



HTBA SUBMISSISON
DARTBROOK COAL MINE
MODIFICATION 7 (DA 231-7-2000 MOD 7)

APRIL 2019

EXECUTIVE SUMMARY

The Hunter Thoroughbred Breeders' Association (HTBA) welcomes the opportunity to make a submission on the Dartbrook Modification 7 proposal.

The HTBA represents Australia's multi-billion dollar thoroughbred breeding industry centered and concentrated in the Hunter Valley consisting of over 200 thoroughbred breeding operations and support industries. It is Australia's largest concentration of thoroughbred breeding operations (2nd largest in the world) and largest producers, suppliers and exporters of premium thoroughbreds. Our industry contributed some \$5 billion, \$2.6 billion and over \$0.5 billion per annum to national, state and regional economies. We are a significant national, state and local employer and have been recognized by the NSW Government as a state significant industry. We have been mapped as an Equine Critical Industry Cluster and promised heightened protection by the NSW Government, as well as having been protected from coal seam gas mining. Compared to our sister industries world-wide, we are the only thoroughbred breeding industry of significant size, importance and global reputation that is not protected with buffers or protection zones from incompatible development – such as mining.

The HTBA opposes this application by Australian Pacific Coal (APC) to recommence underground mining at the Dartbrook site, in close proximity to one of our (and the world's) leading stud operations (Darley Kelvinside) and to the town of Aberdeen.

We oppose this proposal for a number of reasons:

1. It sits at the gateway to a key section of the Equine Critical Industry Cluster in the Upper Hunter and Segenhoe Valleys;
2. It is clearly incompatible with international scale thoroughbred breeding operations;
3. It fails every merit on any assessment for of the merits of this proposal of this kind;
4. It is economically detrimental (at a national, state and regional level); and
5. It is manifestly not in the public interest.

Analysis by experts in their respective fields, commissioned by the HTBA has found that the proposed Dartbrook modification 7:

- is based on a **fatally flawed mine plan** that is based on an incorrect coal price, sub-standard coal quality, inaccurate production rate assumptions and underestimates of capital and operating costs;
- presents a net benefit calculation that is based on **"optimism bias"** – incorrectly inflating the coal price, potential tax and royalty payments; underestimating the costs; ignoring externalities (including social and cumulative impacts, greenhouse gas impacts and impacts on agricultural industries); and overestimating the benefits;
- is likely to result in a **negative "benefit" to the national and state economies of \$73m and \$15m respectively** – a **worse** situation than doing nothing;
- **comprehensively fails to appropriately assess the social impacts** of this proposal (both marginal and cumulative) – in line with NSW Social Impact Assessment guidelines and including impacts on human health, community character and cohesiveness and sense of place and country;
- will result in **unacceptable air quality exceedances**, by the Proponent's own admission – worsening the Upper Hunter's already "dangerously dusty" air quality – which is already close to or on NEPM limits and considered the worst air quality region in NSW (with air quality exceedances already at levels of five to ten times above what is considered safe). This is with several key elements of the proposal not having been assessed in terms of air quality impacts including cumulative and social impacts, such as the potential future use of the coal handling and preparation plant;
- will result in **unacceptable noise exceedances** and uses **inscrutable noise modeling** that cannot be interrogated by anyone (including the Department and the Commission) due to the outdated and

inaccessible modeling software used by the Proponent's consultants. Blasting and cumulative noise impacts have not been assessed, noise limits attributable to Dartbrook are higher than those of the adjoining Mount Pleasant open cut mine; noise limits that are inconsistent with those for similar mines in the region; and noise intrusiveness is likely to be 15 to 20dB than ambient background noise at Kayuga;

- **fundamentally deficient water analysis** – ground and surface water impacts are unknown, water risks are too high (particularly concerning in times of drought), and a post facto approach to water management which is considered to be unacceptable, irresponsible and potentially irreversible;
- **manifestly fails to assess the Aboriginal and non-Aboriginal heritage** impacts of the proposal, despite the plentiful availability of public information on both matters; findings of previous Planning Assessment Commissions (PACs), and the existence of a federally endorsed native title claim over the area;
- **fails to adequately assess visual impacts** – including the inability to identify impacted residences in close proximity (+/- 1km) to the mine site; the visual impact of 192 B double movements every day five days a week (or every 3.5 minutes); the visual impact of other above ground infrastructure (the size of which has not been divulged); direct, indirect, static and dynamic visual impacts of the mine (including light and noise pollution);
- **raises serious legal issues** including the validity of this s75W modification; modification constraints; irrelevant considerations; lack of information to properly assess the modification application; and a flawed Department of Planning Assessment Report.

This modification proposal by an unproven miner with no mining experience or background, (to our knowledge), provides us with no confidence.

The Department of Planning's Assessment Report unquestioningly accepts and adopts the Proponent's claims and conclusions without any critical analysis. In doing so the Department disregards NSW policies and guidelines and the deliberations and decisions of Justice Preston to which the Department was a party.

The Department's approach to this and other mining proposals does not instill confidence in the NSW planning process and diminishes the community's confidence and trust. It should be given no weight in your deliberations.

This submission provides further information on our industry and surrounding landscape and discusses in more detail the mining operations, economic, social, environmental, heritage, noise and visual impacts and outlines the deficiencies of the proposed modification.

The HTBA is strongly of the view that this Dartbrook modification is economically, environmentally and socially damaging and in today's context, it does not have, and is unlikely to gain, a social licence to operate. It is not in the public interest and we strongly recommend it be refused.

Yours sincerely



Dr Cameron Collins
President

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1. INTRODUCTION

The Hunter Thoroughbred Breeders Association represents some 200 industry participants including thoroughbred breeders and suppliers of equine support services.

The NSW Government has acknowledged the state significance of the Hunter's Thoroughbred Breeding Industry in its Strategic Land Use Plans for the Hunter and Upper Hunter, has recognised and mapped the Hunter's Equine Critical Industry Cluster and has acted to protect our industry from coal seam gas mining.

The Hunter Valley's Thoroughbred Breeding industry is **1 of 3 Centres of Thoroughbred Breeding Excellence in the world** and is the second largest concentration of thoroughbred horse studs in the world outside of Kentucky USA.

It is a **multi-billion dollar industry** concentrated in the Hunter Valley that contributes over **\$0.5billion** to the Hunter regional economy, **\$2.6 billion** to the NSW economy and over **\$5 billion** to the national economy every year. It provides sustainable employment to over **5,000 people** in the Hunter and supports a sophisticated network of equine support industries.

It is vertically integrated into the Racing Industry and provides employment and business opportunities to over **200,000 people** across its national network – upstream and down from fodder and saddlery to fashion and hospitality¹.

Our Association, and member companies, are not opposed to mining. We acknowledge that mining has a place in the NSW economy. But mining should not displace other pre-existing, sustainable industries and the jobs and economic contributions they make to our regional, state and national economies.

The transition away from the mining in the past five years has reinforced the need, and added impetus, for economic diversification and resilience. International experts and researchers are cautioning investors and Governments alike regarding the potential for stranded mining assets in Australia. Our political leaders (both national and state) and their policies are encouraging investment to promote growth in other areas of our economy to build strong diversity and to prepare for the transition from a mining dependent energy future to one that is more diverse, environmentally responsible and economically efficient.

Concerns regarding air pollution, human health and climate change are driving investments in alternative energies, influencing international commodity markets, the stronger application of Environmentally Sustainable Development (ESD) principles in financial institutions and international government policies (particularly in China) to protect human health, reduce pollution and respond to climate change. Governments and energy decisions are having, and will continue to have, profound effects on our economy and demand for resources - increasing the imperative for alternative industries, resources and strong diversified resilient economies.

Given the significant and cumulative environmental and socio-economic impacts and land use conflicts posed by this proposal, we strongly encourage all Independent Planning Commissions to follow previous practice and to tour affected major agricultural industries (in this case our own industry). This practice would enable the Commission to comprehend first hand how these industries operate and how vulnerable they are to threats imposed by incompatible development, such as mining so that fully informed decisions can be made.

Appendix 1 to this submission provides more details on our industry, its value chain and its history in the Hunter Valley.

2. DARTBROOK PROJECT BACKGROUND:

History, Ownership & Key Consent Conditions

Experienced miners such as Peabody Coal, Shell Australia and Anglo American have all owned the Dartbrook mine at different times. It is now owned by a new company with no mining background or experience at all, Australia Pacific Coal.

Under two separate development consents, including its current consent, and seven (7) Modifications, the Dartbrook Underground mine has been approved to operate for 31 years from December 1991 to December 2022. To date the Dartbrook mine has been inoperative for more years than it has been operational (16 years compared to 12 years respectively).

It is **important to note that the original consent in 1991 was based on the construction of a sub-surface corridor (now known as the Hunter Tunnel)** to transport the coal to the CHPP and then the Main Northern Railway line for transport to port. This undertaking by the original Proponent was decided following the examination of two options – transportation by use of the existing road system or the construction of a conveyor. The use of the road system to transport the coal was found to be expensive and **environmentally damaging**. A surface conveyor would be cheaper but would be environmentally intrusive. To meet environmental objectives, the original Proponent decided to construct the subsurface corridor.ⁱⁱ

The original consent, granted in 1991, for the longwall mining of the Wynn Seam, was modified in 2001 to allow mining to shift from the Wynn Seam to the stratigraphically higher Kayuga, Mt Arthur and Piercefield Seams as the Wynn seam was posing “difficult mining conditions, including a high gas make, large and unmineable dykes and the constraining presence of alluvial lands.”ⁱⁱⁱ The use of the Hunter Tunnel remained an integral component of the modification and approval – and indeed subsequent modification approvals.

In 2003, the new owner of the Dartbrook underground mine, Anglo American, moved mining operations from the Wynn Seam to the Kayuga Seam. In the intervening 3 year period, it was quickly evident that this shift also “*caused unanticipated operational difficulties at the mine.*”^{iv} The coal from the Kayuga seam was found to have “*a higher proportion of fines, than the coal from the Wynn Seam. ... reduced efficiency of the CHPP, ... [which] significantly increased the demand for stockpile capacity at the mine. It also increased the moisture content of the tailings generated by the CHPP and consequently it has become harder to dewater and dispose of the rejects in the Rejects Emplacement Area.*”^v Further the Kayuga Seam goaf was “*susceptible to spontaneous combustion, which reduces the safety of underground mining.*”^{vi}

Despite their experience and commitment to health and safety, in December 2006 both Anglo Coal and Downer EDI were convicted and fined in the Industrial Court for the fatal fall of an underground coal mine roof killing an employee which took place on 28 May 2004.^{vii} This was one of several fatalities that occurred at the trouble plagued Dartbrook underground mine site between 1997 and 2004.

In 2006, due to “ongoing operational and geological issues” the experienced miner Anglo American decided to mothball the Dartbrook underground mine operations. For the past 13 years the mine has remained inoperative, under care and maintenance.

In December 2015 Anglo American announced its had entered into a Sale Purchase Agreement with Australian Pacific Coal Limited, for the Dartbrook coal mine. In May 2017 the sale was completed following a vendor loan of \$7.7m from Anglo American.

Today the mine is owned by Australia Pacific Coal (“APC”), a company that is majority owned by Trepang Services whose principals are Mr Nick Paspaley (of the Paspaley pearling empire) and Mr John Robinson (a Northern Territory Property Developer). APC’s inaugural chairman and CEO (and previously part owner of the company) Mr Nathan Tinkler resigned both these positions when declared bankrupt. The

company's current Managing Director is Mr John Robinson Junior who holds an accounting degree and is a Member of the Australian Institute of Company Directors. To the best of our understanding, none of these principals have any prior experience in underground mining.

3. PROJECT APPLICATION:

On 27 February 2018, AQC applied for a modification to DA 231-7-2000 to:

- re-commence underground operations at the Dartbrook mine using bord and pillar mining of the Kayuga coal seam instead of the approved longwall for a maximum production rate of 1.5mt pa;
- change the method of transferring coal to the train load out facility (from the approved sub-surface Hunter Tunnel to above ground truck haulage); and
- extend the period of approval by 5 years (from December 2022 to December 2027).

The request to modify the transfer of coal from the approved sub-surface conveyor in the Hunter Tunnel to above ground B-double truck haulage (192 trips per day, 5 days a week) is completely at odds with a fundamental and core undertaking of the original Development Application and consent conditions, the 2001 modification consent and subsequent modification consents.

It completely ignores the environmental damage and intrusion an above ground transportation system would cause and sweeps aside a critical and core undertaking (ie sub-surface transport through the Hunter Tunnel) given by two previous owners in order to gain approval and a social licence to operate the Dartbrook underground mine in the first place.

This element of the modification alone is such a substantial departure from the original 1991 application and the 2001 Modification, and a betrayal of the mine's social licence to operate, that it should merit a complete rejection of AQC's modification proposal. Such a decision would, in our view, accord with Justice Robson's verdict in the s75W matter of *Billinudgel Property Pty Ltd v Minister for Planning* [2016] NSW LEC139.^{viii}

One might ask, what would motivate such a desperate act? The answer can be found in AQC's response to the Commission's questioning on this matter in their meeting with the Proponent on 18 February 2019:

*"Now, based on the tonnes that we're seeking to mine overall, the capital costs becomes a very important component of any business case, and certainly the capital cost to reinstate the Hunter Tunnel, which is approximately four kilometres west to east and was largely – all of the conveyer structure was removed by former owners when it entered care and maintenance. **It's not an immaterial cost to go ahead and reinstate those works. ... a more capital light approach is the haulage that we proposed ...**"*^{ix}

This response goes to the core of the economic issues with this project that it is not economically viable and provides no economic benefits for the State or Nationally.

4. PROJECT REFERRAL

43 submissions were received from the public and special interests groups during the exhibition process for this modification – of which the overwhelming majority, 41 submissions, objected to this modification.

Due to the strong level of community concern to the AQC modification proposal, it was referred to the IPC for determination by the Department of Planning on 25 January 2019.

The IPC's public meeting on 9 April coincided with the first day of trading of one of the thoroughbred breeding industry's premier thoroughbred bloodstock sales, the Inglis Easter Yearling Sale, held every year at this time in Sydney. Hunter Valley bred bloodstock represent some 80% of the catalogue for this sale.

While the principals, employees, support industries and clients of Hunter Valley studs were not able to attend the IPC's public meeting many have made their concerns and opposition known to the IPC via alternate speakers, lodging submissions or providing video presentations.

5. PROJECT SURROUNDS AND HISTORICAL CONTEXT:

The Hunter's thoroughbred breeding community has a long and proud history with the land spanning nearly two centuries.

From the first breeding land surveyed and the first settler and stud established by George Bowman in the early 1820s to the latest crop of thoroughbred athletes and champions, the Thoroughbred Breeding Industry has been an intrinsic part of the fabric of the Hunter community, its history and heritage.

We live amongst scenic heritage listed landscapes and have world famous reputations for our horse breeding and racing exploits, including the production of champions of the Turf – such as our most famous thoroughbred mare - Winx.

The Hunter Valley is the heartland of Australia's premier thoroughbred breeding industry. It is recognized as Australia's Horse Capital as it is Australia's largest thoroughbred breeding nursery, concentrated in the NSW Hunter Valley.

The Hunter Valley's unique environment – its heritage, scenic landscape, water systems, rich soils and undulating lands protected by the Valley walls are essential attributes for breeding world leading thoroughbred elite, attracting investment and maintaining sustainable jobs and diverse economies.

Our industry operates in a clean, green and serene environment which is highly sensitive to threats, including to our reputation and brand, posed by mining – a fact acknowledged by 5 previous PACs and 2 Gateway Panels.

The Upper Hunter and Segenhoe Valleys are home to a major part of the Equine Critical Industry Cluster where many studs, broodmare farms and equine support industries are clustered – including one of Australia's and the world's largest and most important thoroughbred operations, Darley Kelvinside.

Many of our stud farms have passed their skills, excellence and traditions of breeding champion athletes from generation to generation. Thousands of dedicated horsemen and women live locally, work, raise their families and continue the proud history of care and attention to our industry and community.

The Dartbrook mine is situated at the gateway to these equine operations in the Upper Hunter, which apart from this abandoned underground mine, has hitherto been untouched by mining. Its environmental and social impacts will therefore be significant and by the Department's own admission in its Assessment report, the impacts of reopening this abandoned mine are akin to a "new mine operation."

6. RELEVANT NSW GOVERNMENT POLICIES AND LEGISLATION:

6.1 Environmental Planning and Assessment Act 1979 (“EP&A Act”)

The objects of the EP&A Act (as outlined in section 1.3) are

- a) to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State’s natural and other resources,
- b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,
- c) to promote the orderly and economic use and development of land,
- d) to promote the delivery and maintenance of affordable housing,
- e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,
- f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),
- g) to promote good design and amenity of the built environment,
- h) to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants,
- i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,
- j) to provide increased opportunity for community participation in environmental planning and assessment.

In our view, this modification fails EP&A Act objects 1.3(a), (b), (c), (e), (f), and (j). (We refer also to our comments on Merit Assessment in the next section).

6.2 State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 (“Mining SEPP”)

The aims of Mining SEPP as outlined in section 2 of the policy are (*emphasis added*):

- a) to provide for the proper management and development of mineral, petroleum and extractive material resources *for the purpose of promoting the social and economic welfare of the State*, and
- b) to facilitate the *orderly and economic use and development of land* containing mineral, petroleum and extractive material resources, and
- (b1) to promote the development of *significant mineral resources*, and
- c) to establish appropriate planning controls to *encourage ecologically sustainable development* through the environmental assessment, and sustainable management, of development of mineral, petroleum and extractive material resources, and
- d) to establish a gateway assessment process for certain mining and petroleum (oil and gas) development:
 - (i) *to recognise the importance of agricultural resources*, and
 - (ii) *to ensure protection of strategic agricultural land and water resources*, and
 - (iii) *to ensure a balanced use of land by potentially competing industries*, and
 - (iv) to provide for the sustainable growth of mining, petroleum *and agricultural industries*.

We submit that AQC's proposed modification does not meet aims 2(a), 2(b), 2(b1), 2(c) and 2(d) of the Mining SEPP. (See also our comments in the Merit Assessment section of this submission).

6.3 Previous Independent Planning Assessment Reports

Five (5) previous Independent Planning Assessment Commission Reports^x found that:

- international scale thoroughbred breeding enterprises and coal mining were incompatible land uses in close proximity;
- the thoroughbred industry in the Upper Hunter Valley is a very significant contributor to the regional, state and national economies and a major source of employment and should be protected;
- structure of the [thoroughbred breeding] industry makes it particularly vulnerable to threats based on image and coal mining in the Upper Hunter Valley is strongly identified as such a threat;
- the importance of the Equine Critical Industry Cluster, its sensitivities to intensive development and the landscape character of its central operators ... needs to be acknowledged with the development and enforcement of appropriate buffers, exclusionary zones or preservation measures to safeguard this important industry.

These PACs also found that mining would have air quality, blast noise effects, visual amenity and heritage impacts for which "adaptive management" was unsuitable; adverse impacts were potentially irreversible; and unacceptable negative economic and social impacts.^{xi}

On the matter of "co-existence" we note that in 2015 the PAC^{xii} found that:

"Land use planning, ... involves the regulation of land use in an efficient way to manage land use conflict. Coexistence is an outcome whereby different land uses can occur in proximity to one another. Each land use type should be sustainable and should not pose any significant threat to the success or longevity of the other."^{xiii}

"Balancing these competing and conflicting land uses is not inherent in the existing planning framework for the region and espousing coexistence does not make it so."^{xiv}

"Co-existence" is a term that has been much bandied about. It is not a political or public panacea for land use conflicts.

Peaceful "co-existence" should embrace the principles of good government and planning; the sustainable growth of regional economies respecting diversity and resilience; the protection of strategic agricultural lands and industries, waters, and the environment; and the separation of incompatible land uses. It should encourage the development of mineral resources in a balanced and sustainable manner – one that respects our environment and protects iconic agricultural industries and the investment and sustainable jobs they create – and one that implements the principles of environmentally sustainable development and delivers intra and inter-generational equity.

The objects of the EP&A Act, the aims of the Mining SEPP, Government policies and guidelines (see below) all contain ESD requirements, the protection of strategic agricultural land and water resources and the "balanced" use of land by competing industries. These objectives and principles have been acknowledged and acted upon by previous PACs.

In our view, Dartbrook Modification No 7 demonstrates many similarities with mining proposals rejected by previous PACs – including the potential to impact the Upper Hunter's Equine CIC, significant negative environmental and socio-economic impacts, incompatible land use with nearby agricultural industries and lack of intra and inter-generational equity. For these reasons we submit the Dartbrook Modification 7 proposal should be rejected.

6.4 Strategic Regional Land Use Plan – Upper Hunter (“The Plan”) & The Hunter Regional Plan (“the HRP”)

These Plans recognise the importance of restoring balance to the Upper Hunter; the need to end land use conflicts; the need to transition from traditional energy sources to renewables; the need for resilient and diverse regions and the need to protect and grow industries such as Equine, Viticulture and Tourism in the Upper Hunter.

In delivering the Upper Hunter Strategic Regional Land Use Plan in 2012, the Premier acknowledged “The Upper Hunter is one of the State’s most fertile and productive agricultural areas” and “the national and international significance of the Upper Hunter’s wine and thoroughbred industries has also been recognised, with large areas of the region also identified for heightened protection.”^{xv}

In 2015 the Commission^{xvi} noted that the “Strategic Regional Land Use Plan for the Upper Hunter prepared in 2012, identifies and highlighted the importance of the Upper Hunter’s Equine and Viticulture Critical Industry Clusters. Further strategic planning work is needed to address current conflicts and deliver planning protections to safeguard both of these Critical Industry Clusters from incompatible land uses thereby providing greater certainty for all sectors and potential land uses in the region and providing greater investment in these Critical Industry Clusters”.

In the Community Health and Amenity chapter of the Plan, the NSW Government acknowledged that:

- “A perceived decrease in human health and well being (physical and psychological) is one of the key impacts from coal mining in the Upper Hunter region. And
- the impact of air pollution on health and amenity is a major community issue in the region. And
- The main air pollutant from mining is dust, which is caused by vehicle activity, wind erosion from exposed surfaces, stockpiling, drilling, blasting, crushing and screening.”^{xvii}

This chapter of the Plan also recognised that mining causes noise pollution, impacts negatively on visual amenity and has the potential to impact both on water security and safety.^{xviii}

In 2016 the NSW Government published the Hunter Regional Plan, another 20-year blueprint for the future that “reflects community and stakeholder aspirations.”^{xix}

Direction 5 of the HRP is to transform the productivity of the Upper Hunter in recognition that “it is undergoing a transition with the major transformation occurring in power generation, emerging technologies, growth opportunities in agriculture and changes in the mining sector.”^{xx}

Direction 9 of the HRP focuses on growing tourism in the region, including enabling the growth in tourism in the Upper Hunter through integration with the Equine Critical Industry Cluster.^{xxi} Direction 19 focuses on identifying and protecting the region’s heritage.

A key part of the local Government narrative for the Upper Hunter and regional priorities includes ^{xxii}:

- the protection of the Equine Critical Industry Cluster and allowing for expansion of the thoroughbred industry.
- supporting the tourism economy by investigating ways to leverage agriculture and equine industry strengths to attract food based and equine-related visitors. Scone and Aberdeen feature as strategic centres with the significant agricultural employment cluster being the Equine Critical Industry Cluster.

The objectives of growing international tourism, preserving the Upper Hunter region’s heritage, protecting the Equine Critical Industry Cluster, allowing for expansion of the Thoroughbred Breeding industry and leveraging the equine industry to boost regional tourism and investment are incompatible with the approval of mines. The impact of mining is to dissuade this investment and create adverse impacts on our environment, heritage and investment and tourism attractiveness.

In our view, Dartbrook Modification 7 exhibits all of the negative environmental and social consequences of mining and does not accord with the purposes (including the protection and growth of ECIC, Viticulture and tourism industries) of these Plans – a conclusion also reached by previous PACs. For these reasons, we submit the proposal should be rejected.

6.5 NSW Social Impact Assessment (SIA) Guideline, September 2017

This guideline applies to State significant resource projects, including modification applications, submitted post September 2017 (capturing Dartbrook Modification 7).

The objectives of this guideline are, inter alia, to ^{xxiii}:

- facilitate improved project planning and design through earlier identification of potential social impacts;
- support informed decision-making by strengthening the quality and relevance of information and analysis provided to the consent authority;
- facilitate meaningful, respectful and effective community and stakeholder engagement on social impacts across each EIA phase, from scoping to post-approval.

Social Impacts are clearly defined in this Guideline, including way of life; community composition, cohesion and character; culture (including Aboriginal culture and connection to country); health and wellbeing; surroundings (including aesthetic values and amenity) ; personal and property rights; and fears and aspirations (real and perceived)^{xxiv}.

Cumulative social impacts are also required under this guideline. Principles guiding the social impact assessment are listed in Table 2 of the guideline and include:^{xxv}

- distributive equity (intra and inter-generational);
- impartiality;
- inclusivity - seeking to hear, understand and respect the perspectives of the full diversity of potentially affected groups of people;
- precautionary;
- proportionate;
- rigorous; and
- transparency.

It is noteworthy that the Proponent did not prepare an SIA as part of the EA process as required by this guideline. The Proponent only prepared the SIA as a result of significant criticism raised by stakeholders during the EA exhibition period. The subsequent preparation of the SIA as part of the Proponent's Response to Submissions did not provide an opportunity for stakeholders to be consulted or to respond to the SIA.

As a significant neighboring industry, the HTBA was not consulted by the Proponent in the preparation of their SIA.

In our view the Proponent's SIA does not address or meet the SIA guiding principles, it ignores cumulative social impacts, and was not undertaken in a meaningful, respectful and inclusive manner. The serious omissions and deficiencies of the SIA do not support informed decision making and represent further reasons why the Dartbrook Modification 7 proposal should be rejected.

6.6 Local Government Plans

Both the Muswellbrook and Upper Hunter Shire Councils have local environment plans in place that:

- encourage the proper management of natural resources by protecting, enhancing or conserving them;;
- ensure the natural environment is protected;
- provide a secure future for agriculture;
- incorporate the principles of cumulative impact assessment to provide a framework within which assessments of resource development proposals can be made;
- ensure thorough assessment of social, economic and environmental impacts, along with community health and wellbeing, are incorporated in individual resource development proposals;
- require Social Impact Statements so that thorough assessments for all mining projects are conducted.

The Upper Hunter Shire Council's Position Statement on Coal and Coal Seam Gas (2011) makes clear the Council's opposition to coal and coal seam gas mining in the LGA. The Council's more recent resolution on Climate Change and Sustainability (2019) recognises that all levels of Government, local, state and federal, must respond effectively to global warming and play their role in setting safe climate goals, implementing sustainable programs to contribute to the state and national response to global warming.

In our view, AQC's Dartbrook Modification 7 proposal fails to meet the principles, policies and standards, endorsed or resolved by the Muswellbrook and Upper Hunter Shire Councils, including through their local environmental plans.

7. MERIT ASSESSMENT

7.1 Mine Plan and Operations – Fatally Flawed.

The HTBA commissioned Mr Michael White, mine operations expert, to review the Dartbrook Modification 7 mine plan.

Mr White finds that this project, as described in the EA, has major risks in revenue assumptions due to:

- coal quality deficiencies;
- inaccurate production rate assumptions;
- incorrect operating cost assumptions; and
- incorrect capital expenditure assumptions.

As a stand-alone project, Mr White finds that profitability looks to be unlikely and the product coal quality assumption is fatally flawed. We note also that the Proponent's own JORC report (2017) published to the ASX, similarly finds that the underground mining project as a stand alone project is not viable.^{xxvi}

In particular, Mr White finds that the project as described, cannot consistently produce unwashed coal product and assume 100% of this product coal quality is the same as the ROM coal quality (both in terms of ash content and revenue assumptions). This quality "gap" is highlighted by inconsistencies between the Proponent's Response to Submissions, the JORC Coal Reserves Statement and market values and expectations.

Capital costs have been underestimated (\$15m in EA; \$45m in RTS versus Mr White's estimate of \$162m) as have production rates and personnel (FTE) required to achieve desired production levels (AQC's 99 FTE versus Mr White's 140 – 158 FTE) and operating costs (which Mr White considers "aggressive" for this proposed operation).

The potential future use of the coal washery further muddies the water for this proposal. It is clearly not part of the Dartbrook Mod 7 proposal. **Its cost and environmental impacts in the context of this Modification have not been assessed.**

The Proponent has clearly stipulated that 100% of the product from this proposal will be unwashed coal (underpinning capital and operating costs assumptions and revenue assumptions and cost benefit analysis). Yet the Proponent wishes to have the option to access the washery should it need to – disregarding the fact that the coal washery may need additional capital costs, and further impact on operating costs and personnel and disregarding any consideration of the environmental impacts in a contemporary context.

Importantly the Proponent (and the Department) completely overlooks the fact that this modification proposal is for unwashed coal (ie does not require the use of the washery), proposes to operate in a completely different environment and using significantly different processes to those which were approved in 2001 and subsequently abandoned by previous more experienced underground miners 13 years ago. The legality of the washery “option” is also drawn into question (see Legal section below).

Given the serious and constraining issues outlined above, Mr White concludes that this modification cannot be approved. We concur with Mr White’s conclusion. Mr White’s full report and presentation to the IPC at the public hearing are attached at Annex 2 of this submission.

7.2 Economic Analysis: Biased and Net Negative

A review conducted by Marsden Jacob Associates of the economic analysis submitted by Dartbrook Proponent, AQC, reveals:

- the proposal’s costs have been underestimated and benefits overestimated;
- the assumed coal price is too high;
- the royalty benefit has been overstated;
- the net producer surplus is overstated and could be non-existent;
- company income tax benefit is overstated;
- externality impacts are underestimated or ignored;
- the social impact assessment is biased in favour of the mine;
 - it too is incomplete;
 - ignores impacts on surrounding agricultural uses (such as the equine critical industry cluster); and
 - is devoid of any consideration of cumulative impacts;
- the AQC economic analysis is biased in favour of the mine;
- the AQC economic analysis suffers from “optimism bias”.

Marsden Jacob concludes that when coal price, royalty, producer and income tax assumptions are adjusted (in a very conservative case) and costs associated with greenhouse gas emissions are taken into account, the net social benefit reported by the Proponent of:

- \$236m (national scale) converts to a **net negative** social benefit of **\$73m**; and
- \$34m (NSW scale) converts to a **net negative** social benefit of **\$15m**.

In other words, on a very conservative basis, as a result of this project we will be worse off nationally and at a state level. This does not factor in the socio-economic impacts of loss of agricultural industries

(such as the Equine CIC), the impacts on Biophysical Sustainable Agricultural Land (BSAL) (both of which are clearly mapped and identified by the Proponent within the mine's boundaries), and other social and environmental and cumulative impacts, which are entirely ignored by this proposal.

Marsden Jacob concludes by asking how a project could be considered for approval when the annual greenhouse gas emissions alone (\$8.5m per annum) significantly outstrip any potential royalty revenues on a basis of roughly 2:1?

On the basis of the Marsden Jacob economic analysis, we submit that the Dartbrook Modification 7 proposal is economically detrimental, not in the public interest and should be rejected.

Marsden Jacob's full report and presentation to the IPC at the public hearing are attached at Annex 3 of this submission.

7.3 Air Quality - Dangerously Dusty

The air quality in the Upper Hunter is acknowledged as the worst in NSW.

The Air Quality report prepared by Stephenson Environmental concludes that the Upper Hunter's air quality for both PM 2.5 and PM 10 is already close to or exceeding NEPM criteria. It is dangerously dusty. The resumption of operations at the Dartbrook Underground mine, will by AQC's own admission create further air quality exceedances.

Mr Stephenson's analysis finds that:

- the Proponent's air quality assessment identifies that background (derived from 2014 data) air quality for PM2.5 and PM10 is close to or exceeding NEPM criteria;
- current air quality data indicates that actual background is higher;
- not all dust sources have been included in the modelling;
- cumulative impacts are underestimated and already demonstrate exceedances of criteria
- this proposed mine will increase the scale and extent of NEPM unacceptable impacts.
- this proposed mine will add to air quality impacts and will project those impacts northward into areas currently unaffected by mining.
- the focus of the Proponent's assessment and DPE report is whether air quality triggers voluntary acquisition criteria at non mine owned residences.
 - this does not give adequate weight to the fact that air quality criteria will, as a consequence of the mine, be exceeded over a large area of land.
- the analysis of this proposed mine does not take into account the social impacts on the community of decreased air quality.
- the air quality assessment does not include GHG emissions (scope 1, 2 or 3).

Mr Stephenson's report is attached at Annex 4 to this submission.

7.4 Noise & Blasting – Inaccurate, Inconsistent and Inscrutable

The HTBA Commissioned Mr Frank Butera of Arup, an international multi-discipline engineering firm, to assess the noise, and blasting impacts of AQC's Dartbrook Mod 7 proposal, as assessed by Bridges Acoustics for the Proponent.

Mr Butera's analysis found that:

- the Bridges Acoustics assessment did not investigate intrusive noise levels in accordance with the NSW policy for industry and there is insufficient information within the Bridges Acoustics report to complete an accurate noise intrusiveness assessment;
- blasting is anticipated by the Proponent but has not been assessed – no ground borne vibration, blast noise or blast overpressure within the current environment has been completed by the Proponent;
- no cumulative noise and blasting assessments, including those recognising the adjoining operating Mount Pleasant open cut mine have been undertaken;
- oddly, noise limits proposed by Bridges Acoustics are significantly higher than noise limits prepared for the Mount Pleasant open cut mine for the same residential properties surrounding the Dartbrook mine;
- conversely, noise modeled for truck noise levels at Mount Pleasant (consistent with the industry standards) are 7 dB higher than those at Dartbrook;
- there is no understanding or acknowledgement of existing ambient noise levels in the vicinity of the residential properties;
- insufficient information on the origins or repeatability of noise data relied on in the Bridges noise assessment;
- social impacts associated with operational noise from the Dartbrook mine have not been assessed;
- noise source data for acoustic modeling by Bridges is inconsistent with other Bridges Acoustic noise assessment reports for similar mining projects in the region;
- software used by Bridges (ENM software) cannot be interrogated or scrutinised by anyone.

Importantly Mr Butera found that:

- the noise assessment is incomplete and fails to provide an intrusive noise assessment, a cumulative noise assessment or social noise assessment.
- the report lacks information that accurately assesses the noise impacts of the project.
- the noise impact report demonstrates that the project noise limits will be exceeded;
- noise assessment does not demonstrate a true representation of the current or future noise and blast vibration impacts.

Mr Butera concludes that the Commission cannot rely on the findings of the Proponent's noise assessment. We concur with Mr Butera and submit that the Commission should not approve this modification proposal.

Mr Butera's presentation and notes have been provided to the Commission. They are also attached for convenience at [Appendix 5](#) to this submission.

7.5 Water

OD Hydrology was commissioned by the HTBA to review the water impacts of Dartbrook Modification 7.

Mr Droop, OD Hydrology Principal, considered whether the Dartbrook proposal:

- provides a good understanding of the likely water resource behaviour of the project over its projected 20 year life;
- quantifies the risks and potential consequences and impacts of the project; and
- provides a clear and robust plan to appropriately manage those risks and impacts and whether it provides a sound basis for confident decision-making regarding the project.

Mr Droop found that the Proponent's water analysis fails on all these counts. Further Mr Droop found that:

- there is a fundamental lack of information demonstrating how the project water management system would operate and behave under the range of climatic and potential operating conditions it could experience over its life;
- the water balance information and analysis is dated – based on studies undertaken some 20 years ago;
- there is no meaningful assessment of project flood risk (despite repeated requests from OEH);
- there is no assessment of the project under conditions in which the coal washery is brought into operation – which would represent major fundamental changes in overall project water balance and ongoing water management requirements;
- there is no recognition or analysis of climate change on groundwater conditions or flood risks on already currently stressed water systems;
- provides no meaningful assessment of the project as now proposed to be developed and operated – which would again change the overall project water balance;
- does not recognise that we are now experiencing natural and surface water conditions that are more variable and extreme than previously thought.

There is no updated groundwater modeling and no acknowledgement of the work undertaken as part of the Greater Hunter Regional Water Strategy – which clearly reveals that recent experience shows us that climatic conditions could occur which would see allocations within the system reduced to zero for more than 10 consecutive years. An issue of significant importance during the now more frequent drought occurrences and putting into perspective current climatic conditions that are worse than those of the hitherto considered extreme conditions of the 1940s.

This Proponent's lack of a project specific assessment results in a range of water related risks associated with the project that are not understood, recognized or analysed. Dealing with water impacts post facto may not only be inappropriate but may be irreversible and uncompensatable. Water is the lifeblood of the Hunter's thoroughbred breeding, viticulture and agricultural industries. Any impacts on our water sources will be damaging to all agricultural industries that equally rely on these water sources.

It is not only contrary to merit assessment guidelines not to have a basic understanding and assessment of the impacts of this mining project on the region's water sources, it is irresponsible. As Mr Droop stated in his presentation to the IPC:

“without this basic understanding, we can't quantify or understand the risks of, for example, supply failure for the projects, impacts on other water users under very dry conditions, or the potential risks and consequences of project flooding and failure under very wet conditions. And without a clear understanding of those risks and potential consequences, the fundamental outcome is an approach to managing risk and impact which is reactive and after the fact.”

Mr Droop, the Proponent and the Department (in their respective reports) have made it clear that no one understands the real and potential water impacts and risks of this modification. Indeed, the Department and Proponent have to date been unable to identify what kind of water licence the Proponent holds, the impacts of any aquifer interference or whether appropriate applications have been made regarding aquifer interference under the Water Management Act. This coupled with the total lack of appropriate water analysis, renders the risks far too high to consider this modification application.

We submit that the Proponent's analysis of water related issues is entirely deficient, the consequences unknown, the risks too high, and a post facto approach to water management or mitigation to be irresponsible and potentially irreversible. During more periods of extreme drought we consider the risks posed by this modification to be totally unacceptable. For all of the above reasons, we submit the Dartbrook mine modification should be rejected.

OD Hydrology's presentation and report are attached in Appendix 6.

7.6 Heritage Impact – Unknown and Unassessed

The HTBA commissioned GML Heritage to conduct a review of both the European and Aboriginal cultural heritage aspects of the Dartbrook proposed modification. In their assessment GML found:

On European Heritage:

- the Upper Hunter has a rich and complex cultural heritage with intertwined Aboriginal and non-Aboriginal values which are historic, aesthetic, social, spiritual and scientific;
- the Upper Hunter's historic cultural heritage has been recognized by numerous previous PACs;
- there are a significant number of local heritage items found within and near the town of Aderdeen including Riverview and Kayuga Homesteads and the Macintyre, Kayuga and Dartbrook Cemeteries;
- yet the Proponent does not acknowledge, review or assess any of these impacts in their EA or Social Impact Assessment for this modification;
- European historic heritage should have been considered as part of this modification process. It has not. As a consequence, no informed decision can be made on the nature and extent of the mine's potential impacts.

On Aboriginal Heritage:

- The Proponent has refused to undertake a heritage assessment outside the mineshaft area. This is in breach of OEH policy for assessing Aboriginal cultural landscape and intangible values. A cultural heritage assessment should have been undertaken for the whole mining area.
- The Proponent's EA suggests that subsidence would be limited to 100mm whereas previous Anglo American reports state that subsidence up to 1.6 metres has previously occurred.
- The significance of the region to Aboriginal people is evidenced through the Plains Clans of the Wonnarua People's (PCWP) native title claim. There are many publicly available reports and information that detail the importance of this region to the local Aboriginal community;
- The PCWP have confirmed that the area in and around the Dartbrook Mine contains travelling routes, a major Aboriginal song line, several ceremonial areas – including the male Bora ceremonial grounds located on the northern boundary of the Dartbrook mining area (and possibly extending and connecting over 8 to 10 kms). They have also confirmed that the central Bora area is located within the mining subsidence district. This culturally and spiritually important area has not been assessed. Without proper assessment, these impacts cannot be dismissed as "negligible".
- The classification of an Aboriginal SIA is grossly misleading - given the inappropriate representation and consultation of Aboriginal stakeholders (and not including the Native Title holder) and the lack of cumulative impact assessment.

We concur with GML's assessment of the heritage assessment for this modification. Both Aboriginal and non-Aboriginal heritage assessments are entirely deficient, contrary to the Bura Charter, contrary to Government policy and guidelines, and contrary to social impacts imposed upon communities (both Aboriginal and non-Aboriginal) in the Upper Hunter as articulated by Justice Preston in *Gloucester Resources Limited v Minister for Planning* [2019] NSWLEC 7 (paras 270 – 417).

Given the significance of Aboriginal and non-Aboriginal heritage in this area, including within the mine plan area, we strongly recommend this modification be refused.

A copy of GML's full report is appended at Annex 7.

7.7 Visual and Landscape Impact

Mr Michael Wright, Landscape Architect, was commissioned by the HTBA to assess the visual and landscape impacts of the proposed Dartbrook modification. In his assessment Mr Wright found:

- from a landscape character and visual impact perspective, few land uses contrast more profoundly than coal mining and intensive agriculture (particularly thoroughbred breeding);
- the proposed Dartbrook mine modification is the most northerly mine in the Hunter and extends into the highly scenic and valuable landscape of the Upper Hunter and Segenhoe Valleys (which is the gateway to this part of the Hunter Valley's Equine Critical Industry Cluster and where many studs, broodmare farms and equine support industries are clustered);
- the Proponent's visual impact assessment as outlined in its EA to be totally inadequate (comprising one paragraph and 2 site photos). It failed to appropriately consider the significance and frequency of the visual impacts of this Modification including:
 - the identification and assessment of 10-12 residences, less than 1km from the mine site, and other residences and locations from the town of Aberdeen, that would be directly impacted by the mine's activities;
 - 192 B-double truck movements every day, five days a week (ie one every 3.5 minutes).
 - No mention of the significance of tourism, thoroughbred breeding industries and viticulture and the impacts on motorists, travelers and investors of the proposed mining activity (or indeed the increasing encroachment of mining to these industries and local towns);
- a lack of information on the shaft shed and haul road which will have a visual impact (both static and dynamic given the truck movements on the haul road) but for which no detail is given and no assessment has or can be made;
- a paucity of information and assessment on the visual impacts of any potential reopening of the Coal Handling and Preparation Plant and the Rail Loop at the East site.
- a lack of acknowledgement and assessment of transport corridors – and accordingly their high visual sensitivity as recognised tourism and thoroughbred client routes;
- the lack of identification and assessment of local roads and streets which also have a view of the mine's activities;

In short, Mr Wright has found that the Proponent's EA and Social Impact Assessment has comprehensively failed to address the true extent of the visual and social amenity impacts of the Dartbrook Modification 7 proposal. It is our view that the distance between the mine and the township of Aberdeen is much closer than that claimed by the Proponent and unquestioningly adopted by the Department.

Mr Wright also notes that the Department in its Assessment Report acknowledges that the social impacts of this underground mine "would be more akin to a new mine opening." It is extraordinary therefore that the Department has not more carefully considered the Proponent's visual impacts – particularly given the mine:

- is located in a sensitive and attractive landscape,
- is located in an area of known land use conflict,
- will have adverse impacts (marginal and cumulative) on the character and identity of this part of the Upper Hunter;
- is very close to the township of Aberdeen; and
- the known incompatibility and sensitivity of thoroughbred breeding and mining.

Section 4 of Mr Wright's report (at [Appendix 8](#)) clearly identifies the direct, indirect, static and dynamic visual impacts on public and private areas, including from light pollution.

We agree with Mr Wright's findings that the visual assessment process for this modification has been totally inadequate at every level and fails to properly identify and assess the likely visual impacts of the mining activity on local residents, landholders, local and regional businesses and travelers through the area. We also agree with Mr Wright that for all these reasons this modification should be refused.

7.8 Legal Matters

In their legal presentation and advice, Beatty Legal raise a number of key legal points for the Commission's consideration, including the:

- validity of this section 75W modification given it seeks to change an underlying and essential part of the original approval (that is the use of the Hunter Tunnel);
- constraints of the modification proposal before you by the terms of its application – that is the use of the CHPP cannot be indiscriminately used by the Proponent to wash coal extracted by bord and pillar method;
- irrelevant nature of impacts permitted under the current consent when the proposal should be assessed on its merits having regard to contemporary economic, social and environmental impacts and in its current context. (We also note the calculated nature of the Proponent's picking and choosing varying date and data benchmarks to best suit their argument);
- lack of information to properly assess the proposal's impacts during and post mining – including no consideration given to end of life for the mine and shaft and appropriate rehabilitation;
- lack of appropriate consideration given to all aspects of relevant Environmental Planning Instruments and Government policies, including the Mining SEPP;
- lack of assessment of cumulative impacts, including environmental and social; direct and indirect and greenhouse gas emissions
- flawed nature of the Department's Assessment Report – which accepts and adopts the Proponent's flaws rather than evaluating it objectively;

In our view, supported by advice from our legal advisers, the Commission does not have sufficient information before it to reach an informed decision on the impacts of this proposal. The risks to the environment, community and nearby agricultural industries, is far too high. Furthermore, the economic analysis demonstrates that this mine, with all its risks and faults, is likely to deliver a negative "benefit" and the nation, the state and the local region will be worse off. In this context alone the proposal should be refused.

Further, there are some serious legal issues that merit consideration, including whether this is a valid s75W modification given the Hunter Tunnel is not intended to be used despite previous Proponent's and consents accepting that above ground haulage of coal was "environmentally damaging and intrusive".

We agree with Beatty Legal, "there is no public interest, now or in the future, in approving this application." We strongly submit, that it be refused.

Beatty Legal's advice is presented in Appendix 9.

8. DEPARTMENT OF PLANNING ASSESSMENT REPORT

The Department's Assessment Report has uncritically accepted and adopted the Proponent's claims with respect to this proposed modification.

The Department's approach is sadly not a one-off occurrence. In the recent past, and despite 3 PAC reports to the contrary, the Department steadfastly continued to support an open cut application at Drayton South by Anglo American – an application that was again rejected by a 4th PAC.

Given the scientific and technical advice provided by experts commissioned by the HTBA, Dartbrook Modification 7 is another example of unquestioning, uncritical analysis by the Department of Planning, which diminishes the credibility of the Department, the NSW Planning process and the community's trust.

We submit that you place no weight in the Department's Assessment Report in your consideration of this matter.

9. RECOMMENDATION

The Dartbrook Modification 7 proposal:

- does not accord with NSW policies for the Upper Hunter and Hunter Region;
- does not comply with NSW guidelines for significant development proposals;
- does not enjoy the confidence or support of the Upper Hunter Shire or Muswellbrook Councils;
- does not result in any economic benefits for Australia or NSW and in fact produces negative benefits;
- does not pass any merit assessment;
- raises serious legal issues;
- raises serious issues in respect of air quality, noise, water, heritage and visual impacts;
- does not have a social licence to operate;
- does not provide any benefit and is not in the public interest.

We strongly recommend that the Commission refuse the Dartbrook Modification 7 application.

END NOTES

- i Refer to Thoroughbred Breeding Value Chain at Appendix 1
- ii With the exception of the first six months during which the coal would be transported by road while the subsurface conveyor was constructed. Primary Submission on behalf of the Dartbrook Joint Venturers, 20 June 1991, p 16
- iii NSW Department of Urban Affairs and Planning Assessment Report, Proposed Dartbrook Extended Underground Coal Mine, p 1
- iv NSW Department of Planning Assessment Report, Proposed Modification to the Dartbrook Coal Mine Development Consent, November 2005, p 2
- v Ditto
- vi Ditto
- vii NSW Government, Department of Planning and Environment, Resources Regulator, Prosecution summaries, Prosecution date, 10 December 2007, Incident date 29 May 2004.
- viii Billinudgel Property Pty Ltd v Minister for Planning [2016] NSW LEC139. See also supplementary advice by Beatty Legal Appendix 9
- ix Auscript Australasia Pty Ltd, Transcript of meeting between the Independent Planning Commission and the Applicant, 18 February 2019, p 6
- x Planning Assessment Commission The Bickham Coal Project Report, May 2010 and 4 Planning Assessment Commission Reports on the Drayton South Coal Project
- xi Planning Assessment Commission Report on the Drayton South Coal Project, 2017 p 44
- xii Planning Assessment Commission Report on the Drayton South Coal Project, 2015
- xiii Ibid, p ii
- xiv Ibid, p iv
- xv Strategic Regional Land Use Plan for the Upper Hunter, 2012, Premier's Foreword
- xvi Op cit, p v
- xvii Ibid, p 55
- xviii Ibid pages 58 - 59
- xix Hunter Regional Plan 2036, Foreword.
- xx Ibid, p 24
- xxi Ibid, p29
- xxii Ibid p 72
- xxiii NSW Social Impact Assessment Guideline for State significant mining, petroleum and extractive industry development, September 2017, p 2
- xxiv Ibid, p 5
- xxv Ibid, p 10
- xxvi JORC report 2017 – cite references