Environmental Research and Consultancy Department

Civil Aviation Authority

Noise Exposure Contours for Stansted Airport 2020

ERCD REPORT 2103

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Summary

1. This report presents the 2020 average summer day and night noise exposure contours generated for London Stansted Airport.

2. The noise modelling used radar and noise data from Stansted's Noise and Track Keeping (NTK) system. Mean flight tracks and lateral dispersions for each route, and average flight profiles of aircraft height, speed and thrust for each aircraft type, were calculated using these data.

3. The COVID-19 global pandemic had an unprecedented impact on aircraft movement numbers at Stansted. Analysis of the 2020 summer traffic data revealed that average daily movements for the 16-hour daytime period (212.9) were 58% lower than the previous year (2019: 512.2). The B738 ANCON type (i.e. Boeing 737-800) had the highest decrease in movements of 208.7 per 16-hour day.

4. On average there were 38.9 movements per 8-hour night over the 2020 summer period, a decrease of 58% from 2019 (92.7). The highest decrease at night was for the B738, which was down by 34.2 movements.

5. The above reductions in movements caused large decreases in contour areas and population counts. The area of the 2020 average summer day actual modal split (71% south-west / 29% north-east) 54 dB $L_{Aeq,16h}$ contour decreased by 58% to 22.3 km^2 (2019: 53.4 km^2). The population count within this contour decreased by 79% to 1,550 (2019: 7,350). The 51 dB $L_{Aeq,16h}$ contour was plotted for the first time in 2020, and this contour enclosed an area of 41.9 km^2, with a population count of 5,600. There was a 58% area reduction (2019: 98.9 km^2) and a 67% population decrease (2019: 17,000) from 2019.

6. The area of the 2020 average summer day standard modal split (73% south-west / 27% north-east) 54 dB $L_{Aeq,16h}$ contour decreased by 58% to 22.3 km^2 (2019: 53.1 km^2). The population count within this contour was 1,500, 79% lower than in 2019 (7,300). The standard 57 dB $L_{Aeq,16h}$ contour area (11.8 km^2) was within the 33.9 km^2 contour area limit imposed by the Stansted Planning Condition AN1.

7. The area of the 2020 average summer night actual modal split (69% south-west / 31% north-east) 48 dB $L_{Aeq,8h}$ contour was 32.9 km^2, a decrease of 54% from the previous year (2019: 72.2 km^2). The population count within this contour was 4,100, 59% lower than in 2019 (9,950). The 45 dB $L_{Aeq,8h}$ contour was plotted for the first time in 2020, and this contour enclosed an area of 58.3 km^2, with a population count of 7,800.

8. Contours were also produced for the supplementary noise metric N65. The area of the 2020 average summer day actual modal split N65 20-event contour was 99.9 km^2 (2019: 171.8 km^2), with a population count of 14,250 (2019: 22,800).

Chapter 1
Introduction

Background

1.1 Each year the Environmental Research and Consultancy Department (ERCD) of the Civil Aviation Authority (CAA) calculates the noise exposure around London Stansted Airport. Up until 2015, this work was carried out on behalf of the Department for Transport (DfT). Since 2016, ERCD has been commissioned directly by Stansted Airport Ltd (STAL).

1.2 The UK civil aircraft noise model ANCON is used to estimate the noise exposure. The model calculates the emission and propagation of noise from arriving and departing air traffic, and is validated with noise measurements.

1.3 The noise exposure metric used is the Equivalent Continuous Sound Level (L_{eq}), and in particular $L_{Aeq,16h}$ (0700-2300 local time), which is calculated over the 92-day summer period from 16 June to 15 September. The background to the use of this index is explained in DORA Report 9023 (**Ref 1**).

1.4 Noise exposure is depicted in the form of noise contours, i.e. lines joining places of constant L_{eq}, akin to the height contours shown on geographical maps or isobars on a weather chart. Historically in the UK, $L_{Aeq,16h}$ noise contours have been plotted at levels from 57 to 72 dB in 3 dB steps. However, the Survey of Noise Attitudes, SoNA 2014 (**Ref 2**), found that the degree of annoyance (based on the percentage of respondents highly annoyed), previously occurring at 57 dB, occurs at 54 dB. The $L_{Aeq,16h}$ contours for Stansted have therefore been plotted down to the lower level of 54 dB since 2017. At the airport's request, the 2020 $L_{Aeq,16h}$ contours have also been plotted at 51 dB, this being defined in Government's Airspace and Noise Policy (**Ref 3**) as the daytime Lowest Observed Adverse Effect Level (LOAEL).

1.5 Following the publication of the Aviation Policy Framework in March 2013 (**Ref 4**), night-time (2300-0700 local time) $L_{Aeq,8h}$ noise contours have been produced on an annual basis for the designated airports. Since 2013, night-time $L_{Aeq,8h}$ contours have therefore been calculated for Stansted from 48 to 72 dB in 3 dB steps in accordance with standard practice. At the airport's request, the 2020 $L_{Aeq,8h}$ contours have also been plotted at the 45 dB level, this being defined in Government's Airspace and Noise Policy (**Ref 3**) as the night-time LOAEL.

1.6 Daytime contours using the supplementary noise metric N65 16-hour have also been produced. N65 contours indicate the number of aircraft noise events exceeding a maximum sound level (L_{Amax}) of 65 dB at a given location.

1.7 The objectives of this report are to explain the noise modelling methodology used to produce the 2020 day and night contours for Stansted Airport, to present the calculated noise contours and to assess the changes from the previous year (**Ref 5**). Long-term trends are also examined.

Stansted Airport

1.8 Stansted Airport is situated 35 miles (56 km) north-east of London and is surrounded by countryside and small villages to the north, south and east, and by the town of Bishop's Stortford to the west (**Figure B1** of **Appendix B**).

1.9 Stansted Airport has a single runway, designated 04/22, which is 3,049 m long. The Runway 04 landing threshold[1] is displaced by 300 m. There is one main passenger terminal. The layout of the runway, taxiways and passenger terminal in 2020 is shown in **Figure B2**.[2]

1.10 In the 2020 calendar year there were approximately 86,000 aircraft movements at Stansted (2019: 200,000) and the airport handled 7.5 million passengers (2019: 28.1 million).[3]

1.11 Following the granting of planning permission for the Stansted G1 proposal on 8 October 2008, the following planning condition ('Planning Condition AN1') came into force:

> *"The area enclosed by the 57dB(A) Leq16hr (0700-2300) contour, when calculated and measured by the Civil Aviation Authority's Aircraft Noise Contour Model 2.3 or as may be amended, shall not exceed 33.9 sq km using the standardised average mode from the date of grant of this permission. Any necessary account shall be taken of this requirement in declaring the capacity of Stansted Airport for the purpose of Council Regulation (EEC) No 95/93 of 18 January 1993 on common rules for the allocation of slots at Community airports. Forecast aircraft movements and consequential noise contours for the forthcoming year shall be reported to the Local Planning Authority annually on the 31st January each year."*

1.12 Based on the above planning condition, the area of the standard (i.e. 20-year average) runway modal split 57 dB $L_{Aeq,16h}$ contour is not to exceed a limit of 33.9 km^2.

[1] The runway threshold marks the beginning of the runway available for landing aircraft. A *displaced* threshold is a runway threshold that is not located at the physical end of the runway. A displaced threshold is often employed to give arriving aircraft sufficient clearance over an obstacle.

[2] UK AIP, AD 2-EGSS-2-1

[3] Source: Civil Aviation Authority (https://www.caa.co.uk/airportstatistics)

Chapter 2

Noise modelling methodology

ANCON model

2.1 Noise contours were calculated with the UK civil aircraft noise model ANCON (version 2.4), which is developed and maintained by ERCD on behalf of the DfT. A technical description of ANCON is provided in R&D Report 9842 (**Ref 6**). The ANCON model is also used to produce the annual contours for Heathrow and Gatwick airports, and a number of other UK airports.

2.2 ANCON is fully compliant with the latest European guidance on noise modelling, ECAC.CEAC Doc 29 (Fourth edition), published in December 2016 (**Ref 7**). 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).

Radar data

2.3 The noise modelling carried out by ERCD made extensive use of radar data extracted from Stansted Airport's Noise and Track Keeping (NTK) system. Most large airports have NTK systems, which take data from Air Traffic Control (ATC) radars and combine them with flight information such as call sign, aircraft registration, aircraft type and destination. Analyses of departure and arrival flight tracks, and flight profiles, were based on 2020 summer radar data.

Flight tracks

2.4 Aircraft departing Stansted are required to follow specific flight paths called Noise Preferential Routes (NPRs) unless directed otherwise by ATC. NPRs were designed to avoid the overflight of built-up areas where possible. They establish a path from the take-off runway to the main UK air traffic routes and form the first part of the Standard Instrument Departure (SID) routes. The Stansted NPR/SID routes are illustrated in **Figure B3**.

2.5 Associated with each NPR is a lateral swathe, which is defined by a pair of lines that diverge at 10 degrees from a point 2,000 m from start-of-roll, leading to a corridor extending 1.5 km either side of the nominal NPR centreline. Within this swathe the aircraft are considered to be flying on-track. The swathe takes account of various factors that affect track-keeping, including tolerances in

navigational equipment, type and weight of aircraft, and weather conditions – particularly winds that may cause drifting when aircraft are turning. Aircraft reaching an altitude of 4,000 ft[4] at any point along an NPR may be turned off the route by ATC onto more direct headings to their destinations – a practice known as 'vectoring'. ATC may also vector aircraft from NPRs below this altitude for safety reasons, to avoid storms for example.

2.6 Departure and arrival flight tracks were modelled using radar data extracted from the Stansted NTK system over the 92-day summer period, 16 June to 15 September 2020. Mean flight tracks were calculated from 24-hour data since both day and night contours were being produced.

2.7 **Figure B4** shows a 24-hour sample of radar flight tracks from 28 August 2020. In-house radar analysis software was used to calculate mean departure flight tracks and associated lateral dispersions for each NPR/SID. Arrival tracks for Runways 04 and 22 were modelled using evenly-spaced 'spurs' about the extended runway centrelines. The majority of arriving aircraft joined the centrelines at distances between 11 and 22 km from the Runway 22 threshold, and between 9 and 21 km from the Runway 04 threshold.

Flight profiles

2.8 For each ANCON type, average flight profiles of height, speed and thrust versus track distance (for departures and arrivals separately) were reviewed and updated where necessary, using 2020 summer radar data. The engine power settings required for the aircraft to follow the average height and speed profiles were calculated from data describing aircraft performance characteristics within each of the different aircraft type categories. Daytime flight profiles were generated as in previous years.

2.9 At distances greater than about 10 km from the runway threshold, the average aircraft heights for arrivals on Runway 22 were higher than on Runway 04, as in preceding years. This was due to the use of Continuous Descent Operations (CDOs) on Runway 22, where aircraft generally join the glideslope at a greater height. CDOs have been employed for arrivals to Runway 22 since 1999. Separate Runway 22 and Runway 04 descent profiles were therefore used to model arrivals for all aircraft types.

2.10 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.

[4] An altitude of 3,000 ft for aircraft on the UTAVA/NUGBO/BKY departure routes in the period 0600-2330.

Noise emissions

2.11 At Stansted, the NTK system captures data from both fixed and mobile noise monitors around the airport. Noise event data for individual aircraft operations were matched to operational data provided by the airport. The Stansted NTK system employs 8 fixed monitors positioned approximately 6.5 km from start-of-roll, together with several mobile monitors that can be deployed anywhere within the NTK radar coverage area.[5]

2.12 The noise data collected were screened by ERCD with reference to several criteria so that only reliable data were used in the analysis. First, 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[6]. Secondly, 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). Thirdly, 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.[7]

2.13 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.

2.14 The most significant change to 2020 SEL noise levels were:

- reductions for B738 departures of 0.5 dB up to about 14 km from start-of-roll, and reductions of up to 1 dB thereafter.
- reductions for B738 arrivals of between 0.5-1.0 dB.

Validation of L_{Amax} levels, which are the basis of the N65 contours (but not the L_{Aeq} contours), was also carried out. For the B738, there were decreases in L_{Amax} of up to 1.0 dB on departure.

[5] Further information on the noise monitors can be found in CAP 1149 (**Ref 8**).

[6] Wind speeds above 10 m/s, in accordance with ISO 20906 (**Ref 9**).

[7] *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.

Daytime traffic by ANCON type

2.15 The contours were based on the daily average movements that took place during the 16-hour day (0700-2300 local time) and 8-hour night (2300-0700 local time), over the 92-day summer period from 16 June to 15 September inclusive. The source of this information was the Stansted NTK system, which stores radar data supplemented by daily flight plans. Traffic statistics from NTK data were cross-checked with runway logs supplied by NATS[8] and close agreement was found.

2.16 The average number of daily movements at Stansted over the 2020 summer day period (212.9) was 58% lower than the previous year (2019: 512.2). These unprecedented reductions resulted from the effects of the COVID-19 pandemic on air travel worldwide.

2.17 A breakdown of the 2020 average summer day movements by ANCON type is provided in **Table C1**. The largest decrease in daily movements was for the ANCON type B738, which was down by 208.7 movements (note: descriptions of all the ANCON types can be found in **Table D1** of **Appendix D**). The largest increase was for the ANCON type MD11, up by 1.0 movement per day.

2.18 **Figure B5** illustrates the numbers of movements by ANCON type for the 2020 average summer day. The B738 was the most common type at Stansted with 144.2 daily movements (68% of the total), followed by the EXE3 with 16.5 daily movements (8% of the total).

2.19 The B738 was the noise dominant ANCON type (for both departure and arrival noise) at Stansted during the daytime because it was responsible for the highest contribution of 'noise energy', which is a function of both aircraft noise level and movement numbers.

2.20 It is estimated[9] that over 99% of aircraft movements in the 2020 summer day period were compliant with the ICAO Chapter 4 noise standard.[10]

[8] NATS is the provider of air traffic control services to Stansted Airport.

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

[10] Aircraft certification noise levels are classified by the ICAO *Standards and Recommended Practices – Aircraft Noise: Annex 16 to the Convention on International Civil Aviation* into 'Chapter 3', 'Chapter 4' and 'Chapter 14' types. The Chapter 4 standard (applicable from 2006) is more stringent than the Chapter 3 standard (1977) and typically characterised by modern, quieter, high-bypass turbofan aircraft. The 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.

Night-time traffic by ANCON type

2.21 There were 38.9 aircraft movements on average over the 8-hour night in 2020, a decrease of 58% from the previous year (2019: 92.7). Arrivals comprised 54% of movements at night.

2.22 A breakdown of the 2020 average summer night movements by ANCON type is provided in **Table C2**. The highest decrease was for the ANCON type B738, which was down by 34.2 movements per night. The largest increase was for the B748, which was up by 0.5 per night.

2.23 **Figure B6** illustrates the numbers of movements by ANCON type for the 2020 average summer night. Similar to daytime, traffic was dominated by the B738 with 21.0 movements per night, representing 54% of the total. The second most frequent type was the B733 with 5.9 movements per night, or 15% of the total.

2.24 The B738 was the noise dominant ANCON type (for both departure and arrival noise) at Stansted during the night-time period.

2.25 It is estimated that over 99% of aircraft movements in the 2020 summer night period were compliant with the ICAO Chapter 4 noise standard.

Daytime traffic distributions by NPR/SID route

2.26 **Figure B7** shows the percentage distribution of departing aircraft by NPR/SID route for the 2020 summer day period, with distribution figures from 2019 for comparison. The Runway 22 BKY and CLN SIDs had the highest traffic loadings of 33% and 37% respectively in 2020. The loading increases of 2% on the Runway 04 BKY and CLN routes were due to the 4% higher proportion of north-easterly operations in 2020 compared to 2019.

2.27 Since 4 February 2016, when the LAMP 1A airspace change was implemented,[11] traffic that would previously have flown on the DET SID has been switched to the CLN SID.[12] The effects of the switch can be seen in the statistics for the DET SIDs, which only had 1% of departure operations from Runway 22 and less than 1% from Runway 04, in both 2019 and 2020.

[11] https://www.caa.co.uk/Commercial-industry/Airspace/Airspace-change/Decisions/London-Airspace-Management-Programme-Phase-1A/

[12] The DET SID is not normally available now during daytime hours.

Night-time traffic distributions by NPR/SID route

2.28 **Figure B8** shows the percentage distribution of departing aircraft by NPR/SID route for the 2020 summer night period, with distribution figures from 2019 for comparison.

2.29 The Runway 22 BKY and CLN routes had the highest proportions of departure traffic over the summer night period (33% and 32% respectively). The 22 CLN SID loading was 6% lower than in 2019.

2.30 As for daytime, the effects of the switch in traffic from the DET to CLN SIDs (following implementation of the LAMP 1A airspace change) can be seen in the relatively low percentage loadings on the DET routes, although the 22 DET loading increased to 5% in 2020 (2019: 2%).

Runway modal splits

2.31 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. The ratio of south-westerly (i.e. Runway 22) and north-easterly (i.e. Runway 04) operations is referred to as the *runway modal split*.

2.32 Two sets of contours have been produced for the 2020 summer day:

(a) Using the 'actual' modal split over the $L_{Aeq,16h}$ day period; and

(b) Assuming the 'standard' modal split over the $L_{Aeq,16h}$ day period, i.e. the long-term modal split calculated from the 20-year rolling average. For 2020, this was the 20-year period from 2001 to 2020. Use of the standard modal split enables year-on-year comparisons without the runway usage significantly affecting the contour shape.

2.33 The actual and standard daytime south-west / north-east (SW / NE) percentage modal splits for 2020 and 2019 are summarised in **Table 1**.

Table 1 Stansted daytime runway modal splits

Year	Actual modal split (SW / NE percentage)	Standard modal split (SW / NE percentage)
2020	71 / 29	73 / 27
2019	75 / 25	73 / 27

2.34 The daytime actual modal split in 2020 (71% SW / 29% NE) had a 4% lower proportion of south-westerly operations compared to 2019 (75% SW / 25% NE).

The 2020 standard modal split of 73% SW / 27% NE was unchanged from 2019. Historical daytime runway modal splits at Stansted for the past 20 years are illustrated in **Figure B9**.

2.35 The night-time actual runway modal split for the 2020 summer period was 69% SW / 31% NE. There was a 6% decrease in the percentage of south-westerly operations compared to 2019. The night-time modal splits for 2020 and 2019 are summarised in **Table 2**.

Table 2 Stansted night-time runway modal splits

Year	Actual modal split (SW / NE percentage)
2020	69 / 31
2019	75 / 25

Topography

2.36 The topography around Stansted 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 considered.

2.37 ERCD holds OS terrain height data on a 50-metre grid for the whole of Great Britain. Interpolation was performed to generate height data at each of the calculation points on the receiver grid used by the ANCON noise model. The terrain heights above mean sea level (AMSL) in the vicinity of Stansted Airport are illustrated in **Figure B10**.

Population and 'Points of Interest' databases

2.38 Estimates were made of the numbers of people and households enclosed by the noise contours. The population data used in this report are a 2020 update of the 2011 Census supplied by CACI Limited.

2.39 The CACI population database contains data referenced at postcode level. Population and household numbers for each postcode are assigned to a single coordinate located at the postcode's centroid. The postcode data points and associated population counts for the area around Stansted Airport are illustrated in **Figure B11**.

2.40 Within the extent of the 2020 summer day actual 51 dB $L_{Aeq,16h}$ contour, the population count using the 2020 population database was 1% higher than with

the 2019 database. This provides an indication of the effect of any population changes in the vicinity of the airport on the results presented in Chapter 3.

2.41 Estimates have also been made of the numbers of noise sensitive buildings located within the daytime contours, using the PointX 'Points of Interest' (2020) database. For the purpose of this study, the noise sensitive buildings that have been considered are schools (including nurseries), hospitals and places of worship.

Chapter 3
Results

2020 day actual $L_{Aeq,16h}$ contours

3.1 The Stansted 2020 summer day $L_{Aeq,16h}$ noise contours generated with the actual runway modal split (71% SW / 29% NE) are shown in **Figure B12**. The contours are plotted from 51 to 72 dB at 3 dB intervals. Cumulative estimates of the areas, populations and households within the contours are provided in **Table 3**.

Table 3 Stansted 2020 summer day actual modal split $L_{Aeq,16h}$ contours – area, population and household estimates

$L_{Aeq,16h}$ (dB)	Area (km^2)	Population	Households
> 51	41.9	5,600 (5,550)	2,200 (2,200)
> 54	22.3	1,550 (1,550)	600 (550)
> 57	11.8	500 (500)	200 (200)
> 60	6.1	200 (150)	100 (50)
> 63	3.0	50 (50)	< 50 (< 50)
> 66	1.5	0 (0)	0 (0)
> 69	0.9	0 (0)	0 (0)
> 72	0.6	0 (0)	0 (0)

Note: Populations and households are given to the nearest 50, and estimates using the 2019 population database are also given in brackets for comparison purposes.

3.2 The 2020 summer day actual 51 dB $L_{Aeq,16h}$ contour enclosed an area of 41.9 km^2 and a population of 5,600.

3.3 Estimates of the cumulative numbers of noise sensitive buildings within the 2020 summer day actual $L_{Aeq,16h}$ contours are provided in **Table 4**.

Table 4 Stansted 2020 summer day actual modal split $L_{Aeq,16h}$ contours – noise sensitive building estimates

$L_{Aeq,16h}$ (dB)	Schools	Hospitals	Places of worship
> 51	4	0	7
> 54	1	0	2
> 57	1	0	2
> 60	0	0	0
> 63	0	0	0
> 66	0	0	0
> 69	0	0	0
> 72	0	0	0

2020 night actual $L_{Aeq,8h}$ contours

3.4 The Stansted 2020 summer night $L_{Aeq,8h}$ noise contours generated with the actual runway modal split (69% SW / 31% NE) are shown in **Figure B13**. The contours are plotted from 45 to 66 dB at 3 dB intervals (note: the 69 and 72 dB contours have been omitted for clarity). Cumulative estimates of the areas, populations and households within the contours are provided in **Table 5**.

3.5 The 2020 summer night actual 45 dB $L_{Aeq,8h}$ contour enclosed an area of 58.3 km^2 and a population of 7,800.

Table 5 Stansted 2020 summer night actual modal split $L_{Aeq,8h}$ contours – area, population and household estimates

$L_{Aeq,8h}$ (dB)	Area (km^2)	Population	Households
> 45	58.3	7,800 (7,800)	3,100 (3,100)
> 48	32.9	4,100 (3,950)	1,600 (1,550)
> 51	17.7	1,100 (1,100)	400 (400)
> 54	9.4	350 (300)	100 (100)
> 57	4.9	50 (50)	50 (50)
> 60	2.5	0 (0)	0 (0)
> 63	1.3	0 (0)	0 (0)
> 66	0.8	0 (0)	0 (0)
> 69	0.5	0 (0)	0 (0)
> 72	0.3	0 (0)	0 (0)

Note: Populations and households are given to the nearest 50, and estimates using the 2019 population database are also given in brackets for comparison purposes.

2020 day standard $L_{Aeq,16h}$ contours

3.6 The Stansted 2020 summer day $L_{Aeq,16h}$ noise contours generated with the standard runway modal split (73% SW / 27% NE) are shown in **Figure B14**. The contours are plotted from 51 to 72 dB at 3 dB intervals. Cumulative estimates of the areas, populations and households within the contours are provided in **Table 6**.

Table 6 Stansted 2020 summer day standard modal split $L_{Aeq,16h}$ contours – area, population and household estimates

$L_{Aeq,16h}$ (dB)	Area (km^2)	Population	Households
> 51	42.0	5,700 (5,600)	2,250 (2,200)
> 54	22.3	1,500 (1,500)	550 (550)
> 57	11.8	500 (500)	200 (200)
> 60	6.1	200 (150)	100 (50)
> 63	3.0	50 (50)	< 50 (< 50)
> 66	1.5	0 (0)	0 (0)
> 69	0.9	0 (0)	0 (0)
> 72	0.6	0 (0)	0 (0)

Note: Populations and households are given to the nearest 50, and estimates using the 2019 population database are also given in brackets for comparison purposes.

3.7 The 2020 summer day standard 51 dB $L_{Aeq,16h}$ contour enclosed an area of 42.0 km^2 and a population of 5,700.

3.8 Estimates of the cumulative numbers of noise sensitive buildings within the 2020 summer day standard $L_{Aeq,16h}$ contours are provided in **Table 7**.

Table 7 Stansted 2020 summer day standard modal split $L_{Aeq,16h}$ contours – noise sensitive building estimates

$L_{Aeq,16h}$ (dB)	Schools	Hospitals	Places of worship
> 51	5	0	7
> 54	1	0	2
> 57	1	0	2
> 60	0	0	0
> 63	0	0	0
> 66	0	0	0
> 69	0	0	0
> 72	0	0	0

2020 day actual $L_{Aeq,16h}$ contours – comparison with 2019

3.9 The Stansted 2020 and 2019 summer day actual modal split $L_{Aeq,16h}$ contours are compared in **Figure B15**. The 2019 contours are only plotted at 54 and 57 dB, and the 2020 contours only from 54-66 dB, for clarity. Comparisons are made from the 54 dB level as the 51 dB contour was not produced for 2019. The changes in area and population between 2019 and 2020 are summarised in **Table 8**.

Table 8 Stansted 2019 and 2020 summer day actual $L_{Aeq,16h}$ contours – area and population estimates

$L_{Aeq,16h}$ (dB)	2019 area (km^2)	2020 area (km^2)	Area change	2019 population	2020 population	Population change
> 54	53.4	22.3	-58%	7,350	1,550	-79%
> 57	28.5	11.8	-59%	2,500	500	-80%
> 60	15.0	6.1	-59%	900	200	-78%
> 63	7.8	3.0	-62%	300	50	-83%
> 66	4.0	1.5	-63%	50	0	-100%
> 69	2.0	0.9	-55%	0	0	(-)
> 72	1.1	0.6	-45%	0	0	(-)

Note: The 2019 and 2020 summer day actual runway modal splits were 75% SW / 25% NE and 71% SW / 29% NE respectively. Comparisons at 51 dB are not included as contours were not produced at this level for 2019.

3.10 The 54 dB contour area decreased by 58% in 2020 and areas also reduced at the other contour levels by up to 63%. The area decreases were predominantly the result of substantial movement decreases following the COVID-19 global pandemic, and to a smaller extent to lower measured noise levels for the noise dominant ANCON type B738, as described in section 2.14. The population count inside the 54 dB contour fell by 79% and similar decreases were seen at the higher contour levels.

3.11 Percentage changes in contour area are not necessarily accompanied by similar changes in enclosed population because of the uneven distribution of populations around the airport.

3.12 The 51 dB contour area in 2019 would have been 98.9 km^2, enclosing a population count of 17,000. Thus, the 51 dB contour area in 2020 represents a reduction of 58%, with a population decrease of 67%.

2020 night actual $L_{Aeq,8h}$ contours – comparison with 2019

3.13 The Stansted 2019 and 2020 night actual modal split $L_{Aeq,8h}$ contours are compared in **Figure B16**. The 2019 contours are only plotted at 48 and 51 dB, and the 2020 contours only from 48-63 dB, for clarity. Comparisons are made from the 48 dB level as the 45 dB contour was not produced for 2019. **Table 9** summarises the changes in area and population between 2019 and 2020.

Table 9 Stansted 2019 and 2020 summer night actual $L_{Aeq,8h}$ contours – area and population estimates

$L_{Aeq,8h}$ (dB)	2019 area (km^2)	2020 area (km^2)	Area change	2019 population	2020 population	Population change
> 48	72.2	32.9	-54%	9,950	4,100	-59%
> 51	39.3	17.7	-55%	5,050	1,100	-78%
> 54	20.7	9.4	-55%	1,300	350	-73%
> 57	10.8	4.9	-55%	450	50	-89%
> 60	5.6	2.5	-55%	150	0	-100%
> 63	2.8	1.3	-54%	0	0	(-)
> 66	1.5	0.8	-47%	0	0	(-)
> 69	0.9	0.5	-44%	0	0	(-)
> 72	0.5	0.3	-40%	0	0	(-)

Note: The 2019 and 2020 summer night actual runway modal splits were 75% SW / 25% NE and 69% SW / 31% NE respectively. Comparisons at 45 dB are not included as contours were not produced at this level for 2019.

3.14 The 48 dB contour area decreased by 54% in 2020 and areas also reduced at the other contour levels by up to 55%. The area decreases were predominantly the result of substantial movement decreases following the COVID-19 global pandemic, and to a smaller extent to lower measured noise levels for the noise dominant ANCON type B738, as described in section 2.14.

3.15 The population count inside the 48 dB contour fell by 59% and even larger decreases were seen at the higher contour levels.

2020 day standard $L_{Aeq,16h}$ contours – comparison with 2019

3.16 The Stansted 2020 and 2019 summer day standard modal split $L_{Aeq,16h}$ contours are compared in **Figure B17**. The 2019 contours are only plotted at 54 and 57 dB, and the 2020 contours only from 54-66 dB, for clarity. Comparisons are made from the 54 dB level as the 51 dB contour was not produced for 2019.

3.17 **Table 10** summarises the changes in area and population between 2019 and 2020.

Table 10 Stansted 2019 and 2020 summer day standard $L_{Aeq,16h}$ contours – area and population estimates

$L_{Aeq,16h}$ (dB)	2019 area (km^2)	2020 area (km^2)	Area change	2019 population	2020 population	Population change
> 54	53.1	22.3	-58%	7,300	1,500	-79%
> 57	28.3	11.8	-58%	2,300	500	-78%
> 60	15.0	6.1	-59%	900	200	-78%
> 63	7.8	3.0	-62%	250	50	-80%
> 66	4.0	1.5	-63%	50	0	-100%
> 69	2.0	0.9	-55%	0	0	(-)
> 72	1.1	0.6	-45%	0	0	(-)

Note: The 2019 and 2020 summer day standard runway modal splits were both 73% SW / 27% NE. Comparisons at 51 dB are not included as contours were not produced at this level for 2019.

3.18 The standard contours normally provide a clearer indication than the actual contours of ‘fleet noise level’ changes from year to year, because they minimise the effects of any differences between the ratios of south-westerly to north-easterly operations.

3.19 The 54 dB contour area decreased by 58% in 2020 and areas also reduced at the other contour levels by up to 63%. The area decreases were predominantly

the result of substantial movement decreases following the COVID-19 global pandemic, and to a smaller extent to lower measured noise levels for the noise dominant ANCON type B738, as described in section 2.14.

3.20 The population count inside the 54 dB contour fell by 79% and similar decreases were seen at the higher contour levels.

3.21 The 57 dB $L_{Aeq,16h}$ standard modal split contour area of 11.8 km^2 was below the Planning Condition AN1 contour area limit of 33.9 km^2 (see section 1.11).

Daytime $L_{Aeq,16h}$ noise contour historical trend

3.22 **Figure B18** shows how the 57 dB $L_{Aeq,16h}$ day actual modal split contour has changed in area and population terms since 1988 by comparison with the total annual (365-day) aircraft movements. Actual modal split data are used in this figure because standard modal split contours were not produced prior to 1995.

Annual movements

3.23 Annual movements at Stansted rose steadily between 1990 and 2001, showing rapid growth between 1997 and 1999. The number of movements in 2001 and 2002 were similar, but in 2003, the annual figure rose by 9% over the preceding year. A 7% rise in 2006 was followed by a 1% increase in 2007, when the level of annual movements reached a peak.

3.24 The total annual movement figure for 2008 dropped by 7% from the 2007 peak – this can be attributed to the economic downturn and fluctuating oil price. The movement figure declined even further in 2009, by 13%, as the global recession continued to affect the aviation industry.

3.25 The year 2010 saw another fall in traffic for the third year running, this time by 8%. The volcanic ash crisis in April, industrial action in May, adverse winter weather and a continued reduction in demand for leisure travel were some of the factors that caused the decline in traffic.

3.26 Annual traffic dropped by 4% in 2011 and reached a low in 2012 after having fallen for the fifth year in a row, this time by 3%, reflecting the continued reduction in demand for flights over this period. However, 2013 saw the first increase in annual flights (by 2%) following five years of consecutive decline from the 2007 peak. Movements continued to rise by 5-7% each year from 2014 to 2018 as demand returned, although in 2019, they reduced by 1%.

3.27 The year 2020 was greatly impacted by the COVID-19 pandemic, which led to a 57% reduction in annual movements.

Areas and populations

3.28 Up to 1998, areas and populations within the 57 dB $L_{Aeq,16h}$ contour have generally risen in line with movements, but in 1999, despite the high traffic growth, the area fell by 19%. This decrease was attributable to fewer movements of older, noisier, Chapter 2 aircraft – especially those by the BAC 1-11, which fell by 64% in that year.

3.29 Areas generally declined after 2001 following completion of the phase-out of Chapter 2 aircraft. There was a 7% decrease in traffic in 2008 and the area fell by 6%, reducing further in 2009 by 17% and again in 2010 by 7% as total movements dropped. The 2011 and 2012 areas fell to the lowest levels seen at Stansted since 1990 as traffic levels continued to drop. The area decreased

further in 2013 to 20.0 km^2 as summer period traffic decreased, despite the overall movements increase seen over the annual period. Up till then, this was also the smallest 57 dB $L_{Aeq,16h}$ actual contour area calculated for Stansted. (The previous smallest area had been 20.1 km^2 in 1990). However, the contour area increased between 2014 (21.6 km^2) and 2018 (28.5 km^2) as movements rose each year. The 2019 summer saw a halt to the area growth trend as annual movements fell for the first time in 7 years, and the 2019 area was unchanged from 2018.

3.30 The reductions in flights following the COVID-19 pandemic in 2020 meant the contour area in 2020 was the lowest ever recorded, at 11.8 km^2.

3.31 From 2001 to 2008, population counts fluctuated within a range from approximately 2,000 to 2,900. The years with higher proportions of south-westerly movements have tended to produce the higher population counts. In 2009, the shift in modal split to a lower proportion of south-westerly movements along with lower movement numbers caused the population count to dip to 1,500.

3.32 From 2009 to 2013, population counts were relatively steady, albeit reducing as contour areas continued to fall year-on-year. Since 2013, populations have generally risen. In 2014 the population count increased by 32% as the contour extended into some populated areas. This resulted from growth in summer movements and a higher proportion of north-easterly operations, which affected the contour shape. In 2015, a return to a more typical runway modal split led to changes in the contour shape, with the net effect being an unchanged population count. A shift to a higher percentage of south-westerly operations in 2016 led to a 24% population increase as the contour stretched across populated areas such as Thaxted and Little Hallingbury. The population increased by 20% in 2017 as the contour expanded over the same areas following a 10% rise in movements. However, the population fell by 14% in 2018 as a large shift in favour of easterly movements pulled the contour away from Thaxted. The runway modal split reverted to a higher percentage of south-westerly movements in 2019, which meant that the 57 dB contour extended over parts of Thaxted, causing the population count to rise by 19%.

3.33 The population count reduced by 80% in 2020 as the contour area dropped to its lowest ever level.

Supplementary noise metric – N65 day contours

3.34 N65 contours[13] have been produced for the 2020 summer daytime period, using the same modelling input data as the $L_{Aeq,16h}$ actual modal split (71% SW / 29% NE) contours.

3.35 The N65 day actual contours are shown in **Figure B19**, plotted at levels of 20, 50, 100 and 200 events. Estimates of area, population and households within the N65 day actual contours are summarised in **Table 11**.

Table 11 Stansted 2020 summer day actual modal split N65 contours – area, population and household estimates

N65	Area (km^2)	Population	Households
> 20	99.9	14,250	5,500
> 50	44.9	6,750	2,650
> 100	15.4	1,050	400
> 200	0.2	0	0
> 500	0.0	0	0

Note: Populations and households are given to the nearest 50. The 2020 summer day actual runway modal split was 71% SW / 29% NE.

3.36 The 2020 summer day actual N65 20-event contour enclosed an area of 99.9 km^2 (2019: 171.8 km^2) and a population of 14,250 (2019: 22,800). The area decrease was predominantly the result of substantial movement decreases following the COVID-19 global pandemic, and to a smaller extent to lower measured departure L_{Amax} noise levels for the noise dominant ANCON type B738, as described in section 2.14.

3.37 Estimates of the cumulative numbers of noise sensitive buildings within the 2020 summer day actual N65 contours are provided in **Table 12**.

[13] N65 contours show the number of aircraft noise events exceeding 65 dB L_{Amax}.

Table 12 Stansted 2020 summer day actual modal split N65 contours – noise sensitive building estimates

N65	Schools	Hospitals	Places of worship
> 20	13	0	16
> 50	7	0	8
> 100	1	0	2
> 200	0	0	0
> 500	0	0	0

3.38 N65 contours have also been produced for the 2020 summer day standard modal split (73% SW / 27% NE) and they are shown in **Figure B20**, plotted at levels of 20, 50, 100 and 200 events. Estimates of area, population and households within the N65 summer day standard contours are summarised in **Table 13**.

Table 13 Stansted 2020 summer day standard modal split N65 contours – area, population and household estimates

N65	Area (km^2)	Population	Households
> 20	99.6	14,400	5,550
> 50	45.0	6,800	2,700
> 100	15.4	1,050	400
> 200	0.2	0	0
> 500	0.0	0	0

Note: Populations and households are given to the nearest 50. The 2020 summer day standard runway modal split was 73% SW / 27% NE.

3.39 The 2020 summer day standard N65 20-event contour enclosed an area of 99.6 km^2 (2019: 173.7 km^2) and a population of 14,400 (2019: 23,150). The area decrease was predominantly the result of substantial movement decreases following the COVID-19 global pandemic, and to a smaller extent to lower measured departure L_{Amax} noise levels for the noise dominant ANCON type B738, as described in section 2.14.

3.40 Estimates of the cumulative numbers of noise sensitive buildings within the 2020 summer day standard N65 contours are provided in **Table 14**.

Table 14 Stansted 2020 summer day standard modal split N65 contours – noise sensitive building estimates

N65	Schools	Hospitals	Places of worship
> 20	13	0	16
> 50	7	0	8
> 100	1	0	2
> 200	0	0	0
> 500	0	0	0

Chapter 4
Conclusions

4.1 Year 2020 average summer day $L_{Aeq,16h}$ and night $L_{Aeq,8h}$ noise exposure contours have been generated for Stansted Airport using the ANCON noise model.

4.2 Movements over the 2020 summer day period fell by 58% from 2019 following the COVID-19 global pandemic. The 2020 average summer day actual modal split (71% south-west / 29% north-east) 54 dB $L_{Aeq,16h}$ contour area decreased by 58% to 22.3 km^2 (2019: 53.4 km^2). The population enclosed within this contour was 1,550, a 79% reduction from the previous year (2019: 7,350).

4.3 The 2020 average summer day standard modal split (73% south-west / 27% north-east) 54 dB $L_{Aeq,16h}$ contour area decreased by 58% to 22.3 km^2 (2019: 53.1 km^2). The 57 dB $L_{Aeq,16h}$ contour area was 11.8 km^2, the lowest ever recorded, and below the 33.9 km^2 limit imposed by the Stansted Planning Condition AN1. The population count of 1,500 within the 2020 summer day standard 54 dB $L_{Aeq,16h}$ contour was 79% lower than in 2019 (7,300).

4.4 Movements over the 2020 summer night period fell by 58% from 2019. The 2020 average summer night actual modal split (69% south-west / 31% north-east) 48 dB $L_{Aeq,8h}$ contour enclosed an area of 32.9 km^2, which was 54% lower than the previous year (2019: 72.2 km^2). The population count of 4,100 within this contour was 59% lower than in 2019 (9,950).

4.5 Supplementary noise metric N65 contours have also been produced for the 2020 average summer 16-hour day period. The area of the N65 20-event actual modal split contour was 99.9 km^2 (2019: 171.8 km^2), enclosing a population of 14,250 (2019: 22,800). The N65 20-event contour assuming the standard modal split was 99.6 km^2 (2019: 173.7 km^2), with a population count of 14,400 (2019: 23,150).

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.
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4. Department for Transport, *Aviation Policy Framework*, Cm 8584, March 2013.
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6. Ollerhead J B, Rhodes D P, Viinikainen M S, Monkman D J, Woodley A C, *The UK Civil Aircraft Noise Contour Model ANCON: Improvements in Version 2*, R&D Report 9842, June 1999.
7. European Civil Aviation Conference, *Report on Standard Method of Computing Noise Contours around Civil Airports*, ECAC.CEAC Doc 29, Fourth edition, December 2016.
8. Civil Aviation Authority, *Noise Monitor Positions at Heathrow, Gatwick and Stansted Airports*, CAP 1149, Sixth edition, March 2020.
9. ISO 20906:2009 *Acoustics - Unattended monitoring of aircraft sound in the vicinity of airports*.

APPENDIX B

Figures

Figure B1 Stansted Airport and the surrounding area

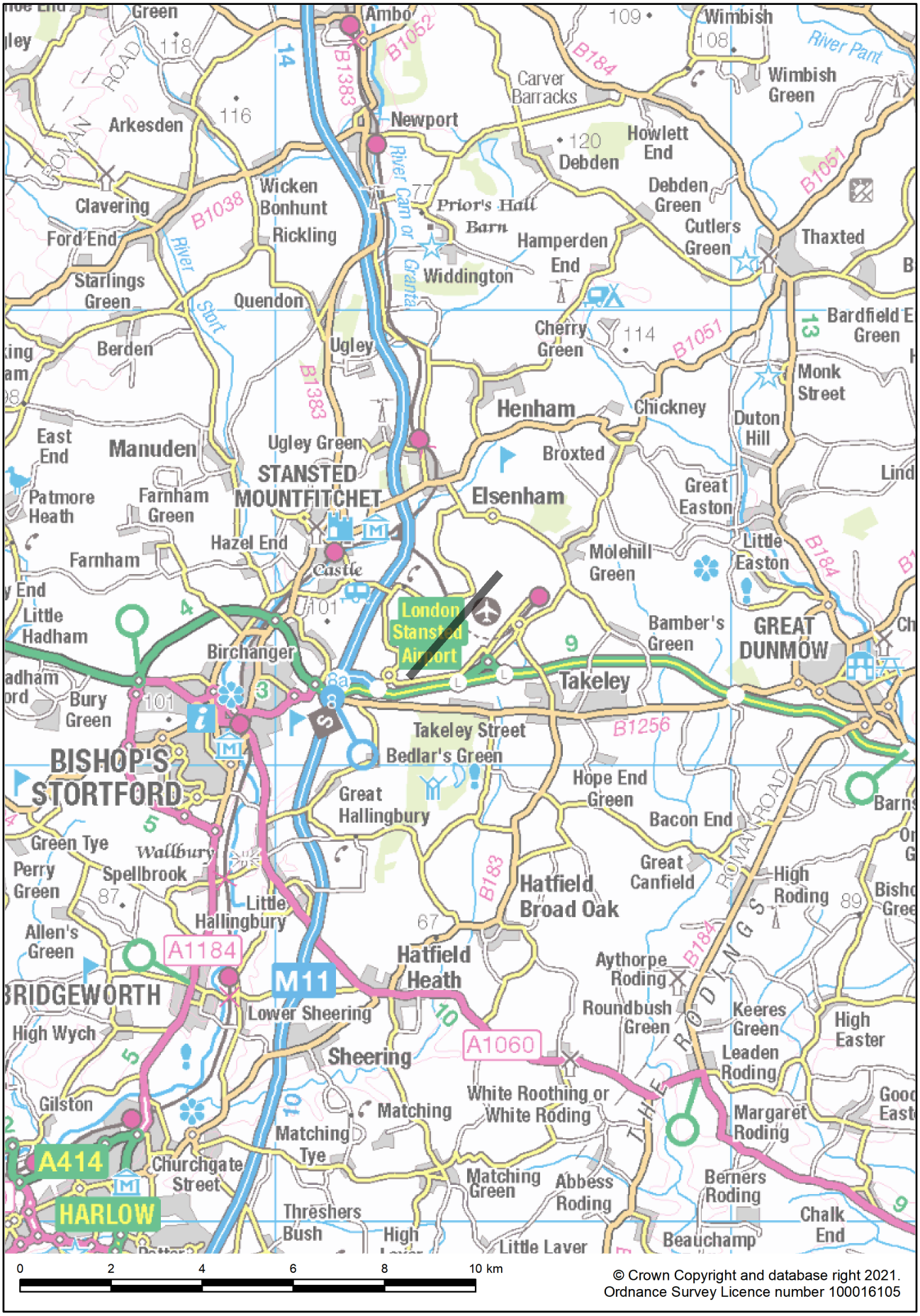


Figure B2 Stansted Airport layout

Figure B3 Stansted NPR/SID routes

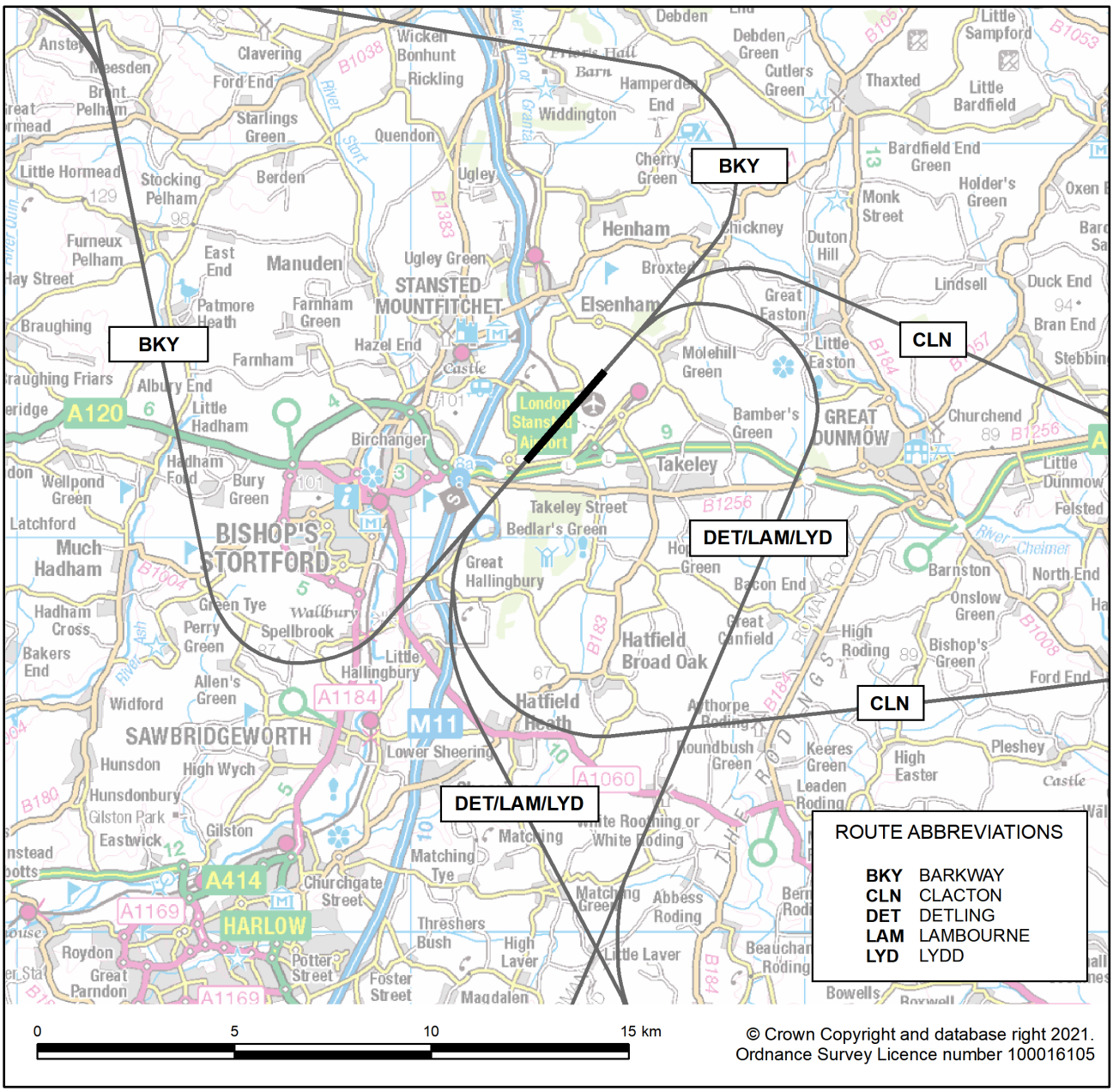


Figure B4 Typical Stansted radar flight tracks

Figure B5 Stansted 2020 average summer day movements by ANCON type

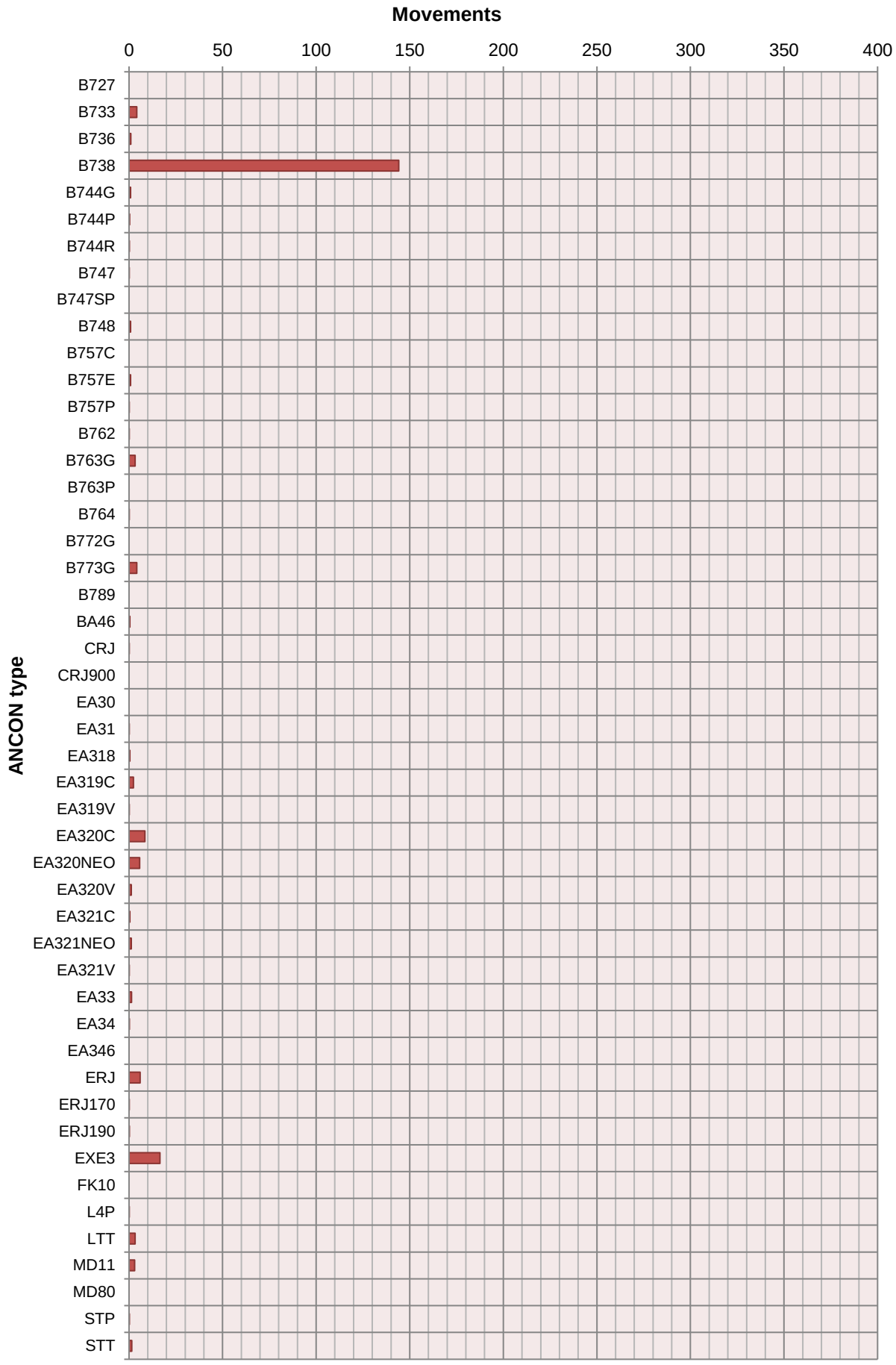


Figure B6 Stansted 2020 average summer night movements by ANCON type

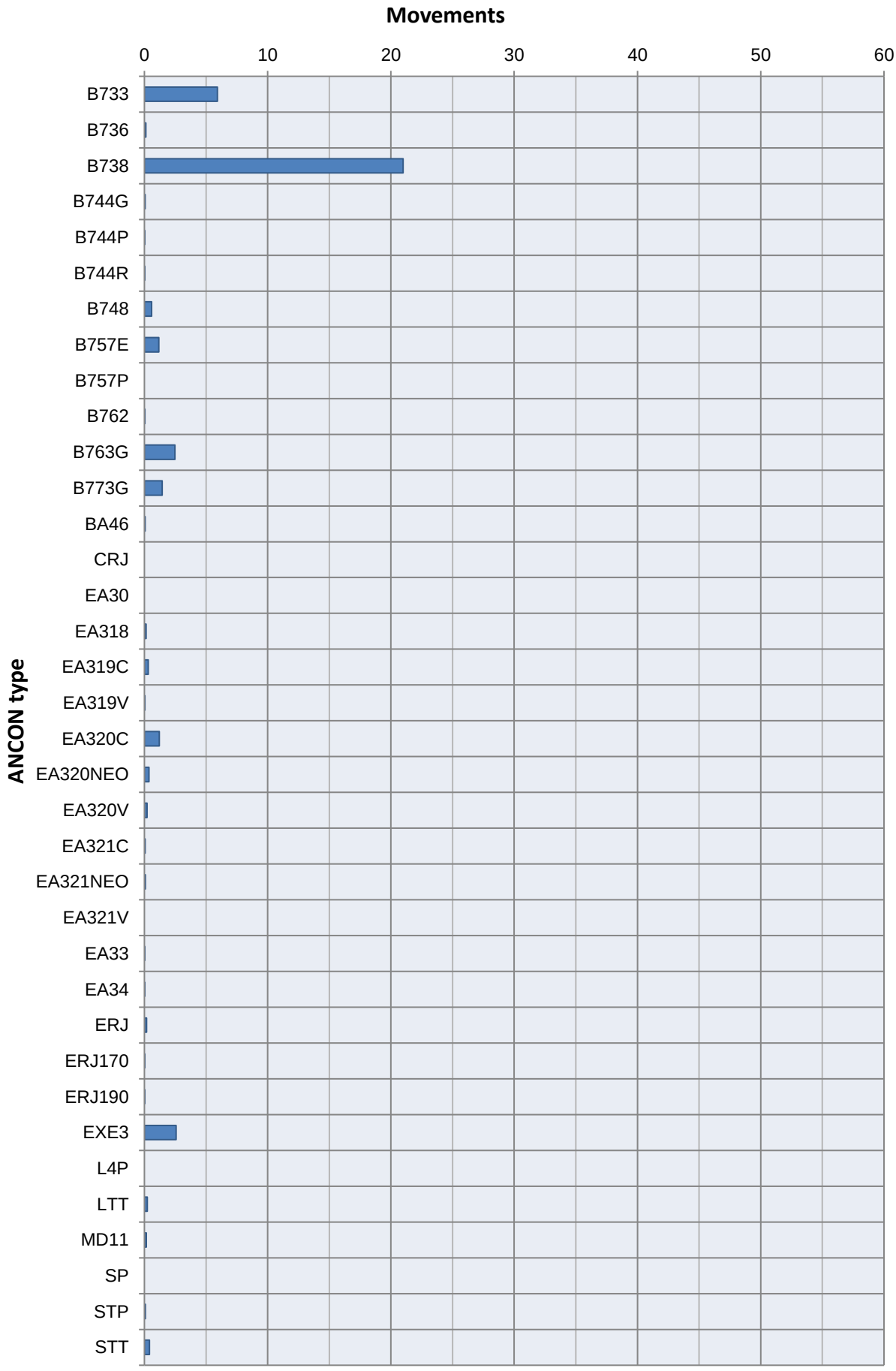


Figure B7 Stansted 2020 summer day departure traffic distributions by NPR/SID

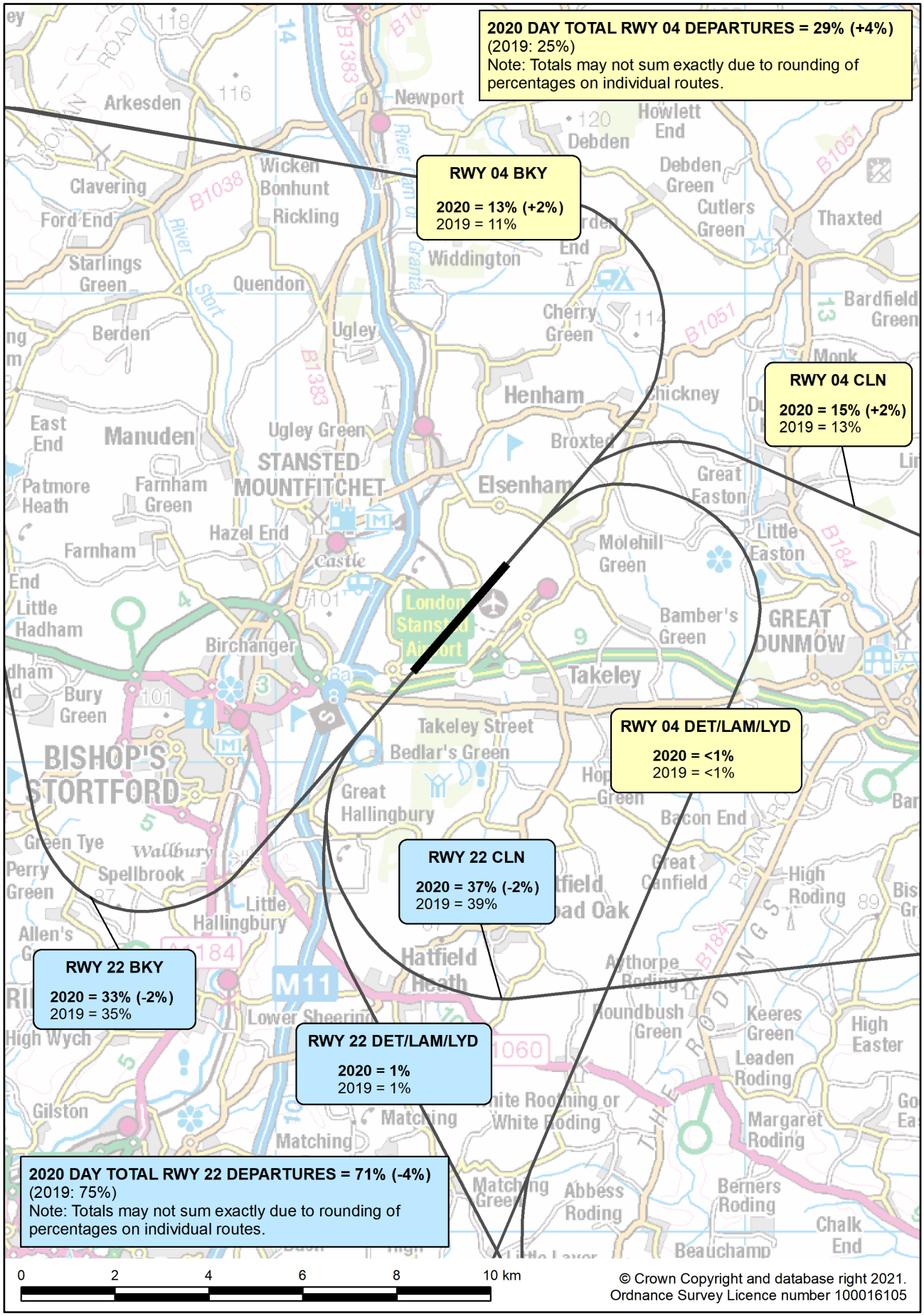


Figure B8 Stansted 2020 summer night departure traffic distributions by NPR/SID

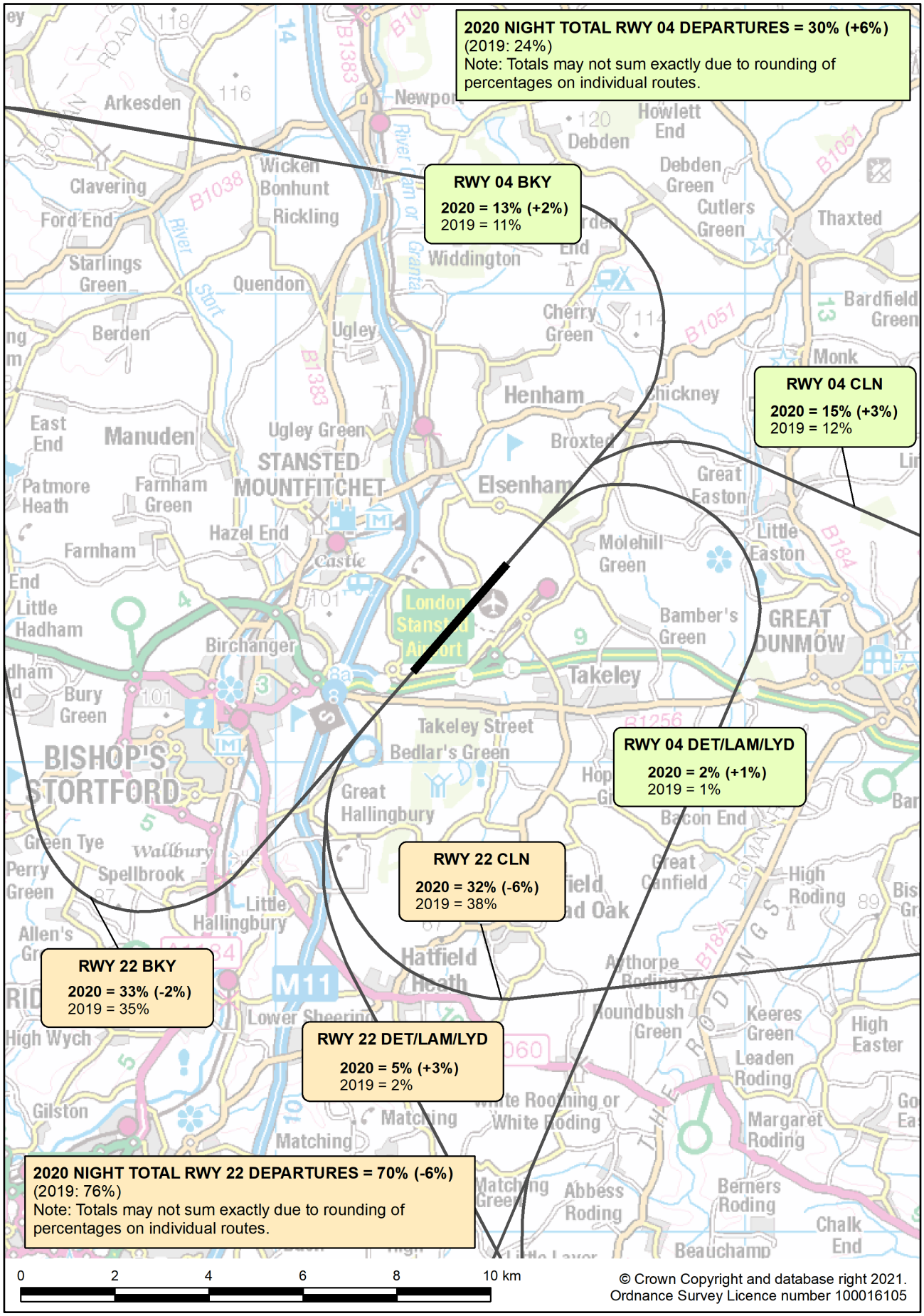


Figure B9 Stansted summer day modal splits 2001-2020

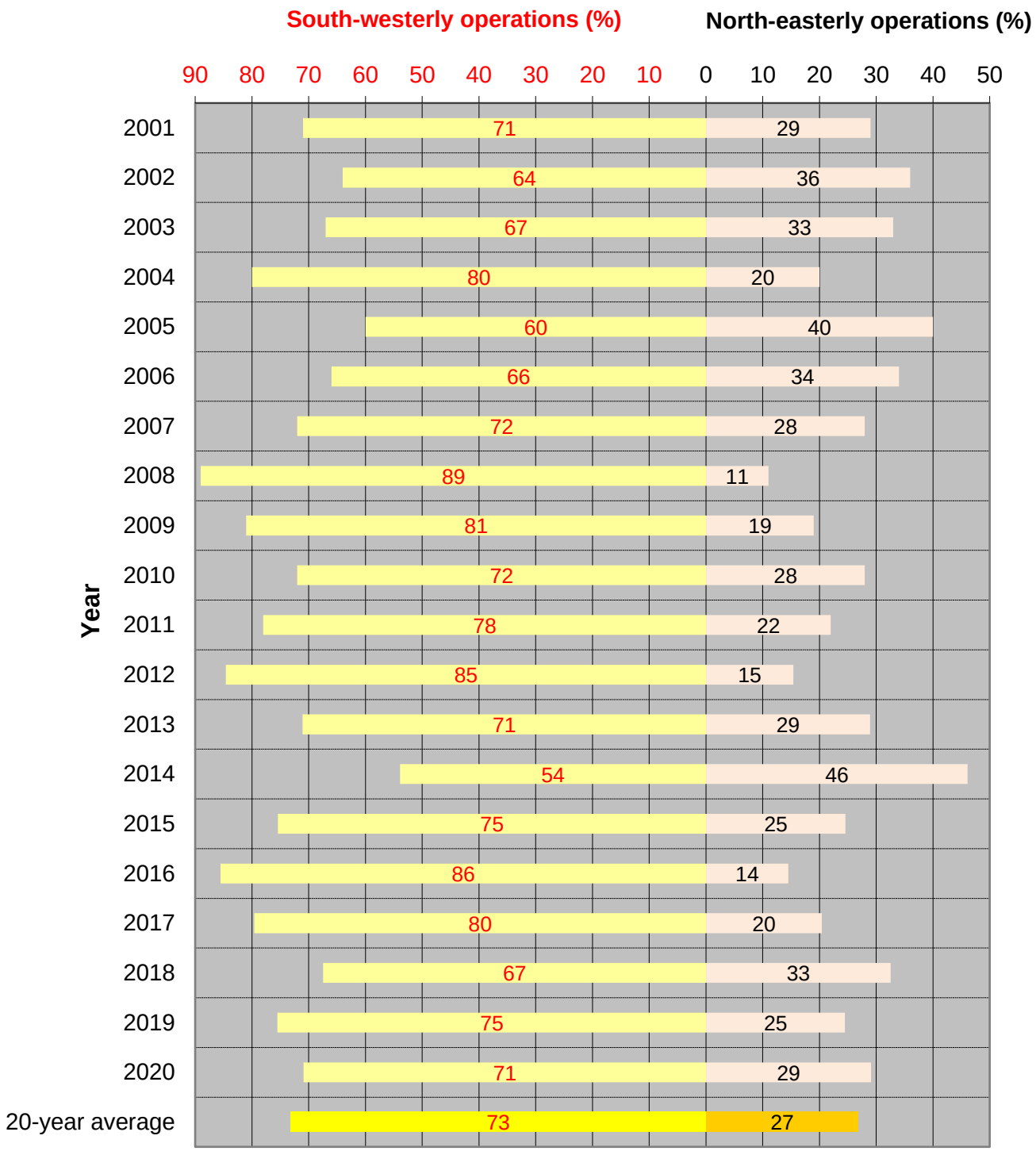


Figure B10 Terrain heights around Stansted Airport

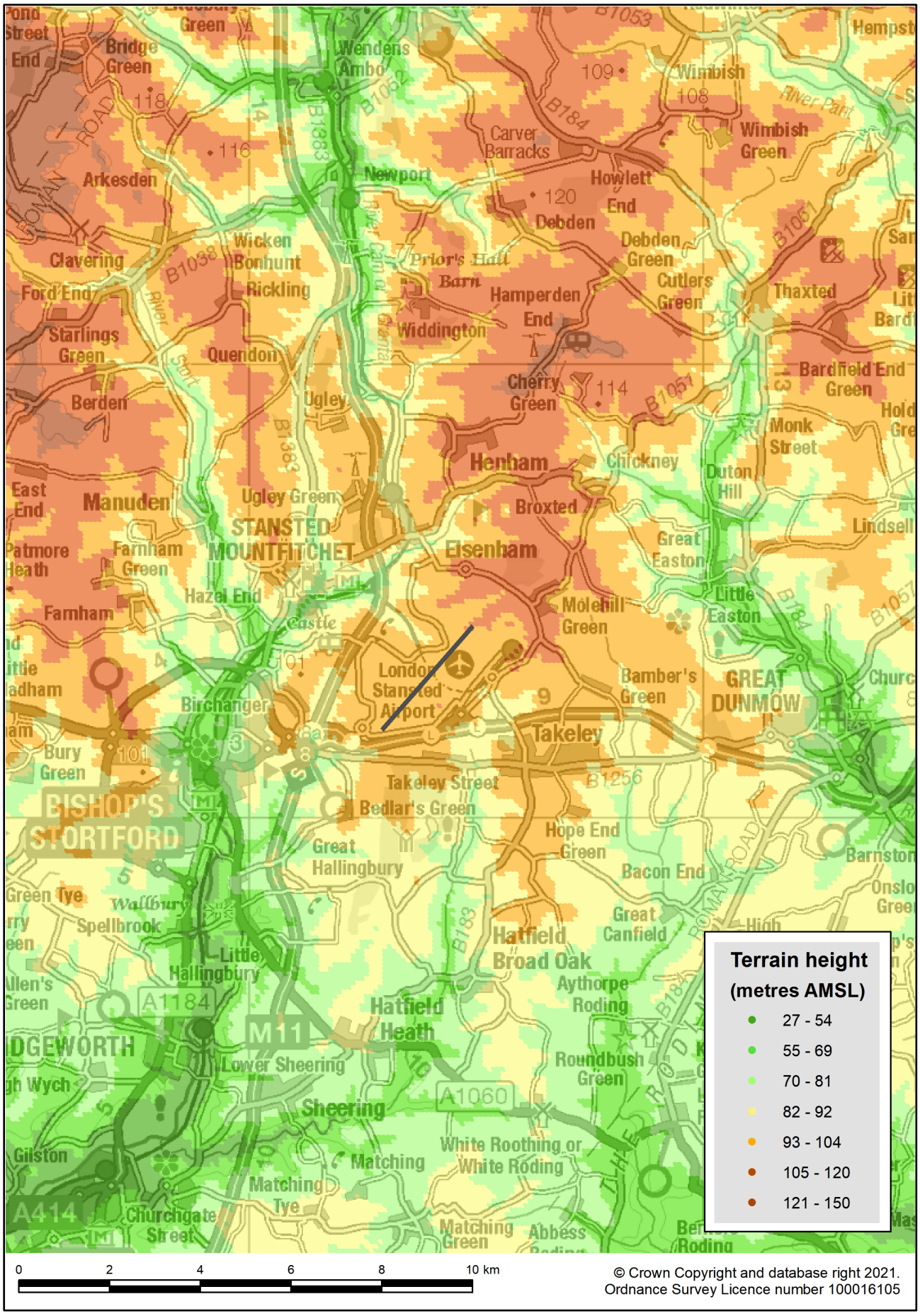


Figure B11 Population data points around Stansted Airport

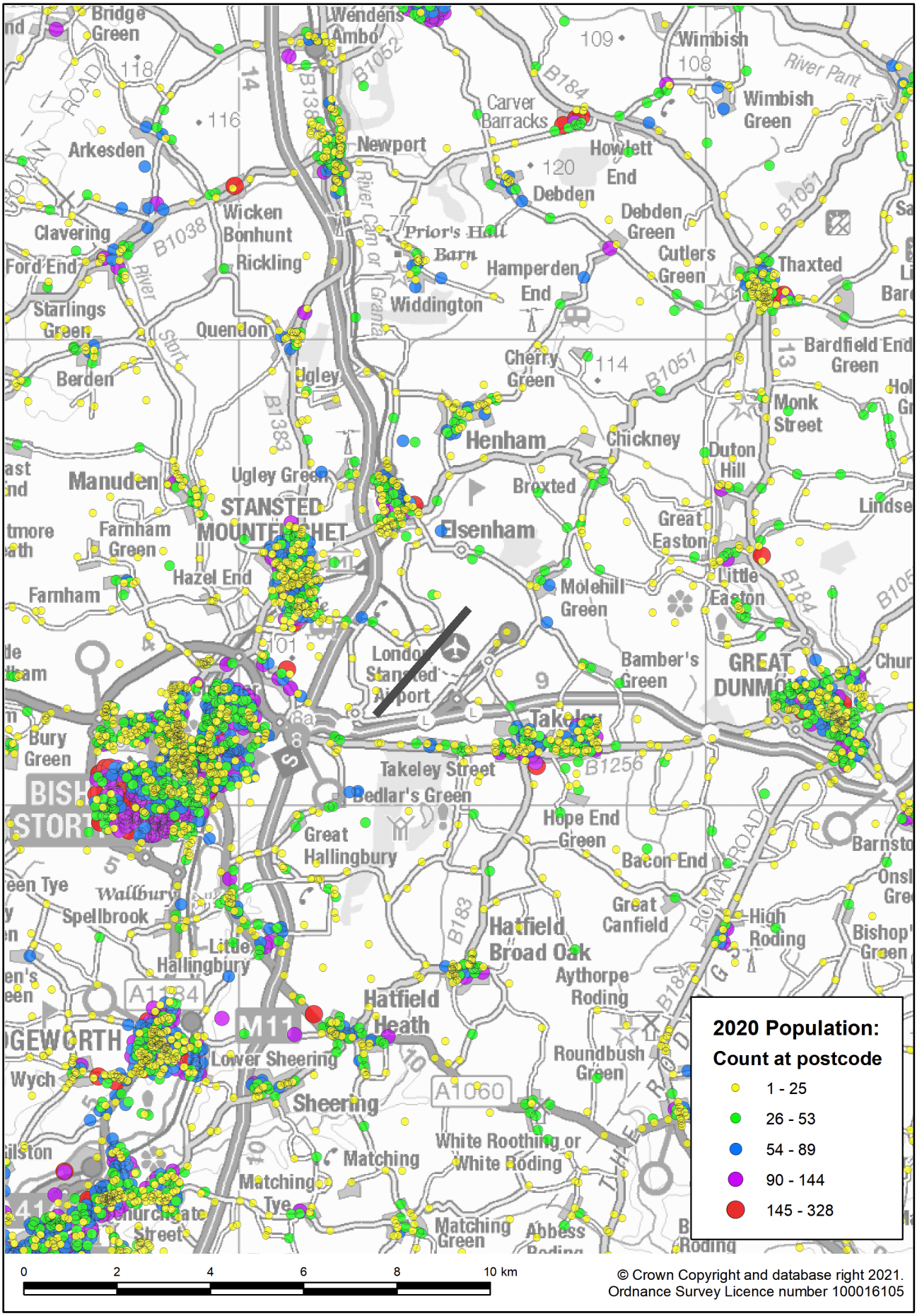


Figure B12 Stansted 2020 summer day actual modal split (71% SW / 29% NE) $L_{Aeq,16h}$ contours

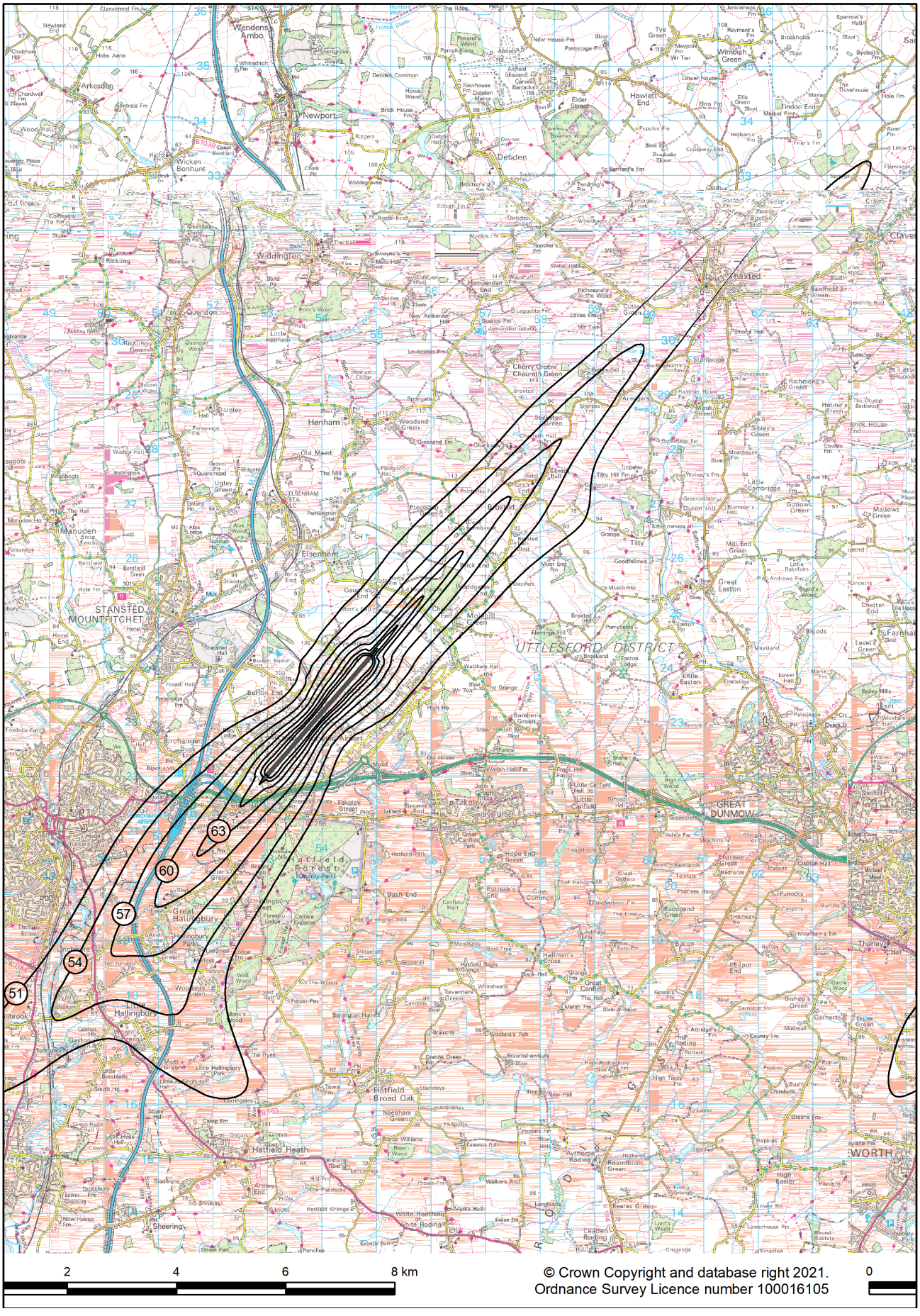


Figure B13 Stansted 2020 summer night actual modal split (69% SW / 31% NE) $L_{Aeq,8h}$ contours

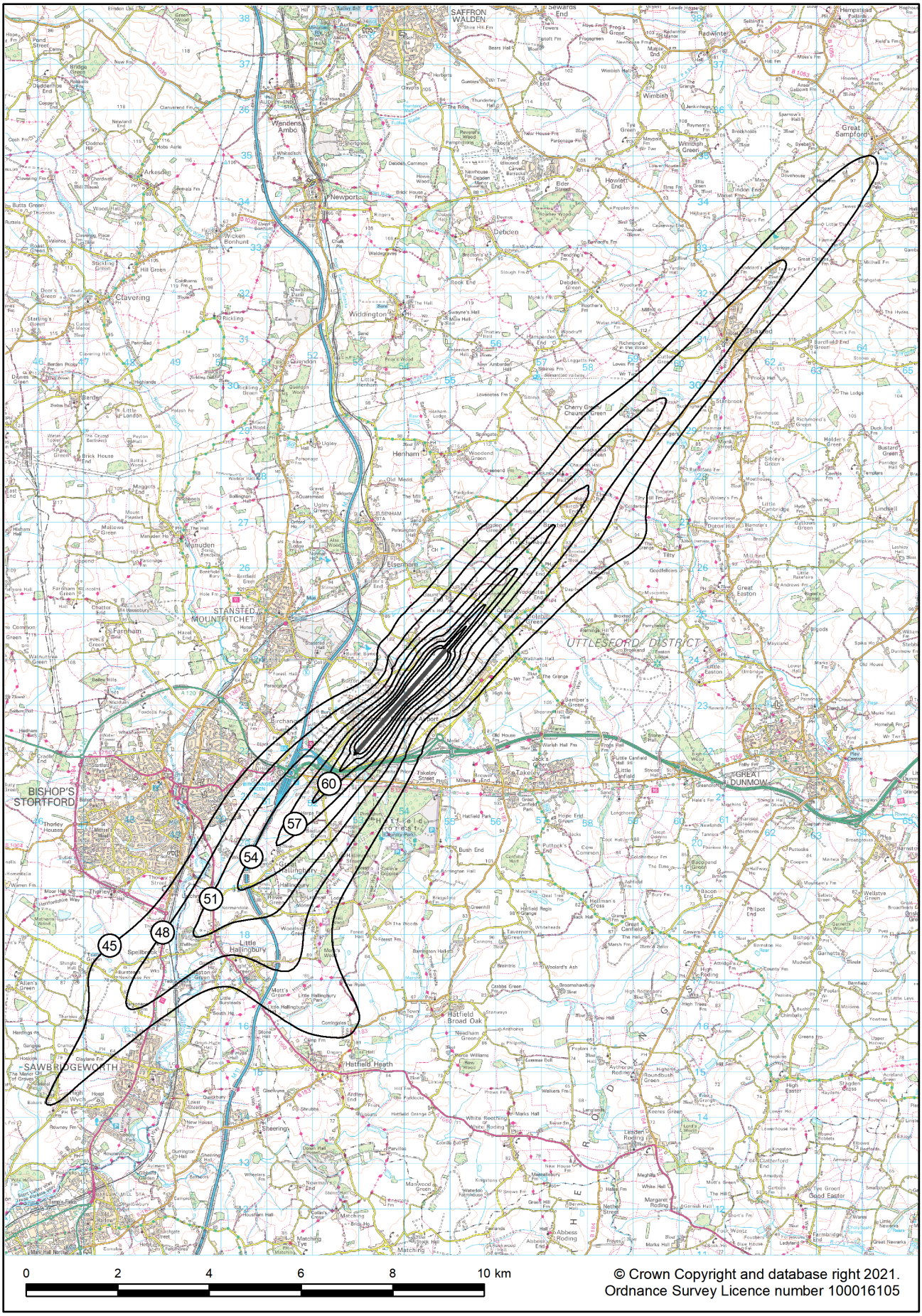


Figure B14 Stansted 2020 summer day standard modal split (73% SW / 27% NE) $L_{Aeq,16h}$ contours

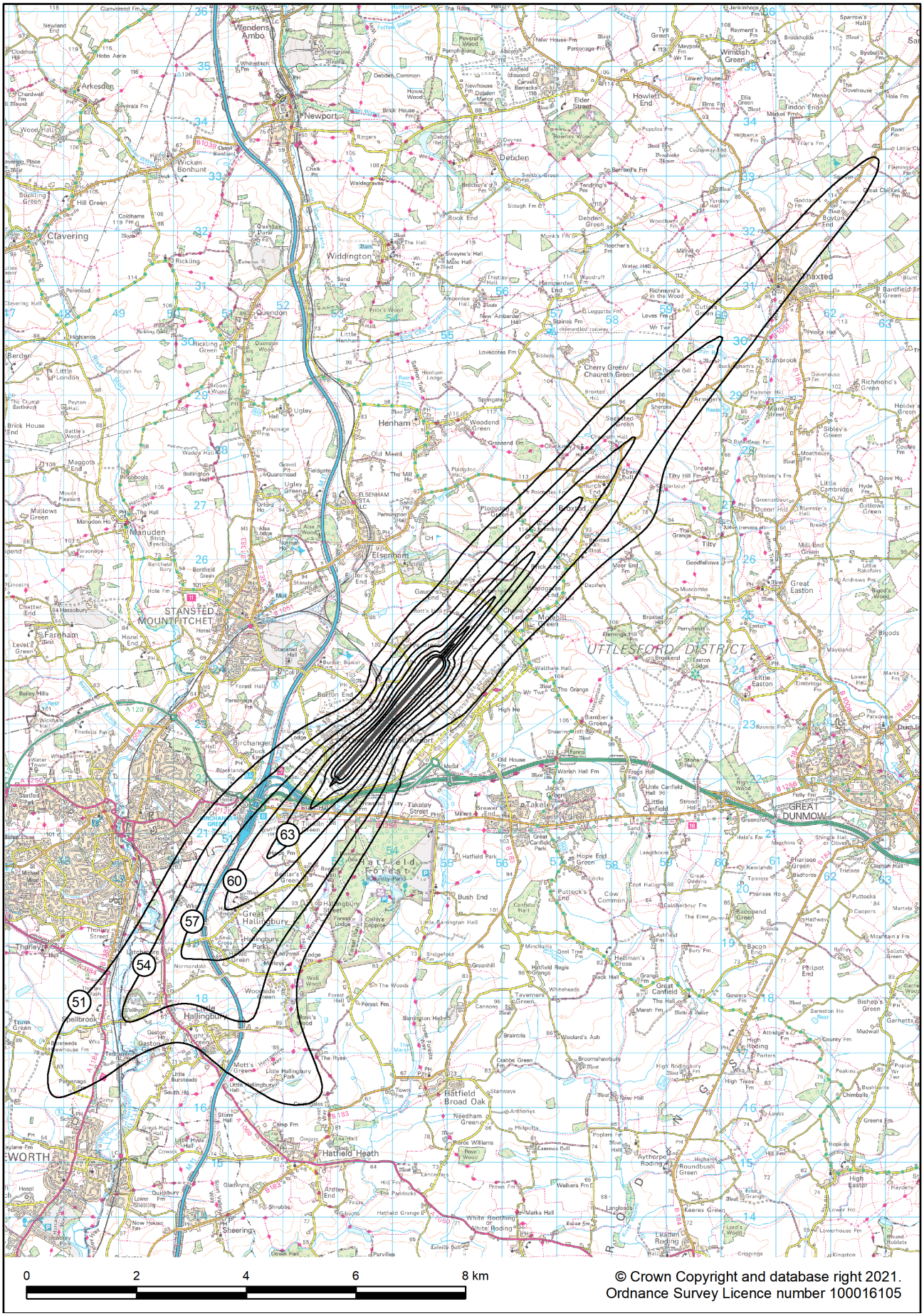


Figure B15 Stansted summer day actual modal split 2020 (71% SW / 29% NE) and 2019 (75% SW / 25% NE) $L_{Aeq,16h}$ contours

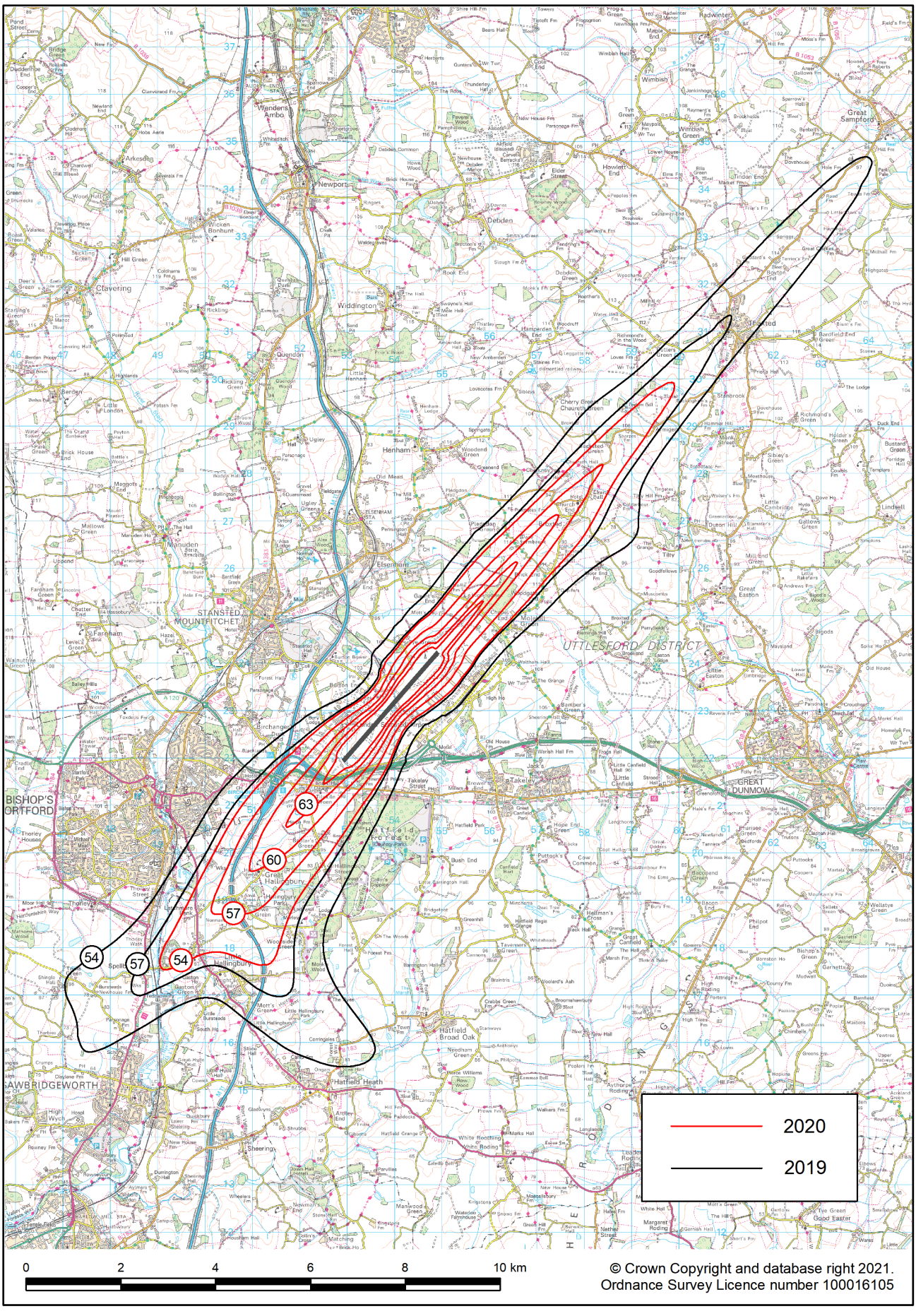


Figure B16 Stansted summer night actual modal split 2020 (69% SW / 31% NE) and 2019 (75% SW / 25% NE) $L_{Aeq,8h}$ contours

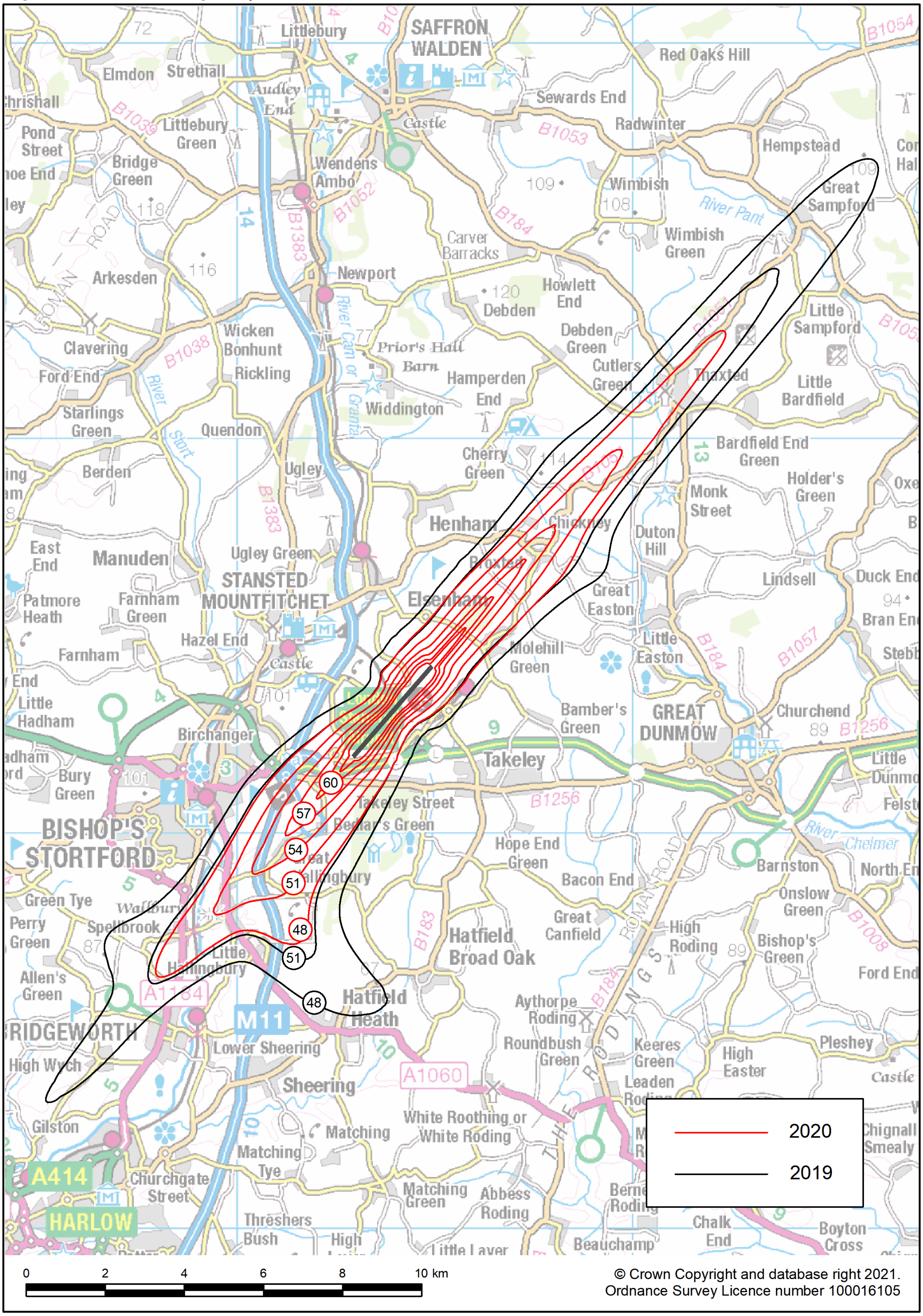
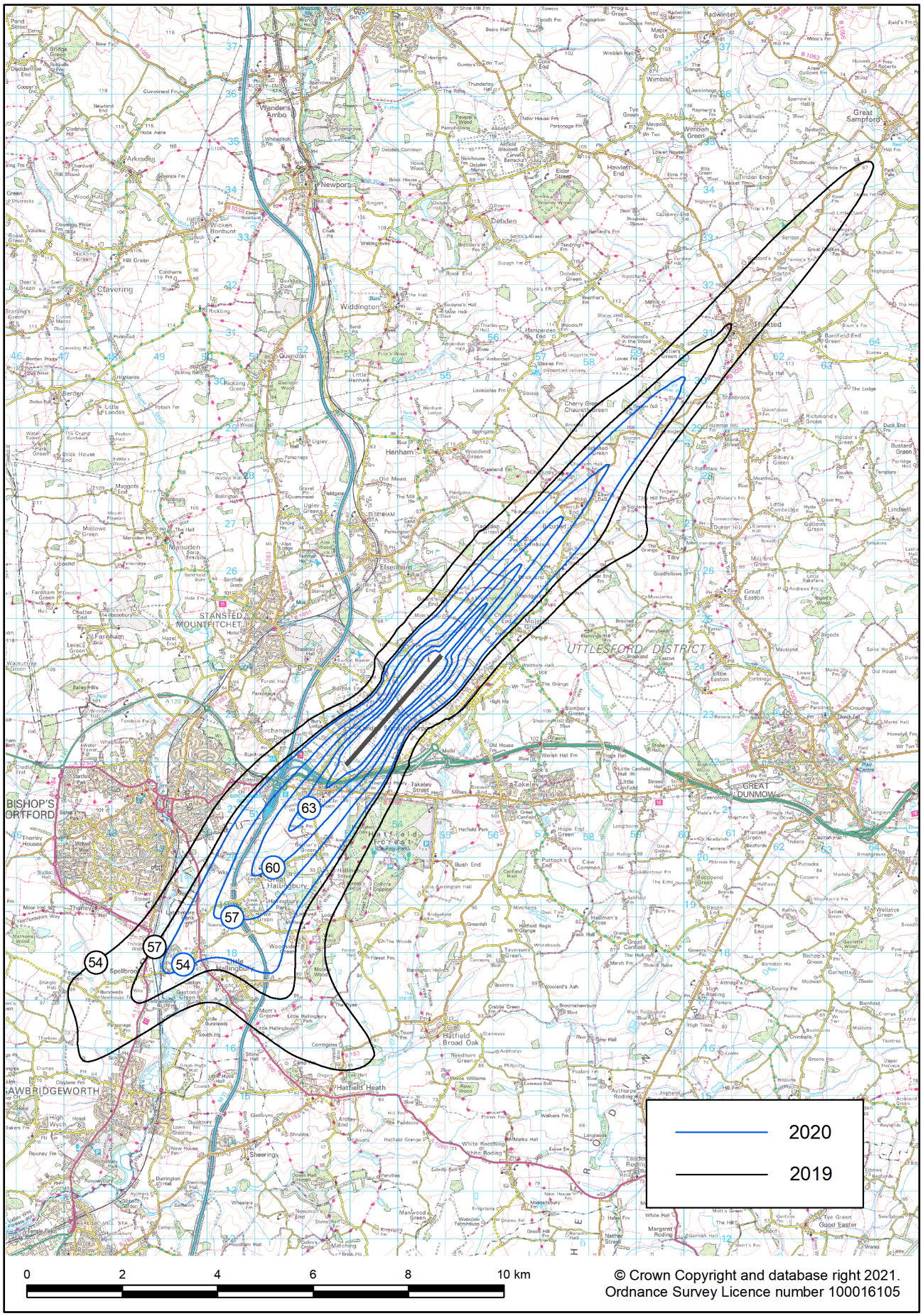


Figure B17 Stansted summer day standard modal split 2020 (73% SW / 27% NE) and 2019 (73% SW / 27% NE) $L_{Aeq,16h}$ contours



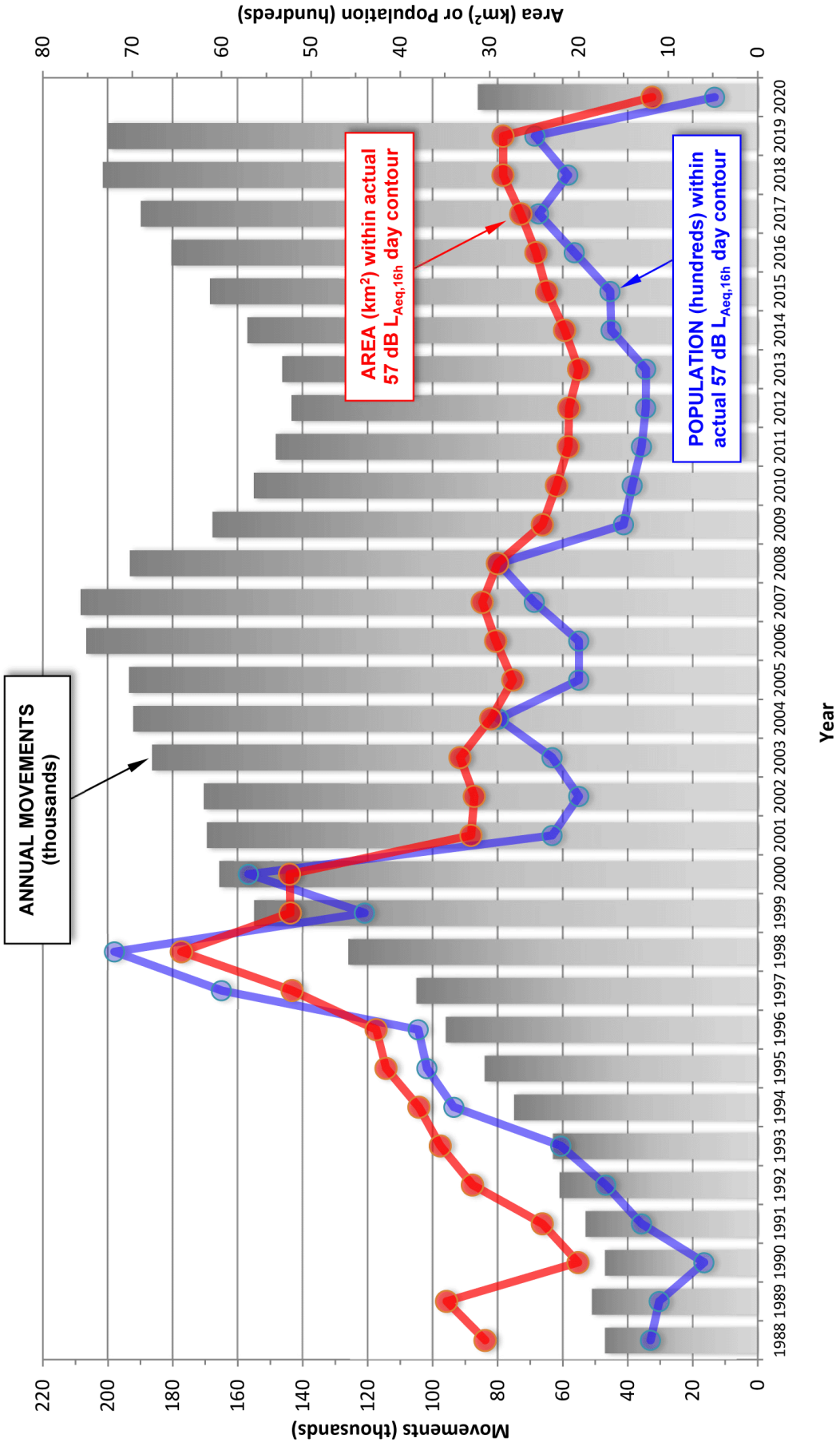


Figure B18 Stansted 1988-2020 annual traffic and summer day $L_{Aeq,16h}$ noise contour area/population trends

Figure B19 Stansted 2020 summer day actual modal split (71% SW / 29% NE) N65 contours

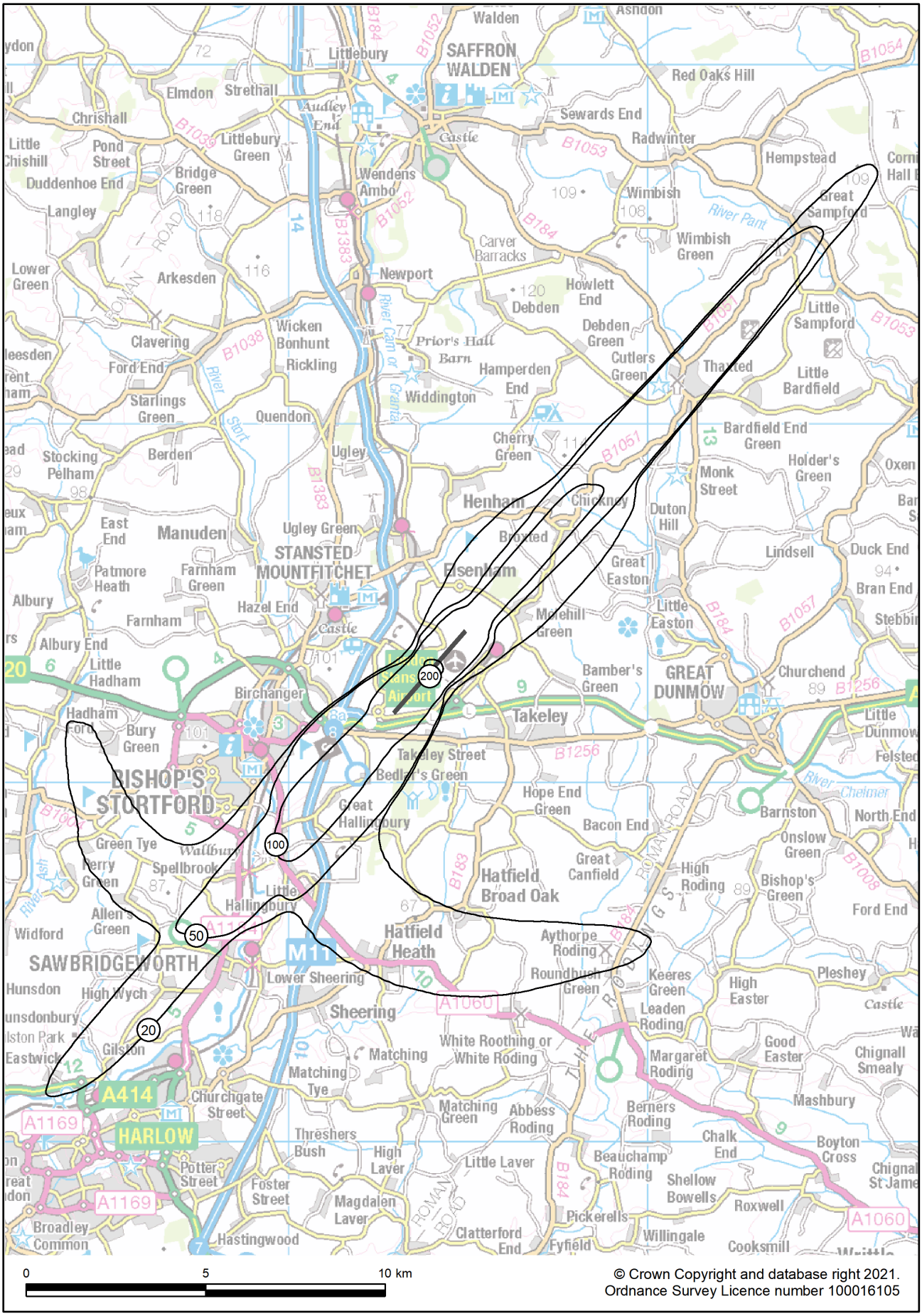
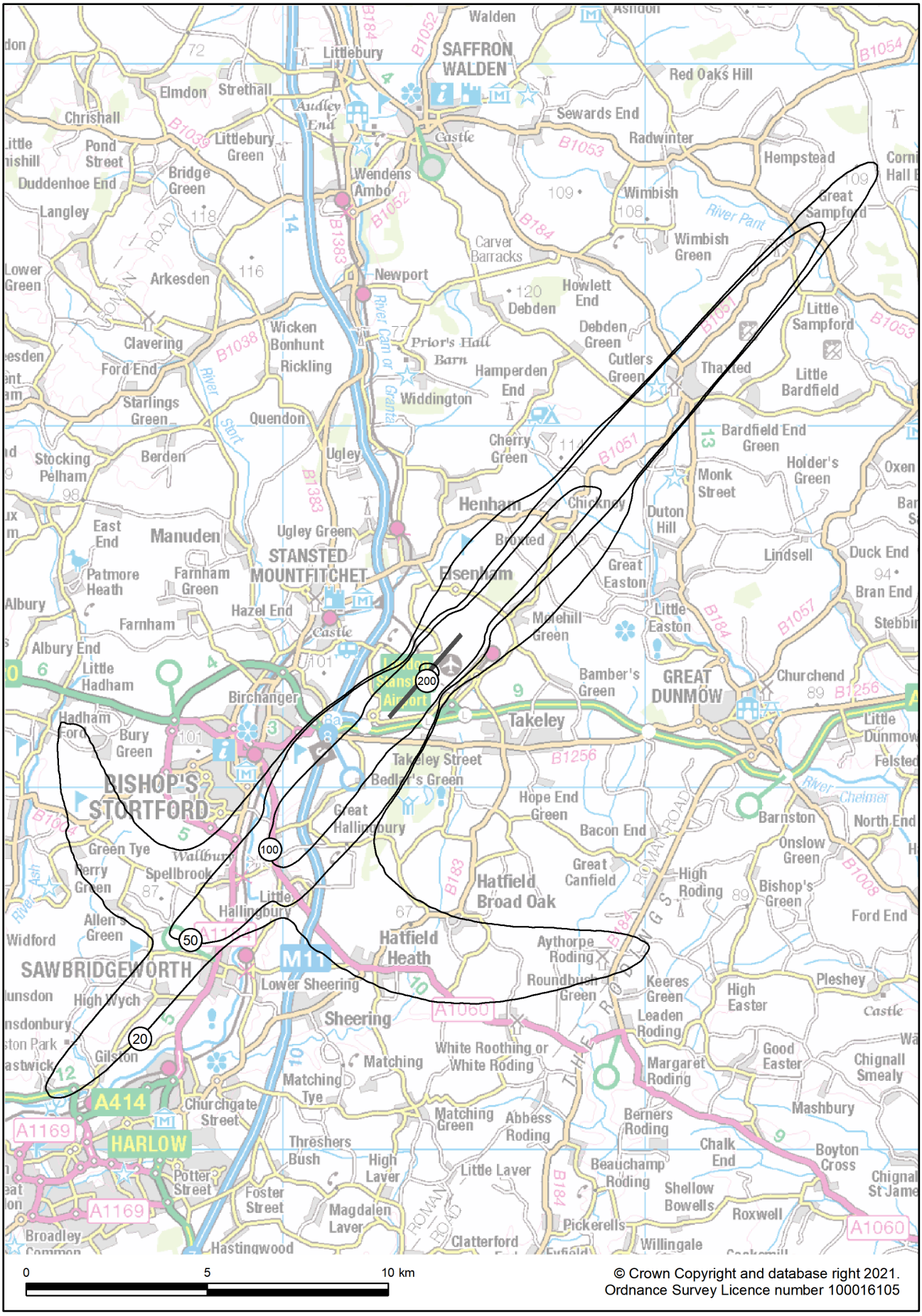


Figure B20 Stansted 2020 summer day standard modal split (73% SW / 27% NE) N65 contours



APPENDIX C

Tables

Table C1 Stansted 2019 and 2020 average summer day movements by ANCON type

ANCON type	2019 departures	2019 arrivals	2019 total	2020 departures	2020 arrivals	2020 total	Change departures	Change arrivals	Change total
B727	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	-0.1
B733	2.9	1.9	4.8	2.7	1.6	4.2	-0.2	-0.4	-0.6
B736	0.7	0.7	1.4	0.5	0.5	0.9	-0.3	-0.2	-0.5
B738	182.5	170.4	352.9	72.7	71.5	144.2	-109.7	-99.0	-208.7
B744G	0.7	0.7	1.4	0.4	0.4	0.8	-0.3	-0.3	-0.6
B744P	0.4	0.4	0.8	0.2	0.1	0.3	-0.2	-0.3	-0.5
B744R	0.1	0.1	0.2	0.1	0.1	0.2	0.0	0.0	0.0
B747	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1
B747SP	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	-0.1
B748	0.4	0.4	0.8	0.7	0.2	0.9	0.3	-0.2	0.1
B757C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B757E	2.0	1.4	3.3	0.5	0.3	0.9	-1.4	-1.0	-2.5
B757P	0.5	0.0	0.6	0.0	0.0	0.0	-0.5	0.0	-0.5
B762	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B763G	2.5	1.8	4.3	1.8	1.4	3.3	-0.6	-0.3	-1.0
B763P	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	-0.1
B764	0.2	0.2	0.3	0.0	0.0	0.1	-0.1	-0.1	-0.3
B772G	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B773G	3.6	3.3	7.0	2.2	2.0	4.2	-1.4	-1.4	-2.8
B789	0.1	0.1	0.1	0.0	0.0	0.0	-0.1	-0.1	-0.1
BA46	0.3	0.2	0.5	0.2	0.2	0.4	-0.1	0.0	-0.1
CRJ	0.2	0.1	0.3	0.0	0.0	0.1	-0.1	-0.1	-0.2
CRJ900	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EA30	0.1	0.1	0.3	0.0	0.0	0.0	-0.1	-0.1	-0.3
EA31	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
EA318	0.2	0.2	0.3	0.3	0.2	0.4	0.1	0.0	0.1
EA319C	17.0	16.6	33.6	1.2	1.2	2.4	-15.8	-15.4	-31.2
EA319V	1.4	1.3	2.7	0.1	0.1	0.1	-1.3	-1.3	-2.6
EA320C	12.0	11.3	23.2	4.4	4.0	8.4	-7.6	-7.2	-14.8
EA320NEO	2.6	2.7	5.3	2.7	3.0	5.7	0.1	0.3	0.4
EA320V	3.0	2.4	5.4	0.7	0.6	1.3	-2.3	-1.8	-4.2
EA321C	6.7	4.7	11.4	0.2	0.3	0.5	-6.5	-4.4	-10.9
EA321NEO	0.3	0.3	0.6	0.6	0.6	1.2	0.3	0.3	0.6
EA321V	2.4	1.7	4.0	0.0	0.0	0.0	-2.3	-1.7	-4.0
EA33	0.7	0.8	1.5	0.7	0.7	1.3	-0.1	-0.1	-0.2
EA34	0.1	0.1	0.2	0.1	0.1	0.2	0.0	0.0	-0.1
EA346	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	-0.1

ANCON type	2019 departures	2019 arrivals	2019 total	2020 departures	2020 arrivals	2020 total	Change departures	Change arrivals	Change total
ERJ	3.1	2.9	6.0	3.0	2.9	5.9	-0.1	0.1	-0.1
ERJ170	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	-0.1
ERJ190	0.9	1.1	2.0	0.1	0.1	0.2	-0.8	-1.0	-1.8
EXE3	11.6	11.1	22.6	8.3	8.2	16.5	-3.3	-2.8	-6.1
FK10	0.1	0.1	0.1	0.0	0.0	0.0	-0.1	-0.1	-0.1
L4P	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1
LTT	4.7	5.1	9.7	1.5	1.7	3.2	-3.2	-3.3	-6.5
MD11	1.0	1.0	2.0	1.5	1.6	3.1	0.5	0.6	1.0
MD80	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	-0.1
STP	0.1	0.1	0.1	0.1	0.1	0.2	0.0	0.1	0.1
STT	0.9	0.9	1.8	0.7	0.7	1.5	-0.2	-0.1	-0.3
Total	**266.0**	**246.3**	**512.2**	**108.3**	**104.6**	**212.9**	**-157.7**	**-141.7**	**-299.4**
							(-59%)	(-58%)	(-58%)

Note: Changes have been calculated before rounding.

Table C2 Stansted 2019 and 2020 average summer night movements by ANCON type

ANCON type	2019 departures	2019 arrivals	2019 total	2020 departures	2020 arrivals	2020 total	Change departures	Change arrivals	Change total
B733	2.4	3.4	5.9	2.4	3.5	5.9	0.0	0.1	0.0
B736	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0
B738	21.7	33.5	55.2	9.9	11.1	21.0	-11.8	-22.4	-34.2
B744G	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
B744P	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B744R	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B748	0.0	0.1	0.1	0.0	0.6	0.6	0.0	0.5	0.5
B757E	1.1	1.8	2.9	0.5	0.7	1.2	-0.6	-1.1	-1.7
B757P	0.1	0.6	0.7	0.0	0.0	0.0	-0.1	-0.6	-0.7
B762	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B763G	1.3	2.0	3.3	1.0	1.4	2.5	-0.3	-0.5	-0.8
B773G	0.6	0.9	1.5	0.6	0.9	1.4	0.0	0.0	-0.1
BA46	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
CRJ	0.0	0.1	0.1	0.0	0.0	0.0	0.0	-0.1	-0.1
EA30	0.1	0.1	0.2	0.0	0.0	0.0	-0.1	-0.1	-0.2
EA318	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.1	0.1
EA319C	3.1	3.7	6.8	0.2	0.1	0.3	-2.9	-3.6	-6.5
EA319V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EA320C	1.8	2.6	4.4	0.5	0.7	1.2	-1.3	-1.9	-3.2
EA320NEO	0.4	0.2	0.6	0.4	0.0	0.4	0.0	-0.2	-0.3
EA320V	0.2	0.8	1.0	0.1	0.1	0.2	-0.1	-0.7	-0.8
EA321C	0.9	2.8	3.7	0.0	0.0	0.1	-0.8	-2.8	-3.6
EA321NEO	0.1	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.0
EA321V	0.3	0.9	1.2	0.0	0.0	0.0	-0.3	-0.9	-1.2
EA33	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EA34	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ERJ	0.0	0.2	0.3	0.1	0.1	0.2	0.0	-0.1	-0.1
ERJ170	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ERJ190	0.3	0.2	0.5	0.0	0.0	0.0	-0.3	-0.1	-0.5
EXE3	1.2	1.8	3.1	1.2	1.3	2.6	0.0	-0.5	-0.5
L4P	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LTT	0.4	0.0	0.4	0.2	0.0	0.2	-0.2	0.0	-0.2
MD11	0.0	0.0	0.0	0.2	0.0	0.2	0.1	0.0	0.1
SP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
STP	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0
STT	0.1	0.2	0.3	0.2	0.2	0.4	0.1	0.1	0.2
Total	**36.4**	**56.2**	**92.7**	**17.8**	**21.1**	**38.9**	**-18.6**	**-35.2**	**-53.7**

ANCON type	2019 departures	2019 arrivals	2019 total	2020 departures	2020 arrivals	2020 total	Change departures	Change arrivals	Change total
							(-51%)	(-63%)	(-58%)

Note: Changes have been calculated before rounding.

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
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
CRJ900	Bombardier CRJ900 series

ANCON type	Description
DC87	McDonnell Douglas DC-8-70 series
DC10	McDonnell Douglas DC-10
EA221	Airbus A220-100
EA223	Airbus A220-300
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
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
SP	Single propeller

ANCON type	Description
STP	Small twin-piston
STT	Small twin-turboprop
TU54	Tupolev Tu-154

Glossary

Glossary	
AIP	Aeronautical Information Publication
AMSL	Above mean sea level
ANCON	The UK civil aircraft noise contour model, developed and maintained by ERCD.
ATC	Air Traffic Control
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)
ERCD	Environmental Research and Consultancy Department
ICAO	International Civil Aviation Organization
$L_{Aeq,16h}$	Equivalent A-weighted sound level of aircraft noise for the 16-hour daytime period (0700-2300 local time)
$L_{Aeq,8h}$	Equivalent A-weighted sound level of aircraft noise for the 8-hour night-time period (2300-0700 local time)
L_{eq}	Equivalent sound level of aircraft noise, often called ‘equivalent continuous sound level’.
L_{Amax}	A-weighted maximum sound level of a noise event.
LOAEL	Lowest Observed Adverse Effect Level
N65	Number of aircraft noise events exceeding 65 dB L_{Amax}.
NPD	Noise-Power-Distance
NPR	Noise Preferential Route
NTK	Noise and Track Keeping monitoring system
SEL	Sound Exposure Level – the steady noise level, which over a period of one second contains the same sound energy as the whole aircraft noise event. It is equivalent to the L_{eq} of the noise event normalised to one second.
SID	Standard Instrument Departure

Glossary	
STAL	Stansted Airport Limited