

Recent experience introducing noise valuation into transport appraisal in the UK



6^{èmes} Assises nationales de la qualité de l'environnement sonore, Paris, 16 Décembre 2010

John Nellthorp



1. UK noise policy
2. Transport noise - appraisal at local level
3. Evidence on transport noise valuation
4. Implementation of noise values 2006-10
5. Noise and health - recent UK review and proposals

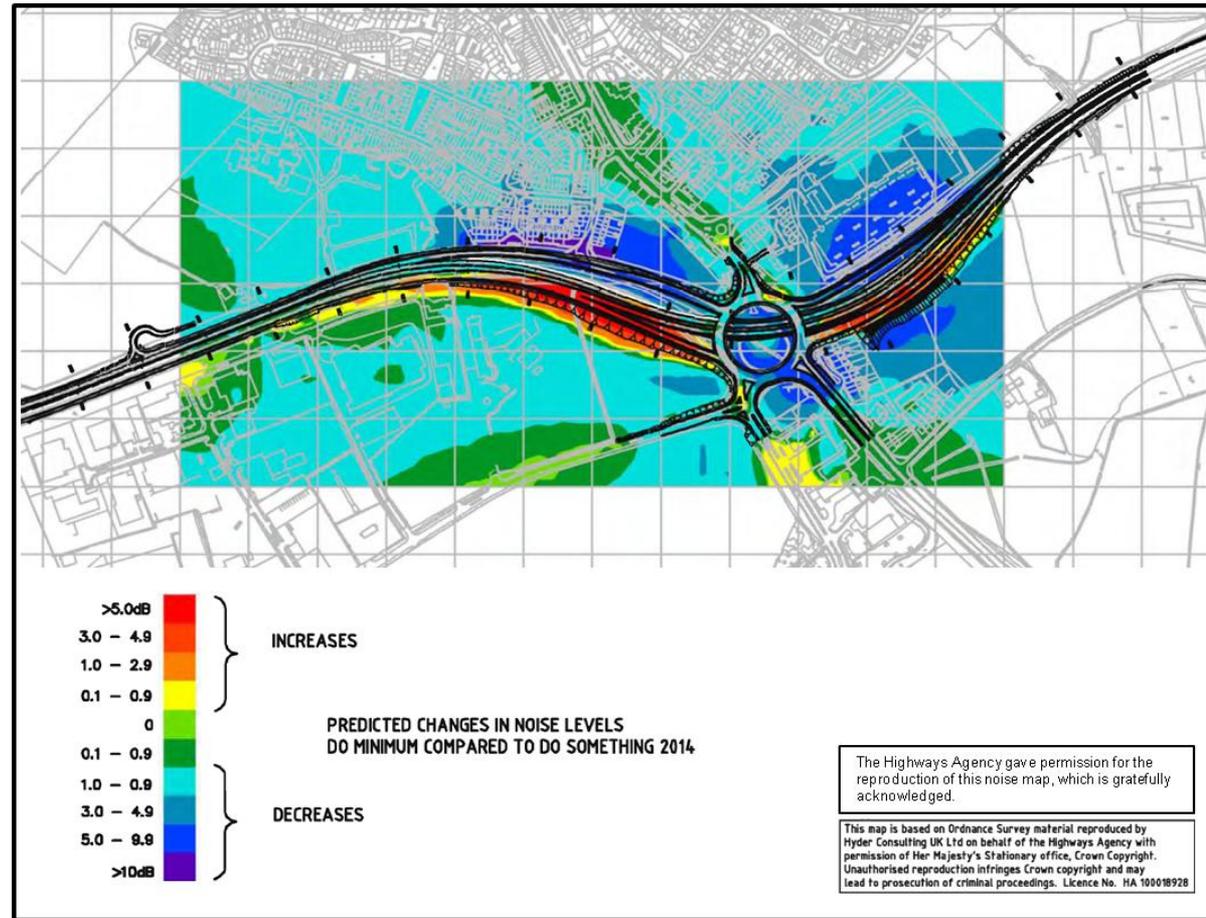
- Environmental Noise Directive (2002/49/EC)
 - Noise mapping, Noise Action Plans, Quiet Areas
- Historic principle:
 - “minimise noise ‘as far as reasonably practical’”
- Noise policy aims 2010 (England)
 - effective management and control of environmental noise, in order to improve health and quality of life
 - measure ‘willingness to pay’ for noise reduction

2. Transport noise appraisal at local level



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- Noise modelling techniques



applied to a 'major project' (cost >€12million)

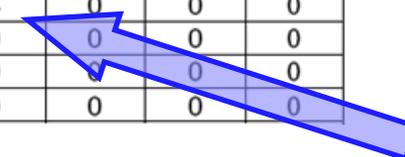


2. Transport noise appraisal at local level



- Modelled noise impact

Proposal Opening Year	2014													
Average Household Size	2.36													
Project (Road or Rail)	Road													
No. of households experiencing 'Do Minimum' & 'Do Something' noise levels (given in dB _{Leq}) in Opening Year														
Do-Minimum	Do-Something													
	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	>81
<45	155	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	52	303	24	0	0	0	0	0	0	0	0	0	0	0
48-50.9	3	144	813	53	0	0	0	0	0	0	0	0	0	0
51-53.9	0	0	320	539	70	0	0	0	0	0	0	0	0	0
54-56.9	0	0	0	180	658	62	0	0	0	0	0	0	0	0
57-59.9	0	0	0	6	55	397	63	0	0	0	0	0	0	0
60-62.9	0	0	0	0	12	43	219	14	0	0	0	0	0	0
63-65.9	0	0	0	0	0	10	16	186	11	0	0	0	0	0
66-68.9	0	0	0	0	0	0	0	15	209	13	0	0	0	0
69-71.9	0	0	0	0	0	0	9	20	11	30	3	0	0	0
72-74.9	0	0	0	0	0	0	0	0	0	1	4	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>81	0	0	0	0	0	0	0	0	0	0	0	0	0	0



2. Transport noise appraisal at local level



- Many households are in the range 45-55dB:

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57-59.9	0	0	0	6	55	397	63	0	0	0	0	0	0	0
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66-68.9	0	0	0	0	0	0	0	15	209	13	0	0	0	0
69-71.9	0	0	0	0	0	0	9	20	11	30	3	0	0	0
72-74.9	0	0	0	0	0	0	0	0	0	1	4	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>81	0	0	0	0	0	0	0	0	0	0	0	0	0	0

2,600 {

1,900 {

3. Transport noise valuation



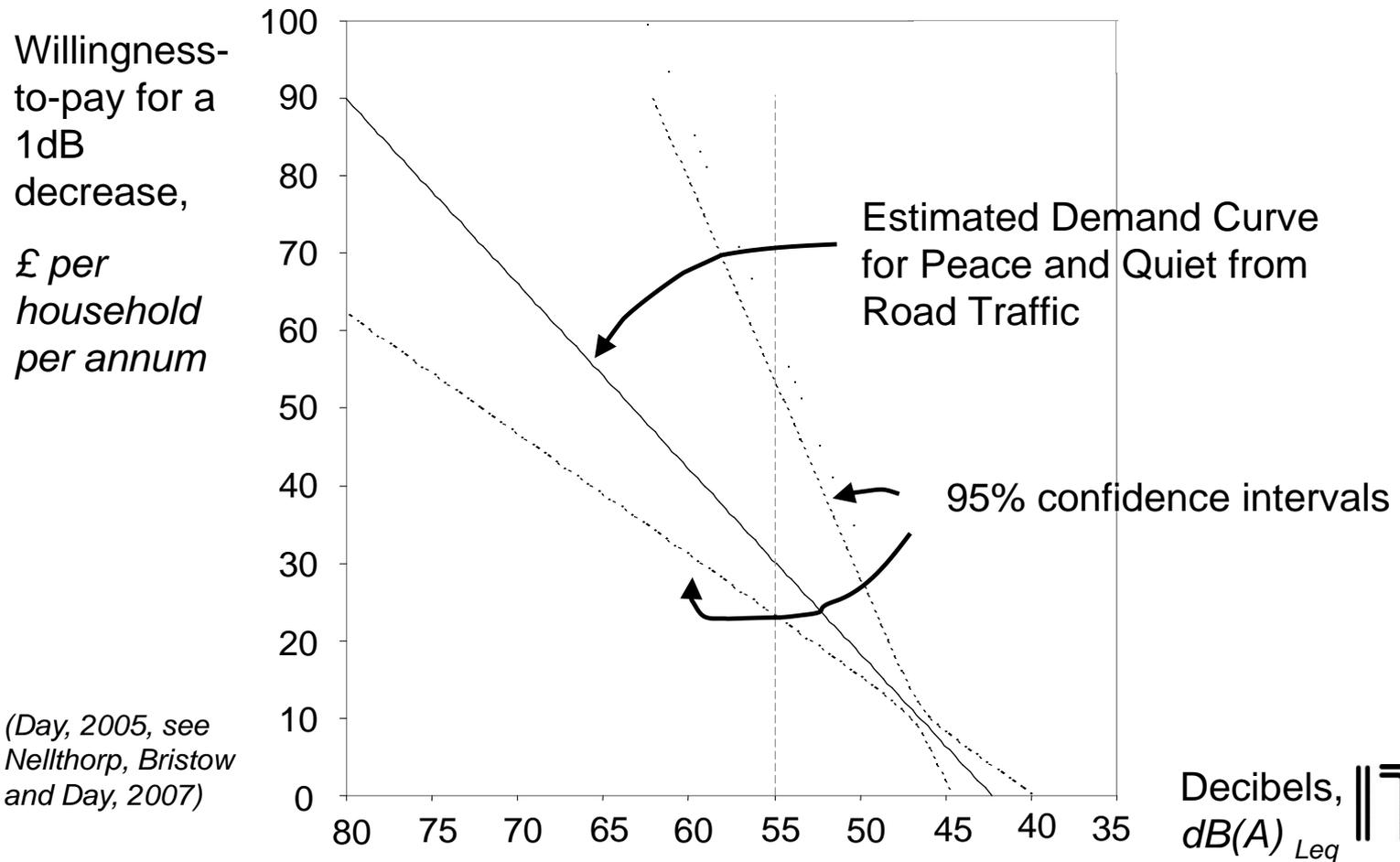
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- Citizens value peace and quiet at home
- UK introduced official values for noise reduction in 2006
- Based on 'willingness to pay' (WTP):
 - housing market study in Birmingham (10,000 transactions)
 - GIS model of façade noise
 - econometric model (Bateman, Day & Lake, 2004)
- Threshold for 'willingness-to-pay' (WTP) = 45dB (previously believed to be 55dB)

3. Transport noise valuation



- Hedonic Pricing study, Birmingham



3. Transport noise valuation



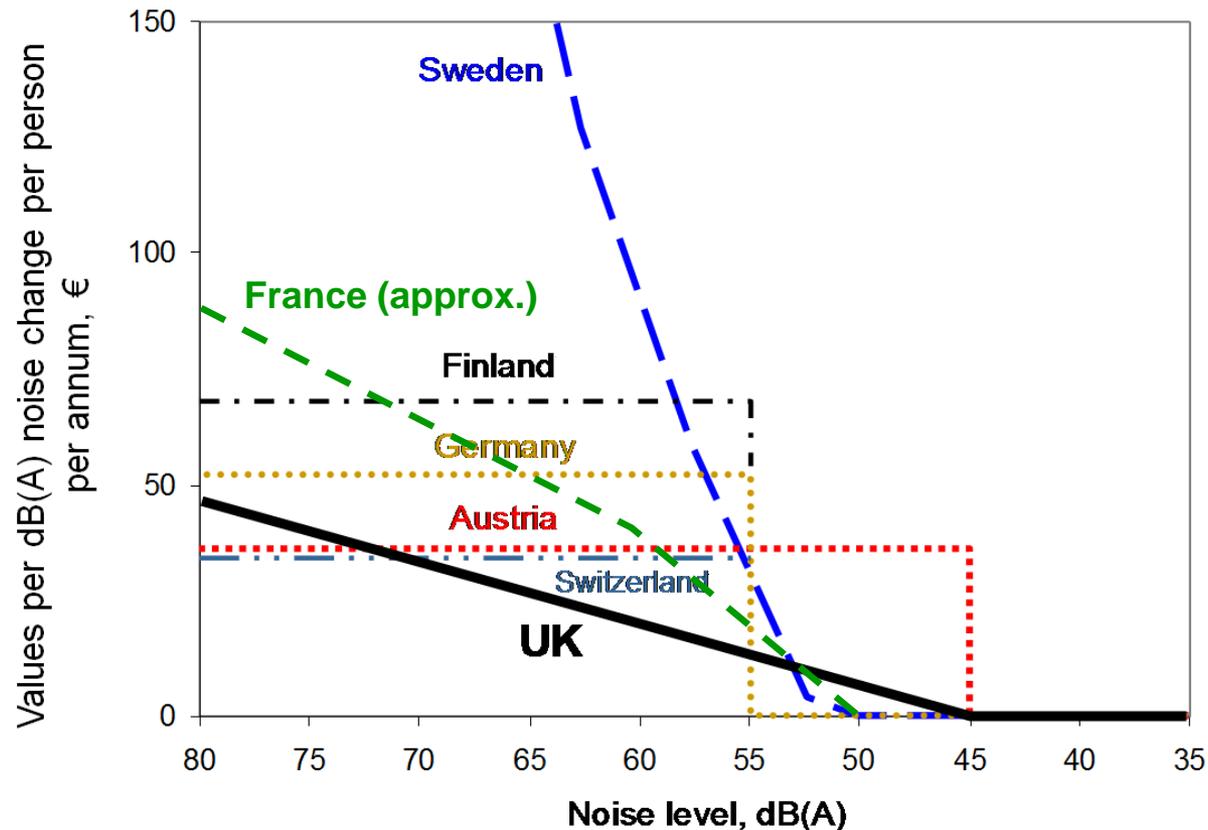
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- For use in appraisal and policy analysis, values transferred:
 - 1997 → 2002 onwards
 - Birmingham → rest of UK
 - private housing market → all citizens including social housing
 - see Nellthorp, Bristow and Day (2007) in *Transport Reviews*
- Values benchmarked against international evidence
 - see Nellthorp, Bristow and Day (2007)

3. Transport noise valuation



- UK values and European comparisons, 2002 € at PPP

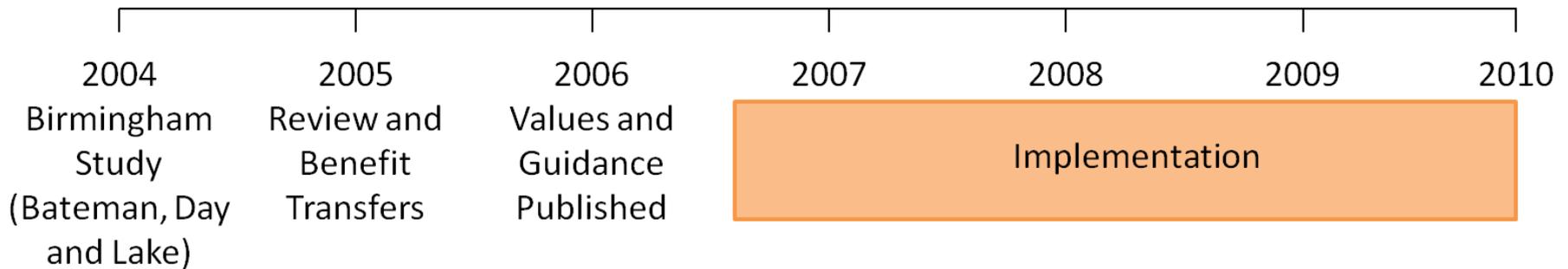


4. Implementation of noise values



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- **Timeline:**



- Values applied to: roads; railways; Local Transport Plans; urban transport policy

4. Implementation of noise values



- How influential is noise?

Present Value of Noise Benefits as % of project costs for roads

Project	Noise PVB, £million (a)	PVC to Public Accounts, £million (b)	(a)/(b)
1	4.5	124	3.6%
2	0.9	76.3	1.2%
3	0.3	75	0.4%
4	-1.2	300	0.4%
5	1.6	101	1.5%
6	4.3	161	2.7%
7	0.03	28	0.1%
8	1.31	89.4	1.5%

Source: Highways Agency

4. Implementation of noise values



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- Local transport: noise benefits found to be **small**, e.g. Hucknall Town Centre Improvement Scheme, $PVB(\text{noise}) = 2\%$ of project cost
- Rail: High Speed line to the North (HS2), **small** net benefit $< 1\%$ of project cost
- Transport policy analysis:
 - **large** total costs of road noise disamenity in English major cities, estimated at £3-5 billion per annum, in 2009 prices and values
 - similar to climate change costs
 - marginal utility of a 1dB reduction = £0.3 to £0.5 billion per annum.

4. Implementation of noise values



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- Issues: health impact?
 - is health impact \approx 15% of WTP (HEATCO, Swiss values vs. hedonic prices)?
 - or 50% of WTP (UK Strategy Unit)
 - lost productivity due sleep disturbance?
- Night time noise
- Non-residential noise
- Different sound spectrums – High Speed Rail, urban light railways, congested traffic

5.Noise and health - recent UK review and proposals



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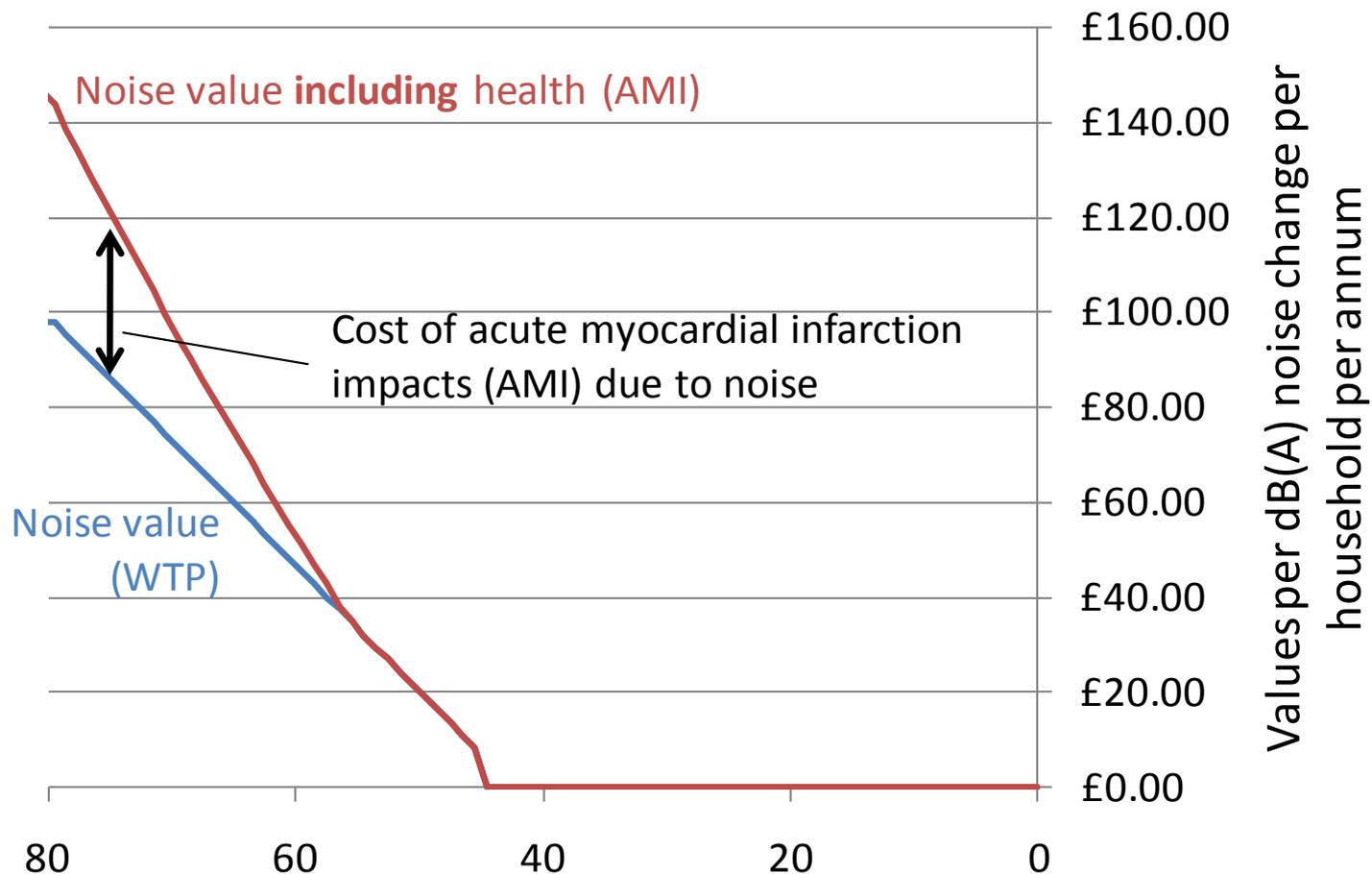
- Interdepartmental Group on Costs and Benefits
 - noise increases the risk of acute myocardial infarction (AMI) or heart attack – risk can be valued using Babisch dose-response function

5.Noise and health - recent UK review and proposals



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- Interdepartmental Group on Costs and Benefits



5.Noise and health - recent UK review and proposals



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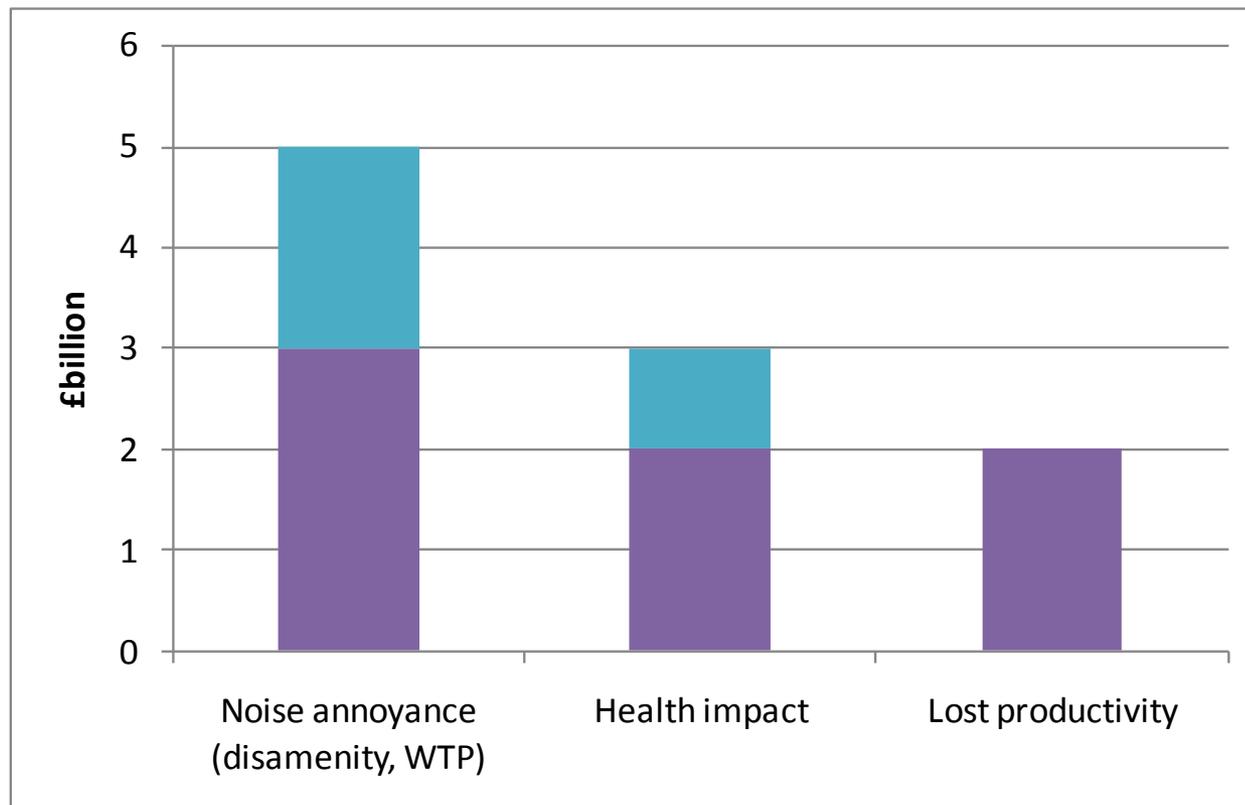
- Interdepartmental Group on Costs and Benefits
 - noise also increases cases of *hypertension* by 1.6% per dB
 - noise causes sleep *disturbance* (% rises with noise level) ... economic impact due to lost sleep and reduced productivity at work:
 - assume 2% of population affected by severe sleep disturbance, assume this decreases total productivity by 0.1%, apply to GVA data, implies productivity losses from noise pollution ~ £2billion per annum

5.Noise and health - recent UK review and proposals



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- Interdepartmental Group on Costs and Benefits
 - estimates of total noise impact in English major cities (2009):



- Evidence that citizens value peace and quiet down to $45\text{dB(A)}_{\text{Leq}}$
- Transport projects and policies – noise changes are valued (£)
- Including health effects increases the noise values, but noise benefits of transport projects still small (1-3%)
- Large scope for gains *if* urban transport noise could be reduced to 45dB, perhaps £3-5bn per annum
- Research on value of Quiet Areas (Eco Quartiers) starting in January.

- Appraisal guidance for transport: www.dft.gov.uk/webtag Unit 3.3.2 'Noise'
- Bateman, Day and Lake (2004), *The valuation of transport-related noise in Birmingham*, Technical Report to the Department for Transport, UEA, 2004
- Nellthorp, Bristow and Day (2007), 'Introducing Willingness-to-pay for Noise Changes into Transport Appraisal: An Application of Benefit Transfer', *Transport Reviews*
- Nellthorp (2010), 'UK experience of implementing noise values in transport appraisal, 3 years on', *Internoise Proceedings*
- New research – UK government 'inter-departmental group': www.defra.gov.uk/environment/quality/noise/igcb/publications/index.htm

2. Transport noise appraisal at local level



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- Reported outcomes:
 - number of households experiencing increase/decrease in noise
 - change in % of population 'annoyed'
 - **also 'Present Value of Benefits (Noise), £'**

4. Implementation of noise values



- Since 2008, noise valuation starts early in project development

Pre-project	Options		Development			Construction	
0 Strategy, Shaping & Prioritisation	1 Option Identification	2 Option Selection	3 Preliminary Design	4 Statutory Procedures & Powers	5 Construction Preparation	6 Construction	7 Handover & Closeout



Source: Highways Agency

3. Transport noise valuation



- Noise values measure citizens' *willingness-to-pay* for noise reductions (or accept compensation for increases)

Noise Change in the Interval, dB(A)		£ per person per annum for a 1 dB(A) change within the stated interval
Low	High	
<45		0.0
45	50	5.8
50	55	11.4
55	60	17.0
60	65	22.6
65	70	28.1
70	75	33.7
75	80	39.3
>80		41.5

£1=€1.42 in 2002 at Purchasing Power Parity