

Appendix 11.1 Noise Prediction Calculations

Rc	1719.95886
SA (internal)	13145
a	0.12
Facade SRI 2a	30
Facade SRI 2b	30

Source	Source Number	Sound Pressure	Sound Power	Distance to Receptor		Direct/Reverb at 1.5m			Direct/Reverb at 4m		
				at 1.5m height	at 10m height	Direct	Rev	Total	Direct	Rev	Total
Measured Level Near EfW Boiler				n/a	n/a	n/a	n/a	85.0	n/a	n/a	85.0
Measured Level Near Circulation Pump			71	31	32.572995	33.2	44.7	45.0	32.8	44.7	44.9
Measured Level Near Circulation Pump			71	31	32.572995	33.2	44.7	45.0	32.8	44.7	44.9

Totals			
1.5m	4m	1.5m	4m
85.0	85.0	316227766.0	316227766.0
45.0	44.9	31362.7	31166.2
45.0	44.9	31362.7	31166.2
Total Average		85.0	85.0
1.5m height	In to Out	49.0	
4m height	In to Out	49.0	

Assumed 1 delivery per hour

	Door Size (m2)	Door Rw	Unit Leq at 1m	Number of Deliveries/hr	Number of Doors	Duration Doors Open Per Delivery (minutes)	seconds/hr/door (4min per delivery)
Roller Shutter Door (open)	20	0	79.0	1	1	4	240
Roller Shutter Door (closed)	20	21	58.0	1	1	4	3360
Time roller shutter door open per hour (seconds)	240						
Time roller shutter door closed per hour (Seconds)	3360						
Total Seconds per hour	3600						
Time averaged LAeq 1hr Per Meter	67.7						
Time averaged LAeq 1hr Per unit	80.7						

façade	area	Lw/unit
RSD 1 Façade 1a	20	80.7
Façade 1b	538	76.3
Façade 1c	410	75.1
Façade 1d	208	72.2
Façade 1e	16	61.0

Rc	1719.95886
SA (internal)	13145
a	0.12
Facade SRI 2a	36
Facade SRI 2b	36

Source	Source Number	Sound Pressure	Sound Power	Distance to Receptor		Direct/Reverb at 1.5m			Direct/Reverb at 4m		
				at 1.5m height	at 10m height	Direct	Rev	Total	Direct	Rev	Total
Measured Level Near EfW Boiler				n/a	n/a	n/a	n/a	85.0	n/a	n/a	85.0
Measured Level Near Circulation Pump			71	20	22.36068	37.0	44.7	45.4	36.0	44.7	45.2
Measured Level Near Circulation Pump			71	50	50.990195	29.0	44.7	44.8	28.9	44.7	44.8

Totals			
1.5m	4m	1.5m	4m
85.0	85.0	316227766.0	316227766.0
45.4	45.2	34286.5	33284.8
44.8	44.8	30079.4	30048.6
	Total	85.0	85.0
	Average	85.0	
1.5m height	In to Out	43.0	
4m height	In to Out	43.0	

Assumed 1 delivery per hour

	Door Size (m2)	Door Rw	Unit Leq at 1m	Number of Deliveries/hr	Number of Doors	Duration Doors Open Per Delivery (minutes)	seconds /hr/door (4min door open per delivery)
Roller Shutter Door (open)	20	0	79.0	1	1	4	240
Roller Shutter Door (closed)	20	21	58.0	1	1	4	3360
Time roller shutter door open per hour (seconds)	240						
Time roller shutter door closed per hour (Seconds)	3360						
Total Seconds per hour	3600						
Time averaged LAeq 1hr Per Meter	67.7						
Time averaged LAeq 1hr Per unit	80.7						

façade	area	Lw/unit
Façade 2	569.5	70.6
Façade 3	103	63.1
Façade 4a	401	69.0
RSD 1 Façade 4	20	80.7
Façade 4b	279	67.5
Façade 4c	132	64.2
Façade 4d	16	55.0

Rc	1719.95886
SA (internal)	13145
a	0.12
Facade SRI 2a	30
Facade SRI 2b	30

Source	Source Number	Sound Pressure	Sound Power	Distance to Receptor		Direct/Reverb at 1.5m			Direct/Reverb at 4m		
				at 1.5m height	at 10m height	Direct	Rev	Total	Direct	Rev	Total
Measured Level Near EfW Boiler				n/a	n/a	n/a	n/a	85.0	n/a	n/a	85.0
Measured Level Near Circulation Pump			71	6	11.661904	47.5	44.7	49.3	41.7	44.7	46.4
Measured Level Near Circulation Pump			71	45	46.097722	30.0	44.7	44.8	29.7	44.7	44.8

Totals			
1.5m	4m	1.5m	4m
85.0	85.0	316227766.0	316227766.0
49.3	46.4	84927.5	44008.8
44.8	44.8	30267.4	30220.8
	Total	85.0	85.0
	Average	85.0	
1.5m height	In to Out	49.0	
4m height	In to Out	49.0	

Assumed 1 delivery per hour

	Door Size (m2)	Door Rw	Unit Leq at 1m	Number of Deliveries/hr	Number of Doors	Duration Doors Open Per Delivery (minutes)	seconds /hr/door (4min door open per delivery)
Roller Shutter Door (open)	20	0	79.0	1	1	4	240
Roller Shutter Door (closed)	20	21	58.0	1	1	4	3360
Time roller shutter door open per hour (seconds)	240						
Time roller shutter door closed per hour (Seconds)	3360						
Total Seconds per hour	3600						
Time averaged LAeq 1hr Per Meter	67.7						
Time averaged LAeq 1hr Per unit	80.7						

façade	area	Lw/unit
Façade 8a	244	72.9
RSD 1 Façade 8	20	80.7
Façade 8b	964	78.8
Façade 8c	542	76.3
Façade 8d	16	61.0

Rc	1719.95886
SA (internal)	13145
a	0.12
Facade SRI 2a	30
Facade SRI 2b	30

Source	Source Number	Sound Pressure	Sound Power	Distance to Receptor		Direct/Reverb at 1.5m			Direct/Reverb at 4m		
				at 1.5m height	at 4m height	Direct	Rev	Total	Direct	Rev	Total
Measured Level Near EfW Boiler				n/a	n/a	n/a	n/a	85.0	n/a	n/a	85.0
Measured Level Near Circulation Pump			71	15	18.027756	39.5	44.7	45.8	37.9	44.7	45.5
Measured Level Near Circulation Pump			71	15	18.027756	39.5	44.7	45.8	37.9	44.7	45.5

Totals			
1.5m	4m	1.5m	4m
85.0	85.0	316227766.0	316227766.0
45.8	45.5	38182.0	35442.3
45.8	45.5	38182.0	35442.3
	Total	85.0	85.0
	Average	85.0	
1.5m height	In to Out	49.0	
4m height	In to Out	49.0	

façade	area	Lw/unit
Roof 1	681	77.3
Roof 2	1280	80.1
Roof 3	1048	79.2

Rc	1912.60686
SA (internal)	13145
a	0.13
Facade SRI 2a	36
Facade SRI 2b	36

Source	Source Number	Sound Pressure	Sound Power	Distance to Receptor		Direct/Reverb at 1.5m			Direct/Reverb at 4m		
				at 1.5m height	at 10m height	Direct	Rev	Total	Direct	Rev	Total
Hydraulic Skid, Furnace			83	15	18.027756	51.5	56.2	57.5	49.9	56.2	57.1
Hydraulic Skid, Furnace			83	15	18.027756	51.5	56.2	57.5	49.9	56.2	57.1
Feed Water Pump			75	5	11.18034	53.0	48.2	54.3	46.0	48.2	50.3
Feed Water Pump			75	5	11.18034	53.0	48.2	54.3	46.0	48.2	50.3
Air Compressor			69	5	11.18034	47.0	42.2	48.3	40.0	42.2	44.3
Thermal Oil Skid			75	12	15.620499	45.4	48.2	50.0	43.1	48.2	49.4
Thermal Oil Skid			75	12	15.620499	45.4	48.2	50.0	43.1	48.2	49.4
Cooling Medium Pump			75	5	11.18034	53.0	48.2	54.3	46.0	48.2	50.3

Totals			
1.5m	4m	1.5m	4m
57.5	57.1	558404.1	514983.3
57.5	57.1	558404.1	514983.3
54.3	50.3	267426.2	106393.6
54.3	50.3	267426.2	106393.6
48.3	44.3	67174.4	26724.9
50.0	49.4	101081.8	86759.5
50.0	49.4	101081.8	86759.5
54.3	50.3	267426.2	106393.6
	Total	63.4	61.9
	Average	62.7	
1.5m height	In to Out	21.4	
10m height	In to Out	19.9	
	Average	20.7	
	façade	area	Lw/unit
	Façade 1a	432	47.1
	Façade 1b	78	39.6

Rc	1912.60686
SA (internal)	13145
a	0.13
Facade SRI 2a	30
Facade SRI 2b	30

Source	Source Number	Sound Pressure	Sound Power	Distance to Receptor	Direct/Reverb at 1.5m		
					Direct	Rev	Total
Hydraulic Skid, Furnace			83	10	55.0	56.2	58.7
Hydraulic Skid, Furnace			83	10	55.0	56.2	58.7
Feed Water Pump			75	10	47.0	48.2	50.7
Feed Water Pump			75	10	47.0	48.2	50.7
Air Compressor			69	10	41.0	42.2	44.7
Thermal Oil Skid			75	10	47.0	48.2	50.7
Thermal Oil Skid			75	10	47.0	48.2	50.7
Cooling Medium Pump			75	10	47.0	48.2	50.7

Totals	
1.5m	1.5m
58.7	734801.1
58.7	734801.1
50.7	116458.1
50.7	116458.1
44.7	29253.0
50.7	116458.1
50.7	116458.1
50.7	116458.1
Total	63.2

In to Out 27.2

façade	area	Lw/unit
roof	379	53.0

Rc	1523.58664
SA (internal)	13145
a	0.10
Facade SRI 2a	30
Facade SRI 2b	30

Source	Source Number	Sound Pressure	Sound Power	Distance to Receptor		Direct/Reverb at 1.5m			Direct/Reverb at 4m		
				at 1.5m height	at 10m height	Direct	Rev	Total	Direct	Rev	Total
DW306 Ceron Shredder			98	5	11.18034	76.0	72.2	77.5	69.0	72.2	73.9
DW306 Ceron Shredder			98	10	14.142136	70.0	72.2	74.2	67.0	72.2	73.3
DF307 Shredder			109	15	18.027756	77.5	83.2	84.2	75.9	83.2	83.9
DF307 Shredder			109	25	26.925824	73.1	83.2	83.6	72.4	83.2	83.5
Nihot Density Separator			93	15	18.027756	61.5	67.2	68.2	59.9	67.2	67.9
Nihot Density Separator			93	25	26.925824	57.1	67.2	67.6	56.4	67.2	67.5
Eddy Current Separator			85	15	18.027756	53.5	59.2	60.2	51.9	59.2	59.9
Eddy Current Separator			85	25	26.925824	49.1	59.2	59.6	48.4	59.2	59.5
Bluemac 25-10 Trommel			88	15	18.027756	56.5	62.2	63.2	54.9	62.2	62.9
Bluemac 25-10 Trommel			88	25	26.925824	52.1	62.2	62.6	51.4	62.2	62.5
Spaleck Flip Flow Screen			87	15	18.027756	55.5	61.2	62.2	53.9	61.2	61.9
Conveyors			110	25	26.925824	74.1	84.2	84.6	73.4	84.2	84.5

Totals

1.5m	4m	1.5m	4m
77.5	73.9	56727837.7	24597610.1
74.2	73.3	26605749.3	21585401.2
84.2	83.9	264721608.4	247435471.7
83.6	83.5	228766444.0	225976819.1
68.2	67.9	6649506.2	6215298.0
67.6	67.5	5746353.3	5676281.1
60.2	59.9	1053875.7	985058.4
59.6	59.5	910735.6	899629.9
63.2	62.9	2102758.5	1965449.8
62.6	62.5	1817156.5	1794997.7
62.2	61.9	1670280.4	1561212.3
84.6	84.5	287999889.7	284487960.1

Total Average 89.5 89.2

1.5m height In to Out 53.5

4m height In to Out Average 53.2 53.3

Assumed 1 export per hour

	Door Size (m2)	Door Rw	Unit Leq at 1m	Number of Deliveries/hr	Number of Doors	Duration Doors Open Per Delivery (minutes)	seconds/hr/door (4min door open per delivery)
Roller Shutter Door (open)	20	0	83.5	1	8	4	30
Roller Shutter Door (closed)	20	21	62.5	1	8	4	3570
Time roller shutter door open per hour (seconds)	30						
Time roller shutter door closed per hour (Seconds)	3570						
Total Seconds per hour	3600						
Time averaged LAeq 1hr Per Meter	65.6						
Time averaged LAeq 1hr Per unit	78.6						

façade	area	Lw/unit
Façade 3a	5	60.3
RSD 1 Façade 3	20	78.6
Façade 3b	17.5	65.7
Façade 3c	42	69.5
Façade 3d	621	81.2

Rc	1532.37144
SA (internal)	13145
a	0.10
Facade SRI 2a	36
Facade SRI 2b	36

Source	Source Number	Sound Pressure	Sound Power	Distance to Receptor	Direct/Reverb at 1.5m			Totals 1.5m	1.5m
					Direct	Rev	Total		
DW306 Ceron Shredder			98	10	70.0	72.2	74.2	74.2	26510785.0
DW306 Ceron Shredder			98	10	70.0	72.2	74.2	74.2	26510785.0
DF307 Shredder			109	10	81.0	83.2	85.2	85.2	333751009.0
DF307 Shredder			109	10	81.0	83.2	85.2	85.2	333751009.0
Nihot Density Separator			93	10	65.0	67.2	69.2	69.2	8383446.3
Nihot Density Separator			93	10	65.0	67.2	69.2	69.2	8383446.3
Eddy Current Separator			85	10	57.0	59.2	61.2	61.2	1328686.7
Eddy Current Separator			85	10	57.0	59.2	61.2	61.2	1328686.7
Bluemac 25-10 Trommel			88	10	60.0	62.2	64.2	64.2	2651078.5
Bluemac 25-10 Trommel			88	10	60.0	62.2	64.2	64.2	2651078.5
Spaleck Flip Flow Screen			87	10	59.0	61.2	63.2	63.2	2105826.5
Spaleck Flip Flow Screen			87	10	59.0	61.2	63.2	63.2	2105826.5
Conveyors			110	10	82.0	84.2	86.2	86.2	420167626.4

90.7

1.5m
height

48.7

Assumed 1 export per hour

façade	area	Lw/unit
Roof	1340	80.0

Rc	1532.37144
SA (internal)	13145
a	0.10
Facade SRI 2a	36
Facade SRI 2b	36

Source	Source Number	Sound Pressure	Sound Power	Distance to Receptor		Direct/Reverb at 1.5m			Direct/Reverb at 4m		
				at 1.5m height	at 4m height	Direct	Rev	Total	Direct	Rev	Total
Measured Level Near MRF loading Point				n/a	n/a	n/a	n/a	74.0	n/a	n/a	74.0
Measured Level Near MRF loading Point				n/a	n/a	n/a	n/a	74.0	n/a	n/a	74.0
Wheeled Loader		-	108	20	20	74.0	82.2	82.8	73.8	82.2	82.8
Wheeled Loader		-	108	10	11	80.0	82.2	84.2	79.4	82.2	84.0
Tipper Lorry		-	100	10	11	72.0	74.2	76.2	71.4	74.2	76.0
Tipper Lorry		-	100	10	11	72.0	74.2	76.2	71.4	74.2	76.0

Totals			
1.5	4	1.5	4
74.0	74.0	25118864.3	25118864.3
74.0	74.0	25118864.3	25118864.3
82.8	82.8	189802628.9	188837177.3
84.2	84.0	265107849.8	251258613.8
76.2	76.0	42016762.6	39821806.6
76.2	76.0	42016762.6	39821806.6
Total		87.7	87.6
Average		87.6	
1.5m height	In to Out	45.7	
4m height	In to Out	45.6	45.6

façade	area	Lw/unit
Façade 1	312	70.6
Façade 3	314	70.6

Rc	1532.37144
SA (internal)	13145
a	0.10
Facade SRI 2a	30
Facade SRI 2b	30

Source	Source Number	Sound Pressure	Sound Power	Distance to Receptor		Direct/Reverb at 1.5m			Direct/Reverb at 4m		
				at 1.5m height	at 4m height	Direct	Rev	Total	Direct	Rev	Total
Measured Level Near MRF loading Point				n/a	n/a	n/a	n/a	74.0	n/a	n/a	74.0
Measured Level Near MRF loading Point				n/a	n/a	n/a	n/a	74.0	n/a	n/a	74.0
Wheeled Loader		-	108	10	11	80.0	82.2	84.2	79.4	82.2	84.0
Wheeled Loader		-	108	20	20	74.0	82.2	82.8	73.8	82.2	82.8
Tipper Lorry		-	100	10	11	72.0	74.2	76.2	71.4	74.2	76.0
Tipper Lorry		-	100	10	11	72.0	74.2	76.2	71.4	74.2	76.0

Totals			
1.5	4	1.5	4
74.0	74.0	25118864.3	25118864.3
74.0	74.0	25118864.3	25118864.3
84.2	84.0	265107849.8	251258613.8
82.8	82.8	189802628.9	188837177.3
76.2	76.0	42016762.6	39821806.6
76.2	76.0	42016762.6	39821806.6
Total		87.7	87.6
Average		87.6	
1.5m height	In to Out	51.7	
4m height	In to Out	51.6	51.6

Assumed 1 delivery per hour

	Door Size (m2)	Door Rw	Unit Leq at 1m	Number of Deliveries/hr	Number of Doors	Duration Doors Open Per Delivery (minutes)	seconds/hr/door (4min door open per delivery)
Roller Shutter Door (open)	20	0	81.7	8	4	4	480
Roller Shutter Door (closed)	20	21	60.7	8	4	4	3120
Time roller shutter door open per hour (seconds)	480						
Time roller shutter door closed per hour (Seconds)	3120						
Total Seconds per hour	3600						
Time averaged LAeq 1hr Per Meter	73.2						
Time averaged LAeq 1hr Per unit	86.2						

façade	area	Lw/unit
RSD 1		
Façade 2	20	86.2
Façade 2a	33	66.8
Façade 2b	17.5	64.1
Façade 2c	36	67.2
Façade 2d	203	74.7

Rc	1532.37144
SA (internal)	13145
a	0.10
Facade SRI 2a	30
Facade SRI 2b	30

Source	Source Number	Sound Pressure	Sound Power	Distance to Receptor		Direct/Reverb at 1.5m					
						Direct	Rev	Total			
Measured Level Near MRF loading Point				n/a		n/a	n/a	74.0			
Measured Level Near MRF loading Point				n/a		n/a	n/a	74.0			
Wheeled Loader		-	108	8		82.0	82.2	85.1			
Wheeled Loader		-	108	8		82.0	82.2	85.1			
Tipper Lorry		-	100	8		74.0	74.2	77.1			
Tipper Lorry		-	100	8		74.0	74.2	77.1			

Totals			
1.5	4	1.5	4
74.0	0.0	25118864.3	1.0
74.0	0.0	25118864.3	1.0
85.1	0.0	321586765.5	1.0
85.1	0.0	321586765.5	1.0
77.1	0.0	50968067.5	1.0
77.1	0.0	50968067.5	1.0
Total		89.0	7.8
Average		86.0	
1.5m height	In to Out	53.0	

façade	area	Lw/unit
Roof	1340	84.3

Rc	1532.37144
SA (internal)	13145
a	0.10
Facade SRI 2a	30
Facade SRI 2b	30

Source	Source Number	Sound Pressure	Sound Power	Distance to Receptor		Direct/Reverb at 1.5m			Direct/Reverb at 4m		
				at 1.5m height	at 4m height	Direct	Rev	Total	Direct	Rev	Total
Turbine		-	96	2	4	82.0	70.2	82.3	75.0	70.2	76.2
Generator		-	85	2	4	71.0	59.2	71.3	64.0	59.2	65.2

Totals			
1.5	4	1.5	4
82.3	76.2	168773197.6	42068178.3
71.3	65.2	13406131.6	3341594.2
Total		82.6	76.6
Average		80.6	
1.5m height	In to Out	46.6	
4m height	In to Out	40.6	44.6

Assumed 1 delivery per hour

	Door Size (m2)	Door Rw	Unit Leq at 1m	Number of Deliveries/hr	Number of Doors	Duration Doors Open Per Delivery (minutes)	seconds/hr/door (4min door open per delivery)
Roller Shutter Door (open)	24	0	76.6	0	1	0	0
Roller Shutter Door (closed)	24	21	55.6	0	1	0	3600
Time roller shutter door open per hour (seconds)	0						
Time roller shutter door closed per hour (Seconds)	3600						
Total Seconds per hour	3600						
Time averaged LAeq 1hr Per Meter	55.6						
Time averaged LAeq 1hr Per unit	69.4						

façade	area	Lw/unit
RSD 1		
Façade 2	24	69.4
Façade 1+3	289	69.2
Façade 4	161	66.6
Roof	175	67.0
Façade 2a	48	61.4
Façade 2b	64	62.6
Façade 2c	18	57.1

Section 1

SA	Area	Co-eff	Total Absorbtion
Walls	6705	0.15	1005.75
Ceiling	3220	0.15	483
Floor	3220	0.01	32.2
SUM			1520.95
Average Coeff			0.12

Section 1a

SA	Area	Co-eff	Total Absorbtion
Walls	1600	0.15	240
Ceiling	391	0.15	58.65
Floor	391	0.01	3.91
SUM			302.56
Average Coeff			0.13

Section 2

SA	Area	Co-eff	Total Absorbtion
Walls	3248	0.15	487.2
Ceiling	3139	0.15	470.85
Floor	3139	0.01	31.39
SUM			989.44
Average Coeff			0.10

Section 3

SA	Area	Co-eff	Total Absorbtion
Walls	1520	0.15	228
Ceiling	1420	0.15	213
Floor	1420	0.01	14.2
SUM			455.2
Average Coeff			0.10