Scenario	Phase	Key STW Effluent Discharges	Assumed Flow (m3/day)	Assumed Concentrations											
				BOD_5 (mg/L)	TSS (mg/L)	Org-N (mg/L)	NH_3-N (mg/L)	Ortho-P (mg/L)	TP (mg/L)	TON (mg/L)	DO (mg/L)	*E. coli* (no/100mL)	Cu (mg/L)	Silicate (mg/L)	TRC (mg/L)
1b (Year 2009) – HATS Stage 1	Baseline (normal operation without disinfection at SCISTW)	PPSTW [2]	193,800[1]	214 [3]	211 [3]	24 [3]	24 [3]	3.33 [4]	5.6 [5]	0	0	1.5E+07 [3]	0.40 [6]	9 [7]	0
		SHWSTW [8]	63,123[31]	180 [10]	120 [10]	10.21 [9]	30.32 [9]	1.43 [9]	2.40 [4]	0.137 [9]	0.1 [11]	300,000 [10]	0.08 [38]	9 [7]	0
		YLSTW [14]	44,157[31]	20 [25]	30 [25]	8.85 [25]	7.66 [25]	2.37 [15]	2.62 [15]	30.66 [15]	0.5 [17]	295,600 [18]	0.0248 [16]	9 [7]	0
		SWSTW [19]	136,008[31]	214 [12]	211 [12]	24 [12]	24 [12]	3.33 [12]	5.6 [12]	0	0	1.5E+07 [12]	0.40 [12]	9 [7]	0
		SCISTW [22]	1,576,300[31]	68 [23]	42 [23]	9.93 [23]	17.43 [23]	1.8 [23]	3 [23]	0 [23]	0.1 [11]	1.00E+07 [23]	0.023 [23]	8.6 [23]	0
		THEES [24]	382,794[47]	20 [25]	30 [25]	8.85 [25]	7.66 [25]	1.70 [26]	1.93 [26]	11.48 [25]	5.2 [27]	15,000 [25]	0.0643 [28]	9 [7]	0.07 [30]
		SHTSTW [29]	9,148[31]	180 [44]	100 [44]	10.21 [45]	30.32 [45]	1.43 [45]	2.40 [45]	0.137 [45]	0.1 [11]	60,000 [44]	0.08 [38]	9 [7]	0
1a (Year 2009) – HATS Stage 1	Operation (normal operation with disinfection at SCISTW)	PPSTW [2]	193,800[1]	214 [3]	211 [3]	24 [3]	24 [3]	3.33 [4]	5.6 [5]	0	0	1.5E+07 [3]	0.40 [6]	9 [7]	0
		SHWSTW [8]	63,123[31]	180 [10]	120 [10]	10.21 [9]	30.32 [9]	1.43 [9]	2.40 [4]	0.137 [9]	0.1 [11]	300,000 [10]	0.08 [38]	9 [7]	0
		YLSTW [14]	44,157[31]	20 [25]	30 [25]	8.85 [25]	7.66 [25]	2.37 [15]	2.62 [15]	30.66 [15]	0.5 [17]	295,600 [18]	0.0248 [16]	9 [7]	0
		SWSTW [19]	136,008[31]	214 [12]	211 [12]	24 [12]	24 [12]	3.33 [12]	5.6 [12]	0	0	1.5E+07 [12]	0.40 [12]	9 [7]	0
		SCISTW [32]	1,576,300[31]	68 [23]	42 [23]	9.93 [23]	17.43 [23]	1.8 [23]	3 [23]	0 [23]	0.1 [11]	200,000 [46]	0.023 [23]	8.6 [23]	0.2 [33]
		THEES [24]	382,794[47]	20 [25]	30 [25]	8.85 [25]	7.66 [25]	1.70 [26]	1.93 [26]	11.48 [25]	5.2 [27]	15,000 [25]	0.0643 [28]	9 [7]	0.07 [30]
		SHTSTW [29]	9,148[31]	180 [44]	100 [44]	10.21 [45]	30.32 [45]	1.43 [45]	2.40 [45]	0.137 [45]	0.1 [11]	60,000 [44]	0.08 [38]	9 [7]	0
2b (Year 2013) – HATS Stage 1	Baseline (normal operation without disinfection at SCISTW)	PPSTW [35]	203,800[1]	180 [10]	120 [10]	24 [36]	24 [36]	1.33 [4]	2.24 [37]	0.137 [9]	0.1 [11]	300,000 [10]	0.08 [38]	9 [7]	0.2 [39]
		SHWSTW [8]	78,504[31]	180 [10]	120 [10]	10.21 [9]	30.32 [9]	1.43 [9]	2.40 [4]	0.137 [9]	0.1 [11]	300,000 [10]	0.08 [38]	9 [7]	0
		YLSTW [14]	52,304[31]	20 [25]	30 [25]	8.85 [25]	7.66 [25]	2.37 [15]	2.62 [15]	30.66 [15]	0.5 [17]	295,600 [18]	0.0248 [16]	9 [7]	0
		SWSTW [19]	143,374[31]	214 [12]	211 [12]	24 [12]	24 [12]	3.33 [12]	5.6 [12]	0	0	1.5E+07 [12]	0.40 [12]	9 [7]	0
		SCISTW [22]	1,661,100[31]	68 [23]	42 [23]	9.93 [23]	17.43 [23]	1.8 [23]	3 [23]	0 [23]	0.1 [11]	1.00E+07 [23]	0.023 [23]	8.6 [23]	0
		THEES [24]	426,397[47]	20 [25]	30 [25]	8.85 [25]	7.66 [25]	1.70 [26]	1.93 [26]	11.48 [25]	5.2 [27]	15,000 [25]	0.0643 [28]	9 [7]	0.07 [30]
		SHTSTW [29]	9,692[31]	180 [44]	100 [44]	10.21 [45]	30.32 [45]	1.43 [45]	2.40 [45]	0.137 [45]	0.1 [11]	60,000 [44]	0.08 [38]	9 [7]	0
2a (Year 2013) – HATS Stage 1	Operation (normal operation with disinfection at SCISTW)	PPSTW [35]	203,800[1]	180 [10]	120 [10]	24 [36]	24 [36]	1.33 [4]	2.24 [37]	0.137 [9]	0.1 [11]	300,000 [10]	0.08 [38]	9 [7]	0.2 [39]
		SHWSTW [8]	78,504[31]	180 [10]	120 [10]	10.21 [9]	30.32 [9]	1.43 [9]	2.40 [4]	0.137 [9]	0.1 [11]	300,000 [10]	0.08 [38]	9 [7]	0
		YLSTW [14]	52,304[31]	20 [25]	30 [25]	8.85 [25]	7.66 [25]	2.37 [15]	2.62 [15]	30.66 [15]	0.5 [17]	295,600 [18]	0.0248 [16]	9 [7]	0
		SWSTW [19]	143,374[31]	214 [12]	211 [12]	24 [12]	24 [12]	3.33 [12]	5.6 [12]	0	0	1.5E+07 [12]	0.40 [12]	9 [7]	0
		SCISTW [32]	1,661,100[31]	68 [23]	42 [23]	9.93 [23]	17.43 [23]	1.8 [23]	3 [23]	0 [23]	0.1 [11]	200,000 [46]	0.023 [23]	8.6 [23]	0.2 [33]
		THEES [24]	426,397[47]	20 [25]	30 [25]	8.85 [25]	7.66 [25]	1.70 [26]	1.93 [26]	11.48 [25]	5.2 [27]	15,000 [25]	0.0643 [28]	9 [7]	0.07 [30]
		SHTSTW [29]	9,692[31]	180 [44]	100 [44]	10.21 [45]	30.32 [45]	1.43 [45]	2.40 [45]	0.137 [45]	0.1 [11]	60,000 [44]	0.08 [38]	9 [7]	0

Scenario	Phase	Key STW Effluent Discharges		Assumed Flow (m3/day)	Assumed Concentrations											
					BOD_5 (mg/L)	TSS (mg/L)	Org-N (mg/L)	NH_3-N (mg/L)	Ortho-P (mg/L)	TP (mg/L)	TON (mg/L)	DO (mg/L)	*E. coli* (no/100mL)	Cu (mg/L)	Silicate (mg/L)	TRC (mg/L)
3b (Year 2020) with HATS Stage 2A	Baseline (normal operation without disinfection at SCISTW)	PPSTW [35]		230,000[1]	180 [10]	120 [10]	24 [36]	24 [36]	1.33 [4]	2.24 [37]	0.137 [9]	0.1 [11]	300,000 [10]	0.08 [38]	9 [7]	0.2 [39]
		SHWSTW [8]		114,970[31]	180 [10]	120 [10]	10.21 [9]	30.32 [9]	1.43 [9]	2.40 [4]	0.137 [9]	0.1 [11]	300,000 [10]	0.08 [38]	9 [7]	0
		NWNT outfall [13]	YLSTW [43]	58,185[31]	20 [25]	30 [25]	8.85 [25]	7.66 [25]	2.37 [15]	2.62 [15]	30.66 [15]	0.5 [17]	15,000 [25]	0.0248 [16]	9 [7]	0
			SWSTW [34]	159,848[31]	100 [20]	55 [20]	8.8 [20]	25 [20]	0.98 [4]	1.64 [21]	0 [20]	0.1 [20]	20,000 [20]	0.08 [38]	9 [7]	0
		SCISTW [22]		2,341,600[31]	68 [23]	42 [23]	9.93 [23]	17.43 [23]	1.8 [23]	3 [23]	0 [23]	0.1 [11]	1.00E+07 [23]	0.023 [23]	8.6 [23]	0
		THEES [24]		470,000[47]	20 [25]	30 [25]	8.85 [25]	7.66 [25]	1.70 [26]	1.93 [26]	11.48 [25]	5.2 [27]	15,000 [25]	0.0643 [28]	9 [7]	0.07 [30]
		SHTSTW [29]		12,100[31]	180 [44]	100 [44]	10.21 [45]	30.32 [45]	1.43 [45]	2.40 [45]	0.137 [45]	0.1 [11]	60,000 [44]	0.08 [38]	9 [7]	0
3a (Year 2020) with HATS Stage 2A	Operation (normal operation with disinfection at SCISTW)	PPSTW [35]		230,000[1]	180 [10]	120 [10]	24 [36]	24 [36]	1.33 [4]	2.24 [37]	0.137 [9]	0.1 [11]	300,000 [10]	0.08 [38]	9 [7]	0.2 [39]
		SHWSTW [8]		114,970[31]	180 [10]	120 [10]	10.21 [9]	30.32 [9]	1.43 [9]	2.40 [4]	0.137 [9]	0.1 [11]	300,000 [10]	0.08 [38]	9 [7]	0
		NWNT outfall [13]	YLSTW [43]	58,185[31]	20 [25]	30 [25]	8.85 [25]	7.66 [25]	2.37 [15]	2.62 [15]	30.66 [15]	0.5 [17]	15,000 [25]	0.0248 [16]	9 [7]	0
			SWSTW [34]	159,848[31]	100 [20]	55 [20]	8.8 [20]	25 [20]	0.98 [4]	1.64 [21]	0 [20]	0.1 [20]	20,000 [20]	0.08 [38]	9 [7]	0
		SCISTW [32]		2,341,600[31]	68 [23]	42 [23]	9.93 [23]	17.43 [23]	1.8 [23]	3 [23]	0 [23]	0.1 [11]	20,000 [46]	0.023 [23]	8.6 [23]	0.2 [33]
		THEES [24]		470,000[47]	20 [25]	30 [25]	8.85 [25]	7.66 [25]	1.70 [26]	1.93 [26]	11.48 [25]	5.2 [27]	15,000 [25]	0.0643 [28]	9 [7]	0.07 [30]
		SHTSTW [29]		12,100[31]	180 [44]	100 [44]	10.21 [45]	30.32 [45]	1.43 [45]	2.40 [45]	0.137 [45]	0.1 [11]	60,000 [44]	0.08 [38]	9 [7]	0
4b (Ultimate Year) with HATS Stage 2B	Baseline (normal operation without disinfection at SCISTW)	PPSTW [35]		230,000[1]	180 [10]	120 [10]	24 [36]	24 [36]	1.33 [4]	2.24 [37]	0.137 [9]	0.1 [11]	300,000 [10]	0.08 [38]	9 [7]	0.2 [39]
		SHWSTW [8]		168,937[31]	180 [10]	120 [10]	10.21 [9]	30.32 [9]	1.43 [9]	2.40 [4]	0.137 [9]	0.1 [11]	300,000 [10]	0.08 [38]	9 [7]	0
		NWNT outfall [13]	YLSTW [43]	70,000[31]	20 [25]	30 [25]	8.85 [25]	7.66 [25]	2.37 [15]	2.62 [15]	30.66 [15]	0.5 [17]	15,000 [25]	0.0248 [16]	9 [7]	0
			SWSTW [34]	246,000[31]	100 [20]	55 [20]	8.8 [20]	25 [20]	0.98 [4]	1.64 [21]	0 [20]	0.1 [20]	20,000 [20]	0.08 [38]	9 [7]	0
		SCISTW [40]		2,800,000[31]	24 [41]	16 [41]	2.5 [41]	2 [41]	1.3 [41]	2 [41]	23 [41]	0.5 [17]	295,600 [18]	0.012 [23]	8.6 [23]	0
		THEES [24]		470,000[47]	20 [25]	30 [25]	8.85 [25]	7.66 [25]	1.70 [26]	1.93 [26]	11.48 [25]	5.2 [27]	15,000 [25]	0.0643 [28]	9 [7]	0.07 [30]
		SHTSTW [29]		16,848[31]	180 [44]	100 [44]	10.21 [45]	30.32 [45]	1.43 [45]	2.40 [45]	0.137 [45]	0.1 [11]	60,000 [44]	0.08 [38]	9 [7]	0
4a (Ultimate Year) with HATS Stage 2B	Operation (normal operation with disinfection at SCISTW)	PPSTW [35]		230,000[1]	180 [10]	120 [10]	24 [36]	24 [36]	1.33 [4]	2.24 [37]	0.137 [9]	0.1 [11]	300,000 [10]	0.08 [38]	9 [7]	0.2 [39]
		SHWSTW [8]		168,937[31]	180 [10]	120 [10]	10.21 [9]	30.32 [9]	1.43 [9]	2.40 [4]	0.137 [9]	0.1 [11]	300,000 [10]	0.08 [38]	9 [7]	0
		NWNT outfall [13]	YLSTW [43]	70,000[31]	20 [25]	30 [25]	8.85 [25]	7.66 [25]	2.37 [15]	2.62 [15]	30.66 [15]	0.5 [17]	15,000 [25]	0.0248 [16]	9 [7]	0
			SWSTW [34]	246,000[31]	100 [20]	55 [20]	8.8 [20]	25 [20]	0.98 [4]	1.64 [21]	0 [20]	0.1 [20]	20,000 [20]	0.08 [38]	9 [7]	0
		SCISTW [42]		2,800,000[31]	24 [41]	16 [41]	2.5 [41]	2 [41]	1.3 [41]	2 [41]	23 [41]	0.5 [17]	1,000 [46]	0.012 [23]	8.6 [23]	0.2 [33]
		THEES [24]		470,000[47]	20 [25]	30 [25]	8.85 [25]	7.66 [25]	1.70 [26]	1.93 [26]	11.48 [25]	5.2 [27]	15,000 [25]	0.0643 [28]	9 [7]	0.07 [30]
		SHTSTW [29]		16,848[31]	180 [44]	100 [44]	10.21 [45]	30.32 [45]	1.43 [45]	2.40 [45]	0.137 [45]	0.1 [11]	60,000 [44]	0.08 [38]	9 [7]	0

(1) Based on the latest findings from the "CE 51/2002(DS) Upgrading of Pillar Point Sewage Treatment Works – Investigation, Design and Construction".

(2) Pillar Point Sewage Treatment Works (preliminary treatment).
(3) Based on the influent concentrations for PPSTW as provided under "CE51/2002 (DS) Upgrading of Pillar Point Sewage Treatment Works" and assuming 20% removal rate for BOD, TSS and *E.coli* after preliminary treatment.
(4) Assumed that the ratio of TP to OrthoP is 1.68.
(5) Based on average concentration measured in the effluent of PPSTW as reported in "Review of Tuen Mun and Tsing Yi Sewerage Master Plans Final Working Paper WP9: Final Sewage Treatment and Disposal for Tuen Mun".
(6) Average concentration from actual measurement of effluent at PPSTW (preliminary treatment) from 1992 to 1995.
(7) Average concentration from actual measurements of raw sewage at Sha Tin STW from 1987 to 1989.
(8) Siu Ho Wan Sewage Treatment Works (CEPT + UV disinfection).
(9) Average concentration from actual measurement of effluent at SHWSTW from May 05 to Oct 05.
(10) Based on discharge license of SHWSTW (CEPT + UV disinfection) at 95 percentile.
(11) Typical DO concentration in CEPT effluent based on the approved EIA Report for the "Upgrading and Expansion of San Wai STW and the Expansion of Ha Tsuen PS" (Section A5.3.1.2 of Appendix A).
(12) It is assumed that the effluent quality of SWSTW (preliminary treatment) would be similar to that of the existing PPSTW which is also a preliminary treatment plant.
(13) NWNT outfall would receive combined effluent flow from YLSTW and SWSTW.
(14) Yuen Long Sewage Treatment Works (secondary treatment).
(15) Average concentration from actual measurement of effluent at YLSTW from 2004 to 2005.
(16) Average concentration from actual measurement of effluent at YLSTW from 2003 to 2004.
(17) Typical DO concentration in secondary treated effluent based on the approved EIA Report for the "Upgrading and Expansion of San Wai STW and the Expansion of Ha Tsuen PS" (Section A5.3.1.2 of Appendix A).
(18) Based on 95 percentile value from actual measurement of effluent at Sha Tin STW (secondary treatment).
(19) San Wan Sewage Treatment Works (Preliminary Treatment). The effluent from SWSTW would be discharged to the Urmston Road via the NWNT outfall.
(20) Typical concentrations in CEPT effluent with UV disinfection based on the approved EIA Report for the "Upgrading and Expansion of San Wai STW and the Expansion of Ha Tsuen PS" (Section A5.3.1.2 of Appendix A).
(21) Based on the average TP concentration of 4.11 mg/L from actual measurement at SWSTW (preliminary treatment) and a removal rate of 60% for TP in the CEPT effluent.
(22) Stonecutters Island Sewage Treatment Works (CEPT) – "without disinfection" scenario.
(23) Based on Table 4.2.9 of the "Environmental and Engineering Feasibility Assessment Studies in Relation to the Way Forward of the Harbour Area Treatment Scheme (HATS EEFS) Final Study Report".
(24) The combined effluent flow from Tai Po Sewage Treatment Works (TPSTW) and Sha Tin Sewage Treatment Works (STSTW) is discharged into the Victoria Harbour via the Kai Tak Nullah (KTN) outfall under the Tolo Harbour Effluent Export Scheme (THEES). Secondary treatment is currently provided for TPSTW and STSTW. It is assumed that centralized chlorination and dechlorination would be provided for the combined flow from TPSTW and STSTW.
(25) Based on discharge license of Sha Tin STW (secondary treatment) at 95 percentile.
(26) Average concentration from actual measurement of effluent at STSTW from 2004 to 2005.
(27) Based on the average DO level measured by EPD near the KTN outfall as reported in the "Hong Kong River Water Quality 2003".
(28) Average concentration from actual measurement of effluent at STSTW and TPSTW from 2003 to 2004.
(29) Sham Tseng Sewage Treatment Works (CEPT + UV disinfection).
(30) It is assumed that a dechlorination facility would be provided at the THEES tunnel exit at Diamond Hill to reduce the total residual chlorine (TRC) level to 0.2 mg/L. Assuming an effluent retention time of roughly 60 minutes between the exit point of the dechlorination plant and the KTN outfall, the TRC level in the effluent would be reduced to 0.07 mg/L at the KTN outfall using a decay rate of 24/day.
(31) For 2009, 2013 and 2020 scenarios, the flow rates were calculated using the unit flow factors from the "Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning (Version 1.0), EPD, March 2005" and the latest population and employment statistics. For the ultimate scenario, the design plant capacity was used.
(32) Stonecutters Island Sewage Treatment Works (CEPT + disinfection) – "with disinfection" scenario.
(33) Based on the proposed discharge standards For SCISTW at 95 percentile.
(34) San Wan Sewage Treatment Works (CEPT). Centralized UV disinfection would be provided for the combined effluent flow from YLSTW and SWSTW before discharge via the NWNT outfall.
(35) With upgrading of PPSTW to CEPT + chlorination and dechlorination.
(36) Based on influent concentrations for PPSTW in Table 4.3 of the "Discussion Notes for Flow and Loads Projections" prepared under CE51/2002(DS) assuming 0% removal rate for organic nitrogen (Org-N) and ammonia nitrogen (NH_3-N) during the CEPT process.
(37) Based on average concentration measured in the effluent of PPSTW (preliminary treatment) as reported in "Review of Tuen Mun and Tsing Yi Sewerage Master Plans Final Working Paper WP9: Final Sewage Treatment and Disposal for Tuen Mun" and a removal rate of 60% for TP in the CEPT effluent.
(38) Based on the average concentration from actual measurement of effluent at PPSTW (preliminary treatment) from 1992 to 1995 and a removal rate of 80% for Cu in the CEPT effluent.
(39) Assumed that the characteristics of the chlorinated CEPT effluent from PPSTW would be the same as those of the chlorinated HATS effluent (see Note (33)).
(40) Stonecutters Island Sewage Treatment Works (Biological Treatment with Biological Aerated Filters) – "without disinfection" scenario..
(41) Based on Section 4 of the "Assessment of the Water Quality Implications of Phased Implementation of HATS Stage 2".
(42) Stonecutters Island Sewage Treatment Works (Biological Treatment with Biological Aerated Filters + disinfection) – "with disinfection" scenario.
(43) Yuen Long Sewage Treatment Works (secondary treatment). Centralized UV disinfection would be provided for the combined effluent flow from YLSTW and SWSTW before discharge via the NWNT outfall.
(44) Based on discharge license of SHTSTW (CEPT + UV disinfection) at 95 percentile.
(45) No measured effluent data is available for this parameter. It is assumed that the effluent quality of SHTSTW would be similar to that of SHWSTW as both STWs are CEPT plants with UV disinfection.
(46) Based on the proposed discharge standards for SCISTW at geometric mean.
(47) Based on the approved EIA report for Tai Po Sewage Treatment Works Stage 5.