3. CONSTRUCTION NOISE

3.1 Introduction

The construction of the proposed Tai O sheltered boat anchorage and associated features may result in noise impacts that need to be controlled and minimised. This chapter addresses potential sources of noise impact during the anchorage construction phase, assesses their potential significance and where necessary, makes recommendations for suitable mitigation measures to reduce the impacts to acceptable levels. The construction noise impacts have been assessed based on the preliminary design of the anchorage, plant requirements, construction programme and methodology as proposed by CED and as reviewed in Chapter 2.

3.2 Legislation and Applicable Standards

In this Study, reference is made to the Hong Kong Environmental Planning Standards and Guidelines (HKPSG), the Noise Control Ordinance (NCO), the EIA Ordinance and the associated Technical Memorandum, (EIA TM).

In Hong Kong, construction noise is controlled through the NCO and the two subsidiary TMs on Noise from Percussive Piling (PP-TM) and Noise from Construction Work Other Than Percussive Piling (GW-TM). The TMs establish the permitted noise levels for construction work depending upon working hours and the existing noise climate.

An additional TM, the TM on Noise from Construction Work in Designated Areas (DA-TM) deals with the control of noise generated by Specified Powered Mechanical Equipment (SPME) and Prescribed Construction Works (PCWs) in identified designated areas. The SPME includes hand-held breakers, bulldozers, concrete lorry mixers, dump trucks and hand-held poker vibrators and PCWs includes the erection/dismantling of formwork/scaffolding, loading/unloading or handling of rubble, wooden boards, steel bars, wood or scaffolding material and hammering. As the Study Area is not situated in a designated area, the criteria in DA-TM have not been considered in this assessment.

The NCO criteria for the control of noise from Powered Mechanical Equipment (PME) is dependent upon the Area Sensitivity Rating (ASR), which is a “letter” system describing the background noise conditions in which the Noise Sensitive Receivers (NSRs) are located, rather than the measured background noise levels. As the worst affected NSRs are located in a rural area, the applicable ASR for these NSRs, as per the GW-TM, is an ‘A’. The NCO requires that construction related noise levels affecting the NSRs is less than the specified Acceptable Noise Level (ANL) which relates to the ASR. **Table 3.1** below shows the ASR selection criteria as stated in the GW-TM.

Table 3.1: Area Sensitivity Rating Criteria.

Type of Area Containing the NSR	Degree to which NSR is Affected by IF[4]		
	Not Affected[1]	Indirectly Affected[2]	Directly Affected[3]
(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

Notes:

(1) Not Affected means that the NSR is at such a location that the noise generated by the influencing factors[4] (IFs) is not noticeable at the NSR

(2) Indirectly Affected means that the NSR is at such a location that the noise generated by the IF, whilst noticeable at the NSR, is not a dominant feature of the noise climate of the NSR

(3) Directly Affected means that the NSR is in such a location that the noise generated by the IF is readily noticeable at the NSR and is a dominant feature of the noise climate of the NSR

(4) IFs are defined as industrial areas, major roads or the area within the boundary of Hong Kong International Airport

Construction activities of the proposed sheltered boat anchorage development during restricted hours (1900 to 0700 hours or any time on Sundays or general holidays) must be planned and controlled in accordance with the NCO and the GW-TM. However, construction activities during restricted hours are not anticipated.

Works requiring the use of PME during restricted hours and particularly at night will need to be carried out under the provision of a Construction Noise Permit (CNP) and planned to achieve the required Basic Noise Level (BNL) - these are shown in **Table 3.2** below. The BNL is corrected using the TM Methodology to produce the ANL, which is used in the CNP approval process. Again, construction activities during restricted hours are not anticipated during the Tai O sheltered boat anchorage works phase.

Table 3.2: Basic Noise Levels (in Leq, 30 min dB(A)).

Time Period	Area Sensitivity Rating		
	A	B	C
All days during the evening (1900-2300) and general holidays (including Sundays) during the day and evening (0700-2300)	60	65	70
All days during the night-time (2300-0700)	45	50	55

A limit of $L_{eq,\ 30\ min}$ 75 dB(A) for daytime construction activities (i.e. non restricted hours), as detailed in Annex 5, Table 1B of the EIA TM has been adopted for this assessment. This standard applies to all domestic premises, including temporary housing accommodation, hotels and

hostels. For schools, a daytime noise level of $L_{eq, 30\ min}$ 70 dB(A), lowered to $L_{eq, 30\ min}$ 65 dB(A) during examination periods, is recommended.

Subsidiary regulations of the NCO include the Noise Control (Hand Held Percussive Breakers) and Noise Control (Air Compressors) Regulations, which require compliance with relevant noise emission standards and the fixing of noise emission labels to specified plant and equipment. While these requirements are not directly relevant to the construction noise impact assessment detailed herein, Contractors must meet them during the construction phase of a project.

A CNP is required by the regulations of the NCO for the use of all PME during restricted hours. The procedures set out in PP-TM and GW-TM are used by EPD to determine whether or not a CNP should be issued. CNPs will not automatically be granted and will be assessed on a case-by-case basis by EPD.

Percussive piling during both restricted hours and non-restricted hours is only permitted where a CNP has been approved by EPD. The PP-TM sets out the permitted hours of operation of percussive piling and ANL requirements, which are dependent on the architectural characteristics of the NSR. The ANL criteria for percussive piling are reproduced in **Table 3.3**. ANLs for hospitals, schools, clinics, courts of law and other particularly sensitive receivers are 10 dB below the figures quoted in **Table 3.3**.

Table 3.3: Acceptable Noise Levels for Percussive Piling.

Architectural Characteristics of NSR	ANL, dB(A)
No windows or other openings	100
With central air conditioning system	95
With windows or other openings, but without central air conditioning system	85

Piling may be required for the construction of the dolphin markers. Vibratory piling may be necessary for construction of a sheet-piled seawall for protection of the outer seawall, However, the requirement for this protection measure will be reviewed during the detailed design stage. Future Contractors will have to apply for a CNP to carry out any associated percussive piling works.

The ASRs assumed in this report are for indicative assessment only. Despite any description or assessment made in this report on construction noise aspects, there is no guarantee that a CNP will be issued for the project construction. The Noise Control Authority will consider a well-justified CNP application, once filed, for construction works within restricted hours as guided by the relevant Technical Memoranda issued under the NCO. The Noise Control Authority will take into account of contemporary conditions/situations of adjoining land uses and any previous complaints against construction activities at the site before making his decision in granting a CNP. Nothing in this report shall bind the Noise Control Authority in making their decision. If a CNP is to be issued, the Noise Control Authority shall include in it any condition they think fit. Failure to comply with any such conditions will lead to cancellation of the CNP and prosecution action under the NCO.

3.3 Noise Sensitive Receivers

With reference to Annex 13 of the EIA TM and the GW-TM, 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 is considered to be a NSR.

A review of both existing and committed landuses has been conducted to identify NSRs in the vicinity of the Tai O sheltered boat anchorage and the mangrove planting area. This was carried out through a combination of site visits and reference to the adopted Tai O Outline Development Plan No. D/I-TO/1, the adopted Tai O Layout Plan No. L/I-TO/1C and Extract Plan No. E/LI 98/14A which indicates the proposed amendments to the adopted Tai O Layout Plan.

A description of the identified representative NSRs and their corresponding ASRs and landuses are summarised in **Table 3.4** and are illustrated in **Figure 3.1**.

Table 3.4: Noise Sensitive Receivers for the Tai O Sheltered Boat Anchorage Construction Noise Impact Assessment.

NSR	Description	Land Use(1)	Area Sensitivity Rating(2)
1	Village house in Shek Tsai Po	R	A
2	Village house in Shek Tsai Po	R	A
3	Village house along Shek Tsai Po Street	R	A
4	School near Shek Tsai Po	S	A
5	Temple in Shek Tsai Po	C	A
6	Clinic	C	A
7	Community centre	C	A
8	Village house	R	A
9	School	S	A
10	Church	C	A
11	Lung Tin Estate Phase 2 Area B	R	A
12	Lung Tin Estate Phase 1	R	A
13	Buddhist Fat Ho Memorial College near Tai O Road	S	A
14	Temple in San Tsuen	C	A
15	Chung Uk/San Tsuen	R	A
16	Leung Uk Tsuen	R	A
17	Nam Chung Tsuen	R	A
18	Nam Chung	R	A
19	Fan Kwai Tong	R	A
20	Village house	R	A
21	Police quarters	R	A
22	Village house	R	A
23	Village house (near pedestrian footbridge)	R	A

Notes:
(1) R – Residential; S – School; C – Church/Temple/Community Centre/Clinic.
(2) Area Sensitive Rating as defined in the GW-TM.

3.4 Baseline Conditions

Tai O is predominantly rural and is not usually exposed to high levels of ambient construction or traffic noise, although sewerage improvement works are currently being carried out along Shek Tsai Po Street, which runs along the northern shore of Tai O Bay. Major existing noise sources have been identified and are summarised as follows:

- the bus terminus situated to the west of Lung Tin Estate and north of the salt pan area;
- the fire station, the electric sub-station, the telephone exchange and microwave station to the north of the Tai O recreation ground in the vicinity of Shek Tsai Po Street;
- the water supplies depot in Shek Tsai Po;
- the fire station to the east of Lung Tin Estate;
- the service reservoir to the east of San Tsuen; and
- the Tai O Road.

3.5 Potential Sources of Impact

For the purposes of this noise assessment, the proposed works have been divided into a number of geographical work sites. Various construction activities and thus groups of PME have been assumed for each of these work sites during different construction phases. Details of the proposed construction programme and the associated deployment schedule of PME are presented in **Appendix 1a**. Locations of the work sites are shown in **Figure 3.1**.

As indicated in Section 2.2 the sheltered boat anchorage development will involve the following construction activities:

- construction of 700m long breakwater, marker dolphins, public landings and other marine facilities;
- protection of the outer seawall through construction of a sheet piled wall alongside existing outer seawall (subject to confirmation during the detailed design);
- reclamation of a total 1.0ha of land (eastern and western reclamation sites of 0.3ha and 0.7ha respectively) for development as boat maintenance facilities and a loading/unloading area;
- dredging and disposal of marine mud to construct a 8ha boat mooring area, associated fairways/access approaches, breakwater foundation, berthing area; and
- engineering works to prepare the salt pan area for development of a mangrove habitat. The formation will involve breaking of internal bund structures, placement of dredged sediment in the salt pans and material reworking.

The extent of noise impacts during these construction activities is dependent upon the type and number of PME to be used - such impacts are also likely to change during different phases of the construction programme.

3.6 Assessment Methodologies

For the purposes of this construction noise impact assessment, the major noise generating activities have been divided into 5 main activities namely,

- dredging for approach channels/anchorage area;
- reclamation works;
- breakwater construction,
- marker dolphins; and
- formation works for the mangrove planting area.

The plant required for each of these activities has been identified and classified into 14 groups. All NSRs are assumed to have a direct line of sight and are thus totally exposed to the appropriate works area, as such no screening correction has been applied. In addition, an "on-time" of 100% has been assumed for all construction plant and equipment. The potential noise impacts during these various noise generating construction activities is considered below.

3.6.1 Dredging in Approach Channels and Anchorage Area

The likely PME to be used for dredging of the navigational northern/southern access channels, the berthing area and the sheltered boat anchorage area are conventional grab dredgers and potentially small cutter suction dredgers. The sound power levels of these PME are tabulated in **Table 3.5**.

Table 3.5: Assumed Plant Inventory and Sound Power Levels for Dredging Works (Group 1).

Plant Type	GW-TM Identification Code	Number of Units	SWL, dB(A)
Grab Dredger	CNP 063	1	112
Cutter Suction Dredger	CNP 070	1	103
Tug Boat	CNP 221	1	110
Derrick Barge	CNP 061	1	104

3.6.2 Reclamation Works

Under this Assignment, the design of the proposed eastern and western reclamation areas comprises formation only, including: dredging of mud for construction of the vertical seawall on the berthing face of the western reclamation, pitched slope seawalls for the other reclamation

boundaries and reclamation filling. Typical PME inventory and PME sound power levels for reclamation works are presented in **Table 3.6**. Barges for the transportation of fill material to site may also be required.

Table 3.6: Assumed Plant Inventory and Sound Power Levels for Reclamation Works.

Plant Type	GW-TM Identification Code	Number of Units	SWL, dB(A)
Vertical Seawall (Group 2)			
Cranes	CNP 048	1	112
Grab Dredger	CNP 063	1	112
Tug Boat	CNP 221	1	110
Derrick Barge	CNP 061	1	104
Pitched Slope Seawall (Group 3)			
Grab Dredger	CNP 063	1	112
Derrick Barge	CNP 061	1	104
Tug Boat	CNP 221	1	110
Sand Filling and Other Services (Group 4)			
Grader	CNP 104	1	113
Excavator	CNP 081	1	112
Bulldozer	CNP 030	1	115
Vibratory Roller	CNP 186	2	108
Dump Truck	CNP 067	1	117
Vibratory Poker	CNP 170	1	113
Paving Train	-	1	109

3.6.3 Breakwater Construction

The anchorage breakwater is proposed to be a traditional rubble structure protected with rock armour. Prior to breakwater construction, marine muds must first be dredged in order to allow development of an appropriate foundation. These dredging works are considered to be the most significant noise generating activities during breakwater construction.

Conventional grab dredgers are likely to be used for these dredging works (refer to Section 2.7). The sound power levels of the PME likely to be used during breakwater construction are presented in **Table 3.7**.

Table 3.7: Assumed Plant Inventory and Sound Power Levels for Breakwater Construction.

Plant Type	GW-TM Identification Code	Number of Units	SWL, dB(A)
Trench Dredging (Group 5)			
Grab Dredger	CNP 063	1	112
Derrick Barge	CNP 061	1	104
Tug Boat	CNP 221	1	110
Geotextile (Group 6)			
Pontoons with 4 Winches	CNP 263	2	111
Tug Boat	CNP 221	1	110
Sand Blanket (Group 7)			
Derrick Barge	CNP 061	1	104
Tug Boat	CNP 221	1	110
Prefabricated Band Drains (Group 8)			
Tug Boat	CNP 221	1	110
Derrick Barge	CNP 061	1	104
Surcharge (Group 9)			
Tug Boat	CNP 221	1	110
Derrick Barge	CNP 061	1	104
Rock Fill and Armour Rock (Group 10)			
Tug Boat	CNP 221	1	110
Derrick Barge	CNP 061	1	104

Notes:
Source: Shiu Wing Steel Mill (Tuen Mun) Final EIA.

3.6.4 Marker Dolphins

Steel tubular piles or steel H-piles may be used as a foundation for the marker dolphins and may entail the use of piling. The sound power levels of the PME likely to be used are presented in **Table 3.8**.

Table 3.8: Assumed Plant Inventory and Sound Power Levels for Marker Dolphins.

Plant Type	GW-TM Identification Code	Number of Units	SWL, dB(A)
Piling Works (Group 11)			
Hydraulic Hammer	BS5228 Table C4/13	1	106
Electric Saws	BS5228 Table C7/75	1	105
Derrick Barge	CNP 061	1	104
Tug Boat	CNP 221	1	110
Concrete Works (Group 12)			
Concrete Lorry Mix	CNP 044	1	109
Concrete Pump	CNP 047	1	109
Air Compressor	CNP 003	1	104
Vibratory Poker	CNP 170	1	113

3.6.5 Formation for Mangrove Planting Habitat

Some of the material dredged from Tai O Bay will be placed in the salt pan area in order to develop a mangrove planting habitat. It has been recommended that material be placed in the salt pans mechanically using grab dredgers (refer to Section 2.8), with the existing internal bund features being reworked to create the layout as detailed in Section 2.5. In addition, in order to protect the existing outer seawall, a sheet-piled wall may be installed on the seaward side of the outer seawall. The sound power levels of PME likely to be used to create the mangrove habitat are illustrated in **Table 3.9**.

Table 3.9: Assumed Plant Inventory and Sound Power Levels for Formation Works in the Mangrove Planting Area.

Plant Type	GW-TM Identification Code	Number of Units	SWL, dB(A)
Sheet Piling Works of Existing Outer Seawall (Group 13)			
Crane	CNP 048	1	112
Vibrating Hammer	CNP 172	1	115
Electric Saw	BS5228 Table C7/75	1	105
Excavator	CNP 081	1	112
Dump Truck	CNP 067	1	117
Placement and Working of Dredged Mud (Group 14)			
Grab dredger	CNP 063	1	112
Truck	CNP 067	1	117
Bulldozer	CNP 030	1	115
Excavator	CNP 081	1	112

3.7 Evaluation of Construction Noise Impacts

Noise levels at the identified NSRs have been predicted based on the proposed construction programme (refer to **Figure 2.7**), consideration of distance attenuation, the plant inventory and corresponding sound power levels. The plant inventory and summary noise calculations are provided in **Appendices 1b** and **1c**, respectively.

The methodology for assessing noise impacts associated with the construction activities and equipment as highlighted in Section 3.6 is based on the methodology proposed in the GW-TM, and summarised as follows:

- locate appropriate NSRs with respect to the work site (refer to Section 3.3);
- determine distance attenuation and screening effects to NSRs from the work site notional noise source point; and
- predict construction noise levels at NSRs in the absence of any mitigation measures.

A summary of the potential construction noise impacts during the sheltered boat anchorage construction phase is presented in **Table 3.10** below.

Table 3.10: Predicted Maximum Construction Noise Levels (Without Mitigation).

NSR	Description	Daytime Noise Standards	Year 2001	Year 2002	Year 2003
1	Village house in Shek Tsai Po	75	67	67	66
2	Village house in Shek Tsai Po	75	67	69	66
3	Village house along Shek Tsai Po Street	75	66	68	64
4	School near Shek Tsai Po	65/70	63	66	62
5	Temple in Shek Tsai Po	75	64	66	63
6	Clinic	75	65	68	64
7	Community centre	75	66	69	65
8	Village house	75	67	71	66
9	School	65/70	68	74	66
10	Church	75	68	74	66
11	Lung Tin Estate Phase 2 Area B	75	69	87	67
12	Lung Tin Estate Phase 1	75	64	72	64
13	Buddhist Fat Ho Memorial College near Tai O Road	65/70	62	69	63
14	Temple in San Tsuen	75	62	67	62
15	Chung Uk/San Tsuen	75	62	67	63
16	Leung Uk Tsuen	75	66	71	66
17	Nam Chung Tsuen	75	66	81	69
18	Nam Chung	75	73	74	73
19	Fan Kwai Tong	75	68	71	69
20	Village house	75	74	78	72
21	Police quarters	75	66	74	65
22	Village house	75	74	81	68
23	Village house (near pedestrian footbridge)	75	71	78	71

Notes:
Shading denotes exceedance of noise limit for the particular NSR

The predicted results shown in Table 3.10 indicate that noise levels at some of the identified NSRs will exceed the applicable noise standards during various stages of the construction programme.

The school near Shek Tsai Po (NSR 4) will be exposed to potential adverse noise impacts during construction of the breakwater at work sites A4 and A5 in the second quarter (Q2) of 2002. The highest predicted noise level is Leq 66 dB(A), which marginally exceeds the noise standard for schools during examination periods by 1 dB(A).

Another school (NSR 9) located to the north-east of the Study Area will also be subject to significant noise impacts, particularly during Q4 of 2001 (from work sites A11 and A12), Q2 of 2002 (from work site A9) and throughout 2003 (from work site M1). The primary sources of impact come from the operation of PME for sheet piling to protect the outer seawall (Q4 of 2001), reclamation works (Q2 of 2002) and construction of marker dolphins (2003). The highest predicted noise level is Leq 74 dB(A) in Q2 of 2002.

Residents of Lung Tin Estate Phase 2 Area B (NSR 11) will be exposed to potential noise impacts during Q1, Q2 and Q3 of 2002 when the reclamation work is being undertaken at work site A10. The highest predicted noise level is Leq 87 dB(A), which is 12 dB over the daytime noise standard for residential dwellings.

The predicted noise results indicate that the Buddhist Fat Ho Memorial College (NSR 13), located near Tai O Road, will be exposed to a noise level 4 dB(A) higher than the noise standard for schools if the reclamation works at work site A10 during Q1, Q2 and Q3 of 2002 are undertaken during the school examination period.

Nam Chung Tsuen (NSR 17) will be affected by construction noise during Q2 and Q3 of 2002. The primary noise contributing activities are the placement of dredged mud/sand mixture at work site A11 and sheet piling works at work site A12 and A13. The highest predicted noise level is Leq 81 dB(A).

The highest predicted noise levels at the village house (NSR 20) located to the south of the Study Area is Leq 78 dB(A). These exceed the daytime noise standard for residential dwellings. This NSR will be mostly affected in Q1 and Q2 of 2002 during construction of breakwater at work sites A4 and A5 and reclamation works at work site A10.

The village houses (NSRs 22 and 23) will be mostly affected by noise during Q4 of 2002 due to construction noise arising from reclamation works at work site A9. The corresponding highest predicted noise levels are Leq 81 dB (A) and Leq 78 dB (A), respectively.

3.8 Mitigation Options

In order to carry out the construction works within the relevant noise limits, mitigation measures will be required. Possible measures that could be considered to reduce the construction related noise impacts are presented as follows:

- selection and programming of construction processes;
- reduction in the number of plant operating concurrently in critical areas close to NSRs;

- use of noise barriers/noise enclosures;
- use of "quiet" plant and working methods; and
- use of good site practice to limit noise emissions at sources.

These noise mitigation techniques are reviewed below.

3.8.1 Selection and Programming of Construction Processes

Scheduling of the timing and sequencing of the various construction activities can be undertaken in a manner that limits the amount of concurrent noise generating activities. In the case of schools, the potentially most disruptive construction activities should be programmed to coincide as far as possible with school holiday periods.

3.8.2 Reduction in the Numbers of Plant

It may be possible to restrict the number of plant or group of equipment to be used concurrently without severely affecting the progress of the work. It is recommended that this practice should be used where possible, particularly for noisy plant operating within certain parts of the construction site that are very close to NSRs. The combination of this mitigation measure with the selection of quiet plant will further reduce the total noise generated by the construction activities.

3.8.3 Noise Barriers/Noise Enclosures

The use of temporary barriers can reduce noise levels generated from construction equipment. Based on the heights of the NSRs and the site topography, noise barriers of this type can result in noise attenuation from screening effects for stationary and mobile plant. Whilst these screening effects can be achieved at upper floors of NSRs, greater benefits would result at lower floors.

Complete acoustic enclosures, which fully cover machinery, can give significant noise reductions of between 15 to 25 dB(A). The degree of reduction will vary depending upon the nature of the material used for the enclosure, and whether there is any additional noise damping material, such as rockwool, incorporated into the design. Unless the enclosure is a proprietary model fitted directly to the plant, enclosures tend to be more effective for stationary plant, as any openings or gaps will significantly reduce the noise attenuation capacity.

3.8.4 Use of "Quiet" Alternative Plant and Working Methods

The use of particular plant with equipment noise levels quieter than those specified in the GW-TM can result in a reduction of noise levels generated by plant. The level of noise reduction achieved is dependent upon the Contractor's chosen methods of working. It is possible for the Contractor to achieve noise reductions from the adopted working methodologies by specifying maximum limits of sound power level for specific plant equipment.

"Quiet" plant is defined as a PME having actual SWLs lower than the values specified for PME in the GW-TM. SWLs for selected "quiet" and alternative plant are presented in **Table 3.11**.

Table 3.11: Maximum SWLs for Selected "Quiet" and Alternative Plant.

"Quiet" Alternative Plant	Maximum SWL, dB(A)
Cranes	108
Vibratory poker	102
Grader	110
Excavator	104
Bulldozers	109
Vibratory roller	102
Concrete lorry mix	100
Concrete pump	106
Air compressor	100
Dump truck	103

It should be noted that various types of silenced equipment can be found in Hong Kong and that the noise emission of a particular piece of equipment has to be validated by certificate or demonstration to EPD's requirements.

3.8.5 Good Site Practice

Good Site Practice (GSP), when properly implemented and managed, can provide a considerable noise reduction at sensitive receivers. Examples of GSP include the following:

- use of well-maintained and regularly-serviced plant during the works;
- plant operating on an intermittent basis should be turned off or throttled down when not in active use;
- plant that is known to emit noise strongly in one direction should be orientated to face away from the NSRs;
- silencers, mufflers and enclosures for plant should be used where possible and maintained adequately throughout the works;
- where possible mobile plant should be sited away from NSRs; and
- stockpiles of excavated materials and other structures such as site buildings should be used effectively to screen noise from the works.

3.9 Recommended Mitigation Techniques

From the possible mitigation measures identified above, an integrated approach comprising different mitigation measures for different NSRs during different construction phases is proposed as follows:

- quiet plant and barriers for Group 2 PME;

- barriers for Group 3 PME;
- quiet plant and barriers for Group 4 PME;
- quiet plant for Group 12 PME;
- quiet plant for Group 13 PME; and
- quiet plant and barriers for Group 14 PME.

In particular, for the school at NSR 9, during the examination period, there should be:

- no Group 1 works at work site A8 during Q4 of 2001;
- no Group 2 and Group 3 works undertaken concurrently at work site A9 during Q1 and Q2 of 2002 (i.e. either Group 2 or Group 3 works should be carried out at any one time); and
- no Group 5 to Group 9 works (inclusive) at work-sites A4 and A5 during Q1 and Q2 of 2002.

3.10 Mitigated Impacts

The residual noise impacts during the construction phase following the adoption of the mitigation strategy detailed in Section 3.9 have been assessed. The predicted residual noise levels are presented in **Table 3.12**, sample calculations are provided in **Appendix 1c**.

Table 3.12: Predicted Maximum Construction Noise Levels in dB(A) (With Mitigation).

NSR	Description	Daytime Noise Standards	Year 2001	Year 2002	Year 2003
1	Village house in Shek Tsai Po	75	67	64	64
2	Village house in Shek Tsai Po	75	67	67	64
3	Village house along Shek Tsai Po Street	75	65	65	63
4	School near Shek Tsai Po	65/70	62	62	60
5	Temple in Shek Tsai Po	75	63	63	61
6	Clinic	75	64	64	62
7	Community centre	75	65	65	62
8	Village house	75	66	65	63
9	School	65/70	65	65	63
10	Church	75	66	66	63
11	Lung Tin Estate Phase 2 Area B	75	67	75	64
12	Lung Tin Estate Phase 1	75	62	63	61
13	Buddhist Fat Ho Memorial College near Tai O Road	65/70	60	61	60
14	Temple in San Tsuen	75	59	60	60
15	Chung Uk/San Tsuen	75	60	60	60
16	Leung Uk Tsuen	75	63	63	63

NSR	Description	Daytime Noise Standards	Year 2001	Year 2002	Year 2003
17	Nam Chung Tsuen	75	64	71	66
18	Nam Chung	75	69	70	70
19	Fan Kwai Tong	75	68	69	67
20	Village house	75	73	75	71
21	Police quarters	75	66	65	63
22	Village house	75	74	73	65
23	Village house (Near Pedestrian Footbridge)	75	69	71	70

With the use of the proposed mitigation strategy, the predicted noise levels at all the identified NSRs would comply with the daytime noise criteria.

3.11 Environmental Monitoring Requirements

Due to the potential for adverse noise impacts during the construction phase, noise mitigation measures will need to be implemented. The efficacy of the environmental control measures recommended will need to be checked through an EM&A programme during the construction period. Monitoring should be carried out at representative NSRs where potential exceedances of the noise criteria have been predicted, taking into account the suitability and circumstances of each NSR. Recommended baseline noise monitoring locations are recommended in **Figure 3.1**. Details of the noise monitoring requirements are presented in the EM&A Manual.

3.12 Conclusions

Construction of the proposed Tai O sheltered boat anchorage is anticipated to last for about 3 years from 2001 to 2003, with construction activities being phased. Noise generating activities will occur throughout this construction phase. The main receptor areas that are liable to be affected by construction noise are the existing village areas such as Lung Tin Estate Phase 2 Area B, the Buddhist Fat Ho Memorial College, Nam Chung Tsuen and some isolated village houses.

Unmitigated construction activities are likely to exceed acceptable standards for construction noise limits. Where adverse noise impacts have been predicted, practical mitigation measures have been proposed. The residual noise impacts following the incorporation of the proposed noise mitigation measures would meet the EIA TM daytime criteria. Alternative methods for noise reduction and control will need to be incorporated into the design and construction contract clauses as necessary.