# ANNEX F: Noise contours for Heathrow, Gatwick and Stansted Airports

The noise contours for this consultation have been produced by the Environmental Research and Consultancy Department (ERCD) of the Civil Aviation Authority (CAA) using the UK aircraft noise contour model (ANCON 2.4), which calculates the emissions and propagation of noise from arriving and departing air traffic according to ECAC.CEAC Doc 29 4th Edition Volume 2[1].

Noise exposure contours for the 6.5-hour night quota period (23:30-06:00 local time) have been produced to demonstrate how the current night restrictions regime affects the night-time $L_{Aeq,6.5h}$ noise contours at each airport. The contours have been calculated at 3 dB intervals from 48 dB to 66 dB using data for the following periods, each of which covers a full winter and summer season as described in the current night restrictions regime:

- 30 October 2016 to 29 October 2017
- 28 October 2018 to 27 October 2019
- 31 October 2021 to 30 October 2022

The corresponding night-time $L_{Aeq,8h}$ noise contours for the 8-hour night period (23:00-07:00 local time) have also been produced, along with night contours using the supplementary noise metrics N60 6.5-hour and N60 8-hour. N60 contours indicate the number of aircraft noise events exceeding a maximum sound level ($L_{Amax}$) of 60 dB at a given location and have been calculated at levels of 10, 20 and 50 events where possible.

Estimates have been made of the numbers of people and households enclosed within each set of noise contours (**Tables 1 to 36**). The population data used for the 2021-22 contours are a 2022 update of the 2011 Census supplied by CACI Limited[2]. Equivalent CACI population data for 2017 and 2019 have been used for the 2016-17 contours and 2018-19 contours, respectively. The areas, population and household data are provided for each contour level, on a cumulative basis, in accordance with normal practice. The 6.5-hour and 8-hour contours for the 2021-22 period are shown in **Figures 1 to 6** at 3 dB intervals from 48 dB. For presentational reasons higher contour levels have not been labelled in some cases.

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[1] ECAC.CEAC Doc 29 4th Edition (2016), *Report on Standard Method of Computing Noise Contours around Civil Airports Volume 2: Technical Guide*, European Civil Aviation Conference (ECAC).
[2] www.caci.co.uk

The total number of people highly sleep disturbed[3] during the 6.5-hour night (above 48dB LAeq) across the three airports between 2016-17 and 2021-22 is estimated to have significantly fallen[4], however the vast majority of this reduction is attributed to a large reduction in the number of people highly sleep disturbed around Heathrow (from 23,900 in 2016-17 down to 9,600 in 2021-22, a reduction of 14,300) with smaller absolute reductions observed around Gatwick (1,100 in 2016-17 down to 300 in 2021-22, a reduction of 800). Conversely, the incidence of sleep disturbance around Stansted is estimated to have increased slightly (from 900 in 2016-17, up to 1,100 in 2021-22, an increase of 200), albeit significantly smaller in magnitude, relative to changes at Heathrow and Gatwick.

These sleep disturbance results are intrinsically related to the changes in area and population in the 48dB LAeq 6.5-hour night contours. For example, a percentage increase or decrease in the population residing within a noise contour would result in a proportionate increase or decrease in the number of people reporting sleep disturbance.

It is not possible to draw any firm conclusions from the data presented, as at the present time the aviation sector is still in recovery, and we have not yet seen a complete return to pre-pandemic levels of traffic at all three of Heathrow, Gatwick and Stansted Airports.

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[3] Estimates of sleep disturbance are based on the exposure-response relationship provided in the World Health Organization Environmental Noise Guidelines for the European Region (WHO (2018)) for estimating the number of people said to be Highly Sleep Disturbed (HSD). When considering these results, it should be noted that the exposure-response relationship is based on the 8-hour Lnight period from 23:00 to 07:00, but in this instance has been applied to data for the 6.5-hour night quota period from 23:30 to 06:00. Figures have been rounded to the nearest 100. Note that the dose-response relationship for sleep disturbance provided in WHO (2018) results in a higher incidence of sleep disturbance at any given noise exposure level compared to the dose-response relationships used in previous consultations, which used the relationship provided in the World Health Organization Burden of Disease from Environmental Noise (2011).

[4] In this instance, Transport Analysis Guidance (TAG) has not been used to formally appraise and monetize sleep disturbance impacts due to a lack of population and area data granularity. Estimating and monetising the marginal sleep disturbance impact at each interest airport requires population data for incremental noise contours from 48dB LAeq upwards, which we have not been able to access.

**Table 1** Heathrow Winter 2016-17/Summer 2017 $L_{Aeq, 6.5h}$ night contours - area, population and household estimates

| Contour (dBA) | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 48 | 32.8 | 110.7 | 40.8 |
| > 51 | 16.2 | 52.7 | 18.1 |
| > 54 | 8.1 | 21.0 | 6.9 |
| > 57 | 4.0 | 3.5 | 1.1 |
| > 60 | 2.1 | 1.3 | 0.4 |
| > 63 | 1.2 | <0.1 | <0.1 |
| > 66 | 0.6 | 0 | 0 |

**Table 2** Heathrow Winter 2018-19/Summer 2019 $L_{Aeq, 6.5h}$ night contours - area, population and household estimates

| Contour (dBA) | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 48 | 30.0 | 95.7 | 33.3 |
| > 51 | 15.2 | 47.8 | 15.6 |
| > 54 | 7.6 | 18.5 | 5.8 |
| > 57 | 3.8 | 2.8 | 0.8 |
| > 60 | 2.0 | 1.0 | 0.3 |
| > 63 | 1.1 | <0.1 | <0.1 |
| > 66 | 0.6 | 0 | 0 |

**Table 3** Heathrow Winter 2021-22/Summer 2022 $L_{Aeq, 6.5h}$ night contours - area, population and household estimates

| Contour (dBA) | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 48 | 17.1 | 47.2 | 15.3 |
| > 51 | 8.3 | 14.6 | 4.4 |
| > 54 | 4.1 | 2.6 | 0.7 |
| > 57 | 2.2 | 0.4 | 0.1 |
| > 60 | 1.3 | <0.1 | <0.1 |
| > 63 | 0.7 | 0 | 0 |
| > 66 | 0.3 | 0 | 0 |

**Table 4**  Heathrow Winter 2016-17/Summer 2017 $L_{Aeq, 8h}$ night contours - area, population and household estimates

| Contour (dBA) | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 48 | 97.1 | 367.0 | 150.8 |
| > 51 | 59.8 | 187.6 | 72.1 |
| > 54 | 32.0 | 85.7 | 30.6 |
| > 57 | 15.9 | 40.9 | 14.1 |
| > 60 | 8.1 | 12.4 | 3.9 |
| > 63 | 4.3 | 2.5 | 0.8 |
| > 66 | 2.4 | 0.5 | 0.2 |

**Table 5**  Heathrow Winter 2018-19/Summer 2019 $L_{Aeq, 8h}$ night contours - area, population and household estimates

| Contour (dBA) | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 48 | 97.6 | 365.5 | 144.5 |
| > 51 | 58.5 | 182.2 | 67.5 |
| > 54 | 29.1 | 79.8 | 27.0 |
| > 57 | 14.9 | 38.9 | 12.6 |
| > 60 | 7.6 | 11.8 | 3.5 |
| > 63 | 4.0 | 2.4 | 0.7 |
| > 66 | 2.2 | 0.4 | 0.1 |

**Table 6**  Heathrow Winter 2021-22/Summer 2022 $L_{Aeq, 8h}$ night contours - area, population and household estimates

| Contour (dBA) | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 48 | 70.1 | 227.5 | 86.5 |
| > 51 | 41.9 | 124.5 | 44.7 |
| > 54 | 19.7 | 51.9 | 17.0 |
| > 57 | 9.7 | 19.4 | 6.0 |
| > 60 | 4.7 | 2.8 | 0.8 |
| > 63 | 2.5 | 0.6 | 0.2 |
| > 66 | 1.5 | <0.1 | <0.1 |

**Table 7**  Heathrow Winter 2016-17/Summer 2017 N60 6.5h night contours - area, population and household estimates

| N60 | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 10 | 16.0 | 102.1 | 42.3 |
| > 20 | 0.0 | 0 | 0 |
| > 50 | 0.0 | 0 | 0 |

**Table 8**  Heathrow Winter 2018-19/Summer 2019 N60 6.5h night contours - area, population and household estimates

| N60 | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 10 | 17.1 | 112.5 | 45.0 |
| > 20 | 0.0 | 0 | 0 |
| > 50 | 0.0 | 0 | 0 |

**Table 9**  Heathrow Winter 2021-22/Summer 2022 N60 6.5h night contours - area, population and household estimates
No data - fewer than 10 noise events per night on average.

**Table 10** Heathrow Winter 2016-17/Summer 2017 N60 8h night contours - area, population and household estimates

| N60 | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 10 | 170.7 | 908.5 | 389.1 |
| > 20 | 103.9 | 594.7 | 253.8 |
| > 50 | 0.5 | 0 | 0 |

**Table 11** Heathrow Winter 2018-19/Summer 2019 N60 8h night contours - area, population and household estimates

| N60 | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 10 | 193.9 | 1000.5 | 414.3 |
| > 20 | 115.7 | 652.3 | 267.8 |
| > 50 | 0.7 | 0 | 0 |

**Table 12** Heathrow Winter 2021-22/Summer 2022 N60 8h night contours - area, population and household estimates

| N60 | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 10 | 149.4 | 789.9 | 326.8 |
| > 20 | 54.3 | 259.5 | 102.5 |
| > 50 | 0.0 | 0 | 0 |

**Table 13** Gatwick Winter 2016-17/Summer 2017 $L_{Aeq, 6.5h}$ night contours - area, population and household estimates

| Contour (dBA) | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 48 | 39.2 | 5.1 | 2.0 |
| > 51 | 19.2 | 1.2 | 0.5 |
| > 54 | 9.9 | 0.5 | 0.1 |
| > 57 | 5.0 | 0.3 | 0.1 |
| > 60 | 2.5 | 0.2 | <0.1 |
| > 63 | 1.4 | 0 | 0 |
| > 66 | 0.8 | 0 | 0 |

**Table 14** Gatwick Winter 2018-19/Summer 2019 $L_{Aeq, 6.5h}$ night contours - area, population and household estimates

| Contour (dBA) | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 48 | 32.1 | 3.9 | 1.5 |
| > 51 | 17.0 | 1.1 | 0.4 |
| > 54 | 9.2 | 0.4 | 0.1 |
| > 57 | 4.8 | 0.3 | 0.1 |
| > 60 | 2.5 | 0.1 | <0.1 |
| > 63 | 1.4 | 0 | 0 |
| > 66 | 0.8 | 0 | 0 |

**Table 15** Gatwick Winter 2021-22/Summer 2022 $L_{Aeq, 6.5h}$ night contours - area, population and household estimates

| Contour (dBA) | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 48 | 22.6 | 1.4 | 0.6 |
| > 51 | 12.4 | 0.6 | 0.2 |
| > 54 | 6.9 | 0.2 | 0.1 |
| > 57 | 3.4 | 0.1 | <0.1 |
| > 60 | 1.7 | 0 | 0 |
| > 63 | 1.0 | 0 | 0 |
| > 66 | 0.6 | 0 | 0 |

**Table 16** Gatwick Winter 2016-17/Summer 2017 $L_{Aeq, 8h}$ night contours - area, population and household estimates

| Contour (dBA) | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 48 | 71.4 | 9.4 | 3.7 |
| > 51 | 36.4 | 3.5 | 1.4 |
| > 54 | 20.0 | 1.2 | 0.5 |
| > 57 | 10.6 | 0.5 | 0.1 |
| > 60 | 5.5 | 0.3 | 0.1 |
| > 63 | 2.9 | 0.1 | <0.1 |
| > 66 | 1.6 | 0 | 0 |

**Table 17** Gatwick Winter 2018-19/Summer 2019 $L_{Aeq, 8h}$ night contours - area, population and household estimates

| Contour (dBA) | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 48 | 61.7 | 7.8 | 3.1 |
| > 51 | 32.3 | 2.3 | 0.9 |
| > 54 | 18.2 | 1.1 | 0.4 |
| > 57 | 10.0 | 0.5 | 0.2 |
| > 60 | 5.3 | 0.2 | 0.1 |
| > 63 | 2.8 | 0.1 | 0 |
| > 66 | 1.6 | 0 | 0 |

**Table 18** Gatwick Winter 2021-22/Summer 2022 $L_{Aeq, 8h}$ night contours - area, population and household estimates

| Contour (dBA) | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 48 | 34.7 | 3.1 | 1.3 |
| > 51 | 19.4 | 1.1 | 0.5 |
| > 54 | 10.9 | 0.5 | 0.2 |
| > 57 | 5.8 | 0.1 | <0.1 |
| > 60 | 2.8 | <0.1 | <0.1 |
| > 63 | 1.6 | 0 | 0 |
| > 66 | 1.1 | 0 | 0 |

**Table 19**  Gatwick Winter 2016-17/Summer 2017 N60 6.5h night contours - area, population and household estimates

| N60 | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 10 | 81.6 | 10.5 | 4.2 |
| > 20 | 44.7 | 7.7 | 3.0 |
| > 50 | 0.0 | 0 | 0 |

**Table 20**  Gatwick Winter 2018-19/Summer 2019 N60 6.5h night contours - area, population and household estimates

| N60 | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 10 | 88.6 | 9.9 | 3.8 |
| > 20 | 35.2 | 6.2 | 2.4 |
| > 50 | 0.0 | 0 | 0 |

**Table 21**  Gatwick Winter 2021-22/Summer 2022 N60 6.5h night contours - area, population and household estimates

| N60 | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 10 | 92.8 | 10.4 | 4.1 |
| > 20 | 31.7 | 5.9 | 2.3 |
| > 50 | 0.0 | 0 | 0 |

**Table 22**  Gatwick Winter 2016-17/Summer 2017 N60 8h night contours - area, population and household estimates

| N60 | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 10 | 170.7 | 24.6 | 9.9 |
| > 20 | 112.2 | 12.9 | 5.2 |
| > 50 | 5.0 | 0.1 | <0.1 |

**Table 23**  Gatwick Winter 2018-19/Summer 2019 N60 8h night contours - area, population and household estimates

| N60 | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 10 | 153.1 | 23.9 | 9.4 |
| > 20 | 105.1 | 11.7 | 4.6 |
| > 50 | 4.9 | 0.2 | <0.1 |

**Table 24**  Gatwick Winter 2021-22/Summer 2022 N60 8h night contours - area, population and household estimates

| N60 | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 10 | 127.8 | 13.9 | 5.5 |
| > 20 | 83.6 | 9.6 | 3.8 |
| > 50 | 1.2 | <0.1 | 0 |

**Table 25** Stansted Winter 2016-17/Summer 2017 $L_{Aeq, 6.5h}$ night contours - area, population and household estimates

| Contour (dBA) | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 48 | 35.2 | 4.3 | 1.7 |
| > 51 | 18.7 | 1.8 | 0.7 |
| > 54 | 9.5 | 0.4 | 0.2 |
| > 57 | 4.8 | 0.1 | <0.1 |
| > 60 | 2.6 | 0 | 0 |
| > 63 | 1.4 | 0 | 0 |
| > 66 | 0.8 | 0 | 0 |

**Table 26** Stansted Winter 2018-19/Summer 2019 $L_{Aeq, 6.5h}$ night contours - area, population and household estimates

| Contour (dBA) | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 48 | 35.7 | 4.7 | 1.9 |
| > 51 | 18.6 | 1.5 | 0.6 |
| > 54 | 9.5 | 0.4 | 0.1 |
| > 57 | 4.8 | 0.1 | <0.1 |
| > 60 | 2.6 | 0 | 0 |
| > 63 | 1.4 | 0 | 0 |
| > 66 | 0.8 | 0 | 0 |

**Table 27** Stansted Winter 2021-22/Summer 2022 $L_{Aeq, 6.5h}$ night contours - area, population and household estimates

| Contour (dBA) | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 48 | 35.4 | 5.1 | 2.1 |
| > 51 | 18.3 | 1.6 | 0.7 |
| > 54 | 9.3 | 0.5 | 0.2 |
| > 57 | 4.8 | 0.1 | 0.1 |
| > 60 | 2.5 | 0 | 0 |
| > 63 | 1.4 | 0 | 0 |
| > 66 | 0.8 | 0 | 0 |

**Table 28** Stansted Winter 2016-17/Summer 2017 $L_{Aeq, 8h}$ night contours - area, population and household estimates

| Contour (dBA) | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 48 | 52.6 | 6.5 | 2.6 |
| > 51 | 29.2 | 3.7 | 1.5 |
| > 54 | 15.3 | 0.8 | 0.3 |
| > 57 | 7.8 | 0.2 | 0.1 |
| > 60 | 4.1 | 0.1 | <0.1 |
| > 63 | 2.1 | 0 | 0 |
| > 66 | 1.2 | 0 | 0 |

**Table 29** Stansted Winter 2018-19/Summer 2019 $L_{Aeq, 8h}$ night contours - area, population and household estimates

| Contour (dBA) | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 48 | 58.1 | 8.1 | 3.2 |
| > 51 | 31.6 | 3.9 | 1.6 |
| > 54 | 16.8 | 1.0 | 0.4 |
| > 57 | 8.8 | 0.3 | 0.1 |
| > 60 | 4.6 | 0.1 | <0.1 |
| > 63 | 2.3 | 0 | 0 |
| > 66 | 1.3 | 0 | 0 |

**Table 30** Stansted Winter 2021-22/Summer 2022 $L_{Aeq, 8h}$ night contours - area, population and household estimates

| Contour (dBA) | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 48 | 51.1 | 6.9 | 2.8 |
| > 51 | 27.7 | 3.4 | 1.4 |
| > 54 | 14.7 | 1.0 | 0.4 |
| > 57 | 7.7 | 0.3 | 0.1 |
| > 60 | 4.0 | 0.1 | 0.1 |
| > 63 | 2.0 | 0 | 0 |
| > 66 | 1.1 | 0 | 0 |

**Table 31** Stansted Winter 2016-17/Summer 2017 N60 6.5h night contours - area, population and household estimates

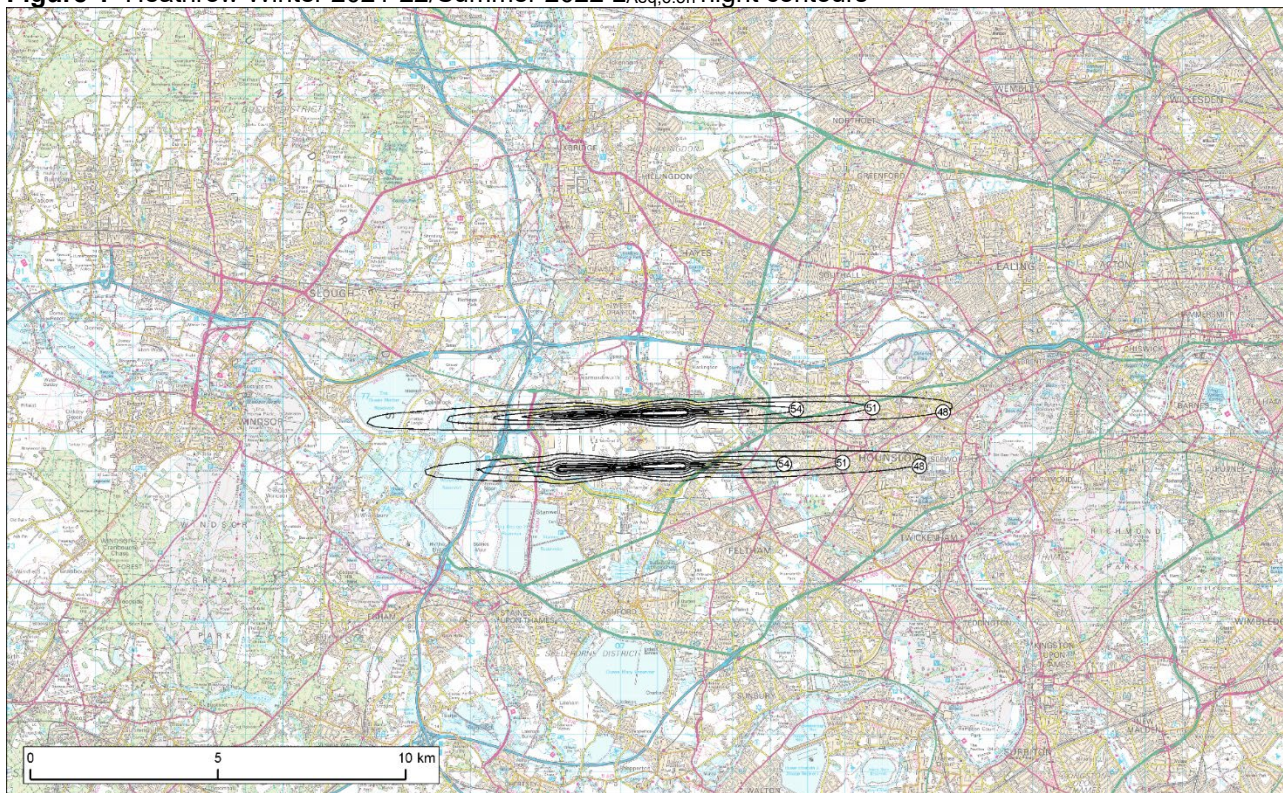| N60 | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 10 | 65.9 | 7.8 | 3.1 |
| > 20 | 16.2 | 0.5 | 0.2 |
| > 50 | 0.0 | 0 | 0 |


**Table 32** Stansted Winter 2018-19/Summer 2019 N60 6.5h night contours - area, population and household estimates

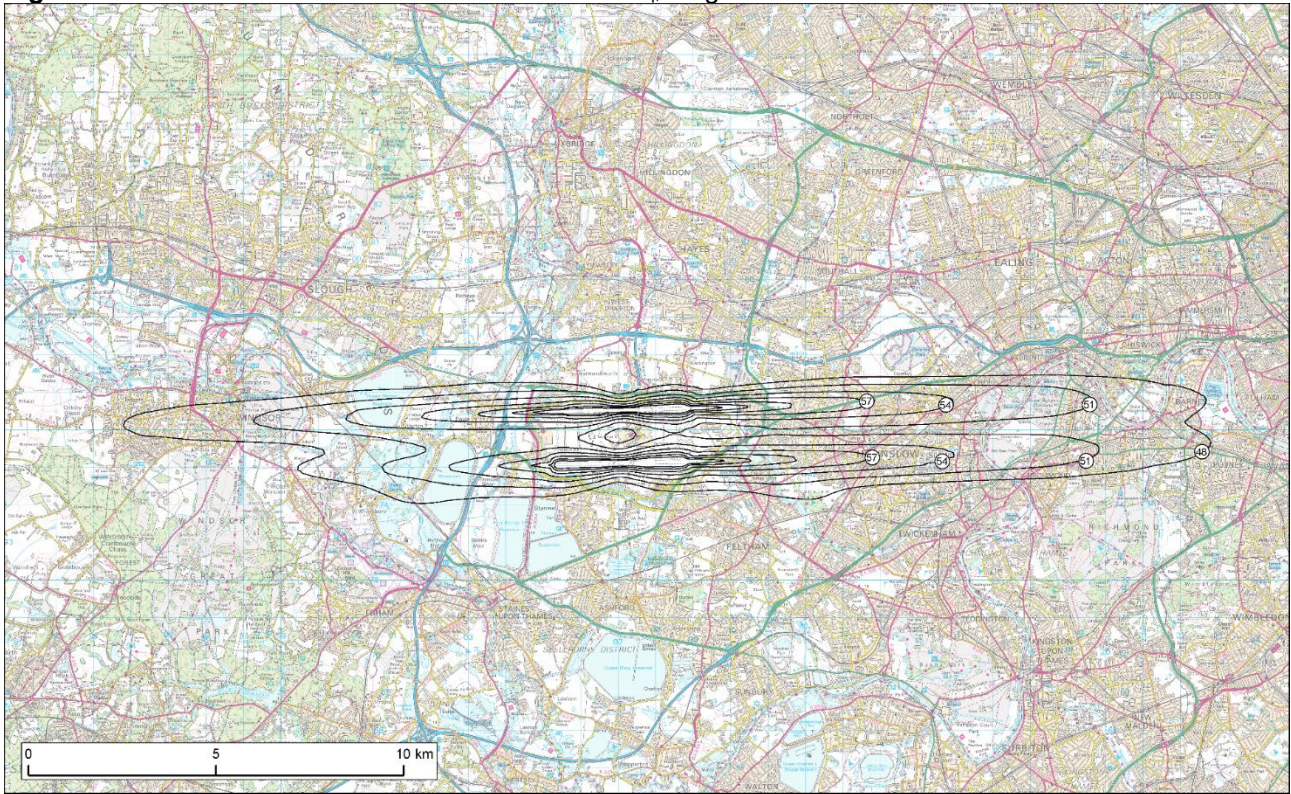| N60 | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 10 | 66.4 | 9.8 | 4.0 |
| > 20 | 14.1 | 0.5 | 0.2 |
| > 50 | 0.0 | 0 | 0 |


**Table 33** Stansted Winter 2021-22/Summer 2022 N60 6.5h night contours - area, population and household estimates

| N60 | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 10 | 73.4 | 12.4 | 5.1 |
| > 20 | 22.6 | 3.3 | 1.4 |
| > 50 | 0.0 | 0 | 0 |

**Table 34** Stansted Winter 2016-17/Summer 2017 N60 8h night contours - area, population and household estimates

| N60 | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 10 | 117.1 | 22.4 | 9.0 |
| > 20 | 69.8 | 10.6 | 4.2 |
| > 50 | 2.5 | <0.1 | <0.1 |

**Table 35** Stansted Winter 2018-19/Summer 2019 N60 8h night contours - area, population and household estimates

| N60 | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 10 | 156.3 | 28.7 | 11.5 |
| > 20 | 72.7 | 14.1 | 5.6 |
| > 50 | 2.9 | <0.1 | <0.1 |

**Table 36** Stansted Winter 2021-22/Summer 2022 N60 8h night contours - area, population and household estimates

| N60 | Area (sq km) | Population (1000s) | Households (1000s) |
|---|---|---|---|
| > 10 | 126.6 | 24.7 | 10.0 |
| > 20 | 68.9 | 11.9 | 4.8 |
| > 50 | 2.7 | <0.1 | <0.1 |

**Figure 1** Heathrow Winter 2021-22/Summer 2022 $L_{Aeq,6.5h}$ night contours



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**Figure 2** Heathrow Winter 2021-22/Summer 2022 $L_{Aeq,8h}$ night contours



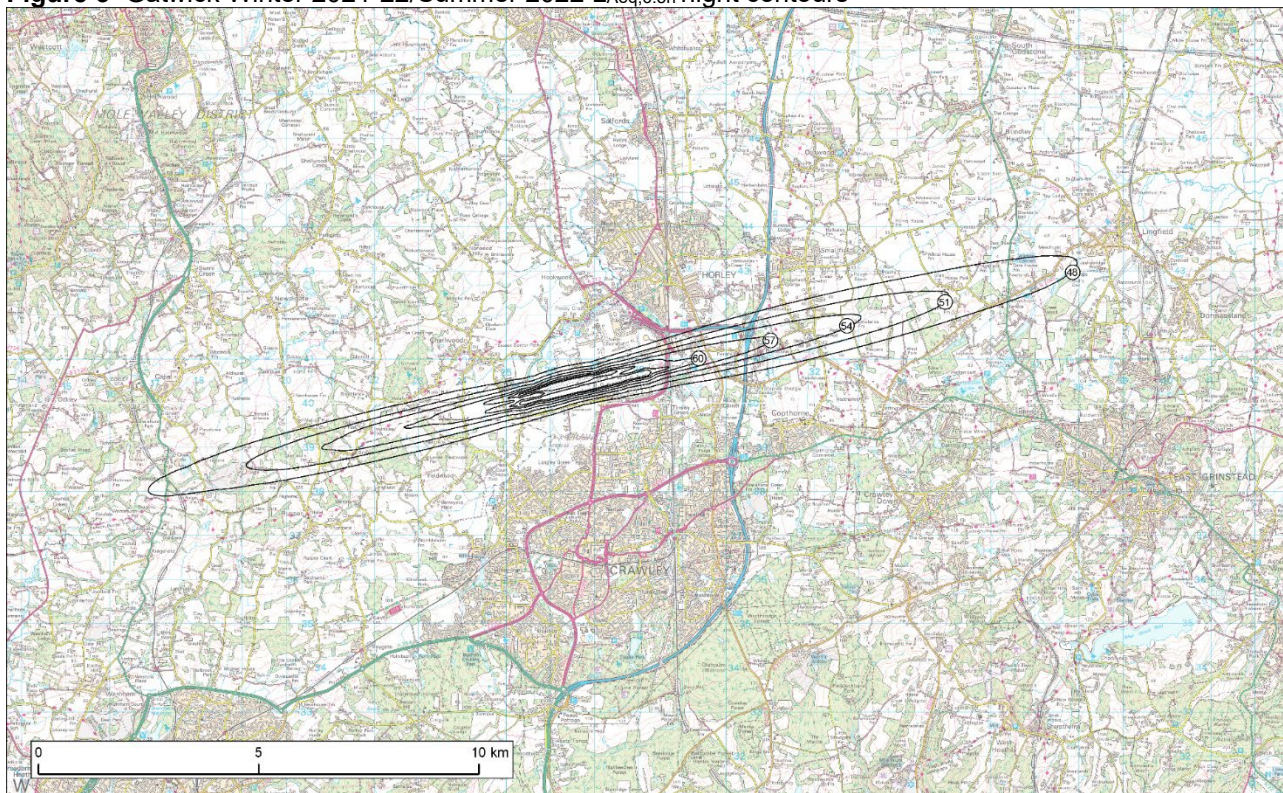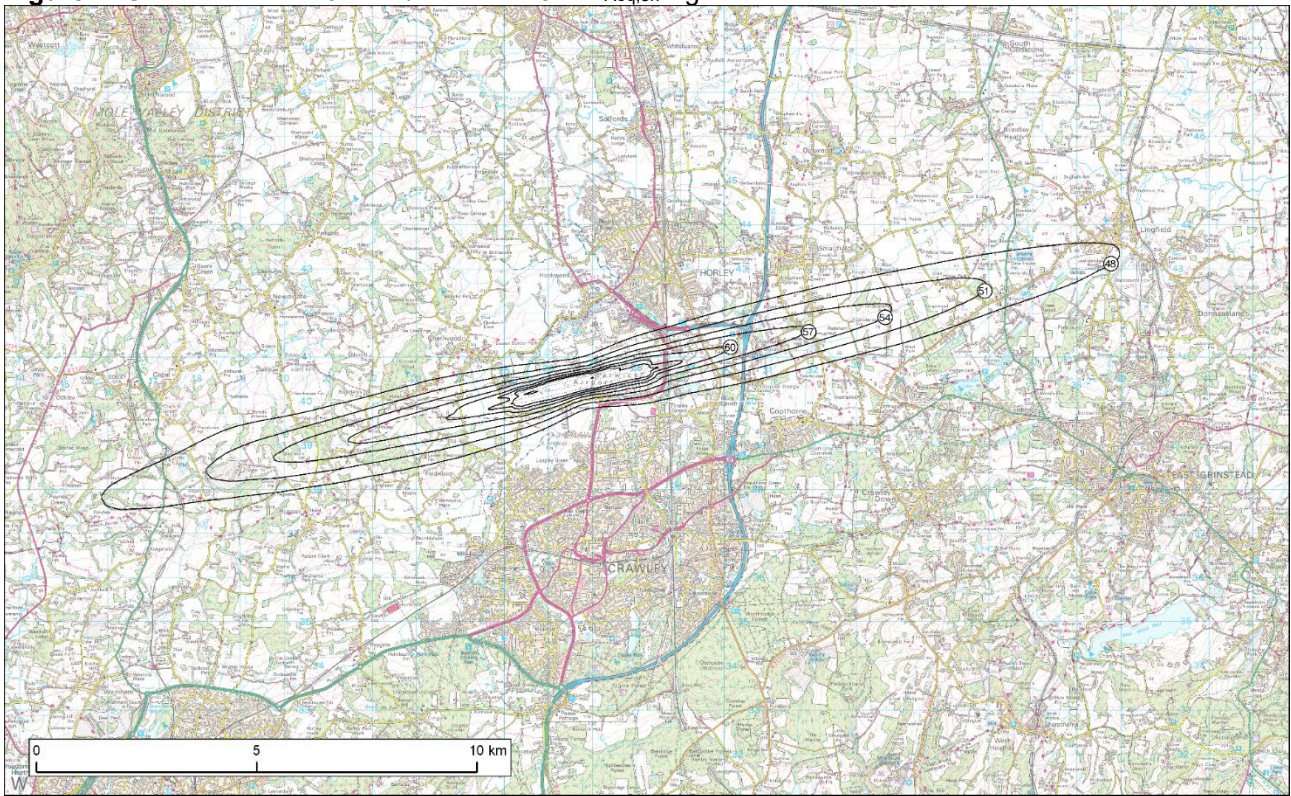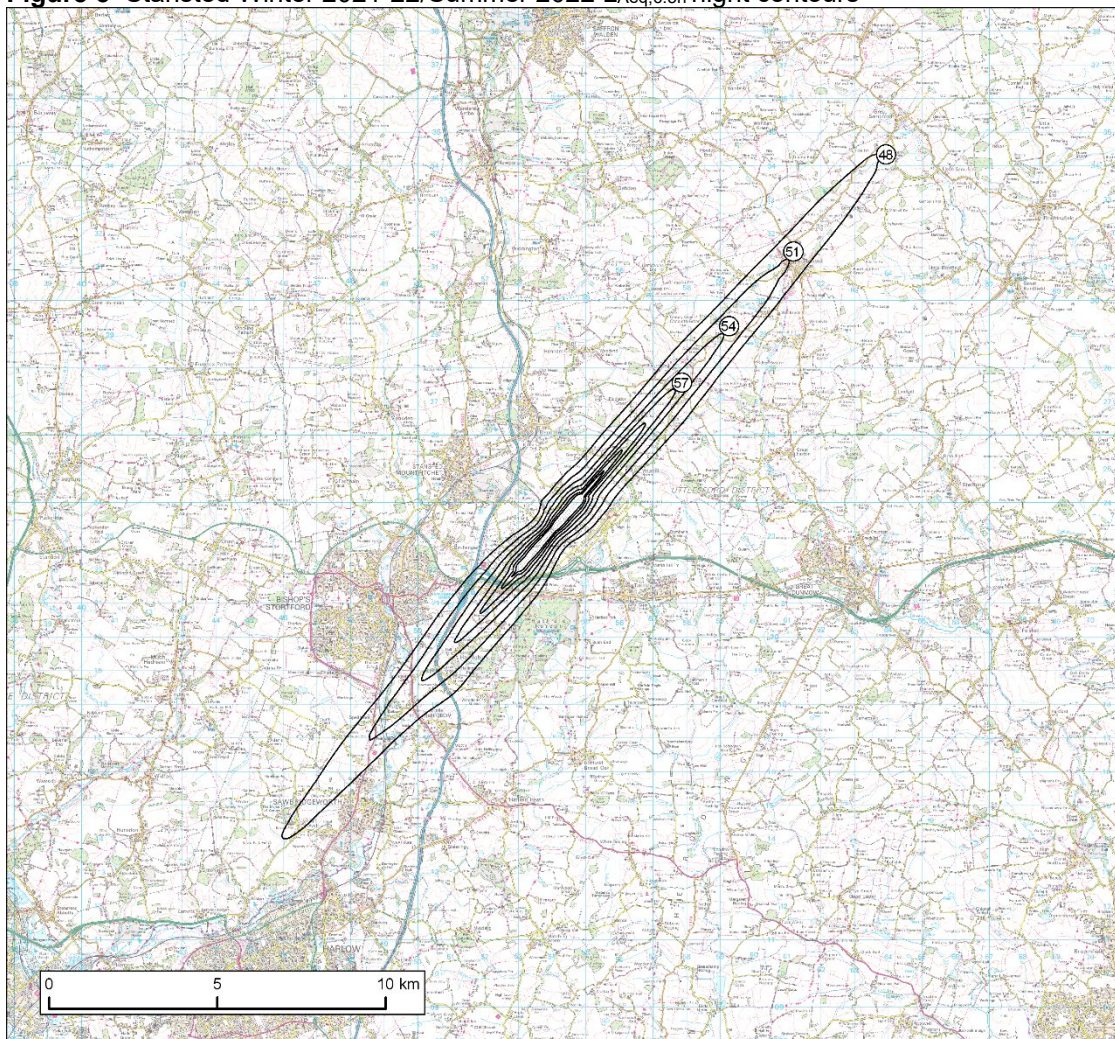© Crown Copyright and database right 2023. Ordnance Survey Licence number 100016105

**Figure 3**  Gatwick Winter 2021-22/Summer 2022 $L_{Aeq,6.5h}$ night contours

**Figure 4** Gatwick Winter 2021-22/Summer 2022 $L_{Aeq,8h}$ night contours
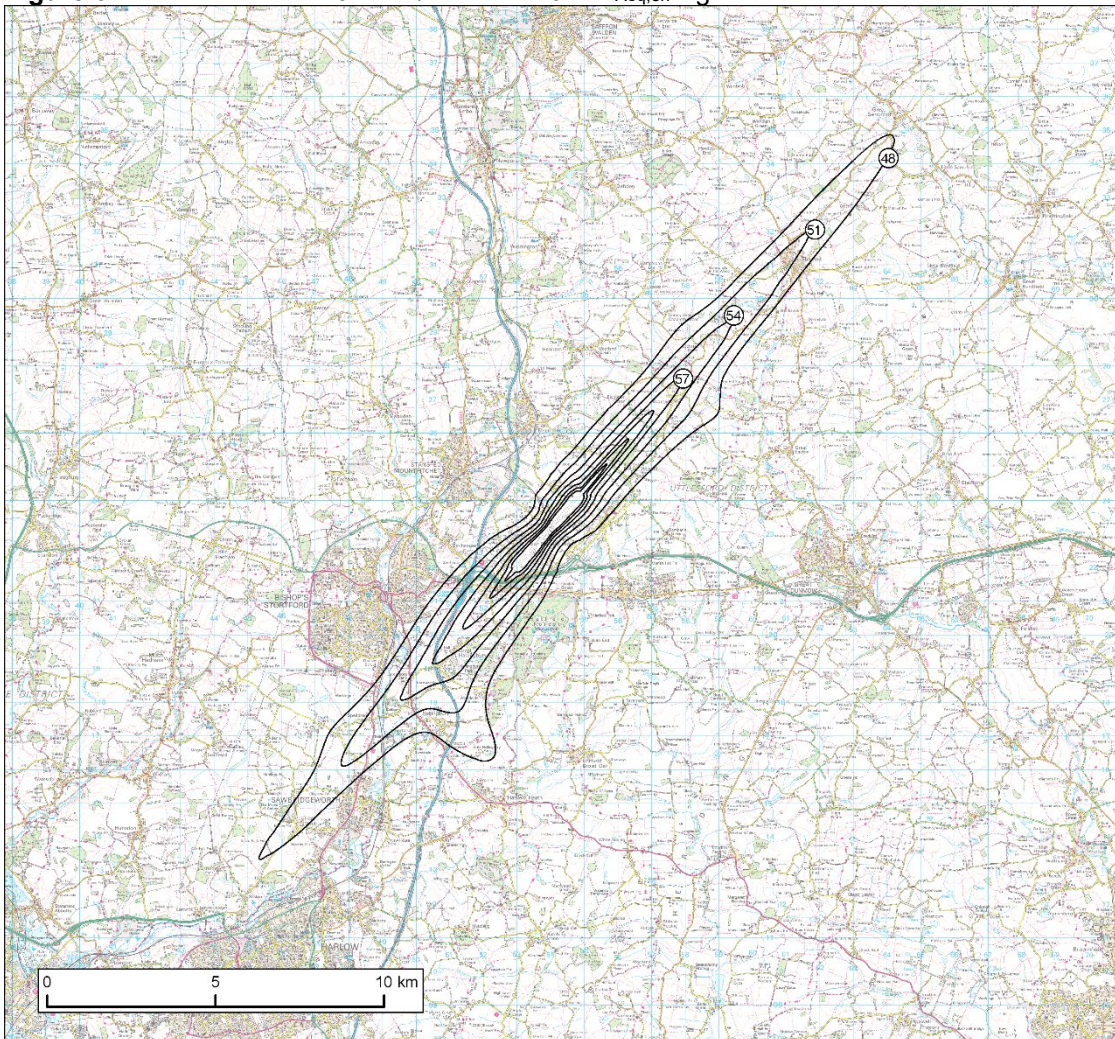
**Figure 5** Stansted Winter 2021-22/Summer 2022 $L_{Aeq,6.5h}$ night contours



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**Figure 6** Stansted Winter 2021-22/Summer 2022 $L_{Aeq,8h}$ night contours