AMBIENT NOISE ON MERSEYSIDE – STAGE 1 REPORT

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Report prepared by:

Hepworth Acoustics Limited

Entec

Woodholmes ksa

On behalf of:

Merseyside Transport, Health and Environment Forum

Report prepared by: Peter Hepworth BSc (Hons) MIOA Managing Director	
Report checked by: Paul Bassett BSc (Hons) MSc MIOA Chief Consultant	

HEPWORTH ACOUSTICS

Entec

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1.0 INTRODUCTION

1.1 Hepworth Acoustics Ltd was commissioned by Sefton Council on behalf of Merseyside Transport, Health and Environment (THE) Forum to carry out a research project into ambient noise levels and resident's attitudes to ambient noise levels and sources across the five Merseyside local authorities. Hepworth Acoustics is working with Woodholmes ksa and Entec on this project.

1.2 The project was endorsed in the Merseyside Local Transport Plan (July 2000) and funding has been provided by the five local authorities and Merseytravel.

1.3 The project is programmed to be carried out over a 12 month period from April 2003.

1.4 This report has been produced as the Stage 1 report for the study. The Stage 1 report is required to document the final project specification and provide a detailed method statement.

1.5 The final project specification is shown in Section 2, and the detailed method statements for the different elements of the work are shown in Section 3, 4 and 5.

2.0 PROJECT SPECIFICATION

2.1 The key aim of this project is to ascertain the extent to which people on Merseyside perceive noise to be a problem and identify which types of noise and noise sources are perceived to have the greatest effect. There is a specific need to understand the impact of any transportation noise on the resident population, in order to recommend a framework in which a future ambient noise policy can be developed.

2.2 In order to achieve the key aim of the study and to be able to use the findings of the study to develop future policy, the following items represent the project specification:

i) To review available research and information about the contribution and significance of transport noise to overall background noise levels.

ii) To review current thinking and research on the effects of noise, specifically transport-related noise, on quality of life and interpret its relevance for Merseyside.

iii) To identify and assess the perception of the noise environment experienced by people in Merseyside and, in particular, the sources which are most prevalent and most likely to cause annoyance, with specific reference to the perception of transport sources.

iv) To characterise the range of ambient noise conditions occurring on Merseyside, particularly in relation to transport noise.

v) To recommend a framework within which a possible future Merseyside noise strategy could be developed that will address key noise related issues and the possible role of the transport sector.

vi) To identify the requirements for further research and information as a basis for better describing the key factors affecting people's experience of noise.

2.3 The following specific work items were required in order to achieve the above specified project aims:

i) A public perception survey on noise sources and attitudes to noise to be carried out at a random sample of 10 households in each of the 118 wards on Merseyside.

ii) A survey of noise levels at 90 locations throughout Merseyside. The survey locations were required to cover two examples of nine different noise environments in each of the five local authority areas.

iii) Modelling to be carried out of the spread of noise from significant linear noise sources at 15 locations across Merseyside. Verification of the predictions to be carried out by noise measurements at 2 or 3 locations.

iv) Collection and collation of the results of noise complaints to the local authorities.

v) Collection and collation of suitable ambient noise data obtained by the local authorities.

3.0 NOISE ATTITUDE SURVEY METHODOLOGY

3.1 The methodology for the noise attitude survey has been designed to adhere to the following requirements:

i) Be representative of the whole of Merseyside, in terms of geography and population

ii) Provide data that is comparable with any national surveys, to enable the situation in Merseyside to be understood in a wider context (e.g. *National Noise Attitude Survey*)

iii) Capture attitudes to transport noise in particular.

Desk research

3.2 Some initial desk research was conducted in order to ascertain whether any organisations, or indeed other local authorities, had commissioned similar research studies at a local and/or national level.

3.3 It was apparent that the only national studies that had taken place were Defra's *National Noise Attitude Surveys* (NNAS) conducted in both 1991 and 1999.

3.4 On a local level, it seems that the Greater London Authority are the only authority who have conducted research similar to that proposed. *The Mayor's Draft London Ambient Noise Strategy* uses a similar line of questioning as that put forward by the Audit Commission in a Performance Indicator relating to noise levels.

3.5 These research methodologies were influential in the questionnaire development for this study, as detailed within the Quantitative survey section.

3.6 They were also influential in the choice of questions to be put forward for the Merseyside Citizen's Panel questionnaire. One question adhered closely to the Audit Commission Indicator and another to a question within the NNAS 1999 survey.

Fieldwork

3.7 The methodology outlined in the original brief was as follows:

i) A stratified random sampling approach based on electoral wards.

ii) 10 addresses from each of the 118 wards in Merseyside to be randomly selected (whilst ensuring a distribution across the geography of the ward).

iii) Face to face interviews should be made after an appointment has been made.

iv) Reserve addresses for each ward to be randomly generated in case any of the first ten addresses cannot be contacted or are unwilling to participate.

3.8 Although we agreed that face to face interviews should be conducted, we felt that the following alternative methodology provided a more cost-effective solution. This alternative would take account of the need to reach a representative spread of the population, but factor in the inevitability of some communities having a relatively high level of unoccupied properties.

3.9 As with the methodology specified in the brief, our recommended approach aimed to generate a total of 1180 participants, i.e. 10 interviews per ward. This sample size will ensure there is a high degree of statistical accuracy [the achieved sample is based on the total number of respondents to the survey, not the number of respondents to individual questions]:

i) In comparison with the whole Merseyside population, the margin for error would be +/- 2.9% at the 95% confidence level.

ii) When analysing the data by Local Authority, the margins for error would be as follows at the 95% confidence level:

- Liverpool (340 interviews): +/- 5.3%
- Knowsley (220 interviews): +/- 6.6%
- Sefton (220 interviews): +/- 6.6%
- St Helens (180 interviews): +/- 7.3%
- Wirral (220 interviews): +/- 6.6%.

3.10 Respondents were to be selected by first identifying 10 clusters in each ward as follows:

i) 10 streets were selected at random for each ward. Maps were used for each ward and a random dispersal method was employed, which took account of population concentrations.

ii) For each street, 30 households were selected at random.

iii) Addresses were selected using Post Office files, which are commonly regarded as a more accurate tool for a random sampling technique, as the electoral role excludes any individuals not registered.

iv) Where there were less than 30 households within a street, households in an adjacent street were also used.

v) If there were less than 30 households within two adjacent streets, an alternative street from that ward was selected at random.

vi) An interviewer was instructed to conduct an interview with one member of any of these 30 households. Given that a selection of addresses were provided from which ONE interview was to be achieved, it was not necessary to prepare reserve addresses or clusters.

3.11 The interviewers were also given the following additional instructions:

i) To conduct all 10 interviews for each ward at varying times of day/days of week to ensure we achieve a balance between the working and non working population:

- At least 3 during week 'days' (9am – 6pm)
- At least 3 during weekday evenings (6pm – 9pm)
- At least 3 at weekends.

ii) Each respondent must be 16 years old or older (this adheres to the age groups surveyed in the NNAS survey).

iii) Interviews within each ward should be conducted across a spread of age groups and gender, and interviewers should ensure that a mix of 'workers' and non-workers' should be obtained.

3.12 It was proposed that interviews should not be conducted during the school summer holiday period, as noise levels at this time of year may not be representative of those generally experienced during the rest of the year, i.e. there may be an attitude bias in data captured during this time.

3.13 We aimed therefore to conduct interviews for half of the wards during July 2003, and the other half within September and October 2003. We ensured that each Local Authority was represented in each wave.

3.14 A process of 'door knocking' was used in order to obtain interviews. Although follow up appointments were made with respondents as required, the interviewer aimed to conduct the interview on the first visit.

3.15 Interviews were conducted 'in-home' because of the mechanics of the showcards and shuffle cards used during the interview. To assure respondents of the study's authenticity, the interviewers were able to show them:

i) A photo card identification, with the Woodholmes ksa telephone number, so respondents could check the legitimacy of the project;

ii) A letter of authority from all the Merseyside Local Authorities (all the Local Authority logos appeared on the letter);

iii) A leaflet, outlining the purpose of the study and the Local Authority contacts who deal with noise complaints;

iv) A copy of a recent press release.

3.16 Participating respondents were acknowledged with a gift from the project partners of a pen and notepad. They were also given 'Thank you' letters from both the local authority and Woodholmes ksa and were allowed to keep the information leaflet.

3.17 The study was officially branded 'Merseyside Noise Study 2003', the logo appearing on the letter of authority, the information leaflet, the Local Authority 'Thank you' letter and the pens/notepads. Publicity for the study took place via a press release, which was sent out a couple of weeks before the start of the interviews.

3.18 All interviews were conducted to the Market Research Society Code of Conduct.

3.19 To ensure that specific requirements of the project were fully understood a central briefing to the fieldwork team was held prior to fieldwork commencing.

3.20 Each interviewer was also accompanied by their supervisor at least once (and up to as many times as was required) to ensure that interviews were being conducted correctly.

3.21 Once questionnaires had been returned, a 10% random backcheck was conducted on each interviewer's work, to ensure that the interview had indeed adhered to the MRS Code of Conduct.

Questionnaire design

3.22 A draft questionnaire was designed to largely mirror that used in the NNAS 99 survey. It was also devised with a view to each interview taking approximately 25 minutes to administer. However the questionnaire duration can in fact vary according to the extent to which different noise types bother the respondent.

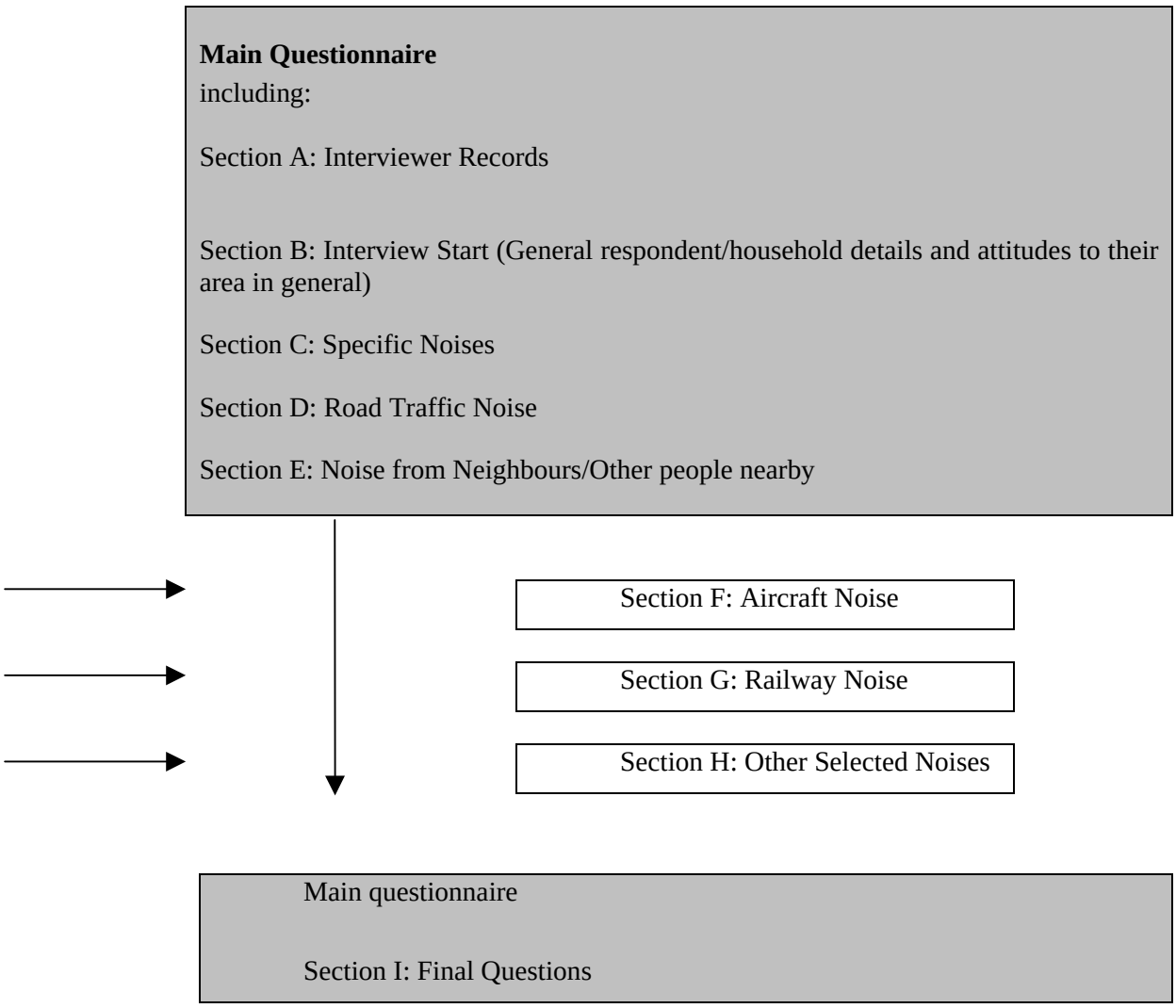
3.23 The draft was piloted in-house, and was therefore estimated to be between 20 and 50 minutes in duration.

3.24 Prior to fieldwork commencement, a presentation of the questionnaire and methodology was given to Merseyside Local Authority stakeholders. Feedback resulted in minor changes being made to the questionnaire.

Questionnaire content

3.25 The questionnaire is largely based on the one used in the NNAS 99 survey, particularly in structure. This was considered to be important if data from the two surveys was to be compared. The final questionnaire is shown in Appendix A.

3.26 The following diagram illustrates its structure, whereby those sections in grey are to be completed with all respondents:



3.27 **Sections A and B** capture general details about the respondent, together with their general attitudes to their local area.

3.28 **Section C** mainly captures the extent to which they are 'bothered, annoyed or disturbed' by generic noise types;

i) the line of questioning is identical to that used in NNAS 99 (so that data is comparable) whereby if a respondent replies 'Not at all', the interviewer must check whether they actually hear the *specific* noise. This line of questioning has been developed by NNAS based on their qualitative work, where it was found that 'being bothered by a noise' was associated quite closely with 'hearing it'. Indeed, this line of questioning also saves the time taken up asking two questions, i.e. 'do you hear the noise?' and 'are you bothered by it?'

ii) At the end of Section C, and as in the NNAS 99 survey, respondents are asked to divide the noise types into two groups, a group which bother them and one which do not. They are then asked to rank the noises which bother them. Their top three noise types, besides 'Road Traffic noise' and 'Noise from Neighbours/Other people nearby', will then identify additional (separate) questionnaire sections that are necessary to complete.

3.29 **Sections D and E** capture more specific responses to 'Road Traffic Noise' and 'Noise from Neighbours/Other People Nearby' respectively. As with the NNAS 99 survey, these sections were compulsory irrespective of the extent to which the noises bothered the respondent.

i) In addition, it was thought necessary for the 'Road Traffic' section to be compulsory, as this section relates to 'Transport noise', an important issue for this survey.

ii) The NNAS 99 survey also included an additional section entitled 'Detailed Neighbour Noise', which captures even more detail on the noise types. This section has not been included within our survey questionnaire, as:

- The questionnaire would then be far longer than 25 minutes in duration.
- This level of importance has not been placed on other generic noise types within the survey.

3.30 **Sections F, G and H** are located in separate sections, and relate to the capture of detailed information on Aircraft, Railway and 'Other Selected' noises (e.g. Building/Construction, Sea/Canal Traffic, Leisure and Entertainment). As discussed, these are to be completed if they are ranked highly enough by the respondent at the end of Section C.

3.31 After completion of all necessary sections, the interviewer is then required to return to the 'Main Questionnaire', and complete **Section I** with the respondent. This section captures general overall attitudes to the noises they hear, together with the extent to which they have ever complained about any other issues other than noise. Again, this section was used in the NNAS 99 survey questionnaire.

3.32 Additions have been made to the NNAS 99 questionnaire where deemed necessary. The details and rationale for these additions are as follows:

i) Although the respondent is being asked to say the extent to which they are bothered by noise types, this may not necessary tell us whether they identify the noise level as being a 'problem', e.g. they might be 'bothered' by a noise, but may actually accept the noise as one which cannot be resolved/occurs naturally in everyday life. Indeed they may have moved to a location in full knowledge of its noisy environment. We have therefore included the question put forward by the Audit Commission (in Section C), which asks respondents to rate each noise type according to whether it is 'not a problem', 'a problem but not serious' or 'a serious problem'.

- As this question is also likely to be used within the Citizen's Panel questionnaire, this survey can also act as a benchmark against which future Citizen's Panel responses can be compared.

ii) We have also included a question (which was also on the Citizen's Panel questionnaire in July 2003) that puts 'noise' in context in relation to the annoyance of other local issues that are not necessarily environmental. This will then give us a measure of the extremity of feeling towards 'noise'.

iii) Although we have included NNAS 99 questions in each section which ask whether the respondent has ever 'acted' to try and reduce the amount of noise, it was also thought important to determine what they believe should be done in the future about the particular noise level, either by themselves or another particular body/organisation. This type of question is related to one put forward in *The Mayor's Draft London Ambient Noise Strategy* questionnaire, which asks respondents to give the extent to which they would support different actions to reduce noise levels.

iv) This question also gives the respondent the chance to say whether the noise levels/problem are 'accepted' as a matter of course, i.e. there is nothing that can be done to reduce them.

3.33 The following additional questions again serve to provide a measure of the extremity of 'feeling' towards the noise levels:

i) whether the respondent could make comparisons between noise levels in their local area and overall levels within their Local Authority.

ii) whether respondents had ever considered moving house because of the noise levels.

3.34 Changes were made to the main noise sources and to those within the 'Road Traffic' section, which mainly related to sources omitted from the NNAS survey questionnaire. Attention to the 'Road Traffic' section was thought to be important, as 'Transport' issues were of particular interest in this survey.

3.35 Additional noise sources were:

i) 'Animals' (added to the list of main generic noise sources in Section C)

ii) 'Car horns' (Road Traffic section)

iii) 'Noise caused by speed bumps/traffic calming systems' (Road Traffic section)

3.36 Some vehicle types (within the Road Traffic section) were separated as the noises emitted by them were thought to be quite different, e.g.

i) 'Private cars / taxis' became 'Private cars', 'Hackney Carriage taxis (black cabs)' and 'Mini-cabs'

ii) 'Buses / coaches' became 'Buses' and 'Coaches'

iii) 'Motor bikes / scooters' became 'Motor bikes' and 'Scooters'

3.37 After feedback from local authority stakeholders, who wished to add questions relating to the effect of the noises on the respondent's health, it was decided to add an option amongst the actions the respondent could have taken to reduce the noise levels; the respondent could indicate whether they had actually taken medical advice/action.

Data processing and analysis

3.38 Returned data is cleaned, coded and entered into an SPSS database.

3.39 Once entered, it will be checked against Census 2001 data for representation within each Local Authority. Where necessary, it will be weighted to be representative of that Authority by;

i) Age group.
ii) Socio-economic classification.
iii) Gender.

3.40 All data will be analysed, whereby both tables and charts will be produced for data at each of the following levels/subgroups:

i) Overall data.
ii) By Local Authority (5 subgroups).
iii) By age group (7 subgroups).
iv) By gender (two groups).
v) By socio-economic classification (3 groups: A/B, C1/C2, D/E).

3.41 Statistical analysis will be performed to determine any significant attitude differences between the above subgroups.

3.42 An example of cross-tabulations to be analysed is shown below:
Extent to which the respondent is bothered by various noise types, analysed by

i) The age of their home.
ii) The attributes of that area (as reported by the interviewer).
iii) Measures that determine the extremity of feeling towards ‘noise’.

4.0 NOISE SURVEY METHODOLOGY

Site based noise measurements

4.1 The noise surveys have been carried out at 90 locations as specified in the tender document. The nine noise environments monitored in each local authority are listed below:

i) Adjacent to a busy urban road.
ii) Adjacent to a motorway.
iii) Adjacent to a railway line.
iv) Adjacent to a transport interchange.
v) In a suburban residential street.
vi) In a city/town centre.
vii) Near the airport.
viii) In a city park.
ix) In a rural area.

4.2 The distribution of the noise monitoring locations was discussed at a meeting held with the Local Authority Environmental Health Departments. Having decided on the general locations for noise monitoring, a visit was then made to each of the areas to choose suitable locations that fit into one of the above categories. Most monitoring locations were adjacent to the façade of houses.

4.3 Access was arranged with householders to locate the noise monitoring equipment, and an explanation of the purpose of the survey was provided. To assure participants of the study's authenticity, the surveyors were able to show them:

i) A business card identification, with the Hepworth Acoustics telephone number, so respondents could check the legitimacy of the project;
ii) A letter of authority from all the Merseyside Local Authorities (all the Local Authority logos appeared on the letter);
iii) A leaflet, outlining the purpose of the study and the Local Authority contacts who deal with noise complaints;

4.4 Participating respondents were acknowledged with a gift from the project partners of a pen and notepad. They were also given a 'Thank you' letter from the local authority.

4.5 The noise surveys were carried out over a 24 hour period with the microphone at a height of 1.2m above ground level and 1m from the façade of a building wherever possible. There were some areas where this was not be possible, e.g. city centre buildings where properties front onto the street. In these areas, it was necessary to carry out measurements at first floor level to avoid causing obstruction with the noise meter.

4.6 The noise measurements were carried out using Type 1 sound level meters complying with BS 60651 and BS 60804. All noise meters had their calibration checked before and after each survey to ensure that measurements were not affected by calibration drift. Measurements were carried out for a continuous 24 hour period on a weekday, with measurements not starting before 10:00am Monday morning and being completed before 4:00pm on Friday. Noise measurements were not carried out during school holidays. Noise measurements were carried out during relatively calm and dry weather conditions. The aim was to ensure that local wind speeds did not exceed 5m/s during the survey, and that there was no heavy rain during the period. Measurements were repeated where the above conditions were not met.

4.7 The survey data was obtained in 'A weighted' format. The noise indices L_{Aeq}, L_{Amax}, L_{Amin}, L_{A99}, L_{A90}, L_{A50}, L_{A10}, L_{A1} were recorded. Results are presented in terms of 1 hour values, although the data was recorded at 1 minute intervals so that more detailed analysis of individual measurements could be carried out if required.

4.8 The survey methodology was chosen to provide data compatible with that used in the National Noise Incidence Survey. A number of different time periods have been used in the report, as different guidance and regulations uses different time periods. The different time periods are defined below:

Description	**Time Period**
16 hour day	0700 – 2300
12 hour day	0700 – 1900
4 hour evening	1900 – 2300
8 hour night	2300 – 0700
18 hour day	0600 – 2400
24 hour day	0000 - 2400

4.9 The noise data has been analysed to compare the results from Merseyside with the national results obtained in the National Noise Incidence Survey. This includes the percentage of monitoring locations above the WHO guidelines for day and night, and the percentage of monitoring locations above the qualifying level for road traffic noise insulation. In addition, summary tables are provided for the range of noise levels measured in the nine different categories of area, and also for the range of noise levels in the 5 districts.

Noise modelling

4.10 The spread of noise from linear noise sources has been modelled using the Lima noise prediction software. This software is used to map large urban areas, and has already been used to map Birmingham and Westminster within the UK. The software produces noise contours from a three dimensional model of the noise source and surrounding buildings and ground contours. The results demonstrate the spread of noise in urban areas.

4.11 Predictions have been carried out for five examples of motorways, main roads and railways, one in each of the five boroughs. In order to provide some validation of the measurements, 24 hour noise monitoring has been carried out at five locations adjacent to one example of motorways, main roads and railways.

4.12 Information is presented on the correlation between predicted and measured levels at the 15 monitoring locations. In addition, data is presented on the attenuation of noise levels with distance from the 3 types of linear noise source.

5.0 LOCAL AUTHORITY NOISE DATA

Collation of existing noise information

5.1 Key contacts from the local authorities have been established during the workshop meeting. During Stage 2, we would aim to develop the relationship with the relevant contacts in order to establish the availability of data and to obtain the data required for the study. This is likely to consist of:

i) Existing noise survey data; and

ii) Complaints data.

5.2 The key unknowns at this stage are the extent of any data, the quality of data and its accessibility from the various Councils involved. It has been assumed that:

i) The Merseyside Borough Environmental Health Departments have computerised records of complaints that will include category and type of complaint. (This is typically reported to the Chartered Institute of Environmental Health on an annual basis).

ii) Noise survey data will be paper based and is likely to be held by planning departments on the relevant development control file.

iii) In order to correlate with the noise survey data (which will be gathered as part of this study) we would ignore any survey data of less than 24 hour duration.

iv) Complaint and survey data would only be gathered for the last 3 years.

5.3 This information will be used to compare with the survey data obtained as part of this project.