

Appendix 3.1a Adjustment of Background NO₂ at Black Point Power Station and Castle Peak Power Station

The NO₂/NO_x conversion for the BPPS & CPPS emission sources are estimated based on Janssen's formula:

$$C_2 = C_1[A_2(1-\exp(-\alpha_2X))] / A_1(1-\exp(-\alpha_1X))$$

In the BPPS EIA Study, the values of coefficients used are obtained from Janssen tables for summer conditions using linear interpolation of wind speeds. The ambient ozone concentration was assumed as 35ppb of A and 50ppb for α determination.

Therefore, the value of A was 0.74 and the value of $\alpha = 0.21\text{km}^{-1}$ for wind speed of 8m/s and 0.29km^{-1} for wind speed of 12m/s.

The 5-year average of the annual average of daily hourly maximum ozone concentration measured at EPD Air Quality Monitoring Station in Yuen Long is $74 \mu\text{g}/\text{m}^3$, 38ppb. Assuming the summer conditions, from the Janssen Table 4,

A will be 0.74 for wind speeds from 5 to 15m/s.

In consistent with the BPPS EIA Study approach, the O₃ background of 38ppb was assumed for A and 53ppb for α determination.

Thus, the value of A is 0.74 and the value of $\alpha=0.21 \text{ km}^{-1}$ for wind speed of 8m/s and 0.29km^{-1} for wind speed of 12m/s.

The calculated value of A and α are the same value assumed in the BPPS EIA Study, thus the concentrations predicted in the BPPS EIA Study can be used directly.

In accordance with the BPPS EIA Study, Part A, Table 3.3a, the maximum hourly NO₂ was predicted based on the generating capacity of 4,800 MW of BPPS. However, reference to the latest SP Licences for BPPS, the current capacity is about 2500MW, which is about 50%, thus, a factor of 0.5 is applied to adjust the NO₂ concentration from BPPS contribution.

In the BPPS EIA Study, Annex B, the NO_x concentration at the source for CPA in the wind tunnel testing was $1,577\text{mg}/\text{m}^3$. However, refer to the latest SP Licence, the licence limit of NO_x for emission from CPA is $1,500\text{mg}/\text{m}^3$. Thus, a reduction factor of 0.05 is applied to adjust the NO₂ concentration from CPA contribution.

In the BPPS EIA Study, Annex B, the NO_x concentration at the source for CPB in the wind tunnel testing was $1,578\text{mg}/\text{m}^3$. However, refer to the approved Emission Control Project to CPPS "B" Units EIA Study, new NO_x reduction technology is proposed for CPB, hence, further 80% of current NO_x emission is reduced. However, the revised licence limit of NO_x for CPB is not confirmed, a tightened NO_x limit specified in the Best Practicable Means for Electricity Works (Coal-fired Plant, Gas-fired Gas Turbine and Oil-fired Gas Turbine (Peak Lopping Plant))(BPM7/1) of $670\text{mg}/\text{m}^3$ will be adopted in this assessment. Thus, a reduction factor of 0.57 is applied to adjust the NO₂ concentration from CPB contribution.

Adjustment for NO₂ concentration from BPPS and CPPS contribution:

Hourly NO₂ concentration

| ASR | | BPPS (%AQO) ⁽¹⁾ | CPA ($\mu\text{g}/\text{m}^3$) ⁽²⁾ | CPB ($\mu\text{g}/\text{m}^3$) ⁽²⁾ | Adjusted NO ₂ concentration |
|--|-----------------------------|-------------------------------|---|---|---|
| Sheung Pak Nai | 7.5km, 232°, 8m/s | 5 | 59.9 | 46.6 | 84 |
| Ha Pak Nai | 3.2km, 232°, 252°, 8m/s | 10 | 59.9 | 46.6 | 92 |
| Lung Kwu Tan ⁽³⁾ | 2.0km, 330°, 12m/s | 30 | - | - | 45 |
| Tin Shui Wai Park | 12km, 232°, 8m/s | 5 | 51.7 | 62.7 | 84 |
| Tuen Mun Valley & Butterfly Beach Area ⁽³⁾ | 7.5km, 252°,270°,290°, 8m/s | 15 | - | - | 23 |
| Tuen Mun Area 38 ⁽³⁾ | 4.8km, 330°, 12m/s | 20 | - | - | 30 |

Notes:

(1) The maximum measured NO₂ concentrations due to BPPS Emissions are reference to BPPS EIA Report Part A, Table 3.3a.

(2) The CPPS contributions are reference to BPPS EIA Report Annex H, Table H.1

(3) For ASRs located at Lung Kwu Tan, Tuen Mun Valle, Butterfly Beach Area & Tuen Mun Area38, since the worst wind direction from BPPS/STF and CPPS are not at the same wind direction, no cumulative impact from CPPS is anticipated.

Daily and Annual NO₂ concentration

| ASR | Daily NO ₂ (%AQO) ⁽¹⁾ | Annual NO ₂ (%AQO) ⁽¹⁾ | Adjusted Daily NO ₂ concentration (µg/m ³) | Adjusted Annual NO ₂ concentration (µg/m ³) |
|---|---|--|---|--|
| Sheung Pak Nai⁽²⁾ | 11.3 | 0.5 | 17 | 0.4 |
| Ha Pak Nai | 11.3 | 0.5 | 17 | 0.4 |
| Lung Kwu Tan | 12.1 | 0.6 | 18 | 0.5 |
| Tin Shui Wai Park | 14.6 | 0.6 | 22 | 0.5 |
| Tuen Mun Valley & Butterfly Beach Area | 9.2 | 0.7 | 14 | 0.6 |
| Tuen Mun Area 38⁽³⁾ | - | - | 18 | 0.7 |

Notes:

(1) The 2nd highest daily & annual NO₂ concentrations due to BPPS & CPPS emissions are reference to BPPS EIA Report Part B, Table 6.2b.

(2) As there is no wind tunnel testing was performed at Sheung Pak Nai in the BPPS EIA Study, the NO₂ concentrations predicted at Ha Pak Nai is used as worst case assumption.

(3) The daily and annual average NO₂ concentrations are contributed by both BPPS and CPPS. For BPPS contribution, as indicated by the maximum hourly concentrations (due to BPPS only), the worst-case impacts at Tuen Mun Area 38 is about 30% higher than that at Butterfly Beach Area. For CPPS contribution, as no wind tunnel testing was performed at Tuen Mun Area 38 in the BPPS EIA Study, reference was made to the Emission Control Project to CPPS "B" Units EIA Study with regards to the CPPS contribution. The maximum concentration ratio predicted at Tuen Mun Area 38 is lower than the maximum concentration ratio predicted at Butterfly Beach Area as presented in the CPPS "B" Units EIA Study. Overall on conservative side, we assume that the total daily and annual BPPS and CPPS contribution at Tuen Mun Area 38 would be 30% higher than the total daily and annual BPPS and CPPS contribution at Butterfly Beach Area.