

Calculation of Construction Dust Emission Sources

Description	Source	Emission Rates	Parameters	Remarks	
Construction Activities	Heavy Construction Area Source	TSP (g/m ² /s)	1.723E-05	Emission Rate = (Emission Factor*10 ⁶ /10000)/(30*No. of Operation hour*60*60)*(Percentage Active/100)*(1-Dust Suppression%) TSP emission factor (Mg/hectare/month of activity) 2.69 Percentage area actively operating (%) 100 % of dust suppression 91.7 No. of operation hour (hr) 12 Emission height (m) 0.5	from AP-42, section 13.2.3, 1/95 ed. For watering once every 2 hours. Refer to the Calculation of Dust Suppression Efficiency by Watering. Assume typical working hours of work site (0700 - 1900)
		RSP (g/m ² /s)	8.149E-06	RSP emission factor (Mg/hectare/month of activity) 1.27 % fraction of TSP 0.473	from AP-42, section 13.2.4, 11/06 ed.
		FSP (g/m ² /s)	1.240E-06	FSP emission factor (Mg/hectare/month of activity) 0.194 % fraction of TSP 0.072	from AP-42, section 13.2.4, 11/06 ed.
	Wind erosion Area Source	TSP (g/m ² /s)	2.695E-06	Emission Rate = Emission Factor*10 ⁶ *(10000*365*24*60*60)*(Percentage Active/100) Percentage area actively operating (%) 100 TSP emission factor (Mg/hectare/yr) 0.85	from AP-42, section 11.9, 10/98 ed.
		RSP (g/m ² /s)	1.275E-06	RSP emission factor (mg/m3) 0.402 % fraction of TSP 0.473	from AP-42, section 13.2.4, 11/06 ed.
		FSP (g/m ² /s)	1.941E-07	FSP emission factor (mg/m3) 0.061 % fraction of TSP 0.072	from AP-42, section 13.2.4, 11/06 ed.

Emission Inventory for AERMOD Model - Construction Dust Emission Sources

Source ID	Type	X	Y	Release Height (m)	Hour (hr)	TSP Emission Rate (g/m ³ /s)		RSP Emission Rate (g/m ³ /s)		FSP Emission Rate (g/m ³ /s)	
		(m)	(m)			Working hours	Non-working hours	Working hours	Non-working hours	Working hours	Non-working hours
P1	AREAPOLY	836303.0	826796.1	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
		836297.9	826800.9								
		836293.1	826795.8								
		836298.2	826791.0								
P2	AREAPOLY	836336.5	826763.0	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
		836331.6	826767.9								
		836326.6	826762.9								
		836331.6	826758.0								
P3	AREAPOLY	836340.8	826740.7	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
		836342.0	826742.0								
		836345.9	826741.0								
		836347.2	826739.8								
		836343.2	826735.6								
		836341.9	826736.8								
P4	AREAPOLY	836373.8	826718.0	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
		836368.4	826722.4								
		836363.9	826717.1								
		836369.3	826712.6								
P5	AREAPOLY	836400.7	826695.6	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
		836395.3	826700.0								
		836390.8	826694.6								
		836396.2	826690.2								
P6	AREAPOLY	836418.0	826677.4	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
		836416.2	826679.1								
		836418.8	826681.9								
		836419.9	826680.9								
		836423.2	826684.6								
		836419.6	826688.0								
		836416.2	826684.3								
		836417.3	826683.3								
		836414.7	826680.5								
		836412.9	826682.1								
		836408.1	826677.0								
		836413.3	826672.3								
P7	AREAPOLY	836460.2	826613.8	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
		836467.9	826618.4								
		836463.3	826626.1								
		836455.6	826621.5								
P8	AREAPOLY	836496.5	826548.7	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
		836502.7	826551.9								
		836505.9	826545.6								
		836499.7	826542.4								
P9	AREAPOLY	836530.7	826488.8	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
		836538.0	826494.2								
		836532.6	826501.4								
		836525.4	826496.1								
P10	AREAPOLY	836476.8	826457.7	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
		836475.5	826464.6								
		836468.6	826463.3								
		836469.9	826456.4								
P11	AREAPOLY	836495.0	826469.1	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
		836494.7	826467.4								
		836500.7	826462.6								
		836502.3	826463.2								
		836503.5	826470.8								
P12	AREAPOLY	836550.0	826469.3	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
		836550.6	826476.2								
		836543.6	826476.8								
		836543.1	826469.8								
P13	AREAPOLY	836569.7	826468.0	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
		836576.5	826466.3								
		836578.2	826473.1								
		836571.4	826474.8								
P14	AREAPOLY	836590.0	826437.3	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
		836594.4	826445.1								
		836586.5	826449.5								
		836582.1	826441.7								
		836616.0	826464.9								
P15	AREAPOLY	836617.4	826464.4	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
		836610.4	826446.1								
		836609.0	826446.7								
		836607.2	826442.0								
		836611.9	826440.2								
		836613.7	826444.9								
		836612.3	826445.4								
		836619.3	826463.7								
		836620.7	826463.1								
		836622.5	826467.8								
		836617.8	826469.6								
		836627.2	826422.6								
P16	AREAPOLY	836634.0	826420.8	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
		836635.7	826427.6								
		836628.9	826429.3								
		836645.3	826440.3								
P17	AREAPOLY	836652.0	826438.3	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
		836654.1	826445.0								
		836647.4	826447.0								
		836664.2	826416.8								
P18	AREAPOLY	836671.2	826416.4	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
		836671.6	826423.4								
		836664.6	826423.7								
		836687.1	826436.2								
P19	AREAPOLY	836688.6	826436.1	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
		836688.0	826428.8								
		836686.5	826428.9								
		836686.1	826423.9								
		836691.1	826423.5								
		836691.5	826428.5								
		836690.0	826428.6								
		836690.6	826435.9								
		836692.1	826435.8								
		836692.6	826440.8								
		836687.6	826441.2								
		836701.7	826417.5								
P20	AREAPOLY	836708.6	826418.5	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
		836707.6	826425.5								
		836700.7	826424.4								
		836737.8	826426.6								
P21	AREAPOLY	836744.5	826428.9	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
		836740.6	826440.2								
		836733.9	826437.9								
		836766.5	826437.0								
P22	AREAPOLY	836772.8	826440.0	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
		836767.7	826450.9								
		836761.3	826447.9								

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Source ID	Type	X	Y	Release Height (m)	Hour (hr)	TSP Emission Rate (g/m ³ /s)		RSP Emission Rate (g/m ³ /s)		FSP Emission Rate (g/m ³ /s)										
		(m)	(m)			Working hours	Non-working hours	Working hours	Non-working hours	Working hours	Non-working hours									
P77	AREAPOLY	837500.3	826291.4	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07									
		837505.2	826294.8		07:00 - 19:00															
		837510.0	826288.1		07:00 - 19:00															
		837504.7	826285.1		07:00 - 19:00															
C1	AREAPOLY	837293.7	826309.4	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07									
		837329.4	826327.2		07:00 - 19:00															
		837341.4	826306.9		07:00 - 19:00															
		837366.3	826267.0		07:00 - 19:00															
		837378.7	826249.8		07:00 - 19:00															
		837392.5	826233.8		07:00 - 19:00															
		837400.1	826226.0		07:00 - 19:00															
		837371.7	826206.4		07:00 - 19:00															
		837344.5	826238.7		07:00 - 19:00															
		837318.0	826273.3		07:00 - 19:00															
		C2	AREAPOLY		837371.7							826206.4	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
					837400.1							826226.0		07:00 - 19:00						
837447.0	826186.2			07:00 - 19:00																
837475.9	826158.7			07:00 - 19:00																
837511.4	826124.9			07:00 - 19:00																
837532.2	826101.8			07:00 - 19:00																
837550.2	826088.8			07:00 - 19:00																
837522.3	826051.1			07:00 - 19:00																
837492.7	826079.0			07:00 - 19:00																
837465.5	826105.8			07:00 - 19:00																
837408.6	826162.8			07:00 - 19:00																
837410.3	826163.9			07:00 - 19:00																
C3	AREAPOLY	837397.1	826177.9	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07									
		837550.2	826088.8		07:00 - 19:00															
		837566.5	826077.2		07:00 - 19:00															
		837567.8	826066.2		07:00 - 19:00															
		837595.0	826041.7		07:00 - 19:00															
		837608.0	826032.0		07:00 - 19:00															
		837636.8	826017.4		07:00 - 19:00															
		837653.4	826016.6		07:00 - 19:00															
		837652.3	825994.3		07:00 - 19:00															
		837630.1	826001.4		07:00 - 19:00															
		837615.3	826005.5		07:00 - 19:00															
		837618.3	825993.5		07:00 - 19:00															
		837608.8	825990.9		07:00 - 19:00															
		837604.7	826005.2		07:00 - 19:00															
		837592.5	826009.0		07:00 - 19:00															
		837588.8	826010.1		07:00 - 19:00															
		837570.0	826018.8		07:00 - 19:00															
		C4	AREAPOLY		837553.7							826027.9	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
837536.0	826039.9			07:00 - 19:00																
837522.4	826051.0			07:00 - 19:00																
837791.3	826061.2			07:00 - 19:00																
837770.6	826050.0			07:00 - 19:00																
837756.8	826041.1			07:00 - 19:00																
837745.2	826031.2			07:00 - 19:00																
837711.2	826021.0			07:00 - 19:00																
837674.2	826015.6			07:00 - 19:00																
837653.4	826016.6			07:00 - 19:00																
837652.3	825994.3			07:00 - 19:00																
837656.7	825987.5			07:00 - 19:00																
837661.0	825978.4			07:00 - 19:00																
837678.1	825971.6			07:00 - 19:00																
C5	AREAPOLY	837698.5	825986.4	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07									
		837724.1	825986.1		07:00 - 19:00															
		837745.5	825988.7		07:00 - 19:00															
		837768.8	825994.0		07:00 - 19:00															
		837812.4	826009.1		07:00 - 19:00															
		837791.3	826061.2		07:00 - 19:00															
		837813.0	826007.7		07:00 - 19:00															
		837852.5	826023.3		07:00 - 19:00															
		837931.5	826048.4		07:00 - 19:00															
		838002.0	826067.4		07:00 - 19:00															
		838032.9	826075.8		07:00 - 19:00															
		838109.5	826099.0		07:00 - 19:00															
		838163.1	826112.7		07:00 - 19:00															
		838195.3	826121.6		07:00 - 19:00															
		838201.1	826156.9		07:00 - 19:00															
		838198.0	826161.8		07:00 - 19:00															
		838155.7	826151.7		07:00 - 19:00															
		C6	AREAPOLY		838089.8							826141.4	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
837997.2	826122.7			07:00 - 19:00																
837937.7	826110.4			07:00 - 19:00																
837913.7	826104.6			07:00 - 19:00																
837860.3	826088.1			07:00 - 19:00																
837807.8	826068.6			07:00 - 19:00																
836289.7	826798.3			07:00 - 19:00																
836305.0	826815.4			07:00 - 19:00																
836196.6	826918.5			07:00 - 19:00																
836162.5	826931.2			07:00 - 19:00																
836146.8	826931.9			07:00 - 19:00																
836190.9	826889.8			07:00 - 19:00																
C7	AREAPOLY	836217.5	826866.7	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07									
		836212.8	826861.0		07:00 - 19:00															
		836260.3	826820.7		07:00 - 19:00															
		836264.1	826820.7		07:00 - 19:00															
		836389.9	826706.3		07:00 - 19:00															
		836394.6	826712.5		07:00 - 19:00															
		836411.1	826700.6		07:00 - 19:00															
		836409.6	826734.9		07:00 - 19:00															
		836376.8	826762.2		07:00 - 19:00															
		836367.4	826747.6		07:00 - 19:00															
		836345.3	826761.5		07:00 - 19:00															
		836346.1	826768.9		07:00 - 19:00															
		836331.6	826783.0		07:00 - 19:00															
		836338.2	826799.3		07:00 - 19:00															
C8	AREAPOLY	836322.6	826812.1	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07									
		836306.4	826817.0		07:00 - 19:00															
		836289.7	826798.3		07:00 - 19:00															
		836344.5	826744.5		07:00 - 19:00															
		836366.7	826724.1		07:00 - 19:00															
		837080.9	826530.0		07:00 - 19:00															
		837092.3	826505.8		07:00 - 19:00															
		837139.7	826528.1		07:00 - 19:00															
		837159.3	826519.4		07:00 - 19:00															
		837172.1	826511.5		07:00 - 19:00															
		837178.1	826506.3		07:00 - 19:00															
		837199.6	826516.5		07:00 - 19:00															
837201.2	826522.6	07:00 - 19:00																		
837184.4	826554.5	07:00 - 19:00																		
837180.5	826556.3	07:00 - 19:00																		
837176.5	826557.8	07:00 - 19:00																		

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Source ID	Type	X	Y	Release Height (m)	Hour (hr)	TSP Emission Rate (g/m ³ /s)		RSP Emission Rate (g/m ³ /s)		FSP Emission Rate (g/m ³ /s)	
		(m)	(m)			Working hours	Non-working hours	Working hours	Non-working hours	Working hours	Non-working hours
C9	AREAPOLY	837652.6	825994.3	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
		837635.1	826000.0		07:00 - 19:00						
		837637.8	825985.8		07:00 - 19:00						
		837639.8	825968.2		07:00 - 19:00						
		837647.0	825967.4		07:00 - 19:00						
		837651.2	825978.6		07:00 - 19:00						
C10	AREAPOLY	837524.0	826142.3	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
		837519.6	826136.3		07:00 - 19:00						
		837570.6	826095.9		07:00 - 19:00						
		837580.6	826087.7		07:00 - 19:00						
		837591.1	826077.2		07:00 - 19:00						
		837606.2	826058.1		07:00 - 19:00						
		837630.0	826020.8		07:00 - 19:00						
		837636.6	826017.4		07:00 - 19:00						
		837642.4	826017.1		07:00 - 19:00						
		837638.1	826024.0		07:00 - 19:00						
		837638.7	826025.3		07:00 - 19:00						
		837614.8	826062.1		07:00 - 19:00						
		837601.8	826078.7		07:00 - 19:00						
		837589.9	826090.9		07:00 - 19:00						
837544.9	826126.9	07:00 - 19:00									
C11	AREAPOLY	837728.1	825986.6	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
		837721.7	825986.0		07:00 - 19:00						
		837699.0	825986.4		07:00 - 19:00						
		837678.1	825971.6		07:00 - 19:00						
		837677.5	825971.8		07:00 - 19:00						
		837657.9	825956.5		07:00 - 19:00						
		837664.2	825948.9		07:00 - 19:00						
		837649.4	825934.7		07:00 - 19:00						
		837659.9	825923.1		07:00 - 19:00						
		837685.8	825943.3		07:00 - 19:00						
		837706.8	825958.5		07:00 - 19:00						
		837733.2	825974.2		07:00 - 19:00						
		837794.0	826001.4		07:00 - 19:00						
		837745.5	825988.7		07:00 - 19:00						
C12	AREAPOLY	837825.7	825974.4	0.5	07:00 - 19:00	1.723E-05	2.695E-06	8.149E-06	1.275E-06	1.240E-06	1.941E-07
		837830.1	825974.4		07:00 - 19:00						
		837830.2	825975.9		07:00 - 19:00						
		837825.4	825975.9		07:00 - 19:00						
		837817.6	825973.6		07:00 - 19:00						
		837803.8	825968.4		07:00 - 19:00						
		837775.1	825955.9		07:00 - 19:00						
		837744.0	825932.2		07:00 - 19:00						
		837738.7	825925.0		07:00 - 19:00						
		837739.8	825924.2		07:00 - 19:00						
		837745.1	825931.1		07:00 - 19:00						
		837776.1	825954.7		07:00 - 19:00						
		837804.1	825966.9		07:00 - 19:00						
		837818.1	825972.2		07:00 - 19:00						

Appendix 3.1 Calculation of Construction Dust Emission Source

Calculation of Dust Suppression Efficiency from Watering

Dust suppression efficiency is assumed to be 91.7%. Assumptions are stated as below.

With reference to the Equation (5-4) of USEPA's Control of Open Fugitive Dust Sources (EPA-450/3-98-008), dust suppression efficiency can be estimated by:

$$C = 100 - \frac{0.8 \cdot p \cdot d \cdot t}{i}$$

where

C = average control efficiency, in percent

p = potential average hourly daytime evaporation rate in mm/hour

d = average hourly daytime traffic rate in vehicles per hour

i = application intensity in L/m²

t = time between applications in hour

The following assumptions are made for assessment purpose:

Assumption 1:

Potential average hourly daytime evaporation rate p can be estimated by $0.0049 \cdot e$, where e is the mean annual average evaporation rate (inches). From the past measurement data in Hong Kong's Observatory, evaporation recorded at King's Park between 1981 - 2010 is 1227.3 mm¹. Therefore $p = 0.0049 \cdot (1227.3 \text{ mm}) = 0.0049 \cdot (48.3188976 \text{ inches}) = 0.2368$.

Assumption 2:

Estimate average hourly daytime traffic rate in vehicles per hour = 20. (d = 20)

Assumption 3:

Assume watering application intensity as 0.91 L/m². (i = 0.91)

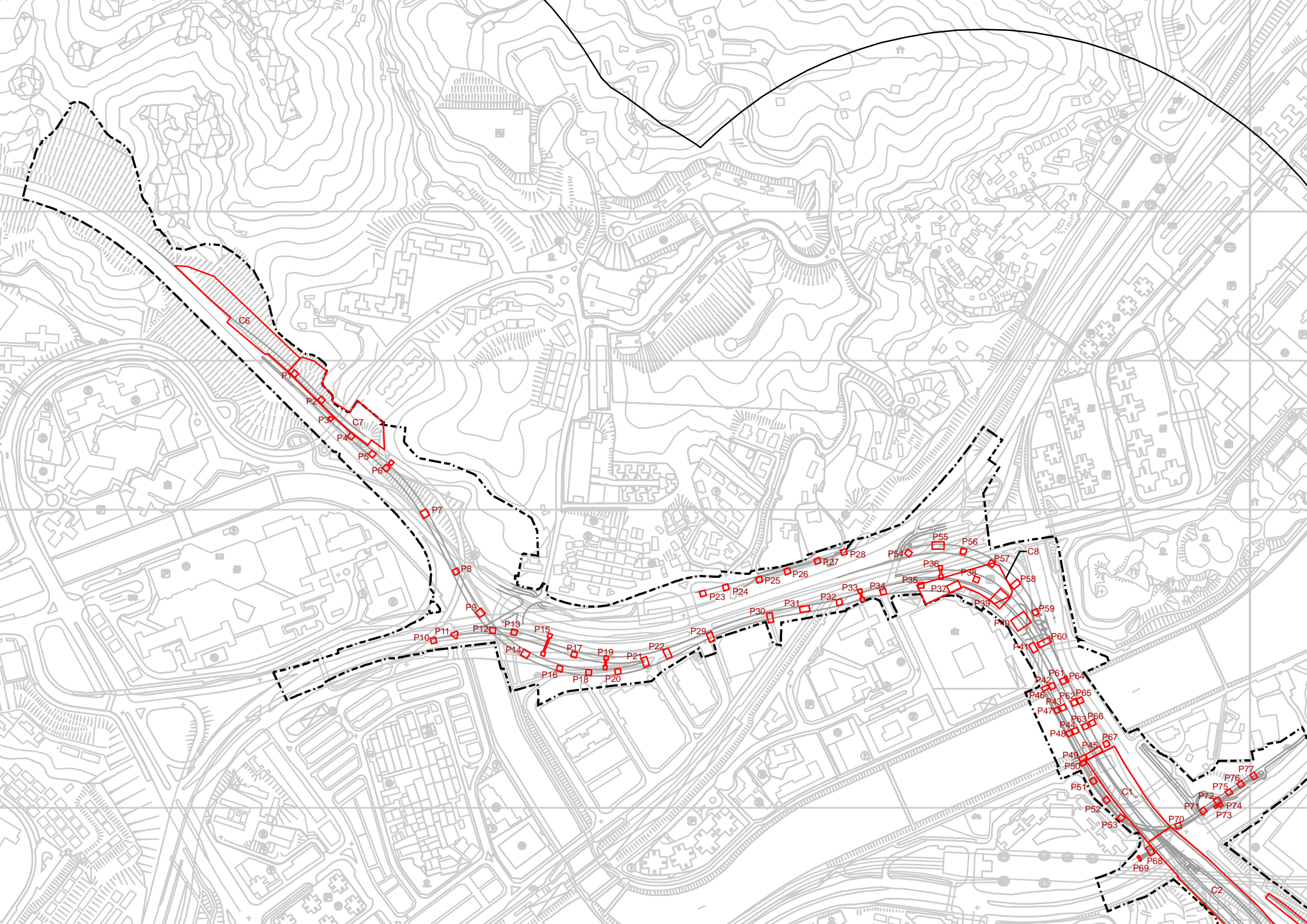
Assumption 4:

Assumes watering frequency as once every 2 hours. (t = 2)

With the above assumptions, dust suppression efficiency is calculated as below:

$$C = 100 - 0.8 \cdot (0.2368) \cdot (20) \cdot (2) / 0.91 = \underline{\underline{91.7\%}}$$

¹ The Hong Kong's Observatory evaporation recorded at King's Park between 1981 to 2010 is taken from http://www.weather.gov.hk/cis/normal/1981_2010/normal_s_e.htm



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