

**APPENDIX 3B**  
**Details of Construction**  
**Dust Emission**  
**Calculation**

| Table A3B.1: Unmitigated Construction Phase Dust Emission Factors        |                   |   |
|--|-------------------|---|
| <b>Daytime Dust Emissions from Ngong Ping STW Construction Site</b>      |                   |   |
| <b>1 Rock breaking</b>   |                   |   |
| Typical volume of material produced from each rock breaking event (cu.m) | 7.35              | estimated   |
| Typical number of rock breaking event per day                            | 20                | estimated   |
| Typical volume of material produced from rock breaking per day (cu.m)    | 147               | calculated  |
| TSP emission rate (kg/hr)  | 4.07E-04          | calculated based on AP-42 Table 11.9-2 for the same volume of material produced from traditional blasting. Refer to Equation (1). |
| <b>2 Drilling</b>  |                   |   |
| Typical volume of blasted material per day (cu.m)                        | 147               | estimated   |
| PM-10 emission rate (kg/hr)  | 1.47E-03          | calculated based on AP-42 Table 11.19.2-1 for wet drilling of unfragmented stone Refer to Equation (2).                           |
| TSP emission rate (kg/hr)  | 3.09E-03          | calculated by multiplying PM-10 by 2.1 (suggested in AP-42 Table 11.19.2-1)   |
| <b>3 Truck unloading</b>   |                   |   |
| 2-way truck flow (veh/hr)  | 8                 | estimated maximum truck flow  |
| Truck volume (Mg)  | 10                | assumed   |
| Total material handling (Mg/hr)  | 40                | calculated  |
| TSP emission rate (kg/hr)  | 4.00E-02          | calculated based on AP-42 Table 11.9-4 Refer to Equation (3).   |
| <b>4 Bulldozing</b>  |                   |   |
| Moisture content (%)   | 7.9               | mean value from AP-42 Table 11.9-3 for bulldozer  |
| Silt content (%)   | 6.9               | mean value from AP-42 Table 11.9-3 for bulldozer  |
| TSP emission rate (kg/hr)  | 1.80E+00          | calculated based on AP-42 Table 11.9-2 Refer to Equation (4).   |
| <b>5 Truck loading</b>   |                   |   |
| 2-way truck flow (veh/hr)  | 8                 | estimated maximum truck flow  |
| Truck volume (Mg)  | 10                | estimated   |
| Total material handling (Mg/hr)  | 40                | calculated  |
| TSP emission rate (kg/hr)  | 7.20E-01          | calculated based on AP-42 Table 11.9-4 Refer to Equation (5).   |
| <b>6 Vehicle traffic on unpaved site roads</b>                           |                   |   |
| Silt content (%)   | 4.3               | mean value from AP-42 Table 11.9-3 for haul truck   |
| Moisture content (%)   | 2.4               | mean value from AP-42 Table 11.9-3 for haul truck   |
| Average weight of vehicle (Mg)   | 24                | estimated   |
| 2-way truck flow (veh/hr)  | 8                 | estimated maximum truck flow  |
| Average one-way travel distance within site (km)                         | 0.1               | estimated   |
| TSP emission rate (kg/hr)  | 1.09E+00          | calculated based on AP-42 Section 13.2.2 Refer to Equation (6).   |
| <b>7 Site erosion</b>  |                   |   |
| TSP emission rate (Mg/hectare/yr)  | 0.85              | AP-42 Table 11.9-4  |
| Total site area (sq.m)   | 20700             | estimated   |
| Percentage exposed active works area (%)                                 | 50                | assumed   |
| TSP emission rate (kg/hr)  | 1.00E-01          | calculated  |
| <b>Total daytime TSP emissions (unmitigated)</b>                         | <b>3.75 kg/hr</b> |   |
|  | or                | <b>5.03E-05 g/sq.m/s</b>  |

List of Equations

|              |   |  |
|--------------|---|--|
| Equation (1) | $E \text{ (in kg/blast)} = 0.00022 \times (A)^{1.5}$ <p>A = horizontal area (m<sup>2</sup>), with blasting depth ≤21 m. Not for vertical face of a bench.</p> $E \text{ (in kg/ volume of produced material)} = 0.00022 \times (V/21)^{1.5} / V$ <p>V=Typical volume of material produced from rock breaking per day (cu.m)</p> $E \text{ (in kg/hr)} = [0.00022 \times (V/21)^{1.5} / V \text{ (kg/ volume of produce material)}] \times V/H$ <p>H= assumed 10 working hours per day</p> |  |
| Equation (2) | $4.0 \times 10^{-5} \times V \times (2.5 \text{ Mg/m}^3) / H$ <p>V= Typical volume of blasted material per day (cu.m), H= assumed 10 working hours per day</p>  |  |
| Equation (3) | $\text{TSP emission rate (kg/hr)} = 0.001 \times \text{Total material handling (Mg/hr)}$  |  |
| Equation (4) | $\text{Emission Factor} = 2.6 (s)^{1.2} / (M)^{1.3}$ <p>s = material silt content (%)</p> <p>M = material moisture content (%)</p>  |  |
| Equation (5) | $\text{TSP emission rate (kg/hr)} = 0.018 \times \text{Total material handling (Mg/hr)}$  |  |
| Equation (6) | $E = k (s/12)^a (W/3)^b / (M/0.2)^c$ <p>E = size-specific emission factor (lb/VMT)</p> <p>s = surface material silt content (%)</p> <p>W = mean vehicle weight (tons)</p> <p>M = surface material moisture content (%)</p> <p>For TSP, K=10, a=0.8, b=0.5, c=0.4</p>  | $E1 = E \times 281.9 \times \text{Veh} \times L$ <p>E1= TSP emission rate (kg/hr)</p> <p>Veh= 2-way truck flow (veh/hr)</p> <p>L= Average one-way travel distance within site (km)</p> <p>1 lb/VMT = 281.9 g/VKT</p> |

| <b>Nighttime Dust Emissions from Ngong Ping STW Construction Site</b>                      |                   |  |
|--|-------------------|--|
| <b>1 Site erosion</b>  |                   |  |
| TSP emission rate (Mg/hectare/yr)  | 0.85              | AP-42 Table 11.9-4   |
| Total site area (sq.m)   | 20700             | estimated  |
| Percentage exposed active works area (%)   | 50                | assumed  |
| TSP emission rate (kg/hr)  | 1.00E-01          |  |
| <b>Total nighttime TSP emissions</b>   | <b>0.10 kg/hr</b> |  |
|  | or                | 1.35E-06 g/sq.m/s  |
| <b>Daytime Dust Emissions from Cable Car Terminal Construction Site</b>                    |                   |  |
| Total site area (sq.m)   | 37600             | estimated  |
| TSP emission rate in g/sq.m/s  | 5.03E-05          | assumed to be the same as for Ngong Ping STW construction site |
| <b>Total daytime TSP emissions from Cable Car Terminal construction site (unmitigated)</b> | <b>6.81 kg/hr</b> |  |
| <b>Nighttime Dust Emissions from Cable Car Terminal Construction Site</b>                  |                   |  |
| <b>1 Site erosion</b>  |                   |  |
| TSP emission rate (Mg/hectare/yr)  | 0.85              | AP-42 Table 11.9-4   |
| Total site area (sq.m)   | 37600             | estimated  |
| Percentage exposed active works area (%)   | 50                | assumed  |
| TSP emission rate (kg/hr)  | 1.82E-01          |  |
| <b>Total nighttime TSP emissions</b>   | <b>0.18 kg/hr</b> |  |
|  | or                | 1.35E-06 g/sq.m/s  |

| Table A3B.2: Mitigated Construction Phase Dust Emission Factors          |                   |   |
|--|-------------------|---|
| <b>Daytime Dust Emissions from Naong Ping STW Construction Site</b>      |                   |   |
| <b>1 PCF (Penetrating Cone Fracture)</b>                                 |                   |   |
| Typical volume of material produced from each rock breaking event (cu.m) | 7.35              | estimated   |
| Typical number of rock breaking event per day                            | 20                | estimated   |
| Typical volume of material produced from rock breaking per day (cu.m)    | 147               | calculated  |
| TSP emission rate (kg/hr)  | 4.07E-04          | calculated based on AP-42 Table 11.9-2 for the same volume of material produced from traditional blasting<br>Refer to Equation (1). |
| <b>2 Drilling</b>  |                   |   |
| Typical volume of blasted material per day (cu.m)                        | 147               | estimated   |
| PM-10 emission rate (kg/hr)  | 1.47E-03          | calculated based on AP-42 Table 11.19.2-1 for wet drilling of unfragmented stone<br>Refer to Equation (2).                          |
| TSP emission rate (kg/hr)  | 3.09E-03          | calculated by multiplying PM-10 by 2.1 (suggested in AP-42 Table 11.19.2-1)   |
| <b>3 Truck unloading</b>   |                   |   |
| 2-way truck flow (veh/hr)  | 8                 | estimated maximum truck flow  |
| Truck volume (Mg)  | 10                | assumed   |
| Total material handling (Mg/hr)  | 40                | calculated  |
| Dust mitigation efficiency (%)   | 75                | For four times daily watering with complete coverage, AP-42 4th edition S11.2.4.4   |
| TSP emission rate (kg/hr)  | 1.00E-02          | calculated based on AP-42 Table 11.9-4<br>Refer to Equation (3).  |
| <b>4 Bulldozing</b>  |                   |   |
| Moisture content (%)   | 7.9               | mean value from AP-42 Table 11.9-3 for bulldozer  |
| Silt content (%)   | 6.9               | mean value from AP-42 Table 11.9-3 for bulldozer  |
| Dust mitigation efficiency (%)   | 75                | For four times daily watering with complete coverage, AP-42 4th edition S11.2.4.4   |
| TSP emission rate (kg/hr)  | 4.49E-01          | calculated based on AP-42 Table 11.9-2<br>Refer to Equation (4).  |
| <b>5 Truck loading</b>   |                   |   |
| 2-way truck flow (veh/hr)  | 8                 | estimated maximum truck flow  |
| Truck volume (Mg)  | 10                | estimated   |
| Total material handling (Mg/hr)  | 40                | calculated  |
| Dust mitigation efficiency (%)   | 75                | For four times daily watering with complete coverage, AP-42 4th edition S11.2.4.4   |
| TSP emission rate (kg/hr)  | 1.80E-01          | calculated based on AP-42 Table 11.9-4<br>Refer to Equation (5).  |
| <b>6 Vehicle traffic on unpaved site roads</b>                           |                   |   |
| Silt content (%)   | 4.3               | mean value from AP-42 Table 11.9-3 for haul truck   |
| Moisture content (%)   | 2.4               | mean value from AP-42 Table 11.9-3 for haul truck   |
| Average weight of vehicle (Mg)   | 24                | estimated   |
| 2-way truck flow (veh/hr)  | 8                 | estimated maximum truck flow  |
| Average one-way travel distance within site (km)                         | 0.1               | estimated   |
| Dust mitigation efficiency (%)   | 75                | For four times daily watering with complete coverage, AP-42 4th edition S11.2.4.4   |
| Dust reduction due to speed control (%)                                  | 59                | Speed limit reduce to 10km/hr, reduction according to Section 13.2.2.2  |
| TSP emission rate (kg/hr)  | 1.13E-01          | calculated based on AP-42 Section 13.2.2<br>Refer to Equation (6).  |
| <b>7 Site erosion</b>  |                   |   |
| TSP emission rate (Mg/hectare/yr)  | 0.85              | AP-42 Table 11.9-4  |
| Total site area (sq.m)   | 20700             | estimated   |
| Percentage exposed active works area (%)                                 | 50                | assumed   |
| Dust mitigation efficiency (%)   | 75                | For four times daily watering with complete coverage, AP-42 4th edition S11.2.4.4   |
| TSP emission rate (kg/hr)  | 2.51E-02          | calculated  |
| <b>Total daytime TSP emissions (mitigated)</b>                           | <b>0.78 kg/hr</b> |   |
|  | or                | 1.05E-05 g/sq.m/s   |

### List of Equations

|              |   |  |
|--------------|---|--|
| Equation (1) | $E \text{ (in kg/blast)} = 0.00022 \times (A)^{1.5}$ <p>A = horizontal area (m<sup>2</sup>), with blasting depth ≤21 m. Not for vertical face of a bench.</p> $E \text{ (in kg/ volume of produced material)} = 0.00022 \times (V/21)^{1.5} / V$ <p>V=Typical volume of material produced from rock breaking per day (cu.m)</p> $E \text{ (in kg/hr)} = [0.00022 \times (V/21)^{1.5} / V \text{ (kg/ volume of produce material)}] \times V/H$ <p>H= assumed 10 working hours per day</p> |  |
| Equation (2) | $4.0 \times 10^{-5} \times V \times (2.5 \text{ Mg/m}^3) / H$ <p>V= Typical volume of blasted material per day (cu.m), H= assumed 10 working hours per day</p>  |  |
| Equation (3) | $\text{TSP emission rate (kg/hr)} = 0.001 \times \text{Total material handling (Mg/hr)} \times (1-N/100)$ <p>N= Dust mitigation efficiency (%)</p>  |  |
| Equation (4) | $\text{Emission Factor} = 2.6 (s)^{1.2} / (M)^{1.3} \times (1-N/100)$ <p>s = material silt content (%), M = material moisture content (%), N= Dust mitigation efficiency (%)</p>  |  |
| Equation (5) | $\text{TSP emission rate (kg/hr)} = 0.018 \times \text{Total material handling (Mg/hr)} \times (1-N/100)$ <p>N= Dust mitigation efficiency (%)</p>  |  |
| Equation (6) | $E = k (s/12)^a (W/3)^b / (M/0.2)^c$ <p>E = size-specific emission factor (lb/VMT)<br/>s = surface material silt content (%)<br/>W = mean vehicle weight (tons)<br/>M = surface material moisture content (%)<br/>For TSP, K=10, a=0.8, b=0.5, c=0.4</p>  | $E1 = E \times 281.9 \times \text{Veh} \times L \times (1-N/100)$ <p>E1= TSP emission rate (kg/hr)<br/>Veh= 2-way truck flow (veh/hr)<br/>L= Average one-way travel distance within site (km)<br/>N= Dust mitigation efficiency (%)<br/>1 lb/VMT = 281.9 g/VKT</p> |

| <b>Nighttime Dust Emissions from Ngong Ping STW Construction Site</b>                    |                   |  |
|--|-------------------|--|
| <b>1 Site erosion</b>  |                   |  |
| TSP emission rate (Mg/hectare/yr)  | 0.85              | AP-42 Table 11.9-4   |
| Total site area (sq.m)   | 20700             | estimated  |
| Percentage exposed active works area (%)   | 50                | assumed  |
| TSP emission rate (kg/hr)  | 1.00E-01          |  |
| <b>Total nighttime TSP emissions</b>   | <b>0.10 kg/hr</b> |  |
|  | or                | 1.35E-06 g/sq.m/s  |
| <b>Daytime Dust Emissions from Cable Car Terminal Construction Site</b>                  |                   |  |
| Total site area (sq.m)   | 37600             | estimated  |
| TSP emission rate in g/sq.m/s  | 1.05E-05          | assumed to be the same as for Ngong Ping STW construction site |
| <b>Total daytime TSP emissions from Cable Car Terminal construction site (mitigated)</b> | <b>1.42 kg/hr</b> |  |
| <b>Nighttime Dust Emissions from Cable Car Terminal Construction Site</b>                |                   |  |
| <b>1 Site erosion</b>  |                   |  |
| TSP emission rate (Mg/hectare/yr)  | 0.85              | AP-42 Table 11.9-4   |
| Total site area (sq.m)   | 37600             | estimated  |
| Percentage exposed active works area (%)   | 50                | assumed  |
| TSP emission rate (kg/hr)  | 1.82E-01          |  |
| <b>Total nighttime TSP emissions</b>   | <b>0.18 kg/hr</b> |  |
|  | or                | 1.35E-06 g/sq.m/s  |