Proceedings of The Institute of Acoustics

THE ENVIRONMENTAL IMPACT OF ROAD AND RAIL NOISE ON A SMALL HOUSING DEVELOPMENT IN BOLTON.

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1. INTRODUCTION

The effects of environmental noise on people may be examined by the investigation of complaints or in terms of response to social survey questionnaires. This paper investigates the impact of noise from road and rail traffic on a small residential development by assessing social survey responses.

The Environmental Health Division of Bolton M.B.C. had been involved from the initial planning stages to ensure that precautions were incorporated in the development so that residents were given some protection against environmental noise.

This paper attempts:-

1) to show how a postal survey carried out on a small scale can be used as an effective means of collecting information and assessing noise impact.

2) to show the degree of annoyance expressed by the residents due to road and rail traffic noise in comparison to noise exposure.

3) to assess the effectiveness of Environmental Health Officer involvement at the planning stage in the prevention of environmental noise problems.

2. SITE DESCRIPTION AND HISTORY

The site consists of a small plot of land 0.89 hectares in size bounded by residential properties to the north, a main railway line to the west, and two busy major roads to the east.

THE ENVIRONMENTAL IMPACT OF ROAD AND RAIL NOISE ON A SMALL HOUSING DEVELOPMENT IN BOLTON.

The railway line is the main route from Manchester to Preston. The road running adjacent to the eastern boundary is the main roadway between Bolton and Farnworth, also along the eastern boundary runs the A666 - a two lane dual carriageway connecting to the North West motorway network.

Noise measurements had been made at 4 positions on the pre-developed site and the L10 index ranged from 64 dB(A) - 74 dB(A) [3 dB(A) added for reflecting facade.] It is the policy of the Environmental Health Division that housing development should not take place where external levels are in excess of L10(18h) 65 dB(A)and that internal levels should not exceed L10(18h) 50 dB(A) with a preferred target of L10(18h) 40 dB(A). Screening of the site from traffic noise was not possible, the principle road source being elevated, and an initial assessment showed the site to be environmentally unsuitable for housing.

The District Planning Authority and a housing association were keen to proceed with this site. Subsequently the Environmental Health Division advised that as a minimum, a block of single aspect flats on the eastern boundary should act as a barrier block offering protection to the remainder of the site,also the dining/kitchens which were on the 'noisy' side of the block should have acoustic double glazing installed.

The developed site consisted of 12 bungalows, 14 flats, and 23 houses; 49 properties in total.

194 trains/day pass the site, but nearest proposed dwellings were at 30m from track and no additional design features were recommended.

3. THE SOCIAL SURVEY

The postal survey was designed to obtain a confidential response from residents and encouraged them to express their true feelings.

The questionnaire asked about the degree of annoyance due to road and rail noise using a four point "bother" scale, similar to previous studies (Ref. 1).

THE ENVIRONMENTAL IMPACT OF ROAD AND RAIL NOISE ON A SMALL HOUSING DEVELOPMENT IN BOLTON.

The design of the questionnaire was not intended to immediately lead residents to assume that the survey was solely related to rail and road noise. Some questions were also included on industrial noise and neighbour noise.

4. THE NOISE MEASUREMENTS

Road traffic noise measurements were as follows:-

Facade L10 (18h) levels on site varied between 55 - 73 dB(A). Internal measurements were carried out in and around a vacant first floor flat and were as below:-

POSITION	L10 [dB(A)]	
1) kitchen - outside	72.8	'noisy facade'
2) kitchen - inside	42.4	'noisy facade'
3) living room - outside	59.8	'quiet facade'
4) living room - inside	43.9	'quiet facade'
5) bedroom - inside	42.1	'quiet facade'

Rail noise measurements were made outside the nearest houses. Peak levels varied between 67 and 74 dB(A) and the Leq(24 hr) was estimated at 49 dB(A).

5. INTERPRETATION

The response to the questionnaire was good (72%). The questionnaires which were not returned were from dwellings evenly distributed throughout the site, and it is considered that no weighting is applicable to the findings of the report as a result of this.

The degree of bother due to road traffic noise as expressed by all respondents was as follows :-

% Respondents	Degree Bothered
29	Not at all
34	A little
29	Quite a lot
8	Very much

There was very poor correlation (r = 0.2) between average

degree of bother expressed and the externally measured L10 (18h) index. Also, the degree of bother expressed by respondents living in the block of flats [i.e. those exposed to highest facade levels - L10 (18h) 73dB(A)] was lower than that shown by respondents living in houses [i.e. facade levels - L10 (18h) 55 - 65 dB(A)]. In addition, 73% of flat residents indicated that they were not bothered by road traffic noise whilst in the room with double glazing.
With regard to railway noise, the correlation between peak level and bother was poor. Indeed, the average degree of bother for groups of houses was approximately the same (2.2) irrespective of distance from the track.

6. DISCUSSION

It is rare for housing sites to be examined after the houses have been erected and occupied in order to identify the acceptability of environmental conditions to the residents. It is only usually when complaints arise that on-site investigations take place & then the Local Authority may be unable to control the source of noise annoyance.

The use of postal questionnaires is one way of obtaining peoples views on their environment. As long as such surveys and questionnaires are designed and carried out properly, and provided that unbiased conclusions are drawn, the information gathered will be invaluable to the Environmental Health Officer in his attempts to maintain satisfactory living conditions. It can be expected that the use of social surveys will gain increasing importance in the work of Environmental Health Departments.

At the design stage of this residential site environmental safeguards were incorporated as described in the site development history. The results of this project show that the design criteria have been broadly met.

I have therefore drawn the following conclusions:-

1. At this site there appears to be no correlation between respondents degree of bother and the increase in the level of noise due to road or rail

traffic.

2. From the measurements taken on site the policy criteria have been achieved in that the levels measured internally are in the range of L10(18hr) 42-44 dB(A).

3. Analysis of survey response indicates that residents are satisfied with the performance of the dual glazing.

4. Despite being exposed to high external noise levels - L10(18h) 70-73 dB(A) - the flat dwellers on this site are apparentley less bothered by traffic noise than people living in the houses. It may be concluded that single aspecting of flats plus double glazing has been successful.

REFERENCES.

1) "A Review Of Techniques For Scaling Subjective Judgements."
A.O.Grigg Transport and Road Research Lab, Dept of Environment/Dept of Trade. TRRL Supplementary report 379.