Environmental Research and Consultancy Department
Civil Aviation Authority

ERCD REPORT 1503

Noise Exposure Contours for Stansted Airport 2014

J Lee
G Cebrian
L Edmonds
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Prepared by the Civil Aviation Authority on behalf of the Department for Transport, August 2015

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Summary

This report presents the year 2014 average summer day and night noise exposure contours for London Stansted Airport.

The 57 dBA Leq day contour area for 2014 based on the actual runway modal split (54% south-west / 46% north-east) was calculated to be 21.6 km^2, 8% higher than in 2013 (2013: 20.0 km^2). The population enclosed within the 2014 actual 57 dBA contour was 32% higher at 1,650 (2013: 1,250). The 48 dBA Leq night actual modal split (50% south-west / 50% north-east) contour area for 2014 was calculated to be 56.3 km^2, an increase of 9% from 2013 (2013: 51.5 km^2), enclosing a population of 6,650 (2013: 6,400), a 4% rise.

August 2015

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.

Population data used in this report are based on 2011 Census data (updated for 2014) supplied by CACI Information Services.

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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 2014 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 2014 summer traffic data for Stansted revealed that average daily movements for the daytime period (384.9) increased by 8% from the previous year (2013: 356.0). The B738 ANCON type had the largest movement increase of 24 per day. There were on average 74.4 movements in the 8-hour night period over the 2014 summer (2013: 66.1), a rise of 13%.

The 2014 actual modal split (54% south-west / 46% north-east) 57 dBA day Leq contour area increased by 8% to 21.6 km^2 (2013: 20.0 km^2). The population enclosed within the 2014 actual 57 dBA Leq contour was 32% higher than in 2013 at 1,650 (2013: 1,250). The area increase was caused by the 8% rise in average daily movements. The population growth resulted from the contour extending over some populated areas following the movement increase and changes to the runway modal split.

The year 2014 standard modal split (70% south-west / 30% north-east) 57 dBA day Leq contour area increased by 9% to 21.8 km^2 (2013: 20.0 km^2), though this was still well within the 33.9 km^2 contour area limit imposed by the Stansted Planning Condition AN1. The population count within the 2014 standard contour was 1,500, 20% higher than in the previous year (2013: 1,250). The 8% increase in average daily movements caused the contour to extend over some populated areas.

The 2014 actual modal split (50% south-west / 50% north-east) 48 dBA night Leq contour enclosed an area of 56.3 km^2 (2013: 51.5 km^2), an increase of 9%. This followed a 13% rise in night movements. The 48 dBA population of 6,650 was 4% higher than in the previous year (2013: 6,400). The 20% higher proportion of north-easterly operations and 13% greater number of movements in 2014 led to significant changes to the shape of the night contours.

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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) noise contours on an annual basis for the designated airports. Night 8-hour Leq contours have therefore also 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 2014 Stansted Leq contours overlaid onto Ordnance Survey® (OS) base maps. Diagrams in Adobe® PDF and AutoCAD DXF format 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 2014 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**).

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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 2014 is shown in **Figure 2**.[4]

1.2.3 In the 2014 calendar year there were approximately 157,000 aircraft movements (2013: 146,000) at Stansted Airport, handling 20.0 million passengers (2013: 17.9 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 (13 Dec 2012) 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, tail number, aircraft type and destination. Analyses of departure and arrival flight tracks, and flight profiles, were based on year 2014 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 also vector aircraft from NPRs below this altitude for safety reasons, including in certain weather conditions (for example, to avoid storms).

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 2014. 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 2014. 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 10 and 22 km from threshold for Runway 04, and between 11 and 23 km from threshold for Runway 22.

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 2014 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 Examination of the 2014 radar data indicated that, as in the preceding years, at distances greater than 10 km from the runway threshold, the average aircraft heights for arrivals on Runway 04 were generally somewhat lower than on Runway 22. This follows the introduction of Continuous Descent Approach (CDA) for Runway 22 arrivals via the Abbott stack from 4 November 1999 and its extension to all Runway 22 arrivals in 2000. 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.

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

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 are then 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 are screened by ERCD with reference to several criteria so that only high quality data are used in the analysis. First of all, noise data that lie outside a 'weather window' are discarded. This ensures that the data used are not affected by adverse meteorological conditions such as precipitation and strong winds. Secondly, the maximum noise level of the aircraft event must 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 pass through a 60-degree inverted cone, centred at the noise monitor, are retained in order to minimise the effects of lateral attenuation[8] and lateral directivity[9].

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 are based on the daily average movements that take 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 is 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[10], however, it was found that the NTK totals were somewhat higher than those recorded in the logs. An investigation revealed that there was a change to the process by which data were fed into the NTK system, which meant that NTK data now included records of planned flights that did not actually take place. The NTK data were therefore adjusted accordingly

[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.

[9] 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.

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

to remove any redundant flight records, after which a close match was achieved with the runway log data.

Daytime traffic distribution by noise class

2.6.2 The average number of daily movements at Stansted over the 2014 summer day period (384.9) was 8% higher than in the previous year (2013: 356.0).

2.6.3 **Table 1a** lists the average summer day movements[11] by 8 noise classes of aircraft, ranked in ascending order of noise emission, i.e. from least to most noisy, in 2013 and 2014. As in 2013, the vast majority of movements (92%) were by short-haul jet aircraft (Noise Class 3), and their numbers increased by 7% to 354 per day in 2014. (Note: in 2014 an estimated 98% of the aircraft within Noise Class 3 for the daytime period were compliant with the 'Chapter 4' noise standard[12]).

2.6.4 Compared to Noise Class 3, there were relatively few movements by aircraft in Noise Classes 2, 4 and 5, and almost insignificant numbers in Noise Classes 1, 6, 7 and 8. Noise Class 2 (large twin turboprop aircraft) had the second highest number of movements (15 per day), but despite a 68% increase in 2014, they still only comprised 4% of total movements. Noise Class 5 (second generation wide-body 3 or 4-engine aircraft) had the third highest number of movements (9 per day), representing 2% of total movements at Stansted.

2.6.5 **Figure 5** illustrates the changing distribution of traffic among the 8 noise classes over the period from 1988 to 2014 inclusive. The increasing dominance of short-haul 'Chapter 3' and 'Chapter 4' jet movements (Noise Class 3) over the years at Stansted can be clearly seen.

Night-time traffic distribution by noise class

2.6.6 There were 74.4 aircraft movements on average for the 8-hour night in 2014, a rise of 13% (2013: 66.1). Arrivals comprised 60% of total 2014 night movements.

2.6.7 **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. Short-haul jet aircraft (Noise Class 3) formed the highest proportion of movements (89%). (Note: in 2014 an estimated 95% of the aircraft within Noise Class 3 for the night period were compliant with the 'Chapter 4' noise standard).

Daytime traffic distribution by ANCON aircraft type

2.6.8 A more detailed breakdown of the year 2014 average summer day movements, indicating the ANCON aircraft types that fall into each noise class, is provided in

[11] Includes departures and arrivals.

[12] In June 2001, following the fifth meeting of the Committee on Aviation Environmental Protection (CAEP/5), the Council of ICAO adopted a new 'Chapter 4' noise standard, which was more stringent than the previous 'Chapter 3' standard.

Table 2a. Comparison of the daily movement numbers for 2013 and 2014 shows that the largest increase by far was for the ANCON type B738[13], with a rise of 24 daily movements. The second highest increase was for large twin turboprops (LTT), by 6 movements per day. The largest *decrease* was a reduction of 4 daily movements by the ANCON type EA320C[14].

2.6.9 **Figure 6a** illustrates the numbers of movements by ANCON aircraft type for the 2014 average summer day. The B738 was clearly the most common ANCON aircraft type at Stansted with 256 daily movements (67% of the total), followed by the EA319C[15] with 52 daily movements (14%).

2.6.10 The B738 was the noise dominant ANCON type at Stansted 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

2.6.11 A more detailed breakdown of the year 2014 average summer night movements, indicating the ANCON types that fall into each noise class, is provided in **Table 2b**. The highest increase was for the ANCON type B738, which was up by 6 movements per night. The largest decrease was for the BA46[16], down by 2 movements per night.

2.6.12 **Figure 6b** illustrates the numbers of movements by ANCON aircraft type for the 2014 average summer night. Similar to daytime, movements at night were dominated by the B738 ANCON type with an average of 45 movements (representing 60% of total night movements).

Daytime traffic distribution by NPR/SID route

2.6.13 **Figure 7a** shows the distribution of departing aircraft by NPR/SID route for the 2014 summer day period, including distribution figures from 2013 for comparison. As in the previous year, the Runway 22 BUZ/BKY/CPT routes took the highest proportion of departure traffic over the summer period (25%), although this percentage was 7% lower than in 2013. Percentage decreases were also seen on the other Runway 22 routes in 2014. There were traffic increases of up to 8% on each of the Runway 04 routes.

Night-time traffic distribution by NPR/SID route

2.6.14 **Figure 7b** shows the distribution of departing aircraft by NPR/SID route for the 2014 summer night period, including distribution figures from 2013 for comparison. The Runway 22 BUZ/BKY/CPT routes took the highest proportion of

[13] B738 = Boeing 737-800/900

[14] EA320C = Airbus A320 with CFM56 engines

[15] EA319C = Airbus A319 with CFM56 engines

[16] BA46 = BAe 146/Avro RJ

departure traffic over the summer night period (25%), closely followed by the Runway 04 BUZ/BKY/CPT routes (24%). There were percentage increases on each of the Runway 04 routes, especially for BUZ/BKY/CPT where the increase was 11%.

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 2014 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 2014, this is the 20-year period from 1995 to 2014. 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 2014 and the previous year are summarised in the table below:

Stansted summer day runway modal splits for 2014 and 2013

Modal split scenario	% south-west (Runway 22)	% north-east (Runway 04)
Actual 2014	54%	46%
Actual 2013	71%	29%
Standard 2014	70%	30%
Standard 2013	71%	29%

2.7.4 It can be seen that in 2014 the proportion of actual south-westerly movements reduced considerably, by 17% compared to year 2013. This was due to extended periods of north-easterly operations at the start and end of the 92-day summer period. In contrast, August saw extended periods of south-westerly operations with half the normal proportion of north-easterly operations. The 2014 standard modal split had 1% fewer south-westerly movements than in 2013. 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 2014 summer period was 50% south-west / 50% north-east, representing a 20% decrease in the proportion of

south-westerly operations compared to the previous year (2013: 70% south-west / 30% north-east).

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[17] 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 2014 update of the latest 2011 Census supplied by CACI Limited[18]. Within the extent of the 2014 actual 57 dBA Leq contour, the population count using the 2014 population database was 2% lower than with the previous 2013 database, so the effect of the 2014 population database update was a small reduction in population counts around Stansted.

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 co-ordinate 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 Estimates have also been made of the numbers of noise sensitive buildings situated within the daytime contours, using the *InterestMap*™[19] 'Points of Interest' (2014) database. For the purpose of this study, the noise sensitive buildings that have been considered are schools, hospitals and places of worship.

[17] Meridian™ 2

[18] www.caci.co.uk

[19] 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 2014 day Leq noise contours generated with the actual 2014 summer day period runway modal split (54% south-west / 46% 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 2014 day actual modal split contours are provided in the table below:

Stansted 2014 day actual contours - area, population and household estimates

Leq (dBA)	Area (km^2)	Population	Households
> 57	21.6	1,650	650
> 60	11.7	350	150
> 63	6.1	100	50
> 66	3.1	< 50	< 50
> 69	1.7	0	0
> 72	1.0	0	0

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

3.1.3 The 2014 day actual modal split 57 dBA Leq contour enclosed an area of 21.6 km^2 and a population of 1,650.

3.1.4 Estimates of the cumulative numbers of noise sensitive buildings within the 2014 day actual modal split contours are provided in the table below:

Stansted 2014 day actual contours - noise sensitive building estimates

Leq (dBA)	Schools	Hospitals	Places of worship
> 57	3	0	3
> 60	0	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 2014 night Leq noise contours generated with the actual 2014 summer night period runway modal split (50% south-west / 50% 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 2014 night actual modal split contours are provided in the following table:

Stansted 2014 night actual contours – area, population and household estimates

Leq (dBA)	Area (km^2)	Population	Households
> 48	56.3	6,650	2,700
> 51	30.5	2,000	800
> 54	16.6	1,200	500
> 57	8.6	200	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 2014 night actual modal split 48 dBA Leq contour enclosed an area of 56.3 km^2 and a population of 6,650.

3.3 Day standard modal split contours

3.3.1 The Stansted 2014 day Leq noise contours generated with the standard 2014 summer day period runway modal split (70% south-west / 30% 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 2014 day standard modal split contours are provided in the following table:

Stansted 2014 day standard contours - area, population and household estimates

Leq (dBA)	Area (km^2)	Population	Households
> 57	21.8	1,500	600
> 60	11.7	350	150
> 63	6.2	100	50
> 66	3.1	< 50	< 50
> 69	1.7	0	0
> 72	1.0	0	0

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

3.3.3 The 2014 day standard modal split 57 dBA Leq contour enclosed an area of 21.8 km^2 and a population of 1,500.

3.3.4 Estimates of the cumulative numbers of noise sensitive buildings within the 2014 day standard modal split contours are provided in the table below:

Stansted 2014 day standard contours - noise sensitive building estimates

Leq (dBA)	Schools	Hospitals	Places of worship
> 57	2	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 2013 contours

4.1.1 The Stansted 2014 day actual modal split Leq contours are compared against the 2013 day actual Leq contours in **Figure 13a**. The table below summarises the areas, populations and percentage changes from 2013 to 2014:

Stansted day actual contours - area and population estimates for 2013 and 2014

Leq (dBA)	2013 Area (km^2)	2014 Area (km^2)	Area change (%)	2013 Pop.	2014 Pop.	Pop. change (%)
> 57	20.0	21.6	+8%	1,250	1,650	+32%
> 60	10.6	11.7	+10%	350	350	0%
> 63	5.6	6.1	+9%	100	100	0%
> 66	2.9	3.1	+7%	0	< 50	(n/a)
> 69	1.6	1.7	+6%	0	0	(n/a)
> 72	0.9	1.0	+11%	0	0	(n/a)

Note: the 2013 and 2014 day actual runway modal splits were 71% SW / 29% NE and 54% SW / 46% NE respectively.

4.1.2 The 57 dBA contour area for 2014 increased by 8%, in line with the 8% rise in total movements. Area increases of up to 11% were also seen at the higher contour levels. The population count grew by 32% inside the 57 dBA contour, caused mainly by the extension of the contour towards the south-west over parts of Spellbrook, and to the east over Molehill Green.

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

4.1.4 The effect on contour shapes of the 17% higher proportion of north-easterly operations in 2014 can be clearly seen in **Figure 13a**. The Runway 22 arrival contour tips to the north-east of the airport have retracted, and the Runway 22 departure lobe pointing to the south-east is smaller. Conversely, the 57 dBA south-west contour tip due to landings on Runway 04 is more pronounced, and the sides of the contours immediately to the north-east of the airport have widened, reflecting higher numbers of north-easterly departures.

4.2 Night actual modal split contours – comparison with 2013 contours

4.2.1 The Stansted 2014 night actual modal split Leq contours are compared against the 2013 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 2013 to 2014:

Stansted night actual contours - area and population estimates for 2013 and 2014

Leq (dBA)	2013 Area (km^2)	2014 Area (km^2)	Area change (%)	2013 Pop.	2014 Pop.	Pop. change (%)
> 48	51.5	56.3	+9%	6,400	6,650	+4%
> 51	28.6	30.5	+7%	2,250	2,000	-11%
> 54	15.6	16.6	+6%	850	1,200	+41%
> 57	8.3	8.6	+4%	250	200	-20%
> 60	4.4	4.5	+2%	50	50	0%
> 63	2.3	2.3	0%	0	0	(n/a)
> 66	1.3	1.3	0%	0	0	(n/a)
> 69	0.8	0.8	0%	0	0	(n/a)
> 72	0.5	0.5	0%	0	0	(n/a)

Note: the 2013 and 2014 night actual runway modal splits were 70% SW / 30% NE and 50% SW / 50% NE respectively.

4.2.2 The 48 dBA contour area increased by 9%, with area increases also seen at all the contours levels up to 60 dBA, as a result of the 13% higher number of night movements in 2014 (note: arrival movements rose by 26% and departures decreased by 3%, giving an overall movement change of +13%). The 48 dBA contour population rose by 4%, however, there was no consistent pattern to the changes in population counts, with some large increases or decreases seen depending on the contour level.

4.2.3 The shift in the 2014 runway modal split in favour of 20% more north-easterly operations is evident in the shape of the noise contours. The 57 dBA contour lobe to the south-west has extended markedly from the higher proportion of Runway 04 arrivals, in conjunction with the 26% increase in arrival movements. The Runway 22 contour lobe caused by departures turning to the south-east has retracted, whilst the Runway 04 departure lobe pointing to the east has extended. The Runway 22 arrival contour tip shortened only slightly as the 20% change in runway modal split in favour of north-easterly operations was partially offset by the 26% increase in arrival movements.

4.3 Day standard modal split contours – comparison with 2013 contours

4.3.1 The Stansted 2014 day standard modal split Leq contours are compared against the 2013 day standard Leq contours in **Figure 14**. The following table summarises the areas, populations and percentage changes from 2013 to 2014:

Stansted day standard contours - area and population estimates for 2013 and 2014

Leq (dBA)	2013 Area (km^2)	2014 Area (km^2)	Area change (%)	2013 Pop.	2014 Pop.	Pop. change (%)
> 57	20.0	21.8	+9%	1,250	1,500	+20%
> 60	10.6	11.7	+10%	350	350	0%
> 63	5.6	6.2	+11%	100	100	0%
> 66	2.9	3.1	+7%	0	< 50	(n/a)
> 69	1.6	1.7	+6%	0	0	(n/a)
> 72	0.9	1.0	+11%	0	0	(n/a)

Note: the 2013 and 2014 day standard runway modal splits were 71% SW / 29% NE and 70% SW / 30% 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 difference between the ratios of south-westerly to north-easterly operations.

4.3.3 The 57 dBA contour area increased by 9% in 2014 in line with the 8% increase in total movements, with similar changes at the other contour levels. The overall increase in the size of the contours in year 2014 compared to 2013 can be seen in **Figure 14**. The population count within the 57 dBA contour was 20% higher due to extensions of the contour over populated areas such as Spellbrook and Little Hallingbury to the south-west, and Brick End to the north-east.

4.3.4 It is noted that the 57 dBA Leq standard modal split contour area of 21.8 km^2 is well below the Planning Condition AN1 contour area limit of 33.9 km^2 (see section 1.2.4).

4.4 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. Please note that 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% – this can be attributed to the economic downturn and fluctuating oil price. The figure dropped even further in 2009, by 13%, as the global recession continued to impact upon 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 factors causing the decline in traffic.

4.4.5 Annual traffic dropped further in 2011 by 4% and also in 2012 for the fifth year running (also by 4%) as the demand for flights continued to fall. However, 2013 saw the first increase in annual flights since the five years of successive decline that followed the 2007 peak. Movements rose again in 2014, this time by 7%, as the recovery in passenger demand continued.

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), and this was the lowest ever contour area calculated for Stansted. (The previous area low was 20.1 km^2 back in 1990). However, the contour area increased in 2014 as movements rose significantly.

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 substantial increase in summer movements and a much higher proportion of north-easterly operations, which affected the contour shape significantly.

5 Conclusions

5.1 Year 2014 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 2014 actual modal split 57 dBA day Leq contour area increased by 8% to 21.6 km^2 (2013: 20.0 km^2). This followed an 8% rise in total movements for the 2014 summer day period to 384.9 (2013: 356.0), with the B738 ANCON type having the largest increase of 24 movements per day. The population enclosed within the 2014 actual 57 dBA Leq contour was 32% higher than in 2013 at 1,650 (2013: 1,250). This was caused by a combination of the movement increase and major changes to the runway modal split in 2014, which meant that the contour extended over some populated areas.

5.3 The year 2014 standard modal split 57 dBA day Leq contour area increased by 9% to 21.8 km^2 (2013: 20.0 km^2), though this was still well within the 33.9 km^2 contour area limit imposed by the Stansted Planning Condition AN1. The population count within the 2014 standard contour of 1,500 was 20% higher than in the previous year (2013: 1,250). The increase in movements caused the contour to extend over some populated areas.

5.4 Night-time Leq contours have also been produced. The 2014 actual modal split 48 dBA night Leq contour enclosed an area of 56.3 km^2 (2013: 51.5 km^2), an increase of 9%. This was a result of the 13% increase in night movements. The 48 dBA contour population of 6,650 was 4% higher than in the previous year (2013: 6,400). The 20% higher proportion of north-easterly operations and 13% rise in the number of movements produced significant changes to the shape of the night contours.

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Table 1a Stansted 2013 and 2014 average summer day movements by noise class

Noise Class	Description	2013	2014	Percentage of total 2014 movements	Change
PROPELLER AIRCRAFT					
1	Small propeller aircraft	0.6	0.5	< 1%	-0.1 (*)
2	Large propeller aircraft	9.0	15.1	4%	+6.1 (+68%)
CHAPTER 3/4 JETS **					
3	Short-haul aircraft	330.3	354.0	92%	+23.7 (+7%)
4	Wide-body twin-engine aircraft	5.7	6.3	2%	+0.6 (+11%)
5	2nd generation wide-body 3,4-engine aircraft	10.1	8.8	2%	-1.3 (-13%)
LARGE CHAPTER 2/3 JETS					
6	1st generation wide-body 3,4-engine aircraft	< 0.1	< 0.1	0%	0.0 (*)
2nd GENERATION TWIN JETS					
7	Narrow-body twin-engine *(including Ch.2 and hush-kitted versions)*	< 0.1	< 0.1	0%	0.0 (*)
1st GENERATION JETS					
8	Narrow-body 3,4-engine aircraft	0.2	0.1	0%	-0.1 (*)
	TOTAL	356.0	**384.9**	100%	**+28.9 (+8%)**

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

** An estimated 98% of *Noise Class 3* aircraft in the 2014 daytime period met the 'Chapter 4' noise standard (2013: 99%).

Note: Totals may not sum exactly due to rounding.

Table 1b Stansted 2013 and 2014 average summer night movements by noise class

Noise Class	Description	2013	2014	Percentage of total 2014 movements	Change
PROPELLER AIRCRAFT					
1	Small propeller aircraft	0.2	0.2	< 1%	0.0 (*)
2	Large propeller aircraft	1.2	3.2	4%	+2.0 (*)
CHAPTER 3/4 JETS **					
3	Short-haul aircraft	60.1	66.1	89%	+6.0 (+10%)
4	Wide-body twin-engine aircraft	3.6	4.6	6%	+1.0 (+28%)
5	2nd generation wide-body 3,4-engine aircraft	1.1	0.4	< 1%	-0.7 (*)
LARGE CHAPTER 2/3 JETS					
6	1st generation wide-body 3,4-engine aircraft	0.0	0.0	0%	0.0 (*)
2nd GENERATION TWIN JETS					
7	Narrow-body twin-engine *(including Ch.2 and hush-kitted versions)*	0.0	0.0	0%	0.0 (*)
1st GENERATION JETS					
8	Narrow-body 3,4-engine aircraft	0.0	0.0	0%	0.0 (*)
	TOTAL	66.1	**74.4**	100%	**+8.3 (+13%)**

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

** An estimated 95% of *Noise Class 3* aircraft in the 2014 night-time period met the 'Chapter 4' noise standard (2013: 98%).

Note: Totals may not sum exactly due to rounding.

Table 2a Stansted 2013 and 2014 average summer day movements by ANCON aircraft type

Aircraft type	Noise class	ANCON type	2013	2014	Change
Single piston propeller	1	SP	0.1	< 0.1	-0.1
Small twin-piston propeller	1	STP	0.1	< 0.1	-0.1
Small twin-turboprop	1	STT	0.4	0.4	0.0
Large twin-turboprop	2	LTT	9.0	15.0	+6.0
Large four-engine propeller	2	L4P	0.0	0.1	+0.1
Boeing 737-300/400/500	3	B733	3.9	6.1	+2.2
Boeing 737-600/700	3	B736	0.9	0.4	-0.5
Boeing 737-800/900	3	B738	232.4	256.3	+23.9
Boeing 757-200 (RB211-535C engines)	3	B757C	0.1	0.0	-0.1
Boeing 757-200 (RB211-535E4/E4B engines)	3	B757E	1.3	1.3	0.0
Boeing 757-200 (PW2037/2040 engines)	3	B757P	0.2	0.2	0.0
BAe 146/Avro RJ	3	BA46	1.9	0.7	-1.2
Airbus A318	3	EA318	< 0.1	0.2	+0.2
Airbus A319 (CFM56 engines)	3	EA319C	52.2	52.1	-0.1
Airbus A319 (IAE V2500 engines)	3	EA319V	7.4	7.0	-0.4
Airbus A320 (CFM56 engines)	3	EA320C	10.1	5.7	-4.4
Airbus A320 (IAE V2500 engines)	3	EA320V	2.9	0.4	-2.5
Airbus A321 (CFM56 engines)	3	EA321C	1.5	5.5	+4.0
Airbus A321 (IAE V2500 engines)	3	EA321V	0.2	0.3	+0.1
Executive Business Jet (Chapter 3)	3	EXE3	12.5	13.9	+1.4
Bombardier CRJ100/200	3	CRJ	< 0.1	0.1	+0.1
Bombardier CRJ900	3	CRJ900	< 0.1	1.1	+1.1
Embraer ERJ 135/145	3	ERJ	1.8	2.0	+0.2
Embraer E-170	3	ERJ170	0.1	0.1	0.0
Embraer E-190	3	ERJ190	0.9	0.1	-0.8
Fokker 100	3	FK10	< 0.1	< 0.1	0.0
McDonnell Douglas MD-80 series	3	MD80	< 0.1	0.4	+0.4
Boeing 767-200	4	B762	1.0	1.1	+0.1
Boeing 767-300 (GE CF6-80 engines)	4	B763G	2.5	2.4	-0.1
Boeing 767-300 (PW PW4000 engines)	4	B763P	0.1	0.1	0.0
Boeing 767-400	4	B764	0.0	< 0.1	0.0
Boeing 777-200 (GE GE90 engines)	4	B772G	0.2	< 0.1	-0.2
Boeing 777-200LR/300ER (GE GE90 engines)	4	B773G	0.1	1.0	+0.9
Boeing 787-8	4	B788	0.0	< 0.1	0.0
Airbus A300	4	EA30	1.4	1.4	0.0
Airbus A310	4	EA31	0.2	0.1	-0.1
Airbus A330	4	EA33	0.3	0.2	-0.1
Airbus A340-200/300	5	EA34	0.3	0.2	-0.1
Airbus A340-600	5	EA346	0.2	< 0.1	-0.2
Airbus A380 (RR Trent 900 engines)	5	EA38R	< 0.1	0.0	0.0
Boeing 747-400 (GE CF6-80F engines)	5	B744G	0.7	1.2	+0.5
Boeing 747-400 (PW PW4000 engines)	5	B744P	0.8	0.8	0.0
Boeing 747-400 (RR RB211 engines)	5	B744R	0.2	0.8	+0.6
Boeing 747SP	5	B747SP	0.2	0.3	+0.1
Boeing 747-8	5	B748	3.1	1.0	-2.1
McDonnell Douglas MD-11	5	MD11	4.6	4.5	-0.1

Aircraft type	Noise class	ANCON type	2013	2014	Change
Boeing 747-100/200/300	6	B747	< 0.1	< 0.1	0.0
McDonnell Douglas DC-9 (Chapter 3)	7	DC9	0.0	< 0.1	0.0
Executive Business Jet (Chapter 2)	7	EXE2	0.0	< 0.1	0.0
Boeing 707	8	B707	< 0.1	0.0	0.0
Boeing 727 (Chapter 3)	8	B727	0.2	0.1	-0.1
Tupolev Tu-154	8	TU54	0.0	< 0.1	0.0
		TOTAL	356.0	**384.9**	**+28.9 (+8%)**

Note: Totals may not sum exactly due to rounding.

Table 2b Stansted 2013 and 2014 average summer night movements by ANCON aircraft type

Aircraft type	Noise class	ANCON type	2013	2014	Change
Small twin-piston propeller	1	STP	0.1	0.1	0.0
Small twin-turboprop	1	STT	0.1	0.1	0.0
Large twin-turboprop	2	LTT	1.2	3.2	+2.0
Large four-engine propeller	2	L4P	0.0	< 0.1	0.0
Boeing 737-300/400/500	3	B733	6.8	6.4	-0.4
Boeing 737-600/700	3	B736	0.1	0.1	0.0
Boeing 737-800/900	3	B738	38.3	44.6	+6.3
Boeing 757-200 (RB211-535C engines)	3	B757C	0.1	0.0	-0.1
Boeing 757-200 (RB211-535E4/E4B engines)	3	B757E	0.6	0.4	-0.2
Boeing 757-200 (PW2037/2040 engines)	3	B757P	< 0.1	< 0.1	0.0
BAe 146/Avro RJ	3	BA46	2.1	< 0.1	-2.1
Airbus A318	3	EA318	< 0.1	< 0.1	0.0
Airbus A319 (CFM56 engines)	3	EA319C	7.0	7.3	+0.3
Airbus A319 (IAE V2500 engines)	3	EA319V	0.2	0.3	+0.1
Airbus A320 (CFM56 engines)	3	EA320C	1.7	1.5	-0.2
Airbus A320 (IAE V2500 engines)	3	EA320V	< 0.1	< 0.1	0.0
Airbus A321 (CFM56 engines)	3	EA321C	0.7	2.7	+2.0
Airbus A321 (IAE V2500 engines)	3	EA321V	< 0.1	< 0.1	0.0
Executive Business Jet (Chapter 3)	3	EXE3	2.2	2.4	+0.2
Bombardier CRJ100/200	3	CRJ	< 0.1	0.0	0.0
Embraer ERJ 135/145	3	ERJ	0.2	0.2	0.0
Embraer E-190	3	ERJ190	< 0.1	< 0.1	0.0
Fokker 100	3	FK10	0.0	< 0.1	0.0
McDonnell Douglas MD-80 series	3	MD80	0.0	< 0.1	0.0
Boeing 767-200	4	B762	0.8	0.8	0.0
Boeing 767-300 (GE CF6-80 engines)	4	B763G	1.2	1.3	+0.1
Boeing 777-200 (GE GE90 engines)	4	B772G	0.1	0.0	-0.1
Boeing 777-200LR/300ER (GE GE90 engines)	4	B773G	0.0	1.1	+1.1
Boeing 787-8	4	B788	0.0	< 0.1	0.0
Airbus A300	4	EA30	1.4	1.4	0.0
Airbus A310	4	EA31	< 0.1	0.0	0.0
Airbus A330	4	EA33	0.1	< 0.1	0.0
Airbus A340-200/300	5	EA34	< 0.1	< 0.1	0.0
Airbus A340-500/600	5	EA346	< 0.1	0.0	0.0
Boeing 747-400 (GE CF6-80F engines)	5	B744G	< 0.1	< 0.1	0.0
Boeing 747-400 (PW PW4000 engines)	5	B744P	0.1	< 0.1	0.0
Boeing 747-400 (RR RB211 engines)	5	B744R	< 0.1	0.1	0.0
Boeing 747SP	5	B747SP	< 0.1	0.0	0.0
Boeing 747-8	5	B748	0.6	0.1	-0.5
McDonnell Douglas MD-11	5	MD11	0.2	0.1	-0.2
		TOTAL	66.1	**74.4**	**+8.3 (+13%)**

Note: Totals may not sum exactly due to rounding.

Figure 1 Stansted Airport and surrounding area

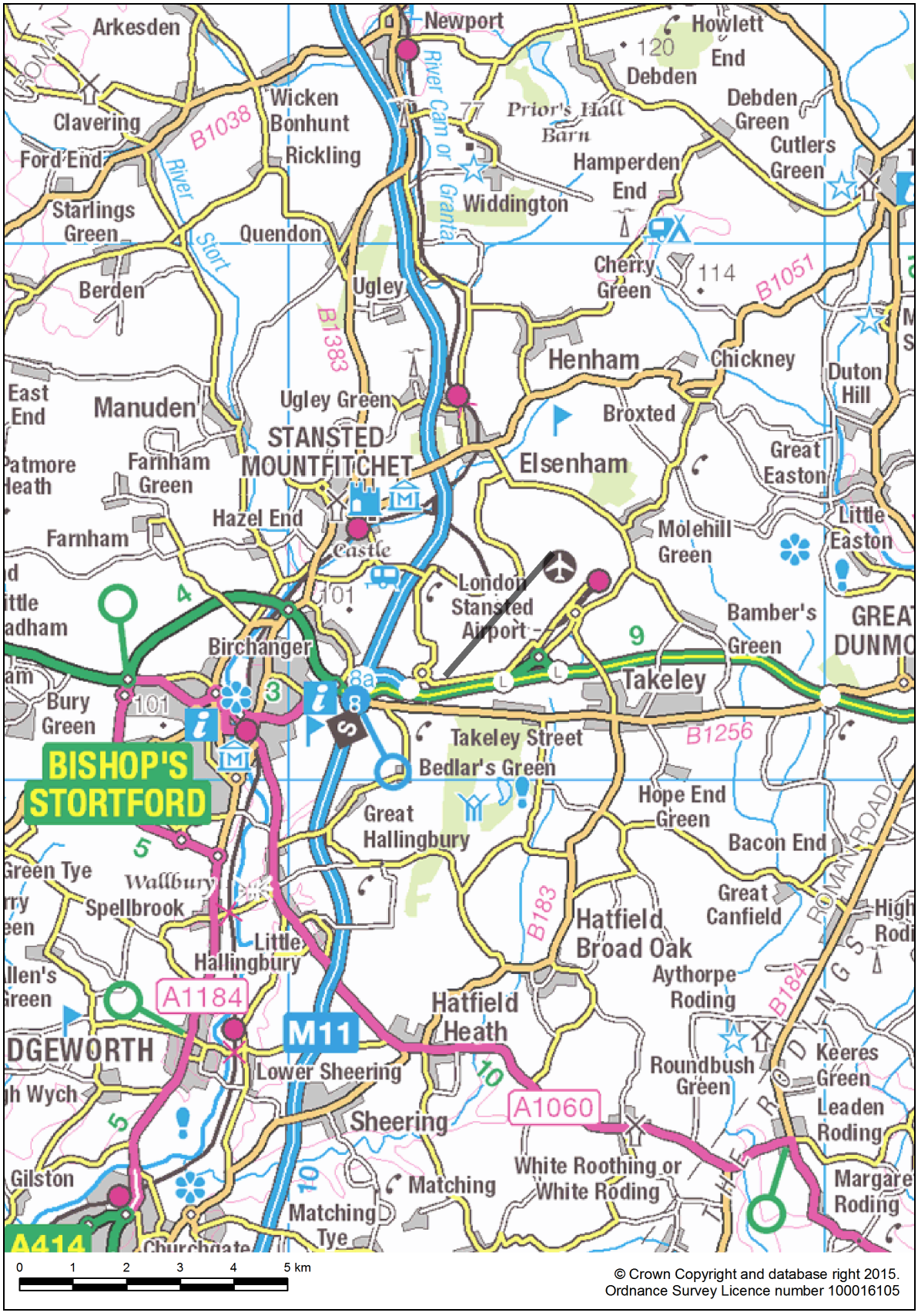


Figure 2 Stansted Airport layout in 2014

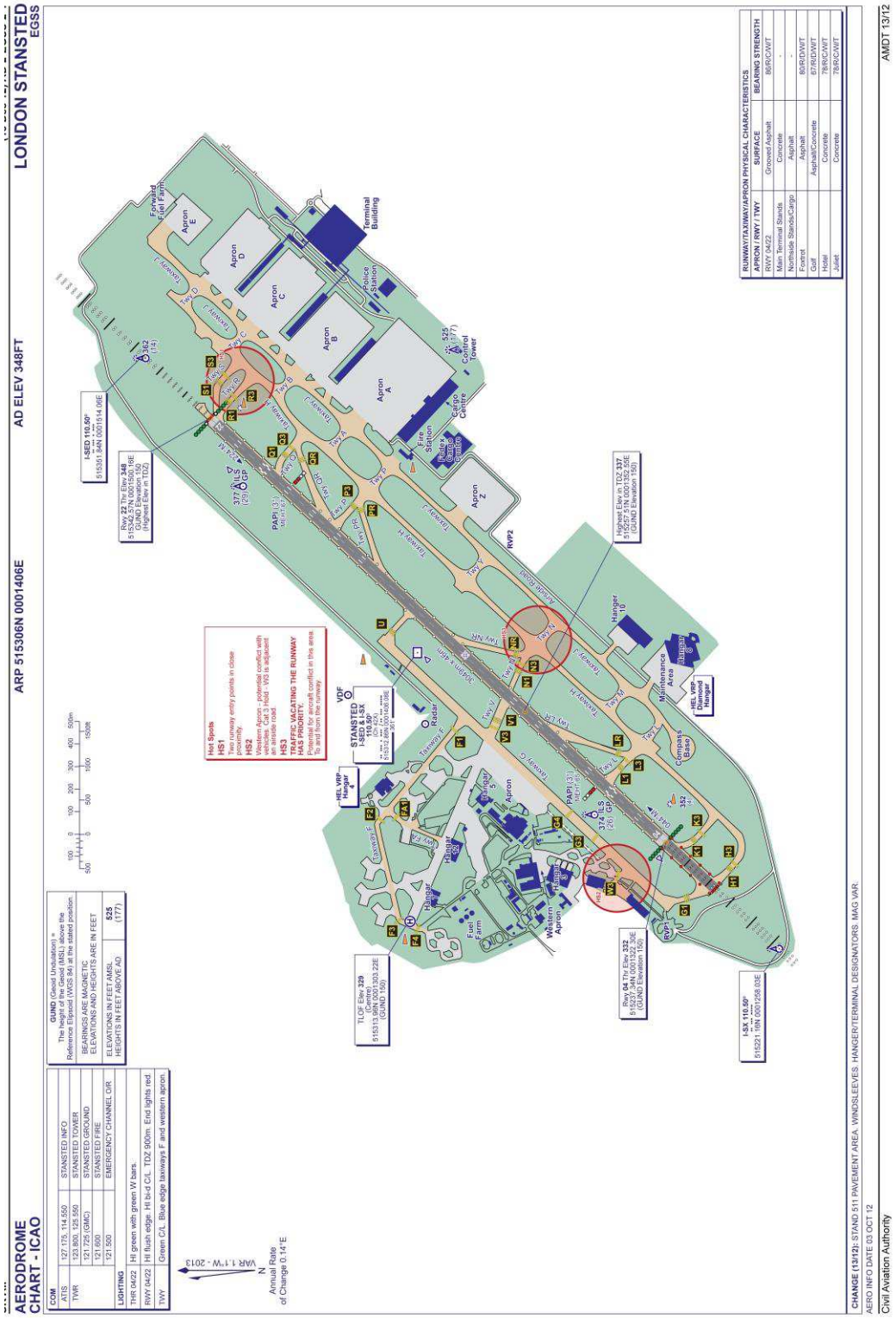


Figure 3 Stansted NPR/SID routes

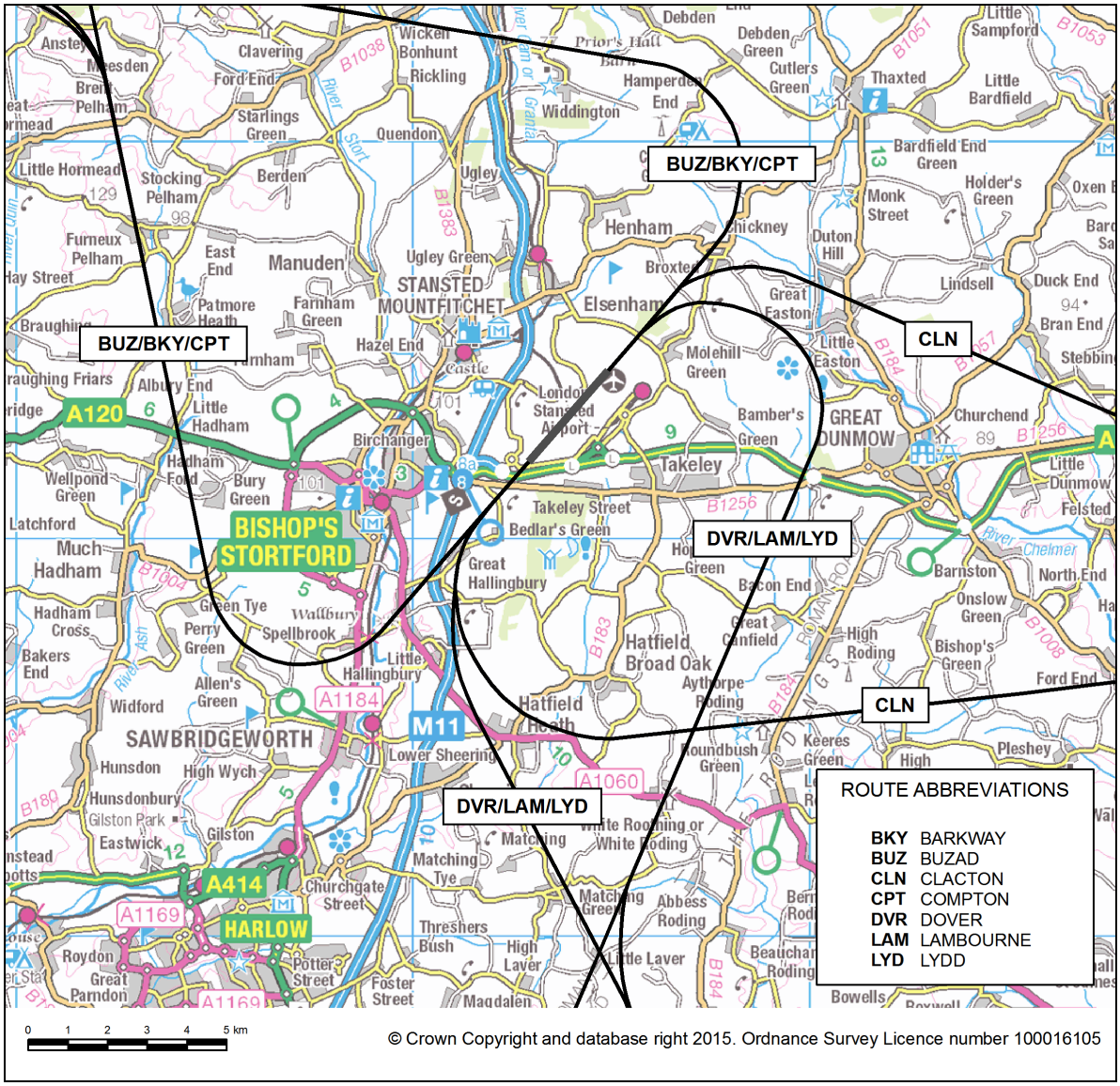


Figure 4 Typical Stansted radar flight tracks

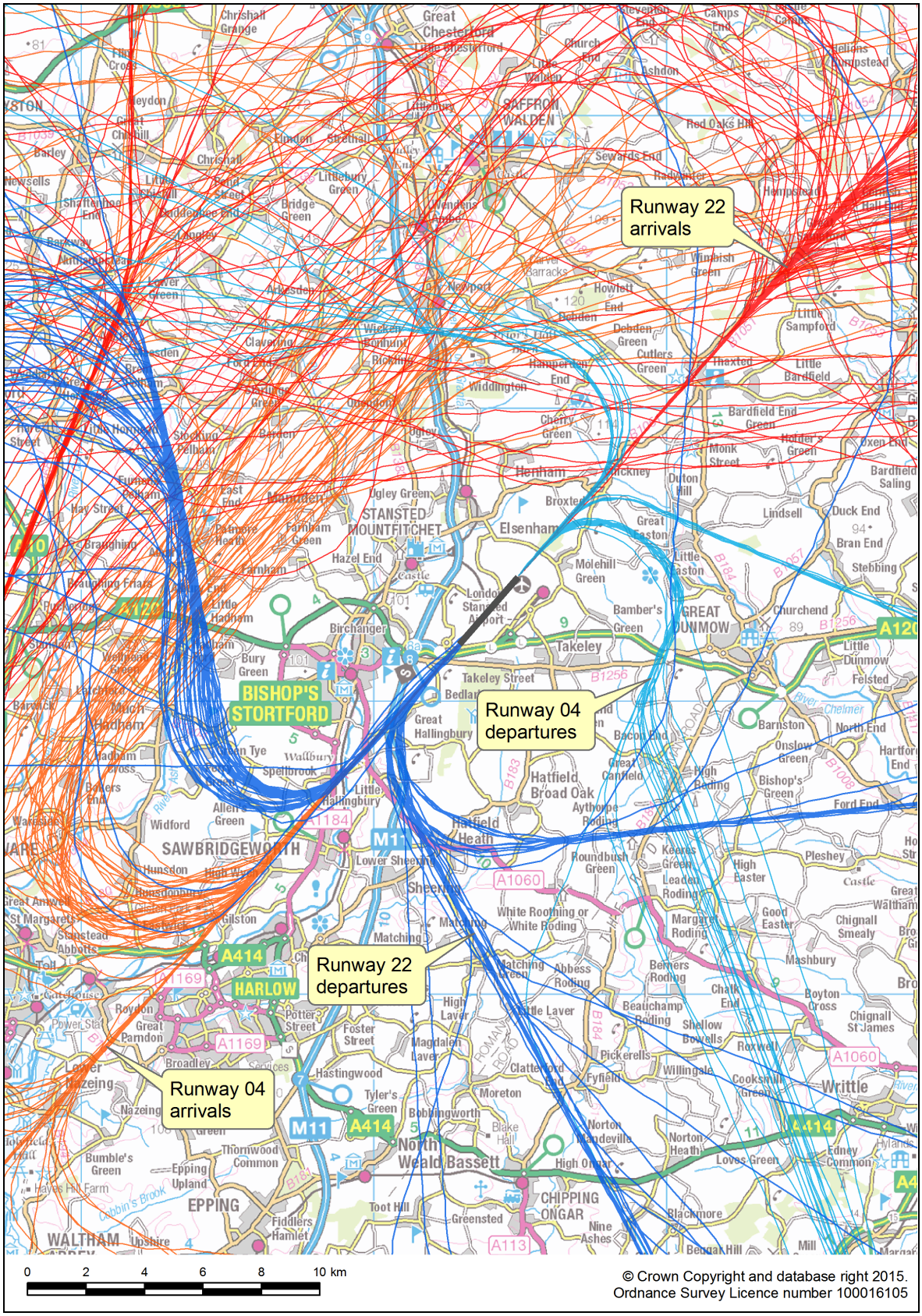
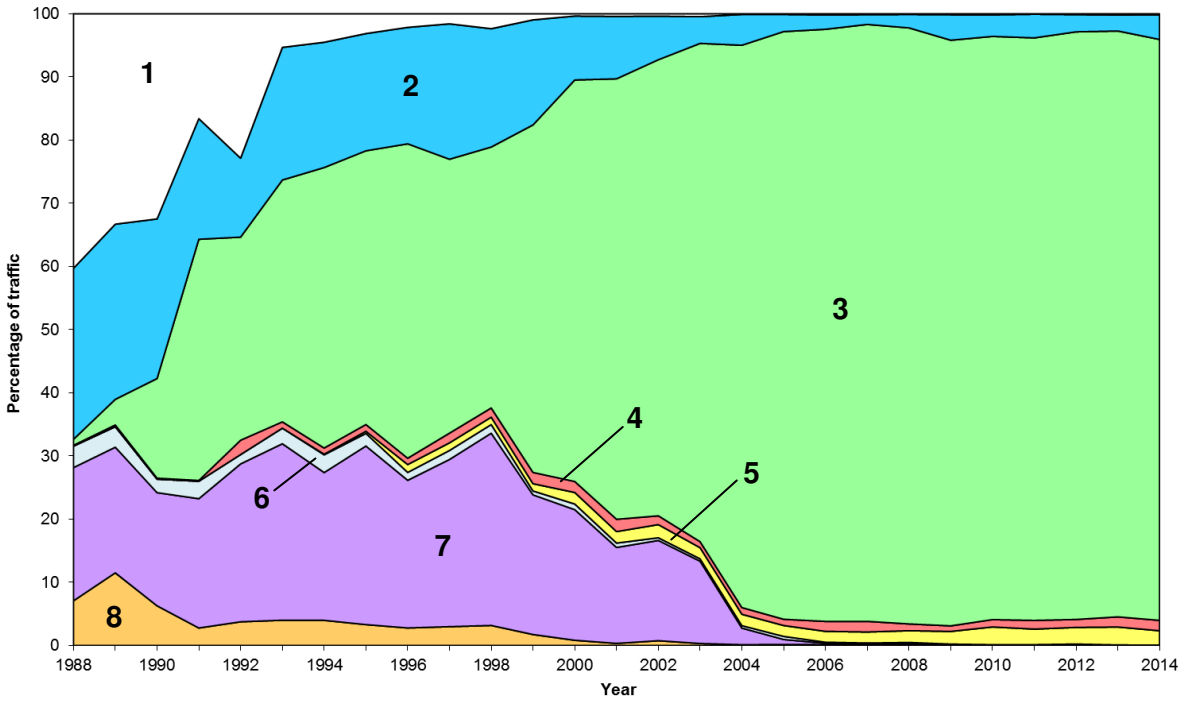


Figure 5 Stansted noise class trend 1988-2014



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
1 Small props, e.g. single/twin piston and turboprop light aircraft
2 Large props, e.g. 2- and 4-propeller transports, e.g. ATR-42, BAe ATP

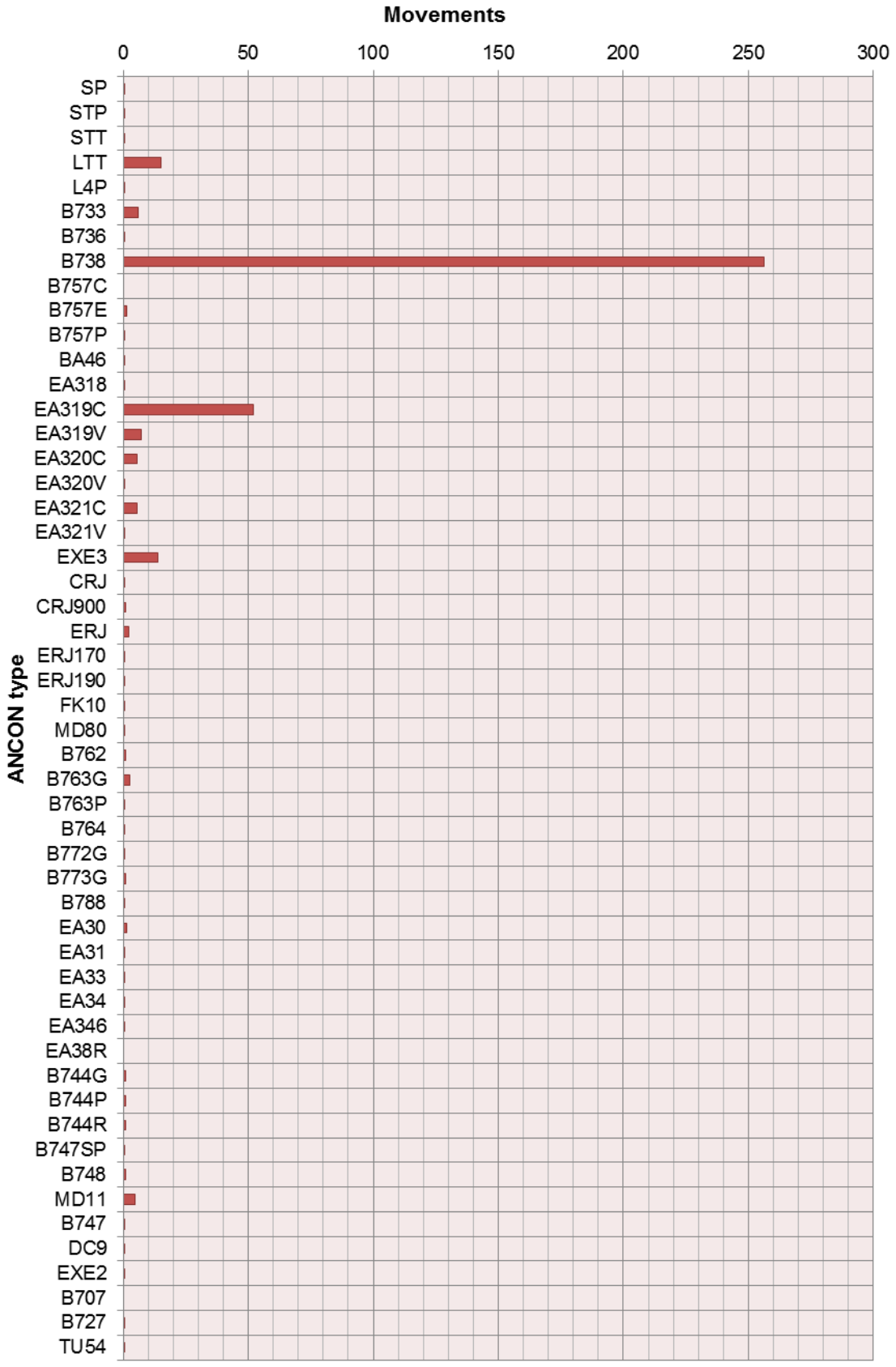
Chapter 3/4 jets
3 Short-haul, e.g. Airbus A319, Boeing 737-800
4 Wide-body twins, e.g. Airbus A300, Boeing 767-300
5 2nd generation wide-body 3/4-engine aircraft, e.g. Boeing 747-8, MD-11

Large Chapter 2/3 jets
6 1st generation wide-body 3/4-engine aircraft, e.g. Boeing 747-200

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

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

Figure 6a Stansted 2014 average summer day movements by ANCON type



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

Figure 6b Stansted 2014 average summer night movements by ANCON type

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

Figure 7a Stansted 2014 and 2013 summer day NPR/SID traffic distributions

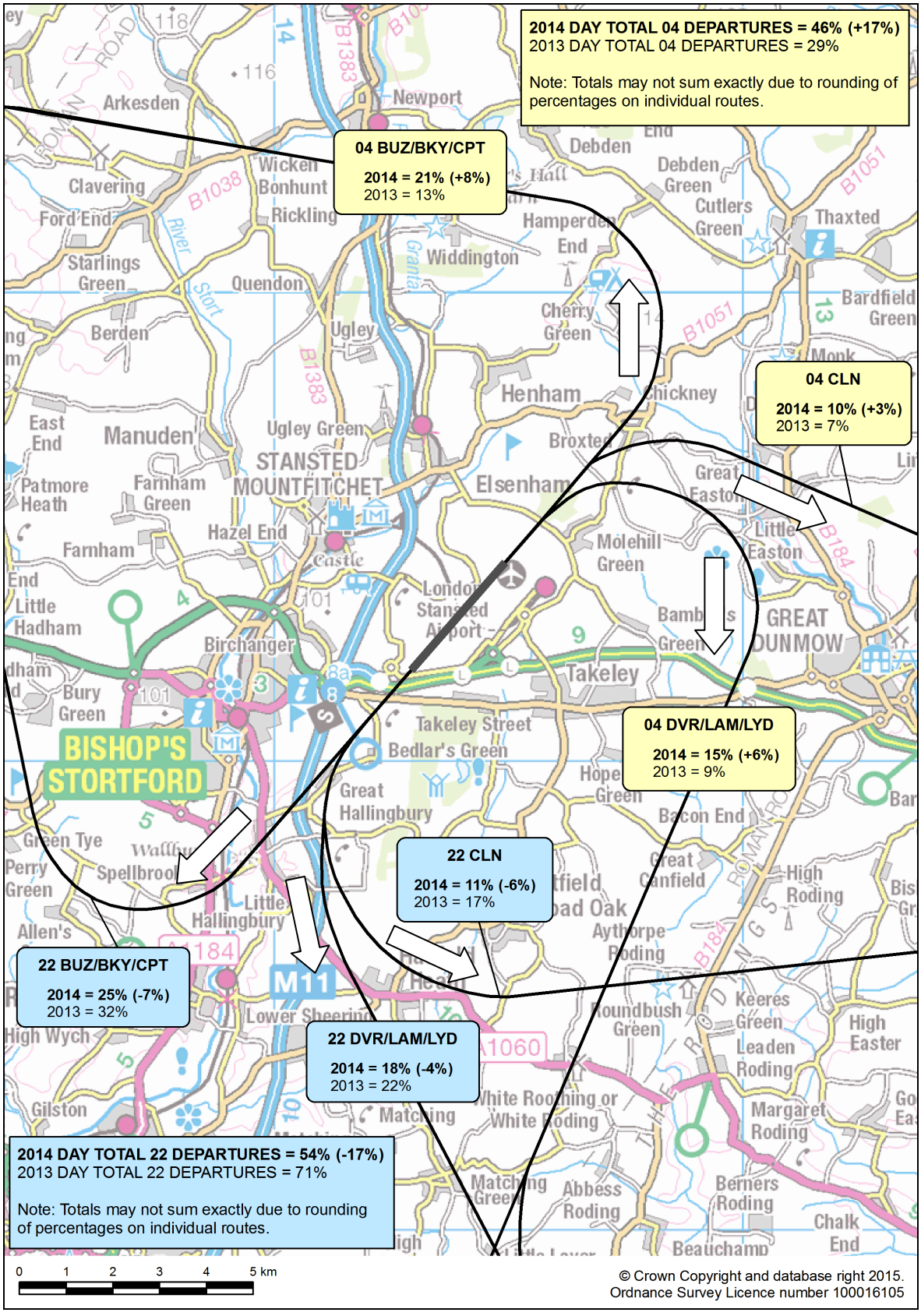


Figure 7b Stansted 2014 and 2013 summer night NPR/SID traffic distributions

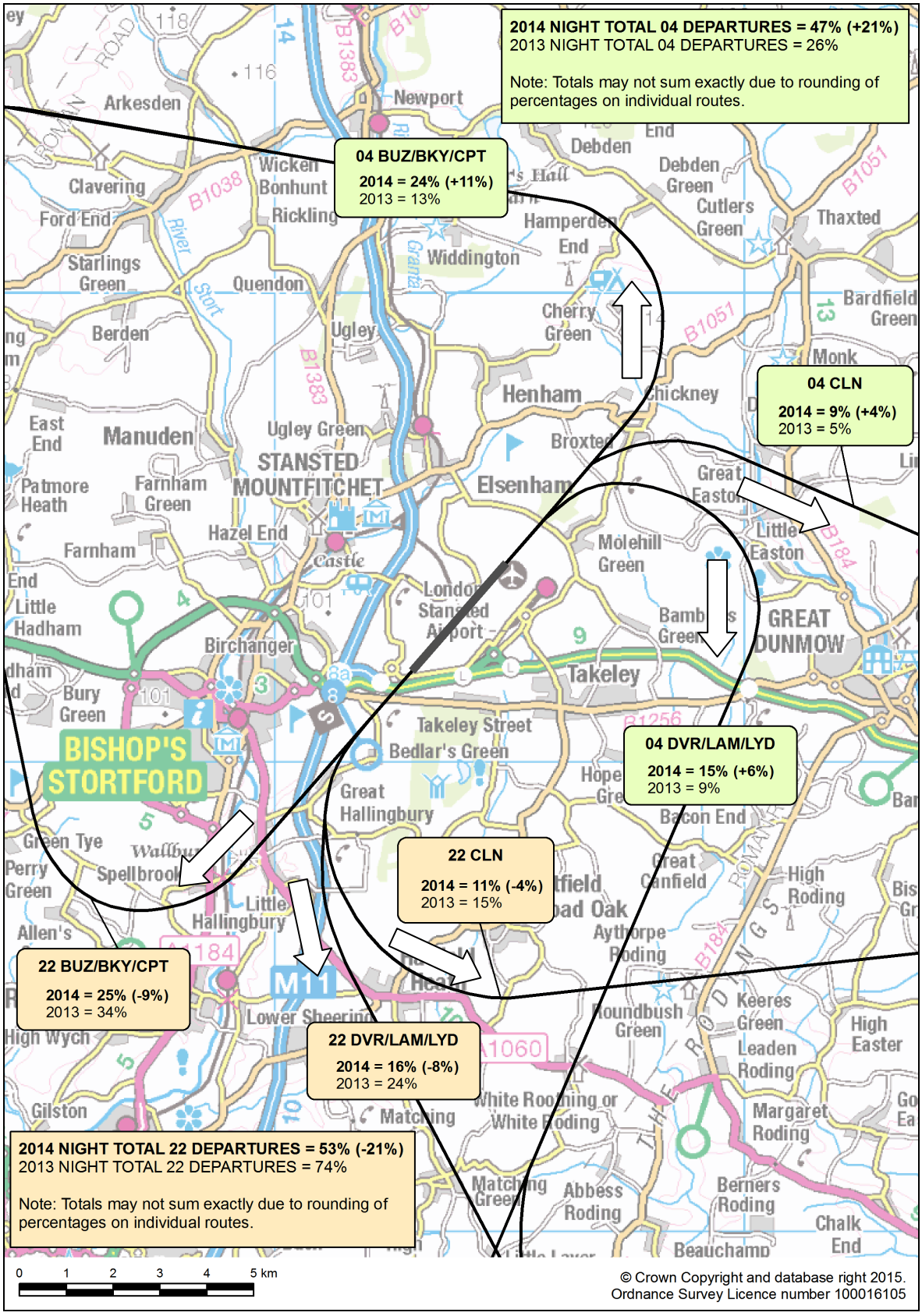


Figure 8 Stansted average summer day runway modal splits 1995-2014

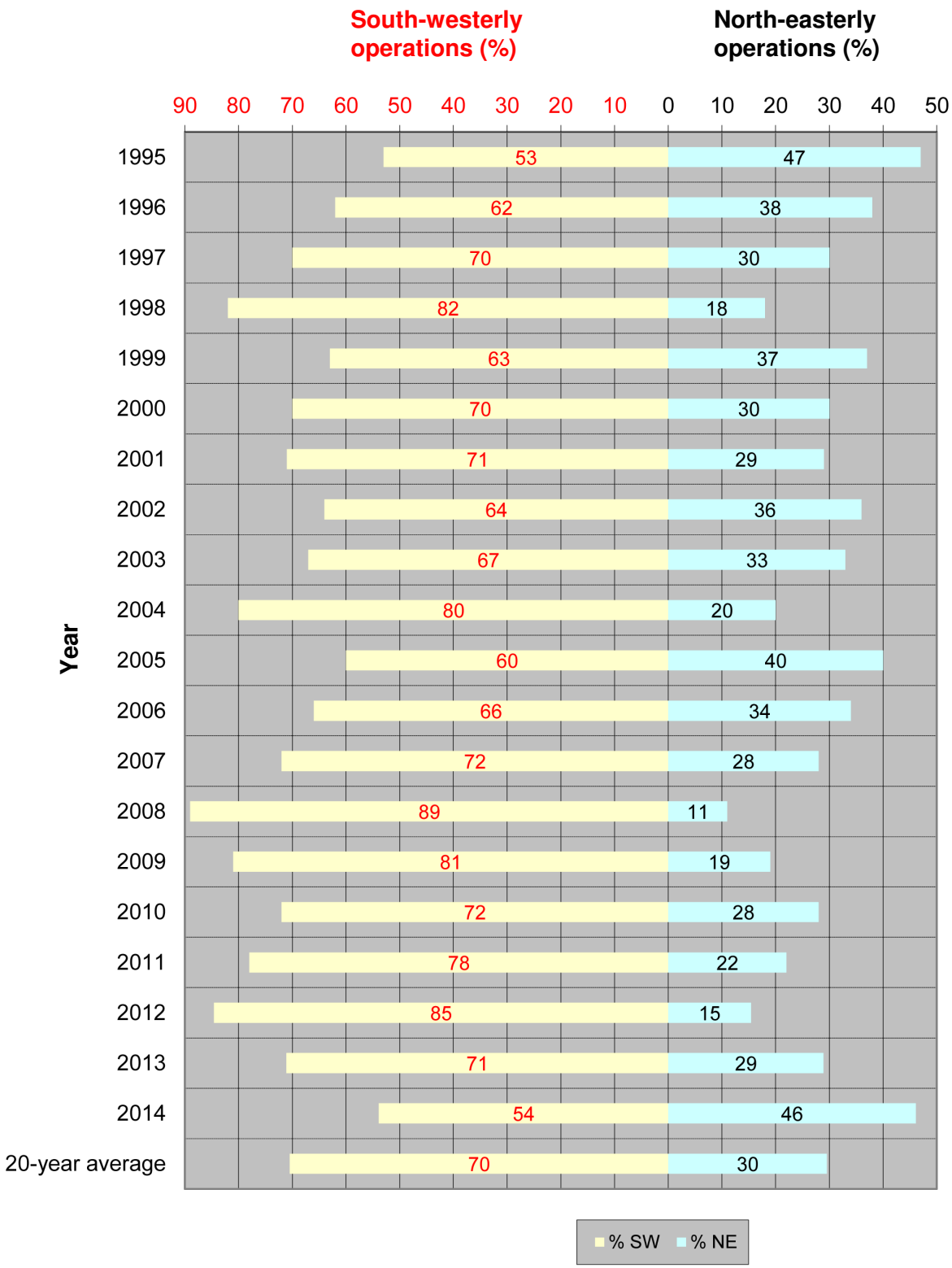


Figure 9 Topography around Stansted Airport

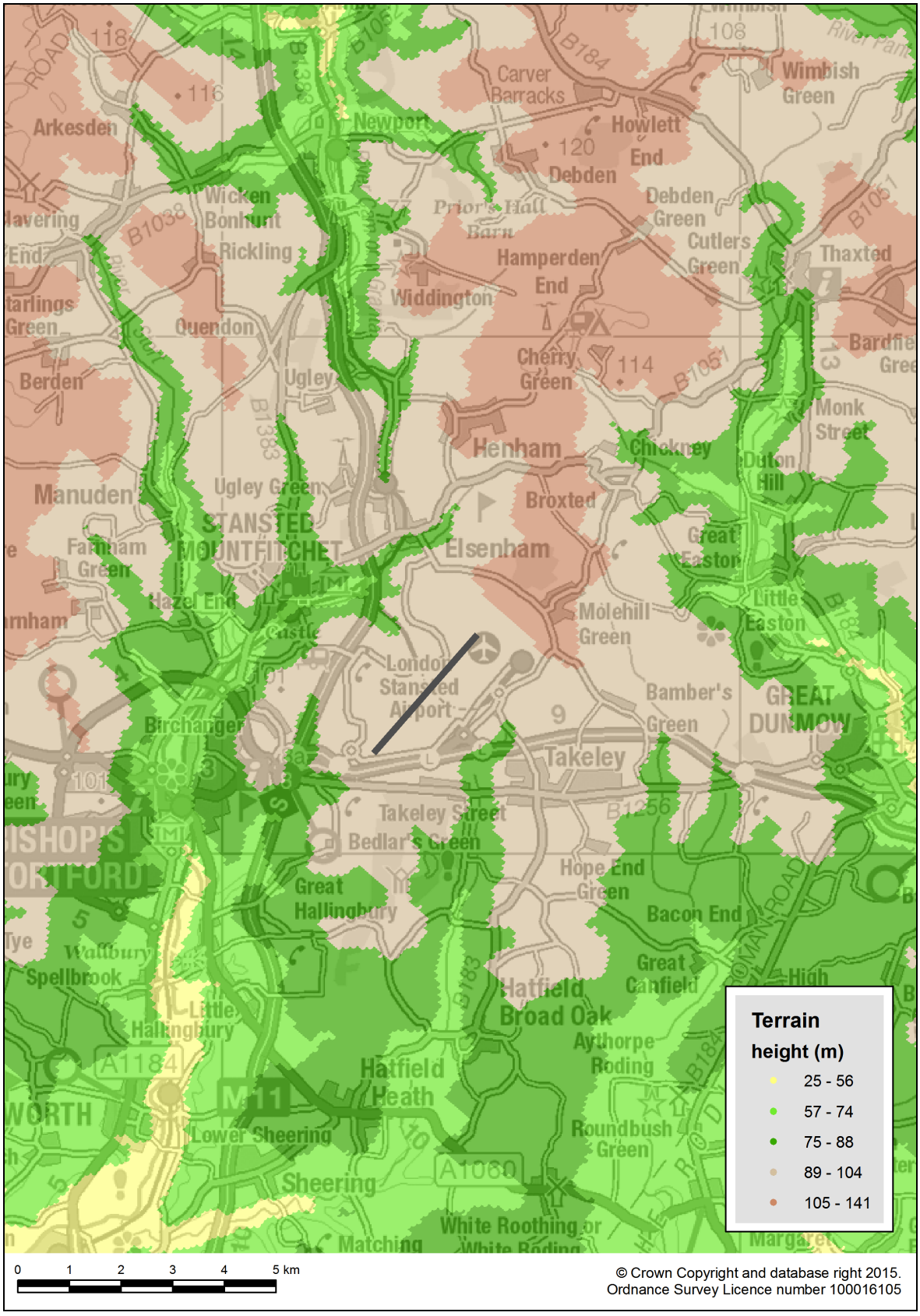


Figure 10 Population data points around Stansted Airport

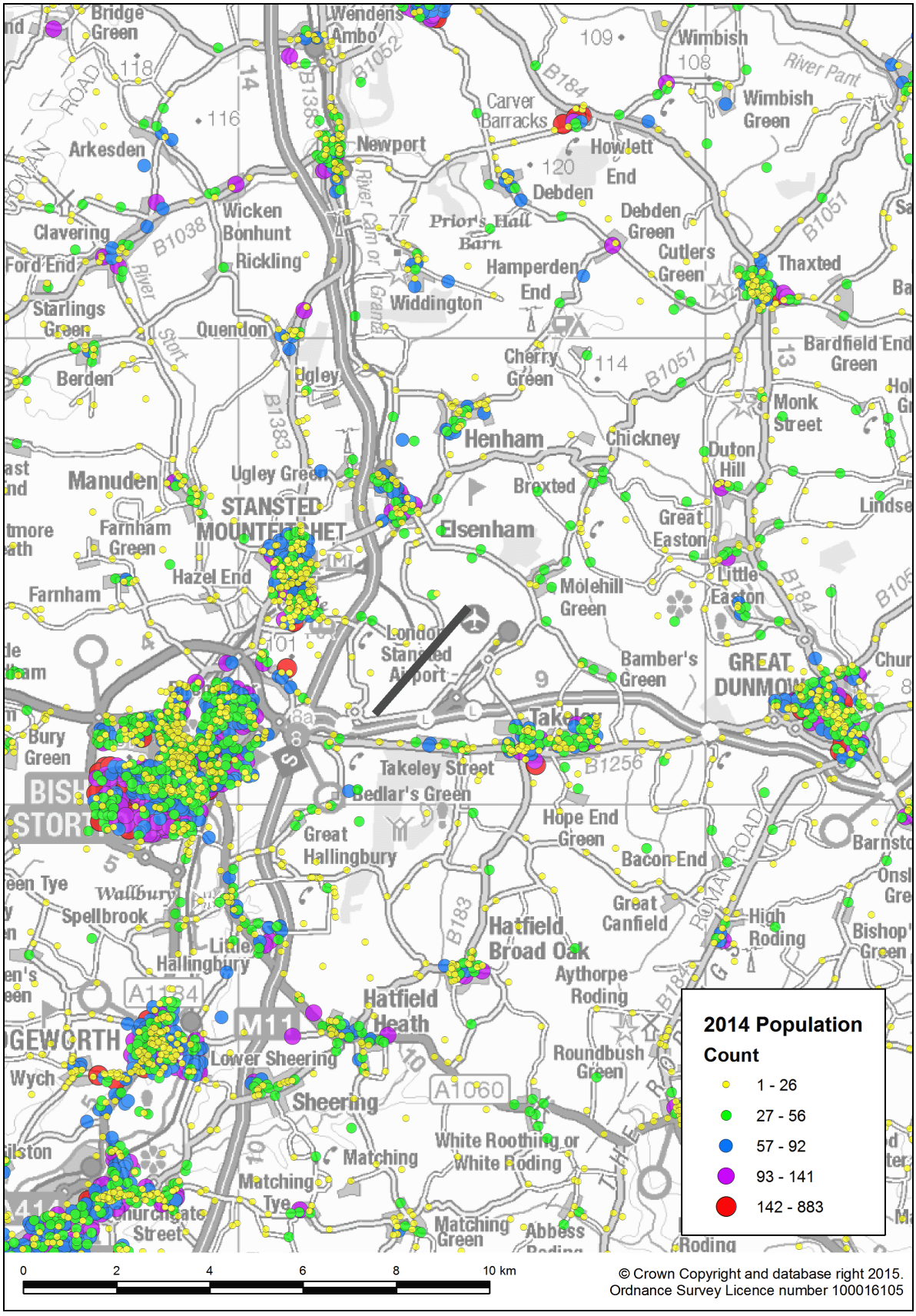


Figure 11a Stansted 2014 day actual (54% SW / 46% NE) Leq contours

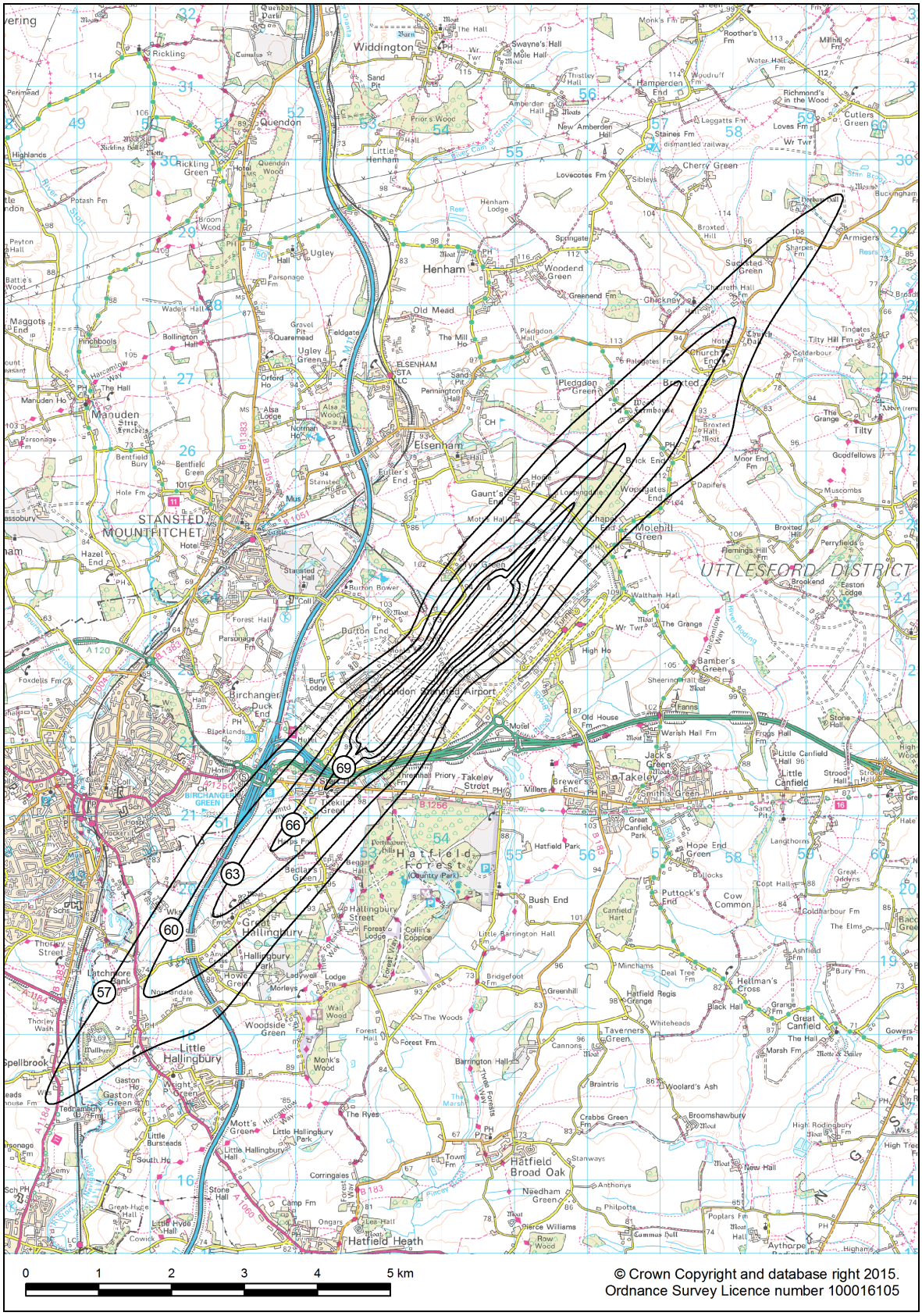


Figure 11b Stansted 2014 night actual (50% SW / 50% NE) Leq contours

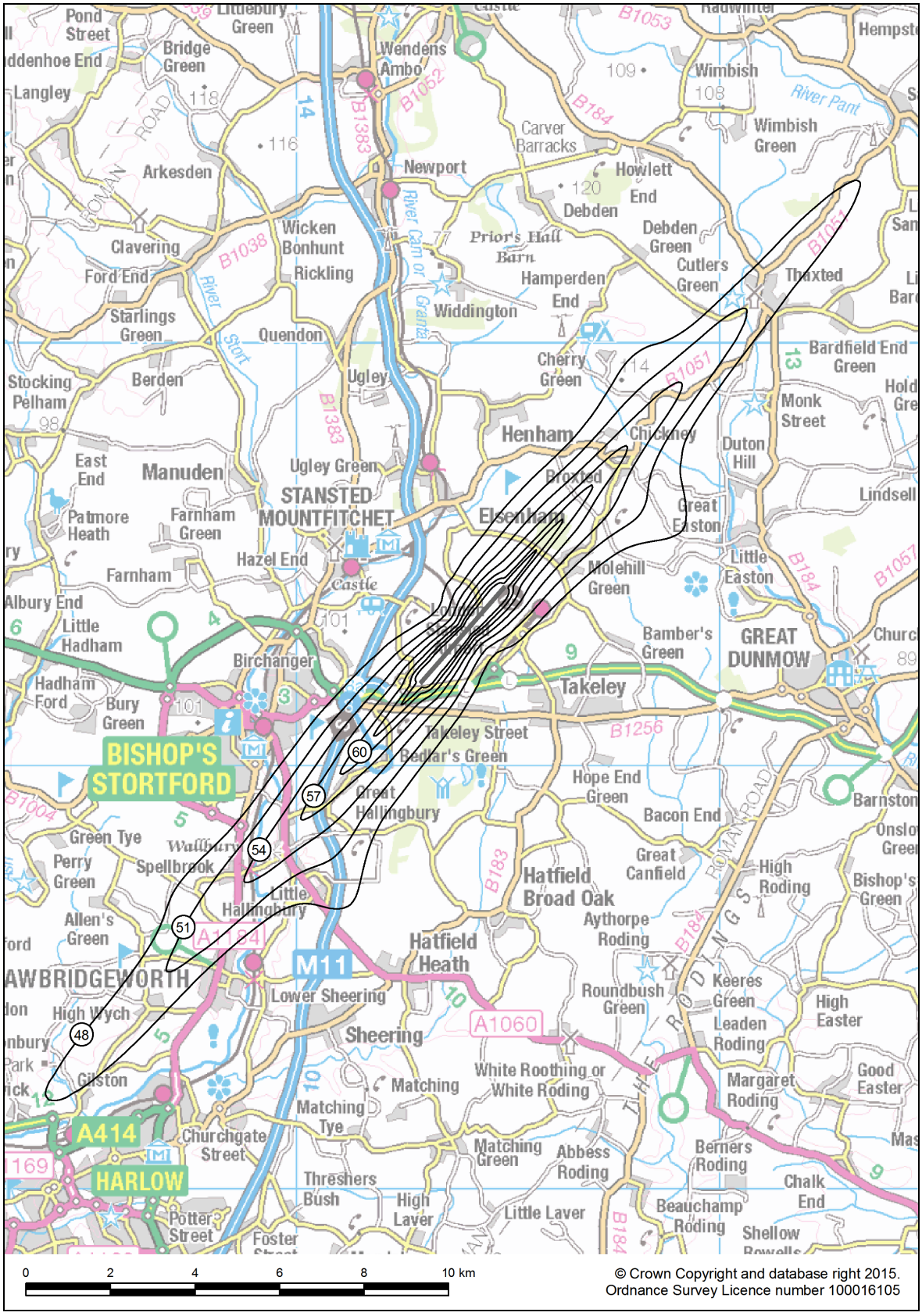


Figure 12 Stansted 2014 day standard (70% SW / 30% NE) Leq contours

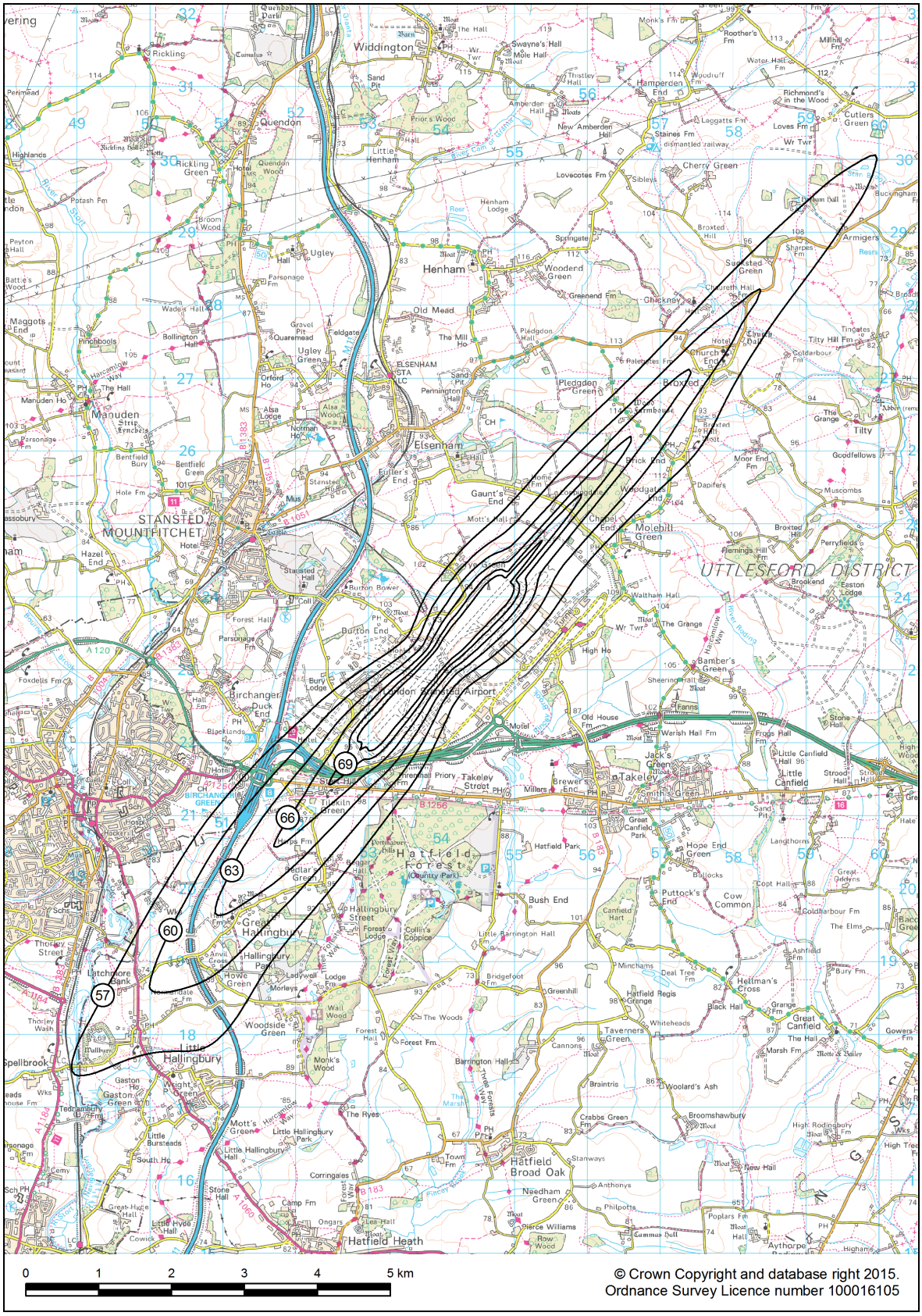


Figure 13a Stansted day actual 2014 (54% SW / 46% NE) and 2013 (71% SW / 29% NE) Leq contours

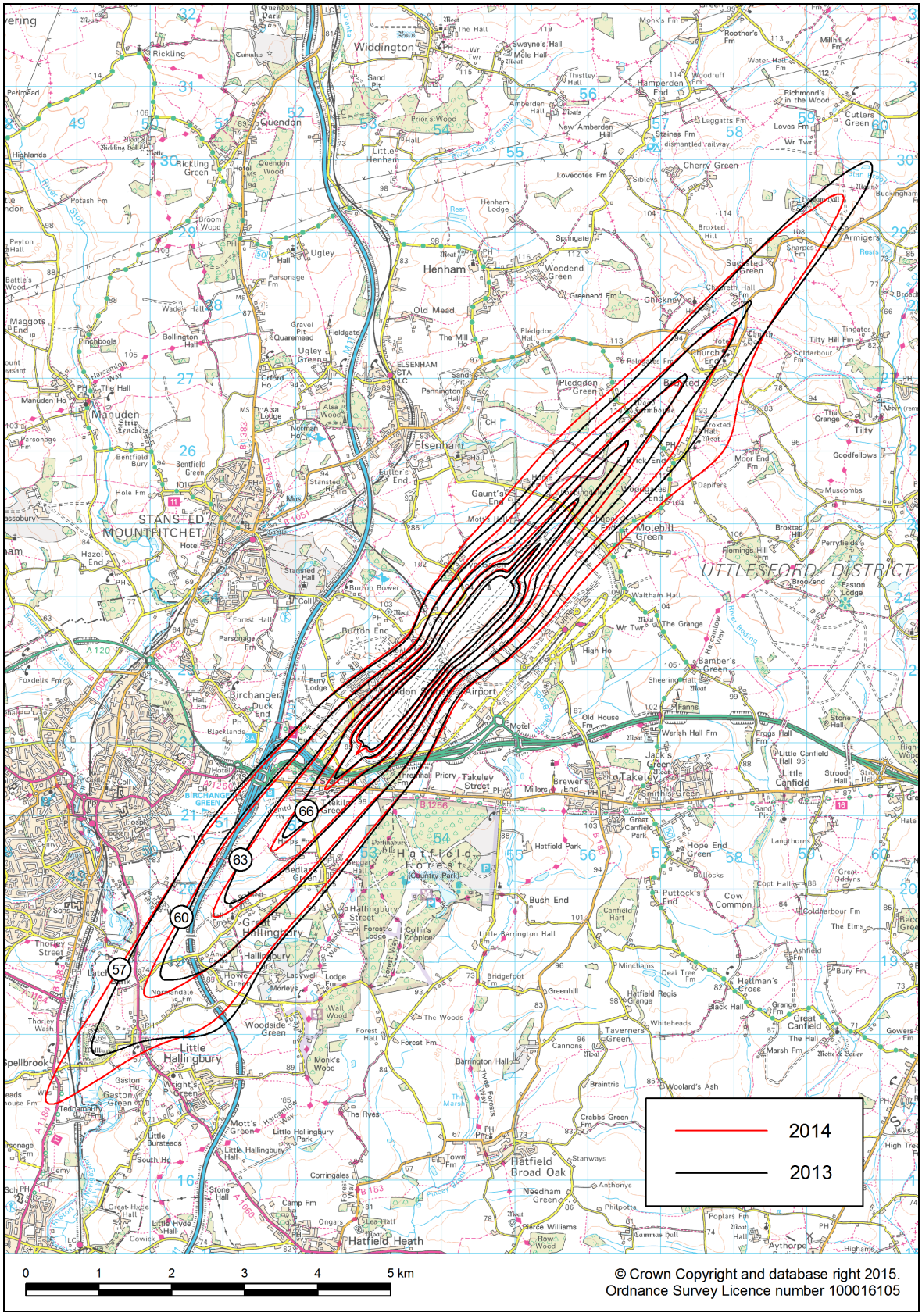


Figure 13b Stansted night actual 2014 (50% SW / 50% NE) and 2013 (70% SW / 30% NE) Leq contours

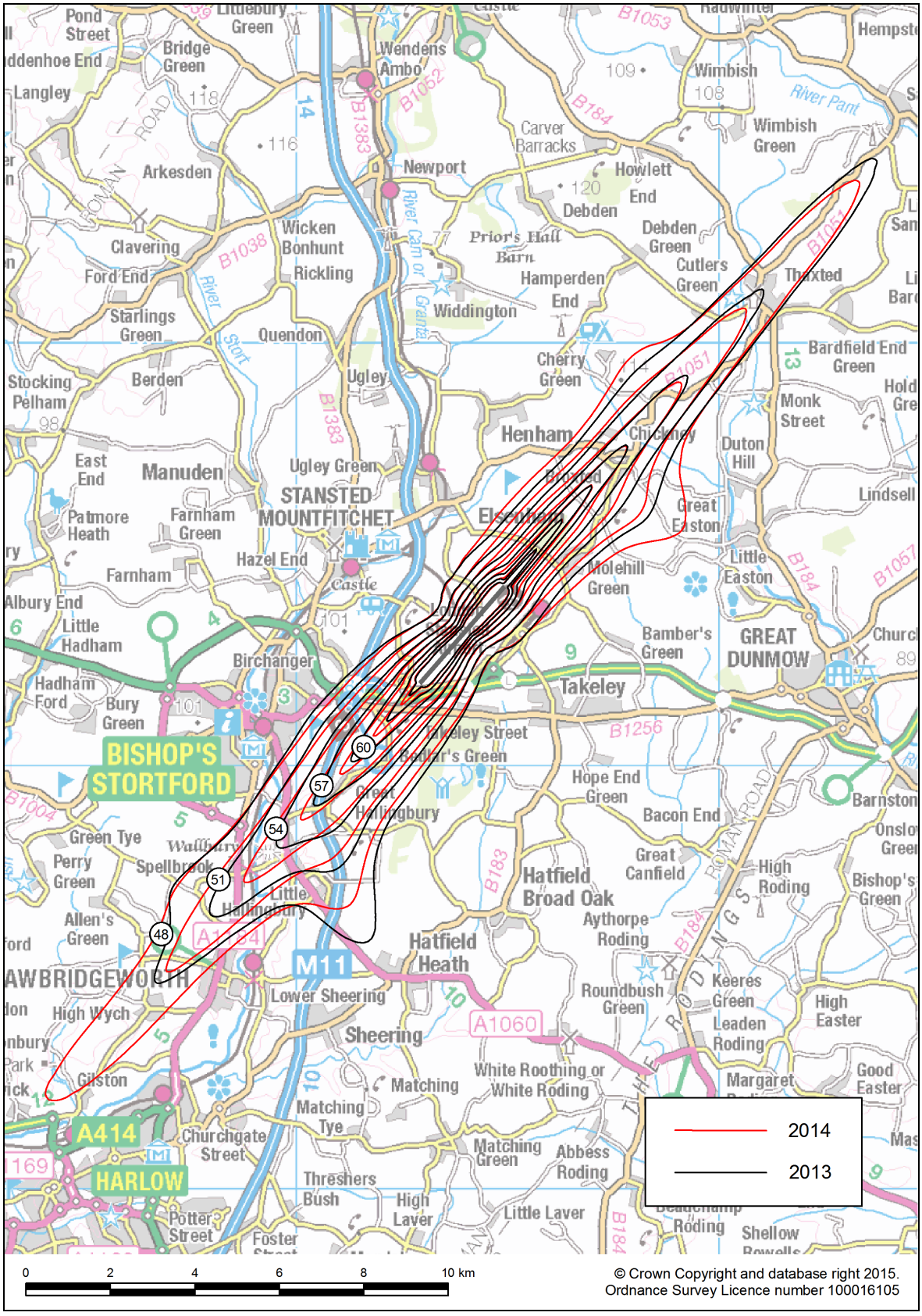
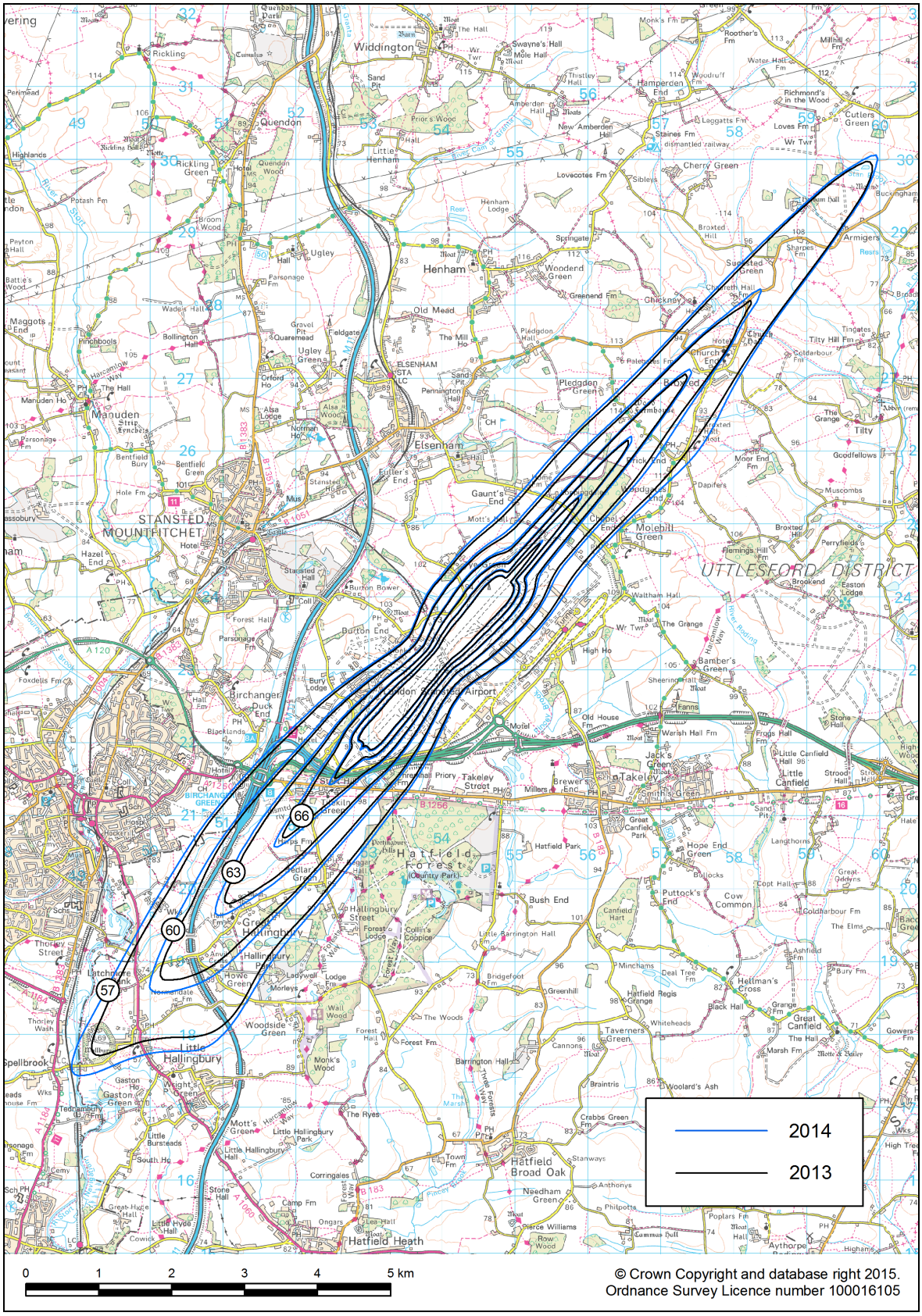


Figure 14 Stansted day standard 2014 (70% SW / 30% NE) and 2013 (71% SW / 29% NE) Leq contours



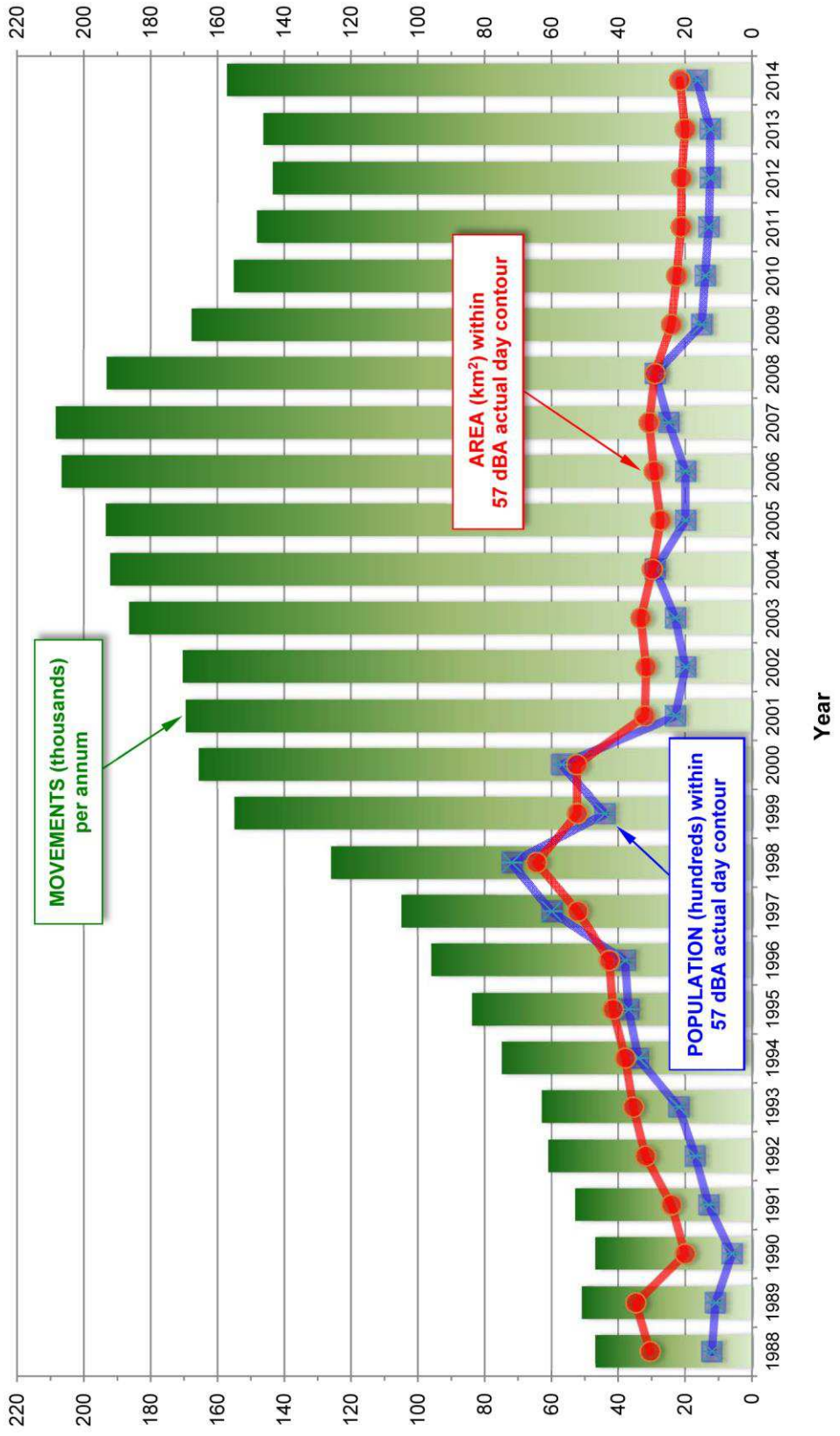


Figure 15 Stansted annual traffic and summer day Leq noise contour area/population trend 1988-2014