

Appendix D2

Plant Inventories for Construction Noise Predictions



C1753 - TST KCR Extension Construction Noise Calculations

No Mitigation (Normal Quantity of Plant)

Worksite 1: Advance Works								
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10*(SWL/10)	
Cooling Mains Diversion	Site Preparation	Compressor <10m3/min	2	001	100	103	2.00E+10	
		Breaker, hand held >20<35kg	4	026	111	117	5.04E+11	
							Total SWL	117
	Trench Support	Sheetpiling, vibratory (install)	1	TS 300 (West Rail)	118	118	6.31E+11	
								Total SWL
	Excavation	Excavator	1	081	112	112	1.58E+11	
		Lorry	1	141	112	112	1.58E+11	
		Compressor <10m3/min	1	001	100	100	1.00E+10	
		Water pump, petrol	1	282	103	103	2.00E+10	
							Total SWL	115
	Reinstatement	Excavator	1	081	112	112	1.58E+11	
		Lorry	1	141	112	112	1.58E+11	
							Total SWL	115

Worksite 2: HH Re-provisioning works							
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10*(SWL/10)
Site Preparation	Site Preparation	Breaker, excavator mounted, hydraulic	2	028	122	125	3.17E+12
	Regrading/Formation	Excavator	1	081	112	112	1.58E+11
		Lorry	1	141	112	112	1.58E+11
Station Construction	Crane, tower	2	049	95	98	6.32E+09	
	Crane, mobile	1	048	112	112	1.58E+11	
	Lorry	1	141	112	112	1.58E+11	
	Excavator	1	081	112	112	1.58E+11	
	Ventilation Fan	1	241	108	108	6.31E+10	
						Total SWL	117
Concreting	Concrete Pump	2	047	109	112	1.59E+11	
	Crane, tower	1	049	95	95	3.16E+09	
	Poker, vibratory, handheld	6	170	113	121	1.20E+12	
	Concrete Lorry Mixer	2	044	109	112	1.59E+11	
	Ventilation Fan	1	241	108	108	6.31E+10	
						Total SWL	122
Demolition	Removal	Excavator	1	081	112	112	1.58E+11
		Lorry	1	141	112	112	1.58E+11
						Total SWL	115

Worksite 3: IMC Enabling Works							
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ⁴ (SWL/10)
Demolition	Removal	Excavator	1	081	112	112	1.58E+11
		Lorry	1	141	112	112	1.58E+11
		Total SWL					115
Marine Piling		Piling, large diameter bored, grab and chisel	1	164	115	115	3.16E+11
		Generator, silenced	1	102	100	100	1.00E+10
		Lorry	1	141	112	112	1.58E+11
		Total SWL					117
RC Beam Installation		Crane, mobile	2	048	112	115	3.17E+11
		Lorry	1	141	112	112	1.58E+11
		Total SWL					117
Deck Construction		Poker, vibratory, handheld	4	170	113	119	7.98E+11
		Concrete Lorry Mbar	2	044	109	112	1.59E+11
		Concrete Pump	2	047	109	112	1.59E+11
		Total SWL					120
Road Regrading	Site Preparation	Breaker, excavator mounted, hydraulic	1	028	122	122	1.58E+12
		Total SWL					122
	Excavation	Excavator	1	081	112	112	1.58E+11
		Lorry	2	141	112	115	3.17E+11
		Compressor <10m3/min	1	001	100	100	1.00E+10
		Breaker, hand-held >10<20kg	2	024	108	111	1.28E+11
		Total SWL					118
	Reinstatement	Road roller	1	185	108	108	6.31E+10
		Grader	1	104	113	113	2.00E+11
		Lorry	1	141	112	112	1.58E+11
	Total SWL					118	
	Resurfacing	Asphalting Paver	1	004	109	109	7.94E+10
Lorry		2	141	112	115	3.17E+11	
Road roller		1	185	108	108	6.31E+10	
Total SWL					117		

Worksite 4: HH to CHT (at grade)							
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ⁴ (SWL/10)
Site Preparation	Site Preparation	Breaker, excavator mounted, hydraulic	1	028	122	122	1.58E+12
		Lorry	1	141	112	112	1.58E+11
		Compressor <10m3/min	1	001	100	100	1.00E+10
		Breaker, hand-held >20<35kg	2	024	111	114	2.52E+11
		Total SWL					123
Site Regrading		Excavator	2	081	112	115	3.17E+11
		Lorry	1	141	112	112	1.58E+11
		Compressor <10m3/min	1	001	100	100	1.00E+10
		Breaker, hand-held >10<20kg	1	024	108	108	6.31E+10
		Total SWL					117
Tunnel Box Construction		Crane, mobile	2	048	112	115	3.17E+11
		Generator, silenced	3	102	100	105	3.00E+10
		Compressor <10m3/min	2	001	100	103	2.00E+10
		Lorry	1	141	112	112	1.58E+11
		Total SWL					117
Concreting		Poker, vibratory, handheld	4	170	113	119	7.98E+11
		Crane, mobile	1	048	112	112	1.58E+11
		Concrete Pump	1	047	109	109	7.94E+10
		Concrete Lorry Mbar	1	044	109	109	7.94E+10
		Total SWL					120

Worksite 5: TSTE Station (Open Cut) East								
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ⁴ (SWL/10)	
Chemical Grouting		*SI Drill for Central	2	-	114	117	5.02E+11	
		Concrete Pump	1	047	109	109	7.94E+10	
		Water Pump (petrol)	1	282	103	103	2.00E+10	
		Total SWL					118	
* Remark: measured SWL of Percussive Drilling Machine at MTRC construction site (Central Subway)								
Site Preparation		Compressor <10m3/min	1	001	100	100	1.00E+10	
		Breaker, hand-held >20<35kg	2	025	111	114	2.52E+11	
		Lorry	1	141	112	112	1.58E+11	
		Total SWL					116	
Sheet Piling	Oscillating		1	165	115	115	3.18E+11	
Total SWL 115								
Diaphragm Walling	Walling	Excavation Rig*	2	-	101	104	2.52E+10	
		Lorry	2	141	112	115	3.17E+11	
		Pump, petrol	1	282	103	103	2.00E+10	
	Total SWL 118							
	Concreting		Concrete Lorry Mixer	2	044	109	112	1.59E+11
			Crane, mobile**	1	-	98	98	6.31E+09
Total SWL 112								
Breaking		Breaker, excavated mounted, hydraulic	1	028	122	122	1.58E+12	
Total SWL 122								
Road Decking		Compressor <10m3/min	1	001	100	100	1.00E+10	
		Crane, mobile	1	048	112	112	1.58E+11	
		Pneumatic Winch (wrench)	2	281	110	113	2.00E+11	
		Ventilation Fan	1	241	108	108	6.31E+10	
		Total SWL					116	
Excavation (at surface)		Lorry	8	141	112	121	1.27E+12	
		Winch (electric)	3	262	95	100	9.49E+09	
		Ventilation Fan	2	241	108	111	1.26E+11	
		Generator, silenced	2	102	100	103	2.00E+10	
		Conveyors	4	041	90	98	4.00E+09	
		Total SWL					122	
Station Construction		Crane, tower	2	49	95	98	6.32E+09	
		Crane, mobile	1	48	112	112	1.58E+11	
		Lorry	1	141	112	112	1.58E+11	
		Excavator	1	81	112	112	1.58E+11	
		Ventilation Fan	1	241	108	108	6.31E+10	
		Total SWL					117	
Tunnel Box Construction	Formation	Crane, mobile	1	048	112	112	1.58E+11	
		Compressor <10m3/min	1	001	100	100	1.00E+10	
		Ventilation Fan	1	241	108	108	6.31E+10	
		Generator, silenced	1	102	100	100	1.00E+10	
		Winch (electric)	1	282	95	95	3.16E+09	
		Total SWL					114	
	Concreting		Concrete Lorry Mixer	2	044	109	112	1.59E+11
			Ventilation Fan	1	241	108	108	6.31E+10
			Concrete Pump	1	047	109	109	7.94E+10
			Total SWL					115
Backfilling		Excavator	1	081	112	112	1.58E+11	
		Lorry	3	141	112	117	4.75E+11	
		Road roller	1	185	108	108	6.31E+10	
		Total SWL					118	
Road Reinstatement		Road roller	1	185	108	108	6.31E+10	
		Grader	1	104	113	113	2.00E+11	
		Asphalting Paver	1	004	109	109	7.94E+10	
		Lorry	1	141	112	112	1.58E+11	
		Total SWL					117	

NOTE: * = Liebherr 852, 70T Hydraulic cable excavator HS 852HD. SWL by measurement on 23 Oct 1995 = 101dB(A) by EHS Consultants
 ** = Same as above ans SWL = 96dB(A)

Worksite 5A: TSTE Station (Open Cut) West							
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10*(SWL/10)
Site Preparation	Slope Works	Rock Drill, crawler mounted, hydraulic	2	182	123	128	3.99E+12
		Temp. Exc. Support					
		Bored piling Rigs	2	165	115	118	6.32E+11
		Bored piling Rigs (Soldier Piles)	3	165	115	120	9.49E+11
						Total SWL	127
Excavation (Drill and Blast)		Breaker, excavator mounted, hydraulic	4	028	122	128	6.34E+12
		Excavator	4	081	112	118	6.34E+11
		Lorry	12	141	112	123	1.90E+12
		Rock Drill, crawler mounted, pneumatic	8	182	123	132	1.60E+13
		Crane, mobile	2	048	112	115	3.17E+11
		Ventilation Fan	8	241	108	117	5.05E+11
		Conveyor	4	041	90	96	4.00E+09
		Crusher Plant*	1	-	119	119	7.94E+11
							Total SWL
Station Construction		Crane, tower	2	049	95	98	6.32E+09
		Crane, mobile	1	048	112	112	1.58E+11
		Lorry	1	141	112	112	1.58E+11
		Excavator	1	081	112	112	1.58E+11
		Ventilation Fan	1	241	108	108	6.31E+10
		Rock Drill (Crawler Mounted), Pneumatic Mini Piles	4	182	123	129	7.98E+12
							Total SWL
Concreting		Concrete Pump	4	047	109	115	3.18E+11
		Crane, tower	2	049	95	98	6.32E+09
		Poker, vibratory, handheld	10	170	113	123	2.00E+12
		Concrete Lorry Mixer	4	044	109	115	3.18E+11
		Ventilation Fan	4	241	108	114	2.52E+11
							Total SWL
Backfilling		Crane, tower	2	049	95	98	6.32E+09
		Excavator	1	081	112	112	1.58E+11
		Lorry	2	141	112	115	3.17E+11
		Roller, vibratory	1	186	108	108	6.31E+10
							Total SWL

Compressor + Generators assumed to be centrally housed in an acoustic enclosure

NOTE: * SWL of the plant extracted from BS5228:Part 1:1997 Table C2 (Reference no. B)

Worksite 6: Middle Road Entrances								
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ⁴ (SWL/10)	
Chemical Grouting		*SI Drill for Central	2	-	114	117	5.02E+11	
		Concrete Pump	1	047	109	109	7.94E+10	
		Water Pump (petrol)	1	282	103	103	2.00E+10	
		Total SWL					118	
* Remark: measured SWL of Percussive Drilling Machine at MTRC construction site (Central Subway)								
Site Preparation		Lorry	1	141	112	112	1.58E+11	
		Compressor <10m3/min	1	001	100	100	1.00E+10	
		Breaker, handheld > 20<30kg	2	025	111	114	2.52E+11	
		Total SWL					116	
Road Decking		Compressor <10m3/min	1	001	100	100	1.00E+10	
		Crane, mobile	1	048	112	112	1.58E+11	
		Pneumatic Winch (wrench)	2	261	110	113	2.00E+11	
		Ventilation Fan	1	241	108	108	6.31E+10	
		Total SWL					116	
Excavation (at surface)		Lorry	2	141	112	115	3.17E+11	
		Winch (electric)	1	262	95	95	3.16E+09	
		Generator, silenced	1	102	100	100	1.00E+10	
		Ventilation Fan	1	241	108	108	6.31E+10	
		Total SWL					116	
Subway Box Construction	Formation	Crane, mobile	1	048	112	112	1.58E+11	
		Compressor <10m3/min	1	001	100	100	1.00E+10	
		Ventilation Fan	1	241	108	108	6.31E+10	
		Winch (electric)	1	262	95	95	3.16E+09	
		Generator, silenced	1	102	100	100	1.00E+10	
		Total SWL					114	
	Concreting		Concrete Lorry Mixer	1	044	109	109	7.94E+10
			Ventilation Fan	1	241	108	108	6.31E+10
			Concrete Pump	1	047	109	109	7.94E+10
			Total SWL					113
Backfilling		Excavator	1	081	112	112	1.58E+11	
		Lorry	1	141	112	112	1.58E+11	
		Road roller	1	185	108	108	6.31E+10	
		Total SWL					116	
Road Reinstatement		Road roller	1	185	108	108	6.31E+10	
		Grader	1	104	113	113	2.00E+11	
		Asphalting Paver	1	004	109	109	7.94E+10	
		Lorry	1	141	112	112	1.58E+11	
		Total SWL					117	

NOTE * = Liebherr 852, 70T Hydraulic cable excavator HS 852HD. SWL by measurement on 23 Oct 1995 = 101dB(A) by EHS Consultants

Worksite 7: Pedestrian Link Mody Road to MTRC							
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10*(SWL/10)
Site Preparation		Lorry	2	141	112	115	3.17E+11
		Compressor <10m3/min	2	001	100	103	2.00E+10
		Breaker, handheld >20<35kg	4	025	111	117	5.04E+11
		Total SWL					119
Bored Piling	Excavation	Piling, oscillator	3	165	115	120	9.49E+11
		Generator, silenced	2	102	100	103	2.00E+10
		Pump, petrol	2	262	103	106	3.96E+10
		Total SWL				120	
	Concreting	Mobile Crane	2	048	112	115	3.17E+11
		Concrete Lorry Mixer	2	044	109	112	1.59E+11
		Poker Vibratory, hand-held	4	170	113	119	7.98E+11
		Total SWL				121	
Road Decking		Compressor <10m3/min	2	001	100	103	2.00E+10
		Crane, mobile	2	048	112	115	3.17E+11
		Pneumatic Winch (wrench)	4	261	110	116	4.00E+11
		Ventilation Fan	2	241	108	111	1.26E+11
		Total SWL				119	
Excavation (at surface)		Lorry	2	141	112	115	3.17E+11
		Ventilation Fan	2	241	108	111	1.26E+11
		Total SWL				116	
Subway Box Construction	Formation	Crane, mobile	2	048	112	115	3.17E+11
		Generator, silenced	2	102	100	103	2.00E+10
		Winch, electric	2	262	95	98	6.32E+09
		Compressor <10m3/min	2	001	100	103	2.00E+10
		Ventilation Fan	2	241	108	111	1.26E+11
	Total SWL				117		
	Concreting	Concrete Lorry Mixer	2	044	109	112	1.59E+11
		Ventilation Fan	2	241	108	111	1.26E+11
		Generator, silenced	2	102	100	103	2.00E+10
		Concrete Pump	2	047	109	112	1.59E+11
Total SWL					117		
Backfilling		Excavator	1	081	112	112	1.58E+11
		Lorry	1	141	112	112	1.58E+11
		Road roller	1	185	108	108	6.31E+10
		Total SWL				116	
Road Reinstatement		Road roller	1	185	108	108	6.31E+10
		Grader	1	104	113	113	2.00E+11
		Asphalting Paver	1	004	109	109	7.94E+10
		Lorry	1	141	112	112	1.58E+11
		Total SWL				117	

C1753 - TST KCR Extension Construction Noise Calculations

Mitigation 1 - Using Absolute Minimum Quantity of Plant

Worksite 1: Advance Works								
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ⁴ (SWL/10)	
Cooling Mains Diversion	Site Preparation	Compressor <10m ³ /min	2	001	100	103	2.00E+10	
		Breaker, hand held >20<35kg	4	028	111	117	5.04E+11	
							Total SWL	117
	Trench Support	Sheetpiling, vibratory (install)	1	TS 300 (West Rail)	118	118	6.31E+11	
							Total SWL	118
	Excavation	Excavator	1	081	112	112	1.58E+11	
		Lorry	1	141	112	112	1.58E+11	
		Compressor <10m ³ /min	1	001	100	100	1.00E+10	
		Water pump, petrol	1	282	103	103	2.00E+10	
							Total SWL	115
	Reinstatement	Excavator	1	081	112	112	1.58E+11	
		Lorry	1	141	112	112	1.58E+11	
							Total SWL	115

Worksite 2: HH Re-provisioning works							
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ⁴ (SWL/10)
Site Preparation	Site Preparation	Breaker, excavator mounted, hydraulic	1	028	122	122	1.58E+12
							Total SWL
	Regrading/Formation	Excavator	1	081	112	112	1.58E+11
Lorry		1	141	112	112	1.58E+11	
						Total SWL	115
Station Construction	Crane, tower	2	049	95	98	6.32E+09	
	Crane, mobile	1	048	112	112	1.58E+11	
	Lorry	1	141	112	112	1.58E+11	
	Excavator	1	081	112	112	1.58E+11	
	Ventilation Fan	1	241	108	108	6.31E+10	
						Total SWL	117
Concreting	Concrete Pump	2	047	109	112	1.59E+11	
	Crane, tower	1	049	95	95	3.16E+09	
	Poker, vibratory, handheld	6	170	113	121	1.20E+12	
	Concrete Lorry Mixer	2	044	109	112	1.59E+11	
	Ventilation Fan	1	241	108	108	6.31E+10	
						Total SWL	122
Demolition	Removal	Excavator	1	081	112	112	1.58E+11
		Lorry	1	141	112	112	1.58E+11
						Total SWL	115

Mitigation 1 (Reduced)

Worksite 3: IMC Enabling Works								
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ⁴ (SWL/10)	
Demolition	Removal	Excavator	1	081	112	112	1.58E+11	
		Lorry	1	141	112	112	1.58E+11	
							Total SWL	115
Marine Piling		Piling, large diameter bored, grab and chisel	1	164	115	115	3.16E+11	
		Generator, silenced	1	102	100	100	1.00E+10	
		Lorry	1	141	112	112	1.58E+11	
							Total SWL	117
RC Beam Installation		Crane, mobile	2	048	112	115	3.17E+11	
		Lorry	1	141	112	112	1.58E+11	
							Total SWL	117
Deck Construction		Poker, vibratory, handheld	4	170	113	119	7.98E+11	
		Concrete Lorry Mixer	2	044	109	112	1.59E+11	
		Concrete Pump	2	047	109	112	1.59E+11	
							Total SWL	120
Road Regrading	Site Preparation	Breaker, excavator mounted, hydraulic	1	028	122	122	1.58E+12	
							Total SWL	122
	Excavation	Excavator	1	081	112	112	1.58E+11	
		Lorry	2	141	112	115	3.17E+11	
		Compressor <10m3/min	1	001	100	100	1.00E+10	
		Breaker, hand-held >10<20kg	2	024	108	111	1.28E+11	
							Total SWL	118
	Reinstatement	Road roller	1	185	108	108	6.31E+10	
		Grader	1	104	113	113	2.00E+11	
		Lorry	1	141	112	112	1.58E+11	
						Total SWL	116	
	Resurfacing		Asphalting Paver	1	004	109	109	7.94E+10
			Lorry	2	141	112	115	3.17E+11
Road roller			1	185	108	108	6.31E+10	
					Total SWL	117		

Worksite 4: HH to CHT (at grade)							
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ⁴ (SWL/10)
Site Preparation	Site Preparation	Breaker, excavator mounted, hydraulic	1	028	122	122	1.58E+12
		Lorry	1	141	112	112	1.58E+11
		Compressor <10m3/min	1	001	100	100	1.00E+10
		Breaker, hand-held >20<35kg	2	024	111	114	2.52E+11
							Total SWL
Site Regrading		Excavator	2	081	112	115	3.17E+11
		Lorry	1	141	112	112	1.58E+11
		Compressor <10m3/min	1	001	100	100	1.00E+10
		Breaker, hand-held >10<20kg	1	024	108	108	6.31E+10
							Total SWL
Tunnel Box Construction		Crane, mobile	2	048	112	115	3.17E+11
		Generator, silenced	3	102	100	105	3.00E+10
		Compressor <10m3/min	2	001	100	103	2.00E+10
		Lorry	1	141	112	112	1.58E+11
							Total SWL
Concreting		Poker, vibratory, handheld	4	170	113	119	7.98E+11
		Crane, mobile	1	048	112	112	1.58E+11
		Concrete Pump	1	047	109	109	7.94E+10
		Concrete Lorry Mixer	1	044	109	109	7.94E+10
							Total SWL

Mitigation 1 (Reduced)

Worksite 5: TSTE Station (Open Cut) East									
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ⁴ (SWL/10)		
Chemical Grouting		*SI Drill for Central	2	-	114	117	5.02E+11		
		Concrete Pump	1	047	109	109	7.94E+10		
		Water Pump (petrol)	1	282	103	103	2.00E+10		
		Total SWL					118		
* Remark: measured SWL of Percussive Drilling Machine at MTRC construction site (Central Subway)									
Site Preparation		Compressor <10m3/min	1	001	100	100	1.00E+10		
		Breaker, hand-held >20<35kg	2	025	111	114	2.52E+11		
		Lorry	1	141	112	112	1.58E+11		
		Total SWL					116		
Sheet Piling	Oscillating		1	185	115	115	3.18E+11		
							Total SWL	115	
Diaphragm Walling	Walling	Excavation Rig*	2	-	101	104	2.52E+10		
		Lorry	1	141	112	112	1.58E+11		
		Pump, petrol	1	282	103	103	2.00E+10		
								Total SWL	113
	Concreting	Concrete Lorry Mixer	1	044	109	109	7.94E+10		
		Crane, mobile**	1	-	98	98	6.31E+09		
Total SWL						109			
Breaking	Breaker, excavated mounted, hydraulic	1	028	122	122	1.58E+12			
	Total SWL					122			
Road Decking		Compressor <10m3/min	1	001	100	100	1.00E+10		
		Crane, mobile	1	048	112	112	1.58E+11		
		Pneumatic Winch (wrench)	2	261	110	113	2.00E+11		
		Ventilation Fan	1	241	108	108	6.31E+10		
		Total SWL					116		
Excavation (at surface)		Lorry	1	141	112	112	1.58E+11		
		Winch (electric)	1	262	95	95	3.16E+09		
		Ventilation Fan	1	241	108	108	6.31E+10		
		Generator, silenced	1	102	100	100	1.00E+10		
		Conveyors	4	041	90	96	4.00E+09		
		Total SWL					114		
Station Construction		Crane, tower	2	49	95	98	6.32E+09		
		Crane, mobile	1	48	112	112	1.58E+11		
		Lorry	1	141	112	112	1.58E+11		
		Excavator	1	81	112	112	1.58E+11		
		Ventilation Fan	1	241	108	108	6.31E+10		
							Total SWL	117	
Tunnel Box Construction	Formation	Crane, mobile	1	048	112	112	1.58E+11		
		Compressor <10m3/min	1	001	100	100	1.00E+10		
		Ventilation Fan	1	241	108	108	6.31E+10		
		Generator, silenced	1	102	100	100	1.00E+10		
		Winch (electric)	1	262	95	95	3.16E+09		
		Total SWL					114		
	Concreting	Concrete Lorry Mixer	2	044	109	112	1.59E+11		
		Ventilation Fan	1	241	108	108	6.31E+10		
							Total SWL	115	
Backfilling		Excavator	1	081	112	112	1.58E+11		
		Lorry	1	141	112	112	1.58E+11		
		Road roller	1	185	108	108	6.31E+10		
		Total SWL					116		
Road Reinstatement		Road roller	1	185	108	108	6.31E+10		
		Grader	1	104	113	113	2.00E+11		
		Asphalting Paver	1	004	109	109	7.94E+10		
		Lorry	1	141	112	112	1.58E+11		
		Total SWL					117		

NOTE: * = Liebherr 852, 70T Hydraulic cable excavator HS 852HD. SWL by measurement on 23 Oct 1995 = 101dB(A) by EHS Consultants
 ** = Same as above ans SWL = 98dB(A)

Mitigation 1 (Reduced)

Worksite 5A: TSTE Station (Open Cut) West							
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ⁶ (SWL/10)
Site Preparation	Slope Works	Rock Drill, crawler mounted, hydraulic	2	182	123	126	3.99E+12
		Bored piling Rigs	2	185	115	118	6.32E+11
	Temp. Exc. Support	Bored piling Rigs (Soldier Piles)	3	185	115	120	9.49E+11
						Total SWL	127
Excavation (Drill and Blast)		Breaker, excavator mounted, hydraulic	2	028	122	125	3.17E+12
		Excavator	2	081	112	115	3.17E+11
		Lorry	1	141	112	112	1.58E+11
		Rock Drill, crawler mounted, pneumatic	3	182	123	128	5.99E+12
		Crane, mobile	2	048	112	115	3.17E+11
		Ventilation Fan	1	241	108	108	6.31E+10
		Conveyor	4	041	90	98	4.00E+09
		Crusher Plant*	1	-	119	119	7.94E+11
							Total SWL
Station Construction		Crane, tower	2	049	95	98	6.32E+09
		Crane, mobile	1	048	112	112	1.58E+11
		Lorry	1	141	112	112	1.58E+11
		Excavator	1	081	112	112	1.58E+11
		Ventilation Fan	1	241	108	108	6.31E+10
		Rock Drill (Crawler Mounted), Pneumatic Mini Piles	4	182	123	129	7.98E+12
							Total SWL
Concreting		Concrete Pump	2	047	109	112	1.59E+11
		Crane, tower	1	049	95	95	3.16E+09
		Poker, vibratory, handheld	6	170	113	121	1.20E+12
		Concrete Lorry Mixer	2	044	109	112	1.59E+11
		Ventilation Fan	1	241	108	108	6.31E+10
					Total SWL	122	
Backfilling		Crane, tower	2	049	95	98	6.32E+09
		Excavator	1	081	112	112	1.58E+11
		Lorry	2	141	112	115	3.17E+11
		Roller, vibratory	1	186	108	108	6.31E+10
					Total SWL	117	
Compressor + Generators assumed to be centrally housed in an acoustic enclosure							

NOTE: * SWL of the plant extracted from BS5228:Part 1:1997 Table C2 (Reference no. 8)

Worksite 6: Middle Road Entrances							
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ⁴ (SWL/10)
Chemical Grouting		*Si Drill for Central	2	-	114	117	5.02E+11
		Concrete Pump	1	047	109	109	7.94E+10
		Water Pump (petrol)	1	282	103	103	2.00E+10
		Total SWL					118
* Remark: measured SWL of Percussive Drilling Machine at MTRC construction site (Central Subway)							
Site Preparation		Lorry	1	141	112	112	1.58E+11
		Compressor <10m ³ /min	1	001	100	100	1.00E+10
		Breaker, handheld > 20<30kg	2	025	111	114	2.52E+11
		Total SWL					116
Road Decking		Compressor <10m ³ /min	1	001	100	100	1.00E+10
		Crane, mobile	1	048	112	112	1.58E+11
		Pneumatic Winch (wrench)	2	261	110	113	2.00E+11
		Ventilation Fan	1	241	108	108	6.31E+10
		Total SWL					116
Excavation (at surface)		Lorry	1	141	112	112	1.58E+11
		Winch (electric)	1	262	95	95	3.16E+09
		Generator, silenced	1	102	100	100	1.00E+10
		Ventilation Fan	1	241	108	108	6.31E+10
		Total SWL					114
Subway Box Construction	Formation	Crane, mobile	1	048	112	112	1.58E+11
		Compressor <10m ³ /min	1	001	100	100	1.00E+10
		Ventilation Fan	1	241	108	108	6.31E+10
		Winch (electric)	1	262	95	95	3.16E+09
		Generator, silenced	1	102	100	100	1.00E+10
		Total SWL					114
	Concreting	Concrete Lorry Mixer	1	044	109	109	7.94E+10
		Ventilation Fan	1	241	108	108	6.31E+10
		Concrete Pump	1	047	109	109	7.94E+10
		Total SWL					113
Backfilling		Excavator	1	081	112	112	1.58E+11
		Lorry	1	141	112	112	1.58E+11
		Road roller	1	185	108	108	6.31E+10
		Total SWL					116
Road Reinstatement		Road roller	1	185	108	108	6.31E+10
		Grader	1	104	113	113	2.00E+11
		Asphalting Paver	1	004	109	109	7.94E+10
		Lorry	1	141	112	112	1.58E+11
		Total SWL					117

NOTE: * = Liebherr 852, 70T Hydraulic cable excavator HS 852HD. SWL by measurement on 23 Oct 1995 = 101dB(A) by EHS Consultants

Worksite 7: Pedestrian Link Mody Road to MTRC							
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ⁶ {SWL/10}
Site Preparation		Lorry	2	141	112	115	3.17E+11
		Compressor <10m ³ /min	1	001	100	100	1.00E+10
		Breaker, handheld >20<35kg	2	025	111	114	2.52E+11
		Total SWL					118
Bored Piling	Excavation	Piling, oscillator	1	165	115	115	3.16E+11
		Generator, silenced	1	102	100	100	1.00E+10
		Pump, petrol	1	282	103	103	2.00E+10
	Total SWL					115	
	Concreting	Mobile Crane	1	048	112	112	1.58E+11
		Concrete Lorry Mixer	2	044	109	112	1.59E+11
Poker Vibratory, hand-held		2	170	113	116	3.99E+11	
Total SWL					119		
Road Decking		Compressor <10m ³ /min	1	001	100	100	1.00E+10
		Crane, mobile	1	048	112	112	1.58E+11
		Pneumatic Winch (wrench)	2	261	110	113	2.00E+11
		Ventilation Fan	1	241	108	108	6.31E+10
		Total SWL					116
Excavation (at surface)		Lorry	1	141	112	112	1.58E+11
		Ventilation Fan	1	241	108	108	6.31E+10
		Total SWL					113
Subway Box Construction	Formation	Crane, mobile	1	048	112	112	1.58E+11
		Generator, silenced	1	102	100	100	1.00E+10
		Winch, electric	1	262	95	95	3.16E+08
		Compressor <10m ³ /min	1	001	100	100	1.00E+10
		Ventilation Fan	1	241	108	108	6.31E+10
	Total SWL					114	
	Concreting	Concrete Lorry Mixer	2	044	109	112	1.59E+11
		Ventilation Fan	1	241	108	108	6.31E+10
		Generator, silenced	1	102	100	100	1.00E+10
		Concrete Pump	1	047	109	109	7.94E+10
Total SWL						115	
Backfilling		Excavator	1	081	112	112	1.58E+11
		Lorry	1	141	112	112	1.58E+11
		Road roller	1	185	108	108	6.31E+10
		Total SWL					116
Road Reinstatement		Road roller	1	185	108	108	6.31E+10
		Grader	1	104	113	113	2.00E+11
		Asphalting Paver	1	004	109	109	7.94E+10
		Lorry	1	141	112	112	1.58E+11
		Total SWL					117

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Mitigation 2 - Using Absolute Minimum Quantity of Plant and Quiet Plants

Worksite 1: Advance Works							
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ⁴ (SWL/10)
Cooling Mains Diversion	Site Preparation	Compressor <10m ³ /min	2	001	100	103	2.00E+10
		Breaker, hand held >20<35kg	4	028	108	114	2.52E+11
							Total SWL
	Trench Support	Sheetpiling, vibratory (install)	1	TS 300 (West Rail)	118	118	6.31E+11
							Total SWL
	Excavation	Excavator	1	081	105	105	3.16E+10
		Lorry	1	141	105	105	3.16E+10
		Compressor <10m ³ /min	1	001	100	100	1.00E+10
		Water pump, petrol	1	282	88	88	6.31E+08
							Total SWL
	Reinstatement	Excavator	1	081	105	105	3.16E+10
		Lorry	1	141	105	105	3.16E+10
							Total SWL

Worksite 2: HH Reprovisioning works							
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ⁴ (SWL/10)
Site Preparation	Site Preparation	Breaker, excavator mounted, hydraulic	1	028	115	115	3.16E+11
							Total SWL
	Regrading/ Formation	Excavator	1	081	105	105	3.16E+10
		Lorry	1	141	105	105	3.16E+10
						Total SWL	108
Station Construction	Crane, tower	2	049	95	98	6.32E+09	
	Crane, mobile	1	048	105	105	3.16E+10	
	Lorry	1	141	105	105	3.16E+10	
	Excavator	1	081	105	105	3.16E+10	
	Ventilation Fan	1	241	108	108	6.31E+10	
						Total SWL	112
Concreting	Concrete Pump	2	047	105	108	6.32E+10	
	Crane, tower	1	049	95	95	3.16E+09	
	Poker, vibratory, handheld	6	170	110	118	6.00E+11	
	Concrete Lorry Mixer	2	044	109	112	1.59E+11	
	Ventilation Fan	1	241	108	108	6.31E+10	
						Total SWL	119
Demolition	Removal	Excavator	1	081	105	105	3.16E+10
		Lorry	1	141	105	105	3.16E+10
							Total SWL

Worksite 3: IMC Enabling Works							
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ⁴ (SWL/10)
Demolition	Removal	Excavator	1	081	105	105	3.16E+10
		Lorry	1	141	105	105	3.16E+10
		Total SWL					108
Marine Piling		Piling, large diameter bored, grab and chisel	1	164	115	115	3.16E+11
		Generator, silenced	1	102	100	100	1.00E+10
		Lorry	1	141	105	105	3.16E+10
		Total SWL					116
RC Beam Installation		Crane, mobile	2	048	105	108	6.32E+10
		Lorry	1	141	105	105	3.16E+10
		Total SWL					110
Deck Construction		Poker, vibratory, handheld	4	170	110	116	4.00E+11
		Concrete Lorry Mixer	2	044	109	112	1.59E+11
		Concrete Pump	2	047	105	108	6.32E+10
		Total SWL					118
Road Regrading	Site Preparation	Breaker, excavator mounted, hydraulic	1	028	115	115	3.16E+11
		Total SWL					115
	Excavation	Excavator	1	081	105	105	3.16E+10
		Lorry	2	141	105	108	6.32E+10
		Compressor <10m3/min	1	001	100	100	1.00E+10
		Breaker, hand-held >10<20kg	2	024	108	111	1.28E+11
		Total SWL					114
	Reinstatement	Road roller	1	185	108	108	6.31E+10
		Grader	1	104	113	113	2.00E+11
		Lorry	1	141	105	105	3.16E+10
	Total SWL					115	
Resurfacing	Asphalting Paver	1	004	109	109	7.94E+10	
	Lorry	2	141	105	108	6.32E+10	
	Road roller	1	185	108	108	6.31E+10	
Total SWL					113		

Worksite 4: HH to CHT (at grade)							
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ⁴ (SWL/10)
Site Preparation	Site Preparation	Breaker, excavator mounted, hydraulic	1	028	115	115	3.16E+11
		Lorry	1	141	105	105	3.16E+10
		Compressor <10m3/min	1	001	100	100	1.00E+10
		Breaker, hand-held >20<35kg	2	024	108	111	1.28E+11
		Total SWL					117
Site Regrading		Excavator	2	081	105	108	6.32E+10
		Lorry	1	141	105	105	3.16E+10
		Compressor <10m3/min	1	001	100	100	1.00E+10
		Breaker, hand-held >10<20kg	1	024	108	108	6.31E+10
Total SWL					112		
Tunnel Box Construction		Crane, mobile	2	048	105	108	6.32E+10
		Generator, silenced	3	102	100	105	3.00E+10
		Compressor <10m3/min	2	001	100	103	2.00E+10
		Lorry	1	141	105	105	3.16E+10
		Total SWL					112
Concreting		Poker, vibratory, handheld	4	170	110	116	4.00E+11
		Crane, mobile	1	048	105	105	3.16E+10
		Concrete Pump	1	047	105	105	3.16E+10
		Concrete Lorry Mixer	1	044	109	109	7.94E+10
		Total SWL					117

Mitigation 2

Worksite 5: TSTE Station (Open Cut) East								
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10*(SWL/10)	
Chemical Grouting		*SI Drill for Central	2	-	114	117	5.02E+11	
		Concrete Pump	1	047	105	105	3.16E+10	
		Water Pump (petrol)	1	282	88	88	6.31E+08	
							Total SWL	117
* Remark: measured SWL of Percussive Drilling Machine at MTRC construction site (Central Subway)								
Site Preparation		Compressor <10m3/min	1	001	100	100	1.00E+10	
		Breaker, hand-held >20<35kg	2	025	108	111	1.26E+11	
		Lorry	1	141	105	105	3.16E+10	
							Total SWL	112
Sheet Piling	Oscillating		1	165	115	115	3.16E+11	
							Total SWL	115
Diaphragm Walling	Walling	Excavation Rig*	2	-	101	104	2.52E+10	
		Lorry	1	141	105	105	3.16E+10	
		Pump, petrol	1	282	88	88	6.31E+08	
						Total SWL	108	
	Concreting	Concrete Lorry Mixer	1	044	109	109	7.94E+10	
		Crane, mobile**	1	-	98	98	6.31E+09	
					Total SWL	109		
Breaking	Breaker, excavated mounted, hydraulic	1	028	115	115	3.16E+11		
					Total SWL	115		
Road Decking		Compressor <10m3/min	1	001	100	100	1.00E+10	
		Crane, mobile	1	048	105	105	3.16E+10	
		Pneumatic Winch (wrench)	2	281	110	113	2.00E+11	
		Ventilation Fan	1	241	108	108	6.31E+10	
							Total SWL	115
Excavation (at surface)		Lorry	1	141	105	105	3.16E+10	
		Winch (electric)	1	262	95	95	3.16E+09	
		Ventilation Fan	1	241	108	108	6.31E+10	
		Generator, silenced	1	102	100	100	1.00E+10	
		Conveyors	4	041	90	98	4.00E+09	
							Total SWL	110
Station Construction		Crane, tower	2	049	95	98	6.32E+09	
		Crane, mobile	1	048	105	105	3.16E+10	
		Lorry	1	141	105	105	3.16E+10	
		Excavator	1	081	105	105	3.16E+10	
		Ventilation Fan	1	241	108	108	6.31E+10	
							Total SWL	112
Tunnel Box Construction	Formation	Crane, mobile	1	048	105	105	3.16E+10	
		Compressor <10m3/min	1	001	100	100	1.00E+10	
		Ventilation Fan	1	241	108	108	6.31E+10	
		Generator, silenced	1	102	100	100	1.00E+10	
		Winch (electric)	1	282	95	95	3.16E+09	
							Total SWL	111
	Concreting	Concrete Lorry Mixer	2	044	109	112	1.59E+11	
		Ventilation Fan	1	241	108	108	6.31E+10	
		Concrete Pump	1	047	105	105	3.16E+10	
							Total SWL	114
Backfilling		Excavator	1	081	105	105	3.16E+10	
		Lorry	1	141	105	105	3.16E+10	
		Road roller	1	185	108	108	6.31E+10	
							Total SWL	111
Road Reinstatement		Road roller	1	185	108	108	6.31E+10	
		Grader	1	104	113	113	2.00E+11	
		Asphalting Paver	1	004	109	109	7.94E+10	
		Lorry	1	141	105	105	3.16E+10	
							Total SWL	116

NOTE: * = Liebherr 852, 70T Hydraulic cable excavator HS 852HD. SWL by measurement on 23 Oct 1995 = 101dB(A) by EHS Consultants
 ** = Same as above ans SWL = 96dB(A)

Worksite 5A: TSTE Station (Open Cut) West							
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10*(SWL/10)
Site Preparation	Slope Works	Rock Drill, crawler mounted, hydraulic	2	182	123	126	3.99E+12
		Bored piling Rigs	2	185	110	113	2.00E+11
	Temp. Exc. Support	Bored piling Rigs (Soldier Piles)	3	185	110	115	3.00E+11
						Total SWL	127
Excavation (Drill and Blast)		Breaker, excavator mounted, hydraulic	2	028	115	118	6.32E+11
		Excavator	2	081	105	108	6.32E+10
		Lorry	1	141	105	105	3.16E+10
		Rock Drill, crawler mounted, pneumatic	3	182	123	128	5.99E+12
		Crane, mobile	2	048	105	108	6.32E+10
		Ventilation Fan	1	241	108	108	6.31E+10
		Conveyor	4	041	90	96	4.00E+09
		Crusher Plant*	1	-	110	110	1.00E+11
						Total SWL	128
Station Construction		Crane, tower	2	049	95	98	6.32E+09
		Crane, mobile	1	048	105	105	3.16E+10
		Lorry	1	141	105	105	3.16E+10
		Excavator	1	081	105	105	3.16E+10
		Ventilation Fan	1	241	108	108	6.31E+10
		Rock Drill (Crawler Mounted), Pneumatic Mini Pile	4	182	123	129	7.98E+12
					Total SWL	129	
Concreting		Concrete Pump	2	047	105	108	6.32E+10
		Crane, tower	1	049	95	95	3.16E+09
		Poker, vibratory, handheld	6	170	110	118	6.00E+11
		Concrete Lorry Mixer	2	044	109	112	1.59E+11
		Ventilation Fan	1	241	108	108	6.31E+10
					Total SWL	119	
Backfilling		Crane, tower	2	049	95	98	6.32E+09
		Excavator	1	081	105	105	3.16E+10
		Lorry	2	141	105	108	6.32E+10
		Roller, vibratory	1	186	108	108	6.31E+10
					Total SWL	112	

Compressor + Generators assumed to be centrally housed in an acoustic enclosure

NOTE: * SWL of the plant extracted from BS5228:Part 1:1997 Table C2 (Reference no. 10)

Worksite 6: Middle Road Entrances								
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ⁴ (SWL/10)	
Chemical Grouting		*SI Drill for Central	2	-	114	117	5.02E+11	
		Concrete Pump	1	047	105	105	3.16E+10	
		Water Pump (petrol)	1	282	88	88	6.31E+08	
							Total SWL	117
* Remark: measured SWL of Percussive Drilling Machine at MTRC construction site (Central Subway)								
Site Preparation		Lorry	1	141	105	105	3.16E+10	
		Compressor <10m ³ /min	1	001	100	100	1.00E+10	
		Breaker, handheld > 20<30kg	2	025	108	111	1.26E+11	
							Total SWL	112
Road Decking		Compressor <10m ³ /min	1	001	100	100	1.00E+10	
		Crane, mobile	1	048	105	105	3.16E+10	
		Pneumatic Winch (wrench)	2	261	110	113	2.00E+11	
		Ventilation Fan	1	241	108	108	6.31E+10	
							Total SWL	115
Excavation (at surface)		Lorry	1	141	105	105	3.16E+10	
		Winch (electric)	1	262	95	95	3.16E+09	
		Generator, silenced	1	102	100	100	1.00E+10	
		Ventilation Fan	1	241	108	108	6.31E+10	
							Total SWL	110
Subway Box Construction	Formation	Crane, mobile	1	048	105	105	3.16E+10	
		Compressor <10m ³ /min	1	001	100	100	1.00E+10	
		Ventilation Fan	1	241	108	108	6.31E+10	
		Winch (electric)	1	262	95	95	3.16E+09	
		Generator, silenced	1	102	100	100	1.00E+10	
							Total SWL	111
	Concreting		Concrete Lorry Mixer	1	044	109	109	7.94E+10
			Ventilation Fan	1	241	108	108	6.31E+10
			Concrete Pump	1	047	105	105	3.16E+10
								Total SWL
Backfilling		Excavator	1	081	105	105	3.16E+10	
		Lorry	1	141	105	105	3.16E+10	
		Road roller	1	185	108	108	6.31E+10	
							Total SWL	111
Road Reinstatement		Road roller	1	185	108	108	6.31E+10	
		Grader	1	104	113	113	2.00E+11	
		Asphalting Paver	1	004	109	109	7.94E+10	
		Lorry	1	141	105	105	3.16E+10	
							Total SWL	116

NOTE: * = Liebherr 852, 70T Hydraulic cable excavator HS 852HD. SWL by measurement on 23 Oct 1995 = 101dB(A) by EHS Consultants

Worksite 7: Pedestrian Link Mody Road to MTRC								
Activity	Element	PME	Units	TM Ref (GNP)	SWL	sub-SWL	10 ⁻⁴ (SWL/10)	
Site Preparation		Lorry	2	141	105	108	6.32E+10	
		Compressor <10m3/min	1	001	100	100	1.00E+10	
		Brasker, handheld >20<35kg	2	025	108	111	1.26E+11	
						Total SWL	113	
Bored Piling	Excavation	Piling, oscillator	1	185	115	115	3.16E+11	
		Generator, silenced	1	102	100	100	1.00E+10	
		Pump, petrol	1	282	88	88	6.31E+08	
							Total SWL	115
	Concreting	Mobile Crane	1	048	105	105	3.16E+10	
		Concrete Lorry Mixer	2	044	109	112	1.59E+11	
Poker Vibratory, hand-held		2	170	110	113	2.00E+11		
						Total SWL	116	
Road Decking		Compressor <10m3/min	1	001	100	100	1.00E+10	
		Crane, mobile	1	048	105	105	3.16E+10	
		Pneumatic Winch (wrench)	2	261	110	113	2.00E+11	
		Ventilation Fan	1	241	108	108	6.31E+10	
								Total SWL
Excavation (at surface)		Lorry	1	141	105	105	3.16E+10	
		Ventilation Fan	1	241	108	108	6.31E+10	
						Total SWL	110	
Subway Box Construction	Formation	Crane, mobile	1	048	105	105	3.16E+10	
		Generator, silenced	1	102	100	100	1.00E+10	
		Winch, electric	1	262	95	95	3.16E+09	
		Compressor <10m3/min	1	001	100	100	1.00E+10	
		Ventilation Fan	1	241	108	108	6.31E+10	
							Total SWL	111
	Concreting	Concrete Lorry Mixer	2	044	109	112	1.59E+11	
		Ventilation Fan	1	241	108	108	6.31E+10	
		Generator, silenced	1	102	100	100	1.00E+10	
		Concrete Pump	1	047	105	105	3.16E+10	
						Total SWL	114	
Backfilling		Excavator	1	081	105	105	3.16E+10	
		Lorry	1	141	105	105	3.16E+10	
		Road roller	1	185	108	108	6.31E+10	
						Total SWL	111	
Road Reinstatement		Road roller	1	185	108	108	6.31E+10	
		Grader	1	104	113	113	2.00E+11	
		Asphalting Paver	1	004	109	109	7.94E+10	
		Lorry	1	141	105	105	3.16E+10	
								Total SWL

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Mitigation 3 - Using Absolute Minimum Quantity of Plant, Quiet Plants and Barriers

Worksite 1: Advance Works							
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ⁴ (SWL/10)
Cooling Mains Diversion	Site Preparation	Compressor <10m ³ /min	2	001	90	93	2.00E+09
		Breaker, hand held >20<35kg	4	026	103	109	7.98E+10
							Total SWL
	Trench Support	Sheetpiling, vibratory (install)	1	TS 300 (West Rail)	118	118	6.31E+11
							Total SWL
	Excavation	Excavator	1	081	100	100	1.00E+10
		Lorry	1	141	105	105	3.16E+10
		Compressor <10m ³ /min	1	001	90	90	1.00E+09
		Water pump, petrol	1	282	78	78	6.31E+07
							Total SWL
	Reinstatement	Excavator	1	081	100	100	1.00E+10
		Lorry	1	141	105	105	3.16E+10
							Total SWL

Worksite 2: HH Reprovisioning works							
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ⁴ (SWL/10)
Site Preparation	Site Preparation	Breaker, excavator mounted, hydraulic	1	028	110	110	1.00E+11
							Total SWL
	Regreeding/ Formation	Excavator	1	081	100	100	1.00E+10
Lorry		1	141	105	105	3.16E+10	
						Total SWL	106
Station Construction	Crane, tower	2	049	95	98	6.32E+09	
	Crane, mobile	1	048	100	100	1.00E+10	
	Lorry	1	141	105	105	3.16E+10	
	Excavator	1	081	100	100	1.00E+10	
	Ventilation Fan	1	241	98	98	6.31E+09	
						Total SWL	108
Concreting	Concrete Pump	2	047	95	98	6.32E+09	
	Crane, tower	1	049	95	95	3.16E+09	
	Poker, vibratory, handheld	6	170	105	113	1.90E+11	
	Concrete Lorry Mixer	2	044	109	112	1.59E+11	
	Ventilation Fan	1	241	98	98	6.31E+09	
						Total SWL	116
Demolition	Removal	Excavator	1	081	100	100	1.00E+10
		Lorry	1	141	105	105	3.16E+10
						Total SWL	106

Worksite 3: IMC Enabling Works								
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ⁴ (SWL/10)	
Demolition	Removal	Excavator	1	081	100	100	1.00E+10	
		Lorry	1	141	105	105	3.16E+10	
		Total SWL					108	
Marine Piling		Piling, large diameter bored, grab and chisel	1	164	115	115	3.16E+11	
		Generator, silenced	1	102	90	90	1.00E+09	
		Lorry	1	141	105	105	3.16E+10	
		Total SWL					115	
RC Beam Installation		Crane, mobile	2	048	100	103	2.00E+10	
		Lorry	1	141	105	105	3.16E+10	
		Total SWL					107	
Deck Construction		Poker, vibratory, handheld	4	170	105	111	1.26E+11	
		Concrete Lorry Mixer	2	044	109	112	1.59E+11	
		Concrete Pump	2	047	95	98	6.32E+09	
		Total SWL					115	
Road Regrading	Site Preparation	Breaker, excavator mounted, hydraulic	1	028	110	110	1.00E+11	
		Total SWL					110	
	Excavation		Excavator	1	081	100	100	1.00E+10
			Lorry	2	141	105	108	6.32E+10
			Compressor <10m3/min	1	001	90	90	1.00E+09
			Breaker, hand-held >10<20kg	2	024	103	108	3.99E+10
			Total SWL					111
	Reinstatement		Road roller	1	185	108	108	6.31E+10
			Grader	1	104	113	113	2.00E+11
			Lorry	1	141	105	105	3.16E+10
	Total SWL					115		
	Resurfacing		Asphalting Paver	1	004	109	109	7.94E+10
Lorry			2	141	105	108	6.32E+10	
Road roller			1	185	108	108	6.31E+10	
Total SWL					113			

Worksite 4: HH to CHT (at grade)							
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ⁴ (SWL/10)
Site Preparation	Site Preparation	Breaker, excavator mounted, hydraulic	1	028	110	110	1.00E+11
		Lorry	1	141	105	105	3.16E+10
		Compressor <10m3/min	1	001	90	90	1.00E+09
		Breaker, hand-held >20<35kg	2	024	105	108	6.32E+10
		Total SWL					113
Site Regrading		Excavator	2	081	100	103	2.00E+10
		Lorry	1	141	105	105	3.16E+10
		Compressor <10m3/min	1	001	90	90	1.00E+09
		Breaker, hand-held >10<20kg	1	024	105	105	3.16E+10
Total SWL					109		
Tunnel Box Construction		Crane, mobile	2	048	100	103	2.00E+10
		Generator, silenced	3	102	90	95	3.00E+09
		Compressor <10m3/min	2	001	90	93	2.00E+09
		Lorry	1	141	105	105	3.16E+10
		Total SWL					108
Concreting		Poker, vibratory, handheld	4	170	105	111	1.26E+11
		Crane, mobile	1	048	100	100	1.00E+10
		Concrete Pump	1	047	95	95	3.16E+09
		Concrete Lorry Mixer	1	044	109	109	7.94E+10
		Total SWL					113

Mitigation 3

Worksite 5: TSTE Station (Open Cut) East								
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ⁴ (SWL/10)	
Chemical Grouting		*SI Drill for Central	2	-	114	117	5.02E+11	
		Concrete Pump	1	047	85	85	3.16E+09	
		Water Pump (petrol)	1	282	78	78	6.31E+07	
							Total SWL	117
* Remark: measured SWL of Percussive Drilling Machine at MTRC construction site (Central Subway)								
Site Preparation		Compressor <10m3/min	1	001	90	90	1.00E+09	
		Breaker, hand-held >20<35kg	2	025	103	106	3.99E+10	
		Lorry	1	141	105	105	3.16E+10	
							Total SWL	109
Sheet Piling	Oscillating		1	165	115	115	3.16E+11	
							Total SWL	115
Diaphragm Walling	Walling	Excavation Rig*	2	-	98	99	7.96E+09	
		Lorry	1	141	105	105	3.16E+10	
		Pump, petrol	1	282	78	78	6.31E+07	
							Total SWL	106
	Concreting	Concrete Lorry Mixer	1	044	109	109	7.94E+10	
		Crane, mobile**	1	-	93	93	2.00E+09	
						Total SWL	109	
Breaking	Breaker, excavated mounted, hydraulic	1	028	110	110	1.00E+11		
						Total SWL	110	
Road Decking		Compressor <10m3/min	1	001	100	100	1.00E+10	
		Crane, mobile	1	048	100	100	1.00E+10	
		Pneumatic Winch (wrench)	2	261	100	103	2.00E+10	
		Ventilation Fan	1	241	108	108	6.31E+10	
							Total SWL	110
Excavation (at surface)		Lorry	1	141	105	105	3.16E+10	
		Winch (electric)	1	262	85	95	3.16E+09	
		Ventilation Fan	1	241	108	108	6.31E+10	
		Generator, silenced	1	102	98	98	6.31E+09	
		Conveyors	4	041	90	96	4.00E+09	
							Total SWL	110
Station Construction		Crane, tower	2	049	95	98	6.32E+09	
		Crane, mobile	1	048	100	100	1.00E+10	
		Lorry	1	141	105	105	3.16E+10	
		Excavator	1	081	100	100	1.00E+10	
		Ventilation Fan	1	241	98	98	6.31E+09	
							Total SWL	108
Tunnel Box Construction	Formation	Crane, mobile	1	048	100	100	1.00E+10	
		Compressor <10m3/min	1	001	90	90	1.00E+09	
		Ventilation Fan	1	241	98	98	6.31E+09	
		Generator, silenced	1	102	90	90	1.00E+09	
		Winch (electric)	1	262	85	85	3.16E+08	
							Total SWL	103
	Concreting	Concrete Lorry Mixer	2	044	109	112	1.59E+11	
		Ventilation Fan	1	241	98	98	6.31E+09	
		Concrete Pump	1	047	85	85	3.16E+09	
							Total SWL	112
Backfilling		Excavator	1	081	100	100	1.00E+10	
		Lorry	1	141	105	105	3.16E+10	
		Road roller	1	185	108	108	6.31E+10	
							Total SWL	110
Road Reinstatement		Road roller	1	185	108	108	6.31E+10	
		Grader	1	104	113	113	2.00E+11	
		Asphalting Paver	1	004	109	109	7.94E+10	
		Lorry	1	141	105	105	3.16E+10	
							Total SWL	118

NOTE: * = Liebherr 852, 70T Hydraulic cable excavator HS 852HD. SWL by measurement on 23 Oct 1995 = 101dB(A) by EHS Consultants
 ** = Same as above ans SWL = 96dB(A)

Worksite 5A: TSTE Station (Open Cut) West							
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ⁴ (SWL/10)
Site Preparation	Slope Works	Rock Drill, crawler mounted, hydraulic	2	182	123	128	3.99E+12
		Bored piling Rigs	2	165	105	108	6.32E+10
	Temp. Exc. Support	Bored piling Rigs (Soldier Piles)	3	165	105	110	9.49E+10
		Total SWL					128
Excavation (Drill and Blast)		Breaker, excavator mounted, hydraulic	2	028	110	113	2.00E+11
		Excavator	2	081	100	103	2.00E+10
		Lorry	1	141	105	105	3.16E+10
		Rock Drill, crawler mounted, pneumatic	3	182	123	128	5.99E+12
		Crane, mobile	2	048	100	103	2.00E+10
		Ventilation Fan	1	241	98	98	6.31E+09
		Conveyor	4	041	90	98	4.00E+09
		Crusher Plant*	1	-	110	110	1.00E+11
		Total SWL					128
Station Construction		Crane, tower	2	049	95	98	6.32E+09
		Crane, mobile	1	048	100	100	1.00E+10
		Lorry	1	141	105	105	3.16E+10
		Excavator	1	081	100	100	1.00E+10
		Ventilation Fan	1	241	98	98	6.31E+09
		Rock Drill (Crawler Mounted), Pneumatic Mini Pile	4	182	123	129	7.98E+12
Total SWL					129		
Concreting		Concrete Pump	2	047	95	98	6.32E+09
		Crane, tower	1	049	95	95	3.16E+09
		Poker, vibratory, handheld	6	170	105	113	1.90E+11
		Concrete Lorry Mixer	2	044	109	112	1.59E+11
		Ventilation Fan	1	241	98	98	6.31E+09
Total SWL					116		
Backfilling		Crane, tower	2	049	95	98	6.32E+09
		Excavator	1	081	100	100	1.00E+10
		Lorry	2	141	105	108	6.32E+10
		Roller, vibratory	1	188	108	108	6.31E+10
Total SWL					112		

Compressor + Generators assumed to be centrally housed in an acoustic enclosure

NOTE: * SWL of the plant extracted from BS5228:Part 1:1997 Table C2 (Reference no. 10)

Worksite 6: Middle Road Entrances							
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ⁶ (SWL/10)
Chemical Grouting		*SI Drill for Central	2	-	114	117	5.02E+11
		Concrete Pump	1	047	95	95	3.16E+09
		Water Pump (petrol)	1	282	78	78	6.31E+07
							Total SWL
* Remark: measured SWL of Percussive Drilling Machine at MTRC construction site (Central Subway)							
Site Preparation		Lorry	1	141	105	105	3.16E+10
		Compressor <10m3/min	1	001	90	90	1.00E+09
		Breaker, handheld > 20<30kg	2	025	103	106	3.99E+10
							Total SWL
Roac Decking		Compressor <10m3/min	1	001	90	90	1.00E+09
		Crane, mobile	1	048	100	100	1.00E+10
		Pneumatic Winch (wrench)	2	261	100	103	2.00E+10
		Ventilation Fan	1	241	98	98	6.31E+09
							Total SWL
Excavation (at surface)		Lorry	1	141	105	105	3.16E+10
		Winch (electric)	1	262	85	85	3.16E+08
		Generator, silenced	1	102	90	90	1.00E+09
		Ventilation Fan	1	241	98	98	6.31E+09
							Total SWL
Subway Box Construction	Formation	Crane, mobile	1	048	100	100	1.00E+10
		Compressor <10m3/min	1	001	90	90	1.00E+09
		Ventilation Fan	1	241	98	98	6.31E+09
		Winch (electnc)	1	262	85	85	3.16E+08
		Generator, silenced	1	102	90	90	1.00E+09
							Total SWL
	Concreting	Concrete Lorry Mixer	1	044	109	109	7.94E+10
		Ventilation Fan	1	241	98	98	6.31E+09
		Concrete Pump	1	047	95	95	3.16E+09
							Total SWL
Backfilling		Excavator	1	081	100	100	1.00E+10
		Lorry	1	141	105	105	3.16E+10
		Road roller	1	185	108	108	6.31E+10
					Total SWL	110	
Road Reinstatement		Road roller	1	185	108	108	6.31E+10
		Grader	1	104	113	113	2.00E+11
		Asphalting Paver	1	004	109	109	7.94E+10
		Lorry	1	141	105	105	3.16E+10
					Total SWL	116	

NOTE: * = Liebherr 852, 70T Hydraulic cable excavator HS 852HD. SWL by measurement on 23 Oct 1995 = 101dB(A) by EHS Consultants

Worksite 7: Pedestrian Link Mody Road to MTRC							
Activity	Element	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ⁶ (SWL/10)
Site Preparation		Lorry	2	141	105	108	6.32E+10
		Compressor <10m3/min	1	001	90	90	1.00E+09
		Breaker, handheld >20<35kg	2	025	103	108	3.99E+10
							Total SWL
Bored Piling	Excavation	Piling, oscillator	1	165	105	105	3.16E+10
		Generator, silenced	1	102	90	90	1.00E+09
		Pump, petrol	1	282	78	78	6.31E+07
							Total SWL
	Concreting	Mobile Crane	1	048	100	100	1.00E+10
		Concrete Lorry Mixer	2	044	109	112	1.59E+11
		Poker Vibratory, hand-held	2	170	105	108	6.32E+10
							Total SWL
Road Decking		Compressor <10m3/min	1	001	90	90	1.00E+09
		Crane, mobile	1	048	100	100	1.00E+10
		Pneumatic Winch (wrench)	2	281	100	103	2.00E+10
		Ventilation Fan	1	241	98	98	6.31E+09
							Total SWL
Excavation (at surface)		Lorry	1	141	105	105	3.16E+10
		Ventilation Fan	1	241	98	98	6.31E+09
							Total SWL
Subway Box Construction	Formation	Crane, mobile	1	048	100	100	1.00E+10
		Generator, silenced	1	102	90	90	1.00E+09
		Winch, electric	1	262	85	85	3.16E+08
		Compressor <10m3/min	1	001	90	90	1.00E+09
		Ventilation Fan	1	241	98	98	6.31E+09
						Total SWL	103
	Concreting	Concrete Lorry Mixer	2	044	109	112	1.59E+11
		Ventilation Fan	1	241	98	98	6.31E+09
		Generator, silenced	1	102	90	90	1.00E+09
		Concrete Pump	1	047	100	100	1.00E+10
						Total SWL	112
Backfilling		Excavator	1	081	100	100	1.00E+10
		Lorry	1	141	105	105	3.16E+10
		Road roller	1	185	108	108	6.31E+10
							Total SWL
Road Reinstatement		Road roller	1	185	108	108	6.31E+10
		Grader	1	104	113	113	2.00E+11
		Asphalting Paver	1	004	109	109	7.94E+10
		Lorry	1	141	105	105	3.16E+10
							Total SWL

C1753 - TST KCR Extension Construction Noise Calculations

Mitigation 4 - Using Alternative Construction Method & Construction Management
For Worksites 7 & 6

Worksite 7: Pedestrian Link Mody Road to MTRC (For Worksite 7A)								
Activity	PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ² (SWL/10)	SWL	
Site Preparation	a	Crane Lorry ^[1]	1	-	104	104	2.51E+10	(1) a+d = 105
	b	Concrete Saw (electric) ^[2]	1	-	102	102	1.58E+10	(2) b = 102
	c	Breaker, Handheld (electric)	2	024	98	101	1.26E+10	(3) c = 101
	d	Mini-excavator ^[3]	1	-	97	97	5.01E+09	(4) e+f = 100
	e	Concrete Lorry Mixer	1	044	99	99	7.94E+09	
	f	Vibrating Poker ^[4]	2	-	92	95	3.17E+08	
Case: (1) a+d (2) b (3) c (4) e+f				Max SWL = 105 (Case (1))				
Pipe Pile Wall	a	Crawler Rig w/ leaders ^[5]	3	-	93	98	5.99E+09	(1) a+b+c = 103
	b	Immersed hammer/drill ^[6]	3	-	95	100	9.49E+09	(2) d = 0
	c	Crane	1	049	95	95	3.16E+09	(3) e+f = 105
	d	Crane Lorry ^[1]	0	-	104	0	1.00E+00	(4) g+h = 100
	e	Mini-excavator ^[3]	1	-	97	97	5.01E+09	(5) j+k = 101
	f	Lorry ^[1]	1	-	104	104	2.51E+10	
	g	Concrete Lorry Mixer	1	044	99	99	7.94E+09	
	h	Vibrating Poker ^[4]	2	-	92	95	3.17E+08	
	j	Site investigation Drilling ^[7]	2	-	98	101	1.26E+10	
	k	Grout mixer/ pump	2	045	81	84	2.52E+08	
	Case: (1) a+b+c (2) d (3) e+f (4) g+h (5) j+k				Max SWL = 105 (Case (3))			
Traffic Deck & Utility Support	a	Concrete Saw (electric) ^[2]	2	-	102	105	3.17E+10	(1) a = 105
	b	Breaker, Handheld (electric)	2	024	98	101	1.26E+10	(2) b+c = 104
	c	Mini-excavator ^[3]	2	-	97	100	1.00E+10	(3) d+e = 105
	d	Crane	1	049	95	95	3.16E+09	
	e	Lorry ^[1]	1	-	104	104	2.51E+10	
Case: (1) a (2) b+c (3) d+e				Max SWL = 105 (Case (1) or (3))				
Excavation & Shoring (Under Deck)	a	Excavator	1	081	97	97	5.01E+09	(1) a+b+c+e+f = 101
	b	Conveyor System (electric)	1	041	75	75	3.16E+07	(2) a+c+d+e+f = 102
	c	Hoist (electric)	1	122	80	80	1.00E+08	(3) a+b+c+d+e+f = 102
	d	Tunnel Loco & Skips (electric) ^[8]	1	-	95	95	3.16E+09	
	e	Breaker, Handheld (electric)	3	024	93	98	5.99E+08	
	f	Ventilation Equipment (electric)	2	241	83	86	3.99E+08	
Case: (1) a+b+c+e+f (2) a+c+d+e+f (3) a+b+c+d+e+f				Max SWL = 102 (Case (2) or (3))				
Subway Construction (Under Deck)	a	Hoist (electric)	1	122	80	80	1.00E+08	(1) a+b = 95
	b	Tunnel Loco & Skips (electric) ^[8]	1	-	95	95	3.16E+09	(2) a+b+e = 96
	c	Concrete Lorry Mixer	3	044	94	99	7.54E+09	(3) c+d+e = 100
	d	Vibrating Poker ^[4]	4	-	87	93	2.00E+09	(4) a+b+c+d+e = 101
	e	Ventilation Equipment (electric)	2	241	83	86	3.99E+08	
Case: (1) a+b (2) a+b+e (3) c+d+e (4) a+b+c+d+e				Max SWL = 101 (Case (4))				
Backfilling	a	Lorry ^[1]	1	-	104	104	2.51E+10	(1) a+b+d = 105
	b	Mini-excavator ^[3]	1	-	97	97	5.01E+09	(2) c = 99
	c	Concrete Lorry Mixer	1	044	99	99	7.94E+09	
	d	Roller, Manual (diesel) ^[9]	1	-	96	96	3.98E+09	
Case: (1) a+b+d (2) c				Max SWL = 105 (Case (1))				
Road Reconstruction	a	Crane Lorry ^[1]	1	-	104	104	2.51E+10	(1) a = 104
	b	Mini-excavator ^[3]	1	-	97	97	5.01E+09	(2) b = 97
	c	Concrete Lorry Mixer	1	044	99	99	7.94E+09	(3) c+d = 104
	d	Vibrating Tamper ^[10]	1	-	102	102	1.58E+10	
Case: (1) a (2) b (3) c+d				Max SWL = 104 (Case (1) or (3))				

NOTE:

- [1] SWL of the plant extracted from BSS228:Part 1:1987 Table C3 (Reference no. 82)
- [2] SWL of the plant extracted from BSS228:Part 1:1987 Table C3 (Reference no. 108)
- [3] SWL of the plant extracted from BSS228:Part 1:1987 Table C3 (Reference no. 20)
- [4] SWL of the plant extracted from BSS228:Part 1:1987 Table C4 (Reference no. 44)
- [5] SWL of the plant extracted from BSS228:Part 1:1987 Table C4 (Reference no. 11)
- [6] SWL of the plant extracted from BSS228:Part 1:1987 Table C8 (Reference no. 52)
- [7] SWL of the plant extracted from BSS228:Part 1:1987 Table C8 (Reference no. 53)
- [8] SWL of the plant extracted from BSS228:Part 1:1987 Table C8 (Reference no. 25)
- [9] SWL of the plant extracted from BSS228:Part 1:1987 Table C3 (Reference no. 115)
- [10] SWL of the plant by measurement = 110dB(A) by WMA Consultants
- [11] SWL of the plant by measurement = 75dB(A) by WMA Consultants
- [12] SWL of the plant with model no. Kobelco 7080 Crawler crane

C1753 - TST KCR Extension Construction Noise Calculations

Mitigation 4 - Using Alternative Construction Method & Construction Management For Worksites 7 & 6

Worksite 7: Pedestrian Link Mody Road to MTRC (For Worksite 7B to 7H, 6R, 6S & 6W)									
Activity		PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ² (SWL/10)		SWL
Site Preparation	a	Crane Lorry ^[1]	1	-	104	104	2.51E+10	(1) a+d =	105
	b	Concrete Saw (electric) ^[2]	1	-	102	102	1.58E+10	(2) b =	102
	c	Breaker, Handheld (electric)	2	024	98	101	1.26E+10	(3) c =	101
	d	Mini-excavator ^[3]	1	-	97	97	5.01E+09	(4) e+f =	100
	e	Concrete Lorry Mixer	1	044	99	99	7.94E+09		
	f	Vibrating Poker ^[4]	2	-	92	95	3.17E+09		
Case: (1) a+d (2) b (3) c (4) e+f					Max SWL = 105 (Case (1))				
Pipe Pile Wall	a	Crawler Rig w/ leaders ^[5]	4	-	93	99	7.98E+09	(1) a+b+c =	104
	b	Immersed hammer/drift ^[6]	4	-	95	101	1.26E+10	(2) d =	0
	c	Crane	1	049	95	95	3.16E+09	(3) e+f =	105
	d	Crane Lorry ^[1]	0	-	104	0	1.00E+00	(4) g+h =	100
	e	Mini-excavator ^[3]	1	-	97	97	5.01E+09	(5) j+k =	101
	f	Lorry ^[1]	1	-	104	104	2.51E+10		
	g	Concrete Lorry Mixer	1	044	99	99	7.94E+09		
	h	Vibrating Poker ^[4]	2	-	92	95	3.17E+09		
	j	Site investigation Drilling ^[7]	2	-	98	101	1.26E+10		
	k	Grout mixer/ pump	2	045	81	84	2.52E+08		
	Case: (1) a+b+c (2) d (3) e+f (4) g+h (5) j+k					Max SWL = 105 (Case (3))			
Traffic Deck & Utility Support	a	Concrete Saw (electric) ^[2]	2	-	102	105	3.17E+10	(1) a =	105
	b	Breaker, Handheld (electric)	2	024	98	101	1.26E+10	(2) b+c =	104
	c	Mini-excavator ^[3]	2	-	97	100	1.00E+10	(3) d+e =	105
	d	Crane	1	049	95	95	3.16E+09		
	e	Lorry ^[1]	1	-	104	104	2.51E+10		
Case: (1) a (2) b+c (3) d+e					Max SWL = 105 (Case (1) or (3))				
Excavation & Shoring (Under Deck)	a	Excavator	1	081	97	97	5.01E+09	(1) a+b+c+e+f =	101
	b	Conveyor System (electric)	1	041	75	75	3.16E+07	(2) a+c+d+e+f =	102
	c	Hoist (electric)	1	122	80	80	1.00E+08	(3) a+b+c+d+e+f =	102
	d	Tunnel Loco & Skips (electric) ^[8]	1	-	95	95	3.16E+09		
	e	Breaker, Handheld (electric)	3	024	93	98	5.99E+09		
	f	Ventilation Equipment (electric)	2	241	83	86	3.99E+08		
Case: (1) a+b+c+e+f (2) a+c+d+e+f (3) a+b+c+d+e+f					Max SWL = 102 (Case (2) or (3))				
Subway Construction (Under Deck)	a	Hoist (electric)	1	122	80	80	1.00E+08	(1) a+b =	95
	b	Tunnel Loco & Skips (electric) ^[8]	1	-	95	95	3.16E+09	(2) a+b+e =	96
	c	Concrete Lorry Mixer	3	044	94	99	7.54E+09	(3) c+d+e =	100
	d	Vibrating Poker ^[4]	4	-	87	93	2.00E+09	(4) a+b+c+d+e =	101
	e	Ventilation Equipment (electric)	2	241	83	86	3.99E+08		
Case: (1) a+b (2) a+b+e (3) c+d+e (4) a+b+c+d+e					Max SWL = 101 (Case (4))				
Backfilling	a	Lorry ^[1]	1	-	104	104	2.51E+10	(1) a+b+d =	105
	b	Mini-excavator ^[3]	1	-	97	97	5.01E+09	(2) c =	99
	c	Concrete Lorry Mixer	1	044	99	99	7.94E+09		
	d	Roller, Manual (diesel) ^[9]	1	-	96	96	3.98E+09		
Case: (1) a+b+d (2) c					Max SWL = 105 (Case (1))				
Road Reconstruction	a	Crane Lorry ^[1]	1	-	104	104	2.51E+10	(1) a =	104
	b	Mini-excavator ^[3]	1	-	97	97	5.01E+09	(2) b =	97
	c	Concrete Lorry Mixer	1	044	99	99	7.94E+09	(3) c+d =	104
	d	Vibrating Tamper ^[10]	1	-	102	102	1.58E+10		
Case: (1) a (2) b (3) c+d					Max SWL = 104 (Case (1) or (3))				

NOTE:

[1] SWL of the plant extracted from BSS228:Part 1:1987 Table C3 (Reference no. 92)
 [2] SWL of the plant extracted from BSS228:Part 1:1987 Table C3 (Reference no. 108)
 [3] SWL of the plant extracted from BSS228:Part 1:1987 Table C5 (Reference no. 20)
 [4] SWL of the plant extracted from BSS228:Part 1:1987 Table C4 (Reference no. 44)
 [5] SWL of the plant extracted from BSS228:Part 1:1987 Table C4 (Reference no. 11)
 [6] SWL of the plant extracted from BSS228:Part 1:1987 Table C6 (Reference no. 52)

[7] SWL of the plant extracted from BSS228:Part 1:1987 Table C6 (Reference no. 53)
 [8] SWL of the plant extracted from BSS228:Part 1:1987 Table C6 (Reference no. 25)
 [9] SWL of the plant extracted from BSS228:Part 1:1987 Table C3 (Reference no. 115)
 [10] SWL of the plant by measurement = 110dB(A) by WMA Consultants
 [11] SWL of the plant by measurement = 75dB(A) by WMA Consultants
 [12] SWL of the plant with model no. Kabelec 7080 Crawler crane

C1753 - TST KCR Extension Construction Noise Calculations

Mitigation 4 - Using Alternative Construction Method & Construction Management For Worksites 7 & 6

Worksite 7: Pedestrian Link Mody Road to MTRC (For Worksite 7J, 7M and 6U)									
Activity		PME	Units	TM Ref (CNP)	SWL	sub-SWL	10*(SWL/10)		SWL
Site Preparation	a	Crane Lorry ^[1]	1	-	104	104	2.51E+10	(1) a+d =	105
	b	Concrete Saw (electric) ^[2]	1	-	102	102	1.58E+10	(2) b =	102
	c	Breaker, Handheld (electric)	2	024	98	101	1.26E+10	(3) c =	101
	d	Mini-excavator ^[3]	1	-	97	97	5.01E+09	(4) e+f =	100
	e	Concrete Lorry Mixer	1	044	99	99	7.94E+09		
	f	Vibrating Poker ^[4]	2	-	92	95	3.17E+09		
Case: (1) a+d (2) b (3) c (4) e+f								Max SWL = 105 (Case (1))	
Pipe Pile Wall	a	Crawler Rig w/ leaders ^[5]	2	-	93	96	3.89E+09	(1) a+b+c =	100
	b	Immersed hammer/dril ^[6]	2	-	95	98	6.32E+09	(2) d =	104
	c	Crane	0	049	95	0	1.00E+00	(3) e+f =	105
	d	Crane Lorry ^[1]	1	-	104	104	2.51E+10	(4) g+h =	100
	e	Mini-excavator ^[3]	1	-	97	97	5.01E+09	(5) j+k =	98
	f	Lorry ^[1]	1	-	104	104	2.51E+10		
	g	Concrete Lorry Mixer	1	044	99	99	7.94E+09		
	h	Vibrating Poker ^[4]	2	-	92	95	3.17E+09		
	j	Site investigation Drilling ^[10]	1	-	98	98	6.31E+09		
	k	Grout mixer/pump	1	045	81	81	1.26E+08		
	Case: (1) a+b+c (2) d (3) e+f (4) g+h (5) j+k								Max SWL = 105 (Case (3))
Traffic Deck & Utility Support	a	Concrete Saw (electric) ^[2]	1	-	102	102	1.58E+10	(1) a =	102
	b	Breaker, Handheld (electric)	1	024	98	98	6.31E+09	(2) b+c =	102
	c	Mini-excavator ^[3]	2	-	97	100	1.00E+10	(3) d+e =	105
	d	Crane	1	049	95	95	3.16E+09		
	e	Lorry ^[1]	1	-	104	104	2.51E+10		
Case: (1) a (2) b+c (3) d+e								Max SWL = 105 (Case (3))	
Excavation & Shoring (Under Deck)	a	Excavator	1	081	97	97	5.01E+09	(1) a+b+c+e+f =	101
	b	Conveyor System (electric)	1	041	75	75	3.16E+07	(2) a+c+d+e+f =	102
	c	Hoist (electric)	1	122	80	80	1.00E+08	(3) a+b+c+d+e+f =	102
	d	Tunnel Loco & Skips (electric) ^[10]	1	-	95	95	3.16E+09		
	e	Breaker, Handheld (electric)	3	024	93	98	5.99E+09		
	f	Ventilation Equipment (electric)	2	241	83	86	3.99E+08		
Case: (1) a+b+c+e+f (2) a+c+d+e+f (3) a+b+c+d+e+f								Max SWL = 102 (Case (2) or (3))	
Subway Construction (Under Deck)	a	Hoist (electric)	1	122	80	80	1.00E+08	(1) a+b =	95
	b	Tunnel Loco & Skips (electric) ^[10]	1	-	95	95	3.16E+09	(2) a+b+e =	96
	c	Concrete Lorry Mixer	3	044	94	99	7.54E+09	(3) c+d+e =	100
	d	Vibrating Poker ^[4]	4	-	87	93	2.00E+09	(4) a+b+c+d+e =	101
	e	Ventilation Equipment (electric)	2	241	83	86	3.99E+08		
Case: (1) a+b (2) a+b+e (3) c+d+e (4) a+b+c+d+e								Max SWL = 101 (Case (4))	
Backfilling	a	Lorry ^[1]	1	-	104	104	2.51E+10	(1) a+b+d =	105
	b	Mini-excavator ^[3]	1	-	97	97	5.01E+09	(2) c =	99
	c	Concrete Lorry Mixer	1	044	99	99	7.94E+09		
	d	Roller, Manual (diesel) ^[11]	1	-	96	96	3.98E+09		
Case: (1) a+b+d (2) c								Max SWL = 105 (Case (1))	
Road Reconstruction	a	Crane Lorry ^[1]	1	-	104	104	2.51E+10	(1) a =	104
	b	Mini-excavator ^[3]	1	-	97	97	5.01E+09	(2) b =	97
	c	Concrete Lorry Mixer	1	044	99	99	7.94E+09	(3) c+d =	104
	d	Vibrating Tamper ^[12]	1	-	102	102	1.58E+10		
Case: (1) a (2) b (3) c+d								Max SWL = 104 (Case (1) or (3))	

NOTE:

[1] SWL of the plant extracted from BSS228:Part 1:1997 Table C3 (Reference no. 82)
 [2] SWL of the plant extracted from BSS228:Part 1:1997 Table C3 (Reference no. 108)
 [3] SWL of the plant extracted from BSS228:Part 1:1997 Table C5 (Reference no. 20)
 [4] SWL of the plant extracted from BSS228:Part 1:1997 Table C4 (Reference no. 44)
 [5] SWL of the plant extracted from BSS228:Part 1:1997 Table C4 (Reference no. 11)
 [6] SWL of the plant extracted from BSS228:Part 1:1997 Table C4 (Reference no. 11)
 [7] SWL of the plant extracted from BSS228:Part 1:1997 Table C6 (Reference no. 52)

[7] SWL of the plant extracted from BSS228:Part 1:1997 Table C6 (Reference no. 53)
 [8] SWL of the plant extracted from BSS228:Part 1:1997 Table C6 (Reference no. 25)
 [9] SWL of the plant extracted from BSS228:Part 1:1997 Table C3 (Reference no. 115)
 [10] SWL of the plant by measurement = 110dB(A) by WMA Consultants
 [11] SWL of the plant by measurement = 75dB(A) by WMA Consultants
 [12] SWL of the plant with model no. Kobelco 7080 Crawler crane

C1753 - TST KCR Extension Construction Noise Calculations

Mitigation 4 - Using Alternative Construction Method & Construction Management For Worksites 7 & 6

Worksite 7: Pedestrian Link Mody Road to MTRC (For Worksite 7K, 7L, 7P, 6T & 6V)									SWL
Activity		PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ³ (SWL/10)		
Site Preparation	a	Crane Lorry ^[1]	1	-	104	104	2.51E+10	(1) a+d =	105
	b	Concrete Saw (electric) ^[2]	1	-	102	102	1.58E+10	(2) b =	102
	c	Breaker, Handheld (electric)	2	024	98	101	1.26E+10	(3) c =	101
	d	Mini-excavator ^[3]	1	-	97	97	5.01E+09	(4) e+f =	100
	e	Concrete Lorry Mixer	1	044	99	99	7.94E+09		
	f	Vibrating Poker ^[4]	2	-	92	95	3.17E+09		
Case: (1) a+d (2) b (3) c (4) e+f Max SWL = 105 (Case (1))									
Pipe Pile Wall	a	Crawler Rig w/ leaders ^[4]	2	-	93	96	3.99E+09	(1) a+b+c =	101
	b	Immersed hammer/drill ^[4]	2	-	95	98	6.32E+08	(2) d =	0
	c	Crane	1	049	95	95	3.16E+09	(3) e+f =	105
	d	Crane Lorry ^[1]	0	-	104	0	1.00E+00	(4) g+h =	100
	e	Mini-excavator ^[3]	1	-	97	97	5.01E+09	(5) j+k =	98
	f	Lorry ^[1]	1	-	104	104	2.51E+10		
	g	Concrete Lorry Mixer	1	044	99	99	7.94E+09		
	h	Vibrating Poker ^[4]	2	-	92	95	3.17E+09		
	j	Site Investigation Drilling ^[4]	1	-	98	98	6.31E+09		
	k	Grout mixer/ pump	1	045	81	81	1.26E+08		
	Case: (1) a+b+c (2) d (3) e+f (4) g+h (5) j+k Max SWL = 105 (Case (3))								
Traffic Deck & Utility Support	a	Concrete Saw (electric) ^[2]	1	-	102	102	1.58E+10	(1) a =	102
	b	Breaker, Handheld (electric)	1	024	98	98	6.31E+09	(2) b+c =	102
	c	Mini-excavator ^[3]	2	-	97	100	1.00E+10	(3) d+e =	105
	d	Crane	1	049	95	95	3.16E+09		
	e	Lorry ^[1]	1	-	104	104	2.51E+10		
Case: (1) a (2) b+c (3) d+e Max SWL = 105 (Case (3))									
Excavation & Shoring (Under Deck)	a	Excavator	1	081	97	97	5.01E+09	(1) a+b+c+d+e+f =	101
	b	Conveyor System (electric)	1	041	75	75	3.16E+07	(2) a+c+d+e+f =	102
	c	Hoist (electric)	1	122	80	80	1.00E+08	(3) a+b+c+d+e+f =	102
	d	Tunnel Loco & Skips (electric) ^[8]	1	-	95	95	3.16E+09		
	e	Breaker, Handheld (electric)	3	024	93	98	5.99E+09		
	f	Ventilation Equipment (electric)	2	241	83	86	3.99E+08		
Case: (1) a+b+c+d+e+f (2) a+c+d+e+f (3) a+b+c+d+e+f Max SWL = 102 (Case (2) or (3))									
Subway Construction (Under Deck)	a	Hoist (electric)	1	122	80	80	1.00E+08	(1) a+b =	95
	b	Tunnel Loco & Skips (electric) ^[8]	1	-	95	95	3.16E+09	(2) a+b+e =	96
	c	Concrete Lorry Mixer	3	044	94	99	7.54E+09	(3) c+d+e =	100
	d	Vibrating Poker ^[4]	4	-	87	93	2.00E+09	(4) a+b+c+d+e =	101
	e	Ventilation Equipment (electric)	2	241	83	86	3.99E+08		
Case: (1) a+b (2) a+b+e (3) c+d+e (4) a+b+c+d+e Max SWL = 101 (Case (4))									
Backfilling	a	Lorry ^[1]	1	-	104	104	2.51E+10	(1) a+b+d =	105
	b	Mini-excavator ^[3]	1	-	97	97	5.01E+09	(2) c =	99
	c	Concrete Lorry Mixer	1	044	99	99	7.94E+09		
	d	Roller, Manual (diesel) ^[9]	1	-	96	96	3.98E+09		
Case: (1) a+b+d (2) c Max SWL = 105 (Case (1))									
Road Reconstruction	a	Crane Lorry ^[1]	1	-	104	104	2.51E+10	(1) a =	104
	b	Mini-excavator ^[3]	1	-	97	97	5.01E+09	(2) b =	97
	c	Concrete Lorry Mixer	1	044	99	99	7.94E+09	(3) c+d =	104
	d	Vibrating Tamper ^[10]	1	-	102	102	1.58E+10		
Case: (1) a (2) b (3) c+d Max SWL = 104 (Case (1) or (3))									

NOTE:

- [1] SWL of the plant extracted from BSS228:Part 1:1987 Table C3 (Reference no. 82)
- [2] SWL of the plant extracted from BSS228:Part 1:1987 Table C3 (Reference no. 108)
- [3] SWL of the plant extracted from BSS228:Part 1:1987 Table C5 (Reference no. 20)
- [4] SWL of the plant extracted from BSS228:Part 1:1987 Table C4 (Reference no. 44)
- [5] SWL of the plant extracted from BSS228:Part 1:1987 Table C4 (Reference no. 11)
- [6] SWL of the plant extracted from BSS228:Part 1:1987 Table C3 (Reference no. 52)
- [7] SWL of the plant extracted from BSS228:Part 1:1987 Table C8 (Reference no. 53)
- [8] SWL of the plant extracted from BSS228:Part 1:1987 Table C8 (Reference no. 25)
- [9] SWL of the plant extracted from BSS228:Part 1:1987 Table C3 (Reference no. 115)
- [10] SWL of the plant by measurement = 110dB(A) by WMA Consultants
- [11] SWL of the plant by measurement = 75dB(A) by WMA Consultants
- [12] SWL of the plant with model no. Kobelco 7080 Crawler crane

C1753 - TST KCR Extension Construction Noise Calculations

**Mitigation 4 - Using Alternative Construction Method & Construction Management
For Worksites 7 & 6**

Worksite 7: Pedestrian Link Mody Road to MTRC (For Worksite 7N)									
Activity		PME	Units	TM Ref (CNP)	SWL	sub-SWL	10 ⁴ (SWL/10)		SWL
Site Preparation	a	Crane Lorry ^[1]	1	-	104	104	2.51E+10	(1) a+d =	105
	b	Concrete Saw (electric) ^[7]	1	-	102	102	1.58E+10	(2) b =	102
	c	Breaker, Handheld (electric)	2	024	98	101	1.26E+10	(3) c =	101
	d	Mini-excavator ^[8]	1	-	97	97	5.01E+09	(4) e+f =	100
	e	Concrete Lorry Mixer	1	044	99	99	7.94E+09		
	f	Vibrating Poker ^[9]	2	-	92	95	3.17E+09		
Case: (1) a+d (2) b (3) c (4) e+f Max SWL = 105 (Case 1)									
Pipe Pile Wall	a	Crawler Rig w/ leaders ^[4]	3	-	93	98	5.99E+09	(1) a+b+c =	102
	b	Immersed hammer/drift ^[8]	3	-	95	100	9.49E+09	(2) d =	104
	c	Crane	0	049	95	0	1.00E+00	(3) e+f =	105
	d	Crane Lorry ^[1]	1	-	104	104	2.51E+10	(4) g+h =	100
	e	Mini-excavator ^[8]	1	-	97	97	5.01E+09	(5) j+k =	98
	f	Lorry ^[1]	1	-	104	104	2.51E+10		
	g	Concrete Lorry Mixer	1	044	99	99	7.94E+09		
	h	Vibrating Poker ^[9]	2	-	92	95	3.17E+09		
	j	Site investigation Drilling ^[10]	1	-	98	98	6.31E+09		
	k	Grout mixer/ pump	1	045	81	81	1.26E+08		
	Case: (1) a+b+c (2) d (3) e+f (4) g+h (5) j+k Max SWL = 105 (Case 3)								
Traffic Deck & Utility Support	a	Concrete Saw (electric) ^[7]	1	-	102	102	1.58E+10	(1) a =	102
	b	Breaker, Handheld (electric)	1	024	98	98	6.31E+09	(2) b+c =	102
	c	Mini-excavator ^[8]	2	-	97	100	1.00E+10	(3) d+e =	105
	d	Crane	1	049	95	95	3.16E+09		
	e	Lorry ^[1]	1	-	104	104	2.51E+10		
Case: (1) a (2) b+c (3) d+e Max SWL = 105 (Case 2)									
Excavation & Shoring (Under Deck)	a	Excavator	1	081	97	97	5.01E+09	(1) a+b+c+e+f =	101
	b	Conveyor System (electric)	1	041	75	75	3.16E+07	(2) a+c+d+e+f =	102
	c	Hoist (electric)	1	122	80	80	1.00E+08	(3) a+b+c+d+e+f =	102
	d	Tunnel Loco & Skips (electric) ^[11]	1	-	95	95	3.16E+09		
	e	Breaker, Handheld (electric)	3	024	93	98	5.99E+09		
	f	Ventilation Equipment (electric)	2	241	83	86	3.99E+08		
Case: (1) a+b+c+e+f (2) a+c+d+e+f (3) a+b+c+d+e+f Max SWL = 102 (Case 2) or (3)									
Subway Construction (Under Deck)	a	Hoist (electric)	1	122	80	80	1.00E+08	(1) a+b =	95
	b	Tunnel Loco & Skips (electric) ^[11]	1	-	95	95	3.16E+09	(2) a+b+e =	96
	c	Concrete Lorry Mixer	3	044	94	99	7.54E+09	(3) c+d+e =	100
	d	Vibrating Poker ^[9]	4	-	87	93	2.00E+09	(4) a+b+c+d+e =	101
	e	Ventilation Equipment (electric)	2	241	83	86	3.99E+08		
Case: (1) a+b (2) a+b+e (3) c+d+e (4) a+b+c+d+e Max SWL = 101 (Case 4)									
Backfilling	a	Lorry ^[1]	1	-	104	104	2.51E+10	(1) a+b+d =	105
	b	Mini-excavator ^[8]	1	-	97	97	5.01E+09	(2) c =	99
	c	Concrete Lorry Mixer	1	044	99	99	7.94E+09		
	d	Roller, Manual (diesel) ^[12]	1	-	96	96	3.98E+09		
Case: (1) a+b+d (2) c Max SWL = 105 (Case 1)									
Road Reconstruction	a	Crane Lorry ^[1]	1	-	104	104	2.51E+10	(1) a =	104
	b	Mini-excavator ^[8]	1	-	97	97	5.01E+09	(2) b =	97
	c	Concrete Lorry Mixer	1	044	99	99	7.94E+09	(3) c+d =	104
	d	Vibrating Tamper ^[10]	1	-	102	102	1.58E+10		
Case: (1) a (2) b (3) c+d Max SWL = 104 (Case 1) or (3)									

NOTE:

[1] SWL of the plant extracted from BSS228:Part 1:1987 Table C3 (Reference no. 92)
 [2] SWL of the plant extracted from BSS228:Part 1:1987 Table C3 (Reference no. 108)
 [3] SWL of the plant extracted from BSS228:Part 1:1987 Table C5 (Reference no. 20)
 [4] SWL of the plant extracted from BSS228:Part 1:1987 Table C4 (Reference no. 44)
 [5] SWL of the plant extracted from BSS228:Part 1:1987 Table C4 (Reference no. 11)
 [6] SWL of the plant extracted from BSS228:Part 1:1987 Table C6 (Reference no. 52)

[7] SWL of the plant extracted from BSS228:Part 1:1987 Table C8 (Reference no. 53)
 [8] SWL of the plant extracted from BSS228:Part 1:1987 Table C8 (Reference no. 25)
 [9] SWL of the plant extracted from BSS228:Part 1:1987 Table C3 (Reference no. 115)
 [10] SWL of the plant by measurement = 110dB(A) by WHA Consultants
 [11] SWL of the plant by measurement = 75dB(A) by WHA Consultants
 [12] SWL of the plant with model no. Kobelco 7000 Crawler crane

C1753 - TST KCR Extension Construction Noise Calculations**Mitigation 4 - Using Alternative Construction Method & Construction Management
For Worksites 7 & 6**

Worksite 7: Pedestrian Link Mody Road to MTRC (For Hoist Location)							
Activity		PME	Units	TM Ref (GNP)	SWL	sub-SWL	10 ⁴ (SWL/10)
Centralised Equipment	a	Electrical Substation ^[1]	1	-	55	55	3.16E+05
	b	Compressor (electric)	1	001	80	80	1.00E+08
	c	Ventilation Fans	3	241	58	63	1.89E+06
	d	Hoist (electric)	1	122	75	75	3.16E+07
	e	Mobile Crane (part time) ^[2]	1	-	87	87	5.01E+08
	f	Concrete Pump (part time)	1	045	76	76	3.98E+07
Case: (1) a+b+c+d					Max SWL = 88		
(2) a+b+c+e					(Case (2) or (4))		
(3) a+b+c+f							
(4) a+b+c+d+e+f							

(1) a+b+c+d = 81
(2) a+b+c+e = 88
(3) a+b+c+f = 82
(4) a+b+c+d+e+f = 88

NOTE:

[1] SWL of the plant by measurement = 75dB(A) by WHA Consultants

[2] SWL of the plant with model no. Kobelco 7060 Crawler crane