DOC17/230860-03:ATC

Mr Paul Freeman
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NSW Department of Planning and Environment
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Dear Mr Freeman

Hume Coal and Berrima Rail Project – SSD 7171 and 7172
Comments on the Environment Impact Statement

I am writing in reply to your email dated 31 March 2017 notifying the Environment Protection Authority (EPA) of the public exhibition of the Environmental Impact Statement (EIS) for the proposed Hume Coal mine and related Berrima Rail project.

The EPA has reviewed the EIS and provides comments in the attachment to this letter (**Attachment A**). The comments highlight areas where the proposal presents the likelihood of significant risk to the environment. The comments also point to areas where the EPA recommends the proponent provide more information and clarification to assist the Department of Planning and Environment (DPE) in the assessment and determination of this proposal.

The EPA considers that the two focus areas for further attention by the proponent are:

- Water Pollution - including pollution potential to groundwater and other waters
- Environmental Risk Management – including overall water management, coal washery reject contingencies and others.

The EPA may require further clarification upon receipt and review of this information.

The EPA can meet with DPE at a mutually convenient time to discuss any of our comments. Should you require any further information please contact Andrew Couldridge on (02) 4224 4100.

Yours sincerely

G Howard 30/6/17

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ATTACHMENT A

EPA SUBMISSION ON HUME COAL AND BERRIMAL RAIL PROJECTS

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WATER POLLUTION

The EIS indicates an Environment Protection Licence will be required for *"Coal Works"* under Schedule 1 of *Protection of the Environment Operations (POEO) Act 1997.* Under Section 120 of the POEO Act it is an offence to pollute waters. The EIS does not appear to adequately assess the need for licence provisions on water pollution for discharges to surface and underground waters.

If the project is approved, the EPA will attach conditions to the licence to the protect the environment. These conditions can include limits, operating, monitoring and reporting requirements. When exercising its licensing functions, the EPA is required to consider any of the matters in Section 45 of the POEO Act that are relevant. These include but are not necessarily limited to:

- the pollution that will be caused and its impact on the environment
- practical measures that can be taken to prevent, control, abate or mitigate the pollution and protect the environment from harm
- the environmental values of water affected by the proposed discharge
- practical measures that can be taken to restore or maintain those values.

This may include, but not be limited to, the following project activities:

- Discharges of water to mine voids/bulkheads from the Primary Water Dam (PWD)
- Discharges from ponds SB03 and SB04 to Oldbury Creek
- Discharges from Pond MWD07 to mine shaft
- Surface application of treated wastewater (sewage) to land during construction and operation.

The EPA aims to ensure that licences specifically regulate discharges to waters of pollutants that pose a risk of non-trivial harm to human health or the environment. *"Waters"* includes surface and underground waters. *"Trivial"* here relates to both the concentration of the pollutant as well as its risk to the environment. The EPA may also take into account the risk of water pollution if predictions are not met or if incidents occur. The EPA specifies pollutants on a licence where their discharge in all practical terms is unavoidable and measures to control the pollutants and their impacts cannot be feasibly implemented.

The EIS states that water discharged underground will be derived from a variety of surface and underground sources. This water may cause water pollution. *"Water pollution"* is defined in the POEO Act. These sources of pollutants include the following:

- Changes in mine water chemistry that can occur when depressurised groundwater is released during mining, circulated via the Primary Water Dam, and emplaced back underground due to oxidation and other chemical processes and contact with excavated coal/rock.
- Leachate from co-disposed coal wash reject (CWR)/mine water in mine voids/bulkheads.
- Discharges from underground continuous miner operations (for example, water sprays, hydraulic spills/leaks) and surface activities that may contain hydrocarbons (for example, vehicle washing).
- Contact with *"stone dust"* applied to underground workings.
- Additions of waters to the PWD from surface operations including stormwater runoff from *"dirty"* surface areas (coal stockpiles/CWR emplacement), leachate from the CWR stockpiles and runoff from proposed effluent (sewage) irrigation areas. It will also include process water from the Coal Preparation Plant (CPP) which will contain coal fines, a range of water/coal processing chemicals (including flocculants and other water conditioning agents) and potential treated sewage effluent (if reused in the CPP).
- The potential interaction and recirculation of the waters underground/in surface ponds under the water management system over time.

The EIS does not provide sufficient information to determine if the concentration or load of these pollutants as well as its risk to the environment is trivial or not. The prediction of *"non-significant impacts to groundwater quality from the discharges of water from the primary water dam (PWD)"* in the EIS appears based on various assumptions about the input water quality. These include the quality of groundwater, CPP return water (taken from another mine) and uncontaminated rainwater. The EIS appears to state that the concentration/accumulation of contaminants in the PWD will be negligible due to dilution from rainfall and groundwater, both of which are claimed to be fresh.

It appears the discharge of PWD water to mine voids may constitute pollution of waters under Section 120 of the POEO Act based on some existing information in the EIS. Projected water quality from the PWD appears to contains elements at concentrations that are significantly higher than background ground water. For example, the EIS appears to indicate copper, nickel and zinc levels in the PWD water are higher than background levels when compared to Wongawilli coal seam water and Hawkesbury sandstone groundwater.

As the nature and levels of impact are site-specific, the onus is on the proponent to fully understand the nature of all discharges to waters and identify the impact of the pollution likely to be caused. This information includes:

- characterisation of any proposed discharges to waters in the environmental impact assessment.
- assessment of the likely impacts of discharges on the waters and how these will be mitigated, particularly regarding the environmental values of the waterway or groundwater.
- an indication of any limits that are considered by the proponent to be reasonable for the proposed discharges.
- undertaking comprehensive risk assessments and monitoring programs to target the key pollutants requiring control.

The environmental values of a waterway or groundwater are those that are relevant from the list of values set out in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC and ARMCANZ 2000) and identified in the NSW Water Quality Objectives. These guidelines are also used as a benchmark to assess the likely impact of pollution and the controls that should be placed on that pollution. Other guidance material, such as Environmental Guideline: Use of Effluent by Irrigation (Department of Environment and Conservation 2004), is used to inform consideration of other wastewater management approaches.

Further comment on these issues is provided below in the sections on groundwater and surface water and guidance on the EPA approach can be found on *Environment Protection Authority Licensing Fact Sheet - Using environment protection licensing to control water pollution* at:
http://www.epa.nsw.gov.au/resources/licensing/130119eplswater.pdf.

ENVIRONMENTAL RISK MANAGEMENT

It is important that all environmental risk contributions are defined and accounted for to ensure that the magnitude of any impacts to the environment are carefully weighed up with the social and economic costs/benefits of the project. These matters do not appear to have been fully accounted for in the EIS and create uncertainties in defining the environmental impact of the project in the short, medium and long term and affect its estimated costs and benefits.

There are high environmental and community expectations associated with this proposed project. The development is in a highly sensitive area including drinking water surface catchments. These catchments include Medway Rivulet/Medway Dam which is part of Wingecarribee Shire Council (WSC) water supply (the WSC water treatment plant has not operated since 2013) and Wingecarribee River/Warragamba dam (part of the Sydney drinking water supply). The project area also is overlying aquifers that contain high water quality groundwater extensively utilised. This sensitivity is heightened by the shallow nature of the coal seam to be worked and the relationships between groundwater flows and quality in these aquifers and baseline surface water flows and quality in local creeks.

The proponent has placed a high emphasis on a range of innovations to mitigate environmental impacts. Many of these innovations are not currently widely used in NSW underground coal mines. There are uncertainties in the practicability of these measures due to lack of specific detail on these measures in the EIS, inherent limitations in the best management practices being applied and site constraints/opportunities. These risks can create uncertainty in defining the environmental impact of the project in the short, medium and long term and affect its estimated costs and benefits. These matters do not appear to have been fully accounted for in the EIS. This includes, but is not limited to the Hazard and Risk Assessment (Appendix P) and the Economic Assessment (Appendix Q).

For example, scenarios that may result in increased environmental risks/costs include but are not limited to the following:

- The safe and viable operation of the mine is affected by a greater than predicted rate of groundwater generation or the bulkheads are not successful in retaining co-disposed water/CWR in sealed voids.
- Groundwater quality impacts from co-disposed CWR/water occurs that necessitates pre-treatment of PWD water before disposal underground, avoidance of CWR emplacement underground or groundwater remediation.
- Discharge requirements for PWD water to surface waters if excess water is generated that cannot be discharged underground.
- Injection of PWD water to the Hawkesbury Sandstone (an alternate option for surplus water suggested in the EIS)
- Pre-treatment of water from the PWD may be required to permit its reuse in vehicle wash down, coal processing and other mine infrastructure. This has not been defined in the EIS.
- High environmental monitoring, auditing and reporting costs to regularly demonstrate and independently validate the mine is operating in a proper and efficient manner and maintained in a proper and efficient condition, with respect to its environmental, safety and engineering capability and performance.
- Underground emplacement of CWR is not found to be practical and a surface emplacement area or offsite disposal (potential CWR levy) is required.
- The onsite sewage management system during construction and operation and its ability to meet required environmental and human health performance outcomes has not been defined.
- Ongoing PWD management costs, including sludge/tailings management (for example, dredging and disposal).
- The decommissioning and rehabilitation requirements and costs at the end of the Project's life have not been defined. This includes method of treatment and disposal of water and sludges in the PWD.
- The project noise footprint is greater than predicted. This can be due to difficulties in designing, predicting and controlling noise sources such as low frequency noise (including C weighted noise) from the Coal Preparation Plant and rail noise (for example, wheel squeal) from the proposed rail

loop. This has implications not only with respect to compliance with noise limits but also potentially with application of acquisition and mitigation rights.

It is important that individual risk contributions are defined and accounted for to ensure that the magnitude of any impacts to the environment are carefully weighed up with the social and economic costs/benefits of the project. Potentially uncertain long term costs and environmental consequences may require the need for contingencies to be secured financially. For example, surface and groundwater quality impacts may take years to develop and these impacts may persist for long periods. Extensive monitoring of surface and groundwater will be required to detect any early variation in water quality. Any significant change or likely change to surface or groundwater quality that causes pollution and impairs the environmental values of waters may require clean up action, remediation, pollution reduction programs, or compensation for damages resulting from pollution. Some further risk observations are provided below:

Water Management Model

The projects successful management of water relies heavily on modelling of ground and surface waters. The modelling although performed conservatively, contains inherent risk from assumptions and projections of experience from existing mine operations that may be dissimilar. This may result in uncertainty in defining potential impacts to groundwater and surface water.

Bulkheads

The EIS states that bulkhead seals will contain PWD water and underground reject material. The composition and design of the sealed bulkheads is however not detailed within the EIS documents. Their role in the site water management implies they will be constructed of an inert impermeable material. Their construction, design, composition and properties should be defined.

The EIS provides reference to UK and US guidelines for the safe design and construction of bulkheads in underground coal mines. The documents acknowledge risk with use of bulkheads and the UK guideline states *"Mines should install watertight plugs only when there is no reasonably practicable alternative for the long-term management of mine water inflows"*. The document emphasises the need for structural integrity in strata surrounding the bulkhead including minimal fracture networks, strong bedding planes and little damage during excavation.

The EPA is not qualified to assess the design of the bulkheads. However it notes that elsewhere in the EIS, cracking and dilation of strata is expected to occur up to two to three metres above driveages due to subsidence. The driveages and roadways also appear to be located in the lower band of the coal seam with coal at the base and roof. These conditions do not appear to conform to the recommended integrity in surrounding strata under the UK guidelines.

PWD Water Quality

Mine water quality can be highly variable due to several factors. These factors can be difficult to predict with certainty and include:

- Changes in groundwater chemistry upon exposure to atmosphere.
- Coal stockpile runoff (entraining sediment and carbonate compounds).
- Polymeric flocculants and coagulants typically used in preliminary sediment basins.
- Polymeric and metallic based flocculants used in the CPP.
- Leachate from the reject stockpile.
- Underground emplacement of reject with different sized particles.
- Underground emplacement using polymers to increase fluidity for pumping and solidifiers for stability in the emplacement.
- Oil release from equipment above and below ground.
- Occasional stone dust and sewage effluent entrainment.

The EIS does not appear to propose pre-treatment of coal contaminated water in SB01 and SB02. The EIS also does not propose treatment of water from the PWD for use in the CPP as occurs in many

mines. These treatment processes should be described in relation to the viability of effective reuse in plant/equipment and the influence they will have on water quality in the PWD and in water discharges underground.

WASTE

Contingencies need to be defined in the EIS if underground emplacement is later found to be not viable.

The EIS proposes to inject CWR (coarse rejects up to 10mm and fines) underground in mine voids behind bulkheads with mine water. In the initial phase of mining operations, a surface CWR emplacement area will be created until sufficient underground voids space is created and infrastructure for underground co -disposal has been established. The EIS appears to state this surface CWR stockpile will remain for life of the mine (20 years) and then be processed for underground disposal immediately prior to mine closure. Another surface emergency CWR stockpile will also be required to temporarily store CWR and allow coal processing if underground emplacement of CWR is interrupted during normal operations.

Surface Emplacement Location

The proponent should explain why the surface CWR stockpile (non-emergency) cannot be processed earlier for underground emplacement and is required for the life of the mine. The EIS states the rejects will fill only about one third of the void space left by coal extraction. The EPA publication *"Environmental Guidelines: Solid Waste Landfills" (1996)* should be taken into account for this stockpile. This guideline identifies areas which are inappropriate for landfilling because of their environmental sensitivity. This includes surface drinking water catchments and areas overlying aquifers that contains drinking water quality groundwater that is vulnerable to pollution, both of which are present for this project. These considerations are important if underground emplacement of CWR is not found to be practical and a surface CWR emplacement on the premises is required.

Coal wash reject – licensing, exemptions and levy

Coal wash rejects generated on the premises do not attract the coal wash rejects levy under Section 88 of the *POEO Act*. This levy will apply to any coal wash rejects that are disposed of off the premises unless a general or specific resource recovery exemption is obtained. The purpose of this levy is to stimulate improved environmental management of coal waste by making disposal more expensive (that is, to provide an economic incentive for mine operators to develop alternatives to disposal).

The land application of coal wash rejects outside the licensed premises may also require regulation under an Environment Protection Licence (EPL) for the scheduled activity of *"Waste Disposal (application to land)"*. Wastes which meet the requirements of either general or specific resource recovery exemptions, issued in accordance with Clause 51 of the *Protection of the Environment Operations (Waste) Regulation 2008*, are removed from this framework and are not subject to either licensing requirements or payment of the waste levy.

At present, there are two General Resource Recovery Exemptions which relate to alternative end-uses of coal wash rejects. These exemptions are "the coal wash rejects general exemption" which allows for a restricted use of coal wash rejects to be used in civil engineering applications, and *"the coal wash rejects (coal mine void) exemption"* which allows for coal wash rejects to be used for rehabilitation within coal mine voids. Both exemptions have several criteria which must be strictly complied with to benefit from the exemption.

GROUNDWATER QUALITY

General Observations

The EIS states that the Wongawilli coal seam (to be mined) within the project area is overlaid by Hawkesbury sandstone and in some places by the Wianamatta group. The Hawkesbury sandstone contains fresh groundwater of high yield. In contrast the Wianamatta Group contains minor supplies of poor quality groundwater. The coal seam is hydraulically connected to the overlying Hawkesbury Sandstone. Groundwater from the Hawkesbury sandstone is extensively used and contributes to baseline flows in local creeks. Uses of this groundwater include irrigation, stock drinking water and drinking water.

The underground co-disposal of minewater and rejects increases the risk of environmental impact to these environmental values of this water. Groundwater leakage resulting from the mining works in the coal seam will result in less base flow to connected surface waterways such as creeks and rivers. The EIS states these impacts are mitigated regionally by topography, but are locally extensive within the projects dewatering influence.

The EIS contains a desktop assessment of groundwater quality impacts. In providing this advice the EPA has considered the RGS Geochemical Report (2016) referred to in the EIS. The assessment is based on the expected characteristics of leachate generated when the reject is placed underground. To determine this a laboratory scale test called the Kinetic Leach Column (KLC) test was performed on a limited number of borehole core samples from the project area. Leached water from the samples was analysed for major dissolved ions and concentrations of heavy metals.

The EPA is concerned that the laboratory scale tests may not adequately represent operational impacts as results from leach tests are variable because of method dependency (method, equipment used and sample preparation). Minor changes in test methodology such as the design and construction of test vessels could lead to significant differences in both the mass of metal species released and the patterns of release. Variability is increased under real world conditions of reject preparation and changes in groundwater quality due to the mining process and injection of surface water from the primary water dam.

No evidence was provided in the EIS on the predictive ability of the tests generally and at the project site specifically. The EPA is not satisfied that the use of the KLC test, for what appears to be a primary basis for the disposal decision, is justified. The EPA recommends that the proponent undertake additional investigations to provide more certainty to the EIS prediction that the mine is unlikely to change the beneficial use status of the groundwater resource.

In addition, as the approach contains notable uncertainty, the EPA recommends that the proponent develop targeted monitoring and complementary contingency management as discussed in more detail below.

CPP reject underground emplacement

The EIS proposes to emplace CPP rejects underground in voids created during mining. The EIS does not identify the limestone dosage of the KLC tests for the CPP rejects that are returned underground (KLC 24). The KLC tests for the temporary surface emplacement are presented to have a concentration of one to two per cent limestone for an acidity buffer. The proponent should identify the proposed concentration of limestone dosing for the underground emplacement of CCP reject.

Groundwater monitoring programs should be further developed to monitor compliance with the pioneering mining process. Trigger actions and response plans should be developed as a contingency should monitoring results indicate further dosage or remedial reject treatment measures are required.

Although staged leachate testing informed the development of final KLC methodology for underground emplacement, the final KLC 24 test does not discuss or assess the potential variability within this

methodology before applying it at a landscape scale. Some form of replication is usually implemented to assess error margins and variability. The RGS report also notes this uncertainty between laboratory and real world environments.

Determining the efficacy of the underground emplacement proposal, and any variation from the controlled laboratory environment is noted as a particular area for targeted monitoring in this RGS report. This is not a clear objective of the proposed monitoring program in the EIS. Further, no contingency management options are discussed in the EIS (that is, Trigger Action Response Plans).

The importance of this monitoring, and possibly further replication of the appropriate KLC tests, is required due to the minimal buffering capacity of natural materials identified by the tests within the report. This means all buffering capacity from will come from the spraying of the walls with limestone (as explosion suppression), tailings amendment (one per cent limestone), and concrete bulkheads. It is noted that Granulated Blast Furnace slag is a recommended aggregate for bulkhead construction in the references.

Temporary CPP surface reject and lining

The EIS states that CPP rejects from initial workings will be stored on a temporary reject stockpile. The stockpile will remain until mine closure when they will be emplaced underground. The EIS does not justify the need for maintaining a temporary stockpile on site when surface runoff and leachate presents a risk to surface and groundwater quality.

The EPA recommends that the proponent should only have a working reject stockpile to hold material prior to processing and underground emplacement. The working stockpile should be limited in size at any time to a reasonable quantity of material to account for mine scheduling and operational difficulties such as equipment malfunction and breakdown. However, if a temporary CPP stockpile is found to be necessary in the project, the EPA makes the following comments on its design and operation.

The EIS discusses minimising the generation of leachate from the temporary surface CPP reject, without isolating it from the receiving environment. Liner systems should be designed to prevent pollution to surface and groundwater through the base and sides of a pollution source in line with the EPA's draft liner policy. Reducing infiltration to the pile is not a sufficient barrier to prevent impacts radiating from the proposed stockpiling of reject. Shallow groundwater monitoring should be proposed to monitor any downgradient seepage that could occur from the temporary surface CPP rejects. The RGS Geochemical (2016) report also recommends regular monitoring of runoff and seepage from coal stockpile and coal reject storage areas.

The contingency use of the surface temporary reject during operations indicates an ongoing source of pollutants from the stockpile. The proposed belt filter process for dewatering of reject before being emplaced on a surface stockpile has limited certainty around the residual moisture content of these tailings. If the stockpile is necessary, the EPA recommends the CPP surface rejects design include an impermeable barrier with leachate collection system isolating potential seepage from the surrounding environment. Leachate from the CPP reject stockpile should be monitored occasionally to ascertain the extent of release of pollutants from the stockpile.

It is recommended the proponent demonstrate that proposed barriers are sufficient to prevent pollution to shallow groundwater from the temporary surface emplacement of CPP reject and PWD.

PWD sediments

The hydrogeochemical analysis indicates colloid and precipitates from redox equilibrium reactions are to accumulate as sludge in the PWD. These sediments are likely to be a source of heavy metal pollutants and should be appropriately classified and managed. Clarification is sought as to the fate and management for these sediments. Accumulated sediments may impact on the available capacity in the PWD and cleaning and maintenance may be required during the life of the project. It is recommended the proponent provide additional information on the fate of PWD sediments

Monitoring

Baseline groundwater monitoring program has created an extensive dataset to determine the existing environment. Spatially, the monitoring network is primarily designed to monitor physical impacts from dewatering. For the reasons outlined, the groundwater monitoring plan should be expanded to validate the modelled chemical impacts of the underground reject emplacement as impacts physically propagate through the system, particularly to determine the efficacy of the limestone amendment as a pH buffer at depth. Specific monitoring with complementary trigger action response plans has the potential to minimise unexpected impacts from the project. Expansion of the targeted monitoring program also has the capacity to demonstrate the integrity of surface infrastructure, that is, PWD and surface CCP reject.

The EPA recommends that:

- groundwater monitoring objectives be expanded to
  - Target groundwaters downgradient of sealed underground reject emplacement
  - Target shallow groundwaters downgradient of the temporary surface CPP rejects.
- Trigger Action Response Plans be developed for implementation should targeted groundwater monitoring indicate unexpected impacts from mine operations.

SURFACE WATER QUALITY

The EIS does not appear to adequately address the assessment requirements. Guidance and recommendations to address inadequacies are provided below.

Construction stage surface water discharge impact assessment

The EIS does not assess the potential impact of construction stage stormwater discharges on receiving waters. The EPA recommends that the Proponent should:

- characterise construction stage discharges in terms of the expected concentrations and loads of all pollutants that may be introduced into the water cycle by source and discharge point, including residual discharges after mitigation measures are implemented
- assess the significance of any identified impacts including considering the relevant ambient water quality outcomes consistent with the practices and principles of the ANZECC (2000) Guidelines and relevant trigger values
- demonstrate how the proposal will be designed and operated to:
  - protect the Water Quality Objectives for receiving waters where they are currently being achieved
  - contribute to achieving the Water Quality Objectives over time where they are not being achieved.
- propose additional or alternative treatment measures if non-trivial risks to waters are identified
- propose discharge criteria for key pollutants.

Lining of mine water storages

The EIS does not provide details of liner systems for the mine water storages, stating only that the primary water dam will be clay lined. The EPA's requirement for contaminated water storages and tailings storage facilities is to achieve a hydraulic conductivity of 1×10^{-9} m/s or less with a constructed clay liner of at least 1,000 mm, or a geosynthetic liner providing equivalent or better protection. Liner systems must be designed, constructed and operated to prevent pollution of surface water and groundwater from seepage of contaminants through the base and side walls.

If it can be demonstrated that the contaminated water poses a low risk to the environment, a liner with higher conductivity than the benchmark requirement can be proposed. Alternately, if the tailings pose a high risk to the water environment a liner system that provides a higher level of protection is likely to be required.

If an alternative liner system to the benchmark requirements is proposed, a competent entity must complete a robust hydrogeological investigation and impact assessment and adequately justify the efficacy of the liner system and demonstrate the construction will prevent pollution of waters.

The EPA recommends the Proponent should provide design details of liner systems for the mine water storage. If the liner permeability is higher or thickness less than the benchmark requirements, a risk assessment should be provided to demonstrate it will protect receiving waters.

First flush

Sediment basins SB03 and SB04 are proposed to capture first flush run-off from areas not in direct contact with coal. The EPA accepts the use of first flush systems in areas that do not drain continuous sources of pollution. These include roadways, paved areas, buildings and some grassed areas. Although not specifically stated in the EIS, the proponent must ensure that no unsealed areas drain to the first flush system. This must include workshops and equipment storage areas where wheel movements of heavy vehicles tend to break hardstand. The first flush system must not be used for capture in lieu of bunding for chemical storages which should be designed in accordance with appropriate Australia Standards.

Clarification is required on how the first flush from SB03 and SB04 catchments will be diverted to the primary water dam and how entrained particulates will be managed to prevent contaminated discharges. First flush systems typically have a sump to capture the first flush of runoff that is bypassed once full. The EIS appears to indicate that the first flush of runoff from the catchments of SB03 and SB04 will drain directly to the sediment basins before being pumped to the primary water dam. Contaminants present in runoff are likely to be largely carried in particulate form to SB03 and SB04 and risk being deposited there. Later resuspension and/or dissolution could result in contaminants being released with controlled discharges or managed overflows.

The Proponent should clarify how the first flush from the SB03 and SB04 catchments will be managed to minimise the risk of contaminants being deposited in the sediment basins and later released in discharges.

Temporary coal reject stockpile

Leachate from the temporary coal reject stockpile could pollute groundwater or surface water if not appropriately managed. The EIS states that the material will be amended with one to two per cent lime to adjust pH and reduce leaching of metals, the stockpile will be contoured and vegetated, and clean runoff will be diverted around the stockpile. However, the EIS does not provide details of other measures to manage the risk of water pollution, such as locating the stockpile on a low permeability base, capping the stockpile and/or leachate collection/monitoring.

The Proponent should consider the potential risk to receiving waters due to seepage from the temporary coal reject stockpile and practical measures to manage any risks to receiving waters. Practical measures may include, but are not limited to:

a) locating the stockpile on a low permeability base
b) capping the stockpile
c) leachate collection/monitoring.

Water Quality Assessment

The EIS refers to numerical trigger values provided in the *Independent inquiry into the Hawkesbury Nepean River system* (HRC, 1998). ANZECC (2000) trigger values rather than those in the HRC (1998) document should be adopted when conducting the impact assessment.

The Proponent proposes developing site specific trigger values for parameters where the median or 80th percentile baseline concentration exceeds the default trigger value. Table 6.3 of Appendix E includes preliminary site specific trigger values. These appear to have been derived from Medway Rivulet and Oldbury Creek data.

The default trigger values in the ANZECC (2000) guidelines were derived from ecosystem data for unmodified or slightly disturbed ecosystems. Slightly disturbed reference sites must be used to derive site specific trigger values for a waterway with a slightly to moderately disturbed protection level. Medway Rivulet and Oldbury Creek are moderately disturbed agricultural streams with urban diffuse source and point source inputs and are not appropriate reference sites. SWQ06, located in Belanglo State Forest, would provide an appropriate reference site as it is likely to be representative of a slightly disturbed stream.

The Proponent proposes preliminary discharge limits, indicating final discharge limits will be developed in consultation with the EPA. The preliminary discharge limits do not appear to have been developed with regard to the environmental values of the receiving waters or the practical measures available to mitigate pollution. The following points are noted regarding preliminary limits:

- the pH limits do not align with the ANZECC (2000) trigger values for upland rivers (that is, 6.5-8).
- the TDS limit is likely to equate to a conductivity level several times greater than the ANZECC (2000) trigger value for upland rivers (that is, 350 µS/cm).
- the TSS limit is likely to equate to a turbidity level greater than the ANZECC (2000) upland river trigger value (that is, 25 NTU).

- the oil and grease limit is greater than the ANZECC (2000) trigger values for some toxicants that could comprise oil and grease (for example, benzene – 950 µg/L).

The following trigger values are relevant but not considered:

- the ANZECC (2000) physical and chemical stressor trigger values for ammonia (0.013 mg/L) and oxides of nitrogen (NO_x; 0.015 mg/L).
- the ANZECC (2000) freshwater interim working levels for beryllium (0.00013 mg/L) and cobalt (0.0014 mg/L).

The EPA recommends the Proponent revise the water quality assessment using either ANZECC (2000) trigger values or site specific trigger values based on 24 contiguous monthly samples from an appropriate (that is, slightly disturbed) reference site(s) such as SQW06 in Belanglo State Forest.

This assessment must, at a minimum:

a) characterise operation stage discharges in terms of the expected concentrations and loads of all pollutants that may be introduced into the water cycle by source and discharge point, including residual discharges after mitigation measures are implemented
b) assess the significance of any identified impacts including consideration of the relevant ambient water quality outcomes consistent with the practices and principles of the ANZECC (2000) Guidelines and relevant trigger values
c) demonstrate how the proposal will be designed and operated to:
    i. protect the Water Quality Objectives for receiving waters where they are currently being achieved
    ii. contribute towards achievement of the Water Quality Objectives over time where they are not being achieved.
d) propose additional or alternative treatment measures if non-trivial risks to waters are identified; and
e) propose discharge criteria for key pollutants.

Concentrations following reduction in creek baseflow

The reduction in baseflow in Oldbury Creek caused by drawdown of the surface water table will cause an increase in concentration of dissolved substances. Dissolved metal levels are predicted to increase two to three times from existing levels and may exceed ANZECC water quality trigger values.

Operation surface water monitoring program

The proposed surface water monitoring program only has one monitoring site downstream of SB03 and SB04 (SWQ15). This may not detect discharge impacts as the site is in Medway Reservoir where dilution and inputs from other sources occur. Proposed activities within the Wells Creek catchment could generate contaminated water, but the operation stage monitoring program does not include sites on Wells Creek. The Proponent should include monitoring sites on Wells Creek and Medway Rivulet downstream of the project boundary in the surface water monitoring program.

Management plans

There are several issues which should be addressed in relevant management plans (for example, Water Management Plans, Effluent Reuse Plans) before operations commence:

- The EIS states that if a pollutant concentration at a downstream site exceeds both the trigger value and the concentration at the upstream site, then the next round of monitoring results will be checked. If the concentration is exceeded again, there would be an investigation into potential contamination sources and risks. Given that monitoring will occur monthly, this approach may not allow for management responses within an appropriate timeframe. While this response may be appropriate in the circumstances described, a downstream exceedance of the trigger value should sometimes trigger an immediate response even if it is not greater than the concentration at the upstream site. For example, where a pollutant is at acutely toxic levels.

- The sediment in the water storages is likely to contain pollutants at non-trivial levels. This sediment may need to be removed and appropriately disposed of to maintain the capacity of storages.
- Treated effluent from the STP will be used on-site as process water. If the STP is commissioned before the treated effluent can be used as process water, it will be used for dust suppression on roads and earthworks or trucked offsite. However, the sustainability of this potential reuse has not been assessed.
- The EIS suggests that mine water will be reused on site but it is unclear in what processes. As this water is likely to contain potential pollutants at non-trivial levels, there is a risk that reuse could result in pollution of waters.
- Vehicles leaving working areas of the site through the main access road will use the wheel wash to prevent coal dust tracking outside the site. It is unclear how wastewater from the wheel wash will be disposed of.

Before construction commences the Proponent should amend the Water Quality Objective Exceedance Response to include:

- management responses to monitoring results as soon as practicable when a trigger is exceeded in a single round of monitoring (rather than responding after two consecutive rounds)
- clarification regarding responses that apply if the pH is below the lower trigger value.

Before operations commence the following matters should be addressed in appropriate management plans:

- Detail the management and disposal of sediment collected in the mine water storages and sediment basins.
- Develop a list of parameters that will be monitored before and during discharges at SB03 and SB04, subject to the results of the operational discharge impact assessment. Turbidity and/or total suspended solids must be included at a minimum.
- If treated sewage effluent is reused on-site other than as process water, an effluent reuse plan must be prepared before irrigation commences. Any reuse by irrigation must be consistent with the practices and principles of the Environmental Guidelines, Use of Effluent by Irrigation (DEC, 2004). The Plan must be prepared by a suitably qualified person and include, at a minimum:
  - a characterisation of the treated effluent in terms of expected pollutant concentrations and loads
  - the volume of effluent to be reused
  - the locations and characteristics of reuse areas
  - an assessment of the sustainability of effluent reuse.
- Detail how mine water reuse will be managed to minimise the risk of water pollution.
- Provide details of wheel wash wastewater management.

Discharges from the PWD

The EIS states that no discharge of excess water is expected to occur from the PWD due to the size of the dam. This conclusion was reached by modelling historical precipitation conditions. The EIS also states that if a release of water to Oldbury Creek is needed in the future, a water treatment plant will be built and a licence to discharge sought from the EPA. However, no assessment is given of the characteristics of the discharge; the likely impact on water quality and aquatic health; or what treatment processes would be necessary to minimise such an impact. Under Section 58 of the POEO Act, there are a range of factors that the EPA must consider when varying an EPL.

Berrima Rail Project

Erosion and sediment control

The EIS does not specify the design storm sizing for the construction or operation (if required) stage sediment retention basins, stating only that they will be *"in accordance with Landcom (2004) and DECC (2008) guidelines"*. Based on the durations of disturbance and the standard receiving environment, construction stage and operation stage sediment basins should be sized to achieve the required water quality for storms up to at least the 80th and 90th percentile five-day events respectively in line with *Managing Urban Stormwater: Soils and Construction, Volume 1* (Landcom, 2004) and *Volume 2A Installation of Services* (DECC, 2008).

The EIS identifies the soils in the area as Kandosolic Redoxic Hydrosols and Dystrophic Yellow Kandosols onsite. Both these soils are sodic and susceptible to erosion.

As part of a Soil and Water Management Plan, the EPA recommends that the proponent should:

- ensure that construction stage sediment retention basins are designed and managed to achieve the required water quality for storms up to at least the 80th percentile five-day event
- ensure that operation stage sediment retention basins are designed and managed to achieve the required water quality for storms up to at least the 90th percentile five-day event
- include specific measures to manage the increased erosion risk from the sodic soils on site.

Construction stage surface water discharge impact assessment

The EIS does not adequately assess the potential impact of construction stage discharges. The EIS does not provide details of the pollution that may be caused or the likely impact on the environmental values of the receiving waters.

The EPA recommends that the proponent should:

- characterise construction stage discharges in terms of the expected concentrations and loads of pollutants
- assess the impact of construction stage discharges on the environmental values of the receiving waters consistent with the practices and principles of the ANZECC (2000) Guidelines and referring to relevant trigger values
- propose additional or alternative treatment measures if non-trivial risks to waters are identified
- propose discharge criteria for key pollutants.

Wastewater management

A consistent overview of the intended treatment, disposal and/or reuse of wastewater for the Project is needed for clarity.

The EIS has contradictory statements about how wastewater will be managed during the construction stage. In Section 2.4.5 it states: *"Any potentially contaminated rainfall water that is captured in bunded areas, as well as the small quantities of sewage effluent, will be trucked off site (separately) to a licensed treatment facility using a licensed contractor, as required"*. However, Table 13.23 indicates that sewage from the temporary rail construction facility will be subject to tertiary treatment and reused in site operations.

The EIS states that during operation, greywater would be used for drip irrigation after primary treatment and blackwater would be subject to tertiary treatment and reused in site operations, however Section 2.5.4 states that *"Black water and grey water will be treated in a commercially available septic system that meets Council and Sydney Catchment Authority (SCA) requirements"*.

The EPA recommends that If treated sewage is reused for irrigation or dust suppression on-site, an effluent reuse plan must be prepared before irrigation begins. Any reuse by irrigation must be consistent with the practices and principles of the Environmental Guidelines, Use of Effluent by

Irrigation (DEC, 2004). The Plan must be prepared by a suitably qualified person and include, at a minimum:

- a characterisation of the treated effluent in terms of expected pollutant concentrations and loads;
- the volume of effluent to be reused
- the locations and characteristics of reuse areas
- an assessment of the sustainability of effluent reuse.

NOISE

Sleep Disturbance

The noise impact assessment for the Hume Coal Project examined possible sleep disturbance impacts from rail movements. It found that predicted maximum noise levels from rail movements would exceed the sleep disturbance screening criteria, up to L_{Amax} 53 dB.

The Hume Coal assessment also concluded that up to two rail movements would occur in one night and that therefore a maximum noise event would only occur up to two times per night:

- This is correct where a train pass by is the event for which a maximum (L_{Amax}) noise level occurs.
- However, for sources of noise such as wheel squeal, each wagon pass by can generate wheel squeal and therefore a high noise level.
- Consequently, there could be a maximum noise event associated with each locomotive or wagon pass by. This could be up to about 40 maximum noise events per train movement in this case.

The noise impact assessment for the Berrima Rail Project stated that the rail infrastructure noise guideline provides a L_{Amax} criterion of 80 dB for non-network rail lines. The guideline does not provide a L_{Amax} criterion for non-network rail lines, and the assessment should have instead used the approach in the application notes to the industrial noise policy.

The Berrima Rail assessment predicted that maximum noise levels from rail movements would exceed the sleep disturbance screening criteria, up to L_{Amax} 56 dB. This prediction assumed that curve noise would be effectively managed.

The application notes to the industrial noise policy require a detailed analysis where the sleep disturbance screening criterion is not met.

The EPA recommends that possible sleep disturbance impacts from rail movements associated with the Hume Coal and Berrima Rail projects are assessed in more detail using the application notes to the industrial noise policy: http://www.epa.nsw.gov.au/noise/applicnotesindustnoise.htm.

Rail Link Alignment & Rail Curve Noise

The proposed rail link alignment will introduce several tight radius curves to the rail link, which are likely to introduce significant curve noise greater than the curve gain (up to 8 dB) allowed for in modelling.

The EIS did not explain how the proposed rail link alignment was chosen, or why the old alignment through the cement works to Medway Colliery was not used instead, to minimise the number of curves and maximise curve radius.

The EIS proposed to control curve noise primarily through grinding and gauge widening. The proponent's attention is drawn to the recent Planning Assessment Commission determination for Stage 1 of the Moorebank Precinct East intermodal terminal where best practice mitigation measures and rolling stock were required to address rail noise on tight curves.

The EPA is aware of research by Transport for NSW, and others, which suggests:

- Wheel squeal is largely caused by poorly steering bogies.
- Gauge face lubrication and top of rail friction modifiers can significantly reduce the incidence of curve noise. Sydney Trains is currently trialling top of rail friction modifiers on the North Shore Line.

The EIS did not address these significant factors in managing wheel squeal.

The rail project assessment also stated it would use the latest generation AC traction locomotives with electronically controlled pneumatic brakes. This is likely to reduce, but not eliminate, bunching noise. Neither impact assessment predicted the L_{Amax} noise level from train bunching or horn use.

The Proponent should consider further mitigation measures to manage curve noise, bunching noise and rail noise more generally on the proposed rail link and loading loop. These should include:

- Minimising the number of curves and maximising curve radius in the rail link.
- Using best practice rolling stock, including locomotives with the lowest practicable noise levels, and steering, permanently-coupled *"multipack"* wagons. For example, rolling stock that have bogies that steer properly under all operating conditions such as:
  - Super Service Ride Control bogies with polymer centre plate liners
  - One-piece or two-piece bogies
  - Three-piece bogies with steering arms (for example, Scheffel, AR1)
  - Three-piece bogies with cross-bracing arms (for example, ZK1, Barber S2 HD)
- Maintenance of the rail link and loading loop, including gauge face lubrication and top of rail friction modifiers.
- Technologies and practices that minimise unnecessary horn use and locomotive idling.

Low Frequency Noise

The Noise Impact Assessment in the EIS used an approach to assessing low frequency noise from the EPA's *draft* Industrial Noise Guideline. The Guideline has been exhibited for public consultation but is not yet Government policy.

As the Guideline is in draft, the approach to low frequency noise needs to be rigorously and scientifically justified in the context of the Hume Coal Project for it to be used as an alternative to the existing Industrial Noise Policy. Points for consideration include:

- The Proponent should seek advice from the DPE on whether as the consent authority, it endorses the approach to low frequency noise in the noise impact assessment of the project.
- The noise impact assessment discussed the industrial noise policy approach, referring to perverse outcomes that can occur when low frequency noise attracts a penalty at more distant receivers, but not at closer receivers. That is not the case for this project.
- The noise impact assessment noted that there are limitations to applying the proposed approach at the environmental assessment stage, and requested mitigation rights to be only applied for low frequency noise impacts following operational noise monitoring. This request should be considered by DPE as the consent authority.

The implications of the approach to low frequency noise are potentially significant, not only with respect to compliance with noise limits but also potential application of acquisition and mitigation rights. The EPA is concerned that the noise impact assessment component of the EIS does not adequately consider these implications.

The EPA recommends that the proponent:

- provide rigorous, scientific justification, in the context of this project, to demonstrate that the approach proposed for low frequency noise is an appropriate alternative to the industrial noise policy approach in this case; or
- provide an assessment of operational noise from the proposal which includes a 5 dB modifying factor adjustment if the mine noise L_{Ceq} is predicted to be 15 dB or more greater than the L_{Aeq}.

Railway System Licensing

The Berrima rail project includes a private track that will be approximately 8.2 km in length and will be constructed and operated by Hume Coal. The construction and operation of the project does not trigger any requirements for *"railway systems activities"* under the POEO Act. The appropriate regulatory authority for any operational rail issues will be the local government authority – WSC unless it forms part of the Hume Coal premises licence.

The Main Railway Line from Berrima to Port Kembla is regulated by the EPA under the ARTC licence (EPL 3142). The EIS states that the Proponent will use the latest generation locomotives and wagons, however no detail has been provided. The ARTC licence includes locomotive noise limits for new locomotives. Whilst Hume Coal is proposing to cover train wagons, this EPL also contains requirements in relation to coal dust management in this rail corridor.

AIR QUALITY

As part of the EIS, an air quality impact assessment (AQIA) was undertaken - *Air Quality and Greenhouse Gas Assessment Report* (Ramboll Environ, February 2017). The EPA has reviewed the AQIA which was conducted in general accordance with the EPA's Approved Methods for Sampling and Analysis 2016 (Approved Methods). The EPA did not identify any issues that have the potential to alter the overall conclusions and outcomes of this assessment. The EPA however recommends the proponent address the following issues.

The AQIA predicted that levels of particulate matter in air caused by the mine are likely to be below EPA and national air quality criteria. The parameters examined included total suspended particulate matter (TSP), particulate matter less than 10 microns and 2.5 microns (PM_{10} & $PM_{2.5}$), and dust deposition levels. The AQIA concluded that any increase in the likelihood of air quality exceedances was negligible. Since the modelling used very conservative assumptions, the predicted increase in levels is minor and will have negligible impact.

The annual average dust deposition was taken as the annual average for all dust monitors for the years 2012-2015. It is noted that adopting an ambient annual average which has been averaged over several years is not in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants. However the EPA also acknowledges that taking 2013 annual average background data predicts compliance for all pollutants.

The AQIA used meteorological data from the Hume Coal Station and the BOM operated Moss Vale station in the dispersion modelling. However it is unclear how cumulative impacts were assessed using the results from the two meteorological data sets.

Section 9.1.3 of the AQIA states that 365 individual concentrations were paired with every recorded 24 hour average background data. However, modelling was undertaken using two meteorological data sets, and so there are 730 data points, or the cumulative assessment was undertaken twice, for each set of assessment results.

The EPA recommends that the proponent clarify how the results from the two meteorological data sets were incorporated into the cumulative 24 hour average PM_{10} and $PM_{2.5}$ assessments.

HEALTH IMPACT ASSESSMENT

Scope and purpose of the HIA

Health Impact Assessments (HIA) are generally used as a process to systematically identify and assess health impacts of an activity. In doing so they facilitate the reduction or avoidance of negative impacts on human health and enhance positive impacts. They can also be used to demonstrate to the community that due consideration has been given to human health impacts associated with an activity.

The Project HIA is stated to address likely impacts on community health from exposure to air emissions and noise from the Project. In addition, the HIA summarises epidemiological literature on associations between exposure to air pollutants and noise and various health outcomes. Literature on health effects of coal mining is also presented.

The information provided in the HIA is useful in further discussing the findings of the air and noise specialist studies, and to provide additional context and information on potential impacts to human health associated with exposure to Project air and noise emissions.

The HIA does not clearly present the assessment approach or scope, or evaluate the key factors or issues that might require consideration. For example, despite addressing potential noise and air impacts in some detail, the HIA does not consider or discuss potential effects on health due to other matters covered in the specialist studies within the EIS. For example, the HIA does not consider or assess potential health impacts associated with chemical contamination of water; safety hazards; and other community stressors that impact health such as social and community cohesion.

The guidelines and general principals to be addressed when undertaking health impact assessments are provided in the national guidelines available from the Centre for Health Equity Training, Research and Evaluation (CHETRE, 2007) and enHealth (2001) (the enHealth Guidelines). Recommended principals include community consultation, scoping and integration of health impact assessment with environmental impact assessment. The proposed health impact assessment framework in the enHealth Guidelines includes elements such as scoping, profiling the affected population, risk assessment, risk management, implementation and decision making and monitoring and ongoing management.

A more formal, structured and comprehensive HIA, generally conducted in accordance with the national guidelines for health impact assessment, is required to clearly demonstrate all key issues that relate to impacts on community health have been identified and assessed.

The EPA recommends the Proponent revise the HIA to be consistent with the national guidance for health impact assessment. For example, the HIA should:

- be systematic in its approach;
- provide sufficient information to demonstrate to the community that due consideration has been given to all potential significant human health impacts associated with the Project
- include the relevant elements of the national health impact assessment framework such as scoping, profiling the affected population, risk assessment, risk management, implementation and decision making, monitoring, and ongoing management.

Assessment of potential project effects

The HIA scope is limited to a discussion and assessment of the potential impacts on health associated with air and noise emissions, rather than consideration of potential impacts from the whole Project. The HIA is essentially a limited screening level assessment as it considers only the key issues identified in the air and noise specialist technical studies within the EIS.

The HIA does not include an evaluation of the specialist assessments undertaken, or the potential impacts and risks to the community, or specific community concerns.

The HIA relies on supporting assessments (for example, the Air Quality and Greenhouse Gas Assessment Report and the Noise and Vibration Assessment Report). Any changes made to supporting assessments will require the HIA to be reviewed and potentially amended to ensure it remains accurate and consistent. The EPA advises that any inaccuracies in the assessments that support the HIA may change the outcomes of the HIA. If this occurs, the HIA will need to be revised to reflect and address the changes.

Identification of community concerns regarding potential health related issues.

The HIA provides limited information on the local community that could be affected by the project. The HIA does not identify the location of sensitive populations, provide information on existing health data for the community, or potential health related concerns sourced from stakeholder engagement conducted as a part of the Project. Consequently, it is unclear how potential health related issues of concern from the community have been identified and addressed.

It is also unclear if the community engagement and consultation strategy undertaken for the Project included an opportunity for the community and stakeholders to raise issues and concerns related to health effects. The EPA notes that robust consultation is consistent with the principals outlined in the enHealth Guidelines on health impact assessment.

The EPA recommends the Proponent revise the HIA to clarify all community concerns regarding potential health related issues have been appropriately identified and considered.

Exposure to air pollutants

The HIA includes a limited quantitative health risk assessment for long term exposure to particulate matter (PM_{10} and $PM_{2.5}$). An example of quantifying health impacts is provided in a footnote in the HIA. However, the EPA note details to describe, justify or support the calculations are not provided, for example with respect to baseline health statistics or methodology.

In addition, only limited information is presented regarding the critical aspects of the assessment, such as: hazard assessment, exposure assessment, and risk characterisation (including calculations). Consequently, the health risk assessment lacks clarity and rigour.

Exposure to gaseous emissions such as NO_2 and VOCs are stated as "*so small that any health effects are likely to be undetectable*", however the HIA does not include a reference or provide data or information to support and justify this statement. The EPA also notes that the HIA does not consider in detail diesel engine exhaust which has been classified by IARC as carcinogenic to humans.

The EPA recommends the Proponent revise the HIA to contain a more robust and comprehensive health risk assessment for exposure to air pollutants.

Gas drainage

Gas drainage is expected to be low due to the low gas content of the coal (0.25-0.5m^3 gas per tonne) which is 96 to 100 per cent carbon dioxide (based on coal core sample testing of the Wongawilli Seam) (EIS Section 2.5.3). This gas content is stated to be similar to the neighbouring Berrima Colliery. Consequently, the EIS states that gas drainage wells will not be required and any liberated gas will be controlled by dilution through ventilation.

The EIS does not present any data, or provide any references, to support to the evaluation of gas drainage requirements.

The EPA recommends the Proponent revise the EIS to include supporting information to justify the assumption that gas drainage is expected to be low and the Project will not require any gas drainage wells or other measures (for example flaring of gas).

National Environment Protection (Ambient Air Quality) Measure

The HIA refers to the Australian Standard for 24-hour average PM_{10} allowing five exceedances a year to account for dust storms and bushfires. The EPA notes the National Environment Protection (Ambient Air Quality) Measure was varied on 4 February 2016 replacing the five-day exceedance with an exceptional event rule.

The EPA recommends the Proponent amend the HIA to clarify an exceptional event rule is in place for the 24-hour PM_{10} standard.

REFERENCES

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