

Riverside Energy Park

Environmental Statement Technical Appendices

APPENDIX:

C.2

PLANNING INSPECTORATE REFERENCE NUMBER:

EN010093

DOCUMENT REFERENCE:

STACK MODELLING

November 2018 | Revision 0 | APFP Regulation 5(2)(a)

Planning Act 2008 | Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

C.2.1 Baseline Point Sources and Emissions

Table C.2.1.1 Input Parameters for Point Sources Modelled for Baseline Concentrations

Source Name	Crossness Sewage Sludge Incinerator	Riverside Resource Recovery Facility
OS Grid Co-ordinate X	549150	549700
OS Grid Co-ordinate Y	180740	180574
Stack height (m)	60	90
Diameter (m)	1.27	3.93
Flue gas temperature (°C)	120	129
Exit Velocity (m/s)	26.1	21

Table C.2.1.2 Modelled Emission Rates for Baseline Point Sources

Pollutant	Emission Rate (g/s)	
	Crossness Sewage Sludge Incinerator	Riverside Resource Recovery Facility
Arsenic	3.2 x 10 ⁻⁵	0.003
Benzene	-	1.53
Benzo(a)pyrene	3.2 x 10 ⁻⁵	1.4 x 10 ⁻⁵
Cadmium	3.2 x 10 ⁻⁵	0.008
Chromium VI	-	2.0 x 10 ⁻⁵
Lead	0.003	0.077
Manganese	-	0.077
Nickel	-	0.077
Nitrogen Dioxide	3.2	0.21
Particulates (PM ₁₀ /PM _{2.5})	0.3	1.53



C.2.2 Impact of ERF Emissions – Human Receptors

Table C.2.2.1 Predicted Annual Arsenic Concentrations

Sensitive Human Receptor ID	REP PC ($\mu\text{g}/\text{m}^3$)	PC (%) of EAL	Background (2016) ($\mu\text{g}/\text{m}^3$)	REP + RRRF + Crossness ($\mu\text{g}/\text{m}^3$)	Total PEC ($\mu\text{g}/\text{m}^3$)	PEC (%)	IAQM Significance
R1	7.42×10^{-5}	2.47%	9.9×10^{-4}	1.13×10^{-4}	1.10×10^{-3}	36.7%	Negligible
R2	7.67×10^{-5}	2.56%		9.87×10^{-5}	1.09×10^{-3}	36.3%	Negligible
R3	7.98×10^{-5}	2.66%		1.33×10^{-4}	1.12×10^{-3}	37.4%	Negligible
R4	2.82×10^{-5}	0.94%		6.04×10^{-5}	1.05×10^{-3}	35.0%	Negligible
R5	8.98×10^{-5}	2.99%		1.30×10^{-4}	1.12×10^{-3}	37.3%	Negligible
R6	7.30×10^{-5}	2.43%		1.51×10^{-4}	1.14×10^{-3}	38.0%	Negligible
R7	1.29×10^{-4}	4.31%		2.29×10^{-4}	1.22×10^{-3}	40.6%	Negligible
R8	1.69×10^{-4}	5.65%		2.53×10^{-4}	1.24×10^{-3}	41.4%	Minor
R8B	1.66×10^{-4}	5.54%		2.55×10^{-4}	1.24E-03	41.5%	Minor
R9	2.66×10^{-5}	0.89%		3.96×10^{-5}	1.03×10^{-3}	34.3%	Negligible
R10	2.42×10^{-5}	0.81%		3.56×10^{-5}	1.02×10^{-3}	34.2%	Negligible
R11	9.65×10^{-5}	3.22%		1.45×10^{-4}	1.13×10^{-3}	37.8%	Negligible
R12	2.87×10^{-5}	0.96%		4.27×10^{-5}	1.03×10^{-3}	34.4%	Negligible
R13	3.27×10^{-5}	1.09%		5.02×10^{-5}	1.04×10^{-3}	34.6%	Negligible
R14	2.74×10^{-5}	0.91%		4.17×10^{-5}	1.03×10^{-3}	34.4%	Negligible
R15	8.63×10^{-5}	2.88%		1.28×10^{-4}	1.12×10^{-3}	37.2%	Negligible
R16	7.42×10^{-5}	2.47%		1.19×10^{-4}	1.11×10^{-3}	36.9%	Negligible
R16B	6.82×10^{-5}	2.27%		1.09×10^{-4}	1.10×10^{-3}	36.6%	Negligible
R17	8.38×10^{-5}	2.79%		1.20×10^{-4}	1.11×10^{-3}	37.0%	Negligible
R18A 1st	1.37×10^{-4}	4.58%		2.40×10^{-4}	1.23×10^{-3}	41.0%	Negligible
R18B 4th	1.38×10^{-4}	4.58%		2.40×10^{-4}	1.23×10^{-3}	41.0%	Negligible
R19A 1st	1.12×10^{-4}	3.75%		1.35×10^{-4}	1.12×10^{-3}	37.5%	Negligible
R19B 6th	1.14×10^{-4}	3.81%		1.39×10^{-4}	1.13×10^{-3}	37.6%	Negligible
R20A GF	1.35×10^{-4}	4.50%		2.39×10^{-4}	1.23×10^{-3}	40.9%	Negligible
R20B 5th	1.35×10^{-4}	4.51%		2.40×10^{-4}	1.23×10^{-3}	41.0%	Negligible
R21	2.45×10^{-5}	0.82%		3.68×10^{-5}	1.03×10^{-3}	34.2%	Negligible
R22	1.22×10^{-4}	4.06%		2.09×10^{-4}	1.20×10^{-3}	39.9%	Negligible
R23	3.82×10^{-5}	1.27%	6.29×10^{-5}	1.05×10^{-3}	35.1%	Negligible	
R24	2.38×10^{-5}	0.79%	3.95×10^{-5}	1.03×10^{-3}	34.3%	Negligible	
R25	2.34×10^{-5}	0.78%	3.90×10^{-5}	1.03×10^{-3}	34.3%	Negligible	
R26	5.43×10^{-5}	1.81%	8.42E-05	1.07×10^{-3}	35.8%	Negligible	
R27	1.33×10^{-5}	0.44%	2.28×10^{-5}	1.01×10^{-3}	33.7%	Negligible	



Table C.2.2.2 Predicted Annual Average Benzene Concentrations

Sensitive Human Receptor ID	REP PC ($\mu\text{g}/\text{m}^3$)	PC (%)	Background (2016) ($\mu\text{g}/\text{m}^3$)	REP + RRRF + Crossness ($\mu\text{g}/\text{m}^3$)	Total PEC ($\mu\text{g}/\text{m}^3$)	PEC (%)	IAQM Significance
R1	2.97×10^{-2}	0.59%	6.20×10^{-1}	0.0492	0.6694	13.39%	Negligible
R2	3.07×10^{-2}	0.61%	6.27×10^{-1}	0.0416	0.6687	13.37%	Negligible
R3	3.19×10^{-2}	0.64%	6.84×10^{-1}	0.0583	0.7424	14.85%	Negligible
R4	1.13×10^{-2}	0.23%	4.27×10^{-1}	0.0276	0.4545	9.09%	Negligible
R5	3.59×10^{-2}	0.72%	6.45×10^{-1}	0.0557	0.7005	14.01%	Negligible
R6	2.92×10^{-2}	0.58%	4.39×10^{-1}	0.0685	0.5079	10.16%	Negligible
R7	5.17×10^{-2}	1.03%	5.52×10^{-1}	0.1020	0.6541	13.08%	Negligible
R8	6.78×10^{-2}	1.36%	5.61×10^{-1}	0.1096	0.6708	13.42%	Negligible
R8B	6.65×10^{-2}	1.33%	7.00×10^{-1}	0.1110	0.6722	13.44%	Negligible
R9	1.07×10^{-2}	0.21%	5.90×10^{-1}	0.0171	0.7171	14.34%	Negligible
R10	9.70×10^{-3}	0.19%	5.61×10^{-1}	0.0154	0.6058	12.12%	Negligible
R11	3.86×10^{-2}	0.77%	7.11×10^{-1}	0.0628	0.6241	12.48%	Negligible
R12	1.15×10^{-2}	0.23%	9.06×10^{-1}	0.0184	0.7292	14.58%	Negligible
R13	1.31×10^{-2}	0.26%	7.11×10^{-1}	0.0218	0.9273	18.55%	Negligible
R14	1.09×10^{-2}	0.22%	5.61×10^{-1}	0.0181	0.7289	14.58%	Negligible
R15	3.45×10^{-2}	0.69%	6.20×10^{-1}	0.0555	0.6167	12.33%	Negligible
R16	2.97×10^{-2}	0.59%	6.45×10^{-1}	0.0519	0.6721	13.44%	Negligible
R16B	2.73×10^{-2}	0.55%	5.52×10^{-1}	0.0475	0.6677	13.35%	Negligible
R17	3.35×10^{-2}	0.67%	5.61×10^{-1}	0.0514	0.6962	13.92%	Negligible
R18A 1st	5.49×10^{-2}	1.10%	6.20×10^{-1}	0.1066	0.6587	13.17%	Negligible
R18B 4th	5.50×10^{-2}	1.10%	6.27×10^{-1}	0.1069	0.6590	13.18%	Negligible
R19A 1st	4.50×10^{-2}	0.90%	6.27×10^{-1}	0.0559	0.6830	13.66%	Negligible
R19B 6th	4.58×10^{-2}	0.92%	5.52×10^{-1}	0.0580	0.6851	13.70%	Negligible
R20A GF	5.40×10^{-2}	1.08%	5.52×10^{-1}	0.1065	0.6586	13.17%	Negligible
R20B 5th	5.42×10^{-2}	1.08%	5.52×10^{-1}	0.1069	0.6591	13.18%	Negligible
R21	9.79×10^{-3}	0.20%	6.99×10^{-1}	0.0159	0.7146	14.29%	Negligible
R22	4.87×10^{-2}	0.97%	5.52×10^{-1}	0.0927	0.6449	12.90%	Negligible
R23	1.53×10^{-2}	0.31%	6.46×10^{-1}	0.0276	0.6734	13.47%	Negligible
R24	9.53×10^{-3}	0.19%	6.27×10^{-1}	0.0174	0.6442	12.88%	Negligible
R25	9.38×10^{-3}	0.19%	6.27×10^{-1}	0.0172	0.6439	12.88%	Negligible
R26	2.17×10^{-2}	0.43%	6.83×10^{-1}	0.0365	0.7200	14.40%	Negligible
R27	5.32×10^{-3}	0.11%	6.25×10^{-1}	0.0101	0.6353	12.71%	Negligible



Table C.2.2.3 Predicted Annual Average Benzo(a)pyrene Concentrations

Sensitive Human Receptor ID	REP PC ($\mu\text{g}/\text{m}^3$)	PC (%)	Background (2016) ($\mu\text{g}/\text{m}^3$)	REP + RRRF + Crossnes s ($\mu\text{g}/\text{m}^3$)	Total PEC ($\mu\text{g}/\text{m}^3$)	PEC (%)	IAQM Significance
R1	6.23×10^{-7}	0.25%	2.1×10^{-4}	2.12×10^{-6}	2.08×10^{-4}	83.18%	Negligible
R2	6.44×10^{-7}	0.26%		2.06×10^{-6}	2.08×10^{-4}	83.16%	Negligible
R3	6.70×10^{-7}	0.27%		2.40×10^{-6}	2.08×10^{-4}	83.30%	Negligible
R4	2.37×10^{-7}	0.09%		8.18×10^{-7}	2.07×10^{-4}	82.66%	Negligible
R5	7.54×10^{-7}	0.30%		2.67×10^{-6}	2.09×10^{-4}	83.40%	Negligible
R6	6.13×10^{-7}	0.25%		1.99×10^{-6}	2.08×10^{-4}	83.13%	Negligible
R7	1.09×10^{-6}	0.43%		3.35×10^{-6}	2.09×10^{-4}	83.67%	Negligible
R8	1.42×10^{-6}	0.57%		4.27×10^{-6}	2.10×10^{-4}	84.04%	Negligible
R8 B	1.40×10^{-6}	0.56%		4.51×10^{-6}	2.10×10^{-4}	84.14%	Negligible
R9	2.24×10^{-7}	0.09%		6.84×10^{-7}	2.07E-04	82.61%	Negligible
R10	2.04×10^{-7}	0.08%		6.32×10^{-7}	2.06×10^{-4}	82.59%	Negligible
R11	8.10×10^{-7}	0.32%		2.67×10^{-6}	2.09×10^{-4}	83.40%	Negligible
R12	2.41×10^{-7}	0.10%		7.28×10^{-7}	2.07×10^{-4}	82.62%	Negligible
R13	2.74×10^{-7}	0.11%		9.44×10^{-7}	2.07×10^{-4}	82.71%	Negligible
R14	2.30×10^{-7}	0.09%		7.51×10^{-7}	2.07×10^{-4}	82.63%	Negligible
R15	7.25×10^{-7}	0.29%		2.38×10^{-6}	2.08×10^{-4}	83.28%	Negligible
R16	6.24×10^{-7}	0.25%		2.16×10^{-6}	2.08E-04	83.20%	Negligible
R16B	5.73×10^{-7}	0.23%		1.99×10^{-6}	2.08×10^{-4}	83.13%	Negligible
R17	7.04×10^{-7}	0.28%		2.39×10^{-6}	2.08×10^{-4}	83.29%	Negligible
R18A 1st	1.15×10^{-6}	0.46%		3.55×10^{-6}	2.09×10^{-4}	83.75%	Negligible
R18B 4th	1.16×10^{-6}	0.46%		3.55×10^{-6}	2.09×10^{-4}	83.75%	Negligible
R19A 1st	9.45×10^{-7}	0.38%		2.54×10^{-6}	2.08×10^{-4}	83.35%	Negligible
R19B 6th	9.61×10^{-7}	0.38%		2.60×10^{-6}	2.08×10^{-4}	83.37%	Negligible
R20A GF	1.13×10^{-6}	0.45%		3.50×10^{-6}	2.09×10^{-4}	83.73%	Negligible
R20B 5th	1.14×10^{-6}	0.45%		3.50×10^{-6}	2.09×10^{-4}	83.73%	Negligible
R21	2.06×10^{-7}	0.08%		6.38×10^{-7}	2.06×10^{-4}	82.59%	Negligible
R22	1.02×10^{-6}	0.41%		3.16×10^{-6}	2.09×10^{-4}	83.60%	Negligible
R23	3.21×10^{-7}	0.13%	1.02×10^{-6}	2.07×10^{-4}	82.74%	Negligible	
R24	2.00×10^{-7}	0.08%	6.35×10^{-7}	2.06×10^{-4}	82.59%	Negligible	
R25	1.97×10^{-7}	0.08%	6.25×10^{-7}	2.06×10^{-4}	82.58%	Negligible	
R26	4.56×10^{-7}	0.18%	1.65×10^{-6}	2.07×10^{-4}	83.00%	Negligible	
R27	1.12×10^{-7}	0.04%	3.66×10^{-7}	2.06×10^{-4}	82.48%	Negligible	



Table C.2.2.4 Predicted Annual Average Cadmium Concentrations

Sensitive Human Receptor ID	REP PC ($\mu\text{g}/\text{m}^3$)	PC (%)	Background (2016) ($\mu\text{g}/\text{m}^3$)	REP + RRRF + Crossness ($\mu\text{g}/\text{m}^3$)	Total PEC ($\mu\text{g}/\text{m}^3$)	PEC (%)	IAQM Significance
R1	5.93×10^{-5}	1.19%	2.5×10^{-4}	1.58E-04	4.04×10^{-4}	8.08%	Negligible
R2	6.14×10^{-5}	1.23%		1.20E-04	3.66×10^{-4}	7.31%	Negligible
R3	6.38×10^{-5}	1.28%		1.97E-04	4.43×10^{-4}	8.85%	Negligible
R4	2.25×10^{-5}	0.45%		1.05E-04	3.51×10^{-4}	7.01%	Negligible
R5	7.18×10^{-5}	1.44%		1.71E-04	4.17×10^{-4}	8.34%	Negligible
R6	5.84×10^{-5}	1.17%		2.56E-04	5.02×10^{-4}	10.04%	Negligible
R7	1.03×10^{-4}	2.07%		3.57E-04	6.02×10^{-4}	12.05%	Negligible
R8	1.36×10^{-4}	2.71%		3.46E-04	5.92×10^{-4}	11.84%	Negligible
R8B	1.33×10^{-4}	2.66%		3.57E-04	6.03×10^{-4}	12.05%	Negligible
R9	2.13×10^{-5}	0.43%		5.45E-05	3.00×10^{-4}	6.01%	Negligible
R10	1.94×10^{-5}	0.39%		4.89E-05	2.95×10^{-4}	5.90%	Negligible
R11	7.72×10^{-5}	1.54%		2.02E-04	4.47×10^{-4}	8.95%	Negligible
R12	2.30×10^{-5}	0.46%		5.82E-05	3.04×10^{-4}	6.08%	Negligible
R13	2.61×10^{-5}	0.52%		6.99E-05	3.16×10^{-4}	6.32%	Negligible
R14	2.19×10^{-5}	0.44%		5.77E-05	3.04×10^{-4}	6.07%	Negligible
R15	6.90×10^{-5}	1.38%		1.75E-04	4.21×10^{-4}	8.42%	Negligible
R16	5.94×10^{-5}	1.19%		1.71E-04	4.17×10^{-4}	8.34%	Negligible
R16B	5.46×10^{-5}	1.09%		1.56E-04	4.02×10^{-4}	8.05%	Negligible
R17	6.71×10^{-5}	1.34%		1.57E-04	4.03×10^{-4}	8.06%	Negligible
R18A 1st	1.10×10^{-4}	2.20%		3.70E-04	6.16×10^{-4}	12.32%	Negligible
R18B 4th	1.10×10^{-4}	2.20%		3.71E-04	6.17×10^{-4}	12.34%	Negligible
R19A 1st	9.00×10^{-5}	1.80%		1.49E-04	3.95×10^{-4}	7.90%	Negligible
R19B 6th	9.15×10^{-5}	1.83%		1.58E-04	4.04×10^{-4}	8.07%	Negligible
R20A GF	1.08×10^{-4}	2.16%		3.72E-04	6.18×10^{-4}	12.36%	Negligible
R20B 5th	1.08×10^{-4}	2.17%		3.74E-04	6.20×10^{-4}	12.40%	Negligible
R21	1.96×10^{-5}	0.39%		5.09E-05	2.97×10^{-4}	5.93%	Negligible
R22	9.75×10^{-5}	1.95%		3.19E-04	5.65×10^{-4}	11.30%	Negligible
R23	3.05×10^{-5}	0.61%	9.25E-05	3.38×10^{-4}	6.77%	Negligible	
R24	1.91×10^{-5}	0.38%	5.90E-05	3.05×10^{-4}	6.10%	Negligible	
R25	1.88×10^{-5}	0.38%	5.82E-05	3.04×10^{-4}	6.08%	Negligible	
R26	4.35×10^{-5}	0.87%	1.18E-04	3.64×10^{-4}	7.28%	Negligible	
R27	1.06×10^{-5}	0.21%	3.49E-05	2.81×10^{-4}	5.61%	Negligible	



Table C.2.2.5 Predicted Annual Average Chromium (VI) Concentrations

Sensitive Human Receptor ID	REP PC ($\mu\text{g}/\text{m}^3$)	PC (%)	Background (2016) ($\mu\text{g}/\text{m}^3$)	REP + RRRF + Crossness ($\mu\text{g}/\text{m}^3$)	Total PEC ($\mu\text{g}/\text{m}^3$)	PEC (%)	IAQM Significance
R1	3.86×10^{-7}	0.19%	3.2×10^{-4}	6.40×10^{-7}	3.22×10^{-4}	160.91%	Negligible
R2	3.99×10^{-7}	0.20%		5.41×10^{-7}	3.22×10^{-4}	160.91%	Negligible
R3	4.15×10^{-7}	0.21%		7.58×10^{-7}	3.22×10^{-4}	160.92%	Negligible
R4	1.47×10^{-7}	0.07%		3.59×10^{-7}	3.22×10^{-4}	160.79%	Negligible
R5	4.67×10^{-7}	0.23%		7.23×10^{-7}	3.22×10^{-4}	160.95%	Negligible
R6	3.80×10^{-7}	0.19%		8.91×10^{-7}	3.22×10^{-4}	160.90%	Negligible
R7	6.72×10^{-7}	0.34%		1.33×10^{-6}	3.22×10^{-4}	161.05%	Negligible
R8	8.81×10^{-7}	0.44%		1.42×10^{-6}	3.22×10^{-4}	161.15%	Negligible
R8B	8.65×10^{-7}	0.43%		1.44×10^{-6}	3.22×10^{-4}	161.15%	Negligible
R9	1.38×10^{-7}	0.07%		2.23×10^{-7}	3.22×10^{-4}	160.78%	Negligible
R10	1.26×10^{-7}	0.06%		2.00×10^{-7}	3.22×10^{-4}	160.78%	Negligible
R11	5.02×10^{-7}	0.25%		8.16×10^{-7}	3.22×10^{-4}	160.97%	Negligible
R12	1.49×10^{-7}	0.07%		2.40×10^{-7}	3.22×10^{-4}	160.79%	Negligible
R13	1.70×10^{-7}	0.08%		2.83×10^{-7}	3.22×10^{-4}	160.80%	Negligible
R14	1.42×10^{-7}	0.07%		2.35×10^{-7}	3.22×10^{-4}	160.79%	Negligible
R15	4.49×10^{-7}	0.22%		7.21×10^{-7}	3.22×10^{-4}	160.94%	Negligible
R16	3.86×10^{-7}	0.19%		6.75×10^{-7}	3.22×10^{-4}	160.91%	Negligible
R16B	3.55×10^{-7}	0.18%		6.18×10^{-7}	3.22×10^{-4}	160.89%	Negligible
R17	4.36×10^{-7}	0.22%		6.68×10^{-7}	3.22×10^{-4}	160.93%	Negligible
R18A 1st	7.14×10^{-7}	0.36%		1.39×10^{-6}	3.22×10^{-4}	161.07%	Negligible
R18B 4th	7.15×10^{-7}	0.36%		1.39×10^{-6}	3.22×10^{-4}	161.07%	Negligible
R19A 1st	5.85×10^{-7}	0.29%		7.26×10^{-7}	3.22×10^{-4}	161.01%	Negligible
R19B 6th	5.95×10^{-7}	0.30%		7.54×10^{-7}	3.22×10^{-4}	161.01%	Negligible
R20A GF	7.02×10^{-7}	0.35%		1.38×10^{-6}	3.22×10^{-4}	161.07%	Negligible
R20B 5th	7.04×10^{-7}	0.35%		1.39×10^{-6}	3.22×10^{-4}	161.07%	Negligible
R21	1.27×10^{-7}	0.06%		2.07×10^{-7}	3.22×10^{-4}	160.78%	Negligible
R22	6.33×10^{-7}	0.32%		1.21×10^{-6}	3.22×10^{-4}	161.03%	Negligible
R23	1.98×10^{-7}	0.10%	3.59×10^{-7}	3.22×10^{-4}	160.81%	Negligible	
R24	1.24×10^{-7}	0.06%	2.27×10^{-7}	3.22×10^{-4}	160.78%	Negligible	
R25	1.22×10^{-7}	0.06%	2.23×10^{-7}	3.22×10^{-4}	160.78%	Negligible	
R26	2.83×10^{-7}	0.14%	4.75×10^{-7}	3.22×10^{-4}	160.86%	Negligible	
R27	6.92×10^{-8}	0.03%	1.31×10^{-7}	3.21×10^{-4}	160.75%	Negligible	



Table C.2.2.6 Predicted Annual Mean Lead Concentrations

Sensitive Human Receptor ID	REP PC ($\mu\text{g}/\text{m}^3$)	PC (%)	Background (2016) ($\mu\text{g}/\text{m}^3$)	REP + RRRF + Crossness ($\mu\text{g}/\text{m}^3$)	Total PEC ($\mu\text{g}/\text{m}^3$)	PEC (%)	IAQM Significance
R1	1.49×10^{-4}	0.06%	0.0112	1.26×10^{-3}	0.0125	5.00%	Negligible
R2	1.54×10^{-4}	0.06%		8.66×10^{-4}	0.0121	4.84%	Negligible
R3	1.61×10^{-4}	0.06%		1.62×10^{-3}	0.0129	5.14%	Negligible
R4	5.67×10^{-5}	0.02%		9.20×10^{-4}	0.0122	4.86%	Negligible
R5	1.81×10^{-4}	0.07%		1.33×10^{-3}	0.0126	5.03%	Negligible
R6	1.47×10^{-4}	0.06%		2.21×10^{-3}	0.0135	5.38%	Negligible
R7	2.60×10^{-4}	0.10%		2.95×10^{-3}	0.0142	5.68%	Negligible
R8	3.41×10^{-4}	0.14%		2.67×10^{-3}	0.0139	5.56%	Negligible
R8B	3.35×10^{-4}	0.13%		2.78×10^{-3}	0.0140	5.61%	Negligible
R9	5.36×10^{-5}	0.02%		4.24×10^{-4}	0.0117	4.67%	Negligible
R10	4.88×10^{-5}	0.02%		3.81×10^{-4}	0.0116	4.65%	Negligible
R11	1.94×10^{-4}	0.08%		1.58×10^{-3}	0.0128	5.13%	Negligible
R12	5.78×10^{-5}	0.02%		4.49×10^{-4}	0.0117	4.68%	Negligible
R13	6.57×10^{-5}	0.03%		5.55×10^{-4}	0.0118	4.72%	Negligible
R14	5.51×10^{-5}	0.02%		4.53×10^{-4}	0.0117	4.68%	Negligible
R15	1.74×10^{-4}	0.07%		1.37×10^{-3}	0.0126	5.04%	Negligible
R16	1.49×10^{-4}	0.06%		1.38×10^{-3}	0.0126	5.05%	Negligible
R16B	1.37×10^{-4}	0.05%		1.26×10^{-3}	0.0125	5.00%	Negligible
R17	1.69×10^{-4}	0.07%		1.20×10^{-3}	0.0124	4.98%	Negligible
R18A 1st	2.76×10^{-4}	0.11%		3.05×10^{-3}	0.0143	5.72%	Negligible
R18B 4th	2.77×10^{-4}	0.11%		3.06×10^{-3}	0.0143	5.72%	Negligible
R19A 1st	2.26×10^{-4}	0.09%		9.67×10^{-4}	0.0122	4.88%	Negligible
R19B 6th	2.30×10^{-4}	0.09%		1.05×10^{-3}	0.0123	4.91%	Negligible
R20A GF	2.72×10^{-4}	0.11%		3.08×10^{-3}	0.0143	5.73%	Negligible
R20B 5th	2.72×10^{-4}	0.11%		3.10×10^{-3}	0.0143	5.73%	Negligible
R21	4.92×10^{-5}	0.02%		3.97×10^{-4}	0.0116	4.65%	Negligible
R22	2.45×10^{-4}	0.10%		2.62×10^{-3}	0.0139	5.54%	Negligible
R23	7.68×10^{-5}	0.03%	7.47×10^{-4}	0.0120	4.79%	Negligible	
R24	4.79×10^{-5}	0.02%	4.81×10^{-4}	0.0117	4.69%	Negligible	
R25	4.72×10^{-5}	0.02%	4.75×10^{-4}	0.0117	4.69%	Negligible	
R26	1.09×10^{-4}	0.04%	9.53×10^{-4}	0.0122	4.88%	Negligible	
R27	2.68×10^{-5}	0.01%	2.89×10^{-4}	0.0115	4.61%	Negligible	



Table C.2.2.7 Predicted Annual Mean Manganese Concentrations

Sensitive Human Receptor ID	REP PC ($\mu\text{g}/\text{m}^3$)	PC (%)	Background (2016) ($\mu\text{g}/\text{m}^3$)	REP + RRRF + Crossness ($\mu\text{g}/\text{m}^3$)	Total PEC ($\mu\text{g}/\text{m}^3$)	PEC (%)	IAQM Significance
R1	1.78×10^{-4}	0.12%	5.42×10^{-3}	1.15×10^{-3}	6.58×10^{-3}	4.38%	Negligible
R2	1.84×10^{-4}	0.12%		7.73×10^{-4}	6.20×10^{-3}	4.13%	Negligible
R3	1.91×10^{-4}	0.13%		1.50×10^{-3}	6.93×10^{-3}	4.62%	Negligible
R4	6.76×10^{-5}	0.05%		8.91×10^{-4}	6.31×10^{-3}	4.21%	Negligible
R5	2.15×10^{-4}	0.14%		1.19×10^{-3}	6.61×10^{-3}	4.41%	Negligible
R6	1.75×10^{-4}	0.12%		2.14×10^{-3}	7.56×10^{-3}	5.04%	Negligible
R7	3.10×10^{-4}	0.21%		2.82×10^{-3}	8.25×10^{-3}	5.50%	Negligible
R8	4.07×10^{-4}	0.27%		2.49×10^{-3}	7.91×10^{-3}	5.27%	Negligible
R8B	3.99×10^{-4}	0.27%		2.61×10^{-3}	8.03×10^{-3}	5.36%	Negligible
R9	6.39×10^{-5}	0.04%		3.94×10^{-4}	5.82×10^{-3}	3.88%	Negligible
R10	5.82×10^{-5}	0.04%		3.52×10^{-4}	5.77×10^{-3}	3.85%	Negligible
R11	2.32×10^{-4}	0.15%		1.47×10^{-3}	6.89×10^{-3}	4.59%	Negligible
R12	6.89×10^{-5}	0.05%		4.18×10^{-4}	5.84×10^{-3}	3.89%	Negligible
R13	7.84×10^{-5}	0.05%		5.09×10^{-4}	5.93×10^{-3}	3.95%	Negligible
R14	6.57×10^{-5}	0.04%		4.18×10^{-4}	5.84×10^{-3}	3.89%	Negligible
R15	2.07×10^{-4}	0.14%		1.25×10^{-3}	6.68×10^{-3}	4.45%	Negligible
R16	1.78×10^{-4}	0.12%		1.28×10^{-3}	6.70×10^{-3}	4.47%	Negligible
R16B	1.64×10^{-4}	0.11%		1.17×10^{-3}	6.59×10^{-3}	4.39%	Negligible
R17	2.01×10^{-4}	0.13%		1.08×10^{-3}	6.50×10^{-3}	4.34%	Negligible
R18A 1st	3.30×10^{-4}	0.22%		2.91×10^{-3}	8.33×10^{-3}	5.56%	Negligible
R18B 4th	3.30×10^{-4}	0.22%		2.92×10^{-3}	8.35×10^{-3}	5.56%	Negligible
R19A 1st	2.70×10^{-4}	0.18%		8.59×10^{-4}	6.28×10^{-3}	4.19%	Negligible
R19B 6th	2.75×10^{-4}	0.18%		9.38×10^{-4}	6.36×10^{-3}	4.24%	Negligible
R20A GF	3.24×10^{-4}	0.22%		2.94×10^{-3}	8.37×10^{-3}	5.58%	Negligible
R20B 5th	3.25×10^{-4}	0.22%		2.96×10^{-3}	8.39×10^{-3}	5.59%	Negligible
R21	5.87×10^{-5}	0.04%		3.69×10^{-4}	5.79×10^{-3}	3.86%	Negligible
R22	2.92×10^{-4}	0.19%		2.49×10^{-3}	7.91×10^{-3}	5.28%	Negligible
R23	9.16×10^{-5}	0.06%	7.04×10^{-4}	6.13×10^{-3}	4.08%	Negligible	
R24	5.72×10^{-5}	0.04%	4.54×10^{-4}	5.88×10^{-3}	3.92%	Negligible	
R25	5.63×10^{-5}	0.04%	4.48×10^{-4}	5.87×10^{-3}	3.91%	Negligible	
R26	1.30×10^{-4}	0.09%	8.68×10^{-4}	6.29×10^{-3}	4.19%	Negligible	
R27	3.19×10^{-5}	0.02%	2.73×10^{-4}	5.70×10^{-3}	3.80%	Negligible	



Table C.2.2.8 Predicted Annual Average Nickel Concentrations

Sensitive Human Receptor ID	REP PC ($\mu\text{g}/\text{m}^3$)	PC (%)	Background (2016) ($\mu\text{g}/\text{m}^3$)	REP + RRRF + Crossness ($\mu\text{g}/\text{m}^3$)	Total PEC ($\mu\text{g}/\text{m}^3$)	PEC (%)	IAQM Significance
R1	6.53×10^{-4}	3.26%	8.8×10^{-4}	1.63×10^{-3}	2.51×10^{-3}	12.56%	Negligible
R2	6.75×10^{-4}	3.38%		1.24×10^{-3}	2.13×10^{-3}	10.64%	Negligible
R3	7.02×10^{-4}	3.51%		2.02×10^{-3}	2.90×10^{-3}	14.50%	Negligible
R4	2.48×10^{-4}	1.24%		1.07×10^{-3}	1.95×10^{-3}	9.75%	Negligible
R5	7.90×10^{-4}	3.95%		1.77×10^{-3}	2.65×10^{-3}	13.26%	Negligible
R6	6.42×10^{-4}	3.21%		2.61×10^{-3}	3.49×10^{-3}	17.45%	Negligible
R7	1.14×10^{-3}	5.69%		3.65×10^{-3}	4.53×10^{-3}	22.67%	Minor
R8	1.49×10^{-3}	7.45%		3.57×10^{-3}	4.46×10^{-3}	22.29%	Minor
R8B	1.46×10^{-3}	7.32%		3.68×10^{-3}	4.56×10^{-3}	22.81%	Minor
R9	2.34×10^{-4}	1.17%		5.62×10^{-4}	1.45×10^{-3}	7.23%	Negligible
R10	2.13×10^{-4}	1.07%		5.04×10^{-4}	1.39×10^{-3}	6.94%	Negligible
R11	8.49×10^{-4}	4.24%		2.08×10^{-3}	2.96×10^{-3}	14.80%	Negligible
R12	2.53×10^{-4}	1.26%		6.01×10^{-4}	1.48×10^{-3}	7.42%	Negligible
R13	2.87×10^{-4}	1.44%		7.20×10^{-4}	1.60×10^{-3}	8.01%	Negligible
R14	2.41×10^{-4}	1.20%		5.95×10^{-4}	1.48×10^{-3}	7.39%	Negligible
R15	7.59×10^{-4}	3.80%		1.81×10^{-3}	2.69×10^{-3}	13.45%	Negligible
R16	6.53×10^{-4}	3.27%		1.76×10^{-3}	2.64×10^{-3}	13.20%	Negligible
R16B	6.01×10^{-4}	3.00%		1.61×10^{-3}	2.49×10^{-3}	12.45%	Negligible
R17	7.38×10^{-4}	3.69%		1.62×10^{-3}	2.51×10^{-3}	12.53%	Negligible
R18A 1st	1.21×10^{-3}	6.04%		3.79×10^{-3}	4.67×10^{-3}	23.37%	Minor
R18B 4th	1.21×10^{-3}	6.05%		3.80×10^{-3}	4.69×10^{-3}	23.43%	Minor
R19A 1st	9.90×10^{-4}	4.95%		1.56×10^{-3}	2.45×10^{-3}	12.23%	Negligible
R19B 6th	1.01×10^{-3}	5.03%		1.65×10^{-3}	2.53×10^{-3}	12.67%	Negligible
R20A GF	1.19×10^{-3}	5.94%		3.81×10^{-3}	4.69×10^{-3}	23.46%	Minor
R20B 5th	1.19×10^{-3}	5.96%		3.83×10^{-3}	4.71×10^{-3}	23.57%	Minor
R21	2.15×10^{-4}	1.08%		5.25×10^{-4}	1.41×10^{-3}	7.04%	Negligible
R22	1.07×10^{-3}	5.36%		3.27×10^{-3}	4.15×10^{-3}	20.77%	Negligible
R23	3.36×10^{-4}	1.68%	9.50×10^{-4}	1.83×10^{-3}	9.17%	Negligible	
R24	2.10×10^{-4}	1.05%	6.06×10^{-4}	1.49×10^{-3}	7.44%	Negligible	
R25	2.06×10^{-4}	1.03%	5.97×10^{-4}	1.48×10^{-3}	7.40%	Negligible	
R26	4.78×10^{-4}	2.39%	1.22×10^{-3}	2.10×10^{-3}	10.50%	Negligible	
R27	1.17×10^{-4}	0.59%	3.58×10^{-4}	1.24×10^{-3}	6.20%	Negligible	



Table C.2.2.9 Predicted Annual Average Nitrogen Dioxide Concentrations

Sensitive Human Receptor ID	REP PC ¹ (µg/m ³)	PC (%)	Background + Traffic (µg/m ³)	REP + RRRF + Crossness (µg/m ³)	Total PEC (µg/m ³)	PEC (%)	IAQM Significance
R1	2.49 x 10 ⁻¹	0.62%	19.84	0.65	20.49	51.2%	Negligible
R2	2.58 x 10 ⁻¹	0.64%	24.45	0.54	24.99	62.5%	Negligible
R3	2.68 x 10 ⁻¹	0.67%	20.69	0.79	21.48	53.7%	Negligible
R4	9.47 x 10 ⁻²	0.24%	20.80	0.37	21.17	52.9%	Negligible
R5	3.02 x 10 ⁻¹	0.75%	21.59	0.75	22.34	55.8%	Negligible
R6	2.45 x 10 ⁻¹	0.61%	18.24	0.90	19.14	47.8%	Negligible
R7	4.34 x 10 ⁻¹	1.09%	27.95	1.32	29.27	73.2%	Negligible
R8	5.69 x 10 ⁻¹	1.42%	26.59	1.40	27.99	70.0%	Negligible
R8B	8.95 x 10 ⁻²	1.40%	28.58	1.42	30.00	75.0%	Negligible
R9	8.14 x 10 ⁻²	0.22%	20.64	0.22	20.86	52.2%	Negligible
R10	3.24 x 10 ⁻¹	0.20%	18.87	0.20	19.07	47.7%	Negligible
R11	9.65 x 10 ⁻²	0.81%	31.69	0.82	32.51	81.3%	Negligible
R12	1.10 x 10 ⁻¹	0.24%	25.12	0.24	25.36	63.4%	Negligible
R13	9.20 x 10 ⁻²	0.27%	29.03	0.29	29.32	73.3%	Negligible
R14	2.90 x 10 ⁻¹	0.23%	31.67	0.24	31.91	79.8%	Negligible
R15	2.49 x 10 ⁻¹	0.72%	28.73	0.73	29.46	73.6%	Negligible
R16	2.82 x 10 ⁻¹	0.62%	19.65	0.69	20.34	50.9%	Negligible
R16B	4.61 x 10 ⁻¹	0.57%	21.66	0.63	22.29	55.7%	Negligible
R17	5.59 x 10 ⁻¹	0.70%	21.59	0.68	22.27	55.7%	Negligible
R18A 1st	2.29 x 10 ⁻¹	1.15%	23.08	1.38	24.46	61.1%	Negligible
R18B 4th	3.78 x 10 ⁻¹	1.16%	21.44	1.38	22.82	57.1%	Negligible
R19A 1st	3.84 x 10 ⁻¹	0.94%	25.60	0.69	26.29	65.7%	Negligible
R19B 6th	4.62 x 10 ⁻¹	0.96%	22.25	0.72	22.97	57.4%	Negligible
R20A GF	4.54 x 10 ⁻¹	1.13%	22.92	1.38	24.30	60.7%	Negligible
R20B 5th	4.55 x 10 ⁻¹	1.14%	21.19	1.38	22.57	56.4%	Negligible
R21	8.22 x 10 ⁻²	0.21%	32.89	0.21	33.10	82.7%	Negligible
R22	1.28 x 10 ⁻¹	1.02%	23.05	1.20	24.25	60.6%	Negligible
R23	8.00 x 10 ⁻²	0.32%	25.40	0.36	25.76	64.4%	Negligible
R24	7.88 x 10 ⁻²	0.20%	29.81	0.23	30.04	75.1%	Negligible
R25	1.83 x 10 ⁻¹	0.20%	30.82	0.22	31.04	77.6%	Negligible
R26	4.47 x 10 ⁻²	0.46%	20.44	0.50	20.94	52.3%	Negligible
R27	4.09 x 10 ⁻¹	0.11%	25.65	0.13	25.78	64.5%	Negligible

¹ Including contribution of additional traffic movements associated with REP



Table C.2.2.10 Predicted Annual Mean PM₁₀ Concentrations

Sensitive Human Receptor ID	REP PC ² (µg/m ³)	PC (%)	Background + Traffic (µg/m ³)	REP + RRRF + Crossness (µg/m ³)	Total PEC (µg/m ³)	PEC (%)	IAQM Significance
R1	0.015	0.04%	15.40	0.048	15.45	38.6%	Negligible
R2	0.015	0.04%	16.66	0.039	16.70	41.7%	Negligible
R3	0.016	0.04%	16.24	0.057	16.30	40.7%	Negligible
R4	0.006	0.01%	16.75	0.026	16.77	41.9%	Negligible
R5	0.018	0.04%	15.22	0.055	15.28	38.2%	Negligible
R6	0.015	0.04%	15.70	0.064	15.77	39.4%	Negligible
R7	0.026	0.06%	17.62	0.094	17.72	44.3%	Negligible
R8	0.034	0.08%	17.43	0.100	17.53	43.8%	Negligible
R8B	0.033	0.08%	18.12	0.101	18.22	45.5%	Negligible
R9	0.005	0.01%	16.01	0.016	16.03	40.1%	Negligible
R10	0.005	0.01%	15.83	0.014	15.84	39.6%	Negligible
R11	0.019	0.05%	19.19	0.059	19.25	48.1%	Negligible
R12	0.006	0.01%	17.84	0.017	17.86	44.6%	Negligible
R13	0.007	0.02%	17.99	0.021	18.01	45.0%	Negligible
R14	0.005	0.01%	19.45	0.017	19.47	48.7%	Negligible
R15	0.017	0.04%	17.93	0.053	17.99	45.0%	Negligible
R16	0.015	0.04%	15.38	0.050	15.43	38.6%	Negligible
R16B	0.014	0.03%	16.01	0.046	16.06	40.1%	Negligible
R17	0.017	0.04%	15.22	0.050	15.27	38.2%	Negligible
R18A 1st	0.027	0.07%	16.12	0.098	16.22	40.6%	Negligible
R18B 4th	0.028	0.07%	15.65	0.099	15.74	39.4%	Negligible
R19A 1st	0.022	0.06%	17.21	0.049	17.26	43.1%	Negligible
R19B 6th	0.023	0.06%	15.90	0.051	15.95	39.9%	Negligible
R20A GF	0.027	0.07%	16.07	0.098	16.17	40.4%	Negligible
R20B 5th	0.027	0.07%	15.57	0.099	15.67	39.2%	Negligible
R21	0.005	0.01%	21.52	0.015	21.54	53.8%	Negligible
R22	0.024	0.06%	16.14	0.086	16.22	40.6%	Negligible
R23	0.008	0.02%	18.51	0.026	18.54	46.3%	Negligible
R24	0.005	0.01%	19.89	0.016	19.91	49.8%	Negligible
R25	0.005	0.01%	20.17	0.016	20.19	50.5%	Negligible
R26	0.011	0.03%	15.63	0.036	15.67	39.2%	Negligible
R27	0.003	0.01%	18.55	0.010	18.56	46.4%	Negligible

² Including contribution of additional traffic movements associated with REP



Table C.2.2.11 Predicted Annual Mean PM_{2.5} Concentrations

Sensitive Human Receptor ID	REP PC ³ (µg/m ³)	PC (%)	Background + Traffic (µg/m ³)	REP + RRRF + Crossness (µg/m ³)	Total PEC (µg/m ³)	PEC (%)	IAQM Significance
R1	0.015	0.07%	8.89	0.048	8.94	44.7%	Negligible
R2	0.015	0.08%	10.15	0.039	10.19	50.9%	Negligible
R3	0.016	0.08%	9.12	0.057	9.18	45.9%	Negligible
R4	0.006	0.03%	9.69	0.026	9.71	48.6%	Negligible
R5	0.018	0.09%	8.69	0.055	8.75	43.7%	Negligible
R6	0.015	0.07%	9.12	0.064	9.18	45.9%	Negligible
R7	0.026	0.13%	11.35	0.094	11.45	57.2%	Negligible
R8	0.034	0.17%	10.16	0.100	10.26	51.3%	Negligible
R8B	0.033	0.17%	10.95	0.101	11.05	55.2%	Negligible
R9	0.005	0.03%	9.05	0.016	9.07	45.3%	Negligible
R10	0.005	0.02%	8.97	0.014	8.98	44.9%	Negligible
R11	0.019	0.10%	12.18	0.059	12.24	61.2%	Negligible
R12	0.006	0.03%	10.07	0.017	10.09	50.5%	Negligible
R13	0.007	0.03%	10.38	0.021	10.40	52.0%	Negligible
R14	0.005	0.03%	11.95	0.017	11.97	59.8%	Negligible
R15	0.017	0.09%	10.75	0.053	10.81	54.0%	Negligible
R16	0.015	0.07%	8.86	0.050	8.91	44.6%	Negligible
R16B	0.014	0.07%	9.58	0.046	9.63	48.1%	Negligible
R17	0.017	0.08%	8.69	0.050	8.74	43.7%	Negligible
R18A 1st	0.027	0.14%	9.64	0.098	9.74	48.7%	Negligible
R18B 4th	0.028	0.14%	9.09	0.099	9.19	46.0%	Negligible
R19A 1st	0.022	0.11%	10.76	0.049	10.81	54.0%	Negligible
R19B 6th	0.023	0.11%	9.30	0.051	9.35	46.7%	Negligible
R20A GF	0.027	0.14%	9.58	0.098	9.68	48.4%	Negligible
R20B 5th	0.027	0.14%	9.01	0.099	9.11	45.6%	Negligible
R21	0.005	0.02%	14.11	0.015	14.13	70.6%	Negligible
R22	0.024	0.12%	9.65	0.086	9.73	48.7%	Negligible
R23	0.008	0.04%	12.23	0.026	12.25	61.3%	Negligible
R24	0.005	0.02%	13.43	0.016	13.44	67.2%	Negligible
R25	0.005	0.02%	13.75	0.016	13.77	68.8%	Negligible
R26	0.011	0.05%	8.85	0.036	8.89	44.4%	Negligible
R27	0.003	0.01%	11.21	0.010	11.22	56.1%	Negligible

³ Including contribution of additional traffic movements associated with REP



C.2.3 Impact of ERF Emissions – Terrestrial Biodiversity Receptors

Table C.2.3.1 Predicted Annual Average NO_x Process Contributions and Predicted Environmental Concentrations

Site Name	Background µg/m ³	PC µg/m ³	PC ¹ %	PEC µg/m ³	PEC ¹ %
International and Nationally Designated Sites					
Inner Thames Marshes (SSSI)/ Rainham Marshes (SSSI/LNR)	40.9	0.83	2.75%	41.8	139%
Ingrebourne Marshes (SSSI/ LNR)	33.6	0.64	2.12%	34.2	114%
Oxleas Woodlands (SSSI)	33.8	0.07	0.24%	33.9	113%
Thorndon Park (SSSI)	21.2	0.07	0.23%	21.3	71%
Darenth Wood (SSSI)	33.4	0.04	0.14%	33.5	112%
Grays Thurrock Chalk Pit (SSSI)	36.9	0.04	0.12%	36.9	123%
Farningham Wood (SSSI/LNR)	33.6	0.03	0.12%	33.6	112%
Epping Forest (SSSI)	42.4	0.03	0.10%	42.4	141%
Curtismill Green (SSSI)	29.4	0.03	0.10%	29.4	98%
Hangman's Wood & Deneholes (SSSI)	28.9	0.03	0.09%	28.9	96%
Epping Forest (SSSI and SAC)	45.4	0.02	0.08%	45.4	151%
Hainault Forest (SSSI)	22.9	0.02	0.07%	22.9	76%
Locally Designated Sites					
Crossness LNR	37.5	0.47	1.57%	38.0	127%
M039	40.9	0.80	2.66%	41.7	139%
BxL07	31.8	0.67	2.24%	32.5	108%
BxL16	35.4	0.60	1.99%	36.0	120%
BxB114	33.3	0.54	1.80%	33.8	113%
Lesnes Abbey Wood LNR	31.4	0.25	0.84%	31.7	106%
BxB103	31.7	0.21	0.70%	31.9	106%
M041	28.8	0.18	0.59%	29.0	97%

¹ Expressed as percentage of the annual target (mean) of Nitrogen oxide of 30 µg/m³



Table C.2.3.2 Predicted Daily Mean NO_x Process Contributions and Predicted Environmental Concentrations

Site Name	Background µg/m ³	PC µg/m ³	PC %	PEC µg/m ³	PEC %
International and Nationally Designated Sites					
Inner Thames Marshes (SSSI/LNR)/ Rainham Marshes (SSSI)	40.9	5.2	6.9%	46.1	61.5%
Ingrebourne Marshes (SSSI/LNR)	33.6	3.1	4.1%	36.7	48.9%
Epping Forest (SAC)	45.4	1.4	1.9%	46.8	62.4%
Oxleas Woodlands (SSSI)	33.8	1.1	1.5%	34.9	46.6%
Epping Forest (SSSI)	42.4	0.7	1.0%	43.1	57.5%
Thorndon Park (SSSI)	21.2	0.7	1.0%	21.9	29.3%
Darenth Wood (SSSI)	33.4	0.7	1.0%	34.2	45.5%
Farningham Wood (SSSI/LNR)	33.6	0.7	0.9%	34.2	45.6%
Grays Thurrock Chalk Pit (SSSI)	36.9	0.5	0.7%	37.4	49.9%
Hainault Forest (SSSI)	22.9	0.4	0.6%	23.3	31.1%
Curtismill Green (SSSI)	29.4	0.4	0.6%	29.8	39.7%
Hangman's Wood & Deneholes (SSSI)	28.9	0.3	0.4%	29.2	38.9%
Locally Designated Sites					
Crossness LNR	37.5	15.6	20.8%	53.1	70.8%
BxBI14	33.3	7.5	9.9%	40.7	54.3%
Lesnes Abbey Wood LNR	31.4	7.3	9.7%	38.7	51.6%
BxL07	31.8	6.6	8.7%	38.3	51.1%
BxL16	35.4	5.6	7.4%	41.0	54.6%
BxB103	31.7	5.0	6.7%	36.7	48.9%
M039	40.9	5.0	6.7%	46.0	61.3%
M041	28.8	2.9	3.8%	31.6	42.2%

¹ Expressed as percentage of the annual target (mean) of Nitrogen oxide of 75 µg/m³

Table C.2.3.3 Predicted Annual Mean SO₂ Process Contributions and Predicted Environmental Concentrations



Site Name	Background µg/m ³	PC µg/m ³	PC %	PEC µg/m ³	PEC %
International and Nationally Designated Sites					
Inner Thames Marshes (SSSI) / Rainham Marshes (SSSI/LNR)	2.3	0.206	0.69%	2.47	8.2%
Ingrebourne Marshes (SSSI/LNR)	2.3	0.159	0.53%	2.42	8.1%
Epping Forest (SSSI)	1.5	0.007	0.07%	1.48	14.8%
Oxleas Woodlands (SSSI)	1.5	0.018	0.06%	1.54	5.1%
Thorndon Park (SSSI)	1.5	0.017	0.06%	1.55	5.2%
Grays Thurrock Chalk Pit (SSSI)	3.5	0.009	0.03%	3.51	11.7%
Darenth Wood (SSSI)	2.0	0.010	0.03%	2.03	6.8%
Farningham Wood (SSSI/LNR)	2.0	0.009	0.03%	2.00	6.7%
Epping Forest (SAC)	1.5	0.006	0.02%	1.50	5.0%
Hainault Forest (SSSI)	2.8	0.006	0.02%	2.78	9.3%
Curtismill Green (SSSI)	0.3	0.007	0.02%	0.35	1.2%
Hangman's Wood & Deneholes (SSSI)	3.5	0.007	0.02%	3.51	11.7%
Locally Designated Sites					
Crossness LNR	1.6	0.118	0.39%	1.72	5.7%
M039	2.3	0.199	0.66%	2.46	8.2%
BxL07	1.9	0.168	0.56%	2.04	6.8%
BxL16	1.9	0.149	0.50%	2.02	6.7%
BxB114	1.9	0.135	0.45%	2.01	6.7%
Lesnes Abbey Wood LNR	1.6	0.063	0.21%	1.66	5.5%
BxB103	1.6	0.053	0.18%	1.65	5.5%
M041	1.9	0.045	0.15%	1.91	6.4%

¹Expressed as percentage of annual target (mean) of Sulphur dioxide of 30 µg/m³ with exception of Epping Forest (SSSI) where the annual target of Sulphur dioxide is 10 µg/m³ for lichens



Table C.2.3.4 Predicted Annual Mean Ammonia Process Contributions and Predicted Environmental Concentrations

Site Name	Background µg/m ³	PC µg/m ³	PC %	PEC µg/m ³	PEC %
International and Nationally Designated Sites					
Inner Thames Marshes (SSSI)/ Rainham Marshes (SSSI/LNR)	2.4	0.0688	2.3%	2.4	81.3%
Ingrebourne Marshes (SSSI/LNR)	2.4	0.0530	1.8%	2.4	80.8%
Oxleas Woodlands (SSSI)	2.1	0.0060	0.2%	2.1	69.9%
Epping Forest (SSSI)	2.6	0.0025	0.2%	2.6	263.2%
Thorndon Park (SSSI)	1.7	0.0056	0.2%	1.7	56.5%
Epping Forest (SAC)	2.8	0.0020	0.1%	2.8	94.1%
Hainault Forest (SSSI)	1.8	0.0019	0.1%	1.8	59.7%
Curtismill Green (SSSI)	1.8	0.0025	0.1%	1.8	59.4%
Grays Thurrock Chalk Pit (SSSI)	1.5	0.0030	0.1%	1.5	49.8%
Hangman's Wood & Deneholes (SSSI)	1.5	0.0022	0.1%	1.5	49.7%
Darenth Wood (SSSI)	1.6	0.0034	0.1%	1.6	54.1%
Farningham Wood (SSSI/LNR)	1.7	0.0029	0.1%	1.7	56.8%
Locally Designated Sites					
Crossness LNR	2.0	0.0392	1.3%	2.1	69.0%
M039	2.4	0.0664	2.2%	2.4	81.2%
BxL07	3.1	0.0560	1.9%	3.2	106.2%
BxL16	3.1	0.0498	1.7%	3.2	106.0%
BxB114	3.1	0.0451	1.5%	3.2	105.8%
Lesnes Abbey Wood LNR	2.0	0.0211	0.7%	2.1	68.4%
BxB103	2.0	0.0175	0.6%	2.0	68.3%
M041	3.1	0.0148	0.5%	3.1	104.8%

¹ Expressed as percentage of annual target (mean) of Ammonia of 3 µg/m³ with exception of Epping Forest (SSSI) where the annual target of Ammonia is 1 µg/m³ for lichens



Table C.2.3.5 Predicted Daily HF Process Contributions and Predicted Environmental Concentrations

Site Name	Background µg/m ³	PC µg/m ³	PC %	PEC µg/m ³	PEC %
International and Nationally Designated Sites					
Inner Thames Marshes (SSSI)/ Rainham Marshes (SSSI/LNR)	1.0	0.0430	0.9%	1.043	20.9%
Oxleas Woodlands (SSSI)		0.0091	0.2%	1.009	20.2%
Epping Forest (SSSI)		0.0060	0.1%	1.006	20.1%
Epping Forest (SAC)		0.0120	0.2%	1.012	20.2%
Ingrebourne Marshes (SSSI/LNR)		0.0256	0.5%	1.026	20.5%
Thorndon Park (SSSI)		0.0062	0.1%	1.006	20.1%
Hainault Forest (SSSI)		0.0036	0.1%	1.004	20.1%
Curtismill Green (SSSI)		0.0037	0.1%	1.004	20.1%
Grays Thurrock Chalk Pit (SSSI)		0.0044	0.1%	1.004	20.1%
Hangman's Wood & Deneholes (SSSI)		0.0023	0.0%	1.002	20.0%
Darenth Wood (SSSI)		0.0062	0.1%	1.006	20.1%
Farningham Wood (SSSI/LNR)		0.0055	0.1%	1.005	20.1%
Locally Designated Sites					
Crossness LNR	1.0	0.1299	2.6%	1.130	22.6%
BxB103		0.0418	0.8%	1.042	20.8%
M039		0.0419	1.1%	1.055	21.1%
BxL07		0.0546	0.9%	1.046	20.9%
BxL16		0.0465	1.2%	1.061	21.2%
Lesnes Abbey Wood LNR		0.0605	0.5%	1.024	20.5%
M041		0.0239	1.2%	1.062	21.2%
BxB114		0.0621	0.8%	1.042	20.8%

¹ Expressed as percentage of daily target of HF of 5 µg/m³

Table C.2.3.6 Predicted Nitrogen Deposition



Site Name	Lower Critical Load (kgN/ha/yr)	Background (kgN/ha/yr)	PC (kgN/ha/yr)	PC %	PEC (kgN/ha/yr)	PEC %
International and Nationally Designated Sites						
Inner Thames Marshes (SSSI) / Rainham Marshes (SSSI/LNR)	20	16.9	8.32 x 10 ⁻²	0.42%	17.0	85%
Ingrebourne Marshes (SSSI/LNR)	15	16.9	6.42 x 10 ⁻²	0.43%	17.0	113%
Oxleas Woodlands (SSSI)	10	28.3	1.45 x 10 ⁻²	0.14%	28.3	283%
Thorndon Park (SSSI)	10	27.6	1.37 x 10 ⁻²	0.14%	27.6	276%
Darenth Wood (SSSI)	10	26.3	8.17 x 10 ⁻³	0.08%	26.3	263%
Grays Thurrock Chalk Pit (SSSI)	10	24.2	7.29 x 10 ⁻³	0.07%	24.2	242%
Farningham Wood (SSSI/LNR)	10	28.7	7.04 x 10 ⁻³	0.07%	28.7	287%
Epping Forest (SAC)	10	19.7	4.78 x 10 ⁻³	0.05%	19.7	197%
Hainault Forest (SSSI)	10	26.5	4.53 x 10 ⁻³	0.05%	26.5	265%
Hangman's Wood & Deneholes (SSSI)	10	24.2	5.30 x 10 ⁻³	0.05%	24.2	242%
Epping Forest (SSSI)	8	18.3	3.00 x 10 ⁻³	0.04%	18.3	229%
Curtismill Green (SSSI)	20	16.4	2.97 x 10 ⁻³	0.01%	16.4	82%
Locally Designated Sites						
Crossness LNR	20	16.4	4.75 x 10 ⁻²	0.24%	16.4	82%
BxL16	10	34.4	1.20 x 10 ⁻¹	1.20%	34.6	346%
BxB114	5	19.3	5.45 x 10 ⁻²	1.09%	19.4	387%
BxL07	10	34.4	6.78 x 10 ⁻²	0.68%	34.5	345%
Lesnes Abbey Wood LNR	10	28.4	5.11 x 10 ⁻²	0.51%	28.5	285%
BxB103	10	28.4	4.24 x 10 ⁻²	0.42%	28.5	285%
M039	20	16.9	8.03 x 10 ⁻²	0.40%	17.0	85%
M041	20	19.3	1.80 x 10 ⁻²	0.09%	19.3	97%



Table C.2.3.7 Predicted Total Acid Deposition (Nitrogen and Sulphur)

Site Name	Critical Load (keq/ha/yr)	Background (keq/ha/yr)	PC (keq/ha/yr)	PC %	PEC (keq/ha/yr)	PEC %
International and Nationally Designated Sites						
Inner Thames Marshes (SSSI) / Rainham Marshes (SSSI/LNR)	5.071	1.4	0.083	1.63%	1.48	29.2%
Oxleas Woodlands (SSSI)	2.721	2.22	0.014	0.52%	2.23	82.1%
Epping Forest (SSSI)	4.45	1.48	0.003	0.07%	1.48	33.3%
Epping Forest (SAC)	1.594	1.59	0.005	0.29%	1.59	100.0%
Ingrebourne Marshes	not sensitive to acidification					
Thorndon Park (SSSI)	2.065	2.16	0.013	0.65%	2.17	105.2%
Hainault Forest (SSSI)	2.908	2.07	0.004	0.15%	2.07	71.3%
Curtismill Green (SSSI)	2.078	1.32	0.003	0.14%	1.32	63.7%
Grays Thurrock Chalk Pit (SSSI)	1.739	1.98	0.007	0.41%	1.99	114.3%
Hangman's Wood & Deneholes (SSSI)	1.739	1.98	0.005	0.30%	1.99	114.2%
Darenth Wood (SSSI)	8.57	2.1	0.008	0.09%	2.11	24.6%
Farningham Wood (SSSI/LNR)	1.511	2.28	0.007	0.46%	2.29	151.3%
Locally Designated Sites						
Crossness LNR	5.071	1.35	0.047	0.93%	1.40	27.6%
BxB103	1.031	2.24	0.042	4.03%	2.28	221.3%
M039	NA					
BxL07	8.612	2.7	0.067	0.78%	2.77	32.1%
BxL16	8.612	2.7	0.118	1.37%	2.82	32.7%
Lesnes Abbey Wood LNR	1.034	2.24	0.050	4.84%	2.29	221.5%
M041	NA					
BxBI14	NA					



Table C.2.3.7 Predicted Nitrogen Acid Deposition (keqN/ha/year)

Site Name	NO ₂ (µg/m ³)	Acidification from NO ₂ (keq/ha/year)	NH ₃ (µg/m ³)	Acidification from NH ₃ (keq/ha/year)	Total Nitrogen Acid Deposition (keqN/ha/yr)
International and Nationally Designated Sites					
Oxleas Woodlands (SSSI)	0.050	1.03 x 10 ⁻³	0.0060	3.32 x 10 ⁻³	4.35 x 10 ⁻³
Thorndon Park (SSSI)	0.047	9.73 x 10 ⁻⁴	0.0056	3.13 x 10 ⁻³	4.11 x 10 ⁻³
Darenth Wood (SSSI)	0.028	5.82 x 10 ⁻⁴	0.0034	1.87 x 10 ⁻³	2.46 x 10 ⁻³
Grays Thurrock Chalk Pit (SSSI)	0.025	5.19 x 10 ⁻⁴	0.0030	1.67 x 10 ⁻³	2.19 x 10 ⁻³
Farningham Wood (SSSI/LNR)	0.024	5.01 x 10 ⁻⁴	0.0029	1.61 x 10 ⁻³	2.12 x 10 ⁻³
Hangman's Wood & Deneholes (SSSI)	0.018	3.78 x 10 ⁻⁴	0.0022	1.22 x 10 ⁻³	1.59 x 10 ⁻³
Epping Forest (SAC)	0.017	3.41 x 10 ⁻⁴	0.0020	1.10 x 10 ⁻³	1.44 x 10 ⁻³
Hainault Forest (SSSI)	0.016	3.23 x 10 ⁻⁴	0.0019	1.04 x 10 ⁻³	1.36 x 10 ⁻³
Epping Forest (SSSI)	0.021	2.14 x 10 ⁻⁴	0.0025	9.19 x 10 ⁻⁴	1.13 x 10 ⁻³
Curtismill Green (SSSI)	0.021	2.12 x 10 ⁻⁴	0.0025	9.09 x 10 ⁻⁴	1.12 x 10 ⁻³
Inner Thames Marshes (SSSI) / Rainham Marshes (SSSI/LNR)	0.578	5.93 x 10 ⁻³	0.0688	2.54 x 10 ⁻²	3.14 x 10 ⁻²
Ingrebourne Marshes (SSSI)	0.446	4.57 x 10 ⁻³	0.0530	1.96 x 10 ⁻²	2.42 x 10 ⁻²
Locally Designated Sites					
Crossness LNR	0.330	3.38 x 10 ⁻³	0.0392	1.45 x 10 ⁻²	1.79 x 10 ⁻²
M041	0.125	1.28 x 10 ⁻³	0.0148	5.49 x 10 ⁻³	6.77 x 10 ⁻³
M039	0.558	5.72 x 10 ⁻³	0.0664	2.46 x 10 ⁻²	3.03 x 10 ⁻²
BxL07	0.471	4.83 x 10 ⁻³	0.0560	2.07 x 10 ⁻²	2.56 x 10 ⁻²
BxBI14	0.378	3.88 x 10 ⁻³	0.0451	1.67 x 10 ⁻²	2.06 x 10 ⁻²
Lesnes Abbey Wood LNR	0.177	3.64 x 10 ⁻³	0.0211	1.17 x 10 ⁻²	1.54 x 10 ⁻²
BxB103	0.147	3.02 x 10 ⁻³	0.0175	9.72 x 10 ⁻³	1.27 x 10 ⁻²
BxL16	0.418	8.58 x 10 ⁻³	0.0498	2.76 x 10 ⁻²	3.62 x 10 ⁻²



Table C.2.3.7 Predicted Sulphur Acid Deposition (keqS/ha/year)

Site Name	SO ₂ (µg/m ³)	Acidification from SO ₂ (keq/ha/year)	HCl (µg/m ³)	Acidification from HCl ¹ (keq/ha/year)	Total Sulphur Acid Deposition (keqS/ha/yr)
International and Nationally Designated Sites					
Inner Thames Marshes (SSSI) / Rainham Marshes (SSSI/LNR)	0.206	2.44 x 10 ⁻²	0.0413	2.68 x 10 ⁻²	0.0512
Ingrebourne Marshes (SSSI)	0.159	1.88 x 10 ⁻²	0.0318	2.06 x 10 ⁻²	0.0395
Oxleas Woodlands (SSSI)	0.018	4.25 x 10 ⁻³	0.0036	5.59 x 10 ⁻³	0.0098
Thorndon Park (SSSI)	0.017	4.01 x 10 ⁻³	0.0034	5.27 x 10 ⁻³	0.0093
Darenth Wood (SSSI)	0.010	2.40 x 10 ⁻³	0.0020	3.16 x 10 ⁻³	0.0056
Grays Thurrock Chalk Pit (SSSI)	0.009	2.14 x 10 ⁻³	0.0018	2.81 x 10 ⁻³	0.0050
Farningham Wood (SSSI/LNR)	0.009	2.06 x 10 ⁻³	0.0017	2.72 x 10 ⁻³	0.0048
Hangman's Wood & Deneholes (SSSI)	0.007	1.56 x 10 ⁻³	0.0013	2.05 x 10 ⁻³	0.0036
Epping Forest (SAC)	0.006	1.40 x 10 ⁻³	0.0012	1.85 x 10 ⁻³	0.0032
Hainault Forest (SSSI)	0.006	1.33 x 10 ⁻³	0.0011	1.75 x 10 ⁻³	0.0031
Epping Forest (SSSI)	0.007	8.81 x 10 ⁻⁴	0.0015	9.67 x 10 ⁻⁴	0.0018
Curtismill Green (SSSI)	0.007	8.72 x 10 ⁻⁴	0.0015	9.56 x 10 ⁻⁴	0.0018
Locally Designated Sites					
Crossness LNR	0.118	1.39 x 10 ⁻²	0.0235	1.53 x 10 ⁻²	0.0292
BxL16	0.149	3.53 x 10 ⁻²	0.0299	4.65 x 10 ⁻²	0.0818
M039	0.199	2.36 x 10 ⁻²	0.0398	2.59 x 10 ⁻²	0.0494
BxL07	0.168	1.99 x 10 ⁻²	0.0336	2.18 x 10 ⁻²	0.0417
Lesnes Abbey Wood LNR	0.063	1.50 x 10 ⁻²	0.0127	1.97 x 10 ⁻²	0.0347
BxB114	0.135	1.60 x 10 ⁻²	0.0270	1.75 x 10 ⁻²	0.0335
BxB103	0.053	1.24 x 10 ⁻²	0.0105	1.64 x 10 ⁻²	0.0288
M041	0.045	5.27 x 10 ⁻³	0.0089	5.78 x 10 ⁻³	0.0110

¹Using wet and dry deposition



C.2.4 Stepped Buildings Results – Point of Maximum Concentration

Pollutant	Averaging Time	AQAL (µg/m ³)	PC % using Rochdale Envelope (worst case)	PC % using Stepped Buildings (realistic case)
Ammonia	Annual	180	0.25%	0.07%
Ammonia	Hourly	2500	0.17%	0.13%
Antimony	Annual	5	0.01%	0.003%
Antimony	Hourly	150	0.003%	0.002%
Arsenic	Annual	0.003	38.19%	10.49%
Benzene	Annual	5	9.16%	2.52%
Benzene	Hourly	195	2.17%	1.63%
Benzo(a)pyrene	Annual	0.00025	3.85%	1.06%
Cadmium	Annual	0.005	18.33%	5.03%
Cadmium	Hourly	15	0.06%	0.04%
Carbon monoxide	8-hourR	10000	0.14%	0.04%
Carbon monoxide	Hourly	30000	0.07%	0.05%
Chromium (Total)	Annual	3	0.14%	0.04%
Chromium III	Annual	5	0.27%	0.08%
Chromium III	Hourly	150	0.08%	0.06%
Chromium VI	Annual	0.0002	2.98%	0.82%
Cobalt	Annual	0.2	0.13%	0.04%
Cobalt	Hourly	1.5	0.16%	0.12%
Copper	Annual	10	0.01%	0.004%
Copper	Hourly	200	0.01%	0.005%
Hydrogen chloride	Hourly	750	0.34%	0.25%
Hydrogen fluoride	Annual	16	0.29%	0.08%
Hydrogen fluoride	Hourly	160	0.26%	0.20%
Lead	Annual	0.25	0.92%	0.25%
Manganese	Annual	0.15	1.83%	0.50%
Manganese	Hourly	1500	0.002%	0.001%
Mercury	Annual	0.25	0.37%	0.10%
Mercury	Hourly	7.5	0.11%	0.08%
Nickel	Annual	0.02	50.41%	13.84%
Nickel	Hourly	30	0.31%	0.23%
Nitrogen Dioxide	Annual	40	9.62%	2.64%
Nitrogen Dioxide	99.79%ile hourly	200	6.66%	2.24%
Particulates (PM10)	Annual	40	0.57%	0.16%



Pollutant	Averaging Time	AQAL (µg/m3)	PC % using Rochdale Envelope (worst case)	PC % using Stepped Buildings (realistic case)
Particulates (PM ₁₀)	90.41 th %ile daily	50	1.27%	0.38%
Particulates (PM _{2.5})	Annual	25	0.92%	0.25%
Particulates (PM _{2.5})	Annual	20	1.15%	0.31%
Sulphur dioxide	99.90 th %ile 15 minute	266	3.92%	1.40%
Sulphur dioxide	99.18 th %ile daily	125	5.55%	1.58%
Sulphur dioxide	99.73 th %ile hourly	350	2.70%	0.89%
Thallium	Annual	1	0.09%	0.03%
Thallium	Hourly	30	0.03%	0.02%
Vanadium	Annual	5	0.01%	0.002%
Vanadium	Hourly	1	0.25%	0.19%

