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NSW Planning Assessment Commission
Rocky Hill Coal Project (SSD 5156)

I am personally unable to attend the Commission's public hearing scheduled for Tuesday 14th November to be held at the Gloucester Soldier's Club in relation to the Rocky Hill Coal Project's application for a Coal Mine at Forbesdale NSW. I would like to thank the Commission for the opportunity to submit a written comment on this proposal as the decision made by the Commission will have a profound effect on my family's future. This is easily understood as it is our home that sits in the foreground of the cover page of Department of Planning's recommendations regarding the proposal.

Whilst being delighted at the overall tenure of the Departments rejection of the proposal there remain several issues unresolved, primarily the filling of the void and development of the areas final landform.

The proposal would show this, in the Planning Department's words, "to be current best practice" however best practice is simple to conceive but far more difficult to achieve. The Department correctly has significant concerns about Gloucester Resources Limited being able to fund the proposed void filing and landform development, my concern however rests in the practicality of this ever being achieved due to the design of the landform, the size of the void and the availability of material to produce the promised outcome.

I have raised these issues previously as part of the GRIP submission opposing the original application and more recently as part of the Groundswell Gloucester submission opposing the amended application. In the first instance, with typical arrogance, we were dismissed as being unqualified and ill-informed by GRL with they, being the experts, assuring the Department all was good. Their responses with regard to the amended application were at least specific in regards to the calculation of extracted volumes and material availability but then were shrouded in irrelevant detail on interim material placement and movements, and no detail at all on the material requirements to achieve the final landform design.

The ability for GRL to be able to fill the void and produce the final landform is, and always has been, three simple equations…..

Firstly……. How much will be dug up **plus** the amount it will expand **less** the amount exported from the site **less** the amount of compaction of material **equals** the amount available to fill the void and produce the final landform.
Secondly……. How much material is required to fill the void **plus** how much material is required to develop the final landform **equals** the amount required to achieve the promised result

Thirdly……How much material is available **less** the amount of material required equals the ability to fill the void and produce the final landform. **(Positive = possible….Negative = impossible)**

Despite many opportunities to do so GRL has never provided all the information required to allow calculation of the second equation preferring instead to argue continuously that their "swell factor" parameter in the first equation is definitive and no other should be countenanced.

Whilst the Planning Department considered GRL's swell factor "reasonable" it also stated it could not be definitive.

This can be no more clearly demonstrated than reviewing the results of an audit of swell factors produced at the Callide mine in Queensland where the historically used 18% was shown to vary from 3.13% to 18.23% across the mine giving an average of 11.23% [a]

The table below outlines the possible results of the first equation using GRL's figures for overburden and coal rejects. GRL's figures produce the maximum and minimum figures. The Groundswell calculated figure is shown with the Callide mine by way of providing a comparison.

Material Availability:

	Overburden plus coal rejects Mbcm	25% swell 2.5% - 3% compaction Mlcm	22% swell 2.5% - 3% compaction Mlcm	11.25% swell 2.5% - 3% compaction Mlcm	20% swell 33% of swell compaction Mlcm
GRL maximum	127.4	155.269			
GRL minimum	127.4		151.542		
Callide Mine	127.4			137.419	
Groundswell	127.46[b]				144.54

The table below outlines the possible results of the second equation. As previously stated GRL have never provided any detail on the volume requirements required to produce the final landform. The only indication as to the quantity required came as part of their Response to Submissions to the Amended Project. They stated **"an accurate computer generated emplacement volume" of 4.1621 Mm3 for block 10."** The Groundswell calculated volume for the referred block 10 is 4.2413Mm^3, 0.0792Mm^3 or 1.87% less than the GRL figure. Given this, and having no GRL figures, the amounts shown in the table reflect an amount 2% less than the Groundswell calculated figures.

The figure shown as incomplete filling of open cut pits reflects a previously unstated concept from the GRL Responses to Submissions to the Amended Project …. "*the difference between the volume of all open cut pits (140Mm3) and the backfill volume placed within the four open cut pits (129.6Mm3) i.e. 10.4Mm3 is a consequence of the final landform within the area of the former Main Pit which, though free draining, would be slightly flatter and lower in elevation than some areas of the existing landform.*" All maps and written sections in both the original and amended EIS's bear no reference to this.

Given that the main pit covers an area of approximately 1950m x 550m = 1072500m2 this represents a lowering of the elevation by an average of 9.7m below the existing terrain.

Material Requirement:

	Volume of Open cut pits Mcm	Incomplete filling of Open cut pits -Mcm	Open cut pits total Mcm	Final Landform Mcm	Total requirement Mlcm
GRL maximum	140		140	39.79	179.79
GRL minimum	140	-10.4	129.6	39.79	169.39
Groundswell	140		140	40.6	180.6

The table below outlines the possible results of the third equation.

Material Balance:

	Material Availability Mlcm	Material Requirement GRL max Mcm	Material Requirement GRL min Mcm	Material Requirement Groundswell Mcm	Material Balance Mlcm
GRL maximum	155.269		169.39		-14.121
GRL minimum	151.542	179.79			-28.248
Callide Mine	137.419			180.6	-43.181
Groundswell	144.54			180.6	-36.060

The figures above are self-evident.

Given the best possible outcome, using GRL's own raw figures for material availability, using GRL's own figures for swell factor and compaction, using GRL's own figures for void and landform requirements and allowing for GRL's 9.7m lowering of the existing landform over

the pit area **…….. A shortfall of 14.121Mm^3 of material to fill the void and produce the final landform. Enough material to fill the Melbourne Cricket Ground 9 times!**
Using GRL's quoted swell rates for Stratford Mine and complying with filling the voids to the levels shown in the original and amended EIS's**……..A shortfall of 28.248 Mm^3 or 18.26 MCG's!**

The Department of Planning is recommending, that an appropriate rehabilitation bond be calculated and provided before granting a mining lease and that due to the uncertainty over swell and compaction rates strict monitoring is required in case adjustments are needed. This would appear to be totally inconsequential as the filling of the void and the development can never happen.

And what if Groundswell's figures are proven correct…..a 36.06Mm^3 shortfall…. 23.3 MCG's of dirt…over 20% of the total amount of material extracted over the mine's lifetime.

This mine cannot be allowed to go ahead for all the reasons outlined in the Department of Planning's recommendations regarding proximity, health, noise, dust, water quality and visual issues. But these, as shown above, are not the only areas of failure in GRL's proposal.

I can only request that the Commission accept the advice of the Department of Planning and recommend, without qualification, that the Rocky Hill Coal project be **NOT** allowed to proceed under any circumstances. Furthermore that the Commission recommend revocation of the exploration licences covering the area surrounding the township of Gloucester freeing the town from the spectre of the mine once again appearing in the future.

Thank you again for the opportunity to submit my comments to the Commission.

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Please find below supporting material for statements and figures mentioned above. This are provided in conjunction with information detailed in the Groundswell Gloucester submission opposing the Rocky Hill Coal Project previously submitted to the Department of Planning.

Substantiating Material

The information below is provided to substantiate the figures and statements shown previously. All figures pertaining to GRL have been sourced directly from information they have provided.

a…..The Callide Mine Queensland – Audit of Swell Factor

In January 2011 the Brisbane Corporate Office of Anglo American requested validation of the swell factor applied to the overburden removed by cast blasting as part of its annual audit of the Callide Mine in Queensland.

Throughout its history the Callide Mine had used a swell factor of 18% for its entire mine site. The origin of this figure is obscure with the only reference being a small passage within the Callide Blasting Manual (2006) mentioning a minimum swell factor of 10% and a maximum of 30%. The manual the states that an average of 18% is achieved. Besides this mysterious average no other proof or form of validity could be found.

The responsibility to validate the 18% swell factor was given to the Technical Services Manager to the Engineering, Geology and Survey departments.

The reason for this request for validation was an attempt to rectify possible problem in the volumes reported to Anglo BOC as manager of all Anglo mine sites in Queensland.

In 2011 an investigation was undertaken by a Mr Andrew Heit of the University of Southern Queensland Faculty of Engineering and Surveying under the auspices of the Callide Mine Technical Services Manager.

The investigation into the parameters that affect the swell factor used in volume and design calculations at the Callide Mine would require accurate data to be obtained from across the Callide Mine operation. The Mine operates in 3 areas (Dunn Creek, Central Valley and Boundary Hill) with each site having multiple pits. Parameters covering the geology, blast patterns and blast size were measured as was the swell of the material extracted as a result of the blast. This process was repeated a number of times at each location and the results are shown in Table 3.2 of the original report.

This table is reproduced below.

Table 3.2 is of the swell factors gained from all the blasts at all the sites.

	Blast	Swell Factor
Central Valley	CVN9_MP1	1.010
	CVN9_MP2	1.056
	CVN9_MP3	1.030
	CVN9_MP4	1.056
	CVN9_MP5	1.015
	CVN9_MP5B	1.056
	CVN9_MP6	1.014
	CVS5_MP1	1.031
	CVS5_MP2	1.014
Boundary Hill	S29_MP1	1.167
	S29_MP2	1.163
	S29_MP3	1.184
	S28_MP1	1.177
	S21_MP2	1.198
	S21_MP3	1.184
	S21_MP4	1.179
	S22_MP1	1.196
	S22_MP2	1.193
Dunn Creek	BFN3_MP2	1.139
	BFN3_MP3	1.133
	HC01_MP1	1.148
	HC01_MP2	1.127

The resulting swell factors range from a minimum 1.01 at Central Valley and a Maximum of 1.198 at Boundary Hill.

These figures represent the following:

Central Valley average swell factor 1.0313 or 3.13%
Boundary Hill average swell factor 1.1823 or 18.23%
Dunn Creek average swell factor 1.1368 or 13.68%

Callide Mine Average 1.1123 or 11.23%

It should be noted that these factors are representative of uncompacted, unsettled overburden.

The conclusion of this study was that the actual mine average of 11.23% was significantly less than the assumed and long used 18% but variances in site geology, blast size and patterns suggested that at a minimum swell figures for each area should be used but preferably swell figures obtained for each pit.

Material Availability & Requirement Calculations

b…..Coal Density

Gloucester Resources state that the volume of all pits is 126Mbcm overburden +14Mbcm coal (density 1.5t/m3). This density is that for Anthracite (the highest rank of coal and at no point has been suggested as available at Rocky Hill) which is far higher than that for bituminous coal (density 1.346t/m3) used for metal smelting and power production. Gloucester Groundswell have used this figure which equates to a volume of 15.6Mbcm

Material Availability Comparisons

The differences in availability given varying swell and compaction rates is shown below.

	a	b	c	d	e	f	g	h
	Overburden	**ROM coal**	**ROM coal**	**sized coal**	**rejects**	**available material**	**available material**	**available material after 33% compaction**
	(Mbcm)	(Mt)	(Mbcm)	(Mbcm)	(Mbcm)	(Mbcm)	(Mlcm)	(Mm3)
			b/1.346	c x 0.9	c-d	a+e	fx1.2	(g-f).67+g
20% swell 33% compaction of volume increase	**125.9**	**21**	**15.602**	**14.042**	**1.560**	**127.460**	**152.952**	**144.540**
	a	b	c	d	e	f	g	h
	Overburden	**ROM coal**	**ROM coal**	**sized coal**	**rejects**	**available material**	**available material**	**available material 2.5%-3%**
	(Mbcm)	(Mt)	(Mbcm)	(Mbcm)	(Mbcm)	(Mbcm)	(Mlcm)	(Mm3)
			b/1.346	c x 0.9	c-d	a+e	fx1.25	gx0.975
25% swell 2.5%-3% compaction	126	21	14	12.6	1.4	127.4	159.25	155.269
	(Mbcm)	(Mt)	(Mbcm)	(Mbcm)	(Mbcm)	(Mbcm)	(Mlcm)	(Mm3)
22% swell 2.5%-3% compaction			b/1.346	c x 0.9	c-d	a+e	fx1.22	gx0.975
	126	21	14	12.6	1.4	127.4	155.428	151.5423
	(Mbcm)	(Mt)	(Mbcm)	(Mbcm)	(Mbcm)	(Mbcm)	(Mlcm)	(Mm3)
			b/1.346	c x 0.9	c-d	a+e	fx1.112	gx0.975
11.25% swell 2.5%-3% compaction	126	21	14	12.6	1.4	127.4	141.669	137.419

Material Requirement for Final Landform

Gloucester Resources Limited contest that the mass balance undertaken by Gloucester Groundswell is incorrect principally due to incorrect assumptions adopted and calculations undertaken. A review of methodologies and calculations was undertaken and revised figures on the landform requirements are tabulated below.[1]

Gloucester Resources Limited have at no point in either the original EIS or the amended EIS outlined a volume requirement for the final landform to be achieved. Therefore an estimation of volume only has been able to be used obtained by interpretation and interpolation of information provided on existing and final landforms shown in fig 2.20 of the amended EIS. The results of this are shown in the table below.

SECTION	SECTIONAL AREA (m2) PROPOSED a	EXISTING LANDFORM b	DIFFERENCE c=a-b	AVERAGE SECTIONAL AREA DIFFERENCE (m2) d={c(A)+c(B)}/2	BLOCK	WIDTH (m) e	BLOCK VOLUME (m3) f=dxe
A	2062.5	2062.5	0				
				-406.25	1	200	-81250
B	13250	14062.5	-812.5				0
				406.25	2	200	81250
C	25437.5	23812.5	1625				0
				1281.25	3	200	256250
D	26500	25562.5	937.5				0
				812.5	4	200	162500
E	24875	24187.5	687.5				0
				687.5	5	200	137500
F	36562.5	35875	687.5				0
				734.375	6	200	146875
Ga	35593.75	34812.5	781.25				0
				406.25	7	200	81250
Gb	66343.75	66312.5	31.25				0
				2828.125	8	200	565625
H	72500	66875	5625				0
				11956.25	9	200	2391250
I	92281.25	73993.75	18287.5				0
				21206.25	10	200	4241250
J	87875	63750	24125				0
				25781.25	11	200	5156250
K	118812.5	91375	27437.5				0
				29968.75	12	200	5993750
L	111500	79000	32500				0
				30906.25	13	200	6181250
M	96750	67437.5	29312.5				0
				31000	14	200	6200000
N	90437.5	57750	32687.5				0
				27781.25	15	200	5556250
O	64437.5	41562.5	22875				0
				16406.25	16	200	3281250
P	48187.5	38250	9937.5				0
				4968.75	17	50	248437.5
ORIGINAL	0	0	0				
							40593687.5

The figures above show that 40.5997 Mm3 of material would be required to produce the landform as shown in Fig 2.20 of the Amended Project EIS given the existing landform show in the same Figure.

In their response to submissions GRL state “an accurate computer generated emplacement volume” of 4.1621 Mm3 for block 10. The figure shown in the above table for block 10 is 4.2413 an amount of 0.0792 Mm3 or 1.87% greater.

Allowing for an error factor of 2% the minimum requirement for final landform would be 39.79Mm3. This figure has been used as the GRL requirement.

Incomplete filling of the Open Cut Pit Voids.

In their responses GRL state “*the difference between the volume of all open cut pits (140Mm3) and the backfill volume placed within the four open cut pits (129.6Mm3) i.e. 10.4Mm3 is a consequence of the final landform within the area of the former Main Pit which, though free draining, would be slightly flatter and lower in elevation than some areas of the existing landform.”*

The information provided by GRL in figure 2.20 indicates a surplus of material in this area of 0.55Mm3 (this is taken into account in the Gloucester Groundswell figures).

Given that the main pit covers an area of approximately 1950m x 550m = 1072500m2 this represents a lowering of the elevation by an average of 9.7m below the existing terrain.

It should be noted that there has been no mention of this incomplete void filling in either the original or amended EIS’s and is completely at odds with statement by GRL in section 2.26.2.2 that

"GRL considered it imperative to design the mine in a manner that would enable the final mine void to be backfilled following the completion of coal extraction"

Notes:

1 A review of figures provided in the Gloucester Groundswell submission opposing the Amended Project was carried out following an error shown in the GRL responses. A revised methodology was adopted and the corrected figures are shown.