REPORT JULY 2016

Drayton South Coal Mine: Supplementary Assessment

Independent review of Anglo American response

Report prepared for Coolmore Australia and Darley Australia

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Executive summary

Anglo American is seeking development approval for the Drayton South coal mine. The Drayton South coal mine involves the development of mining operations for a period of 15 years.

The project is directly across the road from, and within 1km of, Australia's largest thoroughbred stud operations, owned and operated by Darley Australia and Coolmore Australia.

Marsden Jacob Associates (Marsden Jacob) was engaged by Coolmore Australia and Darley Australia to review the economic aspects of the report submitted by Anglo American as part of the Supplementary Assessment:

- Anglo American Response to Planning Assessment Commission Review Report – Drayton South Coal Project (May 2016)
- Houston Kemp (2016) Expert report of Greg Houston, A report for Clayton Utz on behalf of Anglo American Metallurgical Coal Pty Ltd

The review was also undertaken in the context of various prior reports by Anglo American, Gillespie Economics, NSW Government Planning and Environment, Hansen Bailey and BDA Group.

Marsden Jacob's independent review has focused on the economic consequences of the proposed new Drayton South open-cut coal mine.

Background

The Hunter Valley is the capital of Australia's thoroughbred breeding operations and is recognised as one of only three International Centres of Thoroughbred Breeding Excellence. The Hunter Valley thoroughbred breeding industry is an important:

- source of employment and economic diversity: stallion farms, broodmare farms and a sophisticated local network of support and supply businesses. These businesses would not be based in the Hunter Valley without the breeders in the Hunter Valley;
- economic contributor to a national racing and breeding industry that has 231,700 employees and participants, 381 clubs which conduct 19,168 races each year and produces $5 billion in gross domestic product per annum; and
- source of export income: the Hunter Valley is the largest exporter of premium thoroughbreds and the market is forecast to expand into the Asia-Pacific market.

The Review PAC recommended that the Drayton South Coal Mine proposal from Anglo American should not proceed

In November 2016, the Planning Assessment Commission (PAC) *"recommended that the Drayton South Coal Mine proposal from Anglo American should not proceed"* (PAC 2015 Fact Sheet). In making this recommendation the PAC stated that:

- *"The Commission has balanced the economic, social and environmental factors in its review of the proposal and, in doing so, identified* ***a real risk to another significant industry and to diversity within the regional economy****."* (PAC 2015 Fact Sheet)

- *"The **mining and thoroughbred land uses are vastly different and are not compatible in close proximity**."* (PAC 2015 Fact Sheet)
- *"**the studs are the cornerstone of the Hunter Equine Critical Industry Cluster**, which represents the top of the pyramid of the industry in NSW and Australia, their future must also be secured. Whilst balancing the evidence and merits of the proposal before it, the Commission has been unable to find any additional practical mitigation options or management measures that would satisfy it that the longer term future of the studs could be assured if mining progressed."* (PAC 2015 Fact Sheet)
- *"The Commission considers that the scenario of the studs leaving the Hunter is the critical issue for the decision maker to weigh up in considering whether to approve the project... **The risk of putting an industry of considerable international standing, which has a sustainable long term future**, into decline and value reduction needs to be weighed against a project with potentially immediate and tangible employment and community benefits, but arguable over-all economic public benefit and a **relatively short 15 year lifespan**."* (PAC 2015 page iii)
- *"The Commission considers that, as has already been provided for coal seam gas and drafted for wind farms, clear buffers or **exclusion zones need to be established** to protect sensitive industries from the significant impacts of open cut mining."* (PAC 2015 Fact Sheet)

The Review PAC found that the net economic benefits of the project are optimistic and are likely to have been overstated.

Where the economic (cost-benefit) analysis is concerned, the PAC found:

- *"in the case of the Drayton South project for instance, **assumptions are favourable to the Applicant's case**, and the BCA has excluded some potential costs such as impacts on the horse industry, impacts on the environment (including cumulative human health), Aboriginal cultural heritage, and landscape/tourism impacts."*
- *"there are some **uncertainties** associated with the quantum of **benefits** that would be generated from the project and that there are a **number of externalities, or costs, that have not been included in the cost benefit analysis** undertaken."*
- *"The Commission concludes there are a range of uncertainties in relation to the project benefits, that the risks to the Equine Critical Industry Cluster are real and that the risks are likely to outweigh the relatively short term benefits of the mine."*
- *"The Commission considers that the **net economic benefits of the project are optimistic and are likely to have been overstated**."* (PAC 2015 page 25).

Conclusions of this independent review

The following conclusions have emerged from Marsden Jacob's review of the 2016 Supplementary Assessment reports by Anglo American and Houston Kemp.

Houston Kemp's findings are based on flawed assumptions

Houston Kemp argues that if Coolmore and Darley were to leave the Upper Hunter the equine critical industry cluster (CIC) would not be under threat because new stud farms would enter the CIC and existing stud farms would expand their services; and the CIC would still be the largest thoroughbred breeding region in Australia.

These conclusions are based on a series of flawed assumptions that result from an ill-informed analysis of data from the Australian Stud Book (ASB). For instance the analysis:

- incorrectly assumes that stallion and mare fertility is homogenous;
- incorrectly assumes that stallion libido (sex drive/sexual appetite) is homogeneous;
- falsely assumes that Darley Australia and Coolmore Australia could simply relocate from Jerrys Plains and stay in the Hunter region;
- misunderstands the breeding market. Mares follow stallions, so if Coolmore Australia and Darley Australia were forced to relocate to Victoria they would take their market with them;
- ignores the known fact that a significantly number of premium stallions cannot simply be purchased from a thoroughbred sale because the market is constrained; and
- fails to acknowledge that if Coolmore and Darley were to relocate to Victoria the Victorian stud market would become larger than NSW.

The evidence underpinning these findings is detailed in Section 2.

Recent announcements by Anglo American increase the risks and uncertainties associated with the proposed Drayton South project

Anglo American has recently made a number of public announcements that affect the assumptions in the economic analysis and increase the risks and uncertainties associated with the project, for instance:

- 17 June 2016, Anglo American announced that it would be ceasing operations at the existing Drayton site.
- 16 February 2016, Anglo American announced that it is selling coal assets because *"The Group's coal assets have been identified as non-core"*.
- 16 February 2016, Anglo American stated that *"continuity of operations between Drayton and Drayton South is not possible"*.

In light of Anglo American's announcements that coal assets are being sold and operations are ceasing at Drayton North, the obvious presumption is that Anglo American is only seeking this approval so that the land can be sold with a development approval.

This is an important consideration for the economic analysis because a number of key assumptions will almost certainly vary with different owners, such as capital and operating costs and the production schedule. Particularly as different owners will not necessarily be able to exploit Anglo American's "claimed" infrastructure and operating synergies, and cost increases will further increase the net social loss that would result if the mine is developed.

The stated coal price has increased from $87 per tonne to $102 per tonne. This outlook is far higher than recent price outlooks from UBS the same source cited in the Gillespie Economics analysis.

Marsden Jacob agrees with the PAC statement that *"it is evident from a review of a number of credible forecasts of coal prices that the Applicant's assumptions are at the upper end of the spectrum"* (PAC 2015 page 24).

The Anglo American Response to PAC Report has confirmed that the assumed coal price is actually AUD$102 per tonne, not AUD$87 per tonne as was previously stated in the reports. Gillespie Economics previously stated that the: *"Projected prices for the Project product thermal coal were provided by Anglo American and are based on the average of the December 2014 Consensus Pricing from 21 financial institutions (UBS, 2014). The assumed price is USD$72/t in 2016, USD$82/t in 2017 and AUD$87/t thereafter"*. (2015 page E-25)

In November 2015 UBS (the source of the consensus pricing for coal in Gillespie Economics) released a report titled *North American Coal Industry – 2016 outlook: black as coal*. In this report UBS cuts its long-term (2020) seaborne thermal coal real-price forecasts to USD$55/mt (see Table 1). USD$55 per tonne equates to between AUD$65 and AUD$73 per tonne (0.85-0.75 exchange rate). UBS commented that the *"price cuts are driven by: an absence of demand growth from seaborne markets, ample brownfield expansion potential to replace depletion, and deflated capex and opex assumptions in our coal price model"* (page 1).

Table 1: UBS thermal coal outlook (USD$)

		2015E	2016E	2017E	2018E	2019E	LT
Thermal coal – contract ($mt)	New	$71	$63	$60	$61	$62	$55
	Old	*$71*	*$64*	*$65*	*$70*	*$82*	*$82*
Thermal coal – spot ($/mt)	New	$59	$55	$56	$57	$58	$55
	Old	*$59*	*$56*	*$61*	*$71*	*$84*	*$82*

Source: North American Coal Industry – 2016 outlook: black as coal

Given UBS has materially reduced the coal price outlook, Marsden Jacob has analysed the impact if the assumed coal prices is AUD$87 per tonne (which is well above the UBS outlook price). At this coal price the value of coal production falls by over $400 million in present value terms.

Conclusions from previous reviews still remain

Anglo American's submission does not resolve many of the issues that have been identified with the economic analysis of the Drayton South open-cut coal mine. Marsden Jacob's conclusions point to systemic optimism bias that necessitate careful consideration and robust sensitivity testing.

The economic analysis over-estimates the net social benefit of the proposed mine by at least $538 million, even before other costs such as capital, production tonnages and impacts on the neighbouring studs are factored into the analysis.

Marsden Jacob's review of the Drayton South open-cut coal mine economic analysis has identified that net social benefit of the proposed mine is over-estimated by at least $538 million (present value). Furthermore, this reduction in the net social benefit is conservative because it only factors in changes to the value of coal, value of greenhouse gas emissions, aboriginal heritage and travel time impacts.

The reduction in the net social benefit could be significantly higher if other costs were included, such as: capital costs (approximately $40-50 million PV); impacts that would result if product coal tonnes are over-estimated (close to $1 billion PV) and state impacts that emerge if Coolmore Australia and Darley Australia are forced to relocate interstate (up to $368 million PV). In summary, Marsden Jacob's review identifies that benefits and costs have potentially been miscalculated by around $1.5 billion (PV).

The problems with the economic analysis of the Drayton South open-cut coal mine are discussed briefly in Table 2 and detailed in Chapter 3.

Table 2: Under-estimated costs and over-estimated benefits

	Under-estimated costs	Over-estimated benefits	Comments
Value of Coal		~$413 million (PV)	Value of coal falls when AUD$87 per tonne is assumed (see Section 3.2).
Value of Greenhouse Gas Emissions	~$75 million (PV)		Value of greenhouse gas emission impacts increases from $6 million to $81 million (PV), a discrepancy of $75 million. This calculation is based on the greenhouse gas emissions as stated in Gillespie Economics (E-11). Marsden Jacob has not included Scope 3 emissions from the burning of coal. (see Section 3.6)
Aboriginal Heritage Impacts	~$45 million (PV)		Aboriginal heritage impacts were included in the 2012 analysis, but excluded in the 2015 analysis. This change, between 2012 and 2015, materially biases the economic analysis in favour of the proposed Drayton South open-cut coal mine (see Section 3.6).
Travel time costs	~$5 million (PV)		Travel time cost are readily quantified but have been excluded from the analysis (see Section 3.6)
Non-market employment		$146 million (PV)	Exclusion of non-market employment benefits (see Section 3.7).
Product tonnes over-estimated		~$910 million (PV)	Anglo American over-estimated the size of the economic coal resource at the existing Drayton (North) mine by 15.8 million tonnes or nearly 35%. It is therefore possible that the size of the coal resource at Drayton South has also been materially over-estimated. This, in turn, would mean that the value of coal and royalty returns are materially over-estimated, so a 35% reduction in product tonnage sensitivity analysis should be undertaken. If the coal resource is smaller it is possible that the variable components of the operating costs would fall and partially offset the change, but this change could not be estimated because operating costs are reported at an aggregate level (see Section 3.3).
Capital cost	~$101 million (Nominal)		Recent announcements and previous independent reviews have raised uncertainties around the project capital costs (see Section 3.5)

	Under-estimated costs	Over-estimated benefits	Comments
Other externalities	$unknown		Independent reviews of the project have identified a number externality impacts that are not quantified, including legacy surface water and groundwater, noise, air, animal health, animal behaviour, marketing, heritage and visual impacts (see Section 3.6)

It should be noted that Marsden Jacob was unable to check several cost and benefit items because they are only reported at an aggregate level, such as opportunity cost of land, operating cost and avoided decommissioning and rehabilitation costs.

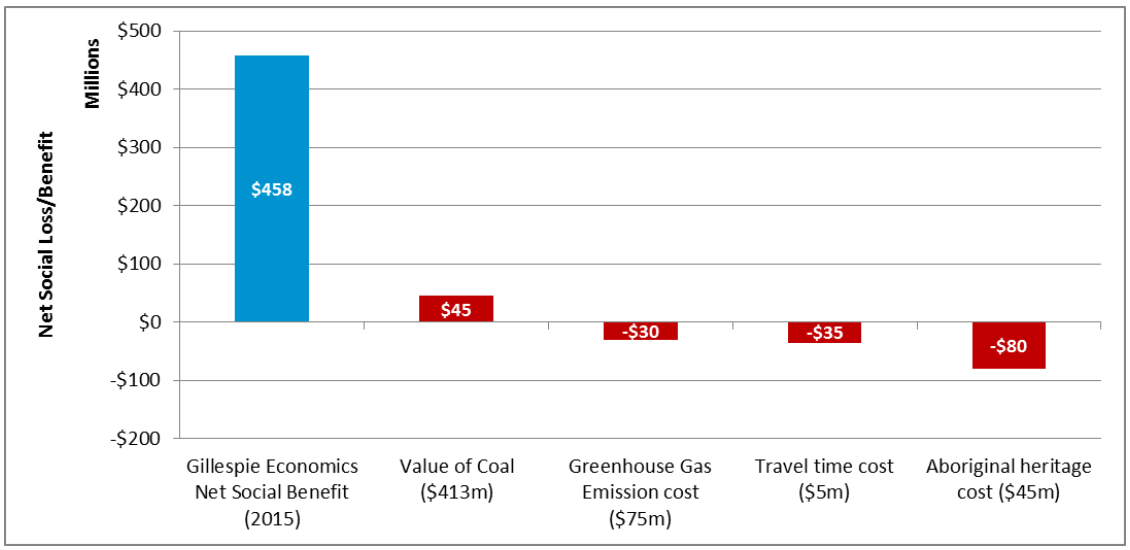
When the economic analysis is recalculated the Drayton South coal mine results in a net social loss of around $80 million.

The proposed Drayton South open-cut coal is not economically beneficial, even before impacts on the studs are factored into the analysis. Figure 1 illustrates that the claimed net social benefit of $458 million (net present value) should actually be a net social loss of around $80 million (net present value). The net social loss results from:

- revised value of coal – subtract $413 million (present value);
- revised greenhouse gas emissions – subtract $75 million (present value);
- travel time costs – subtract $5 million (present value); and
- aboriginal heritage impacts based on Gillespie Economics' (2012) – subtract $45 million (present value).

If other production, externality and capital costs were also factored into the current economic analysis this will further increase the net social loss that would result if the mine is developed.

Figure 1: Net Social Benefit/Loss



The analysis does not comply with government requirements

The economic analysis does not comply with the NSW government's requirements, because:

- assumptions underlying all estimates have not been made explicit, such as capital costs, operating costs and externality impacts. NSW Treasury guidelines stipulate *"Assumptions underlying all estimates should be made explicit in the evaluation"* (TPP07-5, page 17);
- there are issues with the calculations. NSW Treasury guidelines state: *"The key to the analysis is a complete and accurate enumeration of all the costs and benefits associated with a project"* (TPP07-5, page 50). The SEARs state: "*projected economic costs and benefits of the project, including the basis for their estimation"*;
- all of the negative impacts have not been included in the analysis. The supplement to the SEARs state: "*The economic and social impacts of the action, both positive and negative, must be analysed"*;
- the analysis of the costs and benefits to NSW is focused on royalties, taxes and contributions. The SEARs require a detailed assessment of: *"the costs and benefits of the project, identifying whether the development as a whole would result in a net benefit to NSW"*; and
- the analysis does not pay *"particular attention to impacts on the operation and reputation of the Upper Hunter Equine and Viticulture Critical Industry Clusters and the associated tourism industry"*(SEARs). The analysis simply asserts that the Drayton South open-cut coal mine will have no impact on the viability of the neighbouring studs.

Furthermore, because the cost-benefit analysis has been undertaken from a national perspective the sensitivity analysis for NSW is only shows how royalty and tax benefits to NSW change under different assumptions. There are two problems with this:

1. royalties are financial transfers between the project proponent and the NSW Government, as confirmed by the fact that the operating costs in the analysis exclude royalties (Gillespie Economics, 2015, E-33). Thus while they represent a financial gain to NSW, the economic analysis of the project really should be focused on the net social benefit/cost of the project to NSW.
2. royalty returns are also directly linked to production tonnes and assumed coal prices, so similar to the 'value of coal' calculation (discussed earlier) the royalty returns to NSW are materially over-stated.

Why would the NSW Government consider approving a mine that at best has a 15 year life and jeopardise an industry that is a critical source of regional economic diversification and that in the words of the PAC has a "*sustainable long term future"* (PAC 2015 page iii). Particularly, when, in light of recent announcements by Anglo American, it would appear that approval is being pursued to inflate the asset value ahead of it being sold.

1. Introduction

Anglo American is seeking development approval for the Drayton South coal mine. The Drayton South coal mine involves the development of mining operations for a period of 15 years.

The project is directly across the road from, and within 1km of, Australia's largest thoroughbred stud operations, owned and operated by Darley Australia and Coolmore Australia.

Marsden Jacob Associates (Marsden Jacob) was engaged by Coolmore Australia and Darley Australia to review the economic aspects of the report submitted by Anglo American as part of the Supplementary Assessment:

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The review was also undertaken in the context of various prior reports by Anglo American, Gillespie Economics, NSW Government Planning and Environment, Hansen Bailey and BDA Group.

Marsden Jacob's review has focused on the economic aspects of the proposed new Drayton South open-cut coal mine. Marsden Jacob has not assessed the financial viability of the proposed Drayton South open-cut coal mine.

1.1 Background

On 11 September 2015, Marsden Jacob presented the 'summary' conclusions of our review at the Review Planning Assessment Commission (PAC) hearing in Denman. In October 2015, Marsden Jacob submitted a Review Report entitled "Drayton South Coal Mine: Review PAC, Independent review of the Economic Assessment".

PAC recommended that the Drayton South Coal Mine proposal from Anglo American should not proceed

In November 2016, the Planning Assessment Commission (PAC) *"recommended that the Drayton South Coal Mine proposal from Anglo American should not proceed"* (PAC 2015 Fact Sheet). In making this recommendation the PAC stated that:

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management measures that would satisfy it that the longer term future of the studs could be assured if mining progressed." (PAC 2015 Fact Sheet)

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PAC finds that the net economic benefits of the project are optimistic and are likely to have been overstated.

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- *"The Commission considers that the **net economic benefits of the project are optimistic and are likely to have been overstated**."* (PAC 2015 page 25).

1.2 Review Methodology

Marsden Jacob has independently reviewed the approach, assumptions and calculations undertaken by the advisors to Anglo American.

For this reason, a number of our conclusions differ from the other peer reviewers of the 2015 reports, because: BDA Group (Anglo American's peer reviewer) states that *"No attempt has been made to check the data used, or review the computational accuracy of the spreadsheet based economic model"*; and Deloitte Access Economics (NSW Government's peer reviewer) makes no comment on the computational accuracy of the economic analysis.

Illustrating the problem that emerges when independent reviewer do not check the calculations, none of the other reviews identified that the assumed coal price in the analysis was AUD$102 per tonne, not AUD$87 per tonne as stated in the reports.

The reader should note that Marsden Jacob also attempted to check the computation accuracy of each analysis, but because we do not have access to the spreadsheet models and many of the assumptions are only reported at a high level it was not possible to check many of the results.

The NSW Treasury guidelines state that "*Assumptions underlying all estimates should be made explicit in the evaluation"* (page 17). The fact that we were unable to check all the calculations means that this requirement in the guidelines has not been met and the results thus cannot be independently verified.

1.3 Information Sources

This review has focused on the economic aspects of the following reports:

- Anglo American Response to Planning Assessment Commission Review Report – Drayton South Coal Project (May 2016)
- Expert report of Greg Houston (2016) A report for Clayton Utz on behalf of Anglo American Metallurgical Coal Pty Ltd

The review has also been undertaken in the context of the following prior reports:

- Anglo American (2015) Drayton South Coal Project: Environmental Impact Statement: Main Report
- Anglo American (2015) Drayton South Coal Project: Environmental Impact Statement: Appendix B – Mine Justification Plan
- Anglo American (2015) Drayton South Coal Project: Response to Submissions
- Australian Stud Book data (2014 covers and 2015 foals)
- BDA Group (2015) Drayton Mine Extension Project Economic Impact Assessment Peer Review (Environmental Impact Statement: Appendix F)
- Gillespie Economics (2012) Drayton South Coal Project – Economic Assessment (Environmental Impact Statement Appendix U)
- Gillespie Economics (2015) Drayton South Coal Project – Economic Assessment (Environmental Impact Statement: Appendix E)
- Hansen Bailey (2014) Drayton South Coal Project – Consequential Environmental Impact Assessment for Retracted Mine Plan
- NSW Government Planning and Environment (2015) State Significant Development Drayton South Coal Project: Secretary's Environmental Assessment Report
- NSW Government Planning and Environment (2015) State Significant Development Drayton South Coal Project: Secretary's Environmental Assessment Report
- NSW Government Planning and Environment (2015) State Significant Development Drayton South Coal Project: Secretary's Environmental Assessment Report (Appendix H – Economics Peer Review by Deloitte Access Economics)
- Planning Assessment Commission (2015) Drayton South Open Cut Coal Project Review Report, Fact Sheet and Annexures

Marsden Jacob has undertaken a high level review of the submissions and responses to submission that have been made on this and previous Drayton South projects.

Marsden Jacob has also drawn upon the results of the following study: Marsden Jacob Associates (2013) Economic impact of the proposed Drayton South Open-cut Coal Mine development on the Hunter Valley Thoroughbred Industry.

1.4 Review Structure

This review report is structured as follows:

- Section 2: Coolmore and Darley are the cornerstone of the Hunter Equine critical industry cluster
- Section 3: Drayton South is not economically beneficial
- Section 4: The analysis does not comply with the SEARs and NSW Treasury guidelines

2. Coolmore and Darley are the cornerstone of the Hunter Equine critical industry cluster

The Hunter Valley is the capital of Australia's thoroughbred breeding operations and is recognised as one of only three International Centres of Thoroughbred Breeding Excellence. The Hunter Valley thoroughbred breeding industry is a critical source of:

- Employment: stallion farms, broodmare farms and a sophisticated local network of support and supply businesses. These businesses would not be based in the Hunter Valley without the breeders in the Hunter Valley;
- Racing and breeding industry: nationally, the Australian industry has 231,700 employees and participants, and 381 clubs which conduct 19,168 races each year, producing $5 billion in gross domestic product per annum; and
- Export income: the Hunter Valley is the largest exporter of premium thoroughbreds and the market is forecast to expand into the Asia-Pacific market.

Coolmore and Darley studs are *"the cornerstone of the Hunter Equine Critical Industry Cluster, which represents the top of the pyramid of the industry in NSW and Australia, their future must also be secured."* (PAC 2015 Fact Sheet)

2.1 The conclusions reached by Houston Kemp are based on flawed assumptions and analysis

Houston Kemp argues that if Coolmore and Darley were to leave the Upper Hunter the equine critical industry cluster (CIC) would not be under threat because:

- new stud farms would enter the CIC and existing stud farms would expand their services; and
- the CIC would still be the largest thoroughbred breeding region in Australia.

These conclusions are based on a series of flawed assumptions that result from the Australian Stud Book (ASB) data being misinterpreted. The conclusions also ignore the fundamental structure of the industry and the many considerations that stallion owners and managers need to carefully balance, including physical, genetic, fertility, libido, longevity of the stallion, conception rates and age (to name a few of the factors).

2.1.1 The industry is unusual and heterogeneous

Houston, as reported in the judgement for McHugh v Australian Jockey Club Limited[1], has previously recognised that the thoroughbred industry is diverse, heterogeneous and unique:

- 1190: He (Mr Houston) said that the breeders were principally interested in the prospects of their output, their thoroughbred yearlings, being the prospects for those progeny to be successful in terms of prize money in thoroughbred races. However because the prize pool was set exogenously or independently of the costs of any producers in that market and

[1] McHugh v Australian Jockey Club Limited (No 13) [2012] FCA 1441

because not everyone can win first or second prize, that meant it was a **very unusual market**.

- 1202: Mr Houston said that if you were trying to understand the effect of changes in a market and bringing forward evidence from actual participants in the market, it was very important to satisfy oneself that those participants were representative, particularly in a market that had such diverse and **heterogeneous characteristics**.

Despite these previous acknowledgements of the uniqueness and heterogeneity (having widely dissimilar components) of the thoroughbred breeding market, the modelling by Houston Kemp mistakenly appears to assume homogeneity across a range of key matters.

2.1.2 Houston Kemp 's analysis falsely assumes homogeneity

The modelling by Houston Kemp simplistically assumes that other (non Coolmore and Darley) stallions can *"expand their services"*. To estimate the potential for other studs to expand their service offering, Houston Kemp draws on ASB data to calculate *"the maximum number of covers that could be reasonably undertaken"*. The statistical analysis is undertaken by age group across the stallions and concludes that for stallions aged between two and 15 years they could perform *"179 covers"*, which equates to the *"90th percentile"* of the number of covers (Houston Kemp, 2016, page 49).

The assumptions used in the analysis are critically flawed because they misinterpret the data and ignore a number of key issues that discussions with breeding industry experts have confirmed:

- The ASB does not report the number of covers[2] actually performed by each stallion. The ASB reports the number of mares that a particular stallion covered during the breeding season. Discussions with breeding experts confirmed that depending on stallion and mare fertility, a stallion may cover a single mare numerous times to achieve pregnancy, and even then the live foal rate averages around 70-80%.
- Stallion fertility and libido is heterogeneous and needs to be carefully managed and monitored. Furthermore, mare fertility and ability to conceive is also heterogeneous.
- Increasing the number of mares that a stallion covers can have both short-term and long-term impacts on the stallion. In the short-term a stallion's libido could be exceeded and it might refuse to cover mares. In the longer-run stallion viability and profitability could be adversely impacted.
- The modelled outcome may result in a short-term increase in stallion fees for remaining high end stallions, but industry experts have confirmed there could be adverse consequences from a narrowing of the gene pool and mid-to-long term performance issues.

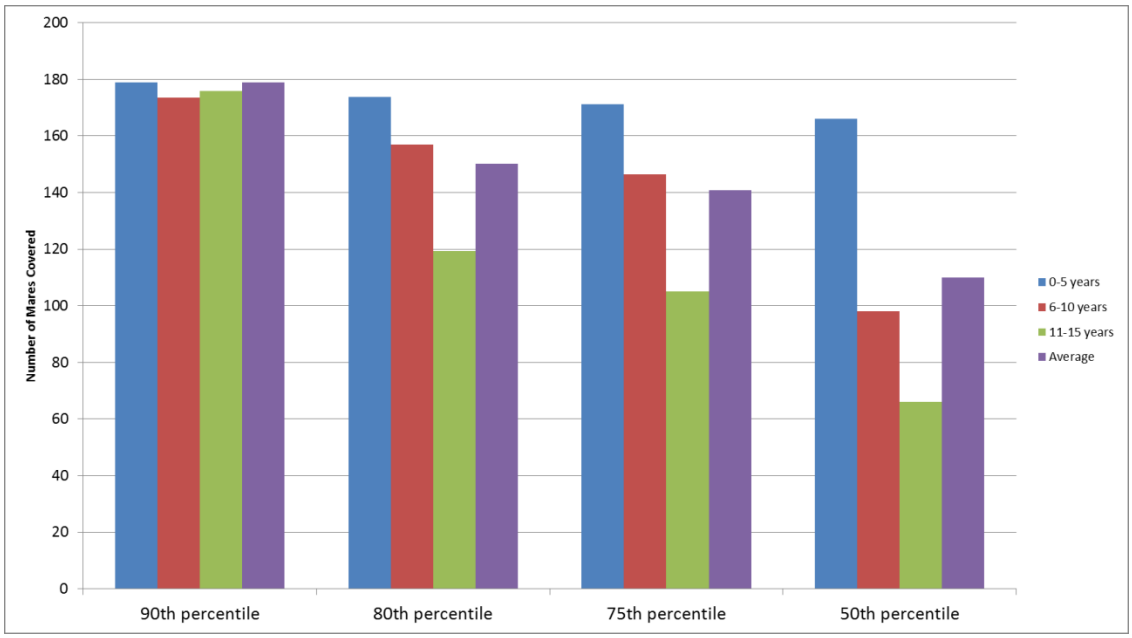
Furthermore the following analysis further highlights the improbability of Houston Kemp's 90th percentile analysis. From the ASB data for 2014 (covers), Figure 2 shows that there is a significant statistical difference in the number of mares covered by a stallion at different percentiles and the differences are even more pronounced when age is considered:

- 90th percentile is 179 mares covered (range is 175-180)
- 80th percentile is 150 mares covered (range is 120-174)
- 75th percentile is 141 mares covered (range is 105-171)

[2] Cover = Covering (The service) the natural act of a stallion mating with a mare, https://www.studbook.org.au/DisplayPDF.aspx?ty=RULES

- 50th percentile is 110 mares covered (range is 66-166)

Figure 2: Number of mares covered, Hunter Valley, Stallions aged two to 15 years (2014)



Source: Marsden Jacob analysis using Australian Stud Book data

2.1.3 Houston Kemp underestimates the number of stallions that would be required

Houston Kemp's analysis is thus unrealistically optimistic about the ability of other stud farms to increase their stallion service offering to gain market share from Coolmore and Darley if they were to relocate outside the Hunter Valley.

Houston Kemp states that if Coolmore and Darley were to relocate then *"the number of covers lost would be about 1,300 per year, which is equivalent to around eight stallions in the two year to 15 year age band undertaking covers near to their capacity"* (page 51).

Marsden Jacob's analysis reveals that this conclusion is highly sensitive to the number of mares covered and ignores the fact that premium stallions are very rare and cannot simply be purchased at a thoroughbred market.

Illustrating the sensitivity of the outcome, if the mare cover rate is assumed to be 141 (75th percentile) the number of mares that wouldn't have a premium stallion to cover them in the Hunter (at the level that their owners sought in 2014) would be around 1,700, so the deficit would be at least 12 stallions.

While this doesn't sound like many, the ASB data (2014 covers – 2015 foals) confirms that premium stallions are extremely rare (see Table 3):

- In the greater than $100,000 service fees category. Houston Kemp states that 2 new stallions would be required. There are only 3 stallions in Australia that earn service fees over $100,000:
  - Fastnet Rock, Coolmore Australia
  - Exceed And Excel, Darley Australia
  - Redoute's Choice, Arrowfield – 19 years old.

- $50,000-$100,000 service fees category. Houston Kemp states that 5 new stallions would be required. There are only 10 stallions in Australia that earn these service fees and 6 of them are owned by Coolmore and Darley.
- $30,000-$50,000 service fees category. Houston Kemp states that 1 new stallion would be required. There are only 9 stallions in Australia that earn these service fees and 4 of them are owned by Coolmore and Darley.

Table 3: Number of stallions by service fee range

Service fee range	Number of Stallions (Coolmore)	Number of Stallions (Darley)	Coolmore and Darley Proportion	Number of Stallions (All)	Houston required stallions	Marsden Jacob required stallions (minimum)
$0-5,000	0	0	0%	**355**		
$5-10,000	2	4	6%	**106**		
$10-20,000	1	2	5%	**58**		
$20-30,000	4	2	26%	**23**		**2**
$30-50,000	1	2	33%	**9**	**1**	**3**
$50-100,000	3	3	60%	**10**	**5**	**5**
$100,000+	1	1	67%	**3**	**2**	**2**

Source: Australian Stud Book, 2014 covers 2015 foals

2.1.4 Houston Kemp fails to recognise that the market for premium stallions is constrained

As Houston Kemp has previously acknowledged the thoroughbred market is unique.

Unfortunately the current analysis by Houston Kemp fails to recognise that it takes at least four to five years at stud to prove a stallion's potential through its progeny. Discussions with industry experts have confirmed that it is not until thoroughbreds are two or three years old that their potential is shown on the track.

Because of this uncertainty it is very difficult to put a value on a proven premium stallion in the market as this will depend on a large number of factors, including: age, fertility, libido, conception rates, lineage to name but a few. Nonetheless when industry experts were pressed, they estimated that a stallion that can charge a service fee of $50,000 might be worth tens of millions of dollars, in the event a vendor can be identified.

As a result, Houston Kemp materially under-estimates both the number of stallions required and the ease with which they could be replaced.

2.1.5 If Coolmore and Darley were to relocate to Victoria the Hunter Valley would no longer be the largest thoroughbred breeding market in Australia

There is a misconception that capital investment and proximity to the Hunter Valley are material barriers to Coolmore Australia and Darley Australia relocating. This misconception ignores the fact that:

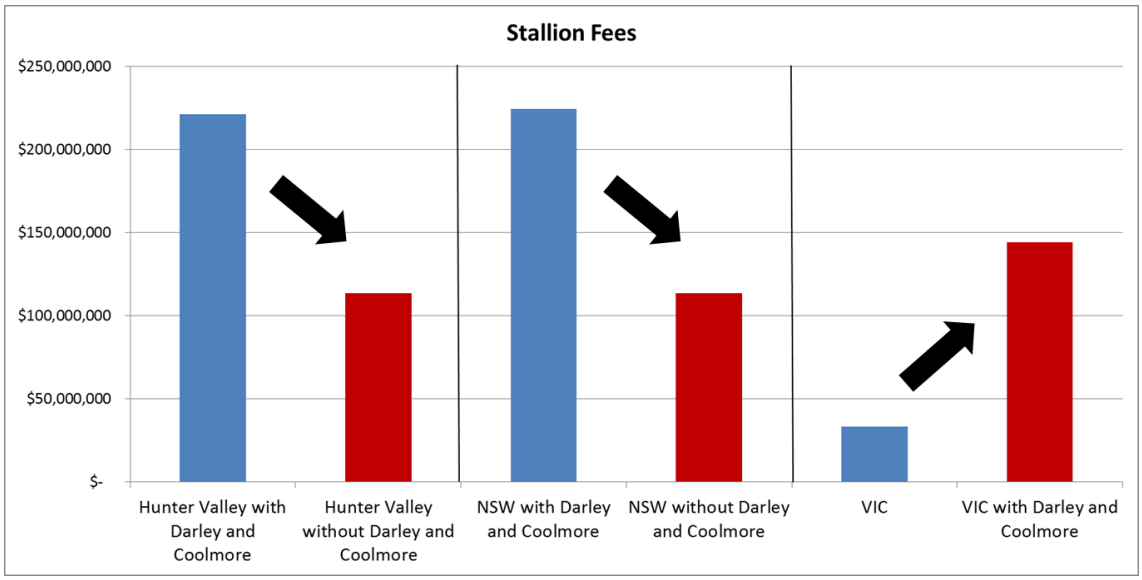
- earnings from stallion fees are fundamental to Coolmore Australia and Darley Australia's business viability;

- their bloodstock (stallions and mares) is valued in the hundreds of millions which is far greater than the property values;
- if Coolmore Australia and Darley Australia are forced to relocate they will take their clients and valuable bloodstock with them. They will not leave a void in the market; and
- in our interviews with regional stakeholders, numerous stakeholders have commented that if Coolmore Australia and Darley Australia were forced to relocate the impact on the equine CIC will be devastating. Critically all of them commented that stallion farms are the centre of the industry, so if they move the rest of the industry will move.

This means that even if another equine farm operator were to locate on Coolmore Australia and Darley Australia's properties (if they were forced to relocate) then the net economic impact on NSW would not be mitigated.

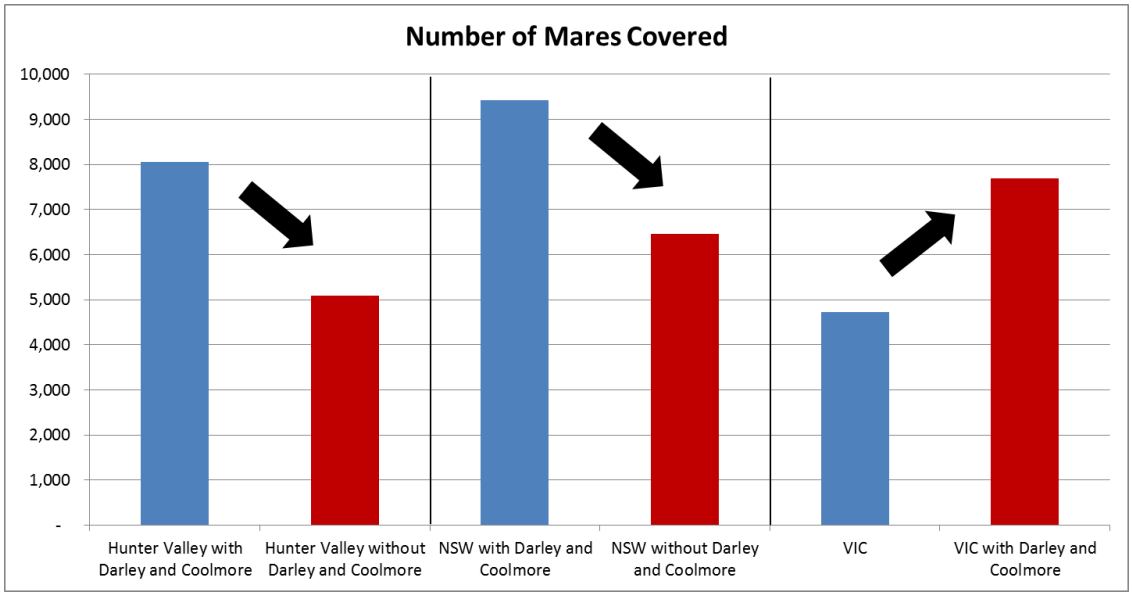
Houston Kemp argues that even if Coolmore and Darley were to relocate to the Goulburn (Victoria) the Hunter Valley would remain the largest thoroughbred region in Australia. Marsden Jacob's analysis of the ASB data reveals that if Coolmore and Darley were to relocate to Victoria, and retain their market share, the Victorian thoroughbred breeding would be larger than NSW in terms of both value (stallion fees) and number of mares covered, see Figure 3 and Figure 4.

Figure 3: Stallion Fees



Source: Australian Stud Book, 2014 covers 2015 foals

Figure 4: Number of mares covered



Source: Australian Stud Book, 2014 covers 2015 foals

Houston Kemp also claims that Coolmore Australia and Darley Australia would simply relocate within the Hunter Valley because they need to remain close to broodmares. There are three fundamental problems with this line of argument that have been confirmed through discussions with breeding industry experts:

1. Houston Kemp falsely assumes that stallions follow mares. Consistent with our previous analysis (2013-15) and numerous industry and stakeholder submissions to the PAC it is clear that the business structure and model for this industry confirms that mares follow stallions. Mare owners carefully select stallions in order to maximise their chances of breeding a valuable yearling and race horse, and the cost of transporting mares is low when compared with the services fees particularly for premium stallions even when significant distances are involved.
2. Darley and Coolmore cannot simply relocate from Jerrys Plains and stay in the Hunter Region. A relocation decision by a rational economic decision maker would be based on a thorough financial and property analysis, analysis that Houston Kemp has not undertaken.
3. It is very difficult to find an alternative site in the Hunter Valley that offers the same scale, environmental attributes (clean air, clean water and green rolling hills) and is not at risk from future mine development.

2.1.6 Houston Kemp's comparison between Edinglassie and Coolmore and Darley is flawed

Houston Kemp claims that Edinglassie operates successfully opposite an open cut mine and is comparable to Coolmore Australia and Darley Australia. Houston Kemp draws upon Magic Millions and Inglis data to claim that the quality of thoroughbreds sold by Edinglassie is not inferior.[3]

[3] Houston Kemp, A report for Clayton Utz on behalf of Anglo American Metallurgical Coal Pty Ltd, 2016, p 23-26 and p 31-32.

Marsden Jacob has reviewed the sales data for 2015[4] and the following issues emerged with the Houston Kemp findings:

- Houston Kemp's conclusions are reached by drawing upon sales data from across a range of horse markets, yearlings, weanlings, broodmares and racehorses. Comparisons need to be made on a like-with-like basis, the current comparison across vastly different markets is misleading.
- Coolmore Australia's yearlings are not comparable to Edinglassie because Coolmore Australia's average sale price ($209,000) is more than double that of Edinglassie ($95,000). Additionally, Coolmore Australia's highest sale prices for a yearling was nearly double that achieved by Edinglassie. Noting that this is only for sales where Coolmore was the vendor and thus excludes trades where a Coolmore stallion sired a yearling for another vendor.
- Darley Australia does not trade weanlings or yearlings, because Darley breeds to race. Whereas the majority of Edinglassie's sales are on yearling markets.

This review confirms that Coolmore and Darley are not comparable with Edinglassie.

2.2 The Hunter Valley thoroughbred breeding industry is important and interconnected

The Hunter Valley thoroughbred breeding industry is vertically integrated with an interdependent regional and national industry whose reputation is internationally acclaimed. The regional industry includes stallion farms, broodmare farms and a sophisticated network of support and supply industries that would not be in the region but for the stallion farms. The industry employs nearly 4,797 people[5] directly and thousands of people indirectly in the Hunter Valley and is a critical contributor to the many thousands of people and participants in NSW and the Australian thoroughbred breeding and racing industry.

The Hunter Valley is Australia's largest producer and exporter of premium quality thoroughbreds. The multi-billion dollar industry is one of three Centres of Thoroughbred Breeding Excellence in the world. It has the largest concentration of studs in the world outside of Kentucky in the USA. It is supported by a sophisticated network of equine support industries that would not be in the Hunter Valley but for the thoroughbred breeding studs, including the Scone Equine Hospital, the largest equine hospital in the southern hemisphere.

The interconnected nature of the industry is founded on the strength and reputation of their stallion farms and supported by over 150 broodmare farms and a network of support and supply industries that have established in the Hunter Valley, including feed merchants, saddlers, farriers, horse transportation, vets (and the Scone Equine Hospital) and tourism. All of these organisations are reliant on Coolmore Australia and Darley Australia, because the industry's focal point is the stallion farms, without these the other businesses would not be located in the Hunter Valley.

The thoroughbred industry is a critical source of employment and economic diversification in the Hunter Valley. Recent analysis by the Regional Australia Institute highlights the critical

[4] Based on the same sources as used in Houston Kemp (2016): http://www.magicmillions.com.au/sales/?past=true, accessed 16 and 17 June 2016; http://inglis.com.au/sales/results/#9PQGWyLiTLwoFULx.97, accessed 16 and 17 June 2016.

[5] IER (2014) Size and Scope of the NSW Racing Industry, http://www.olgr.nsw.gov.au/pdfs/racing/NSWRacingStudy_lowres.pdf

importance of economic diversification in regional economies: *"Economic diversification plays an important role in providing resilience and flexibility for regional Australia's economies. Without this cushion, regional economies may suffer disproportionately during adverse external shocks, with exacerbated negative effects on employment security, income and living standards."* (Page 3)[6]

Confirming the importance of the thoroughbred industry as a key source of economic diversity in the Hunter Valley, Ernst & Young (2009) found that the thoroughbred industry income was $298 million. This is nearly double the gross value of irrigated agricultural production for the Hunter-Central Rivers region of $155 million (excluding the thoroughbred industry), based on ABS data. The next biggest sectors are dairy ($65 million), meat cattle ($30 million) and hay ($7 million).

Finally, the minerals sector downturn is already being witnessed in the Hunter Valley with many communities and businesses being adversely impacted. If the CIC is fragmented by the development of the Drayton South open-cut mine, forcing Coolmore Australia and Darley Australia to relocate, this would diminish the resilience of the diverse economic base and further amplify its vulnerability to future economic and climatic shocks.

2.3 Coolmore and Darley are critical participants in the Hunter Valley

Coolmore Australia and Darley Australia (located across the road from, and within 1km of, the proposed Drayton South open cut coal mine development) are Australia's largest thoroughbred breeding studs. Coolmore Australia and Darley Australia's combined stallion fee earnings of $110 million (in the Hunter Valley) comprise 50% of the service fees in the Hunter Valley ($220 million) and 40% of the Australian Service fee market ($280 million), (ASB 2014).

This means Coolmore Australia and Darley Australia are critical players in the Hunter Valley thoroughbred cluster because they are the largest international scale thoroughbred studs in Australia (in both physical scale and market share). These two studs alone constitute the epicentre of Australia's and NSW's thoroughbred breeding industry and any impacts on their business operations will impact all other related and support services. A fact that is confirmed in NSW Department of Trade and Investment (2014): *"the Coolmore and Woodlands (Darley) thoroughbred stud enterprises are pivotal (core businesses) to the sustainability of the Upper Hunter Equine Critical Industry Cluster and should be protected."*[7]

As Michael Ford, (former) Keeper of the ASB, stated:

> *"The stand-out fact is that Coolmore and Darley produce 40% of the estimated income earned in Australia, while the Hunter Valley produces 74% leaving only 2% for the rest of New South Wales, and 24% for all the other states" (27 March 2013).*

[6] www.regionalaustralia.org.au/wp-content/uploads/2013/07/Diversification-Policy-Paper-RB_V2.pdf, accessed 10 March 2014

[7] https://majorprojects.affinitylive.com/public/de66f6885b3e911bc0feec1dc740bdae/Drayton%20South%20-%20NSW%20Trade%20and%20Investment%20-%20Response%20to%20PAC%20Review.pdf, accessed 8 September 2015

The 2015 review PAC stated: *"the studs are the cornerstone of the Hunter Equine Critical Industry Cluster, which represents the top of the pyramid of the industry in NSW and Australia, their future must also be secured."* (Fact Sheet, Page 1)

If Coolmore Australia and Darley Australia were to leave the Hunter Valley and move to Victoria, this would have a massive impact on the thoroughbred breeding industry and related industries, both within the Hunter Valley and NSW.

2.3.1 Drayton South open-cut coal mine and premium stallion farms are incompatible

Coolmore Australia and Darley Australia are recognised premium stallion farms. This means that their business model is different to both broodmare farms and most other stallion farms.

Image, client perception, visual presentation and reputation are all critical components in a premium thoroughbred stud's business model. This is consistent with international best practice and can be witnessed at leading studs worldwide.

Coolmore Australia and Darley Australia provide services to and compete in a highly competitive environment for investment catering to a broad spectrum of clients, including syndicates of everyday investors, high net worth clients and racing enthusiasts who are highly mobile in their market choices. These clients choose to have their mares serviced by the stallions that stand at Coolmore Australia and Darley Australia because they hope to breed a successful race horse.

To attract and retain their clients, Coolmore Australia and Darley Australia have invested millions of dollars into their bloodstock and properties to ensure they present as world class facilities to both existing and new clients.

Coolmore Australia and Darley Australia believe that the construction of an open-cut mine across the road from their properties will immediately and permanently impact on their business model. Furthermore, as soon as the impact occurs it is too late, no amount of monitoring could undo the impact. While Anglo American argues that Woodlands is not currently being used for stud operations this is not correct. The economic analysis needs to recognise that the land has previously and recently been used for this purpose, and it retains an option value that would be extinguished if the mine were developed.

These observations are confirmed by:

- Planning Assessment Commission (2015): *"The mining and thoroughbred land uses are vastly different and are not compatible in close proximity."* (Fact Sheet)
- NSW Government Mining and Petroleum Gateway Panel: *"the Panel's view is that open-cut coal mining as proposed at Drayton South, and thoroughbred horse breeding studs of the nature, scale and importance of Coolmore and Woodlands (Darley), are incompatible land uses that cannot coexist in close proximity"* (December 2013, page 3).
- Houston Kemp (2016) states that *"Stud farms are not alone in wanting to portray a good image of themselves through the physical beauty of their premises. It is common in many customer-facing industries – from vineyards to retailers, shops and restaurants – for companies to manage their image and present their business in the best possible way to customers and potential investors"* (page 20).

Because of their leading position in the market these two businesses make a major contribution to the local economy. Analysis by Marsden Jacob (2013), based on modelling by NIEIR (National Institute of Economic and Industry Research), found that the direct economic loss to

the NSW economy that results from Coolmore Australia and Darley Australia relocating to Victoria would be between $229 m (base case) and $368 m (sensitivity test), in net present value terms.

Coolmore Australia and Darley Australia directly employ up to 300 people during the breeding season in their Hunter Valley operations. If Coolmore Australia and Darley Australia were forced to depart this would very conservatively put 640 jobs at risk in the Hunter Valley across broodmare farms, veterinary hospitals, transport, farriers, saddlers, capital equipment, hospitality, construction that are not supplying the mines.

If Coolmore Australia and Darley Australia were forced to depart this would result in the regional economy being over $120 million per annum poorer in gross regional production.

2.4 Concluding remarks

Coolmore Australia and Darley Australia are critical players in the Hunter Valley thoroughbred cluster because they are the largest international scale thoroughbred studs in Australia (in both physical scale and market share).

The 2015 PAC found that *"The mining and thoroughbred land uses are vastly different and are not compatible in close proximity"* (PAC 2015 Fact Sheet). This finding has been confirmed by numerous experts who have identified that the Drayton South mine would irreparably damage their business model.

For instance, Coolmore Australia and Darley Australia's expert advisors have stated that:

- there are serious deficiencies in the air, noise, water, visual and economic impact analysis;
- there are unacceptably high visual risks which will irreversibly alter the Hunter Valley landscape and topography. The visual impact of this proposed mine will be evident for over two decades; and
- that the horse health assertions are incorrect or have little relevance to the majority of horses in the Hunter Valley region.

This report along with other independent expert reports confirms the very real impacts and risks associated with the proposed mine and concludes that development of the mine would not be economically beneficial to NSW.

Why would the NSW Government consider approving a mine that at best has a 15 year life and thus jeopardise an industry that is a critical source of regional income, diversification and that in the words of the PAC has a "*sustainable long term future"* (PAC 2015 page iii). Particularly, when, in light of recent announcements by Anglo American, it would appear that approval is being pursued to inflate the asset value ahead of it being sold.

3. Drayton South is not economically beneficial

In this section Marsden Jacob presents the results of the review of the economic merit of the Drayton South open-cut coal mine based on the previous economic analysis reports and Anglo American Response to Planning Assessment Commission Review Report – Drayton South Coal Project (May 2016).

Marsden Jacob's review has focused on whether the Drayton South coal mine is economically beneficial (results in a net social benefit), based on the information provided by Anglo American.

Marsden Jacob has not assessed the financial viability of the Drayton South coal mine.

3.1 Summary findings

3.1.1 Recent announcements by Anglo American increase the risks and uncertainties associated with the proposed Drayton South project

Anglo American has recently made a number of public announcements that affect the assumptions in the economic analysis and increase the risks and uncertainties associated with the project, for instance:

- 17 June 2016, Anglo American announced that it would be ceasing operations at their current Drayton site.
- 16 February 2016, Anglo American announced that it is selling coal assets because *"The Group's coal assets have been identified as non-core"*.
- 16 February 2016, Anglo American stated that *"continuity of operations between Drayton and Drayton South is not possible"*.

In light of Anglo American's announcements that coal assets are being sold and operations are ceasing at Drayton North, the obvious presumption is that Anglo American is only seeking this approval so that the land can be sold with a development approval.

This is an important consideration for the economic analysis because a number of key assumptions will almost certainly vary with different owners, such as capital and operating costs and the production schedule. Particularly as different owners will not necessarily be able to exploit Anglo American's "claimed" infrastructure and operating synergies, and any cost increases will further increase the net social loss that would result if the mine is developed.

3.1.2 The economic analysis over-estimates the net social benefit of the proposed mine by at least $538 million

The economic analysis of the proposed Drayton South open-cut coal mine needs to assess the full range of costs and benefits in a balanced, detailed and demonstrably unbiased manner.

Marsden Jacob's review of the Drayton South open-cut coal mine economic analysis has identified that the net social benefit of the proposed mine is over-estimated by at least $538 million (present value). Furthermore, this reduction in the net social benefit is conservative

because it only factors in changes to the value of coal, value of greenhouse gas emissions, aboriginal heritage and travel time.

The reduction in the net social benefit could be significantly higher (see Table 4) if other costs were included, such as: missing capital costs (approximately $40-50 million); impacts that would result if product tonnes are over-estimated (close to $1 billion) and state impacts that emerge if Coolmore Australia and Darley Australia are forced to relocate interstate (up to $368 million). In summary, Marsden Jacob's review identifies that benefits and costs have potentially been misestimated by around $1.5 billion (PV).

Table 4: Under-estimated costs and over-estimated benefits

	Under-estimated costs	Over-estimated benefits	Comments
Value of Coal		~$413 million (PV)	Value of coal reduces when AUD$87 per tonne is assumed (see Section 3.2).
Value of Greenhouse Gas Emissions	~$75 million (PV)		Value of greenhouse gas emission impacts increases from $6 million to $81 million (PV), a discrepancy of $75 million. This calculation is based on the greenhouse gas emissions as stated in Gillespie Economics (E-11). Marsden Jacob has not included Scope 3 emissions from the burning of coal. (see Section 3.6)
Aboriginal Heritage Impacts	~$45 million (PV)		Aboriginal heritage impacts were included in the 2012 analysis, but excluded in the 2015 analysis. This change, between 2012 and 2015, materially biases the economic analysis in favour of the proposed Drayton South open-cut coal mine (see Section 3.6).
Travel time costs	~$5 million (PV)		Travel time cost are readily quantified but have been excluded from the analysis (see Section 3.6)
Non-market employment		$146 million (PV)	Exclusion of non-market employment benefits (see Section 3.7).
Product tonnes over-estimated		~$910 million (PV)	Anglo American over-estimated the size of the economic coal resource at the existing Drayton (North) mine by 15.8 million tonnes or nearly 35%. It is therefore possible that the size of the coal resource at Drayton South has also been materially over-estimated. This, in turn, would mean that the value of coal and royalty returns are materially over-estimated, so a 35% reduction in product tonnage sensitivity analysis should be undertaken. If the coal resource is smaller it is possible that the variable components of the operating costs would fall and partially offset the change, but this change could not be estimated because operating costs are reported at an aggregate level (see Section 3.3).
Capital cost	~$101 million (Nominal)		Recent announcements and previous independent reviews have raised uncertainties around the project capital costs (see Section 3.5)

	Under-estimated costs	Over-estimated benefits	Comments
Other externalities	$unknown		Independent reviews of the project have identified a number externality impacts that are not quantified, including legacy surface water and groundwater, noise, air, animal health, animal behaviour, marketing, heritage and visual impacts (see Section 3.6)

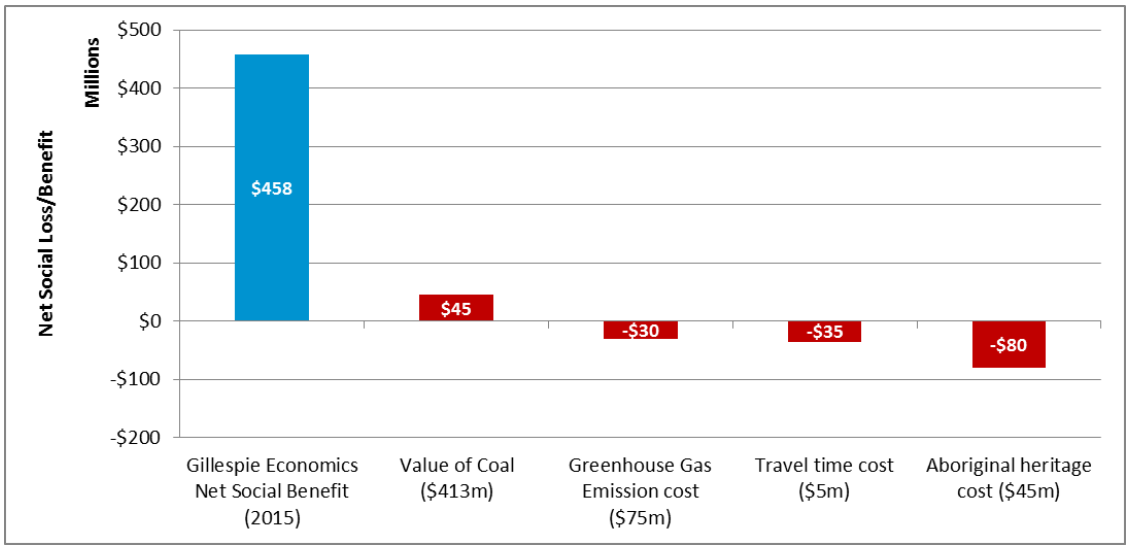
3.1.3 When the economic analysis is recalculated using Anglo American's and Gillespie Economics' assumptions the Drayton South coal mine conservatively results in a net social loss of around $80 million.

The proposed Drayton South open-cut coal is not economically beneficial, even before impacts on the studs are factored into the analysis. Figure 5 illustrates that the claimed net social benefit of $458 million (net present value) should actually be a net social loss of around $80 million (net present value). The net social loss results from:

- revised value of coal that was recalculated based on Gillespie Economics' and Anglo American's stated assumptions – subtract $413 million (present value);
- revised greenhouse gas emissions cost that was recalculated based on Gillespie Economics' and Anglo American's stated assumptions – subtract $75 million (present value);
- travel time costs based on Gillespie Economics' response to the Deloitte Access Economics review – subtract $5 million (present value); and
- aboriginal heritage impacts based on Gillespie Economics' (2012) – subtract $45 million (present value).

If other production, externality and capital costs (see Conclusion 1) were also factored into the current economic analysis this will further increase the net social loss that would result if the mine is developed.

Figure 5: Net Social Benefit/Loss



The economic impact for NSW and the Hunter Valley region could be even more pronounced if the Drayton South open-cut coal mine is developed and Coolmore Australia and Darley

Australia are forced to relocate. In 2013, Marsden Jacob estimated the direct economic loss to the NSW economy that results from Coolmore Australia and Darley Australia relocating to Victoria is between $229 m (base case) and $368 m (sensitivity test), in net present value terms.

3.2 Over-estimated benefits: Value of coal

Marsden Jacob's analysis concludes that the value of coal is over-estimated by around $413 million (present value at 7% discount rate) and this value could be higher subject to sensitivity testing around the production schedule.

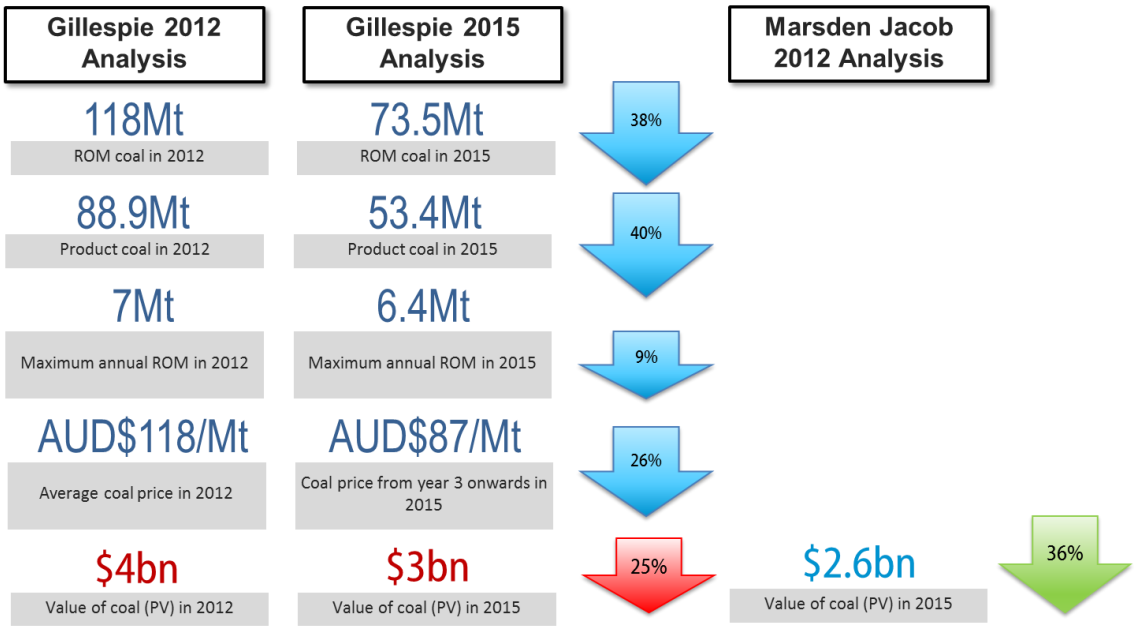
The value of coal is fundamental to assessing whether the Drayton South open-cut coal mine is economically beneficial. The value of coal is important because it represents over 90% of the benefits in the economic analysis of the proposed Drayton South Coal Mine. It is also fundamental to estimating the royalties to be paid to the NSW Government.

3.2.1 How did the Value of Coal change between 2012 and 2015?

In 2015, Marsden Jacob reviewed how the value of coal has changed in Gillespie Economics analysis between 2012 and 2015. This revealed that the value of coal, in present value terms, has reduced by 25%, from $4,046 million (2012) to $2,999 million (2015). This value reduction is surprisingly small, particularly when you consider that the:

- product (saleable) coal tonnage has fallen by 40%; and
- assumed coal price has fallen by 26% (see Figure 6).

Figure 6: Value of Coal



Source: Marsden Jacob analysis, 2015

3.2.2 Anglo American confirms the assumed coal price is actually AUD$102 per tonne

Anglo American has now confirmed (2016) that the assumed coal price was actually AUD $102 per tonne, not AUD$87 per tonne as previously stated[8]. A fact that none of the previous peer reviewers identified.

Thermal coal is a heterogeneous commodity that can have different quality specifications and these quality specifications affect its market value. Gillespie Economic and Deloitte Access Economic (2015) confirm that *"all of the product coal is expected to have low ash content and is consequently of benchmark quality"*. This means that the price path for coal from Drayton South should reflect benchmark thermal coal prices.

3.2.3 Anglo American's forecast coal prices are unrealistic

The assumed thermal coal values are unrealistically high. If the assumed price as originally stated in the reporting was used (AUD$87 per tonne) this would be more believable and would accord with a variety of forecasts:

- Secretary's Environmental Assessment Report: *"NSW Trade & Investment, which forecasts that the medium and long term export thermal coal price is likely to be between US$67 and US$88 a tonne (assuming an AUD/USD exchange rate of 0.75)"*. (2015, p47)
- Deloitte Access Economics has previously modelled a second scenario *"based (on) $74* (AUD) *a tonne, equivalent to the long term average coal price (World Bank 2012)."* (2013, p28)
- Deloitte Access Economics (2015) commented that the assumed coal prices should be updated to reflect recent changes in prices and exchange rates. However, Deloitte's comments focus on the short-run prices whereas long-run prices are actually more important for this cost-benefit analysis.
- UBS Securities Canada Inc. has released a research report titled *North American Coal Industry – 2016 outlook: black as coal* (2015). In this report, UBS cuts its long-term (2020) seaborne thermal coal real-price forecasts by 33% to $55/mt (see Table 5). UBS commented that the *"price cuts are driven by: an absence of demand growth from seaborne markets, ample brownfield expansion potential to replace depletion, and deflated capex and opex assumptions in our coal price model"* (page 1).

  UBS is the stated source for the consensus forecasts in the Gillespie Economics analysis (2015, page E-25).

[8] Gillespie Economics (2015) states that the coal prices used in the economic analysis and royalty calculations are:

- USD$72/t in 2016;
- USD$82/t in 2017; and
- AUD$87/t thereafter (pages 25, 56 and 61).

Table 5: UBS thermal coal outlook (USD$)

		2015E	2016E	2017E	2018E	2019E	LT
Thermal coal – contract ($mt)	New	$71	$63	$60	$61	$62	$55
	Old	*$71*	*$64*	*$65*	*$70*	*$82*	*$82*
Thermal coal – spot ($/mt)	New	$59	$55	$56	$57	$58	$55
	Old	*$59*	*$56*	*$61*	*$71*	*$84*	*$82*

Source: North American Coal Industry – 2016 outlook: black as coal

- The World Bank's more recent commodity outlook (April 2016) notes that "production in India is rising under new government policies that plan to significantly reduce imports in the next few years. Coal supply is expected to be ample, and there is also significant spare capacity that could be brought back on-line in countries such as Australia and Indonesia. China is also seeking to boost exports, further bloating the seaborne market." (page 26).

  This builds on earlier World Bank analysis (October 2015) that found that: *"Coal faces difficult market conditions going forward due to slowing import demand in China. Reasons for concern include moderate growth for electricity generation in key importing regions, increased competition from natural gas due to lower prices, larger penetration of renewables due to environmental policies, and introduction of carbon trading schemes which would penalize coal further. Meanwhile, coal supplies are expected to be ample, in part because of the ramp-up in new capacity from earlier investment (though now slowing)."* (page 18).

  In the report, the World Bank issued a new commodity price forecast for Australian thermal coal, fob Newcastle/Port Kembla. The World Bank has revised its thermal coal prices down significantly with real prices now forecast to remain at around USD$50-54/mt until 2020, after which they are forecast to increase to USD$60/mt (see Table 6).

Table 6: World Bank Thermal Coal forecast (USD)

	2015	2016	2017	2018	2019	2020	2025
Coal, Australia ($/mt)	$57.5	$50.0	$51.0	$52.1	$53.1	$54.2	$60.0

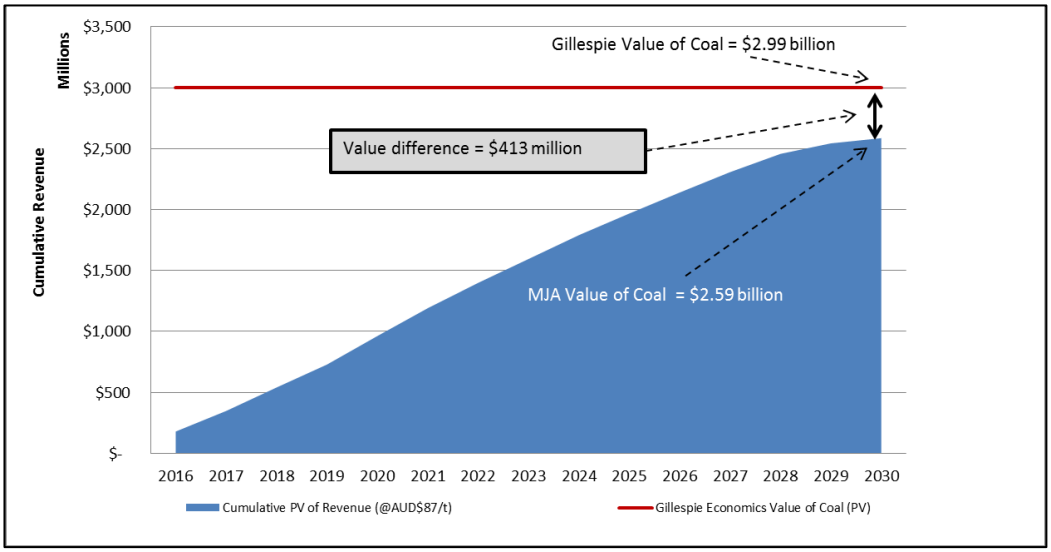
Note: Coal (Australia). Thermal, f.o.b. piers, Newcastle/Port Kembla, 6,700 kcal/kg, 90 days forward delivery

3.2.4 Value of Coal: Present Value at AUD$ 87 per tonne

Marsden Jacob has recalculated the revenue based on a coal value of $87 per tonne. Marsden Jacob finds that the value of coal would be $2,586 million (present value at 7% discount rate), not $2,999 million (present value at 7% discount rate). This means the value of coal:

- has been over-estimated by over $400 million (see Figure 7); and
- when compared to 2012 ($4,046 million) the value of coal now falls by 36%.

Figure 7: Value of Coal at AUD$87/t, present value at 7% discount rate



Source: Marsden Jacob, 2015, see Attachment A for more detail on this calculation

3.3 Over-estimates the benefits: Production schedule

White M (2015) Review of Key Mining Issues: Drayton South Coal Project identifies that from 2008 to 2014 at the existing Drayton coal mine *"actual saleable production was significantly less than the schedule provided in the 2007 EA. The total shortfall in that period was 15.8 million product tonnes or 34.9%. This shortfall occurred during a period of peak and sustained high coal prices when mine operators had strong economic incentive to maximise production levels"*, see Figure 8.

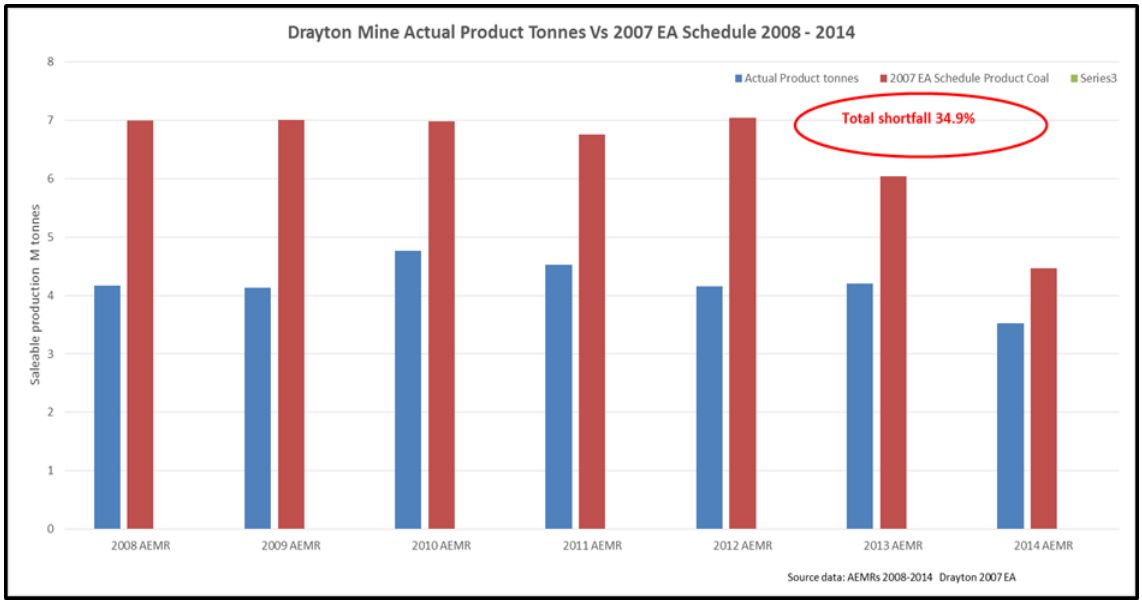
Where did this coal go? White M (2015) comments that: *"Based on the above information 13.5 million ROM tonnes of reserves were "lost" over the period 2007-2014. This represents both a significant loss in asset value for Anglo and the non-realisation of expected royalties for the State of New South Wales from the coal tonnes that were not produced"*.

As a result, it appears that Anglo American over-estimated the size of the economic coal resource at the existing Drayton mine. It is therefore possible that the size of the coal resource at Drayton South has also been materially over-estimated. This, in turn, could mean that the revenue from coal and royalty returns are materially over-estimated in the Drayton South cost-benefit and regional analysis.

The NSW Government Department of Industry – Resources and Energy correspondence to the PAC (30 October 2015) which states: *"While it is true the Drayton mine has produced less coal than stated, as can be seen below so had most of the adjacent mines"* (page 2). This evidence points to systemic optimism bias in the analysis of coal extraction rates that necessitates careful consideration and robust sensitivity testing.

It is therefore critical that the economic analysis for the Drayton South open-cut coal mine include a sensitivity analysis that considers the economic merit of the proposed coal mine if the product tonnes are over-estimated by 35%. This is important, because this change could reduce the value of coal estimate by 35%, or over $910 million (present value), based on Marsden Jacob's re-estimated value of coal of $2,586 million.

Figure 8: Drayton Mine Actual Product Tonnes vs 2007 EA Schedule



Source: White M (2015) Review of Key Mining Issues: Drayton South Coal Project

If the mined coal resource is smaller, the variable components of the operating costs for Drayton South could fall and partially offset this change, but it was not possible to estimate the change because operating costs are reported at an aggregate level in the economic analysis.

3.4 Over-estimated benefits: Avoided decommissioning and rehabilitation

Our review has identified that a number of other benefits appear to have been over-estimated or materially increased with no clear justification. To highlight the issues the following discusses:

- Avoided rehabilitation and decommissioning costs; and
- Non-market employment benefits.

3.4.1 Avoided rehabilitation and decommissioning costs

Despite extracting a smaller amount of coal over a shorter period of time, than the previously proposed Drayton South open-cut coal mine, the rehabilitation and decommissioning cost has increased from $32 million (2012) to $66 million (2015) in nominal terms.

In present value terms this means the avoided cost associated with decommissioning and rehabilitating the existing Drayton North and new Drayton South mine has increased by 140%, from $17 million (present value) to $41 million (present value), which is beneficial to the economic analysis of the proposed mine.

Not only is there no breakdown of the decommissioning and rehabilitation cost, but there is no justification for the very significant increase in this avoided cost. Highlighting the reporting deficiency, the only detail provided in the Gillespie Economics' analysis is: *"At the end of the Project life, the mine site will begin to be decommissioned and rehabilitated at an estimated cost of $66M"* (page E-25).

3.4.2 Non-market employment benefits

The Gillespie Economics analysis continues to include non-market employment benefits in the analysis. Non-market unemployment benefits must be excluded from the cost-benefit analysis.

The inclusion of non-market employment benefits has been roundly criticised by the NSW Land and Environment Court and NSW Planning Assessment Commission reviews of similar projects (see Wallarah 2 and Stratford Extension). For instance, previous Planning Assessment Commission reviews have found that the inclusion of non-market employment benefits is: *"thoroughly discredited"* (Wallarah 2 Planning Assessment Commission) or *"of doubtful validity"* (Stratford Extension Planning Assessment Commission).

3.5 Under-estimates the costs: Capital cost

In the 2015 economic assessment, the project capital costs are $131 million ($107 million present value). This means the project capital cost has fallen by $354 million from the 2012 economic assessment when the capital cost was $485 million.

The EIS attributes part of this capital reduction to extending the lives of existing equipment and buying second hand replacement equipment at reduced capital cost (compared to buying new equipment).

White M (2015) comments that: *"While these are valid ways to reduce capital spend, there is a trade-off in that this strategy will incur additional operating (maintenance) costs and will increase the likelihood of lower than planned equipment reliability and availability. This increased equipment downtime reduces the annual production capacity of effected equipment."*

White M (2015) also comments that the life of mine capital cost appears to have been under-estimated and conservatively commented that around "*$101 million"* in additional capital items may be needed by the mine, because: *"New mining equipment does not appear to be accounted for, and the EIS document states that existing mining equipment will be utilised for the Drayton South Project. The bulk of equipment to be used for the Drayton South project is not new, and will require ongoing replacements over the life of the project if it is to operate effectively and efficiently. This would likely be required across a full range of equipment from excavators and trucks, dozers, light trucks and light vehicles right down to minor capital items including pumps, welders, generators and tools."*

As previously discussed recent announcements call into question the capital cost assumptions because new owners are unlikely to be able to exploit the 'claimed' but questionable efficiencies. This further increases the risk that the capital costs have been under-estimated. This is important because if the capital cost are higher than those included in the current cost-benefit analysis, this will further increase the net social loss that would result if the mine is developed.

Equally, based on White M (2015) it may be that the operating costs have be under-estimated.

3.6 Under-estimates the costs: Externality impacts

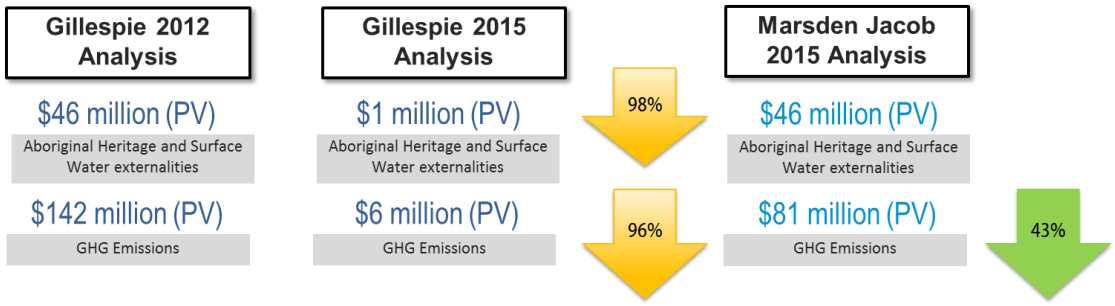
Development of the Drayton South open-cut coal mine will result in a number of negative externality impacts. A negative externality is a cost that is imposed on a third party as a result of the economic development or transaction. Externalities are also referred to as spill over effects and negative externalities are also referred to as external costs. External costs are

important because as the NSW Treasury economic appraisal guidelines state: *"external costs and benefits must be taken into account"* (page 11).

It is noteworthy that very few of the external costs have been valued in the 2015 analysis, for those which have been valued they have fallen by extremely significant amounts between 2012 and 2015. For instance, the cost of:

- aboriginal heritage and surface water impacts has reduced by 98% or $45 million ($46 million less $1 million); and
- greenhouse gas emissions has reduced by 96% or $136 million ($142 million less $6 million), see Figure 9.

Figure 9: Externality Impacts, present value



Source: Marsden Jacob, 2015

This leads to two key questions: Why have externality impacts from the Drayton South coal mine decreased so significantly? And, why are other externality impacts not valued in the Gillespie Economics analysis?

3.6.1 Aboriginal heritage costs

As Veale S (2015) identifies there are significant aboriginal (and non-aboriginal) heritage values on the site of the Drayton South open-cut coal mine, and the land is currently the subject of a native title claim.

In 2012, Gillespie Economics stated that *"the Project has the potential to impact Aboriginal heritage sites in Project land disturbance areas"*, consequently, Gillespie Economics estimate the value of Aboriginal heritage impacts at $45 million[9] present value (at 7% discount rate), page 16.

In 2015, Gillespie Economics does not value the Aboriginal heritage impacts and instead states that *"Any impacts on Aboriginal heritage sites may impact the well-being of the Aboriginal community. However, monetisation of these impacts is problematic and so these impacts are best left to consideration as part of the preparation of the Aboriginal Cultural Heritage Management Plan"* (page E-30).

This change, between 2012 and 2015, materially biases the economic analysis in favour of the proposed Drayton South open-cut coal mine.

[9] The additional $1 million relates to surface water externalities.

3.6.2 Value of greenhouse gas emissions

Gillespie Economics' incorrectly attributes only 1% of the greenhouse gas emissions cost to Australia. This means that in Gillespie Economics (2015) greenhouse gas emissions from an Australian perspective are valued at \$0.23/t of $CO_{2\text{-}e}$.

Anglo American's peer reviewer (BDA Group) and the Department's peer reviewer (Deloitte Access Economics) disagree with this approach and yet Gillespie Economics has refused to change the greenhouse gas valuation methodology:

- BDA Group (Internal Peer Review, 2015): *"It is reasonable to assume that Australia will act to meet an agreed greenhouse gas reduction target … the order-of-magnitude of such costs by marginal projects is probably also around the \$23/t mark. This implies the \$6m cost attributable at the global level by Gillespie Economics should also be attributable at the national level."*
- Deloitte Access Economics (NSW Government Peer Review, 2015): *"We agree with the internal peer review (BDA Group 2015) that the approach of scaling the Greenhouse gas impact by Australia's share of global GDP is inappropriate".*

Marsden Jacob has also consulted with Emeritus Professor Harry Campbell from the University of Queensland, School of Economics on this matter. Emeritus Professor Campbell confirmed that Gillespie Economics' approach to valuing greenhouse gas emissions is not appropriate and the value of greenhouse gas emissions should be attributed to Australia.

Consequently, in Marsden Jacob's opinion the full cost of the greenhouse gas emissions from the Drayton South open-cut coal mine (excluding Scope 3 from the burning of thermal coal) should be attributed to Australia in the analysis.

Gillespie Economics states that: *"The project is predicted to generate in the order of 4.6 Mt of direct carbon dioxide equivalent emissions ($CO_{2\text{-}e}$) associated with mining (Scope 1 emissions) over the lifetime of the Project. Approximately 1.2 Mt of indirect (Scope 2) $CO_{2\text{-}e}$ emissions associated with on-site electricity consumptions and 0.4 Mt of indirect (Scope 3) $CO_{2\text{-}e}$ emissions associated with the transport of product coal to Newcastle … In addition there would be 127 Mt of indirect (Scope 3) emissions associated with the use of Thermal Coal"* (2015, E-11)

If you exclude the 127 Mt of Scope 3 emissions from the burning of thermal coal, which it is assumed would be sourced from elsewhere, the greenhouse gas emissions total 6.2 Mt of $CO_{2\text{-}e}$.

As per Table 7, this means the externality impact of greenhouse gases should be around \$81 million (at 7% discount rate) not \$6 million, when the value of greenhouse gas emissions is assumed to be \$23 per tonne of $CO_{2\text{-}e}$.

Table 7: Greenhouse Gas calculation

	2012	2015
GHG emissions (over 15 years)	11.5 Mt of $CO_{2\text{-}e}$	6.2 Mt of $CO_{2\text{-}e}$
Value of GHG emissions	\$23/t of $CO_{2\text{-}e}$	\$23/t of $CO_{2\text{-}e}$
TOTAL (undiscounted value)	\$265 million	\$142 million

Present Value (15 years @ 7% discount rate)	**$142 million**	**$81 million** (not $6 million)

Sources: 1. Gillespie Economics (2012) Drayton South Coal Project – Economic Assessment (Environmental Impact Statement Appendix U), Gillespie Economics (2015) Drayton South Coal Project – Economic Assessment (Environmental Impact Statement: Appendix F)

3.6.3 Travel time costs

Marsden Jacob questions why travel time costs for users of Edderton Rd that are readily quantifiable have been excluded by Gillespie Economics?

Deloitte Access Economics (2015) also questioned their exclusion and in response Gillespie Economics commented that the proposed re-alignment of Edderton Rd will result in a *"5km increase in travel distance (4 minute travel time) for those travelling from the east (~523 trips per day) and 5km decrease in travel distance (4 minute travel time) for those travelling from the west (~107 trips per day)"*, based on this Gillespie Economics estimated that the *"net costs from the intersection relocation in perpetuity (keeping vehicle movements fixed) is estimated at in the order of $5M present value (at 7% discount rate)"*. (Deloitte Access Economics review, 2015, page 28)

This confirms that this travel cost is readily quantifiable and so it should have been included in the cost-benefit analysis.

3.6.4 Other externalities

Expert reviews by noise, air, animal health, animal behaviour, marketing, heritage and visual professionals have identified that the two studs will be adversely impacted if the Drayton South open-cut coal mine is developed.

3.6.5 Impact on NSW if Coolmore and Darley are forced to relocate

As previously demonstrated, Coolmore Australia and Darley Australia are critical players in the Hunter Valley thoroughbred cluster because they are the largest international scale thoroughbred studs in Australia (in both physical scale and market share).

If Drayton South open-cut coal mine is developed, and Coolmore Australia and Darley Australia are forced to move from NSW to Victoria they would leave a void in the market that cannot be filled by other industry participants, because Coolmore Australia and Darley Australia would take their bloodstock and clients with them (previously discussed in Section 2).

In 2013, Marsden Jacob estimated the direct economic loss to the NSW economy that results from Coolmore Australia and Darley Australia relocating to Victoria is between $229 m (base case) and $368 m (sensitivity test), in net present value terms.

3.7 These issues are not new

Many of the issues identified in Marsden Jacob's review are not new. The same issues have emerged and been the subject of serious and sustained criticism from the judiciary, public authorities, other economists and the Planning Assessment Commission (PAC), for instance:

- Chief Judge Preston (2013) Bulga Milbrodale Progress Association Inc v Minister for Planning and Infrastructure and Warkworth Mining Limited, NSWLEC 48;

- NSW Planning Assessment Commission (2014) Stratford Extension Project Review Report; and
- NSW Planning Assessment Commission (2014) Wallarah 2 Coal Project Review Report

Their key conclusions include:

- **CJ Preston**: *"I am not satisfied that the economic analyses provided on behalf of Warkworth support the conclusion urged by both Warkworth and the Minister, namely that the economic benefits of the Project outweigh the environmental, social and other costs."*
- **CJ Preston**: *"Having regard to the limitations of the economic analyses … I am of the view that the results of those analyses are of limited value in deciding whether I can reach a state of satisfaction as to the nature and extent of impacts in considering each and all of the relevant matters, the weight I should assign to each matter, and the balancing of the matters, to determine whether the Project should be approved or disapproved."*
- **Stratford PAC**: *"The economic value of the project as described in the EIS and in subsequent documentation provided by the Proponent is not credible."*
- **Wallarah 2 PAC**: *"In considering the merits of the project as a whole the Commission has found that the benefits claimed for the project by the Proponent (and largely adopted by the Department's Preliminary Assessment Report) are not credible."*

Despite clear and sustained criticism the analysis of the Drayton South open-cut coal mine further demonstrates Anglo American and Gillespie Economics' unwillingness to respond to the criticisms and produce a detailed analysis that assesses the full range of costs and benefits in a balanced, detailed and demonstrably unbiased manner.

Consequently, Marsden Jacob is of the opinion that a review or consent authority cannot rely on this economic analysis as the basis for the decision.

4. The analysis does not comply with the SEARs and NSW Guidelines

The Anglo American submission claims that the analysis has been produced in accordance with the following requirements and guidelines:

- The Secretary's Environmental Assessment Requirements (SEARs) for the Project that relate to economics (DPE, 2015);
- EP&A Act and Environmental Planning and Assessment Regulation 2000;
- Guideline for the use of cost benefit analysis in mining and coal seam gas proposals (NSW Government 2012);
- NSW Government guidelines for economic appraisal (NSW Treasury 2007); and
- State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries Amendment (Resource Significance) 2013.

The economic assessment does not comply with the SEARs or the NSW government guidelines.

4.1 Secretary's Environmental Assessment Requirements (SEARs)

The SEARs require that Anglo American undertake a *"Social and Economic"* assessment that includes:

- *"a detailed assessment of the likely social impacts of the development on the local and regional community, paying particular attention to impacts on the operation and reputation of the Upper Hunter Equine and Viticulture Critical Industry Clusters and the associated tourism industry; and*
- *a detailed assessment of the likely economic impacts of the development, paying particular attention to:*
  - *the costs and benefits of the project, identifying whether the development as a whole would result in a net benefit to NSW, including consideration of fluctuations in commodity markets and exchange rates; and*
  - *the demand for the provision of local infrastructure and services, having regard to Muswellbrook Shire Council's requirements".*

And, the supplement to the SEARs requires that:

"The economic and social impacts of the action, both positive and negative, must be analysed. Matters of interest include:

a) details of any public consultation activities undertaken, and their outcomes;

b) details of any consultation with Indigenous stakeholders;

c) projected economic costs and benefits of the project, including the basis for their estimation through cost/benefit analysis or similar studies;

d) employment opportunities expected to be generated by the project (including construction and operational phases).

Economic and social impacts should be considered at the local, regional and national levels. Details of the relevant cost and benefits of alternative options to the proposed action, as identified in Section 4 above, should also be included.

Identification of affected parties is required, including a statement mentioning any communities that may be affected and describing their views." (Section 7)

Review findings: SEARs

Marsden Jacob's review finds that the economic assessment does not comply with the SEARs. Compliance is essential to ensure that an unbiased, verifiable and transparent economic assessment is undertaken.

The current assessment does not meet the SEARs where detail, accuracy and transparency are concerned, because:

- it is not a *"detailed assessment"* – much of the key information is only reported at an aggregated level so it is not possibly to verify or check either the calculations or assumptions that underpin the calculations for key variables.
- the *"projected economic costs and benefits of the project, including the basis for their estimation"* has not been detailed for a number of key variables.
- the economic analysis does not pay *"particular attention to impacts on the operation and reputation of the Upper Hunter Equine and Viticulture Critical Industry Clusters and the associated tourism industry"*. The analysis simply asserts that the Drayton South open-cut coal mine will have no impact on the viability of the neighbouring studs. Experts engaged by Coolmore Australia and Darley Australia have confirmed that the studs will be adversely impacted by the proposed Drayton South open-cut coal mine. This is clear testament to the fact that this proposed mine will adversely affect their business model and viability. The standing of these impacts has been recognised by the Drayton South Review Planning Assessment Commission, Drayton South Decision Planning Assessment Commission and the NSW Mining and Petroleum Gateway Panel.

4.2 NSW Government Guidelines for Economic Appraisal (TPP07-5)

The authoritative source on economic assessment in NSW is the NSW Government Guidelines for Economic Appraisal (TPP07-5) issued by NSW Treasury. These guidelines state that:

- *"The key to the analysis is a complete and accurate enumeration of all the costs and benefits associated with a project."* (page 50)
- *"All relevant cost items which can be identified, quantified or estimated must be included"*; and
- *"Assumptions underlying all estimates should be made explicit in the evaluation."* (page 17)

This detail is necessary to ensure that there is no project bias in the analysis: *"Treasury considers how the data are produced and reviews the assumptions incorporated in the analysis. This is to ensure there is no "project bias" in the analysis, for example, in terms of overoptimistic benefits and/or underestimated costs"* (page 4).

Review findings: NSW Treasury guidelines

The economic assessment does not meet NSW Treasury requirements, because

- the calculations are not accurate;
- all relevant cost items have not been quantified;
- assumptions underlying many of the estimates have not been made explicit; and
- the analysis has not been undertaken in an unbiased manner.

The analysis also does not meet the sensitivity testing requirements as specified in the guidelines. The current sensitivity tests do not consider worst case outcomes, instead the analysis downplays the sensitivity of the present value outcomes.

Where the NSW sensitivity tests are concerned (Table 4.6 in Gillespie Economics 2015) a number of the sensitivity tests make no sense, for instance:

- Groundwater: How can the present value outcome increase by $87 million under both +/- 20% sensitivity tests?
- Opportunity cost of land: Why doesn't the opportunity cost of land, which is all based in NSW, change the result under +/-20% sensitivity tests?

Furthermore, because the cost-benefit analysis has been undertaken from a national perspective the sensitivity analysis for NSW is predominantly showing how royalty and tax benefits to NSW change under different assumptions. There are two problems with this:

1. royalties are financial transfers between the project proponent and the NSW Government, as confirmed by the fact that the operating costs in the analysis exclude royalties (Gillespie Economics, 2015, E-33). Thus while they represent a financial gain to NSW, the economic analysis of the project really should be focused on the net social benefit/cost of the project.
2. royalty returns are also directly linked to production tonnes and assumed coal prices, so similar to the 'value of coal' calculation (discussed earlier) the royalties are also currently over-stated.

Attachment A: Value of Coal

Table 8 details the value of coal present value calculation at AUD$87 per tonne. Table 9 details the value of coal present value calculation at AUD$102.35 per tonne

Table 8: Value of Coal at AUD$87/t

	Marsden Jacob ($m NPV)	Gillespie 2015 ($m NPV)	Difference	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
COAL PRODUCTION																				
ROM Coal (Mt)				0	0	3.34	3.00	3.99	4.23	5.57	5.89	5.73	5.79	6.18	5.87	6.06	6.31	5.99	3.64	1.85
Product Coal (Mt)				0	0	2.43	2.14	2.90	3.03	4.04	4.21	4.10	4.15	4.43	4.28	4.47	4.63	4.44	2.73	1.46
Yield (%)				0	0	72.7	71.3	72.8	71.6	72.4	71.5	71.6	71.6	71.6	73.0	73.8	73.4	74.0	74.9	78.6
VALUE OF COAL																				
Assumed Coal Price ($AUD)				**0**	**0**	**85**	**96**	**87**	**87**	**87**	**87**	**87**	**87**	**87**	**87**	**87**	**87**	**87**	**87**	**87**
Value of Coal ($m)	**2,586**	**2,999**	**- 413**	0	0	206	206	253	263	351	367	357	361	385	373	389	403	386	237	127

Source: Marsden Jacob, 2015

Table 9: Value of Coal at AUD$102.35/t

	Marsden Jacob ($m NPV)	Gillespie 2015 ($m NPV)	Difference	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
COAL PRODUCTION																				
ROM Coal (Mt)				0	0	3.34	3.00	3.99	4.23	5.57	5.89	5.73	5.79	6.18	5.87	6.06	6.31	5.99	3.64	1.85
Product Coal (Mt)				0	0	2.43	2.14	2.90	3.03	4.04	4.21	4.10	4.15	4.43	4.28	4.47	4.63	4.44	2.73	1.46
Yield (%)				0	0	72.7	71.3	72.8	71.6	72.4	71.5	71.6	71.6	71.6	73.0	73.8	73.4	74.0	74.9	78.6
VALUE OF COAL																				
Assumed Coal Price ($AUD)				**0**	**0**	**85**	**96**	**102**	**102**	**102**	**102**	**102**	**102**	**102**	**102**	**102**	**102**	**102**	**102**	**102**
Value of Coal ($m)	**2,981**	**2,999**	-18	0	0	206	206	297	310	413	431	420	424	453	438	457	474	454	279	149

Source: Marsden Jacob, 2015

Note: The difference of 0.6% can be readily explained by a rounding error.