

Appendix 4-6A
Estimated Construction Noise Levels
Due to Planned RD Site

Appendix 4-6A-2 Summary Table of Calculated Construction Noise Level at NSRs (Mitigated Scenario with QPMEs and Movable Noise Barriers)

NSR Label	Descriptions	Construction Noise Level from Each Work Group							Cumulative A+G+F	Highest Noise Level, dB(A)	Noise Criteria, dB(A)
		A	B	C	D	E	F	G			
		Site Formation, Filling and Excavation	Construction of Underground Services and Utilities	Road works	Foundation	Superstructure	Sub-structure (Pile Cap)	Dump Trucks Travelling on Haul Road			
Existing NSRs											
N1	Fairview Park	54	52	54	56	52	52	55	59	59	75
N2	Fairview Park	54	52	54	56	52	52	56	59	59	75
N3	Fairview Park	59	57	59	61	57	57	58	62	62	75
N4	Fairview Park	60	58	60	62	58	58	59	64	64	75
N5	Fairview Park	60	58	60	62	58	58	58	64	64	75
N6	Fairview Park	58	56	58	60	56	56	57	62	62	75
N7	Yau Mei San Tsuen	61	59	61	63	59	59	59	65	65	75
N8	Chuk Yuen Tsuen	73	71	73	75	71	71	65	75	75	75
N9	Chuk Yuen Tsuen	72	70	72	74	70	70	64	74	74	75
N10	Bethel High School	57	55	57	59	55	55	57	61	61	70 (65 during examination)
N11	Helene Terrace	54	52	54	56	52	52	56	59	59	75
N12	Villa Camilia	54	52	54	56	52	52	56	59	59	75
N13	Fairview Park	53	51	53	55	51	51	55	58	58	75
N14	Wong Chan Sook Ying Memorial School	52	50	52	54	50	50	54	57	57	70 (65 during examination)
N15	Man Yuen Tsuen	52	50	52	54	50	50	54	57	57	75
N16	Fairview Park	58	56	58	60	56	56	57	62	62	75
N17	Palm Springs	53	51	53	55	51	51	55	58	58	75
N18	Temp. house at Yau Mei San Tsuen	57	55	57	59	55	55	57	61	61	75
N19	Existing village house	56	54	56	58	54	54	56	60	60	75
N20	Fairview Park	59	57	59	61	57	57	58	63	63	75

PMEs Inventory - Mitigated (with QPMEs and Movable Noise Barriers)													
Construction Activity	Sub. Work Group	Powered Mechanical Equipment	Reference	SWL per unit	Qty	Total, SWL	Total SWL, dB(A)	At-source Noise Mitigation Measure	Noise Barrier Effect **	Total SWL (Mitigated)	Total SWL, dB(A)	Highest SWL of Each Construction Activity, dB(A) ^a	
	D2	Piling works	Generator, super silenced	CNP103	95	4	101	Movable noise barrier	-10	91	114		
			Continuous Flight Auger (CFA) piles (piling, earth auger)	CNP167	114	3	119		Provision of acoustic shielding	-5			114
	D3	Concreting works	Concrete Lorry Mixer	CNP044	109	5	116	Movable noise barrier	-10	106	107		
			Generator, super silenced	CNP103	95	4	101	Movable noise barrier	-10	91			
			Poker, vibratory, hand-held (electric)	EPD *	102	4	108	Movable noise barrier	-10	98			
(E)	E1	General construction works	Air Compressor	CNP001	100	6	108	Movable noise barrier	-10	98	110		
			Bar bender and cutter (electric)	CNP021	90	9	100	Movable noise barrier	-10	90			
			Mobile Crane	Hitachi Sumitomo SCX700, 132kW	101	3	106	Movable noise barrier	-5	101			
			Drill/grinder, hand-held (electric)	CNP065	98	10	108	Movable noise barrier	-10	98			
			Generator, super silenced	CNP103	95	4	101	Movable noise barrier	-10	91			
			Saw, circular, wood	CNP201	108	12	119	Movable noise barrier	-10	109			
	E2	Concreting works	Concrete Lorry Mixer	CNP044	109	8	118	Movable noise barrier	-10	108	110		
			Concrete Pump	CNP047	109	4	115	Movable noise barrier	-10	105			
			Generator, super silenced	CNP103	95	4	101	Movable noise barrier	-10	91			
			Poker, vibratory, hand-held (electric)	EPD *	102	7	110	Movable noise barrier	-10	100			
(F)	F1	General pile cap construction	Bar bender and cutter (electric)	CNP021	90	10	100	Movable noise barrier	-10	90	108		
			Generator, super silenced	CNP103	95	5	102	Movable noise barrier	-10	92			
			Lorry (5.5 tonne < Gross vehicle weight <= 38 tonne)	EPD *	105	2	108		0	108			
	F2	Concreting works	Concrete Lorry Mixer	CNP044	109	3	114	Movable noise barrier	-5	109	110		
			Concrete Pump	CNP047	109	1	109	Movable noise barrier	-10	99			
			Generator, super silenced	CNP103	95	6	103	Movable noise barrier	-10	93			
			Poker, vibratory, hand-held (electric)	EPD *	102	2	105	Movable noise barrier	-10	95			
	F3	Backfill and reinstatement	Excavator, wheeled/tracked	KATO model HD820V (EPD-01233)	99	2	102	Movable noise barrier	-5	97	98		
			Roller, vibratory	SAKAI model SW250-1 (EPD-00509)	95	1	95	Movable noise barrier	-5	90			
	(G)	G	Dump Trucks Travelling on Haul Road During Site Formation	Dump Truck (5.5 tonne < Gross vehicle weight <= 38 tonne)	EPD *	105	10	115			115	115	115

Note: Noise levels of the above construction plants are based on the "Technical Memorandum on Noise From Construction Work Other Than Percussive Piling" and EPD's QPMEs database (available at: <http://www.epd.gov.hk/cgi-bin/npg/qpme/index.pl?lang=eng>)

* EPD website: http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWL.pdf

** According to EIAO Guidance Note No. 9/2010, with provision of noise barriers, a 5dB(A) noise reduction for movable plant, 10 dB(A) for stationary plant and 15 dB(A) for enclosed ones can be assumed.

According to "A Practical Guide for the Reduction of Noise from Construction Works" (page 11), published by HKSAR Gov. Environmental Protection Department, July 1989, excavated-mounted breaker with sound proof hammer bracket installed could achieve a noise reduction up to 10dB(A).

According to the "Best Practice Guide for Environmental Protection on Construction Sites", page 6-9, published by Hong Kong Construction Association, January 2009, excavator-mounted breaker with sound proof hammer bracket can achieve a noise reduction of up to 10dB(A). (Doc. Available at: <http://www.hkca.com.hk/front/20090306bpg.pdf>)

@ The highest SWL calculated for each Construction Activity for construction noise impact assessment. Each Construction Activity has been divided into several sub. work groups based on the sequence of construction works. The respective sub-work groups of each Construction Activity will not overlap with one another.

Appendix 4-6A-4 Calculation of Construction Noise Level (Mitigated Scenario with QPMs and Movable Noise Barriers)

NSR	Construction Activity	Total SWL, dB(A)	Dist. (NSR to Site Boundary) (A), m	Dist. (Site Boundary to Notional Source) (B), m	Horz. Distance (= A+B), m	Dist. Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
N1	A Site Formation, Filling and Excavation	112	420	50	470	-61.4	3.0	54
	B Construction of Underground Services and Utilities	110	420	50	470	-61.4	3.0	52
	C Road works	112	420	50	470	-61.4	3.0	54
	D Foundation	114	420	50	470	-61.4	3.0	56
	E Superstructure	110	420	50	470	-61.4	3.0	52
	F Sub-structure (Pile Cap)	110	420	50	470	-61.4	3.0	52
N2	A Site Formation, Filling and Excavation	112	382	50	432	-60.7	3.0	54
	B Construction of Underground Services and Utilities	110	382	50	432	-60.7	3.0	52
	C Road works	112	382	50	432	-60.7	3.0	54
	D Foundation	114	382	50	432	-60.7	3.0	56
	E Superstructure	110	382	50	432	-60.7	3.0	52
	F Sub-structure (Pile Cap)	110	382	50	432	-60.7	3.0	52
N3	A Site Formation, Filling and Excavation	112	216	50	266	-56.5	3.0	59
	B Construction of Underground Services and Utilities	110	216	50	266	-56.5	3.0	57
	C Road works	112	216	50	266	-56.5	3.0	59
	D Foundation	114	216	50	266	-56.5	3.0	61
	E Superstructure	110	216	50	266	-56.5	3.0	57
	F Sub-structure (Pile Cap)	110	216	50	266	-56.5	3.0	57
N4	A Site Formation, Filling and Excavation	112	174	50	224	-55.0	3.0	60
	B Construction of Underground Services and Utilities	110	174	50	224	-55.0	3.0	58
	C Road works	112	174	50	224	-55.0	3.0	60
	D Foundation	114	174	50	224	-55.0	3.0	62
	E Superstructure	110	174	50	224	-55.0	3.0	58
	F Sub-structure (Pile Cap)	110	174	50	224	-55.0	3.0	58
N5	A Site Formation, Filling and Excavation	112	178	50	228	-55.1	3.0	60
	B Construction of Underground Services and Utilities	110	178	50	228	-55.1	3.0	58
	C Road works	112	178	50	228	-55.1	3.0	60
	D Foundation	114	178	50	228	-55.1	3.0	62
	E Superstructure	110	178	50	228	-55.1	3.0	58
	F Sub-structure (Pile Cap)	110	178	50	228	-55.1	3.0	58
N6	A Site Formation, Filling and Excavation	112	242	50	292	-57.3	3.0	58
	B Construction of Underground Services and Utilities	110	242	50	292	-57.3	3.0	56
	C Road works	112	242	50	292	-57.3	3.0	58
	D Foundation	114	242	50	292	-57.3	3.0	60
	E Superstructure	110	242	50	292	-57.3	3.0	56
	F Sub-structure (Pile Cap)	110	242	50	292	-57.3	3.0	56
N7	A Site Formation, Filling and Excavation	112	147	50	197	-53.9	3.0	61
	B Construction of Underground Services and Utilities	110	147	50	197	-53.9	3.0	59
	C Road works	112	147	50	197	-53.9	3.0	61
	D Foundation	114	147	50	197	-53.9	3.0	63
	E Superstructure	110	147	50	197	-53.9	3.0	59
	F Sub-structure (Pile Cap)	110	147	50	197	-53.9	3.0	59
N8	A Site Formation, Filling and Excavation	112	3	50	53	-42.5	3.0	73
	B Construction of Underground Services and Utilities	110	3	50	53	-42.5	3.0	71
	C Road works	112	3	50	53	-42.5	3.0	73
	D Foundation	114	3	50	53	-42.5	3.0	75
	E Superstructure	110	3	50	53	-42.5	3.0	71
	F Sub-structure (Pile Cap)	110	3	50	53	-42.5	3.0	71
N9	A Site Formation, Filling and Excavation	112	9	50	59	-43.4	3.0	72
	B Construction of Underground Services and Utilities	110	9	50	59	-43.4	3.0	70
	C Road works	112	9	50	59	-43.4	3.0	72
	D Foundation	114	9	50	59	-43.4	3.0	74
	E Superstructure	110	9	50	59	-43.4	3.0	70
	F Sub-structure (Pile Cap)	110	9	50	59	-43.4	3.0	70
N10	A Site Formation, Filling and Excavation	112	259	50	309	-57.8	3.0	57
	B Construction of Underground Services and Utilities	110	259	50	309	-57.8	3.0	55
	C Road works	112	259	50	309	-57.8	3.0	57
	D Foundation	114	259	50	309	-57.8	3.0	59
	E Superstructure	110	259	50	309	-57.8	3.0	55
	F Sub-structure (Pile Cap)	110	259	50	309	-57.8	3.0	55
N11	A Site Formation, Filling and Excavation	112	396	50	446	-61.0	3.0	54
	B Construction of Underground Services and Utilities	110	396	50	446	-61.0	3.0	52
	C Road works	112	396	50	446	-61.0	3.0	54
	D Foundation	114	396	50	446	-61.0	3.0	56
	E Superstructure	110	396	50	446	-61.0	3.0	52
	F Sub-structure (Pile Cap)	110	396	50	446	-61.0	3.0	52
N12	A Site Formation, Filling and Excavation	112	382	50	432	-60.7	3.0	54
	B Construction of Underground Services and Utilities	110	382	50	432	-60.7	3.0	52
	C Road works	112	382	50	432	-60.7	3.0	54
	D Foundation	114	382	50	432	-60.7	3.0	56
	E Superstructure	110	382	50	432	-60.7	3.0	52
	F Sub-structure (Pile Cap)	110	382	50	432	-60.7	3.0	52
N13	A Site Formation, Filling and Excavation	112	470	50	520	-62.3	3.0	53
	B Construction of Underground Services and Utilities	110	470	50	520	-62.3	3.0	51
	C Road works	112	470	50	520	-62.3	3.0	53
	D Foundation	114	470	50	520	-62.3	3.0	55
	E Superstructure	110	470	50	520	-62.3	3.0	51
	F Sub-structure (Pile Cap)	110	470	50	520	-62.3	3.0	51
N14	A Site Formation, Filling and Excavation	112	519	50	569	-63.1	3.0	52
	B Construction of Underground Services and Utilities	110	519	50	569	-63.1	3.0	50
	C Road works	112	519	50	569	-63.1	3.0	52
	D Foundation	114	519	50	569	-63.1	3.0	54
	E Superstructure	110	519	50	569	-63.1	3.0	50
	F Sub-structure (Pile Cap)	110	519	50	569	-63.1	3.0	50

NSR	Construction Activity	Total SWL, dB(A)	Dist. (NSR to Site Boundary) (A), m	Dist. (Site Boundary to Notional Source) (B), m	Horz. Distance (= A+B), m	Dist. Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)
N15	A Site Formation, Filling and Excavation	112	531	50	581	-63.3	3.0	52
	B Construction of Underground Services and Utilities	110	531	50	581	-63.3	3.0	50
	C Road works	112	531	50	581	-63.3	3.0	52
	D Foundation	114	531	50	581	-63.3	3.0	54
	E Superstructure	110	531	50	581	-63.3	3.0	50
	F Sub-structure (Pile Cap)	110	531	50	581	-63.3	3.0	50
N16	A Site Formation, Filling and Excavation	112	242	50	292	-57.3	3.0	58
	B Construction of Underground Services and Utilities	110	242	50	292	-57.3	3.0	56
	C Road works	112	242	50	292	-57.3	3.0	58
	D Foundation	114	242	50	292	-57.3	3.0	60
	E Superstructure	110	242	50	292	-57.3	3.0	56
	F Sub-structure (Pile Cap)	110	242	50	292	-57.3	3.0	56
N17	A Site Formation, Filling and Excavation	112	469	50	519	-62.3	3.0	53
	B Construction of Underground Services and Utilities	110	469	50	519	-62.3	3.0	51
	C Road works	112	469	50	519	-62.3	3.0	53
	D Foundation	114	469	50	519	-62.3	3.0	55
	E Superstructure	110	469	50	519	-62.3	3.0	51
	F Sub-structure (Pile Cap)	110	469	50	519	-62.3	3.0	51
N18	A Site Formation, Filling and Excavation	112	275	50	325	-58.2	3.0	57
	B Construction of Underground Services and Utilities	110	275	50	325	-58.2	3.0	55
	C Road works	112	275	50	325	-58.2	3.0	57
	D Foundation	114	275	50	325	-58.2	3.0	59
	E Superstructure	110	275	50	325	-58.2	3.0	55
	F Sub-structure (Pile Cap)	110	275	50	325	-58.2	3.0	55
N19	A Site Formation, Filling and Excavation	112	321	50	371	-59.4	3.0	56
	B Construction of Underground Services and Utilities	110	321	50	371	-59.4	3.0	54
	C Road works	112	321	50	371	-59.4	3.0	56
	D Foundation	114	321	50	371	-59.4	3.0	58
	E Superstructure	110	321	50	371	-59.4	3.0	54
	F Sub-structure (Pile Cap)	110	321	50	371	-59.4	3.0	54
N20	A Site Formation, Filling and Excavation	112	210	50	260	-56.3	3.0	59
	B Construction of Underground Services and Utilities	110	210	50	260	-56.3	3.0	57
	C Road works	112	210	50	260	-56.3	3.0	59
	D Foundation	114	210	50	260	-56.3	3.0	61
	E Superstructure	110	210	50	260	-56.3	3.0	57
	F Sub-structure (Pile Cap)	110	210	50	260	-56.3	3.0	57

Remark: ** Distance is based on shortest horizontal distance.

The notional noise source location is assumed based on the methodology listed in the statutory Technical Memorandum on Noise from Construction work other than Percussive Piling and that used in the approved EIA report for Wo Shan Wai. It has been assumed that all PME items are operating and gathered within a worksite for a conservative assessment.

Calculation of Noise Level Due to Travelling of Dump Truck within the Project Construction Area During Site Formation, Filling and Excavation Stage

NSR	Construction Activity	No. of Trucks/hr.	SWL per Unit, dB(A)	Horz. Distance From NSR, m	Average Speed, km/hr	Calculated LAeq Due to Travelling of Dump Truck, dB(A) [#]
N1	G Dump Trucks Travelling on Haul Road	10	115	470	10	55
N2	G Dump Trucks Travelling on Haul Road	10	115	432	10	56
N3	G Dump Trucks Travelling on Haul Road	10	115	266	10	58
N4	G Dump Trucks Travelling on Haul Road	10	115	224	10	59
N5	G Dump Trucks Travelling on Haul Road	10	115	228	10	58
N6	G Dump Trucks Travelling on Haul Road	10	115	292	10	57
N7	G Dump Trucks Travelling on Haul Road	10	115	197	10	59
N8	G Dump Trucks Travelling on Haul Road	10	115	53	10	65
N9	G Dump Trucks Travelling on Haul Road	10	115	59	10	64
N10	G Dump Trucks Travelling on Haul Road	10	115	309	10	57
N11	G Dump Trucks Travelling on Haul Road	10	115	446	10	56
N12	G Dump Trucks Travelling on Haul Road	10	115	432	10	56
N13	G Dump Trucks Travelling on Haul Road	10	115	520	10	55
N14	G Dump Trucks Travelling on Haul Road	10	115	569	10	54
N15	G Dump Trucks Travelling on Haul Road	10	115	581	10	54
N16	G Dump Trucks Travelling on Haul Road	10	115	292	10	57
N17	G Dump Trucks Travelling on Haul Road	10	115	519	10	55
N18	G Dump Trucks Travelling on Haul Road	10	115	325	10	57
N19	G Dump Trucks Travelling on Haul Road	10	115	371	10	56
N20	G Dump Trucks Travelling on Haul Road	10	115	260	10	58

Remark: * According to information available at EPD website: http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf
Based on equation in the British Standard "Noise Control on Construction and Open Sites, BS 5228: Part 1: 2009": $LA_{eq} = SWL - 33 + 10\log_{10} Q - 10\log_{10} V - 10\log_{10} D$
Where,
SWL = Sound Power Level of the dump truck
Q is the number of vehicles per hour
V is the average speed (10 km/hr)
D is the distance of receiver position from the haul road (m) (the horizontal distance between the receiver position and the construction notional noise source is taken in this noise assessment)