Appendix 4.6: Calculation of Dust Suppression Efficiency from Watering

Dust suppression efficiency is assumed to be 87.5%. 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/m^2

t = time between applications in hour (t = 1)

The following assumptions are made for assessment purpose:

Assumption 1:
Potential average hourly daytime evaporation rate p can be estimated by 0.0049 * e, where e is the mean annual average evaporation rate (inches). From past measurement data in Hong Kong's Observatory, evaporation recorded at King's Park between 1981 - 2010 is 1227.3 mm[1]. Therefore p = 0.0049 * (1227.3 mm) = 0.0049 * (48.3188976 inches) = 0.2368.

Assumption 2:

Estimate average hourly daytime traffic rate in vehicles per hour = 10. (d = 10)

Assumption 3:

Assume watering application intensity as 0.152 L/m^2. (i = 0.152)

Assumption 4:

Assumes watering frequency as once per hour. (t = 1)

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

C = 100 – 0.8*(0.2368)*(10)*(1) / 0.152= **87.5%**

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[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/normals_e.htm