



# MOOLARBEN COAL PROJECT

*Stage 2*

## *A P P E N D I X 6B*

### *Revised Water Balance*





Mr Ian Callow  
Felix Resources Pty Ltd  
PO Box 10470  
Adelaide Street  
BRISBANE QLD 4000

16<sup>th</sup> March 2009

Dear Ian,

### MOOLARBEN COAL PROJECT – EA 2 REVISED MINE WATER BALANCE FOR STAGE 2 OPERATIONS

I refer to our recent discussions and your request for us to revisit the mine water balance analysis that was undertaken for Stage 2 of the Moolarben Coal Project.

As you are aware, Stage 2 of the Moolarben Coal Project involves open-cut and underground mining within the Murrumbidgee and Eastern Creek valleys, both of which adjoin the area approved for mining as part of Stage 1 of the project. WorleyParsons carried out a range of water balance analyses for Stage 2 of the project, all of which are documented in a report titled, 'Moolarben Coal Project EA2 – Surface Water Management Strategy' (Issue No 4, November 2008). This report was included as an appendix to the Environmental Assessment for Stage 2 of the project.

The water balance analyses that are documented in the November 2008 Report were based on water demand data that was supplied by Felix Resources for mining operations proposed as part of Stage 1 of the project. This data was based on observations made at the Ashton Mine Project which showed that 208 ML of water is required per 1 million tonnes of ROM coal. This water demand is based on the following assumptions:

- All ROM coal is washed
- There will be no recovery of water from rejects and tailings
- Standard dust suppression measures will be used

This resulted in the water demand distribution listed in **Table 1**.

**Table 1 WATER DEMAND DISTRIBUTION ADOPTED FOR NOVEMBER 2008 WATER BALANCE**

AREA OF USE	MAXIMUM WATER DEMAND (ML/year)
Coal handling and preparation plant	1,414
Dust suppression across open cut and mine infrastructure areas	849
Potable (bath-house)	50
Use in underground area	601
Evaporation	<u>622</u>
<b>Total Maximum Demand</b>	<b>3,536</b>



The results of the water balance analyses for Stage 2 of the project showed that there will be periods during the mine life when a water deficit will exist. Accordingly, it was argued with our report that this deficit would be made up by accessing additional water resources in the area in accordance with provisions outlined within the Draft Hunter Alluvial and Unregulated Water Resources Water Sharing Plan.

However, since submission of our November 2008 Report, we understand that Felix Resources has decided to introduce a range of water savings which will be applied to the Stage 2 mining operation. These water savings are based on the following assumptions:

- Only open cut ROM coal is to be washed
- 15 Litres/tonne of coal is to be recovered from rejects and tailings
- Chemical dust suppressants are used on trafficked areas

These water savings measures are predicted to substantially reduce the water demand. For example, the proposed use of chemical dust suppressants is predicted to deliver a 40% reduction in water application rates. On this basis, the overall water demand for mining is estimated to be 157 ML per 1 million tonnes of ROM coal. This results in the water demand distribution listed in **Table 2**.

**Table 2 PROPOSED REVISED WATER DEMAND DISTRIBUTION**

AREA OF USE	MAXIMUM WATER DEMAND (ML/year)
Coal handling and preparation plant	1,081
Recovery and Recycling of wash plant water	-195
Dust suppression across open cut and mine infrastructure areas	509
Potable (bath-house)	50
Use in underground area	601
Evaporation	<u>622</u>
<b>Total Maximum Demand</b>	<b>2,668</b>

In recognition of the revised water demand, a revised water balance analysis was undertaken for each of the climatic scenarios that were considered as part of the original water balance and which are documented in Section 8 of our November 2008 Report. The results of the revised water balance analyses for each climate scenario are listed in each of Tables 16A to 23A, which are enclosed within **Attachment A**. Each "A version" of the table enclosed within **Attachment A** effectively replaces the corresponding table within the November 2008 Report.

The results from the revised water balance analysis show that there are very few years in any of the adopted climate scenarios where the mine borefield cannot meet the shortfall in water demand. That is, any shortfall in water supply can typically be made up by pumping from the mine borefield. Notwithstanding, it should also be noted that the revised operating protocols will still result in less extraction from the borefield than determined previously and prior to adoption of the water savings now proposed by Felix Resources.



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I trust that the additional water balance analysis documented herein meets your immediate requirements and that the accompanying tables of results can duly be read as replacements of those tables included within our November 2008 Report. In the meantime, please feel free to contact me on 02 8456 7230 should you wish to clarify any item or discuss the water balance modelling further.

Yours faithfully  
**WorleyParsons**

Chris Thomas  
Manager, Water Resources  
WorleyParsons



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# **ATTACHMENT A**

## **RESULTS OF REVISED WATER BALANCE ANALYSIS FOR ADOPTED CLIMATE SCENARIOS**



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**Table 16A REVISED WATER BALANCE RESULTS FOR “AVERAGE” RAINFALL CONDITIONS**

Mine Year	Total Mined ROM Coal (mtpa)	Total Demand (ML/yr)	Mine Infows (ML/yr)	Required Borefield Production (ML/yr)	Surface Water Inflows (ML/yr)	Total Available Water (ML/yr)	Surplus / Deficit (ML)
1	7.0	1099	162	591	347	1099	0
2	11.0	1727	221	1143	362	1727	0
3	11.5	1806	165	1278	362	1806	0
4	12.0	1884	177	1344	362	1884	0
5	12.3	1938	221	1354	362	1938	0
6	14.4	2257	246	1489	521	2257	0
7	15.4	2414	578	1295	541	2414	0
8	16.2	2549	448	1574	527	2549	0
9	16.3	2562	450	1588	524	2562	0
10	16.4	2573	429	1622	521	2573	0
11	15.8	2481	547	1403	531	2481	0
12	16.3	2566	502	1322	742	2566	0
13	16.2	2546	536	1251	759	2546	0
14	15.4	2410	579	1060	771	2410	0
15	16.0	2516	630	1118	768	2516	0
16	15.3	2395	580	913	901	2395	0
17	15.3	2408	1124	358	925	2408	0
18	15.7	2467	735	818	915	2467	0
19	16.8	2642	1343	351	948	2642	0
20	16.9	2648	794	894	960	2648	0
21	16.6	2606	899	747	960	2606	0
22	16.0	2514	1380	145	988	2514	0
23	14.7	2313	1974	0	1239	3213	900
24	14.2	2230	1016	532	683	2230	0
25	4.8	747	1876	0	950	2826	2079
26	3.3	523	2021	0	964	2985	2462
27	3.2	506	2425	0	964	3389	2883
28	3.4	539	2435	0	964	3399	2860
29	3.5	542	2797	0	964	3761	3218
30	1.8	280	2723	0	964	3687	3407



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**Table 17A REVISED WATER BALANCE RESULTS FOR “BELOW AVERAGE” RAINFALL CONDITIONS**

Mine Year	Total Mined ROM Coal (Mtpa)	Total Demand (ML/yr)	Mine Inflows (ML/yr)	Required Bore field Inflows (ML/yr)	Surface Water Inflows (ML/yr)	Total Available Water (ML/yr)	Surplus / Deficit (ML)
1	7.0	1099	162	674	263	1099	0
2	11.0	1727	221	1234	272	1727	0
3	11.5	1806	165	1357	283	1806	0
4	12.0	1884	177	1581	125	1884	0
5	12.3	1938	221	1366	350	1938	0
6	14.4	2257	246	1610	400	2257	0
7	15.4	2414	578	1576	260	2414	0
8	16.2	2549	448	1495	605	2549	0
9	16.3	2562	450	1693	419	2562	0
10	16.4	2573	429	1593	550	2573	0
11	15.8	2481	547	1659	225	2432	-49
12	16.3	2566	502	1319	745	2566	0
13	16.2	2546	536	1392	618	2546	0
14	15.4	2410	579	1284	547	2410	0
15	16.0	2516	630	1277	609	2516	0
16	15.3	2395	580	903	912	2395	0
17	15.3	2408	1124	500	783	2408	0
18	15.7	2467	735	940	793	2467	0
19	16.8	2642	1343	650	649	2642	0
20	16.9	2648	794	1132	722	2648	0
21	16.6	2606	899	1135	572	2606	0
22	16.0	2514	1380	123	1011	2514	0
23	14.7	2313	1974	0	1234	3207	894
24	14.2	2230	1016	785	430	2230	0
25	4.8	747	1876	0	963	2839	2092
26	3.3	523	2021	0	964	2985	2462
27	3.2	506	2425	0	964	3389	2883
28	3.4	539	2435	0	964	3399	2860
29	3.5	542	2797	0	964	3761	3218
30	1.8	280	2723	0	964	3687	3407





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**Table 18A REVISED WATER BALANCE RESULTS FOR “ABOVE AVERAGE” RAINFALL CONDITIONS**

Mine Year	Total Mined ROM Coal (mtpa)	Total Demand (ML/yr)	Mine Inflows (ML/yr)	Required Bore field Inflows (ML/yr)	Surface Water Inflows (ML/yr)	Total Available Water (ML/yr)	Surplus / Deficit (ML)
1	7.0	1426	162	653	612	1426	0
2	11.0	1727	221	1079	427	1727	0
3	11.5	1806	165	1314	326	1806	0
4	12.0	1884	177	1292	414	1884	0
5	12.3	1938	221	1174	543	1938	0
6	14.4	2257	246	1403	608	2257	0
7	15.4	2414	578	1171	665	2414	0
8	16.2	2549	448	1557	544	2549	0
9	16.3	2562	450	1466	646	2562	0
10	16.4	2573	429	1296	847	2573	0
11	15.8	2481	547	1395	539	2481	0
12	16.3	2566	502	1348	716	2566	0
13	16.2	2546	536	830	1180	2546	0
14	15.4	2410	579	1060	771	2410	0
15	16.0	2516	630	1084	802	2516	0
16	15.3	2395	580	928	886	2395	0
17	15.3	2408	1124	180	1104	2408	0
18	15.7	2467	735	747	985	2467	0
19	16.8	2642	1343	333	966	2642	0
20	16.9	2648	794	813	1041	2648	0
21	16.6	2606	899	539	1168	2606	0
22	16.0	2514	1380	192	941	2514	0
23	14.7	2313	1974	0	1136	3110	797
24	14.2	2230	1016	362	853	2230	0
25	4.8	747	1876	0	964	2840	2093
26	3.3	523	2021	0	964	2985	2462
27	3.2	506	2425	0	964	3389	2883
28	3.4	539	2435	0	964	3399	2860
29	3.5	542	2797	0	964	3761	3218
30	1.8	280	2723	0	964	3687	3407



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**Table 19A REVISED WATER BALANCE RESULTS FOR THE “WORST CASE DRY WEATHER” SCENARIO**

Mine Year	Total Mined ROM Coal (mtpa)	Total Demand (ML/yr)	Mine Infows (ML/yr)	Required Bore field Inflows (ML/yr)	Surface Water Inflows (ML/yr)	Total Available Water (ML/yr)	Surplus / Deficit (ML)
6	14.4	2257	246	1784	227	2257	0
7	15.4	2414	578	1579	257	2414	0
8	16.2	2549	448	1758	168	2375	-174
9	16.3	2562	450	1713	184	2346	-216
10	16.4	2573	429	1709	321	2459	-113
11	15.8	2481	547	1659	217	2424	-58
12	16.3	2566	502	1661	287	2450	-116
13	16.2	2546	536	1545	465	2546	0
14	15.4	2410	579	1444	387	2410	0
15	16.0	2516	630	1374	512	2516	0
16	15.3	2395	580	1217	597	2395	0



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**Table 20A REVISED WATER BALANCE RESULTS FOR AVERAGE RAINFALL  
CONDITIONS FOR STAGE 2 ONLY [OC4, UG1 AND UG2 ONLY]**

Mine Year	Total Mined ROM Coal (Mtpa)	Total Demand (ML/yr)	Mine Infows (ML/yr)	Required Bore field Inflows (ML/yr)	Surface Water Inflows (ML/yr)	Total Available Water (ML/yr)	Surplus / Deficit (ML)
1	7.0	0	162	0	338	500	500
2	11.0	628	221	218	189	628	0
3	11.5	707	165	376	166	707	0
4	12.0	707	177	363	166	707	0
5	12.3	682	221	294	166	682	0
6	14.4	1393	246	955	192	1393	0
7	15.4	1158	578	388	192	1158	0
8	16.2	1136	448	496	192	1136	0
9	16.3	2292	450	1668	174	2292	0
10	16.4	2416	429	1709	136	2275	-141
11	15.8	2324	547	1601	175	2324	0
12	16.3	2409	502	1659	248	2409	0
13	16.2	2389	536	1590	263	2389	0
14	15.4	2253	579	1394	280	2253	0
15	16.0	2359	630	1452	277	2359	0
16	15.3	2238	580	1259	399	2238	0
17	15.3	2199	1124	666	409	2199	0
18	15.7	1884	735	741	409	1884	0
19	16.8	1884	1343	92	449	1884	0
20	16.9	1884	794	632	458	1884	0
21	16.6	1884	899	528	457	1884	0
22	16.0	1806	1380	0	478	1858	53
23	14.7	1570	1974	0	568	2542	972
24	14.2	1473	1016	279	178	1473	0



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**Table 21A REVISED WATER BALANCE RESULTS FOR BELOW AVERAGE RAINFALL CONDITIONS FOR STAGE 2 ONLY [OC4, UG1 AND UG2 ONLY]**

Mine Year	Total Mined ROM Coal (Mtpa)	Total Demand (ML/yr)	Mine Infows (ML/yr)	Required Bore field Inflows (ML/yr)	Surface Water Inflows (ML/yr)	Total Available Water (ML/yr)	Surplus / Deficit (ML)
1	7.0	0	162	0	305	467	467
2	11.0	628	221	248	159	628	0
3	11.5	707	165	416	126	707	0
4	12.0	707	177	467	63	707	0
5	12.3	682	221	305	156	682	0
6	14.4	1393	246	998	149	1393	0
7	15.4	1158	578	509	70	1158	0
8	16.2	1136	448	460	228	1136	0
9	16.3	2292	450	1690	152	2292	0
10	16.4	2416	429	1709	119	2258	-158
11	15.8	2324	547	1659	59	2266	-58
12	16.3	2409	502	1638	269	2409	0
13	16.2	2389	536	1611	204	2351	-38
14	15.4	2253	579	1477	197	2253	0
15	16.0	2359	630	1509	220	2359	0
16	15.3	2238	580	1256	402	2238	0
17	15.3	2199	1124	710	364	2199	0
18	15.7	1884	735	768	381	1884	0
19	16.8	1884	1343	164	377	1884	0
20	16.9	1884	794	744	345	1884	0
21	16.6	1884	899	698	287	1884	0
22	16.0	1806	1380	0	493	1873	68
23	14.7	1570	1974	0	568	2542	972
24	14.2	1473	1016	327	131	1473	0



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**Table 22A REVISED WATER BALANCE RESULTS FOR ABOVE AVERAGE RAINFALL CONDITIONS FOR STAGE 2 ONLY [OC4, UG1 AND UG2 ONLY]**

Mine Year	Total Mined ROM Coal (Mtpa)	Total Demand (ML/yr)	Mine Infows (ML/yr)	Required Bore field Inflows (ML/yr)	Surface Water Inflows (ML/yr)	Total Available Water (ML/yr)	Surplus / Deficit (ML)
1	7.0	0	162	0	401	562	562
2	11.0	628	221	168	239	628	0
3	11.5	707	165	377	164	707	0
4	12.0	707	177	330	199	707	0
5	12.3	682	221	176	284	682	0
6	14.4	1393	246	935	212	1393	0
7	15.4	1158	578	298	282	1158	0
8	16.2	1136	448	490	198	1136	0
9	16.3	2292	450	1614	228	2292	0
10	16.4	2416	429	1709	269	2407	-9
11	15.8	2324	547	1567	209	2324	0
12	16.3	2409	502	1625	282	2409	0
13	16.2	2389	536	1394	460	2389	0
14	15.4	2253	579	1373	301	2253	0
15	16.0	2359	630	1416	314	2359	0
16	15.3	2238	580	1227	431	2238	0
17	15.3	2199	1124	597	478	2199	0
18	15.7	1884	735	704	445	1884	0
19	16.8	1884	1343	77	464	1884	0
20	16.9	1884	794	602	487	1884	0
21	16.6	1884	899	470	514	1884	0
22	16.0	1806	1380	0	445	1826	20
23	14.7	1570	1974	0	568	2542	972
24	14.2	1473	1016	235	222	1473	0



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**Table 23A REVISED WATER BALANCE RESULTS FOR “WORST CASE DRY WEATHER” SCENARIO FOR STAGE 2 ONLY [OC4, UG1 AND UG2 ONLY]**

Mine Year	Total Mined ROM Coal (Mtpa)	Total Demand (ML/yr)	Mine Infows (ML/yr)	Required Bore field Inflows (ML/yr)	Surface Water Inflows (ML/yr)	Total Available Water (ML/yr)	Surplus / Deficit (ML)
6	14.4	1393	246	1068	79	1393	0
7	15.4	1158	578	487	92	1158	0
8	16.2	1136	448	648	39	1136	0
9	16.3	2292	450	1713	77	2240	-52
10	16.4	2416	429	1709	77	2216	-200
11	15.8	2324	547	1659	57	2264	-60
12	16.3	2409	502	1661	81	2244	-165
13	16.2	2389	536	1611	127	2274	-115
14	15.4	2253	579	1543	131	2253	0
15	16.0	2359	630	1545	184	2359	0
16	15.3	2238	580	1351	307	2238	0

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