

RSP

RiverOak Strategic Partners

Data on Disability Adjusted Life Years

TR020002/D4/DALY

Examination Document



Project Name:	Manston Airport Development Consent Order
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Appendix NS. 1.6

Annoyance as a health outcome

This technical note has been produced to supplement the applicant's response to Question Ns.1.6 of the First Written Questions issued by the Examining Authority (ExA) on the 18 January 2019:

"PHE [RR-1608]

Annoyance was not included as a health outcome, as recommended by the WHO¹ and the Interdepartmental Group on Costs and Benefits Noise (IGCBN)².

Can the Applicant express the noise impacts in terms of Disability Adjusted Life Years (DALYs)³ and in monetary terms using the methodologies in [5,6]?"

1. Introduction

As noted by the ExA in footnote 3, annoyance was assessed in monetary terms in Appendix 12.3 of the ES [APP-057] in the context of an options appraisal of flight path options. Annoyance was not presented for the assessed route presented in the main ES chapters 12 or 15 [APP-034]. In response to PHE [RR-1608] and EXAs written question NS 1.6 [REP3-195]. This note presents an assessment of the number of people "highly annoyed" by aircraft noise in terms of population exposed to aircraft noise and in terms of DALYs.

Monetised values for annoyance have not been provided. This was discussed with PHE on 1st March 2019. The applicant considers that monetisation is more appropriate at the strategic/policy level (for example when comparing one scheme to another in a route options appraisal) and that monetisation has less relevance at a project level as it tends to mask not only the nature of the potential health outcome from noise, but also the relative geographic distribution of potential effects. Hence this note presents annoyance in terms of DALYs only. PHE agree with this approach.

2. Assessment

2.1 Calculation of number of people highly annoyed

The proportion of highly annoyed people (%HA) is calculated with the L_{den} ⁴ exposure response relationship for aircraft noise recommended by WHO 2012¹ and IGCBN 2014², i.e.

$$\%HA = -9.199 \times 10^{-5} * (L_{den} - 42)^3 + 3.932 \times 10^{-2} * (L_{den} - 42)^2 + 0.2939 * (L_{den} - 42) \quad (1)$$

¹ WHO Burden of Disease from Environmental Noise, 2012

² Defra/Interdepartmental Group on Costs and Benefits Noise Subject Group, 2014

³ Appendix 12.3 does refer to costed WebTag which address DALY's

⁴ L_{den} is Day-evening-night level. It is a descriptor of noise level based on energy equivalent noise level (Leq) over a whole day with a penalty of 10 dB(A) for night time noise (22.00-7.00) and an additional penalty of 5 dB(A) for evening noise (i.e. 19.00-23.00)

The number of households experiencing specific noise levels with and without scheme for the opening and forecast years has been identified using noise predictions from the project aircraft noise model. Population counts have using the CACI Ltd population dataset.

Values of $L_{Aeq,16hr}$ from the noise model have been converted to L_{den} using the adjustment suggested in CAP1506⁵, i.e.:

$$L_{den} = L_{Aeq,16hr} + 2dB \quad (2)$$

As recommended by DEFRA² noise exposure levels below 42 dB L_{den} are excluded from the population count.

The population in the vicinity of the proposed airport is not currently exposed to aircraft noise, hence this calculation assumes no noise exposure without the scheme. This is likely to result in an overestimate of annoyance at the population exposed to the lowest levels of aviation noise as the majority of the population will be exposed to noise from other sources, such as road noise, to some degree.

2.2 Annoyance in Disability Adjusted Life Years (DALYs)

Based on the WHO methodologies¹ the number of "Highly Annoyed" (HA) population and Disability Adjusted Life Years (DALYs) have been calculated and presented in **Error! Reference source not found.** for the opening year, i.e. Year 2 (2020) and in **Error! Reference source not found.** for the year of maximum forecast capacity, i.e. Year 20 (2038).

The number of DALYs is calculated with:

$$\text{Number of DALYs} = (\text{Number of HA citizens}) * DW. \quad (3)$$

The disability weight (DW) for annoyance has a value of 0.02, as established by WHO¹ with a sensitivity range for the DW's between 0.01 and 0.12, reflecting the low/high range from their literature review.

⁵ Survey of noise attitudes 2014: Aircraft, CAP 1506, Civil Aviation Authority, 2017.

2.3 Results

The total number of people highly annoyed for Year 2 and Year 20 in terms of population and DALYs are outlined in Table 1 and Table 2 respectively.

Table 1 Number of Highly Annoyed (HA) citizens and disability-adjusted life years (DALYs) after the scheme for opening year

Average sound pressure level, L_{den} (dB(A))	Population exposed	Population HA %	Number of HA population	DALYs
42	2454	0.00	0	0.0
43	2491	0.33	8	0.2
44	2795	0.74	21	0.4
45	2859	1.23	35	0.7
46	2880	1.80	52	1.0
47	3098	2.44	76	1.5
48	3105	3.16	98	2.0
49	4598	3.95	182	3.6
50	3836	4.82	185	3.7
51	2661	5.76	153	3.1
52	2392	6.78	162	3.2
53	2758	7.87	217	4.3
54	2709	9.03	245	4.9
55	1983	10.26	203	4.1
56	867	11.57	100	2.0
57*	683	12.95	88	1.8
58	518	14.39	74	1.5
59	449	15.91	71	1.4
60	175	17.49	31	0.6
61	55	19.15	11	0.2
62	14	20.87	3	0.1
63	16	22.66	4	0.1
64	35	24.52	8	0.2
65	2	26.44	1	0.0
66	0	28.43	0	0.0
67	48	30.49	15	0.3
68	62	32.60	20	0.4
69	48	34.8	0	0.3
70	62	37.0	0	0.5
>71	0	39.3	0	0.0
Total population highly annoyed			2,063 people	41 DALYs
Total population exposed to noise >42dB L_{den}			43,541 people	

Table 2 Number of Highly Annoyed (HA) citizens and disability-adjusted life years (DALYs) after the scheme for year of maximum forecast capacity

Average sound pressure level, L _{den} (dB(A))	Population exposed	Population HA %	Number of HA population	DALYs
42	7286	0.0	0	0.0
43	9508	0.3	32	0.6
44	11190	0.7	83	1.7
45	6026	1.2	74	1.5
46	1755	1.8	32	0.6
47	2001	2.4	49	1.0
48	3034	3.2	96	1.9
49	2841	4.0	112	2.2
50	3692	4.8	178	3.6
51	3064	5.8	177	3.5
52	3501	6.8	237	4.7
53	2818	7.9	222	4.4
54	4018	9.0	363	7.3
55	3820	10.3	392	7.8
56	2532	11.6	293	5.9
57*	2174	12.9	281	5.6
58	1877	14.4	270	5.4
59	2781	15.9	442	8.8
60	2804	17.5	490	9.8
61	1785	19.1	342	6.8
62	805	20.9	168	3.4
63	591	22.7	134	2.7
64	573	24.5	140	2.8
65	290	26.4	77	1.5
66	74	28.4	21	0.4
67	35	30.5	11	0.2
68	2	32.6	1	0.0
69	48	34.8	17	0.3
70	62	37.0	23	0.5
>71	0	39.3	0	0.0
Total population highly annoyed			4,756 people	95 DALYs
Total population exposed to noise >42dB L_{den}			80,983 people	