

Plea for 30dBA Noise Act limit

Belfast City Council's Helen Morrissey has outlined results from research that suggests current Noise Act minimum permitted noise level for enforcement fails to reflect true levels of annoyance.

Morrissey was speaking at last month's Institute of Acoustics *What noise annoys?* conference held in Oxford.

Belfast is one of the few UK authorities that has adopted the Noise Act which gives special powers to tackle noise at night. Unlike most UK authorities, Belfast finds it useful – it boasts a 96% compliance rate with Noise Act warnings – and issued 12 fixed penalty notices last year when warnings didn't work.

Notices can be served if the permitted level is 35dBA in any case where the underlying noise level does not exceed 25dBA or 10 dBA over the underlying level in all other cases. Since the Act was introduced, the World Health Organisation has said that 30dBA is a better threshold for night time disturbance.

The Noise Act is criticised by many for being too restrictive but Morrissey says it does allow instant serving of a warning notice, provided the noise criteria are met. Morrissey said: "Of the sixty complaints included in this study, the measured noise level was greater than the 35dBA threshold in only 38% of the cases. This meant that for the other 62% the council could not take any action under the Act." 92% of the

complaints referred to TV, radio and stereo noise.

As no review of the Noise Act limits has taken place, Belfast carried out a study to see whether the 35dBA threshold was still appropriate. 60 complainers were sampled, and asked how annoyed they were about the noise. This annoyance rating was then compared to an officer's rating, and noise level readings.

Investigating officers were found to be able to accurately judge whether a noise was a statutory nuisance, but usually felt the annoyance was less than that claimed by the complainer. But correlation of annoyance and sound level readings suggested the 35dBA threshold corresponded to a level midway between 'annoyed' and 'extremely annoyed' suggesting that the threshold of action is too high and leaves many complainers likely to be annoyed but with no ability to use the Noise Act to take action.

"Belfast City Council agrees that annoyance can occur between 30-35dBA and to make the Noise Act more effective, the threshold should be dropped to 30dBA. This would bring it more into line with that in place in Scotland (31dBA) and the 30dBA used by the WHO," concluded Morrissey.

● *What noise annoys?* proceedings are available from the Institute of Acoustics, Linda Cauty ☎ 01727 848195

Less seismic impact from turbines, study finds

Wind farms may produce fewer seismic vibrations than previously thought, a wind turbine conference in Berlin has heard. The conference, organised by Geoff Leventhall and INCE/Europe, brought together experts in wind farm noise and vibration last month.

Interest in wind farm seismic disturbance arose because the UK Ministry of Defence opted to object to all wind farms within an 80km radius of its southern Scotland Eskdalemuir seismic monitoring site that is used to monitor nuclear testing under the international Comprehensive Test Ban Treaty.

Peter Styles of Keele University told the conference: "This is a very low noise vibration site located in the centre a region with huge wind resources. Concern was expressed by statutory consultees that vibration from wind farm developments might prejudice the detection capability of the facility."

The MoD's blanket 80km radius objection effectively removed at least 40% of the UK renewable wind resource identified by the Department of Trade and Industry (DTI).

Research was therefore carried out on existing

wind farms to establish how far vibrations from wind turbines could transfer into the ground as seismic waves. Results showed seismic impacts were less than previously thought, and that a graduated exclusion zone was appropriate within an absolute ban within the core 10km radius.

Beyond that core, researchers propose a form of seismic ceiling that would allow the MoD facility to operate effectively. Current generation turbines could be built but would quickly fill up the 'ceiling' preventing future building of windmills.

Researchers say it would be better to withhold permission for current generation turbines within 25km of the facility until newer generation, low vibration equipment is available, allowing more wind generation capacity but without exceeding the seismic impact.

The conclude: "No reasonable wind farm would have an impact on the seismic monitoring station if built more than 50km away."

● Papers from the Berlin conference *Wind turbine noise: perspectives for control* are available from INCE/Europe www.inceurope.org

More from the conference next month

Alton: terms agreed

The terms of the noise abatement order served on Alton Towers have been agreed.

Following refusal by the local authority to take action, a local resident brought a noise nuisance action against the theme park last year and the court agreed that screams and mechanical noise from rides, and noise from pop concerts and fireworks caused a statutory nuisance (*Noise Management Aug/Sep 2004 p 7*). An order was agreed but subsequently appealed against by Alton Towers on the basis that it was too restrictive.

Now the order has been rehashed with Alton Towers gaining some concessions. It is now allowed to have three firework displays during the bonfire night period provided noise at the complainant's property does not exceed 95dB L_{Amax} .

Daily noise levels must not exceed 40dB $L_{Aeq 1hr}$ as compared to the previous order that allowed only 28db. Alton Towers says the 40dB limit is stretching but possible – whereas achieving 28dB was virtually impossible.

The park will also be able to hold as many concerts as it likes – provided it keeps to noise limits of 40dB. It added: "Alton Towers is pleased that the ruling has recognised our willingness to accommodate the needs and concerns of local residents and we will of course now go away and consider exactly how the 40dB limit will affect the park's operation."

Quiet homes for London

The Greater London Authority and UK Noise Association's *Quiet homes for London conference* was held last month.

A noise rating system was proposed for dwellings that would give householders more choice. Analysis of London noise mapping data also showed poor people suffer higher noise.

● More details next month

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BRIEFLY...

Noise worsens Ombudsman workload

Noise features highly in cases dealt with by the Housing Ombudsman, its annual report suggests.

The Housing Ombudsman scheme had jurisdiction over more than 2.1 million units owned or managed by 2,124 social landlords and over 40,000 units owned or managed by 92 private sector landlords. Last year there was a 20% increase in casework, the report reveals.

● Ombudsman website www.ihos.org.uk/general/announcements.asp

Young acoustician rewarded

Sound materials firm IAC of Winchester has presented a trophy to the winner of inaugural *Institute of Acoustics young persons' award for innovation in acoustical engineering* at the annual acoustics industry dinner held in Oxford.

IAC sponsors the biennial award aimed at stimulating innovation among young engineers. Andrew Hurrell of Precision Acoustics won first prize for his miniature ultrasonic hydrophones for use in clinical diagnostic imaging. He won a trophy, £500 cheque and trip to Copenhagen and visit to a concert hall.

First runner up was Kelvin Griffiths of Harman Becker Automotive Systems in Bridgend who developed a loudspeaker modelling tool. Second runner up was Graeme Maclean of Ricardo who developed a software program for the identification of sources of noise in combustion engines.

● www.ioa.org.uk

Airport gets tracking update

Birmingham International Airport's latest environment report says the airport became the first in Europe to install a new ANOMS 8 package, an advanced monitoring system which will upgrade the airport's noise and track-keeping capabilities.

Harmonoise finalised

TRL has released its final research report on Harmonoise traffic noise model.

It has also released a report on the sound insulation properties of timber noise barriers.

● *PPRO40 Validation of BS CEN/TS 1793-5 for the measurement of the airborne sound insulation of timber noise barriers*, and *PPRO34 Harmonoise prediction model for road traffic noise* are available from the TRL Publications Unit ☎ 01344 770297

NSCA lists demands for strategy

Nuisance

NSCA has used Defra's Noise Forum conference to re-state calls for action on neighbourhood noise.

Defra is poised to announce details of a neighbourhood noise strategy for launch in 2007, a draft will be released for consultation later this year. The Government says this "will review existing legislation for dealing with noise nuisance, including the statutory nuisance regime under the Environmental Protection Act 1990, as well as any gaps that existing legislation does not address".

At last month's Noise Forum, Martin Joseph, chief executive of NSCA outlined a number of points for inclusion in the strategy:

- A commitment to adequate funding, especially for local authority noise services, to take this work forward;
- More effective publicity and educational campaigns to raise awareness about noise issues and encourage considerate behaviour;
- Encouragement of partnership initiatives, for ever closer co-operation between Government departments with policy responsibility for noise;
- A clear link with the developing ambient noise strategy to ensure coherent and comprehensive policy making; and
- Further research into technical, legislative and social remedies to noise problems.

Yet another rap for Plymouth

Nuisance

Plymouth City Council has had yet another rap from the Local Authority Ombudsman concerning noise from the local airfield.

Noise from operations at the airfield has led to a series of adverse decisions against the local authority over recent years (*Noise Management Aug/Sep p2*). A helicopter flying school uses the local authority-owned airport and carries out frequent training flights. The latest complaint focuses on early morning engine testing of the helicopters.

The Ombudsman says that environmental health officials, when interviewed, reported that "the issue of engine-testing is 'extraordinary', and that the noise is 'very intrusive'; the most intrusive noise is the early-morning testing, up to 100 decibels at 5.30am". The officer added that in a factory, ear-protectors are required for sustained exposure at 90 decibels or more.

Officials told the Ombudsman there was little disagreement about how bad the noise is, but that the conflict of opinion within the council is about

what should be done about it, with enforcement officials being at odds with wider council objectives to retain jobs at the site.

The council appears to have ignored reports from its own environmental health officers, found the Ombudsman: "The nuisance caused by the noise as assessed by the council's own environmental protection officers is in my opinion sufficiently serious to have warranted prompt and effective action by the council to control the engine-testing; but there has been no such action.

"The Ombudsman finds maladministration causing injustice and recommends the council to take a number of urgent steps, including prompt and effective action to control noise nuisance caused to residents from engine testing, and pay compensation"

Households significantly affected by noise should be paid £500 by the council every year, says the judgement, and those severely affected should be paid £1000 a year – or abate the nuisance.

Skateboard prompts noise problems

Sound insulation

Shepway Council in Kent may have to close a skate park because of noise.

Since January, Shepway Council has received complaints from nearby residents about the noise generated by skateboarders at the Folkestone sports centre. Although an abatement notice was served on the Folkestone Sports Centre Trust in May asking it to stop the noise nuisance by 11 July, the problems continued.

To give the trust more time to find a

solution and to give local residents some respite, the council asked for a reduction in the park's opening time. This was done, but complaints continued.

The council has now asked the sports centre to restrict opening hours even more and to try and find a way of reducing the noise levels. If this request is not met by 1 December, the skateboard park will have to close until the noise problem is sorted.

Connell award for Northern Ireland

Local authority winner of the 2005 John Connell award was the Northern Ireland Environment and Heritage Service for planning and implementation of a huge survey and noise awareness campaign (*Noise Management July p2*).

Particular emphasis is placed on the redress available to noise sufferers with the message that it is okay to complain, that they are not isolated and should not feel intimidated, and that noise is a serious matter.

Wakefield Council was highly commended for its neighbour noise in-depth survey and campaign, covering attitudes and behaviour in noise related scenarios. Gary Blenkinsop of Wakefield talked of the need to exercise extreme care when dealing with certain neighbour noise complaints, and that environmental health officers had to remember that when they left, the neighbours still have to live next door with one another, so a gentle approach involving both sides may be appropriate before resorting to

the law.

The winner of the award for technology was Sound Dead Steel for a product which significantly reduces the transmission of impact noise along steel structures such as panels, hoppers, chutes, rail, hi-fi, ductwork, pumps, and compressors. The firm says its product behaves like soft lead in acoustic terms.

The winner of the innovation award was Sanctum Consultants. Set up by former environmental health officers, it aims to help members of the public who have problem noise cases and through a low cost, fixed price package, can steer the complainant through the options of self help using noise legislation and can act as arbitrators.

Alan Hawes, receiving the award from Lord Whitty, said that there were so many cases of noise problems where the complainant felt at their wits end and had no-one to turn to.

● Noise Abatement Society
www.noiseabatementociety.com

NAS drops train horn challenge

The Noise Abatement Society says it is putting on hold plans to go to court over the noisy train horns issue.

NAS has campaigned against noisy horns fitted to new railway trains. There are numerous complaints from those living near railway lines that the horns are used too much and are unnecessarily loud (*Noise Management July p2*).

The society has been trying to raise money to fund a legal challenge against the rail industry, specifically the Rail Safety Standards Board (RSSB) which sets the standard for rail horns. A particular problem for complainants is the difficulty in determining legal responsibility for the nuisance.

However intervention by the Office of Rail Regulation (ORR) led to a

meeting with the RSSB which led to the RSSB "agreeing to consider new solutions and including further research into the broadband option".

● MPs led by Peter Ainsworth have tabled an early day motion in the House of Commons. Such motions are by way of protest and have no chance of becoming law.

It says: "This House deplores the distress and disruption to sleep and day-to-day life caused by noise from train horns; believes that the installation of broadband horns would produce a significant reduction in nuisance and would cost only £700 per train; urges train operating companies to take effective action to end blight; and calls on the Office of the Rail Regulator to discharge its Railway Act duties.

London housing claim a landmark?

Housing providers say they will face huge costs if they lose a court challenge that could set a precedent.

London & Quadrant resident Mark Vella has gone to the High Court to demand that the London Borough of Lambeth serve a noise abatement notice on the housing trust. He claims that sound insulation is so bad that normal day to day activity of neighbours is causing sufficient noise in his own dwelling to affect his

health.

If he wins the challenge, housing associations say the bill to insulate existing properties will be massive – some £10,000 per flat, with no guarantee of success. At the moment housing associations do not believe they have a duty to improve substandard insulation following the landmark Baxter court case.

Vella lives in a flat converted from a terraced house in 1978.

BRIEFLY...

Best practice

Dogs not too loud, says Derby

Police handlers are unlikely to find their hearing is damaged by barking dogs.

The University of Derby and Derbyshire police have carried out a research study to test noise exposure, levels of dog barking and other noises experienced at work by kennel workers and dog handlers under the new Control of Noise at Work Regulations (2005) due to come into force in April.

John Pritchard of the University of Derby said: "This study has demonstrated that the noise exposure of the police dog handlers will be below the more stringent action levels introduced in the forthcoming legislation in April 2006. Dog handlers at Derbyshire Constabulary are working within current noise thresholds but close to the new acceptable levels. However under different conditions and on different days, such as crowd control at a football match, they may exceed these levels. Further research is required to study this in more depth." He adds that hearing protection would help if levels become excessive.

Derbyshire Police says it had not expected to have to do the study, and adds that in a bid to reduce noise its dog vans are equipped with acoustic barriers.

In the study, Derby's academics placed sound level meters within the dog kennel's exercise yard at Derbyshire Constabulary's Butterley Hall in Ripley. Noise dose meters were fixed to the kennel staff.

The study involved two sergeants, two dog trainers and twenty police officers. It also looked at 34 dogs, of which 21 were German Shepherds, 11 Springer Spaniels, a Labrador and a Springer Spaniel Labrador cross.

Off road effort by MPs

MP Bob Spink has proposed a Motor Vehicle (Anti-Social Use) Bill.

The private members bill would give police powers to stamp out the "destructive" damage to recreational areas and stop the damaging effect on residents' quality of life caused by 'minimotos, gopeds and other recreational vehicles'. The bill gained its first reading but stands no chance of becoming law.

Meanwhile the Government is stiffening its resolve to ban motorised vehicles from unpaved rights of way in national parks and other beauty spots. In the Natural Environment Bill currently being discussed in Parliament, it is seeking to remove rights for vehicles on such tracks.

Nuisance

Sound insulation

Forum told of noise progress

The Noise Forum conference highlighted the likely impacts of a wealth of forthcoming initiatives, legislation and research, says Lisa Russell

As was apparent at last month's Noise Forum conference, considerable change is afoot in terms of legislation, strategies and research.

Speakers talked about such initiatives as the Neighbourhood Noise Strategy (due out for consultation shortly), new planning policy standards and several research projects including sound transmission through open/closed windows (see box, below).

One particular area set to see considerable change is in the regulation of noise from licensed premises. They are being subjected to a raft of noise-related legislation and not only through this month's introduction of the Licensing Act 2003 (*Noise Management October p4*). Pubs and clubs will find that the Noise Act will apply to them, currently it only applies to residential premises.

But suitable noise levels need to be set before the Noise Act can be extended to noise from licensed premises. Moves towards a new measurement protocol were explained by Casella Stanger's Colin Grimwood, who is also technical adviser to Defra. Looking six to nine months ahead, "there is going to be a range of reactive, proactive and flexible noise control approaches available" said Grimwood. "It is clear that local authorities and police are

going to have to work together and will need to understand each other's responsibilities, duties, powers and limitations," he said.

The term "licensed premises" covers far more than pubs and clubs. It also includes provision of regulated entertainment in places such as cinemas, sports venues and village halls. Retail sale of alcohol is also covered, as is the provision of late night refreshment.

The noise arising is equally wide ranging – music, public address systems, mechanical services, big screen sport, people entering and leaving, vehicle sound, waste collection and so on. "What this means in policy terms is that the controls that are going to be put in place, of necessity will have to be broadly drafted in order to deal with this wide range of sources and wide range of premises," said Grimwood.

One option is to take the existing residential night noise offence and apply it to licensed premises, said Grimwood, but research is being carried out looking at other options. The first project has just been published. It came up with a number of candidate rating methods suitable for licensed premises (see box, right).

Grimwood outlined five key pieces of legislation that will govern such places: the Human Rights Act 1998,

the new Licensing Act 2003, the Anti-Social Behaviour Act 2003, the Environmental Protection Act 1990 and Section 84 of the new Clean Neighbourhood & Environment Act 2005. This provides the mechanism for amending the Noise Act 1996 to include licensed premises. Fines of up to £5000 or fixed penalties of £500 will be payable by those who exceed the permitted level and ignore the warning notice.

There appear to be a number of underlying policy difficulties, he said, in terms of reconciling the regeneration of the night time economy with protection of local residents. There is also the problem of a range of similar terms and powers under the various Acts. "You can either view that as a mish-mash of slightly contradictory legislation or you can view the range of powers as an opportunity to use the right one when it suits the circumstances. Hopefully the latter is the approach that will be taken," said Grimwood.

For the domestic night noise offence, a lot of work went into the reasoning behind the concepts and the setting of values. Permitted levels depend on the underlying noise. "It is not a fixed level of noise," said Grimwood. One of the options open to Defra was simply to read across the existing night noise offence and

Napier reveals how to deal with open windows

Research being carried out at Napier University is yielding data that will play an important role in determining the effect that windows – open or closed – have on insulating homes from noise.

A team from the University's Building Performance Centre has conducted comprehensive testing on different window configurations to establish the effects of various parameters on the sound level. Latest results were unveiled at the conference, though further discussions will be held by Defra before drawing conclusions and providing figures for use in practice.

The aim of the project was to determine the range of acoustic transmission values for windows, open and closed. The work was commissioned by Defra as part of the preparatory work for PPS24. "For this project we are concerned with dwellings and in particular the sound difference between the outside and the inside of a room which has open windows," explained Napier's Rebecca Hutt.

Team members presented results showing the decrease in insulation caused by opening windows and vents when compared to the closed window. Taking a closed window and opening it to give an open area of 500 sq cm gives a reduction in insulation of between 19dB and 28dB, said Daniel Lurcock. Doubling the size of the opening increases the figure to 20-29dB; doubling it again to 0.2 sq m takes the reduction in insulation to 22-31dB.

The installation of a closed vent has an effect of 2-7dB compared to a closed window with no vent. "Just by opening the vent, consistently we found 6dB difference," added

Lurcock. Taking the vent away and leaving the open slot gave a 13dB reduction in insulation compared to a closed window.

A literature review found that the bulk of research for domestic properties was in the mid-1970s, said Hutt. There has been only limited research on domestic window units and this didn't particularly look at factors such as the open area, the source's angle of incidence, frame type, seals and the role of trickle vents.

The Napier team set up an anechoic chamber for the source sounds, linked by the window being tested to a reverberation chamber. Different types and configurations were tested, such as sash windows and ones pivoting horizontally or vertically.

"We found significant variability in the effect of different window attributes," said Lurcock. Changing the closed window area from 0.4 sq m to 2.4 sq m caused a variation in insulation of 12dB, while the angle of incidence could account for a difference of 5dB.

The existing PPG24 for England and Wales says that the insulation provided by any type of window when partially open will be in the region of 10dBA to 15dBA. Scotland's PAN 56 also makes the observation that "it is reasonable for occupiers of noise sensitive premises to expect satisfactory internal noise levels with their windows sufficiently open for ventilation purposes. Only in exceptional circumstances should satisfactory noise levels be achievable only with windows shut and other means of ventilation provided..."

● Napier Building Performance Centre: www.sbe.napier.ac.uk/bpc

apply it to licensed premises. "The department has agreed that we will, at least attempt to, come up with a new permitted noise level and a new protocol to apply the night noise offence to licensed premises," said Grimwood.

Capita Symonds and BRE have been awarded a contract to pursue the recommendations of the first phase report further. "If the research is successful, the aim is to implement methodology into a new night noise offence," said Grimwood.

There is another option apart from measurement, he said: "Do we need this technical approach to a night noise offence, or could we have a subjective night noise offence?" He pointed out that anti-social behaviour provisions use a subjective assessment of behaviour, with perhaps sterner consequences. Could, he wondered, the "permitted level" of entertainment noise also use a subjective judgement of unacceptable noise?

It is not only in dealing with licensed premises that change is afoot. Other speakers at the conference highlighted aspects of the wealth of initiatives under way.

Defra noise policy adviser Jon Lartice outlined to delegates the latest developments in the Neighbourhood Noise Strategy, following the publication of earlier research in October 2003 at the previous Noise Forum conference. A stakeholders meeting took place in July this year, a

technical group met in October and a central government group is due to meet. The aim is to publish a draft scoping strategy for consultation before the end of this year.

Policy development will take place next year, with consultation on the proposals in 2007 followed by launch and implementation of the strategy the same year. Consultation will be carried out to define the objectives and clarify the draft scope of strategy – for instance confirming the noise sources to be included – and ensuring that the gap is bridged between this and the ambient noise strategy, he said.

NCSA chief executive Martin Joseph said that it must be clear which strategy was going to pick up each type of noise so that things do not fall between the two. He gave a number of aims for the strategy, feeling that it should improve the noise environment where poor and preserve it where good. The target should be to work towards an acceptable standard of quiet enjoyment in the home environment for everyone.

The complexity of neighbourhood relationships and their effect on local noise was highlighted by Ginette Unsworth of Encams in a presentation about what makes noise makers and noise sufferers tick (*Noise Management October 2003 p3*). The 200-page report for Defra identifies five groups of sufferer such as the "don't want a drama" group who are

typically first time owners, who do little to communicate with the offending neighbour though will resort to making their own din to "get their own back".

In the enemy camp were three types of noise maker, such as the "what can I do" noise makers who know there is a problem, but claim they cannot stop the baby crying, the children playing, the teenagers making a din or the dog barking.

World Health Organisation technical officer noise and health Célia Rodrigues said some 80 million people in the European Union suffer from noise at levels that create annoyance, lead to disturbed sleep or are high enough that adverse health effects are to be feared. WHO is involved with three current projects including the night noise guidelines project – co-sponsored with the European Commission – which aims to provide the necessary scientific data about the health impact of air, road and traffic noises.

Defra's environmental noise policy head Wendy Hartnell said that she wanted to start a dialogue with the stakeholders in noise. She outlined the work being undertaken in areas such as the ambient noise strategy, the Environmental Noise Directive (END) and noise and planning policy guidance document PPS24 (*Noise Management October p3*). "Noise can be the product of a flourishing economy and it's a question of striking a balance," she said.

Measuring noise from pubs and clubs: a new framework?

The report *Noise from pubs and clubs – phase 1* was produced by the University of Salford and Hepworth Acoustics for Defra. It identifies several candidate assessment methods for use in applying the Noise Act 1996 to licensed premises.

The Noise Act 1996, as applied to residential premises, is based on a relative criterion of assessing $L_{A_{eq}}$ against the background level. However, pubs and clubs generate a wide range of different types of noise.

"Any project to develop a new noise rating must begin by conceding the difficulty of the task. Nevertheless, quantitative methods and rating criteria are essential if effective policies for noise control are to be developed," says the report.

Candidate methods proposed include ones specifically for pub and club noise, those for general low-frequency noise, ones relying on absolute criteria and based on relative assessments. The report also describes a validation programme which would enable objective ratings and listener perceptions to be compared.

The researchers found no strong consensus among academics and practitioners about the existing rating methods. The methods for validation therefore needs to be drawn quite broadly, to include the loA working group annex (a relative measurement, of

$L_{A_{eq}}$ vs $L_{A_{90}}$ plus L_{10} vs $L_{A_{90}}$ in 40-160Hz 1/3 octave bands), a noise rating curve absolute method, WHO absolute $L_{A_{eq}}$ values, at least one low-frequency noise code and a subjective audibility test.

"The method must take account of the significant physical features of the noise," says the report. "These will certainly include level (probably by A-weighted $L_{A_{eq}}$). Almost certainly, some form of measure of bass prominence will be needed, perhaps based on $L_{A_{eq}}$ in 63 and 125Hz octave bands. The method may also need to take account of temporal features, like bass beat, perhaps evaluated by L_{10} - $L_{A_{90}}$ in a low-frequency octave band.

"It is also not yet clear if a measurement of background noise is essential for adequate prediction of the listener response. Finally, the assessment method should be as simple as possible without sacrificing accuracy."

To compare the methods, the report proposes tests in which listeners are exposed to pub and club noise and are asked to rate the noise subjectively. An audio recording can then be analysed by computer, enabling a large number of objective rating schemes to be compared.

● The report can be viewed on www.defra.gov.uk/environment/noise/research/pubs-clubs-phase1/pubsclubs-phase1.pdf

The Highways Agency has been treating roads with quiet blacktop and noise bunds. Has it made a difference, a BRE report asks?

Quieter roads give satisfaction?

The BRE has produced a hefty tome dealing with a similarly weighty issue – a 243 page report on Highways Agency efforts to mitigate noise hotspots on existing trunk roads.

The Agency has a rolling programme of mitigation measures, as per the 1998 DETR report, *A new deal for trunk roads in England*. The project is intended to reduce noise at some of the most serious hotspots on its network, in parallel with another programme (a target from the 2000 DETR ten-year plan) to overlay noisy concrete surfaces with a thin layer of asphalt (*Noise Management March 2004 p6*).

BRE was commissioned to undertake an independent investigation into how effective these programmes have been by sampling 17 of the hotspots, undertaking noise level and social surveys both before and after mitigation work took place, to give an accurate assessment of its impact and to tie together the residents' responses and the actual amount of noise reduction achieved.

Initially the work was due to focus solely on the hotspots, but in 2001 the surface overlay work was added to the research establishment's remit.

Seven of the sites were due to have noise barriers installed; five were to have the thin surface overlay; one site had both and four were used as a control. Residents at another site where a barrier was planned but subsequently not built were interviewed once as part of the exercise, and this site was also used as a control site for two other target sites on the same road.

The sites were chosen according to various criteria, including the number of residential dwellings close to the road that could be included in the social survey and the dominance of traffic noise over other sources.

Detailed acoustical data, along with meteorological and traffic information, were acquired from several locations within each of the sites, across several weeks spanning the period before and after the measures were put in place. Extra satellite measurements allowed noise levels to be allocated to individual dwellings affected by the schemes.

Where appropriate, the noise levels were corrected to take into account changes in meteorological and traffic conditions. This meant excluding data collected where the average wind speed was above 1m/s and the peak speed above

5m/s and when it rained.

At each site, a specially-designed, structured survey of residents' attitudes was undertaken both before and after mitigation, exploring their feelings about living in the area and their attitudes towards noise, not just of traffic, and other road traffic nuisance.

The second survey generally took place a year after the first, at the same time of year, when the mitigation measures were well established. Researchers were told to interview the same people on both occasions and 'before' and 'after' surveys were matched to ensure that changes in responses could be analysed.

In terms of serious noise work, long-term measurements were taken at a number of locations throughout each site. The locations were chosen for a variety of reasons: because they faced or backed directly on to the site, were representative of a group of properties or were the most exposed, the occupants were happy to provide access and the instrumentation could be securely fixed.

The measurement techniques were fairly standard: microphones were positioned at first-floor level, 1m from the most exposed façade to have windows. If most of the dwellings were bungalows, readings had to be taken from the ground floor, 1.2m above ground level and, again, 1m from the most exposed façade with windows though the first-floor location was preferred where possible because of the reduced disturbance.

The noise surveys generally began a week or two before the social surveys and ran for between four and six weeks, finishing either concurrently with or after the social surveys to give the best representation of the noise levels being experienced by the residents at that time.

Twenty to thirty ten-minute satellite measurements were also taken at representative locations throughout the site, in line with the most exposed facades and at various distances away from the road, across open ground or down side roads.

To represent noise levels at other dwellings involved in the social survey a correction factor was introduced using a series of short-term, representative satellite measurements. The correction factors were used with the long-term measurements to calculate a long-term average weekday $L_{A10\ 18hr}$ level for each

dwelling in the sample.

These correction factors were worked out thus: the ten-minute L_{A10} was calculated for each satellite measurement, and the corresponding ten-minute L_{A10} for the same time period at the nearest appropriate long-term measurement location was also measured. From that, the difference in noise level between the two measurement locations could be worked out.

The work then assumed that the long-term noise level at the location of a satellite measurement could be estimated using the average of the corrections calculated for all satellite measurements made at that location.

The general conclusions about the barrier sites included an observation that there were significant decreases in at least one noise indicator at all sites where mitigation work had been undertaken.

The site with the fewest significant decreases had an existing barrier and noise-reducing sandbag bund before the mitigation work took place. On the other side of the same road, where there had been no barrier, many more significant decreases in noise indicators were found.

Generally, more significant decreases were seen in the night-time noise indicators, possibly because these are less likely to be affected by noise sources other than traffic. Significance is a term taken from statistics: statistical tests calculate the probability, p , that results are due to chance fluctuations in conditions. If p is low, usually below 5%, the result is said to be significant.

Interestingly, in some cases, more significant differences were seen for L_{Aeq} and L_{A10} noise indicators than for L_{A90} indicators, although most of this difference seemed to be due to there being no significant changes in night-time $L_{A90\ 6hr}$ levels at one particular site.

At the sites with a thin surface overlay, in common with the barrier sites most indicators showed significant decreases. At one site where both an overlay and a barrier were installed, and in another part of the same site where just an overlay was put down, there were significant decreases for all indicators across all measurement locations. Again, in common with the barrier sites, most of the non-significant changes are for the night-time L indicators.

At the control sites, a much smaller number of significant changes were

seen, and the majority of these were increases in noise level.

At two sites in particular there were a number of significant increases. At one site there was a three-year gap between the 'before' and 'after' surveys, and a change in traffic flow was thought likely to be the key factor behind the increase.

At the other site, the road had been given a thin surface overlay ahead of the 'before' monitoring period, so possibly the increases in noise level may be at least partly due to a deterioration in the effectiveness of that surface, the report speculated, while acknowledging that more research would have to be done if that hypothesis were to be tested.

The accompanying social survey, undertaken by a market research company, used a number of standard statistical tests to enhance the accuracy of the results. These included the significance test mentioned above, a 'matched pairs' test used to find the significance of differences in responses where there are more than two possible responses, such as when the answer is on a scale (say, one to ten); and a test used to calculate the likelihood that something happening the same number of times would be the same across a number of samples or conditions.

The survey contained 14 questions relating to noise level satisfaction. Of the seven noise barrier-only sites, all except one showed some significant improvements in ratings, and no significant deterioration.

Showing, perhaps, how subjective perception of noise is, there were many significant improvements in satisfaction at one site where there were no significant reductions in measured noise, though it did have relatively low noise levels to start with. And at another site most changes were negative, indicating a trend of reduced satisfaction despite a significant reduction in noise at one of the two measurement locations.

The site in question had lower barriers, and these were perceived to be less substantial than those on the other side of the road, and the report suggests that disappointment with the result may have had an effect on residents' responses, despite the reduction in measured noise levels. So grumpy were the responses that they had to be dealt with separately in some of the results analyses to avoid skewing the general situation (the report does not reveal which site this was).

Of the five sites with a surface overlay, three had from seven to 12 significant improvements in noise ratings. Two other sites had only one statistically significant improvement, but at one of these most other ratings had improved.

At the one site where both a barrier and an overlay were installed, there were 13 significantly improved ratings. One site, where noise had significantly reduced, had a number of non-significant decreases in satisfaction, which could indicate a trend. None of the control sites showed any significantly-improved ratings – indeed, most showed worse ratings. Only one boasted a number of increased ratings, though not significant ones.

The survey continued with a further series of 11 questions on the effects of traffic on everyday life. At two sites with a barrier and one site with an overlay, the majority of the ratings significantly improved. Of the non-significant results, more were improvements than deteriorations. At the control sites, the results tended to mirror the previous survey responses.

Satisfaction with local amenities tended to have increased by the end of the survey at mitigation sites, with all the significant changes being improvements, and with more improvements than reductions in satisfaction overall.

The set of eight questions on other road traffic nuisance gave less clear-cut results, as did the level of agreement with a series of traffic-related statements, which was much as expected given the many factors involved.

The relationship between noise levels and community response was similar to that found in previous investigations into the effect of building bypasses and resurfacing a motorway with porous asphalt. Post-work satisfaction levels for the current Agency mitigation programme were, however, lower. This is thought to be because, unlike the previous bypass study, while the noise may have reduced the traffic levels remained the same.

The results suggest that both barriers and resurfacing are associated with significant reductions in measured noise and significant improvements in the subjective rating of noise levels.

Being real life, a number of additional factors intruded on the work, such as road works at one site, which were carried out at night and probably reduced traffic speed and volume. A road-widening project was also

announced just prior to the 'after' survey – for both actions, the report notes, it would be hard to quantify the effect.

Human factors could also have played a part – at one of the control sites, residents had been expecting to have barriers installed, which were subsequently cancelled, so they may have been more unhappy with the noise levels than under normal circumstances. At some sites, where barriers on one side of the road were lower than on the other side, residents may have been disappointed by the apparent meagreness of their protection and voiced their opinions accordingly.

In terms of making the comparison between barriers and overlays, the study may prove illuminating, if frustrating, in that there was no significant difference in terms of the increase in satisfaction provided. Barriers did appear to have a slight edge, particularly in terms of enjoyment of the garden.

The report recommends further, longitudinal studies to assess the long-term performance of the mitigation measures, particularly the potential deterioration of quiet surfaces, and on the social side, long-term trends in attitudes after the installation of mitigation measures. Adding further sites would also be useful in extending the database, it concludes.

● Email us for the pdf of the report: jack.pease@thomson.com

Before and after

Noise levels before and after mitigation works

Site	Mean LA _{10,18hr}		Median LA _{10,18hr}	
	Before	After	Before	After
Site 1a	69.9	65.8	70.2	66.6
Site 1b	71.7	66.5	75.4	68.1
Site 2	74.1	67.6	74.6	67.8
Site 2c	70.0	70.4	69.4	69.8
Site 3	77.6	73.3	80.1	76.2
Site 4	67.1	65.3	66.9	65.2
Site 5	71.4	67.7	72.0	67.3
Site 6c	65.1	66.7	65.0	66.5
Site 7	68.1	65.2	66.7	64.7
Site 7c	65.5	65.1	65.8	65.1
Site 8	72.2	69.9	72.9	68.6
Site 9a	62.8	62.4	62.0	62.0
Site 9b	69.2	66.0	69.0	66.2
Site 10	66.1	n/a	67.4	n/a
Site 11	65.0	57.7	64.6	60.5
Site 11c	63.9	63.2	63.9	62.9
Site 12	64.8	63.9	66.7	65.3
Site 13	68.3	64.4	67.6	63.8

COMING EVENTS

November 25th: Sound insulation in dwellings, Current and future building regulations in the UK and Ireland: Implementation and limitations, conference organised by the Irish & Scottish Branches of the Institute of Acoustics to be held in Dublin, Institute of Acoustics ☎ 01727 848195

December 1st: Let's get physical: conference organised by the Measurement & Instrumentation Group of the IoA to be held at the Health & Safety Laboratory, Buxton, Institute of Acoustics ☎ 01727 848195

December 7th: Planning and noise: PPS24 and related topics, organised by the London branch of the IoA, to be held at The Royal Society, London, Institute of Acoustics ☎ 01727 848195

2006

March 14-15th
NSCA Spring workshop on noise. NSCA ☎ 01273 878770

April 3rd-4th: Futures in acoustics – today's research – tomorrow's careers, conference organised by the IoA's Building Acoustics Group to be held at the University of Southampton, Institute of Acoustics ☎ 01727 848195

June 5th-7th: Euronoise 2006 to be held in Tampere Finland
Website www.acoustics.hut.fi/asf

September 18-20th: Low Frequency 2006 to be held in Bristol, website: www.lowfrequency2006.org

December 3rd-6th: Internoise 2006, International congress and exposition on noise control engineering to be held in Honolulu, Hawaii, USA. website: www.inceusa.org

Ken Livingstone was (not for the first time) 'unavoidably absent' from UKNA/GIA's interesting meeting on quieter homes last month.

The assembled audience included many housing association specialists and tenants suffering problems, their stories were depressingly familiar.

One particular anecdote came from an unusually well informed source – Sean Smith of the Building Performance Centre at Napier University.

His personal experience came when his upstairs neighbours got themselves a hard wooden floor and a brass bed. The question is, does 'bedroom noise' fare well under new Part E noise insulation regime designed to reduce lower frequency tones (but has proved less effective at cutting out 'normal living' noises)?

Helen Morrissey from Belfast gave a thought provoking talk to the Institute of Acoustics autumn conference held in Oxford last month.

She explained that the council had received 5,000 noise complaints prompted by an enthusiastic noise awareness campaign – some 68% from women.

Morrissey hit back at suggestions from

her male colleagues that this was because women are more neurotic and complain more.

Quite right too, men probably don't complain because they're the ones making all the noise!

For those of us not trained in technical matters, trying to get our head round acoustic measurements is a nightmare.

MP's have similar problems, according to a recent Hansard transcript of a Commons debate on the Civil Aviation Bill which went like this:

Justine Greening: "Will the hon. Lady tell us how the Government defines 'medium to high noise'? What decibel levels are used?"

Transport minister Karen Buck: "I will not be drawn on specific decibel levels; we have a clear framework."

Mr. Duncan: "Why not? What is the level? Tell us".

Ms Buck: "We know that high noise is 69 dB."

Richard Bacon: "What about medium noise?"

Ms Buck: "It does not say here. I will confirm the definition of medium noise. I think that I can safely say that it is below 69 dB."

Hmmm. Such insight.

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