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**Mr & Mrs Stones
28 Pimlico Village
Clitheroe**

**Environmental Assessment
Proposed Residential Development
Land to the rear of
28 Pimlico Village
Clitheroe**

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High Crompton
Shaw
Oldham**

August 2018

Introduction

AB acoustics were commissioned by Mr & Mrs Stones to undertake an environmental noise assessment at a proposed residential development on land to the rear of No.28 Pimlico Village Clitheroe.

This report is intended to accompany an Outline Planning Application for development of the site to residential properties. This follows the approval of the same scheme in September 2015 (Local Planning Authority Ref: 3/2014/0742).

The site is located on Pimlico Link Road which is an access road to various industrial sites within the immediate vicinity.

There are a number of older residential properties in the immediate area that are adjacent to both Pimlico Link Road the Tarmac Plant and Johnson Matthey.

Below is a photograph of the site with the measurement location marked – a plan of the site is also included at the end of the report – this plan is an Indicative Plan for the Outline Planning Application and the final layout and design of the residential properties will be determined at the Reserved Matters stage.



Approximate extent of site

Approximate Measurement Location

The measurement location was chosen to be near to the access / exit point to the Tarmac site off Pimlico Link Road and the noise level measured is considered representative of the noise level at the site.

The survey was undertaken at the time stated in the Results – as are the weather conditions.

In BS 8233:1999 (Sound Insulation and Noise Reduction in Building,Ref.4) design criteria is provided for noise levels inside buildings : summarised these are :

Bedrooms : $L_{Aeq} = 30$ dBA
Lounge : $L_{Aeq} = 35$ dBA
 $L_{amax} = 45$ dBA

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 15 dBA to the external noise – however it has been suggested that this figure is too high and is more likely to be in the region of 10 dBA – as a compromise a figure of 12 dBA has been used for the attenuation of an open window.

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).

Noise Assessment Criteria

The likelihood of complaints about noise from industrial plant can be assessed where the standard is appropriate using BS 4142 – 2014 – this has recently replaced the earlier standard BS 4142 : 1997

This standard describes methods for rating and assessing sound of an industrial / commercial nature. The methods described use outdoor sound levels to assess the likely effects of sound on people who might be inside / outside residential premises.

The significance of sound of an industrial / commercial nature depends upon the margin by which the rating level of the source exceeds the background sound level and the context in which the sound occurs.

The Standard is intended to be used for :

Investigating complaints regarding noise.

Assessing sound from proposed / new / modified or additional noise sources of an industrial / commercial nature.

Assessing sound at proposed new dwellings or premises used for residential purposes.

The sound level from a source when determined as a discrete entity distinct and free of other influences contributing to the ambient sound is referred to as the 'specific sound level'.

The specific sound level is evaluated at an identified location over the appropriate reference time intervals which are : 1 hours during the daytime – 07.00 to 23.00 hrs and 15 minutes during the night time – 23.00 to 07.00 hrs.

The specific noise may be subject to acoustic feature correction if the noise level at the measurement location is subjectively considered to contain certain acoustic features that may increase the significance of the impact of the noise over the background level.

If these features are present at the measurement location then the character correction is added to the specific sound level to arrive at the rating level.

The Standard requires the assessor to consider the subjective prominence of the character of the specific noise source at the measurement location / noise sensitive receptors and the extent to which the character of the noise will attract attention to it – such features are taken into account by applying the following corrections :

	Tonality	Impulsivity	Other Characteristics
Just Perceptible	+ 2 dB + 3dB	-	
Clearly Perceptible	+ 4dB	+ 6 dB	-
Highly Perceptible	+ 6dB	+9 dB	-
Readily Distinctive against Residual Environment			+ 3 dB

If both tonal and impulsive characteristics are both present then two corrections can be made – however if only one is dominant then only one correction need be applied.

If no corrections are deemed appropriate then the Rating Level equals the Specific Noise Level.

An initial estimate of the impact of the specific sound is obtained by subtracting the measured background level from the rating level and considering the following :

A) Typically the greater the difference the greater the impact.

- B) A difference of around + 10 dB or more is likely to be an indication of a significant adverse impact – depending on context.
- C) A difference of around + 5 dB or more is likely to be an indication of an adverse impact – depending on context.
- D) The lower the rating level is to the measured background level the less likely it is that the sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the measured background level this is an indication that the sound source will have a low impact depending upon context.

Where the initial estimate of the impact needs to be modified due to the context then all pertinent factors need to be taken into consideration – these include the following :

- The absolute level of the sound.
- The character and level of the residual sound compared to the character and level of the specific sound.
- The sensitivity of the receptor and whether residential dwellings already incorporate design measures that secure good internal and outdoor conditions eg facade insulation – ventilation / cooling that reduces the need to open windows – acoustic screening.
- The standard recognises that the response to sound can be subjective as well as to the local attitudes to the source of the sound and the character of the neighbourhood.

Also relevant are the World Health Organisation (WHO) Guidelines for Community Noise – these identify that sleep may be disturbed by short term noise events and the level associated with this is 45 dB LAmax inside the bedroom – this relates to 60 dB LAmax external to the bedroom.

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 : reference World Health Organisation.

BS 4142 : 2014

Regarding the residential properties the survey was undertaken – as stated above - with respect to BS 4142 : 2014 .

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.

The weather conditions were considered ideal for environmental noise measurements with no rain – dry / damp surfaces - low wind speeds (< 5.0 m /sec).

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.

The measurements were undertaken over a number of days / times in order to obtain – what is considered to be – a representative measurement of the existing noise climate at this location.

Therefore taking the above into account it is considered that the uncertainty has been controlled as far as practically possible with the results being over predicted rather than under predicted and therefore the above represents a robust assessment.

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.'

BS 8233 : 2014

The above standard is used to assess noise within residential property and in 'private amenity areas' that can be attached to these properties. They are used to assess the design of new buildings (or refurbishment) rather than assess the effects of changes to the external noise.

However it is recognised that this is not always achievable in existing areas such as City Centres or adjacent to existing commercial development.

In such cases it is suggested that a compromise between the possible raised noise level and the advantages of the commercial development should be reached – therefore any development should be designed to achieve the lowest practicable noise level and should not necessarily be prohibited.

Equipment Used and Procedure

The noise levels were measured using a :

The measurements were made with a Bruel & Kjaer 2238 Type 1 Sound Level Meter – fitted with a suitable weathershield - at a height of 1.5m and at least 1.5m away from any reflecting surfaces.

The system was calibrated prior to the series of measurements and checked afterwards using a B & K Type 4231 Calibrator – no deviation was found.

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

Results and Discussion

The daytime / early evening measurements were attended whilst the night time measurements were not.

The main source of noise at the site is undoubtedly the traffic flow along Pimlico Link Road to the various industrial sites – cement lorries going to the Cement Works and Tarmac Lorries entering / leaving site at the Pimlico Link Road entrance and tonal noise from the nearby Johnson Matthey Plant.

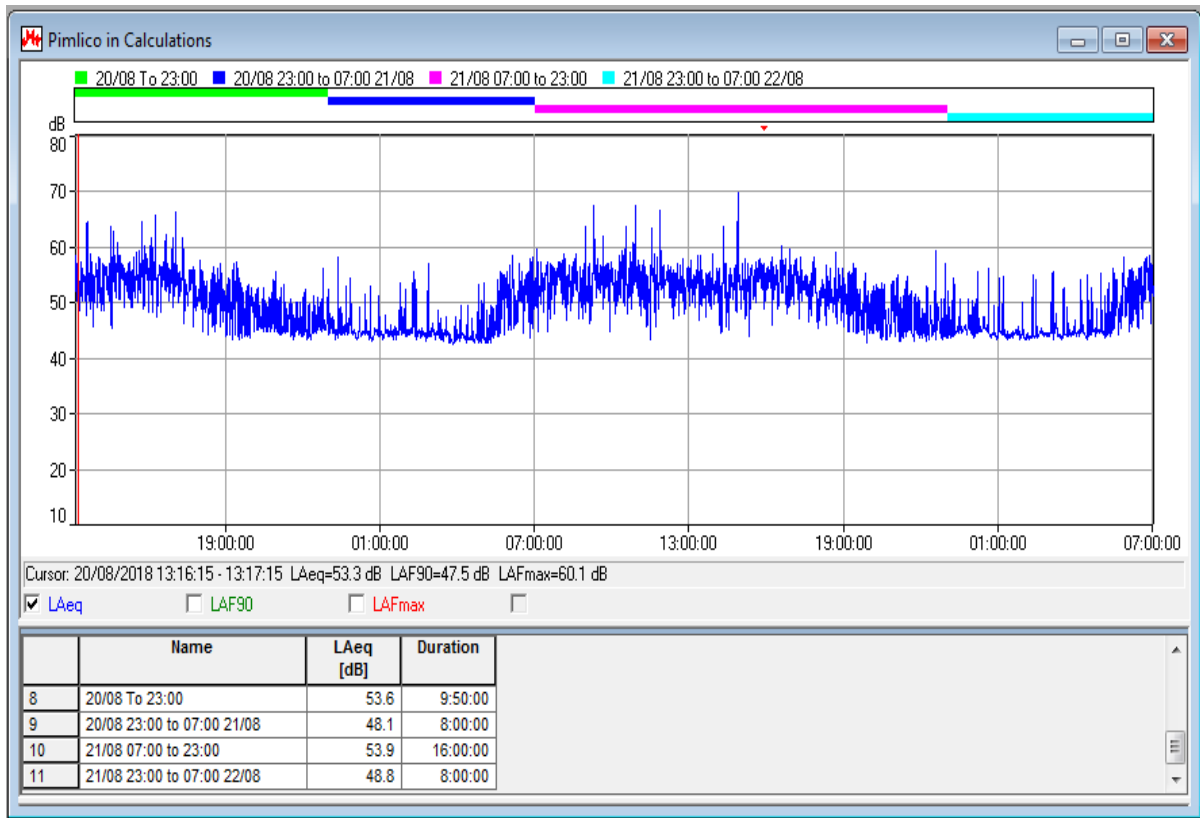
Below are the graphs of the measured noise level from approximately 13.00 hrs on Monday 20 August until 07.00hrs on Wednesday 22 August 2018 – the measurement time frame was T = 1 minute.

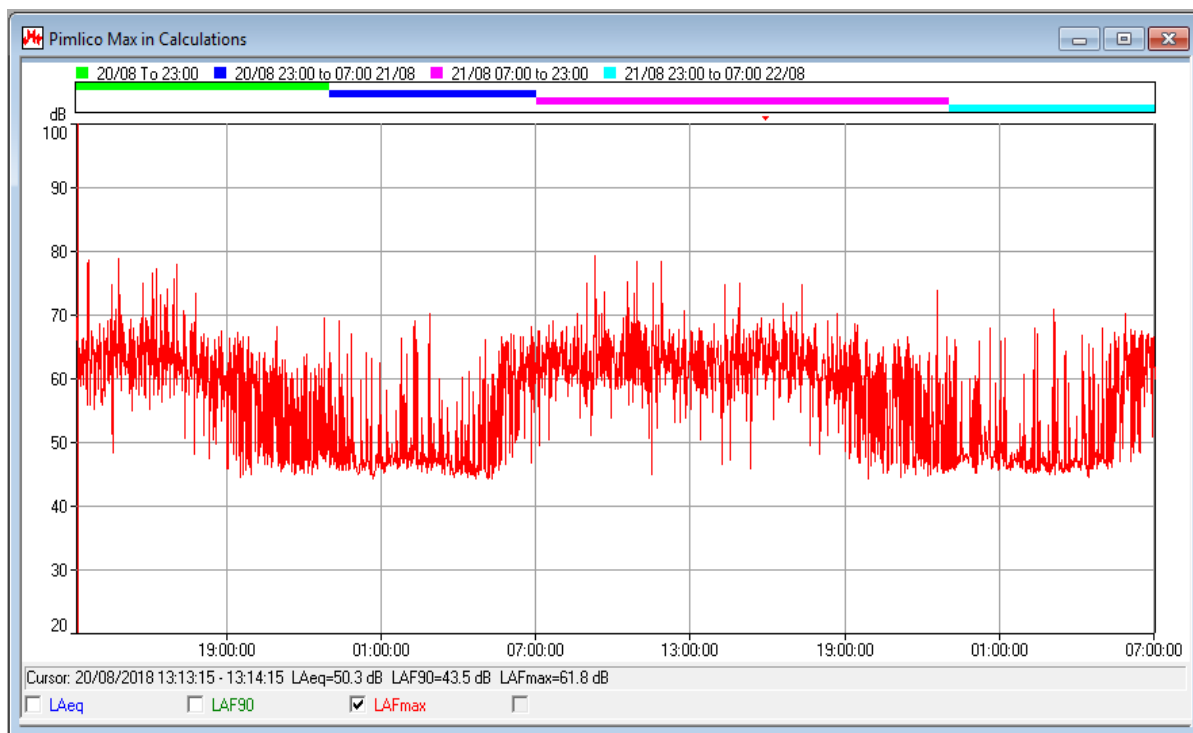
Weather

Date	Wind Speed M/sec	Wind Direction	Temperature C	Rain	Cloud Cover %	Road Conditions
20.08.18 Start 13.00 hrs	0	-	21	No	100	Dry
16.30 – 18.00	0	-	17	Yes	100	Wet
End 19.00 hrs	0.7	variable	16	No	100	Damp
21.08.18 Start 09.00 hrs	0	-	19	No	100	Dry
End 18.30 hrs	0	-	19	No	100	Dry

22.08.18 07.00 hrs	1.1	NW	16	No	50	Damp
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Measured Results





As can be seen from the above the log average LA eq for the time period 07.00 to 23.00 hrs is calculated to be **54 (53.7) dBA**.

For the time period 23.00 to 07.00 hrs it is calculated to be **48 (48.4) dBA**.

The LA max is taken as **68 dBA**.

However as there is a tonal character to the noise at the proposed site (from the nearby Johnson Matthey plant) then a correction has been added to the above measured noise levels (regarded as the Specific Noise Levels) to account for this tonal element.

The tonal character is regarded as 'Just Perceptible' therefore a + 2 dB correction is added resulting in a Rating Level of $54 + 2 = 56$ **dBA** between the hours 07.00 to 23.00.

These are the noise levels used to determine the glazing / ventilation requirements of the various rooms in the proposed development.

Between the hours 07.00 – 23.00 the required attenuation is $56 - 35 = 21$ **dBA**

Between the hours 23.00 and 07.00 the required attenuation is $48 - 30 = 18$ **dBA**

The LA max is required to be attenuated by $68 - 45 = 23$ **dBA**

The required attenuation is detailed above - however as the main source of noise is due to the traffic movement the Pimlico Link Road then the $R_w + C_{tr}$ indicator is used rather than the R_w indicator as traffic noise contains the majority of its sound energy in the lower frequency bands.

As can be seen the glazing / ventilation requirements are governed by the day time requirements of **21 dB** – therefore the glazing could be 4 / 6 to 20mm / 4mm IGU's (or any glazed unit having the same quoted attenuation) which as can be seen from the data sheet enclosed at the end of the report has a quoted $D_{n,ew} + C_{tr}$ of **25 dBA**.

This glazing will attenuate the LA max to the required level having a quoted Rw of **29 dB**.

These quoted attenuations should be regarded as a minimum requirement.

Any glazing units having a quoted attenuation in excess of the above will be suitable.

With respect to the ventilation of the habitable rooms these are usually regarded as the bedrooms, lounges, dining kitchens and kitchens but only if they are dining kitchens.

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 – however suppliers of suitable acoustically treated ventilation systems can be found on the following web sites;

www.passivent.com

These supply vents that fit into the window header and can be acoustically treated or:

www.vents.com

supply core vents that are wall mounted.

Both these types of vent will be suitable acoustically provided that they meet the minimum attenuation requirements for the attenuation.

Or any ventilation unit having a quoted $D_{n,ew}$ in excess of **21 dB**

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It is important that the windows are correctly fitted into the wall – gaps and holes around the frames must be kept to a minimum and those that occur must be fully sealed with a high density sealer – *on no account must light weight expanding foams be used.*

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 .

The attenuation of the external wall 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 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 attenuations required will be easily met with the proposed construction of the external walls

External Area

All the proposed residential properties have external areas – it is usual that those areas that front onto roads are not regarded as *private amenity areas*.

However those that are enclosed by the property itself and fencing between neighbouring properties must be regarded as private amenity areas and as such the external noise level in these spaces is governed by the World Health Organisation (WHO) Guidelines.

Briefly this states that the external noise level must be less than 55 dBA to prevent serious annoyance during the daytime and evening and less than 50 dBA to prevent moderate annoyance.

As can be seen from the above the external noise level at the site was measured at LAeq = **54 dBA** – which is within the requirements of the WHO.- but the Rating Level is calculated to be **56 dBA** which is just in excess of the requirements of the WHO.

The amenity areas to the front of the development are open spaces and front onto the access road and as such are usually not regarded as 'private amenity areas'.

However the *private amenity areas* at the rear of the proposed development will be afforded some degree of screening by the residential properties themselves.

The attenuation due to screening is a very complex problem – but according to BS 5228 : Part 1 : 2009 the screening due to the actual development could vary between 5 and 10 dBA – if this is the case then the noise level to the rear of the proposed development could be of the order of **46 to 51 dBA**.

Both these calculated levels are within the requirements of the WHO.

Recommendations

That the glazing / ventilation types specified above be fitted – these should result in internal noise levels within the residential properties that are within the requirements of BS 8233.

The external noise level in the *private amenity areas* to the rear of the properties are below the requirements of the WHO therefore with respect to noise the site is suitable for residential development.

However BS 8233 : 2014 states that the main criteria to be considered are the internal levels in the various rooms – and as can be seen from the above if the glazing / ventilation specified is installed then these will be met .

Therefore the external levels in 'private amenity areas' whilst obviously desirable are possibly not the main criteria and as acoustic screening is included then it is likely that the above is the best that can be practically achieved.

Roger Leach AMIOA

Dated : August 2018



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.



Approximate Measurement Location



Approximate Measurement Location