

# Mott MacDonald HK

## Consulting Engineers

20th Floor, Two Landmark East  
100 How Ming Street  
Kwun Tong, Kowloon, Hong Kong

### Contract:

Agreement No. CE 45/2004 (CE) Liantang/Heung Yuen Wai  
Boundary Control Point and Associated Works - Investigation

### Job Ref:

255228

### Subject:

Estimation of Pollutant Loadings from Existing Site

### Calc. Sheet No.

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### Drawing Ref.

### Calculations by

WT

### Checked by

JC

### Date:

10.09.2010

Ref.

## Appendix 6.2 - Estimation of Pollutant Loadings from Existing Site

### 1 Calculation of Sewage Load

Assumptions:

- Global unit load factors are taken from Table 4 of the Sewerage Manual

Global Unit Load factors

Load Type	Unit Load Factor Residential
SS (kg/d/person)	0.04
BOD (kg/d/person)	0.042
TN (kg/d/person)*	0.0085
NH3N (kg/d/person)	0.005
E. Coli. (no./d/person)	4.30E+10

Note:-

\*TN is equal to TKN + nitrite N + nitrate N. As nitrite N and nitrate N are assumed to be in very small amount or zero in raw domestic wastewater at the beginning, TN is taken as equal to TKN in the raw sewage.

Calculation

$$\text{Total pollution loading} = \text{Unit Load Factor} \times \text{Population}$$

$$\text{Pollution Load Concentration} = \frac{\text{Total Load}}{\text{Total Flow}}$$

Total Pollution Load from Existing Uses

Load Type	Chuk Yuen North	Chuk Yuen South	Chuk Yuen North Load Conc.	Chuk Yuen South Load Conc.
SS	15.12 kg/d	4.08 kg/d	166.67 mg/L	166.67 mg/L
BOD	15.88 kg/d	4.28 kg/d	175.00 mg/L	175.00 mg/L
TN	3.21 kg/d	0.87 kg/d	35.42 mg/L	35.42 mg/L
NH3N	1.89 kg/d	0.51 kg/d	20.83 mg/L	20.83 mg/L
E. Coli.	1.63E+13 no./d	4.39E+12 no./d	1.63E+13 no./d	4.39E+12 no./d

### 2. Performance of Septic Tank

Assumptions:

- Removal performance of septic tanks for various pollution loading is based on reference data provided in Chapter 25 of Syed R. Qasim "Wastewater Treatment Plants: Planning, Design and Operation"

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### Removal Performance of Septic Tank and Lead Field

Load Type	Range of Removal	Design Removal**
SS	66%-75%	70%
BOD	40%-52%	45%
TN	20%-29%	24%
E. Coli.	3log-4log	3log
Load Type	Range of Increase	Design Increase (%)**
NH <sub>3</sub> N*	178%-223%	200%

Note:-

\*The amount of NH<sub>3</sub>N in the effluent of the septic tank after biological reactions will not exceed the amount of TN remaining in the effluent of septic tank as TN=TKN + Nitrate-N+Nitrite-N and TKN = NO<sub>3</sub>N + Organic N.

\*\*The design removal and increase percentages of loading are assumed to be the mid-value of the typical range of removal and increase of the sewage.

### 3. Pollutant Loadings after Septic Tank

#### Effluent Quality from Septic Tank for Chuk Yuen North

Load Type	Raw Sewage	Effluent after septic tank	Flow L/d	Total load after septic tank
SS	166.67 mg/L	50.00 mg/L	90720	4.54 kg/d
BOD	175.00 mg/L	96.25 mg/L	90720	8.73 kg/d
TN*	35.42 mg/L	26.92 mg/L	90720	2.44 kg/d
NH <sub>3</sub> N	20.83 mg/L	26.92 mg/L	90720	2.44 kg/d
E. Coli.	1.63E+13 no./d	1.63E+10 no./d	-	1.63E+10 no./d

#### Effluent Quality from Septic Tank for Chuk Yuen South

Load Type	Raw Sewage	Effluent after septic tank	Flow L/d	Total load after septic tank
SS	166.67 mg/L	50.00 mg/L	24480	1.22 kg/d
BOD	175.00 mg/L	96.25 mg/L	24480	2.36 kg/d
TN*	35.42 mg/L	26.92 mg/L	24480	0.66 kg/d
NH <sub>3</sub> N	20.83 mg/L	26.92 mg/L	24480	0.66 kg/d
E. Coli.	4.39E+12 no./d	4.39E+09 no./d	-	4.39E+09 no./d

Notes:-

\* TN load in effluent shall be greater than or equal to NH<sub>3</sub>N load in effluent.

#### Total Effluent Quality from Septic Tank for Chuk Yuen Villages

Load Type	Raw Sewage	Effluent after septic tank	Flow L/d	Total load after septic tank
SS	166.67 mg/L	50.00 mg/L	115200	5.76 kg/d
BOD	175.00 mg/L	96.25 mg/L	115200	11.09 kg/d
TN*	35.42 mg/L	26.92 mg/L	115200	3.10 kg/d
NH <sub>3</sub> N	20.83 mg/L	26.92 mg/L	115200	3.10 kg/d
E. Coli.	2.06E+13 no./d	2.06E+10 no./d	-	2.06E+10 no./d