

Appendix A9.4

Demolition and Construction Assessment – Model Inputs and Assumptions

Data Sources

- OS mapping: file 'OS_MasterMap.dwg', 05/12/13.
- OSD building location, extent and height: files '00993-10-P-1000.pdf' and '00993-10-P-3304.pdf' from Steve Pearce, URS Principal Environmental Consultant, 16/12/13.
- Existing topography within the site and immediate vicinity: file '25683-001T-02A-OSG.dwg' from James Mitchell, URS GIS Consultant, 14/11/13.
- Existing topography outside the extent of the topo survey in the wider area: 2m contours purchased from emapsite.
- Construction Traffic data: e-mail from Stephen Morris, URS Senior Transport planner, 03/03/14.
- Construction activities, plant, on-times and assumed locations based on construction logistics plan (CLP) and discussions with Sam Palomo (Dragados) between February and June 2014, see Table A9.4.1. and A9.4.9.

Modelling Assumptions

- 3.6m high solid construction hoarding provided around the Whole Block and Arthur Street sites with no gaps between panels or between panels and the ground. Barrier attenuation has been calculated using octave band sound levels in accordance with *BS 5228*. This is assumed to be in place throughout the works at both sites.
- Ground absorption: hard (0.0).
- Existing building heights estimated from Google 'streetview' and site visit.
- 19 of the closest buildings selected as representative receptors at which construction noise levels are assessed. Receptor positions located up the façade of each receptor to ensure levels representative of each floor of each receptor are estimated. Assessment based on worst affected floor for each activity.
- All estimated construction noise levels are façade levels.
- All construction plant associated with each activity is assumed to be operational for the period of time defined by its given 'on-time'..
- Specific details of the location of some items of plant are provided in the CLP. The remaining plant which will move around the site has been assumed to be spread across the site, or as otherwise identified by Sam Palomo (Dragados) to ensure a reasonably realistic worst case for each receptor.
- For the first activity (demolition) at the Whole Block Site, the estimated construction noise levels relate to phase 1 of the demolition works when 20 Abchurch Lane is still in place. The remainder of the site is assumed to be open

with no shielding from buildings which remain or are partially demolished on the remainder of the site, to ensure a worst case approach.

- All plant has been assumed to be operating at ground level (source height 1.5m above ground), this is considered to be a reasonable worst case. For some activities (e.g. demolition at whole block site), plant will be operating above ground level which will reduce the mitigation provided by the site boundary hoarding. However, the hoarding only provides a significant benefit to ground floor level at the receptors, higher floors will have direct line of sight over the top of the hoarding.
- Spraying robots (x2) during 'shaft creation' at Arthur Street Site are assumed to be operating at a depth of 10m within the shaft.

Table A9.4.1: Demolition (Activity a1) Plant List – Whole Block Site

Plant	L _w Source data BS5228 Ref	L _{wA} (dB)	Activity a1 – Demolition	
			No.	%On-time / hr
Concrete Pulveriser	C.1.5	100	2	60
Crane Tower	C.4.48	104	1	30
Cutter/Drill	C.4.69	113	2	10
Compressor*	C.5.5	93	2	10
Mini Excavator (3-8 tonnes)	C.4.68	93	4	60
Breaker	C.1.6	111	2	60
Skidsteer Loading shovel (3-5t)	C.4.68	93	4	90
Scaffolding and hydraulic access platform	C.4.57	95	2	30
Tipper Lorry per hour	C.8.20	107	2	5
Wheel Wash	C.2.46	90	2	20
Skip Truck per hour	C.8.21	103	2	5
Tracked excavator	C.6.9	104	3	90

*assumed within enclosure providing noise reduction of 10dB

Table A9.4.2: CFA Piling (Activity a2) Plant List – Whole Block Site

Plant	L _w Source data BS5228 Ref	L _{wA} (dB)	Activity a2 – Piling	
			No.	%On-time / hr
Piling Rig (CFA assumed)	C.3.21	107	2	70
Concrete Truck	C.4.20	108	2	5
13Tn Excavator	C.5.11	101	1	30
10 M ³ Muck Wagon	C.8.18	106	1	5
100t Crane	C.4.41	99	1	80
13T Wheeled loader	C.2.28	104	1	30

Table A9.4.3: Excavation / Creation of Station Box (Activity a3) Plant List – Whole Block Site

Plant	L _w Source data BS5228 Ref	L _{wA} (dB)	Activity a3 – Excavation / Creation of Station Box	
			No.	%On-time / hr
Concrete Truck	C.4.20	108	3	5
Steel Delivery Truck	C.6.21	108	1	5
10 M ³ Muck Wagon	C.8.18	106	2	5
Tower Crane	C.4.48	104	1	70
20t excavator	C.2.21	99	1	40
40m boom pump	C.4.30	107	1	20
10M ³ skips	D.7.82	91	1	60
100t Crane	C.4.41	99	1	60
Dewatering Station (water pump)*	C.2.45	93	1	100
13T Wheeled loader	C.2.28	104	1	40

*assumed within enclosure providing noise reduction of 10dB

Table A9.4.4: Installation of Shell and Core of Station (Activity a4) Plant List – Whole Block Site

Plant	L _w Source data BS5228 Ref	L _{WA} (dB)	Activity a4 – Installation of Shell and Core of Station	
			No.	%On-time / hr
Concrete Truck	C.4.20	108	3	5
Steel Delivery Truck	C.6.21	108	2	5
Tower Crane	C.4.48	104	1	70
Ventilation Fan	Dragados (Zitron ZVN 1-18-200/4)	89	1	100
Telescopic handler	C.4.55	98	1	30
Transformer (switchroom)	Dragados measurement	76	1	100
Compressor*	D.3.99	106	1	15
100t Crane	C.4.41	99	1	80
Concrete Pump*	C.3.26	103	1	20

*assumed within enclosure providing noise reduction of 10dB

Table A9.4.5: Evening / Weekend / Night-time (Activity a5) Plant List – Whole Block Site

Plant	L _w Source data BS5228 Ref	L _{wA} (dB)	Activity a5 – Evening / Weekend / Night-time	
			No.	%On-time / hr
Ventilation Fan	Dragados (Zitron ZVN 1-18-200/4)	89	1	100
Transformer (switchroom)	Dragados measurement	76	1	100

Table A9.4.6: Sheet Piling (Activity a6) Plant List – Arthur Street

Plant	L _w Source data BS5228 Ref	L _{wA} (dB)	Activity a6 – Sheet Piling	
			No.	%On-time / hr
(Sheet) Piling Rig	Dragados	108	1	80
200t Crane	C.4.38	106	-	-
100t Crane	C.4.41	99	-	-
Auxiliary crane	C.4.41	99	1	80
Steel Delivery Truck (per hour – as source line)	C.6.21	108	1	100
500 kVA Generator*	C.8.24	87	1	100

*assumed within enclosure providing noise reduction of 10dB

Table A9.4.7: Shaft Creation (Activity a7) Plant List – Arthur Street.

Plant	L _w Source data BS5228 Ref	L _{wA} (dB)	Activity a7 – Shaft Creation	
			No.	%On-time / hr
Auxiliary mobile crane	C.4.41	99	1	70
Steel Delivery Truck (per hour – as source line)	C.6.21	108	1	100
500 kVA Generator*	C.8.24	87	1	5
Micropile Rig	C.3.18	104	1	30
Micropile small grouting plant	D.6.13	108	1	30
Planetary mixer*	D.6.1	92	1	30
Concrete pump*	C.3.26	103	1	30
Spraying robot	C.3.26	103	2	40
Tracked Excavator	C.2.21	99	1	50
Wheeled Excavator	C.4.10	94	1	50
10m ³ Skips	D.7.82	91	2	60
10m ³ Muck Wagons (per hour – as source line)	C.8.18	106	2	100
32Tn Gantry Crane	HS2 (ARUP measured)	100	1	80

*assumed within enclosure providing noise reduction of 10dB

Table A9.4.8: Tunnelling / Excavation (Activity a8) Plant List – Arthur Street, outside core hours

Plant	L _w Source data BS5228 Ref	L _{wA} (dB)	Activity a8 – Tunnelling / Excavation	
			No.	%On-time / hr
500 kVA Generator*	C.8.24	87	1	5
Planetary mixer*	D.6.1	92	1	80
Concrete pump*	C.3.26	103	1	80
10m3 Skips	D.7.82	91	1	60
10m3 Muck Wagons (per hour – as source line)	C.8.18	106	3	100
32Tn Gantry Crane	HS2 (ARUP measured)	100	1	60
Ventilation Fan	Dragados (Zitron ZVN 1-18-200/4)	89	1	100
Telescopic handler	C.4.55	98	1	30
Transformer (switchroom)*	Dragados measurement	76*	1	100
Compressor*	D.3.99	106	1	20
Alimack Lift System	C.4.61 (caged material hoist)	96	1	25
Dewatering station (water pump)*	C.2.45	93	1	100

*assumed within enclosure providing noise reduction of 10dB

Table A9.4.9: Tunnelling / Excavation (Activity a8) Plant List – Arthur Street, core hours

Plant	L _w Source data BS5228 Ref	L _{wA} (dB)	Activity a8 – Tunnelling / Excavation	
			No.	%On-time / hr
Auxiliary crane	C.4.41	99	1	10
Steel Delivery Truck (per hour – as source line)	C.6.21	108	2	100
Planetary mixer*	D.6.1	92	1	80
Concrete pump*	C.3.26	103	1	80
32Tn Gantry Crane	HS2 (ARUP measured)	100	1	60
Pre-mix shocrete delivery	C4.24	95	2	40
Manitou (13Tn)	C.4.55	98	1	60

*assumed within enclosure providing noise reduction of 10dB

Table A9.4.10: Installation of Gantry Crane (Activity a9) Plant List – Arthur Street.

Plant	L _w Source data BS5228 Ref	L _{wA} (dB)	Activity a9 – Installation of Gantry Crane	
			No.	%On-time / hr
200t Crane	C.4.38	106	1	80
100t Crane	C.4.41	99	1	80
Steel Delivery Truck (per hour – as source line)	C.6.21	108	1	100

Table A9.4.11: Anticipated Construction Plant for Utility Works at Arthur Street

Plant	Source data BS5228 Ref	L _{wA} (dB)	No.	%On-time / hr
Excavation				
Compressor	C.5.5	93	1	50
Hand-held pneumatic breaker	C.1.6	111	1	25
Road saw	C.4.72	107	1	3
Mini excavator	C.4.67	101	1	80
Utility Works				
Mains ejector	Dragados	103	1	5
Compressor	C.5.5	93	1	10
Generator	C.4.78	94	1	100
3 tonne excavator	C.3.20	96	1	50
Winch	C.4.61	96	1	50
Butt fusion machine	Dragados	93	1	50
Hand tools	C.4.69	113	1	40
Reinstatement				
Hand tools	C.4.69	113	1	40
Compressor	C.5.5	93	1	50
Rammer tamper	C.2.41	108	1	3
Mini excavator	C.4.67	101	1	80

Table A9.4.12: Anticipated Construction Plant at Grout Shaft Sites

Plant	Source data BS5228 Ref	L _{wA} (dB)	No.	%On-time / hr
Initial Works (One day - to break through surface and below ground concrete)				
Tracked excavator break out and load	C.6.12	102	1	100
Lorry (as line source)	C.11.5	108	1/h	-
Shaft Excavation works				
50 t crane (operating)	C.4.46	95	1	50
50 t crane (idling)	C.4.47	89	1	25
Concrete segment delivery truck (as line source)	C.6.21	108	1/h	-
Grout mixer and pump plant	D.6.13	108	1	25
Tracked excavator	C.2.21	99	1	80
Material into 2m3 skips	D.7.82	91	2	60
10m3 Muck wagons (as line source)	C.8.18	106	1/h	-
Temporary fans	Measured (Crossrail)	101	1	100
Grouting phase				
6 t drilling machine	C.4.96	105	1	80
Injection hose reel	C.3.13	91	1	80
Reinstatement 2 weeks				
Lorries (as line source)	C.11.5	108	1/h	-
Whacker plate	C.2.41	108	1	60
Concrete poker (vibrating)	C.4.34	97	1	60

Table A9.4.13: Anticipated Construction Plant at Sewer Shaft Sites

Plant	L _w Source data BS5228 Ref	L _{wA} (dB)	Activity – Shaft Creation		
			No.	DAY: %On-time / hr	NIGHT: %On-time / hr
Tracked excavator break out and load	C6.12	102	1	100	50
50 t crane (operating)	C.4.46	95	1	50	25
50 t crane (idling)	C.4.47	89	1	25	25
Concrete delivery truck (as line source)	C.6.21	108	1/h	-	-
Concrete segment delivery truck (as line source)	C.6.21	108	1/h (day only)	-	-
Diesel generator	C.8.24	87	1	100	100
Grout mixer and pump plant	D.6.13	108	1	25	25
Tracked excavator	C.2.21	99	1	80	80
Wheeled excavator	C.4.10	94	1	50	50
Material into 10m3 skips	D.7.82	91	2	60	60
10m3 Muck wagons (as line source)	C.8.18	106	1/h	-	-
Temporary fans	Measured (Crossrail)	101	1	100	100

Table A9.4.14: Predicted Demolition and Construction Noise Levels at Whole Block Site (floor 1 = ground floor)

Receptor Location	Floor	Activity a1 - Demolition	Activity a2 – CFA Piling	Activity a3 – Excavation / Creation of Station Box	Activity a4 – Installation of Shell and Core of Station	Activity a5 – Evening / weekend / night-time
		Predicted L _{Aeq,1h} dB (façade)				
R1	1	65	54	56	55	31
	2	78	65	70	68	40
	3	79	66	70	68	44
	4	79	67	71	69	45
	5	79	66	70	69	45
	6	78	66	71	69	45
R2	1	59	53	57	57	28
	2	66	59	63	63	28
	3	71	64	68	67	32
	4	73	64	68	67	32
	5	74	63	68	67	32
	6	74	63	68	67	32

Receptor Location	Floor	Activity a1 - Demolition	Activity a2 – CFA Piling	Activity a3 – Excavation / Creation of Station Box	Activity a4 – Installation of Shell and Core of Station	Activity a5 – Evening / weekend / night-time
		Predicted L _{Aeq,1h} dB (façade)				
R3	1	62	51	54	52	26
	2	67	54	59	57	26
	3	71	50	56	52	28
	4	70	51	56	52	28
	5	72	54	57	52	28
	6	71	56	57	53	29
R4	1	58	52	51	47	31
	2	67	62	58	55	37
R5	1	51	47	45	43	26
	2	51	47	45	43	26
	3	53	54	46	54	39
	4	54	55	53	54	39
	5	54	55	53	54	39

Receptor Location	Floor	Activity a1 - Demolition	Activity a2 – CFA Piling	Activity a3 – Excavation / Creation of Station Box	Activity a4 – Installation of Shell and Core of Station	Activity a5 – Evening / weekend / night-time
		Predicted L _{Aeq,1h} dB (façade)				
	6	55	55	53	54	39
R6	1	65	64	61	58	41
	2	77	76	71	69	54
	3	79	77	72	69	54
	4	78	77	72	69	53
R7	1	64	63	60	57	40
	2	77	76	72	69	53
	3	78	76	72	69	52
	4	77	76	72	69	52
	5	77	76	72	69	52
	6	76	75	72	69	53
R8	1	66	64	61	61	44
	2	73	69	66	65	50

Receptor Location	Floor	Activity a1 - Demolition	Activity a2 – CFA Piling	Activity a3 – Excavation / Creation of Station Box	Activity a4 – Installation of Shell and Core of Station	Activity a5 – Evening / weekend / night-time
		Predicted L _{Aeq,1h} dB (façade)				
	3	76	72	70	68	53
	4	77	73	70	69	54
	5	77	74	70	69	54
	6	77	74	69	69	54
	7	77	74	69	69	53
	8	76	74	69	69	53
R9	1	69	65	63	64	46
	2	80	74	75	73	55
	3	83	76	77	76	58
	4	82	76	76	76	58
	5	81	76	76	75	57
	6	81	76	75	74	57
	7	80	75	75	74	56

Receptor Location	Floor	Activity a1 - Demolition	Activity a2 – CFA Piling	Activity a3 – Excavation / Creation of Station Box	Activity a4 – Installation of Shell and Core of Station	Activity a5 – Evening / weekend / night-time
		Predicted L _{Aeq,1h} dB (façade)				
	8	79	75	74	73	55
R10	1	65	57	60	59	40
	2	71	63	65	63	46
	3	76	69	70	68	51
	4	78	69	72	70	50
	5	78	69	71	70	51
	6	78	69	71	70	51
	7	78	69	71	69	51

Table A9.4.15: Predicted Construction Noise Levels at Arthur Street Site.

Receptor Location	Floor	Activity a6 – Sheet Piling	Activity a7 – Shaft Creation	Activity a8 – Tunnelling/Excavation (outside core hours)	Activity a8 – Tunnelling/Excavation (core hours)	Activity a9 – Installation of Gantry Crane
		Predicted $L_{Aeq,1h}$ dB (façade)				
R11	1	44	44	38	38	42
	2	44	44	38	38	42
	3	44	44	38	38	42
	4	44	44	38	39	42
R12	1	40	41	36	37	38
	2	40	41	36	37	38
	3	40	41	36	37	38
R13	1	46	47	43	44	45
	2	47	48	45	46	47
	3	49	50	49	49	48
	4	50	52	50	51	49
R14	6	74	73	68	70	72

Receptor Location	Floor	Activity a6 – Sheet Piling	Activity a7 – Shaft Creation	Activity a8 – Tunnelling/Excavation (outside core hours)	Activity a8 – Tunnelling/Excavation (core hours)	Activity a9 – Installation of Gantry Crane
		Predicted L _{Aeq,1h} dB (façade)				
R15	1	54	55	55	55	53
	2	71	70	68	70	69
	3	73	72	70	72	72
	4	73	72	70	71	71
	5	73	72	69	70	71
R16	1	66	65	59	59	64
	2	78	77	71	71	76
	3	83	82	75	75	81
	4	82	80	74	74	80
	5	81	79	72	73	78
	6	79	77	71	72	76
	7	78	76	70	70	75
	8	77	75	69	69	74

Receptor Location	Floor	Activity a6 – Sheet Piling	Activity a7 – Shaft Creation	Activity a8 – Tunnelling/Excavation (outside core hours)	Activity a8 – Tunnelling/Excavation (core hours)	Activity a9 – Installation of Gantry Crane
		Predicted L _{Aeq,1h} dB (façade)				
R17 - North - bottom floors	1	61	62	60	61	61
	2	66	66	63	63	65
	3	77	76	71	70	76
	4	77	77	70	70	76
	5	76	75	70	69	75
R17 - North West	1	53	53	66	61	51
	2	59	62	64	64	61
	3	65	68	67	69	67
	4	64	66	66	66	64
	5	63	65	65	65	63
R17 - North - top floors	6	74	74	68	66	73

Receptor Location	Floor	Activity a6 – Sheet Piling	Activity a7 – Shaft Creation	Activity a8 – Tunnelling/Excavation (outside core hours)	Activity a8 – Tunnelling/Excavation (core hours)	Activity a9 – Installation of Gantry Crane
		Predicted L _{Aeq,1h} dB (façade)				
	7	73	73	67	65	72
	8	72	72	66	65	71
	9	71	71	65	64	70
	10	70	70	64	63	69
R18	1	43	44	37	37	42
	2	45	45	39	39	44
	3	45	46	39	39	44
	4	45	46	40	40	44
	5	45	46	40	40	44
	6	46	46	41	41	45
	7	46	47	42	42	45
R19	1	44	46	44	45	43
	2	53	56	55	56	53

Receptor Location	Floor	Activity a6 – Sheet Piling	Activity a7 – Shaft Creation	Activity a8 – Tunnelling/Excavation (outside core hours)	Activity a8 – Tunnelling/Excavation (core hours)	Activity a9 – Installation of Gantry Crane
		Predicted L _{Aeq,1h} dB (façade)				
	3	55	59	58	58	55
	4	54	58	57	57	54
	5	53	57	56	56	54
	6	53	56	55	56	53
	7	53	56	55	55	53
	8	53	56	54	55	53
	9	53	55	54	55	53