Environmental Research and Consultancy Department
Civil Aviation Authority

ERCD REPORT 1603

Noise Exposure Contours for Stansted Airport 2015

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Prepared by the Civil Aviation Authority on behalf of the Department for Transport, January 2017

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Summary

This report presents the year 2015 average summer day and night noise exposure contours for London Stansted Airport.

The 57 dBA Leq day contour area for 2015 based on the actual runway modal split (75% south-west / 25% north-east) was calculated to be 23.6 km^2, 9% higher than the previous year (2014: 21.6 km^2). However, the population enclosed was unchanged from 2014 at 1,650.

The 48 dBA Leq night actual modal split (73% south-west / 27% north-east) contour area for 2015 was calculated to be 57.2 km^2, an increase of 2% (2014: 56.3 km^2). The enclosed population was 6,950, a rise of 5% from the year before (2014: 6,650).

January 2017

The authors of this report are employed by the Civil Aviation Authority. The work reported herein was carried out on behalf of the Department for Transport.

Any views expressed are not necessarily those of the Secretary of State for Transport.

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Glossary

AIP Aeronautical Information Publication

ANCON The UK civil aircraft noise contour model, developed and maintained by ERCD.

ATC Air Traffic Control

CAA Civil Aviation Authority – the UK's independent specialist aviation regulator.

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.

CDA Continuous Descent Approach

DfT Department for Transport (UK Government)

ERCD Environmental Research and Consultancy Department of the Civil Aviation Authority.

Leq Equivalent sound level of aircraft noise in dBA, often called 'equivalent continuous sound level'. For conventional historical contours this is based on the daily average movements that take place within the 16-hour period (0700-2300 local time) over the 92-day summer period from 16 June to 15 September inclusive.

NPD Noise-Power-Distance

NPR Noise Preferential Route

NTK Noise and Track Keeping monitoring system. The NTK system associates radar data from air traffic control radar with related data from both fixed (permanent) and mobile noise monitors at prescribed positions on the ground.

OS Ordnance Survey®, Great Britain's national mapping agency.

SEL The Sound Exposure Level of an aircraft noise event is the steady noise level, which over a period of *one second* contains the same sound energy as the whole event. It is equivalent to the Leq of the noise event normalised to one second.

SID Standard Instrument Departure

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Executive Summary

This report presents the year 2015 average summer day and night noise exposure contours generated for London Stansted Airport.

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.

Analysis of the 2015 summer traffic data for Stansted revealed that average daily movements for the 16-hour daytime period (420.9) increased by 9% from the previous year (2014: 384.9). The B738 ANCON aircraft type (i.e. Boeing 737-800) had the largest increase in movements of 30 per day. There were on average 74.1 movements over the 2015 summer 8-hour night period, a 0.4% reduction from the year before (2014: 74.4).

The 2015 day actual modal split (75% south-west / 25% north-east) 57 dBA Leq contour area increased by 9% to 23.6 km^2 (2014: 21.6 km^2), a consequence of the 9% rise in movements. The population enclosed within this contour, however, was the same as in 2014 at 1,650. This was due to significant changes in the contour shape, arising from a large shift in the actual modal split between 2014 (54% south-west / 46% north-east) and 2015 (75% south-west / 25% north-east), with 2014 being an atypical year.

The year 2015 day standard modal split (72% south-west / 28% north-east) 57 dBA Leq contour area increased by 8% to 23.5 km^2 (2014: 21.8 km^2). This area was still well within the 33.9 km^2 contour area limit imposed by the Stansted Planning Condition AN1. The population count within the 2015 standard contour was 1,750, 17% higher than the previous year (2014: 1,500). The increase in population was due to a combination of the expansion of the contour and the 2015 update to the population database.

The 2015 night actual modal split (73% south-west / 27% north-east) 48 dBA Leq contour enclosed an area of 57.2 km^2, an increase of 2% from the previous year (2014: 56.3 km^2). There was a 0.4% reduction in night movements, but also some changes to the fleet mix, including additional B733 (Boeing 737-300/400/500) aircraft that were offset by a decrease in B738 movements. The 48 dBA population of 6,950 was 5% higher than the previous year (2014: 6,650). The 23% higher proportion of south-westerly operations in 2015 led to significant changes to the shape of the night contours and thus the populations enclosed.

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1 Introduction

1.1 Background

1.1.1 Each year the Environmental Research and Consultancy Department (ERCD) of the Civil Aviation Authority (CAA) calculates the noise exposure around London Stansted Airport on behalf of the Department for Transport (DfT). A computer model, ANCON, validated with noise measurements, is used to estimate the noise exposure. The model calculates the emission and propagation of noise from arriving and departing air traffic.

1.1.2 The noise exposure metric used 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. The background to the use of this index is explained in DORA Report 9023 (**Ref 1**).

1.1.3 Noise exposure is depicted in the form of noise contours, i.e. lines joining places of constant Leq, akin to the height contours shown on geographical maps or isobars on a weather chart. In the UK, Leq noise contours are normally plotted at levels from 57 to 72 dBA, in 3 dB steps.[1] The 57 dBA level denotes the approximate onset of significant community annoyance.

1.1.4 Following the publication of the Aviation Policy Framework in March 2013 (**Ref 2**), there is now a commitment by the DfT to produce night (2300-0700 local time) noise contours on an annual basis for the designated airports. Night 8-hour Leq contours have therefore been calculated for Stansted from 48 to 72 dBA in 3 dB steps in accordance with standard practice. Average summer night contours were first calculated for Stansted for the year 2013.

1.1.5 This report contains small-scale diagrams of the year 2015 Stansted Leq contours overlaid onto Ordnance Survey® (OS) base maps. Larger-scale diagrams in Adobe® PDF format and AutoCAD® DXF format contours (for specialist users) are also available for download from the GOV.UK website.[2]

1.1.6 The objectives of this report are to explain the noise modelling methodology used to produce the year 2015 day and night Leq contours for Stansted Airport, to present the calculated noise contours and to assess the changes from the previous year (**Ref 3**). Long-term trends are also examined.

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[1] Aircraft noise contours are also produced on behalf of airports for the specific purpose of meeting the requirements of the *Environmental Noise (England) Regulations 2006*, which implemented Directive 2002/49/EC, *Assessment and Management of Environmental Noise*, in England. These are based on annual average values and require the use of different parameters (L_{day}, $L_{evening}$, L_{night}, $L_{eq,16hr}$ and L_{den} at 5 dB steps), so it is not possible to draw meaningful conclusions between the two types of contour maps. Further details about Directive 2002/49/EC are available on the Department for Environment, Food and Rural Affairs website at *www.gov.uk/defra* as well as ERCD Reports 1204, 1205 and 1206 (available from *www.caa.co.uk*), which cover Heathrow, Gatwick and Stansted 2011 noise mapping respectively.

[2] https://www.gov.uk/government/publications/noise-exposure-contours-around-london-airports

1.2 Stansted Airport

1.2.1 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 1**).

1.2.2 Stansted Airport has a single runway (04/22), which is 3,049 m long. The landing threshold[3] for Runway 04 is displaced by 300 m. There is one main passenger terminal. The layout of the runway, taxiways and passenger terminal in 2015 is shown in **Figure 2**.[4]

1.2.3 In the 2015 calendar year there were approximately 169,000 aircraft movements at Stansted (2014: 157,000) and the airport handled 22.5 million passengers (2014: 20.0 million).[5]

1.2.4 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."*

1.2.5 Based on the above planning condition, the area of the standard (i.e. 20-year average) runway modal split 57 dBA Leq contour is not to exceed a limit of 33.9 km^2.

[3] 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.

[4] UK AIP (5 Mar 2015) AD 2-EGSS-2-1

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

2 Noise contour modelling methodology

2.1 ANCON noise model

2.1.1 Noise contours were calculated with the UK civil aircraft noise model ANCON (version 2.3), 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 4**). The ANCON model is also used for the production of annual contours for Heathrow and Gatwick airports, and a number of other UK airports.

2.1.2 ANCON is fully compliant with the latest European guidance on noise modelling, ECAC.CEAC Doc 29 (3rd edition), published in December 2005 (**Ref 5**). This guidance document represents internationally agreed best practice as implemented in modern aircraft noise models.

2.2 Radar data

2.2.1 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 year 2015 summer radar data.

2.3 Flight tracks

2.3.1 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 3**.

2.3.2 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[6] 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

[6] An altitude of 3,000 ft for aircraft on the 'BARKWAY' departure routes in the period 0600-2330.

also vector aircraft from NPRs below this altitude for safety reasons, to avoid storms for example.

2.3.3 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 2015. Mean flight tracks were calculated from 24-hour data since both day and night contours were being produced.

2.3.4 **Figure 4** shows a sample of radar flight tracks from a day in August 2015. 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 12 and 21 km from threshold for Runway 22, and between 11 and 19 km from threshold for Runway 04.

2.4 Flight profiles

2.4.1 For each ANCON aircraft type, average flight profiles of height, speed and thrust versus track distance (for departures and arrivals separately) were reviewed and updated where necessary, using year 2015 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.

2.4.2 Daytime flight profiles were generated as in previous years. Following checks on the night-time profile data, it was concluded that the profiles generated from the daytime data were appropriate for use with the night contours.

2.4.3 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 Approaches (CDAs) on Runway 22, where aircraft generally join the glideslope from a greater height. CDAs 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.

2.4.4 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.

2.5 Noise emissions

2.5.1 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 a number of mobile monitors that can be deployed anywhere within the NTK radar coverage area.[7]

2.5.2 The noise data collected were screened by ERCD with reference to several criteria so that only reliable data were used in the analysis. First of all, 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. 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.[8]

2.5.3 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.

2.6 Traffic distributions

2.6.1 The Leq 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 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[9] and close agreement was found.

Daytime traffic distribution by Noise Class

2.6.2 The average number of daily movements at Stansted over the 2015 summer day period (420.9) was 9% higher than in the previous year (2014: 384.9).

2.6.3 **Table 1a** lists the average summer day movements[10] by 8 Noise Classes of aircraft, ranked in ascending order of noise emission, i.e. from least to most noisy, in 2014 and 2015. The 8 Noise Classes, which were previously designated Noise Classes 1-8, have now been renamed as *Noise Classes A-H* respectively, as

[7] Further information on the noise monitors can be found in CAP 1149 (**Ref 6**).

[8] *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.

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

[10] Includes departures and arrivals.

summarised in the following table. This has been done to avoid possible confusion with the ICAO noise 'Chapters'.[11]

Noise Class description	Previous Noise Class ID (up to 2014)	New Noise Class ID (2015 onwards)
Small propeller	1	A
Large propeller	2	B
Narrow-body (Chapter 3/4)	3	C
Wide-body twins (Chapter 3/4)	4	D
Wide-body 3/4-engine (Chapter 3/4)	5	E
Wide-body 3/4-engine (1st gen. Ch. 2/3)	6	F
Narrow-body twins (2nd gen.)	7	G
Narrow-body 3/4-engine (1st gen.)	8	H

2.6.4 The vast majority of movements (91%) were within Noise Class C (i.e. narrow-body Chapter 3 and Chapter 4 jet aircraft) and their numbers increased by 8% to 383 per day in 2015.

2.6.5 Compared to Noise Class C, there were relatively few aircraft movements in Noise Classes B, D and E, and insignificant numbers in Noise Classes A, F, G and H. Noise Class B (large twin turboprop aircraft) had the second highest number of movements at 20 per day, an increase of 31% from 2014, but they only represented 5% of total movements in 2015. Noise Class D (wide-body twins) and Noise Class E (wide-body 3 or 4-engine aircraft) both had 9 daily movements, each representing 2% of total movements at Stansted.

2.6.6 An estimated[12] 98% of aircraft in the 2015 summer day period were compliant with the ICAO Chapter 4 noise standard.

2.6.7 **Figure 5** illustrates the changing distribution of traffic among the 8 Noise Classes over the period from 1988 to 2015 inclusive. The increasing dominance of narrow-

[11] 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 will be applicable to new large aircraft types presented for certification from 2017 and it represents a further level of stringency compared to the Chapter 4 standard.

[12] 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.

body jet aircraft movements (Noise Class C) over the years at Stansted can be clearly seen.

Night-time traffic distribution by Noise Class

2.6.8 There were 74.1 aircraft movements on average over the 8-hour night in 2015, a reduction of 0.4% from the previous year (2014: 74.4). Arrivals made up 60% of total movements at night.

2.6.9 **Table 1b** lists the average summer night movements by 8 Noise Classes of aircraft, ranked in ascending order of noise emission, i.e. from least to most noisy, in 2014 and 2015. Similar to the daytime period, narrow-body jet aircraft (Noise Class C) formed the highest proportion of movements (90%) at night.

2.6.10 An estimated 96% of aircraft in the 2015 summer night period were compliant with the ICAO Chapter 4 noise standard.

Daytime traffic distribution by ANCON aircraft type

2.6.11 A more detailed breakdown of the year 2015 average summer day movements, indicating the ANCON aircraft types that fall into each Noise Class, is provided in **Table 2a**. Comparison of the daily movement numbers for 2014 and 2015 shows that the largest increase, by far, was for the ANCON aircraft type B738 in Noise Class C, with a rise of 30 daily movements (note: ANCON type descriptions can be found in **Table 2a**). The second highest increase was for the B733 (also in Noise Class C), which was up by 6 movements per day. The largest *decrease* was 10 daily movements by the ANCON type EA319C (Noise Class C).

2.6.12 **Figure 6a** illustrates the numbers of movements by ANCON aircraft type for the 2015 average summer day. The B738 was clearly the most common ANCON aircraft type at Stansted, with 287 daily movements (68% of the total), followed by the EA319C with 43 daily movements (10% of the total).

2.6.13 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.

Night-time traffic distribution by ANCON aircraft type

2.6.14 A more detailed breakdown of the year 2015 average summer night movements, indicating the ANCON aircraft types that fall into each Noise Class, is provided in **Table 2b**. The largest decrease was for the ANCON type B738, which was down by 2 movements per night. The highest increase was for the B733, up by 2 movements per night.

2.6.15 **Figure 6b** illustrates the numbers of movements by ANCON aircraft type for the 2015 average summer night. Similar to daytime, night traffic was dominated by the B738 with 42 movements (representing 57% of total night movements). The next

most frequent types were the B733 with 8 movements per night (11% of the total) and the EA319C with 7 per night (10% of the total).

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

Daytime traffic distribution by NPR/SID route

2.6.17 **Figure 7a** shows the percentage distribution of departing aircraft by NPR/SID route for the 2015 summer day period, with distribution figures from 2014 for comparison. Similar to the previous year, the Runway 22 BUZ/BKY/CPT routes had the highest proportion of departure traffic (35%) over the summer period, a 10% higher figure than in 2014. Percentage increases of 5-6% were also seen on the other Runway 22 routes in 2015. There were departure traffic decreases of up to 9% on each of the Runway 04 routes. The changes in percentage loading on the routes were largely due to the year-on-year variation in the runway modal split, as described in section 2.7.

Night-time traffic distribution by NPR/SID route

2.6.18 **Figure 7b** shows the percentage distribution of departing aircraft by NPR/SID route for the 2015 summer night period, with distribution figures from 2014 for comparison. Similar to daytime, the Runway 22 BUZ/BKY/CPT routes had the highest proportion of departure traffic (37%) over the summer night period, a 12% increase from 2014. This was followed by the Runway 22 DET/LAM/LYD routes (26%) with a 10% rise from 2014. There were percentage decreases on each of the Runway 04 routes, the largest being for Runway 04 BUZ/BKY/CPT, where there was a reduction of 10% from 2014. The changes in percentage loading on the routes were largely due to the year-on-year variation in the runway modal split, as described in section 2.7.

2.7 Runway modal splits

2.7.1 In general, aircraft will take-off and land into a headwind to maximise lift during take-off and maximise deceleration upon 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*.

2.7.2 Two sets of contours have been produced for the year 2015 summer day:

(i) Contours using the ‘actual’ modal split over the Leq day period; and

(ii) Contours 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 2015, this is the 20-year period from 1996 to 2015. Use of the standard modal split enables year-on-year comparisons without the runway usage significantly affecting the contour shape.

2.7.3 The actual and standard daytime modal splits for 2015 and the previous year are summarised in the following table:

Stansted summer day runway modal splits for 2015 and 2014

Modal split scenario	% south-west (Runway 22)	% north-east (Runway 04)
Actual 2015	75%	25%
Actual 2014	54%	46%
Standard 2015	72%	28%
Standard 2014	70%	30%

2.7.4 The daytime actual runway modal split reverted to a more typical figure in 2015 (75% south-west / 25% north-east), following the unusually high proportion of north-easterly movements in 2014. The proportion of south-westerly movements was 21% higher in 2015 than in 2014. The 2015 standard modal split had 2% more south-westerly movements than in 2014. Historical runway modal splits at Stansted for the past 20 years are summarised in **Figure 8**.

2.7.5 The night-time actual runway modal split for the 2015 summer period (73% south-west / 27% north-east) was also more typical compared to 2014, when the proportion of north-easterly movements was unusually high. There was a 23% increase in the proportion of south-westerly operations in 2015 compared to the previous year. Night-time modal splits for the past 3 years are summarised in the following table:

Stansted summer night runway modal splits

Year	% south-west (Runway 22)	% north-east (Runway 04)
2015	73%	27%
2014	50%	50%
2013	70%	30%

2.8 Topography

2.8.1 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 taken into account.

2.8.2 ERCD holds OS terrain height data[13] on a 200 metre by 200 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. The terrain heights in the vicinity of Stansted Airport are depicted diagrammatically in **Figure 9**.

2.9 Population and 'Points of Interest' databases

2.9.1 Estimates were made of the numbers of people and households enclosed within the noise contours. The population data used in this report are a 2015 update of the latest 2011 Census supplied by CACI Limited.[14]

2.9.2 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 10**.

2.9.3 Within the extent of the 2015 day actual 57 dBA Leq contour, the population count using the 2015 population database was 5% higher than with the 2014 database, so the effect of the 2015 population database update was a significant increase in the population count around Stansted.

2.9.4 Estimates have also been made of the numbers of noise sensitive buildings situated within the daytime contours, using the *InterestMap*™[15] 'Points of Interest' (2015) database. For the purpose of this study, the noise sensitive buildings that have been considered are schools, hospitals and places of worship.

[13] Meridian™ 2

[14] www.caci.co.uk

[15] InterestMap™ is distributed by Landmark Information Group Ltd and derived from Ordnance Survey 'Points of Interest' data.

3 Noise contour results

3.1 Day actual modal split contours

3.1.1 The Stansted 2015 day Leq noise contours generated with the actual 2015 summer day period runway modal split (75% south-west / 25% north-east) are shown in **Figure 11a**. The contours are plotted from 57 to 72 dBA at 3 dB intervals.

3.1.2 Cumulative estimates of the areas, populations and households within the 2015 day actual modal split contours are provided in the table below:

Stansted 2015 day actual contours - area, population and household estimates

Leq (dBA)	Area (km^2)	Population	Households
> 57	23.6	1,650	650
> 60	12.7	550	250
> 63	6.7	150	100
> 66	3.4	50	< 50
> 69	1.8	0	0
> 72	1.0	0	0

Note: Populations and households are given to the nearest 50.

3.1.3 The 2015 day actual 57 dBA Leq contour enclosed an area of 23.6 km^2 and a population of 1,650.

3.1.4 Estimates of the cumulative numbers of noise sensitive buildings within the 2015 day actual contours are provided in the table below:

Stansted 2015 day actual contours - noise sensitive building estimates

Leq (dBA)	Schools	Hospitals	Places of worship
> 57	1	0	2
> 60	1	0	2
> 63	0	0	0
> 66	0	0	0
> 69	0	0	0
> 72	0	0	0

3.2 Night actual modal split contours

3.2.1 The Stansted 2015 night Leq noise contours generated with the actual 2015 summer night period runway modal split (73% south-west / 27% north-east) are shown in **Figure 11b**. The contours are plotted from 48 to 66 dBA at 3 dB intervals (note: the 69 and 72 dBA contours have been omitted from the diagram for clarity).

3.2.2 Cumulative estimates of the areas, populations and households within the 2015 night actual modal split contours are provided in the following table:

Stansted 2015 night actual contours – area, population and household estimates

Leq (dBA)	Area (km^2)	Population	Households
> 48	57.2	6,950	2,850
> 51	31.6	3,800	1,550
> 54	16.7	950	400
> 57	8.5	250	100
> 60	4.5	50	< 50
> 63	2.3	0	0
> 66	1.3	0	0
> 69	0.8	0	0
> 72	0.5	0	0

Note: Populations and households are given to the nearest 50.

3.2.3 The 2015 night actual 48 dBA Leq contour enclosed an area of 57.2 km^2 and a population of 6,950.

3.3 Day standard modal split contours

3.3.1 The Stansted 2015 day Leq noise contours generated with the standard 2015 summer day period runway modal split (72% south-west / 28% north-east) are shown in **Figure 12**. The standard contours are plotted from 57 to 72 dBA at 3 dB intervals.

3.3.2 Cumulative estimates of the areas, populations and households within the 2015 day standard modal split contours are provided in the following table:

Stansted 2015 day standard contours - area, population and household estimates

Leq (dBA)	Area (km^2)	Population	Households
> 57	23.5	1,750	700
> 60	12.7	550	200
> 63	6.7	150	100
> 66	3.4	50	< 50
> 69	1.8	0	0
> 72	1.0	0	0

Note: Populations and households are given to the nearest 50.

3.3.3 The 2015 day standard 57 dBA Leq contour enclosed an area of 23.5 km^2 and a population of 1,750.

3.3.4 Estimates of the cumulative numbers of noise sensitive buildings within the 2015 day standard contours are provided in the table below:

Stansted 2015 day standard contours - noise sensitive building estimates

Leq (dBA)	Schools	Hospitals	Places of worship
> 57	1	0	2
> 60	0	0	2
> 63	0	0	0
> 66	0	0	0
> 69	0	0	0
> 72	0	0	0

4 Analysis of results

4.1 Day actual modal split contours – comparison with 2014 contours

4.1.1 The Stansted 2015 day actual modal split Leq contours are compared against the 2014 day actual Leq contours in **Figure 13a**. The table below summarises the areas, populations and percentage changes from 2014 to 2015:

Stansted day actual contours - area and population estimates for 2014 and 2015

Leq (dBA)	2014 Area (km^2)	2015 Area (km^2)	Area change (%)	2014 Pop.	2015 Pop.	Pop. change (%)
> 57	21.6	23.6	+9%	1,650	1,650	0%
> 60	11.7	12.7	+9%	350	550	+57%
> 63	6.1	6.7	+10%	100	150	+50%
> 66	3.1	3.4	+10%	< 50	50	(n/a)
> 69	1.7	1.8	+6%	0	0	(-)
> 72	1.0	1.0	0%	0	0	(-)

Note: The 2014 and 2015 day actual runway modal splits were 54% SW / 46% NE and 75% SW / 25% NE respectively.

4.1.2 The effect on contour shapes of the 21% higher proportion of south-westerly operations in 2015 can be seen in **Figure 13a**. The Runway 22 arrival contour tips to the north-east of the airport have lengthened at all levels, and the Runway 22 departure lobe pointing to the south-east has expanded towards Little Hallingbury. Conversely, the 57 dBA contour tip to the south-west due to landings on Runway 04 has retracted, and the contours to the north-east of the airport near Broxted and Molehill Green have narrowed, reflecting lower numbers of north-easterly departures.

4.1.3 The 57 dBA contour area for 2015 increased by 9%, in line with the 9% rise in total movements. Similar area increases were also seen at the higher contour levels.

4.1.4 The population count inside the 57 dBA contour for 2015 was the same as in the previous year due to significant contour shape changes. Population increases from an expansion of the contour towards Little Hallingbury were offset by reductions near Molehill Green where the contour narrowed. However, the 60 dBA contour had a 57% increase in population, which resulted from the extension of the contour over some populated areas, e.g. Bedlar's Green and to the north-east of Broxted/Church End. A similar effect was observed at the 63 dBA contour level.

4.1.5 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.

4.2 Night actual modal split contours – comparison with 2014 contours

4.2.1 The Stansted 2015 night actual modal split Leq contours are compared against the 2014 night actual Leq contours in **Figure 13b** (note: the 69 and 72 dBA contours have been omitted from the diagram for clarity). The table below summarises the areas, populations and percentage changes from 2014 to 2015:

Stansted night actual contours - area and population estimates for 2014 and 2015

Leq (dBA)	2014 Area (km^2)	2015 Area (km^2)	Area change (%)	2014 Pop.	2015 Pop.	Pop. change (%)
> 48	56.3	57.2	+2%	6,650	6,950	+5%
> 51	30.5	31.6	+4%	2,000	3,800	+90%
> 54	16.6	16.7	+1%	1,200	950	-21%
> 57	8.6	8.5	-1%	200	250	+25%
> 60	4.5	4.5	0%	50	50	0%
> 63	2.3	2.3	0%	0	0	(-)
> 66	1.3	1.3	0%	0	0	(-)
> 69	0.8	0.8	0%	0	0	(-)
> 72	0.5	0.5	0%	0	0	(-)

Note: The 2014 and 2015 night actual runway modal splits were 50% SW / 50% NE and 73% SW / 27% NE respectively.

4.2.2 The large shift in the 2015 runway modal split in favour of 23% more south-westerly operations is evident in the shape of the noise contours. The Runway 04 arrival lobe has shortened because of the lower numbers of arrivals to Runway 04. Conversely, the Runway 22 arrival contour tip has extended. The 48 dBA contour lobe due to departures turning to the south-east from Runway 22 has enlarged, and the contour lobe caused by departures from Runway 04 turning to the east has contracted.

4.2.3 The 48 dBA contour area increased by 2%, even though movements fell by 0.4%. This can be attributed to a combination of: (a) changes to the fleet mix, e.g. an increase in B733 movements and a reduction for the B738, and (b) updates to the noise characteristics of some of the ANCON aircraft types in the light of 2015 noise monitoring data. There were also area increases at the 51 and 54 dBA levels. At most of the other contour levels, the areas remained the same.

4.2.4 The 48 dBA contour population rose by 5%, largely because of the 2015 population database update, as an increase in population from the extension of the contour over Great Sampford to the north-east of the airport was offset by a decrease in population caused by the contour retracting from High Wych at the opposite end. However, at the 51 dBA level, the population count increased by 90%, a consequence of the 51 dBA contour stretching over the village of Thaxted. Changes in contour shape were mainly responsible for the significant percentage decrease and increase in population at the 54 and 57 dBA levels respectively.

4.3 Day standard modal split contours – comparison with 2014 contours

4.3.1 The Stansted 2015 day standard modal split Leq contours are compared against the 2014 day standard Leq contours in **Figure 14**. The following table summarises the areas, populations and percentage changes from 2014 to 2015:

Stansted day standard contours - area and population estimates for 2014 and 2015

Leq (dBA)	2014 Area (km^2)	2015 Area (km^2)	Area change (%)	2014 Pop.	2015 Pop.	Pop. change (%)
> 57	21.8	23.5	+8%	1,500	1,750	+17%
> 60	11.7	12.7	+9%	350	550	+57%
> 63	6.2	6.7	+8%	100	150	+50%
> 66	3.1	3.4	+10%	< 50	50	(n/a)
> 69	1.7	1.8	+6%	0	0	(-)
> 72	1.0	1.0	0%	0	0	(-)

Note: The 2014 and 2015 day standard runway modal splits were 70% SW / 30% NE and 72% SW / 28% NE respectively.

4.3.2 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.

4.3.3 The 57 dBA contour area increased by 8% in 2015 in line with the 9% increase in total movements, with similar percentage changes in area seen at the higher contour levels. The overall increase in the size of the contours in year 2015 compared to 2014 can be seen in **Figure 14**. The population count within the 57 dBA contour was 17% higher due to: (a) extensions of the contour over populated areas to the south-west such as Little Hallingbury and Spellbrook, and (b) the 2015 update to the population database.

4.3.4 The 57 dBA Leq standard modal split contour area of 23.5 km^2 was well below the Planning Condition AN1 contour area limit of 33.9 km^2 (see section 1.2.4).

4.4 Day noise contour historical trend

4.4.1 **Figure 15** shows how the 57 dBA Leq 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.

Movement trend

4.4.2 Annual movements at Stansted rose steadily between 1990 and 2001, showing rapid growth in particular 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. Another rise in 2006 was followed by a slight increase in the annual figure in 2007, the latter representing a peak level.

4.4.3 The total annual movement figure for 2008 dropped by 7% from the 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.

4.4.4 Year 2010 saw another large 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.

4.4.5 Annual traffic dropped further in 2011 (by 4%) and reached a low in 2012 after falling for the fifth year in a row (by 3%), reflecting the continued reduction in demand for flights over this period. However, 2013 saw the first increase in annual flights after five years of consecutive decline from the 2007 peak. Movements rose by 7% in both 2014 and 2015, as demand returned.

Area and population trend

4.4.6 Up to 1998, areas and populations within the 57 dBA Leq 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 – in particular those by the BAC 1-11 which fell by 64% in that year.

4.4.7 Areas have generally declined since 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% relative to 2007. The area further reduced in 2009 and again in 2010 as total movements dropped substantially. The 2011 and then the 2012 areas dropped to the lowest levels seen at Stansted since 1990 as traffic continued to fall. The area decreased again in 2013 to 20.0 km^2 as summer period traffic fell (despite the overall movements increase seen over the annual period) - this was also the smallest ever 57 dBA Leq actual contour area calculated for Stansted. (The previous smallest area was 20.1 km^2 in 1990). However, the contour area increased in 2014 and 2015 as movements rose considerably.

4.4.8 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 significantly lower movement numbers caused the population count to dip markedly to 1,500. From 2009 to 2013, population counts were relatively steady, albeit reducing slightly as contour areas continued to fall year-on-year. However,

in 2014 the population count rose markedly by 32% as the contour extended over some populated areas. This resulted from a significant increase in summer movements and a much higher proportion of north-easterly operations, which affected the contour shape significantly. In 2015, a return to a more typical runway modal split led to significant changes in the contour shape, with the net effect being an unchanged population count.

5 Conclusions

5.1 Year 2015 average summer 16-hour day and 8-hour night Leq noise exposure contours have been generated for Stansted Airport using the ANCON noise model.

5.2 The results show that the 2015 day actual modal split (75% south-west / 25% north-east) 57 dBA Leq contour area increased by 9% to 23.6 km^2 (2014: 21.6 km^2). This resulted from a 9% rise in total movements over the 2015 summer day period, with the B738 ANCON aircraft type having the largest increase of 30 movements per day. The population enclosed within the 2015 day actual 57 dBA Leq contour was 1,650, the same as in 2014. There were significant changes to the contour shape following the major shift in the runway modal split in 2015 to a more typical percentage of south-westerly operations.

5.3 The year 2015 day standard modal split (72% south-west / 28% north-east) 57 dBA Leq contour area increased by 8% to 23.5 km^2 (2014: 21.8 km^2). This area was still well within the 33.9 km^2 contour area limit imposed by the Stansted Planning Condition AN1. The population count within the 2015 day standard 57 dBA contour of 1,750 was 17% higher than the previous year (2014: 1,500). The rise in total movements caused the contour to extend over some populated areas. The 2015 population database update also contributed to the higher population count.

5.4 Night-time Leq contours have also been produced. The 2015 night actual modal split (73% south-west / 27% north-east) 48 dBA Leq contour enclosed an area of 57.2 km^2, which was 2% higher than the previous year (2014: 56.3 km^2). Despite a 0.4% reduction in night movements in 2015, changes to the fleet mix and noise updates to some of the ANCON aircraft types led to the small area increase. The 48 dBA contour population of 6,950 was 5% higher than in the previous year (2014: 6,650). This was largely due to the 2015 update to the population database. The 23% higher proportion of south-westerly operations in 2015 produced significant changes in the shape of the night contours.

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Table 1a Stansted 2014 and 2015 average summer day movements by Noise Class

Noise Class	Description	2014	2015	Percentage of total 2015 movements	Change
PROPELLER AIRCRAFT					
A	Small propeller aircraft	0.5	0.5	0%	0.0 (*)
B	Large propeller aircraft	15.1	19.8	5%	+4.7 (+31%)
CHAPTER 3/4 JETS					
C	Narrow-body aircraft	354.0	383.3	91%	+29.3 (+8%)
D	Wide-body twin-engine aircraft	6.3	8.5	2%	+2.2 (+35%)
E	Wide-body 3 or 4-engine aircraft	8.8	8.8	2%	0.0 (0%)
LARGE CHAPTER 2/3 JETS					
F	1st generation wide-body 3 or 4-engine aircraft	< 0.1	< 0.1	0%	0.0 (*)
2nd GENERATION TWIN JETS					
G	Narrow-body twin-engine *(including Ch.2 and hush-kitted versions)*	< 0.1	< 0.1	0%	0.0 (*)
1st GENERATION JETS					
H	Narrow-body 3 or 4-engine aircraft *(including hush-kitted versions)*	0.1	< 0.1	0%	-0.1 (*)
	TOTAL	384.9	**420.9**	100%	**+36.0 (+9%)**

* Percentage changes not shown due to low numbers and limited data resolution.

Notes:

- Totals may not sum exactly due to rounding.
- An estimated 98% of aircraft in the 2015 daytime period met the ICAO Chapter 4 noise standard.

Table 1b Stansted 2014 and 2015 average summer night movements by Noise Class

Noise Class	Description	2014	2015	Percentage of total 2015 movements	Change
PROPELLER AIRCRAFT					
A	Small propeller aircraft	0.2	0.2	0%	0.0 (*)
B	Large propeller aircraft	3.2	2.9	4%	-0.3 (-9%)
CHAPTER 3/4 JETS					
C	Narrow-body aircraft	66.1	66.5	90%	+0.4 (+1%)
D	Wide-body twin-engine aircraft	4.6	4.0	5%	-0.6 (-13%)
E	Wide-body 3 or 4-engine aircraft	0.4	0.4	1%	0.0 (*)
LARGE CHAPTER 2/3 JETS					
F	1st generation wide-body 3 or 4-engine aircraft	0.0	0.0	0%	0.0 (*)
2nd GENERATION TWIN JETS					
G	Narrow-body twin-engine *(including Ch.2 and hush-kitted versions)*	0.0	0.0	0%	0.0 (*)
1st GENERATION JETS					
H	Narrow-body 3 or 4-engine aircraft *(including hush-kitted versions)*	0.0	0.0	0%	0.0 (*)
	TOTAL	74.4	**74.1**	100%	**-0.3 (-0.4%)**

* Percentage changes not shown due to low numbers and limited data resolution.

Notes:

- Totals may not sum exactly due to rounding.
- An estimated 96% of aircraft in the 2015 night-time period met the ICAO Chapter 4 noise standard.

Table 2a Stansted 2014 and 2015 average summer day movements by ANCON aircraft type

Aircraft type	Noise Class	ANCON type	2014	2015	Change
Single piston propeller	A	SP	< 0.1	< 0.1	0.0
Small twin-piston propeller	A	STP	< 0.1	0.2	+0.2
Small twin-turboprop	A	STT	0.4	0.2	-0.2
Large twin-turboprop	B	LTT	15.0	19.7	+4.7
Large four-engine propeller	B	L4P	0.1	0.1	0.0
Boeing 737-300/400/500	C	B733	6.1	12.4	+6.3
Boeing 737-600/700	C	B736	0.4	0.8	+0.4
Boeing 737-800/900	C	B738	256.3	286.6	+30.3
Boeing 757-200 (RB211-535E4/E4B engines)	C	B757E	1.3	1.4	+0.1
Boeing 757-200 (PW2037/2040 engines)	C	B757P	0.2	0.1	-0.1
BAe 146/Avro RJ	C	BA46	0.7	0.5	-0.2
Bombardier CRJ100/200	C	CRJ	0.1	0.0	-0.1
Bombardier CRJ900	C	CRJ900	1.1	0.0	-1.1
Airbus A318	C	EA318	0.2	0.3	+0.1
Airbus A319 (CFM56 engines)	C	EA319C	52.1	42.6	-9.5
Airbus A319 (IAE V2500 engines)	C	EA319V	7.0	5.7	-1.3
Airbus A320 (CFM56 engines)	C	EA320C	5.7	10.1	+4.4
Airbus A320 (IAE V2500 engines)	C	EA320V	0.4	1.4	+1.0
Airbus A321 (CFM56 engines)	C	EA321C	5.5	5.7	+0.2
Airbus A321 (IAE V2500 engines)	C	EA321V	0.3	0.0	-0.3
Embraer ERJ 135/145	C	ERJ	2.0	1.1	-0.9
Embraer E-170	C	ERJ170	0.1	0.1	0.0
Embraer E-190	C	ERJ190	0.1	0.7	+0.6
Executive Business Jet (Chapter 3)	C	EXE3	13.9	13.7	-0.2
Fokker 100	C	FK10	< 0.1	0.1	+0.1
McDonnell Douglas MD-80 series	C	MD80	0.4	< 0.1	-0.3
Boeing 767-200	D	B762	1.1	0.6	-0.5
Boeing 767-300 (GE CF6-80 engines)	D	B763G	2.4	2.6	+0.2
Boeing 767-300 (PW PW4000 engines)	D	B763P	0.1	< 0.1	-0.1
Boeing 767-400	D	B764	< 0.1	< 0.1	0.0
Boeing 777-200 (GE GE90 engines)	D	B772G	< 0.1	0.2	+0.2
Boeing 777-200LR/300ER (GE GE90 engines)	D	B773G	1.0	1.7	+0.7
Boeing 787-8 Dreamliner	D	B788	< 0.1	< 0.1	0.0
Airbus A300	D	EA30	1.4	1.5	+0.1
Airbus A310	D	EA31	0.1	0.1	0.0
Airbus A330	D	EA33	0.2	1.8	+1.6
Boeing 747-400 (GE CF6-80F engines)	E	B744G	1.2	1.1	-0.1
Boeing 747-400 (PW PW4000 engines)	E	B744P	0.8	0.5	-0.3
Boeing 747-400 (RR RB211 engines)	E	B744R	0.8	0.8	0.0
Boeing 747SP	E	B747SP	0.3	0.4	+0.1
Boeing 747-8	E	B748	1.0	1.0	0.0
Airbus A340-200/300	E	EA34	0.2	0.3	+0.1
Airbus A340-500/600	E	EA346	< 0.1	0.1	0.0
McDonnell Douglas MD-11	E	MD11	4.5	4.5	0.0
Boeing 747-100/200/300	F	B747	< 0.1	< 0.1	0.0
McDonnell Douglas DC-9 (Chapter 3)	G	DC9	< 0.1	0.0	0.0

Aircraft type	Noise Class	ANCON type	2014	2015	Change
Executive Business Jet (Chapter 2)	G	EXE2	< 0.1	< 0.1	0.0
Boeing 727 (Chapter 3)	H	B727	0.1	0.0	-0.1
Tupolev Tu-154	H	TU54	< 0.1	< 0.1	0.0
		TOTAL	384.9	**420.9**	**+36.0 (+9%)**

Note: Totals may not sum exactly due to rounding.

Table 2b Stansted 2014 and 2015 average summer night movements by ANCON aircraft type

Aircraft type	Noise Class	ANCON type	2014	2015	Change
Small twin-piston propeller	A	STP	0.1	0.2	+0.1
Small twin-turboprop	A	STT	0.1	< 0.1	0.0
Large twin-turboprop	B	LTT	3.2	2.7	-0.5
Large four-engine propeller	B	L4P	< 0.1	0.2	+0.2
Boeing 737-300/400/500	C	B733	6.4	8.4	+2.0
Boeing 737-600/700	C	B736	0.1	0.3	+0.2
Boeing 737-800/900	C	B738	44.6	42.4	-2.2
Boeing 757-200 (RB211-535E4/E4B engines)	C	B757E	0.4	0.7	+0.3
Boeing 757-200 (PW2037/2040 engines)	C	B757P	< 0.1	0.0	0.0
BAe 146/Avro RJ	C	BA46	< 0.1	0.6	+0.5
Airbus A318	C	EA318	< 0.1	0.1	0.0
Airbus A319 (CFM56 engines)	C	EA319C	7.3	7.3	0.0
Airbus A319 (IAE V2500 engines)	C	EA319V	0.3	0.2	-0.1
Airbus A320 (CFM56 engines)	C	EA320C	1.5	1.5	0.0
Airbus A320 (IAE V2500 engines)	C	EA320V	< 0.1	0.3	+0.3
Airbus A321 (CFM56 engines)	C	EA321C	2.7	2.7	0.0
Airbus A321 (IAE V2500 engines)	C	EA321V	< 0.1	0.0	0.0
Embraer ERJ 135/145	C	ERJ	0.2	0.1	-0.1
Embraer E-190	C	ERJ190	< 0.1	0.1	+0.1
Executive Business Jet (Chapter 3)	C	EXE3	2.4	1.9	-0.5
Fokker 100	C	FK10	< 0.1	0.0	0.0
McDonnell Douglas MD-80 series	C	MD80	< 0.1	0.0	0.0
Boeing 767-200	D	B762	0.8	0.2	-0.6
Boeing 767-300 (GE CF6-80 engines)	D	B763G	1.3	1.1	-0.2
Boeing 777-200 (GE GE90 engines)	D	B772G	0.0	< 0.1	0.0
Boeing 777-200LR/300ER (GE GE90 engines)	D	B773G	1.1	1.0	-0.1
Boeing 787-8 Dreamliner	D	B788	< 0.1	0.0	0.0
Airbus A300	D	EA30	1.4	1.5	+0.1
Airbus A330	D	EA33	< 0.1	0.2	+0.2
Boeing 747-400 (GE CF6-80F engines)	E	B744G	< 0.1	0.1	0.0
Boeing 747-400 (PW PW4000 engines)	E	B744P	< 0.1	< 0.1	0.0
Boeing 747-400 (RR RB211 engines)	E	B744R	0.1	0.0	-0.1
Boeing 747-8	E	B748	0.1	0.2	+0.1
Airbus A340-200/300	E	EA34	< 0.1	< 0.1	0.0
McDonnell Douglas MD-11	E	MD11	0.1	0.1	0.0
		TOTAL	74.4	**74.1**	**-0.3 (-0.4%)**

Note: Totals may not sum exactly due to rounding.

Figure 1 Stansted Airport and the surrounding area

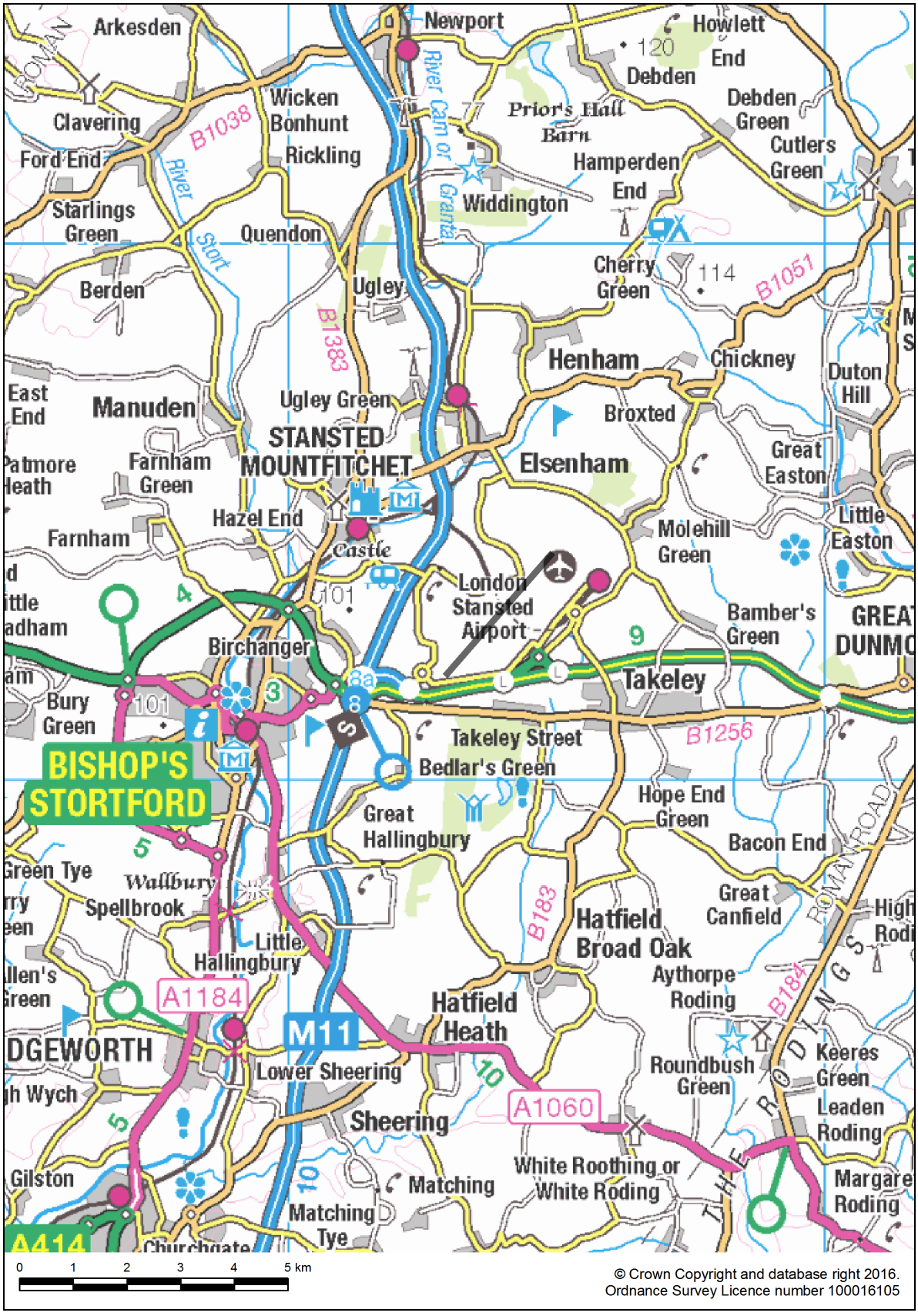


Figure 2 Stansted Airport layout in 2015

Figure 3 Stansted NPR/SID routes

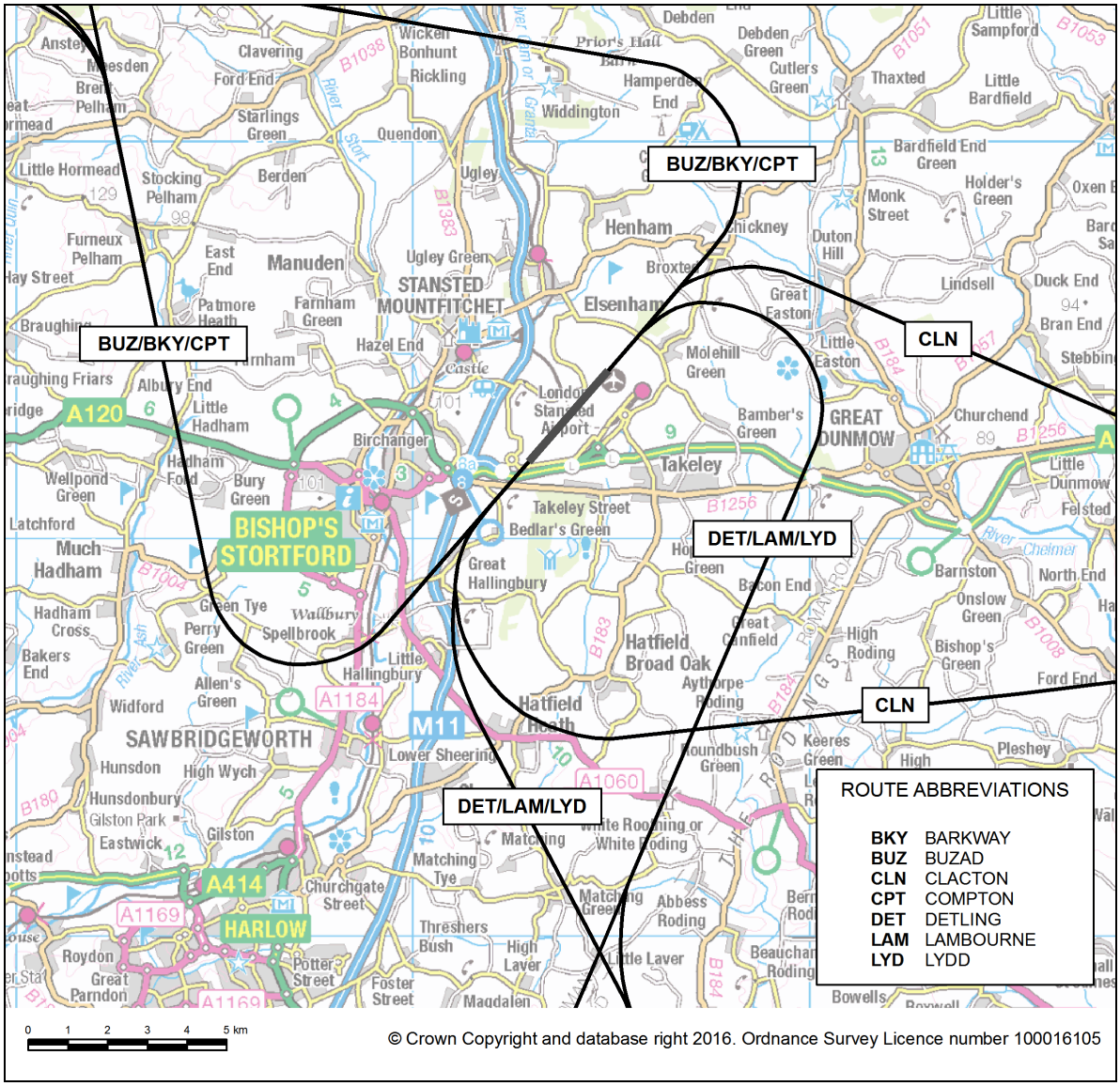


Figure 4 Typical Stansted radar flight tracks

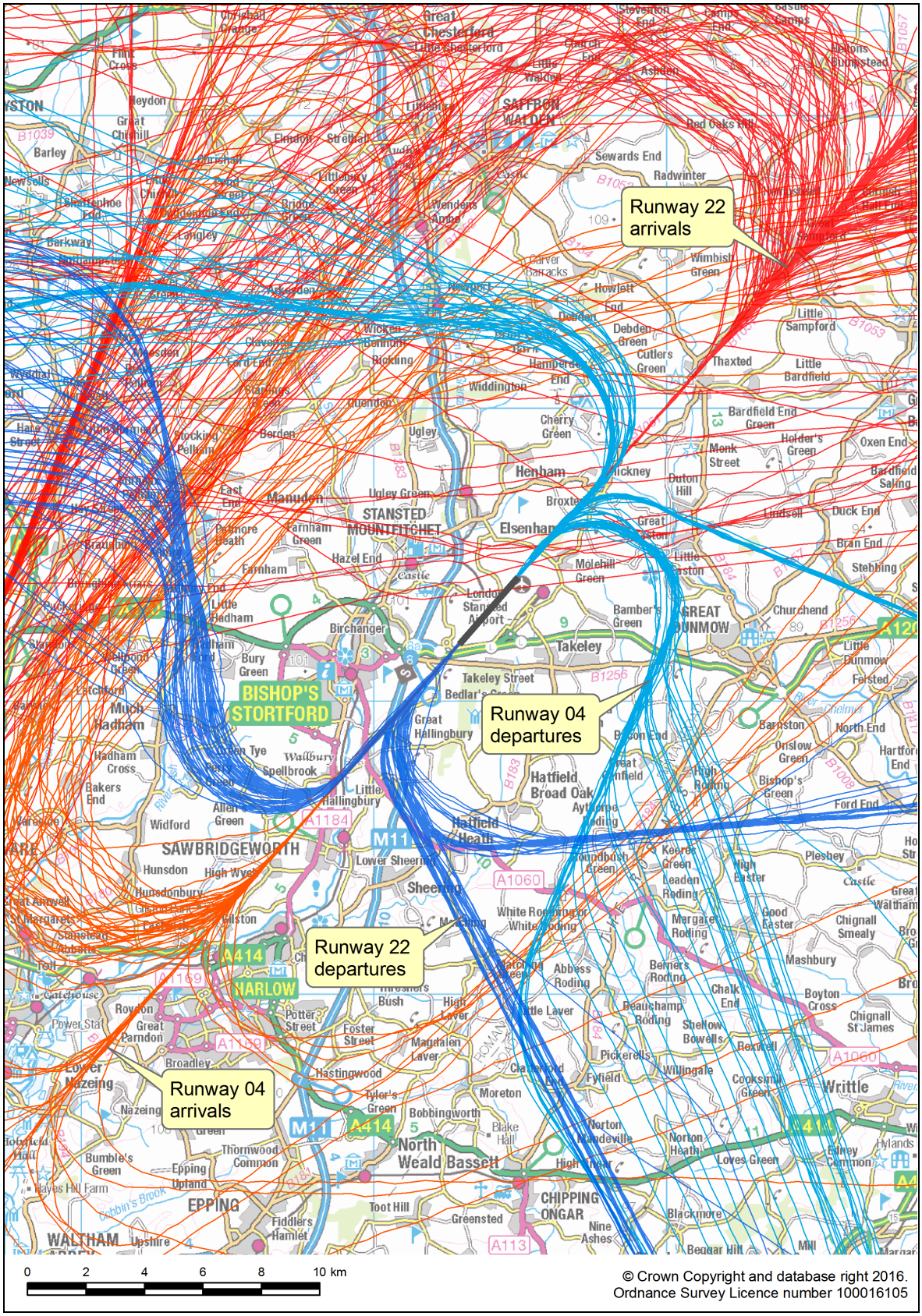
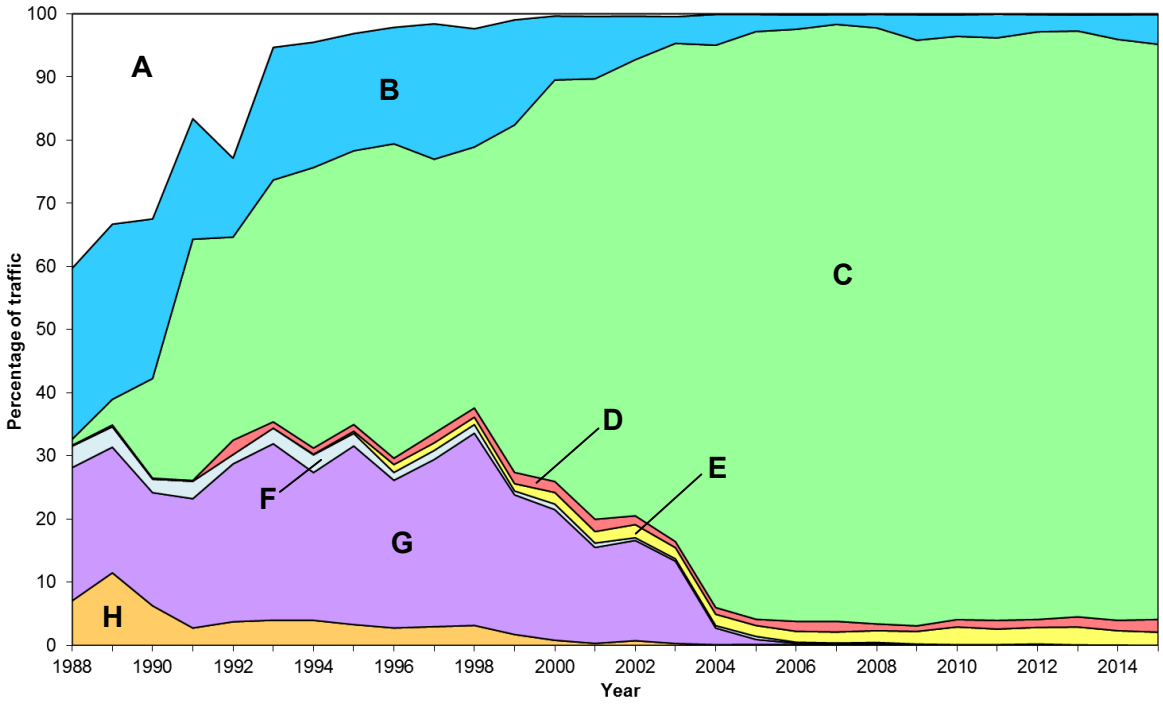


Figure 5 Stansted Noise Class trend 1988-2015



Note: The percentages from 1990 onwards relate to the average 16-hour Leq day; before 1990 the percentages relate to the average 12-hour NNI day (0700-1900 local time). Also, the percentages before 1992 are based on departures only, from 1992 they relate to total movements.

Key to Noise Classes

Propeller aircraft
A Small props, e.g. single/twin piston and turboprop light aircraft
B Large props, e.g. twin and 4-propeller transports, e.g. ATR-42, BAe ATP

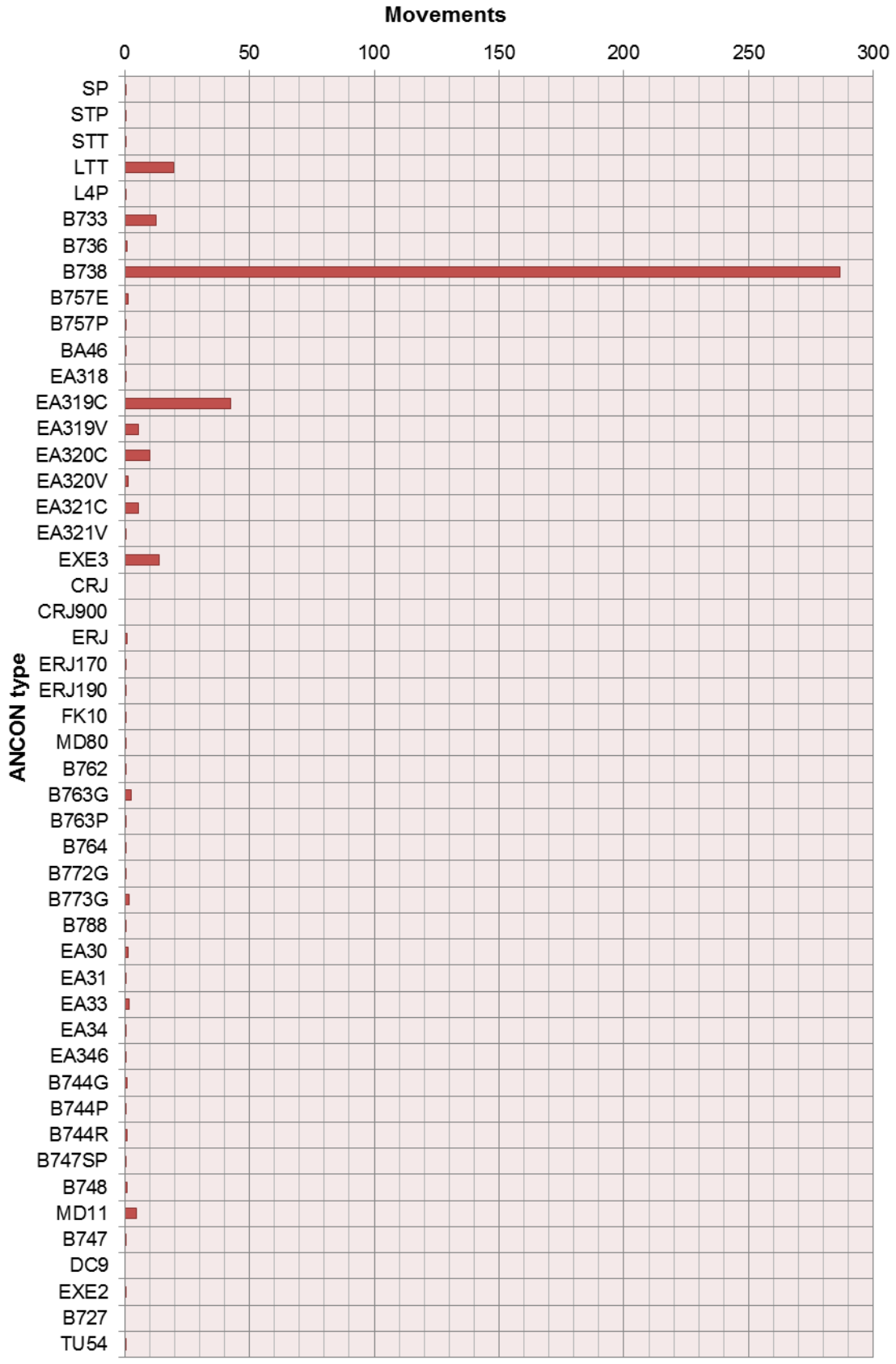
Chapter 3/4 jets
C Narrow-body aircraft, e.g. Airbus A319, Boeing 737-800
D Wide-body twins, e.g. Airbus A300, Boeing 767-300
E Wide-body 3 or 4-engine aircraft, e.g. Boeing 747-8, MD-11

Large Chapter 2/3 jets
F 1st generation wide-body 3 or 4-engine aircraft, e.g. Boeing 747-200

2nd generation twin jets
G Narrow-body twins (including Ch.2 and hush-kitted versions), e.g. Boeing 737-200

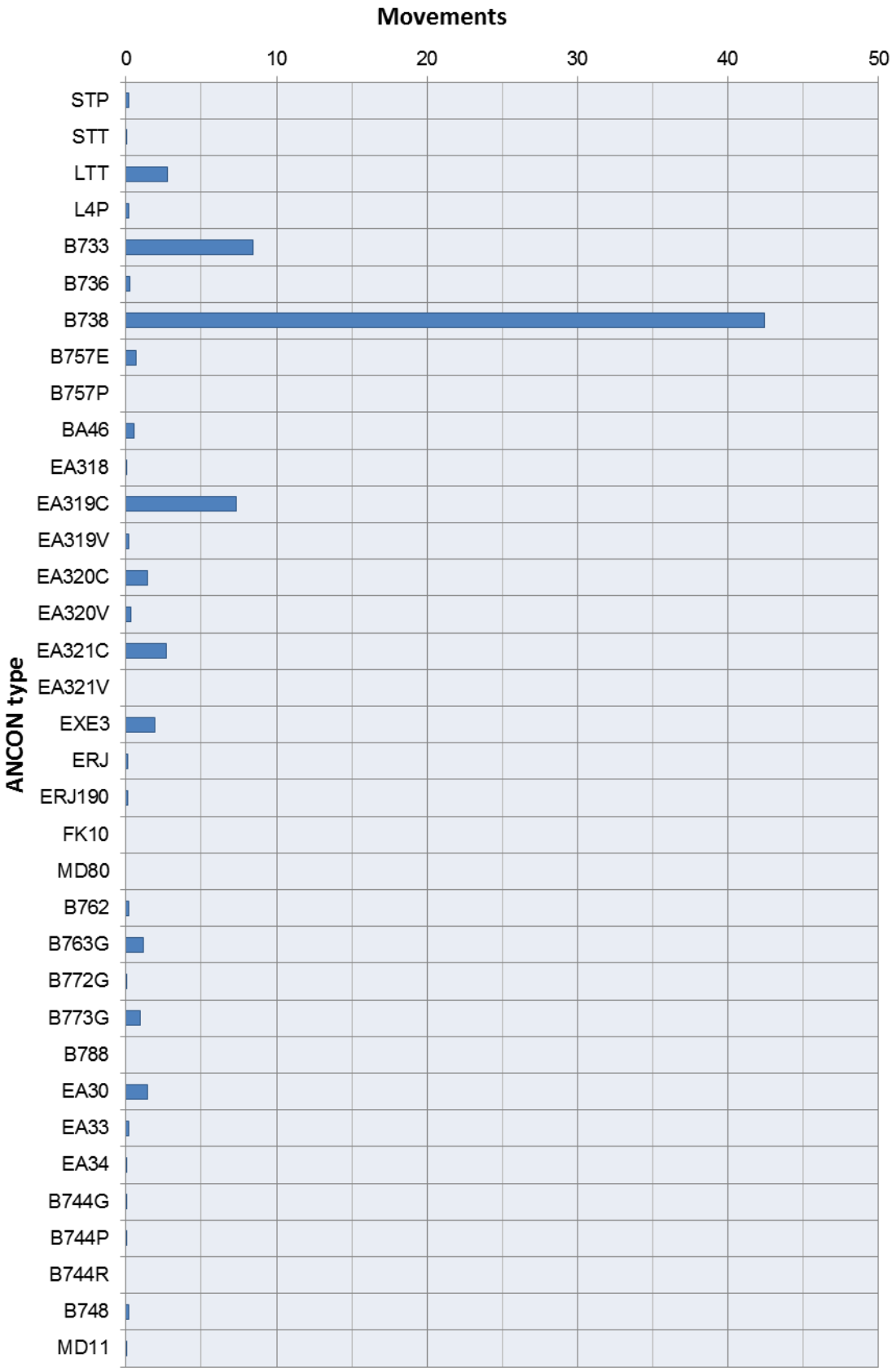
1st generation jets
H Narrow-body 3 or 4-engine aircraft (including hush-kitted versions), e.g. Boeing 727

Figure 6a Stansted 2015 average summer day movements by ANCON aircraft type



Note: ANCON types are shown in the same order as **Table 2a**.

Figure 6b Stansted 2015 average summer night movements by ANCON aircraft type



Note: ANCON types are shown in the same order as **Table 2b**.

Figure 7a Stansted 2015 and 2014 summer day NPR/SID traffic distributions

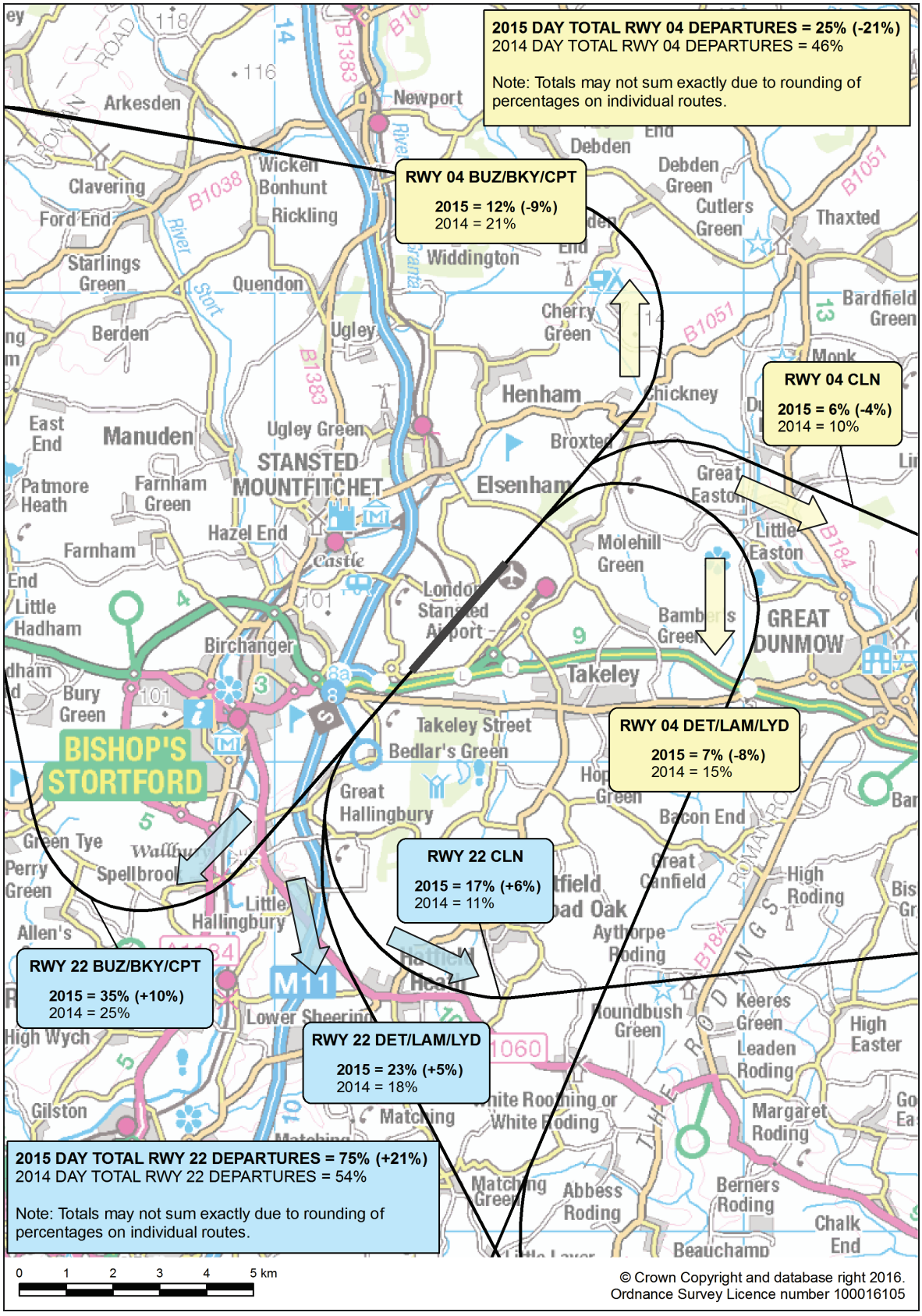


Figure 7b Stansted 2015 and 2014 summer night NPR/SID traffic distributions

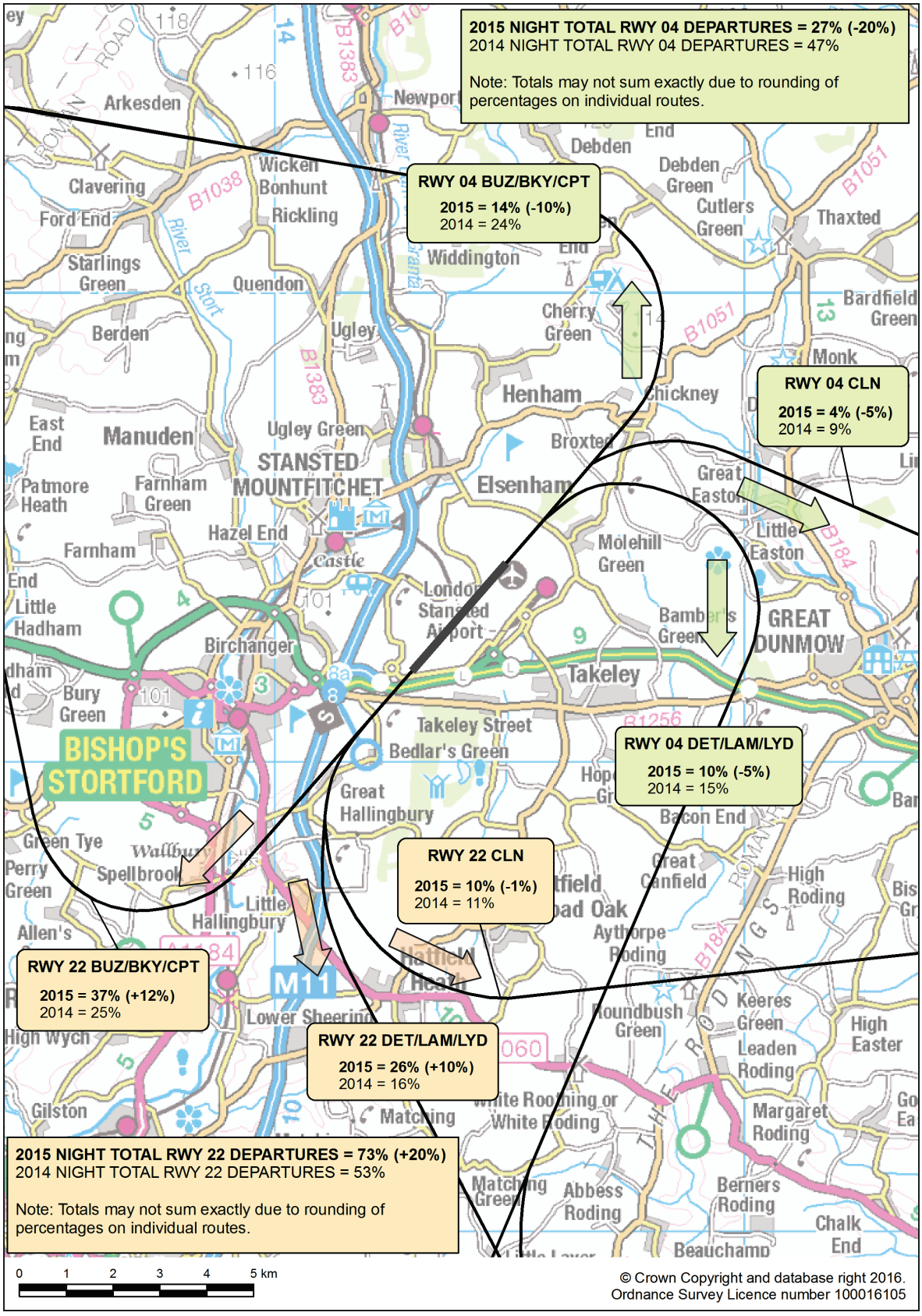


Figure 8 Stansted average summer day runway modal splits 1996-2015

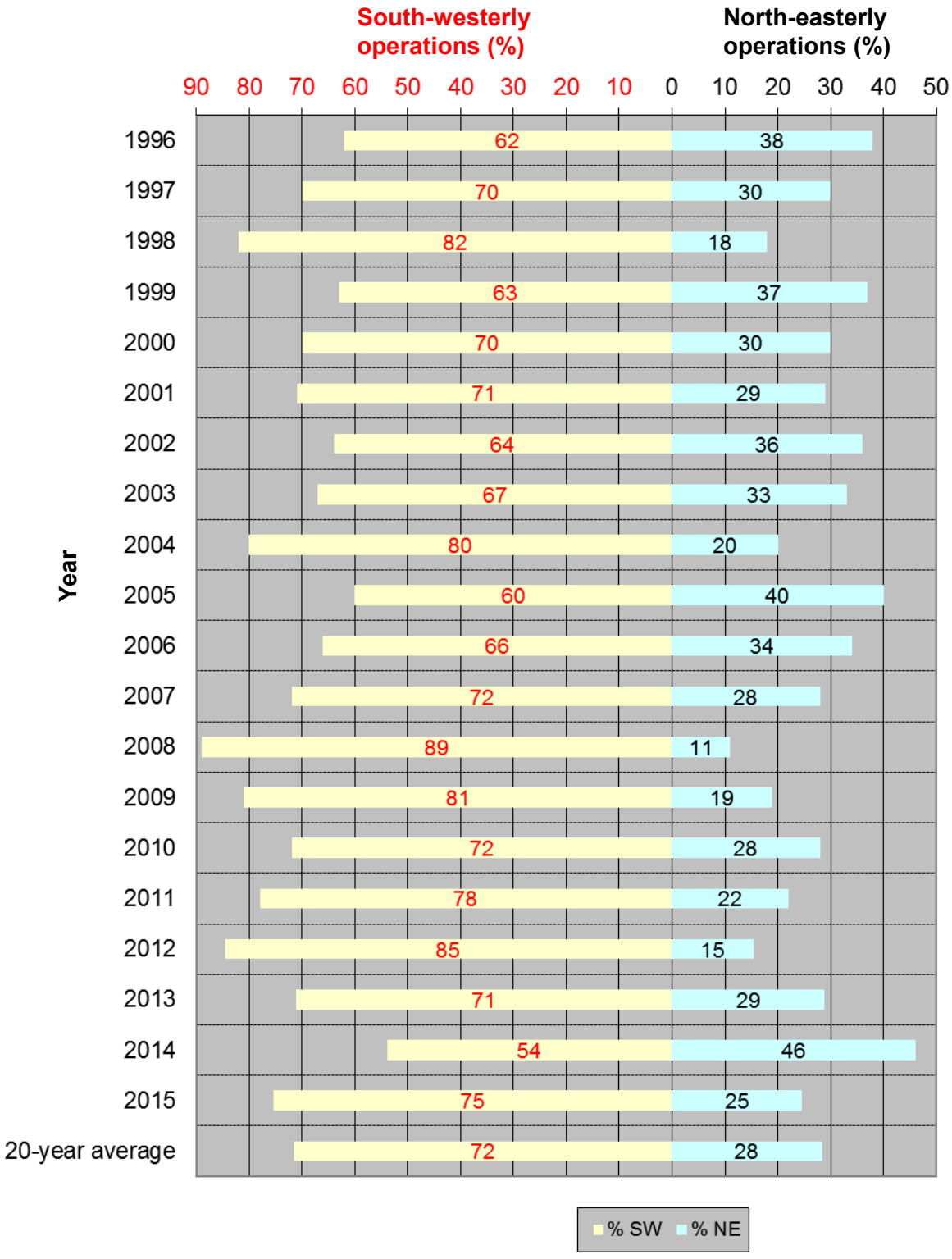


Figure 9 Topography around Stansted Airport

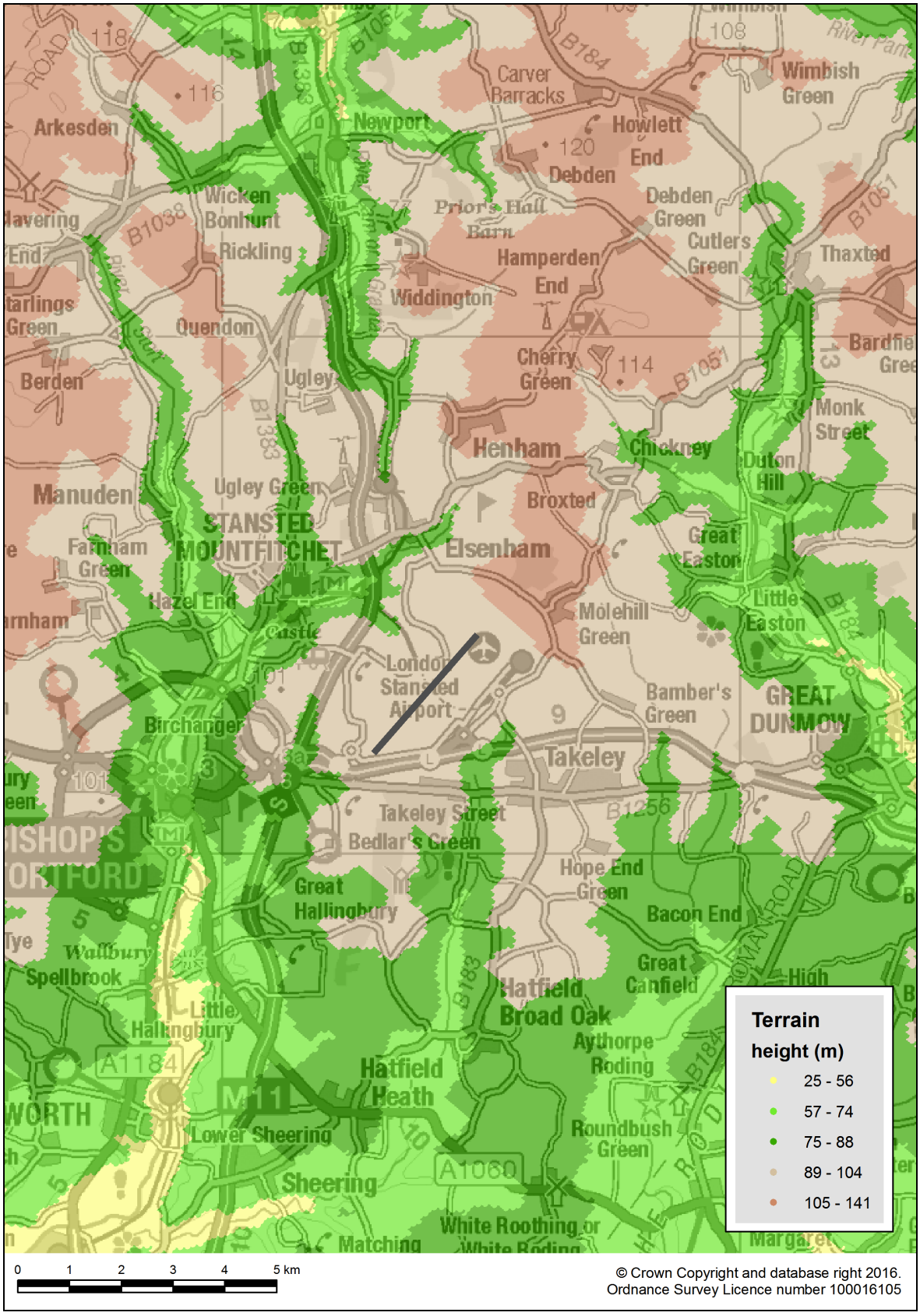


Figure 10 Population data points around Stansted Airport

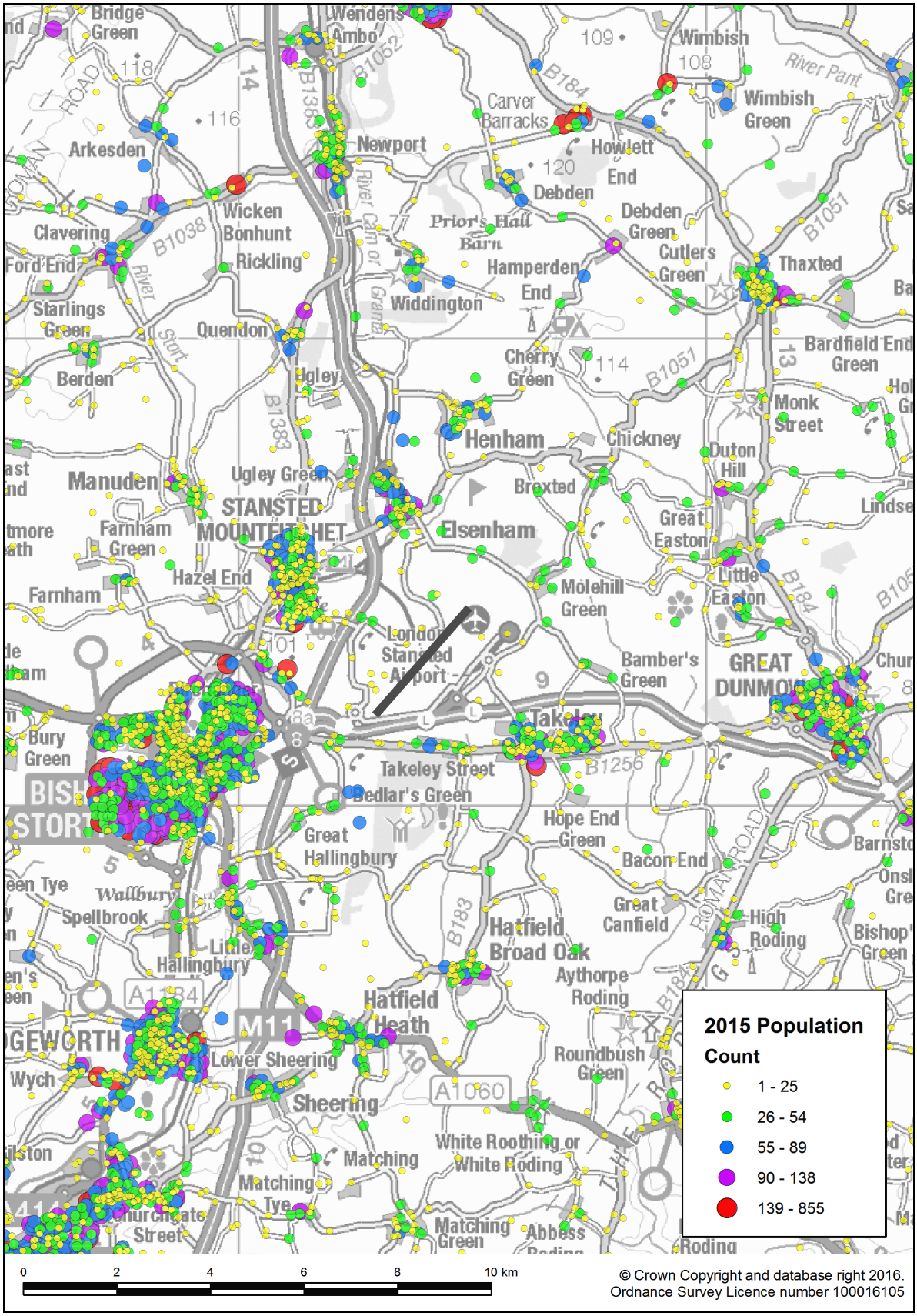


Figure 11a Stansted 2015 day actual (75% SW / 25% NE) Leq contours

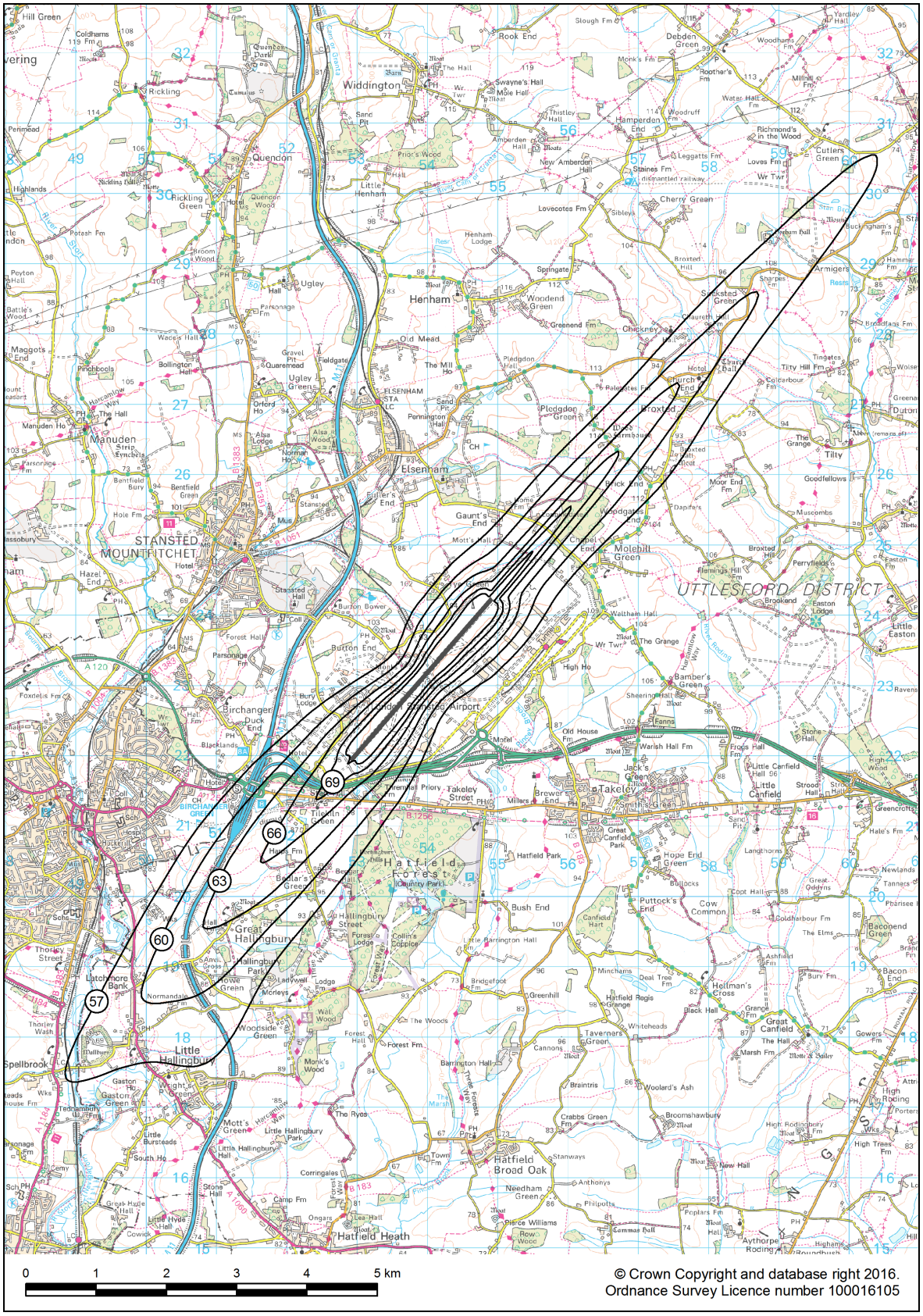


Figure 11b Stansted 2015 night actual (73% SW / 27% NE) Leq contours

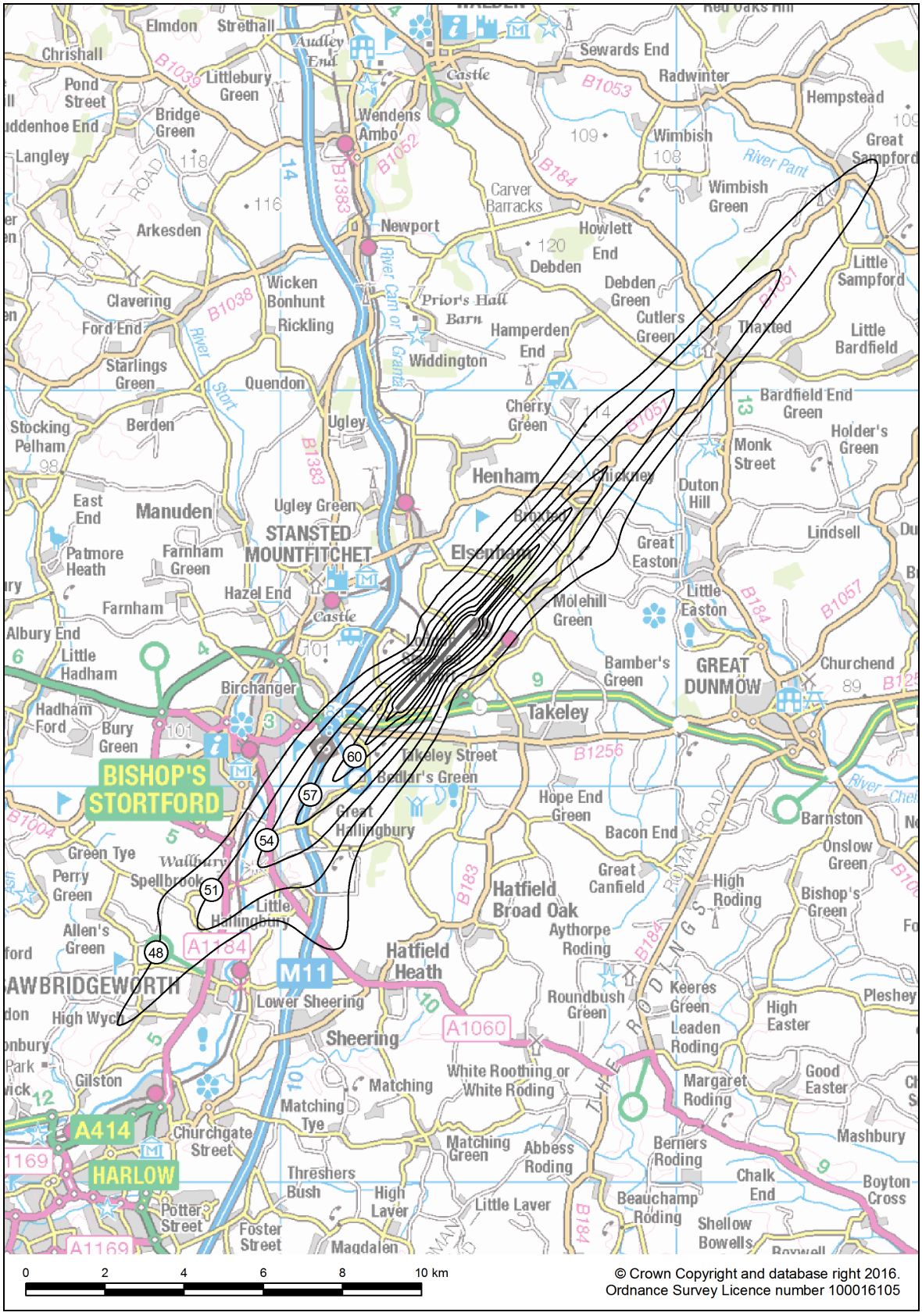


Figure 12 Stansted 2015 day standard (72% SW / 28% NE) Leq contours

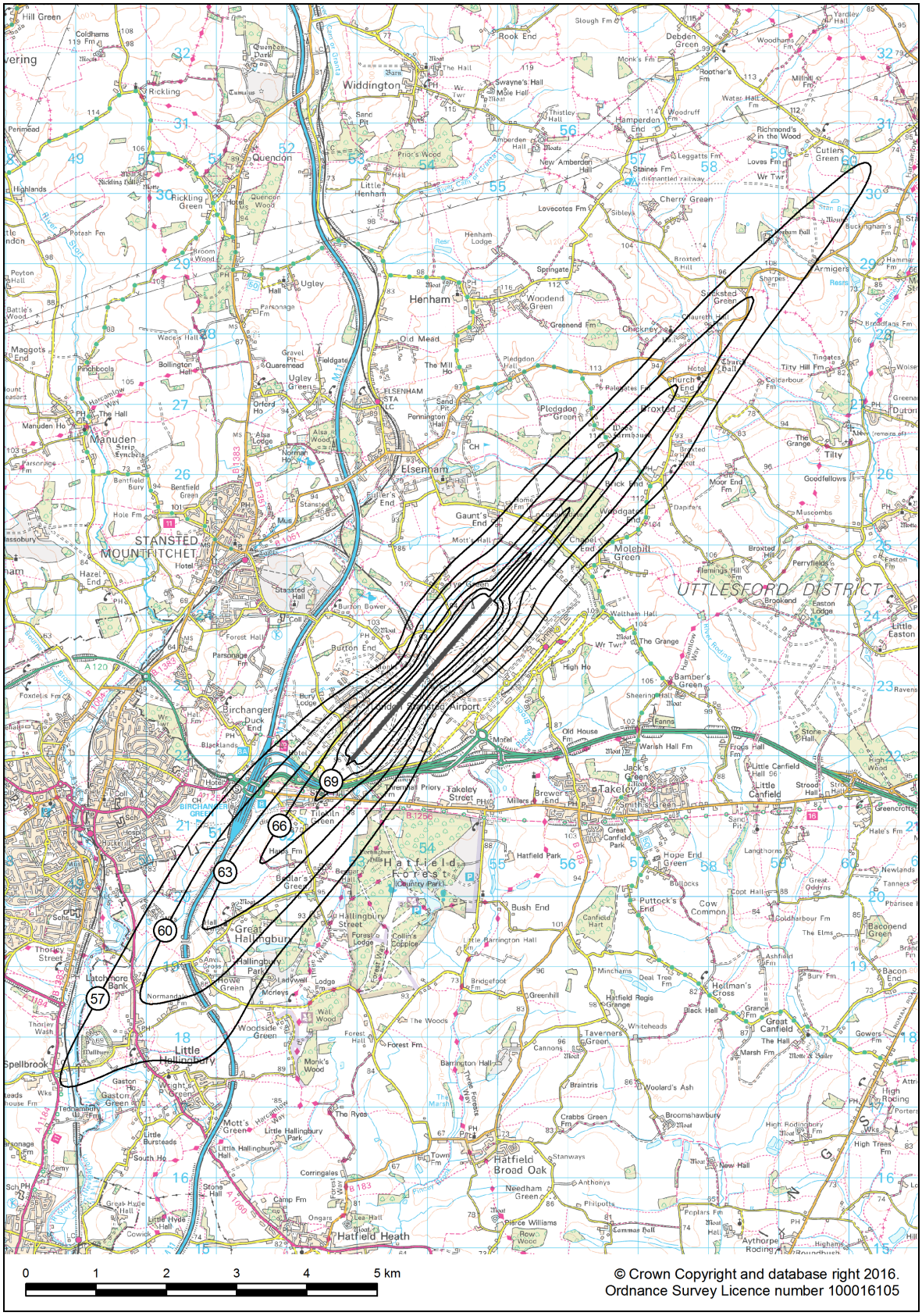


Figure 13a Stansted day actual 2015 (75% SW / 25% NE) and 2014 (54% SW / 46% NE) Leq contours

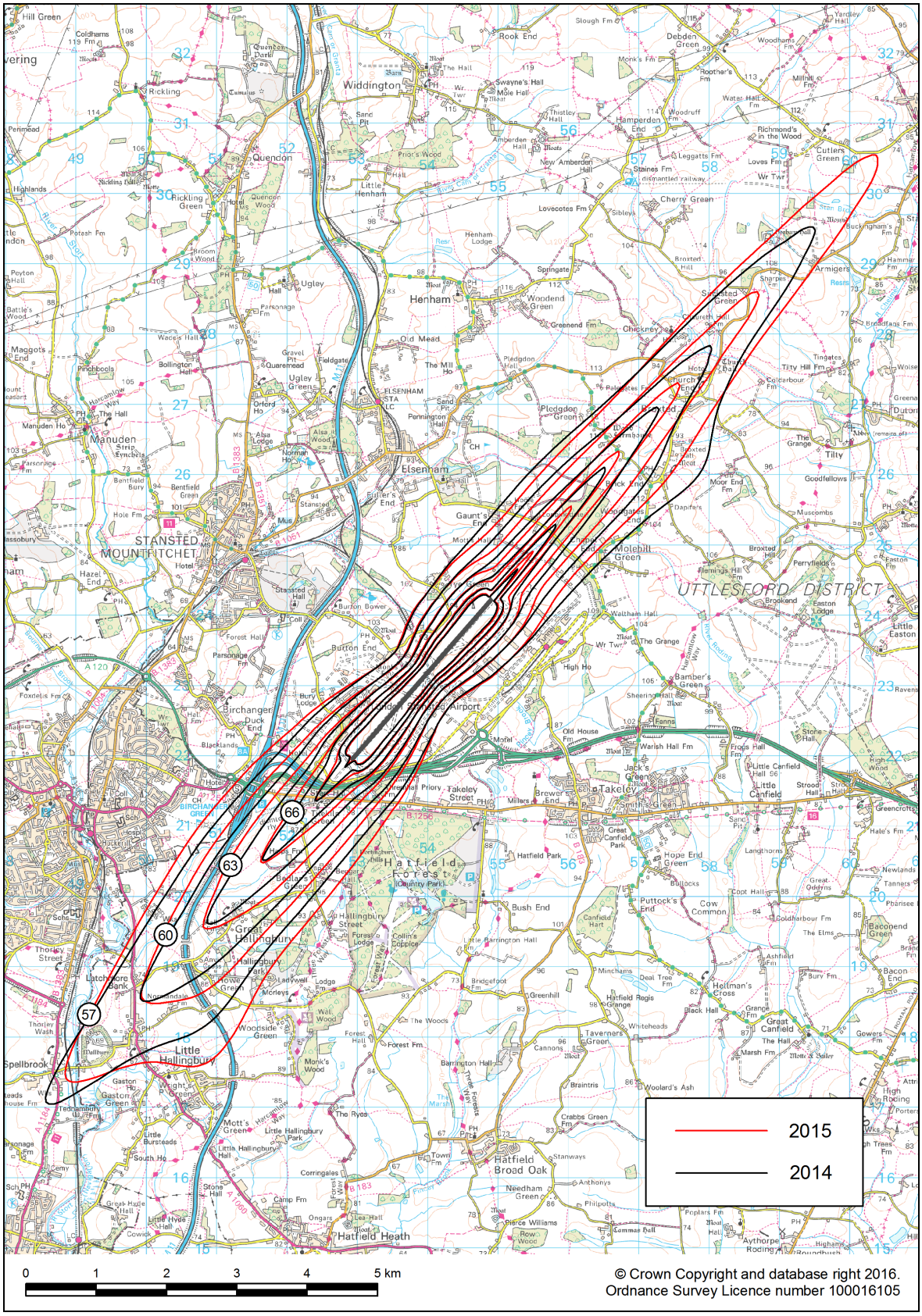


Figure 13b Stansted night actual 2015 (73% SW / 27% NE) and 2014 (50% SW / 50% NE) Leq contours

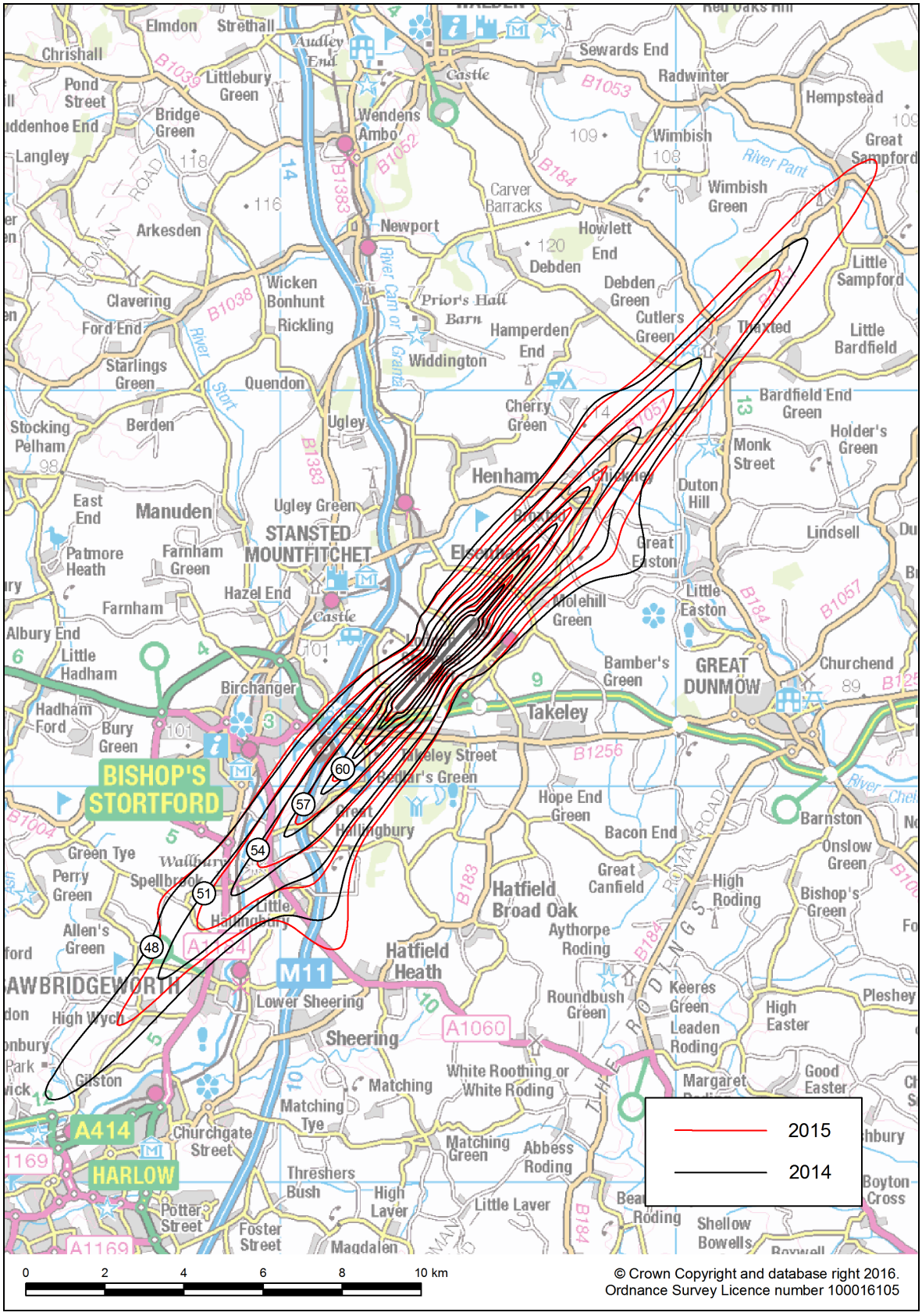


Figure 14 Stansted day standard 2015 (72% SW / 28% NE) and 2014 (70% SW / 30% NE) Leq contours

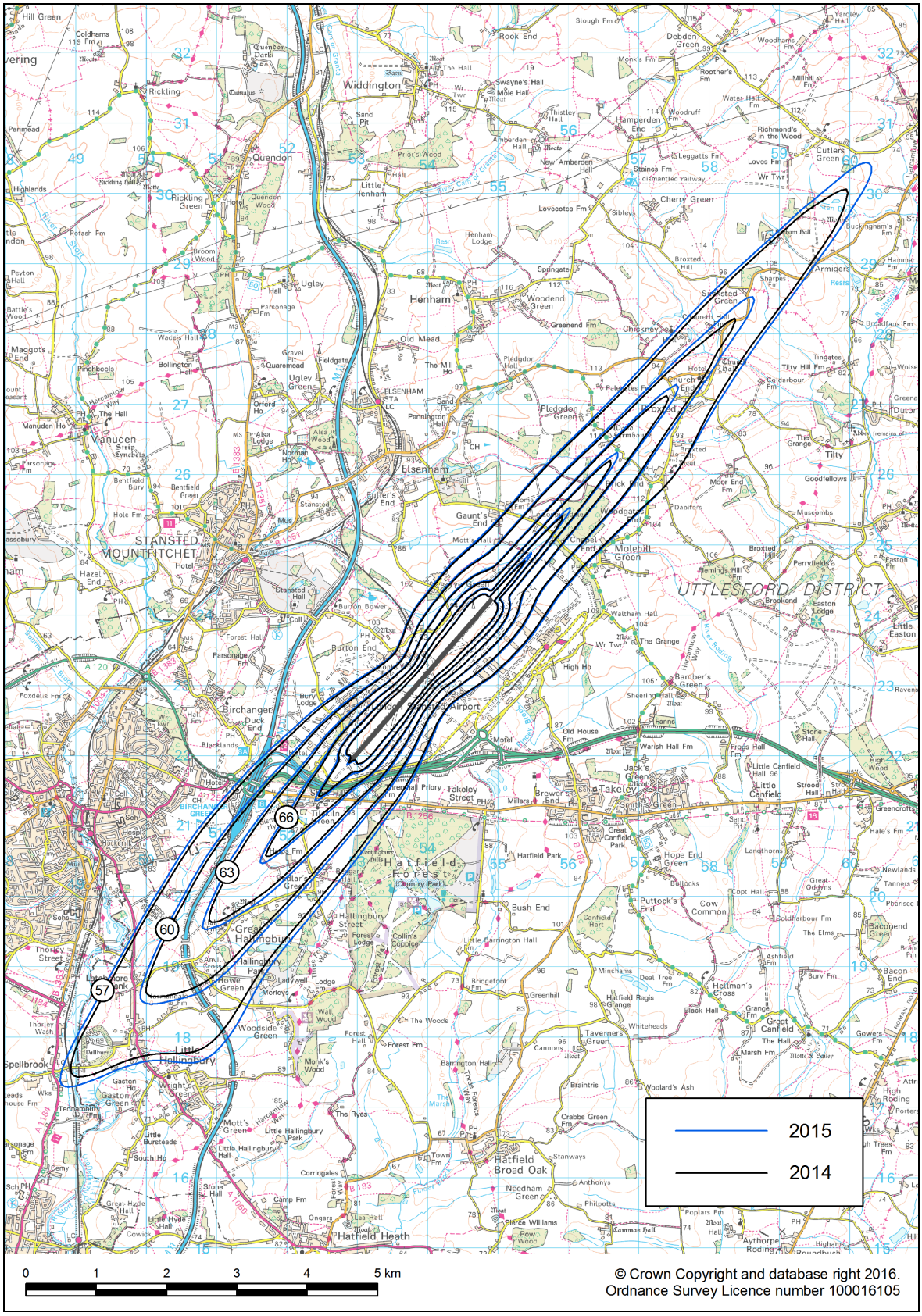


Figure 15 Stansted annual traffic and summer day Leq noise contour area/population trend 1988-2015