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**Environmental Assessment
Residential Development
29 Berry Brow
Newton Heath
Manchester
M40 1GR**

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Shaw
Oldham
OL2 7RH**

June 2020

Introduction

AB acoustics were commissioned by Wiplow on behalf of Mr & Mrs Stelfox to undertake an acoustic assessment of the development at 29 Berry Brow.

This report has been prepared in response to Condition 12 of Planning Application 106570/FO/2014/N1 detailed below ;

and/or Remediation Strategy) which shall be submitted to and approved in writing by the City Council as local planning authority.

b) When the development commences, the development shall be carried out in accordance with the previously agreed Remediation Strategy and a Completion/Verification Report shall be submitted to and approved in writing by the City Council as local planning authority.

In the event that ground contamination, groundwater contamination and/or ground gas, not previously identified, are found to be present on the site at any time before the development is occupied, then development shall cease and/or the development shall not be occupied until, a report outlining what measures, if any, are required to remediate the land (the Revised Remediation Strategy) is submitted to and approved in writing by the City Council as local planning authority and the development shall be carried out in accordance with the Revised Remediation Strategy, which shall take precedence over any Remediation Strategy or earlier Revised Remediation Strategy.

Reason - To ensure that the presence of or the potential for any contaminated land and/or groundwater is detected and appropriate remedial action is taken in the interests of public safety, pursuant to policies DM1 and EN18 of the Core Strategy.

10) No development that is hereby approved shall commence unless and until samples and specifications of all materials to be used on all external elevations of the development have been submitted to and approved in writing by the City Council as local planning authority.

Reason - To ensure that the appearance of the development is acceptable to the City Council as local planning authority in the interests of the visual amenity of the area within which the site is located, as specified in policies SP1 and DM1 of the Core Strategy.

11) Before first occupation, the first floor windows in both side elevations of the new dwelling shall be obscure glazed to a specification of no less than level 5 of the Pilkington Glass Scale or such other alternative equivalent and shall remain so in perpetuity.

Reason - To protect the amenity and living conditions of adjacent residential property from overlooking or perceived overlooking and in accordance with policies SP1 and DM1 of the Core Strategy.

12) Before the development commences a scheme for acoustically insulating the proposed residential accommodation against noise from nearby railway line shall be submitted to and approved in writing by the City Council as local planning authority. There may be other actual or potential sources of noise which require consideration on or near the site, including any local commercial/industrial premises. The approved noise insulation scheme shall be completed before any of the dwelling units are occupied.

Noise survey data must include measurements taken during early morning rush-hour periods and night time to determine the appropriate sound insulation measures necessary. The internal noise criterion are as follows:

- Bedrooms (night time - 23.00 - 07.00) 30 dB LAeq
- Individual noise events should not normally exceed 45 dB L_{Amax} (BS 8233:1999)
- Living Rooms (daytime - 07.00 - 23.00) 40 dB L_{Aeq}



Approximate Site Location

Approximate Measurement Location

As can be seen the development is location in an urban location adjacent to other residential properties. - there is no traffic movement immediately at the front / rear of the property as access is down a small cul de sac .

The development site is adjacent to a railway line – the Leeds to Manchester / Liverpool line – there are a number of passenger trains that travel along this line between Leeds and Manchester / Liverpool together with a number of goods trains – the majority of train movements are between 07.00 and 23.00 hrs but movements are possible over the whole of any 24 hr period.

It is the aim of this report to estimate the effects of the rail noise on the development – however it should be noted that there are a number of residential properties at similar distances from the rail line. No industrial activity was evident in the immediate area of the site though there was some noise from nearby roadworks on Berry Brow.

In BS 8233:2014 design criteria is provided for noise levels inside buildings : summarised these are :

Location	Activity	07.00 – 23.00	23.00 – 07.00
Living Room	Resting	35 dBA	-
Dining Room	Dining	40 dBA	-
Bedroom	Sleeping / Daytime Resting	35 dBA	30 dBA

Individual Noise Events should not normally exceed 45 dB LAmax in the bedrooms

The above 30 dBA level is acceptable as avoiding sleep disturbance.

The measured external levels are compared to the required internal levels in the Standard to determine the attenuation that must be offered by the structure of the building in order to achieve the required internal levels.

Also it is generally accepted that an open window will achieve an attenuation of 12 dBA to the external noise.

The requirements specified should be regarded as the minimum.

The requirements specified in the following report should be regarded as the minimum.

Note is also made of the requirements for 'external amenity area' with respect to the guidelines laid down by the World Health Organisation (WHO).

The Qualitative Guidance NPPG

This new guidance issued in March 2014 is qualitative therefore it does not contain any quantitative guidance on acceptable noise levels.

Paragraph 10 states ' *Care should be taken, however, to avoid these (British Standards) being implemented as fixed thresholds as specific circumstances may justify some variation being allowed* ' .

Therefore it is clear that current guidance assumes that quantitative standards can be used provided that there is flexibility in their application.

In paragraph 5 various noise categories and thresholds are set out; up to and including "Noticeable and Intrusive" it seems likely that the intention would be to recognise that whilst the noise levels are not desirable, planning consent should be granted provided that the noise can be mitigated and the intrusion reduced to a minimum. "Noticeable and Intrusive" noise occurs when:

"Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life."

Above the 'Significant Observed Adverse Effect Level ' - SOAEL – threshold, noise becomes 'Noticeable and Disruptive ' because

"The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty

in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area."

Noise which is "Noticeable and disruptive" should be avoided; however, it is the next level of disturbance "Noticeable and very disruptive" that should be prevented.

It can be seen that the NPPG noise guidance envisages that if properties are provided with alternative ventilation and acoustic glazing, designed to ensure "acceptable" internal noise levels, then internal noise levels would not exceed the "Significant Observed Adverse Effect Level" and that planning consent could be granted. The guidance states "If the exposure is above this level the planning process should be used to avoid this effect occurring, by use of appropriate mitigation such as by altering the design and layout."

National Planning Policy Framework

This provides brief guidance on planning and noise – it states that planning policies and the resultant decisions should aim to :

A – 'avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of the development.'

B – 'mitigate and reduce to a minimum other adverse impacts on health and quality of life arise from the new development – this includes the use of conditions'.

C – recognise the development will often create some noise and existing businesses wanting to expand to develop in continuance of their business should not have unreasonable restrictions placed on them because of changes in nearby land uses since they were established.

D – identify and protect areas of tranquility which have remained relatively undisturbed by noise and are prized for their recreational and amenity value.'

Therefore the above internal values from BS 8233 : 2014 are used

BS 4142 : 2014 – though not actually applied to this situation.

It is now a requirement of BS 4142 to consider the potential uncertainty of the assessment – the steps taken to reduce uncertainty as far as practical included :

All the measurements were made with a Type 1 sound level meter with certificates of calibration and field calibration checks were undertaken after each series of measurements with a minimal drift (0.1 dB) recorded.

Variations in ground cover between the proposed site and the receivers could affect the ground absorption and therefore the calculated levels at the various receivers – in order to reduce this problem it has been assumed that there is acoustically reflective ground cover over the various distances.

Inaccuracies that could result from estimates of the intervening ground cover – meteorological conditions etc. will not be significant.

Equipment Used and Measurement Method

The noise levels were measured using a :

Brüel & Kjær 2260 Type 1 Sound Level Meter

Calibration was undertaken using a :

Brüel & Kjær type 4231 calibrator

The measurement was carried out at the location shown.

The measurements were undertaken at the times stated in the results.

Discussion

The rail noise from the passing trains was measured at the location shown above.

As the principal source of noise at the site was considered to be the railway - then the noise level was determined as recommended by the *Calculation of Railway Noise* document.

The noise levels were measured during the train passages in terms of 'sound exposure level' – SEL – also measured was the maximum sound pressure level – L_{max} .

The rail noise is determined in terms of the daytime L_{Aeq16h} and the night time L_{Aeq8hr} levels by using the following formulae :

$$L_{Aeq(T)} = SEL_{average} + 10\log N - 10\log T$$

Where : $L_{Aeq(T)}$ = Average L_{Aeq} over time period T

$SEL_{average}$ = Average Sound Exposure Level

N = Number of train passages in time period T

T = Time period in seconds.

It is understood that a total of 138 passenger trains pass the site (Timetable information) during a weekday between the hours of 07.00 and 23.00 and 8 trains between the hours of 23.00 and 07.00 hrs. However it is unclear whether all these trains actually operate at the present time as the actual count of train passages from the graph results in a total of 85 between 07.00 and 23.00 hrs and 8 between 23.00 to 07.00 hrs.

In the following calculation the higher number has been used in order to give a more robust assessment.

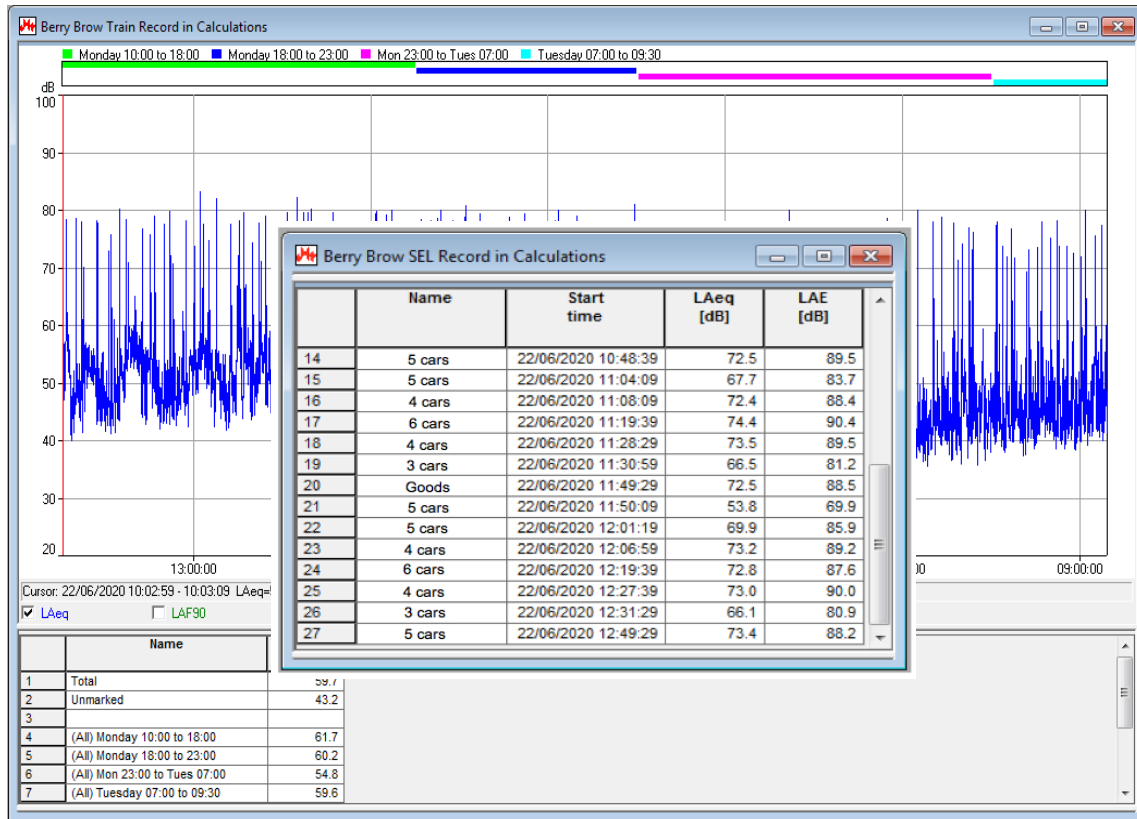
During the attended measurement period a total of 14 SEL measurements were observed made of the train pass-by events.

Date	Wind Speed m/sec	Wind Direction	Temp. C	Rain	Cloud Cover %	Road Condition
22 06.2020 Start	3.4	W	17	No	50	Dry
22.06.20 End of Attended	3.9	SW	18	No	40	Dry
22.06.20	1.9	S	19	No	100	Dry

The actual SEL's for the train passages are given below – together with the measured L_{Amax} levels .

During the measurements the noise level consisted of the noise from the passing trains – wind noise in the nearby trees but also noise from distant traffic. There was also noise from the road works on Berry Brow itself.

In the overall measured LA_{eq} the contribution from these other sources (road works on Gutter Hill) has been included even though this raises the noise level at the proposed site in order to produce a robust assessment.



As can be seen the 'daytime' noise level varied very little between the measurement hours of 10.00 on Monday until 09.30 on Tuesday recording a log average of **61 (60.5) dBA**.

The measured LA eq between the hours 23.00 to 07.00 being **55 (54.8) dBA**

The above Table details the SEL's for the train passages observed.

Train Type	Measured SEL	Average
6	90.4 – 87.6	89.0
5	89.5-83.7-69.9-85.9-88.2	83.4
4	88.4 – 89.5 – 89.2 - 90	89.3
3	81.2 – 80.9	81
Goods	88.5	88.5

From the above the frequency of train types can be calculated with the following results :

6 Coach – 14%
5 Coach – 36%
4 Coach – 29%
3 Coach – 14%
Goods - 7%

Therefore it is possible to determine the likely number of trains that that pass No. 29 during the two times periods of interest.

Train Type	07.00 – 23.00 hrs	23.00 to 07.00 hrs
6 Coach	19	1
5 Coach	50	3
4 Coach	40	2
3 Coach	19	1
Goods	10	1

Using the above equation :

$$L_{Aeq(T)} = SEL_{average} + 10\log N - 10\log T$$

Where : $L_{Aeq(T)}$ = Average L_{Aeq} over time period T
 $SEL_{average}$ = Average Sound Exposure Level
N = Number of train passages in time period T

T = Time period in seconds.

The L_{Aeq} levels for the various events can be calculated :

	07.00 – 23.00 hrs	L_{Aeq}
6 Coach	19	54.1
5 Coach	50	52.7
4 Coach	40	57.7
3 Coach	19	46.1
Goods	10	50.8

If the above are summed logarithmically the resultant level is calculated to be **61 (60.7) dBA**

Repeating the above for the hours 23.00 – 07.00

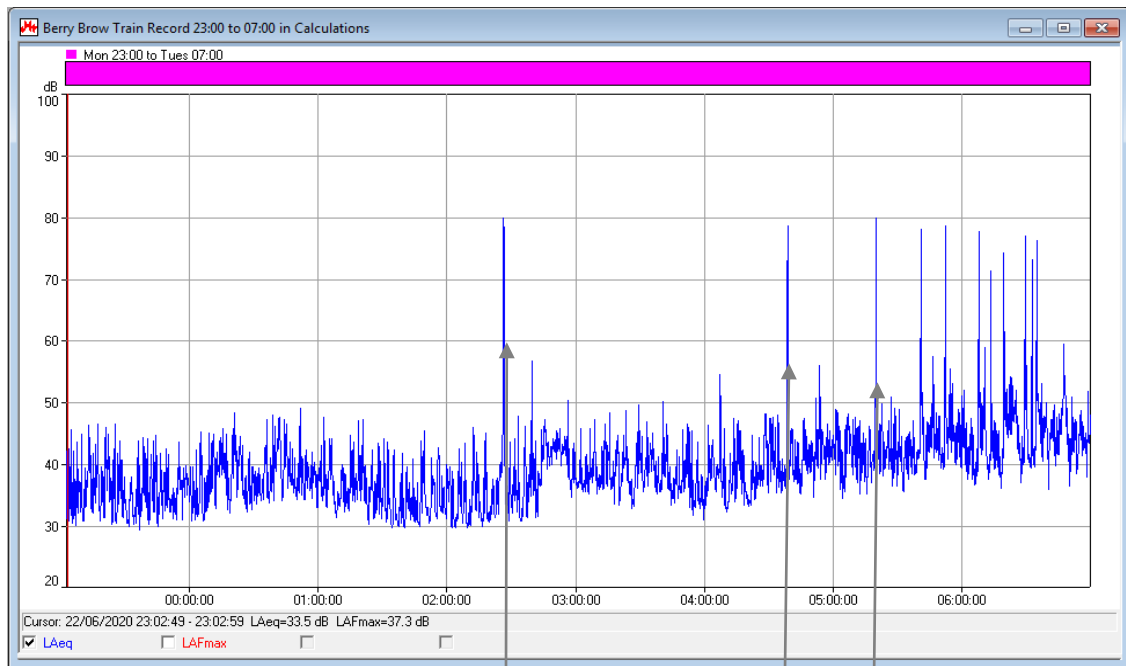
Train Type	23.00 to 07.00 hrs	L_{Aeq}
6 Coach	1	44.1
5 Coach	3	43.5
4 Coach	2	47.7
3 Coach	1	36.4
Goods	1	43.9

If the above are summed logarithmically the resultant level is calculated to be **51 (51.3) dBA**

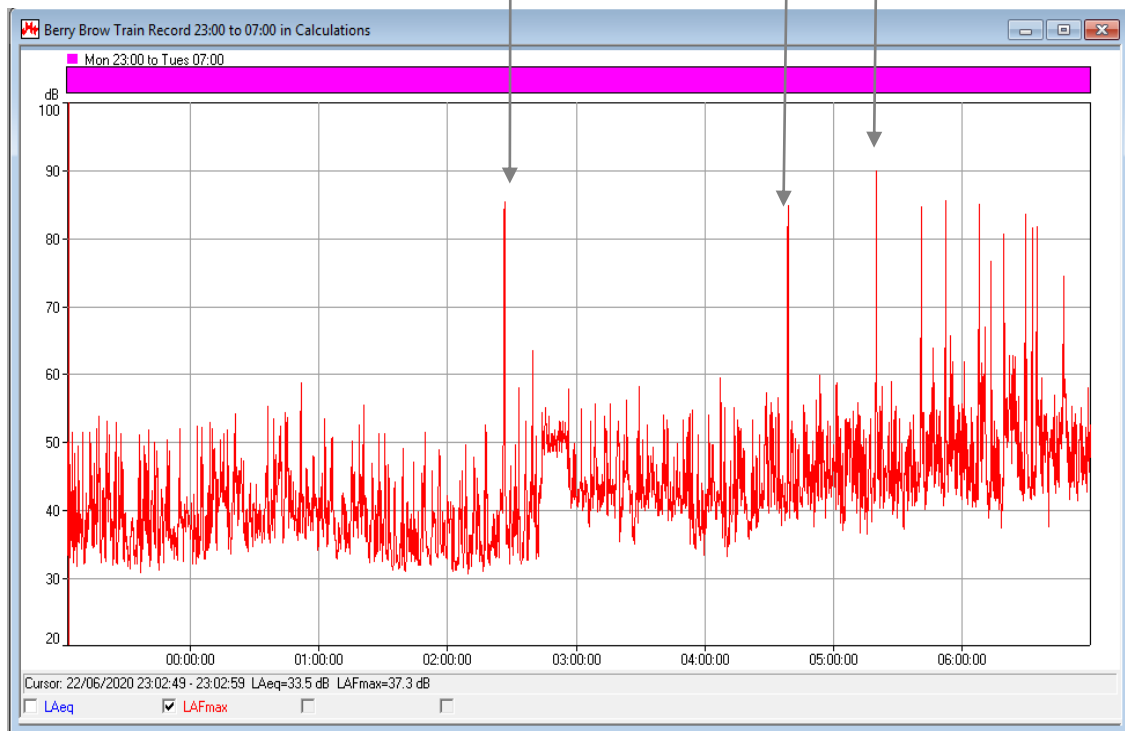
The actual overall measured levels during the whole of the measurement period are detailed below :

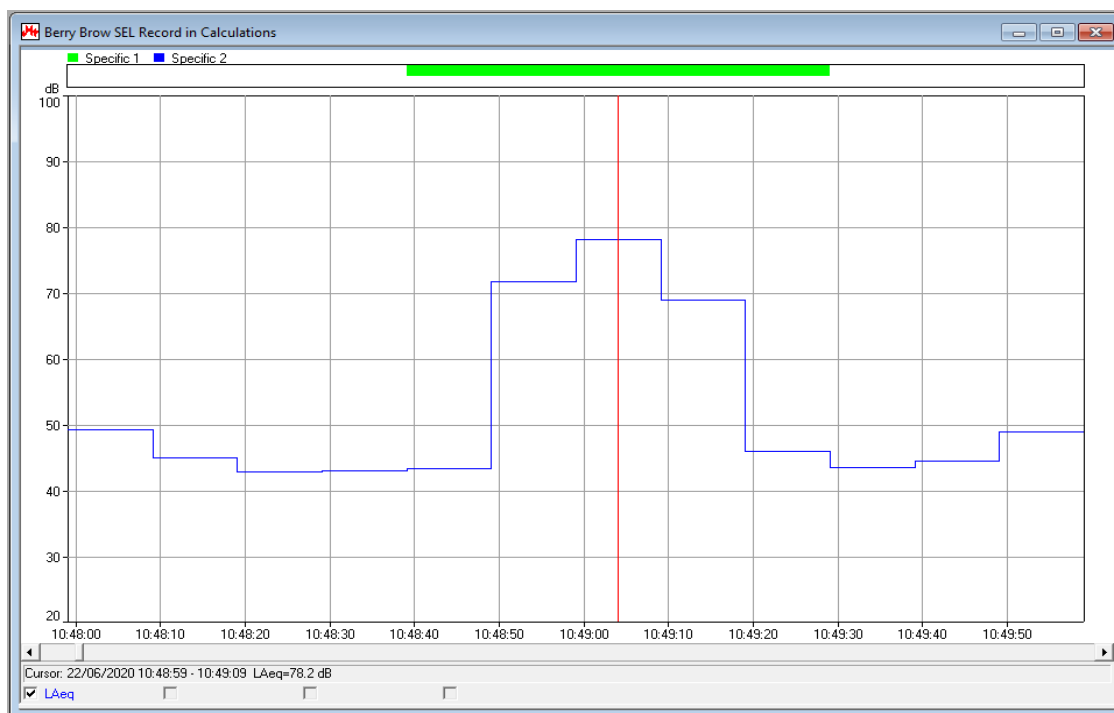
LA eq	Measured	Calculated
07.00 to 23.00 Average	61	61
23.00 – 07.00	55	51

As can be seen the actual measured level between the hours 07.00 and 23.00 is of the same order as the calculated noise level for the train passages.

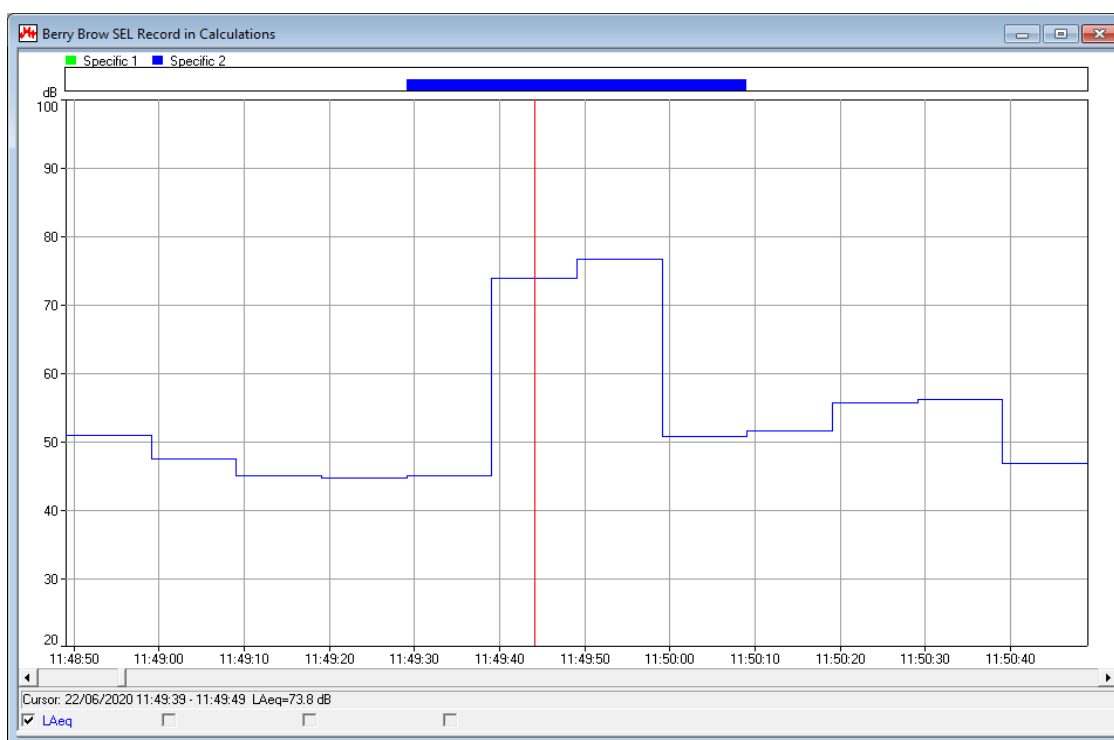


These events are unknown but are not Train passings





Passenger Train Profile.



Goods Train Profile

With respect to the LA max levels it is accepted that the highest LA max is not usually the one that is used to determine the level as there can be 'several' events within a 1 hour period – from the above the LA max used is **83 dBA** which is the LA max measured with the train passages during the measurement time frame.

These are the levels that are used to determine the attenuation of both the glazing and the ventilation of the rooms of the proposed development.

In general the construction of the building must be undertaken with great care as even small gaps will reduce the attenuation provided by the structure and even if a complete wall, which may have an attenuation of 50 dBA has a hole in it equivalent to 1/1000 of the wall area the effective attenuation of the wall is limited to a maximum of 30 dBA.

The actual area of the window in the wall affects the internal noise level: the greater the window area the higher the internal noise level. In general a normal double skinned brick wall will have an attenuation of 45/50 dBA ; however this can be reduced by in excess of 5 dBA if the area of the windows is of the order of 25%. The type of glazing then becomes important.

When the windows are open the only important consideration is the area of the opening: if it is 10% of the total area the noise attenuation will be of the order of 12 dBA regardless of the construction of the remaining 90% of the wall.

With regard to the roof, if it is a pitched slated or tiled roof with an under ceiling and mineral fibre insulation then an attenuation of the order of 45 dBA should be achieved.

The above required attenuation will easily be met with the construction of the external walls and the roof.

As the required attenuation is above that of an open window (regarded as 12 dBA) then the type of ventilation fitted will depend also upon the number of air changes per hour that are required by Building Regulations – this is beyond the scope of this report .

These vents need only be fitted in habitable rooms – these are usually considered to be dining kitchens, lounges and bedrooms.

Therefore from the above the required attenuation between the hours 07.00 to 23.00 is $61 - 35 =$ **26 dBA**

Between the hours 23.00 to 07.00 hrs the required attenuation is $55 - 30 =$ **25 dBA**.

The required attenuation to the LA max = $81 - 45 =$ **36 dBA** .

As can be seen the specification of the glazing is determined by the attenuation required to the LA max level.

It is understood that the glazing fitted in No. 29 Berry Brow is :

8.8mm acoustic laminated and 6.8mm laminated pane in a 28mm overall unit.

As can be seen from the attached data sheet the quoted $R_w + C_{tr} = 34$ dB .

With regard to the ventilation any vent that has a quoted $D_{n,ew}$ in excess of **26 dB** will achieve the required internal levels .

With respect to the L_{Amax} as the maximum level usually contains most of its energy in the mid to high frequency range therefore the more usual R_w attenuation can be used – the above specified unit having a quoted attenuation of **$R_w = 41dB$** .

With respect to the National Planning Guidance 2014 states that noise exposure defined by the response of people to the noise – briefly it states that :

Perception	Examples of Outcome	Increasing Effect Level	Action
Not Noticeable	No effect	No observed Effect	No Specific Measures required
Noticeable and not Intrusive	Noise can be heard – does not cause any change in behaviour or attitude	No Observed Adverse Impact	No Specific Measures required
Noticeable and Intrusive	Noise can be heard and causes small changes in behaviour and / or attitude – affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Impact	Mitigate and reduce to a minimum.

Rear Facade

This facade is screened from the main noise source – the railway – the attenuation due to screening (by the property itself) is a very complex problem but according to **–BS 5228 : Part1 : 2009 Section F.2.2.2.1 Section C** an attenuation to the noise from this source of the order of the order of between 5 and 10 dBA can be expected – in this case an attenuation of 10 dBA has been assumed – if this is the case then the calculated noise level at the rear facade could be of the order of **51 / 45 dBA**.

The actual attenuation achieve could be greater than 10 dBA as the rear facade is at a greater distance from the noise source than the measurement location.

Therefore from the above the required attenuation between the hours 07.00 to 23.00 is $51 - 35 =$ **16 dBA**

Between the hours 23.00 to 07.00 hrs the required attenuation is $45 - 30 =$ **15 dBA**.

The required attenuation to the $L_A max = 70 - 45 =$ **25 dBA** .

Therefore from the above the glazing should be IGU of 4 / 6 to 20mm / 4 which has a quoted attenuation of **$R_w + C_{tr} = 25 dB$** (see enclosed data sheet) – the of $R_w + C_{tr}$ figure has been used to account for the low frequency content of the rail noise – and an **$R_w = 29 dB$**

With regard to the ventilation any vent that has a quoted $D_{n,ew}$ in excess of **16 dB** will achieve the required internal levels .

External Levels

These areas are regarded as outdoor living areas and as such are covered by the guidelines laid down by the World Health Organisation (WHO).

In brief an 'Outdoor Living Area' should be subject to a noise level less than 55 dBA in order to prevent serious annoyance during the daytime and evening - a level less than 50 dBA is desirable to prevent moderate annoyance.

From the above the external noise level at the front facade of the proposed property is of the order of **61 dBA** – however this area is solely used as a car parking area and therefore it is usual that the WHO Guidelines do not apply

The garden / patio is at the rear of the development and as such is effectively screened from the main noise source at the site – namely the passage of the trains.

According to **BS 5228 : Part1 : 2009 Section F.2.2.2.1 Section C** an attenuation to the noise from this source of the order of 5 to 10 dBA expected – as the trains will be screened from the rear gardens then an attenuation of 10 dBA is assumed – if this is the case then the noise level at the rear of No. 29 could be of the order of **51 dBA**.

The assumed attenuation of 10 dBA is very likely to be a minimum as the rear area is also at an increased distance from the measurement location which will also result in some level of attenuation.

This level is within the WHO Guidelines

Conclusions

As can be seen from the above the glazing / ventilation specified results in internal levels within the rooms of the development that are within the requirements of BS 8233 : 2014.

Condition 12 of the Planning Approval is therefore satisfied.

Roger Leach AMIOA

June 2020



Pilkington Optiphon™

	dB sound reduction index by octave band – Hz						$R_w(C;C_{tr})$	R_w	R_w+C	R_w+C_{tr}
	125	250	500	1000	2000	4000				

Configuration single glazing

6.8 mm Pilkington Optiphon™	21	26	31	35	37	38	35(-1;-3)	35	34	32
8.8 mm Pilkington Optiphon™	24	28	34	38	37	43	37(-1;-4)	37	36	33
10.8 mm Pilkington Optiphon™	28	31	36	38	39	47	38(-1;-2)	38	37	36
12.8 mm Pilkington Optiphon™	30	32	37	39	41	51	39(-0;-2)	39	39	37
16.8 mm Pilkington Optiphon™	29	34	37	39	46	55	40(-0;-2)	40	40	38

Configuration Insulating Glass Unit (IGU), thickness in mm

6 / 6 to 20 mm / 6.8 Pilkington Optiphon™	23	24	34	42	43	52	38(-2;-5)	38	36	33
6 / 6 to 20 mm / 8.8 Pilkington Optiphon™	24	26	40	48	46	54	41(-3;-7)	41	38	34
6 / 6 to 20 mm / 10.8 Pilkington Optiphon™	23	28	41	47	45	55	42(-3;-7)	42	39	35
6 / 6 to 20 mm / 12.8 Pilkington Optiphon™	20	29	43	47	46	49	42(-3;-8)	42	39	34
8.8 Pilkington Optiphon™ / 6 to 20 mm / 12.8 Pilkington Optiphon™	26	36	46	50	52	63	47(-2;-7)	47	45	40
16.8 Pilkington Optiphon™ / 6 to 20 mm / 16.8 Pilkington Optiphon™	29	40	45	47	54	68	48(-2;-6)	48	46	42

The above IGUs with Pilkington K Glass™ on one pane and a 16 mm 90 % Argon-filled cavity achieve a U value of 1.5 W/m² K.

Further information on solar and thermal performance is available on the Pilkington website using the Spectrum program: www.pilkington.com/spectrum

Impact classification EN12600 Class 1(B)1 for all above Pilkington Optiphon™ products

$R_w(C;C_{tr})$ are in accordance with EN717-1

Non Pilkington Optiphon™ glass products. Figures from BS EN 12354

	dB sound reduction index by octave band – Hz						$R_w(C;C_{tr})$	R_w	R_w+C	R_w+C_{tr}
	125	250	500	1000	2000	4000				

Configuration single glazing

4 mm Float Glass	17	20	26	32	33	26	29(-2;-3)	29	27	26
6 mm Float Glass	18	23	30	35	27	32	31(-2;-3)	31	29	28
8 mm Float Glass	20	24	29	34	29	37	32(-2;-3)	32	30	29
10 mm Float Glass	23	26	32	31	32	39	33(-2;-3)	33	31	30
12 mm Float Glass	27	29	31	32	38	47	34(-0;-2)	34	34	32

Configuration Insulating Glass Unit (IGU), Float glass, thickness in mm

4 / 6 to 20 mm / 4	21	17	25	35	37	31	29(-1;-4)	29	28	25
6 / 6 to 20 mm / 6	20	18	28	38	34	38	31(-1;-4)	31	30	27
6 / 6 to 20 mm / 4	21	20	26	38	37	39	32(-2;-4)	32	30	28
10 / 6 to 20 mm / 4	24	21	32	37	42	43	35(-2;-5)	35	33	30
10 / 6 to 20 mm / 6	24	24	32	37	37	44	35(-1;-3)	35	34	32

Note that these are conservative figures and cover all products by European glass manufacturers.

R_w = Weighted sound reduction. This scale allows for the response of the human ear and could be used for determining a suitable product to reduce noise such as voices.

C = An adjustment to the R_w scale that could be used for selecting a product to reduce noise from music, radio, tv, high speed traffic and other medium to high frequencies.

C_{tr} = An adjustment to the R_w scale that could be used for selecting a product to reduce noise from urban road traffic, disco music and other noises with a large component of low frequencies.

Note that a 3 dB difference is barely discernable, 5 dB is clearly discernable and 10 dB is a doubling or halving of the noise.

asdf