Environmental Research and Consultancy Department

Civil Aviation Authority

# Heathrow Airport 2018 Summer Noise Contours and Noise Action Plan Contours

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# Summary


*Overview*

1. This report presents the Heathrow 2018 average summer 16-hour day and 8-hour night Leq contours, as well as the 2018 annual $L_{day}$, $L_{evening}$, $L_{night}$, $L_{den}$ and $L_{eq,6.5hr\ night}$ 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 2018 are examined and comparisons made with the 2006 (base year) and 2017 (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 2018, and noise changes between 2017 and 2018.

3. Although 2018 had the highest passenger traffic, the $L_{den}$ 55 dBA contour had its smallest area and population count over the 13-year study period (2006-2018).

*Movements in 2018*

4. Average summer day movements in 2018 at Heathrow decreased by 0.6% from 2017. In contrast, summer night movements increased by 6%. The Airbus A320neo aircraft type had the highest increase in numbers during the summer day period (+32 movements). For the 2018 summer night, the Boeing 777-300ER with GE engines had the largest increase (+4 movements).

5. Aircraft movements over the 2018 annual $L_{day}$ 12-hour period decreased by 0.5% from 2017. There was a 2% rise in movements over the 2018 annual $L_{evening}$ 4-hour period. Annual $L_{night}$ 8-hour movements were 5% higher in 2018. Total movements over the 2018 annual $L_{den}$ average 24-hour period (1308.8) were 0.4% higher than in 2017. Movements were 3% higher for the 2018 $L_{eq,6.5hr\ night}$ period compared to 2017.

6. The largest increase in movements over the 2018 annual average 24-hour period was for the Airbus A320neo (+35 movements), followed by the Airbus A330 and Boeing 787-9, each with an increase of 9 movements. The highest movement decreases were for the Airbus A320 with IAE engines (-21) and the A320 with CFM engines (-13).

7. The estimated percentage of aircraft in the Heathrow fleet mix meeting the ICAO Chapter 4 noise standard has risen from 94% in 2006 to over 99% in 2018. In

addition, it is estimated that around 62% of movements met the latest ICAO Chapter 14 noise standard.

*2018 summer Leq contours*

8. The 54 dBA Leq contour area for the average summer day (actual runway modal split 78% W / 22% E) in 2018 was 158.3 $km^2$, 6% lower than in 2017 (168.3 $km^2$). Daytime Leq contour areas were lower by up to 10% in 2018 compared to 2017. This can be attributed to the introduction of quieter aircraft in the fleet mix, reductions in the total number of movements, the shift to a higher proportion of easterly movements in 2018, and also noise adjustments made to a number of ANCON aircraft types in light of the 2018 noise measurements. Population and household counts within the contours also decreased.

9. The average summer night 48 dBA Leq contour area based on the actual runway modal split (80% W / 20% E) was 106.0 $km^2$, a 3% increase from 2017 (103.1 $km^2$). Night-time Leq contour areas increased by up to 7% in 2018. This was primarily due to the 6% increase in traffic at night, which outweighed the noise reductions from quieter aircraft and the aforementioned noise adjustments made following the 2018 measurements. Population and household counts also mostly increased in 2018.

*2018 Noise Action Plan contours*

10. The noise modelling results showed that the $L_{day,}$ $L_{evening}$ and $L_{den}$ contour areas for 2018 were all smaller than in 2017. For example, the 2018 $L_{den}$ 55 dBA contour area of 176.8 $km^2$ was 3% lower than in 2017 (182.3 $km^2$). The area reductions can be attributed to a switch to more modern, quieter aircraft types such as the Airbus A320neo and Boeing 787-9, and noise reduction adjustments made to a number of ANCON types in the light of noise measurements undertaken in 2018. However, the $L_{night}$ 50 dBA contour area increased by 4% as annual night movements rose by 5%.

11. The 2018 $L_{eq,6.5hr\ night}$ 48 dBA contour area was 6% lower at 31.8 $km^2$ (2017: 33.9 $km^2$), even though movements rose by 3%. The area reduction can be attributed to quieter aircraft types in the fleet mix and reductions in numbers of arrivals of the largest types. Population and household counts reduced as the contour retracted from populated areas around Kew following the lower percentage of westerly arrivals in 2018.

*Trends since 2006*

12. An examination of the long-term trends between 2006 and 2018 showed that the annual $L_{day}$ 55 dBA contour area was fairly steady between 2009 and 2014 after

the initial high in 2006, though it dipped in 2010, but it has gradually declined since 2014. Populations and households within the $L_{day}$ contours fell to a low in 2010 after dropping steadily since 2006. Movements were also at a low in 2010. 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. Movements over the $L_{day}$ period have been steady since 2006 apart from the low of 2010.

13. The area, population and households within the $L_{evening}$ 55 dBA contour decreased in 2009 and 2010 from the 2006 level as movements declined, but rose in 2011 as movements recovered. Since 2011 the area, population and households have followed a downward trend, apart from 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.

14. For the $L_{night}$ 50 dBA contour, the area was steady between 2011 and 2016, having been higher between 2006 and 2010, and dropped to a low in 2017 before rising in 2018. Movements over the $L_{night}$ period have also been steady since 2006, in the range of 75-78 movements, except in 2018 when the movements reached a high. The $L_{night}$ population and household counts followed a downward trend from 2009 to 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.

15. After the 2006 base year, $L_{den}$ 55 dBA contour areas were fairly flat between 2009 and 2013, but since then 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 have generally declined since 2011, 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 dBA area also fell to a low. Movements have been at a relatively steady level between 2006 and 2018, apart from a dip in 2010.

16. The $L_{eq,6.5hr\ night}$ 48 dBA 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 reduce. 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.

17. Between the 2006 base year and 2018 there has been a 60% 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 2018 there were on average 46 movements of the Airbus A380 and 113 movements of the Boeing 787-8/9 over the 24-hour period.

18. The 2018 annual period contour areas were below 2006 base year levels for all the noise metrics considered. For example, the 2018 $L_{den}$ 55 dBA contour area of 176.8 $km^2$ was 28% smaller than the area in 2006 (244.7 $km^2$). Population counts were all lower in 2018, except for the $L_{night}$ 50 dBA contour - this was due to population encroachment around Heathrow between 2006 and 2018. Had the population database remained unchanged between 2006 and 2018, the population and household counts for the 2018 contours would have all been even lower than in 2006. For example, the $L_{den}$ 55 dBA population count in 2006 was 756,100 and it decreased by 19% to 611,300 in 2018. Had the population remained at 2006 levels in 2018, the 2018 population count would have been 529,100, a decrease of 30% from 2006. This shows that in the period 2006-2018, the reducing contour area meant that 144,800 people were effectively moved out of the $L_{den}$ 55 dBA contour. This figure would have been 227,000 had the population not grown.

*Noise change analysis*

19. An analysis of $L_{den}$ noise changes between 2006 and 2018 (assuming 2006 base year runway modal splits) revealed that most areas within the 2018 $L_{den}$ 55 dBA contour have experienced noise reductions of up to 3 dB or more. There were some areas that were exposed to increases in noise levels of less than 1 dB. Around 99% of the area considered for noise changes was exposed to decreases in noise.

20. $L_{den}$ noise changes between 2017 and 2018 (assuming the 2017 runway modal split) showed that 74% of the assessment area experienced decreases in noise

of up to 1 dB. Approximately 24% of the total area considered was exposed to noise increases, most of which were found to be less than 0.1 dB.

21. An analysis of $L_{night}$ noise changes between 2006 and 2018 (assuming the 2006 base year $L_{night}$ runway modal split) showed that 98% of the total area experienced reductions in noise levels of up to 3 dB or more.

22. Noise changes for $L_{night}$ between 2017 and 2018 (assuming the 2017 runway modal split) indicated some regions that were exposed to noise increases of less than 1 dB, of which most were less than 0.3 dB. Around 38% 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 2018. All the contour areas for N65 and N70 day have decreased between 2006 and 2018. This reflects the phase-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, some of the N60 night contour areas increased, which can be attributed mainly to the difference in runway modal split and the 11% higher number of arrival movements in 2018 compared to 2006.

24. There were population increases for the N70 contours despite the area decreases, which can be explained by the population encroachment that occurred in the areas surrounding Heathrow between 2006 and 2018.

25. An analysis of annual 16-hour day N65 changes between 2006 and 2018 (assuming the 2006 base year modal split) also showed that many areas have experienced reductions of up to 50-100 N65 events. However, there were some locations where the numbers of N65 events in 2018 increased due to: (a) higher movement rates on the CPT/GOGSI routes in 2018, (b) a change in the position of the DET (previously DVR) departure mean track, and (c) a higher usage of the southern runway for arrivals in 2018 compared to 2006. Around 84% of the assessment area experienced either decreases of 10 or more N65 events or changes of less than 10 events. A similar analysis of N65 changes between 2017 and 2018 (assuming the 2017 modal split) revealed that 90% of the assessment area was exposed either to decreases of up to 50 events or changes of less than 10 events.

26. An analysis of annual 16-hour day N70 changes between 2006 and 2018 (assuming the 2006 runway modal split) indicated some areas where increases in N70 events occurred. These were due to a westerly shift in the position of the 2018 DET mean departure track relative to 2006, a higher usage of the southern runway for westerly departures in 2006, and the northern runway being favoured for westerly arrivals in 2006. Approximately 87% of the assessment area was

exposed to either decreases of more than 10 N70 events or changes of less than 10 N70 events. This figure rose to 94% when the effects of differences in north-south runway usage were removed.

27. An analysis of annual 16-hour day N70 changes between 2017 and 2018 (assuming the 2017 modal split) showed that more than 99% of the area under consideration was either exposed to N70 changes of less than 10 events, or decreases of more than 10 events in 2018.

28. An examination of N60 changes between 2006 and 2018 (assuming the 2006 runway modal split) for the annual 8-hour night showed that 35% of the area assessed experienced changes of less than 2 events, or reductions of between 2 and 5 events. The N60 changes between 2017 and 2018 (assuming the 2017 runway modal split) indicated that 50% of the assessment area was either exposed to changes of less than 2 events, or a decrease of between 2 and 5 events per 8-hour night.

Chapter 1
# Introduction

1.1 This report presents the 2018 noise exposure contours generated for London Heathrow Airport. First of all, 2018 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 2018 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 Leq 16-hour (0700-2300 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 Leq 16-hour contours in this report have been plotted from 54 to 72 dBA 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 dBA, now occurs at 54 dBA. The summer day contours have been plotted from 54 dBA since 2016.

1.4 Night-time 8-hour Leq contours have also been calculated from 48 to 72 dBA in 3 dB steps in accordance with standard practice. Average summer night Leq 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' 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 2018 calendar year (1 January to 31 December), whilst the $L_{eq,6.5hr\ night}$ contour was based on data from the combined 2018 summer and 2018-19 winter night quota seasons (i.e. the period from 25 March 2018 to 31 March 2019).

1.8 Contours for the 2018 annual period have also been produced using the supplementary noise metrics N65 and N70 for daytime, and N60 for night-time. Number Above contours indicate the number of aircraft noise events exceeding a certain maximum sound level ($L_{max}$) at a given location. For example, N70 contours show the number of events exceeding 70 dBA $L_{max}$.

1.9 In summary, noise contours have been produced for the following noise metrics:

- Average summer 16-hour day Leq (0700-2300 local time);
- Average summer 8-hour night Leq (2300-0700 local time);
- Annual $L_{day}$, $L_{evening}$, $L_{night}$, $L_{den}$ and $L_{eq,6.5hr\ night}$;
- N65 and N70 for the annual average 16-hour day (0700-2300 local time); and
- N60 for the annual average 8-hour night (2300-0700 local time).

1.10 In regard to the above metrics, the following points can be noted:

- The summer day and night Leq 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 $L_{eq,6.5hr\ night}$ 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, Leq-based noise metrics.
- 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 2018 Noise Action Plan contours are compared with those from 2017 (**Ref 5**) and the 2006 base year (**Ref 6**) to assess the changes in area, population and households enclosed. The long-term contour trends from 2006 to 2018 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 7**).

2.2 ANCON is fully compliant with the European guidance on noise modelling, ECAC.CEAC Doc 29 (4th edition), published in December 2016 (**Ref 8**). 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 were generated from summer 2018 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 2018 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 type[1], 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 engines[2], as it was sufficiently different from the daytime profile. All other aircraft types operating at night were modelled with daytime profiles.

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

[2] ANCON type B744R

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 9**).

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.

2.10 The most significant noise database updates following noise measurements undertaken in 2018 were as follows:

[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.

- B763P – up to 2 dB lower on departure at distances between about 8 and 24 km from start-of-roll;
- B763R – up to 1 dB lower on departure at distances greater than about 6 km from start-of-roll;
- EA319V - up to 1 dB lower on arrival between about 7 and 19 km from threshold;
- EA320V – up to 1 dB lower on departure at distances greater than about 6 km from start-of-roll, and up to 1 dB lower on arrival between about 7 and 19 km from threshold; and
- EA321V – up to 1 dB lower on departure at distances greater than about 4 km from start-of-roll.

2.11 As with the summer 2017 data, additional validation of $L_{max}$ levels for each aircraft type, which are the basis of the N70, N65 and N60 contours (but not the Leq contours), was undertaken for 2018.

## Traffic data

2.12 The contours were calculated using 2018 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 (0700-2300 local time) and night (2300-0700 local time), and the annual average 12-hour day (0700-1900 local time), 4-hour evening (1900-2300 local time), 8-hour night (2300-0700 local time), 24-hour period and 6.5-hour night (2330-0600 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 figures[4]. 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 2018 summer day period (1265.5) was 0.6% lower than the previous year (2017: 1273.1). In contrast, average summer night movements rose by 6% in 2018 to 88.0 (2017: 83.0). (Night-time departures increased by 12% and arrivals by 4%).

2.14 The largest movement increases over the 2018 average summer 16-hour day period were for the ANCON types EA320NEO (+32), EA33 (+11), B789 (+10)

[4] For the 6.5-hour night, the total was divided by 371.

and CS300 (+10). The EA320V had the highest movement decrease (-36), followed by the EA320C (-24) and B763G (-11).

2.15 During the 2018 average summer 8-hour night period the largest movement increase was for the ANCON type B773G (+4). The highest movement decrease was for the B763P (-2).

2.16 The annual average 24-hour daily movements for the base year 2006 and years 2009-2018 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).

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 and 2018 the movement total was back close to the 2006 figure.

**Table 1 Heathrow annual 24-hour movements for years 2006 & 2009-2018**

| Year | Total daily movements | Percentage change 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 |

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 $L_{eq,6.5hr\ night}$ time periods, for 2006 and 2009-2018, 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** for arrivals, and 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 $L_{eq,6.5hr\ night}$ time periods, for 2006 and 2009-2018, in **Tables C9-a** to **C9-k**.

## Aircraft noise classes

2.20 The 2018 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 2018 annual average 24-hour period, along with percentages from the 2006 base year for comparison.

**Table 2 Heathrow 2018 annual average 24-hour movements by Noise Class**

| Noise Class | Aircraft Description | 2018 movements | 2018 percentage | 2006 percentage |
|---|---|---|---|---|
| A | Small propeller | 0.0 | 0.0% | < 0.1% |
| B | Large propeller | 12.9 | 1.0% | 0.6% |
| C | Narrow-body jets *(e.g. Airbus A320, Boeing 737-800)* | 779.6 | 59.6% | 65.3% |
| D | Wide-body twins *(e.g. Boeing 777, Boeing 787)* | 401.7 | 30.7% | 18.4% |
| E | Wide-body 3,4 engine *(e.g. Boeing 747-400, Airbus A380)* | 114.5 | 8.8% | 15.2% |
| F | 1st generation wide-body 3,4 engine *(e.g. Boeing 747-100)* | 0.0 | 0.0% | 0.3% |
| G | 2nd generation narrow-body twins *(e.g. Boeing 737-200)* | 0.0 | 0.0% | 0.0% |
| H | 1st generation narrow-body 3,4 engine *(e.g. Boeing 727)* | 0.0 | 0.0% | < 0.1% |
| | **Total** | **1308.8** | **100.0%** | **100.0%** |

Note: Totals may not sum exactly due to rounding.

2.21 It can be seen that 99% of movements in 2018 were within Noise Classes C, D and E. The proportion of narrow-body jet aircraft (Noise Class C) decreased from 65% to 60% between 2006 and 2018. There was also a reduction from 15% to 9% in the proportion of wide-body 3 or 4-engine types (Noise Class E). In

contrast, the proportion of wide-body twin-engine aircraft (Noise Class D) increased from 18% to 31% between 2006 and 2018.

2.22 The chart in **Figure B2** of **Appendix B** illustrates the breakdown of total movements by Noise Class for 2006 and 2009-2018. Movements over the annual average 24-hour period in 2018 by ANCON aircraft type are summarised in **Table C6**. They are described in more detail for Noise Classes C-E below.

*Noise Class C aircraft changes*

2.23 Noise Class C was the largest grouping in all the years and made up 60% of total movements in 2018. Numbers within Noise Class C (narrow-body aircraft such as the Airbus A319, A320 and A321) dropped between 2006 and 2010, but increased in 2011 to a level higher than in 2006. Since 2011, numbers have gradually fallen (**Figure B2**). Within Noise Class C the highest decreases were for the EA320V (-21 movements) and EA320C (-13). They were offset by increases for the EA320NEO (+35 movements) and the CS300 and B738MAX (+8 each). The Airbus A319/320/321 aircraft family accounted for 91% of Noise Class C movements in 2018.

*Noise Class D aircraft changes*

2.24 The next largest grouping was Noise Class D (wide-body twin-engine aircraft, such as the Boeing 777-200/300 and Boeing 787-8/9), which accounted for 31% of total movements in 2018. These have risen steadily in frequency between 2009 and 2018 (**Figure B2**). The largest increases within Noise Class D in 2018 were for the ANCON types EA33, up by 9 movements, and B773G (up by 6). The largest decreases were for the B763P, down by 11 movements, and the B763G, down by 9. The newest aircraft types such as the Boeing 787-8/9 series and Airbus A350-900/1000 series made up 32% of all Noise Class D movements, an increase from 2017 when the figure was 28%.

*Noise Class E aircraft changes*

2.25 Nine percent of total movements were within Noise Class E in 2018. Movements of the Noise Class E grouping (wide-body 3 or 4-engine aircraft such as the Boeing 747-400 and Airbus A380) decreased in both 2009 and 2010 from the 2006 level, and after a small rise in 2011, have declined steadily through to 2018 (**Figure B2**). Within Noise Class E, the largest reduction in 2018 was for the ANCON aircraft type EA38R (-5 movements), and there were no types with increases. The more modern Airbus A380 aircraft accounted for 40% of total Noise Class E movements in 2018, a reduction from the 2017 figure of 41%.

## Fleet mix by ICAO noise Chapter

2.26 An analysis of the certification noise levels of aircraft operating at Heathrow in 2018 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 2018 at an estimated 99% or higher.

2.28 In addition, it has been estimated that around 62% of aircraft operations 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 2018 summer 16-hour day:

(a) Using the 'actual' modal split over the Leq day period; and

(b) Assuming the 'standard' modal split over the Leq day period, i.e. the long-term modal split calculated from the 20-year rolling average. For 2018, this is the 20-year period from 1999 to 2018. Use of the standard modal split enables year-on-year comparisons without the runway usage significantly affecting the contour shape.

2.31 The 2017 and 2018 runway modal splits for the day and night summer periods are summarised in **Table 3**.

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

[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 3 Heathrow 2017 and 2018 summer runway modal splits**

| Time period | 2017 actual split (W/E percentage) | 2018 actual split (W/E percentage) | 2017 standard split (W/E percentage) | 2018 standard split (W/E percentage) |
|---|---|---|---|---|
| 16-hour day | 84 / 16 | 78 / 22 | 79 / 21 | 79 / 21 |
| 8-hour night | 81 / 19 | 80 / 20 | Data not available | Data not available |

2.32 The annual noise contours were modelled with the 2018 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 2018 there was a 16% modal split shift towards easterly operations over the annual 24-hour period.

**Table 4 Heathrow annual runway modal splits**

| Time period | 2017 actual split (W/E percentage) | 2018 actual split (W/E percentage) | 5-year average 2014-2018 (W/E percentage) |
|---|---|---|---|
| 12-hour day | 81 / 19 | 65 / 35 | 71 / 29 |
| 4-hour evening | 81 / 19 | 65 / 35 | 72 / 28 |
| 8-hour night | 80 / 20 | 64 / 36 | 71 / 29 |
| 24-hour day | 81 / 19 | 65 / 35 | 72 / 28 |
| 6.5-hour night | 75 / 25 | 69 / 31 | 71 / 29 |

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 (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 $L_{eq,6.5hr\ night}$, are summarised in **Tables C10-a** to **C10-e** respectively, for 2006 and 2009-2018, and 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 2018 contours are a 2018 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 2018 $L_{den}$ 55 dBA contour, the population count was 0.2% higher with the 2018 population database compared to the 2017 database.

[8] www.caci.co.uk

Chapter 3
# Results

## 2018 summer day actual Leq contours

3.1 The Heathrow 2018 summer day Leq noise contours generated with the actual runway modal split (78% west / 22% east) are shown in **Figure B3** of **Appendix B**. The contours are plotted from 54 to 72 dBA at 3 dB intervals and overlaid onto the 2017 contours.

3.2 Cumulative estimates of the areas, populations and households within the 2018 summer day actual contours are provided in **Table 5**, along with the figures from 2017.

**Table 5 Heathrow 2017 and 2018 summer day actual modal split contours – area, population and household estimates**

| Leq (dBA) | Area ($km^2$) | | | Population | | | Households | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2017 | **2018** | change | 2017 | **2018** | Change | 2017 | **2018** | change |
| > 54 | 168.3 | 158.3 | -6% | 549.6 | 497.3 | -10% | 225.4 | 202.2 | -10% |
| > 57 | 93.2 | 86.8 | -7% | 230.6 | 219.4 | -5% | 89.0 | 84.2 | -5% |
| > 60 | 52.2 | 48.6 | -7% | 112.2 | 101.2 | -10% | 40.8 | 36.4 | -11% |
| > 63 | 30.1 | 28.5 | -5% | 42.5 | 38.4 | -10% | 14.9 | 13.5 | -9% |
| > 66 | 17.7 | 15.9 | -10% | 12.4 | 9.7 | -22% | 4.3 | 3.4 | -21% |
| > 69 | 8.5 | 7.9 | -7% | 3.2 | 2.6 | -19% | 1.1 | 0.9 | -18% |
| > 72 | 4.5 | 4.3 | -4% | 0.1 | 0.1 | 0% | < 0.1 | < 0.1 | (n/a) |

Note: Populations and households are given in thousands. The 2017 and 2018 population/household counts are based on 2017 and 2018 CACI updates of the 2011 Census respectively.

3.3 The 2018 summer day actual 54 dBA Leq contour enclosed an area of 158.3 $km^2$ and a population of 497,300. This area was 6% smaller than in 2017 (168.3 $km^2$), and the population was 10% lower (2017: 549,600).

3.4 The contour area reductions can be attributed to: (a) fleet mix changes, such as the introduction of quieter types like the EA320NEO and B789, (b) 0.6% fewer overall movements, (c) a 6% higher percentage of easterly operations, which further reduces the contour area, and (d) noise adjustments made in light of the 2018 noise measurements, as described in section 2.10.

## 2018 summer day standard Leq contours

3.5 The Heathrow 2018 summer day Leq noise contours generated with the standard runway modal split (79% west / 21% east) are shown in **Figure B4**. The contours are plotted from 54 to 72 dBA at 3 dB intervals and overlaid onto the 2017 contours.

3.6 Cumulative estimates of the areas, populations and households within the 2018 summer day standard contours are provided in **Table 6**, along with the figures from 2017.

**Table 6 Heathrow 2017 and 2018 summer day standard modal split contours – area, population and household estimates**

| Leq (dBA) | Area ($km^2$) | | | Population | | | Households | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2017 | **2018** | change | 2017 | **2018** | change | 2017 | **2018** | change |
| > 54 | 167.0 | 158.5 | -5% | 532.6 | 501.8 | -6% | 217.1 | 204.6 | -6% |
| > 57 | 92.3 | 87.0 | -6% | 232.7 | 219.6 | -6% | 89.6 | 84.4 | -6% |
| > 60 | 51.6 | 48.7 | -6% | 111.0 | 101.5 | -9% | 40.3 | 36.6 | -9% |
| > 63 | 30.0 | 28.5 | -5% | 41.5 | 38.8 | -7% | 14.5 | 13.6 | -6% |
| > 66 | 17.6 | 16.0 | -9% | 11.9 | 9.8 | -18% | 4.1 | 3.4 | -17% |
| > 69 | 8.4 | 7.9 | -6% | 2.8 | 2.6 | -7% | 1.0 | 0.9 | -10% |
| > 72 | 4.5 | 4.3 | -4% | 0.1 | 0.1 | 0% | < 0.1 | < 0.1 | (n/a) |

Note: Populations and households are given in thousands. The 2017 and 2018 population/household counts are based on 2017 and 2018 CACI updates of the 2011 Census respectively.

3.7 The 2018 summer day standard 54 dBA Leq contour enclosed an area of 158.5 $km^2$ and a population of 501,800. The 54 dBA area was 5% smaller than in 2017 (167.0 $km^2$), whilst the population was 6% lower (2017: 532,600).

3.8 The contour area reductions reflect the introduction of quieter types like the EA320NEO and B789, the 0.6% fewer movements, and noise adjustments made in light of the 2018 noise measurements, as described in section 2.10.

3.9 The larger 54 dBA contour lobe in 2018 from CPT/GOGSI departures (to the south-west of Windsor) can be attributed to the higher movement rate on these routes compared to 2017.

## 2018 summer day single mode Leq contours

3.10 The Heathrow 2018 summer day Leq 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 2018 and 2006) are shown in **Figures B5** and **B6** respectively. The contours are plotted from 54 to 72 dBA 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 2018 summer day single mode contours are provided in **Tables 7** and **8**.

**Table 7 Heathrow 2006 and 2018 summer day 100% W contours (assuming 2006 N-S runway usage) – area, population and household estimates**

| Leq (dBA) | Area ($km^2$) | | | Population | | | Households | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2006 | **2018** | change | 2006 | **2018** | change | 2006 | **2018** | Change |
| > 54 | 215.6 | 165.7 | -23% | 638.6 | 571.4 | -11% | 289.5 | 240.2 | -17% |
| | | | | | (488.9) | (-23%) | | (219.8) | (-24%) |
| > 57 | 126.5 | 91.5 | -28% | 297.0 | 222.3 | -25% | 128.0 | 86.7 | -32% |
| | | | | | (179.9) | (-39%) | | (75.8) | (-41%) |
| > 60 | 69.4 | 49.4 | -29% | 113.7 | 103.1 | -9% | 46.5 | 37.8 | -19% |
| | | | | | (78.4) | (-31%) | | (31.3) | (-33%) |
| > 63 | 38.5 | 28.8 | -25% | 50.5 | 44.0 | -13% | 20.1 | 15.5 | -23% |
| | | | | | (33.1) | (-34%) | | (13.0) | (-35%) |
| > 66 | 23.4 | 17.1 | -27% | 18.3 | 12.9 | -30% | 7.0 | 4.5 | -36% |
| | | | | | (10.6) | (-42%) | | (3.9) | (-44%) |
| > 69 | 13.0 | 8.2 | -37% | 5.2 | 3.5 | -33% | 2.0 | 1.2 | -40% |
| | | | | | (2.8) | (-46%) | | (1.0) | (-50%) |
| > 72 | 6.7 | 4.4 | -34% | 1.1 | 0.3 | -73% | 0.4 | 0.1 | -75% |
| | | | | | (0.2) | (-82%) | | (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 2018 population/household counts are based on a 2018 CACI update of the 2011 Census. Estimates for 2018 using the 2006 population database are shown in blue.

**Table 8 Heathrow 2006 and 2018 summer day 100% E contours (assuming 2006 N-S runway usage) – area, population and household estimates**

| Leq (dBA) | Area ($km^2$) | | | Population | | | Households | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2006 | **2018** | change | 2006 | **2018** | Change | 2006 | **2018** | change |
| > 54 | 196.6 | 151.7 | -23% | 516.9 | 436.2 | -16% | 216.1 | 172.6 | -20% |
| | | | | | (366.6) | (-29%) | | (155.0) | (-28%) |
| > 57 | 112.7 | 80.7 | -28% | 324.6 | 246.0 | -24% | 136.4 | 95.6 | -30% |
| | | | | | (202.6) | (-38%) | | (84.0) | (-38%) |
| > 60 | 63.4 | 42.7 | -33% | 169.4 | 129.1 | -24% | 69.6 | 48.5 | -30% |
| | | | | | (105.0) | (-38%) | | (42.5) | (-39%) |
| > 63 | 35.0 | 22.9 | -35% | 71.9 | 40.6 | -44% | 28.4 | 14.7 | -48% |
| | | | | | (31.3) | (-56%) | | (12.5) | (-56%) |
| > 66 | 18.9 | 12.9 | -32% | 22.3 | 8.3 | -63% | 8.7 | 3.1 | -64% |
| | | | | | (6.4) | (-71%) | | (2.7) | (-69%) |
| > 69 | 10.6 | 7.3 | -31% | 3.6 | 1.6 | -56% | 1.6 | 0.6 | -63% |
| | | | | | (1.2) | (-67%) | | (0.6) | (-63%) |
| > 72 | 6.2 | 4.2 | -32% | 0.9 | 0.8 | -11% | 0.4 | 0.3 | -25% |
| | | | | | (0.5) | (-44%) | | (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 2018 population/household counts are based on a 2018 CACI update of the 2011 Census. Estimates for 2018 using the 2006 population database are shown in blue.

3.12 For the westerly single mode contours, the 2018 areas have all decreased relative to 2006, by up to 37%. The populations have also all decreased, although proportionately less so at the 54, 60 and 63 dBA levels. This is likely due to the effects of population encroachment between 2006 and 2018. Household counts in 2018 were all lower than in 2006.

3.13 For the easterly single mode contours, the 2018 areas have also all decreased relative to 2006, by up to 35%. Both population and household numbers were lower at all contour levels in 2018 compared to 2006.

3.14 Populations and household estimates for 2018, assuming the 2006 population database, indicate that the populations would have decreased even more without the population encroachment that took place between 2006 and 2018.

## 2018 summer night actual Leq contours

3.15 The Heathrow 2018 summer night Leq 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 dBA at 3 dB intervals (the 69 and 72 dBA contours have been omitted for clarity) and overlaid onto the 2017 contours.

3.16 Cumulative estimates of the areas, populations and households within the 2018 summer night actual contours are provided in **Table 9**, along with the figures from 2017.

**Table 9 Heathrow 2017 and 2018 summer night actual modal split contours – area, population and household estimates**

| Leq (dBA) | Area ($km^2$) | | | Population | | | Households | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2017 | **2018** | change | 2017 | **2018** | change | 2017 | **2018** | change |
| > 48 | 103.1 | 106.0 | +3% | 397.9 | 417.5 | +5% | 164.6 | 174.2 | +6% |
| > 51 | 62.4 | 64.1 | +3% | 197.2 | 201.7 | +2% | 76.0 | 78.2 | +3% |
| > 54 | 35.1 | 35.9 | +2% | 95.1 | 95.6 | +1% | 34.3 | 34.9 | +2% |
| > 57 | 17.7 | 18.3 | +3% | 45.3 | 45.1 | 0% | 15.6 | 15.6 | 0% |
| > 60 | 9.1 | 9.4 | +3% | 15.4 | 16.2 | +5% | 5.0 | 5.2 | +4% |
| > 63 | 4.8 | 4.9 | +2% | 2.7 | 2.7 | 0% | 0.8 | 0.8 | 0% |
| > 66 | 2.6 | 2.7 | +4% | 0.7 | 0.6 | -14% | 0.2 | 0.2 | 0% |
| > 69 | 1.5 | 1.6 | +7% | < 0.1 | < 0.1 | (n/a) | < 0.1 | < 0.1 | (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 2017 and 2018 population/household counts are based on 2017 and 2018 CACI updates of the 2011 Census respectively.

3.17 The 2018 night actual 48 dBA Leq contour enclosed an area of 106.0 $km^2$ and a population of 417,500. The 48 dBA area was 3% larger than in 2017 (103.1 $km^2$), whilst the population was 5% higher (2017: 397,900). Areas also increased at the higher contour levels in 2018. The increases in the night contour area can be attributed mainly to the 6% rise in night movements in 2018, which outweighed noise improvements from a shift to quieter aircraft types and the noise reduction adjustments highlighted in section 2.10.

## 2018 summer night single mode Leq contours

3.18 The Heathrow 2018 summer night Leq 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 dBA at 3 dB intervals (the 69 and 72 dBA 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 2018 summer night single mode contours are provided in **Tables 10** and **11**.

**Table 10 Heathrow 2006 and 2018 summer night 100% W contours (assuming 2006 N-S runway usage) area, population and household estimates**

| Leq (dBA) | Area ($km^2$) | | | Population | | | Households | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2006 | **2018** | Change | 2006 | **2018** | Change | 2006 | **2018** | change |
| > 48 | 118.3 | 106.2 | -10% | 431.8 | 488.8 | +13% | 195.7 | 207.4 | +6% |
| > 51 | 71.4 | 64.9 | -9% | 188.5 | 221.5 | +18% | 80.2 | 86.7 | +8% |
| > 54 | 42.2 | 37.6 | -11% | 99.1 | 117.6 | +19% | 40.6 | 44.2 | +9% |
| > 57 | 23.3 | 18.8 | -19% | 47.3 | 54.4 | +15% | 18.4 | 19.0 | +3% |
| > 60 | 11.8 | 9.7 | -18% | 21.6 | 23.4 | +8% | 8.2 | 7.9 | -4% |
| > 63 | 6.4 | 4.9 | -23% | 7.4 | 4.4 | -41% | 2.5 | 1.4 | -44% |
| > 66 | 3.5 | 2.6 | -26% | 1.7 | 1.4 | -18% | 0.6 | 0.4 | -33% |
| > 69 | 2.0 | 1.4 | -30% | 0.2 | < 0.1 | (n/a) | 0.1 | < 0.1 | (n/a) |
| > 72 | 1.3 | 0.8 | -38% | 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 2018 population/household counts are based on a 2018 CACI update of the 2011 Census.

**Table 11 Heathrow 2006 and 2018 summer night 100% E contours (assuming 2006 N-S runway usage) area, population and household estimates**

| Leq (dBA) | Area ($km^2$) | | | Population | | | Households | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2006 | **2018** | change | 2006 | **2018** | change | 2006 | **2018** | change |
| > 48 | 112.0 | 101.7 | -9% | 197.3 | 188.9 | -4% | 81.4 | 72.5 | -11% |
| > 51 | 68.9 | 61.2 | -11% | 120.8 | 100.5 | -17% | 49.5 | 38.8 | -22% |
| > 54 | 39.4 | 33.0 | -16% | 52.0 | 38.8 | -25% | 21.9 | 16.0 | -27% |
| > 57 | 20.5 | 16.6 | -19% | 7.9 | 5.6 | -29% | 3.5 | 2.3 | -34% |
| > 60 | 11.2 | 8.8 | -21% | 1.8 | 1.8 | 0% | 0.8 | 0.7 | -13% |
| > 63 | 6.2 | 4.5 | -27% | 0.7 | 0.6 | -14% | 0.3 | 0.3 | 0% |
| > 66 | 3.4 | 2.4 | -29% | 0.2 | 0.1 | -50% | 0.1 | 0.1 | 0% |
| > 69 | 1.9 | 1.3 | -32% | 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 2018 population/household counts are based on a 2018 CACI update of the 2011 Census.

3.20 For the westerly single mode contours, the areas have all decreased in 2018 relative to 2006, by up to 38%. Populations and households, however, were higher in 2018 especially at the lower level contours from 48 to 57 dBA. This can be attributed to the effects of population encroachment around Heathrow between 2006 and 2018.

3.21 For the easterly single mode contours, the 2018 areas were lower at all the contour levels, by up to 36%. Population and households were all lower or unchanged in 2018 compared to 2006.

## 2018 summer day overflight contours and track density diagrams

3.22 Contours showing the number of 2018 average summer 16-hour day overflights (up to 4,000 ft AMSL), for 48.5 and 60 degree elevation angles[9] at the ground receiver (see **Ref 4**), are shown in **Figures B10** and **B11** respectively. The results for the 2018 summer day are overlaid onto the 2017 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 of 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, 2017 and 2018 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**.

## 2018 summer night overflight contours and track density diagrams

3.25 Contours showing the number of 2018 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 2018 summer night are overlaid onto the 2017 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, 2017 and 2018 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.

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

## 2018 Noise Action Plan contours

3.28 The following Noise Action Plan contours for 2018 are shown in **Figures B14-B18** of **Appendix B** respectively, overlaid onto the 2017 contours:

- $L_{day}$, from 55 to 75 dBA in 5 dB steps;
- $L_{evening}$, from 55 to 75 dBA in 5 dB steps;
- $L_{night}$, from 50 to 70 dBA in 5 dB steps;
- $L_{den}$, from 55 to 75 dBA in 5 dB steps; and
- $L_{eq,6.5hr\ night}$, 48 dBA.

3.29 The estimated cumulative areas, populations and households within the above 2018 contours are summarised in **Tables 12-16** respectively, along with the results for 2017. The 2018 population and household figures are based on a 2018 update of the 2011 Census supplied by CACI Ltd. (The 2017 population and household figures are based on a 2017 update of the 2011 Census).

3.30 A comparison between the cumulative 2018 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 2018 $L_{den}$ 55 dBA contour, there was a 0.2% increase in the population count between 2017 and 2018.

## 2018 $L_{day}$ contours

3.33 Total movements in the 2018 $L_{day}$ period decreased by 0.5% from 2017 to 951.5 per 12-hour day (see **Table C3**). The largest increases were for the ANCON types EA320NEO (+26 movements), EA33 (+9) and B789 (+7). These were offset by decreases for the EA320V (-18 movements), EA320C (-11), and the B763P and B763G (-9 each).

3.34 The 55 dBA $L_{day}$ contour area was 8% smaller than in 2017 and there were also area decreases at the other contour levels of up to 8% (**Table 12**).

**Table 12 Heathrow 2018 $L_{day}$ contours - area, population and household estimates**

| $L_{day}$ (dBA) | Area ($km^2$) | | | Population | | | Households | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2017 | **2018** | change | 2017 | **2018** | change | 2017 | **2018** | change |
| > 55 | 139.3 | 128.6 | -8% | 410.4 | 351.9 | -14% | 164.7 | 138.4 | -16% |
| > 60 | 53.2 | 48.8 | -8% | 116.8 | 103.8 | -11% | 42.5 | 37.4 | -12% |
| > 65 | 21.6 | 20.2 | -6% | 20.1 | 16.3 | -19% | 6.9 | 5.6 | -19% |
| > 70 | 6.9 | 6.5 | -6% | 2.0 | 1.1 | -45% | 0.7 | 0.4 | -43% |
| > 75 | 2.6 | 2.5 | -4% | < 0.1 | < 0.1 | (n/a) | < 0.1 | < 0.1 | (n/a) |

Note: Populations and households are given in thousands. The 2017 and 2018 population/household counts are based on 2017 and 2018 CACI updates of the 2011 Census respectively.

3.35 These area changes can be attributed to: (a) the 16% higher proportion of easterly operations, which tends to reduce the contour area at Heathrow, (b) the introduction of more modern, quieter aircraft such as the EA320NEO, and (c) noise adjustments made in light of the 2018 noise measurements, as described in section 2.10.

3.36 Population counts for the 55 dBA contour in 2018 were 14% lower than in 2017, and reductions were also seen at the higher contour levels. There were similar percentage changes for household counts.

3.37 The 2018 $L_{day}$ contours are compared against the 2017 $L_{day}$ contours in **Figure B14**. The effects of the 16% change in the 2018 runway modal split in favour of easterly operations is evident in the departure contour lobes to the east of the airport resulting from aircraft turning to the north and south, and also in the arrival contour lobes over Windsor, which have all increased in size. Conversely, the westerly arrival contour lobe over London and the westerly departure lobes have all retracted. 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.

## 2018 $L_{evening}$ contours

3.38 Total movements in the 2018 $L_{evening}$ period increased by 2% from 2017, to 275.7 per 4-hour evening (see **Table C4**). The highest movement increase was for the ANCON aircraft type EA320NEO (+8 movements). The largest decrease was for the EA320V (-3 movements).

3.39 The area of the 55 dBA $L_{evening}$ contour decreased by 9% in 2018 despite the 2% increase in movements (see **Table 13**). There were also reductions in area at the higher contour levels of up to 11%. These area changes can be attributed to: (a) the 16% higher proportion of easterly operations, which tends to reduce the contour area at Heathrow, (b) the introduction of more modern, quieter aircraft such as the EA320NEO, and (c) noise adjustments made in light of the 2018 noise measurements, as described in section 2.10.

**Table 13 Heathrow 2018 $L_{evening}$ contours - area, population and household estimates**

| $L_{evening}$ (dBA) | Area ($km^2$) | | | Population | | | Households | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2017 | **2018** | change | 2017 | **2018** | change | 2017 | **2018** | change |
| > 55 | 121.3 | 110.8 | -9% | 307.5 | 305.7 | -1% | 119.3 | 119.1 | 0% |
| > 60 | 45.6 | 42.6 | -7% | 84.2 | 80.8 | -4% | 30.1 | 28.9 | -4% |
| > 65 | 19.0 | 16.9 | -11% | 10.9 | 8.9 | -18% | 3.9 | 3.2 | -18% |
| > 70 | 6.1 | 5.6 | -8% | 0.7 | 0.5 | -29% | 0.3 | 0.2 | -33% |
| > 75 | 2.4 | 2.3 | -4% | 0.0 | 0.0 | (n/a) | 0.0 | 0.0 | (n/a) |

Note: Populations and households are given in thousands. The 2017 and 2018 population/household counts are based on 2017 and 2018 CACI updates of the 2011 Census respectively.

3.40 Reductions in population and household counts of up to 33% were found at the 55 to 70 dBA contour levels.

3.41 The 2018 $L_{evening}$ contours are compared against the 2017 contours in **Figure B15**. As with the $L_{day}$ contours, the 16% shift in the 2018 runway modal split in favour of easterly operations caused the extension of the departure contour lobes to the east of the airport formed by aircraft turning to the north and south, and likewise the arrival contour lobes over Windsor. Conversely, the contour lobes resulting from westerly departures and arrivals have all retracted. 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.

## 2018 $L_{night}$ contours

3.42 Total movements over the 2018 $L_{night}$ period increased by 5% from 2017 (77.9) to 81.6 per 8-hour night (see **Table C5**). Arrivals constituted 75% of all $L_{night}$ movements. The largest increases were for the ANCON types B773G (+2 movements) and B744R (+1), whilst the largest decreases were for the EA38R and B763P (-1 movement each).

3.43 The area of the $L_{night}$ 50 dBA contour was 4% larger in 2018, but areas at the higher contour levels were mostly similar (see **Table 14**). The area change for the 50 dBA contour can be attributed in part to the 5% increase in movements.

**Table 14 Heathrow 2018 $L_{night}$ contours - area, population and household estimates**

| $L_{night}$ (dBA) | Area ($km^2$) | | | Population | | | Households | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2017 | **2018** | change | 2017 | **2018** | change | 2017 | **2018** | Change |
| > 50 | 69.9 | 72.7 | +4% | 224.6 | 220.9 | -2% | 87.7 | 86.5 | -1% |
| > 55 | 25.0 | 24.5 | -2% | 72.3 | 59.6 | -18% | 25.6 | 20.9 | -18% |
| > 60 | 8.1 | 8.1 | 0% | 14.5 | 11.2 | -23% | 4.7 | 3.6 | -23% |
| > 65 | 2.9 | 2.9 | 0% | 1.3 | 0.8 | -38% | 0.4 | 0.2 | -50% |
| > 70 | 1.1 | 1.2 | +9% | 0.0 | 0.0 | (n/a) | 0.0 | 0.0 | (n/a) |

Note: Populations and households are given in thousands. The 2017 and 2018 population/household counts are based on 2017 and 2018 CACI updates of the 2011 Census respectively.

3.44 There was a 2% decrease in population within the $L_{night}$ 50 dBA contour, and even larger percentage decreases at the higher contour levels. These were brought about by contour shape changes arising from the 16% higher proportion of easterly operations (see below).

3.45 The 2018 $L_{night}$ contours are compared against the 2017 contours in **Figure B16**. It can be seen that arrival noise was dominant over the night period. The shift in runway modal split from 80% west / 20% east in 2017 to 64% west / 36% east in 2018 had the main effect of shortening the arrival contour lobes over west London and lengthening them over Windsor.

## 2018 $L_{den}$ contours

3.46 The total annual 24-hour aircraft movements in 2018 (1308.8) were 0.4% higher than in 2017 (see **Table C6**). The largest movement increases were for the ANCON types EA320NEO (+35), and EA33 and B789 (+9 each). These were offset by decreases for the EA320V (-21 movements), EA320C (-13) and B763P (-11). There was a 1% reduction in movements of Boeing 747-400 aircraft in 2018 compared to 2017.

3.47 The area of the $L_{den}$ 55 dBA contour in 2018 was 3% smaller than in 2017 (see **Table 15**) and area reductions of up to 6% were also found at the higher contour levels. These area changes can be attributed to: (a) the 16% higher proportion of easterly operations, which tends to reduce the contour area at Heathrow, (b) the introduction of more modern, quieter aircraft such as the EA320NEO, and (c) noise adjustments made in light of the 2018 noise measurements, as described in section 2.10.

**Table 15 Heathrow 2018 $L_{den}$ contours - area, population and household estimates**

| $L_{den}$ (dBA) | Area ($km^2$) | | | Population | | | Households | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2017 | **2018** | change | 2017 | **2018** | change | 2017 | **2018** | change |
| > 55 | 182.3 | 176.8 | -3% | 699.6 | 611.3 | -13% | 293.5 | 253.9 | -13% |
| > 60 | 71.8 | 67.7 | -6% | 189.6 | 182.1 | -4% | 72.8 | 69.3 | -5% |
| > 65 | 27.8 | 26.6 | -4% | 49.6 | 42.6 | -14% | 17.4 | 14.9 | -14% |
| > 70 | 9.1 | 8.6 | -5% | 5.3 | 4.1 | -23% | 1.8 | 1.4 | -22% |
| > 75 | 3.3 | 3.1 | -6% | 0.1 | 0.1 | 0% | < 0.1 | < 0.1 | (n/a) |

Note: Populations and households are given in thousands. The 2017 and 2018 population/household counts are based on 2017 and 2018 CACI updates of the 2011 Census respectively.

3.48 The population count was 13% lower for the 55 dBA contour in 2018, as the arrival contour tip arising from westerly arrivals retracted from densely populated areas of London due to the higher proportion of easterly operations (**Figure B17**). Populations also decreased at the higher contour levels and a similar pattern of changes was seen for the household counts.

3.49 The 2018 $L_{den}$ contours are compared against the 2017 contours in **Figure B17**. The westerly arrival contour lobes to the east of the airport have retracted following the 16% shift in favour of easterly movements in 2018. At the opposite end near Windsor, the increase in proportion of easterly operations caused an increase in the extent of the contour lobe. The higher proportion of easterly operations also caused the expansion of the easterly departure contour lobes

formed by aircraft that turn to the north and south. Conversely, the contour lobes due to westerly departures have retracted.

## 2018 $L_{eq,6.5hr\ night}$ contours

3.50 Total movements in the 6.5-hour night period for 2018 (see **Table C7**) increased by 3% to 16.9 from the previous year (2017: 16.4). The highest movement increase was for the ANCON aircraft type B789 (+1.2), whilst the largest decrease was for the EA38R (-0.7). Total 6.5-hour night departures increased by 3% from 1.3 in 2017 to 1.4 in 2018. Total 6.5-hour night arrival movements also increased by 3%, from 15.1 in 2017 to 15.6 in 2018.

3.51 The 48 dBA $L_{eq,6.5hr\ night}$ contour area of 31.8 $km^2$ in 2018 was 6% lower compared to 2017 (see **Table 16**). Populations and households within the 48 dBA contour decreased by 16% and 17% respectively.

**Table 16 Heathrow 2018 $L_{eq,6.5hr\ night}$ contour - area, population and household estimates**

| $L_{eq,6.5hr\ night}$ (dBA) | Area ($km^2$) | | | Population | | | Households | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2017 | **2018** | change | 2017 | **2018** | Change | 2017 | **2018** | change |
| > 48 | 33.9 | 31.8 | -6% | 118.0 | 99.0 | -16% | 43.6 | 36.3 | -17% |

Note: Populations and households are given in thousands. The 2017 and 2018 population/household counts are based on 2017 and 2018 CACI updates of the 2011 Census respectively.

3.52 The 2018 $L_{eq,6.5hr\ night}$ 48 dBA contour is compared against the 2017 contour in **Figure B18**. The northern runway contour lobe to the east of the airport (around Kew) retracted in 2018, helping to reduce the population count. The 2018 modal split for arrivals only was 69% west / 31% east (see **Table C10-e**), which was equivalent to a 7% lower percentage of westerly arrivals than in 2017, when the arrival runway split was 76% west / 24% east. Although the northern runway contour lobe lengthened at the opposite end near Windsor (due to the aforementioned modal split change), this was largely over unpopulated areas.

3.53 The reduction in area despite the movement increase can be attributed to the changes in fleet mix to quieter types, e.g. B789, whilst arrival movements for noisier types such as the B763P, EA38R and B744R reduced.

## 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 $L_{eq,6.5hr\ night}$ respectively, for the base year 2006 and 2009 through to 2018 (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 had an effect on the contours between 2006 and 2018 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.

*$L_{day}$ trends*

3.56 There was a downward trend for the $L_{day}$ 55 dBA area, population and households from 2006 through to 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. From 2011 to 2014, the $L_{day}$ area was relatively steady, before falling in 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.

3.57 Populations rose in 2013 following the major population database update but have fallen since 2014 in line with the area reductions. 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 dBA area exhibited a downward trend from 2006 through to 2010 before rising in 2011 (when there was also a rise in movements), but since then, has fallen steadily through to 2018 (**Figure B20**). This downward area trend can be attributed to the introduction of quieter aircraft types and to reductions in noise levels for certain ANCON 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.

3.59 Populations and households fell in 2009 from the 2006 levels, but increased in 2010 and 2011, and since then have 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.

### *$L_{night}$ trends*

3.60 The $L_{night}$ 50 dBA area dropped between 2006 and 2009, but since then has remained at a steady level, although it fell to a low in 2017 (**Figure B21**). Between 2006 and 2017, $L_{night}$ movements were in the range of 75-78 per night, but rose to 82 in 2018.

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 reversed in 2018 as the percentage of westerly operations reduced by 16%.

### *$L_{den}$ trends*

3.62 The $L_{den}$ 55 dBA area decreased between 2006 and 2009 as movements of the noise dominant Boeing 747-400 aircraft dropped by 21% (**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.

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.

### *$L_{eq,6.5hr\ night}$ trends*

3.65 The $L_{eq,6.5hr\ night}$ 48 dBA area has generally followed a downward trend since 2006, except in 2010 when movements increased due to disruptions caused by volcanic ash, ATC strikes and adverse winter weather (**Figure B23**).

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 low in proportion of westerly movements helped move the contour away from west London, reducing the population count.

## Cumulative area, population and household counts – comparisons with 2006

3.67 The 2018 and 2006 cumulative results in **Tables C11-C15** of **Appendix C** show that the 2018 annual contour areas were all below 2006 base year levels across all the noise metrics. For example, the $L_{den}$ 55 dBA contour area in 2018 was 176.8 $km^2$, which was 28% smaller than the 2006 $L_{den}$ 55 dBA area of 244.7 $km^2$ (see **Table C14**).

3.68 All population and household counts were lower in 2018 compared to 2006, in line with the area decreases, except for one case where the 2018 $L_{night}$ 50 dBA contour population count was 7% higher than in 2006 (**Table C13**). This rise in population can be attributed to the effects of population encroachment between 2006 and 2018 in the areas around Heathrow. To illustrate the impact of encroachment, population and household counts for the 2018 contours have also been made using the 2006 population database. These counts, which are highlighted in blue in **Tables C11-C15**, confirm that the population and household counts would have dropped across all the noise metrics had there not been any population encroachment between 2006 and 2018. In the above case of the 2018 $L_{night}$ 50 dBA contour, the population count would have fallen by 14% without encroachment.

3.69 Historically the Heathrow noise contour area has been largely controlled by movements of the Boeing 747-400 aircraft. However, their numbers have decreased from an average of 135 movements per day in 2006 (**Ref 6**) to 54 movements in 2018, which corresponds to a 60% reduction. Newer, quieter aircraft types such as the Airbus A380 and Boeing 787-8/9 were not in service in 2006, but by 2018 there was an average of 46 daily movements of the Airbus A380 and 113 daily movements of the Boeing 787-8/9. Such fleet changes helped to reduce the Heathrow contour areas between 2006 and 2018.

## 2018 $L_{den}$ noise contours – comparisons with 2006

3.70 A diagram comparing the 2018 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 over this period of time 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 route[10]). 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

[10] See **Figure 1** for the Heathrow SID route diagram.

Runway 27R extended centreline compared to 2018. There was a 5% lower percentage of westerly operations in 2018 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 2018, the 2018 $L_{den}$ contours have also been produced using the 2006 base year 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.

3.72 As the effects of the W/E and N/S runway splits have been removed, this means that the contour changes that are visible are due to the remaining changes including:

- improvements to the aircraft fleet;
- variations in the tracks actually flown; and
- variations of the number of each aircraft on each route.

3.73 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 results of the modelling are the best practicable representation of the actual noise exposure.

## Noise change diagrams for $L_{den}$

3.74 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 2018 and 2006 $L_{den}$ noise contours, assuming the 2006 runway modal splits in both cases[11] (see **Figure B26**). The 2006 $L_{den}$ modal split was 70% west / 30% east. The outer extent of both the 2006 and 2018 $L_{den}$ 55 dBA contours (assuming the 2006 modal split) has been used as the boundary of the noise changes.

3.75 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 2018. There are some relatively small areas that have seen noise

[11] That is, the 2018 $L_{day}$, $L_{evening}$ and $L_{night}$ contours (the constituent parts of 2018 $L_{den}$) have been modelled with the 2006 $L_{day}$, $L_{evening}$ and $L_{night}$ runway modal splits respectively.

increases of less than 1 dB. It is estimated that 99% of the total area within the $L_{den}$ noise change boundary experienced decreases in noise.

3.76 Another noise change diagram has been produced comparing the 2018 and 2006 $L_{den}$ noise contours - this time assuming both the 2006 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.

3.77 A further noise change map has been produced to compare the 2018 and 2017 $L_{den}$ noise contours, assuming the 2017 runway modal splits in both cases[12] (see **Figure B28**). The 2017 $L_{den}$ modal split was 81% west / 19% east. The outer extent of the 2017 and 2018 $L_{den}$ 55 dBA contours has been used as the boundary of the areas of noise change being considered. Around 74% of the area has experienced noise reductions of up to 1 dB. There are some areas of noise increase (of less than 1 dB) especially to the east of the airport, where on closer inspection, the increases were found to be mostly less than 0.1 dB. The areas of noise increase made up 26% of the total area assessed.

3.78 A summary of the annual passengers, movements and 55 dBA $L_{den}$ contour area, populations and households for 2006 and 2009-2018 is given in **Table 17**. The annual passengers rose from 67.5 mppa in 2006 to 80.1 mppa in 2018, a 19% increase. Over the same period of time the $L_{den}$ 55 dBA contour area fell from 244.7 $km^2$ to 176.8 $km^2$, a decrease of 28%, and the population fell by 19%. Although 2018 had the highest passenger traffic since 2006, the $L_{den}$ 55 dBA contour for that year had the smallest area and population.

[12] That is, the 2018 $L_{day}$, $L_{evening}$ and $L_{night}$ contours (the constituent parts of 2018 $L_{den}$) have been modelled with the 2017 $L_{day}$, $L_{evening}$ and $L_{night}$ runway modal splits respectively.

**Table 17 Heathrow annual passengers/movements and 55 dBA $L_{den}$ area/population/households for 2006 & 2009-2018**

| Year | Passengers (mppa) | Annual movements | 55 dBA $L_{den}$ area ($km^2$) | 55 dBA $L_{den}$ population | 55 dBA $L_{den}$ 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 |

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

## 2018 $L_{night}$ noise contours – comparisons with 2006

3.79 A diagram comparing the 2018 and 2006 $L_{night}$ contours can be found in **Figure B29**. Overall reductions in contour area between 2006 and 2018 can be seen. The cumulative areas, populations and households for these contours are summarised in **Table C13**. The 2018 $L_{night}$ 50 dBA contour area of 72.7 $km^2$ was 14% smaller than in 2006 (84.4 $km^2$). The population count within this contour rose by 7% due to the effects of population encroachment.

## Noise change diagrams for $L_{night}$

3.80 A noise change diagram has been produced comparing 2018 $L_{night}$ with 2006 $L_{night}$ assuming the 2006 $L_{night}$ runway modal split (72% west / 28% east) in both cases (see **Figure B30**). The outer extent of the 2006 and 2018 $L_{night}$ 50 dBA contours has been taken as the boundary of the noise changes. It can be seen that nearly all areas have experienced reductions in noise levels of up to 3 dB or higher, which reflects the replacement of the older, noisier types between 2006 and 2018. For example, the B744R had 21 movements per night in 2006, but by

2018 this had reduced to 11. It is estimated that 98% of the total area within the $L_{night}$ noise change boundary experienced decreases in noise.

3.81 An additional noise change diagram (see **Figure B31**) has been produced comparing 2018 with 2017 $L_{night}$ assuming the 2017 $L_{night}$ runway modal split (80% west / 20% east) in both cases. The outer extent of the 2017 and 2018 $L_{night}$ 50 dBA 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 near Windsor. On closer inspection, it was found that the majority of noise increases were less than 0.3 dB. The regions experiencing noise decreases (of up to 2 dB) comprised 38% of the total area assessed.

## 2018 $L_{night}$ single mode noise contours

3.82 Single mode 2018 $L_{night}$ 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 2018 and 2006 $L_{night}$ single mode contours (assuming the 2006 north-south runway usage in both cases) are provided in **Tables 18** and **19**.

3.83 The contour areas for both 100% westerly and 100% easterly modes have all decreased in 2018 compared to 2006. Whilst populations and households have also decreased for the most part, population increases are seen for the westerly single mode contours at the 50 and 55 dBA levels (**Table 18**). This can be attributed to the effects of population encroachment around Heathrow between 2006 and 2018.

**Table 18 Heathrow 2006 and 2018 $L_{night}$ 100% W contours (assuming 2006 N-S runway usage) – area, population and household estimates**

| $L_{night}$ (dBA) | Area ($km^2$) | | | Population | | | Households | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2006 | **2018** | change | 2006 | **2018** | change | 2006 | **2018** | change |
| > 50 | 86.0 | 71.4 | -17% | 282.8 | 286.9 | +1% | 124.8 | 115.8 | -7% |
| > 55 | 35.2 | 25.8 | -27% | 78.2 | 87.7 | +12% | 31.5 | 31.8 | +1% |
| > 60 | 11.9 | 8.3 | -30% | 23.7 | 23.3 | -2% | 9.0 | 7.8 | -13% |
| > 65 | 4.3 | 2.7 | -37% | 2.9 | 2.3 | -21% | 1.0 | 0.7 | -30% |
| > 70 | 1.6 | 0.9 | -44% | < 0.1 | < 0.1 | (n/a) | < 0.1 | < 0.1 | (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 2018 population/household counts are based on a 2018 CACI update of the 2011 Census.

**Table 19 Heathrow 2006 and 2018 $L_{night}$ 100% E contours (assuming 2006 N-S runway usage) – area, population and household estimates**

| $L_{night}$ (dBA) | Area ($km^2$) | | | Population | | | Households | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2006 | **2018** | change | 2006 | **2018** | change | 2006 | **2018** | change |
| > 50 | 82.1 | 68.1 | -17% | 140.7 | 96.6 | -31% | 57.6 | 37.8 | -34% |
| > 55 | 32.3 | 24.1 | -25% | 28.8 | 15.2 | -47% | 12.6 | 6.6 | -48% |
| > 60 | 11.3 | 8.0 | -29% | 1.7 | 1.7 | 0% | 0.7 | 0.7 | 0% |
| > 65 | 4.2 | 2.6 | -38% | 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 2018 population/household counts are based on a 2018 CACI update of the 2011 Census.

## 2018 N65 annual 16-hour day contours

3.84 N65 contours (i.e. contours showing the number of aircraft noise events above 65 dBA $L_{max}$) have been produced for the 2018 annual average 16-hour day period (0700-2300 local time), for which the runway modal split was 65% west / 35% east.

3.85 The N65 contours for both 2018 and 2006[13] are overlaid in **Figure B34** (for clarity only the 50, 200 and 500 noise event levels are shown in the diagram). At the 50 events level, it can be seen that the 2018 contours were generally smaller; however, there was an obvious extension especially to the contour lobe over Richmond Park, which was caused by higher movement rates on the easterly DET departure route in 2018 compared to 2006.

3.86 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 2018 annual average 16-hour day N65 contours - area, population and household estimates**

| N65 | Area ($km^2$) | | | Population | | | Households | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2006 | **2018** | Change | 2006 | **2018** | Change | 2006 | **2018** | change |
| > 50 | 267.2 | 231.6 | -13% | 754.3 | 724.7 | -4% | 337.2 | 299.7 | -11% |
| > 100 | 162.5 | 137.4 | -15% | 470.8 | 394.5 | -16% | 209.9 | 157.7 | -25% |
| > 200 | 83.0 | 66.1 | -20% | 223.5 | 178.9 | -20% | 96.3 | 68.0 | -29% |
| > 500 | 13.2 | 10.8 | -18% | 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 2018 population/household counts are based on a 2018 CACI update of the 2011 Census.

3.87 The results show that the N65 50 events contour area reduced by 13% between 2006 and 2018, which reflects the switch from the noisiest aircraft such as the Boeing 747-400 to quieter types such as the Airbus A380 and Boeing 777-300ER. The population count within this contour was 4% lower in 2018. Area, population and household decreases were also found at all the higher contour levels.

[13] The 2006 modal split was 70% W / 30% E.

## N65 annual 16-hour day change diagrams

3.88 An N65 change map has been produced comparing the 2018 and 2006 N65 annual 16-hour results assuming the 2006 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 2018 N65 50 events contours assuming the 2006 runway modal split.

3.89 It can be seen that many areas have experienced reductions of up to 100-200 noise events (per annual 16-hour day) that exceed 65 dBA $L_{max}$. 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 (SAM) departure routes. An area in the vicinity of Egham also experienced increases of up to 50 N65 events, which was caused by the DET mean departure track being positioned more to the west in 2018 compared to 2006. A region to the east of the southern runway showed increases of 10-50 N65 events. This was caused by a higher proportion of westerly arrivals on the northern runway in 2006, in contrast to 2018 when the westerly arrivals were split evenly between the two runways. Approximately 84% of the total area within the outer boundary of noise event changes experienced either N65 decreases or changes of less than 10 N65 events.

3.90 Another N65 change map has been produced comparing the 2018 and 2017 N65 results, assuming the 2017 runway modal split (81% west / 19% east) in both cases (see **Figure B36**). The boundary for the changes is the outer extent of the 2017 and 2018 N65 50 events contours assuming the 2017 runway modal split. Around 90% of the area considered was either exposed to changes of less than 10 N65 events or reductions of between 10 and 50 N65 events.

## 2018 N70 annual 16-hour day contours

3.91 N70 contours (i.e. contours showing the number of aircraft noise events above 70 dBA $L_{max}$) have also been produced for the 2018 annual average 16-hour day period (0700-2300 local time), for which the runway modal split was 65% west / 35% east.

3.92 The N70 contours for 2018 and 2006[14] are overlaid in **Figure B37** (for clarity only the 50, 200 and 500 noise event levels are shown in the diagram). At the 50 events level the 2018 contour is generally smaller, reflecting the switch to quieter aircraft types from the noisiest types as the Boeing 747-400.

[14] The 2006 modal split was 70% W / 30% E.

3.93 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 2018 annual average 16-hour day N70 contours - area, population and household estimates**

| N70 | Area ($km^2$) | | | Population | | | Households | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2006 | **2018** | Change | 2006 | **2018** | change | 2006 | **2018** | change |
| > 50 | 119.7 | 99.5 | -17% | 252.0 | 265.5 | +5% | 105.0 | 102.9 | -2% |
| > 100 | 71.4 | 63.0 | -12% | 136.0 | 147.6 | +9% | 56.9 | 55.1 | -3% |
| > 200 | 41.8 | 35.5 | -15% | 63.4 | 57.9 | -9% | 24.8 | 20.0 | -19% |
| > 500 | 2.1 | 1.4 | -33% | < 0.1 | < 0.1 | (n/a) | < 0.1 | < 0.1 | (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 2018 population/household counts are based on a 2018 CACI update of the 2011 Census.

3.94 The 50 events N70 contour area has reduced between 2006 and 2018 by 17%, 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. The population count within the 50 and 100 event contours increased by 5% and 9% respectively. This resulted from population encroachment in the areas around Heathrow.

3.95 N70 contours for 2018 assuming both the 2006 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 noise 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 5% at the 100 and 200 event levels in 2018 – this can be attributed to the effects of population encroachment in the areas around Heathrow.

**Table 22 Heathrow 2006 and 2018 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 | **2018** | change | 2006 | **2018** | change | 2006 | **2018** | change |
| > 50 | 119.7 | 98.4 | -18% | 252.0 | 249.4 | -1% | 105.0 | 96.3 | -8% |
| > 100 | 71.4 | 63.0 | -12% | 136.0 | 142.8 | +5% | 56.9 | 53.3 | -6% |
| > 200 | 41.8 | 35.6 | -15% | 63.4 | 66.3 | +5% | 24.8 | 23.5 | -5% |
| > 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 2018 population/household counts are based on a 2018 CACI update of the 2011 Census.

## N70 annual 16-hour day change diagrams

3.96 An N70 change map has been produced comparing the N70 results for 2018 with those for 2006, assuming the 2006 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 2018 N70 50 events contours assuming the 2006 runway modal split. It can be seen that many areas have experienced reductions of up to 100-200 N70 events. An area in the vicinity of Egham experienced increases of up to 50 N70 events, which was caused by the DET mean departure track being positioned more to the west in 2018 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 greater number of westerly departures in 2006 using the southern runway, whereas in 2018, westerly departures were split evenly between the two runways. An area to the east of the southern runway also showed increases of up to 50-100 N70 events. 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 evenly between the two runways in 2018. Approximately 87% of the total assessment area was either 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 2018 with 2006, assuming the 2006 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 2018 N70 50 events contours assuming the 2006 runway modal split and the 2006 north-south runway usage. With the effects of the 2006 north-south runway usage removed, the areas of N70 increases to the west of the northern runway and to the east of the southern runway have reduced in size. Approximately 94% of the area within the outer boundary is

exposed to either 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 2018 and 2017 N70 results, assuming the 2017 runway modal split (81% west / 19% east) in both cases (see **Figure B41**). The boundary for the changes is the outer extent of the 2017 and 2018 N70 50 events contours assuming the 2017 runway modal split. Over 99% of the area is either exposed to changes of less than 10 N70 events or reductions of more than 10 N70 events.

## 2018 N70 annual 16-hour day single mode contours

3.99 Single mode 2018 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 2018 compared to 2006 by up to 24%. However, population counts have risen for the westerly single mode contours due to the effects of population encroachment.

**Table 23 Heathrow 2006 and 2018 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 | **2018** | change | 2006 | **2018** | Change | 2006 | **2018** | change |
| > 50 | 121.8 | 105.5 | -13% | 220.1 | 224.2 | +2% | 92.8 | 87.3 | -6% |
| > 100 | 77.7 | 65.6 | -16% | 133.6 | 139.3 | +4% | 55.1 | 53.1 | -4% |
| > 200 | 51.3 | 43.7 | -15% | 94.7 | 97.8 | +3% | 38.6 | 35.7 | -8% |
| > 500 | 4.6 | 3.5 | -24% | 0.3 | 0.4 | +33% | 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 2018 population/household counts are based on a 2018 CACI update of the 2011 Census.

**Table 24 Heathrow 2006 and 2018 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 | **2018** | change | 2006 | **2018** | change | 2006 | **2018** | change |
| > 50 | 97.9 | 82.6 | -16% | 312.1 | 278.7 | -11% | 131.4 | 109.3 | -17% |
| > 100 | 62.3 | 54.1 | -13% | 179.0 | 175.8 | -2% | 73.8 | 67.2 | -9% |
| > 200 | 41.6 | 34.4 | -17% | 92.2 | 90.4 | -2% | 36.8 | 33.1 | -10% |
| > 500 | 18.0 | 15.5 | -14% | 11.0 | 7.5 | -32% | 5.0 | 2.9 | -42% |

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 2018 population/household counts are based on a 2018 CACI update of the 2011 Census.

## 2018 N60 annual 8-hour night contours

3.101 N60 contours (i.e. contours showing the number of aircraft noise events above 60 dBA $L_{max}$) have been produced for the 2018 annual average 8-hour night period (2300-0700 local time), for which the runway modal split was 64% west / 36% east. The N60 contours for 2018 and 2006 are overlaid in **Figure B44** for the event levels 10, 20 and 50. 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 events contour areas increased by 15% and 23% respectively between 2006 and 2018. These increases in area can be attributed mainly to: (a) the difference in runway modal split between the two years, which affected the contour shapes (for example, the 10 events N60 contour area for 2018 falls to 200.5 $km^2$ if the 2006 modal split is assumed), and (b) the 11% increase in night arrival movements in 2018 compared to 2006. Population counts within these contours also rose in line with the area increases. The 16% higher proportion of easterly arrivals in 2018[15] was the primary cause of the extension of the contours west of Windsor.

[15] See **Table C10-c**

**Table 25 Heathrow 2006 and 2018 annual average 8-hour night N60 contours - area, population and household estimates**

| N60 | Area ($km^2$) | | | Population | | | Households | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2006 | **2018** | change | 2006 | **2018** | change | 2006 | **2018** | change |
| > 10 | 184.4 | 211.8 | +15% | 837.2 | 974.5 | +16% | 387.6 | 419.8 | +8% |
| > 20 | 89.9 | 110.7 | +23% | 389.9 | 523.5 | +34% | 175.7 | 220.2 | +25% |
| > 50 | 0.5 | 0.5 | 0% | < 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 2018 population/household counts are based on a 2018 CACI update of the 2011 Census.

## N60 annual 8-hour night change diagrams

3.103 An N60 change map has been produced comparing the 2018 and 2006 annual 8-hour night N60 results, assuming the 2006 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 2018 annual 8-hour night N60 10 events contours assuming the 2006 runway modal split. Around 35% of the area is exposed to changes of less than 2 N60 events or reductions of between 2 and 5 N60 events. Approximately 9% of the area is exposed to increases of more than 5 events.

3.104 A further N60 change map has been produced comparing the 2018 and 2017 annual 8-hour night N60 results, assuming the 2017 runway modal split (80% west / 20% east) in both cases (**Figure B46**). The boundary for the changes is the outer extent of the 2017 and 2018 annual 8-hour night N60 10 events contours assuming the 2017 runway modal split. Around 50% of the area is exposed to changes of less than 2 N60 events or reductions of between 2 and 5 N60 events. Approximately 10% of the area is exposed to increases of more than 5 events.

Chapter 4
# Conclusions

4.1 In 2018, there were an average of 1265.5 summer 16-hour day movements at Heathrow, 0.6% less than in 2017 (1273.1). The area of the 54 dBA average summer day actual modal split (78% west / 22% east) Leq contour was 158.3 $km^2$, 6% smaller than in 2017 (168.3 $km^2$). The population count within this contour dropped by 10% to 497,300 (2017: 549,600). The 54 dBA standard modal split (79% west / 21% east) Leq contour area decreased by 5% to 158.5 $km^2$ (2017: 167.0 $km^2$), and the population fell by 6% to 501,800 (2017: 532,600).

4.2 The 2018 average summer 8-hour night movement total (88.0) was 6% higher than in 2017 (83.0). (Night departure movements increased by 12% and night arrivals rose by 4%). The area of the 48 dBA 8-hour night actual modal split (80% west / 20% east) Leq contour increased by 3% to 106.0 $km^2$ (2017: 103.1 $km^2$), and the population count rose by 5% to 417,500 (2017: 397,900).

4.3 The numbers of annual aircraft movements at Heathrow in 2018 compared to 2017 were 0.5% lower over the $L_{day}$ period, 2% higher for $L_{evening}$, and 5% higher for $L_{night}$. Overall 24-hour $L_{den}$ movements in 2018 (1308.8) were 0.4% higher than in 2017 (1303.7). Movements over the 6.5-hour night period in 2018 were 3% higher compared to 2017.

4.4 The area of the 55 dBA $L_{day}$ contour in 2018 (128.6 $km^2$) was 8% smaller than in 2017. There were also area decreases of up to 8% at the other $L_{day}$ contour levels. Similarly, the 55 dBA $L_{evening}$ contour reduced by 9% in 2018 to 110.8 $km^2$ and there were reductions at the higher contour levels of up to 11%. The area of the 50 dBA $L_{night}$ contour in 2018 (72.7 $km^2$) was 4% higher than in 2017. The 55 dBA $L_{den}$ contour area of 176.8 $km^2$ was 3% smaller than in 2017 (182.3 $km^2$).

4.5 The above reductions in contour area for over the summer and annual daytime periods can be attributed to the ongoing introduction of more modern, quieter types such as the Airbus A320neo, and also to noise adjustments made to certain ANCON types following noise measurements undertaken in 2018 (see section 2.10). The shift to a lower percentage of westerly movements in 2018 also helped to reduce areas further. Night-time summer and annual contour areas increased in 2018 because movement increases outweighed the effects of quieter aircraft in the fleet mix.

4.6 The 2018 $L_{day}$ contours showed population and household changes from 2017 in line with the area reductions. The shift to a lower proportion of westerly operations in 2018 changed the $L_{day}$ contour shapes, which in turn affected the

population counts. The runway modal split changes also affected the shape of the 2018 $L_{evening}$ contours, and population counts decreased for all the contours. For 2018 $L_{night}$, the lower percentage of westerly arrival operations shortened the contours over west London, causing decreases in population counts. For 2018 $L_{den}$, changes to the contour shapes caused by the higher proportion of easterly operations meant that population and household counts fell in all cases along with the area reductions. Similar to $L_{night}$, the higher proportion of easterly operations caused a retraction of the $L_{eq,6.5hr\ night}$ 48 dBA contour over west London in 2018, reducing the population and household counts.

*Annual contour trends*

4.7 With respect to long-term trends, the $L_{day}$ 55 dBA contour area was reasonably steady from 2009 to 2014 after the initial high 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 dBA area has steadily fallen as noise levels reduced for certain ANCON aircraft types, as identified by noise measurement data, and as the fleet mix continued to switch to more modern, quieter aircraft. The $L_{day}$ 55 dBA populations and households fell to a low in 2010 after dropping from the 2006 peak 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. Movements over the $L_{day}$ period since 2006 have been steady apart from the dip in 2010.

4.8 The area, population and households within the $L_{evening}$ 55 dBA contour decreased in 2009 from the 2006 peak 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 noise reductions 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. Movements declined between 2011 and 2014, but rose in 2015 and levelled off in 2016 and 2017, before rising in 2018.

4.9 Aircraft movements over the $L_{night}$ period have been relatively stable since 2006, although in 2018 they reached a high. The $L_{night}$ 50 dBA area was steady between 2011 and 2016, having been higher between 2006 and 2010, and dropped to a low in 2017 before rising in 2018. 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 operations and a more even split between 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.

4.10 After the 2006 high, the $L_{den}$ 55 dBA 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 various ANCON aircraft types, as identified by noise measurement data. Populations and households trended downwards between 2011 and 2016, apart from a rise in population 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. Aircraft movements in the $L_{den}$ period have been at a similar level since 2006, with the exception of a drop in 2010.

4.11 The $L_{eq,6.5hr\ night}$ 48 dBA area has generally followed a downward trend since 2006, 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 the rise in 2010. Following population decreases for the most part between 2006 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 B744R movements 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 moved 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.

*Comparisons with 2006 (base year) and 2017 (previous year)*

4.12 The 2018 cumulative contour areas were below 2006 levels for all the annual noise metrics considered. In most cases, populations and households within the 2018 contours were also lower than in 2006. Where there were higher populations and households in 2018, this was due to the effects of population encroachment around Heathrow between 2006 and 2018. Population and household counts for the 2018 contours, carried out with the 2006 population

database instead of the 2018 database, indicated that the 2018 counts would have all been lower than in 2006 if population encroachment had not occurred.

4.13 An assessment of $L_{den}$ noise changes between 2006 and 2018, assuming the 2006 base year modal split in both cases, indicated that 99% of the assessment area experienced noise reductions. Around 1% of the area was exposed to noise increases, which were all lower than 1 dB.

4.14 An analysis of $L_{den}$ noise changes between 2017 and 2018, assuming the 2017 modal split in both cases, indicated that 74% of the area experienced noise reductions of up to 1 dB. The remaining 26% of the total area assessed was exposed to noise increases, although these were mostly less than than 0.1 dB.

4.15 An analysis of $L_{night}$ noise changes between 2006 and 2018, assuming the 2006 base year runway modal split in both cases, showed that 98% 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 B744R, which reduced from 21 to 11 movements per night between 2006 and 2018.

4.16 An assessment of $L_{night}$ noise changes between 2017 and 2018, assuming the 2017 modal split in both cases, revealed some areas with a noise increase of less than 1 dB to the east of the airport as far as Barnes, and to the west near Windsor. The areas of noise decrease made up 38% of the total area assessed.

4.17 Single-mode contours produced for 2018 and 2006 $L_{night}$ (assuming the 2006 north-south runway usage) showed that areas have all reduced in 2018 compared to 2006. However, population counts increased at some of the '100% W' mode contour levels, which can be attributed to the effects of population encroachment between 2006 and 2018.

4.18 N65 and N70 annual average 16-hour day contours produced for 2006 and 2018 showed that all the contour areas have decreased between 2006 and 2018. This is indicative of the replacement of the noisiest aircraft types, such as the Boeing 747-400, by quieter types including the Airbus A380, Boeing 777-300ER and Boeing 787-8/9. However, there were area increases for the N60 annual average 8-hour night contours in 2018 compared to 2006. This resulted mainly from the difference in runway modal split and the 11% higher number of night arrival movements in 2018 compared to 2006.

4.19 There were increases in population counts for the N70 contours despite the reductions in contour area. These were due to the effects of population encroachment around Heathrow.

4.20 An assessment of annual 16-hour day N65 changes between 2006 and 2018, assuming the 2006 modal splits, showed that many areas have experienced reductions of up to 100-200 events. However, there were increases of up to

50 events, (a) south of Windsor due to higher usage of the CPT and GOGSI (SAM) routes in 2018, (b) near Egham due to a westerly shift in the position of the 2018 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 evenly split between the northern and southern runways in 2018. Approximately 84% of the total assessment area experienced either decreases in N65 events or changes of less than 10 N65 events.

4.21 An analysis of annual 16-hour day N65 changes between 2017 and 2018, assuming the 2017 modal split, indicated that 90% of the area assessed was either exposed to changes of less than 10 events or reductions of up to 50 events.

4.22 An assessment of annual 16-hour day N70 changes between 2006 and 2018, assuming the 2006 runway modal splits, revealed some areas where increases in N70 events occurred. These were due to: (a) a westerly shift in the position of the 2018 DET mean departure track relative to 2006, (b) a greater usage of the southern runway for westerly departures in 2006, and (c) the northern runway being favoured for westerly arrivals in 2006. Approximately 87% of the total assessment area experienced either decreases of more than 10 N70 events, or changes of less than 10 N70 events. This figure rose to 94% when the effects of the differences in north-south runway usage were also removed.

4.23 An analysis of annual 16-hour day N70 noise changes between 2017 and 2018, assuming the 2017 runway modal split, showed that over 99% of the total area experienced changes of less than 10 events, or decreases of more than 10 events.

4.24 An examination of annual 8-hour night N60 changes between 2006 and 2018, assuming the 2006 runway modal split, showed that 35% of the total area assessed is exposed to reductions of between 2 and 5 N60 events, or changes of less than 2 N60 events.

4.25 The N60 annual 8-hour night changes between 2017 and 2018, assuming the 2017 runway modal split, indicated that 50% of the total area assessed is either exposed to reductions of between 2 and 5 N60 events, or changes of less than 2 N60 events.

**APPENDIX A**

# References


1. Critchley J B, Ollerhead J B, *The Use of Leq as an Aircraft Noise Index*, DORA Report 9023, September 1990.
2. Civil Aviation Authority, *Survey of Noise Attitudes (2014): Aircraft*, CAP 1506, February 2017.
3. Department for Transport, *Aviation Policy Framework*, Cm 8584, March 2013.
4. Civil Aviation Authority, *Definition of Overflight*, CAP 1498, Second edition, April 2017.
5. Civil Aviation Authority, *Heathrow Airport 2017 Summer Noise Contours and Noise Action Plan Contours*, ERCD Report 1801, September 2018.
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7. Civil Aviation Authority, *The UK Civil Aircraft Noise Contour Model ANCON: Improvements in Version 2*, R&D Report 9842, June 1999.
8. European Civil Aviation Conference, *Report on Standard Method of Computing Noise Contours around Civil Airports*, ECAC.CEAC Doc 29, Fourth edition, December 2016.
9. Civil Aviation Authority, *Noise Monitor Positions at Heathrow, Gatwick and Stansted Airports*, CAP 1149, Fifth edition, April 2019.

**APPENDIX B**

# Figures

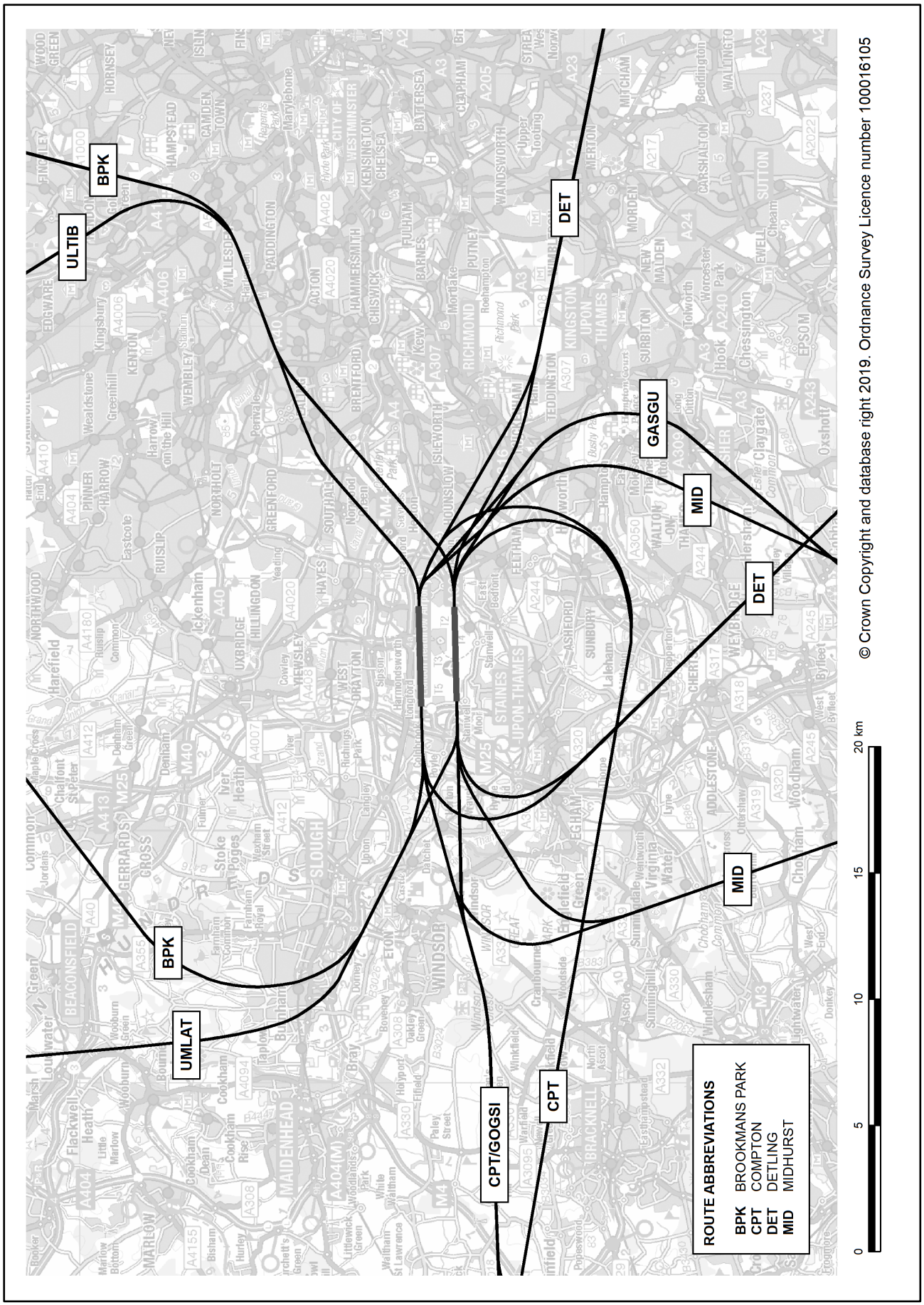
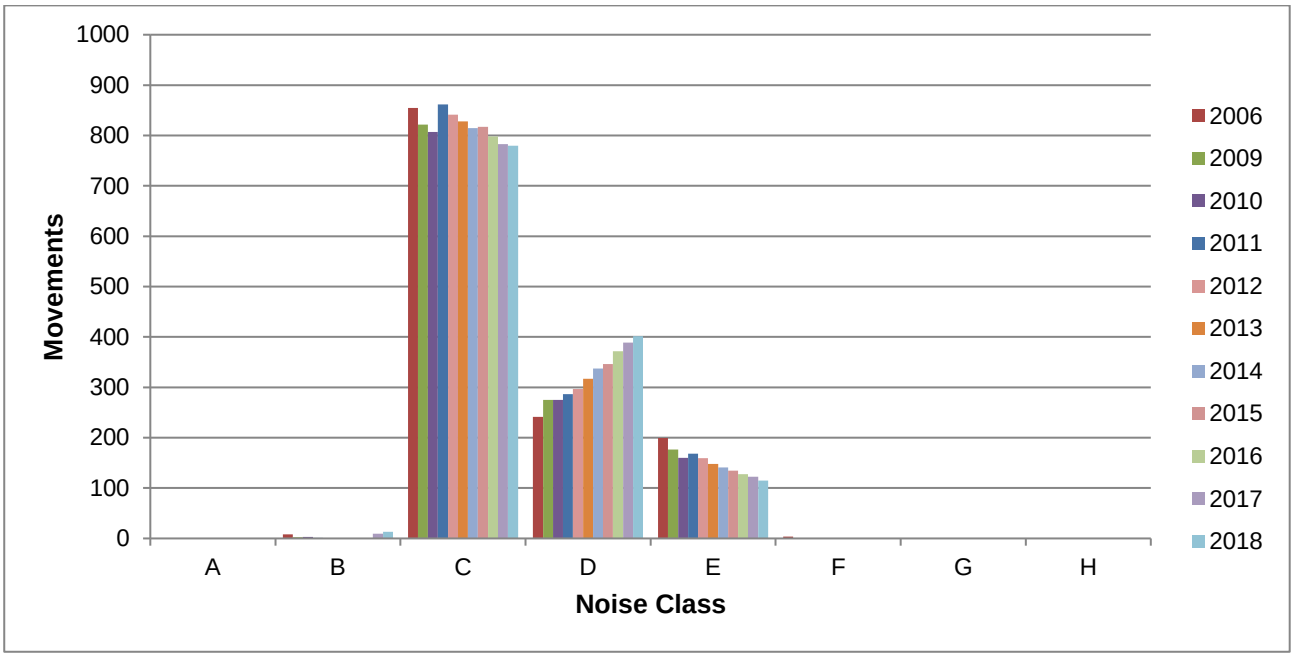



**Figure B1 Heathrow NPR/SID routes**

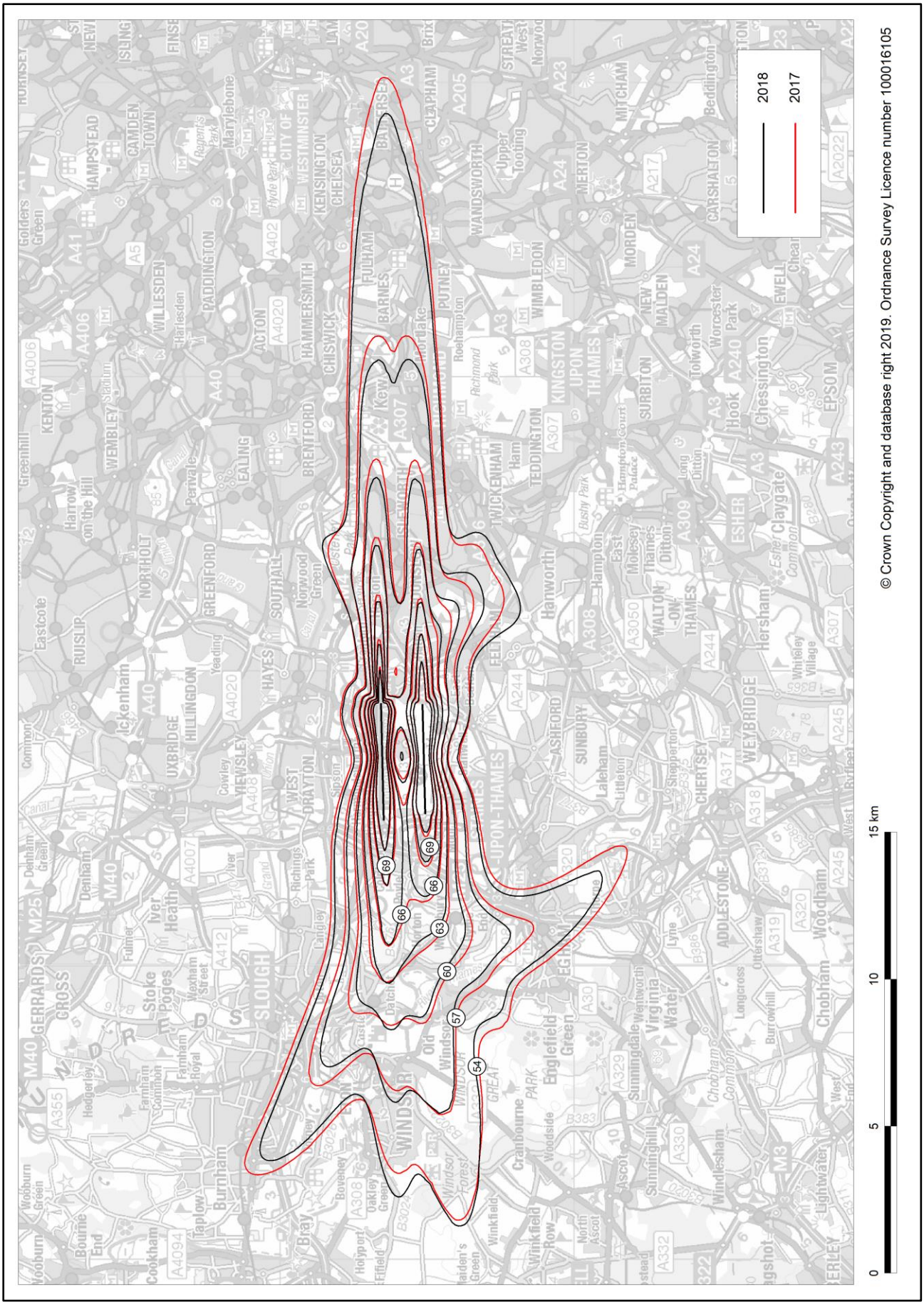
**Figure B2 Heathrow annual average 24-hour movements by Noise Class**




Note: Noise Class descriptions are given below:

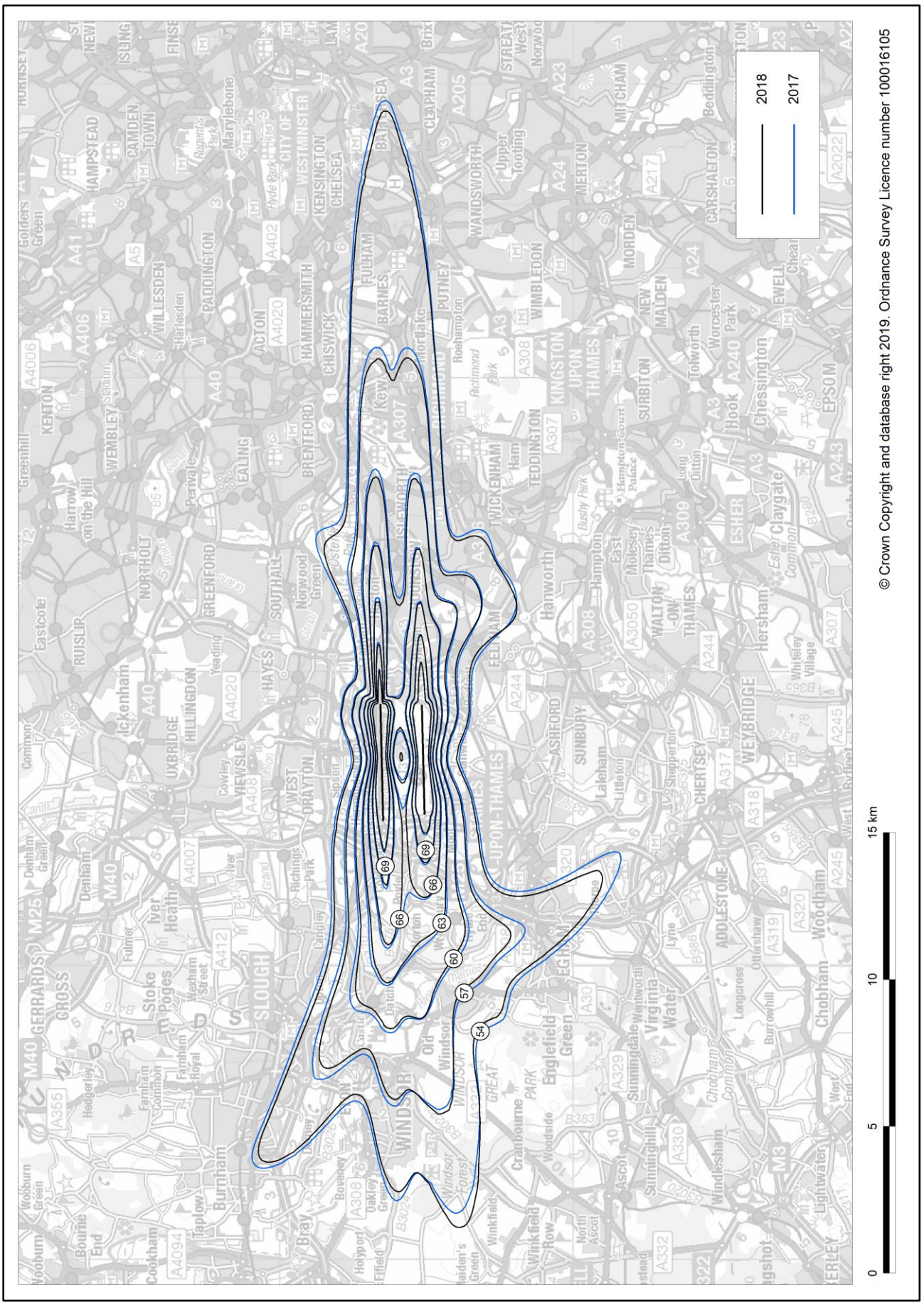
| Noise Class | Description |
|---|---|
| A | Small propeller |
| B | Large propeller |
| C | Narrow-body jets *(e.g. Airbus A319, Airbus A320, Boeing 737-800)* |
| D | Wide-body twin engine *(e.g. Boeing 777, Boeing 787, Airbus A330)* |
| E | Wide-body 3,4 engine *(e.g. Boeing 747-400, Airbus A380)* |
| F | 1st generation wide-body 3,4 engine *(e.g. Boeing 747-100)* |
| G | 2nd generation narrow-body twin engine *(e.g. Boeing 737-200)* |
| H | 1st generation narrow-body 3,4 engine *(e.g. Boeing 727)* |

**Figure B3 Heathrow 2018 and 2017 average summer day 54-72 dBA actual modal split Leq noise contours**




Note: 2017 day actual modal split was 84% W / 16% E; 2018 day actual modal split was 78% W / 22% E.

**Figure B4 Heathrow 2018 and 2017 average summer day 54-72 dBA standard modal split Leq noise contours**




Note: 2017 day standard modal split was 79% W / 21% E; 2018 day standard modal split was 79% W / 21% E.

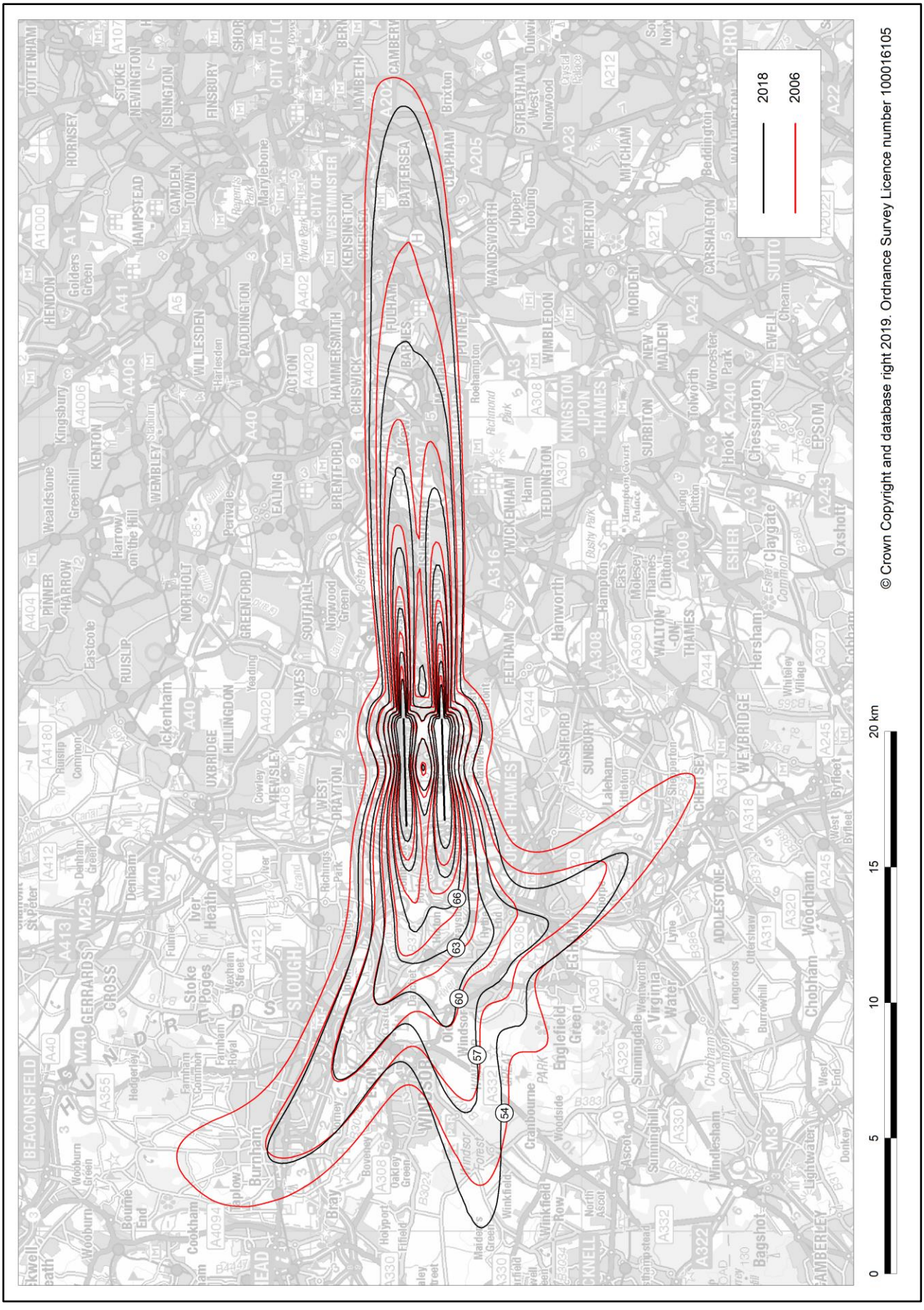



**Figure B5 Heathrow 2018 and 2006 average summer day 54-72 dBA 100% W Leq noise contours (with 2006 N-S runway usage)**

**Figure B6 Heathrow 2018 and 2006 average summer day 54-72 dBA 100% E Leq noise contours (with 2006 N-S runway usage)**

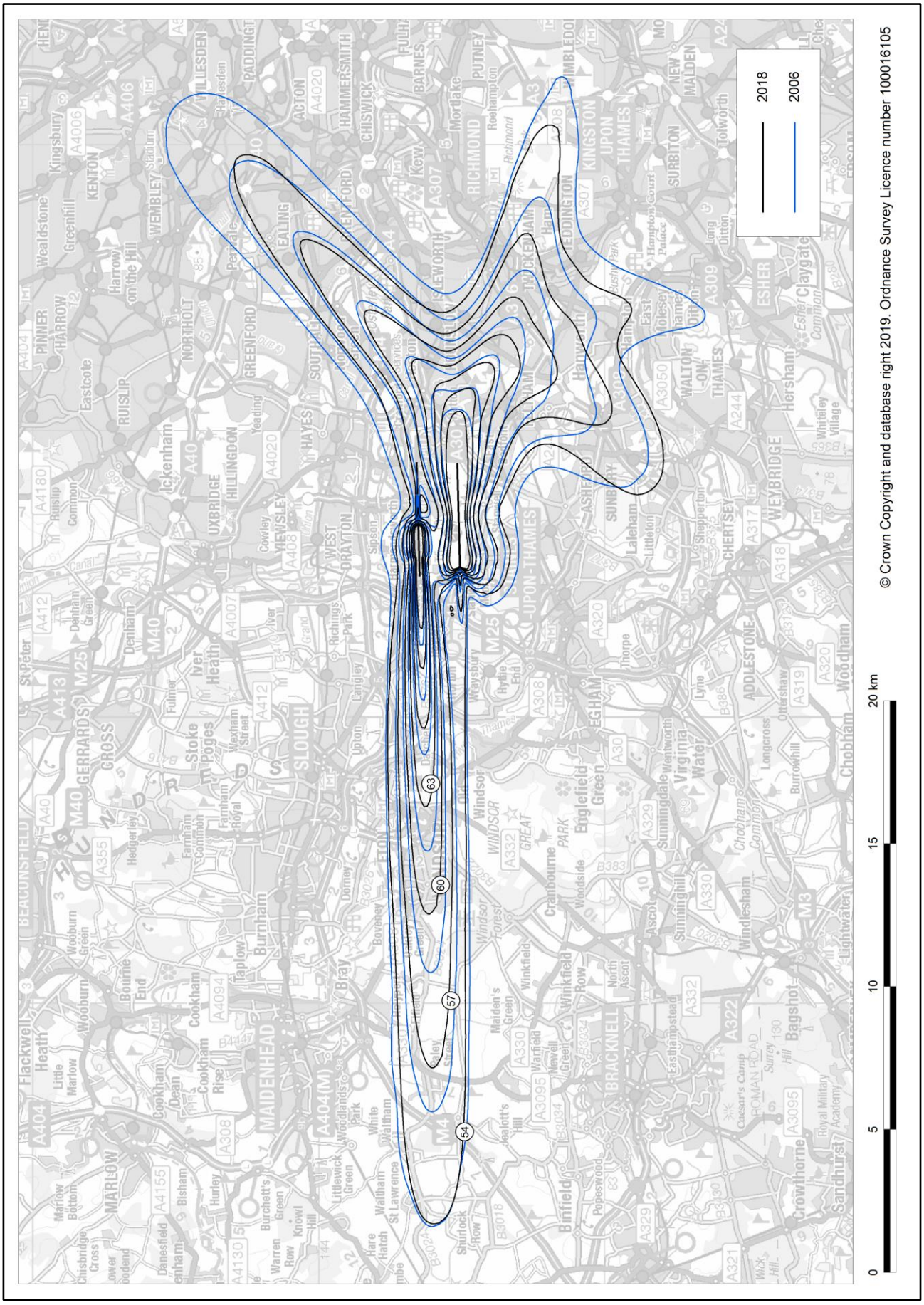
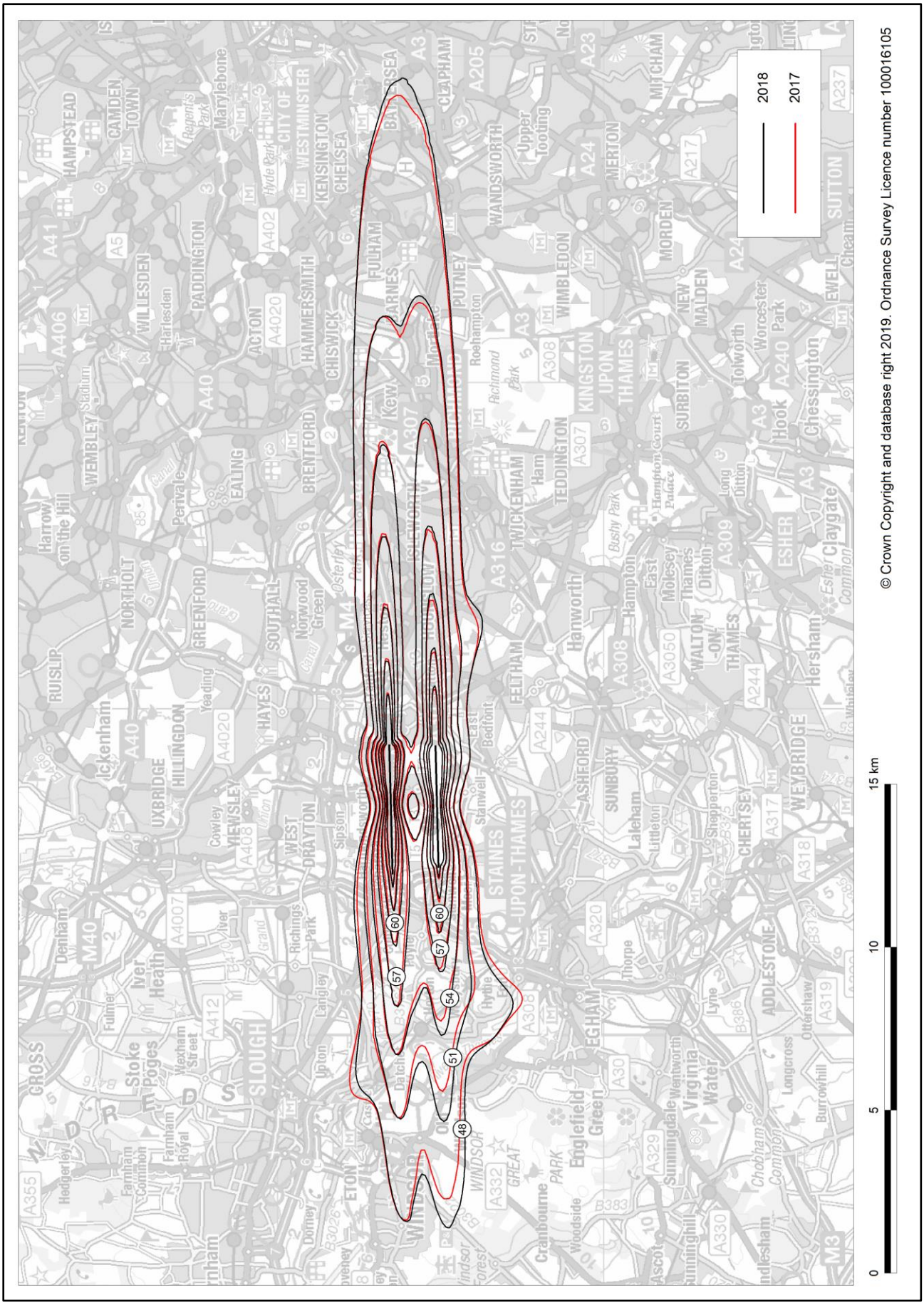


**Figure B7 Heathrow 2018 and 2017 average summer night 48-66 dBA actual modal split Leq noise contours**




Note: 2017 night actual modal split was 81% W / 19% E; 2018 night actual modal split was 80% W / 20% E.

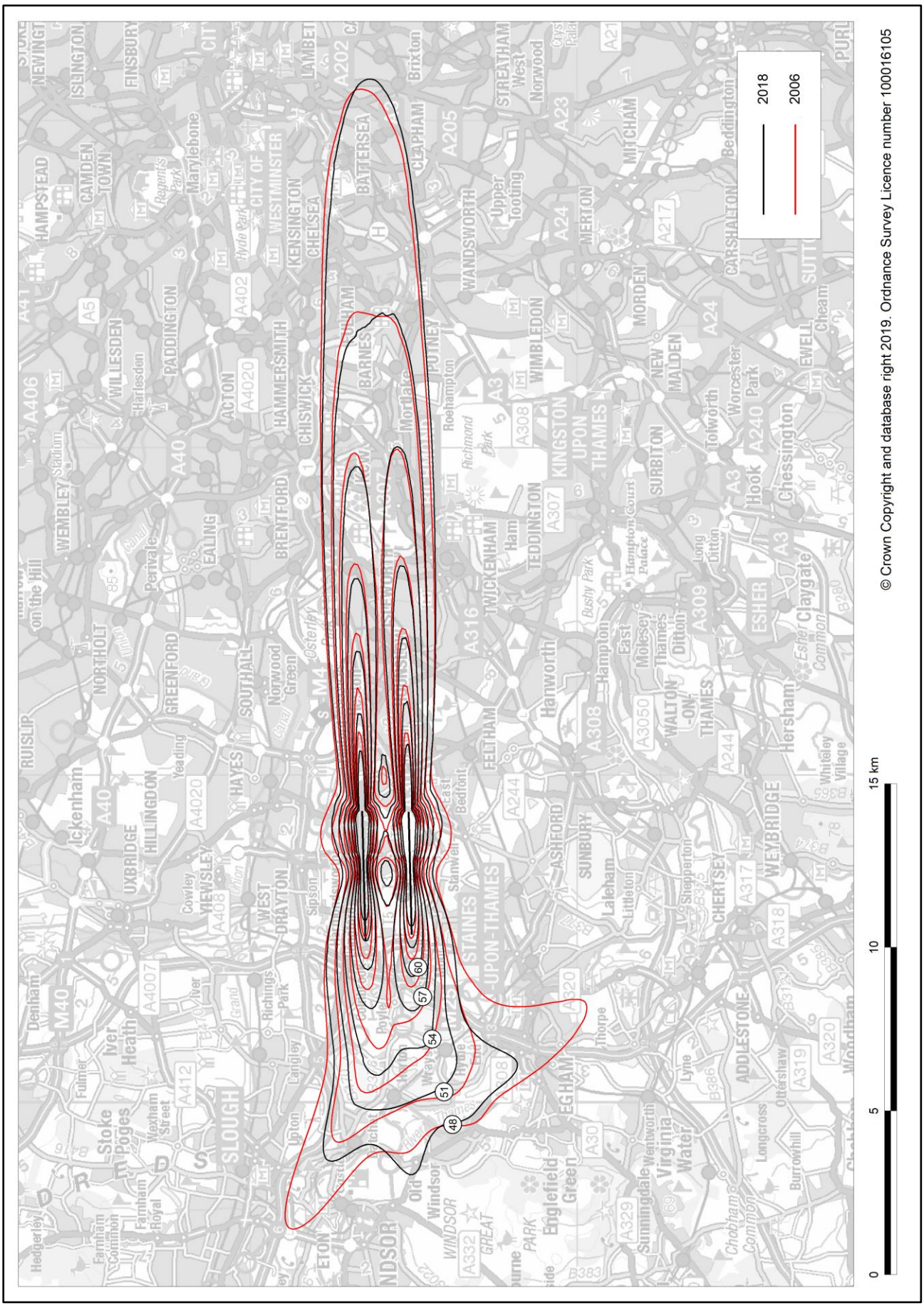



**Figure B8 Heathrow 2018 and 2006 average summer night 48-66 dBA 100% W Leq noise contours (with 2006 N-S runway usage)**

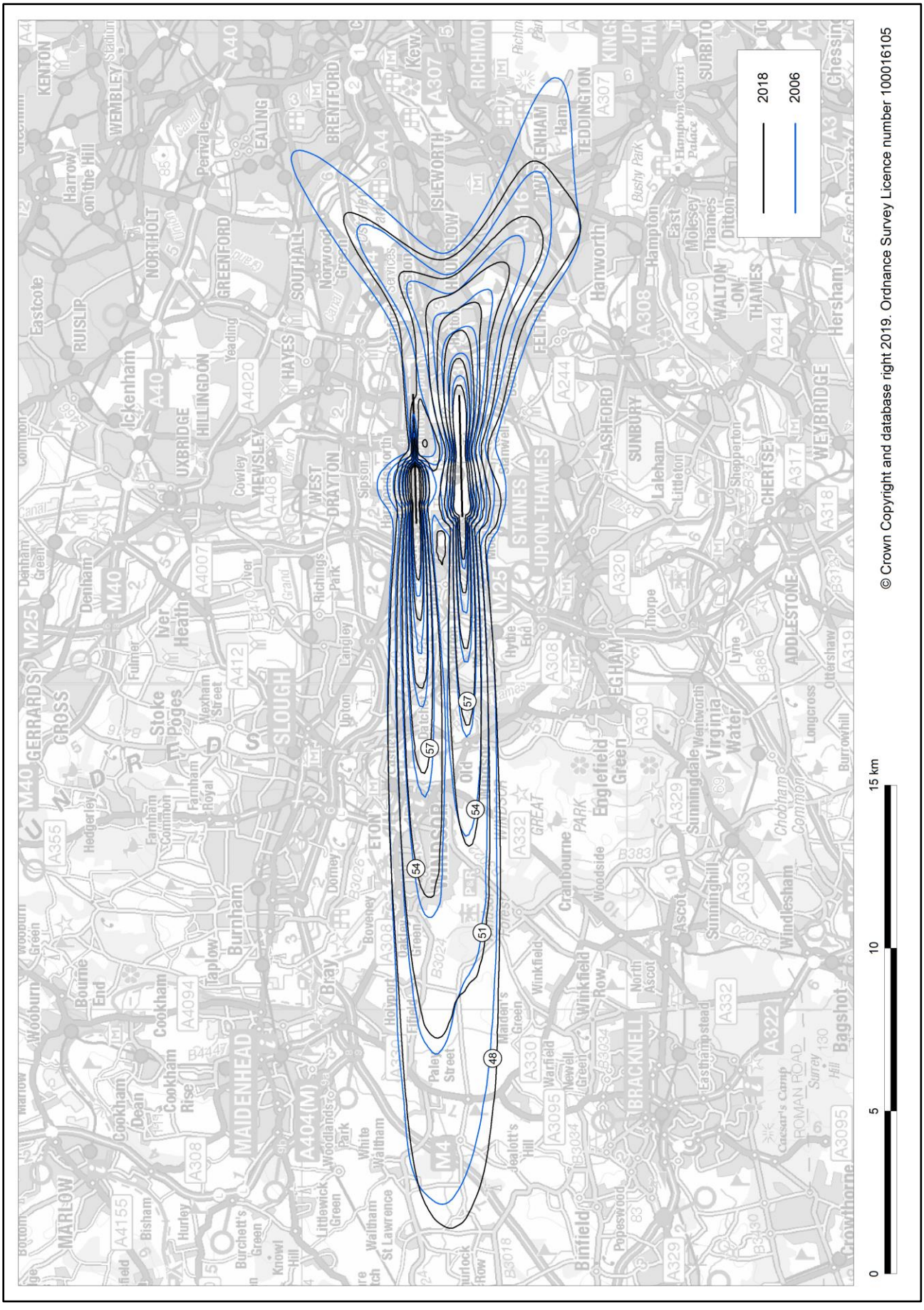



**Figure B9 Heathrow 2018 and 2006 average summer night 48-66 dBA 100% E Leq noise contours (with 2006 N-S runway usage)**

**Figure B10 Heathrow 2018 and 2017 average summer day overflight contours (assuming 48.5 degree elevation angle)**

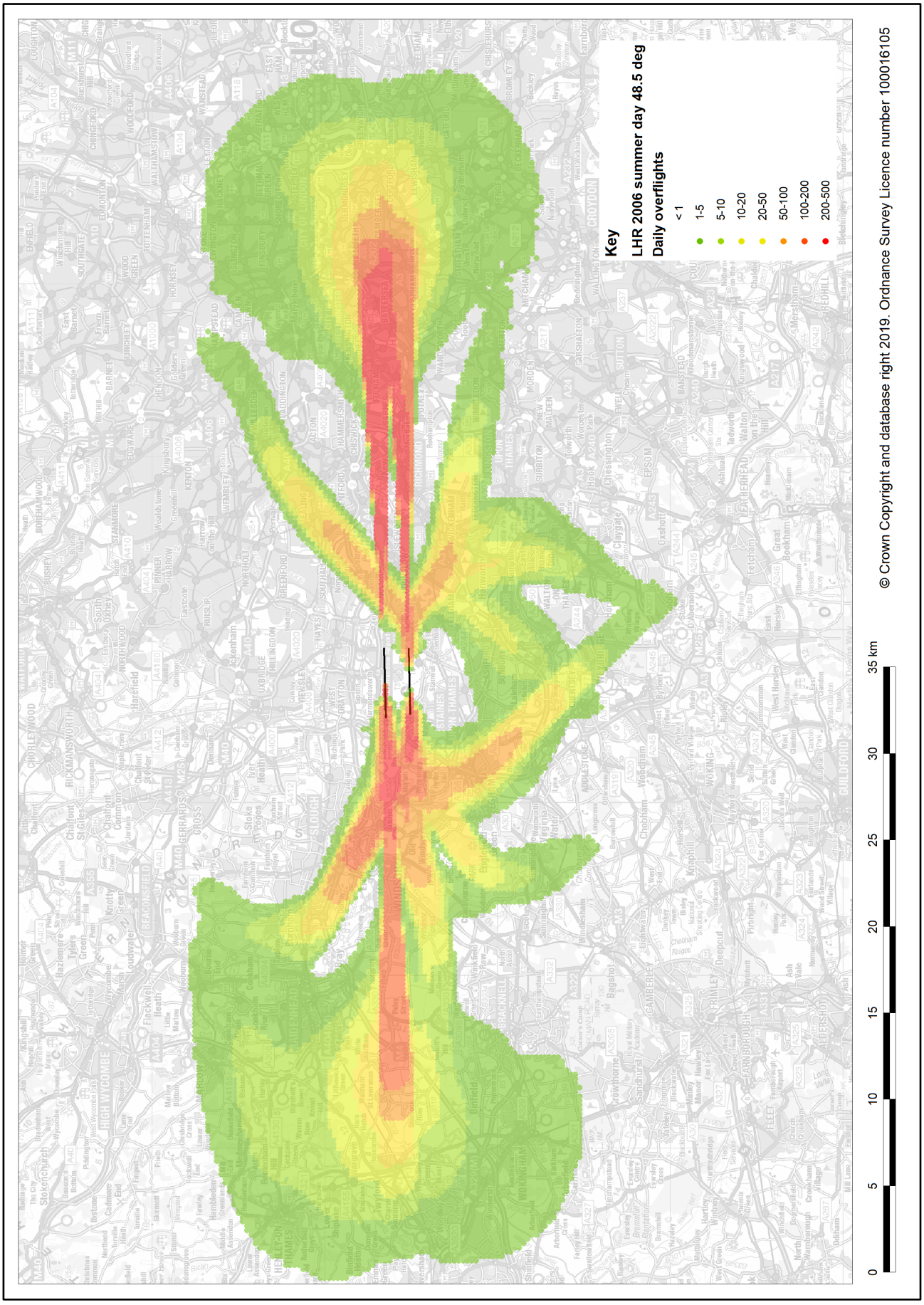



**Figure B10-a Heathrow 2006 average summer day overflight track density diagram (assuming 48.5 degree elevation angle)**

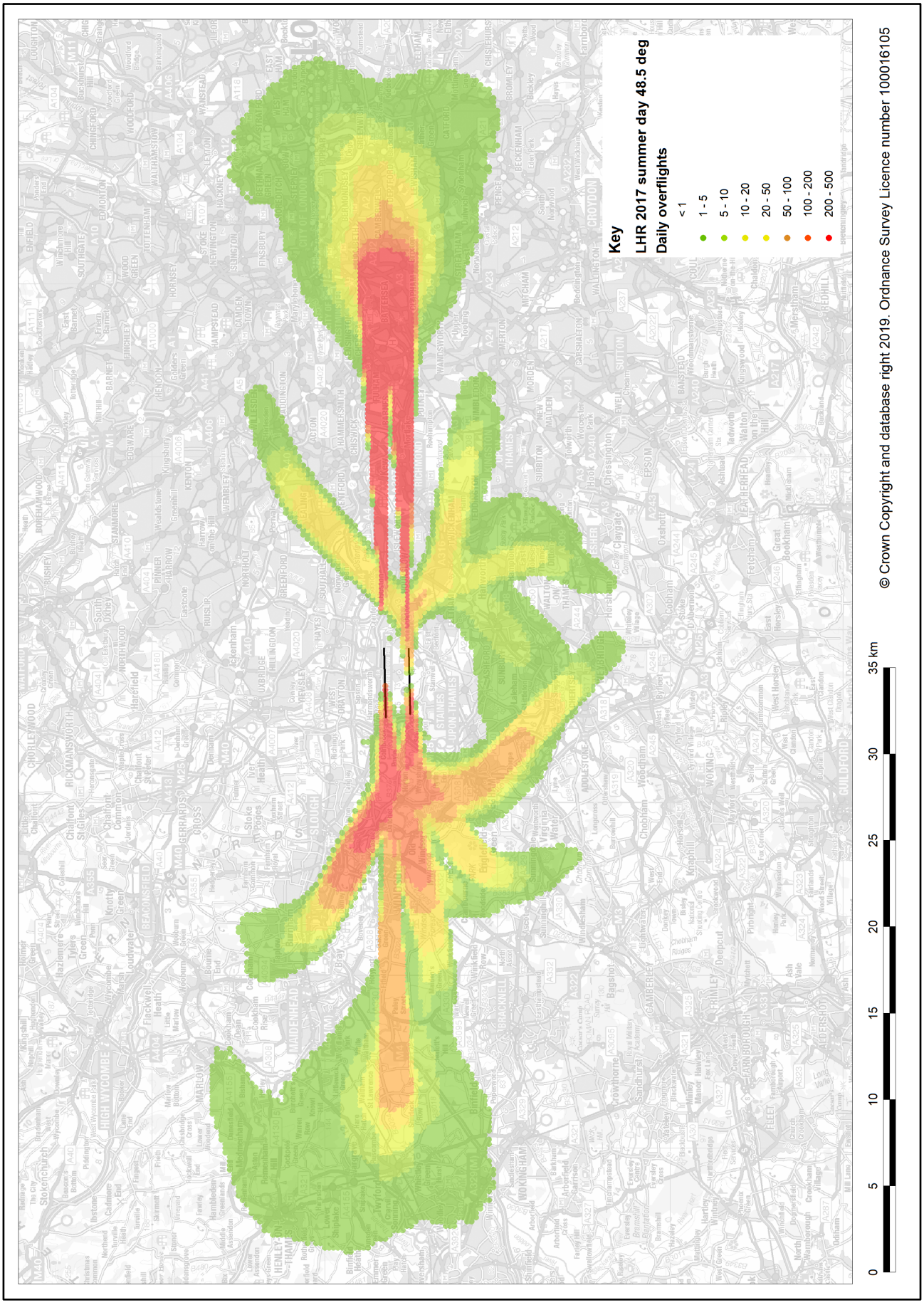



**Figure B10-b Heathrow 2017 average summer day overflight track density diagram (assuming 48.5 degree elevation angle)**

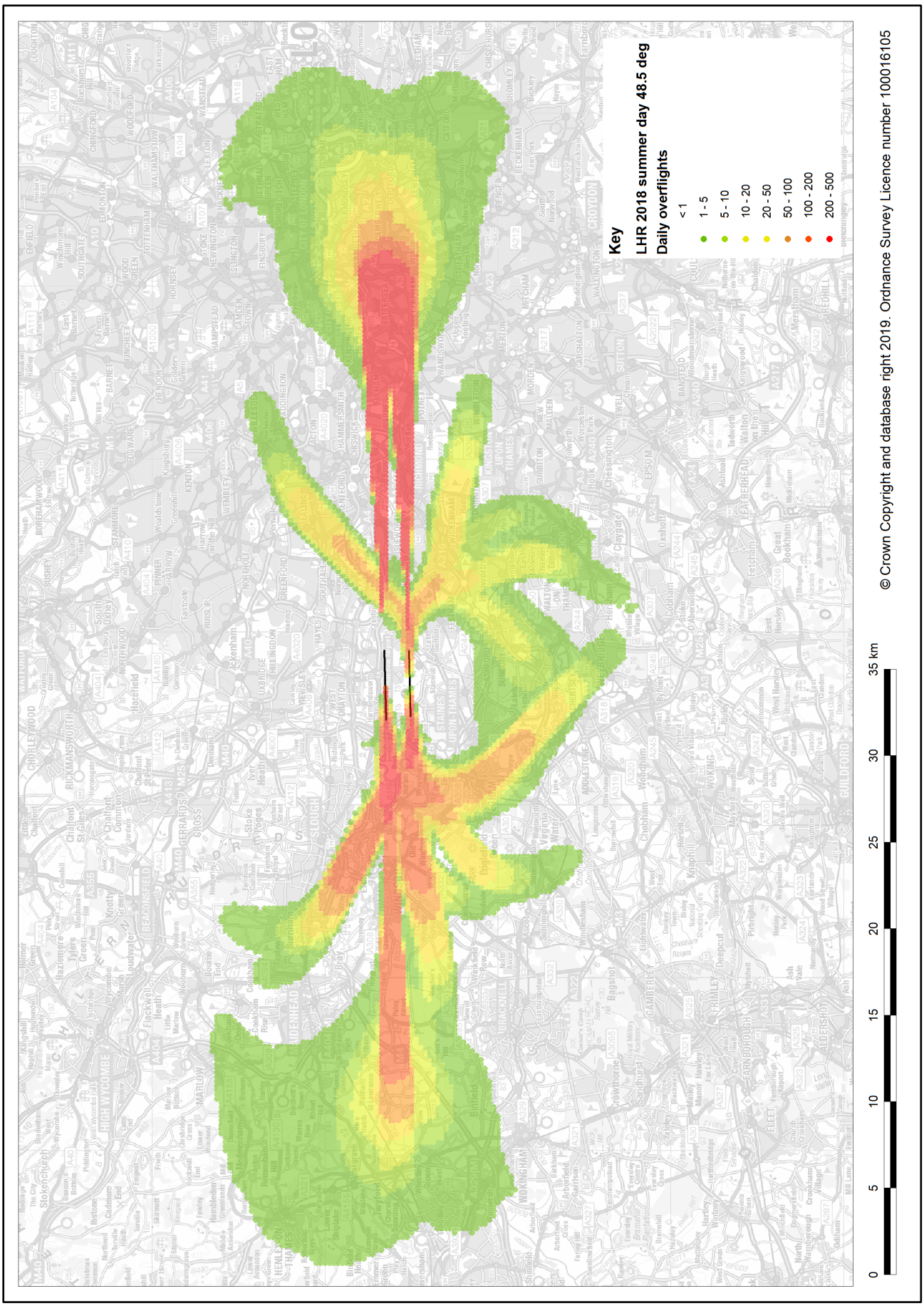



**Figure B10-c Heathrow 2018 average summer day overflight track density diagram (assuming 48.5 degree elevation angle)**

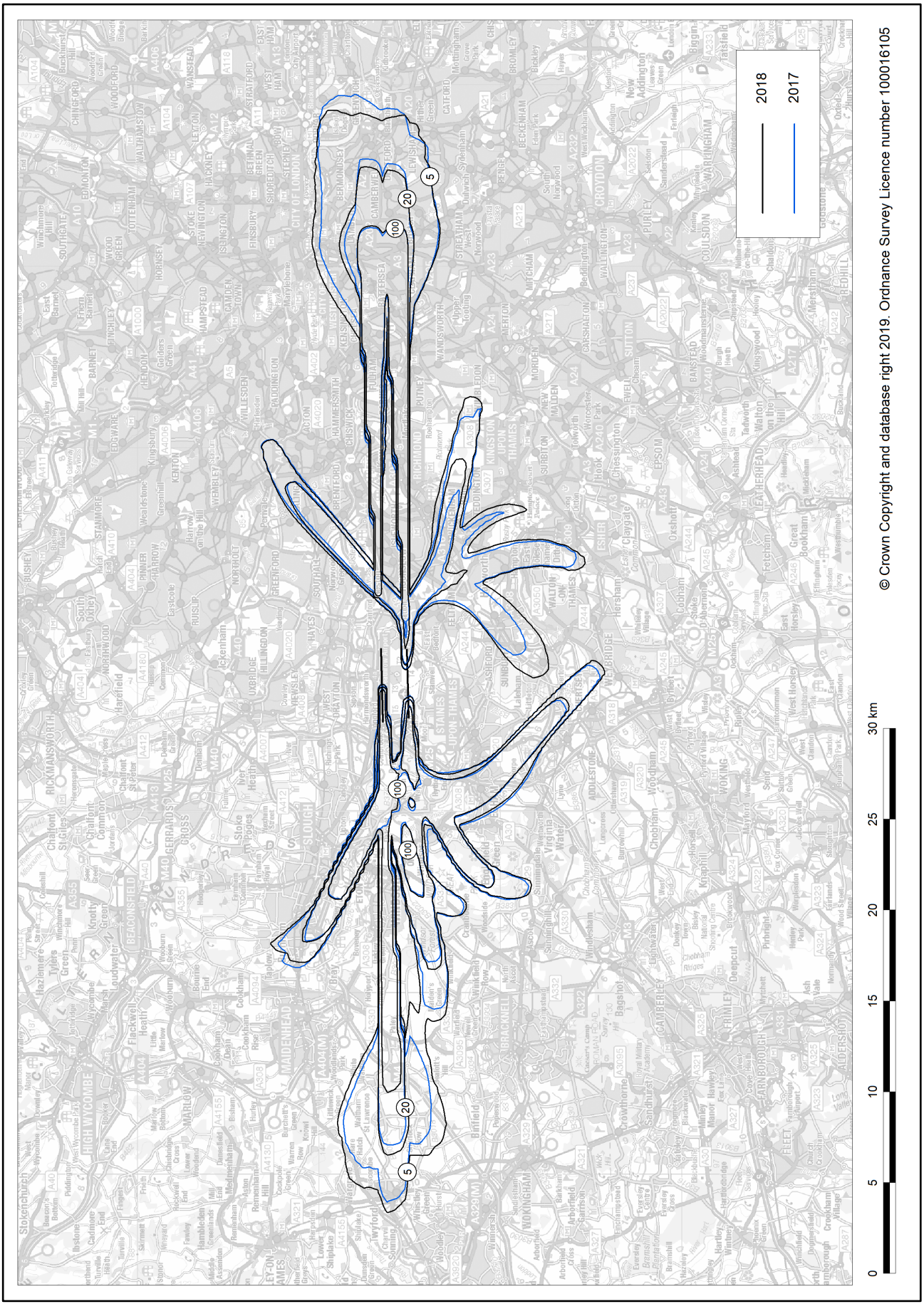



**Figure B11 Heathrow 2018 and 2017 average summer day overflight contours (assuming 60 degree elevation angle)**

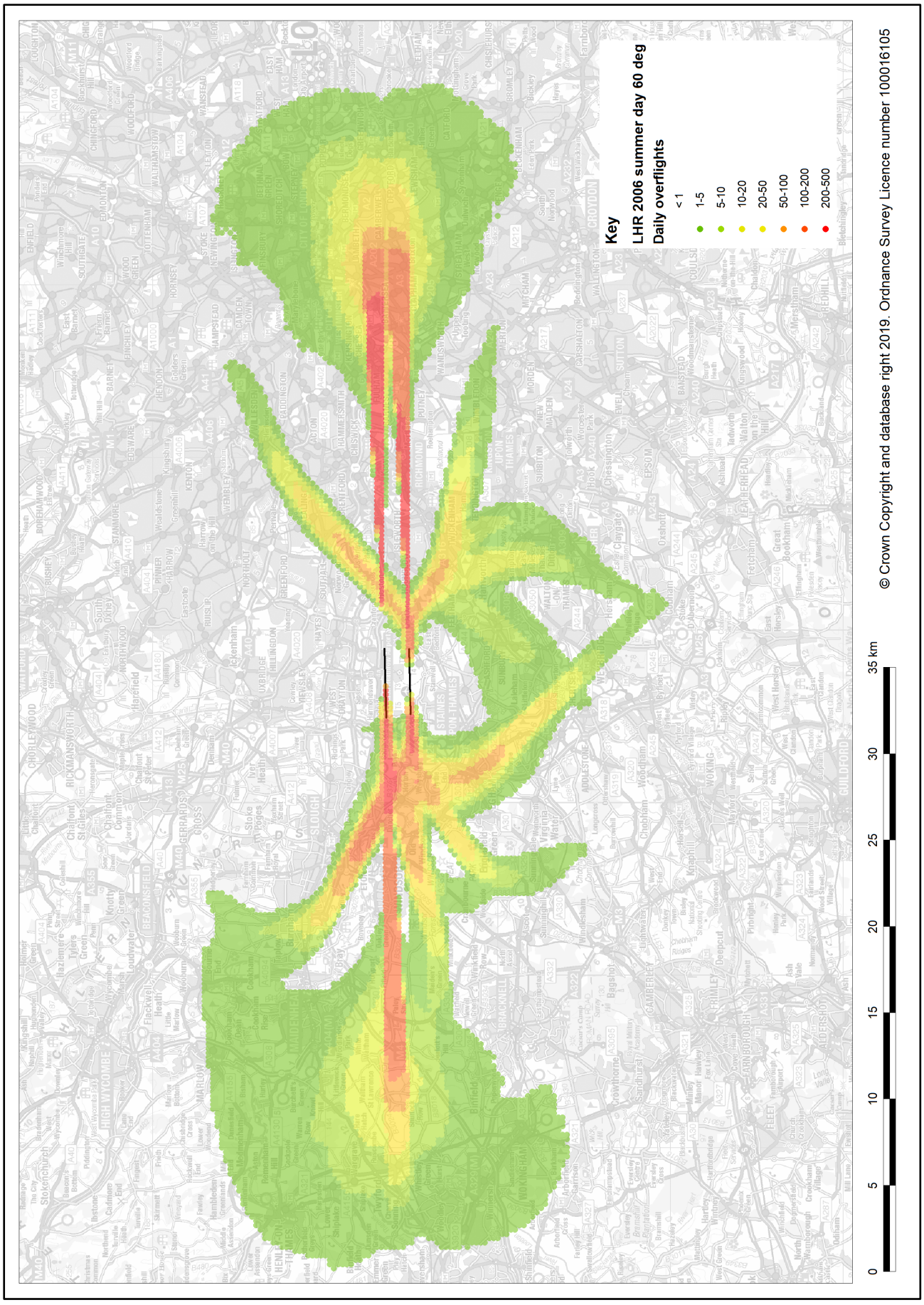



**Figure B11-a Heathrow 2006 average summer day overflight track density diagram (assuming 60 degree elevation angle)**

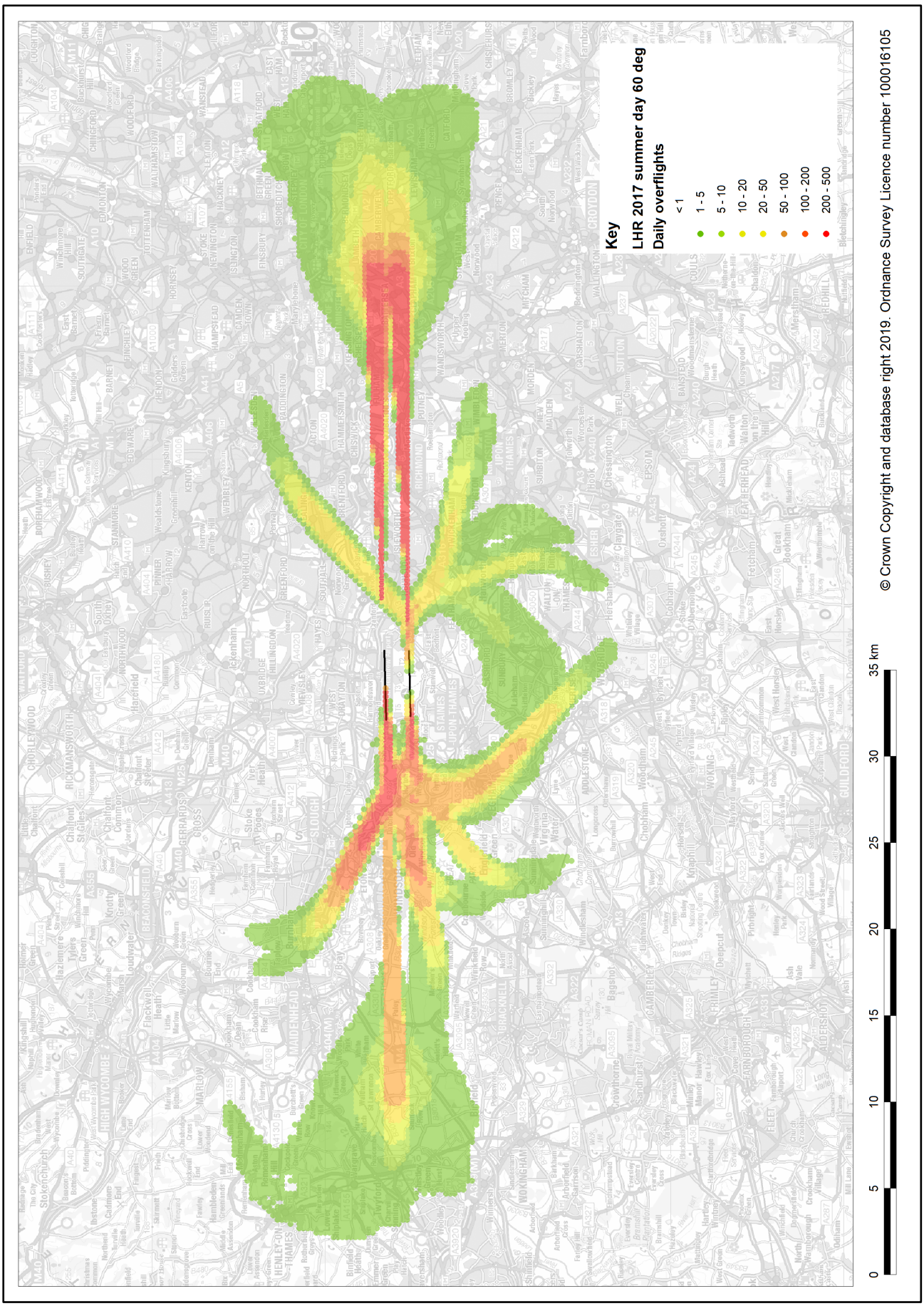



**Figure B11-b Heathrow 2017 average summer day overflight track density diagram (assuming 60 degree elevation angle)**

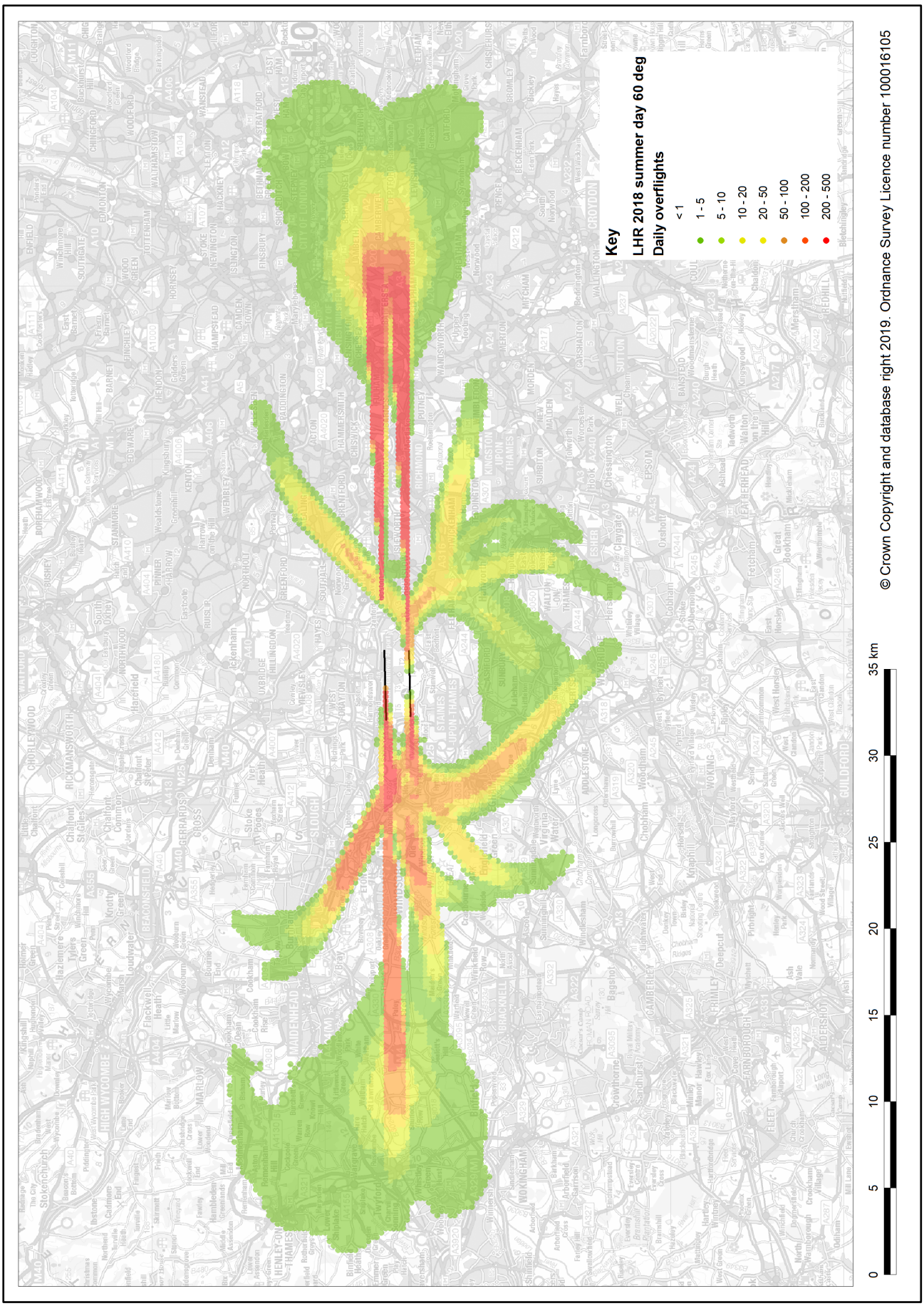
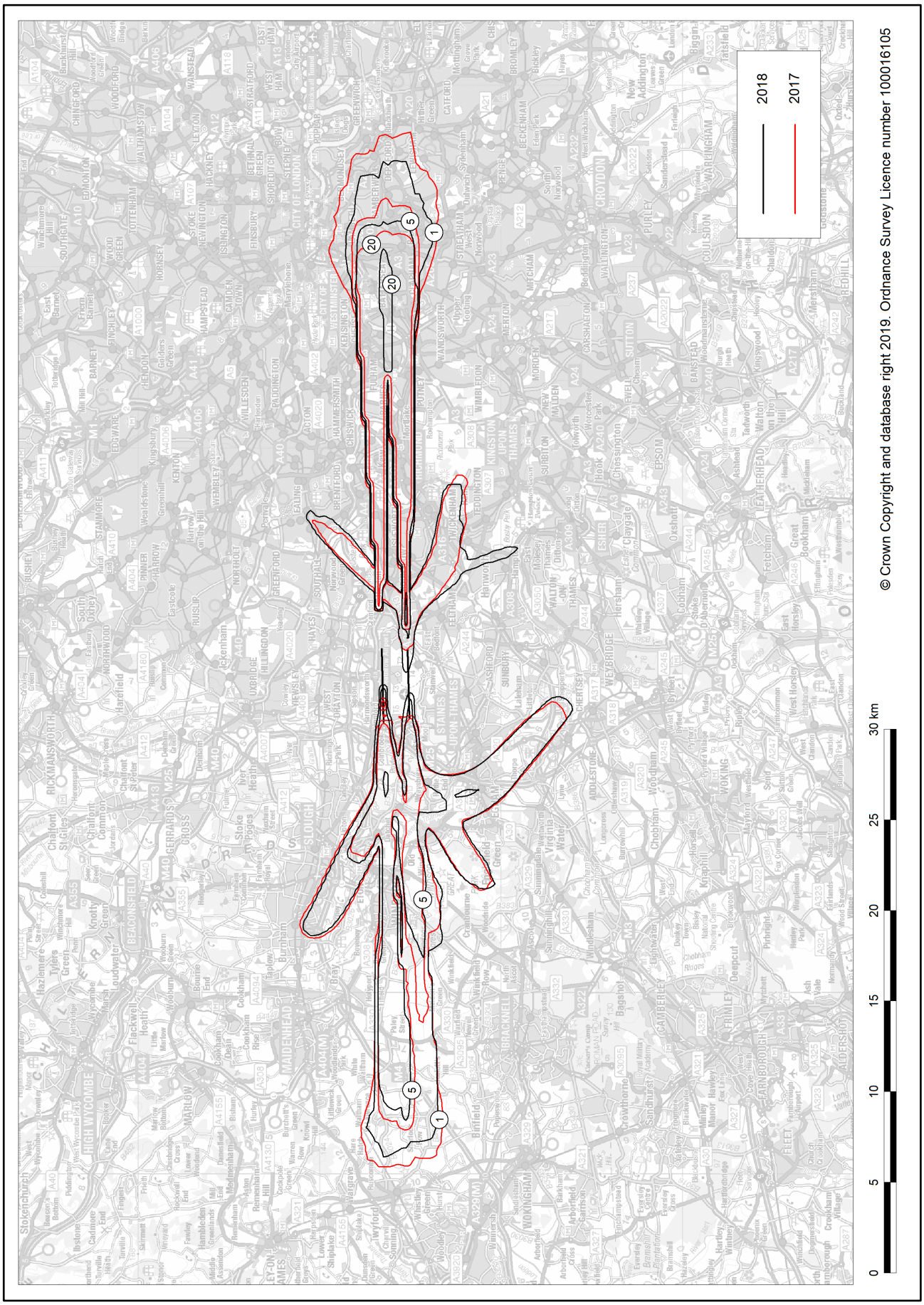



**Figure B11-c Heathrow 2018 average summer day overflight track density diagram (assuming 60 degree elevation angle)**

**Figure B12 Heathrow 2018 and 2017 average summer night overflight contours (assuming 48.5 degree elevation angle)**



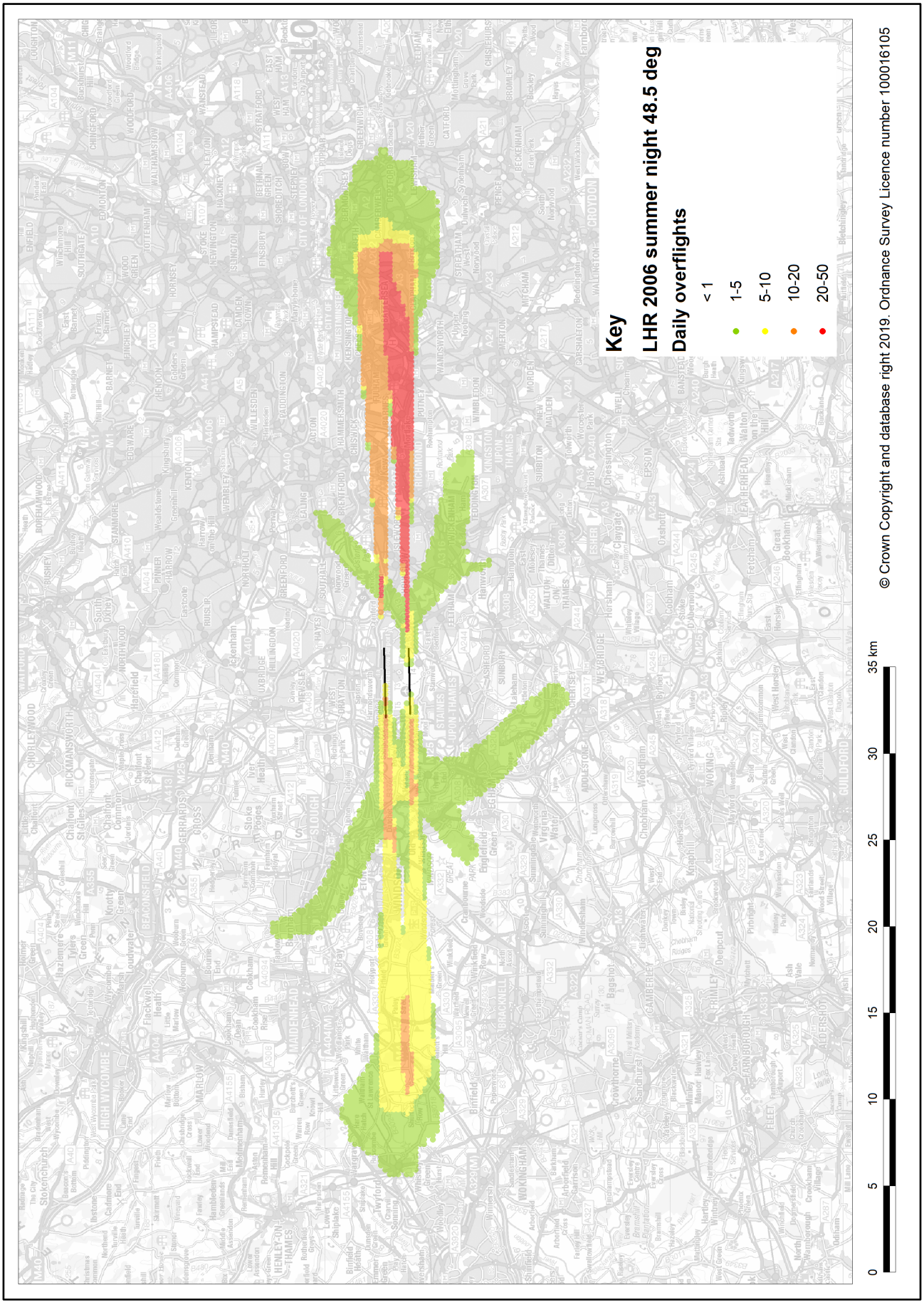



**Figure B12-a Heathrow 2006 average summer night overflight track density diagram (assuming 48.5 degree elevation angle)**

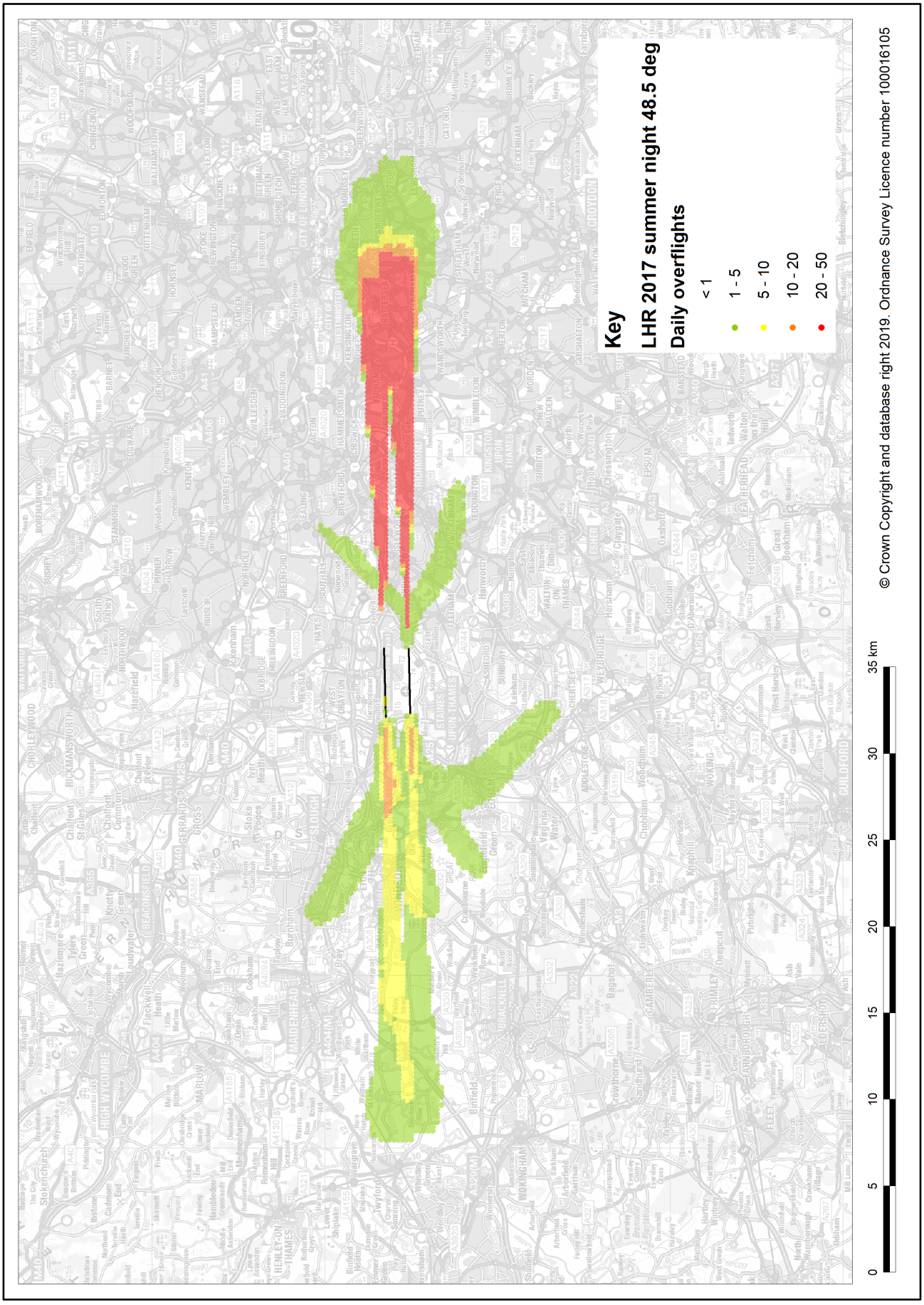



**Figure B12-b Heathrow 2017 average summer night overflight track density diagram (assuming 48.5 degree elevation angle)**

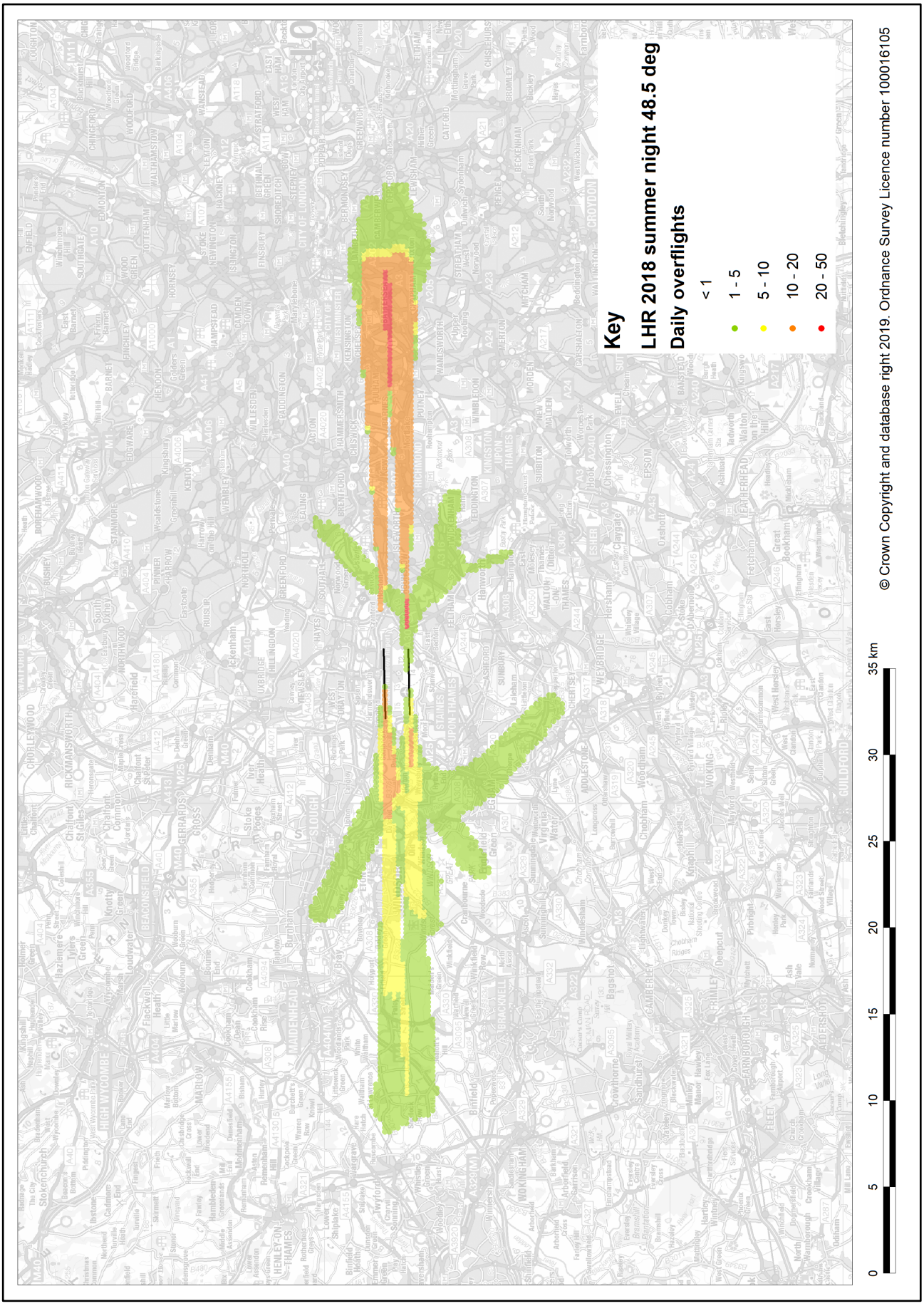



**Figure B12-c Heathrow 2018 average summer night overflight track density diagram (assuming 48.5 degree elevation angle)**

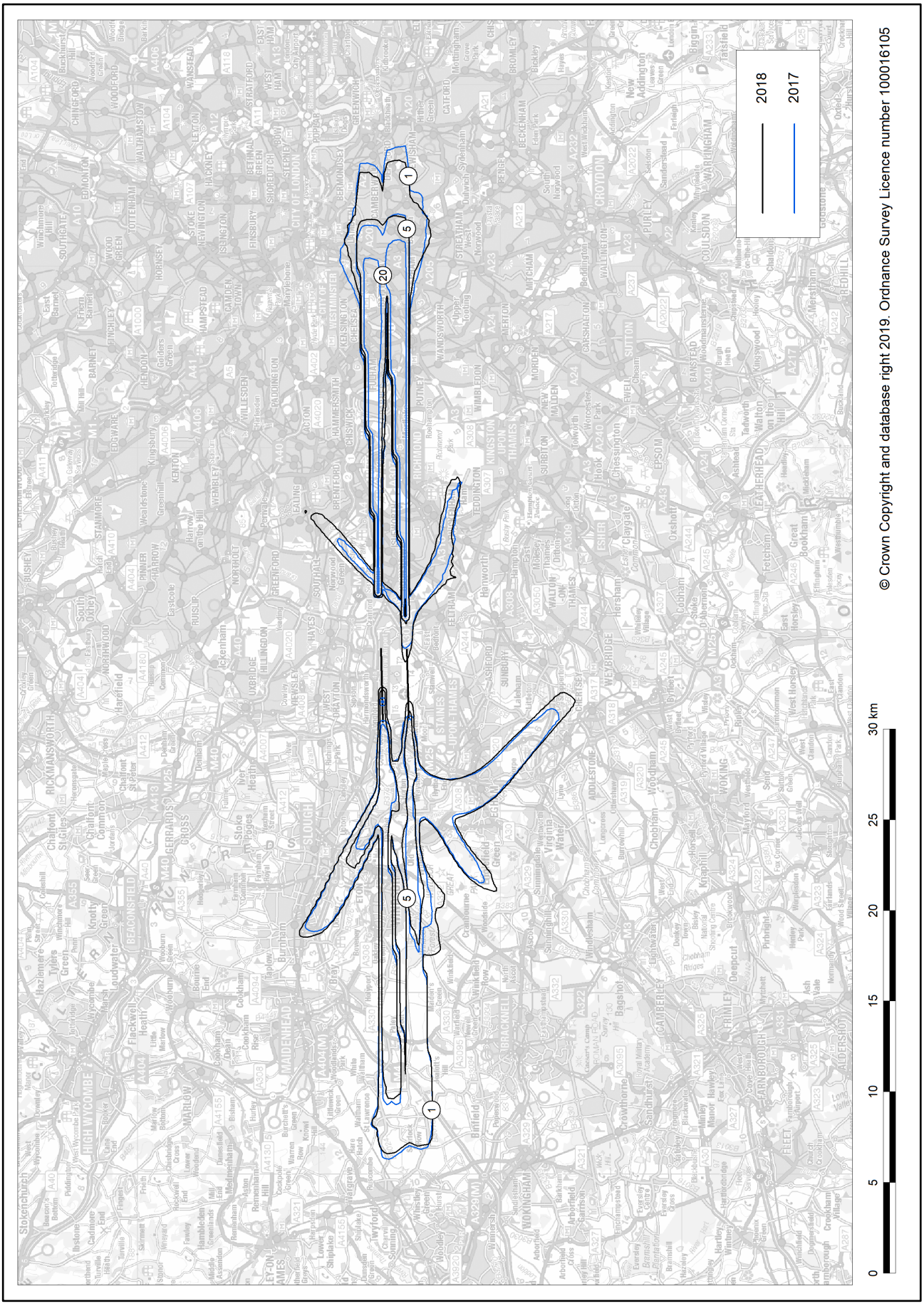



**Figure B13 Heathrow 2018 and 2017 average summer night overflight contours (assuming 60 degree elevation angle)**

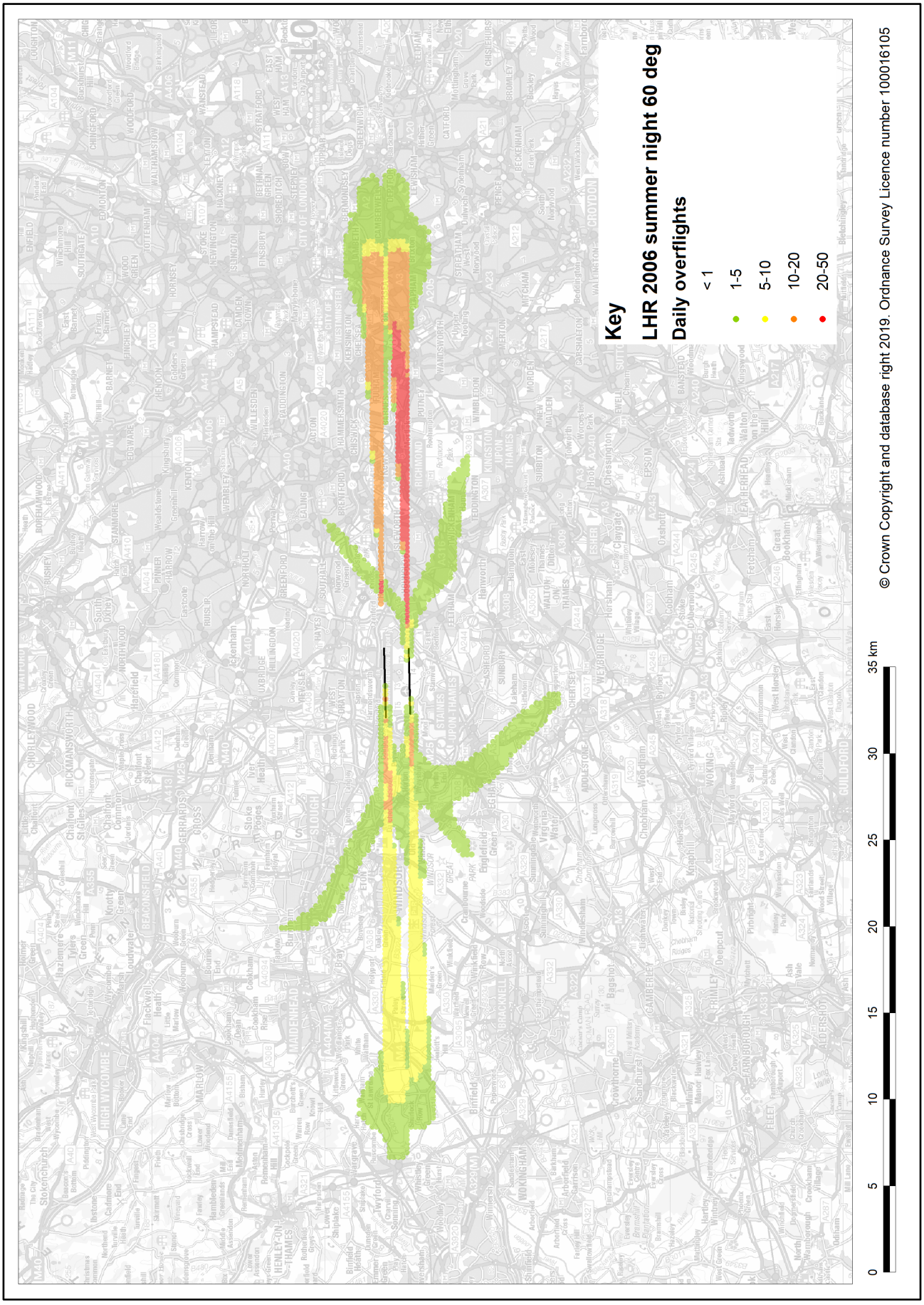



**Figure B13-a Heathrow 2006 average summer night overflight track density diagram (assuming 60 degree elevation angle)**

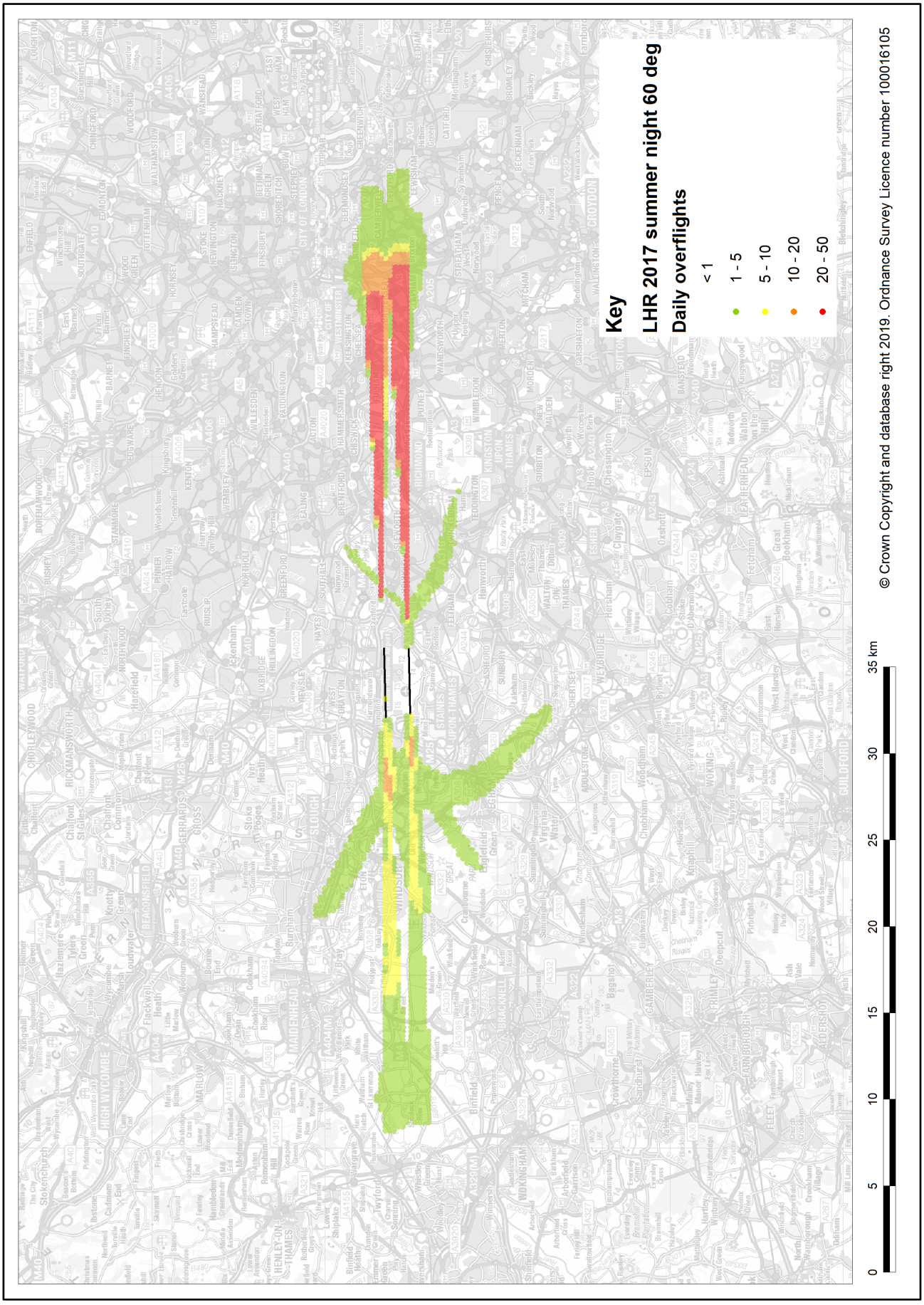



**Figure B13-b Heathrow 2017 average summer night overflight track density diagram (assuming 60 degree elevation angle)**

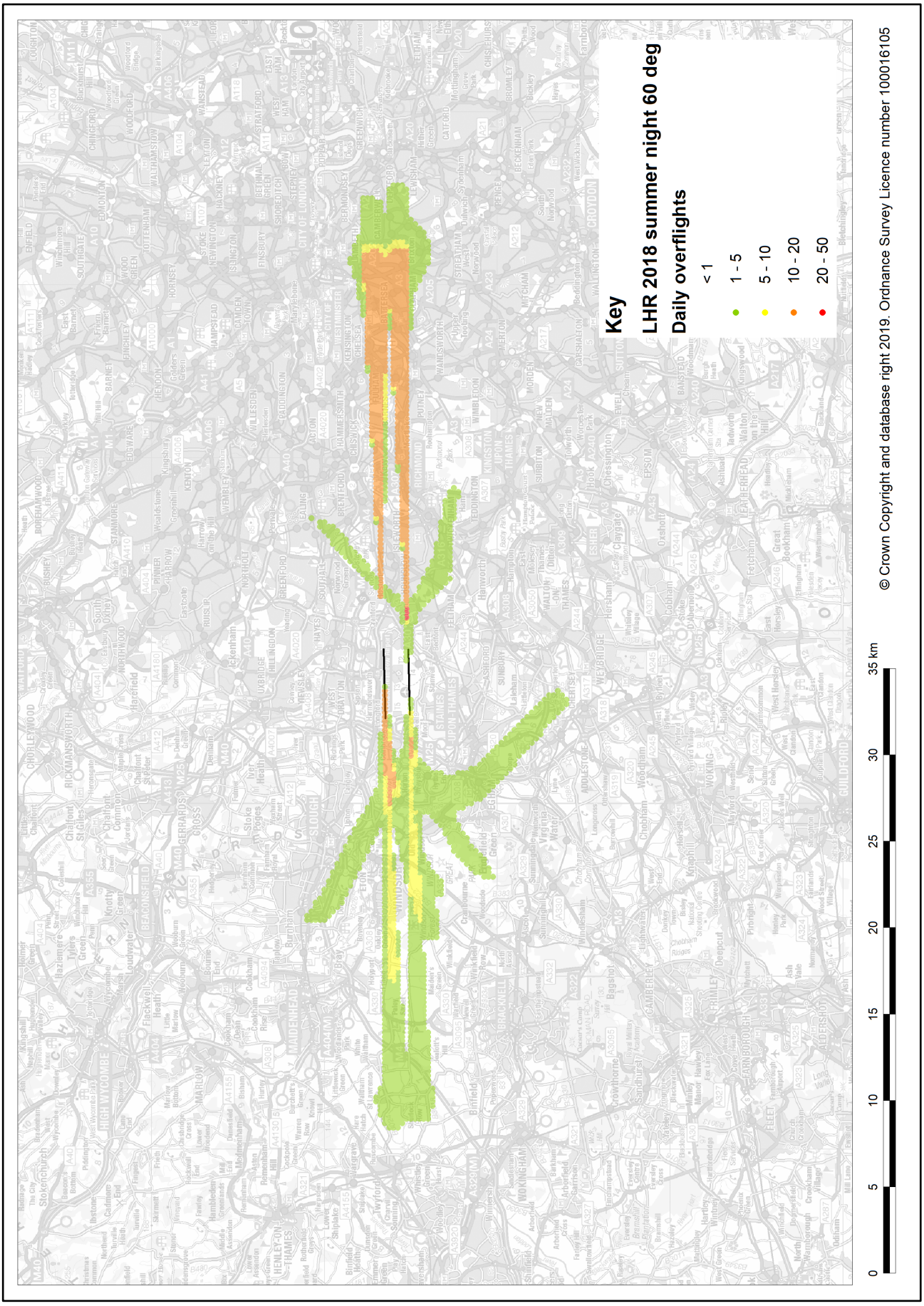



**Figure B13-c Heathrow 2018 average summer night overflight track density diagram (assuming 60 degree elevation angle)**

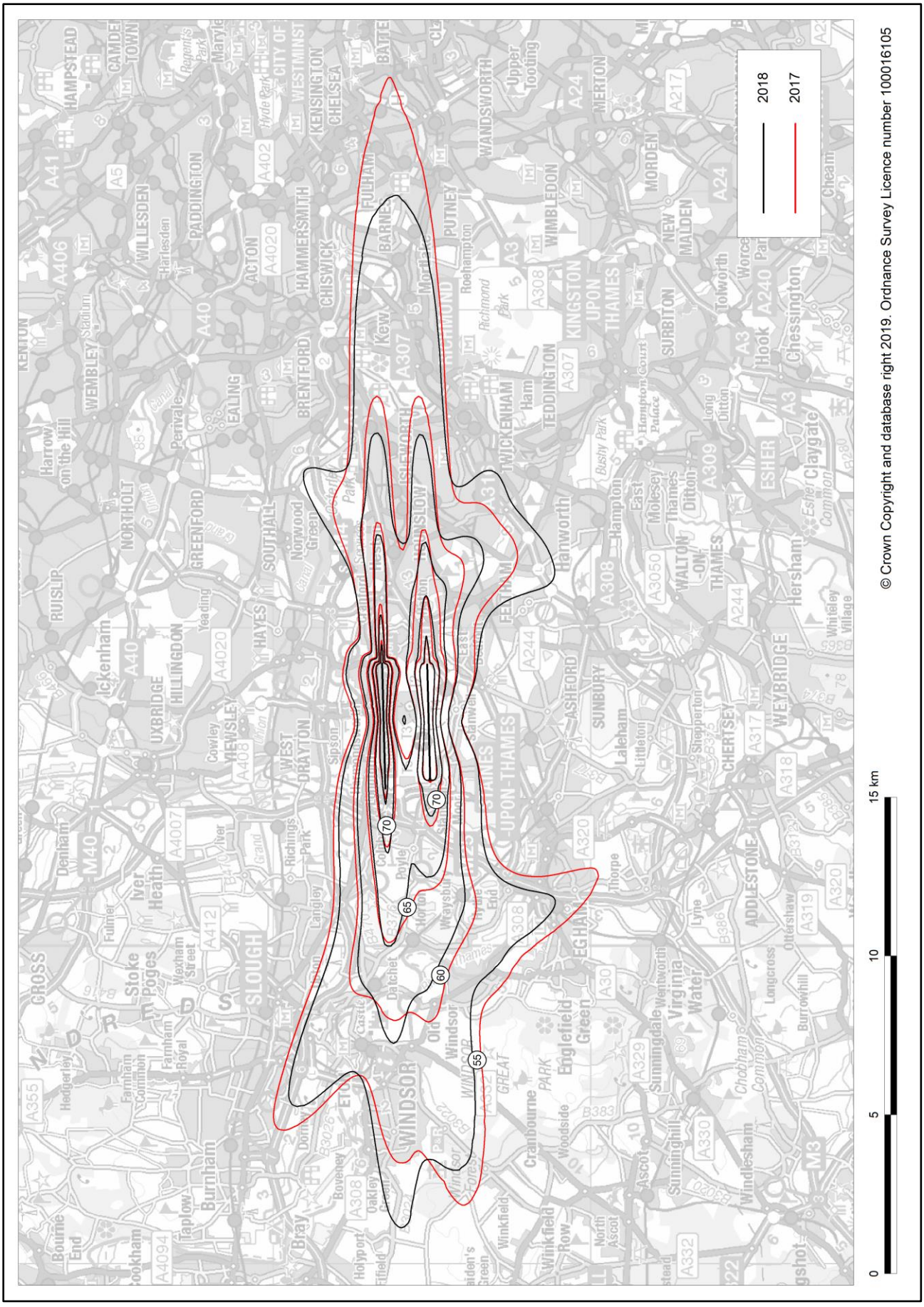



**Figure B14 Heathrow 2018 and 2017 $L_{day}$ noise contours**

Note: 2017 $L_{day}$ modal split was 81% W / 19% E; 2018 $L_{day}$ modal split was 65% W / 35% E.

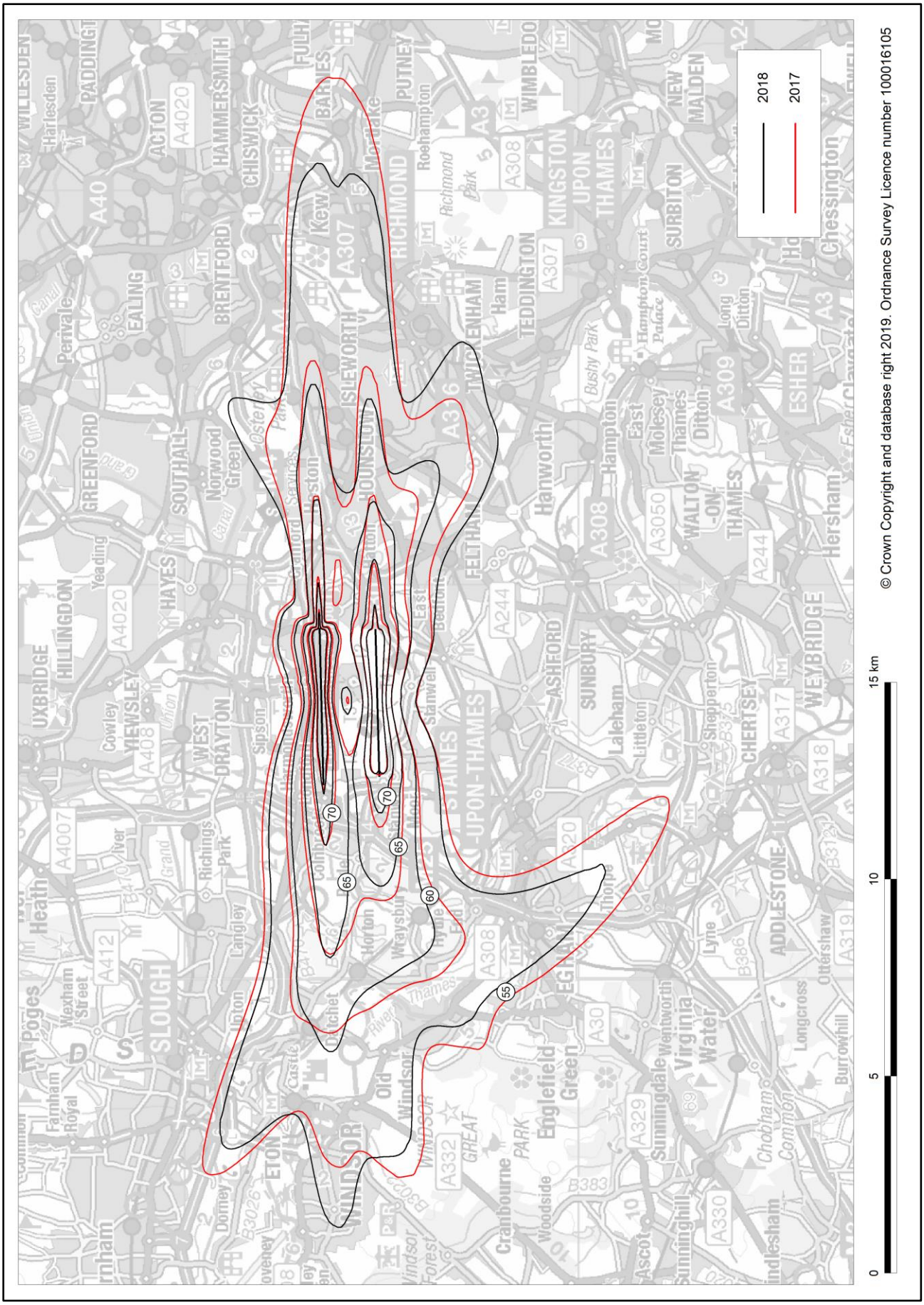



**Figure B15 Heathrow 2018 and 2017 $L_{evening}$ noise contours**

Note: 2017 $L_{evening}$ modal split was 81% W / 19% E; 2018 $L_{evening}$ modal split was 65% W / 35% E.

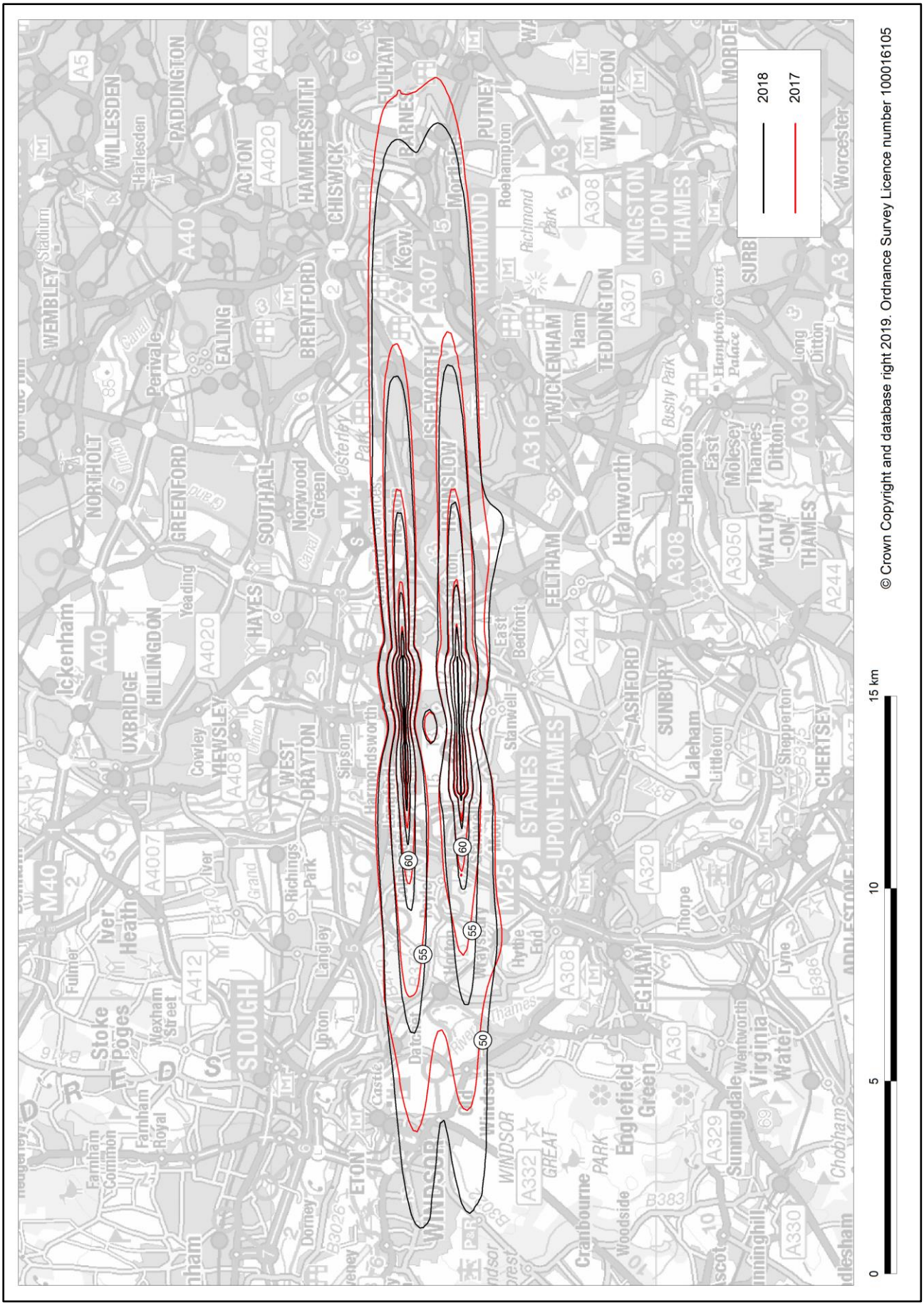



**Figure B16 Heathrow 2018 and 2017 $L_{night}$ noise contours**

Note: 2017 $L_{night}$ modal split was 80% W / 20% E; 2018 $L_{night}$ modal split was 64% W / 36% E.

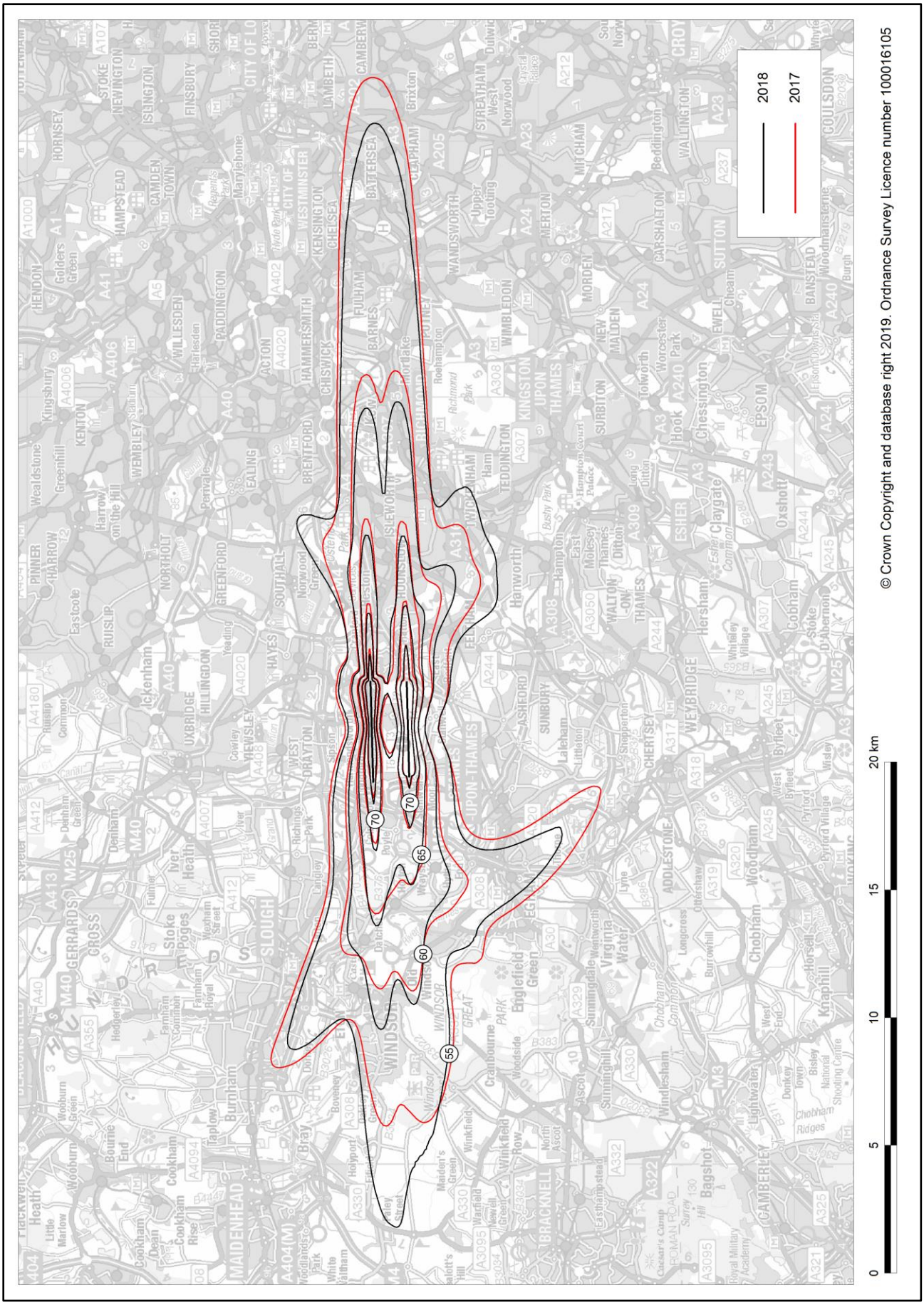



**Figure B17 Heathrow 2018 and 2017 $L_{den}$ noise contours**

Note: 2017 $L_{den}$ modal split was 81% W / 19% E; 2018 $L_{den}$ modal split was 65% W / 35% E.

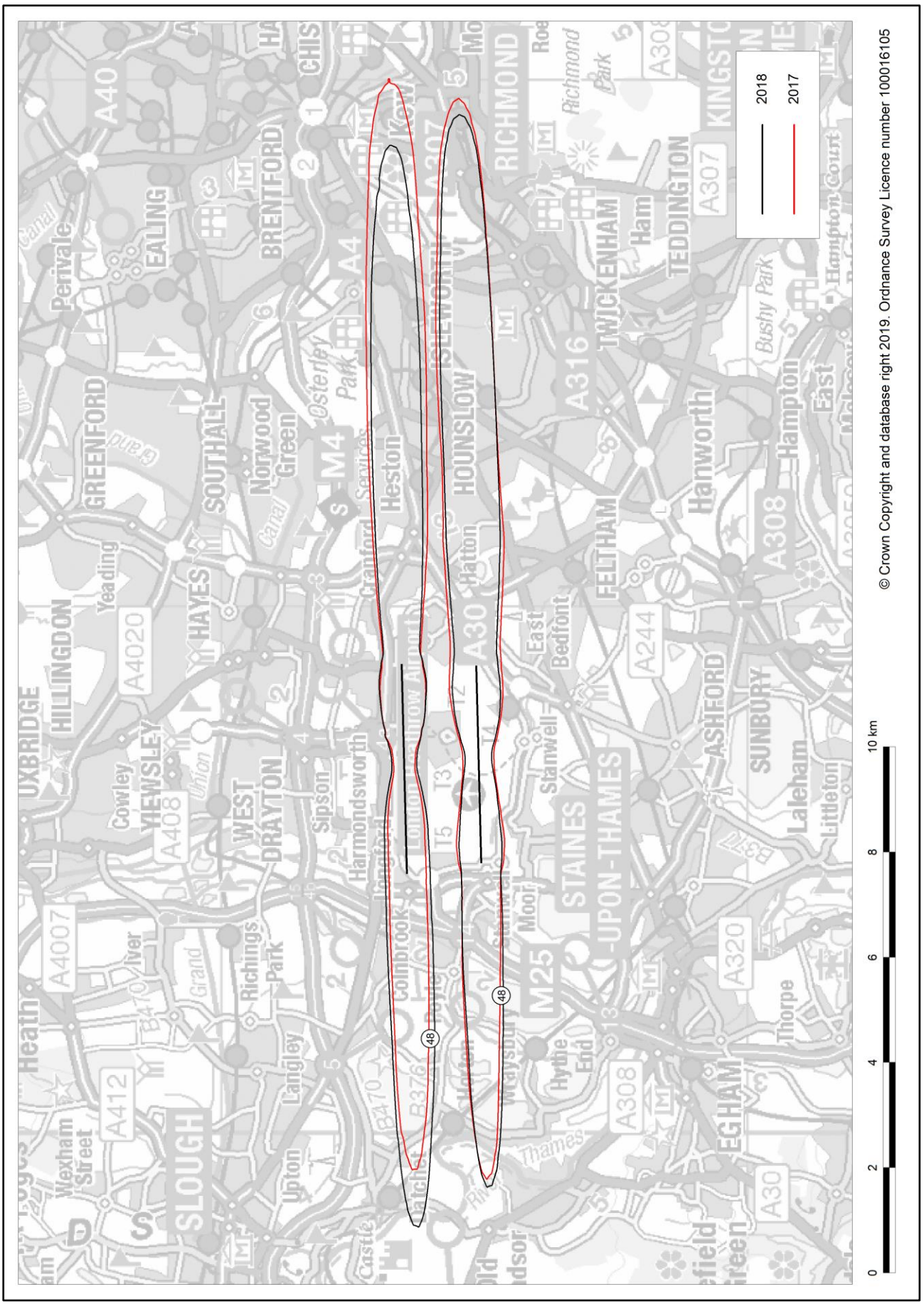
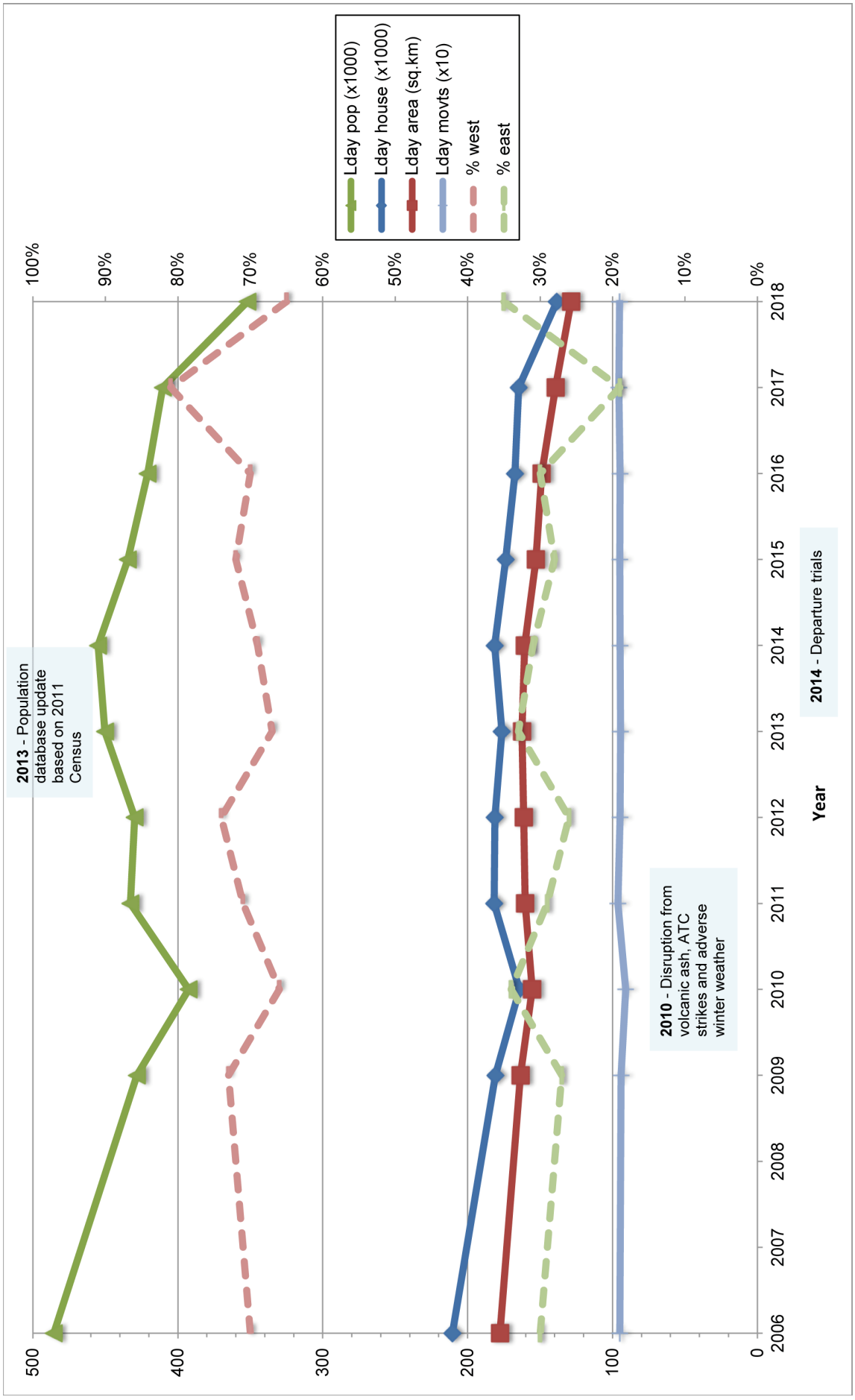



**Figure B18 Heathrow 2018 and 2017 $L_{eq,6.5hr\ night}$ noise contours**

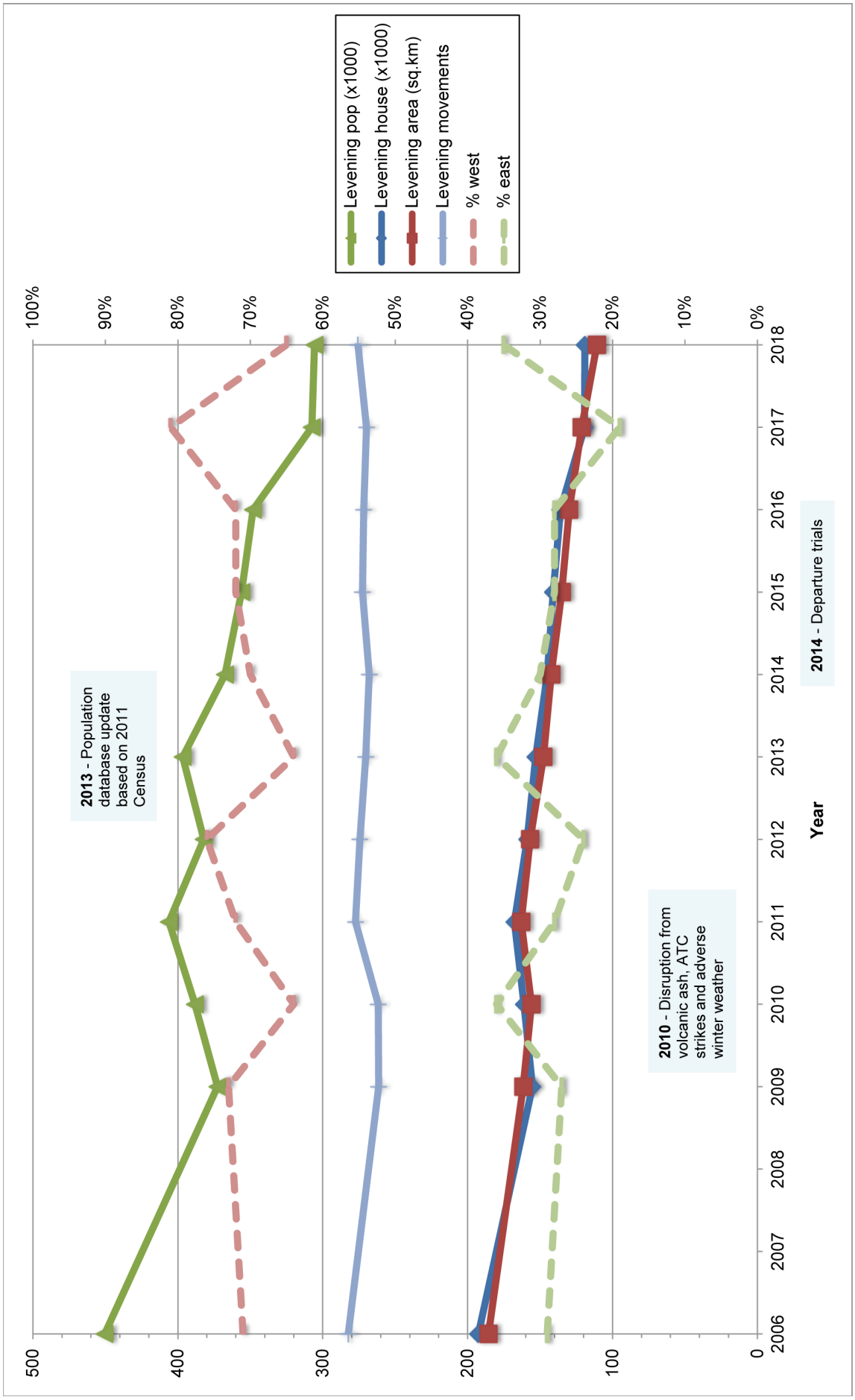
Note: 2017 $L_{eq,6.5hr\ night}$ modal split was 75% W / 25% E; 2018 $L_{eq,6.5hr\ night}$ modal split was 69% W / 31% E.

**Figure B19 Heathrow 2006 to 2018 $L_{day}$ 55 dBA area, population and household trends**



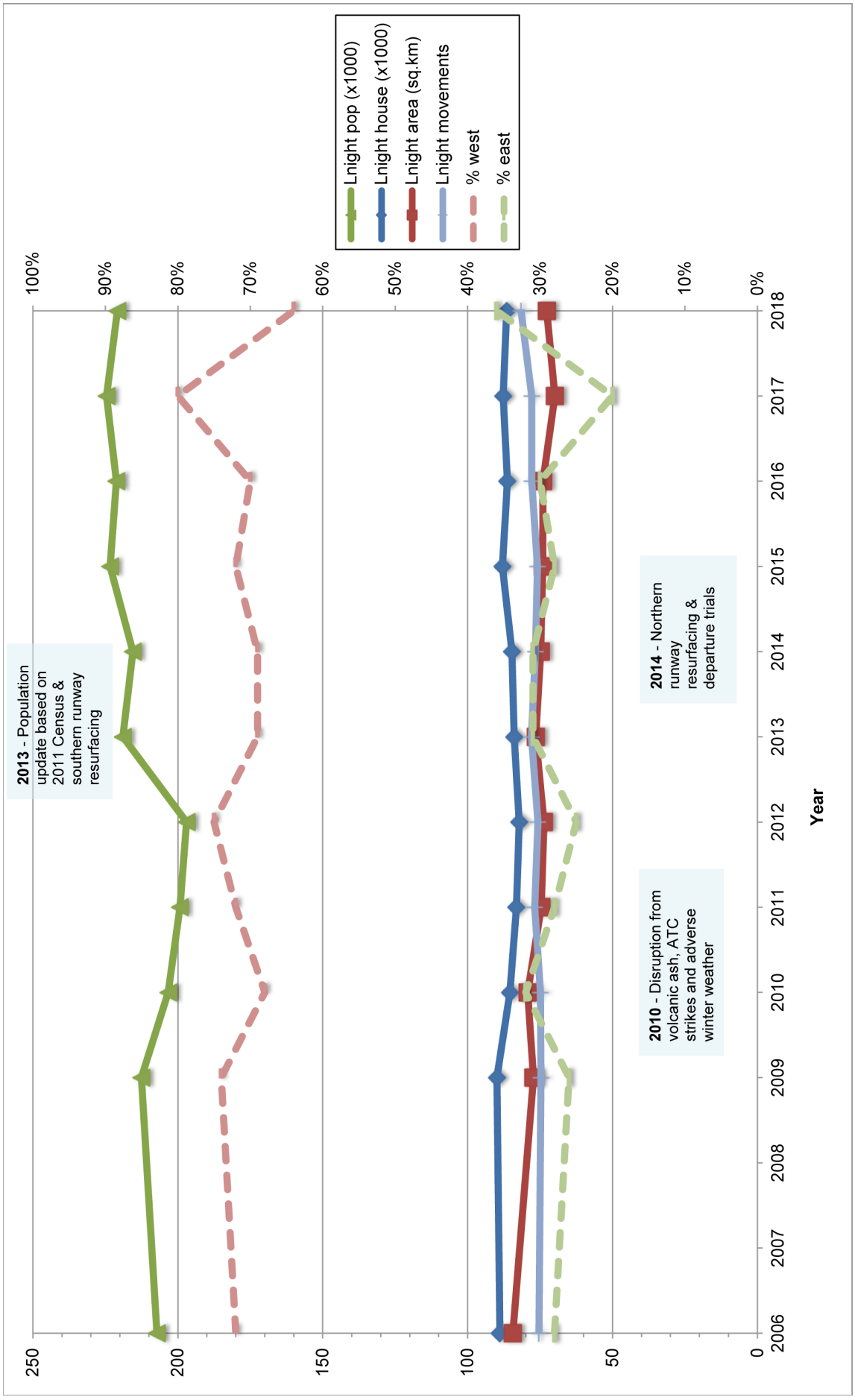

Note: There are no contour data for 2007 and 2008, and the lines joining the 2006 and 2009 data points are not meant to imply that the levels for 2007 and 2008 can be interpolated.

**Figure B20 Heathrow 2006 to 2018 $L_{evening}$ 55 dBA area, population and household trends**



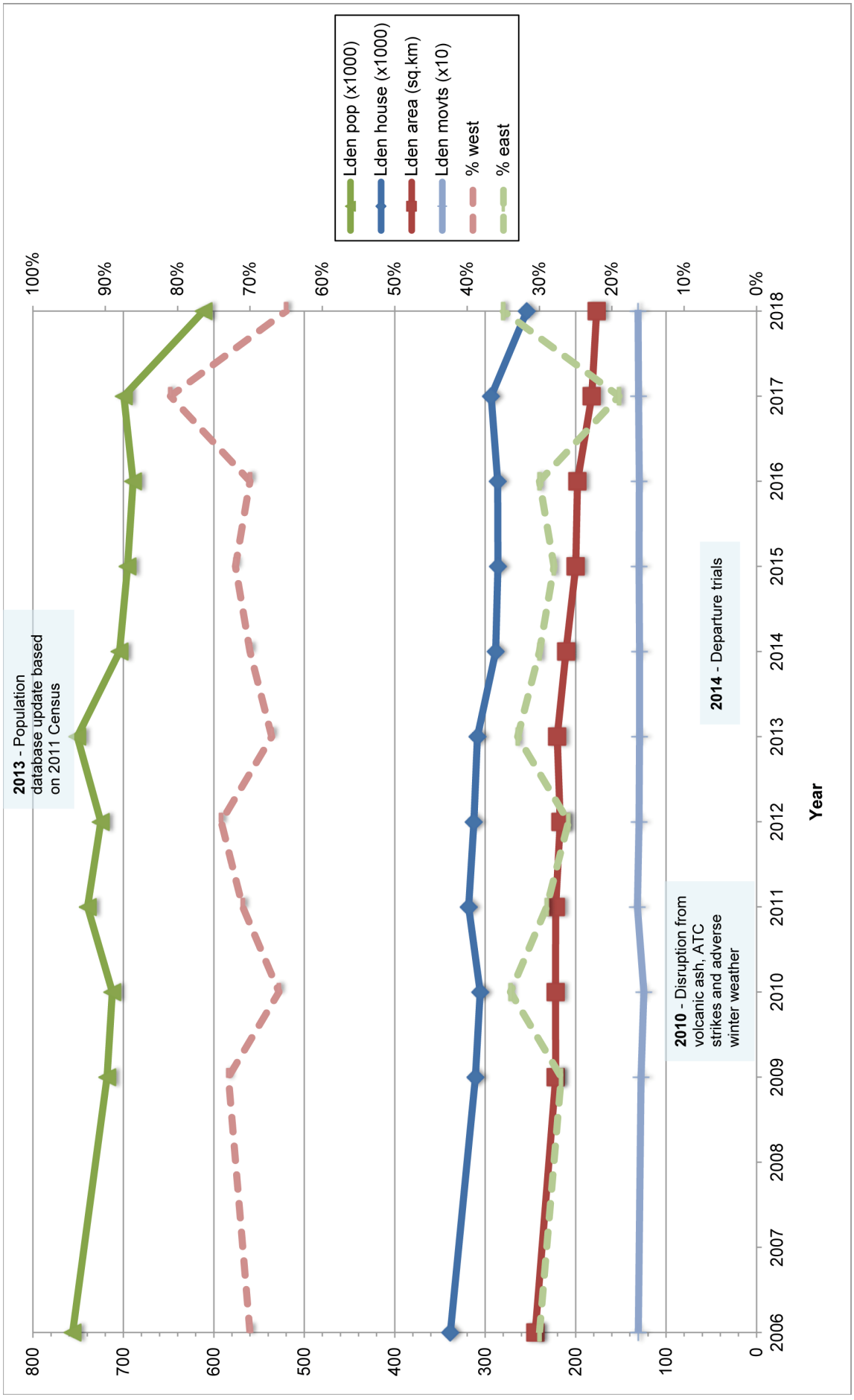

Note: There are no contour data for 2007 and 2008, and the lines joining the 2006 and 2009 data points are not meant to imply that the levels for 2007 and 2008 can be interpolated.

**Figure B21 Heathrow 2006 to 2018 $L_{night}$ 50 dBA area, population and household trends**



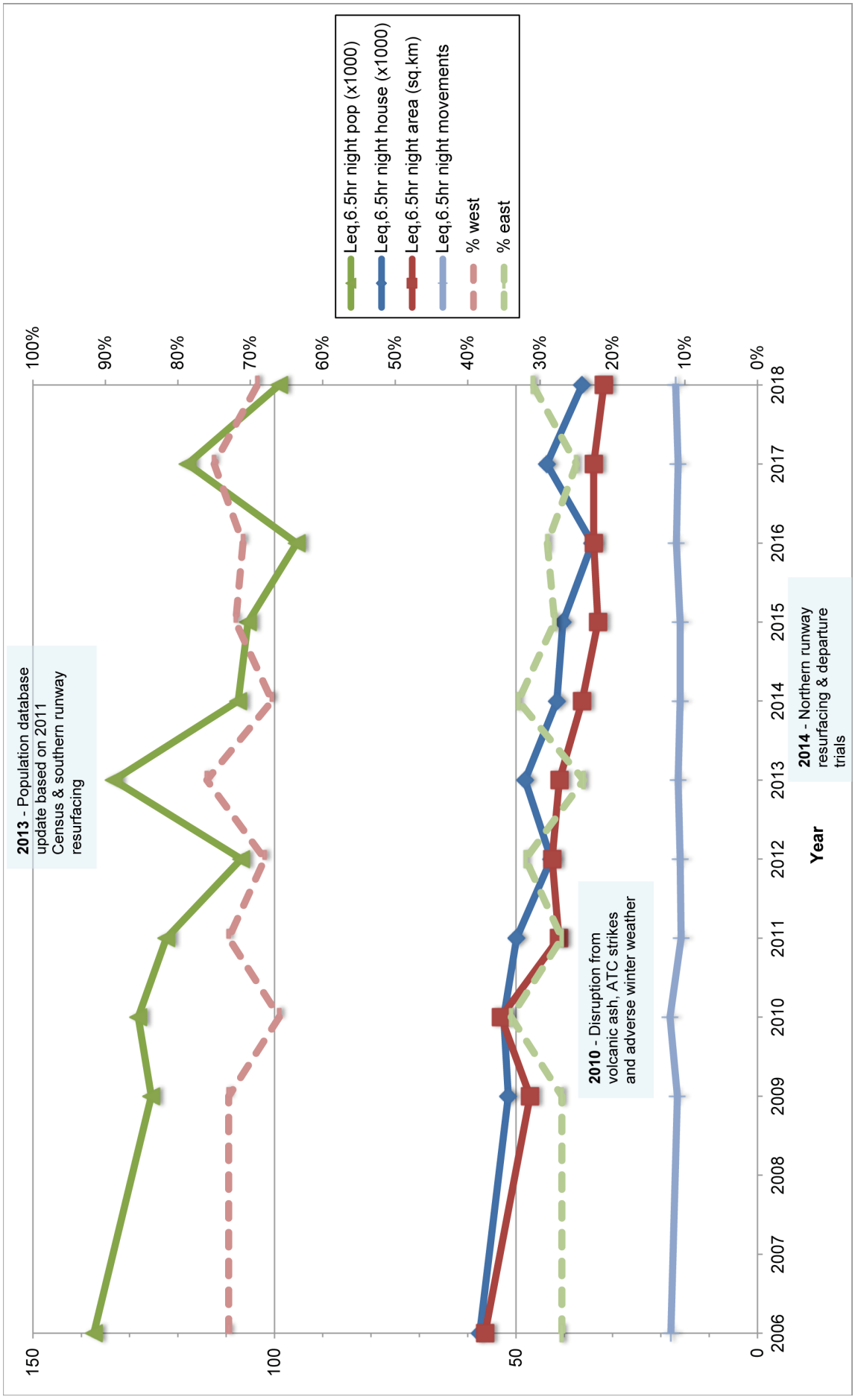

Note: There are no contour data for 2007 and 2008, and the lines joining the 2006 and 2009 data points are not meant to imply that the levels for 2007 and 2008 can be interpolated.

**Figure B22 Heathrow 2006 to 2018 $L_{den}$ 55 dBA 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 2018 $L_{eq,6.5hr\ night}$ 48 dBA 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.

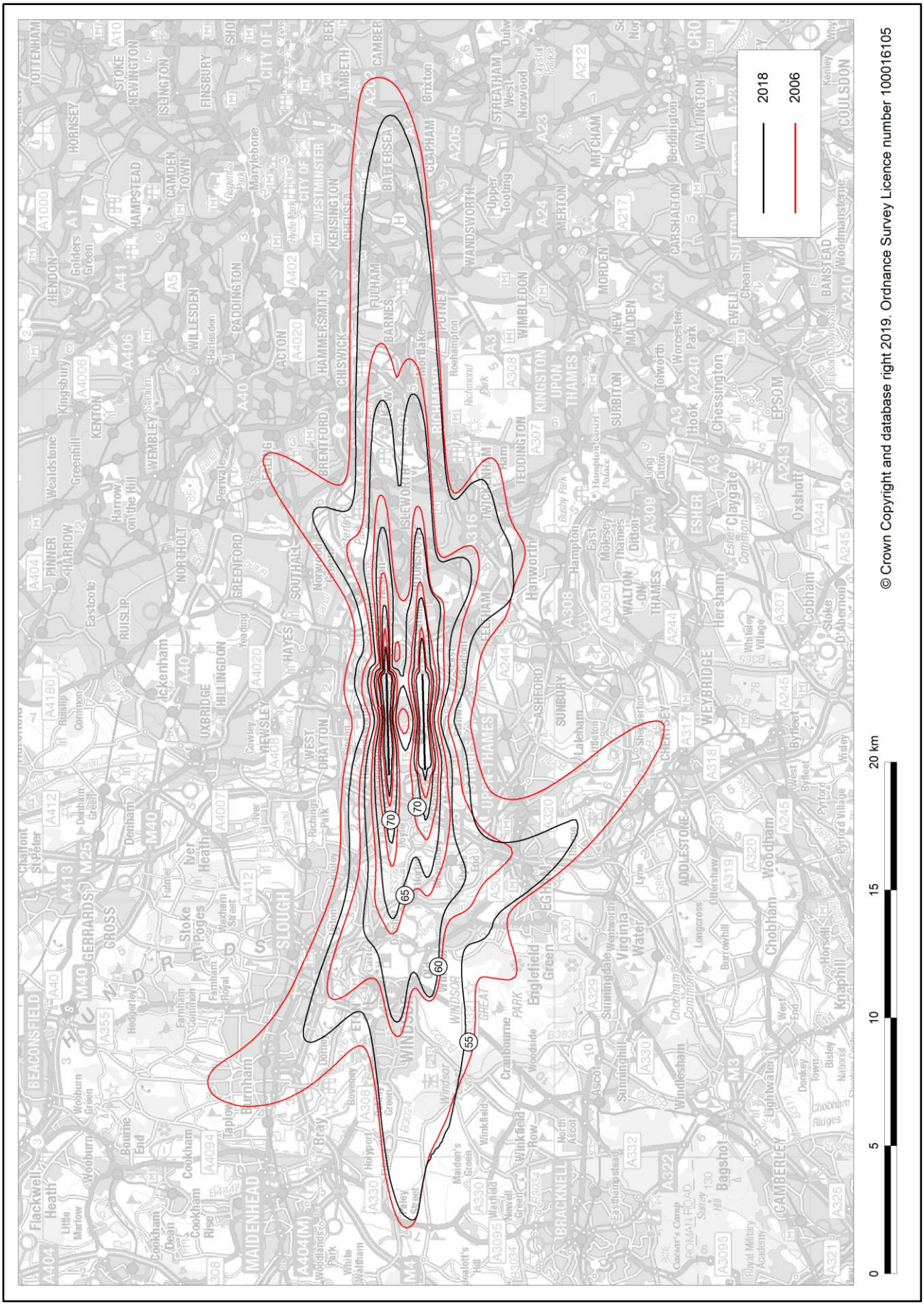
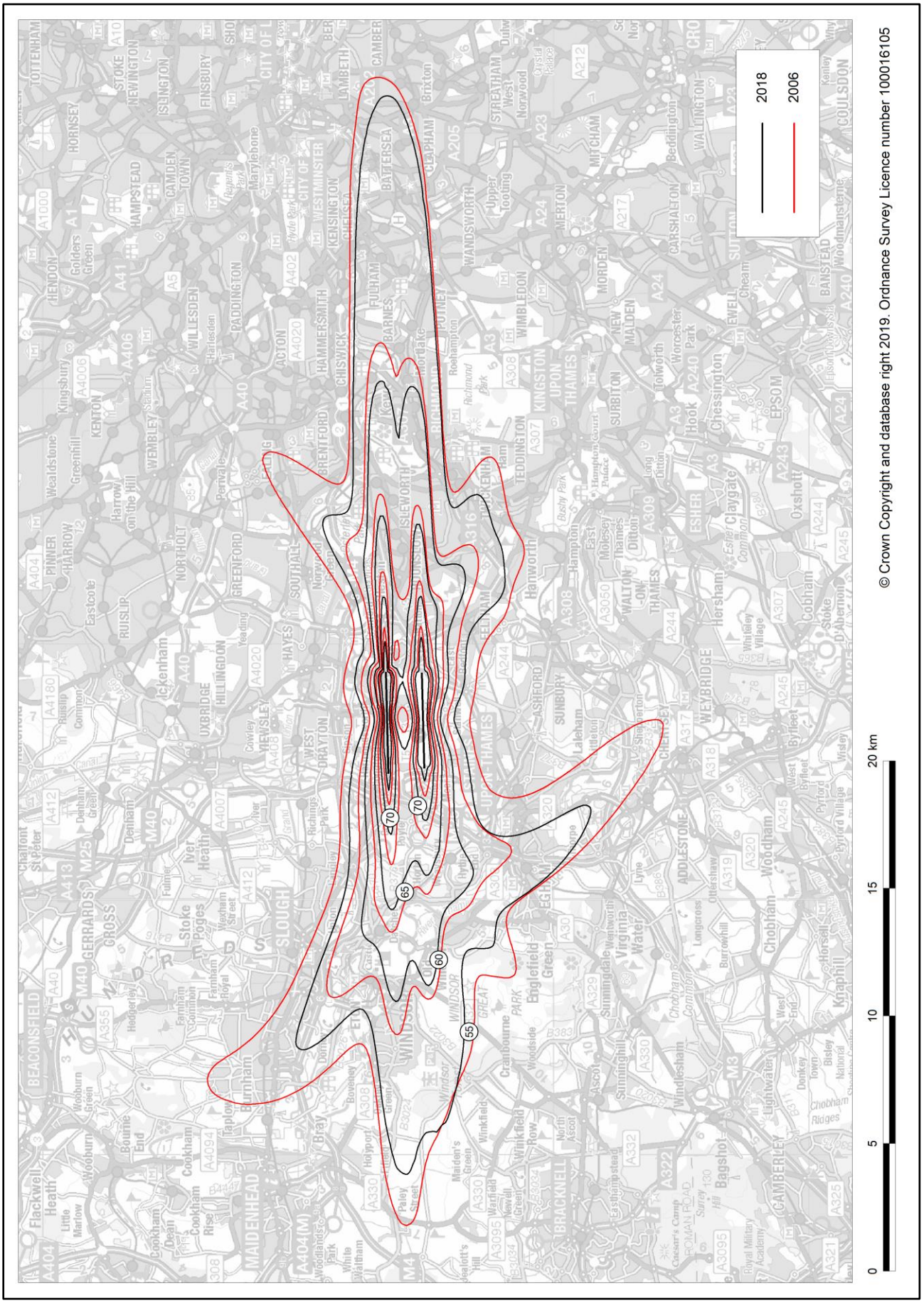



**Figure B24 Heathrow 2018 and 2006 $L_{den}$ noise contours**

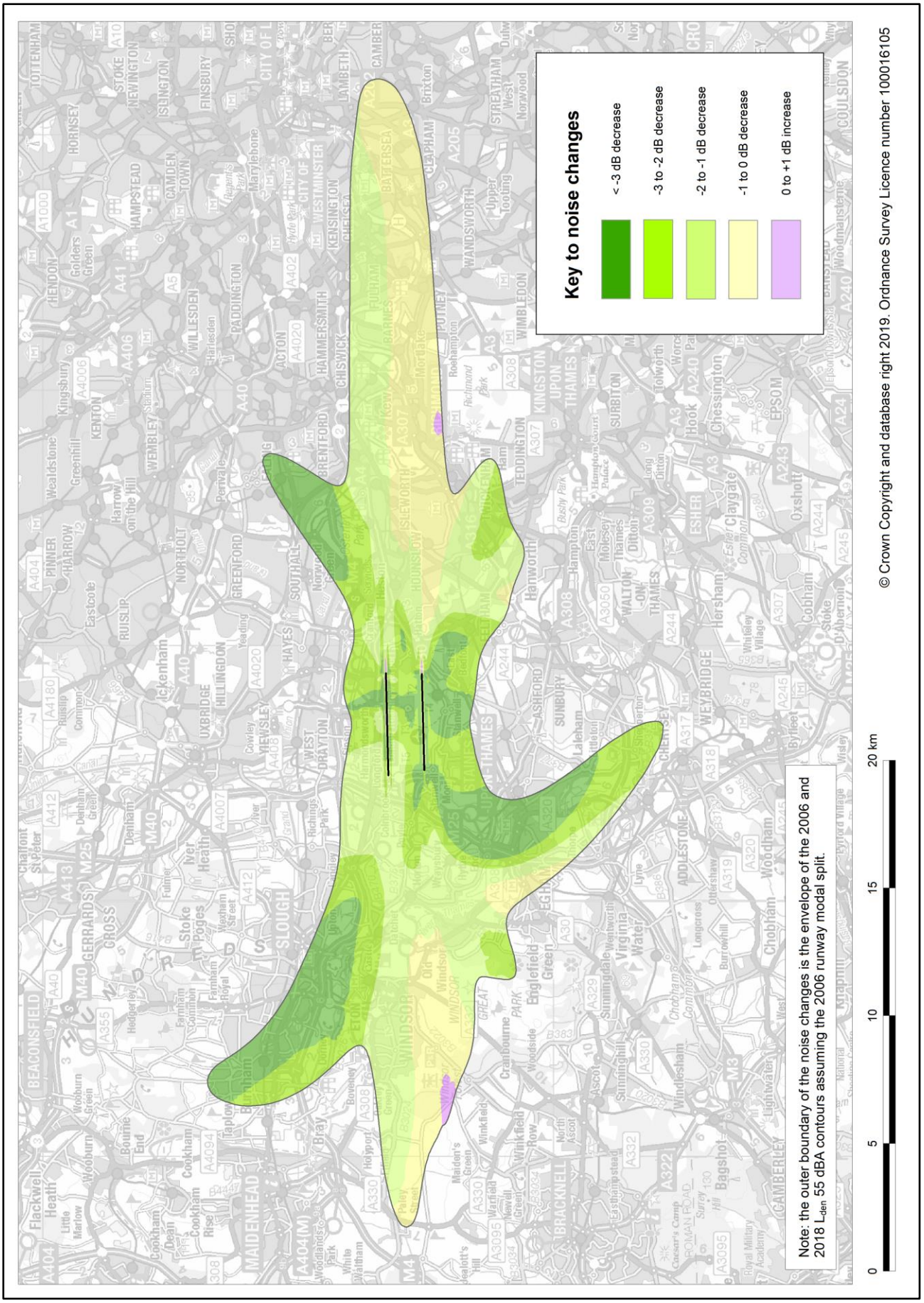
Note: 2006 $L_{den}$ modal split was 70% W / 30% E; 2018 $L_{den}$ modal split was 65% W / 35% E.

**Figure B25 Heathrow 2018 and 2006 $L_{den}$ noise contours (assuming 2006 runway modal split and 2006 N-S runway usage)**



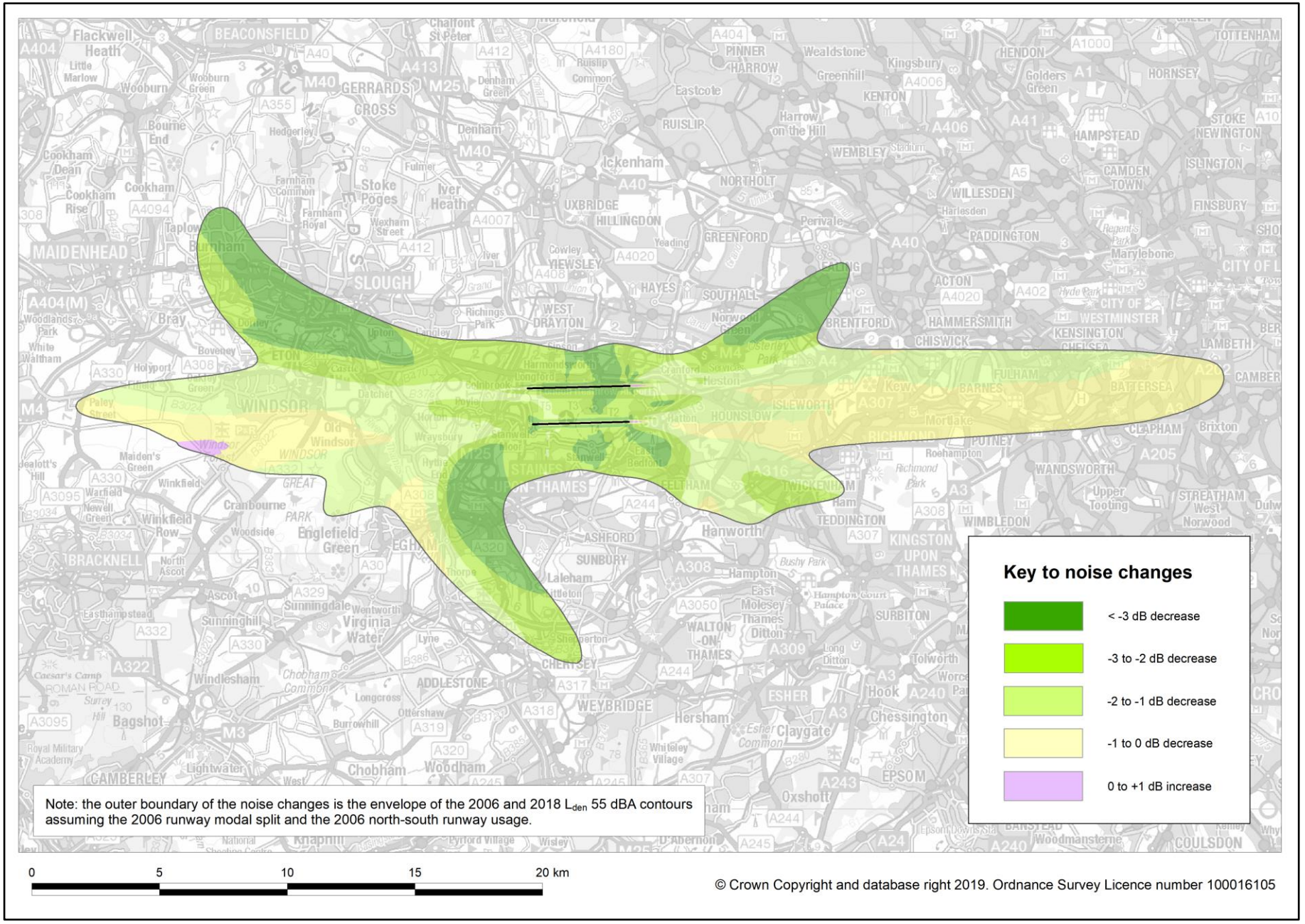

Note: 2006 $L_{den}$ modal split was 70% W / 30% E.

**Figure B26 Heathrow noise change map for 2018 vs 2006 $L_{den}$ (assuming 2006 runway modal split)**



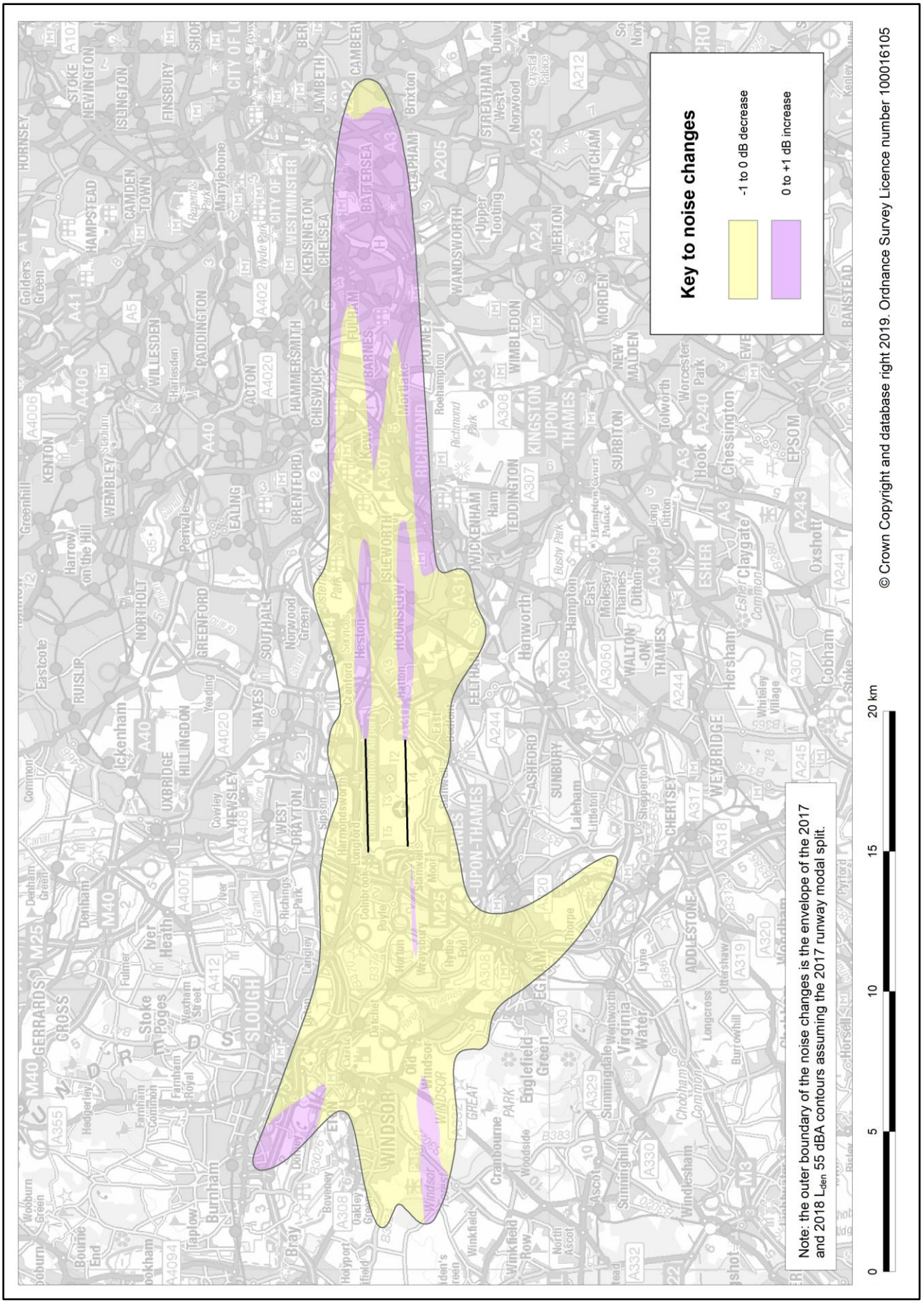

Note: 2006 $L_{den}$ modal split was 70% W / 30% E.

## Figure B27 Heathrow noise change map for 2018 vs 2006 $L_{den}$ (assuming 2006 runway modal split and 2006 N-S runway usage)




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

**Figure B28 Heathrow noise change map for 2018 vs 2017 $L_{den}$ (assuming 2017 runway modal split)**




Note: 2017 $L_{den}$ modal split was 81% W / 19% E.

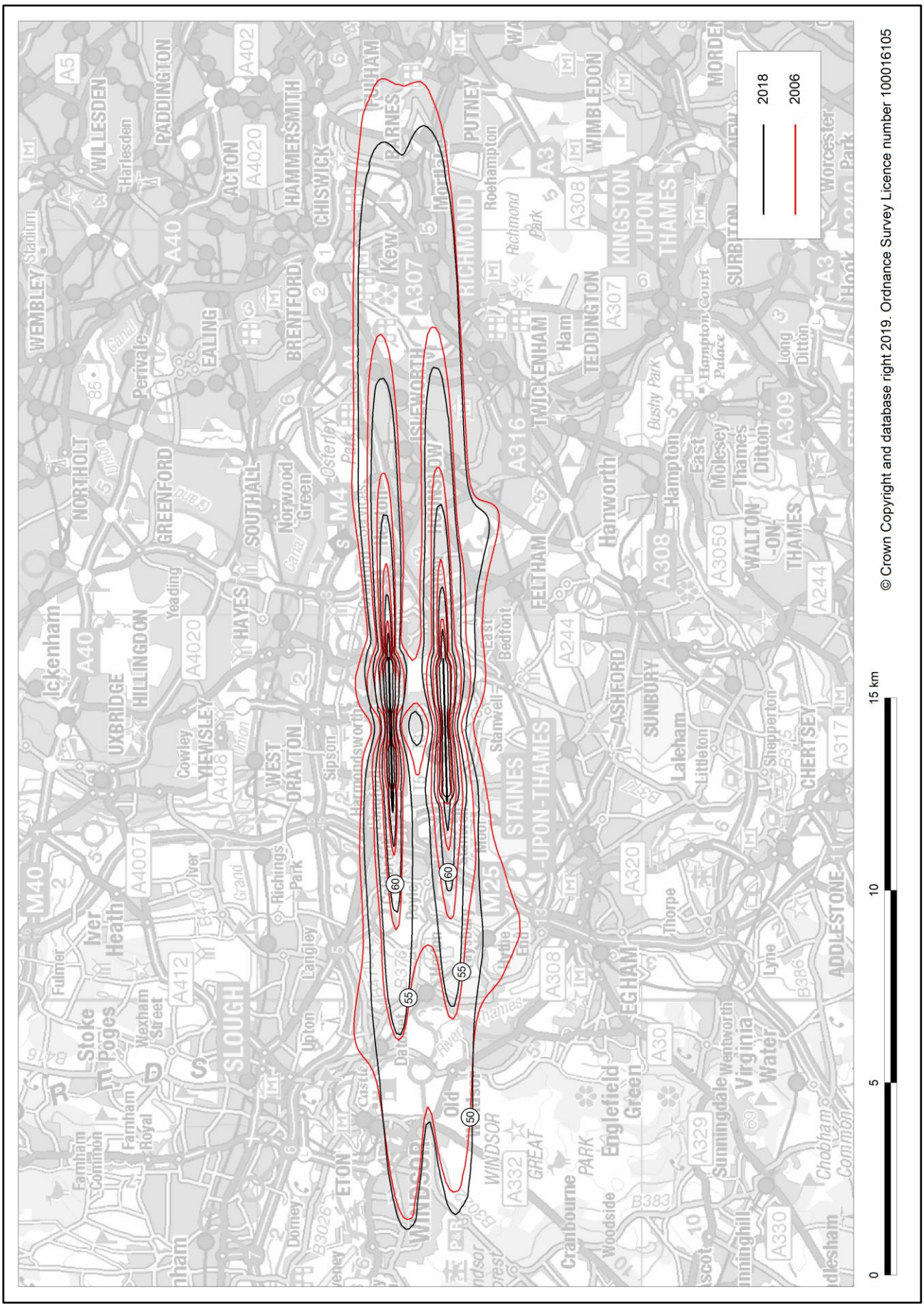
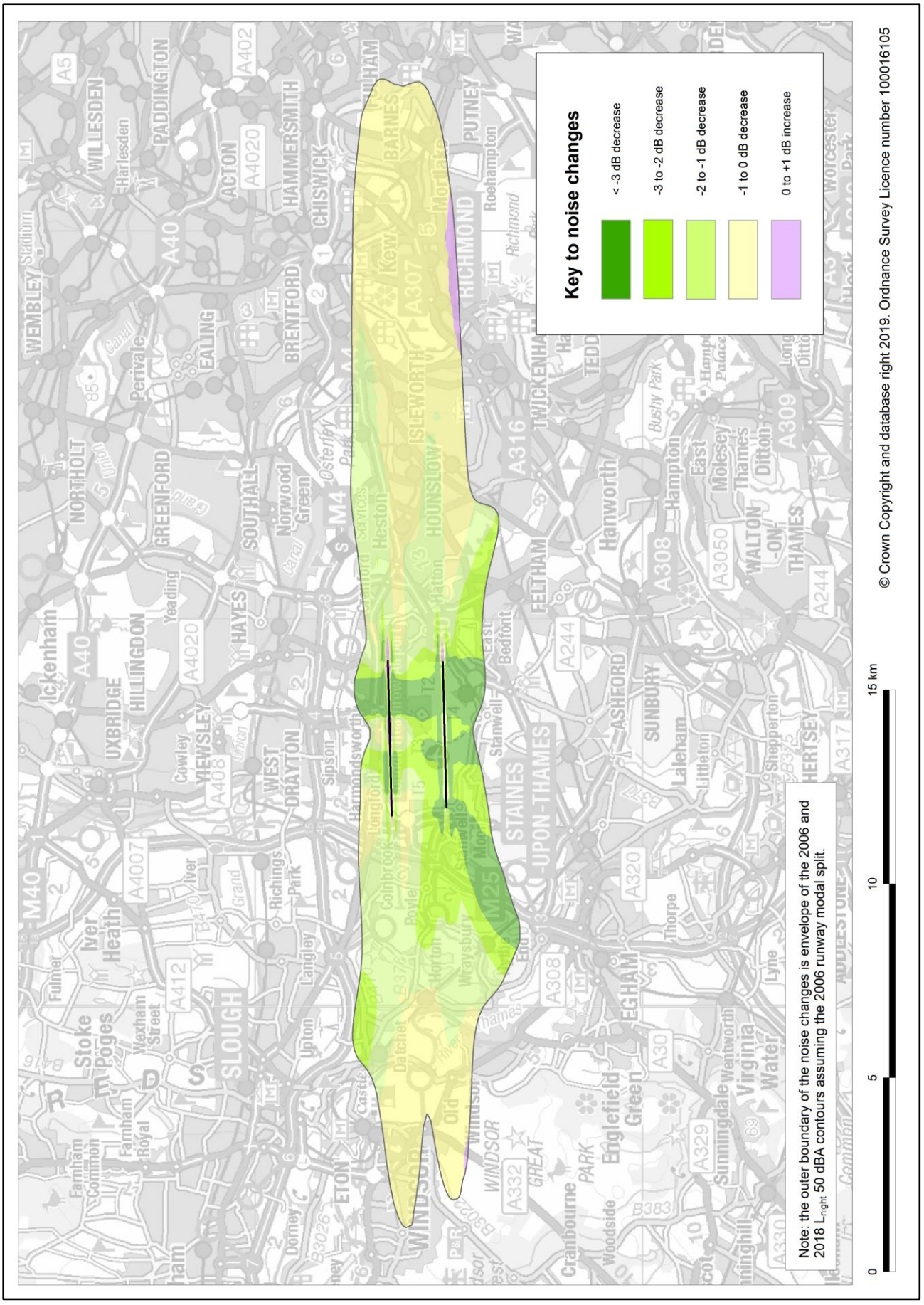



**Figure B29 Heathrow 2018 and 2006 $L_{night}$ noise contours**

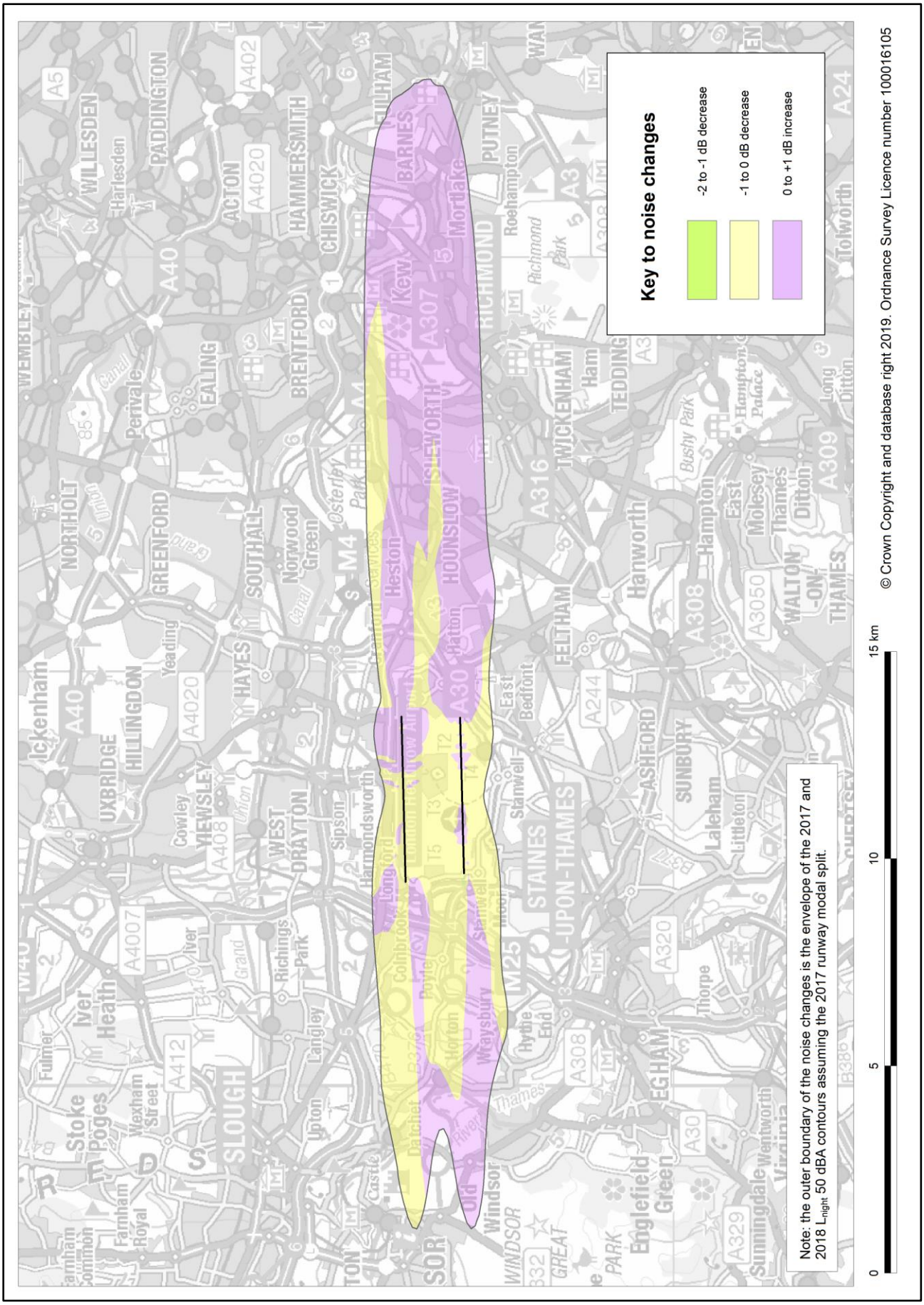
Note: 2006 $L_{night}$ modal split was 72% W / 28% E; 2018 $L_{night}$ modal split was 64% W / 36% E.

**Figure B30 Heathrow noise change map for 2018 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 2018 vs 2017 $L_{night}$ (assuming 2017 runway modal split)**




Note: 2017 $L_{night}$ modal split was 80% W / 20% E.

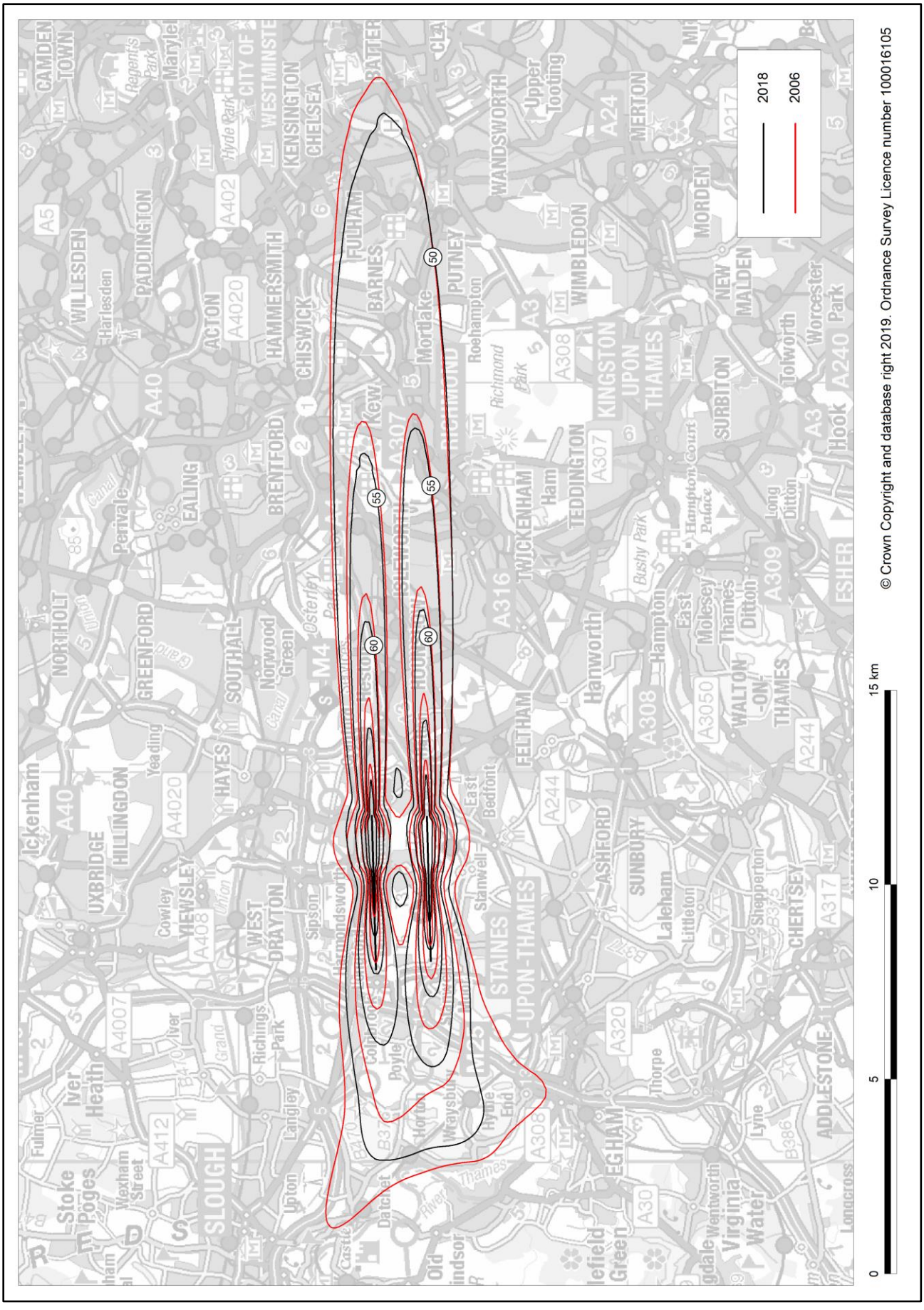



**Figure B32 Heathrow 2018 and 2006 $L_{night}$ 50-70 dBA 100% W Leq noise contours (assuming 2006 N-S runway usage)**

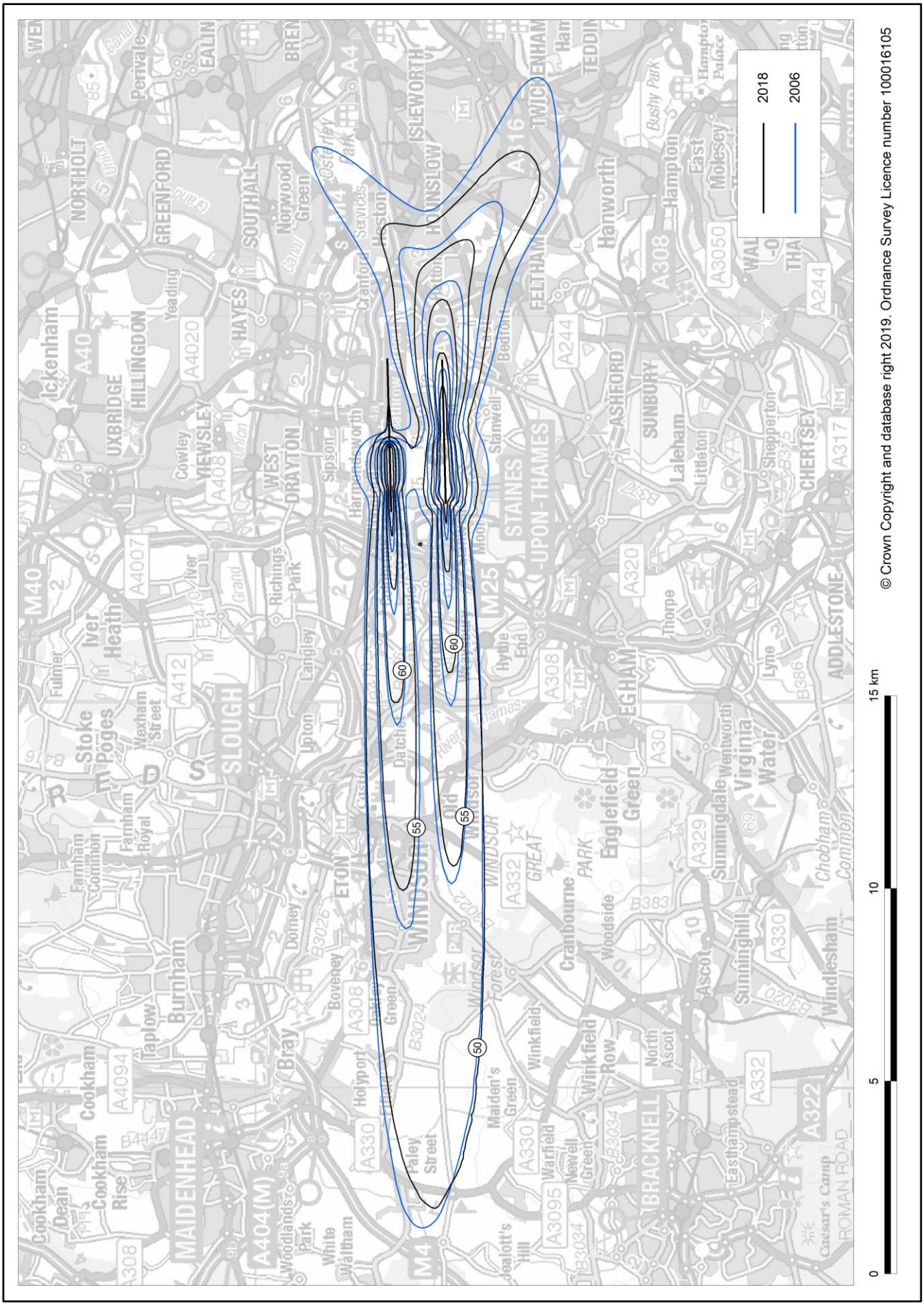



**Figure B33 Heathrow 2018 and 2006 $L_{night}$ 50-70 dBA 100% E Leq noise contours (assuming 2006 N-S runway usage)**

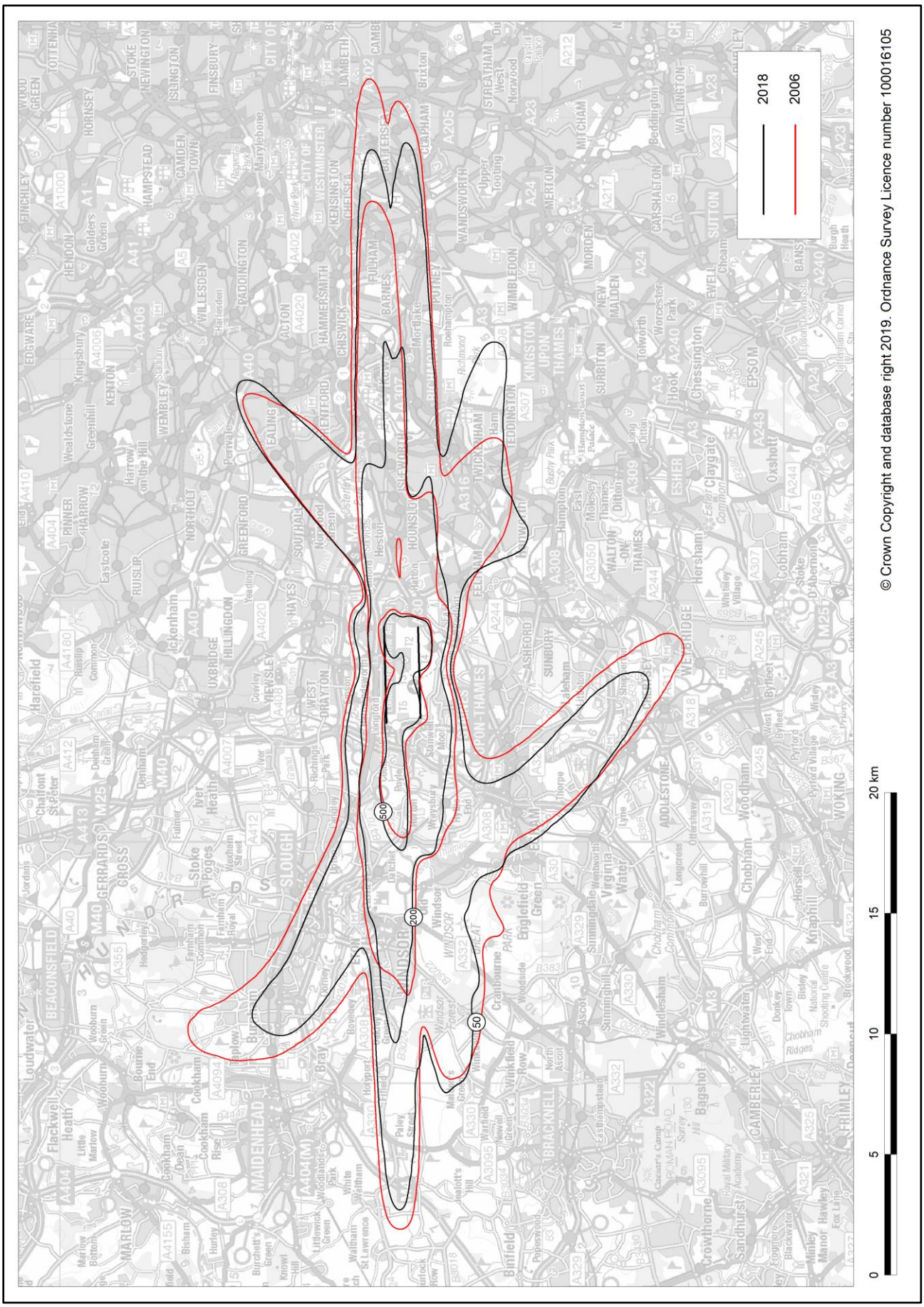
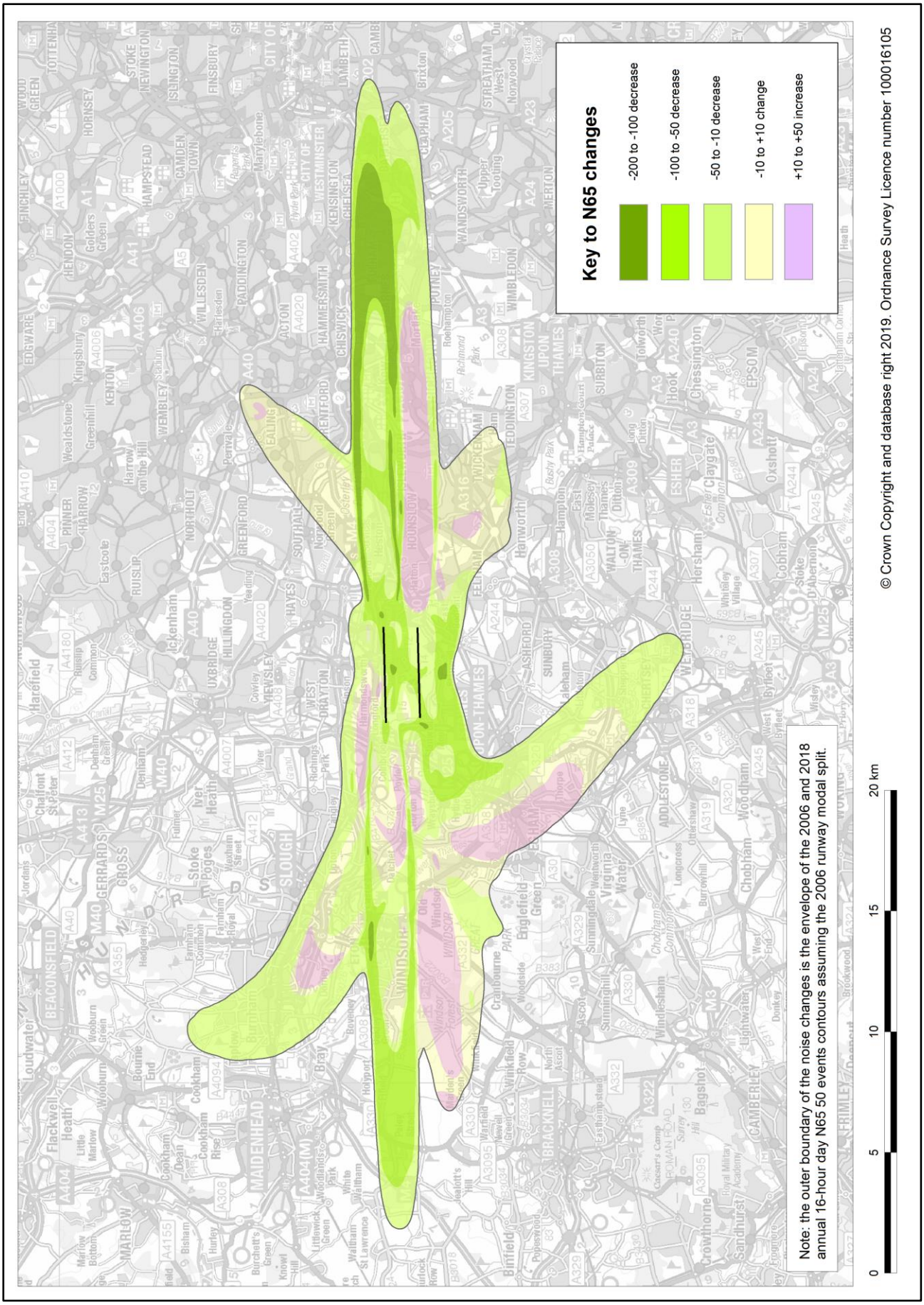



**Figure B34 Heathrow 2018 and 2006 annual 16-hour day N65 contours**

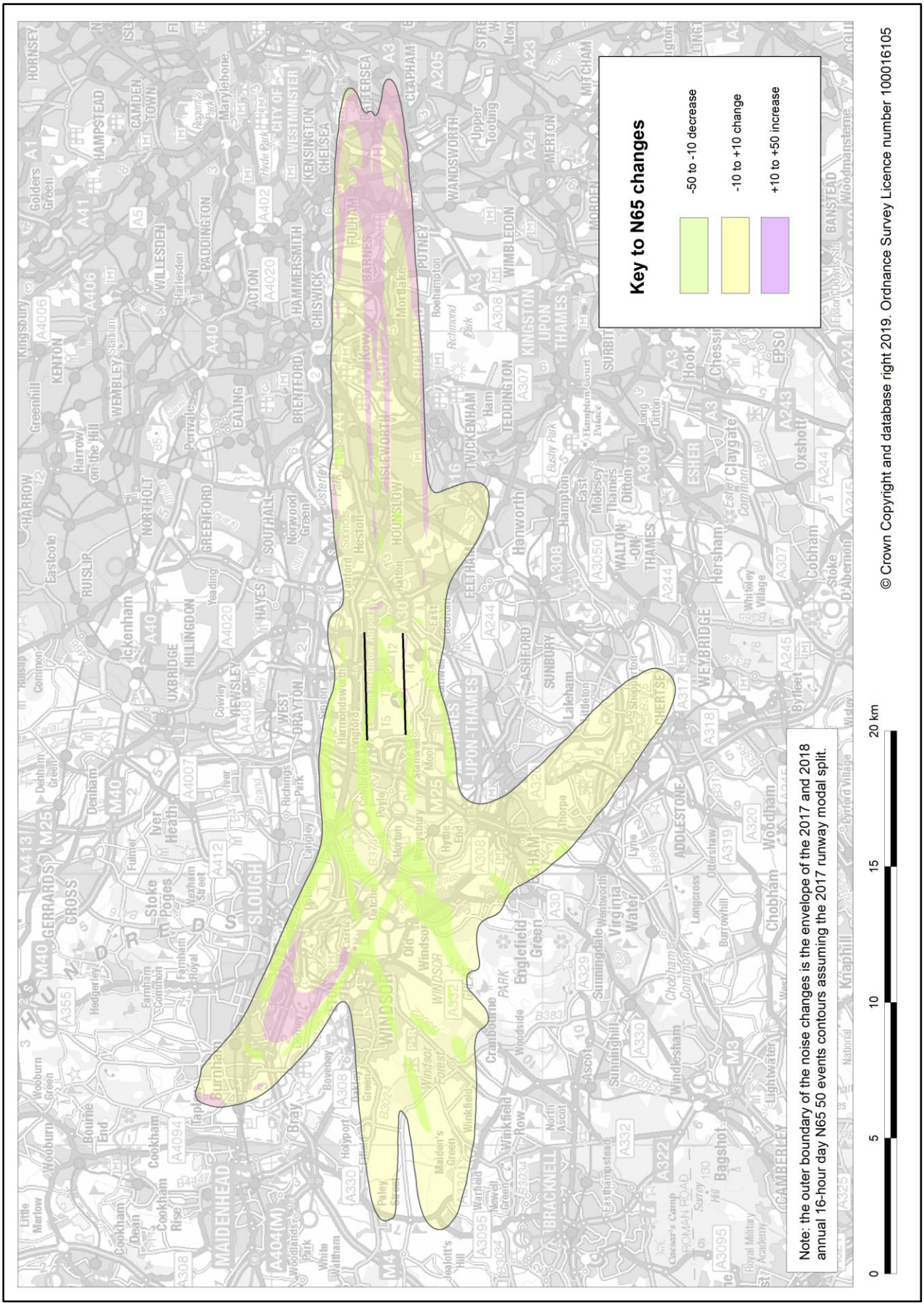
Note: 2006 annual 16-hour day modal split was 70% W / 30% E; 2018 annual 16-hour day modal split was 65% W / 35% E.

**Figure B35 Heathrow change map for 2018 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 2018 vs 2017 annual 16-hour day N65 (assuming 2017 runway modal split)**




Note: 2017 annual 16-hour day modal split was 81% W / 19% E.

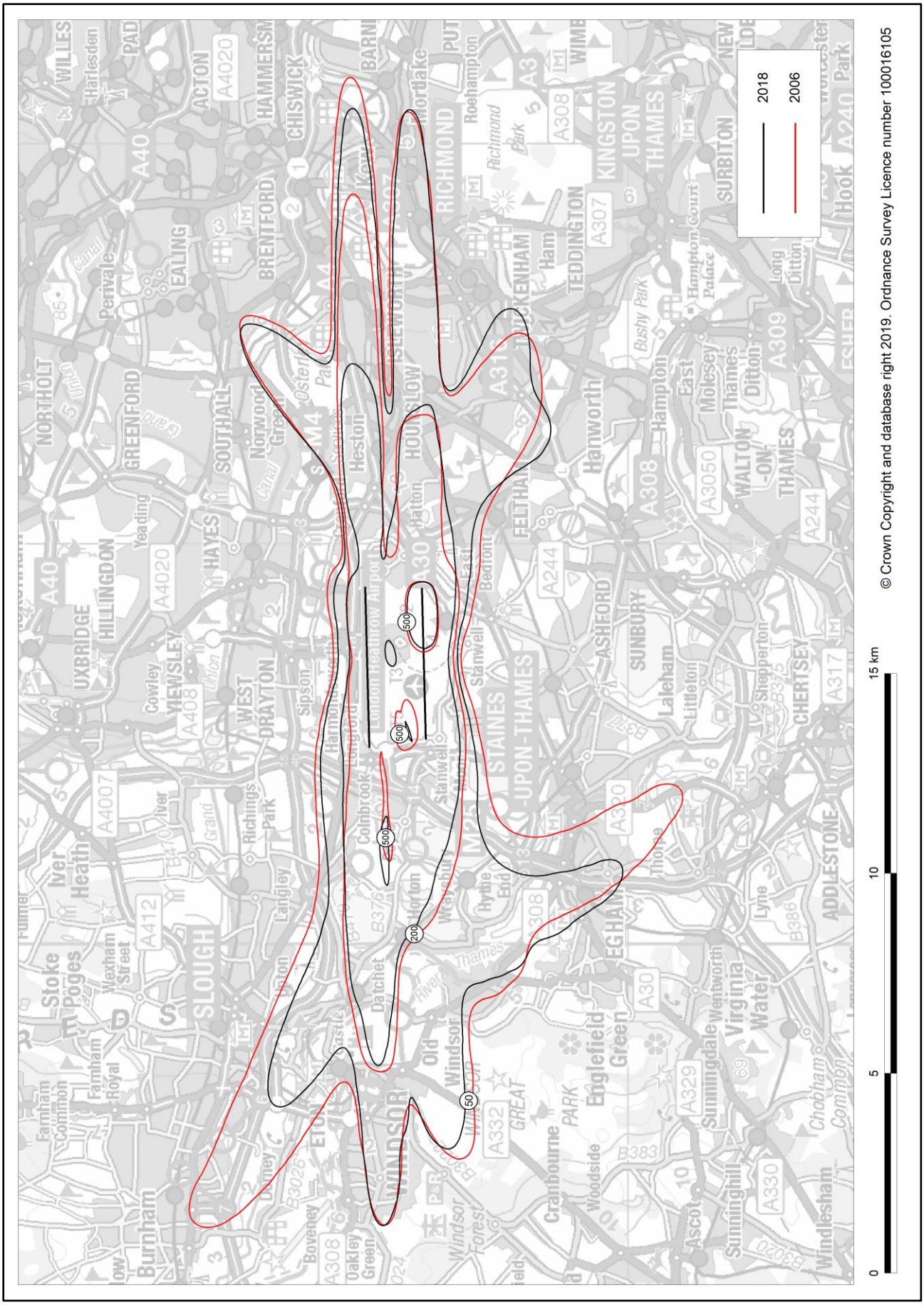
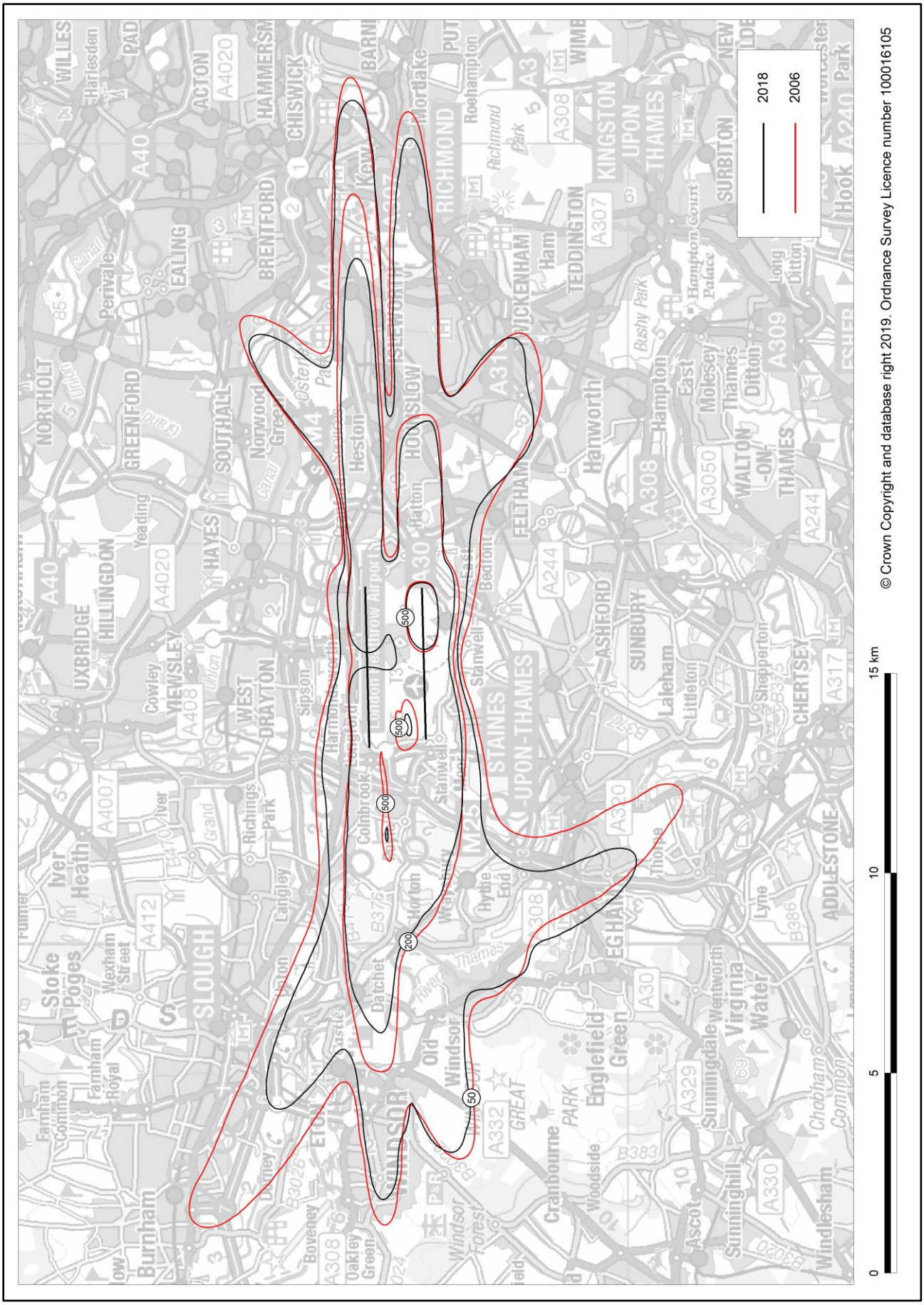



**Figure B37 Heathrow 2018 and 2006 annual 16-hour day N70 contours**

Note: 2006 annual 16-hour day modal split was 70% W / 30% E; 2018 annual 16-hour day modal split was 65% W / 35% E.

**Figure B38 Heathrow 2018 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 2018 vs 2006 annual 16-hour day N70 (assuming 2006 runway modal split)**

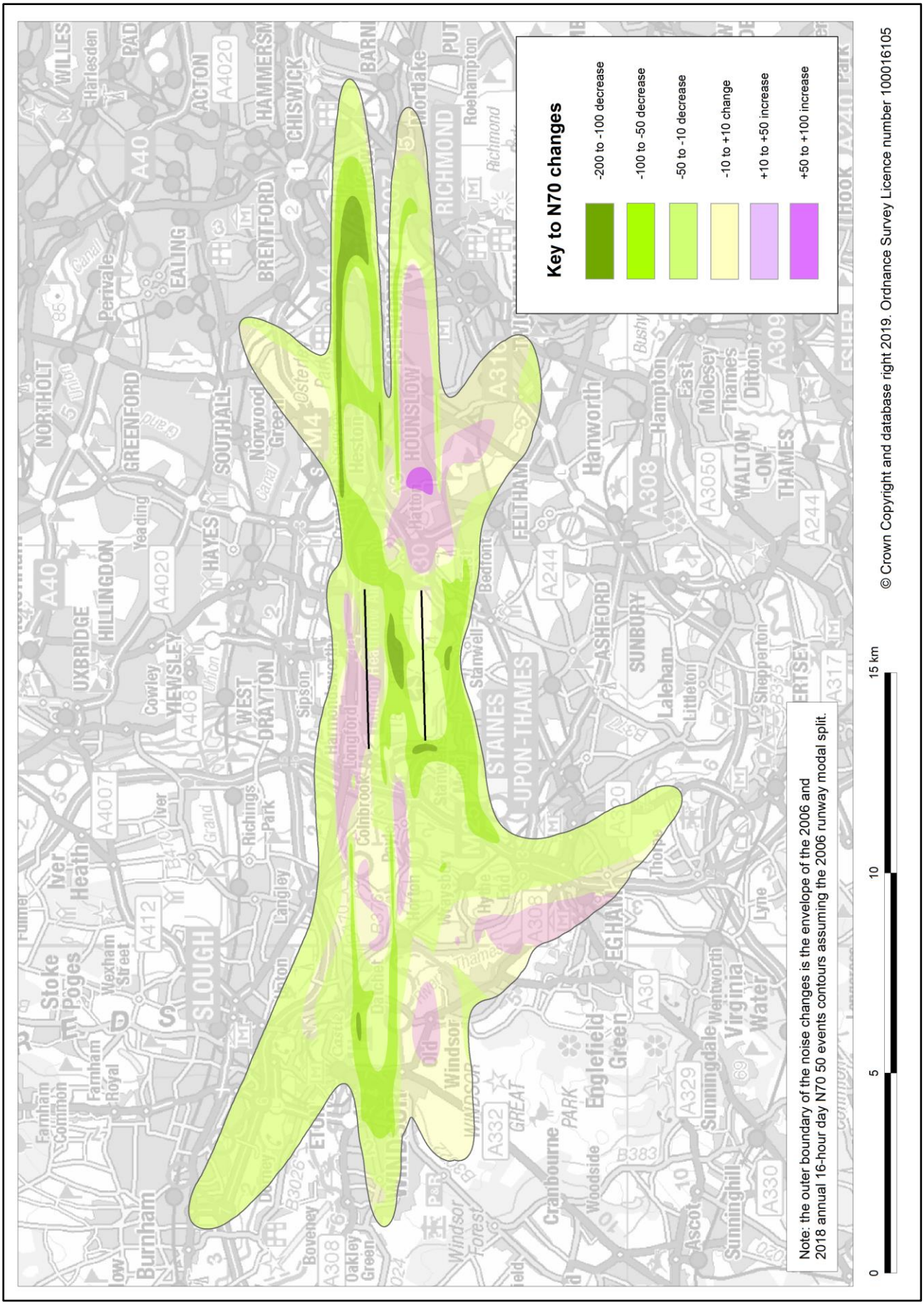
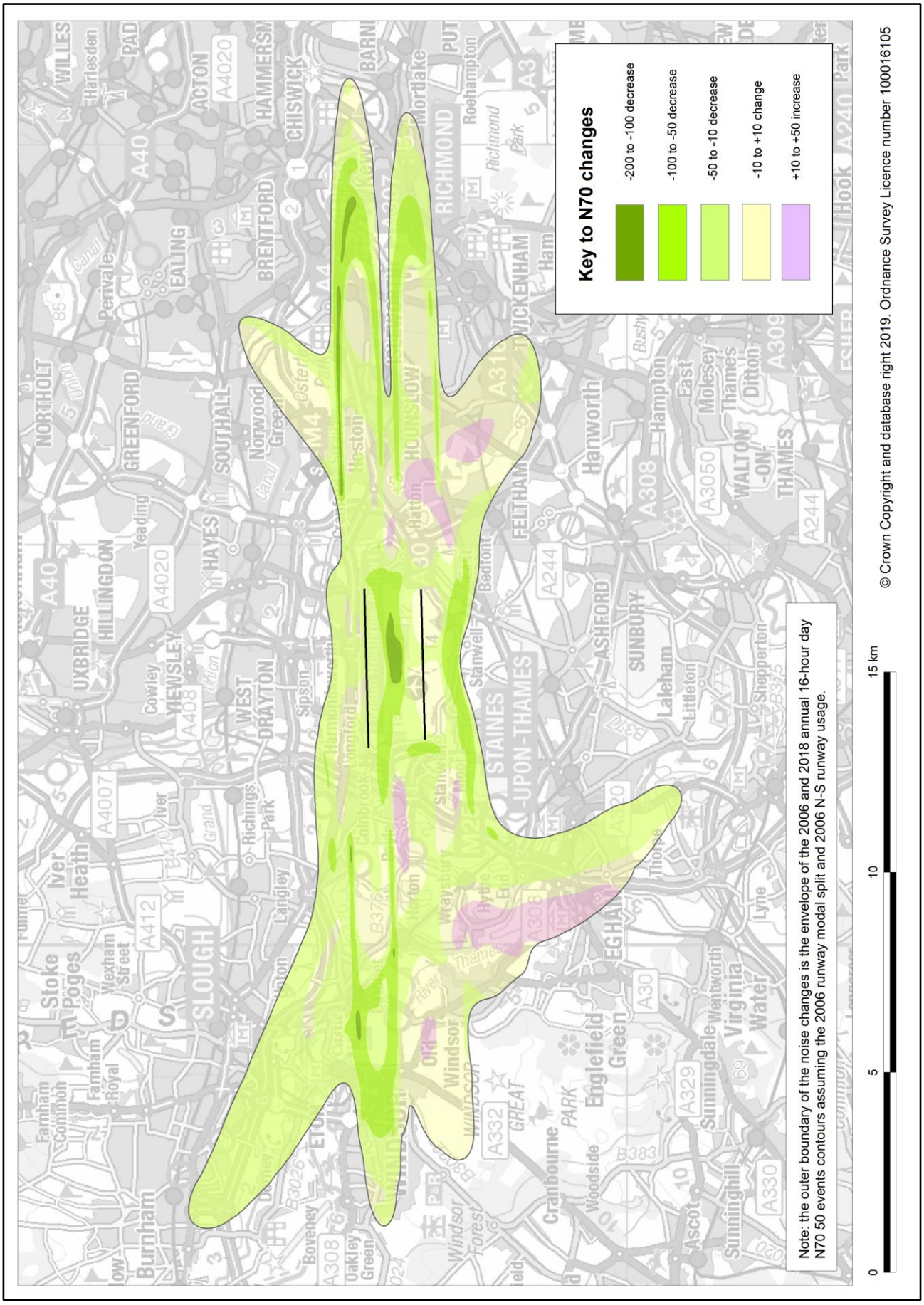
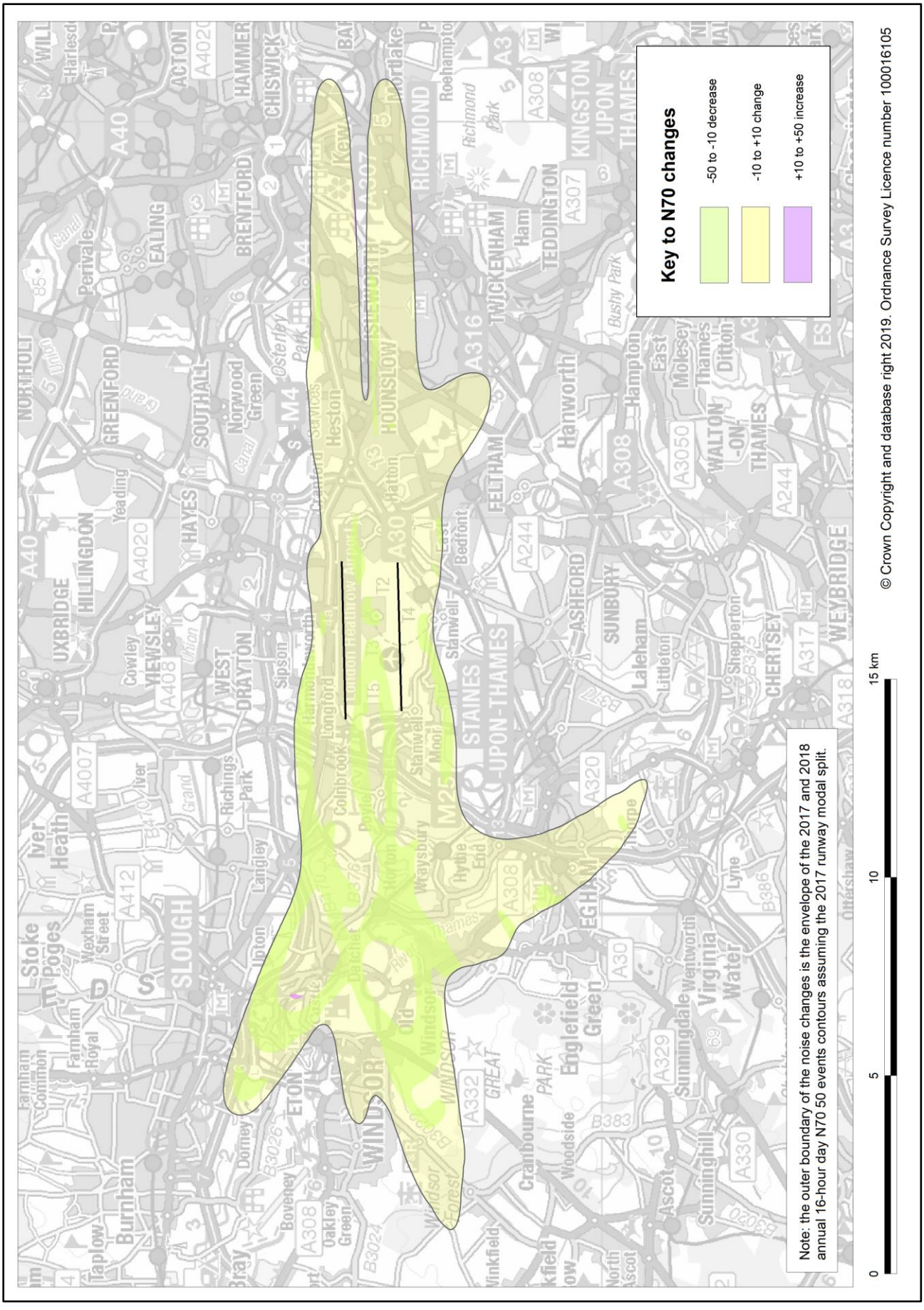


**Figure B40 Heathrow change map for 2018 vs 2006 annual 16-hour day N70 (with 2006 runway modal split and 2006 N-S runway usage)**




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

**Figure B41 Heathrow change map for 2018 vs 2017 annual 16-hour day N70 (assuming 2017 runway modal split)**




Note: 2017 annual 16-hour day modal split was 81% W / 19% E.

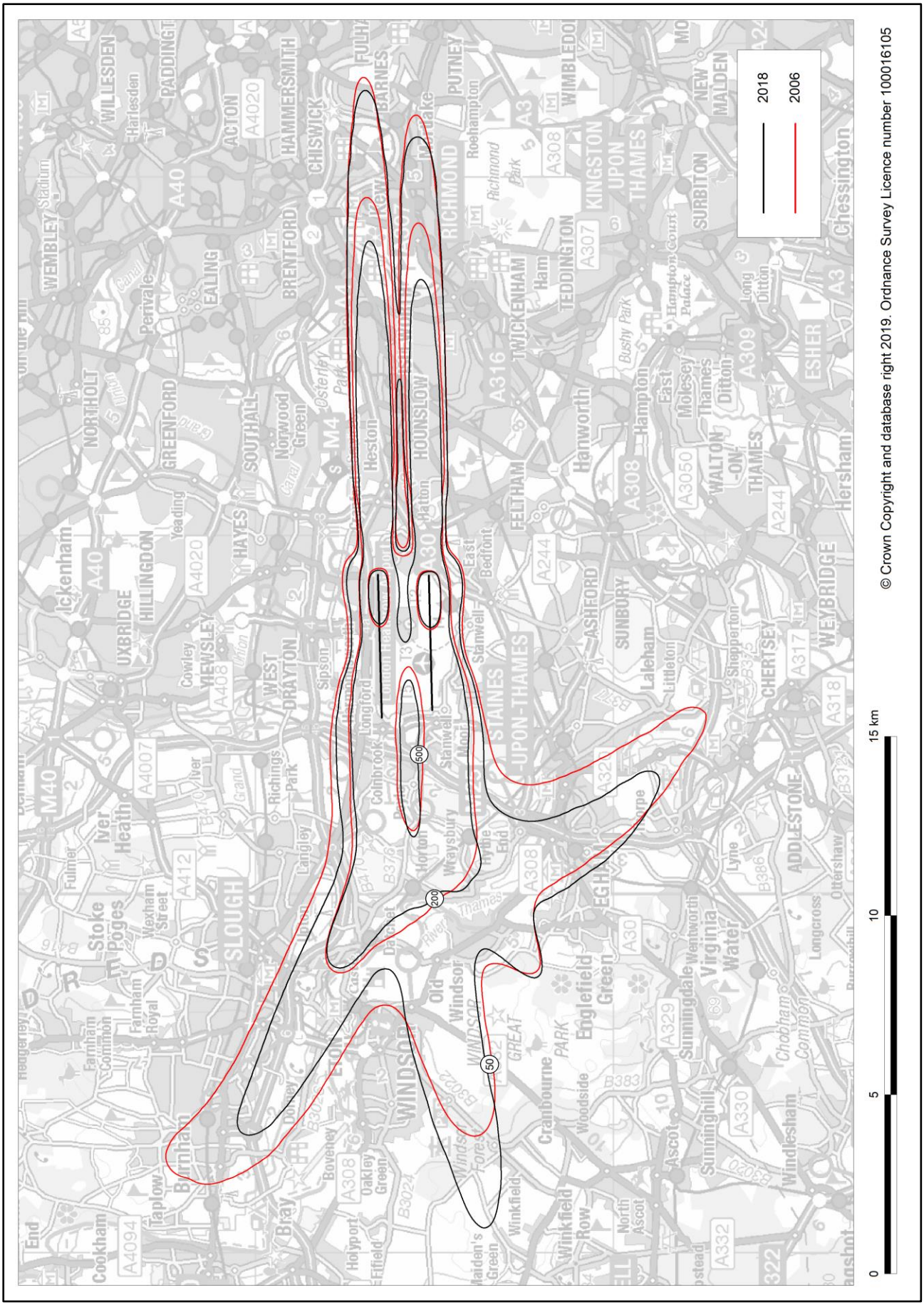



**Figure B42 Heathrow 2018 and 2006 annual 16-hour day N70 100% W contours (assuming 2006 N-S runway usage)**

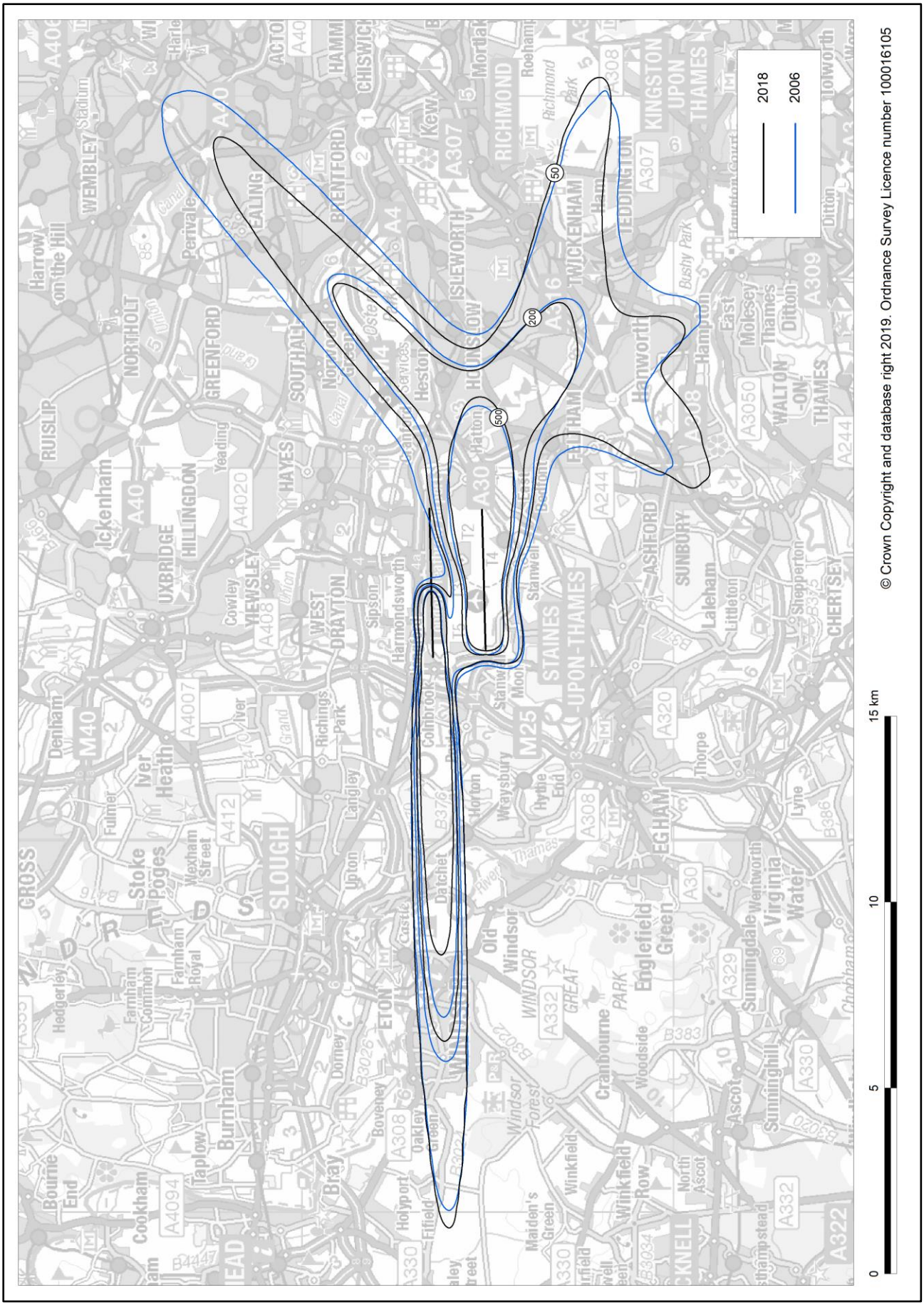



**Figure B43 Heathrow 2018 and 2006 annual 16-hour day N70 100% E contours (assuming 2006 N-S runway usage)**

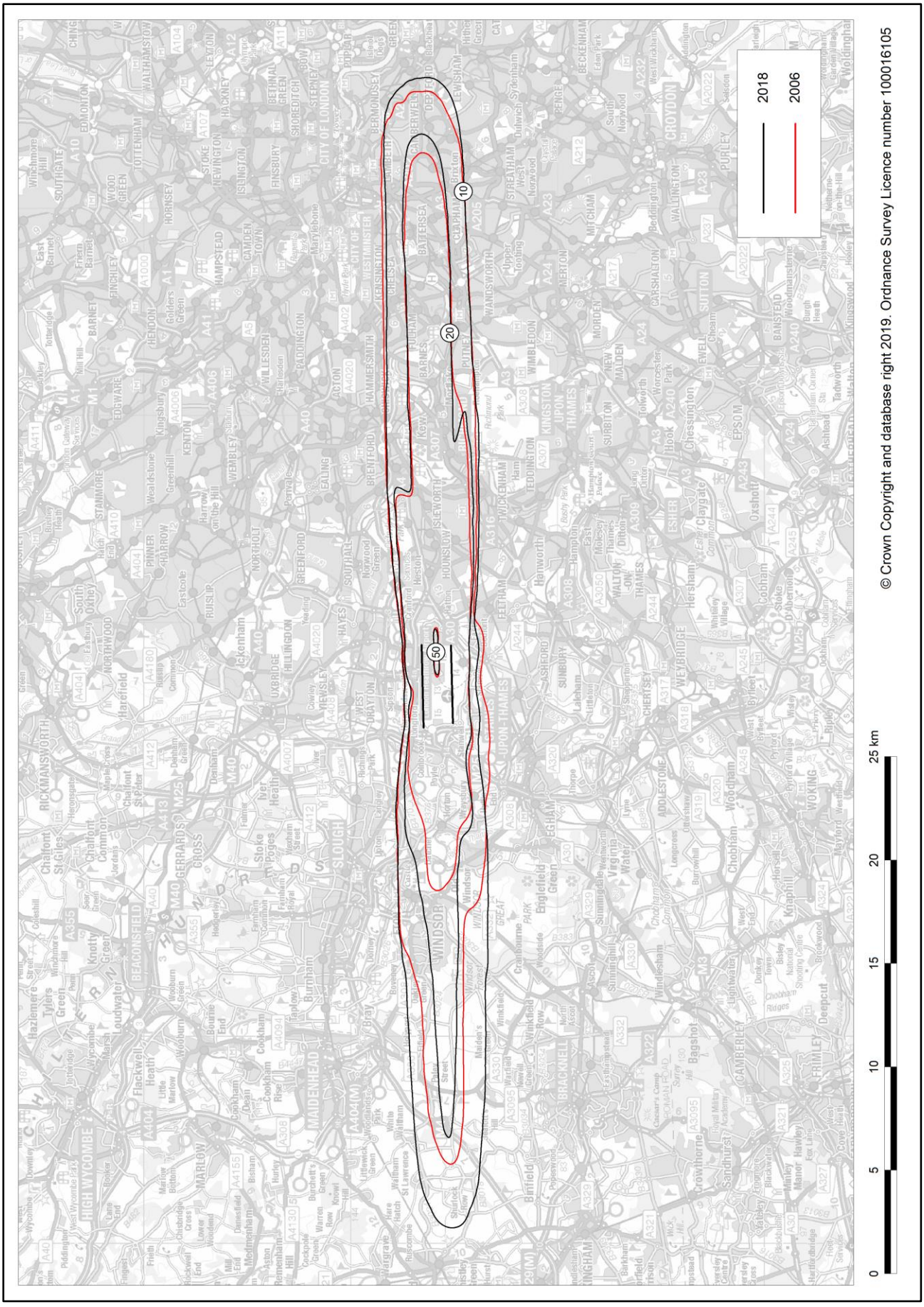
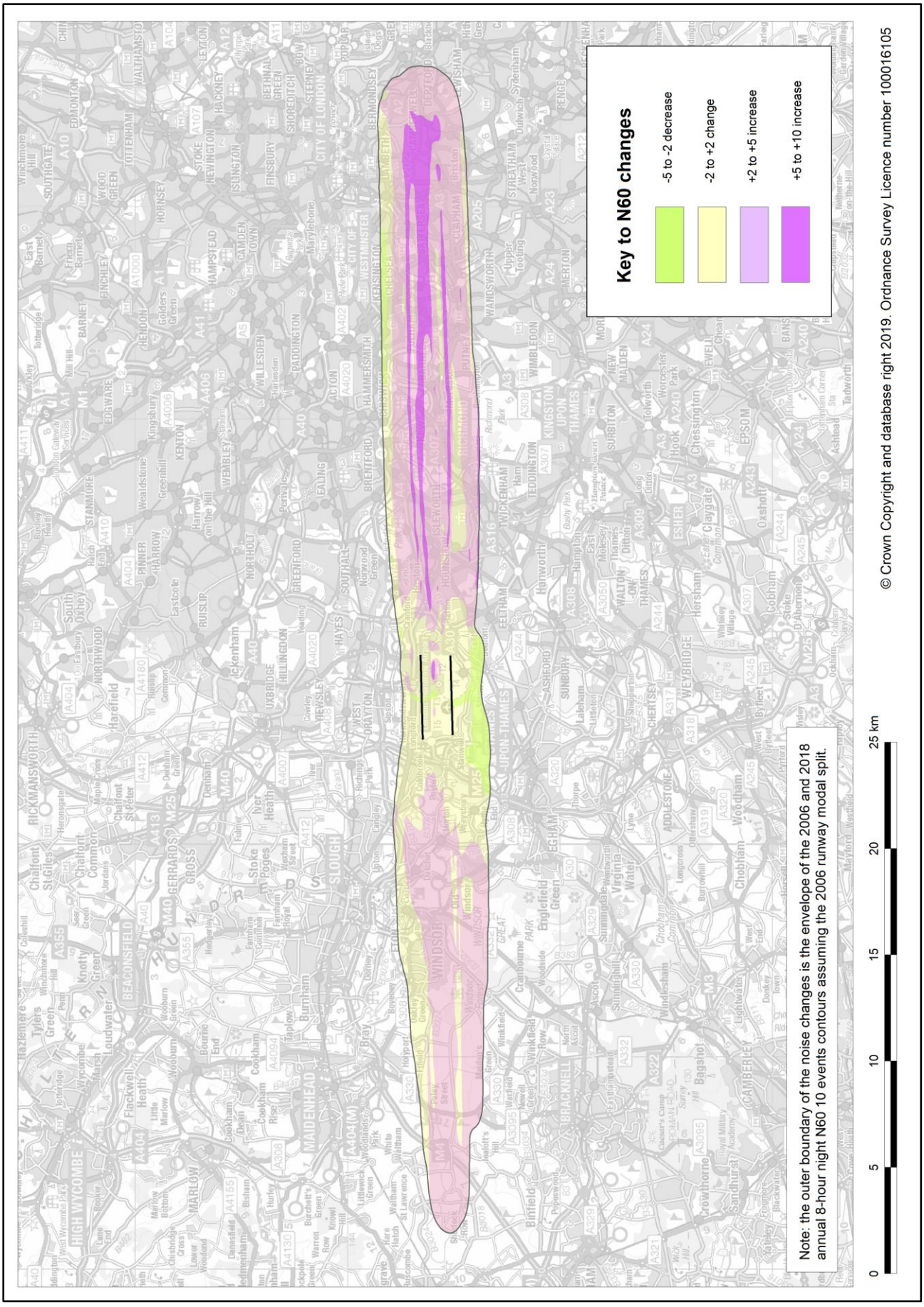



**Figure B44 Heathrow 2018 and 2006 annual 8-hour night N60 contours**

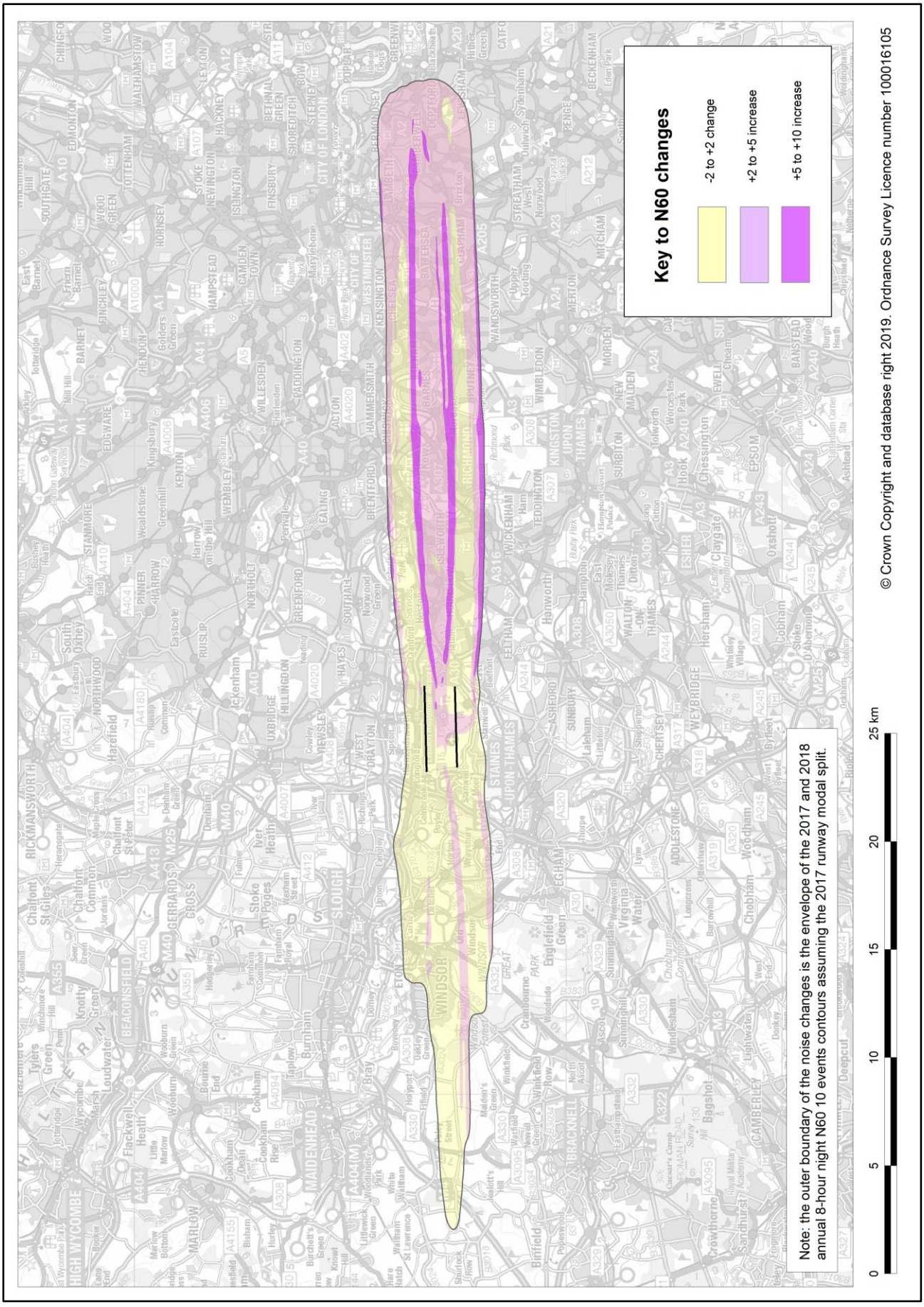
Note: 2006 annual 8-hour night modal split was 72% W / 28% E; 2018 annual 8-hour night modal split was 64% W / 36% E.

**Figure B45 Heathrow change map for 2018 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 2018 vs 2017 annual 8-hour night N60 (assuming 2017 runway modal split)**




Note: 2017 annual 8-hour night modal split was 80% W / 20% E.

**APPENDIX C**

# Tables

**Table C1 Heathrow 2017 and 2018 average summer 16-hour day traffic movements by ANCON type**

| ANCON type | 2017 departs | 2017 arrivals | 2017 total | 2018 departs | 2018 arrivals | 2018 total | Change departs | Change arrivals | Change total |
|---|---|---|---|---|---|---|---|---|---|
| B733 | 0.3 | 0.4 | 0.7 | 0.0 | 0.0 | 0.0 | -0.3 | -0.3 | -0.6 |
| B736 | 7.4 | 7.9 | 15.4 | 6.1 | 6.4 | 12.5 | -1.3 | -1.5 | -2.9 |
| B738MAX | 0.0 | 0.0 | 0.0 | 4.0 | 4.6 | 8.6 | +4.0 | +4.6 | +8.6 |
| B738 | 10.0 | 11.3 | 21.3 | 7.6 | 8.4 | 16.0 | -2.4 | -2.9 | -5.3 |
| B744G | 0.2 | 0.2 | 0.4 | 0.2 | 0.2 | 0.4 | 0.0 | 0.0 | 0.0 |
| B744P | 1.6 | 1.5 | 3.2 | 0.5 | 0.6 | 1.2 | -1.1 | -0.9 | -2.0 |
| B744R | 26.1 | 16.6 | 42.6 | 26.7 | 16.5 | 43.2 | +0.6 | -0.1 | +0.5 |
| B748 | 0.7 | 0.7 | 1.4 | 0.6 | 0.6 | 1.2 | -0.1 | -0.1 | -0.2 |
| B753 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 |
| B757C | 0.2 | 0.2 | 0.4 | 0.0 | 0.0 | 0.1 | -0.1 | -0.2 | -0.3 |
| B757E | 3.9 | 3.9 | 7.7 | 3.6 | 3.3 | 6.9 | -0.2 | -0.6 | -0.8 |
| B757P | 1.1 | 0.4 | 1.5 | 0.1 | 0.1 | 0.3 | -1.0 | -0.3 | -1.3 |
| B762 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| B763G | 8.8 | 7.7 | 16.6 | 2.6 | 2.6 | 5.2 | -6.2 | -5.2 | -11.4 |
| B763P | 13.3 | 9.5 | 22.8 | 7.6 | 5.7 | 13.3 | -5.7 | -3.8 | -9.5 |
| B763R | 10.7 | 11.4 | 22.1 | 8.3 | 9.0 | 17.4 | -2.3 | -2.4 | -4.7 |
| B764 | 0.1 | 0.1 | 0.1 | 3.6 | 3.4 | 7.0 | +3.6 | +3.3 | +6.9 |
| B772G | 16.9 | 13.3 | 30.3 | 17.1 | 13.3 | 30.4 | +0.2 | 0.0 | +0.1 |
| B772P | 2.0 | 1.4 | 3.4 | 2.0 | 1.2 | 3.2 | 0.0 | -0.2 | -0.2 |
| B772R | 15.9 | 13.2 | 29.1 | 15.3 | 13.7 | 29.0 | -0.6 | +0.5 | -0.1 |
| B773G | 48.4 | 41.1 | 89.5 | 50.6 | 42.5 | 93.1 | +2.2 | +1.4 | +3.6 |
| B788 | 21.7 | 20.0 | 41.7 | 23.2 | 21.4 | 44.6 | +1.5 | +1.4 | +2.9 |
| B789 | 29.6 | 22.5 | 52.1 | 34.7 | 27.5 | 62.2 | +5.1 | +5.0 | +10.1 |
| 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 |
| CRJ900 | 0.9 | 0.9 | 1.8 | 0.6 | 0.6 | 1.2 | -0.3 | -0.3 | -0.6 |
| CS100 | 2.4 | 2.4 | 4.8 | 0.4 | 0.4 | 0.8 | -2.0 | -2.0 | -4.0 |
| CS300 | 0.0 | 0.0 | 0.0 | 4.8 | 4.8 | 9.7 | +4.8 | +4.8 | +9.7 |
| EA30 | 1.9 | 2.8 | 4.7 | 1.5 | 2.5 | 4.1 | -0.3 | -0.3 | -0.6 |
| EA31 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 |
| EA318 | 1.7 | 1.7 | 3.5 | 1.6 | 1.7 | 3.3 | -0.1 | -0.1 | -0.2 |
| EA319C | 19.7 | 21.1 | 40.8 | 19.0 | 20.9 | 39.9 | -0.7 | -0.2 | -0.9 |

| ANCON type | 2017 departs | 2017 arrivals | 2017 total | 2018 departs | 2018 arrivals | 2018 total | Change departs | Change arrivals | Change total |
|---|---|---|---|---|---|---|---|---|---|
| EA319V | 92.4 | 92.8 | 185.3 | 96.5 | 96.3 | 192.8 | +4.1 | +3.4 | +7.5 |
| EA320C | 66.6 | 69.1 | 135.6 | 55.2 | 56.9 | 112.1 | -11.4 | -12.2 | -23.6 |
| EA320NEO | 6.3 | 6.4 | 12.6 | 22.0 | 22.9 | 44.9 | +15.7 | +16.5 | +32.2 |
| EA320V | 126.1 | 127.0 | 253.1 | 108.5 | 109.0 | 217.4 | -17.7 | -18.0 | -35.7 |
| EA321C | 5.7 | 7.3 | 13.0 | 7.9 | 9.6 | 17.5 | +2.2 | +2.4 | +4.6 |
| EA321NEO | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | +0.1 |
| EA321V | 44.1 | 45.2 | 89.3 | 45.4 | 46.3 | 91.8 | +1.3 | +1.1 | +2.5 |
| EA33 | 18.9 | 16.2 | 35.2 | 25.1 | 21.4 | 46.5 | +6.2 | +5.2 | +11.4 |
| EA34 | 1.4 | 1.6 | 3.0 | 0.8 | 0.7 | 1.4 | -0.7 | -0.9 | -1.6 |
| EA346 | 6.6 | 6.5 | 13.1 | 4.5 | 5.1 | 9.6 | -2.0 | -1.4 | -3.5 |
| EA3510 | 0.0 | 0.0 | 0.0 | 0.9 | 0.9 | 1.8 | +0.9 | +0.9 | +1.8 |
| EA359 | 3.5 | 3.1 | 6.6 | 6.1 | 5.3 | 11.4 | +2.6 | +2.2 | +4.8 |
| EA38GP | 11.2 | 10.8 | 22.0 | 11.2 | 10.3 | 21.4 | -0.0 | -0.5 | -0.5 |
| EA38R | 14.7 | 8.4 | 23.1 | 12.5 | 6.9 | 19.5 | -2.1 | -1.5 | -3.6 |
| ERJ | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 |
| ERJ170 | 0.4 | 0.4 | 0.7 | 0.4 | 0.4 | 0.7 | 0.0 | 0.0 | 0.0 |
| ERJ190 | 3.8 | 3.9 | 7.7 | 3.4 | 3.5 | 6.9 | -0.4 | -0.4 | -0.8 |
| EXE3 | 1.1 | 1.1 | 2.1 | 0.4 | 0.4 | 0.8 | -0.7 | -0.7 | -1.3 |
| FK10 | 0.3 | 0.3 | 0.6 | 0.0 | 0.0 | 0.0 | -0.3 | -0.3 | -0.6 |
| L4P | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| LTT | 6.1 | 6.2 | 12.3 | 6.6 | 6.6 | 13.2 | +0.5 | +0.4 | +0.9 |
| MD80 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 | 0.7 | +0.3 | +0.3 | +0.7 |
| **Total** | **654.6** | **618.5** | **1273.1** | **650.6** | **614.9** | **1265.5** | **-4.0** | **-3.6** | **-7.7** |
| | | | | | | | (-1%) | (-1%) | (-1%) |

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

**Table C2 Heathrow 2017 and 2018 average summer 8-hour night traffic movements by ANCON type**

| ANCON type | 2017 departs | 2017 arrivals | 2017 total | 2018 departs | 2018 arrivals | 2018 total | Change departs | Change arrivals | Change total |
|---|---|---|---|---|---|---|---|---|---|
| B733 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | -0.1 | 0.0 | -0.1 |
| B736 | 0.5 | 0.0 | 0.5 | 0.3 | 0.0 | 0.3 | -0.2 | 0.0 | -0.2 |
| B738MAX | 0.0 | 0.0 | 0.0 | 0.6 | 0.1 | 0.8 | +0.6 | +0.1 | +0.8 |
| B738 | 1.3 | 0.0 | 1.4 | 0.8 | 0.0 | 0.9 | -0.5 | 0.0 | -0.5 |
| B744G | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| B744P | 0.1 | 0.2 | 0.3 | 0.1 | 0.0 | 0.1 | 0.0 | -0.2 | -0.2 |
| B744R | 0.3 | 9.7 | 10.0 | 0.2 | 10.4 | 10.6 | -0.1 | +0.7 | +0.6 |
| B748 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| B757C | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | -0.1 | 0.0 | -0.1 |
| B757E | 0.0 | 0.0 | 0.1 | 0.1 | 0.4 | 0.5 | 0.0 | +0.4 | +0.4 |
| B757P | 0.0 | 0.7 | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 | -0.7 | -0.7 |
| B762 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| B763G | 0.0 | 1.2 | 1.2 | 0.0 | 0.1 | 0.1 | 0.0 | -1.1 | -1.1 |
| B763P | 0.1 | 3.8 | 3.8 | 0.1 | 2.0 | 2.1 | +0.1 | -1.8 | -1.8 |
| B763R | 1.0 | 0.3 | 1.3 | 1.0 | 0.3 | 1.3 | 0.0 | 0.0 | 0.0 |
| B764 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 | 0.0 | +0.3 | +0.3 |
| B772G | 0.9 | 4.5 | 5.4 | 1.3 | 5.2 | 6.5 | +0.5 | +0.7 | +1.1 |
| B772P | 0.0 | 0.6 | 0.6 | 0.0 | 0.7 | 0.7 | 0.0 | +0.1 | +0.1 |
| B772R | 0.8 | 3.6 | 4.4 | 1.4 | 3.0 | 4.4 | +0.6 | -0.6 | 0.0 |
| B773G | 1.1 | 8.3 | 9.4 | 2.5 | 10.6 | 13.1 | +1.4 | +2.2 | +3.6 |
| B788 | 1.1 | 2.9 | 4.0 | 1.3 | 3.1 | 4.4 | +0.2 | +0.2 | +0.4 |
| B789 | 0.7 | 7.9 | 8.6 | 0.7 | 7.8 | 8.5 | -0.1 | 0.0 | -0.1 |
| CRJ900 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| CS300 | 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 | 0.9 | 0.0 | 0.9 | 0.0 | 0.0 | 0.0 |
| EA318 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| EA319C | 1.6 | 0.2 | 1.7 | 2.1 | 0.2 | 2.3 | +0.5 | 0.0 | +0.6 |
| EA319V | 1.0 | 0.6 | 1.6 | 1.2 | 1.5 | 2.7 | +0.2 | +0.9 | +1.2 |
| EA320C | 3.1 | 0.6 | 3.7 | 2.2 | 0.5 | 2.7 | -0.9 | -0.1 | -1.0 |
| EA320NEO | 0.1 | 0.0 | 0.2 | 1.0 | 0.1 | 1.1 | +0.8 | +0.1 | +0.9 |
| EA320V | 2.2 | 1.3 | 3.5 | 2.1 | 1.5 | 3.6 | -0.1 | +0.2 | +0.1 |
| EA321C | 1.6 | 0.1 | 1.6 | 1.9 | 0.2 | 2.1 | +0.3 | +0.2 | +0.5 |

| ANCON type | 2017 departs | 2017 arrivals | 2017 total | 2018 departs | 2018 arrivals | 2018 total | Change departs | Change arrivals | Change total |
|---|---|---|---|---|---|---|---|---|---|
| EA321V | 1.6 | 0.5 | 2.1 | 1.7 | 0.8 | 2.4 | +0.1 | +0.3 | +0.4 |
| EA33 | 1.6 | 4.2 | 5.8 | 1.3 | 5.0 | 6.3 | -0.3 | +0.8 | +0.5 |
| EA34 | 0.5 | 0.3 | 0.8 | 0.0 | 0.1 | 0.1 | -0.5 | -0.2 | -0.7 |
| EA346 | 0.3 | 0.4 | 0.7 | 0.5 | 0.0 | 0.6 | +0.2 | -0.3 | -0.1 |
| EA3510 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | +0.1 | 0.0 | +0.1 |
| EA359 | 0.1 | 0.5 | 0.5 | 0.1 | 0.9 | 1.0 | +0.1 | +0.4 | +0.5 |
| EA38GP | 0.3 | 0.8 | 1.1 | 0.3 | 1.2 | 1.5 | 0.0 | +0.4 | +0.4 |
| EA38R | 0.2 | 6.5 | 6.7 | 0.1 | 5.8 | 5.9 | -0.1 | -0.7 | -0.8 |
| ERJ190 | 0.2 | 0.0 | 0.2 | 0.1 | 0.0 | 0.1 | -0.1 | 0.0 | -0.1 |
| EXE3 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 |
| LTT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Total** | **23.4** | **59.5** | **83.0** | **26.1** | **61.9** | **88.0** | **+2.7** | **+2.3** | **+5.1** |
| | | | | | | | (+12%) | (+4%) | (+6%) |

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

**Table C3 Heathrow 2017 and 2018 annual 12-hour day traffic movements by ANCON type**

| ANCON type | 2017 departs | 2017 arrivals | 2017 total | 2018 departs | 2018 arrivals | 2018 total | Change departs | Change arrivals | Change total |
|---|---|---|---|---|---|---|---|---|---|
| B733 | 0.7 | 0.7 | 1.4 | 0.0 | 0.0 | 0.1 | -0.7 | -0.6 | -1.3 |
| B736 | 5.2 | 6.0 | 11.2 | 3.5 | 4.6 | 8.1 | -1.6 | -1.5 | -3.1 |
| B738MAX | 0.1 | 0.1 | 0.3 | 3.0 | 2.9 | 5.9 | +2.9 | +2.8 | +5.7 |
| B738 | 8.3 | 9.1 | 17.4 | 7.1 | 7.6 | 14.7 | -1.2 | -1.5 | -2.7 |
| B744G | 0.2 | 0.3 | 0.5 | 0.1 | 0.2 | 0.2 | -0.1 | -0.2 | -0.2 |
| B744P | 0.8 | 0.9 | 1.8 | 0.2 | 0.4 | 0.7 | -0.6 | -0.5 | -1.1 |
| B744R | 21.9 | 15.6 | 37.5 | 22.9 | 15.1 | 37.9 | +1.0 | -0.6 | +0.4 |
| B747SP | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| B748 | 0.1 | 0.6 | 0.7 | 0.1 | 0.6 | 0.6 | 0.0 | 0.0 | 0.0 |
| B753 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 |
| B757C | 0.1 | 0.2 | 0.3 | 0.0 | 0.0 | 0.1 | -0.1 | -0.2 | -0.2 |
| B757E | 2.7 | 1.7 | 4.4 | 2.3 | 1.2 | 3.5 | -0.5 | -0.5 | -1.0 |
| B757P | 0.8 | 0.4 | 1.1 | 0.3 | 0.2 | 0.4 | -0.5 | -0.2 | -0.7 |
| B762 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| B763G | 8.0 | 7.0 | 15.0 | 3.3 | 3.0 | 6.3 | -4.7 | -4.0 | -8.7 |
| B763P | 12.3 | 8.3 | 20.5 | 6.9 | 4.7 | 11.6 | -5.4 | -3.6 | -8.9 |
| B763R | 9.1 | 6.4 | 15.5 | 7.2 | 4.9 | 12.1 | -1.9 | -1.4 | -3.3 |
| B764 | 0.9 | 0.6 | 1.5 | 3.6 | 2.2 | 5.7 | +2.7 | +1.6 | +4.2 |
| B772G | 12.9 | 12.2 | 25.1 | 13.2 | 12.0 | 25.2 | +0.3 | -0.2 | +0.1 |
| B772P | 2.2 | 2.0 | 4.2 | 2.3 | 1.5 | 3.8 | +0.1 | -0.6 | -0.4 |
| B772R | 12.1 | 12.3 | 24.4 | 12.2 | 12.6 | 24.8 | +0.0 | +0.4 | +0.4 |
| B773G | 27.6 | 32.8 | 60.4 | 29.4 | 32.7 | 62.1 | +1.8 | -0.1 | +1.7 |
| B788 | 17.6 | 16.5 | 34.1 | 18.7 | 19.4 | 38.1 | +1.1 | +2.9 | +4.0 |
| B789 | 20.9 | 19.8 | 40.7 | 24.4 | 23.5 | 48.0 | +3.6 | +3.7 | +7.2 |
| BA46 | 0.1 | 0.1 | 0.2 | 0.0 | 0.0 | 0.0 | -0.1 | -0.1 | -0.1 |
| CRJ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| CRJ900 | 0.1 | 0.2 | 0.3 | 0.1 | 0.1 | 0.2 | -0.1 | -0.1 | -0.2 |
| CS100 | 1.1 | 1.5 | 2.6 | 0.6 | 0.7 | 1.3 | -0.5 | -0.8 | -1.3 |
| CS300 | 0.2 | 0.2 | 0.4 | 3.3 | 3.2 | 6.5 | +3.1 | +3.0 | +6.1 |
| EA30 | 1.1 | 1.1 | 2.2 | 0.9 | 0.9 | 1.8 | -0.2 | -0.2 | -0.4 |
| EA31 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | -0.1 | 0.0 | -0.1 |
| EA318 | 1.3 | 1.9 | 3.2 | 1.2 | 1.5 | 2.7 | -0.1 | -0.4 | -0.5 |

| ANCON type | 2017 departs | 2017 arrivals | 2017 total | 2018 departs | 2018 arrivals | 2018 total | Change departs | Change arrivals | Change total |
|---|---|---|---|---|---|---|---|---|---|
| EA319C | 15.9 | 16.2 | 32.1 | 13.8 | 15.0 | 28.8 | -2.1 | -1.2 | -3.4 |
| EA319V | 72.6 | 66.8 | 139.4 | 71.9 | 66.1 | 138.1 | -0.7 | -0.6 | -1.3 |
| EA320C | 46.8 | 50.9 | 97.7 | 41.4 | 45.2 | 86.6 | -5.4 | -5.7 | -11.1 |
| EA320NEO | 4.2 | 4.7 | 8.9 | 18.3 | 16.8 | 35.1 | +14.1 | +12.1 | +26.2 |
| EA320V | 98.3 | 88.1 | 186.4 | 88.3 | 79.7 | 167.9 | -10.0 | -8.5 | -18.5 |
| EA321C | 5.1 | 5.8 | 10.9 | 5.9 | 6.3 | 12.2 | +0.8 | +0.5 | +1.4 |
| EA321NEO | 0.0 | 0.0 | 0.0 | 0.2 | 0.3 | 0.5 | +0.2 | +0.3 | +0.5 |
| EA321V | 36.1 | 31.3 | 67.4 | 35.1 | 29.8 | 64.8 | -1.0 | -1.6 | -2.6 |
| EA33 | 13.8 | 14.3 | 28.1 | 19.6 | 17.9 | 37.5 | +5.7 | +3.6 | +9.4 |
| EA34 | 0.5 | 0.5 | 1.0 | 0.5 | 0.6 | 1.1 | 0.0 | +0.1 | +0.1 |
| EA346 | 3.6 | 4.6 | 8.3 | 2.8 | 4.2 | 7.0 | -0.8 | -0.4 | -1.3 |
| EA359 | 1.0 | 2.2 | 3.2 | 2.1 | 4.3 | 6.3 | +1.0 | +2.1 | +3.2 |
| EA3510 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.0 | +0.2 | +0.2 |
| EA38GP | 6.9 | 8.6 | 15.5 | 6.9 | 8.3 | 15.2 | 0.0 | -0.3 | -0.3 |
| EA38R | 8.8 | 7.4 | 16.2 | 6.7 | 6.0 | 12.7 | -2.1 | -1.4 | -3.5 |
| ERJ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ERJ170 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.0 | 0.0 | +0.1 |
| ERJ190 | 2.1 | 2.8 | 4.9 | 1.9 | 2.7 | 4.5 | -0.2 | -0.1 | -0.3 |
| EXE3 | 0.9 | 0.7 | 1.5 | 0.3 | 0.3 | 0.6 | -0.6 | -0.3 | -0.9 |
| FK10 | 0.4 | 0.5 | 0.8 | 0.0 | 0.0 | 0.0 | -0.3 | -0.4 | -0.8 |
| LTT | 3.3 | 3.4 | 6.7 | 4.5 | 4.7 | 9.2 | +1.2 | +1.3 | +2.5 |
| MD11 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| MD80 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.2 | +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** | **488.7** | **467.4** | **956.0** | **487.2** | **464.3** | **951.5** | **-1.5** | **-3.0** | **-4.5** |
| | | | | | | | (-0.3%) | (-1%) | (-0.5%) |

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

**Table C4 Heathrow 2017 and 2018 annual 4-hour evening traffic movements by ANCON type**

| ANCON type | 2017 departs | 2017 arrivals | 2017 total | 2018 departs | 2018 arrivals | 2018 total | Change departs | Change arrivals | Change total |
|---|---|---|---|---|---|---|---|---|---|
| B733 | 0.1 | 0.3 | 0.4 | 0.0 | 0.0 | 0.1 | -0.1 | -0.3 | -0.3 |
| B736 | 2.0 | 1.7 | 3.8 | 1.6 | 0.9 | 2.6 | -0.4 | -0.8 | -1.2 |
| B738MAX | 0.0 | 0.0 | 0.0 | 0.3 | 0.9 | 1.1 | +0.2 | +0.9 | +1.1 |
| B738 | 2.7 | 2.8 | 5.5 | 2.0 | 2.1 | 4.1 | -0.8 | -0.7 | -1.5 |
| B744G | 0.2 | 0.0 | 0.2 | 0.1 | 0.2 | 0.3 | -0.1 | +0.2 | +0.1 |
| B744P | 0.4 | 0.2 | 0.5 | 0.3 | 1.0 | 1.3 | 0.0 | +0.8 | +0.8 |
| B744R | 3.9 | 1.0 | 4.9 | 3.4 | 0.0 | 3.4 | -0.5 | -0.9 | -1.5 |
| B748 | 0.5 | 0.0 | 0.5 | 0.5 | 0.0 | 0.5 | 0.0 | 0.0 | 0.0 |
| B753 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 |
| B757C | 0.1 | 0.0 | 0.1 | 0.0 | 1.8 | 1.8 | 0.0 | +1.8 | +1.8 |
| B757E | 1.1 | 2.0 | 3.0 | 1.0 | 0.2 | 1.1 | -0.1 | -1.8 | -1.9 |
| B757P | 0.2 | 0.2 | 0.4 | 0.2 | 0.0 | 0.2 | 0.0 | -0.2 | -0.2 |
| B762 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| B763G | 0.1 | 0.2 | 0.3 | 0.1 | 0.1 | 0.2 | 0.0 | -0.1 | -0.2 |
| B763P | 0.2 | 0.9 | 1.2 | 0.1 | 0.2 | 0.3 | -0.1 | -0.8 | -0.9 |
| B763R | 0.9 | 4.4 | 5.3 | 0.5 | 3.4 | 4.0 | -0.4 | -1.0 | -1.4 |
| B764 | 0.0 | 0.2 | 0.2 | 0.1 | 0.9 | 1.0 | +0.1 | +0.7 | +0.8 |
| B772G | 4.7 | 0.9 | 5.6 | 4.4 | 1.3 | 5.6 | -0.3 | +0.3 | 0.0 |
| B772P | 0.9 | 0.4 | 1.3 | 0.1 | 0.0 | 0.1 | -0.8 | -0.4 | -1.2 |
| B772R | 4.7 | 1.5 | 6.2 | 4.3 | 1.5 | 5.8 | -0.4 | 0.0 | -0.4 |
| B773G | 17.0 | 4.5 | 21.5 | 17.8 | 6.1 | 23.9 | +0.8 | +1.7 | +2.4 |
| B788 | 3.8 | 2.6 | 6.4 | 4.7 | 1.8 | 6.5 | +0.9 | -0.9 | 0.0 |
| B789 | 6.7 | 1.6 | 8.3 | 7.6 | 1.7 | 9.2 | +0.9 | +0.1 | +1.0 |
| BA46 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| CRJ900 | 0.1 | 0.0 | 0.2 | 0.1 | 0.1 | 0.2 | 0.0 | 0.0 | 0.0 |
| CS100 | 0.6 | 0.2 | 0.8 | 0.3 | 0.1 | 0.4 | -0.3 | -0.1 | -0.5 |
| CS300 | 0.0 | 0.1 | 0.1 | 1.0 | 1.1 | 2.1 | +0.9 | +1.0 | +2.0 |
| EA30 | 0.9 | 1.7 | 2.5 | 0.8 | 1.7 | 2.5 | 0.0 | 0.0 | 0.0 |
| EA31 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| EA318 | 0.6 | 0.1 | 0.7 | 0.4 | 0.1 | 0.5 | -0.2 | 0.0 | -0.2 |
| EA319C | 4.1 | 5.3 | 9.3 | 4.3 | 5.0 | 9.2 | +0.2 | -0.3 | -0.1 |
| EA319V | 14.2 | 20.6 | 34.8 | 15.0 | 21.1 | 36.1 | +0.7 | +0.6 | +1.3 |

| ANCON type | 2017 departs | 2017 arrivals | 2017 total | 2018 departs | 2018 arrivals | 2018 total | Change departs | Change arrivals | Change total |
|---|---|---|---|---|---|---|---|---|---|
| EA320C | 16.7 | 15.4 | 32.1 | 16.2 | 14.6 | 30.8 | -0.4 | -0.8 | -1.3 |
| EA320NEO | 1.3 | 1.0 | 2.3 | 3.8 | 6.4 | 10.2 | +2.6 | +5.4 | +7.9 |
| EA320V | 20.5 | 32.4 | 52.9 | 20.2 | 29.9 | 50.1 | -0.3 | -2.5 | -2.8 |
| EA321C | 1.5 | 2.0 | 3.5 | 1.8 | 2.5 | 4.2 | +0.3 | +0.5 | +0.8 |
| EA321NEO | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.2 | +0.1 | +0.1 | +0.2 |
| EA321V | 7.8 | 13.1 | 20.8 | 8.3 | 14.0 | 22.3 | +0.5 | +0.9 | +1.4 |
| EA33 | 6.5 | 2.3 | 8.8 | 5.3 | 2.4 | 7.8 | -1.2 | +0.1 | -1.0 |
| EA34 | 0.8 | 0.7 | 1.6 | 0.4 | 0.1 | 0.5 | -0.4 | -0.6 | -1.0 |
| EA346 | 2.3 | 1.0 | 3.3 | 2.4 | 1.0 | 3.4 | +0.1 | 0.0 | +0.1 |
| EA359 | 2.8 | 1.1 | 3.9 | 4.0 | 0.6 | 4.6 | +1.2 | -0.5 | +0.7 |
| EA3510 | 0.0 | 0.0 | 0.0 | 0.7 | 0.6 | 1.3 | +0.7 | +0.6 | +1.3 |
| EA38GP | 4.0 | 1.2 | 5.2 | 4.0 | 1.1 | 5.1 | 0.0 | -0.1 | -0.1 |
| EA38R | 5.3 | 0.1 | 5.4 | 5.0 | 0.1 | 5.2 | -0.3 | +0.1 | -0.2 |
| 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 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 |
| ERJ190 | 1.3 | 0.8 | 2.1 | 1.3 | 0.5 | 1.8 | 0.0 | -0.2 | -0.3 |
| EXE3 | 0.1 | 0.3 | 0.5 | 0.1 | 0.1 | 0.2 | 0.0 | -0.3 | -0.3 |
| FK10 | 0.3 | 0.2 | 0.4 | 0.0 | 0.0 | 0.0 | -0.2 | -0.1 | -0.4 |
| L4P | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| LTT | 1.5 | 1.3 | 2.7 | 2.0 | 1.7 | 3.7 | +0.5 | +0.4 | +0.9 |
| 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** | **143.6** | **126.2** | **269.8** | **146.6** | **129.1** | **275.7** | **+3.0** | **+2.9** | **+5.9** |
| | | | | | | | (+2%) | (+2%) | (+2%) |

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

**Table C5 Heathrow 2017 and 2018 annual 8-hour night traffic movements by ANCON type**

| ANCON type | 2017 departs | 2017 arrivals | 2017 total | 2018 departs | 2018 arrivals | 2018 total | Change departs | Change arrivals | Change total |
|---|---|---|---|---|---|---|---|---|---|
| B733 | 0.2 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | -0.2 | 0.0 | -0.2 |
| B736 | 0.5 | 0.0 | 0.6 | 0.3 | 0.0 | 0.3 | -0.2 | 0.0 | -0.2 |
| B738MAX | 0.0 | 0.0 | 0.0 | 0.6 | 0.1 | 0.8 | +0.6 | +0.1 | +0.8 |
| B738 | 0.9 | 0.0 | 0.9 | 0.7 | 0.0 | 0.7 | -0.2 | 0.0 | -0.2 |
| B744G | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| B744P | 0.1 | 0.2 | 0.2 | 0.1 | 0.0 | 0.1 | 0.0 | -0.2 | -0.2 |
| B744R | 0.2 | 9.4 | 9.6 | 0.2 | 10.4 | 10.6 | 0.0 | +1.0 | +1.0 |
| 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 | 0.1 | 0.2 | 0.0 | 0.3 | 0.3 | 0.0 | +0.1 | +0.1 |
| B757P | 0.0 | 0.4 | 0.4 | 0.0 | 0.1 | 0.1 | 0.0 | -0.3 | -0.3 |
| B762 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| B763G | 0.0 | 1.0 | 1.0 | 0.0 | 0.5 | 0.5 | 0.0 | -0.5 | -0.5 |
| B763P | 0.0 | 3.3 | 3.4 | 0.0 | 2.2 | 2.3 | 0.0 | -1.1 | -1.1 |
| B763R | 0.9 | 0.2 | 1.1 | 0.8 | 0.2 | 0.9 | -0.1 | 0.0 | -0.2 |
| B764 | 0.0 | 0.1 | 0.1 | 0.0 | 0.5 | 0.5 | 0.0 | +0.4 | +0.4 |
| B772G | 0.6 | 5.1 | 5.7 | 0.9 | 5.2 | 6.2 | +0.3 | +0.2 | +0.5 |
| B772P | 0.0 | 0.7 | 0.7 | 0.0 | 0.9 | 0.9 | 0.0 | +0.2 | +0.2 |
| B772R | 0.6 | 3.6 | 4.2 | 0.8 | 3.1 | 3.9 | +0.2 | -0.5 | -0.3 |
| B773G | 0.7 | 8.0 | 8.7 | 1.3 | 9.6 | 11.0 | +0.7 | +1.6 | +2.2 |
| B788 | 0.6 | 2.9 | 3.5 | 0.8 | 3.0 | 3.8 | +0.1 | +0.1 | +0.3 |
| B789 | 0.4 | 6.6 | 7.0 | 0.4 | 7.2 | 7.6 | -0.1 | +0.6 | +0.5 |
| BA46 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| CRJ900 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| CS300 | 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 | 0.8 | 0.0 | 0.8 | 0.0 | 0.0 | 0.0 |
| EA31 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| EA318 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| EA319C | 1.7 | 0.2 | 1.9 | 2.1 | 0.2 | 2.3 | +0.4 | 0.0 | +0.4 |
| EA319V | 1.0 | 0.5 | 1.5 | 1.2 | 0.8 | 2.0 | +0.2 | +0.3 | +0.5 |
| EA320C | 3.3 | 0.4 | 3.7 | 2.5 | 0.4 | 3.0 | -0.7 | 0.0 | -0.7 |

| ANCON type | 2017 departs | 2017 arrivals | 2017 total | 2018 departs | 2018 arrivals | 2018 total | Change departs | Change arrivals | Change total |
|---|---|---|---|---|---|---|---|---|---|
| EA320NEO | 0.3 | 0.0 | 0.3 | 1.1 | 0.1 | 1.2 | +0.9 | +0.1 | +0.9 |
| EA320V | 2.4 | 0.6 | 3.0 | 2.0 | 0.8 | 2.8 | -0.4 | +0.2 | -0.2 |
| EA321C | 1.2 | 0.0 | 1.3 | 1.2 | 0.1 | 1.4 | 0.0 | +0.1 | +0.1 |
| EA321NEO | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| EA321V | 1.1 | 0.6 | 1.7 | 1.2 | 0.7 | 1.9 | +0.1 | +0.2 | +0.2 |
| EA33 | 0.8 | 4.5 | 5.3 | 0.6 | 5.2 | 5.8 | -0.2 | +0.6 | +0.5 |
| EA34 | 0.3 | 0.4 | 0.6 | 0.0 | 0.3 | 0.3 | -0.3 | -0.1 | -0.4 |
| EA346 | 0.3 | 0.7 | 1.0 | 0.4 | 0.5 | 0.9 | +0.1 | -0.2 | -0.2 |
| EA359 | 0.1 | 0.6 | 0.6 | 0.1 | 1.2 | 1.3 | 0.0 | +0.6 | +0.6 |
| EA3510 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| EA38GP | 0.2 | 1.4 | 1.5 | 0.2 | 1.6 | 1.8 | 0.0 | +0.3 | +0.2 |
| EA38R | 0.1 | 6.7 | 6.8 | 0.1 | 5.7 | 5.8 | 0.0 | -1.0 | -1.0 |
| ERJ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ERJ190 | 0.2 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | -0.1 | 0.0 | -0.1 |
| 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 | 0.0 | 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 |
| STT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Total** | **19.6** | **58.2** | **77.9** | **20.6** | **60.9** | **81.6** | **+1.0** | **+2.7** | **+3.7** |
| | | | | | | | (+5%) | (+5%) | (+5%) |

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

**Table C6 Heathrow 2017 and 2018 annual 24-hour day traffic movements by ANCON type**

| ANCON type | 2017 departs | 2017 arrivals | 2017 total | 2018 departs | 2018 arrivals | 2018 total | Change departs | Change arrivals | Change total |
|---|---|---|---|---|---|---|---|---|---|
| B733 | 1.0 | 1.0 | 2.0 | 0.1 | 0.1 | 0.2 | -0.9 | -0.9 | -1.8 |
| B736 | 7.8 | 7.8 | 15.5 | 5.5 | 5.5 | 11.0 | -2.3 | -2.3 | -4.5 |
| B738MAX | 0.1 | 0.1 | 0.3 | 3.9 | 3.9 | 7.8 | +3.8 | +3.8 | +7.6 |
| B738 | 11.9 | 11.9 | 23.8 | 9.7 | 9.7 | 19.4 | -2.2 | -2.2 | -4.4 |
| B744G | 0.3 | 0.3 | 0.7 | 0.2 | 0.4 | 0.5 | -0.2 | 0.0 | -0.1 |
| B744P | 1.3 | 1.3 | 2.5 | 0.6 | 1.4 | 2.0 | -0.6 | +0.1 | -0.5 |
| B744R | 26.0 | 26.0 | 52.0 | 26.4 | 25.5 | 51.9 | +0.4 | -0.5 | -0.1 |
| B747SP | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| B748 | 0.6 | 0.6 | 1.2 | 0.6 | 0.6 | 1.1 | 0.0 | 0.0 | 0.0 |
| B753 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 |
| B757C | 0.2 | 0.2 | 0.4 | 0.1 | 1.9 | 1.9 | -0.2 | +1.6 | +1.5 |
| B757E | 3.8 | 3.8 | 7.6 | 3.3 | 1.6 | 4.9 | -0.5 | -2.2 | -2.7 |
| B757P | 1.0 | 1.0 | 1.9 | 0.4 | 0.3 | 0.7 | -0.5 | -0.7 | -1.2 |
| B762 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| B763G | 8.2 | 8.2 | 16.3 | 3.5 | 3.5 | 7.0 | -4.7 | -4.7 | -9.3 |
| B763P | 12.5 | 12.5 | 25.1 | 7.1 | 7.1 | 14.2 | -5.5 | -5.5 | -10.9 |
| B763R | 10.9 | 10.9 | 21.9 | 8.5 | 8.5 | 17.0 | -2.4 | -2.4 | -4.8 |
| B764 | 0.9 | 0.9 | 1.8 | 3.6 | 3.6 | 7.2 | +2.7 | +2.7 | +5.5 |
| B772G | 18.2 | 18.1 | 36.3 | 18.5 | 18.5 | 37.0 | +0.3 | +0.3 | +0.7 |
| B772P | 3.1 | 3.1 | 6.2 | 2.4 | 2.4 | 4.8 | -0.7 | -0.7 | -1.5 |
| B772R | 17.4 | 17.4 | 34.9 | 17.3 | 17.3 | 34.6 | -0.1 | -0.1 | -0.3 |
| B773G | 45.3 | 45.3 | 90.6 | 48.5 | 48.5 | 96.9 | +3.2 | +3.2 | +6.4 |
| B788 | 22.0 | 22.0 | 44.0 | 24.2 | 24.2 | 48.3 | +2.2 | +2.2 | +4.3 |
| B789 | 28.0 | 28.0 | 56.0 | 32.4 | 32.4 | 64.8 | +4.4 | +4.4 | +8.8 |
| BA46 | 0.1 | 0.1 | 0.2 | 0.0 | 0.0 | 0.0 | -0.1 | -0.1 | -0.2 |
| CRJ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| CRJ900 | 0.2 | 0.2 | 0.5 | 0.2 | 0.2 | 0.3 | -0.1 | -0.1 | -0.2 |
| CS100 | 1.7 | 1.7 | 3.4 | 0.8 | 0.8 | 1.7 | -0.9 | -0.9 | -1.8 |
| CS300 | 0.2 | 0.2 | 0.5 | 4.3 | 4.3 | 8.6 | +4.1 | +4.0 | +8.1 |
| EA30 | 2.8 | 2.8 | 5.5 | 2.6 | 2.6 | 5.1 | -0.2 | -0.2 | -0.4 |
| EA31 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 |
| EA318 | 2.0 | 1.9 | 3.9 | 1.6 | 1.6 | 3.2 | -0.3 | -0.3 | -0.7 |

| ANCON type | 2017 departs | 2017 arrivals | 2017 total | 2018 departs | 2018 arrivals | 2018 total | Change departs | Change arrivals | Change total |
|---|---|---|---|---|---|---|---|---|---|
| EA319C | 21.7 | 21.7 | 43.3 | 20.1 | 20.1 | 40.3 | -1.5 | -1.5 | -3.1 |
| EA319V | 87.8 | 87.8 | 175.7 | 88.1 | 88.1 | 176.2 | +0.2 | +0.2 | +0.5 |
| EA320C | 66.7 | 66.8 | 133.5 | 60.2 | 60.2 | 120.4 | -6.6 | -6.6 | -13.1 |
| EA320NEO | 5.8 | 5.8 | 11.5 | 23.3 | 23.3 | 46.6 | +17.5 | +17.5 | +35.0 |
| EA320V | 121.2 | 121.1 | 242.3 | 110.4 | 110.4 | 220.9 | -10.7 | -10.7 | -21.5 |
| EA321C | 7.8 | 7.8 | 15.6 | 8.9 | 8.9 | 17.8 | +1.1 | +1.1 | +2.3 |
| EA321NEO | 0.0 | 0.0 | 0.0 | 0.4 | 0.4 | 0.7 | +0.4 | +0.4 | +0.7 |
| EA321V | 45.0 | 45.0 | 89.9 | 44.5 | 44.5 | 89.0 | -0.4 | -0.4 | -0.9 |
| EA33 | 21.1 | 21.1 | 42.3 | 25.5 | 25.5 | 51.0 | +4.4 | +4.4 | +8.8 |
| EA34 | 1.6 | 1.6 | 3.2 | 1.0 | 1.0 | 1.9 | -0.6 | -0.6 | -1.3 |
| EA346 | 6.3 | 6.3 | 12.6 | 5.7 | 5.7 | 11.3 | -0.7 | -0.7 | -1.3 |
| EA359 | 3.8 | 3.8 | 7.7 | 6.1 | 6.1 | 12.2 | +2.3 | +2.3 | +4.5 |
| EA3510 | 0.0 | 0.0 | 0.0 | 0.8 | 0.8 | 1.6 | +0.8 | +0.8 | +1.6 |
| EA38GP | 11.1 | 11.1 | 22.3 | 11.0 | 11.0 | 22.1 | -0.1 | -0.1 | -0.2 |
| EA38R | 14.2 | 14.2 | 28.4 | 11.8 | 11.8 | 23.7 | -2.4 | -2.4 | -4.7 |
| ERJ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ERJ170 | 0.1 | 0.1 | 0.3 | 0.2 | 0.2 | 0.3 | 0.0 | 0.0 | 0.0 |
| ERJ190 | 3.6 | 3.6 | 7.2 | 3.2 | 3.2 | 6.4 | -0.4 | -0.4 | -0.7 |
| EXE3 | 1.0 | 1.0 | 2.0 | 0.4 | 0.4 | 0.8 | -0.6 | -0.6 | -1.3 |
| FK10 | 0.6 | 0.6 | 1.2 | 0.0 | 0.0 | 0.1 | -0.6 | -0.6 | -1.2 |
| L4P | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| LTT | 4.7 | 4.7 | 9.5 | 6.5 | 6.5 | 12.9 | +1.7 | +1.7 | +3.5 |
| MD11 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| MD80 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.2 | +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 |
| STT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Total** | **651.9** | **651.8** | **1303.7** | **654.4** | **654.4** | **1308.8** | **+2.5** | **+2.6** | **+5.1** |
| | | | | | | | (+0.4%) | (+0.4%) | (+0.4%) |

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

**Table C7 Heathrow 2017 and 2018 6.5-hour night traffic movements by ANCON type**

| ANCON type | 2017 departs | 2017 arrivals | 2017 total | 2018 departs | 2018 arrivals | 2018 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 |
| B738MAX | 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 |
| B744G | 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 | 0.1 | 2.4 | 2.5 | 0.0 | 2.2 | 2.2 | 0.0 | -0.3 | -0.3 |
| 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 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| B757P | 0.0 | 0.0 | 0.0 | 0.0 | 0.9 | 0.9 | 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 | 0.5 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | -0.5 | -0.5 |
| B763R | 0.0 | 0.1 | 0.1 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 |
| B764 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| B772G | 0.1 | 1.4 | 1.5 | 0.2 | 0.8 | 1.0 | 0.0 | -0.6 | -0.6 |
| B772P | 0.0 | 0.3 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | -0.3 | -0.3 |
| B772R | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.2 | 0.0 | 0.0 | 0.0 |
| B773G | 0.2 | 3.0 | 3.3 | 0.3 | 3.1 | 3.4 | 0.0 | +0.1 | +0.1 |
| B788 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.2 | 0.0 | 0.0 | 0.0 |
| B789 | 0.1 | 2.0 | 2.1 | 0.1 | 3.2 | 3.3 | 0.0 | +1.2 | +1.2 |
| CS300 | 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 | 0.1 | 0.0 | 0.1 | 0.2 | 0.0 | +0.1 | +0.1 |
| EA320C | 0.0 | 0.1 | 0.1 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 |
| EA320NEO | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| EA320V | 0.0 | 0.2 | 0.2 | 0.0 | 0.3 | 0.3 | 0.0 | +0.1 | +0.1 |
| 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 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

| ANCON type | 2017 departs | 2017 arrivals | 2017 total | 2018 departs | 2018 arrivals | 2018 total | Change departs | Change arrivals | Change total |
|---|---|---|---|---|---|---|---|---|---|
| EA321V | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.2 | 0.0 | 0.0 | 0.0 |
| EA33 | 0.1 | 0.3 | 0.3 | 0.1 | 0.1 | 0.1 | 0.0 | -0.2 | -0.2 |
| EA34 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| EA346 | 0.1 | 0.0 | 0.1 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 |
| EA3510 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| EA359 | 0.0 | 0.0 | 0.1 | 0.0 | 0.8 | 0.8 | 0.0 | +0.7 | +0.7 |
| EA38GP | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| EA38R | 0.1 | 4.3 | 4.4 | 0.1 | 3.6 | 3.7 | 0.0 | -0.7 | -0.7 |
| 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 |
| LTT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Total** | **1.3** | **15.1** | **16.4** | **1.4** | **15.6** | **16.9** | **+0.1** | **+0.5** | **+0.5** |
| | | | | | | | (+3%) | (+3%) | (+3%) |

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

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

| Route | $L_{day}$ | $L_{evening}$ | $L_{night}$ | $L_{den}$ | $L_{eq,6.5hr\ night}$ |
|---|---|---|---|---|---|
| 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 | $L_{day}$ | $L_{evening}$ | $L_{night}$ | $L_{den}$ | $L_{eq,6.5hr\ night}$ |
|---|---|---|---|---|---|
| 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 | $L_{day}$ | $L_{evening}$ | $L_{night}$ | $L_{den}$ | $L_{eq,6.5hr\ night}$ |
|---|---|---|---|---|---|
| 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 | $L_{day}$ | $L_{evening}$ | $L_{night}$ | $L_{den}$ | $L_{eq,6.5hr\ night}$ |
|---|---|---|---|---|---|
| 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 | $L_{day}$ | $L_{evening}$ | $L_{night}$ | $L_{den}$ | $L_{eq,6.5hr\ night}$ |
|---|---|---|---|---|---|
| 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 | $L_{day}$ | $L_{evening}$ | $L_{night}$ | $L_{den}$ | $L_{eq,6.5hr\ night}$ |
|---|---|---|---|---|---|
| 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 | $L_{day}$ | $L_{evening}$ | $L_{night}$ | $L_{den}$ | $L_{eq,6.5hr\ night}$ |
|---|---|---|---|---|---|
| 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 | $L_{day}$ | $L_{evening}$ | $L_{night}$ | $L_{den}$ | $L_{eq,6.5hr\ night}$ |
|---|---|---|---|---|---|
| 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 | $L_{day}$ | $L_{evening}$ | $L_{night}$ | $L_{den}$ | $L_{eq,6.5hr\ night}$ |
|---|---|---|---|---|---|
| 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 | $L_{day}$ | $L_{evening}$ | $L_{night}$ | $L_{den}$ | $L_{eq,6.5hr\ night}$ |
|---|---|---|---|---|---|
| 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%** |

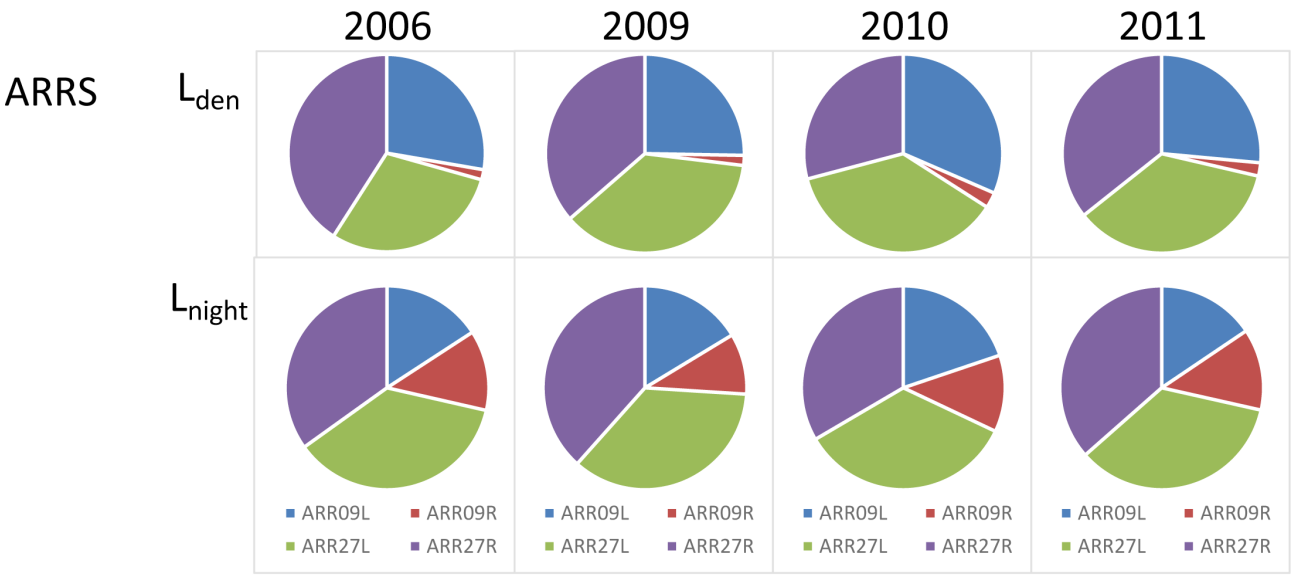
Note: the SAM routes were renamed GOGSI (27L/27R) and GASGU (09L/09R) in 2015, but the SAM name has been retained in this table for ease of comparison with the previous tables.

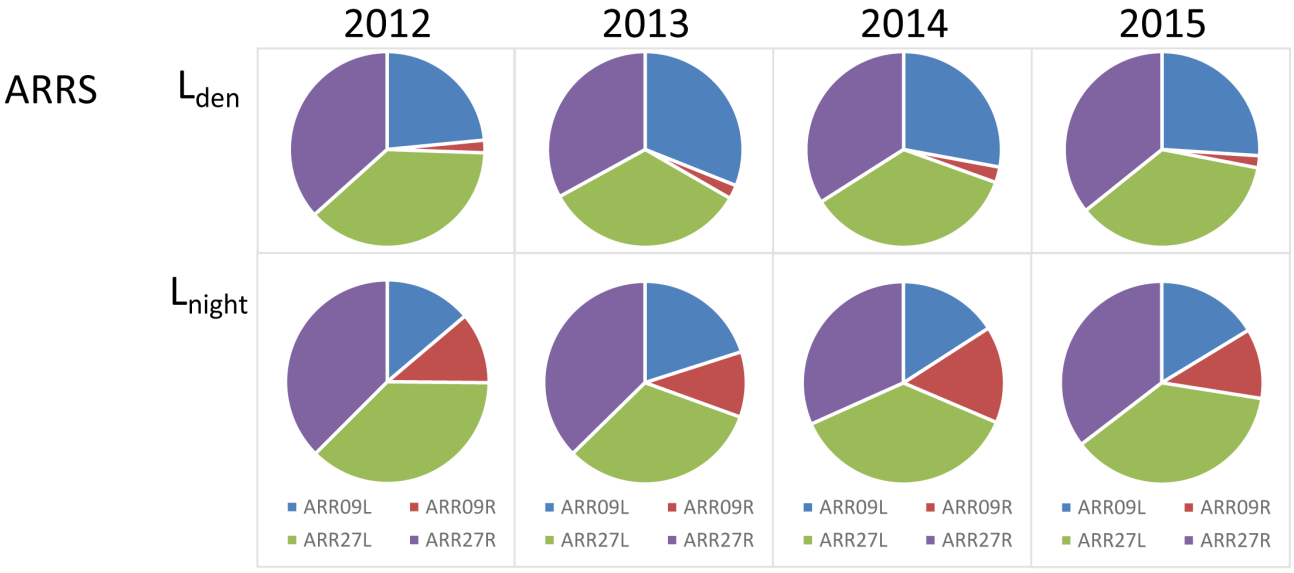
**Table C8-k Heathrow 2018 route distributions (percentage of daily total)**

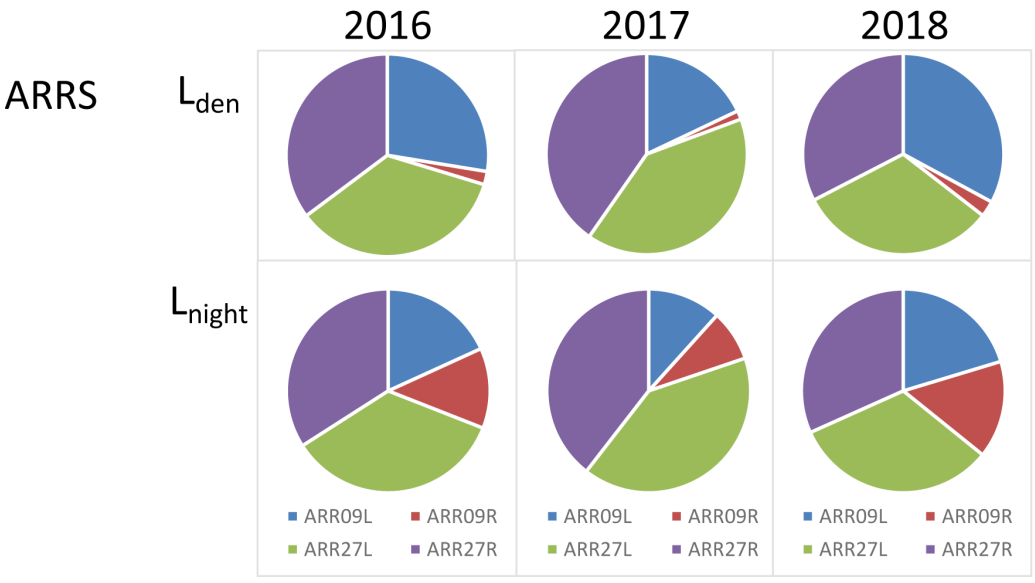
| Route | $L_{day}$ | $L_{evening}$ | $L_{night}$ | $L_{den}$ | $L_{eq,6.5hr\ night}$ |
|---|---|---|---|---|---|
| 09L_BPK | 0.0% | 0.0% | 0.1% | 0.0% | 0.1% |
| 09L_BUZ (ULTIB) | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 09L_CPT | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 09L_DET | 0.0% | 0.0% | 0.1% | 0.0% | 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.

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

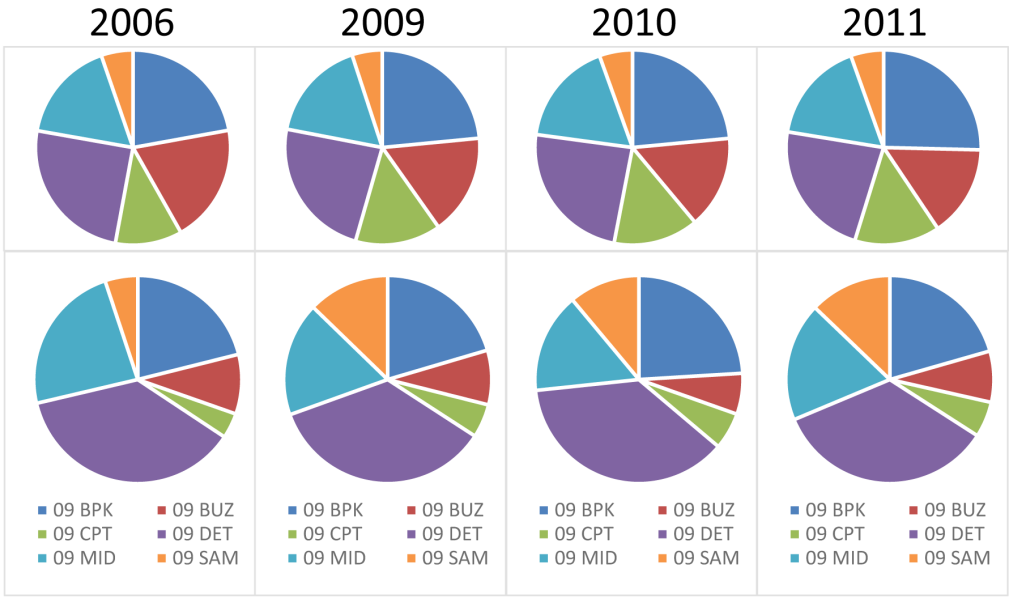


*Pie charts based on Tables C8-a to C8-k for Runway 09L/R departure movements:*

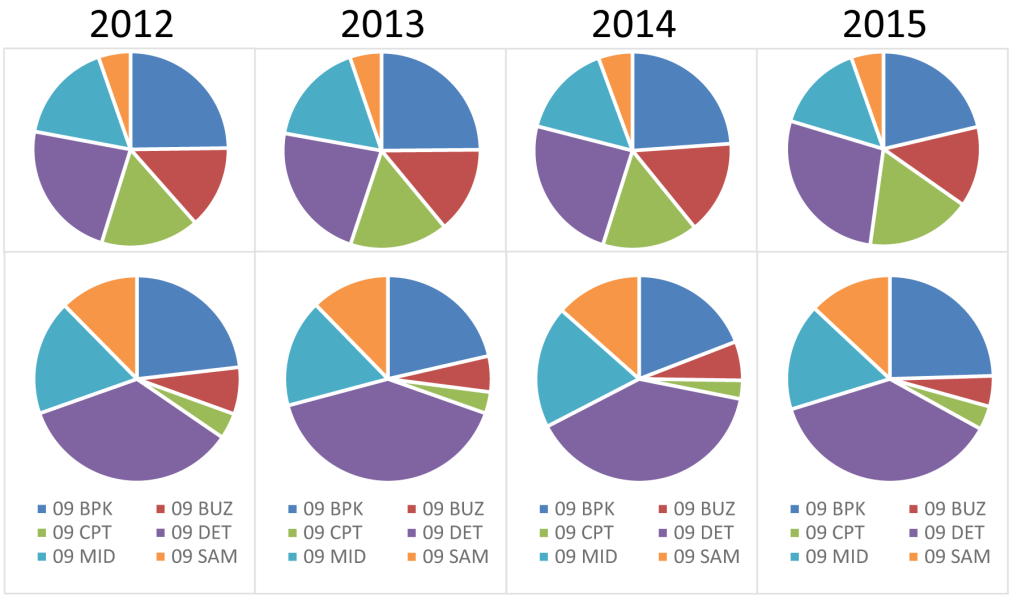
DEPS 09 $L_{den}$




DEPS 09 $L_{night}$



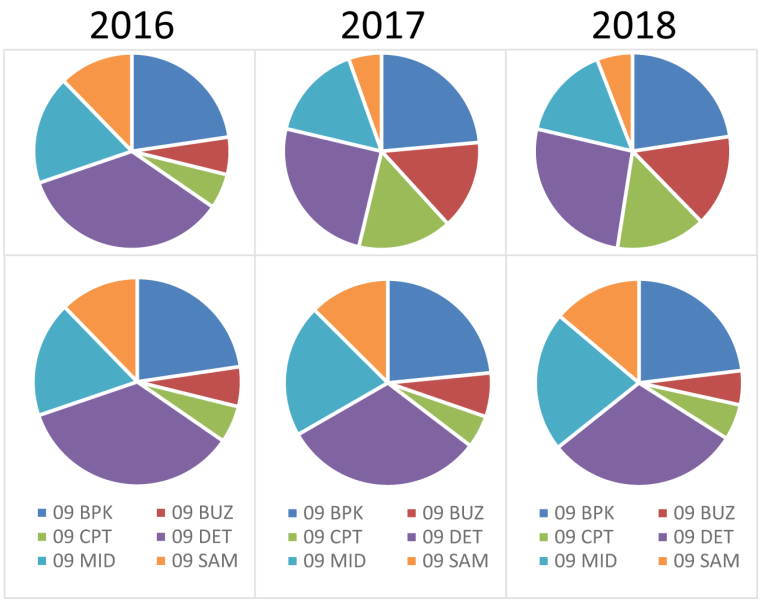

DEPS 09 $L_{den}$




DEPS 09 $L_{night}$



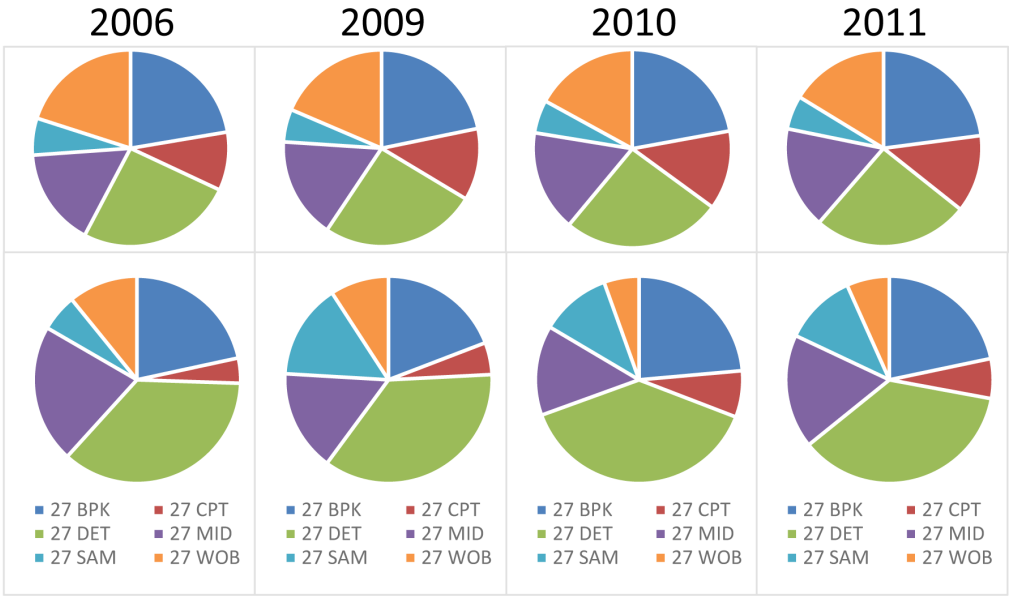

DEPS 09 $L_{den}$




DEPS 09 $L_{night}$

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

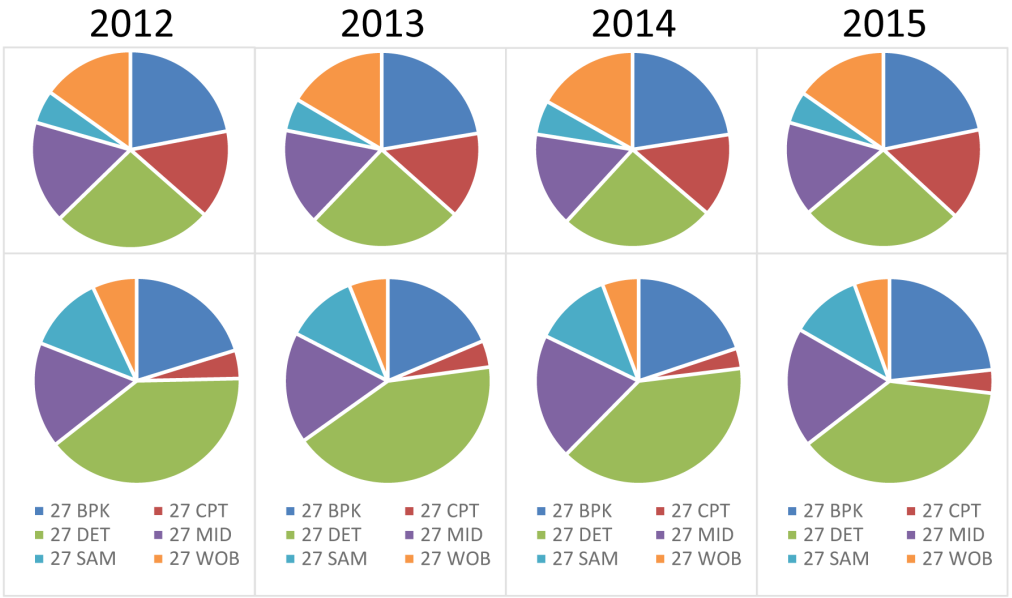
DEPS 27 $L_{den}$




DEPS 27 $L_{night}$



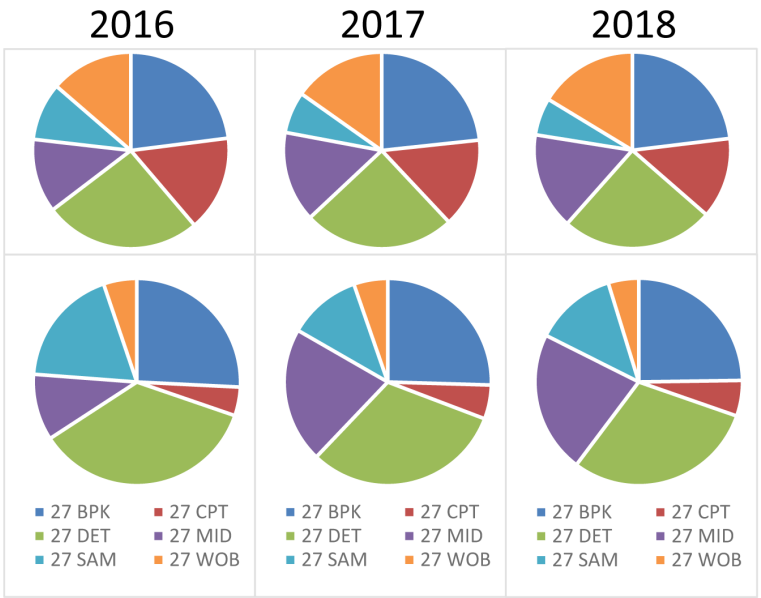

DEPS 27 $L_{den}$




DEPS 27 $L_{night}$




DEPS 27 $L_{den}$




DEPS 27 $L_{night}$

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

| Route | $L_{day}$ | $L_{evening}$ | $L_{night}$ | $L_{den}$ | $L_{eq,6.5hr\ night}$ |
|---|---|---|---|---|---|
| 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 | $L_{day}$ | $L_{evening}$ | $L_{night}$ | $L_{den}$ | $L_{eq,6.5hr\ night}$ |
|---|---|---|---|---|---|
| 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 | $L_{day}$ | $L_{evening}$ | $L_{night}$ | $L_{den}$ | $L_{eq,6.5hr\ night}$ |
|---|---|---|---|---|---|
| 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 | $L_{day}$ | $L_{evening}$ | $L_{night}$ | $L_{den}$ | $L_{eq,6.5hr\ night}$ |
|---|---|---|---|---|---|
| 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 | $L_{day}$ | $L_{evening}$ | $L_{night}$ | $L_{den}$ | $L_{eq,6.5hr\ night}$ |
|---|---|---|---|---|---|
| 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 | $L_{day}$ | $L_{evening}$ | $L_{night}$ | $L_{den}$ | $L_{eq,6.5hr\ night}$ |
|---|---|---|---|---|---|
| 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 | $L_{day}$ | $L_{evening}$ | $L_{night}$ | $L_{den}$ | $L_{eq,6.5hr\ night}$ |
|---|---|---|---|---|---|
| 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 | $L_{day}$ | $L_{evening}$ | $L_{night}$ | $L_{den}$ | $L_{eq,6.5hr\ night}$ |
|---|---|---|---|---|---|
| 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 | $L_{day}$ | $L_{evening}$ | $L_{night}$ | $L_{den}$ | $L_{eq,6.5hr\ night}$ |
|---|---|---|---|---|---|
| 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 | $L_{day}$ | $L_{evening}$ | $L_{night}$ | $L_{den}$ | $L_{eq,6.5hr\ night}$ |
|---|---|---|---|---|---|
| 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 | $L_{day}$ | $L_{evening}$ | $L_{night}$ | $L_{den}$ | $L_{eq,6.5hr\ night}$ |
|---|---|---|---|---|---|
| 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 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% |

**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% |

**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% |

**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% |

**Table C10-e Heathrow $L_{eq,6.5hr\ night}$ 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% |

**Table C11 Heathrow 2006 & 2018 $L_{day}$ cumulative contour area, population and household estimates**

| $L_{day}$ (dBA) | 2006 area | 2018 area | Change in area | 2006 pop | 2018 pop | Change in pop | 2006 house | 2018 house | Change in house |
|---|---|---|---|---|---|---|---|---|---|
| > 55 | 177.7 | 128.6 | -28% | 485.6 | 351.9 | -28% | 210.5 | 138.4 | -34% |
| | | | | | (289.1) | (-40%) | | (121.6) | (-42%) |
| > 60 | 64.0 | 48.8 | -24% | 111.0 | 103.8 | -6% | 44.9 | 37.4 | -17% |
| | | | | | (78.6) | (-29%) | | (31.3) | (-30%) |
| > 65 | 27.2 | 20.2 | -26% | 24.1 | 16.3 | -32% | 9.2 | 5.6 | -39% |
| | | | | | (13.3) | (-45%) | | (5.0) | (-46%) |
| > 70 | 9.3 | 6.5 | -30% | 2.8 | 1.1 | -61% | 1.0 | 0.4 | -60% |
| | | | | | (0.8) | (-71%) | | (0.3) | (-70%) |
| > 75 | 3.5 | 2.5 | -29% | < 0.1 | < 0.1 | (n/a) | < 0.1 | < 0.1 | (n/a) |
| | | | | | (< 0.1) | (n/a) | | (< 0.1) | (n/a) |

**Table C12 Heathrow 2006 & 2018 $L_{evening}$ cumulative contour area, population and household estimates**

| $L_{evening}$ (dBA) | 2006 area | 2018 area | Change in area | 2006 pop | 2018 pop | Change in pop | 2006 house | 2018 house | Change in house |
|---|---|---|---|---|---|---|---|---|---|
| > 55 | 185.6 | 110.8 | -40% | 450.5 | 305.7 | -32% | 192.6 | 119.1 | -38% |
| | | | | | (247.4) | (-45%) | | (103.3) | (-46%) |
| > 60 | 66.1 | 42.6 | -36% | 106.3 | 80.8 | -24% | 42.4 | 28.9 | -32% |
| | | | | | (61.1) | (-43%) | | (24.3) | (-43%) |
| > 65 | 28.1 | 16.9 | -40% | 20.5 | 8.9 | -57% | 7.9 | 3.2 | -59% |
| | | | | | (7.3) | (-64%) | | (2.9) | (-63%) |
| > 70 | 10.0 | 5.6 | -44% | 2.4 | 0.5 | -79% | 1.0 | 0.2 | -80% |
| | | | | | (0.4) | (-83%) | | (0.2) | (-80%) |
| > 75 | 3.8 | 2.3 | -39% | < 0.1 | 0.0 | (n/a) | < 0.1 | 0.0 | (n/a) |
| | | | | | (0.0) | (n/a) | | (0.0) | (n/a) |

Notes:

- Areas are given in $km^2$, and populations and households in thousands.
- The 2006 population/household counts are based on a 2006 CACI update of the 2001 Census.
- The 2018 population/household counts are based on a 2018 CACI update of the 2011 Census.
- Estimates for 2018 using the 2006 population database are shown in blue.

**Table C13 Heathrow 2006 & 2018 $L_{night}$ cumulative contour area, population and household estimates**

| $L_{night}$ (dBA) | 2006 area | 2018 area | Change in area | 2006 pop | 2018 pop | Change in pop | 2006 house | 2018 house | Change in house |
|---|---|---|---|---|---|---|---|---|---|
| > 50 | 84.4 | 72.7 | -14% | 207.2 | 220.9 | +7% | 88.9 | 86.5 | -3% |
| | | | | | (177.3) | (-14%) | | (75.4) | (-15%) |
| > 55 | 34.2 | 24.5 | -28% | 62.0 | 59.6 | -4% | 24.1 | 20.9 | -13% |
| | | | | | (44.3) | (-29%) | | (17.1) | (-29%) |
| > 60 | 11.9 | 8.1 | -32% | 16.3 | 11.2 | -31% | 6.0 | 3.6 | -40% |
| | | | | | (8.6) | (-47%) | | (3.0) | (-50%) |
| > 65 | 4.5 | 2.9 | -36% | 1.7 | 0.8 | -53% | 0.6 | 0.2 | -67% |
| | | | | | (0.7) | (-59%) | | (0.3) | (-50%) |
| > 70 | 1.8 | 1.2 | -33% | < 0.1 | 0.0 | (n/a) | < 0.1 | 0.0 | (n/a) |
| | | | | | (0.0) | (n/a) | | (0.0) | (n/a) |

**Table C14 Heathrow 2006 & 2018 $L_{den}$ cumulative contour area, population and household estimates**

| $L_{den}$ (dBA) | 2006 area | 2018 area | Change in area | 2006 pop | 2018 pop | Change in pop | 2006 house | 2018 house | Change in house |
|---|---|---|---|---|---|---|---|---|---|
| > 55 | 244.7 | 176.8 | -28% | 756.1 | 611.3 | -19% | 338.5 | 253.9 | -25% |
| | | | | | (529.1) | (-30%) | | (234.6) | (-31%) |
| > 60 | 92.7 | 67.7 | -27% | 194.6 | 182.1 | -6% | 81.6 | 69.3 | -15% |
| | | | | | (139.2) | (-28%) | | (57.8) | (-29%) |
| > 65 | 37.1 | 26.6 | -28% | 54.3 | 42.6 | -22% | 21.4 | 14.9 | -30% |
| | | | | | (32.1) | (-41%) | | (12.5) | (-42%) |
| > 70 | 13.7 | 8.6 | -37% | 9.6 | 4.1 | -57% | 3.5 | 1.4 | -60% |
| | | | | | (3.1) | (-68%) | | (1.1) | (-69%) |
| > 75 | 5.0 | 3.1 | -38% | 0.7 | 0.1 | -86% | 0.3 | < 0.1 | (n/a) |
| | | | | | (< 0.1) | (n/a) | | (< 0.1) | (n/a) |

Notes:

- Areas are given in $km^2$, and populations and households in thousands.
- The 2006 population/household counts are based on a 2006 CACI update of the 2001 Census.
- The 2018 population/household counts are based on a 2018 CACI update of the 2011 Census.
- Estimates for 2018 using the 2006 population database are shown in blue.

**Table C15 Heathrow 2006 & 2018 $L_{eq,6.5hr\ night}$ cumulative contour area, population and household estimates**

| $L_{eq,6.5hr\ night}$ (dBA) | 2006 area | 2018 area | Change in area | 2006 pop | 2018 pop | Change in pop | 2006 house | 2018 house | Change in house |
|---|---|---|---|---|---|---|---|---|---|
| > 48 | 56.4 | 31.8 | -44% | 137.4 | 99.0 | -28% | 57.5 | 36.3 | -37% |
| | | | | | (74.1) | (-46%) | | (29.6) | (-49%) |

Notes:

- Areas are given in $km^2$, and populations and households in thousands.
- The 2006 population/household counts are based on a 2006 CACI update of the 2001 Census.
- The 2018 population/household counts are based on a 2018 CACI update of the 2011 Census.
- Estimates for 2018 using the 2006 population database are shown in blue.
- The 2006 results were based on data recorded over the 2006 calendar year. The 2018 results were based on data recorded from 25 March 2018 to 31 March 2019.

**Table C16 Heathrow 2006 & 2018 $L_{den}$ cumulative contour area, population and household estimates – assuming 2006 W/E runway modal split and 2006 N/S runway usage**

| $L_{den}$ (dBA) | 2006 area | 2018 area | Change in area | 2006 pop | 2018 pop | Change in pop | 2006 house | 2018 house | Change in house |
|---|---|---|---|---|---|---|---|---|---|
| > 55 | 244.7 | 177.1 | -28% | 756.1 | 645.7 | -15% | 338.5 | 270.5 | -20% |
| > 60 | 92.7 | 68.4 | -26% | 194.6 | 182.5 | -6% | 81.6 | 69.8 | -14% |
| > 65 | 37.1 | 26.6 | -28% | 54.3 | 44.5 | -18% | 21.4 | 15.5 | -28% |
| > 70 | 13.7 | 8.6 | -37% | 9.6 | 4.3 | -55% | 3.5 | 1.4 | -60% |
| > 75 | 5.0 | 3.1 | -38% | 0.7 | < 0.1 | (n/a) | 0.3 | < 0.1 | (n/a) |

Notes:

- Areas are given in $km^2$, and populations and households in thousands.
- The 2006 population/household counts are based on a 2006 CACI update of the 2001 Census.
- The 2018 population/household counts are based on a 2018 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 |
| B738MAX | Boeing 737 MAX 8 |
| B738 | Boeing 737-800/900 |
| 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 |
| BA46 | BAe 146/Avro RJ series |
| CRJ | Bombardier CRJ100/200 series |
| CRJ700 | Bombardier CRJ700 series |

| ANCON type | Description |
|---|---|
| CRJ900 | Bombardier CRJ900 series |
| CS100 | Bombardier CS100 (rebranded as Airbus A220-100 in July 2018) |
| CS300 | Bombardier CS300 (rebranded as Airbus A220-300 in July 2018) |
| DC10 | McDonnell Douglas DC-10 |
| 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 |
| 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 |
| MD11 | McDonnell Douglas MD-11 |
| MD80 | McDonnell Douglas MD-80 series |

| ANCON type | Description |
|---|---|
| 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 |
| ERCD | Environmental Research and Consultancy Department |
| FOPP | Fuel Over Pressure Protector |
| ICAO | International Civil Aviation Organization |
| $L_{day}$ | Equivalent sound level of aircraft noise in dBA for the annual average 12-hour day period (0700-1900 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 $L_{night}$. |
| Leq | Equivalent sound level of aircraft noise in dBA, often called ‘equivalent continuous sound level’. |
| $L_{eq,6.5hr\ night}$ | Equivalent sound level of aircraft noise in dBA for the average 6.5-hour night quota period (2330-0600 local time). |
| $L_{evening}$ | Equivalent sound level of aircraft noise in dBA for the annual average 4-hour evening period (1900-2300 local time). |
| $L_{max}$ | Maximum sound level of a noise event in dBA. |
| $L_{night}$ | Equivalent sound level of aircraft noise in dBA for the annual average 8-hour night period (2300-0700 local time). |
| N70/N65/N60 | Number of aircraft noise events exceeding a maximum sound level ($L_{max}$) of 70/65/60 dBA. |
| NTK | Noise and Track Keeping monitoring system. |

| Glossary | |
|---|---|
| SEL | Sound Exposure Level |
| SoNA | Survey of Noise Attitudes |