

Appendix 5-1

Baseline Water Quality Sampling Results

Appendix 5-1A - Baseline Water Quality Sampling Results for Wet Season

Raw Data of Sampling Location W2

Parameters	Unit	Reporting Limit	Effluent Discharge Std (Gp D) #	WQO Criteria #	23 Sep 2012 13:55	26 Sep 2012 13:25	29 Sep 2012 09:52	02 Oct 2012 10:57	04 Oct 2012 09:52	06 Oct 2012 10:03	08 Oct 2012 09:47	10 Oct 2012 10:36	12 Oct 2012 09:25	15 Oct 2012 09:16	17 Oct 2012 09:43	19 Oct 2012 09:36	19 Aug 2013 09:21	21 Aug 2013 10:16	23 Aug 2013 12:38	26 Aug 2013 13:37	28 Aug 2013 13:32	30 Aug 2013 06:30	02 Sep 2013 13:56	04 Sep 2013 15:00	06 Sep 2013 11:15	09 Sep 2013 11:25	11 Sep 2013 13:42	13 Sep 2013 12:32	Range	Average	Median
Salinity	g/L	0.1	-	-	1.3	1.9	4.3	6.6	5.4	0.3	4.8	11.1	6.6	11.1	10.0	1.0	0.2	0.4	<0.1*	0.2	0.3	0.3	0.1	0.1	0.2	0.2	0.3	0.3	<0.1 * - 11.1	2.8	0.4
Water Flow	L/s	1.0	-	-	252.0	266.0	360.0	88.0	420.0	206.0	280.0	280.0	690.0	130.0	240.0	20.0	50.0	<1.0*	<1.0*	<1.0*	60.0	60.0	70.0	120.0	60.0	20.0	<1.0*	<1.0*	<1.0 * - 690.0	153.2	79.0
Water Depth	m	0.1	-	-	0.8	0.7	0.7	2.0	0.5	0.4	1.6	0.4	2.1	1.2	0.8	0.1	2.0	1.8	1.9	1.7	1.2	1.9	1.0	1.5	2.0	1.9	1.7	0.7	0.1 - 2.1	1.3	1.4
Temperature	°C	0.1	30	-	32.8	30.4	27.0	26.6	27.1	27.2	27.9	28.6	26.9	27.0	26.6	25.0	28.2	29.2	26.5	28.2	34.7	30.3	29.7	25.8	26.3	29.0	31.5	29.9	25.0 - 34.7	28.4	28.1
pH Value	-	0.1	6-10	between 6 & 9	6.9	7.9	7.6	7.1	7.0	7.3	7.6	7.2	7.1	7.2	7.3	7.2	7.4	7.3	7.1	7.4	7.7	7.6	7.5	7.7	7.5	7.4	7.4	7.2	6.9 - 7.9	7.4	7.4
Dissolved Oxygen	mg/L	0.1	-	4 (Min.)	2.3	7.6	4.7	3.0	6.5	6.2	5.5	5.3	4.5	1.8	3.0	5.5	3.4	1.8	6.5	2.4	7.6	5.0	7.5	7.2	5.0	3.7	4.8	8.1	1.8 - 8.1	5.0	5.0
Dissolved Oxygen (% Saturation)	%	1.0	-	-	31.8	102.0	60.3	39.2	82.5	78.2	72.3	72.9	58.0	24.7	39.9	67.3	43.0	23.0	81.0	31.0	109.0	66.0	99.0	89.0	62.0	48.0	65.0	107.0	23.0 - 109.0	64.7	65.5
Turbidity	NTU	1	-	-	74	60	19	43	86	160	96	38	22	61	91	250	40	32	204	81	56	60	18	96	44	84	67	141	18 - 250	80	64
Biochemical Oxygen Demand	mg/L	2	20	5 (Max.)	5	6	5	4	3	4	4	5	5	4	8	4	3	3	4	4	4	3	<2 *	<2 *	<2 *	<2 *	6	3	<2 * - 8	4	4
Chemical Oxygen Demand	mg/L	5	80	30 (Max.)	29	25	24	28	27	28	19	33	25	23	37	34	15	16	24	15	15	22	8	26	8	20	21	20	8 - 37	23	24
Total Phosphorus	mg/L	0.1	5-10	-	0.6	0.6	0.8	0.8	0.8	0.6	0.7	0.5	0.4	0.9	1.0	0.8	@	@	@	@	@	@	@	@	@	@	@	@	0.4 - 1.0	0.7	0.8
Reactive Phosphorus	mg/L	0.01	-	-	0.19	0.26	0.59	0.71	0.43	0.13	0.23	0.27	0.32	0.68	0.78	0.12	@	@	@	@	@	@	@	@	@	@	@	@	0.12 - 0.78	0.39	0.30
Oil and grease	mg/L	5	10	-	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 * - <5 *	<5 *	<5 *
Electrical Conductivity @ 25°C	µS/ cm	1	-	-	2060	3670	7380	10200	6630	654	7500	16300	9450	16600	15100	1640	@	@	@	@	@	@	@	@	@	@	@	@	654 - 16600	8099	7440
Suspended Solids (SS)	mg/L	2	30	20 (Median)	63	51	20	36	62	140	89	9	52	216	28	22	106	49	43	38	14	86	28	54	48	110	110	9 - 216	60	49	
Total Kjeldahl Nitrogen as N	mg/L	0.1	-	-	5.7	2.7	8.1	7.4	6.8	2.5	4.8	4.8	3.8	6.4	7.0	1.9	1.9	2.5	2.6	2.8	1.8	1.5	2.6	1.2	1.4	2.3	3.1	1.8	1.2 - 8.1	3.6	2.7
Ammonia as N	mg/L	0.01	10-20	-	2.78	2.09	5.04	4.99	4.69	1.26	1.99	3.30	3.00	4.93	4.79	1.38	1.57	2.25	0.46	1.87	1.07	0.96	0.50	0.92	0.96	1.86	1.57	1.01	0.46 - 5.04	2.30	1.87
Escherichia coli (E. coli)	cfu / 100 mL	1	1000	1000 (Median)	40000	7800	10000	4400	14000	14000	4700	2800	2700	2000	24000	2900	87000	43000	120000	46000	11000	140	3600	7100	28000	4700	8400	3000	140 - 120000	8705	8100
Faecal Coliforms	cfu / 100 mL	1	-	-	46000	9800	22000	5100	27000	23000	5600	3500	3600	19000	32000	3500	@	@	@	@	@	@	@	@	@	@	@	@	3500 - 46000	11380	14400
Aluminium	mg/L	0.01	-	-	1.12	0.88	0.34	0.64	1.30	3.37	0.36	0.45	0.13	0.73	1.35	5.08	@	@	@	@	@	@	@	@	@	@	@	@	0.13 - 5.08	1.31	0.81
Copper	mg/L	0.001	-	-	0.007	0.007	0.003	0.004	0.007	0.014	0.006	0.004	0.003	0.007	0.007	0.021	@	@	@	@	@	@	@	@	@	@	@	@	0.003 - 0.021	0.008	0.007
Chromium	mg/L	0.01	-	-	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	@	@	@	@	@	@	@	@	@	@	@	@	@	<0.01 * - <0.01 *	<0.01 *	<0.01 *
Lead	mg/L	0.001	-	-	0.005	0.005	0.002	0.002	0.005	0.023	0.002	0.002	0.001	0.004	0.018	@	@	@	@	@	@	@	@	@	@	@	@	@	0.001 - 0.023	0.006	0.004
Zinc	mg/L	0.01	-	-	0.08	0.07	0.03	0.04	0.07	0.10	0.04	0.43	0.11	0.10	0.06	0.20	@	@	@	@	@	@	@	@	@	@	@	@	0.03 - 0.43	0.11	0.08
Cadmium	mg/L	0.0002	0.001-0.1	-	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	0.0002	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	0.0003	@	@	@	@	@	@	@	@	@	@	@	@	<0.0002 * - 0.0003	0.0002	0.0002
Sulphide as S ²⁻	mg/L	0.1	1	-	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	@	@	@	@	@	@	@	@	@	@	@	@	@	<0.1 * - <0.1 *	<0.1 *	<0.1 *
Nitrate as N	mg/L	0.01	-	-	1.09	1.15	0.51	0.72	1.56	1.83	1.05	1.00	1.11	1.12	0.93	1.82	0.85	0.95	0.99	0.81	1.10	1.42	1.45	1.02	0.97	0.90	1.64	1.81	0.51 - 1.83	1.16	1.07
Nitrite as N	mg/L	0.01	-	-	0.20	0.22	0.29	0.42	0.36	0.15	0.25	0.36	0.24	0.40	0.61	0.21	0.13	0.23	0.04	0.14	0.08	0.09	0.08	0.03	0.09	0.16	0.12	0.10	0.03 - 0.61	0.21	0.18
Nitrate + nitrite nitrogen	mg/L	@@	20-50	-	1.29	1.37	0.80	1.14	1.92	1.98	1.30	1.36	1.35	1.52	1.54	2.03	0.98	1.18	1.03	0.95	1.18	1.51	1.53	1.05	1.06	1.06	1.76	1.91	0.80 - 2.03	1.37	1.33
Unionized ammonia-nitrogen	mg/L	@@@	-	0.021	0.021	0.129	0.128	0.040	0.031	0.016	0.054	0.038	0.024	0.050	0.060	0.012	0.027	0.034	0.004	0.033	0.056	0.030	0.012	0.027	0.019	0.034	0.034	0.004 - 0.129	0.039	0.032	

Remark:

Values at or below laboratory reporting limits are calculated as laboratory report limits.
 Bold numbers indicate exceedance of the relevant water quality criteria/ standard.
 Data presented are annual arithmetic means except for E. coli and Faecal Coliforms which are annual geometric means.
 * denotes that the measured concentration is below the laboratory's reporting limit
 ** Waste discharges shall not cause the toxins in water to attain such levels as to produce significant toxic carcinogenic, mutagenic or teratogenic effects in humans, fish or any other aquatic organisms, with due regard to biologically cumulative effects in food chain and to toxicant interactions with each other. Waste discharges shall not cause a risk to any beneficial uses of the aquatic environment
 # According to the water quality standard stated in Section 5.2.2 of the EIA report.
 ## Water samplings and testings were conducted by a HOKLAS accredited laboratory, ALS Technichem (HK) Pty Ltd.
 @ Parameter not tested.
 @@ Calculated by summation of the concentration of Nitrate as N and Nitrite as N
 @@@ The concentration of unionized ammonia (UIA) are calculated from analysed NH3-N from water samples taken and in-situ measurement of temperature, pH and salinity. References are shown as below:
 - Bower C.E. and Bidwell J.P. (1978), Ionization of ammonia in seawater: Effect of temperature, pH and salinity. J. Fish. Res. Board Can. Vol.35, pp.1012-1016;
 - K., Russo R.C. & et. al. (1975), Aqueous ammonia equilibrium calculations: effect of pH and temperature. J. Fish. Res. Board Can. Vol.32, pp.2379-2383;
 - K.H. Khoo, C.H. Culbertson, and R.G. Bates, Thermodynamics of the dissociation of ammonium ion in seawater from 5 to 40°C, Journal of Solution Chemistry, 6:281-290, 1977.

Appendix 5-1A - Baseline Water Quality Sampling Results for Wet Season

Raw Data of Sampling Location W3

Parameters	Unit	Reporting Limit	Effluent Discharge Std (Gp D) #	WQO Criteria #	23 Sep 2012 12:06	26 Sep 2012 11:07	29 Sep 2012 08:21	02 Oct 2012 09:33	04 Oct 2012 08:25	06 Oct 2012 08:19	08 Oct 2012 08:36	10 Oct 2012 09:09	12 Oct 2012 08:16	15 Oct 2012 08:01	17 Oct 2012 08:28	19 Oct 2012 08:27	19 Aug 2013 08:51	21 Aug 2013 09:55	23 Aug 2013 11:57	26 Aug 2013 13:05	28 Aug 2013 13:02	30 Aug 2013 05:57	02 Sep 2013 13:21	04 Sep 2013 14:42	06 Sep 2013 10:20	09 Sep 2013 10:32	11 Sep 2013 13:09	13 Sep 2013 11:56	Range	Average	Median	
Salinity	g/L	0.1	-	-	0.4	2.1	5.5	6.6	6.1	4.3	6.2	11.0	6.9	11.4	8.9	1.3	0.2	0.5	0.4	0.2	0.3	0.3	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1 - 11.4	3.1	0.5
Water Flow	L/s	1.0	-	-	24.0	490.0	306.0	370.0	130.0	37.8	87.0	87.0	290.0	140.0	230.0	9.0	45.0	<1.0*	10.0	<1.0*	60.0	120.0	110.0	100.0	<1.0*	<1.0*	<1.0*	<1.0*	<1.0*	<1.0* - 490.0	110.5	73.5
Water Depth	m	0.1	-	-	0.2	1.6	1.6	1.2	0.4	0.3	1.2	1.3	2.3	1.2	0.7	0.1	2.4	2.2	2.1	1.7	1.3	1.9	1.0	1.3	2.4	2.0	1.9	0.7	0.1 - 2.4	1.4	1.3	
Temperature	°C	0.1	30	-	32.2	28.9	26.5	26.2	26.5	26.3	27.5	27.7	25.6	26.8	26.2	24.2	28.6	29.5	27.7	28.7	34.1	30.7	29.2	26.0	26.6	26.4	29.6	30.7	24.2 - 34.1	28.0	27.6	
pH Value	-	0.1	6-10	between 6 & 9	7.1	7.7	7.4	7.0	7.1	7.0	7.3	7.0	7.2	7.2	7.1	7.3	7.3	7.3	7.5	7.3	7.5	7.6	7.4	7.7	7.3	7.4	7.3	7.3	7.0 - 7.7	7.3	7.3	
Dissolved Oxygen	mg/L	0.1	-	4 (Min.)	5.4	2.2	1.9	1.9	2.1	2.1	3.5	4.5	4.2	1.4	0.9	5.1	2.7	4.4	1.9	4.2	4.0	4.0	7.4	6.8	3.6	3.6	2.9	7.6	0.9 - 7.6	3.6	3.6	
Dissolved Oxygen (% Saturation)	%	1.0	-	-	74.1	29.4	24.7	24.4	27.3	26.6	45.6	61.0	53.9	18.2	11.6	61.6	35.0	22.0	55.0	25.0	60.0	53.0	96.0	83.0	45.0	45.0	38.0	102.0	11.6 - 102.0	46.6	45.0	
Turbidity	NTU	1	-	-	314	19	23	40	154	94	19	10	19	100	231	733	45	35	43	59	146	91	17	110	67	98	68	108	10 - 733	110	68	
Biochemical Oxygen Demand	mg/L	2	20	5 (Max.)	6	<2 *	4	4	6	6	3	4	4	4	11	8	<2 *	3	3	5	5	5	<2 *	3	2	2	3	3	<2 * - 11	4	4	
Chemical Oxygen Demand	mg/L	5	80	30 (Max.)	43	13	20	27	43	31	12	28	25	23	58	67	18	22	17	17	18	28	8	28	14	17	17	8 - 67	25	21		
Total Phosphorus	mg/L	0.1	5-10	-	1.0	0.5	0.8	0.9	1.0	0.8	0.5	0.4	0.5	0.9	1.2	1.5	@	@	@	@	@	@	@	@	@	@	@	@	0.4 - 1.5	0.8	0.9	
Reactive Phosphorus	mg/L	0.01	-	-	0.20	0.35	0.67	0.70	0.53	0.36	0.38	0.31	0.36	0.63	0.72	0.22	@	@	@	@	@	@	@	@	@	@	@	@	0.20 - 0.72	0.45	0.37	
Oil and grease	mg/L	5	10	-	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 * - <5 *	<5 *	<5 *	
Electrical Conductivity @ 25°C	µS/ cm	1	-	-	777	3910	9450	10200	7980	7290	9590	16400	9990	16900	13300	2250	@	@	@	@	@	@	@	@	@	@	@	@	777 - 16900	9003	9520	
Suspended Solids (SS)	mg/L	2	30	20 (Median)	259	13	19	48	139	93	17	8	11	67	226	@	34	25	35	37	108	64	14	60	42	69	51	92	8 - 259	67	48	
Total Kjeldahl Nitrogen as N	mg/L	0.1	-	-	4.4	3.3	9.4	6.8	6.9	5.6	4.9	4.4	5.1	6.0	7.0	5.0	1.9	2.5	5.6	3.4	2.3	1.6	2.0	1.2	2.8	2.8	3.3	1.8	1.2 - 9.4	4.2	3.9	
Ammonia as N	mg/L	0.01	10-20	-	1.34	2.49	5.28	4.97	4.93	4.10	3.13	3.42	3.00	4.69	4.67	2.69	1.36	2.23	3.22	2.52	1.23	1.52	0.42	0.81	1.80	2.04	2.21	0.58	0.42 - 5.28	2.69	2.51	
Escherichia coli (E. coli)	cfu / 100 mL	1	1000	1000 (Median)	69000	11000	12000	2700	30000	15000	11000	6400	4100	11000	27000	23000	66000	17000	41000	43000	31000	26000	12000	44000	180000	11000	27000	2200	2200 - 180000	18363	20000	
Faecal Coliforms	cfu / 100 mL	1	-	-	77000	17000	15000	2900	43000	20000	16000	8700	6800	23000	74000	32000	@	@	@	@	@	@	@	@	@	@	@	@	@	2900 - 77000	19209	18500
Aluminium	mg/L	0.01	-	-	4.51	0.27	0.50	0.88	<0.01 *	1.66	0.29	0.15	0.13	1.09	5.53	14.10	@	@	@	@	@	@	@	@	@	@	@	@	<0.01 * - 14.10	2.43	0.69	
Copper	mg/L	0.001	-	-	0.023	0.004	0.004	0.005	<0.001	0.011	0.004	0.002	0.004	0.007	0.020	0.054	@	@	@	@	@	@	@	@	@	@	@	@	<0.001 * - 0.054	0.012	0.005	
Chromium	mg/L	0.01	-	-	0.01	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	0.03	@	@	@	@	@	@	@	@	@	@	@	@	@	<0.01 * - 0.03	0.0	0.0	
Lead	mg/L	0.001	-	-	0.021	0.002	0.002	0.003	<0.001	0.007	0.001	<0.001	0.001	0.005	0.014	0.046	@	@	@	@	@	@	@	@	@	@	@	@	<0.001 * - 0.046	0.009	0.003	
Zinc	mg/L	0.01	-	-	0.25	0.03	0.04	0.04	<0.01 *	0.09	0.16	0.37	0.09	0.11	0.16	0.46	@	@	@	@	@	@	@	@	@	@	@	@	<0.01 * - 0.46	0.15	0.10	
Cadmium	mg/L	0.0002	0.001-0.1	-	0.0002	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	0.0002	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	0.0006	@	@	@	@	@	@	@	@	@	@	@	@	<0.0002 * - 0.0006	0.0002	0.0002	
Sulphide as S ²⁻	mg/L	0.1	1	-	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	@	@	@	@	@	@	@	@	@	@	@	@	@	<0.1 * - <0.1 *	<0.1 *	<0.1 *	
Nitrate as N	mg/L	0.01	-	-	1.06	1.03	0.56	0.71	1.29	1.72	1.04	1.02	1.32	1.14	0.90	1.70	0.88	0.93	0.75	0.84	1.00	1.06	1.05	0.82	0.89	0.90	1.18	1.50	0.56 - 1.72	1.05	1.03	
Nitrite as N	mg/L	0.01	-	-	0.18	0.26	0.33	0.43	0.41	0.47	0.35	0.37	0.24	0.42	0.46	0.21	0.14	0.22	0.06	0.21	0.08	0.09	0.05	0.02	0.10	0.16	0.20	0.09	0.02 - 0.47	0.23	0.21	
Nitrate + nitrite nitrogen	mg/L	@@	20-50	-	1.24	1.29	0.89	1.14	1.70	2.19	1.39	1.39	1.56	1.56	1.36	1.91	1.02	1.15	0.81	1.05	1.08	1.15	1.10	0.84	0.99	1.06	1.38	1.59	0.81 - 2.19	1.29	1.20	
Unionized ammonia-nitrogen	mg/L	@@@	-	0.021	0.016	0.090	0.082	0.030	0.039	0.025	0.042	0.023	0.028	0.047	0.036	0.028	0.020	0.034	0.068	0.036	0.040	0.049	0.008	0.024	0.023	0.032	0.034	0.010	0.008 - 0.090	0.036	0.033	

Remark:

Values at or below laboratory reporting limits are calculated as laboratory report limits.
 Bold numbers indicate exceedance of the relevant water quality criteria/ standard.
 Data presented are annual arithmetic means except for E. coli and Faecal Coliforms which are annual geometric means.
 * denotes that the measured concentration is below the laboratory's reporting limit
 ** Waste discharges shall not cause the toxins in water to attain such levels as to produce significant toxic carcinogenic, mutagenic or teratogenic effects in humans, fish or any other aquatic organisms, with due regard to biologically cumulative effects in food chain and to toxicant interactions with each other. Waste discharges shall not cause a risk to any beneficial uses of the aquatic environment
 # According to the water quality standard stated in Section 5.2.2 of the EIA report.
 ## Water samplings and testings were conducted by a HOKLAS accredited laboratory, ALS Technichem (HK) Pty Ltd.
 @ Parameter not tested.
 @@ Calculated by summation of the concentration of Nitrate as N and Nitrite as N
 @@@ The concentration of unionized ammonia (UIA) are calculated from analysed NH3-N from water samples taken and in-situ measurement of temperature, pH and salinity. References are shown as below:
 - Bower C.E. and Bidwell J.P. (1978), Ionization of ammonia in seawater: Effect of temperature, pH and salinity. J. Fish. Res. Board Can. Vol.35, pp.1012-1016;
 - K., Russo R.C. & et. al. (1975), Aqueous ammonia equilibrium calculations: effect of pH and temperature. J. Fish. Res. Board Can. Vol.32, pp.2379-2383;
 - K.H. Khoo, C.H. Culbertson, and R.G. Bates, Thermodynamics of the dissociation of ammonium ion in seawater from 5 to 40°C, Journal of Solution Chemistry, 6:281-290, 1977.

Appendix 5-1A - Baseline Water Quality Sampling Results for Wet Season

Raw Data of Sampling Location W4

Parameters	Unit	Reporting Limit	Effluent Discharge Std (Gp D) #	WQO Criteria #	23 Sep 2012 10:37	26 Sep 2012 10:29	29 Sep 2012 07:53	02 Oct 2012 09:03	04 Oct 2012 07:56	06 Oct 2012 07:53	08 Oct 2012 08:08	10 Oct 2012 08:43	12 Oct 2012 07:50	15 Oct 2012 07:35	17 Oct 2012 08:05	19 Oct 2012 08:00	19 Aug 2013 08:25	21 Aug 2013 09:36	23 Aug 2013 11:27	26 Aug 2013 12:35	28 Aug 2013 12:36	30 Aug 2013 05:30	02 Sep 2013 12:57	04 Sep 2013 14:23	06 Sep 2013 09:55	09 Sep 2013 10:03	11 Sep 2013 12:37	13 Sep 2013 11:28	Range	Average	Median	
Salinity	g/L	0.1	-	-	1.7	2.2	6.2	6.6	6.1	7.6	6.1	9.7	8.7	11.5	6.5	2.6	0.3	0.7	0.4	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.1 - 11.5	3.3	1.2
Water Flow	L/s	1.0	-	-	99.0	270.0	405.0	180.0	42.0	78.0	104.0	104.0	500.0	<1.0	95.0	50.0	60.0	10.0	<1.0*	<1.0*	40.0	100.0	120.0	80.0	<1.0*	<1.0*	<1.0*	20.0	<1.0* - 500.0	98.5	69.0	
Water Depth	m	0.1	-	-	0.4	1.5	1.5	1.0	0.2	0.4	1.1	1.4	2.0	1.2	0.4	0.2	2.2	2.0	2.1	1.8	1.3	1.8	1.1	1.6	2.2	2.0	2.1	0.8	0.2 - 2.2	1.3	1.5	
Temperature	°C	0.1	30	-	31.1	28.9	26.1	26.0	26.2	26.4	27.5	27.3	25.2	26.4	25.8	23.5	28.3	29.1	27.6	28.5	32.5	30.1	28.6	26.0	25.6	27.2	29.2	28.9	23.5 - 32.5	27.6	27.4	
pH Value	-	0.1	6-10	between 6 & 9	7.1	7.7	7.5	7.0	6.8	7.1	7.1	7.0	7.2	7.2	7.0	7.1	7.3	7.3	7.5	7.5	7.2	7.4	7.4	7.6	7.3	7.3	7.3	7.1	6.8 - 7.7	7.3	7.3	
Dissolved Oxygen	mg/L	0.1	-	4 (Min.)	5.5	3.4	2.6	1.4	0.1	1.5	2.0	4.1	5.9	2.6	1.6	3.9	2.9	1.4	2.9	2.0	5.1	3.8	2.4	5.5	3.6	3.4	2.5	4.2	0.1 - 5.9	3.1	2.9	
Dissolved Oxygen (% Saturation)	%	1.0	-	-	74.4	44.0	33.0	17.8	23.2	20.0	26.3	54.2	74.8	34.4	19.7	46.6	37.0	19.0	37.0	26.0	71.0	50.0	31.0	68.0	44.0	43.0	32.0	54.0	17.8 - 74.8	40.9	37.0	
Turbidity	NTU	1	-	-	774	23	18	77	33	37	9	22	21	74	449	1430	45	49	91	101	117	151	17	107	68	142	85	143	9 - 1430	170	76	
Biochemical Oxygen Demand	mg/L	2	20	5 (Max.)	7	2	3	4	3	4	3	3	6	4	5	10	<2 *	2	3	3	5	4	9	5	2	2	3	18	<2* - 18	5	4	
Chemical Oxygen Demand	mg/L	5	80	30 (Max.)	64	16	20	22	38	25	16	26	27	24	66	44	19	17	15	16	17	28	26	31	14	24	21	66	14 - 66	28	24	
Total Phosphorus	mg/L	0.1	5-10	-	1.6	0.6	0.8	1.0	1.1	0.7	0.6	0.5	0.7	0.9	1.4	3.2	@	@	@	@	@	@	@	@	@	@	@	@	@	0.5 - 3.2	1.1	0.9
Reactive Phosphorus	mg/L	0.01	-	-	0.24	0.38	0.63	0.72	0.39	0.47	0.45	0.38	0.49	0.66	0.47	0.24	@	@	@	@	@	@	@	@	@	@	@	@	0.24 - 0.72	0.46	0.46	
Oil and grease	mg/L	5	10	-	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	10	<5* - 10	5.2	5.0	
Electrical Conductivity @ 25°C	µS/ cm	1	-	-	2760	4150	10600	10200	5570	11400	9630	14600	12300	17000	9600	4350	@	@	@	@	@	@	@	@	@	@	@	@	2760 - 17000	9347	9915	
Suspended Solids (SS)	mg/L	2	30	20 (Median)	@	16	18	74	82	25	6	6	13	56	408	@	30	36	62	65	81	92	17	68	52	105	37	147	6 - 408	68	54	
Total Kjeldahl Nitrogen as N	mg/L	0.1	-	-	4.2	3.4	6.8	5.9	6.4	6.2	7.0	5.0	5.2	6.4	6.0	5.5	2.0	3.4	4.5	3.0	2.3	2.1	5.9	1.8	2.8	2.8	3.3	4.7	1.8 - 7.0	4.4	4.6	
Ammonia as N	mg/L	0.01	10-20	-	0.84	2.71	5.10	5.00	4.68	4.50	3.48	3.39	4.24	4.72	4.04	2.23	1.43	2.69	2.70	2.47	1.47	1.49	2.92	1.03	1.42	1.81	2.29	3.28	0.84 - 5.10	2.91	2.71	
Escherichia coli (E. coli)	cfu / 100 mL	1	1000	1000 (Median)	18000	19000	16000	1800	57000	22000	12000	5500	23000	19000	79000	25000	94000	14000	30000	190000	48000	29000	54000	17000	110000	8500	15000	180000	1800 - 190000	26687	22500	
Faecal Coliforms	cfu / 100 mL	1	-	-	35000	22000	32000	2200	82000	31000	21000	7600	28000	28000	110000	26000	@	@	@	@	@	@	@	@	@	@	@	@	2200 - 110000	24608	28000	
Aluminium	mg/L	0.01	-	-	11.90	0.32	0.46	1.79	1.64	0.68	0.26	0.12	0.19	1.06	9.21	28.80	@	@	@	@	@	@	@	@	@	@	@	@	@	0.12 - 28.80	4.70	0.87
Copper	mg/L	0.001	-	-	0.063	0.004	0.004	0.010	0.008	0.005	0.004	0.003	0.006	0.007	0.036	0.121	@	@	@	@	@	@	@	@	@	@	@	@	0.003 - 0.121	0.023	0.007	
Chromium	mg/L	0.01	-	-	0.03	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	0.02	0.07	@	@	@	@	@	@	@	@	@	@	@	@	<0.01* - 0.07	0.0	0.0	
Lead	mg/L	0.001	-	-	0.054	0.002	0.002	0.007	0.005	0.002	0.002	0.001	0.002	0.004	0.027	0.100	@	@	@	@	@	@	@	@	@	@	@	@	0.001 - 0.100	0.017	0.003	
Zinc	mg/L	0.01	-	-	0.73	0.04	0.06	0.07	0.05	0.04	0.11	0.23	0.19	0.11	0.30	0.94	@	@	@	@	@	@	@	@	@	@	@	@	0.04 - 0.94	0.24	0.11	
Cadmium	mg/L	0.0002	0.001-0.1	-	0.0005	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	0.001	@	@	@	@	@	@	@	@	@	@	@	@	<0.0002* - 0.0010	0.0003	0.0002	
Sulphide as S ²⁻	mg/L	0.1	1	-	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	@	@	@	@	@	@	@	@	@	@	@	@	<0.1* - <0.1*	<0.1*	<0.1*	
Nitrate as N	mg/L	0.01	-	-	1.18	1.16	0.62	0.71	1.76	1.35	1.00	1.13	1.13	1.16	0.98	1.65	0.89	0.85	0.87	0.82	0.99	1.03	1.82	1.17	0.89	0.85	1.16	1.70	0.62 - 1.82	1.12	1.08	
Nitrite as N	mg/L	0.01	-	-	0.44	0.27	0.35	0.43	0.32	0.58	0.37	0.35	0.28	0.41	0.27	0.25	0.13	0.23	0.26	0.20	0.08	0.08	0.16	0.06	0.10	0.14	0.20	0.23	0.06 - 0.58	0.26	0.26	
Nitrate + nitrite nitrogen	mg/L	@@	20-50	-	1.62	1.43	0.97	1.14	2.08	1.93	1.37	1.48	1.41	1.57	1.25	1.90	1.02	1.08	1.13	1.02	1.07	1.11	1.98	1.23	0.99	0.99	1.36	1.93	0.97 - 2.08	1.38	1.31	
Unionized ammonia-nitrogen	mg/L	@@@	-	0.021	0.009	0.097	0.097	0.030	0.018	0.035	0.029	0.022	0.038	0.046	0.024	0.014	0.020	0.040	0.057	0.055	0.022	0.030	0.053	0.024	0.017	0.024	0.034	0.030	0.009 - 0.097	0.036	0.030	

Remark:

Values at or below laboratory reporting limits are calculated as laboratory report limits.
 Bold numbers indicate exceedance of the relevant water quality criteria/ standard.
 Data presented are annual arithmetic means except for E. coli and Faecal Coliforms which are annual geometric means.
 * denotes that the measured concentration is below the laboratory's reporting limit
 ** Waste discharges shall not cause the toxins in water to attain such levels as to produce significant toxic carcinogenic, mutagenic or teratogenic effects in humans, fish or any other aquatic organisms, with due regard to biologically cumulative effects in food chain and to toxicant interactions with each other. Waste discharges shall not cause a risk to any beneficial uses of the aquatic environment
 # According to the water quality standard stated in Section 5.2.2 of the EIA report.
 ## Water samplings and testings were conducted by a HOKLAS accredited laboratory, ALS Technichem (HK) Pty Ltd.
 @ Parameter not tested.
 @@ Calculated by summation of the concentration of Nitrate as N and Nitrite as N
 @@@ The concentration of unionized ammonia (UIA) are calculated from analysed NH3-N from water samples taken and in-situ measurement of temperature, pH and salinity. References are shown as below:
 - Bower C.E. and Bidwell J.P. (1978), Ionization of ammonia in seawater: Effect of temperature, pH and salinity. J. Fish. Res. Board Can. Vol.35, pp.1012-1016;
 - K., Russo R.C. & et. al. (1975), Aqueous ammonia equilibrium calculations: effect of pH and temperature. J. Fish. Res. Board Can. Vol.32, pp.2379-2383;
 - K.H. Khoo, C.H. Culbertson, and R.G. Bates, Thermodynamics of the dissociation of ammonium ion in seawater from 5 to 40°C, Journal of Solution Chemistry, 6:281-290, 1977.

Appendix 5-1A - Baseline Water Quality Sampling Results for Wet Season

Raw Data of Sampling Location WK1

Parameters	Unit	Reporting Limit	Effluent Discharge Std (Gp D) #	WQO Criteria #	23 Sep 2012 12:32	26 Sep 2012 11:30	29 Sep 2012 08:43	02 Oct 2012 09:50	04 Oct 2012 08:41	06 Oct 2012 08:35	08 Oct 2012 08:50	10 Oct 2012 09:25	12 Oct 2012 08:30	15 Oct 2012 08:15	17 Oct 2012 08:43	19 Oct 2012 08:44	19 Aug 2013 09:06	21 Aug 2013 10:06	23 Aug 2013 12:14	26 Aug 2013 13:22	28 Aug 2013 13:18	30 Aug 2013 06:16	02 Sep 2013 13:39	04 Sep 2013 14:51	06 Sep 2013 10:58	09 Sep 2013 11:11	11 Sep 2013 13:23	13 Sep 2013 12:15	Range	Average	Median	
Salinity	g/L	0.1	-	-	0.3	3.7	2.8	1.6	0.4	1.5	8.8	10.6	10.1	2.0	0.5	0.7	0.2	0.3	0.2	0.3	0.1	0.1	0.3	0.2	0.3	0.3	0.2	0.2	0.1 - 10.6	1.9	0.3	
Water Flow	L/s	1.0	-	-	2.6	1.6	1.6	<1.0 *	<1.0 *	<1.0 *	13.0	13.0	<1.0 *	<1.0 *	<1.0 *	4.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	2.0	1.0	1.0	1.0	<1.0 * - 13.0	2.4	1.0	
Water Depth	m	0.1	-	-	0.3	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1 - 0.3	0.1	0.1	
Temperature	°C	0.1	30	-	30.8	30.0	26.2	25.9	26.2	26.0	27.9	27.4	27.4	25.9	25.7	24.4	27.2	29.3	28.1	28.8	31.8	30.1	30.2	27.8	27.2	29.2	25.9	28.7	24.4 - 31.8	27.8	27.6	
pH Value	-	0.1	6-10	between 6 & 9	7.3	7.6	7.6	7.2	7.2	7.3	7.4	7.2	7.3	7.2	7.3	7.4	7.4	7.4	7.4	7.4	7.5	7.3	7.4	7.8	7.4	7.5	7.6	7.2	7.2 - 7.8	7.4	7.4	
Dissolved Oxygen	mg/L	0.1	-	4 (Min.)	6.0	4.2	4.4	4.8	4.2	3.3	4.0	4.0	3.9	3.4	4.2	4.9	4.0	1.6	3.0	1.4	6.0	4.7	1.3	7.4	2.2	1.8	5.7	6.1	1.3 - 7.4	4.0	4.1	
Dissolved Oxygen (% Saturation)	%	1.0	-	-	80.0	57.0	55.7	59.3	52.5	41.3	52.8	53.1	52.4	43.0	51.0	59.2	41.3	21.0	39.0	18.0	81.0	62.0	17.0	95.0	28.0	24.0	70.0	79.0	17.0 - 95.0	51.8	52.7	
Turbidity	NTU	1	-	-	55	37	26	37	39	31	25	33	30	48	29	47	28	19	47	26	42	23	19	54	21	29	19	40	19 - 55	34	31	
Biochemical Oxygen Demand	mg/L	2	20	5 (Max.)	4	7	11	11	10	16	13	10	12	13	12	8	30	18	35	10	7	26	8	15	40	27	8	4 - 40	15	12		
Chemical Oxygen Demand	mg/L	5	80	30 (Max.)	24	38	34	33	40	41	41	46	38	24	32	34	24	68	44	66	23	25	64	36	33	73	73	22 - 73	41	37		
Total Phosphorus	mg/L	0.1	5-10	-	0.6	0.9	1.0	0.8	0.9	1.1	1.0	0.8	0.9	0.9	1.1	@	@	@	@	@	@	@	@	@	@	@	@	@	0.6 - 1.1	0.9	0.9	
Reactive Phosphorus	mg/L	0.01	-	-	0.38	0.56	0.66	0.50	0.56	0.76	0.53	0.49	0.64	0.60	0.68	0.56	@	@	@	@	@	@	@	@	@	@	@	@	0.38 - 0.76	0.58	0.56	
Oil and grease	mg/L	5	10	-	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	5	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	6	6	<5 *	<5 * - 6	5.1	5.0
Electrical Conductivity @ 25°C	µS/ cm	1	-	-	506	6740	5160	2690	643	2030	13200	15900	15200	3220	899	1210	@	@	@	@	@	@	@	@	@	@	@	@	506 - 15900	5617	2955	
Suspended Solids (SS)	mg/L	2	30	20 (Median)	35	37	28	33	34	19	36	29	23	33	18	30	33	18	31	21	355	24	14	23	15	21	21	32	14 - 355	40	29	
Total Kjeldahl Nitrogen as N	mg/L	0.1	-	-	6.3	7.6	9.8	8.2	10.0	11.0	11.1	10.2	11.3	10.5	8.1	7.7	4.4	12.6	7.7	14.5	4.1	3.0	13.6	2.8	10.0	20.2	15.7	4.1	2.8 - 20.2	9.4	9.9	
Ammonia as N	mg/L	0.01	10-20	-	3.76	5.97	7.92	6.00	7.08	8.47	7.78	6.84	8.54	8.42	6.52	5.88	3.62	11.60	5.53	11.80	2.63	2.51	8.96	1.68	6.61	16.90	10.20	3.36	1.68 - 16.90	7.02	6.73	
Escherichia coli (E. coli)	cfu / 100 mL	1	1000	1000 (Median)	82000	77000	180000	27000	1000000	240000	57000	86000	57000	68000	98000	130000	410000	1500000	800000	2000000	250000	420000	3500000	470000	1300000	1600000	420000	300000	27000 - 3500000	284552	275000	
Faecal Coliforms	cfu / 100 mL	1	-	-	87000	98000	200000	38000	1100000	310000	64000	110000	78000	92000	120000	140000	@	@	@	@	@	@	@	@	@	@	@	@	@	38000 - 1100000	127670	104000
Aluminium	mg/L	0.01	-	-	0.47	0.40	0.39	0.64	0.46	0.40	0.27	0.34	0.15	0.51	0.19	0.21	@	@	@	@	@	@	@	@	@	@	@	@	0.15 - 0.64	0.37	0.40	
Copper	mg/L	0.001	-	-	0.004	0.005	0.005	0.005	0.007	0.005	0.006	0.004	0.004	0.004	0.003	0.003	@	@	@	@	@	@	@	@	@	@	@	@	0.003 - 0.007	0.005	0.005	
Chromium	mg/L	0.01	-	-	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	@	@	@	@	@	@	@	@	@	@	@	@	@	<0.01 * - <0.01 *	<0.01 *	<0.01 *	
Lead	mg/L	0.001	-	-	0.003	0.003	0.003	0.004	0.003	0.002	0.002	0.002	0.002	0.004	0.001	0.001	@	@	@	@	@	@	@	@	@	@	@	@	0.001 - 0.004	0.003	0.003	
Zinc	mg/L	0.01	-	-	0.04	0.07	0.05	0.06	0.04	0.04	0.33	0.36	0.53	0.11	0.03	0.02	@	@	@	@	@	@	@	@	@	@	@	@	0.02 - 0.53	0.14	0.06	
Cadmium	mg/L	0.0002	0.001-0.1	-	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	@	@	@	@	@	@	@	@	@	@	@	@	@	<0.0002 * - <0.0002 *	<0.0002 *	<0.0002 *	
Sulphide as S ²⁻	mg/L	0.1	1	-	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	0.2	0.4	<0.1 *	<0.1 *	@	@	@	@	@	@	@	@	@	@	@	@	@	<0.1 * - 0.4	0.1	0.1	
Nitrate as N	mg/L	0.01	-	-	1.06	0.71	0.52	0.85	1.97	1.32	0.72	0.75	0.64	1.73	1.51	1.56	0.70	0.01	0.77	<0.01 *	1.34	1.35	<0.01 *	1.20	0.42	<0.01 *	<0.01 *	1.71	<0.01 * - 1.97	0.87	0.76	
Nitrite as N	mg/L	0.01	-	-	0.18	0.34	0.23	0.22	0.58	0.23	0.37	0.37	0.28	0.26	0.18	0.20	0.07	0.07	0.11	0.02	0.08	0.09	<0.01 *	0.06	0.13	<0.01 *	<0.01 *	0.10	<0.01 * - 0.58	0.18	0.16	
Nitrate + nitrite nitrogen	mg/L	@@	20-50	-	1.24	1.05	0.75	1.07	2.55	1.55	1.09	1.12	0.92	1.99	1.69	1.76	0.77	0.08	0.88	0.03	1.42	1.44	<0.02 *	1.26	0.55	<0.02 *	<0.02 *	1.81	<0.02 * - 2.55	1.05	1.08	
Unionized ammonia-nitrogen	mg/L	@@@	-	0.021	0.063	0.185	0.190	0.057	0.069	0.102	0.133	0.072	0.113	0.080	0.077	0.079	0.059	0.219	0.096	0.215	0.073	0.040	0.180	0.070	0.108	0.397	0.240	0.039	0.039 - 0.397	0.123	0.088	

Remark:

Values at or below laboratory reporting limits are calculated as laboratory report limits.
 Bold numbers indicate exceedance of the relevant water quality criteria/ standard.
 Data presented are annual arithmetic means except for E. coli and Faecal Coliforms which are annual geometric means.
 * denotes that the measured concentration is below the laboratory's reporting limit
 ** Waste discharges shall not cause the toxins in water to attain such levels as to produce significant toxic carcinogenic, mutagenic or teratogenic effects in humans, fish or any other aquatic organisms, with due regard to biologically cumulative effects in food chain and to toxicant interactions with each other. Waste discharges shall not cause a risk to any beneficial uses of the aquatic environment
 # According to the water quality standard stated in Section 5.2.2 of the EIA report.
 ## Water samplings and testings were conducted by a HOKLAS accredited laboratory, ALS Technichem (HK) Pty Ltd.
 @ Parameter not tested.
 @@ Calculated by summation of the concentration of Nitrate as N and Nitrite as N
 @@@ The concentration of unionized ammonia (UIA) are calculated from analysed NH3-N from water samples taken and in-situ measurement of temperature, pH and salinity. References are shown as below:
 - Bower C.E. and Bidwell J.P. (1978), Ionization of ammonia in seawater: Effect of temperature, pH and salinity. J. Fish. Res. Board Can. Vol.35, pp.1012-1016;
 - K., Russo R.C. & et. al. (1975), Aqueous ammonia equilibrium calculations: effect of pH and temperature. J. Fish. Res. Board Can. Vol.32, pp.2379-2383;
 - K.H. Khoo, C.H. Culbertson, and R.G. Bates, Thermodynamics of the dissociation of ammonium ion in seawater from 5 to 40°C, Journal of Solution Chemistry, 6:281-290, 1977.

Appendix 5-1A - Baseline Water Quality Sampling Results for Wet Season

Raw Data of Sampling Location WK2

Parameters	Unit	Reporting Limit	Effluent Discharge Std (Gp D) #	WQO Criteria #	23 Sep 2012 12:37	26 Sep 2012 11:35	29 Sep 2012 08:50	02 Oct 2012 09:54	04 Oct 2012 08:44	06 Oct 2012 08:42	08 Oct 2012 08:55	10 Oct 2012 09:30	12 Oct 2012 08:33	15 Oct 2012 08:23	17 Oct 2012 08:49	19 Oct 2012 08:48	19 Aug 2013 09:15	21 Aug 2013 10:11	23 Aug 2013 12:20	26 Aug 2013 13:28	28 Aug 2013 13:26	30 Aug 2013 06:21	02 Sep 2013 13:47	04 Sep 2013 14:54	06 Sep 2013 11:04	09 Sep 2013 11:16	11 Sep 2013 13:31	13 Sep 2013 12:21	Range	Average	Median	
Salinity	g/L	0.1	-	-	0.4	0.5	0.5	0.5	0.4	0.6	0.4	0.8	0.4	0.4	0.4	0.3	0.4	0.2	0.5	0.6	0.6	0.5	0.2	0.5	0.5	0.6	0.5	0.2 - 0.8	0.5	0.5		
Water Flow	L/s	1.0	-	-	<1.0 *	-	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	
Water Depth	m	0.1	-	-	0.3	0.1	0.1	0.2	0.2	0.1	0.2	<0.1 *	0.1	0.1	<0.1 *	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	
Temperature	°C	0.1	30	-	29.9	28.5	24.1	24.6	24.8	24.7	25.6	23.9	23.2	24.9	24.9	23.1	28.1	28.9	27.7	29.3	34.0	31.3	32.4	27.2	27.4	28.9	20.4	28.7	20.4 - 34.0	26.9	27.3	
pH Value	-	0.1	6-10	between 6 & 9	7.1	7.8	7.8	7.2	7.3	7.3	7.9	7.4	7.3	7.2	7.4	7.4	7.8	8.0	7.7	7.9	7.8	7.9	8.1	7.7	7.9	8.0	7.9	7.6	7.1 - 8.1	7.6	7.8	
Dissolved Oxygen	mg/L	0.1	-	4 (Min.)	1.1	1.4	1.1	1.0	0.9	1.0	1.3	2.0	0.8	1.3	2.2	2.2	6.5	6.8	5.8	5.5	5.1	3.8	6.2	6.7	7.2	6.2	10.1	3.6	0.8 - 10.1	3.7	2.9	
Dissolved Oxygen (% Saturation)	%	1.0	-	-	14.8	17.9	12.7	12.7	10.8	11.7	15.5	23.9	9.8	15.9	26.8	25.8	83.0	89.0	74.0	72.0	72.0	52.0	85.0	84.0	91.0	81.0	112.0	46.0	9.8 - 112.0	47.5	36.4	
Turbidity	NTU	1	-	-	16	9	10	6	8	16	6	20	20	14	7	12	10	12	13	26	24	3	22	21	86	103	68	64	3 - 103	25	15	
Biochemical Oxygen Demand	mg/L	2	20	5 (Max.)	6	3	5	4	4	10	3	9	4	4	3	2	2	4	4	8	4	5	3	2	3	4	11	11	2 - 11	5	4	
Chemical Oxygen Demand	mg/L	5	80	30 (Max.)	39	26	35	28	39	45	26	46	34	13	41	30	23	32	23	34	29	35	30	26	23	43	54	55	13 - 55	34	33	
Total Phosphorus	mg/L	0.1	5-10	-	2.7	2.6	5.1	3.6	6.9	6.3	4.9	5.3	3.4	2.4	3.0	3.2	@	@	@	@	@	@	@	@	@	@	@	@	@	2.4 - 6.9	4.1	3.5
Reactive Phosphorus	mg/L	0.01	-	-	2.61	2.13	4.14	2.89	6.31	5.76	4.12	4.66	2.86	2.08	2.80	2.20	@	@	@	@	@	@	@	@	@	@	@	@	2.08 - 6.31	3.55	2.88	
Oil and grease	mg/L	5	10	-	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *
Electrical Conductivity @ 25°C	µS/ cm	1	-	-	679	1030	989	885	787	823	780	1350	844	687	655	639	@	@	@	@	@	@	@	@	@	@	@	@	639 - 1350	846	805	
Suspended Solids (SS)	mg/L	2	30	20 (Median)	4	6	4	3	4	5	6	8	2	9	11	4	7	10	7	30	14	26	20	9	49	81	94	63	2 - 94	20	9	
Total Kjeldahl Nitrogen as N	mg/L	0.1	-	-	14.9	13.1	13.5	13.7	13.6	16.0	13.5	17.0	10.1	9.0	12.0	14.1	2.0	1.4	2.4	3.5	5.3	3.6	4.5	1.1	3.0	7.4	10.0	17.6	1.1 - 17.6	9.3	10.1	
Ammonia as N	mg/L	0.01	10-20	-	10.80	11.70	12.20	12.00	11.80	14.60	10.90	14.30	8.91	7.28	10.70	8.15	1.44	1.32	0.91	1.74	3.22	3.43	1.87	0.35	1.55	5.97	7.44	14.90	0.35 - 14.90	7.40	7.80	
Escherichia coli (E. coli)	cfu / 100 mL	1	1000	1000 (Median)	19000	5700	1400	16000	2000	3000	3200	900	2100	1600	1700	2300	55000	21000	49000	32000	8400	20000	4800	6700	16000	8700	11000	14000	900 - 55000	6854	7550	
Faecal Coliforms	cfu / 100 mL	1	-	-	27000	6800	2400	18000	2300	7000	3900	2800	3700	2500	3600	2600	@	@	@	@	@	@	@	@	@	@	@	@	2300 - 27000	4715	3650	
Aluminium	mg/L	0.01	-	-	0.02	0.03	0.04	0.04	0.08	0.12	0.04	0.04	0.02	0.07	0.08	0.03	@	@	@	@	@	@	@	@	@	@	@	@	0.02 - 0.12	0.05	0.04	
Copper	mg/L	0.001	-	-	0.003	0.003	0.003	0.003	0.007	0.004	0.003	0.003	0.005	0.004	0.004	0.002	@	@	@	@	@	@	@	@	@	@	@	@	0.002 - 0.007	0.004	0.003	
Chromium	mg/L	0.01	-	-	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	@	@	@	@	@	@	@	@	@	@	@	@	@	<0.01 * - <0.01 *	<0.01 *	<0.01 *	
Lead	mg/L	0.001	-	-	<0.001 *	0.001	0.001	0.001	0.002	0.003	0.001	0.001	<0.001 *	0.002	0.002	<0.001 *	@	@	@	@	@	@	@	@	@	@	@	@	<0.001 * - 0.003	0.001	0.001	
Zinc	mg/L	0.01	-	-	0.02	0.02	0.03	0.02	0.02	0.06	0.02	0.03	0.02	0.04	0.03	0.01	@	@	@	@	@	@	@	@	@	@	@	@	0.01 - 0.06	0.03	0.02	
Cadmium	mg/L	0.0002	0.001-0.1	-	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	@	@	@	@	@	@	@	@	@	@	@	@	@	<0.0002 * - <0.0002 *	<0.0002 *	<0.0002 *	
Sulphide as S ²⁻	mg/L	0.1	1	-	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	0.2	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	@	@	@	@	@	@	@	@	@	@	@	@	@	<0.1 * - 0.2	0.1	0.1	
Nitrate as N	mg/L	0.01	-	-	0.41	0.49	0.10	0.22	0.16	0.02	0.04	0.03	0.10	0.17	0.11	0.10	0.43	0.79	0.47	0.91	2.40	3.36	0.98	0.37	0.61	1.21	1.44	1.03	0.02 - 3.36	0.66	0.42	
Nitrite as N	mg/L	0.01	-	-	0.25	0.21	0.08	0.12	0.11	<0.01 *	0.04	0.03	0.09	0.13	0.07	0.07	0.20	0.40	0.17	0.58	1.14	1.31	0.46	0.04	0.24	0.63	1.06	0.76	<0.01 * - 1.31	0.34	0.19	
Nitrate + nitrite nitrogen	mg/L	@@	20-50	-	0.66	0.70	0.18	0.34	0.27	0.03	0.08	0.06	0.19	0.30	0.18	0.17	0.63	1.19	0.64	1.49	3.54	4.67	1.44	0.41	0.85	1.84	2.50	1.79	0.03 - 4.67	1.01	0.64	
Unionized ammonia-nitrogen	mg/L	@@@	-	0.021	0.107	0.511	0.396	0.104	0.130	0.160	0.489	0.186	0.088	0.064	0.149	0.100	0.061	0.091	0.030	0.100	0.200	0.223	0.199	0.011	0.078	0.414	0.233	0.423	0.011 - 0.511	0.190	0.140	

Remark:

Values at or below laboratory reporting limits are calculated as laboratory report limits.
 Bold numbers indicate exceedance of the relevant water quality criteria/ standard.
 Data presented are annual arithmetic means except for E. coli and Faecal Coliforms which are annual geometric means.
 * denotes that the measured concentration is below the laboratory's reporting limit
 ** Waste discharges shall not cause the toxins in water to attain such levels as to produce significant toxic carcinogenic, mutagenic or teratogenic effects in humans, fish or any other aquatic organisms, with due regard to biologically cumulative effects in food chain and to toxicant interactions with each other. Waste discharges shall not cause a risk to any beneficial uses of the aquatic environment
 # According to the water quality standard stated in Section 5.2.2 of the EIA report.
 ## Water samplings and testings were conducted by a HOKLAS accredited laboratory, ALS Technichem (HK) Pty Ltd.
 @ Parameter not tested.
 @@ Calculated by summation of the concentration of Nitrate as N and Nitrite as N
 @@@ The concentration of unionized ammonia (UIA) are calculated from analysed NH3-N from water samples taken and in-situ measurement of temperature, pH and salinity. References are shown as below:
 - Bower C.E. and Bidwell J.P. (1978), Ionization of ammonia in seawater: Effect of temperature, pH and salinity. J. Fish. Res. Board Can. Vol.35, pp.1012-1016;
 - K., Russo R.C. & et. al. (1975), Aqueous ammonia equilibrium calculations: effect of pH and temperature. J. Fish. Res. Board Can. Vol.32, pp.2379-2383;
 - K.H. Khoo, C.H. Culbertson, and R.G. Bates, Thermodynamics of the dissociation of ammonium ion in seawater from 5 to 40°C, Journal of Solution Chemistry, 6:281-290, 1977.

Appendix 5-1A - Baseline Water Quality Sampling Results for Wet Season

Raw Data of Sampling Location WK3

Parameters	Unit	Reporting Limit	Effluent Discharge Std (Gp D) #	WQO Criteria #	23 Sep 2012 12:21	26 Sep 2012 11:18	29 Sep 2012 08:32	02 Oct 2012 09:43	04 Oct 2012 08:35	06 Oct 2012 08:29	08 Oct 2012 08:44	10 Oct 2012 09:18	12 Oct 2012 08:23	15 Oct 2012 08:08	17 Oct 2012 08:37	19 Oct 2012 08:36	19 Aug 2013 08:59	21 Aug 2013 10:02	23 Aug 2013 12:08	26 Aug 2013 13:15	28 Aug 2013 13:11	30 Aug 2013 06:09	02 Sep 2013 13:32	04 Sep 2013 14:47	06 Sep 2013 10:52	09 Sep 2013 11:02	11 Sep 2013 13:17	13 Sep 2013 12:08	Range	Average	Median
Salinity	g/L	0.1	-	-	0.3	3.8	2.7	1.1	5.2	1.5	9.0	10.7	10.2	1.4	0.5	0.7	0.2	0.3	0.2	0.3	0.1	0.1	0.3	0.2	0.2	0.3	0.2	0.2	0.1 - 10.7	2.1	0.3
Water Flow	L/s	1.0	-	-	6.5	6.7	6.2	4.7	3.3	3.0	25.0	25.0	5.0	1.8	4.2	4.8	6.0	2.0	2.0	1.0	2.0	2.0	1.0	3.0	2.0	1.0	1.0	1.0	1.0 - 25.0	5.0	3.0
Water Depth	m	0.1	-	-	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1 - 0.2	0.1	0.1
Temperature	°C	0.1	30	-	31.0	29.7	25.9	25.8	26.2	26.2	27.9	27.3	27.4	25.8	25.7	24.4	27.3	29.2	28.0	28.8	31.7	30.2	30.3	27.3	26.8	29.2	29.2	28.6	24.4 - 31.7	27.9	27.7
pH Value	-	0.1	6-10	between 6 & 9	7.2	7.6	7.6	7.2	7.2	7.3	7.3	7.2	7.2	7.2	7.2	7.3	7.4	7.5	7.4	7.4	7.5	7.6	7.4	7.6	7.4	7.5	7.6	7.2	7.2 - 7.6	7.4	7.4
Dissolved Oxygen	mg/L	0.1	-	4 (Min.)	4.8	3.7	3.6	4.7	2.7	3.0	3.9	4.0	3.8	3.4	4.0	4.7	4.0	1.3	2.9	0.9	5.8	5.3	0.8	5.5	3.2	1.8	4.1	5.7	0.8 - 5.8	3.7	3.9
Dissolved Oxygen (% Saturation)	%	1.0	-	-	64.5	49.3	44.5	58.4	33.9	36.8	52.6	53.1	50.4	41.5	49.7	56.5	50.0	17.0	37.0	11.0	80.0	71.0	11.0	69.0	39.0	24.0	53.0	74.0	11.0 - 80.0	47.0	49.9
Turbidity	NTU	1	-	-	52	32	20	35	39	32	28	23	28	51	34	44	30	19	46	28	40	21	20	62	21	30	18	52	18 - 62	34	31
Biochemical Oxygen Demand	mg/L	2	20	5 (Max.)	5	7	11	10	11	14	10	11	12	10	11	10	7	28	17	36	9	8	20	7	12	32	26	5 - 36	14	11	
Chemical Oxygen Demand	mg/L	5	80	30 (Max.)	40	43	31	28	52	38	37	43	38	28	36	34	31	54	46	75	28	27	57	34	26	86	70	24 - 86	42	38	
Total Phosphorus	mg/L	0.1	5-10	-	0.7	0.8	1.0	0.7	0.8	1.2	0.9	0.8	1.0	0.8	0.9	0.8	@	@	@	@	@	@	@	@	@	@	@	@	0.7 - 1.2	0.9	0.8
Reactive Phosphorus	mg/L	0.01	-	-	0.38	0.55	0.68	0.46	0.53	0.80	0.54	0.52	0.66	0.52	0.70	0.53	@	@	@	@	@	@	@	@	@	@	@	@	0.38 - 0.80	0.57	0.54
Oil and grease	mg/L	5	10	-	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 * - <5 *	<5 *	<5 *
Electrical Conductivity @ 25°C	µS/ cm	1	-	-	520	6750	5040	1950	720	2680	13500	16000	15300	2410	948	1300	@	@	@	@	@	@	@	@	@	@	@	@	520 - 16000	5593	2545
Suspended Solids (SS)	mg/L	2	30	20 (Median)	42	35	23	34	32	27	41	29	20	26	22	32	32	15	36	18	38	18	15	28	17	22	11	46	11 - 46	27	28
Total Kjeldahl Nitrogen as N	mg/L	0.1	-	-	6.8	7.8	10.3	8.9	10.3	10.4	10.6	10.2	11.0	9.4	8.6	7.6	4.0	12.6	8.3	15.2	4.5	3.3	13.6	3.0	7.3	16.8	14.3	5.2	3.0 - 16.8	9.2	9.2
Ammonia as N	mg/L	0.01	10-20	-	3.89	5.98	8.19	5.75	7.59	8.19	8.11	7.09	8.25	7.83	6.49	5.91	2.96	11.20	5.51	11.90	2.83	2.35	9.01	1.74	4.69	14.60	10.20	3.52	1.74 - 14.60	6.82	6.79
Escherichia coli (E. coli)	cfu / 100 mL	1	1000	1000 (Median)	72000	87000	140000	92000	130000	290000	98000	76000	72000	41000	32000	130000	430000	2300000	610000	1200000	300000	220000	2600000	210000	920000	2500000	1500000	130000	32000 - 2600000	249090	175000
Faecal Coliforms	cfu / 100 mL	1	-	-	72000	98000	160000	120000	150000	340000	120000	120000	98000	89000	38000	140000	@	@	@	@	@	@	@	@	@	@	@	@	38000 - 340000	113595	120000
Aluminium	mg/L	0.01	-	-	0.60	0.42	0.27	0.57	0.38	0.38	0.67	0.30	0.16	0.22	0.31	0.26	@	@	@	@	@	@	@	@	@	@	@	@	0.16 - 0.67	0.38	0.35
Copper	mg/L	0.001	-	-	0.006	0.005	0.004	0.005	0.006	0.004	0.008	0.004	0.004	0.002	0.004	0.003	@	@	@	@	@	@	@	@	@	@	@	@	0.002 - 0.008	0.005	0.004
Chromium	mg/L	0.01	-	-	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	@	@	@	@	@	@	@	@	@	@	@	@	@	<0.01 * - <0.01 *	<0.01 *	<0.01 *
Lead	mg/L	0.001	-	-	0.005	0.004	0.002	0.003	0.004	0.001	0.004	0.002	0.002	0.001	0.002	0.001	@	@	@	@	@	@	@	@	@	@	@	@	0.001 - 0.005	0.003	0.002
Zinc	mg/L	0.01	-	-	0.06	0.06	0.03	0.04	0.04	0.03	0.36	0.36	0.50	0.03	0.04	0.02	@	@	@	@	@	@	@	@	@	@	@	@	0.02 - 0.50	0.13	0.04
Cadmium	mg/L	0.0002	0.001-0.1	-	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	@	@	@	@	@	@	@	@	@	@	@	@	@	<0.0002 * - <0.0002 *	<0.0002 *	<0.0002 *
Sulphide as S ²⁻	mg/L	0.1	1	-	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	0.3	0.2	0.4	<0.1 *	0.2	<0.1 *	@	@	@	@	@	@	@	@	@	@	@	@	<0.1 * - 0.4	0.2	0.1
Nitrate as N	mg/L	0.01	-	-	0.84	0.74	0.52	0.95	2.14	1.27	0.74	0.77	0.64	1.94	1.59	1.48	0.70	0.08	0.84	0.06	1.31	1.30	<0.01 *	1.14	0.80	<0.01 *	<0.01 *	1.57	<0.01 * - 2.14	0.89	0.82
Nitrite as N	mg/L	0.01	-	-	0.18	0.34	0.22	0.19	0.36	0.27	0.38	0.38	0.27	0.26	0.19	0.20	0.07	0.07	0.10	0.04	0.09	0.09	<0.01 *	0.05	0.09	<0.01 *	<0.01 *	0.09	<0.01 * - 0.38	0.17	0.14
Nitrate + nitrite nitrogen	mg/L	@@	20-50	-	1.02	1.08	0.74	1.14	2.50	1.54	1.12	1.15	0.91	2.20	1.78	1.68	0.77	0.15	0.94	0.10	1.40	1.39	<0.02 *	1.19	0.89	<0.02 *	<0.02 *	1.66	<0.02 * - 2.50	1.06	1.10
Unionized ammonia-nitrogen	mg/L	@@@	-	0.021	0.052	0.182	0.192	0.054	0.074	0.100	0.111	0.074	0.087	0.074	0.061	0.063	0.049	0.263	0.095	0.217	0.078	0.074	0.182	0.045	0.075	0.343	0.300	0.040	0.040 - 0.343	0.120	0.077

Remark:

Values at or below laboratory reporting limits are calculated as laboratory report limits.
 Bold numbers indicate exceedance of the relevant water quality criteria/ standard.
 Data presented are annual arithmetic means except for E. coli and Faecal Coliforms which are annual geometric means.
 * denotes that the measured concentration is below the laboratory's reporting limit
 ** Waste discharges shall not cause the toxins in water to attain such levels as to produce significant toxic carcinogenic, mutagenic or teratogenic effects in humans, fish or any other aquatic organisms, with due regard to biologically cumulative effects in food chain and to toxicant interactions with each other. Waste discharges shall not cause a risk to any beneficial uses of the aquatic environment
 # According to the water quality standard stated in Section 5.2.2 of the EIA report.
 ## Water samplings and testings were conducted by a HOKLAS accredited laboratory, ALS Technichem (HK) Pty Ltd.
 @ Parameter not tested.
 @@ Calculated by summation of the concentration of Nitrate as N and Nitrite as N
 @@@ The concentration of unionized ammonia (UIA) are calculated from analysed NH3-N from water samples taken and in-situ measurement of temperature, pH and salinity. References are shown as below:
 - Bower C.E. and Bidwell J.P. (1978), Ionization of ammonia in seawater: Effect of temperature, pH and salinity. J. Fish. Res. Board Can. Vol.35, pp.1012-1016;
 - K., Russo R.C. & et. al. (1975), Aqueous ammonia equilibrium calculations: effect of pH and temperature. J. Fish. Res. Board Can. Vol.32, pp.2379-2383;
 - K.H. Khoo, C.H. Culbertson, and R.G. Bates, Thermodynamics of the dissociation of ammonium ion in seawater from 5 to 40°C, Journal of Solution Chemistry, 6:281-290, 1977.

Appendix 5-1A - Baseline Water Quality Sampling Results for Wet Season

Raw Data of Sampling Location WK4

Parameters	Unit	Reporting Limit	Effluent Discharge Std (Gp D) #	WQO Criteria #	23 Sep 2012 12:49	26 Sep 2012 10:52	29 Sep 2012 08:10	02 Oct 2012 09:23	04 Oct 2012 08:14	06 Oct 2012 08:11	08 Oct 2012 08:29	10 Oct 2012 09:01	12 Oct 2012 08:07	15 Oct 2012 07:52	17 Oct 2012 08:21	19 Oct 2012 08:20	19 Aug 2013 08:40	21 Aug 2013 09:48	23 Aug 2013 11:50	26 Aug 2013 12:58	28 Aug 2013 12:56	30 Aug 2013 05:49	02 Sep 2013 13:13	04 Sep 2013 14:37	06 Sep 2013 10:12	09 Sep 2013 10:23	11 Sep 2013 12:53	13 Sep 2013 11:49	Range	Average	Median		
Salinity	g/L	0.1	-	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Water Flow	L/s	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Water Depth	m	0.1	-	-	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	
Temperature	°C	0.1	30	-	31.8	29.4	27.1	27.6	27.7	26.8	27.7	26.8	26.3	26.6	26.7	24.9	29.0	30.3	28.9	30.2	34.0	32.6	32.6	28.7	27.7	30.9	31.2	31.2	24.9 - 34.0	29.0	28.8		
pH Value	-	0.1	6-10	between 6 & 9	9.0	9.2	8.5	8.6	8.9	8.9	8.8	8.9	8.6	8.7	8.7	8.5	8.0	8.5	8.0	8.4	8.7	8.6	8.6	8.0	7.7	9.0	8.9	8.7	7.7 - 9.2	8.6	8.7		
Dissolved Oxygen	mg/L	0.1	-	4 (Min.)	11.2	9.2	6.4	8.8	8.9	8.6	8.4	7.1	7.5	7.6	7.9	6.6	5.1	6.0	4.4	6.3	8.6	3.1	6.9	5.5	3.7	9.0	8.0	7.9	3.1 - 11.2	7.2	7.6		
Dissolved Oxygen (% Saturation)	%	1.0	-	-	152.0	120.0	79.9	112.0	114.0	108.0	106.0	88.6	92.8	95.2	98.7	80.2	67.0	80.0	57.0	84.0	121.0	43.0	95.0	71.0	47.0	121.0	108.0	107.0	43.0 - 152.0	93.7	95.1		
Turbidity	NTU	1	-	-	35	32	32	39	33	31	28	41	44	42	34	40	11	15	14	15	14	19	23	21	18	15	14	13	11 - 44	26	26		
Biochemical Oxygen Demand	mg/L	2	20	5 (Max.)	4	4	5	5	4	5	5	5	5	5	4	5	3	3	3	3	4	5	4	3	3	3	4	4	3 - 5	4	4		
Chemical Oxygen Demand	mg/L	5	80	30 (Max.)	59	37	58	59	65	62	50	63	70	16	64	79	31	30	30	32	37	41	42	36	37	34	34	34	16 - 79	46	39		
Total Phosphorus	mg/L	0.1	5-10	-	<0.1 *	0.1	0.9	0.1	0.1	<0.1 *	<0.1 *	<0.1 *	<0.1 *	0.1	<0.1 *	0.1	@	@	@	@	@	@	@	@	@	@	@	@	<0.1 * - 0.9	0.2	0.1		
Reactive Phosphorus	mg/L	0.01	-	-	<0.01 *	0.01	<0.01 *	0.01	<0.01 *	<0.01 *	<0.01 *	0.01	0.01	<0.01 *	<0.01 *	<0.01 *	@	@	@	@	@	@	@	@	@	@	@	@	<0.01 * - 0.01	0.01	0.01		
Oil and grease	mg/L	5	10	-	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	
Electrical Conductivity @ 25°C	µS/ cm	1	-	-	226	234	239	235	254	243	229	242	257	235	231	239	@	@	@	@	@	@	@	@	@	@	@	@	226 - 257	239	237		
Suspended Solids (SS)	mg/L	2	30	20 (Median)	23	24	29	27	24	33	27	34	27	20	39	42	9	11	11	9	13	26	24	13	12	12	11	9	9 - 42	21	24		
Total Kjeldahl Nitrogen as N	mg/L	0.1	-	-	1.9	2.1	12.6	2.1	2.3	2.2	1.9	2.3	2.3	2.2	2.2	2.4	1.3	1.4	4.4	1.1	1.2	1.3	1.6	1.4	1.6	1.4	1.4	1.3	1.1 - 12.6	2.3	1.9		
Ammonia as N	mg/L	0.01	10-20	-	0.07	0.11	0.03	0.07	0.04	0.02	<0.01 *	0.11	0.11	0.33	<0.01 *	0.10	0.24	0.11	0.13	0.07	0.05	0.07	0.09	0.11	0.20	0.07	0.03	0.05	<0.01 * - 0.33	0.09	0.07		
Escherichia coli (E. coli)	cfu / 100 mL	1	1000	1000 (Median)	20000	2100	110	660	310	130	680	210	330	900	280	110	1400	200	3000	74	13	100	330	670	180	960	4	<1 *	<1 * - 20000	244	295		
Faecal Coliforms	cfu / 100 mL	1	-	-	31000	3400	220	710	410	160	770	290	380	1700	980	180	@	@	@	@	@	@	@	@	@	@	@	@	160 - 31000	741	560		
Aluminium	mg/L	0.01	-	-	0.08	0.11	0.14	0.11	0.15	0.12	0.15	0.11	0.12	0.11	0.12	0.12	@	@	@	@	@	@	@	@	@	@	@	@	0.08 - 0.15	0.12	0.12		
Copper	mg/L	0.001	-	-	0.002	0.002	0.002	0.001	0.005	<0.001	0.002	0.001	0.003	0.001	0.001	0.002	@	@	@	@	@	@	@	@	@	@	@	@	<0.001 * - 0.005	0.002	0.002		
Chromium	mg/L	0.01	-	-	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	@	@	@	@	@	@	@	@	@	@	@	@	@	<0.01 * - <0.01 *	<0.01 *	<0.01 *		
Lead	mg/L	0.001	-	-	0.002	0.003	0.003	0.003	0.003	0.002	0.003	0.003	0.003	0.003	0.003	@	@	@	@	@	@	@	@	@	@	@	@	0.002 - 0.003	0.003	0.003			
Zinc	mg/L	0.01	-	-	<0.01 *	<0.01 *	<0.01 *	<0.01 *	0.01	<0.01 *	<0.01 *	<0.01 *	<0.01 *	0.01	<0.01 *	<0.01 *	@	@	@	@	@	@	@	@	@	@	@	@	<0.01 * - 0.01	0.01	0.01		
Cadmium	mg/L	0.0002	0.001-0.1	-	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	@	@	@	@	@	@	@	@	@	@	@	@	<0.0002 * - <0.0002 *	<0.0002 *	<0.0002 *			
Sulphide as S ²⁻	mg/L	0.1	1	-	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	@	@	@	@	@	@	@	@	@	@	@	@	@	<0.1 * - <0.1 *	<0.1 *	<0.1 *		
Nitrate as N	mg/L	0.01	-	-	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	0.01	<0.01 *	<0.01 *	<0.01 *	<0.01 *	0.05	0.08	0.02	0.04	<0.01 *	0.01	0.04	0.02	0.03	<0.01 *	<0.01 *	<0.01 *	<0.01 * - 0.08	0.02	0.01			
Nitrite as N	mg/L	0.01	-	-	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 * - 0.01	0.01	0.01			
Nitrate + nitrite nitrogen	mg/L	@@	20-50	-	<0.02 *	<0.02 *	<0.02 *	<0.02 *	<0.02 *	<0.02 *	0.02	<0.02 *	<0.02 *	<0.02 *	<0.02 *	0.06	0.09	0.03	0.05	<0.02 *	0.02	0.05	0.03	0.04	<0.02 *	0.02	<0.02 *	<0.02 * - 0.09	0.03	0.02			
Unionized ammonia-nitrogen	mg/L	@@@	-	0.021	0.033	0.060	0.005	0.015	0.014	0.007	0.003	0.037	0.022	0.080	0.002	0.015	0.017	0.023	0.009	0.012	0.017	0.019	0.025	0.008	0.007	0.032	0.012	0.015	0.002 - 0.080	0.020	0.015		

Remark: Values at or below laboratory reporting limits are calculated as laboratory report limits. Bold numbers indicate exceedance of the relevant water quality criteria/ standard. Data presented are annual arithmetic means except for E. coli and Faecal Coliforms which are annual geometric means. * denotes that the measured concentration is below the laboratory's reporting limit ** Waste discharges shall not cause the toxins in water to attain such levels as to produce significant toxic carcinogenic, mutagenic or teratogenic effects in humans, fish or any other aquatic organisms, with due regard to biologically cumulative effects in food chain and to toxicant interactions with each other. Waste discharges shall not cause a risk to any beneficial uses of the aquatic environment # According to the water quality standard stated in Section 5.2.2 of the EIA report. ## Water samplings and testings were conducted by a HOKLAS accredited laboratory, ALS Technichem (HK) Pty Ltd. @ Parameter not tested. @@ Calculated by summation of the concentration of Nitrate as N and Nitrite as N @@@ The concentration of unionized ammonia (UIA) are calculated from analysed NH3-N from water samples taken and in-situ measurement of temperature, pH and salinity. References are shown as below: - Bower C.E. and Bidwell J.P. (1978), Ionization of ammonia in seawater: Effect of temperature, pH and salinity. J. Fish. Res. Board Can. Vol.35, pp.1012-1016; - K., Russo R.C. & et. al. (1975), Aqueous ammonia equilibrium calculations: effect of pH and temperature. J. Fish. Res. Board Can. Vol.32, pp.2379-2383; - K.H. Khoo, C.H. Culbertson, and R.G. Bates, Thermodynamics of the dissociation of ammonium ion in seawater from 5 to 40°C, Journal of Solution Chemistry, 6:281-290, 1977.

Appendix 5-1A - Baseline Water Quality Sampling Results for Wet Season

Raw Data of Sampling Location WK5

Parameters	Unit	Reporting Limit	Effluent Discharge Std (Gp D) #	WQO Criteria #	23 Sep 2012 11:41	26 Sep 2012 10:41	29 Sep 2012 08:02	02 Oct 2012 09:14	04 Oct 2012 08:05	06 Oct 2012 08:03	08 Oct 2012 08:18	10 Oct 2012 08:52	12 Oct 2012 07:58	15 Oct 2012 07:43	17 Oct 2012 08:14	19 Oct 2012 08:12	19 Aug 2013 08:31	21 Aug 2013 09:41	23 Aug 2013 11:40	26 Aug 2013 12:41	28 Aug 2013 12:43	30 Aug 2013 05:41	02 Sep 2013 13:03	04 Sep 2013 14:31	06 Sep 2013 10:03	09 Sep 2013 10:11	11 Sep 2013 13:01	13 Sep 2013 11:35	Range	Average	Median			
Salinity	g/L	0.1	-	-	0.2	0.4	0.2	0.2	0.2	0.2	0.2	0.3	4.6	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Water Flow	L/s	1.0	-	-	1.5	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	1.0	1.0	<1.0 *	<1.0 *	3.2	32.0	<1.0 *	<1.0 *	<1.0 *	<1.0 *	2.0	2.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	<1.0 * - 32.0	2.5	1.0		
Water Depth	m	0.1	-	-	<0.1 *	0.3	0.3	<0.1 *	<0.1 *	<0.1 *	0.1	<0.1 *	0.4	<0.1 *	0.2	<0.1 *	0.1	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	0.2	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	0.1	0.1
Temperature	°C	0.1	30	-	29.0	27.2	24.4	25.3	25.4	24.6	25.6	24.4	24.3	24.6	24.8	23.4	27.4	27.0	26.7	27.5	29.7	28.2	28.4	26.0	25.3	26.7	27.7	27.4	23.4 - 29.7	26.3	26.4			
pH Value	-	0.1	6-10	between 6 & 9	7.7	7.8	7.8	7.6	7.8	7.6	8.1	8.0	7.2	7.5	7.5	7.6	7.3	7.4	7.1	7.1	7.5	7.6	7.5	7.5	7.3	7.5	7.6	7.4	7.1 - 8.1	7.5	7.5			
Dissolved Oxygen	mg/L	0.1	-	4 (Min.)	5.7	1.4	3.7	7.8	5.5	6.5	7.8	6.8	1.7	6.2	6.4	6.5	2.9	4.9	4.4	3.3	6.7	4.8	6.3	6.2	3.6	6.8	6.8	7.5	1.4 - 7.8	5.4	6.2			
Dissolved Oxygen (% Saturation)	%	1.0	-	-	74.0	18.1	44.3	94.9	67.7	78.6	95.6	81.6	20.4	74.0	77.9	76.9	37.0	62.0	55.0	42.0	88.0	62.0	82.0	76.0	44.0	85.0	87.0	95.0	18.1 - 95.6	67.5	75.0			
Turbidity	NTU	1	-	-	25	42	18	16	10	15	8	8	24	19	19	37	31	17	146	29	18	23	20	59	33	17	19	20	8 - 146	28	20			
Biochemical Oxygen Demand	mg/L	2	20	5 (Max.)	8	9	4	5	5	4	5	5	8	4	4	6	3	10	13	34	6	14	7	5	4	4	14	11	3 - 34	8	6			
Chemical Oxygen Demand	mg/L	5	80	30 (Max.)	39	42	14	25	30	20	17	24	28	14	12	31	16	33	47	45	19	36	25	27	20	16	27	17	12 - 47	26	25			
Total Phosphorus	mg/L	0.1	5-10	-	1.6	1.4	0.8	1.3	1.5	1.3	1.3	1.3	1.1	1.1	1.3	1.5	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	
Reactive Phosphorus	mg/L	0.01	-	-	1.27	1.04	0.54	1.16	1.33	1.04	1.19	1.23	0.89	1.02	1.20	1.26	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	
Oil and grease	mg/L	5	10	-	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	14	<5 *	11	<5 *	<5 *	<5 *	<5 *	6	8	<5 * - 14	5.8	5.0			
Electrical Conductivity @ 25°C	µS/ cm	1	-	-	449	1240	337	382	402	346	364	543	8250	338	384	388	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	
Suspended Solids (SS)	mg/L	2	30	20 (Median)	12	54	34	13	9	13	10	12	17	8	6	30	24	16	87	27	13	11	14	34	25	9	14	15	6 - 87	21	14			
Total Kjeldahl Nitrogen as N	mg/L	0.1	-	-	19.5	10.7	7.0	14.7	17.3	11.2	12.9	13.1	11.2	8.9	11.5	14.0	3.1	4.0	4.4	5.3	3.5	4.6	4.4	2.0	2.6	2.8	3.1	2.9	2.0 - 19.5	8.1	6.2			
Ammonia as N	mg/L	0.01	10-20	-	14.20	8.35	4.79	12.60	14.30	9.72	10.20	11.70	8.11	8.85	10.80	10.60	1.72	3.28	2.78	3.32	2.99	4.34	2.31	0.91	1.11	2.60	1.56	2.51	0.91 - 14.30	6.40	4.57			
Escherichia coli (E. coli)	cfu / 100 mL	1	1000	1000 (Median)	50000	38000	8600	31000	80000	51000	39000	18000	96000	51000	64000	32000	52000	48000	410000	110000	37000	60000	66000	16000	37000	32000	20000	14000	8600 - 410000	42596	43500			
Faecal Coliforms	cfu / 100 mL	1	-	-	57000	47000	9700	34000	100000	58000	48000	36000	120000	67000	78000	37000	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	
Aluminium	mg/L	0.01	-	-	0.10	0.36	0.23	0.22	0.14	0.19	0.13	0.12	0.09	0.08	0.10	0.33	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	
Copper	mg/L	0.001	-	-	0.004	0.006	0.003	0.004	0.006	0.004	0.003	0.004	0.003	0.003	0.003	0.005	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	
Chromium	mg/L	0.01	-	-	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	
Lead	mg/L	0.001	-	-	0.001	0.004	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.002	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	
Zinc	mg/L	0.01	-	-	0.02	0.05	0.02	0.02	0.02	0.02	0.02	0.03	0.18	0.02	0.02	0.04	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	
Cadmium	mg/L	0.0002	0.001-0.1	-	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	
Sulphide as S ²⁻	mg/L	0.1	1	-	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	
Nitrate as N	mg/L	0.01	-	-	<0.01 *	1.47	1.32	2.89	1.19	1.09	1.18	0.94	0.34	1.40	1.00	0.94	1.24	0.95	1.26	1.54	2.05	1.40	1.75	1.75	1.37	1.92	2.36	1.94	<0.01 * - 2.89	1.39	1.35			
Nitrite as N	mg/L	0.01	-	-	<0.01 *	0.21	0.14	0.37	0.29	0.21	0.19	0.18	0.18	0.22	0.16	0.16	0.15	0.19	0.10	0.20	0.30	0.22	0.16	0.07	0.12	0.16	0.20	0.18	<0.01 * - 0.37	0.18	0.18			
Nitrate + nitrite nitrogen	mg/L	@@	20-50	-	<0.02 *	1.68	1.46	3.26	1.48	1.30	1.37	1.12	0.52	1.62	1.16	1.10	1.39	1.14	1.36	1.74	2.35	1.62	1.91	1.82	1.49	2.08	2.56	2.12	<0.02 * - 3.26	1.57	1.49			
Unionized ammonia-nitrogen	mg/L	@@@	-	0.021	0.514	0.335	0.159	0.284	0.508	0.209	0.707	0.603	0.069	0.152	0.188	0.209	0.023	0.053	0.022	0.028	0.073	0.119	0.051	0.017	0.013	0.052	0.041	0.042	0.013 - 0.707	0.186	0.096			

Remark:

Values at or below laboratory reporting limits are calculated as laboratory report limits.
 Bold numbers indicate exceedance of the relevant water quality criteria/ standard.
 Data presented are annual arithmetic means except for E. coli and Faecal Coliforms which are annual geometric means.
 * denotes that the measured concentration is below the laboratory's reporting limit
 ** Waste discharges shall not cause the toxins in water to attain such levels as to produce significant toxic carcinogenic, mutagenic or teratogenic effects in humans, fish or any other aquatic organisms, with due regard to biologically cumulative effects in food chain and to toxicant interactions with each other. Waste discharges shall not cause a risk to any beneficial uses of the aquatic environment
 # According to the water quality standard stated in Section 5.2.2 of the EIA report.
 ## Water samplings and testings were conducted by a HOKLAS accredited laboratory, ALS Technichem (HK) Pty Ltd.
 @ Parameter not tested.
 @@ Calculated by summation of the concentration of Nitrate as N and Nitrite as N
 @@@ The concentration of unionized ammonia (UIA) are calculated from analysed NH3-N from water samples taken and in-situ measurement of temperature, pH and salinity. References are shown as below:
 - Bower C.E. and Bidwell J.P. (1978), Ionization of ammonia in seawater: Effect of temperature, pH and salinity. J. Fish. Res. Board Can. Vol.35, pp.1012-1016;
 - K., Russo R.C. & et. al. (1975), Aqueous ammonia equilibrium calculations: effect of pH and temperature. J. Fish. Res. Board Can. Vol.32, pp.2379-2383;
 - K.H. Khoo, C.H. Culbertson, and R.G. Bates, Thermodynamics of the dissociation of ammonium ion in seawater from 5 to 40°C, Journal of Solution Chemistry, 6:281-290, 1977.

Appendix 5-1B - Baseline Water Quality Sampling Results for Dry Season

Raw Data of Sampling Location W2

Parameters	Unit	Reporting Limit	Effluent Discharge Std (Gp D) #	WQO Criteria#	28 Dec 2012 11:00	03 Jan 2013 11:10	10 Jan 2013 10:10	17 Jan 2013 09:53	25 Mar 2015 13:19	27 Mar 2015 10:49	30 Mar 2015 10:52	01 Apr 2015 10:24	08 Apr 2015 10:49	10 Apr 2015 10:34	13 Apr 2015 10:34	15 Apr 2015 10:23	17 Apr 2015 10:26	20 Apr 2015 10:29	22 Apr 2015 10:29	24 Apr 2015 10:23	Range	Average	Median
Salinity	g/L	0.1	-	-	5.9	0.4	4.2	0.4	6.0	3.8	0.9	2.0	5.3	2.1	0.4	1.5	3.3	6.0	4.6	3.6	0.4 - 6.0	3.2	3.5
Water Flow	L/s	1.0	-	-	160.0	15.0	60.0	<1.0 *	200.0	140.0	150.0	180.0	220.0	210.0	170.0	190.0	170.0	290.0	190.0	160.0	<1.0 * - 290.0	156.6	170.0
Water Depth	m	0.1	-	-	0.4	0.2	0.8	0.1	2.0	1.4	1.5	1.8	2.2	2.1	1.7	1.9	1.7	2.9	1.9	1.6	0.1 - 2.9	1.5	1.7
Temperature	°C	0.1	30	-	19.3	19.3	14.8	17.8	19.8	20.5	23.3	24.7	23.1	19.2	20.7	22.5	24.5	26.1	24.2	24.3	14.8 - 26.1	21.5	21.6
pH Value	-	0.1	6-10	between 6 & 9	7.2	6.9	7.5	7.3	7.4	7.3	7.4	7.4	7.4	7.2	7.3	7.5	7.6	7.3	7.5	7.3	6.9 - 7.6	7.3	7.4
Dissolved Oxygen	mg/L	0.1	-	4 (Min.)	2.6	2.7	7.8	5.8	0.8	2.4	0.5	2.5	2.5	1.4	2.5	0.8	1.6	0.6	0.3	0.9	0.3 - 7.8	2.2	2.0
Dissolved Oxygen (% Saturation)	%	1.0	-	-	29.2	29.7	79.1	61.0	9.4	26.8	6.3	30.8	30.5	14.8	28.3	9.2	19.1	7.3	3.7	8.9	3.7 - 79.1	24.6	23.0
Turbidity	NTU	1	-	-	36	503	66	199	25	51	32	19	34	22	38	28	28	30	26	58	19 - 503	75	33
Biochemical Oxygen Demand	mg/L	2	20	5 (Max.)	<2 *	6	15	8	4	4	21	6	5	5	6	5	6	4	6	5	<2 * - 21	7	6
Chemical Oxygen Demand	mg/L	5	80	30 (Max.)	20	40	37	48	26	23	53	21	<50 ***	25	35	21	25	<50 ***	<50 ***	30	20 - 53	35	33
Total Phosphorus	mg/L	0.1	5-10	-	@	@	@	@	1.0	1.1	0.9	1.4	1.1	1.0	1.1	1.2	1.0	0.7	1.2	1.0	0.7 - 1.4	1.1	1.1
Reactive Phosphorus	mg/L	0.01	-	-	@	@	@	@	0.85	0.71	0.23	0.94	0.91	0.75	0.46	0.80	0.67	0.49	0.90	0.70	0.23 - 0.94	0.70	0.73
Oil and grease	mg/L	5	10	-	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 * - <5 *	<5 *	<5 *
Electrical Conductivity @ 25°C	µS/cm	1	-	-	@	@	@	@	10900	6850	1780	3590	9510	4060	1370	3010	5760	10300	7890	6630	1370 - 10900	5971	6195
Suspended Solids (SS)	mg/L	2	30	20 (Median)	34	@	63	217	28	36	38	17	31	21	111	24	24	32	30	43	17 - 217	50	32
Total Kjeldahl Nitrogen as N	mg/L	0.1	-	-	8.0	3.3	8.8	4.0	7.9	6.0	4.6	7.0	8.7	5.9	5.3	7.0	7.8	8.3	8.5	6.6	3.3 - 8.8	6.7	7.0
Ammonia as N	mg/L	0.01	10-20	-	5.96	1.60	5.65	2.47	7.22	5.07	3.38	5.47	3.64	5.32	4.34	5.92	6.29	6.07	5.45	5.40	1.60 - 7.22	4.95	5.43
Escherichia coli (E. coli)	cfu / 100 mL	1	1000	1000 (Median)	37000	32000	30000	7200	3600	11000	170000	28000	4000	2400	25000	24000	2500	12000	11000	36000	2400 - 170000	14368	18000
Faecal Coliforms	cfu / 100 mL	1	-	-	@	@	@	@	3800	13000	170000	46000	5700	4900	27000	28000	4500	12000	12000	44000	3800 - 170000	15748	12500
Aluminium	mg/L	0.01	-	-	@	@	@	@	0.56	0.19	0.18	0.23	0.69	0.43	1.25	0.48	0.50	0.32	0.30	0.27	0.18 - 1.25	0.45	0.37
Copper	mg/L	0.001	-	-	@	@	@	@	0.005	0.003	0.002	0.003	0.004	0.005	0.010	0.003	0.003	0.002	0.002	0.003	0.002 - 0.010	0.004	0.003
Chromium	mg/L	0.01	-	**	@	@	@	@	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 * - <0.01 *	<0.01 *	<0.01 *
Lead	mg/L	0.001	-	-	@	@	@	@	0.002	<0.001 *	0.001	0.001	0.002	0.002	0.008	0.002	0.001	0.001	<0.001 *	0.001	<0.001 * - 0.008	0.002	0.001
Zinc	mg/L	0.01	-	-	@	@	@	@	0.06	0.03	0.02	0.02	0.06	0.05	0.09	0.02	0.04	0.17	0.02	0.04	0.02 - 0.17	0.05	0.04
Cadmium	mg/L	0.0002	0.001-0.1	-	@	@	@	@	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 * - <0.0002 *	<0.0002 *	<0.0002 *
Sulphide as S ²⁻	mg/L	0.1	1	-	@	@	@	@	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 * - <0.1 *	<0.1 *	<0.1 *
Nitrate as N	mg/L	0.01	-	-	0.83	1.72	2.73	3.11	1.01	0.95	0.16	0.45	0.69	0.94	0.68	0.66	0.69	0.94	0.67	0.93	0.16 - 3.11	1.07	0.88
Nitrite as N	mg/L	0.01	-	-	0.17	0.10	0.19	0.14	0.33	0.25	0.79	0.25	0.26	0.24	0.13	0.17	0.29	0.36	0.28	0.24	0.10 - 0.79	0.26	0.25
Nitrate + nitrite nitrogen	mg/L	@@	20-50	-	1.00	1.82	2.92	3.25	1.34	1.20	0.95	0.70	0.95	1.18	0.81	0.83	0.98	1.30	0.95	1.17	0.70 - 3.25	1.33	1.09
Unionized ammonia-nitrogen	mg/L	@@@	-	0.021	0.014	0.002	0.027	0.007	0.027	0.015	0.013	0.021	0.014	0.013	0.013	0.028	0.038	0.018	0.026	0.016	0.002 - 0.038	0.018	0.016

Remark: Values at or below laboratory reporting limits are calculated as laboratory report limits.

Bold numbers indicate exceedance of the relevant water quality criteria/ standard.

Data presented are annual arithmetic means except for E. coli and Faecal Coliforms which are annual geometric means.

* denotes that the measured concentration is below the laboratory's reporting limit

** Waste discharges shall not cause the toxins in water to attain such levels as to produce significant toxic carcinogenic, mutagenic or teratogenic effects in humans, fish or any other aquatic organisms, with due regard to biologically cumulative effects in food chain and to toxicant interactions with each other. Waste discharges shall not cause a risk to any beneficial uses of the aquatic environment

*** Reporting limit for COD was adjusted by the laboratory due to high chloride content which requires dilution of sample.

According to the water quality standard stated in Section 5.2.2 of the EIA report.

Water samplings and testings were conducted by a HOKLAS accredited laboratory, ALS Technichem (HK) Pty Ltd. Testing parameters that were identified to be in poor condition during the water sampling in September 2012 and October 2012 as well as the key WQO parameters stated in Section 5.2.2 of the EIA report, have been selected for laboratory testing during the subsequent sampling in December 2012 and January 2013.

@ Parameter not tested.

@@ Calculated by summation of the concentration of Nitrate as N and Nitrite as N

@@@ The concentration of unionized ammonia (UIA) are calculated from analysed NH3-N from water samples taken and in-situ measurement of temperature, pH and salinity. References are shown as below:

- Bower C.E. and Bidwell J.P. (1978), Ionization of ammonia in seawater: Effect of temperature, pH and salinity. J. Fish. Res. Board Can. Vol.35, pp.1012-1016;

- K., Russo R.C. & et. al. (1975), Aqueous ammonia equilibrium calculations: effect of pH and temperature. J. Fish. Res. Board Can. Vol.32, pp.2379-2383;

- K.H. Khoo, C.H. Culbertson, and R.G. Bates, Thermodynamics of the dissociation of ammonium ion in seawater from 5 to 40°C, Journal of Solution Chemistry, 6:281-290, 1977.

Appendix 5-1B - Baseline Water Quality Sampling Results for Dry Season

Raw Data of Sampling Location W3

Parameters	Unit	Reporting Limit	Effluent Discharge Std (Gp D) #	WQO Criteria#	28 Dec 2012 09:55	03 Jan 2013 09:57	10 Jan 2013 08:58	17 Jan 2013 08:55	25 Mar 2015 12:41	27 Mar 2015 10:42	30 Mar 2015 10:42	01 Apr 2015 10:14	08 Apr 2015 10:39	10 Apr 2015 10:23	13 Apr 2015 10:24	15 Apr 2015 10:13	17 Apr 2015 10:12	20 Apr 2015 10:17	22 Apr 2015 10:17	24 Apr 2015 10:11	Range	Average	Median
Salinity	g/L	0.1	-	-	11.3	0.6	9.8	0.6	6.9	4.1	3.6	5.5	7.0	2.6	0.7	2.1	4.8	7.3	5.8	4.4	0.6 - 11.3	4.8	4.6
Water Flow	L/s	1.0	-	-	29.0	7.5	100.0	4.5	200.0	300.0	320.0	360.0	220.0	210.0	340.0	380.0	340.0	290.0	190.0	160.0	4.5 - 380.0	215.7	215.0
Water Depth	m	0.1	-	-	0.5	0.3	0.9	0.2	2.0	1.5	1.6	1.8	2.2	2.1	1.7	1.9	1.7	2.9	1.9	1.6	0.2 - 2.9	1.6	1.7
Temperature	°C	0.1	30	-	18.2	17.8	15.7	16.5	18.2	20.4	23.7	25.5	23.7	19.1	20.8	22.8	24.3	26.3	24.5	24.1	15.7 - 26.3	21.4	21.8
pH Value	-	0.1	6-10	between 6 & 9	7.3	7.1	7.6	7.2	7.4	7.3	7.4	7.4	7.3	7.3	7.5	7.6	7.5	7.3	7.4	7.3	7.1 - 7.6	7.4	7.4
Dissolved Oxygen	mg/L	0.1	-	4 (Min.)	1.5	2.6	7.4	4.4	4.9	3.2	1.9	3.6	2.7	1.6	4.0	1.4	1.6	0.3	1.2	1.4	0.3 - 7.4	2.7	2.3
Dissolved Oxygen (% Saturation)	%	1.0	-	-	16.9	27.5	78.8	45.2	57.1	41.9	23.0	45.2	33.5	17.1	44.6	15.7	19.6	3.5	11.6	14.6	3.5 - 78.8	31.0	25.3
Turbidity	NTU	1	-	-	52	188	72	283	20	43	39	24	39	31	85	29	36	31	34	75	20 - 283	68	39
Biochemical Oxygen Demand	mg/L	2	20	5 (Max.)	6	8	12	9	4	5	12	8	4	5	4	6	6	4	5	4	4 - 12	6	6
Chemical Oxygen Demand	mg/L	5	80	30 (Max.)	27	31	52	47	60	24	27	<50 ***	<50 ***	24	15	27	27	<50 ***	<50 ***	30	15 - 60	37	31
Total Phosphorus	mg/L	0.1	5-10	-	@	@	@	@	0.9	1.1	1.1	1.3	0.8	1.1	0.6	1.2	0.9	0.6	1.0	0.9	0.6 - 1.3	1.0	1.0
Reactive Phosphorus	mg/L	0.01	-	-	@	@	@	@	0.79	0.76	0.95	0.88	0.52	0.81	0.23	0.66	0.53	0.41	0.78	0.69	0.23 - 0.95	0.67	0.73
Oil and grease	mg/L	5	10	-	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 * - <5 *	<5 *	<5 *
Electrical Conductivity @ 25°C	µS/ cm	1	-	-	@	@	@	@	12400	7410	6540	9730	11800	4760	807	3830	8220	12800	10000	7840	807 - 12800	8011	8030
Suspended Solids (SS)	mg/L	2	30	20 (Median)	39	165	83	265	25	34	30	24	38	33	37	34	31	32	29	47	24 - 265	59	34
Total Kjeldahl Nitrogen as N	mg/L	0.1	-	-	9.6	4.5	9.9	4.1	8.8	7.2	9.3	8.4	7.9	6.8	1.7	8.2	7.8	7.5	9.0	7.0	1.7 - 9.9	7.4	7.9
Ammonia as N	mg/L	0.01	10-20	-	7.70	4.00	6.91	3.53	5.16	5.65	7.89	7.06	3.59	6.02	1.55	6.42	6.36	5.58	3.72	5.62	1.55 - 7.89	5.42	5.64
Escherichia coli (E. coli)	cfu / 100 mL	1	1000	1000 (Median)	58000	68000	34000	44000	8200	8800	52000	50000	11000	46000	20000	81000	21000	15000	14000	18000	8200 - 81000	26828	27500
Faecal Coliforms	cfu / 100 mL	1	-	-	@	@	@	@	8800	9200	57000	67000	18000	78000	25000	92000	26000	15000	14000	20000	8800 - 92000	26290	22500
Aluminium	mg/L	0.01	-	-	@	@	@	@	0.39	0.12	0.27	0.37	0.50	0.70	0.41	0.63	0.66	0.34	0.63	0.96	0.12 - 0.96	0.50	0.46
Copper	mg/L	0.001	-	-	@	@	@	@	0.004	0.002	0.004	0.018	0.010	0.005	0.004	0.004	0.004	0.002	0.003	0.006	0.002 - 0.018	0.006	0.004
Chromium	mg/L	0.01	-	**	@	@	@	@	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 * - <0.01 *	<0.01 *	<0.01 *
Lead	mg/L	0.001	-	-	@	@	@	@	0.001	<0.001 *	0.001	0.001	0.004	0.003	0.002	0.003	0.002	<0.001 *	0.002	0.003	<0.001 * - 0.004	0.002	0.002
Zinc	mg/L	0.01	-	-	@	@	@	@	0.05	0.03	0.03	0.07	0.67	0.08	0.03	0.04	0.12	0.18	0.04	0.08	0.03 - 0.67	0.12	0.06
Cadmium	mg/L	0.0002	0.001-0.1	-	@	@	@	@	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 * - <0.0002 *	<0.0002 *	<0.0002 *
Sulphide as S ²⁻	mg/L	0.1	1	-	@	@	@	@	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 * - <0.1 *	<0.1 *	<0.1 *
Nitrate as N	mg/L	0.01	-	-	0.79	1.26	1.44	2.74	1.21	0.94	0.20	0.39	0.94	0.95	1.27	0.54	0.87	1.02	0.81	0.86	0.20 - 2.74	1.01	0.94
Nitrite as N	mg/L	0.01	-	-	0.37	0.09	0.42	0.13	0.36	0.25	0.35	0.28	0.28	0.23	0.17	0.21	0.33	0.34	0.31	0.26	0.09 - 0.42	0.27	0.28
Nitrate + nitrite nitrogen	mg/L	@@	20-50	-	1.16	1.35	1.86	2.87	1.57	1.19	0.55	0.67	1.22	1.18	1.44	0.75	1.20	1.36	1.12	1.12	0.55 - 2.87	1.29	1.20
Unionized ammonia-nitrogen	mg/L	@@@	-	0.021	0.023	0.007	0.042	0.008	0.020	0.017	0.030	0.027	0.011	0.018	0.007	0.039	0.030	0.017	0.014	0.017	0.007 - 0.042	0.020	0.017

Remark: Values at or below laboratory reporting limits are calculated as laboratory report limits.

Bold numbers indicate exceedance of the relevant water quality criteria/ standard.

Data presented are annual arithmetic means except for E. coli and Faecal Coliforms which are annual geometric means.

* denotes that the measured concentration is below the laboratory's reporting limit

** Waste discharges shall not cause the toxins in water to attain such levels as to produce significant toxic carcinogenic, mutagenic or teratogenic effects in humans, fish or any other aquatic organisms, with due regard to biologically cumulative effects in food chain and to toxicant interactions with each other. Waste discharges shall not cause a risk to any beneficial uses of the aquatic environment

*** Reporting limit for COD was adjusted by the laboratory due to high chloride content which requires dilution of sample.

According to the water quality standard stated in Section 5.2.2 of the EIA report.

Water samplings and testings were conducted by a HOKLAS accredited laboratory, ALS Technichem (HK) Pty Ltd. Testing parameters that were identified to be in poor condition during the water sampling in September 2012 and October 2012 as well as the key WQO parameters stated in Section 5.2.2 of the EIA report, have been selected for laboratory testing during the subsequent sampling in December 2012 and January 2013.

@ Parameter not tested.

@@ Calculated by summation of the concentration of Nitrate as N and Nitrite as N

@@@ The concentration of unionized ammonia (UIA) are calculated from analysed NH3-N from water samples taken and in-situ measurement of temperature, pH and salinity. References are shown as below:

- Bower C.E. and Bidwell J.P. (1978), Ionization of ammonia in seawater: Effect of temperature, pH and salinity. J. Fish. Res. Board Can. Vol.35, pp.1012-1016;

- K., Russo R.C. & et. al. (1975), Aqueous ammonia equilibrium calculations: effect of pH and temperature. J. Fish. Res. Board Can. Vol.32, pp.2379-2383;

- K.H. Khoo, C.H. Culbertson, and R.G. Bates, Thermodynamics of the dissociation of ammonium ion in seawater from 5 to 40°C, Journal of Solution Chemistry, 6:281-290, 1977.

Appendix 5-1B - Baseline Water Quality Sampling Results for Dry Season

Raw Data of Sampling Location W4

Parameters	Unit	Reporting Limit	Effluent Discharge Std (Gp D) #	WQO Criteria#	28 Dec 2012 09:20	03 Jan 2013 09:27	10 Jan 2013 08:22	17 Jan 2013 08:27	25 Mar 2015 12:04	27 Mar 2015 10:26	30 Mar 2015 10:17	01 Apr 2015 09:54	08 Apr 2015 10:25	10 Apr 2015 10:03	13 Apr 2015 10:02	15 Apr 2015 09:50	17 Apr 2015 09:50	20 Apr 2015 09:53	22 Apr 2015 09:50	24 Apr 2015 09:48	Range	Average	Median
Salinity	g/L	0.1	-	-	11.4	0.8	10.3	0.9	7.7	4.5	4.4	7.1	7.7	3.1	0.8	3.5	5.8	8.8	6.4	4.8	0.8 - 11.4	5.5	5.3
Water Flow	L/s	1.0	-	-	70.0	20.0	120.0	5.1	200.0	280.0	320.0	180.0	220.0	210.0	340.0	380.0	340.0	290.0	190.0	200.0	5.1 - 380.0	210.3	205.0
Water Depth	m	0.1	-	-	0.6	0.3	0.9	0.3	2.0	1.4	1.6	1.8	2.2	2.1	1.7	1.9	1.7	2.9	1.9	2.0	0.3 - 2.9	1.6	1.8
Temperature	°C	0.1	30	-	17.7	17.2	15.4	16.2	17.7	20.3	23.5	24.8	23.5	19.0	20.8	22.4	24.3	26.4	24.3	23.8	15.4 - 26.4	21.1	21.6
pH Value	-	0.1	6-10	between 6 & 9	7.2	7.1	7.6	7.2	7.4	7.1	7.3	7.3	7.2	7.2	7.3	7.4	7.4	7.3	7.4	7.2	7.1 - 7.6	7.3	7.3
Dissolved Oxygen	mg/L	0.1	-	4 (Min.)	1.2	4.3	6.3	4.5	4.4	3.7	0.8	2.3	2.5	1.0	1.6	0.4	0.9	0.3	2.1	2.5	0.3 - 6.3	2.4	2.2
Dissolved Oxygen (% Saturation)	%	1.0	-	-	13.3	44.8	67.2	46.5	51.4	47.4	9.1	29.4	30.6	10.4	18.4	4.8	10.9	4.2	24.9	29.4	4.2 - 67.2	27.7	27.2
Turbidity	NTU	1	-	-	72	1050	73	1280	28	30	23	16	44	30	47	18	37	48	34	47	16 - 1280	180	41
Biochemical Oxygen Demand	mg/L	2	20	5 (Max.)	5	13	11	20	3	12	11	9	4	6	4	8	8	4	6	4	3 - 20	8	7
Chemical Oxygen Demand	mg/L	5	80	30 (Max.)	35	87	51	145	83	23	32	<50 ***	<50 ***	24	23	26	26	<50 ***	<50 ***	29	23 - 145	49	43
Total Phosphorus	mg/L	0.1	5-10	-	@	@	@	@	0.8	1.0	1.4	1.0	0.6	1.0	1.2	1.1	0.8	0.6	0.9	1.0	0.6 - 1.4	1.0	1.0
Reactive Phosphorus	mg/L	0.01	-	-	@	@	@	@	0.69	0.68	0.90	0.68	0.46	0.80	0.78	0.70	0.50	0.38	0.72	0.70	0.38 - 0.90	0.67	0.70
Oil and grease	mg/L	5	10	-	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 * - <5 *	<5 *	<5 *
Electrical Conductivity @ 25°C	µS/ cm	1	-	-	@	@	@	@	14200	8100	8060	12900	13000	5600	1500	6960	10300	14700	10900	8580	1500 - 14700	9567	9440
Suspended Solids (SS)	mg/L	2	30	20 (Median)	83	793	93	@	29	35	26	19	43	32	41	19	24	49	32	44	19 - 793	91	35
Total Kjeldahl Nitrogen as N	mg/L	0.1	-	-	10.9	6.6	9.2	8.5	7.4	7.1	9.1	7.9	7.2	7.1	6.0	8.0	7.1	6.8	8.3	8.6	6.0 - 10.9	7.9	7.7
Ammonia as N	mg/L	0.01	10-20	-	7.80	2.90	6.39	4.01	5.18	5.93	7.39	5.80	4.61	6.69	5.49	6.61	5.32	5.40	4.92	5.92	2.90 - 7.80	5.65	5.65
Escherichia coli (E. coli)	cfu / 100 mL	1	1000	1000 (Median)	44000	97000	34000	41000	8600	14000	160000	61000	17000	58000	7900	31000	14000	19000	15000	230000	7900 - 230000	32500	32500
Faecal Coliforms	cfu / 100 mL	1	-	-	@	@	@	@	9200	17000	160000	71000	24000	66000	8700	33000	54000	22000	15000	230000	8700 - 230000	34941	28500
Aluminium	mg/L	0.01	-	-	@	@	@	@	0.39	0.12	0.19	0.12	0.54	0.81	0.80	0.40	0.25	1.34	0.64	0.77	0.12 - 1.34	0.53	0.47
Copper	mg/L	0.001	-	-	@	@	@	@	0.005	0.003	0.004	0.004	0.008	0.006	0.007	0.003	0.003	0.004	0.003	0.004	0.003 - 0.008	0.005	0.004
Chromium	mg/L	0.01	-	**	@	@	@	@	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 * - <0.01 *	<0.01 *	<0.01 *
Lead	mg/L	0.001	-	-	@	@	@	@	0.001	<0.001 *	0.002	<0.001 *	0.004	0.003	0.004	0.002	<0.001 *	0.004	0.002	0.003	<0.001 * - 0.004	0.002	0.002
Zinc	mg/L	0.01	-	-	@	@	@	@	0.09	0.03	0.07	0.08	0.65	0.08	0.07	0.08	0.11	0.20	0.05	0.07	0.03 - 0.65	0.13	0.08
Cadmium	mg/L	0.0002	0.001-0.1	-	@	@	@	@	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 * - <0.0002 *	<0.0002 *	<0.0002 *
Sulphide as S ²⁻	mg/L	0.1	1	-	@	@	@	@	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 * - <0.1 *	<0.1 *	<0.1 *
Nitrate as N	mg/L	0.01	-	-	0.80	1.03	1.50	2.73	1.42	0.89	0.38	0.88	0.99	1.02	0.91	0.78	1.16	1.01	0.83	0.87	0.38 - 2.73	1.08	0.95
Nitrite as N	mg/L	0.01	-	-	0.39	0.10	0.47	0.16	0.36	0.26	0.34	0.31	0.30	0.22	0.22	0.39	0.31	0.34	0.32	0.27	0.10 - 0.47	0.30	0.31
Nitrate + nitrite nitrogen	mg/L	@@	20-50	-	1.19	1.13	1.97	2.89	1.78	1.15	0.72	1.19	1.29	1.24	1.13	1.17	1.47	1.35	1.15	1.14	0.72 - 2.89	1.37	1.19
Unionized ammonia-nitrogen	mg/L	@@@	-	0.021	0.018	0.005	0.039	0.009	0.020	0.011	0.022	0.017	0.011	0.016	0.016	0.025	0.020	0.016	0.019	0.014	0.005 - 0.039	0.017	0.017

Remark: Values at or below laboratory reporting limits are calculated as laboratory report limits.

Bold numbers indicate exceedance of the relevant water quality criteria/ standard.

Data presented are annual arithmetic means except for E. coli and Faecal Coliforms which are annual geometric means.

* denotes that the measured concentration is below the laboratory's reporting limit

** Waste discharges shall not cause the toxins in water to attain such levels as to produce significant toxic carcinogenic, mutagenic or teratogenic effects in humans, fish or any other aquatic organisms, with due regard to biologically cumulative effects in food chain and to toxicant interactions with each other. Waste discharges shall not cause a risk to any beneficial uses of the aquatic environment

*** Reporting limit for COD was adjusted by the laboratory due to high chloride content which requires dilution of sample.

According to the water quality standard stated in Section 5.2.2 of the EIA report.

Water samplings and testings were conducted by a HOKLAS accredited laboratory, ALS Technichem (HK) Pty Ltd. Testing parameters that were identified to be in poor condition during the water sampling in September 2012 and October 2012 as well as the key WQO parameters stated in Section 5.2.2 of the EIA report, have been selected for laboratory testing during the subsequent sampling in December 2012 and January 2013.

@ Parameter not tested.

@@ Calculated by summation of the concentration of Nitrate as N and Nitrite as N

@@@ The concentration of unionized ammonia (UIA) are calculated from analysed NH3-N from water samples taken and in-situ measurement of temperature, pH and salinity. References are shown as below:

- Bower C.E. and Bidwell J.P. (1978), Ionization of ammonia in seawater: Effect of temperature, pH and salinity. J. Fish. Res. Board Can. Vol.35, pp.1012-1016;

- K., Russo R.C. & et. al. (1975), Aqueous ammonia equilibrium calculations: effect of pH and temperature. J. Fish. Res. Board Can. Vol.32, pp.2379-2383;

- K.H. Khoo, C.H. Culbertson, and R.G. Bates, Thermodynamics of the dissociation of ammonium ion in seawater from 5 to 40°C, Journal of Solution Chemistry, 6:281-290, 1977.

Appendix 5-1B - Baseline Water Quality Sampling Results for Dry Season

Raw Data of Sampling Location WK1

Parameters	Unit	Reporting Limit	Effluent Discharge Std (Gp D) #	WQO Criteria#	28 Dec 2012 10:07	03 Jan 2013 10:11	10 Jan 2013 10:55	17 Jan 2013 10:29	25 Mar 2015 13:01	27 Mar 2015 11:04	30 Mar 2015 11:17	01 Apr 2015 10:44	08 Apr 2015 11:08	10 Apr 2015 10:56	13 Apr 2015 10:59	15 Apr 2015 10:48	17 Apr 2015 10:50	20 Apr 2015 10:50	22 Apr 2015 10:48	24 Apr 2015 10:46	Range	Average	Median
Salinity	g/L	0.1	-	-	1.1	0.3	0.4	0.3	4.5	1.6	10.6	2.6	3.5	0.9	0.2	1.2	2.8	4.3	2.8	2.1	0.2 - 10.6	2.5	1.9
Water Flow	L/s	1.0	-	-	<1.0 *	1.1	1.5	1.5	41.0	44.0	44.0	23.0	43.0	42.0	40.0	30.0	23.0	23.0	23.0	23.0	<1.0 * - 44.0	25.3	23.0
Water Depth	m	0.1	-	-	0.4	0.1	0.1	0.1	0.2	0.2	0.2	0.5	0.2	0.2	0.1	0.4	0.5	0.5	0.5	0.5	0.1 - 0.5	0.3	0.2
Temperature	°C	0.1	30	-	19.2	18.2	16.0	16.7	19.2	21.3	22.7	24.7	22.6	20.3	21.6	22.4	23.8	25.9	24.4	24.5	16.0 - 25.9	21.5	22.0
pH Value	-	0.1	6-10	between 6 & 9	7.3	7.4	7.7	7.4	7.1	7.2	7.2	7.4	7.4	7.1	7.3	7.5	7.4	7.4	7.4	7.3	7.1 - 7.7	7.3	7.4
Dissolved Oxygen	mg/L	0.1	-	4 (Min.)	3.7	5.4	6.6	6.0	1.4	3.6	1.8	3.6	2.8	2.2	3.7	1.0	0.6	0.6	1.9	2.0	0.6 - 6.6	2.9	2.5
Dissolved Oxygen (% Saturation)	%	1.0	-	-	40.7	57.9	66.5	62.3	16.6	24.1	20.5	43.5	32.9	24.8	41.8	11.4	6.7	7.2	23.0	26.4	6.7 - 66.5	31.6	25.6
Turbidity	NTU	1	-	-	82	30	24	48	28	56	20	26	21	51	25	33	28	24	22	36	20 - 82	35	28
Biochemical Oxygen Demand	mg/L	2	20	5 (Max.)	6	25	38	14	13	13	12	15	12	12	11	12	12	13	16	13	6 - 38	15	13
Chemical Oxygen Demand	mg/L	5	80	30 (Max.)	40	40	68	41	44	37	43	48	38	38	29	36	33	<50 ***	40	33	29 - 68	41	40
Total Phosphorus	mg/L	0.1	5-10	-	@	@	@	@	1.1	0.9	1.3	1.5	1.2	0.9	0.6	1.2	1.1	1.0	1.2	1.1	0.6 - 1.5	1.1	1.1
Reactive Phosphorus	mg/L	0.01	-	-	@	@	@	@	0.74	0.54	0.81	0.96	0.90	0.63	0.37	0.75	0.70	0.68	0.90	0.66	0.37 - 0.96	0.72	0.72
Oil and grease	mg/L	5	10	-	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 * - <5 *	<5 *	<5 *
Electrical Conductivity @ 25°C	µS/cm	1	-	-	@	@	@	@	8510	3000	2060	4890	6490	1660	364	2380	50100	7700	4950	4020	364 - 50100	8010	4455
Suspended Solids (SS)	mg/L	2	30	20 (Median)	76	28	20	40	38	11	29	26	32	47	28	37	26	28	25	27	11 - 76	32	28
Total Kjeldahl Nitrogen as N	mg/L	0.1	-	-	7.5	8.0	15.2	7.4	10.4	8.0	9.4	11.9	10.6	7.5	4.0	10.1	10.2	11.1	9.6	9.2	4.0 - 15.2	9.4	9.5
Ammonia as N	mg/L	0.01	10-20	-	5.10	5.70	13.6	5.00	5.60	6.27	6.84	9.43	8.09	6.50	3.21	7.69	8.22	8.55	4.35	6.75	3.21 - 13.60	6.93	6.63
Escherichia coli (E. coli)	cfu / 100 mL	1	1000	1000 (Median)	240000	88000	1800000	34000	750000	1100	920000	200000	180000	420000	260000	420000	120000	770000	780000	210000	1100 - 1800000	217190	250000
Faecal Coliforms	cfu / 100 mL	1	-	-	@	@	@	@	790000	1500	940000	350000	270000	810000	280000	470000	170000	810000	800000	220000	1500 - 940000	283708	410000
Aluminium	mg/L	0.01	-	-	@	@	@	@	0.20	0.11	0.15	0.28	0.28	0.35	0.42	0.25	0.13	0.18	0.14	0.21	0.11 - 0.42	0.22	0.21
Copper	mg/L	0.001	-	-	@	@	@	@	0.004	0.002	0.002	0.004	0.004	0.004	0.005	0.003	0.002	0.002	0.002	0.001	0.001 - 0.005	0.003	0.003
Chromium	mg/L	0.01	-	**	@	@	@	@	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 * - <0.01 *	<0.01 *	<0.01 *
Lead	mg/L	0.001	-	-	@	@	@	@	0.001	<0.001 *	<0.001 *	0.002	0.002	0.002	0.003	0.001	<0.001 *	<0.001 *	<0.001 *	0.001	<0.001 * - 0.003	0.001	0.001
Zinc	mg/L	0.01	-	-	@	@	@	@	0.06	0.02	0.02	0.04	0.04	0.04	0.03	0.02	0.04	0.08	0.02	0.02	0.02 - 0.08	0.04	0.04
Cadmium	mg/L	0.0002	0.001-0.1	-	@	@	@	@	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 * - <0.0002 *	<0.0002 *	<0.0002 *
Sulphide as S ²⁻	mg/L	0.1	1	-	@	@	@	@	0.2	0.3	0.2	0.3	0.2	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 * - 0.3	0.2	0.1
Nitrate as N	mg/L	0.01	-	-	0.59	0.99	0.89	2.39	0.24	0.65	0.05	0.17	0.45	0.62	1.10	0.51	0.61	0.58	0.71	0.57	0.05 - 2.39	0.70	0.60
Nitrite as N	mg/L	0.01	-	-	0.20	0.10	0.10	0.13	0.57	0.16	0.29	0.22	0.18	0.18	0.18	0.16	0.25	0.31	0.22	0.18	0.10 - 0.57	0.21	0.18
Nitrate + nitrite nitrogen	mg/L	@@	20-50	-	0.79	1.09	0.99	2.52	0.81	0.81	0.34	0.39	0.63	0.80	1.28	0.67	0.86	0.89	0.93	0.75	0.34 - 2.52	0.91	0.81
Unionized ammonia-nitrogen	mg/L	@@@	-	0.021	0.015	0.022	0.105	0.019	0.010	0.015	0.016	0.036	0.031	0.012	0.010	0.037	0.031	0.032	0.016	0.020	0.010 - 0.105	0.027	0.020

Remark: Values at or below laboratory reporting limits are calculated as laboratory report limits.

Bold numbers indicate exceedance of the relevant water quality criteria/ standard.

Data presented are annual arithmetic means except for E. coli and Faecal Coliforms which are annual geometric means.

* denotes that the measured concentration is below the laboratory's reporting limit

** Waste discharges shall not cause the toxins in water to attain such levels as to produce significant toxic carcinogenic, mutagenic or teratogenic effects in humans, fish or any other aquatic organisms, with due regard to biologically cumulative effects in food chain and to toxicant interactions with each other. Waste discharges shall not cause a risk to any beneficial uses of the aquatic environment

*** Reporting limit for COD was adjusted by the laboratory due to high chloride content which requires dilution of sample.

According to the water quality standard stated in Section 5.2.2 of the EIA report.

Water samplings and testings were conducted by a HOKLAS accredited laboratory, ALS Technichem (HK) Pty Ltd. Testing parameters that were identified to be in poor condition during the water sampling in September 2012 and October 2012 as well as the key WQO parameters stated in Section 5.2.2 of the EIA report, have been selected for laboratory testing during the subsequent sampling in December 2012 and January 2013.

@ Parameter not tested.

@@ Calculated by summation of the concentration of Nitrate as N and Nitrite as N

@@@ The concentration of unionized ammonia (UIA) are calculated from analysed NH3-N from water samples taken and in-situ measurement of temperature, pH and salinity. References are shown as below:

- Bower C.E. and Bidwell J.P. (1978), Ionization of ammonia in seawater: Effect of temperature, pH and salinity. J. Fish. Res. Board Can. Vol.35, pp.1012-1016;

- K., Russo R.C. & et. al. (1975), Aqueous ammonia equilibrium calculations: effect of pH and temperature. J. Fish. Res. Board Can. Vol.32, pp.2379-2383;

- K.H. Khoo, C.H. Culberson, and R.G. Bates, Thermodynamics of the dissociation of ammonium ion in seawater from 5 to 40°C, Journal of Solution Chemistry, 6:281-290, 1977.

Appendix 5-1B - Baseline Water Quality Sampling Results for Dry Season

Raw Data of Sampling Location WK2

Parameters	Unit	Reporting Limit	Effluent Discharge Std (Gp D) #	WQO Criteria#	28 Dec 2012 10:12	03 Jan 2013 10:16	10 Jan 2013 10:22	17 Jan 2013 10:03	25 Mar 2015 13:10	27 Mar 2015 11:12	30 Mar 2015 11:29	01 Apr 2015 10:53	08 Apr 2015 11:18	10 Apr 2015 11:08	13 Apr 2015 11:12	15 Apr 2015 10:59	17 Apr 2015 11:03	20 Apr 2015 11:03	22 Apr 2015 11:01	24 Apr 2015 10:58	Range	Average	Median
Salinity	g/L	0.1	-	-	0.6	0.6	0.5	0.4	0.4	0.4	0.4	0.5	0.4	0.8	0.9	0.7	0.6	0.6	0.5	0.6	0.4 - 0.9	0.6	0.6
Water Flow	L/s	1.0	-	-	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 *	<1.0 * - <1.0 *	<1.0 *	<1.0 *
Water Depth	m	0.1	-	-	0.3	<0.1 *	0.1	<0.1 *	0.1	0.1	0.1	0.5	0.2	0.4	0.6	0.3	0.3	0.3	0.3	0.5	<0.1 * - 0.6	0.3	0.3
Temperature	°C	0.1	30	-	17.4	15.9	13.6	14.8	17.4	21.2	24.8	25.2	20.0	18.5	20.8	22.5	24.7	27.6	25.5	27.2	13.6 - 27.6	21.1	21.0
pH Value	-	0.1	6-10	between 6 & 9	7.5	7.5	7.6	7.5	7.5	7.9	7.6	8.0	7.5	7.6	7.7	7.9	8.1	7.9	8.2	8.3	7.5 - 8.3	7.8	7.7
Dissolved Oxygen	mg/L	0.1	-	4 (Min.)	1.7	3.2	6.9	3.4	1.7	4.1	2.6	2.9	1.2	2.4	4.8	4.0	4.4	5.0	3.2	3.2	1.2 - 6.9	3.4	3.2
Dissolved Oxygen (% Saturation)	%	1.0	-	-	17.4	32.3	66.2	33.4	19.2	23.8	30.9	36.6	13.5	26.2	54.2	45.8	54.9	63.8	39.4	40.3	13.5 - 66.2	37.4	35.0
Turbidity	NTU	1	-	-	11	14	3	5	22	13	15	14	14	19	33	23	17	13	17	32	3 - 33	17	15
Biochemical Oxygen Demand	mg/L	2	20	5 (Max.)	15	9	4	3	11	8	14	8	18	10	7	6	7	7	7	12	3 - 18	9	8
Chemical Oxygen Demand	mg/L	5	80	30 (Max.)	25	52	18	30	73	68	65	41	170	50	40	36	36	38	45	74	18 - 170	54	43
Total Phosphorus	mg/L	0.1	5-10	-	@	@	@	@	3.0	3.6	2.6	3.4	5.2	1.0	0.8	1.5	2.1	2.6	2.2	3.0	0.8 - 5.2	2.6	2.6
Reactive Phosphorus	mg/L	0.01	-	-	@	@	@	@	2.29	2.92	1.79	2.78	3.62	0.52	0.30	0.85	1.52	2.39	1.83	2.36	0.30 - 3.62	1.93	2.06
Oil and grease	mg/L	5	10	-	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 * - <5 *	<5 *	<5 *
Electrical Conductivity @ 25°C	µS/ cm	1	-	-	@	@	@	@	939	882	776	1060	891	807	1710	1450	1240	1100	1040	1020	776 - 1710	1076	1030
Suspended Solids (SS)	mg/L	2	30	20 (Median)	7	18	2	<2 *	31	12	26	10	28	16	40	15	6	8	23	24	<2 * - 40	17	16
Total Kjeldahl Nitrogen as N	mg/L	0.1	-	-	19.3	15.9	17.0	12.6	33.8	38.4	32.6	31.1	26.3	13.6	15.4	20.0	26.6	25.5	27.4	42.1	12.6 - 42.1	24.9	25.9
Ammonia as N	mg/L	0.01	10-20	-	12.00	15.80	16.90	10.50	31.40	35.40	29.70	27.60	19.80	13.60	11.80	19.50	25.10	23.20	23.00	35.00	10.50 - 35.40	21.89	21.40
Escherichia coli (E. coli)	cfu / 100 mL	1	1000	1000 (Median)	3700	3100	9100	220	3200	1600	37000	2900	2400	3600	8100	55000	7300	46000	65000	21000	220 - 65000	6827	5500
Faecal Coliforms	cfu / 100 mL	1	-	-	@	@	@	@	3200	1800	37000	4400	3600	5800	8800	62000	18000	49000	66000	21000	1800 - 66000	12388	13400
Aluminium	mg/L	0.01	-	-	@	@	@	@	0.08	0.26	0.08	0.09	0.12	0.02	0.32	0.08	0.05	0.07	0.14	0.07	0.02 - 0.32	0.11	0.08
Copper	mg/L	0.001	-	-	@	@	@	@	0.004	0.007	0.004	0.003	0.008	0.005	0.005	0.003	0.002	0.002	0.004	0.004	0.002 - 0.008	0.004	0.004
Chromium	mg/L	0.01	-	**	@	@	@	@	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 * - <0.01 *	<0.01 *	<0.01 *
Lead	mg/L	0.001	-	-	@	@	@	@	0.003	0.006	0.002	0.002	0.004	<0.001 *	0.003	0.001	<0.001 *	0.001	0.003	0.004	<0.001 * - 0.006	0.003	0.003
Zinc	mg/L	0.01	-	-	@	@	@	@	0.03	0.07	0.02	0.03	0.12	0.07	0.05	0.02	0.02	0.04	0.03	0.04	0.02 - 0.12	0.04	0.03
Cadmium	mg/L	0.0002	0.001-0.1	-	@	@	@	@	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 * - <0.0002 *	<0.0002 *	<0.0002 *
Sulphide as S ²⁻	mg/L	0.1	1	-	@	@	@	@	0.1	0.2	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 * - 0.2	0.1	0.1
Nitrate as N	mg/L	0.01	-	-	0.45	0.48	1.45	1.08	0.27	0.24	0.28	0.22	<0.01 *	0.27	0.20	0.24	0.25	0.26	0.45	0.34	<0.01 * - 1.45	0.41	0.27
Nitrite as N	mg/L	0.01	-	-	0.19	0.25	0.34	0.27	0.18	0.36	0.28	0.37	0.02	0.16	0.19	0.30	0.42	0.51	0.87	0.46	0.02 - 0.87	0.32	0.29
Nitrate + nitrite nitrogen	mg/L	@@	20-50	-	0.64	0.73	1.79	1.35	0.45	0.60	0.56	0.59	0.03	0.43	0.39	0.54	0.67	0.77	1.32	0.80	0.03 - 1.79	0.73	0.62
Unionized ammonia-nitrogen	mg/L	@@@	-	0.021	0.058	0.076	0.103	0.050	0.150	0.437	0.180	0.431	0.095	0.083	0.091	0.241	0.495	0.286	0.572	1.098	0.050 - 1.098	0.278	0.165

Remark: Values at or below laboratory reporting limits are calculated as laboratory report limits.

Bold numbers indicate exceedance of the relevant water quality criteria/ standard.

Data presented are annual arithmetic means except for E. coli and Faecal Coliforms which are annual geometric means.

* denotes that the measured concentration is below the laboratory's reporting limit

** Waste discharges shall not cause the toxins in water to attain such levels as to produce significant toxic carcinogenic, mutagenic or teratogenic effects in humans, fish or any other aquatic organisms, with due regard to biologically cumulative effects in food chain and to toxicant interactions with each other. Waste discharges shall not cause a risk to any beneficial uses of the aquatic environment

*** Reporting limit for COD was adjusted by the laboratory due to high chloride content which requires dilution of sample.

According to the water quality standard stated in Section 5.2.2 of the EIA report.

Water samplings and testings were conducted by a HOKLAS accredited laboratory, ALS Technichem (HK) Pty Ltd. Testing parameters that were identified to be in poor condition during the water sampling in September 2012 and October 2012 as well as the key WQO parameters stated in Section 5.2.2 of the EIA report, have been selected for laboratory testing during the subsequent sampling in December 2012 and January 2013.

@ Parameter not tested.

@@ Calculated by summation of the concentration of Nitrate as N and Nitrite as N

@@@ The concentration of unionized ammonia (UIA) are calculated from analysed NH3-N from water samples taken and in-situ measurement of temperature, pH and salinity. References are shown as below:

- Bower C.E. and Bidwell J.P. (1978), Ionization of ammonia in seawater: Effect of temperature, pH and salinity. J. Fish. Res. Board Can. Vol.35, pp.1012-1016;

- K., Russo R.C. & et. al. (1975), Aqueous ammonia equilibrium calculations: effect of pH and temperature. J. Fish. Res. Board Can. Vol.32, pp.2379-2383;

- K.H. Khoo, C.H. Culbertson, and R.G. Bates, Thermodynamics of the dissociation of ammonium ion in seawater from 5 to 40°C, Journal of Solution Chemistry, 6:281-290, 1977.

Appendix 5-1B - Baseline Water Quality Sampling Results for Dry Season

Raw Data of Sampling Location WK3

Parameters	Unit	Reporting Limit	Effluent Discharge Std (Gp D) #	WQO Criteria#	28 Dec	03 Jan	10 Jan	17 Jan	25 Mar	27 Mar	30 Mar	01 Apr	08 Apr	10 Apr	13 Apr	15 Apr	17 Apr	20 Apr	22 Apr	24 Apr	Range	Average	Median
					2012 10:02	2013 10:05	2013 09:48	2013 09:45	2015 12:05	2015 10:58	2015 11:09	2015 10:34	2015 11:00	2015 10:47	2015 10:47	2015 10:36	2015 10:40	2015 10:39	2015 10:39	2015 10:35			
Salinity	g/L	0.1	-	-	0.9	0.3	0.4	0.3	3.5	1.6	1.0	2.6	3.5	0.7	0.2	1.2	2.8	4.2	2.6	1.9	0.2 - 4.2	1.7	1.4
Water Flow	L/s	1.0	-	-	5.0	5.2	5.0	3.6	41.0	47.0	44.0	23.0	43.0	40.0	40.0	30.0	23.0	23.0	23.0	23.0	3.6 - 47.0	26.2	23.0
Water Depth	m	0.1	-	-	0.4	0.1	0.1	0.1	0.2	0.2	0.2	0.5	0.2	0.2	0.1	0.4	0.5	0.5	0.5	0.5	0.1 - 0.5	0.3	0.2
Temperature	°C	0.1	30	-	19.2	18.2	16.0	16.7	19.2	21.2	22.7	24.7	22.2	20.0	21.1	21.8	23.7	25.9	24.0	24.5	16.0 - 25.9	21.3	21.5
pH Value	-	0.1	6-10	between 6 & 9	7.3	7.3	7.8	7.4	7.3	7.1	7.2	7.4	7.4	7.5	7.2	7.4	7.5	7.4	7.4	7.4	7.1 - 7.8	7.4	7.4
Dissolved Oxygen	mg/L	0.1	-	4 (Min.)	3.8	5.6	5.6	6.0	1.8	2.0	3.4	2.8	3.1	3.0	3.5	0.4	2.0	0.5	1.8	1.9	0.4 - 6.0	3.0	2.9
Dissolved Oxygen (% Saturation)	%	1.0	-	-	41.0	59.2	56.7	62.3	20.4	23.7	39.5	33.6	36.4	32.6	39.6	5.0	24.9	6.3	22.2	25.4	5.0 - 62.3	33.1	33.1
Turbidity	NTU	1	-	-	71	37	27	51	26	46	22	21	22	43	25	43	19	26	24	67	19 - 71	36	27
Biochemical Oxygen Demand	mg/L	2	20	5 (Max.)	4	28	41	14	11	15	16	16	12	10	10	13	13	12	16	10	4 - 41	15	13
Chemical Oxygen Demand	mg/L	5	80	30 (Max.)	40	43	67	39	42	42	53	53	39	35	27	50	39	<50 ***	43	35	27 - 67	44	42
Total Phosphorus	mg/L	0.1	5-10	-	@	@	@	@	1.1	0.8	1.3	1.5	1.2	0.9	0.7	1.4	1.1	1.0	1.2	1.0	0.7 - 1.5	1.1	1.1
Reactive Phosphorus	mg/L	0.01	-	-	@	@	@	@	0.75	0.52	0.74	0.92	0.92	0.56	0.38	0.60	0.69	0.66	0.87	0.65	0.38 - 0.92	0.69	0.68
Oil and grease	mg/L	5	10	-	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 * - <5 *	<5 *	<5 *
Electrical Conductivity @ 25°C	µS/ cm	1	-	-	@	@	@	@	8100	3060	2080	4900	6420	1380	379	2540	5080	7330	4930	3660	379 - 8100	4155	4280
Suspended Solids (SS)	mg/L	2	30	20 (Median)	72	32	22	38	28	18	29	30	26	46	27	106	27	34	26	25	18 - 106	37	29
Total Kjeldahl Nitrogen as N	mg/L	0.1	-	-	6.6	7.2	14.9	7.0	9.4	7.1	11.0	12.1	11.2	6.6	3.9	10.0	10.2	11.3	11.2	9.6	3.9 - 14.9	9.3	9.8
Ammonia as N	mg/L	0.01	10-20	-	4.50	5.50	11.1	5.20	6.97	6.56	6.90	9.33	7.26	5.35	3.27	7.98	8.45	8.69	6.12	6.23	3.27 - 11.10	6.84	6.73
Escherichia coli (E. coli)	cfu / 100 mL	1	1000	1000 (Median)	82000	91000	2000000	150000	810000	210000	350000	440000	140000	280000	120000	360000	230000	850000	720000	310000	82000 - 2000000	300124	295000
Faecal Coliforms	cfu / 100 mL	1	-	-	@	@	@	@	820000	240000	350000	820000	220000	420000	140000	410000	240000	850000	720000	310000	140000 - 850000	393159	380000
Aluminium	mg/L	0.01	-	-	@	@	@	@	0.17	0.25	0.14	0.11	0.42	0.81	0.23	1.94	0.21	0.27	0.23	0.82	0.11 - 1.94	0.47	0.24
Copper	mg/L	0.001	-	-	@	@	@	@	0.003	0.003	0.003	0.003	0.006	0.006	0.004	0.014	0.002	0.002	0.003	0.010	0.002 - 0.014	0.005	0.003
Chromium	mg/L	0.01	-	**	@	@	@	@	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 * - <0.01 *	<0.01 *	<0.01 *
Lead	mg/L	0.001	-	-	@	@	@	@	<0.001 *	0.001	<0.001 *	<0.001 *	0.003	0.003	0.002	0.010	<0.001 *	0.001	0.002	0.005	<0.001 * - 0.010	0.003	0.002
Zinc	mg/L	0.01	-	-	@	@	@	@	0.04	0.02	0.02	0.03	0.06	0.06	0.02	0.12	0.04	0.08	0.03	0.12	0.02 - 0.12	0.05	0.04
Cadmium	mg/L	0.0002	0.001-0.1	-	@	@	@	@	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 * - <0.0002 *	<0.0002 *	<0.0002 *
Sulphide as S ²⁻	mg/L	0.1	1	-	@	@	@	@	0.2	0.3	0.3	0.3	0.4	<0.1 *	<0.1 *	0.3	<0.1 *	0.2	0.1	<0.1 *	<0.1 * - 0.4	0.2	0.2
Nitrate as N	mg/L	0.01	-	-	0.81	0.95	0.93	2.36	0.72	0.67	0.03	0.07	0.43	0.85	1.14	0.48	0.59	0.52	0.72	0.59	0.03 - 2.36	0.74	0.70
Nitrite as N	mg/L	0.01	-	-	0.10	0.10	0.10	0.13	0.27	0.16	0.32	0.25	0.18	0.17	0.18	0.15	0.26	0.32	0.22	0.17	0.10 - 0.32	0.19	0.18
Nitrate + nitrite nitrogen	mg/L	@@	20-50	-	0.91	1.05	1.03	2.49	0.99	0.83	0.35	0.32	0.61	1.02	1.32	0.63	0.85	0.84	0.94	0.76	0.32 - 2.49	0.93	0.88
Unionized ammonia-nitrogen	mg/L	@@@	-	0.021	0.013	0.016	0.108	0.020	0.021	0.012	0.016	0.035	0.027	0.026	0.008	0.030	0.041	0.033	0.023	0.024	0.008 - 0.108	0.028	0.023

Remark: Values at or below laboratory reporting limits are calculated as laboratory report limits.

Bold numbers indicate exceedance of the relevant water quality criteria/ standard.

Data presented are annual arithmetic means except for E. coli and Faecal Coliforms which are annual geometric means.

* denotes that the measured concentration is below the laboratory's reporting limit

** Waste discharges shall not cause the toxins in water to attain such levels as to produce significant toxic carcinogenic, mutagenic or teratogenic effects in humans, fish or any other aquatic organisms, with due regard to biologically cumulative effects in food chain and to toxicant interactions with each other. Waste discharges shall not cause a risk to any beneficial uses of the aquatic environment

*** Reporting limit for COD was adjusted by the laboratory due to high chloride content which requires dilution of sample.

According to the water quality standard stated in Section 5.2.2 of the EIA report.

Water samplings and testings were conducted by a HOKLAS accredited laboratory, ALS Technichem (HK) Pty Ltd. Testing parameters that were identified to be in poor condition during the water sampling in September 2012 and October 2012 as well as the key WQO parameters stated in Section 5.2.2 of the EIA report, have been selected for laboratory testing during the subsequent sampling in December 2012 and January 2013.

@ Parameter not tested.

@@ Calculated by summation of the concentration of Nitrate as N and Nitrite as N

@@@ The concentration of unionized ammonia (UIA) are calculated from analysed NH3-N from water samples taken and in-situ measurement of temperature, pH and salinity. References are shown as below:

- Bower C.E. and Bidwell J.P. (1978), Ionization of ammonia in seawater: Effect of temperature, pH and salinity. J. Fish. Res. Board Can. Vol.35, pp.1012-1016;

- K., Russo R.C. & et. al. (1975), Aqueous ammonia equilibrium calculations: effect of pH and temperature. J. Fish. Res. Board Can. Vol.32, pp.2379-2383;

- K.H. Khoo, C.H. Culbertson, and R.G. Bates, Thermodynamics of the dissociation of ammonium ion in seawater from 5 to 40°C, Journal of Solution Chemistry, 6:281-290, 1977.

Appendix 5-1B - Baseline Water Quality Sampling Results for Dry Season

Raw Data of Sampling Location WK4

Parameters	Unit	Reporting Limit	Effluent Discharge Std (Gp D) #	WQO Criteria#	28 Dec 2012 09:39	03 Jan 2013 09:46	10 Jan 2013 10:50	17 Jan 2013 10:24	25 Mar 2015 12:29	27 Mar 2015 10:34	30 Mar 2015 10:32	01 Apr 2015 10:06	08 Apr 2015 10:32	10 Apr 2015 10:14	13 Apr 2015 10:14	15 Apr 2015 10:03	17 Apr 2015 09:59	20 Apr 2015 10:06	22 Apr 2015 10:03	24 Apr 2015 09:59	Range	Average	Median	
Salinity	g/L	0.1	-	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1 - 0.2	0.2	0.2
Water Flow	L/s	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Water Depth	m	0.1	-	-	0.3	0.3	0.3	0.3	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.3 - 0.5	0.4	0.4
Temperature	°C	0.1	30	-	17.8	16.2	15.3	16.7	17.8	21.5	24.4	25.8	25.5	21.9	22.8	23.7	25.4	27.4	25.0	25.7	15.3 - 27.4	22.1	23.3	
pH Value	-	0.1	6-10	between 6 & 9	7.9	8.3	8.4	8.8	7.8	7.8	7.9	8.7	8.1	7.7	8.1	8.4	8.6	8.6	8.4	8.1	7.7 - 8.8	8.2	8.2	
Dissolved Oxygen	mg/L	0.1	-	4 (Min.)	7.0	9.5	8.6	9.2	6.7	6.7	9.0	7.6	6.4	4.8	8.5	5.4	6.8	7.6	3.4	3.5	3.4 - 9.5	6.9	6.9	
Dissolved Oxygen (% Saturation)	%	1.0	-	-	74.0	96.6	86.0	94.4	76.9	73.2	108.0	93.5	78.8	54.7	98.3	65.0	83.0	96.7	44.3	47.8	44.3 - 108.0	79.5	80.9	
Turbidity	NTU	1	-	-	46	27	28	33	22	19	8	14	13	12	18	22	9	15	17	25	8 - 46	21	19	
Biochemical Oxygen Demand	mg/L	2	20	5 (Max.)	9	5	7	6	5	8	4	7	3	4	3	4	4	4	6	4	3 - 9	5	5	
Chemical Oxygen Demand	mg/L	5	80	30 (Max.)	65	48	55	52	48	52	45	45	42	44	42	39	44	43	52	43	39 - 65	47	45	
Total Phosphorus	mg/L	0.1	5-10	-	@	@	@	@	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	0.6	<0.1 *	<0.1 * - 0.6	0.1	0.1	
Reactive Phosphorus	mg/L	0.01	-	-	@	@	@	@	<0.01 *	<0.01 *	<0.01 *	0.01	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 * - 0.01	0.01	0.01	
Oil and grease	mg/L	5	10	-	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 *	<5 * - <5 *	<5 *	<5 *	
Electrical Conductivity @ 25°C	µS/cm	1	-	-	@	@	@	@	330	339	325	333	330	320	295	304	302	329	314	318	295 - 339	320	323	
Suspended Solids (SS)	mg/L	2	30	20 (Median)	32	27	27	28	12	17	12	13	10	11	10	10	9	13	16	11	9 - 32	16	13	
Total Kjeldahl Nitrogen as N	mg/L	0.1	-	-	2.5	2.2	2.8	2.4	1.8	2.1	1.7	1.6	1.5	1.6	1.6	1.5	1.6	1.7	1.7	1.7	1.5 - 2.8	1.9	1.7	
Ammonia as N	mg/L	0.01	10-20	-	0.04	0.09	0.07	0.21	0.10	0.08	0.03	0.10	0.03	0.03	0.04	0.02	0.07	0.04	0.06	0.04	0.02 - 0.21	0.07	0.05	
Escherichia coli (E. coli)	cfu / 100 mL	1	1000	1000 (Median)	130	3100	3000	100	760	120	470000	1100	2900	5000	4300	10000	360	580	1100	210	100 - 470000	1379	1100	
Faecal Coliforms	cfu / 100 mL	1	-	-	@	@	@	@	850	160	480000	1800	3000	5100	5000	12000	460	630	1100	210	160 - 480000	2097	1450	
Aluminium	mg/L	0.01	-	-	@	@	@	@	0.04	0.06	0.06	0.06	0.08	0.07	0.09	0.07	0.08	0.06	0.07	0.03	0.03 - 0.09	0.06	0.06	
Copper	mg/L	0.001	-	-	@	@	@	@	0.001	0.001	<0.001 *	0.001	0.002	0.001	0.001	<0.001 *	<0.001 *	0.001	0.001	<0.001 *	<0.001 * - 0.002	0.001	0.001	
Chromium	mg/L	0.01	-	**	@	@	@	@	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 * - <0.01 *	<0.01 *	<0.01 *	
Lead	mg/L	0.001	-	-	@	@	@	@	0.001	0.001	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.002	0.002	<0.001 *	<0.001 * - 0.002	0.001	0.001	
Zinc	mg/L	0.01	-	-	@	@	@	@	<0.01 *	0.38	0.03	0.03	0.02	0.03	0.02	<0.01 *	0.01	0.01	0.02	0.02	<0.01 * - 0.38	0.05	0.02	
Cadmium	mg/L	0.0002	0.001-0.1	-	@	@	@	@	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 * - <0.0002 *	<0.0002 *	<0.0002 *	
Sulphide as S ²⁻	mg/L	0.1	1	-	@	@	@	@	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 * - <0.1 *	<0.1 *	<0.1 *	
Nitrate as N	mg/L	0.01	-	-	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	0.02	0.01	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 * - 0.02	0.01	0.01	
Nitrite as N	mg/L	0.01	-	-	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 * - <0.01 *	<0.01 *	<0.01 *	
Nitrate + nitrite nitrogen	mg/L	@@	20-50	-	< 0.02 *	< 0.02 *	< 0.02 *	< 0.02 *	< 0.02 *	9.83	9.81	< 0.02 *	< 0.02 *	< 0.02 *	< 0.02 *	< 0.02 *	< 0.02 *	< 0.02 *	< 0.02 *	< 0.02 *	<0.02 * - 9.83	1.25	0.02	
Unionized ammonia-nitrogen	mg/L	@@@	-	0.021	0.000	0.003	0.003	0.020	0.001	0.001	0.000	0.008	0.001	0.000	0.001	0.001	0.004	0.002	0.002	0.001	0.000 - 0.020	0.003	0.001	

Remark: Values at or below laboratory reporting limits are calculated as laboratory report limits.
 Bold numbers indicate exceedance of the relevant water quality criteria/ standard.
 Data presented are annual arithmetic means except for E. coli and Faecal Coliforms which are annual geometric means.
 * denotes that the measured concentration is below the laboratory's reporting limit
 ** Waste discharges shall not cause the toxins in water to attain such levels as to produce significant toxic carcinogenic, mutagenic or teratogenic effects in humans, fish or any other aquatic organisms, with due regard to biologically cumulative effects in food chain and to toxicant interactions with each other. Waste discharges shall not cause a risk to any beneficial uses of the aquatic environment
 *** Reporting limit for COD was adjusted by the laboratory due to high chloride content which requires dilution of sample.
 # According to the water quality standard stated in Section 5.2.2 of the EIA report.
 ### Water samplings and testings were conducted by a HOKLAS accredited laboratory, ALS Technichem (HK) Pty Ltd. Testing parameters that were identified to be in poor condition during the water sampling in September 2012 and October 2012 as well as the key WQO parameters stated in Section 5.2.2 of the EIA report, have been selected for laboratory testing during the subsequent sampling in December 2012 and January 2013.
 @ Parameter not tested.
 @@ Calculated by summation of the concentration of Nitrate as N and Nitrite as N
 @@@ The concentration of unionized ammonia (UIA) are calculated from analysed NH3-N from water samples taken and in-situ measurement of temperature, pH and salinity. References are shown as below:
 - Bower C.E. and Bidwell J.P. (1978), Ionization of ammonia in seawater: Effect of temperature, pH and salinity. J. Fish. Res. Board Can. Vol.35, pp.1012-1016;
 - K., Russo R.C. & et. al. (1975), Aqueous ammonia equilibrium calculations: effect of pH and temperature. J. Fish. Res. Board Can. Vol.32, pp.2379-2383;
 - K.H. Khoo, C.H. Culbertson, and R.G. Bates, Thermodynamics of the dissociation of ammonium ion in seawater from 5 to 40°C, Journal of Solution Chemistry, 6:281-290, 1977.

Appendix 5-1B - Baseline Water Quality Sampling Results for Dry Season

Raw Data of Sampling Location WK5

Parameters	Unit	Reporting Limit	Effluent Discharge Std (Gp D) #	WQO Criteria#	28 Dec 2012 09:29	03 Jan 2013 09:38	10 Jan 2013 11:02	17 Jan 2013 10:33	25 Mar 2015 12:18	27 Mar 2015 10:12	30 Mar 2015 09:47	01 Apr 2015 09:34	08 Apr 2015 10:06	10 Apr 2015 09:38	13 Apr 2015 09:34	15 Apr 2015 09:30	17 Apr 2015 09:30	20 Apr 2015 09:31	22 Apr 2015 09:31	24 Apr 2015 09:28	Range	Average	Median
Salinity	g/L	0.1	-	-	0.3	0.2	0.2	0.2	0.6	0.2	0.2	0.2	0.5	0.2	0.2	0.2	0.2	1.9	0.2	0.2	0.2 - 1.9	0.4	0.2
Water Flow	L/s	1.0	-	-	<1.0 *	2.7	4.0	<1.0 *	18.0	6.0	9.0	24.0	30.0	24.0	18.0	108.0	60.0	84.0	15.0	75.0	<1.0 * - 108.0	30.0	18.0
Water Depth	m	0.1	-	-	0.5	<0.1 *	<0.1 *	<0.1 *	0.6	0.2	0.3	0.8	1.0	0.4	0.3	0.9	0.5	0.7	0.5	0.5	<0.1 * - 1.0	0.5	0.5
Temperature	°C	0.1	30	-	19.0	17.2	14.3	15.7	19.0	20.9	23.2	23.8	20.3	19.8	21.4	21.4	22.4	25.7	22.7	24.1	14.3 - 25.7	20.7	21.2
pH Value	-	0.1	6-10	between 6 & 9	7.2	7.6	7.9	7.6	7.1	7.1	7.2	7.8	7.4	7.4	7.4	7.2	7.5	7.2	7.8	7.8	7.1 - 7.9	7.5	7.4
Dissolved Oxygen	mg/L	0.1	-	4 (Min.)	5.2	6.6	6.4	6.1	4.3	4.9	6.4	6.8	4.1	4.6	4.5	1.2	1.9	0.4	1.2	1.2	0.4 - 6.8	4.1	4.6
Dissolved Oxygen (% Saturation)	%	1.0	-	-	56.4	68.9	62.6	61.9	47.6	49.7	74.9	80.2	45.3	50.8	51.4	13.0	21.4	4.6	13.9	16.3	4.6 - 80.2	44.9	50.3
Turbidity	NTU	1	-	-	13	22	15	17	25	94	13	20	12	14	13	14	23	33	17	18	12 - 94	23	17
Biochemical Oxygen Demand	mg/L	2	20	5 (Max.)	6	7	16	6	14	60	29	63	14	22	12	24	8	14	28	23	6 - 63	22	15
Chemical Oxygen Demand	mg/L	5	80	30 (Max.)	30	21	27	22	99	202	56	78	39	41	33	39	26	43	61	30	21 - 202	53	39
Total Phosphorus	mg/L	0.1	5-10	-	@	@	@	@	1.5	1.9	1.8	2.0	1.4	1.2	1.7	1.8	1.3	2.4	2.1	1.7	1.2 - 2.4	1.7	1.8
Reactive Phosphorus	mg/L	0.01	-	-	@	@	@	@	1.07	1.06	1.09	1.47	1.37	0.79	1.41	1.16	0.95	1.80	1.68	1.46	0.79 - 1.80	1.28	1.27
Oil and grease	mg/L	5	10	-	<5 *	<5 *	<5 *	<5 *	<5 *	33	8	23	<5 *	<5 *	<5 *	8	<5 *	<5 *	7	6	<5 * - 33	8	5
Electrical Conductivity @ 25°C	µS/ cm	1	-	-	@	@	@	@	6920	452	408	439	766	427	436	404	480	2330	435	442	404 - 6920	1162	441
Suspended Solids (SS)	mg/L	2	30	20 (Median)	16	19	23	17	23	208	34	39	14	22	9	14	22	42	14	14	9 - 208	33	21
Total Kjeldahl Nitrogen as N	mg/L	0.1	-	-	12.0	12.7	16.1	12.6	25.5	27.6	18.3	19.3	16.1	15.0	12.1	14.4	9.1	16.4	23.6	31.9	9.1 - 31.9	17.7	16.1
Ammonia as N	mg/L	0.01	10-20	-	17.50	12.70	16.00	12.50	20.40	22.50	17.30	19.90	12.50	14.70	10.60	13.00	8.68	14.70	15.70	23.90	8.68 - 23.90	15.79	15.20
Escherichia coli (E. coli)	cfu / 100 mL	1	1000	1000 (Median)	71000	51000	45000	3800	140000	680000	410000	100000	270000	440000	420000	48000	20000	570000	1200000	170000	3800 - 1200000	135853	155000
Faecal Coliforms	cfu / 100 mL	1	-	-	@	@	@	@	140000	700000	440000	190000	480000	680000	480000	57000	53000	580000	1200000	170000	53000 - 1200000	296348	460000
Aluminium	mg/L	0.01	-	-	@	@	@	@	0.13	6.47	0.27	0.07	0.11	0.24	0.08	0.09	0.10	0.24	0.06	0.04	0.04 - 6.47	0.66	0.11
Copper	mg/L	0.001	-	-	@	@	@	@	0.005	0.053	0.005	0.004	0.007	0.008	0.006	0.003	0.003	0.003	0.006	0.003	0.003 - 0.053	0.009	0.005
Chromium	mg/L	0.01	-	**	@	@	@	@	<0.01 *	0.02	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 *	<0.01 * - 0.02	0.01	0.01
Lead	mg/L	0.001	-	-	@	@	@	@	0.004	0.035	0.002	<0.001 *	0.002	0.003	0.003	0.001	0.002	<0.001 *	<0.001 *	<0.001 *	<0.001 * - 0.035	0.005	0.002
Zinc	mg/L	0.01	-	-	@	@	@	@	0.03	0.38	0.03	0.02	0.04	0.07	0.04	0.02	0.02	0.04	0.02	0.02	0.02 - 0.38	0.06	0.03
Cadmium	mg/L	0.0002	0.001-0.1	-	@	@	@	@	<0.0002 *	0.0006	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 *	<0.0002 * - 0.0006	0.0002	0.0002
Sulphide as S ²⁻	mg/L	0.1	1	-	@	@	@	@	<0.1 *	0.2	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 *	<0.1 * - 0.2	0.1	0.1
Nitrate as N	mg/L	0.01	-	-	9.40	0.58	0.78	0.66	0.16	0.25	0.09	<0.01 *	0.37	0.10	0.39	0.38	0.32	0.19	0.22	0.31	<0.01 * - 9.40	0.89	0.32
Nitrite as N	mg/L	0.01	-	-	1.36	0.10	0.10	0.11	0.44	0.10	0.05	<0.01 *	0.13	0.15	0.12	0.09	0.08	0.18	0.07	0.07	<0.01 * - 1.36	0.20	0.10
Nitrate + nitrite nitrogen	mg/L	@@	20-50	-	10.76	0.68	0.88	0.77	0.60	0.35	0.14	<0.02 *	0.50	0.25	0.51	0.47	0.40	0.37	0.29	0.38	<0.02 * - 10.76	1.09	0.44
Unionized ammonia-nitrogen	mg/L	@@@	-	0.021	0.041	0.077	0.197	0.076	0.038	0.042	0.041	0.194	0.047	0.056	0.040	0.031	0.042	0.035	0.153	0.233	0.031 - 0.233	0.084	0.044

Remark: Values at or below laboratory reporting limits are calculated as laboratory report limits.
 Bold numbers indicate exceedance of the relevant water quality criteria/ standard.
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 * denotes that the measured concentration is below the laboratory's reporting limit
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 - K.H. Khoo, C.H. Culberson, and R.G. Bates, Thermodynamics of the dissociation of ammonium ion in seawater from 5 to 40°C, Journal of Solution Chemistry, 6:281-290, 1977.