

## **APPENDIX 1**

# **AIR QUALITY MONITORING DATA**

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**2008 - 2009 High Volume Air Sampler TSP Results**

Date	Event	Site 1 TSP			Site 2 TSP			Site 3 TSP			Site 8 TSP		
		Site 1 TSP Result	Site 1 Rolling Annual Average	Site 1 Data Recovery	Site 1 TSP Result	Site 2 Rolling Annual Average	Site 2 Data Recovery	Site 3 TSP Result	Site 3 Rolling Annual Average	Site 3 Data Recovery	Site 8 TSP Result	Site 8 Rolling Annual Average	Site 8 Data Recovery
02/09/2008	1	74	91	100.0	61	72	100.0	101	89	100.0	70	79	100.0
08/09/2008	2	46	92	100.0	46	69	100.0	61	87	100.0	43	76	100.0
14/09/2008	3	95	89	100.0	77	69	100.0	88	87	100.0	78	75	100.0
20/09/2008	4	247	91	100.0	169	71	100.0	165	88	100.0	178	77	100.0
26/09/2008	5	184	93	100.0	132	69	100.0	120	86	100.0	143	75	100.0
02/10/2008	6	298	94	100.0	219	72	100.0	220	88	100.0	188	76	100.0
08/10/2008	7	77	93	100.0	91	71	100.0	103	87	100.0	74	75	100.0
14/10/2008	8	86	92	100.0	79	71	100.0	103	87	100.0	89	75	100.0
20/10/2008	9	176	93	100.0	153	73	100.0	157	89	100.0	155	76	100.0
26/10/2008	10	149	95	100.0	127	73	100.0	138	88	100.0	126	76	100.0
01/11/2008	11	83	94	100.0	66	74	100.0	86	89	100.0	74	77	100.0
07/11/2008	12	112	95	100.0	92	74	100.0	142	90	100.0	123	78	100.0
13/11/2008	13	115	96	100.0	78	73	100.0	99	89	100.0	79	77	100.0
19/11/2008	14	32	94	100.0	35	73	100.0	41	89	100.0	24	77	100.0
25/11/2008	15	99	95	100.0	85	74	100.0	127	90	100.0	85	78	100.0
01/12/2008	16	156	97	100.0	116	75	100.0	169	91	100.0	133	79	100.0
07/12/2008	17	98	97	100.0	54	75	100.0	61	91	100.0	60	79	100.0
13/12/2008	18	95	98	100.0	55	74	100.0	68	91	100.0	66	79	100.0
19/12/2008	19	120	99	100.0	83	75	100.0	112	92	100.0	92	80	100.0
25/12/2008	20	34	98	100.0	31	74	100.0	40	91	100.0	36	79	100.0
31/12/2008	21	182	100	100.0	145	76	100.0	185	93	100.0	157	81	100.0
06/01/2009	22	187	102	100.0	121	76	100.0	201	94	100.0	142	82	100.0
12/01/2009	23	68	101	100.0	64	76	100.0	115	95	100.0	68	82	100.0
18/01/2009	24	60	102	100.0	41	76	100.0	72	95	100.0	52	82	100.0
24/01/2009	25	154	103	100.0	142	76	100.0	137	95	100.0	111	83	100.0
30/01/2009	26	88	102	100.0	79	77	100.0	115	96	100.0	92	83	100.0
05/02/2009	27	124	104	100.0	112	79	100.0	186	99	100.0	128	85	100.0
11/02/2009	28	40	104	100.0	35	79	100.0	49	98	100.0	38	85	100.0
17/02/2009	29	28	103	100.0	44	78	100.0	42	97	100.0	37	84	100.0
23/02/2009	30	100	103	100.0	141	80	100.0	94	98	100.0	92	85	100.0
01/03/2009	31	93	104	100.0	90	79	100.0	113	98	100.0	89	85	100.0
07/03/2009	32	146	105	100.0	125	80	100.0	123	98	100.0	135	85	100.0
13/03/2009	33	76	105	100.0	68	80	100.0	69	97	100.0	45	85	100.0
19/03/2009	34	94	106	100.0	122	82	100.0	100	98	100.0	98	86	100.0
25/03/2009	35	151	107	100.0	155	82	100.0	144	98	100.0	159	86	100.0
31/03/2009	36	26	105	100.0	24	82	100.0	40	97	100.0	24	85	100.0
06/04/2009	37	35	104	100.0	38	82	100.0	37	97	100.0	33	85	100.0
12/04/2009	38	82	105	100.0	68	83	100.0	45	97	100.0	63	86	100.0
18/04/2009	39	50	105	100.0	47	83	100.0	50	98	100.0	54	87	100.0
24/04/2009	40	167	108	100.0	148	85	100.0	111	99	100.0	117	88	100.0
30/04/2009	41	56	108	100.0	47	84	100.0	49	97	100.0	61	86	100.0
06/05/2009	42	73	106	100.0	67	84	100.0	69	97	100.0	78	86	100.0
12/05/2009	43	110	107	100.0	110	83	100.0	115	97	100.0	130	86	100.0
18/05/2009	44	129	105	100.0	106	83	100.0	153	97	100.0	129	86	100.0
24/05/2009	45	61	105	100.0	65	83	100.0	92	97	100.0	70	86	100.0
30/05/2009	46	32	104	100.0	31	84	100.0	35	98	100.0	35	86	100.0
05/06/2009	47	109	106	100.0	65	84	100.0	50	98	100.0	81	87	100.0
11/06/2009	48	166	108	100.0	75	85	100.0	103	99	100.0	112	89	100.0
17/06/2009	49	47	108	100.0	43	85	100.0	62	99	100.0	59	89	100.0
23/06/2009	50	46	107	100.0	53	85	100.0	52	99	100.0	61	88	100.0
29/06/2009	51	149	108	100.0	92	85	100.0	67	98	100.0	104	89	100.0
05/07/2009	52	142	109	100.0	100	85	100.0	77	98	100.0	110	89	100.0
11/07/2009	53	42	108	100.0	38	85	100.0	31	98	100.0	39	89	100.0
17/07/2009	54	82	108	100.0	81	85	100.0	36	97	100.0	88	89	100.0
23/07/2009	55	125	109	100.0	45	85	100.0	55	97	100.0	72	89	100.0
29/07/2009	56	114	109	100.0	104	85	100.0	80	97	100.0	88	89	100.0
04/08/2009	57	186	109	100.0	117	85	100.0	121	98	100.0	148	89	100.0
10/08/2009	58	120	109	100.0	124	85	100.0	136	98	100.0	136	89	100.0
16/08/2009	59	212	108	100.0	164	87	100.0	112	97	100.0	152	91	100.0
22/08/2009	60	146	107	100.0	81	88	100.0	107	97	100.0	99	92	100.0
28/08/2009	61	305	111	100.0	175	90	100.0	182	99	100.0	211	94	100.0

**2008 – 2009 Tapered Element Oscillating Microbalance (TEOM) PM10 Results**

Date	Site 1		Site 2		Site 3		Site 8		Site4		Site 7		Ashton Contribution (only calculated for north westerly winds)				
	Site 1 – PM10 24hr Average	Site 1 – PM10 Rolling Annual Average	Site 2 – PM10 24hr Average	Site 2 – PM10 Rolling Annual Average	Site 3 – PM10 24hr Average	Site 3 – PM10 Rolling Annual Average	Site 8 – PM10 24hr Average	Site 8 – PM10 Rolling Annual Average	Site 4 – PM10 24hr Average	Site 4 – PM10 Rolling Annual Average	Site 7 – PM10 24hr Average	Site 7 – PM10 Rolling Annual Average	Wind Direction	Site 1 Ashton Contribution	Site 2 Ashton Contribution	Site 3 Ashton Contribution	Site 8 Ashton Contribution
02-Sep-08	17	25	17	19	22	23	21	24	22	22	21	22	NW	-4	-4	1	0
03-Sep-08	14	25	13	19	18	23	16	24	20	22	24	22	SE	0	0	0	0
04-Sep-08	6	25	6	19	7	23	6	24	8	22	7	22	SE	0	0	0	0
05-Sep-08	5	25	5	19	5	23	5	24	7	22	7	22	SE	0	0	0	0
06-Sep-08	3	25	3	19	3	23	2	24	4	22	4	22	SW	0	0	0	0
07-Sep-08	12	25	11	19	10	23	12	24	14	22	11	22	NW	0	0	-1	1
08-Sep-08	17	25	14	19	15	23	16	24	19	22	20	22	SE	0	0	0	0
09-Sep-08	12	25	14	19	15	23	14	24	19	22	17	22	SE	0	0	0	0
10-Sep-08	22	25	20	19	19	22	23	24	32	22	23	22	SE	0	0	0	0
11-Sep-08	24	25	21	19	21	22	23	24	25	22	22	22	NW	3	-1	-1	1
12-Sep-08	42	25	35	19	35	23	40	24	50	22	26	22	NW	16	8	9	14
13-Sep-08	50	25	28	19	36	22	47	24	38	22	31	22	NW	19	-3	5	16
14-Sep-08	26	25	17	19	20	22	25	24	22	22	19	22	NW	7	-2	1	6
15-Sep-08	95	25	44	19	48	22	81	24	61	22	42	22	NW	53	2	6	39
16-Sep-08	94	25	64	19	84	23	98	24	89	23	71	22	NW	23	-7	13	27
17-Sep-08	18	25	17	19	20	23	23	24	23	23	29	22	SE	0	0	0	0
18-Sep-08	32	25	24	19	28	23	33	24	32	23	26	22	SE	0	0	0	0
19-Sep-08	69	25	49	19	52	23	60	24	59	23	42	22	NW	27	8	11	19
20-Sep-08	73	25	42	19	52	23	71	24	56	23	44	22	NW	28	-2	7	26
21-Sep-08	26	25	24	19	31	23	31	24	32	23	29	22	SE	0	0	0	0
22-Sep-08	48	25	28	19	38	23	51	24	41	23	21	22	NW	28	8	18	31
23-Sep-08	9	25	11	19	9	23	8	24	13	23	10	22	NW	-1	1	-1	-2
24-Sep-08	11	25	13	19	13	23	13	24	16	23	19	22	SE	0	0	0	0
25-Sep-08	10	25	13	19	14	23	12	24	19	22	19	22	SE	0	0	0	0
26-Sep-08	40	25	27	19	25	22	40	24	31	22	18	22	NW	22	9	7	22
27-Sep-08	50	25	31	19	27	22	40	24	36	22	19	22	NW	31	12	9	21
28-Sep-08	67	25	33	19	42	22	61	24	43	22	28	22	NW	38	4	14	33
29-Sep-08	23	25	19	19	27	22	23	24	28	22	27	22	SE	0	0	0	0
30-Sep-08	22	25	18	19	24	22	23	24	26	22	16	22	NE	0	0	0	0
01-Oct-08	47	25	30	18	26	22	36	24	47	22	14	21	NW	33	16	12	22
02-Oct-08	66	25	40	18	49	22	57	24	57	22	34	21	NW	32	6	15	23
03-Oct-08	84	25	48	18	58	22	72	25	57	22	38	21	NW	46	10	20	34
04-Oct-08	34	25	22	18	22	22	34	25	28	22	30	21	NW	6	-6	-6	6
05-Oct-08	12	24	12	18	10	22	12	25	17	22	18	21	SE	0	0	0	0
06-Oct-08	10	24	6	18	3	22	7	25	12	22	9	21	NW	1	-3	-6	-2
07-Oct-08	41	24	22	18	15	22	35	25	21	22	14	21	NW	27	8	0	21
08-Oct-08	20	24	18	18	16	22	22	25	23	22	18	21	NW	2	0	-2	4
09-Oct-08	19	24	18	18	18	22	23	25	24	22	26	21	SE	0	0	0	0
10-Oct-08	28	24	22	18	19	21	26	25	26	22	24	21	SE	0	0	0	0
11-Oct-08	26	24	17	18	14	21	25	25	24	22	21	21	NW	5	-4	-7	4
12-Oct-08	25	24	19	18	14	21	24	25	22	22	25	21	SE	0	0	0	0
13-Oct-08	56	24	28	18	18	21	47	25	28	22	20	21	NW	36	8	-2	27
14-Oct-08	19	24	17	18	16	21	21	25	24	22	21	21	SE	0	0	0	0
15-Oct-08	14	24	13	18	11	21	13	25	14	22	21	21	SE	0	0	0	0
16-Oct-08	18	24	15	18	17	21	21	25	22	22	25	21	SE	0	0	0	0
17-Oct-08	23	24	22	18	17	21	24	25	25	22	22	21	SW	0	0	0	0
18-Oct-08	23	24	22	18	22	21	29	25	35	22	26	21	NW	-3	-4	-5	3
19-Oct-08	40	24	28	18	57	21	33	25	34	22	22	21	NW	18	6	35	11
20-Oct-08	50	24	33	18	32	21	47	25	47	22	45	21	NW	6	-12	-13	2
21-Oct-08	13	24	15	18	13	21	12	25	17	22	22	21	SE	0	0	0	0
22-Oct-08	6	24	7	18	7	21	6	25	9	22	10	21	SE	0	0	0	0
23-Oct-08	10	24	9	18	8	21	12	25	11	22	11	21	SE	0	0	0	0
24-Oct-08	20	24	17	18	21	21	23	25	28	22	23	21	SE	0	0	0	0
25-Oct-08	24	24	20	18	19	21	25	25	28	22	22	21	NW	2	-3	-3	3
26-Oct-08	35	24	26	18	28	21	33	25	33	22	20	21	NW	15	5	8	13
27-Oct-08	80	24	48	18	43	21	76	25	56	22	38	21	NW	43	10	5	38
28-Oct-08	50	24	45	18	51	21	55	25	71	22	67	21	SE	0	0	0	0
29-Oct-08	11	24	12	18	11	21	10	25	18	22	19	21	SE	0	0	0	0
30-Oct-08	20	24	19	18	17	20	21	25	28	22	28	21	SE	0	0	0	0
31-Oct-08	93	24	50	18	48	20	100	25	62	22	38	21	NW	55	12	10	62
01-Nov-08	19	24	17	18	18	20	19	25	28	22	37	21	NW	-9	-11	-10	-10

**2008 – 2009 Tapered Element Oscillating Microbalance (TEOM) PM10 Results**

Date	Site 1		Site 2		Site 3		Site 8		Site4		Site 7		Ashton Contribution (only calculated for north westerly winds)				
	Site 1 – PM10 24hr Average	Site 1 – PM10 Rolling Annual Average	Site 2 – PM10 24hr Average	Site 2 – PM10 Rolling Annual Average	Site 3 – PM10 24hr Average	Site 3 – PM10 Rolling Annual Average	Site 8 – PM10 24hr Average	Site 8 – PM10 Rolling Annual Average	Site 4 – PM10 24hr Average	Site 4 – PM10 Rolling Annual Average	Site 7 – PM10 24hr Average	Site 7 – PM10 Rolling Annual Average	Wind Direction	Site 1 Ashton Contribution	Site 2 Ashton Contribution	Site 3 Ashton Contribution	Site 8 Ashton Contribution
02-Nov-08	11	24	10	18	10	20	11	25	17	22	19	21	NW	-6	-6	-7	-5
03-Nov-08	34	24	12	18	25	20	29	25	29	22	17	21	NW	17	-5	8	11
04-Nov-08	16	24	15	18	17	20	15	25	28	22	37	21	NW	-13	-14	-12	-13
05-Nov-08	34	24	21	18	24	20	29	25	37	22	29	21	NW	5	-7	-4	0
06-Nov-08	49	24	20	18	30	21	46	25	27	22	19	21	NW	30	1	11	27
07-Nov-08	32	24	24	18	47	21	36	25	32	22	48	21	NW	1	-8	15	4
08-Nov-08	57	24	24	18	46	21	57	25	22	22	29	21	NW	35	2	24	35
09-Nov-08	26	24	19	18	20	21	27	25	N/A	22	26	21	NW	0	-7	-5	1
10-Nov-08	22	24	17	18	29	21	24	25	N/A	22	34	21	NW	-12	-16	-5	-10
11-Nov-08	21	24	17	18	30	21	25	25	N/A	22	32	21	NW	-12	-16	-2	-7
12-Nov-08	18	24	12	18	25	21	20	25	N/A	22	32	21	NW	-14	-19	-7	-12
13-Nov-08	25	24	16	18	22	21	21	25	N/A	22	31	21	NW	-7	-15	-10	-10
14-Nov-08	69	24	31	18	39	21	51	25	N/A	22	25	21	NW	44	6	14	26
15-Nov-08	30	24	20	18	24	21	27	25	N/A	22	23	21	NW	7	-3	1	4
16-Nov-08	23	24	18	18	25	21	21	25	N/A	22	43	21	NW	-20	-24	-18	-21
17-Nov-08	21	24	15	18	25	21	21	25	N/A	22	35	21	NW	-14	-20	-10	-14
18-Nov-08	15	24	10	18	14	21	14	25	N/A	22	12	21	NW	3	-2	2	3
19-Nov-08	10	24	7	18	10	21	9	25	N/A	22	10	21	NW	0	-3	0	-1
20-Nov-08	25	24	12	18	12	21	17	25	N/A	22	15	21	NW	10	-3	-3	3
21-Nov-08	40	24	21	18	39	21	46	25	N/A	22	26	21	NW	13	-5	13	20
22-Nov-08	30	24	13	18	28	21	29	25	N/A	22	18	21	NW	11	-5	10	11
23-Nov-08	53	25	21	18	40	21	53	25	N/A	22	26	21	NW	27	-5	14	27
24-Nov-08	100	25	57	18	113	21	106	25	N/A	22	105	21	NW	-5	-49	7	0
25-Nov-08	24	25	18	18	31	21	25	25	N/A	22	40	21	NW	-16	-22	-9	-16
26-Nov-08	19	25	13	18	24	21	19	25	20	22	30	21	NW	-1	-8	3	-1
27-Nov-08	14	25	14	18	23	21	25	25	24	22	25	21	NW	-10	-10	-1	1
28-Nov-08	20	25	14	18	16	21	19	25	17	22	19	21	NW	3	-3	-2	1
29-Nov-08	15	25	11	18	14	21	11	25	16	22	13	21	NW	3	-2	1	-1
30-Nov-08	32	25	17	18	30	21	32	25	23	22	18	21	NW	14	-1	12	14
01-Dec-08	36	25	22	18	50	22	45	25	36	22	27	21	NW	9	-5	23	18
02-Dec-08	34	25	27	18	50	22	50	25	46	22	43	21	SE	0	0	0	0
03-Dec-08	39	25	20	18	40	22	38	25	47	22	28	21	SW	0	0	0	0
04-Dec-08	33	25	22	18	40	22	33	25	35	23	51	22	SE	0	0	0	0
05-Dec-08	24	25	18	18	31	22	34	25	30	23	29	22	NW	-5	-10	2	6
06-Dec-08	48	25	25	18	41	22	49	25	37	23	28	22	NW	20	-4	12	21
07-Dec-08	24	25	15	18	21	22	24	25	20	23	20	22	NW	4	-5	1	4
08-Dec-08	15	25	12	18	15	22	13	25	15	23	16	22	SE	0	0	0	0
09-Dec-08	29	25	21	18	20	22	29	25	21	23	16	21	NW	14	5	5	13
10-Dec-08	NA	25	24	18	41	22	40	25	37	23	39	21	SE	0	0	0	0
11-Dec-08	18	25	14	18	20	22	19	25	18	23	24	22	SE	0	0	0	0
12-Dec-08	11	25	8	18	12	22	12	25	13	23	11	21	SE	0	0	0	0
13-Dec-08	30	25	14	18	21	22	30	25	18	23	16	21	NW	14	-3	5	14
14-Dec-08	43	25	19	18	34	22	38	25	29	23	22	21	NW	21	-4	12	16
15-Dec-08	21	25	13	18	21	22	22	25	20	23	18	21	NW	3	-6	3	4
16-Dec-08	33	25	20	18	35	22	34	25	26	23	21	21	NW	12	-2	13	13
17-Dec-08	44	25	26	18	38	22	43	25	40	23	30	21	NW	15	-4	8	14
18-Dec-08	55	26	22	18	47	22	45	25	59	23	30	21	NW	25	-8	17	15
19-Dec-08	34	26	18	18	32	22	31	25	35	23	28	21	SE	0	0	0	0
20-Dec-08	21	26	15	18	20	22	6	25	21	23	27	21	SE	0	0	0	0
21-Dec-08	17	26	12	18	19	22	3	25	19	23	22	21	SE	0	0	0	0
22-Dec-08	25	26	17	18	31	22	3	25	35	23	37	22	SE	0	0	0	0
23-Dec-08	29	26	21	18	34	22	2	25	35	23	25	22	NW	4	-4	9	-23
24-Dec-08	20	26	15	18	17	22	4	25	17	23	19	22	SE	0	0	0	0
25-Dec-08	18	26	15	18	16	22	3	25	16	23	17	22	SE	0	0	0	0
26-Dec-08	18	26	14	18	15	22	4	25	14	23	17	22	SE	0	0	0	0
27-Dec-08	24	26	12	18	15	22	1	25	13	23	13	21	NW	11	0	3	-11
28-Dec-08	21	26	12	18	23	22	2	25	12	23	13	21	NW	8	0	10	-10
29-Dec-08	23	26	14	18	25	22	2	25	23	23	19	21	NW	4	-5	5	-17
30-Dec-08	32	26	17	18	29	22	1	25	19	23	20	21	NW	13	-3	9	-18
31-Dec-08	67	26	41	18	72	22	3	25	62	23	47	21	NW	20	-6	25	-43
01-Jan-09	34	26	24	18	39	23	1	25	31	23	26	21	NW	7	-3	13	-25

**2008 – 2009 Tapered Element Oscillating Microbalance (TEOM) PM10 Results**

Date	Site 1		Site 2		Site 3		Site 8		Site4		Site 7		Ashton Contribution (only calculated for north westerly winds)				
	Site 1 – PM10 24hr Average	Site 1 – PM10 Rolling Annual Average	Site 2 – PM10 24hr Average	Site 2 – PM10 Rolling Annual Average	Site 3 – PM10 24hr Average	Site 3 – PM10 Rolling Annual Average	Site 8 – PM10 24hr Average	Site 8 – PM10 Rolling Annual Average	Site 4 – PM10 24hr Average	Site 4 – PM10 Rolling Annual Average	Site 7 – PM10 24hr Average	Site 7 – PM10 Rolling Annual Average	Wind Direction	Site 1 Ashton Contribution	Site 2 Ashton Contribution	Site 3 Ashton Contribution	Site 8 Ashton Contribution
02-Jan-09	51	26	32	18	68	23	5	25	49	23	47	21	SE	0	0	0	0
03-Jan-09	17	26	12	18	15	23	7	25	13	23	13	21	SE	0	0	0	0
04-Jan-09	16	26	13	18	15	23	8	25	15	23	16	21	SE	0	0	0	0
05-Jan-09	53	26	25	18	42	23	25	25	32	23	20	21	NW	33	5	21	5
06-Jan-09	57	26	30	18	57	23	28	25	54	23	35	21	NW	22	-5	21	-7
07-Jan-09	69	26	39	18	63	23	39	25	61	23	38	21	NW	31	1	25	1
08-Jan-09	42	26	31	18	39	23	17	25	51	23	47	21	SE	0	0	0	0
09-Jan-09	16	26	9	18	17	23	7	25	15	23	24	21	SE	0	0	0	0
10-Jan-09	13	26	9	18	14	23	5	25	25	23	22	21	SE	0	0	0	0
11-Jan-09	17	26	12	18	17	23	8	25	N/A	23	24	21	SE	0	0	0	0
12-Jan-09	22	26	17	18	33	23	10	25	N/A	23	46	21	SE	0	0	0	0
13-Jan-09	14	26	10	18	17	23	7	25	N/A	23	24	21	SE	0	0	0	0
14-Jan-09	34	26	22	18	31	23	18	25	N/A	23	25	21	SE	0	0	0	0
15-Jan-09	82	26	37	18	65	23	46	25	83	23	47	21	NW	35	-10	18	0
16-Jan-09	37	26	26	18	48	23	17	25	78	24	54	22	SE	0	0	0	0
17-Jan-09	23	27	20	18	23	23	5	25	46	24	37	22	SE	0	0	0	0
18-Jan-09	15	27	11	18	19	23	5	25	24	24	26	22	SE	0	0	0	0
19-Jan-09	67	27	29	18	38	23	16	25	62	24	32	22	SE	0	0	0	0
20-Jan-09	54	27	32	18	40	23	20	25	49	24	29	22	NW	25	3	11	-9
21-Jan-09	67	27	32	18	50	23	28	25	60	24	35	22	NW	32	-3	15	-7
22-Jan-09	31	27	17	18	21	23	20	25	27	24	14	22	NW	17	3	7	6
23-Jan-09	28	27	18	18	25	23	28	25	22	24	11	22	NW	17	7	13	16
24-Jan-09	33	27	29	18	33	23	31	25	30	24	28	22	NW	6	2	5	3
25-Jan-09	26	27	23	18	28	23	27	25	26	24	32	22	SE	0	0	0	0
26-Jan-09	15	27	14	18	17	23	17	25	19	24	22	22	SE	0	0	0	0
27-Jan-09	25	27	14	18	28	23	19	25	37	24	30	22	SE	0	0	0	0
28-Jan-09	15	27	18	18	30	23	20	25	27	24	32	22	SE	0	0	0	0
29-Jan-09	25	27	20	18	28	23	27	25	29	24	35	22	SE	0	0	0	0
30-Jan-09	21	27	21	18	34	23	27	25	41	24	26	22	SE	0	0	0	0
31-Jan-09	27	27	21	18	27	23	26	25	33	24	28	22	SE	0	0	0	0
01-Feb-09	24	27	22	18	34	23	30	25	40	24	38	22	SE	0	0	0	0
02-Feb-09	22	27	21	18	39	24	30	25	41	25	31	22	SE	0	0	0	0
03-Feb-09	27	27	23	18	38	24	32	25	45	25	38	22	SE	0	0	0	0
04-Feb-09	21	27	21	18	35	24	28	25	33	25	30	22	SE	0	0	0	0
05-Feb-09	26	27	24	18	42	24	34	25	40	25	31	22	SE	0	0	0	0
06-Feb-09	23	27	24	19	34	24	32	25	34	25	24	22	SE	0	0	0	0
07-Feb-09	17	27	17	19	23	24	22	25	24	25	17	22	SE	0	0	0	0
08-Feb-09	29	27	24	19	36	24	35	25	38	25	26	22	SE	0	0	0	0
09-Feb-09	39	27	33	19	60	24	45	25	76	25	52	22	SE	0	0	0	0
10-Feb-09	10	27	10	19	15	24	13	25	16	25	11	22	SE	0	0	0	0
11-Feb-09	10	27	11	19	13	24	12	25	11	25	11	22	SE	0	0	0	0
12-Feb-09	11	27	10	19	13	24	11	25	13	25	17	22	SE	0	0	0	0
13-Feb-09	10	27	9	19	12	24	10	25	11	25	17	22	SE	0	0	0	0
14-Feb-09	7	27	6	19	8	24	7	25	7	25	7	22	SE	0	0	0	0
15-Feb-09	5	27	5	19	6	24	5	24	5	25	8	22	SE	0	0	0	0
16-Feb-09	13	27	12	19	14	24	13	24	15	25	21	22	SE	0	0	0	0
17-Feb-09	12	27	10	19	13	24	12	24	14	25	13	22	SE	0	0	0	0
18-Feb-09	10	27	11	19	12	24	11	24	11	25	12	22	SE	0	0	0	0
19-Feb-09	21	27	14	19	22	24	20	24	18	25	18	22	NE	0	0	0	0
20-Feb-09	34	27	26	19	35	24	35	24	34	25	34	22	SE	0	0	0	0
21-Feb-09	21	27	18	19	24	24	23	24	23	25	27	22	SE	0	0	0	0
22-Feb-09	16	27	14	19	17	24	17	24	17	25	21	22	SE	0	0	0	0
23-Feb-09	35	27	31	19	32	24	36	24	38	25	31	22	NE	0	0	0	0
24-Feb-09	38	27	22	19	31	24	38	24	30	25	27	22	SW	0	0	0	0
25-Feb-09	40	27	31	19	37	24	40	24	37	25	44	22	SE	0	0	0	0
26-Feb-09	25	27	22	19	28	24	27	25	26	25	33	22	SE	0	0	0	0
27-Feb-09	14	27	12	19	20	24	17	24	17	25	18	22	SE	0	0	0	0
28-Feb-09	46	27	32	19	39	24	41	25	41	25	24	22	NW	21	7	15	17
01-Mar-09	33	27	28	19	36	24	37	25	37	25	42	22	SE	0	0	0	0
02-Mar-09	17	27	14	19	23	24	19	25	25	25	29	22	SE	0	0	0	0
03-Mar-09	20	27	15	19	26	24	21	25	29	25	24	22	SE	0	0	0	0



**2008 – 2009 Tapered Element Oscillating Microbalance (TEOM) PM10 Results**

Date	Site 1		Site 2		Site 3		Site 8		Site4		Site 7		Ashton Contribution (only calculated for north westerly winds)				
	Site 1 – PM10 24hr Average	Site 1 – PM10 Rolling Annual Average	Site 2 – PM10 24hr Average	Site 2 – PM10 Rolling Annual Average	Site 3 – PM10 24hr Average	Site 3 – PM10 Rolling Annual Average	Site 8 – PM10 24hr Average	Site 8 – PM10 Rolling Annual Average	Site 4 – PM10 24hr Average	Site 4 – PM10 Rolling Annual Average	Site 7 – PM10 24hr Average	Site 7 – PM10 Rolling Annual Average	Wind Direction	Site 1 Ashton Contribution	Site 2 Ashton Contribution	Site 3 Ashton Contribution	Site 8 Ashton Contribution
04-Mar-09	67	28	55	19	64	24	71	25	65	25	47	22	NW	21	9	17	24
05-Mar-09	80	28	48	19	75	24	86	25	75	26	58	22	NW	22	-10	17	28
06-Mar-09	42	28	33	19	40	24	46	25	44	26	37	22	NW	5	-4	3	9
07-Mar-09	32	28	28	19	32	24	37	25	39	26	32	22	SE	0	0	0	0
08-Mar-09	31	28	24	19	32	24	44	25	33	26	42	22	SE	0	0	0	0
09-Mar-09	21	28	16	19	31	24	24	25	34	26	30	22	SE	0	0	0	0
10-Mar-09	17	28	14	19	23	24	20	25	27	26	27	22	SE	0	0	0	0
11-Mar-09	14	28	10	19	18	24	15	25	20	26	23	22	SE	0	0	0	0
12-Mar-09	14	28	10	19	20	24	14	25	22	26	22	22	SE	0	0	0	0
13-Mar-09	20	28	14	19	17	24	18	25	22	26	18	22	SW	0	0	0	0
14-Mar-09	16	28	11	19	12	24	13	25	14	26	13	22	NW	2	-3	-1	0
15-Mar-09	15	28	10	19	11	24	13	25	12	26	9	22	SW	0	0	0	0
16-Mar-09	42	28	18	19	28	24	39	25	23	26	16	22	NW	26	2	12	23
17-Mar-09	23	28	17	19	26	24	26	25	26	26	22	22	NE	0	0	0	0
18-Mar-09	19	28	18	19	22	24	24	25	27	26	29	22	SE	0	0	0	0
19-Mar-09	25	28	26	19	26	24	28	25	30	26	21	22	NW	4	5	5	7
20-Mar-09	19	28	17	19	25	24	22	25	33	26	30	22	SE	0	0	0	0
21-Mar-09	12	28	10	19	12	24	11	25	15	26	13	22	SE	0	0	0	0
22-Mar-09	14	28	12	19	16	24	15	25	16	26	13	22	SE	0	0	0	0
23-Mar-09	34	28	25	19	34	24	36	25	36	26	29	22	SE	0	0	0	0
24-Mar-09	39	28	32	19	39	24	41	25	58	26	40	22	SE	0	0	0	0
25-Mar-09	39	28	32	19	40	25	45	25	63	26	33	22	SE	0	0	0	0
26-Mar-09	39	28	29	19	40	25	41	25	49	26	28	22	NW	11	1	12	13
27-Mar-09	35	28	24	19	38	25	35	25	33	26	37	23	SE	0	0	0	0
28-Mar-09	17	28	14	19	24	25	18	25	22	26	20	23	SE	0	0	0	0
29-Mar-09	14	28	12	19	15	25	15	25	16	26	19	23	SE	0	0	0	0
30-Mar-09	12	28	11	19	18	24	15	25	17	26	18	22	SE	0	0	0	0
31-Mar-09	12	28	10	19	11	24	12	25	13	26	10	22	SE	0	0	0	0
01-Apr-09	9	28	8	19	8	24	9	25	9	26	8	22	SE	0	0	0	0
02-Apr-09	12	28	10	19	12	24	12	25	12	26	16	22	SE	0	0	0	0
03-Apr-09	10	27	9	19	9	24	10	25	10	25	14	22	SE	0	0	0	0
04-Apr-09	14	27	13	19	14	24	16	25	15	25	19	22	SE	0	0	0	0
05-Apr-09	18	27	15	19	19	24	20	25	20	25	23	22	SE	0	0	0	0
06-Apr-09	18	27	16	19	20	24	20	25	20	25	25	22	SE	0	0	0	0
07-Apr-09	16	27	12	19	16	24	16	25	17	25	27	22	SE	0	0	0	0
08-Apr-09	13	27	12	19	15	24	15	25	17	25	19	22	SE	0	0	0	0
09-Apr-09	7	27	6	19	9	24	7	25	10	25	18	22	SE	0	0	0	0
10-Apr-09	17	27	14	19	17	24	17	25	18	25	15	22	NW	2	-1	2	2
11-Apr-09	20	27	16	19	21	24	22	25	23	25	22	22	NW	-3	-6	-1	0
12-Apr-09	23	27	17	19	16	24	20	25	16	25	16	22	NW	7	1	0	5
13-Apr-09	17	27	14	19	N/A	24	18	25	20	25	17	22	SE	0	0	0	0
14-Apr-09	27	27	18	19	N/A	24	24	25	21	25	14	22	NW	13	4	NA	11
15-Apr-09	69	28	21	19	N/A	24	58	25	32	25	19	22	NW	50	2	NA	39
16-Apr-09	82	28	61	19	N/A	24	93	25	108	26	67	22	NW	15	-6	NA	26
17-Apr-09	55	28	43	19	N/A	24	62	25	31	26	53	23	SE	0	0	0	0
18-Apr-09	18	28	18	19	N/A	24	21	25	22	26	21	23	SE	0	0	0	0
19-Apr-09	15	28	13	19	N/A	24	17	25	15	26	16	23	SE	0	0	0	0
20-Apr-09	13	28	9	19	6	24	12	25	14	26	14	23	SE	0	0	0	0
21-Apr-09	13	28	10	19	14	24	14	25	14	26	21	23	SE	0	0	0	0
22-Apr-09	8	28	7	19	11	24	9	25	11	26	12	23	SE	0	0	0	0
23-Apr-09	11	28	10	19	15	24	13	25	13	26	18	23	SE	0	0	0	0
24-Apr-09	30	28	25	19	22	24	30	25	28	26	23	23	NW	7	2	-1	6
25-Apr-09	116	28	74	19	108	25	128	25	79	26	84	23	NW	37	-5	30	49
26-Apr-09	65	28	27	19	64	25	67	25	73	26	35	23	NW	29	-8	29	31
27-Apr-09	70	29	34	19	47	25	63	25	40	26	27	23	NW	44	7	21	37
28-Apr-09	52	29	16	19	29	25	44	25	24	26	18	23	NW	34	-2	12	26
29-Apr-09	16	29	13	19	18	25	17	25	18	26	21	23	SE	0	0	0	0
30-Apr-09	10	29	9	19	9	25	9	25	8	26	11	23	SE	0	0	0	0
01-May-09	22	29	18	19	20	25	21	25	20	26	16	23	NW	5	1	4	5
02-May-09	15	28	14	19	14	25	16	25	19	26	16	23	SE	0	0	0	0
03-May-09	12	28	10	19	14	25	12	25	14	26	15	23	SE	0	0	0	0

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Date	Site 1		Site 2		Site 3		Site 8		Site4		Site 7		Ashton Contribution (only calculated for north westerly winds)				
	Site 1 – PM10 24hr Average	Site 1 – PM10 Rolling Annual Average	Site 2 – PM10 24hr Average	Site 2 – PM10 Rolling Annual Average	Site 3 – PM10 24hr Average	Site 3 – PM10 Rolling Annual Average	Site 8 – PM10 24hr Average	Site 8 – PM10 Rolling Annual Average	Site 4 – PM10 24hr Average	Site 4 – PM10 Rolling Annual Average	Site 7 – PM10 24hr Average	Site 7 – PM10 Rolling Annual Average	Wind Direction	Site 1 Ashton Contribution	Site 2 Ashton Contribution	Site 3 Ashton Contribution	Site 8 Ashton Contribution
04-May-09	17	28	16	19	17	25	15	25	18	26	16	23	NW	2	0	1	0
05-May-09	16	28	16	19	17	25	15	25	18	26	18	23	NE	0	0	0	0
06-May-09	17	28	15	19	16	25	16	25	13	26	17	23	NE	0	0	0	0
07-May-09	27	28	20	19	24	24	28	25	25	26	23	23	NW	3	-4	1	4
08-May-09	26	28	21	19	24	24	26	25	24	26	25	23	SE	0	0	0	0
09-May-09	23	28	19	19	16	24	20	25	19	26	17	23	NW	6	2	-1	3
10-May-09	18	28	16	19	21	24	20	25	22	26	20	23	SE	0	0	0	0
11-May-09	19	28	18	19	21	24	19	25	19	26	23	23	SE	0	0	0	0
12-May-09	22	28	19	19	22	24	25	25	23	26	18	23	NW	4	1	4	7
13-May-09	62	28	32	19	43	25	72	25	49	26	26	23	NW	36	6	17	46
14-May-09	63	29	33	19	47	25	64	25	48	26	31	23	NW	33	3	16	33
15-May-09	60	29	24	19	51	25	65	25	52	26	24	23	NW	37	0	27	41
16-May-09	62	29	21	19	49	25	69	25	59	26	24	23	NW	38	-3	25	45
17-May-09	27	29	19	19	28	25	31	25	25	26	26	23	NW	1	-7	2	5
18-May-09	22	29	20	19	28	25	26	25	26	27	34	23	SE	0	0	0	0
19-May-09	13	29	11	19	20	25	15	25	23	27	25	23	SE	0	0	0	0
20-May-09	12	29	10	19	21	25	14	25	18	26	21	23	SE	0	0	0	0
21-May-09	13	29	11	19	13	25	14	25	14	26	18	23	SE	0	0	0	0
22-May-09	12	28	11	19	12	25	12	25	14	26	15	23	SE	0	0	0	0
23-May-09	15	28	13	19	14	25	16	25	16	26	19	23	SE	0	0	0	0
24-May-09	16	28	15	19	18	25	17	25	17	26	22	23	SE	0	0	0	0
25-May-09	13	28	13	19	15	25	15	25	15	26	16	23	SE	0	0	0	0
26-May-09	22	28	14	19	21	25	23	25	22	26	14	23	NW	8	0	7	8
27-May-09	33	28	25	19	31	25	39	25	33	26	20	23	NW	13	5	11	19
28-May-09	20	28	17	19	18	24	21	25	19	26	15	23	NW	5	2	3	6
29-May-09	13	28	12	19	12	24	12	25	14	26	14	23	SE	0	0	0	0
30-May-09	8	28	8	19	8	24	8	25	10	26	11	23	SE	0	0	0	0
31-May-09	10	28	9	19	11	24	11	25	12	26	13	23	SE	0	0	0	0
01-Jun-09	14	28	12	19	18	24	16	25	19	26	19	23	SE	0	0	0	0
02-Jun-09	12	28	11	19	16	24	14	25	18	26	17	23	SE	0	0	0	0
03-Jun-09	7	28	7	19	11	24	9	25	11	26	10	23	SE	0	0	0	0
04-Jun-09	18	28	16	19	15	24	18	25	17	26	16	23	NW	1	0	-1	2
05-Jun-09	29	28	13	19	18	25	21	25	23	26	11	23	NW	18	2	7	10
06-Jun-09	23	28	11	19	14	25	19	25	14	26	9	23	NW	13	1	4	9
07-Jun-09	18	28	11	19	16	25	19	25	16	26	10	23	NW	9	1	6	9
08-Jun-09	23	28	11	19	13	25	23	25	14	26	9	23	NW	15	2	4	14
09-Jun-09	32	29	11	19	15	25	29	25	17	26	8	23	NW	24	2	7	21
10-Jun-09	33	29	12	19	19	25	30	25	23	26	10	23	NW	22	2	9	19
11-Jun-09	29	29	12	19	25	25	26	25	24	26	10	23	NW	20	3	15	16
12-Jun-09	26	29	16	19	19	25	24	25	20	26	14	23	NW	11	2	5	10
13-Jun-09	32	29	22	19	27	25	31	25	28	26	17	23	NW	14	5	9	14
14-Jun-09	25	29	17	19	23	25	25	25	28	26	21	23	NW	4	-4	2	4
15-Jun-09	38	29	22	19	24	25	33	25	25	27	21	23	NW	17	0	2	11
16-Jun-09	29	29	17	19	24	25	30	25	24	27	21	23	NW	8	-4	3	9
17-Jun-09	12	29	11	19	15	25	13	25	13	27	16	23	SE	0	0	0	0
18-Jun-09	8	29	9	19	19	25	10	25	11	27	11	23	SE	0	0	0	0
19-Jun-09	8	29	7	19	10	25	9	25	10	27	9	23	SE	0	0	0	0
20-Jun-09	6	29	6	19	7	25	7	25	8	27	10	23	SE	0	0	0	0
21-Jun-09	16	29	11	19	12	25	15	25	15	26	9	23	NW	7	2	3	6
22-Jun-09	12	29	11	19	7	25	10	25	13	27	7	23	NW	5	4	0	3
23-Jun-09	15	28	14	19	20	25	15	25	16	26	12	23	NW	3	1	8	2
24-Jun-09	27	28	14	19	15	25	27	25	21	26	12	23	NW	15	2	3	15
25-Jun-09	38	28	19	19	26	25	37	25	24	26	15	23	NW	23	4	11	22
26-Jun-09	30	28	18	19	25	25	26	25	21	26	20	23	NW	10	-2	5	6
27-Jun-09	33	28	23	19	25	25	36	25	28	26	20	23	NW	13	3	5	16
28-Jun-09	25	28	10	19	14	25	20	25	13	26	9	23	NW	16	1	5	12
29-Jun-09	32	28	19	19	17	25	26	25	24	26	13	23	NW	19	5	4	13
30-Jun-09	39	28	25	19	26	25	35	25	25	26	21	23	NW	18	4	5	14
01-Jul-09	120	28	67	19	107	25	128	25	111	26	78	23	NW	43	-11	30	50
02-Jul-09	66	28	30	19	45	25	68	25	46	27	31	23	NW	35	-1	14	36
03-Jul-09	38	28	11	19	19	25	36	25	22	27	13	23	NW	26	-2	6	23

**2008 – 2009 Tapered Element Oscillating Microbalance (TEOM) PM10 Results**

Date	Site 1		Site 2		Site 3		Site 8		Site4		Site 7		Ashton Contribution (only calculated for north westerly winds)				
	Site 1 – PM10 24hr Average	Site 1 – PM10 Rolling Annual Average	Site 2 – PM10 24hr Average	Site 2 – PM10 Rolling Annual Average	Site 3 – PM10 24hr Average	Site 3 – PM10 Rolling Annual Average	Site 8 – PM10 24hr Average	Site 8 – PM10 Rolling Annual Average	Site 4 – PM10 24hr Average	Site 4 – PM10 Rolling Annual Average	Site 7 – PM10 24hr Average	Site 7 – PM10 Rolling Annual Average	Wind Direction	Site 1 Ashton Contribution	Site 2 Ashton Contribution	Site 3 Ashton Contribution	Site 8 Ashton Contribution
04-Jul-09	26	28	16	19	17	25	25	25	23	27	15	23	NW	11	1	2	10
05-Jul-09	22	28	12	19	12	25	16	25	16	27	10	23	NW	12	2	2	6
06-Jul-09	33	29	20	19	29	25	33	25	29	27	19	23	NW	14	1	9	14
07-Jul-09	18	28	15	19	21	25	21	25	23	27	22	23	SE	0	0	0	0
08-Jul-09	16	29	12	19	19	25	18	25	16	27	17	23	SE	0	0	0	0
09-Jul-09	12	29	14	19	14	25	16	25	15	27	13	23	SE	0	0	0	0
10-Jul-09	8	28	8	19	13	25	11	25	12	27	14	23	SE	0	0	0	0
11-Jul-09	11	28	10	19	9	25	10	25	12	27	10	23	NW	1	0	-1	0
12-Jul-09	25	28	20	19	15	25	22	25	19	27	16	23	NW	9	4	0	6
13-Jul-09	22	28	18	19	15	25	19	25	21	27	15	23	NW	7	4	0	5
14-Jul-09	30	28	13	19	20	25	29	25	22	27	12	23	NW	18	1	7	16
15-Jul-09	14	28	10	19	12	25	16	25	17	27	14	23	SW	0	0	0	0
16-Jul-09	12	28	8	19	8	25	11	25	12	27	7	23	NW	5	1	1	3
17-Jul-09	15	28	14	19	15	25	19	25	14	27	13	23	NW	2	1	2	5
18-Jul-09	19	28	13	19	12	25	17	25	15	27	10	23	NW	9	3	2	7
19-Jul-09	24	28	19	19	14	25	22	25	17	27	14	23	NW	10	5	0	9
20-Jul-09	24	28	24	19	22	25	24	25	24	27	16	23	NW	8	8	6	8
21-Jul-09	34	28	27	19	33	25	37	25	38	27	31	23	NW	3	-4	2	6
22-Jul-09	33	28	29	19	27	25	30	25	34	27	28	23	NW	5	1	-1	2
23-Jul-09	16	28	10	19	13	25	18	25	16	27	13	23	NW	3	-3	0	5
24-Jul-09	17	28	14	19	14	25	19	25	15	27	13	23	NW	4	1	1	6
25-Jul-09	15	28	11	19	13	25	16	25	17	27	11	23	NW	4	0	2	5
26-Jul-09	15	28	14	19	16	25	18	25	20	27	14	23	NW	1	0	3	4
27-Jul-09	23	28	16	19	15	25	19	25	19	27	12	23	NW	11	5	3	8
28-Jul-09	32	28	15	19	18	25	29	25	22	27	12	23	NW	20	3	6	17
29-Jul-09	26	28	19	19	20	25	29	25	23	27	17	23	NW	9	2	3	12
30-Jul-09	27	28	14	19	16	25	22	25	25	27	11	23	NW	16	2	5	11
31-Jul-09	35	28	22	19	25	25	33	25	27	27	19	23	NW	17	3	6	14
01-Aug-09	20	28	16	19	17	25	19	25	19	27	12	23	NW	7	4	4	7
02-Aug-09	21	28	14	19	17	25	22	25	21	27	13	23	NW	8	0	4	9
03-Aug-09	34	28	20	19	27	25	31	25	28	27	15	23	NW	20	5	13	16
04-Aug-09	30	28	18	19	31	25	34	25	29	27	18	23	NW	12	0	13	16
05-Aug-09	26	28	20	19	29	25	28	25	33	27	24	23	NW	2	-5	4	3
06-Aug-09	24	28	16	19	25	25	26	25	33	27	18	23	NW	5	-2	7	8
07-Aug-09	44	28	33	19	49	25	44	25	49	27	44	23	NW	0	-11	6	1
08-Aug-09	20	28	14	19	18	25	20	25	21	27	17	23	SE	0	0	0	0
09-Aug-09	28	28	18	19	25	25	27	25	28	27	18	23	NW	9	-1	6	9
10-Aug-09	28	28	23	19	31	25	34	25	34	27	32	23	SE	0	0	0	0
11-Aug-09	32	28	26	19	40	25	40	25	43	27	38	23	SE	0	0	0	0
12-Aug-09	44	28	24	19	34	25	40	25	32	27	23	23	NW	21	1	11	17
13-Aug-09	56	28	26	19	43	25	51	25	39	27	25	23	NW	30	0	18	25
14-Aug-09	40	28	30	19	34	25	41	25	50	27	29	23	NW	11	1	5	12
15-Aug-09	40	28	26	19	35	25	40	25	34	27	21	23	NW	19	5	14	20
16-Aug-09	41	28	25	19	30	25	37	25	27	27	20	23	NW	21	5	10	17
17-Aug-09	79	28	39	19	66	25	71	25	65	28	44	23	NW	35	-5	22	27
18-Aug-09	28	28	23	19	28	25	31	25	33	28	24	23	NW	4	0	4	7
19-Aug-09	33	28	27	19	34	26	39	25	45	28	29	23	NW	5	-1	5	11
20-Aug-09	45	28	33	19	43	26	50	25	57	28	37	23	NW	8	-4	6	13
21-Aug-09	85	28	51	19	78	26	79	25	95	28	57	23	NW	29	-6	21	22
22-Aug-09	26	28	16	19	24	26	24	25	24	28	17	23	NW	9	-1	7	7
23-Aug-09	29	28	20	19	28	26	31	25	31	28	24	23	SE	0	0	0	0
24-Aug-09	47	29	21	19	37	26	44	25	33	28	30	24	NW	17	-9	7	14
25-Aug-09	104	29	39	19	70	26	97	25	62	28	52	24	NW	53	-13	18	45
26-Aug-09	70	29	27	19	49	26	65	25	55	28	31	24	NW	39	-4	17	34
27-Aug-09	52	29	37	19	63	26	50	25	68	28	25	24	NW	27	12	38	25
28-Aug-09	81	29	37	19	59	26	80	25	57	28	44	24	NW	37	-6	15	36
29-Aug-09	70	29	33	20	65	26	82	25	57	29	39	24	NW	31	-6	26	42
30-Aug-09	40	29	9	20	26	26	29	25	17	29	11	24	NW	29	-2	16	18
31-Aug-09	43	29	17	20	31	26	38	25	28	29	16	24	NW	28	2	15	23

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**APPENDIX 2**

**GROUNDWATER REPORT**

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# Water and Environment

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## **ASHTON COAL MINE 2008-2009 AEMR GROUNDWATER MANAGEMENT REPORT**

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Prepared for      Ashton Coal Operations Pty Ltd

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Date of Issue      30 October 2009

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Our Reference      S56C/600/003a

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**ASHTON COAL MINE 2008-2009 AEMR  
GROUNDWATER MANAGEMENT REPORT**

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Prepared for      Ashton Coal Operations Pty Ltd

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Date of Issue      30 October 2009

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Our Reference      S56C/600/003a

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## ASHTON COAL MINE 2008-2009 AEMR GROUNDWATER MANAGEMENT REPORT

	Date	Revision Description
<b>Revision</b>	A	Issued for client review
	B	Final

	Name	Position	Signature	Date
<b>Originator</b>	Jason van den Akker	Project Hydrogeologist		17/9/2009
<b>Reviewer</b>	Peter Dundon	Senior Principal		30/10/2009

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## **EXECUTIVE SUMMARY**

This report has been prepared in accordance with Consent Condition 9.2 (d) of the Ashton Coal Project Approval and covers the reporting period 1 September 2008 to 1 September 2009. This report has been prepared as a supporting document for the Ashton Coal Operations Ltd 2008-2009 Annual Environmental Management Report.

This report details the monitoring and other work carried out as part of the groundwater management activities for the project. The results of all groundwater monitoring are presented, together with analysis of trends. Actual impacts derived from the analysis of this data are compared to the impacts predicted for this stage of mining in both the EIS studies and studies carried out in support of the LW1-4 SMP Application.

Over the 2008-09 reporting period:

- ▼ The groundwater monitoring network was expanded to establish baseline conditions in the Glennies Creek alluvium and the main coal seams as part of the proposed South East Open Cut project and mining of the Upper Liddell seam in the underground area.
- ▼ Groundwater monitoring frequency was altered in preparation of the extension of mining of the Pikes Gully Seam beyond LW1-4.
- ▼ Apart from the initial drawdown observed in the Glennies Creek alluvium during the mining of LW1, no mining impacts have been observed in the Glennies Creek, Bowmans Creek and Hunter river alluvium.
- ▼ Large drawdown responses in the Pikes Gully and Permian overburden units have continued to be observed in the immediate LW1-4 mining area. Piezometers located in the barrier between LW1 and Glennies Creek did not show any additional responses to underground mining.
- ▼ Total groundwater inflows to the underground mine (1.8 to 7.4 L/s) have been below inflow rates predicted in the EIS at this stage of mining (13.5 to 15 L/s).
- ▼ Seepage inflows to the underground mine from Glennies Creek alluvium (0.8 to 1.7 L/s) have been below the EIS predictions at this stage of mining (2.8 to 3 L/s).

In conclusion, the monitoring program has been carried out generally in accordance with the Ashton Ground Water Management Plan (GWMP) and the requirements detailed in the Consent Conditions. All groundwater-related impacts from underground mining during the review period were below the levels predicted in the EIS (2001), and in the LW1-4 SMP groundwater assessment carried out in 2006 (Dundon and Associates, 2006).



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## **1 INTRODUCTION**

The Ashton Coal Project, located 14km west of Singleton in the Hunter Valley Region (**Figure 1**) consist of both open cut and underground mining operations to access a series of coal seams within the Permian Foybrook Formation.

The Ashton Coal Project was granted approval on 11 October 2002 (Department of Planning, 2002). The development approval (DA) included both the open cut mine located to the north of the New England Highway, and the underground mine south of the highway.

The open cut mine commenced operations in 2003. Coal is recovered from several seams of varying thickness.

The approved underground mine comprised eight longwall panels. The first four panels (LWs 1 to 4) were approved for mining of the Pikes Gully Seam under a Subsidence Management Plan (SMP) Application lodged and approved in 2006. Underground mine development commenced in July 2006, and mining has now been completed in LW1, LW2 and LW3. LW4 is in progress.

A revised mine plan for continued mining of the Pikes Gully Seam west of LW1-LW4 comprising a combination of longwalls and miniwalls (LW/MW 5-9) was prepared by Ashton Coal Operations Pty Ltd (ACOL) and an SMP Application lodged. SMP approval for LW5, LW6, MW7 and MW8 was granted on 2 July 2009.

Consent Condition 9.2 of the Project Approval requires that ACOL prepares and submits an Annual Environmental Management Report (AEMR) throughout the life of the project and for five years after completion of mining in the DA area. Condition 9.2 (d) requires that the AEMR shall include (inter alia):

- d) a Groundwater Management Report prepared by an independent expert to the satisfaction of DIPNR, addressing:*
  - i) work done under, and the level of compliance with, the groundwater management measures defined in the Groundwater Management Plan; and*
  - ii) identification of trends in groundwater monitoring data and comparison with predictions, in documents referred to in condition 1.2 and any previous SMIARs, over the life of the mining operations.*

This report covers the reporting period 1 September 2008 to 1 September 2009, and is prepared as a supporting document for ACOL's 2008-2009 AEMR.

This document presents a review of the groundwater management work undertaken and the level of compliance with the consent conditions and with the Groundwater Management Plan (GWMP). A brief analysis of trends displayed by the monitoring data is presented, together with a comparison of the observed trends with predictions made in the Environmental Impact Statement (EIS) and the Subsidence Management Plan (SMP) for Pikes Gully Seam LWs1 to 4.



## 2 GROUNDWATER MONITORING

### 2.1 PIEZOMETERS

ACOL maintains a comprehensive groundwater monitoring program on 96 piezometer bores, as well as monitoring within the underground mine. The network of monitoring piezometers, their function and current status are detailed in **Table 2.1**. The piezometers include both open standpipes and multi-level vibrating wire piezometer bores. Locations are shown on **Figure 1**.

**Table 2.1: Ashton Coal Project Monitoring Bore Network**

Bore	Location	Aquifer/ Geological Unit*	Type of Monitoring Bore**	Comments
<b><u>Open Cut Monitoring:</u></b>				
GM1	Rail loop	UL	SP	EIS recommended monitoring bores. Installed 2003.
GM3	Camberwell Village	GC alluvium	SP	
GM3A	Village	UB	SP	
WML172	Glennies Ck		SP	Replacements for OC1 and OC2 (lost to mining activity). Installed 2007.
WML173	Glennies Ck		SP	
WML174	Glennies Ck Rd		SP	
<b><u>Underground Mine Monitoring:</u></b>				
RM01	Bowmans Creek		SP	EIS Investigations. Installed 2001.
RM02			SP	
RM03			SP	
RM04			SP	
RM05			SP	
RM06			SP	
RM07			SP	
RM09			SP	
RM10			SP	
RA01				
RSGM1		Seam unknown	SP	
PB1		BC Alluvium	SP	
RA8		Colluvium	SP	Bowmans Creek alluvium investigations
RA10		BC Alluvium	SP	



ASHTON COAL MINE 2008-2009 AEMR GROUNDWATER MANAGEMENT REPORT  
**GROUNDWATER MONITORING**

Bore	Location	Aquifer/ Geological Unit*	Type of Monitoring Bore**	Comments
RA12		Colluvium	SP	(2007)
RA14		BC Alluvium	SP	
RA16		Colluvium	SP	
RA17		BC Alluvium	SP	
RA18		BC Alluvium	SP	
RA30		BC Alluvium	SP	Bowmans Creek alluvium investigations (2007)
T1-A		BC Alluvium	SP	
T1-P		CM OB	SP	
T2-A		BC Alluvium	SP	
T2-P		CM OB	SP	
T3-A		BC Alluvium	SP	
T3-P		CM OB	SP	
T4-A		BC Alluvium	SP	
T4-P		CM OB	SP	
T5		BC Alluvium	SP	
T6		BC Alluvium	SP	
T7		BC Alluvium	SP	
T10		BC Alluvium	SP	
WML20	Within underground mine	PG	SP	EIS Investigations. Installed 2001.
WML21		PG	SP	
WML106		Lem15	VW	Subsidence monitoring network-UG mine (2006-2007)
		Lem19		
		PG		
WML107A		Lem11	VW	
		Lem15		
		Lem19		
WML107B		Lem8-9	SP	
WML108A		Lem11-12	VW	
		Lem15		
WML108B		Lem8-9	SP	
WML109A		Lem8-9	VW	



Bore	Location	Aquifer/ Geological Unit*	Type of Monitoring Bore**	Comments
		Lem12		
		Lem15		
<b>WML109B</b>		Lem7	SP	
<b>WML110A</b>		Lem6	VW	
		Lem8-9 IB		
		Lem11-12		
		Lem15		
<b>WML110B</b>		CM OB	SP	
<b>WML110C</b>		Colluvium	SP	
<b>WML111A</b>		Lem4	VW	
		Lem7		
		Lem11-12		
		Lem15		
<b>WML111B</b>		CM OB	SP	
<b>WML112A</b>		Lem2-3	VW	Subsidence monitoring network-UG mine (2006-2007)
		Lem6-7		
		Lem8		
		Lem15		
<b>WML112B</b>		Bays 1-2	SP	
<b>WML112C</b>		Alluvium	SP	
<b>WML113A</b>		Bays2	VW	
		Lem3-4		
		Lem9		
		Lem10-12		
<b>WML113B</b>		Bays1	SP	
<b>WML113C</b>		Alluvium	SP	
<b>WML114A</b>		Lem10-12	VW	
		Lem15		
		Lem19		
<b>WML114B</b>		Lem6-9	SP	
<b>WML115A</b>		Lem7	VW	



ASHTON COAL MINE 2008-2009 AEMR GROUNDWATER MANAGEMENT REPORT  
**GROUNDWATER MONITORING**

Bore	Location	Aquifer/ Geological Unit*	Type of Monitoring Bore**	Comments
		Lem8-9		
		Lem15		
		Lem19		
		PG		
<b>WML115B</b>		CM OB	SP	
<b>WML115C</b>		Alluvium	SP	
<b>WML189</b>		Lem15	VW	Subsidence impacts of LW2-3 (2007)
		PG		
		Arties		
<b>WML191</b>		Lem15	VW	Multi-seam baseline monitoring (2007)
		PG		
		UL		
		ULL		
		LB		
<b>WML213</b>		Bays	VW	Multi-seam baseline monitoring (2008)
		Lem 8-9		
		Lem 15		
		Lem 19		
		PG		
		UL		
		ULL		
		LB		
<b>WML119</b>	Between Glennies Ck and LW1	PG	SP	Monitoring of impacts of LW1-4 on Glennies Ck alluvium (2006)
<b>WML120A</b>		PG	SP	
<b>WML120B</b>		GC alluvium	SP	
<b>WML129</b>		GC alluvium	SP	
<b>WML181</b>		PG	SP	
<b>WML182</b>	PG	SP	Monitoring subsidence impacts in barrier between LW1 and Glennies Ck (2007)	
<b>WML183</b>	PG	SP		
<b>WML184</b>	PG	SP		
<b>WML185</b>	PG	SP		
		PG		SP



Bore	Location	Aquifer/ Geological Unit*	Type of Monitoring Bore**	Comments
WML186		PG	SP	
WMLC248		ULL	VW	ULD subsidence management plan (2009)
		ULLL		
		LB		
		Heb1		
WML261		UL	SP	
WML262		UL	SP	
WMLC144	East of Glennies Ck	UL	VW	Deeper seam baseline monitoring (2007)
		ML1		
		ML2		
		ULL		
		LLL		
		UB		
		LB		
WMLC245		UL	VW	
		MLD		
		LB		
		LB-Heb interburden		
WML239		GC alluvium	SP	Monitoring of impacts on Glennies Ck alluvium (2006)
WML240		GC alluvium	SP	
WML241		GC alluvium	SP	
WML243		GC alluvium	SP	
WML247		GC alluvium	SP	
WML249		GC alluvium	SP	
WML250		GC alluvium	SP	
WML252		GC alluvium	SP	
WML253		GC alluvium	SP	
WML294		GC alluvium	SP	
AP243		GC alluvium	SP	
AP244		GC alluvium	SP	
AP245		GC alluvium	SP	



Bore	Location	Aquifer/ Geological Unit*	Type of Monitoring Bore**	Comments
RA27	Between UG and Hunter R	HR Alluvium	SP	Monitoring impacts on HR alluvium (2008)

\* Alluvium: BC = Bowmans Creek; GC = Glennies Creek; HR = Hunter River.  
 Coal seams: Bays = Bayswater; Lem = Lemington; PG = Pikes Gully; UL = Upper Liddell seam; ML = Middle Liddell; ULL = Upper Lower Liddell; LLL = Lower Lower Liddell; UB = Upper Barrett; LB = Lower Barrett; Heb = Hebden.  
 Overburden: CM OB = coal measures overburden.

\*\* VW = multi-level vibrating wire piezometer bore; SP = standpipe piezometer.

The monitoring network has been expanded during the review period:

- ▼ In late 2008, an extensive shallow drilling program was undertaken to more accurately define the location and extent of connected alluvium adjacent to Glennies Creek. Several bores were completed as standpipe piezometers (WML239-WML253, AP243-245, and WML294), to allow sampling and hydraulic testing, as well as ongoing water level monitoring. This work was carried out in support of the hydrogeological impact assessment for the proposed South East Open Cut Mine.
- ▼ Two additional multi-level vibrating wire piezometers have been installed to establish baseline monitoring conditions of the main coal seams beneath the Pikes Gully seam in the proposed South East Open Cut area (WMLC245) and on the western side of Glennies Creek, east of LW1 (WMLC248).
- ▼ Two additional standpipe piezometers (WML261 and WML262) were completed within the Upper Liddell Coal Seam between Glennies Creek and LW1 to allow hydraulic testing and baseline monitoring in support of the Subsidence Management Plan for the mining of the Upper Liddell Seam.

The piezometers have been monitored at various frequencies during the review period, with all monitoring bores monitored at least every 3 months, while bores associated with the underground mine are generally monitored more frequently (weekly or fortnightly) during critical stages of the longwall panel advance.

The monitoring frequency was intensified in the early stages of underground mining, above that specified in the GWMP, until the groundwater system response became clear. It is proposed that the monitoring frequency will now in most cases revert to that outlined in the GWMP, while some bores in the Bowmans Creek alluvium will continue to be monitored with increased frequency in preparation for the proposed extension of mining beyond LW4. The proposed monitoring frequency for the next review period (September 2009 to August 2010) is summarised in **Table 2.2**.

A number of bores which have always been dry have now been eliminated from the monitoring network.

**Table 2.2: Ashton Coal Project- Proposed piezometer monitoring frequency**

Piezometers (refer Table 2.1)	Monitoring Frequency (2006-2007)	Monitoring Frequency (2007-2008)	Monitoring Frequency (2008-2009)	Comments
GM1	quarterly	monthly	monthly	
GM3A and GM3B	quarterly	quarterly	quarterly	



Piezometers (refer Table 2.1)	Monitoring Frequency (2006-2007)	Monitoring Frequency (2007-2008)	Monitoring Frequency (2008-2009)	Comments
GM2, GM4 and GM5	quarterly	-	-	Removed – always dry
WML172-174	not monitored	quarterly	quarterly	Replacement for OC1 and OC2
RM01 to RM10	quarterly	monthly	fortnightly	Data logger on RM9
RA01, RSGM1, PB1	quarterly	monthly	monthly	
WML20-21	weekly	weekly or monthly	weekly or monthly	
WML106-115	standpipes weekly;  VW piezos fortnightly	fortnightly or monthly	fortnightly or monthly	
WML119, 120A-B and 129	continuous (dataloggers)	monthly	continuous/monthly	Data logger on WML120a and WML120b. WML119 is damaged
WML144, 189, 191 and 213	fortnightly	weekly or fortnightly	weekly or fortnightly	
WML145-167	fortnightly	fortnightly	-	Decommissioned
WML239 - WML253, AP243- AP245 and WML294	-	-	monthly	
WML181-186	weekly	weekly	weekly	Data logger on WM184 and WML186
RA8-RA30	fortnightly	weekly	weekly	Data logger on RA27
T1-10	fortnightly	weekly or fortnightly	weekly or fortnightly	
WMLC245 and WMLC248	-	-	monthly	
WML261 and WML262	-	-	Weekly during early stages of ULD mining, then monthly	Data logger to be installed

The standpipe piezometers have been monitored for water levels, and also sampled periodically for water quality testing. Vibrating wire piezometers have been monitored for groundwater pressures only. Automatic water level data loggers have been installed in six standpipe





piezometers, to allow continuous water level monitoring in the barrier region between LW1 and Glennies Creek, and in the Bowmans Creek and Hunter River alluvium.

Selected monitoring bores were sampled periodically for detailed laboratory analysis, comprising TDS, EC, pH, major ions, dissolved metals, nutrients, cyanide, fluoride, turbidity and total suspended solids.

## **2.2 UNDERGROUND MONITORING**

Groundwater monitoring was also carried out within the underground mine, including:

- ▼ Groundwater inflow rates (metering of dewatering pipelines)
- ▼ Seepage inflows from the eastern rib of the LW1 tailgate, which is conveyed by pipeline to the LW1 backroad sump (V-notch weir at discharge from pipeline).
- ▼ Metering of water imported to the underground mine for longwall operation.
- ▼ Metering of total water volumes pumped from the mine to the dam beside the mine portal in Arties pit, or directly into the mine water management system.
- ▼ Water quality monitoring (EC) of seepage discharge from the LW1 backroad pipeline.
- ▼ Water quality monitoring at various in-mine sumps, and total water pumped out of the mine.

## **2.3 DISCUSSION OF GROUNDWATER LEVEL CHANGES**

### **2.3.1 NORTH EAST OPEN CUT**

Groundwater levels in the open cut monitoring bores completed in Permian coal measures showed continued steady decline through the review period (**Figure 2**). Bore GM3A (Glennies Creek Alluvium) was generally dry during the reporting period.

### **2.3.2 UNDERGROUND MINE**

#### **Alluvium**

Groundwater hydrographs of piezometers which monitor the Bowmans Creek Alluvium, Glennies Creek Alluvium and Hunter River Alluvium are presented in **Figures 3 to 5**.

During the reporting period, groundwater levels in the Bowmans Creek alluvium were generally stable, and show periodic influence of rainfall recharge, notably in September 2008, February 2009 and April 2009 (**Figure 3**). The long-term hydrographs of alluvium bores in the Bowmans Creek area do not show any evidence of mining-induced impacts.

Similar responses were observed in the Glennies Creek alluvium (**Figure 4**). The continuous records from WML120B and WML129 (located between LW1 and Glennies Creek) show a very slight upward trend overall, together with short-term sharp responses to rainfall recharge events (**Figure 4**). The slight upward trend at WML120B is suggesting gradual recovery of groundwater levels after the initial impacts from LW1 development in 2006.

The Hunter River alluvium piezometer RA27 shows groundwater levels responding only to periodic rainfall recharge events (**Figure 5**).

#### **Permian Coal Measures**

Composite plots of all Pikes Gully Seam and Permian overburden piezometers are presented in **Figures 6 to 11**. They include:

- ▼ Standpipe piezometers which monitor the weathered near surface coal measures overburden in the Bowmans Creek Flood plain area (**Figure 6**),
- ▼ Vibrating wire piezometers installed within the Permian overburden units - WML106 to WML115, WML189, WML191 and WML213 (**Figure 7** and **Figure 8**),
- ▼ Pikes Gully standpipe piezometers to the east of LW1 - WML119, WML120A and WML181-WML186 (**Figure 9**),
- ▼ Pikes Gully standpipe/vibrating wire piezometers geographically distributed across the current area of underground LW1-4 mining (WML20, WML106-84m, WML189-93m and



WML191-100m) and across the LW/MW5-9 mining area (WML21, WML115-144m and WML213-205m) (**Figure 10**); and

- ▼ Multi-level vibrating wires installed within the Liddell, Barrett and Hebden coal seams - WML144, WML245, WML191, WML213 and WMLC248 (**Figure 11**).

### Permian Overburden Units

Standpipe piezometers completed into the upper weathered zone of the Permian coal measures in the Bowmans Creek floodplain area mostly show no impact on groundwater levels from underground or open cut mining (**Figure 6**). Several of these bores show a clear and direct response to rainfall recharge events, consistent with the receipt of recharge by vertical infiltration of local rainfall. The exception is bore T1-P, which is completed into the uppermost water-bearing horizon in the Permian at a location within the Bowmans Creek floodplain, 80m west of the northern part of LW4. During August 2009, the groundwater level fell by about 2m in T1-P coinciding with the passage of LW4 past this location. At the same time, no water level impact was observed in the alluvium bore T1-A at the same location.

Varying drawdown impacts have been observed in piezometers which monitor the overlying Bayswater and Lemington seams, in response to underground mining.

Two Bayswater seam piezometers show definite drawdown, viz WML113-40m and WML213-48m. These are believed to be responding to mining at the adjacent Narama mine, not the Ashton operation, as they have been on a consistent downward trend throughout the period of monitoring.

Four multi-level piezometers in the LW1-4 mining area and five others to the west of LW5 have shown recognisable drawdown responses in the Lemington seams during the reporting period, viz (see **Figure 7** and **Figure 8**):

- ▼ WML108 – Lem8-9, Lem11-12 and Lem15 (south of LW3);
- ▼ WML109 – Lem7 and Lem11-12 (south of LW4);
- ▼ WML191 – Lem15 (above the chain pillar between LW2 and LW3);
- ▼ WML189 – Lem15 (above the chain pillar between LW2 and LW3);
- ▼ WML110 – Lem6OB, Lem 6, Lem8-9IB and Lem11-12 (S end of LW5);
- ▼ WML111 – Lem7 and Lem11-12 (S end of LW6);
- ▼ WML112 – Lem6-7 and Lem 8 (above chain pillar between MW7 and MW8);
- ▼ WML113 – Lem9 (S end of MW9); and
- ▼ WML114 – Lem6-9 (above middle section of LW5).

Some piezometers located outside of the current mining area (ie LW1-4) have noted steady drawdown responses in the Lemington seams for reasons unrelated to Ashton mining operations, as explained below:

- ▼ The cyclic pattern of water levels (recovery following drawdown events) at WML110-65m (**Figure 7**) appears to be an exaggerated rainfall recharge response.
- ▼ WML112, WML113, and WML213 located near the south-west corner of the underground mining area, have revealed steady drawdown trends within upper Lemington Seams Lem8-9. This is believed to be due to neighbouring mining activities, rather than Ashton.

With exception of WML189-48m and WML191-52m, WML107-38m and WML08-25m, the Lemington seams remain partially saturated in piezometers near LW1-4.

### Pikes Gully Seam

No piezometers east of LW1 (between LW1 and Glennies Creek) showed any further response to underground mining over the reporting period (**Figure 9**). The trends observed in the piezometers are continuations of trends established during the mining of LW1.

Groundwater levels in WML120A have continued to show steady recovery of approximately 0.7m/y, so that more than half of the initial drawdown has now been recovered. This steady recovery is also observed in neighbouring piezometers WML184 to WML186. The partial



recovery in water levels suggests a steady reduction in the hydraulic conductivity of the Pikes Gully Seam, possibly due to partial clogging of the cleat fracture flow pathways. This gradual recovery in water levels has been accompanied by a gradual reduction in the rate of underground seepage inflows. Aside from rainfall recharge events, water levels in WML119, WML181 and WML182 have revealed a steady drawdown trend of approximately 1m/y since the mining of LW1 began. Piezometers remote from the Pikes Gully outcrop have not yet shown any response to the recharge events.

Piezometers which monitor the Pikes Gully Seam in the underground SMP area have all shown responses to mining (**Figure 10**). Whilst most responses were observed during the mining of LW1 and LW2 (2007-08 AEMR reporting period), marked responses have been observed in WML191-100m, WML115-144m, WML213 and WML21 over the 2008-09 reporting period. The pattern of responses observed to date can be summarised as follows:

- ▼ WML108-84m and WML20 responded strongly to LW1 development headings, with WML20 responding further to LW2 headings and the NW mains. No significant responses were observed during the subsequent LW2 extractions. WML20 became dry during the nearby mining of LW3 maingate headings and is no longer monitored.
- ▼ Vibrating wire piezometer WML191-VW100 located in the chain pillar between LW2 and LW3 showed dramatic depressurisation in response to the mining of LW3. WML189-93m, which is also located in the chain pillar to the north of WML191 showed marked drawdown as the LW2 development heading passed and no further responses during the extraction of LW3.
- ▼ WML21, located in the northern part of LW5, responded strongly to the advance of the NW mains and LW4 development headings past this point.
- ▼ WML115-144m is located closer to the NW Mains than the LW1-4 area. The continued drawdown response observed over the reporting period is believed to be due primarily to drainage into the nearby NW mains and development headings for LW4 and LW5, where the lowest point in the headings near WML115 is at an elevation of around -45mAHD.
- ▼ WML213 is remote from both LW1-4 and the NW Mains. The steady drawdown observed in WML213 is believed to be due to mining activities on neighbouring mine sites, not the Ashton operation.

#### **Liddell, Barrett and Hebden Coal Seams**

Piezometers in seams below the Pikes Gully seam (Upper Liddell Seam down to the Hebden Seam) have not shown any significant drawdown during LW1-4 extraction (**Figure 11**). However, several piezometers continue to show a slow but steady downward trend, which is considered to be unrelated to the Ashton underground mining and open cut mining, but is likely to be a regional response to general mining activity in the broader region.

#### **2.4 GROUNDWATER QUALITY**

The EC and pH data from sampling of piezometers and basic statistical analysis results are summarised in **Table 2.3** and **Table 2.4** respectively.



Table 2.3: Salinity Measured as Electrical Conductivity ( $\mu\text{S}/\text{cm}$ )

BORE	Sep-Dec 2007	Jan-Feb 2008	May-Jun 2008	Jul-Aug 2008	Nov-2008	Feb-2009	May-2009	Min	Ave	Max
RM04	1310	1540	972	1240	1240	1220	1140	722	1271	1760
RM06	1170	772	826	806	791	878	824	772	1098	1490
RM07	1320	1230	-	890	813	874	845	813	1814	9920
RM09	1220	1350	1190	1080	997	930	921	921	1343	5810
RM10	1510	1690	1560	1440	1400	1290	1180	1050	1433	3700
PB1	1560	1640	1520	1340	1260	1140	1080	1070	1468	1740
RA10	1780	-	-	-	-	-	1940	1940	1940	1940
RA14	2050	-	-	-	-	-	2190	1060	1625	2190
RA17	1190	-	-	-	-	-				
RA18	2100	-	-	-	-	-	1690	1690	1765	1840
RA30	1560	-	-	-	-	-	1530	1530	1565	1600
WML110C	9340	-	-	9340	-	-	-	8620	8980	9340
WML112C	1360	-	-	1200	-	-	-	1200	1420	1640
WML113C	1450	-	-	1250	-	-	-	1250	1350	1450
WML115C	4100	-	-	5150	-	-	-	4100	4625	5150
T1-A	2040	-	-	-	-	-	1080	1080	1100	1120
T2-A	1680	-	-	-	-	-	1270	1270	1350	1430

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T3-A	2150	-	-	-	-	-	2400	2400	2410	2420
T4-A	2270	-	-	-	-	-	3470	3280	3375	3470
T5	1330	-	-	-	-	-	1260	1260	1330	
T6	1280	-	-	-	-	-	1420	1400	1410	1400
T7	6420	-	-	-	-	-	5380	5350	5365	5380
T9	2490	-	-	-	-	-	-			
T10	2050	-	-	-	-	-	2180	2180	2220	2260
<b>Summary for all Bowmans Creek Alluvium:</b>								<b>722</b>	<b>2284</b>	<b>9920</b>
RA27	2540	-	-	-	-	-	2080	1960	2020	2080
<b>Summary for all Hunter River Alluvium:</b>								-	-	-
WML120B	1220	-	-	992	992	915	903	903	959	1106
WML129	577	-	-	571	-	458	490	458	523	574
WML148	2610	-	-	-	-	-	-	-	-	-
WML155	915	-	-	-	-	-	-	-	-	-
WML157	803	-	-	-	-	-	-	-	-	-
WML158	705	-	-	-	-	-	-	-	-	-
WML239	-	-	-	-	-	903	-	-	-	-
WML241	-	-	-	-	-	687	-	-	-	-
<b>Summary for all Glennies Creek Alluvium:</b>								<b>458</b>	<b>741</b>	<b>1106</b>



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RA8	8370	-	-	-	-	-	7660	7660	7680	7700
RA16	13400	-	-	-	-	-	11500	11100	11300	11500
WML240	-	-	-	-	-	1640	-	-	-	-
WML243	-	-	-	-	-	3740	-	-	-	-
WML247	-	-	-	-	-	14800	-	-	-	-
WML249	-	-	-	-	-	15300	-	-	-	-
WML252	-	-	-	-	-	3730	-	-	-	-
WML253	-	-	-	-	-	417	-	-	-	-
WML256	-	-	-	-	-	3250	-	-	-	-
<b>Summary for all Colluvium:</b>								<b>417</b>	<b>5784</b>	<b>15300</b>
RM02	-	2290	3630	3860	5250	4450	4410	2290	5162	8400
RM05	2200	2310	2370	2220	2620	2360	2200	1070	2228	2620
T1-P	9220	-	-	-	-	-	8510	8000	8255	8510
T2-P	1070	-	-	-	-	-	320	320	634	948
T3-P	2050	-	-	-	-	-	1280	1280	1290	1300
T4-P	2000	-	-	-	-	-	1790	1790	1855	1920
WML108B	-	-	-	15100	-	-	16100	15100	15500	16100
WML109B	-	-	-	11400	-	-	-	11400	11850	12300
WML110B	9415	-	-	10000	-	-	9190	9190	9517	10000

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WML111B	2580	-	-	2290	-	-	605	605	1448	2290
WML112B	1720	-	-	1600	-	-	2100	1600	1893	2100
WML113B	875	-	-	835	-	-	908	835	884	909
WML114B	6570	-	-	5200	-	4890	4900	4890	5441	6570
WML115B	3790	-	-	3440	-	3770	3720	3440	3629	3790
<b>Summary for all Weathered Coal Measures Overburden:</b>					-	-	-	<b>320</b>	<b>4970</b>	<b>16100</b>
WML 20	9820	5720	-	-	-	-	-	2470	5412	9820
WML 21	6460	8280	8110	8390	-	7690	7550	5170	7469	8700
WML119	2320	-	-	1820	-	-	-	1820	2070	2320
WML120A	1260	-	-	810	-	1040	919	810	1007	1260
WML181	2380	-	-	2460	-	2680	2640	2380	2540	2680
WML182	8680	-	-	6950	-	6510	6730	6510	7218	8680
WML183	8180	-	-	5890	-	5950	5640	5640	6415	8180
WML184	4580	-	-	5140	-	4940	4940	4580	4900	5140
WML185	4430	-	-	2940	-	2900	2310	2310	3145	4430
WML186	387	-	-	-	1930	933	-	387	1083	1930
<b>Summary for all Pikes Gully Seam:</b>								<b>387</b>	<b>4126</b>	<b>9820</b>
WML261	-	-	-	-	-	-	2510	-	-	-
WML262	-	-	-	-	-	-	6270	-	-	-



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<b>Summary for all Upper Liddell Seam:</b>								<b>2510</b>	<b>-</b>	<b>6270</b>
WML172	-	-	-	4880	-	3280	3200	3200	3787	4880
RSGM1	6250	10300	10200	10600	8760	6490	5590	5480	9487	12200
GM1	369	526	1100	3900	4990	5240	5450	295	4654	9370
<b>Summary for all Other Major Coal Seams:</b>								<b>295</b>	<b>5976</b>	<b>12200</b>

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Table 2.4: Groundwater pH

BORE	Feb-07	May-07	Aug-07	Nov-07	Feb-08	May-08	Aug-08	Nov-08	Feb-09	May-09	Min	Ave	Max
RM04	7.05	6.93	7.41	7.19	6.84	7.1	7.47	7.08	6.86	7.12	6.84	7.11	7.47
RM06	7.07	7.09	7.14	7.21	7.21	7.04	7.37	7.1	7.1	7.21	7.04	7.15	7.37
RM07	7.13	7.01	7.24	7.31	7.06		7.36	7.21	6.94	7.15	6.94	7.16	7.36
RM09	7.02	6.79		7.1	6.93	6.98	7.28	7.29	6.77	7.09	6.77	7.03	7.29
RM10	7.01	6.76	7.08	7.09	6.83	6.89	7.27	7.09	6.86	7.15	6.76	7.00	7.27
PB1	7.02	7.77	7.26	7.26	7.06	7.34	7.23	7.28	7.06	7.4	7.02	7.27	7.77
RA10				7.39					6.91	7.1	6.91	7.13	7.39
RA14				7.08					7.02	7.16	7.02	7.09	7.16
RA18				7.31					6.93	7.31	6.93	7.18	7.31
RA30				6.63					6.71	7.13	6.63	6.82	7.13
WML110C				7.13			7.04		6.56		6.56	6.91	7.13
WML112C				8.61			7.45		6.96	7.45	6.96	7.62	8.61
WML113C				7.13			6.99		6.58		6.58	6.90	7.13
WML115C				7.39			7.32				7.32	7.36	7.39
T1-A				7.82					7.08	7.47	7.08	7.46	7.82
T2-A				7.11					7.09	7.49	7.09	7.23	7.49
T3-A				6.97					6.69	6.9	6.69	6.85	6.97
T4-A				7.14					6.76	7.2	6.76	7.03	7.20
T5				7.04					6.88	7.03	6.88	6.98	7.04

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T6			6.96			6.74	7.05	6.74	6.92	7.05			
T7			7.09			6.74	7.12	6.74	6.98	7.12			
T10			7.04			6.71	7.04	6.71	6.93	7.04			
<b>Summary- Bowmans Creek Alluvium</b>								6.56	7.11	8.61			
RA 27			6.94			6.76	7.14	6.76	6.95	7.14			
Summary - Hunter River Alluvium								6.76	6.95	7.14			
WML120B			7.1	6.96		6.74	7.07	6.74	6.97	7.10			
WML129			7.33			6.88	7.3	6.88	7.17	7.33			
WML239							7.01	7.01	7.01	7.01			
WML241							6.96	6.96	6.96	6.96			
<b>Summary- Glennies Creek Alluvium</b>								6.74	7.04	7.33			
RA8			7.35			6.87	7	6.87	7.07	7.35			
RA16			7			6.57	6.76	6.57	6.78	7.00			
WML240						6.61		6.61	6.61	6.61			
WML243						6.64		6.64	6.64	6.64			
WML247						7.24		7.24	7.24	7.24			
WML249						7.49		7.49	7.49	7.49			
WML252						7.04		7.04	7.04	7.04			
WML253						6.98		6.98	6.98	6.98			
WML256						6.55		6.55	6.55	6.55			
<b>Summary- Colluvium</b>								6.55	6.93	7.49			
RM02	6.59	6.64			6.74	6.74	7.34	6.73	6.52	6.82	6.52	6.77	7.34



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RM05	6.46	6.46	6.85	6.88	6.58	6.69	6.87	6.68	6.44	6.84	6.44	6.68	6.88
T1-P				7.12					6.91	7.33	6.91	7.12	7.33
T2-P				6.77					7.07	7.6	6.77	7.15	7.60
T3-P									9.06	8.5	8.50	8.78	9.06
T4-P				9.69					7.39	7.84	7.39	8.31	9.69
WML108B							6.43		6.05	6.23	6.05	6.24	6.43
WML109B							6.76			6.13	6.13	6.45	6.76
WML110B				7.4			7.07		6.13	6.6	6.13	6.80	7.40
WML111B				7.48			8.28		6.97	7.45	6.97	7.55	8.28
WML112B				8.89			7.5		7.09	7.46	7.09	7.74	8.89
WML113B				7.72			7.21		6.59	6.92	6.59	7.11	7.72
WML114B				7.34			7.9		7.2	7.76	7.20	7.55	7.90
WML115B													
<b>Summary- Weathered Coal Measures Overburden</b>											6.05	7.12	9.69
WML20	7.48	7.72	8.16	8.2	8.26						7.48	7.96	8.26
WML21	7.89	7.95	8	8.4	7.64	7.52	7.66		7.62	7.91	7.52	7.84	8.40
WML119				5.29			7.27		6.73	7.75	5.29	6.76	7.75
WML120A				7.69			7.16		6.89	7.35	6.89	7.27	7.69
WML181							8.01		7.62	7.76	7.62	7.80	8.01
WML182				6.91			7.14		6.79	6.94	6.79	6.95	7.14
WML183				6.81			7.06		6.88	7.08	6.81	6.96	7.08
WML184				6.96			7.02		6.92	7.01	6.92	6.98	7.02

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WML185				6.68			6.75		6.67	6.9	6.67	6.75	6.90
WML186				6.76			6.92		6.8		6.76	6.83	6.92
<b>Summary- Pikes Gully Seam</b>											5.29	7.29	8.40
WML261													
WML262													
<b>Summary - Upper Liddell Seam</b>													
RSGM1	6.98	7.21	7.14	7.25	6.73	6.87	7.2	7.13	6.54	6.85	6.54	6.99	7.25
GM1	7.81	6.97	7.39	7.12	6.89	7.44	8.32	7.91	7.61	7.89	6.89	7.54	8.32
WML172							7.6		7.33	7.65	7.33	7.53	7.65
<b>Summary- Other major coal seams</b>											6.54	7.30	8.32



The groundwater quality monitoring data has highlighted some variation from the normal pattern of low salinity in the alluvium and high salinity in the Permian. The main variances are as follows:

**Bowmans Creek alluvium:**

- ▼ Salinities in the Bowmans Creek alluvium ranged from a minimum of 772 to a maximum of 9920  $\mu\text{S}/\text{cm}$  EC (at RM06 and RM07 respectively).
- ▼ The average EC for all Bowmans Creek alluvium samples is 2284  $\mu\text{S}/\text{cm}$  (**Table 2.3**).
- ▼ Slightly lower ECs than in the previous period are attributed to dilution of groundwater from increased rainfall recharge.
- ▼ Bowmans Creek ceased continuous flow in early 2007, and water was maintained in disconnected pools only by virtue of small volume groundwater baseflow discharges. The total rate of groundwater baseflow was very small, insufficient to maintain continuous flow. The surface water EC at this time increased to 14000  $\mu\text{S}/\text{cm}$ . Flow resumed by June 2007 and ECs then declined rapidly (**Figure 12**). A smaller increase in ECs was noted to occur at site SM4 during the AEMR period, to a maximum of almost 2000  $\mu\text{S}/\text{cm}$  in February 2009, before declining again with subsequent rainfall runoff.

**Glennies Creek alluvium:**

- ▼ The Glennies Creek alluvium also reported variable salinity, with ECs ranging from 458 to 2610  $\mu\text{S}/\text{cm}$ .
- ▼ The higher alluvium ECs are believed to be due to upward seepage of groundwater from the Permian into the alluvium and/or related to up-dip exposes of the Branxton Formation.
- ▼ The alluvium EC's are all noticeably higher than the EC of surface flow in Glennies Creek, which during the period ranged between 235 and 612  $\mu\text{S}/\text{cm}$  (**Figure 14**).
- ▼ After some EC decline during the development headings stage of LW1, the ECs of alluvium piezometers on the western side of Glennies Creek (WML120B and WML129) have remained steady during LW1 to LW4 panel extractions.

**Hunter River alluvium:**

- ▼ The one sample of Hunter River alluvium (from bore RA27) collected over the reporting period reported an EC of 2080  $\mu\text{S}/\text{cm}$ , which is significantly higher than the Hunter River surface flow (**Figure 13**).

**Pikes Gully Seam:**

- ▼ Salinity of Pikes Gully seam groundwater ranged from 810 to 9820  $\mu\text{S}/\text{cm}$  EC. After some EC decline during the development headings stage of LW1, the ECs of Pikes Gully bores on the western side of Glennies Creek (WML119 and WML120A) have remained steady during LW1 to LW4 panel extractions.

**Upper Liddell Seam:**

- ▼ Salinity of the Upper Liddell Seam ranged from 2510 to 6270  $\mu\text{S}/\text{cm}$  EC. The relatively lower EC encountered in WML261 may indicate a component of direct recharge from infiltration of rainfall, as this bore is located relatively close to subcrop.

**Other Permian Coal Measures:**

- ▼ ECs ranging from 295 to 12200  $\mu\text{S}/\text{cm}$  were reported during the period.

Electrical conductivity (EC) data obtained from underground monitoring are presented in **Figures 14** and **15**. Corresponding ECs at various piezometers in the Glennies Creek valley or between Glennies Creek and the mine are plotted on **Figure 14**. Other underground EC monitoring results are plotted on **Figure 15**.



After some EC decline during the development headings of LW1, the ECs of the seepage inflows to TG1A as measured at the discharge point on the LW1 back-road pipeline have remained reasonably steady over the reporting period. The decrease in groundwater EC observed in the Pikes Gully and Alluvium piezometers (between LW1 and Glennies Creek) in earlier years is believed to be due to induced water flow from the Glennies Creek Alluvium towards the mine through the Pike Gully Seam.

The groundwater in the alluvium is near-neutral in pH (range 6.63 to 8.61). Likewise the coal measures groundwater is generally near-neutral, with most pH values lying within a similar range over the reporting period all piezometers reported pHs within guideline limits for freshwater ecosystems (6.5 to 8).

## 2.5 GROUNDWATER MINE INFLOWS

### 2.5.1 NORTH EAST OPEN CUT

Approximately 0.5 ML/d (6 L/s) is pumped from the open cut mine on average. This comprises rainfall captured by the mine catchment, including rainfall infiltration to the in-pit waste, as well as groundwater inflows. Total groundwater inflows to the open cut are estimated to be only a small proportion of the total, probably less than 25% of the total or 0.13 ML/d (1.5 L/s).

### 2.5.2 UNDERGROUND MINE

The underground mine water balance has been closely monitored since the commencement of underground mining. Water balance components have been determined by a combination of V-notch weirs, in-line flow-meters, and timing of filling of storage tanks and sumps.

Inputs to the underground mine include both groundwater inflows and water imported for operation of the longwall. Outputs include water pumped directly into the mine water supply system from a vertical borehole accessing a sump at the low-point at the SW corner of LW1 (LW1 Backroad Sump); and water pumped via pipelines along the underground roadways to a storage dam in Arties Pit beside the mine portal.

Since extraction of LW1, access to TG1 has been lost, and seepage inflows to TG1A from Glennies Creek alluvium are now captured separately from other mine inflows and conveyed via pipeline to a discharge point in the LW1 Backroad (**Figure 1**), where the flow rate is measured at a V-notch weir. This discharge then flows to the LW1 Backroad Sump.

Net groundwater inflows to the underground mine have been determined from the mine water balance, to have reached a peak of 7.14 L/s (on 7 January 2009), averaging 4.6 L/s (0.4 ML/d) over the 2008-2009 review period. The inflow rate predicted in the EIS for this stage of underground mining was between 13.5 L/s and 16 L/s (12 to 14 ML/d). Inflows have therefore been well below the EIS predictions (**Figure 16**).

Measurements of total seepage inflows from the Glennies Creek alluvium during the review period have continued to decrease, ranging from 1.7 to 0.8 L/s, with an average inflow rate for the 2008-2009 year of 1.4 L/s. The average seepage rate into the underground mine predicted in the EIS for this stage of mining was 4 L/s. Hence seepage inflows from Glennies Creek alluvium have been well below the rates predicted in the EIS (**Figure 16**).

No seepage inflows from Bowmans Creek alluvium or Hunter River alluvium have been detected.



### **3 GROUNDWATER MODEL REVIEW**

In accordance with Consent Condition 4.14, the performance of the groundwater system in response to mining operations was compared with impacts predicted in the EIS, based on the groundwater modelling undertaken in the EIS studies (HLA, 2001). The actual impacts were also compared with impacts predicted in the groundwater report accompanying the LW1-4 SMP Application (Dundon and Associates, 2006). A report on this comparison was issued in December 2007 (Dundon and Associates, 2007).

The groundwater model used for the EIS studies has been modified to allow better definition of subsidence related impacts of underground mining. The modifications include re-definition of model layers, including assignment of separate model layers for the main coal seams and the interburden (previously each seam and its overburden were treated as a single layer), and the subdivision of the Pikes Gully seam overburden into several layers (previously the Pikes Gully seam and its overburden constituted a single layer).

Successful calibration of the model was undertaken, and the model then used to predict the potential impacts of future mining of Pikes Gully Seam in the LW/MW 5-9 mine plan (Aquaterra, 2008c). The calibration of this model was subsequently refined as part of the groundwater impact assessment for the proposed South East Open Cut project (Aquaterra, 2009d).

The Aquaterra (2008c) model was first run in transient mode to calibrate against observed impacts from open cut mining and underground mining from the Pikes Gully seam in LW1 and LW2 up to April 2008. The calibration modelling predicted baseflow reductions in Glennies Creek of 2.3 L/s by the end of the calibration period, which is consistent with observed inflows from the Glennies Creek alluvium into LW1 (around 2 L/s). Predicted groundwater level impacts also showed very good calibration with observed drawdowns in the large network of monitoring bores, which are distributed across the project area and in all the main hydrogeological units and model layers. Observed impacts are also at or below those predicted in the EIS studies.

A comparison of actual impacts with EIS and SMP predictions over the 2008-09 reporting period showed the following:

- ▼ Total groundwater inflows to the underground (1.8 to 7.4 L/s) below inflow rates predicted in the EIS (13.5 to 15 L/s).
- ▼ Seepage inflows to the underground mine from Glennies Creek alluvium (0.8 to 1.7 L/s) have been below the EIS predictions (2.8 to 3.0 L/s).
- ▼ Groundwater levels in the Glennies Creek alluvium have declined by less than the magnitude predicted in the EIS.
- ▼ Rainfall recharge was not observed to increase significantly through open surface subsidence cracks above LW1 during any of the intense rainfall events.

In summary all groundwater-related impacts from underground mining during the review period were below the levels predicted in the EIS (HLA, 2001), and in the LW1-4 SMP groundwater assessment carried out in 2006 (Dundon and Associates, 2006).

Most of the impacts that have been observed, occurred prior to the end of LW1, and no significant incremental impact or influence has been observed from mining of LW2 to LW4.



## 4 REFERENCES

Aquaterra Consulting Pty Ltd, 2008a. *Ashton Coal - End of Panel 1 Groundwater Report*. Report to Ashton Coal, July 2008.

Aquaterra Consulting Pty Ltd, 2008b. *Ashton Underground Mine – Bowmans Creek Alluvium Investigation*. Report to Ashton Coal, September 2008.

Aquaterra Consulting Pty Ltd, 2008c. *Ashton Underground Mine – LW/MW 5-9 Pikes Gully Seam - Groundwater Impact Assessment Report*. Report to Ashton Coal, October 2008.

Aquaterra Consulting Pty Ltd, 2008d. *Ashton South East Open Cut Project: Hydrogeological Impact Assessment Report*. Report to Ashton Coal, July 2009.

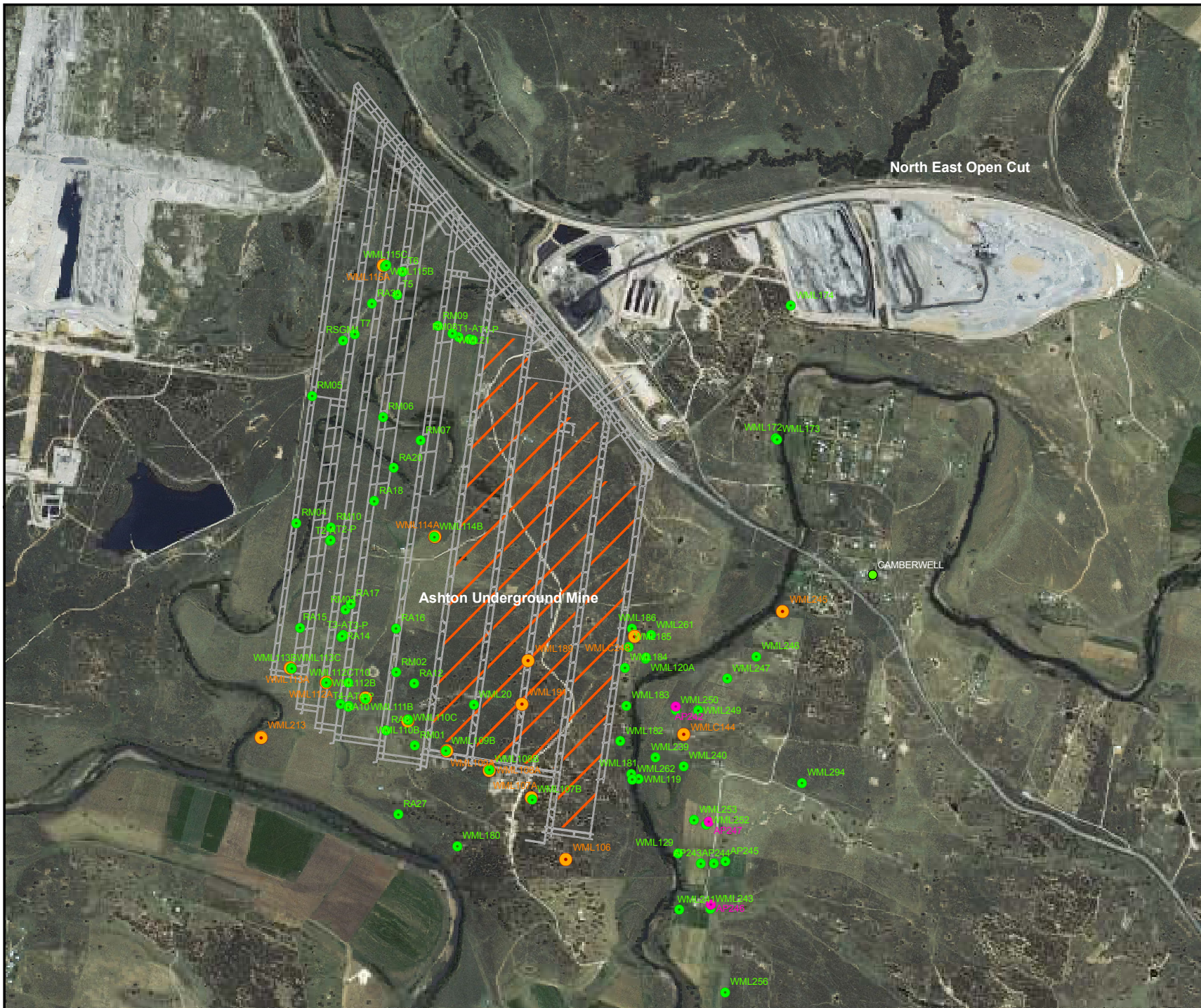
HLA-Envirosciences, 2001. *Environmental Impact Statement, Ashton Coal Project: Appendix H – Groundwater Hydrology and Impact Report*.

Peter Dundon and Associates Pty Ltd, 2006. *Ashton Coal Mine Longwall Panels 1-4, Subsidence Management Plan – Groundwater Assessment*.

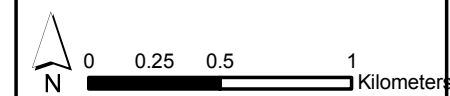
Peter Dundon and Associates Pty Ltd, 2007. *Ashton Coal Mine Groundwater Impacts of Longwall 1, Comparison with EIS and SMP Predictions*.



# Figures



- Ashton Monitoring Piezometers
- Vibrating Wire
- Stand Pipe
- Test Bore
- Pikes Gully Mine Plan
- ↗ Extent of Longwall mining to date



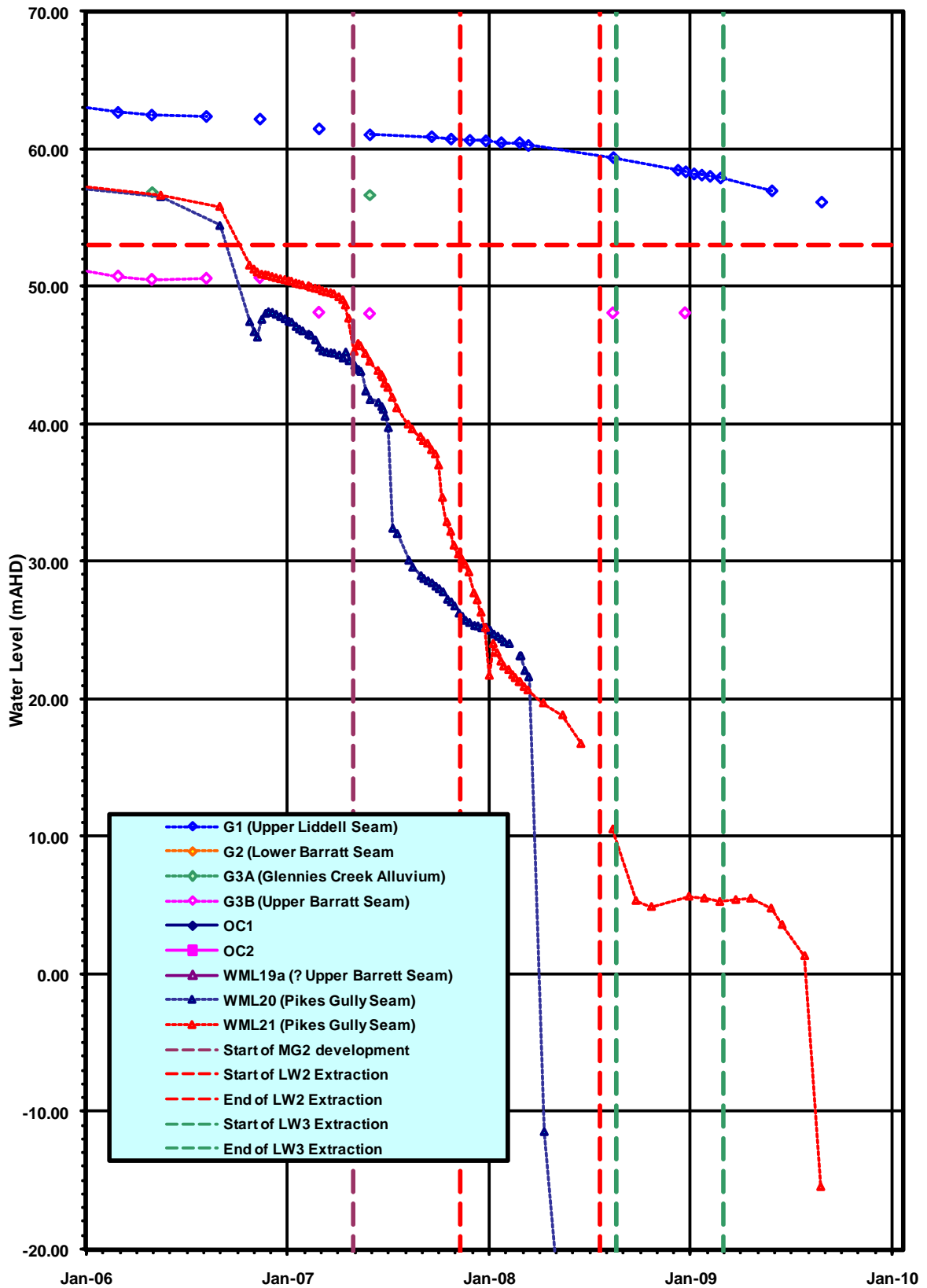
aquaterra

Date: 31/08/2009	Project: S56C
Drawn: JVDA	Revision A
Drawing No.	

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Figure 1:  
Site location and monitoring plan

## ASHTON OPEN CUT MONITORING HYDROGRAPHS



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Drawing Number	S56-002	Revision	B

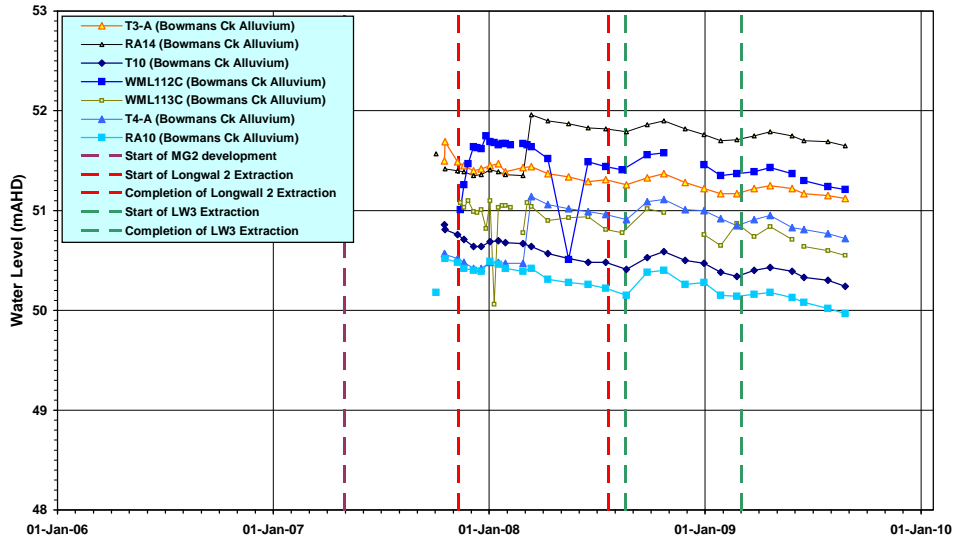
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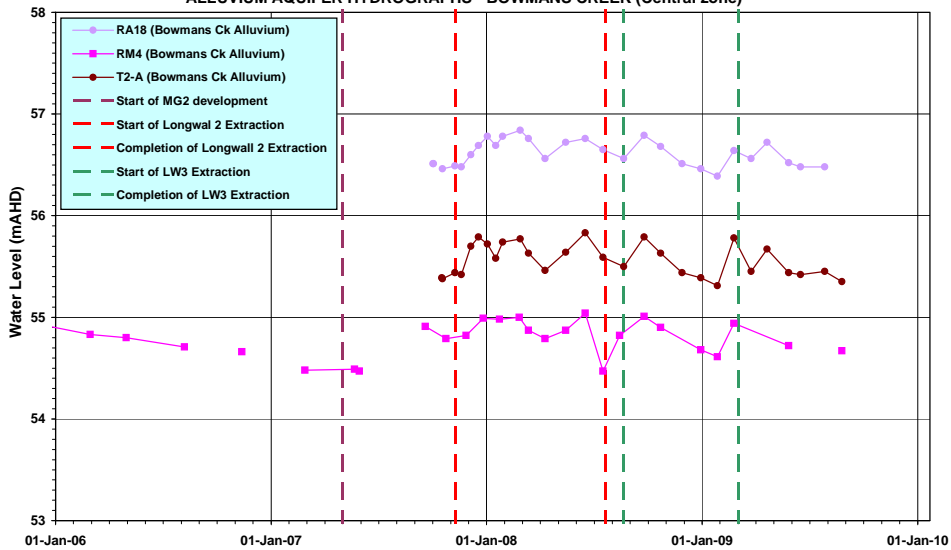
**GROUNDWATER LEVEL HYDROGRAPHS  
Open Cut Monitoring Bores**

Figure 2

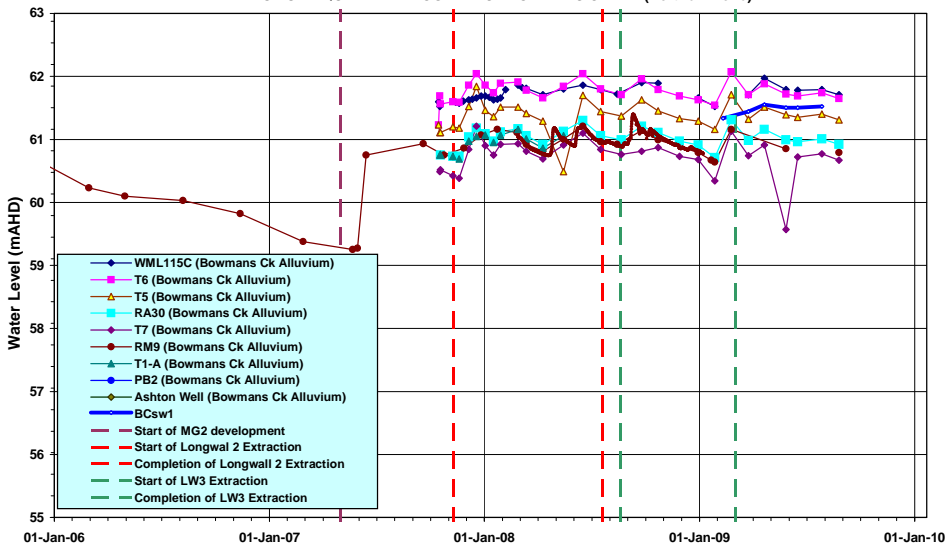
ALLUVIUM AQUIFER HYDROGRAPHS - BOWMANS CREEK (Southern zone)



ALLUVIUM AQUIFER HYDROGRAPHS - BOWMANS CREEK (Central zone)



ALLUVIUM AQUIFER HYDROGRAPHS - BOWMANS CREEK (Northern zone)

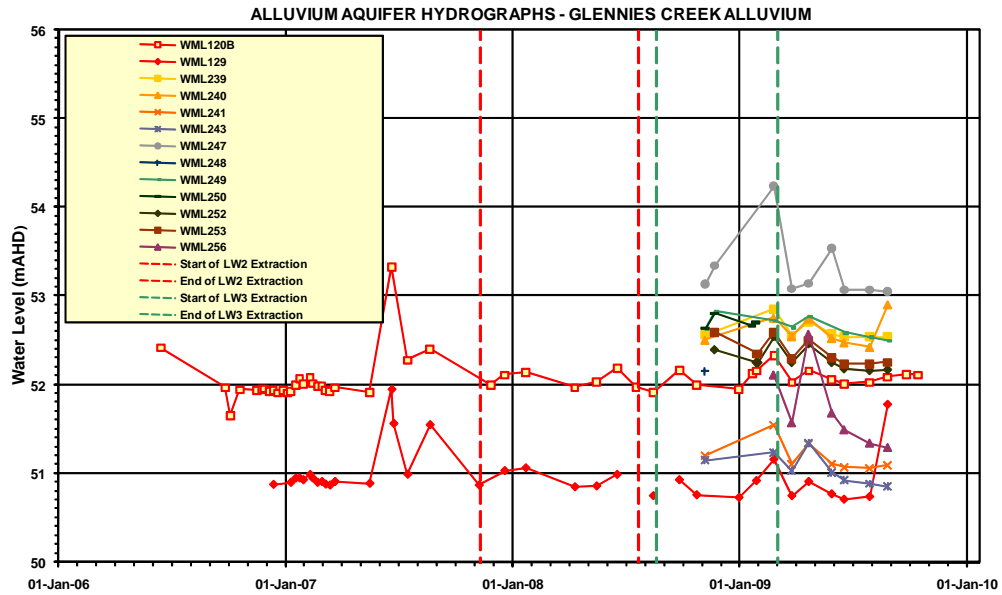


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Drawing Number	S56-003	Revision	B

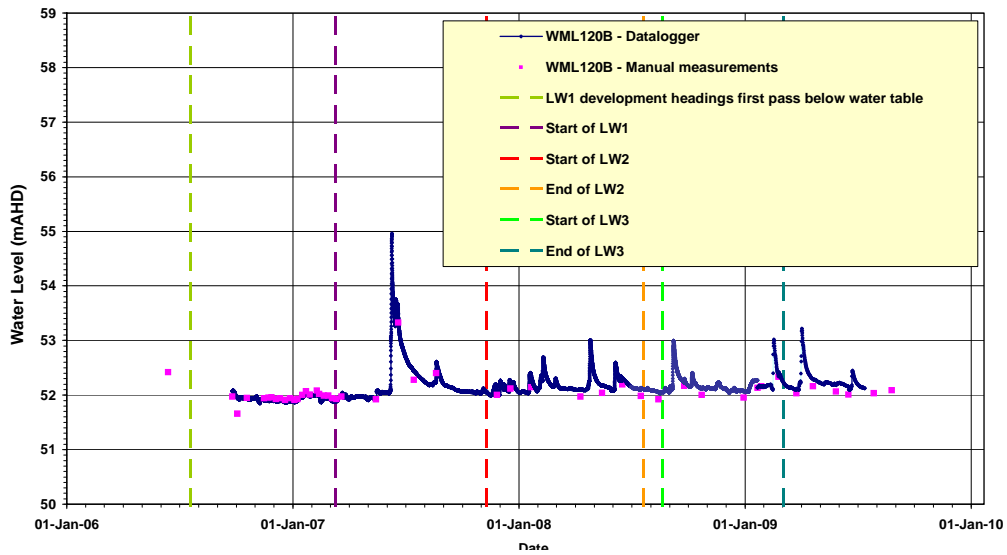
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GROUNDWATER LEVEL HYDROGRAPHS  
Bowmans Creek Alluvium

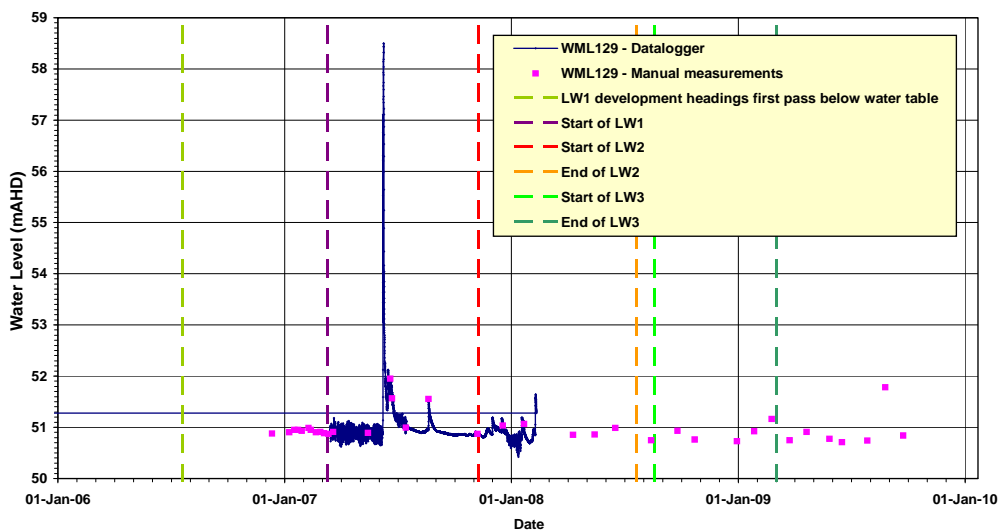
Figure 3



**GROUNDWATER LEVEL HYDROGRAPH - WML120B (Glennies Creek Alluvium)**



**GROUNDWATER LEVEL HYDROGRAPH - WML129 (Glennies Creek Alluvium)**



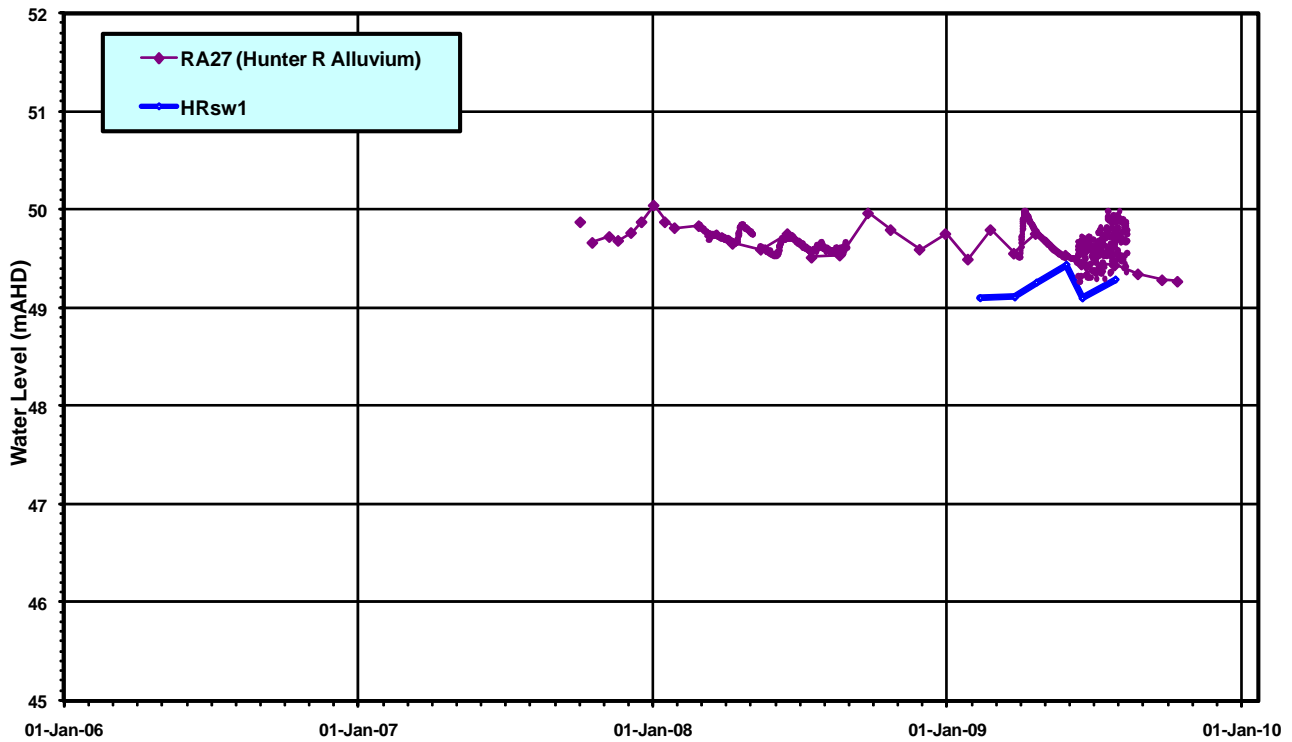
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Drawing Number	S56-004	Revision	C



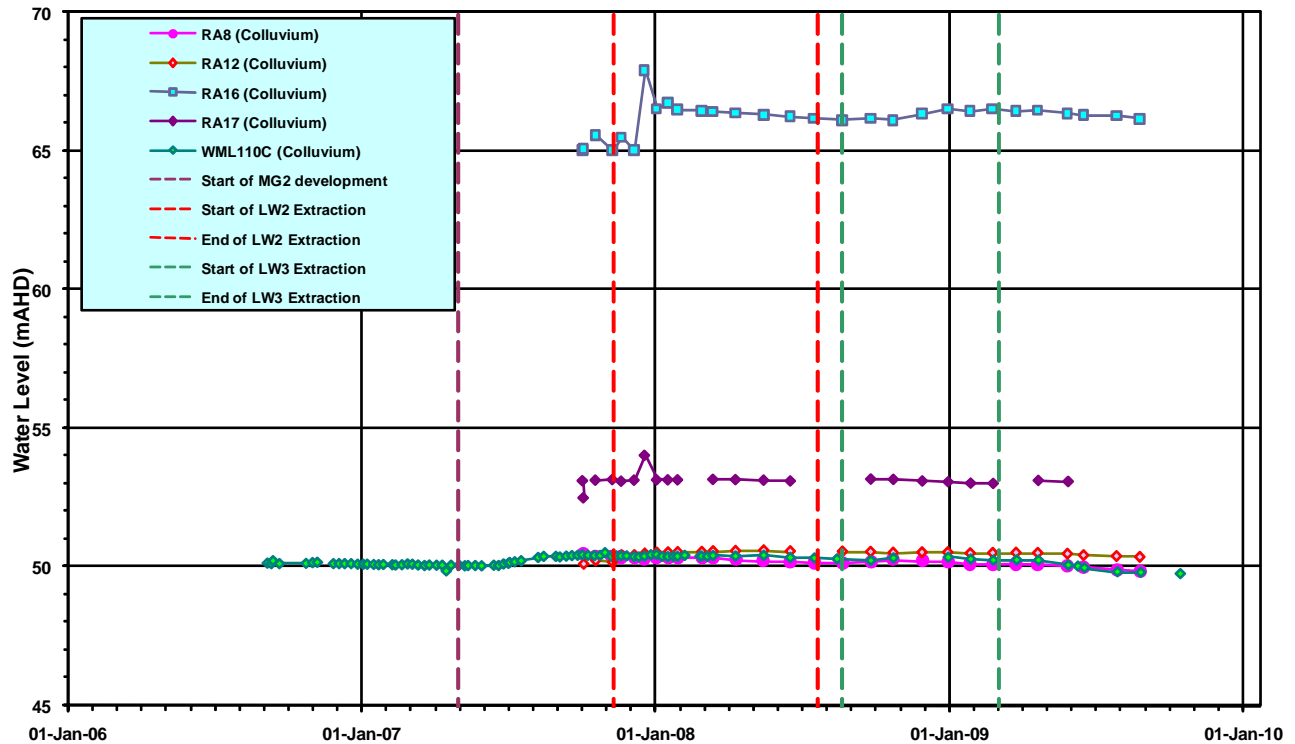
**Ashton Coal Operations Ltd**

**GROUNDWATER LEVEL HYDROGRAPHS  
Glennies Creek Alluvium**

### ALLUVIUM AQUIFER HYDROGRAPHS - HUNTER RIVER ALLUVIUM



### ALLUVIUM AQUIFER HYDROGRAPHS - COLLUVIUM / REGOLITH



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Drawing Number	S56-005	Revision	B

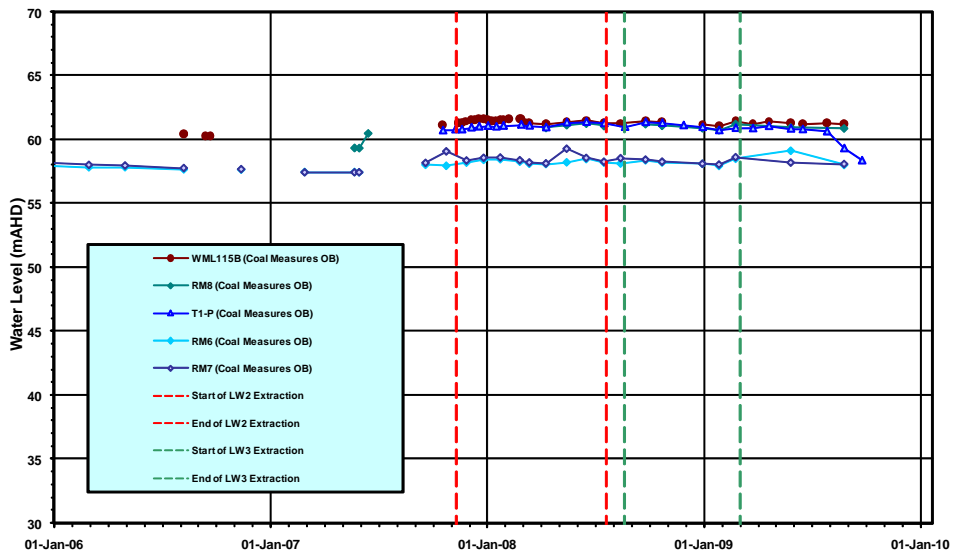
**Ashton Coal Operations Ltd**

**GROUNDWATER LEVEL HYDROGRAPHS**  
 Hunter River Alluvium  
 Colluvium / Regolith

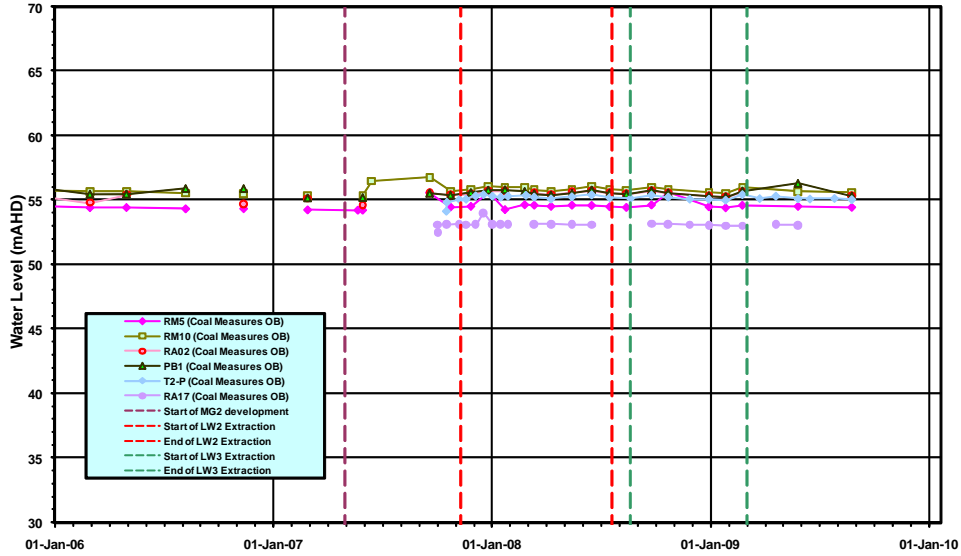
**Figure 5**



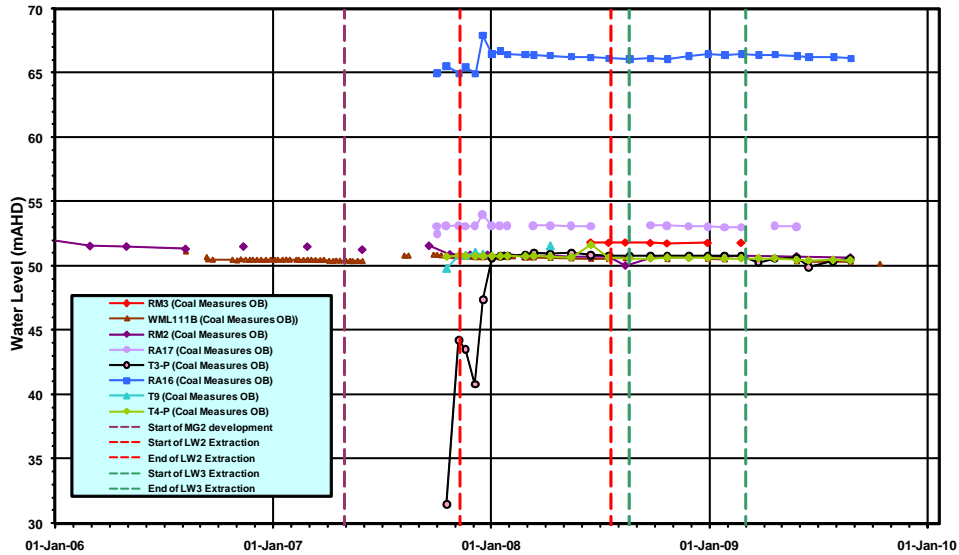
ASHTON - COAL MEASURES OVERBURDEN HYDROGRAPHS (Bowmans Ck Northern Section)



ASHTON - COAL MEASURES OVERBURDEN HYDROGRAPHS (Bowmans Ck Central Section)



ASHTON - COAL MEASURES OVERBURDEN HYDROGRAPHS (Bowmans Creek Southern Section)



Date 07 September 2009

Scale As Shown

Ashton Coal Operations Ltd

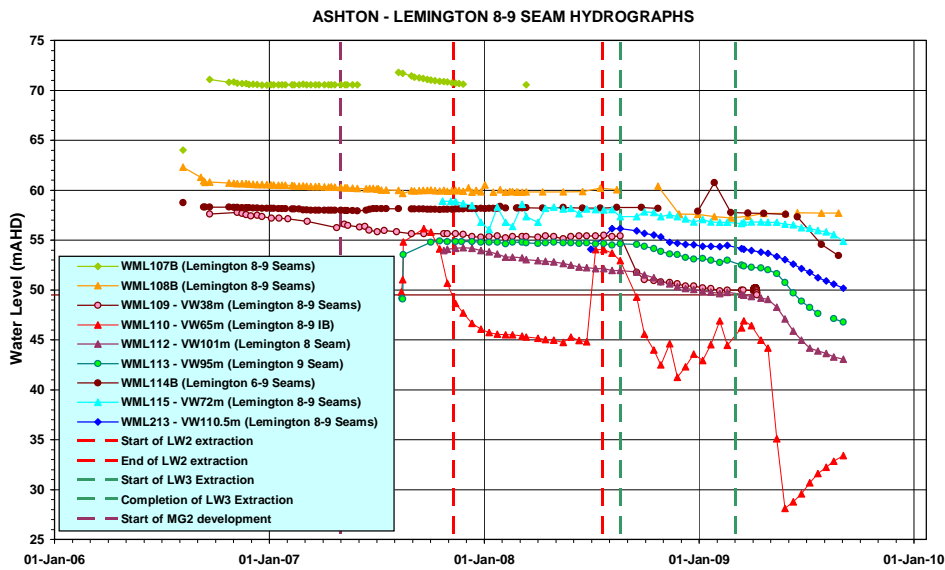
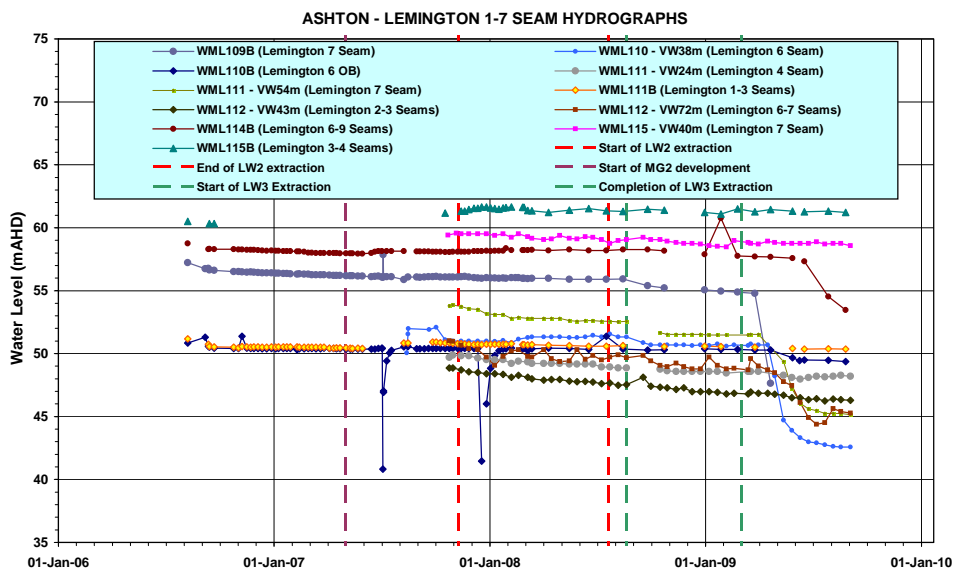
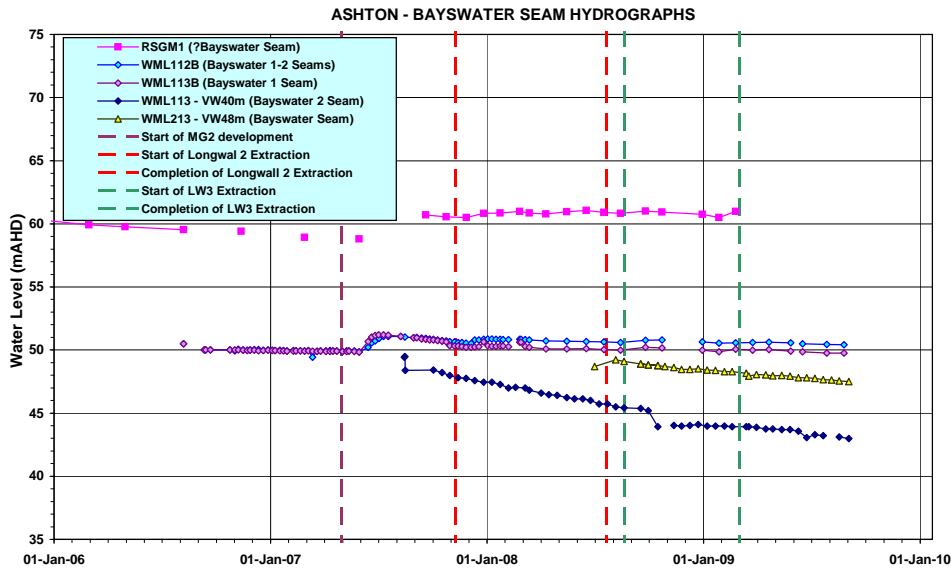
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Drawing Number S56-006

Revision B

GROUNDWATER LEVEL HYDROGRAPHS  
Weathered Near-Surface Coal Measures Overburden



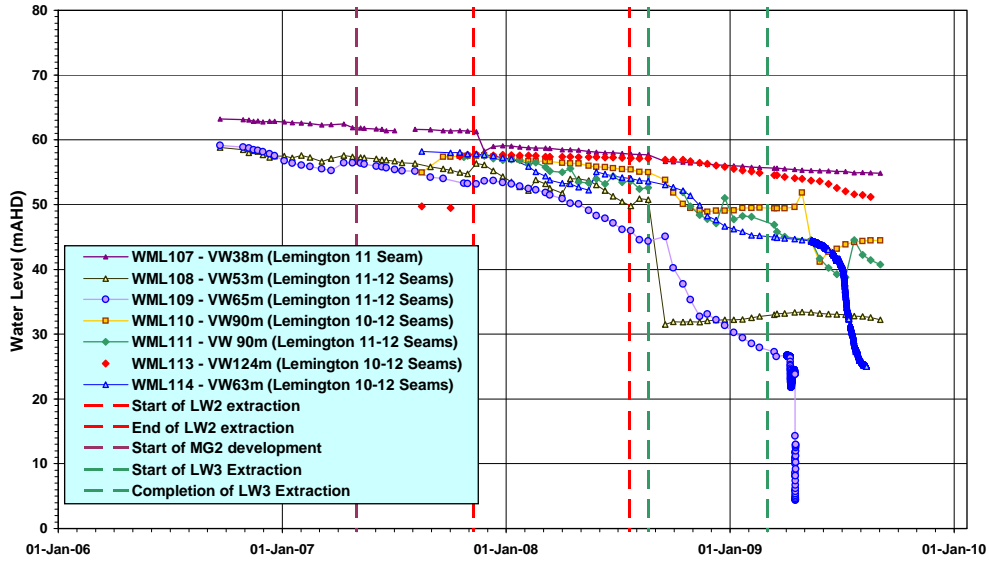
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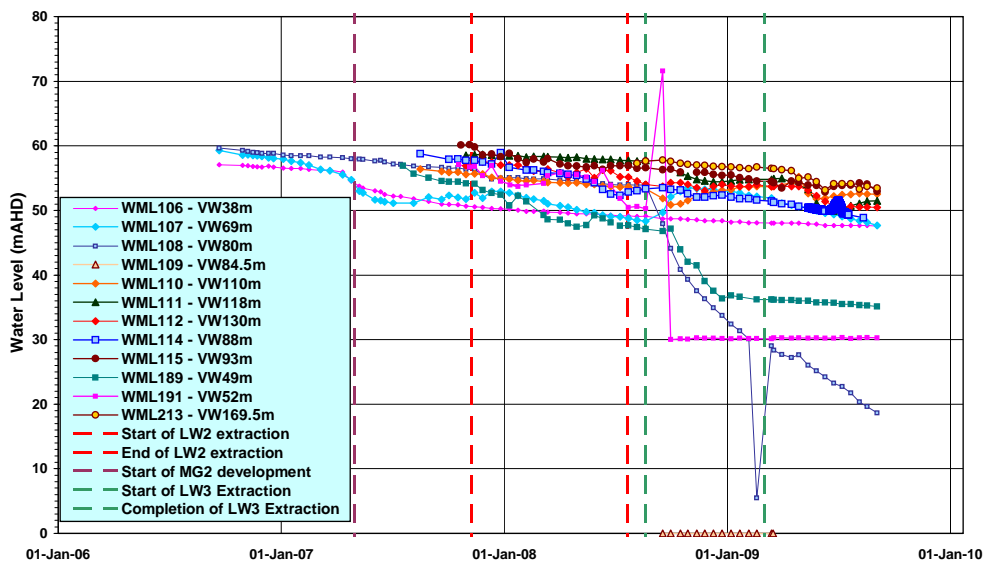
**GROUNDWATER LEVEL HYDROGRAPHS  
Bayswater Seam Lemington 1-9 Seams**



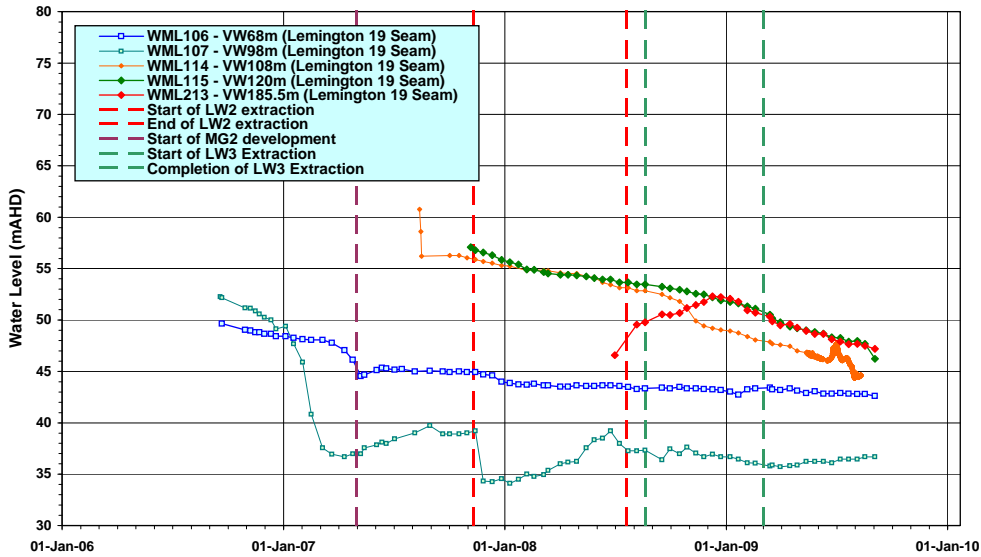
### ASHTON - LEMINGTON 10-12 SEAM HYDROGRAPHS



### ASHTON - LEMINGTON 15 SEAM HYDROGRAPHS



### ASHTON - LEMINGTON 19 SEAM HYDROGRAPHS



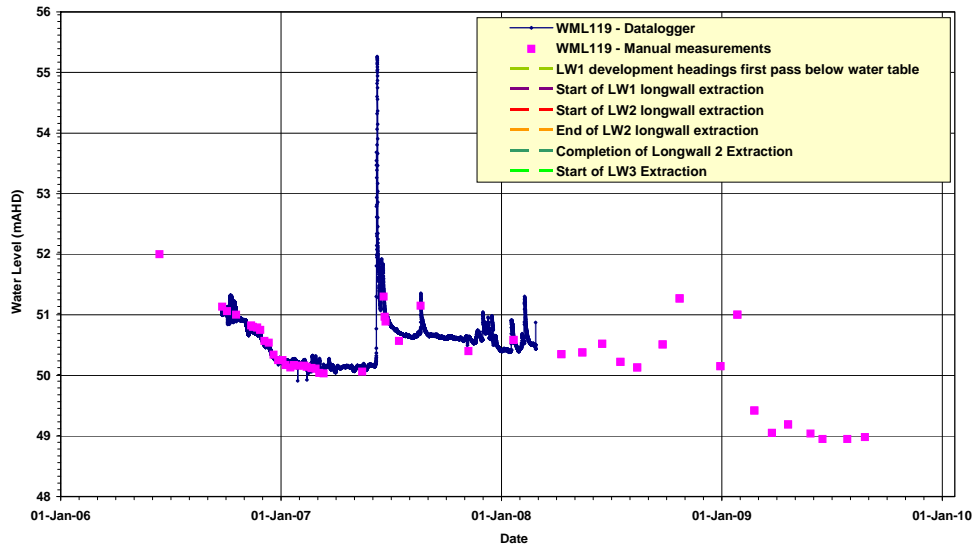
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Drawing Number	S56-008	Revision	B

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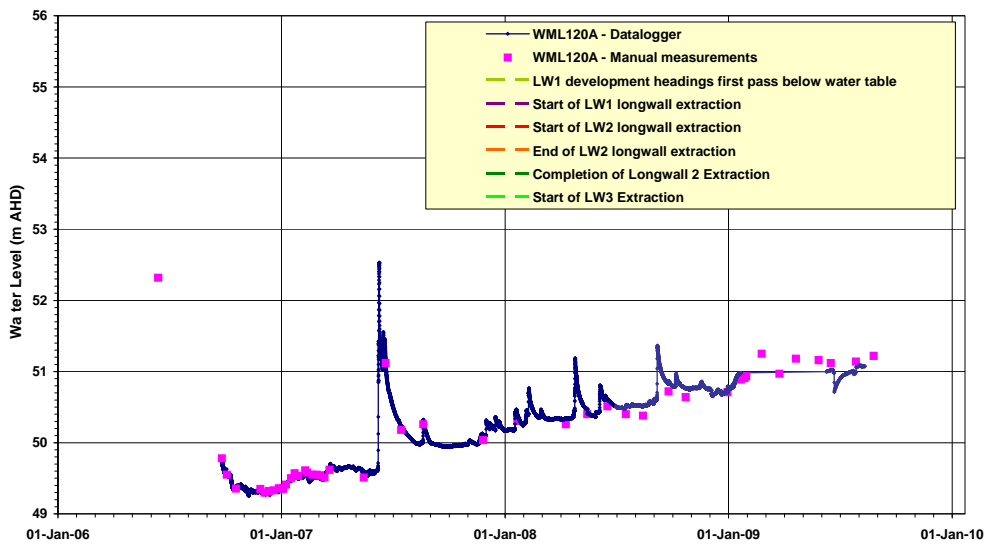
**GROUNDWATER LEVEL HYDROGRAPHS**  
Lemington Seams 10-19

**Figure 8**

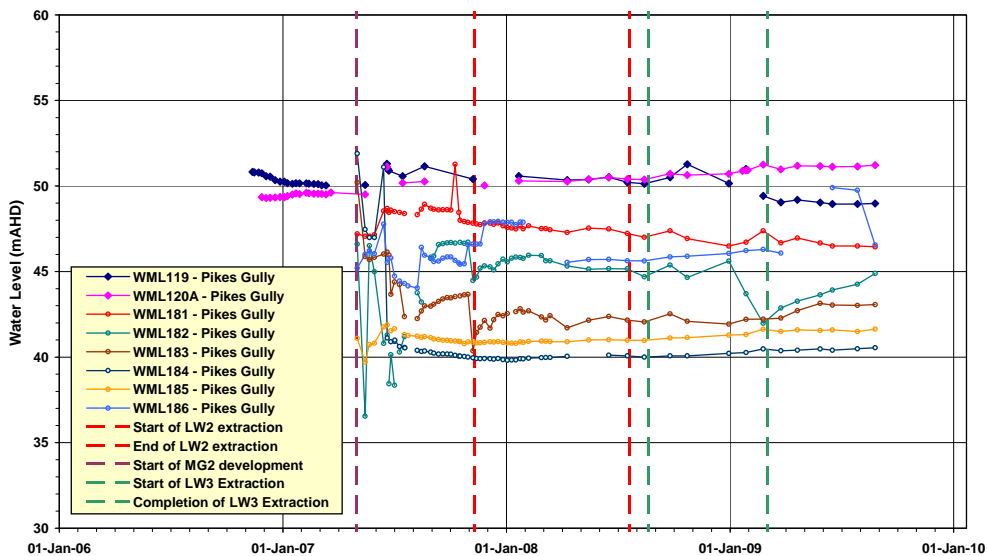
**GROUNDWATER LEVEL HYDROGRAPH - WML119 (Pikes Gully Seam)**



**GROUNDWATER LEVEL HYDROGRAPH - WML120A (Pikes Gully Seam)**



**ASHTON - PIKES GULLY SEAM HYDROGRAPHS - EAST OF LW1**



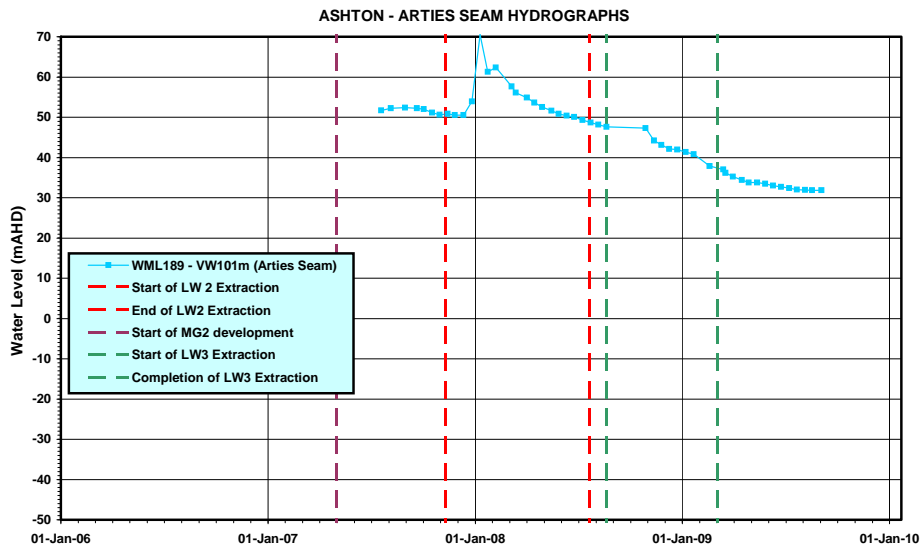
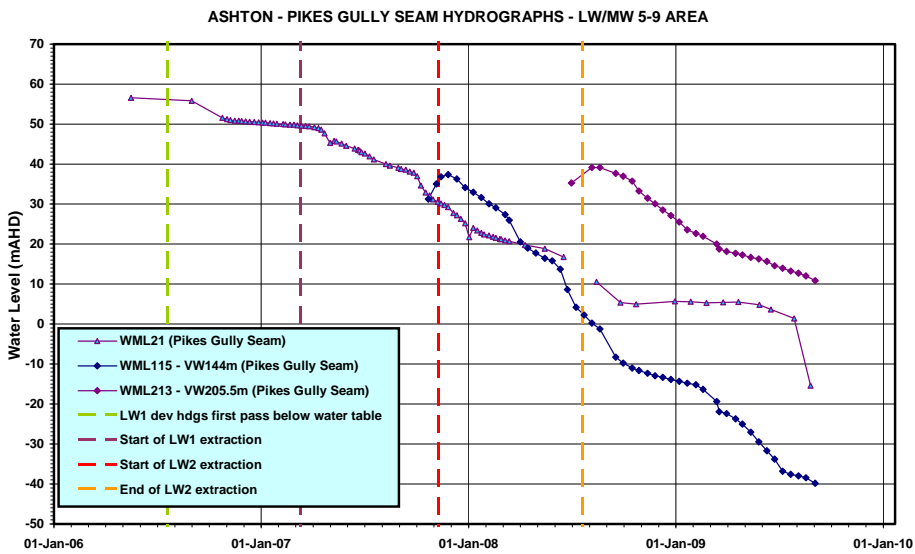
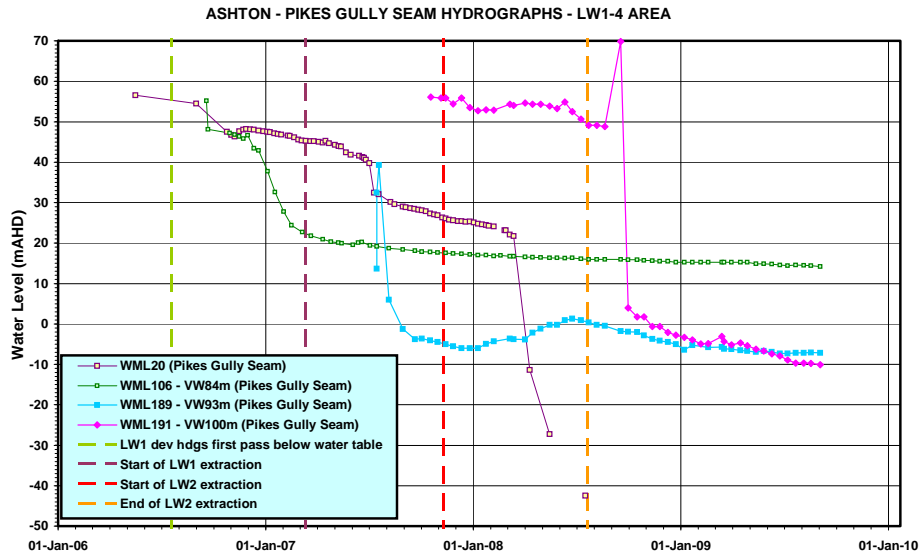
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Initials	PZ	Project	S56C
Drawing Number	S55F-009	Revision	0

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**GROUNDWATER LEVEL HYDROGRAPHS  
Pikes Gully Seam East of LW1**



**Figure 9**

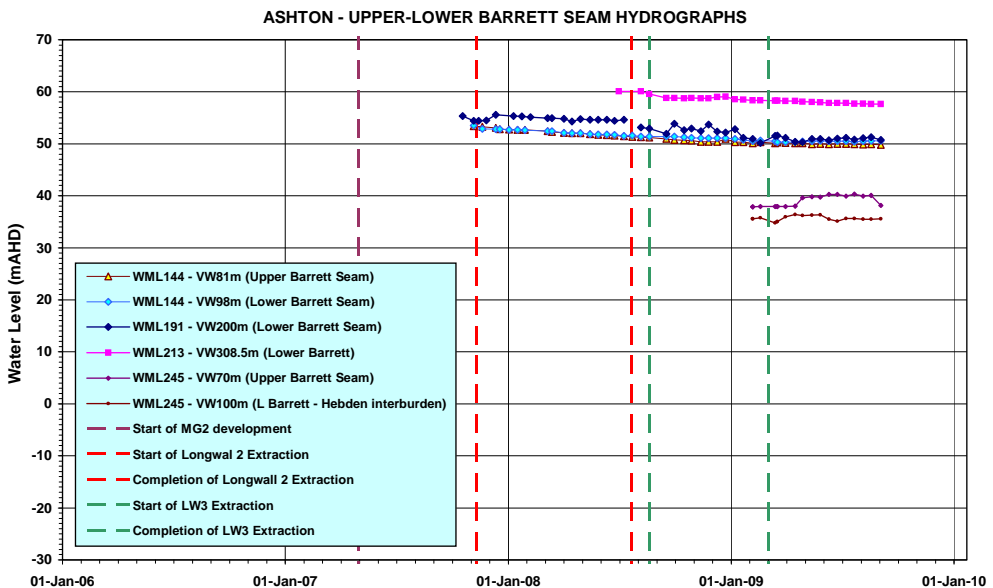
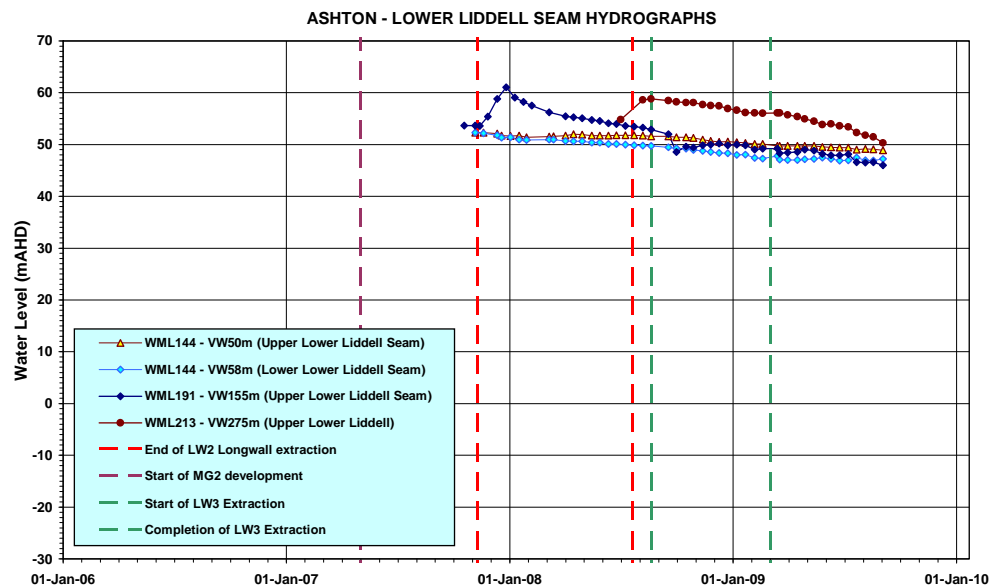
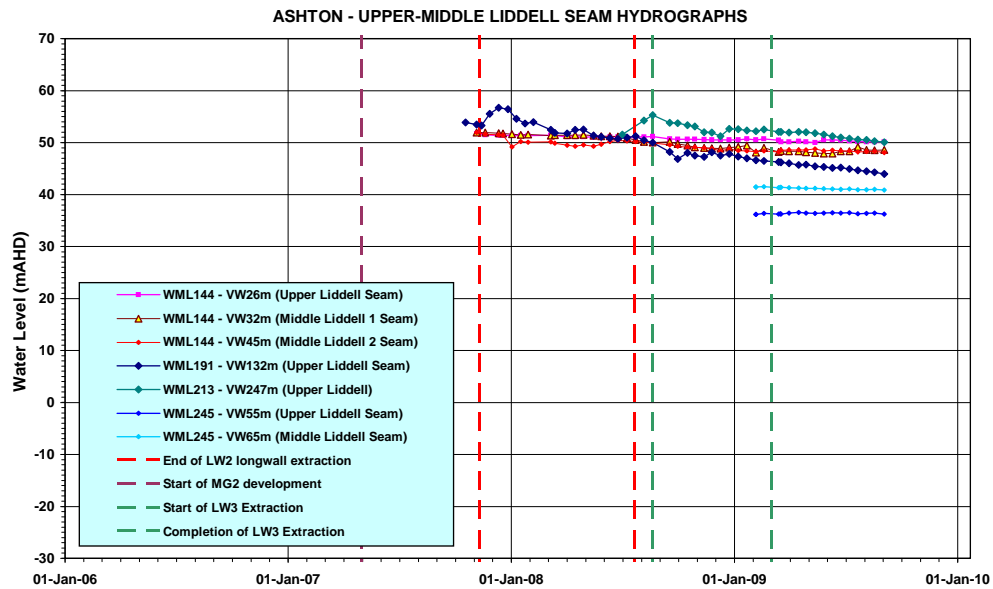


Date	15 September 2009	Scale	As Shown
Initials	PZ	Project	S56C
Drawing Number	S55F-010	Revision	0

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**GROUNDWATER LEVEL HYDROGRAPHS  
Pikes Gully Seam LW1-4, LW5-9  
and Arties Seam**

**Figure 10**



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Drawing Number	S55F-011	Revision	0

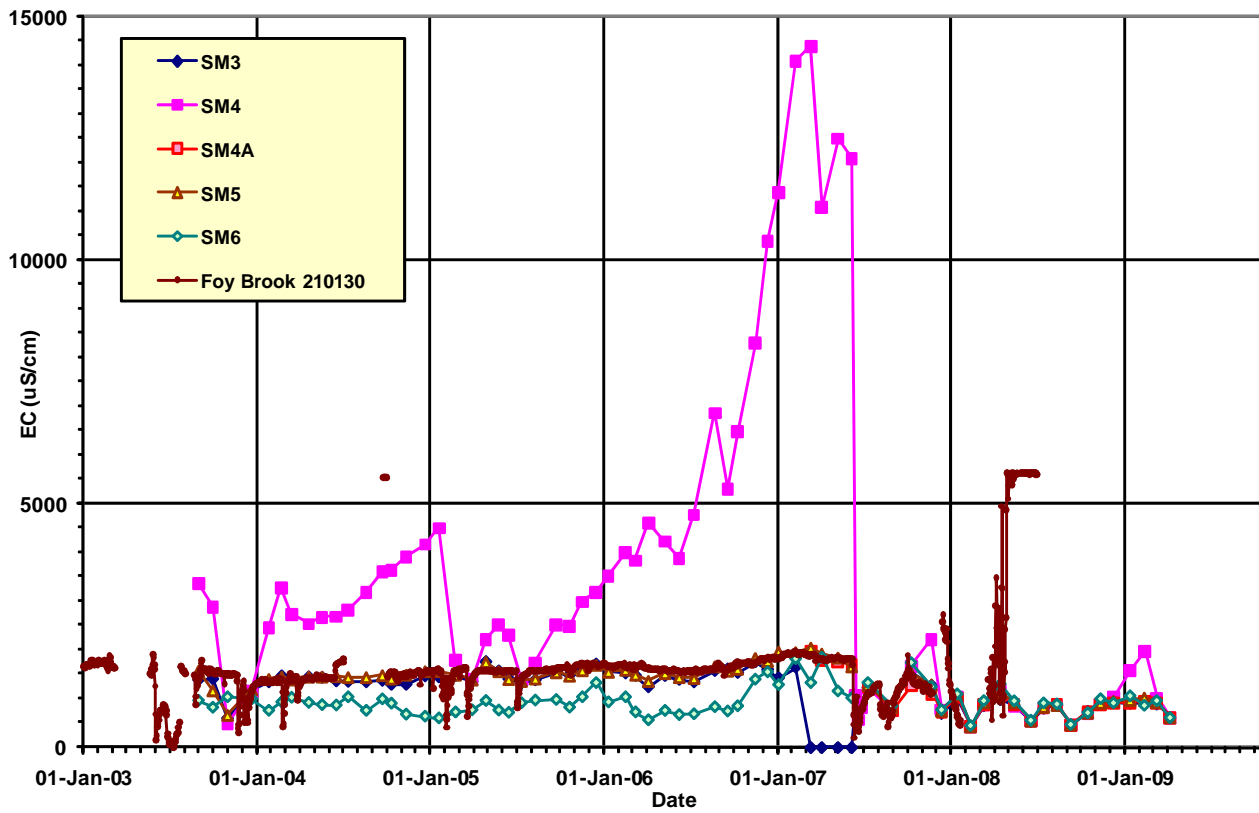


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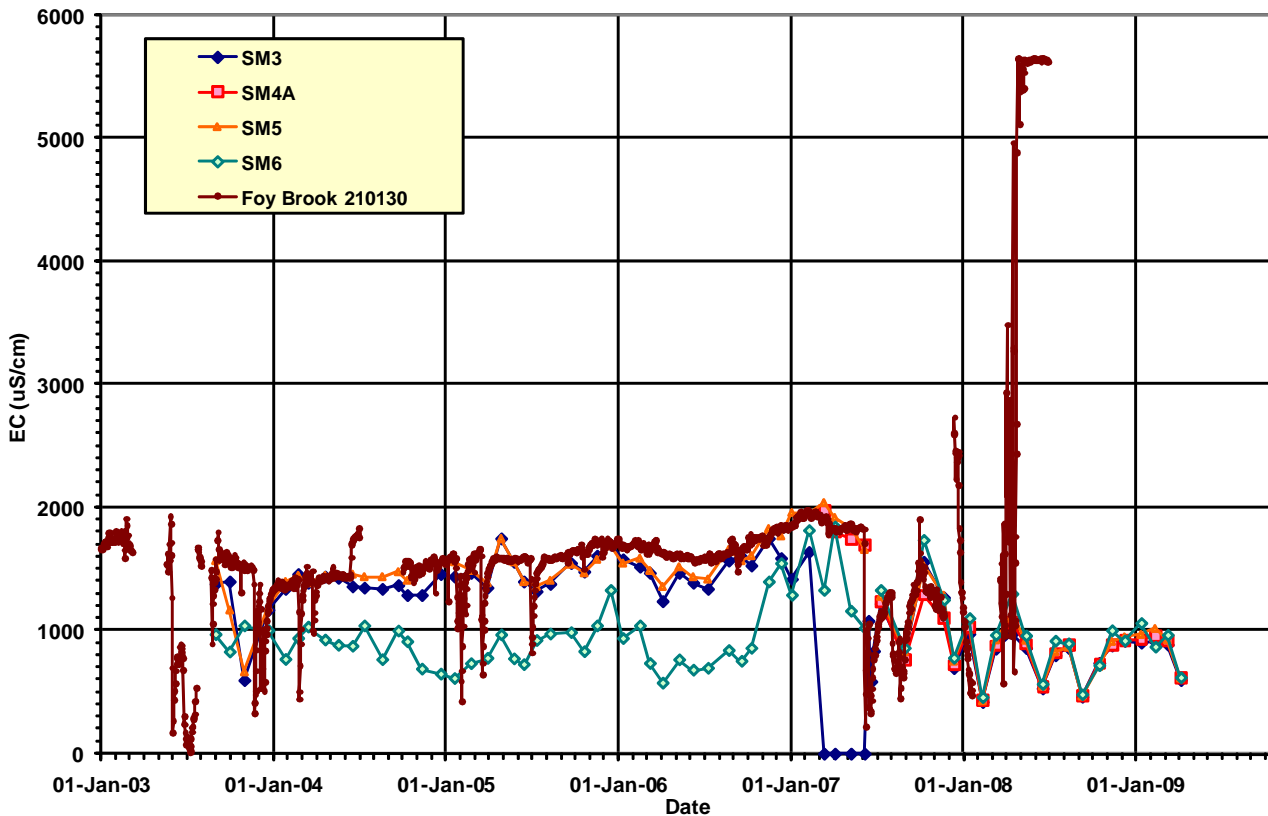
**GROUNDWATER LEVEL HYDROGRAPHS**  
Liddell, Barrett and Hebden Seams

**Figure 11**

BOWMANS CREEK SURFACE WATER QUALITY - EC



BOWMANS CREEK SURFACE WATER QUALITY - EC

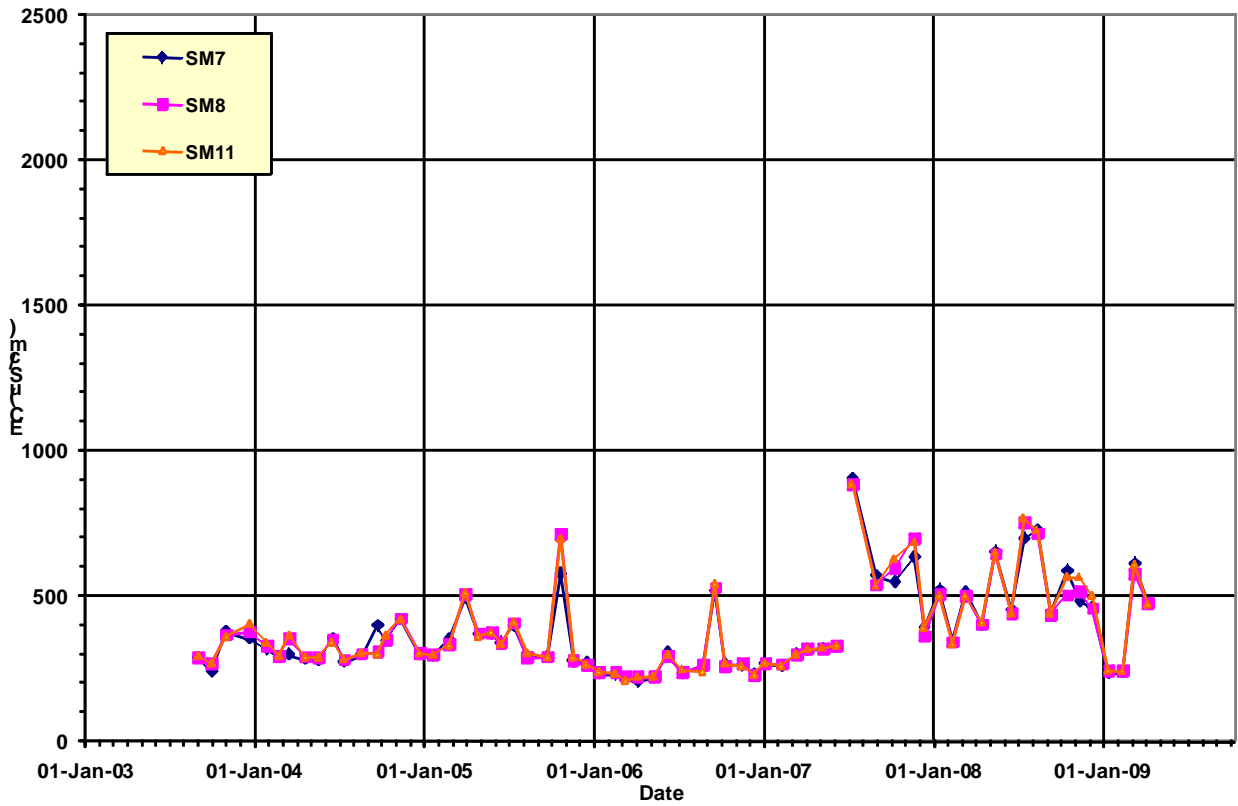


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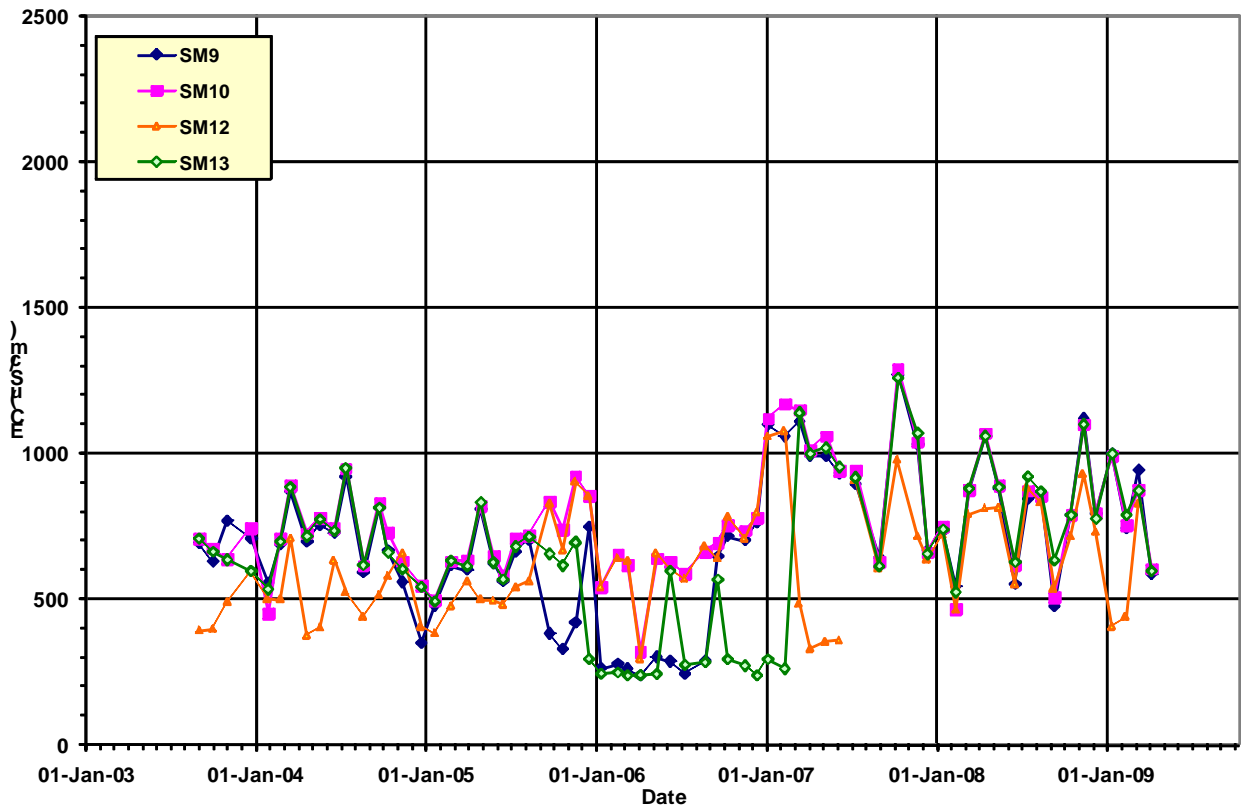
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SURFACE WATER QUALITY  
Bowmans Creek - EC

GLENNIES CREEK SURFACE WATER QUALITY - EC



HUNTER RIVER SURFACE WATER QUALITY - EC



Date 17 September 2009

Scale As Shown

Ashton Coal Operations Ltd

Initials PZ

Project S56C

Drawing Number S55F-013

Revision 0

SURFACE WATER QUALITY  
Glennies Creek and Hunter River



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Water and Environment

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**APPENDIX 3**

**BLAST MONITORING DATA**

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**2007 – 2008 Blast Vibration and Overpressure Results**

Shot No	Date	Time	Location	St Clements Church		Camberwell Village	
				Vibration	Overpressure	Vibration	Overpressure
1	03-Sep-08	12:01pm	UB_S6B1-2E, PS_UB_S6N	0	105	1	105
2	03-Sep-08	12:04pm	LLLD_S6B3-4W	0	105	0	108
3	04-Sep-08	10:05am	MLD_S7B4W_30	0	104	1	104
4	11-Sep-08	12:12pm	ULLD_S7B1-2E+PS	1	104	1	106
5	11-Sep-08	12:15pm	UBS_S5B3-4W	1	118	1	118
6	12-Sep-08	4:23pm	LLLD_S6B4W	0	102	0	104
7	12-Sep-08	4:30pm	UBS_S5B3-4W Misfire	1	105	1	107
8	16-Sep-08	10:20am	MLD_S7B4W_2	1	105	1	107
9	17-Sep-08	12:41pm	UB_S6B2-3E	1	104	1	106
10	24-Sep-08	12:44pm	LB_S5B3-4E	1	105	2	104
11	24-Sep-08	12:48pm	UB_S6B3-4E	1	103	2	106
12	29-Sep-08	12:01pm	PS_UB_S6N2	0	NA	0	NA
13	29-Sep-08	12:11pm	LB_S5B2-3E	0	103	0	104
14	03-Oct-08	9:40am	UB_S6B1-3W	1	111	1	1
15	09-Oct-08	9:39am	UB_S6B3W	1	101	1	102
16	09-Oct-08	9:41am	ULLD_S7B2-3E	0	DNT	1	103
17	10-Oct-08	3:00pm	LB_S5B3-4W	1	104	2	105
18	13-Oct-08	1:00pm	UB_S6B3-4W	1	100	1	99
19	17-Oct-08	4:16pm	ULLD_S7B3-4E	1	100	1	102
20	17-Oct-08	4:24pm	MLD_S8B1-3E	1	112	1	111
21	21-Oct-08	9:36am	LB_S5B2-3	0	106	1	105
22	24-Oct-08	3:30pm	LB_S5B1	0	DNT	0	DNT
23	28-Oct-08	9:38am	UBS_S6B3E	0	100	1	102
24	29-Oct-08	9:39am	UBS_S6B1-2E, PS_LB_S6North	1	103	1	109

**2007 – 2008 Blast Vibration and Overpressure Results**

Shot No	Date	Time	Location	St Clements Church		Camberwell Village	
				Vibration	Overpressure	Vibration	Overpressure
25	01-Nov-08	09:19:18	MLD_S8B3-4E	1	116	1	119
26	05-Nov-08	12:07:51	PS_LB_S6N	0	DNT	1	98
27	05-Nov-08	12:09pm	LLLD_S5B4W	0	103	0	DNT
28	07-Nov-08	12:17:09	UBS_S6B1-3W	1	102	0	101
29	12-Nov-08	12:02pm	LLLD_S6B4	0	DNT	0	105
30	13-Nov-08	12:10pm	UBS_S4B4S	1	99	1	99
31	14-Nov-08	11:00am	PS_MLD_S8West	0	DNT	0	DNT
32	18-Nov-08	10:05am	PS_MLD_S8North	0	DNT	0	DNT
33	18-Nov-08	10:13am	MLD_S8B3_15	1	98	1	100
34	21-Nov-08	4:12:pm	LB_S6B3E	1	106	2	110
35	24-Nov-08	3:12pm	LB_S6B2E	0	100	0	101
36	27-Nov-08	12:05pm	LB_S6B1E	1	100	1	101
37	01-Dec-08	12:03:20	UB_S6B4E	1	103	1	105
38	02-Dec-08	16:55:38	LLLD_S7B1E	1	114	1	109
39	04-Dec-08	09:25:02	LLLD_S7B2E	0	106	0	115
40	05-Dec-08	12:30pm	LLLD_S7B3E	0	DNT	0	DNT
41	09-Dec-08	14:03:12	LB_S6B3W	1	107	2	109
42	13-Dec-08	12:15:16	LB_S6B2W	1	113	1	116
43	13-Dec-08	12:12pm	MLD_TOE	0	DNT	0	DNT
44	17-Dec-08	09:36:12	UBS_S4B4S2, UB_S6B4S	1	104	1	106
45	18-Dec-08	1:40pm	LB_S6B1W	0	DNT	0	DNT
46	19-Dec-08	09:15:19	PS_UB_S7N	0	108	0	98
47	24-Dec-08	14:57:25	UB_S7B1-2E	1	103	2	106
48	30-Dec-08	12:06:02	Single hole UBS 1	0	DNT	0	DNT
49	30-Dec-08	12:08:14	Single hole UBS 2	0	107	1	97

**2007 – 2008 Blast Vibration and Overpressure Results**

Shot No	Date	Time	Location	St Clements Church		Camberwell Village	
				Vibration	Overpressure	Vibration	Overpressure
50	30-Dec-08	12:09:10	Single hole UBS 3	0	DNT	0	DNT
51	30-Dec-08	12:11:27	Single hole UBS 4	0	DNT	0	DNT
52	30-Dec-08	12:13:38	Single hole UBS 5	0	103	0	94
53	30-Dec-08	12:16:11	Single hole UBS 6	0	DNT	1	93
54	30-Dec-08	12:19:08	Single hole UBS 7	0	DNT	1	100
55	30-Dec-08	12:21:54	Single hole UB 1	0	106	1	96
56	30-Dec-08	12:25:17	Single hole UB 2	0	DNT	0	DNT
57	30-Dec-08	12:27:28	Single hole UB 3	0	107	1	96
58	30-Dec-08	12:29:12	Single hole UB 4	0	DNT	0	DNT
59	30-Dec-08	12:31:24	Single hole UB 5	0	DNT	0	108
60	30-Dec-08	12:33:53	Single hole UB 6	0	104	1	105
61	30-Dec-08	12:36:52	Single hole UB 7	0	DNT	0	DNT
62	30-Dec-08	12:39:02	Single hole MLD 1	0	100	1	101
63	30-Dec-08	12:41:24	Single hole MLD 2	0	99	1	98
64	30-Dec-08	12:43:20	Single hole MLD 3	0	DNT	0	DNT
65	30-Dec-08	12:45:31	Single hole MLD 4	1	103	1	96
66	30-Dec-08	12:48:01	Single hole MLD 5	1	100	1	100
67	30-Dec-08	12:50:50	Single hole MLD 6	1	102	0	97
68	30-Dec-08	12:56:16	Single hole MLD 7	0	104	0	DNT
69	30-Dec-08	12:58:26	Single hole ULD 1	0	99	0	90
70	30-Dec-08	13:01:21	Single hole ULD 2	1	101	1	100
71	30-Dec-08	13:03:08	Single hole ULD 3	0	DNT	0	DNT
72	30-Dec-08	13:04:55	Single hole ULD 4	0	108	0	DNT
73	30-Dec-08	13:07:06	Single hole ULD 5	0	DNT	0	102
74	30-Dec-08	13:11:30	Single hole ULD 6	0	DNT	0	DNT

**2007 – 2008 Blast Vibration and Overpressure Results**

Shot No	Date	Time	Location	St Clements Church		Camberwell Village	
				Vibration	Overpressure	Vibration	Overpressure
75	30-Dec-08	13:15:00	Single hole ULD 7	0	DNT	0	DNT
76	06-Jan-09	16:33:19	MLD_S8B1-2 toe south, MLD_S8B1-2, MLD_S8B1-2 toe north	1	112	1	113
77	08-Jan-09	14:55:48	UB_S7B3E	1	107	1	102
78	13-Jan-09	12:01:38	UBS_S4B5N	1	99	2	103
79	13-Jan-09	12:09:00	MLD_S5B6E	2	109	2	113
80	14-Jan-09	4:30pm	Dump_S6B1-3 (Floor Sump)	0	DNT	0	DNT
81	16-Jan-09	2:10pm	PS_LLLD_S7 + 2 mld rocks	0	DNT	0	DNT
82	16-Jan-09	14:15:57	UB_S3B7	1	105	2	102
83	20-Jan-09	12:05pm	MLD_Knob_(2) + 2 mld rocks	0	DNT	0	DNT
84	23-Jan-09	09:31:26	ULLD_S7B1-3	1	104	1	107
85	24-Jan-09	09:05:26	MLD_S8B3_2	1	114	1	110
86	29-Jan-09	11:34:48	MLD_Knob_(3)	1	98	0	100
87	29-Jan-09	11:42:24	UBS_S5-6B4N	1	101	0	99
88	30-Jan-09	12:06:24	UB_S7B3E	0	DNT	0	99
89	02-Feb-09	14:10:40	PS_MLD_S9	1	105	1	107
90	03-Feb-09	14:11:10	UBS_S7B2E	0	108	1	108
91	05-Feb-09	13:39:34	UBS_S7B1E	0	DNT	1	106
92	07-Feb-09	11:30am	PS_LLLD_S8E + Rock Garden	0	DNT	0	DNT
93	09-Feb-09	13:57:44	ULLD_S8B1-3E	1	103	1	105
94	14-Feb-09	09:31:03	LB_S6B4N	1	99	2	102
95	14-Feb-09	09:46:42	LB_S6B4N	1	101	2	102
96	19-Feb-09	09:34:26	ULLD_S8B4E	1	98	1	99
97	20-Feb-09	12:01:39	UBS_S5B4	0	101	1	104
98	24-Feb-09	09:35:07	LB_S7B3E	1	112	1	114

**2007 – 2008 Blast Vibration and Overpressure Results**

Shot No	Date	Time	Location	St Clements Church		Camberwell Village	
				Vibration	Overpressure	Vibration	Overpressure
99	25-Feb-09	9:05am	MLD_RockGarden(2)	0	DNT	0	DNT
100	27-Feb-09	12:01:14	LB_S7B2E	1	107	1	109
101	03-Mar-09	11:26:27	ULLD_S8B1-2	1	110	1	107
102	05-Mar-09	13:41:49	ULLD_S8B1 + PS	1	105	1	105
103	05-Mar-09	2:30pm	LB_S7B1	0	DNT	0	DNT
104	06-Mar-09	12:00:15	UBS_S3B5	1	105	2	105
105	11-Mar-09	2:00pm	LLLD_S7B1-2W	0	DNT	0	DNT
106	12-Mar-09	12:45:31	ULLD_S8B1-2W	0	DNT	1	109
107	13-Mar-09	14:54:02	UBS_S3B5_S	1	99	2	102
108	16-Mar-09	12:30pm	LLLD_S8B3E	0	DNT	0	DNT
109	18-Mar-09	11:56:54	LLLD_S8B1-2E	0	DNT	1	98
110	19-Mar-09	11:59:02	ULD_S5B7E(2)	1	111	1	111
111	20-Mar-09	14:31:24	UB_S7B1W, PS_UB_S7	1	106	1	105
112	24-Mar-09	09:38:35	UB_S7B2-3W	0	108	1	109
113	27-Mar-09	09:12:10	UB_S8B1-2E, PS_UB_S8	0	106	1	108
114	28-Mar-09	9:00am	LLLD_S8B1	0	DNT	0	DNT
115	30-Mar-09	15:25:16	LLLD_S8B2	0	106	0	105
116	03-Apr-09	4:15pm	LLLD_S8B4	0	DNT	0	DNT
117	06-Apr-09	10:30am	LLLD_S8B2	0	DNT	0	DNT
118	09-Apr-09	10:41:45	LLLD_S8B3, UB_S8B3E	1	98	1	102
119	09-Apr-09	10:42am		0	DNT	0	DNT
120	09-Apr-09	13:48:11	ULD_S5B7W	2	106	1	104
121	14-Apr-09	10:43:48	UB_S6-7B4	2	101	3	103
122	15-Apr-09	10:24:10	UBS_S7B1-3W	0	DNT	1	107
123	18-Apr-09	14:48:11	UB_S8B1-3	1	106	1	107

**2007 – 2008 Blast Vibration and Overpressure Results**

Shot No	Date	Time	Location	St Clements Church		Camberwell Village	
				Vibration	Overpressure	Vibration	Overpressure
124	18-Apr-09	?	UBS_S8B1-3E	0	DNT	0	DNT
125	20-Apr-09	17:32:58	UB_S7B4	1	97	1	102
126	24-Apr-09	13:01:05	UB_S8B3-4E	1	102	1	105
127	28-Apr-09	3:35pm	LB_S4-5B4S	0	DNT	0	DNT
128	28-Apr-09	15:44:58	LLLD_S8B1W	1	NA	5	109
129	30-Apr-09	12:39:15	UBS_S5-6B4	0	DNT	0	99
130	30-Apr-09	12:49:52	ULD_S5B8E2	0	DNT	1	109
131	01-May-09	4:05pm	LLLD_S8B1W	0	DNT	0	DNT
132	01-May-09	16:09:45	LB_S7B1-3W	NA	NA	2	107
133	04-May-09	14:59:16	UBS_S7B4	0	DNT	0	95
134	06-May-09	2:55pm	UBS_S7B4E	0	DNT	0	DNT
135	07-May-09	15:02:03	LB_S8B1-3E + PS, PS_LB_S8B1E	1	103	2	103
136	09-May-09	09:20:22	UB_S8B1-3W + PS, PS_UBS_S8B1-3	1	107	1	107
137	12-May-09	12:32:55	LB_S6-7B4	1	97	1	100
138	13-May-09	12:04:38	ULD_S6B6E	1	117	1	116
139	18-May-09	09:33:08	UB_S9S1-2	0	101	1	101
140	18-May-09	09:42:29	LB_S6-7B4E	1	104	3	104
141	25-May-09	12:07:46	LB_S8B3E	1	101	1	97
142	25-May-09	12:18:23	ULD_S6B7E	1	113	2	112
143	26-May-09	12:01:04	UBS_S8B3	0	103	0	101
144	27-May-09	09:30:14	LB_S6-7B4E2	1	103	1	102
145	28-May-09	12:04:22	UBS_S8B1-2	0	99	NA	NA
146	29-May-09	15:49:42	UBS_S8B2	2	96	NA	NA
147	03-Jun-09	12:20:48	ULD_S5-6B8	2	119	2	119



**2007 – 2008 Blast Vibration and Overpressure Results**

Shot No	Date	Time	Location	St Clements Church		Camberwell Village	
				Vibration	Overpressure	Vibration	Overpressure
148	04-Jun-09	12:14:10	UBS_S8B1-3W	0	102	0	100
149	10-Jun-09	9:45am	UBS_S8B1W(2), UBS_Knob, UBS_S8B3(2)	0	DNT	0	DNT
150	12-Jun-09	14:44:15	LB_S8B1-2	1	111	1	109
151	15-Jun-09	12:07:47	MLD_S5B7-8E	1	114	2	111
152	18-Jun-09	15:15:12	LB_S9B1-2E	1	102	2	100
153	25-Jun-09	12:11:52	ULD_S6B6-7W	2	136	1	132
154	26-Jun-09	15:27:20	LB_S9B1-2ES	1	106	2	109
155	06-Jul-09	12:10:43	PS_ULD_West, ULD_S7B6_75	1	105	1	104
156	07-Jul-09	12:35:17	LB_S7B4	1	102	1	103
157	10-Jul-09	09:03:25	LB_S9B1-2W	1	104	1	101
158	10-Jul-09	12:35:41	MLD_S5B7-8	2	108	2	109
159	15-Jul-09	12:34:07	ULD_S4B9, PS_ULD_South	5	117	4	111
160	20-Jul-09	3:00pm	LB_S9B1-2W2	0	DNT	0	DNT
161	21-Jul-09	12:05:11	ULD_S5B8-9	3	118	4	119
162	24-Jul-09	12:43:36	LB_S8B3N1	1	101	1	101
163	28-Jul-09	12:35:28	PS_ULD_SW	2	106	2	106
164	30-Jul-09	12:01:43	ART_S6B8-9, PS_ULD_W2	1	115	1	116
165	31-Jul-09	14:58:39	LB_S8B3N2	1	115	1	108
166	08-Aug-09	09:08:25	MLD_S5-6B8	2	112	2	115
167	11-Aug-09	10:27:23	ULD_S6B7-8	2	119	2	119
168	13-Aug-09	12:06:00	MLD_S6B6-7E	1	112	1	115
169	20-Aug-09	12:13:15	ULD_S6B8-9E, PS_ULD_W4	3	116	2	117
170	24-Aug-09	09:26:36	UBS_S6-8B4	0	106	1	102
171	27-Aug-09	09:01:39	PS_ULD_W5	1	108	2	103

**2007 – 2008 Blast Vibration and Overpressure Results**

Shot No	Date	Time	Location	St Clements Church		Camberwell Village	
				Vibration	Overpressure	Vibration	Overpressure
172	28-Aug-09	14:16:18	MLD_S4B9	2	112	2	109
<b>Total Blasts 172</b>			<b>Number Blasts Recorded</b>	171	120	170	132
			<b>% Blasts Recorded</b>	99%	70%	99%	77%
			<b>Maximum</b>	5	136	5	132
			<b>Average</b>	1	106	1	104
			<b>Minimum</b>	0	96	0	90
			<b>No &gt; 2 mm/s</b>	3		5	
			<b>% &gt; 2 mm/s</b>	1.8%		2.9%	
			<b>No &gt; 10mm/s</b>	0		0	
			<b>No &gt; 115 dBL</b>		9		10
			<b>% &gt; 115 dBL</b>		5.2%		5.8%
			<b>No &gt; 120 dBL</b>		1		1

**APPENDIX 4**

**Complaints List**

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**2008 - 2009 Ashton Coal Operations Complaints List**

<b>Complaint No</b>	<b>Date</b>	<b>Time</b>	<b>Identifier</b>	<b>Issue</b>	<b>Wind Speed (m/s)</b>	<b>Wind Direction</b>	<b>Inversion</b>	<b>Comments/Operational Changes</b>
1	07/09/2008	9:00pm	9	lights	NA	NA	NA	Light was observed by EO prior to the complaint being received and the OCE had been contacted to relocate the light. The lighting plant was adjusted to face the ground. EO observed the change from Camberwell Village and found the glare from the light was removed.
2	07/09/2008	8:55pm	DECC	lights	NA	NA	NA	
3	07/09/2008	10:30am	DECC	noise	2.7m/s	WNW	No inversion	No operational changes made as complaint received after the fact.
4	12/09/2008	7:45pm	18	noise	2.1m/s	WNW	1.8°C/100m	Following the complaint the OCE relocated dumping operations below RL120.
5	13/09/2008	9:05pm	18	noise	3.5m/s	N	13.1°C/100m	The OCE reviewed operations. All dumping had been relocated to low, night time dumps earlier in the night. No further changes were made.
6	15/09/2008	4:39pm	18	dust	9.6m/s	NW	NA	High wind speeds were experienced throughout the day. Real-time dust levels were being continuously monitored throughout the day by the site environmental officer. All operations were situated low in the pit. 30mins prior to the complaint the third water cart was started up. A decrease in dust levels was recorded following the third water cart. PM10 levels were within Ashton Coal's criteria when the open cut finished at 10pm however for the full 24hr period the PM10 levels exceeded Ashton Coals contribution criteria for the day. This was the result of a dust storm experienced at all sites up wind and down between 8pm and 6am on the 15th and 16th September
7	16/09/2008	5:30am	18	other	5.3m/s	NW	No inversion	Ashton conducted an investigation into the vibration concerns and found no correlation between Ashton equipment and the times of vibration complaints. Further investigation suggested that the rattling of the windows was the result of NW winds blowing against the western walls of the property.
8	03/10/2008	9:40am	18	blast (dust / vibration)	8.1m/s	WNW	No inversion	Complaints received were regarding vibration of house and dust emissions. Blasting results were within Ashton Coals criteria. A small dust spike was recorded on the PM10 monitors following the blast however Ashton Coal remained in compliance with the air quality criteria for the day.
9	03/10/2008	9:40am	DECC	blast (dust / vibration)	8.1m/s	WNW	No inversion	
10	03/10/2008	2:04pm	8	dust	10.1m/s	WNW	NA	Real-time dust levels were being continuously monitored throughout the day by the site environmental officer. Ashton had relocated all exposed dumping operations into the pit earlier in the day. Dust levels were within criteria for the day. Following the complaint the OCE started up a third water cart.
11	10/10/2008	7:30am	DECC	noise	1m/s	WNW	2.3°C/100m	No operational changes made as complaint received after the fact.
12	11/10/2008	6:45am	DECC	noise	0.6m/s	WNW	2.2°C/100m	No operational changes made as complaint received after the fact.

**2008 - 2009 Ashton Coal Operations Complaints List**

<b>Complaint No</b>	<b>Date</b>	<b>Time</b>	<b>Identifier</b>	<b>Issue</b>	<b>Wind Speed (m/s)</b>	<b>Wind Direction</b>	<b>Inversion</b>	<b>Comments/Operational Changes</b>
13	11/10/2008	3:15pm	DECC	noise	1.1m/s	WNW	No inversion	No operational changes made as complaint received after the fact.
14	13/10/2008	4:30pm	8	dust	3.8m/s	WNW	NA	Real-time PM10 levels were assessed throughout the day and an inspection of the pit was conducted which identified no excessive dust was being generated. It was concluded that the dust observed by the complainant was likely the result of shift change where all 12 trucks start up from the same location. All 3 water carts were operating at the time of the complaint.
15	13/10/2008	6:15pm	18	dust	3.6m/s	WNW	NA	Prior to the complaint one of the three water carts had broken down. A slight increase in dust levels was recorded following this. The water cart was started back up shortly after the complaint. Ashton complied with all criteria for the day.
16	17/10/2008	7:00am	DECC	noise	0.2m/s	WNW	6.3°C/100m	No operational changes made as complaint received after the fact.
17	25/10/2008	8:46pm	18	noise	1.5m/s	NW	8.8°C/100m	An inspection by the site environmental officer indicated ACOL operations were audible in Camberwell Village. The weather conditions, particularly the inversion were noise enhancing for ACOL's operations at the time of the complaint. Following the inspection dumping operations were relocated to lower levels.
18	26/10/2008	7:07pm	18	noise	0.5m/s	NW	5.7°C/100m	An inspection by the site environmental officer indicated ACOL operations were audible in Camberwell Village. The weather conditions, particularly the inversion were noise enhancing for ACOL's operations at the time of the complaint. Following the inspection dumping operations were relocated to lower levels.
19	27/10/2008	9:00am	DECC	noise/dust	1.1m/s	WNW	No inversion	No operational changes made as complaint received after the fact. See comments below in relation to activities for the day.
20	27/10/2008	4:00pm	DECC	dust/noise	1.1m/s	WNW	No inversion	No operational changes made as complaint received after the fact. See comments below in relation to activities for the day.
21	27/10/2008	7:31pm	18	noise	3.6m/s	WNW	0.3°C/100m	Following the complaint an inspection of the open cut pit was conducted by the OCE. Dozer operations were relocated to the northern side of the open cut dump.
22	27/10/2008	7:34pm	18	dust	3.6m/s	WNW	0.3°C/100m	Real-time PM10 levels were monitored throughout the day by the site environmental officer. During the day Topsoil hauling was ceased following a visual inspection and a blast was cancelled due to prevailing wind conditions. Ashton complied with PM10 levels for the day.
23	27/10/2008	8:33pm	18	noise	6.2m/s	WNW	1.9°C/100m	A second inspection following the inspection at 7:31 was conducted after the complaint. All truck movements were relocated to the northern haul road.

**2008 - 2009 Ashton Coal Operations Complaints List**

<b>Complaint No</b>	<b>Date</b>	<b>Time</b>	<b>Identifier</b>	<b>Issue</b>	<b>Wind Speed (m/s)</b>	<b>Wind Direction</b>	<b>Inversion</b>	<b>Comments/Operational Changes</b>
24	31/10/2008	10:22am	8	dust	9.5m/s	WNW	NA	Strong winds were experienced throughout the day. Real-time PM10 levels were monitored throughout the day by the site environmental officer. Dust levels were elevated and prompted a shutdown of equipment. Excavator 19 shutdown at 9am due to dust in pit. Dumping was relocated from the southern boundary to the north at 10:45am. Excavator 21 was shutdown at 1:30pm. Excavator 20 was shutdown at 1:40pm. Excavator 30 was shut down at 2pm. Excavator 21 and 30 were started back up at 4:30pm. Excavator 19 was started up at 5:30pm. Dust levels increased following this change so Excavator 19 was shut down again at 6:00pm.
25	31/10/2008	10:43am	31	dust	9.5m/s	WNW	NA	
26	31/10/2008	1:44pm	8	dust	10.1m/s	WNW	NA	
27	31/10/2008	10:00am	DECC	dust	9.5m/s	WNW	NA	Complaint received after the fact. Refer to 1087-1089 for details relating to the days conditions.
28	31/10/2008	10:38am	DECC	dust	9.5m/s	WNW	NA	Complaint received after the fact. Refer to 1087-1089 for details relating to the days conditions.
29	03/11/2008	10:44pm	9	lights	NA	NA	NA	Following shut down of the open cut operations a light was left on to allow re-fuelling. The complainant indicated that the light was not affecting her but wanted to ensure ACOL was aware the light was on and hadn't forgotten to switch it off. Following the call the equipment was refuelled and the light shut off.
30	05/11/2008	7:34pm	9	dust	0.9m/s	NNW	1.3°C/100m	Real-time PM10 levels were monitored throughout the day by the site environmental officer and were low at the time of the complaint. No operational changes were made as a result. Ashton complied with all dust criteria for the day.
31	06/11/2008	7:58pm	18	noise	2.4m/s	WNW	0.9°C/100m	The site environmental officer conducted an inspection of Camberwell Village and found Ashton was audible at the time of the complaint. Dumping was relocated to the northern side and lower down in the Open Cut pit.
32	08/11/2008	10:48am	8	dust	9.4m/s	NNW	NA	Strong gusty winds began at 10:30am leading to a short spike in dust levels. Prior to receiving the complaint the OCE received a call from his dozer operator indicating winds had picked up and more dust was being generated. The OCE relocated exposed operations in pit. Ashton remained within compliance of all criteria for the day.
33	04/11/2008	7:30pm	DECC	dust	0.9m/s	NNW	No inversion	Ashton Coals 24hr average PM10 contribution for the day was less than 0. There was no dust observable in Camberwell Village at the time of the complaint and PM10 levels were not elevated. No operational changes were made.
34	05/11/2008	8:30pm	DECC	noise	1.2m/s	WNW	No inversion	No operational changes made as complaint received after the fact.

**2008 - 2009 Ashton Coal Operations Complaints List**

<b>Complaint No</b>	<b>Date</b>	<b>Time</b>	<b>Identifier</b>	<b>Issue</b>	<b>Wind Speed (m/s)</b>	<b>Wind Direction</b>	<b>Inversion</b>	<b>Comments/Operational Changes</b>
35	06/11/2008	8:00pm	DECC	noise	2.4m/s	WNW	No inversion	No operational changes made as complaint received after the fact.
36	12/11/2008	7:15am	DECC	noise	0.2m/s	ESE	No inversion	Winds were emanating from the south east. These are ideal conditions for dumping at higher locations as the wind will reduce noise impacts from Ashton Coal. Following the complaint being received to site at 11am an inspection of Camberwell Village indicated that Ashton was barely audible. No further operational changes were made.
38	18/11/2008	5:10pm	18	other	0.4m/s	NW	NA	The complaint was regarding a bio-waste odour believed to be coming from Ashton Coal. Ashton were not spreading Organic Growth Medium (OGM) on the day of the complaint. An inspection of Camberwell Village following the complaint suggested the smell was associated with a septic system and not the OGM, which have very different odours.
39	21/11/2008	9:05pm	18	noise	4m/s	WNW	No inversion	An inspection of the open cut pit by the OCE was conducted following the complaint. All noise sources had been relocated to night dumps on the northern side of the pit prior to the complaint. No further action was taken.
40	30/11/2008	5:36pm	18	dust	5.8m/s	WNW	NA	Real-time PM10 levels were assessed by the site environmental officer and were not elevated at the time of the complaint. No operational changes were made as a result. Ashton remained within criteria for the day.
41	01/12/2008	9:20am	18	noise	3.1m/s	WNW	No inversion	An inspection of Camberwell Village indicated that noise from Ashton Coal was not excessive although Topsoil hauling on the 135RL dump was audible. Topsoil hauling was ceased as a result.
42	16/12/2008	7.00pm	DECC	noise	4.5m/s	WNW	No inversion	A review of the open cut operations was undertaken by the OCE following the 9:35 complaint. All operations were at low levels in the pit. Then the complainant was called the following day in response to the complaint they indicated that trucks truck specifically were audible at 11pm. Ashton open cut operations shut down at 10pm.
43	16/12/2008	9.35pm	18	noise	2.6m/s	W	1.6°C/100m	
44	17/12/2008	9.35am	DECC	blast	3.7m/s	NW	No inversion	Blast results in Camberwell Village were all below criteria. A small increase in PM10 concentrations above background levels was recorded following the blast however Ashton Coal were within dust criteria for the day.
45	17/12/2008	9.49am	18	blast	3.7m/s	NW	No inversion	
46	04/01/2009	6:30am	DECC	noise	0.7m/s	WNW	5.5°C/100m	Open Cut operations did not commence until 7am.
47	05/01/2009	9:00am	DECC	noise	4.1 m/s	WNW	No inversion	No operational changes made as complaint received after the fact.
48	06/01/2009	7:00am	DECC	noise	1.5m/s	WNW	9.6°C/100m	No operational changes made as complaint received after the fact.
49	06/01/2009	4:35pm	8	blast	3.3m/s	WNW	No inversion	Blast results were all within criteria. A dust spike was recorded following the blast however Ashton were within all air quality criteria for the day.
50	07/01/2009	12.00pm	DECC	noise/dust	2.4m/s	WNW	No inversion	Dust levels were within criteria throughout the day. No operational changes made as complaint received after the fact.



**2008 - 2009 Ashton Coal Operations Complaints List**

<b>Complaint No</b>	<b>Date</b>	<b>Time</b>	<b>Identifier</b>	<b>Issue</b>	<b>Wind Speed (m/s)</b>	<b>Wind Direction</b>	<b>Inversion</b>	<b>Comments/Operational Changes</b>
51	07/01/2009	6.00 pm	DECC	noise	4.5m/s	NW	No inversion	No operational changes made as complaint received after the fact.
52	08/01/2009	3.20 am	DECC	noise	0.9m/s	SW	3°C/100m	Southerly winds were in at the time of the complaint which are noise reducing for Ashton Coal's operations. No operational changes made as complaint received after the fact.
53	10/01/2009	7:30am	DECC	noise	3.2m/s	SE	6.6°C/100m	Southerly winds were in at the time of the complaint which are noise reducing for Ashton Coal's operations. No operational changes made as complaint received after the fact.
54	13/01/2009	7:20am	DECC	noise	2.3m/s	SE	No inversion	Southerly winds were in at the time of the complaint which are noise reducing for Ashton Coal's operations. No operational changes made as complaint received after the fact.
55	13/01/2009	12:02pm	DECC	blast	2.4m/s	SE	No inversion	2 Shots fired at Ashton Coal. Blast levels for both shots were below criteria.
56	13/01/2009	7:25pm	DECC	noise	2.3m/s	SE	No inversion	Southerly winds were in at the time of the complaint which are noise reducing for Ashton Coal's operations. No operational changes made as complaint received after the fact.
57	14/01/2009	7:20am	DECC	noise	0.9m/s	SW	3.6°C/100m	Winds were emanating from the south at the time of the complaint which are noise reducing conditions for Ashton Coal's operations. No operational changes made as complaint received after the fact.
58	14/01/2009	1:40pm	DECC	dust	1.1m/s	SW	No inversion	Winds were emanating from the south west at the time of the complaint (Ashton is NW of the Village). Dust levels recorded in Camberwell Village at the time of the complaint were low. Ashton complied with all criteria for the day. No operational changes made as complaint received after the fact.
59	15/01/2009	6:30am	DECC	noise/dust	1.4m/s	NW	10.5°C/100m	Upwind PM10 levels were similar to Camberwell PM10 levels. Ashton complied with all criteria for the day. No operational changes made as complaint was received after the fact.
60	21/01/2009	5:30pm	9	dust	4.9m/s	WNW	No inversion	Real-time PM10 levels were monitored throughout the day by the site environmental officer. No excessive dust levels were recorded on PM10 monitors. Ashton complied with all criteria for the day. Ashton had operational strategies (including water carts and stockpile sprays) in place to ensure compliance with PM10 criteria.
61	28/01/2009	7:15am	DECC	noise	0.8m/s	SE	No inversion	Southerly winds were in at the time of the complaint which are noise reducing for Ashton Coal's operations. No operational changes made as complaint received after the fact.
62	14/02/2009	9:50am	DECC	blast	7.4m/s	SE	No inversion	Blast results were all within criteria. Dust from the blast moved north from the shot away from Camberwell Village due to the southerly winds at the time.

**2008 - 2009 Ashton Coal Operations Complaints List**

<b>Complaint No</b>	<b>Date</b>	<b>Time</b>	<b>Identifier</b>	<b>Issue</b>	<b>Wind Speed (m/s)</b>	<b>Wind Direction</b>	<b>Inversion</b>	<b>Comments/Operational Changes</b>
63	20/02/2009	12:07pm	DECC	blast	0.5m/s	NW	No inversion	No excessive dust was observed in Camberwell Village following the blast, blast levels were within criteria.
63	04/03/2009	5:39pm	18	dust	4.5	NW	No inversion	Media reports indicated that a dust storm covered the Hunter Valley in "mud rain" on the evening of the complaint. Real-time PM10 levels recorded at the time of the complaint showed elevated PM10 levels upwind and downwind of ACOL operations.
64	04/03/2009	9:35pm	18	noise	3.1	NW	No inversion	All gear operating at low locations in the pit. No operational changes required.
65	04/03/2009	9:00pm	DECC	noise / vibration				
66	05/03/2009	11:30am	18	dust	3.4	W	No inversion	The effects from the dust storm the previous night were still being observed in the Hunter Valley. Operations were assessed by the EO and OCE to ensure no off-site dust sources were operating. All water carts operating at the time fo the complaint. No further action taken.
67	19/03/2009	7:26pm	9	noise	2.7	E	Not available	Prevailing winds were from the east. An inspection of Camberwel Village by the EO following the complaint indicated that ACOL was not audible.
68	15/04/2009	3:07am	18	noise	2.6	NW	3.9°C/100m	MS contacted the CHPP control room and confirmed the only operations at ACOL at the time of the complaint was a single dozer operating on the Underground ROM stockpile. ACOL was barely audible at the time of the complaint. No operational changes were made.
69	15/04/2009	2:45am	DECC	noise				
70	15/04/2009	4:11pm	18	dust	3.5	NW	No inversion	EO inspected Camberwell Village and identified dust observable from the Village. Following this Excavator 19 was shut down. ACOL complied with PM10 criteria for the day.
71	15/04/2009	9:12pm	18	noise	2.7	NW	9.5°C/100m	Excavator 19 previously shutdown. All other operations were located at low levels (<RL60) in the pit. No further changes made.
72	15/04/2009	9:12pm	DECC	noise				
73	27/04/2009	9:08pm	18	noise	4.6	NW	No inversion	Following an inspection by the EO all dozers were restricted to 1st gear only.
74	28/04/2009	3:45pm	DECC	blast	5.2	SW	No inversion	2 blasts were fired at ACOL. Dust was observed to move along Glennies Creek and dispersed prior to reaching Lethbridge St. Blast results at the Village monitor were vibration 5mm/s and Overpressure 110dB. The vibration result falls within the 5% criteria of 2mm/s. ACOL complied with this criteria for the reporting period.
75	13/05/2009	12:00pm	18	blast	2.5	NW	No inversion	1 blast was fired in the Open Cut pit. Dust levels were not elevated in the 30minute period following the blast. Dust from the blast migrated south east however did not cross Glennies Creek into Camberwell Village.
76	13/05/2009	12:00pm	DECC	blast				
77	13/05/2009	12:30pm	DECC	blast				

**2008 - 2009 Ashton Coal Operations Complaints List**

<b>Complaint No</b>	<b>Date</b>	<b>Time</b>	<b>Identifier</b>	<b>Issue</b>	<b>Wind Speed (m/s)</b>	<b>Wind Direction</b>	<b>Inversion</b>	<b>Comments/Operational Changes</b>
78	13/05/2009	3:45pm	18	dust	2	NW	No inversion	PM10 levels at the time of the complaint were low. All water carts were operating along with stockpile sprays. An inspection of the Open Cut pit indicated no excessive dust sources. No further action taken.
79	08/05/2009	10:12am	DECC	dust	0.5	S	No inversion	Dust levels were extremely low at the time of the complaint. Complaint received after the fact so no action taken.
80	06/03/2009	12:05pm	DECC	blast	1.2	NW	No inversion	Village blast results were vibration 2mm/s and overpressure 105dBL, all within criteria.
81	08/06/2009	7:15am	DECC	noise				Open Cut operations were not commenced until 8am as it was a public holiday.
82	09/06/2009	10:38am	DECC	operating time				ACOL did not begin operations until 7am.
83	11/06/2009	8:00am	DECC	noise				Complaint received after the fact so no action taken.
84	11/06/2009	6:19pm	18	noise	4	NW	No inversion	Following the complaint the OCE shutdown Excavator 30. An inspection at 9:30pm indicated that ACOL was barely audible.
85	12/06/2009	8:40pm	18	noise	1.2	NW	9.3°C/100m	Following the complaint the 994 Loader was shutdown.
86	14/06/2009	9:32pm	18	other	4.3	W	No inversion	Complainant indicated that they believed their windows were vibrating from the operations. ACOL operations were as normal. An investigation is currently being undertaken to determine the source of the window vibration.
87	15/06/2009	5:33pm	18	dust	1.3	NW	No inversion	Very little dust was being generated in the Open Cut at the time of the complaint. PM10 levels were also very low at the time. No operational changes were made as a result.
88	15/06/2009	11:07pm	18	other	1.1	W	6.6°C/100m	The complainant again complained of window vibration resulting from ACOL operations. The Open Cut was shutdown at the time of the complaint.
89	25/06/2009	12:15pm	18	blast				The blast fired at ACOL exceeded overpressure criteria. Blast results were vibration 1mm/s and overpressure 132dBL. Dust was observed to move from the Open Cut down to Camberwell Village. No fume was identified within the dust cloud.
90	25/06/2009	12:15pm	37	blast				
91	25/06/2009	12:15pm	30	blast				
92	25/06/2009	12:15pm	38	blast				
93	25/06/2009	12:15pm	40	blast				
94	25/06/2009	12:05pm	DECC	blast				
95	25/06/2009	12:20pm	DECC	blast				
96	25/06/2009	1:00pm	DECC	blast	4.5	NW	No inversion	
97	06/07/2009	8:05pm	18	noise				
98	06/07/2009	8:07pm	DECC	noise	4	NW	Not available	An inspection of Camberwell Village immediately prior to the complaint indicated ACOL was audible. A noise assessment was undertaken however noise levels dropped off 15 minutes after the complaint was received following the second inspection.

**2008 - 2009 Ashton Coal Operations Complaints List**

<b>Complaint No</b>	<b>Date</b>	<b>Time</b>	<b>Identifier</b>	<b>Issue</b>	<b>Wind Speed (m/s)</b>	<b>Wind Direction</b>	<b>Inversion</b>	<b>Comments/Operational Changes</b>
99	13/07/2009	6:45am	DECC	noise				ACOL operations were shut down at the time of the complaint. The Open Cut did not commence until 7am.
100	13/07/2009	9:10pm	18	noise	5.3	NW	No inversion	Following an inspection of Camberwell by the EO, trucks in the Open Cut were requested to slow down and reduce the use of retard breaks. Noise levels did not decrease so the drill rigs were shutdown.
101	18/07/2009	6:30pm	DECC	noise	0.5	NW	7.8°C/100m	Following the complaint received at 8:55pm by a resident in Camberwell Village Excavator 30 and the D8 dozer were shutdown.
102	18/07/2009	8:55pm	18	noise				
103	19/07/2009	8:56am	9	noise	4.1	NW	1.1°C/100m	An inspection indicated ACOL noise was not excessive, no further changes were made.
104	19/07/2009	11:15am	9	dust	7.4	NW	No inversion	PM10 levels were not elevated at the time of the complaint however Excavator 30 was shutdown due to some visible dust being generated at the locaiton.
105	19/07/2009	8:22pm	18	noise	2.1	NW	1.6°C/100m	Following the complaint an inspection was completed by the OCE and the two drill rigs were shutdown.
106	18/07/2009	10:30pm	DECC	noise	4.1	NW	No inversion	The Open Cut was shutdown at the time of the complaint.
107	21/07/2009	6:00am	18	other	1 - 4	NW	Up to 16.6°C/100m	Complainant indicated that their windows had been vibrating from 10pm through to 7am. All open cut operations were shut down at the time of the complaint. ACOL has committed to having an engineer assess the vibration concerns.
108	21/07/2009	12:10pm	9	blast				
109	21/07/2009	12:45pm	18	blast	5.5	NW	No inversion	ACOL exceeded the 5% criteria at the Village monitor for the blast with vibration 4mm/s and overpressure 119dB. No spike was recorded in dust levels at Site 1 following the blast. Weather forecasts indicated that wind speeds were likely to increase later in the week resulting in a higher potential for dust impacts from blasting.
110	21/07/2009	12:05pm	DECC	blast				
111	21/07/2009	12:05pm	DECC	blast				
112	28/07/2009	4:00pm	DECC	dust				
113	28/07/2009	4:15pm	18	dust	3.7	NW	No inversion	PM10 levels had been low throughout the day and at the time of the complaint. An Excavator had also been shut down for some time leading up to the complaint. Whilst there were no excessive dust sources within the pit, the drill rigs were checked for dust suppression and a drill pattern was wet down.
114	28/07/2009	7:00pm	DECC	noise				The OCE conducted an inspection following the complaint at 7:00pm. Following this Excavator 19 and associated dozer and trucks were shutdown. The DECC complaint was not responded to as it was received after the fact.
115	28/07/2009	8:50pm	18	noise	2.8	NW	2.4°C/100m	

**2008 - 2009 Ashton Coal Operations Complaints List**

<b>Complaint No</b>	<b>Date</b>	<b>Time</b>	<b>Identifier</b>	<b>Issue</b>	<b>Wind Speed (m/s)</b>	<b>Wind Direction</b>	<b>Inversion</b>	<b>Comments/Operational Changes</b>
116	31/07/2009	4:29pm	18	dust				The EO inspected Camberwell Village following the blast and identified that there was no visible impact from ACOL operations on Camberwell Village. PM10 levels at the time were low and supported this observation. Some dust was visible in the Open Cut pit. The OCE was contacted to ensure dust mitigation strategies were being employed. No operational changes were made.
117	31/07/2009	4:27pm	DECC	dust	6.0	NW	No inversion	
118	02/08/2009	10:00am	DECC	dust				
119	02/08/2009	11:14am	18	dust	2.2	NW	No inversion	Three water carts were operating at the time of the complaint. The OCE inspected the Open Cut operations and could not identify any significant dust sources. The OCE also inspected Camberwell Village and found that there was not visible dust impact from ACOL operations. PM10 levels throughout the day and at the time of the complaint were low and supported the OCE's assessment. No further operational changes were made.
120	02/08/2009	9:42pm	DECC	noise	4	NW	0.8°C/100m	Open Cut operations ceased at 9:45pm. As the complaint was received after the fact no operational changes were made.
121	06/08/2009	1:00am	18	other	1.0 - 2.4	NW	9-12°C/100m	Complainants windows were vibrating from 1am to 6am. Open Cut operations were shut down at the time of the complaint. ACOL has committed to having an engineer assess the vibration concerns.
122	14/08/2009	8:54pm	18	noise	2.5	NW	11.2°C/100m	An inspection of the Open Cut and Glennies Creek Road was conducted by the OCE. The 994 Loader was shutdown following the inspection.
123	16/08/2009	12:50pm	18	dust	6.2	NW	No inversion	OCE inspected the Open Cut and no excessive dust generation was observed. PM10 levels were not elevated at the time of the complaint and ACOL complied with all dust criteria for the day.
124	20/08/2009	12:15pm	DECC	Blast (dust+vib)	1.9	NW	No inversion	Dust was observed from Camberwell Village following the blast however there was no spike in PM10 levels indicating that there was no impact on Camberwell. Blast results at the Village monitor were vibration 2mm/s and Overpressure 117dBL.
125	20/08/2009	5:09pm	18	dust	2.0	NW	No inversion	Three water carts were operating at the time of the complaint. The OCE conducted an inspection of the Open Cut and identified no excessive dust sources. A previous inspection of Camberwell Village at 4pm indicated no dust impacts from ACOL operations. PM10 levels were not elevated and all dust criteria were complied with for the day.
126	27/08/2009	9:28am	18	Blast (dust+vib)	4.3	NW	No inversion	ACOL complied with PM10 criteria for the day. Blast vibration (2mm/s) and overpressure (103dBL) results were below criteria.
127	28/08/2009	5:03pm	18	dust	3.0	NW	No inversion	An inspection of Camberwell Village following the complaint identified that there was no dust visible impacting on Camberwell Village. ACOL complied with PM10 criteria for the day.

2008 - 2009 Ashton Coal Operations Complaints List

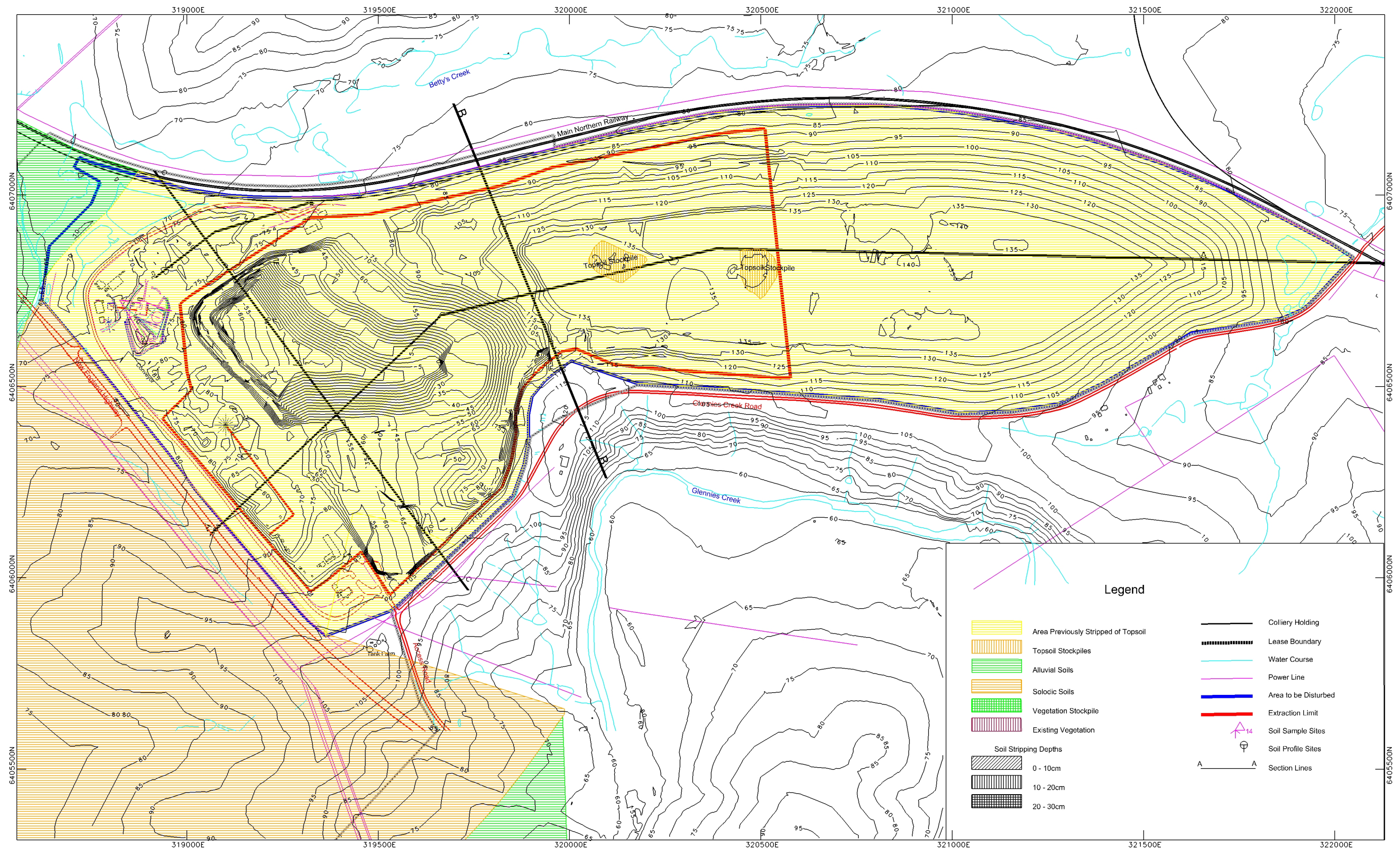
Complaint No	Date	Time	Identifier	Issue	Wind Speed (m/s)	Wind Direction	Inversion	Comments/Operational Changes
128	30/08/2009	11:30am	18	dust	5.9	SW	No inversion	An inspection of the Open Cut pit identified that a dozer was pushing a windrow of a face producing dust. The dozer work was ceased immediately.

## **APPENDIX 5**

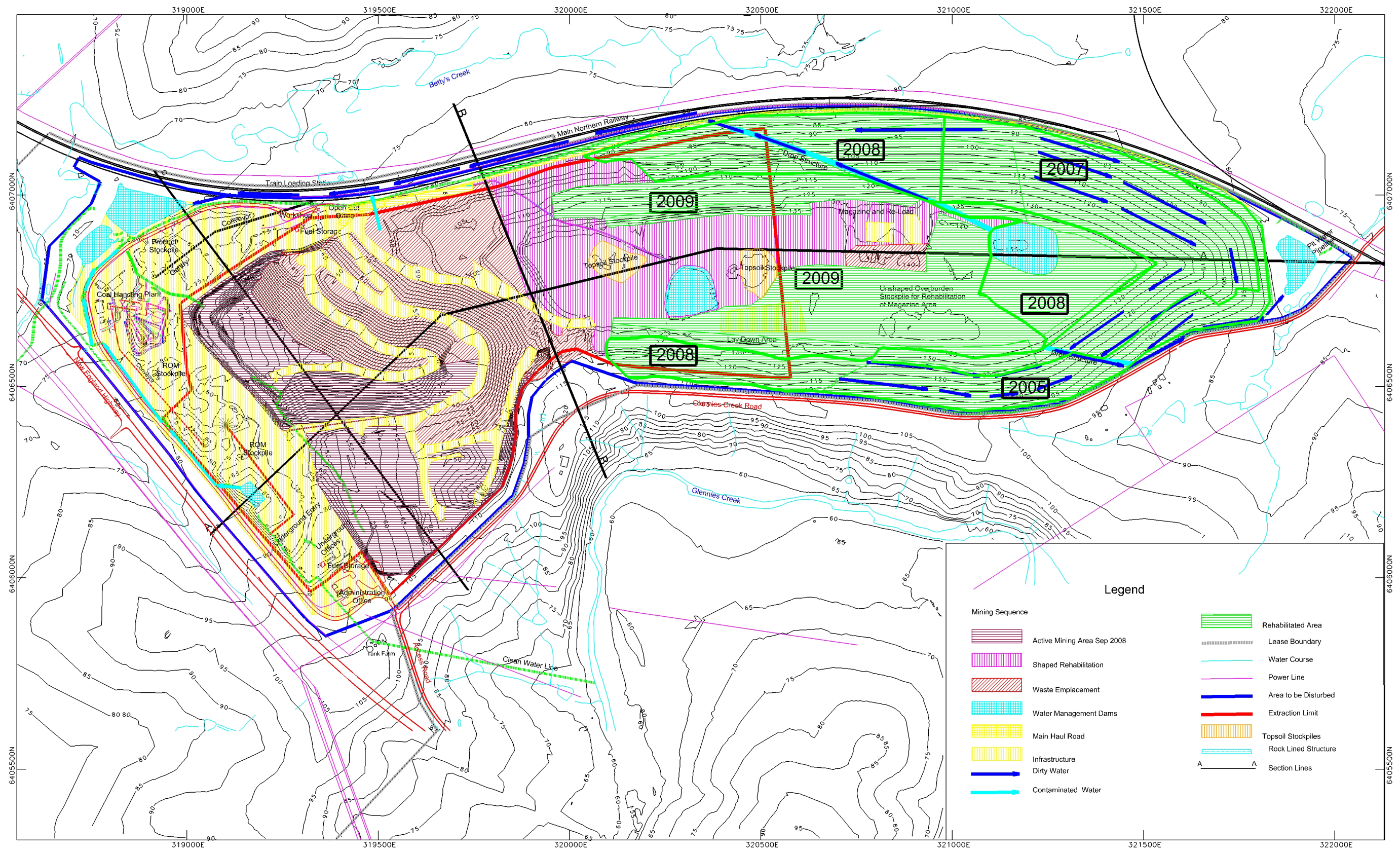
### **AEMR Plans**

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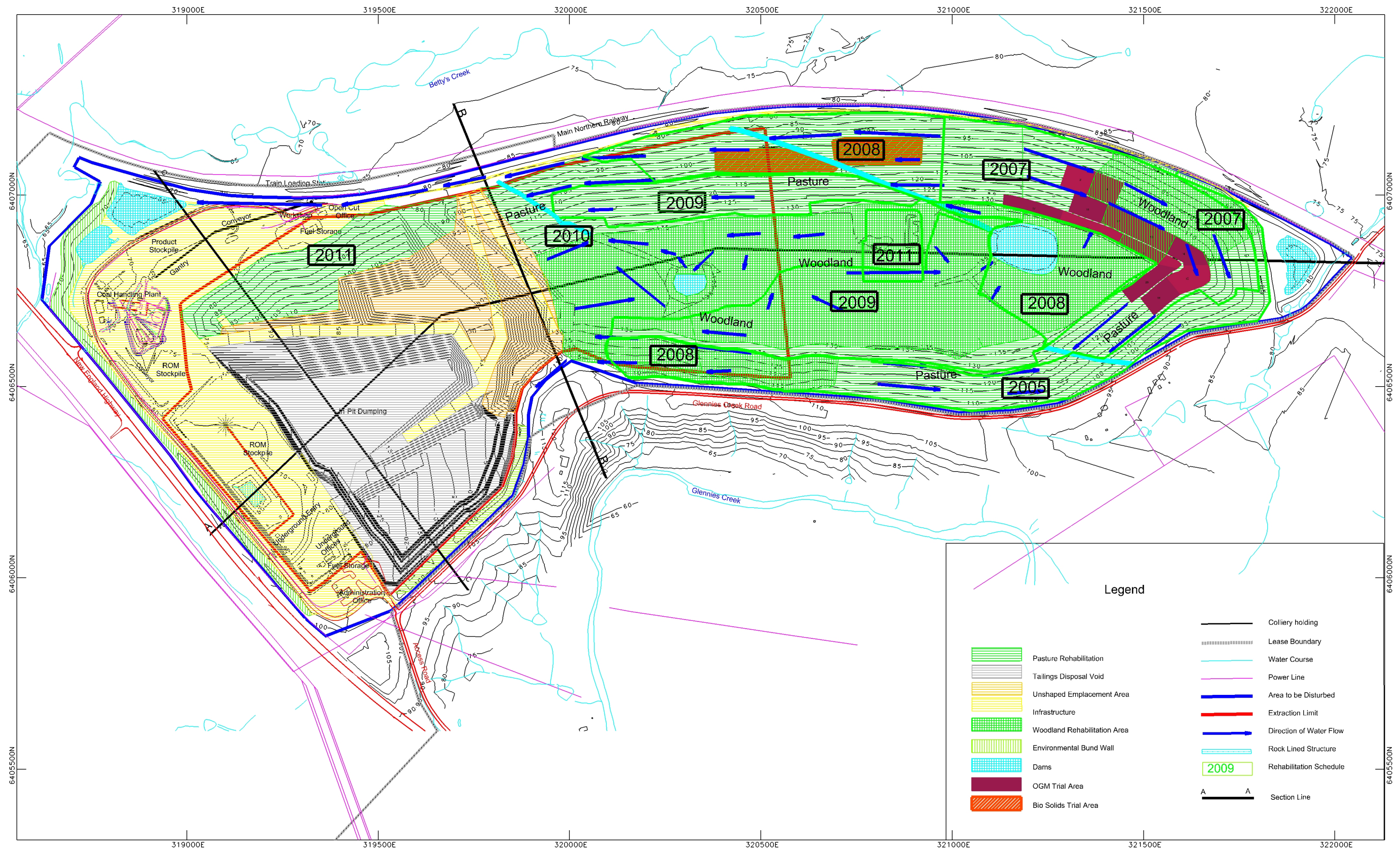




### Legend

<b>Mining Sequence</b>		Rehabilitated Area
Active Mining Area Sep 2008	Lease Boundary	Water Course
Shaped Rehabilitation	Power Line	Area to be Disturbed
Waste Emplacement	Extraction Limit	Topsoil Stockpiles
Water Management Dams	Rock Lined Structure	Section Lines
Main Haul Road		
Infrastructure		
Dirty Water		
Contaminated Water		

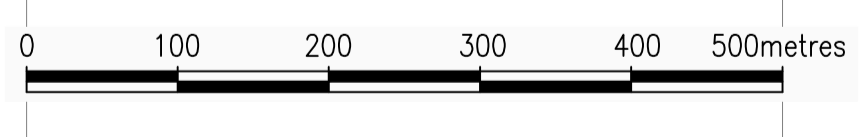
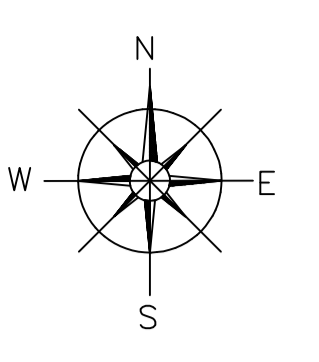
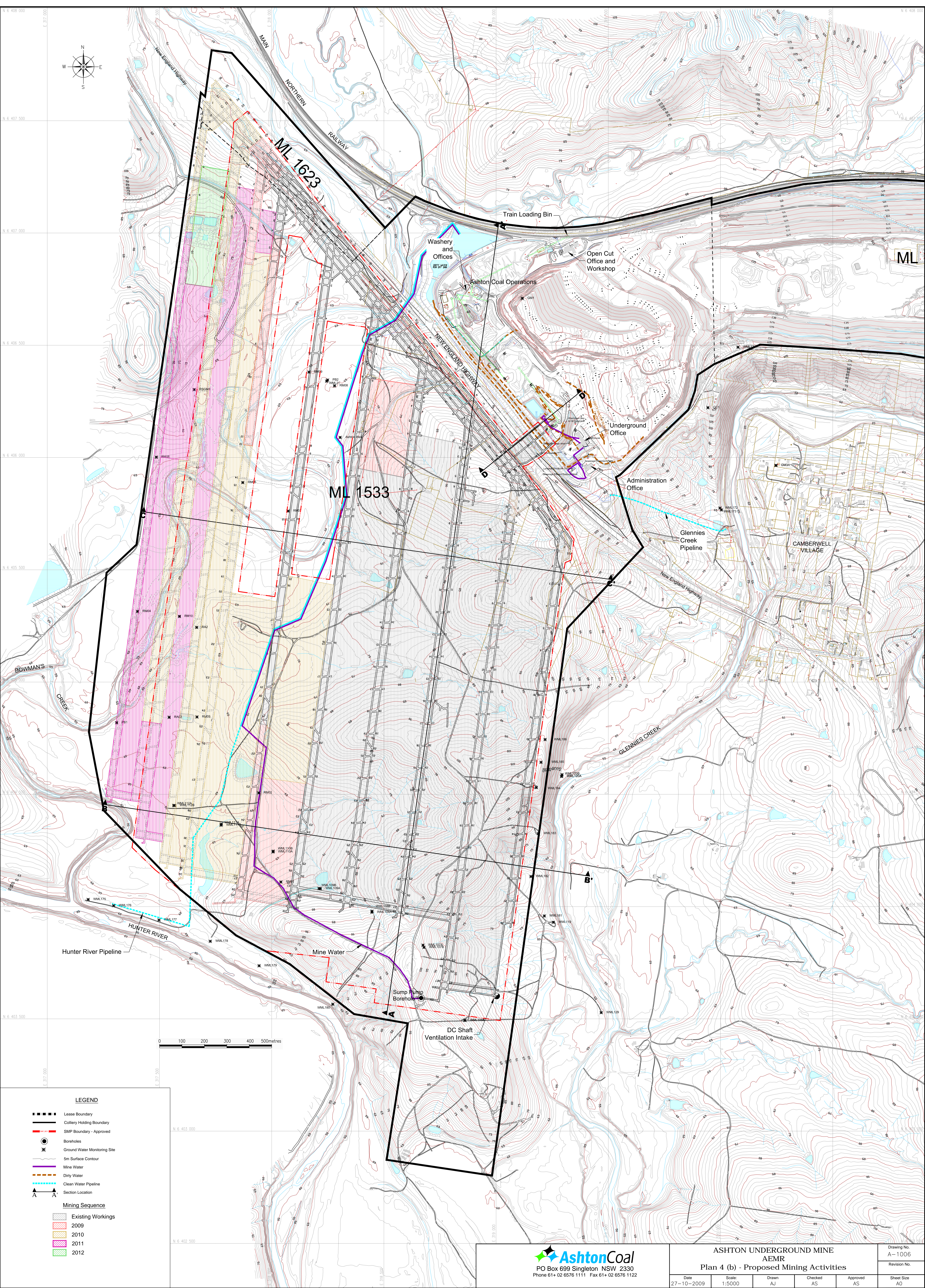




### Legend

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**LEGEND**

- ▬▬▬▬ Lease Boundary
  - ▬▬▬▬ Colliery Holding Boundary
  - ▬▬▬▬ SMP Boundary - Approved
  - Boreholes
  - ⊗ Ground Water Monitoring Site
  - 5m Surface Contour
  - Mine Water
  - Dirty Water
  - Clean Water Pipeline
  - Section Location
- Mining Sequence**
- Existing Workings
  - 2009
  - 2010
  - 2011
  - 2012

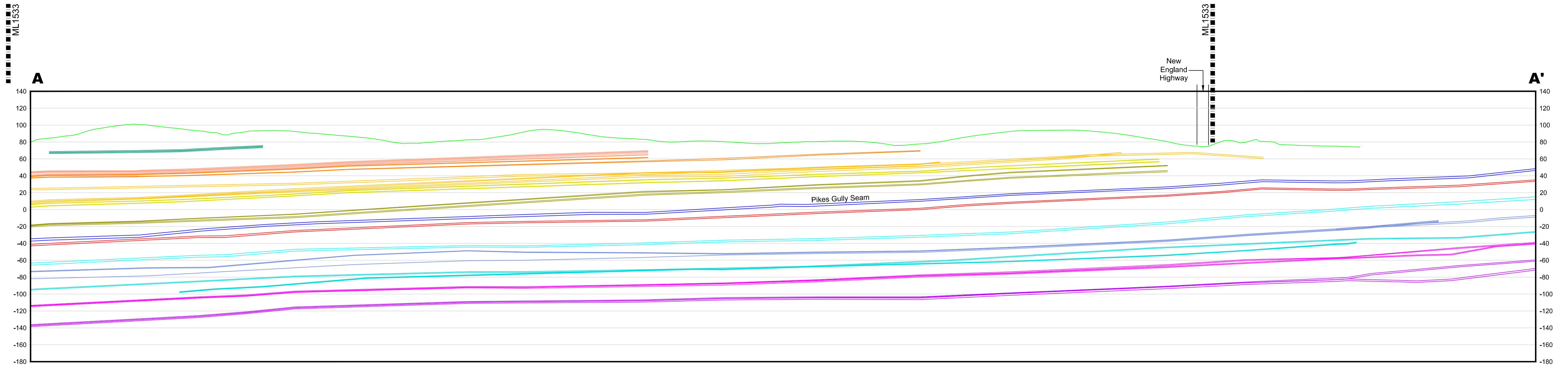
**AshtonCoal**  
 PO Box 699 Singleton NSW 2330  
 Phone 61+ 02 6576 1111 Fax 61+ 02 6576 1122

**ASHTON UNDERGROUND MINE  
 AEMR  
 Plan 4 (b) - Proposed Mining Activities**

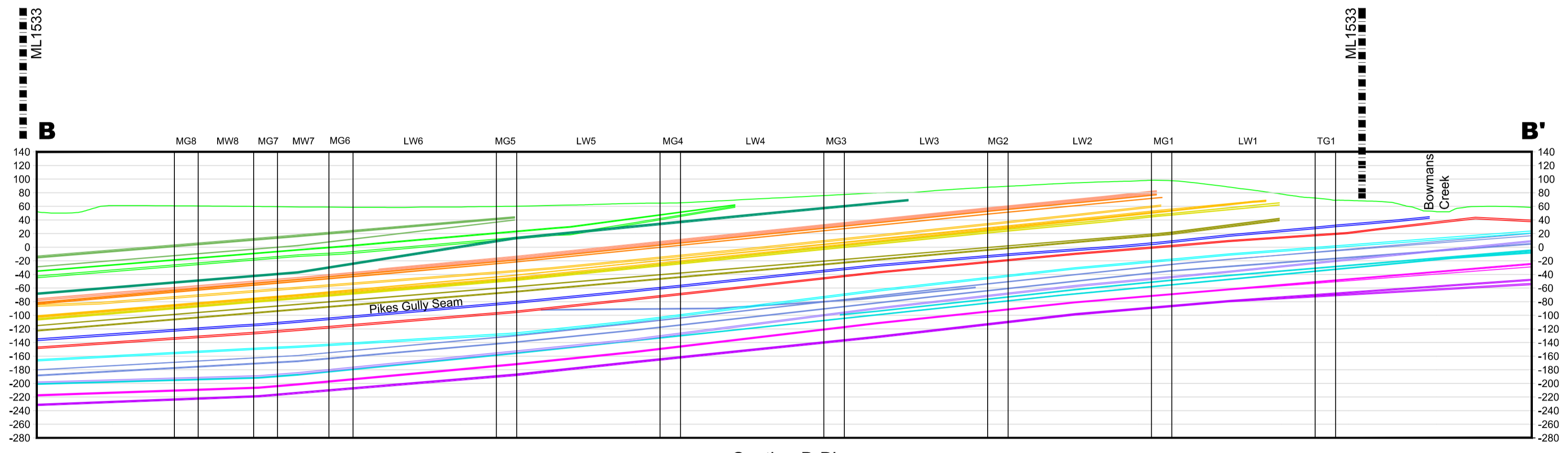
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Drawing No.  
A-1006  
Revision No.

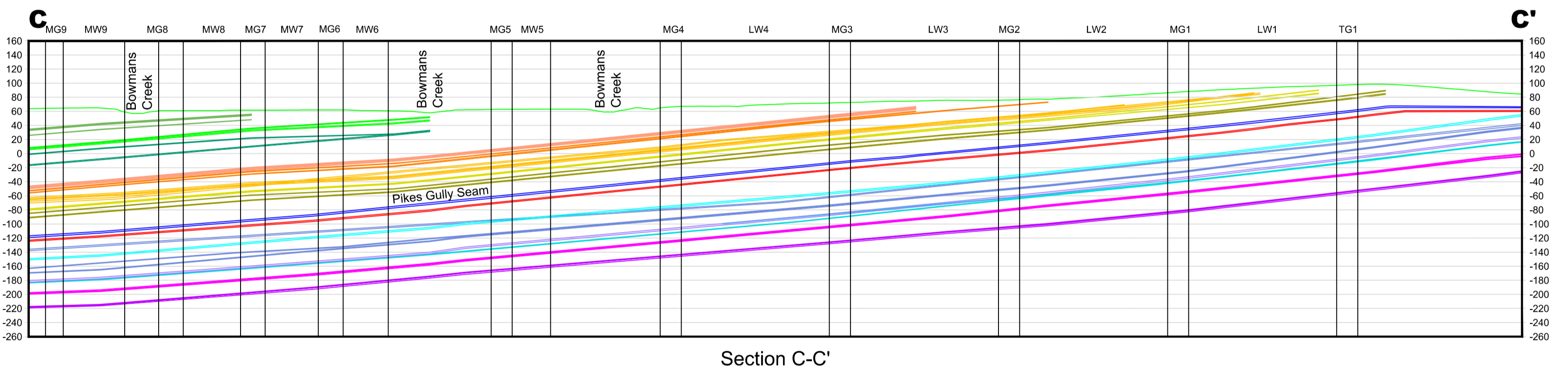




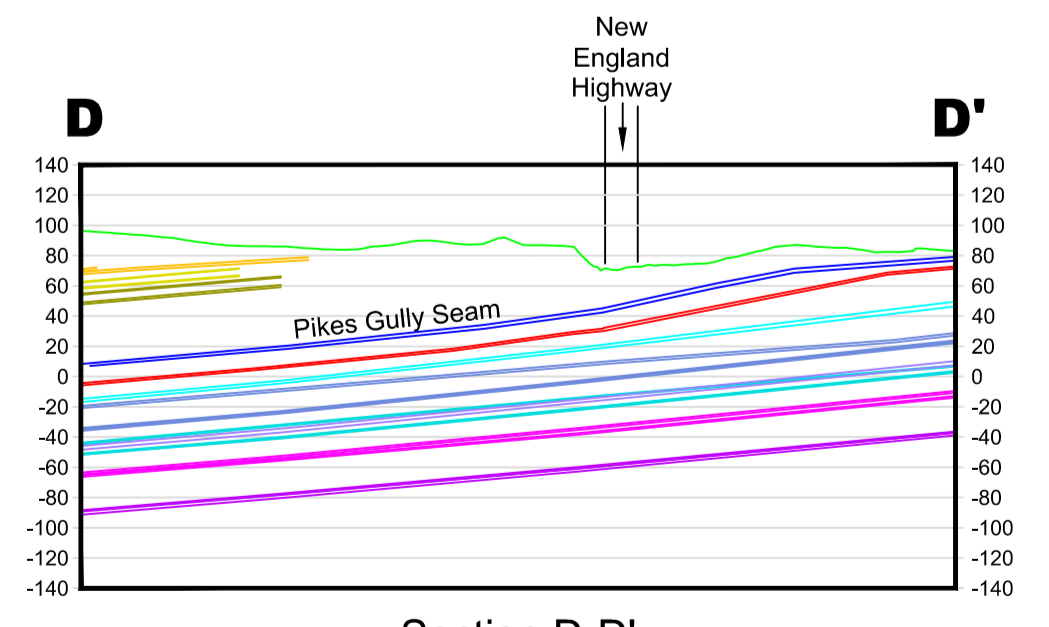
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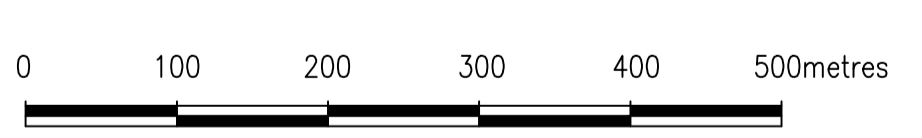
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Section C-C'  
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Horizontal Scale 1:5,000



Section D-D'  
Vertical Scale 1:5,000  
Horizontal Scale 1:5,000



**LEGEND**

- Mining Leases
- Existing Surface
- Lemington Seams 3,4 & 5
- Lemington Seams 6 & 7
- Lemington Seams 8 & 9
- Lemington Seams 10, 11 & 12
- Lemington Seams 13 & 14
- Lemington Seam 15
- Lemington Seams 16 & 17
- Lemington Seams 18 & 19
- Pikes Gully Seam
- Arties Seam
- Upper Liddell Seam
- Middle Liddell Seam
- Upper Lower Liddell Seam
- Lower Lower Liddell Seam
- Upper Barrett



ASHTON UNDERGROUND MINE  
AEMR  
PLAN 7 (b) - Sections

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