
APPENDIX 4.4A

**ASSESSMENT OF WATER QUALITY
IMPACT DUE TO POSSIBLE CHANGE IN
THE HATS TREATMENT FOR 2016**

Appendix 4.4A

Assessment of Water Quality Impact due to Possible Change in the HATS Treatment for 2016

Option 5d of HATS (secondary treatment with nitrification) was assumed in this EIA study for water quality modelling. As the HATS study is still on-going and the level of treatment is still being considered, an additional model run, namely Scenario 3f, has been carried out to address the possible scenario of HATS with chemical enhanced primary treatment (CEPT) with disinfection. Scenario 3f represents normal operation of TPSTW and STSTW in 2016 after Project commission where the effluent flow from TPSTW would reach its full capacity (13,000 m³/day) using an alternate coastline configuration as shown in **Figure 4.6b**. It is assumed that the Project effluent was discharged into the Kai Tak Approach Channel (KTAC) without the SEKD. The HATS loading assumed under Scenario 3f is given in **Table A** below.

Table A Pollution Loading from Stonecutters Sewage Treatment Works under HATS (CEPT with disinfection)

Parameters	Stonecutters
Flow (m ³ per day)	2787291
BOD (g per day)	188978330
SS (g per day)	117066222
Organic Nitrogen (g per day)	27674014
NH ₃ -N (g per day)	49443560
<i>E. coli</i> (no. per day)	5.5746E+14
Copper (g per day)	64609
Total Phosphorus (g per day)	8361873
Ortho-Phosphate (g per day)	5017124
Silicate (g per day)	23970703
Total nitrite and nitrate (g per day)	0

The water quality contour plots for Scenario 3f (using alternative HATS option, CEPT with disinfection) are shown in **Figures 3f1** to **3f10**. **Tables 3f1** and **3f2** summarised the modelling results at identified water sensitive receivers. The results for Scenario 3c (using original HATS loading assumed in the EIA, Option 5d) are also included in the contour plots for comparison. The model set-up of Scenario 3c was exactly the same as that for Scenario 3f but with a different assumed HATS loading. All the results are presented as annual average.

The modelling results indicated the change in HATS loading assumption would change the background pollutant concentration patterns of most of the selected parameters as shown in **Figure 3f1** to **3f10**. However, it was found that the impact from the Project effluent would be very localized and would be confined within the KTAC and the existing Kwun Tong Typhoon Shelter (KTTS). The water quality impact contributed by the Project effluent was not sensitive to the change in the HATS loading assumption.

Table 3f1 Predicted Water Quality at Indicator Points for Scenario 3c and Scenario 3f in Year 2016 (annual average)

Indicator Point	Scenario	DA DO (mg/L)	DA DO 10%tile (mg/L)	Bottom DO (mg/L)	Bottom DO 10%tile (mg/L)	DA TIN (mg/L)	DA UIA (mg/L)	DA SS (mg/L)	DA <i>E. coli</i> (no/100mL)
Fish Culture Zone (Figure 4.10)									
Ma Wan	Scenario 3c	5.86	4.96	5.74	4.60	0.25	0.006	7.42	45
	Scenario 3f	5.80	4.91	5.67	4.52	0.24	0.007	7.44	57
Tung Lung	Scenario 3c	5.89	4.40	5.55	3.35	0.05	0.002	3.91	9
	Scenario 3f	5.86	4.31	5.54	3.31	0.05	0.002	3.90	9
Gazetted Beach (Figure 4.10)									
Tung Wan	Scenario 3c	6.02	5.07	5.75	4.54	0.24	0.005	6.68	12
	Scenario 3f	5.90	4.97	5.62	4.43	0.23	0.008	6.73	24
Ting Kau	Scenario 3c	5.87	4.90	5.76	4.61	0.25	0.006	6.85	101
	Scenario 3f	5.77	4.81	5.65	4.51	0.24	0.008	6.90	123
Typhoon Shelter (Figure 4.10)									
Rambler Channel	Scenario 3c	5.93	5.07	5.76	4.74	0.29	0.007	6.92	3710
	Scenario 3f	5.79	4.92	5.60	4.59	0.27	0.010	6.96	3720
Yau Ma Tei	Scenario 3c	6.69	5.84	5.98	4.52	0.29	0.007	6.69	3180
	Scenario 3f	6.52	5.72	5.82	4.17	0.22	0.009	6.68	3180
Kwun Tong	Scenario 3c	6.11	5.16	5.87	4.44	0.30	0.010	5.03	217
	Scenario 3f	6.04	4.99	5.82	4.31	0.25	0.011	5.00	216
Sam Ka Tsuen	Scenario 3c	6.24	5.38	5.92	4.56	0.19	0.005	4.94	841
	Scenario 3f	6.18	5.22	5.86	4.43	0.15	0.006	4.91	840
Causeway Bay	Scenario 3c	6.41	5.80	6.25	5.41	0.25	0.005	5.34	1590
	Scenario 3f	6.30	5.58	6.14	5.17	0.16	0.007	5.28	1510
Sau Kei Wan	Scenario 3c	6.12	4.97	5.86	4.25	0.17	0.004	4.65	1270
	Scenario 3f	6.06	4.80	5.81	4.12	0.11	0.004	4.60	1270
Marina (Figure 4.10)									
Kellett Island	Scenario 3c	6.36	5.72	6.19	5.29	0.26	0.005	5.29	2700
Marina	Scenario 3f	6.24	5.47	6.08	5.05	0.17	0.007	5.23	2580
Marina at SEKD	Scenario 3c	6.12	5.36	5.81	4.53	0.29	0.009	5.61	2260
	Scenario 3f	6.04	5.15	5.75	4.35	0.23	0.010	5.57	2250
EPD Monitoring Station (Figure 4.1)									
EM1	Scenario 3c	5.93	4.33	5.71	3.67	0.10	0.003	4.16	67
	Scenario 3f	5.89	4.24	5.69	3.62	0.07	0.003	4.14	66
EM2	Scenario 3c	5.85	4.21	5.61	3.52	0.07	0.002	3.99	11
	Scenario 3f	5.82	4.13	5.59	3.48	0.06	0.002	3.97	11
EM3	Scenario 3c	5.78	3.91	5.58	3.40	0.05	0.001	3.75	13
	Scenario 3f	5.76	3.86	5.57	3.38	0.04	0.001	3.75	13
VM1	Scenario 3c	6.05	4.79	5.86	4.18	0.17	0.004	4.56	285
	Scenario 3f	5.99	4.64	5.81	4.07	0.10	0.004	4.51	277
VM2	Scenario 3c	6.09	4.98	5.90	4.38	0.20	0.005	4.74	173
	Scenario 3f	6.02	4.80	5.84	4.25	0.14	0.006	4.70	169
VM4	Scenario 3c	6.12	5.11	5.92	4.47	0.24	0.005	4.92	307
	Scenario 3f	6.04	4.89	5.86	4.31	0.14	0.006	4.85	288
VM5	Scenario 3c	6.19	5.33	6.00	4.72	0.27	0.005	5.18	450

Indicator Point	Scenario	DA DO (mg/L)	DA DO 10%tile (mg/L)	Bottom DO (mg/L)	Bottom DO 10%tile (mg/L)	DA TIN (mg/L)	DA UIA (mg/L)	DA SS (mg/L)	DA <i>E. coli</i> (no/100mL)
VM5	Scenario 3f	6.08	5.06	5.90	4.52	0.17	0.007	5.14	536
VM6	Scenario 3c	6.20	5.39	5.98	4.70	0.28	0.006	5.31	436
	Scenario 3f	6.08	5.11	5.87	4.47	0.19	0.008	5.28	488
VM7	Scenario 3c	6.21	5.38	5.97	4.68	0.29	0.006	5.42	353
	Scenario 3f	6.06	5.10	5.84	4.44	0.21	0.010	5.42	449
VM8	Scenario 3c	6.04	4.97	5.85	4.55	0.27	0.005	5.70	34
	Scenario 3f	5.85	4.82	5.66	4.39	0.24	0.011	5.81	96
VM12	Scenario 3c	6.05	5.08	5.85	4.52	0.31	0.006	6.07	234
	Scenario 3f	5.86	4.77	5.64	4.19	0.25	0.011	6.11	281
VM15	Scenario 3c	6.26	5.50	5.98	4.73	0.29	0.006	5.53	148
	Scenario 3f	6.11	5.21	5.83	4.44	0.21	0.009	5.54	216
VM13	Scenario 3c	5.87	4.86	5.74	4.59	0.29	0.006	6.70	1160
	Scenario 3f	5.71	4.68	5.56	4.36	0.26	0.010	6.75	1170
VM14	Scenario 3c	5.90	5.02	5.82	4.81	0.28	0.006	6.82	1260
	Scenario 3f	5.77	4.89	5.67	4.66	0.26	0.009	6.86	1260
WM1	Scenario 3c	5.91	4.51	5.68	3.90	0.09	0.002	4.61	13
	Scenario 3f	5.86	4.46	5.65	3.89	0.09	0.003	4.63	15
WM2	Scenario 3c	5.98	4.81	5.76	4.27	0.17	0.004	5.59	8
	Scenario 3f	5.89	4.74	5.68	4.22	0.16	0.006	5.63	10
WM3	Scenario 3c	6.00	4.97	5.78	4.43	0.43	0.006	6.07	111
	Scenario 3f	5.72	4.68	5.51	4.18	0.37	0.019	6.30	634
WM4	Scenario 3c	5.84	4.71	5.73	4.45	0.24	0.005	6.54	29
	Scenario 3f	5.72	4.62	5.61	4.35	0.23	0.008	6.60	61

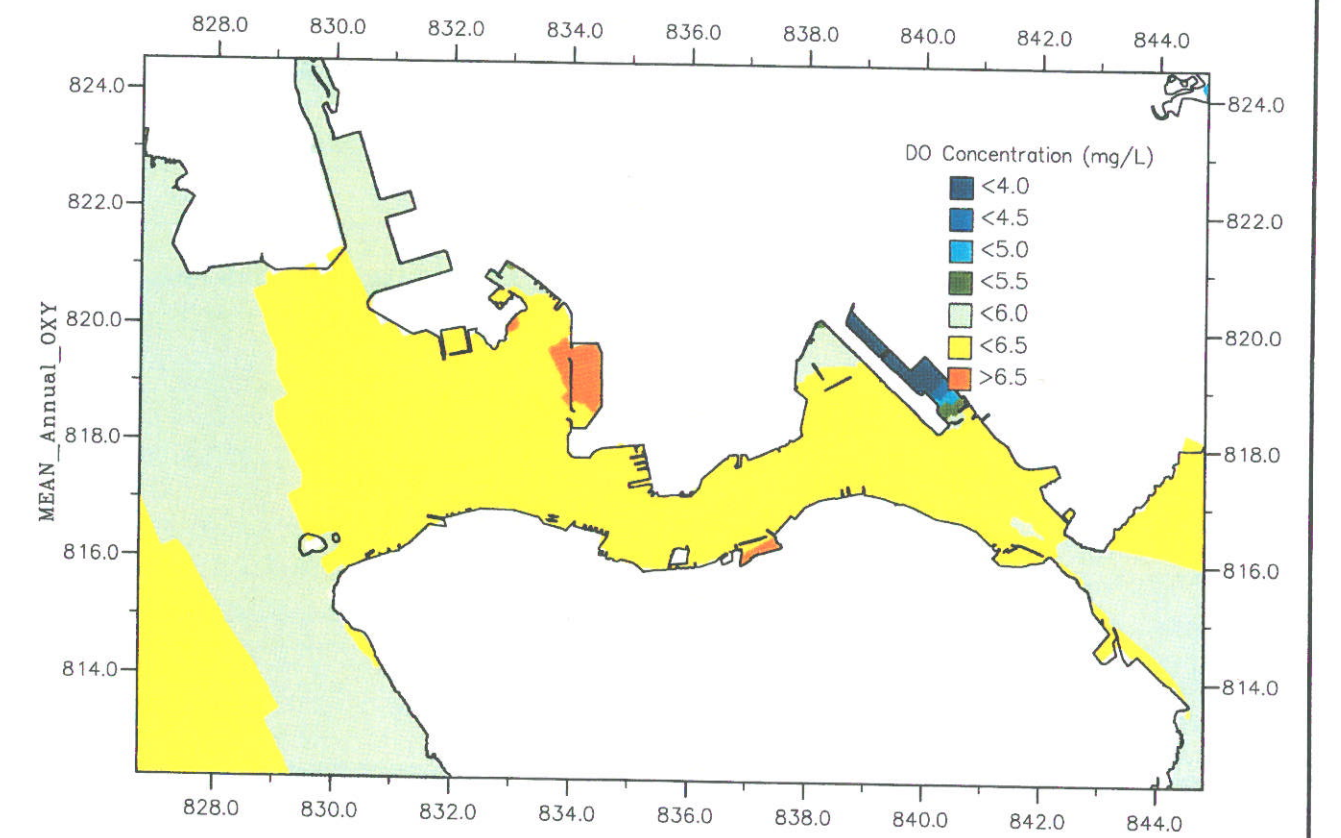
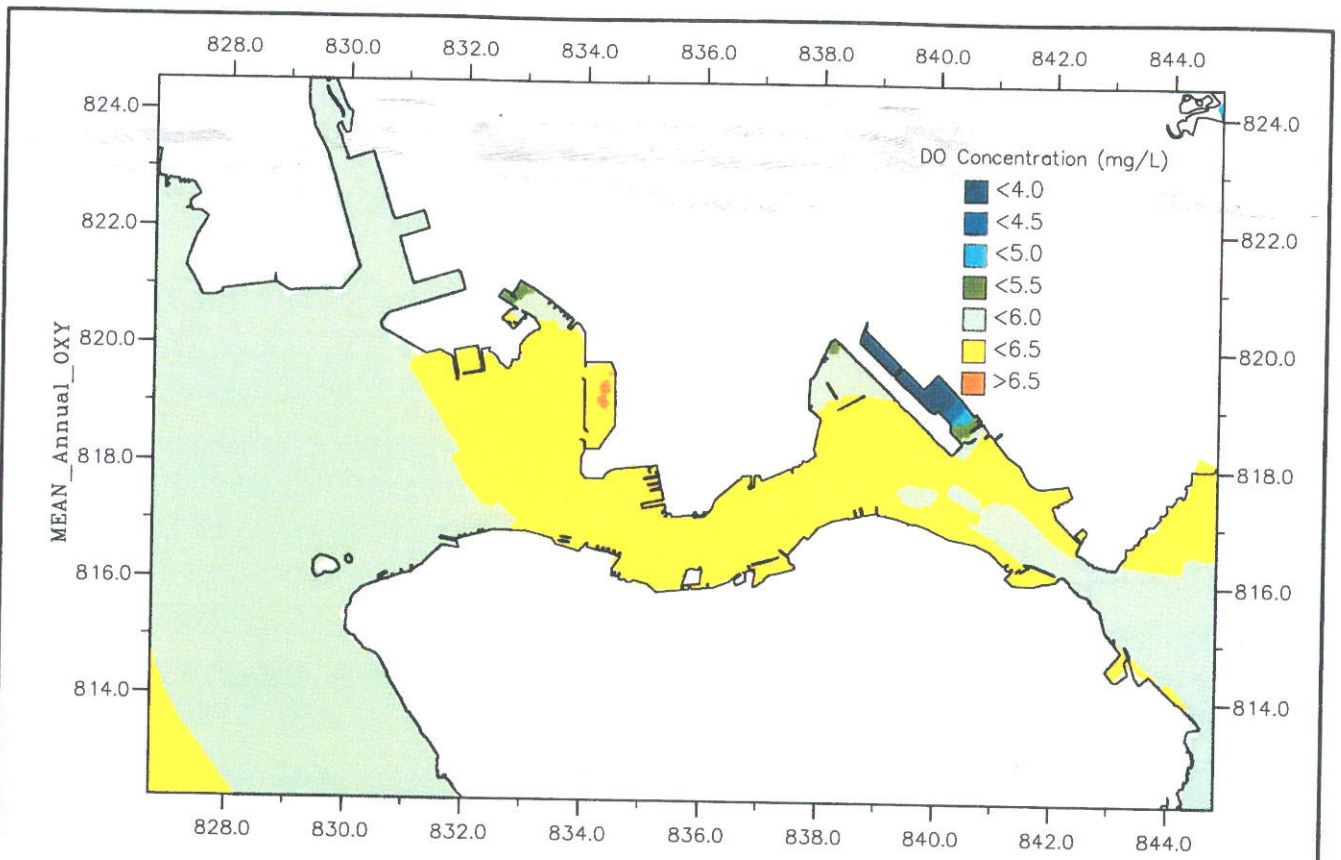
Note: Numbers in bold indicated non-compliance of WQO.

Table 3f2 Predicted Water Quality at Water Intakes for Scenario 3c and Scenario 3f in Year 2016 (annual average)

Indicator Point	Scenario	DA DO (mg/L)	DA DO 10 %tile (mg/L)	DA TIN (mg/L)	DA UIA (mg/L)	DA SS (mg/L)	DA <i>E. coli</i> (no/100mL)
WSD Salt Water Intake (Figure 4.3)							
Tsuen Wan (26)	Scenario 3c	5.90	5.04	0.28	0.007	6.98	6230
	Scenario 3f	5.77	4.93	0.27	0.010	7.02	6230
Tsing Yi (27)	Scenario 3c	5.90	4.94	0.29	0.006	6.66	1050
	Scenario 3f	5.74	4.77	0.26	0.010	6.71	1060
Cheung Sha Wan (28)	Scenario 3c	5.77	4.47	0.47	0.018	10.20	17300
	Scenario 3f	5.61	4.33	0.40	0.020	10.20	17300
Yau Ma Tei (19)	Scenario 3c	6.36	5.63	0.28	0.006	5.73	389
	Scenario 3f	6.21	5.32	0.20	0.008	5.71	410
Tai Wan (20)	Scenario 3c	6.15	5.24	0.24	0.007	5.09	247
	Scenario 3f	6.08	5.05	0.18	0.007	5.04	244
Cha Kwo Ling (21)	Scenario 3c	6.20	5.32	0.26	0.008	4.98	312
	Scenario 3f	6.14	5.17	0.21	0.009	4.95	312
Yau Tong (22)	Scenario 3c	6.15	5.18	0.21	0.006	4.81	1090
	Scenario 3f	6.09	5.02	0.16	0.006	4.78	1090
Kennedy Town (15)	Scenario 3c	6.06	5.01	0.26	0.004	5.46	311
	Scenario 3f	5.87	4.88	0.23	0.011	5.57	386
Sheung Wan (14)	Scenario 3c	6.17	5.28	0.30	0.006	5.48	970
	Scenario 3f	6.01	4.99	0.22	0.010	5.50	1080
Central Water Front (13)	Scenario 3c	6.20	5.33	0.31	0.006	5.51	827
	Scenario 3f	6.03	5.03	0.23	0.011	5.54	1020
Wan Chai (12b)	Scenario 3c	6.25	5.50	0.26	0.005	5.19	924
	Scenario 3f	6.15	5.24	0.16	0.007	5.14	924
North Point (25)	Scenario 3c	6.14	5.05	0.20	0.004	4.80	1080
	Scenario 3f	6.07	4.87	0.12	0.005	4.75	1100
Quarry Bay (16)	Scenario 3c	6.12	5.02	0.19	0.004	4.76	1610
	Scenario 3f	6.05	4.84	0.12	0.005	4.70	1620
Sai Wan Ho (17)	Scenario 3c	6.11	4.97	0.18	0.004	4.66	1410
	Scenario 3f	6.04	4.79	0.11	0.004	4.60	1410
Siu Sai Wan (18)	Scenario 3c	6.13	4.86	0.10	0.003	4.37	3480
	Scenario 3f	6.07	4.73	0.08	0.003	4.35	3480
Cooling Water Intake (Figure 4.3)							
Princes Building (11)	Scenario 3c	6.21	5.37	0.27	0.005	5.27	930
	Scenario 3f	6.09	5.10	0.18	0.008	5.23	854
HSBC Intake (10)	Scenario 3c	6.22	5.39	0.27	0.005	5.28	1130
	Scenario 3f	6.10	5.12	0.18	0.008	5.24	981

Indicator Point	Scenario	DA DO (mg/L)	DA DO 10 %tile (mg/L)	DA TIN (mg/L)	DA UIA (mg/L)	DA SS (mg/L)	DA <i>E. coli</i> (no/100mL)
Queensway Government	Scenario 3c	6.23	5.41	0.27	0.005	5.28	1010
	Scenario 3f	6.11	5.14	0.18	0.008	5.24	819
DCS Zone 1 (23)	Scenario 3c	6.23	5.41	0.27	0.005	5.28	1010
	Scenario 3f	6.11	5.14	0.18	0.008	5.24	819
Telecom House (7) (8) (6b)	Scenario 3c	6.21	5.38	0.27	0.005	5.21	1270
	Scenario 3f	6.10	5.12	0.17	0.007	5.16	1340
Great Eagle Centre (4) (5) (6a)	Scenario 3c	6.21	5.38	0.27	0.005	5.21	1270
	Scenario 3f	6.10	5.12	0.17	0.007	5.16	1340
Windsor House (1) / Excelsior Hotel / World Trade Centre (2)	Scenario 3c	6.57	5.93	0.24	0.005	5.38	1130
	Scenario 3f	6.44	5.81	0.15	0.006	5.33	1090
DCS Zone 4 (24)	Scenario 3c	6.33	5.65	0.26	0.006	5.31	8420
	Scenario 3f	6.23	5.42	0.17	0.007	5.26	8430
Intake at SEKD	Scenario 3c	6.13	5.35	0.30	0.009	5.58	215
	Scenario 3f	6.05	5.15	0.24	0.010	5.54	215

Note: Numbers in bold indicated non-compliance of WQO.



Agreement No. CE 43/2001, Tai Po Sewage Treatment Works Stage V – EIA
 Annual Depth-Averaged Dissolved Oxygen Concentration in Victoria
 Harbour (Upper: Scenario 3f; Lower: Scenario 3c)

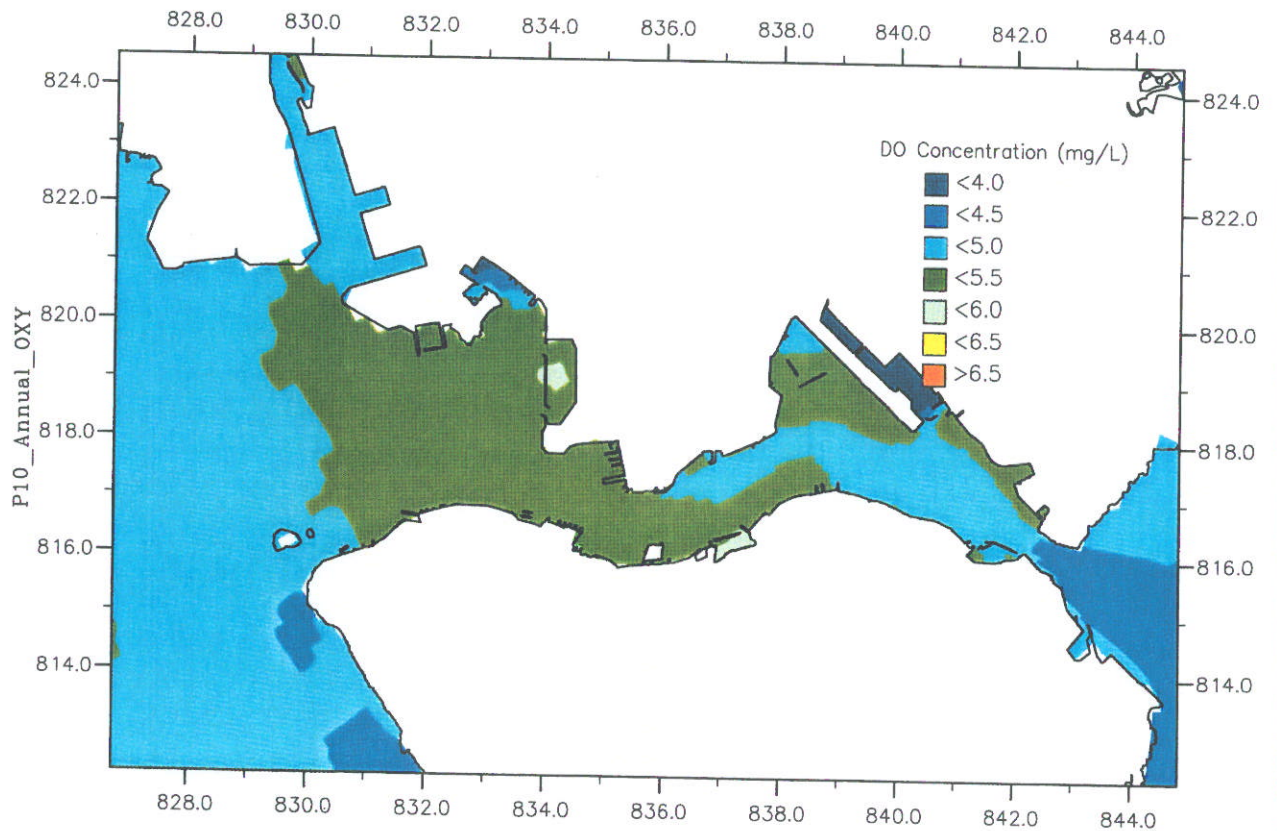
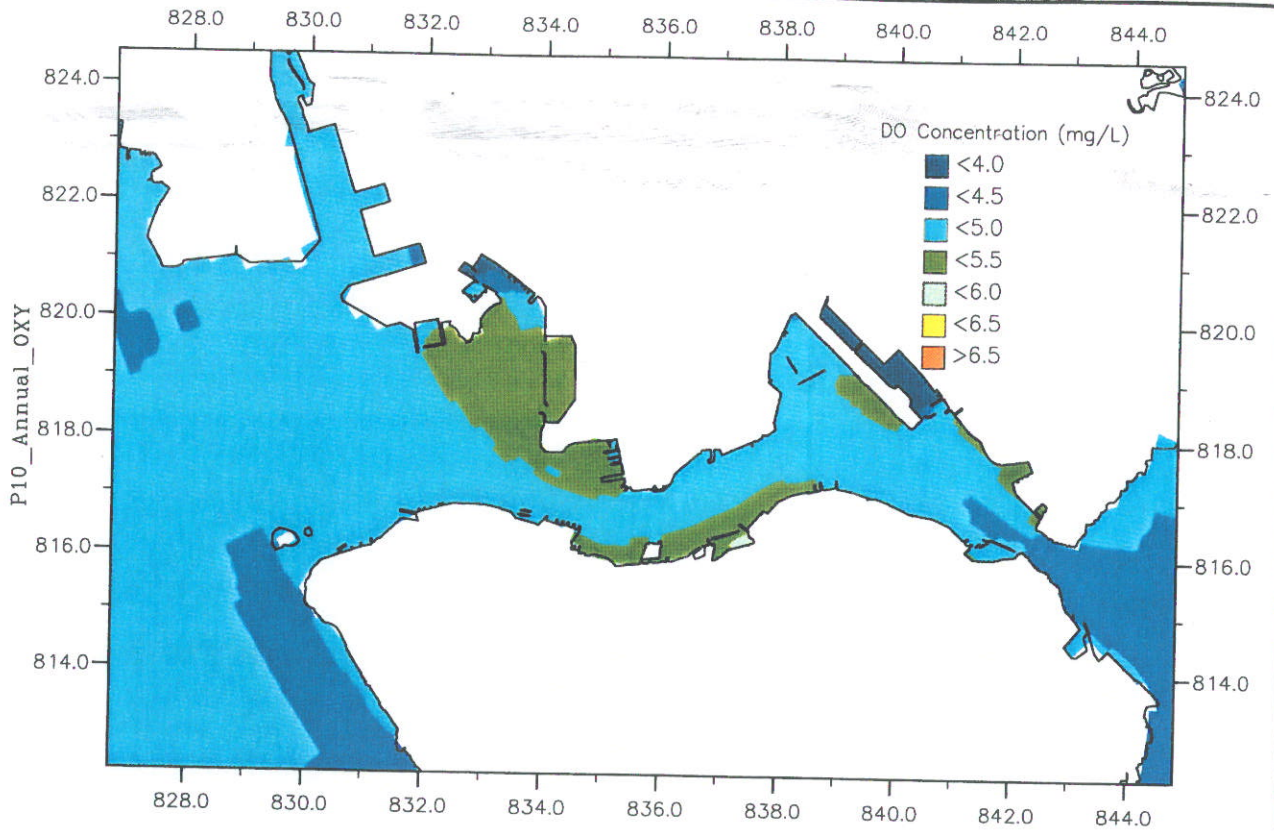
Scenario 3cf 2016

Figure 3f1

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scen3cf-c.ssn



Agreement No. CE 43/2001, Tai Po Sewage Treatment Works Stage V – EIA
 10 Percentile of Depth-Averaged Dissolved Oxygen Concentration in
 Victoria Harbour (Upper: Scenario 3f; Lower: Scenario 3c)

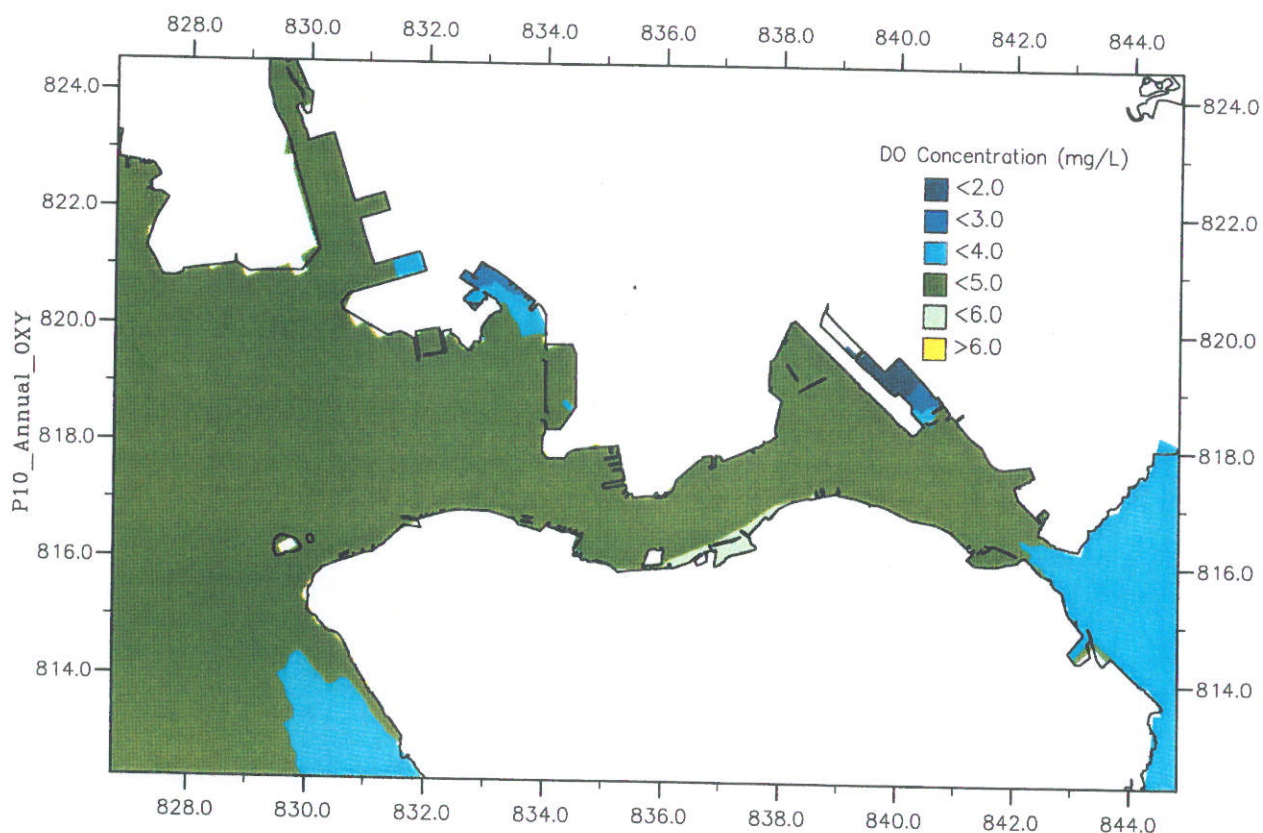
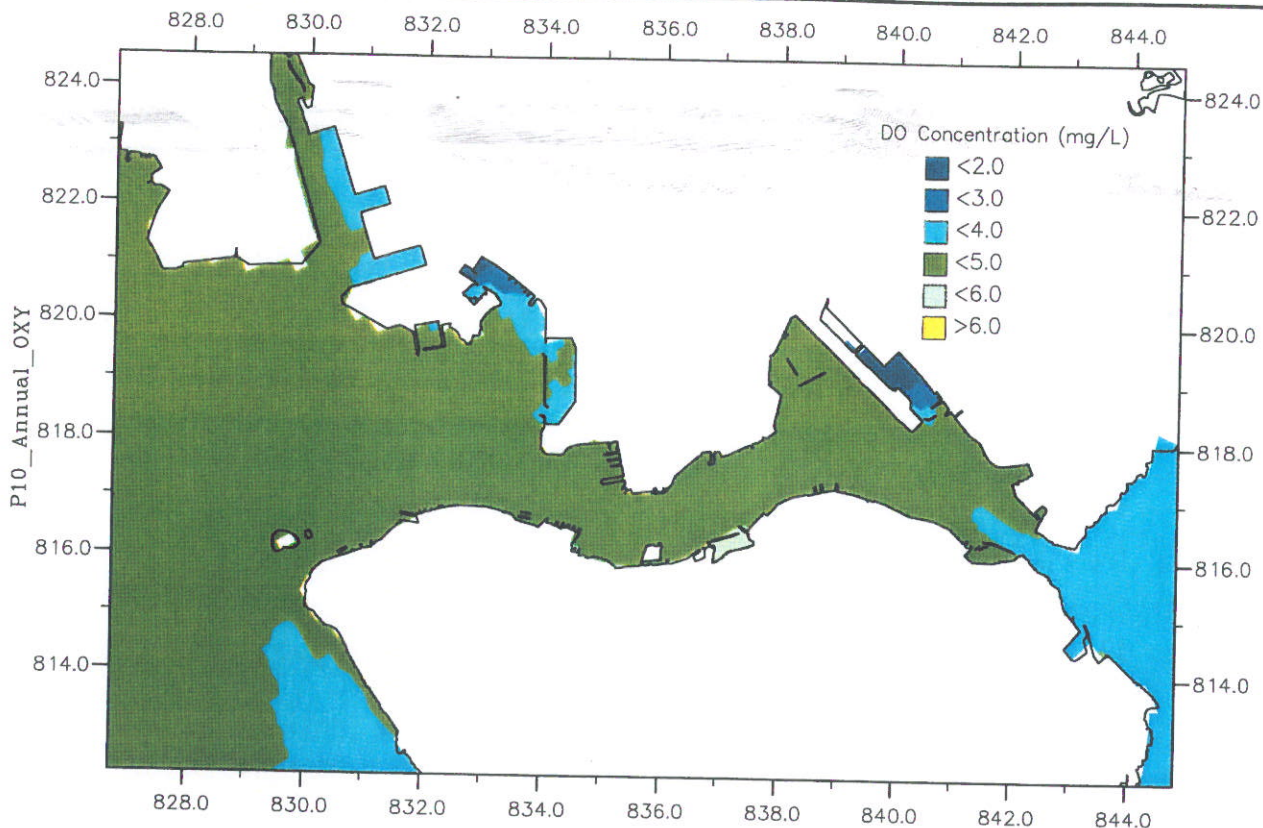
Scenario 3cf 2016

Figure 3f2

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scen3cf-c.ssn



Agreement No. CE 43/2001, Tai Po Sewage Treatment Works Stage V – EIA
 10 Percentile of Bottom Dissolved Oxygen Concentration in Victoria
 Harbour (Upper: Scenario 3f; Lower: Scenario 3c)

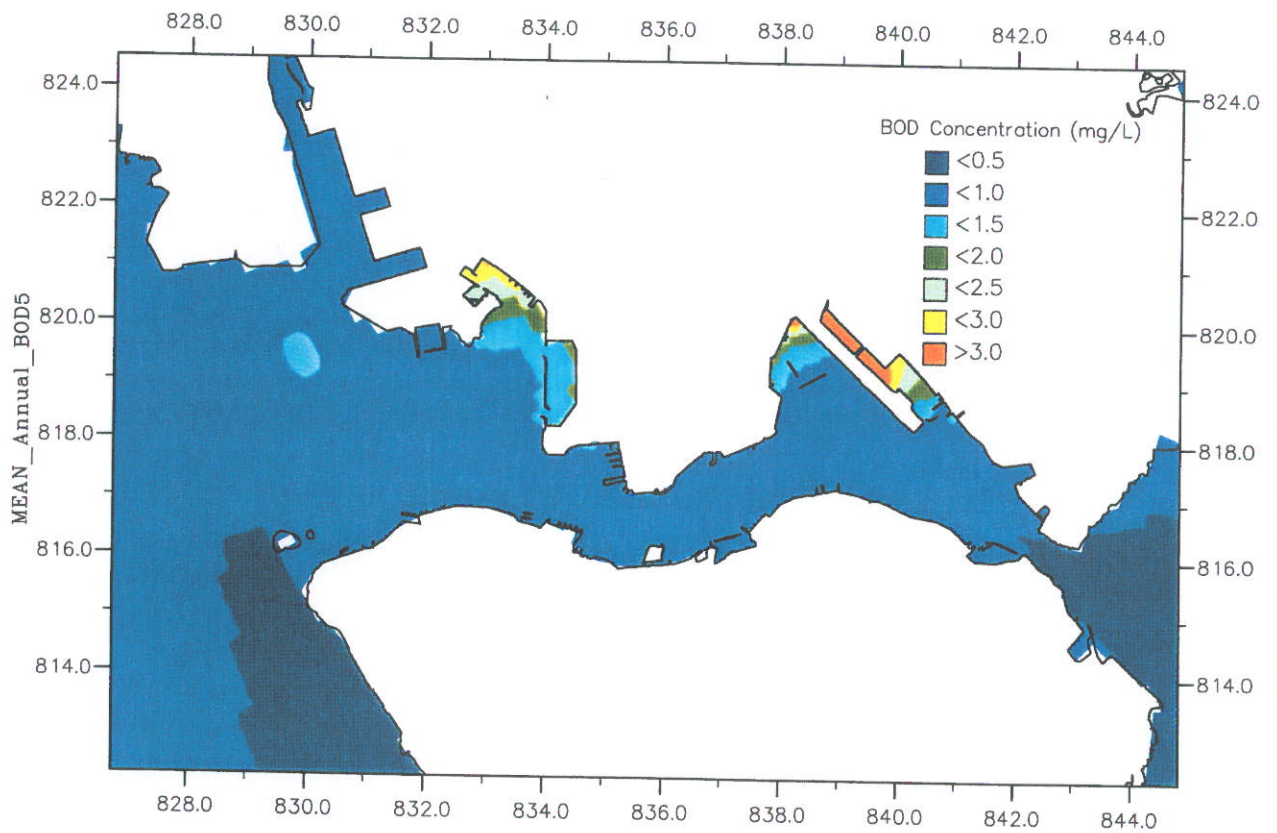
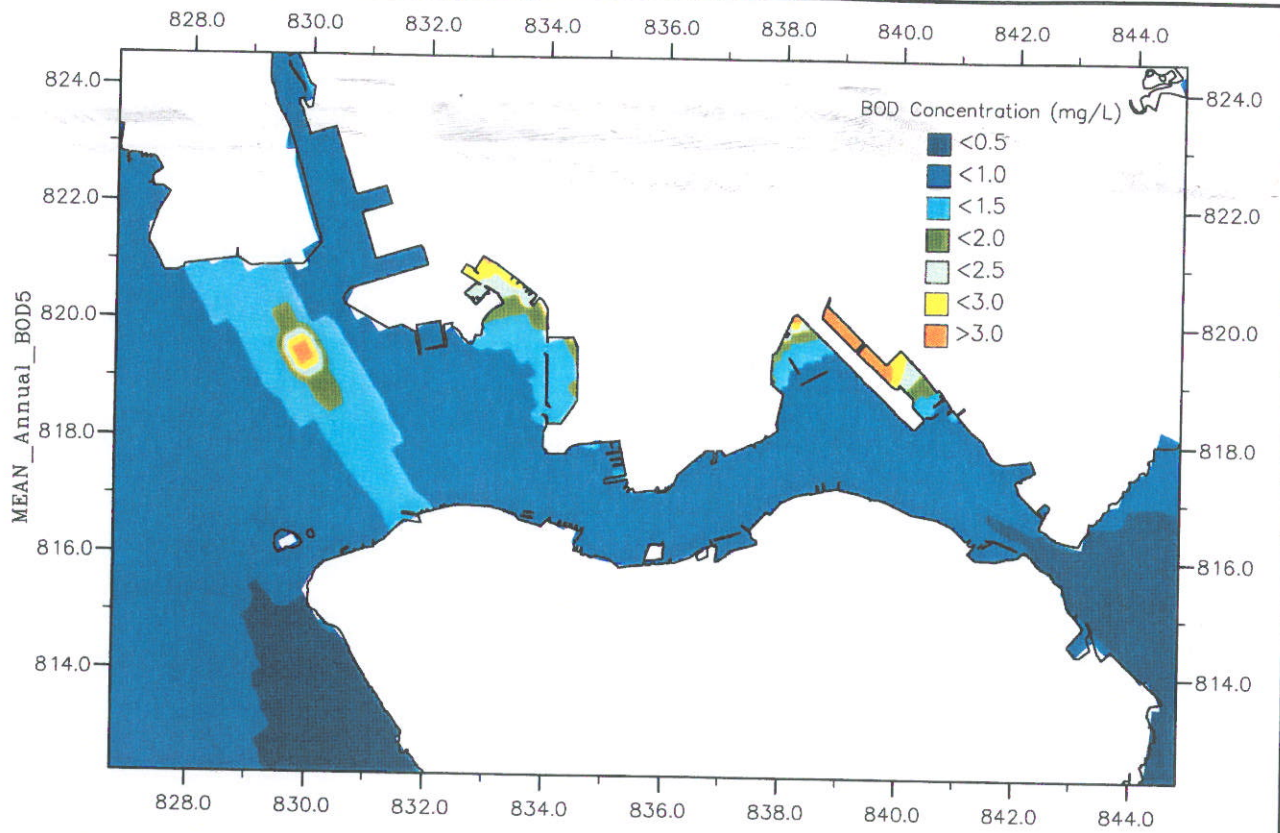
Scenario 3cf 2016

Figure 3f3

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scen3cf-c.ssn



Agreement No. CE 43/2001, Tai Po Sewage Treatment Works Stage V – EIA
 Annual Depth-Averaged BOD5 Concentration in Victoria
 Harbour (Upper: Scenario 3f; Lower: Scenario 3c)

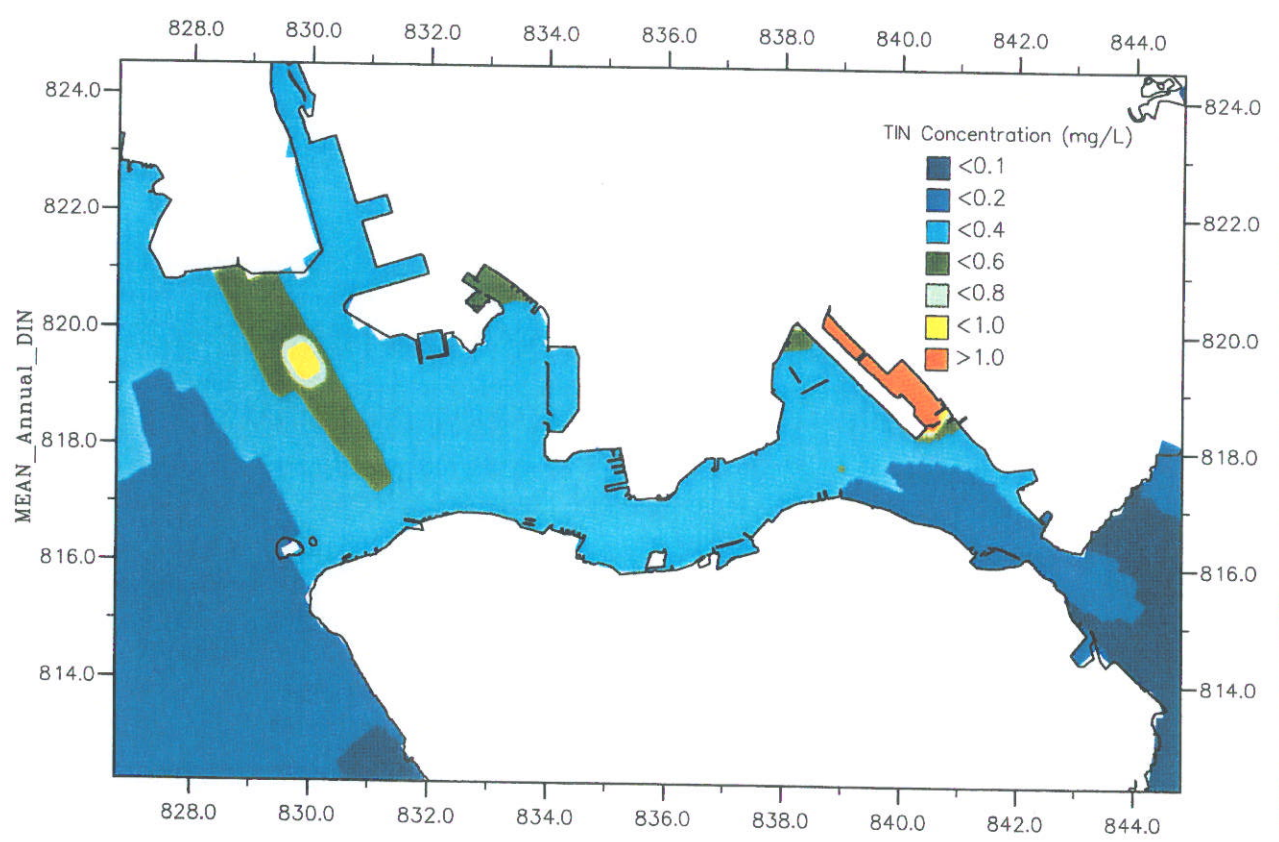
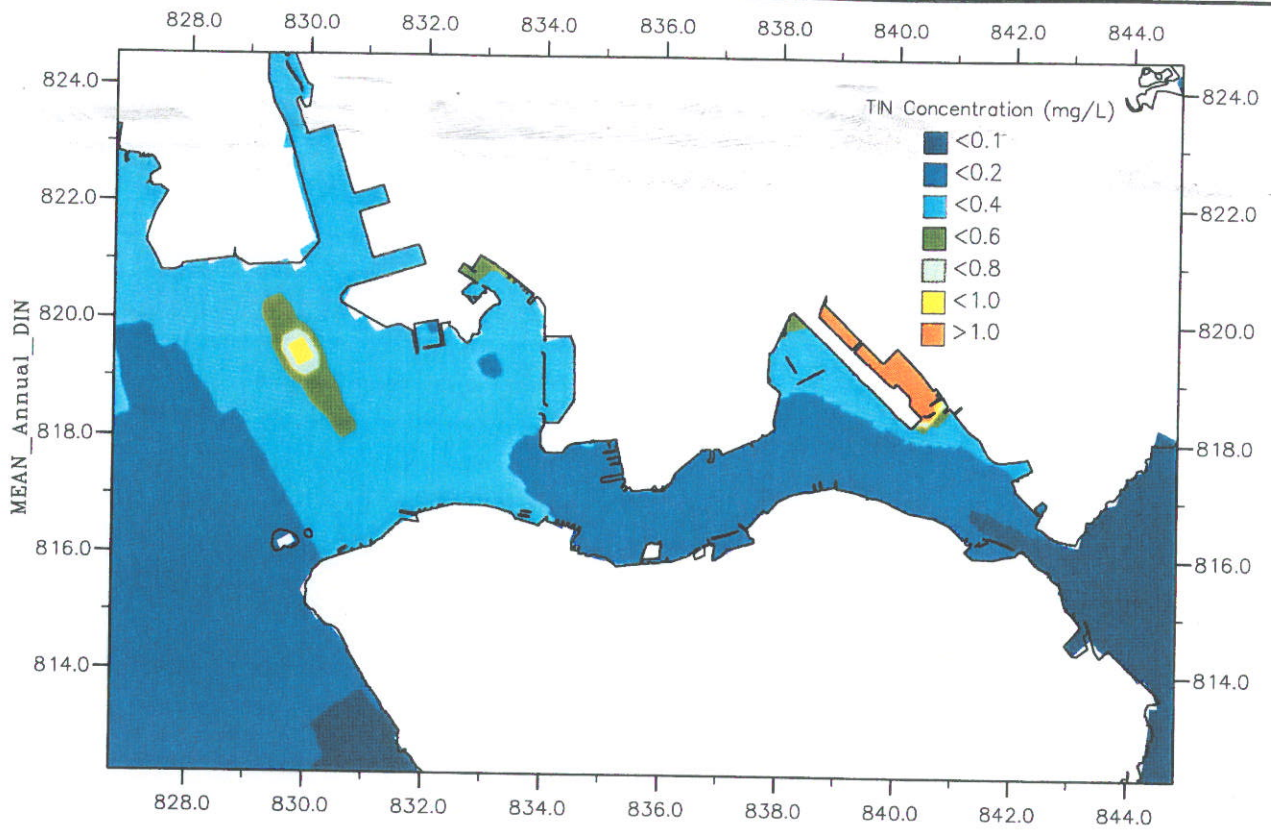
Scenario 3cf 2016

Figure 3f4

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scen3cf-c.ssn



Agreement No. CE 43/2001, Tai Po Sewage Treatment Works Stage V – EIA
 Annual Depth-Averaged Total Inorganic Nitrogen Concentration in
 Victoria Harbour (Upper: Scenario 3f; Lower: Scenario 3c)

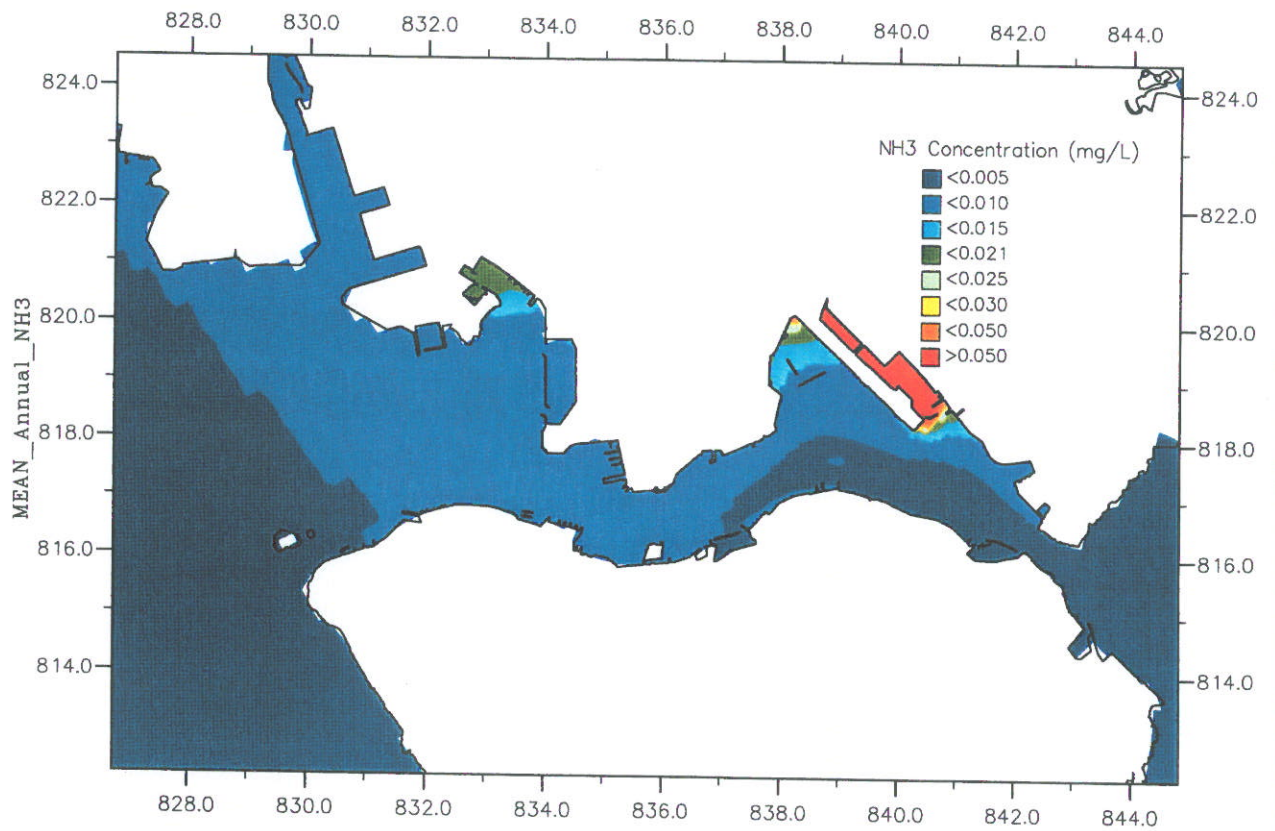
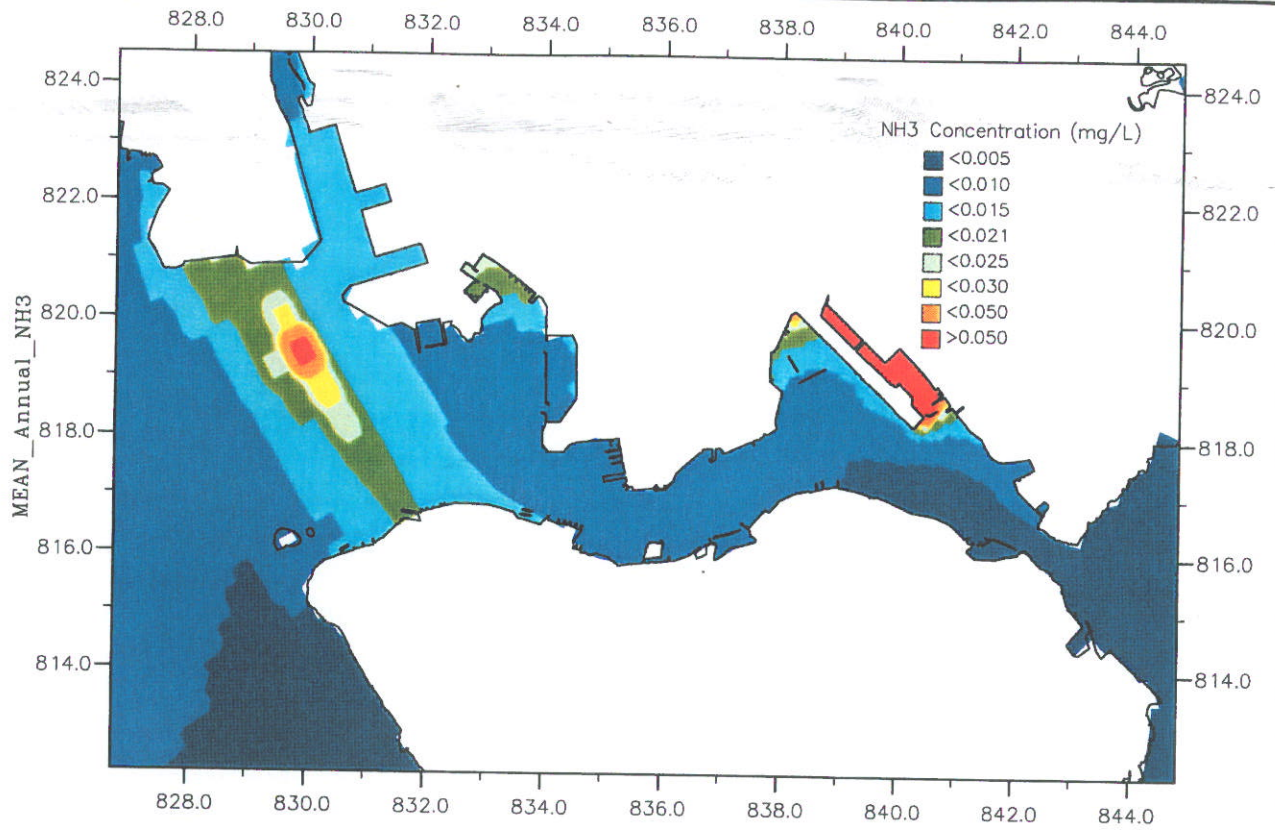
Scenario 3cf 2016

Figure 3f5

Drainage Services Department

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scen3cf-c.ssn



Agreement No. CE 43/2001, Tai Po Sewage Treatment Works Stage V - EIA
 Annual Depth-Averaged Unionised Ammonia Concentration in
 Victoria Harbour (Upper: Scenario 3f; Lower: Scenario 3c)

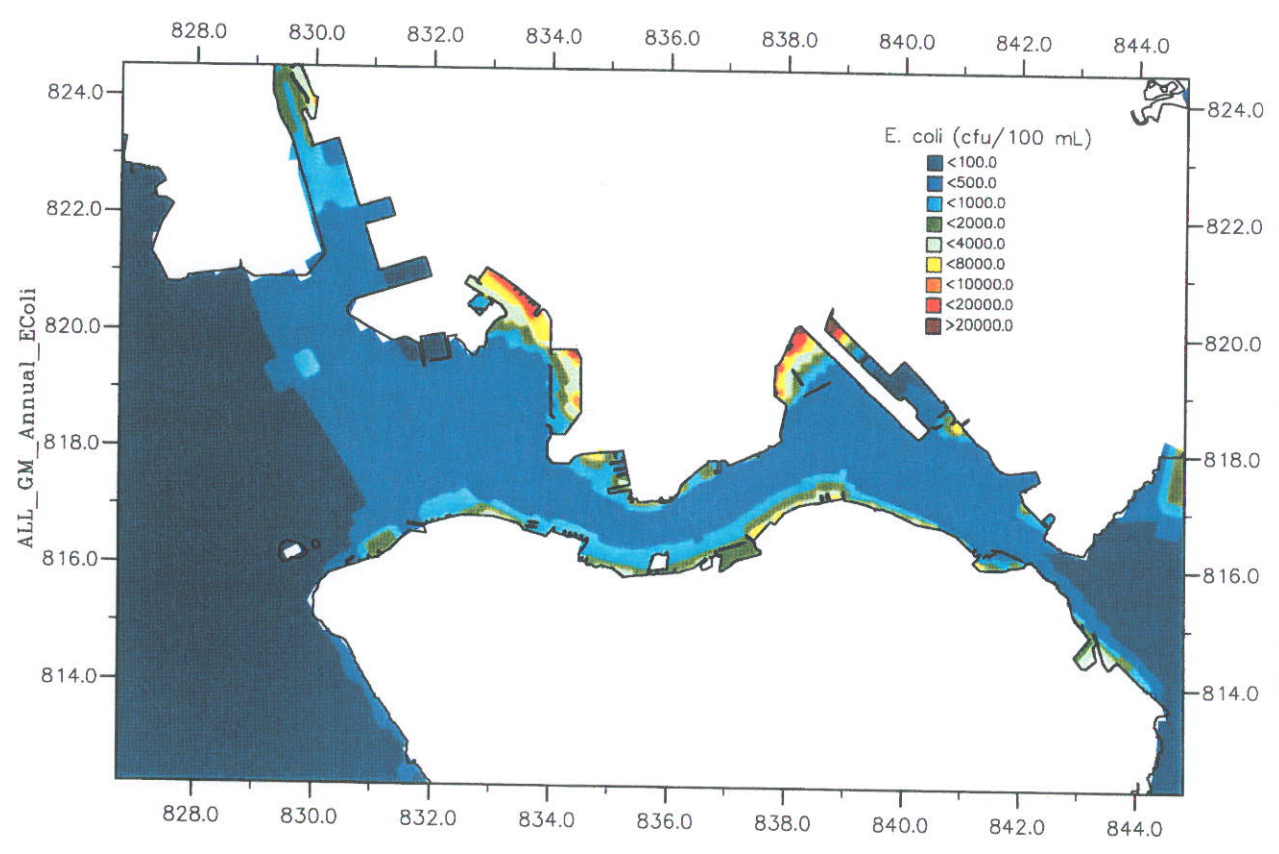
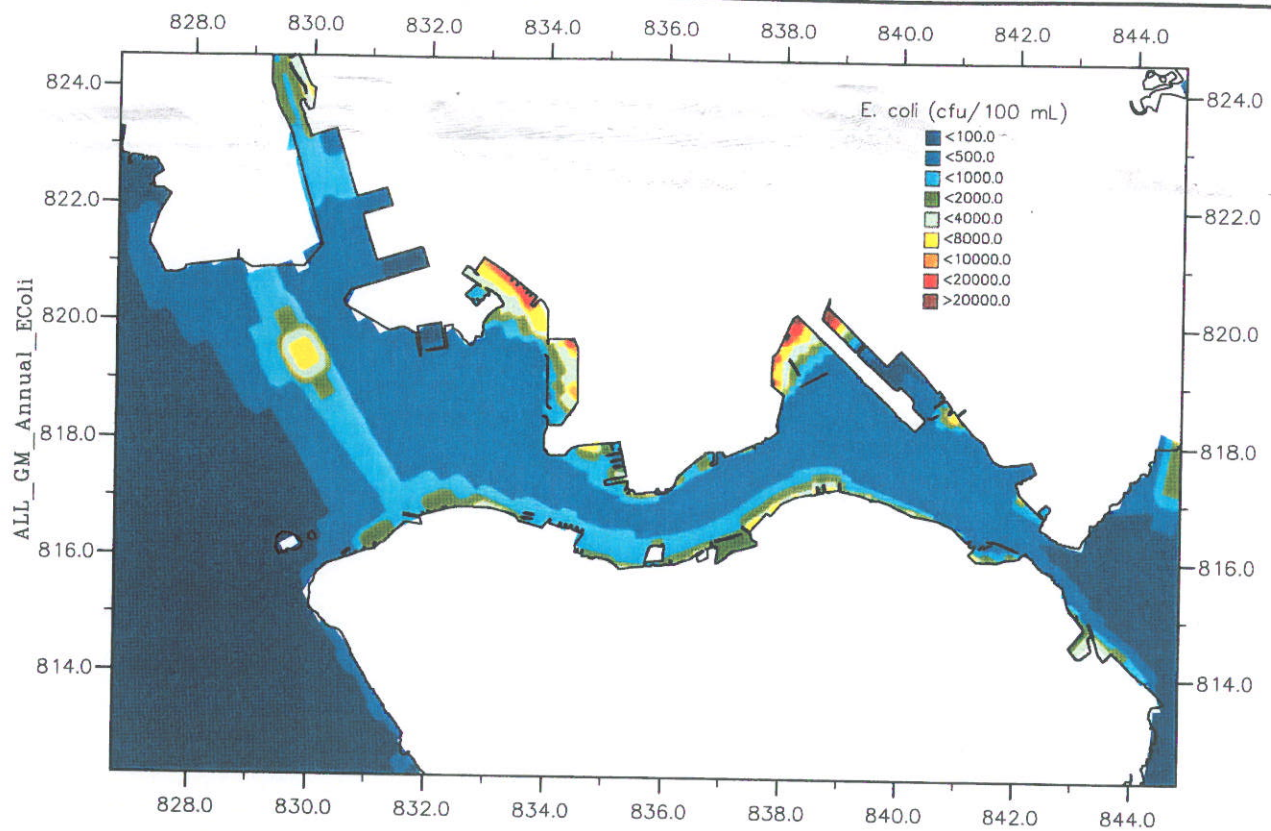
Scenario 3cf 2016

Figure 3f6

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scen3cf-c.ssn



Agreement No. CE 43/2001, Tai Po Sewage Treatment Works Stage V – EIA
 Annual Depth-Averaged E. coli Concentration (Geometric Mean)
 in Victoria Harbour (Upper: Scenario 3f; Lower: Scenario 3c)

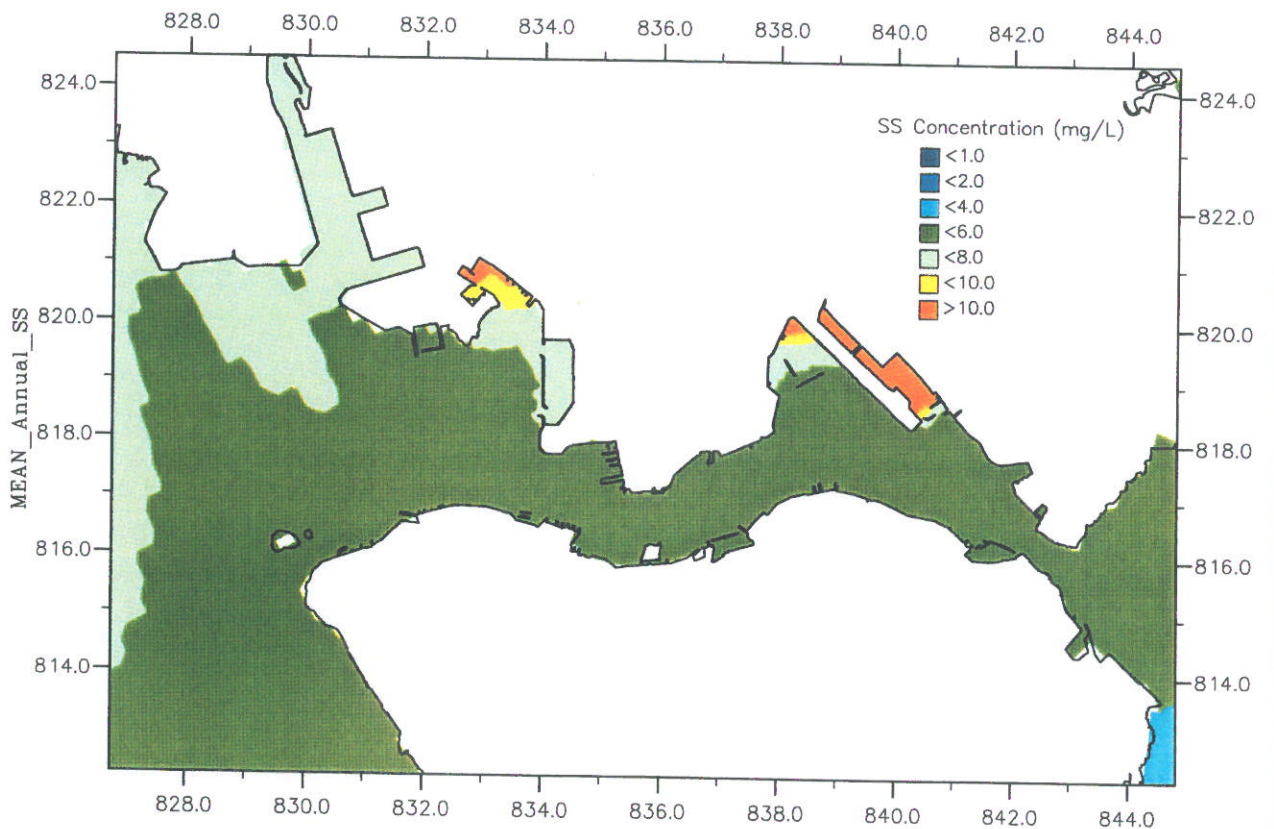
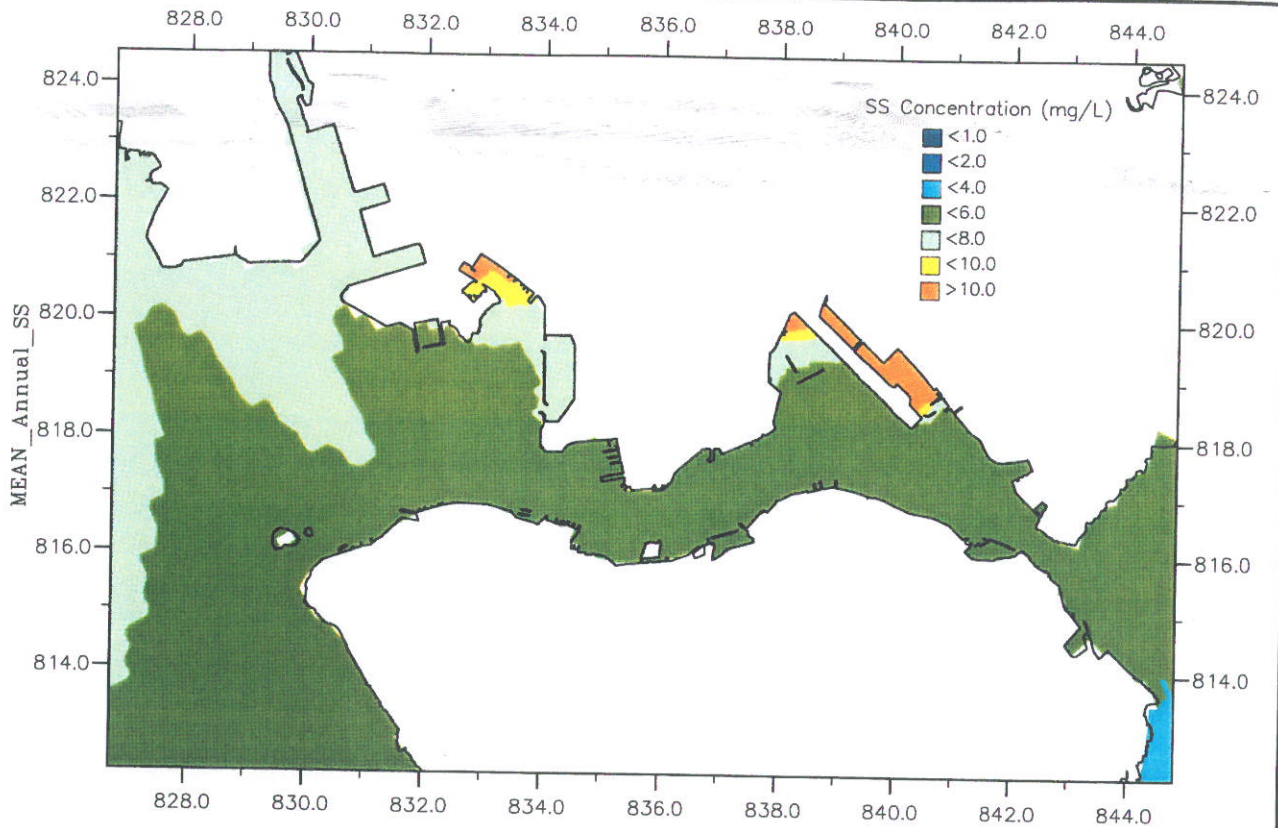
Scenario 3cf 2016

Figure 3f7

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scen3cf-c.ssn



Agreement No. CE 43/2001, Tai Po Sewage Treatment Works Stage V – EIA
 Annual Depth-Averaged Suspended Solids Concentration in
 Victoria Harbour (Upper: Scenario 3f; Lower: Scenario 3c)

Scenario 3cf

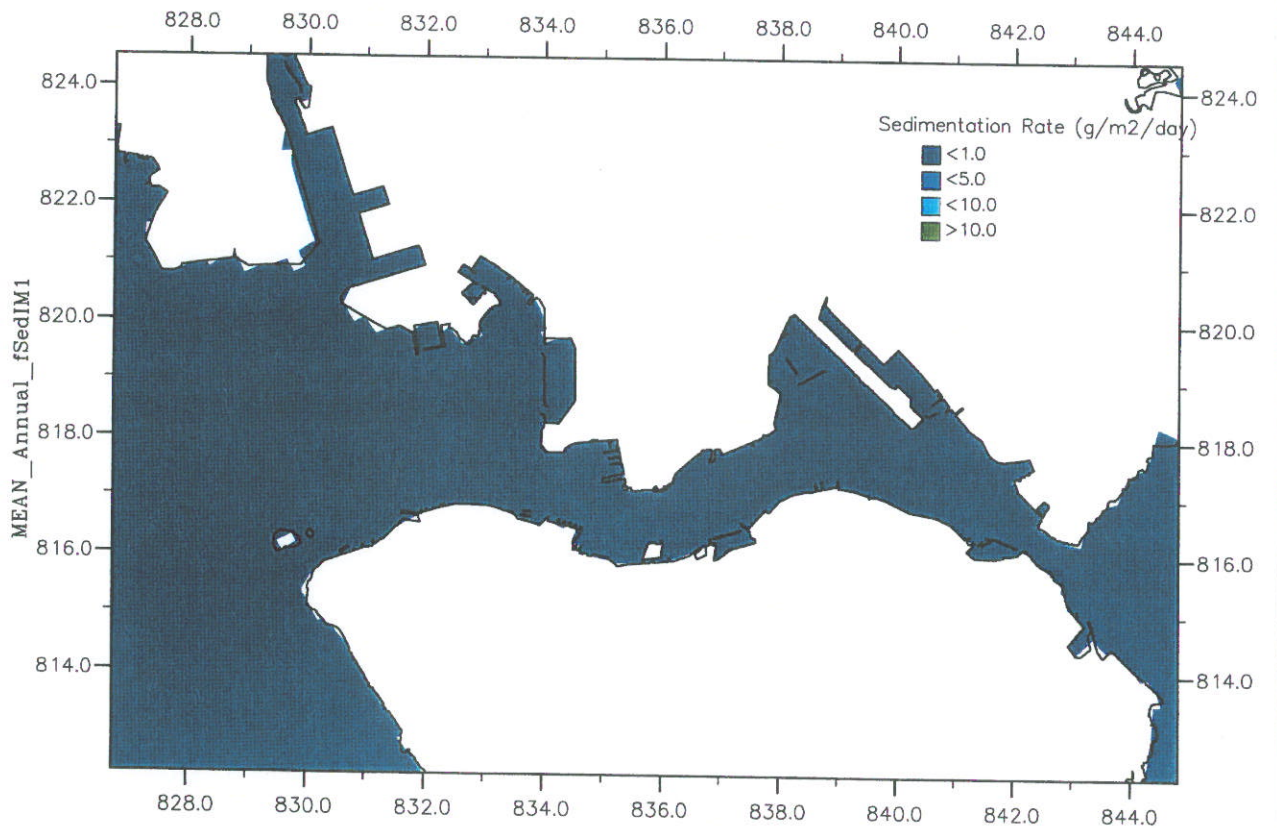
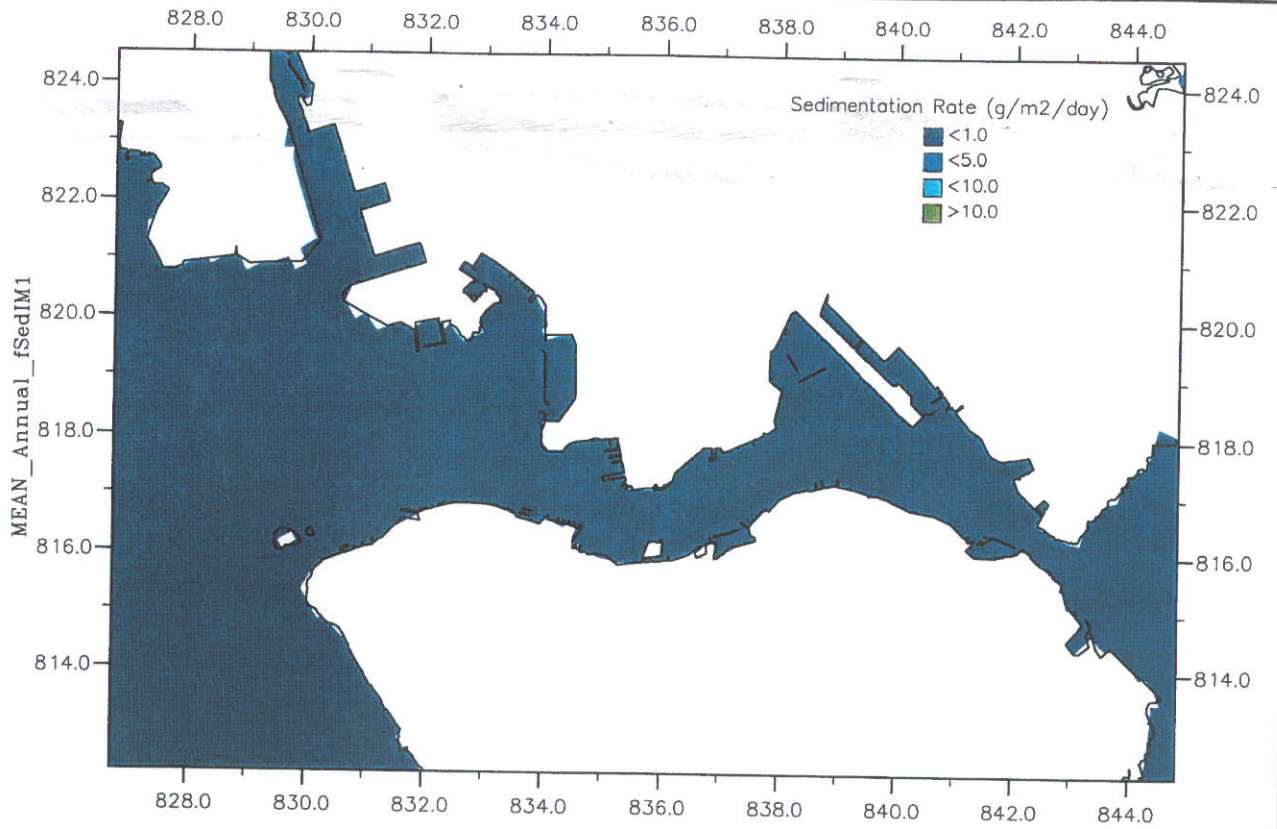
2016

Figure 3f8

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scen3cf-c.ssn



Agreement No. CE 43/2001, Tai Po Sewage Treatment Works Stage V – EIA
 Annual Depth-Averaged Sedimentation Rate in Victoria Harbour
 (Upper: Scenario 3f; Lower: Scenario 3c)

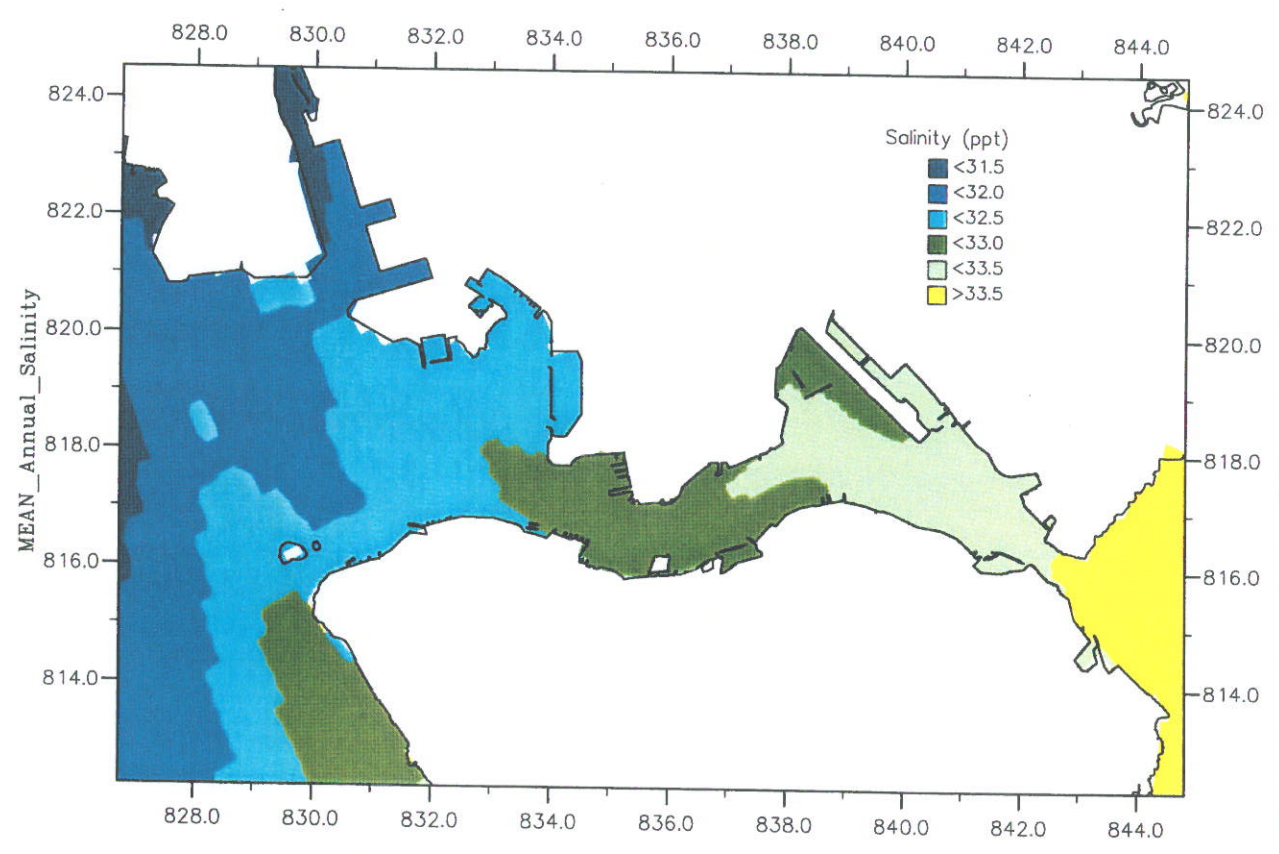
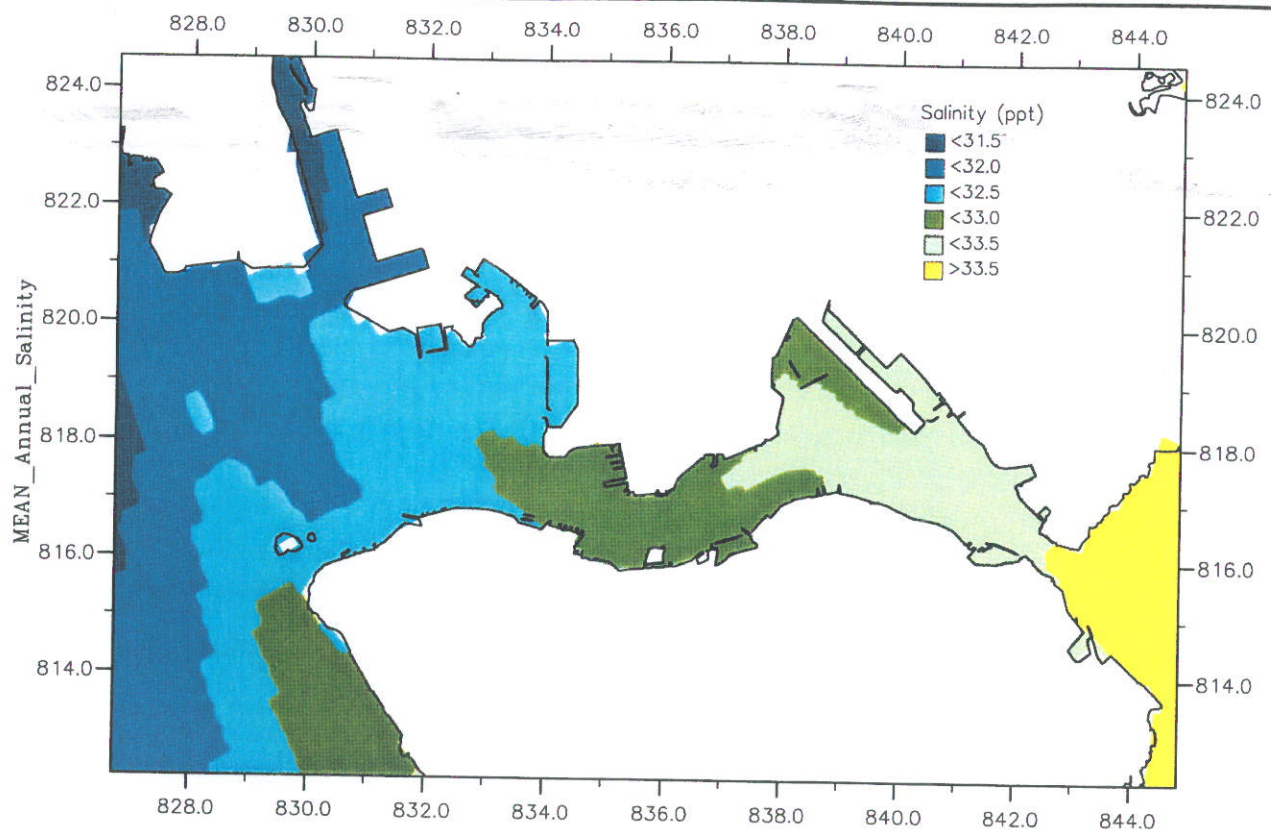
Scenario 3cf 2016

Figure 3f9

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scen3cf-c.ssn



Agreement No. CE 43/2001, Tai Po Sewage Treatment Works Stage V – EIA
 Annual Depth-Averaged Salinity in Victoria Harbour
 (Upper: Scenario 3f; Lower: Scenario 3c)

Scenario 3cf 2016

Figure 3f10

Drainage Services Department

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scen3cf-c.ssn