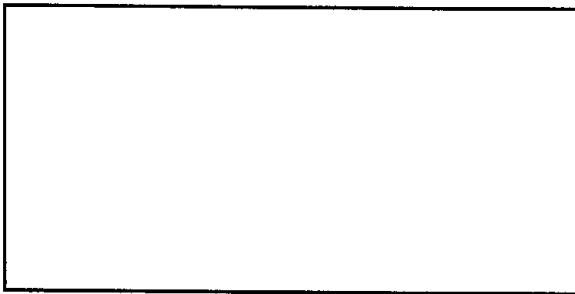


**TECHNICAL MEMORANDUM ON NOISE FROM  
CONSTRUCTION WORK OTHER THAN  
PERCUSSIVE PILING**

**Environmental Protection Department  
Noise Control Authority**



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# TABLE OF CONTENTS

	<i>Page</i>
<b>1. PRELIMINARY</b>	
1.1 Citation and Commencement .....	5
1.2 Application and Scope .....	5
1.3 Interpretation .....	5
1.4 General Introduction to the Procedures .....	6
<b>2. ASSESSMENT OF NOISE FROM THE CONSTRUCTION WORK</b>	
2.1 Step 1 — Location of the Most Affected Noise Sensitive Receiver (NSR) .....	7
2.2 Step 2 — Determination of the Area Sensitivity Rating (ASR) .....	7
2.3 Step 3 — Determination of the Basic Noise Level(BNL) .....	8
2.4 Step 4 — Correction for the Duration of the Construction Noise Permit (CNP) .....	8
2.5 Step 5 — Correction for Multiple Permit Situations .....	9
2.6 Step 6 — Determination of the Acceptable Noise Level (ANL) .....	9
2.7 Step 7 — Location of Items of Powered Mechanical Equipment (PME).....	9
2.8 Step 8 — Sound Power Levels for Items of Powered Mechanical Equipment (PME) .....	10
2.9 Step 9 — Distance Attenuation and Summation of Noise Levels ....	10
2.10 Step 10 — Corrections for the Effect of Barriers .....	11
2.11 Step 11 — Corrections for Acoustic Reflections .....	11
2.12 Step 12 — Corrected Noise Level (CNL) at the Noise Sensitive Receiver (NSR).....	11
2.13 Step 13 — Construction Noise Permit (CNP) Issuing Procedure.....	11
<b>3. PROVISIONS FOR SPECIAL CASES</b>	
3.1 Quiet Working Methods or Other Special Factors .....	12
3.2 Unavoidable Constraints on Working Hours .....	12

	<i>Page</i>
3.3 Construction Work Having Important Social Implications .....	13
4. TESTING FOR COMPLIANCE WITH CONSTRUCTION NOISE PERMIT CONDITIONS RELATING TO MAXIMUM NOISE LEVELS..	13
ANNEX — GENERAL CALIBRATION AND MEASUREMENT PROCEDURES .....	19

#### **LIST OF TABLES**

Table 1 Area Sensitivity Ratings (ASRs) .....	14
Table 2 Basic Noise Levels (BNLs) .....	15
Table 3 Sound Power Levels for Items of Powered Mechanical Equipment (PME) .....	15
Table 4 Summation of Noise Levels .....	17
Table 5 Correction Factors to Obtain the Predicted Noise Level (PNL) from Sound Power Levels at Given Distances .....	18

# **TECHNICAL MEMORANDUM ON NOISE FROM CONSTRUCTION WORK OTHER THAN PERCUSSIVE PILING**

## **1. PRELIMINARY**

### **1.1 *Citation and Commencement***

This Technical Memorandum is issued pursuant to section 9 of the Noise Control Ordinance and may be cited as the Technical Memorandum on Noise from Construction Work other than Percussive Piling. This Technical Memorandum shall replace the existing one that was originally published under section 11(1) of the Noise Control Ordinance in Special Supplement No.5 to Gazette Extraordinary No.38 Vol. CXXX on 7 November 1988 and came into operation on 7 December 1988. This Technical Memorandum shall come into operation in accordance with section 12 of the Noise Control Ordinance.

### **1.2 *Application and Scope***

This Technical Memorandum details the procedures that should generally be adopted by the Authority:

for the assessment of noise from construction work other than percussive piling;

for the issuing of Construction Noise Permits for construction work other than percussive piling pursuant to section 8 of the Ordinance; and

for determining whether or not any such Construction Noise Permit is being complied with.

### **1.3 *Interpretation***

In this Technical Memorandum, unless the context otherwise requires, the following definitions apply:

“Authority” has the same meaning as in the Ordinance;

“construction site” has the same meaning as in the Ordinance;

“Construction Noise Permit” has the same meaning as in the Ordinance;

“construction work” has the same meaning as in the Ordinance;

“Ordinance” means the Noise Control Ordinance;

“percussive piling” has the same meaning as in the Ordinance;

“pile” has the same meaning as in the Ordinance;

“piling” has the same meaning as in the Ordinance;

“powered mechanical equipment” has the same meaning as in the Ordinance;

“restricted hours” means the time between 1900 and 0700 hours and any time on a general holiday, including Sunday;

“Secretary” has the same meaning as in the Ordinance; and

“site boundary” means the boundary of a construction site as specified in a Construction Noise Permit.

Standard acoustical terminology is used throughout this Technical Memorandum. Other terms are as defined in the Ordinance or in the text of this Technical Memorandum.

#### 1.4 *General Introduction to the Procedures*

For the purpose of assessing if a Construction Noise Permit may be issued for construction work other than percussive piling during restricted hours the Authority shall act in accordance with the following general procedures which are detailed in subsequent sections. The Authority shall:

- (a) identify the most affected Noise Sensitive Receiver, determine the Area Sensitivity Rating for the area within which the Noise Sensitive Receiver is located and hence determine the relevant Acceptable Noise Level (in accordance with Sections 2.1 to 2.6);
- (b) calculate the Corrected Noise Level which will be generated by the construction work at the Noise Sensitive Receiver (in accordance with Sections 2.7 to 2.12); and
- (c) compare the Corrected Noise Level with the Acceptable Noise Level to determine if a Construction Noise Permit may be issued (in accordance with Section 2.13).

If the Corrected Noise Level is equal to or less than the Acceptable Noise Level the Construction Noise Permit may be issued by the Authority in the prescribed form and may include such conditions as the Authority considers appropriate, such as the permissible items of Powered Mechanical Equipment which may be used on the construction site, the hours during which the Construction Noise Permit is valid, the dates of commencement and expiry of the Construction Noise Permit, any noise levels which may not be exceeded at specified locations during specified times and any special noise control measures that must be adopted.

A Construction Noise Permit may be issued for an initial period of such duration as the Authority considers appropriate, and may be renewed before or after

the date of expiry for such further period or periods and subject to such alterations or new conditions as the Authority considers appropriate. If the Corrected Noise Level exceeds the Acceptable Noise Level a Construction Noise Permit should not generally be issued.

A Construction Noise Permit may not be issued for construction work which is to be carried out on or within a building which is either:

- (a) a Noise Sensitive Receiver either wholly or partially in use for its intended purpose at the time of the proposed construction work; or
- (b) directly adjoining a building which is a Noise Sensitive Receiver,

such that the noise to be generated by the construction work would be transmitted primarily through the structural elements of the building or buildings and, in the opinion of the Authority, would be likely to cause an adverse noise impact on the Noise Sensitive Receiver.

Applications for Construction Noise Permits for the carrying out of non-percussive piling shall also be assessed in accordance with the procedures detailed in this Technical Memorandum. The component items of equipment and plant used for non-percussive piling operations shall be considered to be items of Powered Mechanical Equipment. Construction Noise Permits for percussive piling may be issued only in accordance with the Technical Memorandum on Noise from Percussive Piling.

## 2. ASSESSMENT OF NOISE FROM THE CONSTRUCTION WORK

### 2.1 *Step 1 — Location of the Most Affected Noise Sensitive Receiver (NSR)*

The NSR which will be most affected by noise from the construction work shall be identified.

For the purpose of this Technical Memorandum any domestic premises, hotel, hostel, temporary housing accommodation, hospital, medical clinic, educational institution, place of public worship, library, court of law or performing arts centre shall be considered to be a NSR. Any other premises or place, not being in the nature of either industrial or commercial premises, which is considered by the Authority to have a similar sensitivity to noise as the premises and places above shall also be considered to be a NSR. Any premises or place shall, however, be considered to be a NSR only when it is in use for its intended purpose.

### 2.2 *Step 2 — Determination of the Area Sensitivity Rating (ASR)*

#### 2.2.1 General

The ASR is a function of the type of area within which the NSR is located and the degree of the effect on the NSR of particular Influencing Factors (IFs) as defined in Section 2.2.3. After a careful examination of the area under consideration

and the effect of any IFs, the ASR may be determined from Table 1.

#### 2.2.2 Type of area within which the Noise Sensitive Receiver (NSR) is located

The Authority shall have regard to an area of adequate size when determining the type of area within which the NSR is located in accordance with the descriptions in Table 1. Typically, in urban areas an area of 100 m radius around the NSR should be adequate, whereas in sparsely developed areas, such as rural districts, an area of 500 m radius or even more should be considered, depending upon the circumstances. Special factors may dictate that other distances should be used at the discretion of the Authority.

#### 2.2.3 Effect of Influencing Factors (IFs)

For the purpose of this Technical Memorandum any industrial area, major road or the area within the boundary of Hong Kong International Airport shall be considered to be an IF. Industrial areas and the Airport should be regarded as IFs irrespective of the time of day.

The term "industrial area" means an area which consists of a number of factories or industrial undertakings located primarily in purpose-built industrial buildings. It includes any premises, buildings or activities which the Authority deems, by virtue of their acoustical characteristics, make an area industrial in nature. The term "major road" means a road which has a heavy and generally continuous flow of vehicular traffic and, in normal circumstances, means a road with an annual average daily traffic flow in excess of 30,000. Where a major road has an unusually low traffic flow rate (less than 300 vehicles per hour) at the time of day under consideration it shall not be considered as an IF at that time.

In situations where more than one IF affects the NSR to an equal degree only one IF shall be considered.

#### 2.2.4 Area Sensitivity Rating (ASR)

The Authority shall determine the appropriate ASR for the NSR under consideration from Table 1.

### 2.3 Step 3 — *Determination of the Basic Noise Level (BNL)*

The appropriate BNL, in dB(A), for a given NSR may be determined from Table 2, having regard to the appropriate ASR and the time period as specified in the Construction Noise Permit application.

### 2.4 Step 4 — *Correction for the Duration of the Construction Noise Permit (CNP)*

If the duration of an initial CNP, or, in the case of a renewal of a CNP, the combined duration of the initial CNP and any renewal or renewals of a CNP for associated construction work on substantially the same construction site, will be less than or equal to 14 days, a positive correction of 3 dB(A) shall be applied to the BNL.



For the purposes of this Step a CNP shall be considered to be a renewal of a CNP if its date of commencement is less than or equal to 21 days after the expiry date of any other CNP for associated construction work on substantially the same construction site.

### *2.5 Step 5 — Correction for Multiple Permit Situations*

If in the opinion of the Authority the NSR will be materially affected by noise from construction work associated with more than one CNP, the Authority may make such correction to the BNL as it considers appropriate having regard to standard acoustical principles and practices.

### *2.6 Step 6 — Determination of the Acceptable Noise Level (ANL)*

The corrections obtained in Steps 4 and 5 shall be applied to the BNL obtained in Step 3 to give the ANL.

### *2.7 Step 7 — Location of Items of Powered Mechanical Equipment (PME)*

All items of PME should be considered to be grouped at a position mid-way between the approximate geographical centre of the construction site and its boundary nearest to the NSR. This position is referred to as the notional source position.

If the construction site is irregular in shape the geographical centre may fall outside the physical limits of the site. In such cases the notional source position shall be taken to be the position on the construction site boundary nearest to the geographical centre of the site. If two such points exist, the point nearest to the NSR shall be used.

If the construction site is linear in shape (that is, long, thin and substantially uniform in width, but not necessarily straight) with a length to width ratio exceeding 5:1, only the dominant portion of the site shall be considered for the purpose of determining the notional source position. The dominant portion is defined as the portion of the linear site closest to the NSR and having a length to width ratio of 5:1. If part of the construction site is linear in shape then such part shall be subject to a separate assessment for a separate CNP, at the discretion of the Authority.

If the construction site is large such that the notional source position would be greater than 50 m from the point on the site boundary nearest to the NSR the position shall be taken to be a point 50 m from that point on the site boundary measured along the line between the approximate geographical centre of the site and the point on the site boundary nearest to the NSR.

If in the opinion of the Authority the site is of such shape or dimensions that the procedure outlined above cannot readily be applied or if such application would lead to an inappropriate notional source position the Authority may select such a notional source position as it considers appropriate in the circumstances.

If the Authority is satisfied that any item of PME is to remain in

substantially the same position, and the particular item and its position has been specified by the applicant, the actual position may be used in conjunction with the notional source position for all other items of PME in the calculation of distance attenuation in Step 9.

## 2.8 *Step 8 — Sound Power Levels for Items of Powered Mechanical Equipment (PME)*

The sound power levels in dB(A) of each of the items of PME intended for use on the construction site (including lorries attending the construction site) shall be obtained from Table 3. If any item of PME intended for use on the construction site does not appear in Table 3 the Authority may make use of such sound power level as it considers appropriate.

## 2.9 *Step 9 — Distance Attenuation and Summation of Noise Levels*

### 2.9.1 General

In determining the distance from the source position to the NSR blank facades shall not be considered and the distance shall be determined to the nearest NSR facade with windows, doors or other openings. The plan distance or, where appropriate, the slant distance shall be used.

### 2.9.2 Procedure for Use with a Single Notional Source Position

If all items of PME are assumed to be located at a single notional source position, the sound power levels obtained in Step 8 shall be summed logarithmically in accordance with Table 4 to obtain a total sound power level.

The distance between the notional source position and the NSR shall be determined and the appropriate correction factor shall be obtained from Table 5. This correction factor shall be subtracted from the total sound power level to give the Predicted Noise Level (PNL) at the NSR.

### 2.9.3 Procedure for Use with Actual Source Positions or a Combination of Actual and Notional Source Positions

If in addition to a notional source position a number of actual source positions are being used, or if only actual source positions are being used, the distances between the actual source positions and the NSR shall be determined and the appropriate correction factors shall be obtained from Table 5. These factors shall be subtracted from the individual sound power levels for each item of PME to give the individual sound pressure levels for each item of PME at the NSR.

Any combined sound pressure level from items of PME assumed to be located at a notional source position shall be determined in accordance with Section 2.9.2 and shall be added logarithmically to the individual sound pressure levels from items of PME assumed to be at actual source positions in accordance with Table 4, to give the PNL at the NSR.

## 2.10 Step 10 — Corrections for the Effect of Barriers

In cases where the Authority considers that all items of PME to be used on the construction site will be totally screened by a substantial barrier such that none will be visible when viewed from any window, door or other opening in any facade of the NSR, a negative correction of 10 dB(A) shall be applied to the PNL obtained in Step 9. In cases where the Authority considers a higher negative correction should be applied, the Authority shall use appropriate correction factors having regard to standard acoustical principles and practices.

Substantial barriers shall be taken to be large solid objects, such as buildings or topographical features, which will act as effective acoustic screens. Barriers which are small, lightweight, incomplete or temporary, such as site fences or hoardings, are not to be considered. The effects of purpose-built acoustic barriers may be taken into account in accordance with Section 3.1.

In cases where the Authority considers that all items of PME to be used on the construction site other than “quiet” items of PME will be totally screened when viewed from the NSR, a negative correction of 5 dB(A) shall be applied to the PNL obtained in Step 9. For the purpose of this section “quiet” items of PME shall be considered to be those whose sound power level is more than 15 dB(A) below the total sound power level being generated by all items of PME.

In cases where the NSR is a building directly adjacent to the construction site such that none of the items of PME to be used on the construction site will be visible when viewed from any window, door or other opening in any facade of the NSR, the NSR shall be considered to be partially screened and a negative correction of 5 dB(A) shall be applied to the PNL obtained in Step 9.

## 2.11 Step 11 — Corrections for Acoustic Reflections

In cases where the NSR is a building, a positive correction of 3 dB(A) shall be applied to the PNL obtained in Step 9.

An additional positive correction of up to 3 dB(A) may be applied to the PNL in cases where the Authority considers that noise levels at the NSR will be increased due to the confined or reverberant nature of the immediate locality of the construction site or the NSR.

## 2.12 Step 12 — Corrected Noise Level (CNL) at the Noise Sensitive Receiver (NSR)

The corrections obtained in Steps 10 and 11 shall be applied to the PNL obtained in Step 9 to give the CNL at the NSR.

## 2.13 Step 13 — Construction Noise Permit (CNP) Issuing Procedure

The CNL at the NSR obtained in Step 12 shall be compared with the ANL obtained in Step 6. If the CNL is equal to or less than the ANL the CNP may be issued. If the CNL is greater than the ANL the CNP shall not be issued unless the

application is a special case as defined in Section 3. The procedures detailed in Section 3 shall then be followed.

When giving consideration to the renewal of CNPs pursuant to section 8 of the Ordinance the Authority may impose additional conditions or may refuse to renew a CNP having regard to complaints received and other relevant factors, notwithstanding the procedures and guidelines detailed in Steps 1 to 12.

To assist in enforcement procedures the Authority may include as a condition for all CNPs a requirement for the CNP applicant to ensure that each item of PME which is permitted to be used on the construction site is, at the time of its use, labelled in a legible and conspicuous manner with the appropriate identification code as shown in Table 3. For items not given in Table 3 the identification code to be used shall be as specified by the Authority in the CNP.

### 3. PROVISIONS FOR SPECIAL CASES

#### 3.1 *Quiet Working Methods or Other Special Factors*

Applications which contain sufficient details of any particularly quiet items of PME or any special noise control measures which the CNP applicant proposes to employ on the site, or any other special factors or exceptional circumstances which the applicant considers may be relevant, may be given special consideration by the Authority. In considering such special cases the Authority may make allowances, adjustments or corrections to any of the factors in Section 2 and appropriate calculation procedures may be adopted by the Authority having regard to standard acoustical principles and practices.

Any CNP issued under this provision may include conditions such as details of the special noise control measures to be employed, acoustic performance specifications for such measures or for particularly quiet items of PME to be used, maximum noise levels at the NSR or at any other position and any other conditions which may be considered to be appropriate by the Authority.

#### 3.2 *Unavoidable Constraints on Working Hours*

A CNP may be granted even if the CNL exceeds the ANL if it can be demonstrated to the satisfaction of the Authority that to carry out the construction work during restricted hours would cause less public annoyance or inconvenience than would be caused by carrying out the construction work during non-restricted hours.

This provision shall apply in cases such as those in which serious interruption or disruption would be caused to road, rail or other forms of transport, or to utilities such as the supply of water, gas or electricity.

A CNP may also be granted for work which is governed by tidal conditions.

When a CNP is granted as a result of this provision, the Authority shall ensure that the quietest practicable working methods are being employed. Conditions

in the CNP may specify the use of specially silenced items of PME, acoustic screens and other noise control measures, in cases where their use would have a beneficial effect in reducing noise levels and would be practicable.

Additional CNP conditions shall restrict the use of noisy road-breaking equipment and other particularly noisy construction work during certain hours. Whenever possible, the use of such equipment or the carrying out of such construction work shall not be permitted between 2100 and 0600 hours, and the loading of spoil into trucks shall not take place between 2300 and 0600 hours. Only in very exceptional circumstances shall the carrying out of such construction work be permitted after 2300 hours or the loading of spoil after midnight. If these restrictions are not possible the CNP shall state that all care shall be taken to ensure that such construction work is carried out as quickly as possible with due regard for the potential noise intrusion which may result.

### *3.3 Construction Work Having Important Social Implications*

Where in the opinion of the Authority a CNP application is for construction work which, by virtue of its magnitude or purpose, may have significant social implications or where refusal to grant a CNP may not be in the public interest, or where the granting of a CNP might arouse considerable public concern, the Authority shall refer the matter for advice to the Secretary. In giving such advice the Secretary shall give due considerations to these factors. In such cases the Authority shall abide by any advice received from the Secretary.

## **4. TESTING FOR COMPLIANCE WITH CONSTRUCTION NOISE PERMIT CONDITIONS RELATING TO MAXIMUM NOISE LEVELS**

In cases where a maximum noise level has been specified as a condition of a CNP, measurements may be taken to determine if this condition is being complied with. Such measurements should generally be carried out in accordance with the procedures and guidelines given in the Annex.

*Table 1 – Area Sensitivity Ratings (ASRs)*

Type of Area Containing NSR \ Degree to which NSR is affected by IF	Not Affected	Indirectly Affected	Directly Affected
(i) Rural area, including country parks or village type developments	A	B	B
(ii) Low density residential area consisting of low-rise or isolated high-rise developments	A	B	C
(iii) Urban area	B	C	C
(iv) Area other than those above	B	B	C

For the purpose of Table 1, the following definitions shall apply:

“country park” means an area that is designated as a country park pursuant to section 14 of the Country Parks Ordinance;

“directly affected” means that the NSR is at such a location that noise generated by the IF is readily noticeable at the NSR and is a dominant feature of the noise climate of the NSR;

“indirectly affected” means that the NSR is at such a location that noise generated by the IF, whilst noticeable at the NSR, is not a dominant feature of the noise climate of the NSR;

“not affected” means that the NSR is at such a location that noise generated by the IF is not noticeable at the NSR; and

“urban area” means an area of high density, diverse development including a mixture of such elements as industrial activities, major trade or commercial activities and residential premises.

Table 2 — Basic Noise Levels (BNLs)

Time Period \ ASR	A	B	C
All days during the evening (1900 to 2300 hours), and general holidays (including Sundays) during the day-time and evening (0700 to 2300 hours)	60	65	70
All days during the night-time (2300 to 0700 hours)	45	50	55

Table 3 — Sound Power Levels for Items of Powered Mechanical Equipment (PME)

Identification Code	Description	Sound Power Level (dB(A))
CNP 001	Air compressor, air flow $\leq 10 \text{ m}^3/\text{min}$	100
CNP 002	Air compressor, air flow $> 10 \text{ m}^3/\text{min}$ and $\leq 30 \text{ m}^3/\text{min}$	102
CNP 003	Air compressor, air flow $> 30 \text{ m}^3/\text{min}$	104
CNP 004	Asphalt paver	109
CNP 021	Bar bender and cutter (electric)	90
CNP 022	Batching plant	108
CNP 023	Breaker, hand-held, mass $\leq 10 \text{ kg}$	108
CNP 024	Breaker, hand-held, mass $> 10 \text{ kg}$ and $< 20 \text{ kg}$	108
CNP 025	Breaker, hand-held, mass $\geq 20 \text{ kg}$ and $\leq 35 \text{ kg}$	111
CNP 026	Breaker, hand-held, mass $> 35 \text{ kg}$	114
CNP 027	Breaker, excavator mounted (pneumatic)	122
CNP 028	Breaker, excavator mounted (hydraulic)	122
CNP 029	Ballast tamper, hand-held (electric)	105
CNP 030	Bulldozer	115
CNP 041	Conveyor belt	90
CNP 042	Concrete corer	117
CNP 043	Chipper, hand-held (pneumatic)	112
CNP 044	Concrete lorry mixer	109
CNP 045	Concrete mixer (electric)	96
CNP 046	Concrete mixer (petrol)	96

Identification Code	Description	Sound Power Level (dB(A))
CNP 047	Concrete pump, stationary/lorry mounted	109
CNP 048	Crane, mobile/barge mounted (diesel)	112
CNP 049	Crane, tower (electric)	95
CNP 050	Compactor, vibratory	105
CNP 061	Derrick barge	104
CNP 062	Dredger, chain bucket	118
CNP 063	Dredger, grab	112
CNP 064	Drill, percussive, hand-held (electric)	103
CNP 065	Drill/grinder, hand-held (electric)	98
CNP 066	Dumper	106
CNP 067	Dump truck	117
CNP 081	Excavator/loader, wheeled/tracked	112
CNP 101	Generator, standard	108
CNP 102	Generator, silenced, 75 dB(A) at 7 m	100
CNP 103	Generator, super silenced, 70 dB(A) at 7 m	95
CNP 104	Grader	113
CNP 121	Hoist, passenger/material (pneumatic)	108
CNP 122	Hoist, passenger/material (electric)	95
CNP 123	Hoist, passenger/material (petrol)	104
CNP 141	Lorry	112
CNP 161	Paint line marker	90
CNP 162	Piling, diaphragm wall, bentonite filtering plant	105
CNP 163	Piling, diaphragm wall, hydraulic extractor	90
CNP 164	Piling, large diameter bored, grab and chisel	115
CNP 165	Piling, large diameter bored, oscillator	115
CNP 166	Piling, large diameter bored, reverse circulation drill	100
CNP 167	Piling, earth auger, auger	114
CNP 168	Power pack for hand-held items of PME	100
CNP 169	Power rammer (petrol)	108
CNP 170	Poker, vibratory, hand-held	113
CNP 171	Planer, wood, hand-held (electric)	117
CNP 181	Rock drill, crawler mounted (pneumatic)	128



Identification Code	Description	Sound Power Level (dB(A))
CNP 182	Rock drill, crawler mounted (hydraulic)	123
CNP 183	Rock drill, hand-held (pneumatic)	116
CNP 184	Road planer or miller	111
CNP 185	Road roller	108
CNP 186	Roller, vibratory	108
CNP 201	Saw, circular, wood	108
CNP 202	Saw, chain, hand-held	114
CNP 203	Saw/groover, concrete (petrol)	115
CNP 204	Scraper	119
CNP 221	Tug boat	110
CNP 222	Tractor	118
CNP 241	Ventilation fan	108
CNP 261	Winch (pneumatic)	110
CNP 262	Winch (electric)	95
CNP 263	Winch (petrol)	102
CNP 281	Water pump (electric)	88
CNP 282	Water pump (petrol)	103
CNP 283	Water pump, submersible (electric)	85

*Table 4 — Summation of Noise Levels*

Difference in dB(A) between two noise levels being summed	Amount in dB(A) to add to the higher noise level
0 to 0.5	3.0
1.0 to 1.5	2.5
2.0 to 3.0	2.0
3.5 to 4.5	1.5
5.0 to 7.0	1.0
7.5 to 12.0	0.5
more than 12.0	0

When using Table 4 noise levels should be summed in a pairwise fashion and the final total rounded to the nearest whole dB(A), with values of 0.5 or more being rounded upwards.

*Table 5 — Correction Factors to Obtain the Predicted Noise Level (PNL) from Sound Power Level at Given Distances*

Distance (m)	Correction (dB(A))	Distance (m)	Correction (dB(A))
0	8	30 to 33	38
1	8	34 to 37	39
2	14	38 to 41	40
3	18	42 to 47	41
4	20	48 to 52	42
5	22	53 to 59	43
6	24	60 to 66	44
7	25	67 to 74	45
8	26	75 to 83	46
9	27	84 to 93	47
10	28	94 to 105	48
11	29	106 to 118	49
12	30	119 to 132	50
13	30	133 to 148	51
14	31	149 to 166	52
15 to 16	32	167 to 187	53
17 to 18	33	188 to 210	54
19 to 21	34	211 to 235	55
22 to 23	35	236 to 264	56
24 to 26	36	265 to 300	57
27 to 29	37		

For the purpose of determining the correction to be used for converting from sound power level at the source to the PNL at the NSR, the distance from the source position to the NSR shall be determined to the nearest whole metre, with values of 0.5 or more being rounded upwards.

This table is only valid for distances of up to 300 m. For distances greater than 300 m the Authority shall calculate appropriate correction factors having regard to standard acoustical principles and practices.

# ANNEX — GENERAL CALIBRATION AND MEASUREMENT PROCEDURES

## 1. *Instrumentation*

For the purpose of this Technical Memorandum sound level meters shall comply with International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1), and other noise measuring and analysis instrumentation shall be of a comparable professional quality. Standard acoustical principles and practices shall be followed in the measurement and analysis of the noise under investigation.

## 2. *Calibration Procedures*

Immediately prior to and following each noise measurement the accuracy of the sound level meter shall be checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements may be accepted as valid only if the calibration levels from before and after the noise measurement agree to within 1.0 dB.

## 3. *Measurement Procedures*

### 3.1 Assessment Point

Noise levels shall be determined by carrying out measurements at the assessment point. Where a measurement is to be carried out at a building, the assessment point shall normally be at a position 1 m from the exterior of the building facade but may be at any other point considered to be appropriate by the Authority. Where a measurement is to be made of noise being received at a place other than a building, the assessment point shall be at a position 1.2 m above the ground, at a particular point considered appropriate by the Authority.

### 3.2 Noise Units and Descriptors

Any noise measurement shall be made in terms of the A-weighted equivalent continuous sound pressure level ( $L_{eq}$ ) measured with an integrating sound level meter. Such measurement shall be made over any 5-minute period during the CNP period under consideration.

### 3.3 Rounding of Noise Levels

All noise measurements shall be rounded to the nearest whole dB(A), with values of 0.5 or more being rounded upwards.

### 3.4 Weather Conditions

Noise measurements should be made in accordance with standard acoustical principles and practices in relation to weather conditions.