



Hong Kong Government
Territory Development Department
Urban Area Development Office

Central and Wan Chai Reclamation Development

Central Reclamation, Phase 1
Focussed Environmental Impact Assessment Study
Final Report
Addendum on Noise Assessment

Maunsell Consultants Asia Ltd

in association with

Balfours International (Asia)

MVA Asia Ltd · Urbis Travers Morgan Ltd

CES Consultants in Environmental Sciences (Asia) Ltd

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CENTRAL RECLAMATION, PHASE 1
Noise Assessment for NSR2 (United Building)

1 Introduction

In the Final Report on the Focussed EIA Study of Central Reclamation Phase 1, a maximum sound power level from construction plant of 132 dB(A) was calculated for the worst case months of May and June 1995 (refer to Appendices I and II). The maximum noise level at NSR2 was predicted to reach 85 dB(A) which exceeds the day-time requirement by 10 dB(A). This calculation did not, however, take into account that the noise would be arising from two separate contracts.

The objective of this additional assessment was to evaluate in more detail the noise impact at NSR2 (United Building) within the critical months by considering the construction schedule and any mitigation required to satisfy the day-time construction noise limit of 75 dB(A). This assessment takes into account the different site areas available to each contract.

2 Construction Programme

Central Reclamation, Phase 1, Engineering Works Contract, will be carried out in two construction stages. During the first stage, two bunds will be constructed to the new seawall along the eastern and western boundaries of the reclamation. The ferry piers, access roads, cooling water pumping stations and some culvert extensions will be constructed during this stage. Once these facilities are fully operational, the existing piers and pumping stations will be abandoned and the second stage of reclamation, i.e. filling in the embankment between the bunds, will commence. As one of the first tasks in the second stage, the existing ferry piers will be demolished and the precast piles extracted or cut off at seabed level. The existing piers will be removed during the period June - August 1994. Two further piers and perimeter roads will be constructed in this stage. Detailed construction schedule and the location of each section is shown in Appendices III & IV respectively.

The Hong Kong Station and Tunnel Contract will commence soon after the start of the second stage of the Engineering Works Contract - when sufficient land is formed, in late 1994. After this time, noise will be produced from the Station Contract and the now more distant Engineering Works Contract.

3 Noise Assessment

For the period March - June 1995, construction for the Engineering Works Contract will be mainly at the pier and between the road and seawall. The distance from the Notional Source Position (NSP) of construction plant in each area to the NSR2 and the resulting noise attenuation are given in Table 3.1.

Table 3.1 Distance Attenuation from NSPs to NSR2

Area	Distance, m	Attenuation, dB(A)
Pier	420.	60
Between Road & Seawall	360	59

Plant will be engaged in pier construction and the resulting noise level at NSR2 is shown in Table 3.2.

Table 3.2 Calculation of Noise Level Generated from Pier Construction

Plant	No. of Plant Item	SWL, dB(A)	Total SWL, dB(A)
Mobile Crane	4	112	124
Track Crane	4	112	
Ready-mix Truck	6	109	
Concrete Pump	3	109	
Tug Boat	2	110	
Barge	8	104	
Lighter	4	104	
Distance Attenuation			(60)
Sound Pressure Level at NSR2			67

Plant will be engaged on work between road and seawall and the resulting noise level at NSR2 is shown in Table 3.3.

Table 3.3 Calculation of Noise Level Generated from Between Road and Seawall

Plant	No. of Plant Item	SWL, dB(A)	Total SWL, dB(A)
Dump Truck	10	117	128
Lorry	4	112	
Compressor	5	109	
Generator	5	108	
Distance Attenuation			(59)
Sound Pressure Level at NSR2			72

For the period March - June 1995, construction work for the Hong Kong Station and Tunnel Contract will be mainly at S2, S3, S5 and S6 (Figure 1). The distances from the NSP of plant in each area to the NSR2 and the resulting noise attenuation are given in Table 3.4.

Table 3.4 Distance Attenuation from NSPs to NSR2

Area	Distance, m	Attenuation, dB(A)
S2	460	61
S3	240	56
S5 & S6	150	52

Plant will be engaged in S2 construction and the resulting noise level at NSR2 is shown in Table 3.5.

Table 3.5 Calculation of Noise Level Generated from S2 Construction

Plant	No. of Plant Item	SWL, dB(A)	Total SWL, dB(A)
Bored Piling Oscillator	2	115	118
Bentonite Filtering Plant	2	105	
Diaphragm Wall Extractor	2	90	
Distance Attenuation			(61)
Sound Pressure Level at NSR2			60

Plant will be engaged in S3 construction and the resulting noise level at NSR2 is shown in Table 3.6. As S3 construction work will be totally screened by the Southland Building, a 10 dB(A) negative correction has therefore been applied.

Table 3.6 Calculation of Noise Level Generated from S3 Construction

Plant	No. of Plant Item	SWL, dB(A)	Total SWL, dB(A)
Tug Boat	2	110	121
Barge	2	104	
Grab Dredger	2	112	
Bored Piling Oscillator	2	115	
Bentonite Filtering Plant	2	105	
Diaphragm Wall Extractor	2	90	
Distance Attenuation			(56)
Barrier Correction			(10)
Sound Pressure Level at NSR2			58

Plant will be engaged in S5 and S6 construction and the resulting noise level at NSR2 is shown in Table 3.7. Works on S5 and S6 were assumed be undertaken at the same time, and the NSP for these areas is partially screened by the Southland Building. Therefore, a 5 dB(A) negative correction has be applied.

Table 3.7 Calculation of Noise Level Generated from S5 & S6 Construction

Plant	No. of Plant Item	SWL, dB(A)	Total SWL, dB(A)
Mobile Crane	4	112	128
Ready-mix Truck	6	109	
Concrete Pump	3	109	
Dump Truck	4	117	
Dozer	3	115	
Backhoe	2	112	
Lorry	3	112	
Bored Piling Oscillator	1	115	
Bentonite Filtering Plant	1	105	
Diaphragm Wall Extractor	1	90	
Compressor	5	109	
Generator	5	108	
Distance Attenuation			(52)
Partial Screen			(5)
Sound Pressure Level at NSR2			74

The total sound pressure level is therefore calculated as shown in Table 3.8.

Table 3.8 Calculation of Sound Pressure Level at the Facade of NSR2

Area	Sound Pressure Level, dB(A)	Overall Sound Pressure Level, dB(A)
Pier	67	77
Between Road & Seawall	72	
S2	60	
S3	58	
S5 & S6	74	

The total noise level is equal to 77 dB(A) which is still 2 dB(A) higher than the day-time requirement. Mitigation is therefore required. In terms of noise sources, 19% of the noise is predicted to come from the Engineering Works Contract and 81% to come from the Hong Kong Station and Tunnel Contract.

Mitigation

One way of reducing the noise level would be to erect a noise barrier along the shore near the Vehicular Ferry Pier after the demolition of the pier. The barrier should be long enough to shield the angle of view from the NSR2 to the site area and high enough to block the line of sight from the NSR2 to the notional source position.

NSR2 is only a seven to eight storey building which is estimated to be 22m high. The notional source position is 50m away from the shore and therefore the dimension of the barrier required would be at least 6.5m high and 120m long. An overall reduction of up to 5 dB(A) could easily be achieved by using 18mm plywood board for constructing the barrier.

Alternatively, diversion of all dump trucks from going through the exposed area in S5 and S6 (except the operation of one dump truck at a time for dumping purposes), and provision of noise baffles to the noise generating parts of the bored piling oscillator operated inside these areas, may be a more appropriate method for obtaining the required 2 dB(A) reduction.

Either of the methods above could be used to comply with the daytime noise limit, however, it is up to contractors to select the mitigation measures to be applied. However it will be the responsibility of the Station Contractor rather than the Engineering Works Contractor to achieve this mitigation since the majority of the noise will be generated by the Station Contract plant. Any mitigation measures adopted should be developed in parallel with the detailed design and should be coherent with the construction programme.

Table 3.17 Sound Power Levels [dB(A)] for Central Reclamation Phase 1 Engineering Works Plant Schedule No. 1

Closest Area	Equipment	1992			1993												1994												1995						1996											
		10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12						
Pier	Material Handling																																													
	Mobile Crane	115	115	115	115	115	115	115	115	121	121	121	121	121	121	118	118	118	118	118	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115					
Pier	Track Crane															118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118						
	Concrete Pump																																													
Between Road & Seawall	Excavation and Filling																																													
	Dump Truck																																													
Pier	Backhoe	112	112	112												118	118	118	118	118																										
	Lorry	115	115	115	115	115	115	115	115	118	118	118	118	118	118	118	118	118	118	118	115	115	115	115	115	115	115	115	115	115	115	115	118	118	118	118	118	118	118							
Pier	Tug Boat	110	113	113	113	113	113	113	113	113	113	113	113	113	110						110	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113						
	Barge	110	113	113	113	113	113	113	113	113	113	113	113	113	110						110	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113						
Between Road & Seawall	Grab Dredger	118	119	119	119											118	119	119	119	119																										
	Lighter	107	107	107	107	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	107	107	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110							
Pier	Bored Piling Oscillator															118	118	118	118	118	118																									
	Bentonite Filtering Plant															105	105	105	105	105	105																									
Between Road & Seawall	Diaphragm Wall Extractor															96	96	96	96	96	96																									
	Auxiliary																																													
Between Road & Seawall	Compressor	112	112	115	115	116	116	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115							
	Generators	111	115	114	114	115	115	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114							
Between Road & Seawall	Hydraulic Impact Breaker				114	114	114	114																																						
	Total Sound Power Level	123	125	126	126	125	125	124	124	127	131	131	130	130	127	126	126	126	126	126	126	126	126	126	126	126	126	125	125	125	125	125	129	129	129	129	126	126	126	126						

- Notes: 1. Area is for sectional area closest to NSR2 in which PME from this contract may operate, because of contract site boundaries, in the months March-June 1995.
2. Between March and June 1995, all PME shown in the table will be engaged in pier construction (i.e. beyond the S12 seawall) except for Excavation and Filling, and Auxiliary which will only operate between the road and seawalls.

Central Reclamation, Phase 1 Engineering Works
Section Completion Dates

Section	Completion		Completion Date for Commencement	
	Days	Cal Months *	on 3.10.1992	
1 *	570	18.7	25 Apr. 1994	
2 *	766	25.2	7 Nov. 1994	
3 *	872	28.6	21 Feb. 1995	
4	450	14.8	26 Dec. 1993	
5 *	802	26.3	13 Dec. 1994	
6 *	837	27.5	17 Jan. 1995	
7	837	27.5	17 Jan. 1995	
8	1065	35.0	2 Sept. 1995	
9	1000	32.9	29 June 1995	
10 *	907	29.8	28 Mar. 1995	
11	1306	42.9	30 Apr. 1996	
12 *	1350	44.4	13 June 1996	
13	1400	46.0	2 Aug. 1996	
14	1825	60.0	1 Oct. 1997	
15	120	3.9	30 Jan. 1993	
16	1460	48.0	1 Oct. 1996	
17	1700	55.9	29 May 1997	
18	2150	70.7	22 Aug. 1998	
19	1220	40.1	4 Feb. 1996	
20	90	3.0	31 Dec. 1992	
21	1184	38.9	30 Dec. 1995	
22	1184	38.9	30 Dec. 1995	
23	636	20.9	30 June 1994	

- Note: 1. Section 1 relates to Sectional Area S1 etc.
2. Sections marked * will be handed to MTRC's Station Contract after the Completion Date.

