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A SURVEY OF ANNOYANCE CAUSED BY NOISE FROM THE DOCKLANDS LIGHT RAILWAY

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INTRODUCTION

Previous work by Shield et al [1-3] has described the noise annoyance caused to the local community by the Docklands Light Railway (DLR) in London. In order to assess the extent of the annoyance, and to investigate more thoroughly the relationship between noise levels and annoyance caused by the DLR, a social survey of residential areas along the railway has been carried out together with a noise survey. This paper reports on some general observations arising from a preliminary analysis of the survey data.

THE SURVEYS

A questionnaire was designed which attempted to disguise the purpose of the survey by asking questions relating to various aspects of the environment including the general noise climate, as well as questions concerning attitudes to the DLR, and noise from the DLR.

Sixteen residential sites along the railway were selected for the survey. The original intention was to administer the questionnaire in person, but this method gave a very poor response rate. It was therefore decided to conduct a postal survey. The response rate using this method was approximately fifty percent. Valid responses were obtained from a total of 149 residents, distributed over the sixteen sites.

At each site recordings were made of several trains passing various different points. From the recordings the average third octave spectrum at each site was determined, together with the spectrum which gave rise to the maximum linear level recorded, L_{max}. The average linear, A-, B-, and C-weighted levels at each site were also calculated, and are shown in Table 1. Some typical maximum noise spectra are shown in Figure 1.

The L_{eq} levels for various different time periods were estimated from the average single event levels and the

published DLR timetable. It should be noted that these estimated levels may only approximate to the actual level at the time of the survey as considerable upgrading work was being carried out on the DLR, and some trains were not running at their normal speeds or to the normal timetable.

DESCRIPTION OF RESPONDENTS

Of the 149 respondents, 85 (57%) were female. The ages of the respondents ranged from 18 to over 75 years, 34% being in full time employment outside the home, and 28% retired. A histogram showing the percentages of respondents in different age groups is shown in Figure 2. The lengths of time the respondents had lived in their present dwellings are shown in Figure 3; 31% had lived at their present address for between 6 and 10 years, and 22% for between 11 and 20 years. Thus the majority of respondents had lived in the area since before the DLR opened.

It has been suggested previously that many of those complaining about noise from the DLR were local residents opposed to the new developments in Docklands, and unlikely to use the railway. The questionnaire therefore asked about travel on the DLR, and general satisfaction with the DLR. 83% of those surveyed travel on the DLR at least once a week. Of these, most of the journeys are for shopping (48%) or leisure activities (40%); 25% use the DLR for travelling to work.

ANNOYANCE AND INTERFERENCE FROM DLR NOISE

People were asked about both annoyance and interference caused by noise from DLR trains.

Overall, 68% of the respondents reported being annoyed to some extent by noise from DLR trains. People were asked to rate their annoyance on a four point scale ('no annoyance', 'little annoyance', 'moderate annoyance', 'great annoyance'). The percentages of respondents annoyed to different extents are shown in Figure 4. It can be seen that 27% reported being very much annoyed by the train noise; 21% moderately annoyed; and 20% a little annoyed. The time of day when people found the noise the most annoying was the early morning.

In addition to noise from the DLR, noise from aircraft, helicopters, British Rail trains, road traffic and construction sites was also heard. Noise from the DLR was

considered more annoying than noise from any of the other sources.

When asked whether the noise from the DLR interfered with everyday activities such as watching television or listening to music, 71% of respondents reported experiencing some interference. 41% claimed that the noise interferes with listening to the television or radio; 49% shut doors or windows because of the noise; and 42% said that rest and relaxation is disturbed. 26% of respondents complained of loss of sleep due to the trains.

CORRELATIONS BETWEEN RESPONSE AND NOISE LEVEL

It has been argued previously that, because of high levels of low frequency noise due to the DLR, the use of dB(A) and L_{Aeq} may not be appropriate for specifying acceptable noise levels for urban light railways [4]. It was hoped that the results of this study would lead to the confirmation of some existing noise parameter, or the development of a new parameter, as suitable for the assessment of noise from urban light transit systems.

In a preliminary statistical analysis of the results [5] the questionnaire responses for each site were correlated with the averaged noise level L_{av}, the maximum level L_{max}, and the 24 hour L_{eq} expressed in linear dB, dB(A), dB(B), and dB(C) at each site. The highest correlations were obtained when noise levels were expressed in linear dB, and the lowest when the noise is measured in dB(A), thereby supporting the proposition that dB(A) is not an adequate indicator of community response to noise from the DLR owing to the high low frequency content of the sound.

Table 2 shows the correlations obtained when the noise levels are compared with the percentages of people annoyed at each site, and Table 3 shows the correlations between noise levels and the percentages of people affected in any way by the noise. It can be seen that in both cases the noise levels expressed in linear dB give the highest correlations, and the levels in dB(A) the lowest.

CONCLUSIONS

It has been shown that a high percentage of residents living near the Docklands Light Railway are annoyed and disturbed by the noise from DLR trains. Preliminary analysis of the

results has indicated that noise levels expressed in dB(A) do not adequately represent the community response to the noise. Further analysis is required to investigate the relationship between alternative noise indices and the results of the social survey, in order to find a noise parameter that accurately reflects the extent of annoyance caused by the noise.

REFERENCES

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ANNOYANCE CAUSED BY NOISE FROM THE DOCKLANDS LIGHT RAILWAY

Table 1

Average noise levels at each site.

Site	dB(lin)	dB(A)	dB(B)	dB(C)
1	73.4	68.2	70.5	73.0
2	70.5	60.6	63.0	68.9
3	72.3	62.1	66.7	71.5
4	78.3	70.7	74.0	77.7
5	75.5	64.2	70.2	74.9
6	81.9	64.6	74.6	81.3
7	76.4	65.0	70.5	75.7
8	78.9	66.6	72.2	78.2
9	76.0	70.7	73.2	75.6
10	81.2	66.9	72.5	79.8
11	78.7	69.4	73.8	78.1
12	74.7	64.0	68.9	74.0
13	75.2	68.6	71.5	74.7
14	74.5	64.2	69.1	73.7
15	80.2	66.2	72.3	79.2
16	71.3	59.9	65.7	70.7

Table 2

Correlation coefficients between percentages annoyed and noise levels

Level\Weighting	Linear	A	B	C
Lav	0.58	0.37	0.44	0.55
Leq (24h)	0.46	0.31	0.34	0.44
Lmax	0.51	0.13	0.38	0.50

Table 3

Correlation coefficients between percentages affected and noise levels

Level\Weighting	Linear	A	B	C
Lav	0.59	0.30	0.46	0.58
Leq (24h)	0.49	0.25	0.37	0.48
Lmax	0.41	0.19	0.38	0.42

ANNOYANCE CAUSED BY NOISE FROM THE DOCKLANDS LIGHT RAILWAY

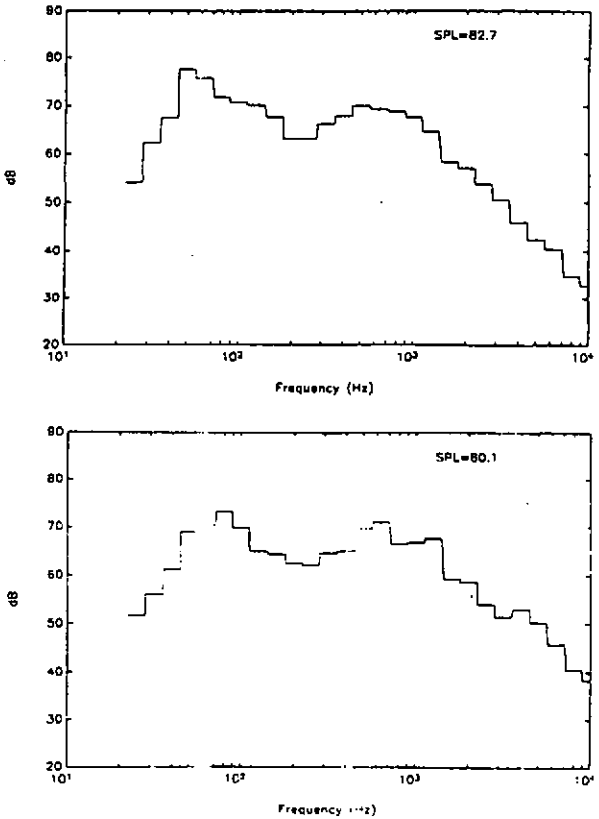

Figure 1 Maximum spectra

ANNOYANCE CAUSED BY NOISE FROM THE DOCKLANDS LIGHT RAILWAY

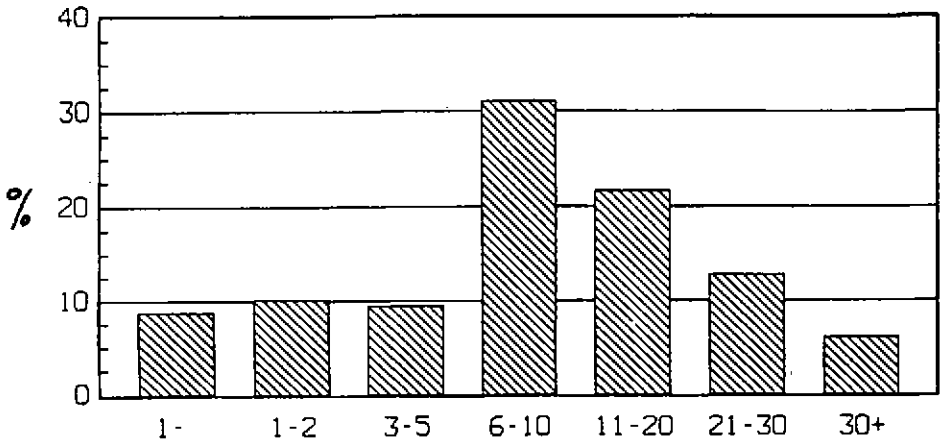

Figure 2. Ages of respondents (years).

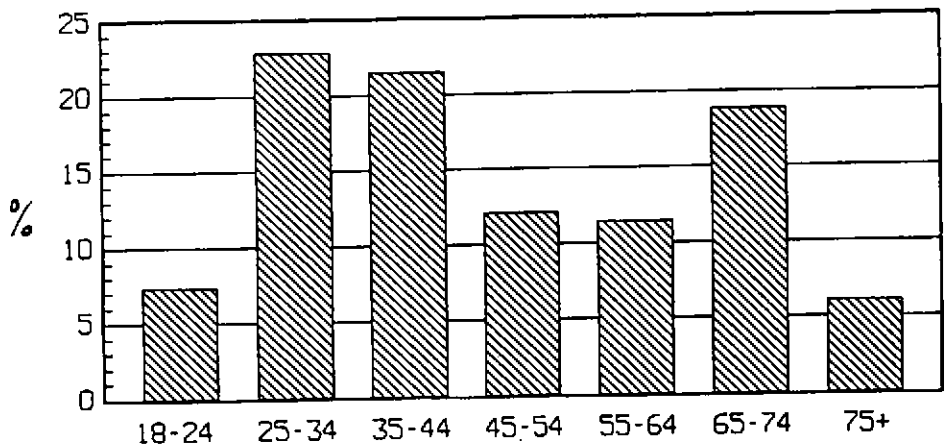

Figure 3. Length of residence (years) in present dwelling.

ANNOYANCE CAUSED BY NOISE FROM THE DOCKLANDS LIGHT RAILWAY

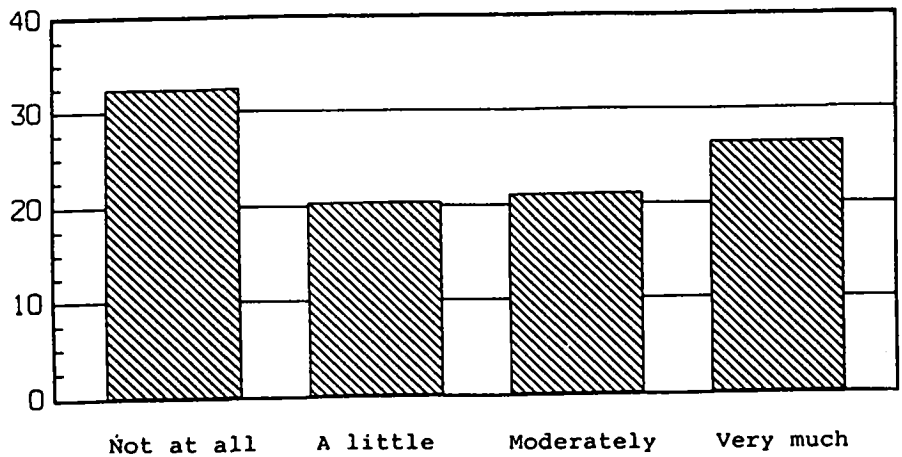

Figure 4. Percentages of people annoyed by DLR noise.