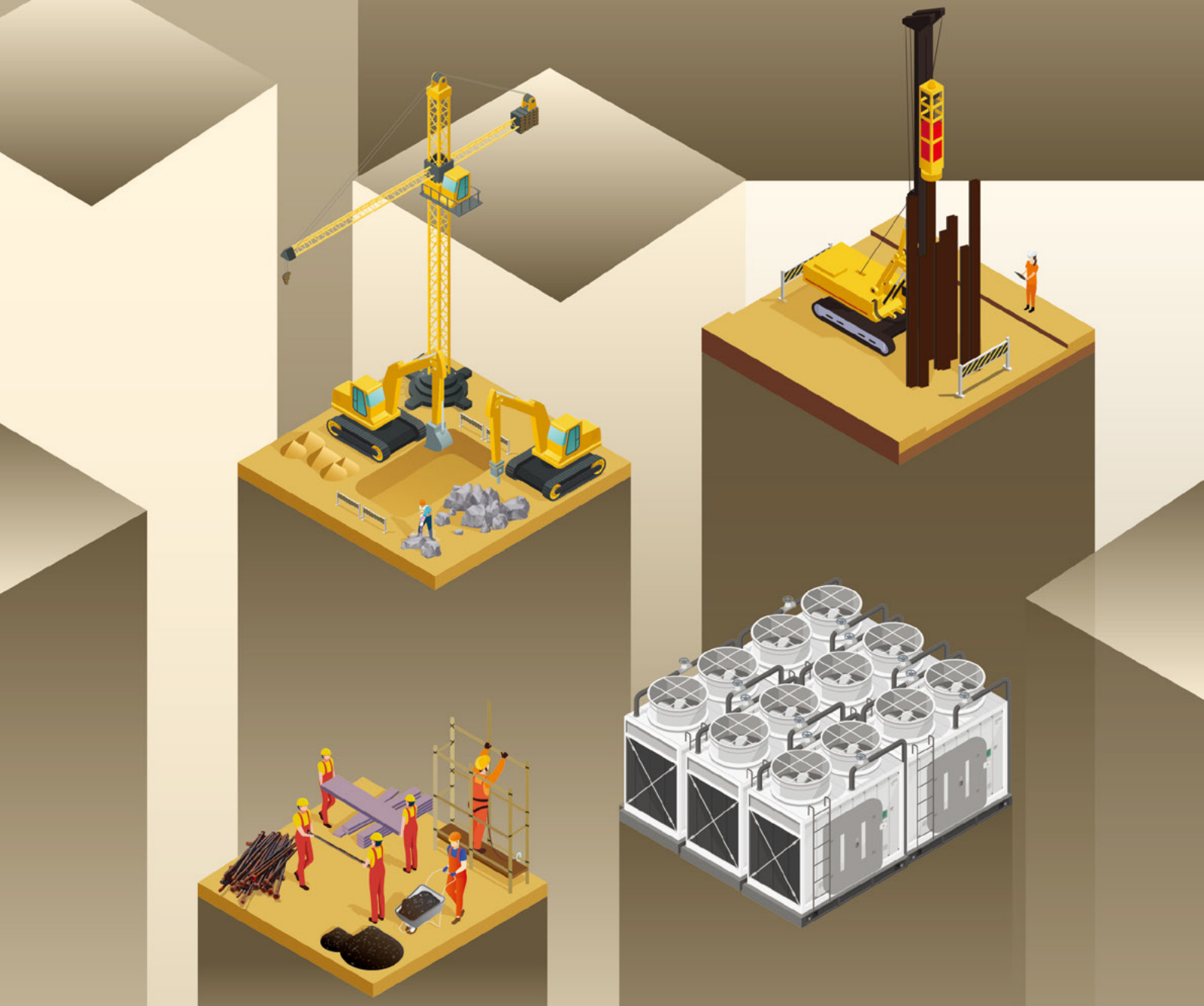
TECHNICAL MEMORANDA ISSUED UNDER THE NOISE CONTROL ORDINANCE (CAP. 400)



環境保護署
Environmental Protection Department

2024

The Noise Control Ordinance (Cap. 400) ("NCO") provides the statutory controls on various types of environmental noise by different mechanisms. Based on the premises from which the noises are emanating, their characteristics and time of occurrence during the day, as well as the types of noise sensitive receiver, different technical assessments would be adopted to evaluate their acceptability under respective control mechanisms. Pursuant to section 9 and section 10 of the NCO, specific Technical Memoranda were issued for implementation of such control mechanisms.

There are four (4) Technical Memoranda issued, and compiled in this collection as follows:

- **Technical Memorandum on Noise from Percussive Piling**
- **Technical Memorandum on Noise from Construction Work other than Percussive Piling**
- **Technical Memorandum on Noise from Construction Work in Designated Areas**
- **Technical Memorandum for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites**

These Technical Memoranda set out the principles, procedures, guidelines, standards and limits, which shall be adopted by the Noise Control Authority for assessments of the respective types of environmental noise in relation to discharging its statutory duties or functions under the NCO. In addition, these Technical Memoranda could also be references for professionals involving in assessments and prevention of noise emanated from projects or operations under the above categories.

Other relevant details of the NCO and related regulations can be found in the "Hong Kong e-legislation" website of the Department of Justice at www.elegislation.gov.hk/hk/cap400.

TECHNICAL MEMORANDUM ON NOISE FROM PERCUSSIVE PILING

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This Technical Memorandum, originally published under section 11(1) of the Noise Control Ordinance in Special Supplement No.5 to Gazette No. 20 Vol. CXXXIX on 16 May 1997, came into operation on 19 June 1997.

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 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 determining (on the basis of the calculated noise level) any permitted hours of operation for percussive piling;

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

for determining whether or not any Construction Noise Permit for percussive piling 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 Noise Permit" has the same meaning as in the Ordinance;

"diesel hammer" means a device which imparts a percussive force to a pile by means of the downward motion of a ram which causes the compression and ignition of a charge of diesel fuel;

"double acting" describes the working principle of a piling hammer in which a percussive force is imparted to a pile by means of the direct or indirect impact of a ram or piston falling under the force of gravity with an additional downward force being exerted by a fluid at high pressure, the ram or piston being raised by means of a force imparted by a fluid at high pressure;

"drop hammer" means a device which imparts a percussive force to a pile by means of the direct or indirect impact of a mass falling under the force of gravity alone, the mass being raised by means of a crane or winch;

"hydraulic hammer" means a device which imparts a percussive force to a pile by means of the downward motion of a ram or piston which follows the single or double acting principle and is powered by hydraulic fluid at high pressure;

"internal drop hammer" means a drop hammer used in such a manner that the point of impact is at or near the bottom of the pile casing, the casing being a hollow steel tube within which the action of the hammer takes place;

"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;

"piling zone" means an area within which percussive piling may take place, as specified in a Construction Noise Permit;

"pneumatic or steam hammer" means a device which imparts a percussive force to a pile by means of the downward motion of a ram or piston which follows the single or double acting principle and is powered by air or steam at high pressure;

"Secretary" has the same meaning as in the Ordinance; and

"single acting" describes the working principle of a piling hammer in which a percussive force is imparted to a pile by means of the direct or indirect impact of a ram or piston falling under the force of gravity alone, the ram or piston being raised by means of a force imparted by a fluid at high pressure.

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 determining if a Construction Noise Permit for percussive piling should include restrictions on the hours during which percussive piling may take place (referred to in this Technical Memorandum as the permitted hours of operation) 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 and determine the appropriate Acceptable Noise Level (in accordance with Sections 2.1 and 2.2);

(b) calculate the Corrected Noise Level which will be generated by the percussive piling at the Noise Sensitive Receiver (in accordance with Sections 2.3 to 2.8); and

(c) determine the appropriate permitted hours of operation for the percussive piling by comparing the Corrected Noise Level with the Acceptable Noise Level (in accordance with Sections 2.9 and 2.10).

The Construction Noise Permit issued by the Authority shall include the permitted hours of operation as a condition, and may include such other conditions as the Authority considers appropriate, such as the permissible piling methods and pile types which may be used, the area within which percussive piling may take place (referred to in this Technical Memorandum as the piling zone), the dates of commencement and expiry of the Construction Noise Permit and any special noise control measures that must be adopted. In particular, a more stringent criterion shall be applied to the use of diesel, pneumatic and steam hammer pile drivers.

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.

Construction Noise Permits for the carrying out of non-percussive piling are only required between 1900 and 0700 hours or at any time on a general holiday, including Sunday, and may only be issued in accordance with the Technical Memorandum on Noise from Construction Work other than Percussive Piling.

2. DETERMINATION OF THE PERMITTED HOURS OF OPERATION FOR PERCUSSIVE PILING

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

The NSR which will be most affected by noise from the percussive piling 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, performing arts centre or office building shall be considered to be a NSR. Any other premises or place, not being in the nature of industrial 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 Acceptable Noise Level (ANL) for the Noise Sensitive Receiver (NSR)*

The Authority shall determine the appropriate ANL for the NSR under consideration from Table 1. If Table 1 is not directly applicable to the NSR under consideration the Authority may make use of such ANL as it considers appropriate.

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

2.3 *Step 3 - Sound Power Levels for Percussive Piling*

The sound power level of each of the percussive piling units included in the CNP application shall be obtained from Table 2 having regard to the piling method and pile type combination. If any piling method and pile type combination included in the CNP application does not appear in Table 2 the Authority may make use of such sound power level as it considers appropriate.

2.4 *Step 4 - Summation of Noise Levels*

The sound power levels obtained in Step 3 shall be summed logarithmically in accordance with Table 3 to obtain a total sound power level.

2.5 *Step 5 - Distance Attenuation*

The plan distance or, where appropriate, the slant distance between the NSR and the pile location nearest to the NSR shall be determined.

The position of the pile location nearest to the NSR shall be selected having regard to any pile layout drawing supplied by the CNP applicant. If no such drawing is supplied to the Authority the position shall be taken to be the position on the piling zone boundary nearest to the NSR.

The appropriate correction factor for distance attenuation shall be obtained from Table 4. This correction factor shall be subtracted from the total sound power level obtained in Step 4 to give the Predicted Noise Level (PNL) at the NSR.

2.6 *Step 6 - Corrections for the Effect of Barriers*

In cases where the Authority considers that all of the percussive piling 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 5.

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.

In cases where the NSR is a building directly adjacent to the construction site such that none of the percussive piling 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 5.

2.7 *Step 7 - 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 5.

An additional positive correction of 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.

2.8 *Step 8 - Corrected Noise Level (CNL) at the Noise Sensitive Receiver (NSR)*

The corrections obtained in Steps 6 and 7 shall be applied to the PNL obtained in Step 5 to give the CNL at the NSR.

2.9 *Step 9 - Determination of the Permitted Hours of Operation*

The CNL at the NSR obtained in Step 8 shall be compared with the ANL obtained in Step 2 and the appropriate permitted hours of operation, if applicable, shall be determined from Table 5A or 5B.

The Authority may vary the timing (but not the total duration) of the permitted hours of operation if it considers that such variation would be justified by the nature or requirements of any NSR which may be affected or of the percussive piling under consideration.

The timing and total duration of the permitted hours of operation may be varied if the application is a special case as defined in Section 3. The procedures detailed in Section 3 shall then be followed.

2.10 *Step 10 - Construction Noise Permit (CNP) Issuing Procedure*

Each CNP issued by the Authority shall include as a condition the permitted hours of operation and may also include such other conditions as the Authority considers appropriate. When there is no permitted hours of operation for the use of diesel, pneumatic and/or steam hammers as determined in Step 9 above, a CNP shall not be issued.

When giving consideration to the renewal of CNPs pursuant to section 8 of the Ordinance the Authority may impose additional conditions or time restrictions having regard to complaints received and other relevant factors, notwithstanding the procedures and guidelines detailed in Steps 1 to 9.

3. PROVISIONS FOR SPECIAL CASES

3.1 *Quiet Working Methods or Other Special Factors*

Applications which contain sufficient details of any particularly quiet percussive piling methods or any special noise control measures which the CNP applicant proposes to employ, or any other special factors or exceptional circumstances which the applicant considers 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 percussive piling methods to be used, maximum noise levels at the NSR or at any other positions and any other conditions which may be considered to be appropriate by the Authority.

3.2 *Percussive Piling Having Important Social Implications*

Where in the opinion of the Authority a CNP application is for percussive piling in connection with a project which, by virtue of its magnitude or purpose, may have significant social implications or where restrictions on the permitted hours of operation may not be in the public interest or where the carrying out of percussive piling during the permitted hours of operation 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.

3.3 *Designated Geologically Difficult Areas*

The Authority shall consider a CNP application to use diesel hammers if that site is situated in Scheduled Areas no. 2 and 4 in the Fifth Schedule of the Buildings Ordinance (Chapter 123) which all these areas are geologically difficult areas and are designated as Geologically Difficult Areas. For any CNP issued under this provision, the appropriate permitted hours of operation shall be determined from Table 5A in accordance with Section 2.9.

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 - Acceptable Noise Levels (ANLs)

NSR Window Type or Means of Ventilation		ANL (dB(A))
(i)	NSR (or part of NSR) with no windows or other openings	100
(ii)	NSR with central air conditioning system	90
(iii)	NSR with windows or other openings but without central air conditioning system	85

10 dB(A) shall be subtracted from the ANLs shown above for NSRs which are hospitals, medical clinics, educational institutions, courts of law or other NSRs which are considered by the Authority to be particularly sensitive to noise.

Table 2 - Sound Power Levels for Percussive Piling

Piling Method* and Pile Type	Sound Power Level (dB(A))
Diesel hammer driving pre-stressed concrete pile	128
Diesel hammer driving steel pile	132
Diesel hammer driving steel sheet pile	132
Drop hammer driving concrete pile	116
Drop hammer driving steel pile	126
Drop hammer driving steel sheet pile	129
Hydraulic hammer (double acting) driving pre-stressed concrete pile	126
Hydraulic hammer (double acting) driving steel pile	129
Hydraulic hammer (double acting) driving steel sheet pile	129
Hydraulic hammer (single acting) driving pre-stressed concrete pile	122
Hydraulic hammer (single acting) driving steel pile	126
Hydraulic hammer (single acting) driving steel sheet pile	126
Internal drop hammer	113
Pneumatic or steam hammer (double acting) driving steel sheet pile	135
Pneumatic or steam hammer (single acting) driving steel pile	130

* These terms are defined in Section 1.3

Table 3 - 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 3 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 4 - 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	17	44 to 48	44
1	17	49 to 53	45
2	20	54 to 59	46
3	21	60 to 65	47
4	23	66 to 72	48
5	24	73 to 79	49
6	24	80 to 87	50
7	25	88 to 96	51
8	26	97 to 107	52
9	27	108 to 118	53
10	29	119 to 130	54
11	30	131 to 144	55
12	30	145 to 159	56
13	31	160 to 175	57
14	32	176 to 193	58
15	33	194 to 214	59
16	33	215 to 236	60
17	34	237 to 260	61
18	34	261 to 288	62
19	35	289 to 317	63
20 to 21	36	318 to 351	64
22 to 24	37	352 to 387	65
25 to 26	38	388 to 427	66
27 to 29	39	428 to 472	67
30 to 32	40	473 to 521	68
33 to 36	41	522 to 575	69
37 to 39	42	576 to 635	70
40 to 43	43	636 to 700	71

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 700 m. For distances greater than 700 m the Authority shall calculate appropriate correction factors having regard to standard acoustical principles and practices.

Table 5A - Permitted Hours of Operation for the Carrying Out of Piling Work Not Involving the Use of Diesel, Pneumatic and/or Steam Hammers

Amount by which Corrected Noise Level (CNL) exceeds Acceptable Noise Level (ANL), CNL - ANL	Permitted hours of operation on any day not being a general holiday
10 dB(A) < CNL-ANL	0800 to 0900 AND 1230 to 1330 AND 1700 to 1800
0 dB(A) < CNL-ANL ≤ 10 dB(A)	0800 to 0930 AND 1200 to 1400 AND 1630 to 1800
CNL-ANL ≤ 0 dB(A)	0700 to 1900

Table 5A is also applicable to the piling work involving the use of diesel hammers permitted under Section 3.3.

Table 5B - Permitted Hours of Operation for the Carrying Out of Piling Work Involving the Use of Diesel, Pneumatic and/or Steam Hammers

(i) Effective for percussive piling work to be conducted until 31.3.98

Amount by which Corrected Noise Level (CNL) exceeds Acceptable Noise Level (ANL), CNL - ANL	Permitted hours of operation on any day not being a general holiday
10 dB(A) < CNL-ANL	0800 to 0900 AND 1230 to 1330 AND 1700 to 1800
0 dB(A) < CNL-ANL ≤ 10 dB(A)	0800 to 0930 AND 1200 to 1400 AND 1630 to 1800
CNL-ANL ≤ 0 dB(A)	0700 to 1900

(ii) Effective for percussive piling work to be conducted between 1.4.98 and 30.9.98 (Stage 1)

Amount by which Corrected Noise Level (CNL) exceeds Acceptable Noise Level (ANL), CNL - ANL	Permitted hours of operation on any day not being a general holiday
20 dB(A) < CNL-ANL	Nil
10 dB(A) < CNL-ANL ≤ 20 dB(A)	0800 to 0900 AND 1230 to 1330 AND 1700 to 1800
0 dB(A) < CNL-ANL ≤ 10 dB(A)	0800 to 0930 AND 1200 to 1400 AND 1630 to 1800
CNL-ANL ≤ 0 dB(A)	0700 to 1900

(iii) Effective for percussive piling work to be conducted between 1.10.98 and 31.3.99 (Stage 2)

Amount by which Corrected Noise Level (CNL) exceeds Acceptable Noise Level (ANL), CNL - ANL	Permitted hours of operation on any day not being a general holiday
10 dB(A) < CNL-ANL	Nil
0 dB(A) < CNL-ANL ≤ 10 dB(A)	0800 to 0930 AND 1200 to 1400 AND 1630 to 1800
CNL-ANL ≤ 0 dB(A)	0700 to 1900

(iv) Effective for percussive piling work to be conducted between 1.4.99 and 30.9.99 (Stage 3)

Amount by which Corrected Noise Level (CNL) exceeds Acceptable Noise Level (ANL), CNL - ANL	Permitted hours of operation on any day not being a general holiday
0 dB(A) < CNL-ANL	Nil
CNL-ANL ≤ 0 dB(A)	0700 to 1900

(v) Effective for percussive piling work to be conducted on or after 1.10.99 (Stage 4)

Amount by which Corrected Noise Level (CNL) exceeds Acceptable Noise Level (ANL), CNL - ANL	Permitted hours of operation on any day not being a general holiday
-10 dB(A) < CNL-ANL	Nil
CNL-ANL ≤ -10 dB(A)	0700 to 1900

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 level 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 (Leq) measured with an integrating sound level meter. Such measurement shall be made over any 5-minute period during the CNP period under consideration.

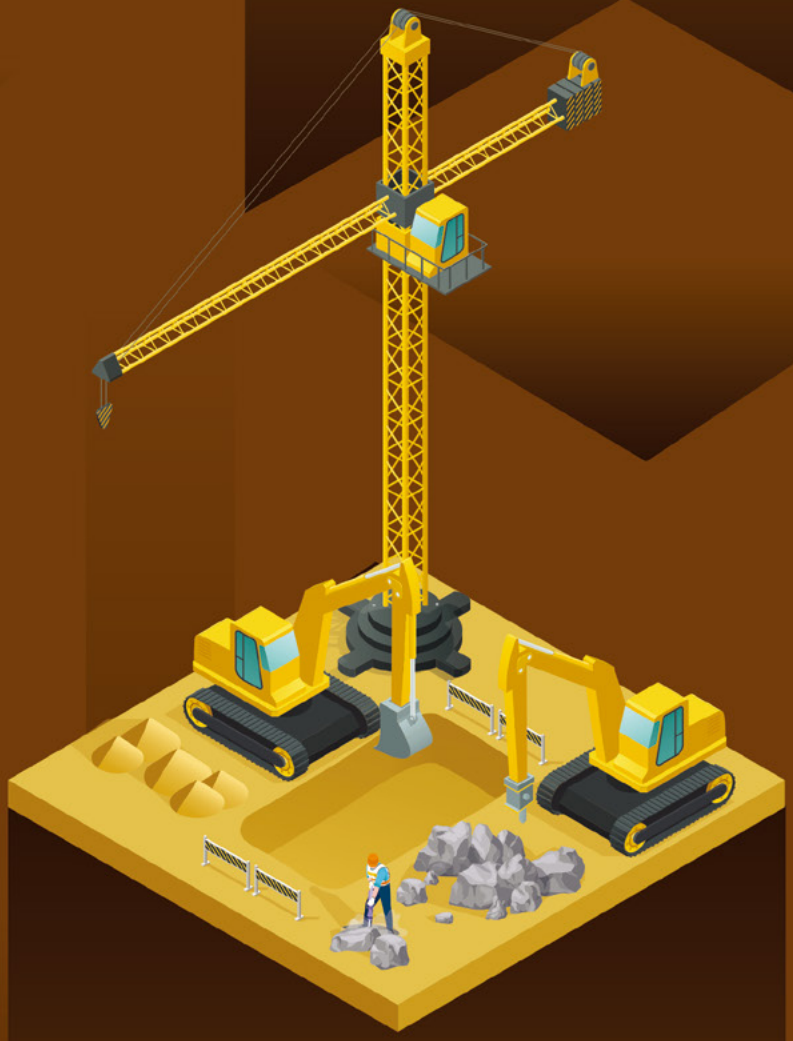
3.3 Rounding of Noise Levels

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 international acoustical standards and practices in relation to weather conditions.

TECHNICAL MEMORANDUM ON NOISE FROM CONSTRUCTION WORK OTHER THAN PERCUSSIVE PILING



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This Technical Memorandum, originally published under section 11(1) of the Noise Control Ordinance in Special Supplement No.5 to Gazette No. 2 Vol. CXXXVIII on 12 January 1996, came into operation on 14 February 1996.

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.I.

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 ≤ 10 m^3/min	100
CNP 002	Air compressor, air flow > 10 m^3/min and ≤ 30 m^3/min	102
CNP 003	Air compressor, air flow > 30 m^3/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 ≤ 10 kg	108
CNP 024	Breaker, hand-held, mass > 10 kg and < 20 kg	108
CNP 025	Breaker, hand-held, mass ≥ 20 kg and ≤ 35 kg	111
CNP 026	Breaker, hand-held, mass > 35 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
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

Identification Code	Description	Sound Power Level (dB(A))
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
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 (Leq) 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.

TECHNICAL MEMORANDUM ON NOISE FROM CONSTRUCTION WORK IN DESIGNATED AREAS

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LIST OF TABLES

This Technical Memorandum, originally published under section 11(1) of the Noise Control Ordinance in Special Supplement No.5 to Gazette No. 22 Vol. 5 on 1 June 2001, came into operation on 5 July 2001.

1. PRELIMINARY

1.1 *Citation and Commencement*

This Technical Memorandum on Noise from Construction Site within a Designated Area which is generated from the Use of Specified Powered Mechanical Equipment (SPME) to carry out construction work other than Percussive Piling and/or the Carrying Out of Prescribed Construction Work (PCW) is issued pursuant to section 9 of the Noise Control Ordinance and may be cited as the Technical Memorandum on Noise from Construction Work in Designated Areas. This Technical Memorandum replaces the Technical Memorandum published in Special Supplement No. 5 to Gazette No. 6 Vol. CXXXVIII on 9 February 1996. 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 construction work to be conducted on or after 1 November 1996:

for the assessment of noise from construction work within a designated area involving the use of SPME other than percussive piling and/or the carrying out of PCW;

for the issuing of Construction Noise Permits for construction work within a designated area involving the use of SPME other than percussive piling and/or the carrying out of PCW pursuant to sections 8 & 8A of the Ordinance; and,

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

In areas, other than a designated area, or when the construction work does not involve the use of SPME nor the carrying out of PCW, the procedures governing the issuing of Construction Noise Permits shall be in accordance with the Technical Memorandum on Noise from Construction Work other than Percussive Piling.

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 Noise Permit" has the same meaning as in the Ordinance;

"construction site" has the same meaning as in the Ordinance;

"construction work" has the same meaning as in the Ordinance;

"designated area" has the same meaning as in the Ordinance;

"formwork" means any type of metallic, wooden or fibreglass construction including any structural support designed to enable concrete, cement or other material poured in a fluid state to assume a particular shape upon setting;

"hammering" means to strike repeatedly any object, instrument or surface with any other object, instrument or surface;

"Noise Sensitive Receiver" means 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. 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 Noise Sensitive Receiver. Any premises or place shall, however, be considered to be a Noise Sensitive Receiver only when it is in use for its intended purpose.

"Ordinance" means the Noise Control Ordinance;

"powered mechanical equipment" has the same meaning as in the Ordinance;

"prescribed construction work" means the construction work prescribed for the purpose of section 6(2) of the Ordinance. The Noise Control (Construction Work) Regulation stipulates the type of construction work being prescribed for control;

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

"rubble" means any kind of debris or superfluous material arising from construction work including bricks, concrete, metal, glass, wood, plastic, earth, rock, bamboo or fibreglass;

"scaffolding" means any type of construction made of metal, wood or bamboo whose purpose is to enable temporary access to a part or parts of another structure or building whether completed or not;

"Secretary" has the same meaning as in the Ordinance;

"specified powered mechanical equipment" means those items of powered mechanical equipment as specified in Table A.3 of Annex A in this Technical Memorandum; 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.

2. THE USE OF SPECIFIED POWERED MECHANICAL EQUIPMENT (SPME) FOR THE PURPOSE OF CARRYING OUT CONSTRUCTION WORK OTHER THAN PERCUSSIVE PILING AND/OR THE CARRYING OUT OF PRESCRIBED CONSTRUCTION WORK (PCW) WITHIN A DESIGNATED AREA

The use of any SPME as listed in Table A.3 in Annex A and the carrying out of any PCW as listed in Annex B within a designated area during the restricted hours shall require a valid Construction Noise Permit (CNP). The considerations and procedures governing whether a CNP may be issued for the above works are described in this Technical Memorandum.

A CNP shall not generally be granted for the use of SPME during the restricted hours within a designated area unless the Corrected Noise Level (CNL) for all the SPME proposed to be used does not exceed the appropriate Acceptable Noise Level (ANL) as determined according to A.2.1 to A.2.6 in Annex A. Such CNP application shall be assessed in accordance with the procedures detailed in Annex A. Notwithstanding the above, such a permit may be granted if the application is a special case as defined in Section 5.

The Authority may refuse to grant a CNP for the use of powered mechanical equipment if the Authority has reason to believe that the equipment is to be used in conjunction with the carrying out of any PCW not being permitted under this Technical Memorandum.

A CNP shall not generally be granted for the carrying out of PCW within a designated area during the restricted hours unless the application is a special case as defined in Section 5. In this case, the applicant shall submit a method statement for the carrying out of each type of PCW to describe how and where such work is to be carried out together with the CNP application for the Authority to assess in connection with these special cases.

3. DESIGNATED AREAS

Designated areas, in which the control of SPME and PCW will apply, are established through the Noise Control (Construction Work Designated Areas) Notice made under section 8A(1) of the Ordinance.

4. CONSTRUCTION NOISE PERMIT (CNP)

The CNP issued by the Authority in the prescribed form may include such conditions as the Authority considers appropriate, such as the SPME permitted to be used and the PCW permitted to be carried out on the construction site, the hours during which the CNP is valid, the dates of commencement and expiry of the CNP, 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 CNP 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 period or periods and subject to such alterations or new conditions as the Authority considers appropriate.

A CNP 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 (NSR) 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 NSR,

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 NSR.

When giving consideration to the renewal of CNPs pursuant to sections 8 & 8A 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 Section 2 and Annex A.

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 SPME, which is permitted to be used, on a 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 A.3 in Annex A.

5. PROVISIONS FOR SPECIAL CASES

5.1 *Unavoidable Constraints on Working Hours*

A CNP may be granted 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 work during non-restricted hours.

This provision shall apply in cases such as those in which serious interruption would be caused to road, rail or other forms of transport; or to utilities such as 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 carrying out of particularly quiet working methods, the use of specially silenced items of equipment, 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.

5.2 *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.

5.3 *Quiet Working Methods or Other Special Factors for the Use of SPME*

Any particularly quiet items of SPME or any special noise control measures for the use of SPME 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 to his application for the use of SPME, may be given special consideration by the Authority. The applicant must demonstrate to the satisfaction of the Authority that the claimed noise reduction is achievable in the form of a report submitted together with his CNP application. The report must be prepared by a person who by reason of his training and experience is competent to carry out such noise assessment. In considering such special cases the Authority may make allowances, adjustments or corrections to any of the factors in Annex A 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 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.

5.4 *Quiet Working Methods or Other Special Factors for the Carrying out of PCW*

A CNP may be granted for the carrying out of PCW if quiet working methods as listed in Annex C are adopted for the execution of the PCW.

A CNP may also be granted for the carrying out of PCW if the Authority is satisfied that the location of work being carried out is screened by solid barriers, such as purpose-designed acoustic screens, buildings or topographical features. These barriers must act as useful acoustic screens to effectively protect the affected noise sensitive receivers. Detailed descriptions of such special factors shall be submitted in the CNP application and will be assessed by the Authority in accordance with standard acoustical principles and practices.

Any CNP issued under this provision may include conditions such as details of the quiet working methods, locations at which the PCW is permitted to be carried out and any other conditions which may be considered to be appropriate by the Authority.

6. TESTING FOR COMPLIANCE WITH CONSTRUCTION NOISE PERMIT 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 Annex D.

ANNEX A - ASSESSMENT OF NOISE FROM CONSTRUCTION WORK INVOLVING THE USE OF SPECIFIED POWERED MECHANICAL EQUIPMENT (SPME) OTHER THAN PERCUSSIVE PILING WITHIN A DESIGNATED AREA

A.1. *General Introduction to the Procedures*

For the purpose of assessing if a Construction Noise Permit (CNP) may be issued for construction work involving the use of SPME other than percussive piling within a designated area during the 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 (NSR), determine the Area Sensitivity Rating (ASR) for the area within which the NSR is located and hence determine the relevant Acceptable Noise Level (ANL) (in accordance with Sections A.2.1 to A.2.6);

(b) calculate the Corrected Noise Level (CNL) which will be generated by the construction work at the NSR (in accordance with Sections A.2.7 to A.2.12); and

(c) compare the CNL with the ANL to determine if a CNP may be issued (in accordance with Section A.2.13).

If the CNL is equal to or less than the ANL the CNP 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 SPME which may be used on the construction site, the hours during which the CNP is valid, the dates of commencement and expiry of the CNP, 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.2. *Calculation Procedure*

A.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.

A.2.2 Step 2 - *Determination of the Area Sensitivity Rating (ASR)*

A.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 A.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 A.1.

A.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 A.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.

A.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.

A.2.2.4 Area Sensitivity Rating (ASR)

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

A.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 A.2, having regard to the appropriate ASR and the time period as specified in the Construction Noise Permit application.

A.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.

A.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.

A.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.

A.2.7 Step 7 - *Location of Items of Specified Powered Mechanical Equipment (SPME)*

All items of SPME 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 SPME 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 SPME in the calculation of distance attenuation in Step 9.

A.2.8 Step 8 - *Sound Power Levels for Specified Powered Mechanical Equipment (SPME)*

The sound power levels in dB(A) of each of the items of SPME intended for use on the construction site shall be obtained from Table A.3.

If any item of SPME in Table A.3 intended for use on the construction site is a prescribed product under the Ordinance and is fitted with a valid noise emission label, then the sound power level on the label shall be used instead of the one in Table A.3 for the calculation of CNL.

A.2.9 Step 9 - *Distance Attenuation and Summation of Noise Levels*

A.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.

A.2.9.2 Procedure for Use with a Single Notional Source Position

If all items of SPME 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 A.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 A.5. This correction factor shall be subtracted from the total sound power level to give the Predicted Noise Level (PNL) at the NSR.

A.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 A.5. These factors shall be subtracted from the individual sound power levels for each item of SPME to give the individual sound pressure levels for each item of SPME at the NSR.

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

A.2.10 Step 10 - *Corrections for the Effect of Barriers*

In cases where the Authority considers that all items of SPME 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 5.3.

In cases where the Authority considers that all items of SPME to be used on the construction site other than "quiet" items of SPME 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 SPME 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 SPME.

In cases where the NSR is a building directly adjacent to the construction site such that none of the items of SPME 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.

A.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.

A.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.

A.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 5. The procedures detailed in Section 5 shall then be followed.

Table A.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 A.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 A.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)	45	50	55
All days during the night-time (2300 to 0700 hours)	30	35	40

Table A.3 - Sound Power Levels for Items of Specified Powered Mechanical Equipment (SPME)

Identification Code	Description	Sound Power Level (dB(A))
CNP 023	Breaker, hand-held, mass ≤ 10 kg	108
CNP 024	Breaker, hand-held, mass > 10 kg and < 20 kg	108
CNP 025	Breaker, hand-held, mass ≥ 20 kg and ≤ 35 kg	111
CNP 026	Breaker, hand-held, mass > 35 kg	114
CNP 030	Bulldozer	115
CNP 044	Concrete lorry mixer	109
CNP 067	Dump truck	117
CNP 170	Poker, vibratory, hand-held	113

Table A.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 A.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 A.5 - Correction Factors to Obtain the Predicted Noise Level (PNL) from Sound Power Levels 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 B - PRESCRIBED CONSTRUCTION WORK (PCW)

Identification Code	Description of Activity
PCW 001	Erection or dismantling of formwork or scaffolding.
PCW 002	Loading, unloading or handling of rubble, wooden boards, steel bars, wood or scaffolding material.
PCW 003	Hammering.

ANNEX C - QUIET WORKING METHODS FOR PCW

Identification Code	Description of Quiet Working Method
QPCW 001	Disposal of rubble through plastic chutes.

ANNEX D - GENERAL CALIBRATION AND MEASUREMENT PROCEDURES

D.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.

D.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.

D.3. *Measurement Procedures*

D.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.

D.3.2 Noise Units and Descriptors

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

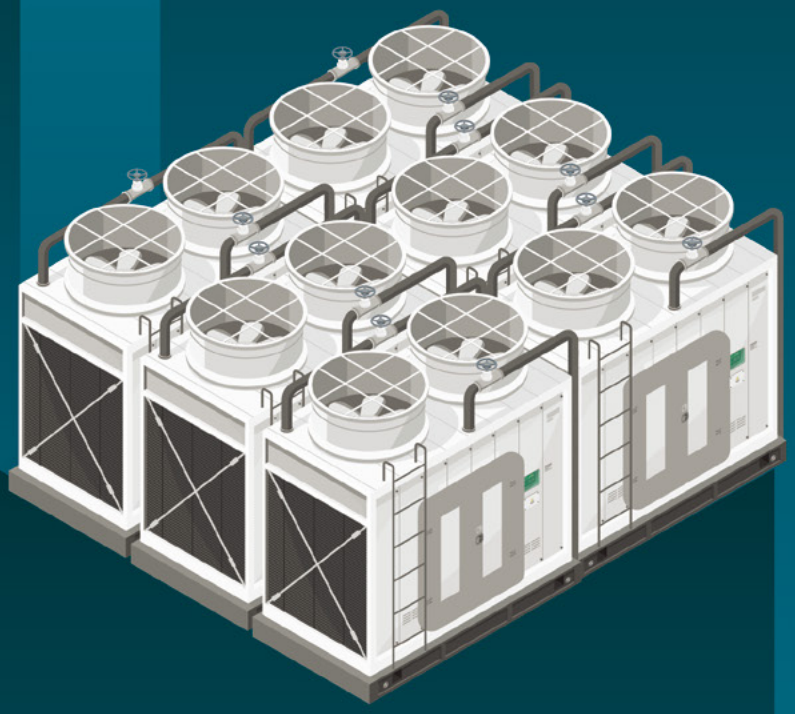
D.3.3 Rounding of Noise Levels

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

D.3.4 Weather Conditions

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

TECHNICAL MEMORANDUM FOR THE ASSESSMENT OF NOISE FROM PLACES OTHER THAN DOMESTIC PREMISES, PUBLIC PLACES OR CONSTRUCTION SITES



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This Technical Memorandum, originally published under section 11(1) of the Noise Control Ordinance in Special Supplement No.5 to Gazette No. 20 Vol. CXXXIX on 16 May 1997, came into operation on 19 June 1997.

TECHNICAL MEMORANDUM FOR THE ASSESSMENT OF NOISE FROM PLACES OTHER THAN DOMESTIC PREMISES, PUBLIC PLACES OR CONSTRUCTION SITES

1. PRELIMINARY

1.1 *Citation and Commencement*

This Technical Memorandum is issued pursuant to section 10 of the Noise Control Ordinance and may be cited as the Technical Memorandum for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites. 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 measurement and assessment of noise emanating from places other than domestic premises, public places or construction sites;

for the issuing of Noise Abatement Notices pursuant to section 13(1)(c) of the Ordinance; and

for determining whether or not any Noise Abatement Notice 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;

"domestic premises" has the same meaning as in the Ordinance;

"Ordinance" means the Noise Control Ordinance;

"place" has the same meaning as in the Ordinance; and

"public place" has the same meaning as in the Ordinance.

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*

When investigating a complaint regarding noise emanating from places or premises falling within the scope of this Technical Memorandum the Authority shall generally act in accordance with the following procedures which are detailed in subsequent sections. The Authority shall:

(a) determine the appropriate Acceptable Noise Level for the Noise Sensitive Receiver in question (in accordance with Section 2);

(b) conduct measurements to obtain the Corrected Noise Level of the noise under investigation (in accordance with Section 3); and

(c) compare the Corrected Noise Level with the Acceptable Noise Level to determine if a Noise Abatement Notice may be issued (in accordance with Section 4).

2. DETERMINATION OF THE ACCEPTABLE NOISE LEVEL

2.1 *General*

The appropriate Acceptable Noise Level (ANL) for a particular Noise Sensitive Receiver (NSR) is dependent upon the character of the area within which the NSR is located, and the time of day under consideration.

The steps to be followed in determining an ANL are as follows:

(a) identify the NSR, in accordance with Section 2.2;

(b) determine the Area Sensitivity Rating (ASR) of the area within which the NSR is located, in accordance with Section 2.3; and

(c) determine the ANL from Table 2 in Section 2.4, by reference to the ASR and the time period under consideration.

2.2 *Location of the Noise Sensitive Receiver (NSR)*

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.

2.3 *Determination of the Area Sensitivity Rating (ASR)*

2.3.1 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 2.3.3. After a careful examination of the area under consideration and the effect of any IFs, the ASR may be determined from Table 1.

2.3.2 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.

When determining the type of area within which the NSR is located the Authority should not generally take into account the presence of the premises or place from which the noise under investigation is emanating. However, if the Authority considers that such a premises or place by virtue of its size or other characteristics plays a major role in determining the type of area within which the NSR is located, it should be taken into account.

2.3.3 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.

An area which consists of a number of factories or industrial establishments; or an establishment which is having industrial operation or operations that is or are of a significant scale is designated as an "industrial area" for the purpose of this Technical Memorandum. 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.

2.3.4 Area Sensitivity Rating (ASR)

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

Any NSR shall, irrespective of Table 1, be assigned an ASR of "C" if it is within 100 m of a zone designated as "Industrial" or "Industrial Estate" on a statutory Outline Zoning Plan, or an ASR of "B" if it is between 100 m and 250 m from such a zone, except in cases where Table 1 indicates an ASR of "C".

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 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.

2.4 *Determination of the Acceptable Noise Level (ANL)*

The appropriate ANL, in dB(A), for a given NSR may be determined from Table 2, having regard to the appropriate ASR and the time period under consideration.

Table 2 - Acceptable Noise Levels (ANLs)

Time Period	ASR		
	A	B	C
Day (0700 to 1900 hours)	60	65	70
Evening (1900 to 2300 hours)			
Night (2300 to 0700 hours)	50	55	60

Where the noise under investigation is being received within a building from a noise source located on or within the same or an adjoining building such that the noise is transmitted primarily through the structural elements of the building or buildings, the appropriate ANL shall be 10 dB(A) less than the relevant ANL as shown in Table 2. A similar adjustment should be made to the relevant ANL if the point of assessment is at an internal location of a building in which the NSR is located.

3. MEASUREMENT OF THE NOISE UNDER INVESTIGATION

3.1 *General*

The Authority should measure the noise under investigation in accordance with the procedures outlined in Section 3.2. Corrections may need to be applied to the Measured Noise Level (MNL) to account for certain noticeable characteristics of the noise and these shall be made in accordance with Section 3.3 to determine the Corrected Noise Level (CNL).

Where the NSR is considered by the Authority to be materially affected by one or more other noise sources falling within the scope of this Technical Memorandum, the Authority shall assess the noise under investigation in a manner which the Authority considers appropriate in the circumstances, having regard to standard acoustical principles and practices.

3.2 *Determination of the Measured Noise Level (MNL)*

The MNL of the noise under investigation shall be measured over a Sample Time Period (STP) by the Authority in accordance with the calibration and measurement procedures detailed in the Annex. An adjustment may be made where appropriate to allow for the influence of the background noise, in accordance with standard acoustical principles and practices.

3.3 *Determination of the Corrected Noise Level (CNL)*

3.3.1 General

Where the noise under investigation is considered by the Authority to have tonal, impulsive or intermittent characteristics, appropriate corrections shall be made to the MNL to obtain the CNL, as detailed below.

3.3.2 Correction for Tonality

A correction for tonality shall be applied if, between 31.5 Hz and 16 kHz, any one-third octave band or any pair of adjacent one-third octave bands of the A-weighted spectrum of the noise under investigation satisfies all of the following conditions:

(a) the level of the one-third octave band under consideration, or, in the case of a pair of bands, the level of the highest band in that pair, is not more than 15.0 dB below the level of the highest one-third octave band;

(b) the level of the one-third octave band under consideration, or, in the case of a pair of bands, the arithmetic average of the levels of the two bands, is more than 1.0 dB higher than the level of each of the adjacent bands on either side of the band or pair of bands under consideration; and

(c) the level difference, known as the tonality factor, f_{tone}, between the level of the one-third octave band under consideration, or, in the case of a pair of bands, the arithmetic average of the levels of the two bands, and the arithmetic average of the levels of the adjacent bands on either side of the band or pair of bands under consideration is 3.0 dB or more.

The analysis to determine if a tonal correction is necessary shall be carried out over such a time period or periods as the Authority considers appropriate within the STP, so as to be representative of the tonal characteristics of the noise under investigation.

Where the noise under investigation is assessed to have a tonal characteristic with a tonality factor, f_{tone}, the correction, c_{tone}, to the MNL shall be as shown in Table 3.

Table 3 - Tonality Correction

f_{tone}(dB)	c_{tone}(dB(A))	
	in cases where the frequency of any band under consideration is below 250 Hz	**in cases where the frequency of each band under consideration is higher than or equal to 250 Hz**
greater than or equal to 3.0 and less than 6.0	0	3
greater than or equal to 6.0 and less than 9.0	3	6
greater than or equal to 9.0	6	6

3.3.3 Correction for Impulsiveness

If the noise under investigation is considered by the Authority to be impulsive in character a positive correction, c_{imp}, of not more than 3 dB(A) may be applied to the MNL.

3.3.4 Correction for Intermittency

A correction for intermittency shall be applied to the MNL, for the night-time period (2300 to 0700 hours) only, when the A-weighted sound pressure level of the noise under investigation is subject to rapid changes in level of 5.0 dB(A) or more occurring with a degree of regularity within the STP, the typical magnitude of these changes in level being known as the intermittency factor, f_{int}.

Where the noise under investigation is assessed to have an intermittent characteristic with an intermittency factor, f_{int}, the correction, c_{int}, to the MNL shall be as shown in Table 4.

Table 4 - Intermittency Correction

f_{int} (dB(A))	c_{int} (dB(A))
greater than or equal to 5.0 and less than 10.0	3
greater than or equal to 10.0	6

3.3.5 Calculation of Corrected Noise Level (CNL)

The CNL shall be calculated by applying the appropriate corrections to the MNL in accordance with the following formula:

$CNL = MNL + c_{tone} + c_{imp} + c_{int}$ dB(A)

4. ISSUING A NOISE ABATEMENT NOTICE AND TESTING FOR COMPLIANCE

The CNL shall be compared with the ANL. When the CNL is greater than the ANL, the Authority may issue a Noise Abatement Notice (NAN). In cases where a NAN has already been issued the Authority shall compare the CNL, measured at a point as specified in the NAN, with such requirements as may be specified in the NAN to determine if the NAN is being complied with.

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.

Where the noise under investigation is transmitted to the NSR primarily either through the structural elements of the building; through openings other than those at the facade of the building; or through specially provided glazing at the facade of the building as considers appropriate for reducing the noise, the assessment point shall be at a particular internal location which the Authority considers appropriate having regard to the normal occupancy of the building.

3.2 Noise Units and Descriptors

Any noise measurement to determine the MNL shall be made in terms of the A-weighted equivalent continuous sound pressure level (Leq) measured with an integrating sound level meter. Such measurement shall be made over any 30 minute period or any shorter period when the Authority is satisfied that the noise under investigation is essentially steady over a 30 minute period, which shall be taken to be the STP.

3.3 Rounding of Noise Levels

With the exception of the CNL which should be calculated to the nearest whole dB(A), with values of 0.5 or more being rounded upwards, other measured or calculated noise levels shall be determined to the nearest 0.1 dB(A) or dB, with values of 0.05 or more being rounded upwards.

3.4 Weather Conditions

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