated using the latest version of the UK civil aircraft noise model ANCON (version 2.4), which is developed and maintained by ERCD on behalf of the Department for Transport (DfT). A technical description of the ANCON model can be found in R&D Report 9842 (**Ref 8**).
- 2.2 ANCON is fully compliant with the European guidance on noise modelling, ECAC.CEAC Doc 29 (4th edition), published in December 2016 (**Ref 9**). This guidance document represents internationally-agreed best practice as implemented in modern aircraft noise models. The fourth edition introduced some minor changes to the modelling of start-of-roll noise, which were incorporated in the 2017 software update to ANCON (version 2.4).

Flight tracks

- 2.3 Mean departure and arrival flight tracks are used to represent the large number of individual aircraft flight tracks in a way that can be modelled making efficient and effective use of computer processing resources. The mean tracks were generated from summer 2019 radar data. Mean tracks are the mathematical representation of an NPR/SID route swathe, consisting of a central track that defines the average aircraft position along the route swathe. Lateral dispersions across the route swathe were modelled by multiple sub-tracks derived from a statistical analysis of the underlying radar track data. The Heathrow NPR/SID routes are shown in **Figure B1** of **Appendix B**.

Flight profiles

- 2.4 Average flight profiles of height, speed and thrust were also based on summer 2019 radar data. These profiles represent the aircraft heights, speeds and thrust settings at various distances from the runway, averaged across all the routes for each ANCON type¹, for departures and arrivals separately. Daytime flight profiles were generated as in previous years. However, a separate night-time departure profile was produced for the Boeing 747-400 with Rolls-Royce engines², as it

¹ See **Table D1** for a list of ANCON types.

² ANCON type B744R

was sufficiently different from the daytime profile. All other aircraft types operating at night were modelled with daytime profiles.

- 2.5 The application of reverse thrust following touchdown was modelled for all ANCON types where applicable. Reverse thrust was included in both the day and night contours.

Noise data

- 2.6 Noise levels for each ANCON aircraft type are checked and updated each year according to the latest noise measurements, so they represent the best available data.
- 2.7 At Heathrow, the Noise and Track-Keeping (NTK) system captures data from both fixed and mobile noise monitors around the airport. Noise event data for individual aircraft operations are matched to operational data provided by the airport. The Heathrow NTK system uses 12 fixed monitors positioned approximately 6.5 km from start-of-roll, together with a number of mobile monitors that can be deployed anywhere within the NTK radar coverage area. Further information on the noise monitors can be found in CAP 1149 (**Ref 10**).
- 2.8 The noise data collected were screened by ERCD with reference to several criteria so that only reliable data were used in the analysis:
- Noise data that lay outside a 'weather window' were discarded. This ensured that the data used were not affected by adverse meteorological conditions such as precipitation and strong winds;
 - The maximum noise level of the aircraft event had to exceed the noise monitor threshold by at least 10 dB to avoid underestimates of the Sound Exposure Level (SEL);
 - Only measurements obtained from aircraft operations that passed through a 60-degree inverted cone, centred at the noise monitor, were retained in order to minimise the effects of lateral attenuation and lateral directivity.³
- 2.9 The ANCON model calculates aircraft noise using a noise database expressing SEL as a function of engine power setting and slant distance to the receiver – also known as the 'Noise-Power-Distance' (NPD) relationship. The ANCON noise database is continually reviewed and updated with adjustments made annually when measurements show this to be necessary.

³ *Lateral attenuation* is the excess sound attenuation caused by the ground surface, which can be significant at low angles of elevation. *Lateral directivity* is the non-uniform directionality of sound radiated laterally about the roll axis of the aircraft – this is influenced to a large extent by the positioning of the engines.

- 2.10 The most significant SEL noise database updates following noise measurements undertaken in 2019 were as follows:
- B773G – up to 0.6 dB higher on departure at distances between about 10 and 22 km from start-of-roll, and 0.6 dB lower on arrival at distances greater than about 15 km from threshold;
 - B789 – up to 0.5 dB higher on departure at distances greater than about 12 km from start-of-roll;
 - EA320C - up to 1 dB lower on arrival at distances greater than about 13 km from threshold;
 - EA33 – up to 0.3 dB higher on arrival at distances between about 5 and 10 km from threshold;
 - EA346 – up to 1 dB higher on departure at distances greater than about 12 km from start-of-roll;
 - EA38R – up to 1.5 dB higher on arrival at all distances.
- 2.11 Additional validation of L_{Amax} levels for each aircraft type, which are the basis of the N70/N65/N60 contours (but not the L_{Aeq} contours), was undertaken for 2019.

Traffic data

- 2.12 The contours were calculated using 2019 movement data extracted from the Heathrow NTK system, which stores radar data supplemented by daily flight plans. Breakdowns of the aircraft movements by ANCON aircraft type for the average summer day (07:00-23:00 local time) and night (23:00-07:00 local time), and the annual average 12-hour day (07:00-19:00 local time), 4-hour evening (19:00-23:00 local time), 8-hour night (23:00-07:00 local time), 24-hour period and 6.5-hour night (23:30-06:00 local time), are summarised in **Tables C1-C7 of Appendix C**. The summer and annual traffic numbers have been divided by 92 and 365 respectively in the tables to provide daily average figures⁴. Detailed descriptions of individual ANCON aircraft types are given in **Table D1 of Appendix D**.
- 2.13 The average number of daily movements at Heathrow over the 2019 summer day period (1260.4) was 0.4% lower than the previous year (2018: 1265.5). Average summer night movements fell by 1.5% in 2019 to 86.7 (2018: 88.0). (Night-time departures increased by 0.4% from 26.1 to 26.3, whilst arrivals reduced by 2.3% from 61.9 to 60.4).

⁴ For the 6.5-hour night, the total was divided by 364.

- 2.14 The largest movement increases over the 2019 average summer 16-hour day period were for the ANCON types EA320NEO (+41.5), EA321NEO (+25.5), LTT (+15.3) and B789 (+11.7). The EA319V had the highest movement decrease (-23.1), followed by the EA320V (-22.5) and B763R (-17.4). Movements of the B738MAX reduced to zero in the 2019 summer period (2018: 8.6) after the aircraft was grounded worldwide following the fatal accidents in October 2018 and March 2019.
- 2.15 During the 2019 average summer 8-hour night period the largest movement increases were for the ANCON types B789 (+2.5) and EA359 (+1.2). The highest movement decreases were for the B773G (-1.7) and EA319C (-1.5).
- 2.16 The annual average 24-hour daily movements for the base year 2006 and years 2009-2019 are summarised in **Table 1**, along with the total annual movements in each year. (Note that 2012 and 2016 were leap years, so the total annual movements were divided by 366 to give the annual average 24-hour daily movements on which the noise contours are calculated).

Table 1 Heathrow annual 24-hour movements for years 2006 & 2009-2019

Year	Total daily movements	Percentage change (rounded) relative to 2006	Total annual movements (thousands)
2006	1307.6	(n/a)	477.3
2009	1277.2	-2%	466.2
2010	1245.8	-5%	454.7
2011	1317.1	+1%	480.7
2012	1297.9	-1%	475.0
2013	1293.1	-1%	472.0
2014	1292.8	-1%	471.9
2015	1297.9	-1%	473.7
2016	1297.4	-1%	474.8
2017	1303.7	0%	475.9
2018	1308.8	0%	477.7
2019	1312.9	0%	479.2

- 2.17 It can be seen that total movements decreased in both 2009 and 2010 relative to 2006, with the 2010 total being 5% lower than in 2006. However, in 2011 the

total rose to a level 1% above the 2006 total. Movements dropped back in 2012 to a level 1% below that in 2006, and then remained at this level until 2016. In 2017 through to 2019 the movement total was back close to the 2006 figure.

- 2.18 The allocations of traffic on each departure route and arrival runway are summarised in terms of the percentage of total daily operations for each of the L_{day} , $L_{evening}$, L_{night} , L_{den} and $L_{Aeq,6.5h}$ time periods, for 2006 and 2009-2019, in **Tables C8-a to C8-k**. Route allocations for the L_{den} and L_{night} periods are also shown as pie charts following **Table C8-k**, firstly for arrivals, and then for easterly and westerly departures. These charts illustrate how the proportion of flights on each route has changed over time.
- 2.19 The percentage allocations of traffic on each departure route and arrival runway are also summarised for single mode scenarios (e.g. 100% W departures, 100% W arrivals), for each of the L_{day} , $L_{evening}$, L_{night} , L_{den} and $L_{Aeq,6.5h}$ time periods, for 2006 and 2009-2019, in **Tables C9-a to C9-k**.

Aircraft noise classes

- 2.20 The 2019 Heathrow fleet mix can be considered in terms of aircraft 'Noise Class' categories (A-H), which are ranked in ascending order of noise emission, i.e. from the quietest (A) to the noisiest (H). Noise Class percentage breakdowns are summarised in **Table 2** for the 2019 annual average 24-hour period, along with percentages from the 2006 base year for comparison. For the first time, in 2019, Noise Classes C-E have each been split into 3rd and 4th generation subclasses, e.g. 'C3' (3rd gen.) and 'C4' (4th gen.), where C4, D4 and E4 represent the more modern, quieter 4th generation types:
- Noise Class C4 = B738MAX, EA221, EA223, EA320NEO, EA321NEO;
 - Noise Class D4 = B789, B7810, EA359, EA3510; and
 - Noise Class E4 = B748, EA38GP, EA38R.
- 2.21 It can be seen that 98% of movements in 2019 were within Noise Classes C, D and E. The proportion of narrow-body jet aircraft (Noise Class C) decreased from 65.3% to 59.5% between 2006 and 2019. There was also a reduction in the proportion of wide-body 3 or 4-engine types (Noise Class E) from 15.2% in 2006 to 8.2% in 2019. In contrast, the proportion of wide-body twin-engine aircraft (Noise Class D) increased from 18.4% to 30.5% between 2006 and 2019. The more modern, quieter aircraft in Noise Classes C4, D4 and E4 made up 9.3%, 11.1% and 3.4% of total movements respectively (24% when combined).
- 2.22 The chart in **Figure B2** of **Appendix B** illustrates the breakdown of total movements by Noise Class for 2006 and 2009-2019. (Movements over the annual average 24-hour period in 2019 by ANCON aircraft type are summarised

in **Table C6**). They are described in more detail for Noise Classes C-E in the following sections.

Table 2 Heathrow 2019 annual average 24-hour movements by Noise Class

Noise Class	Aircraft Description	2019 movements	2019 percentage	2006 percentage
A	Small propeller (single/twin piston and light turboprop)	< 0.1	0.0%	< 0.1%
B	Large propeller (twin and 4-propeller)	24.3	1.9%	0.6%
C	Narrow-body aircraft, e.g. <i>Airbus A319, Boeing 737-800</i>	(780.7)	(59.5%)	65.3%
↘ C3	3rd generation narrow-body , e.g. <i>Airbus A319, Boeing 737-800</i>	658.1	50.1%	-
↘ C4	4th generation narrow-body , e.g. <i>Airbus A320neo, Boeing 737 MAX 8</i>	122.7	9.3%	-
D	Wide-body twins, e.g. <i>Airbus A330, Boeing 777-200</i>	(400.7)	(30.5%)	18.4%
↘ D3	3rd generation wide-body twins , e.g. <i>Airbus A330, Boeing 777-200</i>	254.7	19.4%	-
↘ D4	4th generation wide-body twins , e.g. <i>Airbus A350-900, Boeing 787-9</i>	146.0	11.1%	-
E	Wide-body 3 or 4-engine aircraft, e.g. <i>Airbus A380, Boeing 747-400</i>	(107.2)	(8.2%)	15.2%
↘ E3	3rd generation wide-body 4-engine , e.g. <i>Boeing 747-400</i>	62.1	4.7%	-
↘ E4	4th generation wide-body 4-engine , e.g. <i>Airbus A380</i>	45.1	3.4%	-
F	1 st generation wide-body 3,4 engine, e.g. <i>Boeing 747-100</i>	0.0	0.0%	0.3%
G	2 nd generation narrow-body twins, e.g. <i>Boeing 737-200</i>	0.0	0.0%	0.0%
H	1 st generation narrow-body 3,4 engine, e.g. <i>Boeing 727</i>	0.0	0.0%	< 0.1%
	Total	1312.9	100.0%	100.0%

Note: Noise Classes C, D and E have each been split into two separate subclasses for 2019. Totals may not sum exactly due to rounding.

Noise Class C aircraft changes

2.23 Noise Class C was the largest grouping in all the years (see **Figure B2**) and made up 59.5% of total movements in 2019. Since 2006, the proportion of movements under Noise Class C (narrow-body aircraft) has generally fallen. In

2019, the largest Noise Class C movement decreases from 2018 were for the EA320V (-25.2) and EA319V (-11.4). These were offset by movement increases for the EA320NEO (+39.1) and EA321NEO (+23.5). The Airbus A320 family (A318-A321) accounted for 93% of Noise Class C movements in 2019. The more modern types such as Boeing 737 MAX 8, Airbus A221/A223 and Airbus A320neo/A321neo comprised 16% of Noise Class C movements.

Noise Class D aircraft changes

- 2.24 The next largest grouping was Noise Class D (wide-body twin-engine aircraft), which accounted for 30.5% of total movements in 2019. The proportion of Noise Class D movements has mostly risen between 2006 and 2019 (see **Figure B2**). For 2019, the largest movement increases within Noise Class D from 2018 were for the ANCON types B789 (+12.2) and the EA33 (+7.6). The largest movement decreases were for the B763R (-17.0) and the B773G (-8.4). The newest aircraft types such as the Boeing 787-8/9/10, Airbus A350-900/1000 and Airbus A330neo made up 36% of all Noise Class D movements.

Noise Class E aircraft changes

- 2.25 Around 8% of total movements were within Noise Class E (wide-body four-engine aircraft) in 2019. The proportion of movements in Noise Class E has declined steadily since 2006 through to 2019 (see **Figure B2**). Within Noise Class E, the largest movement reductions in 2019 from 2018 were for the B744R and EA346 (both -2.4). The largest increase was for the EA34 (+0.5). The more modern aircraft such as the Airbus A380 and Boeing 747-8 accounted for 42% of all Noise Class E movements in 2019.

Fleet mix by ICAO noise Chapter

- 2.26 An analysis of the certification noise levels of aircraft operating at Heathrow in 2019 indicated that over 99%⁵ of the fleet were compliant with the ICAO Chapter 4 noise standard.
- 2.27 In the 2006 base year, the estimated percentage of Chapter 4-compliant aircraft was 94%, and by 2009 this had risen to 95%. The figure was higher in 2010 and 2011 (96% in both years), and in 2012 and 2013 the compliance level had reached an estimated 97%. The compliance level was at its highest from 2014 to 2019 at an estimated 99% or higher.

⁵ The percentage figure is purely an estimate because in some cases, detailed aircraft information (e.g. engine modifications) was not readily available, so some assumptions had to be made.

2.28 In addition, it has been estimated that around 66% of aircraft operations in 2019 (2018: 62%) were compliant with the latest ICAO Chapter 14 noise standard.⁶

Runway modal splits

2.29 In general, aircraft will take-off and land into a headwind to maximise lift during take-off and landing. The wind direction, which varies over the course of a year, will therefore have an important influence on the usage of runways.⁷ The ratio of westerly (i.e. Runway 27L/27R) and easterly (i.e. Runway 09L/09R) operations is referred to as the *runway modal split*.

2.30 Two sets of contours have been produced for the 2019 summer 16-hour day:

(a) Using the ‘actual’ modal split over the L_{Aeq} day period; and

(b) Assuming the ‘standard’ modal split over the L_{Aeq} day period, i.e. the long-term modal split calculated from the 20-year rolling average. For 2019, this is the 20-year period from 2000 to 2019. Using the standard modal split enables year-on-year comparisons without the runway usage significantly affecting the contour shape.

2.31 The 2018 and 2019 runway modal splits for the day and night summer periods are summarised in **Table 3**.

Table 3 Heathrow 2018 and 2019 summer runway modal splits

Time period	2018 actual split (W/E percentage)	2019 actual split (W/E percentage)	2018 standard split (W/E percentage)	2019 standard split (W/E percentage)
16-hour day	78 / 22	80 / 20	79 / 21	80 / 20
8-hour night	80 / 20	80 / 20	Data not available	Data not available

2.32 The annual noise contours were modelled with the 2019 actual West/East (W/E) runway modal splits, which are summarised in **Table 4** along with the modal splits from the previous year, and also the 5-year rolling average. In 2019 there was a 9% shift in favour of westerly operations over the annual 24-hour period compared to 2018.

⁶ The latest Chapter 14 standard is applicable to new large aircraft types presented for certification from 31 December 2017 and it represents a further level of stringency compared to the Chapter 4 standard.

⁷ A ‘westerly preference’ is used at Heathrow, meaning operations in westerly mode even if there is a light tailwind, to reduce the use of easterly SIDs that tend to overfly more populated areas than the westerly SIDs.

Table 4 Heathrow annual runway modal splits

Time period	2018 actual split (W/E percentage)	2019 actual split (W/E percentage)	5-year average 2015- 2019 (W/E percentage)
12-hour day	65 / 35	74 / 26	72 / 28
4-hour evening	65 / 35	73 / 27	73 / 27
8-hour night	64 / 36	74 / 26	72 / 28
24-hour day	65 / 35	74 / 26	72 / 28
6.5-hour night	69 / 31	73 / 27	72 / 28

Note: The 6.5-hour night covers the period from the end of March in one year to the end of March in the following year, according to the start of the summer and end of the winter night quota seasons (also see section 1.7).

- 2.33 The runway modal split percentages for each of the annual periods modelled, L_{day} , $L_{evening}$, L_{night} , L_{den} and $L_{Aeq,6.5h}$ night, are summarised in **Tables C10-a to C10-e** respectively, for 2006 and 2009-2019, for departures and arrivals separately.
- 2.34 A higher proportion of westerly movements at Heathrow tends to cause an increase in contour area. Conversely, a higher proportion of easterly movements at Heathrow tends to reduce the contour area. During easterly operations, departures from Runway 09L are restricted by the Cranford Agreement, resulting in the majority of departures operating from Runway 09R, whilst landings are on Runway 09L. This concentrates traffic onto fewer flight paths, reducing the overall contour area.

Topography

- 2.35 The topography around Heathrow Airport was modelled by accounting for terrain height. This was achieved by geometrical corrections for source-receiver distance and elevation angles. Other, more complex effects, such as lateral attenuation from uneven ground surfaces and noise screening/reflection effects due to topographical features, were not taken into account.
- 2.36 ERCD holds Ordnance Survey terrain height data on a 50-metre grid for the whole of England. Interpolation was performed to generate height data at each of the calculation points on the receiver grid used by the ANCON noise model.

Population database

- 2.37 Estimates were made of the population and households enclosed within the noise contours. The population data used in this report for the 2019 contours are a 2019 update of the latest 2011 Census supplied by CACI Limited.⁸ The CACI population database contains data referenced at the postcode level. Population and household numbers associated with each postcode are assigned to a single coordinate located at the postcode's centroid.
- 2.38 Within the extent of the 2019 L_{den} 55 dB contour, the population count was 0.5% lower with the 2019 population database compared to the 2018 database. This provides an indication of the effect of any population changes in the vicinity of the airport on the results presented in Chapter 3.

Modelling factors affecting contour comparisons

- 2.39 The following Results section in this report compares contour results from different years. Apart from changes in fleet mix and movement totals between years, these comparisons are also affected by modelling factors such as:
- Mean track and lateral dispersion differences on each route;
 - Changes to average flight profiles of height, speed and thrust for each ANCON type;
 - Noise database changes;
 - Runway modal split (westerly/easterly) variations;
 - Changes in north-south runway usage, which can be affected by runway resurfacing works, for example;
 - Population database changes arising from annual updates;
 - Noise model updates, especially over longer periods of time.
- 2.40 Some of these factors can be accounted for in the comparisons (e.g. runway modal splits, population database changes), but others such as changes to the noise model, mean tracks and flight profiles are more complex and would require a disproportionate amount of effort to account for.

⁸ www.caci.co.uk

Chapter 3 Results

2019 summer day actual $L_{Aeq,16h}$ contours

- 3.1 The Heathrow 2019 summer day $L_{Aeq,16h}$ noise contours generated with the actual runway modal split (80% west / 20% east) are shown in **Figure B3 of Appendix B**. The contours are plotted from 54 to 72 dB at 3 dB intervals and overlaid onto the 2018 contours.
- 3.2 Cumulative estimates of the areas, populations and households within the 2019 summer day actual $L_{Aeq,16h}$ contours are provided in **Table 5**, along with the figures from 2018.

Table 5 Heathrow 2018 and 2019 summer day actual modal split $L_{Aeq,16h}$ contours – area, population and household estimates

$L_{Aeq,16h}$ (dB)	Area (km ²)			Population			Households		
	2018	2019	change	2018	2019	change	2018	2019	change
> 54	158.3	156.1	-1%	497.3	492.7	-1%	202.2	193.4	-4%
> 57	86.8	86.3	-1%	219.4	213.9	-3%	84.2	79.1	-6%
> 60	48.6	48.0	-1%	101.2	100.3	-1%	36.4	34.6	-5%
> 63	28.5	27.9	-2%	38.4	37.9	-1%	13.5	12.7	-6%
> 66	15.9	15.5	-3%	9.7	9.9	+2%	3.4	3.3	-3%
> 69	7.9	7.7	-3%	2.6	2.5	-4%	0.9	0.8	-11%
> 72	4.3	4.2	-2%	0.1	0.0	(n/a)	< 0.1	0.0	(n/a)

Note: Populations and households are given in thousands. The 2018 and 2019 population/household counts are based on 2018 and 2019 CACI updates of the 2011 Census respectively.

- 3.3 The 2019 summer day actual 54 dB $L_{Aeq,16h}$ contour enclosed an area of 156.1 km² and a population of 492,700. This area was 1% smaller than in 2018 (158.3 km²), and the population was 1% lower (2018: 497,300).
- 3.4 The contour area reductions can be attributed primarily to the higher proportions of more modern, quieter types such as the EA320NEO and EA321NEO.

2019 summer day standard $L_{Aeq,16h}$ contours

- 3.5 The Heathrow 2019 summer day $L_{Aeq,16h}$ noise contours generated with the standard runway modal split (80% west / 20% east)⁹ are shown in **Figure B4**. The contours are plotted from 54 to 72 dB at 3 dB intervals and overlaid onto the 2018 contours.
- 3.6 Cumulative estimates of the areas, populations and households within the 2019 summer day standard $L_{Aeq,16h}$ contours are provided in **Table 6**, along with the figures from 2018.

Table 6 Heathrow 2018 and 2019 summer day standard modal split $L_{Aeq,16h}$ contours – area, population and household estimates

$L_{Aeq,16h}$ (dB)	Area (km ²)			Population			Households		
	2018	2019	change	2018	2019	change	2018	2019	change
> 54	158.5	156.1	-2%	501.8	492.7	-2%	204.6	193.4	-5%
> 57	87.0	86.3	-1%	219.6	213.9	-3%	84.4	79.1	-6%
> 60	48.7	48.0	-1%	101.5	100.3	-1%	36.6	34.6	-5%
> 63	28.5	27.9	-2%	38.8	37.9	-2%	13.6	12.7	-7%
> 66	16.0	15.5	-3%	9.8	9.9	+1%	3.4	3.3	-3%
> 69	7.9	7.7	-3%	2.6	2.5	-4%	0.9	0.8	-11%
> 72	4.3	4.2	-2%	0.1	0.0	(n/a)	< 0.1	0.0	(n/a)

Note: Populations and households are given in thousands. The 2018 and 2019 population/household counts are based on 2018 and 2019 CACI updates of the 2011 Census respectively.

- 3.7 The 2019 summer day standard 54 dB $L_{Aeq,16h}$ contour enclosed an area of 156.1 km² and a population of 492,700. This area was 2% smaller than in 2018 (158.5 km²), whilst the population was 2% lower (2018: 501,800).
- 3.8 The contour area reductions reflect the higher proportions of more modern, quieter types such as the EA320NEO and EA321NEO.
- 3.9 The extension of the 54 dB contour lobe in 2019 that resulted from CPT/GOGSI departures (to the south-west of Windsor) can be attributed to the higher movement rate on these routes compared to 2018.

⁹ The standard modal split was the same as the actual modal split in 2019.

2019 summer day single mode $L_{Aeq,16h}$ contours

3.10 The Heathrow 2019 summer day $L_{Aeq,16h}$ noise contours for 100% westerly and 100% easterly modes assuming the 2006 north-south runway usage (to eliminate the effects of differences in north-south runway usage between 2019 and 2006) are shown in **Figures B5** and **B6** respectively. The contours are plotted from 54 to 72 dB at 3 dB intervals and overlaid onto the corresponding single mode contours for 2006.

3.11 Cumulative estimates of the areas, populations and households within the 2006 and 2019 summer day single mode $L_{Aeq,16h}$ contours are provided in **Tables 7** and **8**.

Table 7 Heathrow 2006 and 2019 summer day $L_{Aeq,16h}$ 100% W contours (assuming 2006 N-S runway usage) – area, population and household estimates

$L_{Aeq,16h}$ (dB)	Area (km ²)			Population			Households		
	2006	2019	change	2006	2019	change	2006	2019	Change
> 54	215.6	163.6	-24%	638.6	556.7	-13%	289.5	224.5	-22%
> 57	126.5	90.8	-28%	297.0	218.0	-27%	128.0	81.8	-36%
> 60	69.4	49.0	-29%	113.7	101.6	-11%	46.5	35.5	-24%
> 63	38.5	28.3	-26%	50.5	42.7	-15%	20.1	14.4	-28%
> 66	23.4	16.6	-29%	18.3	12.1	-34%	7.0	4.0	-43%
> 69	13	8.0	-38%	5.2	3.4	-35%	2.0	1.1	-45%
> 72	6.7	4.3	-36%	1.1	0.2	-82%	0.4	0.1	-75%
> 54				638.6	477.7	-25%	289.5	214.3	-26%
> 57				297.0	179.0	-40%	128.0	75.3	-41%
> 60				113.7	78.3	-31%	46.5	31.2	-33%
> 63				50.5	32.7	-35%	20.1	12.9	-36%
> 66				18.3	10.4	-43%	7.0	3.8	-46%
> 69				5.2	2.7	-48%	2.0	1.0	-50%
> 72				1.1	0.2	-82%	0.4	0.1	-75%

Note: Populations and households are given in thousands. The 2006 population/household counts are based on a 2006 CACI update of the 2001 Census. The 2019 population/household counts are based on a 2019 CACI update of the 2011 Census. **Estimates for 2019 using the 2006 population database are shown in blue.**

Table 8 Heathrow 2006 and 2019 summer day L_{Aeq,16h} 100% E contours (assuming 2006 N-S runway usage) – area, population and household estimates

L _{Aeq,16h} (dB)	Area (km ²)			Population			Households		
	2006	2019	change	2006	2019	Change	2006	2019	change
> 54	196.6	150.1	-24%	516.9	435.3	-16%	216.1	165.8	-23%
> 57	112.7	80.0	-29%	324.6	238.1	-27%	136.4	88.7	-35%
> 60	63.4	42.5	-33%	169.4	125.9	-26%	69.6	45.5	-35%
> 63	35.0	22.6	-35%	71.9	37.9	-47%	28.4	13.2	-54%
> 66	18.9	12.5	-34%	22.3	7.5	-66%	8.7	2.7	-69%
> 69	10.6	7.1	-33%	3.6	1.4	-61%	1.6	0.5	-69%
> 72	6.2	4.1	-34%	0.9	0.7	-22%	0.4	0.3	-25%
> 54				516.9	369.9	-28%	216.1	156.5	-28%
> 57				324.6	198.0	-39%	136.4	81.9	-40%
> 60				169.4	104.4	-38%	69.6	42.2	-39%
> 63				71.9	29.1	-60%	28.4	11.8	-58%
> 66				22.3	5.6	-75%	8.7	2.3	-74%
> 69				3.6	1.1	-69%	1.6	0.5	-69%
> 72				0.9	0.5	-44%	0.4	0.2	-50%

Note: Populations and households are given in thousands. The 2006 population/household counts are based on a 2006 CACI update of the 2001 Census. The 2019 population/household counts are based on a 2019 CACI update of the 2011 Census. **Estimates for 2019 using the 2006 population database are shown in blue.**

- 3.12 For the westerly single mode contours, the 2019 areas have all decreased relative to 2006, by up to 38%. The population and household counts in 2019 were also all lower than in 2006.
- 3.13 For the easterly single mode contours, the 2019 areas have also all decreased relative to 2006, by up to 35%. Both population and household numbers were lower at all contour levels in 2019 compared to 2006.
- 3.14 Populations and household estimates for 2019, assuming the 2006 population database, are shown in blue in the lower half of each table. These figures indicate that the populations would have decreased even more without the population encroachment that took place between 2006 and 2019.

2019 summer night actual $L_{Aeq,8h}$ contours

- 3.15 The Heathrow 2019 summer night $L_{Aeq,8h}$ noise contours generated with the actual runway modal split (80% west / 20% east) are shown in **Figure B7**. The contours are plotted from 48 to 66 dB at 3 dB intervals (the 69 and 72 dB contours have been omitted for clarity) and overlaid onto the 2018 contours.
- 3.16 Cumulative estimates of the areas, populations and households within the 2019 summer night actual $L_{Aeq,8h}$ contours are provided in **Table 9**, along with the figures from 2018.

Table 9 Heathrow 2018 and 2019 summer night actual modal split $L_{Aeq,8h}$ contours – area, population and household estimates

$L_{Aeq,8h}$ (dB)	Area (km ²)			Population			Households		
	2018	2019	change	2018	2019	change	2018	2019	change
> 48	106.0	105.4	-1%	417.5	428.5	+3%	174.2	172.4	-1%
> 51	64.1	63.7	-1%	201.7	201.8	0%	78.2	75.2	-4%
> 54	35.9	35.1	-2%	95.6	97.3	+2%	34.9	33.9	-3%
> 57	18.3	17.3	-5%	45.1	46.3	+3%	15.6	15.2	-3%
> 60	9.4	8.8	-6%	16.2	16.6	+2%	5.2	5.1	-2%
> 63	4.9	4.6	-6%	2.7	2.7	0%	0.8	0.8	0%
> 66	2.7	2.5	-7%	0.6	0.6	0%	0.2	0.2	0%
> 69	1.6	1.5	-6%	< 0.1	0.0	(n/a)	< 0.1	0.0	(n/a)
> 72	0.9	0.9	0%	0.0	0.0	(n/a)	0.0	0.0	(n/a)

Note: Populations and households are given in thousands. The 2018 and 2019 population/household counts are based on 2018 and 2019 CACI updates of the 2011 Census respectively.

- 3.17 The 2019 night actual 48 dB $L_{Aeq,8h}$ contour enclosed an area of 105.4 km² and a population of 428,500. The 48 dB area was 1% smaller than in 2018 (106.0 km²), whilst the population was 3% higher (2018: 417,500). Areas also decreased at the higher contour levels in 2019. The reductions in night contour area can be attributed mainly to higher numbers of more modern, quieter types such as the B789, EA320NEO, EA321NEO and EA359, which offset the effects of increases in arrival noise levels for the EA38R and EA33. Populations increased at some of the contour levels despite the area decreases, due to contour shape changes that extended the contours over west London.

2019 summer night single mode $L_{Aeq,8h}$ contours

- 3.18 The Heathrow 2019 summer night $L_{Aeq,8h}$ noise contours for 100% westerly and 100% easterly modes assuming the 2006 north-south runway usage are shown in **Figures B8** and **B9** respectively. The contours are plotted from 48 to 66 dB at 3 dB intervals (the 69 and 72 dB contours have been omitted for clarity) and overlaid onto the corresponding single mode contours for 2006.
- 3.19 Cumulative estimates of the areas, populations and households within the 2006 and 2019 summer night single mode $L_{Aeq,8h}$ contours are provided in **Tables 10** and **11**.

Table 10 Heathrow 2006 and 2019 summer night 100% W $L_{Aeq,8h}$ contours (assuming 2006 N-S runway usage) area, population and household estimates

$L_{Aeq,8h}$ (dB)	Area (km ²)			Population			Households		
	2006	2019	Change	2006	2019	Change	2006	2019	change
> 48	118.3	104.8	-11%	431.8	501.9	+16%	195.7	204.6	+5%
> 51	71.4	64.2	-10%	188.5	224.4	+19%	80.2	84.7	+6%
> 54	42.2	37.1	-12%	99.1	123.3	+24%	40.6	44.3	+9%
> 57	23.3	17.5	-25%	47.3	55.3	+17%	18.4	18.3	-1%
> 60	11.8	9.0	-24%	21.6	23.5	+9%	8.2	7.4	-10%
> 63	6.4	4.5	-30%	7.4	4.4	-41%	2.5	1.3	-48%
> 66	3.5	2.3	-34%	1.7	1.6	-6%	0.6	0.5	-17%
> 69	2.0	1.2	-40%	0.2	0.0	-100%	0.1	0.0	-100%
> 72	1.3	0.7	-46%	0.0	0.0	(n/a)	0.0	0.0	(n/a)

Note: Populations and households are given in thousands. The 2006 population/household counts are based on a 2006 CACI update of the 2001 Census. The 2019 population/household counts are based on a 2019 CACI update of the 2011 Census.

Table 11 Heathrow 2006 and 2019 summer night 100% E $L_{Aeq,8h}$ contours (assuming 2006 N-S runway usage) area, population and household estimates

$L_{Aeq,8h}$ (dB)	Area (km ²)			Population			Households		
	2006	2019	change	2006	2019	change	2006	2019	change
> 48	112.0	98.8	-12%	197.3	171.3	-13%	81.4	63.9	-21%
> 51	68.9	59.8	-13%	120.8	86.1	-29%	49.5	33.1	-33%
> 54	39.4	32.5	-18%	52.0	34.9	-33%	21.9	14.4	-34%
> 57	20.5	15.9	-22%	7.9	4.3	-46%	3.5	1.8	-49%
> 60	11.2	8.2	-27%	1.8	1.7	-6%	0.8	0.7	-13%
> 63	6.2	4.2	-32%	0.7	0.5	-29%	0.3	0.2	-33%
> 66	3.4	2.2	-35%	0.2	0.1	-50%	0.1	0.1	0%
> 69	1.9	1.2	-37%	0.0	0.0	(n/a)	0.0	0.0	(n/a)
> 72	1.1	0.7	-36%	0.0	0.0	(n/a)	0.0	0.0	(n/a)

Note: Populations and households are given in thousands. The 2006 population/household counts are based on a 2006 CACI update of the 2001 Census. The 2019 population/household counts are based on a 2019 CACI update of the 2011 Census.

- 3.20 For the westerly single mode contours, the areas have all decreased in 2019 relative to 2006, by up to 46%. Populations and households, however, were higher in 2019 especially at the lower level contours from 48 to 60 dB. This can be attributed largely to the effects of population encroachment around Heathrow between 2006 and 2019.
- 3.21 For the easterly single mode contours, the 2019 areas were lower at all contour levels, by up to 37%. Population and households were also lower (or unchanged) in 2019 compared to 2006.

2019 summer day overflight contours and track density diagrams

- 3.22 Contours showing the number of 2019 average summer 16-hour day overflights (up to 4,000 ft AMSL), for 48.5 and 60-degree elevation angles¹⁰ at the ground receiver (see **Ref 4**), are shown in **Figures B10** and **B11** respectively. The results for the 2019 summer day are overlaid onto the 2018 summer day results and plotted at levels of 5, 20 and 100 overflights per 16-hour day.
- 3.23 It should be noted that these overflight contours have been included in this report as a supplementary metric to provide insight into the number of aircraft flyover events that might be observed. As yet there are no established methods for assessing the annoyance or health impacts from various levels of overflight.
- 3.24 Overflight track density diagrams, which indicate the number of overflights using colour-shading, are provided in **Figures B10-a** to **B10-c** for the 2006, 2018 and 2019 average summer day respectively assuming a 48.5-degree elevation angle. Corresponding diagrams for a 60-degree elevation angle can be found in **Figures B11-a** to **B11-c**.

2019 summer night overflight contours and track density diagrams

- 3.25 Contours showing the number of 2019 average summer 8-hour night overflights (up to 4,000 ft AMSL), for 48.5 and 60-degree elevation angles, are shown in **Figures B12** and **B13** respectively. The results for the 2019 summer night are overlaid onto the 2018 summer night results and plotted at levels 1, 5 and 20 overflights per 8-hour night.
- 3.26 Overflight track density diagrams are provided in **Figures B12-a** to **B12-c** for the 2006, 2018 and 2019 summer night respectively assuming a 48.5-degree elevation angle. Corresponding diagrams for a 60-degree elevation angle can be found in **Figures B13-a** to **B13-c**.
- 3.27 Similarly, as yet there are no established methods for assessing sleep disturbance or health impacts of night-time overflights.

¹⁰ The elevation angle is defined as the angle between the ground and the aircraft as seen from the observer at ground level.

2019 Noise Action Plan contours

- 3.28 The following Noise Action Plan contours for 2019 are shown in **Figures B14-B18** of **Appendix B** respectively, overlaid onto the 2018 contours:
- L_{day} , from 55 to 75 dB in 5 dB steps;
 - $L_{evening}$, from 55 to 75 dB in 5 dB steps;
 - L_{night} , from 50 to 70 dB in 5 dB steps;
 - L_{den} , from 55 to 75 dB in 5 dB steps; and
 - $L_{Aeq,6.5h}$ night, 48 dB.
- 3.29 The estimated cumulative areas, populations and households within the above 2019 contours are summarised in **Tables 12-16** respectively, along with the results for 2018. The 2019 population and household figures are based on a 2019 update of the 2011 Census supplied by CACI Ltd. (The 2018 population and household figures are based on a 2018 update of the 2011 Census).
- 3.30 A comparison between the cumulative 2019 results and those from the 2006 base year are provided in **Tables C11-C15** of **Appendix C**. All the population and household figures in these tables are based on data supplied by CACI Ltd with the respective annual updates.
- 3.31 Percentage changes in contour area are not necessarily accompanied by similar changes in enclosed population and households because populations are unevenly distributed around the airport. Therefore, the population and household counts can be quite sensitive to changes in contour shape.
- 3.32 Changes in contour population counts from year to year are also influenced by the effects of the annual update to the population database. Within the region bounded by the 2019 L_{den} 55 dB contour, there was a 0.5% decrease in the population count between 2018 and 2019.

2019 L_{day} contours

- 3.33 Total movements in the 2019 L_{day} period increased by 0.2% from 2018 to 953.3 per 12-hour day (see **Table C3**). Arrivals increased by 0.5% and departures reduced by 0.1%. The largest increases were for the ANCON types EA320NEO (+28.6 movements) and EA321NEO (+16.5). These were offset by decreases for the EA320V (-21.1 movements) and B763R (-12.1).
- 3.34 The 55 dB L_{day} contour area of 129.1 km² was 0.4% larger than in 2018 (see **Table 12**). The area also increased at the 60 dB level, by 1%.

Table 12 Heathrow 2019 L_{day} contours - area, population and household estimates

L _{day} (dB)	Area (km ²)			Population			Households		
	2018	2019	change	2018	2019	change	2018	2019	change
> 55	128.6	129.1	0% ¹¹	351.9	357.9	+2%	138.4	136.9	-1%
> 60	48.8	49.1	+1%	103.8	104.6	+1%	37.4	36.0	-4%
> 65	20.2	20.2	0%	16.3	17.4	+7%	5.6	5.7	+2%
> 70	6.5	6.4	-2%	1.1	1.3	+18%	0.4	0.5	+25%
> 75	2.5	2.5	0%	< 0.1	0.0	(n/a)	< 0.1	0.0	(n/a)

Note: Populations and households are given in thousands. The 2018 and 2019 population/household counts are based on 2018 and 2019 CACI updates of the 2011 Census respectively.

- 3.35 These area rises can be mainly attributed to: (a) the 9% higher proportion of westerly operations, which tends to increase the contour area at Heathrow, and (b) adjustments to the noise levels of certain ANCON types such as the B773G on departure following the 2019 noise measurements (see section 2.10). These offset the effects of quieter aircraft in the fleet mix.
- 3.36 Population counts for the 55 dB contour in 2019 were 2% higher than in 2018, and increases were also seen at the higher contour levels.
- 3.37 The 2019 L_{day} contours are compared against the 2018 L_{day} contours in **Figure B14**. The effects of the 9% change in the 2019 runway modal split in favour of westerly operations is evident in the shrinking of the departure contour lobes to the east of the airport (from aircraft turning to the north and south), and also in the arrival contour lobes near Windsor. Conversely, the westerly departure and arrival contour lobes have all expanded. The changes to the contour shapes due to the runway modal split also played a part in the population count changes between the two years.

¹¹ +0.4% to 1 d.p.

2019 L_{evening} contours

- 3.38 Total movements in the 2019 L_{evening} period increased by 1% from 2018 to 279.1 per 4-hour evening (see **Table C4**). Departures increased by 2% and arrivals by 0.4%. The highest movement increases were for the ANCON types EA320NEO (+9.7) and EA321NEO (+6.3). The largest movement decreases were for the EA320V (-4.3) and B763R (-4.0).
- 3.39 The area of the 55 dB L_{evening} contour increased by 2% in 2019 to 112.5 km² (see **Table 13**). There was also an increase in area of 2% at the 65 dB level. These area changes can be largely attributed to: (a) the 8% higher proportion of westerly operations, which tends to increase the contour area at Heathrow, offsetting the effects of quieter aircraft in the fleet mix, and (b) adjustments to the noise levels of certain ANCON types (e.g. B773G, B789 and EA346) following the 2019 noise measurements (see section 2.10).

Table 13 Heathrow 2019 L_{evening} contours - area, population and household estimates

L_{evening} (dB)	Area (km ²)			Population			Households		
	2018	2019	change	2018	2019	change	2018	2019	change
> 55	110.8	112.5	+2%	305.7	292.5	-4%	119.1	110.0	-8%
> 60	42.6	42.6	0%	80.8	77.0	-5%	28.9	26.3	-9%
> 65	16.9	17.2	+2%	8.9	9.0	+1%	3.2	3.1	-3%
> 70	5.6	5.5	-2%	0.5	0.6	+20%	0.2	0.2	0%
> 75	2.3	2.2	-4%	0.0	0.0	(n/a)	0.0	0.0	(n/a)

Note: Populations and households are given in thousands. The 2018 and 2019 population/household counts are based on 2018 and 2019 CACI updates of the 2011 Census respectively.

- 3.40 Reductions in population and household counts of up to 9% were found at the 55 and 60 dB contour levels.
- 3.41 The 2019 L_{evening} contours are compared against the 2018 contours in **Figure B15**. As with the L_{day} contours, the 8% shift in the 2019 runway modal split in favour of westerly operations contracted the departure contour lobes to the east of the airport (from aircraft turning to the north and south), as well as the arrival contour lobes around Windsor. Conversely, the contour lobes resulting from westerly departures and arrivals have all extended. The changes to the contour shapes due to the runway modal split also played a part in the population count changes between the two years.

2019 L_{night} contours

- 3.42 Total movements over the 2019 L_{night} period decreased by 1% to 80.5 per 8-hour night from 2018 (see **Table C5**). Arrival movements fell by 2%, whilst departure movements were unchanged. Arrivals constituted 75% of all L_{night} movements. The largest movement increases were for the ANCON types B789 (+1.7) and EA320NEO, EA3510 and EA359 (+0.8 each), whilst the largest decreases were for the EA319C (-1.2) and B744R (-1.1).
- 3.43 The area of the L_{night} 50 dB contour was 1% smaller in 2019 and areas also reduced at the higher contour levels (see **Table 14**). The area reductions from 2018 can be largely attributed to the higher numbers of quieter types as described above and the effects of the change in runway modal split, which offset arrival noise increases for aircraft types such as the EA38R and EA33 following the 2019 measurements (see section 2.10).

Table 14 Heathrow 2019 L_{night} contours - area, population and household estimates

L _{night} (dB)	Area (km ²)			Population			Households		
	2018	2019	change	2018	2019	change	2018	2019	Change
> 50	72.7	72.2	-1%	220.9	228.5	+3%	86.5	86.5	0%
> 55	24.5	24.2	-1%	59.6	70.6	+18%	20.9	23.7	+13%
> 60	8.1	7.8	-4%	11.2	13.7	+22%	3.6	4.2	+17%
> 65	2.9	2.7	-7%	0.8	1.4	+75%	0.2	0.4	100%
> 70	1.2	1.1	-8%	0.0	0.0	(n/a)	0.0	0.0	(n/a)

Note: Populations and households are given in thousands. The 2018 and 2019 population/household counts are based on 2018 and 2019 CACI updates of the 2011 Census respectively.

- 3.44 There was a 3% increase in population within the L_{night} 50 dB contour and even larger percentage increases at the higher contour levels. These were largely caused by contour shape changes arising from the 10% higher proportion of westerly operations in 2019.
- 3.45 The 2019 L_{night} contours are compared against the 2018 contours in **Figure B16**. It can be seen that arrival noise was dominant over the night period. The shift in runway modal split from 64% west / 36% east in 2018 to 74% west / 26% east in 2019 had the effect of lengthening the arrival contour lobes over west London and pulling them away from Windsor.

2019 L_{den} contours

- 3.46 Total annual 24-hour aircraft movements in 2019 (1312.9) were 0.3% higher than in 2018 (see **Table C6**). The largest movement increases were for the ANCON types EA320NEO (+39.1), EA321NEO (+23.5) and B789 (+12.2). These were offset by decreases for the EA320V (-25.2 movements), B763R (-17.0) and EA319V (-11.4). There was a 7% reduction in movements of Boeing 747-400 aircraft in 2019 compared to 2018.
- 3.47 The area of the L_{den} 55 dB contour in 2019 was 0.3% smaller than in 2018 (see **Table 15**). The area increased by 2% at 60 dB, but reduced by 1% at the 65 and 70 dB levels. The area changes are influenced by a number of factors including: (a) the 10% higher proportion of westerly operations, which tends to increase the contour area at Heathrow, (b) the introduction of more modern, quieter aircraft such as the EA320NEO, and (c) noise adjustments following the 2019 noise measurements, as described in section 2.10.

Table 15 Heathrow 2019 L_{den} contours - area, population and household estimates

L _{den} (dB)	Area (km ²)			Population			Households		
	2018	2019	change	2018	2019	change	2018	2019	change
> 55	176.8	176.2	0% ¹²	611.3	664.3	+9%	253.9	268.4	+6%
> 60	67.7	69.0	+2%	182.1	186.6	+2%	69.3	68.8	-1%
> 65	26.6	26.4	-1%	42.6	46.4	+9%	14.9	15.5	+4%
> 70	8.6	8.5	-1%	4.1	4.8	+17%	1.4	1.5	+7%
> 75	3.1	3.1	0%	0.1	0.0	-100%	< 0.1	0.0	(n/a)

Note: Populations and households are given in thousands. The 2018 and 2019 population/household counts are based on 2018 and 2019 CACI updates of the 2011 Census respectively.

- 3.48 The population count was 9% higher for the 55 dB contour in 2019, as the arrival contour tip arising from westerly arrivals extended into densely populated areas of London, following the higher proportion of westerly operations (see **Figure B17**). Populations also increased at the higher contour levels.
- 3.49 The 2019 L_{den} contours are compared against the 2018 contours in **Figure B17**. The westerly arrival contour lobes to the east of the airport have extended following the 10% shift in favour of westerly movements in 2019. At the opposite end near Windsor, the decrease in proportion of easterly operations caused retractions in the arrival contour lobes here. The higher proportion of westerly

¹² -0.3% to 1 d.p.

operations also caused an expansion of the westerly departure contour lobes from aircraft turning to the north and south. Conversely, the contour lobes due to easterly departures have retracted.

2019 $L_{Aeq,6.5h}$ night contours

- 3.50 Total movements in the 6.5-hour night period for 2019 (see **Table C7**) decreased by 6% to 15.9 from the previous year (2018: 16.9). The highest movement increase was for the ANCON type B763P (+0.9), whilst the largest decrease was for the B757P (-0.9). Total 6.5-hour night departures decreased from 1.4 in 2018 to 1.1 in 2019. Total 6.5-hour night arrival movements reduced by 5%, from 15.6 in 2018 to 14.8 in 2019.
- 3.51 The 48 dB $L_{Aeq,6.5h}$ night contour area of 33.4 km² in 2019 was 5% higher compared to 2018 (see **Table 16**). Populations and households within the 48 dB contour increased by 15% and 11% respectively.

Table 16 Heathrow 2019 $L_{Aeq,6.5h}$ night contour - area, population and household estimates

$L_{Aeq,6.5h}$ (dB)	Area (km ²)			Population			Households		
	2018	2019	change	2018	2019	Change	2018	2019	change
> 48	31.8	33.4	+5%	99.0	114.0	+15%	36.3	40.4	+11%

Note: Populations and households are given in thousands. The 2018 and 2019 population/household counts are based on 2018 and 2019 CACI updates of the 2011 Census respectively.

- 3.52 The 2019 $L_{Aeq,6.5h}$ night 48 dB contour is compared against the 2018 contour in **Figure B18**. The northern runway contour tip to the east of the airport extended over densely-populated parts of Kew in 2019, causing an increase in the population count. The 2019 modal split for arrivals only was 73% west / 27% east (see **Table C10-e**), which was equivalent to a 4% higher percentage of westerly arrivals compared to 2018, when the arrival runway split was 69% west / 31% east. Although the northern runway contour tip shortened at the western end near Datchet (due to the aforementioned modal split change), this was over sparsely populated areas.
- 3.53 The 5% increase in area (in spite of the reduction in total movements) can be attributed primarily to the higher measured arrival noise levels of up to 1.5 dB for the noise dominant ANCON type EA38R in 2019 (see section 2.10). The introduction of the B763P into the 6.5-hour night fleet mix at the expense of the quieter B757P (see section 3.50 above) was another factor in the area increase.

Long-term contour trends

- 3.54 Long-term area, population and household trends for the outermost cumulative contour are shown graphically in **Figures B19-B23** for L_{day} , L_{evening} , L_{night} , L_{den} and $L_{\text{Aeq,6.5h}}$ night respectively, starting from the base year 2006 and then from 2009 through to 2019 (note: the population and household trends are all based on updated CACI data). The westerly and easterly movement percentages (i.e. the runway modal split) have also been indicated by the dashed lines on the charts.
- 3.55 Some factors that influenced the contours between 2006 and 2019 include the following:
- 2006:
 - ICAO Chapter 4 compliance estimated at 94% of the total fleet. (In the following years, the replacement of older, noisier types by quieter types increased the Chapter 4 compliance percentage, leading to smaller contours).
 - 2009:
 - Boeing 747-400 movements were 21% lower than in 2006, causing reductions in contour area.
 - 2010:
 - Disruption from volcanic ash crisis, air traffic control strikes and adverse winter weather led to higher numbers of late-running departures at night, thus increasing the size of the night-time contours;
 - Total movements were 5% lower than in 2006, helping to reduce contour areas relative to 2006;
 - A low in the percentage of westerly movements, tending to reduce contour areas.
 - 2011:
 - Total annual 24-hour movements were 6% higher than in 2010, tending to increase contour areas.
 - 2013:
 - Southern runway closed at night due to the resurfacing programme, shifting the noise at night from the southern runway to the northern runway;

- A low in the percentage of westerly movements, helping to reduce contour areas.
- 2014:
 - Northern runway closed at night due to the resurfacing programme, shifting the noise at night from the northern runway to the southern runway;
 - ICAO Chapter 4 compliance reached an estimated 99% of the total fleet (5% more than in 2006), reflecting higher numbers of newer, quieter aircraft and reducing contour areas compared to 2006;
 - Westerly departure trials between August and November, and easterly departure trials between July and November, shifting the distribution of departure noise to different areas.
- 2015:
 - Return to a 'normal' north-south runway usage split at night following the runway resurfacing works in 2013 and 2014, shifting some noise back to the northern runway;
 - Return to (a) standard departure routes following the departure trials of 2014, and (b) distributions of departure noise experienced prior to 2014;
 - ICAO Chapter 4 compliance estimated at 99% of the total fleet, reflecting higher numbers of newer, quieter aircraft and reducing contour areas compared to 2006.
- 2016:
 - Ongoing phase-out of older, noisier aircraft types such as the Boeing 747-400 and replacement by more modern, quieter types such as the Airbus A380 and Boeing 787-8/9, helping to reduce contour areas compared to 2006.
- 2017:
 - Ongoing replacement of older, noisier aircraft types by more modern, quieter types such as the Boeing 787-8/9, Airbus A320neo and A350-900, helping to reduce contour areas compared to 2006. The majority of A320 aircraft family are now fitted with Fuel Over Pressure Protectors (FOPP) air flow deflectors, reducing approach noise.

- 2018:
 - Ongoing replacement of older, noisier aircraft types by more modern, quieter types such as the Airbus A320neo, Boeing 787-9 and Boeing 737 MAX 8, helping to reduce contour areas compared to 2006;
 - A low in the percentage of westerly movements, helping to reduce contour areas.
- 2019:
 - Ongoing replacement of older, noisier aircraft types by more modern, quieter types such as the Airbus A320neo/A321neo and Boeing 787-9, helping to reduce contour areas compared to 2006;
 - A higher percentage of westerly movements, tending to increase contour areas.

L_{day} trends

- 3.56 There were downward trends for the L_{day} 55 dB area, population and households between 2006 and 2010, when movements also fell to a low and the percentage of easterly operations was unusually high (see **Figure B19**). However, an increase in area in 2011 was also accompanied by an increase in populations and households, which to a large extent was due to the update to the population database in 2011, and also to the 5% higher proportion of westerly movements. Between 2011 and 2014, the L_{day} area was relatively steady, before falling from 2015 through to 2018 as noise levels reduced for certain ANCON aircraft types as identified by noise measurements, and as the fleet continued to switch to more modern, quieter aircraft types. The area rose slightly in 2019 because of a higher proportion of westerly operations and noise adjustments made to certain aircraft types.
- 3.57 Populations rose in 2013 following the major population database update but have fallen since 2014 in line with the area reductions, apart from in 2019 when the area increased. The low in the percentage of westerly movements in 2018 helped to reduce the population count further in 2018 as the contour retracted from parts of west London. The proportion of westerly movements was at its lowest in 2010 and 2013, but reached a high in 2017, before falling to a low again in 2018. Apart from 2010, total movements have been relatively steady, in the range of approximately 940-960 per 12-hour day.

L_{evening} trends

- 3.58 The L_{evening} 55 dB area exhibited a downward trend from 2006 through to 2010, before rising in 2011 when there was also an increase in movements. Since then, the area has fallen steadily (see **Figure B20**), although there was a slight increase in 2019. This downward area trend can be attributed to the introduction of quieter aircraft types and to reductions in noise levels for certain aircraft types as identified by noise measurements. After the rise in 2011, movement numbers in the evening period declined from 2012 to 2014, but rose in 2015 and levelled off in 2016 and 2017, before rising again in 2018 and 2019.
- 3.59 Populations and households fell in 2009 from the 2006 levels, but increased in 2010 and 2011, and since then have generally fallen in unison with the area reductions except in 2013 when there was a major update to the 2013 population database. The percentage of westerly operations was at its lowest in 2010 and 2013, but reached a high in 2017, before falling to a low again in 2018 and rising back up in 2019.

L_{night} trends

- 3.60 The L_{night} 50 dB area dropped between 2006 and 2009, but since then has remained at a steady level, although it fell to a low in 2017 (see **Figure B21**). Between 2006 and 2017, L_{night} movements were in the range of 75-78 per night, before rising to 81.6 in 2018 and 80.5 in 2019.
- 3.61 There was a downward trend in the population and households from 2009 to 2012 after the 2009 high. However, since 2012, population and household counts have been relatively high because of a range of factors. First, the population count rose in 2013 following the major update to the 2013 population database and the southern runway resurfacing programme, which increased arrival noise over Windsor. Around 60% of this population increase was due solely to the population database update. The population also then increased in 2015 as the contour shape changed following the northern runway resurfacing works in 2014 and the subsequent reversion to a 'normal' north/south runway usage in 2015, coupled with a higher percentage of westerly operations. The population count increased further in 2017 as a shift to a higher proportion of westerly operations extended the contour over parts of west London, but fell in 2018 as the percentage of westerly operations reduced by 16%. The population rose again in 2019 following contour shape changes that resulted from a 10% higher proportion of westerly operations.

L_{den} trends

- 3.62 The L_{den} 55 dB area decreased between 2006 and 2009 as movements of the noise dominant Boeing 747-400 aircraft dropped by 21% (see **Figure B22**). From 2009 to 2013 the area stayed at a similar level, but has fallen since then as the fleet continued its switch to more modern, quieter aircraft such as the Airbus A380, Boeing 787-8/9 and Airbus A320neo, and also as a result of noise reduction adjustments made to various aircraft types in the light of noise measurements undertaken annually.
- 3.63 The L_{den} population and households declined from 2006 through to 2010, but increased in 2011 despite the area staying almost constant - mainly due to the effects of the update to the 2011 population database, and also to a higher proportion of westerly movements. Between 2011 and 2016, the population and households generally followed a downward trend, apart from in 2013, when there was a major update to the 2013 population database. In 2017 the population count increased as the westerly arrival contour extended over west London due to a relatively large shift in the runway modal split in favour of westerly operations. The low in westerly operations in 2018 helped to reduce the population count as the contour retracted from densely-populated areas of London. This effect reversed in 2019 as the percentage of westerly operations increased by 9%, extending the arrival contour into areas of west London.
- 3.64 The frequency of movements has been fairly steady since the 2006 base year, apart from a dip in 2010 when disruptions from volcanic ash, air traffic control strikes and adverse winter weather meant the total was 5% below 2006 levels. There were lows in the proportions of westerly operations in 2010 and 2013, but a high was reached in 2017, followed by another low in 2018, before rising again in 2019.

L_{Aeq,6.5h} night trends

- 3.65 The $L_{Aeq,6.5h}$ night 48 dB area has generally followed a downward trend since 2006, except in 2010 when late-running movements increased due to disruptions caused by volcanic ash, ATC strikes and adverse winter weather (**Figure B23**). Movements have been relatively steady, in the range of about 16-17 per 6.5-hour night, apart from 2006 and 2010 when there were 18 movements on average.
- 3.66 Population and household counts moved broadly in line with the contour area from 2006 to 2011. However, in 2012 the population count fell despite an area increase, as parts of the contour retracted from densely-populated areas of west London after the percentage of westerly movements reduced. The area dropped by 4% in 2013, but the population count increased by 25% as the contour extended over west London in line with the northern runway. This population rise was caused by a combination of: (a) the southern runway resurfacing

programme, which shifted movements to the northern runway, (b) a higher percentage of westerly operations, and (c) the major 2013 population database update based on the 2011 Census. Around 50% of the total population increase in 2013 was due solely to the population database update. The area and population/household counts declined in 2014 following a reduction in B744R movements and a shift in traffic to the southern runway whilst the northern runway underwent resurfacing works. In 2015 the area and population/household counts fell again as more B744R movements were replaced by quieter aircraft. The further decline in populations and households in 2016 resulted from a 3% shift in the runway modal split for arrivals in favour of easterly operations, which had the effect of pulling the contour away from populated areas in Kew. However, the population count increased in 2017 as a higher proportion of westerly arrivals extended the contour back over west London. In 2018 the lower proportion of westerly movements helped move the contour away from west London, reducing the population count. The runway modal split reverted back to a higher westerly percentage in 2019, stretching the contour over densely-populated parts of west London.

Cumulative area, population and household counts – comparisons with 2006

- 3.67 The 2019 and 2006 cumulative results in **Tables C11-C15** of **Appendix C** show that the 2019 annual contour areas were all below 2006 base year levels across all the noise metrics. For example, the L_{den} 55 dB contour area in 2019 was 176.2 km², which was 28% smaller than the 2006 L_{den} 55 dB area of 244.7 km² (see **Table C14**).
- 3.68 All population and household counts were lower in 2019 compared to 2006, in line with the area decreases, except for the 2019 L_{night} 50 and 55 dB contours where the population counts were 10% and 14% higher respectively (**Table C13**). These rises in population can be attributed to the effects of population encroachment in the areas around Heathrow between 2006 and 2019. To illustrate the impact of encroachment, population and household counts for the 2019 contours have also been made using the 2006 population database. These counts, highlighted in blue in **Tables C11-C15**, confirm that the population and household counts would have reduced further across all the noise metrics had there not been any population encroachment between 2006 and 2019. In the above case of the 2019 L_{night} 50 and 55 dB contours, the population counts would have fallen by 9% and 14% respectively without any encroachment.
- 3.69 Historically the Heathrow noise contour area has been largely influenced by movements of the noise dominant Boeing 747-400 aircraft. However, their numbers have decreased from an average of 135 movements per day in 2006

(Ref 7) to 50 movements in 2019, equivalent to a 63% reduction. Newer, quieter aircraft types such as the Airbus A380 and Boeing 787-8/9 were not in service in 2006, but by 2019 there were an average of 44 daily movements of the Airbus A380 and 125 daily movements of the Boeing 787-8/9. Such fleet changes helped to reduce the Heathrow contour areas between 2006 and 2019.

2019 L_{den} noise contours – comparisons with 2006

- 3.70 A diagram comparing the 2019 and 2006 L_{den} contours can be found in **Figure B24**. The contour lobes associated with departures turning to the north have shortened considerably, following the replacement of the Boeing 747-400 aircraft by quieter types such as the Airbus A380 and Boeing 777-300ER. A similar change is seen in the contour lobe formed by westerly departures turning to the south (on the DVR/DET route¹³). Westerly arrival movements were more prevalent on the northern runway in 2006, thus the contour lobes to the east of the airport in 2006 were more expansive along the Runway 27R extended centreline compared to 2019. There was a 4% higher percentage of westerly operations in 2019 compared to 2006.
- 3.71 To eliminate the effects of changes to the runway modal split and the north-south runway usage between 2006 and 2019, the 2019 L_{den} contours have also been produced using the 2006 base year actual runway modal split and the 2006 north-south runway usage (see **Figure B25**). The cumulative areas, populations and households within the resulting L_{den} contours are summarised in **Table C16**, and reductions compared to 2006 are seen at all contour levels. As the effects of the W/E and N/S runway splits have been removed, this means that the contour differences that are visible are due to the remaining changes including:
- improvements to the aircraft fleet;
 - variations in the tracks actually flown; and
 - variations in the number of each aircraft on each route.
- 3.72 It should be noted that noise from different events with the same aircraft type on the same track with the same fuel load can still vary due to procedural differences, whether standard procedures or those of individual pilots. The modelling attempts to reflect the average noise level for an aircraft, flight track, stage length (distance flown) and weather. As the ANCON model is updated annually to reflect actual and average noise levels, the modelling results are the best practicable representation of the actual noise exposure.

¹³ See **Figure 1** for the Heathrow SID route diagram.

Noise change diagrams for L_{den}

- 3.73 In order to identify the areas where L_{den} noise levels have increased or decreased whilst excluding the effect of weather patterns on runway usage, a 'noise change' map has been produced to compare the noise exposure between the 2019 and 2006 L_{den} noise contours, assuming the 2006 actual runway modal splits in both cases¹⁴ (see **Figure B26**). The 2006 L_{den} modal split was 70% west / 30% east. The outer extent or envelope¹⁵ of both the 2006 and 2019 L_{den} 55 dB contours assuming the 2006 actual modal split has been used as the boundary (i.e. assessment area 'envelope'¹⁶) of the noise changes.
- 3.74 As expected, most areas have experienced noise reductions of up to 3 dB or higher, which reflects the phase-out of the older, noisier aircraft types between 2006 and 2019. There are some relatively small areas that have seen noise increases of up to 1 dB. It is estimated that 99% of the total area within the L_{den} noise change boundary experienced decreases in noise.
- 3.75 Another noise change diagram has been produced comparing the 2019 and 2006 L_{den} noise contours - this time assuming both the 2006 actual runway modal split and the 2006 north-south runway usage in both cases (see **Figure B27**). A similar pattern of noise changes is seen in this diagram, with over 99% of the total area experiencing reductions in noise.
- 3.76 A further noise change map has been produced to compare the 2019 and 2018 L_{den} noise contours, assuming the 2018 actual runway modal splits in both cases¹⁷ (see **Figure B28**). The 2018 L_{den} modal split was 65% west / 35% east. The outer extent of the 2018 and 2019 L_{den} 55 dB contours has been used as the boundary of the areas of noise change being considered. Around 44% of the area experienced noise reductions of up to 2 dB. There were some areas with noise increases, which on closer inspection, were found to be all less than 0.5 dB. The areas of noise increase made up 56% of the total area assessed.
- 3.77 A summary of the annual passengers, aircraft movements and L_{den} 55 dB contour area, populations and households for 2006 and 2009-2019 is given in **Table 17**. The annual passengers rose from 67.5 mppa in 2006 to 80.9 mppa in 2019, a 20% increase. Over the same time period, the L_{den} 55 dB contour area fell from 244.7 km² to 176.2 km², a decrease of 28%, and the population reduced

¹⁴ That is, the 2019 L_{day} , $L_{evening}$ and L_{night} contours (the constituent parts of 2019 L_{den}) have been modelled with the 2006 L_{day} , $L_{evening}$ and L_{night} runway modal splits respectively.

¹⁵ See glossary for a diagram explaining the 'envelope' concept.

¹⁶ See Glossary for an explanation.

¹⁷ That is, the 2019 L_{day} , $L_{evening}$ and L_{night} contours (the constituent parts of 2019 L_{den}) have been modelled with the 2018 L_{day} , $L_{evening}$ and L_{night} runway modal splits respectively.

by 12% from 756,100 to 664,300. Although 2019 had the highest passenger traffic since 2006, the L_{den} 55 dB contour had the smallest area.

Table 17 Heathrow annual passengers/movements and 55 dB L_{den} area/population/households for 2006 & 2009-2019

Year	Passengers (mppa)	Annual movements	55 dB L _{den} area (km ²)	55 dB L _{den} population	55 dB L _{den} households
2006	67.5	477.3	244.7	756.1	338.5
2009	66.0	466.2	222.1	717.9	310.8
2010	65.9	454.7	222.3	712.2	305.5
2011	69.4	480.7	221.9	739.5	318.2
2012	70.0	475.0	216.9	725.0	312.5
2013	72.4	472.0	220.4	750.9	308.5
2014	73.4	471.9	210.7	704.3	288.3
2015	75.0	473.7	200.0	695.4	285.9
2016	75.7	474.8	198.0	689.4	286.1
2017	78.0	475.9	182.3	699.6	293.5
2018	80.1	477.7	176.8	611.3	253.9
2019	80.9	479.2	176.2	664.3	268.4

Note: Annual movements, populations and households are given in thousands.

2019 L_{night} noise contours – comparisons with 2006

3.78 A diagram comparing the 2019 and 2006 L_{night} contours can be found in **Figure B29**. Overall reductions in contour area between 2006 and 2019 can be seen. The cumulative areas, populations and households for these contours are summarised in **Table C13**. The 2019 L_{night} 50 dB contour area of 72.2 km² was 14% smaller than in 2006 (84.4 km²). However, the population count within this contour rose by 10% due to the effects of population encroachment. Had the population database remained unchanged from 2006, the 2019 population count would have reduced by 9%.

Noise change diagrams for L_{night}

- 3.79 A noise change diagram has been produced comparing 2019 L_{night} with 2006 L_{night} assuming the 2006 L_{night} actual runway modal split (72% west / 28% east) in both cases (see **Figure B30**). The outer extent of the 2006 and 2019 L_{night} 50 dB contours has been taken as the boundary of the noise changes. It can be seen that nearly all areas have experienced reductions in noise level of up to 3 dB or higher, which reflects the replacement of the older, noisier types between 2006 and 2019. For example, the B744R had 21 movements per night in 2006, but by 2019 this had reduced to 9 per night. It is estimated that 95% of the total area within the L_{night} noise change boundary experienced decreases in noise of up to 3 dB or higher.
- 3.80 An additional noise change diagram (see **Figure B31**) has been produced comparing 2019 with 2018 L_{night} , assuming the 2018 L_{night} actual runway modal split (64% west / 36% east) in both cases. The outer extent of the 2018 and 2019 L_{night} 50 dB contours has been taken as the boundary of the noise changes. Areas with a noise increase of up to 1 dB can be seen to the east of the airport as far as Barnes, and to the west as far as Windsor. On closer inspection, it was found that the majority of noise increases were less than 0.5 dB. The regions experiencing noise decreases (of up to 2 dB) comprised 41% of the total area assessed.

2019 L_{night} single mode noise contours

- 3.81 Single mode 2019 L_{night} contours have been produced assuming the 2006 L_{night} north-south runway usage (see **Figures B32** and **B33**). They are overlaid onto the corresponding single mode L_{night} contours for 2006. Cumulative estimates of the areas, populations and households within the 2019 and 2006 L_{night} single mode contours (assuming the 2006 north-south runway usage in both cases) are provided in **Tables 18** and **19**.
- 3.82 The contour areas for both 100% westerly and 100% easterly modes have all decreased in 2019 compared to 2006. Whilst populations and households have decreased for the easterly single mode contours, there are population increases for the westerly single mode contours at the 50, 55 and 60 dB levels (**Table 18**). These can be attributed to the effects of population encroachment around Heathrow between 2006 and 2019.

Table 18 Heathrow 2006 and 2019 L_{night} 100% W contours (assuming 2006 N-S runway usage) – area, population and household estimates

L _{night} (dB)	Area (km ²)			Population			Households		
	2006	2019	change	2006	2019	change	2006	2019	change
> 50	86.0	71.6	-17%	282.8	299.1	+6%	124.8	116.6	-7%
> 55	35.2	25.4	-28%	78.2	89.1	+14%	31.5	30.8	-2%
> 60	11.9	7.9	-34%	23.7	24.3	+3%	9.0	7.7	-14%
> 65	4.3	2.5	-42%	2.9	2.3	-21%	1.0	0.6	-40%
> 70	1.6	0.9	-44%	< 0.1	0.0	(n/a)	< 0.1	0.0	(n/a)

Note: Populations and households are given in thousands. The 2006 population/household counts are based on a 2006 CACI update of the 2001 Census. The 2019 population/household counts are based on a 2019 CACI update of the 2011 Census.

Table 19 Heathrow 2006 and 2019 L_{night} 100% E contours (assuming 2006 N-S runway usage) – area, population and household estimates

L _{night} (dB)	Area (km ²)			Population			Households		
	2006	2019	change	2006	2019	change	2006	2019	change
> 50	82.1	67.9	-17%	140.7	87.6	-38%	57.6	33.7	-41%
> 55	32.3	24.1	-25%	28.8	15.9	-45%	12.6	6.9	-45%
> 60	11.3	7.6	-33%	1.7	1.4	-18%	0.7	0.6	-14%
> 65	4.2	2.4	-43%	0.4	0.2	-50%	0.2	0.1	-50%
> 70	1.6	0.9	-44%	0.0	0.0	(n/a)	0.0	0.0	(n/a)

Note: Populations and households are given in thousands. The 2006 population/household counts are based on a 2006 CACI update of the 2001 Census. The 2019 population/household counts are based on a 2019 CACI update of the 2011 Census.

2019 N65 annual 16-hour day contours

- 3.83 N65 contours (i.e. contours showing the number of aircraft noise events above 65 dB L_{Amax}) have been produced for the 2019 annual average 16-hour day period (07:00-23:00 local time), for which the actual runway modal split was 74% west / 26% east.
- 3.84 The N65 contours for both 2019 and 2006¹⁸ are overlaid in **Figure B34** (for clarity, only the 50, 200 and 500-event levels are shown in the diagram). At the 50-event level, it can be seen that the 2019 contours were generally smaller; however, there was an obvious extension to the contour lobe to the west of Windsor Forest. This was caused by higher movement rates on the westerly CPT/GOGSI departure routes in 2019 compared to the CPT/SAM routes in 2006.
- 3.85 The estimated cumulative areas, populations and households are summarised in **Table 20** for N65 values of 50,100, 200 and 500 events.

Table 20 Heathrow 2006 and 2019 annual average 16-hour day N65 contours - area, population and household estimates

N65	Area (km ²)			Population			Households		
	2006	2019	Change	2006	2019	Change	2006	2019	change
> 50	267.2	237.0	-11%	754.3	763.0	+1%	337.2	307.5	-9%
> 100	162.5	139.8	-14%	470.8	419.6	-11%	209.9	163.8	-22%
> 200	83.0	76.5	-8%	223.5	220.7	-1%	96.3	82.9	-14%
> 500	13.2	10.5	-20%	3.3	0.8	-76%	1.4	0.4	-71%

Note: Populations and households are given in thousands. The 2006 population/household counts are based on a 2006 CACI update of the 2001 Census. The 2019 population/household counts are based on a 2019 CACI update of the 2011 Census.

- 3.86 The results show that the N65 50-event contour area reduced by 11% between 2006 and 2019, which reflects the switch from the noisiest aircraft types such as the Boeing 747-400 to quieter types such as the Airbus A380 and Boeing 777-300ER. Areas also decreased at the higher contour levels by up to 20%. The population count within the 50-event contour was 1% higher in 2019, though population decreases were found at the higher contour levels. Analysis show that the 50-event population count would have fallen by 12% had there not been population encroachment between 2006 and 2019 in the areas around Heathrow.

¹⁸ The 2006 modal split was 70% W / 30% E.

N65 annual 16-hour day change diagrams

- 3.87 An N65 change map has been produced comparing the 2019 and 2006 N65 annual 16-hour results assuming the 2006 actual runway modal split (70% west / 30% east) in both cases (see **Figure B35**). The boundary for the changes is the outer extent of the 2006 and 2019 N65 50-event contours assuming the 2006 actual runway modal split.
- 3.88 Many areas have experienced reductions of up to 100 noise events or more that exceed 65 dB L_{Amax} , over the annual 16-hour day. However, there were increases of up to 50 N65 events south of Windsor, which was due to the higher movement rates on the westerly CPT and GOGSI (previously SAM) departure routes. An area in the vicinity of Egham also experienced increases of up to 50 N65 events, which was caused by the calculated DET mean departure track being positioned more to the west in 2019 compared to 2006¹⁹. A region to the east of the southern runway showed increases of 10-50 events or more. This was caused by a higher proportion of westerly arrivals on the northern runway in 2006, in contrast to 2019 when the westerly arrivals were split more evenly between the two runways. Approximately 84% of the total area within the outer boundary of noise event changes experienced N65 decreases or changes of less than 10 N65 events. Around 16% of the assessment area experienced N65 increases of 10 or more events.
- 3.89 Another N65 change map has been produced comparing the 2019 and 2018 N65 results, assuming the 2018 actual runway modal split (65% west / 35% east) in both cases (see **Figure B36**). The boundary for the changes is the outer extent of the 2018 and 2019 N65 50-event contours assuming the 2018 runway actual modal split. Around 86% of the area within the outer boundary experienced decreases of more than 10 N65 events or changes of less than 10 events.

2019 N70 annual 16-hour day contours

- 3.90 N70 contours (i.e. contours showing the number of aircraft noise events above 70 dB L_{Amax}) have also been produced for the 2019 annual average 16-hour day period (07:00-23:00 local time), for which the actual runway modal split was 74% west / 26% east.
- 3.91 The N70 contours for 2019 and 2006²⁰ are overlaid in **Figure B37** (for clarity, only the 50, 200 and 500-event levels are shown in the diagram). At the 50-event

¹⁹ Variances in mean track position over time can be caused by factors such as changes in the fleet mix using the route (track-keeping characteristics will vary between different aircraft types).

²⁰ The 2006 modal split was 70% W / 30% E.

level the 2019 contour is generally smaller, reflecting the switch to quieter aircraft types from the noisiest types as the Boeing 747-400.

3.92 The estimated cumulative areas, populations and households are summarised in **Table 21** for N70 values of 50,100, 200 and 500 events.

Table 21 Heathrow 2006 and 2019 annual average 16-hour day N70 contours - area, population and household estimates

N70	Area (km ²)			Population			Households		
	2006	2019	Change	2006	2019	change	2006	2019	change
> 50	119.7	100.4	-16%	252.0	253.0	+0.4%	105.0	94.5	-10%
> 100	71.4	64.2	-10%	136.0	147.9	+9%	56.9	53.7	-6%
> 200	41.8	39.4	-6%	63.4	87.9	+39%	24.8	30.1	+21%
> 500	2.1	1.1	-48%	< 0.1	0.0	(n/a)	< 0.1	0.0	(n/a)

Note: Populations and households are given in thousands. The 2006 population/household counts are based on a 2006 CACI update of the 2001 Census. The 2019 population/household counts are based on a 2019 CACI update of the 2011 Census.

3.93 The 50-event N70 contour area has reduced between 2006 and 2019 by 16%, reflecting the replacement of the noisiest aircraft such as the Boeing 747-400 and the introduction of quieter types such as the Airbus A380, Boeing 777-300ER and the Boeing 787-8/9. Areas also reduced at the higher contour levels. However, the population count within the 50 to 200-event contours increased by up to 39% (at the 200-event level). This resulted from population encroachment in the areas around Heathrow and the longer westerly arrival lobe at the 200-event contour level for the southern runway in 2019, which stretched over Hounslow.

3.94 N70 contours for 2019 assuming both the 2006 actual runway modal split and the 2006 north-south runway usage are overlaid onto the 2006 contours in **Figure B38** (for clarity, only the 50, 200 and 500-event levels are shown in the diagram). The estimated cumulative areas, populations and households are summarised in **Table 22** for N70 values of 50,100, 200 and 500 events. Areas have decreased at all contour levels, but population counts increased by up to 8% (at the 100-event level) in 2019 – this can be attributed to the effects of population encroachment in the areas around Heathrow.

Table 22 Heathrow 2006 and 2019 annual average 16-hour day N70 contours (assuming 2006 modal split and 2006 N-S runway usage) - area, population and household estimates

N70	Area (km ²)			Population			Households		
	2006	2019	change	2006	2019	change	2006	2019	change
> 50	119.7	99.6	-17%	252.0	252.2	+0.1%	105.0	94.1	-10%
> 100	71.4	64.0	-10%	136.0	147.1	+8%	56.9	52.7	-7%
> 200	41.8	35.8	-14%	63.4	66.1	+4%	24.8	22.3	-10%
> 500	2.1	1.2	-43%	< 0.1	0.0	(n/a)	< 0.1	0.0	(n/a)

Note: Populations and households are given in thousands. The 2006 population/household counts are based on a 2006 CACI update of the 2001 Census. The 2019 population/household counts are based on a 2019 CACI update of the 2011 Census.

N70 annual 16-hour day change diagrams

- 3.95 An N70 change map has been produced comparing the N70 results for 2019 with those for 2006, assuming the 2006 actual runway modal split (70% west / 30% east) in both cases (see **Figure B39**). The boundary for the changes is the outer extent of the 2006 and 2019 N70 50-event contours assuming the 2006 runway modal split.
- 3.96 Many areas have experienced reductions of up to 100 N70 events or more. However, there were increases of up to 50 N65 events to the south-east of Windsor, which was due to the higher movement rates on the westerly CPT and GOGSI (previously SAM) departure routes. An area in the vicinity of Egham experienced increases of up to 50 N70 events, which was caused by the calculated DET mean departure track being positioned more to the west in 2019 compared to 2006. Some areas around the western end of the northern runway also experienced increases of between 10 and 50 N70 events. This can be explained by the higher number of westerly departures in 2006 using the southern runway, whereas in 2019, westerly departures were split more evenly between the two runways. An area to the east of the southern runway also showed increases of up to 50 N70 events or more. This was caused by a greater proportion of westerly arrivals using the northern runway over the annual 16-hour day period in 2006, whereas westerly arrivals were split more evenly between the two runways in 2019. Approximately 87% of the total assessment area was exposed to decreases of more than 10 N70 events or changes of less than 10 N70 events.
- 3.97 A further N70 change map has been produced comparing the N70 results for 2019 with 2006, assuming the 2006 actual runway modal split and the 2006 north-south runway usage in both cases (see **Figure B40**). The boundary for the changes is outer extent of the 2006 and 2019 N70 50-event contours assuming

the 2006 actual runway modal split and the 2006 north-south runway usage. With the effects of the 2006 north-south runway usage removed, the regions with N70 increases to the west of the northern runway and to the east of the southern runway have reduced in size. Approximately 96% of the area within the outer boundary is exposed to decreases of more than 10 N70 events or changes of less than 10 N70 events.

3.98 An N70 change map has also been produced comparing the 2019 and 2018 N70 results, assuming the 2018 actual runway modal split (65% west / 35% east) in both cases (see **Figure B41**). The boundary for the changes is the outer extent of the 2018 and 2019 N70 50-event contours assuming the 2018 runway modal split. Around 94% of the area is exposed to changes of less than 10 N70 events or reductions of more than 10 N70 events.

2019 N70 annual 16-hour day single mode contours

3.99 Single mode 2019 N70 annual 16-hour day contours have been produced assuming the 2006 north-south runway usage (**Figures B42 and B43**). They are overlaid onto the corresponding single mode N70 contours for 2006. Cumulative estimates of the areas, populations and households within these contours are provided in **Tables 23 and 24** for 100% westerly and 100% easterly modes respectively.

3.100 All the single mode contours reduced in area in 2019 compared to 2006, by up to 26%. However, population counts have risen by up to 9% for the westerly single mode contours due to the effects of population encroachment.

Table 23 Heathrow 2006 and 2019 annual 16-hour day N70 100% W contours (assuming 2006 N-S runway usage) – area, population and household estimates

N70	Area (km ²)			Population			Households		
	2006	2019	change	2006	2019	Change	2006	2019	change
> 50	121.8	111.0	-9%	220.1	240.2	+9%	92.8	90.4	-3%
> 100	77.7	66.4	-15%	133.6	143.8	+8%	55.1	52.5	-5%
> 200	51.3	43.4	-15%	94.7	96.5	+2%	38.6	33.4	-13%
> 500	4.6	3.4	-26%	0.3	0.3	0%	0.1	0.1	0%

Note: Populations and households are given in thousands. The 2006 population/household counts are based on a 2006 CACI update of the 2001 Census. The 2019 population/household counts are based on a 2019 CACI update of the 2011 Census.

Table 24 Heathrow 2006 and 2019 annual 16-hour day N70 100% E contours (assuming 2006 N-S runway usage) – area, population and household estimates

N70	Area (km ²)			Population			Households		
	2006	2019	change	2006	2019	change	2006	2019	change
> 50	97.9	82.8	-15%	312.1	282.5	-9%	131.4	106.7	-19%
> 100	62.3	54.4	-13%	179.0	168.4	-6%	73.8	61.7	-16%
> 200	41.6	34.2	-18%	92.2	87.1	-6%	36.8	30.9	-16%
> 500	18.0	15.4	-14%	11.0	7.0	-36%	5.0	2.7	-46%

Note: Populations and households are given in thousands. The 2006 population/household counts are based on a 2006 CACI update of the 2001 Census. The 2019 population/household counts are based on a 2019 CACI update of the 2011 Census.

2019 N60 annual 8-hour night contours

3.101 N60 contours (i.e. contours showing the number of aircraft noise events above 60 dB L_{Amax}) have been produced for the 2019 annual average 8-hour night period (23:00-07:00 local time), for which the actual runway modal split was 74% west / 26% east. The N60 contours for 2019 and 2006 are overlaid in **Figure B44** for the 10, 20 and 50-event levels. The L_{night} modal split in 2006 was 72% west / 28% east.

3.102 The estimated cumulative areas, populations and households are summarised in **Table 25**. The N60 10 and 20-event contour areas increased by 13% and 31% respectively between 2006 and 2019. These area increases can be largely attributed to the 9% increase in night arrival movements in 2019 compared to 2006, which all occurred within the shoulder periods (23:00-23:30 and 06:00-07:00). Population and household counts also rose with the area increases.

Table 25 Heathrow 2006 and 2019 annual average 8-hour night N60 contours - area, population and household estimates

N60	Area (km ²)			Population			Households		
	2006	2019	change	2006	2019	change	2006	2019	change
> 10	184.4	207.6	+13%	837.2	1119.7	+34%	387.6	466.3	+20%
> 20	89.9	118.1	+31%	389.9	700.7	+80%	175.7	286.9	+63%
> 50	0.5	1.0	+100%	< 0.1	0.0	(n/a)	< 0.1	0.0	(n/a)

Note: Populations and households are given in thousands. The 2006 population/household counts are based on a 2006 CACI update of the 2001 Census. The 2019 population/household counts are based on a 2019 CACI update of the 2011 Census.

N60 annual 8-hour night change diagrams

- 3.103 An N60 change map has been produced comparing the 2019 and 2006 annual 8-hour night N60 results, assuming the 2006 actual runway modal split (72% west / 28% east) in both cases (see **Figure B45**). The boundary for the changes is the outer extent of the 2006 and 2019 annual 8-hour night N60 10-event contours assuming the 2006 runway modal split. Around 52% of the area within the boundary is exposed to changes of less than 3 N60 events or reductions of more than 3 events. Approximately 19% of the area considered is exposed to increases of more than 5 events.
- 3.104 A further N60 change map has been produced comparing the 2019 and 2018 annual 8-hour night N60 results, assuming the 2018 actual runway modal split (64% west / 36% east) in both cases (**Figure B46**). The boundary for the changes is the outer extent of the 2018 and 2019 annual 8-hour night N60 10-event contours assuming the 2018 runway modal split. Around 72% of the area is either exposed to changes of less than one N60 event or reductions of more than one event. Approximately 3% of the area is exposed to increases of more than 3 events.

Chapter 4

Conclusions

2019 summer contours

- 4.1 In 2019, there were an average of 1260.4 summer 16-hour day movements at Heathrow, 0.4% less than in 2018 (1265.5). The area of the 54 dB average summer day actual modal split (80% west / 20% east) $L_{Aeq,16h}$ contour was 156.1 km², 1% smaller than in 2018 (158.3 km²). The population count within this contour dropped by 1% to 492,700 (2018: 497,300). The 54 dB standard modal split (80% west / 20% east) $L_{Aeq,16h}$ contour area decreased by 2% to 156.1 km² (2018: 158.5 km²), and the population fell by 2% to 492,700 (2018: 501,800).
- 4.2 The 2019 average summer 8-hour night movement total (86.7) was 1.5% lower than in 2018 (88.0). (Night departure movements increased by 0.4% from 26.1 to 26.3 and night arrivals fell by 2.3% from 61.9 to 60.4). The area of the 48 dB night actual modal split (80% west / 20% east) $L_{Aeq,8h}$ contour decreased by 1% to 105.4 km² (2018: 106.0 km²), and the population count rose by 3% to 428,500 (2018: 417,500).
- 4.3 The above area decreases for the 2019 summer day contours can be attributed to the higher proportions of more modern, quieter aircraft types such as the Airbus A320neo and A321neo. The reduction in the 2019 summer night contour area resulted from higher numbers of quieter types such as the Boeing 787-9 and Airbus A320neo, A321neo and A350-900.

2019 annual Noise Action Plan contours

- 4.4 The numbers of annual aircraft movements at Heathrow in 2019 compared to 2018 were 0.2% higher over the L_{day} period, 1.2% higher for $L_{evening}$, and 1.3% lower for L_{night} . Total 24-hour L_{den} movements in 2019 (1312.9) were 0.3% higher than in 2018 (1308.8). Movements over the 6.5-hour night period in 2019 were 6% lower compared to 2018.
- 4.5 The area of the 55 dB L_{day} contour in 2019 (129.1 km²) was 0.4% larger than in 2018. The 55 dB $L_{evening}$ contour area increased by 2% in 2019 to 112.5 km². The 50 dB L_{night} contour area in 2019 (72.2 km²) was 1% smaller. The 55 dB L_{den} contour area of 176.2 km² was 0.3% smaller than in 2018. The 48 dB $L_{Aeq,6.5h}$ night contour area in 2019 was 33.4 km², 5% larger than in 2018 (31.8 km²).
- 4.6 The above increases in L_{day} and $L_{evening}$ contour areas for 2019 can be attributed to: (a) the higher proportions of westerly operations, which tends to increase the contour area at Heathrow, and (b) adjustments made to the noise levels of

certain ANCON types following noise measurements undertaken in 2019 (see section 2.10). These offset the effects of quieter aircraft in the fleet mix. The area decreases for the 2019 L_{night} contours can be largely attributed to higher numbers of the more modern, quieter types and the effects of the change in runway modal split, which offset arrival noise increases for certain aircraft types (e.g. Airbus A380 with Rolls-Royce engines) following the 2019 measurements (see section 2.10). The area changes for the 2019 L_{den} contours were influenced by the aforementioned higher proportion of westerly operations, the higher proportions of quieter types such as the Airbus A320neo and noise adjustments made to certain types following the 2019 measurements. The increase in area of the 2019 $L_{\text{Aeq},6.5\text{h}}$ night 48 dB contour was mainly caused by higher measured arrival noise levels in 2019 of up to 1.5 dB for the noise dominant Airbus A380 with Rolls-Royce engines, which offset the reduction in total movements.

- 4.7 The 2019 L_{day} contours showed population increases from 2018 that resulted from changes to the contour shape due to the shift in runway modal split. The effects of changes in the runway modal split on contour shapes also played a part in the population counts for the 2019 L_{evening} contours, where decreases were seen for the outermost contours. For 2019 L_{night} , the contour shape changes brought about by the higher percentage of westerly operations caused increases in population counts. Population counts also increased for the 2019 L_{den} contours, as the higher proportion of westerly operations extended the arrival contours over densely-populated parts of west London. A higher proportion of westerly operations also helped extend the $L_{\text{Aeq},6.5\text{h}}$ night 48 dB contour over areas around Kew in 2019, increasing the population and household counts.

Annual contour trends

- 4.8 With respect to long-term trends, the L_{day} 55 dB contour area was fairly steady from 2009 to 2014 after the initial highest level in 2006. A dip in the L_{day} area in 2010 coincided with a low in aircraft movements and a relatively high percentage of easterly movements. Since 2014, the L_{day} 55 dB area has steadily fallen as noise levels reduced for certain ANCON types, as identified by noise measurement data, and as the fleet mix continued to switch to more modern, quieter aircraft. There was, however, a slight increase in area in 2019 following a higher proportion of westerly operations and noise adjustments made to certain aircraft types. The L_{day} 55 dB populations and households fell to a low in 2010 after dropping from the 2006 peak (i.e. the highest level across all the years considered), but rose in 2011 and 2013 following updates to the population database. Since 2014, populations and households have fallen in line with the area reductions, apart from 2019 when the area increased. Movements over the L_{day} period since 2006 have been steady apart from the dip in 2010.

- 4.9 The area, population and households within the L_{evening} 55 dB contour decreased in 2009 from the 2006 peak (i.e. the highest level across all the years considered) as movements declined, but rose to a high in 2011 as movements recovered. Since 2011, the area, population and households have followed a downward trend as quieter aircraft have been introduced, and as noise reductions were also made to certain ANCON aircraft types to reflect measurement data, although in 2013 the population count increased due to the major population database update, and in 2019 the area increased slightly. Movements declined between 2011 and 2014, but rose in 2015 and levelled off in 2016 and 2017, before rising in 2018 and 2019.
- 4.10 Aircraft movements over the L_{night} period were relatively stable between 2006 and 2017, in the range of 75-78 per night, but in 2018 and 2019 they reached highs of around 81 movements. The L_{night} 50 dB area has been steady between 2011 and 2019 apart from a dip in 2017, having been higher between 2006 (when the area was the highest across all the years considered) and 2010. The population and household counts followed a downward trend from 2009 through to 2012, but increased in 2013 after the major population database update, and also because of contour shape changes caused by the southern runway resurfacing programme in 2013. A higher percentage of westerly movements and a more even split between operations on the northern and southern runways (after the northern runway resurfacing work carried out in 2014) influenced the contour shape in 2015. Populations have remained at a relatively higher level since 2013. The population count in 2017 increased due to a higher proportion of westerly operations, which extended the contour over west London, although this reversed in 2018 as the percentage of westerly operations reduced markedly. However, in 2019, the population count increased again following a shift to a higher proportion of westerly operations.
- 4.11 After the 2006 peak (i.e. the highest level across all the years considered), the L_{den} 55 dB contour area was fairly flat between 2009 and 2013, but since then has gradually fallen as the Heathrow fleet switched to more modern, quieter types such as the Airbus A380 and Boeing 787-8/9, and as noise levels reduced for certain ANCON aircraft types, as identified by noise measurement data. Following the 2006 peak (the highest level across all the years considered), populations and households have trended downwards, although there were rises in population in 2011 and especially in 2013 due to the major population database update. The population count rose again in 2017 as the shift in runway modal split in favour of westerly operations extended the contour over west London, but this reversed in 2018 as the percentage of westerly operations dropped. However, the population count rose again in 2019 as the proportion of westerly operations increased, extending the contour again over parts of west London. Aircraft movements in the L_{den} period have been at a similar level since 2006, with the exception of a dip in 2010.

- 4.12 The $L_{Aeq,6.5h}$ night 48 dB area has generally followed a downward trend since the 2006 peak (i.e. the highest level across all the years considered), apart from a rise in 2010, which was due to the effects of higher night movements following disruption from adverse winter weather, volcanic ash and air traffic control strikes. Movements since 2006 been relatively steady, apart from highs in 2006 and 2010. Following population decreases for the most part between the 2006 peak (when the population was at its highest across the years considered) and 2012, the population count rose sharply in 2013 due to an extension of the contour over west London in line with the northern runway. This was caused by resurfacing works on the southern runway coupled with a higher percentage of westerly operations. (There was also a major update to the population database in 2013). However, in 2014, the population count returned to near 2012 levels as the contour area reduced and then fell again in 2015 as more movements of the Boeing 747-400 with Rolls-Royce engines were phased out. A reduction in the percentage of westerly arrival operations in 2016 shifted the contour away from populated areas of Kew, which in turn reduced the population count, despite the overall area increase. A return to a higher proportion of westerly arrivals in 2017 extended the contour back over west London, which caused population and household counts to rise, but this reversed in 2018 as the percentage of westerly operations reduced. This effect reversed again in 2019 as the proportion of westerly operations increased.

2019 annual contour comparisons with 2006 (base year) and 2018

- 4.13 The 2019 cumulative contour areas were below 2006 levels for all the annual noise metrics considered. Populations and households within the 2019 contours were also lower compared to 2006, except for L_{night} , due to the effects of population encroachment around Heathrow. Population and household counts for the 2019 contours, carried out with the 2006 population database instead of the 2019 database, indicated that the 2019 counts would have all been lower relative to 2006 without the effects of population encroachment.
- 4.14 An analysis of L_{den} noise changes between 2006 and 2019, assuming the 2006 base year actual modal split in both cases, indicated that 99% of the assessment area experienced noise reductions. Less than 1% of the area was exposed to noise increases of up to 1 dB.
- 4.15 An analysis of L_{den} noise changes between 2018 and 2019, assuming the 2018 actual modal split in both cases, indicated that 44% of the assessment area experienced noise reductions of up to 1 dB. The remaining 56% of the area was exposed to noise increases, although these were all less than 0.5 dB.
- 4.16 An analysis of L_{night} noise changes between 2006 and 2019, assuming the 2006 base year actual runway modal split in both cases, showed that 95% of the area under consideration experienced noise reductions of up to 3 dB or higher. This

reflects the replacement of the older, noisier aircraft types operating at night, especially the Boeing 747-400 with Rolls-Royce engines, whose movements reduced from 21 to 9 per night between 2006 and 2019.

- 4.17 An analysis of L_{night} noise changes between 2018 and 2019, assuming the 2018 actual modal split in both cases, showed that 41% of the assessment area experienced noise reductions of up to 2 dB.
- 4.18 Single-mode contours produced for 2019 and 2006 L_{night} (assuming the 2006 north-south runway usage) showed that areas have all reduced in 2019 compared to 2006. However, population counts increased at some of the westerly single mode contour levels, which can be attributed to the effects of population encroachment between 2006 and 2019.
- 4.19 N65 and N70 annual average 16-hour day contours produced for 2006 and 2019 showed that all the contour areas have decreased between the two years. This is indicative of the replacement of the noisiest aircraft types, such as the Boeing 747-400, by quieter types such as the Airbus A380, Boeing 777-300ER and Boeing 787-8/9. There were, however, area increases for the N60 annual average 8-hour night contours in 2019 compared to 2006. This resulted mainly from the 9% higher number of night arrival movements in 2019 compared to 2006.
- 4.20 There was an increase in the population count for the outermost N65 contour, which was due to the effects of population encroachment around Heathrow. There were also population count increases for the N70 contours, which were caused by population encroachment along with contour shape changes.
- 4.21 An assessment of annual 16-hour day N65 changes between 2006 and 2019, assuming the 2006 actual modal splits, showed that many areas have experienced reductions of up to 100 events or more. However, there were increases of up to 50 events: (a) south of Windsor, due to higher usage of the CPT and GOGSI (previously SAM) routes in 2019, (b) near Egham due to a westerly shift in the position of the calculated 2019 DET mean departure track relative to 2006, and (c) east of the southern runway, because the northern runway was used proportionately more for westerly arrivals in 2006, whereas westerly arrivals were more evenly split between the northern and southern runways in 2019. Approximately 84% of the total assessment area experienced decreases in N65 events, or changes of less than 10 N65 events.
- 4.22 An analysis of annual 16-hour day N65 changes between 2018 and 2019, assuming the 2018 actual modal split, indicated that 86% of the area assessed was exposed to reductions of more than 10 events, or changes of less than 10 events.
- 4.23 An assessment of annual 16-hour day N70 changes between 2006 and 2019, assuming the 2006 actual runway modal split, revealed some areas where

increases in N70 events have occurred. These were due to: (a) higher movements rates on the westerly CPT and GOGSI (previously SAM) departure routes in 2019, (b) a westerly shift in the position of the calculated 2019 DET mean departure track relative to 2006, (c) a greater usage of the southern runway for westerly departures in 2006, and (d) the northern runway being favoured for westerly arrivals in 2006. Approximately 87% of the total assessment area experienced decreases of more than 10 N70 events, or changes of less than 10 N70 events. This figure rose to 96% when the effects of the differences in north-south runway usage were also removed.

- 4.24 An analysis of annual 16-hour day N70 noise changes between 2018 and 2019, assuming the 2018 actual runway modal split, showed that 94% of the total area experienced changes of less than 10 events, or decreases of more than 10 events.
- 4.25 An examination of annual 8-hour night N60 changes between 2006 and 2019, assuming the 2006 actual runway modal split, showed that 52% of the total area assessed is exposed to reductions of more than 3 N60 events, or changes of less than 3 events.
- 4.26 The N60 annual 8-hour night changes between 2018 and 2019, assuming the 2018 actual runway modal split, indicated that 72% of the total area assessed is exposed to reductions of more than one N60 event, or changes of less than one event.

APPENDIX A

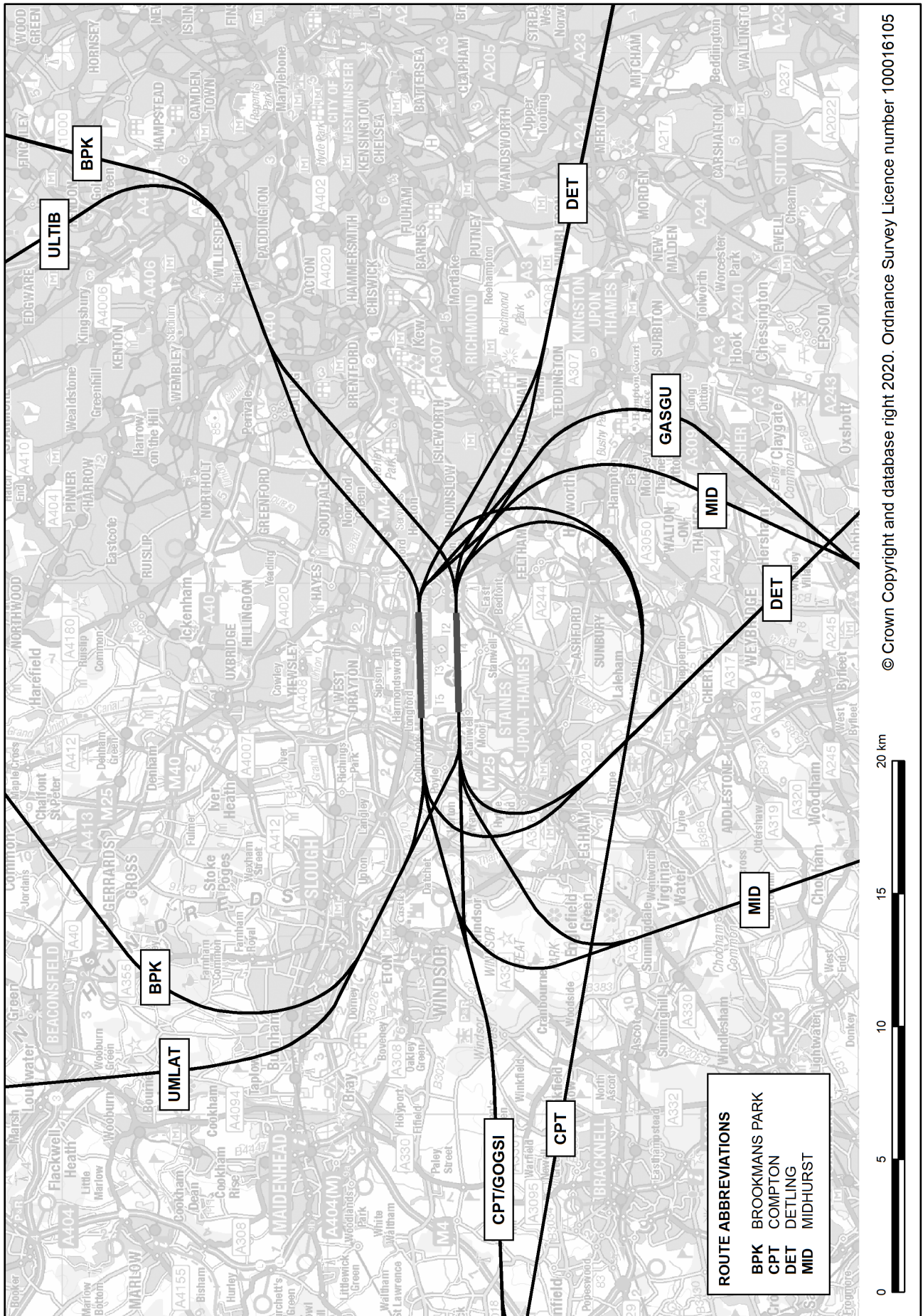
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2. Civil Aviation Authority, *Survey of Noise Attitudes (2014): Aircraft*, CAP 1506, February 2017.
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10. Civil Aviation Authority, *Noise Monitor Positions at Heathrow, Gatwick and Stansted Airports*, CAP 1149, Sixth edition, March 2020.

APPENDIX B

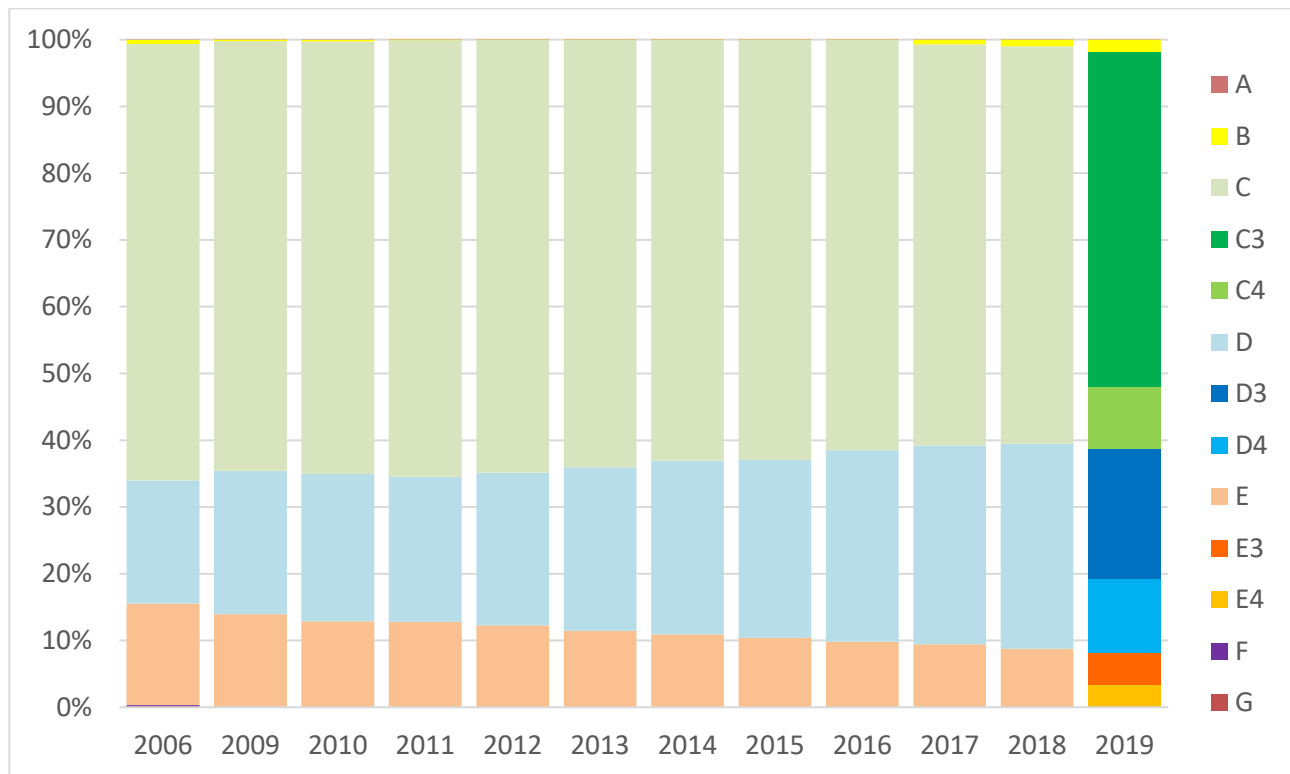
Figures

Figure B1 Heathrow NPR/SID routes



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Figure B2 Heathrow annual average 24-hour movements by Noise Class

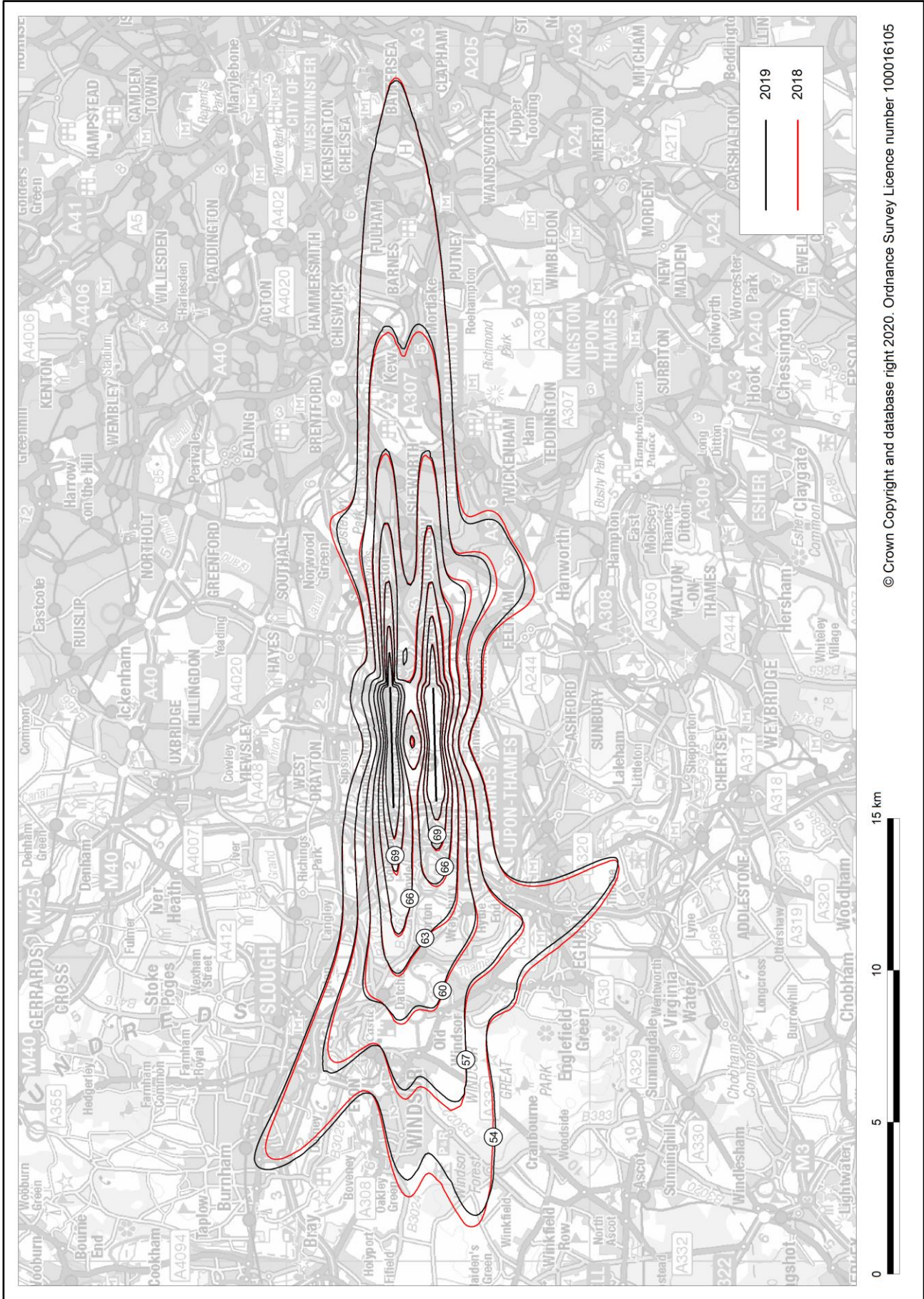


Note: Noise Class descriptions are given below:

Key to Noise Classes

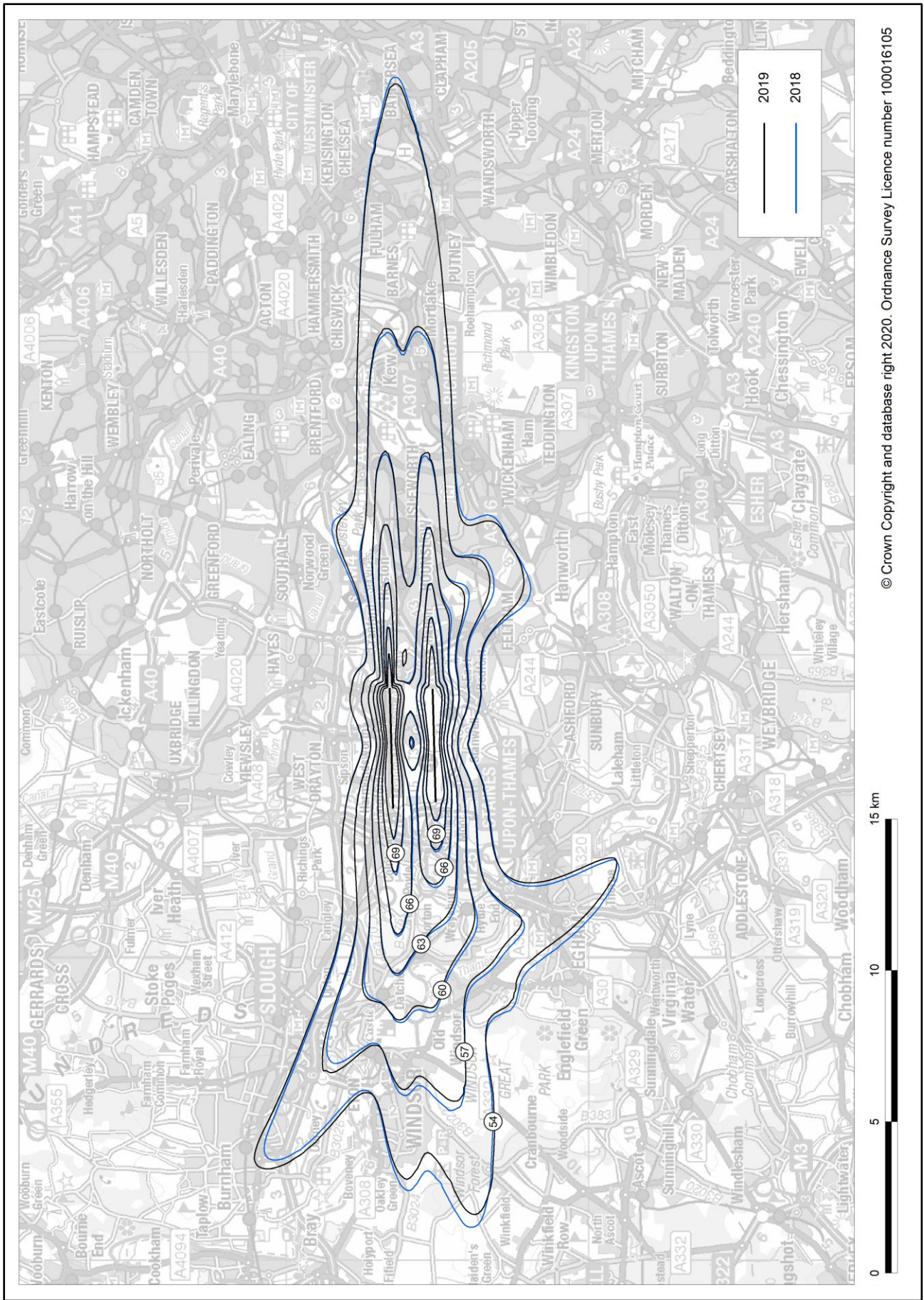
- A** Small propeller (single/twin piston and turboprop light aircraft)
- B** Large propeller (twin and 4-propeller aircraft), e.g. ATR-42, BAe ATP
- C** Narrow-body aircraft (up to 2018), e.g. Airbus A319, Boeing 737-800
- C3** 3rd generation narrow-body aircraft (from 2019), e.g. Airbus A319, Boeing 737-800
- C4** 4th generation narrow-body aircraft (from 2019), e.g. Airbus A320neo, Boeing 737 MAX 8
- D** Wide-body twins (up to 2018), e.g. Airbus A330, Boeing 777-200
- D3** 3rd generation wide-body twins (from 2019), e.g. Airbus A330, Boeing 777-200
- D4** 4th generation wide-body twins (from 2019), e.g. Airbus A350-900, Boeing 787-9
- E** Wide-body 3 or 4-engine aircraft (up to 2018), e.g. Airbus A380, Boeing 747-400
- E3** 3rd generation wide-body 4-engine aircraft (from 2019), e.g. Boeing 747-400
- E4** 4th generation wide-body 4-engine aircraft (from 2019), e.g. Airbus A380
- F** 1st generation wide-body 3 or 4-engine aircraft, e.g. Boeing 747-200
- G** 2nd generation narrow-body twins (including Ch.2 and hush-kitted versions), e.g. Boeing 737-200
- H** 1st generation narrow-body 3 or 4-engine aircraft (including hush-kitted versions), e.g. Boeing 707

Figure B3 Heathrow 2019 and 2018 average summer day 54-72 dB actual modal split $L_{Aeq,16h}$ noise contours



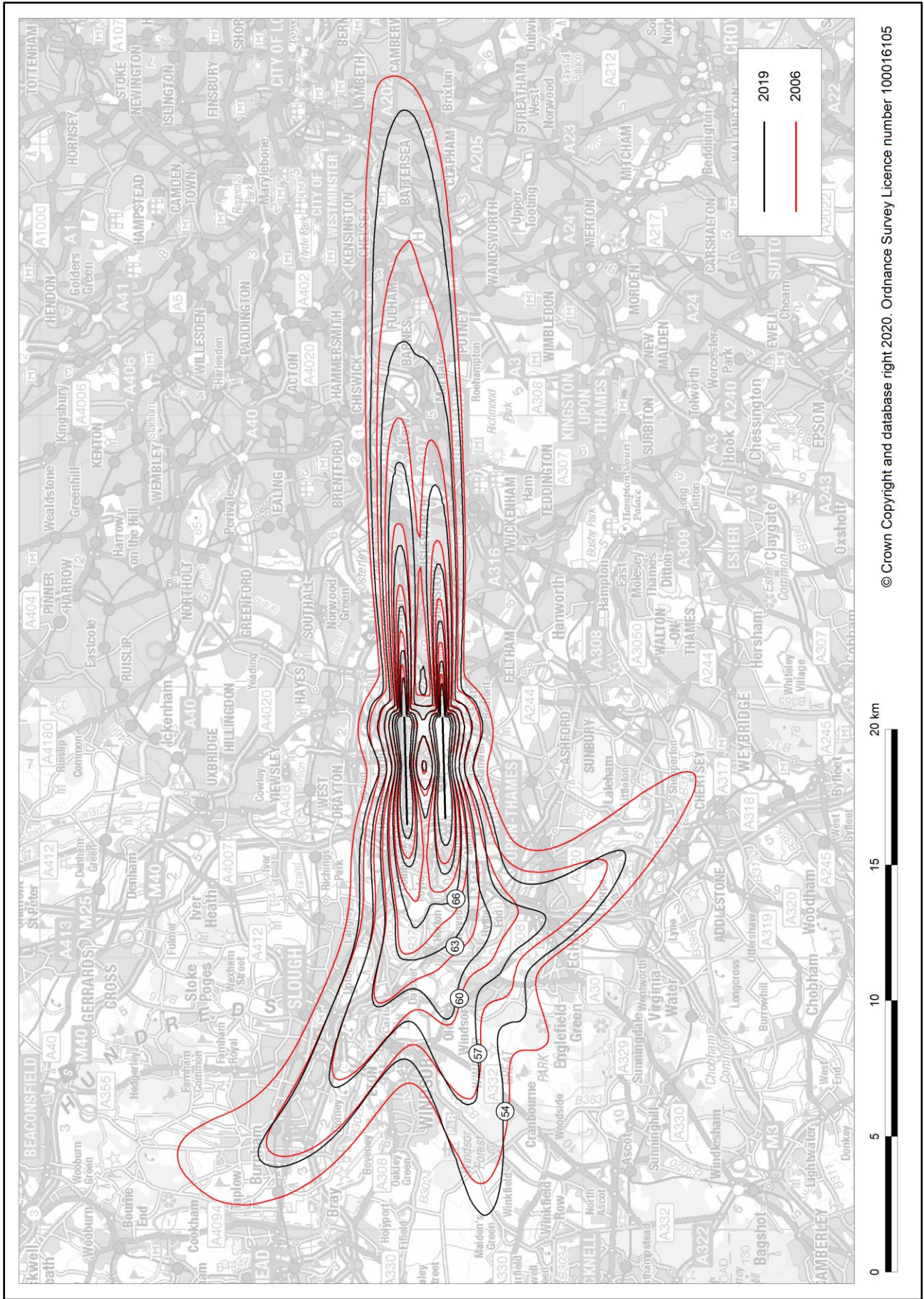
Note: 2018 day actual modal split was 78% W / 22% E; 2019 day actual modal split was 80% W / 20% E.

Figure B4 Heathrow 2019 and 2018 average summer day $L_{Aeq,16h}$ standard modal split 54-72 dB standard noise contours



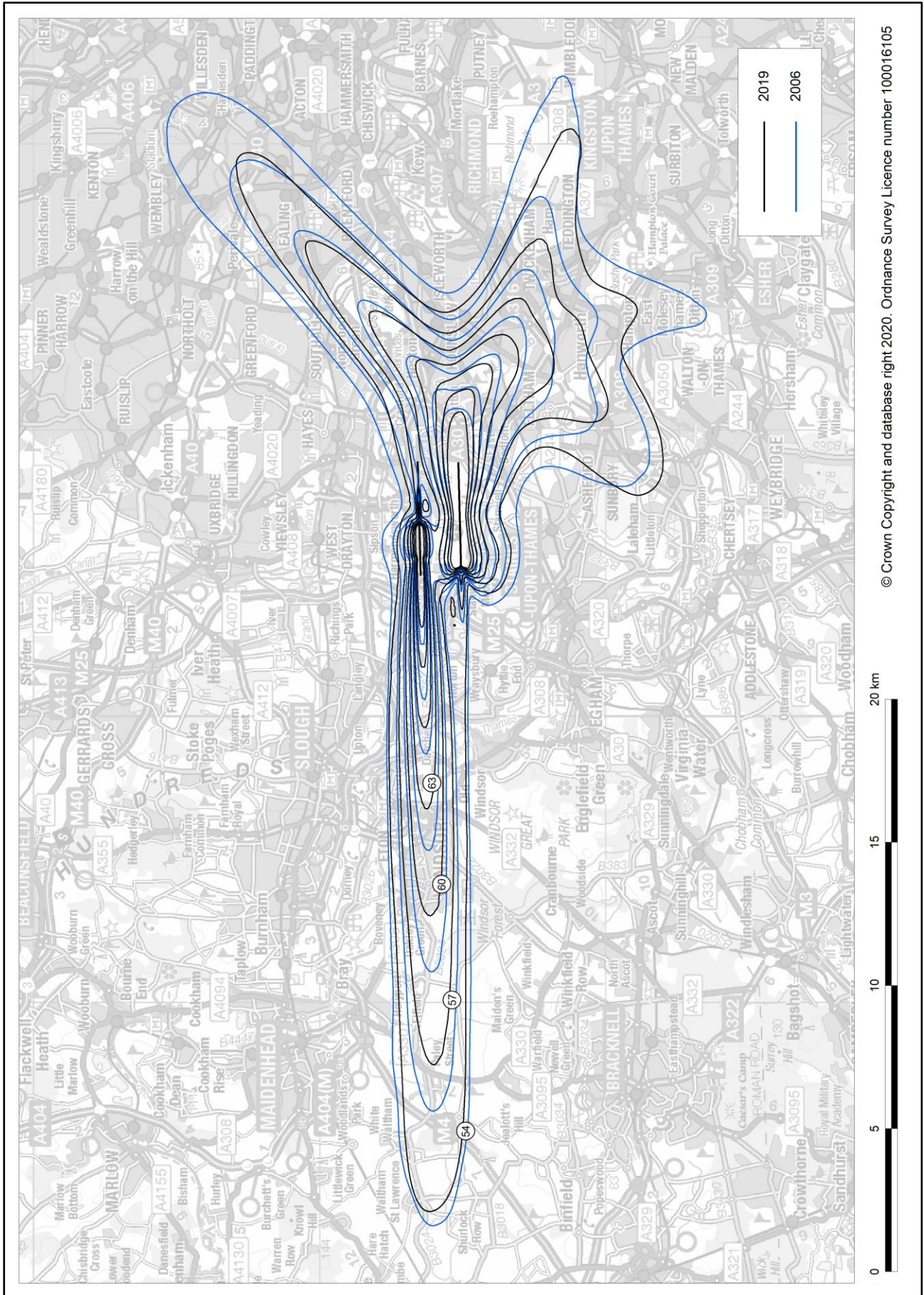
Note: 2018 day standard modal split was 79% W / 21% E; 2019 day standard modal split was 80% W / 20% E.

Figure B5 Heathrow 2019 and 2006 average summer day 54-72 dB 100% W L_{Aeq,16h} noise contours (with 2006 N-S runway usage)



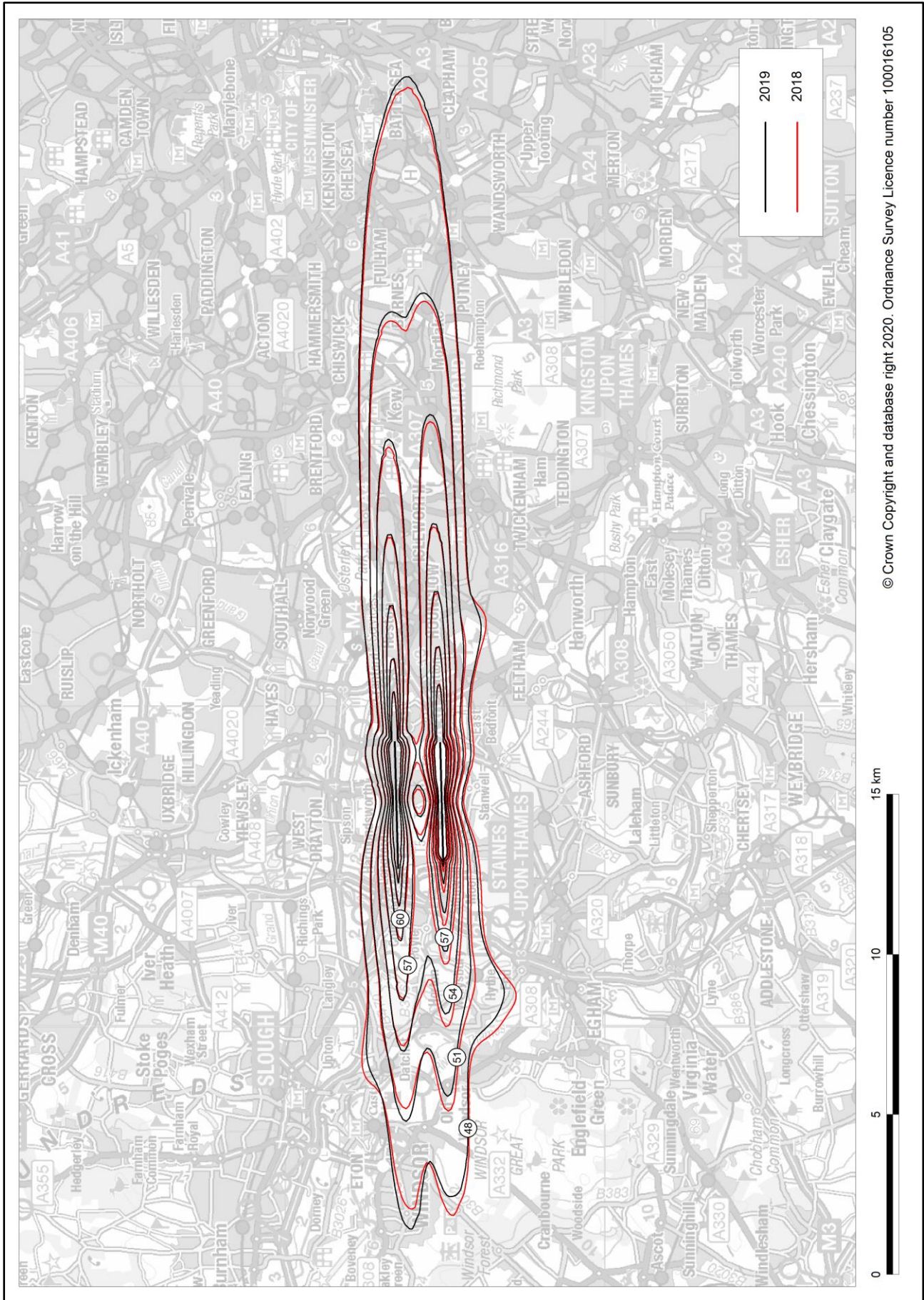
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Figure B6 Heathrow 2019 and 2006 average summer day 54-72 dB 100% E L_{Aeq,16h} noise contours (with 2006 N-S runway usage)



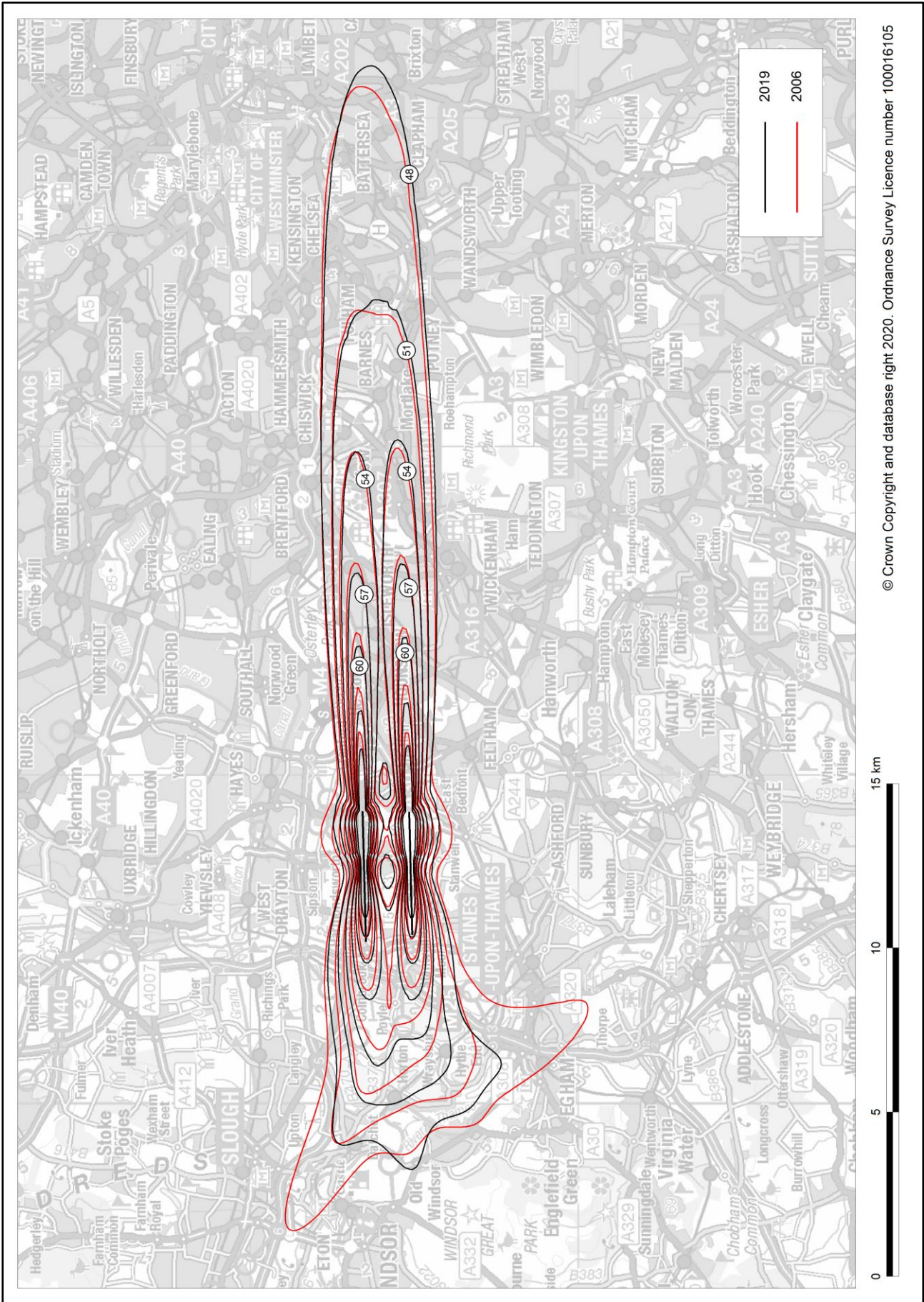
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Figure B7 Heathrow 2019 and 2018 average summer night $L_{Aeq,8h}$ actual modal split 48-66 dB actual modal split noise contours



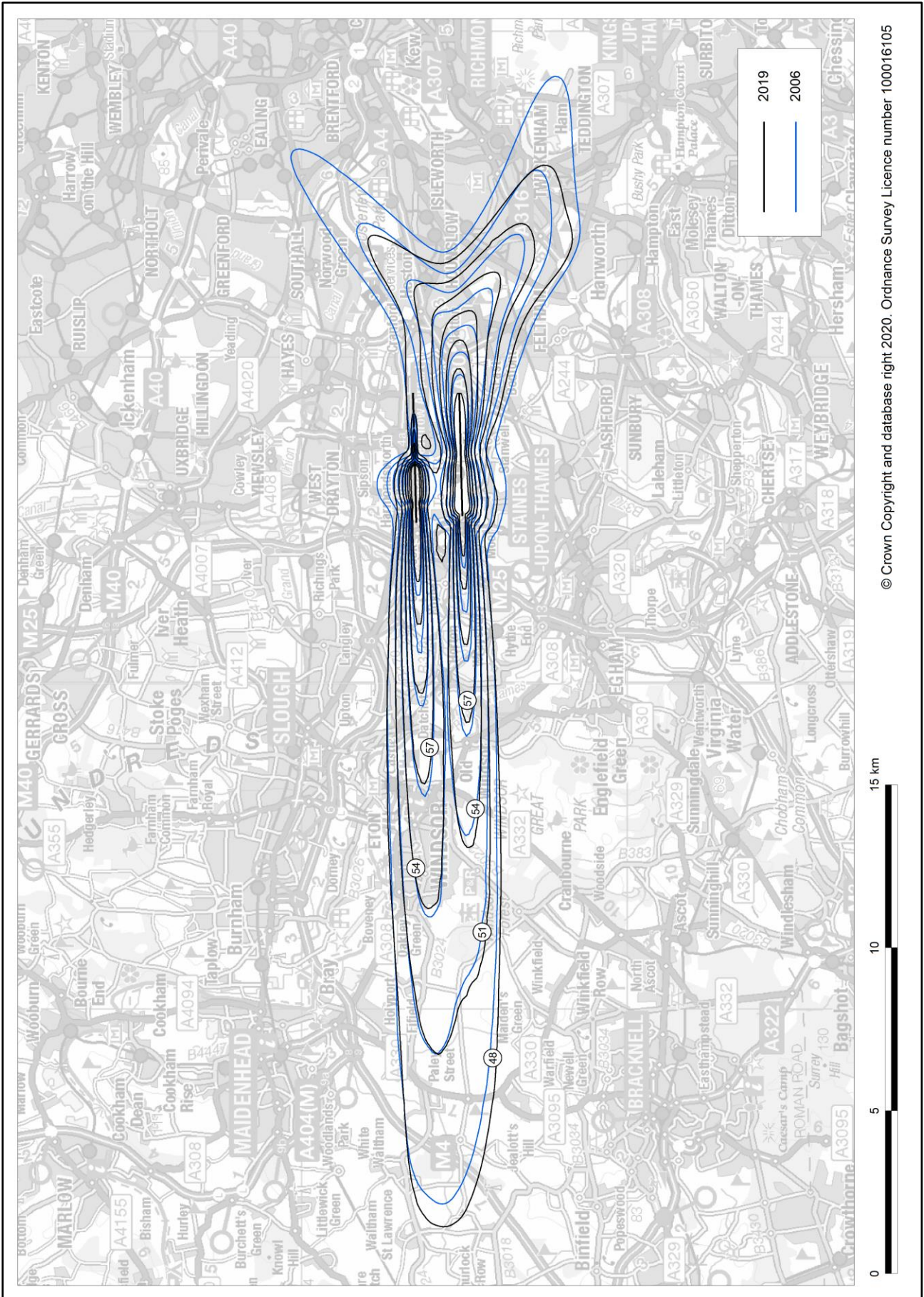
Note: 2018 night actual modal split was 80% W / 20% E; 2019 night actual modal split was 80% W / 20% E.

Figure B8 Heathrow 2019 and 2006 average summer night 48-66 dB 100% W L_{Aeq,8h} noise contours (with 2006 N-S runway usage)



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Figure B9 Heathrow 2019 and 2006 average summer night 48-66 dB 100% E L_{Aeq,8h} noise contours (with 2006 N-S runway usage)



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Figure B10 Heathrow 2019 and 2018 average summer day overflight contours (assuming 48.5-degree elevation angle)



Figure B10-a Heathrow 2006 average summer day overflight track density diagram (assuming 48.5-degree elevation angle)

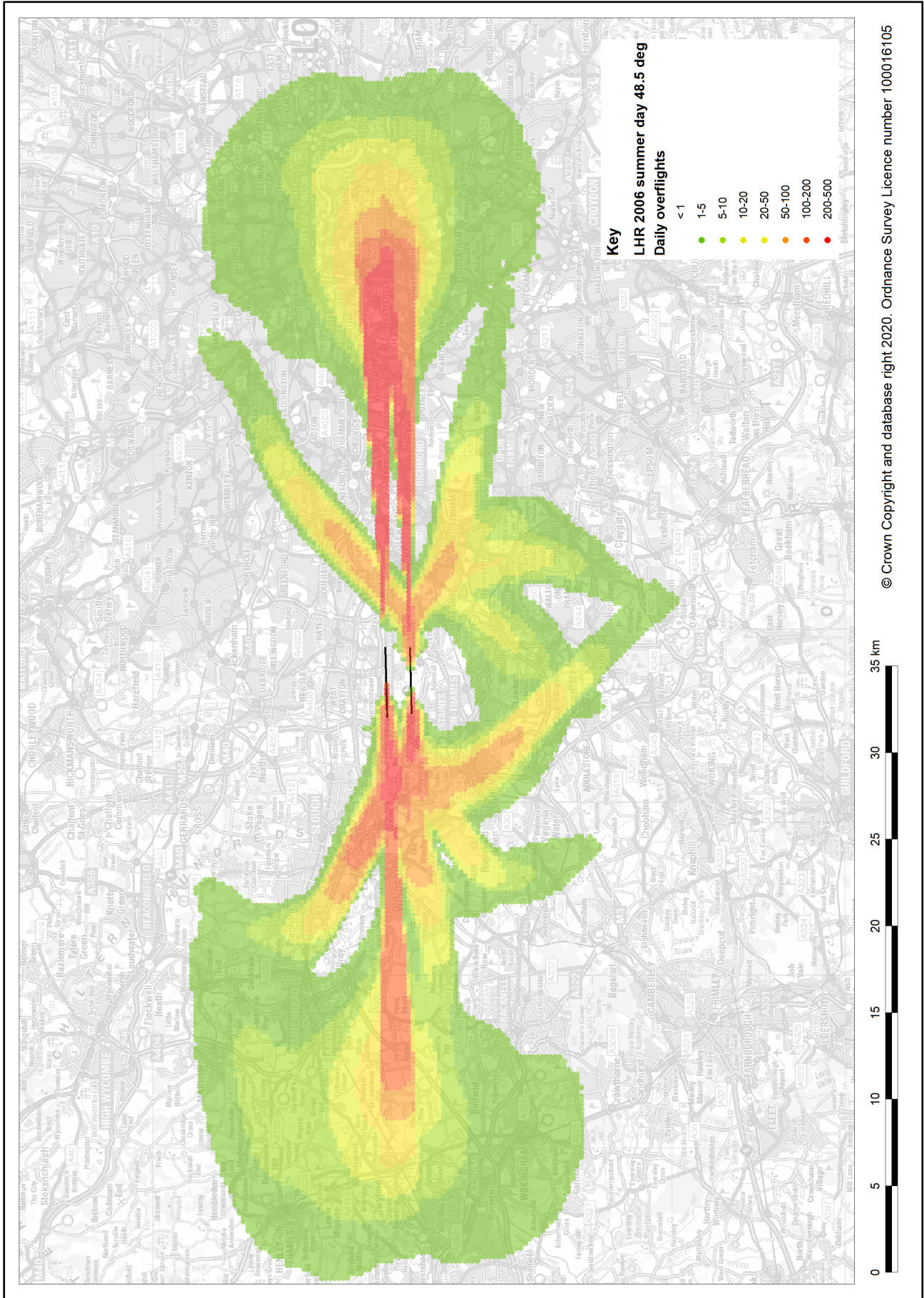


Figure B10-b Heathrow 2018 average summer day overflight track density diagram (assuming 48.5-degree elevation angle)

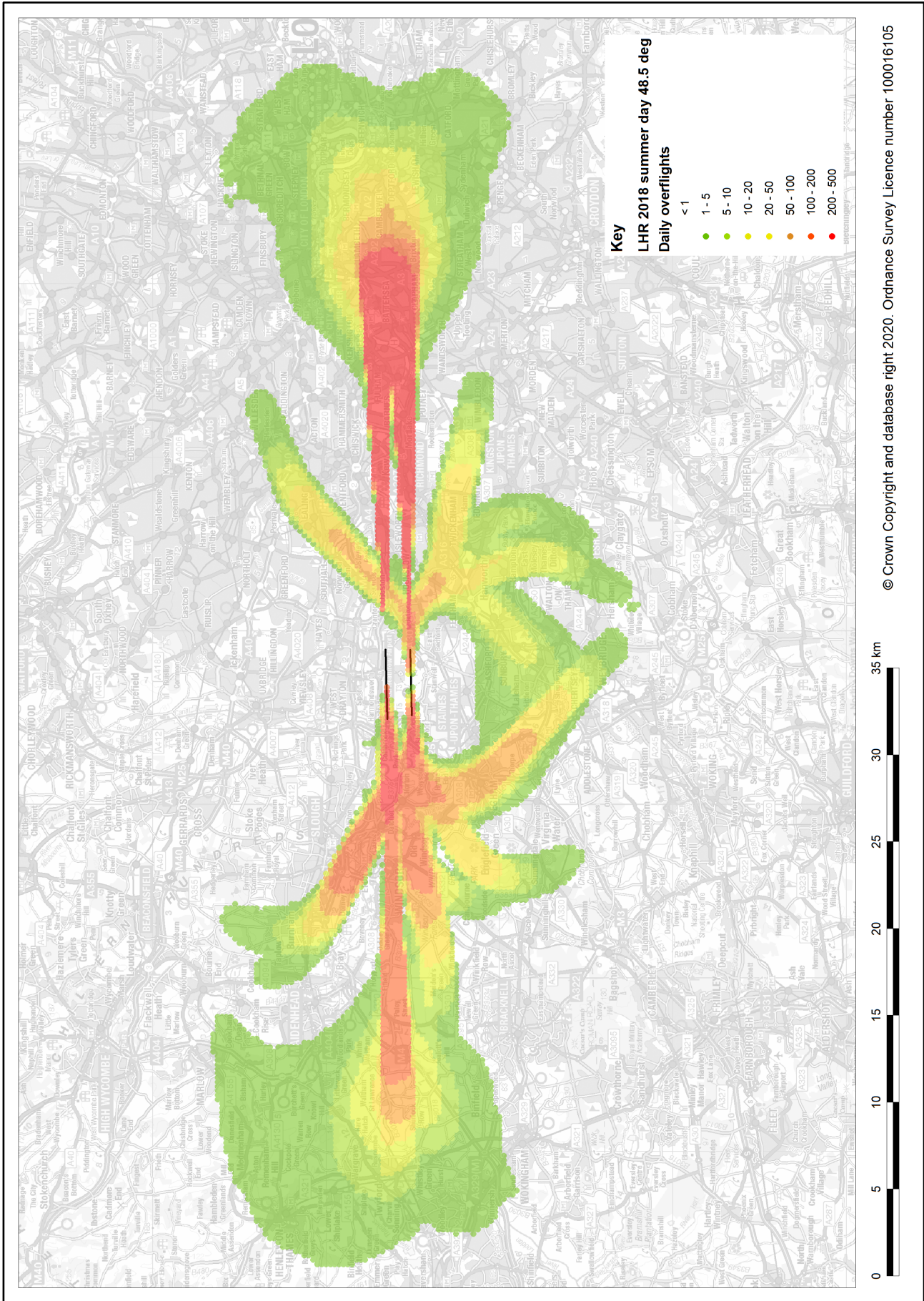


Figure B10-c Heathrow 2019 average summer day overflight track density diagram (assuming 48.5-degree elevation angle)

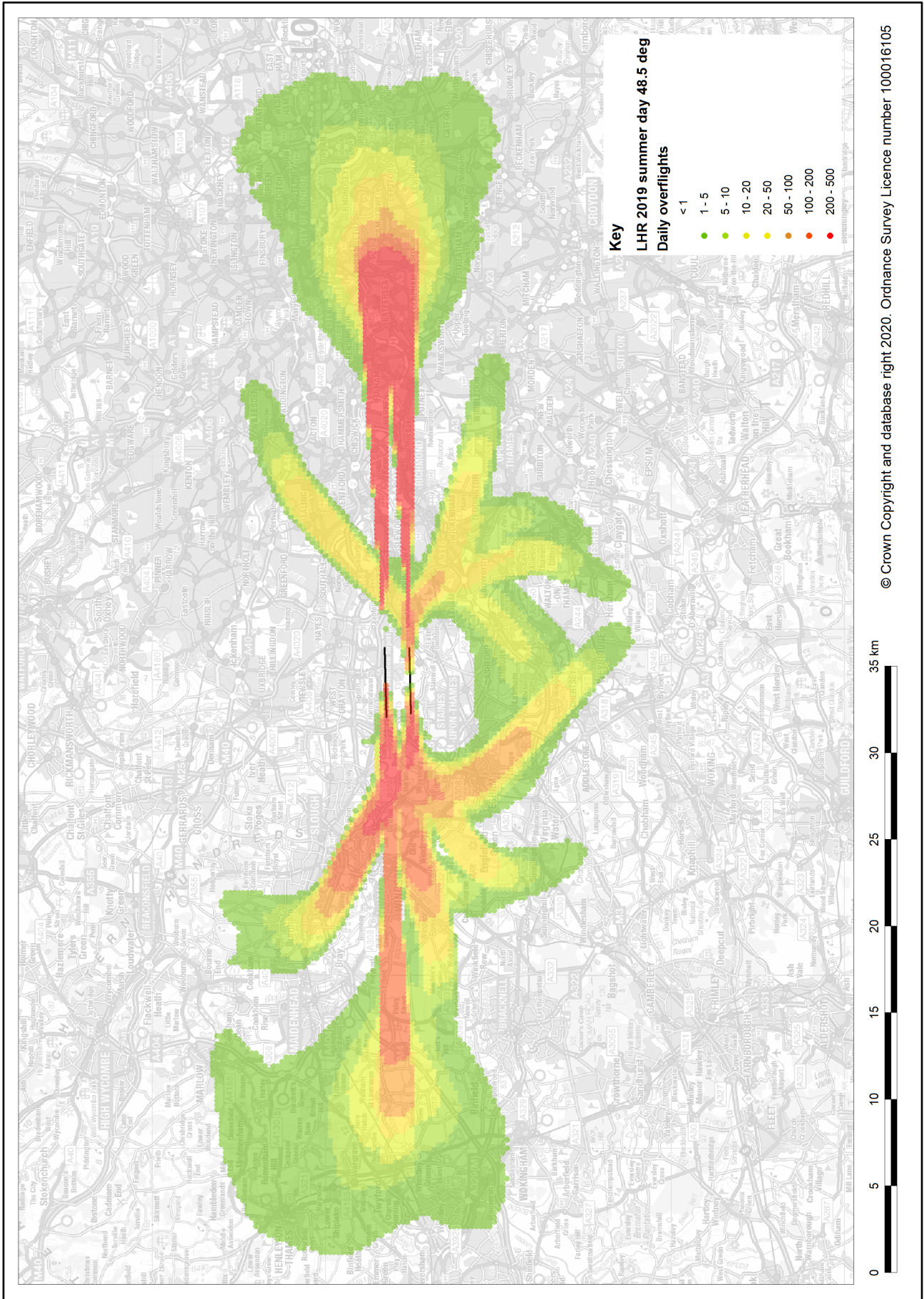


Figure B11 Heathrow 2019 and 2018 average summer day overflight contours (assuming 60-degree elevation angle)

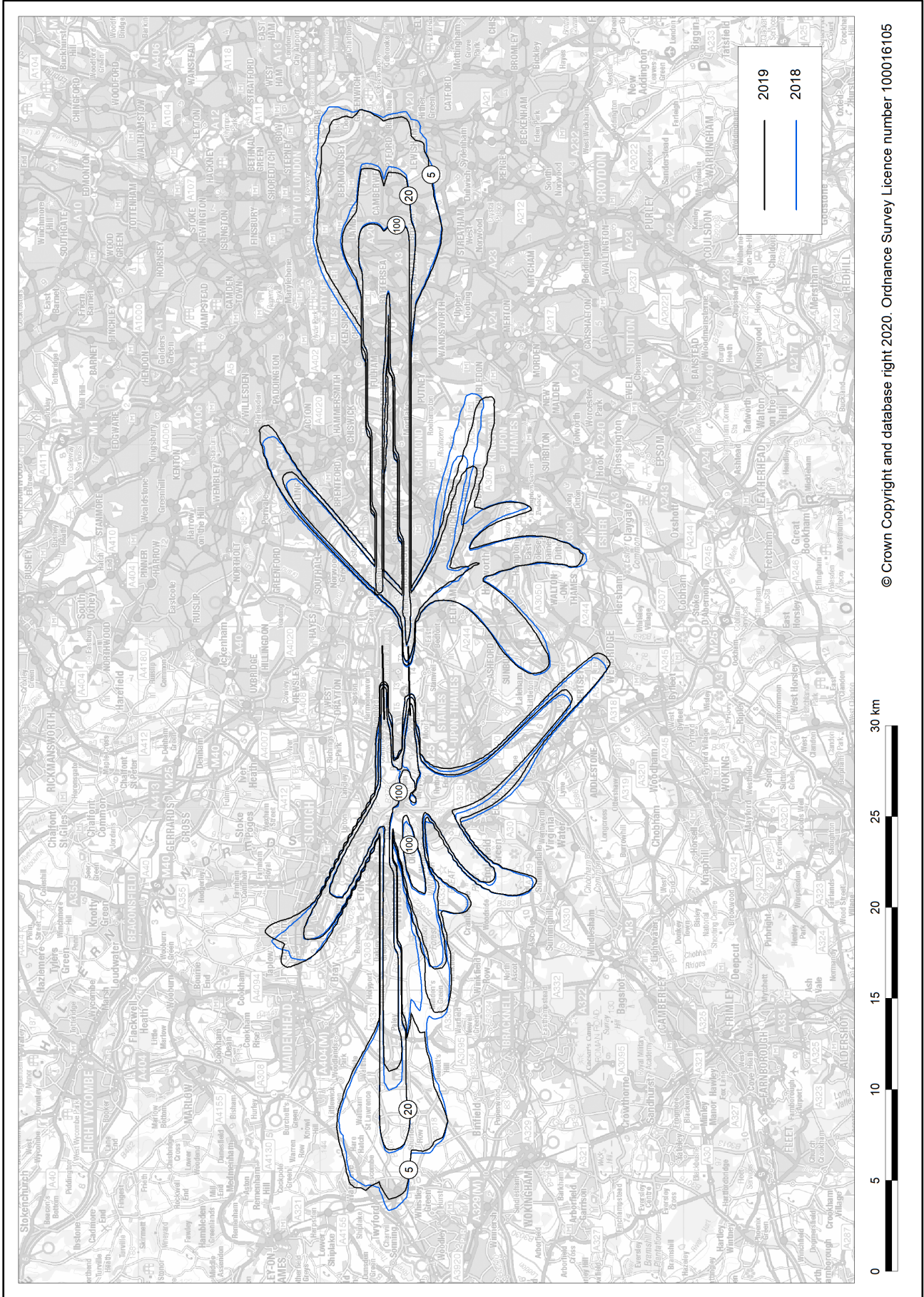


Figure B11-a Heathrow 2006 average summer day overflight track density diagram (assuming 60-degree elevation angle)

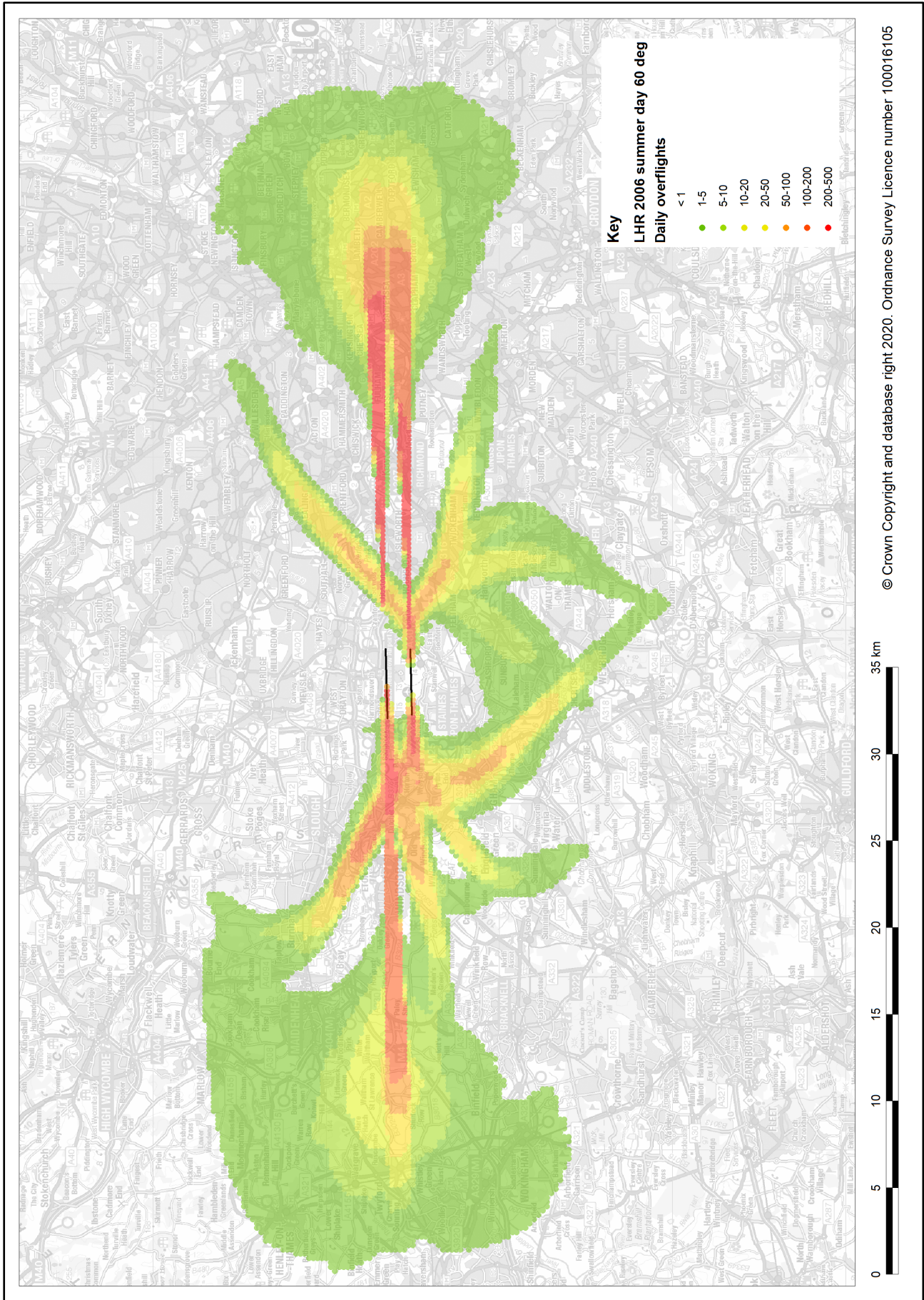


Figure B11-b Heathrow 2018 average summer day overflight track density diagram (assuming 60-degree elevation angle)

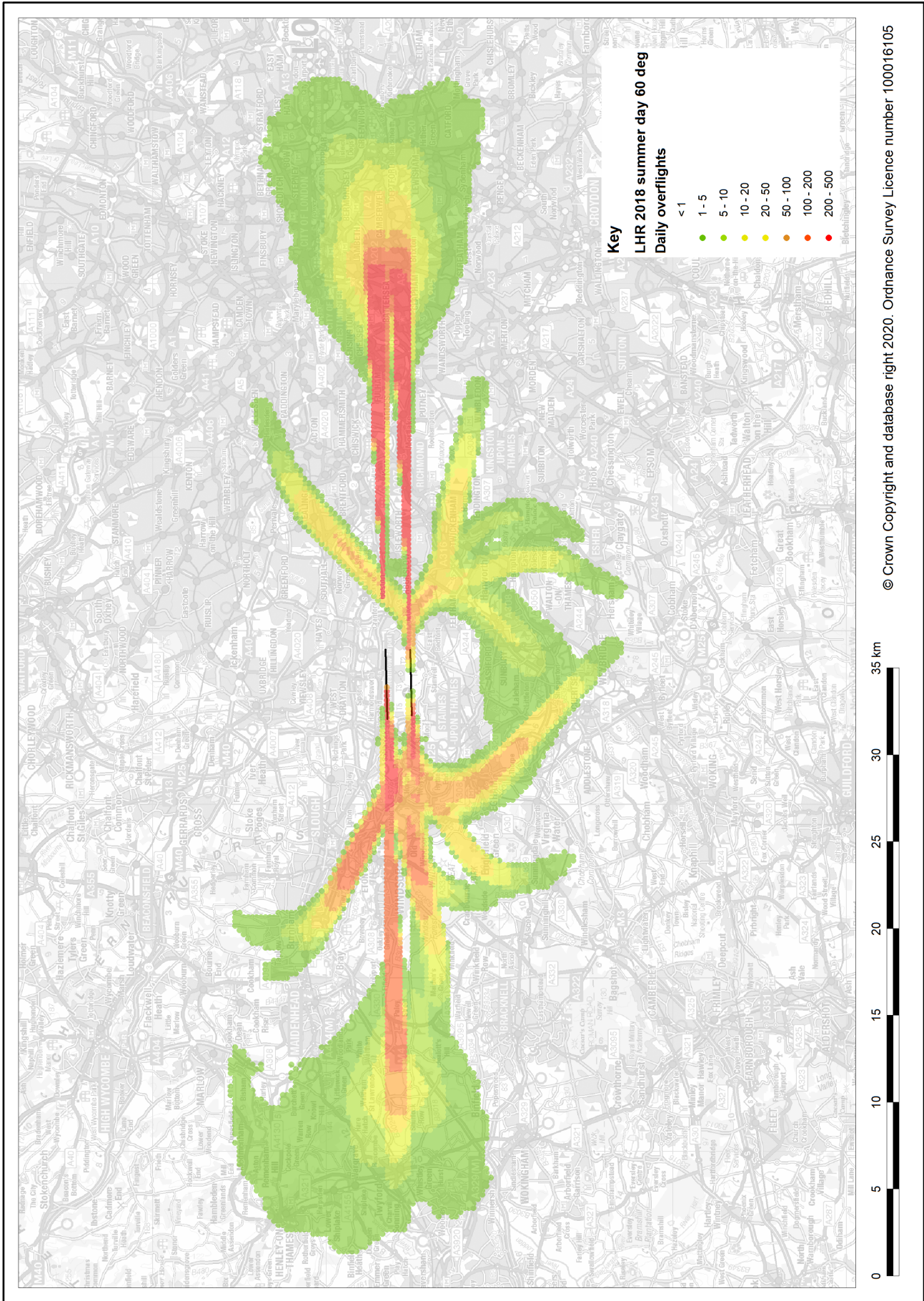


Figure B11-c Heathrow 2019 average summer day overflight track density diagram (assuming 60-degree elevation angle)

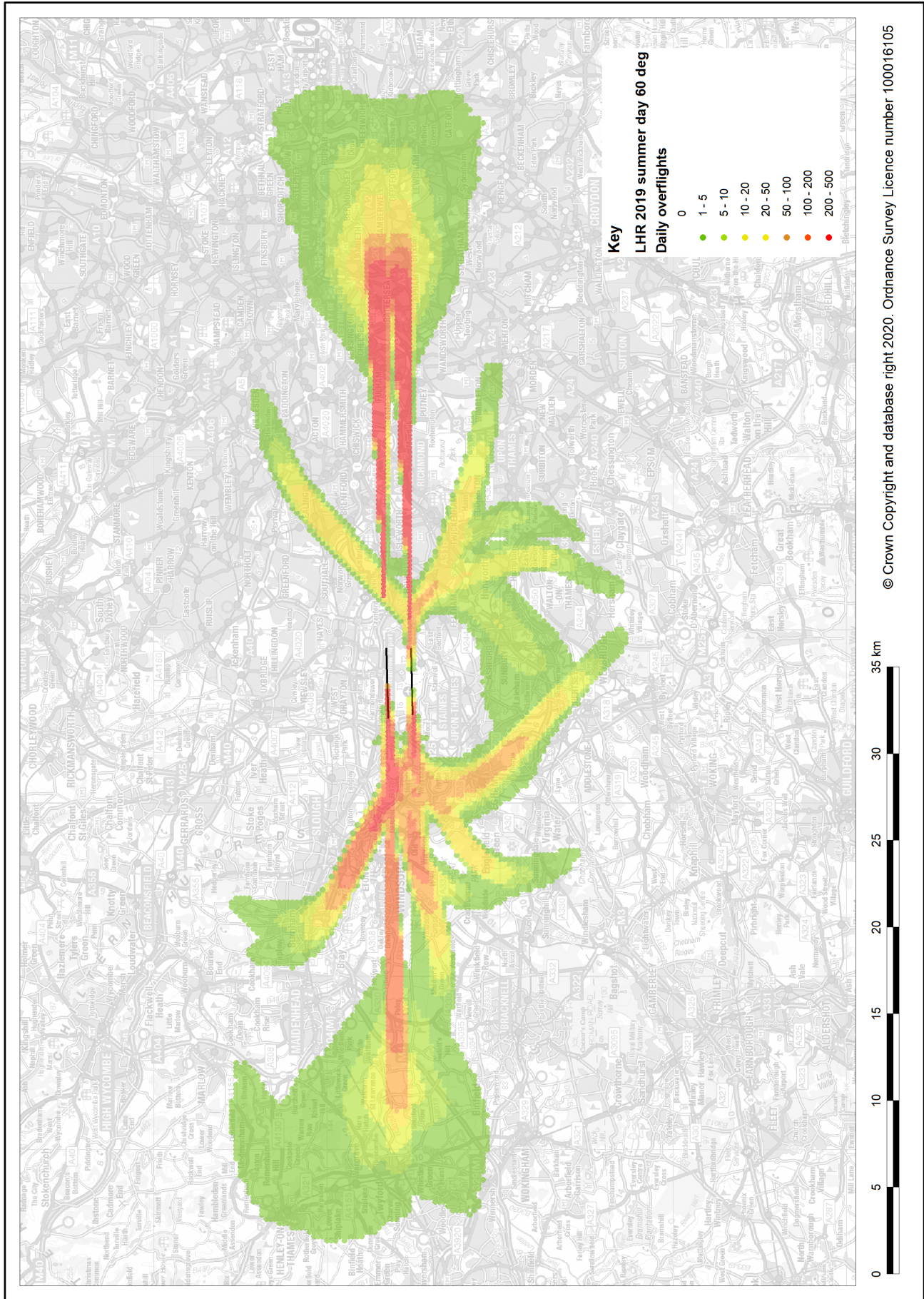


Figure B12 Heathrow 2019 and 2018 average summer night overflight contours (assuming 48.5-degree elevation angle)

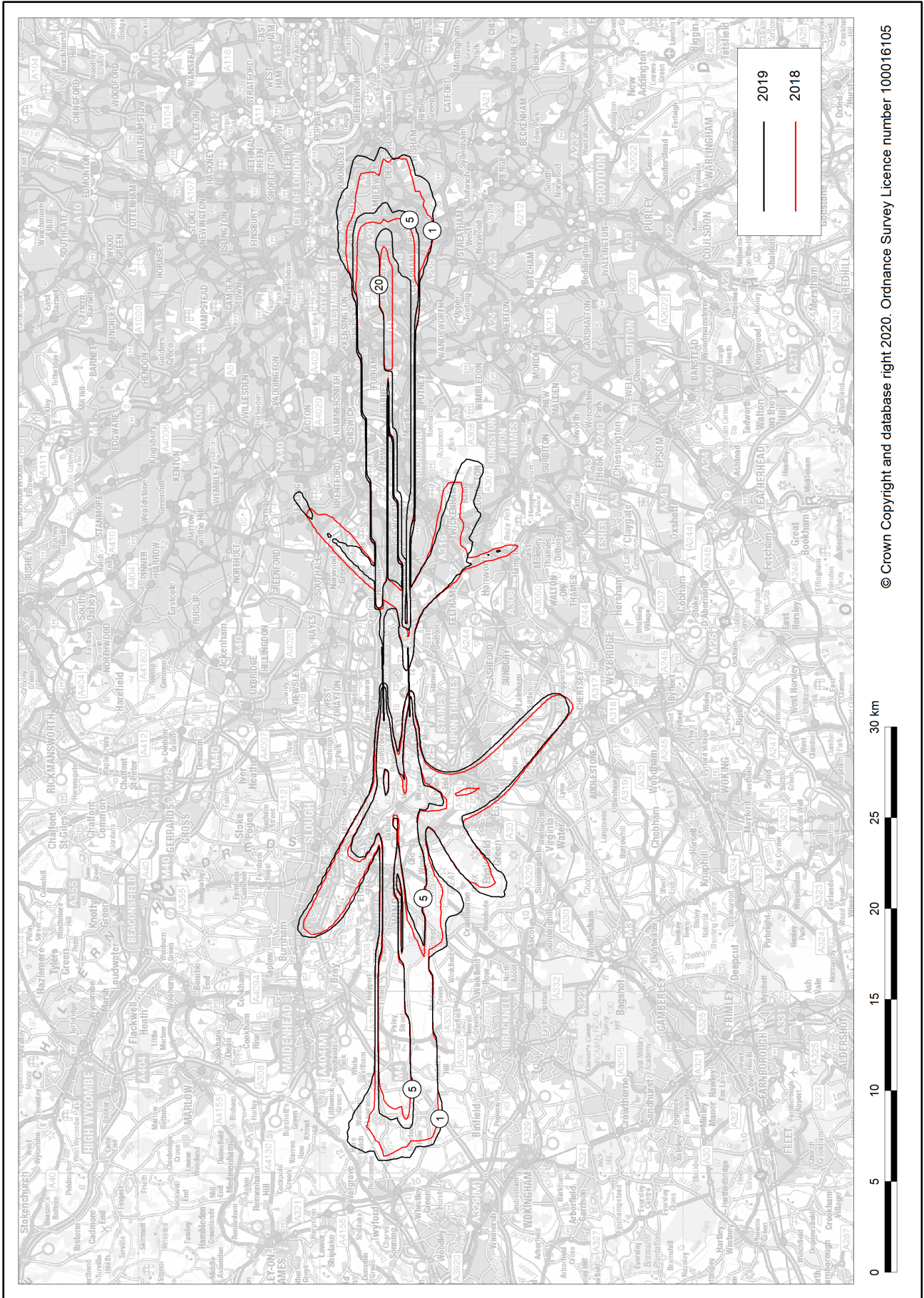


Figure B12-a Heathrow 2006 average summer night overflight track density diagram (assuming 48.5-degree elevation angle)

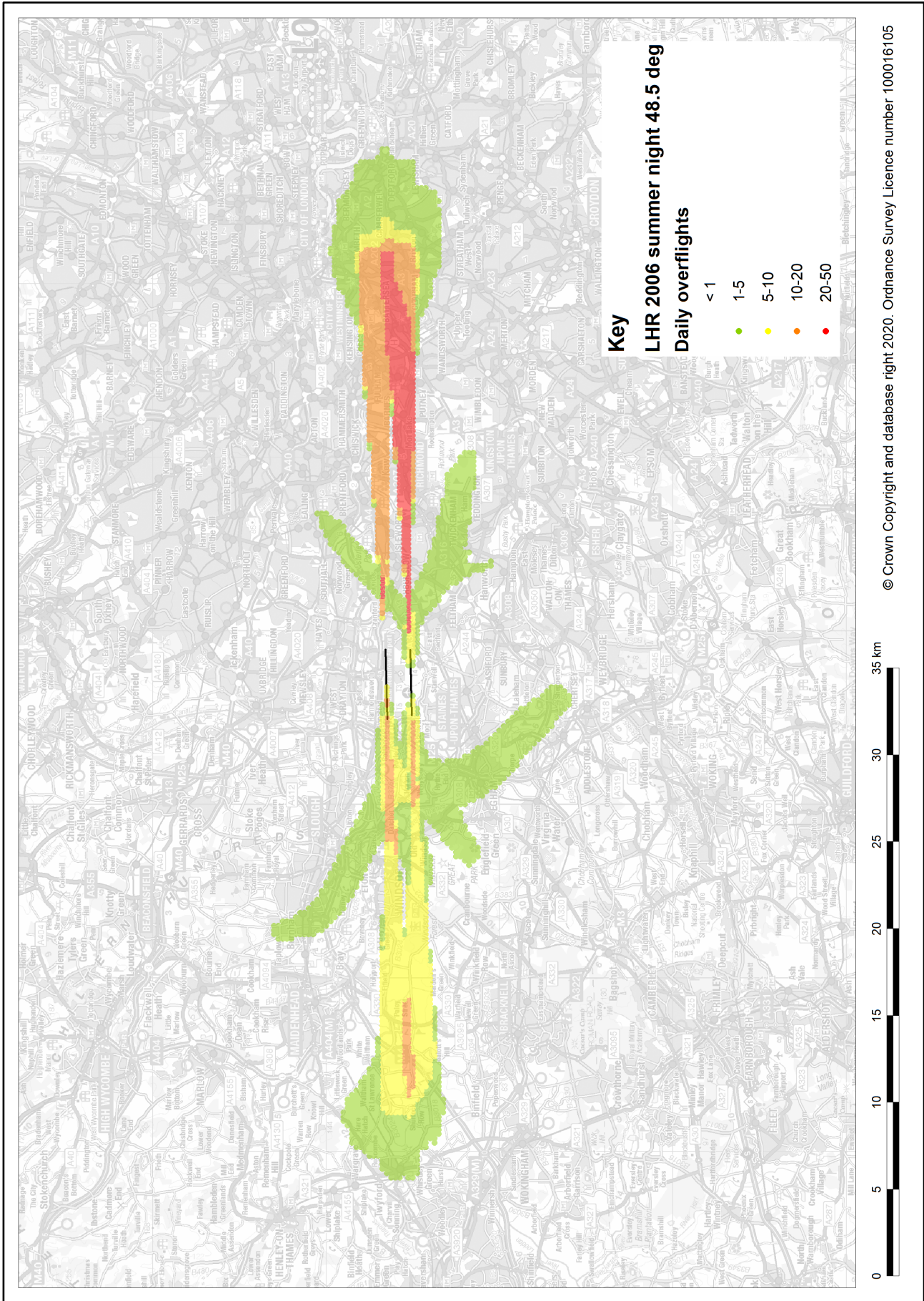


Figure B12-b Heathrow 2018 average summer night overflight track density diagram (assuming 48.5-degree elevation angle)

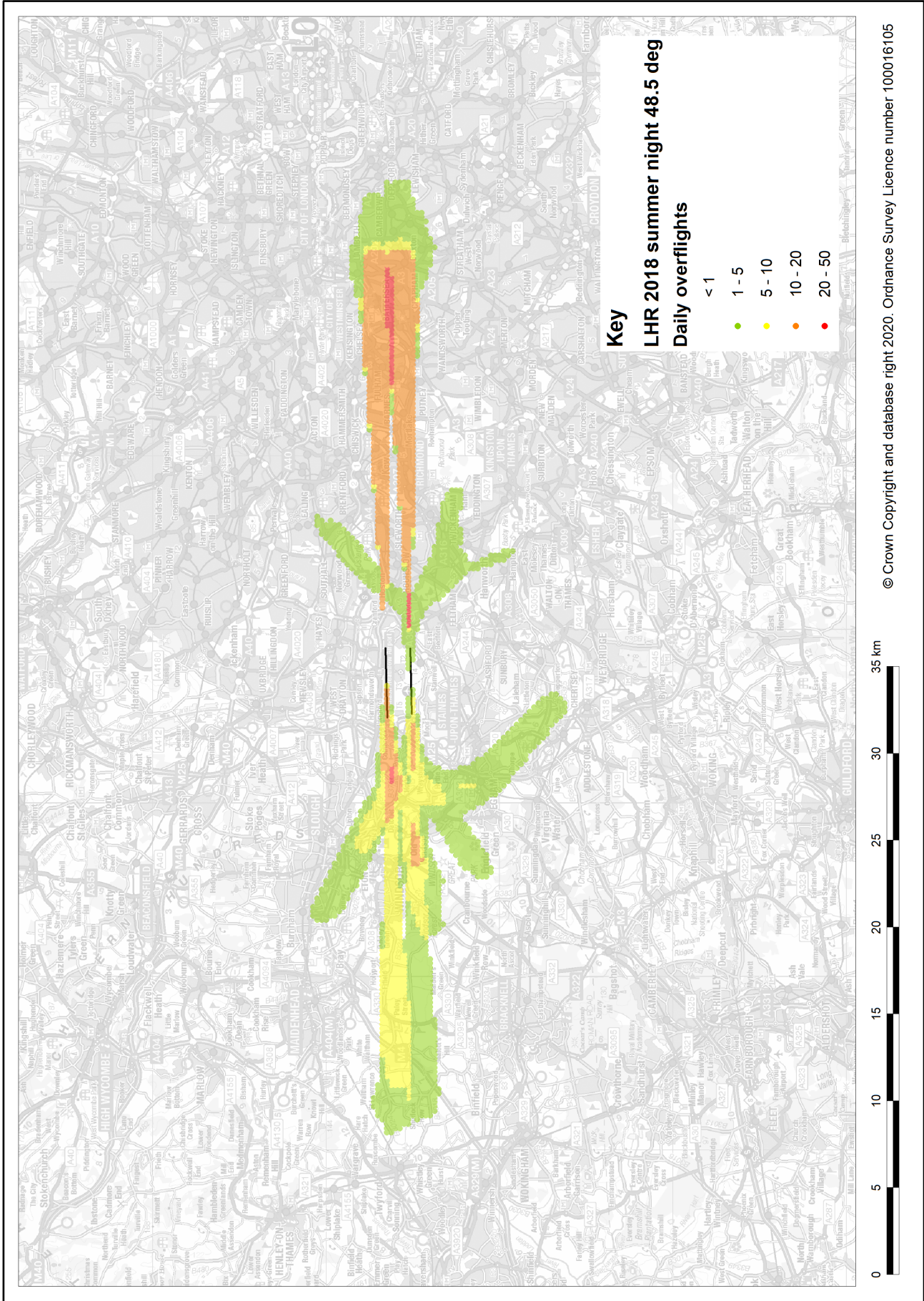


Figure B12-c Heathrow 2019 average summer night overflight track density diagram (assuming 48.5-degree elevation angle)

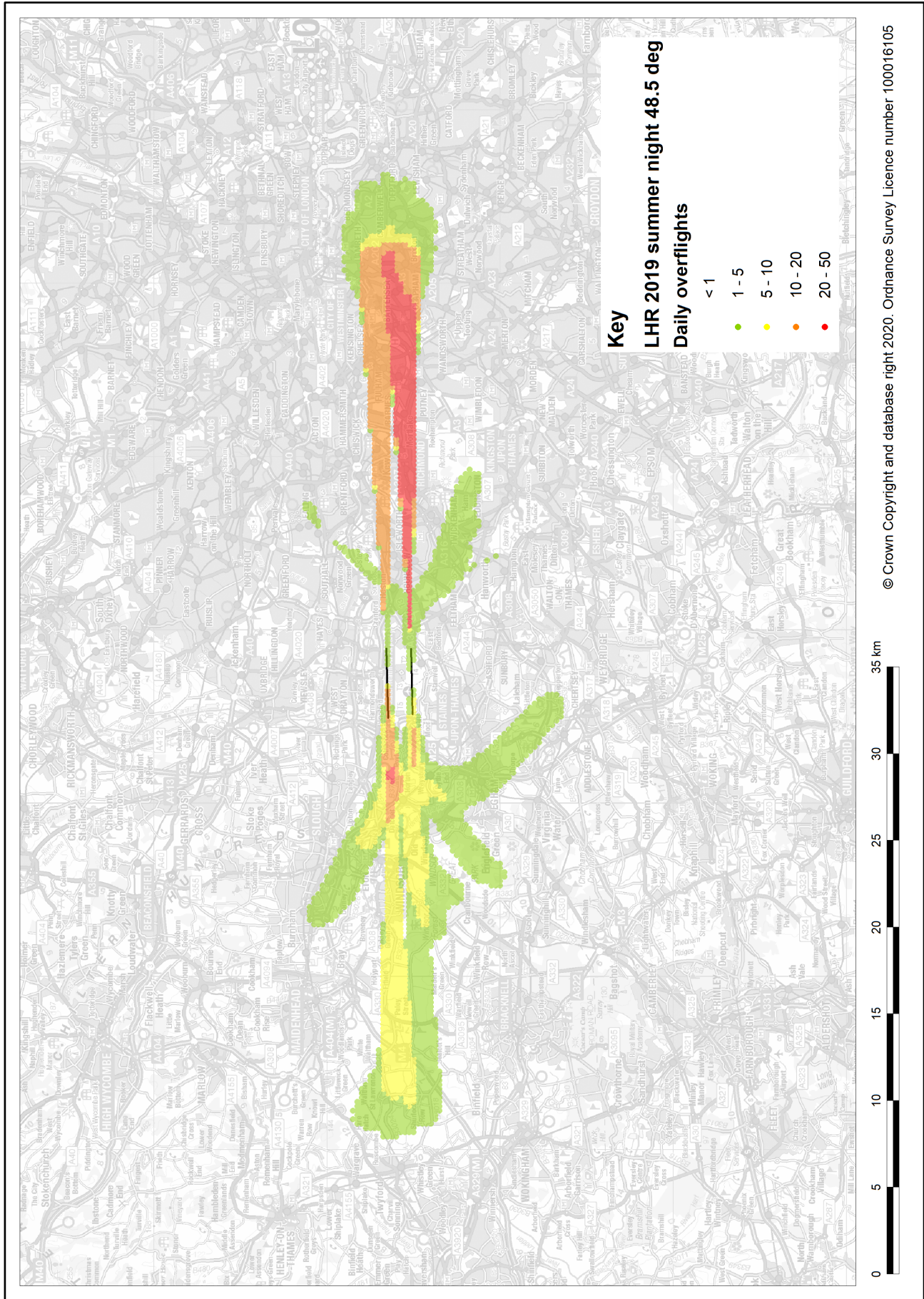


Figure B13 Heathrow 2019 and 2018 average summer night overflight contours (assuming 60-degree elevation angle)

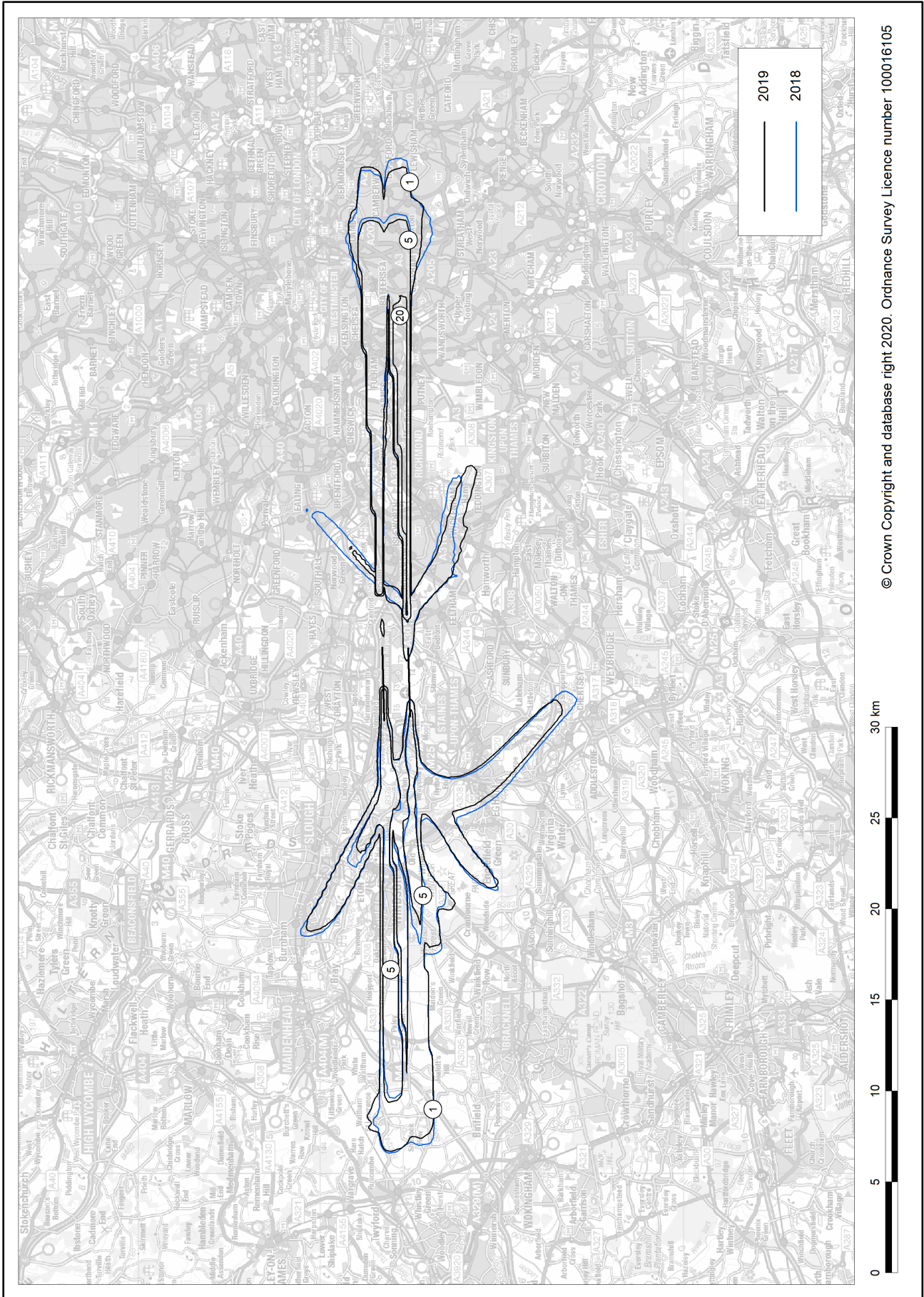


Figure B13-a Heathrow 2006 average summer night overflight track density diagram (assuming 60-degree elevation angle)

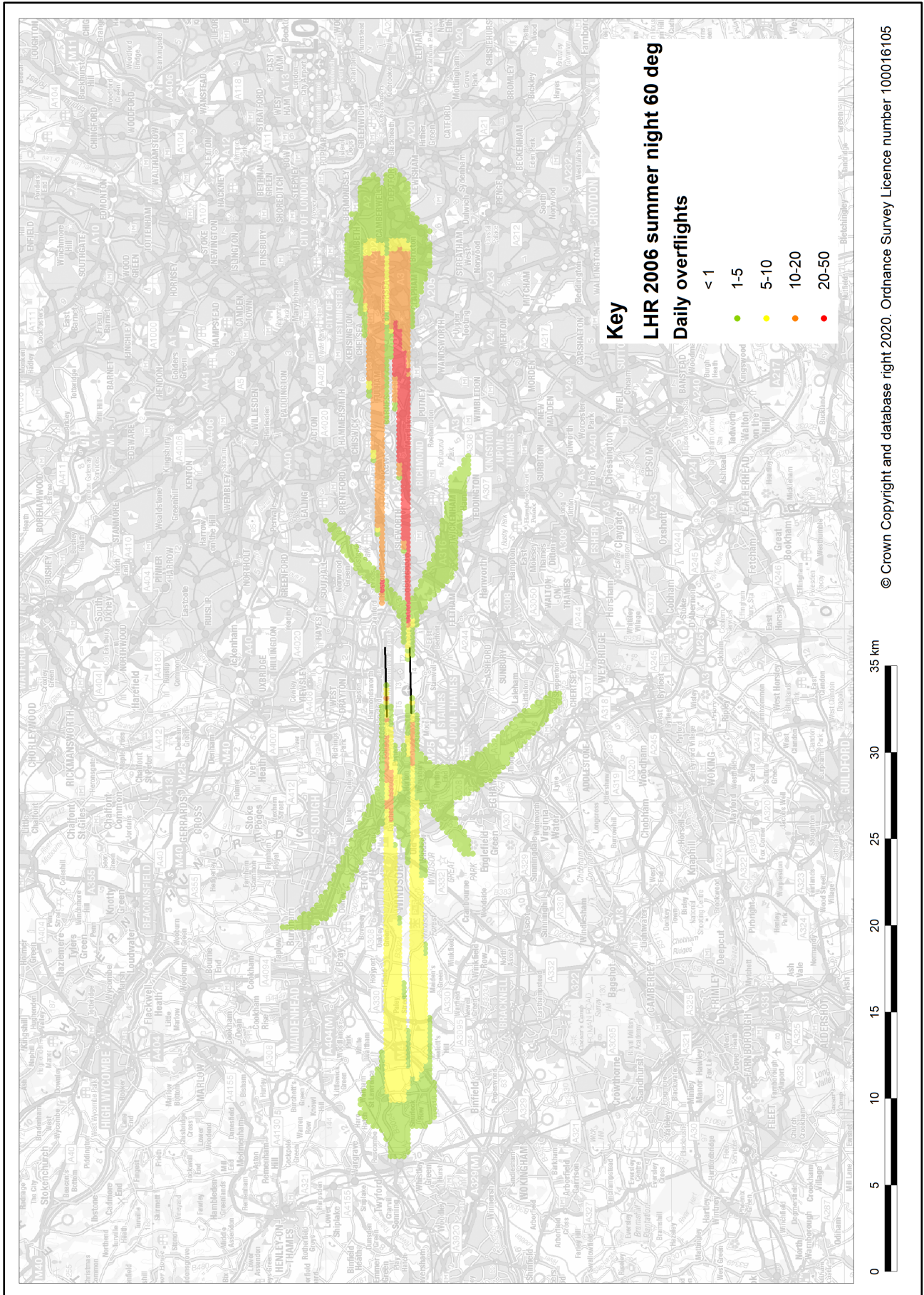


Figure B13-b Heathrow 2018 average summer night overflight track density diagram (assuming 60-degree elevation angle)

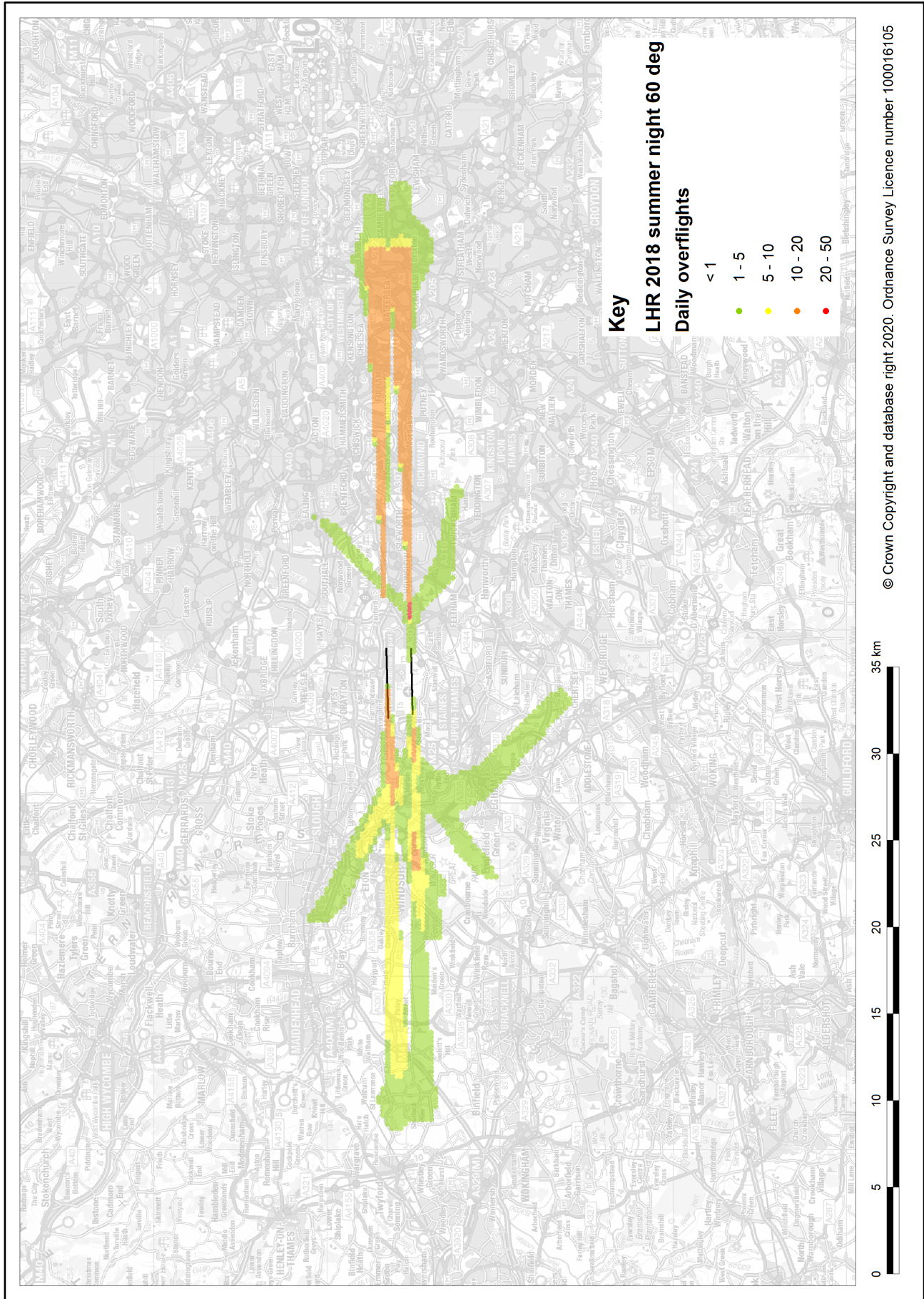


Figure B13-c Heathrow 2019 average summer night overflight track density diagram (assuming 60-degree elevation angle)

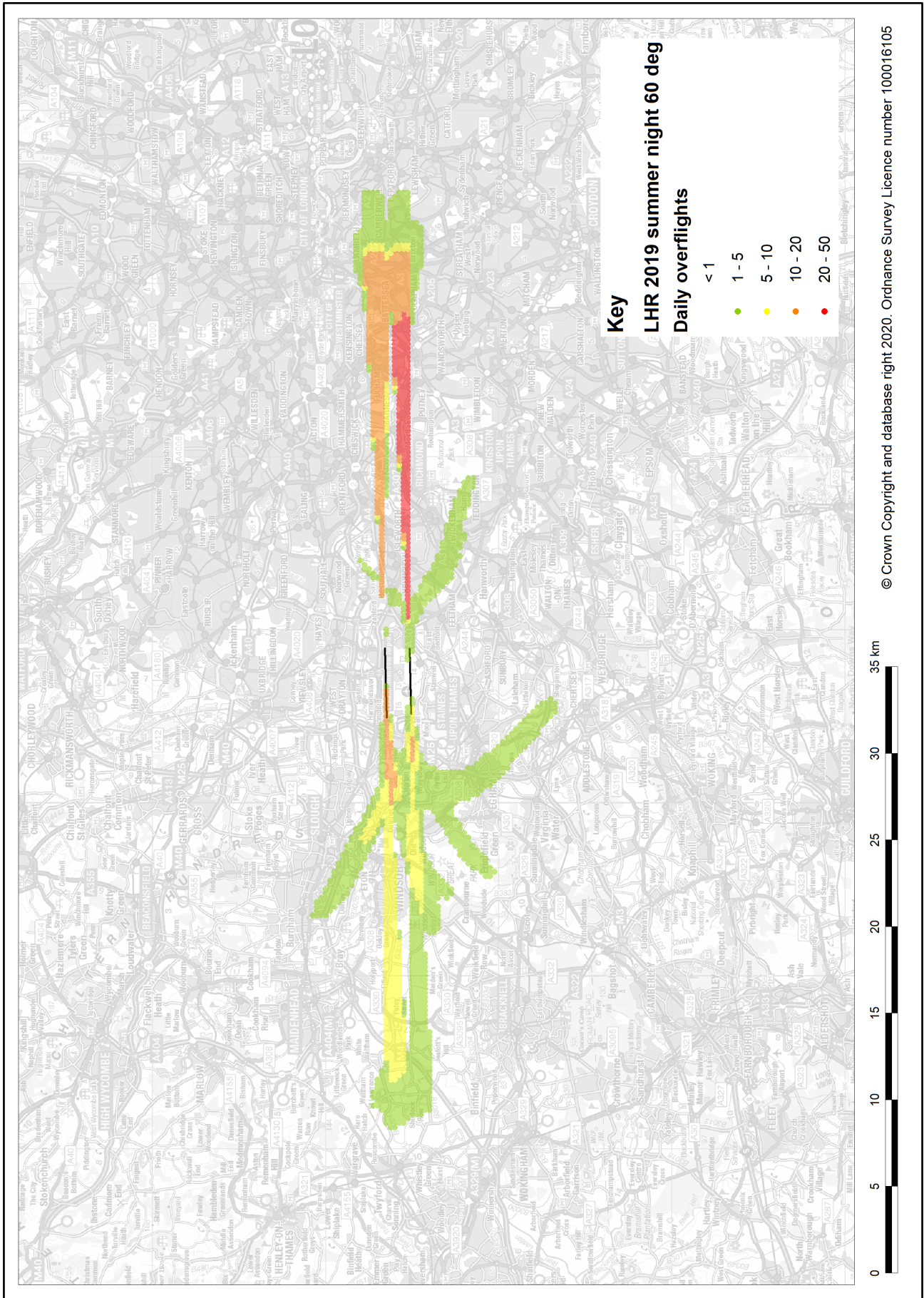
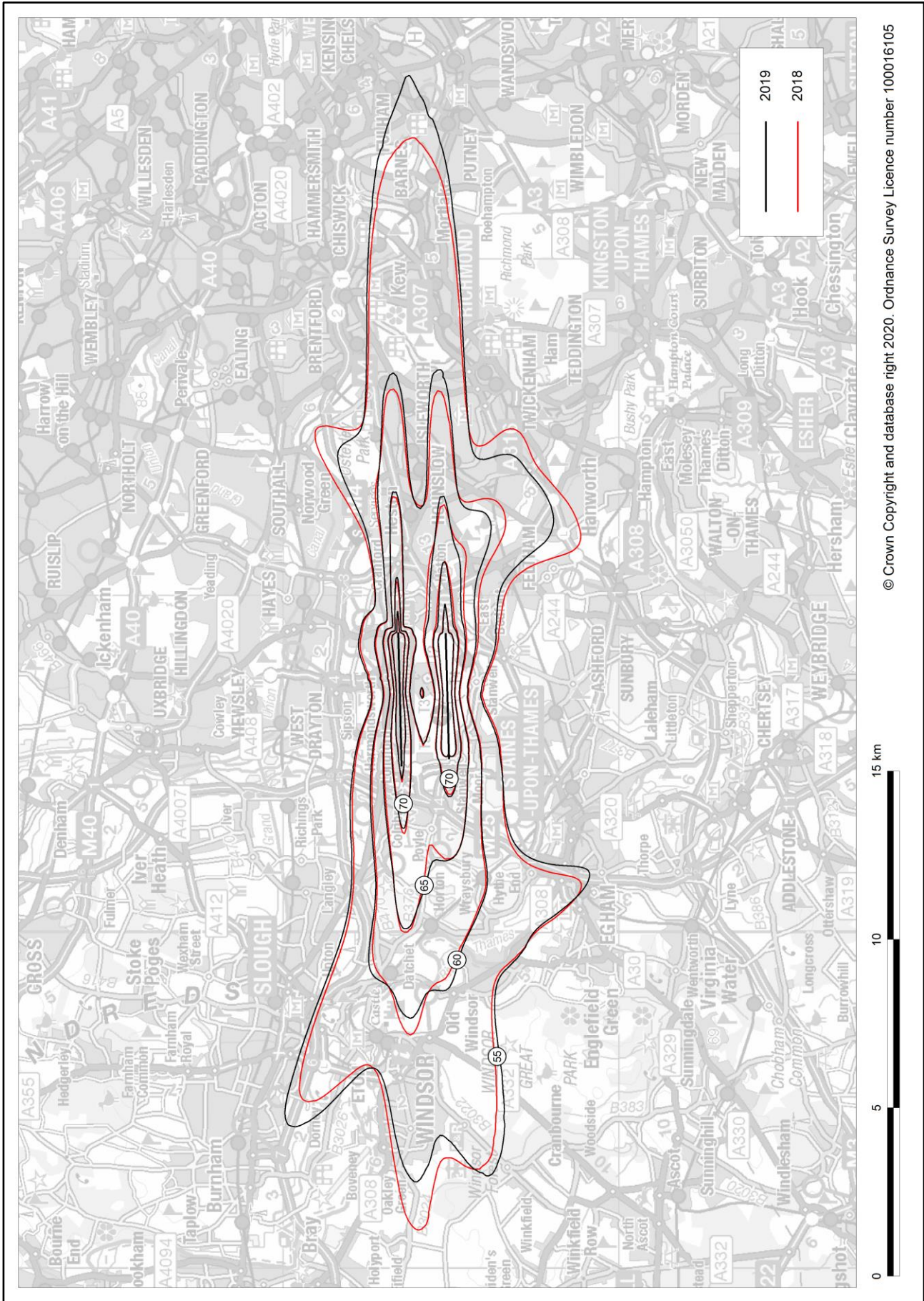
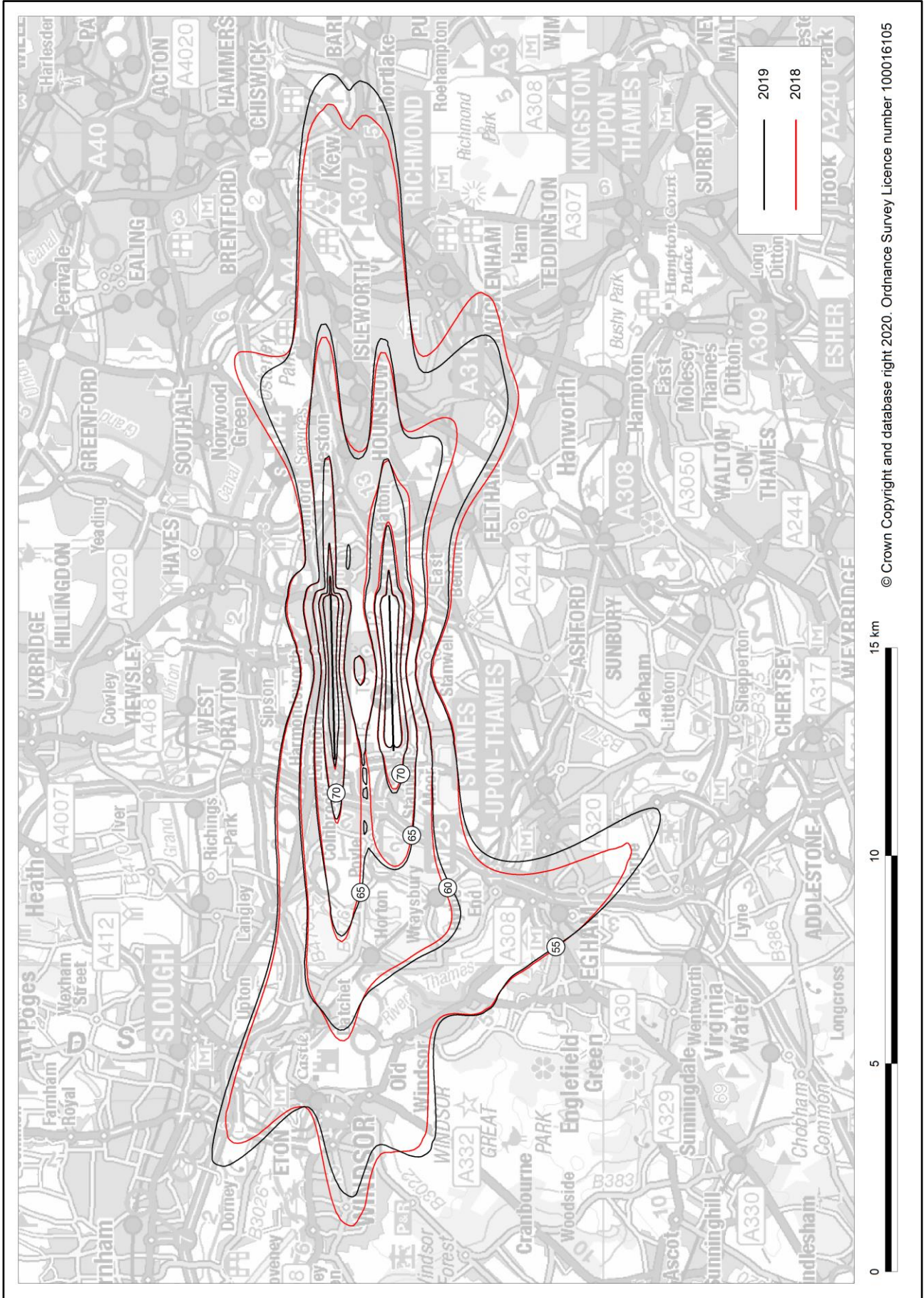


Figure B14 Heathrow 2019 and 2018 L_{day} noise contours



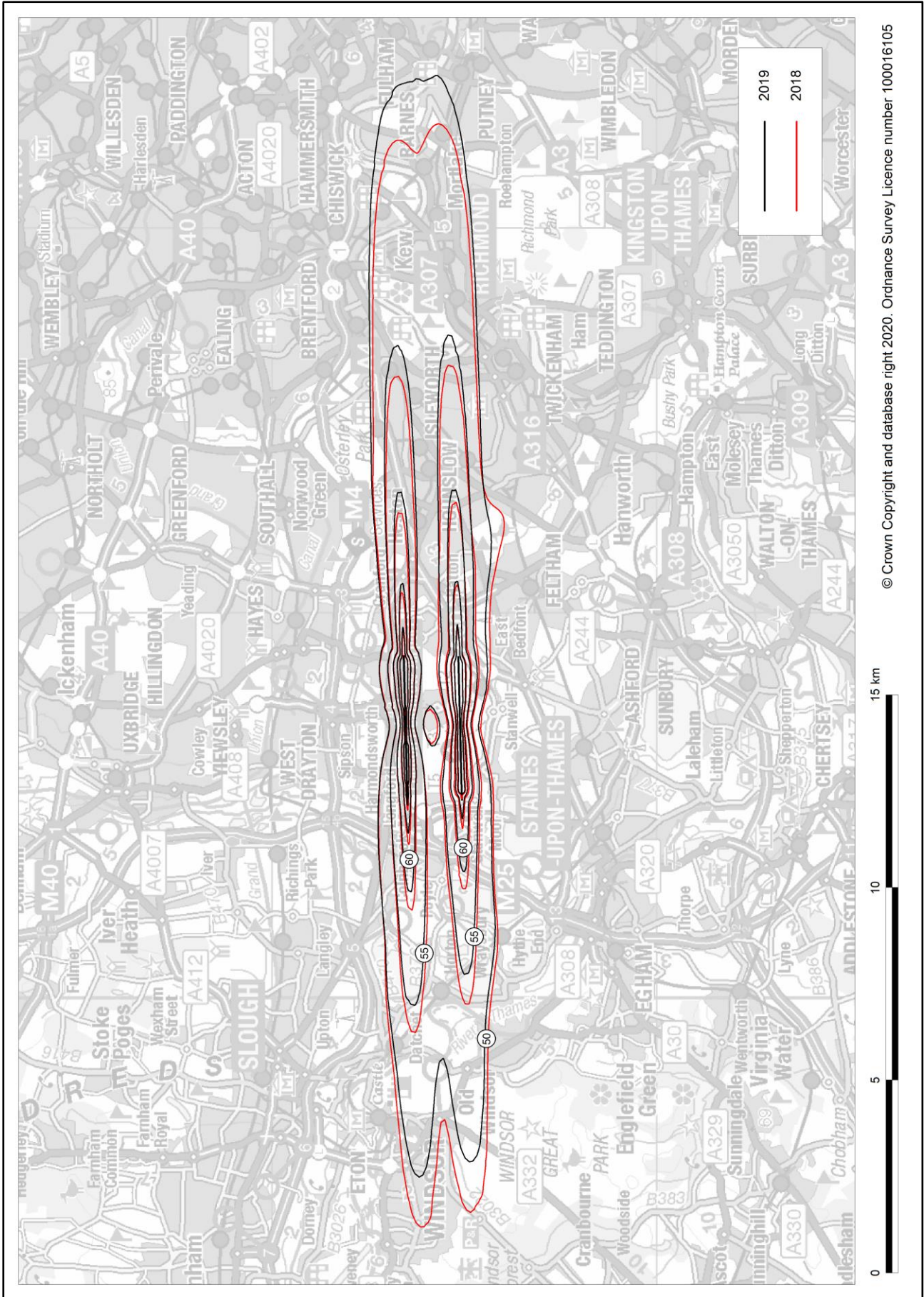
Note: 2018 L_{day} modal split was 65% W / 35% E; 2019 L_{day} modal split was 74% W / 26% E.

Figure B15 Heathrow 2019 and 2018 Levening noise contours



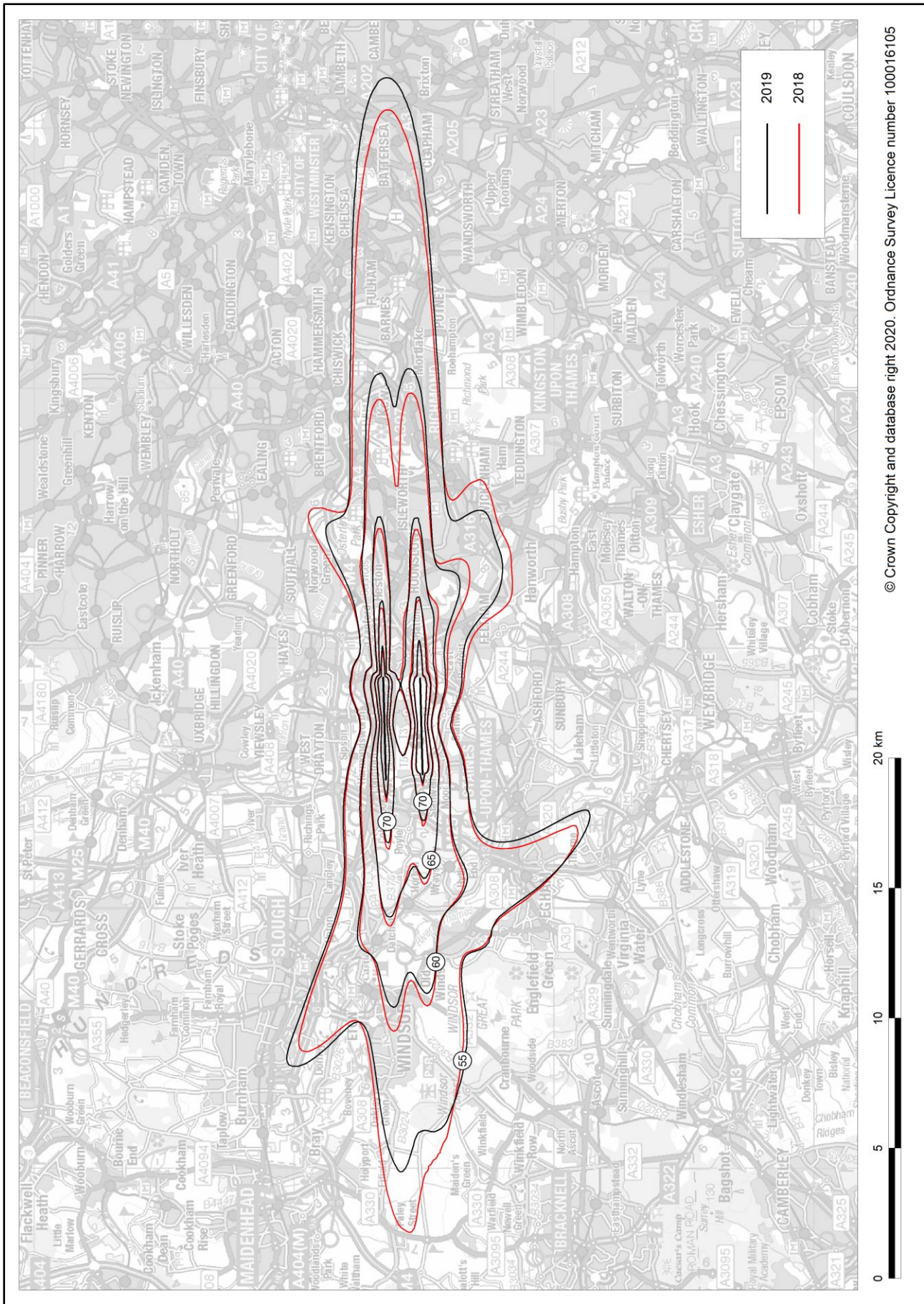
Note: 2018 Levening modal split was 65% W / 35% E; 2019 Levening modal split was 73% W / 27% E.

Figure B16 Heathrow 2019 and 2018 L_{night} noise contours



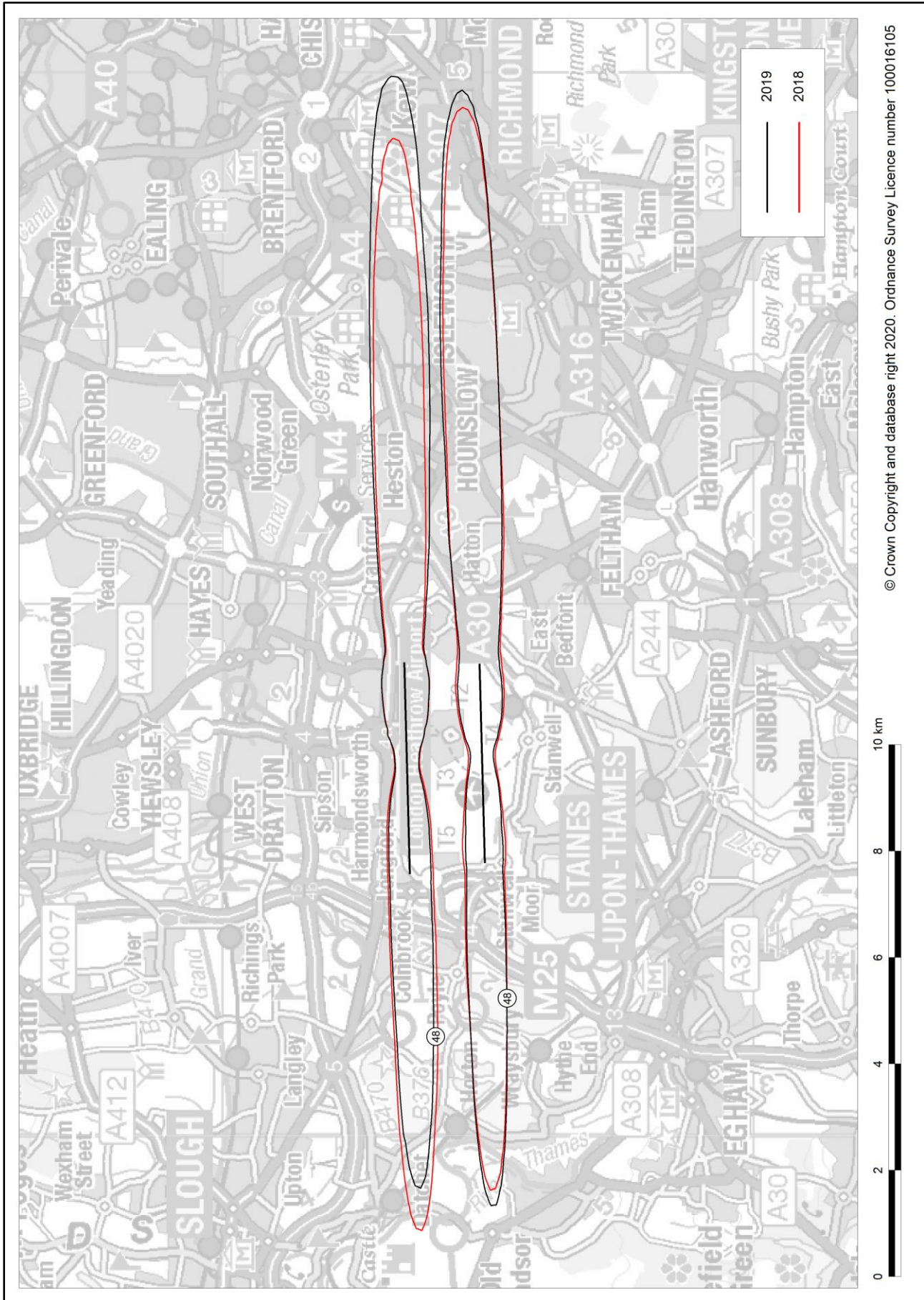
Note: 2018 L_{night} modal split was 64% W / 36% E; 2019 L_{night} modal split was 74% W / 26% E.

Figure B17 Heathrow 2019 and 2018 L_{den} noise contours



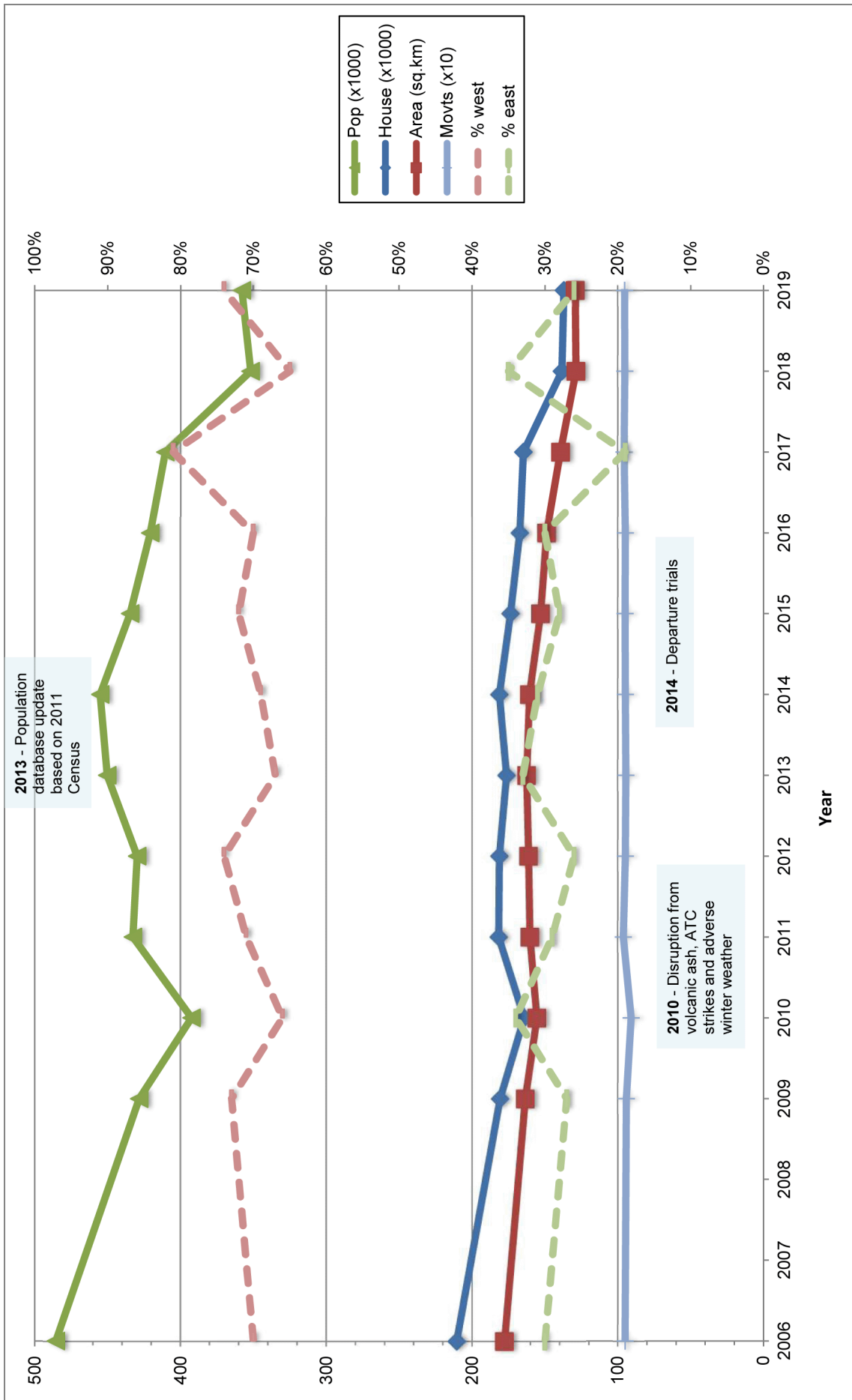
Note: 2018 L_{den} modal split was 65% W / 35% E; 2019 L_{den} modal split was 74% W / 26% E.

Figure B18 Heathrow 2019 and 2018 $L_{Aeq,6.5h}$ night noise contours



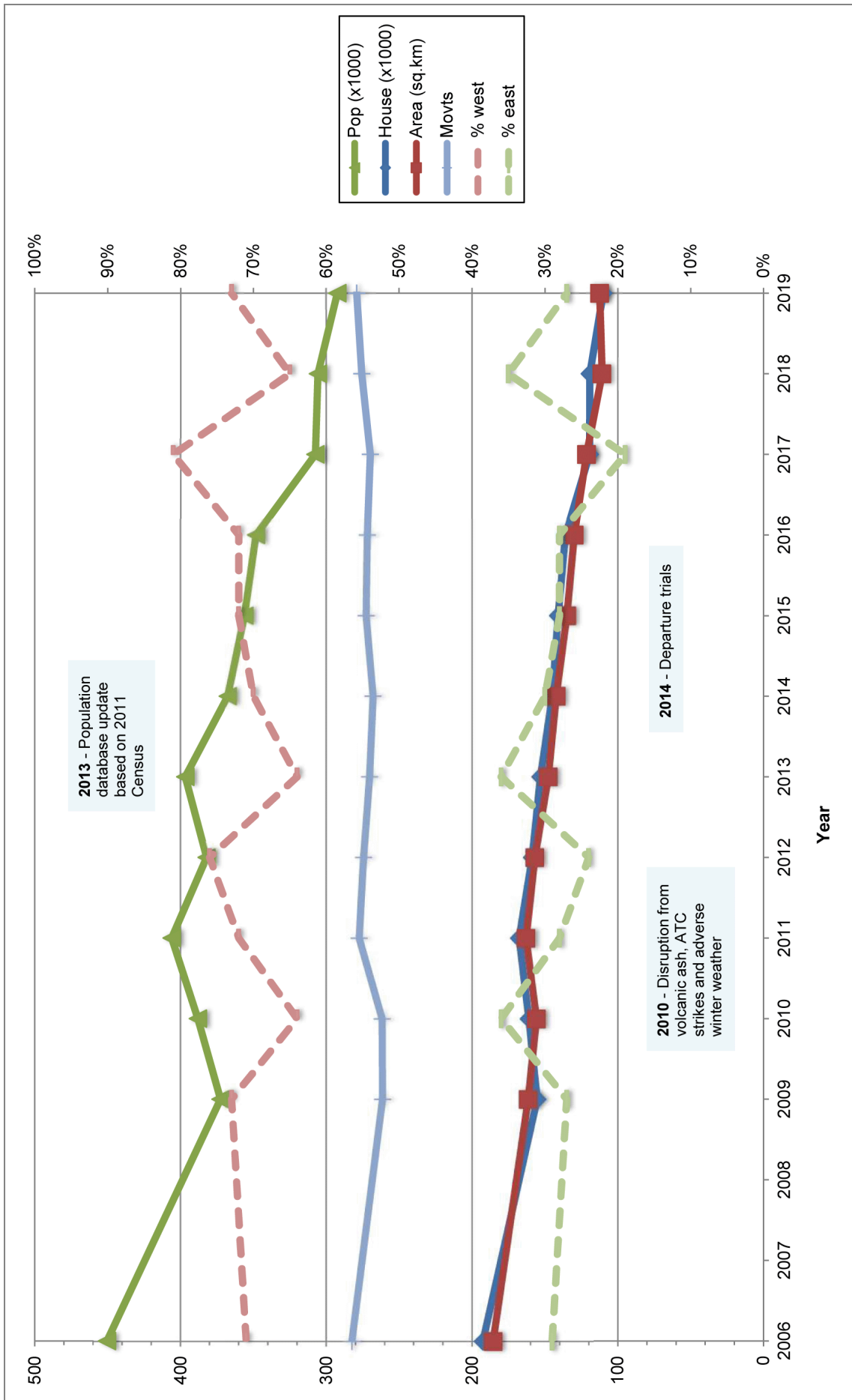
Note: 2018 $L_{Aeq,6.5h}$ night modal split was 69% W / 31% E; 2019 $L_{Aeq,6.5h}$ night modal split was 73% W / 27% E.

Figure B19 Heathrow 2006 to 2019 L_{day} 55 dB area, population and household trends



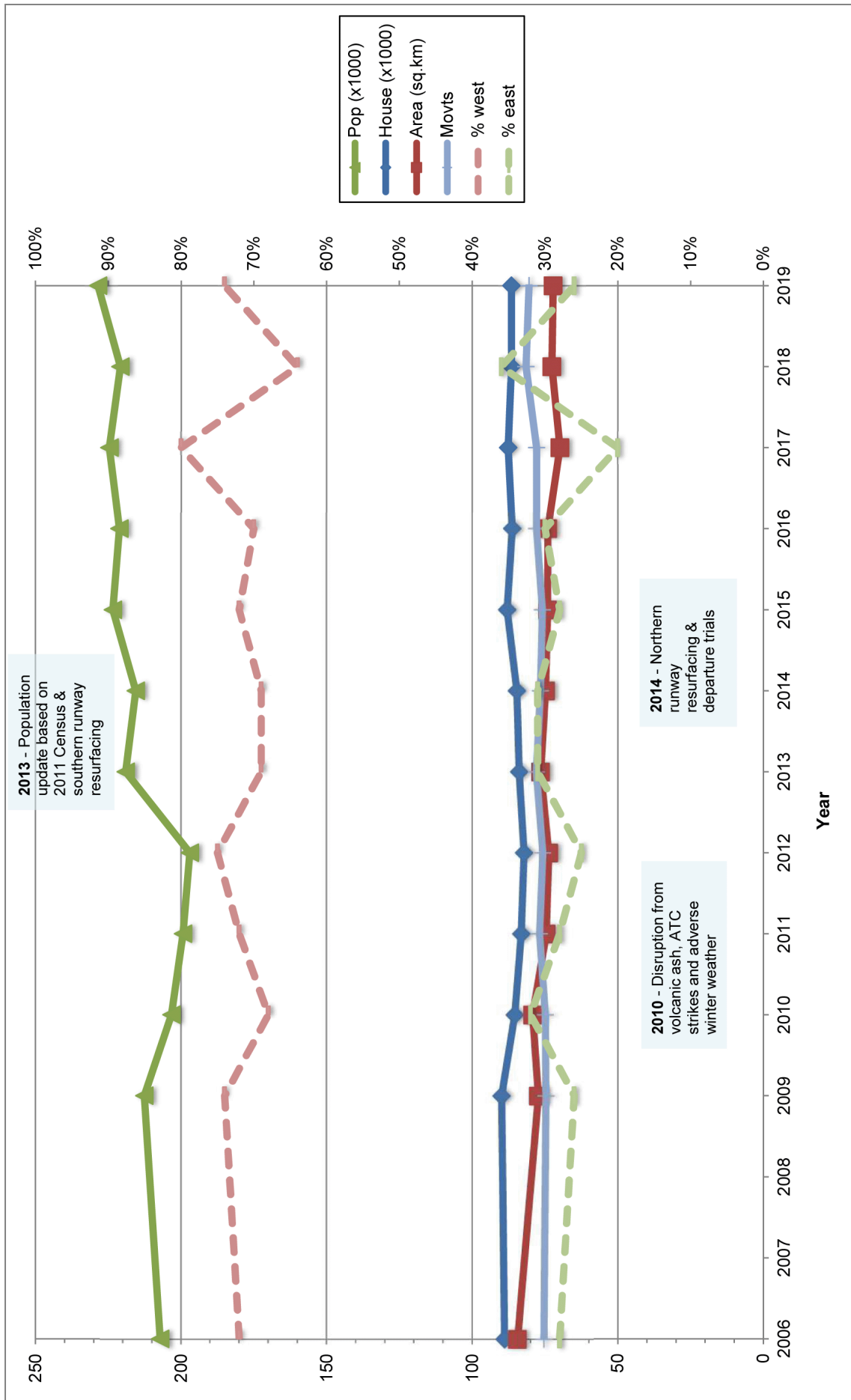
Note: There are no contour data for 2007 and 2008, and the lines joining the 2006 and 2009 data points are not meant to imply that the levels for 2007 and 2008 can be interpolated.

Figure B20 Heathrow 2006 to 2019 L_{evening} 55 dB area, population and household trends



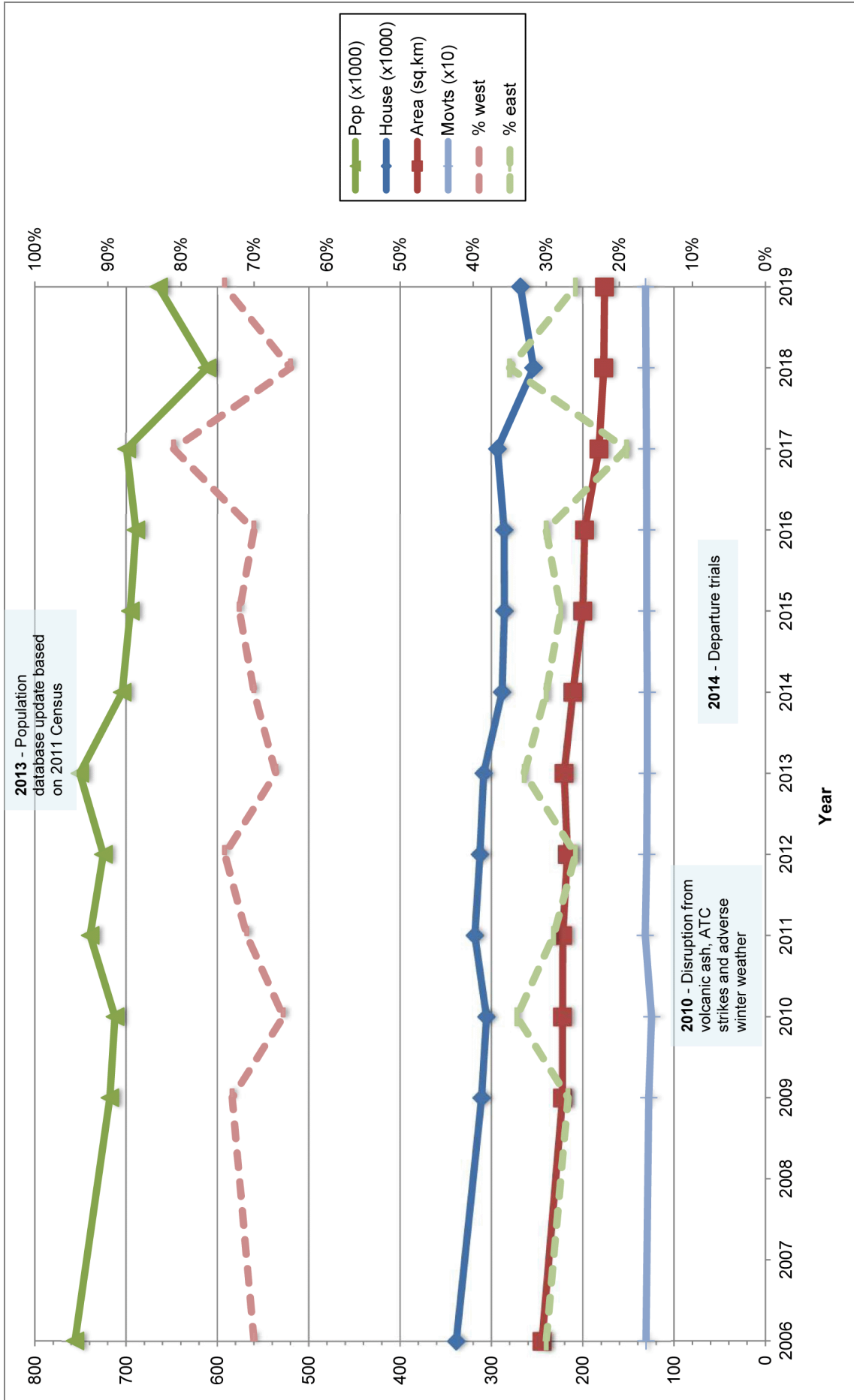
Note: There are no contour data for 2007 and 2008, and the lines joining the 2006 and 2009 data points are not meant to imply that the levels for 2007 and 2008 can be interpolated.

Figure B21 Heathrow 2006 to 2019 L_{night} 50 dB area, population and household trends



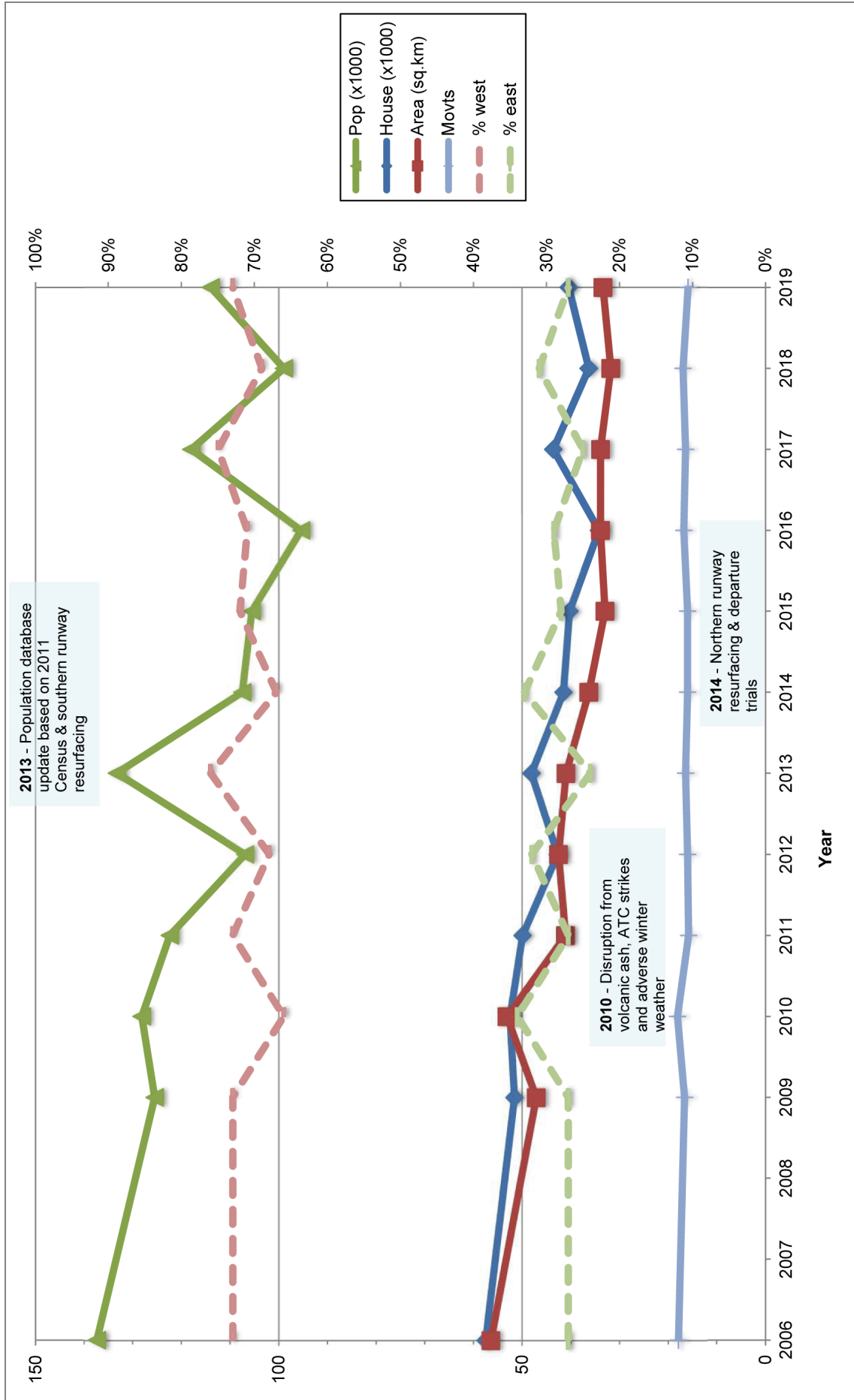
Note: There are no contour data for 2007 and 2008, and the lines joining the 2006 and 2009 data points are not meant to imply that the levels for 2007 and 2008 can be interpolated.

Figure B22 Heathrow 2006 to 2019 L_{den} 55 dB area, population and household trends



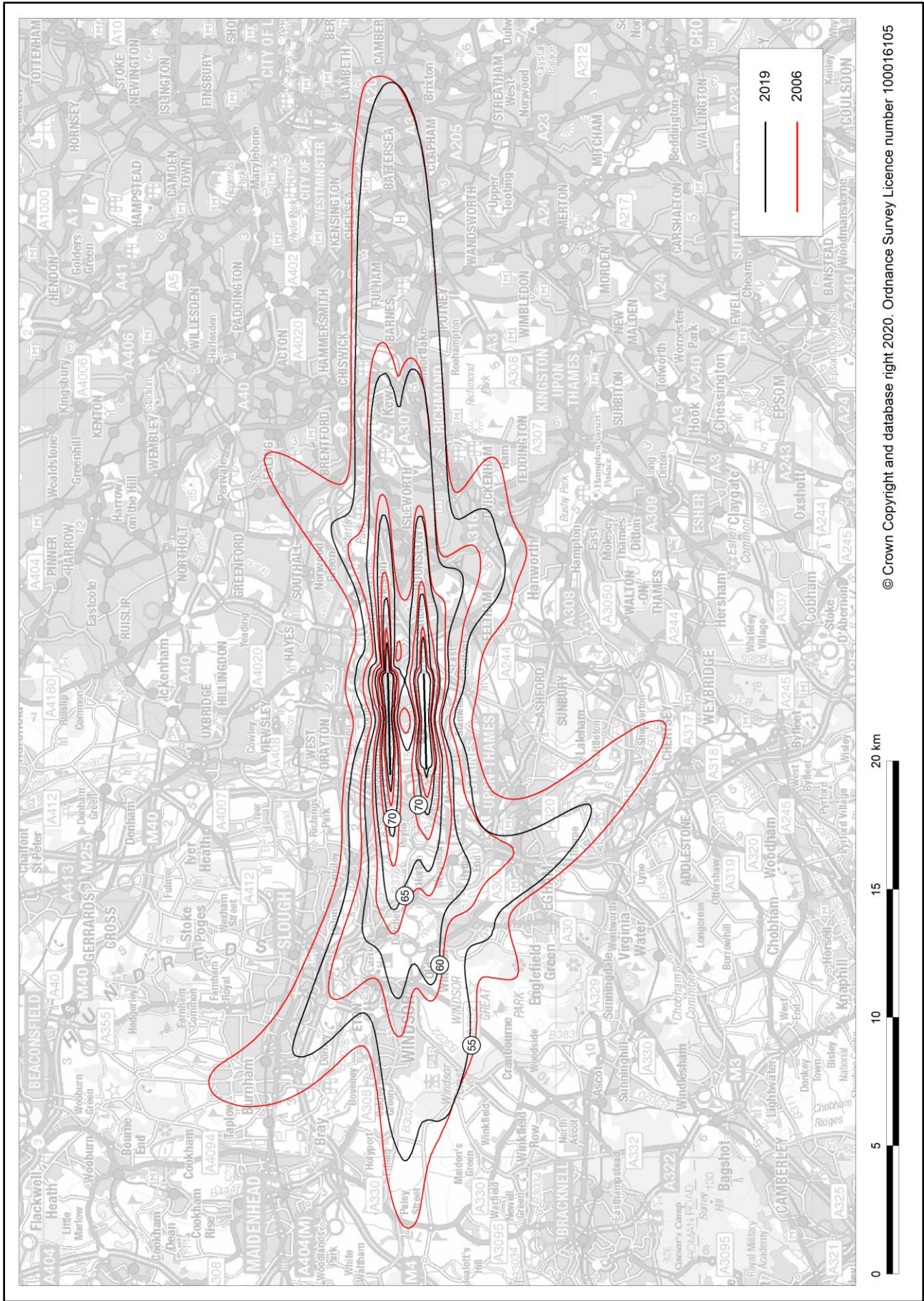
Note: There are no contour data for 2007 and 2008, and the lines joining the 2006 and 2009 data points are not meant to imply that the levels for 2007 and 2008 can be interpolated.

Figure B23 Heathrow 2006 to 2019 $L_{Aeq,6.5h}$ night 48 dB area, population and household trends



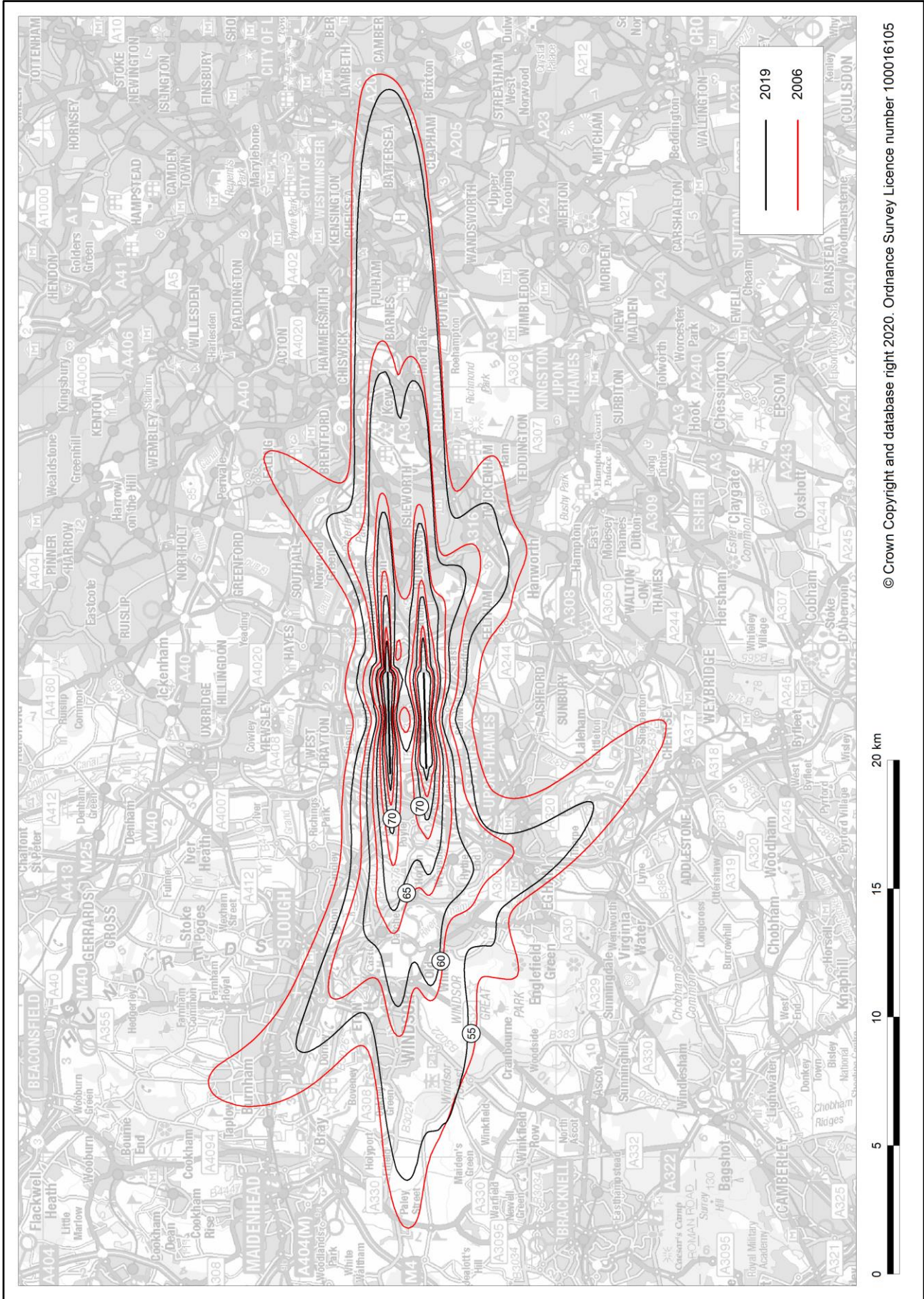
Note: There are no contour data for 2007 and 2008, and the lines joining the 2006 and 2009 data points are not meant to imply that the levels for 2007 and 2008 can be interpolated.

Figure B24 Heathrow 2019 and 2006 L_{den} noise contours



Note: 2006 L_{den} modal split was 70% W / 30% E; 2019 L_{den} modal split was 74% W / 26% E.

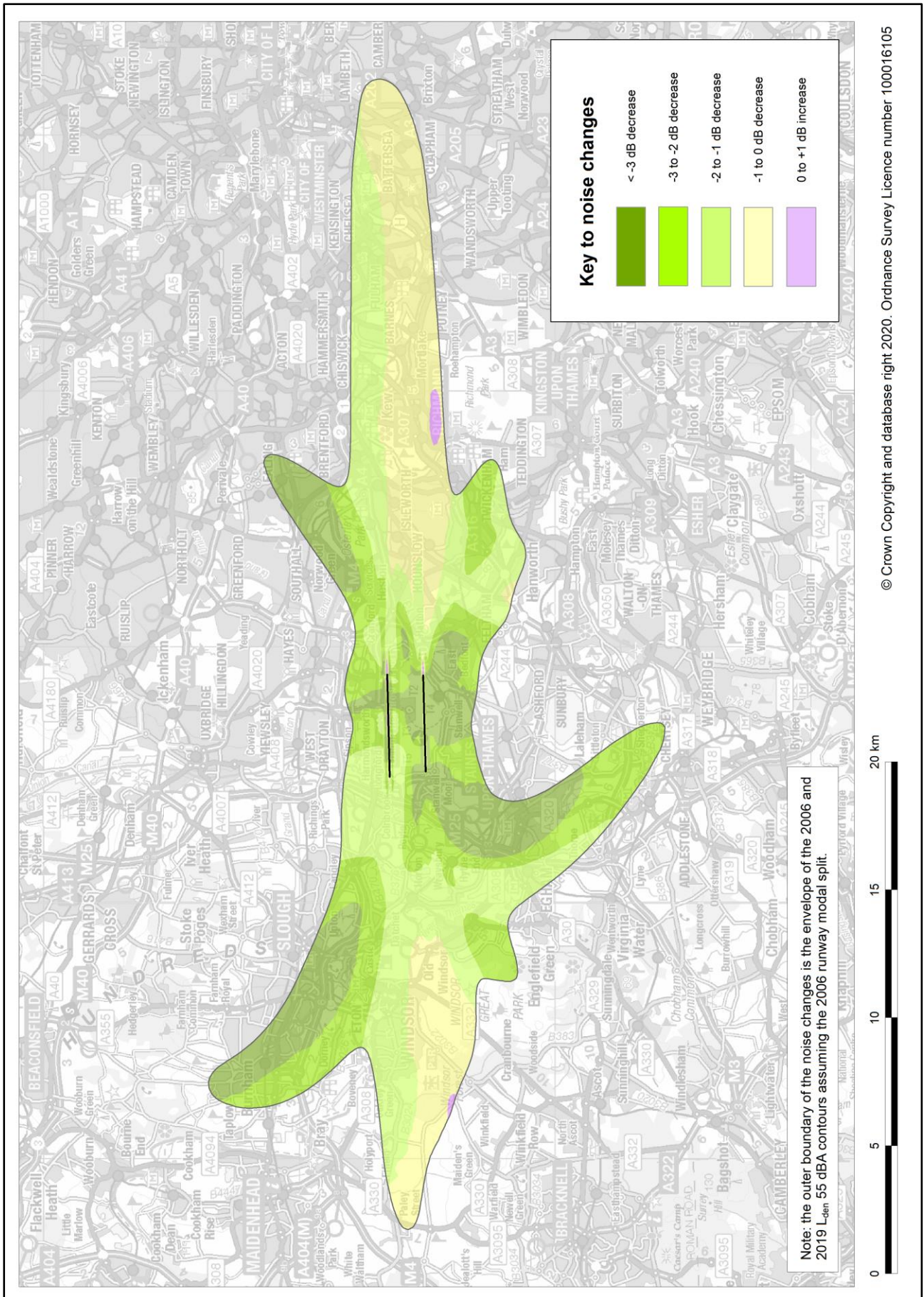
Figure B25 Heathrow 2019 and 2006 L_{den} noise contours (assuming 2006 runway modal split and 2006 N-S runway usage)



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Note: 2006 L_{den} modal split was 70% W / 30% E.

Figure B26 Heathrow noise change map for 2019 vs 2006 L_{den} (assuming 2006 runway modal split)



Note: 2006 L_{den} modal split was 70% W / 30% E.

Figure B27 Heathrow noise change map for 2019 vs 2006 L_{den} (assuming 2006 runway modal split and 2006 N-S runway usage)

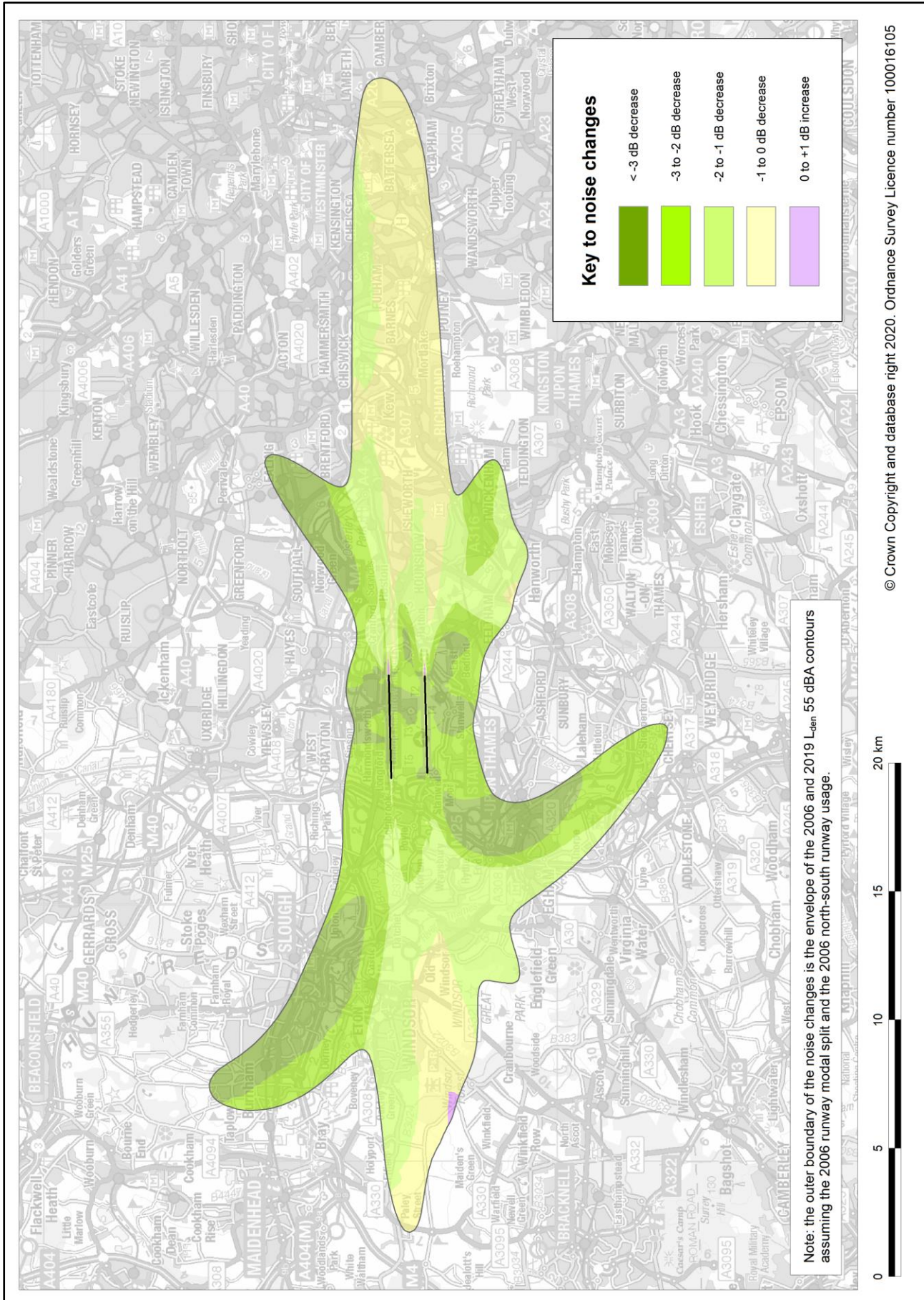
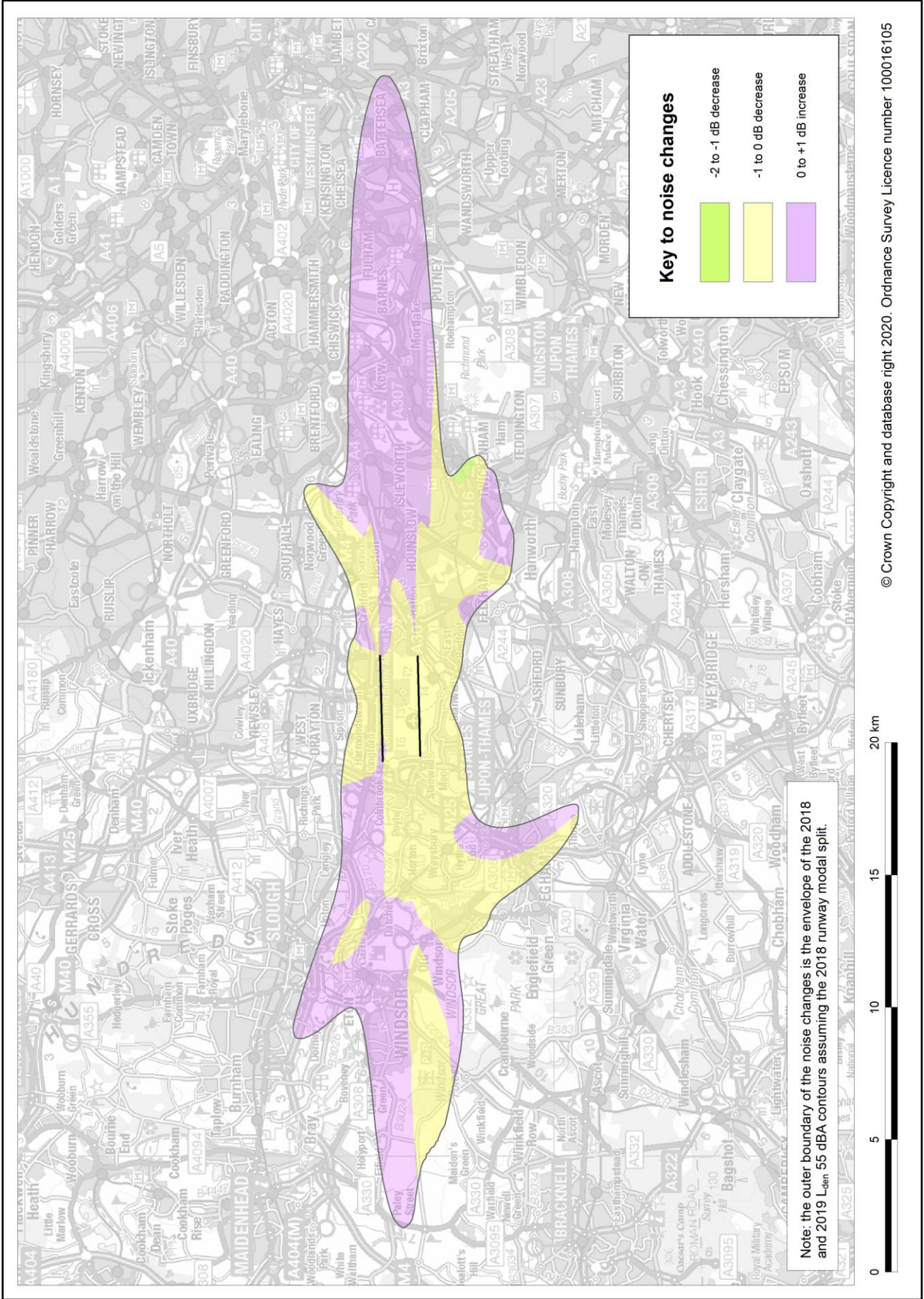


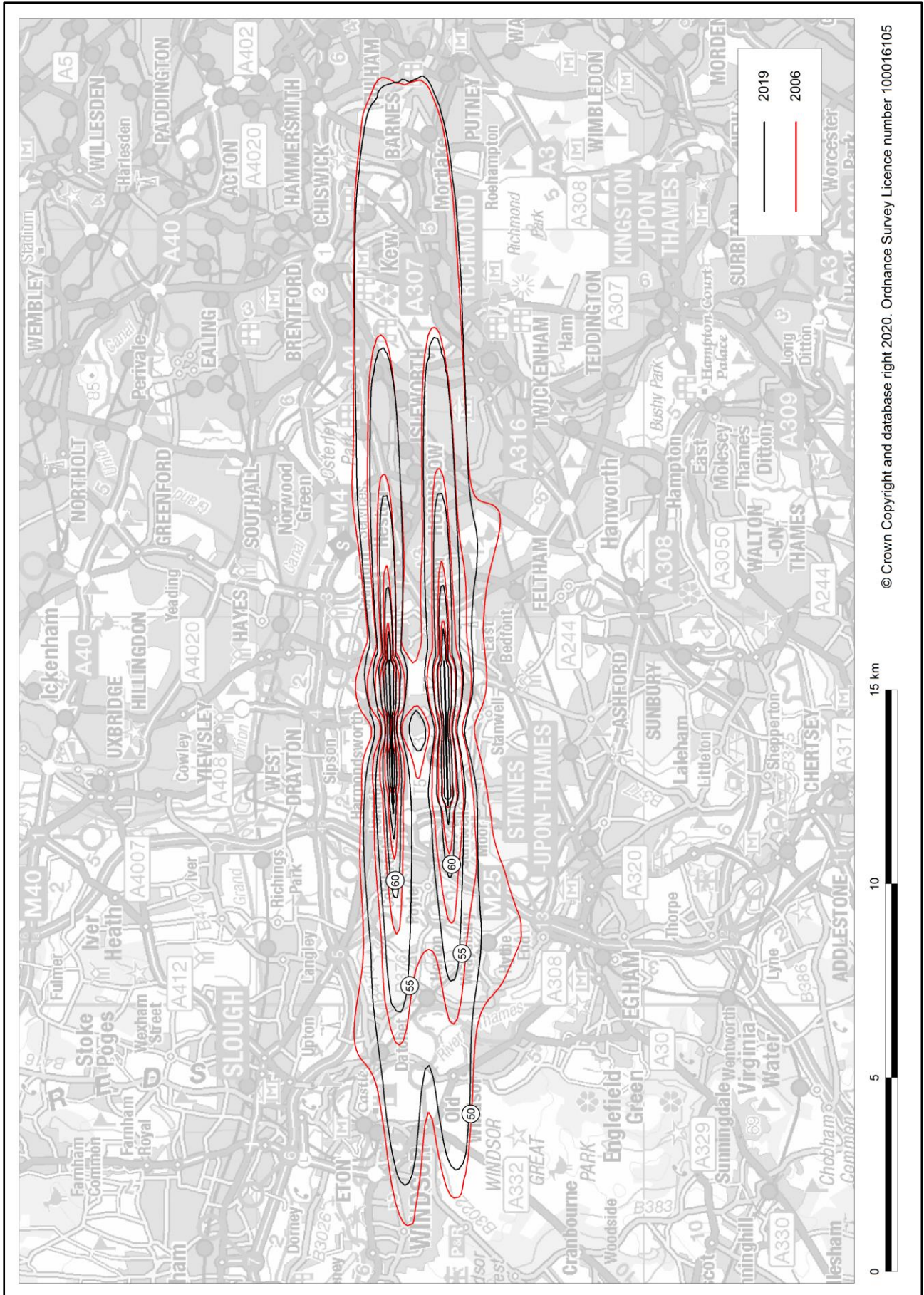
Figure B28 Heathrow noise change map for 2019 vs 2018 L_{den} (assuming 2018 runway modal split)



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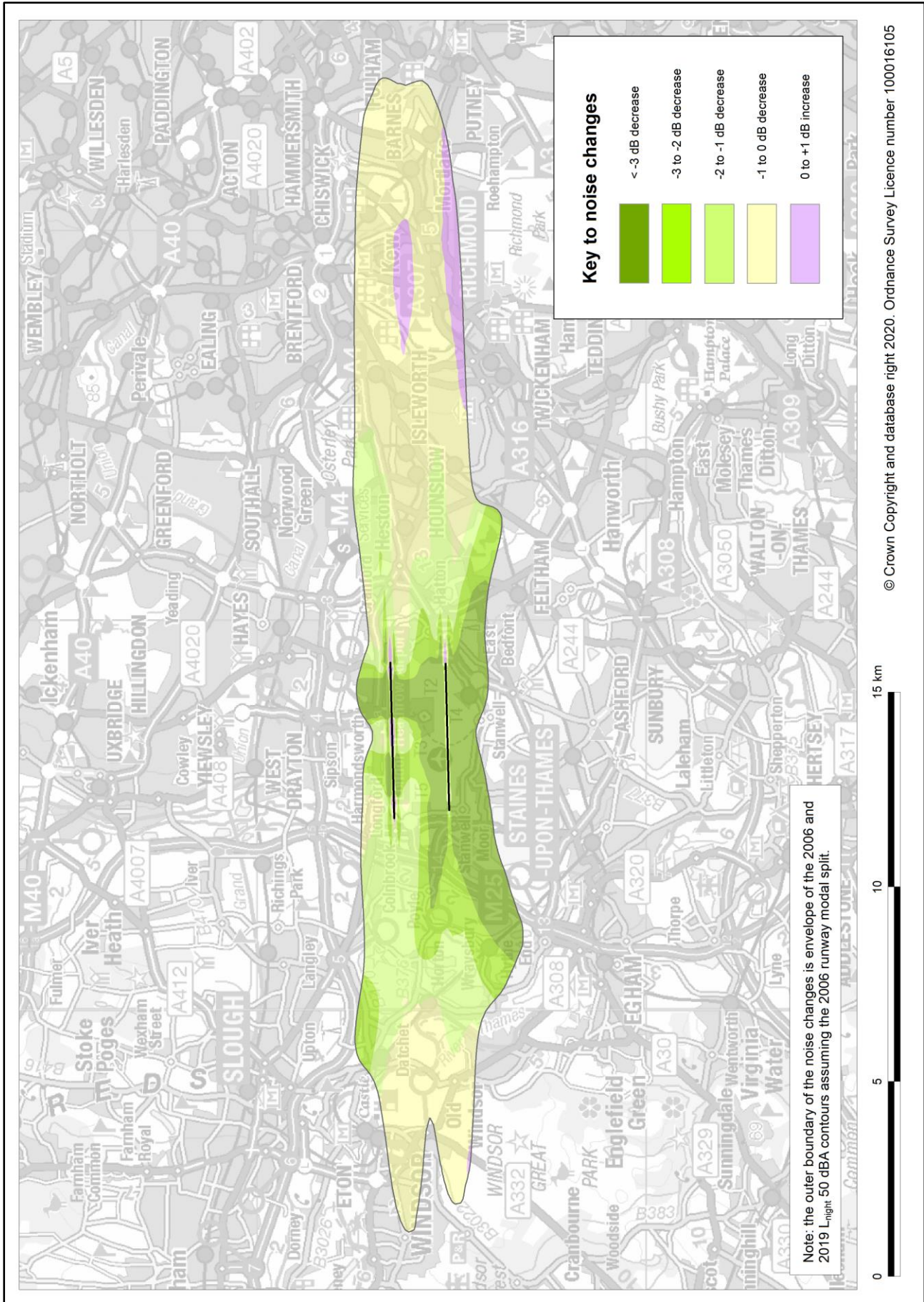
Note: 2018 L_{den} modal split was 65% W / 35% E.

Figure B29 Heathrow 2019 and 2006 L_{night} noise contours



Note: 2006 L_{night} modal split was 72% W / 28% E; 2019 L_{night} modal split was 74% W / 26% E.

Figure B30 Heathrow noise change map for 2019 vs 2006 L_{night} (assuming 2006 runway modal split)



Note: 2006 L_{night} modal split was 72% W / 28% E.

Figure B31 Heathrow noise change map for 2019 vs 2018 L_{night} (assuming 2018 runway modal split)

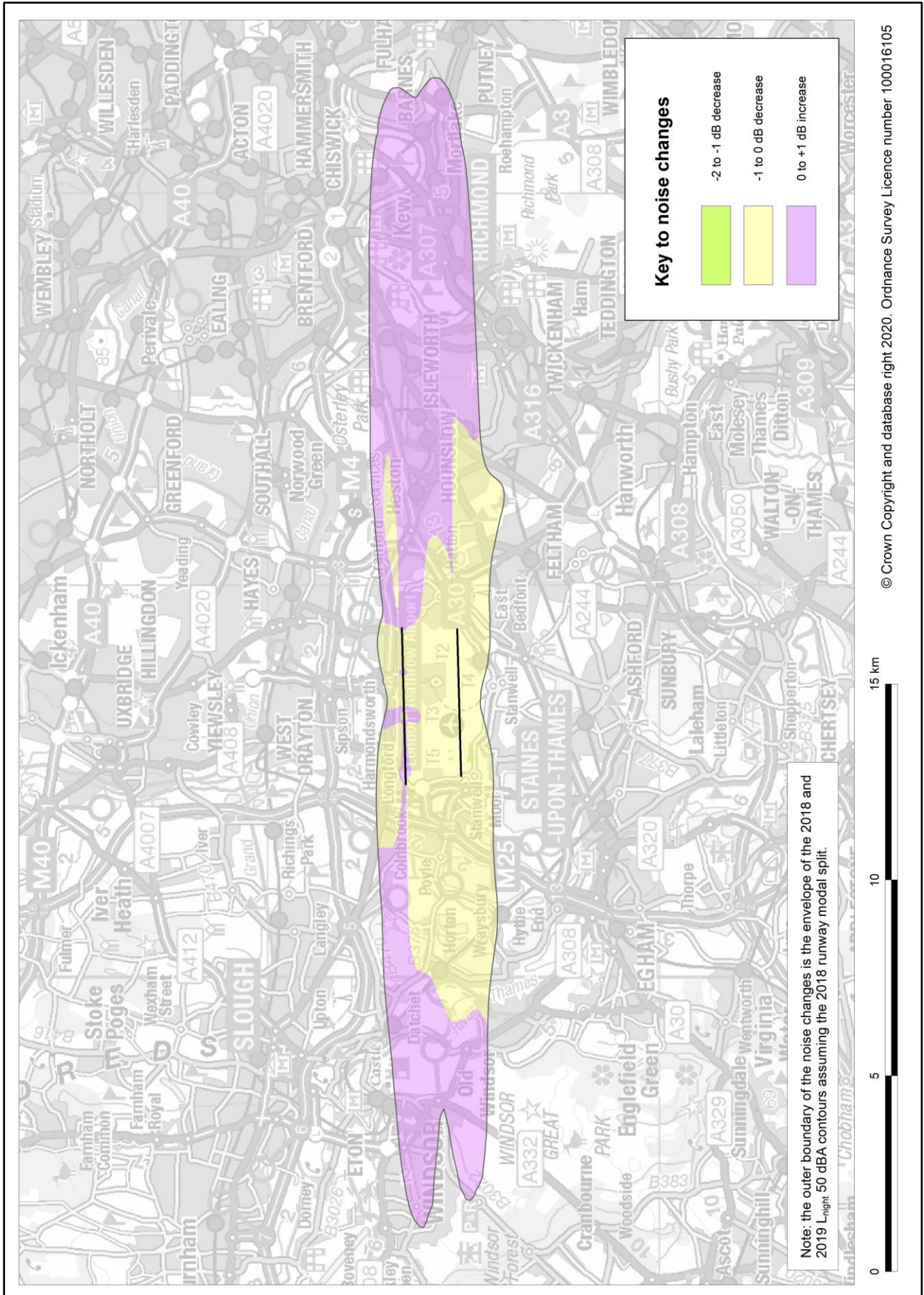
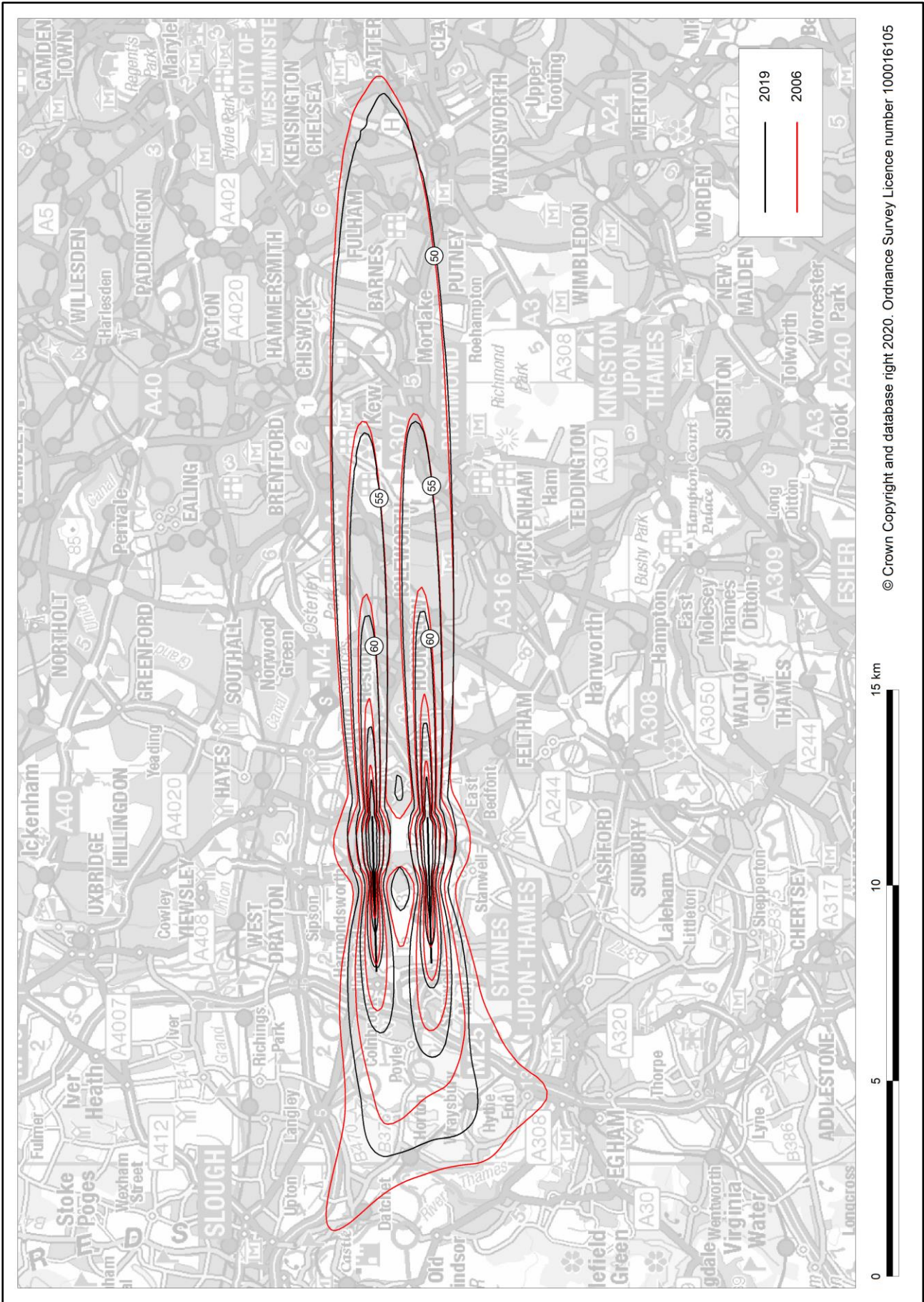


Figure B32 Heathrow 2019 and 2006 L_{night} 50-70 dB 100% W noise contours (assuming 2006 N-S runway usage)



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Figure B33 Heathrow 2019 and 2006 L_{night}: 50-70 dB 100% E noise contours (assuming 2006 N-S runway usage)

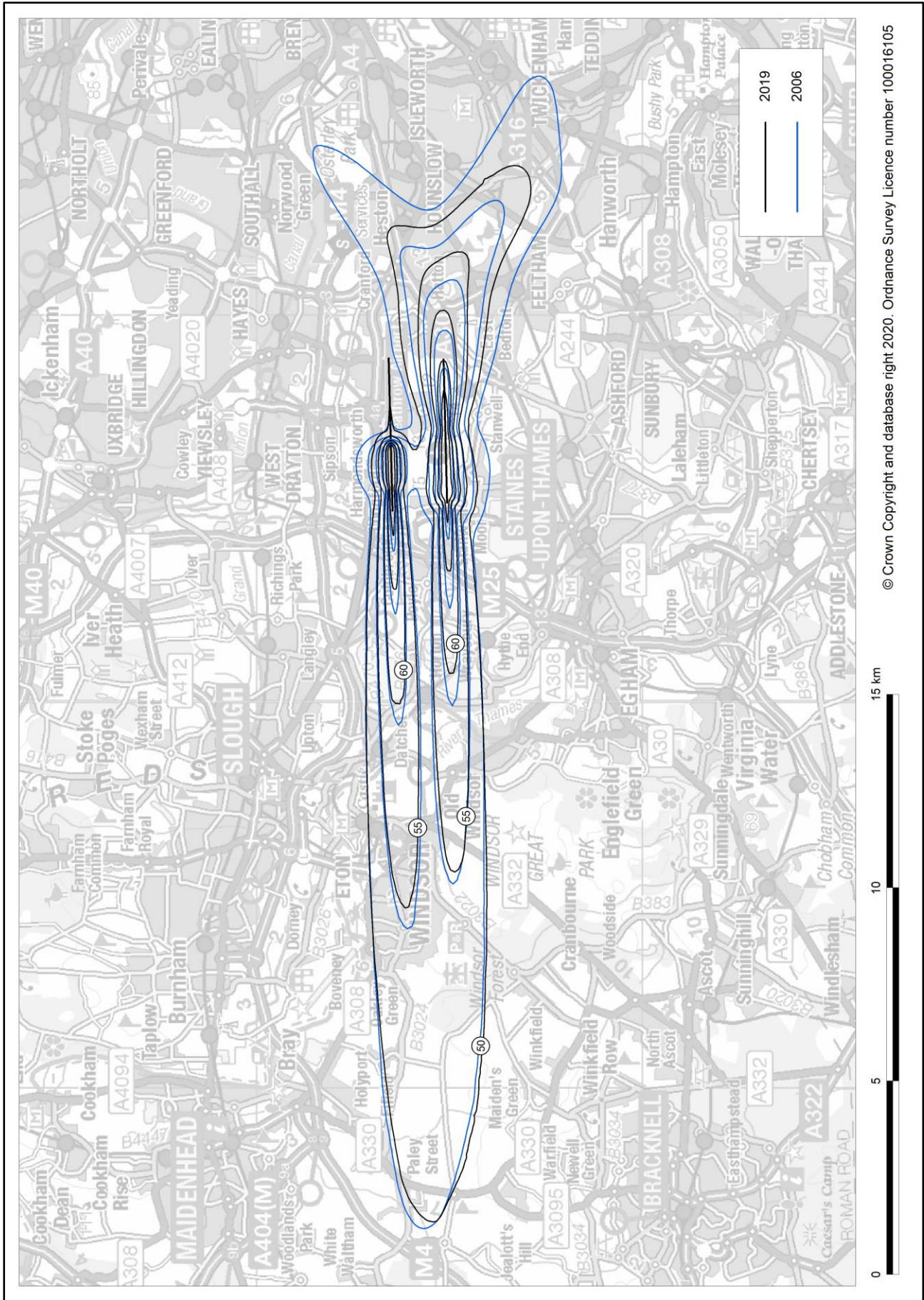
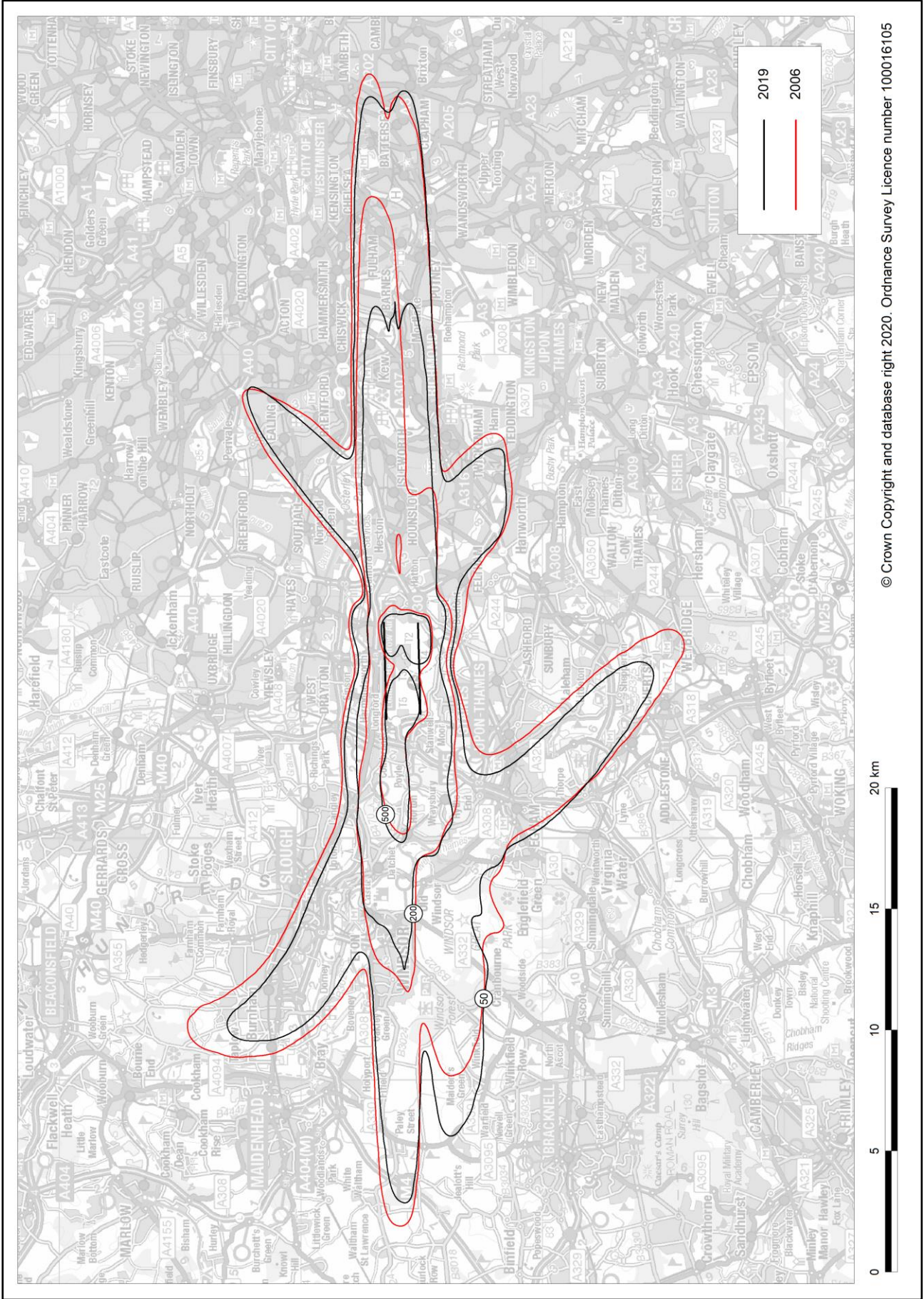
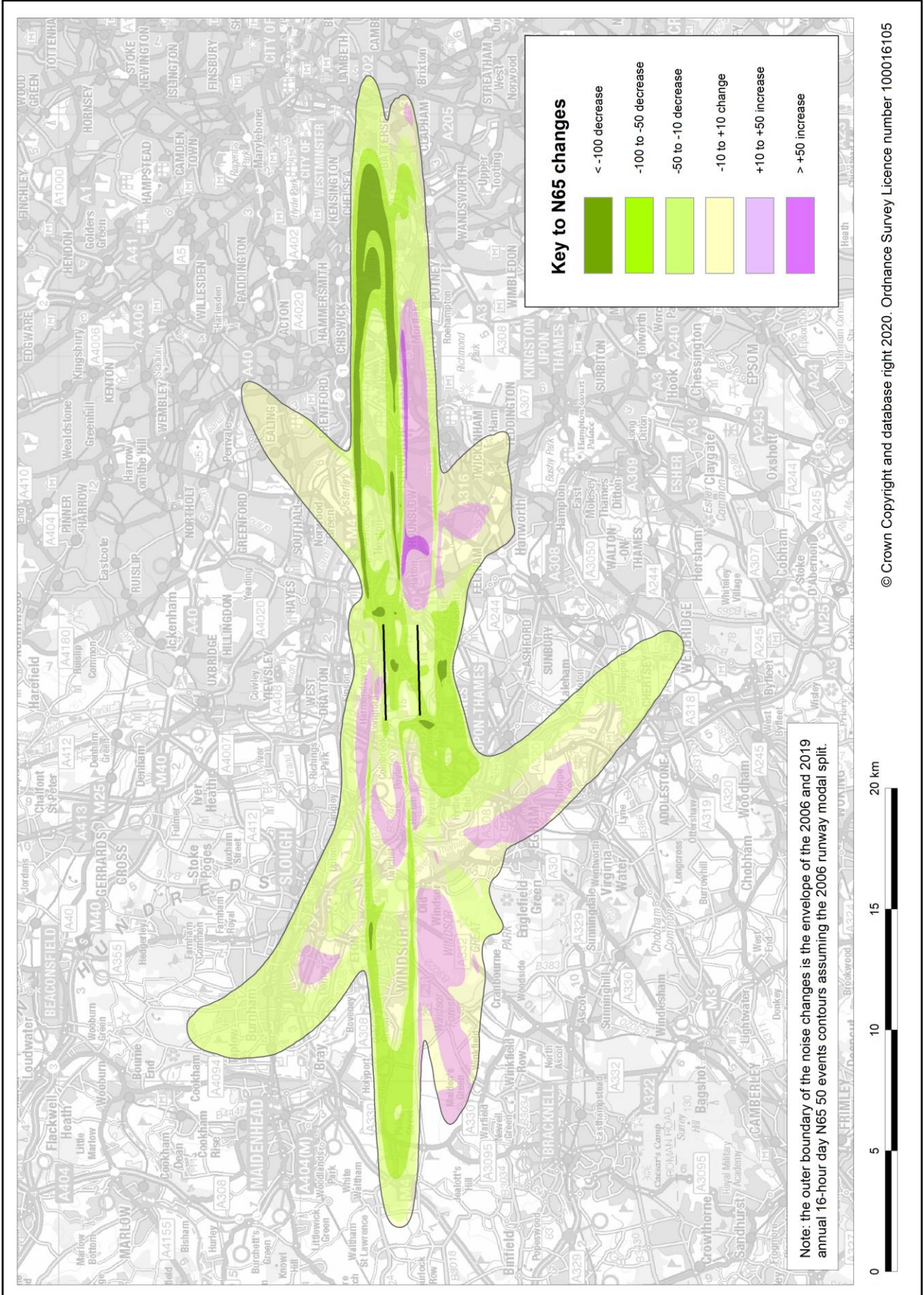


Figure B34 Heathrow 2019 and 2006 annual 16-hour day N65 contours



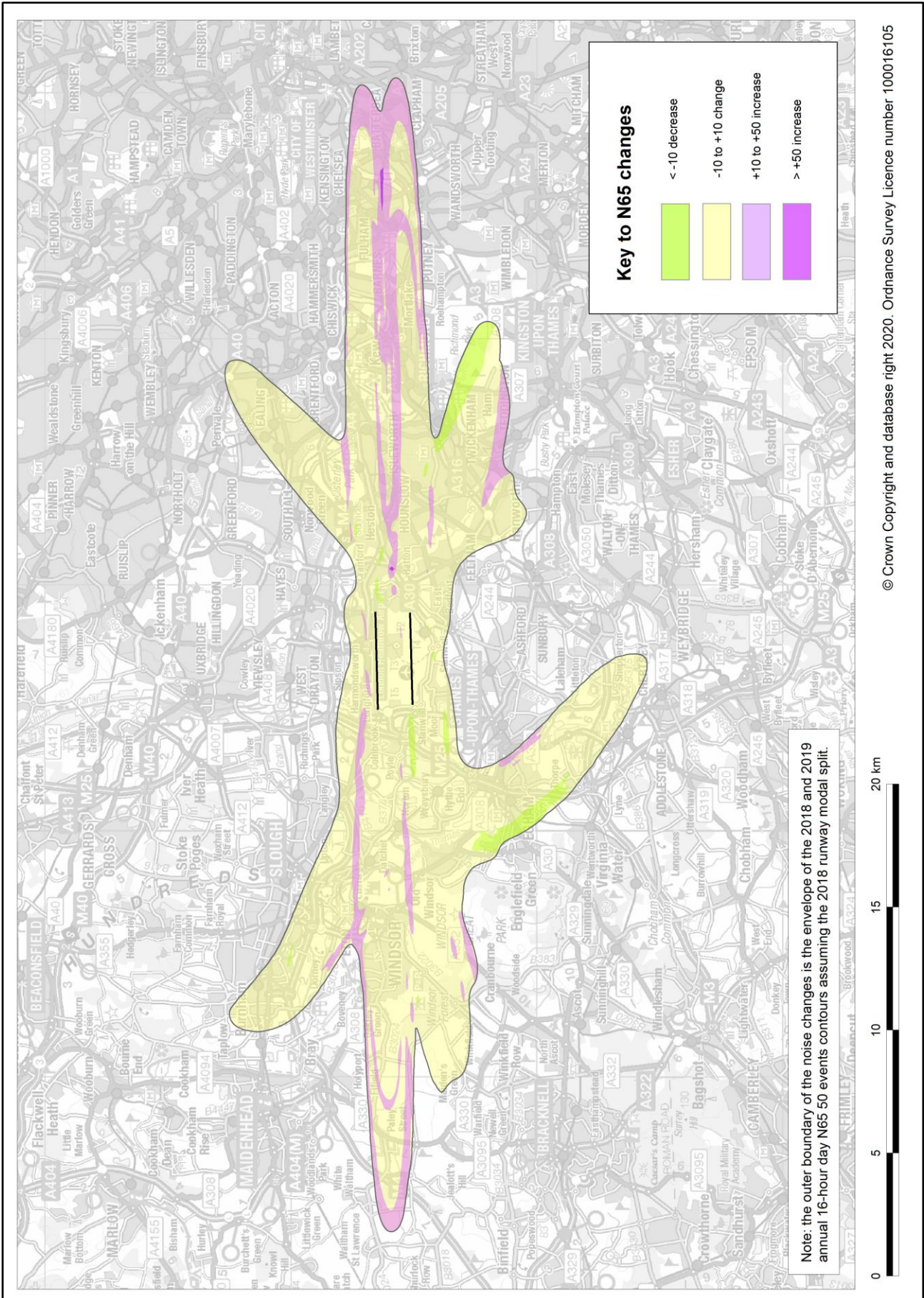
Note: 2006 annual 16-hour day modal split was 70% W / 30% E; 2019 annual 16-hour day modal split was 74% W / 26% E.

Figure B35 Heathrow change map for 2019 vs 2006 annual 16-hour day N65 (assuming 2006 runway modal split)



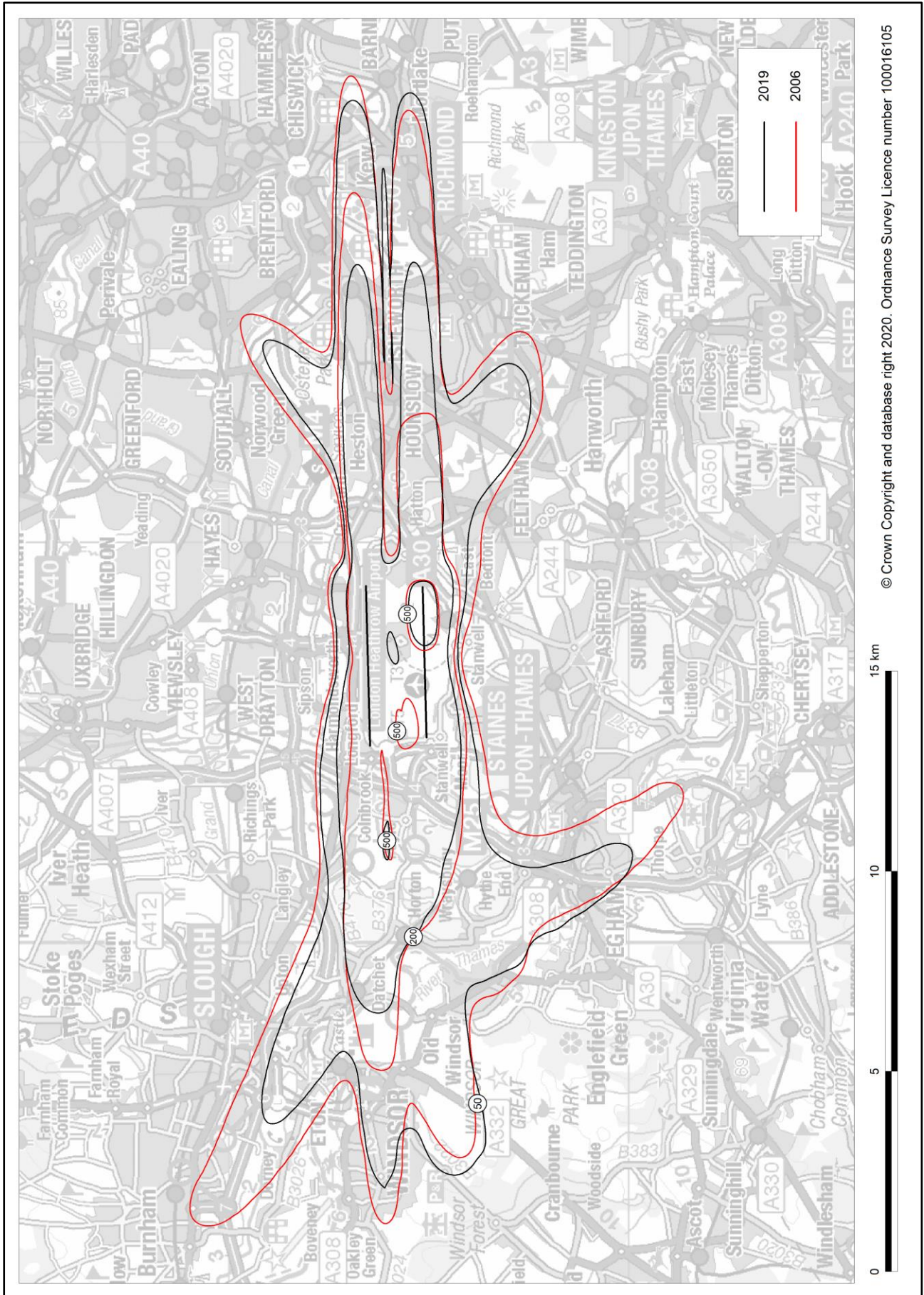
Note: 2006 annual 16-hour day modal split was 70% W / 30% E.

Figure B36 Heathrow change map for 2019 vs 2018 annual 16-hour day N65 (assuming 2018 runway modal split)



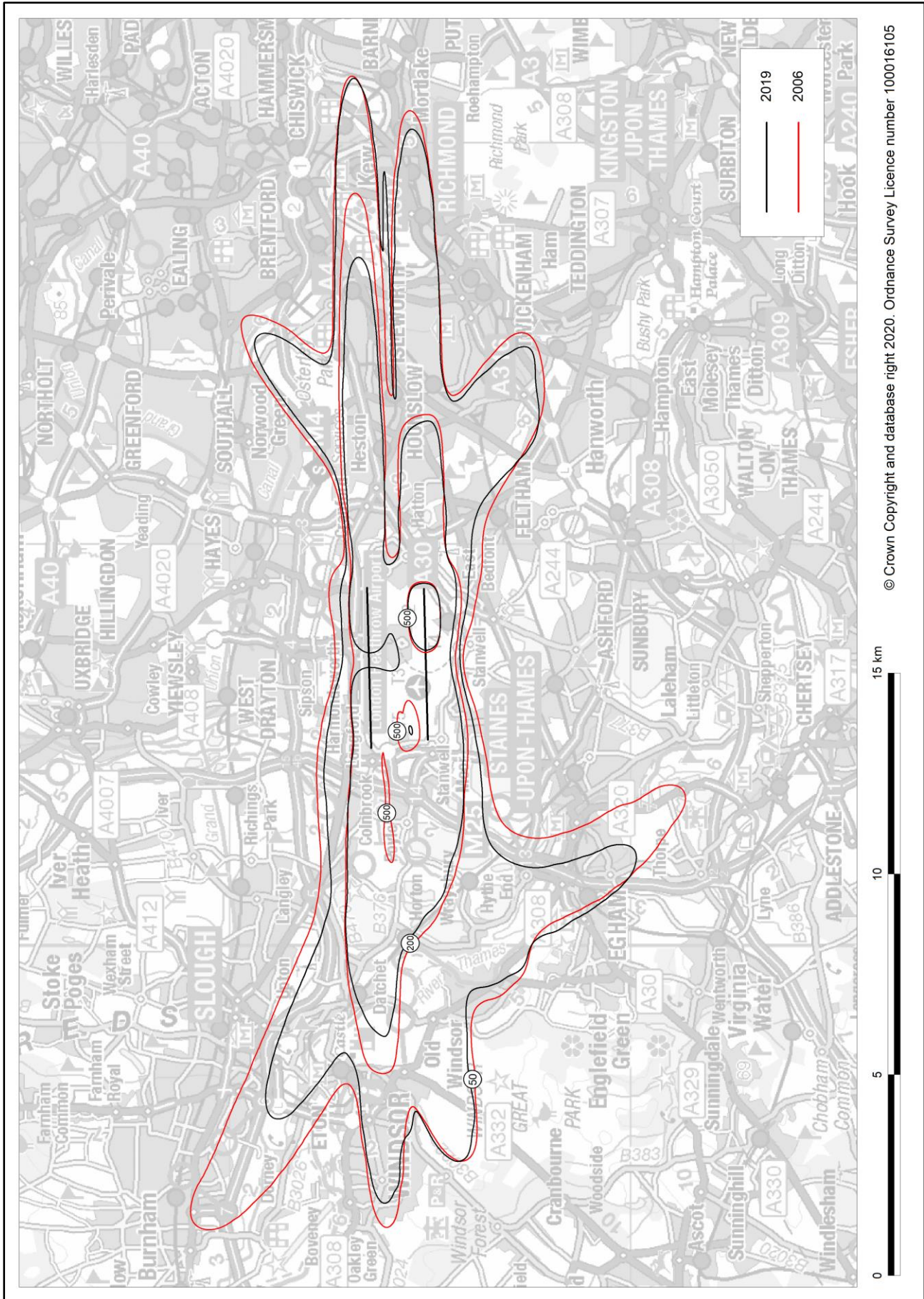
Note: 2018 annual 16-hour day modal split was 65% W / 35% E.

Figure B37 Heathrow 2019 and 2006 annual 16-hour day N70 contours



Note: 2006 annual 16-hour day modal split was 70% W / 30% E; 2019 annual 16-hour day modal split was 74% W / 26% E.

Figure B38 Heathrow 2019 and 2006 annual 16-hour day N70 contours (assuming 2006 modal split and 2006 N-S runway usage)



Note: 2006 annual 16-hour day modal split was 70% W / 30% E.

Figure B39 Heathrow change map for 2019 vs 2006 annual 16-hour day N70 (assuming 2006 runway modal split)

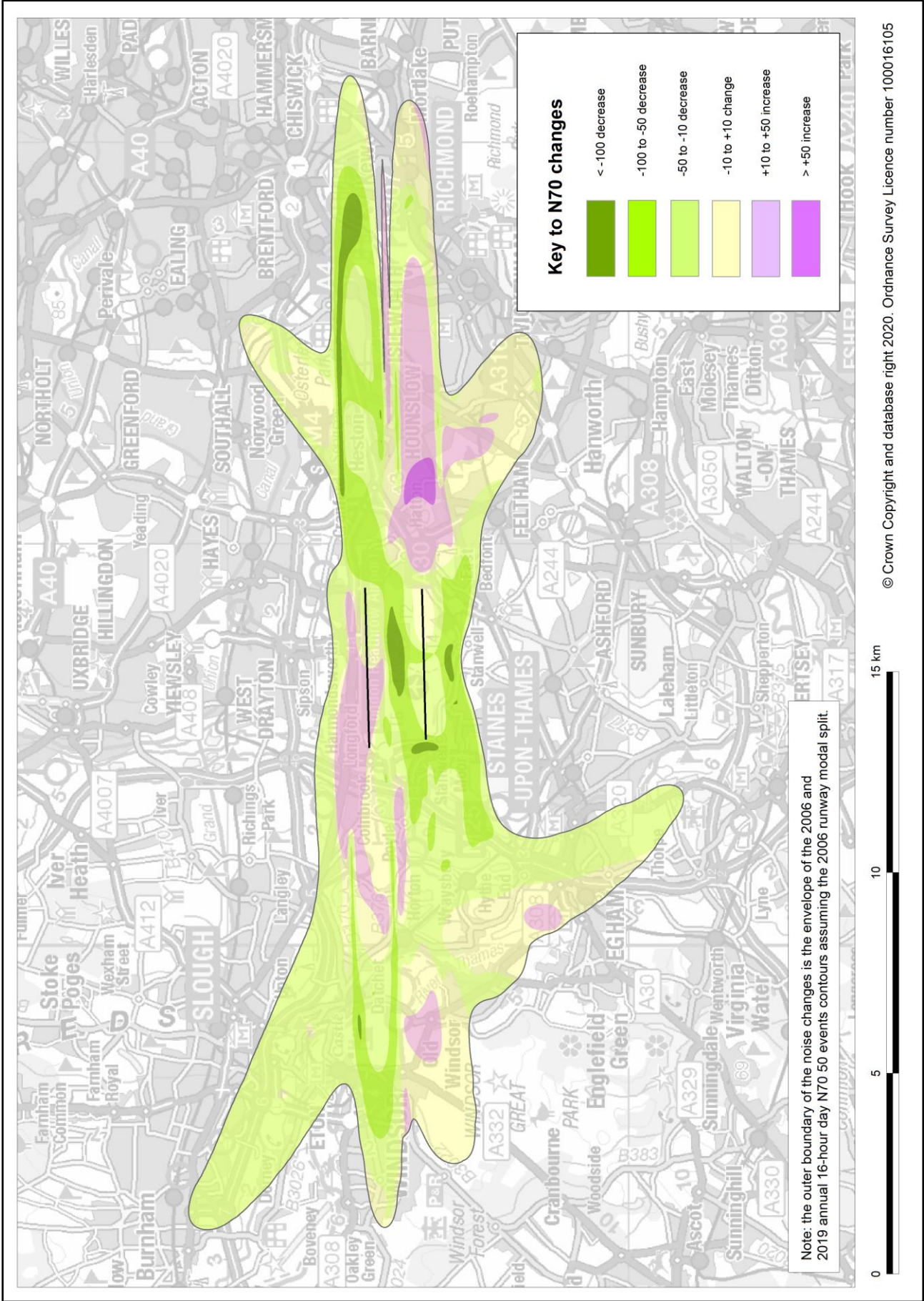
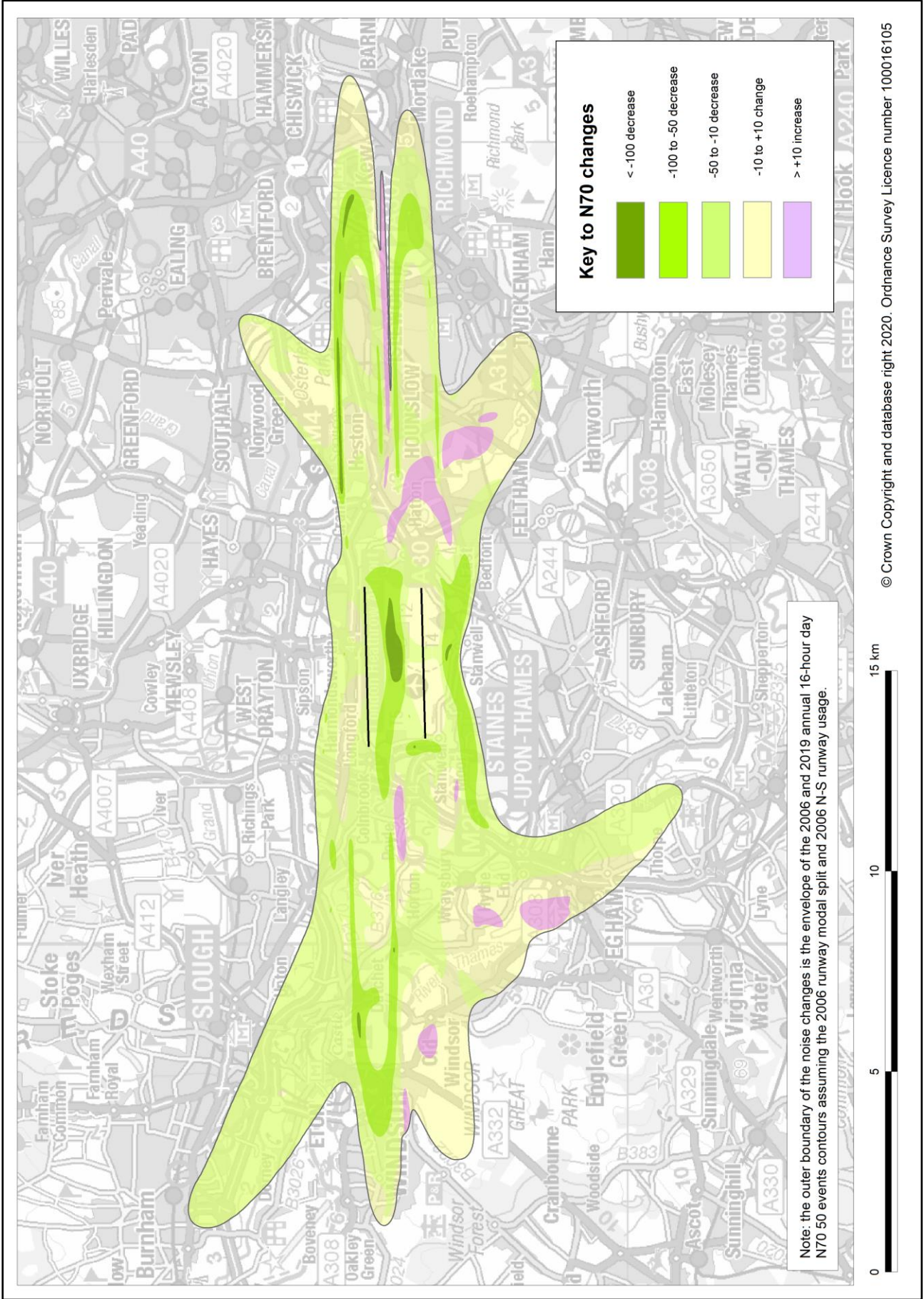
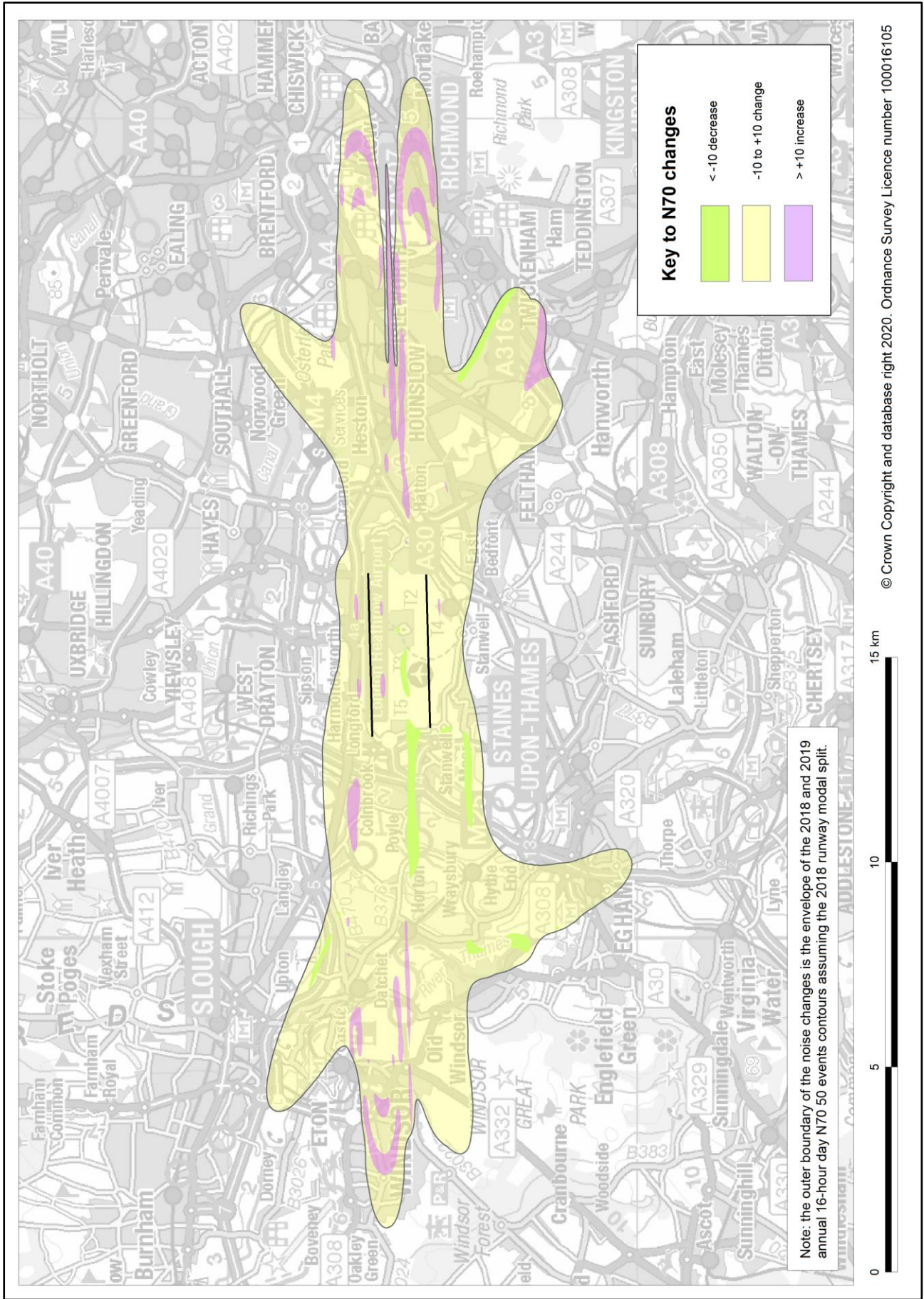


Figure B40 Heathrow change map for 2019 vs 2006 annual 16-hour day N70 (with 2006 runway modal split and 2006 N-S runway usage)



Note: 2006 annual 16-hour day modal split was 70% W / 30% E.

Figure B41 Heathrow change map for 2019 vs 2018 annual 16-hour day N70 (assuming 2018 runway modal split)



Note: 2018 annual 16-hour day modal split was 65% W / 35% E.

Figure B42 Heathrow 2019 and 2006 annual 16-hour day N70 100% W contours (assuming 2006 N-S runway usage)

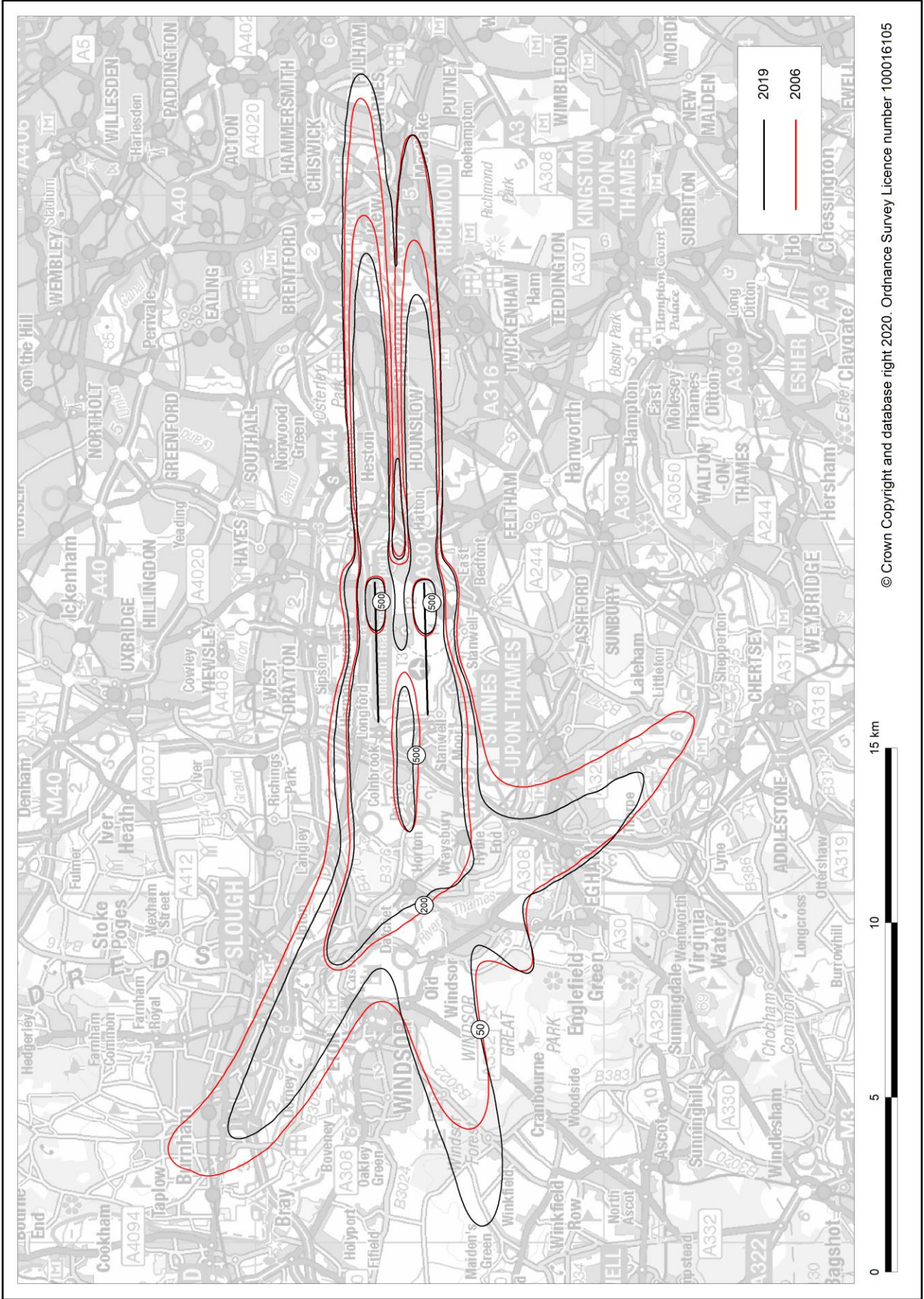


Figure B43 Heathrow 2019 and 2006 annual 16-hour day N70 100% E contours (assuming 2006 N-S runway usage)

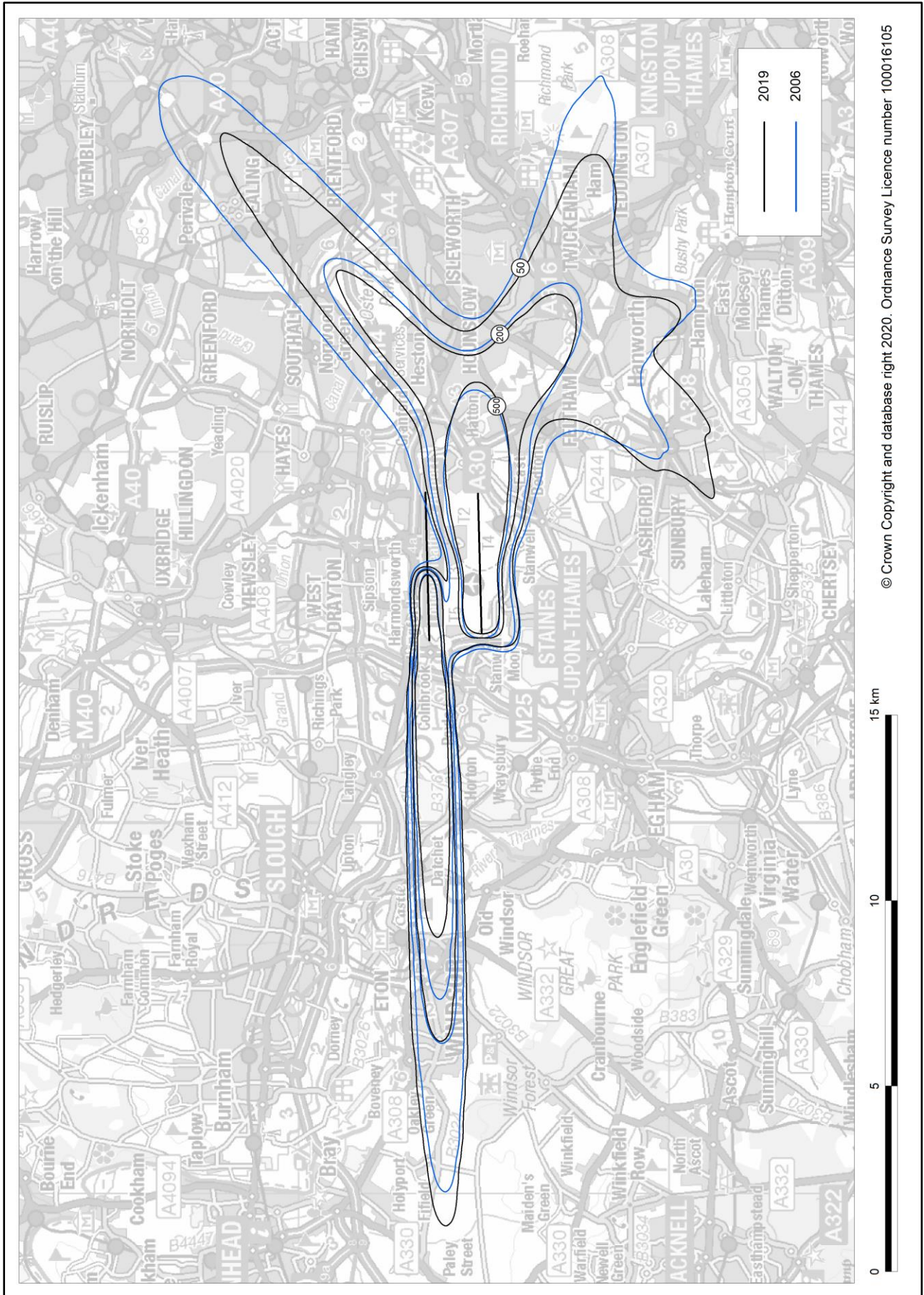
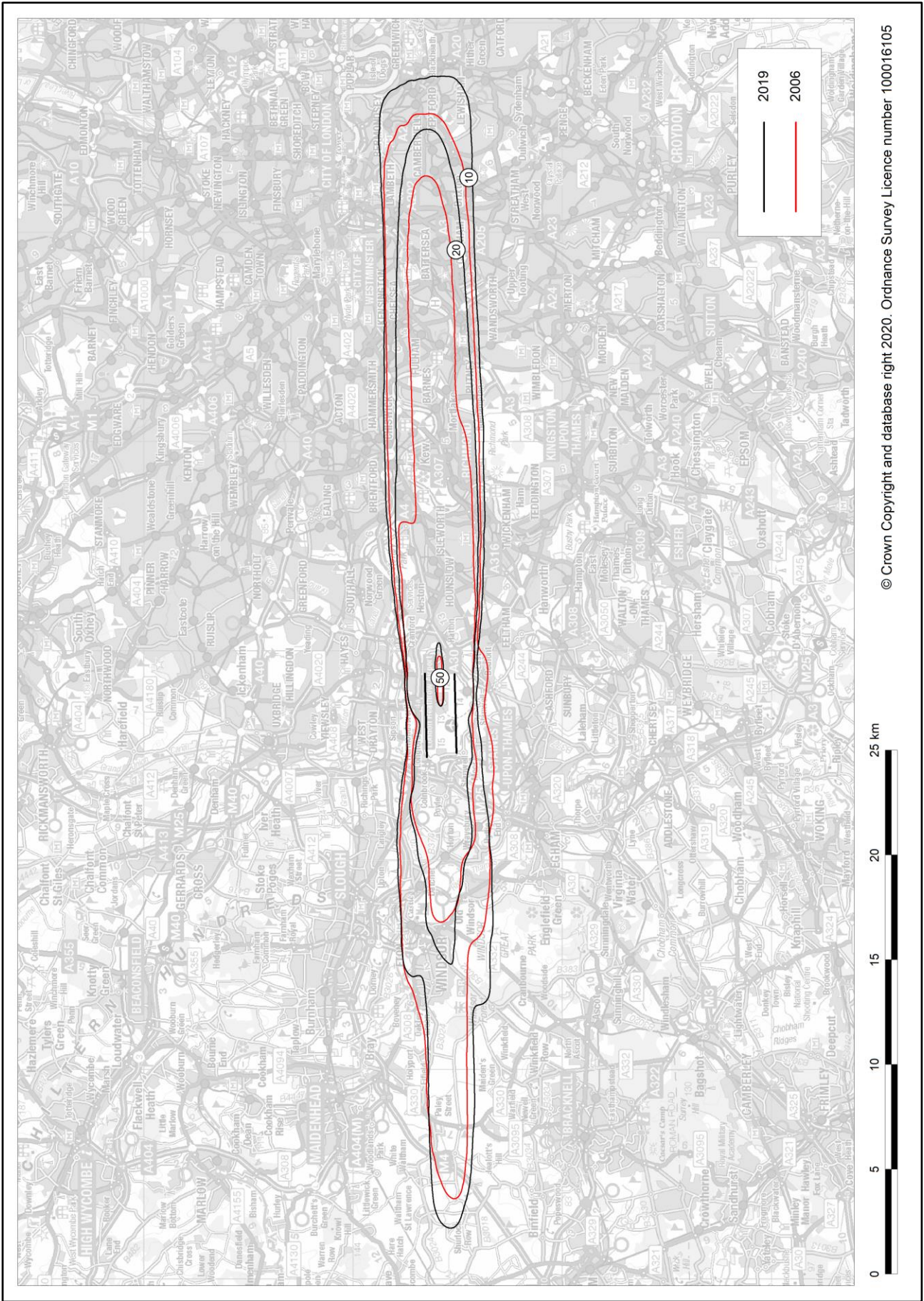
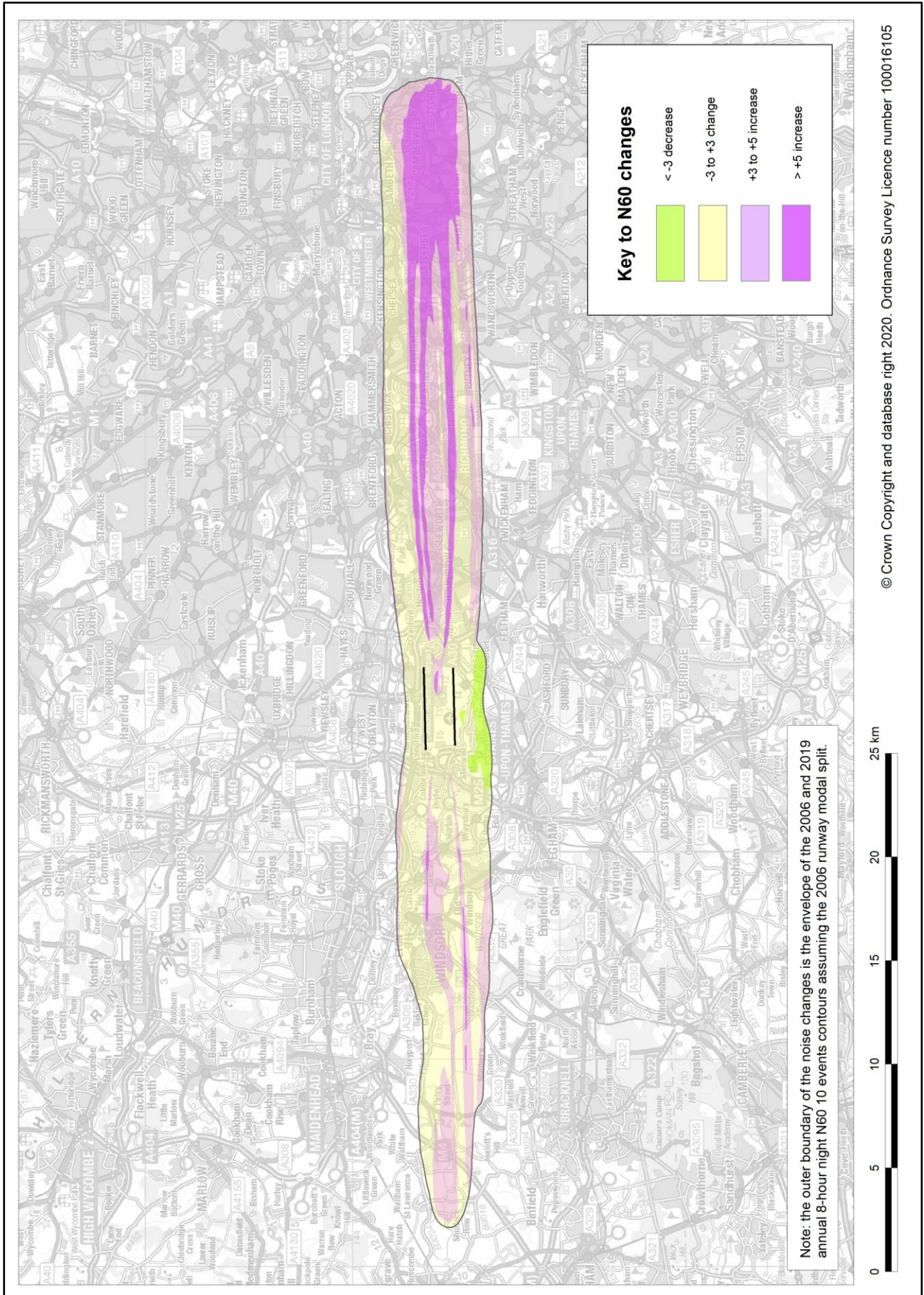


Figure B44 Heathrow 2019 and 2006 annual 8-hour night N60 contours



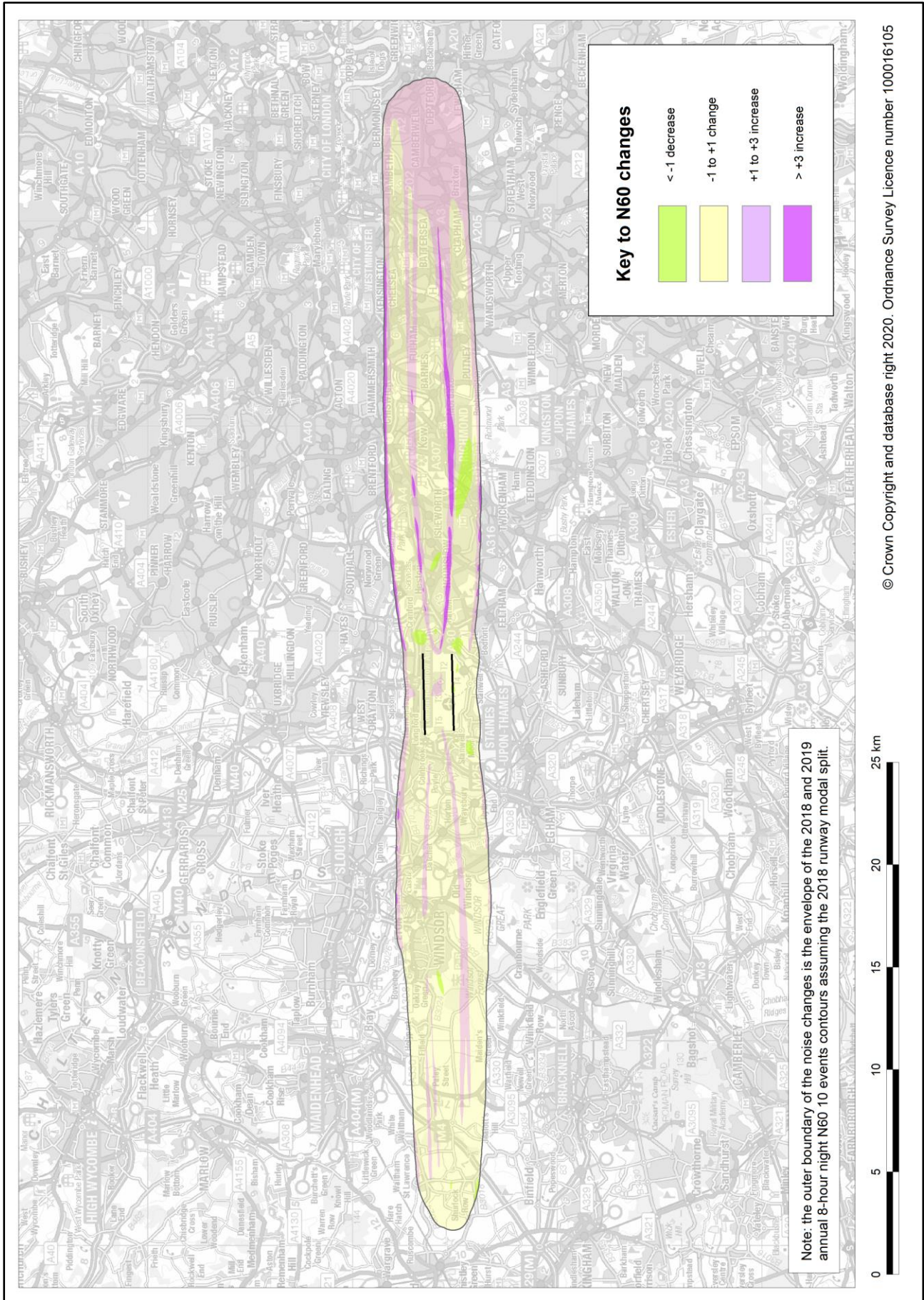
Note: 2006 annual 8-hour night modal split was 72% W / 28% E; 2019 annual 8-hour night modal split was 74% W / 26% E.

Figure B45 Heathrow change map for 2019 vs 2006 annual 8-hour night N60 (assuming 2006 runway modal split)



Note: 2006 annual 8-hour night modal split was 72% W / 28% E.

Figure B46 Heathrow change map for 2019 vs 2018 annual 8-hour night N60 (assuming 2018 runway modal split)



Note: 2018 annual 8-hour night modal split was 64% W / 36% E.

APPENDIX C

Tables

Table C1 Heathrow 2018 and 2019 average summer 16-hour day traffic movements by ANCON type

ANCON type	2018 departs	2018 arrivals	2018 total	2019 departs	2019 arrivals	2019 total	Change departs	Change arrivals	Change total
B733	0.0	0.0	0.0	0.3	0.3	0.5	+0.3	+0.3	+0.5
B736	6.1	6.4	12.5	3.2	3.4	6.6	-2.9	-3.0	-5.9
B738	7.6	8.4	16.0	7.8	8.7	16.5	+0.2	+0.3	+0.5
B738MAX	4.0	4.6	8.6	0.0	0.0	0.0	-4.0	-4.6	-8.6
B744G	0.2	0.2	0.4	0.1	0.1	0.2	-0.1	-0.1	-0.2
B744P	0.5	0.6	1.2	0.4	0.5	0.9	-0.1	-0.2	-0.3
B744R	26.7	16.5	43.2	24.7	15.1	39.8	-2.0	-1.4	-3.4
B748	0.6	0.6	1.2	0.4	0.4	0.8	-0.2	-0.2	-0.4
B753	0.0	0.0	0.1	0.1	0.1	0.2	0.0	0.0	+0.1
B757C	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.0
B757E	3.6	3.3	6.9	3.0	3.0	6.0	-0.7	-0.3	-1.0
B757P	0.1	0.1	0.3	0.1	0.1	0.3	0.0	0.0	0.0
B762	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B763G	2.6	2.6	5.2	4.2	3.4	7.6	+1.5	+0.8	+2.4
B763P	7.6	5.7	13.3	8.9	7.0	15.9	+1.3	+1.3	+2.6
B763R	8.3	9.0	17.4	0.0	0.0	0.0	-8.3	-9.0	-17.4
B764	3.6	3.4	7.0	0.7	0.7	1.4	-2.9	-2.7	-5.6
B772G	17.1	13.3	30.4	18.0	14.9	32.9	+0.9	+1.6	+2.5
B772P	2.0	1.2	3.2	2.0	1.3	3.3	+0.1	+0.1	+0.1
B772R	15.3	13.7	29.0	15.8	14.0	29.8	+0.5	+0.3	+0.8
B773G	50.6	42.5	93.1	42.8	35.1	77.9	-7.7	-7.4	-15.2
B7810	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	+0.1
B788	23.2	21.4	44.6	23.0	22.0	45.0	-0.2	+0.6	+0.4
B789	34.7	27.5	62.2	41.0	33.0	74.0	+6.3	+5.5	+11.7
BA46	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CRJ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CRJ900	0.6	0.6	1.2	0.2	0.2	0.4	-0.4	-0.4	-0.8
EA221	0.4	0.4	0.8	0.9	0.9	1.7	+0.5	+0.5	+0.9
EA223	4.8	4.8	9.7	4.6	4.6	9.3	-0.2	-0.2	-0.4
EA30	1.5	2.5	4.1	1.3	2.2	3.5	-0.3	-0.3	-0.6
EA31	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	-0.1
EA318	1.6	1.7	3.3	1.3	1.3	2.5	-0.4	-0.4	-0.8

ANCON type	2018 departs	2018 arrivals	2018 total	2019 departs	2019 arrivals	2019 total	Change departs	Change arrivals	Change total
EA319C	19.0	20.9	39.9	15.9	16.6	32.5	-3.1	-4.3	-7.4
EA319V	96.5	96.3	192.8	84.9	84.8	169.7	-11.7	-11.5	-23.1
EA320C	55.2	56.9	112.1	50.9	53.0	103.9	-4.3	-3.9	-8.1
EA320NEO	22.0	22.9	44.9	42.7	43.7	86.4	+20.7	+20.8	+41.5
EA320V	108.5	109.0	217.4	97.1	97.8	194.9	-11.3	-11.2	-22.5
EA321C	7.9	9.6	17.5	8.8	11.7	20.4	+0.8	+2.1	+2.9
EA321NEO	0.0	0.0	0.1	12.7	12.9	25.6	+12.6	+12.9	+25.5
EA321V	45.4	46.3	91.8	41.9	43.1	85.0	-3.5	-3.2	-6.7
EA33	25.1	21.4	46.5	30.2	26.0	56.2	+5.0	+4.6	+9.7
EA33NEO	0.0	0.0	0.0	0.5	0.3	0.8	+0.5	+0.3	+0.8
EA34	0.8	0.7	1.4	1.2	0.5	1.7	+0.4	-0.1	+0.3
EA346	4.5	5.1	9.6	4.7	4.7	9.4	+0.2	-0.3	-0.2
EA3510	0.9	0.9	1.8	1.4	1.4	2.7	+0.5	+0.4	+0.9
EA359	6.1	5.3	11.4	7.5	6.7	14.2	+1.4	+1.4	+2.8
EA38GP	11.2	10.3	21.4	11.0	10.5	21.5	-0.2	+0.3	+0.1
EA38R	12.5	6.9	19.5	11.9	6.3	18.2	-0.7	-0.7	-1.3
ERJ	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	-0.1
ERJ170	0.4	0.4	0.7	0.4	0.4	0.8	0.0	0.0	0.0
ERJ190	3.4	3.5	6.9	4.8	5.4	10.2	+1.4	+1.9	+3.3
EXE3	0.4	0.4	0.8	0.4	0.3	0.7	0.0	-0.1	-0.1
FK10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LTT	6.6	6.6	13.2	13.8	14.6	28.4	+7.3	+8.0	+15.3
MD80	0.3	0.3	0.7	0.0	0.0	0.0	-0.3	-0.3	-0.7
STT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	650.6	614.9	1265.5	647.3	613.0	1260.4	-3.3	-1.8	-5.1
							(-0.5%)	(-0.3%)	(-0.4%)

Note: Changes and totals have been calculated *before* rounding.

Table C2 Heathrow 2018 and 2019 average summer 8-hour night traffic movements by ANCON type

ANCON type	2018 departs	2018 arrivals	2018 total	2019 departs	2019 arrivals	2019 total	Change departs	Change arrivals	Change total
B733	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
B736	0.3	0.0	0.3	0.2	0.0	0.2	-0.1	0.0	-0.1
B738	0.8	0.0	0.9	0.9	0.0	0.9	0.0	0.0	0.0
B738MAX	0.6	0.1	0.8	0.0	0.0	0.0	-0.6	-0.1	-0.8
B744P	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
B744R	0.2	10.4	10.6	0.2	9.8	10.0	0.0	-0.6	-0.6
B748	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B757C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B757E	0.1	0.4	0.5	0.0	0.0	0.0	0.0	-0.4	-0.5
B757P	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B762	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B763G	0.0	0.1	0.1	0.0	0.8	0.8	0.0	+0.7	+0.8
B763P	0.1	2.0	2.1	0.0	2.0	2.0	-0.1	0.0	-0.1
B763R	1.0	0.3	1.3	0.0	0.0	0.0	-1.0	-0.3	-1.3
B764	0.0	0.3	0.3	0.0	0.0	0.0	0.0	-0.3	-0.3
B772G	1.3	5.2	6.5	1.1	4.2	5.3	-0.2	-0.9	-1.2
B772P	0.0	0.7	0.7	0.0	0.7	0.7	0.0	0.0	0.0
B772R	1.4	3.0	4.4	1.0	2.7	3.7	-0.4	-0.3	-0.8
B773G	2.5	10.6	13.1	1.8	9.5	11.3	-0.7	-1.0	-1.7
B788	1.3	3.1	4.4	1.2	2.2	3.3	-0.1	-0.9	-1.1
B789	0.7	7.8	8.5	1.5	9.5	11.0	+0.8	+1.7	+2.5
CRJ900	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EA223	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EA30	0.9	0.0	0.9	1.1	0.0	1.1	+0.1	0.0	+0.1
EA318	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EA319C	2.1	0.2	2.3	0.8	0.0	0.8	-1.3	-0.2	-1.5
EA319V	1.2	1.5	2.7	1.0	1.0	2.0	-0.3	-0.5	-0.7
EA320C	2.2	0.5	2.7	2.6	0.5	3.0	+0.4	-0.1	+0.3
EA320NEO	1.0	0.1	1.1	1.5	0.6	2.0	+0.5	+0.5	+1.0
EA320V	2.1	1.5	3.6	2.4	1.6	4.0	+0.3	+0.1	+0.4
EA321C	1.9	0.2	2.1	3.0	0.1	3.1	+1.1	-0.1	+0.9
EA321NEO	0.0	0.0	0.0	0.7	0.4	1.1	+0.7	+0.4	+1.1

ANCON type	2018 departs	2018 arrivals	2018 total	2019 departs	2019 arrivals	2019 total	Change departs	Change arrivals	Change total
EA321V	1.7	0.8	2.4	1.9	0.7	2.7	+0.2	0.0	+0.2
EA33	1.3	5.0	6.3	0.7	4.8	5.5	-0.6	-0.2	-0.8
EA33NEO	0.0	0.0	0.0	0.0	0.1	0.1	0.0	+0.1	+0.1
EA34	0.0	0.1	0.1	0.0	0.6	0.6	0.0	+0.5	+0.5
EA346	0.5	0.0	0.6	0.2	0.2	0.4	-0.3	+0.2	-0.1
EA3510	0.1	0.0	0.1	0.1	0.1	0.3	+0.1	+0.1	+0.2
EA359	0.1	0.9	1.0	0.7	1.5	2.3	+0.6	+0.6	+1.2
EA38GP	0.3	1.2	1.5	0.3	0.8	1.1	0.0	-0.4	-0.4
EA38R	0.1	5.8	5.9	0.1	5.7	5.9	0.0	0.0	0.0
ERJ190	0.1	0.0	0.1	0.6	0.0	0.6	+0.5	0.0	+0.5
LTT	0.0	0.0	0.0	0.8	0.0	0.8	+0.8	0.0	+0.8
STT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	26.1	61.9	88.0	26.3	60.4	86.7	+0.1	-1.4	-1.3
							(+0.4%)	(-2.3%)	(-1.5%)

Note: Changes and totals have been calculated *before* rounding.

Table C3 Heathrow 2018 and 2019 annual 12-hour day traffic movements by ANCON type

ANCON type	2018 departs	2018 arrivals	2018 total	2019 departs	2019 arrivals	2019 total	Change departs	Change arrivals	Change total
B733	0.0	0.0	0.1	0.1	0.1	0.2	0.0	0.0	+0.1
B736	3.5	4.6	8.1	2.1	2.8	4.9	-1.4	-1.8	-3.2
B738	7.1	7.6	14.7	7.5	8.0	15.5	+0.4	+0.4	+0.8
B738MAX	3.0	2.9	5.9	0.6	0.5	1.1	-2.5	-2.4	-4.8
B744G	0.1	0.2	0.2	0.0	0.1	0.1	0.0	-0.1	-0.1
B744P	0.2	0.4	0.7	0.1	0.3	0.4	-0.1	-0.1	-0.3
B744R	22.9	15.1	37.9	21.5	14.5	36.0	-1.4	-0.6	-2.0
B748	0.1	0.6	0.6	0.1	0.5	0.6	0.0	0.0	-0.1
B753	0.1	0.1	0.1	0.2	0.2	0.3	+0.1	+0.1	+0.2
B757C	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
B757E	2.3	1.2	3.5	1.7	1.5	3.1	-0.6	+0.2	-0.3
B757P	0.3	0.2	0.4	0.1	0.1	0.1	-0.2	-0.1	-0.3
B762	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B763G	3.3	3.0	6.3	3.3	2.9	6.2	-0.1	-0.1	-0.2
B763P	6.9	4.7	11.6	7.5	5.0	12.5	+0.6	+0.3	+0.9
B763R	7.2	4.9	12.1	0.0	0.0	0.0	-7.2	-4.9	-12.1
B764	3.6	2.2	5.7	1.6	0.9	2.4	-2.0	-1.3	-3.3
B772G	13.2	12.0	25.2	14.5	12.8	27.3	+1.3	+0.9	+2.1
B772P	2.3	1.5	3.8	2.4	1.5	4.0	+0.1	+0.1	+0.2
B772R	12.2	12.6	24.8	12.5	13.1	25.6	+0.3	+0.4	+0.7
B773G	29.4	32.7	62.1	27.7	29.4	57.1	-1.7	-3.3	-5.0
B7810	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B788	18.7	19.4	38.1	18.0	19.4	37.4	-0.7	0.0	-0.7
B789	24.4	23.5	48.0	27.8	28.3	56.1	+3.3	+4.8	+8.1
BA46	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CRJ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CRJ700	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CRJ900	0.1	0.1	0.2	0.0	0.1	0.1	0.0	0.0	-0.1
EA221	0.6	0.7	1.3	0.5	0.6	1.0	-0.1	-0.2	-0.3
EA223	3.3	3.2	6.5	3.8	3.8	7.5	+0.4	+0.6	+1.1
EA30	0.9	0.9	1.8	0.7	0.6	1.3	-0.2	-0.3	-0.5
EA31	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

ANCON type	2018 departs	2018 arrivals	2018 total	2019 departs	2019 arrivals	2019 total	Change departs	Change arrivals	Change total
EA318	1.2	1.5	2.7	0.9	1.0	1.9	-0.3	-0.5	-0.8
EA319C	13.8	15.0	28.8	10.2	13.4	23.6	-3.6	-1.5	-5.1
EA319V	71.9	66.1	138.1	66.6	62.9	129.5	-5.3	-3.2	-8.5
EA320C	41.4	45.2	86.6	39.2	40.7	80.0	-2.2	-4.5	-6.6
EA320NEO	18.3	16.8	35.1	32.7	31.0	63.7	+14.4	+14.2	+28.6
EA320V	88.3	79.7	167.9	77.6	69.3	146.9	-10.7	-10.3	-21.1
EA321C	5.9	6.3	12.2	7.6	8.1	15.8	+1.7	+1.8	+3.5
EA321NEO	0.2	0.3	0.5	9.5	7.5	17.0	+9.3	+7.2	+16.5
EA321V	35.1	29.8	64.8	33.2	28.8	62.0	-1.9	-1.0	-2.9
EA33	19.6	17.9	37.5	22.9	20.8	43.6	+3.3	+2.8	+6.1
EA33NEO	0.0	0.0	0.0	0.2	0.2	0.4	+0.2	+0.2	+0.4
EA34	0.5	0.6	1.1	0.9	0.7	1.6	+0.3	+0.2	+0.5
EA346	2.8	4.2	7.0	2.1	2.8	4.9	-0.7	-1.4	-2.1
EA3510	0.0	0.2	0.2	1.9	1.3	3.2	+1.9	+1.1	+3.0
EA359	2.1	4.3	6.3	2.6	4.5	7.1	+0.6	+0.2	+0.7
EA38GP	6.9	8.3	15.2	6.5	7.9	14.4	-0.5	-0.4	-0.8
EA38R	6.7	6.0	12.7	6.1	5.5	11.7	-0.5	-0.5	-1.0
ERJ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ERJ170	0.1	0.1	0.2	0.2	0.3	0.5	+0.1	+0.2	+0.3
ERJ190	1.9	2.7	4.5	2.3	3.5	5.8	+0.4	+0.9	+1.2
EXE3	0.3	0.3	0.6	0.4	0.4	0.8	+0.1	+0.1	+0.2
FK10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LTT	4.5	4.7	9.2	8.9	9.2	18.1	+4.4	+4.4	+8.9
MD80	0.1	0.1	0.2	0.0	0.0	0.0	-0.1	-0.1	-0.2
STT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	487.2	464.3	951.5	486.5	466.9	953.3	-0.7	+2.5	+1.8
							(-0.1%)	(+0.5%)	(+0.2%)

Note: Changes and totals have been calculated *before* rounding.

Table C4 Heathrow 2018 and 2019 annual 4-hour evening traffic movements by ANCON type

ANCON type	2018 departs	2018 arrivals	2018 total	2019 departs	2019 arrivals	2019 total	Change departs	Change arrivals	Change total
B733	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.0
B736	1.6	0.9	2.6	1.1	0.6	1.7	-0.5	-0.3	-0.9
B738	2.0	2.1	4.1	2.0	2.4	4.4	0.0	+0.4	+0.4
B738MAX	0.3	0.9	1.1	0.1	0.2	0.3	-0.2	-0.7	-0.8
B744G	0.1	0.2	0.3	0.1	0.0	0.1	0.0	-0.2	-0.2
B744P	0.3	1.0	1.3	0.3	0.2	0.5	0.0	-0.8	-0.8
B744R	3.4	0.0	3.4	3.2	1.0	4.2	-0.2	+1.0	+0.8
B748	0.5	0.0	0.5	0.5	0.1	0.6	0.0	0.0	+0.1
B753	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B757C	0.0	1.8	1.8	0.0	0.0	0.0	0.0	-1.8	-1.8
B757E	1.0	0.2	1.1	1.0	1.3	2.3	+0.1	+1.1	+1.2
B757P	0.2	0.0	0.2	0.1	0.1	0.2	-0.1	+0.1	0.0
B762	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B763G	0.1	0.1	0.2	0.1	0.0	0.1	-0.1	0.0	-0.1
B763P	0.1	0.2	0.3	0.1	0.5	0.6	0.0	+0.3	+0.3
B763R	0.5	3.4	4.0	0.0	0.0	0.0	-0.5	-3.4	-4.0
B764	0.1	0.9	1.0	0.0	0.5	0.6	0.0	-0.4	-0.4
B772G	4.4	1.3	5.6	4.0	1.1	5.1	-0.3	-0.2	-0.5
B772P	0.1	0.0	0.1	0.0	0.0	0.0	-0.1	0.0	-0.1
B772R	4.3	1.5	5.8	4.3	1.5	5.9	0.0	0.0	+0.1
B773G	17.8	6.1	23.9	15.6	5.9	21.5	-2.2	-0.3	-2.4
B7810	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B788	4.7	1.8	6.5	5.3	2.4	7.7	+0.6	+0.6	+1.2
B789	7.6	1.7	9.2	10.0	1.6	11.6	+2.4	-0.1	+2.3
BA46	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CRJ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CRJ700	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CRJ900	0.1	0.1	0.2	0.0	0.0	0.0	-0.1	-0.1	-0.1
EA221	0.3	0.1	0.4	0.2	0.1	0.3	-0.1	0.0	-0.1
EA223	1.0	1.1	2.1	1.2	1.1	2.3	+0.2	0.0	+0.2
EA30	0.8	1.7	2.5	0.6	1.6	2.2	-0.2	-0.1	-0.3
EA31	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

ANCON type	2018 departs	2018 arrivals	2018 total	2019 departs	2019 arrivals	2019 total	Change departs	Change arrivals	Change total
EA318	0.4	0.1	0.5	0.2	0.0	0.2	-0.3	-0.1	-0.3
EA319C	4.3	5.0	9.2	5.0	2.6	7.6	+0.7	-2.3	-1.6
EA319V	15.0	21.1	36.1	14.6	18.8	33.4	-0.4	-2.4	-2.7
EA320C	16.2	14.6	30.8	13.0	14.0	27.0	-3.3	-0.6	-3.8
EA320NEO	3.8	6.4	10.2	8.4	11.5	19.9	+4.6	+5.1	+9.7
EA320V	20.2	29.9	50.1	18.2	27.7	45.8	-2.0	-2.2	-4.3
EA321C	1.8	2.5	4.2	1.9	3.1	5.0	+0.2	+0.6	+0.8
EA321NEO	0.1	0.1	0.2	2.1	4.4	6.5	+2.0	+4.3	+6.3
EA321V	8.3	14.0	22.3	8.2	13.2	21.4	-0.1	-0.8	-0.8
EA33	5.3	2.4	7.8	6.0	3.5	9.5	+0.7	+1.1	+1.8
EA33NEO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EA34	0.4	0.1	0.5	0.3	0.0	0.4	-0.1	-0.1	-0.2
EA346	2.4	1.0	3.4	2.2	1.1	3.3	-0.3	+0.1	-0.2
EA3510	0.7	0.6	1.3	0.6	0.6	1.2	-0.1	0.0	-0.2
EA359	4.0	0.6	4.6	4.7	1.7	6.5	+0.8	+1.1	+1.8
EA38GP	4.0	1.1	5.1	3.9	1.1	5.0	-0.1	0.0	-0.1
EA38R	5.0	0.1	5.2	5.2	0.1	5.3	+0.2	0.0	+0.1
ERJ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ERJ170	0.1	0.0	0.1	0.2	0.0	0.2	+0.1	0.0	+0.1
ERJ190	1.3	0.5	1.8	1.9	0.9	2.8	+0.6	+0.3	+0.9
EXE3	0.1	0.1	0.2	0.1	0.1	0.2	0.0	0.0	0.0
FK10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LTT	2.0	1.7	3.7	2.7	3.0	5.7	+0.8	+1.3	+2.0
MD80	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	146.6	129.1	275.7	149.4	129.7	279.1	+2.8	+0.6	+3.4
							(+1.9%)	(+0.4%)	(+1.2%)

Note: Changes and totals have been calculated *before* rounding.

Table C5 Heathrow 2018 and 2019 annual 8-hour night traffic movements by ANCON type

ANCON type	2018 departs	2018 arrivals	2018 total	2019 departs	2019 arrivals	2019 total	Change departs	Change arrivals	Change total
B733	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0
B736	0.3	0.0	0.3	0.2	0.0	0.2	-0.1	0.0	-0.1
B738	0.7	0.0	0.7	0.9	0.0	1.0	+0.3	0.0	+0.3
B738MAX	0.6	0.1	0.8	0.1	0.1	0.2	-0.5	-0.1	-0.6
B744G	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B744P	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
B744R	0.2	10.4	10.6	0.1	9.3	9.4	0.0	-1.1	-1.1
B748	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B753	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B757C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B757E	0.0	0.3	0.3	0.0	0.0	0.0	0.0	-0.2	-0.3
B757P	0.0	0.1	0.1	0.0	0.0	0.0	0.0	-0.1	-0.1
B762	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B763G	0.0	0.5	0.5	0.0	0.4	0.4	0.0	0.0	0.0
B763P	0.0	2.2	2.3	0.0	2.2	2.2	0.0	0.0	0.0
B763R	0.8	0.2	0.9	0.0	0.0	0.0	-0.8	-0.2	-0.9
B764	0.0	0.5	0.5	0.0	0.2	0.2	0.0	-0.4	-0.4
B772G	0.9	5.2	6.2	0.7	5.2	5.9	-0.3	0.0	-0.3
B772P	0.0	0.9	0.9	0.0	0.9	0.9	0.0	0.0	0.0
B772R	0.8	3.1	3.9	0.6	2.7	3.3	-0.2	-0.4	-0.7
B773G	1.3	9.6	11.0	1.0	9.0	10.0	-0.3	-0.6	-0.9
B788	0.8	3.0	3.8	0.6	2.1	2.7	-0.2	-0.9	-1.0
B789	0.4	7.2	7.6	0.7	8.6	9.3	+0.3	+1.4	+1.7
CRJ900	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EA223	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EA30	0.8	0.0	0.8	0.9	0.0	0.9	+0.1	0.0	+0.1
EA318	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EA319C	2.1	0.2	2.3	1.0	0.0	1.1	-1.1	-0.1	-1.2
EA319V	1.2	0.8	2.0	1.1	0.7	1.8	0.0	-0.1	-0.2
EA320C	2.5	0.4	3.0	2.9	0.4	3.3	+0.4	0.0	+0.4
EA320NEO	1.1	0.1	1.2	1.7	0.3	2.0	+0.6	+0.3	+0.8
EA320V	2.0	0.8	2.8	2.1	0.8	2.9	+0.1	-0.1	+0.1

ANCON type	2018 departs	2018 arrivals	2018 total	2019 departs	2019 arrivals	2019 total	Change departs	Change arrivals	Change total
EA321C	1.2	0.1	1.4	1.8	0.1	1.8	+0.5	0.0	+0.5
EA321NEO	0.0	0.0	0.0	0.5	0.2	0.7	+0.5	+0.2	+0.7
EA321V	1.2	0.7	1.9	1.4	0.7	2.1	+0.2	0.0	+0.2
EA33	0.6	5.2	5.8	0.4	5.0	5.4	-0.2	-0.1	-0.3
EA33NEO	0.0	0.0	0.0	0.0	0.1	0.1	0.0	+0.1	+0.1
EA34	0.0	0.3	0.3	0.0	0.5	0.5	0.0	+0.2	+0.2
EA346	0.4	0.5	0.9	0.2	0.5	0.7	-0.2	+0.1	-0.1
EA3510	0.0	0.0	0.0	0.1	0.8	0.8	0.0	+0.8	+0.8
EA359	0.1	1.2	1.3	0.4	1.6	2.0	+0.4	+0.4	+0.8
EA38GP	0.2	1.6	1.8	0.2	1.5	1.6	0.0	-0.1	-0.1
EA38R	0.1	5.7	5.8	0.1	5.8	6.0	0.0	+0.1	+0.1
ERJ190	0.0	0.0	0.0	0.2	0.0	0.2	+0.2	0.0	+0.2
EXE3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LTT	0.0	0.0	0.0	0.5	0.0	0.5	+0.5	0.0	+0.5
SP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
STP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
STT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	20.6	60.9	81.6	20.6	59.9	80.5	0.0	-1.0	-1.0
							(0.0%)	(-1.7%)	(-1.3%)

Note: Changes and totals have been calculated *before* rounding.

Table C6 Heathrow 2018 and 2019 annual 24-hour day traffic movements by ANCON type

ANCON type	2018 departs	2018 arrivals	2018 total	2019 departs	2019 arrivals	2019 total	Change departs	Change arrivals	Change total
B733	0.1	0.1	0.2	0.2	0.2	0.3	+0.1	+0.1	+0.2
B736	5.5	5.5	11.0	3.4	3.4	6.8	-2.1	-2.1	-4.2
B738	9.7	9.7	19.4	10.4	10.4	20.9	+0.7	+0.7	+1.4
B738MAX	3.9	3.9	7.8	0.8	0.8	1.6	-3.1	-3.1	-6.3
B744G	0.2	0.4	0.5	0.1	0.1	0.2	-0.1	-0.3	-0.3
B744P	0.6	1.4	2.0	0.5	0.5	1.0	-0.1	-0.9	-1.0
B744R	26.4	25.5	51.9	24.8	24.8	49.5	-1.7	-0.7	-2.4
B748	0.6	0.6	1.1	0.6	0.6	1.1	+0.0	+0.0	+0.0
B753	0.1	0.1	0.1	0.2	0.2	0.3	+0.1	+0.1	+0.2
B757C	0.1	1.9	1.9	0.0	0.0	0.0	-0.0	-1.8	-1.9
B757E	3.3	1.6	4.9	2.7	2.7	5.5	-0.5	+1.1	+0.6
B757P	0.4	0.3	0.7	0.1	0.1	0.3	-0.3	-0.1	-0.4
B762	0.0	0.0	0.0	0.0	0.0	0.0	+0.0	+0.0	+0.0
B763G	3.5	3.5	7.0	3.4	3.4	6.7	-0.1	-0.1	-0.3
B763P	7.1	7.1	14.2	7.7	7.7	15.3	+0.6	+0.6	+1.2
B763R	8.5	8.5	17.0	0.0	0.0	0.0	-8.5	-8.5	-17.0
B764	3.6	3.6	7.2	1.6	1.6	3.2	-2.0	-2.0	-4.0
B772G	18.5	18.5	37.0	19.1	19.1	38.3	+0.7	+0.7	+1.3
B772P	2.4	2.4	4.8	2.4	2.4	4.9	+0.1	+0.1	+0.1
B772R	17.3	17.3	34.6	17.4	17.4	34.7	+0.1	+0.1	+0.1
B773G	48.5	48.5	96.9	44.3	44.3	88.6	-4.2	-4.2	-8.4
B7810	0.0	0.0	0.0	0.0	0.0	0.0	+0.0	+0.0	+0.0
B788	24.2	24.2	48.3	23.9	23.9	47.8	-0.3	-0.3	-0.5
B789	32.4	32.4	64.8	38.5	38.5	76.9	+6.1	+6.1	+12.2
BA46	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0
CRJ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	+0.0	+0.0
CRJ700	0.0	0.0	0.0	0.0	0.0	0.0	+0.0	+0.0	+0.0
CRJ900	0.2	0.2	0.3	0.1	0.1	0.2	-0.1	-0.1	-0.2
EA221	0.8	0.8	1.7	0.6	0.6	1.3	-0.2	-0.2	-0.4
EA223	4.3	4.3	8.6	4.9	4.9	9.8	+0.6	+0.6	+1.3
EA30	2.6	2.6	5.1	2.2	2.2	4.4	-0.4	-0.4	-0.7
EA31	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0

ANCON type	2018 departs	2018 arrivals	2018 total	2019 departs	2019 arrivals	2019 total	Change departs	Change arrivals	Change total
EA318	1.6	1.6	3.2	1.1	1.1	2.1	-0.6	-0.6	-1.1
EA319C	20.1	20.1	40.3	16.2	16.1	32.3	-4.0	-4.0	-8.0
EA319V	88.1	88.1	176.2	82.4	82.4	164.8	-5.7	-5.7	-11.4
EA320C	60.2	60.2	120.4	55.1	55.1	110.3	-5.1	-5.1	-10.1
EA320NEO	23.3	23.3	46.6	42.8	42.9	85.7	+19.6	+19.6	+39.1
EA320V	110.4	110.4	220.9	97.8	97.8	195.6	-12.6	-12.6	-25.2
EA321C	8.9	8.9	17.8	11.3	11.3	22.6	+2.4	+2.4	+4.8
EA321NEO	0.4	0.4	0.7	12.1	12.1	24.2	+11.7	+11.7	+23.5
EA321V	44.5	44.5	89.0	42.8	42.8	85.6	-1.7	-1.7	-3.5
EA33	25.5	25.5	51.0	29.3	29.3	58.6	+3.8	+3.8	+7.6
EA33NEO	0.0	0.0	0.0	0.2	0.2	0.4	+0.2	+0.2	+0.4
EA34	1.0	1.0	1.9	1.2	1.2	2.4	+0.3	+0.3	+0.5
EA346	5.7	5.7	11.3	4.5	4.5	8.9	-1.2	-1.2	-2.4
EA3510	0.8	0.8	1.6	2.6	2.6	5.2	+1.8	+1.8	+3.7
EA359	6.1	6.1	12.2	7.8	7.8	15.6	+1.7	+1.7	+3.4
EA38GP	11.0	11.0	22.1	10.5	10.5	21.0	-0.5	-0.5	-1.1
EA38R	11.8	11.8	23.7	11.5	11.5	22.9	-0.4	-0.4	-0.7
ERJ	0.0	0.0	0.0	0.0	0.0	0.1	+0.0	+0.0	+0.0
ERJ170	0.2	0.2	0.3	0.3	0.3	0.7	+0.2	+0.2	+0.4
ERJ190	3.2	3.2	6.4	4.4	4.4	8.8	+1.2	+1.2	+2.4
EXE3	0.4	0.4	0.8	0.5	0.5	1.0	+0.1	+0.1	+0.2
FK10	0.0	0.0	0.1	0.0	0.0	0.0	-0.0	-0.0	-0.0
LTT	6.5	6.5	12.9	12.2	12.2	24.3	+5.7	+5.7	+11.4
MD80	0.1	0.1	0.2	0.0	0.0	0.0	-0.1	-0.1	-0.2
SP	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0
STP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	+0.0	+0.0
STT	0.0	0.0	0.0	0.0	0.0	0.0	+0.0	+0.0	+0.0
Total	654.4	654.4	1308.8	656.5	656.4	1312.9	+2.1	+2.0	+4.1
							(+0.3%)	(+0.3%)	(+0.3%)

Note: Changes and totals have been calculated *before* rounding.

Table C7 Heathrow 2018 and 2019 6.5-hour night traffic movements by ANCON type

ANCON type	2018 departs	2018 arrivals	2018 total	2019 departs	2019 arrivals	2019 total	Change departs	Change arrivals	Change total
B733	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B736	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B738	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B744P	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B744R	0.0	2.2	2.2	0.0	2.0	2.0	0.0	-0.2	-0.2
B748	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B753	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B757E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B757P	0.0	0.9	0.9	0.0	0.0	0.0	0.0	-0.9	-0.9
B762	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B763G	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B763P	0.0	0.0	0.0	0.0	0.9	0.9	0.0	+0.9	+0.9
B763R	0.0	0.1	0.1	0.0	0.0	0.0	0.0	-0.1	-0.1
B764	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B772G	0.2	0.8	1.0	0.1	0.6	0.7	-0.1	-0.2	-0.3
B772P	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B772R	0.1	0.1	0.2	0.1	0.1	0.1	0.0	0.0	0.0
B773G	0.3	3.1	3.4	0.3	2.9	3.1	0.0	-0.2	-0.2
B788	0.1	0.1	0.2	0.1	0.1	0.1	0.0	0.0	-0.1
B789	0.1	3.2	3.3	0.1	3.2	3.3	0.0	-0.1	0.0
EA223	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EA30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EA319C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EA319V	0.0	0.1	0.2	0.0	0.1	0.1	0.0	0.0	-0.1
EA320C	0.0	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0
EA320NEO	0.0	0.0	0.0	0.0	0.1	0.1	0.0	+0.1	+0.1
EA320V	0.0	0.3	0.3	0.0	0.3	0.3	0.0	0.0	0.0
EA321C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EA321NEO	0.0	0.0	0.0	0.0	0.1	0.1	0.0	+0.1	+0.1
EA321V	0.1	0.1	0.2	0.1	0.1	0.2	0.0	0.0	0.0
EA33	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0
EA34	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

ANCON type	2018 departs	2018 arrivals	2018 total	2019 departs	2019 arrivals	2019 total	Change departs	Change arrivals	Change total
EA346	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
EA3510	0.0	0.0	0.0	0.0	0.1	0.1	0.0	+0.1	+0.1
EA359	0.0	0.8	0.8	0.1	0.8	0.8	0.0	0.0	0.0
EA38GP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EA38R	0.1	3.6	3.7	0.0	3.4	3.4	0.0	-0.2	-0.3
ERJ190	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EXE3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
STP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
STT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	1.4	15.6	16.9	1.1	14.8	15.9	-0.2	-0.8	-1.0
							(-17%)	(-5%)	(-6%)

Note: Changes and totals have been calculated *before* rounding.

Table C8-a Heathrow 2006 route distributions (percentage of daily total)

Route	L _{day}	L _{evening}	L _{night}	L _{den}	L _{Aeq,6.5h}
09L_BPK	0.0%	0.0%	0.0%	0.0%	0.0%
09L_BUZ	0.0%	0.0%	0.0%	0.0%	0.0%
09L_CPT	0.0%	0.0%	0.0%	0.0%	0.0%
09L_DVR	0.0%	0.0%	0.0%	0.0%	0.0%
09L_MID	0.0%	0.0%	0.0%	0.0%	0.0%
09L_SAM	0.0%	0.0%	0.0%	0.0%	0.0%
09R_BPK	3.2%	3.9%	1.5%	3.3%	0.9%
09R_BUZ	3.3%	2.2%	0.7%	2.9%	0.3%
09R_CPT	1.9%	1.2%	0.3%	1.6%	0.2%
09R_DVR	3.6%	4.4%	2.6%	3.7%	1.5%
09R_MID	2.4%	3.1%	1.7%	2.5%	0.5%
09R_SAM	0.9%	0.6%	0.4%	0.8%	0.2%
27L_BPK	4.5%	5.4%	2.8%	4.6%	2.3%
27L_CPT	2.3%	1.6%	0.5%	2.0%	0.5%
27L_DVR	5.0%	7.0%	4.5%	5.4%	3.8%
27L_MID	3.2%	4.1%	2.7%	3.4%	0.9%
27L_SAM	1.4%	1.2%	0.7%	1.3%	0.6%
27L_WOB	4.5%	3.2%	1.3%	4.0%	0.8%
27R_BPK	3.2%	4.0%	1.6%	3.3%	1.0%
27R_CPT	1.5%	1.1%	0.3%	1.3%	0.2%
27R_DVR	3.5%	4.4%	2.7%	3.6%	1.4%
27R_MID	2.2%	2.9%	1.6%	2.3%	0.4%
27R_SAM	0.9%	0.7%	0.4%	0.8%	0.2%
27R_WOB	3.4%	2.3%	0.9%	3.0%	0.5%
09L_ARRIVAL	14.4%	12.8%	11.5%	13.9%	9.0%
09R_ARRIVAL	0.3%	0.5%	9.3%	0.8%	14.4%
27L_ARRIVAL	14.2%	13.9%	26.6%	14.9%	33.4%
27R_ARRIVAL	20.4%	19.5%	25.4%	20.5%	26.7%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Table C8-b Heathrow 2009 route distributions (percentage of daily total)

Route	L _{day}	L _{evening}	L _{night}	L _{den}	L _{Aeq,6.5h}
09L_BPK	0.0%	0.0%	0.1%	0.0%	0.1%
09L_BUZ	0.0%	0.0%	0.0%	0.0%	0.0%
09L_CPT	0.0%	0.0%	0.0%	0.0%	0.1%
09L_DVR	0.0%	0.0%	0.1%	0.0%	0.1%
09L_MID	0.0%	0.0%	0.0%	0.0%	0.1%
09L_SAM	0.0%	0.0%	0.0%	0.0%	0.0%
09R_BPK	3.0%	4.0%	1.4%	3.1%	1.0%
09R_BUZ	2.5%	1.7%	0.6%	2.2%	0.4%
09R_CPT	2.2%	1.2%	0.3%	1.9%	0.4%
09R_DVR	2.9%	4.3%	2.4%	3.1%	1.4%
09R_MID	2.2%	2.9%	1.2%	2.3%	0.8%
09R_SAM	0.7%	0.7%	0.9%	0.7%	0.1%
27L_BPK	3.8%	5.1%	1.5%	3.9%	0.4%
27L_CPT	2.5%	1.4%	0.4%	2.1%	0.1%
27L_DVR	4.4%	6.1%	2.8%	4.6%	0.8%
27L_MID	2.9%	3.9%	1.3%	3.0%	0.4%
27L_SAM	0.9%	0.9%	1.2%	1.0%	0.1%
27L_WOB	3.8%	2.4%	0.7%	3.3%	0.1%
27R_BPK	4.0%	4.9%	1.9%	4.1%	1.1%
27R_CPT	2.6%	1.4%	0.5%	2.2%	0.4%
27R_DVR	4.6%	5.9%	3.7%	4.8%	2.0%
27R_MID	3.0%	3.8%	1.6%	3.1%	1.0%
27R_SAM	1.0%	0.9%	1.4%	1.0%	0.3%
27R_WOB	4.0%	2.2%	0.9%	3.5%	0.6%
09L_ARRIVAL	12.8%	12.1%	12.2%	12.6%	14.0%
09R_ARRIVAL	0.4%	0.4%	7.2%	0.8%	8.4%
27L_ARRIVAL	18.3%	16.3%	26.7%	18.4%	29.7%
27R_ARRIVAL	17.5%	17.5%	28.8%	18.2%	36.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Table C8-c Heathrow 2010 route distributions (percentage of daily total)

Route	L _{day}	L _{evening}	L _{night}	L _{den}	L _{Aeq,6.5h}
09L_BPK	0.0%	0.0%	0.2%	0.0%	0.7%
09L_BUZ	0.0%	0.0%	0.0%	0.0%	0.0%
09L_CPT	0.0%	0.0%	0.0%	0.0%	0.1%
09L_DVR	0.0%	0.0%	0.2%	0.0%	0.7%
09L_MID	0.0%	0.0%	0.1%	0.0%	0.3%
09L_SAM	0.0%	0.0%	0.0%	0.0%	0.1%
09R_BPK	3.8%	5.1%	1.9%	4.0%	1.2%
09R_BUZ	2.9%	2.1%	0.5%	2.6%	0.2%
09R_CPT	2.8%	1.4%	0.5%	2.4%	0.3%
09R_DVR	3.7%	5.6%	3.0%	4.1%	1.9%
09R_MID	2.8%	3.9%	1.3%	2.9%	1.0%
09R_SAM	0.9%	1.0%	0.9%	0.9%	0.2%
27L_BPK	3.1%	3.5%	2.0%	3.1%	1.2%
27L_CPT	2.2%	1.0%	0.6%	1.9%	0.3%
27L_DVR	3.6%	4.2%	3.3%	3.7%	1.5%
27L_MID	2.4%	2.9%	1.2%	2.4%	1.0%
27L_SAM	0.8%	0.7%	0.9%	0.8%	0.2%
27L_WOB	2.9%	1.5%	0.4%	2.4%	0.1%
27R_BPK	4.0%	5.2%	2.3%	4.2%	1.3%
27R_CPT	2.8%	1.4%	0.7%	2.4%	0.2%
27R_DVR	4.5%	6.3%	3.7%	4.8%	2.0%
27R_MID	2.9%	4.0%	1.3%	3.0%	0.9%
27R_SAM	1.0%	1.1%	1.1%	1.0%	0.2%
27R_WOB	3.6%	2.3%	0.6%	3.2%	0.3%
09L_ARRIVAL	15.9%	15.8%	14.5%	15.8%	14.0%
09R_ARRIVAL	0.8%	0.8%	8.9%	1.3%	14.1%
27L_ARRIVAL	17.9%	18.1%	25.3%	18.4%	28.8%
27R_ARRIVAL	14.5%	12.1%	24.5%	14.6%	27.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Table C8-d Heathrow 2011 route distributions (percentage of daily total)

Route	L _{day}	L _{evening}	L _{night}	L _{den}	L _{Aeq,6.5h}
09L_BPK	0.0%	0.0%	0.1%	0.0%	0.3%
09L_BUZ	0.0%	0.0%	0.0%	0.0%	0.1%
09L_CPT	0.0%	0.0%	0.0%	0.0%	0.0%
09L_DVR	0.0%	0.0%	0.1%	0.0%	0.4%
09L_MID	0.0%	0.0%	0.1%	0.0%	0.2%
09L_SAM	0.0%	0.0%	0.0%	0.0%	0.0%
09R_BPK	3.6%	4.5%	1.3%	3.6%	0.4%
09R_BUZ	2.5%	1.5%	0.5%	2.2%	0.2%
09R_CPT	2.5%	1.0%	0.4%	2.0%	0.0%
09R_DVR	3.1%	4.2%	2.2%	3.3%	0.6%
09R_MID	2.4%	2.9%	1.2%	2.4%	0.2%
09R_SAM	0.8%	0.8%	0.9%	0.8%	0.1%
27L_BPK	3.9%	5.2%	1.8%	4.0%	0.6%
27L_CPT	2.7%	1.2%	0.5%	2.3%	0.1%
27L_DVR	4.4%	5.6%	3.3%	4.6%	1.2%
27L_MID	2.9%	3.6%	1.7%	3.0%	0.5%
27L_SAM	1.0%	1.0%	1.0%	1.0%	0.1%
27L_WOB	3.3%	1.9%	0.6%	2.9%	0.2%
27R_BPK	4.0%	5.4%	2.2%	4.2%	0.6%
27R_CPT	2.7%	1.3%	0.6%	2.3%	0.2%
27R_DVR	4.4%	5.8%	3.5%	4.6%	1.2%
27R_MID	2.9%	3.7%	1.7%	3.0%	0.4%
27R_SAM	1.0%	1.0%	1.2%	1.0%	0.2%
27R_WOB	3.4%	2.0%	0.7%	2.9%	0.2%
09L_ARRIVAL	13.6%	12.6%	11.6%	13.2%	7.9%
09R_ARRIVAL	0.5%	0.6%	9.6%	1.1%	16.0%
27L_ARRIVAL	17.3%	17.5%	26.0%	17.8%	31.2%
27R_ARRIVAL	17.4%	16.9%	27.1%	17.8%	37.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Table C8-e Heathrow 2012 route distributions (percentage of daily total)

Route	L _{day}	L _{evening}	L _{night}	L _{den}	L _{Aeq,6.5h}
09L_BPK	0.0%	0.0%	0.1%	0.0%	0.1%
09L_BUZ	0.0%	0.0%	0.0%	0.0%	0.1%
09L_CPT	0.0%	0.0%	0.0%	0.0%	0.0%
09L_DVR	0.0%	0.0%	0.1%	0.0%	0.3%
09L_MID	0.0%	0.0%	0.1%	0.0%	0.2%
09L_SAM	0.0%	0.0%	0.0%	0.0%	0.1%
09R_BPK	3.0%	3.8%	1.4%	3.1%	1.1%
09R_BUZ	1.9%	1.5%	0.5%	1.7%	0.3%
09R_CPT	2.5%	1.0%	0.3%	2.0%	0.2%
09R_DVR	2.8%	3.4%	2.2%	2.9%	0.7%
09R_MID	2.1%	2.3%	1.1%	2.1%	0.5%
09R_SAM	0.6%	0.7%	0.8%	0.7%	0.1%
27L_BPK	3.7%	5.2%	1.8%	3.9%	0.8%
27L_CPT	3.1%	1.4%	0.4%	2.6%	0.2%
27L_DVR	4.5%	5.8%	3.6%	4.7%	1.5%
27L_MID	3.0%	3.5%	1.6%	3.0%	0.8%
27L_SAM	1.0%	1.0%	1.1%	1.0%	0.3%
27L_WOB	3.0%	2.1%	0.6%	2.7%	0.3%
27R_BPK	4.1%	5.6%	2.1%	4.3%	1.0%
27R_CPT	3.4%	1.5%	0.4%	2.9%	0.1%
27R_DVR	5.0%	6.1%	4.1%	5.2%	1.3%
27R_MID	3.3%	3.9%	1.6%	3.3%	0.7%
27R_SAM	1.0%	1.1%	1.2%	1.1%	0.3%
27R_WOB	3.3%	2.4%	0.7%	3.0%	0.2%
09L_ARRIVAL	12.1%	10.9%	10.2%	11.7%	17.3%
09R_ARRIVAL	0.6%	0.6%	8.4%	1.0%	11.3%
27L_ARRIVAL	18.2%	18.8%	27.7%	18.9%	28.4%
27R_ARRIVAL	17.8%	17.4%	27.8%	18.3%	31.7%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Table C8-f Heathrow 2013 route distributions (percentage of daily total)

Route	L _{day}	L _{evening}	L _{night}	L _{den}	L _{Aeq,6.5h}
09L_BPK	0.0%	0.2%	0.7%	0.1%	0.6%
09L_BUZ	0.0%	0.0%	0.1%	0.0%	0.3%
09L_CPT	0.0%	0.0%	0.0%	0.0%	0.1%
09L_DVR	0.0%	0.3%	1.5%	0.2%	0.8%
09L_MID	0.0%	0.1%	0.5%	0.0%	0.5%
09L_SAM	0.0%	0.1%	0.2%	0.0%	0.1%
09R_BPK	3.9%	5.4%	1.2%	4.1%	0.3%
09R_BUZ	2.6%	2.1%	0.4%	2.3%	0.1%
09R_CPT	3.2%	1.6%	0.3%	2.7%	0.0%
09R_DVR	3.6%	4.3%	2.2%	3.7%	0.5%
09R_MID	2.7%	3.5%	1.0%	2.8%	0.3%
09R_SAM	0.8%	1.0%	0.9%	0.8%	0.1%
27L_BPK	3.6%	4.4%	1.1%	3.6%	0.5%
27L_CPT	2.8%	1.3%	0.3%	2.3%	0.1%
27L_DVR	4.0%	4.3%	2.5%	4.0%	0.8%
27L_MID	2.6%	2.9%	1.1%	2.6%	0.4%
27L_SAM	0.9%	0.9%	0.9%	0.9%	0.1%
27L_WOB	3.0%	2.0%	0.5%	2.7%	0.2%
27R_BPK	3.7%	4.8%	2.2%	3.9%	1.0%
27R_CPT	2.9%	1.4%	0.4%	2.4%	0.2%
27R_DVR	4.3%	5.0%	5.0%	4.5%	2.0%
27R_MID	2.7%	3.3%	2.0%	2.8%	1.1%
27R_SAM	0.9%	1.1%	1.1%	0.9%	0.3%
27R_WOB	3.2%	2.2%	0.6%	2.8%	0.3%
09L_ARRIVAL	15.3%	16.5%	14.7%	15.5%	14.5%
09R_ARRIVAL	0.7%	0.7%	7.6%	1.1%	6.1%
27L_ARRIVAL	16.7%	15.3%	23.5%	16.8%	23.9%
27R_ARRIVAL	15.9%	15.3%	27.3%	16.5%	44.9%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Table C8-g Heathrow 2014 route distributions (percentage of daily total)

Route	L _{day}	L _{evening}	L _{night}	L _{den}	L _{Aeq,6.5h}
09L_BPK	0.0%	0.0%	0.1%	0.0%	0.1%
09L_BUZ	0.0%	0.0%	0.0%	0.0%	0.0%
09L_CPT	0.0%	0.0%	0.0%	0.0%	0.0%
09L_DVR	0.0%	0.1%	0.1%	0.0%	0.1%
09L_MID	0.0%	0.0%	0.1%	0.0%	0.1%
09L_SAM	0.0%	0.0%	0.0%	0.0%	0.1%
09R_BPK	3.5%	4.6%	1.4%	3.6%	0.4%
09R_BUZ	2.6%	1.9%	0.5%	2.3%	0.2%
09R_CPT	2.9%	1.3%	0.2%	2.4%	0.2%
09R_DVR	3.5%	4.3%	2.9%	3.6%	1.1%
09R_MID	2.3%	2.7%	1.4%	2.3%	0.4%
09R_SAM	0.8%	1.1%	1.0%	0.8%	0.2%
27L_BPK	3.7%	5.0%	1.8%	3.9%	0.7%
27L_CPT	2.7%	1.5%	0.3%	2.3%	0.2%
27L_DVR	4.2%	5.2%	3.9%	4.4%	1.7%
27L_MID	2.6%	3.1%	2.0%	2.7%	1.1%
27L_SAM	0.9%	1.2%	1.1%	1.0%	0.3%
27L_WOB	3.2%	2.2%	0.5%	2.9%	0.3%
27R_BPK	3.8%	5.2%	1.7%	4.0%	0.3%
27R_CPT	2.9%	1.5%	0.3%	2.4%	0.1%
27R_DVR	4.4%	5.4%	3.0%	4.5%	1.0%
27R_MID	2.7%	3.3%	1.5%	2.8%	0.4%
27R_SAM	0.9%	1.2%	1.0%	1.0%	0.2%
27R_WOB	3.4%	2.3%	0.5%	3.0%	0.2%
09L_ARRIVAL	14.3%	13.3%	11.9%	14.0%	11.2%
09R_ARRIVAL	0.6%	0.8%	11.6%	1.3%	19.0%
27L_ARRIVAL	17.2%	17.0%	27.5%	17.8%	38.6%
27R_ARRIVAL	16.8%	15.9%	23.6%	17.0%	21.9%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Table C8-h Heathrow 2015 route distributions (percentage of daily total)

Route	L _{day}	L _{evening}	L _{night}	L _{den}	L _{Aeq,6.5h}
09L_BPK	0.0%	0.0%	0.3%	0.0%	0.2%
09L_BUZ	0.0%	0.0%	0.0%	0.0%	0.0%
09L_CPT	0.0%	0.0%	0.1%	0.0%	0.1%
09L_DET	0.0%	0.1%	0.3%	0.0%	0.2%
09L_MID	0.0%	0.0%	0.1%	0.0%	0.1%
09L_SAM (GASGU)	0.0%	0.0%	0.1%	0.0%	0.1%
09R_BPK	2.9%	3.6%	1.3%	3.0%	0.3%
09R_BUZ	2.1%	1.5%	0.3%	1.9%	0.1%
09R_CPT	3.0%	1.2%	0.2%	2.4%	0.0%
09R_DET	3.7%	4.8%	2.1%	3.8%	0.4%
09R_MID	2.1%	2.5%	1.0%	2.1%	0.1%
09R_SAM (GASGU)	0.7%	0.8%	0.8%	0.8%	0.1%
27L_BPK	3.8%	4.9%	1.9%	3.9%	0.6%
27L_CPT	3.3%	1.4%	0.3%	2.7%	0.2%
27L_DET	4.6%	6.0%	3.2%	4.8%	1.2%
27L_MID	2.7%	3.2%	1.6%	2.8%	0.5%
27L_SAM (GOGSI)	0.9%	1.1%	1.0%	0.9%	0.2%
27L_WOB	3.1%	2.0%	0.5%	2.7%	0.2%
27R_BPK	3.7%	5.1%	2.1%	3.9%	0.6%
27R_CPT	3.3%	1.5%	0.3%	2.7%	0.1%
27R_DET	4.6%	6.1%	3.2%	4.9%	0.8%
27R_MID	2.8%	3.4%	1.6%	2.8%	0.4%
27R_SAM (GOGSI)	0.9%	1.1%	0.9%	1.0%	0.1%
27R_WOB	3.1%	2.1%	0.5%	2.8%	0.1%
09L_ARRIVAL	13.2%	12.5%	12.4%	13.0%	15.9%
09R_ARRIVAL	0.5%	0.5%	8.5%	1.0%	10.6%
27L_ARRIVAL	17.5%	17.5%	28.3%	18.1%	35.3%
27R_ARRIVAL	17.5%	16.9%	27.0%	17.9%	31.6%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Note: the SAM routes were renamed GOGSI (27L/27R) and GASGU (09L/09R) in 2015, but the SAM name has been retained in this table for ease of comparison with the previous tables.

Table C8-i Heathrow 2016 route distributions (percentage of daily total)

Route	L _{day}	L _{evening}	L _{night}	L _{den}	L _{Aeq,6.5h}
09L_BPK	0.0%	0.0%	0.1%	0.0%	0.1%
09L_BUZ	0.0%	0.0%	0.0%	0.0%	0.0%
09L_CPT	0.0%	0.0%	0.0%	0.0%	0.0%
09L_DET	0.0%	0.0%	0.1%	0.0%	0.3%
09L_MID	0.0%	0.0%	0.0%	0.0%	0.1%
09L_SAM (GASGU)	0.0%	0.0%	0.0%	0.0%	0.1%
09R_BPK	3.3%	3.9%	1.6%	3.3%	0.3%
09R_BUZ	2.2%	1.3%	0.5%	1.9%	0.1%
09R_CPT	3.1%	1.1%	0.4%	2.5%	0.0%
09R_DET	3.7%	5.2%	2.5%	4.0%	0.3%
09R_MID	2.3%	2.6%	1.3%	2.3%	0.3%
09R_SAM (GASGU)	0.7%	0.9%	0.9%	0.8%	0.0%
27L_BPK	4.0%	4.9%	2.6%	4.1%	1.2%
27L_CPT	3.4%	1.4%	0.5%	2.8%	0.3%
27L_DET	4.2%	6.1%	3.6%	4.5%	2.3%
27L_MID	2.9%	3.4%	1.0%	2.9%	0.9%
27L_SAM (GOGSI)	0.9%	1.1%	1.9%	1.0%	0.3%
27L_WOB	2.8%	1.6%	0.5%	2.4%	0.4%
27R_BPK	3.9%	5.1%	2.2%	4.0%	0.6%
27R_CPT	3.4%	1.4%	0.3%	2.8%	0.0%
27R_DET	4.2%	6.5%	3.0%	4.6%	1.2%
27R_MID	0.9%	3.5%	0.9%	1.4%	0.5%
27R_SAM (GOGSI)	2.7%	1.2%	1.6%	2.3%	0.2%
27R_WOB	2.8%	1.7%	0.4%	2.4%	0.2%
09L_ARRIVAL	14.1%	12.8%	13.5%	13.8%	14.0%
09R_ARRIVAL	0.5%	0.4%	9.5%	1.1%	13.8%
27L_ARRIVAL	17.0%	17.1%	25.9%	17.6%	32.0%
27R_ARRIVAL	17.2%	16.7%	25.2%	17.6%	30.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Note: the SAM routes were renamed GOGSI (27L/27R) and GASGU (09L/09R) in 2015, but the SAM name has been retained in this table for ease of comparison with the previous tables.

Table C8-j Heathrow 2017 route distributions (percentage of daily total)

Route	L _{day}	L _{evening}	L _{night}	L _{den}	L _{Aeq,6.5h}
09L_BPK	0.0%	0.0%	0.1%	0.0%	0.2%
09L_BUZ	0.0%	0.0%	0.0%	0.0%	0.0%
09L_CPT	0.0%	0.0%	0.0%	0.0%	0.0%
09L_DET	0.0%	0.0%	0.1%	0.0%	0.1%
09L_MID	0.0%	0.0%	0.0%	0.0%	0.1%
09L_SAM (GASGU)	0.0%	0.0%	0.0%	0.0%	0.1%
09R_BPK	2.3%	2.6%	1.1%	2.3%	0.5%
09R_BUZ	1.6%	0.9%	0.3%	1.4%	0.2%
09R_CPT	1.8%	0.7%	0.3%	1.5%	0.3%
09R_DET	2.2%	3.4%	1.5%	2.4%	1.3%
09R_MID	1.5%	1.7%	1.0%	1.5%	0.6%
09R_SAM (GASGU)	0.5%	0.7%	0.6%	0.5%	0.2%
27L_BPK	4.6%	5.8%	2.6%	4.7%	0.7%
27L_CPT	3.5%	1.5%	0.5%	2.9%	0.1%
27L_DET	4.6%	7.3%	3.2%	5.0%	0.8%
27L_MID	3.2%	3.6%	2.2%	3.2%	0.5%
27L_SAM (GOGSI)	1.1%	1.6%	1.2%	1.2%	0.2%
27L_WOB	3.6%	2.0%	0.5%	3.1%	0.2%
27R_BPK	4.6%	5.6%	2.5%	4.7%	0.7%
27R_CPT	3.6%	1.5%	0.5%	3.0%	0.0%
27R_DET	4.6%	7.3%	3.1%	5.0%	0.9%
27R_MID	3.2%	1.6%	2.1%	2.8%	0.3%
27R_SAM (GOGSI)	1.1%	3.5%	1.1%	1.6%	0.1%
27R_WOB	3.5%	2.0%	0.5%	3.0%	0.1%
09L_ARRIVAL	9.2%	8.4%	8.7%	9.0%	10.7%
09R_ARRIVAL	0.4%	0.3%	6.1%	0.7%	11.0%
27L_ARRIVAL	19.7%	19.0%	30.4%	20.2%	33.4%
27R_ARRIVAL	19.7%	19.0%	29.6%	20.2%	36.7%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Note: the SAM routes were renamed GOGSI (27L/27R) and GASGU (09L/09R) in 2015, but the SAM name has been retained in this table for ease of comparison with the previous tables.

Table C8-k Heathrow 2018 route distributions (percentage of daily total)

Route	L _{day}	L _{evening}	L _{night}	L _{den}	L _{Aeq,6.5h}
09L_BPK	0.0%	0.0%	0.1%	0.0%	0.1%
09L_BUZ (ULTIB)	0.0%	0.0%	0.0%	0.0%	0.0%
09L_CPT	0.0%	0.0%	0.0%	0.0%	0.0%
09L_DET	0.0%	0.0%	0.1%	0.0%	0.2%
09L_MID	0.0%	0.0%	0.0%	0.0%	0.1%
09L_SAM (GASGU)	0.0%	0.0%	0.0%	0.0%	0.1%
09R_BPK	3.8%	5.4%	2.0%	4.0%	0.3%
09R_BUZ (ULTIB)	3.1%	1.8%	0.5%	2.7%	0.0%
09R_CPT	3.2%	1.3%	0.5%	2.6%	0.0%
09R_DET	4.4%	6.1%	2.6%	4.6%	0.7%
09R_MID	2.7%	3.0%	1.9%	2.7%	0.4%
09R_SAM (GASGU)	0.9%	1.3%	1.2%	1.0%	0.2%
27L_BPK	3.6%	5.1%	2.0%	3.8%	0.6%
27L_CPT	2.7%	1.2%	0.5%	2.2%	0.1%
27L_DET	3.8%	5.6%	2.5%	4.1%	1.0%
27L_MID	2.6%	2.8%	1.7%	2.6%	0.4%
27L_SAM (GOGSI)	0.9%	1.2%	1.0%	1.0%	0.3%
27L_WOB (UMLAT)	3.0%	1.8%	0.4%	2.6%	0.0%
27R_BPK	3.5%	4.8%	2.1%	3.7%	1.0%
27R_CPT	2.5%	1.1%	0.5%	2.1%	0.1%
27R_DET	3.8%	5.2%	2.4%	4.0%	1.1%
27R_MID	2.6%	2.6%	1.9%	2.6%	0.6%
27R_SAM (GOGSI)	0.9%	1.2%	1.1%	1.0%	0.4%
27R_WOB (UMLAT)	3.1%	1.6%	0.4%	2.7%	0.2%
09L_ARRIVAL	16.7%	16.0%	15.2%	16.5%	15.6%
09R_ARRIVAL	0.6%	0.6%	11.5%	1.3%	12.7%
27L_ARRIVAL	15.7%	14.4%	24.3%	16.0%	34.3%
27R_ARRIVAL	15.8%	15.9%	23.7%	16.3%	29.3%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

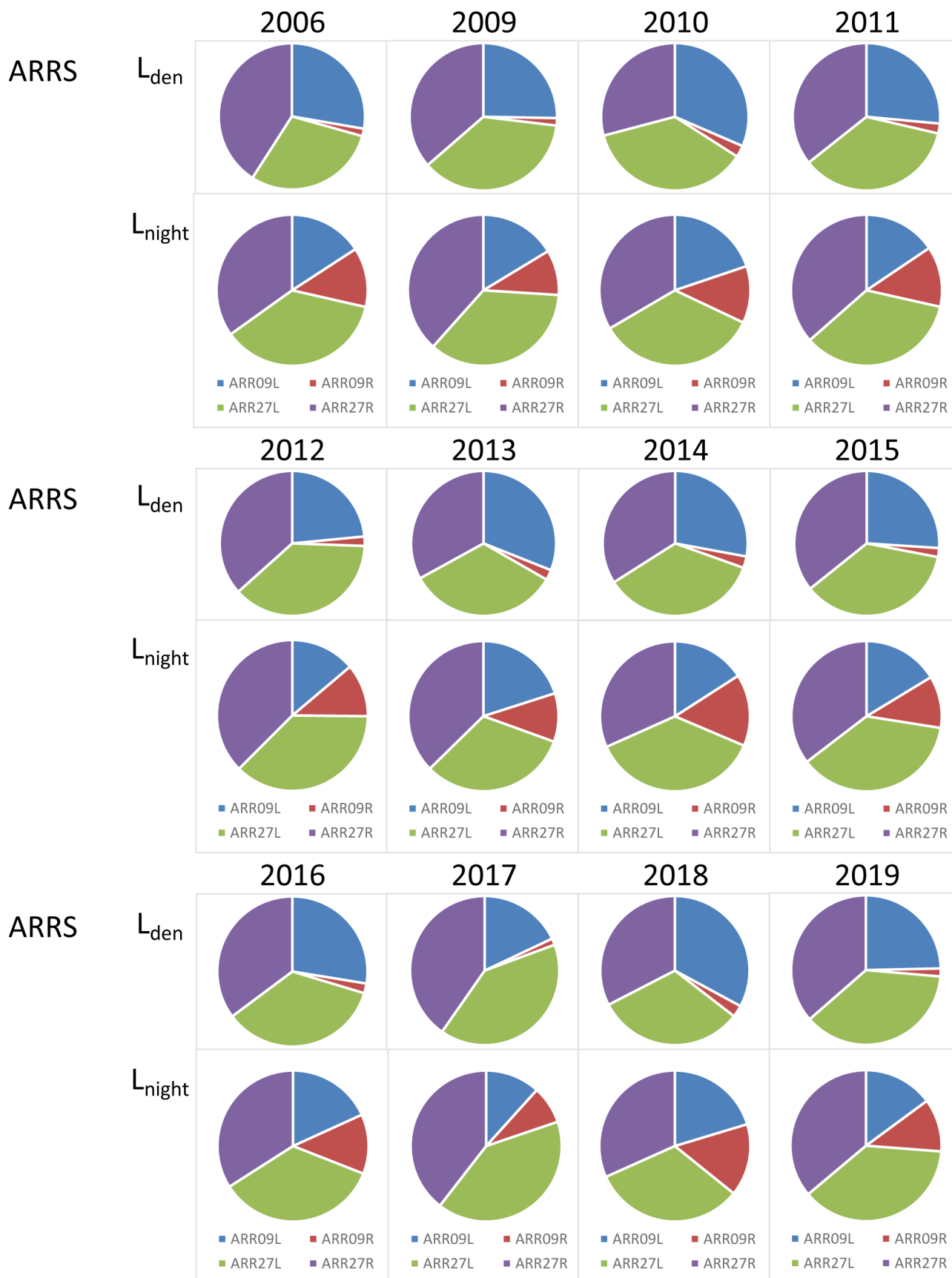
Note: the SAM routes were renamed GOGSI (27L/27R) and GASGU (09L/09R) in 2015, but the SAM name has been retained in this table for ease of comparison with the previous tables. In 2018, WOB was renamed as UMLAT, and BUZ as ULTIB.

Table C8-I Heathrow 2019 route distributions (percentage of daily total)

Route	L _{day}	L _{evening}	L _{night}	L _{den}	L _{Aeq,6.5h}
09L_BPK	0.0%	0.0%	0.1%	0.0%	0.2%
09L_BUZ (ULTIB)	0.0%	0.0%	0.0%	0.0%	0.0%
09L_CPT	0.0%	0.0%	0.0%	0.0%	0.0%
09L_DET	0.0%	0.0%	0.1%	0.0%	0.2%
09L_MID	0.0%	0.0%	0.0%	0.0%	0.0%
09L_SAM (GASGU)	0.0%	0.0%	0.1%	0.0%	0.2%
09R_BPK	2.8%	3.8%	1.5%	2.9%	0.3%
09R_BUZ (ULTIB)	2.3%	1.4%	0.5%	2.0%	0.0%
09R_CPT	2.4%	1.1%	0.4%	2.0%	0.0%
09R_DET	3.0%	4.1%	1.8%	3.2%	0.4%
09R_MID	2.2%	2.4%	1.4%	2.2%	0.2%
09R_SAM (GASGU)	0.8%	1.1%	0.8%	0.8%	0.2%
27L_BPK	3.9%	5.8%	2.1%	4.2%	0.4%
27L_CPT	2.9%	1.5%	0.4%	2.4%	0.1%
27L_DET	4.1%	6.3%	2.4%	4.5%	0.6%
27L_MID	3.1%	3.3%	1.9%	3.0%	0.3%
27L_SAM (GOGSI)	1.1%	1.5%	1.1%	1.2%	0.3%
27L_WOB (UMLAT)	3.4%	2.1%	0.7%	3.0%	0.1%
27R_BPK	4.0%	5.1%	2.5%	4.2%	0.9%
27R_CPT	3.0%	1.4%	0.6%	2.5%	0.2%
27R_DET	4.3%	6.0%	2.8%	4.6%	1.1%
27R_MID	3.1%	3.1%	2.1%	3.1%	0.8%
27R_SAM (GOGSI)	1.1%	1.4%	1.3%	1.2%	0.4%
27R_WOB (UMLAT)	3.7%	1.9%	0.8%	3.1%	0.1%
09L_ARRIVAL	12.4%	12.3%	11.1%	12.3%	11.7%
09R_ARRIVAL	0.4%	0.4%	8.4%	0.9%	13.4%
27L_ARRIVAL	18.5%	16.4%	28.0%	18.6%	32.2%
27R_ARRIVAL	17.7%	17.6%	26.9%	18.2%	35.6%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Note: the SAM routes were renamed GOGSI (27L/27R) and GASGU (09L/09R) in 2015, but the SAM name has been retained in this table for ease of comparison with the previous tables. In 2018, WOB was renamed as UMLAT, and BUZ as ULTIB.

Pie charts based on Tables C8-a to C8-l for arrival movements:



Pie charts based on Tables C8-a to C8-I for Runway 09L/R departure movements:



Pie charts based on Tables C8-a to C8-I for Runway 27L/R departure movements:

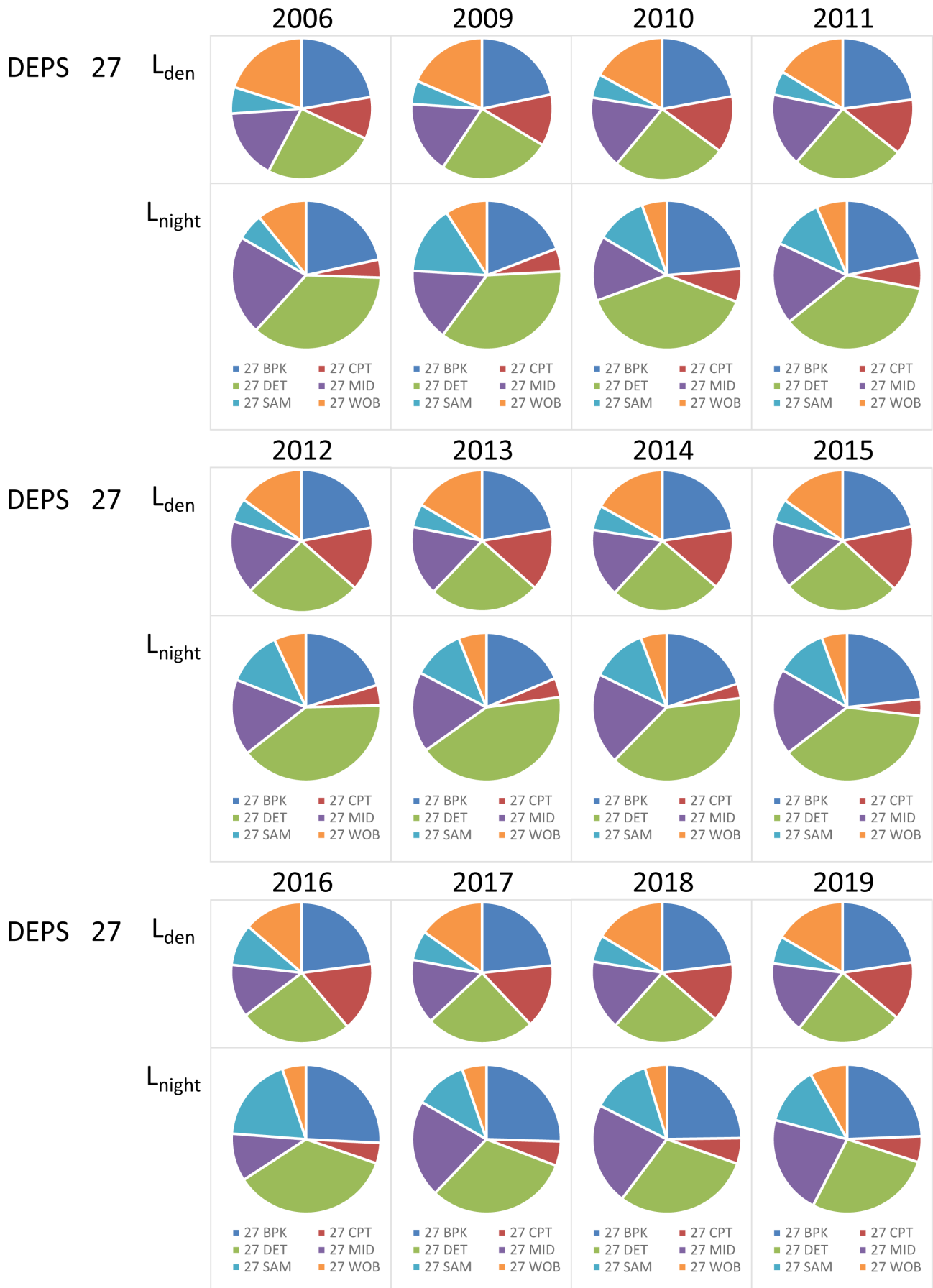


Table C9-a Heathrow 2006 route distributions (single mode operations)

Route	L _{day}	L _{evening}	L _{night}	L _{den}	L _{Aeq,6.5h}
09L_BPK	0.0%	0.0%	0.1%	0.0%	0.0%
09L_BUZ	0.0%	0.0%	0.1%	0.0%	0.0%
09L_CPT	0.0%	0.0%	0.0%	0.0%	0.0%
09L_DVR	0.0%	0.0%	0.0%	0.0%	0.0%
09L_MID	0.0%	0.0%	0.0%	0.0%	0.0%
09L_SAM	0.0%	0.0%	0.0%	0.0%	0.0%
09R_BPK	21.2%	25.5%	21.0%	22.2%	25.5%
09R_BUZ	21.6%	14.4%	9.2%	19.6%	8.5%
09R_CPT	12.3%	7.8%	3.9%	11.0%	6.5%
09R_DVR	23.3%	28.4%	37.0%	24.9%	40.7%
09R_MID	15.8%	19.8%	23.5%	17.0%	13.9%
09R_SAM	5.7%	4.0%	5.1%	5.3%	4.9%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
27L_BPK	12.6%	14.2%	13.8%	13.0%	18.2%
27L_CPT	6.5%	4.2%	2.3%	5.8%	4.0%
27L_DVR	14.1%	18.5%	22.5%	15.4%	29.6%
27L_MID	9.0%	10.9%	13.5%	9.5%	7.4%
27L_SAM	3.8%	3.3%	3.6%	3.7%	5.1%
27L_WOB	12.7%	8.4%	6.3%	11.5%	5.9%
27R_BPK	9.0%	10.6%	7.9%	9.3%	8.0%
27R_CPT	4.2%	2.9%	1.6%	3.8%	1.9%
27R_DVR	9.7%	11.6%	13.7%	10.3%	11.0%
27R_MID	6.2%	7.6%	8.2%	6.6%	3.1%
27R_SAM	2.6%	1.8%	2.2%	2.4%	1.9%
27R_WOB	9.5%	6.0%	4.6%	8.6%	3.9%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
09L_ARRIVAL	98.2%	96.5%	55.4%	94.3%	38.4%
09R_ARRIVAL	1.8%	3.5%	44.6%	5.7%	61.6%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
27L_ARRIVAL	41.1%	41.6%	51.2%	42.0%	55.6%
27R_ARRIVAL	58.9%	58.4%	48.8%	58.0%	44.4%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Table C9-b Heathrow 2009 route distributions (single mode operations)

Route	L _{day}	L _{evening}	L _{night}	L _{den}	L _{Aeq,6.5h}
09L_BPK	0.0%	0.1%	1.9%	0.1%	1.9%
09L_BUZ	0.0%	0.0%	0.9%	0.0%	0.9%
09L_CPT	0.0%	0.0%	2.4%	0.0%	2.4%
09L_DVR	0.0%	0.2%	2.0%	0.1%	2.0%
09L_MID	0.0%	0.1%	1.6%	0.0%	1.6%
09L_SAM	0.0%	0.0%	0.3%	0.0%	0.3%
09R_BPK	22.4%	26.8%	20.9%	23.4%	20.9%
09R_BUZ	18.6%	11.6%	9.3%	17.0%	9.3%
09R_CPT	16.5%	8.0%	8.4%	14.5%	8.4%
09R_DVR	21.5%	28.9%	33.2%	23.2%	33.2%
09R_MID	16.0%	19.7%	17.1%	16.8%	17.1%
09R_SAM	4.9%	4.6%	2.0%	4.8%	2.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
27L_BPK	10.1%	13.1%	5.8%	10.7%	5.8%
27L_CPT	6.6%	3.7%	1.7%	5.9%	1.7%
27L_DVR	11.7%	15.7%	10.6%	12.6%	10.6%
27L_MID	7.8%	10.0%	5.9%	8.3%	5.9%
27L_SAM	2.5%	2.4%	0.7%	2.5%	0.7%
27L_WOB	10.2%	6.1%	1.9%	9.2%	1.9%
27R_BPK	10.7%	12.7%	14.6%	11.1%	14.6%
27R_CPT	6.8%	3.6%	6.1%	6.1%	6.1%
27R_DVR	12.2%	15.2%	26.3%	12.9%	26.3%
27R_MID	8.1%	9.7%	14.0%	8.5%	14.0%
27R_SAM	2.7%	2.3%	4.1%	2.6%	4.1%
27R_WOB	10.8%	5.6%	8.4%	9.6%	8.4%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
09L_ARRIVAL	96.8%	96.7%	62.8%	93.8%	62.6%
09R_ARRIVAL	3.2%	3.3%	37.2%	6.2%	37.4%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
27L_ARRIVAL	51.0%	48.1%	48.1%	50.2%	45.2%
27R_ARRIVAL	49.0%	51.9%	51.9%	49.8%	54.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Table C9-c Heathrow 2010 route distributions (single mode operations)

Route	L _{day}	L _{evening}	L _{night}	L _{den}	L _{Aeq,6.5h}
09L_BPK	0.2%	0.2%	2.2%	0.3%	9.1%
09L_BUZ	0.2%	0.0%	0.5%	0.2%	0.7%
09L_CPT	0.2%	0.1%	0.3%	0.1%	1.6%
09L_DVR	0.2%	0.1%	2.4%	0.3%	10.8%
09L_MID	0.1%	0.1%	1.2%	0.2%	4.9%
09L_SAM	0.0%	0.0%	0.5%	0.1%	1.5%
09R_BPK	22.2%	26.5%	21.4%	23.1%	17.7%
09R_BUZ	17.0%	11.2%	6.0%	15.4%	4.3%
09R_CPT	16.5%	7.1%	5.5%	14.1%	5.1%
09R_DVR	21.5%	29.3%	34.8%	23.7%	26.5%
09R_MID	16.4%	20.2%	14.9%	17.2%	15.5%
09R_SAM	5.3%	5.2%	10.2%	5.5%	2.3%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
27L_BPK	9.0%	10.4%	11.1%	9.4%	12.8%
27L_CPT	6.6%	2.9%	3.2%	5.7%	3.2%
27L_DVR	10.6%	12.4%	18.1%	11.3%	16.2%
27L_MID	7.1%	8.4%	6.7%	7.4%	10.5%
27L_SAM	2.3%	2.1%	5.2%	2.4%	2.9%
27L_WOB	8.5%	4.4%	2.4%	7.3%	1.0%
27R_BPK	12.0%	15.3%	12.7%	12.7%	14.7%
27R_CPT	8.4%	4.0%	4.0%	7.3%	2.3%
27R_DVR	13.4%	18.4%	20.4%	14.7%	21.6%
27R_MID	8.4%	11.8%	7.1%	9.1%	9.1%
27R_SAM	2.9%	3.1%	6.0%	3.0%	2.6%
27R_WOB	10.8%	6.7%	3.1%	9.6%	3.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
09L_ARRIVAL	95.4%	95.0%	61.9%	92.4%	50.0%
09R_ARRIVAL	4.6%	5.0%	38.1%	7.6%	50.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
27L_ARRIVAL	55.4%	60.0%	50.8%	55.9%	51.6%
27R_ARRIVAL	44.6%	40.0%	49.2%	44.1%	48.4%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Table C9-d Heathrow 2011 route distributions (single mode operations)

Route	L _{day}	L _{evening}	L _{night}	L _{den}	L _{Aeq,6.5h}
09L_BPK	0.0%	0.0%	1.4%	0.0%	11.6%
09L_BUZ	0.0%	0.0%	0.3%	0.0%	3.5%
09L_CPT	0.0%	0.0%	0.2%	0.0%	0.6%
09L_DVR	0.0%	0.0%	2.1%	0.1%	17.1%
09L_MID	0.0%	0.0%	1.0%	0.0%	8.6%
09L_SAM	0.0%	0.0%	0.2%	0.0%	1.4%
09R_BPK	24.1%	30.3%	19.9%	25.4%	15.2%
09R_BUZ	17.0%	10.2%	7.1%	15.2%	7.0%
09R_CPT	16.8%	6.6%	5.1%	14.2%	1.6%
09R_DVR	20.8%	28.0%	33.6%	22.8%	22.0%
09R_MID	16.1%	19.5%	17.3%	16.9%	8.5%
09R_SAM	5.2%	5.5%	11.9%	5.4%	3.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
27L_BPK	10.6%	13.9%	9.7%	11.3%	11.9%
27L_CPT	7.5%	3.1%	2.9%	6.4%	1.6%
27L_DVR	12.0%	14.9%	17.3%	12.8%	22.0%
27L_MID	8.0%	9.6%	8.9%	8.4%	8.8%
27L_SAM	2.7%	2.7%	5.2%	2.7%	1.3%
27L_WOB	9.2%	5.1%	3.4%	8.1%	3.6%
27R_BPK	10.8%	14.2%	11.8%	11.6%	12.1%
27R_CPT	7.4%	3.4%	3.5%	6.4%	3.2%
27R_DVR	11.9%	15.4%	18.5%	12.9%	22.2%
27R_MID	8.0%	9.8%	8.8%	8.5%	6.9%
27R_SAM	2.6%	2.8%	6.2%	2.8%	2.9%
27R_WOB	9.3%	5.2%	3.7%	8.2%	3.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
09L_ARRIVAL	96.1%	95.8%	54.4%	92.4%	33.0%
09R_ARRIVAL	3.9%	4.2%	45.6%	7.6%	67.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
27L_ARRIVAL	49.9%	50.9%	48.9%	50.0%	54.2%
27R_ARRIVAL	50.1%	49.1%	51.1%	50.0%	45.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Table C9-e Heathrow 2012 route distributions (single mode operations)

Route	L _{day}	L _{evening}	L _{night}	L _{den}	L _{Aeq,6.5h}
09LBPK	0.0%	0.0%	1.3%	0.07%	3.2%
09LBUZ	0.0%	0.0%	0.3%	0.01%	2.6%
09LCPT	0.0%	0.0%	0.2%	0.01%	1.0%
09LDVR	0.0%	0.0%	1.9%	0.09%	7.4%
09LMID	0.0%	0.0%	0.9%	0.04%	4.4%
09LSAM	0.0%	0.0%	0.4%	0.02%	2.6%
09RBPK	23.3%	30.0%	22.2%	24.74%	29.2%
09RBUZ	14.6%	11.6%	6.7%	13.67%	7.7%
09RCPT	19.3%	7.6%	3.9%	16.21%	5.0%
09RDVR	21.6%	26.8%	33.6%	23.13%	19.7%
09RMID	16.2%	18.6%	16.4%	16.70%	15.5%
09RSAM	5.0%	5.4%	12.1%	5.30%	1.8%
Total	100%	100.0%	100.0%	100.0%	100.0%
27LBPK	9.7%	13.1%	9.2%	10.5%	10.9%
27LCPT	8.1%	3.6%	2.1%	6.9%	2.9%
27LDVR	11.7%	14.5%	18.3%	12.5%	19.4%
27LMID	7.7%	8.8%	8.2%	8.0%	9.7%
27LSAM	2.5%	2.6%	5.8%	2.6%	4.1%
27LWOB	7.9%	5.4%	3.4%	7.2%	4.8%
27RBPK	10.6%	14.1%	11.0%	11.4%	13.6%
27RCPT	9.1%	3.8%	2.4%	7.8%	1.9%
27RDVR	12.9%	15.4%	21.4%	13.7%	17.1%
27RMID	8.4%	9.7%	8.6%	8.7%	9.4%
27RSAM	2.6%	2.8%	6.1%	2.8%	4.0%
27RWOB	8.7%	6.0%	3.7%	8.0%	2.3%
Total	100%	100.0%	100.0%	100.0%	100.0%
09L_ARRIVAL	95.6%	94.5%	55.0%	91.9%	60.5%
09R_ARRIVAL	4.4%	5.5%	45.0%	8.1%	39.5%
Total	100%	100.0%	100.0%	100.0%	100.0%
27L_ARRIVAL	50.6%	51.9%	49.9%	50.8%	47.3%
27R_ARRIVAL	49.4%	48.1%	50.1%	49.2%	52.7%
Total	100%	100.0%	100.0%	100.0%	100.0%

Table C9-f Heathrow 2013 route distributions (single mode operations)

Route	L _{day}	L _{evening}	L _{night}	L _{den}	L _{Aeq,6.5h}
09L_BPK	0.1%	1.0%	7.8%	0.6%	17.5%
09L_BUZ	0.2%	0.1%	1.0%	0.2%	6.4%
09L_CPT	0.0%	0.2%	0.5%	0.1%	2.3%
09L_DVR	0.0%	1.6%	15.2%	0.9%	21.4%
09L_MID	0.0%	0.4%	5.4%	0.3%	16.8%
09L_SAM	0.0%	0.4%	2.2%	0.2%	3.4%
09R_BPK	23.2%	28.6%	13.3%	24.0%	7.3%
09R_BUZ	15.2%	11.6%	4.5%	14.0%	1.7%
09R_CPT	19.1%	8.6%	3.3%	16.3%	1.2%
09R_DVR	21.3%	23.5%	25.5%	21.9%	11.4%
09R_MID	16.1%	18.8%	10.9%	16.5%	7.1%
09R_SAM	4.8%	5.3%	10.4%	5.1%	3.4%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
27L_BPK	10.4%	13.1%	6.8%	10.8%	7.7%
27L_CPT	8.0%	3.9%	1.6%	6.9%	1.0%
27L_DVR	11.6%	12.8%	13.1%	11.9%	12.1%
27L_MID	7.5%	8.7%	7.3%	7.7%	5.8%
27L_SAM	2.5%	2.7%	3.3%	2.6%	1.9%
27L_WOB	8.8%	6.0%	3.5%	8.0%	3.4%
27R_BPK	10.8%	14.3%	12.3%	11.6%	12.9%
27R_CPT	8.4%	4.2%	2.4%	7.3%	3.2%
27R_DVR	12.6%	14.8%	28.5%	13.6%	12.8%
27R_MID	7.8%	9.8%	11.5%	8.4%	34.9%
27R_SAM	2.5%	3.1%	6.3%	2.7%	4.4%
27R_WOB	9.2%	6.6%	3.3%	8.4%	0.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
09L_ARRIVAL	95.4%	95.6%	65.6%	92.8%	69.9%
09R_ARRIVAL	4.6%	4.4%	34.4%	7.2%	30.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
27L_ARRIVAL	51.2%	50.0%	46.2%	50.5%	34.5%
27R_ARRIVAL	48.8%	50.0%	53.8%	49.5%	65.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Table C9-g Heathrow 2014 route distributions (single mode operations)

Route	L _{day}	L _{evening}	L _{night}	L _{den}	L _{Aeq,6.5h}
09L_BPK	0.1%	0.4%	1.1%	0.2%	1.0%
09L_BUZ	0.1%	0.1%	0.1%	0.1%	0.0%
09L_CPT	0.0%	0.1%	0.1%	0.0%	0.0%
09L_DVR	0.0%	0.6%	1.6%	0.2%	2.7%
09L_MID	0.0%	0.1%	1.0%	0.1%	5.2%
09L_SAM	0.0%	0.1%	0.3%	0.0%	1.7%
09R_BPK	22.4%	28.4%	18.8%	23.6%	15.9%
09R_BUZ	16.5%	11.7%	5.5%	15.1%	6.8%
09R_CPT	18.6%	8.1%	3.0%	15.8%	5.9%
09R_DVR	22.6%	26.8%	37.6%	24.0%	39.4%
09R_MID	14.7%	16.7%	17.7%	15.3%	13.1%
09R_SAM	5.0%	6.8%	13.2%	5.6%	8.3%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
27L_BPK	10.5%	13.6%	10.2%	11.1%	10.5%
27L_CPT	7.7%	3.9%	1.5%	6.7%	3.8%
27L_DVR	11.8%	14.0%	22.2%	12.6%	27.6%
27L_MID	7.5%	8.3%	11.2%	7.8%	15.9%
27L_SAM	2.7%	3.2%	6.4%	2.9%	5.0%
27L_WOB	9.1%	6.0%	3.0%	8.3%	4.5%
27R_BPK	10.7%	14.1%	9.4%	11.4%	4.2%
27R_CPT	8.1%	4.1%	1.6%	7.0%	1.7%
27R_DVR	12.3%	14.5%	17.2%	12.9%	15.4%
27R_MID	7.6%	8.9%	8.7%	7.9%	5.8%
27R_SAM	2.5%	3.3%	5.7%	2.7%	2.9%
27R_WOB	9.6%	6.2%	2.8%	8.6%	2.7%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
09L_ARRIVAL	96.1%	94.0%	50.8%	91.7%	37.0%
09R_ARRIVAL	3.9%	6.0%	49.2%	8.3%	63.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
27L_ARRIVAL	50.6%	51.7%	53.9%	51.1%	63.8%
27R_ARRIVAL	49.4%	48.3%	46.1%	48.9%	36.2%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Table C9-h Heathrow 2015 route distributions (single mode operations)

Route	L _{day}	L _{evening}	L _{night}	L _{den}	L _{Aeq,6.5h}
09L_BPK	0.0%	0.2%	4.5%	0.2%	11.0%
09L_BUZ	0.0%	0.0%	0.3%	0.0%	1.0%
09L_CPT	0.0%	0.0%	0.8%	0.0%	4.0%
09L_DET	0.0%	0.4%	5.0%	0.2%	11.0%
09L_MID	0.0%	0.1%	1.9%	0.1%	6.0%
09L_SAM/GASGU	0.0%	0.0%	0.9%	0.0%	7.0%
09R_BPK	20.0%	25.0%	20.4%	21.1%	16.3%
09R_BUZ	14.6%	10.4%	4.4%	13.4%	4.1%
09R_CPT	20.6%	8.2%	2.8%	17.4%	2.0%
09R_DET	25.5%	33.0%	32.7%	27.3%	26.5%
09R_MID	14.3%	16.7%	14.4%	14.8%	8.1%
09R_SAM/GASGU	5.0%	5.7%	11.9%	5.4%	3.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
27L_BPK	10.3%	12.9%	10.9%	10.9%	12.8%
27L_CPT	8.9%	3.7%	1.8%	7.6%	3.6%
27L_DET	12.5%	15.8%	18.7%	13.4%	22.8%
27L_MID	7.4%	8.5%	9.5%	7.7%	10.0%
27L_SAM/GOGSI	2.5%	2.8%	5.7%	2.6%	5.2%
27L_WOB	8.4%	5.3%	2.9%	7.6%	4.8%
27R_BPK	10.1%	13.5%	12.2%	10.9%	11.3%
27R_CPT	8.9%	4.0%	1.9%	7.6%	1.4%
27R_DET	12.6%	16.1%	18.7%	13.5%	15.8%
27R_MID	7.5%	9.0%	9.5%	7.9%	7.7%
27R_SAM/GOGSI	2.5%	2.9%	5.5%	2.7%	2.1%
27R_WOB	8.5%	5.6%	2.8%	7.7%	2.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
09L_ARRIVAL	96.1%	96.1%	59.3%	92.8%	60.4%
09R_ARRIVAL	3.9%	3.9%	40.7%	7.2%	39.6%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
27L_ARRIVAL	50.0%	51.0%	51.2%	50.3%	52.7%
27R_ARRIVAL	50.0%	49.0%	48.8%	49.7%	47.3%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Table C9-i Heathrow 2016 route distributions (single mode operations)

Route	L _{day}	L _{evening}	L _{night}	L _{den}	L _{Aeq,6.5h}
09L_BPK	0.0%	0.0%	1.0%	0.0%	8.2%
09L_BUZ	0.0%	0.0%	0.0%	0.0%	1.9%
09L_CPT	0.0%	0.0%	0.2%	0.0%	0.0%
09L_DET	0.0%	0.0%	1.4%	0.0%	16.7%
09L_MID	0.0%	0.0%	0.6%	0.0%	5.8%
09L_SAM (GASGU)	0.0%	0.0%	0.4%	0.0%	3.0%
09R_BPK	21.6%	26.1%	22.5%	22.6%	19.6%
09R_BUZ	14.1%	8.6%	5.7%	12.6%	7.1%
09R_CPT	20.4%	7.4%	5.2%	17.0%	3.0%
09R_DET	24.3%	34.6%	34.9%	26.9%	18.9%
09R_MID	14.9%	17.2%	16.9%	15.4%	13.5%
09R_SAM (GASGU)	4.8%	6.1%	11.2%	5.3%	2.2%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
27L_BPK	11.1%	13.0%	13.6%	11.6%	14.4%
27L_CPT	9.4%	3.7%	2.8%	7.9%	3.0%
27L_DET	11.6%	16.2%	19.2%	12.9%	28.9%
27L_MID	8.0%	8.8%	10.1%	8.3%	10.9%
27L_SAM (GOGSI)	2.5%	3.0%	5.7%	2.7%	3.9%
27L_WOB	7.8%	4.3%	3.0%	6.9%	4.7%
27R_BPK	10.8%	13.3%	11.8%	11.4%	6.8%
27R_CPT	9.4%	3.7%	1.8%	7.9%	0.5%
27R_DET	11.6%	17.1%	16.0%	12.9%	14.6%
27R_MID	7.6%	9.2%	8.7%	8.0%	6.8%
27R_SAM (GOGSI)	2.5%	3.1%	5.0%	2.7%	2.9%
27R_WOB	7.7%	4.5%	2.4%	6.8%	2.7%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
09L_ARRIVAL	96.3%	96.6%	59.0%	93.0%	50.4%
09R_ARRIVAL	3.7%	3.4%	41.0%	7.0%	49.6%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
27L_ARRIVAL	49.7%	50.6%	50.7%	49.9%	51.2%
27R_ARRIVAL	50.3%	49.4%	49.3%	50.1%	48.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Table C9-j Heathrow 2017 route distributions (single mode operations)

Route	L _{day}	L _{evening}	L _{night}	L _{den}	L _{Aeq,6.5h}
09L_BPK	0.0%	0.1%	2.2%	0.1%	5.2%
09L_BUZ	0.0%	0.0%	0.1%	0.0%	0.5%
09L_CPT	0.0%	0.0%	0.1%	0.0%	0.5%
09L_DET	0.0%	0.0%	2.0%	0.1%	3.8%
09L_MID	0.0%	0.0%	0.7%	0.0%	1.4%
09L_SAM (GASGU)	0.0%	0.0%	0.5%	0.0%	1.9%
09R_BPK	22.5%	26.2%	21.9%	23.3%	14.6%
09R_BUZ	16.7%	8.9%	6.0%	14.6%	4.7%
09R_CPT	18.6%	7.1%	5.0%	15.7%	8.0%
09R_DET	22.2%	34.3%	29.4%	25.1%	35.7%
09R_MID	15.3%	16.6%	19.8%	15.7%	6.6%
09R_SAM (GASGU)	4.7%	6.9%	12.3%	5.4%	17.4%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
27L_BPK	11.2%	13.4%	12.7%	11.8%	15.2%
27L_CPT	8.6%	3.5%	2.7%	7.3%	1.1%
27L_DET	11.1%	16.8%	16.1%	12.5%	17.4%
27L_MID	7.8%	8.3%	10.9%	8.0%	4.8%
27L_SAM (GOGSI)	2.6%	3.7%	5.8%	2.9%	11.1%
27L_WOB	8.8%	4.6%	2.8%	7.7%	3.7%
27R_BPK	11.2%	12.9%	12.5%	11.6%	14.4%
27R_CPT	8.8%	3.4%	2.6%	7.4%	0.4%
27R_DET	11.1%	16.9%	15.2%	12.5%	19.6%
27R_MID	7.8%	8.2%	10.3%	8.0%	1.9%
27R_SAM (GOGSI)	2.6%	3.7%	5.5%	2.9%	7.4%
27R_WOB	8.6%	4.6%	2.7%	7.5%	3.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
09L_ARRIVAL	96.1%	96.0%	59.0%	92.8%	49.3%
09R_ARRIVAL	3.9%	4.0%	41.0%	7.2%	50.7%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
27L_ARRIVAL	49.9%	50.0%	50.7%	50.0%	47.6%
27R_ARRIVAL	50.1%	50.0%	49.3%	50.0%	52.4%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Table C9-k Heathrow 2018 route distributions (single mode operations)

Route	L _{day}	L _{evening}	L _{night}	L _{den}	L _{Aeq,6.5h}
09L_BPK	0.0%	0.0%	0.9%	0.0%	6.3%
09L_BUZ (ULTIB)	0.0%	0.0%	0.1%	0.0%	2.1%
09L_CPT	0.0%	0.0%	0.1%	0.0%	1.4%
09L_DET	0.0%	0.0%	1.0%	0.0%	10.5%
09L_MID	0.0%	0.0%	0.5%	0.0%	6.3%
09L_SAM (GASGU)	0.0%	0.0%	0.4%	0.0%	2.8%
09R_BPK	20.9%	28.3%	22.2%	22.6%	11.9%
09R_BUZ (ULTIB)	17.2%	9.4%	5.2%	15.1%	2.1%
09R_CPT	17.5%	7.1%	5.5%	14.8%	2.1%
09R_DET	24.1%	32.3%	29.3%	26.1%	30.1%
09R_MID	15.1%	15.8%	21.3%	15.5%	16.1%
09R_SAM (GASGU)	5.2%	7.1%	13.4%	5.9%	8.4%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
27L_BPK	10.8%	14.9%	12.0%	11.7%	10.2%
27L_CPT	8.0%	3.4%	2.8%	6.8%	1.1%
27L_DET	11.6%	16.4%	15.3%	12.8%	17.6%
27L_MID	7.9%	8.3%	10.6%	8.1%	6.0%
27L_SAM (GOGSI)	2.9%	3.6%	6.2%	3.1%	5.5%
27L_WOB (UMLAT)	9.2%	5.3%	2.3%	8.1%	0.8%
27R_BPK	10.5%	13.9%	12.7%	11.4%	17.9%
27R_CPT	7.7%	3.1%	2.8%	6.5%	1.6%
27R_DET	11.4%	15.2%	14.6%	12.4%	19.2%
27R_MID	7.8%	7.7%	11.5%	7.9%	9.6%
27R_SAM (GOGSI)	2.8%	3.4%	6.7%	3.0%	6.3%
27R_WOB (UMLAT)	9.5%	4.8%	2.5%	8.2%	4.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
09L_ARRIVAL	96.5%	96.6%	56.8%	92.8%	55.3%
09R_ARRIVAL	3.5%	3.4%	43.2%	7.2%	44.7%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
27L_ARRIVAL	49.9%	47.6%	50.6%	49.5%	53.9%
27R_ARRIVAL	50.1%	52.4%	49.4%	50.5%	46.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Table C9-I Heathrow 2019 route distributions (single mode operations)

Route	L _{day}	L _{evening}	L _{night}	L _{den}	L _{Aeq,6.5h}
09L_BPK	0.0%	0.0%	2.1%	0.1%	10.8%
09L_BUZ (ULTIB)	0.0%	0.0%	0.0%	0.0%	0.0%
09L_CPT	0.0%	0.0%	0.3%	0.0%	2.0%
09L_DET	0.0%	0.0%	1.9%	0.1%	12.7%
09L_MID	0.0%	0.0%	0.5%	0.0%	1.0%
09L_SAM (GASGU)	0.0%	0.0%	1.0%	0.0%	9.8%
09R_BPK	20.7%	27.3%	22.1%	22.2%	18.6%
09R_BUZ (ULTIB)	17.1%	10.2%	7.5%	15.3%	0.0%
09R_CPT	17.8%	8.2%	5.4%	15.2%	0.0%
09R_DET	22.6%	29.5%	26.1%	24.2%	23.5%
09R_MID	16.2%	17.0%	20.8%	16.5%	12.7%
09R_SAM (GASGU)	5.6%	7.8%	12.1%	6.3%	8.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
27L_BPK	10.3%	14.7%	11.2%	11.3%	8.1%
27L_CPT	7.6%	3.7%	2.4%	6.6%	2.3%
27L_DET	10.9%	15.9%	12.8%	12.1%	11.0%
27L_MID	8.1%	8.5%	10.2%	8.2%	5.8%
27L_SAM (GOGSI)	2.8%	3.9%	5.9%	3.2%	5.8%
27L_WOB (UMLAT)	9.1%	5.3%	3.7%	8.1%	1.3%
27R_BPK	10.7%	13.0%	13.1%	11.3%	16.5%
27R_CPT	8.0%	3.5%	3.2%	6.8%	3.2%
27R_DET	11.4%	15.3%	14.8%	12.4%	21.0%
27R_MID	8.3%	8.0%	11.4%	8.3%	14.6%
27R_SAM (GOGSI)	2.9%	3.5%	6.8%	3.1%	7.8%
27R_WOB (UMLAT)	9.8%	4.8%	4.5%	8.5%	2.6%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
09L_ARRIVAL	97.1%	97.2%	56.8%	93.5%	46.7%
09R_ARRIVAL	2.9%	2.8%	43.2%	6.5%	53.3%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
27L_ARRIVAL	51.1%	48.2%	51.0%	50.5%	47.6%
27R_ARRIVAL	48.9%	51.8%	49.0%	49.5%	52.4%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Table C10-a Heathrow L_{day} W-E departure and arrival runway modal splits by year

Year	West departures	East departures	Total	West arrivals	East arrivals	Total
2006	70%	30%	100%	70%	30%	100%
2009	74%	26%	100%	73%	27%	100%
2010	66%	34%	100%	66%	34%	100%
2011	71%	29%	100%	71%	29%	100%
2012	74%	26%	100%	74%	26%	100%
2013	67%	33%	100%	67%	33%	100%
2014	69%	31%	100%	70%	30%	100%
2015	72%	28%	100%	72%	28%	100%
2016	70%	30%	100%	70%	30%	100%
2017	81%	19%	100%	81%	19%	100%
2018	65%	35%	100%	65%	35%	100%
2019	74%	26%	100%	74%	26%	100%

Table C10-b Heathrow L_{evening} W-E departure and arrival runway modal splits by year

Year	West departures	East departures	Total	West arrivals	East arrivals	Total
2006	71%	29%	100%	72%	28%	100%
2009	72%	28%	100%	73%	27%	100%
2010	64%	36%	100%	64%	36%	100%
2011	72%	28%	100%	72%	28%	100%
2012	76%	24%	100%	76%	24%	100%
2013	64%	36%	100%	64%	36%	100%
2014	70%	30%	100%	70%	30%	100%
2015	72%	28%	100%	73%	27%	100%
2016	72%	28%	100%	72%	28%	100%
2017	81%	19%	100%	81%	19%	100%
2018	64%	36%	100%	65%	35%	100%
2019	73%	27%	100%	73%	27%	100%

Table C10-c Heathrow L_{night} W-E departure and arrival runway modal splits by year

Year	West departures	East departures	Total	West arrivals	East arrivals	Total
2006	74%	26%	100%	71%	29%	100%
2009	72%	28%	100%	74%	26%	100%
2010	67%	33%	100%	68%	32%	100%
2011	73%	27%	100%	71%	29%	100%
2012	75%	25%	100%	75%	25%	100%
2013	66%	34%	100%	69%	31%	100%
2014	69%	31%	100%	69%	31%	100%
2015	72%	28%	100%	73%	27%	100%
2016	72%	28%	100%	69%	31%	100%
2017	80%	20%	100%	80%	20%	100%
2018	64%	36%	100%	64%	36%	100%
2019	73%	27%	100%	74%	26%	100%

Table C10-d Heathrow L_{den} W-E departure and arrival runway modal splits by year

Year	West departures	East departures	Total	West arrivals	East arrivals	Total
2006	70%	30%	100%	71%	29%	100%
2009	73%	27%	100%	73%	27%	100%
2010	66%	34%	100%	66%	34%	100%
2011	71%	29%	100%	71%	29%	100%
2012	75%	25%	100%	74%	26%	100%
2013	66%	34%	100%	67%	33%	100%
2014	70%	30%	100%	70%	30%	100%
2015	72%	28%	100%	72%	28%	100%
2016	71%	29%	100%	70%	30%	100%
2017	81%	19%	100%	81%	19%	100%
2018	65%	35%	100%	65%	35%	100%
2019	74%	26%	100%	74%	26%	100%

Table C10-e Heathrow L_{Aeq,6.5h} night W-E departure and arrival runway modal splits by year

Year	West departures	East departures	Total	West arrivals	East arrivals	Total
2006	77%	23%	100%	72%	28%	100%
2009	62%	38%	100%	75%	25%	100%
2010	57%	43%	100%	67%	33%	100%
2011	67%	33%	100%	74%	26%	100%
2012	67%	33%	100%	68%	32%	100%
2013	65%	35%	100%	77%	23%	100%
2014	70%	30%	100%	67%	33%	100%
2015	74%	26%	100%	72%	28%	100%
2016	83%	17%	100%	69%	31%	100%
2017	56%	44%	100%	76%	24%	100%
2018	72%	28%	100%	69%	31%	100%
2019	75%	25%	100%	73%	27%	100%

Table C11 Heathrow 2006 & 2019 L_{day} cumulative contour area, population and household estimates

L _{day} (dB)	2006 area	2019 area	Change in area	2006 pop	2019 pop	Change in pop	2006 house	2019 house	Change in house
> 55	177.7	129.1	-27%	485.6	357.9	-26%	210.5	136.9	-35%
> 60	64.0	49.1	-23%	111.0	104.6	-6%	44.9	36.0	-20%
> 65	27.2	20.2	-26%	24.1	17.4	-28%	9.2	5.7	-38%
> 70	9.3	6.4	-31%	2.8	1.3	-54%	1.0	0.5	-50%
> 75	3.5	2.5	-29%	< 0.1	0.0	(n/a)	< 0.1	0.0	(n/a)
> 55				485.6	299.3	-38%	210.5	127.3	-40%
> 60				111.0	80.8	-27%	44.9	32.1	-29%
> 65				24.1	14.1	-41%	9.2	5.3	-42%
> 70				2.8	1.0	-64%	1.0	0.4	-60%
> 75				< 0.1	0.0	(n/a)	< 0.1	0.0	(n/a)

Table C12 Heathrow 2006 & 2019 L_{evening} cumulative contour area, population and household estimates

L _{evening} (dB)	2006 area	2019 area	Change in area	2006 pop	2019 pop	Change in pop	2006 house	2019 house	Change in house
> 55	185.6	112.5	-39%	450.5	292.5	-35%	192.6	110.0	-43%
> 60	66.1	42.6	-36%	106.3	77.0	-28%	42.4	26.3	-38%
> 65	28.1	17.2	-39%	20.5	9.0	-56%	7.9	3.1	-61%
> 70	10.0	5.5	-45%	2.4	0.6	-75%	1.0	0.2	-80%
> 75	3.8	2.2	-42%	< 0.1	0.0	(n/a)	< 0.1	0.0	(n/a)
> 55				450.5	241.2	-46%	192.6	101.5	-47%
> 60				106.3	58.8	-45%	42.4	23.3	-45%
> 65				20.5	7.7	-62%	7.9	3.0	-62%
> 70				2.4	0.3	-88%	1.0	0.2	-80%
> 75				< 0.1	0.0	(n/a)	< 0.1	0.0	(n/a)

Notes:

- Areas are given in km², and populations and households in thousands.
- The 2006 population/household counts are based on a 2006 CACI update of the 2001 Census.
- The 2019 population/household counts are based on a 2019 CACI update of the 2011 Census.
- **Estimates for 2019 using the 2006 population database are shown in blue.**

Table C13 Heathrow 2006 & 2019 L_{night} cumulative contour area, population and household estimates

L _{night} (dB)	2006 area	2019 area	Change in area	2006 pop	2019 pop	Change in pop	2006 house	2019 house	Change in house
> 50	84.4	72.2	-14%	207.2	228.5	10%	88.9	86.5	-3%
> 55	34.2	24.2	-29%	62.0	70.6	14%	24.1	23.7	-2%
> 60	11.9	7.8	-34%	16.3	13.7	-16%	6.0	4.2	-30%
> 65	4.5	2.7	-40%	1.7	1.4	-18%	0.6	0.4	-33%
> 70	1.8	1.1	-39%	< 0.1	0.0	(n/a)	< 0.1	0.0	(n/a)
> 50				207.2	188.2	-9%	88.9	80.4	-10%
> 55				62.0	53.4	-14%	24.1	20.7	-14%
> 60				16.3	11.1	-32%	6.0	3.9	-35%
> 65				1.7	1.2	-29%	0.6	0.4	-33%
> 70				< 0.1	0.0	(n/a)	< 0.1	0.0	(n/a)

Table C14 Heathrow 2006 & 2019 L_{den} cumulative contour area, population and household estimates

L _{den} (dB)	2006 area	2019 area	Change in area	2006 pop	2019 pop	Change in pop	2006 house	2019 house	Change in house
> 55	244.7	176.2	-28%	756.1	664.3	-12%	338.5	268.4	-21%
> 60	92.7	69.0	-26%	194.6	186.6	-4%	81.6	68.8	-16%
> 65	37.1	26.4	-29%	54.3	46.4	-15%	21.4	15.5	-28%
> 70	13.7	8.5	-38%	9.6	4.8	-50%	3.5	1.5	-57%
> 75	5.0	3.1	-38%	0.7	0.0	-100%	0.3	0.0	-100%
> 55				756.1	574.5	-24%	338.5	257.2	-24%
> 60				194.6	147.7	-24%	81.6	61.9	-24%
> 65				54.3	35.5	-35%	21.4	13.8	-36%
> 70				9.6	3.5	-64%	3.5	1.2	-66%
> 75				0.7	0.0	-100%	0.3	0.0	-100%

Notes:

- Areas are given in km², and populations and households in thousands.
- The 2006 population/household counts are based on a 2006 CACI update of the 2001 Census.
- The 2019 population/household counts are based on a 2019 CACI update of the 2011 Census.
- **Estimates for 2019 using the 2006 population database are shown in blue.**

Table C15 Heathrow 2006 & 2019 $L_{Aeq,6.5h}$ night cumulative contour area, population and household estimates

$L_{Aeq,6.5h}$ (dB)	2006 area	2019 area	Change in area	2006 pop	2019 pop	Change in pop	2006 house	2019 house	Change in house
> 48	56.4	33.4	-41%	137.4	114.0	-17%	57.5	40.4	-30%
> 48				137.4	89.5	-35%	57.5	36.3	-37%

Notes:

- Areas are given in km², and populations and households in thousands.
- The 2006 population/household counts are based on a 2006 CACI update of the 2001 Census.
- The 2019 population/household counts are based on a 2019 CACI update of the 2011 Census.
- **Estimates for 2019 using the 2006 population database are shown in blue.**
- The 2006 results were based on data recorded over the 2006 calendar year. The 2019 results were based on data recorded from 31 March 2019 to 28 March 2020.

Table C16 Heathrow 2006 & 2019 L_{den} cumulative contour area, population and household estimates – assuming 2006 W/E runway modal split and 2006 N/S runway usage

L _{den} (dB)	2006 area	2019 area	Change in area	2006 pop	2019 pop	Change in pop	2006 house	2019 house	Change in house
> 55	244.7	176.7	-28%	756.1	644.7	-15%	338.5	260.2	-23%
> 60	92.7	68.6	-26%	194.6	182.7	-6%	81.6	67.1	-18%
> 65	37.1	26.1	-30%	54.3	44.3	-18%	21.4	14.7	-31%
> 70	13.7	8.4	-39%	9.6	4.3	-55%	3.5	1.3	-63%
> 75	5.0	3.0	-40%	0.7	0.0	-100%	0.3	0.0	-100%

Notes:

- Areas are given in km², and populations and households in thousands.
- The 2006 population/household counts are based on a 2006 CACI update of the 2001 Census.
- The 2019 population/household counts are based on a 2019 CACI update of the 2011 Census.

APPENDIX D

ANCON type descriptions

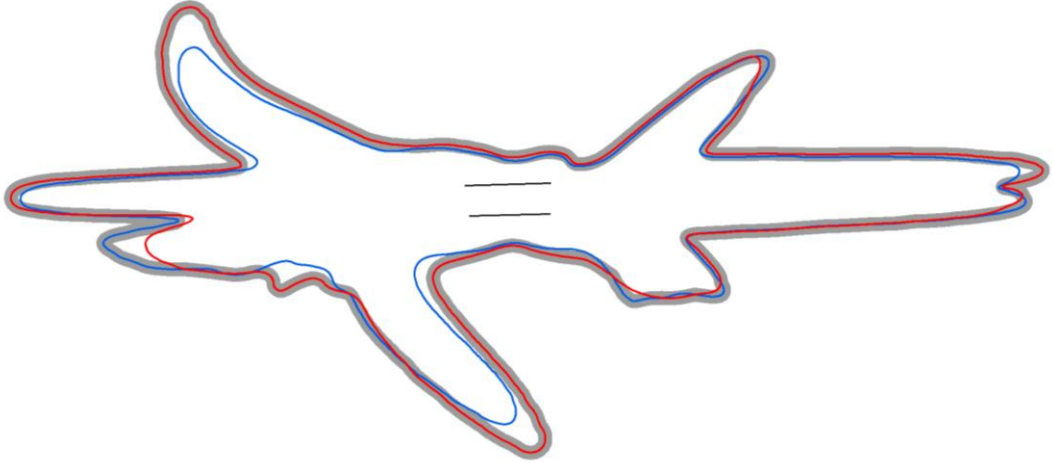
Table D1 ANCON type descriptions

ANCON type	Description
B717	Boeing 717
B727	Boeing 727 (Chapter 2&3)
B732	Boeing 737-200 (Chapter 2&3)
B733	Boeing 737-300/400/500
B736	Boeing 737-600/700
B738	Boeing 737-800/900
B738MAX	Boeing 737 MAX 8
B747	Boeing 747-100 & 200/300 series (certificated to Chapter 3)
B744G	Boeing 747-400 with General Electric CF6-80F engines
B744P	Boeing 747-400 with Pratt & Whitney PW4000 engines
B744R	Boeing 747-400 with Rolls-Royce RB211 engines
B747SP	Boeing 747SP
B748	Boeing 747-8
B753	Boeing 757-300
B757C	Boeing 757-200 with Rolls-Royce RB211-535C engines
B757E	Boeing 757-200 with Rolls-Royce RB211-535E4/E4B engines
B757P	Boeing 757-200 with Pratt & Whitney PW2037/2040 engines
B762	Boeing 767-200
B763G	Boeing 767-300 with General Electric CF6-80 engines
B763P	Boeing 767-300 with Pratt & Whitney PW4000 engines
B763R	Boeing 767-300 with Rolls-Royce RB211 engines
B764	Boeing 767-400
B772G	Boeing 777-200 with General Electric GE90 engines
B772P	Boeing 777-200 with Pratt & Whitney PW4000 engines
B772R	Boeing 777-200 with Rolls-Royce Trent 800 engines
B773G	Boeing 777-200LR/300ER with General Electric GE90 engines
B773P	Boeing 777-300 with Pratt & Whitney PW4000 engines
B773R	Boeing 777-300 with Rolls-Royce Trent 800 engines
B788	Boeing 787-8
B789	Boeing 787-9
B7810	Boeing 787-10
BA46	BAe 146/Avro RJ series
CRJ	Bombardier CRJ100/200 series

ANCON type	Description
CRJ700	Bombardier CRJ700 series
CRJ900	Bombardier CRJ900 series
DC10	McDonnell Douglas DC-10
EA221	Airbus A220-100 (previously Bombardier CS100 until July 2018)
EA223	Airbus A220-300 (previously Bombardier CS300 until July 2018)
EA30	Airbus A300
EA31	Airbus A310
EA318	Airbus A318
EA319C	Airbus A319 with CFM56 engines
EA319V	Airbus A319 with IAE V2500 engines
EA320C	Airbus A320 with CFM56 engines
EA320NEO	Airbus A320neo
EA320V	Airbus A320 with IAE V2500 engines
EA321C	Airbus A321 with CFM56 engines
EA321NEO	Airbus A321neo
EA321V	Airbus A321 with IAE V2500 engines
EA33	Airbus A330
EA33NEO	Airbus A330neo
EA34	Airbus A340-200/300
EA346	Airbus A340-500/600
EA359	Airbus A350-900
EA3510	Airbus A350-1000
EA38GP	Airbus A380 with Engine Alliance GP7000 engines
EA38R	Airbus A380 with Rolls-Royce Trent 900 engines
ERJ	Embraer ERJ 135/145
ERJ170	Embraer E-170/175
ERJ190	Embraer E-190/195
EXE2	Chapter 2 executive jets
EXE3	Chapter 3 executive jets
FK10	Fokker 70/100
L101	Lockheed L-1011 TriStar
L4P	Large four-engine propeller
LTT	Large twin-turboprop

ANCON type	Description
MD11	McDonnell Douglas MD-11
MD80	McDonnell Douglas MD-80 series
SP	Single propeller
STP	Small twin-piston
STT	Small twin-turboprop
TU54	Tupolev Tu-154

Glossary

Glossary	
AMSL	Above Mean Sea Level
ANCON	The UK civil aircraft noise contour model, developed and maintained by ERCD.
CAA	Civil Aviation Authority
dB	Decibel units describing sound level or changes of sound level.
dBA	Units of sound level on the A-weighted scale, which incorporates a frequency weighting approximating the characteristics of human hearing.
DfT	Department for Transport (UK Government)
END	Environmental Noise Directive
Envelope	<p>A boundary defining the assessment area of noise changes, which is derived from the outermost extents of the two sets of contours being compared. As an example, in the diagram below, the 'envelope' is shown in grey, and the two sets of underlying contours are indicated by the red and blue lines.</p> 
ERCD	Environmental Research and Consultancy Department
FOPP	Fuel Over Pressure Protector
ICAO	International Civil Aviation Organization
L _{Aeq}	Equivalent sound level of aircraft noise in dBA, often called 'equivalent continuous sound level'.

Glossary	
$L_{Aeq,16h}$	Equivalent sound level of aircraft noise in dBA for the average 16-hour day period (07:00-23:00 local time).
$L_{Aeq,6.5h}$	Equivalent sound level of aircraft noise in dBA for the average 6.5-hour night quota period (23:30-06:00 local time).
$L_{Aeq,8h}$	Equivalent sound level of aircraft noise in dBA for the average 8-hour night period (23:00-07:00 local time).
L_{Amax}	Maximum sound level of a noise event in dBA.
L_{day}	Equivalent sound level of aircraft noise in dBA for the annual average 12-hour day period (07:00-19:00 local time).
L_{den}	Equivalent sound level of aircraft noise in dBA for the annual average 24-hour period with 5 dB weightings for $L_{evening}$ and 10 dB weightings for L_{night} .
$L_{evening}$	Equivalent sound level of aircraft noise in dBA for the annual average 4-hour evening period (19:00-23:00 local time).
L_{night}	Equivalent sound level of aircraft noise in dBA for the annual average 8-hour night period (23:00-07:00 local time).
N70/N65/N60	Number of aircraft noise events exceeding a maximum sound level (L_{Amax}) of 70/65/60 dB.
NTK	Noise and Track Keeping monitoring system.
SEL	Sound Exposure Level in dBA.
SoNA	Survey of Noise Attitudes