CST Environmental &
Acoustic Consultants

Supplementary Acoustic Report: PPG 24 Assessment

Site c/o Orchard Road /Garden Road Richmond Upon-Thames TW9

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1.0 Introduction

1.1 This report is to be read in conjunction with our April 2007 PPG 24 assessment undertaken for Harepath Properties.

1.2 The local planning authority, on the advice of its specialist Environmental Health Officer, has asked for a detailed assessment of the existing local noise climate during the night period. The request was made in response to concerns about potential noise disturbance from adjoining commercial sites. The site immediately to the south is occupied by Dairy Crest who operate the Richmond Milk Depot, whilst the loading and unloading bays belonging to the Sainsbury's Superstore immediately adjoin the western side of Garden Road. The request followed our previous 24 hr unattended survey which indicated that the local noise climate is influenced mainly by road traffic and aircraft en route to Heathrow. In terms of the PPG NEC scheme we suggested that the survey results indicated that the site sits within NEC category B by Day and C by night (due to Heathrow arrivals between 04:30 and 07:00 hrs). This survey was fully inclusive of any noise generated by the Dairy and Sainsbury's during the night. PPG 24 specifically advises that at a mixed noise site where industrial noise is present but not dominant, its contribution should be included in the noise levels to establish the appropriate NEC.

1.3 For ease of reference the relevant day and night noise levels are shown in the table below which is taken from our 2007 report:

Table 1 – Local Noise Climate

Time	Measured $L_{Aeq\ 16/8\ hr}$	Free Field Adjustment	Resultant $L_{Aeq\ 16/8\ hr}$	NEC
07:00 – 23:00 hrs	65	-3dB(A)	62	B (55 - 63 dBL_{Aeq})
23:00 – 07:00 hrs	61	-3dB(A)	58	C (57- 66 dBL_{Aeq})

1.4 The local authority has specifically asked that a British Standard 4142:1997 assessment be undertaken. PPG 24 advises local authorities that British Standard 4142:1997[1] should be used as the preferred assessment tool where industrial noise has the potential to impact on residential property. BS 4142 provides what is often referred to as a comparative noise assessment in which the existing noise environment is compared to the future situation with the subject plant operating. A BS 4142:1997 assessment provides an indication of the extent to which a fixed noise is likely to generate complaints from local residents. It is the only objective government approved test for assessing noise impact from fixed plant and machinery.

1.5 In addition we were asked by the local planning authority to measure a representative sample of single event noise levels (L_{Amax}) during periods of night time activity on the adjoining sites. Where night time noise levels due to transportation noise sources are of some concern L_{Amax} levels can be useful in determining the potential that such noise excursions may have in causing

[1] BS 4142:1997 " Method for Rating Industrial Noise affecting Mixed Residential & Industrial Areas"

sleep disturbance to new occupants. Government policy enshrined in PPG 24 is that at night outside single event levels below 82dBL_{Amax} are unlikely to cause sleep disturbance for most people.

1.6 In order to respond to the above concerns it was decided to undertake two new assessments. The first being a repeat of our April 2007 survey over a Friday / Saturday period but on this occasion the measuring microphone was placed on a boom overlooking Orchard Road and the Dairy at second floor level. The second assessment was attended throughout the early morning period and comprised a formal BS 4142:1997 assessment.

2.0 Details

2.1 <u>24 Hour unattended survey</u>

2.2 As before a precision grade sound level was mounted the end of a boom projected from a second floor window of the main building. On this occasion a location was chosen overlooking Orchard Road and the Dairy rather than the A316. The survey commenced at around 14:30 on Friday 11th April 2008 and was left to run for 24 hrs.

2.3 The results of this survey are set out in full at section 4 of this report but Table 2 below sets out a summary of the results. It can be seen from the table that the night time L_{Aeq} results are identical to those obtained in 2007 and the daytime result is 1dB(A) less.

Table 2

Time	Measured $L_{Aeq\ 16/8\ hr}$	Free Field Adjustment	Resultant $L_{Aeq\ 16/8\ hr}$	NEC
07:00 – 23:00 hrs	64	-3dB(A)	61	B (55 - 63 dBL_{Aeq})
23:00 – 07:00 hrs	61	-3dB(A)	58	C (57- 66 dBL_{Aeq})

2.4 <u>Early Morning attended Survey</u>

2.5 The attended survey was undertaken between the hours of 04:00 to 06:00 on 15th April 2008 for the purpose of observing activity on the adjoining sites and monitoring noise levels.

2.6 A video survey to monitor road traffic arriving and leaving the area was commissioned over the weekend period of the 14th /18th March 2008. The traffic data from Tues 18th March are attached at appendix vi to this report. Reference to the survey data for Tuesday 18th March (04:00 to 06:00hrs) shows a similar level of activity to that recorded during our attended noise survey and is consistent with the findings of our April 2007 report regarding the overriding impact that arriving aircraft have on the local noise environment the early morning period.

2.7 A plan showing the proposal site and measurement positions are included together with relevant photographs at Appendix 1.

3.0 Description of Site

3.1 The site is located some 100 metres to the south of the A316 close to the junction with Manor Road. A location plan is attached at Appendix 1. The local area can best be described as mixed residential and commercial with established housing to the north of the A316 whilst land immediately surrounding the proposal site is currently mainly in commercial use. An established "Express" dairy operates from land adjacent to the existing rear car park of the proposal site in Orchard Road whilst a Sainsbury Supermarket and petrol filling station is located on land to the west of Orchard Road.

3.2 Impact of Heathrow Airport. The site lies almost directly under the southern Heathrow runway (27L) and for most of the day overflying aircraft can be discerned as part of the local noise environment whether approaching on either the northern or southern runway.

3.3 Once aircraft begin using the southern runway they dominate the local noise environment around the site, this occurred just before 06:00 during the attended survey and was the reason for ceasing the survey as no further meaningful data from the adjoining sites could be captured without contamination from aircraft noise.

3.4 As with previous report (2007) a number of acoustic terms are used throughout, an explanation of these terms is provided at Appendix v of this report.

4.0 The Redevelopment Proposals

4.1 A design scheme has been produced which envisages the demolition of the current building which lies at the corner of Orchard Road and Garden Road and its replacement with a new building.

4.2 The proposed development will provide a mixed use of residential and B1 (office) uses on the site.

5.0 The Surveys –

5.1 The Unattended Survey

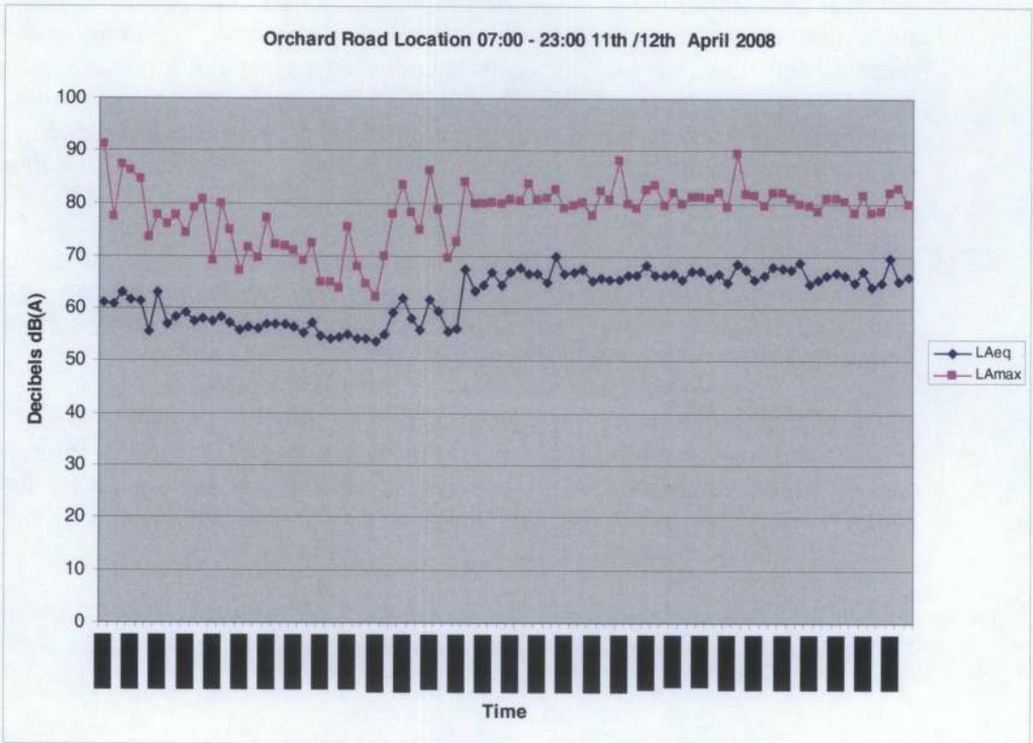
5.2 As with our April 2007 survey a microphone was mounted on a boom at second floor level from the existing building on the proposal site but on this occasion a position was chosen that overlooked both the Sainsbury delivery point and the Orchard Road dairy.

5.3 Measurements were taken using a Svantek 959 Precision grade sound level meter which has traceable calibration. The meter was calibrated on site to 94dB before and after the measurement period. No drift was detected.

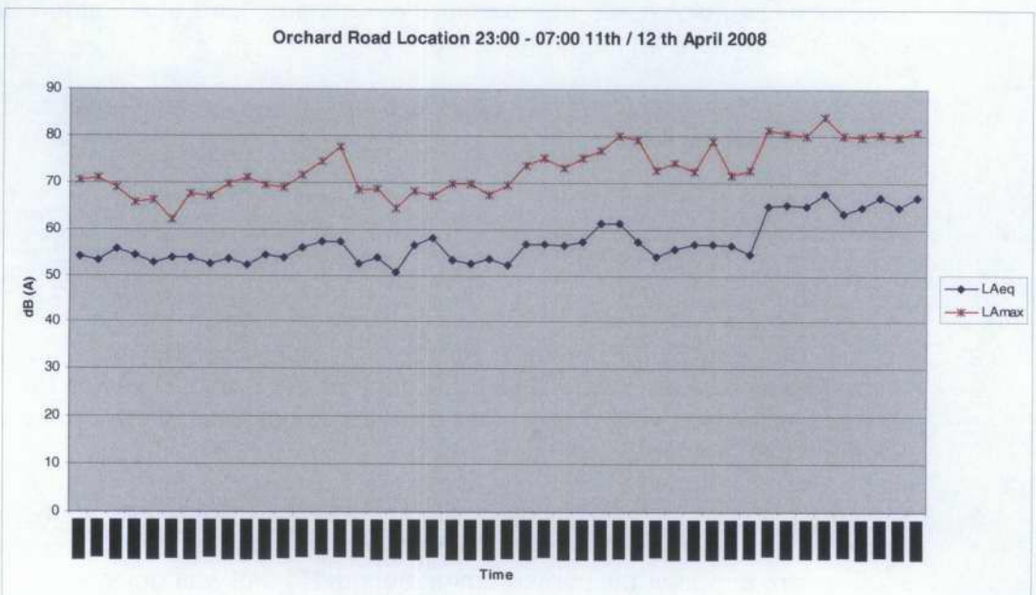
5.4 Measurements commenced just after 15:30 hours on Friday 11th April 2008 and the automatic recording features of the instrument were used to automatically log the data for a full 24 hrs.

5.5 The results are shown in graphical form below:

Graph 1



Graph 2



5.6 Commentary on Results of Unattended Survey

The impact of Heathrow arrivals can be clearly seen from the above graphs. On the day graph (graph 1) the change in runways between 27R (initially) and 27L after 07:21 on Saturday 12th is reflected by an increase in the measured L_{Aeq} of around 10dB. The effect on the night noise environment is similarly demonstrated in graph 2 where a step change can be seen in both the L_{Amax} and L_{Aeq} at around 05:11 hrs – the time of the first aircraft arrivals on that morning.

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5.7 The Attended Survey

5.8 An attended survey was undertaken from just before 04:00 to 06:00 hrs on 15th April 2008. Two survey positions were established within the ground floor yard area of the proposal site. The survey positions are shown in both the photographs and on the attached plan in the appendices to this report. Two precision grade sound level meters were used to monitor the local noise environment, the meters were both mounted on tripods 1.2m above the ground and a detailed log of observed activities on both the Sainsbury site as well as the Dairy was compiled; this is to be found at Appendix iii. A sample of the local noise climate was also taken from the front of the site on Orchard Road at 04:10 hrs in order to confirm the background (L_{A90}) for the area. A level of 45.1 dB(A) was recorded which was in accordance with the lowest L_{A90} level recorded during our 2007 survey

5.9 The memory features of both meters were used to capture noise data. The Rion NA27 (serial number 00590991) was set to continuously record data every 5 minutes as required by BS 4142 for night time measurements. A Svantek 959 precision grade sound level meter (serial No. 11229) was also used for noise measurements but this was set to a 1 minute data capture period in order to identify short term noise excursions. Both meters have traceable calibration and were calibrated to 94dB on site both before and after the measurement period using a Castle Associates acoustic calibrator (serial number 0500301). Neither meter showed any drift in calibration.

5.10 A printout of the survey data is included at Appendix iv.

6.0 Discussion of Results

6.1 The Local Noise Environment

6.2 The activity log confirms that the dairy site is active during the early morning period. It was judged that the Sainsbury operations impacted to a significantly lesser degree on the proposal site although it was noted that a compressor located close to the boundary of the Sainsbury site was audible from the survey position throughout. No reversing alarms or other short term tonal noises were observed although it was possible at times to hear conversation and activities such as pallet trucks being used.

6.3 A difficulty with this particular assessment is in fairly establishing the noise level which is to be taken as measured noise level for the BS test. BS 4142 has its routes in assessing fixed plant and machinery which lend themselves more readily to identifying either a steady noise output or a repeatable pattern of noise. The local noise environment as expressed by the L_{Aeq} was found to vary at times due to changing noise sources during the survey period. The main sources were identified as: vehicle noise, noise from loading and unloading pallets, human voices from the dairy loading bay and aircraft noise.

6.4 For the purposes of the assessment we have taken the following baseline levels (shown in Table 1 below) which we believe are a fair representation of the local noise environment including the background noise level for the area.

Table 1

Time	Measured Noise Level	Residual Noise Level	Measured LA 90
04:00 – 06:00 hrs	52dB(A)	49 dB(A)	47dB(A)

6.5 The above levels were then used to prepare the following BS 4142:1997 assessment

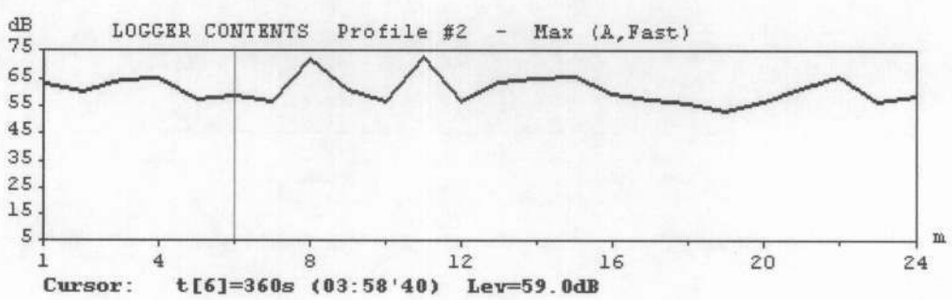
BS 4142 Assessment

Measured Noise	52 dB(A) (See Graphs Sv + Ri)
Residual Noise (estimated from survey)	49 dB(A) (See Graph)
Background Level (L_{A90} – measured)	45 dB(A) (Graph Sv)
Correction (From Table 2 BS 4142)	-3 dB(A)
Specific Noise Level L_{Aeq} 5Min	49 dB(A)
Acoustic Correction (+5dB)	+ 5 dB(A)
Rating Level	54 dB(A)
Excess of rating over background level	+ 9dB

Result – The assessment is below the + 10 dB threshold given in BS 4142 as positive indication that complaints are likely.

6.6 L_{Amax} values

6.7 The following charts show the range of L_{Amax} values recorded. As found in our March 2007 survey, the highest recorded values were due to aircraft arrivals when overhead.

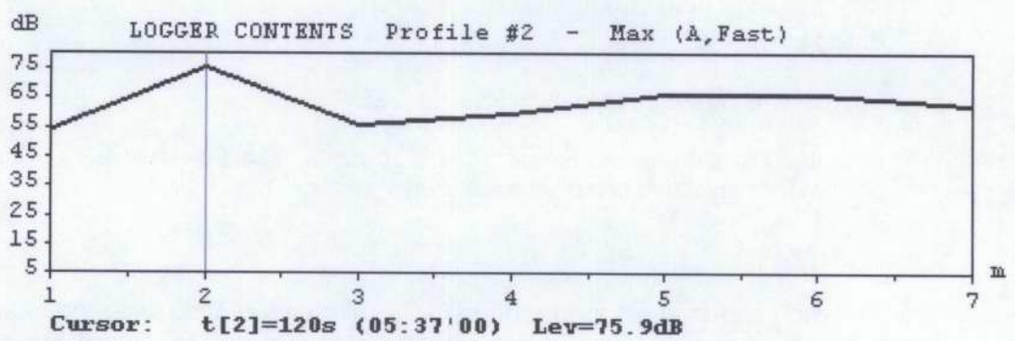


Statistical levels for Histogram: Profile #1 - Leq

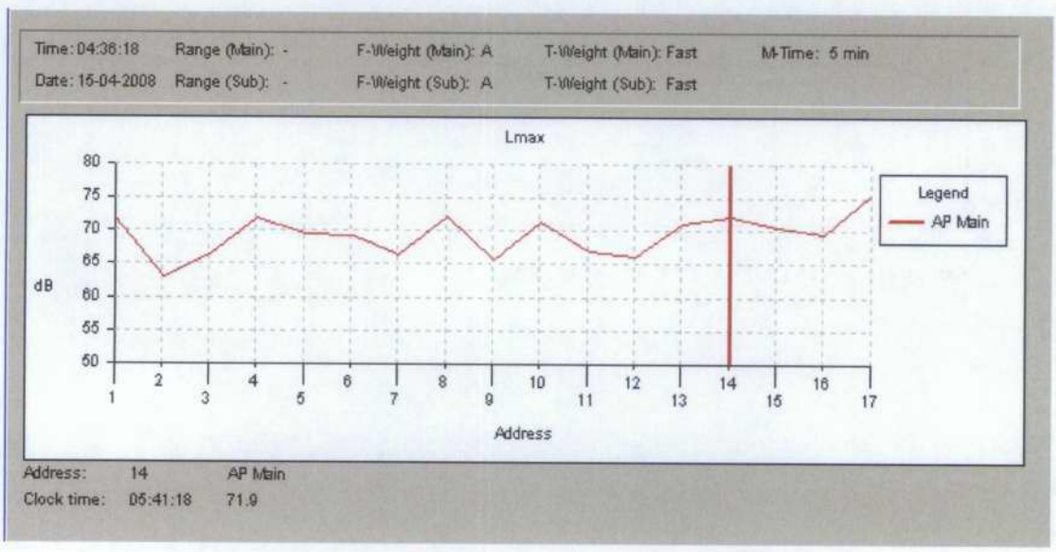
i	1	2	3	4	5	6	7	8	9	10
ni[%]	1	10	20	30	40	50	60	70	80	90
ni[dB]	60.6	50.8	48.2	47.3	46.7	46.2	45.8	45.6	45.4	45.1

L90 results

L_{A90} Result – Front of Site Orchard Road



Svantek – L_{Amax} results



6.8 Impact of Commercial Activity on the Proposed Scheme

6.9 In order to respond objectively to the concerns of the local authority in respect of possible night time disturbance to residents from commercial activity on adjoining sites a table has been constructed at Appendix vii listing the location of the potentially affected windows in blocks A, B and C and the impact that adjoining commercial activity can be predicted to have.

6.10 The benchmarks for a pass/ fail are taken from PPG 24 which recommends that night time levels should not exceed 35dB(A) internally. For daytime levels the BS 8233:1999 standard of 40dB(A) has been adopted which is defined as a reasonable internal noise level for resting. For the avoidance of doubt all windows will be thermally double glazed. PPG 24 advises that thermal double glazing can be expected to achieve at least 32dB(A) reduction between inside and outside noise levels.

6.11 Many of the proposed bedrooms will be acoustically shielded from the commercial activities on the adjoining sites by virtue of looking out on to the central court yard area. The table at appendix vii incorporates a reduction of 5dB(A)[2] or 10dB(A) were appropriate on the BS 4142 rating level.

6.12 A small number of windows on the proposed south elevation of block C will directly overlook the Dairy loading bay. However these windows will either be into circulation spaces or at high level into kitchen / living areas. They will not be required to be openeable for ventilation purposes. It is therefore proposed these windows be thermally doubled glazed and fitted with an outer leaf of acoustic laminate glass ("Optilam phon" or similar) providing an average weighted sound reduction index (Rw) of 36dB(A).

6.13 A number of the proposed bedrooms will overlook Garden Road. Some will overlook Market Road. On the basis of both the video results and our own our own observations, there is no evidence to suggest that either Garden Road or Market Road is used on a regular basis by commercial traffic serving the Dairy. No objective basis for concern about the impact of commercial activity on these elevations has therefore been established.

6.14 The design scheme envisages that some bedrooms will overlook Orchard Road. Both the traffic survey and our own BS 4142 assessment confirmed that night time activity on the Sainsbury site is limited. Windows overlooking Orchard Road will experience noise levels from the Dairy some 2 / 3 dB(A) lower than the "free field" measurements we recorded due to a 90 degree angle of view that will occur between these windows and the dairy loading bay.

[2] BS 5228 D.3.2.2.1 – advises that 5dB(A) reduction can be assumed where there is partial line of sight from noise source to receptor and 10dB(A) where a noise screen completely hides the source from the receiver.

7.0 Conclusions

7.1 A total of 3 Noise Assessments have now been carried out. Surveys 1 and 3 for PPG NEC purposes confirm that the site is affected both by day and night from transport related noise sources. By reference to the PPG 24 NEC scheme the site can be categorised as NEC B (day). At night along with wider surrounding area the site falls into category NEC C due to early morning Heathrow arrivals rather than because of noisy events emanating from either of the adjoining commercial operations.

7.2 The BS 4142:1997 assessment of night time (early morning) operations around the proposal site confirmed that there is activity from both the Dairy and Sainsbury at this time. However the BS assessment did not positively indicate that complaints can be expected from new residents. It is in our view therefore reasonable to conclude that the proposal site passes this test.

7.3 Analysis of the activity logs from both the traffic survey and the BS 4142 assessment shows that the Dairy is the main source of noise at night until the early morning Heathrow arrivals begin at around 04:30 hrs. Our observations confirmed the findings of the traffic survey regarding the limited activity that takes place on the Sainsbury site at night. However a compressor located within the open area of the Sainsbury loading bay does currently impact to some extent on the local noise environment throughout the early morning period.

7.4 An evaluation of the future impact on the proposals from adjoining commercial activities shows that during the sensitive night time periods internal noise levels in all of the proposed bedrooms will meet the 35dB(A) benchmark set down in PPG 24 standards. The survey results give confidence that the 82dBLamx (s) levels will also not be breached.

7.5 PPG 24 provides specific guidance on measures to mitigate the impacts of noise. The proposed design scheme incorporates both layout and engineering solutions in order to satisfactorily mitigate the limited impact that the local night noise environment can be predicted to have on future residents. For example care has been taken in the design at the outset to ensure that no bedroom windows will directly overlook the Dairy. The few windows to the south elevations which will overlook the loading bay are either into circulation spaces or are high level windows into kitchen / living areas. It is proposed to use high performance laminate glazing in sealed thermal units for these windows.

7.7 The courtyard design will offer significant acoustic shielding for bedroom and living room windows that will look out on this area.

7.8 Reference to the latest set of measurement data shows that recorded single event (L_{Amax}) noise levels comfortably met the upper recommended standards for residential development of 82dB$L_{Amax.}$

7.9 Overall we can therefore see no objective reason on noise grounds for deeming the site to be unsuitable for housing, especially as housing already backs on to Dairy from the south.