Calculation of Watering Efficiency

With reference to Cowherd et al., “Control of Open Fugitive Dust Sources, EPA-450/3-88-008, U.S. Environmental Protection Agency, Research Triangle Park, NC, percentage of dust mitigation efficiency is calculated from Equation (3-2):

\[ C = 100 - \frac{0.8 p d t}{i} \]

where

\( p = \) Potential average hourly daytime evaporation rate, mm/hour = 0.25916 [1]
\( d = \) Average hourly daytime traffic rate per hour = 66 per hour [2]
\( i = \) Application intensity = 1.7 L/m² [3]

Note:

[1] \( p = 0.0049 \times 52.8898 \) inch, where 52.8898 inch is equivalent to the total evaporation of 1343.4 mm obtained from Hong Kong Observatory (http://www.weather.gov.hk/cis/normal/1971_2000/normals_e.htm)

[2] The material to be transported in year 2025 in FLN is the most in the whole NDA development.

The total material to be transport in year 2025 in FLN (A) 794,942 m³
Total working area (B): 875,464 sq.m
Average material to be transport per unit working area (C) = (A) / (B) 0.91 m³/sq.m
Area of largest site in 2025 (WC22) (D) 370,120 sq.m
The total material to be transport in year 2025 under WC22 (E) = (C) x (D) 336,078 m³

Trip generation (2 ways) 65.3 veh/hr

(F) = (E) / 5.5 / 12 / 26 / 6 * 2

Assumptions:
1. Assume the construction traffic is generated between 10am and 4pm (6 hours)
2. Assume 26 working days per month
3. Assume 5.5 m³ per truck

[3] The assumptions provided are for the purpose of assessment predictions only. Actual figures would be defined in the detailed design stage.

By applying the Equation (3-2) with the above assumptions,

Dust suppression efficiency = 100 – 0.8 x (0.25916 x 66 x t) / 1.7 [t = time between application, hr]

Therefore,

For watering once per hour (i.e. t = 1 hour), the estimated dust suppression efficiency is 92.1%.