Project

Turing House Free School
Baseline Noise Survey

Prepared for

Campbell Reith

By

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Revision	Date	Comments
A	05/07/2017	Issue.
B	17/08/2018	Revised following comments from DPP.
C	29/08/2018	Figure 2 (proposed layout) amended.
D	29/08/2018	Figure 2 (proposed layout) amended.
E	28/11/2018	Figure 2 & 3, Section 4.0 & 4.2 amended.

Summary

SRL Technical Services Limited has been commissioned by Campbell Reith to complete a baseline noise survey and noise break-in assessment for Turing House Free School, Whitton.

An unattended noise survey was done between Thursday 15 June and Wednesday 21 June 2017, at one location on site. An attended survey was done on Thursday 15 June 2017 at an additional 6 positions on site. The measurement results have been used to assess the likely noise break-in to classrooms, and to set plant noise limits.

It is recommended that the proposed layout of the site and school buildings is reviewed to minimise the likely façade treatments required to reduce noise break-in to classrooms. Less sensitive rooms/non-teaching spaces should be located nearest to the main noise sources, i.e. the B358 Hospital Bridge Road and the railway.

In the school's proposed location, acoustically attenuated natural ventilation and/or mechanical ventilation, will be required to control noise break-in to within the internal ambient noise level criteria. Natural ventilation using opening windows alone will be sufficient to the western and southern façades.

It is likely that 2m high close boarded fences will be required at the boundaries adjacent to sports pitches to reduce the potential noise impacts on residential receptors.

Any noise from new fixed plant installations should not exceed a rating level of 40 dB $L_{A,r}$ and 30 dB $L_{A,r}$ at the nearest sensitive receptors for daytime and night-time periods, respectively.

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1.0 Introduction

A new school is planned to be built along the B358 Hospital Bridge Road, Whitton, Twickenham, London.

To the north of the site are railway tracks with the nearest stations being Feltham, Hounslow, and Whitton. Residential properties are located north west along Redfern Avenue.

To the south east of the site is the B358 Hospital Bridge Road, that rises above site level to go over the railway tracks. Also to the east there is Sempervirens Nursery (a garden centre), and residential properties along Stirling Road.

To the south of the site are residential properties along Springfield Road, Heathfield Recreation Ground, and Heathfield Nursery and Infant and Junior Schools.

To the west is Borough Cemetery.

The site location, with its surrounding area, along with measurement positions is shown below.

Figure 1 Site and its surroundings with measurement locations

The proposed site layout is in Figure 2.

Figure 2 Proposed layout

2.0 Criteria

2.1 Building Bulletin 93

As this is a new build school, the acoustic performance will be subject to the criteria of BB93, February 2015.

Internal noise levels within the teaching rooms are typically required to be around 35-40dB $L_{Aeq,\ 30mins}$. If openable windows are used for natural ventilation, then the internal noise level criteria can be relaxed by 5dB to 40-45dB $L_{Aeq,\ 30mins}$.

2.2 Richmond upon Thames Supplementary Planning Document

Plant noise from the school will be subject to the Supplementary Planning Document from the London Boroughs of: Hillingdon, Hounslow, and Richmond Upon Thames "Development Control for Noise Generating and Noise Sensitive Development", stated in Table 2 within the document:

Table 1 Development Control for Noise Generating and Noise Sensitive Developments External Noise Standards

Table 2: New Industrial and Commercial Development - External Noise Standards

Noise Impact From Relevant Proposed Industrial Or Commercial Premises Or Plant	Development Outcome
Rating Level (LAr,Tr) is at least 5 dB(A) below the Background Level LA90	Normally acceptable
Rating level (LAr,Tr) is no more than 5 dB(A) above the Background Level LA90	Acceptable only if there are overriding economic or social reasons for development to proceed
Rating level (LAr,Tr) is more than 5 dB(A) above the Background Level LA90	Normally unacceptable

Note: All terms as defined in BS4142

This table shows that noise emitted from plant (rating level assessed to BS4142:2014) should ideally be designed to be at least 5dB(A) below the background Level ($L_{A90,T}$ dB) for it to be acceptable.

Plant noise will be assessed to BS4142:2014 'Methods for rating and assessing industrial and commercial sound'. It is typical to set a rating level of equal to the typical background noise level. Penalties may then be applied for any acoustic characteristics of the noise, e.g. tonality, intermittency, etc.

The plant noise will be designed to be equal to the representative background noise level, as determined from the survey. Penalties of 5dB are usually appropriate to account for some tonality (+2dB for a just perceptible tone) and intermittency (+3dB if the intermittency is readily distinctive against the background noise).

Designing the plant with these penalties in mind will be compliant with the Local Authority criterion of the rating level being 5dB below the background level as described in table 1.

3.0 Noise survey

Both attended short duration measurements were obtained along with extended (7 days) unattended logged measurements.

3.1 Attended measurements

All attended measurements were 15 minutes in duration and under free-field conditions (≥3.5m away from reflecting surfaces. Measurements were taken at 1.5m above local ground level. Results of the measurements are shown below.

Table 2 Attended measurements

Location	Start time	$L_{Aeq,15mins}$ (dB)	$L_{A90,15mins}$ (dB)	$L_{AFmax,15mins}$ (dB)
MP1	11:00	64	47	78
MP2	11:29	51	43	68
MP3	12:46	48	41	61
MP4	13:05	56	45	67
MP5	13:24	51	42	64
MP6	13:45	64	47	84

The noise climate consisted of trains passing along the nearby railway (slow local trains and faster outer London trains), road traffic noise, birdsong, rustling leaves, children playing in the nearby Heathfield schools, aircraft flying overhead, and work within Sempervirens Nursery.

The high L_{AFmax} noise level taken during measurements at MP6 was due to a nearby door slam from people going to Sempervirens Nursery.

3.2 Noise logger measurements

The results of the logger are shown in Figure 2. The tabulated results are in Table 3.

Weekday average noise levels were centred around 60-65 dB $L_{Aeq,15mins}$. The weekend daytime average noise level was centred around 50 dB $L_{Aeq,15mins}$. Night-time average noise levels were around 38-50 $L_{Aeq,15mins}$. The background noise levels generally ranged from 40-50 $L_{A90,15mins}$ during daytime periods, and 25-40 dB $L_{A90,15mins}$ during night-time periods.

Most maximum noise levels can be attributed to emergency services sirens, railway noise and occasional low flying aircraft. The uneven noise levels on Sunday 18 June are attributed to rail repair works and alarm horns from the railway. The overall drop in noise levels was due to reduced train noise and the sporadic maximum noise levels were due to rail engineering works and train horns.

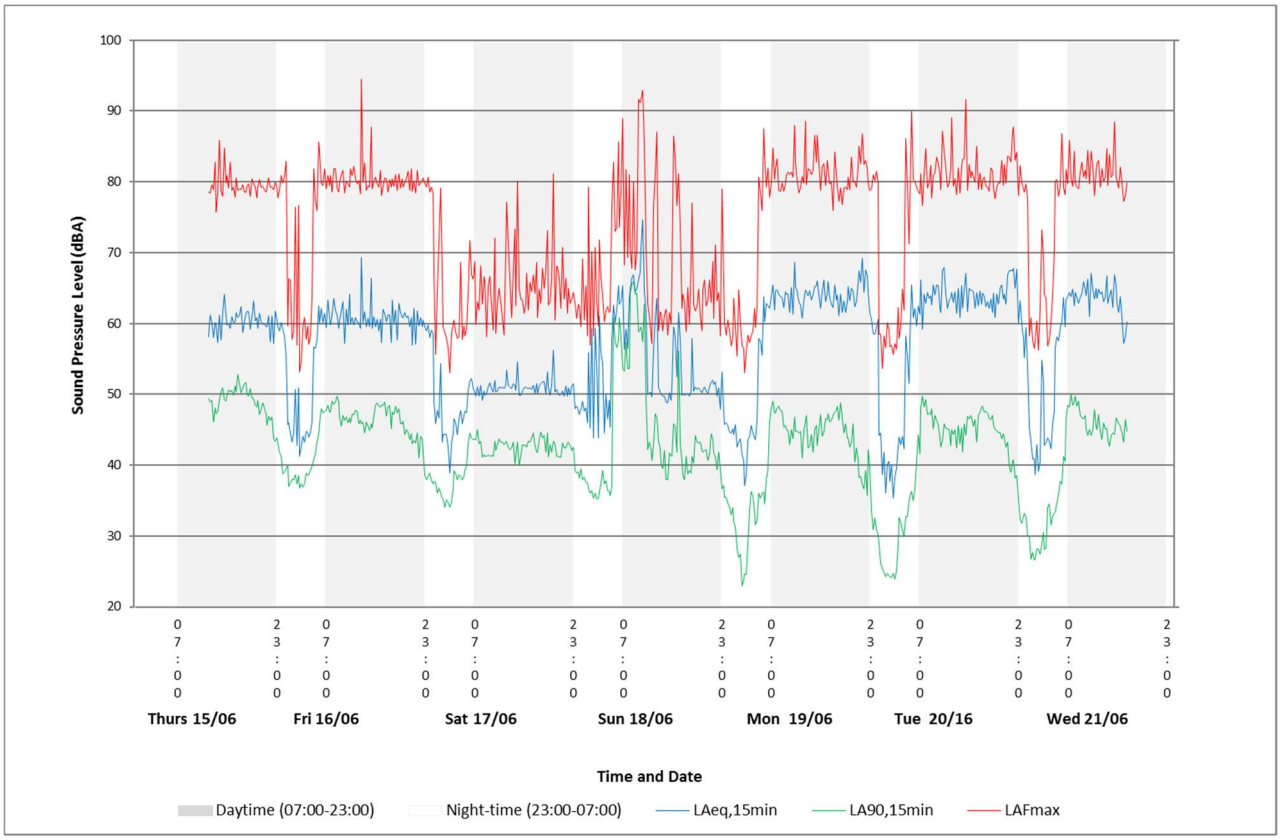


Figure 2 Unattended survey graph

Table 3 Unattended survey results

Date	Period	Average $L_{Aeq,15mins}$	Maximum L_{AFmax}	Average $L_{A90,15mins}$
Thursday 15/06/2017	Daytime* (12:00-23:00)	60*	86*	49*
	Night-time (23:00-07:00)	55	86	40
Friday 16/06/2017	Daytime (07:00-23:00)	63	95	46
	Night-time (23:00-07:00)	51	81	38
Saturday 17/06/2017	Daytime (07:00-23:00)	52	81	43
	Night-time (23:00-07:00)	56	86	41
Sunday 18/06/2017	Daytime (07:00-23:00)	63	93	46
	Night-time (23:00-07:00)	54	88	33
Monday 19/06/2017	Daytime (07:00-23:00)	66	89	45
	Night-time	56	90	31

Date	Period	Average $L_{Aeq,15mins}$	Maximum L_{AFmax}	Average $L_{A90,15mins}$
Tuesday 20/06/2017	(23:00-07:00)			
	Daytime (07:00-23:00)	66	92	45
	Night-time (23:00-07:00)	55	87	32
	Daytime* (07:00-16:30)	63	89	46

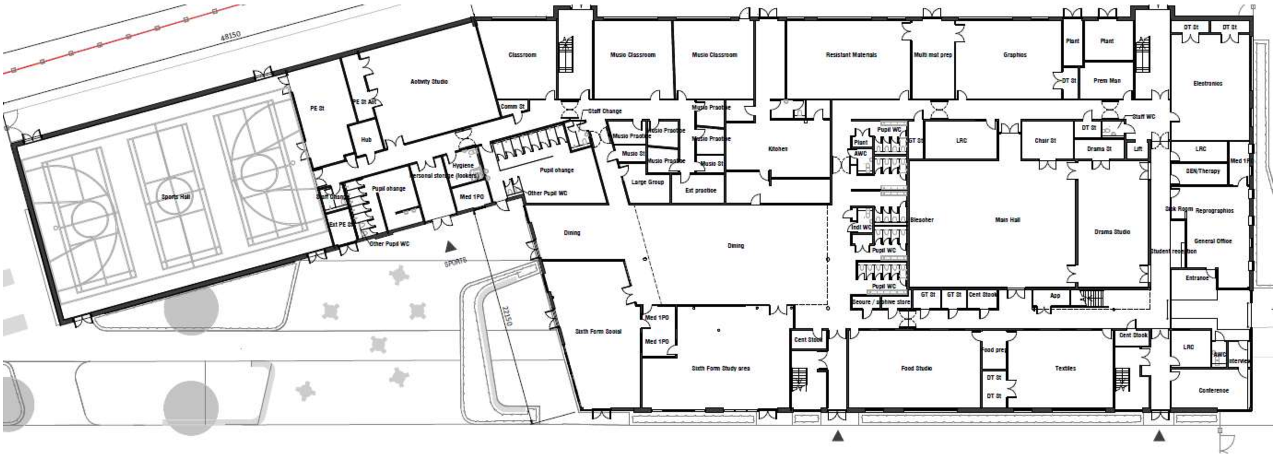
*Not a full daytime measurement

4.0 Discussion

The indicative ground floor plan is shown in Figure 3. Rooms on the first and second floors are general use classrooms.

With the school building in its proposed location, the façade noise levels are likely to be 60 to 63 dB $L_{Aeq,15mins}$ at the north and eastern façades. Mitigation measures are generally required when the façade noise levels approach or exceed 60 dBA.

Figure 3: Indicative ground floor plan



Due to the high noise levels recorded from the logger from Hospital Bridge Road, and the nearby railway, the orientation and layout of the school should be considered, to minimise the need for façade mitigation.

To minimise noise break-in to classrooms, ideally it would be best to move the school buildings to the west of the site, i.e. away from Hospital Bridge Road and shielded from the railway by the intervening residential dwellings. Placing the school buildings in this location would allow the internal ambient noise level criteria to be achieved using natural ventilation via opening windows alone. Most of the sports pitches could then be placed to the south of the school buildings. The school buildings would then shield noise levels to the residents north of the site and any potential mitigation would be required just to the south of the site (to protect the residents at the southern site boundary from noise from the playing fields/sports pitches). However, we realise that this may not be possible due to other site constraints.

If the school is to remain in the north-east site location, then the internal layout of the school should be planned to locate the more sensitive uses away from the nearby surrounding transport noise sources. Less sensitive rooms, such as the kitchen, plant room and non-teaching spaces should be placed in the north-east corner of the building. This is shown to some extent in Figure 3, but the eastern façade of the Electronics room (and classrooms above) is going to be most exposed to noise.

4.1 Internal noise levels

The western and southern façades can use natural ventilation via opening windows alone to meet the internal ambient noise level criteria.

As the expected façade noise levels at the north and eastern façades are 60-63 dB $L_{Aeq,15mins,}$ natural ventilation via opening windows alone will not be sufficient to control noise break-in to within the BB93 criteria. Acoustically attenuated openings in the façade will be required as a minimum to control noise break-in. Unfortunately, this tends to make it difficult to draw the air through the opening due to the increased resistance and therefore a mixed mode system may be required. In this case, the 5dB relaxation to the internal ambient noise level criteria would be allowed for natural ventilation. However, the mixed mode fans would also need to be attenuated to meet the BB93 indoor ambient noise level criteria when they are operating.

If the façade window opening sizes can be provided we can calculate a suitable specification for the attenuation measures that will be required.

Alternatively, a mechanical ventilation strategy can be used in teaching spaces to provide sufficient ventilation without the need to open windows (subject to installing suitably specified glazing).

There are no mandatory requirements for 'ancillary spaces'; kitchens, offices, staff rooms, corridors, stairwells and toilets, so these could be used as a 'buffer' to reduce the noise levels at more sensitive spaces.

To protect students from regular discrete noise events, e.g. aircraft or trains, indoor ambient noise levels should not exceed 60 dB $L_{A1,\ 30mins}$. This will be achieved by default for classrooms on the western and southern façades. We can assess noise from discrete noise events once the proposed façade mitigation is known.

4.2 Noise from playing fields/sports pitches

BB93 requires the noise levels at the boundary of external teaching/recreational areas to not exceed 60 dB $L_{Aeq,30mins}$. Based on the noise survey results, this criterion will be achieved.

As there are also residential receptors surrounding the site, the potential noise impact from the playing fields/sports pitches needs to be considered. The proposed sports pitches are approximately 10m from the nearest residential properties.

Assuming a typical noise level from a sports pitch boundary, the level at the façade of the nearest residential building will be 60 dB L_{Aeq} (when the nearest pitch is in use). Open windows give around 10 to 15dB attenuation, which results in internal noise levels ranging from 45 to 50 dB L_{Aeq}.

Some noise mitigation is required. Installing 2m high close boarded fences along the site boundaries (adjacent to the sports pitches) would reduce façade noise levels to around 50 dB L_{Aeq}. Internal noise levels would then be 35 to 40 dB L_{Aeq}. If the pitches are in use for 3 hours a day, the guideline internal ambient noise level criteria, measured as $L_{Aeq,16h}$, will be achieved in the nearest residential properties.

4.3 External plant noise

The typical daytime background noise level is 45dB $L_{Aeq,T}$. Penalties of 5dB are usually appropriate to account for some tonality (+2dB for a just perceptible tone) and intermittency (+3dB if the intermittency is readily distinctive against the background noise). Therefore, if new fixed plant installations are required, the total noise emissions should not exceed a daytime rating noise level of **40dB $L_{A,r}$**.

If plant is required to operate during night-time periods (23:00-07:00), e.g. starting kitchen extract fans during early morning hours, then the plant noise emissions should not exceed a night-time rating noise level of **30dB $L_{A,r}$** (considering 35dB $L_{Aeq,T}$ as a typical background noise level for the early hours of the morning).

During the unattended survey, some night-time noise levels were measured below 30 dB $L_{Aeq,15mins}$. However, it should be noted that rating levels of 30 dB $L_{A,r}$ or less are very low. With a rating level of 30 dB $L_{A,r}$ at the façades of the nearest dwellings (during night-time periods), and open windows on the dwellings for ventilation, sleep disturbance of residents is very unlikely to occur.

Appendix A - Survey Details

A1. Location of Survey

Near Sempervirens Nursery, B358 Hospital Bridge Road, Whitton, Twickenham, London, TW2 6LH.

A2. Date & Time of Survey

15/06/2017 12:00 - 2:00, attended measurements

15/06/2017 - 21/06/2017, unattended measurements

A3. Personnel Present During Survey

Robert Bungay, BEng AMIOA

A4. Weather Conditions during Survey

15/05/2017 Sunny clear skies, with slight gusts sometimes >5m/s

16/05/2017 Scattered clouds, with wind speeds generally <5m/s

17/05/2017 Partly cloudy, with wind speeds <5m/s

18/05/2017 Mostly cloudy, with wind speeds <5m/s

19/05/2017 Partly cloudy, with wind speeds <5m/s

20/05/2017 Scattered clouds, with wind speeds <5m/s

21/05/2017 Scattered clouds, wind speeds generally <5m/s

A5. Instrumentation

Brüel & Kjær

Type 2250 Sound Level Meter (SRL 2250 Purple, SRL No: 519) (serial no. 2559287)

Norsonic

Type Nor140 Sound Level Meter (SRL No:780) (serial no. 1404738

01dB-Stell

1kHz 94dB Calibrator, Cal21 (serial no. 51231425)

A6. Calibration Procedure

Before and after the survey the measurement apparatus was check calibrated to an accuracy of ±0.3 dB using the 01 dB Sound Level Calibrator. The Calibrator produces a sound pressure level of 93.8 dB re 2 x 10^{-5} Pa at a frequency of 1 kHz.

A7. Survey Procedure

Ambient noise levels were monitored at various positions around the site as shown on Figure 1. Explanations of the parameters used are listed in Appendix B.

Appendix B - Noise Measurement Parameter Definitions

L_{A90} - The "A" weighted sound pressure level that is exceeded for 90% of the measurement period. It is commonly used as the "Background Noise Level".

L_{A10} - The "A" weighted sound pressure level that is exceeded for 10% of the measurement period. This is often used for assessing traffic noise.

L_{Aeq} - The "A" weighted equivalent continuous sound pressure level. A representation of a continuous sound level containing the same amount of sound energy as the measured varying noise, over the measurement period. It can be considered as the "average" noise level.

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