Appendix 3.33 Estimated Odour Emission Reduction by Improvement of DWFI Inerception Efficiency
Derivation of BOD loading in New Yau Ma Tei Typhoon Shelter

Table 1 Deduction of BOD loading in the New Yau Ma Tei Typhoon Shelter

Column ID			(a)			(b)		(c)		(d)		(e)	(f)	(g)	(h)	(i)	(o)	(p)	(q)	(r)
	Reference				Outflow (m³/d)								Phase I Pollution Loading Survey - Water Quality Sampling Results							
Location			DWFI number	Current invert height (mPD)	Inflow (m³/d)	To stormwater Drainage System	To Sewerage system	Percentage Interception (%)	BOD loading from sampling event (kg/d)	Theoretical BOD Loading from Drainage Catchment (kg/d)	Tidal influence?	TBOD_tot, Theoretical BOD Loading from drainage catchment x tidal loading percentage of influence (25% for tidal influence, 12% for no tidal influence, *Tables 4.26 and 4.27*)	TBOD = TBODtot *(γi)	ID	Flow (m³/d)	TSS (kg/d)	COD (kg/d)	NH3-N (kg/d)	BOD₅ Loading from sampling event	Percentage of Pollution Loading	γi Relative percentage of pollution loading in Drainage catchment according to Table 4.25
Reference			Figure 4.17	Figure 8.24 8.30			Table 4.31			Table 4.25	Table 4.30	For DWFI 2, 3 & 4. Based on tide information and invert levels Figures 8.24-8.30	Table 4.25, 4.26, 4.27		Figure 4.15 Table 4.22 - samples collected at the outlet of the box culverts (4.7.42)					Table 4.23	
Lai Chi Kok Park BC			12		12,195	7,540	4,655	38.2%	1,068	19,570			2,348	L10	56,841	1,783	3,613	19	1,068	3.3%	
														L12	31,593	837	3,340	210	1,516	4.7%	
Hing Wah Street BC									3,100	6,346			762	L13	37,070	972	4,159	275	1,584	4.9%	
Fat Chueng Street BC			13											L14	1,244	18	141	5	35	0.1%	
			10								Y			L16	87,409	1,057	8,875	78	1,869	5.8%	
Tonkin Street BC									2,761	11,687		Y	2,922	L17	44,468	401	4,549	43	857	2.7%	
			8								Y			L19	38,286	605	2,911	119	792	2.5%	
														L20	37,463	561	4,155	108	722	2.3%	
Nam Cheong Street BC														L21	37,297	538	5,525	98	1,104	3.4%	
Wai On Street BC									3,092	15,822		Y	3,955	L22	15,094	1,641	1,355	150	474	1.5%	
Tai Kok Tsui Road			7											L35	23,901	2,710	6,685	297	3,115	9.7%	27.0%
Nullah Road BC			6A		566,070	561,000	5,070	0.9%			Y		1,985	L24	60,399	2,036	5,878	344	2,451	7.7%	21.2%
Nelson Road BC			6		8,199	4,215	3,984	48.6%					1,363	L25	30,599	2,252	3,897	163	1,683	5.3%	14.6%
Shantung Street BC													1,461	L26	16,350	1,888	2,882	117	1,804	5.6%	15.6%
Soy Street BC			5		22,122	15,730	6,392	28.9%	11,555	37,424		Y	9,356	L27	25,872	2,996	5,692	177	2,502	7.8%	21.7%
			4	+1.57				32.4%					264	L28	13,106	649	1,692	73	450	1.4%	4.3%
Dundas Street BC													629	L29	22,719	847	2,875	150	1,075	3.4%	10.3%
		diverted to DWFI 4	3										368	L30	15,406	541	2,007	165	629	2.0%	6.0%
Waterloo Road BC													569	L31	18,219	661	2,456	176	971	3.0%	9.3%
Public Square Street BC			2	+1.2				32.4%					1,466	L32	21,370	919	4,654	216	2,503	7.8%	24.0%
Saigon Street BC													2,212	L33	32,031	1,426	6,848	323	3,778	11.8%	36.2%
													566	L34.1	17,072	408	1,971	119	967	3.0%	9.3%
Jordon Road BC									10,428	24,425		Y	6,106	32	L34.2	1,629	21	125	18	55	0.2%	0.5%
																			32,004	100%	

| NOTES | | | | | | No efficiency information available - Assume average of all other DWFIs | | | | | No information available on tidal influence - Assume tidal influence due to invert levels shown in Figure 8.24 - 8.30 and tide information | | =percent of pollution loading / (sum percent of pollution loading for BC) [column (r)] * (Theoretical BOD loading from drainage catchment x tidal loading percentage of influence) [column (d)] | | | | | | | = Percentage of Pollution Loading [column (q)] / sum Percentage of Pollution Loading [column (q)] |

Conservative interception efficiency based on published information (max interception efficiency = 85.5% as for DWFI No. 14 below, and Feasibilty Study, Section 8.2, interception efficiency = 88%)						80.0%															
Lai King Hill Road/Kau Wah Keng	Figure 3.6		KT1																		
Yuen Chow Street	Figure 3.6		9 - YC9 to YC11		3422	3032	390	11.4%			Y										
Kwong Lee Street	Figure 3.6		11																		
Cheung Shun Street	Figure 3.7		14		3487	504	2983	85.5%													
Kom Tsun Street/Cheung Sha Road	Figure 3.6		15		1740	1410	330	19.0%													

Notes:
Review of West Kowloon and Tsuen Wan Sewerage Master Plans - Feasibiliy Study (Feb 2010)

Table 4.22 - Daily Pollution Loads in Stormwater Drainage System
Table 4.23 - Distribution of Pollution Loading in West Kowloon
Table 4.25 - Percentage of DWF Discharge at Box Culverts by Drainage Catchment
Table 4.26 - Percentage of DWF Discharge to Tsuen Wan Coast (Including Mixing Zone Concentration)
Table 4.27 - Percentage of DWF Discharge to Tsuen Wan Coast (Excluding Mixing Zone Concentration)
Table 4.30 - DWFI Monitoring Results
Table 4.31 - Assessment of Average Daily Dry Weather Flow Interception

Table 2 Tide information

Historic Tide Mid-Level   +1.3 mPD

Location	Period of Data	Mean	Mean Higher High Water Level (mPD)	Mean Lower Low Water Level (mPD)
Quarry Bay/North Point	1981-1999	1.3	2	0.5

Notes: Reference made to:
PORT WORKS DESIGN MANUAL - Part 1
General Design Considerations for Marine Works
Civil Engineering Office
Civil Engineering Department
The Government of the Hong Kong Special Administrative Region

Table 3 DWFI efficiencies

DWFI	Measured Interception Efficiency	^TBOD Theoretical BOD loading before DWFI leading to NYMTTS	$^TBOD_M$ Theoretical BOD loading entering NYMTTS at measured interception efficiency	$^TBOD_R$ Theoretical BOD loading entering NYMTTS at the assumed highest interception efficiency of 80.0% (note a and b)	% Overall reduction of BOD loading entering NYMTTS $(^TBOD_M - {}^TBOD_R) / {}^TBOD_M$	
6A	0.9%	1985	1967	393		
6	48.6%	2823	1451	290		
5	28.9%	2026	1440	288		Cherry St
		6834	4859	972	80.0%	BC
3 & 4	32.4%	1830	1237	366		
2	32.4%	3678	2487	736		
no DWFI	0.0%	598	598	598		Jordon Rd
		6106	4323	1700	60.7%	BC

Notes

(a)   For Cherry St a new DWFI is to be installed at the NYMTTS (see Appendix 3.36). This is assumed to have an interception efficiency of 80.0%. This mean for Cherry St BC, the stormwater goes through 1 set of DWFI and then a second DWFI at 80% efficiency. The overall reduction of water entering the NYMTTS at Cherry St compared to the current situation is 80%

(b)   For Jordan Road, the interception efficiency of the existing DWFI are to be improved (see Appendix 3.36) to an assumed interception efficiency of 80%. This means the current DWFI interception will improve from 32.4% to 80.0%. This results in a reduction of 60.7% of stormwater entering NYMTTS when compared to the current situation

Table 4 Contribution of water to NYMTTS odour

Grid number	Date	Background ambient odour (ou/m³)	Odour from Air (total), at water surface (ou/m³) (A)	Odour from Water (ou/m³) (B)	Odour from Sediment (ou/m³)	Odour contribution from water = (B) / (A)
30	18-Feb	229	2632	1334	299	51%
	20-Feb	240	2168	2118	463	98%
7	18-Feb	98	1722	1051	10	61%
	20-Feb	389	3373	2723	10	81%
					average	0.728

Note
Information obtained from onsite sampling, more details can be found in Appendix 3.26b