Drayton South Coal Project

Review Report

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Executive Summary

The Planning Assessment Commission has been directed to review the Drayton South Open Cut Coal Mine proposal and its supporting studies; assess the potential impacts to the Coolmore and Woodlands horse studs and recommend any additional avoidance and mitigation measures required.

The Commission to undertake this review was constituted by Gabrielle Kibble AO (Chair), Garry West and Joe Woodward PSM.

The Commission visited the existing Drayton mine and proposed Drayton South mine site accompanied by the Proponent. The proposal is for a new open cut and highwall mining operation that would be developed as an extension of the existing Drayton mine, making use of Drayton's existing infrastructure, plant and workforce. The mine plan proposes four pits, with highwall mining to extend from each of these pits. The proposal would provide for the ongoing employment of a significant number of the Proponent's workers as well as indirect economic and employment multipliers. The proposal is said to represent $950 million in royalties to the NSW Government, over the life of the mine.

The Commission visited the Coolmore and Darley Woodlands horse studs in late September. The Commission held a public hearing on the project in Denman on 10 October 2013. The Commission heard from 26 registered parties, with speakers both for and against the proposal. Speaking in support of the project the Commission heard from the Proponent, several mine staff and mining sector businesses. Speakers noted the changes that have been made to reduce the impacts of mining on the horse studs, including the proposal to construct a bund to screen views of the mine and the 500m setback from the road and the studs. Speakers also highlighted the employment and socioeconomic benefits of the mine proposal.

The horse studs, the equine industry, the tourism and vineyard industries, environmental interest groups and individuals raised concerns or objections to the proposal. Issues of concern or objection mainly related to the impacts on the studs and the importance of the studs flow on effects across the equine industry cluster throughout the upper hunter. Other concerns related to the water and flora and fauna impacts of the project and the regional environmental, health and socioeconomic impacts of the mining industry more broadly.

The Commission engaged a number of experts to provide advice on the equine industry (Mr Terry Short), the visual and landscape impacts of the project (Dr Richard Lamb) and the scope for changes to the proposed mine plan (Mr Richard Jennings and Mr John Janetzki).

A range of stakeholders from within the equine Critical Industry Cluster (CIC) spoke at the public hearing. These include other farms, as well as the Hunter Thoroughbred Breeders Association, the Scone Equine Hospital and the Scone Race Club. The submissions of these stakeholders emphasise that Coolmore and Darley are critically important to the broader cluster. There are significant links between these studs and many of the agricultural and allied activities in the Upper Hunter. While they may not sit at the centre of the cluster spatially, the proximity of these studs is nonetheless critical to the ongoing operations and success of the cluster as a whole.

The Commission found that the studs and the broader equine industry also complement the wine and tourism industries in the Upper Hunter. The equine industry is part of the identity of the Upper Hunter, seen for example in Scone's title as the "Horse Capital of Australia".

In considering the impacts of the proposal on the Coolmore and Darley Woodlands studs, Mr Short found that the studs' significance to the broader Critical Industry Cluster meant they should be afforded total protection from the impacts of mining and that a buffer distance of several kilometres would be appropriate.

The Commission also heard that the studs have a significant cultural landscape value and advice from Dr Lamb echoed this opinion. Dr Lamb found that "*the combination of physical, aesthetic, cultural and historical values that characterise the studs, along with the nature of the rural industry that underpins them, gives rise to a heightened level of sensitivity to visual impacts*" (Appendix 5, p14-15). The proposed visual bund was found by Dr Lamb to be highly visible and of little visual benefit. Indirect views were also of concern and a 1 – 2 km buffer was recommended by Dr Lamb.

The Commission agrees that the studs are highly important to the equine Critical Industry Cluster and consequently to the broader region, and should be protected from the impacts of mining. The Commission found the proposed mine would threaten the studs' reputation and brand, and potentially their onsite operations as well.

Both studs have residential populations on site as well as visitor and guest accommodation. The threats and impacts identified centre on the visual and amenity impacts, particularly for clients and guests as this would influence the studs' reputation and business. Nonetheless the mine would also impact on residents and employees on the studs and the Commission is not convinced that the air quality impacts would be acceptable, particularly given the latest modelling predictions do not appear to represent the worst case scenario.

Impacts on the day to day equine breeding operations of the studs are much harder to identify with certainty. Nonetheless it seems noise, blasting, lighting and maybe even air emissions could have the potential to disrupt or impact on the breeding operations of the studs. The concerns and questions that have been raised about the acceptability of these impacts on the operations of the studs are such that the Commission cannot be confident there would not be significant impacts on the thoroughbred studs from the proposed mine.

In considering these issues the Commission is of the view that there are real risks to the future viability of the Coolmore and Woodlands studs from the mine as currently proposed in this location. A significant common factor to each impact considered is the proximity of the proposed mine to the thoroughbred studs.

The Department of Planning and Infrastructure sought expert advice on the mine plan from Runge Pincock Minarco (RPM). This advice included consideration of options to keep the mine behind natural ridgelines and to remove or reduce the size of the Redbank Pit. The Commission considered this advice. Both options are said to have a material impact on the project economics and are dismissed by RPM as it has accepted the Proponent's argument that the project would comply with air and noise regulations. As discussed in section 4 of this report the Commission is not satisfied the impacts of the proposed mine plan on the horse studs can be satisfactorily managed.

The Commission sought independent advice on the mine plan. Mr Richard Jennings and Mr John Janetzki found that alterations were technically possible, but that this would reduce the available coal reserves with potential impacts on the viability of the proposed mining operation.

The Commission acknowledges that imposing additional setback requirements will have significant impacts on the mine. Some submissions to the Commission even suggest that the proposed mine is not economically viable.

The Commission has found that the Coolmore and Woodlands studs are critical to the broader equine Critical Industry Cluster and should be protected. Advice to the Commission from Mr Short and Dr Lamb has suggested that a buffer is necessary. A buffer of several kilometres has been nominated as appropriate. The Commission notes however that a natural ridgeline would provide the minimum barrier between the studs and a smaller mine.

The Commission has concluded that this open cut mine should not proceed at the planned scale in this location. The Commission's view is that any future application for a much smaller mine on the northern portion of the site must remain north of the natural ridgeline marked in Figure 5 on page 25 of this report. These setbacks are the absolute minimum required and additional work would need to be done to demonstrate that mining in the remaining northern area of the site would not threaten the viability of the Coolmore and Woodlands studs.

Recommendations

1) The Coolmore and Woodlands horse studs should be recognised as essential to the broader Equine Critical Industry Cluster and given the highest level of protection from the impacts of mining.

2) The mine plan proposed for the site should not be approved.

3) Any open cut mining contemplated on the site should be required to demonstrate that its impacts will not affect the viability of the Coolmore and Woodlands horse studs.

4) If mining on any portion of the site is to proceed, a new mine plan would be need to be developed to plan for extraction from a considerably reduced mining area. As a minimum, the mine plan would need to be constrained to adopt the following physical restrictions:
   a) Open cut mining must be setback behind the existing natural ridgelines;
   b) Considerable buffering to shield the studs from the mine is necessary and, having regard to the topography of the area, open cut mining must not be allowed to extend through the second ridge to the north of the Golden Highway (marked in yellow on Figure 5).

   These physical constraints are put forward as minimum setbacks and any proposed mining area on the site would need to be subject to rigorous assessment to ensure compliance with recommendation 3 above.

5) Any new mine plan for the site would need to be further assessed to ensure the visual, blasting, noise and dust impacts could be managed to an acceptable level at the neighbouring stud properties and should take into account worst case scenarios. Other impacts would also need to be carefully considered both in relation to any impacts to the horse studs and more broadly, particularly in relation to the long term water impacts and the final landform.

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Glossary

CIC:	Critical Industry Cluster, as identified in the *Upper Hunter Strategic Regional Land Use Plan* (DP&I, 2012)
Commission:	Planning Assessment Commission constituted for this review and public hearing, Ms Gabrielle Kibble AO (Chair), Mr Garry West and Mr Joe Woodward PSM
OEH:	Office of Environment and Heritage, formerly DECCW and now incorporating NSW Heritage Office.
Department:	Department of Planning and Infrastructure
DP&I:	Department of Planning and Infrastructure
EA:	Environmental Assessment
EP&A:	Environmental Planning and Assessment
EPA:	Environment Protection Authority
LGA:	Local Government Area
PAC:	Planning Assessment Commission
PM_{10}:	Particulate matter with an aerodynamic diameter smaller than 10 micrometres.
$PM_{2.5}$:	Particulate matter with an aerodynamic diameter smaller than 2.5 micrometres
RPM:	Runge Pincock Minarco, who undertook a review of the mine plan for the Department
The Proponent:	The applicant under Part 3A of the EP&A Act 1979, in this report being Anglo American Metallurgical Coal Pty Ltd. 'Proponent' includes the Proponent's EA consultants.
The proposal:	The subject of the application under Part 3A of the EP&A Act 1979, in this report being the Drayton South Coal Project.

1. Introduction and Terms of Reference

On 16 March 2013 the Minister for Planning and Infrastructure, the Honourable Brad Hazzard MP issued a request to the Chair of the Planning Assessment Commission in relation to the Drayton South Coal Project. The Minister's request was made under Section 23D of the *Environmental Planning and Assessment Act 1979* and Clauses 268R and 268V of the *Environmental Planning and Assessment Regulation 2000*. The terms of reference in the Minister's request are provided in Appendix 1.

On 17 May 2013 the Minister requested the Commission suspend its detailed review, and postpone any planned public hearings on the project.

On 27 August 2013 the Minister issued a revised request to the Planning Assessment Commission for the review, as follows:

1. Carry out a review of the Drayton South Coal Project, and:
   a) consider the EA for the project, the issues raised in submissions, the formal response to submissions, the Preferred Project Report, the review of the mine plan by Runge Pincock Minarco, and any other information provided on the project during the course of the review;
   b) assess the potential impacts of the project on the operations of the Coolmore and Woodlands horse studs; and
   c) recommend any additional measures required to avoid and/or minimise the potential impacts of the project on the horse studs.
2. Conduct public hearings during the review as soon as practicable after the Proponent provides its Preferred Project Report.
3. Submit its final report on the review to the Department of Planning and infrastructure within 1 month of the public hearings, unless the Director-General of the Department agrees otherwise.

A copy of this revised request is provided at Appendix 1.

Ms Gabrielle Kibble AO chair of the Planning Assessment Commission constituted the Commission with Mr Garry West and Mr Joe Woodward PSM.

The Commission engaged consultants to provide expert advice to the Commission. The consultants engaged were Mr Terry Short (Agricultural Scientist of La Tierra), Dr Richard Lamb (Visual and Landscape of Richard Lamb and Associates) and Mr Richard Jennings & Mr John Janetzki (Mine Engineers of R A Jennings and Associates).

The Commission sought and received a 1 month extension on the timeframe for the delivery of the review report, to provide its review report by 10 December 2013.

2. Project Description

Anglo American Metallurgical Coal Pty Ltd proposes to develop a new open cut mining area in the Hunter Valley. The proposed mine would be operated as an extension to its existing Drayton mine, and is known as the Drayton South Coal Mine. The proposed new site is northwest of Jerrys Plains on the northern side of the Golden Highway, mainly within the Muswellbrook Local Government Area.

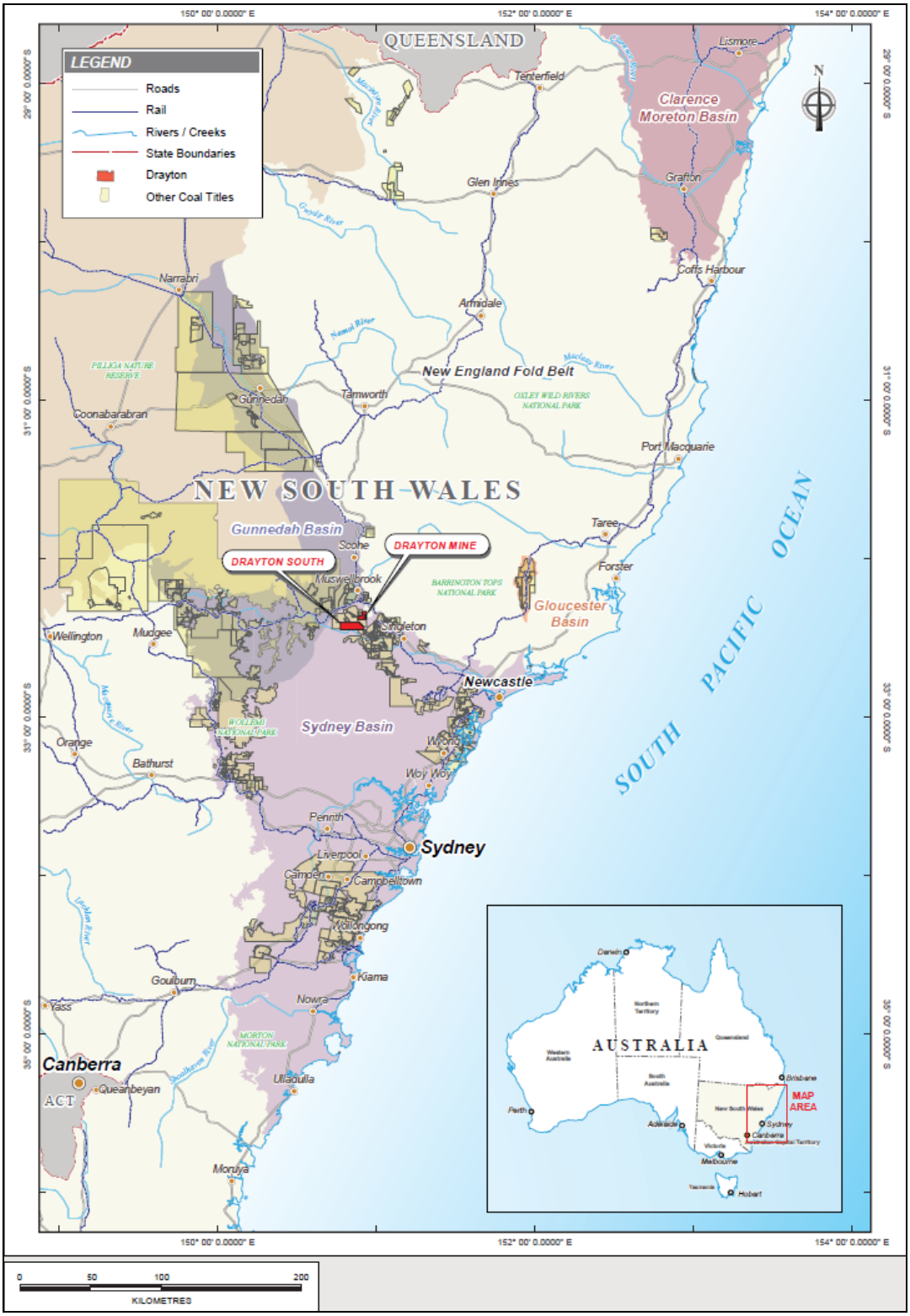

Figure 1: Mine Location **Source: RPM, 2013**

2.1. Background and Historical Context

The Hunter Valley's Muswellbrook area is the traditional land of the Wonnarua people. As outlined in the Proponent's Environmental Assessment, Europeans first identified coal around Newcastle in 1797. Coal mining in the Hunter began "*with some early attempts at recovery from the early 19th century. The first material coal mining commenced at the Muswellbrook Colliery in 1906. Since then and particularly from the 1980s, coal mining in the area has significantly intensified to meet the growth and industrialisation of NSW and Asia*" (Hansen Bailey, 2012, Volume 1, p5). The Commission understands that early mining was largely conducted by underground methods, and that the transition to the large open cut mines seen across the Hunter today occurred relatively recently, in the mid to late twentieth century.

Meanwhile, land from Singleton to Muswellbrook had been surveyed and granted by European settlers in the 1820s, and was largely used for grazing and cropping. The area of the proposed mine site, and its surrounds were covered by the Plashett, Bowfield, Arrowfield, Strowan and Edderton Estates. Plashett was granted in 1827, others such as Strowan, Arrowfield and neighbouring Woodlands were also granted in the 1820s (Hansen Bailey, 2012).

There is a long history of thoroughbreds on the land in this location, with thoroughbreds on Woodlands from the late 1800s and Arrowfield from the early 1900s (Hansen Bailey, 2012). In addition to this, Strowan was known for its Clydesdale stud; and although the Plashett Estate was primarily a cattle, sheep and eventually dairy farm, horse breeding also occurred on the property (Hansen Bailey, 2012).

Parts of the Plashett Estate were eventually transferred to the Electricity Commission and then Hunter Valley Energy Coal Pty Ltd, after 117 years in the Pearse family (Hansen Bailey, 2012). Nonetheless some of the other estates remain in agricultural use, with significant thoroughbred breeding operations and some raising of cattle. Some early homesteads on these properties are also still in use.

In the 1980s the Mount Arthur South Coal Mine was proposed on the project site and was the subject of a Commission of Inquiry. A key argument from objectors at that time was that the mine was not financially viable (CoI, 1986). Other concerns raised at that time related to air quality, noise and vibration, water, visual amenity, tourism and product image, traffic, rehabilitation, relocation of Edderton Road and the location of the rail spur. The mine was approved, but was never built and the approval eventually lapsed. Some grazing continues on the site today.

2.2. Current proposal

The site is now proposed to be mined as a south westerly extension of the existing Drayton open cut coal mine operations (although it is several kilometres from the existing Drayton pits and mining lease area, see Figure 4). The Drayton Coal Mine commenced production in 1983 and currently produces up to 8 million tonnes of Run of Mine coal a year (Hansen Bailey, 2012).

The current proposal is to combine this existing mining operation with the new site to the south west. The new open cut and highwall mining operation seeks to extract up to 7 million tonnes of run of mine coal a year, for 27 years. Coal from the new pits would be processed in the existing plant and loaded and hauled by rail using the existing infrastructure. Once mining in the current Drayton pits is completed these would be used for rejects and tailings disposal and water storage (Hansen Bailey, 2012).

The new mine proposed includes some of the same pits as those previously approved as the Mount Arthur South proposal (now lapsed). Both mine plans include four pits, although the Houston Pit was

not proposed in the previous approval and this new application does not seek to mine the pit known as Zone 3, which was to be opened up to the southwest of the Blakefield pit. As shown in Figure 2, the current proposal also includes highwall mining from each of the pits. A visual bund is proposed to be constructed – to screen views of the mine pits from the Golden Highway and the neighbouring Coolmore Horse Stud Operations. A haul road would be built to connect the two mining operations and an option to install a conveyor is also included in the plans, although the Proponent has not committed to this option.

The Proposal was modified in response to concerns raised in the original submissions made on the project. The changes reduce the size of the visual bund, which also reduces the size of the Houston pit. The later stages of mining have also been adjusted to reduce the size of the final voids that would remain after mining is completed. This reduces the depth of the voids and also changes the long-term water management regime (from a groundwater sink, to a source (increasing Permian coal measure inflow to the Saddlers Creek and Hunter Alluviums by a total of 0.18ML a day)) (Hansen Bailey, 2013b).

At the Public Hearing the Proponent explained the mine plan would forgo 35% of the coal reserve (approximately 53 million tonnes of coal) on the site to maintain a buffer from the horse studs. Nonetheless, the proposal is said to represent $950 million in royalties to the NSW Government and would also provide for the continued employment of the Proponent's staff who currently work at the existing Drayton Mine, where coal reserves are nearly exhausted.

The proposed mine's location, adjoining the existing Drayton and Mount Arthur coal mines provides scope for considerable efficiencies. Unlike many new mining applications, the proposal would not require significant road and rail access roads and or upgrades (although the realignment of Edderton Road is proposed). The proposal also represents the efficient use of existing infrastructure, including the coal handling, processing and loading facilities, as well as the dragline and the broader fleet of mine machinery.

By providing for the continued employment of the existing workforce the mine would also have minimal impacts on the local community both in terms of population and social pressures. This advantage is twofold. First, the workforce for the mine is largely in place, so typical population impacts and associated housing, transport and infrastructure costs, and related social pressures associated with the introduction of a new mine, would be avoided. Second, continued employment of Drayton's staff would delay both the personal and broader social and economic costs associated with loss of employment, which comes when any mining operation ceases.

2.3. Project surrounds

The project site is surrounded by a range of land uses. To the north are two existing open cut coal mines, the Mount Arthur Mine and the Drayton Mine. To the east is the Plashett Dam, associated with Macquarie Generations' Bayswater Power Station. To the south are the Coolmore and Woodlands horse studs and the Arrowfield vineyard and winery (which recently received consent for tourist accommodation on the site, from Muswellbrook Council) (see Figure 4 on page 7). To the west, on the other side of Saddlers Creek, are a number of smaller rural properties. The area to the south and west, including some parts of the site is mapped as Critical Industry Cluster Land in both the equine and viticulture categories, under the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*.

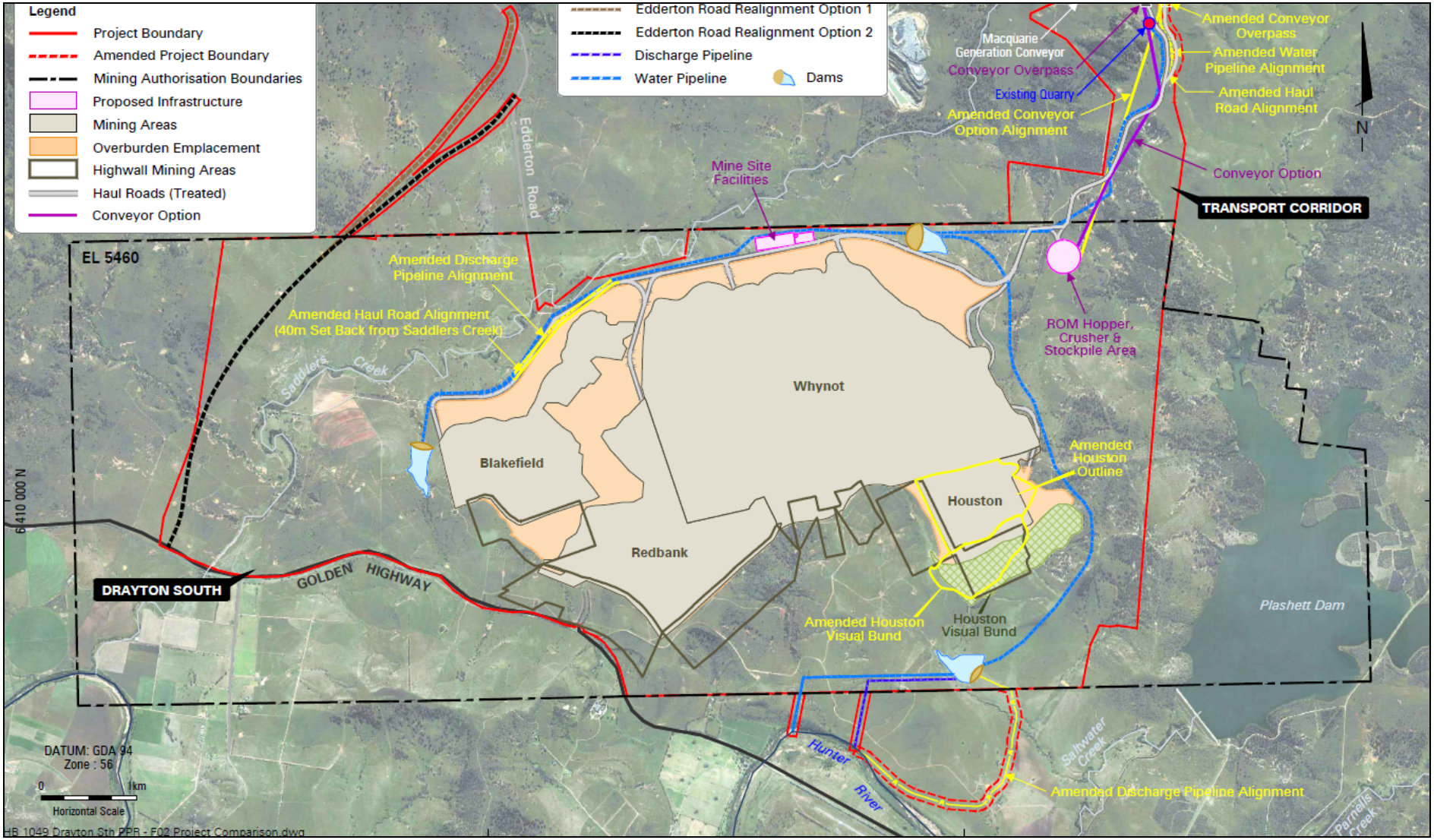

Figure 2: Proponent's revised Drayton South Mine proposal, of August 2013

Source: Hansen Bailey, 2013b

Figure 3: Proponent's revised final void and rehabilitated mine site proposal, of August 2013

Source: Hansen Bailey, 2013b

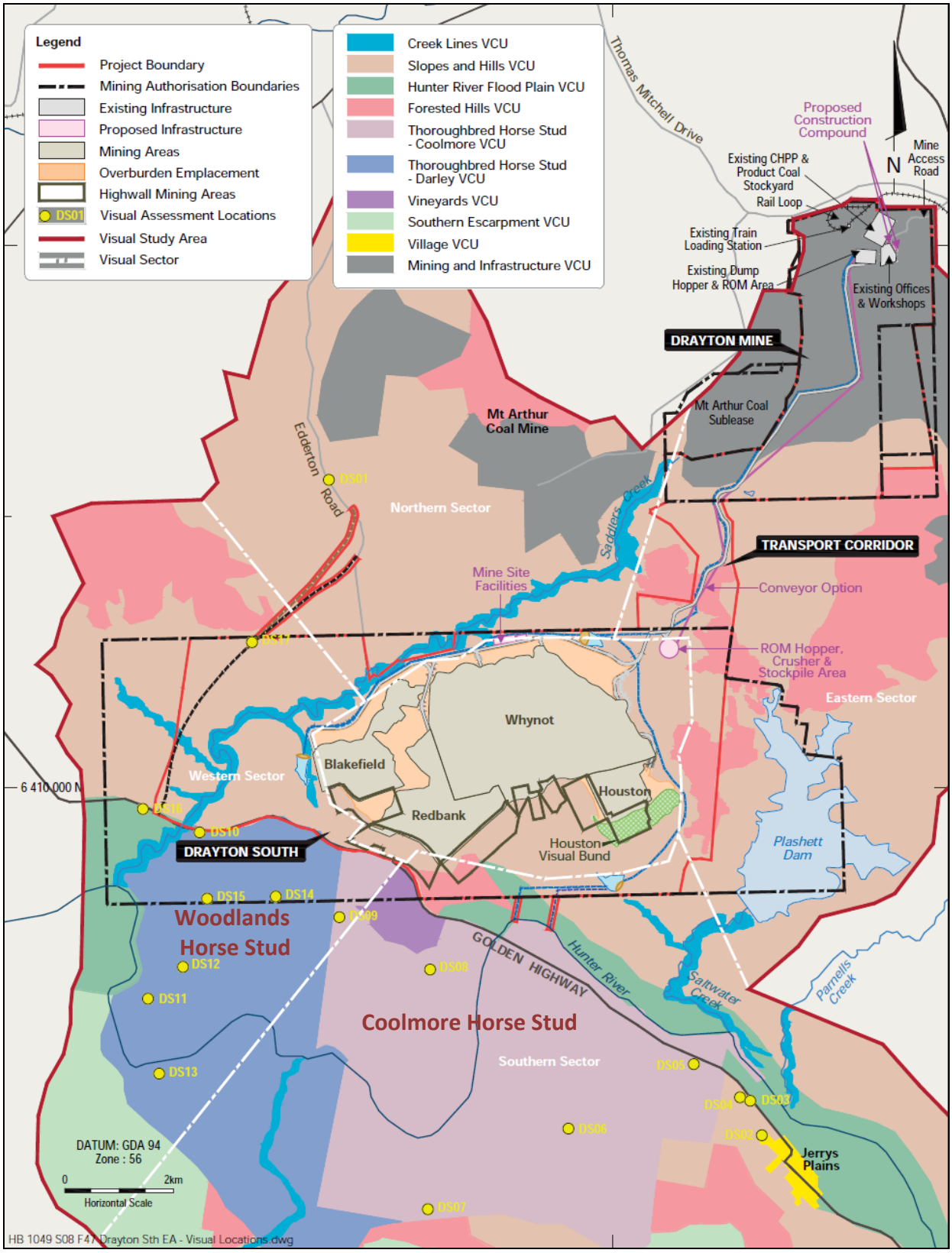

Figure 4: Mine Plan in relation to the neighbouring Coolmore and Woodlands horse studs

Source: Hansen Bailey, 2012

3. Commission Activities

3.1. Public Hearings and Submissions

In accordance with the Commission's terms of reference, public hearings were held on Thursday 10 October 2013 at the Denman Memorial Hall. A total of 26 verbal submissions were made to the Commission at the hearings, comprising the Proponent, the Coolmore and Woodlands Horse Studs, the Hunter Thoroughbred Breeders Association, the Scone Equine Hospital and other related horse racing and/or breeding organisations, a number of mine staff and mine suppliers also spoke at the hearing, along with interest groups for tourism, vineyards and the environment. All those seeking to be heard were heard. 16 written submissions were also made to the Commission. A summary of the issues raised at the Public Hearing is provided in Appendix 2 of this Report. The submissions that are publicly available can be accessed from the Commission's website, along with the speech notes and presentations that were provided to the Commission during the public hearing.

73 submissions to the Department of Planning and Infrastructure were provided to the Commission for consideration.

3.2. Documents, Meetings & Site Inspections

Through the course of the review the Commission accessed a wide range of documents including:

- The Proponent's Environmental Assessment (Hansen Bailey, 2012);
- Submissions from government agencies and the public;
- The Proponent's:
    - Response to Submissions (Hansen Bailey, 2013a);
    - Preferred Project Report (Hansen Bailey, 2013b);
    - Submission responding to submissions made to the Commission, dated 11 November 2013 (Hansen Bailey, 2013c); and
    - its consultant's response to concerns on Air Quality (Pacific Environment Ltd, dated 6 November 2013);
- The 1986 Commission of Inquiry report to the then proposed Mount Arthur South Coal Mine on the site (CoI 1985);
- The two expert reviews commissioned by the Department of Planning:
    - the review of the mine plan by Runge Pincock Minarco; and
    - the review of the air quality impact assessment by SKM.

During the review, the Commission met with representatives for the Department of Planning (16 April 2013 and 5 September 2013), Muswellbrook Shire Council (26 September 2013), the Environment Protection Authority (16 October 2013), and the Proponent (17 April 2013 (on site) and 24 September 2013). Summaries of these meetings are provided in Appendix 3.

The Commission visited the site on 17 April 2013 with the Proponent and its consultants. The Commission visited the Coolmore property on 25 September 2013 accompanied by representatives for Coolmore and visited the Woodlands property on 26 September 2013 accompanied by representatives for Darley.

The Commission also received late submissions from the NSW Environment Protection Authority (EPA) and jointly from Coolmore and Darley. The EPA submission relates to the Proponents revised modelling provided in its response to submissions and raises similar concerns to those of SKM. The Commission since provided the EPA with the Proponent's response to the SKM report (Pacific

Environment Limited, 2013) and understands the EPA is in agreement with SKM's most recent concerns, relating to silt and moisture inputs to the air modelling. The Coolmore and Darley submission was received as the Commission was finalising this report. Nonetheless the Commission has considered the submission. The submission does not change the Commission's opinion or recommendations.

The Commission has considered all this information primarily in the context of the impacts on the Coolmore and Woodlands studs and the possible measures available to avoid and/or minimise the potential impacts on the horse studs. Other impacts and issues raised in submissions would need to be considered in detail by the assessing and determining authorities prior to any determination of the project.

4. Comments and findings relating to the Terms of Reference

4.1. Assess the potential impacts on the operations of the Coolmore and Woodlands horse studs

The terms of reference direct the Commission to specifically assess the potential impacts of the project on the operations of the Coolmore and Woodlands horse studs. In order to assess the potential impacts on the operations of the Coolmore and Woodlands horse studs, the Commission must first understand the two horse studs, the properties they occupy and their operations, their relevance to the broader equine critical industry cluster and the broader industry at a state and national level. The Commission engaged Mr Terry Short to provide expert advice to assist it in its consideration of the project, its understanding of the horse studs and the broader equine industry and the potential impacts of the project on the horse studs. Mr Short's advice is provided in full in Appendix 4. This section has been drafted in consideration of Mr Short's findings and excerpts from his report are referred to throughout this section.

4.1.1. Coolmore and Darley

Both Coolmore and Darley are significant international thoroughbred breeding operations. They are highly sophisticated operations and run breeding programs across multiple continents.

Coolmore has properties in Ireland, America and Australia. The Coolmore Australia farm is on the outskirts of Jerrys Plains in the Hunter Valley. Coolmore Australia lists 12 stallions standing in 2013 (Coolmore, 2013). Of these 12 stallions, seven are also listed as standing in Coolmore Ireland and one in Coolmore America (Coolmore, 2013). This is possible as stallions are moved from one hemisphere to the other to cover mares on both side of the globe, during the respective breeding seasons.

Darley operates in Australia, Europe, Japan and the United States (Darley, 2013). In Australia Darley runs a number of properties in NSW and Victoria. Darley operates two integrated stud properties in the Hunter Valley. These are "Kelvinside", in Aberdeen; and "Woodlands", which sits between Jerrys Plains and Denman (and neighbours the Coolmore property). Kelvinside and Woodlands are operated as an integrated breeding operation. The stallions are based at Kelvinside and Darley's broodmares (and foals) reside at Woodlands. The Woodlands broodmares travel to Kelvinside for covering, but otherwise reside at Woodlands. Darley has 13 stallions listed as standing at Kelvinside this year, of these, nine are also listed to stand in the northern hemisphere; four in Europe (mainly in Newmarket) and five in the United States, mainly in Kentucky (Darley, 2013).

As highlighted by the international movements the stallions make, Coolmore and Darley own and stand a significant number of highly sought after stallions of international calibre. These stallions do not only service Coolmore and Darley's own broodmares, but will also service mares residing at broodmare farms throughout the Upper Hunter. Advice from Mr Short (Appendix 4) suggests that almost half of all stallion standing fees in Australia are attributable to these two operators, Coolmore and Darley. Advice provided by speakers during the public hearing, from other farms in particular, reiterates the significance of these two operators to the thoroughbred breeding industry in the Hunter Valley and to the broader equine Critical Industry Cluster (CIC).

At first glance, the location of the Coolmore and Woodlands horse studs, compared to the equine Critical Industry Cluster as a whole might suggest these two studs are outliers, with the majority of the mapped areas further north and west around Denman, Aberdeen, Scone and Murrurundi. While

physically these studs do sit on the edge of the cluster, in actual fact they are core businesses in the CIC. Mr Short in his advice to the Commission (Appendix 4) has gone so far as to say:

- *"…they are likely the most important of all central actors"* (p33); and
- "*These studs are central to the functioning of the cluster*" (p4).

The Commission heard from a range of stakeholders within the equine Critical Industry Cluster at the public hearing, including other farms, as well as the Hunter Thoroughbred Breeders Association, the Scone Equine Hospital and the Scone Race Club. The submissions of these stakeholders reiterate that these two operators are critically important to the broader cluster, and while they may not sit at the centre of the cluster spatially, the proximity of these studs is nonetheless critical to the ongoing operations and success of the cluster as a whole.

In response to the statements and submissions made at the public hearing supporting the need to maintain the equine industry, as part of a diversified economy, the Proponent suggests that the thoroughbred industry is a very small part of what is already a diversified economy (Hansen Bailey, 2013c). The Proponent (Hansen Bailey, 2013c) argued that the thoroughbred breeding industry represents approximately 2% of the region's employment and that its contribution to the regional economy is less than the contribution estimated for this proposed coal mine.

Whatever the employment and economic contributions of the Coolmore and Woodlands studs and the equine cluster more broadly, the Commission notes that the equine industry has been identified as one of two critical industry clusters in the Upper Hunter Strategic Regional Land Use Plan (DP&I, 2012). The Upper Hunter Strategic Regional Land Use Plan states:

> *The horse breeding cluster includes a highly integrated concentration of horse breeding facilities and related infrastructure covering thoroughbred and stock horse breeding centres and numerous other equine developments and support services, such as a specialised veterinary centre. In 2009 - 2010 the region provided 80 to 90 per cent of the total value of stud horses exported by Australia. It is also the headquarters for the NSW Stockhorse Society.*
>
> *The attraction for equine interests to the region lies in its combination of a temperate climate, protected aspect and varied terrain combined with a lack of tropical diseases and accessibility to Sydney. The breeders are supported by the aggregation of equine industry infrastructure and good transport routes.*
>
> Source: DP&I, 2012 page 22

According to the mapping provided with the plan in September 2012 it was calculated that "*the equine critical industry cluster covers 233,286 ha or 9.7% of the region*" (DP&I 2012 p22).

The Commission acknowledges the Proponent's argument that the thoroughbred breeding industry is only a small component of the Hunter's diverse economy. Nonetheless the Commission notes that the industry complements the region's wine and tourism industries, both as an iconic industry (for example Scone is known and marketed as the Horse Capital of Australia) and as a highly scenic industry. Regardless of its market share, the Hunter's equine industry has been identified as a valuable component of the Upper Hunter. In this regard, the Commission notes the considerable protections afforded to other world class thoroughbred breeding clusters, particularly Newmarket and Kentucky, as identified in Mr Short's advice to the Commission (Appendix 4). In Kentucky in particular, the Government has gone so far as to offer to purchase back landholders development rights (which amongst other things then prohibits activities such as mining and quarrying (Lexington-Fayette Urban County Government, Kentucky, 2009)). The Lexington Council's website indicates that this is to protect the agricultural, equine and tourism economies and conserve the natural, scenic,

open space, historic and agricultural resources of rural Fayette County (Lexington-Fayette Urban County Government, Kentucky, 2013).

In summary, Mr Short has indicated that nearly half of all stallion standing fees in Australia are attributable to Coolmore and Darley. Advice provided by speakers during the public hearing, from other farms in particular, reiterates the significance of these two operators to the thoroughbred breeding industry in the Hunter Valley and to the broader equine Critical Industry Cluster. The Commission acknowledges the significance of the two operators, as the owners of a significant number of the best thoroughbred sires in the Hunter Valley and in turn, the broader equine industry and cluster's reliance on Coolmore and Darley's continued presence in the Upper Hunter.

4.1.1.1. Cultural heritage of the landscape

Having visited both the Coolmore property and Darley's Woodlands property, in addition to the significance of the breeding operations run on the properties, the Commission also noted some cultural landscape value in the properties themselves. The properties have a unique combination of scenic, historic and agricultural qualities which lend themselves to the equine and tourism industries, but could also be argued to have a significant heritage value of their own. As noted by the horse studs, this combination of attributes is extremely difficult, if not impossible to find elsewhere. In addition to the equine industry's arguments for the significance of the operations on the properties, the Commission considers that it is also possible to argue that the properties have a unique cultural landscape value that stems from a combination of scenic and historic qualities - combined with what appears to be a near continuous use of the properties for horse breeding, of one sort or another, for over 100 years if not more. Of course the land use patterns and management practices on the properties have evolved over time, but the functional land use continues.

The significance of the historic homesteads is not disputed and is identified in the Proponent's environmental assessment (Hansen Bailey, 2013). However, the additional value derived from the surrounding cultural landscape setting and the continuity of land uses on the properties has not been recognised to any clear extent nor given any meaningful consideration by the Proponent. Advice from Ms Sharon Veale, prepared for the Hunter Thoroughbred Breeders Association also notes this bias towards the built heritage of individual items, "*with little regard to the functional systems or historical land uses such as pastoralism that generated and supported the development of the homesteads and other built structures and features*" (GML, 2013 page 7).

Ms Veale suggested, in considering the World Heritage Convention definition of cultural landscapes, that the aggregated historic properties now owned by Coolmore and Darley could be categorised as an organically evolved and continuing landscape "*that plays an active role in contemporary society whilst still retaining the ability to demonstrate material evidence of its evolution over time*" (GML, 2013 page 11). It was also suggested that the cultural landscape of this area would likely satisfy criteria for heritage significance at a state and perhaps even the national level (GML, 2013). The Commission sought expert advice on the visual and landscape impacts from Dr Lamb (see section 4.1.3.1 and Appendix 5), who corroborates this view.

The Commission acknowledges that the cultural heritage values of the landscape and continuing land use, combined with the historic built structures have significance and this is considered in the Commission's assessment, see section 4.1.3.

4.1.2. Activities at Coolmore and Woodlands

To better understand the operations and potential impacts, the Commission visited the two studs in late September 2013, during the breeding season. In Australia breeding occurs from September through to December, however activities on the site occur year round.

4.1.2.1. Live Cover

As noted previously Coolmore stands a number of stallions at the farm each year. These stallions are of the highest calibre, and the majority of them are shuttled between Ireland (or the United States) and Australia, to participate in the breeding seasons in both hemispheres. Artificial Insemination is not allowed in thoroughbred breeding, so mares are sent to be covered at the stud where the stallion is standing. Each stallion can cover 3 or 4 mares a day during the breeding season. Coverings occur from early morning through to late in the evening throughout the breeding season at the Coolmore Farm.

Mares that visit Coolmore's stallions can be divided into at least two categories. Some remain on site for the duration of the 11 month gestation period and beyond, and perhaps even reside there permanently. Others will visit for a much shorter period, many mares residing on broodmare farms across the Upper Hunter will only make a brief daytrip to Coolmore for covering, with all other aspects of the breeding cycle occurring elsewhere in the Hunter.

4.1.2.2. Care for the broodmare and development of the foal and yearling

While covering is a critical component of the business, the vast majority of the land on both properties is dedicated to other aspects of the business particularly to the development of the foal. Coolmore has its own veterinary hospital and laboratory as well as a number of paddocks set aside for pregnant mares. Foaling units, paddocks for mares and foals and dedicated space for yearlings provide for each stage of the breeding cycle. Woodlands also has dedicated paddocks for the movement of mares and yearlings around various parts of the property.

There are a number of physical attributes to both the Coolmore and Woodlands properties which the industry has identified as conducive to fostering the development of elite bloodstock. Speakers and submissions on behalf of Coolmore and Darley and the broader thoroughbred breeding industry nominated that the excellent soils on the alluvial flats, and the availability of undulating hills as a highly sought after combination of qualities conducive to the development of elite thoroughbred athletes.

These qualities appear to be valued and sought after worldwide, for example in Kentucky a similar range of features are nominated as the origin of the cluster in that area:

> *"Breeders first came to Fayette County for the unique landscape of the Bluegrass. The undulating landscape builds strong muscles for racing. The high limestone content enriches the grass with calcium phosphate ($CaPO_4$), which strengthens the bones of thoroughbreds."* (University of Kentucky, 1999)

4.1.2.3. Sales and Promotions

Proximity and availability of water and picturesque scenery (including the presence of the Wollemi National Park in the background) were also nominated as highly important to the success of the two farms. For both farms, the visual presentation, perception and the image of the property is highly significant. For Coolmore in particular, yearling barns support another important aspect of the business, with key industry stakeholders visiting the property to inspect the bloodstock at certain times of year. The property also includes an airstrip for the use of VIPs as well as three guest units. Historic homesteads on both properties have also been incorporated into the image and add to the narrative of the properties.

Both studs have raised considerable concern about the visual impact of the proposed coal mine. Mr Short agrees with this concern, indicating that each of the landscape values has been engineered at considerable cost and that the importance of the landscape values to the properties cannot be overstated (Appendix 4).

Mr Short indicates that four key landscape values have been identified within the Upper Hunter equine CIC. In particular the properties have a *rural idyll* landscape, as they are well-maintained with green pasture, painted-wooden fences, and not a thing out of place. The lush green pastures and high quality facilities support the studs' brand and reputation for providing for elite thoroughbreds. Visitors and guests are also greeted with manicured grounds, historic homesteads and stunning views. Mr Short (Appendix 4) has suggested this combination of elements is critical at an enterprise level, particularly for Coolmore and Darley as two pinnacle businesses within the cluster. *"Whilst made to look perfect and complete for customers, the work of maintaining the thoroughbred landscape never ceases and is an enduring business expense"* (La Tierra, 2013, Appendix 4, page 35).

As noted by speakers at the public hearing, the properties (combined with the Arrowfield vineyard and winery) are perceived by some to represent the gateway to the Upper Hunter. The views of the studs for those travelling past along the Golden Highway are likely to also be significant to how the studs are perceived. Any decline in the visual amenity of the area has the potential to also affect the image of the Upper Hunter as a region for viticulture, horses and tourism.

4.1.2.4. Residential and Guest Accommodation

In order to support the operations on site, and maintain the immaculate setting, a relatively large number of people are employed at the properties. Some staff and their families even reside on the properties, and both properties have a number of residential clusters. The Commission understands that the provision of residential accommodation on the studs is integral to the operations. Some staff would be on call at all hours and other activities, particularly foaling, require monitoring 24 hours a day. Both studs also have guest accommodation.

4.1.3. Potential impacts of the project on the operations of the Coolmore and Woodlands Horse Studs

As identified in the previous section, the studs' operations include a number of sensitive uses with the potential to be affected by coal mining in the region. As highlighted by Coolmore at the public hearing, the coal mining operations occurring in the Hunter Valley have grown extensively in recent years. While there is a long history of mining in the region, the growth of open cut mining has led to mining coming much closer to the operations of Coolmore and Darley. From Coolmore in particular, the presence of coal mining activities in the vicinity is evident, with distant blast plumes visible from the site at certain times.

Open cut mining by its nature is an intrusive industry. Impacts from activities associated with coal mining can only be controlled to a certain degree and it is often necessary for the mine to purchase any neighbouring properties with sensitive uses, such as dwellings, where the impacts to people living in close proximity are considered unacceptable. Conditions usually establish acquisition criteria, so that if the mine impacts on particular properties, it will have to purchase the properties, or provide the residents with mitigation measures for particular impacts, such as double glazing for noise impacts.

In this instance options to purchase, acquire or grant acquisition rights to the two highly significant and valuable thoroughbred breeding studs are not considered either appropriate or practical. The Commission has found that the two studs are highly significant to the broader Equine Critical

Industry Cluster and considers that they should be maintained as core equine properties, with their considerable residential populations retained on site. There are special cultural landscape values to the two properties, which are linked to their current use and the high level of maintenance and care provided. The level of maintenance is intrinsic to the current operations but would be almost impossible to maintain with any other use. In addition to these barriers to acquisition, the operations that occur on the studs are highly sensitive. As established by Mr Short (see Appendix 4), a core pillar of these businesses is founded on reputation and image. Any perceived impact on the bloodstock could be detrimental from a business perspective. Even in the absence of any risks to the horses, the visible presence of the mine in such close proximity has the potential to tarnish the reputational image that has been so carefully developed on and around the properties.

The properties are not purely agricultural operations, both have guest accommodation and historic homesteads. The sites, especially Coolmore, host organised events and also cater to VIPs. Any signs of mining, whether causing real or perceived impact, could create questions and doubt in the minds of buyers, investors and other industry representatives. In this fiercely competitive industry the Commission has little doubt that the studs would have to consider their futures in this area.

4.1.3.1. Visual and Reputation Impacts

In order to better understand the potential visual impacts of the project on the horse studs, as well as the broader potential perception impacts the mine may generate, the Commission engaged Dr Richard Lamb to provide expert advice on this matter. Dr Lamb's advice is provided in full in Appendix 5. The Commission summarises and discusses some of Dr Lamb's key comments and findings here below.

Dr Lamb suggests that there are several kinds of visual impact relevant to this assessment. Direct visual effects (e.g. where mining activities are visible, including overburden removal and emplacement and the transport of materials). Indirect visual effects ("*where there is no direct visibility of the mining operations, but there is evidence of them*" (p8)). *"Impacts on the image of the studs, a significant part of which is based on appearances*" (Appendix 5, p8) were also considered.

In relation to the direct visual impacts, Dr Lamb found that the Proponent's Visual Impact Assessment "*reasonably represents the likely visibility of the proposal in most views*" (p8). The assessment was found to have focused on fixed viewing locations, "*while acknowledging that some land uses such as wineries and horse studs make use of the scenic amenity values of the surrounding landscape as part of their business image*" (p9).

While most of the Woodlands stud would have no fixed views of the mine, the exception is the high land in the north eastern part of the property. Dr Lamb found that "*The relative relief is such that there is no practical way to mitigate the impacts on the view and since the operations proceed generally from north to south, advancing toward Darley Woodlands over many years, with the rehabilitation following behind, there will be visual exposure of the mining throughout the operational life of the Redbank and Blakefield pits.*" (p9).

Direct views from Coolmore would be of the proposed visual bund, rather than the mine itself. The visual bund is one of two visual screening measures proposed to address the visibility of the mine from the Golden Highway and Coolmore. The other measure is a densely planted tree screen. The effectiveness of both these measures was questioned at the public hearing.

Dr Lamb considered that the proposed densely planted tree screen along the Golden Highway, opposite the Woodlands stud could provide some screening, but required more detailed planning

and design to ensure its effectiveness, particularly through the use of a range of trees, shrubs and under plantings maturing at different heights.

In considering the Houston visual bund, Dr Lamb found:
The proposed Option 4A bund is still a substantial structure, at approximately 1km in length and up to 79m in height. … The bund is designed to mitigate impacts on all views, including those from rising topography in the eastern part of Coolmore, which is undulating and rises to a series of ridges, from which and along the alignment of Oak Range Road for example, the Houston Bund will be prominent. As a result, it has a significant negative effect on the view from the Golden Highway, isolated parts of Jerrys Plains and parts of Coolmore, including those on the lower eastern slopes, on the flood plain north of the Highway and as seen from the setting of the heritage property Strowan. In those lower areas, the bund is unlikely to be significantly screening activity behind it as the viewing angle is steeply upward from the Highway and vicinity. In other words, the visibility of the bund in the public domain is significant but of little benefit to mitigation of the impacts of proposed mining on those views. (Appendix 5, p10)

While some concerns were raised both by submitters and Dr Lamb regarding the accuracy of the colours used by the Proponent in the photomontages, it was not considered necessary to amend them as the use of more realistic colours and textural qualities would not significantly alter the perception of the impact of the bund on the landscape.

The effectiveness of efforts to revegetate the bund was a particular concern to a number of parties, including Dr Lamb. Dr Lamb raised particular concerns about the lack of detail in the plans for establishment and maintenance of the vegetation cover, including the availability and depth of topsoil to be applied and the need for watering and long term moisture availability.

The mining character of the broader surrounds, particularly to the east was acknowledged as it would be visible to those travelling to the site via the Lower Hunter. However Dr Lamb noted that:
"West of Jerrys Plains at present there is something of a break from this widespread character, which assists the sense of continuity of the studs with the adjacent rural landscape and also with the sense of isolation that is part of the imagery of these places." (Appendix 5, p13)

Indirect impacts that may be evident to visitors included "*night time lighting of the operations that may be perceived as causing a glowing effect on the atmosphere, particularly in ideal circumstances for that phenomenon to occur, that may conflict with the image of cleanliness, safety, isolation and the absence of light that is typical of the rural, high quality experience in the imagery projected by the studs. Blasting noise and dust plumes from blasting or haul roads and unconsolidated overburden may also be perceived as alien to that imagery. In that regard, the sensitivity of the studs to impacts on the imagery that is inherent in their branding and identities deserves acknowledgement and special consideration with regard to the acceptability of the proposed mine, either as proposed or as may be acceptable, subject to recommendations to minimise visual impacts.* (Appendix 5, p13)

The Commission agreed that "*As a general principle, the closer the operations approach the boundaries of the studs, the more likely there are to be indirect visual exposure effects*" (p14). Consequently the proximity of the mine, and the Redbank Pit in particular, is of concern.

In regard to the overall acceptability of the impacts, the low hills on the mine site have been able to be used to shield most direct views of mining on the site, and the location of the infrastructure and coal handling facilities "*distant from the subject horse studs is a significant advantage with regard to management and mitigation of the overall level of visual impacts"* (Appendix 5, p14).

Dr Lamb concluded that:
"Given the size of the proposed mine, the overall level of mitigation of visual impacts is of a generally satisfactory standard. However leaving aside the acceptability of the entire proposal, there are areas for concern in the application as it stands.

If the adjacent rural landscape which comprises the thoroughbred studs was general grazing or agricultural land, the visual impact could be considered acceptable. However, the combination of physical, aesthetic, cultural and historical values that characterise the studs, along with the nature of the rural industry that underpins them, gives rise to a heightened level of sensitivity to visual impacts of all three of the classes identified above, ie. Direct, indirect and impacts on image. ...

… A critical consideration has been missed, concerning the importance of impacts on dynamic views and the fragility of the image of the studs in the context of features that contrast with, appear out of context with, or clash with aspects of that image. The image is not just what is visible at a given point in time or from a single or a range of locations. …

… The landscapes of the studs are of special intrinsic scenic quality and character, historically significant and of importance to the story of development of the Upper Hunter Valley, the theme of agriculture and rural industry and the thoroughbred racing industry. They are of special and possibly unique sensitivity to impacts on the scenic values of their settings and are highly vulnerable to direct and indirect visual impacts. (Appendix 5, p14-15)

The Commission agrees that as proposed the mine would have significant impacts on the visual amenity, landscape and image associated with the Coolmore and Woodlands studs, and their surrounds. Options to avoid or minimise these impacts are discussed in section 4.2.

4.1.3.2. Environment

In addition to the highly sensitive visual, perception and reputational impacts, the mine will generate the usual environmental pollution impacts. Concerns raised in submissions and at the public hearing in relation to the mine's environmental impacts included air quality, noise and blasting, water, biodiversity and lighting impacts.

Water

The potential impact on water was a particular concern for a number of speakers at the public hearing, including to Coolmore; and was also raised in submissions. The mine would impact on the water quality and quantity of both ground and surface water resources. The Proponent considered the water impacts of the mine in the Environmental Assessment. Impacts on water fall into at least two categories, these are the short term impacts which will occur during mining and the long term impacts once mining has been completed.

Coolmore raised particular concern about impacts on water quality, indicating that the mine would be discharging excess water only a short way upstream from some of its water extraction points on the Hunter River. The Proponent has advised that water would be discharged under high flow conditions under the Hunter River Salinity Trading Scheme and any impact would be mitigated by the dilution of the additional flow in the river. There is a risk that some polluted water may be discharged by the mine at some point over the life of the mine and this is a particular risk for Coolmore, who has extraction points downstream.

The Commission expects the mine would make genuine attempts to appropriately manage water on the site, however unintended incidents do sometimes occur at mine sites, whether during day to day activities, or in response to sever weather events. The Commission considers that the location of the

water discharge points upstream of Coolmore's extraction points, and opposite key paddocks (designated for pregnant mares) poses an unnecessary risk of impact. The availability of sufficient credits under the salinity trading scheme also needs to be confirmed as other mines would also be holding or competing for discharge credits.

The longer term water impacts, such as those on groundwater and the ultimate water balance, connectivity and water quality of the final void, have been raised with the Commission. The Commission agrees that if any mining of the site is to proceed, these impacts would need to be carefully considered. In light of the Commission's recommendations (see section 5), and as the long term water issues do not directly relate to the Coolmore and Woodlands operations, the Commission has not undertaken a detailed review of this issue, but notes that any assessment of any mine plan for the site, will need to include detailed consideration of these issues.

Noise and Blasting

The proponent has indicated that it will comply with the Government's air, noise and blasting standards and criteria at all residential receivers on the Coolmore and Woodlands properties (Hansen Bailey, 2013a volume 1). The mine's ability to comply with these standards has been disputed by some parties, with both studs raising particular concerns for the protection of their employees, many of whom reside on the stud properties.

In relation to blasting, the project has the potential to impact on people, structures and horses. Impacts range from immediate overpressure noise and ground vibration, to dust, fume and visual amenity impacts. Blast criteria for amenity and structural impacts are prescribed in the Australian Standards (AS 2187.2-2006) and in the ANZEC "Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration" (ANZEC, 1990). The standard criteria are presented in Table 4-1 below. A lower ground vibration criteria of 5 mm/second has been adopted at certain sites, by the Proponent, to avoid structural damage to some heritage structures (Hansen Bailey, 2013).

Table 4-1 Blast Criteria

Blast Impact	*Amenity Criteria*	*Structural Damage Criteria*
Airblast Overpressure	115 dB for 95% of blasts in any year 120 dB for 100% of blasts	133 dB
Ground Vibration	5 mm/second for 95% of blasts in any year 10 mm/second for 100% of blasts	10 mm/sec

Sourced from:
ANZEC Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration
Australian Standard AS 2187.2-2006 Explosives – Storage and Use, Part 2: Use of Explosives.

The Proponent (Hansen Bailey, 2012) has considered the overpressure and ground vibration impacts on heritage structures and private dwellings in the area, indicating it will be able to comply with both the amenity and structural criteria, by implementing best practice blast minimisation procedures and, where necessary, reducing the maximum instantaneous charge of the blast event. By reducing the charge however, the Proponent has indicated that additional blast events would be required, resulting in up to ten blasts per week (Hansen Bailey, 2012). This requirement for 10 blasts per week would not comply with the ANZEC guidelines (1990) which specify that "*Blasting should generally take place no more than once a day*" (ANZEC 1990, p 3), only between the hours of 9 am to 5 pm and that it should not take place on Sundays or public holidays.

A number of concerns were raised in submissions and at the public hearing regarding noise and blasting impacts from the proposed mine. The neighbouring horse studs are considered to be

particularly sensitive to noise and blasting impacts. Sensitivities relate to both people (including residents and also visitors and guests) and horses (said to have a highly evolved flight response). Evidence on the effect of mine noise and blasting on horses is scarce and it seems reactions may depend to some extent on past exposure (which will vary between all the horses on both sites). Views and opinions presented to the Commission on this issue are contradictory and the information that is readily available lacks consensus (BHP Billiton, 2009; Hansen Bailey, 2012; Huybregts, 2008; Noise Quest, undated; Wyle, undated; US Department of the Interior, 1988 and Larkin, 1996). Given there is uncertainty regarding the actual impact on horses, blasting could be perceived to put the horses on the studs at risk. Consequently, the way noise and blasting is perceived by people on the studs, particularly visitors and guests, could have a significant impact on the studs' reputation and brand.

The proposed blasting operations would have a noticeable amenity impact on people at Darley and Coolmore (and other neighbouring properties, particularly Arrowfield). With the implementation of all the proposed mitigation measures, including reducing the size of blasts and not blasting when there are unfavourable weather conditions, i.e. when the wind is blowing towards these properties, the project would be able to comply with the standard blasting criteria for mines– with the exception of the requirement for a maximum of one blast per day. Nonetheless blasts would still be obvious, particularly in the closer pits, and there would remain a visual impact from the cloud of dust and gases created by each blast. As the effects of mine noise and blasting on horses are not well understood any evidence of blasting could be detrimental to the reputation of the studs.

The Commission accepts that the proximity of the proposed mining operations increases the risk of impacts to the studs. It is difficult to define an appropriate buffer distance for the mine because several factors can affect the propagation of blast impacts, including, blasting conditions, blast type and size, topography, wind, temperature inversions and other meteorological conditions. Likewise, an appropriate criteria is difficult to nominate due to the complex interaction between the actual impact and the way noise and blasting is perceived to affect the studs.

Air Quality

Submissions and presentations to the Commission raised concerns about air quality impacts from the mine. These included those from the NSW Environment Protection Authority (EPA), NSW Health, the horse studs and the Hunter Thoroughbred Breeders Association. Concerns particularly related to human health impacts, as well as the suitability and reliability of the modelling predictions provided by the Proponent. Some questions were also raised about the potential for air quality impacts on equine health.

Air quality in the Upper Hunter has come under increasing scrutiny in recent years. Human health criteria for particulates (24 hour average PM_{10} levels) are being exceeded near some key coal mining precincts (OEH, 2013). Annual average $PM_{2.5}$ levels around Muswellbrook and Singleton are also exceeding or close to exceeding the reporting standards (OEH, 2013).

Upper Hunter air quality monitoring data shows that the air quality (annual and 24 hour average PM_{10} levels) at Jerrys Plains, near the project site is generally well within the health criteria (OEH, 2013). Nonetheless, by year 10 of the proposed mine, the Proponent's modelling suggests that background air quality levels would exceed the 24 hour average PM_{10} criteria on 25 days that year. This proposed mine would add further emissions and would result in additional days when particulate levels would exceed the health criteria. When emissions from this proposed mine are included in the most recent modelling it is predicted that the human health criteria would be exceeded on 38 days in year 10 of mining.

Concerns have been raised regarding the suitability and reliability of the modelling results provided. The Department engaged SKM to undertake a peer review of the air quality assessment provided by the Proponent. SKM raised a number of concerns and these were subsequently corroborated by the EPA. While some of these concerns have now been addressed (Pacific Environment Limited, 2013), some of the inputs used (silt and moisture contents) require further verification. Also, some of the assumptions (for example the 85% control of emissions in Redbank pit haul roads) appear optimistic given that the EPA has indicated 80% control is considered best practice. In short the Commission is not convinced the modelling represents the worst case impact scenario.

The Proponent has proposed to implement best practice dust control measures, with particular attention to the Redbank pit, which is closest to the studs. Nonetheless dust control would be a significant challenge as the mine plan includes four pits and a large surface area would be exposed for much of the 27 year mine life.

The air quality impacts of the project are not considered acceptable due to the combined concerns about the additional amenity and health impacts to residents living on the studs (noting that the properties cannot be acquired by the mine as would usually be allowed) and the reputational damage that may be caused with the deterioration in air quality.

Night Lighting

The mine is proposed to operate 24 hours a day seven days a week and consequently it will generate lighting impacts. This proposal has the advantage of using existing coal handling and load out facilities on the existing Drayton mine site to the north, so lighting impacts from those activities will not change. Nonetheless the mine site is large and has four pits so both direct and diffuse lighting impacts can be expected.

The Proponent has indicated that these impacts will predominantly be caused by lights fitted to mobile fleet, outside the active mining areas (Hansen Bailey, 2012). Existing topography and vegetation would screen most direct lighting, however some intermittent direct light effects would be unavoidable, particularly during construction of the Houston visual bund. Both fixed and moving lights would need to be carefully controlled and the Proponent has proposed to use hooded and directional lighting where practical, to reduce direct impacts to receivers (Hansen Bailey 2012).

The Commission agrees that vegetation screening and best practice controls will be necessary to minimise lighting impacts to neighbouring properties, and particularly the two horse studs. Direct lighting impacts, particularly from construction of the Houston visual bund are of particular concern for residents and guests to Coolmore and Woodlands and for travellers on the Golden Highway. While the Commission acknowledges that diffuse lighting from other mines in the area is already visible, lighting from this proposed mine would highlight the close proximity of the mine.

The influence of mine lighting on the breeding operations has also been raised as a concern. The Commission understands that artificial lighting is used by the studs to manipulate the mares' oestrous cycles to facilitate breeding. There is some concern additional lighting from the proposed mine could disrupt this management of breeding. As lighting impacts have not been quantified it is impossible to know whether the lighting impacts would affect breeding. Nonetheless the risk, whether real or perceived has the potential to damage the business of the studs.

4.1.3.3. Impacts on horses, behaviour and breeding activities

As noted at the public hearing horses have a highly evolved flight response. The Proponent has argued that the horses will become accustomed to any impacts from the mine, as these will build up gradually over time, as mining progresses towards the studs. However the operations on the studs

are far more sophisticated and complex than this. As noted earlier, the stallions are shuttled back and forth from one hemisphere to the other for each breeding season, so would need to become reaccustomed to the presence of the mine each season. Further a significant component of Coolmore's operations relates to the covering of mares, many of which are short term visitors, attending the site for just a matter of hours. There would be no opportunity for these visiting mares to become accustomed to the noise and blasting impacts of the mine, before the handlers must facilitate the delicate task of live covering.

In addition to this, newborn thoroughbred foals are easily startled, it seems reasonable to expect that any real or perceived additional risk to the foals will be avoided by owners and managers alike.

For further discussion on blasting and lighting see section 4.1.3.2 above.

The combined risks to horses and breeding operations from the mine's noise, blasting, lighting and perhaps even air quality impacts are considered to represent a real concern for the studs and their clients. When combined with the visual and perception impacts identified by Dr Lamb, the Commission considers that there is a real risk that if these impacts are unacceptable to Coolmore and Darley and they were to leave this area, there would be significant impacts on the whole Upper Hunter Equine Critical Industry Cluster.

4.1.3.4. Other Issues

Many other issues were raised during the public hearing and in submissions, both in relation to the horse studs and the equine critical industry cluster and in relation to broader impacts of the project – both positive and negative.

Social and economic

A number of speakers and submissions raised concerns about the social and economic impacts. Some were concerned about the impacts that would occur if the project proceeds, while others were concerned about the impacts should it not proceed. As noted by Mr Short in his advice to the Commission (Appendix 4) the mine, as proposed, represents a real risk to the ongoing operations of the two horse studs. If the mine was approved there may well be implications for the whole equine critical industry cluster as well as the broader tourism and wine industries which it complements. Alternatively miners and mine suppliers have indicated they are reliant on this mine proposal for long-term security of employment. Both the mine and the studs contribute to the local community and provide employment.

The Proponent noted that the mine would generate royalties for the state and suggested that the equine industry is only a very small component of the Hunters diverse economy (Hansen Bailey 2013c). Nonetheless the Commission considers that there is value in maintaining a wide range of industries within a diversified economy. The Commission notes that this one mine has the potential to severely impact on the studs, putting the equine industry at risk.

Many speakers acknowledged these competing issues and some suggested that in this day and age it ought to be possible to have both the mine and the horse studs. The Proponent has indicated that its proposal, with a 500 m setback from the stud boundaries and a substantial visual bund to screen direct views of mine operations, will allow both industries to continue. The Commission's assessment has found the project would nonetheless have considerable impacts on the studs and considers that the mine as proposed represents a serious risks to the equine critical industry cluster.

Biodiversity

The Nature Conservation Council and others raised concerns about the mine's impacts on biodiversity, particularly threatened species and endangered ecological communities and the adequacy of the offsets proposed to be provided. A key concern was that the offset area is distant from the site and in a different bioregion. As this issue is not directly related to the Coolmore and Darley Woodlands horse studs the Commission has not considered this issue in detail, but notes that the Office of Environment and Heritage also raised concerns about the adequacy of the offsets proposed to be provided and that this issue will need to be assessed before a determination can be made.

Cultural Landscape and Heritage

The Commission has found that the studs have significant cultural landscape value tied to the existing land use activities that would be threatened by the proposed mining operations. Obvious threats derive from short term amenity impacts, but the greater and more significant risk is that thoroughbred breeding operations on the sites would be discontinued. Without the continuation of this land use it seems likely that the evolution of the cultural landscape would lose its significance, just as the continued use and maintenance of the built heritage items would no longer be assured.

Other impacts

Other impacts of the proposed mine have not been discussed in this report as they were not considered critical to the assessment of the impact on the horse studs. Nonetheless these would need to be considered prior to any determination and include Aboriginal cultural heritage, climate change and traffic impacts.

4.2. Recommend any additional measures required to avoid and/or minimise the potential impacts of the mine on the horse studs

In the previous section the Commission found the project would have a number of detrimental impacts on the Coolmore and Woodland Horse studs. In considering the additional measures available to avoid or minimise the potential impacts of the mine on the horse studs, the Commission found that the management and mitigation measures proposed for the mine are largely appropriate and include commitments to adopt best practice management of a range of impacts. Even with the implementation of best practice management measures the proposal will still have significant visual and amenity impacts and would cause the national air quality standards for human health to be exceeded at a number of residential locations. Both Mr Short and Dr Lamb have provided expert advice suggesting the impacts to the horse studs are unacceptable. The Commission accepts that these impacts are not compatible with the operations of Coolmore and Darley and would create a real threat to the future viability of the studs. Consequently the Commission has considered options to reduce the size and scale of the mining operations. To inform its consideration of this issue the Commission has considered the review of the mine plan undertaken by Runge Pincock Minarco (RPM, 2013) and also engaged Mr Richard Jennings and Mr John Janetzki to provide expert advice on the mine plan. The Commission has first considered the RPM review.

4.2.1. RPM Mine Plan Review

RPM noted it had been asked to consider questions related to three broad topics, relating to the rehabilitation of the existing Drayton Mine, the impact of the proposed Drayton South Mine on the horse studs, the rehabilitation of the proposed Drayton South Mine. The Commission has focused on RPM's consideration and findings on the Drayton South Mine.

The Department requested advice on a number of possible options to change the Drayton South mine plan (to reduce the impacts on the horse studs), broadly these can be summarised as:

- the removal of the Houston and Redbank Pits;
- the removal of all elements of the project that would be visible from Coolmore's property; and
- various options for delaying and/or reducing the impact of the visual bund.

The Department asked RPM to provide comment on both the technical and the financial implications of these options.

In relation to the financial implications, RPM generally found that the key changes it was asked to consider would have a material impact on the project economics. The Commission acknowledges that removing either the Houston or the Redbank pits would reduce the overall production levels, by approximately 8% and 17% respectively and that significant changes to the mine plan will influence the scheduling of both the dragline and truck and shovel fleet, potentially impacting on the ability to efficiently use the fleet available and to achieve coal product blend specifications. Nonetheless RPM did not quantify, the "material impact" it predicted, beyond a broad approximation of the total revenue lost. This is not surprising given the complexity of the economic modelling of the mine.

The project economics are complex and sensitive to a range of variables including future coal prices and the future value of the Australian dollar. The Commission received two alternative economic modelling analyses, provided by Muswellbrook Council and jointly by Coolmore and Darley.

As noted in other sections of this report, typically where the impacts of mining are unacceptable and cannot be readily reduced, the mine will acquire the affected receiver property, removing the impact. For the reasons outlined in section 4, acquisition of the horse studs is considered neither

appropriate nor feasible. Consequently the Commission has considered the possible mitigation measures available and where it is not satisfied these would provide adequate protection for the horse studs it has had to consider removing those components of the mine that are expected to cause the greatest impacts.

RPM found that to remove the visible components of the mine and keep it behind the natural ridgelines would require removal of the Houston Pit and also part of the Whynot pit. RMP estimated that this would result in a loss of 24 million tonnes of run of mine coal (24 Mt ROM coal), reducing dragline utilisation significantly as well as impacting on the overall annual production levels.

There was very little discussion of the options to remove or reduce the size of the Redbank Pit in RPM's report. Nonetheless RPM suggested the Redbank pit is required as it is a low stripping ratio pit that keeps the truck and shovel and coal handling and processing plant utilised.

Both options are said to have a material impact on the project economics and are dismissed by RPM as it has accepted the Proponent's argument that the project would comply with air and noise regulations. As discussed in section 4 the Commission is not satisfied the impacts of the proposed mine plan on the horse studs can be satisfactorily managed.

4.2.2. Expert advice to the Commission on the Mine Plan

The Commission specifically requested its experts to focus on whether the mine could be kept behind natural ridgelines technically, and to also carefully consider options to remove or substantially reduce the size of the Redbank pit, as this was one area the Commission felt the RPM review had not discussed in sufficient detail. The advice provided by Mr Jennings and Mr Janetzki is provided in full in Appendix 6.

Both options were found to be technically possible, although each would have impacts on the mine's production, dragline efficiencies, project risk and overall value. Both changes would also eliminate access to certain highwall mining areas, significantly reducing the available highwall and potentially compromising the viability of the entire highwall mining operation (highwall mining would have produced 3.7 million tonnes of product coal).

RA Jennings and Associates note that the Redbank pit has already been curtailed to maintain a 500m setback from the Golden Highway and to keep mining behind the ridgeline – reducing visual impacts. Nonetheless as the Commission had requested further consideration of Redbank, the engineers advised that the setback distance could be increased technically, but that this would reduce the available coal reserves. It was estimated that approximately 1 million tonnes of product coal would be lost for every 100m of additional setback; and specifically that if the pit size was reduced by 500m along the road boundary approximately 4.4 million tonnes of product coal would be sterilised.

4.2.3. Expert opinion on measures required to avoid or minimise impacts

Expert advice to the Commission on both the visual and broader equine industry impacts of the proposal have found that additional setbacks are required. While neither expert has provided a definitive distance, Mr Short concluded that "*an appropriate buffer distance between the Project and the Coolmore and Woodlands horse studs will be one that prevents and avoids all potential impacts. This is likely to be a distance of several kilometres.*" (Appendix 4, p37). Dr Lamb recommended that in addition to removing the Houston Pit and Bund and realigning the Whynot boundary, "*consideration should be given to requiring wider setbacks from the Golden Highway of the Redbank and part of the adjacent Blakefield pit in the order of 1-2km*" (Appendix 5, p18).

Both experts highlighted the unique factors which have led to these findings. Mr Short suggests that "*some thoroughbred studs make a larger contribution to the sustainability of the CIC than do others. With this in mind, acceptable levels of impacts from mining on horse studs should be variable, not fixed and be determined carefully on a case-by-case basis*." (Appendix 4, p36). In relation to Coolmore and Darley, who are seen as the most important of all core businesses, Mr Short suggests "*It is likely that an adequate buffer distance in this instance will be measured in kilometres, not hundreds of metres, and be influenced by inherent (natural) and induced (mining) topography"* (Appendix 4, p36).

Dr Lamb indicated that "*If the adjacent rural landscape which comprises the thoroughbred studs was general grazing or agricultural land, the visual impact could be considered acceptable. However, the combination of physical, aesthetic, cultural and historical values that characterise the studs, along with the nature of the rural industry that underpins them, gives rise to a heightened level of sensitivity to visual impacts*" (Appendix 5, p14-15).

The Commission concludes that these two horse studs and the historic and landscape value of the properties and surrounds are of special significance and should be retained.

4.2.4. Recommended avoidance and minimisation measures

In this instance, despite the substantial impact on production volumes predicted by both the mine planners engaged by the Commission and those from RPM, the Commission considers that it would be essential to set the mine back behind the natural ridgeline and remove the majority of the Redbank pit (to the second ridge) – to protect the horse studs from the impacts of mining. The Commission has marked the approximate location of this setback boundary on Figure 5 below. The Commission acknowledges that these recommended changes may prove either technically and/or financially unviable. If this smaller mine footprint is found unviable, then the Commission considers that the project cannot proceed.

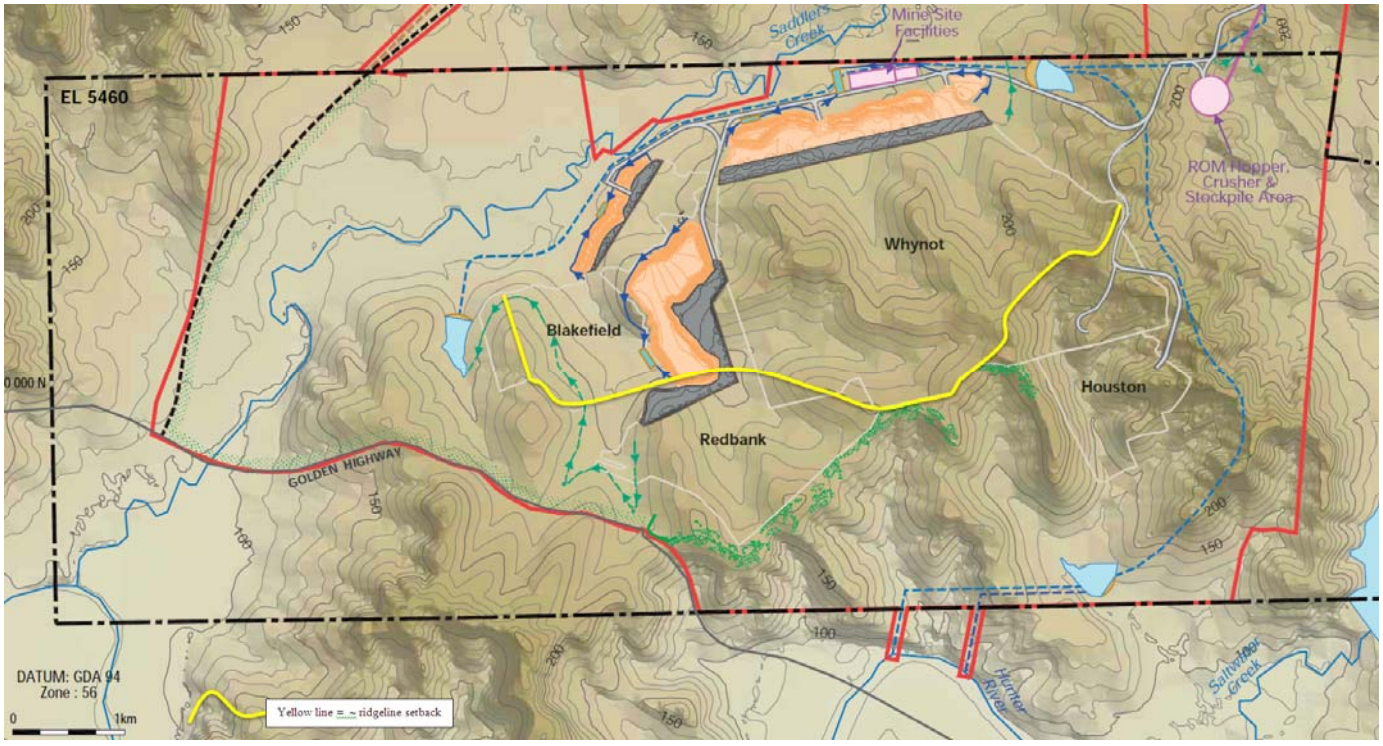

Figure 5: Minimum mining setback requirement, to the north of the ridgeline marked in yellow

Notwithstanding the setback requirements shown in Figure 5, further work would be required to demonstrate that the impacts of the mine could be suitably managed within this reduced mine footprint. In particular, air quality modelling will need to be updated to reflect the revised activities that would occur on site, and also to consider the worst case scenarios for the mine, including the influence of climate change.

The Commission considers that any redesign must include full consideration of the air quality issue. A cautious approach to air quality is recommended, having regard to the fact that high background particulate levels are expected in and around what was this mine plan's year ten (during the 2020 decade).

Visual impacts will still need to be carefully managed as there will still be visible evidence of dust, blast plumes and lighting which will all need to be minimised in accordance with best practice standards.

Blast impacts will also need to be carefully controlled and a detailed blast management plan and protocol will need to be developed in close consultation with the adjoining horse studs to ensure blasting is avoided during sensitive periods, and particularly during special events. Given the cumulative impacts from mining across the region, the Commission considers the ANZEC guideline should be applied and only 1 blast per day should be allowed. In addition, the blasts have the potential to cause particular difficulties for the Coolmore and Woodlands horse studs both in relation to horse handling and reputation. If the mine proceeds in any form, then a protocol for managing and coordinating mine blasting with the operations on the Coolmore and Woodlands studs would need to be developed.

The Commission considers that the location of the water discharge points, immediately upstream of Coolmore's extraction points, poses an unnecessary risk of impact. If the mine proceeds in any form the location of any water discharge points should be reconsidered in relation to Coolmore's extraction points.

The Commission expects that the mine plan for this smaller footprint would be reconsidered in relation to dragline sequencing and the like. Highwall mining options would also need to be reconsidered and further explored. The final landform may be entirely different as a result of the changes. Consequently, detailed consideration of the long term water balance and impacts will need to be undertaken before any determination could be made.

5. Conclusions

The Commission has concluded that this open cut mine should not proceed at the planned scale in this location. There are two key reasons for this position.

First, the mine adjoins two thoroughbred studs of critical importance to the equine critical industry cluster. In short, because these two stud's operators own most of the key breeding stallions, broodmare farms throughout the upper hunter are largely reliant on these operators for continued operations. An impact on either one of these studs has the real potential to cause the studs to leave, which would affect the cluster as a whole.

Second, the Commission heard during the public hearing and in submissions that the landscape in this area is a significant cultural landscape which may qualify for listings of heritage significance at both a State and National level. The Commission found that the historic and continuing land use patterns combined with the built heritage structures, unique topography, landforms and environment have value to the horse and tourism industries, but also have a special cultural heritage significance as well. The Commission considers that the landscape of the studs and their surrounds warrants conservation and protection. Open cut mining in this location threatens the significance of the surrounding landscape.

A previous review undertaken by the Planning Assessment Commission indicated that "*available evidence supports the view that open-cut coal mining and a viable international-scale thoroughbred breeding enterprise are incompatible land-uses*" (PAC, 2010). Mr Short also found that "*Thoroughbred horse studs of the nature and scale of Coolmore and Woodlands, and open cut coal mining as proposed by the Project are incompatible land uses. These land uses cannot co-exist in close proximity to one another.*" This Commission agrees with these statements, but notes that the Commission's conclusions and recommendations are unique to the circumstances of this particular location.

The Commission is recommending that if this coal mine is to proceed it will need to be subject to substantial changes. A much smaller mine on the northern portion of the site, may well be achievable. The Commission is firmly of the view that a reduction in pit sizes will not suffice. Substantial additional setbacks will be required, with associated loss of pits to the mine plan. In addition, given the pits will still be in relatively close proximity to the studs, the mine will need to achieve unprecedented standards of performance, management, consultation and cooperation to ensure the operations of the two horse studs are protected.

The Commission acknowledges that the removal of pits can impact on the viability of a mine plan, not only due to reductions in the tonnage extracted, but perhaps more significantly in relation to mine sequencing. Mine sequencing is important both for efficient use of equipment and to ensure the quality of the coal being extracted at various times can be mixed to achieve the required product blend specifications. In addition to the operational implications, changes to the mine plan will also alter the final landform, including any voids (which should be avoided) and the associated long-term water balance across the rehabilitated site. These changes will need very careful consideration.

If any open cut mining is to proceed on the project site, then it must be subject to the most stringent controls and conditions, including provisions for close cooperation when special events are scheduled on the studs, including requirements to prevent blasting during these events. Setbacks will also be essential and at the very least, must be established to:

- ensure the physical activities and operations are not visible from the studs' primary areas of operations, i.e. mining can only occur behind natural ridgelines; and
- having regard to the topography of the area, open cut mining must not be allowed to extend through the second ridge to the north of the Golden Highway (opposite Arrowfield) to buffer against noise, dust, blasting and lighting (see Figure 5, on page 25 of this report).

The Commission has found that these setbacks are the absolute minimum required and additional work would be needed to demonstrate that mining in the remaining northern area of the site would not cause any significant impacts to the two studs. In addition, it will be essential that any mine operator responsible for the site is willing and capable of acknowledging, understanding and responding to the importance and critically sensitive operations of the two studs.

If this mine is to proceed at all, there must be substantial concessions to the equine industry. With these concessions and setbacks in place a much smaller mine on the northern portion of the site may well be achievable. Consequently the Commission has made the recommendations below.

In summary, the terms of reference for this review directed the Commission to specifically assess the potential impacts of the project on the operations of the Coolmore and Woodlands horse studs and to recommend any additional measures required. The Commission has done this and found that the impacts pose real threats to the studs' operations. The Coolmore and Darley Woodlands studs are critical to the broader Upper Hunter Equine Critical Industry Cluster. Consequently the Commission has recommended significant further setbacks are required between the mine and the studs. The setbacks and other recommendations made here below are specific to the significance of the two studs, the landscape and the topography of the area. The findings and recommendations in this report are specific to the unique circumstances in this location and are not intended to apply to the Upper Hunter Equine Critical Industry Cluster more broadly.

Recommendations

1) The Coolmore and Woodlands horse studs should be recognised as essential to the broader Equine Critical Industry Cluster and given the highest level of protection from the impacts of mining.

2) The mine plan proposed for the site should not be approved.

3) Any open cut mining contemplated on the site should be required to demonstrate that its impacts will not affect the operation of the Coolmore and Woodlands horse studs.

4) If mining on any portion of the site is to proceed, a new mine plan would be need to be developed to plan for extraction from a considerably reduced mining area. As a minimum, the mine plan would need to be constrained to adopt the following physical restrictions:

   a) Open cut mining must be setback behind the existing natural ridgelines;

   b) Considerable buffering to shield the studs from the mine is necessary and, having regard to the topography of the area, open cut mining must not be allowed to extend through the second ridge to the north of the Golden Highway (marked in yellow on Figure 5).

   These physical constraints are put forward as minimum setbacks and any proposed mining area on the site would need to be subject to rigorous assessment to ensure compliance with recommendation 3 above.

5) Any new mine plan for the site would need to be further assessed to ensure the visual, blasting, noise and dust impacts could be managed to an acceptable level at the neighbouring stud properties and should take into account worst case scenarios. Other impacts would also need to be carefully considered both in relation to any impacts to the horse studs and more broadly, particularly in relation to the long term water impacts and the final landform.

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List of Appendices

APPENDIX 1
TERMS OF REFERENCE

Request to the Planning Assessment Commission

Drayton South Coal Project

Section 23D of the *Environmental Planning and Assessment Act 1979.*
Clauses 268R and 268V of the *Environmental Planning & Assessment Regulation 2000.*

I, the Minister for Planning and Infrastructure request the Planning Assessment Commission to:

1. Carry out a review of the Drayton South Coal Project, and:
   a) consider the EA for the project, the issues raised in submissions, the formal response to submissions, the Preferred Project Report, the review of the mine plan by Runge Pincock Minarco, and any other information provided on the project during the course of the review;
   b) assess the potential impacts of the project on the operations of the Coolmore and Woodlands horse studs; and
   c) recommend any additional measures required to avoid and/or minimise the potential impacts of the project on the horse studs.

2. Conduct public hearings during the review as soon as practicable after the Proponent provides its Preferred Project Report.

3. Submit its final report on the review to the Department of Planning and Infrastructure within 1 month of the public hearings, unless the Director-General of the Department agrees otherwise.

The Hon Brad Hazzard MP
Minister for Planning & Infrastructure
27 AUG 2013

Sydney 2013

PREVIOUS TERMS OF REFERENCE OF MARCH 2013, SUPERSEDED BY THE AUGUST 2013 REQUEST

Request to the Planning Assessment Commission

Drayton South Coal Project

Section 23D of the *Environmental Planning and Assessment Act 1979.*
Clauses 268R and 268V of the *Environmental Planning & Assessment Regulation 2000.*

I, the Minister for Planning and Infrastructure request the Planning Assessment Commission to:

1. Carry out a review of the Drayton South Coal Project, and:
   a) consider the EA of the project, the issues raised in submissions, the formal response to submissions, the Gateway Panel's advice on the project, and any other information provided on the project during the course of the review;
   b) assess the merits of the project as a whole, paying particular attention to the:
      - impacts of the project on strategic agricultural land, as identified in the *Upper Hunter Strategic Regional Land Use Plan*, and in particular the Coolmore and Woodlands studs, which form part of a defined Equine Critical Industry Cluster (CIC), and the Arrowfield Estate, which forms part of a Viticulture CIC;
      - health and amenity impacts of the project, with a specific focus on whether all reasonable and feasible mitigation measures are being employed to avoid and/or minimise these potential impacts of the project;
      - impacts of the project on local infrastructure and the demand for services, and in particular:
        - the potential impacts of the project on Edderton Road and Thomas Mitchell Drive;
        - the demand for local-funded infrastructure and services;
        - the demand for state-funded infrastructure and services; and
        - the adequacy of the proposed community (or Section 94) contributions for the project; and
      - long term land use impacts of the project and the suitability of the proposed rehabilitation of both the existing and new mining areas, including the final landforms and voids, and the compatibility of this proposed rehabilitation with the rehabilitation and conservation strategies on adjoining mines and/or power stations and any strategic land use plans for the area;
   c) recommend further measures to avoid, minimise and/or offset the potential impacts of the project; and
   d) provide advice on the suitability of the site for the project and whether the project is in the public interest.

2. Conduct public hearings during the review as soon as practicable after the Proponent provides its formal response to submissions on the project.

3. Submit its final report on the review to the Department of Planning and Infrastructure within 2 months of the public hearings, unless the Director-General of the Department agrees otherwise.

The Hon Brad Hazzard MP
Minister for Planning & Infrastructure

Sydney 16. 3. 2013

APPENDIX 2

LIST OF SPEAKERS AT THE PUBLIC HEARING

Hearing Date: 10 October 2013
Venue: Denman Memorial Hall

1. Anglo American
    - Mr Seamus French, CEO; and
    - Mr Rick Fairhurst, NSW Project Manager
2. Mr John Kaye
3. Mr Adrian Barwick
4. Mr John Hayes
5. Mr Brett Keeping
6. Nature Conservation Council of NSW
    - Ms Katerine Smolski, Campaigns Director
7. Mr Greg Walker
8. Ms Angela Barry
9. Ms Shannan Smith-Eckman
10. Mr Gus Mathers
11. Mr Allen Barry
12. Mr Logan Francis
13. Scone Equine Hospital Group,
    - Dr Angus Adkins
14. Mr Wayne Bedggood
15. Scone Race Club,
    - Mr Noel Leckie, CEO
16. Ms Wendy Bowman
17. Ms Meryan McRobert
18. Cr Kiwa Fisher, Upper Hunter Shire Council
19. Hunter Thoroughbred Breeders Association
    - Mr Andrew Beatty
    - Dr Cameron Collins, President;
    - Ms Sharon Veale; and
    - Dr Carl Fung
20. Ms Kaye Monro
21. Mr Craig Benjamin
22. Coolmore Australia,
    - Mr Ken Barry, Chairman
    - Mr Michael Wright;
    - Mr Ross Watson; and
    - Mr Owen Droop
23. IH & RA Moore Partnership,
    - Mr Neil Sutherland; and
    - Ms Erin Holton
24. Darley Australia
    - Mr Henry Plumptre, Managing Director; and
    - Mr Rod Carr, Principal Marden Jacobs Associates
25. Hunter Environment Lobby
    - Ms Jan Davis, President

SUBMISSIONS AND PRESENENTATIONS MADE AT THE PUBLIC HEARING

Copies of the publicly available submissions along with the presentations and speeches made during the public hearing (that were later provided to the Commission in written form) are available on the Commission's website, http://www.pac.nsw.gov.au. A brief summary of the issues raised at the Public Hearing is provided below.

Issues	Submissions presented at the Public Hearing
Social and Economic	Employment • The outcome was considered to adversely affect employment either way, with mining jobs impacted if the mine does not proceed and agriculture, equine, viticulture and tourism jobs in jeopardy should the mine proceed. • The short term nature of the mining jobs was compared to the potential for a sustainable long term future for the agriculture sector if responsible land management practices are pursued. • It was suggested that not all jobs are good – noting that illness creates jobs. • The mining sector's vulnerability to coal prices was also noted. • Impacts of job losses on miners and their families if the project does not proceed was also of concern. Social • Impacts of uncertainty both from mining and without the mine e.g. when an exploration licence is granted or when a job is lost. • It was said that there is a long history of coal mining in the Hunter Valley and that the workers at the mine are locals. • Inability of other sectors to compete with the mines for workers. • Both the mine and the equine industry argued they are responsible employers with heavy social contributions and involvement in the local community. • The impacts of the mining boom will peak after the mines have closed. • The social impacts of drive in drive out workforce. Economic • The current diversified economy supported by the mining, equine, viticulture and tourism industries was considered well balanced and it was suggested each component needed to be maintained and protected. • Coal mining integral to the region but should not come at the expense of rural industries. • Investment in equine, viticulture and tourism sectors was said to be lost or on hold due to uncertainties about potential mining operations and associated impacts. • It was suggested that the viticulture and equine industries interrelate in the region, with each supporting the other. • The employment and economic benefits of both the mine and the horse studs was noted with suggestions that support services to both industries are vulnerable to the loss of the mine or horse studs. • The financial contribution of the mines was compared to that of the equine industry. • It was said the project would not benefit the NSW economy. • An independent economic assessment was called for. • The long term demand and viability of thermal coal production was questioned suggesting it will remain viable for 50 years at best.

Issues	Submissions presented at the Public Hearing
	• It was noted the mine would take advantage of existing infrastructure and would contribute $550 million in state royalties. Economic Modelling • The economic modelling and methodologies were questioned and it was suggested that the benefits of the mine were overstated. • The coal price adopted was said to be overstated and unrealistic. • Concerns about the assumptions used. • Was said to have failed to address the Director General's requirements and guidelines.
Significance of the Coolmore and Darley Woodlands Horse Studs to the Upper Hunter and the Equine CIC	• Physically positioned as gateway to the Upper Hunter, with picturesque properties a great landmark for arrival to the region. • Considered of National importance and recognised in the listing of the equine Critical Industry Cluster. • The majority of the Upper Hunter Broodmare farms were said to be reliant on the two operators. • Coolmore has been a leading stud for decades and both properties have a long history of producing high quality bloodstock. • Key operators critical to the area's international reputation for excellence. • Contributions to broader equine industry cluster, including local racing and critical to the ongoing survival of local racing and the broader equine CIC. • Any impacts on these two studs was predicted to have significant flow on effects to others in the equine industry, future of the breeding industry in the Hunter considered to be at risk. • Heritage value of the buildings, properties and landscapes on and around the two studs. • Local tourism industry is founded on a collective experience provided by the presence of horses, vineyards and olives and impacts on these studs would have flow on impacts to tourism as well.
Impacts on Horse Studs	• Impacts on horse studs were disputed with some claiming dire impacts and others claiming no impact. • Others acknowledged coexistence may be difficult but encouraged both sides to find a solution. • The unique physical features and environment on and around the studs was said to be irreplaceable and unable to be replicated. • Concerns were raised regarding dust deposition and windblown dust, including based on experience with other mines near horse studs. • Impacts of noise and blasting on horses and safety of handlers during a blast event was of concern; along with • Visibility of blasting and the likely impacts on buyer confidence. • Concern the studs will leave the region, moving to Victoria or internationally.
Health	• Human health impacts, especially from dust and particularly for employees residing on the Coolmore and Woodlands studs. • Insufficient science on the human health impacts of coal mining. • Need for further work on air quality standards. • Inadequate assessment of potential horse health impacts. • The possibility that horses may also be impacted in the same way as people.
Air Quality	• Particularly dust, as well as blast fumes, silica and coal particulates, diesel combustion emissions, heavy metals and sulphur emissions from spontaneous combustion on the existing mine site.

Issues	Submissions presented at the Public Hearing
	• The mine would compound the existing cumulative air quality issues in the Hunter. • Adequacy of the Air Quality assessment, particularly in relation to meteorological data, background estimates and source contributions used in the modelling. • Need for the assessment to acknowledge the highly sensitive nature of neighbouring operations. • Modelling needs to consider climate change and the impact of increased wind speeds.
Water	• Surface and Groundwater impacts not considered to be adequately assessed. • Water quality impacts including mine discharges and generation of leachate. • Water quantity, particularly impacts on the Hunter River, as well as aquifers. • Long term impacts of the final void proposed. • The modelling undertaken was questioned with concerns about the predictions both for water quantity and quality, the modelling was not thought to be reliable and long-term predictions were thought to be unrealistic. • Cumulative impacts, particularly from all the final voids across the Hunter. • It was suggested a regional groundwater study and a comprehensive assessment of the Hunter Salinity Trading Scheme is needed. • Need for water licences to be reserved for agriculture .
Visual	• It was suggested that the visual landscape, picturesque setting, topography, soils and clean healthy environment were significant and crucial features for the ongoing success of the studs and were a common feature of thoroughbred breeding areas worldwide. • The visual presentation and perception of the studs was said to be critical to the businesses, suggesting coexistence was implausible and unrealistic. • The visual impact was suggested to have been understated by the Proponent noting strong colours and signs warning of blasting would all draw attention to the presence of a mine. • The effectiveness of tree screening was questioned, noting that filtered views through tree trunks will still be possible. • The visibility of blast plumes was also of concern with potential to impact on the perception and interest from prospective horse owners.
Land	It was suggested that: • high quality agricultural land should be protected from mining. • Soils on the mine site may be variable, that the land capability of the site has not been verified with adequate mapping and that this is warranted given photographic evidence of significant agricultural activity on the site in the 1970s. • The CIC mapping was based on insufficient data and cannot be relied on. • Mining is a once only use of the land. • The neighbouring studs represent some of the best agricultural land in the Hunter region. • The current use of the horse stud properties is the highest and best use of the land. • The combination of high quality soils, access to water, balance of river flats and undulating hills, favourable pastures and connections to the broader equine industry is critical to the success of the studs, at risk from the

Issues	Submissions presented at the Public Hearing
	proposed mine, unique and worth protecting. • Concerns were also raised regarding the ability to rehabilitate land after mining, both for future use and its long term stability/safety.
Adequacy of the assessment provided by the Proponent	• It was suggested that the Environmental Assessment and Preferred Project Report are inadequate, particularly in assessing impacts on the equine industry. • Concerns were raised about the modelling of various impacts, how the predictions have been derived and expressed and the suitability of criteria uses, given the sensitive nature of the neighbouring operations.
Historic and Cultural Heritage	• The listed heritage items were noted. • It was suggested that the area is a significant cultural landscape with outstanding value to the nation.
Biodiversity	Concerns raised included: • Impacts on threatened species and endangered ecological communities; • Offsets should be within the same bioregion; • Offsets have not been verified; • Offsets are insufficient with a shortfall of 2000 ecosystem credits; and • Impacts on groundwater dependent ecosystems.
Climate change	• Concerns about the contribution to climate change. • Emission no longer internalised without carbon tax. • Need for coal power questioned given renewable technologies are available.
Other	• The Equine and Mining operations were suggested to be incompatible land uses. • Cumulative impacts of mining. • Concern over the process for granting exploration licences. • Legacy of mining impacts for future generations. • Transparency of the coal mining industry in managing and reporting its impacts. • Concerns that the mine may be unable to manage impacts. • Suggestions that the defects of the project cannot be remedied with conditions. • The precautionary principle should be applied. • The need for the project was questioned. • The need for a risk assessment on the preferred project. • It was noted that the mine's traffic would not impact on the Golden Highway.

APPENDIX 3
SUMMARY OF MEETINGS WITH OTHERS

Briefing from the Department of Planning and Infrastructure, 16 April 2013

- The Department advised that the existing Drayton Mine has been operating for 30 years.
- The existing mine operation at Drayton was discussed.
- It was noted that the distance between the two sites is considerable.
- The stripping ratios, footprint and production levels were discussed.
- Similarities to the previous mine plan that was approved on the site were noted.
- The Department indicated that the submissions made were mainly from the local area, with 42 from members of the public and 16 from special interest groups.
- The critical industry cluster mapping was noted to cover parts of the mine site and the mapping criteria were discussed.
- Air quality was noted to be an issue of interest for the broader region.
- Use of the existing rail spur was noted.
- The realignment of Edderton Road was discussed.
- Muswellbrook Council's concerns regarding the Sewage Treatment Plant were noted.

Briefing from the Proponent and site visit, 17 April 2013

- The coal resource in the existing Drayton mine will be exhausted by early 2015.
- The original proposal approved on the project site was to be further to the west, would have mined through the ridgeline and also included a rail loop down to the site.
- It was suggested the mine consent was still valid at the time the horse studs were being established.
- It was suggested that the proposal not to mine through the ridgeline is as a result of discussions with the neighbouring studs.
- The mine would not be accessed from Edderton Road, so there would be minimal traffic impact from the project.
- It was suggested that Coolmore had requested the Houston Pit be removed from the mine plan, but the Proponent does not consider this to be economic.
- The Proponent indicated it has had follow up meetings with Muswellbrook Council, since Council's submission was made and it understands its key concerns are the Voluntary Planning Agreement and the final landform.
- The Proponent indicated it had an option to purchase the Arrowfield site and would do so if the project was approved.
- Neighbours to the west were said to be generally supportive of the project and the realignment of Edderton Road.
- The Proponent indicated that predictive forecasting and real time monitoring is already used on the existing Drayton site for management of dust emissions.
- The Proponent confirmed that no overburden would be transferred from Drayton South to the Drayton mine, only Run of Mine Coal.
- The Proponent advised the conveyor option was not viable at present.

Follow up briefing with the Department of Planning and Infrastructure, 5 September 2013

- The revised terms of reference were noted and the Department confirmed the gateway panel had not yet been appointed.
- A review of the Critical Infrastructure Cluster mapping was said to be in progress with new maps to be produced for exhibition, the Department noted there are some errors with the new maps it had seen.

- The Department explained it had sought expert review of the mine plan and the air quality assessment provided by the Proponent.
- The deadline in the Minister's terms of reference was agreed to be very tight and the Commission advised it would write to seek a one month extension.

Meeting with Proponent, 24 September 2013

- The Proponent indicated it is seeking to commence mining in 2016 and needs a 12 month lead time for construction.
- The Proponent indicated it was in ongoing discussions with Coolmore and would be meeting Coolmore again later that week to try and resolve outstanding concerns.
- The preferred project report was said to provide five key changes, a small realignment of the Haul Road/conveyor route; a change to the pipeline location; a reduction in the size and construction time for Houston visual bund; changes to the final landform, to reduce the size of the final void and additional detail on the rehabilitation of the site; and provision of a minimum 40 m setback to Saddlers Creek.
- The Proponent indicated it was establishing an agreement with Arrowfield and was working through the final negotiations.
- The Voluntary Planning Agreement was noted.
- The Proponent indicated that 2 million tonnes of coal resource would be sterilised as result of the improvements made to the visual bund.
- The Proponent suggested the impacts of blasting to horses on Coolmore's property would build up over time, as mining progressed towards the stud, and so firstly it was expected that the horses would become accustomed to the impacts and if any reactions did occur, there would be scope to learn from these impacts and adjust the operations to minimise issues, as mining progressed closer to the studs.

Meeting with Muswellbrook Council, 26 September 2013

- Council noted that both equine and viticulture Critical Industry Clusters are mapped over considerable parts of the Drayton South Exploration Lease Area.
- Council also noted that there are already extensive coal mining operations in the Muswellbrook Local Government Area.
- Council presented the Commission with an economic study it had commissioned on the project. Council particularly noted that the area is very close to full employment (with 3.7 % unemployment the most recently available figure at the time of the meeting) and that the cost benefit analysis does not include a number of externalities.
- The viability of the mine was questioned by the Council.
- Council suggested that reputational image is critical to the thoroughbred industry.
- Council suggested mining in Muswellbrook LGA was principally underground mining up until the turn of the millennium, and is now largely open cut mining.
- Councils raised concerns about the impacts of mining on air quality in the region.
- The coal resource on this site was not considered to be particularly valuable.
- Council also raised concerns about the realignment of Edderton Road, suggesting that the cumulative realignments by Mount Arthur and this proposal would result in a longer trip than the existing route, via Denman.

Meeting with NSW Environment Protection Authority, 16 October 2013

- The EPA representatives provided comment on the air quality and noise and blasting predictions.
- EPA acknowledged that air quality modelling is increasingly difficult at a cumulative level.
- Consistent with other mines the EPA has focussed on source and emission control for particulates.

- The EPA noted that 80% control of dust represents best practice.
- The Commission asked about the EPA's experience with the dust-a-side product proposed to be used at this mine, the EPA had no direct experience with the product, but noted that the effectiveness of these types of treatments are highly dependent on their application and use.
- In relation to noise, the EPA was largely satisfied with the modelling undertaken, which suggests the mine would comply with standard criteria for noise. It was noted that the modelling adopted very stringent source control of noise.
- In relation to blasting, the mine's proposal to exceed the 1 blast per day guideline was acknowledged.
- The EPA did not have any comments on the potential impacts of either mine dust or blasting on the horses and equine operations at the studs.

APPENDIX 4
EXPERT ADVICE ON THE EQUINE INDUSTRY FROM MR TERRY SHORT

la tierra the earth
NATURAL RESOURCE SCIENTISTS & ENGINEERS

REPORT TO
NSW PLANNING ASSESSMENT COMMISSION

POTENTIAL IMPACTS OF THE PROPOSED DRAYTON SOUTH COAL PROJECT ON COOLMORE AND WOODLANDS HORSE STUDS

November 2013

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Our sustainability

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EXECUTIVE SUMMARY

The New South Wales (NSW) Government's *Strategic Regional Land Use Policy* identifies and protects the *Upper Hunter Equine Critical Industry Cluster (CIC)* as a component of *Strategic Agricultural Land (SAL).* This report to the NSW Planning Assessment Commission reviews the potential impacts of the proposed Drayton South Coal Project (the Project) on the adjacent Coolmore and Woodlands thoroughbred horse studs. Implications to the equine CIC are also discussed with respect to the potential impacts on these studs. Additional measures required to avoid the potential impacts are recommended.

This review finds the following.

1. The Project's Environmental Assessment is lacking with respect to its assessment of potential impacts on Coolmore and Woodlands horse studs and entirely deficient in its description and analysis of the equine CIC.
2. With regard to submissions about the Project, and irrespective of any real or perceived conflicts of interest that submitters may have, there is enough consistent and well-informed argument to establish *reasonable doubt* about many aspects of the potential impacts on Coolmore and Woodlands, and the CIC, put forward in the Project's Environmental Assessment.
3. Even if potential impacts to Coolmore and Woodlands were considered unlikely to occur, the consequences to the CIC should these studs be impacted by the Project are so significant that, when considered carefully, the risks are too great and should be avoided.
4. Thoroughbred horse studs of the nature and scale of Coolmore and Woodlands, and open-cut coal mining as proposed by the Project are incompatible land uses. These land uses cannot co-exist in close proximity to one another.
5. Coolmore and Woodlands (as Darley Australia and operated in conjunction with Kelvinside stallion stud) horse studs are the most important of all core businesses within the CIC. These studs are central to the functioning of the cluster.
6. Project approval will likely trigger the withdrawal of Coolmore and Woodlands horse studs from the CIC because the potential impacts are considered unacceptable by these businesses.
7. If Coolmore and Woodlands horse studs exit the cluster, this will cause decline and possible demise of the CIC.
8. Coolmore and Woodlands horse studs should be provided absolute protection from impacts of open-cut coal mining as proposed by the Project in order to preserve the sustainability of the CIC.
9. An appropriate buffer distance between the Project and the Coolmore and Woodlands horse studs will be one that prevents and avoids all potential impacts. This is likely to be a distance of several kilometres. No alternate mitigation measures could suffice.

1 INTRODUCTION

Anglo American Metallurgical Coal Pty Limited (Anglo Coal) is the Proponent for the proposed Drayton South Coal Project (the Project), in the Upper Hunter region of New South Wales (NSW). The Project seeks to develop an open-cut coal mine in proximity to the Coolmore and Woodlands thoroughbred horse studs, near Jerry's Plains.

The Upper Hunter Strategic Regional Land Use Plan (SRLUP) by DP&I (2012) identifies the equine cluster in the Upper Hunter region as a component of Strategic Agricultural Land (SAL) in NSW and affords it Critical Industry Cluster (CIC) status. The criteria that define this equine CIC are concerned with socio-economic values (DP&I, 2012 p.21). More generally, DP&I (2012) describe CICs as follows.

> *"...a localised concentration of interrelated productive industries based on an agricultural product that provides significant employment opportunities and contributes to the identity of the region. The cluster also needs to be potentially substantially impacted by coal seam gas or mining proposals."*

On 27 August 2013, the Minister for Planning & Infrastructure requested the NSW Planning Assessment Commission (PAC) to carry out a review of the Project and, amongst other things, do the following.

> *"1. b) assess the potential impacts of the project on the operations of the Coolmore and Woodlands horse studs; and,*
>
> *c) recommend any additional measure required to avoid and/or minimise the potential impacts of the project on the horse studs" (Minister for Planning & Infrastructure, 2013).*

PAC has engaged La Tierra to provide advice on these matters for review.

In addition and to an extent reasonably possible, PAC has requested further advice as to the following.

1. *How important is the thoroughbred horse breeding industry, in total, to the Upper Hunter region?*
2. *What is the 'tipping point' at which time Coolmore and Woodlands would exit the Upper Hunter equine CIC?*
3. *What is the importance of reputation value (the brand) to the thoroughbred breeders, particularly Coolmore and Woodlands?*
4. *What would be an appropriate buffer distance between the proposed mine and the horse studs?*

1.1 Methods

In preparing this report, La Tierra has:

- Read the documents referred to in the text of this report;
- Taken into account commentary and presentations made at the Public Hearing in Denman on Thursday 10 October 2013;
- Conducted its own review of available and relevant literature, which is cited throughout the text of this report and fully referenced in Section 6.

2 POTENTIAL IMPACTS OF THE DRAYTON SOUTH PROJECT ON COOLMORE AND WOODLANDS HORSE STUDS

The potential impacts of the Project on Coolmore and Woodlands horse studs are not able to be fully determined because the Proponent's Environmental Assessment (EA) and Preferred Project Report, including the Agricultural Impact Statement (AIS), is non-conforming and non-compliant with requirements. For example, no assessment of potential implications to the CIC has been included. Following is an overview analysis of the *stated* and *unstated* potential impacts of the Project on both studs.

2.1 Stated impacts

The EA identifies a number of potential impacts on Coolmore and Woodlands. Despite requirements of the Director General, assessment of impacts on the CIC is largely absent. The EA fails to adequately describe the CIC or the role of Coolmore and Woodlands in it.

Although Coolmore and Woodlands are immediately adjacent to the Project, the AIS concludes the predominant agricultural enterprise operating within the area is beef cattle breeding for the weaner domestic market (Barnett, 2012). Table 73 of the EA presents the *"Value of Total Agricultural Production Impacted and Outputs."* The table lists wool production, sheep slaughtering and beef slaughtering (Barnett, 2013) but excludes any mention of horse breeding.

Specific to Coolmore, Woodlands and the Equine CIC, a summary of the proponent's assessment of potential impacts from the Project is provided (Table 2.1). To varying degrees, according to location and proximity to the proposed mine, Project operations will be seen, heard, respired and felt on both Coolmore and Woodlands, including in consideration of management, monitoring and mitigation measures. While the EA states clearly that it recognises that the value of thoroughbred breeding in the region is greater than $100M, it inexplicably concludes no economic or socio-economic impact on either stud or the CIC.

Despite subsequent responses provided to the Project through submissions, the Proponent's position remains that no impact on Coolmore and Woodlands will be long-term, permanent and/or material. The Proponent asserts no significant impacts in relation to the following.

- Dust, Noise and Vibration (including overpressure);
- Surface water;
- Ground water;
- Traffic and transport; or,
- Economics.

Table 2.1 Stated potential impacts from the Project on Coolmore, Woodlands and the equine CIC

Stated Impact	Proponent's assessment of impact	Proponent's position on impact	EA address of impact
Equine health (Dust)	Undertaken by: • Dr Nicholas Kannegieter, Specialist Equine Surgeon; • An Air Quality Impact Assessment was undertaken by PAEHolmes. Description and findings: • Dust produced will not pose a risk to equine health in both adults and foals, including individuals permanently residing or visiting the thoroughbred breeding operations, of Woodlands and Coolmore; • Annual average cumulative PM10 concentrations resulting from the Project will meet the regulatory criteria of 30 µg/m3 at all locations on Woodlands Stud and Coolmore Stud; • The PM10 levels generated by the Project are well below the limit of 230 µg/m3 recommended by Cargill (1999), identified through the equine literature review, and the range considered normal for a paddock; • Equine dust health issues are caused by endotoxins attached to the particulate matter Lower Respiratory Tract inflammation. The dust itself will simply be an irritant.	No significant impact. • Proponent has reduced mining intensity at the Redbank mining area. Upgrading truck fleet in Year 10, resulting in no exceedances of the PM10 annual criteria at residences on the Coolmore Stud; • Number of days exceeding the PM10 24-hour criteria at Coolmore Stud office was reduced from 31 to 1.	EA Reports and Appendices: • EA Main Report (Dust – section 8.1.2, 8.1.3, 8.5.3 and 8.5.4) • Revised Risk Assessment (Appendix E); • Air Quality and Greenhouse Gas Assessment (Appendix F) • Equine Health Impact Assessment (Appendix H); • Agricultural Impact Statement (Appendix R) • Preferred Project Report.
Equine health (Noise)	Undertaken by: • Dr Nicholas Kannegieter, Specialist Equine Surgeon; • Acoustics Impact Assessment was undertaken by Bridges Acoustics.	No significant impact. • The noise levels generated by the Project are below levels that are likely to agitate horses; • Given the noise exposures experienced by thoroughbred horses in stables and	EA Reports and Appendices: • EA Main Report (Noise – section 8.3.3.); • Revised Risk Assessment (Appendix E); • Equine Health Impact

Stated Impact	Proponent's assessment of impact	Proponent's position on impact	EA address of impact
	Description of findings: • Noise and vibration impacts are not predicted to exceed the relevant criteria at any privately owned properties to the south of the Drayton South area; • Agricultural resources and enterprises in the locality will not be adversely impacted by noise and vibration; • Noise levels will not exceed 40 dBA on any receivers at Coolmore or Woodlands. For the majority of these receivers, noise levels of 30 to 33 dBA are predicted - comparable to the measured background noise; • Horses exposed to noise levels in the range of 54 to 70 dBA would be unlikely to exhibit signs of distress particularly in the absence of a visual stimuli or threat. Horses can comfortably withstand levels of 54 to 70 dBA; • Cumulative noise impacts may potentially be caused by concurrent operations at the Project, Mt Arthur Coal Mine, Hunter Valley Operations Coal Mine, and Macquarie Generation's power stations and Hunter River pump station; • Horses demonstrate habituation – an ability to become accustomed to certain stimuli. If a noise becomes familiar to the horse and it is not associated with danger it will not be startled by the noise. This will also apply to foals born during the Project.	the habituation ability of horses, the operational noise of the Project is unlikely to have any adverse impacts on equine health.	Assessment (Appendix H); • Acoustics Impact Assessment (Appendix G); • Agricultural Impact Statement (Appendix R); • Preferred Project Report.
Equine health (blasting)	Undertaken by: • Blasting Impact Assessment undertaken by Bridges Acoustics.	No significant impact. • Horses can withstand prolonged vibration during road and air	EA Reports and Appendices: • EA Main Report (Dust – section 8.1.2, 8.1.3, 8.5.3 and

Stated Impact	Proponent's assessment of impact	Proponent's position on impact	EA address of impact
	Description of findings: • All four homesteads on Coolmore and Woodlands are expected to experience blasting impacts - particularly Arrowfield Estate (Coolmore). Arrowfield estate is only 670m away from the Project; • It is expected that the relevant criteria will be exceeded on Coolmore, at Arrowfield Estate, if the MIC is above 500 kg when mining in the most southerly extent of the Redbank mining area; • A conservative -5 dBL correction has been applied to calculated overpressure levels to account for the constructed topographic barrier; • Overpressure levels from blasting (when closest to the receiver) are predicted in the range of 93 to 109 dBL for indicative locations on Coolmore Stud and Woodlands Stud. Distance from blasting to the horse studs will be greatest at the beginning of the Project when overpressure levels will be significantly lower; • Vibration levels produced by blasting would be far lower than the levels experienced by horses during road and air transportation – the horses can become accustomed to noise and overpressure from the Project; • Anecdotal evidence indicates that horses at the Muswellbrook racecourse and stables are not startled by blasting at the neighbouring Bengalla Mine; • No cumulative impacts from blasting activities at neighbouring mining operations is expected.	transportation, it is not expected that the ground vibration and overpressure caused by blasting will have any adverse impacts on equine health.	8.5.4; Noise – section 8.3.3.); • Revised Risk Assessment (Appendix E); • Equine Health Impact Assessment (Appendix H); • Acoustics Impact Assessment (Appendix G); • Agricultural Impact Statement (Appendix R).

Stated Impact	Proponent's assessment of impact	Proponent's position on impact	EA address of impact
Visual	Undertaken by: • Visual Impact Assessment was undertaken by JVP Visual Planning and Design – the Houston Bund was developed; • Subsequent "Coolmore Option 4A" visual bund was developed by Mr John Dwyer, a mining engineer engaged by Coolmore. Description of findings: • Thoroughbred breeding operations are sensitive to changes in the aesthetic quality of the surrounding landscape; • 3D model and photomontages of the Project from select viewing locations during Year 3A, 3B, 10 and 27 developed; • Receivers located to the south of the Project including parts of Coolmore and motorists on the Golden Highway would experience views of the Houston – Coolmore Option 4A visual bund while it is being constructed using a double benching method. During this time (now estimated at 8 months) the visual impacts for these areas would be high; • Visual impact will be reduced to moderate and then low upon completion and then vegetation (rehabilitation) of the bund; • Fully established and scattered tree-screening is visible in the photomontages by Year 27 (Figure 9D of the EA); • Assessment concluded that the visual impact on surrounding receivers will be limited for the majority of the mine life;	High, short term, manageable impacts (between 8 and 16 months) in constructing the visual bund. • Coolmore and Woodlands will not have a significant loss of scenic and landscape values from the Project; • The Visual Impact Assessment undertaken for the Preferred Project Report has confirmed that the "Coolmore Option 4A" visual bund is effective, are far more time-efficient, screening of all views to the Project once constructed.	• EA Main Report; • Revised Risk Assessment (Appendix E); • Equine Health Impact Assessment (Appendix H); • Visual Impact Assessment (Appendix I); • Agricultural Impact Statement (Appendix R); • Preferred Project Report – Coolmore Option 4A.

Stated Impact	Proponent's assessment of impact	Proponent's position on impact	EA address of impact
	• Lighting impacts within the Drayton South area will be from mobile plant outside of active mining areas. In most cases, direct light effects will be limited by existing topography and vegetation.		
Agricultural enterprises and resources	Undertaken by: • Agricultural Impact Statement was undertaken by Scott Barnett & Associates; • Economic Impact Assessment was undertaken by Gillespie Economics. Description of findings: • Part of the Project corresponds with the Equine Cluster, as mapped; • The Project is not anticipated to have significant impacts on: – Availability of land for agricultural purposes including land utilised by the thoroughbred horse breeding industry and Biophysical Strategic Agricultural Land; – Water supply (including highly productive groundwater); – Surrounding enterprises as a result of excessive dust or noise; – Traffic regimes along support infrastructure routes associated with neighbouring agricultural enterprises; – Long term visual amenity of surrounding enterprises; – Labour supply to agricultural enterprises; and – Support services directly employed by agricultural enterprises.	No significant impact.	• EA Main Report; • Revised Risk Assessment (Appendix E); • Agricultural Impact Statement (Appendix R); • Equine Health Impact Assessment (Appendix H); • Economic Impact Statement (Appendix U).

Stated Impact	Proponent's assessment of impact	Proponent's position on impact	EA address of impact
	• The predominant agricultural land use at Drayton South (disturbance footprint and transportation corridor) is beef cattle grazing; • The gross value of current agricultural production within the Drayton South area is $701,208 per annum and the net value is $432,479 per annum. The figure is based on vealer and weaner production.		
Traffic and transport	Undertaken by: • Traffic and Transport Impact Assessment by DC Traffic Engineering. Description of findings: • The Project involves the realignment of Edderton Road, which is a route travelled by employees of agricultural enterprises in the locality, including that of Coolmore and Woodlands. The road will be subject to some disruptions but will remain open throughout construction; • No significant increases in traffic are predicted as a result of the Project; • Traffic modelling shows that when considering future proposed Projects, that the current configuration of the Denman Road / Thomas Mitchell Drive intersection and the Thomas Mitchell Drive / New England Highway intersection would perform at a poor Level of Service during the peak construction and operations phase.	No significant impact.	• EA Main Report; • Revised Risk Assessment (Appendix E); • Traffic and Transport Impact Assessment (Appendix S); • Preferred Project Report.
Ground Water	Undertaken by: • Australasian Groundwater and Environmental	No significant impacts.	• EA Main Report; • Ground Water Impact Assessment (Appendix N);

Stated Impact	Proponent's assessment of impact	Proponent's position on impact	EA address of impact
	Consultants. Description of findings: • In the vicinity of the Project, there are three aquifers, including alluvium along the Hunter River, Saddlers Creek and Saltwater Creek; • Project is predicted to have only very limited leakage impacts on the alluvial lands associated with the Hunter River; • The vertical leakage fluxes between the alluvial deposits associated with Saddlers Creek and the underlying coal measures will be affected due to the proximity of the Project; • Discharge into the Saddlers Creek alluvium will be higher salinity groundwater from the coal measures.		• Agricultural Impact Statement (Appendix R).
Surface Water	Undertaken by: • WRM Water & Environment. Description of findings: • High probability that saline mine water will need to be discharged from the site at various stages of the mine life; • The Project will have an insignificant impact on the Hunter River flows; • No impacts on the Project are expected as a result of flooding from Saddlers Creek or the Hunter River.	No significant impacts.	• EA Main Report; • Surface Water Impact Assessment (Appendix M); • Agricultural Impact Statement (Appendix R).

2.2 Unstated impacts

The unstated impacts are those relevant to Coolmore and Woodlands as enterprises and as central actors in the CIC but which appear absent in the Proponent's assessment. The unstated impacts (Table 2.2) have been identified through review of submissions, a desktop review of the socio-economic theories of clustering and other literature, as well as additional analysis of the potential impacts of noise, dust and lighting to equine breeding. The list is intended to be representative, not exhaustive. The unstated impacts have been qualitatively ranked according to potential impact. Further discussion of unstated impacts is provided following (refer to Section 4 of this report).

Fundamentally, the EA appears premised on a predisposed assumption that Coolmore and Woodlands, and the CIC, are not significantly impacted by the proposed Project. The current review also notes that the Director General's Requirements stated that the assessment must:

- *Pay "particular attention to the thoroughbred breeding industry"; and*
- *Consider the "costs and benefits of the project as a whole, and whether it would result in a net benefit for the NSW community."*

Proximity of the horse studs to the Project is a pivotal consideration in the assessment of impacts. According to submissions provided by both Coolmore and Darley, the Project is within 500 m of respective property boundaries.

Table 2.2 Unstated potential impacts from the Project on Coolmore, Woodlands and the Equine CIC

Unstated impact	Unstated assessment of impact	Comments (from submissions)
Equine CIC	Removal of Central Actors from the Equine CIC due to incompatible land use and perception of Coolmore and Woodlands of unacceptable impacts: • Central Actors move offshore; • Central Actors move interstate. The Hunter Valley would lose its status of one of the three lnternational Centres of Thoroughbred Breeding Excellence in the World Equine CIC collapses and economic loss is significant. Equine CIC relocates and economic loss is significant. Equine CIC image and brand and reputation is permanently damaged. The gap created by the removal of the Central Actors is filled by another multi-national stud operation that does not have the relationships established by Coolmore and Woodlands – generating function and reputation damage.	• If Coolmore and Woodlands studs were to move interstate or off-shore, the effect on the equine CIC and the Australian racing industry would be significant (Marsden Jacob, 2013); • Removal of Coolmore or Woodlands from the CIC would have material and irreversible repercussions felt throughout the NSW breeding, racing and service industries (Marsden Jacob, 2013); • Coolmore, for example, is also a significant employer in the Hunter - employing up to 150 people and contributing to the employment of thousands more in the region (Coolmore, 2013a); • It is also a significant producer, domestic supplier and exporter of champion thoroughbreds and contributes to Australia's international reputation as a world class thoroughbred breeding and racing nation (Coolmore, 2013a); • Darley operations in the Hunter Valley - at Woodlands and Kelvinside are interdependent. Stallions at the Kelvinside farm service the broodmares located at the Woodlands site and other broodmares housed throughout the Valley. If Darley were to leave the Hunter Valley both operations would be impacted (HTBA, 2013b); • The Economic Analysis, undertaken by Marsden Jacobs (2013) for Coolmore and Woodlands, indicates that if the Project is developed and the two studs were to exit the Hunter region this would result in net economic loss to NSW of between $153m and $457m.
Visual	Visual landscape permanently damaged at both Coolmore and Woodlands, including impact to: • Rural Idyll; • Landscapes of conspicuous consumption;	• The very high visual sensitivity of the thoroughbred breeding landscape and the high-impact landscape of open cut coal mining are incompatible (Coolmore, 2013a); • The originally proposed Houston Bund – revised to include the Coolmore Option 4A bund - represents a 77m high

Unstated impact	Unstated assessment of impact	Comments (from submissions)
	• Brandscape; • Landscapes of work. (McManus *et al*. 2011) – refer Section 4.5 of this report) The Brandscape visual catchment of both Coolmore and Woodlands extends beyond the property boundaries and includes the transport routes to and from the studs.	emplacement of overburden in the visual catchment area of Coolmore (Coolmore, 2013a); • The revised estimate of 8-months construction is still likely an underestimate of time-taken to shield the view. A significantly greater amount of time should be expected to vegetation the bund and allow is functioning as a visual catchment mitigation measure (Coolmore, 2013a); • It is likely that the bund will remain an extraordinary and unnatural feature in the proximate landscape, and will be immediately and highly visible to Coolmore and Woodlands and their clients (who may visit the property numerous times during a stabling) and staff (Coolmore, 2013a); • Both properties have invested millions of dollars in capital improvements on land including buildings, irrigation systems, fences, dams, watercourses and other structures to establish and refine the landscape and experience value (Coolmore, 2013a; Darley, 2013b); • The proposal is not consistent with Muswellbrook Shire Council's policy on final voids (MSC, 2013b); • The landform currently visible is significant in the landscape and should be shaped to produce a natural landform and contain appropriate topographical features in keeping with the surrounding undisturbed landscape (MSC, 2013b).
Equine enterprises	Reputation. Equine health. Human health. Land management (Ground and Surface Water). Traffic.	<u>Reputation</u> • The reputation of both Coolmore and Woodlands is completely reinforced by the brandscape; • It is likely that the high-calibre of bloodstock at both properties would be directly and immediately impacted by any perception of equine health impacts – including from dust, noise and vibration (Coolmore, 2013a).

Unstated impact	Unstated assessment of impact	Comments (from submissions)
		Equine health *Dust* • Both properties are extremely close to the proposed Project operations; • Unfounded assumption in the AIS and Equine Impact Assessment that the equine response would differ to the human response to dust exceedences. Further analysis is required. This review has observed other studies that do correlate the equine and human response to particulate matter from dust (Marti and Harwood, 2002). Other studies indicate that there are impacts from equine exposure to environmental inorganic particulate matter (e.g. Schwartz *et al.* 1981; Arenz *et al.* 2011); • Conclusion drawn by analogy is not a robust, or suitable technical surrogate for dust impacts on equine breeding enterprises; • Air quality impacts are expected to exceed the EPAs particulate impact assessment criteria for up to 12 residences. Potential impacts are most significant for 6 private residences, including 227A, 227F and 228M located at Coolmore, to the south of the Project (EPA, 2012). • The Project would contribute to particulate matter in the Upper Hunter air shed in circumstances where the air shed is at capacity insofar as the National guideline is concerned – exceeded in the Muswellbrook township and grossly exceeded in the Singleton township (MSC, 2013b); • Dust plumes will be generated from the blasting activities – proposed to occur five times per week. These will also impact the visual shed (Coolmore, 2013a). *Noise* • Coolmore (2013a) notes that 5 blasts per week would be

Unstated impact	Unstated assessment of impact	Comments (from submissions)
		required to support the proposed production rate of the project; • For thoroughbred breeding studs located directly opposite this proposed coal mine, and the communities of people and families who live on those studs, and the valuable livestock on these properties this continual process of blasting will be highly intrusive, damaging and plainly an untenable situation to endure for any period of time (Coolmore, 2013a). *Ground Water* • Coolmore and Darley rely heavily on ground and surface water sources; • It is possible that the predicted ground water impacts resulting from the Project will be compounded by the impacts from adjacent mining projects; • The preliminary expert report prepared by Gilbert & Sutherland – a counter report to that produced by the proponent – suggests that re-activation of Saddlers Pit at Mt Arthur Coal Mine is expected to influence groundwater levels in the Saddlers Creek alluvium (Coolmore, 2013a). *Surface Water* • Discharge point to be located directly adjacent to Coolmore's operations; • Three of Coolmore's river pumps are located downstream from the discharge pipe for the project. These pumps are used for paddock irrigation, domestic and stock water supply; • No consideration is given to the impacts of salinity to Coolmore, particularly during dry weather; • Unregulated flows would impact on Coolmore and the impacts on Coolmore and the surrounding environment are unknown. *Traffic* • The Project, taken individually and in aggregation with other

Unstated impact	Unstated assessment of impact	Comments (from submissions)
		proposals for road closures and road realignments, will potentially have a substantial impact on traffic efficiency in the local government area (MSC, 2013b).

3 ABOUT CRITICAL INDUSTRY CLUSTERS

CICs have existed for centuries as geographic concentrations (Johnston, 2003), particularly where agricultural activities coalesce around a natural resource and attract complimentary activities seeking strategic socio-economic benefit (Garkovich, 2009). However, the importance of CICs has only gained recognition in economic development and land use planning policy over the past 20 to 30 years or so, and more recently in Australia. A 1998 review found that 35 countries had industry cluster development initiatives (University of Carolina, 1998) and this is thought to have increased significantly in subsequent years (Kleinhardt-FGI, 2002). Not all clusters concern agriculture.

According to Porter (1998), CICs present an alternate way of organising the value chain,

> *"where the proximity of companies and institutions in one location and the repeated exchanges among them, fosters better coordination and trust… A cluster of independent and informally linked companies and institutions represents a robust organisational form that offers advantages in efficiency, effectiveness and flexibility."*

Fundamentally, CICs are complex socio-economic systems. Akin to living ecosystems, CICs have a lifecycle. They are initiated, grow, mature and can die (Kleinhardt-FGI, 2002; Johnston, 2003; Garkovich, 2009; EU, 2010). Regardless of their type, agricultural or other industry, CICs have common components: (i) core businesses or central actors; (ii) support businesses or actors; (iii) soft infrastructure; and, (iv) hard infrastructure (Kleinhardt-FGI, 2002; EU, 2010).

Johnston (2003) highlights the abundance of literature concerning the theory and practice of CICs. They have many alternate names including critical economic clusters, competitive clusters, agglomeration or association economies, learning regions and regional innovation systems, to name but a few. Consistent with DP&I (2012), the term CIC is used here. Following is a high-level review of CIC theory and practice. It is an important inclusion in this report as it affects the conclusions drawn and recommendations.

3.1 Definitions

As cluster concepts have evolved, so cluster definitions have multiplied, and there is no universal definition of a CIC. Some definitions emphasise geographic proximity, some the type of industry, and others innovation (Johnston, 2003). Some observers suggest that different definitions suit different audiences (e.g. Kleinhardt-FGI, 2002).

The basic definition is:

> *Geographic concentrations of industries that gain performance advantages through co-location* (Doeringer & Terkla 1995).

A commonly accepted definition is:

> *A geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities,* Porter (1990).

A more comprehensive definition suggested is:

> *A geographically bounded concentration of similar, related or complementary businesses, with active channels for business transactions, communications and dialogue that share*

specialized infrastructure, labour markets and services and that are faced with common opportunities and threats, (Rosenfeld 1997).

Kleinhardt-FGI (2002) suggest that across all literature, there are common themes that define industrial clusters:

> *"**Dynamic Interactions.** It is the type, quality and extent of interactions and relationships between firms, industries that characterize clusters. Where successful clusters go further than other systems is the extent and depth of collaboration, especially between competitors. They have learnt that they can both collaborate and compete.*
>
> ***Systems Recognition.** Clusters recognize that individual firms are part of much larger systems. They may therefore seek to draw in both vertical and horizontal relationships in the value chain. These include R&D, educational, academic and government partners. They may also move beyond traditional industry segments. A key is breaking down traditional institutional barriers to aligning all elements of the system to gain best leverage and competitive advantage for the cluster.*
>
> ***Social Infrastructure.** Rosenfeld (1996) argues that information flows are critical to effective industry clusters. In order to facilitate this, open and effective social infrastructures are required. He points out that while the characteristics of a cluster may be present, it is not necessarily effectively a cluster. Our experience would reinforce this. An effective cluster must include social interaction, trust and a shared vision in order to fuel the dynamic nature of a cluster. One could say this about other structures as well. However it is the degree that these systems are informal, self-perpetuating and the level of intensity that makes the difference, meshed with the three other elements.*
>
> ***Geographic Scope.** All attempts at definition refer to geographic proximity. This would appear to be closely tied to the level of interactions and trust required for an effective cluster. The greater the distance, the more difficult it is to maintain these at a high level. The degree of geographic spread of a system referred to as a cluster is an indicator of whether the system is 'more' or 'less' a cluster system. One suggestion is that the geographic spread of a cluster is defined as the area covered by a one hour journey by road. Anything more inhibits regular, informal interactions. It is a matter of at what point does the system have to revert to mainly relying on formal communications, rather than being mainly driven by informal interactions"* (Kleinhardt-FGI, 2002).

The Upper Hunter Strategic Regional Land Use Plan (DP&I, 2012) provides the following definition of a CIC (p22):

> *"A CIC is a localised concentration of interrelated productive industries based on an agricultural product that provides significant employment opportunities and contributes to the identity of the region."*

Further, values and criteria for CICs are given as:

> *Industry clusters that meet the following criteria:*
>
> - *there is a concentration of enterprises that provides clear development and marketing advantages and is based on an agricultural product;*
> - *the productive industries are interrelated;*
> - *it consists of a unique combination of factors such as location, infrastructure, heritage and natural resources;*
> - *it is of national and/or international importance;*
> - *it is an iconic industry that contributes to the region's identity; and*

- *it is potential substantially impacted by coal seam gas or mining proposals.*

3.2 Cluster theories

There is much literature on the theory and practice of CICs. Following are some important aspects.

3.2.1 Cluster components

CICs are commonly described as having four components:

> ***1. Core Businesses:*** *The businesses that are the lead participants in the cluster, often earning most of their income from customers who are beyond the cluster's boundary.*
>
> ***2. Support Businesses:*** *The businesses that are directly and indirectly supporting the businesses at the core of the cluster. These may include suppliers of specialised machinery, components, raw materials; and service firms including finance/venture capital, lawyers, design, marketing and PR. Often these firms are highly specialised, and are physically located close to the core businesses.*
>
> ***3. Soft Support Infrastructure:*** *In a high performance cluster, the businesses at the core and the support business do not work in isolation. Successful clusters have community wide involvement. Local schools, universities, polytechnics, local trade and professional associations, economic development agencies and others support their activities and are key ingredients in a high performance cluster. The quality of this soft infrastructure, and the extent of teamwork within it, are very important keys to the development of any cluster.*
>
> ***4. Hard Support Infrastructure:*** *This is the supporting physical infrastructure: roads, ports, waste treatment, communication links, etc. The quality of this infrastructure needs to at least match competitive destinations, be they local or further afield* (Kleinhardt-FGI, 2002).

The development of core competencies is highlighted as crucial to ongoing success of industrial clusters. This may lead to regional dependence on specialised industrial outputs.

3.2.2 Cluster life-cycle

CICs are complex socio-economic systems. Akin to natural ecosystems, clusters can evolve, grow, mature and, in some cases, die (Johnston, 2000; Kleinhardt-FGI 2002; EU, 2010).

Such complex socio-economic systems don't just appear without reason. Initial stimuli is required, e.g. availability of raw materials, soils and climate, market proximity, a chance event or government investment (Kleinhardt-FGI, 2002). Key factors in the subsequent growth and development of CICs are (from Johnston, 2000):

- *Supportive framework conditions acting though market-based incentives;*
- *High levels of interdependency between firms;*
- *Outsourcing to existing or new firms (the key determinant of cluster demography);*
- *Innovation-friendly financial systems, in particular venture capital;*
- *Corporate governance that favours innovation;*
- *Supportive education and training systems;*

- *Market-oriented innovation policy; and*
- *Regional specialisation.*

Suggested stages in the cluster lifecycle have been developed. The following summary is adapted from Kleinhardt-FGI (2002):

1. Potential - Clusters in the early phase of development. At this step it is still uncertain whether it will become an actual cluster, develop critical mass and unique, marketable competencies and technologies.
2. Young - Clusters with strong regional roots and importance to the local economy.
3. Established - Clusters characterised by unique competencies, international competitiveness, and a need for market growth
4. Mature - Well established and mature clusters, characterised by growth and expand strategies via mergers, economies of scale, and development of production technology. Firms in this type of clusters have to a large extent the size and capabilities that enable them to "run their own business".
5. Revival - in some cases, clusters reach a level of maturity and stagnation, which pushes them to develop new technologies and specialised competencies – if not they die out.

Importantly, at each stage in its lifecycle, every cluster is at risk of decline and possible demise. In an analysis of the Kentucky equine cluster Garkovich (2009) states that clusters can decline without constant attention and support, and suggests a variety of potential reasons for this decline.

> *"The emergence of a competing cluster elsewhere;*
>
> *The diminishment, degradation, or transition to other uses of the land resources that support a land-based cluster;*
>
> *Governmental regulations that restrict the adaptability and flexibility of the businesses in the cluster or intervene in the internal competition among firms;*
>
> *The failure to implement public policies that nurture and sustain the viability of the cluster; and*
>
> *The failure to make public investments in essential infrastructure."*

Garkovich (2009) proposes apathy towards CICs underlies all potential causes of decline, i.e. *since it has existed for a long time, it will always exist*, and suggests the long-term survival of the Kentucky equine cluster will depend on *recognizing its contributions to the overall economy and a commitment to building on this unique asset through cluster-based development policies*. It is argued that cluster-based development (and nurturing) policies yield tangible benefits for three reasons.

> *"First, studies (e.g., Gabe, 2003; Krugman, 1991) show that new business activity is higher in those places where there is a high concentration of firms in particular industry sectors, reflecting the availability of skilled labor and related firms. Second, given that clusters attract growth, there is a higher return to public investments in economic development in these places than in others (Gabe, 2003). Third, the concept of an economic cluster provides a solution that enables political decision-makers to explain why they are focusing development programs on particular industry sectors. It is not about favoritism or a reaction to special interests, but a reasoned use of scarce resources to stimulate economic growth"* (Garkovich, 2009).

3.3 Australian industrial clusters

Drawing on a wide range of published work, Johnston (2003) presents a useful summary of industry clusters throughout Australia. More than 100 CICs are identified and rated as follows.

> *"rated into four categories - 'strong' - ****, 'moderate' - ***, 'potential' - **, and 'maybe' - *. The criteria include both strength of interaction, and strength of consequent output. Typically, a strong cluster will have strong horizontal and vertical interactions and produce significantly enhanced outputs such as exports. A moderate cluster will rate less strongly on one or more of these criteria. A potential cluster is one in which cluster advantages have been identified, but are yet to be realised. A 'maybe' cluster is largely a cluster in the eye of the proponents only."*

This work discusses 24 industrial clusters in NSW, including the Hunter region equine and viticulture CICs later identified in DP&I (2012) (Table 3.1). It is interesting that coal mining is absent from the list in NSW but it does appears on the author's list for Queensland. Based on this ranking system, the equine and wine industries are strong and moderate clusters respectively. The equine CIC is one of only four clusters in NSW rated as "strong" indicating its assessed strength of interaction and consequence of output.

Table 3.1 Industrial CICs in Australia (from Johnston, 2000)

Count	Cluster	Location	Status
1	ITC & services	Sydney CBD/Ryde	****
2	Financial services	Sydney CBD	****
3	Electronics	Sydney CBD	****
4	Film services	Sydney CBD	***
5	Transport/logistics	Airport corridor	***
6	Component manuf'ing	Western Sydney	**
7	Toolmaking	Western Sydney	**
8	ITC	Western Sydney	**
9	Legal/accounting	Parramatta	**
10	Multimedia/cultural	Northern Rivers	**
11	Agribusiness	Hunter	*
12	Building/construction	Hunter	**
13	ICT	Hunter	**
14	Engineering fabrication	Hunter	***
15	Equine	Hunter	****
16	Telecommunications	Illawarra	***
17	Health	Illawarra	**
18	Food/horticulture	Riverina	***
19	Natural medicinal/herbs	Northern Rivers	**

Count	Cluster	Location	Status
20	Tourism	New England	**
21	Outdoor recreation	Snowy	*
22	Food and fibre	South-east Corner	*
23	Forestry	South-east Corner	*
24	Wine	Hunter, Mudgee	***

3.4 Global equine cluster case studies

It is often stated that the Upper Hunter region thoroughbred industry is one of three comparative and leading thoroughbred breeding clusters in the world (e.g. DPI, 2013). Certainly, Newmarket in the United Kingdom (UK) and Lexington in Kentucky, United States of America (USA), each espouse claim to being the home of global thoroughbred breeding. For example:

> *Many around the world know Lexington as the Horse Capital of the World. While that view is often shared and stated among those in the Thoroughbred Industry….*Lexington-Fayette Urban County Government (2013a); and,
>
> *Newmarket….is the 'Home of Horseracing' and a globally important horseracing centre. There are more racehorses, trainers, stable staff, stud farms and racing organisations based in and around the town than anywhere else in the world* (Forest Heath District Council, 2013a).

So too does Hippolia in Lower Nomandy, France, for example:

> *….region of Lower Normandy to be a competitiven cluster of the horse industry, allowing France to hold onto the leading position in the horse industry worldwide* (Calvados Strategie, 2013).

The following case studies present a meta-analysis of readily available information about the Kentucky, Newmarket and Hippolia thoroughbred breeding clusters and land use planning protection instruments that relate to each.

3.4.1 The Kentucky Equine Cluster (United States of America)

The following summary of the Kentucky equine cluster was adapted from University of Kentucky (2013) except where cited otherwise.

- Kentucky is home to 242,400 horses. Thoroughbreds are the dominant breed (54,000), followed by Quarter Horses (42,000) and Walking Horses (36,000);
- There were 7,016 thoroughbred foals born in 2012 (The Jockey Club, 2013);
- There are approximately 35,000 equine operations in Kentucky (defined as an address on which at least one horse, pony, donkey or mule resides);
- There are 540 thoroughbred farms. The dominant counties are Fayette (211), Woodford (119) and Bourbon (98) (The Kentucky Horse Council, 2009);
- 1.1 million acres in Kentucky are devoted to equine use;

- The total value of the state's equine and equine-related assets is estimated at US$23.4 billion;
- The total of all equine-related sales and income for equine operations in 2011 was about $1.1 billion;
- Equine-related expenditures by equine operations in 2011 totaled about US$1.2 billion; 77% of operating expenses are spent in Kentucky;
- The output effect, or the increase in sales of total goods and services due to the presence of the equine industry, was measured at approximately $3 billion;
- The employment effect, or the number of jobs created, was measured at 40,665; and,
- The value added effect, which is new income paid to workers, profits earned by businesses or dividends paid to shareholders, was estimated to be $1.4 billion.

The Kentucky equine cluster is centred on Lexington in Fayette County. Recognised as the County's signature industry (Lexington-Fayette Urban County Government, 2013), the equine cluster is protected against competing land development by the Purchase of Development Rights Program (PDR). The goals of the PDR are to:

- Purchase Conservation Easements to protect 50,000 acres (27% of the County) over the next 20 years;
- Protect the agricultural and equine economies of Fayette County by conserving large areas of farm land;
- Conserve and protect the natural, scenic, open space and the historic and agricultural resources of rural Fayette County; and,
- Protect the tourism economy of Fayette County by preserving the unique character and 'Sense of Place' that attracts visitors from all over the world.

To date 240 farms totaling more than 27,443 acres are now permanently protected by conservation easements. Most (131) of these farms are equine.

3.4.2 The Newmarket Equine Cluster (Suffolk County, United Kingdom)

Following is a summary of the Newmarket equine cluster in Suffolk County, United Kingdom (UK).

- The equine industry employs 20% of Newmarket's workforce (Forest Heath District Council, 2010);
- A combined direct and indirect equine industry send of over £250 million; and,
- 65 stud farms and two racecourses.

There are more racehorses, trainers, stable staff, stud farms and racing organisations based in and around Newmarket than anywhere else in the world; over 2900 racehorses in training, 89 licensed trainers, 62 stud farms and 2800 acres of fully maintained training grounds. The horseracing industry spends more than £150 million locally and accounts for approximately 33% of jobs in Newmarket.

The local government planning scheme affords the Newmarket equine CIC development protection from competing land uses. The Forest Heath District Council's Core Strategy Development Plan Document (DPD) forms part of the Local Development Framework (LDF)

for the Forest Heath District (Forest Heath District Council, 2013b). The DPD makes the following statements.

- *The creation of the studlands around Newmarket relating to the horse racing industry has resulted in a unique area of landscape. When examining proposals for development in these areas, the potential impact on this landscape will be an important consideration;*
- *The importance of the Horse Racing industry and Newmarket's associated local heritage and character will be protected and conserved throughout the plan period; and,*
- *The horseracing and bloodstock industries around Newmarket dominate the economy of the town and its surrounding area. Current planning policies aim to ensure that these industries thrive and prosper and therefore generally resist the loss of any land from a horse racing related use. This, combined with the Jockey Club owning large areas of heath around the town, places constraints on the amount of land available for other types of development.*

Whilst the DPD replaced some earlier planning policies, it retained all of those pertaining to the protection of the equine cluster, for example:

- *POLICY 12.1* Proposals for development which would adversely affect the use or appearance of the racecourse or training grounds, or result in their loss for the horse racing purposes will not be permitted.
- *POLICY 12.2* Changes of use of stud land (including buildings) for any purpose other than that essential to the horse racing industry will not be permitted, other than for those proposal contained in the Plan.
- *POLICY 12.3* The racecourse training grounds and stud farms around Newmarket are defined as an area of local landscape value. Proposal for development, which affect the appearance or landscape setting of the town will not be permitted.
- *POLICY 12.9* Where their special character is of exceptional value, individual or groups of training establishments will be designated as Conservation Areas.

3.4.3 The Hippolia Equine Cluster (Lower Normandy, France)

According to Normandy Horse Industry (2013), this region in France produces champions in all disciplines including thoroughbreds, trotters and sport horses. Key statistics for the Normandy equine cluster are as follows.

- *100 000 horses (41 breeds);*
- *8,000 breeders;*
- *20 % of French foals are born in Normandy;*
- *50% of French thoroughbreds born in Normandy;*
- *200 professional riders;*
- *300 riding schools;*
- *€ 620 millions of turnover generated by the equine cluster;*
- *10,000 jobs; and,*
- *4.400 companies involved* (adapted from Normandy Horse Industry, 2013).

Government of France (2013) add:

- *78% of coverings of Thoroughbred, French Trotter and Saddle Horse, made in Lower-Normandy;*
- *Birthplace of the first and only French Foundation for Scientific Cooperation dedicated to equine research; and,*
- *200,000 hectares of prairie land (495.000 acres) dedicated to horse activities.*

In December 2005, the Inter-ministerial Committee for Land Use and Development (CIADT) selected the region of Lower Normandy to be a CIC of the horse industry. Since 2012, this competitive cluster of the horse industry of Lower Normandy has been called Hippolia (Calvados Strategie, 2013).

4 THE UPPER HUNTER EQUINE CLUSTER

The SRLUP (DP&I, 2012) affords the Upper Hunter equine CIC a measure of protection from competing land uses that may affect its sustainability. Importantly, it does not extend these protections to individual horse studs or to horse studs only.

The equine CIC is said to *"includes a highly integrated concentration of horse breeding facilities and related infrastructure covering thoroughbred and stock horse breeding centres and numerous other equine developments and support services…"* (DP&I, 2012). Better detail is provided in DPI (2013), including economic data, but both documents lack insight to the function of the CIC, i.e. horizontal and vertical interdependencies.

Therefore, it is important to apply some cluster theories here to:

- Identify key CIC components;
- Define the roles of Coolmore and Woodlands studs in the CIC;
- Discuss potential impacts to Coolmore and Woodlands studs by the Project; and,
- Reach an opinion as to the flow-on effects to the CIC.

4.1 Defining the Upper Hunter Equine Cluster

Components of the CIC have been identified (Table 4.1). The core business of the cluster is horse breeding to produce a primary product of foals for customers. The core businesses, also termed *central actors*, have been identified. These include thoroughbred studs and, importantly, other horse breed studs including Australian Stock Horses and Quarter Horses. DPI (2013) notes the presence of other breeds in the CIC. Whilst other breeds are important contributors within the region, the highest value is found within the thoroughbred sector.

Central actors are supported by a significant and interdependent array of support businesses, and soft and hard infrastructure. Recognising the importance of geographical proximity, particularly with respect to communication as described in Kleinhardt-FGI (2002), example cluster components are limited to those within a one-hour journey by road. Whilst other businesses beyond this distance may contribute to the cluster, these may be thought of as satellite actors and not direct components of the CIC.

Table 4.1 Cluster components of the Upper Hunter Equine CIC

Primary Customers	International racing industry Australian racing industry Equine sport and recreational riding sectors
↑	
Primary Products	Thoroughbred Yearlings Other breed progeny
↑	

Cluster Components	Type	Example
Core business (central actors)	Thoroughbred Stallion Studs[1, 2]	Arrowfield, Coolmore, Bengalla, Byerley, Emerites Park, Kelvinside (Darley), Kitchwin Hills, Patinack Farm, Toolooganvale Farm, Turangga Farm, Vinery, Widen, Yarraman Park

Cluster Components	Type	Example
	Thoroughbred Broodmare Studs[1, 2]	Amarina Farm, Ashleigh, Attunga, Barador, Baramul, Bellerive, Chatsworth Park, Cressfield, Crowningstone, Edinglassie, Flame Tree, Glastonbury Farms, Golden Grove, Goodwood Farm, Holbrook, Kia Ora, Middlebrook Valley Lodge, Middlebrook Station, Monarch, Murrulla, Redman Park, Riversdale Farm, Riverslea Farm, Segenhoe, Sledmere, Timor Creek, Willowpark, Woodlands (Darley)
	Other breed Studs[3]	Australian Stock Horses: JR Poole, TJ Blake, BW Brooker, DF and JF Mcintyre, Glew Family Partnership, Barsham, Haydon, PA and JM Cutler, SM Fitzpatrick, NJ and L Holz Australian Quarter Horses: Our Range Arabian Horses: Alabama Stud
Support business (support actors)	Equine health	Scone Equine Hospital, Scone Brooks Veterinary Services, Scone Stenhouse Equine Dentistry, Scone Equine Podiatry and Lameness Centre, Muswellbrook
	Equine R&D	Hunter Valley Equine Research Centre, Scone
	Equine legal	Equilaw, Muswellbrook
	Bloodstock agents	Scone Blookstock Service, Scone William Inglis & Son Bloodstock Agents, Scone
	Farriers	A & B Jones, Scone; Brian Atfield Farrier Service, Jerry's Plains; Shannon Smith, Glendonbrook; Ben Anderson Farrier, Denman
	Feed suppliers	Various feed supply merchants in Scone and Muswellbrook
	Feed producers	Numerous including lucerne farmers along the Hunter River
	Horse transport	RB Horse Transport, Scone; Signature Equine Transport, Scone
	Landscape architecture	Ladd-Hudson Architects, Sydney; Timothy Court & Company, Sydney.
	Trades/technical	Carpenters, plumbers, electricians, painters, horticulturalists, greenkeepers
Soft support infrastructure	Education	Tocal Agricultural College, Tocal Scone TAFE, Scone
	Tourism	Hunter Valley Thoroughbred Tours

Cluster Components	Type	Example
	Government policy	State level, e.g. NSW Strategic Regional Land Use Plan; Local, e.g. Muswellbrook Shire Council Community Strategic Plan
Hard support infrastructure	Racing facilities	Scone Race Club
	Transport infrastructure	Roads, rail, air (private)

[1] HTBA (2013)
[2] MSC (2013)
[3] Australian Stock Horse Society (2013)

4.2 Importance of the cluster

The Upper Hunter Equine CIC is of significant regional, state, national and international importance for a number of reasons:

- It is important to the Australian and international racing industry;
- It has economic importance to the region, state and nation; and,
- It is an iconic industry that defines the region's identity.

4.2.1 Place in the racing industry

According to HTBA (2013):

> *"Hunter bred thoroughbreds dominated the 2011 world racing rankings. 33 of the 53 Australian bred horses that made the world rankings list were from the Hunter Valley. Among these eleven came from Darley, seven from Coolmore, six from Arrowfield, four from Vinery, three from Yarraman Park and two from Widden."*

In Australian thoroughbred breeding, each of the 15 leading Australian sires stand at studs in the Upper Hunter Equine CIC (Table 4.2). This indicates the significance of the region to the Australian industry.

Table 4.2 Season 2013-14 Australian leading sires by earnings (adapted from Thoroughbred Breeders Australia, 2013)

Rank	Name	Stud	Location
1	Snitzel	Arrowfield	Upper Hunter region
2	Fastnet Rock	Coolmore	Upper Hunter region
3	Exceed and Excel	Kelvinside (Darley)	Upper Hunter region
4	Reset	Kelvinside (Darley)	Upper Hunter region
5	Stratum	Widden	Upper Hunter region
6	Redoute's Choice	Arrowfield	Upper Hunter region
7	Commands	Kelvinside (Darley)	Upper Hunter region
8	Northern Media[1]	Widden	Upper Hunter region
9	Street Cry	Kelvinside (Darley)	Upper Hunter region

Rank	Name	Stud	Location
10	Mossman	Vinery	Upper Hunter region
11	Lonhro	Kelvinside (Darley)	Upper Hunter region
12	Choisir	Coolmore	Upper Hunter region
13	More Than Ready	Vinery	Upper Hunter region
14	Flying spur[2]	Arrowfield	Upper Hunter region
15	Encosta de Lago	Coolmore	Upper Hunter region

[1] Died of colic July 2013
[2] Retired from stud

4.2.2 Economic importance

DPI (2013) says the equine cluster is critical to the economy of the region and provides a comprehensive summary of available economic data. This summary is reproduced as follows:

> *"The HTBA (HTBA, 2011 and HTBA, 2012) identify the Hunter Valley as:*
>
> - *the largest domestic producer of thoroughbreds breeds, producing around half of all thoroughbred horses born in Australia*
> - *the largest source of thoroughbred exports. 67% of all Australian thoroughbred horses exports in 2008-09; and 80% to 90% of the total value of all Australian thoroughbred exports were sired or bred in the region*
> - *the total estimated value of exported Hunter sired or bred yearling foals was estimated as over $100million in 2011 (Buchan 2012)*
> - *internationally recognised for producing international Group 1 winners – the equine equivalent to Olympic Gold medal winners.*
> - *In 2011 the Hunter produced 63 per cent of the world's top Australian racehorses (as ranked by the federation) and 33 Hunter Valley bred horse made world rankings*
> - *the largest supplier of premium thoroughbreds at national sales. Half of all yearling horses listed for sale and all of the top 10 priced yearlings sold in 2010 were sired by Hunter Valley stallions*
> - *a significant contributor to the regional economy with 85 per cent of all operating expenses spent within the Hunter Valley region*
> - *contributing over $2.4 billion to the NSW economy; and $5 billion to the national economy, and*
> - *employing thousands of people in the region and hundreds of thousands of Australian jobs across its value chain nationally."*

DPI (2013) continue with regard to Australian Stock Horses that:

> *"Scone is the national headquarters for the Australian Stockhorse Society (ASHS). The largest equine recreational and pleasure horse association in Australia, the ASHS has more than 180,000 registered horses (ASHS, 2012).*
>
> *Some 97% of Australian stockhorses are either based in the Hunter or have Hunter bloodlines. More than 50% of the winners of the ASHS annual awards for outstanding national horses have been from the Upper Hunter region."*

In identifying the equine cluster as a CIC, DP&I (2012) infer the cluster satisfies the criteria (p21) and *"…is of national and/or international importance".* At a regional level, McManus *et al.* (2011) state the cluster is of significant importance to the region's economy.

4.2.3 Regional identity

The equine cluster is a crucial source of cultural identity for the town of Scone and the Upper Hunter region (McManus *et al.* 2011). In identifying the equine cluster as a CIC, DP&I (2012) infer the cluster satisfies the criteria (p21) and *"…is an iconic industry and contributes to the region's identity".*

4.3 Role of Coolmore and Woodlands in the cluster

Coolmore and Woodlands are central actors in the core business of the CIC (refer to Table 4.1). More than that, they are likely the most important of all central actors, as most of Australia's leading thoroughbred sires are standing at either Coolmore or Kelvinside (Darley) (Table 4.2). Kelvinside stallion stud near Scone and Woodlands broodmare stud near Jerry's Plains, both Darley Australia, are fully integrated. Kelvinside stallions service all Woodlands broodmares. These two studs are inseparable, critical components of the same private thoroughbred breeding business and it is doubtful that one would exist without the other.

All of the 15 leading Australian sires stand at stud in the Upper Hunter equine CIC. Noting that two of these stallions are no longer standing at stud, eight of the leading 13 (8/13) available sires stand at either Coolmore or Kelvinside, with 3/13 at Coolmore and 5/13 at Kelvinside.

In 2011, only one stallion, Fastnet Rock with 224 mares and standing at Coolmore, covered more than 200 mares in the breeding season (Breednet, 2012). Then standing for $132,000, total fees for 2011 sum to almost $30 million (M). The stallion has stood at Coolmore since 2005. In 2012 his fee was increased to $220,000 making him the most expensive stallion standing at stud in Australia. In 2013 Fastnet Rock's fee rose again to $275,000, which made him $100,000 dearer than the second most expensive stallion in Australia.

Fastnet Rock has sired 13 individual Group 1 winning horses including multiple Group 1 winners Mosheen, Sea Siren and Atlantic Jewel. On this basis, Fastnet Rock is the most important and valuable stallion currently standing in Australia. In 2013, Coomore is standing 12 stallions with fees ranging from $5,500 to $275,000.

According to Darley (2013), in 2013 Darley is standing 13 stallions at Kelvinside. Street Cry heads the stallion roster at a fee of $110,000. He has sired many champions including Melbourne Cup winner Shocking. Another leading Darley sire, Exceed And Excel, has sired more juvenile winners and juvenile Stakes winners since 2008 than any other stallion in the world.

As reported in Carr (2013), total stallion standing fees in Australia summed to $249M in 2011. Of this total amount, $185M is attributed to Upper Hunter sires and $100M of this to Coolmore and Darley.

This analysis indicates the leading role of Coolmore and Darley in the Upper Hunter equine CIC, and their significance to the Australian thoroughbred breeding industry. With respect to the role of Coolmore and Darley in the equine CIC, they are the most important of all central actors in the core business.

4.4 Potential effect of Coolmore and/or Woodlands exiting the cluster

PAC (2010) caution against testing the vulnerability of the Upper Hunter Equine CIC *"without a comprehensive study of both the economics and the risks."* This caution is well founded: the cluster is large, complex and its socio-economic importance is well communicated (e.g. by HTBA, 2013 and others). Such quantitative assessment would perhaps require rigorous economic modeling and risk analysis, and is certainly beyond the scope of this report.

Notwithstanding, using published *cluster-theory* this report has defined the CIC structure (Table 4.1), the lifecycle stage of the CIC (Section 3.3) and the leading roles of both Coolmore Australia (Coolmore stud) and Darely Australia (Woodlands and Kelvinside studs) in this structure (Section 4.3). On this basis it is possible to suggest the potential effects of the studs exiting the CIC as:

- Probable immediate decline of the CIC; and,
- Possible demise of the CIC in the near-term.

These probable and possible potential effects are considered realistic outcomes of exit because:

- Coolmore Australia and Darley Australia are the two largest thoroughbred breeding operations in the Upper Hunter Equine CIC and Australia;
- Coolmore and Darley stand the best sires in the Upper Hunter Equine CIC and Australia (see Section 4.3 of this Report);
- Coolmore and Darely generate 55% of stallion standing fees in the Upper Hunter Equine CIC and 40% nationally;
- Coolmore and Darely are significant employers within the region;
- Due to their roles within the CIC (see Section 4.3 of this report), many support businesses would likely be affected; and,
- Both are internationally mobile businesses that could readily relocate interstate or offshore.

If Coolmore Australia (Coolmore stud) and Darely Australia (Woodlands and Kelvinside studs) were to exit and cause probable decline and possible death of the CIC, *revival* of the CIC should be considered unlikely because:

- The perceived and real issues that caused the decline will remain, deterring others from assuming the vacant lead roles within the CIC; and,
- Cluster critical mass is lost.

4.5 Landscape value

The physical landscape, comprised of soils, water, topography and land use, is important to the thoroughbred breeding industry in the Upper Hunter and elsewhere. Fertile soils, good pasture, rolling topography and clean water are prerequisites to successful horse breeding (Watson, 2013). However, landscape value extends far beyond the physical.

McManus (2013) identifies four landscape values that are important to the Upper Hunter Equine CIC. Understanding how the CIC values landscape provides insight to its serious concerns about competing land uses that alter the physical landscape and risk these landscape values. Each of the landscape values is engineered at considerable cost. Whilst this cost burden is not evenly apportioned across the industry, i.e. studs like Coolmore and Woodlands have invested heavily, the outcomes create a positive externality enjoyed by the whole cluster. Each landscape value is intrinsically linked to stud and cluster economics.

These landscape values are *rural idyll, landscapes of conspicuous consumption, brandscapes* and *landscapes of work*.

The *rural idyll* is an image of well-maintained properties with green pasture, painted-wooden fences, and not a thing out of place. According to McManus (2013) it is *"intended to convey the message that the stud is organized and caring, and that the care shown in the landscaping is transferred into care for the horses. Landscape is therefore symbolic of caring for animals and for an owner's investment."*

Landscapes of conspicuous consumption project an image of status, of wealth, to attract similarly wealthy customers. Thoroughbred breeding studs like Coolmore and Woodlands are landscaped to attract investment. These studs are customer focussed and this makes them different from most other agricultural land uses. As McManus (2013) explains, even the electronic gates are a symbol that most people are excluded and those who are invited inside are special, part of the *"experience economy."*

In an experience economy, customers become associated with the cluster and individual stud brands. Here, the desirability of the experience is paramount. The engineered landscape is entwined with the name, prestige and reputation of the stud and contributes to the positive experience. This is now *brandscape*. It is important at cluster-level but critical at an enterprise-level, particularly for the most significant central actors in the cluster, e.g. Coolmore and Woodlands.

Lastly, *landscapes of work* recognises that these built landscapes of rural idyll, where conspicuous consumption and brandscaping attract the wealthy, are places of work. Whilst made to look perfect and complete for customers, the work of maintaining the thoroughbred landscape never ceases and is an enduring business expense.

Given this insight to landscape values, it is not surprising that the Chairman of Coolmore Advisory Board recently stated: *"the visual quality of both Coolmore and Woodlands and the surround landscape setting is fundamental to the successful operation of our stud farms"* (Coolmore, 2013b). This is correct. The importance of landscape values to Coolmore and Woodlands studs cannot be overstated.

4.6 Buffer to resource development

Recently PAC (2010) concluded; *"available evidence supports the view that open-cut coal mining and a viable international-scale thoroughbred breeding enterprise are incompatible land-uses."* There is no creditable scientific evidence to the contrary.

BHP Billiton's Edinglassie Stud near Muswellbrook is neither a useful example of co-existence between the thoroughbred breeding and coal mining industries nor any benchmark of co-existence because:

- The case study (NSW Minerals Council, 2012) contains false information, i.e. half the horses listed as examples of the stud's success *"since the land was purchased by BHP Billiton"* in 1998 were actually born prior to this date (Pedigree Online, 2013) and the stud has only produced one successful horse in the past eight years of mine ownership (Coolmore, 2013);
- The mine purchased the stud *"as it was considered to be within an area which would be impacted by the mine"* and these actual impacts have never been independently assessed or published;
- The scale and nature of operations at Edinglassie is significantly less than that at Coolmore or Woodlands, e.g. 50 mares at Edinglassie versus 600 mares plus

stallions and foals at Coolmore (Coolmore, 2013) and a similar number of mares at Woodlands.

This co-existence *case study* (NSW Minerals Council, 2012) contains misleading inaccuracies and misrepresentations, lacks any creditable data about the impacts of coal mining on thoroughbred breeding and generally obfuscates the issues. It is more likely that *co-existence* will not always be possible at least at the micro- or property-level, as the issues and impacts are enterprise and operation dependent, heightening the need for proper impact assessment.

A common planning response to incompatible land uses is to demarcate buffer zones to keep them apart. Defining an adequate buffer distance between thoroughbred horse studs and coal mines is not simple and no minimum buffer distance is proposed here for two important reasons. First, not all coal mines will have the same potential impacts on adjacent land uses. For example, consider the potential impacts of dust from an open-cut coal mine versus that from an underground coal mine. Second, DP&I (2012) afford the equine CIC a level of protection but not all components of it, i.e. not all horse studs, and not specific horse studs, e.g. Coolmore or Woodlands. Undoubtedly some thoroughbred studs make a larger contribution to the sustainability of the CIC than do others. With this in mind, acceptable levels of impacts from mining on horse studs should be variable, not fixed, and be determined carefully on a case-by-case basis.

In this case, and with respect to the Upper Hunter Equine CIC, the Coolmore and Woodlands studs are the most important of all core businesses, i.e. the most important central actors in the CIC (see Section 4.3). Because of this important role, and the consequence of their exit (see Section 4.4), these particular studs should be afforded the highest possible protection from potential impacts of coal mining.

A buffer between these studs and the Project should be sufficiently sized to negate any potential impact on the continued operation of these thoroughbred breeding businesses. This would include recognition of the importance of visual amenity, landscape values and reputation to the studs, as highlighted by PAC (2010), supported by McManus (2007) and McManus *et al*. (2011) and detailed herein (refer to Section 4.5). It is likely that an adequate buffer distance in this instance will be measured in kilometres, not hundreds of metres, and be influenced by inherent (natural) and induced (mining) topography.

4.7 Trigger-point for exit

The trigger-point for Coolmore and Woodlands to commence planning to exit the cluster can only be speculated. Perhaps it has already begun. It has been stated that approval of the Project, at least in its current form, will signal the exit of these studs and the immediate contraction of the CIC (Dr. Cameron Collins, PAC Public Hearing, 10 October 2013).

If the studs exit the Upper Hunter region, it is probable that each will seek to relocate as follows.

- In the southern hemisphere to maintain seasonal synergies within the global breeding industry;
- Outside of the Australian breeding season when both studs' shuttle stallions are offshore;
- To another established, though perhaps less renowned and developed equine cluster, e.g. Nagambie in Victoria, Australia or to New Zealand, allowing each to retain its Australian customer base and place in the domestic industry.

5 CONCLUSIONS

The Project, in its current form, is incompatible with the Upper Hunter Equine CIC. If approved it will likely trigger the exit of Coolmore and Woodlands horse studs from the cluster. If these studs leave the cluster, this will cause the immediate decline and possible demise of the CIC.

Following are the findings of this review and summary answers to key questions posed by PAC.

5.1 Review findings

Key findings

1. The Project's Environmental Assessment is lacking with respect to its assessment of potential impacts on Coolmore and Woodlands horse studs and entirely deficient in its description and analysis of the equine CIC.
2. With regard to submissions about the Project, and irrespective of any real or perceived conflicts of interest that submitters may have, there is enough consistent and well-informed argument to establish *reasonable doubt* about many aspects of the potential impacts on Coolmore and Woodlands, and the CIC, put forward in the Project's Environmental Assessment.
3. Even if potential impacts to Coolmore and Woodlands were considered unlikely to occur, the consequences to the CIC should these studs be impacted by the Project are so significant that, when considered carefully, the risks are too great and should be avoided.
4. Thoroughbred horse studs of the nature and scale of Coolmore and Woodlands, and open-cut coal mining as proposed by the Project are incompatible land uses. These land uses cannot co-exist in close proximity to one another.
5. Coolmore and Woodlands (as Darley Australia and operated in conjunction with Kelvinside stallion stud) horse studs are the most important of all core businesses within the CIC. These studs are central to the functioning of the cluster.
6. Project approval will likely trigger the withdrawal of Coolmore and Woodlands horse studs from the CIC because the potential impacts are considered unacceptable by these businesses.
7. If Coolmore and Woodlands horse studs exit the cluster, this will cause decline and possible demise of the CIC.
8. Coolmore and Woodlands horse studs should be provided absolute protection from impacts of open-cut coal mining as proposed by the Project in order to preserve the sustainability of the CIC.
9. An appropriate buffer distance between the Project and the Coolmore and Woodlands horse studs will be one that prevents and avoids all potential impacts. This is likely to be a distance of several kilometres. No alternate mitigation measures could suffice.

Additional observations

1. The SRLUP identifies the Upper Hunter Equine CIC as Strategic Agricultural Land and affords it some protections from competing land uses. It does not identify cluster components or discuss the importance of the CIC's core businesses, i.e. central actors. Much literature suggests protection of these core businesses is required to prevent decline of a CIC.

2. Regulatory guidance for the proper assessment of potential impacts of open-cut coal mining on thoroughbred horse breeding enterprises is lacking. Better guidance will be required to ensure robust, repeatable impact assessments in future.
3. There is a dearth of scientific literature concerning the potential impacts of open-cut coal mining on nearby equine breeding enterprises, particularly with respect to equine responses to environmental stressors. No information does not equal no impact, and the Precautionary Principle must apply.

5.2 Summary answers to key questions

With respect to the scope of work, following are summary answers to each key question.

Minister's direction to PAC:

"1. b) assess the potential impacts of the project on the operations of the Coolmore and Woodlands horse studs; and,

The potential impacts on Coolmore and Woodlands are ranked qualitatively as follows:

- Loss of landscape values;
- Dust;
- Noise;
- Vibration and blast overpressure;
- Ground and surface water;
- Transport and traffic; and,
- Economic.

c) recommend any additional measure required to avoid and/or minimise the potential impacts of the project on the horse studs" (Minister for Planning & Infrastructure, 2013).

Coolmore and Woodlands should be afforded the highest level of protection from the potential impacts of open-cut coal mining. This should take the form of significant buffering distance. No alternate mitigation measures could suffice.

More detailed questions from PAC:

1. How important is the thoroughbred horse breeding industry, in total, to the Upper Hunter region?

The Upper Hunter Equine CIC is of significant regional, state, national and international importance for a number of reasons:

- It is important to the Australian and international racing industry;
- It has economic importance to the region, state and nation; and,
- It is an iconic industry that defines the region's identity.

2. What is the 'tipping point' at which time Coolmore and Woodlands would exit the Upper Hunter equine CIC?

Approval of the Project or another open-cut coal mine in close proximity with potential to cause impacts to the studs.

3. What is the importance of reputation value (the brand) to the thoroughbred breeders, particularly Coolmore and Woodlands?

Reputational value is a component to landscape value which is of paramount importance to the CIC, and particularly Coolmore and Woodlands horse studs.

4. What would be an appropriate buffer distance between the proposed mine and the horse studs?

A suitable buffer between the Project and the studs is required to ensure mining impacts are avoided or prevented. This distance is likely to be at least several kilometres.

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APPENDIX 5
EXPERT ADVICE ON THE VISUAL AND LANDSCAPE IMPACTS FROM DR RICHARD LAMB

Advice to NSW Planning Assessment Commission:

Visual impacts of proposed Drayton South Coal Project, With regard to:

Terms of Reference of the Minister for Planning, 27 August, 2013

Prepared by Dr Richard Lamb BSc, PhD

25 November, 2013

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18 November, 2013

Ms Gabrielle Kibble AO,
Chair,
NSW Planning Assessment Commission,
L13, 301 George Street,
Sydney NSW 2001

Dear Ms Kibble,

1 Reason for this Advice

Richard Lamb and Associates has been appointed by the Department of Planning and Infrastructure (DPI) to provide independent expert professional advice on visual and associated amenity impacts of the proposed Drayton South Coal project to the NSW Planning and Assessment Commission (the PAC).

RLA are specialists in visual impact and landscape heritage assessment. The CV of the principal and author of this advice, Dr Richard Lamb can be viewed on the People tab of the RLA website at www.richardlamb.com.au. Please note that Dr Lamb, contrary to what is shown in the current CV which is under review, has retired from teaching at the University of Sydney and is now a full time professional consultant.

2 Context

Hanson Bailey Environmental Consultants (Hanson Bailey) prepared an Environmental Assessment (EA) for the Drayton South Coal Project (Drayton South) on behalf of the proponent Anglo American Metallurgical Coal Pty Ltd (Anglo American) in November, 2012. Following the exhibition the Department of Planning and Infrastructure (DPI) requested a formal Response to Submission and Anglo American proposed minor amendments, after which the Director-General (DG) requested that a Preferred Project Report be prepared and submitted.

The Minister for Planning and Infrastructure (the Minister) requested the Planning and Assessment Commission (the PAC) to review Drayton South in March, 2013 and in May, 2012 announced he had requested that the PAC defer its review to allow the DPI to further consider submission and in particular to review the potential impacts that the proposal might cause to nearby thoroughbred horse breeding studs.

The Department of Planning and Infrastructure engaged Runge Pincock Minarco to independently review the Mine Plan, following which Anglo American agreed to include some recommended changes in the Preferred Project Report (the PPR).

Relevant to direct visual impacts, the changes included amendment to the Houston Visual Bund, along the lines proposed in Option 4A in public submissions from Coolmore Australia. Anglo American's assessment of the amended bund Option 4A in the PPR is that it is effective in screening all views, including those from Coolmore, once constructed. The Option 4A bund is proposed to be constructed to its final lift height in 8 months from the commencement of construction, rather than the 16 months' duration of construction estimated in the design in the EA.

Notwithstanding the agreement of Anglo American to adopt the Option 4A bund if the project is approved and its assessment that this is a significant improvement over what had been proposed in the EA, Coolmore Australia have continued to express opposition to the project as represented in the PPR.

Subsequent to the preparation of the PPR the Minister for Planning and Infrastructure in Terms of Reference dated 27 August 2013, relevant to the expertise of RLA, requested that the PAC:

1. Carry out a review of the Drayton South Coal Project, and:

a) consider the EA for the project, the issues raised in submissions, the formal response to submissions, the Preferred Project Report, the review of the mine plan by Runge Pincock Minarco and any other information provided on the project during the course of the review;

b) assess the potential impacts of the project on the operations of the Coolmore and Woodlands horse studs; and

c) recommend any additional measures required to avoid and/or minimise potential impacts of the project on the horse studs.

Coolmore and Darley (Woodlands) made presentations to the PAC at a public hearing in Denman on 10 October, 2013. I have read the speaking notes for Ken Barrry, Chairman of the Coolmore Advisory Board, Michael Wright, Ross Watson and Owen Droop and the graphic presentation made by Michael Wright, Landscape Architect for Coolmore and Darley Woodlands. I have also read the submission made to the meeting by the Upper Hunter Thoroughbred Breeders Association presented by Sharon Veale of Godden Mackay Logan Heritage Consultants Pty Ltd.

3 Documents Consulted

In carrying out enquiries so as to satisfy the request of the Minister with regard to visual and related amenity impact, I have had regard to the following documents:

1. Drayton South Coal Project, Preliminary Environmental Assessment, prepared by Hansen Bailey for Anglo American, dated March, 2011.
2. Drayton South Coal Project (11_0062), Director General's Requirements, dated 3 August, 2011.

3. Drayton South Coal Project (11_0062), Supplementary Director General's Requirements, dated 30 March, 2012.
4. Drayton South Coal Project, Environmental Assessment, Prepared by Hansen Bailey for Anglo American, dated November, 2012, with particular attention to:
    a. Appendix A: Schedule of Land to which this EA applies;
    b. Appendix B: Mine Plan Justification;
    c. Appendix D: Stakeholder Engagement;
    d. Appendix I: Visual Impact Assessment;
    e. Appendix L: Non-Aboriginal Heritage Impact Assessment, and:
    f. Appendix Q: Soil and Land Capability Impact Assessment.
5. Agency Submissions on the Environmental Assessment
6. Special Interest Group Submissions on the Environment Assessment, with particular attention to:
    a. Coolmore Submission, 18 January, 2013
    b. Darley Submission, 18 January, 2013
    c. Hunter Thoroughbred Breeders Association Submission, 18 January, 2013
    d. Hunter Valley Wine Industry Association Submission, 21 December, 2012
    e. Scone Equine Hospital Submission, 21 December, 2012
    f. United Pastoral (Arrowfield) Submission, 21 December, 2012
    g. Upper Hunter Winemakers Association Inc. Submission, 21 December, 2012
7. Public Submissions on the Environmental Assessment.
8. Drayton South Coal Project, Response to Submissions, Parts 1-3, prepared by Hansen Bailey for Anglo American, dated May 2013, with particular reference to:
    a. Appendix B: Consolidated Submission Issues;
    b. Appendix J: Rehabilitation Strategy;
9. Drayton South Coal Project, Preferred Project Report, Prepared by Hansen Bailey, dated August, 2013.
10. Expert Review of Drayton South Open Cut Coal Project, Prepared for the NSW DPI by Runge Pincock Minarco, dated July, 2013.
11. Submissions to public meeting of the PAC at Denman on 10 October, 2013 by:
    a. Coolmore Australia, presented by Ken Barrry, Chariman of the Coolmore Advisory Board.
    b. Hunter Thoroughbred Breeders Association, presented by Sharon Veale of Gooden Mackay Logan Heritage Consultants Pty Ltd.
    c. Coommore and Darley Woodlands, Power Point presentation graphics and speaking notes, presented by Micheal Wright.

4 Location of the proposed mine

The Drayton south Coal Project is situated south west of the existing Drayton Coal Mine and to the north and north east of a section of the Golden Highway north west of Jerrys Plains in the upper Hunter Valley. A number of coal mines are present in the region to the north, north east and south east of the proposed mine site.

Between approximately Denman and Maitland, the Hunter River Valley trends south east and is confined on the south west by the northern fringe of the Triassic sedimentary series of geologies of the Hornsby and Blue Mountains plateaus. On the north and north east, the valley is confined by the foothills of the New England, or Barrington Ranges.

The regional concentration of existing and proposed coal mines is the result of the exposure of Permian coal bearing geology in the valley floor as a result of the erosion of overlying lower Triassic sedimentary rocks by the Hunter River.

5 Landscape character

At present the proposed site is rural in character and of undulating to relatively hilly topography, comprising a series of ridges between the catchments of Saddlers Creek on the north west and the Hunter River to the south. The character of the proposed site is similar to that of undulating to hilly land south of the river, some of which is to be found within the existing boundaries of the Coolmore and Darley Woodlands holdings. The existing land cover is dominated by pasture grasses with occasional scattered trees and areas of woodland, predominantly confined to the ridges and less cleared parcels of land, or to water courses. The intrinsic character of the Visual Study Area identified is satisfactorily described in the Visual Impact Assessment (the VIA) prepared by JVP Visual Planning and Design in the EA. Considered in isolation, the landscape character of the proposed mine area is one that is widespread in the locality and in the Upper Hunter Region generally.

To the south and south east of the site, the landscape is characterised by a combination of subtly to substantially different physical and cultural influences, although they largely share the rural character of the proposed mine site. The flood plain, remnant river terraces and lower side slopes of the Hunter River's meandering course are intensively used for irrigated cropping, intensive grazing, grape growing and industrial farming practices such as the breeding of thoroughbred horses. Most of these uses are founded on the deep, alluvial soils deposited by ancient and also recent flooding events and the adjacent supply of permanent water.

The southern backdrop to the valley between Denman and Jerry Plains and the setting for a series of historically significant properties and their curtilages is the eroded and dissected, naturally vegetated sandstone plateaus of the Woolemi National Park, part of the Greater Blue Mountains World Heritage Area, rising to over 600m above the river floodplain. The physical, historical, cultural and cultured features of the landscape combine to create a distinctive landscape character.

6 Landscape quality

The combination of uncleared, naturally vegetated and complexly eroded steep hills as a backdrop, cleared steep to undulating grassy side slopes, and the manicured patchwork of intensively used lower slopes and river flats, with their grid-work of post and rail fenced paddocks, natural riparian landscapes of the Hunter River course, cultural vegetation, houses and other buildings, creates a landscape for the studs that is both distinctive and of

substantial intrinsic scenic quality. At the finer grain, the studs feature highly organised and structured areas defined by the size and character of paddocks and their fencing, manicured road verges, interconnecting and fenced spaces, groups of buildings with specific purposes clustered together, residences associated with specific sub-farms, landscaped areas, grazing paddocks and open views in all directions.

The studs are designed to demonstrate high standards of thoroughbred racehorse production and management in a manicured and cultured landscape that is intended to create an image of quality, safety and luxury conditions for the horses, as well as a display of state of the art breeding environments in a scenic setting. Attributes of the image include clear water, clean air, productive soils, greenness, expansive views and intensive and meticulous attention to detail of almost every visible feature. The sense of the places is that they are deceptively bucolic but are in fact intensively planned, designed, managed and programmed to generate a predictable and high quality product in a setting that projects the image of international thoroughbred breeding underpinning the horse racing industry. All of the world's premiere thoroughbred breeding areas project similar combinations of imagery in their somewhat different physical environments (eg, Newmarket and Kentucky).

Part of the unique quality of the landscapes of the studs that contributes to their image is the sense of continuity with the wider rural landscape and the sense of isolation they currently enjoy from the changing landscapes of the Upper Hunter Valley, many of which are being transformed by coal mining. From most parts of both studs, the presence of the nearest coal mining activity at Mt Arthur has a minor impact on that sense of continuity with the rural landscapes and of the isolation of the internal parts of the studs from outside influences.

7 Non-indigenous cultural heritage values

The origins and maturity of these cultured landscapes is complemented by a number of existing and potential heritage items and their settings, such as Strowan and Woodlands Homesteads, which have significant historical associations reaching back to the origins of occupation of the region and with horse breeding in the Upper Hunter Valley. While there would be unlikely to be any physical impacts on the items themselves, there is a potential for negative impacts on the perception of the significance of the heritage values of their settings in a significant rural cultural landscape arising from the direct and indirect visual impacts of the proposal.

The EA satisfactorily identified the items of existing and potential heritage significance that can be affected by the proposal, however it did not assess the potential for the area occupied by the studs in particular to be identified as a significant rural cultural landscape in its own right. It did not consider the likely impacts on the tangible and intangible heritage values associated with the horse breeding and later thoroughbred breeding industry and the values of the landscape it is associated with.

Godden Mackay Logan Heritage Consultants, in a submission on behalf of the Upper Hunter Thoroughbred Breeders Association made to the PAC at Denman expressed the opinion that the Drayton Sought Coal Project will impact on the historic cultural landscape, its setting and defining character that distinguishes this area of the Hunter Valley and that

views and vistas to and from heritage items will also be impacted through the mining activities. Although not based on any independent assessment or original historical research, the submission concluded that the potential heritage values of the studs would at the very least be likely to meet criterion (a) of the significance criteria for listing on the NSW Sate Heritage Register, ie. *(a) an item is important in the course, or pattern, of NSW's cultural or natural history or the cultural or natural history of the local area)*.

I agree that this would be likely to be one conclusion of a more thorough and comprehensive assessment and further that there is the potential for the place to satisfy other criteria, for example criterion (c), ie, *an items is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW*. There would be potential impacts on these values arising from the mining activity, arising from the direct and indirect visual impacts on both fixed and dynamic views.

8 Direct visual exposure of the site

There are considered to be three kinds of visual impacts that are relevant to this assessment. The first concerns direct visual effects of the proposal (ie. where mining activities such as overburden removal, winning of ROM product, overburden emplacement, construction, rehabilitation, transport of materials, etc. would be visible). The second class of visual effects is indirect (ie. where there is no direct visibility of the mining operations, but there is visual evidence of them). The third class of impacts are impacts on the image of the studs, a significant part of which is based on appearances.

The proposed area of disturbance by the proposed mine is large by the standard of others in the sub-region and it is intended to approach relatively close to the both of the subject studs, where high wall drives underground will approach the Golden Highway and with above ground mining between approximately 500-700m from part of the boundary of each stud.

The predominant areas to be mined are protected from direct views from most of the lower parts of both studs by a series of hills and ridges which are not intended to be disturbed by above ground mining activity. High wall mining is proposed below the hills and closer to both studs underground, however there is not intended to be any surface evidence of this activity.

The major proportion of the mine is further away from Coolmore than Darley Woodlands and the view is oblique with regard to the ridges that reduce visibility toward the subject site. The surface working of the proposed Houston pit is potentially visible between two ridges and that potential visibility is the main reason for the proposed Houston Visual Bund. The bund would also perform other environment control functions by acting as an acoustic barrier.

The VIA in the EA reasonably represents the likely visibility of the proposal in most views. One could argue that the viewing locations chosen do not all represent the worst case scenario, however there are no significant gaps in the range of locations assessed. A useful further viewing place for analysis could have been located approximately at the eastern boundary of Coolmore on the Golden Highway, where the Houston Bund construction and

its final landform would be of high visibility, however its appearance and impact on the views can be inferred adequately from other adjacent locations.

8.1 Fixed viewing locations

The VIA adopts a conventional approach and concentrates on fixed viewing locations for the assessment of impacts, which are then averaged across other similar viewing location categories to arrive at an overall assessment of impacts. The primary weighting criterion used to accord more or less weight to the importance of the visual effects of the proposal is visual sensitivity. The sensitivity criterion is also conventional and gives more weight to views from fixed locations such as dwellings and to those in which the orientation to the view would tend to accentuate the visibility of the effects of the proposal on the landscape. While acknowledging that some land uses such as wineries and horse studs make use of the scenic amenity values of the surrounding landscape as part of their business image, the VIA is primarily concerned with views from fixed locations.

The proposed location of the CHPP, possible future overland conveyor and haul routes, which are to connect the pits to the existing infrastructure at the existing Drayton Mine, are a significant advantage with regard to visual impacts control, as there will be minimal direct visibility of those activities from the studs in question.

Most of Darley Woodlands has no fixed views of the proposed mine site. The exception is the high land that includes a trig. station, Trig Hill and hilly grazing land in the vicinity in the north east part of the property, as well as the frontage of the property to part of the Golden Highway. The view from theTrig Hill location and part of Coolmore on the side slopes of the same ridge system will include the operations in the Redbank and Blakefield pits in the foreground of the view composition, with at least part of the Whynot pit in the middle distance. The relative relief is such that there is no practical way to mitigate the impacts on the view and since the operations proceed generally from north to south, advancing toward Darley Woodlands and Coolmore over many years, with the rehabilitation following behind, there will be visual exposure of the mining throughout the operational life of the Redbank and Blakefield pits.

The lack of internal topographic data for the mine site in the documentation, which could show the changing topography during the various stages of the operation, makes it difficult to ascertain to what extent the operations in the Whynot pit would be visible from these locations.

It is proposed to control the visibility of operations approaching the road in the vicinity of the boundary of Darley by densely planting a tree screen inside the boundary. The likelihood of such a strategy being successful in mitigating the visual impacts has been questioned in the submission to the PAC prepared for Coolmore and Darley and presented to the PAC in Denman. While it is correct that narrow tree bands do lose effectiveness as screens as the trees become taller and lose their lower foliage as shown in the presentation, specification of an appropriate width of tree screen and of a mixture of tall and small trees and shrubs at appropriate densities, as well as under-planting with supplementary vegetation if the screens lose opacity with maturity, can deal with this problem. As is the case with the rehabilitation plan, there is little information on or design of the screen in the documentation

accompanying the PPR. Design of appropriate tree screens that will be effective in mitigating impacts on the views from Darley, Coolmore and the Golden Highway in the general vicinity should be the subject of specific conditions of consent if the proposal is to be approved.

Most of the more intensively used part of Coolmore also has no view of the proposed mine site. However the north west and eastern parts of the property are exposed to varying extents to views toward the south and south east sectors of the proposed mine site, which primarily includes land proposed to be extracted in the operations associated with the Redbank and Houston Pits. The view toward the Houston Pit from the part of Coolmore most exposed to it is oblique and focussed by the adjacent ridges on the re-entrant valley that trends south east in which the Houston Bund will be constructed. In the meantime, the construction, compaction and rehabilitation of the bund will be evident from a significant area, not only within Coolmore, but also on the Golden Highway and in Jerrys Plains.

An effect of the construction of the bund will be the blocking of the view and its replacement with a high, constructed bund. The proposed Option 4A bund is still a substantial structure, at approximately 1km in length and up to 79m in height. In the idealised representation of the Bund in the photomontages that show views from the eastern part of Coolmore (DS03, DS05, SS06 and DS08), the bund is represented as a naturally sloped and ultimately vegetated structure that achieves a character indistinguishable from the adjacent rural landscape. It is also intended to be permanent. For reasons mentioned below, there are risks that the bund may not be satisfactorily rehabilitated and may not achieve the appearance of a grassy, rural hillside.

The bund is designed to mitigate impacts on all views, including those from rising topography in the eastern part of Coolmmore, which is undulating and rises to a series of ridges, from which and along the alignment of Oak Range Road for example, the Houston Bund will be prominent. As a result, it has a significant negative effect on the view from the Golden Highway, isolated parts of Jerrys Plains and parts of Coolmore, including those on the lower eastern slopes, on the flood plain north of the Highway and as seen from the setting of the heritage property Strowan. In those lower areas, the bund is unlikely to be significantly screening activity behind it as the viewing angle is steeply upward from the Highway and vicinity. In other words, the visibility of the bund in the public domain is significant but of little benefit to mitigation of the impacts of proposed mining on those views.

8.2 Fixed views and photomontages

The VIA presents a large range of photomontages that depict the effects on views of selected stages of the operations as seen from various locations, including a number in and adjacent to the two studs. The number of viewing places assessed in the studs is greater in concentration than for any other individual location assessed in the VIA and this indicates that the authors had specific concern for the impacts on views from these. However as noted above, the assessment of visual effects is limited by the concentration on fixed views. The photomontages, leaving aside questions of accuracy, represent a range of such fixed, or static views.

There are a number of montages that specifically represent the visual effects of the Houston Bund on views from the two studs and represent the effects at various stages of its construction and rehabilitation. The montages that show the effects of the proposed mine on the landscape seen from Trig Hill by comparison are more realistic with regard to colours and textures of the overburden emplacements but do not encompass the whole of the horizontal visual field that will be affected.

There are criticisms in some of the submissions in objection to the proposal of the colours used to depict the constructed bunds in the photomontages. On the basis of my observations and experience, the colours are somewhat unrealistic compared to the colours and textures of overburden emplacements that are visible at several other nearby mines. The overburden I observe and which is typical of Upper Hunter mines is light grey in colour with occasional isolated patches of ochre and black tones mixed in. The colour of graded bunds ready for rehabilitation is also typically light grey, or light brown/orange when first ready to be seeded.

I consider that the colours used in the montages depicting the final form of the bund before compaction and rehabilitation begins ought to have been lighter, appear more highly textured and with less green or yellow tones in them, which tended to allow the bund depicted to blend into the background of grassed ridges. In reality the light grey colour of the bund as constructed in each lift, its blocky texture, including its colour, before the spreading of topsoil and seeding, should have been evident in the photomontages. A more realistic colour and texture would have the effect of emphasising the contrast between the bund and the adjacent landscape and also giving a more realistic impression of the distance between the viewer and the bund, making it appear closer. Having said this, the amendment of the montages to present a more realistic colour and texture quality would slightly increase the visual effects of the bund, but would not significantly alter the perception of the impact of the bunds on the landscape.

There are also criticisms of the representation of the apparent effects and success of the proposed rehabilitation of the bunds, first by sowing of grasses and then of the effect of the growth of proposed tree vegetation. If the vegetation was successfully established as intended, the appearance of the bund, if considered in isolation of other effects it would have, would be acceptable. On the basis of the information currently available to the PAC however, to what extent there can be confidence in the success of the rehabilitation is not clear.

There is information in the documentation in Appendix J to the Response to Submissions on the EA, the Rehabilitation Strategy. In the Rehabilitation Strategy there is a series of figures that show schematically how the rehabilitation is to progress, generally from north to south following the progress of development of the pits, with the exception of the Houston Bund. This bund is established early, on the stated intention of eliminating views of the Houston and Whynot pit operations. It also has the unintended effect of permanently blocking a view into a moderately attractive valley landscape.

The appendix contains a conventional description of the process and intention of the rehabilitation strategy and of the performance standards proposed to be achieved and of the management and monitoring objectives. It also shows that the Houston Bund and apparently a significant part of the surrounding landscape is proposed to be planted with

tree vegetation, “tree screening” (see Figure 6). It does not show any visual examples of the rehabilitation such as is proposed for the Houston Bund or show a design of the bund itself. There is no detail as to how the rehabilitation will be achieved and how the vegetation cover that is proposed will be established, maintained and managed. For example, there is no mention of the need for watering of either temporary cover crops or later plantings to ensure their initial establishment and no information on the identity of the grass species to be established after temporary cover crops die off.

While there is information on the availability of topsoil for use in rehabilitation based on the predominant soil types, there is no statement as to which agricultural capability class the final landform of the Houston Bund would fall into and therefore no way to establish what the depth of topsoil that would be placed on it is to be. It may be as little as 150mm in depth. Shallow soil over compacted but unstructured overburden would be subject to intense desiccation by sun and wind and would require special treatment to retain moisture, resist erosion, provide a substrate for grass and tree growth and produce a rural visual character essentially the same as adjacent land, as is the image depicted in the Houston Bund in the photomontages. There is a risk that this will not occur and that the Houston Bund will present a landscape of reduced scenic quality to the Golden Highway and the views from the studs in which it is visible.

8.3 Dynamic views

While it is conventional to concentrate on fixed viewing locations as the VIA does and this extends to the new photomontages presented in the PPR, there is a significant aspect of visual impacts that is thereby missing from the assessment. This is no consideration of dynamic, or moving views. Views are experienced not only in moving sequences, which may be repeated regularly, but may also be from experiences that are displaced in time, in which views or other visual material, such as those from books, digital or other visual media etc. are also assembled cognitively into an image of a place, journey or destination. The latter is a significant consideration with regard to impacts on the visual imagery of the stud operations, which is integral to the presentation of their aesthetic values.

Dynamic viewing is a day to day experience, in which 3 and 4-dimensional understanding of the world comes from the continually refreshed visual images that are experienced while moving about in the environment. The fourth dimension is of time, in which the past and expectations of what will happen in the future are an integral part of the experience and the continual unconscious and also conscious revisions of cognitive images that occur with every new experience.

In the rural context and in particular in a structured and formalised environment such as the horse studs, in which a relatively large number of rural workers are involved, the predominant visual environment is outdoors and views are dynamic. The organisation of the studs is such that most workers are constantly moving about the various discrete and functionally different parts of the large holdings and at times taking their clients with them. While each stud is only partly exposed to views of the mining operations proposed when considered from fixed locations, every person involved in the stud operations, including clients and their agents, will be exposed to the evidence of the mining operations and at times to high levels of exposure. Dynamic views are especially important in providing the

circumstances in which a 3-dimensional understanding of the external environment is assembled as a cognitive image and it can be assembled out of fragmented visual information, for example glimpses, cameo views, filtered, or partly screened views.

Dynamic view experiences would provide the circumstances for any employee or permanent resident and for many visitors to the studs to perceive sufficient visual information on which to base an understanding of the presence of the adjacent mining operations.

Visitors to the studs, who commonly would be clients, may find features of the adjacent mining landscape, compared to the scenic quality, character and blue ribbon imagery of the studs themselves and their wider settings to be discordant and a negative impact on both scenic quality and the image projected by the studs. This may be contributed to by the experience of driving to the studs from Newcastle or the region along the Golden Highway or flying in to land at the Coomore air strip, in which experience many examples of coal mining operations are present, some with little visual mitigation. West of Jerrys Plains at present there is something of a break from this widespread character, which assists the sense of continuity of the studs with the adjacent rural landscape and also with the sense of isolation that is part of the imagery of these places.

8.4 Impacts on the image of the studs

For those assembling the dynamic visual imagery of the place from memory, advertising material and other disparate sources and this would apply to a great many of the clientele and those promoting it to them, the presence of a large coal mine in the immediate vicinity may be seen as clashing with the stereotypes of clean air, clean water, clean pastures, immaculate landscape designs, quietness, wide open spaces and picturesque scenery. As the image is assembled partly by experience and partly by the industry that constructs it for the consumption of the buyers of the services and horses, it is idealised, stereotyped and highly susceptible to impacts of what might objectively seem to be minor effects. For example, night time lighting of the operations that may be perceived as causing a glowing effect on the atmosphere, particularly in ideal circumstances for that phenomenon to occur, may conflict with the image of cleanliness, safety, isolation and the absence of light that is typical of the rural, high quality experience in the imagery projected by the studs. Blasting noise and dust plumes from blasting or vehicles on haul roads and working on unconsolidated overburden may also be perceived as alien to that imagery. In that regard, the sensitivity of the studs to impacts on the imagery that is inherent in their branding and identities deserves acknowledgement and special consideration with regard to the acceptability of the proposed mine, either as proposed or as may be acceptable, subject to recommendations to minimise visual impacts.

9 Indirect visual exposure of the operations

Apart from direct visibility there are likely to be other visible indications of the presence of mining operations, such as general dust from extraction, excavation and haul roads, blasting gas and dust plumes and night-time lighting. There is little information in the EA or the PPR concerning the potential effects of night lighting other than a general statement

that lighting other than on vehicles will be confined to the area of existing infrastructure at the existing Drayton Mine and that general lighting would be hooded. Mining operations will be conducted 24 hours a day. There are no firm plans for conveyors to carry the product to the existing Drayton Mine facilities and haul roads would be utilised day and night. Safety and security would be paramount considerations of night time operations and presumably require high levels of lighting at active mining areas and for construction work such as that on OEAs and for high wall mining operations. It is therefore difficult to see how there would not be a significant potential for night time lighting to impact on the area, in particular in the Redbank Pit, with potential impacts on views as the operations approach Coolmore and Darley Woodlands.

As a general principle, the closer the operations approach the boundaries of the studs, the more likely there are to be indirect visual exposure effects, since in most cases the effect decreases with distance. The exception may be diffuse night lighting effects which can be seen even at low intensities over significant distances. In that regard, the proximity of the operations to both studs, but in particular the proximity of the closest parts of the Redbank Pit to Coolmore and Darley Woodlands, is of concern.

Though not a direct visual impact, there is even a relationship between the effect of isolated noise events such as blasting and visual impacts. Sudden, and unexpected sounds such as blasting usually tend to cause those that hear those sounds to look for the source and try to judge the direction from which the sound is coming, whether or not there is in fact any evidence of the cause. Visual evidence of the operations may be manifested as dust or blasting gas plumes. On other occasions, dust may be visible with no noise experienced. Each of these is an indirect visual impact of the operations.

10 Overall visual impacts of the proposal on the studs

The proposed mine plan benefits from the conservation of the most of the existing appearance of the range of low hills that are along the south west and south sides of the area of proposed disturbance. There is significant merit in utilising a connection to the existing Drayton Mine, at which the existing infrastructure, CHPP and rail load out facility will be used to process the ROM product and ship the coal resource to the Port of Newcastle.

The location of these facilities distant from the subject horse studs is a significant advantage with regard to management and mitigation of the overall level of visual impacts. That benefit generally flows to the public domain as well, in that a proportion of the views from the Golden Highway would not be subject to significant visual impacts. Given the size of the proposed mine, the overall level of mitigation of visual impacts is of a generally satisfactory standard. However leaving aside the acceptability of the entire proposal, there are areas for concern in the application as it stands.

If the adjacent rural landscape which comprises the thoroughbred studs was general grazing or agricultural land, the visual impact could be considered acceptable. However, the combination of physical, aesthetic, cultural and historical values that characterise the studs, along with the nature of the rural industry that underpins them, gives rise to a

heightened level of sensitivity to visual impacts of all three of the classes identified above, ie. Direct, indirect and impacts on image.

The VIA in the EA concedes that aspects of the visual environment are part of the imagery that is projected by the studs, but does not accord them a level of sensitivity that is sufficient to acknowledge their unique qualities or conclude that there is a heightened standard to which visual impact mitigation should aspire in that context. It concentrates on and reasonably represents the physical visual effects of aspects of the mining proposal, on fixed viewing places. A critical consideration has been missed, concerning the importance of impacts on dynamic views and the fragility of the image of the studs in the context of features that contrast with, appear out of context with, or clash with aspects of that image. The image is not just what is visible at a given point in time or from a single or a range of locations. The image is constructed to be ideal, timeless and is carried as much in the minds of people that come to and deal with the studs as in the day to day appearance of the places in the world.

The landscapes of the studs are of special intrinsic scenic quality and character, historically significant and of importance to the story of development of the Upper Hunter Valley, the theme of agriculture and rural industry and the thoroughbred racing industry. They are of special and possibly unique sensitivity to impacts on the scenic values of their settings and are highly vulnerable to direct and indirect visual impacts.

11 Recommendations: measures to avoid or minimise impacts

With regard to the Terms of Reference of the Minister, of 27 August, 2013, I have considered all of the information raised in Term (a) and assessed the potential impacts of the proposal in Term (b). This section of the advice addresses Term (c), which was to recommend any additional measures required to avoid and/or minimise potential impacts of the project on the horse studs.

It is not for me to recommend that the project proceed or otherwise and I leave balancing the costs and benefits to others who have the appropriate expertise. However, with regard to the visual impacts and the potential for mitigation of the direct visual impacts, there are two specific areas of the project which are of concern. The two areas are the impact of the Houston Bund, both on the public domain and on the studs, in particular on Coolmore and secondly and whether the proposed proximity of the Redback Pit to both studs is justified.

11.1 The Houston Pit and Bund

The Houston Bund, notwithstanding the agreement by Anglo American to implement the Option 4A bund proposed by Coolmore, has significant potential direct impacts on views from the stud, including those experienced from the setting of the heritage property Stowan, Ellerslie, Oak Range Road and the landscape in the vicinity, the air strip, paddocks north of the Golden Highway and Quarry Hill.

The bund also has some negative visual impacts on the public domain of the Golden Highway and parts of Jerrys Plains, however in these locations, the bund is unlikely to be significantly screening the operations in the Houston Pit, as it is elevated, distant and the

view angle is upward. The bund has little value to the public in protecting it from visual impacts and it has negative impacts on views and the imagery critical to the operations of Coolmore. The bund has a negative impact on the visual aspects of that image and is associated with direct and indirect visual impacts because it enables operations that can cause indirect impacts to be closer to the stud.

The reason for the bund is stated in relation to visual impacts to be to hide the operations in the Houston Pit and also to hide the potential operations in the Whynot Pit as they progress generally toward the south. Given the time that will elapse before the southern edge of the Whynot Pit would approach the northern extent of the Houston Pit and the potential uncertainty of the economics of coal mining over that period, it is possible that the Whynot Pit may never coalesce with the Houston Pit as shown in the conceptual mine plan. In that context concern about the potential future visibility of operations in the Whynot Pit may not be justified. In addition, if the south eastern edge of the Whynot Pit was realigned to run more closely parallel to the predominant view lines from Coolmore, trending toward the north east, there would be little of the potential future operations in the Whynot Pit visible in any event. In that context, there is less justification for the implementation of the Houston bund, which is predicated on extraction of the resource in the Houston Pit.

The Houston Pit is the smallest in the project in horizontal area but is the one with the highest potential visual exposure to the horse studs, other than in the elevated views from some of the highest parts, such as Trig Hill in Darley and land in the vicinity of Quarry Hill in Coolmore. The view toward the Houston Pit and even more so toward the potential future area to be occupied by the south eastern extent of the Whynot Pit is oblique, even from the eastern parts of of Coolmore. In terms of the potential to block views therefore, the imposition of the bund on the landscape, which is to hide the operations in the smallest pit, is in visual impacts terms out of proportion to the extent to which it mitigates the potential impacts on views and also the indirect visual impacts of the operations.

The low visual impacts rating for the bund in the VIA depend on it soon being indistinguishable from a natural grassy hillside once rehabilitated. There are risks that the bund may not be rehabilitated to the degree envisaged in the VIA, leading to negative impacts on the character, scenic quality and the cultural heritage values of the rural setting that is critical to the imagery of the studs.

If the Houston Pit and therefore the bund was removed from the project, the nearest part of the Whynot Pit would be a further 1.5km away and only partly and obliquely visible from the eastern and more elevated parts of Coolmore. As mentioned above, the alignment of the south eastern part of the Whynot pit could be amended to minimise the potential visibility of future operations in that pit. In further support of that amendment, there would not appear to be a significant likelihood of view from most of Coolmore and it is unlikely that there would be any significant visibility of the operations in Whynot from the Golden Highway or Jerrys Plains.

11.1.1 Recommendation in relation to the Houston Pit and Bund

Consideration should be given to removing the Houston Pit and Bund from the project.

11.1.2 Recommendation in relation to the Whynot Pit

Consideration should be given to recommending the realigning of the south east margin of the Whynot Pit so as to minimise or eliminate views of the operations in views from the Coolmore Stud, Golden Highway and Jerrys Plains.

11.2 Proximity of Redbank and Blakefield Pits to Studs

There is potential for a more satisfactory suite of means to be taken to mitigate direct impacts on Darley and part of Coolmore, for example better designed and managed vegetation buffers between the Golden Highway and the Redbank Pit. While dense banks of vegetation as are shown in the VIA for View Point DS10 Darley Front Gate at Figure 6l.11 may if implemented have some benefits in mitigating visibility of the operations, they are also out of character with the open rural landscapes of the subject site and the Studs. They may also manage only direct impacts at the boundary, while the proximity of the Redbank and part of the Blakefield Pit is also of concern with regard to both direct and potential indirect impacts for other reasons.

The Redbank Pit is at its closest to both studs, with high wall mining drives under the area between the Pit and the Golden Highway. Tree bands may block some views, but will have no effect on others and the Redbank and Blakefield Pits will have a significant direct visual impact on views from some elevated locations of both studs, but most notably from Trig Hill in Darley Woodlands Stud and high land in the vicinity in Coolmore. While the view will be significantly affected by the proposed mining operations, the viewing places are not considered to be of the highest intrinsic sensitivity, as they would not be accessible to most visitors to the stud and would in all likelihood be avoided as a place for staff to take visitors to because of the unimpeded views they provide over the Redbank and Blakefield Pits.

Those scenes would in turn be likely to conflict with the intrinsic scenic quality and cultural landscape of Coolmore and Darley Woodlands studs and would not be desirable features to be promoted as a part of the image values of the place. The proximity of the pit therefore would be likely to result in changes in the management of the stud so as to minimise the potential impacts on image of the place as marketed to its clientele. The proximity also leads to higher risks of indirect impacts, such as visibility of lighting, dust, blasting gases, etc. Since these effects would potentially be visible from places lower than Trig Hill, the area affected by changed management practices may also be greater than what is indicated by the ratings given to single view points used in the impacts assessment in the VIA and the preparation of photomontages.

It is not within my expertise to comment on acoustic impacts, however the proximity of the southern parts of the Pits to the studs is such that I understand charges would need to be reduced by half to achieve the necessary attenuation standards but with twice the blasting frequency to achieve the same explosive effect, doubling the likelihood of indirect visual impacts of dust, gas etc. being visible.

11.2.1 Recommendation with regard to vegetation buffers

Design of appropriate tree screens that will be effective in mitigating impacts on the views from Coolmore and Darley Woodlands and the section of the Golden Highway in the general vicinity should be the subject of specific conditions of consent if the proposal is to be approved.

Consideration should be given to requiring a landscape management plan for all tree planting buffers to roads shown on the plans for approval. A planting design should be required that specifies a sufficient width for a tree screen that it maintains a woodland character in the view from the road, but is of sufficient density when viewed in elevation to screen views of overburden emplacements, roads, vehicles, lights and infrastructure. The design should specify a mixture of tall and small indigenous native trees and shrubs at appropriate densities, as well as a maintenance schedule for under-planting with supplementary vegetation as the screens loses opacity with maturity.

11.2.2 Recommendation for increased setbacks: Redbank and Blakefield Pits

Consideration should be given to requiring wider setbacks from the Golden Highway of the Redbank and part of the adjacent Blakefield Pit in the order of 1-2km, utilising a similar strategy of visual impacts mitigation for the operations (ie, making use of the existing topography to block direct views of the proposed development) so as to minimise the need for screening vegetation bands, reduce the potential for direct visual impacts and minimise the potential for indirect impacts of the operations on views from the Studs.

Please do not hesitate to contact us if you have any questions or require clarification of any points,

Richard Lamb & Associates

APPENDIX 6
EXPERT ADVICE ON THE MINE PLAN FROM MR RICHARD JENNINGS AND MR JOHN JANETZKI

R A Jennings & Associates
2 Rae Cove
Whitebridge NSW
ABN 17076453328

30th October 2013

Ms G Kibble AO
Chair
Planning Assessment Commission
GPO Box 3415
Sydney NSW 2001

Dear Gabrielle

Subject: Review of the Drayton South Mine Plan

With regards to your request in September 2013 to review the mine plan and review the report by Runge Pincock Minarco (RPM) in accordance with the Ministers Request dated 27 August 2013, we have prepared a report addressing these specific issues.

A copy of our report is attached for your reference, we have based our advice on the data and information supplied by Ms Megan Webb and the Expert Review of Drayton South Open Cut Coal Project prepared by RPM for the NSW Department of Planning and Infrastructure, and also the Preferred Project report by Hansen Bailey completed for the Proponent in August 2013.

We have conducted one visit to the site on 9th October 2013, to enable a good understanding of the proposed Drayton South Open Cut Mining Project.

We have reviewed some of the proposed mine plans and schedules provided by the mine, and other information accessible from the PAC website.

We have proposed some additional measures that may be adopted to further minimise the potential impacts of the project on the nearby horse studs. The Proponent would have to conduct a financial analysis on these proposals and ascertain if they are acceptable or impose an unacceptable material impact on the project.

We hope this report meets your needs and are available for further discussion if necessary.

Kind Regards,

Richard Jennings & John Janetzki

1. Executive Summary

The Runge Pincock Minarco (RPM) Review prepared for the NSW Department of Planning has suggested some improvements to the mine plan to reduce the final void size. It also reviewed any potential changes to the dragline schedule and determined that all environmental guidelines can be complied with the existing preferred project plan, RPM did not consider any further reductions in the mine footprint to minimise noise, blasting or dust impacts on nearby horse studs. The report did not evaluate any further mitigation measures, as all of the prescribed environmental limits have been modelled on the preferred project plan and are predicted to be within these limits.

The Drayton South Project Preferred Project proposal operates to within 500 metres of the Golden Highway, Arrowfield Estate and Coolmore horse stud boundary. This buffer zone is the normal minimum distance for a safe blasting exclusion zone to be established. This distance could be increased by reducing the size of the Redbank Open Cut pit. For each 100 metres of pit reduction, the mine loses approximately 1 Mt of product coal from the project. If the pit size is reduced by 500 metres along the road boundary it is estimated that approximately 4.4Mt of product coal would be sterilised, with a substantial financial impact to the project economics. This option provides the most cost effective mitigation measure to further reduce the impact on the nearby horse studs. The nearest mining operation would then be at least 1km from the Coolmore boundary.

Other options to minimise impact on the horse studs are less consequential as the operations in the Whynot pit and Houston pit are all at least 2 km away, and are further protected by the natural ridge line and the erection of a visual bund. Options to vary the mining sequence would have a marginal improvement, if any on the horse studs, as the operation will be utilising the same equipment fleet in the same mining areas during the life of the project.

The proponent has committed to treat all exposed areas with effective dust control measures to meet the prescribed environmental standards, and attempts to reduce the exposed areas by rescheduling do not appear offer any real benefits.

2. Introduction

2.1 Background

New South Wales Department of Planning and Infrastructure have requested the Planning Assessment Commission (PAC) carry out a review and report on various aspects of the Drayton South Coal Project. The PAC requires R A Jennings & Assoc. to provide an Expert Report in relation to aspects of the Drayton South Coal Project mine plan.

2.2 Scope of Work

The scope of work provided by the PAC includes questions relating to the Drayton South Coal Project mine plan and the potential to modify the mine plan to reduce the impacts on the operation of the Coolmore and Woodlands horse studs.

The specific questions covered in this review include:

1. Can the mine be kept behind the ridge from a technical perspective and what are the impacts for the mine?
2. Can the Redbank pit size be reduced to increase the buffer zone between the mining operations and the horse studs? What would be the impact on the mining operation?
3. What are the options for reducing the number of pits that are open at any one time?

2.3 Capability

R A Jennings & Assoc. provide independent consulting and project management services to the resource industry specialising in open cut coal operations. This report has been prepared by Richard Jennings and John Janetzki who both have in excess of 30 years of experience in the planning, operation and management of coal mines. R A Jennings & Assoc. has not previously provided services to Anglo American.

2.4 Limitations

This review has been prepared in accordance with instructions from the Planning Assessment Commission and is for the Commission's sole and exclusive use. R A Jennings & Assoc. does not agree to other parties relying on the content or findings.

The review has been undertaken with reference to documents relating to the Drayton South Project, posted on the NSW Department of Planning and Infrastructure, Major Project's web site.

The review provides estimates of the impact that potential pit boundary changes could have on the Project's coal reserves that have been calculated without the benefit of access to geological models. The calculation methodology, which relies on the change in surface area of the various mining pits, assumes that coal seam thickness and occurrence is uniform over the individual pits.

Whilst this method provides some guidance as to the impact that pit boundary changes would have on coal reserves, it should be verified by interrogating the validated Project geological models.

3. Review

Question 1.

Can the mine be kept behind the ridge from a technical perspective and what are the impacts for the mine?

The proposed Houston, and the south eastern portion on the Whynot pit, extends beyond the south west to north east ridge line that visually shields the majority of the project from the Coolmore stud properties. The Proponent has proposed the construction of the Houston visual bund to provide visual screening. This review considers the implication of keeping all of the mining operations to the north of the ridge line.

It is technically possible to keep all of the mining operations to the north of the main ridge but not without significant adverse impacts to the project. Keeping all of the operations to the north of the ridge line will reduce the visual impact of the project.

Impacts on the project are as follows:

Lost coal reserves, dragline production losses, increased project risk and reduced project value.

Note – the following coal reserves estimates have been based on a simple calculation of surface area changes applied to the total PPR reserves shown in Table 1. Table 1 reserves estimates have been sourced from the Hansen Bailey, as updated to reflect the current PPR mine plan. This calculation method is not based on any modelling of coal seam geology and assumes a uniform coal thickness over the entire pit area. A more accurate assessment of the impact of boundary changes on available coal reserves would require the interrogation of the coal seam geological models and is beyond the scope of this review.

- Elimination of the Houston pit removes 7.1 Mt of open cut product coal and an estimated 0.9 Mt of highwall coal product tonnes. In total 8.0 Mt or 9.1% of the PPR product coal reserves.
- Pulling back the Whynot pit to behind the ridgeline, as shown outlined in yellow in Figure 1, represents a decrease in area of the Whynot pit of approximately 15% of the surface area. On a simple prorated basis, a reduction in reserves in the Whynot pit of 15% represents a loss of product tonnes of 8.1 Mt. Drayton personnel have calculated the reduction in Whynot pit reserves losses to equal 10.6Mt of ROM coal, which at the pit average wash yield of 75.7% equates to 8.0 Mt coal product essentially confirming the area based calculation methodology.
- Total coal losses in the order of 16.1 Mt or 18.4 % of the planned PPR reserves. At an average production rate of 3.7Mt per annum product the removal of 16 Mt of reserves would shorten the project by 4.3 years.
- The reduction in Whynot pit area will reduce the average strike length available for the operation of the dragline in the Whynot pit and the removal of the Houston pit as

alternative dragline work area in the latter years of the project will to lead to dragline scheduling problems resulting in forced dragline shutdowns. Whilst detailed mine planning and skilful production scheduling options may be used to reduce the dragline production delays, the reduced available strike length will inevitably lead to dragline production losses and increase production delay risks.

- The removal of the Houston pit eliminates access for highwall mining from Houston. Based on available face length, this represents approximately 25% of the project highwall mining tonnage. The success of the highwall mining operation is dependent upon having sufficient highwall available to justify the acquisition and development of the highwall mining technology. A reduction of 25% of available highwall may compromise the ability to successfully implement a highwall mining program potentially putting 100% of the highwall tonnage at risk.

Question 2

Can the Redbank pit size be reduced to increase the buffer zone between the mining operations and the horse studs? What would be the impact on the mining operation?

The Redbank pit has been designed as an excavator and truck pit to recover the Redbank coal seam in the southern area of the EL. In order to reduce the visual impact to receivers to the south of the Project, the mining area has been constrained to the area north of the ridgeline. The south western area has also been curtailed to maintain a 500m setback from the Golden highway to provide a buffer and to minimise blasting impacts.

In assessing alternative pit boundaries that may further reduce the impact of the Redbank pit mining activities on the horse studs consideration must be given to the type of impact and the effect that the pit boundary modification may have on the impact.

- As the Redbank pit is already visually screened by the existing ridge line moving the southern boundary further to the north would have little impact on visual amenity.
- The 500m set back from the Golden highway provides the industry standard buffer from blasting fly rock that will avoid the requirement to close the Golden Highway during blasting operations. From a fly rock risk and traffic management perspective, the buffer is adequate.
- As the Golden Highway also forms the Coolmore stud and the Arrowfield estate property boundaries, the Redbank pit operations adjacent to the highway will also come to within approximately 500m of Coolmore and Arrowfield. Whilst the environmental impacts of noise and dust have be modelled and reported by the Proponent as meeting the required guidelines, increasing the buffer zone adjacent to the highway would reduce both noise and dust levels at adjacent properties.
- Any increase in the width of the buffer zone will reduce the coal reserves available to the Project.
- Figure 1 shows the impact of increasing the Redbank pit buffer to the Golden Highway from 500m to 1000m (outlined in green in Figure 1). An increase in the buffer zone from 500m to 1000m is estimated to reduce the area available for mining in the Redbank pit by approximately 30% which would reduce the product coal by approximately 4.4MT or

5.0 % of the total planned coal sales from the Project. The reduction in reserves is likely to reduce the Project duration and the production levels during the later years of the project as the Redbank pit finishes earlier than planned. This would have a significant adverse impact on the Project economics.

- Whilst technically feasible to increase the size of the buffer zone from 500m to some other alternative distance, any increase will reduce both the environmental impact and the available coal reserves.
- It is beyond the scope of this review to assess the level of economic impact that a buffer zone width change would have on the effected parties. Clearly, this is a trade-off between the benefits of coal resource recovery to the Proponent and the community and the benefits that may accrue to the neighbouring land users and the community resulting from a reduced environmental impact.

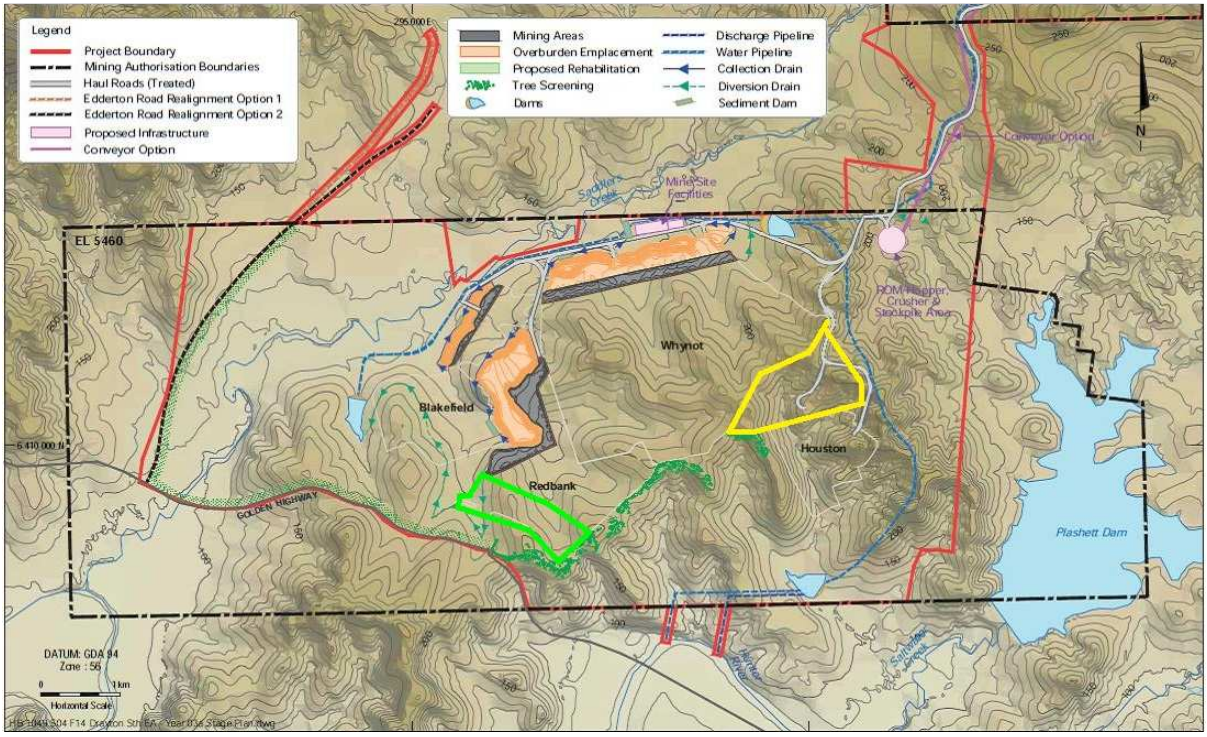


Figure 1 Pit Boundary Modifications

PPR				
Mining Area	**ROM Coal (Mt)**	**Product Coal (Mt)**	**ROM Coal Ash (%)**	**Product Coal Ash (%)**
Whynot	75.2	56.9	22.7	12.8
Redbank	20.3	14.6	29.3	16.3
Blakefield	6.2	5.1	14.9	7.2
Houston	8.8	7.1	25.7	13.3
Highwall Mining	4.9	3.7	23.2	15.3
All Mining Areas	115.4	87.4	24.0	13.4

Table 1 Reserves by pit (Source: PPR reserves estimated provided by Hansen Bailey 22/10/13)

Mining Area	PPR case	All Whynot and Huston mining behind ridgeline	1000m Redbank pit buffer to Golden Hwy
	Product Coal (Mt)	Product Coal (Mt)	Product Coal (Mt)
Whynot	56.9	48.8	56.9
Redbank	14.6	14.6	10.2
Blakefield	5.1	5.1	5.1
Houston	7.1	0	7.1
Highwall mining	3.7	2.8	3.7
All mining areas	**87.4**	**71.3**	**83.0**

Table 2 Reserves for modified pit boundaries

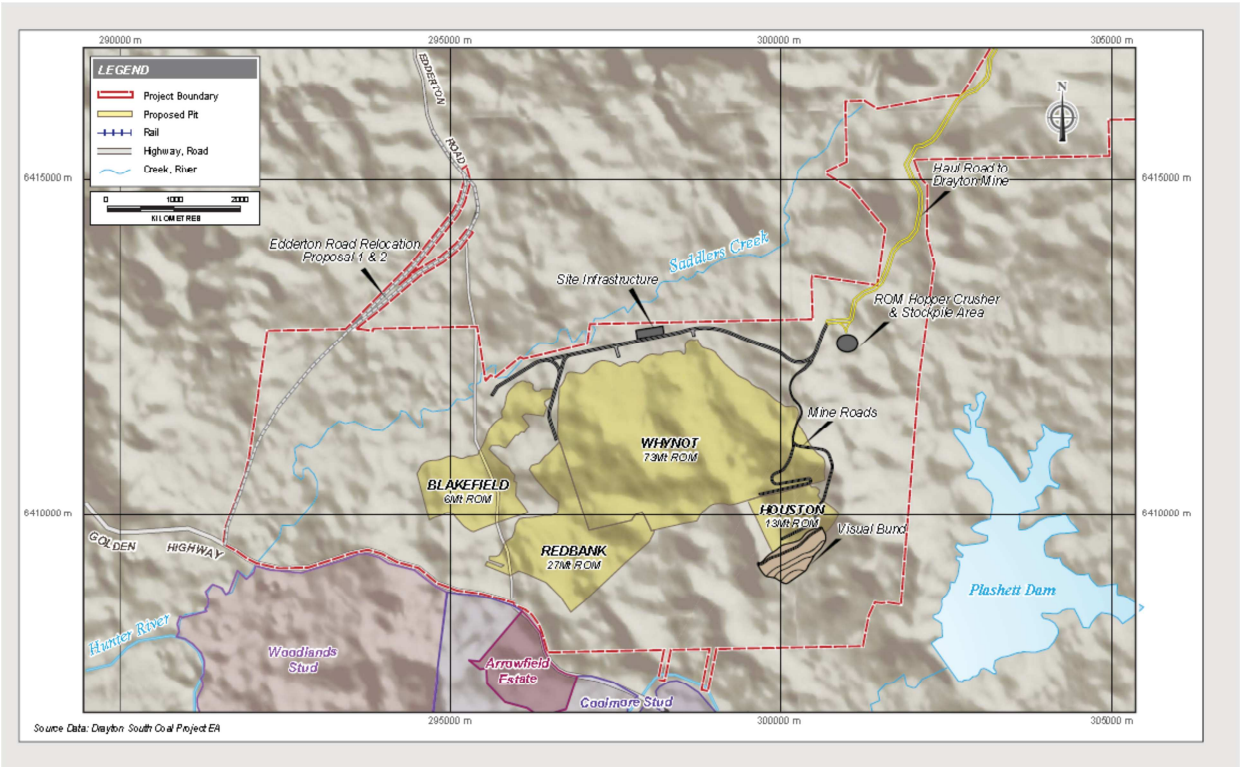
Question 3

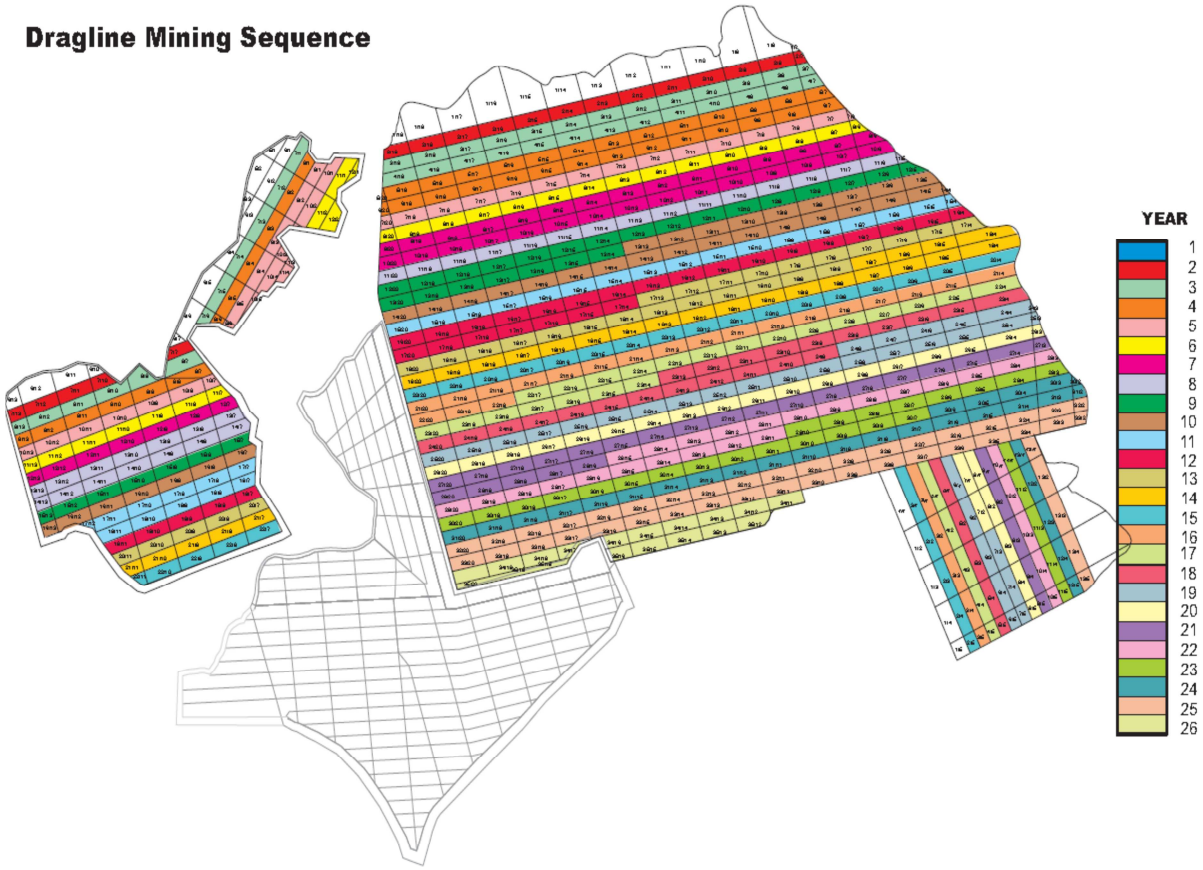
What are the options for reducing the number of pits that are open at any one time?

The final mine plan documented in the Preferred Project Report has been developed to enable the dragline to be fully utilised throughout the project, by providing dragline strips predominantly in the main Whynot pit and utilising the Blakefield and Houston pits to provide additional strike length to allow continuous operation of the dragline.

The schedule also has allowed for highwall mining to take place as soon as possible from the interim highwalls available in the Houston pit from as early as year three. The schedule has been developed to maximise the tonnage of coal available for highwall mining during the life of the project.

The preferred schedule also provides for continuous operation of the Redbank pit throughout the project to provide high ash blend coal for managing specific product coal quality throughout the life of the project. The Redbank pit will be done entirely with trucks and excavators, so is not required for dragline continuity or early highwall mining access. The final highwalls of the Redbank pit will be used for highwall mining before being backfilled and rehabilitated.


290000 m
295000 m
300000 m
305000 m
6415000 m
6410000 m
LEGEND
Project Boundary
Proposed Pit
Rail
Highway, Road
Creek, River
KILOMETRES
EDDERTON ROAD
Edderton Road Relocation Proposal 1 & 2
Saddlers Creek
Site Infrastructure
Haul Road to Drayton Mine
ROM Hopper Crusher & Stockpile Area
Mine Roads
WHYNOT
73Mt ROM
BLAKEFIELD
6Mt ROM
HOUSTON
13Mt ROM
Visual Bund
REDBANK
27Mt ROM
GOLDEN HIGHWAY
Hunter River
Woodlands Stud
Arrowfield Estate
Coolmore Stud
Plashett Dam
N
Source Data: Drayton South Coal Project EA


Dragline Mining Sequence
YEAR
1
2
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4
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- Little scope is available to reschedule work in the Redbank pit, with the disturbed area dependant on how quickly the dumps are established to final landform levels and then rehabilitated during the mining and dumping process.

- The first option to consider would be to only mine one pit at a time using the dragline, thus minimising the disturbed area to only one working dragline pit to supplement the Redbank truck and shovel operations. This option would require the dragline to be shut down after completing each strip to allow for coal extraction, dozer push and drill and blast activities to prepare the next dragline work area. This option would severely compromise the ability to produce enough coal during each year of the project and substantially increase the length of time for the project to extract all of the planned reserves. Blending of low ash and high ash coal is necessary to ensure a consistent production of saleable coal. By only working one pit at any time, the product coal specification would not be able to be achieved, and would therefore be an unworkable option.

- The schedule could be modified to defer any mining in the Houston Pit until around year 10, thus reducing the disturbed area to Whynot, Blakefield and Redbank pits until this time. This would defer the bund construction to around year 10. The existing schedule has the dragline working in the Houston pit from year 15. This option would allow the Blakefield pit to be progressively rehabilitated before disturbing any of the Houston pit area. This option would reduce the overall tonnage of highwall coal from the project, as the Houston pit highwall would not be available for a long enough period to conduct the planned highwall mining activity. This would equate to a loss of up to 0.9Mt of total reserves over the project life by excluding the highwall mining from the Houston pit.

- The other option may be to defer the Blakefield pit, and work the Houston pit earlier in the sequence with the Whynot pit, thus reducing the amount of disturbed area during the early stages of the mine. This option would require the Houston pit to be worked from East to West and would sacrifice approximately half (450Kt) of the available highwall mining coal, as the only highwall mining would be from the Eastern highwall when the dragline has completed all open cut mining from this pit. This option would greatly increase the distance the dragline would need to walk between pits and would require a dragline walk road to be established between the Whynot and Houston pits earlier than the existing schedule. This option would also defer highwall mining from the Blakefield pit final highwalls and potentially have a detrimental impact to delivering consistent product coal quality, as the best quality coal from Blakefield would be deferred to later in the sequence, and lower quality coal from the Houston pit would need to be mined earlier. This option would also require the visual bund to be constructed as early as possible to provide a screen for dragline operations in the Houston pit.