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REPORT

of

SOUND MEASUREMENTS AND RECOMMENDATIONS

at

PROPOSED RESIDENTIAL DEVELOPMENT, LAND OFF PROSPECT ROAD, CLECKHEATON, WEST YORKS BD19.

Date of measurements: 2nd September 2014

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1.0 Summary and Conclusions

An application is being submitted for demolition of an existing industrial building and residential development on the cleared land off Prospect Road, Cleckheaton. The site is near existing industrial premises and for this reason the applicant has commissioned this survey and report on the existing sound levels as affecting proposed residential properties. This report describes sound measurements at the site during periods of daytime and night and compares the results with the current acceptance standards.

1.1 The outdoor sound levels at the site were measured at 37-40 dB LA_{eq} during the daytime and 34-38 dB LA_{eq} at night. The dominant noise source affecting the site was road traffic, with a low level of sound from the adjacent factory becoming audible during brief periods when road noise fell naturally to its lowest levels.

1.2 It is recommended that the LPA's acceptance standards on interior sound levels within dwellings can be achieved by fitting conventional double glazing using two panes of 4mm glass (eg. 4-12-4, 4-16-4, etc.) to the windows of all habitable rooms across the development.

1.3 Ventilation will be achieved within the LPA's daytime and night noise requirements by using open windows.

1.4 It is recommended that all bedroom ceilings on the upper floors of dwellings may be single boarded.

1.5 The LPA's acceptance standard on road traffic noise affecting private gardens will be achieved across the site with no special mitigation measures.

1.6 Sound generated at the adjacent factory as affecting potential dwelling positions near the works boundary is rated at 2 dB above the daytime background sound levels. Noise mitigation is available if required by the provision of a fence of height 2.0m to an acoustical standard along the east boundary of the development site.

2.0 Planning Requirements on Noise

The requirements of the Local Planning Authority with respect to noise are to ensure the minimum standards quantified in the Kirklees Council guidance document 'Noise Design Advice'. These requirements are summarised below.

2.1 Road Traffic Noise

Section 2.1 of the Kirklees MBC document deals with the sound level requirements of new residential properties affected by transportation noise sources and quantifies the minimum standards as:

35 dB LA_{eq} (1-hour) in habitable rooms between 0700 and 2300 hours,
30 dB LA_{eq} (15-min)) in bedrooms between 2300 and 0700 hours,
45 dB LA_{1} (15 min) in bedrooms between 2300 and 0700 hours,
55 dB LA_{max} in bedrooms between 2300 and 0700 hours,
50 dB LA_{eq} (1-hour) in private gardens between 1000 and 1500 hours.

2.2 Existing Industrial or Commercial Noise Affecting New Dwellings

Section 3.1 of the Kirklees MBC document gives requirements which are different to those described above for locations where new residential properties are affected by noise from existing commercial or industrial sources. An assessment is required in accordance with BS 4142 from which the design target is a rating level of the outdoor sound to be at least 5 dB below the background levels during daytime and at night. An alternative design target is to achieve the following interior levels:

NR 30 in habitable rooms between 0700 and 2300 hours,
NR 25 in bedrooms between 2300 and 0700 hours,

The NR values are reduced by 5 dB if there is a distinguishable tone. They are measured as 15-minute L_{eq} values.

In all cases the above indoor sound levels are to be achieved "with windows open or with acoustic ventilation provided which is over and above 'background' ventilation."

3.0 Sound Sources

Road Traffic

The development site has existing dwellings on all sides and is 80m from the nearest road, Prospect Road, onto which there is an access road. Road traffic provided the dominant sound source affecting the site during our daytime and night survey periods.

Industrial Premises

Part of the eastern boundary of the site is adjacent to a carpet factory. Normal working hours are 07.30-16.00 on Mondays to Fridays with no night or weekend activities, but there is understood to be no planning restriction on working hours at the premises. The west elevation of the factory facing the development site is entirely imperforate brickwork with the exception of one personnel-size emergency door. There is a vehicle access door in the north elevation of the factory building which is often left open. This does not face any part of the development site and is shielded from the site by an existing dwelling which is to remain in place. However the open door in the north elevation represents the main path by which factory noise reaches the outdoor environment.

There were no other sound sources affecting the development site during our survey periods.

4.0 Sound Measurements

Sound levels were measured during a period of weekday daytime and at night on Tuesday 2nd September 2014. Positions were used outdoors at:

Plot 1. Nearest dwelling to large open door in factory north elevation.
Plot 4. Nearest dwelling to small open fire door in west elevation.
Plot 11. South boundary of site.
Plot 17. West boundary of site.

The factory was visited during the daytime survey period and confirmed to be working at full production output. Conditions during the survey periods were dry with no wind. All results were taken using a Bruel & Kjaer type 2260 precision sound analyser for which current calibration certificates are held.

Sound Descriptor		Daytime 1500-1700	Night 2230-0000
Plot 1			
Ambient	LA_{eq}	39.4	36.2
Background	LA_{90}	35.2	32.4
Maximum	LA_{max}	55.5	56.1
Plot 4			
Ambient	LA_{eq}	36.9	35.8
Background	LA_{90}	34.2	32.8
Maximum	LA_{max}	54.8	52.2
Plot 11			
Ambient	LA_{eq}	40.3	37.7
Background	LA_{90}	37.2	33.4
Maximum	LA_{max}	54.5	58.1
Plot 17			
Ambient	LA_{eq}	38.6	34.1
Background	LA_{90}	35.6	33.2
Maximum	LA_{max}	52.7	50.1

Frequency spectra of the highest daytime and night results were:

Sound pressure levels, dB linear

Frequency (Hz)	63	125	250	500	1k	2k	4k	8k
Daytime Leq	55.7	42.7	40.5	35.1	34.9	29.6	31.7	45.8
Night Leq	50.2	38.6	33.8	32.7	31.8	29.6	25.8	23.0
Highest Lmax	66.3	62.9	58.6	48.1	49.1	46.1	56.7	55.8

5.0 Sound Insulation to Outdoors

5.1 Interior Sound Levels

The basis of sound insulation is that the outdoor sound sources must not cause indoor sound levels in excess of:

- 35 dB LA_{eq} in living rooms from 0700-2300 hours,
- 30 dB LA_{eq}, 45 dB LA_1 or 55 dB LA_{max} in bedrooms from 2300-0700.

5.2 Bedroom Windows

The sound levels inside an interior room are given by the formula:

$SPL_{inside} = SPL_{outside} - R + 3 + 10 \log S - 10 \log A$

For a furnished domestic room the terms 'A' for sound absorption and 'S' for surface area are generally self-cancelling, which is assumed to be the case. The results show that conventional double glazing consisting of two panes of 4mm glass (eg. 4-12-4, 4-16-4, etc) will achieve the LPA's requirements for bedrooms.

Sound reduction indices dB:

Frequency (Hz)	63	125	250	500	1k	2k	4k	8k
Outer Walls	34	41	45	50	56	65	69	72
4-16-4 glazing	18	22	20	26	36	39	31	35
Wall and glazing	25	29	27	33	43	46	38	42

The maximum sound levels reaching bedrooms at night are:

Sound pressure levels dB linear, Lmax:

Frequency (Hz)	63	125	250	500	1k	2k	4k	8k
Outdoor SPL	66.3	62.9	58.6	48.1	49.1	46.1	56.7	55.8
3dB Reflection	3	3	3	3	3	3	3	3
Wall and Glazing	25	29	27	33	43	46	38	42
Indoor SPL	45	37	35	18	9	3	22	17

The overall level represented by the above spectrum is **30 dB LA_{max}**. The same calculation on the night L_{eq} results predicts an interior level of **7 dB LA_{eq}**. These interior sound levels meet the design targets.

It is recommended that all bedrooms throughout the site may be fitted with conventional double glazing using two panes of 4mm glass (eg 4-12-4, 4-16-4, etc) or the acoustic equivalent.

5.3 Living Room Windows

The same calculation as 5.2 on the highest daytime sound levels shows that conventional double glazing using two panes of 4mm glass will achieve an interior sound level of **13 dB LA_{eq}** which meets the LPA's requirement for living rooms.

It is recommended that all habitable rooms for daytime usage may be fitted with conventional double glazing using two panes of 4mm glass (eg. 4-12-4, 4-16-4 etc.) or the acoustic equivalent.

5.4 Ventilation

It is stated by the LPA that the indoor sound levels which have formed the basis of the design are “to be achieved with windows open or with acoustic ventilation provided which is over and above ‘background’ ventilation”. The LPA’s Noise Design Advice advises that the outdoor-to-indoor sound level difference across a window with a casement open for ventilation is 12 dBA. This suggests that the interior sound levels with windows open for ventilation will comply with the LPA’s daytime and night requirements.

5.5 Roof Materials

The sound insulation of a conventional pitched roof with plasterboard ceiling is usually governed by the plasterboard layer since the sound insulation of the outer roof is limited by ventilation apertures. Single 12.5mm plasterboard alone offers a sound reduction of 29 dB at 1kHz being the sound frequency which dominates the outdoor noise. There will be small but unquantified sound reductions from the thermal quilt, outer roof and decay up to the second floor. Taking these factors into account it is estimated that the overall sound reduction across the roof and a bedroom ceiling will meet the design targets at all dwellings across the site.

It is recommended that bedroom ceilings on the upper floor of all dwellings may be constructed from a single layer of 12.5mm plasterboard.

6.0 Gardens

The LPA calls for the outdoor sound levels in outdoor living areas not to exceed 50 dB LA_{eq} during the daytime. The sound levels across the whole site were 50 dB LA_{eq} or less during our daytime survey period from which it is concluded that the LPA’s requirement in gardens will be met.

7.0 Assessment of Industrial Noise

The ambient sound level at the nearest position of proposed dwellings to the noise source of the large open factory door (plot 1) was 39.4 dB LA_{eq} during the daytime survey period. This was audibly caused by road traffic noise with industrial noise just barely audible when road noise fell naturally to its lowest values. The ambient sound levels at other parts of the site caused entirely by road traffic were 36.9 to 40.3 dB LA_{eq}.

Subtracting the lower value of 36.9 dB LA_{eq} from the 39.4 dB LA_{eq} measured at plot 1 suggests a specific noise level of 35.8 dB LA_{eq} from the factory alone. The factory sound was broadband and continuous in character such that no correction is applied under the method of BS 4142. The rating noise level is 36 dB.

The lowest background level on the site was 34 dB LA_{90} during the daytime.

A comparison of the rating level against the background shows the industrial noise to be rated at 2 dB above the background sound level during the daytime.

There are no regular activities at the factory or industrial noise at night. We were advised that occasionally a single delivery van departs from the factory at night using the door in the north elevation of the factory building but this is an exception when an urgent delivery is needed. Since this activity could not be witnessed during our survey, occurs only occasionally, is of very short duration and takes place at the north elevation where it is entirely shielded from all proposed dwellings, it is not considered in the assessment of this report.

8.0 Noise Mitigation Possibility

The LPA normally calls for rating levels to be 5 dB below background levels. Since sound from the factory is rated at 2 dB above the daytime background the LPA may call for noise mitigation measures to protect the nearest dwellings along the east boundary of the site. If a fence is to be provided along the east boundary of the site then the fence would provide noise attenuation of 10-12 dBA and thereby comply with the LPA's usual requirement if constructed to an acoustical standard and of height 2.0m.

The basic requirement of a fence or wall erected to provide sound attenuation is that it must be entirely imperforate with no airgaps. A timber fence with overlapped or tongued-and-grooved boards would be

suitable. Fences with gaps between boards do not provide any sound attenuation, even if the boards are offset and the angle between them is such that there is no direct sightline through them. There must be no airgap under the fence, usually achieved by fitting the fence onto a low masonry wall or fitting a horizontal board into a gravel trench. Timber such as 12.5mm softwood (or greater) would provide adequate mass.
