N4 Collooney to Castlebaldwin, *Proposed Road Development*

APPENDIX NO. 14.3

Hydrochemistry Results

PREPARED BY: **Minerex Environmental Limited**

Document Control

Status	Issued For	Signed	Approved
FINAL	*Publication*	*CQ*	*CQ*

Parameter / substance (Minerex Environmental Limited)	Medium analysed (- water - soil - gas)	Units	Reported parameter (periodic table)	SALMONID REGULATIONS: SI no. 293 of 1988		SURFACE WATER REGULATIONS S.I. No. 294 of 1989: Directive 75/440/EEC		European Communities Environmental S.I. No. 9 of 2010: Groundwater threshold values for chemical status tests					DRINKING WATER REGULATIO S.I. No. 278 of			Interim Guideline Values (IGV's) EPA, 2004 * FOR COMPARISON	Date sampled	RESULTS																
				Quality of Salmonid Waters		European Communities (Quality of Surface Water												Outfall 15	Outfall 14	Outfall 13	Outfall 12	Outfall 11	Outfall 10	Outfall 9	Outfall 8	Outfall 6	Outfalls 4 & 5	Outfall 3	Outfall 2	Outfall 1	Drumderry Trib.	Carrow nagark	Outfall 7 & Lake 1	Lake 2	Lake 3
				SI no. 293 of 1988	MAC - EQS Inland surface waters	Guide	MAC	Column 1: Test: Assessment for the presence of saline or other intrusions.	Column 2: Test: Assessment of adverse impacts of chemical pollution from groundwater on associated surface	Column 3: Test: Assessment of whether groundwater intended for human consumption in drinking water protected	Column 4: Test: Assessment of the general quality of groundwater in a ground water body in terms of	Overall threshold Values Range	Parameter No.	Parameter Category	Parametric Value	Guidance value																				
Aluminium - total	water	ug/l	Al										29	C	200	200.00	31/01/2011, 01/02/11,	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	-	-	-
Ammonia (non-ionized)	water	mg/l	NH3	0.020	≤0.078 (mean) or ≤0.17 (95%) (Good status) ≤0.048 or ≤0.109												31/01/2011, 01/02/11, 02/02/11	0	0	0	0.02	0	0	0.03	0	0.03	0	0	0	0	0	-	0.02	0.03	0.02
Ammonia (non-ionized)	water	mg/l	NH3	0.020	≤0.078 (mean) or ≤0.17 (95%) (Good status) ≤0.048 or ≤0.109												1/6/11 2/6/11 3/6/11	0.05	0.04	0.03	0.53	0.17	0.04	0.02	0.04	0.06	0.12	0.07	0.05	0.02	0.01	-	0.15	0.04	0.02
Ammoniacal Nitrogen	water	mg/l	NH4-N	0.77		0.038 (A1) 0.77 (A2) 1.55 (A3)	1.16 (A2) 3.1 (A3)		0.065	0.175	0.175	0.065 - 0.175			0.23		31/01/2011, 01/02/11, 02/02/11	<0.2	<0.2	<0.2	<0.2	<0.2	1.37	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.239	<0.2
Ammoniacal Nitrogen	water	mg/l	NH4-N	0.77		0.038 (A1) 0.77 (A2) 1.55 (A3)	1.16 (A2) 3.1 (A3)		0.065	0.175	0.175	0.065 - 0.175			0.23		1/6/11 2/6/11 3/6/11	<0.2	0.126	0.108	<0.2	<0.2	0.14	<0.2	<0.2	0.157	0.13	0.118	0.132	0.164		-	0.23	0.164	0.0979
Benzene	water	ug/l	C 6H 6		50						0.75	0.75	6	B	1.00	1	31/01/2011, 01/02/11,	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	-	<7	<7	<7
Benzene	water	ug/l	C 6H 6		50						0.75	0.75	6	B	1.00	1	1/6/11 2/6/11 3/6/11	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7		-	<7	<7	<7
Biochemical Oxygen Demand (BOD5)	water	mg/l	O2	5.00	≤1.3 (mean) or ≤2.2 (95%) (High status) ≤1.5 or ≤2.6 (95%) (Good status)	<3 (A1) <5 (A2) <7 (A3)											31/01/2011, 01/02/11, 02/02/11	<1	1.34	1.26	1.4	2.63	1.91	1.05	1.46	1.52	1.04	1.3	1.46	1.64	<1	-	1.56	1.76	1.58
Biochemical Oxygen Demand (BOD5)	water	mg/l	O2	5.00	≤1.3 (mean) or ≤2.2 (95%) (High status) ≤1.5 or ≤2.6 (95%) (Good status)	<3 (A1) <5 (A2) <7 (A3)											1/6/11 2/6/11 3/6/11	<1	1.05	1.15	3.74	3.44	1.38	1.23	1.18	1.19	1.81	1.63	1.29	<1		-	2.03	1.78	1.52
BTEX by GC-MS (Benzene,	water	ug/l															31/01/2011, 01/02/11,	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	-	<10	<10	<10
BTEX by GC-MS (Benzene,	water	ug/l															1/6/11 2/6/11 3/6/11	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		-	<10	<10	<10
Chlorine, Residual	water	mg/l		0.005													31/01/2011, 01/02/11,	0	0	0	0	0	0	0.04	0	0	0	0.06	0	0	0	-	0.06	0.1	0.05
Chlorine, Residual	water	mg/l		0.005													1/6/11 2/6/11 3/6/11	0.04	0.03	0.04	0.03	0.06	0.04	0.06	0.05	0.05	0.04	0.08	0.06	0.05		-	0.03	0.05	0.04
Chlorophyll-A	water	ug/l															31/01/2011, 01/02/11,	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.04	2.51	1.71
Chlorophyll-A	water	ug/l															1/6/11 2/6/11 3/6/11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50.7	5.34	1.17
Clostridium perfringens	water	counts	Bact.										32	C	0.00		31/01/2011, 01/02/11,	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-
Coliforms Faecal	water	counts	No. per 100mls			20 (A1)							1	A	0.00	0.00	31/01/2011, 01/02/11,	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Coliforms Total	water	counts	No. per 100mls			50 (A1)							44	C	0.00	0.00	31/01/2011, 01/02/11,	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Copper - dissolved	water	ug/l	Cu	5 - with water hardness of 10 22 - with water hardness of 50 40 - with water hardness of		20 (A1) 50 (A2) 100 (A3)	50 (A1)				1500.00	1500.00				30.00	31/01/2011, 01/02/11, 02/02/11	<0.85	<0.85	<0.85	1.09	0.895	0.983	<0.85	2	<0.85	<0.85	<0.85	<0.85	<0.85	0.886	-	<0.85	<0.85	<0.85
Copper - dissolved	water	ug/l	Cu	5 - with water hardness of 10 22 - with water hardness of 50 40 - with water hardness of		20 (A1) 50 (A2) 100 (A3)	50 (A1)				1500.00	1500.00				30.00	1/6/11 2/6/11 3/6/11	<0.85	1.18	0.924	20.4	1.06	1.78	<0.85	1.4	1.66	1.1	2.53	1.45	<0.85		-	1.66	1.81	1.16
EPH/ Dissolved or emulsified hydrocarbons	water	ug/l				100 (A3)	50 (A1) 200 (A2) 1000 (A3)									10.00	31/01/2011, 01/02/11, 02/02/11	<46	<46	<46	<46	<46	<46	<46	<46	<46	<46	<46	<46	<46	<46	-	<46	<46	<46
EPH/ Dissolved or emulsified hydrocarbons	water	ug/l				100 (A3)	50 (A1) 200 (A2) 1000 (A3)									10.00	1/6/11 2/6/11 3/6/11	<46	<46	<46	<46	<46	<46	<46	<46	<46	<46	<46	<46	<46		-	<46	<46	<46

DO (Dissolved Oxygen)	water	mg/l	O2	50% of samples >9mg/l												No abnormal change	31/01/2011, 01/02/11,	9.09	9.26	8.75	9.2	7.99	6.58	5.78	6	5.85	6.22	5.81	4.81	4.45	5.9	-	6	5.99	5.06
DO (Dissolved Oxygen)	water	%	O2			>70% (A1) >50% (A2) >30% (A3)											31/01/2011, 01/02/11, 02/02/11	98.8	98.3	95.1	99.3	82.8	69	61	64.1	63	62	60.1	48.4	47		-	65.1	59.3	53.8
Electrical conductivity (EC)	water	uS/cm				1000 @20oC (A1,2,3)		800 @20oC		1875 @20oC		800 - 1875 @20oC	34	C	2500 @20oC	1000 @20oC	31/01/2011, 01/02/11, 02/02/11	528	492	414	601	341	513	495	493	536	492	652	498	489	382	601	544	483	398
Electrical conductivity (EC)	water	uS/cm				1106@25o C (A1, 2,3)		885 @25oC		2074 @25oC		886 - 2074 @25oC	34	C	2766 @25oC	1106 @25oC	1/6/11 2/6/11 3/6/11	420	333	428	522	323	413	430	351	449	410	513	381	481		-	460	381	333
Ethylbenzene	water	ug/l														10.00	31/01/2011, 01/02/11,								<5	<5	<5	<5	<5	53.8	<5	-	<5	<5	<5
Ethylbenzene	water	ug/l														10.00	1/6/11 2/6/11 3/6/11	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5		-	<5	<5	<5
Hardness - carbonate	water	mg/l	CaCO3													200.00	31/01/2011, 01/02/11,	306	289	255	333	129	297	304	300	329	272	322	272	280	200	382	332	278	214
Hardness - carbonate	water	mg/l	CaCO3													200.00	1/6/11 2/6/11 3/6/11	271	300	208	399	231	264	303	244	315	258	326	248	369		-	318	253	207
Iron - Total	water	mg/l	Fe										36	C	0.20	0.20	31/01/2011, 01/02/11,	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.024	-	-	-
MTBE (methyl-tert-butyl-ether)	water	ug/l														30.00	31/01/2011, 01/02/11,	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	<3	<3	<3
MTBE (methyl-tert-butyl-ether)	water	ug/l														30.00	1/6/11 2/6/11 3/6/11	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3		-	<3	<3	<3
m,p -Xylene	water	ug/l															31/01/2011, 01/02/11,	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	-	<8	<8	<8
m,p -Xylene	water	ug/l															1/6/11 2/6/11 3/6/11	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8		-	<8	<8	<8
m, p, o-Xylene	water	ug/l															31/01/2011, 01/02/11,								<10	<10	<10	<10	<10	<10	<10		<10	<10	<10
m, p, o-Xylene	water	ug/l															1/6/11 2/6/11 3/6/11																		
Nitrate	water	mg/l	NO3			25 (A1)	50 (A1, 2)			37.50	37.50	37.50	20	B	50.00	25.00	31/01/2011, 01/02/11,	7.05	4.3	1.31	6.21	<0.3	3.13	4.43	2.46	7.57	<0.3	0.479	2.8	0.611	4.34	-	8.24	2.42	1
Nitrate	water	mg/l	NO3			25 (A1)	50 (A1, 2)			37.50	37.50	37.50	20	B	50.00	25.00	1/6/11 2/6/11 3/6/11	6.61	2.22	1.3	5.51	<0.3	3.62	2.73	<0.3	5.33	<0.3	<0.3	<0.3	0.369		-	2.77	<0.3	<0.3
Nitrite	water	mg/l	NO2	0.05						0.375		0.375	21	B	0.50	0.10	31/01/2011, 01/02/11,	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				
Nitrite	water	mg/l	NO2	0.05						0.375		0.375	21	B	0.50	0.10	1/6/11 2/6/11 3/6/11	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		-			
o-Xylene	water	ug/l															31/01/2011, 01/02/11,								<3	<3	<3	<3	<3	<3	<3	-	<3	<3	<3
o-Xylene	water	ug/l															1/6/11 2/6/11 3/6/11	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3		-	<3	<3	<3
pH	water	pH	pH units	6 - 9		6.5 - 8.5 (A1)							35	C	>6 &	>6.5 <9.5	31/01/2011, 01/02/11,	7.54	7.88	7.94	7.66	7.87	7.59	8.21	7.78	7.86	7.98	8.08	8.07	7.75	8.21	7.55	7.87	8.1	8.16
pH	water	pH	pH units	6 - 9		6.5 - 8.5 (A1)							35	C	>6 &	>6.5 <9.5	1/6/11 2/6/11 3/6/11	7.51	7.74	7.68	7.52	7.51	7.68	7.58	7.49	7.78	7.7	7.76	7.7	7.72		-	7.68	7.77	7.73
Phenol total	water	ug/l	C_6H_5OH	Must not be present in such quantites that they adversely affect fish flavour	46	1 (A2) 10 (A3)	1 (A1) 5 (A2) 100 (A3)									0.50	31/01/2011, 01/02/11, 02/02/11	<25	<25	<25	<25	<25	<25	<25	<15	<15	<15	<15	<15	<15	<15	-			
Phenol total	water	ug/l	C_6H_5OH	Must not be present in such quantites that they adversely affect fish flavour	46	1 (A2) 10 (A3)	1 (A1) 5 (A2) 100 (A3)									0.50	1/6/11 2/6/11 3/6/11	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002		-			
Phosphate	water	mg/l	P		≤0.035 (mean) or ≤0.075 (95%) (Good status) ≤0.025 or ≤0.045 (High status)	0.176 (A1) 0.308 (A2, 3)										0.03	31/01/2011, 01/02/11, 02/02/11	<0.03	<0.03	<0.03	0.0623	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	-	<0.03	<0.03	<0.03
Phosphate	water	mg/l	P		≤0.035 (mean) or ≤0.075 (95%) (Good status) ≤0.025 or ≤0.045 (High status)	0.176 (A1) 0.308 (A2, 3)										0.03	1/6/11 2/6/11 3/6/11	<0.03	<0.03	0..0401	0.0985	0.0395	<0.03	0.0336	0.0398	<0.03	<0.03	<0.03	<0.03	<0.03		-	<0.03	<0.03	<0.03
GRO/ PRO (Petroleum range	water	ug/l															31/01/2011, 01/02/11,	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	-	<50	<50	<50
GRO/ PRO (Petroleum range	water	ug/l															1/6/11 2/6/11 3/6/11	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50		-	<50	<50	<50
Toluene	water	ug/l														10	31/01/2011, 01/02/11,								<4	<4	<4	<4	<4	<4	<4	-	<4	<4	<4
Toluene	water	ug/l														10	1/6/11 2/6/11 3/6/11	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4		-	<4	<4	<4
TSS - (Solids - total suspended)	water	mg/l	solids	25		25 (A1)											31/01/2011, 01/02/11, 02/02/11	3	3	3	6.5	20	28	<2	<4	<4	<4	7.22	2.5	<4	<4	-	4.02	<4	2
TSS - (Solids - total suspended)	water	mg/l	solids	25		25 (A1)											1/6/11 2/6/11 3/6/11	3	<2	<4	310	37	12	<4	<6	<6	42	17.5	7.5	<4		-	<4	<2	<4
Zinc - Total	water	ug/l	Zn			500 (A1) 1000 (A2, A3)	3000 (A1) 5000(A2, A3)										31/01/2011, 01/02/11, 02/02/11	<3	<3	<3	3.12	93.3	4.89	<3	<3	<3	<3	62.8	8.74	<3	13.2	-	<3	<3	<3
Zinc - Total	water	ug/l	Zn			500 (A1) 1000 (A2, A3)	3000 (A1) 5000(A2, A3)										1/6/11 2/6/11 3/6/11	6.29	<3	<3	195	20.3	3.65	<3	4.57	<3	11.5	26.2	10.2	3.22		-	9.88	<3	<3