Table 47 Predicted ground-level 1 hour average concentrations of sulfur dioxide at sensitive receptor locations over the three simulation years 1999-2000, 2000-2001 and 2007-2008 for the proposed Bayswater B Coal-fired Power Station with a stack height of 250 metres (in µg/m³)

Stack Height 250 metres		Predicted Ground-level Concentration					Predicted Number of Exceedances of the Air Quality Criterion				
		Isolation		With Background		Background only	Isolation		With Background		Background only
		Average coal sulfur content	Maximum coal sulfur content	Average coal sulfur content	Maximum coal sulfur content		Average coal sulfur content	Maximum coal sulfur content	Average coal sulfur content	Maximum coal sulfur content	
1999-2000	Lake Liddell	279	344	1312	1312	1311	0	0	12	12	12
	Mount Arthur	308	379	954	954	954	0	0	2	2	2
	Muswellbrook	275	339	579	579	579	0	0	1	1	1
	Ravensworth	194	239	465	472	435	0	0	0	0	0
	Singleton	159	196	350	385	277	0	0	0	0	0
2000-2001	Lake Liddell	347	428	633	633	633	0	0	1	1	1
	Mount Arthur	508	626	531	632	531	0	1	0	1	0
	Muswellbrook	331	408	503	532	503	0	0	0	0	0
	Ravensworth	434	535	668	668	668	0	0	2	2	1
	Singleton	239	295	442	442	442	0	0	0	0	0
2007-2008	Lake Liddell	294	362	580	588	546	0	0	1	1	0
	Mitchell Line Rd	461	568	691	799	432	0	0	1	2	0
	Muswellbrook	477	588	776	887	589	0	1	2	2	1
	Ravensworth	409	504	1019	1019	1019	0	0	5	6	5
	Singleton	140	172	340	340	340	0	0	0	0	0
Total additional exceedances							0	2	4	7	0

Table 48 Predicted maximum 1-hour average ground-level concentrations of sulfur dioxide (in µg/m³) at sensitive receptor locations over the three simulation years 1999-2000, 2000-2001 and 2007-2008 for the proposed Bayswater B Coal-fired Power Station with a stack height of 300 metres (in µg/m³)

Stack Height 300 metres		Predicted Ground-level Concentration					Predicted Number of Exceedances of the Air Quality Criterion				
		Isolation		With Background		Background only	Isolation		With Background		Background only
		Average coal sulfur content	Maximum coal sulfur content	Average coal sulfur content	Maximum coal sulfur content		Average coal sulfur content	Maximum coal sulfur content	Average coal sulfur content	Maximum coal sulfur content	
1999-2000	Lake Liddell	262	322	1312	1312	1311	0	0	12	12	12
	Mount Arthur	329	406	954	954	954	0	0	2	2	2
	Muswellbrook	254	314	579	579	579	0	0	1	1	1
	Ravensworth	152	187	466	473	435	0	0	0	0	0
	Singleton	115	141	287	308	277	0	0	0	0	0
2000-2001	Lake Liddell	323	398	633	633	633	0	0	1	1	1
	Mount Arthur	268	330	531	531	531	0	0	0	0	0
	Muswellbrook	313	385	503	503	503	0	0	0	0	0
	Ravensworth	250	308	668	668	668	0	0	2	2	1
	Singleton	218	268	442	442	442	0	0	0	0	0
2007-2008	Lake Liddell	272	336	575	582	546	0	0	1	1	0
	Mitchell Line Rd	358	442	456	484	432	0	0	0	0	0
	Muswellbrook	286	353	589	611	589	0	0	1	2	1
	Ravensworth	299	369	1019	1019	1019	0	0	5	5	5
	Singleton	126	156	340	340	340	0	0	0	0	0
Total additional exceedances							0	0	2	3	

Table 49 Predicted maximum 10-minute average ground-level concentrations of sulfur dioxide at sensitive receptor locations for the three simulation years 1999-2000, 2000-2001 and 2007-2008, for the Bayswater B Coal-fired Power Station, for average and maximum coal sulfur content, in isolation together with the number of additional exceedences (in µg/m³)

Receptor	1999-2000				2000-2001				2007-2008			
	In isolation		Additional Exceedences		In isolation		Additional Exceedences		In isolation		Additional Exceedences	
	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum
R1	504	621	0	0	619	763	0	0	567	698	0	0
R2	n/a	n/a	N/a	N/a	n/a	n/a	N/a	N/a	710	875	0	1
R3	652	803	0	0	530	653	0	0	820	1011	1	2
R4	641	790	0	0	497	612	0	0	913	1125	1	2
R5	586	723	0	0	398	490	0	0	816	1005	0	0
R6	662	816	0	0	535	659	0	0	530	653	0	0
R7	575	709	0	0	654	806	0	0	563	694	0	0
R8	518	638	0	0	639	787	0	0	539	664	0	0
R9	301	371	0	0	495	610	0	0	592	730	0	0
R10	834	1028	1	2	554	682	0	0	784	967	0	0
R11	227	280	0	0	431	532	0	0	250	308	0	0
R12	725	894	1	2	255	315	0	0	332	409	0	0

Table note:
'Average' refers to an SO_2 emission rate based on the average coal sulfur content'
'Maximum' refers to an SO_2 emission rate based on the average coal sulfur content
'Meas[d]' refers to monitoring station observations
N/A: Not applicable; Mitchell Line Road monitoring station not operating
Impact assessment criteria: 712 µg/m³

Table 50 Predicted maximum 1-hour average ground-level concentrations of sulfur dioxide at sensitive receptor locations for the three simulation years 1999-2000, 2000-2001 and 2007-2008, for the Bayswater B Coal-fired Power Station, for average and maximum coal sulfur content, in isolation and with background (in µg/m³)

Receptor	1999-2000					2000-2001					2007-2008				
	In isolation		with Background		Meas[d]	In isolation		with Background		Meas[d]	In isolation		with Background		Meas[d]
	Avg	Max	Avg	Max		Avg	Max	Avg	Max		Avg	Max	Avg	Max	
R1	254	314	579	579	579	313	385	503	503	503	286	353	589	611	589
R2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	358	442	456	484	432
R3	329	406	954	954	954	268	330	531	531	531	414	511	188	228	171
R4	324	399	954	954	954	251	309	531	531	531	461	568	474	571	432
R5	296	365	579	579	579	201	247	503	521	503	412	508	589	589	589
R6	334	412	579	579	579	270	333	503	503	503	268	330	589	589	589
R7	290	358	1312	1312	1311	330	407	633	633	633	285	351	561	564	546
R8	262	322	1312	1312	1311	323	398	633	633	633	272	336	575	582	546
R9	152	187	466	473	435	250	308	668	668	668	299	369	1019	1019	1019
R10	421	519	435	520	435	280	345	668	668	668	396	488	1019	1019	1019
R11	115	141	287	308	277	218	268	442	442	442	126	156	340	340	340
R12	366	452	471	486	435	129	159	668	668	668	168	207	1019	1019	1019

Table note:
'Avg' refers to an SO_2 emission rate based on the average coal sulfur content'
'Max' refers to an SO_2 emission rate based on the average coal sulfur content
'Meas[d]' refers to monitoring station observations
N/A: Not applicable; Mitchell Line Road monitoring station not operating
Impact assessment criteria: 570 µg/m³

Table 51 Predicted ninth highest (99.9th percentile) 1-hour average ground-level concentrations of sulfur dioxide at sensitive receptor locations for the three simulation years 1999-2000, 2000-2001 and 2007-2008, for the Bayswater B Coal-fired Power Station, for average and maximum coal sulfur content, in isolation and with background (in μg/m³)

Receptor	1999-2000				2000-2001				2007-2008			
	In isolation		with Background		In isolation		with Background		In isolation		with Background	
	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
R1	121	149	345	345	124	152	300	319	129	158	292	333
R2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	146	180	361	377
R3	90	111	373	406	106	131	309	325	152	187	185	227
R4	87	108	378	399	119	146	311	311	170	209	363	378
R5	123	151	379	401	90	111	288	288	123	152	334	346
R6	115	141	401	401	88	108	288	290	111	136	303	333
R7	117	144	659	659	180	222	307	355	108	133	375	391
R8	108	133	659	659	196	242	301	340	117	144	375	391
R9	104	128	333	335	163	201	400	415	124	153	457	463
R10	149	184	334	334	103	127	394	394	122	150	457	463
R11	92	113	194	197	109	134	245	258	67	83	257	257
R12	163	201	334	335	84	104	394	394	86	106	457	457

Table note:
'Avg' refers to an SO_2 emission rate based on the average coal sulfur content'
'Max' refers to an SO_2 emission rate based on the average coal sulfur content
'Meas[d]' refers to monitoring station observations
N/A: Not applicable; Mitchell Line Road monitoring station not operating
Impact assessment criteria: 570 μg/m³

Table 52 Predicted maximum 24-hour average ground-level concentrations of sulfur dioxide at sensitive receptor locations for the three simulation years 1999-2000, 2000-2001 and 2007-2008, for the Bayswater B Coal-fired Power Station, for average and maximum coal sulfur content, in isolation and with background (in µg/m³)

Receptor	1999-2000					2000-2001					2007-2008				
	In isolation		with Background		Meas[d]	In isolation		with Background		Meas[d]	In isolation		with Background		Meas[d]
	Avg	Max	Avg	Max		Avg	Max	Avg	Max		Avg	Max	Avg	Max	
R1	31	38	82	82	82	30	37	80	87	77	32	39	79	83	64
R2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	34	41	73	73	72
R3	28	35	116	116	116	35	43	150	150	150	35	43	80	86	54
R4	31	38	116	116	116	35	43	150	150	150	35	43	73	74	54
R5	38	47	82	82	82	29	36	78	78	77	37	45	79	83	64
R6	41	51	82	82	82	35	43	78	78	77	40	49	81	85	64
R7	42	52	199	199	199	78	96	93	111	65	45	55	116	117	115
R8	39	48	199	199	199	71	88	86	103	65	52	64	117	118	115
R9	38	47	123	132	85	64	79	117	117	117	35	43	137	137	137
R10	37	45	95	100	85	33	41	117	117	117	38	46	148	151	137
R11	27	33	66	73	53	27	33	72	72	72	14	18	78	79	74
R12	33	41	101	104	85	13	16	117	117	117	13	17	141	143	137

Table note:
'Avg' refers to an SO_2 emission rate based on the average coal sulfur content'
'Max' refers to an SO_2 emission rate based on the average coal sulfur content
'Meas[d]' refers to monitoring station observations
N/A: Not applicable; Mitchell Line Road monitoring station not operating
Impact assessment criteria: 228 µg/m³

Table 53 Predicted annual average ground-level concentrations of sulfur dioxide at sensitive receptor locations for the three simulation years 1999-2000, 2000-2001 and 2007-2008, for the Bayswater B Coal-fired Power Station, for average and maximum coal sulfur content, in isolation and with background (in µg/m³)

Receptor	1999-2000					2000-2001					2007-2008				
	Isolation		With Background		Meas[d]	Isolation		With Background		Meas[d]	Isolation		With Background		Meas[d]
	Avg	Max	Avg	Max		Avg	Max	Avg	Max		Avg	Max	Avg	Max	
R1	0.7	0.9	10.8	10.9	10.1	0.8	1.0	9.3	9.5	8.4	1.0	1.2	9.4	9.6	8.4
R2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.1	1.4	16.6	16.9	15.4
R3	0.8	0.9	24.4	24.6	23.7	0.9	1.1	16.7	16.9	15.8	1.1	1.4	3.7	4.0	2.3
R4	0.8	1.0	24.4	24.6	23.7	0.9	1.1	16.7	16.9	15.8	1.2	1.4	16.7	16.9	2.3
R5	0.7	0.8	10.7	10.9	10.1	0.7	0.9	9.2	9.3	8.4	1.0	1.3	9.4	9.7	8.4
R6	0.7	0.9	10.8	10.9	10.1	0.8	1.0	9.2	9.4	8.4	1.0	1.3	9.4	9.6	8.4
R7	0.8	1.0	9.5	9.7	8.6	1.2	1.5	7.4	7.7	6.2	1.1	1.3	5.6	5.9	4.5
R8	0.8	1.0	9.5	9.7	8.6	1.2	1.5	7.4	7.7	6.2	1.1	1.4	5.7	6.0	4.5
R9	1.7	2.1	15.8	16.2	14.2	2.0	2.5	14.6	15.1	12.6	2.0	2.5	17.7	18.2	15.6
R10	1.5	1.8	15.7	16.0	14.2	1.1	1.3	13.7	13.9	12.6	1.1	1.4	16.8	17.1	15.6
R11	1.1	1.3	9.1	9.4	8.1	1.3	1.6	7.4	7.7	6.1	1.0	1.3	14.0	14.4	12.6
R12	1.6	2.0	15.8	16.1	14.2	0.9	1.1	13.5	13.7	12.6	0.7	0.9	16.4	16.5	15.6

Table note:
'Avg' refers to an SO_2 emission rate based on the average coal sulfur content'
'Max' refers to an SO_2 emission rate based on the average coal sulfur content
'Meas[d]' refers to monitoring station observations
N/A: Not applicable; Mitchell Line Road monitoring station not operating
Impact assessment criteria: 60 µg/m³

9.1.4 Probability of exceeding the impact assessment criteria for sulfur dioxide due to the variability of coal sulfur content

Table 54 shows the number of exceedances of the 1-hour SO_2 impact assessment criterion predicted using the stochastic modelling technique. The results show that, accounting for the actual distribution of sulfur in the fuel, the Bayswater B Power Station may cause one additional exceedance of the impact assessment criterion at the Lake Liddell monitoring location in the 2007 simulation year. There are no additional exceedances in any other year or at any other location.

Table 54 Predicted number of exceedances of 1-hour sulfur dioxide impact assessment criterion using stochastic modelling technique

Receptor	Background			Background plus Bayswater B		
	1999	2000	2007	1999	2000	2007
Lake Liddell	12	1	0	12	1	**1**
Mt Arthur	2	0	0	2	0	0
Muswellbrook	1	0	1	1	0	1
Ravensworth	0	1	5	0	1	5
Singleton	0	0	0	0	0	0
Additional exceedances	-	-	-	0	0	1

9.2 Nitrogen Dioxide

Predicted ground-level concentrations of nitrogen dioxide are shown in Table 55 and Table 56 for the 1-hour averaging period for the proposed coal-fired power station in isolation and in conjunction with background. Ground-level concentrations of NO_2 for the proposed Bayswater B coal-fired option are below the impact assessment criterion of 246 µg/m^3 indicating that the proposed power station contributes only a small amount to total concentrations.

Figure 48 present the predicted maximum 1-hour average ground-level concentrations of oxides of nitrogen from the proposed Bayswater B coal-fired Power Station in isolation. Note, no criteria exist for oxides of nitrogen as opposed to nitrogen dioxide. The results show that elevated concentrations occur within the vicinity of the stack to the west in addition to areas to the north and southwest of the power station where the impacts are terrain induced.

Predicted annual average ground-level concentrations of nitrogen dioxide are shown in Table 57 for the proposed coal-fired power station in isolation and in conjunction with background. Ground-level concentrations of NO_2 for the proposed Bayswater B coal-fired option are below the impact assessment criterion of 246 µg/m^3 indicating that the proposed power station contributes only a small amount to total concentrations.

Figure 49 present the predicted annual average ground-level concentrations of nitrogen dioxide from the proposed Bayswater B coal-fired Power Station in isolation. Highest ground-level concentrations for the power station in isolation are located to the west.

Table 55 Predicted 1-hour average ground-level concentrations of nitrogen dioxide at sensitive receptor locations (R1 to R6) for the three simulation years 1999-2000, 2000-2001 and 2007-2008, for the Bayswater B coal-fired power station

Receptor	Assessment criterion	Ozone Concentration 35 ppb			Ozone Concentration 120 ppb		
		1999	2000	2007	1999	2000	2007
R1	Background	202	103	77	202	103	77
	Bayswater B in isolation	53	59	51	56	67	59
	Bayswater B plus background	202	103	108	202	103	119
R2	Background	n/a	n/a	85	n/a	n/a	85
	Bayswater B in isolation	n/a	n/a	58	n/a	n/a	72
	Bayswater B plus background	n/a	n/a	93	n/a	n/a	102
R3	Background	70	179	68	70	179	68
	Bayswater B in isolation	65	57	67	70	59	84
	Bayswater B plus background	101	179	68	101	179	68
R4	Background	70	103	77	70	103	77
	Bayswater B in isolation	68	56	52	69	60	58
	Bayswater B plus background	104	103	96	104	103	101
R5	Background	202	81	116	202	81	116
	Bayswater B in isolation	67	66	55	67	72	61
	Bayswater B plus background	202	81	117	202	82	117
R6	Background	202	146	104	202	146	104
	Bayswater B in isolation	76	44	53	76	52	62
	Bayswater B plus background	202	150	104	202	151	104

Table note:
- Impact assessment criterion: 1-hour average of 246 µg/m^3.
- The Janssen method has been applied in the conversion of NO_X to NO^2, assuming two a range of ozone concentrations: 35 ppb and 120 ppb.

Table 56 Predicted 1-hour average ground-level concentrations of nitrogen dioxide at sensitive receptor locations (R7 to R12) for the three simulation years 1999-2000, 2000-2001 and 2007-2008, for the Bayswater B coal-fired power station

Receptor	Assessment criterion	Ozone Concentration 35 ppb			Ozone Concentration 120 ppb		
		1999	2000	2007	1999	2000	2007
R7	Background	81	68	80	81	68	80
	Bayswater B in isolation	65	42	26	66	47	26
	Bayswater B plus background	103	68	80	104	68	80
R8	Background	81	81	116	81	81	116
	Bayswater B in isolation	55	70	53	58	72	59
	Bayswater B plus background	86	81	117	86	81	117
R9	Background	87	146	104	87	146	104
	Bayswater B in isolation	34	45	80	34	56	87
	Bayswater B plus background	87	146	104	87	146	104

Receptor	Assessment criterion	Ozone Concentration 35 ppb			Ozone Concentration 120 ppb		
		1999	2000	2007	1999	2000	2007
R10	Background	87	103	77	87	103	77
	Bayswater B in isolation	95	42	72	95	45	86
	Bayswater B plus background	110	103	95	110	103	102
R11	Background	66	179	68	66	179	68
	Bayswater B in isolation	24	53	74	25	56	93
	Bayswater B plus background	66	179	68	66	179	68
R12	Background	87	87	146	146	104	104
	Bayswater B in isolation	0	0	0	0	0	0
	Bayswater B plus background	87	87	146	146	104	104

Table note:
- Impact assessment criterion: 1-hour average of 246 µg/m^3.
- The Janssen method has been applied in the conversion of NO_X to NO^2, assuming two a range of ozone concentrations: 35 ppb and 120 ppb.

Table 57 Predicted annual average ground-level concentrations of nitrogen dioxide at sensitive receptor locations for the three simulation years 1999-2000, 2000-2001 and 2007-2008, for the Bayswater B coal-fired power station

Receptor	Assessment criterion	Ozone Concentration 35 ppb			Ozone Concentration 120 ppb		
		1999	2000	2007	1999	2000	2007
R1	Background	16.0	14.5	14.9	16.0	14.5	14.9
	Bayswater B in isolation	0.1	0.2	0.2	0.2	0.2	0.2
	Bayswater B plus background	16.2	14.6	15.1	16.2	14.7	15.1
R2	Background	n/a	n/a	18.3	n/a	n/a	18.3
	Bayswater B in isolation	n/a	n/a	0.1	n/a	n/a	0.1
	Bayswater B plus background	n/a	n/a	18.3	n/a	n/a	18.3
R3	Background	15.3	14.6	14.7	15.3	14.6	14.7
	Bayswater B in isolation	0.2	0.2	0.2	0.2	0.2	0.2
	Bayswater B plus background	15.4	14.8	15.0	15.4	14.8	15.0
R4	Background	15.3	0.2	14.7	15.3	0.2	14.7
	Bayswater B in isolation	0.2	14.6	0.2	0.2	14.7	0.2
	Bayswater B plus background	15.4	11.6	15.0	15.4	11.6	15.0
R5	Background	16.0	0.3	14.9	16.0	0.3	14.9
	Bayswater B in isolation	0.1	11.9	0.2	0.1	11.9	0.2
	Bayswater B plus background	16.1	17.2	15.1	16.2	17.2	15.1
R6	Background	16.0	0.5	14.9	16.0	0.5	14.9
	Bayswater B in isolation	0.1	17.6	0.2	0.2	17.6	0.2
	Bayswater B plus background	16.2	13.5	15.1	16.2	13.5	15.1
R7	Background	11.8	0.3	15.6	11.8	0.3	15.6
	Bayswater B in isolation	0.2	13.8	0.2	0.2	13.8	0.2
	Bayswater B plus background	12.0	NA	15.8	12.0	NA	15.8
R8	Background	11.8	11.6	15.6	11.8	11.6	15.6

Receptor	Assessment criterion	Ozone Concentration 35 ppb			Ozone Concentration 120 ppb		
		1999	2000	2007	1999	2000	2007
	Bayswater B in isolation	0.2	0.2	0.2	0.2	0.3	0.2
	Bayswater B plus background	12.0	11.9	15.8	12.0	11.9	15.8
R9	Background	20.0	17.2	21.7	20.0	17.2	21.7
	Bayswater B in isolation	0.3	0.2	0.4	0.4	0.2	0.4
	Bayswater B plus background	20.3	17.4	22.1	20.3	17.4	22.1
R10	Background	20.0	0.2	21.7	20.0	0.2	21.7
	Bayswater B in isolation	0.3	14.6	0.2	0.3	14.6	0.2
	Bayswater B plus background	20.2	14.5	21.9	20.3	14.5	21.9
R11	Background	12.7	14.6	16.1	12.7	14.6	16.1
	Bayswater B in isolation	0.2	0.2	0.2	0.2	0.2	0.2
	Bayswater B plus background	12.9	14.8	16.3	13.0	14.8	16.3
R12	Background	20.0	17.2	21.7	20.0	17.2	21.7
	Bayswater B in isolation	0.0	0.0	0.0	0.0	0.0	0.0
	Bayswater B plus background	20.0	17.2	21.7	20.0	17.2	21.7

Table note:
- Impact assessment criterion: 1-hour average of 62 µg/m^3.
- The Janssen method has been applied in the conversion of NO_X to NO^2, assuming two a range of ozone concentrations: 35 ppb and 120 ppb.

9.3 Lead

Predicted ground-level concentrations of lead are shown in Table 58 for the annual averaging period for the proposed coal-fired power station in isolation. Ground-level concentrations of lead for the proposed power station in isolation are low and only a very small proportion of the annual average impact assessment criterion of 0.5 µg/m^3, consequently, an assessment of lead in conjunction with background concentrations has been deemed unnecessary.

Table 58 Predicted ground-level concentrations of lead at sensitive receptor locations. Predictions are the maximum over the three simulation years 1999-2000, 2000-2001 and 2007-2008.

Receptor	Lead (µg/m³) Annual average
Singleton	0.000007
Lake Liddell	0.000007
Mt Arthur	0.000005
Mitchell Line Road	0.000005
Muswellbrook	0.000011
Ravensworth	0.000011
R4	0.000005
R5	0.000005
R6	0.000006
R7	0.000006
R10	0.000008
Impact assessment criterion	0.5

9.4 Metals and metalloids (Type I and II substances) excluding lead

Predicted ground-level concentrations of metals and metalloids at nearest sensitive receptor locations are shown in Table 59 and Table 60. The predictions represent the maximum ground-level concentrations of the three year simulations for each averaging period. For 1-hour averages, the ground-level concentrations are represented by the 99.9th percentile in accordance with the Approved Methods. For the 24-hour averaging period, the ground-level concentrations are represented by the maximum prediction. The annual averages are the average of predictions for the simulation year.

The model results show that predictions are below the assessment criterion for each metal or metalloid. In all cases, the predicted ground-level concentration is less than 2% of the respective criterion.

Table 59 Predicted ground-level concentrations of metals and metalloids at sensitive receptor locations represented by the MacGen monitoring station locations. Predictions are the maximum over the three simulation years 1999-2000, 2000-2001 and 2007-2008.

Pollutant	Averaging period	Criterion (µg/m³)	Singleton (µg/m³)	Lake Liddell (µg/m³)	Mt Arthur (µg/m³)	Muswellbrook (µg/m³)	Ravensworth (µg/m³)	Mitchell Line Road (µg/m³)
Antimony and compounds	1-hour	9	0.00003	0.00005	0.00004	0.00003	0.00004	0.00003
Arsenic and compounds	1-hour	0.09	0.00022	0.00040	0.00031	0.00026	0.00033	0.00030
Beryllium and beryllium compounds	1-hour	0.004	0.00003	0.00006	0.00005	0.00004	0.00005	0.00005
Boron	24-hour	120	0.035	0.094	0.046	0.042	0.084	0.044
	1-hour	50	0.29	0.42	0.54	0.41	0.39	0.47
	Annual	5	0.0017	0.0016	0.0015	0.0013	0.0027	0.0014
Cadmium and cadmium compounds	1-hour	0.018	0.00004	0.00008	0.00006	0.00005	0.00007	0.00006
Chromium III compounds	1-hour	9	0.0007	0.0012	0.0009	0.0008	0.0010	0.0009
Chromium VI compounds	1-hour	0.09	0.000036	0.000064	0.000050	0.000042	0.000053	0.000048
Cobalt	24-hour	0.1	0.00006	0.00015	0.00007	0.00007	0.00013	0.00007
	1-hour	0.2	0.0004	0.0007	0.0008	0.0006	0.0006	0.0007
	Annual	0.02	2.72E-06	2.51E-06	2.33E-06	2.05E-06	4.18E-06	2.26E-06
Copper dusts and mists	1-hour	18	0.0005	0.0009	0.0007	0.0006	0.0008	0.0007
Manganese and compounds	1-hour	18	0.00318	0.00573	0.00442	0.00375	0.00476	0.00426
Mercury organic	1-hour	0.18	0.00013	0.00023	0.00018	0.00015	0.00019	0.00017
Mercury inorganic	1-hour	1.8	0.00013	0.00023	0.00018	0.00015	0.00019	0.00017
Nickel and nickel compounds	1-hour	0.18	0.0007	0.0012	0.0009	0.0008	0.0010	0.0009
Selenium and compounds	24-hour	10	0.0019	0.0050	0.0024	0.0022	0.0045	0.0023
	1-hour	2	0.015	0.022	0.029	0.022	0.021	0.025
	Annual	0.2	9.25E-05	8.51E-05	7.91E-05	6.96E-05	1.42E-04	7.68E-05
Zinc oxide fumes	1-hour	90	0.0011	0.0020	0.0016	0.0013	0.0017	0.0015

Table 60 Predicted ground-level concentrations of metals and metalloids at sensitive receptor locations. Predictions are the maximum over the three simulation years 1999-2000, 2000-2001 and 2007-2008.

Pollutant	Averaging period	Criterion (µg/m³)	R4 (µg/m³)	R5 (µg/m³)	R6 (µg/m³)	R7 (µg/m³)	R10 (µg/m³)
Antimony and compounds	1 hour	9	0.00004	0.00003	0.00003	0.00004	0.00004
Arsenic and compounds	1 hour	0.09	0.00035	0.00025	0.00023	0.00037	0.00030
Beryllium and beryllium compounds	1 hour	0.004	0.00005	0.00004	0.00004	0.00006	0.00005
Boron	24 hour	120	0.046	0.050	0.054	0.102	0.049
	1 hour	50	0.60	0.54	0.44	0.43	0.55
	Annual	5	0.0015	0.0013	0.0013	0.0016	0.0020
Cadmium and cadmium compounds	1 hour	0.018	0.00007	0.00005	0.00005	0.00007	0.00006
Chromium III compounds	1 hour	9	0.0011	0.0008	0.0007	0.0011	0.0009
Chromium VI compounds	1 hour	0.09	0.000056	0.000040	0.000037	0.000059	0.000049
Cobalt	24 hour	0.1	0.00007	0.00008	0.00008	0.00016	0.00008
	1 hour	0.2	0.0009	0.0008	0.0007	0.0007	0.0009
	Annual	0.02	2.37E-06	2.08E-06	2.07E-06	2.46E-06	3.06E-06
Copper dusts and mists	1 hour	18	0.0008	0.0006	0.0006	0.0009	0.0007
Manganese and compounds	1 hour	18	0.00496	0.00360	0.00335	0.00525	0.00435
Mercury organic	1 hour	0.18	0.00020	0.00014	0.00013	0.00021	0.00017
Mercury inorganic	1 hour	1.8	0.00020	0.00014	0.00013	0.00021	0.00017
Nickel and nickel compounds	1 hour	0.18	0.0011	0.0008	0.0007	0.0011	0.0009
Selenium and compounds	24 hour	10	0.0024	0.0027	0.0029	0.0054	0.0026
	1 hour	2	0.032	0.029	0.023	0.023	0.029
	Annual	0.2	8.03E-05	7.06E-05	7.04E-05	8.37E-05	1.04E-04
Zinc oxide fumes	1 hour	90	0.0018	0.0013	0.0012	0.0019	0.0016

9.5 Organic and other compounds

Predicted ground-level concentrations of organic and other compounds at nearest sensitive receptor locations are shown in Table 61 and Table 62. The predictions represent the maximum ground-level concentrations of the three year simulations for each averaging period. For 1-hour averages, the ground-level concentrations are represented by the 99.9th percentile in accordance with the Approved Methods. For the 24-hour averaging period, the ground-level concentrations are represented by the maximum prediction. The annual averages are the average of predictions for the simulation year.

The model results show that predictions are below the assessment criterion for each compound. With the exception of chlorine, hydrogen chloride and sulphuric acid, the predicted ground-level concentrations are less than 2% of the respective criterion. Of these, chlorine was predicted to be the most critical pollutant with ground-level concentrations up to 71% of the air quality criterion. It should be noted that the chlorine emission rate was set to be equivalent to the regulation emission limit. Actual chlorine emissions from the power station are likely to 90% lower than this based on the chlorine content of the coal (400 ppm) and assuming that all chlorine is emitted as chlorine gas via the stack. Hydrogen chloride and sulphuric acid concentrations are predicted to be less than 13% of the respective criteria.

Table 61 Predicted ground-level concentrations of organic compounds at sensitive receptor locations represented by the MacGen monitoring station locations. Predictions are the maximum over the three simulation years 1999-2000, 2000-2001 and 2007-2008.

Pollutant	Averaging period	Criterion ($\mu g/m^3$)	Singleton ($\mu g/m^3$)	Lake Liddell ($\mu g/m^3$)	Mt Arthur ($\mu g/m^3$)	Muswellbrook ($\mu g/m^3$)	Ravensworth ($\mu g/m^3$)	Mitchell Line Road ($\mu g/m^3$)
Benzene	1-hour	29.0	8.68E-04	1.57E-03	1.21E-03	1.03E-03	1.30E-03	1.16E-03
Chlorine	1-hour	50.0	19.70	35.54	27.44	23.27	29.49	26.39
Cyclohexane	1-hour	19000	0.00040	0.00071	0.00055	0.00047	0.00059	0.00053
Ethylbenzene	1-hour	8000	0.00055	0.00099	0.00076	0.00065	0.00082	0.00073
n-hexane	1-hour	3200	0.00040	0.00071	0.00055	0.00047	0.00059	0.00053
Hydrogen chloride	1-hour	140.0	9.85	17.77	13.72	11.64	14.75	13.20
Dioxins and furans	1-hour	2.00E-06	1.38E-08	2.49E-08	1.92E-08	1.63E-08	2.06E-08	1.85E-08
Polycyclic aromatic hydrocarbon (as benzo[a]pyrene)	1-hour	0.4	0.0001	0.0002	0.0002	0.0001	0.0002	0.0002
Sulfuric acid	1-hour	18	1.2	2.2	1.7	1.5	1.9	1.7
Toluenes	1-hour	360	0.0014	0.0025	0.0019	0.0016	0.0021	0.0019
Xylenes	1-hour	190	0.0002	0.0004	0.0003	0.0003	0.0003	0.0003

Table 62 Predicted ground-level concentrations of organic compounds at sensitive receptor locations. Predictions are the maximum over the three simulation years 1999-2000, 2000-2001 and 2007-2008.

Pollutant	Averaging period	Criterion (µg/m³)	R4 (µg/m³)	R5 (µg/m³)	R6 (µg/m³)	R7 (µg/m³)	R10 (µg/m³)
Benzene	1-hour	29	1.36E-03	9.83E-04	9.15E-04	1.44E-03	1.19E-03
Chlorine	1-hour	50	30.76	22.30	20.76	32.57	26.99
Cyclohexane	1-hour	19000	0.00062	0.00045	0.00042	0.00065	0.00054
Ethylbenzene	1-hour	8000	0.00085	0.00062	0.00058	0.00090	0.00075
n-hexane	1-hour	3200	0.00062	0.00045	0.00042	0.00065	0.00054
Hydrogen chloride	1-hour	140	15.38	11.15	10.38	16.29	13.50
Dioxins and furans	1-hour	2.00E-06	2.15E-08	1.56E-08	1.45E-08	2.28E-08	1.89E-08
Polycyclic aromatic hydrocarbon (as benzo[a]pyrene)	1-hour	0.4	0.0002	0.0001	0.0001	0.0002	0.0002
Sulfuric acid	1-hour	18	1.9	1.4	1.3	2.0	1.7
Toluenes	1-hour	360	0.0022	0.0016	0.0015	0.0023	0.0019
Xylenes	1-hour	190	0.0003	0.0003	0.0002	0.0004	0.0003

9.6 Carbon Monoxide

Predicted ground-level concentrations of carbon monoxide are shown in Table 69 for 15-minute, 1-hour and 8-hour averaging periods for the proposed coal-fired power station in isolation. Ground-level concentrations of carbon monoxide for the proposed power station in isolation and in conjunction with the existing power stations for the various averaging period are low and well below the air quality criterion.

Figure 50 presents the 8-hour average ground-level concentrations of carbon monoxide in isolation. Highest concentrations are located in the immediate vicinity of the stack to the south. These concentrations are well below the air quality objectives.

Figure 51 presents the 8-hour average ground-level concentrations of carbon monoxide in for the proposed power station in addition to modelled background concentrations from the existing Bayswater and Liddell power stations. Highest concentration are located to the north of Lake Liddell. These concentrations are well below the air quality objectives.

The model results show that predictions are well below the assessment criterion for each averaging period. The predicted levels of carbon monoxide represent a very small proportion of the impact assessment criteria. Consequently, an assessment of carbon monoxide in conjunction with background is unnecessary.

Table 63 Predicted ground-level concentrations of carbon monoxide at sensitive receptor locations. Predictions are the maximum over the three simulation years 1999-2000, 2000-2001 and 2007-2008 for the Bayswater B Power Station in isolation

Receptor	Carbon monoxide (µg/m³)		
	15-minutes	1-hour	8-hour
Singleton	9.9	5.8	2.1
Lake Liddell	14.6	8.6	5.3
Mt Arthur	18.8	11.1	2.8
Mitchell Line Road	16.2	9.6	2.7
Muswellbrook	14.2	8.4	2.5
Ravensworth	13.5	8.0	4.3
R4	20.9	12.3	2.8
R5	18.7	11.0	3.0
R6	15.1	8.9	3.2
R7	15.0	8.8	5.6
R10	19.1	11.3	3.0
Impact assessment criterion	100,000	30,000	10,000

9.7 Particles as PM_{10}

Predicted ground-level concentrations of PM_{10} are shown in Table 64 for the 24-hour and annual averaging period for the proposed Bayswater B Power Station in isolation. Ground-level concentrations of PM_{10} for the proposed power station in isolation are low and well below the air quality criterion.

The model results show that the predicted ground-level concentrations of PM_{10} at all sensitive receptor locations are well below the impact assessment criterion for PM_{10}, with a predicted maximum at the most affected receptor (R6) over the three years assessed being 3.54 µg/m^3, which is 7.1% of the impact assessment criterion for the 24-hour average of

PM_{10}. Consequently, an assessment of PM_{10} in conjunction with background is unnecessary.

Figure 52 presents the predicted maximum 24-hour average ground-level concentrations of PM_{10} from the proposed Bayswater B coal-fired Power Station in isolation as a composite of the three modelled periods. The results show that highest concentrations occur within the vicinity of the power station to the southeast.

Figure 53 presents the predicted annual average ground-level concentrations of PM_{10} from the proposed Bayswater B coal-fired Power Station in isolation as a composite of the three modelled periods. The results show that highest concentrations occur to the west of the power station.

Table 64 Predicted 24-hour and annual average ground-level concentrations of PM_{10} at sensitive receptor locations. Predictions are the maximum over the three simulation years 1999-2000, 2000-2001 and 2007-2008 (in µg/m³)

Receptor	24-hour average	Annual average
Singleton	2.36	0.06
Lake Liddell	3.23	0.06
Mt Arthur	1.58	0.05
Mitchell Line Road	1.59	0.04
Muswellbrook	2.91	0.09
Ravensworth	1.67	0.09
R4	1.80	0.05
R5	2.01	0.05
R6	3.54	0.05
R7	1.66	0.05
R10	1.54	0.07
Impact assessment criterion	50	30

9.8 Hydrogen Fluoride

Table 65 presents the predicted maximum 24-hour, 7-day, 30-day and 90-day average ground-level concentrations of hydrogen fluoride at sensitive receptor locations for Bayswater B with background. As discussed in Section 8.6, background for hydrogen fluoride has been predicted by modelling the emissions associated with the Bayswater and Liddell Power Stations.

The results indicate that the impact assessment criterion for specialised vegetation for the 24-hour average is exceeded at all sensitive receptor locations, while the general land use criterion is only exceeded at receptors R7, R8 and R9. However, the only receptor location with a specialised vegetative land use is the Arrowfield Winery, where the predicted maximum 24-hour average is 2.88 µg/m^3, which is 191% of the criterion.

An exceedance of the short-term 24-hour average criterion of HF is unlikely to significantly affect the cultivation of grapevines due to the rate of plant growth. The most significant indicator to the adverse impact of HF on specialised vegetation is the longer 30-day and 90-day averages, which provide for the assessment of air quality in relation to the longer growing season. It is more likely an adverse affect will be sustained in vegetation if the air quality is compromised throughout the growth cycle, primarily between November and grapevine harvest time in February.

There are no predicted exceedances of the 7-day average impact assessment criterion for specialised vegetation of 0.8 µg/m^3 at any sensitive receptor locations for all modelled years.

There are no predicted exceedances of the 30-day average impact assessment criterion for general land use of 0.84 µg/m^3 at any sensitive receptor locations for all modelled years. While the 30-day average impact assessment criterion for specialised vegetation of 0.4 µg/m^3 is predicted to be exceeded at Mount Arthur North, R4, R5, R6, R7, Liddell and Ravensworth, no specialised vegetation such as viticulture has been identified there. Consequently, the applicable criterion is for the general land use. At the only receptor location with a specialised vegetative land use, the Arrowfield Winery, the predicted maximum 30-day average is 0.31 µg/m^3.

There are no predicted exceedances of the 90-day average impact assessment criterion for general land use of 0.5 µg/m^3 at any sensitive receptor locations for all modelled years. While the 90-day average impact assessment criterion for specialised vegetation of 0.25 µg/m^3 is predicted to be exceeded at Mitchell Line Road, Mount Arthur North, R4, and Ravensworth, no specialised vegetation such as viticulture has been identified there. Consequently, the applicable criterion is for the general land use. At the only receptor location with a specialised vegetative land use, the Arrowfield Winery, the predicted maximum 30-day average is 0.24 µg/m^3.

Table 65 Predicted 24-hour, 7-day, 30-day and 90-day average ground-level concentrations of hydrogen fluoride at sensitive receptor locations for Bayswater B with background. Predictions are the maximum over the three simulation years 1999-2000, 2000-2001 and 2007-2008 (in µg/m³)

Receptor	24-hour average	7-day average	30-day average	90-day average
Muswellbrook	2.18	0.54	0.31	0.18
Mitchell Line Road	2.39	0.61	0.39	0.27
Mount Arthur North	2.47	0.61	0.40	0.28
R4	2.46	0.62	0.40	0.29
R5	2.52	0.62	0.40	0.19
R6	2.77	0.70	0.44	0.22
R7	3.88	0.71	0.46	0.21
Liddell	3.95	0.72	0.46	0.21
Ravensworth	4.13	0.73	0.49	0.33
R10	1.98	0.47	0.30	0.22
Singleton	2.32	0.47	0.27	0.23
Arrowfield Winery	2.88	0.44	0.31	0.24
Criteria for specialised land use (grape vines)	1.5	0.8	0.4	0.25
Criteria for general land use	2.9	1.7	0.84	0.5

Note:
[1] General land use criterion applies
[2] Specialised land use criterion applies

Figure 54 presents the maximum 24-hour average ground-level concentrations of Hydrogen Fluoride for the proposed power station in isolation. Regions of elevated concentrations above the guideline for sensitive and general landuse exist.

Figure 55 presents the maximum 24-hour average ground-level concentrations of Hydrogen Fluoride for the proposed power station in addition to modelled background concentrations from the existing Bayswater and Liddell power stations. Broad regions of elevated concentrations above the guideline for sensitive and general landuse exist. The guideline for sensitive vegetation is likely to be exceeded at R12.

Figure 56 presents the maximum 7-day average ground-level concentrations of Hydrogen Fluoride for the proposed power station in addition to modelled background concentrations from the existing Bayswater and Liddell Power Stations.

Figure 57 presents the maximum 30-day average ground-level concentrations of Hydrogen Fluoride for the proposed power station in addition to modelled background concentrations from the existing Bayswater and Liddell Power Stations.

Figure 58 presents the maximum 30-day average ground-level concentrations of Hydrogen Fluoride for the proposed power station in addition to modelled background concentrations from the existing Bayswater and Liddell Power Stations.

10. Interpretation of Air Quality Impacts for the Bayswater B Gas-fired Power Station Option

10.1 Nitrogen Dioxide

Predicted ground-level concentrations of nitrogen dioxide are shown in Table 66 for the 1-hour averaging period for the proposed gas-fired power station in isolation and in conjunction with background. Ground-level concentrations of NO_2 for the proposed gas-fired power station are below the air quality criterion of 246 µg/m^3. The proposed gas-fired power station contributes only a small amount to the total concentration.

Figure 59 present the predicted maximum 1-hour average ground-level concentrations of oxides of nitrogen from the proposed Bayswater B gas-fired Power Station in isolation. Note, no criteria exist for oxides of nitrogen as opposed to nitrogen dioxide. The results show that elevated concentrations occur within the vicinity of the stack to the west.

Figure 60 present the predicted annual average ground-level concentrations of nitrogen dioxide from the proposed Bayswater B gas-fired Power Station in isolation. Highest ground-level concentrations for the power station in isolation are located in a northwest – southeast axis.

Table 66 Predicted 1-hour average ground-level concentrations of nitrogen dioxide at sensitive receptor locations for the three simulation years 1999-2000, 2000-2001 and 2007-2008 for the Bayswater B gas-fired option

Receptor	Assessment criterion	Ozone Concentration 35 ppb			Ozone Concentration 120 ppb		
		1999	2000	2007	1999	2000	2007
R1	Background	202	103	77	202	103	77
	Bayswater B in isolation	30	44	56	30	54	56
	Bayswater B plus background	202	103	84	202	103	86
R2	Background	N/A	N/A	85	N/A	N/A	85
	Bayswater B in isolation	N/A	N/A	50	N/A	N/A	50
	Bayswater B plus background	N/A	N/A	85	N/A	N/A	85
R3	Background	70	179	68	70	179	68
	Bayswater B in isolation	31	37	51	32	45	51
	Bayswater B plus background	70	179	68	70	179	68
R4	Background	70	179	68	70	179	68
	Bayswater B in isolation	33	56	55	35	68	55
	Bayswater B plus background	70	180	68	70	180	68
R5	Background	202	103	77	202	103	77
	Bayswater B in isolation	35	68	73	39	83	73
	Bayswater B plus background	202	103	81	202	103	83
R6	Background	202	103	77	202	103	77
	Bayswater B in isolation	45	80	47	50	97	55
	Bayswater B plus background	202	103	80	202	107	81
R7	Background	81	81	116	81	81	116
	Bayswater B in isolation	41	19	68	49	25	79

Receptor	Assessment criterion	Ozone Concentration 35 ppb			Ozone Concentration 120 ppb		
		1999	2000	2007	1999	2000	2007
	Bayswater B plus background	81	81	117	81	81	117
R8	Background	81	81	116	81	81	116
	Bayswater B in isolation	38	22	55	46	27	65
	Bayswater B plus background	81	81	117	81	81	117
R9	Background	87	146	104	87	146	104
	Bayswater B in isolation	94	75	36	108	87	40
	Bayswater B plus background	114	148	104	128	148	104
R10	Background	87	146	104	87	146	104
	Bayswater B in isolation	62	59	47	75	59	47
	Bayswater B plus background	113	152	104	113	158	104
R11	Background	66	68	80	66	68	80
	Bayswater B in isolation	33	27	28	42	34	28
	Bayswater B plus background	66	68	80	66	68	80
R12	Background	87	87	146	146	104	104
	Bayswater B in isolation	55	65	44	47	71	83
	Bayswater B plus background	87	87	146	146	112	124

Table note:
- Impact assessment criterion: 1-hour average of 246 µg/m³.
- The Janssen method has been applied in the conversion of NO_X to NO^2, assuming two a range of ozone concentrations: 35 ppb and 120 ppb.

Table 67 Predicted annual average ground-level concentrations of nitrogen dioxide at sensitive receptor locations for the three simulation years 1999-2000, 2000-2001 and 2007-2008, for the Bayswater B gas-fired power station

Receptor	Assessment criterion	Ozone Concentration 35 ppb			Ozone Concentration 120 ppb		
		1999	2000	2007	1999	2000	2007
R1	Background	16.0	14.5	14.9	16.0	14.5	14.9
	Bayswater B in isolation	0.2	0.1	0.1	0.2	0.1	0.2
	Bayswater B plus background	16.2	14.6	15.1	16.2	14.6	15.1
R2	Background	n/a	n/a	18.3	n/a	n/a	18.3
	Bayswater B in isolation	n/a	n/a	2.3	n/a	n/a	2.5
	Bayswater B plus background	n/a	n/a	20.6	n/a	n/a	20.8
R3	Background	15.3	14.6	14.7	15.3	14.6	14.7
	Bayswater B in isolation	0.2	0.1	0.2	0.2	0.2	0.2
	Bayswater B plus background	15.5	14.7	15.0	15.5	14.7	15.0
R4	Background	15.3	14.6	14.7	15.3	14.6	14.7
	Bayswater B in isolation	0.2	0.1	0.2	0.3	0.2	0.2
	Bayswater B plus background	15.5	14.7	14.9	15.5	14.7	14.9
R5	Background	16.0	14.5	14.9	16.0	14.5	14.9
	Bayswater B in isolation	0.2	0.1	0.1	0.2	0.1	0.1
	Bayswater B plus background	16.2	14.6	15.0	16.2	14.6	15.1

Receptor	Assessment criterion	Ozone Concentration 35 ppb			Ozone Concentration 120 ppb		
		1999	2000	2007	1999	2000	2007
R6	Background	16.0	14.5	14.9	16.0	14.5	14.9
	Bayswater B in isolation	0.2	0.1	0.1	0.2	0.1	0.1
	Bayswater B plus background	16.2	14.6	15.0	16.2	14.6	15.0
R7	Background	11.8	11.6	15.6	11.8	11.6	15.6
	Bayswater B in isolation	0.2	0.1	0.1	0.2	0.1	0.1
	Bayswater B plus background	12.0	11.7	15.7	12.0	11.8	15.7
R8	Background	11.8	11.6	15.6	11.8	11.6	15.6
	Bayswater B in isolation	0.2	0.1	0.1	0.2	0.1	0.1
	Bayswater B plus background	12.0	11.8	15.7	12.0	11.8	15.7
R9	Background	20.0	17.2	21.7	20.0	17.2	21.7
	Bayswater B in isolation	0.3	0.4	0.3	0.4	0.4	0.3
	Bayswater B plus background	20.3	17.6	22.0	20.3	17.6	22.0
R10	Background	20.0	17.2	21.7	20.0	17.2	21.7
	Bayswater B in isolation	0.4	0.3	0.3	0.4	0.3	0.3
	Bayswater B plus background	20.3	17.5	22.0	20.3	17.5	22.0
R11	Background	12.7	13.5	16.1	12.7	13.5	16.1
	Bayswater B in isolation	0.3	0.3	0.3	0.3	0.4	0.3
	Bayswater B plus background	13.0	13.8	16.3	13.0	13.9	16.3
R12	Background	20.0	17.2	21.7	20.0	17.2	21.7
	Bayswater B in isolation	0.3	0.2	0.1	0.3	0.2	0.1
	Bayswater B plus background	20.3	17.3	21.8	20.3	17.3	21.8

Table note:
- Impact assessment criterion: 1-hour average of 62 $\mu g/m^3$.
- The Janssen method has been applied in the conversion of NO_X to NO^2, assuming two a range of ozone concentrations: 35 ppb and 120 ppb.

10.2 Particulate matter and carbon monoxide

Predicted ground-level concentrations of particulate matter (as PM_{10} and TSP) and carbon monoxide at nearest sensitive receptor locations are shown in Table 68 and Table 69. The predictions represent the maximum ground-level concentrations of the three year simulations for each averaging period. For 1-hour averages, the ground-level concentrations are represented by the 99.9th percentile in accordance with the Approved Methods. For the 24-hour averaging period, the ground-level concentrations are represented by the maximum prediction. The annual averages are the average of predictions for the simulation year.

The model results show that predictions are well below the assessment criterion for each pollutant. The predicted levels of all pollutants represent a very small proportion of the background levels of these pollutants and of the criterion. An assessment of these pollutants in conjunction with background is unnecessary.

Figure 61 presents the 8-hour average ground-level concentrations of carbon monoxide in isolation. Highest concentrations are located in the immediate vicinity of the stack. These concentrations are well below the air quality objectives.

Figure 62 presents the 8-hour average ground-level concentrations of carbon monoxide in for the proposed Bayswater B gas-fired Power Station in addition to modelled background concentrations from the existing Bayswater and Liddell Power Stations. These concentrations are well below the air quality objectives.

Figure 63 presents the predicted maximum 24-hour average ground-level concentrations of PM_{10} from the proposed Bayswater B gas-fired Power Station in isolation as a composite of the three modelled periods. The predicted ground-level concentrations are well below the guidelines.

Figure 64 presents the predicted annual average ground-level concentrations of PM_{10} from the proposed Bayswater B gas-fired Power Station in isolation as a composite of the three modelled periods. Highest ground-level concentrations for the power station in isolation are located in a northwest – southeast axis. The predicted ground-level concentrations are well below the guidelines.

Figure 65 presents the 1-hour maximum ground-level concentration of formaldehyde from the proposed Bayswater B gas-fired Power Station in isolation as a composite of the three modelled periods. The predicted ground-level concentrations are well below the guidelines.

10.3 Organic and other compounds

Predicted ground-level concentrations of organic compounds at nearest sensitive receptor locations are shown in Table 70 and Table 71. The predictions represent the maximum ground-level concentrations of the three year simulations for each averaging period. For 1-hour averages, the ground-level concentrations are represented by the 99.9^{th} percentile in accordance with the Approved Methods.

The model results show that predictions are below the assessment criterion for each compound. With the exception of formaldehyde, the predicted ground-level concentrations are less than 3% of the respective criterion. Formaldehyde was predicted to be the most significant of the organic compounds with ground-level concentrations up to 12% of the air quality criterion.

Table 68 Predicted ground-level concentrations of carbon monoxide and particulate matter as PM_{10} and TSP at sensitive receptor locations represented by the MacGen monitoring station locations. Predictions are the maximum over the three simulation years 1999-2000, 2000-2001 and 2007-2008.

Pollutant	Averaging period	Criterion (µg/m³)	Singleton (µg/m³)	Lake Liddell (µg/m³)	Mt Arthur (µg/m³)	Mitchell Line (µg/m³)	Muswellbrook (µg/m³)	Ravensworth (µg/m³)
PM_{10}	24-hour	50	0.05	0.13	0.06	0.06	0.06	0.11
	Annual	30	0.002	0.002	0.002	0.002	0.002	0.004
TSP	Annual	90	0.002	0.002	0.002	0.002	0.002	0.004
Carbon monoxide	15-minutes	100,000	16.16	23.93	30.74	26.59	23.20	22.19
	1-hour	30,000	9.54	14.13	18.15	15.70	13.70	13.10
	8-hour	10,000	3.49	8.68	4.58	4.41	4.01	7.04

Table 69 Predicted ground-level concentrations of carbon monoxide and particulate matter as PM_{10} and TSP at sensitive receptor locations. Predictions are the maximum over the three simulation years 1999-2000, 2000-2001 and 2007-2008.

Pollutant	Averaging period	Criterion (µg/m³)	R4 (µg/m³)	R5 (µg/m³)	R6 (µg/m³)	R7 (µg/m³)	R10 (µg/m³)
PM_{10}	24-hour	50	0.06	0.07	0.07	0.14	0.07
	Annual	30	0.002	0.002	0.002	0.002	0.003
TSP	Annual	90	0.002	0.002	0.002	0.002	0.003
Carbon monoxide	15-minutes	100,000	34.20	30.56	24.80	24.50	31.24
	1-hour	30,000	20.20	18.05	14.64	14.47	18.45
	8-hour	10,000	4.63	4.93	5.26	9.23	4.83

Table 70 Predicted ground-level concentrations of organic pollutants at sensitive receptor locations represented by the MacGen monitoring station locations. Predictions are the maximum over the three simulation years 1999-2000, 2000-2001 and 2007-2008.

Pollutant	Averaging period	Criterion (µg/m³)	Singleton (µg/m³)	Lake Liddell (µg/m³)	Mt Arthur (µg/m³)	Mitchell Line (µg/m³)	Muswellbrook (µg/m³)	Ravensworth (µg/m³)
1,3-butadiene	1-hour	40	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002
Acrolein	1-hour	0.42	0.002	0.002	0.002	0.002	0.002	0.002
Benzene	1-hour	29.00	0.003	0.003	0.003	0.003	0.004	0.004
Ethylbenzene	1-hour	8000	0.008	0.008	0.009	0.009	0.010	0.012
Formaldehyde	1-hour	20	0.2	0.2	0.2	0.2	0.2	0.3
Polycyclic aromatic hydrocarbon (as benzo[a]pyrene)	1-hour	0.4	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008
Propylene Oxide	1-hour	90	0.01	0.01	0.01	0.01	0.01	0.01
Toluenes	1-hour	360	0.03	0.03	0.04	0.03	0.04	0.05
Xylenes	1-hour	190	0.02	0.02	0.02	0.02	0.02	0.02

Table 71 Predicted ground-level concentrations of carbon monoxide and particulate matter as PM_{10} and TSP at sensitive receptor locations. Predictions are the maximum over the three simulation years 1999-2000, 2000-2001 and 2007-2008.

Pollutant	Averaging period	Criterion (µg/m³)	R4 (µg/m³)	R5 (µg/m³)	R6 (µg/m³)	R7 (µg/m³)	R10 (µg/m³)
1,3-butadiene	1-hour	40	0.0001	0.0001	0.0001	0.0001	0.0002
Acrolein	1-hour	0.42	0.002	0.001	0.002	0.001	0.002
Benzene	1-hour	29.00	0.004	0.003	0.003	0.003	0.004
Ethylbenzene	1-hour	8000	0.010	0.007	0.008	0.007	0.012
Formaldehyde	1-hour	20	0.2	0.2	0.2	0.2	0.3
Polycyclic aromatic hydrocarbon (as benzo[a]pyrene)	1-hour	0.4	0.0007	0.0005	0.0005	0.0005	0.0008
Propylene Oxide	1-hour	90	0.01	0.01	0.01	0.01	0.01
Toluenes	1-hour	360	0.04	0.03	0.03	0.03	0.05
Xylenes	1-hour	190	0.02	0.01	0.02	0.01	0.02

11. Efficacy of the Ambient Air Quality Monitoring Program

MacGen has conducted ambient air quality monitoring in the Hunter Valley since 1986. There are currently six monitoring stations recording 10-minute average data for SO_2 and NO_X (this incorporates NO and NO_2). One of the monitoring stations also measures particulate matter. The location of the monitoring stations and specific details of their operation is included in Section 7. The ambient air quality monitoring program also includes monitoring of ambient gaseous and particulate concentrations of HF and concentrations of fluoride in the leaves of sensitive local crops.

The extent and location of the ambient monitoring stations has been evaluated considering:

- The critical pollutants emitted by coal- and gas-fired power stations
- The predicted location of elevated ground-level concentrations based on the results of dispersion modelling
- The relative locations of the power stations and sensitive land-uses
- The density of residential populations in the local region
- Confounding influences on measured levels of air pollutants

Overall the MacGen ambient air quality monitoring network provides good coverage of the key air pollutants that are likely to be emitted from the proposed Bayswater B Power Station. The following issues were noted with respect to the data collected by the existing monitoring network:

- Monitoring stations are generally located in a line running from the southeast to northwest, reflecting the location of major townships and the predominant valley wind flows. Improved spatial coverage could be achieved by the addition of monitoring station to measure SO_2, NO_X and HF to the southwest to be representative of the Arrowfield Winery and nearby residences around Jerrys Plains.
- The existing particulate monitoring station at Ravensworth is substantially influenced by particulate matter from mining activities. It is therefore unlikely to provide representative data to assess the ambient air quality as a result of MacGen operations.

It is recommended that in-stack monitoring be carried out upon commissioning of Bayswater B and on a yearly basis. Table 72 presents the pollutants to be monitored, the frequency of monitoring and the measurement method for the coal-fired option, while Table 73 presents the recommended monitoring program for the gas-fired option.

Table 72 Recommended in-stack monitoring program for Bayswater B Coal-fired Power Station option

Pollutant	Units of measure	Frequency	Sampling method
Cadmium	Milligrams per cubic metre	Commissioning/yearly	TM-12
Carbon dioxide	Percent	Commissioning/yearly	TM-24
Carbon monoxide	Parts per million	Commissioning/yearly	TM-32
Chlorine	Milligrams per cubic metre	Commissioning/yearly	TM-7 & TM-8
Copper	Milligrams per cubic metre	Commissioning/yearly	TM-12. TM-13 & TM-14
Dry gas density	Kilograms per cubic metre	Commissioning/yearly	TM-23
Hazardous substances	Milligrams per cubic metre	Commissioning/yearly	TM-12, TM-13 & TM-14
Hydrogen chloride	Milligrams per cubic metre	Commissioning/yearly	TM-7 & TM-8
Mercury	Milligrams per cubic metre	Commissioning/yearly	TM-12
Moisture content	Percent	Commissioning/yearly	TM-22
Molecular weight of stack gases	Grams per gram mole	Commissioning/yearly	TM-23
Nitrogen Oxides	Grams per cubic metre	Commissioning/continuous	CEM-2
Oxygen (O2)	Percent	Commissioning/yearly	TM-25
Solid particles	Milligrams per cubic metre	Commissioning/yearly	TM-15
Sulfuric acid mist and sulfur trioxide (as SO3)	Milligrams per cubic metre	Commissioning/yearly	TM-3
Sulphur dioxide	Milligrams per cubic metre	Commissioning/continuous	CEM-2
Temperature	Degrees Celsius	Commissioning/yearly	TM-2
Total fluoride	Milligrams per cubic metre	Commissioning/yearly	TM-9
Undifferentiated Particulates	Milligrams per cubic metre	Commissioning/continuous	CEM-1
Velocity	Metres per second	Commissioning/yearly	TM-2
Volumetric flow rate	Cubic metres per second	Commissioning/yearly	TM-2

Table 73 Recommended in-stack monitoring program for Bayswater B Gas-fired Power Station option

Pollutant	Units of measure	Frequency	Sampling method
Carbon dioxide	Percent	Commissioning/yearly	TM-24
Carbon monoxide	Parts per million	Commissioning/yearly	TM-32
Dry gas density	Kilograms per cubic metre	Commissioning/yearly	TM-23
Moisture content	Percent	Commissioning/yearly	TM-22
Molecular weight of stack gases	Grams per gram mole	Commissioning/yearly	TM-23
Nitrogen Oxides	Grams per cubic metre	Commissioning/continuous	CEM-2
Oxygen (O2)	Percent	Commissioning/yearly	TM-25
Temperature	Degrees Celsius	Commissioning/yearly	TM-2
Velocity	Metres per second	Commissioning/yearly	TM-2
Volumetric flow rate	Cubic metres per second	Commissioning/yearly	TM-2

12. Conclusions

The findings of the air quality impact assessment study for the proposed Bayswater B Power Station Project are discussed below in terms of following key issues:

- Emissions to air, emissions mitigation and control, emissions variability, and best practice emission concentration standards
- Existing environment such as
  - local meteorological conditions that influence plume dispersion
  - inter-annual climatic variability
  - existing air quality due to the operation of the Bayswater and Liddell Power Stations
- Dispersion model accuracy and precision
- Predicted incremental and cumulative impact to local and regional air quality due to the development of the Bayswater B proposal for either the coal- or gas-fired power station options

12.1 Emissions

In regard to emissions from the proposed Bayswater B Coal-fired Power Station, the following conclusions were drawn:

- The use of Ultra Super Critical coal burning technology will maximise energy output providing for a greater energy output per carbon emissions pollution ratio.

- The use of Low NO_X burners in the boiler to control flame temperature and oxygen supply ratios will minimise the formation of thermal NO_X and the overall concentration of NO_X in the flue gas exhaust.

- The use of fabric filters to collect fine particles and fly ash will minimise the emission of PM_{10} from the flue gas exhaust.

- The use of locally sourced coal that has a relatively low sulfur content (0.53% on average) will result in the generation of comparatively less sulfur dioxide emissions than other coal burning plant in Australia and worldwide.

- Emission concentrations of all pollutants regulated under *Part 4* of the *Protection of the Environment Operations (Clean Air) Regulation (2002)* will meet the limits set by the Regulation.

- The study assessed the sensitivity of ground-level impacts to emissions release height through the dispersion modelling of both a 250 metre and 300 metre tall stack. The study found that a stack height of 300 metres minimised the predicted number of occasions when the impact assessment criteria was exceeded.

In regard to emissions from the proposed Bayswater B Gas-fired Power Station, the following conclusions were drawn:

- The use of Low NO_X gas turbines to control flame temperature and oxygen supply ratios will minimise the formation of thermal NO_X and the overall concentration of NO_X in the flue gas exhaust.

- Emission concentrations of all pollutants regulated under *Part 4* of the *Protection of the Environment Operations (Clean Air) Regulation (2002)* will meet the limits set by the Regulation. The regulation limit for NO_X of 70 mg/m^3 will be surpassed by achieving a best practice concentration in-stack of 50 mg/m^3.

12.2 Existing Environment

In regard to the local meteorology and plume dispersion from the existing Bayswater and Liddell Power Stations, and the proposed Bayswater B Power Station, the following conclusions were drawn:

- The predominant ground-level wind flows in the region tend to follow the valley directional axis and flow up-valley from the southeast and down-valley from the northwest. There is a greater frequency of south-easterly winds during the summer and a greater frequency of north-westerly winds during the winter. Flows during the spring and autumn months are more even distributed between these directions.

- Wind speeds (at ten metres above the ground) in the valley, based on observations at Ravensworth and Liddell, tend to be less than five metres per second for almost 90% of the time, and less than two metres per second for between 39-48% of the time.

- Wind speeds at the elevated area on Mount Arthur are, on average, significantly greater than wind speeds lower down the valley.

- The wind fields in the region suggest the areas that are likely to experience the highest ground-level concentrations of air pollutants are to the northwest and southeast of the proposed Bayswater B Power Station and existing power stations.

- The study of the inter-annual variability of wind fileds found that the wind speed and wind direction does not vary significantly from year to year or between monitoring sites. This indicates that other meteorological variables such as the exchanges of surface energy fluxes, boundary layer development or the formation of nocturnal jets are more important to the dispersion of pollutants in the Upper Hunter Valley.

In regard to inter-annual climatic variability, the following conclusions were drawn:

- There was little variation found in the annual mean temperature during the period 1994 – 2009 based on observations at the BoM monitoring station at Cessnock. During this time, annual mean temperatures ranged between 16.3 ^oC and 17 ^oC. No significant positive or negative trend was found to suggest a warming or cooling of the local climate in this period.

- There was some variation found in relative humidity in the region, with the period after 2003 tending to be drier than the period before 2003. The drying of the climate in the period 2006 – 2008 coincides with the peak drought years.

- There was some variation found in the daily mean rainfall during the period 1994 – 2009, with the mean ranging between 0.7 - 1.5 millimetres. The periods between 1994 to 1998 and 2002 to 2007 were relatively dry, while the periods between 1996 to 1997, 1998 to 2002 and 2007 to 2009 were relatively wet.

In regard to the existing air quality in the region, the following conclusions were drawn:

- Considering the presence of heavy industry, mining, agricultural and other activities in the Upper Hunter Valley between Singleton and Muswellbrook, the air quality in the region is relatively good, when compared with the DECC impact assessment criteria.

- For NO_2 during the period 1994 – 2009, there have been a small number of exceedances of the 1-hour average criterion, with five exceedances at Singleton in 2005 and one exceedance at Muswellbrook in 2001 while there have been no exceedances of the annual average. The exceedances at Singleton may be partly attributable to the location of the monitor near a major roadway.

- For SO_2 during the period 1994 – 2009, there have been several exceedances of the short-term 10-minute and 1-hour average criteria. However, there has only been one exceedance of the 24-hour average and no exceedances of the annual average criteria. Many of the exceedances for the 10-minute and 1-hour average criteria were related to the spontaneous combustion of coal and spoil heaps associated with coal mining activities near the Mt Arthur monitoring station. They were unrelated to plume dispersion associated with MacGen operations.

- For PM_{10} during the period 1994 – 2009, there have been several exceedances of the 24-hour average criterion, based on observations at the Ravensworth monitoring station. However, this site is significantly influenced by its proximity to local coal mines and coal handling facilities. The elevated dust concentrations are unlikely to be the result of plume impacts. This conclusion is supported by the very low maximum 24-hour average PM_{10} impact predicted for the proposed Bayswater B project in isolation.

- For HF during the period March 2004 – February 2008, observations of monthly average ground-level concentrations at Ravensworth and Mitchell Line Road indicate the 30-day average criterion of 0.4 $\mu g/m^3$ for specialised land use (such as grape vine cultivation) was exceeded once in September 2006. This observation is for total fluoride (gaseous fluoride as HF and particulate fluoride) with a breakdown of 0.34 $\mu g/m^3$ and 0.18 $\mu g/m^3$ for the gaseous and particulate components, respectively. It is important to note that the gaseous component (HF) is significantly more reactive than the particulate component, with the gaseous HF concentration below the criterion.

In regard to the selection of years for the dispersion modelling, the analysis of wind field variability and existing air quality drew the following conclusions:

- Two years were selected to represent the typical wind field –
  - March 1999 – February 2000
  - March 2000 – February 2001

- One year was selected to represent a slightly different wind field –
  - March 2007 – February 2008
- This selection process also incorporated the years where ground-level concentrations were observed to be higher.

12.3 Dispersion Model Accuracy and Precision

- The evaluation of the models ability to simulate the local wind conditions and temperature indicates good general agreement between the predictions and observations at both the surface and upper levels.

- The model performs well with regard to the prediction of the maximum 1-hour average ground-level concentrations, particularly at Liddell, Mount Arthur and Muswellbrook, and is considered suitable for use in the assessment of criteria pollutants.

- The model performs reasonably well with regard to the prediction of the ninth highest 1-hour average ground-level concentrations, and is considered suitable for use in the assessment of individual toxic air pollutants including metals.

- Any tendency the model had to under-predict the lower percentiles less than 50 $\mu g/m^3$ at Ravensworth, Liddell, Mount Arthur and Muswellbrook can be largely explained by issues concerned with the lower detection limit and measurement uncertainty of the ambient monitors and the contribution of other fugitive sources (e.g. spontaneous combustion of coal spoil) of SO_2 in the region.

12.4 Assessment of Air Quality Impacts

12.4.1 Coal-fired Power Station

In regard to air quality impacts associated with emissions from the proposed Bayswater B Coal-fired Power Station, the air quality impact assessment has found that the proposed power station would cause a relatively minor change to ambient air quality. The most important air pollutant is sulfur dioxide. Ground-level concentrations of sulfur dioxide can be managed and minimised with the use of low sulfur coal. The specific outcomes of the assessment are detailed below for each air pollutant:

For sulfur dioxide -

- Based on the stochastic modelling of the distribution of coal sulfur content, one additional exceedance of the impact assessment criterion of 570 $\mu g/m^3$ is predicted due to the operation of the proposed Bayswater B Power Station. The additional exceedance is predicted for the 2007-2008 modelled period, which was selected as an atypical year for wind speed and direction.

- The predicted maximum 24-hour average for Bayswater B with background at all sensitive receptor locations is below 200 $\mu g/m^3$. The impact assessment criterion is 228 $\mu g/m^3$.

- The predicted annual average for Bayswater B with background at all sensitive receptor locations is below 25 $\mu g/m^3$. The impact assessment criterion is 60 $\mu g/m^3$.

For nitrogen dioxide -

- The predicted maximum 1-hour average for Bayswater B with background at all sensitive receptor locations is below 202 $\mu g/m^3$ for all modelled years. The impact assessment criterion is 246 $\mu g/m^3$.

- The predicted maximum annual average for Bayswater B with background at all sensitive receptor locations is 22 µg/m^3 for all modelled years. The impact assessment criterion is 62 µg/m^3.

For carbon monoxide -

- The maximum 15-minute, 1-hour and 8-hour averages for Bayswater B in isolation are predicted to be well below the impact assessment criterion of 100,000 µg/m3, 30,000 µg/m3 and10,000 µg/m3, respectively.

For hydrogen fluoride -

- The predictions have been made assuming that HF emissions from the Bayswater B Coal-Fired Power Station occur at a rate equivalent to the regulation limit of 50 mg/Nm^3. Measurements from Bayswater and Liddell Power Stations show emissions of HF to be less than half the regulation or limit. Consequently, the predicted levels are an over-estimate of ground-level concentrations that would occur in reality.

- The results indicate that the impact assessment criterion for specialised vegetation for the 24-hour average is exceeded at all sensitive receptor locations, while the general land use criterion is only exceeded at receptors R7, R8 and R9. However, the only receptor location with a specialised vegetative land use is the Arrowfield Winery, where the predicted maximum 24-hour average is 2.88 µg/m^3, which is 191% of the criterion.

- There are no predicted exceedances of the 7-day average impact assessment criterion for specialised vegetation of 0.8 µg/m^3 at any sensitive receptor locations for all modelled years.

- An exceedance of the short-term 24-hour average criterion of HF is unlikely to significantly affect the cultivation of grapevines due to the rate of plant growth. The most reliable indicator of the potential for adverse impact of HF on specialised vegetation is the longer 30-day and 90-day averages, which provide for the assessment of air quality in relation to the growing season. It is more likely an adverse affect will be sustained in vegetation if HF levels are elevated throughout the growth cycle, primarily between November and grapevine harvest time in February.

- There are no predicted exceedances of the 30-day average impact assessment criterion for general land use of 0.84 µg/m^3 at any sensitive receptor locations for all modelled years. While the 30-day average impact assessment criterion for specialised vegetation of 0.4 µg/m^3 is predicted to be exceeded at Mount Arthur North, R4, R5, R6, R7, Liddell and Ravensworth, no specialised vegetation such as viticulture has been identified there. Consequently, the applicable criterion is for the general land use. At the only receptor location with a specialised vegetative land use, the Arrowfield Winery, the predicted maximum 30-day average is 0.31 µg/m^3.

- There are no predicted exceedances of the 90-day average impact assessment criterion for general land use of 0.5 µg/m^3 at any sensitive receptor locations for all modelled years. While the 90-day average impact assessment criterion for specialised vegetation of 0.25 µg/m^3 is predicted to be exceeded at Mitchell Line Road, Mount Arthur North, R4, and Ravensworth, no specialised vegetation such as viticulture has been identified there. Consequently, the applicable criterion is for the general land use. At the only receptor location with a specialised vegetative land use, the Arrowfield Winery, the predicted maximum 90-day average is 0.24 µg/m^3.

For PM_{10} -

- The predicted maximum 24-hour and annual averages for Bayswater B in isolation are a very small proportion of the background levels of these pollutants and of the criterion.

- Impacts associated with the emission of fine particles from the Bayswater B coal-fired option in conjunction with Bayswater and Liddell Power Stations are not likely to significantly contribute to the ground-level concentrations of fine particles in the region. They comprise a small proportion of the background dust levels.

For individual air toxics –

- There are no predicted exceedances of the impact assessment criterion for any air toxics at any sensitive receptor location for all modelled periods. Predicted maximums (99.9th percentiles) are all well below the criterion.

For metals and metalloids –

- There are no predicted exceedances of the impact assessment criterion for any metals and metalloids at any sensitive receptor location for all modelled periods. Predicted maximums (99.9th percentiles) are all well below the criterion.

12.4.2 Gas-Fired Power Station

In regard to air quality assessment of the proposed Bayswater B Gas-fired Power Station, the air quality impact assessment has found that the proposed power station would cause a relatively minor impact on ambient air quality. The most important air pollutant is nitrogen dioxide. Ground-level concentrations of nitrogen dioxide can be managed and minimised with the proposed use of low emissions technology. The specific outcomes of the assessment are detailed below for each air pollutant:

For nitrogen dioxide -

- The predicted maximum 1-hour average for Bayswater B with background at all sensitive receptor locations is below 202 µg/m^3 for all modelled years. The impact assessment criterion is 246 µg/m^3.

- The predicted maximum annual average for Bayswater B with background at all sensitive receptor locations is 22 µg/m^3 for all modelled years. The impact assessment criterion is 62 µg/m^3.

For carbon monoxide -

- The maximum 15-minute, 1-hour and 8-hour averages for Bayswater B in isolation are predicted to be well below the impact assessment criterion of 100,000 µg/m^3, 30,000 µg/m^3 and 10,000 µg/m^3, respectively.

For PM_{10} -

- The predicted maximum 24-hour and annual averages for Bayswater B in isolation are a very small proportion of the background levels of these pollutants and of the criterion.

- Impacts associated with the emission of fine particles from the Bayswater B gas-fired plant option, in conjunction with Bayswater and Liddell Power Stations, are not likely to significantly contribute to the ground-level concentrations of fine particles in the region. They comprise a small proportion of the background dust levels.

For individual air toxics –

- There are no predicted exceedances of the impact assessment criterion for any air toxics at any sensitive receptor location for all modelled periods. Predicted maximums (99.9^{th} percentiles) are all well below the criterion.

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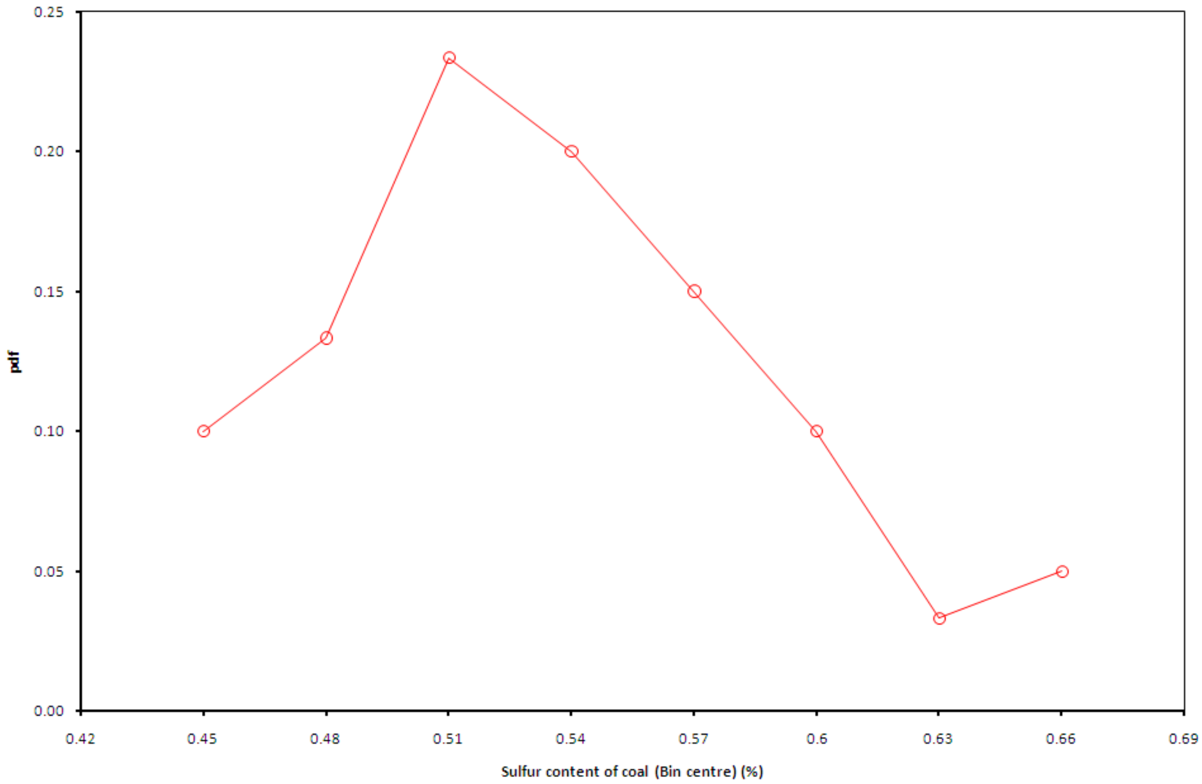


Figure 1 Probability density function for the distribution of coal sulfur content

Type: Scatter plot	**Data source:** MacGen coal sulfur sampling data	**Units:** Percentage
	Prepared by: A. Balch, F. Quintarelli	**Date:** August 2009

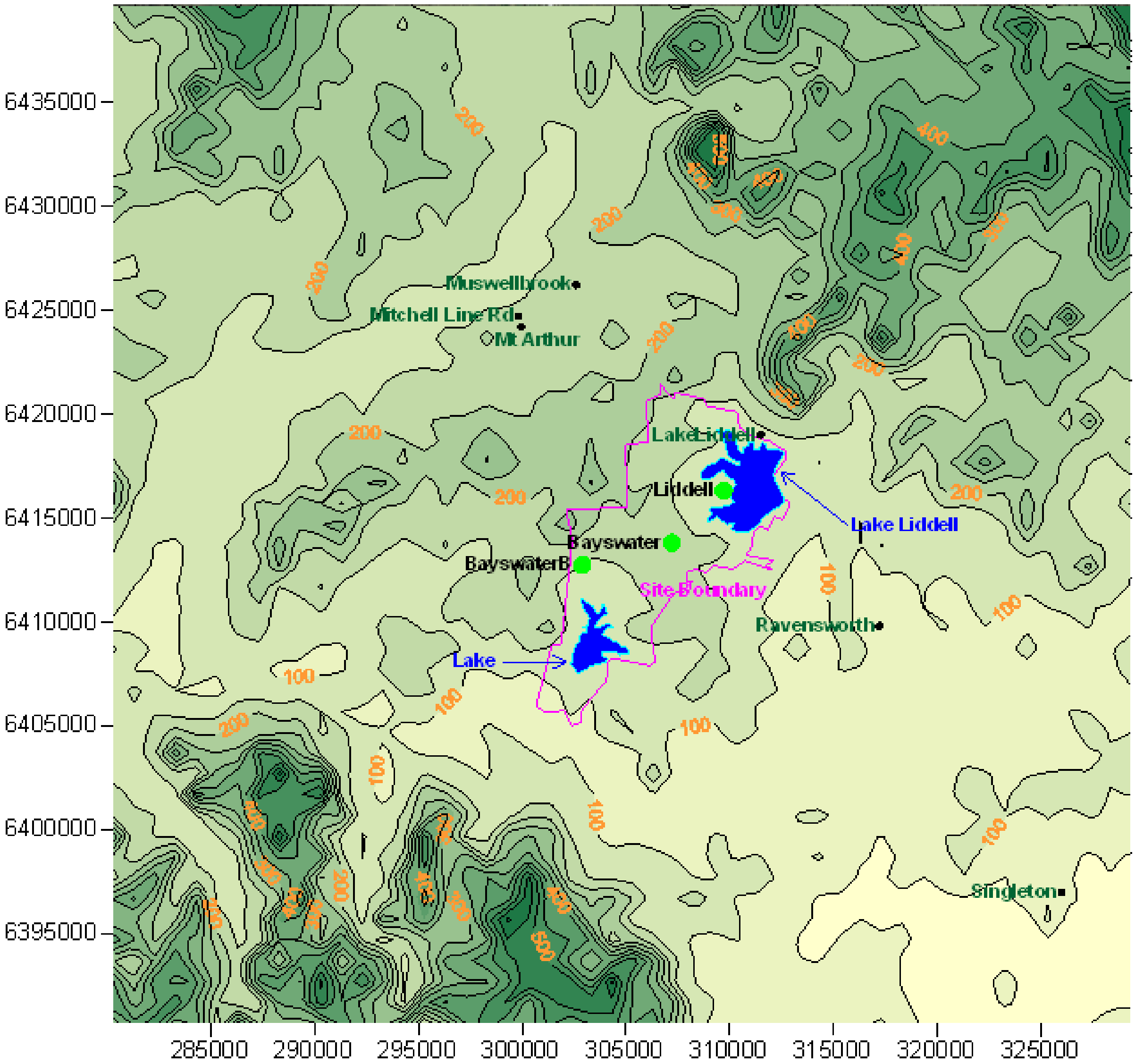


Figure 2 Terrain contour map

Location:	**Data source:**	**Units:**
Hunter Valley near Muswellbrook, NSW	TAPM	Australian Map Grid coordinates – MGA94 1994 AMG Zone 56
Type:	**Prepared by:**	**Date:**
Terrain map	S. Menzel, A. Schloss	August 2009

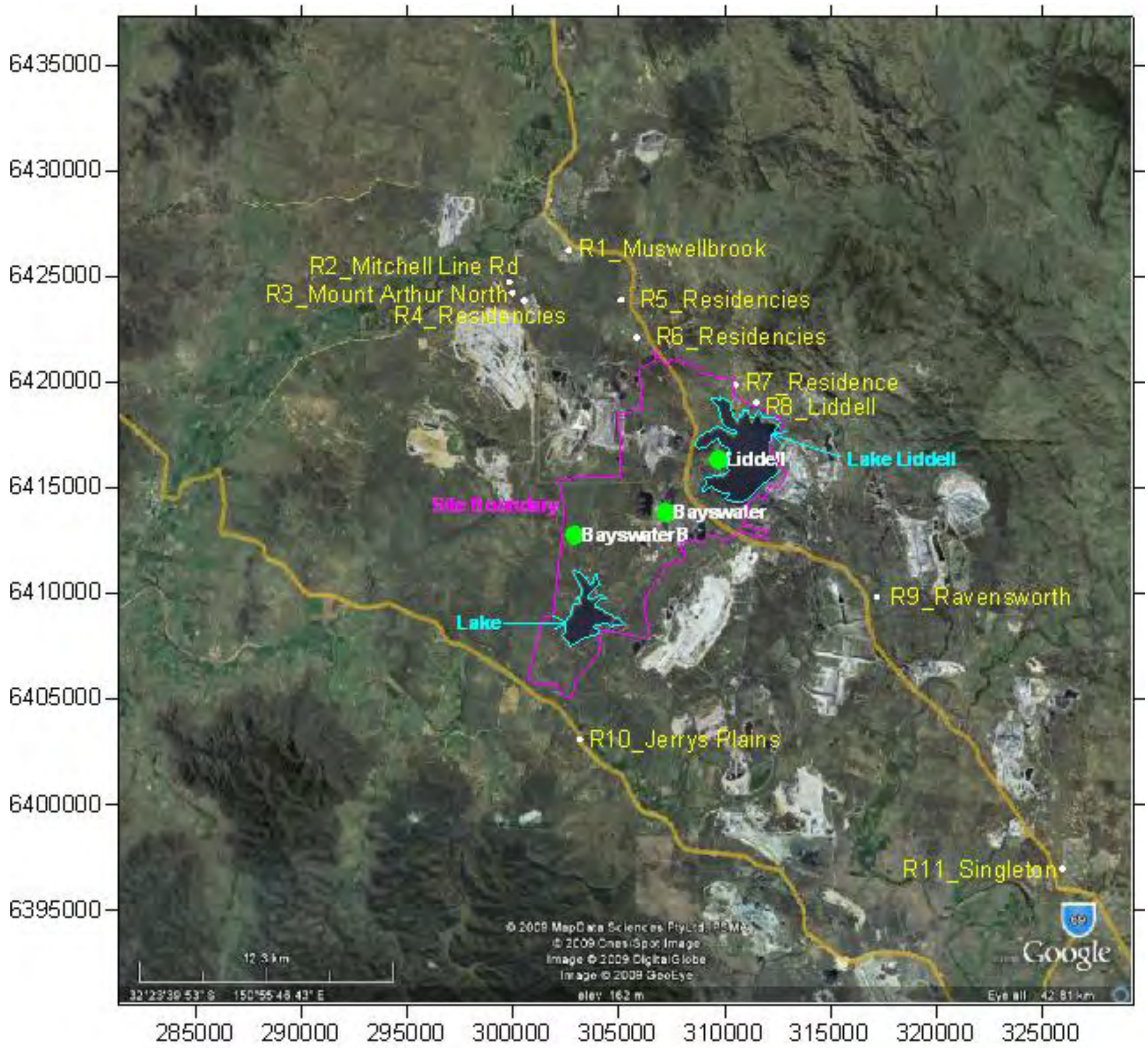
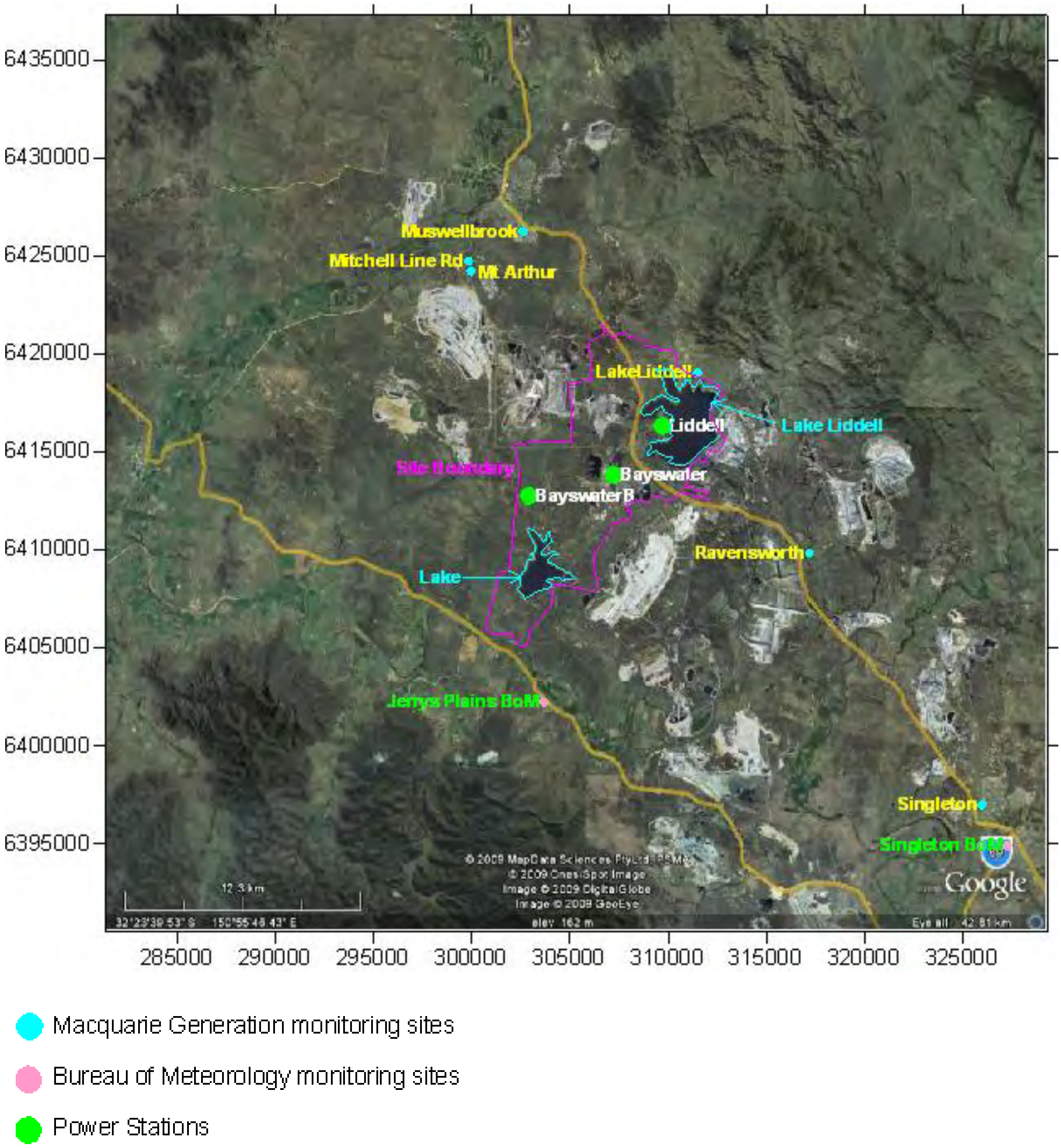


Figure 3 Location of the Macquarie Generation power generation complex in relation to sensitive receptors in the local area

Location: Hunter Valley near Muswellbrook, NSW	**Data source:** Google Earth	**Units:** Australian Map Grid coordinates – MGA94 1994 AMG Zone 56
Type: Aerial map	**Prepared by:** S. Menzel	**Date:** July 2009



Note: The monitoring site operated by BoM at Cessnock is located approximately 28.9km southeast of Singleton. The monitoring site operated by BoM at Scone is located approximately 28.5km north-northwest of Muswellbrook.

Figure 4 Location of Bureau of Meteorology and Macquarie Generation meteorological and ambient air quality monitoring stations

Location: Hunter Valley near Muswellbrook, NSW	**Data source:** Google Earth	**Units:** Australian Map Grid coordinates – MGA94 1994 AMG Zone 56
Type: Aerial map	**Prepared by:** S. Menzel	**Date:** July 2009

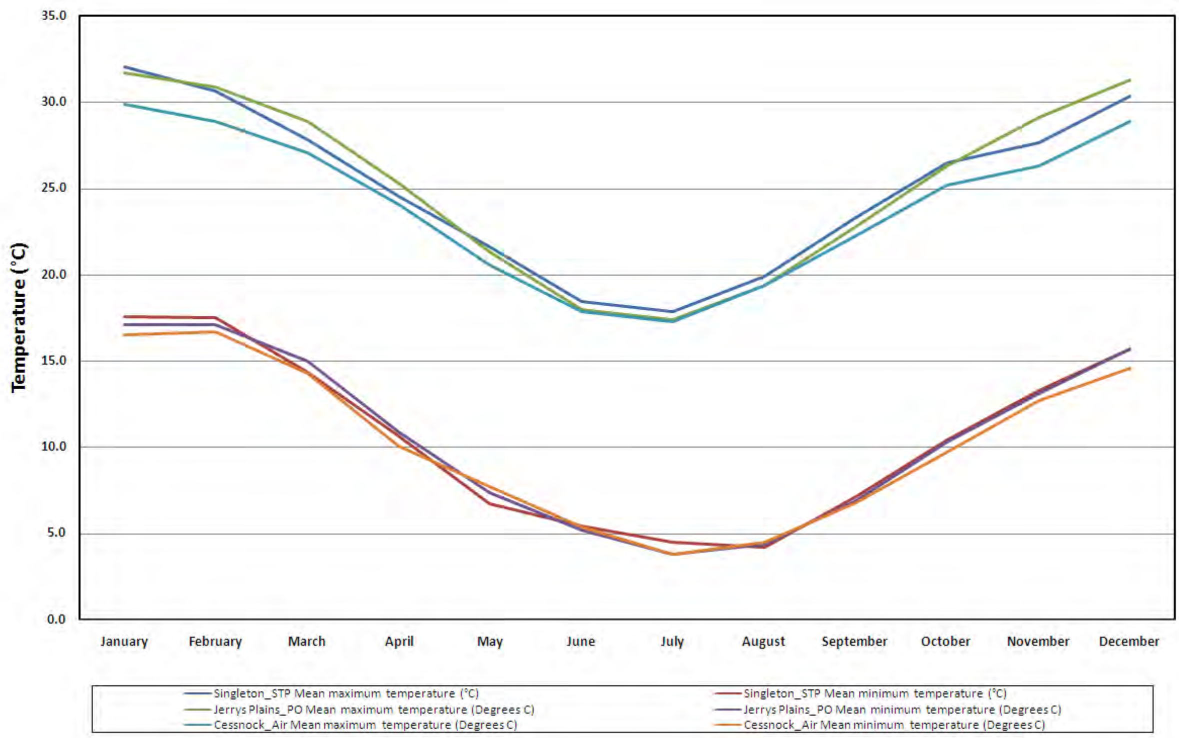


Figure 5	**Average daily maximum and minimum temperatures for Singleton sewage treatment plant (STP), Jerrys Plains post office (PO) and Cessnock Airport (Air)**		
Location: Singleton, Jerrys Plains and Cessnock	**Period:** 2002 – 2009, 1968 – 2009 and 1957 – 2009	**Data source:** BoM	**Units:** °C
Type: Time-series		**Prepared by:** Sarah Menzel	**Date:** July 2009

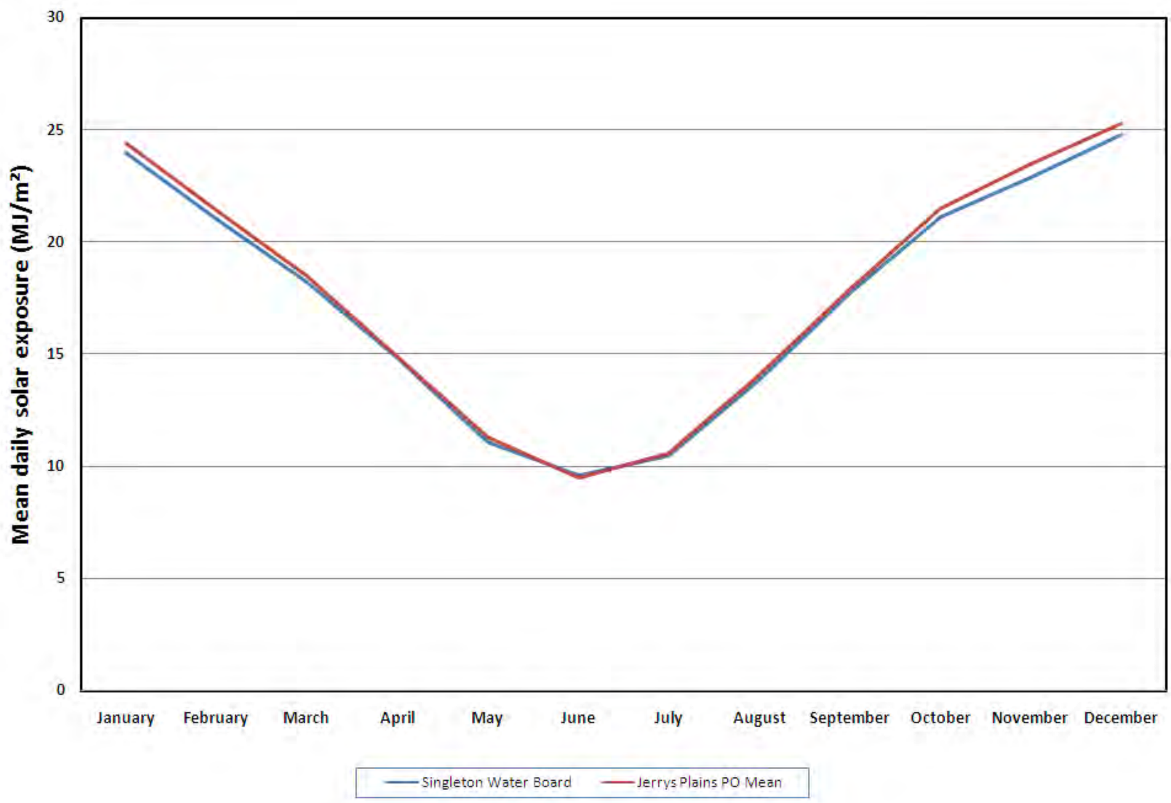


Figure 6 Mean daily solar exposure for Singleton and Jerrys Plains

Location:	Period:	Data source:	Units:
Singleton and Jerrys Plains	1990 – 2009	BoM	MJ/m²
Type: Line		**Prepared by:** Sarah Menzel	**Date:** July 2009

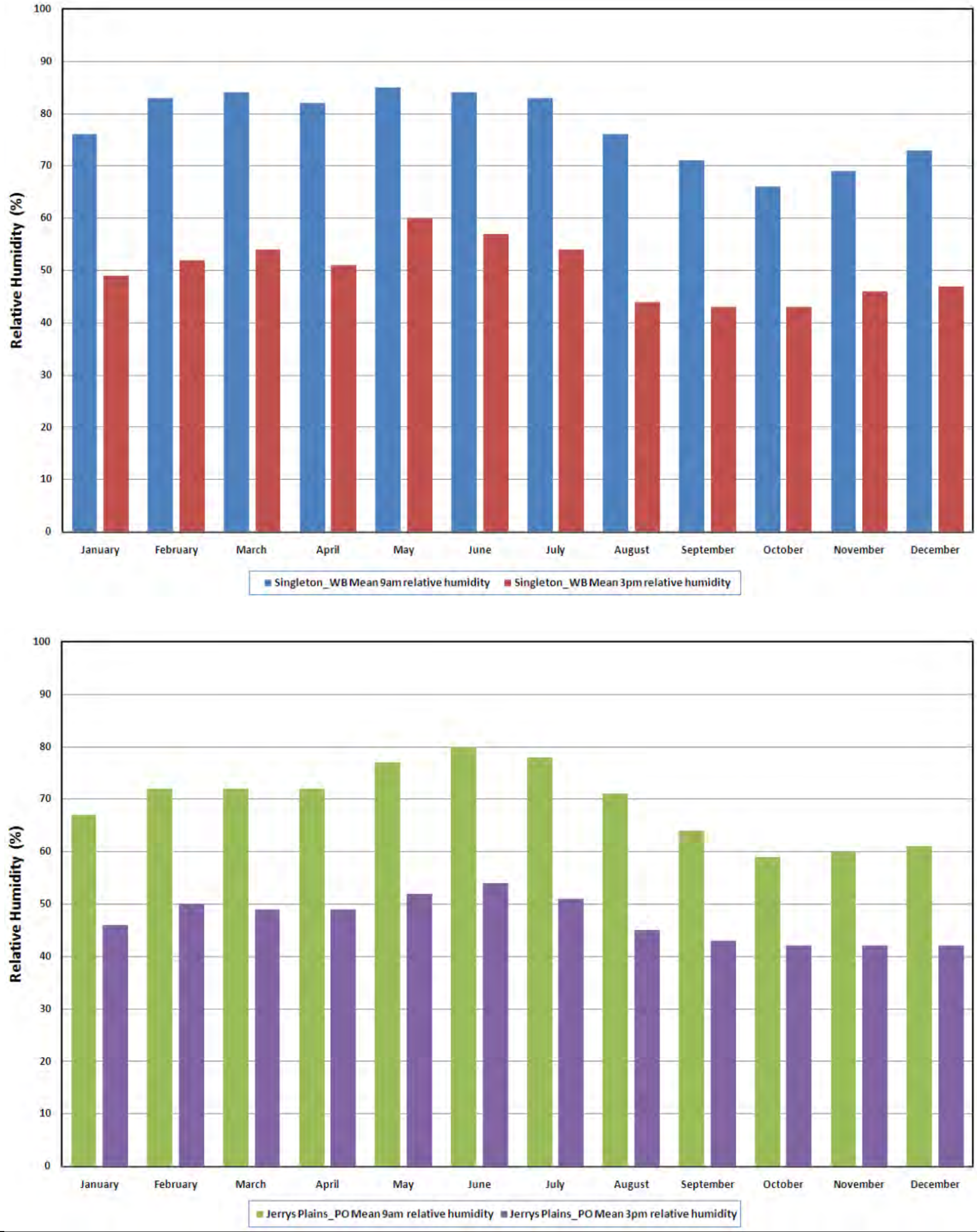


Figure 7 Mean 9am and 3pm relative humidity for the Singleton (top) and Jerrys Plains (bottom) monitoring sites

Location: Singleton and Jerrys Plains	**Period:** 1990 – 2009	**Data source:** BoM	**Units:** %
Type: Bar chart		**Prepared by:** Sarah Menzel	**Date:** July 2009

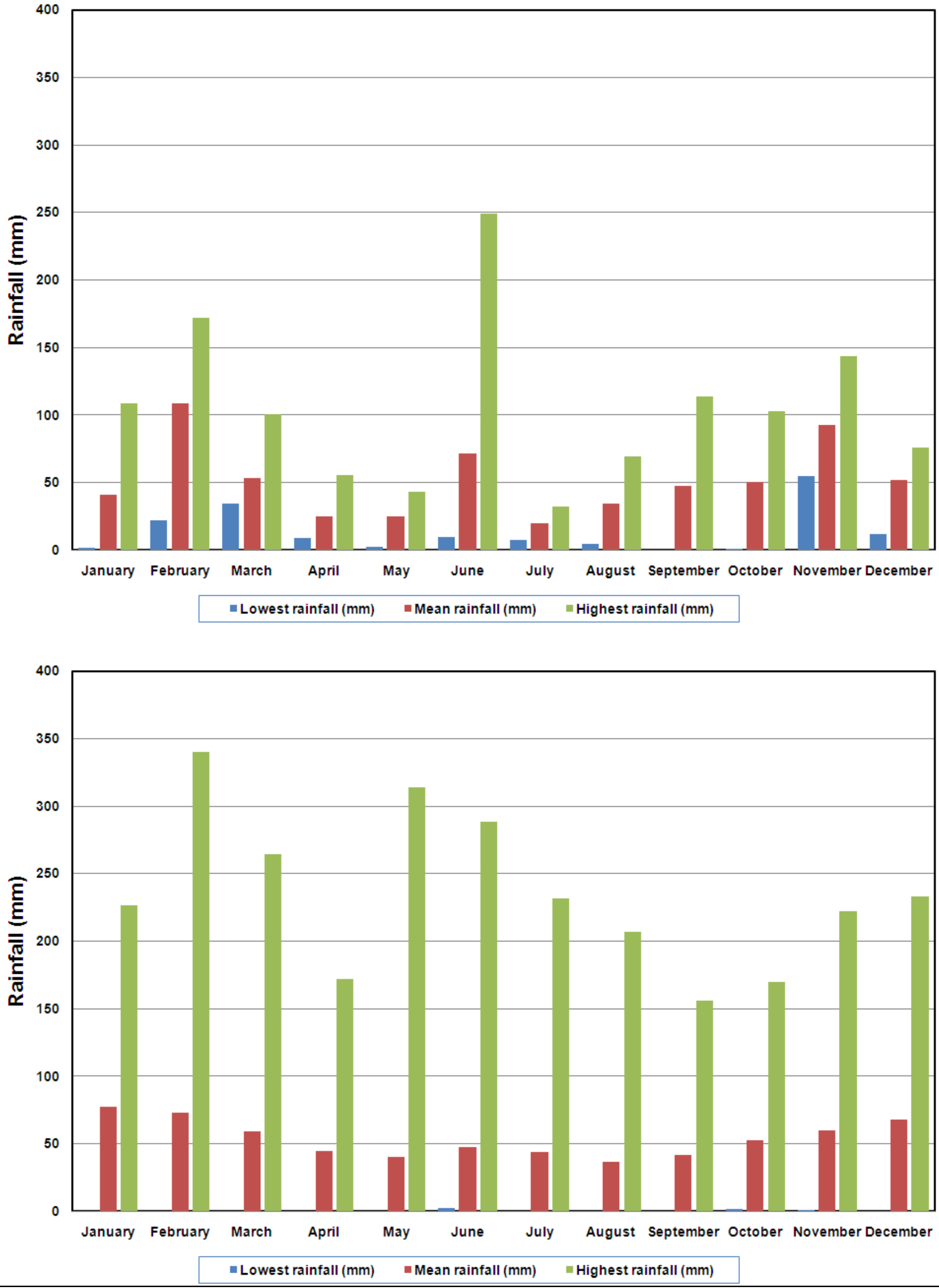


Figure 8	**Range of lowest, average and highest monthly rainfall for Singleton (top) and Jerrys Plains (bottom)**

Location: Singleton and Jerrys Plains	**Period:** 2002 – 2009 (Singleton) and 1884 – 2009 (Jerrys Plains)	**Data source:** BoM	**Units:** mm
Type: Histogram		**Prepared by:** Sarah Menzel	**Date:** July 2009

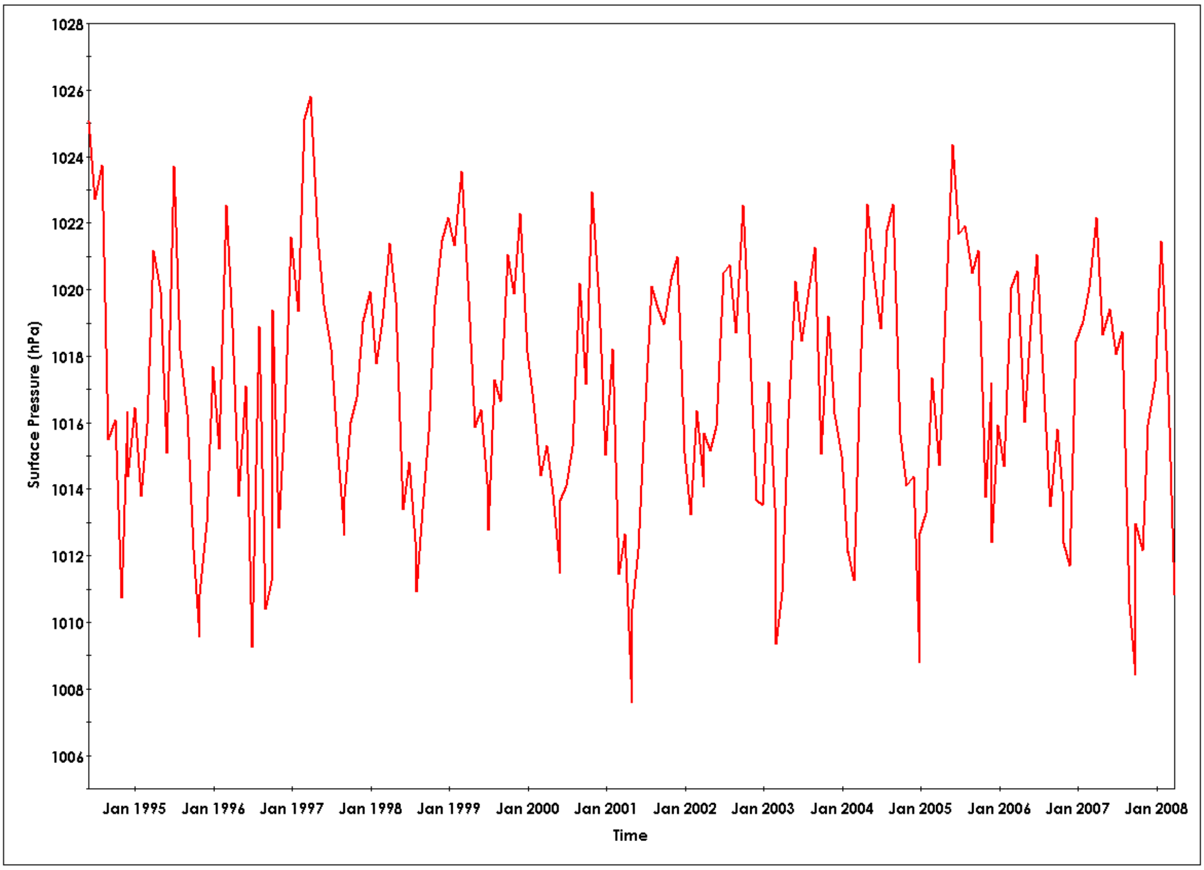


Figure 9 **Monthly averaged surface pressure for the Cessnock monitoring station**

Location: Cessnock	**Period:** June 1994 – July 2009	**Data source:** Bureau of Meteorology	**Units:** hPa
Type: Time-series		**Prepared by:** Sarah Menzel	**Date:** July 2009