

Sure Partners Limited

ARKLOW BANK WIND PARK  
PHASE 2

**ONSHORE GRID  
INFRASTRUCTURE**

**VOLUME III**

**Chapter 9 APPENDICES**

**Appendix 9.3a** Groundwater Assessment

ARUP

 **sse**  
Renewables

## Appendix 9.3a

Generic Assessment

Criteria Groundwater

Generic Assessment Criteria - Groundwater							BH301	BH302	BH303	BH304	BH305
Test	Units	LOD	Count > LOD	EQS	Exceedances	Max					
<b>Inorganics</b>											
Ammoniacal Nitrogen as N	mg/l	<0.2	4	0.175	4	19.1	19.1	0.896	9.12	0.704	<0.2
Dissolved solids, Total (meter)	mg/l	<5	5		-	1000	1000	328	467	545	342
Sulphate	mg/l	<2	5	187.5	1	605	605	33.2	149	53.9	29.6
COD, unfiltered	mg/l	<7	5		-	96.4	96.4	21.8	43.5	44.1	42.5
Phosphate (Ortho as P)	mg/l	<0.02	1		-	0.033	<0.02	<0.02	<0.02	<0.02	0.033
Chloride	mg/l	<0.08	5	187.5	0	134	10.7	23.9	22.6	134	78.2
Nitrate as NO3	mg/l	<0.3	3	37.5	0	12	<0.6	12	<0.3	6.45	6.37
BOD, unfiltered	mg/l	<1	4		-	3.95	2.08	<3	1.87	3.67	3.95
Alkalinity, Total as CaCO3	mg/l	<2	5		-	180	140	168	180	109	104
Suspended solids, Total	mg/l	<2	5		-	244	196	23.6	244	22	185
<b>Filtered (Dissolved) Metals</b>											
Low Level Hexavalent Chromium	mg/l	<0.003	0		-	0	<0.003	<0.003	<0.003	<0.003	<0.006
Chromium, Trivalent (Low)	mg/l	<0.003	1	0.008	0	0.00498	<0.003	<0.003	<0.003	<0.003	0.00498
Mercury (diss.filt)	µg/l	<0.01	0	0.75	0	0	<0.01	<0.01	<0.01	<0.01	<0.01
Antimony (diss.filt)	µg/l	<1	0	5	0	0	<1	<1	<1	<1	<1
Arsenic (diss.filt)	µg/l	<0.5	4	7.5	1	10.2	1.39	<0.5	10.2	1.37	1.04
Barium (diss.filt)	µg/l	<0.2	5	-	-	258	103	33.5	258	18.2	7.56
Cadmium (diss.filt)	µg/l	<0.08	0	3.75	0	0	<0.08	<0.08	<0.08	<0.08	<0.08
Chromium (diss.filt)	µg/l	<1	1	7.5	0	4.98	<1	<1	<1	<1	4.98
Copper (diss.filt)	µg/l	<0.3	5	1500	0	5.44	1.86	0.903	0.416	5.44	2.29
Lead (diss.filt)	µg/l	<0.2	1	7.5	0	1.77	<0.2	<0.2	<0.2	1.77	<0.2
Manganese (diss.filt)	µg/l	<3.0	5	50	4	30500	30500	2540	14100	706	18.4
Molybdenum (diss.filt)	µg/l	<3.0	1		-	12.7	<3	<3	<3	<3	12.7
Nickel (diss.filt)	µg/l	<0.4	5	15	0	10.7	10.7	2.14	8.62	2.42	0.802
Selenium (diss.filt)	µg/l	<1.0	0	10	0	0	<1	<1	<1	<1	<1
Zinc (diss.filt)	µg/l	<1.0	4	75	0	70.4	53.4	22.4	67.7	70.4	<1
Sodium (Dis.Filt)	mg/l	<0.076	5	150	0	78.9	23.6	16.2	17.2	78.9	48.8
Magnesium (Dis.Filt)	mg/l	<0.036	5		-	20.9	20.9	15.3	15.5	12.6	9.47
Potassium (Dis.Filt)	mg/l	<0.2	5		-	31.8	31.8	1.48	4.66	6.94	5.17
Calcium (Dis.Filt)	mg/l	<0.2	5		-	184	184	46.2	65.5	32.9	23.5
Iron (Dis.Filt)	mg/l	<0.019	4	0.2	3	13.7	5.03	0.0509	13.7	1.84	<0.019
<b>Mineral Oil / Oils &amp; Greases</b>											
Mineral oil >C10 C40 (aq)	µg/l	<100	5		0	3460	517	291	604	3460	255
<b>TPH Criteria Working Group (TPH CWG)</b>											
GRO Surrogate % recovery**	%		0		-	106	104	106	98	93	98
GRO >C5-C12	µg/l	<50	1		-	71	<50	<50	<50	71	<50
Methyl tertiary butyl ether (MTBE)	µg/l	<3	0		-	0	<3	<3	<3	<3	<3
Benzene	µg/l	<7	0	0.75	0	0	<7	<7	<7	<7	<7
Toluene	µg/l	<4	0	525	0	0	<4	<4	<4	<4	<4
Ethylbenzene	µg/l	<5	0		-	0	<5	<5	<5	<5	<5
m,p-Xylene	µg/l	<8	0		-	0	<8	<8	<8	<8	<8
o-Xylene	µg/l	<3	0		-	0	<3	<3	<3	<3	<3
Sum of detected Xylenes	µg/l	<11	0		-	0	<11	<11	<11	<11	<11
Sum of detected BTEX	µg/l	<28	0		-	0	<28	<28	<28	<28	<28
Aliphatics >C5-C6	µg/l	<10	0	15000	0	0	<10	<10	<10	<10	<10
Aliphatics >C6-C8	µg/l	<10	0	15000	0	0	<10	<10	<10	<10	<10
Aliphatics >C8-C10	µg/l	<10	1	300	0	17	<10	<10	<10	17	<10
Aliphatics >C10-C12	µg/l	<10	2	300	0	22	15	<10	<10	22	<10

Generic Assessment Criteria - Groundwater							BH301	BH302	BH303	BH304	BH305
Test	Units	LOD	Count > LOD	EQS	Exceedances	Max					
Aliphatics >C12-C16 (aq)	µg/l	<10	1		-	2300	<10	<10	<10	2300	<10
Aliphatics >C16-C21 (aq)	µg/l	<10	2		-	104	17	<10	10	104	<10
Aliphatics >C21-C35 (aq)	µg/l	<10	5		-	402	308	146	402	396	124
Total Aliphatics >C12-C35 (aq)	µg/l	<10	5		-	2800	325	146	412	2800	124
Aromatics >EC5-EC7	µg/l	<10	0	10	0	0	<10	<10	<10	<10	<10
Aromatics >EC7-EC8	µg/l	<10	0	700	0	0	<10	<10	<10	<10	<10
Aromatics >EC8-EC10	µg/l	<10	1	300	0	11	<10	<10	<10	11	<10
Aromatics >EC10-EC12	µg/l	<10	1	90	0	15	10	<10	<10	15	<10
Aromatics >EC12-EC16 (aq)	µg/l	<10	0	90	0	0	<10	<10	<10	<10	<10
Aromatics >EC16-EC21 (aq)	µg/l	<10	0	90	0	0	<10	<10	<10	<10	<10
Aromatics >EC21-EC35 (aq)	µg/l	<10	2	90	1	100	<10	<10	41	100	<10
Total Aromatics >EC12-EC35 (aq)	µg/l	<10	2		-	100	<10	<10	41	100	<10
Total Aliphatics & Aromatics >C5-35 (aq)	µg/l	<10	5		-	2970	368	146	458	2970	124
<b>PCB's - (Solids)</b>											
PCB congener 28	µg/l	<0.015	0		-	0	<0.015	<0.015	<0.015	<0.015	<0.015
PCB congener 52	µg/l	<0.015	0		-	0	<0.015	<0.015	<0.015	<0.015	<0.015
PCB congener 101	µg/l	<0.015	0		-	0	<0.015	<0.015	<0.015	<0.015	<0.015
PCB congener 118	µg/l	<0.015	0		-	0	<0.015	<0.015	<0.015	<0.015	<0.015
PCB congener 138	µg/l	<0.015	0		-	0	<0.015	<0.015	<0.015	<0.015	<0.015
PCB congener 153	µg/l	<0.015	0		-	0	<0.015	<0.015	<0.015	<0.015	<0.015
PCB congener 180	µg/l	<0.015	0		-	0	<0.015	<0.015	<0.015	<0.015	<0.015
Sum of detected EC7 PCB's	µg/l	<0.105	0		-	0	<0.105	<0.105	<0.105	<0.105	<0.105
<b>Semi-Volatile Organic Compounds (SVOCs)</b>											
1,2,4-Trichlorobenzene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
1,2-Dichlorobenzene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
1,3-Dichlorobenzene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
1,4-Dichlorobenzene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
2,4,5-Trichlorophenol (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
2,4,6-Trichlorophenol (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
2,4-Dichlorophenol (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
2,4-Dimethylphenol (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
2,4-Dinitrotoluene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
2,6-Dinitrotoluene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
2-Chloronaphthalene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
2-Chlorophenol (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
2-Methylnaphthalene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
2-Methylphenol (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
2-Nitroaniline (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
2-Nitrophenol (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
3-Nitroaniline (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
4-Bromophenylphenylether (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
4-Chloro-3-methylphenol (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
4-Chloroaniline (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
4-Chlorophenylphenylether (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
4-Methylphenol (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
4-Nitroaniline (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
4-Nitrophenol (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
Azobenzene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
Acenaphthylene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4

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Acenaphthene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
Anthracene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
bis(2-Chloroethyl)ether (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
bis(2-Chloroethoxy)methane (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
bis(2-Ethylhexyl) phthalate (aq)	µg/l	<2	0		-	0	<16	<2	<16	<2	<8
Butylbenzyl phthalate (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
Benzo(a)anthracene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
Benzo(b)fluoranthene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
Benzo(k)fluoranthene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
Benzo(a)pyrene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
Benzo(g,h,i)perylene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
Carbazole (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
Chrysene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
Dibenzofuran (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
n-Dibutyl phthalate (aq)	µg/l	<1	1	6	0	3.49	<8	3.49	<8	<1	<4
Diethyl phthalate (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
Dibenzo(a,h)anthracene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
Dimethyl phthalate (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
n-Dioctyl phthalate (aq)	µg/l	<5	0		-	0	<40	<5	<40	<5	<20
Fluoranthene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
Fluorene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
Hexachlorobenzene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
Hexachlorobutadiene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
Pentachlorophenol (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
Phenol (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
n-Nitroso-n-dipropylamine (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
Hexachloroethane (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
Nitrobenzene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
Naphthalene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
Isophorone (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
Hexachlorocyclopentadiene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
Phenanthrene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
Indeno(1,2,3-cd)pyrene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
Pyrene (aq)	µg/l	<1	0		-	0	<8	<1	<8	<1	<4
<b>Volatile Organic Compounds (VOCs)</b>											
Dibromofluoromethane**	%		0		-	109	106	109	109	107	109
Toluene-d8**	%		0		-	103	98.5	98.1	98	102	103
4-Bromofluorobenzene**	%		0		-	101	99.2	100	99.1	101	101
Dichlorodifluoromethane	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
Chloromethane	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
Vinyl chloride	µg/l	<1	0	0.375	-	0	<1	<1	<1	<1	<1
Bromomethane	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
Chloroethane	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
Trichlorofluoromethane	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
1,1-Dichloroethene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
Carbon disulphide	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
Dichloromethane	µg/l	<3	0		-	0	<3	<3	<3	<3	<3
Methyl tertiary butyl ether (MTBE)	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
1,1-Dichloroethane	µg/l	<1	0		-	0	<1	<1	<1	<1	<1

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cis-1,2-Dichloroethene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
2,2-Dichloropropane	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
Bromochloromethane	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
Chloroform	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
1,1-Dichloropropene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
Carbontetrachloride	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/l	<1	0	2.25	-	0	<1	<1	<1	<1	<1
Benzene	µg/l	<1	0	0.75	-	0	<1	<1	<1	<1	<1
Trichloroethene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
1,2-Dichloropropane	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
Dibromomethane	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
Bromodichloromethane	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
cis-1,3-Dichloropropene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
Toluene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
1,3-Dichloropropane	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
Tetrachloroethene	µg/l	<1	0	7.5	-	0	<1	<1	<1	<1	<1
Dibromochloromethane	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
1,2-Dibromoethane	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
Chlorobenzene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
1,1,1,2-Tetrachloroethane	µg/l	<1	0	7.5	-	0	<1	<1	<1	<1	<1
Ethylbenzene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
m,p-Xylene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
o-Xylene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
Styrene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
Bromoform	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
Isopropylbenzene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg/l	<1	0	7.5	-	0	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
Bromobenzene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
Propylbenzene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
2-Chlorotoluene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
4-Chlorotoluene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
tert-Butylbenzene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
sec-Butylbenzene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
4-iso-Propyltoluene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
n-Butylbenzene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
tert-Amyl methyl ether (TAME)	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
Naphthalene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1

Generic Assessment Criteria - Groundwater							BH301	BH302	BH303	BH304	BH305
Test	Units	LOD	Count > LOD	EQS	Exceedances	Max					
1,3,5-Trichlorobenzene	µg/l	<1	0		-	0	<1	<1	<1	<1	<1
<b>EPH CWG (Speciated)</b>											
Aliphatics >C16-C35 Aqueous	µg/l	<10	5		-	500	325	146	412	500	124

Less than LOD	Concentration Exceeds Threshold
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**GAC Sources:**

Groundwater Threshold Value 2016
Groundwater Threshold Value 2010

Drinking Water Standards (2014)
Petroleum Hydrocarbons in Groundwater - CL:AIRE .