Appendix 3.5 Hydrocarbon Emission Calculations (Working Hours)

Appendix 3.5 - Hydrocarbon Emission Calculations (Working Hours)

Scenario A - 13.0 years Hourly and Daily emissions

Zone 1A & 3

Vol [1A & 3]	34124 m3
T [1A & 1C]	336 days
T [3]	273 days
A [1A]	0.18 ha
A [1C]	0.42 ha

=Vol [1A & 3] / (((T [1A & 1C] x A [1A] / (A [1A] + A [1C])) +T [3]) x 10 hours per day)

Pollutant	Concentration from soil pollutant concentrations (Appendix 3.4) (ppm)	Molecular Weight	VOC concentration (µg/m³) = (Conc (ppm) x MW x 1000) / 24.45	Total average Excavation Rate (m³/hr) based on Appendix 2.1	Emission Rate (µg/s) = Conc x Excav rate / 3600	Total Excavation Area (m²)	Continuous Emission (g/m²/s) = Emmision rate / (1000 x 1000 x Total Excavation Area)
Naphthalene	2.75E-01	128.19	1.44E+03	9.13	3.65E+00	9500	3.84E-10
Phenanthrene	3.38E-01	178.23	2.46E+03	9.13	6.24E+00	9500	6.57E-10
Anthracene	2.50E-01	178.23	1.83E+03	9.13	4.63E+00	9500	4.87E-10
Fluoranthene	4.20E-01	202.26	3.47E+03	9.13	8.80E+00	9500	9.27E-10
Pyrene	4.36E-01	202.26	3.61E+03	9.13	9.15E+00	9500	9.63E-10
Benzo(a)pyrene	3.63E-01	252.32	3.75E+03	9.13	9.50E+00	9500	1.00E-09
Benzene	1.55E-01	78.12	4.95E+02	9.13	1.26E+00	9500	1.32E-10
Toluene	2.06E-01	92.14	7.75E+02	9.13	1.97E+00	9500	2.07E-10
Ethylbenzene	2.06E-01	106.16	8.93E+02	9.13	2.26E+00	9500	2.38E-10
Xylenes (Total)	7.06E-01	106.20	3.06E+03	9.13	7.77E+00	9500	8.18E-10
Acenaphthylene	2.38E-01	152.19	1.48E+03	9.13	3.76E+00	9500	3.96E-10
Acenaphthene	2.26E-01	154.21	1.43E+03	9.13	3.62E+00	9500	3.81E-10
Fluorene	2.37E-01	166.22	1.61E+03	9.13	4.09E+00	9500	4.31E-10
Chrysene	3.18E-01	228.29	2.96E+03	9.13	7.52E+00	9500	7.91E-10
Benzo(a)anthracene	2.85E-01	228.29	2.66E+03	9.13	6.76E+00	9500	7.11E-10
Benzo(b)fluoranthene	5.03E-01	252.31	5.19E+03	9.13	1.32E+01	9500	1.38E-09
Benzo(k)fluoranthene	2.11E-01	252.31	2.18E+03	9.13	5.52E+00	9500	5.81E-10
Dibenzo(a,h)anthracene	2.65E-01	278.35	3.01E+03	9.13	7.64E+00	9500	8.04E-10
Indeno(1,2,3-cd)pyrene	3.11E-01	276.33	3.52E+03	9.13	8.93E+00	9500	9.39E-10
Benzo(g,h,i)perylene	3.15E-01	276.33	3.56E+03	9.13	9.04E+00	9500	9.51E-10

Zone 1B & 1C

Vol [1B & 1C]	69726 m3
T [1A & 1C]	336 days
T [1B]	305 days
A [1A]	0.18 ha
A [1C]	0.42 ha

=Vol [1B & 1C] / (((T [1A & 1C] x A [1C] / (A [1A] + A [1C])) + T [1B]) x 10 hours per day)

Pollutant	Concentration from soil pollutant concentrations (Appendix 3.4) (ppm)	Molecular Weight	VOC concentration (µg/m³) = (Conc (ppm) x MW x 1000) / 24.45	Total average Excavation Rate (m³/hr) based on Appendix 2.1	Emission Rate (µg/s) = Conc x Excav rate / 3600	Total Excavation Area (m²)	Continuous Emission (g/m²/s) = Emmision rate / (1000 x 1000 x Total Excavation Area)
Naphthalene	1.66E-01	128.19	8.70E+02	12.91	3.12E+00	7900	3.95E-10
Phenanthrene	7.97E-01	178.23	5.81E+03	12.91	2.08E+01	7900	2.64E-09
Anthracene	5.22E-01	178.23	3.81E+03	12.91	1.37E+01	7900	1.73E-09
Fluoranthene	2.95E+00	202.26	2.44E+04	12.91	8.74E+01	7900	1.11E-08
Pyrene	3.57E+00	202.26	2.95E+04	12.91	1.06E+02	7900	1.34E-08
Benzo(a)pyrene	2.75E+00	252.32	2.84E+04	12.91	1.02E+02	7900	1.29E-08
Benzene	1.41E-01	78.12	4.51E+02	12.91	1.62E+00	7900	2.05E-10
Toluene	1.41E-01	92.14	5.32E+02	12.91	1.91E+00	7900	2.42E-10
Ethylbenzene	1.41E-01	106.16	6.13E+02	12.91	2.20E+00	7900	2.78E-10
Xylenes (Total)	4.24E-01	106.20	1.84E+03	12.91	6.60E+00	7900	8.35E-10
Acenaphthylene	8.77E-01	152.19	5.46E+03	12.91	1.96E+01	7900	2.48E-09
Acenaphthene	2.18E-01	154.21	1.38E+03	12.91	4.94E+00	7900	6.25E-10
Fluorene	2.45E-01	166.22	1.67E+03	12.91	5.98E+00	7900	7.57E-10
Chrysene	1.61E+00	228.29	1.50E+04	12.91	5.39E+01	7900	6.82E-09
Benzo(a)anthracene	1.36E+00	228.29	1.27E+04	12.91	4.54E+01	7900	5.75E-09
Benzo(b)fluoranthene	2.77E+00	252.31	2.86E+04	12.91	1.03E+02	7900	1.30E-08
Benzo(k)fluoranthene	1.30E+00	252.31	1.34E+04	12.91	4.82E+01	7900	6.10E-09
Dibenzo(a,h)anthracene	4.68E-01	278.35	5.33E+03	12.91	1.91E+01	7900	2.42E-09
Indeno(1,2,3-cd)pyrene	9.39E-01	276.33	1.06E+04	12.91	3.81E+01	7900	4.82E-09
Benzo(g,h,i)perylene	1.15E+00	276.33	1.30E+04	12.91	4.67E+01	7900	5.91E-09

Zone 2

Vol [2]	61093 m3
T [2]	335 days

=Vol [2] / (T [2] x 10 hours per day)

Pollutant	Concentration from soil pollutant concentrations (Appendix 3.4) (ppm)	Molecular Weight	VOC concentration (µg/m³) = (Conc (ppm) x MW x 1000) / 24.45	Total average Excavation Rate (m³/hr) based on Appendix 2.1	Emission Rate (µg/s) = Conc x Excav rate / 3600	Total Excavation Area (m²)	Continuous Emission (g/m²/s) = Emmision rate / (1000 x 1000 x Total Excavation Area)
Naphthalene	7.85E-02	128.19	4.12E+02	18.24	2.08E+00	8500	2.45E-10
Phenanthrene	8.90E-01	178.23	6.49E+03	18.24	3.29E+01	8500	3.87E-09
Anthracene	4.09E-01	178.23	2.98E+03	18.24	1.51E+01	8500	1.78E-09
Fluoranthene	1.53E+00	202.26	1.26E+04	18.24	6.39E+01	8500	7.52E-09
Pyrene	1.90E+00	202.26	1.57E+04	18.24	7.95E+01	8500	9.35E-09
Benzo(a)pyrene	1.27E+00	252.32	1.31E+04	18.24	6.63E+01	8500	7.80E-09
Benzene	1.08E-01	78.12	3.46E+02	18.24	1.75E+00	8500	2.06E-10
Toluene	1.08E-01	92.14	4.08E+02	18.24	2.07E+00	8500	2.43E-10
Ethylbenzene	1.08E-01	106.16	4.70E+02	18.24	2.38E+00	8500	2.80E-10
Xylenes (Total)	3.25E-01	106.20	1.41E+03	18.24	7.15E+00	8500	8.41E-10
Acenaphthylene	4.47E-01	152.19	2.78E+03	18.24	1.41E+01	8500	1.66E-09
Acenaphthene	9.77E-02	154.21	6.16E+02	18.24	3.12E+00	8500	3.67E-10
Fluorene	2.31E-01	166.22	1.57E+03	18.24	7.95E+00	8500	9.36E-10
Chrysene	8.36E-01	228.29	7.81E+03	18.24	3.95E+01	8500	4.65E-09
Benzo(a)anthracene	1.10E+00	228.29	1.02E+04	18.24	5.18E+01	8500	6.10E-09
Benzo(b)fluoranthene	1.05E+00	252.31	1.08E+04	18.24	5.47E+01	8500	6.44E-09
Benzo(k)fluoranthene	9.05E-01	252.31	9.34E+03	18.24	4.73E+01	8500	5.57E-09
Dibenzo(a,h)anthracene	3.07E-01	278.35	3.49E+03	18.24	1.77E+01	8500	2.08E-09
Indeno(1,2,3-cd)pyrene	5.14E-01	276.33	5.81E+03	18.24	2.94E+01	8500	3.46E-09
Benzo(g,h,i)perylene	6.94E-01	276.33	7.85E+03	18.24	3.98E+01	8500	4.68E-09

Zone 4, 5A & 5B

Vol [4, 5A & 5B]	50690 m3
T [4, 5A & 5B]	365 days

=Vol [4, 5A & 5B] / (T [4, 5A & 5B] x 10 hours per day)

Pollutant	Concentration from soil pollutant concentrations (Appendix 3.4) (ppm)	Molecular Weight	VOC concentration (µg/m³) = (Conc (ppm) x MW x 1000) / 24.45	Total average Excavation Rate (m³/hr) based on Appendix 2.1	Emission Rate (µg/s) = Conc x Excav rate / 3600	Total Excavation Area (m²)	Continuous Emission (g/m²/s) = Emmision rate / (1000 x 1000 x Total Excavation Area)
Naphthalene	5.95E-02	128.19	3.12E+02	13.89	1.20E+00	6300	1.91E-10
Phenanthrene	2.63E-01	178.23	1.91E+03	13.89	7.38E+00	6300	1.17E-09
Anthracene	1.52E-01	178.23	1.11E+03	13.89	4.29E+00	6300	6.80E-10
Fluoranthene	7.68E-01	202.26	6.35E+03	13.89	2.45E+01	6300	3.89E-09
Pyrene	9.09E-01	202.26	7.52E+03	13.89	2.90E+01	6300	4.61E-09
Benzo(a)pyrene	9.15E-01	252.32	9.44E+03	13.89	3.64E+01	6300	5.78E-09
Benzene	1.05E-01	78.12	3.37E+02	13.89	1.30E+00	6300	2.06E-10
Toluene	1.05E-01	92.14	3.98E+02	13.89	1.53E+00	6300	2.43E-10
Ethylbenzene	1.05E-01	106.16	4.58E+02	13.89	1.77E+00	6300	2.80E-10
Xylenes (Total)	3.16E-01	106.20	1.37E+03	13.89	5.30E+00	6300	8.42E-10
Acenaphthylene	1.78E-01	152.19	1.11E+03	13.89	4.27E+00	6300	6.78E-10
Acenaphthene	4.83E-02	154.21	3.04E+02	13.89	1.17E+00	6300	1.86E-10
Fluorene	6.26E-02	166.22	4.25E+02	13.89	1.64E+00	6300	2.60E-10
Chrysene	5.23E-01	228.29	4.89E+03	13.89	1.88E+01	6300	2.99E-09
Benzo(a)anthracene	5.56E-01	228.29	5.19E+03	13.89	2.00E+01	6300	3.18E-09
Benzo(b)fluoranthene	8.29E-01	252.31	8.55E+03	13.89	3.30E+01	6300	5.24E-09
Benzo(k)fluoranthene	6.17E-01	252.31	6.37E+03	13.89	2.46E+01	6300	3.90E-09
Dibenzo(a,h)anthracene	2.42E-01	278.35	2.75E+03	13.89	1.06E+01	6300	1.69E-09
Indeno(1,2,3-cd)pyrene	4.03E-01	276.33	4.56E+03	13.89	1.76E+01	6300	2.79E-09
Benzo(g,h,i)perylene	7.27E-01	276.33	8.21E+03	13.89	3.17E+01	6300	5.03E-09

Appendix 3.5 - Hydrocarbon Emission Calculations (Working Hours)

Scenario B - 7.0 years Hourly and Daily emissions

Vol [1A & 3] 34124 m3
T [1A & 1C] 336 days
T [3 (30%) & 1B] 244 days
T [3 (70%)] 273 days
A [1A] 0.18 ha
A [1B] 0.37 ha
A [1C] 0.42 ha
A [3] 0.77 ha

= Vol [1A & 3] / (((T [1A & 1C] x A [1A] / (A [1A] + A [1C])) + T [3 (70%)] + (T [3 (30%) & 1B] x A [3] x 0.3 / (A [3] x 0.3 + A [1B]))) x 10 hours per day)

Zone 1A & 3

Pollutant	Concentration from soil pollutant concentrations (Appendix 3.4) (ppm)	Molecular Weight	VOC concentration (µg/m³) = (Conc (ppm) x MW x 1000) / 24.45	Total average Excavation Rate (m³/hr) based on Appendix 2.1	Emission Rate (µg/s) = Conc x Excav rate / 3600	Total Excavation Area (m²)	Continuous Emission (g/m²/s) = Emmision rate / (1000 x 1000 x Total Excavation Area)
Naphthalene	2.75E-01	128.19	1.44E+03	7.30	2.92E+00	9500	3.07E-10
Phenanthrene	3.38E-01	178.23	2.46E+03	7.30	4.99E+00	9500	5.25E-10
Anthracene	2.50E-01	178.23	1.83E+03	7.30	3.70E+00	9500	3.90E-10
Fluoranthene	4.20E-01	202.26	3.47E+03	7.30	7.04E+00	9500	7.41E-10
Pyrene	4.36E-01	202.26	3.61E+03	7.30	7.32E+00	9500	7.70E-10
Benzo(a)pyrene	3.63E-01	252.32	3.75E+03	7.30	7.60E+00	9500	8.00E-10
Benzene	1.55E-01	78.12	4.95E+02	7.30	1.00E+00	9500	1.06E-10
Toluene	2.06E-01	92.14	7.75E+02	7.30	1.57E+00	9500	1.65E-10
Ethylbenzene	2.06E-01	106.16	8.93E+02	7.30	1.81E+00	9500	1.91E-10
Xylenes (Total)	7.06E-01	106.20	3.06E+03	7.30	6.21E+00	9500	6.54E-10
Acenaphthylene	2.38E-01	490.05	4.78E+03	7.30	9.69E+00	9500	1.02E-09
Acenaphthene	2.26E-01	471.05	4.36E+03	7.30	8.83E+00	9500	9.30E-10
Fluorene	2.37E-01	532.98	5.18E+03	7.30	1.05E+01	9500	1.10E-09
Chrysene	3.18E-01	979.00	1.27E+04	7.30	2.58E+01	9500	2.71E-09
Benzo(a)anthracene	2.85E-01	801.04	9.35E+03	7.30	1.90E+01	9500	1.99E-09
Benzo(b)fluoranthene	5.03E-01	1712.57	3.52E+04	7.30	7.14E+01	9500	7.51E-09
Benzo(k)fluoranthene	2.11E-01	549.98	4.75E+03	7.30	9.62E+00	9500	1.01E-09
Dibenzo(a,h)anthracene	2.65E-01	994.57	1.08E+04	7.30	2.18E+01	9500	2.30E-09
Indeno(1,2,3-cd)pyrene	3.11E-01	1162.20	1.48E+04	7.30	3.00E+01	9500	3.16E-09
Benzo(g,h,i)perylene	3.15E-01	1176.70	1.52E+04	7.30	3.08E+01	9500	3.24E-09

Zone 1B & 1C

Vol [1B & 1C] 69726 m3
T [1A & 1C] 336 days
T [3 (30%) & 1B] 244 days
A [1A] 0.18 ha
A [1B] 0.37 ha
A [1C] 0.42 ha
A [3] 0.77 ha

= Vol [1B & 1C] / (((T [3 (30%) & 1B] x A [1B] / (A [3] x 0.3 + A [1B])) + (T [1A & 1C] x A [1C] / (A [1A] + A [1C]))) x 10 hours per day)

Pollutant	Concentration from soil pollutant concentrations (Appendix 3.4) (ppm)	Molecular Weight	VOC concentration (µg/m³) = (Conc (ppm) x MW x 1000) / 24.45	Total average Excavation Rate (m³/hr) based on Appendix 2.1	Emission Rate (µg/s) = Conc x Excav rate / 3600	Total Excavation Area (m²)	Continuous Emission (g/m²/s) = Emmision rate / (1000 x 1000 x Total Excavation Area)
Naphthalene	1.66E-01	128.19	8.70E+02	18.09	4.37E+00	7900	5.53E-10
Phenanthrene	7.97E-01	178.23	5.81E+03	18.09	2.92E+01	7900	3.69E-09
Anthracene	5.22E-01	178.23	3.81E+03	18.09	1.91E+01	7900	2.42E-09
Fluoranthene	2.95E+00	202.26	2.44E+04	18.09	1.22E+02	7900	1.55E-08
Pyrene	3.57E+00	202.26	2.95E+04	18.09	1.48E+02	7900	1.88E-08
Benzo(a)pyrene	2.75E+00	252.32	2.84E+04	18.09	1.43E+02	7900	1.80E-08
Benzene	1.41E-01	78.12	4.51E+02	18.09	2.27E+00	7900	2.87E-10
Toluene	1.41E-01	92.14	5.32E+02	18.09	2.68E+00	7900	3.39E-10
Ethylbenzene	1.41E-01	106.16	6.13E+02	18.09	3.08E+00	7900	3.90E-10
Xylenes (Total)	4.24E-01	106.20	1.84E+03	18.09	9.25E+00	7900	1.17E-09
Acenaphthylene	8.77E-01	490.05	1.76E+04	18.09	8.84E+01	7900	1.12E-08
Acenaphthene	2.18E-01	471.05	4.21E+03	18.09	2.11E+01	7900	2.68E-09
Fluorene	2.45E-01	532.98	5.35E+03	18.09	2.69E+01	7900	3.40E-09
Chrysene	1.61E+00	979.00	6.44E+04	18.09	3.24E+02	7900	4.10E-08
Benzo(a)anthracene	1.36E+00	801.04	4.45E+04	18.09	2.23E+02	7900	2.83E-08
Benzo(b)fluoranthene	2.77E+00	1712.57	1.94E+05	18.09	9.75E+02	7900	1.23E-07
Benzo(k)fluoranthene	1.30E+00	549.98	2.93E+04	18.09	1.47E+02	7900	1.86E-08
Dibenzo(a,h)anthracene	4.68E-01	994.57	1.90E+04	18.09	9.57E+01	7900	1.21E-08
Indeno(1,2,3-cd)pyrene	9.39E-01	1162.20	4.46E+04	18.09	2.24E+02	7900	2.84E-08
Benzo(g,h,i)perylene	1.15E+00	1176.70	5.55E+04	18.09	2.79E+02	7900	3.53E-08

Zone 2

Vol [2] 61093 m3
T [2] 304 days

= Vol [2] / (T [2] x 10 hours per day)

Pollutant	Concentration from soil pollutant concentrations (Appendix 3.4) (ppm)	Molecular Weight	VOC concentration (µg/m³) = (Conc (ppm) x MW x 1000) / 24.45	Total average Excavation Rate (m³/hr) based on Appendix 2.1	Emission Rate (µg/s) = Conc x Excav rate / 3600	Total Excavation Area (m²)	Continuous Emission (g/m²/s) = Emmision rate / (1000 x 1000 x Total Excavation Area)
Naphthalene	7.85E-02	128.19	4.12E+02	20.10	2.30E+00	8500	2.70E-10
Phenanthrene	8.90E-01	178.23	6.49E+03	20.10	3.62E+01	8500	4.26E-09
Anthracene	4.09E-01	178.23	2.98E+03	20.10	1.67E+01	8500	1.96E-09
Fluoranthene	1.53E+00	202.26	1.26E+04	20.10	7.04E+01	8500	8.29E-09
Pyrene	1.90E+00	202.26	1.57E+04	20.10	8.76E+01	8500	1.03E-08
Benzo(a)pyrene	1.27E+00	252.32	1.31E+04	20.10	7.31E+01	8500	8.60E-09
Benzene	1.08E-01	78.12	3.46E+02	20.10	1.93E+00	8500	2.27E-10
Toluene	1.08E-01	92.14	4.08E+02	20.10	2.28E+00	8500	2.68E-10
Ethylbenzene	1.08E-01	106.16	4.70E+02	20.10	2.63E+00	8500	3.09E-10
Xylenes (Total)	3.25E-01	106.20	1.41E+03	20.10	7.88E+00	8500	9.27E-10
Acenaphthylene	4.47E-01	490.05	8.96E+03	20.10	5.00E+01	8500	5.89E-09
Acenaphthene	9.77E-02	471.05	1.88E+03	20.10	1.05E+01	8500	1.24E-09
Fluorene	2.31E-01	532.98	5.03E+03	20.10	2.81E+01	8500	3.31E-09
Chrysene	8.36E-01	979.00	3.35E+04	20.10	1.87E+02	8500	2.20E-08
Benzo(a)anthracene	1.10E+00	801.04	3.59E+04	20.10	2.00E+02	8500	2.36E-08
Benzo(b)fluoranthene	1.05E+00	1712.57	7.33E+04	20.10	4.09E+02	8500	4.82E-08
Benzo(k)fluoranthene	9.05E-01	549.98	2.04E+04	20.10	1.14E+02	8500	1.34E-08
Dibenzo(a,h)anthracene	3.07E-01	994.57	1.25E+04	20.10	6.96E+01	8500	8.19E-09
Indeno(1,2,3-cd)pyrene	5.14E-01	1162.20	2.44E+04	20.10	1.36E+02	8500	1.60E-08
Benzo(g,h,i)perylene	6.94E-01	1176.70	3.34E+04	20.10	1.87E+02	8500	2.19E-08

Zone 4, 5A & 5B

Vol [4,5A&5B] 50690 m3
T [4] 242 days
T [5A&5B] 274 days

= Vol [4,5A&5B] / ((T [4] + T [5A&5B]) x 10 hours per day)

Pollutant	Concentration from soil pollutant concentrations (Appendix 3.4) (ppm)	Molecular Weight	VOC concentration (µg/m³) = (Conc (ppm) x MW x 1000) / 24.45	Total average Excavation Rate (m³/hr) based on Appendix 2.1	Emission Rate (µg/s) = Conc x Excav rate / 3600	Total Excavation Area (m²)	Continuous Emission (g/m²/s) = Emmision rate / (1000 x 1000 x Total Excavation Area)
Naphthalene	5.95E-02	128.19	3.12E+02	9.82	8.52E-01	6300	1.35E-10
Phenanthrene	2.63E-01	178.23	1.91E+03	9.82	5.22E+00	6300	8.29E-10
Anthracene	1.52E-01	178.23	1.11E+03	9.82	3.03E+00	6300	4.81E-10
Fluoranthene	7.68E-01	202.26	6.35E+03	9.82	1.73E+01	6300	2.75E-09
Pyrene	9.09E-01	202.26	7.52E+03	9.82	2.05E+01	6300	3.26E-09
Benzo(a)pyrene	9.15E-01	252.32	9.44E+03	9.82	2.58E+01	6300	4.09E-09
Benzene	1.05E-01	78.12	3.37E+02	9.82	9.20E-01	6300	1.46E-10
Toluene	1.05E-01	92.14	3.98E+02	9.82	1.08E+00	6300	1.72E-10
Ethylbenzene	1.05E-01	106.16	4.58E+02	9.82	1.25E+00	6300	1.98E-10
Xylenes (Total)	3.16E-01	106.20	1.37E+03	9.82	3.75E+00	6300	5.95E-10
Acenaphthylene	1.78E-01	490.05	3.56E+03	9.82	9.72E+00	6300	1.54E-09
Acenaphthene	4.83E-02	471.05	9.30E+02	9.82	2.54E+00	6300	4.03E-10
Fluorene	6.26E-02	532.98	1.36E+03	9.82	3.72E+00	6300	5.91E-10
Chrysene	5.23E-01	979.00	2.10E+04	9.82	5.72E+01	6300	9.07E-09
Benzo(a)anthracene	5.56E-01	801.04	1.82E+04	9.82	4.97E+01	6300	7.88E-09
Benzo(b)fluoranthene	8.29E-01	1712.57	5.80E+04	9.82	1.58E+02	6300	2.51E-08
Benzo(k)fluoranthene	6.17E-01	549.98	1.39E+04	9.82	3.79E+01	6300	6.01E-09
Dibenzo(a,h)anthracene	2.42E-01	994.57	9.84E+03	9.82	2.68E+01	6300	4.26E-09
Indeno(1,2,3-cd)pyrene	4.03E-01	1162.20	1.92E+04	9.82	5.23E+01	6300	8.31E-09
Benzo(g,h,i)perylene	7.27E-01	1176.70	3.50E+04	9.82	9.54E+01	6300	1.51E-08

Appendix 3.5 - Hydrocarbon Emission Calculations (Working Hours)

Scenario C - 4.5 years Hourly and Daily

Vol [1A&3] 34124 m3
T [1A&3] 275 days

= Vol [1A&3] / (T [1A&3] x 10 hours per day)

Zone 1A & 3

Pollutant	Concentration from soil pollutant concentrations (Appendix 3.4) (ppm)	Molecular Weight	VOC concentration (µg/m³) = (Conc (ppm) x MW x 1000) / 24.45	Total average Excavation Rate (m³/hr) based on Appendix 2.1	Emission Rate (µg/s) = Conc x Excav rate / 3600	Total Excavation Area (m²)	Continuous Emission (g/m²/s) = Emmision rate / (1000 x 1000 x Total Excavation Area)
Naphthalene	2.75E-01	128.19	1.44E+03	12.41	4.96E+00	9500	5.23E-10
Phenanthrene	3.38E-01	178.23	2.46E+03	12.41	8.49E+00	9500	8.93E-10
Anthracene	2.50E-01	178.23	1.83E+03	12.41	6.29E+00	9500	6.62E-10
Fluoranthene	4.20E-01	202.26	3.47E+03	12.41	1.20E+01	9500	1.26E-09
Pyrene	4.36E-01	202.26	3.61E+03	12.41	1.24E+01	9500	1.31E-09
Benzo(a)pyrene	3.63E-01	252.32	3.75E+03	12.41	1.29E+01	9500	1.36E-09
Benzene	1.55E-01	78.12	4.95E+02	12.41	1.71E+00	9500	1.80E-10
Toluene	2.06E-01	92.14	7.75E+02	12.41	2.67E+00	9500	2.81E-10
Ethylbenzene	2.06E-01	106.16	8.93E+02	12.41	3.08E+00	9500	3.24E-10
Xylenes (Total)	7.06E-01	106.20	3.06E+03	12.41	1.06E+01	9500	1.11E-09
Acenaphthylene	2.38E-01	152.19	1.48E+03	12.41	5.12E+00	9500	5.38E-10
Acenaphthene	2.26E-01	154.21	1.43E+03	12.41	4.92E+00	9500	5.18E-10
Fluorene	2.37E-01	166.22	1.61E+03	12.41	5.56E+00	9500	5.86E-10
Chrysene	3.18E-01	228.29	2.96E+03	12.41	1.02E+01	9500	1.08E-09
Benzo(a)anthracene	2.85E-01	228.29	2.66E+03	12.41	9.18E+00	9500	9.67E-10
Benzo(b)fluoranthene	5.03E-01	252.31	5.19E+03	12.41	1.79E+01	9500	1.88E-09
Benzo(k)fluoranthene	2.11E-01	252.31	2.18E+03	12.41	7.50E+00	9500	7.90E-10
Dibenzo(a,h)anthracene	2.65E-01	278.35	3.01E+03	12.41	1.04E+01	9500	1.09E-09
Indeno(1,2,3-cd)pyrene	3.11E-01	276.33	3.52E+03	12.41	1.21E+01	9500	1.28E-09
Benzo(g,h,i)perylene	3.15E-01	276.33	3.56E+03	12.41	1.23E+01	9500	1.29E-09

Zone 1B & 1C

Vol [1B&1C] 69726 m3
T [1B&1C] 334 days

= Vol [1B&1C] / (T [1B&1C] x 10 hours per day)

Pollutant	Concentration from soil pollutant concentrations (Appendix 3.4) (ppm)	Molecular Weight	VOC concentration (µg/m³) = (Conc (ppm) x MW x 1000) / 24.45	Total average Excavation Rate (m³/hr) based on Appendix 2.1	Emission Rate (µg/s) = Conc x Excav rate / 3600	Total Excavation Area (m²)	Continuous Emission (g/m²/s) = Emmision rate / (1000 x 1000 x Total Excavation Area)
Naphthalene	1.66E-01	128.19	8.70E+02	20.88	5.05E+00	7900	6.39E-10
Phenanthrene	7.97E-01	178.23	5.81E+03	20.88	3.37E+01	7900	4.26E-09
Anthracene	5.22E-01	178.23	3.81E+03	20.88	2.21E+01	7900	2.80E-09
Fluoranthene	2.95E+00	202.26	2.44E+04	20.88	1.41E+02	7900	1.79E-08
Pyrene	3.57E+00	202.26	2.95E+04	20.88	1.71E+02	7900	2.17E-08
Benzo(a)pyrene	2.75E+00	252.32	2.84E+04	20.88	1.64E+02	7900	2.08E-08
Benzene	1.41E-01	78.12	4.51E+02	20.88	2.62E+00	7900	3.31E-10
Toluene	1.41E-01	92.14	5.32E+02	20.88	3.09E+00	7900	3.91E-10
Ethylbenzene	1.41E-01	106.16	6.13E+02	20.88	3.56E+00	7900	4.50E-10
Xylenes (Total)	4.24E-01	106.20	1.84E+03	20.88	1.07E+01	7900	1.35E-09
Acenaphthylene	8.77E-01	152.19	5.46E+03	20.88	3.17E+01	7900	4.01E-09
Acenaphthene	2.18E-01	154.21	1.38E+03	20.88	7.99E+00	7900	1.01E-09
Fluorene	2.45E-01	166.22	1.67E+03	20.88	9.68E+00	7900	1.22E-09
Chrysene	1.61E+00	228.29	1.50E+04	20.88	8.71E+01	7900	1.10E-08
Benzo(a)anthracene	1.36E+00	228.29	1.27E+04	20.88	7.35E+01	7900	9.30E-09
Benzo(b)fluoranthene	2.77E+00	252.31	2.86E+04	20.88	1.66E+02	7900	2.10E-08
Benzo(k)fluoranthene	1.30E+00	252.31	1.34E+04	20.88	7.80E+01	7900	9.87E-09
Dibenzo(a,h)anthracene	4.68E-01	278.35	5.33E+03	20.88	3.09E+01	7900	3.91E-09
Indeno(1,2,3-cd)pyrene	9.39E-01	276.33	1.06E+04	20.88	6.15E+01	7900	7.79E-09
Benzo(g,h,i)perylene	1.15E+00	276.33	1.30E+04	20.88	7.56E+01	7900	9.56E-09

Zone 2

Vol [2] 61093 m3
T [2] 306 days

= Vol [2] / (T [2] x 10 hours per day)

Pollutant	Concentration from soil pollutant concentrations (Appendix 3.4) (ppm)	Molecular Weight	VOC concentration (µg/m³) = (Conc (ppm) x MW x 1000) / 24.45	Total average Excavation Rate (m³/hr) based on Appendix 2.1	Emission Rate (µg/s) = Conc x Excav rate / 3600	Total Excavation Area (m²)	Continuous Emission (g/m²/s) = Emmision rate / (1000 x 1000 x Total Excavation Area)
Naphthalene	7.85E-02	128.19	4.12E+02	19.97	2.28E+00	8500	2.69E-10
Phenanthrene	8.90E-01	178.23	6.49E+03	19.97	3.60E+01	8500	4.23E-09
Anthracene	4.09E-01	178.23	2.98E+03	19.97	1.66E+01	8500	1.95E-09
Fluoranthene	1.53E+00	202.26	1.26E+04	19.97	7.00E+01	8500	8.23E-09
Pyrene	1.90E+00	202.26	1.57E+04	19.97	8.70E+01	8500	1.02E-08
Benzo(a)pyrene	1.27E+00	252.32	1.31E+04	19.97	7.26E+01	8500	8.54E-09
Benzene	1.08E-01	78.12	3.46E+02	19.97	1.92E+00	8500	2.26E-10
Toluene	1.08E-01	92.14	4.08E+02	19.97	2.26E+00	8500	2.66E-10
Ethylbenzene	1.08E-01	106.16	4.70E+02	19.97	2.61E+00	8500	3.07E-10
Xylenes (Total)	3.25E-01	106.20	1.41E+03	19.97	7.83E+00	8500	9.21E-10
Acenaphthylene	4.47E-01	152.19	2.78E+03	19.97	1.54E+01	8500	1.82E-09
Acenaphthene	9.77E-02	154.21	6.16E+02	19.97	3.42E+00	8500	4.02E-10
Fluorene	2.31E-01	166.22	1.57E+03	19.97	8.71E+00	8500	1.02E-09
Chrysene	8.36E-01	228.29	7.81E+03	19.97	4.33E+01	8500	5.09E-09
Benzo(a)anthracene	1.10E+00	228.29	1.02E+04	19.97	5.68E+01	8500	6.68E-09
Benzo(b)fluoranthene	1.05E+00	252.31	1.08E+04	19.97	5.99E+01	8500	7.05E-09
Benzo(k)fluoranthene	9.05E-01	252.31	9.34E+03	19.97	5.18E+01	8500	6.10E-09
Dibenzo(a,h)anthracene	3.07E-01	278.35	3.49E+03	19.97	1.94E+01	8500	2.28E-09
Indeno(1,2,3-cd)pyrene	5.14E-01	276.33	5.81E+03	19.97	3.22E+01	8500	3.79E-09
Benzo(g,h,i)perylene	6.94E-01	276.33	7.85E+03	19.97	4.35E+01	8500	5.12E-09

Zone 4, 5A & 5B

Vol [4,5A&5B] 50690 m3
T [4] 184 days
T [5A&5B] 274 days

= Vol [4,5A&5B] / ((T [4] + T [5A&5B]) x 10 hours per day)

Pollutant	Concentration from soil pollutant concentrations (Appendix 3.4) (ppm)	Molecular Weight	VOC concentration (µg/m³) = (Conc (ppm) x MW x 1000) / 24.45	Total average Excavation Rate (m³/hr) based on Appendix 2.1	Emission Rate (µg/s) = Conc x Excav rate / 3600	Total Excavation Area (m²)	Continuous Emission (g/m²/s) = Emmision rate / (1000 x 1000 x Total Excavation Area)
Naphthalene	5.95E-02	128.19	3.12E+02	11.07	9.60E-01	6300	1.52E-10
Phenanthrene	2.63E-01	178.23	1.91E+03	11.07	5.88E+00	6300	9.34E-10
Anthracene	1.52E-01	178.23	1.11E+03	11.07	3.42E+00	6300	5.42E-10
Fluoranthene	7.68E-01	202.26	6.35E+03	11.07	1.95E+01	6300	3.10E-09
Pyrene	9.09E-01	202.26	7.52E+03	11.07	2.31E+01	6300	3.67E-09
Benzo(a)pyrene	9.15E-01	252.32	9.44E+03	11.07	2.90E+01	6300	4.61E-09
Benzene	1.05E-01	78.12	3.37E+02	11.07	1.04E+00	6300	1.64E-10
Toluene	1.05E-01	92.14	3.98E+02	11.07	1.22E+00	6300	1.94E-10
Ethylbenzene	1.05E-01	106.16	4.58E+02	11.07	1.41E+00	6300	2.23E-10
Xylenes (Total)	3.16E-01	106.20	1.37E+03	11.07	4.23E+00	6300	6.71E-10
Acenaphthylene	1.78E-01	152.19	1.11E+03	11.07	3.40E+00	6300	5.40E-10
Acenaphthene	4.83E-02	154.21	3.04E+02	11.07	9.36E-01	6300	1.49E-10
Fluorene	6.26E-02	166.22	4.25E+02	11.07	1.31E+00	6300	2.08E-10
Chrysene	5.23E-01	228.29	4.89E+03	11.07	1.50E+01	6300	2.38E-09
Benzo(a)anthracene	5.56E-01	228.29	5.19E+03	11.07	1.59E+01	6300	2.53E-09
Benzo(b)fluoranthene	8.29E-01	252.31	8.55E+03	11.07	2.63E+01	6300	4.17E-09
Benzo(k)fluoranthene	6.17E-01	252.31	6.37E+03	11.07	1.96E+01	6300	3.11E-09
Dibenzo(a,h)anthracene	2.42E-01	278.35	2.75E+03	11.07	8.47E+00	6300	1.34E-09
Indeno(1,2,3-cd)pyrene	4.03E-01	276.33	4.56E+03	11.07	1.40E+01	6300	2.23E-09
Benzo(g,h,i)perylene	7.27E-01	276.33	8.21E+03	11.07	2.52E+01	6300	4.01E-09

Appendix 3.5 - Hydrocarbon Emission Calculations (Working Hours)

Scenario A - 13.0 years Annual average emissions

Zone 1A & 3 — **Annual % active area: 11%**

Pollutant	Concentration from soil pollutant concentrations (Appendix 3.4) (ppm)	Molecular Weight	VOC concentration (µg/m³) = (Conc (ppm) x MW x 1000) / 24.45	Total average Excavation Rate (m³/hr) based on Appendix 2.1	Emission Rate (µg/s) = Conc x Excav rate / 3600	Total Excavation Area (m²)	Continuous Annual Emission (g/m²/s) = Emmision rate / (1000 x 1000 x Total Excavation Area) x (Annual average active area)
Naphthalene	2.75E-01	128.19	1440.35	9.13	3.65	9500.00	4.42E-11
Phenanthrene	3.38E-01	178.23	2461.98	9.13	6.24	9500.00	7.55E-11
Anthracene	2.50E-01	178.23	1825.46	9.13	4.63	9500.00	5.60E-11
Fluoranthene	4.20E-01	202.26	3471.79	9.13	8.80	9500.00	1.07E-10
Pyrene	4.36E-01	202.26	3609.26	9.13	9.15	9500.00	1.11E-10
Benzo(a)pyrene	3.63E-01	252.32	3747.11	9.13	9.50	9500.00	1.15E-10
Benzene	1.55E-01	78.12	495.24	9.13	1.26	9500.00	1.52E-11
Toluene	2.06E-01	92.14	774.90	9.13	1.97	9500.00	2.38E-11
Ethylbenzene	2.06E-01	106.16	892.81	9.13	2.26	9500.00	2.74E-11
Xylenes (Total)	7.06E-01	106.20	3064.92	9.13	7.77	9500.00	9.40E-11
Acenaphthylene	2.38E-01	152.19	1484.08	9.13	3.76	9500.00	4.55E-11
Acenaphthene	2.26E-01	154.21	1426.55	9.13	3.62	9500.00	4.38E-11
Fluorene	2.37E-01	166.22	1614.10	9.13	4.09	9500.00	4.95E-11
Chrysene	3.18E-01	228.29	2964.83	9.13	7.52	9500.00	9.10E-11
Benzo(a)anthracene	2.85E-01	228.29	2664.32	9.13	6.76	9500.00	8.17E-11
Benzo(b)fluoranthene	5.03E-01	252.31	5186.40	9.13	13.15	9500.00	1.59E-10
Benzo(k)fluoranthene	2.11E-01	252.31	2177.32	9.13	5.52	9500.00	6.68E-11
Dibenzo(a,h)anthracene	2.65E-01	278.35	3011.99	9.13	7.64	9500.00	9.24E-11
Indeno(1,2,3-cd)pyrene	3.11E-01	276.33	3519.65	9.13	8.93	9500.00	1.08E-10
Benzo(g,h,i)perylene	3.15E-01	276.33	3563.57	9.13	9.04	9500.00	1.09E-10

Zone 1B & 1C — **Annual % active area: 11%**

Pollutant	Concentration from soil pollutant concentrations (Appendix 3.4) (ppm)	Molecular Weight	VOC concentration (µg/m³) = (Conc (ppm) x MW x 1000) / 24.45	Total average Excavation Rate (m³/hr) based on Appendix 2.1	Emission Rate (µg/s) = Conc x Excav rate / 3600	Total Excavation Area (m²)	Continuous Annual Emission (g/m²/s) = Emmision rate / (1000 x 1000 x Total Excavation Area) x (Annual average active area)
Naphthalene	1.66E-01	128.19	870.07	12.91	3.12	7900.00	4.54E-11
Phenanthrene	7.97E-01	178.23	5808.01	12.91	20.82	7900.00	3.03E-10
Anthracene	5.22E-01	178.23	3808.48	12.91	13.65	7900.00	1.99E-10
Fluoranthene	2.95E+00	202.26	24370.25	12.91	87.38	7900.00	1.27E-09
Pyrene	3.57E+00	202.26	29523.72	12.91	105.85	7900.00	1.54E-09
Benzo(a)pyrene	2.75E+00	252.32	28360.30	12.91	101.68	7900.00	1.48E-09
Benzene	1.41E-01	78.12	451.37	12.91	1.62	7900.00	2.35E-11
Toluene	1.41E-01	92.14	532.38	12.91	1.91	7900.00	2.78E-11
Ethylbenzene	1.41E-01	106.16	613.38	12.91	2.20	7900.00	3.20E-11
Xylenes (Total)	4.24E-01	106.20	1840.84	12.91	6.60	7900.00	9.60E-11
Acenaphthylene	8.77E-01	152.19	5461.06	12.91	19.58	7900.00	2.85E-10
Acenaphthene	2.18E-01	154.21	1377.25	12.91	4.94	7900.00	7.18E-11
Fluorene	2.45E-01	166.22	1668.71	12.91	5.98	7900.00	8.71E-11
Chrysene	1.61E+00	228.29	15026.40	12.91	53.88	7900.00	7.84E-10
Benzo(a)anthracene	1.36E+00	228.29	12668.89	12.91	45.42	7900.00	6.61E-10
Benzo(b)fluoranthene	2.77E+00	252.31	28588.84	12.91	102.50	7900.00	1.49E-09
Benzo(k)fluoranthene	1.30E+00	252.31	13443.68	12.91	48.20	7900.00	7.01E-10
Dibenzo(a,h)anthracene	4.68E-01	278.35	5329.98	12.91	19.11	7900.00	2.78E-10
Indeno(1,2,3-cd)pyrene	9.39E-01	276.33	10613.26	12.91	38.05	7900.00	5.54E-10
Benzo(g,h,i)perylene	1.15E+00	276.33	13030.15	12.91	46.72	7900.00	6.80E-10

Zone 2 — **Annual % active area: 13%**

Pollutant	Concentration from soil pollutant concentrations (Appendix 3.4) (ppm)	Molecular Weight	VOC concentration (µg/m³) = (Conc (ppm) x MW x 1000) / 24.45	Total average Excavation Rate (m³/hr) based on Appendix 2.1	Emission Rate (µg/s) = Conc x Excav rate / 3600	Total Excavation Area (m²)	Continuous Annual Emission (g/m²/s) = Emmision rate / (1000 x 1000 x Total Excavation Area) x (Annual average active area)
Naphthalene	7.85E-02	128.19	411.53	18.24	2.08	8500.00	3.17E-11
Phenanthrene	8.90E-01	178.23	6488.01	18.24	32.87	8500.00	5.00E-10
Anthracene	4.09E-01	178.23	2984.41	18.24	15.12	8500.00	2.30E-10
Fluoranthene	1.53E+00	202.26	12619.67	18.24	63.93	8500.00	9.73E-10
Pyrene	1.90E+00	202.26	15696.18	18.24	79.51	8500.00	1.21E-09
Benzo(a)pyrene	1.27E+00	252.32	13096.12	18.24	66.34	8500.00	1.01E-09
Benzene	1.08E-01	78.12	346.13	18.24	1.75	8500.00	2.67E-11
Toluene	1.08E-01	92.14	408.25	18.24	2.07	8500.00	3.15E-11
Ethylbenzene	1.08E-01	106.16	470.37	18.24	2.38	8500.00	3.63E-11
Xylenes (Total)	3.25E-01	106.20	1411.66	18.24	7.15	8500.00	1.09E-10
Acenaphthylene	4.47E-01	152.19	2783.89	18.24	14.10	8500.00	2.15E-10
Acenaphthene	9.77E-02	154.21	616.25	18.24	3.12	8500.00	4.75E-11
Fluorene	2.31E-01	166.22	1569.81	18.24	7.95	8500.00	1.21E-10
Chrysene	8.36E-01	228.29	7805.67	18.24	39.54	8500.00	6.02E-10
Benzo(a)anthracene	1.10E+00	228.29	10233.57	18.24	51.84	8500.00	7.89E-10
Benzo(b)fluoranthene	1.05E+00	252.31	10805.88	18.24	54.74	8500.00	8.33E-10
Benzo(k)fluoranthene	9.05E-01	252.31	9343.92	18.24	47.33	8500.00	7.21E-10
Dibenzo(a,h)anthracene	3.07E-01	278.35	3489.84	18.24	17.68	8500.00	2.69E-10
Indeno(1,2,3-cd)pyrene	5.14E-01	276.33	5806.56	18.24	29.41	8500.00	4.48E-10
Benzo(g,h,i)perylene	6.94E-01	276.33	7847.17	18.24	39.75	8500.00	6.05E-10

Zone 4, 5A & 5B — **Annual % active area: 6%**

Pollutant	Concentration from soil pollutant concentrations (Appendix 3.4) (ppm)	Molecular Weight	VOC concentration (µg/m³) = (Conc (ppm) x MW x 1000) / 24.45	Total average Excavation Rate (m³/hr) based on Appendix 2.1	Emission Rate (µg/s) = Conc x Excav rate / 3600	Total Excavation Area (m²)	Continuous Annual Emission (g/m²/s) = Emmision rate / (1000 x 1000 x Total Excavation Area) x (Annual average active area)
Naphthalene	5.95E-02	128.19	312.20	13.89	1.20	6300.00	1.21E-11
Phenanthrene	2.63E-01	178.23	1913.74	13.89	7.38	6300.00	7.44E-11
Anthracene	1.52E-01	178.23	1111.20	13.89	4.29	6300.00	4.32E-11
Fluoranthene	7.68E-01	202.26	6352.02	13.89	24.50	6300.00	2.47E-10
Pyrene	9.09E-01	202.26	7520.48	13.89	29.01	6300.00	2.92E-10
Benzo(a)pyrene	9.15E-01	252.32	9443.70	13.89	36.43	6300.00	3.67E-10
Benzene	1.05E-01	78.12	337.02	13.89	1.30	6300.00	1.31E-11
Toluene	1.05E-01	92.14	397.50	13.89	1.53	6300.00	1.55E-11
Ethylbenzene	1.05E-01	106.16	457.98	13.89	1.77	6300.00	1.78E-11
Xylenes (Total)	3.16E-01	106.20	1374.47	13.89	5.30	6300.00	5.34E-11
Acenaphthylene	1.78E-01	152.19	1106.57	13.89	4.27	6300.00	4.30E-11
Acenaphthene	4.83E-02	154.21	304.44	13.89	1.17	6300.00	1.18E-11
Fluorene	6.26E-02	166.22	425.25	13.89	1.64	6300.00	1.65E-11
Chrysene	5.23E-01	228.29	4885.61	13.89	18.85	6300.00	1.90E-10
Benzo(a)anthracene	5.56E-01	228.29	5186.93	13.89	20.01	6300.00	2.02E-10
Benzo(b)fluoranthene	8.29E-01	252.31	8551.57	13.89	32.99	6300.00	3.32E-10
Benzo(k)fluoranthene	6.17E-01	252.31	6369.84	13.89	24.57	6300.00	2.48E-10
Dibenzo(a,h)anthracene	2.42E-01	278.35	2753.52	13.89	10.62	6300.00	1.07E-10
Indeno(1,2,3-cd)pyrene	4.03E-01	276.33	4560.26	13.89	17.59	6300.00	1.77E-10
Benzo(g,h,i)perylene	7.27E-01	276.33	8210.85	13.89	31.67	6300.00	3.19E-10

Appendix 3.5 - Hydrocarbon Emission Calculations (Working Hours)

Scenario B - 7.0 years Annual average emissions

Zone 1A & 3 — **Annual % active area: 11%**

Pollutant	Concentration from soil pollutant concentrations (Appendix 3.4) (ppm)	Molecular Weight	VOC concentration (µg/m³) = (Conc (ppm) x MW x 1000) / 24.45	Total average Excavation Rate (m³/hr) based on Appendix 2.1	Emission Rate (µg/s) = Conc x Excav rate / 3600	Total Excavation Area (m²)	Continuous Annual Emission (g/m²/s) = Emmision rate / (1000 x 1000 x Total Excavation Area) x (Annual average active area)
Naphthalene	2.75E-01	128.19	1440.35	7.30	2.92	9500.00	3.53E-11
Phenanthrene	3.38E-01	178.23	2461.98	7.30	4.99	9500.00	6.04E-11
Anthracene	2.50E-01	178.23	1825.46	7.30	3.70	9500.00	4.48E-11
Fluoranthene	4.20E-01	202.26	3471.79	7.30	7.04	9500.00	8.52E-11
Pyrene	4.36E-01	202.26	3609.26	7.30	7.32	9500.00	8.85E-11
Benzo(a)pyrene	3.63E-01	252.32	3747.11	7.30	7.60	9500.00	9.19E-11
Benzene	1.55E-01	78.12	495.24	7.30	1.00	9500.00	1.21E-11
Toluene	2.06E-01	92.14	774.90	7.30	1.57	9500.00	1.90E-11
Ethylbenzene	2.06E-01	106.16	892.81	7.30	1.81	9500.00	2.19E-11
Xylenes (Total)	7.06E-01	106.20	3064.92	7.30	6.21	9500.00	7.52E-11
Acenaphthylene	2.38E-01	152.19	1484.08	7.30	3.01	9500.00	3.64E-11
Acenaphthene	2.26E-01	154.21	1426.55	7.30	2.89	9500.00	3.50E-11
Fluorene	2.37E-01	166.22	1614.10	7.30	3.27	9500.00	3.96E-11
Chrysene	3.18E-01	228.29	2964.83	7.30	6.01	9500.00	7.27E-11
Benzo(a)anthracene	2.85E-01	228.29	2664.32	7.30	5.40	9500.00	6.53E-11
Benzo(b)fluoranthene	5.03E-01	252.31	5186.40	7.30	10.51	9500.00	1.27E-10
Benzo(k)fluoranthene	2.11E-01	252.31	2177.32	7.30	4.41	9500.00	5.34E-11
Dibenzo(a,h)anthracene	2.65E-01	278.35	3011.99	7.30	6.11	9500.00	7.39E-11
Indeno(1,2,3-cd)pyrene	3.11E-01	276.33	3519.65	7.30	7.14	9500.00	8.63E-11
Benzo(g,h,i)perylene	3.15E-01	276.33	3563.57	7.30	7.22	9500.00	8.74E-11

Zone 1B & 1C — **Annual % active area: 11%**

Pollutant	Concentration from soil pollutant concentrations (Appendix 3.4) (ppm)	Molecular Weight	VOC concentration (µg/m³) = (Conc (ppm) x MW x 1000) / 24.45	Total average Excavation Rate (m³/hr) based on Appendix 2.1	Emission Rate (µg/s) = Conc x Excav rate / 3600	Total Excavation Area (m²)	Continuous Annual Emission (g/m²/s) = Emmision rate / (1000 x 1000 x Total Excavation Area) x (Annual average active area)
Naphthalene	1.66E-01	128.19	870.07	18.09	4.37	7900.00	6.36E-11
Phenanthrene	7.97E-01	178.23	5808.01	18.09	29.19	7900.00	4.25E-10
Anthracene	5.22E-01	178.23	3808.48	18.09	19.14	7900.00	2.78E-10
Fluoranthene	2.95E+00	202.26	24370.25	18.09	122.47	7900.00	1.78E-09
Pyrene	3.57E+00	202.26	29523.72	18.09	148.37	7900.00	2.16E-09
Benzo(a)pyrene	2.75E+00	252.32	28360.30	18.09	142.52	7900.00	2.07E-09
Benzene	1.41E-01	78.12	451.37	18.09	2.27	7900.00	3.30E-11
Toluene	1.41E-01	92.14	532.38	18.09	2.68	7900.00	3.89E-11
Ethylbenzene	1.41E-01	106.16	613.38	18.09	3.08	7900.00	4.48E-11
Xylenes (Total)	4.24E-01	106.20	1840.84	18.09	9.25	7900.00	1.35E-10
Acenaphthylene	8.77E-01	152.19	5461.06	18.09	27.44	7900.00	3.99E-10
Acenaphthene	2.18E-01	154.21	1377.25	18.09	6.92	7900.00	1.01E-10
Fluorene	2.45E-01	166.22	1668.71	18.09	8.39	7900.00	1.22E-10
Chrysene	1.61E+00	228.29	15026.40	18.09	75.51	7900.00	1.10E-09
Benzo(a)anthracene	1.36E+00	228.29	12668.89	18.09	63.66	7900.00	9.26E-10
Benzo(b)fluoranthene	2.77E+00	252.31	28588.84	18.09	143.67	7900.00	2.09E-09
Benzo(k)fluoranthene	1.30E+00	252.31	13443.68	18.09	67.56	7900.00	9.83E-10
Dibenzo(a,h)anthracene	4.68E-01	278.35	5329.98	18.09	26.78	7900.00	3.90E-10
Indeno(1,2,3-cd)pyrene	9.39E-01	276.33	10613.26	18.09	53.33	7900.00	7.76E-10
Benzo(g,h,i)perylene	1.15E+00	276.33	13030.15	18.09	65.48	7900.00	9.53E-10

Zone 2 — **Annual % active area: 12%**

Pollutant	Concentration from soil pollutant concentrations (Appendix 3.4) (ppm)	Molecular Weight	VOC concentration (µg/m³) = (Conc (ppm) x MW x 1000) / 24.45	Total average Excavation Rate (m³/hr) based on Appendix 2.1	Emission Rate (µg/s) = Conc x Excav rate / 3600	Total Excavation Area (m²)	Continuous Annual Emission (g/m²/s) = Emmision rate / (1000 x 1000 x Total Excavation Area) x (Annual average active area)
Naphthalene	7.85E-02	128.19	411.53	20.10	2.30	8500.00	3.18E-11
Phenanthrene	8.90E-01	178.23	6488.01	20.10	36.22	8500.00	5.01E-10
Anthracene	4.09E-01	178.23	2984.41	20.10	16.66	8500.00	2.31E-10
Fluoranthene	1.53E+00	202.26	12619.67	20.10	70.45	8500.00	9.75E-10
Pyrene	1.90E+00	202.26	15696.18	20.10	87.62	8500.00	1.21E-09
Benzo(a)pyrene	1.27E+00	252.32	13096.12	20.10	73.11	8500.00	1.01E-09
Benzene	1.08E-01	78.12	346.13	20.10	1.93	8500.00	2.67E-11
Toluene	1.08E-01	92.14	408.25	20.10	2.28	8500.00	3.15E-11
Ethylbenzene	1.08E-01	106.16	470.37	20.10	2.63	8500.00	3.63E-11
Xylenes (Total)	3.25E-01	106.20	1411.66	20.10	7.88	8500.00	1.09E-10
Acenaphthylene	4.47E-01	152.19	2783.89	20.10	15.54	8500.00	2.15E-10
Acenaphthene	9.77E-02	154.21	616.25	20.10	3.44	8500.00	4.76E-11
Fluorene	2.31E-01	166.22	1569.81	20.10	8.76	8500.00	1.21E-10
Chrysene	8.36E-01	228.29	7805.67	20.10	43.57	8500.00	6.03E-10
Benzo(a)anthracene	1.10E+00	228.29	10233.57	20.10	57.13	8500.00	7.91E-10
Benzo(b)fluoranthene	1.05E+00	252.31	10805.88	20.10	60.32	8500.00	8.35E-10
Benzo(k)fluoranthene	9.05E-01	252.31	9343.92	20.10	52.16	8500.00	7.22E-10
Dibenzo(a,h)anthracene	3.07E-01	278.35	3489.84	20.10	19.48	8500.00	2.70E-10
Indeno(1,2,3-cd)pyrene	5.14E-01	276.33	5806.56	20.10	32.41	8500.00	4.49E-10
Benzo(g,h,i)perylene	6.94E-01	276.33	7847.17	20.10	43.81	8500.00	6.06E-10

Zone 4, 5A & 5B — **Annual % active area: 9%**

Pollutant	Concentration from soil pollutant concentrations (Appendix 3.4) (ppm)	Molecular Weight	VOC concentration (µg/m³) = (Conc (ppm) x MW x 1000) / 24.45	Total average Excavation Rate (m³/hr) based on Appendix 2.1	Emission Rate (µg/s) = Conc x Excav rate / 3600	Total Excavation Area (m²)	Continuous Annual Emission (g/m²/s) = Emmision rate / (1000 x 1000 x Total Excavation Area) x (Annual average active area)
Naphthalene	5.95E-02	128.19	312.20	9.82	0.85	6300.00	1.22E-11
Phenanthrene	2.63E-01	178.23	1913.74	9.82	5.22	6300.00	7.46E-11
Anthracene	1.52E-01	178.23	1111.20	9.82	3.03	6300.00	4.33E-11
Fluoranthene	7.68E-01	202.26	6352.02	9.82	17.33	6300.00	2.47E-10
Pyrene	9.09E-01	202.26	7520.48	9.82	20.52	6300.00	2.93E-10
Benzo(a)pyrene	9.15E-01	252.32	9443.70	9.82	25.77	6300.00	3.68E-10
Benzene	1.05E-01	78.12	337.02	9.82	0.92	6300.00	1.31E-11
Toluene	1.05E-01	92.14	397.50	9.82	1.08	6300.00	1.55E-11
Ethylbenzene	1.05E-01	106.16	457.98	9.82	1.25	6300.00	1.78E-11
Xylenes (Total)	3.16E-01	106.20	1374.47	9.82	3.75	6300.00	5.35E-11
Acenaphthylene	1.78E-01	152.19	1106.57	9.82	3.02	6300.00	4.31E-11
Acenaphthene	4.83E-02	154.21	304.44	9.82	0.83	6300.00	1.19E-11
Fluorene	6.26E-02	166.22	425.25	9.82	1.16	6300.00	1.66E-11
Chrysene	5.23E-01	228.29	4885.61	9.82	13.33	6300.00	1.90E-10
Benzo(a)anthracene	5.56E-01	228.29	5186.93	9.82	14.15	6300.00	2.02E-10
Benzo(b)fluoranthene	8.29E-01	252.31	8551.57	9.82	23.34	6300.00	3.33E-10
Benzo(k)fluoranthene	6.17E-01	252.31	6369.84	9.82	17.38	6300.00	2.48E-10
Dibenzo(a,h)anthracene	2.42E-01	278.35	2753.52	9.82	7.51	6300.00	1.07E-10
Indeno(1,2,3-cd)pyrene	4.03E-01	276.33	4560.26	9.82	12.44	6300.00	1.78E-10
Benzo(g,h,i)perylene	7.27E-01	276.33	8210.85	9.82	22.41	6300.00	3.20E-10

Appendix 3.5 - Hydrocarbon Emission Calculations (Working Hours)

Scenario C - 4.5 years Annual average emissions

Zone 1A & 3 — **Annual % active area: 9%**

Pollutant	Concentration from soil pollutant concentrations (Appendix 3.4) (ppm)	Molecular Weight	VOC concentration (µg/m³) = (Conc (ppm) x MW x 1000) / 24.45	Total average Excavation Rate (m³/hr) based on Appendix 2.1	Emission Rate (µg/s) = Conc x Excav rate / 3600	Total Excavation Area (m²)	Continuous Annual Emission (g/m²/s) = Emmision rate / (1000 x 1000 x Total Excavation Area) x (Annual average active area)
Naphthalene	2.75E-01	128.19	1440.35	12.41	4.96	9500.00	4.57E-11
Phenanthrene	3.38E-01	178.23	2461.98	12.41	8.49	9500.00	7.82E-11
Anthracene	2.50E-01	178.23	1825.46	12.41	6.29	9500.00	5.80E-11
Fluoranthene	4.20E-01	202.26	3471.79	12.41	11.97	9500.00	1.10E-10
Pyrene	4.36E-01	202.26	3609.26	12.41	12.44	9500.00	1.15E-10
Benzo(a)pyrene	3.63E-01	252.32	3747.11	12.41	12.92	9500.00	1.19E-10
Benzene	1.55E-01	78.12	495.24	12.41	1.71	9500.00	1.57E-11
Toluene	2.06E-01	92.14	774.90	12.41	2.67	9500.00	2.46E-11
Ethylbenzene	2.06E-01	106.16	892.81	12.41	3.08	9500.00	2.83E-11
Xylenes (Total)	7.06E-01	106.20	3064.92	12.41	10.56	9500.00	9.73E-11
Acenaphthylene	2.38E-01	152.19	1484.08	12.41	5.12	9500.00	4.71E-11
Acenaphthene	2.26E-01	154.21	1426.55	12.41	4.92	9500.00	4.53E-11
Fluorene	2.37E-01	166.22	1614.10	12.41	5.56	9500.00	5.13E-11
Chrysene	3.18E-01	228.29	2964.83	12.41	10.22	9500.00	9.41E-11
Benzo(a)anthracene	2.85E-01	228.29	2664.32	12.41	9.18	9500.00	8.46E-11
Benzo(b)fluoranthene	5.03E-01	252.31	5186.40	12.41	17.88	9500.00	1.65E-10
Benzo(k)fluoranthene	2.11E-01	252.31	2177.32	12.41	7.50	9500.00	6.91E-11
Dibenzo(a,h)anthracene	2.65E-01	278.35	3011.99	12.41	10.38	9500.00	9.56E-11
Indeno(1,2,3-cd)pyrene	3.11E-01	276.33	3519.65	12.41	12.13	9500.00	1.12E-10
Benzo(g,h,i)perylene	3.15E-01	276.33	3563.57	12.41	12.28	9500.00	1.13E-10

Zone 1B & 1C — **Annual % active area: 9%**

Pollutant	Concentration from soil pollutant concentrations (Appendix 3.4) (ppm)	Molecular Weight	VOC concentration (µg/m³) = (Conc (ppm) x MW x 1000) / 24.45	Total average Excavation Rate (m³/hr) based on Appendix 2.1	Emission Rate (µg/s) = Conc x Excav rate / 3600	Total Excavation Area (m²)	Continuous Annual Emission (g/m²/s) = Emmision rate / (1000 x 1000 x Total Excavation Area) x (Annual average active area)
Naphthalene	1.66E-01	128.19	870.07	20.88	5.05	7900.00	5.59E-11
Phenanthrene	7.97E-01	178.23	5808.01	20.88	33.68	7900.00	3.73E-10
Anthracene	5.22E-01	178.23	3808.48	20.88	22.08	7900.00	2.45E-10
Fluoranthene	2.95E+00	202.26	24370.25	20.88	141.32	7900.00	1.57E-09
Pyrene	3.57E+00	202.26	29523.72	20.88	171.21	7900.00	1.90E-09
Benzo(a)pyrene	2.75E+00	252.32	28360.30	20.88	164.46	7900.00	1.82E-09
Benzene	1.41E-01	78.12	451.37	20.88	2.62	7900.00	2.90E-11
Toluene	1.41E-01	92.14	532.38	20.88	3.09	7900.00	3.42E-11
Ethylbenzene	1.41E-01	106.16	613.38	20.88	3.56	7900.00	3.94E-11
Xylenes (Total)	4.24E-01	106.20	1840.84	20.88	10.67	7900.00	1.18E-10
Acenaphthylene	8.77E-01	152.19	5461.06	20.88	31.67	7900.00	3.51E-10
Acenaphthene	2.18E-01	154.21	1377.25	20.88	7.99	7900.00	8.85E-11
Fluorene	2.45E-01	166.22	1668.71	20.88	9.68	7900.00	1.07E-10
Chrysene	1.61E+00	228.29	15026.40	20.88	87.14	7900.00	9.65E-10
Benzo(a)anthracene	1.36E+00	228.29	12668.89	20.88	73.47	7900.00	8.14E-10
Benzo(b)fluoranthene	2.77E+00	252.31	28588.84	20.88	165.78	7900.00	1.84E-09
Benzo(k)fluoranthene	1.30E+00	252.31	13443.68	20.88	77.96	7900.00	8.64E-10
Dibenzo(a,h)anthracene	4.68E-01	278.35	5329.98	20.88	30.91	7900.00	3.42E-10
Indeno(1,2,3-cd)pyrene	9.39E-01	276.33	10613.26	20.88	61.55	7900.00	6.82E-10
Benzo(g,h,i)perylene	1.15E+00	276.33	13030.15	20.88	75.56	7900.00	8.37E-10

Zone 2 — **Annual % active area: 9%**

Pollutant	Concentration from soil pollutant concentrations (Appendix 3.4) (ppm)	Molecular Weight	VOC concentration (µg/m³) = (Conc (ppm) x MW x 1000) / 24.45	Total average Excavation Rate (m³/hr) based on Appendix 2.1	Emission Rate (µg/s) = Conc x Excav rate / 3600	Total Excavation Area (m²)	Continuous Annual Emission (g/m²/s) = Emmision rate / (1000 x 1000 x Total Excavation Area) x (Annual average active area)
Naphthalene	7.85E-02	128.19	411.53	19.97	2.28	8500.00	2.35E-11
Phenanthrene	8.90E-01	178.23	6488.01	19.97	35.98	8500.00	3.70E-10
Anthracene	4.09E-01	178.23	2984.41	19.97	16.55	8500.00	1.70E-10
Fluoranthene	1.53E+00	202.26	12619.67	19.97	69.99	8500.00	7.21E-10
Pyrene	1.90E+00	202.26	15696.18	19.97	87.05	8500.00	8.96E-10
Benzo(a)pyrene	1.27E+00	252.32	13096.12	19.97	72.63	8500.00	7.48E-10
Benzene	1.08E-01	78.12	346.13	19.97	1.92	8500.00	1.98E-11
Toluene	1.08E-01	92.14	408.25	19.97	2.26	8500.00	2.33E-11
Ethylbenzene	1.08E-01	106.16	470.37	19.97	2.61	8500.00	2.69E-11
Xylenes (Total)	3.25E-01	106.20	1411.66	19.97	7.83	8500.00	8.06E-11
Acenaphthylene	4.47E-01	152.19	2783.89	19.97	15.44	8500.00	1.59E-10
Acenaphthene	9.77E-02	154.21	616.25	19.97	3.42	8500.00	3.52E-11
Fluorene	2.31E-01	166.22	1569.81	19.97	8.71	8500.00	8.96E-11
Chrysene	8.36E-01	228.29	7805.67	19.97	43.29	8500.00	4.46E-10
Benzo(a)anthracene	1.10E+00	228.29	10233.57	19.97	56.75	8500.00	5.84E-10
Benzo(b)fluoranthene	1.05E+00	252.31	10805.88	19.97	59.93	8500.00	6.17E-10
Benzo(k)fluoranthene	9.05E-01	252.31	9343.92	19.97	51.82	8500.00	5.34E-10
Dibenzo(a,h)anthracene	3.07E-01	278.35	3489.84	19.97	19.35	8500.00	1.99E-10
Indeno(1,2,3-cd)pyrene	5.14E-01	276.33	5806.56	19.97	32.20	8500.00	3.32E-10
Benzo(g,h,i)perylene	6.94E-01	276.33	7847.17	19.97	43.52	8500.00	4.48E-10

Zone 4, 5A & 5B — **Annual % active area: 10%**

Pollutant	Concentration from soil pollutant concentrations (Appendix 3.4) (ppm)	Molecular Weight	VOC concentration (µg/m³) = (Conc (ppm) x MW x 1000) / 24.45	Total average Excavation Rate (m³/hr) based on Appendix 2.1	Emission Rate (µg/s) = Conc x Excav rate / 3600	Total Excavation Area (m²)	Continuous Annual Emission (g/m²/s) = Emmision rate / (1000 x 1000 x Total Excavation Area) x (Annual average active area)
Naphthalene	5.95E-02	128.19	312.20	11.07	0.96	6300.00	1.45E-11
Phenanthrene	2.63E-01	178.23	1913.74	11.07	5.88	6300.00	8.89E-11
Anthracene	1.52E-01	178.23	1111.20	11.07	3.42	6300.00	5.16E-11
Fluoranthene	7.68E-01	202.26	6352.02	11.07	19.53	6300.00	2.95E-10
Pyrene	9.09E-01	202.26	7520.48	11.07	23.12	6300.00	3.50E-10
Benzo(a)pyrene	9.15E-01	252.32	9443.70	11.07	29.03	6300.00	4.39E-10
Benzene	1.05E-01	78.12	337.02	11.07	1.04	6300.00	1.57E-11
Toluene	1.05E-01	92.14	397.50	11.07	1.22	6300.00	1.85E-11
Ethylbenzene	1.05E-01	106.16	457.98	11.07	1.41	6300.00	2.13E-11
Xylenes (Total)	3.16E-01	106.20	1374.47	11.07	4.23	6300.00	6.39E-11
Acenaphthylene	1.78E-01	152.19	1106.57	11.07	3.40	6300.00	5.14E-11
Acenaphthene	4.83E-02	154.21	304.44	11.07	0.94	6300.00	1.41E-11
Fluorene	6.26E-02	166.22	425.25	11.07	1.31	6300.00	1.98E-11
Chrysene	5.23E-01	228.29	4885.61	11.07	15.02	6300.00	2.27E-10
Benzo(a)anthracene	5.56E-01	228.29	5186.93	11.07	15.95	6300.00	2.41E-10
Benzo(b)fluoranthene	8.29E-01	252.31	8551.57	11.07	26.29	6300.00	3.97E-10
Benzo(k)fluoranthene	6.17E-01	252.31	6369.84	11.07	19.58	6300.00	2.96E-10
Dibenzo(a,h)anthracene	2.42E-01	278.35	2753.52	11.07	8.47	6300.00	1.28E-10
Indeno(1,2,3-cd)pyrene	4.03E-01	276.33	4560.26	11.07	14.02	6300.00	2.12E-10
Benzo(g,h,i)perylene	7.27E-01	276.33	8210.85	11.07	25.24	6300.00	3.82E-10