New South Wales Government
Independent Planning Commission

HUME COAL PROJECT
SSD 7172
&
BERRIMA RAIL PROJECT
SSD 7171

Independent Planning Assessment Report in relation to the Minister for Planning's request dated 4 December 2018 under Section 2.9(1)(d) of the *Environmental Planning and Assessment Act 1979*

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27 MAY 2019

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Hume Coal Project and Berrima Rail Project Report ©
State of New South Wales through the Independent Planning Commission NSW 2019

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EXECUTIVE SUMMARY

1. On 4 December 2018, the Minister for Planning requested that the Independent Planning Commission conduct a public hearing into the carrying out of the Hume Coal Project and associated Berrima Rail Project, assess the merits of the projects and prepare a report summarising the actions taken by the Commission in conducting the public hearing including outlining the Commission's findings on the projects, including any recommendations. The Commission was constituted of Professor Chris Fell AM (chair), Mr George Gates PSM, Mr Geoffrey Sharrock and Ms Annelise Tuor.

2. The Hume Coal Project is a greenfield mining project with a project area of approximately 5051 hectares. The Project comprises the construction and operation of an underground coal mine and associated mine infrastructure which will produce 50 million tonnes of run-of-mine coal over a 23-year mine life. The Berrima Rail Project provides the supporting rail infrastructure for the Hume Coal Project to facilitate the transportation of coal by train to Port Kembla (Wollongong) and will include the upgrade and use of the Berrima Branch Line and construction of a new rail spur and loop. The two projects are adjacent to each other and are linked. The Applicant submitted two separate applications, however they are referred to as the Project in this Report.

3. The Commission considered the information referred to in paragraph 1(a) of the Minister's Request, which are:
   - the Environmental Impact Statement for the Projects;
   - all submissions received on the Projects;
   - relevant expert advice (including as identified below); and
   - other relevant information (including as identified below).

   For ease of reference, the Commission has referred in this Report to various extracts from the information and documents provided to the Commission. For the avoidance of doubt, the Commission considered all of that information, not just the extracts.

4. The Commission held a public hearing, received public submissions, and inspected the site and locality. The Commission also met with and received submissions from the Department of Planning and Environment, the Applicant and Coal Free Southern Highlands (a local community group).

5. It is important to note that the role of the Commission at this point is not to determine if the Projects should or should not be approved. The role of the Commission is to fulfil the Minister's request - including to consider the information and assessment provided to date, consider the views of the community and provide findings including any recommendations.

6. The Commission notes that the Department's Preliminary Assessment Report is a preliminary assessment of what the Department considers to be the merits of the Projects. The Department's Preliminary Assessment Report considered the potential key impacts of the Projects with regard to, but not limited to, groundwater, mine design and economics. Other issues identified in the Department's Preliminary Assessment Report included noise, vibration, air quality, greenhouse gas emissions, traffic, rail, biodiversity, heritage, agriculture and rehabilitation.

7. Having considered the information presently available, the views expressed at the public hearing and the submissions it has received, the Commission finds that it is not presently able to adopt a definitive position on the merit of the Projects as a whole. The provision of additional information as recommended in this Report and further expert consideration, is required to determine whether or not the project has merit as an innovative approach to the mining of metallurgical coal with acceptable environmental impact. The Project's location, in an area where there is community concern and potential impacts calls for further information and close attention in the next stage of the assessment process.

8. The Commission notes that its view as to the impacts and merits of the Project may be different when it comes to the point of any determination decision, including because of the provision of additional information in response to this Report, information provided to the Commission independently of this Report, additional matters raised in undertaking its final assessment of the Projects, or other relevant factors. The Commission also notes that consideration of conditions of consent has not formed part of the present process and would need to be given detailed consideration at the determination stage.

9. With respect to the "*Impacts on surface water and groundwater resources, including on private bores"* the Commission finds that the assessment of impacts is not resolved to its satisfaction because of the lack of certain information and the disagreement amongst experts on a number of issues. The Applicant has proposed a novel mining method that is said by it to minimise ground subsidence and to allow solid mine wastes and excess water to be stored in mined-out sections of the Project. There is disagreement amongst the experts on whether such a mining method is feasible and will allow storage of excess water, thus obviating the need of its surface disposal to streams that ultimately flow into the Sydney Catchment. The Commission finds that the Department's Preliminary Assessment Report has not continued the expert dialogue sufficiently to resolve issues of mining risk and successful waste and water emplacement. Because of the present uncertainties the Department has formed the view that the risk to surface water is untenable. Based on the additional information now before it the Commission recommends an additional independent expert appraisal of mining-related risks.

10. With regard to the impact on private bores, the Commission finds that there remain unresolved issues with respect to the groundwater model developed by the Applicant. The estimates of water level drawdown and mine inflow predictions have been called into question, particularly the impacts on larger bores used for irrigation purposes. The Department's expert indicates that the estimates are satisfactory, but this is strongly questioned by groundwater modellers at the Department of Industry – Water (**DoI-Water**) and other groundwater specialists representing objectors, who argue that the modelled predictions are underestimates. The Commission recommends a further review, by an independent groundwater specialist or small technical group with a Chair (with expertise in groundwater modelling), to resolve this issue.

11. Current predictions suggest significant drawdowns that will affect 94 to 118 bores. An outstanding question is whether bores on these properties can be made good. There is significant disquiet about the capability of the Applicant to make good, with the Department indicating that the number of affected properties and extent of drawdown, together with unwillingness of property owners to negotiate with the Applicant, constitute grounds for refusal of the Project.

12. In respect to the *"Social and economic impacts of the projects on the locality and region"* the Commission finds that many in the community, as evidenced by the public hearing and submissions, hold strong negative views about new coal mining developments in the region and the risks to groundwater and amenity of residences in proximity to the mine. Concerns about the impact of the mine on local tourism and agriculture have also been expressed. Balanced against this is that, while the Project would appear to bring economic benefits to the region and the State, the extent of these has not been established. The Commission recommends a more detailed appraisal of the social and economic impacts (both positive and negative).

13. In respect to the *"Suitability of the site"* the Commission notes that the local environment is recognised for its historic and aesthetic appeal, tourism and agriculture. It contains an important aquifer, with numerous bores, and is within the Sydney water catchment. These aspects tend against the suitability of the site. However, the site is also in proximity to an industrial area, and has an important coal resource that, with the Berrima Rail Project, would be easily accessible to Port Kembla for distribution. These aspects tend towards the suitability of the site. The Commission finds that there are a number of issues to be resolved before making any final decision about suitability of the site. Principal amongst these is the extent of Project impacts on bore water resources.

14. At this stage, the findings and recommendations of the Commission are dominated by a number of key issues that require further information and assessment, including:
    - feasibility and safety of the mining technique used and the Project's consequent ability to store mining wastes and excess mine water underground;
    - groundwater impacts and the accuracy of the Applicant's predictions on the lowering of groundwater heads in the vicinity of the mine, predictions of mine inflows and the Applicant's make good capacity for affected bore owners;
    - the impact of water table decline on historic gardens with non-native (exotic) plantings and native vegetation;
    - impact of the Project on historic heritage and the Berrima, Sutton Forest and Exeter Cultural Landscape; and
    - the social and economic benefits of the Project and their scale measured against those related to the costs of impact of the Project on the environment and community.

15. The Commission considers that, if the recommendations below are followed, there will be a sounder basis for the ultimate decision on whether or not to approve the Project. Its Recommendations follow.

RECOMMENDATIONS

R1 Because the Applicant and Department remain a considerable distance apart regarding their positions on the safety of the pine feather method of mining, the Commission suggests that one of the Applicant or the Department, or both of them jointly, engage a new independent expert with experience in innovative coal mining technology with a view to resolving ongoing differences of opinion. This investigation would involve taking into account new information from the Resources Regulator.

R2 As a result of the outcomes of **R1**, the Applicant needs to advise if there are consequences that would arise in relation to mine design and economics (resource recovery).

R3 The Applicant should provide the Project Risk Assessment to the Department, and any other relevant Government agencies, if necessary on a confidential basis, for consideration in any further Department or other Government assessment or response in the next stage of the assessment process.

R4 That the Department review the advice of Department of Industry - Water dated 24 April 2019 and the Applicant's correspondence of the 17 May 2019 and gives consideration to requesting the completion of the revised groundwater flow model, taking into consideration the advice provided.

R5 Because the Applicant and Department of Industry - Water remain a considerable distance apart regarding their positions on the groundwater modelling, the Commission suggests that the Department or the Applicant, or both of them jointly (and in any case in consultation with Department of Industry - Water), engage a new independent expert (or alternatively a small technical group with Chair) with experience in groundwater modelling with a view to resolving ongoing differences of opinion. The independent expert/Chair should consider:

- what practical steps, if any, can be taken to make the model a class 2 model or seek agreement on the class of the model;
- what additional work is required to establish the extent to which the emplacement of water in mined-out voids will reduce the level of drawdown in the later years of the Project;
- the range used for the input parameters in the modelling sensitivity/uncertainty analysis and recommend if a wider range is required so that there is no unreasonable truncation of results; and
- if additional geological information is required.

R6 That the Department give close attention to the practical adequacy of make good provisions during the final assessment process, with an independent review if necessary. This should include the practical aspects such as dispute resolution and economics as well as the technical.

R7 The Applicant is to confirm whether the provisional Water Treatment Plant does form part of the Project – and if so, provide suitable information to permit an appropriate assessment of its impacts.

R8 Should underground emplacement and water impounded have to cease for any reason, the Applicant is to confirm how long under normal mining operations it would take for the reject emplacement stockpile and Primary Water Dam to reach capacity.

R9 The Applicant is to provide greater detail on its surface level reject emplacement process, including the use of the temporary coal reject stockpile (as discussed in paragraph 188) once underground emplacement has been commenced.

R10 The Department is to consider and advise if Assessment Location No 7 should be afforded mitigation rights under the application of the *Noise Policy for Industry*.

R11 The Applicant and Department should explore opportunities to further mitigate noise impacts. Such opportunities may include more extensive noise monitoring, closer attention to atmospheric conditions, incorporation of any recently developed rail and rolling stock modifications, construction of noise bunds and physical barriers and stop-work when exceedances are observed.

R12 The Department's Final Assessment Report should confirm the suitability of the assumptions in the Applicant's modelling in relation to the prevailing wind data utilised as this was questioned by members of the public in submissions.

R13 The Applicant should undertake a more rigorous and detailed assessment of Project Greenhouse Gas Emissions, including Scope 3 end use of product coal, and this should be assessed prior to the Department's Final Assessment.

R14 The Applicant is to clearly define how it intends to mitigate/offset its greenhouse gas emissions through measures such as ensuring that all Project coal is only used within countries that are parties to the Paris Agreement.

R15 Further visual impact assessment should be completed for assessment and should include at a minimum:

- dimensioned plans of the Project area and the railway extension. The plans should include a survey with contours and the location and size of all works as well as the relative heights above ground level of significant structures, including the coal stockpiles, the coal loader and primary water dam walls;
- views of the Project area and railway extension from sensitive properties within and in the vicinity of the Project area (including heritage items), from the Hume Highway and Medway Road or any likely affected property. The distance and heights of the viewing points should be provided;
- views should be without mitigation measures (screen planting) and with mitigation measures in place after 5 years and 15 years;
- any findings in relation to groundwater impacts on gardens, plantings and landscape settings, and
- further assessment of the impacts of night-time lighting.

Any photomontages of the view impacts should be certified in accordance with the Land and Environment Court's Direction on use of photomontages http://www.lec.justice.nsw.gov.au/Pages/practice_procedure/directions.aspx.

R16 Further information should be provided to allow the assessment of the potential impact of water table drawdown on heritage items (including gardens, plantings and landscape settings) within or in the vicinity of the Project area. The information should include confirmation of the existing level of the water table and the anticipated drawdown at both the 67th percentile and the 90th percentile.

R17 The Applicant should address the recommendations of the Heritage Council of NSW's correspondence to the Department dated 17 August 2018 as referenced in paragraph 283.

R18 The Statement of Heritage Impact Assessment should be updated in response to recommendations **R16** and **R17**, and the visual impact of the Project on the significance of the above items and the cultural landscape in accordance with an updated visual impact assessment. (see **R15** in Visual Impact recommendations).

R19 The Applicant is to undertake further technical assessment on the impacts on private gardens, exotic trees and native vegetation from a declining water table.

R20 The additional information provided by the Applicant, including the Updated Economic Impact Assessment prepared by BA Economics in October 2018, should be peer reviewed to determine:

i. whether the concerns and recommendations in the Economic Impact Assessment Review dated December 2017 prepared by BIS Oxford Economics (BISOE 2017) have been adequately addressed, including concerns about transparency in relation to project costs, revenues and externalities; and

ii. the implications and reasonableness of changes/assumptions in the Updated Economic Impact Assessment including the change to the Project description from that in the Hume Coal Environmental Impact Statement and any cost implications.

Following the peer review, if the net economic benefit of the Project remains uncertain and there are outstanding concerns about the assumptions and/or information, a further Economic Impact Assessment should be prepared that is consistent with the recommendations in BISOE 2017 (as set out in pages 1-3 of the Executive summary of BISOE 2017) and any further recommendations of the peer review.

R21 The Department should address whether assumptions in the Updated Economic Impact Assessment in regard to employment numbers and percentage of unskilled workers and whether these come from outside the local area are consistent with the assumptions used in the Social Impact Assessment

R22 The Applicant is to address the residual economic uncertainties, regardless of the strict interpretation of the 2015 Guidelines and Treasury Guidelines.

R23 The Applicant or the Department, or both of them, should review the market for coking coal, including the most recent forecasts by the Australian Government.

R24 The Applicant should consider updating its Social Impact Assessment in accordance with the Department's 'Social Impact Assessment Guidelines – September 2017' and ensure consistency with the assumptions of the revised Economic Impact Assessment.

R25 The Department, regardless of any further assessment provided by the Applicant, should assess the Project in accordance with its 'Social Impact Assessment Guidelines – September 2017' and report on the findings of this assessment in its Final Assessment Report.

R26 The Department should provide an updated and detailed assessment of all relevant components under Part 3 of the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* with its Final Assessment Report, based on any additional information made available since the issue of the Department's Preliminary Assessment Report.

R27 The Applicant should update its consideration of the objects of the *Environmental Planning and Assessment Act 1979* and utilise the definition of 'Ecologically Sustainable Development' from the *Protection of the Environment Administration Act 1991*.

R28 The Department should provide an updated and detailed assessment of the public interest, the objects of the *Environmental Planning and Assessment Act 1979* and 'Ecologically Sustainable Development' with its Final Assessment Report, based on any additional information made available since the issue of the Department's Preliminary Assessment Report, including the further information recommended in this Report by the Commission.

R29 The Department should include in its Final Assessment Report to the Commission an assessment of the public benefits of the Project which give consideration of whether:

i. the economic benefits of the Project outweigh its costs to the local community (section 4.15(1)(b) of the *Environmental Planning and Assessment Act 1979*); and

ii. the public benefits of the Project outweigh the public benefits of other land uses (clause 12 (b) of *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*).

R30 The Department should invite relevant Government agencies to review and provide comment on any new information provided by the Applicant since the Department's Preliminary Assessment Report was published, including the content of this Report. In its Final Assessment Report to the Commission, the Department should consider any further Agency feedback as well as the content of this Report, the Materials, and any additional information produced in response to this Report and its recommendations.

1.0 INTRODUCTION

16. On 4 December 2018, the Minister for Planning (**Minister**) issued a request to the Chair of the Independent Planning Commission to conduct a public hearing into the carrying out of the Hume Coal Project and the associated Berrima Rail Project (collectively known as the **Project**), assess the merits of the Project as a whole, and to prepare a report summarising the actions taken by the Commission in conducting the public hearing and outlining the Commission's finding on the Project, including any recommendations.

17. Professor Mary O'Kane AC, Chair of the IPC, nominated Professor Chris Fell (chair), Mr George Gates, Mr Geoffrey Sharrock and Ms Annelise Tuor to constitute the Commission for the carrying out of the Minister's request.

18. Hume Coal Pty Limited (**Applicant**), is a subsidiary of the Pohang Iron and Steel Company (**POSCO**) which is a steel-making company based in South Korea. The Applicant is seeking approval for two separate but associated Projects which are located approximately 100 kilometres (**km**) south-west of Sydney, with surface infrastructure area located approximately 7km north-west of Moss Vale. The Project is located wholly within the Wingecarribee Local Government Area (**LGA**).

19. The Commission notes that the Department's Preliminary Assessment Report (**Department's PAR**) has stated that:

    The Hume Coal Project is declared to be State Significant Development under section 4.36 of the EP&A Act as it is "development for the purposes of mining that is coal or mineral sands mining", which is specified in clause 5(1) of Schedule 1 of State Environmental Planning Policy (State and Regional Development) 2011 (the SRD SEPP).

    The Berrima Rail Project is also declared to be State Significant Development under section 4.36 of the EP&A Act as it is "a mining related works" for "transporting any mineral", which is specified in clause 5(3) of Schedule 1 of the SRD SEPP.

    The Minister for Planning is the consent authority for State Significant Development projects. However, under section 4.5(a) of the EP&A Act and clause 8A of the SRD SEPP, the Independent Planning Commission must determine the development applications as there were more than 25 submissions objecting to the projects.

20. The Commission concurs with the Department's statement and is satisfied that the Project is State Significant Development for the reasons set out in paragraph 17.

21. The Applicant submitted a separate Environmental Impact Statement (**EIS**) for both the Hume Coal and Berrima Rail Projects. The Commission notes that the Hume Coal Project EIS contains within it the Berrima Rail Project EIS. According to the Hume Coal EIS and Berrima Rail EIS the Project will involve the following – See Section 1.1 and 1.2.

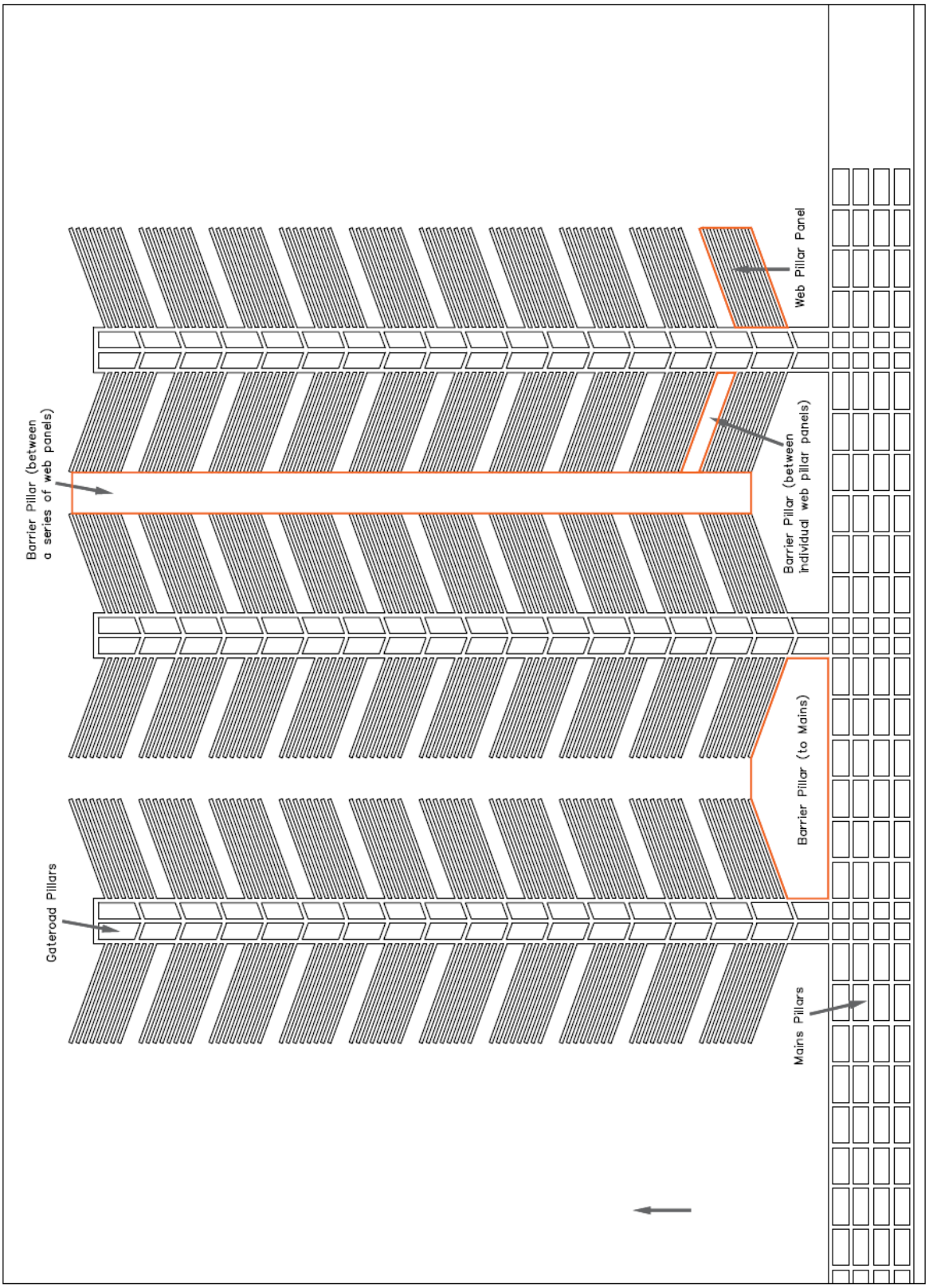
1.1. Hume Coal Project:

22. The Hume Coal Project is a greenfield mining project with a Project area of approximately 5051 hectares (**ha**). Mining has not historically existed, nor does it currently exist within the Project boundary. The Project comprises the construction and operation of an underground coal mine and associated mine infrastructure. The Project is expected to produce 50 million tonnes (**Mt**) of run-of-mine (**ROM**) coal, resulting in 39Mt of saleable coal over a 23-year mine life. The coal extracted is expected to consist of metallurgical (55%) and thermal coal (45%), extracted from the Wongawilli seam. The 'Project Area' is defined in Figure 2 - Local Context on page 18 of this Report. Figure 2 also illustrates some key geographical features, including local townships.

23. The Department's PAR provides a description of the proposed 'pine feather' mining method to be adopted as consisting of "*three key elements (Figure 1):*
    - *the 'trunk' – development of underground main roadways (or 'mains') with a typical width of 29.5 m;*
    - *the 'limbs' - development of gateroads off the mains, which would be driven at angles to the mains, with a typical width of 16 m;*
    - *the 'leaves' – extraction of a series of narrow, parallel drives (or 'plunges') off the outside edges of the gateroads, which would be angled at 70 degrees to the gateroads, with a width of 4 m.*

    … an important aspect of the 'pine feather' mining method is the use of a variety of other types of pillars, including:
    - *'inter-panel pillars'* [or mains pillars] *(typically 50 m width), which are located parallel between the gateroads;*
    - *'intra-panel pillars'* [or barrier pillars] *(typically 22.8 m width), which are located between a group of plunges; and*
    - *'web pillars' (typically 6 m width), which are located between each individual plunge."*

Figure 1 – Illustration of Mine Layout



Source – Hume Coal Project and Berrima Rail Project – Response to Submissions

1.2. Berrima Rail Project:

24. The Hume Coal Project requires the Berrima Rail Project to facilitate the transportation of coal by train to Port Kembla (Wollongong) to supply the international markets and some coal is planned to be sold into the domestic market. The Berrima Rail Project will include the upgrade and use of the existing Berrima Branch line and construction of a new rail spur and loop.

1.3 Local and Regional Context:

25. The Hume Coal EIS describes the Project location as being "*… approximately 100 km south-west of Sydney and 4.5 km west of Moss Vale town centre in the Wingecarribee LGA* [Local Government Area]. *It is in the Southern Highlands region of NSW and the Sydney Basin Biogeographical Region*."

26. The Department's PAR describes the local and regional setting as being "characterised by "*low, rolling hills with predominately rural-residential and small-scale agricultural land uses. This includes scattered rural residents, livestock grazing and various rural businesses… There are various industrial land uses to the east of the project area…* and *includes the Berrima Cement Works, the Berrima Feed Mill and the Dux hot water plant".*

27. The Commission also understands that the "*project area is located within the upper reaches of Sydney's drinking water catchment, and there are numerous watercourses in and around the proposed mining area, including Medway Rivulet, Black Bobs Creek and Oldbury Creek*."

28. The Commission undertook an inspection of the locality and this is discussed in greater detail in Section 5 of this Report.

1.4 Regional Mining Operations:

29. The Commission understands from the Department's PAR that exploration drilling in the Project area first occurred in the 1950s, and an Exploration Authorisation was subsequently issued in 1985 (A349), which includes the Project area.

30. According to the Department's PAR there is a long history of mining within the Southern Highlands; however most of these are historical mines that ceased over 50 years ago, apart from the Berrima Colliery which ceased mining operations in 2013.

2.0 THE COMMISSION'S TASK

2.1 The Minister's Request

31. The Minister's request was issued on 4 December 2018 under section 2.9(1)(d) of the EP&A Act. The request is as follows:

1. *Conduct a public hearing into the carrying out of the Hume Coal Project and associated Berrima Rail Project, and:*
    a) *Consider the following information:*
        - *The EIS for the projects;*
        - *All submissions received on the projects;*
        - *Any relevant expert advice;*
        - *Any other relevant information;*
    b) *Assess the merits of the Hume Coal Project and Berrima Rail Project as a whole having regard to all relevant NSW Government policies, and paying particular attention to the:*
        - *Impacts on surface water and groundwater resources, including on private bores;*
        - *Social and economic impacts of the projects on the locality and region; and*
        - *Suitability of the site; and*
    c) *Prepare a report summarising the actions taken by the Commission in conducting the public hearing and outlining the Commission's findings on the projects, including any recommendations.*

2. *Hold the public hearing as soon as practicable after the Department of Planning and Environment provides its preliminary assessment report to the Commission.*

3. *Submit its report on the public hearing to the Department of Planning and Environment within 8 weeks of holding the public hearing, unless otherwise agreed with the Planning Secretary.*

3.0 THE PROPOSAL

3.1 Applicant's Justification

32. The Hume Coal EIS stated that: "*The project is justified on economic, social and environmental grounds. This is demonstrated by its consistency with the key objects of the NSW Environmental Planning and Assessment Act 1979 (EP&A ACT). The project will enable development of a valuable, publically* [publicly] *owned natural resource – the Wongawilli Seam coal. At the same time, valuable environmental and cultural resources will be managed effectively and protected. When the economic and social benefits of the project are also taken into account, it is evident that community welfare will increase. This means the project will achieve "proper management, development and conservation of resources … and promote social and economic welfare", in accordance with the first object of the EP&A Act."*

"The project will also achieve inter-generational equity by transforming natural capital (coal) into economic and social capital, in the form of greater income and employment, and material capital, in the form of steel and other products that are essential for everyday life. The project is, therefore, consistent with the principles of ecologically sustainable development."

"For the reasons given above the project will serve the public interest."

3.2 Project Proposal

33. As outlined in the Applicant's EIS, key aspects of the Projects are:

Hume Coal Project:

- ongoing coal resource definition activities, along with geotechnical, engineering and other fieldwork to enable detailed design;
- establishment of temporary construction offices and a temporary accommodation village;
- development and operation of an underground coal mine, involving approximately two years of construction and 19 years of mining, followed by closure and rehabilitation occupying up to two years, leading to a total Project life of 23 years. Some coal extraction will commence during the second year of construction and hence there will be some overlap between the construction and operational phases;
- extraction of approximately 50Mt of ROM coal from the Wongawilli seam at a rate of up to 3.5Mt per annum (**Mtpa**). Low-impact mining methods will be used resulting in negligible subsidence impacts;
- following processing of ROM coal in the coal preparation plant (**CPP**), production of up to 3Mtpa of metallurgical and thermal coal for sale to international and domestic markets;
- construction and operation of associated mine infrastructure, mostly on cleared land, including:
  - one personnel and materials drift access and one conveyor drift access from the surface to the coal seam;
  - ventilation shafts, comprising one upcast ventilation shaft and fans, and up to two downcast shafts installed over the life of the mine, depending on ventilation requirements as the mine progresses;
  - a surface infrastructure area, including administration, bathhouse, washdown and workshop facilities, fuel and lubricants storage, warehouses, laydown areas, and other facilities. The surface infrastructure area will also include the CPP and ROM and product coal stockpiles, and coal reject handling infrastructure and a temporary (emergency) reject stockpile;

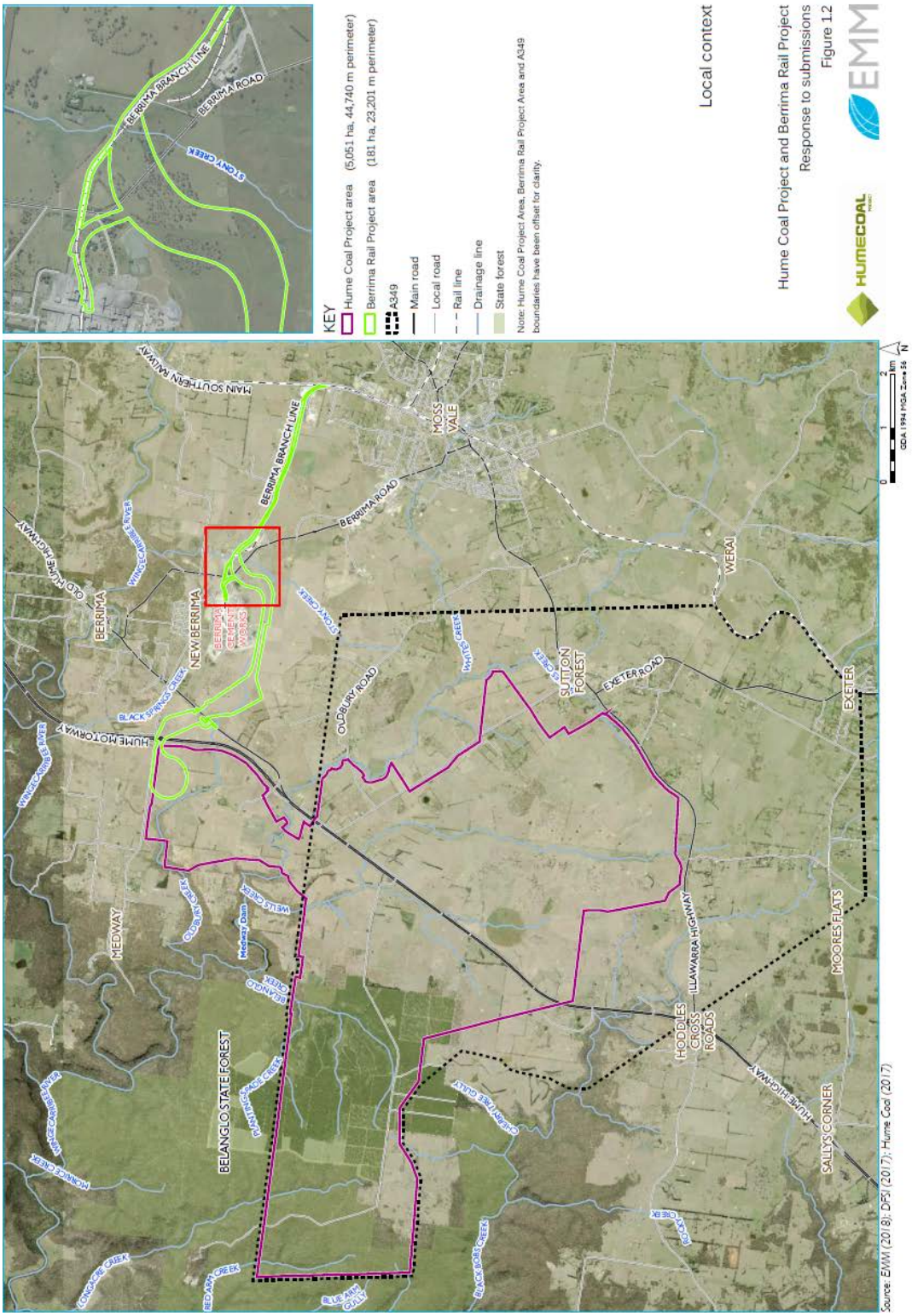
  - surface and groundwater management and treatment facilities, including storages, pipelines, pumps and associated infrastructure;
  - overland conveyors;
  - rail load-out facilities;
  - a small explosives magazine;
  - ancillary facilities, including fences, access roads, car parking areas, helipad and communications infrastructure; and
  - environmental management and monitoring equipment.
- establishment of site access from Mereworth Road, and construction of minor internal roads;
- relocation of some existing utilities;
- coal reject emplacement underground in the mined-out voids;
- emplacement of excess water mine-water in mined-out voids;
- peak workforces of approximately 414 full-time equivalent employees (FTEs) during construction and approximately 300 FTEs during operations; and
- decommissioning of mine infrastructure and rehabilitating the area once mining is complete, so that it can support land uses similar to current ones.

Berrima Rail Project:

34. The Applicant's Response to Submissions (**RTS**) stated that "*Since submission of the Berrima Rail Project EIS, WSC has commenced construction of the Berrima Road realignment. If this is completed, the 'alternative' Berrima Rail Project alignment would be constructed by Hume Coal*". As outlined in the Hume Coal RTS, key components of the Berrima Rail Project ('alternative' alignment) are:
    - upgrades to Berrima Junction (at the eastern end of the Berrima Branch Line) to improve the operational functionality of the junction, including extending a siding, installation of new turnouts and associated signalling on the Branch Line. This does not involve any work at or beyond the interface with the Australian Rail Track Corporation (**ARTC**) - controlled track;
    - installation of a turnout for the new spur line to service the Hume Coal Project on the existing Berrima Branch Line, approximately 1,000 m east of the Berrima Cement Works. A short section of the existing Berrima Branch Line would be shifted north, within the rail corridor on Boral-owned land, to accommodate the spur line;
    - the construction of a railway underpass beneath the realigned Berrima Road, constructed through the elevated embankment for the road. No changes would be required to the existing rail connection into the cement works;
    - construction and operation of a new rail spur line from the Berrima Branch Line connection to the Hume Coal Project coal loading facility;
    - construction and operation of a grade separated crossing (railway bridge) over the Old Hume Highway;
    - construction and operation of maintenance sidings, a passing loop and basic provisioning facilities on the western side of the Old Hume Highway, including an associated access road, car parking and buildings;
    - construction and operation of the Hume Coal rail loop within the Hume Coal Project area, adjacent to Medway Road;
    - construction and operation of associated signalling, services (including water and sewerage), access tracks, power and other ancillary infrastructure; and
    - The new rail track will involve construction of approximately 7.6 km of new track. The track will be constructed to accommodate a 30 tonne (t) axle load.

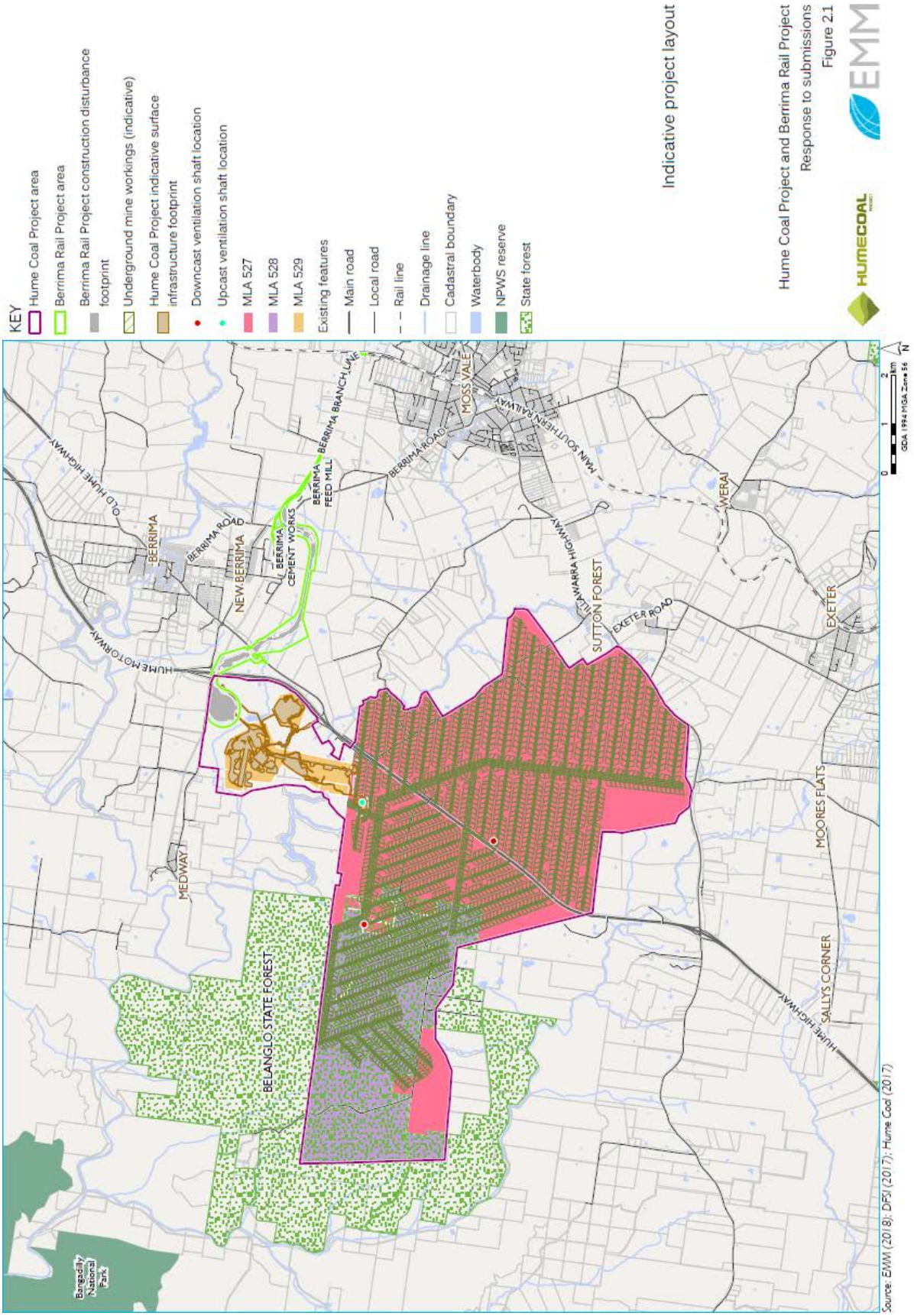
35. The following illustrations of the Project are provided below:
    - Figure 2 – Local Context;
    - Figure 3 – Indicative Project Layout;
    - Figure 4 – Hume Coal Surface Infrastructure Footprint;
    - Figure 5 - Hume Coal Surface Infrastructure Layout; and
    - Figure 6 - Berrima Rail Project Indicative Project Layout.

Figure 2 – Local Context



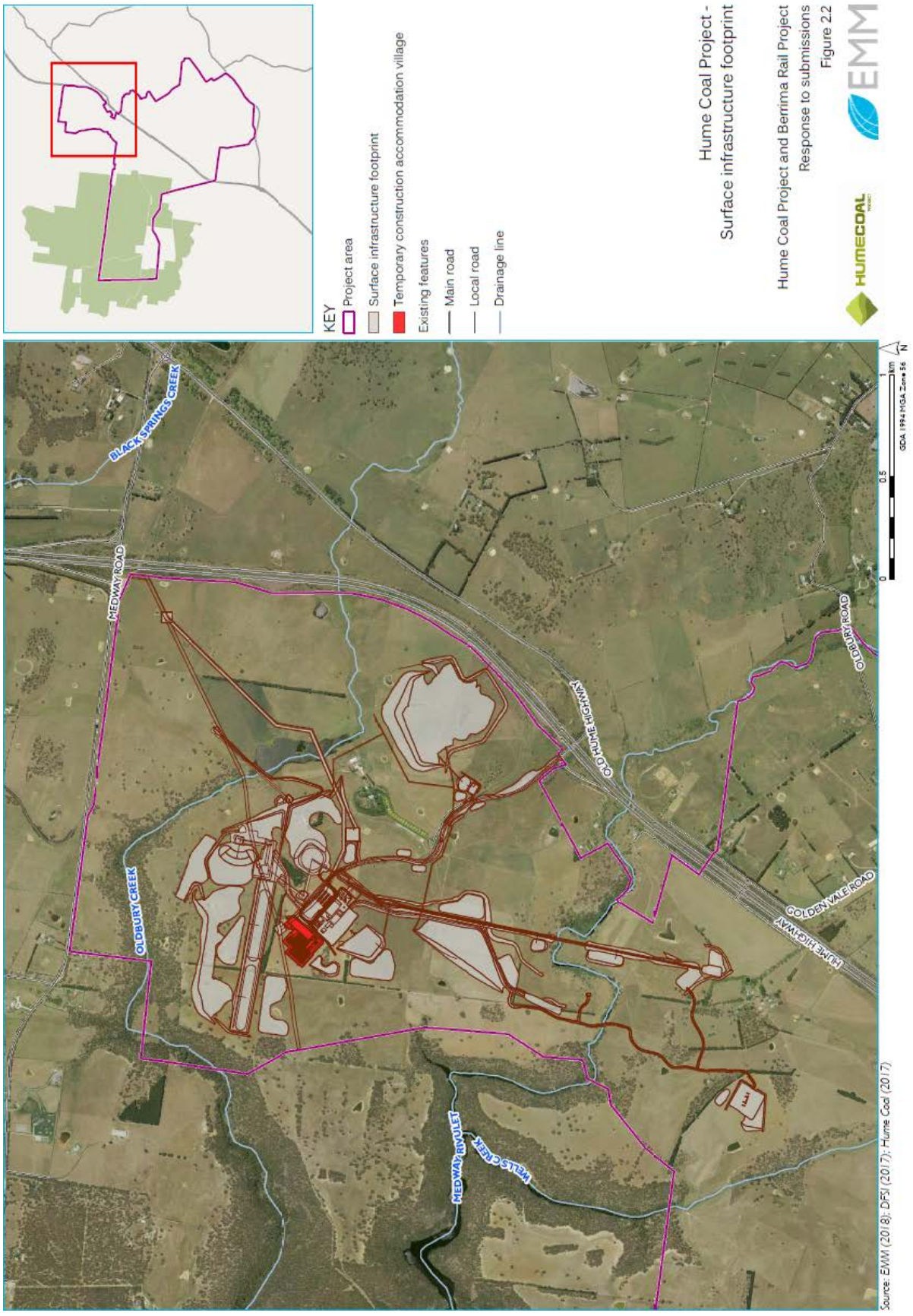
Source – Hume Coal Project and Berrima Rail Project – Response to Submissions

Figure 3 – Indicative Project Layout



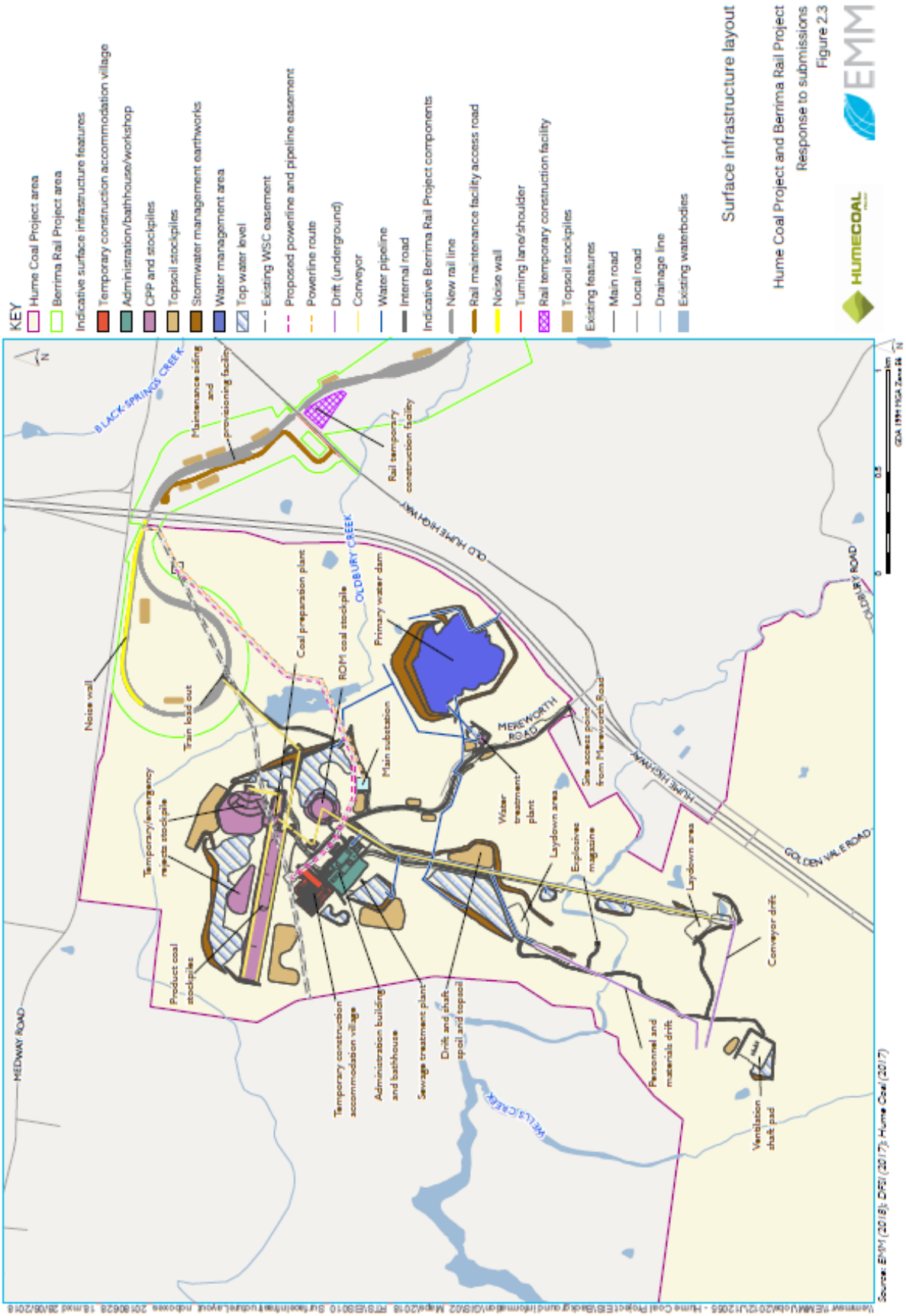
Source – Hume Coal Project and Berrima Rail Project – Response to Submissions

Figure 4 – Hume Coal Surface Infrastructure Footprint



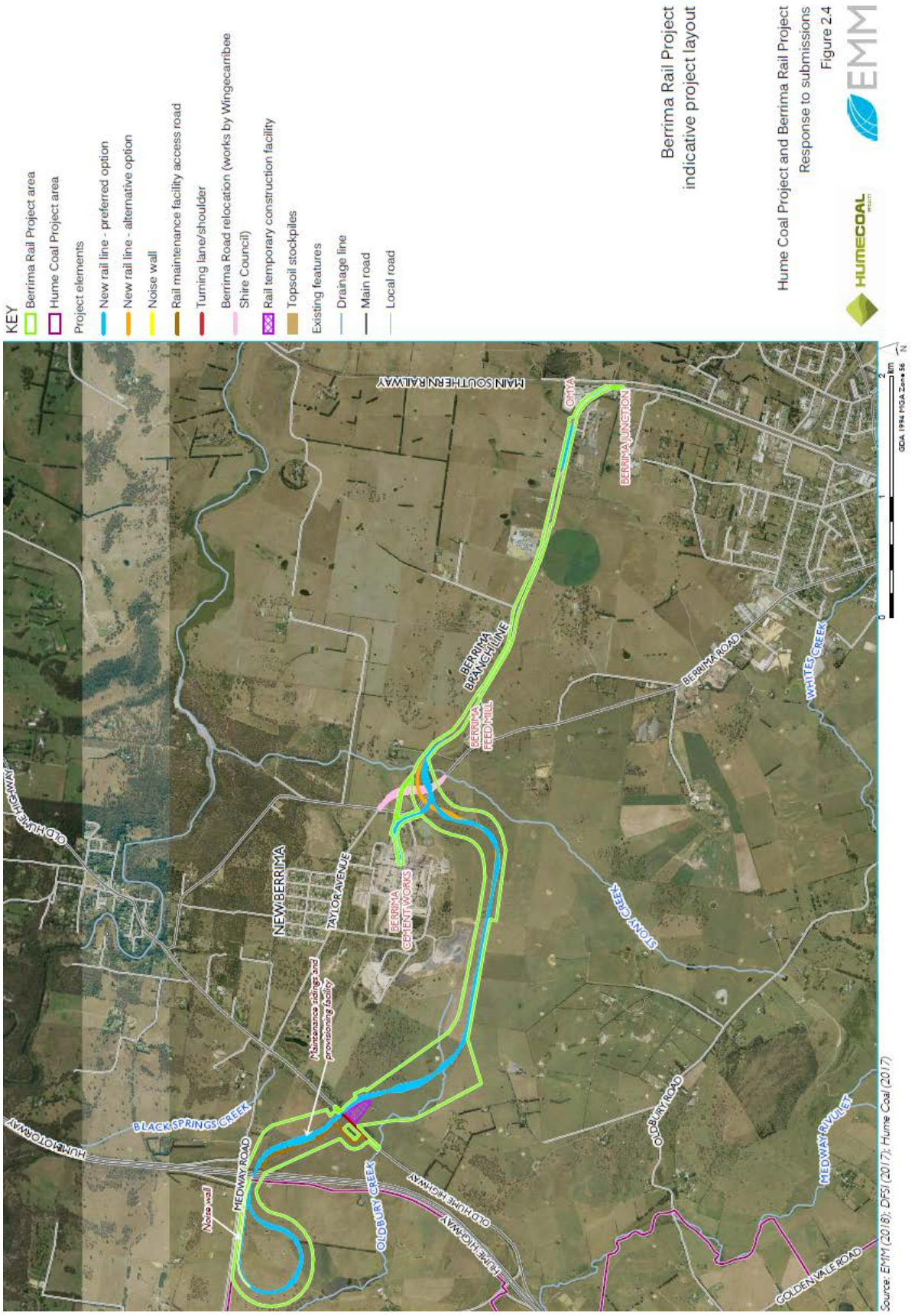
Source – Hume Coal Project and Berrima Rail Project – Response to Submissions

Figure 5 - Hume Coal Surface Infrastructure Layout



Source – Hume Coal Project and Berrima Rail Project – Response to Submissions

Figure 6 - Berrima Rail Project Indicative Project Layout



Source – Hume Coal Project and Berrima Rail Project – Response to Submissions

4.0 DEPARTMENT'S PRELIMINARY ASSESSMENT REPORT

36. On 7 December 2018, the Commission received from the Department of Planning and Environment its PAR.

37. The Commission notes that the Department has provided a preliminary assessment which has focused on the following three key issues:
    - groundwater;
    - mine design; and
    - economics.

38. In relation to the Department's assessment of the Project, the Department's PAR stated that:

    "The assessment of this project has been complex due to the uniqueness of the proposal, the volume of documentation, and the complexity of the technical issues. Consequently, the Department has commissioned independent experts on the key assessment issues, including Emeritus Professor Jim Galvin (mining engineering), Professor Ismet Canbulat (mining engineering), Mr High Middlemis (groundwater), Dr Renzo Tonin (noise) and Andrew Tessler (economics)."

    "In assessing the merits of the project, the Department has considered the submissions in the EIS, the likely environmental, social and economic impacts of the project, the suitability of the site, the relevant environmental planning instruments (EPIs), and the public interest, in accordance with the requirements of the EP&A Act."

    "The Department has also undertaken a comprehensive assessment of the full range of other potential impacts, including economics, noise, vibration, air quality, greenhouse gas emissions, traffic, biodiversity, heritage, agriculture and rehabilitation."

39. The Department's PAR concluded that:

    "*… there is a risk that the operational safety issues associated with the unconventional mine design may result in an unexpected sterilisation of coal, which may significantly reduce the economic benefits of the project*."

    "Further, the Department considers that there is a threat of serious harm to both groundwater and surface water resources, and there is currently considerable scientific uncertainty about the level of environmental damage to both."

    "While the project is likely to have some level of economic benefits for the state of NSW, the scale of these benefits needs to carefully weighed up against the potential impacts of the project on the environment and the community."

    "The Department considers that the economic benefits cannot be realised without significant adverse impacts on the environment and the local community, particularly in relation to groundwater impacts. At this stage, the Department does not consider that the economic benefits outweigh the likely adverse impacts on the environment and community."

    "Consequently, based on the information currently available, the Department considers that the project should not be approved."

While making these observations, the Department's PAR commented on other impacts such as noise and air quality and stated that "*The Department considers that the majority of these potential impacts would be similar to, or less than, other approved underground mining projects. The Department accepts that these potential impacts are likely to be able to be managed, mitigated or offset to achieve an acceptable level of environmental performance, subject to the provision of additional information or via suitable conditions of consent.*"

40. The Commission notes that the Department's PAR, as quoted above, includes a statement about the Department's view that the Project should not be approved. The Commission appreciates that it is independent from the Department and is not bound in any way to agree with the Department's conclusion. It will ultimately be a matter for the Commission in its final determination whether or not to approve the Project.

4.1 Public, Special Interest Groups and Government Agency Submissions

41. As indicated in the Department's PAR, during the exhibition of the Project the Department received 12,654 public submissions. This consisted of 23 from special interest groups (21 object / 2 support); 36 local business submissions (21 object / 15 support); 1,354 individual submissions (929 object / 419 support / 6 comments); and 11,241 form letters (all objections). In relation to the nature of the content of the public submissions made to the Department, the Department's PAR provides a concise summary of the issues raised by the public and key interest groups in sections 5.5 and 5.6 which stated that "*the key issues raised in submissions from the general public included:*
    - *groundwater drawdown on private bores;*
    - *potential contamination of groundwater aquifers;*
    - *potential discharge of mine water to the surrounding catchment;*
    - *movement of water away from agriculture to mining purposes*
    - *compatibility with other land uses in the local area;*
    - *the economic viability of the mine;*
    - *potential tourism impacts; and*
    - *potential heritage impacts, particularly on Berrima."*

42. According to the Department's PAR, during the exhibition of the Project the Department received 13 submissions from various Government agencies. Of the 13 submissions, Wingecarribee Shire Council objected to the Project. The Department's PAR provided a concise summary of the issues raised by Agencies in Section 5.4. The Agencies that provided comment prior to the Department's PAR include:
    - Primary Industries - Fisheries, Agriculture, Water: 16/07/2017 and 6/11/2018;
    - Resources and Geosciences: 11/07/2017 and 13/09/2018;
    - Environment Protection Agency: 30/06/2017 and 14/08/2018;
    - Heritage Council: 17/07/2017 and 17/08/2018;
    - NSW Health: 19/07/2017 and 6/08/2018;
    - Office of Environment and Heritage: 11/07/2017 and 13/12/2018;
    - Roads and Maritime Services: 7/07/2017 and 10/08/2018;
    - Water NSW: 30/06/2017 and 28/08/2018;
    - Wingecarribee Shire Council: undated and 27/08/2018;
    - Subsidence Advisory NSW: 4/07/2017;
    - Transport for NSW: 20/06/2017;
    - Forestry Corporation: 1/03/2017; and
    - NSW Resource Regulator: 2/10/2018.

5.0 COMMISSION MEETINGS, SITE AND LOCALITY INSPECTION

43. As part of its process, the Commission met with the Department, the Applicant, Coal Free Southern Highlands (**CFSH**) and conducted an inspection of the site and surrounding locality.

5.1 Meeting with the Department:

44. On 11 February 2019, the Department met with the Commission on the Project and the content of the PAR. Specifically, the meeting included an overview of the Project and the key assessment matters including – surface water, groundwater, geology and mining method and Project economics. Commissioners asked questions of the Department on the conclusions it had drawn and the approach it had used in coming to its conclusions. The meeting transcript has been available on the Commission's website since 14 February 2019.

5.2 Meeting with the Applicant:

45. On 11 February 2019, the Applicant met with the Commission on the Project. The meeting transcript has been available on the Commission's website since 14 February 2019.

5.3 Meeting with Coal Free Southern Highlands:

46. On 11 February 2019, the Commission met with representatives of CFSH which is a community group based in the NSW Southern Highlands. This meeting was sought by CFSH and subsequently approved by the Panel Chair as several experts CFSH had engaged to review the Project were not going to be available to attend the Public Hearing. The meeting transcript has been available on the Commission's website since 14 February 2019.

5.4 Site Inspection:

47. On 28 February 2019 the Commission conducted an inspection of the site and locality with the Applicant and four local community representatives from the following special interest groups attended and observed the site inspection:
    - Australian Garden and Heritage Society - Southern Highlands;
    - Battle for Berrima;
    - Regional Development Australia; and
    - Medway Road Residents.

    Notes from the site inspection, including details of the locations visited have been available on the Commission's website since 12 March 2019.

5.5 Locality Tour

48. At the conclusion of the site inspection referred to in paragraph 47, the Commission undertook a further tour of the locality that included Medway Road and Berrima township. This inspection was independent and did not include any external participants.

5.6 Meeting with Wingecarribee Shire Council

49. On 7 January 2019, Wingecarribee Shire Council (**Council**) declined an invitation from the Commission to meet with the Commission and elected instead to address the Commission (through Mr Barry Arthur) on the first day of the Public Hearing in Moss Vale on 26 February 2019.

6.0 PUBLIC HEARING

50. As required by the Minister's Request, a public hearing was held over two days on 26 and 27 February 2019 at the Moss Vale Services Club. A total of 74 individuals and groups registered to speak at the hearing and all those who registered were provided the opportunity to speak. Over the course of the hearing a total of 71 people addressed the Commission. A list of registered speakers and an amended list of speakers (due to requested changes) who presented to the Commission are available on the Commission's website. The full transcript from both days of the hearing has been available on the Commission's website since 5 March 2019.

51. The Commission provided stakeholders, including members of the public, an opportunity to make written submissions on the Project up to seven days after the public hearing. Multiple submissions were received both before and after the deadline, and the Commission considered all such submissions.

7.0 MATERIAL CONSIDERED BY THE COMMISSION

52. In exercising the request by the Minister for Planning on 4 December 2018 the Commission has carefully considered the following Project specific material (the **Material**):
    - Hume Coal Project – Environmental Impact Statement and associated information, March 2017;
    - Berrima Rail Project – Environmental Impact Statement (which formed part of the Hume Coal Project EIS) and associated information, March 2017;
    - all Government agency submissions made to the Department;
    - all public submissions made to the Department in respect to the public exhibition period – 30 March 2017 – 30 June 2017;
    - Hume Coal Project – Response to Submissions and associated information, June 2018;
    - Request to the Independent Planning Commission – Hume Coal Project and Berrima Rail Project from the Minster for Planning – the Hon Anthony Roberts MP, 4 December 2018;
    - Department of Planning – Hume Coal Project and Berrima Rail Project, State Significant Development Assessment (SSD 7172 and SSD 7171), and associated information, December 2018;
    - The Commission meetings with the Department of Planning and Environment, Applicant and Coal Free Southern Highlands on 11 February 2019 and all information provided during those meetings;
    - Verbal presentations made to the Commission at the public hearing at Moss Vale on 26 and 27 February 2019 and associated presentation documents, aids and other information;
    - The site inspection and locality tour conducted on 28 February 2019;
    - All public written submissions made to the Commission;
    - The Applicant's submissions to the Commission, March 2019, April 2019 and 17 May 2019;
    - The Commission meeting with the Applicant on 12 March 2019 and all information provided during those meetings;
    - The Applicant's Visual Impact Assessment Videos – uploaded to the Commission website on 19 and 20 March 2019;
    - Department of Industry correspondence to the Commission dated 24 April 2019; and
    - Planning and Environment – Resource Regulator correspondence dated 17 May 2019.

53. Copies of all submissions made to the Commission are available on the Commission's website and a full transcript of the public hearing is available on the Commission's website.

8.0 COMMISSION'S CONSIDERATION, FINDINGS AND RECOMMENDATIONS

54. The Commission received 699 written submissions and 3299 form submissions from the public and heard submissions and received presentations at the public hearing. The key issues addressed were:
    - noise impacts from the Project, including noise on the existing railway line;
    - air quality impacts from the coal stockpile and surface infrastructure area;
    - impacts on the quality of groundwater and surface water;
    - groundwater impacts on privately owned bores and both exotic and native vegetation;
    - loss of property value;
    - visual amenity impacts;
    - impacts on the significance of heritage items and the cultural landscape of the area;
    - economic impacts including the impacts of the Project on agriculture and tourism and the costs to the economy of the local area and community;
    - social impacts, including changes to the way of life, community, health and well-being, surroundings and property rights; and
    - Public interest, Ecologically Sustainable Development, Precautionary Principle and greenhouse gas emissions.

55. These issues are discussed below. The Commission's findings and recommendations represent its preliminary views at this stage of the assessment process. Many of those findings and recommendations concern the need for additional information in response to this Report. The Commission's ultimate determination of the merits of the Project will depend on all of the information that is available at that point.

8.1 Mining Method and Safety

APPLICANT'S CONSIDERATION

56. The Hume Coal EIS notes that numerous mining methods and layouts were considered - such as longwall, miniwall, first workings, full and partial extraction bord and pillar methods - and each method was evaluated against the objectives of technical, financial and environmental optimisation. The Hume Coal EIS states that the proposal will adopt a first workings mining method with a slender pillar system.

57. The Hume Coal EIS notes that this mining method is a "*non-caving mining method based on proved geotechnical design principles, leaving coal pillars in place".* Key features of this mining method described in the Hume Coal EIS include:
    - *"The underground mine layout enables economic resource recovery whilst leaving sufficient coal in place in the form of web and barrier pillars to keep the overlying strata supported and provides long-term geotechnical stability, this meeting the goals of minimising and/or eliminating subsidence impacts and minimising groundwater impacts.*
    - *The void spaces will be kept open until each panel is sealed with bulkheads, this allowing reject emplacement underground, and removing the need for surface reject emplacements, with associated potential for air quality, visual, and surface disturbance related impacts.*
    - *Each mining panel will be separated from adjacent panels by 50 m wide solid coal barrier pillars. The mine workings in each panel will be partially backfilled with coal reject and then sealed with bulkheads following completion of mining.*
    - *The proposed mining system is flexible. It can be modified as required to avoid specific features, for instance geological structures such as faults and diatremes, including any which may not yet have been identified."*

58. The Hume Coal EIS also states that this method *"will offer a significant level of protection to both existing surface features and the groundwater system, by preventing overburden caving and its associated mining-induced fracturing of the overlying Hawkesbury Sandstone* [**HS**]*. This mining method and the associated mine layout will reduce the levels of surface and sub-surface subsidence to the lowest practical level, whilst still allowing economic recovery of the coal resource."*

59. With regards to the impact of this mining method*,* the Hume Coal EIS states that, "*there will be negligible surface subsidence, so overlying aquifers and surface features will be protected. The mine will install bulkheads to seal each panel immediately after extraction and backfilling. This means that groundwater in each panel can begin to recover once a bulkhead is installed. These bulkheads will result in shorter recovery time for groundwater levels than in conventional underground mines.*"

60. In relation to mine safety, the Hume Coal EIS states that *"a range of hazard control plans will be implemented during construction and operation of the project"* and that *"Hazard control measures will be described in further detail in safety management plans that will be developed for the project in accordance with the NSW Work Health and Safety (Mines and Petroleum) Act 2013, NSW Work Health and Safety Act 2011, NSW Work Health and Safety (Mines and Petroleum) Regulation 2014 and NSW Work Health and Safety Regulation 2011"*.

61. The Hume Coal EIS was also accompanied by a Subsidence Assessment (**SA**) prepared by Mine Advice dated December 2016. In relation to the mining method the "… *main features in relation to the mitigation of mining subsidence and associated impacts*…" includes:
    - *"The layout is not dissimilar to that of "highwall mining" whereby a series of long "drives" are formed up using a remote mining method using extraction "spans" between coal pillars of no more than a standard mine roadway width…"*
    - *The coal pillar system left behind after mining is designed to be stable over the long-term. As well as ensuring a suitably high Factor of Safety (FoS) against coal pillar failure, this is supplemented by both: (a) maintaining the extent of any areas of low width to height ratio pillars to sub-critical levels and (b) ensuring that the pillar system contains sufficient numbers and locations of high width:height ratio pillars to ensure that any low width:height ratio pillars are suitably protected as a direct consequence."*

62. In relation to subsidence risks from the mining method, the Hume Coal EIS states that *"A first workings mining method has been adopted for the project as it offers the maximum level of protection to both overlying strata and surface features. As no secondary extraction will be undertaken, no caving of the roof strata from wide unsupported voids will occur"*. The risks from subsidence are further discussed in Section 6.1 of this Report.

63. The Hume Coal RTS was accompanied by additional information relating to the mining method in response to issues raised during the Project exhibition period. This included "*two and three dimensional numerical modelling of the mine layout to provide complementary and independent method of analysing mine stability and subsidence predictions."*

64. In relation to mine safety the Hume Coal RTS stated that "*Operational management plans such as this [risk management plans] are required, by law, to be developed in consultation with the workforce. The consultation and safety role for workers is developed under the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014…*". Furthermore, it stated that "*It is highly inappropriate to develop operational safety management plans, particularly those relating to principal hazards, prior to employing the operational workforce.*"

65. The Hume Coal RTS further stated that "*The WHS (Mines and Petroleum Sites) Regulation 2014 provides for a 50 m separation of solid strata between an active mining face and mine workings that potentially contain water or any other material that can flow resulting in an inrush. This 50 m wide area is called an "inrush control zone". "Hume Coals proposal does not involve mining within an inrush control zone as a result of proximity to old mine workings*."

66. In relation to bulkhead design and failure the Hume Coal RTS stated that "*The catastrophic failure of bulkheads constructed as monolithic plugs is not considered to be a credible scenario due to the inherent nature of the design concept proposed by Hume Coal, assuming the bulkheads are installed with proper care and diligence using established and routinely practices quality assurance processes, and that the design concept is verified and finalised following an inspection of each site by a suitably qualified engineer.*"

67. In relation to the issue of pillar stability and the interaction of this stability with bulkheads and reject emplacement the Hume Coal RTS stated that "*…there is no dependence on the long-term integrity of the bulkhead seals, or the reject emplacement in the assessment of pillar stability*."

68. Furthermore, the Hume Coal RTS stated that "*… bulkheads will become redundant once the mine is rehabilitated, since the workings will naturally flood and the pressures across these seals will equalise once mine inflows cease. This is expected to occur a short time (less than 5 years) after the mine is sealed.*"

DEPARTMENT'S ASSESSMENT

69. The Department's PAR has given much consideration to the issue of mining method and safety and whilst it acknowledged that the Applicant "*has selected this mining method in an attempt to limit subsidence-related impacts…*", it has also expressed concerns over the Project stating that "*the combination of an untested mining method and an unconventional method of storing large quantities of mine water underground is likely to result in serious operational safety risks. These risks are exacerbated by uncertainties about the local geology and the level of risk assessment undertaken to date*."

70. The Commission understands from the Department's PAR that the Department has engaged two experts to assist with their assessment of the Project, being Emeritus Professor Jim Galvin and Professor Ismet Canbulat.

71. According to the Department's PAR, the initial advice provided by both Department experts was that "*the Applicant had not provided an adequate geotechnical model, particularly for the purpose of estimating pillar loads and stability*." Furthermore, it is stated in that "*The EIS utilised an upper extreme loading model for some types of coal pillars and a lower extreme loading model for some type of coal pillars and a lower extreme model in the case of web pillars."*

72. Professor Canbulat is noted in the Department's PAR as stating that "*the predicted likelihood of web pillar failure instability falling somewhere within a range of <0.00001% to 50%*", which was considered "*obviously too wide a range for assessing reliability and stability.*"

73. The Department's PAR also noted concerns raised by both Department experts with the lack of geological data provided. For example, the experts made the following statements:

    Emeritus Professor Jim Galvin
    "devoid of basic information that would normally be shown on such plans… in particular, they do not show fault throw and displacement directions and dyke thickness." and that *"that the Hume Coal Project is not typical of other mine designs"* and *"its safe and successful execution may be quite dependant on the presence, nature and density of geological structure.*"

    Professor Ismet Canbulat
    "*only 25 strain-gauged elastic modules tests were conducted which on Hawksbury Sandstone"* is *"insufficient for the purposes of making conclusions and decisions*."

74. In relation to seeking further information, the Department's PAR stated that "*both Department experts recommended that the Applicant prepare a three dimensional (3D) numerical geotechnical model*." As stated in paragraph 63, the Applicant submitted the requested model formally as part of its Hume Coal RTS. The Hume Coal RTS material was reviewed by the Department's reviewers.

75. Within section 6.3 the Department's PAR is a detailed consideration and assessment of the mining method in which the Department has reached a number of conclusions, including:
    - Methodology – "*…there are residual uncertainties about the geotechnical model, the adequacy of the baseline data and level of risk assessment undertaken. These uncertainties may influence the reliability and accuracy of predictions about pillar stability and other geotechnical issues…*";
    - Subsidence – "*Notwithstanding some minor residual uncertainties about pillar stability and associated subsidence, the Department considers that it is unlikely that subsidence would cause any significant impacts to surface features*";

- Pillar stability risks – "*Ultimately, the Department considers that the issue of pillar stability has not been adequately resolved by the 3D numerical modelling, and that there are significant residual risks to worker health and safety*";
- Impoundment of water – "*… based on the advice of its independent experts, the Department considers that:*
  - *there are inherent risks in the proposed impoundment of large quantities of mine water behind bulkheads during the operation of the mine;*
  - *these risks are exacerbated by various other risks associated with pillar stability and the combination of these risks has not been adequately addressed; and*
  - *there are a range of residual uncertainties, particularly in relation to the timing of the proposed impoundment of water.*

  While the Department acknowledges that these issues could be dealt with by the Resource Regulator in accordance with Work Health and Safety legislation, the Department is concerned that these residual risks may lead to environmental or economic impacts that must be considered under the EP&A Act."
- Environmental impacts – "*…the Department considers that the wide variety of safety risks associated with pillar stability and water impoundment… may lead to the transfer of additional mine water to the surface. This would require significant amendments to the existing project and a substantial amount of additional assessment."*
  "… the Department considers that any discharge of mine water (whether treated or untreated) may result in significant impacts on surface water, particularly given the project's location within the drinking water catchment."
- Economic impacts – "*The uncertainties associated with the proposed mining method and the potential safety risks may also result in reduced economic benefits*."

INFORMATION PROVIDED TO THE COMMISSION

76. Because the Department's experts and those of the Applicant disagree on safety, the Commission at its meeting with the Department on 11 February 2019 questioned Professor Galvin on aspects of safety of the pine feather approach to mining and his responses are available on the Commission's web site.

77. The Applicant was also questioned about aspects of the mining method during its meeting with the Commission on 11 February 2019. The Applicant subsequently provided further information in its submission to the Commission on 5 March 2019 (**Applicant's Submission**). **Table 1** below reproduces the Applicant's summary of responses to the issues relevant to mine method and safety raised by the Department in its preliminary assessment and by the Commission:

Table 1: Applicant Response to DPE Concerns

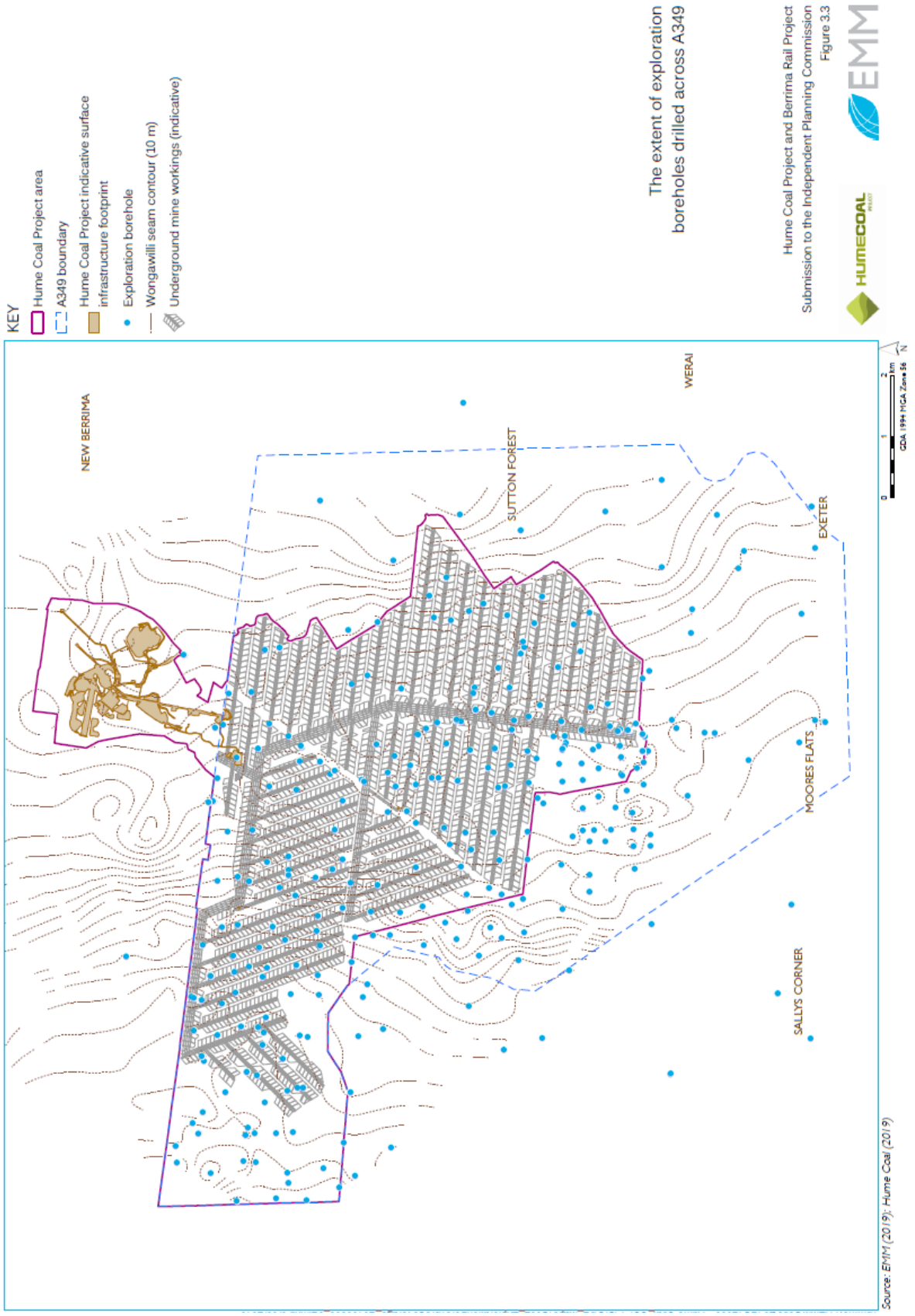
DPE Issue:	Hume Response:
'Untested' and 'unconventional' mining method and design	The mine design is based on long established mine design principles. Similar layouts have been, and are, used at numerous other underground mining operations. An innovative mine design does not affect the ability for the Project to be approved. Notably, the NSW Resource Regulator published an Innovation Policy in January 2019, which states that: *'We are committed to having a responsive and effective regulatory framework for work health and safety that supports the development, trial and adoption of new technologies, systems and products.'*

A substantial degree of uncertainty about the methodology underpinning the geotechnical model, and the level of risk assessment undertaken.	There are no outstanding issues of any substance remaining with regards to the 3D geotechnical model. The model was developed using state of the art software; appropriate material properties with conservative, down-rated values; it was conducted by a leading international expert, Professor Keith Heasley; and it was calibrated against an appropriate case study from the neighbouring Berrima Colliery. The DPE's own experts conceded at the expert's meeting in March 2018 that the model was appropriate. A number of risk assessments have been undertaken for the Project and attended by experts in the fields of mine design, geotechnical engineering, geology and hydrogeology. The risk assessments considered the proposed non-caving mining method, and the risk of inrush and inundation, and the outcomes were used to inform the final proposed mine design and layout.
The combination of the 'untested' mining method with the storage of large quantities of mine water underground, claiming this is likely to result in serious operational safety risks.	As mentioned above, the proposed mine design is based on long established mine principles. Many mines also store water underground. Notably, water will be stored downdip of the bulkheads in the majority of the mine workings, with the exception of one area towards the end of mine life where the seam dip flattens out (refer to Figure 3.4 in this submission). There is therefore no information to support DPE's claim that the mine design, combined with the storage of water underground, will result in serious safety risks is rejected.

Source: *Hume Coal Project Berrima Rail Project: Submission to the Independent Planning Commission – Dated March 2019.*

78. The Applicant's Submission provided additional information on water re-injection and stated that "*Hume Coal was effectively prevented from exploring shallow reinjection of excess water further due to the inability to obtain approval or a licence from DoI Water. Apparently, there appears no mechanism in NSW to approve the activity of reinjection of groundwater… As a result, Hume Coal then made a decision to progress with pumping the water into down dip and or sealed panels in the underground workings.*" The Applicant's Submission also identified 11 mines in NSW known to store water.

Figure 7 – Exploration Boreholes



Source – Hume Coal Submission – March 2019 (Fig 3.3)

79. The Applicant's Submission also provided further information regarding the adequacy of the geological information. The Applicant stated that:

"The assertion that there is a lack of baseline geological data is unfounded. As described in Section 2.4.2, in his expert peer review of the project, Dr Bruce Hebblewhite confirmed that the data provided was quite considerable, and certainly on par with similar mining projects at this stage of evaluation and development.

Hume Coal has extensive geological data over Authorisation 349, including historic holes drilled by previous title holders as well as exploration holes drilled by the company, totalling 345 holes in A349 (an area of 89 km2). There are 179 bores in the proposed mining area itself (an area of 35 km2). Figure 3.3 [Figure 7] *illustrates the extent of boreholes in the project area.*

All Hume Coal boreholes have been geophysically logged with a diverse suite of geophysical logs. These holes have been critically analysed and used to develop a robust geological model.

In addition to the drilling of boreholes, extensive aerial magnetic and radiometrics surveys have been conducted over the entire Authorisation. Surface magnetic surveys were also undertaken targeting specific geological structures that were located by the aerial surveys. Surface surveys for seismic were undertaken in the Belanglo State Forest and property owned by the company. In total approximately 36 line km of data was obtained."

80. The Applicant's Submission also provided further information regarding its position that the mining method represents 'first workings'. The Applicant's Response states that:

"*The assertion or interpretation that the proposed mining method represents secondary extraction is challenged as being inappropriate. Underground coal mining can be divided into primary development or first workings, and secondary extraction. Secondary extraction is a term that has been used in the coal mining industry for many decades to refer to the process of removing solid regions of coal after the main roadway development has been completed. It is usually mined in a different manner, involving more than straight roadway drivage and is usually mined on the retreat. The main examples of secondary extraction are partial or total pillar extraction (by various methods); and longwall mining.*

In the case of the pine feather method, each production panel is mined by development of roadways during the development process. It does not involve any subsequent extraction of pillars or solid blocks of coal and is therefore considered to constitute first workings, as opposed to secondary extraction."

81. At the request of the Commission, Hume's Risk Assessment of the Project ("**Project Risk Assessment**") approach was provided. It was provided on a view only 'Commercial in Confidence' basis to the Commission on 12 March 2019. The Commissioners sighted the Project Risk Assessment.

82. The Commission also put a series of questions to the NSW Resources Regulator seeking more information about the proposed mining method and its likely impacts. The Resources Regulator in its response dated 17 May 2019 stated that it has "*expertise regarding risk management practices applied to mining operations and mine subsidence, and this expertise is engaged to ensure the regulator can fulfill its function as prescribed in section 152 of the Work Health and Safety Act 2011 (WHS Act)."* This response was provided to the Applicant, and made available on the Commission's website on 24 May 2019.

83. The Resources Regulator stated that:

"*While previous advice [to the Department] identified some non-specific work health and safety concerns relating to the proposed mining method, it cannot be inferred that the method is unsafe on the basis it has not been previously applied in NSW, or that Hume Coal cannot or would not implement appropriate controls to manage risks to workers arising from implementing this method of mining."*

"Inherent risk cannot be the sole determinant as to whether a mining operation will be safe or unsafe. Such a determination must be based on the adequacy of risk controls identified in Principal Hazard Management Plans and implemented by the mine operator to manage these risks as low as reasonably practicable."

"It is the position of the Resources Regulator that it is not appropriate to make a determination an activity has an unacceptable level of risk, solely on the basis it is a prescribed high risk activity."

"The storage of rejects has been previously undertaken in underground coal mines in NSW and is routinely done in underground metalliferous mines. The Resources Regulator is not aware of any incidents where workers have been exposed to risk arising from this type of activity in underground coal mines."

"The use of bulkhead seals is prevalent at underground coal mines in NSW. Experienced inspectors within the Resources Regulator cannot recall of significant failure of bulkheads in modern underground coal mines."

"That being the case, the proposed mining method, along with the ability to conduct inseam exploration drilling, allows flexibility to alter short and long-term mine design, which is not generally available to longwall mines, notwithstanding localised impacts. Exploration constraints imposed on underground mining operations by land ownership or imposing natural or man-made features, is in no way considered remarkable."

"Parallel drives, or plunges, are considered secondary extraction. This is consistent with the definitions for first workings and secondary extraction applied by the Department of Planning, and the descriptions in Schedule 3, clause 16 of the Work Health and Safety (Mines & Petroleum Sites) Regulation 2014 (WHS(M&PS)R)."

COMMISSION'S FINDINGS AND RECOMMENDATIONS

84. The Commission in its assessment of merits of the Project has had regard to the proposed mining method and associated safety concerns. The Commission has had regard to the Material before it and given consideration to the issues raised in public submissions. Relevant excerpts from the submissions included:
- the mine design presents a number of uncertainties, is inherently risky and impacts on groundwater resources;
- untested mining method;
- insufficient geological data;
- no guarantee that the bulkheads will work;
- what happens if underground storage does not work; and
- concerns pertaining to the storage of CPP rejects and excess mine water in mined-out voids.

85. The Commission understands that this Project is unique and generates a number of challenges. The Project is in an area which has not been subjected to mining, however coal mining has occurred in a nearby area until recently. The population density is quite high by rural standards, with many properties having significant improvements. According to the Hume Coal EIS, some are heritage items and much of the landscape in the area has been classified by the National Trust. All experts, both for the Applicant and the Department, agree that the mining method chosen will lead to minimal subsidence.

86. Submissions, speakers at the public hearing and experts have raised concerns regarding the lack of geological information and the Commission agrees with those reservations. Extrapolating some geological data from the Berrima coal mine, some five km away, carries with it uncertainty. More closely spaced geological information is desirable to improve the geological confidence in the conceptual mine plan. When the Applicant has been questioned about this the reply has been that a detailed mine plan is not usually prepared this stage of a mining project. This is a problem that will have to be addressed and resolved. The Commission also notes the view of some adjoining landowners that access would not be provided to enable geological investigation. The implications of this will need to be considered.

87. The Commission notes that the Department contends that there remain residual issues, such as the issue of pillar stability, yet to be resolved by this 3D numerical modelling and the reliability of 3D geotechnical modelling. These residual issues may result in the changes to the mine design such as widening the pillars. The implications of such a change would need to be investigated.

88. The Risk Assessment document viewed by the Commission on 12 March 2019 appears to identify and evaluate a number of the issues indicated by the Department's expert reviewers and discusses how they will be handled. However, this document was not made available for peer review during the assessment process on the basis of the Applicant's position that it was "Commercial in Confidence".

89. At this stage of its assessment, the Commission finds that it is generally satisfied with the information provided up to this point regarding mine design and safety which has been assisted by the information from the Resources Regulator. However, the Commission notes the residual disagreement between the Applicant and the Department.

90. The Commission makes the following recommendations that will require further information and/or assessment:

R1 Because the Applicant and Department remain a considerable distance apart regarding their positions on the safety of the pine feather method of mining, the Commission suggests that one of the Applicant or the Department, or both of them jointly, engage a new independent expert with experience in innovative coal mining technology with a view to resolving ongoing differences of opinion. This investigation would involve taking into account new information from the Resources Regulator.

R2 As a result of the outcomes of **R1**, the Applicant needs to advise if there are consequences that would arise in relation to mine design and economics (resource recovery).

R3 The Applicant should provide the Project Risk Assessment to the Department, and any other relevant Government agencies, if necessary on a confidential basis, for consideration in any further Department or other Government assessment or response in the next stage of the assessment process.

8.2 Groundwater and Surface Water

91. The Hume Coal EIS was accompanied with a Water Impact Assessment Report (**WIAR**) prepared by EMM Consulting, dated 3 March 2017. The WIAR stated that "*this assessment has been prepared in accordance with the requirements of the Commonwealth Department of the Environment (DoE) (now the Department of Environment and Energy (DoEE)) and NSW Department of Planning and Environment (DPE)*" and that the "*water assessment was undertaken by a team of leading specialists and a number of technical reports that have been appended for reference to this document, namely:*
    - *Water Balance WSP PB (2016a);*
    - *Surface Water Quality Assessment (WSP PB 2016b);*
    - *Surface Water Flow and Geomorphology (WSP PB 2016c);*
    - *Flooding Assessment (WSP PB 2016d);*
    - *Groundwater Assessment, Volume 1: Data Analysis (Coffey 2016a);*
    - *Groundwater Assessment, Volume 2: Numerical modelling and Impact (Coffey 2016b); and*
    - *Hydrogeochemical Assessment (Geosyntec 2016).*"

92. The Hume Coal EIS stated that "*The overarching water management philosophy involves:*
    - *Runoff from undisturbed areas will be diverted around or away from the infrastructure into natural watercourses via clean water diversion drains.*
    - *Runoff from disturbed areas within the mine infrastructure footprint will be directed to stormwater basins (**SBs**), mine water dams (**MWDs**) and the primary water dam (**PWD**) for storage and reuse.*
    - *Runoff from areas where there is a low risk of coal contact (i.e. runoff from areas that do not contain coal, stockpiles or processing plant but that could contain small amounts of coal due to mine vehicle traffic) may be discharged to local creeks after the first flush provided water quality is acceptable.*
    - *Runoff from areas where there is a low risk of coal contact that does not meet the adopted first flush criteria will be transferred to the PWD for storage.*
    - *Sewage from the administration and workshop area will be treated and reused onsite.*
    - *Grey water will be subject to primary treatment and used for drip irrigation of landscaped areas. Black water will be subject to tertiary treatment and harvested for reuse in the CPP.*"

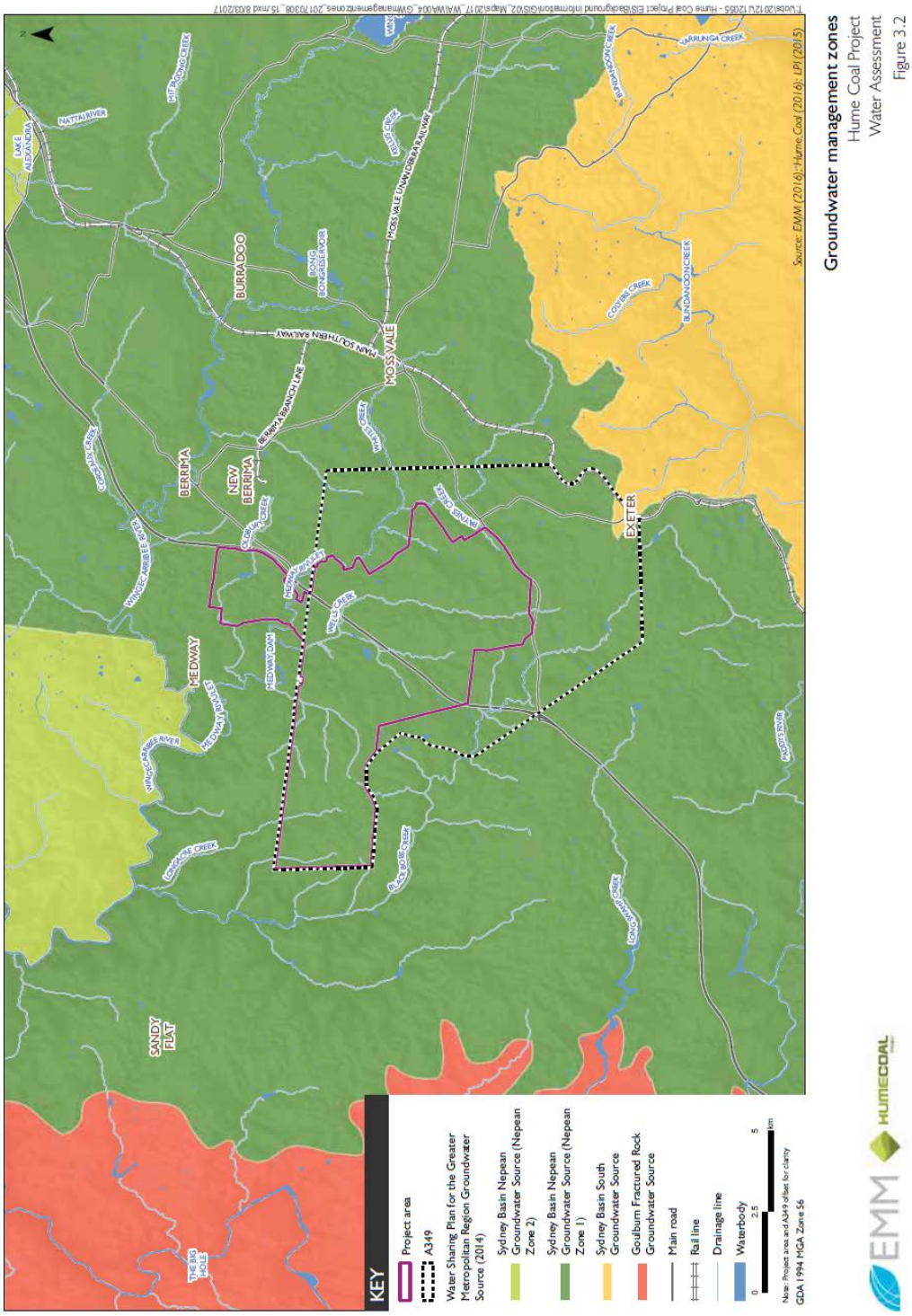
93. In relation to possible predicted effects on groundwater and surface water the WIAR stated the following impacts:
    - *"flow and yield changes for users and the environment – **insignificant**;*
    - *stream bank erosion and geomorphology changes – **insignificant**;*
    - *surface water changes – **insignificant**;*
    - *flooding – **insignificant**;*
    - ***no impacts** predicted for GDEs;*
    - *effects of ecosystems that potentially use groundwater – **insignificant**;*
    - *reductions to baseflow – **insignificant**;*
    - *water quality changes for private landholder bores – **insignificant**; and*
    - *drawdown on private landholder bores – **significant**."*

8.2.1 Groundwater

APPLICANT'S CONSIDERATION

94. The WIAR stated that the "*Hawkesbury Sandstone is the main groundwater bearing unit used for water resources in the project area. Groundwater within the Hawkesbury Sandstone is generally fresh with varying bore yields (the median bore yield of registered bores in the area is 2 L/sec)*."

Figure 7 – Groundwater Management Zones



Source – Hume Coal Project EIS – Water Impact Assessment Report

95. In relation to data collection, the WIAR stated that "*Up to four years of baseline hydrogeological data have been collected at 54 groundwater monitoring bores at 22 locations, 11 vibrating wire piezometer sensors at three locations, and three landholder bores. The network was development in consultation with the NSW Department of Primary Industries (DPI) Water… and documented in the Groundwater Monitoring and Modelling Plan (EMM 2017b).*"

96. In relation to the groundwater model used for the Project, the WIAR stated that "*The numerical groundwater model for the project is a class 2 model with many elements classified as meeting class 3 requirements*." Class 2 is considered to be "*high confidence in model predictions, suitable for use in high value resources or projects with medium to high risk developments*" with Class 3 considered to be "*high confidence in model predictions, suitable for use in high value resources and projects such as regional sustainable yield assessments.*"

97. Furthermore, the WIAR stated that "*Two independent pre-eminent hydrogeologists, Dr Frans Kalf and Dr Noel Merrick, were engaged to peer review the numerical model. The model was judged by both peer reviewers to be fit for purpose in accordance with the guidelines and their professional judgement*."

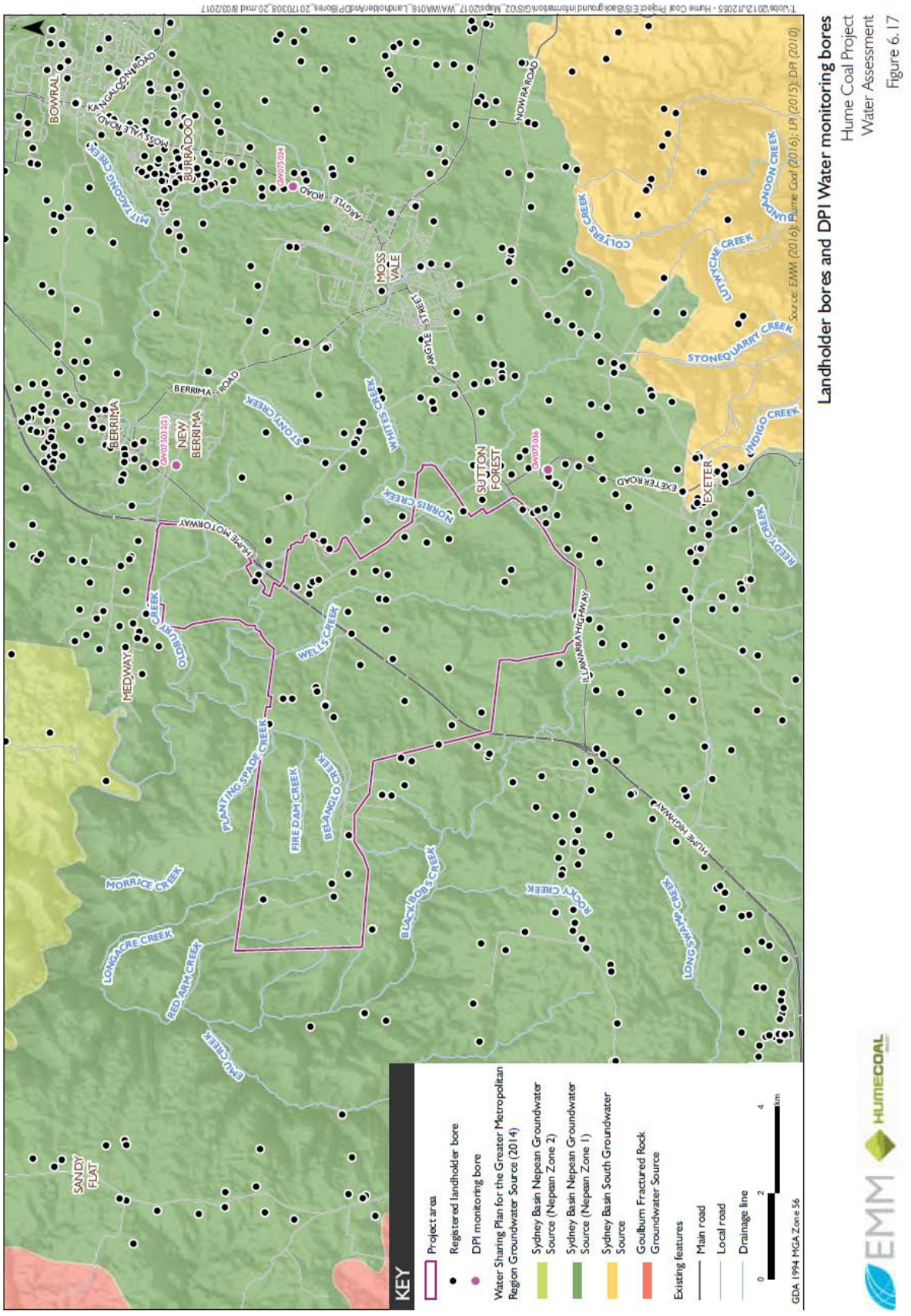
98. In relation to the drawdown of groundwater on privately owned bores, the Hume Coal EIS stated that "*… it is predicted that 93 private landholder bores on 71 properties will experience a drawdown of 2 m or more due to the project. The average duration of drawdown on the 93 affected bores is predicted to be 36 years, with the maximum duration being 65 years. However, most of the recovery will occur in a far shorter time period; on average, a bore will recover by 75% within 23 years after it is first impacted*." Furthermore, the WIAR stated that the "*… maximum project drawdown was of about 45 m of the water table…*".

99. In relation to the make good provisions that apply to the drawdown of groundwater on privately owned bores the Hume Coal EIS stated that "*A 'make-good' assessment was conducted accordance with the Aquifer Interference Policy (**AIP**)…*" and furthermore the WIAR stated that "*A range of make good provisions for landholder bores that could experience a drawdown greater than 2 m have been proposed. The actual provisions that will be applied will be identified following case-by-case assessment as they will depend on the existing infrastructure, the degree of drawdown at each site and the outcome of consultation with the relevant landholder. Strategies could include compensation for increased pumping costs, repositioning pumps to unaffected strata, or relocating bores.*"

100. As part of the Project's mitigation strategy on groundwater impacts the WIAR stated that it is proposed that:

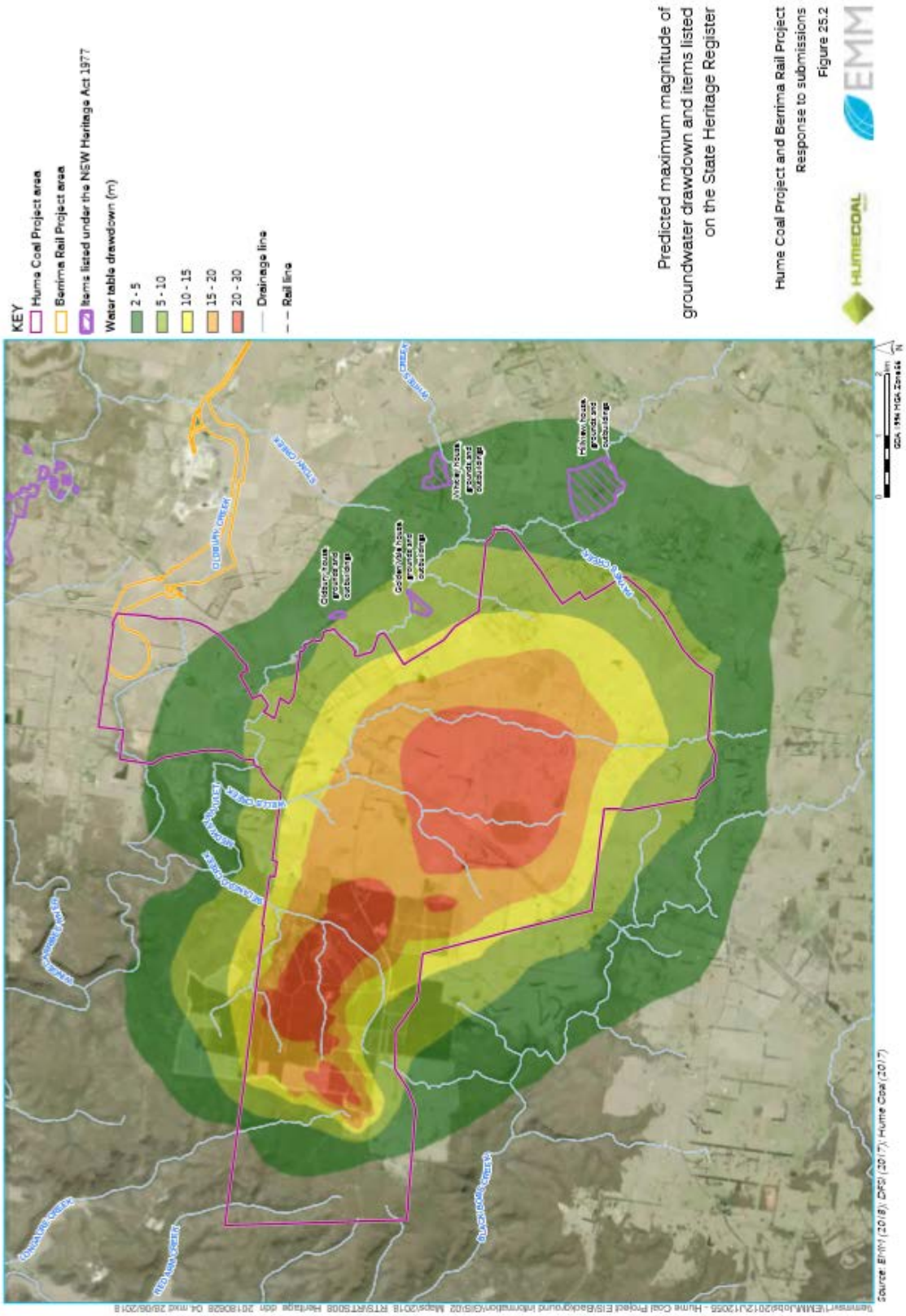
> "*Active injection of water behind the bulkheads will occur from year three (ie once the first bulkhead is sealed) through to year 19 of mining, resulting in a decreased volume of groundwater inflow to the workings and a faster recovery post-mining. Once mining ceases (end of year 19) groundwater inflow to the void is expected to continue for three years (ie until all panels are full) (Coffey 2016b).*
>
> *Once panels are sealed and flooded, the void will become part of the greater groundwater source. Relocating mine sump water into the underground sealed voids averts the need for management and or release of that water at the surface. Facilitating groundwater storage behind the bulkheads naturally and via injection will also greatly decrease groundwater depressurisation, and speed up the groundwater recovery time.*"

Figure 8 – Landholder Bores and DPI Water Monitoring Bores



Source – Hume Coal Project EIS – Water Impact Assessment Report

Figure 9 – Project Induced Groundwater Drawdown



Source – Hume Coal Project RTS

101. In relation to the total peak predicted annual water take (groundwater and surface water), the Hume Coal EIS stated that it would be "*… 2,290.5 ML/yr in year 15…*" and that "*Hume Coal had already secured in excess of approximately 60% of the peak water licence requirement…*". The average yearly inflow "*… to the mine sump is 440ML/yr and 1,157ML/yr to the sealed underground void*."

102. The Hume Coal RTS was accompanied by additional information relating to groundwater impacts in response to issues raised during the Project exhibition period. This included information related to both the Hume Coal Project and Berrima Rail Project. The information contained within the Hume Coal RTS was not fundamentally different from the information provided with the Hume Coal EIS.

103. The Hume Coal RTS found that there "*are no identified high-priority groundwater dependent ecosystems (GDEs) within or proximate to the project area. Stygofauna sampling assessed 19 groundwater monitoring bores (eight within the project area and 11 outside the project area) in 2013 and 2014 (EMM 2017c), and no rare or significant stygofauna was found*."

104. In relation to private water bore access and groundwater usage, the Hume Coal RTS stated that "*Coffey (2016a) identified 83 private water bore access licences within the 9 km radius of the project area with a combine level of entitlement of 5,300 ML/yr.*"

105. As part of the Hume Coal RTS, additional investigations included revision of the groundwater model, make good assessment and production of an updated water impact assessment. The Hume Coal RTS stated that "*The revised modelling confirmed that changes were not required to the project, nor do the predicted impacts on water resources vary significantly, and in many cases not at all, from that presented in the EIS*." A list of the changes is provided in section 4.3.3 and 4.3.4 of the Hume Coal RTS.

106. In relation to water licensing, the Hume Coal RTS stated that the revised groundwater model has resulted in a reduction "*…to 2,093 ML*". Furthermore, that the Applicant "*… has now secured 90% of the total project peak requirement.*"

107. As a result of the revised groundwater assessment, the Hume Coal RTS provided a comparison table to the predictions made within the EIS and the table is reproduced below:

	REVISED ASSESSMENT	**EIS**
Number of bores impacted	94	93
Maximum drawdown range	2 – 47 m	2 – 80 m
Median maximum drawdown	6 m	12 m
Number of landholders with impacted bores	72	71
Average time for a bore to recover by 75% since impact begins	20 years	23 years
Time under which all impacted bores recover after mining starts	76 years	72 years

108. The Hume Coal RTS provided additional details regarding the timing of predicted impacts on private bores and this is reproduced below:

Stage	1	2	3	4	5	6	Total
Time when bore first impacts by 2m drawdown (Years)	**0-5**	**5-10**	**10-15**	**15-20**	**20-25**	**+25**	
Make good provision							
1. increased pumping costs	-	3	7	9	5	7	31
2. deepen pump	6	9	13	3	2	-	33
3a. replace a stock / domestic bore	5	4	2	2	1	1	15
3b. replace an irrigation bore	5	8	1	1	-	-	15
	16	**24**	**23**	**15**	**8**	**8**	**94**

DEPARTMENT'S ASSESSMENT

109. The Department's PAR has given much consideration to the issue of groundwater impacts predicted by the Project as it "*involves extraction of a relatively shallow coal seam in an area that contains productive groundwater aquifers and a large number of groundwater users*."

110. The Commission understands the Department has engaged an independent expert to assist with its assessment of the Project, being Mr Hugh Middlemis, who "*provided:*
- *advice on the groundwater assessment in the EIS, dated 6 December 2017; and*
- *advice on the groundwater assessment in the Response to Submissions, dated 16 October 2018.*"

111. Mr Middlemis concluded that the revised model is a class 2 Model and is fit for purpose, under the Australian Modelling Guidelines (2012). He has also stated that the Merrick (2018) model is conservative as it does not include any surface water from the PWD being placed underground or water being pumped from the mine sump to voids. Such water transfers would speed groundwater water level recovery and help limit drawdown caused by mining dewatering. Furthermore, Mr Middlemis reported that the revised model is best practice due in part to the fact that it is calibrated against four separate data sources (groundwater levels, stream flows, hydraulic conductivity and Berrima Mine inflows) and has included an uncertainty analysis.

112. The Department's PAR acknowledges a number of *"groundwater experts that have provided input or comments on the groundwater impact assessment process and/or groundwater model, including:*"

Applicant	Government	Community
Dr Noel Merrick	Hugh Middlemis	Dr Steven Pells
Dr Frans Kalf	Independent Environmental Scientific Committee	Doug Anderson
Liz Webb	Department of Industry – Water	Chris Jewell
	Water NSW	John Lea

113. In relation to the Aquifer Interference Policy (**AIP**), the Department's PAR stated that the "*Project significantly exceeds the 'minimal impact' threshold, and whether this is an acceptable impact on this highly productive groundwater aquifer is the key issue in the Department's assessment*."

114. The Department's PAR makes a number of comments including:

"*The key issue raised in community submissions is the impacts on the highly productive Hawkesbury Sandstone aquifer, particularly through drawdown impacts on surrounding water users. In addition, the reliability and accuracy of the groundwater modeling has been criticized.*"

"The Department usually provides only a brief commentary on the methodology used for each area of impact assessment before addressing the particular assessment issues. However, the groundwater issues for this project are very complex and difficult to model. This has resulted in a range of residual areas of concern:"

"The key residual concerns are the:
- *'class' of the groundwater model;*
- *characterisation of the local geology; and*
- *uncertainty and sensitivity analyses"*

"In this instance, the Department recognizes that there are some limitations to the model, particularly in relation to the level of local geological data that has been gathered. Notwithstanding, the Department considers that the revised groundwater model provides a range of predictions that can be used to make a reasonable assessment of potential impacts."

"*While Dr Pells and Mr Anderson have raised residual concerns about the sensitivity analysis, Mr Middlemis states that the Applicant's 'combination of uncertainty and sensitivity analysis, in consultation with the regulator, is consistent with the latest best practice*.'"

INFORMATION PROVIDED TO COMMISSION

115. During the Commission's meeting with the Applicant on 11 February 2019, the Applicant made the following points in their presentation which is available on the Commission's website:
- *"DP&E have relied upon NSW DoI Water to provide feedback on the Hume Coal Groundwater Modelling*
- *On Page 3 of Attachment A in the DoI Water Response to Submissions document (6 November 2018), DoI Water state that: "DoI Water is aware that DPE has engaged an independent groundwater expert to review the latest work. DoI Water has not had access to this document in the preparation of this advice";*
- *Thus, DoI Water has provided advice to DPE that doesn't take into account the DPE Independent Groundwater Expert's findings*
- *Hence the disparity between the DPE Preliminary Report conclusions related to groundwater and the findings of the Hugh Middlemis Report*
- *The IPC should refer to the Independent Groundwater Expert Report rather that the summary provided by the DPE Report".*

116. The Commission met with CFSH on 11 February 2019, who provided details of the expert reports they had commissioned. Issues of concern raised were:
- data input to groundwater modelling and absence of pumping tests;
- failure to account for high permeabilities associated with some high-yielding bores that depend on faults, fractures and regional structures;
- assumed thickness of Narrabeen Group rocks, between the Wongawilli seam and Hawkesbury Sandstone that protect the latter;
- assumed drain conductance;
- inadequacy of calibration of model against Berrima Mine information;

- inability of Applicant to collect geological and groundwater data on privately-owned properties because of a Land and Environment Court judgement; and
- the nature of proposed make-good agreements between the Applicant and landholders which are considered to be unworkable.

CFSH believes the modelled drawdowns and groundwater take by the Project are significant underestimates. The Department, on the advice of its expert (Mr Middlemis), has decided to use outputs from the groundwater model and CFSH expressed its strong reservations about this decision.

117. The Applicant's Submission to the Commission provided further information regarding groundwater impacts. **Table 2** below reproduces the Applicant's summary of responses to the groundwater issues raised by the Department's PAR and by the Commission:

Table 2: Applicant Response to DPE Concerns

DPE issue	Hume response
Groundwater impacts	
Make good arrangements not suitable	Make good is clearly technically feasible. DPE expert (Hugh Middlemis) response: 'Depressurisation does not dewater an aquifer unit, it simply lowers the pressure level, which can leave areas of saturated aquifer that can support groundwater pumping'
Make good arrangements not practical	Make good arrangements are standard administrative practice and implemented elsewhere, including in the Southern Coalfields, and have been for many years. Access arrangements are already in place with 20 landholders (step 1 in the process for make good). 'Make Good' is a landholder entitlement. If a landholder does not choose to exercise that right, then there is no dispute. It is an 'opt in' arrangement. DPE expert response: 'The strategies for make good are reasonable in principle.'
Residual uncertainty	One of the most comprehensive water assessments for a mining project in NSW. DPE expert response: 'The Hume Coal Model is fundamentally a good example of best practice of design and execution'.
Lack of geological data and modelling of the interburden layer	Over 345 exploration holes have been drilled in the project area, and interburden between Hawkesbury Sandstone and coal correctly represented. DPE expert response: 'The Hume Coal model has been set up with an appropriate representation of the interburden'.

Significant impacts on highly productive aquifer	Environmental impact of the mine is modest, and not significant or 'unprecedented'. Groundwater impacts from other mines are much greater in terms of drawdown, inflow and time to recover. DPE expert response: 'Dewatering of one horizon of the aquifer (ie the mined coal seam) does not preclude saturated aquifer conditions above'. (The Commission notes that this suggests that water can still be obtained but with increased pumping costs)
Class 2 status challenged, and therefore uncertainty of model results and adoption of conservative model results	The model is Class 2 and the modelling of uncertainty is world class. DPE expert response: 'Downgrading of the model by DPI Water (2017) and Anderson (2017) to class 1 is invalid'. 'DPI Water have now agreed the model is Class 2'. 'Class 2 is justified'. Model is 'fit for purpose'
Concerns Hume will be able to acquire necessary groundwater licences	Hume Coal easily acquired 93% of required groundwater licences (1,909 ML), which covers inflow up until year 16 of the Project. These licences were acquired prior to DPE's Assessment Report being prepared. Hume Coal very confident that the small remaining amount (150 ML) can be acquired.

Source: *Hume Coal Project Berrima Rail Project: Submission to the Independent Planning Commission – Dated March 2019.*

118. On 24 April 2019, DoI-Water provided a response to the Commission's request for additional information dated 1 April 2019. The Commission notes that DoI-Water provided a detailed response to its questions and overall it concluded that "*While the model has improved from earlier models, the additional modelling and hydrogeology work to date has not improved upon a number of key indicators which are required to:*
    - *predict water level and volume impacts to the water supply aquifer due to mine dewatering (to a sub metre scale resolution for drawdowns)*
    - *allow assessment of volume losses at the resolution of individual agricultural users*
    - *confirm licensed allocation volumes.*"

119. Specifically, with respect to the groundwater model, DoI-Water stated:
    - *"The model is uncalibrated and calibration statistics require further explanation and improvement"*;
    - *"The calibration methodology is unsound as it uses uncertain calibration targets"*;
    - *"Some model parameters are outside the range of a reasonable hydrogeological analysis of field information and literature values"*;
    - *"There remains conceptual geological uncertainty"*;
    - *"The spatial refinement is too coarse in key parts of the model domain"*; and
    - *"There is inadequate uncertainty analysis of the parameters applied (narrow range)."*

120. With regard to the interburden layer, DoI-Water stated that it "… *has concerns on how the interburden has been represented. Questions remain as to the extent of the Narrabeen Formation directly above the coal seams and the adequate representation of this in the model (thickness of the interburden and hydraulic parameters chosen for the groundwater model)*".

121. With regard to the improved recovery of drawdown occasioned by emplacement of mine water in mined-out voids, DoI-Water stated that "*While it is true that the water transfer may provide some mitigation to depressurisation impacts, in reality the performance of the aquifer in this regard will only be known postmining.*"

122. With regard to use of 90th percentile predictions to provide a more acceptable estimate of maximum drawdown, DoI-Water stated that "*Using the 90th percentile predictions does not sufficiently allay our concerns regarding the lack of geological detail and as a result DoI Water provided comprehensive recommendations to address this issue*."

123. With regard to hydraulic conductivity (permeability) decreasing with depth, DoI-Water stated that "*In summary, we do not believe that the data presented by the proponent demonstrates clear field evidence for the assertion that hydraulic conductivity decreases with depth*."

124. With regard to the drain conductance parameter which has the potential to limit mine water inflows, DoI-Water stated that "*The drain sensitivity analysis has highlighted incomplete follow up modelling tasks that should have been performed to decrease the uncertainty about mine inflows and their impacts onto drawdowns affecting other water users*."

125. With regard to model calibration using mine dewatering fluxes at the Berrima Coal Mine (which is located to the north of the Project), DoI-Water stated that it "*… does not consider this a reliable calibration parameter*."

126. With regard to error statistic SRMS of 10.7%, DoI-Water stated that it "*… continues to have concerns about the calculation of the SRMS error statistic at over 10%*."

127. With regard to make good provisions, DoI-Water stated that it "*… recommends viable measures need to be developed to address the make good provision requirement. The measures used are likely to vary and for example for some high yield irrigation bores, the ability to provide a viable make good option is yet to be confirmed*."

128. Hume Coal submitted a response to the DoI-Water advice of the 24th April 2019, to the Commission on the 17th May 2019 (**Applicant's 2nd Response**). It contains a strong rebuttal of the DoI-Water position that the groundwater model is not fit for purpose.

129. The Applicant's 2nd Response stated that "*Consultation between Hume Coal and DoI Water on the groundwater model has occurred over the past eight years. Many of the concerns raised in their latest response have been raised previously*" and "*have been considered by the DPE peer reviewer, Hugh Middlemis, to adequately address the issues raised, and that therefore, the Hume Coal groundwater model is fundamentally consistent with best practice in design and execution*"

130. The Applicant's 2nd Response further stated that "*The uncertainty analysis undertaken of the Hume Coal groundwater model is extremely detailed and of a world class standard, having been undertaken by Dr Noel Merrick, a world class groundwater modeller. The mathematics and concepts in uncertainty analysis are fundamental to the results and their interpretation*". The Applicant questions if such expertise resides in the DoI-Water.

131. The Applicant's 2nd Response stated that "*the IPC and the NSW Government can rely on the findings of the experience and expertise of the independent peer reviewer appointed by DPE. The peer reviewer, Hugh Middlemis, is one of the key people in Australia who understands uncertainty and the mathematics involved and this is why his assessment can be relied upon*".

132. The Applicant's 2nd Response stated that it believes that the DoI-Water's response letter of the 24 April 2019 "*indicates a lack of understanding of groundwater modelling for mining situations …*" and contains statements that contradict or do not reflect Government policy and shows an incorrect understanding of groundwater modelling features/ functions/ and processes.

133. The technical detail provided in the Applicant's 2nd Response has been previously reported and has not changed from earlier advice with the exception of some new maps that better explain how the interburden is handled in the groundwater flow model. The explanation that accompanies the maps highlights that the hydraulic conductivity assigned to the interburden layers in the model is identical to that used for the basal subdivision of the Hawkesbury Sandstone, so these layers do not provide a barrier to simulated drawdown or predicted mine inflows, in the Applicant's view.

COMMISSION'S FINDINGS AND RECOMMENDATIONS

134. The Commission in its assessment of merits of the Project has had regard to groundwater impacts. The Commission has had regard to the Material before it and given consideration to the issues raised in public submissions. Relevant excerpts from the submissions included:
    - groundwater impacts are the first and foremost issue;
    - there are strong community objections to the groundwater model predictions;
    - there are concerns that the water impacts are uncertain due to inaccurate baseline data being used in modelling studies; such as incorrect static water levels in private bores. In addition, there was considered to be a selective use of model input parameters;
    - the privately funded groundwater model shows much greater mine inflows and impacts to private bores;
    - reducing the impacts by placing water underground is new and untested and therefore high risk;
    - there is considered to be a high risk of groundwater contamination from the additives introduced to the slurry being placed underground;
    - there is a need for clarity on the make good provisions so that landholders can make business decisions prior to any mining approval;
    - the drop-in water levels will cause private plantings of trees to die;
    - Hume Coal faces serious licensing constraints, in obtaining sufficient entitlement; and
    - deepening bores into the underlying Shoalhaven Group of strata is not feasible as there is no water there of any significance.

135. The Commission has also made a number of observations around the predicted groundwater related impacts which include:

Groundwater Modelling:

136. There is significant Agency and public concern relating to the accuracy and robustness of the Applicant's groundwater modelling.

137. It is noted that the groundwater flow model is a semi-regional model and as such it does not contain local geological data such as faults, fracture zones, basalt intrusions (sills and dykes) and that local geological conditions will have an effect on groundwater flow conditions, including both mine inflow predictions and drawdown impacts on private bores.

138. There is a thin interburden layer of coal, shale, siltstone and sandstone separating the HS from the Wongawilli seam. There has been considerable contention and technical debate as to whether this interburden material is properly represented in the groundwater flow model. Middlemis (2018) stated that it has been appropriately handled. Advice from DoI-Water (2019) is that there is still considerable uncertainty on how this layer has been handled in the model.

139. Middlemis (2018) has declared that the revised model is a class 2 Model and is fit for purpose under the Australian Modelling Guidelines (2012) and best practice due in part to the fact that it is calibrated against four separate data sources (groundwater levels, stream flows, hydraulic conductivity and Berrima Mine inflows) and has included an uncertainty analysis. Advice from DoI-Water (2019) stated that the calibration of the model against four data sets does not necessarily reflect the quality of the model in replicating the existing environment or predicting future impacts. They point out that a visual analysis of the groundwater calibration hydrographs concludes that the vast majority of bores are uncalibrated with only 21% of all the calibration bores having a residual that is less than 2 m and 50 % of the bores exceed 10 m residual between the observed and modelled results. They conclude that there is an insufficient number of calibrated bores to provide confidence in the model predictions.

140. Of particular interest to the Commission is the possibility that the Hawkesbury Sandstone hydraulic conductivity (Kh and Kv) is highest immediately above the coal seam to be mined. There was no representation of this in the model realizations, despite apparently being requested by DoI-Water at a previous modelling meeting. This work would have been useful to check the possibility of larger water inflows to the mine. Likewise, a larger range of drainage conductance values could have been modelled to eliminate the speculation about the interburden layer acting as a bottleneck to flow.

141. The Commission notes that water balance errors associated with the revised (Merrick, 2018) model are now at an acceptable level of 0.2%. The model calibration performance for predicted versus measured groundwater levels remains higher than desirable (SRMS = 10.7%) with only 30% of the uncertainty realisations achieving less than 10% SRMS. Advice from DoI-Water (2019) considers that the SRMS modelling error statistic should be less than 5% for a model to be used for such an important water resource. For this and other reasons DoI-Water does not consider the revised model to be fit for the purpose of assessing drawdown impacts resulting from mining, to an adequate level of certainty. DoI-Water considers that revised model resembles a Level 1 model which incorporates some Level 2 and Level 3 elements.

142. The Applicant's groundwater model shows the impacts on groundwater resources to be significant (94 to 118 bores affected) but not irreversible and full recovery should occur some decades after mining ceases.

143. The Commission notes the disagreement between the comments of the Department's expert and those of DoI-Water in terms of the level of model and the accuracy of prediction of groundwater drawdown. The level of groundwater model and the effectiveness of its predictions need to be resolved.

Make Good Strategy:

144. The AIP requires that where the water level in a private bore is impacted (> 2m) by a proposed development, then make good arrangements should be entered into. Based on the 67th percentile model results, there are predicted to be 94 private bores impacted by a 2m or more decline in groundwater level. The make good strategy is staged in five-year lots and is said to be flexible to the needs of private landholders. The 90th percentile modelled results predict 118 bores will require make good arrangements.

145. Whilst several reviewers have labelled the strategy as technically feasible there are some residual risks for irrigation bore owners as constructing deeper bores, or even multiple bores of larger diameter may not equate to losing a high yielding bore in the HS.

146. DoI-Water consider that the make good arrangements for irrigation bore owners is uncertain as there is little knowledge about the water supply quality and yields from deeper formations.

147. The Department's PAR considers that given the significant opposition to this Project the make good strategy would inevitably lead to a large number of disputes requiring resolution and causing disruption to the community.

Risk of Groundwater Contamination:

148. There is significant public concern relating to the impacts to groundwater quality that will occur if coal rejects are returned into underground voids.

149. The Applicant has undertaken studies using Wongawilli coal and PWD simulated water to determine the likely changes in water quality through the oxidation processes that occur when the coal is exposed to oxygen. Also researched was the treatment of coal rejects with limestone to control the pH.

150. DoI-Water's submission on the Hume Coal EIS stated that the impacts on groundwater quality are considered to be a Level 1 impact in the AIP and not considered significant.

151. Hume Coal EIS and Hume Coal RTS stated that, from the studies the impact on groundwater quality from the storage of treated coal rejects is not considered significant. This is consistent with the EPA requirement that "*There must be no statistically significant change in the beneficial use category of groundwater from background levels further than 40m downgradient of voids used for emplacement of coal reject and waste water*".

Findings and Recommendations:

152. The Commission finds that that the Applicant and Department have not adequately assessed or considered the potential impacts of the Project on groundwater because of the uncertainly around the modelling undertaken to date and the associated uncertainty this might create in understanding the potential groundwater impacts, and the lack of certainty around the practical application of the Applicant's make good proposal.

153. The Commission notes the advice of DoI-Water (2019) that the revised model has significant uncertainties in its predictive capabilities.

154. In addition to the mixing of limestone to the coal rejects before placement underground the Applicant discusses briefly the lining of the underground mine with limestone dust as having an overall beneficial effect on the quality of recovering groundwater in the Hume Coal RTS. The Commission agrees that this would be an additional safety factor in preventing the movement of desorbed metals in groundwater.

155. The Commission considers that speculation about the conservatism of the revised model can only be tested by appropriate sensitivity and uncertainty analysis on a fit for purpose model, and the Commission considers that it is possible that the current model might underestimate mine water inflow and impacts to existing groundwater users. The extent of any underprediction is unknown. Balanced against this is the conservative effect of not considering the positive influence of the return of water and waste materials to the mined-out sections of the mine.

156. The Commission is also aware that any significant drawdown in groundwater levels could have an adverse impact on deeply rooted native and introduced flora which is discussed further in Section 8.12.

157. At this stage of its assessment the Commission finds that it is not satisfied with the information provided up to this point regarding groundwater impacts because of the uncertainty about the extent of groundwater drawdown and the capability of 'making good'.

158. The Commission makes the following recommendations that will require further information and/or assessment:

Ground Water Modelling Recommendations:

R4 That the Department review the advice of Department of Industry - Water dated 24 April 2019 and the Applicant's correspondence of the 17 May 2019 and gives consideration to requesting the completion of the revised groundwater flow model, taking into consideration the advice provided.

R5 Because the Applicant and Department of Industry - Water remain a considerable distance apart regarding their positions on the groundwater modelling, the Commission suggests that the Department or the Applicant, or both of them jointly (and in any case in consultation with Department of Industry - Water), engage a new independent expert (or alternatively a small technical group with Chair) with experience in groundwater modelling with a view to resolving ongoing differences of opinion. The independent expert/Chair should consider:

- what practical steps, if any, can be taken to make the model a class 2 model or seek agreement on the class of the model;
- what additional work is required to establish the extent to which the emplacement of water in mined-out voids will reduce the level of drawdown in the later years of the project;
- the range used for the input parameters in the modelling sensitivity/uncertainty analysis and recommend if a wider range is required so that there is no unreasonable truncation of results; and
- if additional geological information is required.

Make Good Strategy Recommendations:

R6 That the Department give close attention to the practical adequacy of make good provisions during the final assessment process, with an independent review if necessary. This should include the practical aspects such as dispute resolution and economics as well as the technical.

8.2.2 Surface Water

APPLICANT'S CONSIDERATION

159. The Hume Coal EIS proposes the following for handling surface water issues associated with the development:
    - Storage of minewater in depleted sections of the Project;
    - Deflection of stormwater that has not come into contact with coal or wastes in sedimentation ponds from which it is released to Oldbury Creek after first flush and quality standards are met; and
    - Capture of stormwater that has been in contact with coal in the Primary Water Dam for use as process water and possibly in-mine storage.

160. In relation to the impacts of greater than predicted mine inflows and or prolonged wet periods on surface water quality, the WIAR stated that "*If the void space is full and cannot take excess water, and the primary water dam (PWD) is also above the adopted capacity then the excess water will be treated in a water treatment plant (WTP) for release into Oldbury Creek, if required. The WTP is included in the project infrastructure as a provisional item only. In all climate sequences modelled, the water balance model indicates that the PWD has adequate capacity to store excess supply and that treatment and release will not be required*."

161. In relation to data collection, the Hume Coal RTS stated that the "*surface water monitoring network measures hydrologic conditions in the project area, providing over four years of baseline data (2012-2016, inclusive) across 11 streamflow gauging locations and 24 water quality monitoring locations*."

162. In relation to existing surface water quality, the Hume Coal RTS stated that "*Within Medway Rivulet and Oldbury Creek in the project area, surface water typically complies with the most conservative guideline values, with the exception of the following:*
    - *Salinity – although water is typically fresh, electrical conductivity (EC), a measure of salinity, typically exceeds the ANZECC* [Australian and New Zealand Environment and Conservation Council] *and ARMCANZ* [Agricultural and Resource Management Council of Australia and New Zealand] *(2000) guideline for aquatic ecosystems. The shale geology, underlying much of the project area, is a likely contributor to the salinity levels in surface water systems.*
    - *Nutrients – most nitrogen and phosphorus samples exceed the WQOs* [water quality objectives] *recommended in HRC* [Healthy Rivers Commission] *(1998). Agricultural practices and town effluent discharges into local streams are likely contributors to elevated nutrient levels.*
    - *Metals – elevated levels of iron are typically observed compared to the ANZECC and ARMCANZ (2000) guideline for irrigation. Silver is typically elevated in Oldbury Creek compared to the ANZECC (2000) guideline for aquatic ecosystems. Some elevated levels of copper have been observed in Medway Rivulet and some elevated levels of aluminum in both Medway Rivulet and Oldbury Creek compared to the ANZECC and ARMCANZ (2000) guideline for recreation. The Triassic rocks (shale and sandstone) underlying much of the project area are typically high in iron and manganese and are a likely contributor to elevated metals."*

163. The Hume Coal RTS further stated that "*No BTEX chemicals (benzene, toluene, ethylbenzene, and xylene) were detected in baseline samples in either Medway Rivulet or Oldbury Creek*."

164. The Hume Coal RTS acknowledges that "*Containment and reuse of water from operational areas… will result in a reduction in the catchment area and runoff to local streams. A reduction in runoff has the potential to alter the flow regime of the stream… The reduction in catchment area for Medway Rivulet sub-catchment (not including Oldbury Creek) is estimated to be 26.6 ha, which represents 0.2% of the catchment area to its confluence with the Wingecarribee River. A reduction in catchment area for Oldbury Creek is estimated to be 67.6 ha, which is 5.0% of the total catchment area*."

165. In relation to subsequent impacts on surface water quality (potential Total Suspended Solids (**TSS**) and nutrient loads and concentrations) as a result of the discharges, the Hume Coal EIS stated that "*A smaller area of the agricultural catchment will drain to Oldbury Creek during the operational phase, which will result in a significant reduction of more than 10%, and therefore acceptable within NorBE [Neutral or Beneficial] criteria, of the mean annual TSS and nutrient loads reporting to the creek compared with the existing situation."*

166. In relation to the Project's potential impacts on flood behavior the Hume Coal RTS stated that "*With appropriate mitigation measures in place, the flood assessment indicates that the project will have: negligible impacts on flood levels in the Medway Rivulet catchment; flood level impacts within acceptable limits for public roads and private lands in the Oldbury Creek catchment during mine operation; and negligible changes on flood levels in the Oldbury Creek catchment during mine rehabilitation*."

167. The Hume Coal RTS further stated that "*… the proposed surface infrastructure is located outside of the 1 in 100 year floodplain with the exception of the access road crossings and the conveyor crossing.*"

168. In relation to potential impacts of subsidence on surface water, the Hume Coal RTS stated that they "*… predict 'imperceptible' surface disturbance…*" and "*… are low enough in magnitude as to not affect streamflow regimes or geomorphology*."

169. The Hume Coal RTS also considered the impacts on surface water by the Berrima Rail Project. The WIAR stated that "*Surface water flows will not be influenced by construction, operation or rehabilitation of the Berrima Rail Project… will not take water from streams, discharge water to streams or cause groundwater impacts that would decrease base flows to streams*."

170. The Berrima Rail EIS was accompanied by a Surface Water Assessment prepared by Parsons Brinkerhoff dated February 2017. The Berrima Rail EIS set out the following assessment criteria to establish acceptability of Project generated flood impacts:
    - *"Buildings – less than 50 mm afflux if the building is already flooded and no new flooding of buildings not currently flooded due to the proposed works is allowed unless owner's consent is obtained.*
    - *Public roads/rail – less than 100 mm afflux if the road/rail is already flooded and no new flooding of public roads/rail that are not currently flooded.*
    - *Private properties – less than 250 mm afflux.*
    - *No increase in velocity above a threshold of 1.5 m/s, where existing conditions velocities are below the threshold. No more than a 10% increase in velocity where existing conditions velocities are above this threshold."*

171. The Berrima Rail EIS concluded that "*The cumulative modelling results for the Hume Coal Project and Berrima Rail Project indicate that the impacts of the two projects on flood levels in the Oldbury Creek catchment will be within the acceptability criteria for public roads, rail and private land for flooding events up to 100 year ARI [annual recurrence interval] for the operational and rehabilitation scenarios.*"

172. The Hume Coal RTS was accompanied by additional information relating to surface water impacts in response to issues raised during the Project exhibition period. This included information about both the Hume Coal Project and Berrima Rail Project. The information contained within the Hume Coal RTS was not fundamentally different from the information provided with the Hume Coal EIS and Berrima Rail EIS.

173. As part of the Hume Coal RTS, additional investigations included revision of the surface water quality models and assessments which resulted in the production of an updated water impact assessment and stated that "*The revised modelling confirmed that changes were not required to the project, nor do the predicted impacts on water resources vary significantly, and in many cases not at all, from that presented in the EIS*." A list of the changes is provided in section 4.3.3 of the Hume Coal RTS.

174. The Hume Coal RTS made some minor changes to the mitigation measures proposed which included:
    - "*installation of longer vegetated swales (up to 1,250 m long for the unsealed road catchment);*
    - *installation of constructed wetlands; and*
    - *creation of 45 ha of protection zones where clearing farming and industrial activities/infrastructure will be restricted*."

DEPARTMENT'S ASSESSMENT

175. The Department's PAR confirms that the "*… project is located within the upper reaches of Sydney's drinking water catchment, and there are numerous watercourses in and around the proposed mining area, including Medway Rivulet, Black Bobs Creek and Oldbury Creek."*

176. The Department's PAR cited concerns "*… that the various safety risks may lead to the transfer of additional mine water to the surface and a need to discharge into watercourses. The Applicant has not assessed this issue or proposed a water treatment plant."*

177. In relation to Agency submissions the Department's PAR stated that "*The Department, the EPA and WaterNSW consider that any discharges of mine water (whether treated or untreated) may result in significant impacts on surface water"* and that "*WaterNSW raised residual concerns about the Applicant's assessment of the impacts of the project against the neutral or beneficial effect test (NorBE), particularly in relation to a lack of mass balance analysis or Medway Rivulet. WaterNSW recommended the imposition of strict performance criteria including a 'negligible reduction' in both surface water and ground water quality."*

    "The Environmental Protection Authority (EPA) noted that the assessment of potential water impacts is largely reliant on complex water modelling and recommended various conditions to address any residual uncertainties. In particular, EPA recommended strict performance criteria that would ensure there is no discharge from the primary water dam (PWD) into local creeks."

178. The Department's PAR concluded that in relation to surface water impacts *"the wide variety of safety risks associated with pillar stability and waste impoundment (including its classification as a 'High Risk Activity') may lead to the transfer of additional mine water to the surface. This would require significant amendments to the existing project and a substantial amount of additional assessment."*

"While there are a range of residual uncertainties about this issue, the Department considers that any discharge of mine water (whether treated or untreated) may result in significant impacts on surface water, particularly given the project's location within a drinking water catchment."

INFORMATION PROVIDED TO COMMISSION

179. The Applicant's Submission provided some additional clarifications around surface water impacts and reiterated that:

"*The mine water management system has been designed to ensure that no coal contact water is released to surface waters. Runoff from coal contact areas will be captured in various basins and dams (SB01, SB02, MWD05, MWD06 and MWD07), and will be transferred to the Primary Water Dam (PWD). The revised water balance base case modelling adopting groundwater inflow estimates has demonstrated that there will be no releases or overflows from sediment basins (SBs) and main water dams (MWDs) capturing coal contact water (ie no releases or overflows from PWD, SB01, SB02, MWD05, MWD06 or MWD07). The results of the revised water balance modelling are provided in Section 3 of the Revised Surface Water Assessment report (WSP, 2018) contained within the RTS.*

Predicted releases from SB03 and SB04 are provided in Section 3.2.2.3 of the Revised Surface Water Assessment report (WSP, 2018) contained within the RTS. The maximum annual releases to Oldbury Creek from SB03 and SB04 were 30.6 ML/yr and 41.1 ML/yr, respectively, based on 107 water balance realisations. The maximum 19-year sum of releases to Oldbury Creek from SB03 and SB04 were 277 ML and 302 ML, respectively, based on the 107 water balance realisations. In the event that water quality in SB03 and SB04 does not meet the discharge limits, water will not be released to Oldbury Creek and will be contained within the mine water management system.

The PWD has the capacity to store all runoff from SB03 and SB04 catchments, if required. Additional water balance modelling adopting groundwater inflow estimates predicts a peak stored volume of 714 ML in the PWD if there are no releases from SB03 and SB04 to Oldbury Creek based on the 107 water balance realisations. The predicted peak stored volume of 714 ML is lower than the modelled capacity for the PWD of 730 ML.

The water quality of the PWD and the underlying groundwater source (following emplacement of tailings) was considered in detail in both geochemistry reports and in hydrogeochemical analysis and modelling of both systems."

180. In relation to a question from the Commission about the desirability of including a Water Treatment Plant (**WTP**) to allow excess mine water to be desalinated before storage or stream disposal, the Applicant's Submission stated that "*For the project, the water quality of the emplaced rejects and water into the underground workings is 'indistinguishable' in solute concentration and signature to the groundwater within the Wongawilli Coal Seam. Therefore, the process of both osmosis will be minimal (as water qualities are similar) and the downgradient impact to water quality along the long term flow path (ie once groundwater recovers) will be non-existent, and measurable change will not be detected*."

181. In response to a question by the Commission about the desirability of returning treated mine water to the Hawkesbury Sandstone aquifer to minimise drawdown, the Applicant responded that "*Shallow reinjection of excess water from mining operations in the Hawkesbury Sandstone was one of the original strategies considered for water management. … It was a preferred option for the management of surplus water as it would reduce drawdown impacts, reduce the reduction of baseflow and provide efficient emplacement of water back into the key area of the water source. … The reason this option did not progress was the inability of Hume Coal to secure a licence from DoI Water that allowed a trial reinjection test to occur on site. … Hume Coal continued to negotiate for another two years on this matter, and then gave up needing to progress other alternatives for the EIS."*

COMMISSION'S FINDINGS AND RECOMMENDATIONS

182. The Commission in its assessment of merits of the Project has had regard to surface water impacts. The Commission has had regard to the Material before it and given consideration to the issues raised in public submissions. Relevant excerpts from the submissions included:
    - Impacts on part of the Sydney drinking water catchment. If the groundwater becomes contaminated by metal from the coal reject material in the void, then it can leak out into the surface water and result in contamination of Sydney's drinking water;
    - possibility of surface water problems and these haven't been addressed;
    - there are 12 pristine natural surface water creeks and flows and a river in the mining site. To poison Sydney's pristine water catchment with toxic waste and methane gas is a grave concern;
    - reducing and poisoning surface water will have toxic environmental and economic impacts on landowners, agriculture, business and urban residences;
    - the biggest issue with this Project is the impact on the groundwater, which could also cause surface water impacts;
    - significant subsidence and associated impacts on surface water;
    - surface water management will be greatly complicated by such large stockpiles and processing facilities;
    - reliance on surface water supplies;
    - potential risk that the treated or untreated discharge from the mine water will have a severe impact on surface water; and
    - government agencies have said the mine presents an unacceptable risk to the surface water systems.

183. The Commission has carefully considered the additional information in the Applicant's Submission and its responses to the Commission's questions regarding surface water. The Commission has also noted the response of the Resources Regulator which has indicated that successful storage of water occurs at a number of NSW mines. This information suggests that the concerns expressed by the Department's PAR and those raised at the public hearing on the possible impact of the Project on surface water could be resolved satisfactorily if the mine design, safety of proposed operations and underground emplacement are demonstrated to be able to be implemented as proposed in the Project.

184. The Commission finds that that the Department may not have adequately assessed the potential impacts of the Project on surface water because, whilst the Commission agrees that mine water should not be disposed to surface watercourses, it does not agree with the Department's suggestion that safety risks may necessarily result in the transfer of mine water to the surface with subsequent discharge into watercourses.

185. At this stage of its assessment the Commission finds that it is not satisfied with the information provided up to this point regarding surface water impacts because of disagreement over the acceptability of the mine design and the consequent ability to store water underground.

186. The Commission makes the following recommendations that will require further information and/or assessment:

R7 The Applicant is to confirm whether the provisional Water Treatment Plant does form part of the Project – and if so, provide suitable information to permit an appropriate assessment of its impacts.

R8 Should underground emplacement and water impounded have to cease for any reason, the Applicant is to confirm how long under normal mining operations it would take for the reject emplacement stockpile and Primary Water Dam to reach capacity.

8.3 Underground Emplacement

APPLICANT'S CONSIDERATION

187. In relation to underground emplacement the Hume Coal EIS provides a description of the proposed underground emplacement of mine rejects within the underground voids as an alternative to surface emplacement. The Hume Coal EIS stated that underground emplacement "*… was selected to give the following environmental and social benefits:*
    - *eliminates permanent tailings ponds or cells on the surface;*
    - *significantly reduces the potential for visual, dust and noise impacts compared to conventional surface emplacements;*
    - *reduces surface disturbance by avoiding the need for large reject stockpiles;*
    - *additional ground support and pillar confinement is available in backfilled areas; and*
    - *directly responds to the preferences of regulatory officials to minimise above-ground reject stockpiles."*

188. The Hume Coal EIS stated that over "*the life of the project approximately 11 Mt of coarse and fine reject material… will be produced. During the initial 12-18 months… the coal reject will be stored in a temporary coal reject stockpile adjacent to the CPP* [coal processing plant]*… until sufficient void space is available underground, and the plant is commissioned to commence underground emplacement*." However, in relation to the temporary coal reject stockpile, the Hume Coal EIS stated that "*At the end of the operational phase of the project the reject on the temporary coal reject stockpile will be put back through the reject plant and pumped underground prior to sealing the surface entries to the underground mine*."

189. The Hume Coal EIS further stated that "*Once sufficient void space is created, coarse reject will be crushed to a top size of less than 10 mm and combined with fine reject and water to form a slurry. Crushed limestone will be added as required to mitigate any potential for acidity… Rejects will fill approximately 36% of the void space created by coal extraction*."

190. Furthermore, the WIAR stated that "*… limestone amendment of the reject material… is likely to produce leachate that is indistinguishable from natural groundwater quality, and is considered unlikely to change the beneficial use status of the groundwater resources*."

191. The Hume Coal RTS was accompanied by additional information relating to underground emplacement. In relation to the impact of underground emplacement and the risk of groundwater contamination the Applicant's RTS stated that "*The risk of any potential impact to the groundwater from the quality of collected water (eg at the PWD* [Primary Water Dam]*) or from reject slurry transferred into underground workings has been assessed as part of the RGS hydrogeochemical modelling program, which was demonstrated to be negligible (RGS 2018)."*

192. Furthermore, the Hume Coal RTS stated that "*the addition of limestone (1%) to coal rejects produces a neutral pH leachate with excess alkalinity. Emplacing the reject material underground in sealed voids filled with water will remove the potential for oxidation of sulfide minerals due to removal of oxygen, even without the addition of limestone*."

DEPARTMENT'S ASSESSMENT

193. The Commission notes that the Department's PAR does not expressly give consideration to the underground emplacement - but rather focuses on the impoundment of water, which is discussed in Section 8.2.1 of this Report.

INFORMATION PROVIDED TO COMMISSION

194. During the public hearing and in written submissions to the Commission some members of the public have commented adversely on the feasibility of the emplacement of CPP wastes in mined-out voids as part of the waste management protocol for the Project. One of the issues cited was the difficulty in emplacing slurry in a mined-out section as a consequence of the need to pump slurry over long distances and the risk to mine workers should a bulkhead used to contain the stored waste material fail.

195. The Applicant provided a further late submission on 12 April 2019 (**Applicant's Late Submission**) in response to late public submissions that detailed:
- ongoing discussion since 2015 with DPE over underground emplacement as the required method for waste rock disposal;
- experimental studies that the Applicant has undertaken to clarify the process requirements of underground emplacement;
- the use of underground emplacement at other Australian mines and overseas experiences; and
- safety and operability aspects of the process.

196. In the response to the Commission, the Resource Regulator stated that:

"The storage of rejects has been previously undertaken in underground coal mines in NSW and is routinely done in underground metalliferous mines. The Resources Regulator is not aware of any incidents where workers have been exposed to risk arising from this type of activity in underground coal mines."

"The use of bulkhead seals is prevalent at underground coal mines in NSW. Bulkheads are designed specifically for each application in consideration of static head pressure, the nature of other material that may be deposited behind the structure, and the strata conditions at the location where the bulkhead is to be installed."

'A key aspect of maintaining bulkhead integrity is the competency of surrounding strata, consequently designers must consider the strata conditions at the location of the proposed installation site. Designs are typically certified."

COMMISSION'S FINDINGS AND RECOMMENDATIONS

197. The Commission in its assessment of merits of the Project has had regard to underground emplacement. The Commission has had regard to the Material before it and given consideration to the issues raised in public submissions. Relevant excerpts from the submissions included:
- impounding of water underground may result in serious operational safety risks;
- Applicant's analysis is not sufficient, and the reports cited have not been publicly available;
- a mass of 2.2 million tonnes of toxic tailings waste and methane gas will be housed in 1000 empty coal voids, spread in a grid-like design over an area of 46 square kilometres underground;
- reducing and poisoning underground and surface water will have toxic environmental and economic impacts on landowners, agriculture, business and urban residences;
- concerns relating to underground fill placement systems because such systems are non-existent in other coal mines and also because nobody involved has had much, if any, underground base metal mining experience;

- not one mine in Australia that places 100 per cent of its waste products soon after they are produced;
- whether the fill material can be successfully and continuously pumped for up to 10 kilometres from the fill plant. There is a significant risk of pipe failure or blockages in the fill system creating safety hazards; and
- the physical placement of fill in headings will be a significant engineering and worker safety challenge given the flow characteristics of both hydraulic and/or paste fill and the proposed mine geometry.

198. The Commission understands that bulkheads are unconventional, but they have been used at other coal mines in NSW and this was confirmed in the response to the Commission by the Resource Regulator

199. Some experts have expressed reservations about bulkheads and are particularly concerned about the integrity of the bulkheads and the possibility of inrush and consequently the safety of mineworkers. The Applicant's Submission stated that "*water will be stored downdip of the bulkheads in the majority of the mine workings, with the exception of one area towards the end of mine life where the seam dip flattens out*". Water has been stored underground at Ulan No 3, Tahmoor, Austar, Eloura, Clarence, Angus Place and Springvale mines in NSW and at Oakey No.1 and Newlands mines in Queensland. The Resources Regulator has confirmed that bulkheads have been satisfactorily used at a number of NSW mines.

200. At this stage of its assessment the Commission finds that it is generally satisfied with the information provided up to this point regarding underground emplacement because of the information provided by the Applicant, including but not limited to the treatment of stored waste being treated with lime and the information provided (and discussed earlier in this Report) regarding the ability for leakage to occur. The Commission's finding was assisted by the advice provided by the Resource Regulator. The Commission notes the disagreement between the Applicant and Department because of the uncertainly around the modelling undertaken to date and the associated uncertainty this creates in understanding potential operational impacts.

201. The Commission makes the following recommendations that will require further information and/or assessment:

R9 The Applicant is to provide greater detail on its surface level reject emplacement process, including the use of the temporary coal reject stockpile (as discussed in paragraph 188) once underground emplacement has been commenced.

8.4 Subsidence Impacts

APPLICANT'S CONSIDERATION

202. In relation to subsidence impacts, the Hume Coal EIS stated that the proposed "*mining method will offer a significant level of protection to both existing surface features and the groundwater system, by preventing overburden caving and its associated mining-induced fracturing of the overlying Hawkesbury Sandstone. The mining method and the associated mine layout will reduce the levels of surface and sub-surface subsidence to the lowest practical impact level… with maximum surface settlement across the project area predicated to be less than 20 mm (and significantly less in many areas), the potential for significant three-dimensional horizontal shear effects to occur as a direct result of mining subsidence is also negligible*."

203. In relation to predicted subsidence impacts, the Subsidence Assessment (**SA**) "*presented what are considered to be both the "likely" and also or "credible worst-case" predictions for the various parameters that are directly driven by the mining subsidence process. The subsidence-forming mechanisms relevant to the proposed mining method have been evaluated individually and then combined to determine overall levels of surface lowering for the various coal pillar types used in the mine layout*."

204. In relation to subsidence impacts, the SA concluded that:
"*The primary conclusion in relation to vertical subsidence is that surface lowering is likely to manifest relatively uniformly across the proposed mining area to a maximum level of 20 mm. with minimal differential vertical movements being involved in this manifestation, it could be argued that there is no credible mechanism by which tilts, curvatures and horizontal strains can develop."*

"…it is assessed that subsidence will occur concurrently with the mining operations."

"The only credible long-term subsidence risk relates to the integrity and stability of the remnant coal pillar system that is left behind after mining is complete."

205. The SA concluded within its overall summary that:
- *"the proposed mining methods and associated mine layout reduces the levels of surface and subsurface subsidence due to mining to the lowest practical level whilst still allowing productive and economic exploitation of the coal resource, and*
- *the predicted maximum subsidence parameters are sufficiently low such that any associated impacts fall into the "imperceptible" or "negligible" category for all of the surface features that can be evaluated according to pre-set or other established criteria."*

206. The Hume Coal RTS was accompanied by additional information relating to subsidence impacts, and this included information relating to a scenario analysis that was undertaken and stated that "*The simulations undertaken for the scenario analysis represent purely hypothetical situations designed to test the integrity of the design, rather than representing any scenario that might happen. There are no plans to remove any pillars in the mine design*."

207. The Hume Coal RTS stated that a "*… total of four 3D models were undertaken for the scenario analysis…*", and the results of this analysis (reproduced below) found that the "*…key results of this modelling… demonstrate that even under the unreal assumptions that an entire set of web pillars are removed from the pillar system, the surface subsidence and residual stability of the remaining pillars are generally in accordance with the original assessment presented in the Hume Coal Project EIS (ie imperceptible surface subsidence and long-term stable pillars).*"

Case	Peak subsidence
80 m depth, one web pillar removed	3.6 mm
80 m depth, seven web pillars removed	23.5 mm
160 m depth, one web pillars removed	5.1 mm
160 m depth, five web pillars removed	16.4 mm

Source: Applicant's RTS

208. Furthermore, the Hume Coal RTS stated that "*… peak subsidence remains in the same order of magnitude as natural ground movements due to changes in moisture content, even in sandstone derived soils…*".

DEPARTMENT'S ASSESSMENT

209. The Commission notes that the Department's PAR does not give detailed consideration to potential subsidence impacts and stated that "*The Department acknowledges that the Applicant has selected this mining method in an attempt to limit subsidence-related impacts on sensitive features at the surface…*". Furthermore, the Department's PAR stated that "*At the joint expert meeting, the experts agreed in-principle that subsidence is likely to be negligible to minor and is not the key assessment issue"* and that "*Notwithstanding some minor residual uncertainties about pillar stability and associated subsidence, the Department considers that it is unlikely that subsidence would cause any significant impacts to surface features*."

INFORMATION PROVIDED TO COMMISSION

210. The Applicant's Submission provided some additional context on the extent of naturally occurring ground movements within the Project Area as a result of natural occurrences. It was stated that "*… the level of surface vertical movements due to natural climatic variation (rainfall or drought), with no mining present, can be of the order of at least 20 mm*."

COMMISSION'S FINDINGS AND RECOMMENDATIONS

211. The Commission in its assessment of merits of the Project has had regard to mine generated subsidence. The Commission has had regard to the Material before it and given consideration to the issues raised in public submissions. Relevant excerpts from the submissions included:
    - Hume Coal's negligible possible 20-millimetre subsidence predication is optimistic;
    - the devastating loss to national corporate small business and private income from subsidence is immeasurable. It could be counted in multibillions of dollars;
    - do not have any assurances that there will not be subsidence or settlement that would affect our property, pastures and infrastructure;
    - who will pay for the devaluation if subsidence occurs;
    - Hume also needs to show the surface damage or subsidence would be minimal due to the many properties that could be affected above the mine; and
    - concerns pertaining to subsidence impacts on water resources and surface features.

212. The Commission understands that the proposed mining method will result in minimal subsidence impacts on surface features with peak worst-case subsidence in the order of 23.5 mm. The Commission notes that the experts engaged by both the Applicant and Department agree on subsidence related issues.

213. The Commission finds that the Applicant and Department appropriately considered or assessed the impact of subsidence in the locality, and at this stage of its assessment the Commission finds that it is satisfied with the information provided up to this point regarding mine generated subsidence and does not regard it to be a significant issue.

8.5 Noise Impacts:

APPLICANT'S CONSIDERATION:

214. The Hume Coal EIS was accompanied by a Noise and Vibration Impact Assessment (**NVIA**) prepared by EMM Consulting dated 13 February 2017. The Hume Coal NVIA stated that it "*has been prepared following the appropriate guidelines, policies and industry requirements…*".

215. The Hume Coal NVIA stated that "*Operational noise was predicted at 74 assessment locations (75 dwellings) surrounding the project area. The operational noise assessment has identified that during calm and adverse weather conditions and with all feasible and reasonable mitigation and management measures applied:*
    - *One assessment location within the area modelled is expected to experience negligible residual noise levels between 1 to 2 dB above project specific noise level (PNSLs);*
    - *Eight assessment locations (nine dwellings) within the area modelled are predicted to experience residual noise levels between 3 to 5 dB above PNSLs and therefore entitled to voluntary mitigation upon request;* [in accordance with Voluntary Land Acquisition and Mitigation Policy (**VLAMP**)]; and
    - *Two assessment locations within the area modelled area predicted to experience residual noise levels greater than 5 dB above PNSLs and area therefore entitled to voluntary acquisition upon request.*" [in accordance with VLAMP].

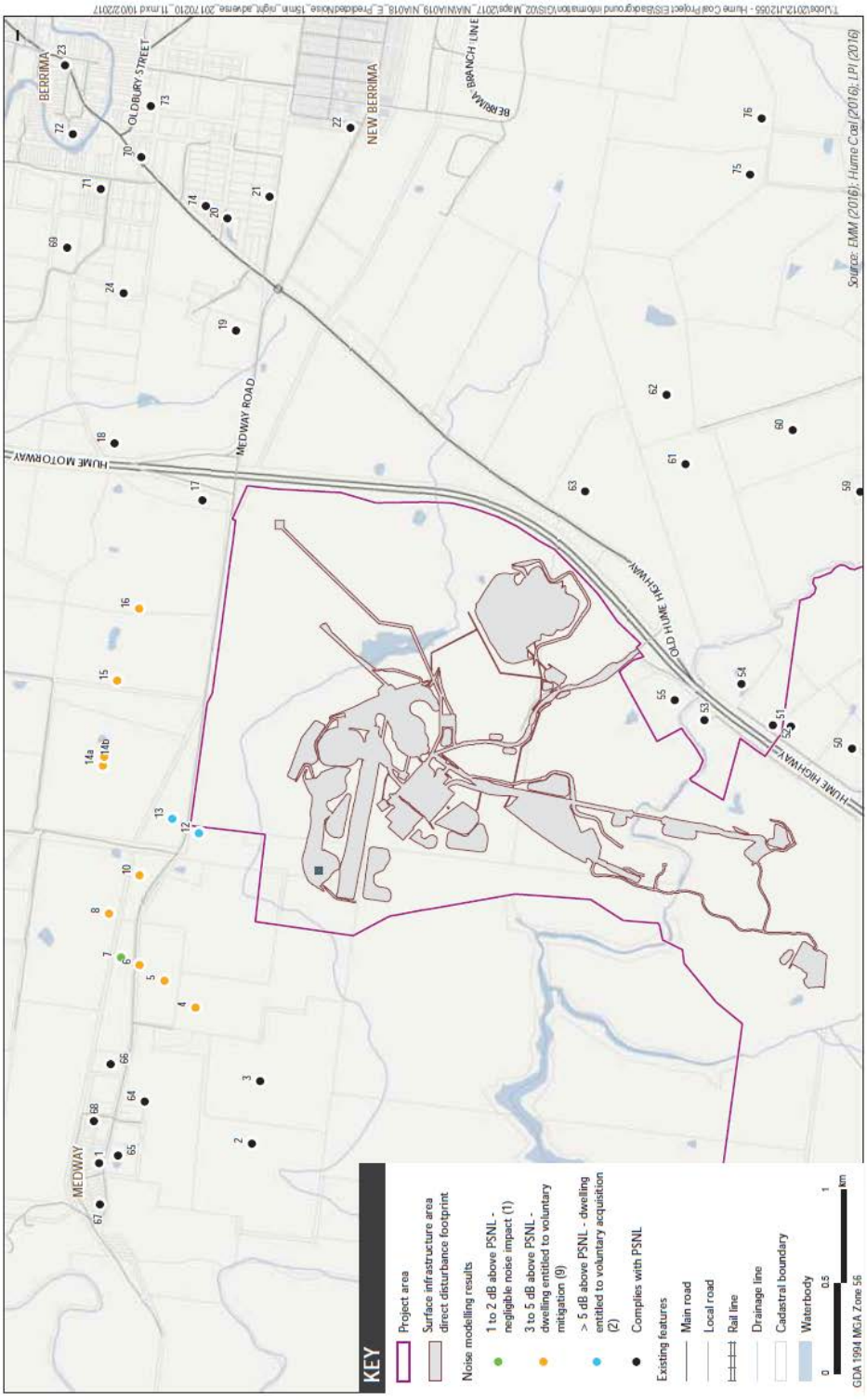
216. In relation to low frequency noise the Hume Coal NVIA stated that "*… increased impacts due to potential low frequency noise are generally contained to properties entitled to voluntary acquisition and mitigation due to operational noise impacts… The exception to this is assessment location 7, which would be positioned into a noise mitigation zone due to a potential 2 dB penalty to total noise level. It would be unduly stringent to apply mitigation rights as a result of this assessment due to the limitations of applying the draft ING* [Industrial Noise Guideline] *LFN* [Low Frequency Noise] *criteria at the environmental assessment stage*."

217. Berrima Rail EIS was accompanied by a NVIA prepared by EMM. The Berrima Rail NVIA stated that "*This noise and vibration impacts assessment has been prepared in accordance with the relevant governmental assessment requirements, guidelines and policies, and in consultation with the relevant government agencies."*

218. The Berrima Rail NVIA concluded that:
    - "*Noise from construction activity associated with the project is predicted to be below the relevant noise management level at the majority of assessment locations. The ICNG's* [Interim Construction Noise guidelines] *highly noise affected construction noise level is predicted to be satisfied at all assessment locations. Construction works will be undertaken in accordance with a CEMP* [Construction Environmental Management Plan]*, which will outline measures to be implemented as far as practicable so that construction activities meet the relevant ICNG NMLs* [Noise Management Levels] *and applicable vibration criteria.*
    - *Noise from operation of the Berrima Rail Project (including both other users and Hume Coal trains) has been assessed in accordance with the RING* [Rail Industrial Noise Guideline]. *One assessment location (28) is predicted to be impacted by noise from the project on the Berrima Branch Line (ie non-network rail line) above the trigger level for voluntary mitigation rights in accordance with the VLAMP.*
    - *Noise from operation of the rail maintenance facility has been assessed in accordance with the INP. Operational noise levels are predicted to satisfy the relevant PSNL at all assessment locations with the exception of one location (19) where a negligible 1 dB above the PSNL is predicted.*

- *The likelihood of sleep disturbance as a result of the project is predicted to be minimal and consistent with current rail operations.*
- *Operation of Hume Coal trains on the broader public rail network is predicted to cause a negligible or marginal increase in existing rail noise levels.*
- *Vibration impacts from construction and operation of the project are predicted to be negligible."*

Figure 6 – Worst Case Operational Noise Impacts – Night, Adverse Weather



Source – Hume Coal Project EIS – Noise Impact Assessment

219. Provided in response to issues raised during the Project exhibition period, the Hume Coal RTS was accompanied by additional information relating to noise related impacts. This included information for both the Hume Coal Project and Berrima Rail Project. It was not fundamentally different from the information provided in the Hume Coal EIS or Berrima Rail EIS.

DEPARTMENT'S ASSESSMENT

220. The Department's PAR provided a brief consideration of noise impacts and stated that "*While there are a number of exceedances of the relevant PNSLs, the Department's independent expert* [Renzo Tonin & Associates] *and EPA consider that noise could be adequately managed through the following:*
    - *Include noise criteria in the conditions.*
    - *Restrict the construction hours to 7 am to 6 pm Monday to Friday, 8 am to 1 pm on Saturday, and no work on Sundays or public holidays.*
    - *Prepare and implement a Noise Management Plan.*
    - *Minimise the construction noise in accordance with the ICNG* [Interim Construction Noise Guidelines].
    - *Provide mitigation and acquisition in accordance with the VLAMP.*
    - *Use approved class of locomotives for operation on the NSW rail network."*

COMMISSION'S FINDINGS AND RECOMMENDATIONS

221. The Commission in its assessment of merits of the Project has had regard to the predicted Project generated noise impacts. The Commission has had regard to the Material before it and given consideration to the issues raised in public submissions. Relevant excerpts from the submissions included:
    - noise impacts generated from coal trains utilising the new rail line and Berrima Branch Line;
    - noise impacts from the mine and rail will have a negative impact on Berrima and tourism in general, including impacts from the rail to Robertson Public School;
    - 24 hour noise impacts will affect existing rural living, especially at nearby residential receivers along Medway Road;
    - impacts on property value due to impacts of rail noise; and
    - concerns pertaining to the correct identification of wind direction as it affected noise propagation to communities like Berrima and the impact of night-time noise on the sleep at impacted residences.

222. The Commission, whilst recognising that a number of properties are likely to be noise affected such that they fall within the purview of VLAMP provisions, finds that containment of noise and vibration impact from the Project can be successfully regulated in concert with an appropriate agreed Noise Management Plan.

223. The Commission finds that that the Applicant and Department have considered and assessed the impact of noise on the locality, and at this stage of its assessment the Commission finds that it is generally satisfied with the technical information provided up to this point regarding noise impacts because the Applicant has provided a thorough expert analysis of the predicted impacts which has been peer reviewed by the Department, Renzo Tonin & Associates (Department's independent expert) and the EPA against the requirements of relevant Government policy framework. The Commission notes that the EPA retained minor residual concerns after its review of the Hume Coal RTS regarding rail noise mitigation measures. However, the Commission notes that the assessment of noise in the Department's PAR was limited and that a more detailed assessment would be required in its Final Assessment Report.

224. The Commission makes the following recommendations that will require further information and/or assessment:

R10 The Department is to consider and advise if Assessment Location No 7 should be afforded mitigation rights under the application of the *Noise Policy for Industry*.

R11 The Applicant and Department should explore opportunities to further mitigate noise impacts. Such opportunities may include more extensive noise monitoring, closer attention to atmospheric conditions, incorporation of any recently developed rail and rolling stock modifications, construction of noise bunds and physical barriers and stop-work when exceedances are observed.

8.6 Air Quality:

APPLICANT'S CONSIDERATION

225. The Hume Coal EIS was accompanied by an Air Quality Impact and Greenhouse Gas Assessments (**AQIA**) prepared by Ramboll Environ dated February 2017. The Hume Coal AQIA stated that the "*… assessment has been prepared following the appropriate guidelines, policies and industry requirements*."

226. In relation to the input meteorology the Hume Coal AQIA stated that "*Meteorological conditions are recorded in the project area by two onsite meteorological stations*"… and… "*in the surrounding area include stations at the Berrima Cement Works and in Moss Vale (Bureau of Meteorology operated). The review of data from all these resources has highlighted that the region experiences winds which are predominately from the westerly, north-easterly and south-easterly quadrants*." This statement is consistent with the information provided in the Berrima Rail AQIA discussed below.

227. In relation to air quality impacts the Hume Coal AQIA stated that "*Particulate matter (PM), diesel combustion and odour emission inventories have been developed for peak construction and operational phases of the project. For operation phase, two scenarios have been assessed, involving the control of wind-blown dust emissions from the product coal stockpiles by watering alone and a combination of water and surface veneering*."

228. The Hume Coal AQIA further stated that "*During operations, the Hume 1 weather station and TEOM* [Tapered Element Oscillating Microbalance] *will be decommissioned and monitoring will be undertaken by Hume 2 weather station and TEOM 2, both of which are adjacent to the majority of the surface infrastructure.*"

229. In relation to cumulative air quality impacts the Hume Coal AQIA stated that "*… by combining modelled project impacts with predicted impacts from neighbouring industrial emission sources and ambient background levels adopted from local and regional air quality monitoring stations. The results of the cumulative impact analysis highlight that the likelihood of the project resulting in an exceedance of the applicable cumulative impact assessment criterion is very low*."

230. The Hume Coal AQIA concluded that "*The results of the dispersion modelling for the construction and operational phases of the project presented in the preceding sections highlight the following:*
    - *Predicted concentrations and deposition rates of particulate matter, diesel combustion and odour air pollutants related to the project-only area well below applicable air quality impact assessment criteria, and minor relative to existing ambient background conditions;*
    - *The construction phase of the project will generate higher impacts in the immediate surrounding environment relative to the operational phase of the project due to a greater proportion of surface based material handling, and truck transportation;*
    - *When project incremental concentrations are combined with concentrations from neighboring emission sources, the combined concentrations are well below applicant impact assessment criteria;*
    - *Analysis of cumulative impacts, accounting for the combination of the project and neighbouring emission sources with ambient background levels, highlights that exceedance of applicable NSW EPS impact assessment criteria would be unlikely to occur in the absence of the project (i.e. days influenced by bushfires, dust storms, etc.).*"

231. The Berrima Rail EIS was accompanied by an AQIA prepared by Ramboll Environ dated February 2017. The Berrima Rail AQIA stated that it *"has been prepared in accordance with the relevant governmental assessment requirements, guidelines and policies, and in consultation with the relevant government agencies."*

232. The Berrima Rail AQIA stated that "*Emissions of particulate matter (TSP, PM10, PM2.5) and gaseous pollutants (NO2 and VOCs) as a result of diesel combustion by locomotive engines were quantified for existing and future operations along the Berrima Branch Line. Fugitive emissions of coal dust from loaded and empty wagons will be mitigated by the use of covered wagons*."

233. The Berrima Rail AQIA considered the operational cumulative impacts which "*showed that:*
    - *predicted cumulative concentrations would not exceed applicable cumulative impact assessment criteria at any surrounding sensitive receptors, beyond those already occurring in the existing environment (i.e. days influenced by bushfires, dust storms, etc.); and*
    - *emissions from the Berrima Branch Line (existing and future Hume Coal Project related movements) are very minor contributors to the predicted cumulative concentrations at all receptors…".*

234. The Berrima Rail AQIA further stated that "*… the contribution of $PM_{2.5}$ emissions from existing and future rail movements along the Berrima Branch Line to total cumulative annual average $PM_{2.5}$ concentrations is very small at all selected assessment locations across the surrounding local area"* and that *"… cumulative impacts in exceedance of applicable air quality impact assessment criteria associated with the Berrima Rail Project are unlikely to occur*."

235. The Berrima Rail AQIA concluded that "*the predicted concentrations from train movements associated with the existing Berrima Branch Line users are very low and well below applicable air quality criteria at all surrounding receptors. The introduction of additional train movements by Hume Coal and the associated increase in annual air pollutant emissions will increase ground level concentrations relative to existing activities. However, the increased emissions will not result in an exceedance of any applicable air quality criteria at any receptor location."*

236. The Hume Coal RTS was accompanied by additional information relating to air quality related impacts in response to issues raised during the Project exhibition period. This included information on both the Hume Coal Project and Berrima Rail Project. The information contained within the Hume Coal RTS was not fundamentally different from the information provided within the Hume Coal EIS and Berrima Rail EIS.

DEPARTMENT'S ASSESSMENT

237. The Department's PAR provided a brief consideration of air quality impacts and stated that "*Predicted concentrations of particulate matter (TSP, PM_{10} and $PM_{2.5}$), gaseous emissions (NO_2 and VOCs) and dust deposition levels would be negligible at the sensitive receptors. The Department and EPA consider that air quality could be adequately managed through the following:*
    - *Include air quality criteria in accordance with EPA's relevant guidelines.*
    - *Prepare and implement an Air Quality Management Plan, in consultation with EPA.*

COMMISSION'S FINDINGS AND RECOMMENDATIONS

238. The Commission in its assessment of merits of the Project has had regard to the predicted Project generated air quality impacts. The Commission has had regard to the Material before it and given consideration to the issues raised in public submissions. Relevant excerpts from the submissions included:
    - reduction in air quality due to the proximity of coal stockpiles to residential receivers;
    - dispersion of coal dust to residential areas due to prevailing wind conditions;
    - increased health impacts, respiratory problems and mortality rates due to coal dust;
    - people have moved to the area for its clean air quality which has helped with illness; and
    - concerns pertaining to the correct identification of wind direction as it affected dust distribution to communities like Berrima and associated health impacts.

239. The Commission understands that the Project has incorporated several operational initiatives designed to minimise any negative impacts on ambient air quality which include:
    - the coal wagons used for transporting coal to Port Kembla will be covered, to minimise fugitive dust emissions;
    - latest technology locomotives will be purchased to ensure the lowest emissions possible;
    - coal conveyors will be covered, the Coal Preparation Plant will be enclosed and the rail loading facility will also be enclosed;
    - the clean coal stockpiles will be oriented to minimise wind erosion;
    - fugitive dust from these stockpiles will be minimised by the use of water sprays and the application of a veneering product; and
    - rejects from the Coal Preparation Plant (CPP) will be stored underground.

240. The Commission, whilst recognising that some sensitive receivers will be subject of reduced air quality over that currently experienced, finds that predicted concentrations of particulate matter, gaseous emissions and dust deposition levels would be negligible at the 76 sensitive receptors included in the studies. All these locations are predicted to be well below applicable air quality impact criteria and impacts are minor relative to existing ambient conditions. The results of the Hume Coal dispersion modelling show that air quality is expected to remain well below applicable air quality impact assessment criteria.

241. The Commission finds that that the Applicant and Department have appropriately considered and assessed the impact of air quality within the locality, and at this stage of its assessment the Commission finds that it is generally satisfied with the technical information provided up to this point regarding air quality impacts because the Applicant has provided a thorough expert analysis of the predicted impacts which has been peer reviewed by the EPA against the requirements of relevant Government policy framework. The EPA did not have any residual concerns relating to air quality impacts. However, the Commission notes that the Department's assessment of air quality in its PAR was limited and that a more detailed assessment would be required in its Final Assessment Report.

R12 The Department's Final Assessment Report should confirm the suitability of the assumptions in the Applicant's modelling in relation to the prevailing wind data utilised as this was questioned by members of the public in submissions.

8.7 Greenhouse Gas Emissions:

APPLICANT'S CONSIDERATION

242. The Hume Coal EIS was accompanied by a Greenhouse Gas Assessment within the Hume Coal AQIA prepared by Ramboll Environ dated February 2017. The Hume Coal AQIA stated that "*A greenhouse gas quantification assessment was undertaken for the project. The annual Scope 1, Scope 2 and Scope 3 emissions (excluding the end use of project coal) represent approximately 0.068% of total GHG* [Greenhouse Gas] *emissions for NSW and 0.017% of total GHG emissions for Australia, based on the National Greenhouse Gas Inventory for 2014.*"

243. The Hume Coal AQIA provided further description around the emission types and stated that "*Direct emissions (also referred to as Scope 1 emissions) occur within the boundary of an organisation and as a result of that organisation's activities. Indirect emissions are generated as a consequence of an organisation's activities but are physically produced by the activities of another organisation. Indirect emissions are further defined as Scope 2 and 3 emissions. Scope 2 emissions occur from the generation of the electricity purchased and consumed by an organisation. Scope 3 emissions occur from all other upstream and downstream activities, for example the downstream extraction and production of raw materials or the upstream use of products and services."*

244. In relation to the consideration of Scope 3 emissions, the Hume Coal AQIA stated that "*Scope 3 is an optional reporting category and should not be used to make comparisons between organisations…".*

245. The Berrima Rail EIS was accompanied by an AQIA prepared by Ramboll Environ dated February 2017. The Berrima Rail AQIA stated that "*A greenhouse gas quantification assessment was undertaken for the project. The maximum annual Scope 1 and Scope 3 emissions associated with the combustion of diesel fuel by locomotives represent approximately 0.0033% of total GHG* [greenhouse gas] *emissions for NSW and 0.0008% of total GHG emissions for Australia, based on the National Greenhouse Gas Inventory for 2014."*

246. The Hume Coal RTS was accompanied by additional information relating to GHG emissions related impacts in response to issues raised during the Project exhibition period. This included information to both the Hume Coal Project and Berrima Rail Project. The information contained within the Hume Coal RTS was not fundamentally different to information provided with the Hume Coal EIS and Berrima Rail EIS.

DEPARTMENT'S ASSESSMENT

247. The Department's PAR provided a brief consideration of GHG impacts and stated that:
    - "*Total annual average scopes 1, and 3 GHG emissions (excluding the end use of coal) for Hume Coal project are estimated as approximately 345.01 kt Co_2-e. Total maximum annual scopes 1, 2 and 3 emissions for Berrima Road Project are estimates as approximately 4.3 kt Co_2-e.*
    - *The predicted emissions from Hume Coal Project for scopes 1, 2 and 3 GHG emissions represent approximately 0.27% of NSW annual GHG emissions and 0.066% of Australia's annual GHG emissions.*
    - *The predicted emissions from Berrima Rail Project for scopes 1, 2 and 3 represent 0.0033% of NSW and 0.0008% of Australia's annual emissions."*

248. The Department's PAR concluded that "*GHG emissions would be minimal and could be managed through the reasonable implementation of all reasonable and feasible measures to minimise the release of GHG emissions.*"

COMMISSION'S FINDINGS AND RECOMMENDATIONS

249. The Commission in its assessment of merits of the Project has had regard to the predicted Project generated GHG emissions related impacts. The Commission has had regard to the Material before it and given consideration to the issues raised in public submissions. Relevant excerpts from submissions included:
    - the proposed coal mine and its coal product would increase global total concentrations of greenhouse gases at a time when what is urgently needed in order to meet generally accepted climate targets is a rapid and deep decrease in those emissions;
    - it is not clear what approval conditions the Department or the IPC could propose that would mitigate the increase in global local concentrations of greenhouse gases that this Project would produce;
    - excluding the impacts of Australian coal burnt offshore is ridiculous;
    - burning coals gives us global warming;
    - the emissions needing to be considered include the more controversial downstream emissions, along with the direct and indirect emissions. And further, the public interest, which incorporates the principles of ecologically sustainable development, also mean that scope 3 emissions should be considered in the consideration of this mine's impacts; and
    - South Korea's POSCO declared plans to eventually halt carbon emissions by switching to a hydrogen-based steelmaking process from 2021.

250. During its meeting with the Commission on 11 February 2019, the Applicant indicated that such coal should not be confused with soft coking coal produced from mines in other parts of Australia. The Commission understands that 55% of the coal produced by the Hume Mine is semi-hard coking coal which is a premium product in producing metallurgical coke for the production of steel, which has different implications for the calculation of GHGE than the consumption of thermal coal.

251. During the public hearing the Applicant was asked by Counsel Assisting the Commission "*would coal be sold to countries that are signatories to the Paris Climate Accord?*" The Applicant took the question on notice and the Commission notes that a response to this question has not been received to date.

252. Since the release of the Department's PAR, the decision of the Land and Environment Court on the Rocky Hill project has emphasised that a consent authority may be required to consider the impacts of a proposed mine on climate change (including by reason of downstream emissions) for a number of reasons including section 4.15(1)(a) of the EP&A Act – applicable environmental planning instruments such as the provisions of *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* (Mining SEPP), section 4.5(1)(b) - the likely impacts of a development and section 4.15(1)(e) the public interest, which includes the principles of ESD. The decision confirmed that indirect, downstream GHG emissions are a relevant consideration to take into account in determining applications for activities involving fossil fuel extraction. It concluded that the consideration of impacts on the environment and the public interest justify considering not only Scope 1 and Scope 2 emissions, but also Scope 3 emissions, and also noted that cl 14(2) of the Mining SEPP requires consideration of an assessment of the greenhouse gas emissions (including downstream emissions) of development for the purposes of mining.

253. The Commission finds that the Applicant and Department have not appropriately considered or assessed the full impact of emissions as required by section 4.15 (1) of the EPA Act, including the provisions of the Mining SEPP. At this stage of its assessment the Commission finds that it is not satisfied with the information provided up to this point regarding GHG emission related impact, particularly Scope 3 emissions and confirmation of any proposed mitigation measures it has proposed to the Commission.

254. The Commission makes the following recommendations that will require further information and/or assessment:

R13 The Applicant should undertake a more rigorous and detailed assessment of Project Greenhouse Gas Emissions, including Scope 3 end use of product coal, and this should be assessed prior to the Department's Final Assessment.

R14 The Applicant is to clearly define how it intends to mitigate/offset its greenhouse gas emissions through measures such as ensuring that all Project coal is only used within countries that are parties to the Paris Agreement.

8.8 Visual Impact

APPLICANT'S CONSIDERATION

255. The Hume Coal EIS is accompanied by a Visual Impact Assessment (**VIA**) prepared by EMM Consulting. The VIA stated that it had "*analysed the potential for visual impacts of the project from six viewpoints in and around the project area. These viewpoints were chosen as representative of the likely impacts of the project on receptors within the areas surrounding the project*". The VIA stated that *"without mitigation, stockpiles, mine infrastructure and lighting would be visible from different viewpoints to varying degrees"*. The Hume Coal EIS stated that *"Hume Coal has already planted visual screens around the project area. Once established, these trees will provide a permanent and natural screen to the various elements of the mine from either roadways or private landholdings"* and *"The location and extent of these tree screens were chosen to mitigate potential views from Medway Road and the Hume Highway"*.

256. The Hume Coal EIS stated that *"Being an underground mine the potential for visual impact is limited to the surface infrastructure area"* and *"No significant new landforms form part of the project"*.

257. In relation to the Project's visual impacts on the locality, the Hume Coal EIS stated that *"Due to existing mature vegetation in the landscape and the area's topography, the project will be relatively shielded from view. Whilst infrastructure has been specifically sited so that it is generally shielded by existing topography and vegetation, the development of the project will result in some changes to the landscape especially in the early stages prior to maturation of screen landscaping. Such changes will be noticeable to viewers from certain viewpoints surrounding the project area, particularly from Medway Road".* However, the Hume Coal EIS stated that *"in most instances, distance combined with intervening topography and vegetation means that visual impacts will be minimised".*

258. The Hume Coal EIS further stated that *"the cumulative impact of the project and the existing development within the locality will be minimal"* and the VIA concluded that *"with appropriate controls and mitigation measures, the visual impact of the Hume Coal project will be low"*.

259. The Hume Coal RTS responded to concerns raised by the community and organisations regarding visual impact of the Project on the existing landscape, the Berrima township and motorists and the findings of the VIA. It included an updated visual amenity and historic heritage impact assessment on Merewether House and its gardens.

260. The Hume Coal RTS stated that *"The adopted underground mining method and underground reject disposal are two critical aspects of the Hume Coal Project that reduced the potential visual impact of the project on the broader landscape"*. In addition, it stated that *"A detailed assessment of the potential visual impacts from each of the selected viewpoints for both projects highlighted that in most instances, distance combined with intervening topography and/or new or existing vegetation means that there will not be a significant impact on public and private views"*.

261. In relation to the impacts of the final landform on visual amenity, the Hume Coal RTS stated *"Importantly, being an underground mine with no permanent surface waste emplacements proposed, the Hume Coal Project will not involve any significant permanent changes to the landform".* It further stated that measures to reduce impacts of the final landform on visual amenity included, but not limited to:

- *"Throughout the project life, mined-out panels will be progressively sealed and reject material placed in these voids as they become available, avoiding the need for surface emplacements of this reject material.*
- *Reject produced during the initial period of mining before sufficient void space is available for underground reject emplacement, will be stored in the temporary coal reject stockpile within the surface infrastructure area.*
- *Dams and stormwater retention basins will also be re-contoured during mine closure and rehabilitation to match the surrounding topography".*

262. In relation to visual impacts on passing motorists the Hume Coal RTS stated that *"the predicted impacts on the view to motorists ranges from negligible, to moderate to low"* and that *"generally due to existing mature vegetation in the landscape, the tree screens already planted by Hume Coal, and the area's topography, the infrastructure associated with both projects will be relatively shielded from view, and where views are possible the view will be brief as motorists travel along the road."*

263. In relation to the impacts of the Project on the Berrima township, located to the north of the Project, the Hume Coal RTS stated that *"The centre of the township of Berrima is over 3 km from the proposed Hume Coal surface infrastructure area and is located in a low lying land to the north of the Wingecarribee River and east of the Hume Highway. The intervening topography (including the berm formed by the Hume Highway) means that the project will have a negligible impact on the visual amenity of the Berrima township".*

264. The Applicant challenges a claim from the National Trust of Australia (NSW) that the combined visual impacts of the coal mine infrastructure and railway will be considerably greater than the low to moderate rating given in its Hume Coal EIS. The Hume Coal RTS stated that *"the visual assessment was conducted in accordance with relevant government guidelines"* and that *"not all viewpoints were predicted to experience a low to moderate impact".* The Hume Coal RTS acknowledges that there were two viewpoints that the VIA considered would experience negligible impacts, one predicted to experience a low impact, two predicted to experience a low to moderate impact and two predicted to experience a moderate visual impact.

DEPARTMENT'S ASSESSMENT

265. The Department's PAR does not specifically address the Project's potential visual impacts on the locality and simply stated that *"The Department acknowledges that the Applicant has taken a number of important steps in designing the project to avoid and/or mitigate potential impacts of the project on the environment and the community, including:*
    - *locating the proposed mine's surface infrastructure away from most sensitive receivers, adjacent to a major highway and on largely cleared land with limited native vegetation".*

COMMISSION'S FINDING AND RECOMMENDATIONS

266. The Commission in its assessment of merits of the Project has had regard to visual impacts. The Commission has had regard to the Material before it and given consideration to the issues raised in public submissions. Relevant excerpts from submissions included:
    - visual impacts of the mine on property values;
    - protecting visual amenity from a Project of this scale cannot be achieved by any amount of conditions of consent. Even tree planting will not remove the impact. The undulating nature of the Shire would mean that the mine will be visible at numerous vantage points across the landscape;

- glimpses or views from the motorway of mining infrastructure and activity that have negative connotations impact on the perceived aesthetic qualities of the landscape;
- visual considerations and the impact on the historic town of Berrima;
- the visibility of the proposed coal mine and associated railway. Concerns focused on the surface infrastructure and, in particular, the size of the coal stockpile (about 800m long, 80m wide and 20m high);
- nearby residents stated that the coal stockpile and infrastructure would be visible but that no impact assessment had been undertaken from their properties;
- the visibility of the Project from surrounding roads would impact on the tourism and agriculture industries of the Southern Highlands; and
- the infrastructure is within the grounds of Mereworth House and would have an adverse visual impact on this heritage item and the cultural landscape in the area.

267. The Commission notes that a number of visual impact videos had been prepared by the Applicant and have been available on the Commission's website since 20 March 2019. The Applicant has confirmed that the videos were prepared independent of the Hume Coal EIS and before the Hume Coal RTS in support of the public exhibition process.

268. The Commission finds that that the Applicant and Department have not adequately assessed or considered the visual impacts of the Project. At this stage of its assessment the Commission finds that it is not satisfied with the information provided up to this point regarding visual impacts because the Commission considers that six viewpoints are not sufficient and that more information is needed to assess the visual impacts of the Project from private properties, particularly heritage items, and public roads.

269. The VIA, based on expert studies, also assumes that the level of groundwater drawdown will not impact on the cultural landscape and scenic quality of the area. However, there are residual questions in relation to the level of water table draw down which may be relevant to the visual assessment.

270. The Commission makes the following recommendations that will require further information and/or assessment:

R15 Further visual impact assessment should be completed for assessment and should include at a minimum:

- dimensioned plans of the project area and the railway extension. The plans should include a survey with contours and the location and size of all works as well as the relative heights above ground level of significant structures, including the coal stockpiles, the coal loader and primary water dam walls;
- views of the project area and railway extension from sensitive properties within and in the vicinity of the Project area (including heritage items), from the Hume Highway and Medway Road or any likely affected property. The distance and heights of the viewing points should be provided;
- views should be without mitigation measures (screen planting) and with mitigation measures in place after 5 years and 15 years;
- any findings in relation to groundwater impacts on gardens, plantings and landscape settings, and
- further assessment of the impacts of night-time lighting.

Any photomontages of the view impacts should be certified in accordance with the Land and Environment Court's Direction on use of photomontages http://www.lec.justice.nsw.gov.au/Pages/practice_procedure/directions.aspx.

8.9 Historic Heritage

APPLICANT'S CONSIDERATION

271. The Hume Coal EIS was accompanied by a Statement of Heritage Impact Assessment (**SHIA**) prepared by EMM Consulting Pty Ltd.

272. In relation to impacts on historic heritage items the Hume Coal EIS stated that "*A total of eight historic heritage items scheduled in the Wingecarribee LEP are located, either wholly or partially, in the project area. One scheduled property occurs within the surface infrastructure area but the listed item itself (Mereworth house and garden) will not be directly affected and is owned by Hume Coal. The other seven items are over the underground mining area and will not be affected because only negligible subsidence will occur. In addition to the listed heritage items, there are two potential archaeological sites that (if present) may reach the threshold of "relics" (HC_127 and Mereworth 1)*." The SHIA also refers to two previously identified but unlisted cultural landscapes (Sutton Forest Unit 6 identified in Wingecarribee Heritage Study 1991) and the Berrima, Sutton Forest and Exeter Landscape Conservation Area, classified by the National Trust of Australia.

273. The Hume Coal EIS further stated that of the seven other items "*three other heritage listed items (the Harp, the Pines and Sutton Farm House) as well as parts of paddocks associated with four heritage listed properties (Newbury, Eling Forest Winery, Bunya Hill and Comfort Hill) are within the project area, and specifically above the underground mining footprint. All items and properties have been identified as having local heritage significance and are listed on the Wingecarribee LEP.*"

274. As to the potential impacts to the landscape and built environment, the Hume Coal EIS stated that there will be "*long-term impacts*" and that these will be low. Furthermore, it was stated that the Project "*… does not involve any demolition of heritage items, and with the use of archival photography the landscape will be rehabilitated to a similar state*."

275. In relation to the management of potential impacts and mitigation measures for listed heritage items, the Hume Coal EIS stated that the design of the Project "*…avoids physical impacts to the majority of the listed heritage items, with the one exception being part of the listed LEP curtilage of Mereworth. However, the actual house and garden at Mereworth will not be subject to physical impacts, nor will any significant structures in the project area be affected*." The SHIA found that *"the most significant impact of the project will be to the visual setting surrounding the house and garden at Mereworth when viewed from within the property. Lesser visual impacts of setting of the house and garden from the public domain will also occur but the project design has used the landscape to screen infrastructure as much as practicable. However some residual visual impacts will remain*".

276. The SHIA also examined a wider area (outside the Project area) which included a number of additional heritage items, three of which are listed on the State Heritage Register (**SHR**) in the vicinity of the Project area.

277. The Hume Coal RTS stated that "*…no impacts on any heritage listed property relating to vibration, dust, or changes to the water table are anticipated, nor will there be any subsidence related surface impacts. Further, there will be no surface disturbance outside the project area*."

278. The Hume Coal RTS included an updated visual amenity and historic heritage impact assessment on Mereworth House and its gardens and an updated list of SHR heritage items within the wider area that were unintentionally missed in the SHIA.

279. The Hume Coal RTS also provided information to address the Heritage Council's concerns about the potential impacts of the mining operation on the three SHR listed items in the vicinity of the Project area. It noted that the mine plan was developed to avoid undermining state heritage listed properties and that the technical reports found that the Project would meet relevant standards. The Hume Coal RTS provided further information on the approximate depth of the existing water table and the predicted draw down at each of the SHR listed properties raised by the Heritage Council. It concluded that the predicted magnitude of water table drawdown is comparable to what would be experienced during natural seasonal variations and local landholder pumping.

DEPARTMENT'S ASSESSMENT

280. The Department's PAR stated that there "… *are three State-listed heritage items in the vicinity of the project (Oldbury Farm, Golden Vale and Hillview), eight locally-listed heritage items in the project area, and the National Trust of Australia has identified a significant cultural landscape conservation area for Berrima, Sutton Forest and Exeter*."

281. In relation to Agency submissions the Department's PAR stated that the Heritage Council of NSW "*raised some residual concerns about the level of heritage assessment undertaken, particularly in relation to historical archaeology and the 'Berrima, Sutton Forest and Exeter Cultural Landscape'. It recommended that additional detailed assessments should be undertaken by suitably qualified heritage consultants*".

282. The Department's PAR provided a brief consideration of historic heritage impacts and concluded that "*historic heritage impacts would not be significant and could be managed through the following:*
    - *Include conditions requiring protection of all items.*
    - *Prepare and implement management plans in consultation with OEH, Council and Heritage Council.*"

COMMISSION'S FINDING AND RECOMMENDATIONS

283. The Commission in its assessment of merits of the Project has had regard to historic heritage impacts. The Commission has had regard to the Material before it and given consideration to the issues raised in public submissions. Relevant excerpts from the submissions included:
    - groundwater that is primarily to preserve our heritage listed garden;
    - the proximity of significant local and state heritage assets;
    - Golden Vale Homestead is owned by the National Trust. The Trust is deeply concerned that the Hume Coal Project may impact on the property's water supplies;
    - Southern Highlands area has had a unique social and economic role and its heritage values need recognition and protection if they are to survive into the future. These values are incompatible with the development of the coal mining landscape;
    - Berrima, located approximately two kilometres from the Project area, is one of the best-conserved towns from the colonial period of Australia. It has a significant collection of state heritage register-listed properties concentrated in a small area;
    - there are 64 heritage items just within the village, 16 of which are on the state register;
    - it is impossible to assert that the impact of the Project on Berrima can be mitigated;

- the adequacy of the SHIA, an alternate Heritage Impact Assessment (**HIA**) prepared on behalf of two community groups reached different conclusions, particularly in relation to the impact of the Project on the significance of Mereworth, as its heritage listing goes beyond the house and garden and includes its rural setting; and
- the SHIA does not address impacts, other than from the surface infrastructure works, on the heritage items in the study area and the cultural landscape. In particular, the impacts of groundwater and water table drawdown have not been adequately assessed.

284. The Commission notes that the SHIA, based on expert studies, assumes that the level of groundwater drawdown will not impact on the cultural landscape. However, there are residual questions in relation to the level of water table draw down. The additional information provided in the Hume Coal RTS illustrated the impact on the three SHR items outside the Project area but not on the items that are within or partly within the Project area where the level of water table drawdown is greater. Furthermore, the impacts were based on the 67th percentile and not the 90th percentile and the level of water table decline is not confirmed.

285. The Commission notes that the historic heritage impacts of the Project within the locality have been peer reviewed by the Heritage Council of NSW against the requirements of relevant Government policy framework. The Commission notes that the Heritage Council of NSW retained concerns which included:
- the adequacy of the assessment on the impacts on Mereworth House; and
- the need for a detailed assessment of the impacts of the Project on the Berrima, Sutton Forest and Exeter cultural landscape.

286. At this stage of its assessment the Commission finds that it is not satisfied with the information provided up to this point regarding historic heritage impacts. The Commission considers that the magnitude of water table drawdown is not confirmed and thus there is a potential change to the aesthetic significance of the heritage items' settings (gardens, tree plantings) and cultural landscape. The SHIA relies on the VIA and further information provided with the Hume Coal RTS to assess the visual impacts of the surface infrastructure on Mereworth House, other heritage items and the cultural landscape. However, the visual impact assessment has shortcomings (that are addressed separately) and the impacts on heritage significance would need to be reassessed in accordance with an updated visual impact study.

287. The Commission makes the following recommendations that will require further information and/or assessment:

R16 Further information should be provided to allow the assessment of the potential impact of water table drawdown on heritage items (including gardens, plantings and landscape settings) within or in the vicinity of the Project area. The information should include confirmation of the existing level of the water table and the anticipated drawdown at both the 67th percentile and the 90th percentile.

R17 The Applicant should address the recommendations of the Heritage Council of NSW's correspondence to the Department dated 17 August 2018 as referenced in paragraph 283.

R18 The Statement of Heritage Impact Assessment should be updated in response to recommendations **R16** and **R17**, and the visual impact of the project on the significance of the above items and the cultural landscape in accordance with an updated visual impact assessment. (see **R15** in Visual Impact recommendations).

8.10 Indigenous Heritage

APPLICANT'S CONSIDERATION

288. The Hume Coal EIS was accompanied by an Aboriginal Cultural Heritage Assessment (**Hume ACHA**) prepared by EMM Consulting Pty Ltd. The Hume Coal EIS stated that "*The impact of the project at a landscape level on Aboriginal cultural heritage values will be relatively small in comparison to the extensive traces of archaeological evidence identified throughout the project area and its surrounds…*"

289. In relation to potential subsidence impacts on heritage sites, the Hume Coal EIS stated that the Project "*…will not directly impact grinding groove sites, rock pools, rock shelters or scar trees…*" and that there would be no subsidence impacts for any known or unknown heritage sites. In addition, the Hume Coal EIS stated that "*…no statutory or non-statutory Aboriginal places of socio-cultural or historic significance have been identified in the project area*."

290. In relation to direct impacts on indigenous sites from surface infrastructure, the Hume Coal EIS stated that "*Out of the 206 Aboriginal sites in the project area, 20 sites will be impacted to some degree by the surface infrastructure area. Of these, three sites will be totally disturbed, 10 partially lost and seven totally lost*." The Hume Coal EIS further stated that:
- "*…no sites of high significance will be directly impacted by the project*" and
- "*…taking the negligible risk of subsidence impacts into account, it is very likely that the rest of the sites in the project area assessed as part of the Aboriginal heritage assessment will not be impacted*."

291. Overall the Hume Coal EIS concluded that "*An Aboriginal Cultural Heritage Management Plan will be developed in consultation with the DP&E and the registered Aboriginal parties. It will detail the management measures for the project, including provisions for the active and passive management of Aboriginal sites, ongoing monitoring requirements and site salvage procedures.*"

292. The Berrima Rail EIS was accompanied by an Aboriginal Cultural Heritage Assessment (**Berrima ACHA**) prepared by EMM Consulting Pty Ltd. The Berrima Rail EIS stated that "*The survey team recorded 11 new sites in the project area. Eight sites were assessed to have low scientific significance, one site was assessed with moderate scientific significance and two sites were assessed to have higher moderate scientific significance. The project has been designed to avoid the areas of highest archaeological sensitivity*."

293. In relation to the cumulative impacts on indigenous heritage, the Berrima Rail EIS stated that "*… large undisturbed areas in the surrounding region contain comparable archaeological sites. Given the general richness of the surrounding archaeological landscape and the amount of ground disturbance required for infrastructure, the cumulative impact of the project on Aboriginal heritage is considered very low.*"

294. The Hume Coal RTS responded to submissions made by OEH and the public and stated "*It is acknowledged that 28 Aboriginal sites will be directly impacted by the two projects. However, this outcome is the result of a process employed throughout the EIS that has aimed to minimise impacts to Aboriginal sites…*"

"*A major design modification involved setting back most of the surface infrastructure area beyond 200 m from the banks of the main water ways in the project area (Oldbury Creek and Medway Rivulet). Consequently, the surface infrastructure area will avoid most of the nearby Aboriginal sites and areas of moderate archaeological sensitivity...Notwithstanding, some unavoidable impacts will result from the linear infrastructure that is required to traverse the main water ways such as conveyors, vehicle track upgrades and railways*."

"*Overall, a substantial archaeological resource will remain in the project area, considering that 191 of the 219 Aboriginal sites assessed in the ACHA (91%) will not be directly impacted by the Hume Coal Project or Berrima Rail Project*."

295. In relation to the further assessment of the indigenous cultural heritage values on the Berrima Rail alternative alignment option, the Hume Coal RTS stated that "*... salvage excavation may not be required for the alternate option...*" In addition, it stated that "*The results of the Associates Archaeology test excavation may indicate that salvage excavation will not be required in this area as opposed to that previously predicted in the ACHA for the Berrima Rail Project. However, the requirement for salvage would be determined based on the outcome of further test excavation and in accordance with conditions that would trigger such measures*".

DEPARTMENT'S ASSESSMENT

296. The Department's PAR identified that "*206 Aboriginal sites were identified within the Hume Coal Project area, 20 of which would be affected by direct disturbance footprint (3 totally disturbed, 10 partially lost and 7 totally lost)*" and that "*11 Aboriginal sites were identified within the Berrima Rail Project area, 8 of which would be affected by direct disturbance footprint (6 partially lost and 2 totally lost).*"

297. In relation to Agency submissions the Department's PAR stated that OEH had "*commented that the project had been largely designed to avoid biodiversity and Aboriginal cultural heritage impacts. Further, it noted its appreciation that the Applicant has undertaken early assessment of Aboriginal heritage impacts, including test excavations*."

298. The Department's PAR provided a brief consideration of indigenous heritage impacts and concluded that "*impacts would not be significant and could be managed through the following:*
    - *Include conditions requiring protection of all items.*
    - *Prepare and implement management plans in consultation with OEH, Council and Heritage Council.*"

COMMISSION'S FINDING AND RECOMMENDATIONS

299. The Commission in its assessment of merits of the Project has had regard to indigenous heritage impacts. The Commission has had regard to the Material before it and given consideration to the issues raised in public submissions, which included the loss of Aboriginal heritage items and subsequent impact on Aboriginal culture.

300. The Commission finds that that the Applicant and Department have adequately considered and assessed indigenous heritage impacts of the Project within the locality, because it has been peer reviewed by the Department and OEH against the requirements of relevant Government policy framework. The Commission notes that OEH did not retain any residual concerns. At this stage of its assessment the Commission finds that it is satisfied with the information provided up to this point regarding indigenous heritage impacts.

8.11 Rehabilitation and Agriculture

APPLICANT'S CONSIDERATION

301. The Hume Coal EIS was accompanied by an Agricultural Impact Statement (**AIS**) prepared by EMM Consulting Pty Ltd which assessed "*…potential impacts of the project on agricultural resources and/or industries within and surrounding the project area…"* and that it "*…followed the process outlined in the Guideline for Agricultural Impact Statements at the Exploration Stage (NSW Government 2015a)."* The Hume Coal EIS stated that:

    "There will be some agricultural production losses during the construction and operation of the project, estimated at approximately $2 million in net present value over the 23 year life of the project. These losses will be somewhat offset by the increase in productivity on other properties Hume Coal owns by the application of leading practice management techniques by the licensee, Princess Pastoral, when compared to the previous management regime."

302. In relation to the potential risks, the Hume Coal EIS stated that "*All identified potential risks to agricultural resources were assessed as being low provided the specified mitigation measures are implemented..."* and that *"The highest potential risk to agriculture was identified as the potential loss of groundwater for agricultural users, resulting from groundwater drawdown…"* associated with dewatering activities*;* and that the Applicant *"…will implement the necessary 'make good' arrangements with reference to the AIP to effectively compensate landholders for drawdown related impacts. Therefore, no uncompensated (financial or otherwise) loss of water availability for agriculture will occur, and the residual level of risk was assessed as low."*

303. In relation to Biophysical strategic agricultural land (**BSAL**) in the Project area and surrounding buffer, the Hume Coal EIS stated that a detailed BSAL assessment "…was undertaken in accordance with the requirements of the *Interim protocol for site verification and mapping of biophysical strategic agricultural land* (NSWG 2013)." The Hume Coal EIS also stated that the assessment concluded that there were *"…no BSAL in the project area, a conclusion that is consistent with the results of the broader scale NSW Government's BSAL mapping."*

304. The Hume Coal EIS was accompanied by a Rehabilitation and Closure Strategy (**RCS**) prepared by EMM Consulting Pty Ltd. The Hume Coal EIS stated that *"The project's rehabilitation and closure strategy's overarching objective is to restore the land to its pre-mining land use, that is, agriculture for livestock production on improved pasture. Being an underground mine, there will be limited need for progressive rehabilitation during the operational phase. However, wherever possible, disturbed areas no longer required for mining activities, such as drill pads and access tracks, will be progressively rehabilitated. In addition, areas disturbed during the construction phase that are not required during mining, such as the temporary construction accommodation village, will be dismantled and the land rehabilitated when no longer in use."*

305. In relation to the rehabilitation of underground voids, the Hume Coal EIS stated that voids *"…will be progressively partially backfilled as mining progresses…"* to help with groundwater recovery, as well as to eliminate the need for *"…large surface reject emplacements that would otherwise require rehabilitation at mine closure."*

306. In relation to the rehabilitation of subsidence impacts, the Hume Coal EIS stated that as coal extraction will be limited to first workings only *"…no noticeable subsidence will occur and thus no land above underground workings is expected to require rehabilitation".* However, regular inspections will be carried out to monitor *"…sensitive features above the underground mining area where land access can be obtained, and remedial actions identified at the time, if required."*

307. The Berrima Rail EIS made reference to the progressive rehabilitation and decommissioning of the Project. The Berrima Rail EIS stated that *"…At the completion of the construction phase, areas disturbed that are not required for operation of the rail line and maintenance facility will be rehabilitated. This includes the temporary construction facility on the eastern side of the Old Hume Highway, and access roads to construction worksites along the rail corridor."*

308. In relation to the decommissioning of the rail infrastructure, the Berrima Rail EIS stated that *"Upon completion of the project, the Hume Coal rail infrastructure will be dismantled and removed. Decomissioning and rehabilitation works will include the removal of the rail track and the maintenance sidings and provisioning facility. The portion of track owned by Boral, including the rail siding to the cement works, will remain indefinitely. The potential for contamination will be assessed, such as around refuelling areas, and areas remediated if required."*

309. The Berrima Rail EIS was also accompanied by a Land and Soil Assessment (**LSA**) prepared by EMM Consulting Pty Ltd which assessed the potential impacts of the railway corridor on agricultural land. The Berrima Rail EIS stated *"The project could result in degradation of soils, a degrading of the* [land and soil capability] *LSCs in the project area and a reduction in paddock size and stocking capacity. Soil stripping, soil stockpiling and erosion and sediment control procedures will be implemented to prevent soil degradation. The rehabilitation strategy is designed to return much of the project area to the pre-disturbance LSCs."*

310. In relation to the impacts of the LSCs, the Berrima Rail EIS stated that the LSCs *"…will be degraded across 14% of the project area which will result in an increase of Class 7 land. The reduction in paddock size and stocking capacity as a result of the project will be minimal; during construction it will be reduced by 9-10% for each property, which reduces to 5% or less during operations."*

311. The Berrima Rail EIS concluded that *"The impact to agricultural land use of the proposed railway corridor is limited to the proposed construction footprint...After construction, the area of land impacted will only comprise area of the infrastructure itself (the operational disturbance footprint). The railway corridor does bisect some paddocks; however, the paddocks will still be able to support the current grazing land use, albeit with a slightly reduced number of stock... Most of the site will revert to grazing land after rehabilitation."*

312. The Hume Coal RTS stated that a Rehabilitation Management Plan (**RMP**) will be produced as part of the conditions of the development consent and that it *"…will detail proposed rehabilitation plans, including a progressive rehabilitation schedule for the entire life cycle of the mine and define key risks and opportunities that need to be addressed to achieve successful rehabilitation."*

313. The Hume Coal RTS also stated that the RMP will include a consideration of *"…the post-mining land-use and the pasture species required to achieve this land use. The pasture species to be seeded on rehabilitated areas once surface infrastructure is removed at closure will be further investigated during the detailed closure planning process … The detailed closure plan, which will be prepared within five years of closure, will detail these pasture species and proposed grazing strategies."*

314. In relation to impacts to agriculture from potential loss of groundwater, the Hume Coal RTS stated that *"The NSW DI Water provided Hume Coal with a comprehensive listing of all existing water bores in late 2015 for use in the EIS (this list was then updated by WaterNSW on of 27 April 2018), for an area well in excess of the predicted area of influence of the mine (ie a distance in excess of 5 km from the mine boundary). This list identifies the location of all known bores and their associated licence/approval. Individual bores can then be linked to the groundwater database and their construction details and associated information at the time of construction can be extracted. The location of each bore (and their associated screened interval) was then reviewed against the revised model and the model run to predict drawdown at every location. Hume Coal are therefore confident that all known bores that are in the area have been included in the assessment, and is using the 67th percentile results to conservatively predict potential drawdown impacts for each of these bores."*

DEPARTMENT'S ASSESSMENT

315. The Department's PAR provided a brief consideration of rehabilitation and agriculture and stated that "*279 ha of land would be disturbed for the project... and that The Department considers that the agricultural impacts would not be significant and could be managed through…*" the implementation of rehabilitation performance criteria, progressive rehabilitation where possible and the preparation and implementation of a Rehabilitation Management Plan.

COMMISSION'S FINDINGS AND RECOMMENDATIONS

316. The Commission in its assessment of merits of the Project has had regard to the rehabilitation and agricultural impacts. The Commission has had regard to the Material before it and given consideration to the issues raised in public submissions. Relevant excerpts from the submissions included:
    - well settled agricultural region, a very extensive settlement and, as seen by the very large number of private bores that would be affected by the mine;
    - the mine will threaten water and aquifers, and agricultural lands in the Wingecarribee area;
    - licence to irrigate the specialist agriculture that they have on their property, to provide that amount of water as their bore will also be destroyed. Trucking is just impossible for make good provisions;
    - reducing and poisoning underground and surface water will have toxic environmental and economic impacts on agriculture;
    - protection of the region's water assets is fundamental for the Southern Highland's brand of agriculture and these are the foundations of our future growth and economic opportunities;
    - the Department cannot say that there will be scenarios where it is not suitable or practical to mitigate a farmer's groundwater loss and then assert the idea that impacts on agriculture can be mitigated;
    - the flow-on effects into loss of employment in the agricultural industries are serious; and
    - loss of agricultural production associated with the loss of groundwater supplies.

317. The Commission notes the Applicant's commitment to return the Project surface infrastructure area back to its existing land use at the cessation of Project operations.

318. The Commission finds that that the Applicant and Department have considered and assessed the impacts on rehabilitation and agriculture, and at this stage of its assessment the Commission finds that it is generally satisfied with the information provided up to this point regarding rehabilitation and agriculture but notes that this position is subject to concerns around groundwater impacts, particularly if make good requirements cannot be met.

8.12 Biodiversity

APPLICANT'S CONSIDERATION

319. The Hume Coal EIS was accompanied by a Biodiversity Assessment (**BA**) prepared by EMM Consulting Pty Ltd that stated that *"…detailed field surveys informed by a detailed desktop review of the project area to accurately assess ecological constraints to surface infrastructure facilities, and detailed desktop analysis of the study area to accurately assess ecological constraints to underground mining."*

320. In relation to the impacts on biodiversity, the Hume Coal EIS stated that "*…first workings method with negligible associated subsidence means that subsidence related impacts on biodiversity will be negligible. The primary direct impact from the project is clearing vegetation to construct surface infrastructure. Careful placement of surface infrastructure has largely avoided the need to clear native vegetation, resulting in only a small amount being affected."*

321. In relation to the impacts on threatened species and communities, the Hume Coal EIS stated that *"…the project is not expected to cause any significant impacts on any of these species and communities."*

322. In relation to the mitigation of remaining impacts on biodiversity and the provision of offsets, the Hume Coal EIS stated that *"…residual or unavoidable impacts include the removal of 64 paddock trees which may provide habitat for some threatened species;"* and that it had undertaken the offset calculations *"…in accordance with the Framework for Biodiversity Assessment: NSW Biodiversity Offsets Policy for Major Projects (OEH 2014) (FBA) to determine the number of credits required to compensate for the project's residual surface impacts."*

323. In relation to the impacts on terrestrial vegetation, the WIA stated *"Terrestrial vegetation has been classified as having a facultative (opportunistic) dependence on groundwater. Facultative (opportunistic) ecosystems will use groundwater during droughts (ie when surface water is not available), but exist without groundwater most of the time. Long Swamp and Stingray Swamp have been classified as having a facultative (proportional) dependence on groundwater (EMM 2017c). Facultative (proportional) ecosystems take a proportion of their water requirements from groundwater; however, there is no absolute threshold for groundwater availability below which ecosystem structure or function is impaired, and can respond to changes in groundwater."*

324. In relation to the mitigation measures for the drawdown, the Hume Coal EIS stated that it will monitor the vegetation *"…during prolonged drought periods and an appropriate response will be determined if the condition of EECs* [Endangered Ecological Communities] *along the creeks is observed to decline, and the decline is attributable to mining."*

325. As to the significance of the terrestrial threatened species, the Hume Coal EIS stated that the Project is not predicted to result in significant impacts for any of terrestrial threatened species and communities and that "*No threatened aquatic species were recorded or are predicted to occur, due to the absence of suitable habitat, and therefore they will not be impacted."*

326. The Hume Coal EIS further stated that the Project will not have any direct impacts on riparian vegetation and that potential impacts on groundwater dependent ecosystems *"…are limited to areas of terrestrial vegetation containing a threatened ecological community and threatened species habitat along Belanglo Creek and Wells Creek".*

327. The Hume Coal EIS also stated that *"No stygofauna were recorded in the project area. However, if any are present it is unlikely that they would be restricted to the area affected by groundwater drawdown given the high level of groundwater connectivity to adjacent areas. Minor reductions in base flow are expected in Medway Rivulet, which is unlikely to have an adverse long-term impact on aquatic ecosystems given the minor base flow reduction expected."*

328. In relation to Platypus habitat, the Hume Coal EIS stated that it found it to be *"…absent from the project area and therefore they will not be impacted by any changes to streamflow or surface hydrology resulting from the project. The breeding population of Platypus on the Wingecarribee River will not be impacted by changes to base flow as a result of the project, as percentage loss of total stream flow as a result of baseflow reduction in the lower Wingecarribee (0.8%) and its tributaries can be assumed to be negligible."*

329. The Berrima Rail EIS was accompanied by a Biodiversity Assessment (**BA**) prepared by EMM Consulting Pty Ltd and stated that *"Two native and one exotic vegetation community were recorded in the biodiversity study area, comprising, respectively, Broad-leaved Peppermint Narrow-leaved Peppermint grassy woodland; Snow Gum Woodland; and cleared land. Sixteen individual Paddy's River Box trees (Eucalyptus macarthurii), listed as endangered under both the TSC Act and EPBC Act, were recorded in the wider biodiversity study area. A further 24 individuals were recorded south□west of the study area. The study area does not contain habitat for any other listed threatened flora species."*

330. In relation to the preferred and alternative rail options, the Berrima Rail EIS stated that both *"…will result in minor residual impacts on 2 hectares (ha) of native vegetation and potential Squirrel Glider habitat. The preferred option will also remove one i Paddy's River Box tree, while the alternative option would retain it. No key fish habitats or habitat for threatened fish species was recorded."*

331. In relation to the biodiversity assessment of the study area, the Berrima Rail EIS stated that it "*…recorded two native vegetation communities, a population of the endangered Paddy's River Box and potential habitat for the vulnerable Squirrel Glider, endangered Australian Painted Snipe, and migratory species comprising the Great Egret, Cattle Egret, Rainbow Bee eater and Latham's Snipe*."

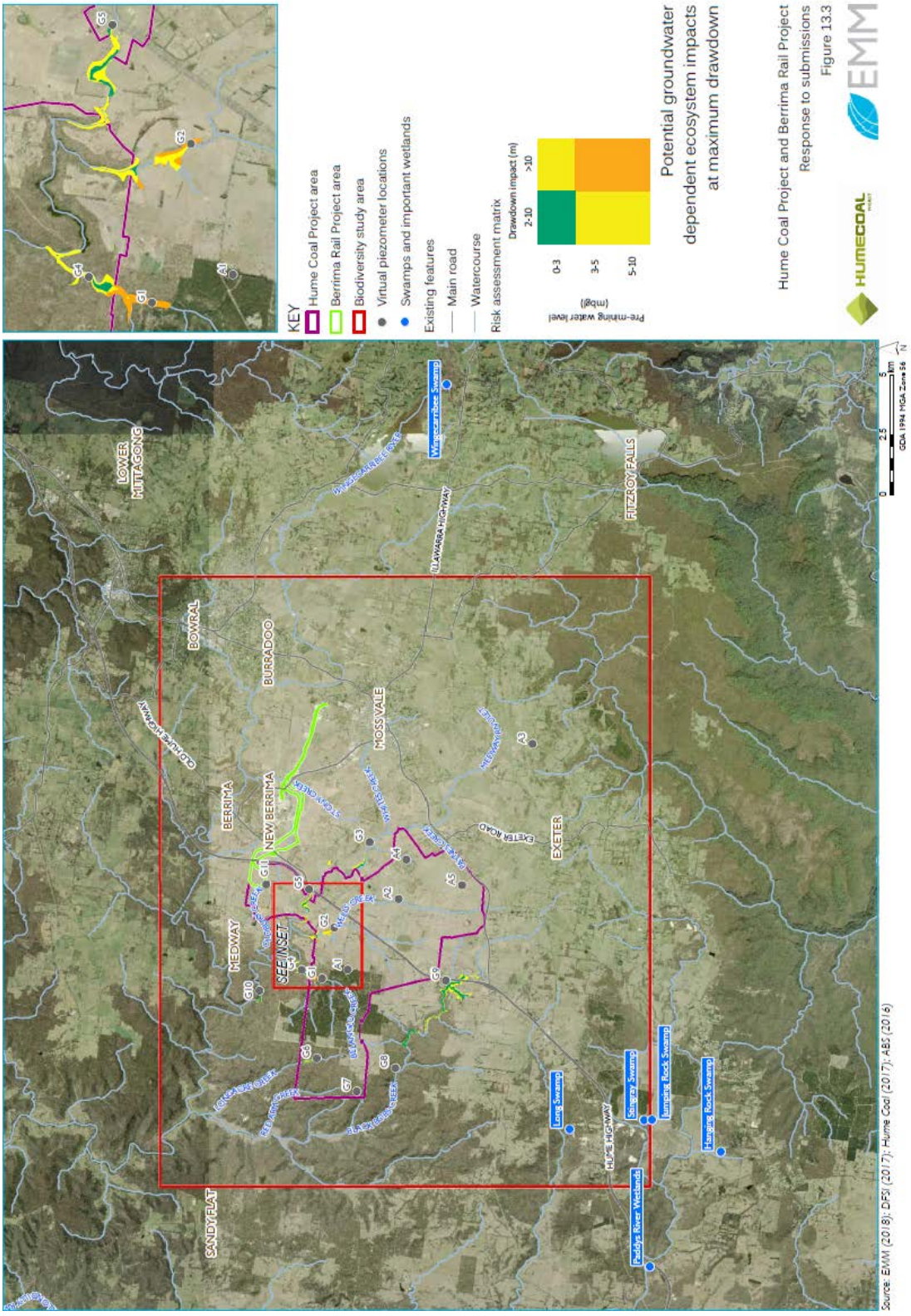
332. In relation to the mitigation measures for impacts on the two vegetation groups, the Berrima Rail EIS stated that *"An offset strategy has been prepared to compensate for the residual impacts on 2 ha of native vegetation and potential Squirrel Glider habitat, and the removal of one Paddy's River Box tree, should the preferred option be adopted. The offset strategy will be finalised within 12 months of project approval in consultation OEH and the NSW Department of Planning and Environment (DP&E)."*

333. The Hume Coal RTS sought to address comments from OEH in relation to the plant community types (**PCTs**) to be impacted by the Project, *re-classification of patch 3 to PCT 1191,* and rectification on minor miscellaneous inputs into the offset calculations. Furthermore, it was stated that "*…an additional floristic plot was completed on 16 November 2017 by EMM ecologists in accordance with Section 5.3.2 of the Framework for Biodiversity Assessment: NSW Offsets Policy for Major Projects (OEH 2014). The vegetation mapping for patch 3 was also refined on this date."*

334. The Hume Coal RTS also stated that *"Areas mapped as PCT 1093 have been revised to PCT 731 following consultation with OEH botanists. It was agreed that PCT 1093 is more representative of a tablelands community. Areas of PCT 677 have also been revised to PCT 1191 as a result of consultation with OEH."*

335. In relation to the offset calculations, the Hume Coal RTS stated that the requested changes *"…were made to the offset calculations for the Hume Coal Project and Berrima Rail Project…"* and that the complete revised calculations and credit reports to the offset calculations for both the Hume Coal Project and the Berrima Rail Project; and, the re-classification of patch 3 to PCT 1191, can be found in the Appendix 4 of the Hume Coal RTS.

Figure 10 – Project Induced Groundwater Drawdown



Source – Hume Coal RTS

DEPARTMENT'S ASSESSMENT

336. The Department's PAR provided a brief consideration of biodiversity and stated that "*The Department and OEH consider the project has largely been designed to avoid and minimise direct impacts of the project on biodiversity. The Hume Coal Project would involve clearing of up to 8.3 ha of native vegetation and threatened species habitat and requires 101 ecosystem credits and 582 species (Koala, Squirrel Gilder and Southern Myotis) credits. The Berrima Rail Project would involve clearing of up to 2 ha of native vegetation and threatened species habitat and requires 6 ecosystem credits and 44 species (Squirrel Gilder) credit.*"

337. The Department's PAR concluded that "*The Department and OEH consider that the biodiversity impacts would not be significant and could be managed through the following:*
    - *Offset any impacts in accordance with NSW Biodiversity Offsets Scheme.*
    - *Prepare and implement a Biodiversity Management Plan in consultation with the OEH*."

COMMISSION'S FINDINGS AND RECOMMENDATIONS

338. The Commission in its assessment of merits of the Project has had regard to biodiversity impacts. The Commission has had regard to the Material before it and given consideration to the issues raised in public submissions. Relevant excerpts from the submissions included:
    - our local environment is unique with rich biodiversity, complex ecosystems, intricate waterways and a wide variety of landform, soils and living conditions;
    - biodiversity must be protected from all and every activity that would threaten it;
    - the biodiversity assessment clearly identifies that there will be negative impacts of the proposed development on an identified critically endangered ecological community and two threatened flora species;
    - the shire is considered to be a biodiversity hotspot and is one of the most biodiverse regions in Australia; and
    - impacts on both native vegetation and planted exotic gardens and trees associated with the loss of groundwater supplies.

339. The Commission notes the Applicant's attempts to best reduce surface impacts from infrastructure in the mine design and acknowledges that during its site inspection and locality tour it was apparent that the Project site has already been significantly cleared for farming purposes and that there has been significant historical investment in the establishment of exotic trees and gardens in the area.

340. The Commission finds that that the Applicant and Department have considered and assessed the impacts on biodiversity, and at this stage of its assessment the Commission finds that it is generally satisfied with the information provided up to this point regarding biodiversity impacts on native species, however it is not satisfied that appropriate consideration and assessment has been given to the possible impacts of water table decline on exotic trees and gardens. The Hume Coal EIS reporting is based on eucalyptus tree species and their estimated rooting depths. Nothing has been reported on the rooting depths of introduced garden plants and exotic trees.

341. The Commission makes the following recommendations that will require further information and/or assessment:

R19 The Applicant is to undertake further technical assessment on the impacts on private gardens, exotic trees and native vegetation from a declining water table.

8.13 Economic

APPLICANT'S CONSIDERATION

342. The Hume Coal EIS was accompanied by an Economic Impact Assessment (**EIA**) prepared by BAEconomics dated 20 February 2017 and stated that *"The approach to preparing the assessment is consistent with various guidelines published by the NSW Government, including 'Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals' published in 2015 (**the 2015 Guidelines**). The 2015 Guidelines also require a public interest test in the form of a cost-benefit (**CBA**) to be undertaken to assess the net benefit of the project to the NSW community. The 2015 Guidelines also require a 'local effects analysis' (**LEA**) to be undertaken to assess the likely impacts of the project on the local economy".*

343. The EIA noted that while the Berrima Rail Project is subject to a separate EIS, from an economic perspective, the benefits to NSW would evolve jointly. The CBA and LEA therefore "*incorporate the combined costs of the project and the BRP* [Berrima Rail Project] *component of the project, including the costs of any external effects."*

344. The EIA assessed direct benefits of the Project to NSW, stating that *"relative to the 'do nothing' (reference) case would amount to $316 million in net present value (**NPV**) terms, consisting of:*
    - *incremental royalty payments that would accrue to the NSW Government of $114 million in NPV terms;*
    - *incremental personal and company income tax payments attributable to NSW of $48 million in NPV terms;*
    - *incremental disposable income payments accruing to NSW residents of $134 million in NPV terms; and*
    - *other incremental benefits accruing to NSW, comprising Medicare payments, payroll taxes, land taxes, levies and local government rate payments, the amount to $20 million in NPV terms."*

345. The EIA further noted that the gross direct benefits of the Project would be offset by externalities arising from greenhouse gas emissions and a small loss in agricultural value added, collectively estimated at around $21 million NPV, the *"net direct benefits of the project to NSW are therefore estimated at $295 million in NPV terms."*

346. In relation to flow-on impacts, the EIA stated that the Project would yield the following benefits for NSW:
    - *"incremental disposable income flow-on benefits of at least $73 million in NPV terms ($6 million per annum); and*
    - *incremental annual average employment flow-on benefits of 62 full-time equivalent (FTE) jobs."*

347. The EIA assessed the direct benefits of the Project to the local economy in the Southern Highlands region, which it considered would predominantly consist of additional disposable income accrued by the Project workforce, yielding:
    - *"incremental disposable income benefits of $85 million in NPV terms accruing to the project workforce…*
    - *incremental payments in shire rates accruing to local government of $1 million in NPV terms."*

    "Accounting for a loss of agricultural value added of $2 million in NPV terms, the net benefits accruing to the local economy are estimated at $84 million."

348. The EIA noted that flow-on effects to the local economy were calculated to account for a small reduction in economic activity that would occur due to displacement of agriculture resulting from the Project. The EIA stated that Project would generate:
    - *"incremental disposable income flow-on benefits of $44 million in NPV terms of $4 million per annum; and*
    - *incremental employment flow-on benefits, accounting for agricultural impacts of 34 FTE jobs."*

349. The Hume Coal EIS concluded that: *"The cost benefit analysis determined that the project's total net direct and indirect economic benefit to NSW will be $368 million in NPV terms."*

350. An Updated Economic Impact Assessment (**Updated EIA**) for the Hume Coal Project was prepared by BAEconomics dated 4 October 2018 and takes into account changes in coal price forecasts, delays to the mine schedule and updated capital and operating costs. It also considers the Technical Notes supporting the 2015 Guidelines published in 2018 (**Technical Notes 2018**).

351. The Updated EIA updated the net direct benefits of the project for NSW and the local economy, respectively and estimated that the Project is expected to generate (gross) direct benefits to NSW of $373 million in net present value (**NPV**), including:
    - $132 million (NPV) in royalties for NSW.
    - $62 million (NPV) in personal and income payments attributable to NSW
    - $156 million (NPV) in disposable income payments accruing to NSW residents
    - $24 million in other benefits accruing to NSW (medicare payments, payroll taxes, land taxes, levies and Local Government rate taxes.

352. The (gross) direct benefits would be offset by externalities from GHG and agriculture of $2m.

353. In addition to the direct benefits, the EIA expected the Project to generate "*flow on*" benefits for NSW comprising $149 million NPV and 22 FTE jobs.

354. The Updated EIA adopted the same assumptions, methodology and approach to costing as the EIA. It provides further information about the predicted external effects of the Project, but these remain internalized to the Project. The GHG externality of $19 million has been deleted on the basis that the Technical Notes 2018 require that the economic impact of GHG emissions should be estimated for NSW only. The Updated EIA also made changes to the Project description which is different to what is in the Hume Coal EIS and the EIA.

355. The Hume Coal RTS was accompanied by additional information in relation to the EIA in response to issues raised during the Project's exhibition period. The Applicant commissioned Judith Stubbs and Associates (**JSA**) to prepare a report, *'Response to Community Concerns regarding impacts on tourism and on land values'*, dated 15 November 2017, to consider the potential impacts of the Project on property values in the Wingecarribee LGA.

356. With regards to the relationship between coal mining and property values, the JSA report stated: *"The analysis found no statistically significant adverse or positive impact of a change in coal mining employment on property prices at the 95% confidence level".* The JSA report considered property values and median sales prices, calculated for the period 1 January 2015 to September 2017 in the LGA, finding: *"median house prices experienced a significant increase over this period. Rural property prices increased by 41% and 63% in the Wingecarribee LGA and selected suburbs respectively, whilst house prices increased by 33% in the Wingecarribee LGA and 42% in selected suburbs over the same period….This finding does not support the hypothesis that prices in the locality have been depressed or adversely affected by the development application for the coal mine and the publicity surrounding the proposed development."*

DEPARTMENT'S ASSESSMENT

357. The Department's PAR acknowledged that there is a valuable coal resource contained within the Project area. It also acknowledged that the Project would yield economic benefits, through *"royalties payable to the state of NSW and through the creation of jobs. If the project reached its predicted employment capacity, it would create up to 300 jobs".* However, it stated that *"there is residual uncertainty about the likely quantum of economic benefits…"*

358. The Department's independent expert, Mr Andrew Tessler of BIS Oxford Economics (**BISOE 2017**), found that "*the CBA is well researched and (with some exceptions) well presented….there remain several areas of concern with the CBA*" including: the assumptions for the inclusion/magnitude of employment benefits; the associated tax benefits (personal income tax, Medicare payments an payroll tax payments) for unemployed/footloose labour; transparency in the description of project costs and revenues; and the inclusion of State wide flow-on (multiplier) effects. BISOE 2017 concludes that assuming no employment benefits (and accompanying tax) and that revenues, costs and externalities are as stated in the CBA, then the project will still provide a net benefit of $127 million NPV.

359. BISOE 2017 also found that the "*LEA is likewise well presented and researched…however, some aspects of the LEA also appear open to question*" in relation to employment benefits and non-labour project expenditure.

360. BISOE 2017 also noted that, other than GHG emissions and agriculture, there was ambiguity about the size of externalities, which is not explicitly quantified in the EIA and is internalised into the project costing. BISOE 2017 provides some costing of externalities including groundwater "make good" ($4.4 million) and purchase of water licenses ($4.8 million), which have been internalized. It notes different figures have been provided in a submission by the Australia Institute 2017 ($130.6 million). The different figures are based on different assumptions and the calculation method for both figures is not transparent.

361. As a result of the review BISOE 2017 made the following recommendations:
    - employment benefits (and associated tax benefits) either be removed from the CBA or a better justification should be made for the existence (and claimed size) of such benefits. In addition, there should be an acknowledgement of the existence of shadow price of unemployed labour even if such costs cannot be quantified;
    - project costs and revenues and the composition of the Net Producer Surplus be more transparently indicated, along the lines suggested in the Guidelines; and
    - the flow on effects at the State-wide level be removed from the EIA Summary, to be consistent with the stipulations of the CBA guidelines issued by NSW Treasury (2017).

    It also recommended that the issues in relation to LEA be addressed.

362. BISOE, in response to certain matters in the Hume Coal RTS concluded that:

- *"the issues raised in the Second Response do not appear to materially affect the findings of BISOE 2017 and the appropriate economic NPV for the project is $127 million, as suggested in BISOE (2017);*
- *the pine-feather method may have risks, however, without considering the other downside risks mentioned below, the volume of coal extracted from the HCP would need to fall to an average of 227,000 tonnes per year (compared to an estimated average 1.6 million tonnes per year) before the project reached an economic break-even point (zero Net Present Value or NPV);*
- *the EIA already allows for a total of $9.2 million in "make good" provisions and for the purchase of water licenses over the course of the HCP. Above and beyond this (and again in isolation from other downside risks) some 6,100 ha to 23,800 ha of agricultural land would need to be lost to production for a period of 46 years before the project reached a zero NPV;*
- *by one measure, (and without considering other downside risks) 196 heritage locations would need to be lost before the project recorded a zero NPV; and*
- *while there may be concerns around the growth generated by the HCP (as opposed to other local growth priorities such as tourism and nature- based activities), this in itself is not an economic issue. However, to the extent that it is felt that quality of life is impacted by the presence of the HCP, this could be quantified by further survey work.*

None of the above mine production, groundwater, heritage and growth/quality of life issues are, in isolation, likely to make the HCP economically unviable (i.e. produce a project NPV below zero). Nonetheless, in each case, less severe impacts could act to reduce the economic case for the mine. Moreover, as indicated, all of these downside risks were considered in isolation to one another. Some of these factors could potentially act in combination with one another. If this were to be the case, it could substantially reduce the economic case for the HCP."

363. The Department's PAR stated that despite these risks and uncertainties, *"Mr Tessler concluded that none of these risks and uncertainties is likely to make the project economically unviable, however he noted that 'it could substantially reduce the economic case' for the project".*

364. In addition, the Department's PAR stated that it "*does not consider that there is any existing shortage in coking or thermal coal that needs to be filled*" and that *"given the project's relatively low annual production rate of thermal coal and the Applicant's plans to export the majority of the coal, the Department does not consider that the project would make any material difference to power generation in NSW or reduce electricity prices for consumers."*

365. The Department's PAR concluded that in relation to Project economics, *"While the project is likely to have some level of economic benefits for the state of NSW, the scale of these benefits needs to be carefully weighed up against the potential impacts of the project on the environment and the community."*

*"The Department considers that the economic benefits cannot be realized without significant adverse impacts on the environment and the community, particularly in relation to groundwater impacts. At this stage, the Department does not consider that the econom*ic *benefits outweigh the likely adverse impacts on the environment and community"*

INFORMATION PROVIDED TO THE COMMISSION

366. During the meeting with the Commission on 11 February 2019, the Applicant questioned the applicability of the Treasury Guidelines to the Project on the basis that these Guidelines only apply to Government projects. However, this was not reiterated in the Applicant's Submission to the Commission.

367. The Applicant's Submission responded directly to many of the statements made in the Department's PAR as being incorrect and challenges a number of the assumptions made by the Department's independent expert and included a comparison table with other recent determinations of mining projects by the Department to demonstrate that the net benefit of $373 million is not "*relatively low*" as stated by the Department's PAR. However, the Applicant's Submission also stated that "*economic benefits of a project should be assessed on their own merits and that it would be erroneous to adopt a "relativity" approach to assessing the economic benefits of a project*".

COMMISSION'S FINDINGS AND RECOMMENDATIONS

368. The Commission in its assessment of merits of the Project has had regard to economic benefits and impacts. The Commission has had regard to the Material before it and given consideration to the issues raised in public submissions. Relevant excerpts from submissions included:
    - concerns that the Project is not consistent with the "clean, green image" of the area and its cultural landscape;
    - that there are significant elements of the Project that add risk to the Shire's economic development opportunities in sustainable agriculture and tourism;
    - the visibility of the Project, particularly its surface infrastructure, and the risk to water resources, would impact on the Southern Highland's brand of agriculture and its tourism appeal. This would put at risk numerous sustainable jobs, both now and increasingly into the future;
    - existing tourism and agriculture provide a number of jobs and there is low unemployment in the area. There was concern that the mine would potentially compete for employment with these industries;
    - that the Project has already impacted on the local economy, with about $1.4 million in investment on hold because of the uncertainty about the mine;
    - concerns that the EIA had not accurately assessed the economic impacts on the local area, in particular, those properties that would be directly affected by the mine through impacts such as noise, visual and groundwater changes;
    - concerns pertaining to the impacts on local property prices; and
    - the potential benefits from additional local employment.

369. The Commission notes that that the EIA was peer reviewed by BISOE 2017, which found that the EIA is well researched and (with some exceptions) well-presented but raised concerns related to the consistency of aspects of the EIA with the 2015 Guidelines and the NSW Treasury (2017) NSW Government Guide to cost benefit analysis (Treasury Guidelines).

370. The Commission understands that BISOE 2017 also raised concerns about transparency in the description of Project costs and revenues and that there was ambiguity about the size of externalities, which is not explicitly quantified in the EIA and is internalized into the Project costing. These factors could further reduce the net benefit of the Project.

371. The Scope of Work issued by the Department for BISOE 2017 included a requirement to assess the consistency of the EIA with relevant Government guidelines including the 2015 Guidelines and the Treasury Guidelines. The EIA states that it is consistent with relevant Government guidelines. BISOE 2017 notes that:

"While the Treasury Guidelines refer to government initiatives and indicate that these initiatives are not intended to replace agency-specific advice, they also note that they are intended to encourage a common analytical approach to CBA across NSW Government (p. 6). In this context, the Treasury Guidelines (p. 6) also refer to the NSW Government (2015), Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals as publically available sector specific guidelines."

372. The Commission notes that the concerns and recommendations in BISOE 2017 have not been thoroughly addressed in the subsequent documents submitted by the Applicant. In particular, the Updated EIA is based on the same interpretation of the 2015 Guidelines and Treasury Guidelines and contains the same lack of transparency about the Project costs and revenues. The Updated EIA has not been peer reviewed and therefore the additional information regarding externalities, including groundwater and GHG emissions and other changes such as the Project description have not been reviewed. Similarly, the estimated net benefit of the Project, based on different assumptions regarding coal price forecasts, delays in mine schedule and updated capital and operating costs, has not been reviewed.

373. The Commission notes that the Department's PAR includes a net economic benefit of NPV $373 million based on the Updated EIA but refers to the estimate of net economic benefit in BISOE 2017 of NPV $127 million. The BISOE 2017 amount is based on the EIA figures and would need to be revised to reflect the Updated EIA.

374. The Commission finds that whilst that the Applicant and Department have considered and assessed the impacts on economics, at this stage of its assessment the Commission finds that it is not satisfied with the level of information and assessment provided. Consequently, the Commission finds that there are residual uncertainties about the quantum of net economic benefit to NSW that would result from the Project. These uncertainties go beyond the uncertainties that would relate to all mining projects such as commodity price, exchange rate fluctuations and geological uncertainty. The uncertainties relate to the interpretation of the 2015 Guidelines and Treasury Guidelines, which significantly impact on the estimated net benefits of the Project. The application of these guidelines would need to be clarified by the Department prior to any further economic assessment being undertaken.

375. There are also uncertainties about the capital and operating costs of the Project, which have not been made available due to concerns about commercial confidentiality. While this may be valid in relation to any public distribution of this information, the concerns should not preclude independent peer review with appropriate confidentiality agreements in place. Similarly, the assumptions and costing regarding externalities should be available for independent review.

376. The costs also need to be considered of any changes to the Project in response to matters such as mine design to address safety, any future requirement for a water treatment plant, impacts from changes to the water table on trees, landscapes and agriculture outside the Project area, additional "make good" measures including potential legal costs and if access to properties for exploration is refused.

377. Assumptions in the EIA and Updated EIA in relation to employment numbers and percentage of unskilled workers and whether these come from outside the local area should also be reviewed for consistency with the assumptions used in the Social Impact Assessment.

378. These uncertainties need to be resolved before the economic benefits of the Project can be weighed against the potential impacts of the Project on the environment and the community.

379. The Commission makes the following recommendations that will require further information and/or assessment:

R20 The additional information provided by the Applicant, including the Updated Economic Impact Assessment prepared by BA Economics in October 2018, should be peer reviewed to determine:

i. whether the concerns and recommendations in the Economic Impact Assessment Review dated December 2017 prepared by BIS Oxford Economics (BISOE 2017) have been adequately justified, including concerns about transparency in relation to project costs, revenues and externalities; and

ii. the implications and reasonableness of changes/assumptions in the Updated Economic Impact Assessment including the change to the project description from that in the Hume Coal Environmental Impact Statement and any cost implications.

Following the peer review, if the net economic benefit of the project remains uncertain and there are outstanding concerns about the assumptions and/or information, a further Economic Impact Assessment should be prepared that is consistent with the recommendations in BISOE 2017 (as set out in pages 1-3 of the Executive summary of BISOE 2017) and any further recommendations of the peer review.

R21 The Department should address whether assumptions in the Updated Economic Impact Assessment in regard to employment numbers and percentage of unskilled workers and whether these come from outside the local area are consistent with the assumptions used in the Social Impact Assessment

R22 The Applicant is to address the residual economic uncertainties, regardless of the strict interpretation of the 2015 Guidelines and Treasury Guidelines.

8.14 Nature of the Market for Coal

APPLICANT'S CONSIDERATION

380. The Hume Coal EIS and supporting documents are predicated on there being ongoing markets for coal, both local and export.

DEPARTMENT'S ASSESSMENT

381. The Department's PAR comments that it "*does not consider that there is any shortage of coking coal or thermal coal that needs to be filled*".

NEW INFORMATION PROVIDED TO COMMISSION

382. Because of the potential importance of this issue, the Commission tasked one of its members, who has significant experience in the coal industry and with the operation of coal markets to undertake research of this issue. What follows is the outcome of the study which has been considered by Commission members.

COMMISSION'S FINDINGS AND RECOMMENDATIONS

383. The supply of coking coal from NSW is small. The southern coalfield is the only coalfield in NSW producing hard coking coal. Production in recent years has been falling.

384. Semi hard coking coal, which Hume Coal would produce, is expected to trade at 80 to 90% of Queensland hard coking coal price. This discount to the hard-coking coal price was not used in the economic evaluation of the Project. A much lower price was used than is currently being realised.

385. According to the Resources and Energy Quarterly, December 2018, Office of the Chief Economist, the Commonwealth Department of Industry, Innovation and Science:

> "*There is growing demand for coking coal. World steel production is forecast to increase by 1.8 per cent annually from 1,689 million tonnes in 2017 to 1,780 million tonnes in 2020. Higher production will be led by growth in India and other emerging markets, while production in China - which represents half of world production — is expected to be steady in 2019 and taper in 2020, driven by an expected slow-down in economic activity.*
>
> *Emerging markets (excluding China) are forecast to increase steel production by 2.5 per cent each year, from 328 million tonnes in 2017 to 345 million tonnes in 2020. Higher production will be driven by the ongoing expansion of India's steel-making capacity. India's steel production is forecast to grow by 6.7 per cent annually, to reach 123 million tonnes in 2020. Higher consumption will be driven by rising consumption in India and other parts of Asia. India's increased steel consumption is driven by rapid urban population growth, substantial government investment in infrastructure, housing and urban development, and its growing manufacturing sector.*

India's metallurgical coal imports have surged in 2018, driven by the ongoing expansion of the domestic steel sector. Metallurgical coal imports grew to 45 million tonnes in the year to September, an increase of 19 per cent year-on-year. India is forecast to overtake China as the world's largest importer of metallurgical coal in 2020, with India's imports forecast to grow steadily over the next two years, to reach 71 million tonnes in 2020. India has limited domestic reserves of metallurgical coal, and will need to increase imports to support the rapid growth of its domestic steel industry.

While the traditional importers in the Asian market — China, Japan and South Korea — will continue to dominate the seaborne market, import growth from these countries is forecast to remain largely subdued. Many countries are building up their steel capacity to meet demand from the construction sector, driven by large infrastructure projects. In particular, Vietnam, Indonesia and Malaysia have substantial additions to blast-furnace steel capacity, which will support the demand for metallurgical coal.

There is also increasing demand for Australian thermal coal in the medium term. Australia's thermal coal export earnings totalled $7.2 billion in the September quarter of 2018, increasing by 34 per cent year-on-year. The strong growth in export earnings was driven by high prices and growth in export volumes, which increased by 4.1 per cent year-on-year. Australia's thermal coal export earnings are forecast to grow from $23 billion in 2017–18 to a new record of $26 billion, before declining to $20 billion in 2019–20."

386. The International Energy Agency (2018) World Energy Outlook stated that:

"*India and south east Asia are expected to be the key drivers of growth in coal use, with demand in those regions projected to more than double between 2017 and 2040*".

"*Among the coal exporting countries, only Australia is projected to substantially ramp up coal production, supported by locational advantage to growing Asian markets and a high quality resource base*"

R23 The Applicant or the Department, or both of them, should review the market for coking coal, including the most recent forecasts by the Australian Government.

8.15 Social Impact

APPLICANT'S CONSIDERATION

387. The Hume Coal EIS was accompanied by a Social Impact Assessment (**SIA**) prepared by EMM Consulting Pty Ltd which "…*examined changes that are likely to occur as a result of the project. The assessment considered measures to enhance social opportunities from the project as well as measures to mitigate negative impacts during all its phases."*

388. In relation to potential negative social impacts, the Hume Coal EIS stated that during construction these will be *"…largely eliminated by the provision of a well-managed accommodation village, which will house non-local construction workers."* Conversely it stated that there will be negative social impacts during the final closure and decommissioning phase as it *"…will result in a loss of jobs and a consequent decline in economic activity."* Notwithstanding, the benefits of the Project *"…will continue as disturbed land will be rehabilitated and there will be an ongoing legacy from the project's contribution to the community during the life of the project through a Voluntary Planning Agreement."*

389. In relation to mitigation measures to offset the negative social impacts, the Hume Coal EIS stated that *"A set of mitigation and management measures will be put in place that have been designed to address specific impacts that will coincide with each phase of the project. All of the measures will be developed and detailed in a social impact management plan, which will include periodic monitoring of the effectiveness of measures and will be revised as necessary throughout the life of the project"* and that *"Social impacts will be managed using a multi-stakeholder approach that has proven to be effective in other resource development jurisdictions."*

390. In relation to the predicted social benefits of the Project, the Hume Coal EIS stated that "…*the project will create a modest increase in job opportunities and contribute to strengthening the skills base of the local workforce…"* and that the predicted social outcome of the Project's operational phase will be *"…the creation of approximately 300 long-term employment positions, most of which will be filled by locals, and a substantial economic stimulus to the area from greater local expenditure…During operations the project area will experience noticeable change but no impacts will be of a level that will be unacceptable, and substantial social benefits will occur."*

391. The Hume Coal EIS stated that other benefits include *"…skills improvements through training and continued investments in community facilities through a Voluntary Planning Agreement"* or generated from the Applicant's Charitable Foundation and concluded that *"…the project will be socially beneficial. This will be the case for three of the four phases of the project's lifecycle that is from planning through to the end of operations. Negative effects will outweigh positive effects only during the final closure phase which has a short duration. The greatest benefit will occur during the operations phase and most of these benefits are of long duration and benefit the whole region."*

392. The Berrima Rail EIS did not include a Social Impact Assessment and stated that the "…*net overall outcome of environmental, economic and social impacts is positive and therefore it is considered the project is orderly development and will be in the public interest."* and that *"The project, resulting from this thorough design process, represents the best of the alternatives available when all relevant economic, environmental and social impacts and benefits are taken into consideration. Consequently, it will have minimal adverse impacts."*

393. The Hume Coal RTS sought to address agency and community comments relating to the absence of any social impact assessment for the Berrima Rail Project and provided a Social Assessment that summarised social impacts resulting from the rail component of the Project on noise, dust, train curfew and rail crossings.

394. In relation to social impacts derived from noise impacts, the Hume Coal RTS stated that *"The results of the noise assessment of the Berrima Rail Project found that noise from the operation of the trains along the Berrima Branch Line (including both other users and Hume Coal Trains) will satisfy all relevant government criteria at the nearest sensitive receivers, with the exception of one assessment location (28), which is predicted to be impacted by noise from the project above the trigger level for voluntary mitigation rights."*

"Operation of Hume Coal trains on the broader rail network is predicted to only cause a negligible or marginal increase in rail noise levels, which is consistent with the small number of trains (up to four per day) Hume Coal will add to this large rail network. Noise from the rail maintenance facility will impact only one location where a negligible 1 dB over the Project Specific Noise Level is predicted for the less sensitive daytime period only. Further, the likelihood of sleep disturbance from the project is predicted to be minimal and consistent with current rail operations."

395. In relation to social impacts derived from dust impacts, the Hume Coal RTS stated that *"…the air quality impact assessment of the Berrima Rail Project (Ramboll Environ 2017b) found predicted concentrations from existing Berrima Branch Line users are well within the acceptable range of air quality criteria at all surrounding receptors. The introduction of additional Hume Coal train movements and associated increase in annual air pollutant emissions will increase ground level concentrations slightly; however, the increase in emissions will not result in exceedance of any applicable air quality criteria at any receptor location."*

396. In relation to social impacts derived from train curfews, the Hume Coal RTS stated that *"…the scheduling of train paths on the broader rail network is determined by the track owner, the Australian Rail Track Corporation (ARTC), and not Hume Coal. Hence, a curfew at Berrima and Moss Vale is not an option that is available to Hume Coal. Notwithstanding, a curfew is not considered practical or necessary to minimise noise and vibration due to the reasons outlined above, nor light emissions. The additional source of light from the Berrima Rail Project will be at the rail maintenance facility, where lighting will be installed and operated in accordance with Australian Standard (AS) 4282:1997 - Control of obtrusive effects of outdoor lighting."*

397. In relation to social impacts derived from impacts to local rail crossings, the Hume Coal RTS stated that *"…Hume Coal acknowledges the existing concern of some community members relating to rail crossings. However, the additional delays at level crossings resulting from the extra Hume Coal trains will not be a significant increase to the total length of time each day when the affected level crossings will be closed to road traffic. The management of rail level crossings is the responsibility of the respective rail line operators; that is the ARTC for the line between Moss Vale and Robertson, and Boral for the Berrima Branch Line and therefore any future decisions to upgrade railway level crossings is the responsibility of these rail line operators."*

DEPARTMENT'S ASSESSMENT

398. The Commission notes that the Department's PAR has not expressly considered the social impacts of the Project.

COMMISSION'S FINDINGS AND RECOMMENDATIONS

399. The Commission in its assessment of merits of the Project has had regard to its consideration of the social impacts of the Project. The Commission has had regard to the Material before it and given consideration to the issues raised in public submissions. Relevant excerpts from the submissions included:
    - Hume Coal is already having a physical and mental toll on residents. Residents have described their feelings of anxiety, fear, angst, depression, traumatisation, helplessness, uncertainty and stress. These types of social impacts are unlikely to quickly disappear. No amount of tree screenings, barriers, making good offsets, buybacks or any other conditions of consent are likely to resolve these social impacts, nor turn the Project into a no impact mine;
    - there is no social licence for Hume Coal's mine;
    - safety concerns over possible delays to emergency vehicles caused by increased train movements on level crossings;
    - socially, there will be adverse impacts on existing residents and businesses;
    - Southern Highlands area has had a unique social and economic role and its heritage values need recognition and protection if they are to survive into the future. These values are incompatible with the development of the coal mining landscape;
    - Hume Coal Project is already having a significant negative social impact to residents of the Shire, and council strongly disagrees with the social impact assessment conclusions put forward by Hume Coal; and
    - the social impacts have been chronic and severe. The symptoms we've seen across the district have included physical illness, alcohol abuse, marital stress, anxiety and depression, constant feelings of uncertainty and hopelessness, financial worries, and the inability to plan for the future.

400. The Commission finds that that the Applicant has considered the potential social impacts of the Project. However, at this stage of its assessment the Commission finds that it is not satisfied with Department's assessment of social impacts because the Department's PAR does not reflect any social impact assessment having been conducted. In particular, while the technical compliance of matters such as noise, air quality etc has been considered the social impacts on those people most affected by the mine have not been assessed. Furthermore, the assumptions in the SIA in relation to employment numbers and percentage of unskilled workers and whether these come from outside the local area should also be reviewed by the Department for consistency with the assumptions used in the Economic Impact Assessment as well as the demographics of the proposed workforce and potential impacts on existing employment in other industries in the local area.

401. The Commission makes the following recommendations that will require further information and/or assessment:

R24 The Applicant should consider updating its Social Impact Assessment in accordance with the Department's 'Social Impact Assessment Guidelines – September 2017' and ensure consistency with the assumptions of the revised Economic Impact Assessment.

R25 The Department, regardless of any further assessment provided by the Applicant, should assess the Project in accordance with its 'Social Impact Assessment Guidelines – September 2017' and report on the findings of this assessment in its Final Assessment Report.

8.16 Suitability of the Site

APPLICANT'S CONSIDERATION

402. The Hume Coal EIS contains the following description of the Project Area:

> "*The project area is in a semi rural setting, with the wider region characterised by grazing properties, small scale farm business, natural areas, forestry, scattered rural residences, villages and towns, industrial activities such as the Berrima Cement Works and Inghams Berrima Feed Mill, some extractive industry and major transport infrastructure such as the Hume Highway.*
>
> *There is a long history of mining in the Southern Coalfield, including mining for coal, iron ore, bauxite, gold, diamonds, shale, clay and kerosene shale. There is also a history of hard rock quarrying in the area, including basalt quarries at Exeter and Mount Gingenbullen as well as the heritage listed dimension stone quarry at Mount Gibraltar. Mining still occurs at various locations within the Wingecarribee Shire local government area (LGA), including the Dendrobium longwall coal mine in the shire's north east. Deposits of potentially commercial bauxite are known to occur in the south of the shire."*

403. The Hume Coal EIS further stated that "*Approximately 117 ha, or 2%, of the project site will be occupied by surface infrastructure and associated facilities, on land owned by Hume Coal. The proposed location of the surface infrastructure area was carefully chosen following evaluation of a number of alternatives. The surface infrastructure is located on mainly cleared land, and was sited where the topography will shield much of the infrastructure from public view insofar as is possible. Above the underground mine, the only material surface disturbance will be drilling sites, ventilation infrastructure, mine access points and access tracks linking various facilities. These will be generally on Hume Coal owned or controlled land, or land where an access agreement is in place with the landowner."*

404. In relation to the suitability of the site, the Hume Coal EIS stated that "…*the project area is suitable for an underground coal mine…"* as the Project *"…will efficiently recover an economic coal resource beneath privately owned land where underground mining is permissible. Resources extracted in this way will avoid land use conflicts by continuing existing land uses at the surface and minimising impacts to significant environmental, cultural and built features."*

405. As to the Berrima Rail Project, the Berrima Rail EIS stated that "…t*he project area is considered to be suitable for the rail works…"* as the Project *"…will facilitate the efficient transport of coal produced by the Hume Coal Project to market while also maintaining current rail usage by other users, currently Boral, Inghams and Omya. The project will avoid land use conflicts by using existing rail infrastructure where possible and by locating new rail works in areas which avoid impacts to significant environmental, cultural and built features."*

DEPARTMENT'S ASSESSMENT

406. The Department's PAR makes the following comments:

> *"The Department acknowledges that there are some advantages to the site as a coal mine, most notably the existence of a valuable coal resource and the presence of existing transportation infrastructure."*

"However, the targeted coal resource is located in a shallow seam that is inherently difficult to extract without causing adverse environmental impacts and disturbing existing land uses. The project is also located within the upper reaches of Sydney's drinking water catchment."

"In addition, while coal mining plays a part in the Southern Highlands region's history and heritage, the region is now more widely known for its rural land uses, small-scale agriculture, scenic landscapes and tourism. The area surrounding the proposed coal mine features relatively dense, small-scale agricultural lots with most properties holding registered bores in order to gain access to productive groundwater aquifers."

"These unique characteristics have led to an unconventional mine design that presents a range of uncertainties and safety risks, as well as the likelihood of significant impacts on water resources."

"Consequently, the Department is concerned that the project site is not suitable for the development of a new coal mine."

407. Under 'Other Impacts' the Department's PAR further commented:

"*The Department has also undertaken a comprehensive assessment of the full range of other potential impacts, including economics, noise, vibration, air quality, greenhouse gas emissions, traffic, biodiversity, heritage, agriculture and rehabilitation.*

The Department considers the majority of these potential impacts would be similar to, or less than, other approved underground mining projects. The Department accepts that these potential impacts are able to be managed, mitigated or offset to achieve an acceptable level of environmental performance, subject to the provision of additional information or via suitable conditions of consent."

INFORMATION PROVIDED TO THE COMMISSION

408. The Applicant's Submission responded to specific comments in the Department's PAR about site suitability and stated that "*The suitability of the site is summarised in Chapter 24 of the EIS (EMM 2017) which explains that principally, the project will efficiently recover an economic coal resource beneath privately-owned land where underground mining is permissible. Resources extracted in this way will avoid land use conflicts by continuing existing land uses at the surface and minimising impacts to significant environmental, cultural and built features. The site is well served by necessary services and infrastructure, particularly nearby rail infrastructure and Port Kembla. A range of commitments have been made by Hume Coal to mitigate potential impacts on surrounding land uses. When these commitments are applied, the project is unlikely to have a significant land use impacts.*

It should also be recognised that the land upon which the project is to be constructed is currently subject to an exploration licence under the NSW Mining Act 1992 and, as noted on page 9 of the DPE's Assessment Report, has been subject to an exploration licence since 1985. Therefore, mining activities in the form of exploratory drilling and prospecting has been an existing land use in the area for many years. More broadly, 11 mines have operated in the Southern Highlands region, with mining undertaken in the region for 150 years."

COMMISSION'S FINDINGS AND RECOMMENDATIONS

409. The Commission in its assessment of merits of the Project has given particular regard to its consideration of the suitability of the site of the Project. The Commission has had regard to the Material before it and given particular consideration to the issues raised in public submissions, which included:
    - the Project site is not suitable for the development of the new coalmine;
    - impact of the mine on the Hawkesbury Sandstone aquifer, both in terms of protection of the quality and volume of water in the aquifer and the ability of the Applicant to make good the lowering of head in bores at properties surrounding the mine;
    - impacts of noise and air quality on communities like Berrima; and
    - concern that the sight of the mine infrastructure from the Hume highway might deter tourists from visiting Berrima. These issues have been discussed under separate headings above.

410. It is the finding of the Commission that matters to do with protection of aquifer and the ability of landowners with registered bores to maintain their access to groundwater loom perhaps largest in the community's mind about the suitability of a mine on this site. The Commission has also noted in its consideration of the issues discussed in the foregoing sections that the Department's PAR does not demonstrate that a comprehensive assessment has been undertaken of a number of issues, including social, economics, greenhouse gas emissions, visual impact. The Commission has indicated what additional information and consideration needs to be given in specific areas. This is required before a decision about the suitability of the site for an underground mining enterprise can be made.

8.17 Statutory Environmental Planning Instruments

APPLICANT'S CONSIDERATION

411. The Hume Coal EIS included a description and consideration of the following Environmental Planning Instruments (**EPIs**) as they apply to the Project.
    - *State Environmental Planning Policy (State and Regional Development) 2011;*
    - *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007;*
    - *State Environmental Planning Policy No 33 – Hazardous and Offensive Development;*
    - *State Environmental Planning Policy No 44 – Koala Habitat Protection;*
    - *State Environmental Planning Policy No 55 – Remediation of Land;*
    - *State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011;* and
    - *Wingecarribee Local Environmental Plan 2010*

412. The Berrima Rail EIS included a description and consideration of the above EPIs as well as the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007.*

413. The Applicant's Submission responded to specific comments in the Department's PAR about site compatibility and stated that "*Hume Coal considers the suggestion that a new coal mine may not be compatible with the "existing, approved and likely preferred land uses" of the E3 and RU2 zones to be inaccurate speculation that fails to have regard to the fact that the project:*
    - *is of a temporary nature, having a project life of 23 years;*
    - *is an underground mining project rather than an open cut project;*
    - *does not propose to have any surface tailings facilities or permanent waste rock emplacement areas;*
    - *has been designed to minimise environmental impacts. In particular, and unlike most other coal mines in the Southern Coalfields, a non-caving underground mining method was chosen to specifically avoid any subsidence impacts on the surface and so that the existing land uses could continue throughout the mine life on the vast majority (98%) of the project area; and*
    - *the site will be able to be rehabilitated to its earlier, pre-disturbance state in a manner that is compatible with existing, approved and likely preferred land uses in the vicinity of the project site.*

    In Hume Coal's view, the "concerns" raised by the DPE in its consideration of clause 12 of the Mining SEPP are not supported by evidence and ignore the important features of the project as described in the EIS, which indicate land use compatibility of the project with existing, approved and likely preferred land uses in neighbouring areas.

414. The Hume Coal EIS had particular regard to *State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011* (**Drinking Water SEPP**) and provided consideration around 'neutral or beneficial effect' (NorBE) requirements within the 'Water Resources' chapter.

415. As a result of MUSIC modelling undertaken, the Hume Coal EIS stated that "*… the potential TSS and nutrient loads and concentrations in Oldbury Creek show discharge will be in accordance with the NorBE criteria. A smaller area of the agricultural catchment will drain to Oldbury Creek during the operational phase, which will result in a significant reduction of more than 10%, and therefore acceptable within NorBE criteria, of the mean annual TSS and nutrient loads reporting to the creek compared with the existing situation.*" MUSIC modelling was also performed to assess the potential impacts of runoff from the two mine access roads located outside of the water management system, and "*Results show that, with the implementation of appropriate vegetated swales as a treatment measure, NorBE criteria will be met*."

416. The Hume Coal EIS concluded that "*… the PWD has enough capacity to contain all surplus water and treatment and release of water from the PWD is not required*."

417. The Hume Coal EIS and Berrima Rail EIS did not identify any inconsistencies or non-compliances with the relevant EPIs.

418. The Hume Coal RTS provided additional clarification around compliance and consistency with relevant EPIs but did not provide any fundamentally new information.

DEPARTMENT'S ASSESSMENT

419. The Department's PAR identified the same EPIs as being relevant to the Project as the Applicant, with the addition of State Environmental Planning Policy (Infrastructure) 2007.

420. In relation to the Hume Coal Project permissibility the Department's PAR has considered the zoning of the site in accordance with the provisions of the *Wingecarribee Local Environmental Plan 2010* (**WLEP**). Pursuant to the WLEP the site is zoned:
- E2 – Environmental Conservation;
- E3 – Environmental Management;
- RU2 – Rural Landscape;
- RU3 – Forestry; and
- SP2 – Infrastructure.

421. In relation to the permissibility of the Hume Coal Project, the Department's PAR stated that under the WLEP, "*… mining development is prohibited in all of these land zones. While clause 7(1)(a) of the Mining SEPP permits 'underground mining' to be carried out on any land, it is only allowed subject to development consent*."

422. In relation to the Berrima Rail Project permissibility the Department's PAR has considered the zoning of the site in accordance with the provisions of the WLEP. Pursuant to the WLEP the site is zoned:
- IN1 – General Industrial;
- IN3 – Heavy Industrial;
- E2 – Environmental Conservation;
- E3 – Environmental Management;
- RU2 – Rural Landscape; and
- SP2 – Infrastructure.

423. In relation to the permissibility of the Berrima Rail Project, the Department's PAR stated "*Under the LEP, the proposed rail works are permissible in the IN1 and IN3 zones but prohibited in the RU2, SP2, E2 and E3 zones. However, under clause 7(1)(b) of the Mining SEPP, development for the purpose of 'mining' (which includes "transportation of materials extracted") may be carried out on land:*
    - *where development for the purposes of agriculture or industry may be carried out (i.e. both the RU2 and E3 zoned land); or*
    - *on land that is the subject of a mining lease (i.e. the E2 zoned land)."*

    "Consequently, the proposed rail works are permissible in the land zoned RU2, E2 and E3, however it is prohibited under both the LEP and the Mining SEPP on the land zoned SP2."

    "…the consent authority has the power to override a partial prohibition for State Significant Development…".

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

424. The Department's PAR also assessed the Project against Clause 12 of the Mining SEPP and stated that "*… the zoning provisions of the LEP are relevant to the extent that they influence the existing, approved and likely preferred land uses in the project area and its surrounds*."

425. The Department's PAR concluded that "*…that the project is not necessarily incompatible with the existing or likely land uses in RU3 or SP2. However, the objectives of the E2 and E3 zone are aimed at protecting existing historic, ecological, cultural and aesthetic values. Similarly, the RU2 zoning is focussed on maintaining the "rural landscape character" and "encouraging sustainable primary industry"*."

    "*Importantly, both the E3 and RU2 zones include non-mandatory objectives, which reflects that there are specific characteristics of the existing land uses that Council would like to protect. Based on the limited list of permitted land uses and the non-mandatory objectives in both zones, the Department is concerned that a new coal mine may not be compatible with the "existing, approved and likely preferred land uses" of these zones*."

State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011

426. In addressing the Drinking Water SEPP, the Department's PAR identified that due to its residual concerns around the underground impoundment of water "*If the mine water cannot be stored underground or in surface dams, it would ultimately need to be discharged at the surface*."

427. Furthermore, the Department's PAR stated that "*While the EIS mentions a water treatment plant as "provisional infrastructure" and the potential discharge of treated water to Oldbury Creek, the Response to Submissions confirms that neither of these aspects are included in the project, and neither have been assessed. The discharge of untreated mine water may cause significant adverse impacts on the receiving environment given the quality of the mine water. This is particularly problematic as the project is located within Sydney's drinking water catchment, which means it must comply with the 'neutral or beneficial effect' (NorBE) test*."

428. In relation to Agency submissions the Department's PAR stated that WaterNSW had "*residual concerns about the Applicant's assessment of the impacts of the project against the neutral or beneficial effect test (NorBE), particularly in relation to a lack of mass balance analysis for Medway Rivulet*", and "*recommended the imposition of strict performance criteria including a 'negligible reduction' in both surface water flow and water quality*."

429. The Department's PAR concluded that "*the project may not conform with the Drinking Water Catchment SEPP.*"

INFORMATION PROVIDED TO THE COMMISSION

430. The Applicant's Submission provided some additional clarifications regarding NorBE compliance and reiterated that "*Most panels storing water during mining are down dip (down hydraulic gradient). The only ones that are not are at the end of mining and not used to store significant water. As a minimum, should water be unable to be stored underground, an assessment against NorBE criteria would need to be undertaken and calculated on the final volume (ie it will not be the total volume).*"

COMMISSION'S FINDINGS AND RECOMMENDATIONS

431. The Commission in its assessment of merits of the Project has had regard to its consideration of the relevant statutory requirements. The Commission has had regard to the Material before it and given consideration to the issues raised in public submissions. Relevant excerpts from the submissions included:
    - very little attention given to the State Environmental Planning Policy relating to the Sydney drinking water catchment and that the Project had to achieve the NorBE criteria;
    - simply not consistent with NSW planning law for a new coal mine to go ahead in NSW in terms of the Paris Agreement;
    - Under the Wingecarribee LEP, mining development is prohibited in all of these land zones;
    - precautionary principle is triggered; and
    - that the Project was inconsistent with the compatibility criteria of the Mining SEPP.

432. The Commission finds that that the Applicant and Department have considered and assessed the Project against the relevant statutory framework.

433. The Commission in its assessment of the Project is satisfied that the Project is consistent with the provisions of the following EPIs:
    - *State Environmental Planning Policy (State and Regional Development) 2011;*
    - *State Environmental Planning Policy No 33 – Hazardous and Offensive Development;*
    - *State Environmental Planning Policy No 44 – Koala Habitat Protection;*
    - *State Environmental Planning Policy No 55 – Remediation of Land; and*
    - *State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011.*

    However, the Commission has formed the view that greater consideration of the Drinking Water SEPP and the Mining SEPP is required.

434. In relation to the Drinking Water SEPP the Commission finds should the proposal to impound water in the underground voids behind bulkheads be achieved and no discharge of mine related water occurs to surface waters, the Commission is satisfied that the Project can achieve the objectives of the Drinking Water SEPP. The Commission notes however that the provision of additional information may change this view.

435. In relation to the Project permissibility the Commission notes that pursuant to the WLEP, all the land use zones within the site prohibit mining activities, however clause 7(1) of the Mining SEPP stated that:

    Development for any of the following purposes may be carried out only with development consent:

(a) underground mining carried out on any land,
(b) mining carried out:
(i) on land where development for the purposes of agriculture or industry may be carried out (with or without development consent), or
(d) facilities for the processing or transportation of minerals or mineral bearing ores on land on which mining may be carried out (with or without development consent), but only if they were mined from that land or adjoining land,

436. Based on the Material, the Commission finds that both the Hume Coal Project and Berrima Rail Project are permissible with consent pursuant to clause 7(1) of the Mining SEPP, and accepts the assessment provided by the Department in relation to this matter.

437. In addition to permissibility, the Mining SEPP requires the consent authority to have consideration of the compatibility of the Project with other land uses (clause 12). In this regard the Commission makes the following findings:

Clause 12 - Compatibility of proposed mine, petroleum production or extractive industry with other land uses

Before determining an application for consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must:
(a) consider:
(i) the existing uses and approved uses of land in the vicinity of the development, and

438. From the Material provided and the locality tour conducted on 28 February 2019, the Commission finds that there are a number of existing and approved land uses within the vicinity of the Project. These land uses include, but are not limited to rural residential, hobby farms and commercial agricultural pursuits, with industrial, residential and commercial activities occurring further afield.

(ii) whether or not the development is likely to have a significant impact on the uses that, in the opinion of the consent authority having regard to land use trends, are likely to be the preferred uses of land in the vicinity of the development, and

439. From the Material provided the Commission finds that the WLEP is the most relevant representation of what land uses are most likely to be considered the preferred uses of land in the vicinity of the Project. In producing a LEP, Council will:
- select zones as appropriate to the needs of the local area, informed by studies and consultation with the public and relevant agencies;
- outline the zone objectives, which are used to clarify the role and function of the zone; and
- determine for each zone whether to permit (with or without consent) or prohibit various land uses.

440. In considering the Mining SEPP, the Commission is required to establish whether or not the development is likely to have a significant impact on the preferred uses of land. Regardless of the permissibility exemptions afforded to mining pursuant to clause 7 of the Mining SEPP, the WLEP has sought to exclude mining as a permissible use in all zones within the vicinity of the site. The nature of the existing surrounding land uses and those permissible under the WLEP are clearly different to the Project

441. Based on the Material, the Commission finds that the preferred land uses are those which are consistent with the existing locality and future land use direction as outlined in the WLEP.

442. Based on the Material currently before it, the Commission finds that at this stage the Project may create negative impacts on the preferred land uses. As discussed in the sections above there are uncertainties about the extent of the impacts of the Project and further information is required to determine whether it would be "significant" or can be mitigated to the extent that it is acceptable.

(iii) any ways in which the development may be incompatible with any of those existing, approved or likely preferred uses, and

443. Based on the Material, and for the reasons cited above the Project is a land use that is different to the surrounding existing uses and to those uses that are permissible in WLEP. The Project is likely to generate impacts that are beyond those that would be generated by the preferred land uses. The Commission finds that the Project may be incompatible with these land uses.

(b) evaluate and compare the respective public benefits of the development and the land uses referred to in paragraph (a) (i) and (ii), and

444. Based on the Material, the Commission accepts that there could be significant public benefits derived from job creation and the revenue and expenditure generated as a result of the Project. The public of NSW could also benefit from increased Government expenditure directly resulting from mining royalties. However, based on the Material, the extent of the economic benefits of the Project remain unclear. Furthermore, there remain uncertainties about the impacts of the Project, including its social impact. The Commission, at this stage, is therefore unable to evaluate the respective public benefits of the Project and the surrounding land uses.

445. The Commission considers it important, when evaluating and comparing the respective public benefits of the Project and the existing and proposed land uses identified within the vicinity of the Project, to highlight that whilst both the Project and other land uses generate benefits, noting the limitations of current information about economic assessments and impacts, there is a significant difference in the nature of these land uses and subsequent benefits that make any direct comparison challenging.

446. However, based on the Material, the Commission's provisional view is that the preferred land uses are sustainable in the long term and will play a significant role in the future growth and development of the Southern Highlands region. The Commission considers that this is an important and relevant distinction in evaluating the public benefits of the development and the land uses referred to in paragraph (a) (i) and (ii). As with the other matters addressed in this Report, further consideration of this issue will need to be given as further information becomes available.

(c)evaluate any measures proposed by the applicant to avoid or minimise any incompatibility, as referred to in paragraph (a) (iii).

447. Based on the Material, the Commission finds that not all measures proposed to avoid or minimise impacts, and therefore incompatibility have, at this stage been satisfactorily resolved.

448. Based on the Material before it, and the critical information that the Commission is seeking from both the Applicant and the Department, at this stage of the process the Commission finds that the Project may not be consistent with clause 12 of the Mining SEPP. However, the Commission's findings represent its preliminary views at this stage of the assessment process and notes that its views may change as a result of the provision of additional information in response to this Report, information provided to the Commission independently of this Report, additional matters raised in undertaking its final assessment of the Project, or other relevant factors.

449. At this stage of its assessment the Commission finds that it is not satisfied with the overall level of assessment provided by the Department regarding Part 3 of the Mining SEPP because the Department has not provided a detailed assessment within the Department's PAR of other relevant requirements, in particular clause 14 in relation to natural resource management and environmental management, including greenhouse gas emissions.

450. The Commission makes the following recommendations that will require further information and/or assessment:

R26 The Department should provide an updated and detailed assessment of all relevant components under Part 3 of the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* with its Final Assessment Report, based on any additional information made available since the issue of the Department's Preliminary Assessment Report.

8.18 Public Interest

APPLICANT'S CONSIDERATION

451. The Hume Coal EIS considered whether the Hume Coal Project is in the public interest and stated that *"… the project is justified on economic, social and environmental grounds."* Chapter 24 sets out the Applicant's consideration of why the Project should be approved, having regard to environmental, economic and social considerations, including the principles of ecologically sustainable development (**ESD**), to address the requirements of the SEARs.

452. The Berrima Rail EIS stated that the Berrima Rail Project has been *"… carefully designed through the investigation of numerous alternative locations to avoid areas of value or sensitivity, and includes all practical measures to reduce construction and operational impacts. The Project…represents the best of the alternatives available when all relevant economic, environmental and social impacts and benefits are taken into consideration…The net overall outcome of environmental, economic and social impacts is positive and therefore it is considered the project is orderly development and will be in the public interest."*

453. Both the Hume Coal EIS and Berrima Rail EIS provided an assessment of the Project against the relevant objects of the EP&A Act:

    'To encourage the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment'

454. The Hume Coal EIS identified the natural resources within the Project area, including coal, agricultural production land, state forest and land comprising biodiversity and cultural values and stated that *"The project's main surface infrastructure area design avoids surface disturbance in the state forest and the disturbance of biodiversity and cultural heritage resources above the mine…"* and that there are *"… no predicted subsidence related impacts on biodiversity or cultural heritage assets."*

    "Impacts to surface water resources have also been assessed as minimal, with all potential impacts to surface water users and stream environments assessed as insignificant in accordance with the Significant impact guidelines (DoE 2013). Where other impacts cannot be avoided, these have been mitigated or offset…"

455. The Hume Coal EIS stated that the Project is committed to employing local residents that live within a 45-minute travel distance of the Project and stated that *"Up to 300 personnel will be employed when the mine is fully operational, bringing associated flow-on benefits to surrounding local communities where these employees will reside. A local procurement policy will also be adopted which will require local goods and services to be used in the project's construction and operation where possible thereby maximising opportunities for local businesses".*

'To encourage the promotion and co-ordination of the orderly and economic use and development of land'

456. The Hume Coal EIS recognises that the orderly and economic use of land is best served by development that is permissible under the relevant statutory framework and that does not unduly restrict other beneficial uses and stated that *"the project is permissible development which is consistent with the relevant planning controls"* and will "*… recover a valuable coal resource without significant residual impacts and will bring significant social and economic benefits to the region"* and will not "*… displace other beneficial uses in the locality."*

457. The Berrima Rail EIS stated that the "*Berrima Rail Project will enable the operation of the Hume Coal Project, and is therefore an essential component of enabling the economic benefits of the Hume Coal mine to be realised*." And that it too would "*…facilitate "orderly and economic use of land"…*".

'To encourage the protection, provision and co-ordination of communication and utility services'

458. The Hume Coal EIS stated that *"Potential impacts to existing communications and utility services have been considered as part of the project design. The project will expand or replace any affected utility services such that currently prevailing service levels will be maintained or improved."* The Berrima Rail EIS stated that the Project will have significant economic benefits as it will *"encourage the…provision of communication and utility services" and thereby satisfy the applicable objects of the EP&A Act".*

'To encourage the provision of land for public purposes'

459. The Hume Coal EIS stated that the Project Area is predominantly privately owned, with the exception of 1,296 ha of Belanglo State Forest and that *"… the project will not restrict public access to this area. Parts of the project area also contains public roads. Access will be maintained along these roads throughout the project life."*

'To encourage the provision of community services and facilities'

460. The Hume Coal EIS stated that the Hume Coal Project's net economic benefit will encourage the provision and co-ordination of community services and facilities in that *"The project will result in considerable payments to the Commonwealth in company taxes, and to the NSW Government in the form of royalties. The latter will be available to the State government to provide services across NSW. Hume Coal will also enter into a VPA or similar, which could be used by WSC to fund local community services and facilities."*

'To encourage the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats'

461. The Hume Coal EIS stated that the Hume Coal Project had been designed to address this objective, and that *"Surface infrastructure has been carefully located to avoid large tracts of native vegetation and first workings underground mining will not cause subsidence related impacts. To compensate for unavoidable disturbance, biodiversity offsets will be provided…".*

'To encourage ecologically sustainable development'

462. The Hume Coal EIS sets out the concept of **ESD** and draws on the Commonwealth Government's 1992 *National Strategy for Ecologically Sustainable Development*, which defines ESD as 'using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life now, and in the future, can be increased'.

463. The Hume Coal EIS stated that *"A comprehensive stakeholder engagement, planning and environmental assessment process has ensured that the principles of ESD are addressed. An extensive baseline monitoring program has ensured that impacts can be confidently predicted as outlined in the EIS. Mitigation and management measures have been identified, thereby addressing the Precautionary Principle"* and that *"The project will enhance community resources by generating employment and public revenues through royalties and taxes, contributing to improvements to local, State and National economies. The project will also conserve community resources directly by establishing offset areas and indirectly through effective impact mitigation.*

'To encourage the provision and maintenance of affordable housing'

464. The Hume Coal EIS stated that a temporary accommodation village would be established at the mine to accommodate employees during the construction period that are not local to the area and that *"The outcomes of the SIA* [Social Impact Assessment] *suggest that most relocating workers will move to the larger towns of Moss Vale and Mittagong, and under both scenarios will not result in a significant population increase or pressure on housing availability at any specific location."*

'To promote the sharing of the responsibility for environmental planning between the different levels of government in the State'

465. The Hume Coal EIS stated that *"all Commonwealth, State, and local government agencies that have an interest in the project have been consulted prior to and while the EIS was being prepared…All levels of government have been involved to date and this will continue as the project is determined."*

'To provide increased opportunity for public involvement and participation in environmental planning and assessment'

466. The Hume Coal EIS stated that extensive community consultation has been undertaken over a number of years, including:
    - *"numerous public information sessions,*
    - *one on one meetings and a Social Reference Group which held regular meetings.*
    - *A community shopfront established initially in Moss vale and then in Berrima gave members of the public an opportunity to find out about the project.*

    Community feedback has helped shape the project and given local input to the EIS…The public will also be involved through the exhibition of the EIS. Any relevant public representations will be considered by the DP&E during assessment of the development application."

467. The Hume Coal RTS was accompanied by additional information in relation to public interest and reiterated the information presented in the Hume Coal EIS and stated in relation to the significance of the resource that *"Matters that can be used to determine the resource's importance for NSW are: employment generation, expenditure, including capital investment, and royalty payments to the state government. The resource's importance in light of these factors can be summarised as follows:*

1. Employment generation: at its operational peak the mine will employ approximately 300 full time jobs.
2. Expenditure: capital expenditure will be around $860 million and operating expenditure will be around $1.4 billion over the life of the mine.
3. Royalties: payments to the NSW government will total around $266 million over the life of the project in 2016 dollars.

It is evident the project, which will develop the dormant publically [sic] owned resource of Wongawilli Seam coal, will be of significant benefit to the local and broader NSW communities, and for the reasons given above, will serve the public interest."

DEPARTMENT'S ASSESSMENT

468. The Department's PAR stated that in assessing the merits of the Project, the Department has considered the mandatory matters for consideration under section 4.15 of the EP&A Act, including: *"the submissions on the EIS, the likely environmental, social and economic impacts of the project, the suitability of the site, the relevant environmental planning instruments (EPIs), and the public interest, including the objects of the Act which include encouraging Ecologically Sustainable Development (ESD)."*

469. The Department's PAR made the following conclusion in relation to whether the Project is in the public interest:

"The courts in NSW have held that the concept of 'ecologically sustainable development' should be taken into account in considering the public interest. The Department considers that there is a threat of serious harm to both groundwater and surface water resources, and there is currently considerable scientific uncertainty about the level of environmental damage to both.

Consequently, the 'precautionary principle' is triggered and the project as currently proposed should not be considered an 'ecologically sustainable development'.

Further, while the project is likely to have some level of economic benefits for the state of NSW, the scale of these benefits needs to carefully weighed up against the potential impacts of the project on the environment and the community.

The Department considers that the economic benefits cannot be realised without significant adverse impacts on the environment and the local community, particularly in relation to groundwater impacts. At this stage, the Department does not consider that the economic benefits outweigh the likely adverse impacts on the environment and community.

Consequently, based on the information currently available, the Department considers that the project should not be approved."

INFORMATION PROVIDED TO THE COMMISSION

470. The Applicant's Submission challenged the Department's adoption of the 'precautionary principle' and stated that in relation to surface water impacts there is "*no reasonable basis upon which it can be concluded that there is "a threat of serious harm". As a result, the first criterion for the precautionary principle to operate in the context of impacts to surface water resources is not satisfied and the precautionary principle thus has no further application in that context*."

471. In relation to groundwater impacts the Applicant's Submission stated that "*There is not… "scientific uncertainty" as to the predicted impacts or "environmental damage" of those impacts, with the consequence that the second criterion for the precautionary principle to operate is not enlivened.*" And further that "*Even if both criteria were satisfied in respect of impacts to groundwater resources, the triggering of the precautionary principle would require a proportionate response (as stated by Chief Judge Preston in Telstra at [128]). Refusal of the project would not be a proportionate response and, in any event, the enlivenment of the precautionary principle does not dictate refusal of the proposed development (Telstra at [179])*."

COMMISSION'S FINDINGS AND RECOMMENDATIONS

472. The Commission in its assessment of merits of the Project has had regard to its consideration of public interest, the objects of the EP&A Act and ESD. The Commission has had regard to the Material before it and given consideration to the issues raised in public submissions. Relevant excerpts from the submissions included:
    - Hume Coal Project as contrary to public interest;
    - public interest includes the principles of ESD, and this Project is contrary to the precautionary principle, is therefore contrary to the elements of ESD and must be refused; and
    - it was inconsistent with the objects of the EP&A Act and that the precautionary principle should be applied.

473. The Commission finds that that the Applicant and Department have considered and assessed the Project against the public interest and the objects of the EP&A Act. However, the Commission has given further consideration to the public interest, the objects of the EP&A Act and the principles of ESD, and in this regard the Commission makes the following findings:

474. Under section 1.3 of the EP&A Act, the relevant objects applicable to the Project 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,
    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, and

j) to provide increased opportunity for community participation in environmental planning and assessment.

475. A relevant object of the EP&A Act to the Project is the facilitation of ESD. The Commission notes that section 6(2) of the *Protection of the Environment Administration Act 1991* (the **POEA Act**) states that ESD requires the effective integration of social, economic and environmental considerations in its decision-making, and that ESD can be achieved through the implementation of:
(a) the precautionary principle;
(b) inter-generational equity;
(c) conservation of biological diversity and ecological integrity; and
(d) improved valuation, pricing and incentive mechanisms.

476. Based on the Material before it, and the critical information that the Commission is seeking to be provided by both the Applicant and/or the Department, at this stage of the process the Commission's provisional view is that due to the Material currently before it, and the extent of information being sought by this Report, there is at this stage no sound basis on which to conclude that the Project is consistent with the following objects of the EP&A Act or ESD, and therefore it may not be currently in the public interest:
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;
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); and
g) to promote good design and amenity of the built environment.

477. However, the Commission's findings represent its preliminary views at this stage of the assessment process. Its views may change as a result of the provision of additional information in response to this report, information provided to the Commission independently of this report, additional matters raised in undertaking its final assessment of the Project, or other relevant factors.

478. At this stage of its assessment the Commission finds that it is not satisfied with the overall level of assessment provided by the Department regarding public interest, objects of the EP&A Act and ESD.

479. The Commission makes the following recommendations that will require further information and/or assessment:

R27 The Applicant should update its consideration of the objects of the *Environmental Planning and Assessment Act 1979* and utilise the definition of 'Ecologically Sustainable Development' from the *Protection of the Environment Administration Act 1991*.

R28 The Department should provide an updated and detailed assessment of the public interest, the objects of the *Environmental Planning and Assessment Act 1979* and 'Ecologically Sustainable Development' with its Final Assessment Report, based on any additional information made available since the issue of the Department's Preliminary Assessment Report, including the further information recommended in this report by the Commission.

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9.0 ADDITIONAL COMMISSION RECOMMENDATIONS

480. With the Material before the Commission, and the critical information that the Commission is seeking to be provided by both the Applicant and the Department, the Commission has established that in addition to the issue/impact specific recommendations made by the Commission in this Report, further recommendations are required to facilitate further consideration and assessment of the Project. These recommendations are as follows:

R29 The Department should include in its Final Assessment Report to the Commission an assessment of the public benefits of the Project which give consideration of whether:

i. the economic benefits of the Project outweigh its costs to the local community (section 4.15(1)(b) of the *Environmental Planning and Assessment Act 1979*); and

ii. the public benefits of the Project outweigh the public benefits of other land uses (clause 12 (b) of *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*).

R30 The Department should invite relevant Government agencies to review and provide comment on any new information provided by the Applicant since the Department's Preliminary Assessment Report was published, including the content of this report. In its Final Assessment Report to the Commission, the Department should consider any further Agency feedback as well as the content of this report, the Materials, and any additional information produced in response to this Report and its recommendations.

10.0 COMMISSION'S CONCLUSION

481. In response to the Minister's Request, the Commission has carefully considered the Project and the submissions made, including the issues raised in written submissions to the Commission, presentations at the public hearing, the submissions to the Department on the Hume Coal EIS, Berrima Rail EIS, the Hume Coal RTS and various other documents submitted by the Applicant, agencies and other third parties. The Commission has considered relevant NSW Government Policy in its consideration of the Project.

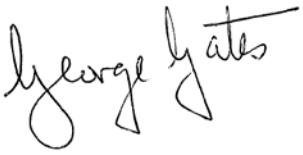
482. The Commission has considered the Department's PAR however it notes that it does not represent a full assessment or provide a final position on the issues considered within it. The Commission makes a number of findings and recommendations seeking further information from both the Applicant and the Department, prior to determination.

483. Having considered the information presently available, the views expressed at the public hearing and the submissions it has received, the Commission finds that it is not presently able to adopt a definitive position on the merits of the Project as a whole. However, at this stage of the Commission's consideration of the Project, the Commission finds that the following issues, at least tentatively, have merit:
- Nature of the Market for Coking Coal;
- Noise (technical compliance);
- Air quality (technical compliance);
- Subsidence;
- Indigenous heritage; and
- Rehabilitation.

484. In contrast there are a number of issues that the Commission cannot currently make a finding on the merits of the Project, whether positive or negative, based to the Material currently before the Commission, which include:
- Mining Method and Safety;
- Groundwater;
- Surface water;
- Underground Emplacement;
- Greenhouse Gas Emissions;
- Visual Impacts;
- Historic Heritage;
- Agriculture;
- Biodiversity;
- Economic;
- Social Impact;
- Suitability of the Site;
- Statutory Environmental Planning Instruments; and
- Public Interest.

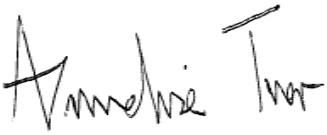
485. The Commission notes that its view as to the merits of the Project may be different when it comes to the point of any determination decision, including because of the provision of additional information in response to this Report, information provided to the Commission independently of this Report, additional matters raised in undertaking its final assessment of the Project, or other relevant factors. The Commission also notes that consideration of conditions of consent has not formed part of the present process and would need to be given detailed consideration at the determination stage.

Professor Chris Fell AM (Chair)
Member of the Commission



George Gates PSM
Member of the Commission

Geoffrey Sharrock
Member of the Commission



Annelise Tuor
Member of the Commission