

Monetisation of aviation noise impacts

Technical Note

Background

Environmental noise – noise emitted from all sources except industrial workplaces – has for many years been seen as an annoyance. Individuals and community groups close to airports have campaigned for many years about the impact that aviation noise has on their lives.

The World Health Organisation (WHO) in their 2011 report, “Burden of disease from environmental noise”¹ concluded that:

There is sufficient evidence from large-scale epidemiological studies linking the population’s exposure to environmental noise with adverse health effects. Therefore, environmental noise should be considered not only as a cause of nuisance but also a concern for public health and environmental health.

The WHO identifies health impacts including: cardiovascular disease, cognitive impairment, sleep disturbance and tinnitus as well as annoyance; further explanation of these health impacts is provided in the appendices.

Following the WHO report, the UK Department for Environment, Food and Rural Affairs (DEFRA) produced guidance in 2013 on assessing impacts of transport-related noise using a monetary approach covering a range of impacts on; annoyance, sleep disturbance and health impacts including acute myocardial infarction (AMI) – i.e. heart-attack – hypertension – i.e. high blood pressure – stroke and dementia².

In December 2015 the Department for Transport (DfT) published “Transport Analysis Guidance (WebTAG) on the analysis of environmental impacts in transport appraisals”³ as an update to the same document from 2014⁴. The significant change in the updated WebTAG noise impact appraisal is the inclusion of DEFRA’s guidance on the valuation of transport-related noise. WebTAG now evaluates noise impacts as health impacts rather than purely as annoyance. The previous guidance recommended use of hedonic-pricing (the willingness-to-pay for peace and quiet in the housing market) based values that increase with GDP per household. In the latest guidance, values are still applied at a household level, however they are now derived from estimates of noise impact on individuals’ health, sleep disturbance and annoyance.

¹ Burden of disease from environmental noise – Quantification of healthy life years lost in Europe:

http://www.who.int/quantifying_ehimpacts/publications/e94888/en/

² Defra, Noise pollution: economic analysis: <https://www.gov.uk/guidance/noise-pollution-economic-analysis>

³ Pdf WebTAG: TAG unit A3 environmental impact appraisal, December 2015 accessed from:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/487684/TAG_unit_a3_envir_imp_app_dec_15.pdf

⁴ Pdf WebTAG: TAG unit A3 environmental impact appraisal, November 2014:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/487593/TAG_unit_a3_environmental_impact_appraisal_november2014.pdf

Differences between DEFRA & DfT guidance

The WebTAG guidance clearly states that its assessment methodology is “based on the central assumptions in DEFRA’s guidance”. There is, nonetheless, an important difference between the objectives of the two methodologies to evaluate the health impact of noise. The DEFRA model tries to provide a monetary value of the actual health impacts whilst WebTAG’s objective is to provide a consistent quantification to facilitate a fair comparison of different transport schemes.

Every individual responds differently to noise and as such the DEFRA model incorporates three different “response-functions”⁵, a low, medium and high response proportion. The DEFRA model also has three different “disability weightings”⁶ for sleep disturbance and annoyance; this reflects the fact that the scale of health impact is not consistent for every individual. Finally there is not a single standard value that can be assigned to a “Disability Adjusted Life Year” (DALY)⁷, hence the DEFRA model has three options: £30,000, £60,000 or £80,000. The DEFRA model can therefore provide multiple sensitivities which can result in a very wide range of monetary values. For example, for sleep disturbance, the marginal cost per household that experiences a one decibel change from 54dB to 55dB L_{night} , is valued by DEFRA as between £36 and £204. For comparison WebTAG utilises the value of £56.90 for the same household.

The noise metrics used to evaluate each impact are also different – for example, the impact of direct AMI is measured using L_{day} in the DEFRA model, whereas WebTAG utilises L_{Aeq} , 16hr; but this is less important than the difference in monetary values.

Additionally the DEFRA model utilises 2014 prices whilst WebTAG presents 2010 prices.

Implementation practicality

There may be some challenges for aviation in using the DEFRA or WebTAG noise models as they require results from <45dB, whilst published ANCON results⁸ typically have a lower limit of 54dB L_{Aeq} or 55dB L_{den} .

If the affected households between 45dB and 54dB were to be excluded from the monetisation calculation, then there is a risk of undervaluing the impacts, particularly given the way that the total population resident within each successive 3dB (L_{Aeq}) or 5dB (L_{den}) banding increases significantly. The counterargument is that if background noise is above 45dB then the impact of environmental noise will not solely be attributable to aviation.

⁵ A “response-function” estimates the proportion of the population affected by the impact.

⁶ A “disability weighting” lies on a scale between zero (indicating the health condition is equivalent to full health) and 1 (indicating the health condition is equivalent to death).

⁷ One DALY can be thought of as one lost year of “healthy” life. DALYs for a disease or health condition are calculated as the sum of the Years of Life Lost (YLL) due to premature mortality in the population and the Years Lost due to Disability (YLD) for people living with the health condition or its consequences.

⁸ The ANCON model is validated against actual aircraft noise data. To be able to collect the data the sound metres have to be located in a position where the differential between background and aircraft noise levels can be distinguished. Finding sites to log aviation data is significantly harder at lower sound levels; hence the validation and assurance of results is less.

Monetisation of the Heathrow North West Runway (NWR) option

This section sets out how the monetary value of health impacts has been evaluated, based on the WebTAG methodology. The methodology proposed within WebTAG guidance relies on a monetary value per household whilst the noise modelling results typically focus on the population within a noise contour. We have therefore modified the WebTAG approach to provide a marginal cost per individual rather than per household; further detail of this is included within the appendices to this paper.

The cost of noise-related health impacts for the three Heathrow North West Runway scenarios has been calculated; the values for 2050 are:

- Minimise Total – £365.8m per annum
- Minimise Newly Affected – £419.8m per annum
- Respite – £343.2m per annum

Aggregated over a 60-year period⁹ provides values of £21.3bn for Minimise Total, £24.6bn for Minimise Newly Affected and £20.3bn for Respite.

Tables 1 to 3 below provide a more detailed summary of results by health-impact for 2030, 2040 and 2050 as well as for a 60 year evaluation period.

Table 1. Monetised annual aircraft noise-related health impacts for **Minimise Total**

Impact (£ millions)	2030	2040	2050	60 Years
Sleep disturbance	£162.4	£193.2	£180.2	£10,743
Annoyance	£109.8	£118.6	£138.0	£7,808
Direct AMI	£5.7	£6.0	£6.1	£362
Hypertensive Stroke	£13.1	£14.1	£16.6	£935
Hypertensive Dementia	£19.7	£21.2	£25.0	£1,409
Total cost	£310.7	£353.1	£365.8	£21,257

Table 2. Monetised annual aircraft noise-related health impacts for **Minimise Newly Affected**

Impact (£ millions)	2030	2040	2050	60 Years
Sleep disturbance	£178.2	£224.9	£213.4	£12,539
Annoyance	£134.8	£148.3	£153.6	£8,969
Direct AMI	£6.0	£6.4	£6.5	£382
Hypertensive Stroke	£16.2	£17.9	£18.5	£1,080
Hypertensive Dementia	£24.5	£26.9	£27.9	£1,628
Total cost	£359.7	£424.3	£419.8	£24,598

⁹ Assuming year 1 in 2026, linear interpolation between assessment years and constant value from 2050 to the end of the 60 year term.

Table 3. Monetised annual aircraft noise-related health impacts for **Respite**

Impact (£ millions)	2030	2040	2050	60 Years
Sleep disturbance	£162.4	£192.7	£181.9	£10,807
Annoyance	£109.8	£118.6	£119.5	£7,061
Direct AMI	£5.7	£6.0	£6.1	£325
Hypertensive Stroke	£13.1	£14.1	£14.2	£839
Hypertensive Dementia	£19.7	£21.2	£21.4	£1,264
Total cost	£310.7	£352.6	£343.2	£20,296

Conclusions

The recent update to the DfT's WebTAG methodology is valuable in helping better understand the severely detrimental impact that noise can have on public health.

The resulting values represent the human cost, underpinned by a WHO valuation of each year of healthy life lost at £60,000.

This human cost, £20-25bn over 60 years, constitutes a significant impact on local communities, reflecting the increased risk of a number of health conditions, including heart attacks, strokes and dementia, caused by aircraft noise. Even with the flight routing optimisation and other technological improvements that are embedded in these three scenarios presented by Heathrow Airport Limited and endorsed by the Airports Commission, these figures demonstrate that an airport in this location cannot avoid severe local public health impacts. Such a scale of impact could be avoided in a location away from densely populated areas.

Appendix I: Health impacts caused by environmental noise

The following explanation of health impacts are taken from the WHO “Burden of disease from environmental noise” report.

Cardiovascular diseases: The evidence from epidemiological studies on the association between exposure to road traffic and aircraft noise and hypertension and ischaemic heart disease has increased during recent years. Road traffic noise has been shown to increase the risk of ischaemic heart disease, including myocardial infarction. Both road traffic noise and aircraft noise increase the risk of high blood pressure. Very few studies exist regarding the cardiovascular effects of exposure to rail traffic noise.

Cognitive impairment in children: The Reduction in cognitive ability in school-age children that occurs while the noise exposure persists and will persist for some time after the cessation of the noise exposure. The extent to which noise impairs cognition, particularly in children, has been studied with both experimental and epidemiological studies.

Sleep disturbance: Sleep disturbance can be measured electro-physiologically or by self-reporting in epidemiological studies using survey questionnaires. In epidemiological studies, “self-reported sleep disturbance” is the most easily measurable outcome indicator, because electro-physiological measurements are costly and difficult to carry out on large samples and may themselves influence sleep.

Tinnitus: Tinnitus is defined as the sensation of sound in the absence of an external sound source. Tinnitus caused by excessive noise exposure has long been described; 50% to 90% of patients with chronic noise trauma report tinnitus. In some people, tinnitus can cause sleep disturbance, cognitive effects, anxiety, psychological distress, depression, communication problems, frustration, irritability, tension, inability to work, reduced efficiency and restricted participation in social life.

Annoyance: WHO defines health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. Therefore, a high level of annoyance caused by environmental noise should be considered as one of the environmental health burdens. Standardized questionnaires are used to assess noise-induced annoyance at the population level. The percentage of highly annoyed is the most widely used prevalence indicator for annoyance in a population.

Appendix 2: Calculation of noise monetisation values

Data for populations affected by noise was accessed from the ERCD Noise Modelling for the Airports Commission: Compendium of results¹⁰.

Where the data indicated “<50” people affected within a specific noise contour then this analysis has assumed a zero population. This may give a more conservative estimate.

Following the WebTAG methodology we are able to calculate the yearly health costs from aircraft noise around Heathrow. Sensitivities are not incorporated in this model¹¹.

¹⁰ (ERCD) Noise Modelling for the Airports Commission: Compendium of results

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/439684/noise-local-assessment-compendium-of-ancon-modelling-results.pdf

¹¹ According to the updated TAG Environmental Appraisal 2015, ‘Where noise impacts are particularly significant, sensitivity testing to reflect these various uncertainties may be required and further advice should be sought from the Department [of Transport] on an appropriate range of sensitivity tests.’

Calculation of monetised aircraft noise related health costs using the WebTAG methodology around Heathrow for North West Runway for Minimise Total

The following calculations were based on data from the North West Runway – Minimise Total scenario. This is the scenario most aligned with the current government policy to, ‘limit and where possible reduce the number of people significantly affected by aircraft noise’¹².

Table 4. Aircraft noise exposure around Heathrow for NWR, Minimise Total, 2030

	Noise contour	Cumulative total number of people exposed	Contour band	Numbers of people living within contour bands
Day	>54 dB LAeq, 16h	440,900	54-57dB LAeq, 16h	309,600
	>57 dB LAeq, 16h	234,800	57-60 dB LAeq, 16h	131,300
	>60 dB LAeq, 16h	131,100	60-63 dB LAeq, 16h	103,500
	>63 dB LAeq, 16h	38,600	63-66 dB LAeq, 16h	27,600
	>66 dB LAeq, 16h	11,900	66-69 dB LAeq, 16h	11,000
	>69 dB LAeq, 16h	900	69-72 dB LAeq, 16h	900
	>72 dB LAeq, 16h	0	>72 dB LAeq, 16h	0
Night	>48 dB LAeq, 8h	272,600	48-51 dB LAeq, 8h	162,100
	>51 dB LAeq, 8h	173,000	51-54 dB LAeq, 8h	110,500
	>54 dB LAeq, 8h	73,400	54-57 dB LAeq, 8h	62,500
	>57 dB LAeq, 8h	11,600	57-60 dB LAeq, 8h	10,900
	>60 dB LAeq, 8h	900	60-63 dB LAeq, 8h	700
	>63 dB LAeq, 8h	200	63-66 dB LAeq, 8h	200
	>66 dB LAeq, 8h	0	66-69 dB LAeq, 8h	0
	>69 dB LAeq, 8h	0	69-72 dB LAeq, 8h	0
	>72 dB LAeq, 8h	0	>72 dB LAeq, 8h	0
24-hour	>55dB Lden	482,800	55-60 dB Lden	326,350
	>60dB Lden	191,400	60-65 dB Lden	156,450
	>65dB Lden	35,800	65-70 dB Lden	34,950
	>70dB Lden	900	70-75 dB Lden	850
	>75dB Lden	50	>75 dB Lden	50

¹² Airports Commission Discussion Paper 05: Aviation Noise:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/223764/airports-commission-noise.pdf

Table 5. Aircraft noise exposure around Heathrow for NWR, Minimise Total, 2040

	Noise contour	Cumulative total number of people exposed	Contour band	Numbers of people living within contour bands
Day	>54 dB LAeq, 16h	455,700	54-57dB LAeq, 16h	322,600
	>57 dB LAeq, 16h	243,200	57-60 dB LAeq, 16h	133,100
	>60 dB LAeq, 16h	141,200	60-63 dB LAeq, 16h	110,100
	>63 dB LAeq, 16h	42,100	63-66 dB LAeq, 16h	31,100
	>66 dB LAeq, 16h	11,900	66-69 dB LAeq, 16h	11,000
	>69 dB LAeq, 16h	900	69-72 dB LAeq, 16h	900
	>72 dB LAeq, 16h	0	>72 dB LAeq, 16h	0
Night	>48 dB LAeq, 8h	308,900	48-51 dB LAeq, 8h	200,400
	>51 dB LAeq, 8h	190,600	51-54 dB LAeq, 8h	108,500
	>54 dB LAeq, 8h	98,200	54-57 dB LAeq, 8h	82,100
	>57 dB LAeq, 8h	18,300	57-60 dB LAeq, 8h	16,100
	>60 dB LAeq, 8h	2,400	60-63 dB LAeq, 8h	2,200
	>63 dB LAeq, 8h	200	63-66 dB LAeq, 8h	200
	>66 dB LAeq, 8h	0	66-69 dB LAeq, 8h	0
	>69 dB LAeq, 8h	0	69-72 dB LAeq, 8h	0
	>72 dB LAeq, 8h	0	>72 dB LAeq, 8h	0
24-hour	>55dB Lden	515,200	55-60 dB Lden	350,600
	>60dB Lden	205,900	60-65 dB Lden	164,600
	>65dB Lden	42,300	65-70 dB Lden	41,300
	>70dB Lden	1,000	70-75 dB Lden	1,000
	>75dB Lden	0	>75 dB Lden	0

Table 6. Aircraft noise exposure around Heathrow for NWR, Minimise Total, 2050

	Noise contour	Cumulative total number of people exposed	Contour band	Numbers of people living within contour bands
Day	>54 dB LAeq, 16h	491,000	54-57dB LAeq, 16h	349,500
	>57 dB LAeq, 16h	249,300	57-60 dB LAeq, 16h	141,500
	>60 dB LAeq, 16h	140,600	60-63 dB LAeq, 16h	107,800
	>63 dB LAeq, 16h	42,900	63-66 dB LAeq, 16h	32,800
	>66 dB LAeq, 16h	10,900	66-69 dB LAeq, 16h	10,100
	>69 dB LAeq, 16h	800	69-72 dB LAeq, 16h	800
	>72 dB LAeq, 16h	0	>72 dB LAeq, 16h	0
Night	>48 dB LAeq, 8h	295,800	48-51 dB LAeq, 8h	187,400
	>51 dB LAeq, 8h	185,600	51-54 dB LAeq, 8h	108,400
	>54 dB LAeq, 8h	88,600	54-57 dB LAeq, 8h	77,200
	>57 dB LAeq, 8h	12,100	57-60 dB LAeq, 8h	11,400
	>60 dB LAeq, 8h	900	60-63 dB LAeq, 8h	700
	>63 dB LAeq, 8h	200	63-66 dB LAeq, 8h	200
	>66 dB LAeq, 8h	0	66-69 dB LAeq, 8h	0
	>69 dB LAeq, 8h	0	69-72 dB LAeq, 8h	0
	>72 dB LAeq, 8h	0	>72 dB LAeq, 8h	0
24-hour	>55dB Lden	637,700	55-60 dB Lden	473,600
	>60dB Lden	205,700	60-65 dB Lden	164,100
	>65dB Lden	42,600	65-70 dB Lden	41,600
	>70dB Lden	1,000	70-75 dB Lden	1,000
	>75dB Lden	0	>75 dB Lden	0

Tables 7-22 below outline the cost for each impact and assessment year.

Table 7. Sleep disturbance - 2030

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
Lnight	48-51 dB L _{Aeq} ,8h	162,100	£378.06	£61,283,526
	51-54 dB L _{Aeq} ,8h	110,500	£487.29	£53,845,545
	54-57 dB L _{Aeq} ,8h	62,500	£607.72	£37,982,500
	57-60 dB L _{Aeq} ,8h	10,900	£773.27	£8,428,643
	60-63 dB L _{Aeq} ,8h	700	£897.43	£628,201
	63-66 dB L _{Aeq} ,8h	200	£1,021.59	£204,318
	66-69 dB L _{Aeq} ,8h	0	£1,187.14	£0
	69-72 dB L _{Aeq} ,8h	0	£1,228.53	£0
	>72 dB L _{Aeq} ,8h	0	£1,228.53	£0
			Total cost	£162,372,733

Table 8. Sleep disturbance - 2040

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
Lnight	48-51 dB L _{Aeq} ,8h	200,400	£378.06	£75,763,224
	51-54 dB L _{Aeq} ,8h	108,500	£487.29	£52,870,965
	54-57 dB L _{Aeq} ,8h	82,100	£607.72	£49,893,812
	57-60 dB L _{Aeq} ,8h	16,100	£773.27	£12,449,647
	60-63 dB L _{Aeq} ,8h	2,200	£897.43	£1,974,346
	63-66 dB L _{Aeq} ,8h	200	£1,021.59	£204,318
	66-69 dB L _{Aeq} ,8h	0	£1,187.14	£0
	69-72 dB L _{Aeq} ,8h	0	£1,228.53	£0
	>72 dB L _{Aeq} ,8h	0	£1,228.53	£0
			Total cost	£193,156,312

Table 9. Sleep disturbance - 2050

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
Lnight	48-51 dB L _{Aeq,8h}	187,400	£378.06	£70,848,444
	51-54 dB L _{Aeq,8h}	108,400	£487.29	£52,822,236
	54-57 dB L _{Aeq,8h}	77,200	£607.72	£46,915,984
	57-60 dB L _{Aeq,8h}	11,400	£773.27	£8,815,278
	60-63 dB L _{Aeq,8h}	700	£897.43	£628,201
	63-66 dB L _{Aeq,8h}	200	£1,021.59	£204,318
	66-69 dB L _{Aeq,8h}	0	£1,187.14	£0
	69-72 dB L _{Aeq,8h}	0	£1,228.53	£0
	>72 dB L _{Aeq,8h}	0	£1,228.53	£0
			Total cost	£180,234,461

Table 10. Annoyance, 2030

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
24-hour	55-60 dB L _{den}	326,350	£157.90	£51,530,665
	60-65 dB L _{den}	156,450	£279.41	£43,713,695
	65-70 dB L _{den}	34,950	£402.67	£14,073,317
	70-75 dB L _{den}	850	£575.75	£489,388
	>75 dB L _{den}	50	£638.60	£31,930
			Total cost	£109,838,994

Table 11. Annoyance, 2040

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
24-hour	55-60 dB L _{den}	350,600	£157.90	£55,359,740
	60-65 dB L _{den}	164,600	£279.41	£45,990,886
	65-70 dB L _{den}	41,300	£402.67	£16,630,271
	70-75 dB L _{den}	1,000	£575.75	£575,750
	>75 dB L _{den}	0	£638.60	£0
			Total cost	£118,556,647

Table 12. Annoyance, 2050

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
24-hour	55-60 dB L _{den}	473,600	£157.90	£74,781,440
	60-65 dB L _{den}	164,100	£279.41	£45,851,181
	65-70 dB L _{den}	41,600	£402.67	£16,751,072
	70-75 dB L _{den}	1,000	£575.75	£575,750
	>75 dB L _{den}	0	£638.60	£0
			Total cost	£137,959,443

Table 13. Direct AMI (heart attack), 2030

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
Day	54-57dB L _{Aeq} , 16h	309,600	£1.33	£411,768
	57-60 dB L _{Aeq} , 16h	131,300	£8.43	£1,106,859
	60-63 dB L _{Aeq} , 16h	103,500	£21.54	£2,229,390
	63-66 dB L _{Aeq} , 16h	27,600	£41.20	£1,137,120
	66-69 dB L _{Aeq} , 16h	11,000	£67.95	£747,450
	69-72 dB L _{Aeq} , 16h	900	£102.34	£92,106
	>72 dB L _{Aeq} , 16h	0	£129.77	£0
			Total Cost	£5,724,693

Table 14. Direct AMI (heart attack), 2040

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
Day	54-57dB L _{Aeq} , 16h	322,600	£1.33	£429,058
	57-60 dB L _{Aeq} , 16h	133,100	£8.43	£1,122,033
	60-63 dB L _{Aeq} , 16h	110,100	£21.54	£2,371,554
	63-66 dB L _{Aeq} , 16h	31,100	£41.20	£1,281,320
	66-69 dB L _{Aeq} , 16h	11,000	£67.95	£747,450
	69-72 dB L _{Aeq} , 16h	900	£102.34	£92,106
	>72 dB L _{Aeq} , 16h	0	£129.77	£0
			Total Cost	£6,043,521

Table 15. Direct AMI (heart attack), 2050

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
Day	54-57dB L _{Aeq} , 16h	349,500	£1.33	£464,835
	57-60 dB L _{Aeq} , 16h	141,500	£8.43	£1,192,845
	60-63 dB L _{Aeq} , 16h	107,800	£21.54	£2,322,012
	63-66 dB L _{Aeq} , 16h	32,800	£41.20	£1,351,360
	66-69 dB L _{Aeq} , 16h	10,100	£67.95	£686,295
	69-72 dB L _{Aeq} , 16h	800	£102.34	£81,872
	>72 dB L _{Aeq} , 16h	0	£129.77	£0
			Total Cost	£6,099,219

Table 16. Hypertensive Stroke, 2030

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
24-hour	55-60 dB L _{den}	326,350	£20.08	£6,553,108
	60-65 dB L _{den}	156,450	£31.62	£4,946,949
	65-70 dB L _{den}	34,950	£43.45	£1,518,578
	70-75 dB L _{den}	850	£55.58	£47,243
	>75 dB L _{den}	50	£55.58	£2,779
			Total cost	£13,068,657

Table 17. Hypertensive Stroke, 2040

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
24-hour	55-60 dB L _{den}	350,600	£20.08	£7,040,048
	60-65 dB L _{den}	164,600	£31.62	£5,204,652
	65-70 dB L _{den}	41,300	£43.45	£1,794,485
	70-75 dB L _{den}	1,000	£55.58	£55,580
	>75 dB L _{den}	0	£55.58	£0
			Total cost	£14,094,765

Table 18. Hypertensive Stroke, 2050

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
24-hour	55-60 dB L _{den}	473,600	£20.08	£9,509,888
	60-65 dB L _{den}	164,100	£31.62	£5,188,842
	65-70 dB L _{den}	41,600	£43.45	£1,807,520
	70-75 dB L _{den}	1,000	£55.58	£55,580
	>75 dB L _{den}	0	£55.58	£0
			Total cost	£16,561,830

Table 19. Hypertensive Dementia, 2030

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
24-hour	55-60 dB L _{den}	326,350	£20.08	£9,885,142
	60-65 dB L _{den}	156,450	£31.62	£7,448,585
	65-70 dB L _{den}	34,950	£43.45	£2,281,886
	70-75 dB L _{den}	850	£55.58	£70,839
	>75 dB L _{den}	50	£55.58	£4,533
			Total cost	£19,690,984

Table 20. Hypertensive Dementia, 2040

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
24-hour	55-60 dB L _{den}	350,600	£20.08	£10,619,674
	60-65 dB L _{den}	164,600	£31.62	£7,836,606
	65-70 dB L _{den}	41,300	£43.45	£2,696,477
	70-75 dB L _{den}	1,000	£55.58	£83,340
	>75 dB L _{den}	0	£55.58	£0
			Total cost	£21,236,097

Table 21. Hypertensive Dementia, 2050

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
24-hour	55-60 dB L _{den}	473,600	£20.08	£14,345,344
	60-65 dB L _{den}	164,100	£31.62	£7,812,801
	65-70 dB L _{den}	41,600	£43.45	£2,716,064
	70-75 dB L _{den}	1,000	£55.58	£83,340
	>75 dB L _{den}	0	£55.58	£0
			Total cost	£24,957,549

Calculation of monetised aircraft noise related health costs using the WebTAG methodology around Heathrow for Minimise Newly Affected

The following calculations were based on data from the North West Runway Minimise Newly Affected scenario.

Table 22. Aircraft noise exposure around Heathrow for NWR, Minimise Newly Affected, 2030

	Noise contour	Cumulative total number of people exposed	Contour band	Numbers of people living within contour bands
Day	>54 dB LAeq, 16h	566,300	54-57dB LAeq, 16h	423,200
	>57 dB LAeq, 16h	248,800	57-60 dB LAeq, 16h	143,100
	>60 dB LAeq, 16h	133,400	60-63 dB LAeq, 16h	105,700
	>63 dB LAeq, 16h	38,400	63-66 dB LAeq, 16h	27,700
	>66 dB LAeq, 16h	11,600	66-69 dB LAeq, 16h	10,700
	>69 dB LAeq, 16h	900	69-72 dB LAeq, 16h	900
	>72 dB LAeq, 16h	0	>72 dB LAeq, 16h	0
Night	>48 dB LAeq, 8h	313,000	48-51 dB LAeq, 8h	197,900
	>51 dB LAeq, 8h	177,800	51-54 dB LAeq, 8h	115,100
	>54 dB LAeq, 8h	73,500	54-57 dB LAeq, 8h	62,700
	>57 dB LAeq, 8h	11,500	57-60 dB LAeq, 8h	10,800
	>60 dB LAeq, 8h	900	60-63 dB LAeq, 8h	700
	>63 dB LAeq, 8h	200	63-66 dB LAeq, 8h	200
	>66 dB LAeq, 8h	0	66-69 dB LAeq, 8h	0
	>69 dB LAeq, 8h	0	69-72 dB LAeq, 8h	0
	>72 dB LAeq, 8h	0	>72 dB LAeq, 8h	0
24-hour	>55dB Lden	641,500	55-60 dB Lden	484,400
	>60dB Lden	191,600	60-65 dB Lden	157,100
	>65dB Lden	35,400	65-70 dB Lden	34,500
	>70dB Lden	900	70-75 dB Lden	900
	>75dB Lden	0	>75 dB Lden	0

Table 23. Aircraft noise exposure around Heathrow for NWR, Minimise Newly Affected, 2040

	Noise contour	Cumulative total number of people exposed	Contour band	Numbers of people living within contour bands
Day	>54 dB LAeq, 16h	593,900	54-57dB LAeq, 16h	446,900
	>57 dB LAeq, 16h	261,600	57-60 dB LAeq, 16h	147,000
	>60 dB LAeq, 16h	144,300	60-63 dB LAeq, 16h	114,600
	>63 dB LAeq, 16h	40,800	63-66 dB LAeq, 16h	29,700
	>66 dB LAeq, 16h	12,000	66-69 dB LAeq, 16h	11,100
	>69 dB LAeq, 16h	900	69-72 dB LAeq, 16h	900
	>72 dB LAeq, 16h	0	>72 dB LAeq, 16h	0
Night	>48 dB LAeq, 8h	385,300	48-51 dB LAeq, 8h	260,100
	>51 dB LAeq, 8h	208,700	51-54 dB LAeq, 8h	125,200
	>54 dB LAeq, 8h	99,800	54-57 dB LAeq, 8h	83,500
	>57 dB LAeq, 8h	18,500	57-60 dB LAeq, 8h	16,300
	>60 dB LAeq, 8h	2,400	60-63 dB LAeq, 8h	2,200
	>63 dB LAeq, 8h	200	63-66 dB LAeq, 8h	200
	>66 dB LAeq, 8h	0	66-69 dB LAeq, 8h	0
	>69 dB LAeq, 8h	0	69-72 dB LAeq, 8h	0
	>72 dB LAeq, 8h	0	>72 dB LAeq, 8h	0
24-hour	>55dB Lden	702,500	55-60 dB Lden	532,800
	>60dB Lden	209,800	60-65 dB Lden	169,700
	>65dB Lden	41,100	65-70 dB Lden	40,100
	>70dB Lden	1,000	70-75 dB Lden	1,000
	>75dB Lden	0	>75 dB Lden	0

Table 24. Aircraft noise exposure around Heathrow for NWR, Minimise Newly Affected, 2050

	Noise contour	Cumulative total number of people exposed	Contour band	Numbers of people living within contour bands
Day	>54 dB LAeq, 16h	594,300	54-57dB LAeq, 16h	445,800
	>57 dB LAeq, 16h	264,200	57-60 dB LAeq, 16h	148,500
	>60 dB LAeq, 16h	148,300	60-63 dB LAeq, 16h	115,700
	>63 dB LAeq, 16h	42,800	63-66 dB LAeq, 16h	32,600
	>66 dB LAeq, 16h	11,000	66-69 dB LAeq, 16h	10,200
	>69 dB LAeq, 16h	800	69-72 dB LAeq, 16h	800
	>72 dB LAeq, 16h	0	>72 dB LAeq, 16h	0
Night	>48 dB LAeq, 8h	373,000	48-51 dB LAeq, 8h	248,800
	>51 dB LAeq, 8h	204,900	51-54 dB LAeq, 8h	124,200
	>54 dB LAeq, 8h	92,300	54-57 dB LAeq, 8h	80,700
	>57 dB LAeq, 8h	12,300	57-60 dB LAeq, 8h	11,600
	>60 dB LAeq, 8h	900	60-63 dB LAeq, 8h	700
	>63 dB LAeq, 8h	200	63-66 dB LAeq, 8h	200
	>66 dB LAeq, 8h	0	66-69 dB LAeq, 8h	0
	>69 dB LAeq, 8h	0	69-72 dB LAeq, 8h	0
	>72 dB LAeq, 8h	0	>72 dB LAeq, 8h	0
24-hour	>55dB Lden	726,600	55-60 dB Lden	550,000
	>60dB Lden	218,300	60-65 dB Lden	176,600
	>65dB Lden	42,700	65-70 dB Lden	41,700
	>70dB Lden	1,000	70-75 dB Lden	1,000
	>75dB Lden	0	>75 dB Lden	0

Tables 25-39 below outline the cost for each impact and each assessment year

Table 25. Sleep disturbance - 2030

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
Lnight	48-51 dB L _{Aeq,8h}	197,900	£378.06	£74,818,074
	51-54 dB L _{Aeq,8h}	115,100	£487.29	£56,087,079
	54-57 dB L _{Aeq,8h}	62,700	£607.72	£38,104,044
	57-60 dB L _{Aeq,8h}	10,800	£773.27	£8,351,316
	60-63 dB L _{Aeq,8h}	700	£897.43	£628,201
	63-66 dB L _{Aeq,8h}	200	£1,021.59	£204,318
	66-69 dB L _{Aeq,8h}	0	£1,187.14	£0
	69-72 dB L _{Aeq,8h}	0	£1,228.53	£0
	>72 dB L _{Aeq,8h}	0	£1,228.53	£0
			Total cost	£178,193,032

Table 26. Sleep disturbance - 2040

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
Lnight	48-51 dB L _{Aeq,8h}	260,100	£378.06	£98,333,406
	51-54 dB L _{Aeq,8h}	125,200	£487.29	£61,008,708
	54-57 dB L _{Aeq,8h}	83,500	£607.72	£50,744,620
	57-60 dB L _{Aeq,8h}	16,300	£773.27	£12,604,301
	60-63 dB L _{Aeq,8h}	2,200	£897.43	£1,974,346
	63-66 dB L _{Aeq,8h}	200	£1,021.59	£204,318
	66-69 dB L _{Aeq,8h}	0	£1,187.14	£0
	69-72 dB L _{Aeq,8h}	0	£1,228.53	£0
	>72 dB L _{Aeq,8h}	0	£1,228.53	£0
			Total cost	£224,869,699

Table 27. Sleep disturbance - 2050

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
Lnight	48-51 dB L _{Aeq,8h}	248,800	£378.06	£94,061,328
	51-54 dB L _{Aeq,8h}	124,200	£487.29	£60,521,418
	54-57 dB L _{Aeq,8h}	80,700	£607.72	£49,043,004
	57-60 dB L _{Aeq,8h}	11,600	£773.27	£8,969,932
	60-63 dB L _{Aeq,8h}	700	£897.43	£628,201
	63-66 dB L _{Aeq,8h}	200	£1,021.59	£204,318
	66-69 dB L _{Aeq,8h}	0	£1,187.14	£0
	69-72 dB L _{Aeq,8h}	0	£1,228.53	£0
	>72 dB L _{Aeq,8h}	0	£1,228.53	£0
			Total cost	£213,428,201

Table 28. Annoyance, 2030

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
24-hour	55-60 dB L _{den}	484,400	£157.90	£76,486,760
	60-65 dB L _{den}	157,100	£279.41	£43,895,311
	65-70 dB L _{den}	34,500	£402.67	£13,892,115
	70-75 dB L _{den}	900	£575.75	£518,175
	>75 dB L _{den}	0	£638.60	£0
			Total cost	£134,792,361

Table 29. Annoyance, 2040

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
24-hour	55-60 dB L _{den}	532,800	£157.90	£84,129,120
	60-65 dB L _{den}	169,700	£279.41	£47,415,877
	65-70 dB L _{den}	40,100	£402.67	£16,147,067
	70-75 dB L _{den}	1,000	£575.75	£575,750
	>75 dB L _{den}	0	£638.60	£0
			Total cost	£148,267,814

Table 30. Annoyance, 2050

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
24-hour	55-60 dB L _{den}	550,000	£157.90	£86,845,000
	60-65 dB L _{den}	176,600	£279.41	£49,343,806
	65-70 dB L _{den}	41,700	£402.67	£16,791,339
	70-75 dB L _{den}	1,000	£575.75	£575,750
	>75 dB L _{den}	0	£638.60	£0
			Total cost	£153,555,895

Table 31. Direct AMI (heart attack), 2030

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
Day	54-57dB L _{Aeq, 16h}	423,200	£1.33	£562,856
	57-60 dB L _{Aeq, 16h}	143,100	£8.43	£1,206,333
	60-63 dB L _{Aeq, 16h}	105,700	£21.54	£2,276,778
	63-66 dB L _{Aeq, 16h}	27,700	£41.20	£1,141,240
	66-69 dB L _{Aeq, 16h}	10,700	£67.95	£727,065
	69-72 dB L _{Aeq, 16h}	900	£102.34	£92,106
	>72 dB L _{Aeq, 16h}	0	£129.77	£0
			Total Cost	£6,006,378

Table 32. Direct AMI (heart attack), 2040

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
Day	54-57dB L _{Aeq} , 16h	446,900	£1.33	£594,377
	57-60 dB L _{Aeq} , 16h	147,000	£8.43	£1,239,210
	60-63 dB L _{Aeq} , 16h	114,600	£21.54	£2,468,484
	63-66 dB L _{Aeq} , 16h	29,700	£41.20	£1,223,640
	66-69 dB L _{Aeq} , 16h	11,100	£67.95	£754,245
	69-72 dB L _{Aeq} , 16h	900	£102.34	£92,106
	>72 dB L _{Aeq} , 16h	0	£129.77	£0
			Total Cost	£6,372,062

Table 33. Direct AMI (heart attack), 2050

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
Day	54-57dB L _{Aeq} , 16h	445,800	£1.33	£592,914
	57-60 dB L _{Aeq} , 16h	148,500	£8.43	£1,251,855
	60-63 dB L _{Aeq} , 16h	115,700	£21.54	£2,492,178
	63-66 dB L _{Aeq} , 16h	32,600	£41.20	£1,343,120
	66-69 dB L _{Aeq} , 16h	10,200	£67.95	£693,090
	69-72 dB L _{Aeq} , 16h	800	£102.34	£81,872
	>72 dB L _{Aeq} , 16h	0	£129.77	£0
			Total Cost	£6,455,029

Table 34. Hypertensive Stroke, 2030

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
24-hour	55-60 dB L _{den}	484,400	£20.08	£9,726,752
	60-65 dB L _{den}	157,100	£31.62	£4,967,502
	65-70 dB L _{den}	34,500	£43.45	£1,499,025
	70-75 dB L _{den}	900	£55.58	£50,022
	>75 dB L _{den}	0	£55.58	£0
			Total cost	£16,243,301

Table 35. Hypertensive Stroke, 2040

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
24-hour	55-60 dB L _{den}	532,800	£20.08	£10,698,624
	60-65 dB L _{den}	169,700	£31.62	£5,365,914
	65-70 dB L _{den}	40,100	£43.45	£1,742,345
	70-75 dB L _{den}	1,000	£55.58	£55,580
	>75 dB L _{den}	0	£55.58	£0
			Total cost	£17,862,463

Table 36. Hypertensive Stroke, 2050

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
24-hour	55-60 dB L _{den}	550,000	£20.08	£11,044,000
	60-65 dB L _{den}	176,600	£31.62	£5,584,092
	65-70 dB L _{den}	41,700	£43.45	£1,811,865
	70-75 dB L _{den}	1,000	£55.58	£55,580
	>75 dB L _{den}	0	£55.58	£0
			Total cost	£18,495,537

Table 37. Hypertensive Dementia, 2030

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
24-hour	55-60 dB L _{den}	484,400	£20.08	£14,672,476
	60-65 dB L _{den}	157,100	£31.62	£7,479,531
	65-70 dB L _{den}	34,500	£43.45	£2,252,505
	70-75 dB L _{den}	900	£55.58	£75,006
	>75 dB L _{den}	0	£55.58	£0
			Total cost	£24,479,518

Table 38. Hypertensive Dementia, 2040

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
24-hour	55-60 dB L _{den}	532,800	£20.08	£16,138,512
	60-65 dB L _{den}	169,700	£31.62	£8,079,417
	65-70 dB L _{den}	40,100	£43.45	£2,618,129
	70-75 dB L _{den}	1,000	£55.58	£83,340
	>75 dB L _{den}	0	£55.58	£0
			Total cost	£26,919,398

Table 39. Hypertensive Dementia, 2050

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
24-hour	55-60 dB L _{den}	550,000	£20.08	£16,659,500
	60-65 dB L _{den}	176,600	£31.62	£8,407,926
	65-70 dB L _{den}	41,700	£43.45	£2,722,593
	70-75 dB L _{den}	1,000	£55.58	£83,340
	>75 dB L _{den}	0	£55.58	£0
			Total cost	£27,873,359

Calculation of monetised aircraft noise related health costs using the WebTAG methodology around Heathrow for Respite

The following calculations were based on data from the North West Runway Respite scenario.

Table 40. Aircraft noise exposure around Heathrow for NWR, Minimise Newly Affected, 2030

	Noise contour	Cumulative total number of people exposed	Contour band	Numbers of people living within contour bands
Day	>54 dB LAeq, 16h	440,900	54-57dB LAeq, 16h	309,600
	>57 dB LAeq, 16h	234,800	57-60 dB LAeq, 16h	131,300
	>60 dB LAeq, 16h	131,100	60-63 dB LAeq, 16h	103,500
	>63 dB LAeq, 16h	38,600	63-66 dB LAeq, 16h	27,600
	>66 dB LAeq, 16h	11,900	66-69 dB LAeq, 16h	11,000
	>69 dB LAeq, 16h	900	69-72 dB LAeq, 16h	900
	>72 dB LAeq, 16h	0	>72 dB LAeq, 16h	0
Night	>48 dB LAeq, 8h	272,600	48-51 dB LAeq, 8h	162,100
	>51 dB LAeq, 8h	173,000	51-54 dB LAeq, 8h	110,500
	>54 dB LAeq, 8h	73,400	54-57 dB LAeq, 8h	62,500
	>57 dB LAeq, 8h	11,600	57-60 dB LAeq, 8h	10,900
	>60 dB LAeq, 8h	900	60-63 dB LAeq, 8h	700
	>63 dB LAeq, 8h	200	63-66 dB LAeq, 8h	200
	>66 dB LAeq, 8h	0	66-69 dB LAeq, 8h	0
	>69 dB LAeq, 8h	0	69-72 dB LAeq, 8h	0
	>72 dB LAeq, 8h	0	>72 dB LAeq, 8h	0
24-hour	>55dB Lden	482,800	55-60 dB Lden	326,300
	>60dB Lden	191,400	60-65 dB Lden	156,500
	>65dB Lden	35,800	65-70 dB Lden	34,900
	>70dB Lden	900	70-75 dB Lden	900
	>75dB Lden	0	>75 dB Lden	0

Table 41. Aircraft noise exposure around Heathrow for NWR, Minimise Newly Affected, 2040

	Noise contour	Cumulative total number of people exposed	Contour band	Numbers of people living within contour bands
Day	>54 dB L _{Aeq} , 16h	455,700	54-57dB L _{Aeq} , 16h	322,600
	>57 dB L _{Aeq} , 16h	243,200	57-60 dB L _{Aeq} , 16h	133,100
	>60 dB L _{Aeq} , 16h	141,200	60-63 dB L _{Aeq} , 16h	110,100
	>63 dB L _{Aeq} , 16h	42,100	63-66 dB L _{Aeq} , 16h	31,100
	>66 dB L _{Aeq} , 16h	11,900	66-69 dB L _{Aeq} , 16h	11,000
	>69 dB L _{Aeq} , 16h	900	69-72 dB L _{Aeq} , 16h	900
	>72 dB L _{Aeq} , 16h	0	>72 dB L _{Aeq} , 16h	0
Night	>48 dB L _{Aeq} , 8h	308,900	48-51 dB L _{Aeq} , 8h	199,400
	>51 dB L _{Aeq} , 8h	190,600	51-54 dB L _{Aeq} , 8h	109,500
	>54 dB L _{Aeq} , 8h	97,200	54-57 dB L _{Aeq} , 8h	81,100
	>57 dB L _{Aeq} , 8h	18,300	57-60 dB L _{Aeq} , 8h	16,100
	>60 dB L _{Aeq} , 8h	2,400	60-63 dB L _{Aeq} , 8h	2,200
	>63 dB L _{Aeq} , 8h	200	63-66 dB L _{Aeq} , 8h	200
	>66 dB L _{Aeq} , 8h	0	66-69 dB L _{Aeq} , 8h	0
	>69 dB L _{Aeq} , 8h	0	69-72 dB L _{Aeq} , 8h	0
	>72 dB L _{Aeq} , 8h	0	>72 dB L _{Aeq} , 8h	0
24-hour	>55dB L _{den}	515,200	55-60 dB L _{den}	350,600
	>60dB L _{den}	205,900	60-65 dB L _{den}	164,600
	>65dB L _{den}	42,300	65-70 dB L _{den}	41,300
	>70dB L _{den}	1,000	70-75 dB L _{den}	1,000
	>75dB L _{den}	0	>75 dB L _{den}	0

Table 42. Aircraft noise exposure around Heathrow for NWR, Minimise Newly Affected, 2050

	Noise contour	Cumulative total number of people exposed	Contour band	Numbers of people living within contour bands
Day	>54 dB L _{Aeq} , 16h	454,700	54-57dB L _{Aeq} , 16h	325,400
	>57 dB L _{Aeq} , 16h	242,200	57-60 dB L _{Aeq} , 16h	129,300
	>60 dB L _{Aeq} , 16h	145,800	60-63 dB L _{Aeq} , 16h	112,900
	>63 dB L _{Aeq} , 16h	43,300	63-66 dB L _{Aeq} , 16h	32,900
	>66 dB L _{Aeq} , 16h	11,200	66-69 dB L _{Aeq} , 16h	10,400
	>69 dB L _{Aeq} , 16h	800	69-72 dB L _{Aeq} , 16h	800
	>72 dB L _{Aeq} , 16h	0	>72 dB L _{Aeq} , 16h	0
Night	>48 dB L _{Aeq} , 8h	297,400	48-51 dB L _{Aeq} , 8h	185,700
	>51 dB L _{Aeq} , 8h	189,600	51-54 dB L _{Aeq} , 8h	111,700
	>54 dB L _{Aeq} , 8h	89,700	54-57 dB L _{Aeq} , 8h	77,900
	>57 dB L _{Aeq} , 8h	12,500	57-60 dB L _{Aeq} , 8h	11,800
	>60 dB L _{Aeq} , 8h	900	60-63 dB L _{Aeq} , 8h	700
	>63 dB L _{Aeq} , 8h	200	63-66 dB L _{Aeq} , 8h	200
	>66 dB L _{Aeq} , 8h	0	66-69 dB L _{Aeq} , 8h	0
	>69 dB L _{Aeq} , 8h	0	69-72 dB L _{Aeq} , 8h	0
	>72 dB L _{Aeq} , 8h	0	>72 dB L _{Aeq} , 8h	0
24-hour	>55dB L _{den}	516,700	55-60 dB L _{den}	348,700
	>60dB L _{den}	210,100	60-65 dB L _{den}	168,000
	>65dB L _{den}	43,100	65-70 dB L _{den}	42,100
	>70dB L _{den}	1,000	70-75 dB L _{den}	1,000
	>75dB L _{den}	0	>75 dB L _{den}	0

Tables 43-57 below outline the cost for each impact and each assessment year

Table 43. Sleep disturbance - 2030

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
Lnight	48-51 dB L _{Aeq} ,8h	162,100	£378.06	£61,283,526
	51-54 dB L _{Aeq} ,8h	110,500	£487.29	£53,845,545
	54-57 dB L _{Aeq} ,8h	62,500	£607.72	£37,982,500
	57-60 dB L _{Aeq} ,8h	10,900	£773.27	£8,428,643
	60-63 dB L _{Aeq} ,8h	700	£897.43	£628,201
	63-66 dB L _{Aeq} ,8h	200	£1,021.59	£204,318
	66-69 dB L _{Aeq} ,8h	0	£1,187.14	£0
	69-72 dB L _{Aeq} ,8h	0	£1,228.53	£0
	>72 dB L _{Aeq} ,8h	0	£1,228.53	£0
			Total cost	£162,372,733

Table 44. Sleep disturbance - 2040

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
Lnight	48-51 dB L _{Aeq} ,8h	199,400	£378.06	£75,385,164
	51-54 dB L _{Aeq} ,8h	109,500	£487.29	£53,358,255
	54-57 dB L _{Aeq} ,8h	81,100	£607.72	£49,286,092
	57-60 dB L _{Aeq} ,8h	16,100	£773.27	£12,449,647
	60-63 dB L _{Aeq} ,8h	2,200	£897.43	£1,974,346
	63-66 dB L _{Aeq} ,8h	200	£1,021.59	£204,318
	66-69 dB L _{Aeq} ,8h	0	£1,187.14	£0
	69-72 dB L _{Aeq} ,8h	0	£1,228.53	£0
	>72 dB L _{Aeq} ,8h	0	£1,228.53	£0
			Total cost	£192,657,822

Table 45. Sleep disturbance - 2050

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
Lnight	48-51 dB L _{Aeq,8h}	185,700	£378.06	£70,205,742
	51-54 dB L _{Aeq,8h}	111,700	£487.29	£54,430,293
	54-57 dB L _{Aeq,8h}	77,900	£607.72	£47,341,388
	57-60 dB L _{Aeq,8h}	11,800	£773.27	£9,124,586
	60-63 dB L _{Aeq,8h}	700	£897.43	£628,201
	63-66 dB L _{Aeq,8h}	200	£1,021.59	£204,318
	66-69 dB L _{Aeq,8h}	0	£1,187.14	£0
	69-72 dB L _{Aeq,8h}	0	£1,228.53	£0
	>72 dB L _{Aeq,8h}	0	£1,228.53	£0
			Total cost	£181,934,528

Table 46. Annoyance, 2030

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
24-hour	55-60 dB L _{den}	326,350	£157.90	£51,530,665
	60-65 dB L _{den}	156,450	£279.41	£43,713,695
	65-70 dB L _{den}	34,950	£402.67	£14,073,317
	70-75 dB L _{den}	850	£575.75	£489,388
	>75 dB L _{den}	50	£638.60	£31,930
			Total cost	£109,838,994

Table 47. Annoyance, 2040

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
24-hour	55-60 dB L _{den}	350,600	£157.90	£55,359,740
	60-65 dB L _{den}	164,600	£279.41	£45,990,886
	65-70 dB L _{den}	41,300	£402.67	£16,630,271
	70-75 dB L _{den}	1,000	£575.75	£575,750
	>75 dB L _{den}	0	£638.60	£0
			Total cost	£118,556,647

Table 48. Annoyance, 2050

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
24-hour	55-60 dB L _{den}	348,700	£157.90	£55,059,730
	60-65 dB L _{den}	168,000	£279.41	£46,940,880
	65-70 dB L _{den}	42,100	£402.67	£16,952,407
	70-75 dB L _{den}	1,000	£575.75	£575,750
	>75 dB L _{den}	0	£638.60	£0
			Total cost	£119,528,767

Table 49. Direct AMI (heart attack), 2030

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
Day	54-57dB L _{Aeq} , 16h	309,600	£1.33	£411,768
	57-60 dB L _{Aeq} , 16h	131,300	£8.43	£1,106,859
	60-63 dB L _{Aeq} , 16h	103,500	£21.54	£2,229,390
	63-66 dB L _{Aeq} , 16h	27,600	£41.20	£1,137,120
	66-69 dB L _{Aeq} , 16h	11,000	£67.95	£747,450
	69-72 dB L _{Aeq} , 16h	900	£102.34	£92,106
	>72 dB L _{Aeq} , 16h	0	£129.77	£0
			Total Cost	£5,724,693

Table 50. Direct AMI (heart attack), 2040

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
Day	54-57dB L _{Aeq} , 16h	322,600	£1.33	£429,058
	57-60 dB L _{Aeq} , 16h	133,100	£8.43	£1,122,033
	60-63 dB L _{Aeq} , 16h	110,100	£21.54	£2,371,554
	63-66 dB L _{Aeq} , 16h	31,100	£41.20	£1,281,320
	66-69 dB L _{Aeq} , 16h	11,000	£67.95	£747,450
	69-72 dB L _{Aeq} , 16h	900	£102.34	£92,106
	>72 dB L _{Aeq} , 16h	0	£129.77	£0
			Total Cost	£6,043,521

Table 51. Direct AMI (heart attack), 2050

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
Day	54-57dB L _{Aeq} , 16h	325,400	£1.33	£432,782
	57-60 dB L _{Aeq} , 16h	129,300	£8.43	£1,089,999
	60-63 dB L _{Aeq} , 16h	112,900	£21.54	£2,431,866
	63-66 dB L _{Aeq} , 16h	32,900	£41.20	£1,355,480
	66-69 dB L _{Aeq} , 16h	10,400	£67.95	£706,680
	69-72 dB L _{Aeq} , 16h	800	£102.34	£81,872
	>72 dB L _{Aeq} , 16h	0	£129.77	£0
			Total Cost	£6,098,679

Table 52. Hypertensive Stroke, 2030

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
24-hour	55-60 dB L _{den}	326,300	£20.08	£6,552,104
	60-65 dB L _{den}	156,500	£31.62	£4,948,530
	65-70 dB L _{den}	34,900	£43.45	£1,516,405
	70-75 dB L _{den}	900	£55.58	£50,022
	>75 dB L _{den}	0	£55.58	£0
			Total cost	£13,067,061

Table 53. Hypertensive Stroke, 2040

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
24-hour	55-60 dB L _{den}	350,600	£20.08	£7,040,048
	60-65 dB L _{den}	164,600	£31.62	£5,204,652
	65-70 dB L _{den}	41,300	£43.45	£1,794,485
	70-75 dB L _{den}	1,000	£55.58	£55,580
	>75 dB L _{den}	0	£55.58	£0
			Total cost	£14,094,765

Table 54. Hypertensive Stroke, 2050

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
24-hour	55-60 dB L _{den}	348,700	£20.08	£7,001,896
	60-65 dB L _{den}	168,000	£31.62	£5,312,160
	65-70 dB L _{den}	42,100	£43.45	£1,829,245
	70-75 dB L _{den}	1,000	£55.58	£55,580
	>75 dB L _{den}	0	£55.58	£0
			Total cost	£14,198,881

Table 55. Hypertensive Dementia, 2030

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
24-hour	55-60 dB L _{den}	326,300	£30.29	£9,883,627
	60-65 dB L _{den}	156,500	£47.61	£7,450,965
	65-70 dB L _{den}	34,900	£65.29	£2,278,621
	70-75 dB L _{den}	900	£83.34	£75,006
	>75 dB L _{den}	0	£90.66	£0
			Total cost	£19,688,219

Table 56. Hypertensive Dementia, 2040

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
24-hour	55-60 dB L _{den}	350,600	£30.29	£10,619,674
	60-65 dB L _{den}	164,600	£47.61	£7,836,606
	65-70 dB L _{den}	41,300	£65.29	£2,696,477
	70-75 dB L _{den}	1,000	£83.34	£83,340
	>75 dB L _{den}	0	£90.66	£0
			Total cost	£21,236,097

Table 57. Hypertensive Dementia, 2050

	Contour band	Number of people within contour band	Total cost per person for mid value in decibel band	Estimated cost
24-hour	55-60 dB L _{den}	348,700	£30.29	£10,562,123
	60-65 dB L _{den}	168,000	£47.61	£7,998,480
	65-70 dB L _{den}	42,100	£65.29	£2,748,709
	70-75 dB L _{den}	1,000	£83.34	£83,340
	>75 dB L _{den}	0	£90.66	£0
			Total cost	£21,392,652