Professor Mary O'Kane AC
Chair
Independent Planning Commission
GPO Box 3415
Sydney NSW 2001

5 November 2020

Dear Professor O'Kane

Maxwell Underground Coal Mine Project (SSD 9526)

I refer to the Commission's letter dated 26 October 2020 requesting further advice regarding the potential impacts of the Maxwell Underground Coal Mine Project on the Upper Hunter Equine Critical Industry Cluster (Equine CIC). The Department's responses to the Commission's enquiries are outlined below.

Blasting Impacts

In responding to the Commission's request, the Department has sought further clarification from Malabar Coal Limited (Malabar) regarding the magnitude of predicted blasting impacts at the boundaries of the thoroughbred studs. A copy of Malabar's response dated 30 October 2020 is provided at **Appendix A**.

As outlined in Table 1 of Attachment A, blasting during the construction phase of the Project would have a substantially smaller Maximum Instantaneous Charge (MIC) than existing open cut mining operations in the locality. The blasting impacts associated with the Project are predicted to remain at or below:

- 111.3 dB(Lin) overpressure against a 95th percentile assessment criterion of 115 dB(Lin); and
- 0.5 mm/sec ground vibration against a 95th percentile assessment criterion of 5 mm/sec,

when measured from the nearest boundaries of the Coolmore and Godolphin properties.

These impacts would remain well below relevant ANZEC criteria for human annoyance and would not impact the structural integrity of built features. Further to this, these impacts would remain below the existing overpressure and vibration levels recorded as being generated at the boundaries of the Coolmore and Godolphin properties due to blasting events at the existing Hunter Valley Operations Complex and Mt Arthur Coal Complex. As noted during the Commission's site visit, blasting activities at these existing mines have had no discernible impact on the operation of the thoroughbred studs.

Consequently, the Department considers that the magnitude of blasting impacts associated with the Project are unlikely to be noticeable at the Coolmore and Godolphin Studs, would be no greater than that of other existing mining complexes already operating in the locality and are not considered to pose a significant risk to horse health and safety.

Air Quality Impacts

The Air Quality and Greenhouse Gas Assessment for the Project modelled dust emissions during the first year of mining operations, prior to the sealing of the haul road between the Mine Entry Area and the Coal Handling and Preparation Plant. This is identified as Scenario 1, or Year 1, as referenced in Section 6.6. of the Department's Assessment Report.

The maximum predicted air quality impacts during Year 1 are depicted in the isopleth diagrams in **Appendix B**, with the maximum impacts at the Coolmore and Godolphin Studs summarised as follows:

Averaging Period	$PM_{2.5}$ (µg/m³)			PM_{10} (µg/m³)		
	Project Contribution	Total Concentration	Assessment Criteria	Project Contribution	Total Concentration	Assessment Criteria
24-hour	**0.0 - 0.1**	1.4 – 21.4	25[a]	**0.0 - 0.4**	4.9 - 45.5[a,c]	50[a]
Annual	**0.0**	4.6 - 4.8	8[b]	**0.0**	10.0 - 11.5	25[b]

[a] Assessment criterion is applied incrementally (due to the Project-alone)
[b] Assessment criterion is applied cumulatively (total impacts due to the Project plus background concentrations)
[c] The maximum predicted 24-hour PM_{10} concentration of 45.5 µg/m³ has been shown to represent realistic and measured background levels and excludes an isolated dust event in May 2015 which resulted in levels of 70.0 µg/m³.

The Project's predicted contribution to PM levels is extremely low, with the predicted Year 1 24-hour average PM_{10} levels reaching a maximum of 0.4 µg/m³ on a single day, 0.3 µg/m³ on a total of 3 days and between 0.0 µg/m³ and 0.2 µg/m³ for the remainder for the year. From Year 4 onwards, the maximum 24-hour average PM_{10} levels would remain between 0.0 µg/m³ and 0.2 µg/m³. When averaged on an annual basis, the Project's PM contributions are predicted to be **0.0 µg/m³**.

The Department's recommended conditions establish a range of safeguards to further minimise air quality impacts on sensitive receivers, including the Equine CIC. The recommended conditions would require Malabar to seal the full length of the haul road within 12 months of commencing first workings at the Maxwell Underground site. In practical terms, this means that the progressive sealing of the road would need to begin well before the end of Year 1. In the interim, the recommended conditions would require Malabar to implement best practice dust management, including the use of water carts along the haul road in combination with real-time air quality monitoring.

Based on its detailed assessment, the Department considers that the Project would be expected to result in nil to negligible impacts on the existing air quality environment within the Equine CIC, would comfortably comply with relevant human health criteria and would not pose any discernible risk to horse health or the operation of the thoroughbred studs.

Advice from NSW Department of Primary Industries

In addition to the above consideration of potential impacts on horse health and the operation of the Equine CIC, the Department has sought specific advice from the NSW Department of Primary Industries Biosecurity and Food Safety, Animal Welfare and Animal Biosecurity Units. The NSW Department of Primary Industries has confirmed that it supports the Department's conclusions in relation to the above and has provided further specific commentary for the Commission's consideration at **Appendix C**.

Comparison of Drayton South and Maxwell Underground Projects

Finally, to assist the Commission in considering the relative impacts of the Project on the Equine CIC, the Department has prepared a summary of the Project's potential impacts, relative to the previous Drayton South open cut mining proposals. A copy of the Department's summary is included at **Appendix D**.

I trust the above information is of assistance and addresses the Commission's enquiries. If you wish to discuss this matter further, please do not hesitate to contact Matt Sprott, Director – Resource Assessments on 8217 2054 or at matthew.sprott@planning.nsw.gov.au

Yours sincerely

Mike Young
Executive Director
Energy, Industry and Compliance
Planning and Assessment

Appendix A
Malabar Response dated 30 October 2020

https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-9526%2120201102T000504.836%20GMT

MALABAR
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30 October 2020

Matthew Sprott
Director Resource Assessments
NSW Department of Planning, Industry and Environment
GPO Box 39
Sydney NSW 2001

via email matthew.sprott@planning.nsw.gov.au

Dear Matthew,

RE: MAXWELL PROJECT (SSD 9526) – ADDITIONAL BLASTING INFORMATION

Malabar understands that the NSW Independent Planning Commission (IPC) has sought further information from the NSW Department of Planning, Industry and Environment (the Department) regarding potential blasting impacts of the Maxwell Underground Project (the Project) at the Coolmore and Godolphin Woodlands thoroughbred studs (collectively referred to as 'the Studs' in this letter).

The Department has requested that Malabar provides further information regarding the magnitude and nature of any potential impacts from blasting at the Studs.

Importantly, as an underground mining operation, surface blasting would not occur as part of operational activities.

It is only during construction of the mine entry area and the transport and services corridor that blasting may be required. Indeed, Malabar would seek to eliminate or minimise the need with material preferentially "free dug" by excavators or ripped using dozers. Accordingly, blasting:

- May only be required intermittently during the construction of the Project (i.e. over a period of approximately 18 months at the start of the Project).
- Would be limited to a Maximum Instantaneous Charge (MIC) of 500 kg. This is substantially smaller than the MIC's permitted at the nearby open cut mining operations.
- Would be undertaken at a distance of at least 4.4 km from the boundary fence of the Studs.

Wilkinson Murray (2019) undertook a comprehensive assessment of construction blasting as part of the *Maxwell Project – Noise Impact Assessment* (Appendix I to the Maxwell Project Environmental Impact Statement). Wilkinson Murray (2019), predicted that vibration and overpressure associated with potential construction blasts for the Project would not be noticeable at the Studs. Notwithstanding, further information in response to the specific requests from the Department is provided below and in Enclosure 1.

Airblast overpressure and ground vibration levels associated with blasting are a function of the distance from the blast and the MIC of explosive used in the blast. Predictive curves for overpressure and ground vibration levels have been derived from measurements conducted at numerous sites, at distances varying between 2 and 7 km from a blast. Data have been used from over 7,600 records of blasts undertaken in the Hunter Valley to derive relationships between scaled distance and overpressure or vibration (Wilkinson Murray, 2019).

The predicted blasting effects of the Project are provided in Table 1, together with a comparison to other approved mines currently operating in the vicinity of the Studs.

Table 1
Comparison of Approved and Predicted Blasting Effects

Operation	Proximity to the Studs*	Maximum MIC	Overpressure at the Studs^	Vibration at the Studs^
Hunter Valley Operations North	4.5 km	3,575 to 6,030 kg	113.0 – 113.8 dBL	2.1 to 3.0 mm/s
Mt Arthur Coal Mine (North)	10 km	1,681 kg	111.1 dBL	0.4 mm/s
Mt Arthur Coal Mine (South)	6 km		111.5 dBL	0.8 mm/s
Maxwell Project (Mine Entry Area)	4.5 km	500 kg	111.3 dBL	0.5 mm/s
Human annoyance criteria	N/A	N/A	115 dB (95%ile) 120 dB (max)	5 mm/s (95%ile) 10 mm/s (max)

* Based on closest proximity of blasting area (e.g. open cut extent or construction area) to boundary fence of the Studs. Refer Figure 1.

^ Assumes maximum MIC used for blast being undertaken at closest point to the boundary fence of the Studs.

Source: Enclosure 1 (Wilkinson Murray, 2020).

The IPC's Site Inspection Notes from its Godolphin Locality Tour state the following[1] (emphasis added):

> *Blasting noise and low frequency vibrations will potentially impact on the horses – blasting vibrations are different to thunder and lightning associated with storm events, where the horses can sense weather changes and behave accordingly to prepare themselves, rather than an unexpected blast.* ***The Panel queried whether Mt Arthur or other existing mining operations had resulted in any issues and was told that this had not been a problem because those operations are further away than the proposed Maxwell development.***

[1] NSW Independent Planning Commission (2020) *Record of Site Inspection – Maxwell Underground Coal Mine project (SSD-9526)*. Accessed from: https://www.ipcn.nsw.gov.au/resources/pac/media/files/pac/projects/2020/09/maxwell-underground-coal-mine-project/site-inspection/201019_site-inspection-notes.pdf

The majority of the Maxwell Project mine entry area and transport and services corridor, where construction blasting may occur, are further from the boundary fences of the Studs than the existing extent of the Hunter Valley Operations North open cut pit. Further, the MIC of blasts that may be required for construction is significantly less than the approved MIC used for operational blasting at the Mt Arthur Coal and Hunter Valley Operations North open cut pits.

Accordingly, the predicted maximum overpressure and vibration associated with potential construction blasting at the Maxwell Project are less than the overpressure and vibration that Malabar understands would have occurred as a result of open cut mining activities at the Mt Arthur Coal and Hunter Valley Operations North open cut pits.

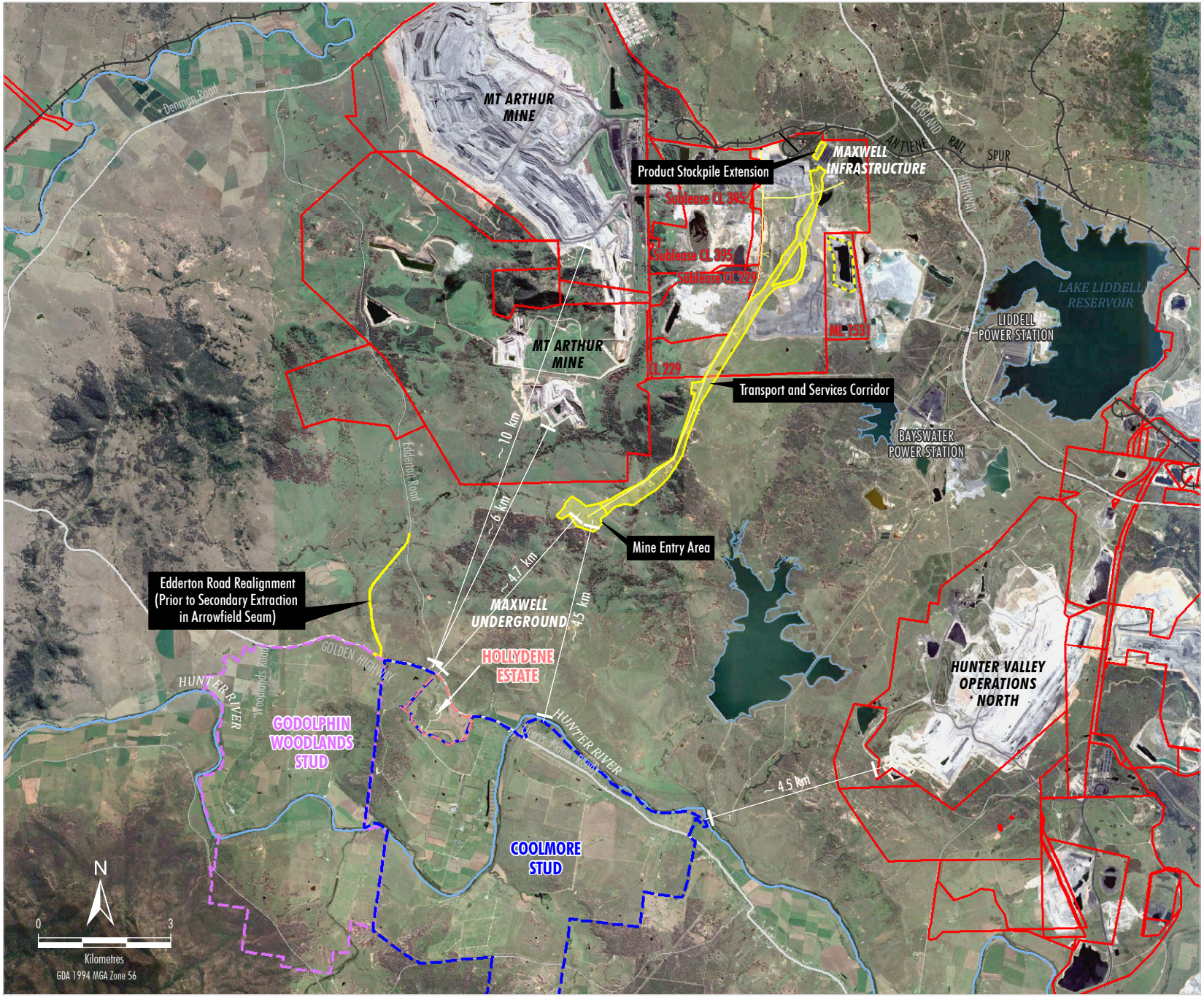
The observation that blasting at Mt Arthur Coal Mine and other existing mining operations has not resulted in blasting issues supports the findings of the Maxwell Project Environmental Impact Statement, which stated that "*vibration and overpressure associated with potential construction blasts for the Project would not be noticeable at the Coolmore and Godolphin Woodlands Studs"*.

Please do not hesitate to contact the undersigned should you wish to discuss.

Yours sincerely,

Bill Dean
General Manager – Projects
Malabar Resources Limited

Enclosure 1 Potential Blasting Effects of the Maxwell Project (Wilkinson Murray, 2020)



LEGEND

- Railway
- Mining and Coal Lease Boundary
- Indicative Surface Development Area
- CHPP Reject Emplacement Area
- Proposed 66 kV Power Supply

Source: © NSW Department of Planning and Environment (2019); NSW Department of Finance, Services & Innovation (2019) Orthophoto: Google Digital Globe (2017)

MALABAR

MAXWELL PROJECT

Proximity of Mining Operations to Coolmore and Godolphin Woodlands Studs

SHM-18-03 Maxwell_Project_IPCB_214A

Enclosure 1

Potential Blasting Effects of the Maxwell Project (Wilkinson Murray, 2020)

WILKINSON MURRAY

29 October 2020

WM Project Number: 18226-D
Our Ref: MCL_291020RH_ltr
Email: wdean@malabarresources.com.au

Mr Bill Dean – Project Director
Malabar Resources Limited
PO Box R864 Royal Exchange
SYDNEY NSW 1225

Dear Bill

Re: Predicted Blasting Effects at Coolmore and Godolphin Woodlands Thoroughbred Studs

Wilkinson Murray prepared the Noise Impact Assessment for the Maxwell Project Environmental Impact Statement. Malabar Resources Limited (Malabar) has subsequently requested additional information regarding predicted blasting effects at the Coolmore and Godolphin Woodlands Thoroughbred Studs.

This letter provides an overview of potential blasting required for the Maxwell Project, a summary of our methodology for determining blast impacts and predictions of overpressure and vibration for the Maxwell Project and other mining operations in the vicinity of the two horse studs.

Maxwell Project Overview

As an underground mining operation, surface blasting would not occur as part of operational activities.

Malabar would seek to eliminate or minimise the need for blasting during construction activities, with material preferentially free dug using excavators or through the use of dozers to rip and push. Blasting of material may be required during construction activities associated with the Mine Entry Area (MEA) and the transport and services corridor. As such, potential overpressure and ground vibration impacts associated with blasting were considered in the *Noise Impact Assessment* prepared for the Maxwell Project Environmental Impact Statement.

Any blasts required for construction activities would be limited to a Maximum Instantaneous Charge (MIC) of 500 kilograms (kg). This is substantially smaller than blasting that would occur in an open cut mining operation (an MIC typically in the order of 2,000 kg to 4,000 kg).

Blasting Criteria and Prediction Methodology

The EPA guideline Assessing Vibration: a technical guideline (NSW Department of Environment and Conservation, 2006) refers to the Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration prepared by the Australian and New Zealand Environment Council (1990). Human annoyance criteria for blasting for any privately-owned receivers or other sensitive locations are:

- maximum overpressure due to blasting should not exceed 115 dB for more than 5% of blasts in any year, and should not exceed 120 dB for any blast; and
- maximum peak particle ground velocity should not exceed 5 millimetres per second (mm/s) for more than 5% of blasts in any year and should not exceed 10 mm/s for any blast.

It is noted that human annoyance criteria may not be applicable to how blast vibration and overpressure may be experienced by other animals.

Airblast overpressure and ground vibration levels from blasting are related to the "scaled distance" from the blast, which is defined as:

Scaled distance = $\frac{D}{W^{1/3}}$ for airblast overpressure; and

Scaled distance = $\frac{D}{W^{1/2}}$ for ground vibration.

- Where D is the distance from the blast (m) and W is the MIC of explosive (kg of ammonium nitrate fuel oil [ANFO] equivalent).

Predictive curves relating scaled distance to overpressure and ground vibration levels have been derived from measurements conducted at numerous sites, typically at a distance varying between 2 and 7 km.

For this assessment, Wilkinson Murray has used data from over 7,600 records of blasts undertaken in the Hunter Valley to derive relationships between scaled distance and overpressure or vibration. These relationships are designed to predict not the mean level of overpressure or vibration, as in a standard "site law", but the 95th percentile value, representing the level which would be exceeded by only 5% of blasts, given the use of current blast practice and the current level of variability in overpressure or vibration for the same scaled distance.

The raw data, and the derived prediction curves which are appropriate up to distances of 10 km, are shown in Appendix A.

For overpressure, a curvilinear relationship with log (Scaled Distance [SD]) was adopted as a best fit for the data:

Overpressure (dB) = $201.1 - 62.313 \log(SD) + 10.79 (\log(SD))^2$

- Where SD is the overpressure-scaled distance (as per formula given above).

For vibration, a linear relationship with log (Peak Particle Velocity) was derived:

Log (PPV) = $3.015 - 1.4359 \log(SD)$

- Where SD is the vibration-scaled distance (as per formula given above).

Overpressure is calculated in dBL (or Linear Peak), which is the maximum level of air pressure fluctuation measured in decibels without frequency weighting[1].

[1] Frequency weightings are often applied to sound measurements to ensure the measured parameter is indicative of the level experienced by the human auditory system (e.g. such as A-weighted decibels typically used for assessing noise impacts from developments).

Predicted Blasting Effects

Table 1 provides a summary of predicted blasting effects of the Project and other mines currently operating in the vicinity of the Coolmore and Godolphin Woodlands Thoroughbred Studs. The maximum MIC for the Mt Arthur Coal Mine and Hunter Valley Operations (North) have been determined as follows:

- **Mt Arthur Coal**: Based on MIC required for deep interburden/overburden at the Mt Arthur Coal Mine[i].
- **Hunter Valley Operations**: Based on MIC required to achieve blasting limits set for Jerrys Plains locations (Receptors 13 and 14)[ii].

Table 1 Comparison of Approved and Predicted Blasting Effects

Operation	Proximity to the Studs*	Maximum MIC	Overpressure at the Studs^	Vibration at the Studs^
Hunter Valley Operations North	4.5 km	3,575 to 6,030 kg	113.0 – 113.8 dBL	2.1 to 3.0 mm/s
Mt Arthur Coal Mine (North)	10 km	1,681 kg	111.1 dBL	0.4 mm/s
Mt Arthur Coal Mine (South)	6 km	1,681 kg	111.5 dBL	0.8 mm/s
Maxwell Project (Mine Entry Area)	4.5 km	500 kg	111.3 dBL	0.5 mm/s
Human annoyance criteria	N/A	N/A	115 dB (95%ile) 120 dB (max)	5 mm/s (95%ile) 10 mm/s (max)

* Based on closest proximity of blasting area (e.g. open cut extent or construction area) to boundary fence of the Studs. Based on aerial photography.

^ Assumes maximum MIC used for blast being undertaken at closest point to the boundary fence of the Studs.

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i. Wilkinson Murray (2013) *Mt Arthur Coal Open Cut Modification Noise & Blasting Assessment*. Accessed from: https://majorprojects.accelo.com/public/69852777788947ce15b3f922d7eb6fa4/10.%20Mt%20Arthur%20Coal%20Open%20Cut%20-%20Mod%201%20-%20EA%20-%20Appendix%20G%20-%20Noise%20and%20Blasting%20Assessment.pdf

ii. EMGA Mitchell McLennan (2010) Carrington West Wing Noise and Vibration Assessment. Accessed from: https://majorprojects.accelo.com/public/bb5a8779cce7451c49d761140dd148a8/Environmental%20Assessment%20-%20Volume%202.pdf

I trust this information is sufficient. Please contact us if you have any further queries.

Yours faithfully
WILKINSON MURRAY

Roman Haverkamp
Senior Engineer

Note
All materials specified by Wilkinson Murray Pty Limited have been selected solely on the basis of acoustic performance. Any other properties of these materials, such as fire rating, chemical properties etc. should be checked with the suppliers or other specialised bodies for fitness for a given purpose. The information contained in this document produced by Wilkinson Murray is solely for the use of the client identified on the front page of this report. Our client becomes the owner of this document upon full payment of our **Tax Invoice** for its provision. This document must not be used for any purposes other than those of the document's owner. Wilkinson Murray undertakes no duty to or accepts any responsibility to any third party who may rely upon this document.

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Wilkinson Murray operates a Quality Management System which complies with the requirements of AS/NZS ISO 9001:2015. This management system has been externally certified by SAI Global and Licence No. QEC 13457 has been issued.

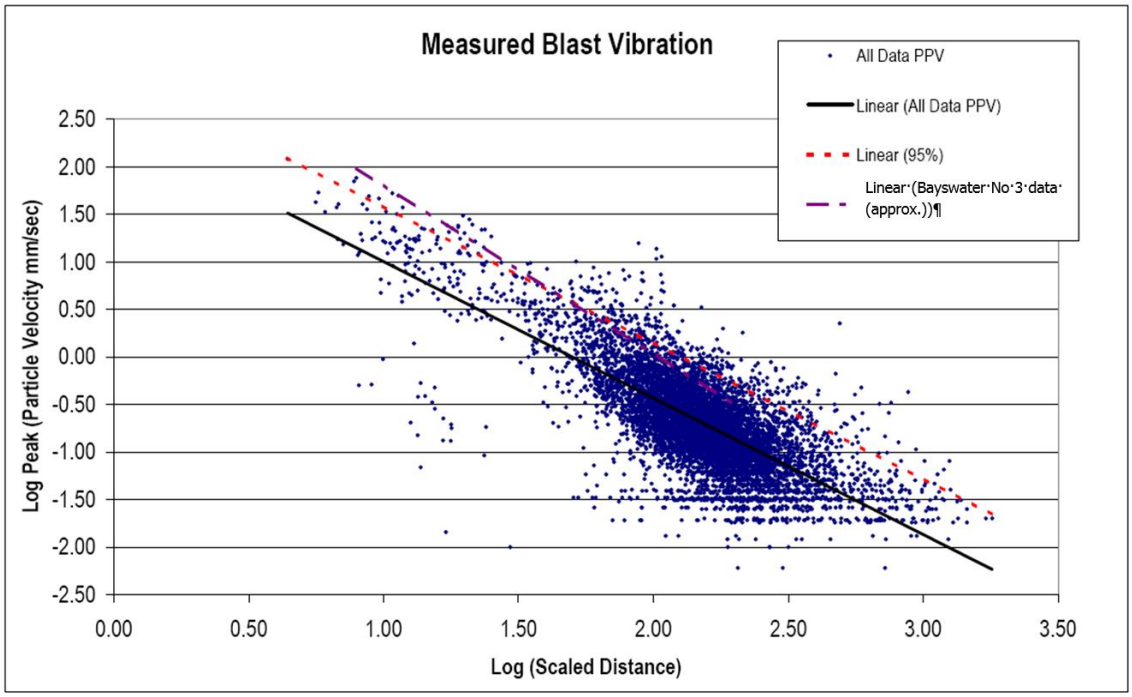
AAAC
This firm is a member firm of the Association of Australasian Acoustical Consultants and the work here reported has been carried out in accordance with the terms of that membership.

APPENDIX A

BLASTING PREDICTION CURVES

For this study, Wilkinson Murray has derived predictive equations for vibration and overpressure using measurement data from approximately 7,000 blasts. Figure A.1 illustrates the measured data and associated linear trend lines for vibration.

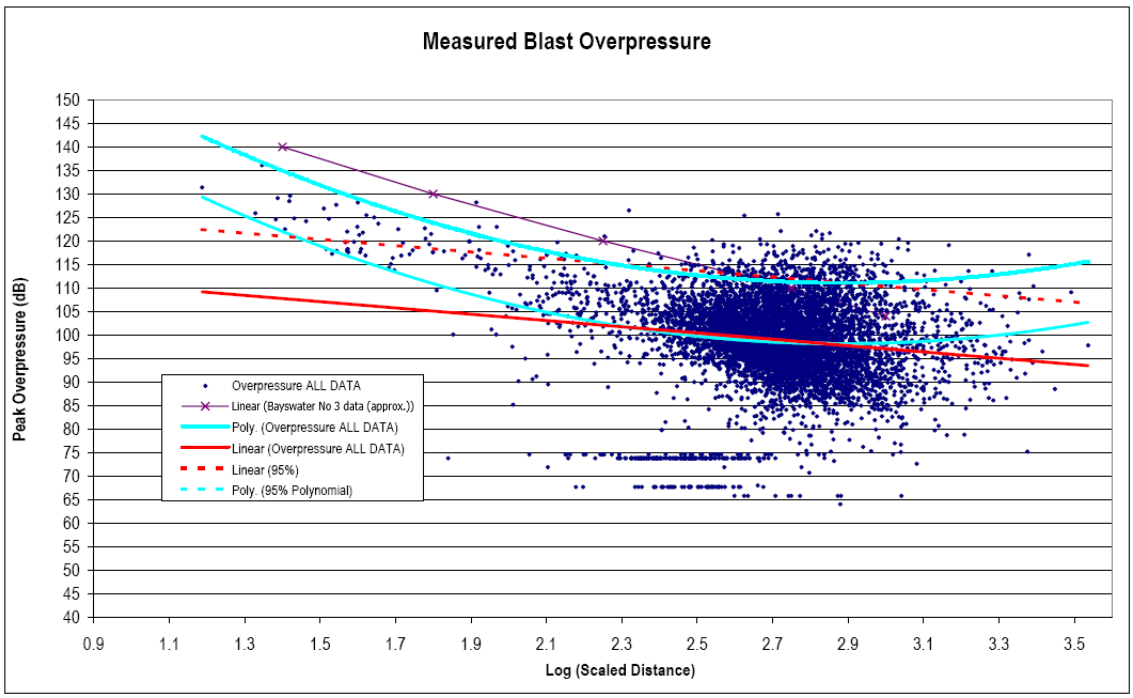
Figure A.1 Measured Peak Particle Velocity from Blasts at Mt Arthur North (logarithmic scale) and Comparison with Data from Bayswater No 3



The figure shows a revised best fit line, a 95 percentile line, and also the previously-adopted 95 percentile based on 1999 data from Bayswater No 3. The correlation with the old data is close, although the new 95 percentile shows slightly lower vibration levels at shorter scaled distance – in the order of 0.2 to 0.3 millimetres per second (mm/s).

Figure A.2 shows data for overpressure. Analysis of these data showed that the relationship between measured peak overpressure and scaled distance is better defined with a polynomial equation (blue) at close range rather than a standard linear equation (red). At relatively low values of scaled distance, the new polynomial 95 percentile curve is approximately 5 decibels (dB) lower than the linear trend line derived from the previous Bayswater No 3 data.

Figure A.2 Measured Peak Overpressure from blasts at Mt Arthur North, and Comparison with Data from Bayswater No 3



Appendix B
Air Quality Isopleth Diagrams (Year 1)

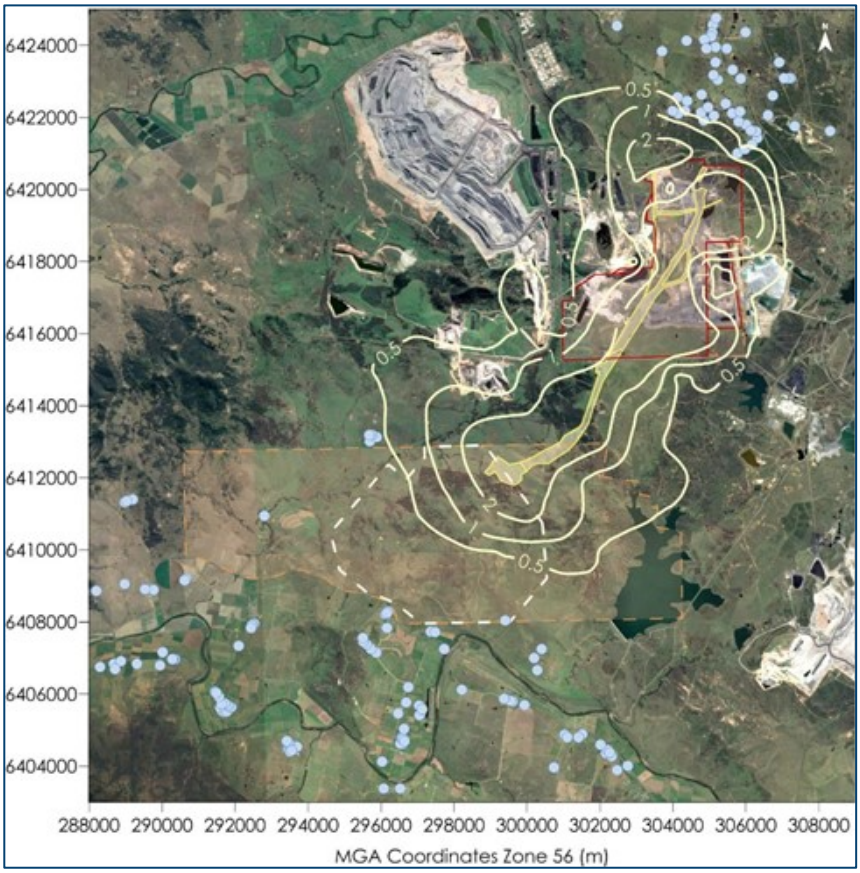


Figure B1: Predicted maximum 24-hour average $PM_{2.5}$ concentrations due to the Project alone (µg/m³)

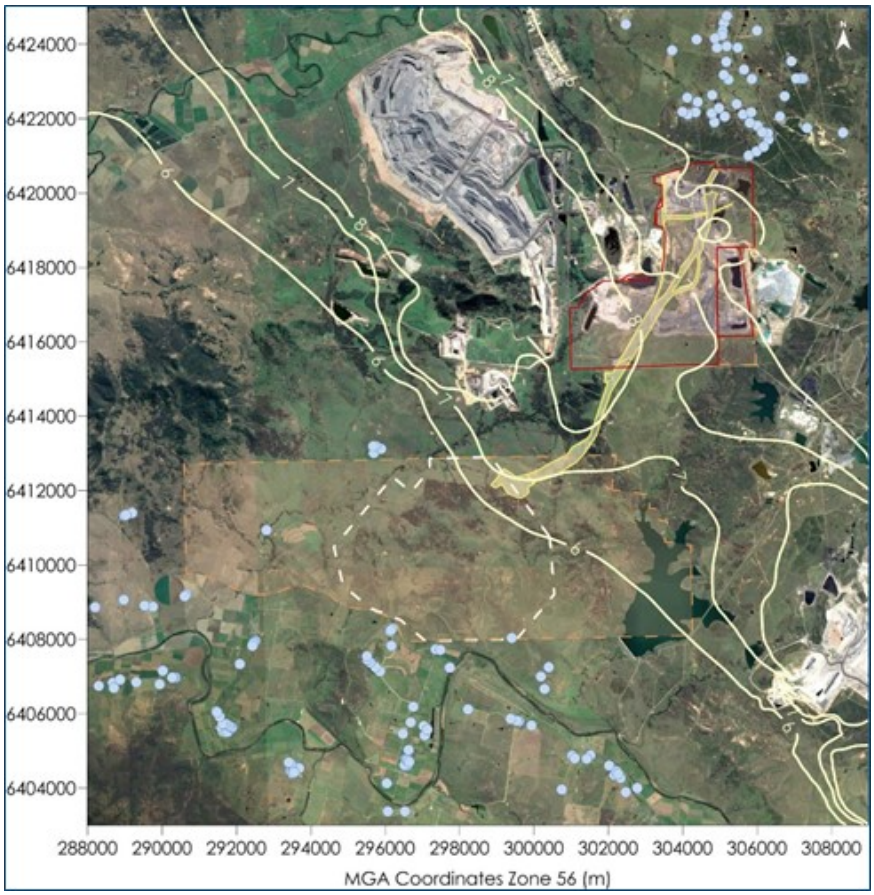


Figure B2: Predicted annual average PM2.5 concentrations due to the Project and all other sources (µg/m³)

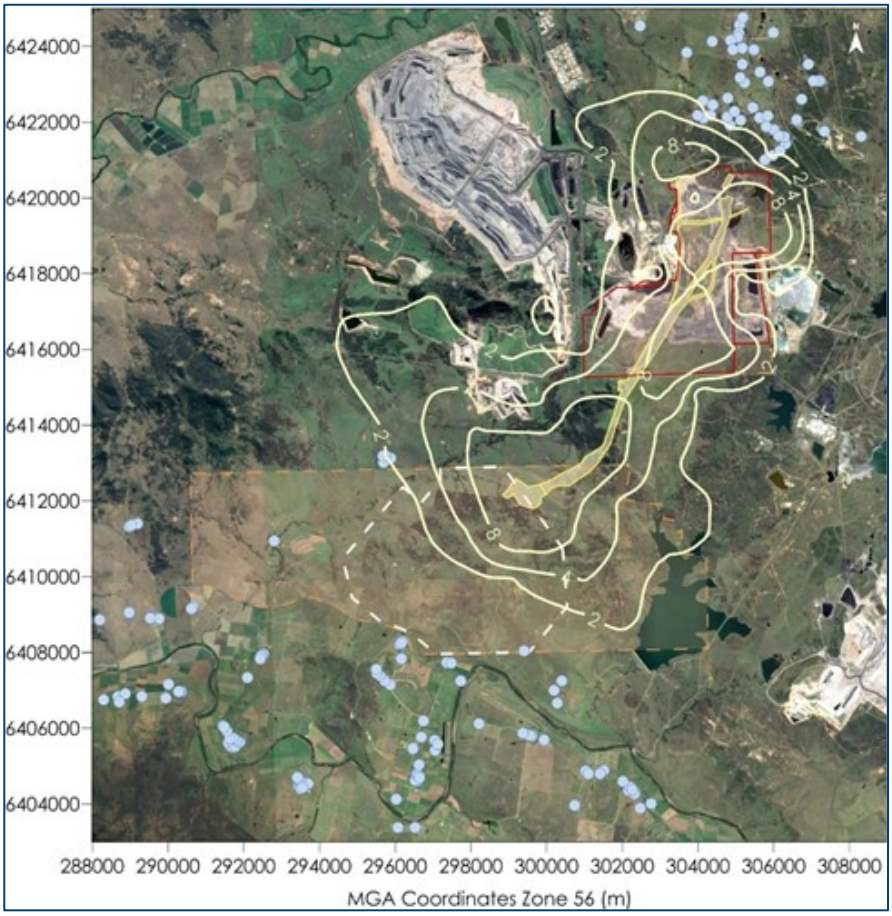


Figure B3: Predicted maximum 24-hour average PM_{10} concentrations due to the Project alone (µg/m³)

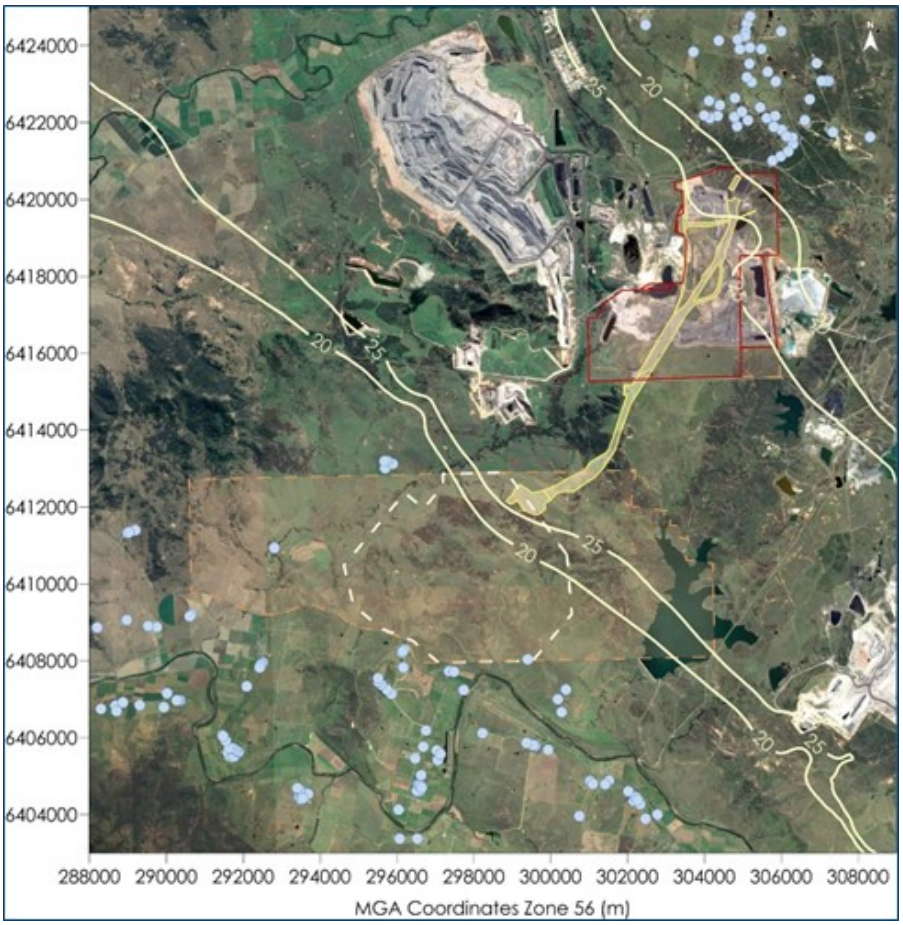


Figure B4: Predicted annual average PM_{10} concentrations due to the Project and all other sources (µg/m³)

Appendix C

NSW Department of Primary Industries letter dated 5 November 2020

OUT20/13770

Matthew Sprott
Director
Resource Assessments

Matthew.Sprott@planning.nsw.gov.au

Dear Mr Sprott

IPC request for information on Maxwell Underground Project

Thank you for the opportunity to provide further specific comment for the above project as per your correspondence dated 4 November 2020. The NSW Department of Primary Industries (NSW DPI) Agriculture provides advice to consent authorities about the protection and growth of agricultural industries and the resources upon which these industries depend to provide economic growth.

NSW DPI's Biosecurity and Food Safety, Animal Welfare and Animal Biosecurity Units conclude that, based on the information provided to Christine Tumney on 4 November, which states the blasts are "unlikely to be noticeable at the Coolmore and Godolphin Studs" NSW DPI do not foresee any animal welfare issues from the noise/vibration associated with blasting. NSW DPI recommends that Maxwell Underground integrates into their monitoring program engagement to notify the horse studs when blasting is about to occur so they can monitor impacts on the horses behaviour, especially in the early stages of the project, to gauge their reaction.

Air quality (dust) can contribute to animal welfare concerns. However, NSW DPI note this issue is to be mitigated through the regular use of water carts on dirt roads initially, then sealing the road surface. DPI sees this mitigation methodology is sufficient to address animal welfare concerns in relation to air quality.

Should you require clarification on any of the information contained in this response please contact Agricultural Landuse Planning Officer Helen Squires on 0437 645 719.

Yours sincerely

T Prentice. 5/11/20

Tamara Prentice
Manager Agricultural Land Use Planning

NSW Department of Primary Industries - Agriculture
Locked Bag 21, Orange NSW 2800 | 161 Kite St, Orange NSW 2800
Email: landuse.ag@dpi.nsw.gov.au | www.dpi.nsw.gov.au | ABN: 19 948 325 463

Appendix D

Comparison of Drayton South and Maxwell Underground Projects

	Drayton South 2014	Drayton South 2017	Maxwell Underground
Key Project Components			
Mining Method	Open cut (3 pits) Dragline operation	Open cut (2 pits) Dragline/truck & shovel	Underground (longwall and bord & pillar)
Coal Product(s)	Thermal coal	Thermal coal	Coking coal (min 75%) Thermal coal (max 25%)
Target coal measures	Greta coal measures	Greta coal measures	Wittingham Coal Measures
Total Resource Recovery	100 Mt ROM coal	75 Mt ROM coal	148 Mt ROM coal
Mine Life (Years)	20	15	26
Annual Production	7 Mtpa	6.4 Mtpa	8 Mtpa ROM coal (max) 5.7 Mtpa ROM coal (average)
Area of Surface Disturbance	**1,655 ha**	**1,477 ha**	**311 ha**
Hours of Operation	24 hrs, 7 days per week	24 hrs, 7 days per week	24 hrs, 7 days per week
Key Impacts on Equine CIC			
Setback from Thoroughbred Studs	• Minimum **500 m** buffer between Project area and stud boundaries	• Minimum **1 km** buffer between Project area and stud boundaries	• Minimum **4.5 km** buffer between Mine Entry Area and stud boundaries
Visual Impacts	• Open cut pits visible from higher elevations on both stud properties, including some horse paddocks at Coolmore Stud • Potential for night-lighting impacts	• Open cut pits visible from higher elevations on both stud properties • Potential for night-lighting impacts	• Mine Entry Area not visible from majority of Coolmore and Godolphin Studs (including residences or horse paddocks) • Limited distant views of transport & services corridor (<1% of viewshed) from highest vantage points at the Studs. • Very low likelihood of night-lighting impacts
Noise	• Noise levels at residences on studs and Hollydene Estate at or below 28 dB (day) and 35 dB (evening/night) • No exceedances of the relevant assessment criteria predicted	• Noise levels at residences on studs and Hollydene Estate at or below 22 dB (day) and 32 dB (evening/night) • No exceedances of the relevant assessment criteria predicted	• Years 1-2: noise levels at studs at or below 26 dB (day), 20 dB (evening) & 27 dB (night). • Year 3 onwards: noise levels at or below 20 dB (day/evening) and 24 dB (night); • No exceedances of the relevant assessment criteria predicted • Project unlikely to be audible above background noise
Blasting	• Up to 2 blasts per day and a total of 5 per week • No specified Maximum Instantaneous Charge (**MIC**), however modelled up to **2,000 kg** • Blasting at least **690 m** from Hollydene Estate (closest receiver to stud boundaries) • Maximum predicted vibration of **14 mm/sec** • Maximum predicted overpressure of **125 dB(Lin)** (no discount for topography applied)	• Up to 2 blasts per day and a total of 5 per week • **MIC 2,000 kg** • Blasting at least **1.8 km** from Hollydene Estate (closest receiver to stud boundaries) • Maximum predicted vibration of **3.1 mm/sec** • Maximum predicted overpressure of **112 dB(Lin)** (no discount for topography applied)	• Up to 2 blasts per day and a total of 8 per week (consistent with Drayton Project Approval) • **MIC 500 kg** • Blasting at least **4.5 km** from Stud boundaries • Maximum predicted vibration of **0.5 mm/sec** at stud boundaries • Maximum predicted overpressure of **111.3 dB(Lin)** at nearest stud boundary
Air	• The original Project's maximum contribution to PM levels at the studs: - Annual average: **1.2 µg/m^3 $PM_{2.5}$** and **10 µg/m^3 PM_{10}** - 24-hour average: **9 µg/m^3 $PM_{2.5}$** and **52 µg/m^3 PM_{10}** • Following revisions to the mine plan the predicted maximum contributions were reduced to: - Annual average: **0.3 µg/m^3 $PM_{2.5}$** and **2 µg/m^3 PM_{10}**	• Project's maximum contribution to PM levels at the studs: - Annual average: **0 µg/m^3 $PM_{2.5}$** and **2 µg/m^3 PM_{10}** - 24-hour average: **2 µg/m^3 $PM_{2.5}$** and **11 µg/m^3 PM_{10}**	• Project's contribution to annual average PM levels **0.0 µg/m^3** • Maximum contributions to 24-hour average PM: **0.1 µg/m^3 $PM_{2.5}$** and **0.4 µg/m^3 PM_{10}** • Very minor impacts compared to 24-hour project alone human health criteria of 25 µg/m^3 $PM_{2.5}$ and 50 µg/m^3 PM_{10}

	- 24-hour average: **3.1 µg/m^3 $PM_{2.5}$** and **19 µg/m^3 PM_{10}**		
Key Project Benefits			
Workforce	300 (construction) 530 (operations)	500 (operations)	250 (construction) 350 (operations)
Capital Investment	$368 million	$131 million	$509 million
Net Economic Benefit	**$510 million**	**$330 million**	**Over $1 billion**