FACULTY OF SCIENCE
AND ENGINEERING

MACQUARIE University

# Report on the predicted off-site impacts of the proposed Hume Coal and Berrima Rail Projects – Southern Highlands, NSW


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30 June 2017
(by email)

Mr Peter Martin
Coal Free Southern Highlands
371 Golden Vale Road
Suttons Forest, NSW 2577
Email: pmm61@icloud.com

**Re**: **Report on the predicted off-site impacts of the proposed Hume Coal and Berrima Rail Projects – Southern Highlands, NSW**

Dear Mr Martin

Please find attached our Report addressing the predicted off-site impacts from the proposed operations of the Hume Coal mine.

Yours sincerely

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## Summary

This Report identifies a number of items that Coal Free Southern Highlands may wish to consider in challenging the establishment of the Hume Coal Mine and the Berrima Rail Project or any future licence conditions associated with their approval. The Report's summary list of Findings and Recommendations detailed below should be read in conjunction with the whole of the Report.

### Findings

1. Coal mining is the most significant non-road diesel emissions source in the Hunter Region of NSW where industrial non-road diesel equipment at coal mines account for 95 % of total PM2.5 non-road diesel emissions.

2. The construction phase of the Hume Coal Project will generate higher impacts to air quality relative to the operational phase of the project due to a greater proportion of surface based material handling and truck transportation.

3. The greatest impacts to air quality from Hume Coal's operations are predicted to be caused by wind erosion of particulate matter from the surface storage of coal and product stockpiles.

4. Hume Coal has not yet decided on the final mitigation measures it will employ to most effectively limit TSP, $PM_{10}$ and $PM_{2.5}$ from the coal and product stockpiles.

5. There is an extensive network of air quality and meteorological monitoring equipment situated at the project area monitoring real-time meteorological conditions and $PM_{10}$ and $PM_{2.5}$ and dust deposition levels.

6. The HCP EIS predicts that there are eight assessment locations (nine dwellings) within the area modelled that are predicted to experience residual noise levels between 3 to 5 dB above Project Specific Noise Levels (PSNLs). As a result, these properties are entitled to voluntary mitigation upon request.

7. In 2015 the NSW Chief Scientist and Engineer released her Independent Review of Rail Coal Dust Emissions Management Practices in the NSW Coal Chain. The Review concluded that there was insufficient data about the amount and distribution of particulates in rail corridors to assess mitigation effectiveness.

8. Should the Berrima Rail Project (BRP) proposal be approved, increased rail usage is expected to result from the improved rail access. The BRP or HCP EIS's have no authority to influence the future operations of the other existing local rail using industries (Boral, Inghams and Omya).

9. The proposed upgrade to the Berrima Junction, the subject of the BRP, will allow increased use of the existing rail infrastructure, including ARTC controlled sections of railway.

10. The community hold concerns that the condition of the Moss Vale / Unanderra Rail line to Port Kembla is not sufficiently adequate to accommodate heavy coal rail trains through the township of Robertson safely.

11. There are no safety warning systems or signal lighting in place at three level crossings within

the Robertson township.

12. The proposed rail loop and spur, the subject of the BRP, will be constructed to accommodate a 30 tonne axle load. The maximum axle load capacity of the ARTC controlled Moss Vale – Unanderra rail route (22.8 tonnes for locomotives and 25 tonnes for freight wagons) is well below the capacity of the proposed BRP track.

## Recommendations

This Report recommends that Coal Free Southern Highlands group should:

1. Seek the imposition of conditions in the project's Environment Protection Licence (EPL) that would ensure long-term assessment of TSP, $PM_{10}$ and $PM_{2.5}$. This needs to be undertaken using a monitoring network that has been independently assessed as being 'fit for purpose' for the assessment of mine-related dust impacts.

2. Seek the imposition of conditions to ensure the dust monitoring program retains adequate 'adaptive management' clauses including an annual review of its efficacy to ensure it remains 'fit for purpose'.

3. Request that the NSW EPA impose a condition on any future HCP EPL that the watering and veneering of the coal and product stockpiles be adopted to limit the transport of wind eroded dust emissions.

4. Request that the NSW EPA impose conditions in the project's EPL requiring air quality monitoring at the eastern boundary of the project.

5. Request a delay of Hume Coal Mine project approval until all residences entitled to voluntary noise mitigation upon request (under the VLAMP) are resolved satisfactorily.

6. Request the NSW EPA impose conditions requiring real-time noise monitors be placed and operated 24 hours a day at all eight locations entitled to voluntary noise mitigation upon request. This is necessary to monitor and establish the off-site impacts from mine and rail construction, surface mining and rail operations noise should the project(s) be approved.

7. Request that any data recorded under any future noise monitoring system (amended or negotiated), undertaken by Hume Coal or the NSW EPA, be made available to impacted persons.

8. Request a delay of the Berrima Rail and Hume Coal Projects approvals until such time as the recommendations outlined in Independent Review of Rail Coal Dust Emissions by the NSW Chief Scientist are implemented and existing knowledge gaps are addressed.

9. In the event that the Hume Coal and Berrima Rail Projects are approved in lieu of any Findings of a recommended NSW Government pilot study, Coal Free Southern Highlands are recommended to request that the most rigorous emissions standards are imposed on Hume Coal with respect to the management of dust and particulate emissions.

10. In light of the predicted coal volumes (annual and ROM) outlined in the Hume Coal and Berrima Rail EIS, Coal Free Southern Highlands are recommended to seek that a maximum of four trains per day, in each direction, on the Berrima Branch Line, be imposed for the life of the

mine regardless of any increases in operations.

11. Request that persons and communities residing along the Moss Vale – Unanderra rail line be included as stakeholders in the HCP and BRP EIS in recognition of the expected consequential increase in rail movements. These impacts include:

    - HCP operations
    - anticipated increases in operations by other rail users as a result of upgraded infrastructure
    - continuation of Tahmoor Mine coal mine train movements once Hume Coal rail usage commences.

12. Seek that Hume Coal be compelled to undertake the same monitoring and modelling programs as have been carried out elsewhere to assess the impacts from new rail infrastructure along the proposed Berrima Rail Link.

13. In light of the predicted coal volumes outlined in the Hume Coal and Berrima Rail EIS (annual and ROM), Coal Free Southern Highlands are recommended to seek that a maximum of the four trains per day, in each direction, on the Moss Vale – Unanderra Line be imposed for the life of the mine regardless of any increases in operations.

14. Request a delay of the Hume Coal or Berrima Rail Projects approval(s) until such time as the findings of the recommended pilot study to characterise the air pollutant profile around the rail corridor is available.

15. Request that prior to any approval of the Hume Coal Project or Berrima Rail Project be considered, the ARTC should establish the suitability of the entire length of the Moss Vale – Unanderra line to safely accommodate rail movements associated with the Hume Coal Project.

16. Request that modelling be conducted to predict future cumulative dust and diesel emissions levels with the inclusion of 2900 additional rail movements per year anticipated from Hume Coal trains along this line.

17. Request that noise monitoring be conducted at Robertson Primary School to quantify existing noise levels and to better assess the appropriateness of any future noise mitigation strategies.

18. Request that a dust monitoring program be conducted at Robertson Primary School to quantify existing dust and diesel emissions levels at the school

19. Request that the BRP be delayed until such time as the Level Crossing Safety Council can convene and assess all existing safety deficiencies of any level crossings identified in this Report and any other level crossing on this line.

20. Request that Hume Coal produce a Coal Transport Plan that outlines the protocols for transporting coal along the Moss Vale – Unanderra Rail line safely.

21. Request that the ARTC report on all the current mitigation strategies they have in place along the Moss Vale – Unanderra Rail line in relation to coal dust and diesel emissions.

# Project overview

This Report identifies and assesses the predicted off-site impacts on communities in the near vicinity of mining operations of the proposed Hume Coal Project (HCP) and the potential impacts from the proposed Berrima Rail Project (BRP).

This Report was commissioned by the Coal Free Southern Highlands group to identify and assess potential impacts on local communities of the proposed Hume Coal Mine in the Southern Highlands region of NSW, in terms of predicted Mine generated dust, noise and diesel emissions and potential impacts and safety of proposed rail operations.

*Terms of Reference*

1. Provide a report which identifies any possible impacts to Southern Highlands communities from mine-generated dust, noise and diesel emissions, from the proposed Hume Coal Mine operations, based on their proximity to the Mine and local meteorological conditions.

2. Identify, if possible, the proposed mine conditions, such as the on-site or offsite locations and hours of operation, of any dust, noise and diesel emissions producing activities of the proposed Hume Coal Mine.

3. Recommend to Coal Free Southern Highlands, relevant conditions and guidelines, currently in use at other mines (or elsewhere), which regulatory authorities might impose to monitor the off-site extent and impacts of mine generated dust, noise and diesel emissions from the proposed Hume Coal Mine.

4. Recommend to Coal Free Southern Highlands, relevant conditions and guidelines, currently in use at other mines (or elsewhere), which regulatory authorities might impose on any future Management Plans or Environmental Protection Licence/s (EPL) to mitigate any predicted impacts from mine-generated dust, noise and diesel emissions from the proposed Hume Coal Mine.

*Consultations undertaken for this Report*

This report involved the following consultation and site visits:

8 July 2016, 371 Golden Vale Road, Suttons Forest:
- Peter and Kim Martin, principal contacts for Coal Free Southern Highlands group. Meeting with Steve George

5 April, 2017, 371 Golden Vale Road, Suttons Forest:
- Peter and Kim Martin, principal contacts for Coal Free Southern Highlands group. Meeting with Steve George and Mark Taylor

18 May, 2017 - Moss Vale Services Club:
- Public presentation to community – Predicted dust, noise and rail impacts from Hume Coals proposed operations, Mark Taylor (and others) presenting.

In addition to the above consultations, numerous phone calls and e-mail discussions were undertaken to assist in clarifying matters raised during compilation of this report.

# Summary of the proposed Hume Coal Project operation and site

The text below is a brief summary of the two projects reviewed in this Report: The Hume Coal Project and the Berrima Rail Project.

## The Hume Coal Project

The Hume Coal Project (HCP) is a proposed coal mining operation located in the Southern Highlands region of New South Wales, approximately 120 km southwest of Sydney. Hume Coal is a subsidiary of POSCO Australia (POSA), which is owned by the Korean company POSCO.[1] The HCP is proposed to be an underground mining operation and is predicted produce and transport 50 million tonnes (Mt) of run-of-mine (ROM) metallurgical coal (coking coal) for steel making and a secondary product of thermal coal.[2] At its peak, coal production is expected to reach 3.5 million tonnes per annum (Mtpa).[3] Hume Coal plans to extract high-quality coking and industrial coal from the Wongawilli Seam located at 70–180 metres below ground.[4]

The HCP requires approval under Part 4, Division 4.1 of the *Environmental Planning and Assessment Act 1979,* NSW (EP&A Act). It is proposed by Hume Coal that the extraction of coal would commence in 2021[5] and is seeking development consent as a State Significant Development proposal (Application SSD 7172).[6] The HCP Mine site will be located near the townships of Moss Vale, New Berrima, Berrima and Medway (Figure 1).

It is expected that the total project life of the HCP will be 23 years, comprising 2 years of infrastructure construction, 19 years of mining and coal extraction and a further 2 years to oversee Mine closure and rehabilitation.[7] Figure 1 shows the geographic location of the Mine relative to surrounding communities and Figure 2 identifies the locations of proposed key infrastructure (surface facilities). These facilities would be constructed predominantly for the handling and loading of coal onto trains for transport, water treatment and administration.

In addition to the overarching Hume Coal Project is the proposed construction of new rail infrastructure close to the townships of Berrima and New Berrima. This proposed rail infrastructure is essential to link the HCP coal handling and transport surface facilities with existing rail infrastructure to transport the mined coal onto the Berrima Branch Line and ultimately to Port Kembla via the Moss Vale – Unanderra rail line. Details of the proposed rail infrastructure upgrade and localised environmental monitoring are contained in a separate EIS known as the Berrima Rail Project (BRP).[8]

[1] Hume Coal Project- Environmental Impact Statement. 2017. Main Report: Volume 1, page ES.1. Available at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7172 (accessed 12 May 2017).
[2] Ibid.
[3] Ibid.
[4] Ibid.
[5] Ibid.
[6] Ibid.
[7] Ibid.
[8] Hume Coal Project - Environmental Impact Statement, 2017. Appendix D Berrima Rail Project – Environmental Impact Statement, - Main Report Appendices A-D Volume 3A. Available at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7172 (accessed 2 June 2017).

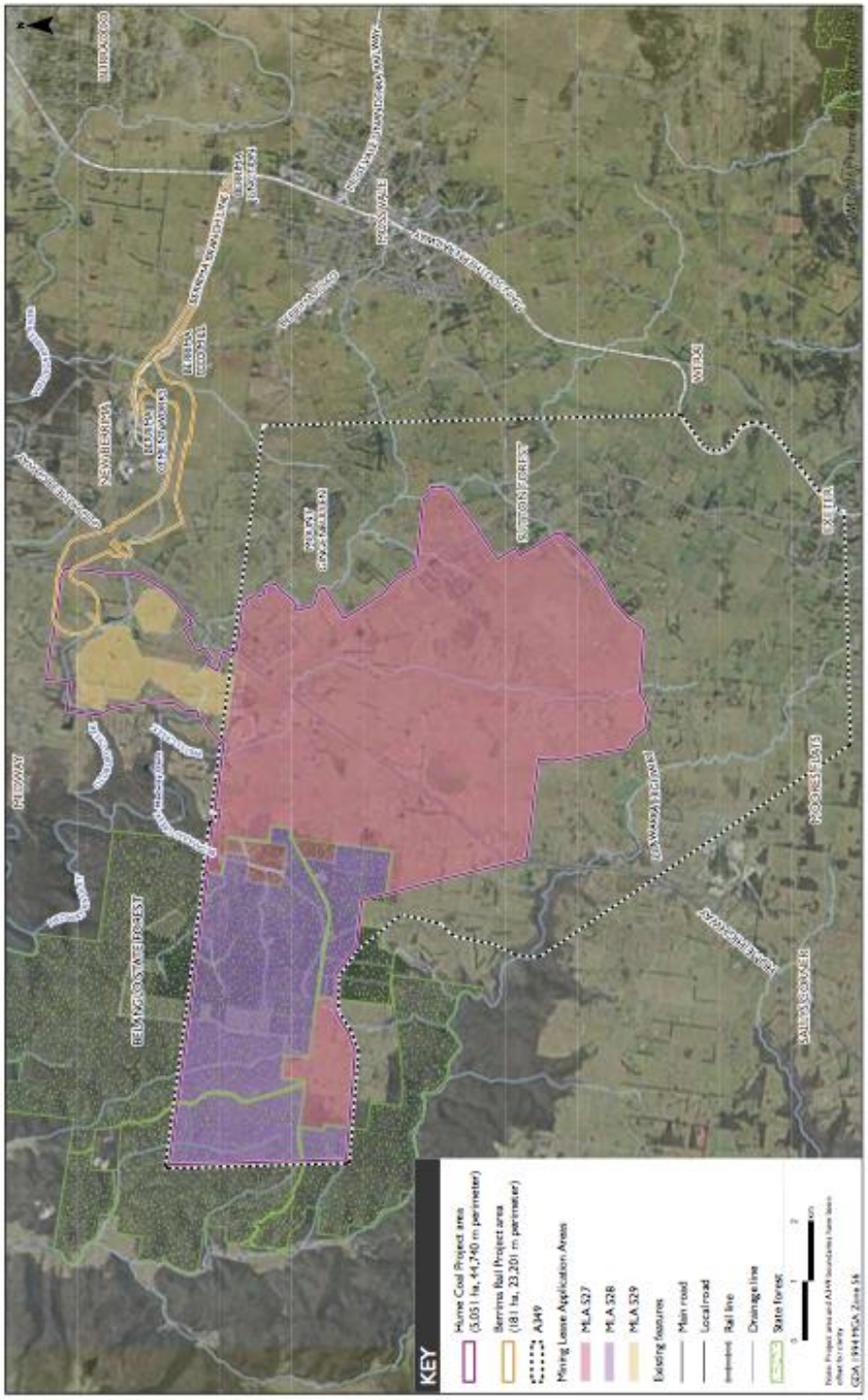


**Figure 1.** Map showing the proposed Hume Coal Project area, the Berrima Rail Project and their relationship to the local community.[9]

[9] Hume Coal Project- Environmental Impact Statement. 2017. Main Report: Volume 1, page ES.3. Available at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7172 (accessed 12 May 2017).

## The Berrima Rail Project

The Berrima Rail Project (BRP) is a separate State Significant Development proposal (SSD 7171) to the HCP. The BRP is seeking development consent under Division 4.1 of Part 4 of the EP&A Act 1979, NSW to construct and operate a new rail loop and spur that would connect the proposed HCP to the existing Berrima Branch Line, which is owned and used by Boral Cement Limited.[10] The proposed rail line will total 8.2 km of new track (if the preferred option is approved) or 7.6 km of new line for the alternative option (discussed on page 31) and will be constructed to accommodate a 30 tonne axle load.[11] The ability to transport coal from the HCP to market is contingent on the approval of the BRP. Moreover, it is noted in the respective HCP and BRP EIS that these two projects, and another proposal for electricity supply works (development consent sought under Part 5 of the EP&A Act 1979, NSW—not a State Significant Development) are inextricably linked. Thus, the development of one project will not go ahead without the development consent for the other two.[12]

The BRP EIS provides an overview of the existing rail infrastructure (the Berrima Branch Line) and details the proposed new rail infrastructure (the Berrima Rail Project) essential for the rail transport of coal to Port Kembla.[13] The conveyance of coal to Port Kembla requires Hume Coal trains to utilise the Moss Vale – Unanderra rail line that is managed by the Australian Rail Track Corporation (ARTC). The ARTC is a Commonwealth Government statutory corporation that manages the majority of Australia's interstate railway networks. The BRP is a separate development application to the HCP and its significance in terms of potential impacts to local communities including those en-route to Port Kembla are discussed in greater detail below.

Detailed within both the respective HCP and BRP EIS are the predictions from environmental modelling undertaken in an attempt to forecast the extent of off-site impacts of noise produced by the mine and of dust and diesel emissions from HCP operations and consequential rail movements. The importance of air quality environmental monitoring and the potential impacts to human health of local communities from mine derived air pollution are discussed below.

[10] Hume Coal Project - Environmental Impact Statement, 2017. Appendix D Berrima Rail Project – Environmental Impact Statement, - Main Report Appendices A-D Volume 3A, page 9. Available at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7172 (accessed 12 May 2017).
[11] Ibid (page 35).
[12] Ibid (page ES.1).
[13] Ibid (page 9).

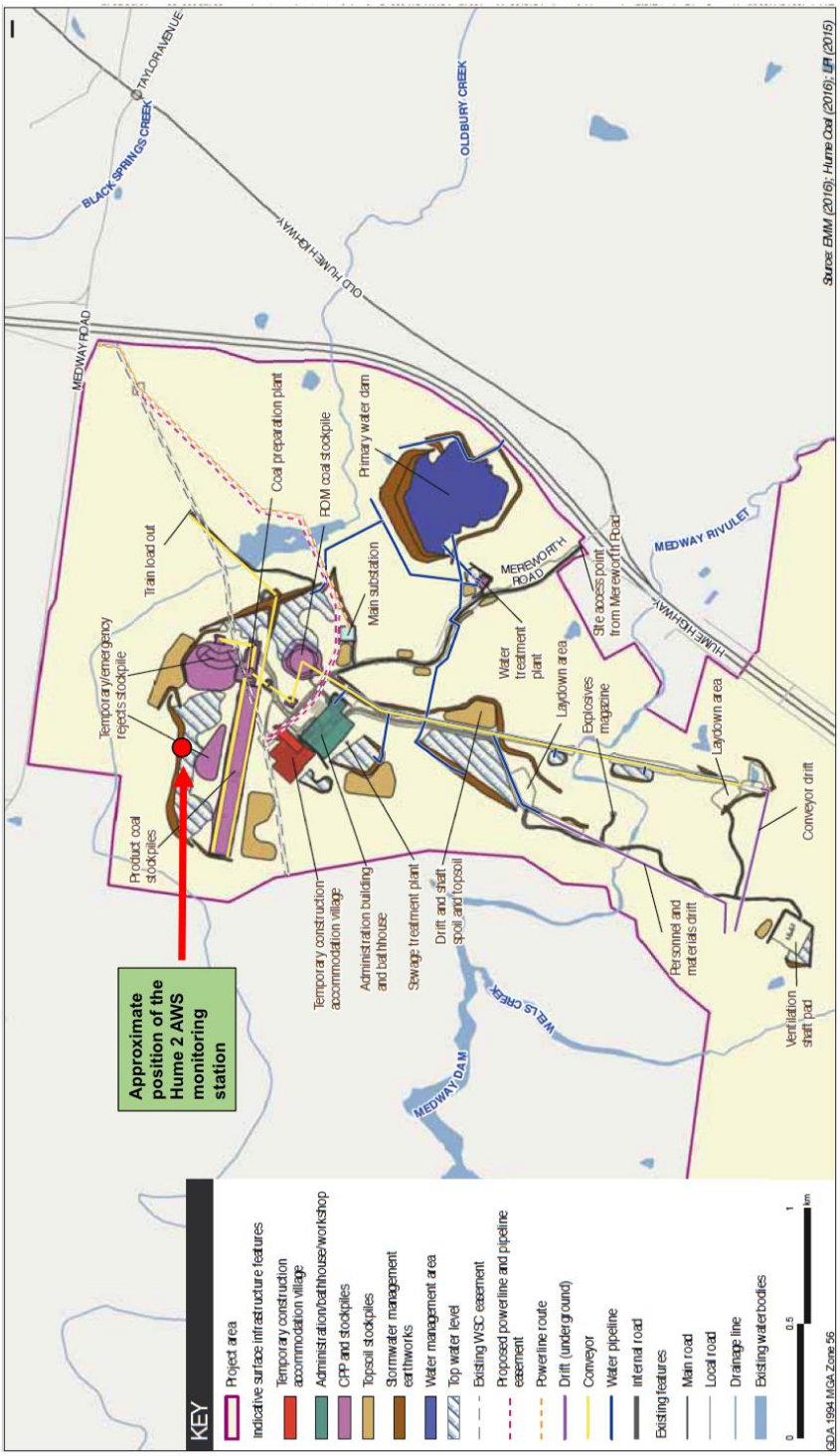


**Figure 2**. Hume Coal Project surface and coal handling facilities including the Hume 2 Automatic Weather Station (AWS) location.[14]

[14] Hume Coal Project- Environmental Impact Statement. 2017. Main Report: Volume 1, page 37. Available at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7172 (accessed 12 May 2017).

## Implications of Particulate Matter (PM) air pollution and particle size on human health

Particulates associated with air quality are referred to as Particulate Matter (PM) and are typically classified according to size, with $PM_{10}$ representing particles less than 10 µm in diameter, and $PM_{2.5}$ being particles less than or equal to 2.5 µm in diameter. By the nature of its definition, $PM_{10}$ includes particles less than $PM_{2.5}$ category.[15] Figure 3 shows the relative size fractions of PM in comparison to a human hair. The implications to human health from exposure to PM are considered in brief below.

In December 2015, the Woolcock Institute of Medical Research, Centre for Air Quality and Health Research and Evaluation (CAR) released a review of the health impacts of emission sources, types and levels of particulate matter air pollution in ambient air in NSW. The Woolcock report provided a comprehensive review of international and Australian evidence in relation to the health effects of exposure to outdoor (ambient) particulate matter (PM) air pollution.

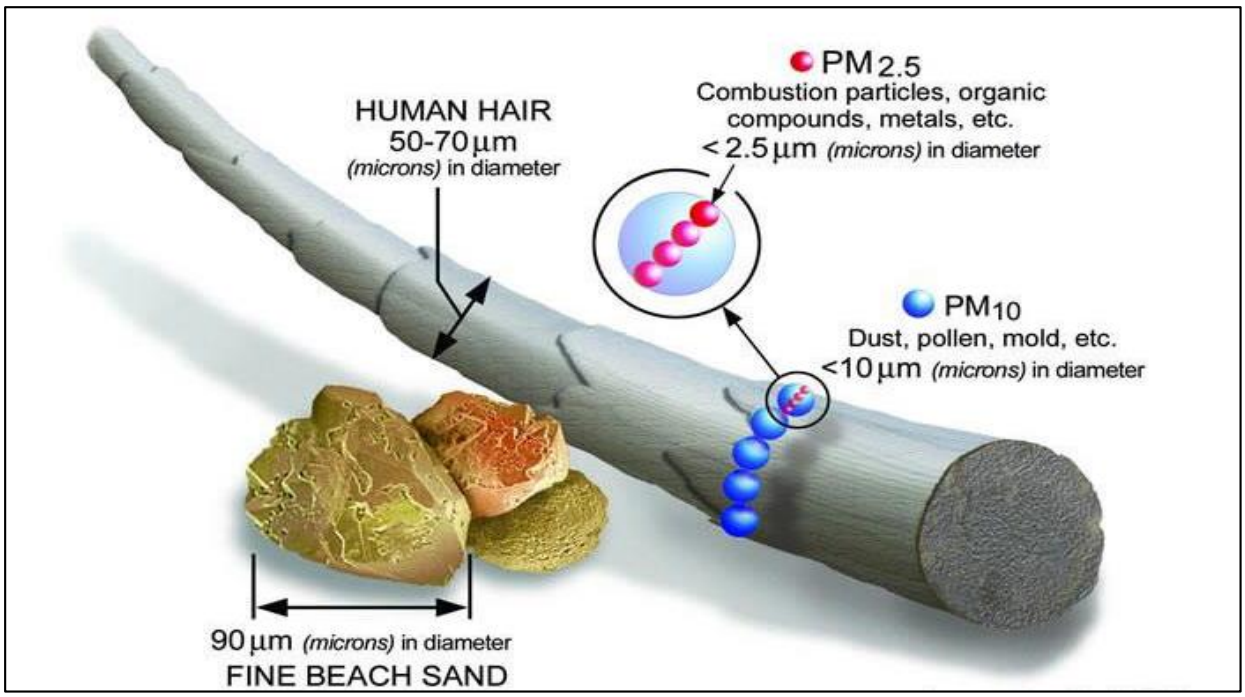


**Figure 3**. Relative PM size fractions in comparison to diameter of a human hair.[16]

The Woolcock report found that the composition of particles affects the toxicity of PM and that some components of PM derived from combustion sources increase particle toxicity.[17] In 2012, the World Health Organization's (WHO) International Agency for Research on Cancer classified diesel

[15] O'Kane, M. 2016. NSW Chief Scientist and Engineers Final Report on the Independent Review of Rail Coal Dust Emissions Management Practices in the NSW Coal Chain. Available at: http://www.chiefscientist.nsw.gov.au/__data/assets/pdf_file/0008/89864/160805-FINAL-Coal-Dust-Report.pdf (accessed 2 November 2016).

[16] US Environmental Protection Agency, 2016. Available at: https://www.epa.gov/pm-pollution/particulate-matter-pm-basics (accessed 11 May 2017).

[17] Centre for Air Quality and Health Research and Evaluation (CAR) and Woolcock Institute of Medical Research. 2015. Review of the health impacts of emission sources, types and levels of particulate matter air pollution in ambient air in NSW. Available at http://woolcock.org.au/s/Health-impacts-of-PM-report_final-for-web-25bx.pdf (accessed 13 June 2017).

exhaust as a human carcinogen.[18] There is evidence that fine particles ($PM_{2.5}$) are more detrimental to health and have a wider range of health effects than larger particles.[19] Particles smaller than $PM_{2.5}$ have greater potential to penetrate deep into the lungs where a cascade of systemic inflammations can occur.[20] One potentially harmful component of $PM_{2.5}$ is black carbon, thought to be toxic, especially for cardiovascular effects.[21] Diesel engine combustion is a major source of black carbon and studies of short-term health effects suggest that black carbon is a better indicator of harmful PM from combustion sources (especially traffic) than is PM mass.[22]

From the Woolcock Institute's review of available evidence, it is highly confident that:

- increases in ambient $PM_{2.5}$ and $PM_{10}$ mass are associated with increases in mortality and, increases in cardiovascular and respiratory morbidity; and
- exposure to PM from combustion-related sources (coal-fired power stations, on-road vehicles, diesel exhaust) is associated with impacts on cardiovascular and respiratory health.[23]

Moreover, the evidence for the Woolcock report's findings is supported by a multitude of epidemiological studies, which show consistent evidence across many sources.[24] Furthermore, the evidence suggests that exposure to current levels of PM in NSW will have measureable adverse impacts on health, particularly in vulnerable populations such as individuals with chronic respiratory and cardiovascular diseases, the elderly, and children. Reductions in PM air pollution in NSW are likely to result in health benefits, particularly for these most vulnerable groups.[25]

From these conclusions, the Woolcock Institute recommended that:

> … exposure of the NSW population to *all* PM (regardless of source) be minimised by reducing ambient PM levels to as low as possible. It would also be prudent to minimise exposure to PM from combustion sources and conduct further investigations of the health impacts of exposure to these particles.[26]

The management of particulates along with emission standards are assessed according to Commonwealth air quality standards, which are implemented at a state level. Ambient Air Quality (AAQ) in Australia is governed by the National Environment Protection Council (NEPC), which assigns National Environment Protection Measures (NEPMs). The relevant AAQ NEPM for Particulate Matter (PM) is listed in Table 1.

[18] NSW Environment Protection Authority - Diesel and Marine Emissions Management Strategy. Available at: http://www.epa.nsw.gov.au/resources/air/150038Diesel-marine-strategy.pdf (accessed 22 March 2017).
[19] Ibid.
[20] Canadian Environmental Health Atlas: Deadly Impact of Airborne Particles (Public Health video). Available at https://www.youtube.com/watch?v=9WAhhZsMr0A (accessed 22 May 2017).
[21] Centre for Air Quality and Health Research and Evaluation (CAR) and Woolcock Institute of Medical Research. 2015. Review of the health impacts of emission sources, types and levels of particulate matter air pollution in ambient air in NSW. Available at http://woolcock.org.au/s/Health-impacts-of-PM-report_final-for-web-25bx.pdf (accessed 13 June 2017).
[22] Ibid.
[23] Ibid.
[24] Ibid.
[25] Ibid.
[26] Ibid.

**Table 1.** Australian particulate matter (PM) standards.[27]

| **Particulate size** | **Ambient Air Quality NEPM standard (1998)** | **Goal** |
|---|---|---|
| | | **AAQ NEPM long term goal for 2025** |
| Particles as $PM_{2.5}$ (Advisory) | 25 µg/m$^3$ / 24 hour day<br>8 µg/m$^3$ / 1 year | 20 µg/m$^3$ / 24 hour day[28]<br>7 µg/m$^3$ / 1 year[29] |
| **Particulate size** | | |
| Particles as $PM_{10}$ | 50 µg/m$^3$ / 24 hour day<br>25 µg/m$^3$ / 1 year | 5 exceedances allowable / year |

Note: It is proposed by the NEPC that by the year 2025, the goal AAQ NEPM goal for Particles as $PM_{2.5}$ will be reduced to 20 µg/m$^3$ / 24 hour day, and 7 µg/m$^3$ / 1 year [30] well inside the timeline of HCP operations.

[27] NEPM Air Quality standards for Australia – Particulate Matter. Available at https://www.environment.gov.au/protection/air-quality/air-quality-standards#air (accessed 22 November 2016).
[28] National Environment Protection Council: Ambient Air Quality guidelines. Available at http://www.nepc.gov.au/resource/variation-ambient-air-quality-nepm-%E2%80%93-particles-standards (accessed 13 June 2017).
[29] Ibid.
[30] Ibid.

## Predicted particulate matter and diesel emissions

The Hume Coal Project Environmental Impact Statement (HCP EIS) outlines the need to construct surface and coal handling infrastructure to facilitate its operations (Figure 2). These facilities would include the coal preparation plant, overland conveyors, personnel and material drift access, ventilation shafts, water management system, offices, workshop, wash-down facilities, and rail load-out facilities. The HCP EIS notes that during the construction phase of the surface facilities, emissions from truck movements along unpaved roads are likely to be dominant sources of coarse particulate matter, while diesel combustion is predicted to account for the vast majority of particulate matter in the $PM_{2.5}$ fraction.[31] Hume Coal intends to mitigate potential underground exposures to diesel emissions by fitting diesel exhaust scrubbers and diesel particulate filters on all underground diesel equipment.[32] This measure is not a planned intervention for surface diesel machinery during either the construction or operational phases of the Mine.[33]

If the HCP is approved, operations conducted at the surface facilities will produce PM in the form of dust and diesel emissions from a variety of mechanical sources and other Mine operations.[34] Emissions scenario modelling conducted to establish the four greatest contributing sources are outlined below:

- wind erosion from coal stockpiles
- ventilation shaft emissions from underground operations, incorporating both fugitive emissions from coal extraction and transportation and diesel fuel combustion
- conveyor belt and transfer stations, from both wind erosion and coal transfer emissions
- stacking and reclaiming of coal.

The HCP EIS indicates from its modelling that PM emission sources derived from the project operations will be dependent on wind conditions, including the coal and product stockpiles and that emissions will increase with wind speed.[35] Indeed, the EIS notes that wind erosion from the coal and product stockpiles will be the primary source of emissions during Hume Coal operations.[36]

In 2015, Hume Coal commissioned the Hume 2 Automatic Weather Station (AWS) to supplement and compare meteorological data it had been utilising from existing AWSs in the region (Figure 4). The Hume 2 AWS is positioned at the proposed coal and product stockpile site. Between October 2015 and July 2016, the AWS recorded continuous real-time wind conditions at this location. Wind rose diagrams (inset in Figure 4) developed from Hume 2 AWS monitoring data have established that the dominant wind direction at this location is westerly and that wind speeds are greatest during the winter and spring months.[37] The dominant westerly wind at these times places the townships of New Berrima, Berrima, Burradoo and Moss Vale directly in the path of potential emissions.

[31] Hume Coal Project - Environmental Impact Statement, 2017 - Appendix D: Air Quality Impact and Greenhouse Gas Assessment, page 53). Available at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7172 (accessed 16 May 2017).
[32] Ibid (page 88).
[33] Ibid (page 57).
[34] Ibid.
[35] Ibid (page 28).
[36] Ibid (page 57).
[37] Hume Coal Project - Environmental Impact Statement, 2017 - Appendix D: Air Quality Impact and Greenhouse Gas Assessment (page 28). Available at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7172 (accessed 16 May 2017).

Hume Coal acknowledges that, at the time of the EIS release, the control methods to be employed for effective dust mitigation to address wind erosion of PM from the product stockpiles

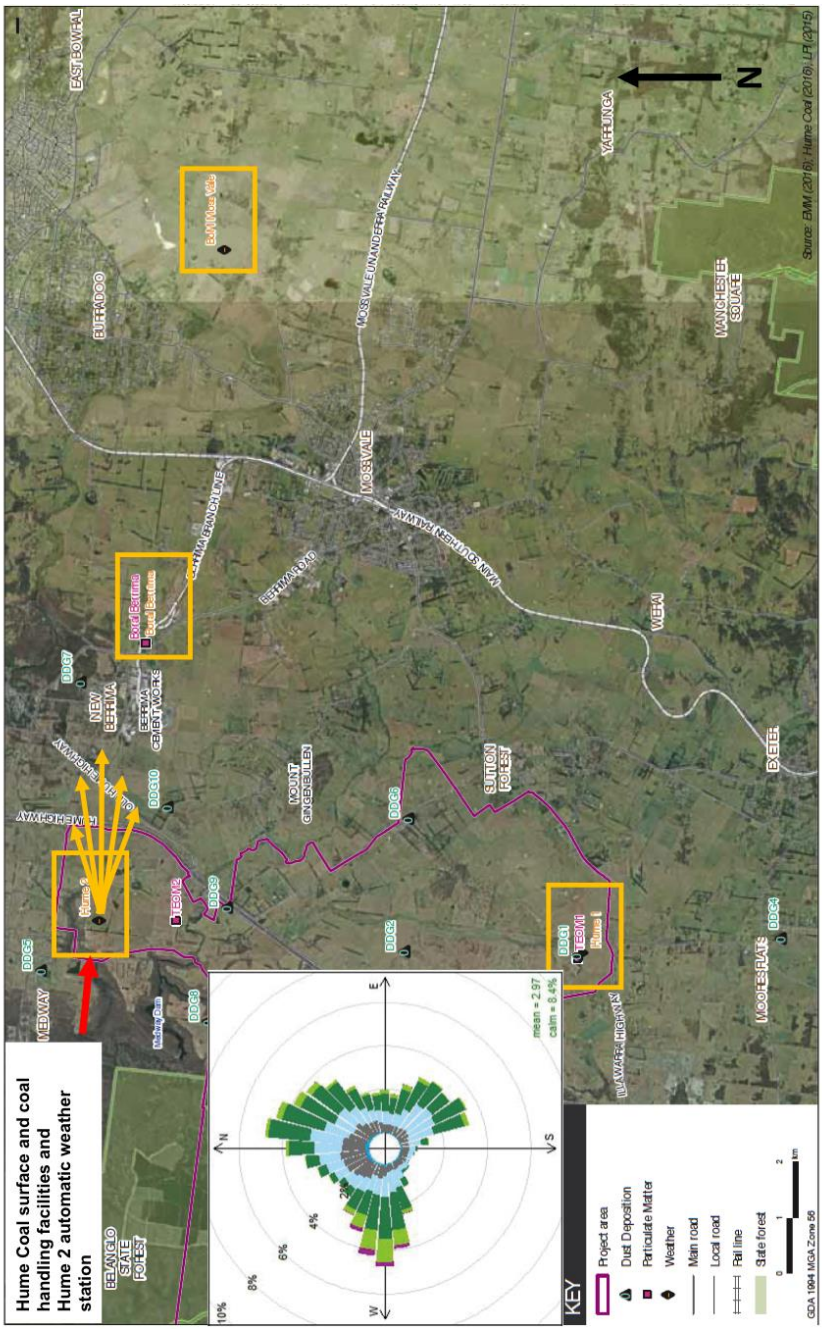


**Figure 4**. Map showing the position of the four Automatic Weather Stations (AWS) including Hume 2. These are co-located with the proposed Hume Coal's surface handling facilities and coal stockpiles. The townships of New Berrima, Burradoo and Berrima lie to the east and downwind of these facilities with the dominant westerly wind being strongest between autumn and spring, with the greatest wind speeds during the winter and spring months). Image modified to include: dominant wind direction (orange arrows), Hume 2 wind rose and AWS locations (orange boxes).[38]

[38] Hume Coal Project - Environmental Impact Statement, 2017 - Appendix D: Air Quality Impact and Greenhouse Gas Assessment, page 53. Available at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7172 (accessed 16 May 2017).

are still being considered. The two emission reduction scenarios it is considering are a *watering only* option, and a *watering and veneering.* Automated water sprays aim to reduce emissions by maintaining high moisture content of a stockpile[39] and the process of veneering involves applying a biodegradable starch-based or polymer-based solution to a stockpile, which forms a crust and prevents wind lift-off of fine particles.[40] In assessing the efficacy of *watering and veneering* control on the stockpiles in comparison to a *watering only* option, the EIS estimates that:

> …a nominal 50% emission reduction factor is applied to product stockpile emissions to account for control by water sprays.[41]

And

> …a nominal 95% emission reduction factor is applied to product stockpile emissions to account for the application of a surface veneer. For this scenario it is assumed that at any given time, 20% of the total product coal stockpile area is actively disturbed by stacker/reclaimer activity and controlled by water sprays only (50% reduction), with the remaining 80% area is stabilised by a veneer (95% reduction).[42]

The greater efficiency of the *watering and veneering* option over *watering only* is further highlighted in Table 2, which depicts the emissions by source estimated for Hume Coal's peak operations utilizing meteorological data from the Hume 1 AWS (Figure 4).

**Table 2.** The relative effectiveness between the *watering only* and the *watering and veneering* controls in terms of reducing annual emissions/ kg from the coal stockpiles for both total emissions and for wind eroded emissions. Table information extracted from the HCP EIS.[43]

| **Calculated emissions (kg/annum) by source** | | | |
|---|---|---|---|
| | **TSP** | **$PM_{10}$** | **$PM_{2.5}$** |
| Wind erosion - Product stockpiles – watering only | 10,712 | 5,356 | 803 |
| Wind erosion - Product stockpiles – watering and veneering | 2,999 | 1,500 | 225 |
| | | | |
| **Total with Product stockpile watering only** | **74,999** | **22,183** | **9,447** |
| **Total with Product stockpile watering and veneering** | **67,286** | **18,327** | **8,869** |

The calculated emissions in Table 2 are considered suitable for comparison given the high degree of similarity between the Hume 2 AWS wind speeds (at the stockpile location), and the Hume 1 AWS wind speeds over the period for which comparative data exists.[44]

Table 2 clearly depicts that a *watering and veneering* option is estimated to be greater than three times more effective at reducing wind eroded TSP, $PM_{10}$ and $PM_{2.5}$ emissions from the coal and product stockpiles than a *watering only* control. The table also depicts a significant overall reduction in total emissions from the stockpiles using a *watering and veneering* option.

[39] Hume Coal Project - Environmental Impact Statement, 2017 - Appendix D: Air Quality Impact and Greenhouse Gas Assessment, page 57). Available at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7172 (accessed 16 May 2017).
[40] Ibid.
[41] Ibid (page 58).
[42] Ibid.
[43] Ibid (page 61).
[44] Ibid.

In terms of monitoring the effectiveness of future mitigation strategies, it is apparent that the management tool to quantify dust and diesel emissions from HCP operations is already in place. This is detailed in the HCP EIS that there is an existing extensive network of air quality and meteorological monitoring equipment situated at the project area. The air monitoring network is currently collecting real-time measurements of meteorological conditions, $PM_{10}$, $PM_{2.5}$ and dust deposition levels.[45] As such:

> This equipment would form the basis for any future air quality monitoring to be conducted during the life of the project.[46]

Although the HCP EIS reveals the existence of this air monitoring equipment, it does not detail the specific locations of future emissions monitoring. The HCP EIS highlights that it is Hume Coal's intention to develop an Air Quality Monitoring Plan, which will document monitoring locations, monitoring methods and reporting responsibilities for the project.[47] Hume Coal's air quality modelling indicates that the cumulative impacts resulting from the project, in addition to neighbouring emission sources with ambient background levels, would be unlikely to exceed the NSW EPA criteria for air quality.[48] Relevantly, the NSW EPA is the chief regulator of issues and activities affecting air quality in NSW.[49]

Regardless, in light of the known wind conditions at the coal and product stockpile locations and their predicted contribution to wind transported emissions, monitoring of PM at the eastern boundary of the project would quantify the effectiveness of mitigation measures employed to reduce these emissions. Ensuring that a monitoring program is in place at the commencement of the HCP would ensure that emissions leaving the site are quantified, assisting in determining the potential off-site emissions impacts on the local community.

**Particulate matter and air quality in the Hunter, NSW**

The Hunter region supports significant industrial activity including coal mining, coal rail transport, power (coal) generation, non-coal industries and large cargo ship movements, including coal exports. These activities are associated with a range of actual and potential contamination which may have contributed, along with other non-industrial sources, to exceedence of air quality standards during parts of the year.[50,51] As a result of ongoing and significant concern in relation to potential health-related air quality impacts due to emissions from these industrial activities, the NSW Government, led by the NSW EPA, has implemented the following activities:

- 2010 (ongoing)—establishment of an Upper Hunter Air Quality Monitoring Network Advisory Committee[52]
- 2012 (ongoing)—installation of a 14-station air quality network, with real-time data access for Upper and Lower Hunter stations[53]

[45] Hume Coal Project Environmental Impact Statement - Appendix D, page 88: Air Quality Impact and Greenhouse Gas Assessment. Available at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7172 (accessed 14 May 2017).
[46] Ibid.
[47] Ibid.
[48] Ibid (page 87).
[49] Ibid.
[50] Upper Hunter monitoring reports. Available at: http://www.environment.nsw.gov.au/aqms/uhaqmnmonitoring.htm (accessed 30 June 2017).
[51] Taylor, M.P. and Isley, C. 2014. Measuring, monitoring and reporting but not intervening: Air Quality in Australian Mining and Smelting Areas. *Air Quality and Climate Change Journal*, 48 (2), 35–42.
[52] Upper Hunter Air Quality Advisory Committee. Available at: http://www.epa.nsw.gov.au/UHAQMCttee/index.htm (accessed 30 June 2017).
[53] Search air quality data. Available at: http://www.environment.nsw.gov.au/AQMS/search.htm (accessed 30 June 2017).

- 2013—Lower Hunter Particle Characterisation Study – particle pollution study examining potential sources from coal mining, coal train dust and wood-fire smoke.[54]
- 2014—Lower Hunter Dust Deposition Project Reference Group to examine the issue and source of visible black dust in the Lower Hunter region[55]
- 2015—NSW Chief Scientist and Engineer Initial Report on the Independent Review of Rail Coal Dust Emissions Management Practices in the NSW Coal Chain.[56]

## Findings relating to predicted particulate matter and diesel emissions

1. **Coal mining is the most significant non-road diesel emissions source in the Hunter Region of NSW where industrial non-road diesel equipment at coal mines account for 95 % of total $PM_{2.5}$ non-road diesel emissions.**[57]

   There will be a considerable array of non-road diesel powered machinery in operation at the Hume Coal Mine and diesel combustion is predicted to account for the vast majority of particulate matter in the $PM_{2.5}$ fraction. In 2012, the World Health Organization's (WHO) International Agency for Research on Cancer classified diesel exhaust as a human carcinogen. Diesel engine combustion is a major source of black carbon and studies of short-term health effects suggest that black carbon is a better indicator of harmful particulate matter (PM) from combustion sources (especially traffic) than PM mass.

2. **The construction phase of the Hume Coal Project will generate higher impacts to air quality relative to the operational phase of the project due to a greater proportion of surface based material handling and truck transportation.**[58]

   The construction of surface infrastructure to facilitate mining operations will produce particulate matter in the form of dust and diesel emissions from a variety of sources. The effectiveness of Hume Coal's proposed mitigation measures to address these emissions cannot be quantified until construction operations commence.

3. **The greatest impacts to air quality from Hume Coal's operations are predicted to be caused by wind erosion of particulate matter from the surface storage of coal and product stockpiles.**

   The EIS acknowledges the greatest source of particulate matter (PM) in the form of TSP, $PM_{10}$ and $PM_{2.5}$ from Hume Coal's operations will be sourced from the coal and product surface stockpiles.[59] Erosion of PM is wind-dependent and these emissions will increase with wind speed.

   Wind rose diagrams developed from the Hume 2 AWS, situated at the coal and product stockpile site, depict wind speed and directions. These have established that wind speeds are

[54] NSW EPA 2016. Lower Hunter air quality studies. Available at: http://www.epa.nsw.gov.au/air/LHairqualstuds.htm (accessed 30 June 2017).
[55] Lower Hunter Dust Deposition Project Reference Group. Available at: http://www.epa.nsw.gov.au/MediaInformation/lhddprg.htm (accessed 30 June 2017).
[56] O'Kane, M. 2016. NSW Chief Scientist and Engineers Final Report on the Independent Review of Rail Coal Dust Emissions Management Practices in the NSW Coal Chain. Available at: http://www.chiefscientist.nsw.gov.au/__data/assets/pdf_file/0008/89864/160805-FINAL-Coal-Dust-Report.pdf (accessed 2 November 2016).
[57] NSW Environment Protection Authority 2015. Diesel and Marine Emissions Management Strategy. Available at: http://www.epa.nsw.gov.au/resources/air/150038Diesel-marine-strategy.pdf (accessed 22 March 2017).
[58] Hume Coal Project - Environmental Impact Statement. 2017 - Appendix D, page 87: Air Quality Impact and Greenhouse Gas Assessment. Available at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7172 (accessed 16 May 2017).
[59] Ibid (page 57).

greatest during the winter and spring months. The dominant westerly wind at these times places the townships of New Berrima, Berrima, Burradoo and Moss Vale directly in the path of potential emissions.

4. **Hume Coal has not yet decided on the final mitigation measures it will employ to most effectively limit TSP, $PM_{10}$ and $PM_{2.5}$ from the coal and product surface stockpiles.**[60]

   Hume Coal has identified two emission reduction scenarios it is considering to control wind eroded PM from the coal and product stockpiles. These are: a *watering only* option, and a *watering and veneering control.* The HCP EIS acknowledges the *watering and veneering* option for reducing wind entrainment of particulate matter from the stockpiles is the most effective method for mitigating particulate dust transport. However, Hume Coal have still not committed to a final control method to be employed for dust mitigation for wind erosion of PM from this source.

5. **There is an extensive network of air quality and meteorological monitoring equipment situated at the project area monitoring real-time meteorological conditions and $PM_{10}$ and $PM_{2.5}$ and dust deposition levels.**[61]

   The HCP EIS verifies the existence of this equipment and confirms that this network would form the basis of any future air quality monitoring to be conducted during the life of the project. The EIS also states that an Air Quality Monitoring Plan, which will document the monitoring locations, monitoring methods and reporting responsibilities will need to be developed for the project.

## Recommendations related to predicted particulate matter and diesel emissions

This Report recommends that Coal Free Southern Highlands group should:

1. **Seek the imposition of conditions in the project's Environment Protection Licence (EPL) that would ensure long-term assessment of TSP, $PM_{10}$ and $PM_{2.5}$. This needs to be undertaken using a monitoring network that has been independently assessed as being 'fit for purpose' for the assessment of mine-related dust impacts.**

   The Office of Environment and Heritage NSW might be a suitable independent organisation to review any such monitoring network.

2. **Seek the imposition of conditions to ensure the dust monitoring program retains adequate 'adaptive management' clauses including an annual review of its efficacy to ensure it remains 'fit for purpose'.**

   It is relevant to note with respect to the uplifting of any 'adaptive management' that the NSW EPA (2014) stated with respective to the reduction of emissions from non-road diesel engines that:

[60] Hume Coal Project - Environmental Impact Statement, 2017 - Appendix D, page 57: Air Quality Impact and Greenhouse Gas Assessment. Available at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7172 (accessed 16 May 2017).
[61] Ibid (page 88).

> …the EPA proposes to use environment protection licence conditions to require each coal mine to evaluate its current non-road diesel emissions management strategy against industry best practice and identify reasonable and feasible improvements.[62]

The relevant point here is that the NSW EPA has previously highlighted 'industry best practice and identify reasonable and feasible improvements', which are clearly constantly changing.

3. **Request that the NSW EPA impose a condition on any future HCP EPL that the *watering and veneering* of the coal and product stockpiles be adopted to limit the transport of wind eroded dust emissions.**

   Conditions of this nature would recognise the fact that the coal stockpiles are acknowledged to be the greatest source of wind eroded TSP, $PM_{10}$ and $PM_{2.5.}$ Furthermore, uplifting of such condition would recognise that the extant wind conditions at the proposed surface coal storage and processing facility places the townships of New Berrima, Berrima, Burradoo and Moss Vale in the path of these potential emissions.

   The imposition of this condition also recognises that despite the *watering and veneering* option being known that industry best practice for wind eroded dust emissions is, no mitigation strategy has yet been decided by Hume Coal. Further, such a condition would acknowledge the importance of ensuring that the most efficient mitigation measure is in place to limit wind eroded emissions prior to the commencement of Hume Coal operations.

4. **Request that the NSW EPA impose conditions in the project's EPL requiring air quality monitoring at the eastern boundary of the project.**

   Monitoring at the eastern boundary of the project would establish the efficacy of any dust mitigation measures employed to limit wind eroded PM from the coal and product stockpiles. Further, such monitoring would quantify the ability of dominant westerly winds to transport these emissions beyond the project boundary and toward local communities.

   Conditions of this nature would also capture and quantify levels of TSP, $PM_{10}$ and $PM_{2.5}$ from the other identified major sources of particulate matter at the surface facility area including:

   - conveying and transfer of coal and coal rejects
   - stacker/reclaimer at ROM and product coal stockpiles
   - ROM coal sizing and screening stations
   - coal preparation plant (CPP)
   - loading of product coal to rail wagons for dispatch to market
   - transfer and loading of coal rejects to temporary storage area
   - bulldozer operations on coal rejects temporary storage area
   - handling of coal rejects by front end loader (FEL) and transfer to paste plant hopper
   - wind erosion of stockpiles, temporary storage area and conveyor belts.

[62] NSW Environment Protection Authority 2015. Diesel and Marine Emissions Management Strategy. Available at: http://www.epa.nsw.gov.au/resources/air/150038Diesel-marine-strategy.pdf (accessed 22 March 2017).

## Project Specific Noise Levels (PSNLs)

The Voluntary Land Acquisition and Mitigation Policy (VLAMP) applies to SSD applications for mining, petroleum and extractive industry development. The policy establishes a framework for ensuring that when noise and dust impacts from a proposed project exceed the relevant assessment criteria, landowners are provided with the opportunity for a negotiated agreement with the proponent or the proponent is obligated to offer mitigation of impacts on the land.[63] The assessment criteria for noise are known as Project Specific Noise Levels (PSNLs). To determine if future Hume Coal operations will exceed the PSNLs, the positioning and installation of monitoring systems, which can capture mine generated noise at sensitive receptors, needs to be negotiated prior to Mine approval. This measure would quantify the degree of exceedances (if any) of PSNLs and would provide a true account of mine derived noise and would afford landowners grounds to negotiate mitigation rights under the VLAMP.

A testament to the difficulties associated with negotiations between landholders and mining interests post-project approval are evidenced by the unresolved struggle between Whitehaven Coal and impacted landowners adjacent to Maules Creek Mine. In an independent report commissioned by local landholders (hereafter referred to as The Maules Creek Report), it was found that the predicted impacts of noise from the nearby mine appeared to exceed those levels indicated in modelling for the projects EIS. It was found that there had been no private agreement reached between landowners and the mine to exceed the PSNLs (as permitted in the Mine's EPL). Further, there were no conditions imposed **prior to the Mine's approval** or in the EPL that compelled the Mine to conduct noise monitoring at sensitive receptors to quantify its noise impact. As a result, the degree of noise exceedances could not be established and mitigation measures could not be negotiated. One of the Maules Creek Reports findings was that:

> There were no conditions in the project approval that *compelled* Whitehaven Coal to negotiate an agreement or purchase the (property owners) prior to final approval of the project.[64]

It is apparent, from the experience of landowners at Maules Creek, that once approval has been granted, any willingness by proponents to reach satisfactory negotiations with land holders diminishes rapidly. This is evidenced when, after numerous attempts by one landowner to have the Mine conduct a noise monitoring program on the affected property, a three-month real-time program was carried out in two locations. Despite numerous requests for the data by the landowner, the Mine only supplied a limited 3-day snapshot of monitoring data from one site and there are no conditions in the EPL that compel the Mine to make the data available. This experience highlights the importance of ensuring that affected receptors are afforded protections and that there are the necessary conditions in place compelling fair dealings between landholders and mining interests prior to project approval.

[63] Hume Coal Project - Environmental Impact Statement, 2017. Appendix D Berrima Rail Project – Environmental Impact Statement, - Main Report Appendices A-D Volume 3A, page 58. Available at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7172 (accessed 12 May 2017).

[64] George, S., Taylor, M.P. 2016. Report on the Off-site impacts from Maules Creek Coal Mine (MCCM) operations on the properties of Blue Range, Ellin Vennin and Marlow Downs (page 9).

## Findings related to Project Specific Noise Levels (PSNLs)

6. **The HCP EIS predicts that there are eight assessment locations (nine dwellings) within the area modelled that are predicted to experience residual noise levels between 3 to 5 dB above Project Specific Noise Levels (PSNLs).[65] As a result, these properties are entitled to voluntary mitigation upon request.**

   To determine if future Hume Coal operations will exceed the PSNLs, the installation of monitoring systems that can capture mine generated noise at sensitive receptors need to be negotiated prior to Mine approval. This measure would quantify the degree of exceedances (if any) of PSNLs. Installation of monitoring systems would provide a true account of mine-derived noise and would afford property owners grounds to negotiate mitigation rights under the Voluntary Land Acquisition and Mitigation Policy (VLAMP).

## Recommendations related to Project Specific Noise Levels (PSNLs)

This Report recommends that Coal Free Southern Highlands group should:

5. **Request a delay of Hume Coal Mine project approval until all residences entitled to voluntary noise mitigation upon request (under the VLAMP) are resolved satisfactorily.**

   Support for the importance of addressing this need for pre-project approval is evidenced by the Maules Creek Mine experience. Impacted residents at Maules Creek found that without clear conditions compelling the Whitehaven Coal to undertake continual real-time Noise monitoring at affected receptors properties, it was not possible to formally quantify noise impacts on affected landowners. This is an important issue in light of the stated possibility of Hume Coals increased future operations. Further, the upgrading of rail infrastructure associated with the BRP will likely lead to increased operations by the other three regular rail users on the Berrima Branch Line and the Moss Vale – Unanderra rail line to Port Kembla.

6. **Request the NSW EPA impose conditions requiring real-time noise monitors be placed and operated 24 hours a day at all eight locations entitled to voluntary noise mitigation upon request. This is necessary to monitor and establish the off-site impacts from mine and rail construction, surface mining and rail operations noise should the project(s) be approved.**

7. **Request that any data recorded under any future noise monitoring system (amended or negotiated), undertaken by Hume Coal or the NSW EPA, be made available to impacted persons.**

[65] Hume Coal Project - Environmental Impact Statement, 2017 - Appendix F, page 303: Noise and Vibration Assessment. Available at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7172 (accessed 16 May 2017).

# Rail coal dust emissions management practices in the NSW relative to proposed Hume Coal operations

In 2015 the NSW Chief Scientist and Engineer released her Independent Review of Rail Coal Dust Emissions Management Practices in the NSW Coal Chain. The Review concluded that there was insufficient data about the amount and distribution of particulates in rail corridors to assess the effectiveness of mitigation.

### Rail derived coal dust: Community response to air pollution

In 2015, the New South Wales Chief Scientist and Engineer, Mary O'Kane, was requested to undertake an independent review of rail coal dust emissions management practices in the NSW Coal Chain (The Review). The Review was in part, in response to concerns expressed by community groups and members, particularly in the NSW Hunter Region, relating to the human health and environmental impacts of dust and particle emissions from coal trains connecting the region's mines with the Port of Newcastle. A further focus of The Review was to assess the current management and monitoring practices of the impacts of coal transport.

The scope of The Review included an assessment of the available literature including numerous studies undertaken locally and internationally to identify the sources of coal dust and emissions in the rail corridor, possible mitigation strategies and analyses of gaps in the current knowledge and understanding. A key finding of The Review was that a significant amount of research has been conducted in The Hunter region. The Review aimed to address the merits of community concerns and to measure and address coal dust emissions as previous attempts had failed to produce a study or set of studies which can definitively determine if there is a problem with the 'rail corridor.

The Review found that generally, the examined studies agreed that dust levels increase when some loaded and unloaded coal and freight trains pass through the corridor; but less well understood is the composition of the dust, its source, quantity, concentration, and pattern and distance of dispersal.[66] A key finding of The Review was that:

> Given the known health impacts of particulate matter, more precision is required about localised air quality in the rail corridor, and the likelihood of its impacting people living and working near the corridor.[67]

This Finding clearly indicates that with the current knowledge gaps, the implications to human health from PM derived from rail transported coal cannot be characterised and the risks cannot be quantified.

[66] O'Kane, M. 2016. NSW Chief Scientist and Engineers Final Report on the Independent Review of Rail Coal Dust Emissions Management Practices in the NSW Coal Chain, page iv. Available at: http://www.chiefscientist.nsw.gov.au/__data/assets/pdf_file/0008/89864/160805-FINAL-Coal-Dust-Report.pdf (accessed 2 November 2016). 2016).

[67] Ibid.

## Findings related to rail coal dust emissions management practices in the NSW relative to proposed Hume Coal operations

7. **In 2015 the NSW Chief Scientist and Engineer released her Independent Review of Rail Coal Dust Emissions Management Practices in the NSW Coal Chain. The Review concluded that there was insufficient data about the amount and distribution of particulates in rail corridors to assess mitigation effectiveness.**[68]

   The Review made a range of recommendations (Appendix 7) in recognition of the known health impacts of particulate matter. These recommendations included the need for a pilot study to establish with greater precision the health effects of localised air quality in rail corridors, and its likely impact on people living and working near the corridor..At this stage, the recommended pilot study has not been initiated though any Findings of such a report would be highly relevant to the proposed rail operations of the Hume Coal Mine.

## Recommendations related to rail coal dust emissions management practices in the NSW relative to proposed Hume Coal operations

This Report recommends that Coal Free Southern Highlands group should:

8. **Request a delay of the Berrima Rail and Hume Coal Projects approvals until such time as the recommendations outlined in Independent Review of Rail Coal Dust Emissions by the NSW Chief Scientist are implemented and existing knowledge gaps are addressed.**

   These recommendations (Appendix 7) are highly relevant to the nature of both project development applications in terms of potential Hume Coal Mine generated particulates and other emissions from coal handling and coal transport. These projects could potentially impact air quality, local communities and those residing in the near vicinity of rail corridors beyond the BRP. In making its recommendations, The Review noted at present, it is:

   > …unable to make a formal determination on specific mitigation techniques because there is not enough known about the amount and distribution of particulates in the rail corridor and thus no reference point against which to assess mitigation effectiveness.[69]

   The Review's recommendations (Appendix 7) were designed to address the existing knowledge gaps relating to particulate production and transport by identifying the need for further studies. Similarly, the Woolcock CAR Review of Health Impacts of Emission Sources, identified similar knowledge gaps in relation to human health outcomes for communities close to coal mining operations:

   > …that exposure to coal dust has the potential to cause chronic respiratory diseases and, possibly cardiovascular disease and cancer. However, limitations of the methods used in the health studies of communities living near coal mines severely restrict what can be inferred from the study results. Furthermore, air pollutants other than coal dust (*e.g.* diesel exhaust emissions and crustal dust) are

[68] O'Kane, M. 2016. NSW Chief Scientist and Engineers Final Report on the Independent Review of Rail Coal Dust Emissions Management Practices in the NSW Coal Chain, page vi. Available at: http://www.chiefscientist.nsw.gov.au/__data/assets/pdf_file/0008/89864/160805-FINAL-Coal-Dust-Report.pdf (accessed 2 November 2016).

[69] Ibid.

associated with coal mining and this makes it difficult to assign health effects specifically to coal dust exposure.[70]

It is apparent in the Findings of these reviews that not enough is known to adequately characterise the distribution, transport, deposition, re-entrainment and the impacts to human health from coal corridor dust, emissions and other particulate matter to impose definitive protective guidelines on Hume Coals operations. Until these inadequacies are addressed, community concerns as to the risks associated with the handling and transport of coal in the near vicinity to communities are likely to remain.

**9. In the event that the Hume Coal and Berrima Rail Projects are approved in lieu of any Findings of a recommended NSW Government pilot study, Coal Free Southern Highlands are recommended to request that the most rigorous emissions standards are imposed on Hume Coal with respect to the management of dust and particulate emissions.**

Conditions of this nature would acknowledge, in part, the findings of The Review in terms of the health implications, existing knowledge gaps and the current inadequacies in quantifying the extent to which coal handling and transport contributes to dust and particulates in the rail corridor. Moreover, such conditions would also acknowledge the possible influences of known sources of dust in rail corridors from handling and transport of coal from Mine to port, these being:

- the surface of loaded wagons
- leakage from doors of loaded wagons
- parasitic load
- residual coal in empty wagons
- emissions from diesel locomotives
- dust originating from soil within the corridor or from elsewhere
- re-entrainment of spilled coal or other dust in the rail corridor, including through
- turbulence caused by passing trains.[71]

[70] Review of the health impacts of emission sources, types and levels of particulate matter air pollution in ambient air in NSW. Centre for Air Quality and Health Research and Evaluation (CAR) and Woolcock Institute of Medical Research (page 71). Available at http://woolcock.org.au/s/Health-impacts-of-PM-report_final-for-web-25bx.pdf (accessed 7 May 2017).

[71] O'Kane, M. 2016. NSW Chief Scientist and Engineers Final Report on the Independent Review of Rail Coal Dust Emissions Management Practices in the NSW Coal Chain, page 15. Available at: http://www.chiefscientist.nsw.gov.au/__data/assets/pdf_file/0008/89864/160805-FINAL-Coal-Dust-Report.pdf (accessed 2 November 2016).

## Predicted impacts from rail operations from proposed Hume Coal Mine

The text below addresses the potential impacts associated with the BRP and Hume Coal's transport operations to port.

### Train movements: Berrima Branch Line

Hume Coal forecasts that the transportation of coal from the HCP surface facilities via the BRPs new rail loop and spur (Figure 5) onto the Berrima Branch Line will require up to eight project related train movements per day.[72] This amounts to 56 trains per week (~2900 rail movements per year). The BRP EIS reports the number of train movements required as approximately 50 per week.[73] This is calculated on the forecasted 3.5 Mtpa of coal the Mine is expected to extract and transport at peak production.[74] The Hume Coal 50 train movements are in addition to the current estimated 120 rail movements along the existing line, from the Berrima Cement Works to the Main Southern Rail Line. Therefore, the total weekly movements along the Berrima Branch Line will be approximately 170 (i.e. 85 trains in and 85 trains out).[75]

What is clear is that there is no certainty for local communities that the estimations outlined in the BRP EIS of Hume Coal weekly train movements will remain at this level. In fact, the opposite is the case as noted in the HCP EIS due to:

> …variations in mine production, scheduling, market conditions and several other factors, uneven rail volumes may result from year to year.[76]

This is a signal that depending on external influences, Hume Coal's train movements in the future may increase. Indeed, a primary justification given for the merits of the BRP is a higher financial return and increased efficiency for the use of rail infrastructure that is described as in the public interest.[77] Moreover, as the existing rail users of the Berrima Branch Line are not captured within the HCP or BRP EIS's or subsequent EPL, any consequential increases in future usage of this rail infrastructure by these parties cannot be influenced through these processes.

Furthermore, the BRP EIS promotes a sentiment that the upgrades of rail infrastructure are as much a public service as they are a commercial enterprise in stating that the upgrade proposal will:

> …eliminate the risk of trains becoming stranded on other sections of the track and unable to enter the private line….[78]

and, in terms of public interest and the efficient use of rail infrastructure:

> The 'do nothing' option was not considered further.[79]

This argument however fails to recognise that what is possibly of greater interest to the public is the potential for expected increases in rail and road traffic, noise and Mine derived emissions (in addition to those already predicted in the EIS), are adequately addressed and treated as a

[72] Hume Coal Project - Environmental Impact Statement, 2017. Appendix D Berrima Rail Project – Environmental Impact Statement, - Main Report Appendices A-D Volume 3A, page 118. Available at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7172 (accessed 12 May 2017).
[73] Ibid (page 25).
[74] Ibid.
[75] Ibid.
[76] Ibid.
[77] Ibid.
[78] Ibid (page 35).
[79] Ibid.

significant concern. It is unclear the degree to which these local communities would benefit from financial returns highlighted in the EIS's, though it is certain that any increases rail usage and 24 hour operations will have a greater impact on local communities in terms of noise, and dust and diesel emissions.

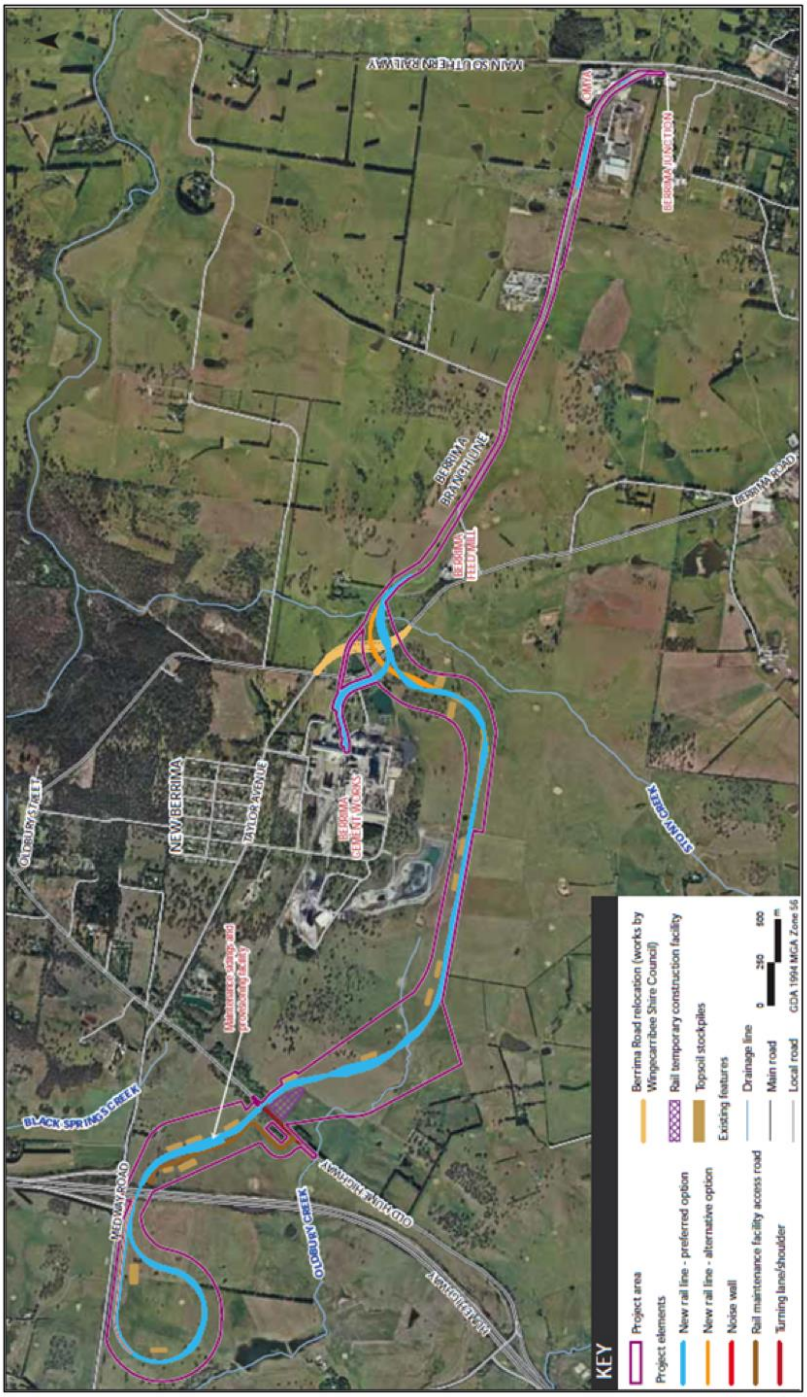


**Figure 5.** The Berrima Rail Project map highlighting the proposed new rail loop and spur, the Berrima Cement Works and existing rail infrastructure including the Berrima Branch Line.[80]

[80] Hume Coal Project - Environmental Impact Statement, 2017. Appendix D Berrima Rail Project – Environmental Impact Statement - Main Report Appendices A-D Volume 3A, page 35. Available at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7172 (accessed 12 May 2017).

## Findings related to predicted impacts from rail operations from proposed Hume Coal Mine

8. **Should the Berrima Rail Project (BRP) proposal be approved, increased rail usage is expected to result from the improved rail access. The BRP or HCP EIS's have no authority to influence the future operations of the other existing local rail using industries (Boral, Inghams and Omya).**

   Existing rail users of the Berrima Branch Line are not captured within the HCP or BRP EIS or will be included in any future Environment Protection Licence (EPL). This creates a lack of certainty for the local community as any increases in future usage of this rail infrastructure by these parties do not appear to addressed via the EIS and are likely to not be incorporated within Hume Coal's future EPL.

9. **The proposed upgrade to the Berrima Junction, the subject of the BRP, will allow increased use of the existing rail infrastructure, including ARTC controlled sections of railway.**

   The nearby Tahmoor Coal Mine utilises the ARTC controlled Moss Vale / Unanderra Rail line to transport coal to Port Kembla. The Tahmoor Coal Mine may continue operations despite the stated belief in the HCP EIS that it would cease operations between 2018 – 2021. The impact of Tahmoor Mine operations discussed in greater detail below. In this eventuality, Hume Coal operations would add an additional 2900 train movements to existing rail traffic on the line.

## Recommendations related to predicted impacts from rail operations from proposed Hume Coal Mine

This Report recommends that Coal Free Southern Highlands group should:

10. **In light of the predicted coal volumes (annual and ROM) outlined in the Hume Coal and Berrima Rail EIS, Coal Free Southern Highlands are recommended to seek that a maximum of four trains per day, in each direction, on the Berrima Branch Line, be imposed for the life of the mine regardless of any increases in operations.**

    Such conditions would provide certainty and be a recognition of the limitations of the HCP and BRP EIS to dictate increases in operations, by other rail users as a consequence of any HCP and BRP approvals.

**11. Request that persons and communities residing along the Moss Vale – Unanderra rail line be included as stakeholders in the HCP and BRP EIS in recognition of the expected consequential increase in rail movements. These impacts include:**

- HCP operations
- anticipated increases in operations by other rail users as a result of upgraded infrastructure
- continuation of Tahmoor Mine coal mine train movements once Hume Coal rail usage commences.

**12. Seek that Hume Coal be compelled to undertake the same monitoring and modelling programs as have been carried out elsewhere to assess the impacts from new rail infrastructure along the proposed Berrima Rail Link.**

**13. In light of the predicted coal volumes outlined in the Hume Coal and Berrima Rail EIS (annual and ROM), Coal Free Southern Highlands are recommended to seek that a maximum of the four trains per day, in each direction, on the Moss Vale – Unanderra Line be imposed for the life of the mine regardless of any increases in operations.**[81]

The imposition of such conditions would recognise the impacts on persons and communities in the near vicinity of the rail line. Moreover, such conditions would acknowledge the limits of the HCP and BRP EIS to dictate increases in operations, by other rail users as a consequence of any HCP and BRP approvals.

**14. Request a delay of the Hume Coal or Berrima Rail Projects approval(s) until such time as the findings of the recommended pilot study to characterise of the air pollutant profile around the rail corridor is available.**

This request to delay the onset of operations reflects the knowledge gaps that need to be addressed as outlined in the Recommendations of the Independent Review of Rail Coal Dust Emissions by the NSW Chief Scientist.

[81] The consistent wording of Recommendation 10 and 13 apply to two separate elements of Hume Coal's proposal. These are the localised impacts from the rail operations (10) and secondly, the flow-on non-local impacts from the project due to rail transport to Port Kembla (13).

## Public safety from rail operations from the proposed Hume Coal Mine

The ARTC controlled sections of railway refers to the Moss Vale – Unanderra line, which is the penultimate rail corridor to Port Kembla and is essential for the transport of the HCP's coal to port.

### Moss Vale – Unanderra Line train movements

The BRP EIS outlines the current rail movements along the 57 km long Moss Vale – Unanderra line. There are presently between 11 – 12 daily train movements, in each direction[82] and of these, the nearby Tahmoor Coal Mine currently accounts for four of these, though presumably, the number would be eight per day (four loaded trains and four empty trains on return). It is documented in the EIS that Hume Coal operations would also require up to four loaded and four empty daily coal train movements which would increase the lines usage to between 15 and 16 daily train movements in each direction.[83] It was believed (at the time of the BRP EIS printing) that the Tahmoor underground coal mine may cease operations between 2018 and 2021.[84] The BRP EIS also indicates that this increased usage level is unlikely to be reached as the Tahmoor rail movements would have likely ceased by the time the HCP was operating.[85]

Recent developments however, (widely reported in local and national media[86,87]) suggest that the Tahmoor Mine has now been placed up for sale and may continue operations beyond the previously indicated closure dates. Should this situation eventuate, the four train movements per day, in each direction, which Hume Coal predicts it will require on this line to convey coal to Port Kembla, may be **in addition to** the Tahmoor trains and not **a replacement of** them. This would amount to a 100 % increase in total coal train movements along this section of rail from the current situation. It is also certain that in this instance, persons and communities who reside along and in the near vicinity of the entire rail line could expect significant increases in associated impacts from this increased activity in terms of:

- increases in operations by Hume Coal and other users, and the impacts of additional rail traffic including:
  - diesel emissions
  - coal dust particulate
  - noise from passing rail freight.

Moreover, these stated train volumes do not account for any future increases in Hume Coal train movements should variations in mine production, scheduling, market conditions and several other factors [88] (addressed in Findings 8 and 9 above) eventuate and lead to the uneven rail volumes from year to year as documented in the BRP EIS.[89]

[82] Hume Coal Project - Environmental Impact Statement, 2017. Appendix D Berrima Rail Project – Environmental Impact Statement, Main Report Appendices A-D Volume 3A, page 131. Available at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7172 (accessed 12 May 2017).
[83] Ibid (page 143).
[84] Ibid.
[85] Ibid.
[86] Jobs may be saved as Glencore puts Tahmoor mine up for sale. Available at: http://www.abc.net.au/news/2017-05-09/glencore-puts-tahmoor-mine-up-for-sale/8510688 (accessed 22 May 2017).
[87] Glencore announces it will sell Tahmoor coal mine. Available at: http://www.dailytelegraph.com.au/newslocal/macarthur/glencore-announces-it-will-sell-tahmoor-coal-mine/news-story/143cab6fad17127acccd79532f7e9e1c (accessed 22 May 2017).
[88] Hume Coal Project - Environmental Impact Statement, 2017. Appendix D Berrima Rail Project – Environmental Impact Statement - Main Report Appendices A-D Volume 3A, page 25. Available at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7172 (accessed 12 May 2017).
[89] Ibid.

As stated in the BRP EIS, the primary objective is:

> … to inform government authorities and other stakeholders about the project and the measures which will be implemented to mitigate, manage and/or monitor potential impacts…[90]

It is clear that with BRP approval, the potential impacts could occur beyond the localised areas outlined in the project's EIS. Extending stakeholder engagement to residents and communities on the Moss Vale – Unanderra is not covered in either EIS document. However, the acknowledged increases in rail traffic along this line would support Hume Coal's contention above that potential impacts on stakeholders from the project require monitoring, management and mitigation. Such monitoring is particularly relevant in the likelihood that Hume Coal and Tahmoor Coal trains could be operating simultaneously.

## Findings relating to public safety from rail operations from the proposed Hume Coal Mine

**10. The community hold concerns that the condition of the Moss Vale / Unanderra Rail line to Port Kembla is not sufficiently adequate to accommodate heavy coal rail trains through the township of Robertson safely.**

Photographic images of sections of the Moss Vale / Unanderra rail line at the township of Robertson depict cracked and rotting timber sleepers between tracks. Further, there appears to be areas where the soil surrounding the tracks and sleepers has been displaced by track movement.

## Recommendations related to public safety from rail operations from the proposed Hume Coal Mine

This Report recommends that Coal Free Southern Highlands group should:

**15. Request that prior to any approval of the Hume Coal Project or Berrima Rail Project be considered, the ARTC should establish the suitability of the entire length of the Moss Vale – Unanderra line to safely accommodate rail movements associated with the Hume Coal Project.**

This should include any future expected rail locomotives and carriages that may utilise the Moss Vale – Unanderra line rail as a result of increased operations made possible by the BRP, including continued expected usage by Tahmoor Mine trains.

**16. Request that modelling be conducted to predict future cumulative dust and diesel emissions levels with the inclusion of 2900 additional rail movements per year anticipated from Hume Coal trains along this line.**

[90] Hume Coal Project - Environmental Impact Statement, 2017. Appendix D Berrima Rail Project – Environmental Impact Statement - Main Report Appendices A-D Volume 3A, page 25. Available at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7172 (accessed 12 May 2017).

## Public safety from rail operations at Robertson due to the proposed Hume Coal Mine

Photographic images of sections of the Moss Vale / Unanderra rail line at the township of Robertson provide justification for community concerns as to the current condition of track to accommodate the existing rail traffic. Images of the Moss Vale / Unanderra rail line at various locations within the Robertson township show cracked and rotting timber sleepers between tracks (Appendices 4,5a and b) and areas where there appears to be significant track movement, enough to agitate the surrounding soil and causing potential instability (Appendices 6a and b).

One such area of concern is within 15 metres of the boundary fence-line of Robertson Primary School (Appendix 4). In addition to the potential safety issues presented by the existing track condition (heavy coal laden trains traversing poorly maintained track near a school) an increase in rail traffic would likely increase noise and disruption to the primary school's learning environment. In addition, the potential health risks of PM exposure will remain unquantified until the NSW Chief Scientists recommended pilot study is conducted and its findings are released..

In Robertson, there are three road / rail intersections (level crossings) where adequate safety warning measures for motorists and pedestrians are non-existent. These crossings intersect the Moss Vale – Unanderra line and are absent of boom gates (to stop traffic at a safe distance from the rail line) or the associated signal lighting for driver safety. Further, the crossings do not have warning lights for pedestrians to traverse the rail tracks safely (locations: Hoddle Street, Hoddle Lane and Old Kangaloon Road—Appendices 1,2 and 3). As established in this Report, Hume Coal's operations will be conducted on a 24-hour basis meaning that a portion of the expected 2900 rail movement per year will occur after daylight hours, when lighting is essential.

Thus the Hume Coal and Berrima Rail project proposals are an appropriate opportunity to re-visit the safety of level crossings in affected areas.

In NSW, level crossing upgrades are administered by the Level Crossing Safety Council. The Council consists of a number of stakeholders including NSW Police, Roads and Maritime Services, Local Government and Shires Association, the ARTC inter alia.[91] The BRP EIS notes that:

> Level crossing upgrades are prioritised using the risk-based ALCAM assessment system, which takes into account a range of factors including the level of road and rail traffic using the level crossing.[92]

An expected increase in rail traffic of 2900 rail movements per year at level crossings on this track would satisfy the Safety Councils criteria to, at a minimum, re-assess these intersections. Moreover, it is further noted in the BRP EIS that since 2013, many level crossings have undergone upgrades to safety features along the route from Berrima to Port Kembla including installation of new red level crossing signs at many level crossings.[93]

[91] Hume Coal Project - Environmental Impact Statement, 2017. Appendix D Berrima Rail Project – Environmental Impact Statement - Main Report Appendices A-D Volume 3A, page 132. Available at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7172 (accessed 12 May 2017).

[92] Ibid.

[93] Hume Coal Project - Environmental Impact Statement, 2017. Appendix D Berrima Rail Project – Environmental Impact Statement - Main Report Appendices A-D Volume 3A, page 132. Available at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7172 (accessed 12 May 2017).

## Findings relating to public safety from rail operations at Robertson from the proposed Hume Coal Mine

**11. There are no safety warning systems or signal lighting in place at three level crossings within the Robertson township.**

In Robertson there are three road / rail intersections (level crossings) where adequate safety warning measures for motorists and pedestrians to negotiate Moss Vale – Unanderra line railway crossings are absent. These crossings are without any boom gates (to stop traffic at a safe distance from the rail line) or the associated signal lighting for driver safety. Further, they do not have warning lights for pedestrians to cross rail tracks safely.

## Recommendations relating to public safety from rail operations at Robertson from the proposed Hume Coal Mine

This Report recommends that Coal Free Southern Highlands group should:

**17. Request that noise monitoring be conducted at Robertson Primary School to quantify existing noise levels and to better assess the appropriateness of any future noise mitigation strategies.**

This measure would be in recognition of the future increases in rail movements likely to arise from Hume Coal operations and the proximity of Robertson Primary School to the Moss Vale – Unanderra rail line.

**18. Request that a dust monitoring program be conducted at Robertson Primary School to quantify existing dust and diesel emissions levels at the school.**

**19. Request that the BRP be delayed until such time as the Level Crossing Safety Council can convene and assess all existing safety deficiencies of any level crossings identified in this Report and any other level crossing on this line.**

Any decisions on crossing upgrades should be made with all available information including, the information outlined in Finding 10.

## The adequacy of current rail infrastructure to safely accommodate rail operations from the proposed Hume Coal Mine

The proposed rail loop and spur (which is the subject of the BRP portion of the HCP EIS) will be constructed to accommodate a 30 tonne axle load.[94] The Australian Rail Track Corporation (ARTC) Route Access Standard D52 (RASD52) document outlines the route capacity guidelines for rail (locomotives and wagons) to utilise the Moss Vale – Unanderra rail route that is required to transport coal from the HCP to Port Kembla.[95] The guidelines detailed in the RASD52 document are listed in Table 3. The RASD52 clearly outlines the requirements, in terms of weight and speed, for locomotives and wagons to access the ARTC managed line between Moss Vale and Unanderra. The guidelines are further divided to address different requirements in this section of track i.e. Moss Vale – Robertson and Robertson – Unanderra. The HCP or BRP EIS do not address the inconsistent capacities of the two different rail sections: the BRP will have a 30 tonne axle load while the Moss Vale – Robertson and the Robertson – Unanderra will have a maximum wagon axle load for freight movement of 25 tonnes and 22.8 tonnes for locomotives. Neither of the EISs detail how Hume Coal will address this gap.

**Table 3.** The ARTC Route Access Standard D52 (RASD52) document outlining route capacity guidelines for rail locomotives and wagons utilising the Moss Vale – Unanderra line.[96] Values in bold and italics indicate maximum axle loads (tonnes).

| **Moss Vale – Robertson** | | | |
|---|---|---|---|
| **Train type** | **Maximum Speed (Kph)** | **Maximum Axle Load (tonnes)** | |
| | | **Locos** | **Wagons** |
| **Freight** | 115 | ***22.3*** | ***19*** |
| | 100 | 22.3 | 21 |
| | 80 | 22.8 | 23 |
| | 65 | ***22.8*** | ***25*** |
| **Passenger** | | | |
| XPT / Railcar | N/A | N/A | |
| Xplorer | 115 | N/A | |
| Diesel Haul | 115 | ***19*** | |
| **Robertson – Unanderra** | | | |
| **Train type** | **Maximum Speed (Kph)** | **Maximum Axle Load (Tonnes)** | |
| | | **Locos** | **Wagons** |
| **Freight** | 50 | ***22.8*** | ***25*** |
| **Passenger** | | | |
| XPT / Railcar | N/A | N/A | |
| Xplorer | 115 | N/A | |
| Diesel Haul | 50 | ***19*** | |

[94] Hume Coal Project - Environmental Impact Statement, 2017. Appendix D Berrima Rail Project – Environmental Impact Statement - Main Report Appendices A-D Volume 3A, page 132. Available at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7172 (accessed 12 May 2017).

[95] Australian Rail Track Corporation Route Access Standard (RAS): DIRN Section Pages D52 - Moss Vale to Unanderra. D52 Route Capacity. Available at: https://www.artc.com.au/uploads/RAS_D52.pdf?080617 (accessed on 24 May 2017).

[96] Ibid.

## Findings relating to the adequacy of current rail infrastructure to safely accommodate rail operations from the proposed Hume Coal Mine

**12. The proposed rail loop and spur, the subject of the BRP, will be constructed to accommodate a 30 tonne axle load. The maximum axle load capacity of the ARTC controlled Moss Vale – Unanderra rail route (22.8 tonnes for locomotives and 25 tonnes for freight wagons) is well below the capacity of the proposed BRP track.**

## Recommendations relating to the adequacy of current rail infrastructure to safely accommodate rail operations from the proposed Hume Coal Mine

This Report recommends that Coal Free Southern Highlands group should:

**20. Request that Hume Coal produce a Coal Transport Plan that outlines the protocols for transporting coal along the Moss Vale – Unanderra Rail line safely.**

Such a plan should include the methods Hume Coal will employ to comply with the safe working weights outlined in any ARTC Report and the maximum axle weights and speeds outlined in the Moss Vale – Unanderra line RAS D52 document. Any such plan would also include protocols for accurately weighing each load train wagon at the train load-out-bin to comply with the stated conditions above.

**21. Request that the ARTC report on all the current mitigation strategies they have in place along the Moss Vale – Unanderra Rail line in relation to coal dust and diesel emissions.**

It is essential that any mitigation strategies are retained (and not precluding from further changes) until characterisation of the air pollutant profile around the rail corridor is available as per the Recommendations of NSW Chief Scientist.

## List of abbreviations and terms

| Term | Abbreviation |
|---|---|
| Ambient air quality | AAQ |
| Berrima Rail Project | BRP |
| Australian Rail Track Corporation | ARTC |
| Environmental Impact Statement | EIS |
| Hume Coal Project | HCP |
| Industrial Noise Guideline | ING |
| Million tonnes | Mt |
| Million tonnes per annum | Mtpa |
| National Environment Protection Council | NEPC |
| National Environment Protection (Ambient Air Quality) Measure | NEPM |
| Particulate Matter < 2.5 µm in diameter | $PM_{2.5}$ |
| Particulate Matter <10 µm in diameter | $PM_{10}$ |
| Project Specific Noise Levels | PSNL |
| Run-of-Mine (Mine life) | ROM |
| Route Access Standard D52 - Moss Vale – Unanderra rail line | RASD52 |
| Total Suspended Particulate (with a diameter 50 µm) | TSP |

**Coal supply chain or coal chain** – describes the steps, points and stages in the extraction, processing, transporting, storing and use or export of coal from the mine to a ship or power plant. The coal chain includes mine site, loading, cleaning, transport (via train, truck or conveyor), shore based handling of coal stockpiles and shipping or feeding of coal to power stations.[97]

**Rail corridor** – defined as the region between the loading activities at the mine site (whether the train or other transport is filled with coal) and the location where the train unloads the coal at the export terminal or power plant.[98]

**Independent Review of Rail Coal Dust Emissions** – The NSW Chief Scientist's Final Report on the Independent Review of Rail Coal Dust Emissions Management Practices in the NSW Coal Chain. The Review examined rail coal dust emission management practices in the NSW Coal Chain to assess the environmental and human health impacts associated with the NSW coal supply chain, particularly in the Hunter region of NSW. The impetus for this Review arose from community concerns about the health impacts of dust and diesel emissions from coal trains that

[97] O'Kane, M. 2016. NSW Chief Scientist and Engineers Final Report on the Independent Review of Rail Coal Dust Emissions Management Practices in the NSW Coal Chain. Available at: http://www.chiefscientist.nsw.gov.au/__data/assets/pdf_file/0008/89864/160805-FINAL-Coal-Dust-Report.pdf (accessed 2 November 2016).

[98] Ibid.

connect the Hunter region's mines to the Port of Newcastle and the effectiveness of current monitoring and management practices.[99]

[99] O'Kane, M. 2016. NSW Chief Scientist and Engineers Final Report on the Independent Review of Rail Coal Dust Emissions Management Practices in the NSW Coal Chain. Available at: http://www.chiefscientist.nsw.gov.au/__data/assets/pdf_file/0008/89864/160805-FINAL-Coal-Dust-Report.pdf (accessed 2 November 2016).

# Appendices

The images data provided in the appendices were taken and supplied for use in this Report by Mr Danny Pullicin. The locations of each image and descriptions of features referred to and relied upon in the Report were also supplied by Mr Danny Pullicin.

## Appendix 1

Level crossing at Hoddle Street and Moss Vale – Unanderra, rail line, Robertson, NSW showing, no boom gates or barriers, no signage, no lighting for safe pedestrian or motorist crossing.

## Appendix 2

Rail intersection Moss Vale – Unanderrra line and Hoddle Lane, Robertson showing no boom gates or barriers, no signage and no lighting for safe pedestrian or motorist crossing.

## Appendix 3

The level crossing at Old Kangaloon Road and the Moss Vale – Unanderrra rail line showing no boom gates or barriers, no signage and no lighting for safe pedestrian or motorist crossing.

## Appendix 4

Damaged timber rail sleepers on the Moss Vale – Unanderra rail line at Robertson, NSW. Image depicts the condition of the track and its distance to the boundary fence of Robertson Public School in the background.

## Appendix 5

Sections of the Moss Vale – Unanderra rail line track at Robertson, NSW, showing cracked timber sleepers and general poor condition of rail infrastructure (a,b).

**(a)** **(b)**

## Appendix 6

Portions of the Moss Vale – Unanderra rail line track at Robertson, NSW showing track where rail movement has caused the shifting of surrounding soil causing piling and coverage of sleepers in places (a,b).

**(a)** **(b)**

## Appendix 7

The Recommendations of the 2015, Independent Review of Rail Coal Dust Emissions Management Practices in the NSW Coal Chain by the NSW Chief Scientist and Engineer.[100]

- That NSW adopt a dual approach to ensuring air quality through:

  I. the current focus on background ambient air quality by way of a well-structured network of standardised (including NEPM) monitors, and;

  II. a systematic focus on spatial and temporal distribution of air pollutants attributable to specific sources, with an initial focus on particulates from local, though possibly moving, sources (e.g. trains) in the coal chain requiring banks of monitors forming a separate network to the current NEPM network allowing real-time monitoring and providing new specific local air quality models of pollution from source to where air quality is at background levels.

Importantly, The Review highlights that for both foci above, the data must be of high quality and publically available and:

- It is recommended that a pilot study be designed and implemented for the rail corridor that would capture more detailed information and data on whether there is a statistically significant increase in particulate levels within the corridor, how far out from the corridor the particulate profile extends, and whether this would result in an unacceptable increased
  health risk for people living in the vicinity of the corridor

- It is recommended that following the pilot study, a process of monitoring pollutant sources at close range be rolled out. This will involve the design, development and deployment of cost effective monitors for measuring air quality near pollutant sources, and the development of models from the data acquired.

- It is recommended that all relevant data from industry and government air quality monitors and the associated models be deposited in the NSW Environmental Data Portal and be available to the community (in raw and processed, graphical form) in line with open data principles.

- It is recommended that rail operator ARTC and all coal producers, coal handlers, coal transporters and companies involved in the coal chain keep all their current mitigation strategies in place (without precluding their further augmentation) until characterisation of the air pollutant profile around the rail corridor is available.

[100] O'Kane, M. 2016. NSW Chief Scientist and Engineers Final Report on the Independent Review of Rail Coal Dust Emissions Management Practices in the NSW Coal Chain. Available at: http://www.chiefscientist.nsw.gov.au/__data/assets/pdf_file/0008/89864/160805-FINAL-Coal-Dust-Report.pdf (accessed 2 November 2016).

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