Noise Impact Assessment Report

In Support of the Location of an External Dry Cooler to Serve Fitzroy Farm, Fitzroy Park London N6

Report Date: July 2010

ENL
Acoustic Consultants
Channel House 386 Seafront
Hayling Island Hants PO11 OBD
Tel/Fax: (02392) 468697

E N L - Acoustic Consultants
Tel: (02392) 468697

NOISE SURVEY REPORT/WH/June 2010.
PROPOSED PLANT FOR FITZROY FARM, FITZROY PARK, LONDON N6.

1.0 INTRODUCTION

1.1 Instruction: To provide consultancy services including noise monitoring, advise and evaluation with reference to a noise assessment for the location of ground source heat recovery plant for the above project.

1.2 Client: Mr R Darrow, Project Manager

1.3 Survey Location: Proposed Fitzroy Farm, Fitzroy Park, London N6 6HT.

1.4 Survey Dates: 16 April 2010 to 19 April 2010 – environmental background noise monitoring.

1.5 Weather Conditions:
i) 16 April 2010 - No wind, cool and dry.
ii) 17 April 2010 - No wind, cool and dry
iii) 18 April 2010 - No wind, cool and dry
iv) 19 April 2010 - No wind, cool and dry

1.6 Instrumentation: CEL 593 C1R Precision Sound Analyser Type 1
CEL 284/2 Acoustic Calibrator Type 1
(Calibration Status: Current Cert from November 2009)

1.7 Report Date: 30 June 2010.

1.8 Acoustic Consultant: R B Parker, MIOA, MCIEH, DMS.

2.0 LOCATION AND OPERATIONAL DETAILS

2.1 The proposed Fitzroy Farm is to be a detached residential property located on the existing Fitzroy Farm, Fitzroy Park London N6. The building will be replacing an existing residential property, currently occupying part of the Fitzroy Farm site.

2.2 For the purposes of the assessment Wallace House will be used as the nearest residential accommodation. Wallace House is about 50 metres to the east of the proposed external plant area. The North London Bowls Club building is located adjacent to the NW boundary of the site, being some 35 metres from the external plant location.

2.3 An internally located ground source heat pump with an external dry cooler forms part of the application and in that context a noise survey has been carried out to assess any noise impact associated with the operation of that plant. The external Dry Cooler is to be located adjacent to the Southern boundary of the site (see drawings in Appendix 1).

2.4 The Ground source heat pump system is situated in the basement of the new house and the Dry Cooler unit is located outside. These units, which are proposed for this development, will provide heating and cooling for the property. It is a sophisticated

system operating under thermostatic and environmental controls. The operating times are likely to be 0600 hours to 2300 hours per day to fulfill its design requirement and heating/cooling demands.

3.0 PURPOSE OF THIS REPORT

3.1 This report provides an environmental noise assessment for the operation of heat pump plant likely to serve the property. The requirements which have to be met are the London Borough of Camden's criteria for noise emissions from new plant. These are as follows:
"Measures should be taken to ensure the specific plant noise levels at a point 1 metre external to sensitive facades are at least 5dBA less than the existing background noise levels (LA90) when the equipment is in operation. Where it is anticipated the equipment will have a noise that has a distinguishable, discreet continuous note, special attention should be given to reducing the noise at any sensitive facade by at least 10dBA below the LA90 level".

3.2 In practice, this means noise from any plant, as measures at any noise sensitive facade should be inaudible.

4.0 ENVIRONMENTAL NOISE MEASUREMENT CONSIDERATIONS.

4.1 In this case environmental measurements were made in accordance with BS7445:1991 Parts 1-3 during the period Friday through Monday inclusive. This was to cover the most sensitive times local residents could be home. Readings were taken to confirm the lowest background noise levels to facilitate assessment of the impact of the operation of the external plant. The microphone was positioned 1.2 metres above ground level midpoint in the site.

4.2 Measurements made have been assessed and rated under procedures in British Standard 4142:1997 - Method for rating industrial noise affecting mixed residential and industrial areas. This standard is extensively used to assess the impact of noise from commercial/industrial equipment upon residential properties. The standard offers a reliable assessment of the impact of environmental noise for many situations.

4.3 Measurement periods of 60 minutes were used during the survey to ensure an adequate range of measurements is made to cover the relevant periods. Calibration of instrumentation was carried out at the beginning and end of each monitoring period, in accordance with good practice.

4.4 Environmental noise measurements have been taken of:
a) Noise from existing environmental activities
b) Existing general area activity.

4.5 The noise level descriptors to be used for the survey:

i) L_{AeqT}dB - Time weighted equivalent continuous A-weighted sound pressure level in decibels. This index is used to describe events over the period of the event.

ii) L_{A90T}dB - A-weighted sound pressure level exceeded for 90% of the measurement period. This index is used to measure background noise level.

iii) L_{Amax}dB - A-weighted maximum sound pressure level measured at 125msecs. This is used to describe short period noise events.

5.0 MONITORING RESULTS

5.1 Table 1 - Environmental Background Noise Monitoring

Position 1 - midpoint of the site at ground level	Period	L_{Aeq}dB	L_{A90}dB	L_{Amax}dB	L_{Amin}dB
	Friday 16 April to Saturday 17 April 2010				
	1200-1300	48	37	80	33
	1300-1400	47	36	72	33
	1400-1500	51	36	80	33
	1500-1600	45	36	65	33
	1600-1700	47	35	77	32
	1700-1800	46	35	76	32
	1800-1900	42	35	67	32
	1900-2000	44	35	71	33
	2000-2100	44	34	66	31
	2100-2200	35	32	51	30
	2200-2300	34	31	58	29
	2300-0000	33	32	52	30
	0000-0100	33	32	52	30
	0100-0200	32	31	50	29
	0200-0300	31	31	43	28
	0300-0400	32	30	44	28
	0400-0500	48	31	71	29
	0500-0600	48	36	73	33
	0600-0700	50	37	69	36
	0700-0800	51	37	73	35
	0800-0900	52	36	71	36
	0900-1000	49	36	68	34
	1000-1100	46	35	64	32
	1100-1200	47	33	69	33

5.2 Table 2 - Environmental Background Noise Monitoring

Position 1 - midpoint of the site at ground level	Period	L_{Aeq}dB	L_{A90}dB	L_{Amax}dB	L_{Amin}dB
	Saturday 17 April to Sunday 18 April 2010				
	1200-1300	46	31	70	29
	1300-1400	47	32	70	29
	1400-1500	46	32	71	30
	1500-1600	42	32	69	29
	1600-1700	40	32	64	29
	1700-1800	43	32	68	29
	1800-1900	46	34	81	31

5.2 Table 2 (Cont'd…) - Environmental Background Noise Monitoring

Position 1 - midpoint of the site at ground level	Period	L_{Aeq}dB	L_{A90}dB	L_{Amax}dB	L_{Amin}dB
	Saturday 17 April to Sunday 18 April 2010				
	1900-2000	38	32	65	30
	2000-2100	35	33	63	31
	2100-2200	36	32	64	30
	2200-2300	35	32	50	30
	2300-0000	35	34	57	32
	0000-0100	34	32	43	31
	0100-0200	33	31	55	29
	0200-0300	32	30	44	29
	0300-0400	31	30	48	29
	0400-0500	49	31	68	29
	0500-0600	50	36	78	33
	0600-0700	53	37	71	36
	0700-0800	51	37	78	34
	0800-0900	52	36	73	35
	0900-1000	50	36	69	34
	1000-1100	48	35	65	33
	1100-1200	46	33	69	33

5.3 Table 3 - Environmental Background Noise Monitoring

Position 1 - midpoint of the site at ground level	Period	L_{Aeq}dB	L_{A90}dB	L_{Amax}dB	L_{Amin}dB
	Sunday 18 April to Monday 19 April 2010				
	1200-1300	53	32	87	29
	1300-1400	42	32	68	30
	1400-1500	40	32	68	29
	1500-1600	43	32	68	29
	1600-1700	43	33	69	30
	1700-1800	44	34	69	30
	1800-1900	43	36	66	34
	1900-2000	53	35	80	33
	2000-2100	37	35	55	33
	2100-2200	36	34	63	32
	2200-2300	34	33	47	31
	2300-0000	33	32	49	30
	0000-0100	32	31	46	30
	0100-0200	32	31	49	29
	0200-0300	30	30	42	28
	0300-0400	31	30	43	28
	0400-0500	46	32	71	29
	0500-0600	47	36	73	33
	0600-0700	49	38	69	35
	0700-0800	49	37	73	35
	0800-0900	51	36	76	34
	0900-1000	50	35	75	33
	1000-1100	49	34	67	33
	1100-1200	49	34	69	32

6.0 NOISE ASSESSMENT.

6.1 Sound Data

6.2 The system that is being used to provide heating and cooling in the dwelling is a ground source heat pump (GSHP), to be located in the basement, and an externally located dry cooler (condenser). The GSHP is to be located internally, in a plant room in the basement of Fitzroy Farm, in the north end of the building. Cooling air will access the area via an attenuated ventilation duct. To facilitate discharge of excess heat an external Dry Cooler (Type Friga-Bohn FC SU 12Y L02 D2) is to be positioned on the SE side of the site adjacent to the boundary fence.

6.3 It is understood that the sound emission levels are provided by the manufacturer for the external dry cooler at LAeq 63dB at 1 metre in free field. The manufacturer's acoustic spectrum is fairly smooth with no evidence of tonality.

The spectral data, provided by the manufacturer is as follows:

Octave Centre Band Frequency (Hz) (dB ref 2x10-5Pa)							
63	125	250	500	1000	2000	4000	8000
71	63	62	61	56	49	40	32

6.4 The calculations below are based on the Dry Cooler unit being provided within an acoustic enclosure, in order to meet the Council's noise requirements. The reason for this is that the background noise levels, particularly at night, are generally low.

6.5 Consideration has been given to the use of an acoustic louvre system to control noise outbreak of the operation of the unit from the plant room as an alternative. However, by putting such a system within an enclosed space such as is proposed, will increase noise emissions from the unit's operation. An acoustic louvre proposal would not provide enough control to meet the Council's criteria and as such has been discounted.

6.6 Assessments

6.7 The British Standard 4142:1997 - 'rating of industrial noise affecting mixed residential and industrial areas' - offers guidance and calculation procedures for the assessment of noise that is likely to give rise to complaint. Although the title indicates that any such assessment is restricted to industrial noise, in the absence of any other suitable environmental noise standard, is used extensively by acoustic professionals, local authorities and academics for the assessment purpose.

6.8 The measured equivalent continuous A-weighted sound pressure level over a given reference time period, being 1 hour during the day and 5 minutes during the night, of the specific noise to which are applied certain corrections which take into account any tone, impulsive or irregular character of the noise.

6.9 In Section 9 reference is made to the assessment method. This section describes a methodology by which the simple arithmetic difference between the rating level and the BNL can be evaluated. It is stated that a difference of +5dB (ie Rating Level - BNL) is of marginal significance. A difference of +10dB or more (ie Rating Level - BNL) indicates that complaints are likely.

6.10 Comments Regarding the Assessments

6.11 The proposed Ground Source Heat Pump System for Fitzroy Farm will provide the internal environment requirements of the property. However it will be supplemented by an internal gas boiler system. In order to address any potential concerns about which period is likely to provide the lowest background noise level for assessment purposes, monitoring was carried out late week, weekend and early week. This data is provided in the tables above.

6.12 As the external plant is likely to operate to 0600 hours to 2300 hours each day the principal assessment in focused upon Wallace House as the closest noise sensitive façade. The Bowling Club building is a non habitable building, is the closest building to Fitzroy Farm and an assessment has been undertaken to ensure activities on the bowling greens are not impacted, by noise from the plant, during recreational use of those areas.

6.13 In conclusion, the readings taken are robust enough to be used as the baseline for the assessments. The lowest background noise was measured in the evenings and at night, so the objective of the monitoring exercise was achieved. Although weekends tend to provide the periods of lowest background noise levels, the readings did confirm, unusually for this area of London, this is generally a low background noise area, particularly at night.

6.14 In conjunction with this other residents in this area are most likely to be home at weekends and as such are more likely to pick up on any noise from plant. In this situation ie a low background noise level and a new item of plant operating, noise would be noticed. Based on this the assessments made include for acoustic attenuation to be provided to the plant before use.

6.15 Assessment for the Dry Cooler Plant – During Period 0700 hours to 2300 hours Weekend at closest window at Wallace House.

Assessment Criteria (A-weighted)	Levels
1. Manufacturers data sound pressure level at 1 metre for the unit (freefield)	63dB
2. Transmission loss for Screening	-10dB
3. Q_o Correction – area reflectivity	0dB
4. Distance Correction - to nearest residential property - 50 metres	-34dB
5. Façade Reflection of incident building	+3dB
6. Acoustic Feature Correction	0dB
7. $L_{Aeq(5\ min)}$ Rating Level	22dB
8. Lowest Background Noise Level (0700 hrs to 2300 hours)	33dB
9. Assessment Level (Line 7-8)	-11dB
The Assessment indicates the operation of the Plant will meet the Council's Noise Criteria	
Noise Level at boundary – With reference to protecting activities on the bowling greens	
1 + 2 + 3 above	53B
Background during day	34dB
Distance Correction - to Bowling Green - 35 metres	-31dB
Assessment	-12dB
This would be considered an acceptable level on the Bowling Green	

6.16 The assessment shows that the operation of the unit meets the Council's environmental noise criteria.

6.17 The above calculations are for A-weighted criteria only. However, in consideration of the proposed period of operation of the units and their distance and position relative to potential noise sensitive properties, in practical terms, are unlikely to be problematic over existing background noise to any premises.

6.17 BS8233:1999.

6.18 The guidance in BS 8233:1999 in relation to acceptable noise levels within buildings has been considered also and does not raise any issues in relation to any nearby residential use. Noise from unpredictable sources, outside the control of the applicant, are more likely to cause sleep disturbance problems in this area.

6.19 In BS8233:1999 the criteria which needs to be considered is that noise levels within the dwellings should not exceed LAeqT 30dB, where T = 5 minutes (ref BS4142:1997). The internal criteria of LAeq 30dB is not exceeded in any nearby residential by the operations of the external plant due to the noise control measures proposed.

6.20 Local Authority Requirements

6.21 The London Borough of Camden Council requires that all new equipment of this type should not increase existing background ie -10dBA below background at any noise sensitive property. In this case that criteria is met.

7.0 CONCLUSIONS

7.1 It is concluded that the location of the acoustically treated plant, as proposed, should ensure that during the hours of operation set out above, it does not cause disturbance to occupiers of the local area and in particular Wallace House. In this regard noise emissions meet with the London Borough of Camden Council environmental noise criteria.

7.2 Although not a policy requirement, it has been shown that noise from the operation of this plant should not disturb the use of the bowling greens, even during the quiet weekend periods. Overall there should be no adverse noise impact on local residents due to the operation of the acoustically treated plant as specified above.

8.0 RECOMMENDATIONS

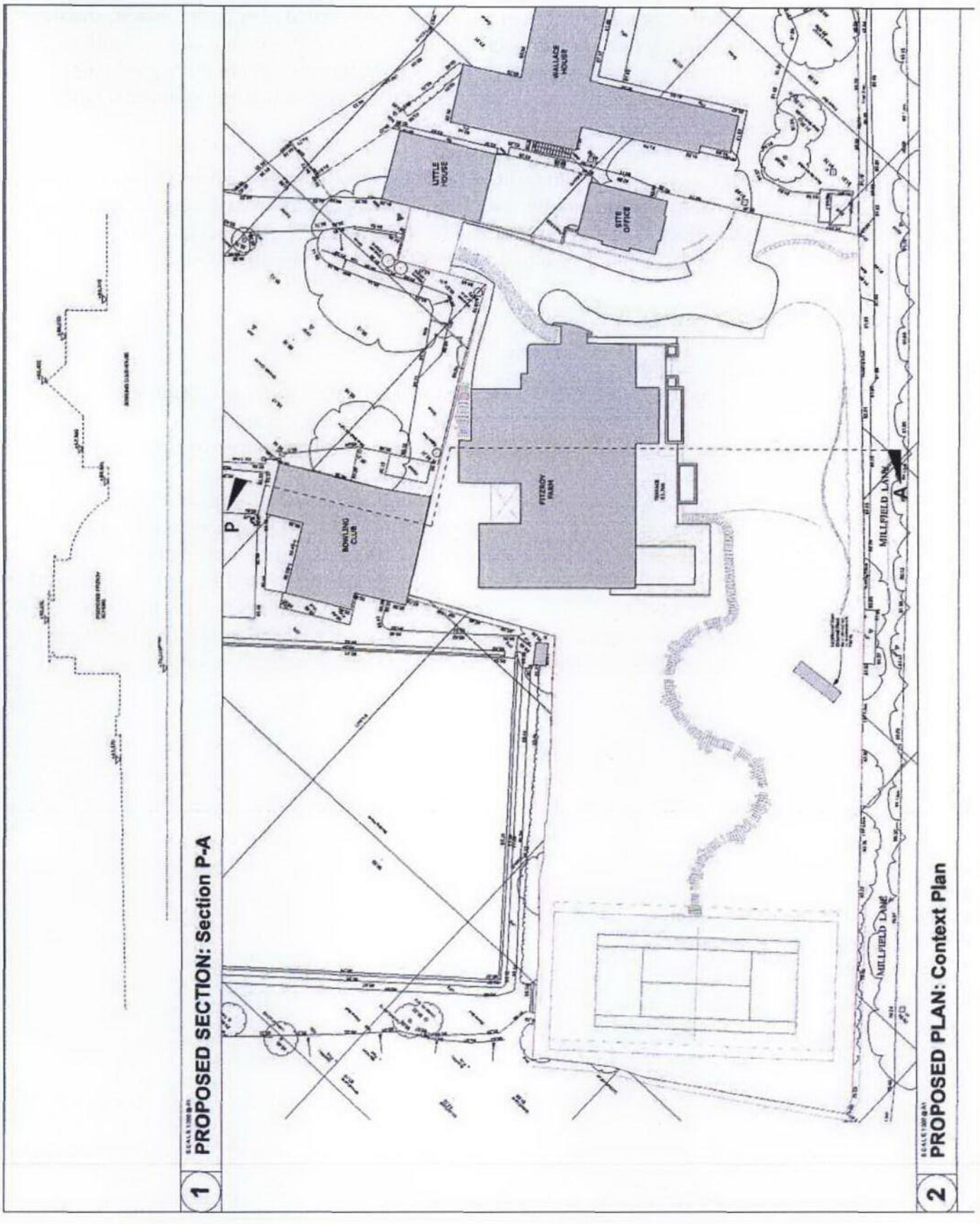
8.1 It is recommended that:

i) The Dry Cooler unit be installed in accordance with manufacturer's instructions toensure it meets the manufacturer's noise data.

ii) The Dry Cooler System be fitted with an automatic time switch to run 0600 hours to 2300 hours each day.

iii) Provide a timber close boarded fence enclosing the Dry Cooler unit on all sides to a height of 1 metre above the unit's maximum height dimension. An access door of similar construction should be provided, but on the south Side (Millfield Lane). Provide acoustic absorbtion to the internal surfaces of the timber enclosure. This should be ST 30 50mm thick acoustic foam wrapped in narrow gauge polythene to offer weather protection. For clarity this enclosure does not have a roof section, it is simply a screen.

APPENDIX 1 – SITE PLAN (NOT TO SCALE)



APPENDIX 2 - GLOSSARY OF ACOUSTIC TERMS

1. **A-weighted decibels - dB(A)** - Approximately equivalent to the human ear frequency response. A simulated measure of the loudness level of the noise as heard by the listener. Specific corrections are made to simulate this response.
2. **Ambient noise** - Totally encompassing sound in a given situation at a given time.
3. **Attenuation** - the amount by which a noise is reduced.
4. **Corrected Noise Level or Rating level L_{ArT}** - the specific noise level plus any adjustment for the character of the noise.
5. **Decibels** - a unit of sound level using a logarithmic scale. It is the ratio of the measured sound pressure and the reference level ie $10 \log_{10}(P^2_1/P^2_{ref})$ where 1 = rms pressure and ref = 2×10^{-5} N/m^2.
6. **Frequency in Hertz** - sound is propagated in wave form. Sound frequency is expressed in cycles per second or Hertz. Most noises comprise many frequencies. One Hertz equals one cycle per second.
7. **L_{AeqT} - Equivalent Continuous A-weighted sound pressure level** - the value of the A-weighted sound pressure level in decibels of the continuous steady sound that within a specified time interval has the same mean square sound pressure as a sound that varies with time.
8. **L_{A90T} - Background Noise Level (BNL)** - the A-weighted level of the residual noise in decibels exceeded for 90% of a given time interval. The level of noise underlying all fluctuating noise s reaching a given location. This tends to be dominated by the more distant, non-local sources and events.
9. **$L_{A10(1hour)}$ dBA - Road Traffic Noise** - the value of $L_{A10(1hour)}$ dBA is the noise exceeded for 10% of a period of one hour.
10. **Noise** - A complex sound often defined as unwanted sound.
11. **Precision Grade Instrumentation** - There are 2 basic grades of instrumentation guaranteeing different grades of accuracy of which precision grade instrumentation is the most accurate.
12. **Sound Pressure Level** - the sound pressure level in decibels is given by:

    $20 \log_{10} (P_1/P_2)$.