Wollongong Coal Ltd

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2nd December 2021

Jessie Evans
Director - Resource Assessments
Department of Planning, Industry and Environment
4 Parramatta Square, 12 Darcy Street
Parramatta, NSW, 2150

Re: Wongawilli Coal Mine (MP 09_0161 Mod 2) Request for additional information

Dear Jessie,

I refer to the Department of Planning, Industry and Environment (DPIE) correspondence dated 19 November 2021, in which further information is requested to detail additional information regarding any potential additional measures to mitigate greenhouse gas (GHG) for the proposed Wongawilli Coal (WWC) Mine (MP 09_0161 Mod 2).

Wollongong Coal Pty Ltd (WCL) has considered the request provided and responded to each of the matters raised in the attachment (Appendix A – GHG Matters Response). In addition to support the measures identified WCL has completed a revised assessment of GHG total emissions based on confirmation of actual expected annual run-of-mine (ROM) extracted from 2 M tonnes per annum (tpa) to 486,000 tpa (Appendix B - Wongawilli MOD2 revised greenhouse gas calculations). In summary the proposed revised mitigation measures as attached for reference for the DPIE (Appendix C).

WCL would welcome the opportunity to discuss any of the aspects discussed in this RFI response with Department if required.

Should you have any questions or queries in relation to the content of this letter please do not hesitate to contact me on 0404 972 746.

Yours sincerely

Richard Sheehan
Wollongong Coal Group Environment Manager
E: Richard.sheehan@wcl.net.au

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Enclosed: Appendix A - WCL Response to DPIE GHG RFI

Appendix B – Revised GHG Assessment

Appendix C – Updated GHG Statements of Committment

Appendix A

DPIE NSW - WCL Response to DPIE GHG RFI

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Table A.1 DPIE RFI Response

Item	Request for information	WCL Response to Additional Information Request
1	Consideration of the mitigation measures identified in the attached letter, including those measures identified by Wollongong Coal in correspondence with the Commonwealth Minister for the Environment as part of the Russel Vale Underground Expansion; and	
1.1	sealing" of coal pillars as estimated to "reduce the proposed action's Scope 1 methane emissions by 40%"	The commitment regarding the sealing of pillars and the subsequent reductions relate to the secondary workings coal mining methodology that is board and pillar as has been committed to by WCL for the Russell Vale Colliery. The MOD2 NWMD project description as detailed in the Modification Report and Submissions Report seeks to extend the life of the Colliery by 5 years to enable Wollongong Coal to continue development of the approved North West Mains Development (NWMD). Furthermore, the modification largely seeks approval to extend the length of the approved NWMD alignment to access the existing Wongawilli Ventilation Shaft 1 and minor surface activities. As the NWMD project scope involves the construction and development of accessways for roads and ventilation through area not subject to previous mining there is no secondary workings or secondary extraction activities proposed or required. Any removal of coal during this process is incidental to this development work in that coal is only removed where it is intersected during the works. Hence sealing of coal pillars is not practical or possible as we are developing the workings through areas not subject to previous mining.
1.2	Utilisation of VAM technology inclusive of the use of such technology for electricity generation	With regard to the quantity of emissions the NWMD project Air quality and greenhouse gas assessment GHG assessment forecast totals are based on calculations incorporating a 2Mtpa production rate. This production rate is acknowledged as not being achieved during mining under the modified approval. The actual total expected production of ROM coal over the 5-year life of the project is 486 Kilo tonnes (kt) (ie 486,000 t) as reported in the Wongawilli Colliery Modification 2 – North West Mains Development Submissions Report September 2021. This results in a total 316,090 total and 63, 218 t CO2-e/year). The low level of emissions associated with the development project does not support the implementation of gas drainage and is well below the levels for which VAM technology would be considered to be a feasible or option for the proposed action.
1.3	Estimated annual reduction of 10,839t CO2e through efficient and sustainable electricity use	In consideration of these specific points detailed in the DPIE RFI accompanying letter WCL proposes to develop a Wongawilli Colliery Sustainability and Emission reduction strategy which would include the reduction of these scope 2 emissions (calculated at 106,065 total and 21,213 t CO2-e/year) via through efficient

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Item	Request for information	WCL Response to Additional Information Request
		and sustainable electricity use, implementation of solar energy projects, and sourcing of electricity from sustainable sources.
1.4		With regard to GHG emissions reporting, the Response to submissions report statement of commitments regarding GHG contains a commitment to including mine ventilation gas monitoring methodology and commitment in the annual NGERs reporting. Should Mod-2 be approved, WCL will ensure compliance with the approved consent conditions regarding GHG reporting.
2	Any other feasible mitigation measures to minimise greenhouse gas additional to those described in the Modification Report and Submissions Report.	

In determining if there were any other feasible mitigation measures to minimise greenhouse gas additional to those described in the Modification Report and Submissions Report WCL has carried out a review of the commitments made in the Russell Vale UEP AQGHGMP, the project and the (EPBC 2020/8702) Extension of mining operations at the existing Russell Vale Colliery Statement of Reasons for Approval under the Environment Protection and Biodiversity Conservation Act 1999.

In the absence of any government mandated guidelines issued by the Australian Government, WCL submits that it is passionately committed to the goal of the Paris Climate Accord and sets its goal to achieve net zero GHG/carbon emission reduction by year 2050. However, being a respectful corporate citizen to the law of the land, WCL further assures that when the guidelines become available from the Australian Government with respect to the GHG and similar carbon reduction strategy will be adhered to and would supersede any commitment or agreement WCL makes in that regard at this time.

With regard to the identification of any other feasible mitigation measures to minimise greenhouse gas additional to those described in the Modification Report and Submissions Report WCL will formulate an Emission and Sustainability Strategy for Wongawilli Colliery to ensure the development of a strategy in accordance with its commitment to being Carbon neutral by year 2050 in accordance with the Paris Climate Accord.

The Wongawilli Colliery Sustainability and Emission reduction strategy is expected to include measures such as:

- reduction of these scope 2 emissions via through efficient and sustainable electricity use,
- implementation of solar energy projects, and sourcing of electricity from sustainable sources.
- WCL will include WWC in its current commitment to reduce/abate/offset its carbon/GHG emissions by 4% each year starting 01 January 2022 with the intention to achieve Paris Climate Accord goal by 2050.
- the development of a Diesel Emission Reduction strategy to reduce diesel emissions

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Item	Request for information	WCL Response to Additional Information Request

- Ongoing investigations of emissions capture technologies as they become available that would be suitable for low-emissions productions as may support future applications.
- WWC will commit to measures to monitor the scope 1 emissions through scheduled monthly ventilation surveys and real time monitoring.

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Appendix B

Wongawilli MOD2 revised greenhouse gas calculations Letter

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2 December 2021

Richard Sheehan
Group Environmental Manager
Wollongong Coal Limited
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Re: Wongawilli Colliery Modification 2 revised greenhouse gas calculations

Dear Richard,

Wongawilli Colliery (the Colliery) is an underground coal mine located approximately 15 kilometres (km) south-west of Wollongong, NSW. The Colliery is owned and operated by Wollongong Coal Pty Limited (Wollongong Coal). Wollongong Coal is majority owned by Jindal Steel and Power Limited (JSPL), who largely purchase coal produced at the Colliery for steel production purposes.

Wollongong Coal are seeking modification to existing approved operations at the Colliery to extend the life of the mine by 5 years and enable the continued development of the approved North West Mains Development (NWMD).

As part of Modification Report prepared by EMM Consulting Pty Limited (EMM) for the proposed modification, an air quality impact assessment (AQIA) was prepared by EMM, dated 17 November 2020. The AQIA quantified air pollutant emissions and associated impacts from the Colliery on the surrounding environment, along with annual greenhouse gas (GHG) emissions.

The assessment of GHG emissions from the Colliery was presented in Section 9 and Appendix D of the AQIA (EMM 2020).

The management of GHG emissions from the Colliery was raised in submissions to the modification report. In addressing the comments relating to GHG emissions, Wollongong Coal seeks to clarify some of the assumptions underpinning the GHG emission calculations presented in the AQIA.

Specifically, the following clarifications to assumptions have been made:

- a confirmation of annual run-of-mine (ROM) extracted by the Colliery from 2 M tonnes per annum (tpa) to 486,000 tpa;
- an associated refinement of stockpiled coal at the Colliery to 48,600 tpa (based on the AQIA assumption of 10% of ROM coal is stored in an onsite stockpile);
- a correction to the site specific factor used to quantify fugitive emissions from underground mining; and
- no change has been made to the annual consumption rates for diesel fuel by onsite equipment or purchased electricity adopted in the AQIA.

Regarding the confirmation of annual ROM coal throughput, this is made to reflect the likely actual future operating conditions at the Colliery and comprises of 311,000 tpa approved to be extracted under current approvals and an additional 175,000 t under the proposed modification.

Regarding the change to the emission factor for fugitive emission from underground mining operations, Wollongong Coal have provided annual GHG emission reports submitted under the *National Greenhouse and Energy Reporting* (NGER) *Act 2007* ranging between 2012 through to 2020. From the annual NGER reports, the reported fugitive emissions from underground workings, annual ROM coal and the associated intensity of fugitive emissions are presented in Table 1.

Table 1 Annual fugitive GHG emissions, annual ROM coal and fugitive emission intensity factor

NGER reporting period	Reported fugitive emissions (t CO_2-e)	ROM Coal (tpa)	Fugitive emissions intensity (t CO_2-e / t ROM coal)
2012/2013	53,825	517,448	0.10
2013/2014	46,758	478,644	0.10
2014/2015	937	1,586	0.59
2015/2016	4,475	0	-
2016/2017	11,521	332,592	0.03
2017/2018	12,288	199,839	0.06
2018/2019	33,995	275,442	0.12
2019/2020	45,522	0	-

CO_2-e = carbon dioxide equivalent

No ROM coal was extracted for the 2015/2016 and 2019/2020 reporting periods, therefore no emissions intensity factor was quantified for these reporting periods. Further, the 2014/2015 emissions intensity is not considered representative given the very low amount of ROM coal extracted in that period. The average fugitive emissions intensity for the eight years of NGER reported data presented in Table 1, excluding the three aforementioned years is 0.084 t CO_2-e/t ROM coal extracted. This emissions intensity value has been adopted in the revised GHG emission calculations for the proposed modification presented for this report.

By comparison, the AQIA (EMM 2020) applied a fugitive emissions intensity from a single reporting period (2018/2019) in order to estimate fugitive emissions from the proposed modification. The previously adopted emissions intensity value was 0.179 t CO_2-e/t ROM coal extracted, which is higher than the corresponding value presented in Table 1 for 2018/2019. Regarding this discrepancy, Wollongong Coal have advised that the 2018/2019 NGER report was updated and resubmitted in August 2021 (ie post submission of the modification report and AQIA) following an audit by the Clean Energy Regulator. As a result of the audit, the emissions intensity value reduced for 2018/2019.

A final revision to the GHG emission calculations relative to those presented in the AQIA relates to an update to the adopted GHG emission factors to the most current version of the Department of Industry, Science, Energy and Resources (DISER) National Greenhouse Accounts Factors (NGAF) workbook. The AQIA applied emission factors from the 2020 edition of the NGAF workbook. A revised edition was published by DISER in August 2021 (ie post submission of the modification report and AQIA) and where applicable, emission factors have been adjusted for this report.

The methodology presented in Section 9 and Appendix D of the AQIA (EMM 2020) has been used as the basis for the revised GHG emission calculations contained within this report. Full details behind the revised GHG emission calculations are contained within Appendix A.

The estimated annual GHG emissions for each emission source are presented in Table 2. The total emissions generated over the life of MOD2 are also presented.

Table 2 Estimated annual GHG emissions – revised calculations

Emission sources	Scope 1 (t CO_2-e/year)	Scope 2 (t CO_2-e/year)	Scope 3 (t CO_2-e/year)
Diesel combustion	135	-	7
Fugitive emissions from driveage	40,946	-	-
Post-mining emissions	923	-	-
Electricity consumption	-	21,213	1,904
End use of coal	-	-	1,341,797
Transport of coal via rail	-	-	184
Transport of coal via ship	-	-	146,966
Total	**42,005**	**21,213**	**1,490,858**
Life of MOD2 total (five years)	**210,026**	**106,064**	**7,454,291**

The significance of GHG emissions relative to state and national GHG emissions is made by comparing annual average GHG emissions against the most recent available total GHG emissions inventories (calendar year 2019[1]) for NSW (136,579 kt CO_2-e) and Australia (529,298 kt CO_2-e).

Annual scope 1 and 2 GHG emissions generated by the Colliery represent approximately 0.046% of total GHG emissions for NSW and 0.012% of total GHG emissions for Australia, based on the National Greenhouse Gas Inventory for 2019.

Scope 3 emissions are approximately 1.5 million tonnes per annum (Mtpa), with the majority associated with consumption of coal by end users. Wollongong Coal commit to only exporting coal to signatories of the Paris Agreement, with the majority planned for export to India. Any scope 3 emissions associated with the consumption of coal from the Colliery will therefore be accounted for in the Nationally Determined Contribution commitments for the end user nation.

The calculated annual scope 1 and 2 emissions from the Colliery are greater than the NGER Scheme facility reporting threshold of 25,000 tpa CO_2-e. Wollongong Coal currently calculate and report scope 1 and 2 GHG emissions annually in accordance with the requirements of the NGER Act and will continue to do so as long as scope 1 and 2 GHG emissions are above the reporting threshold.

Yours sincerely

Scott Fishwick
National Technical Leader - Air Quality
sfishwick@emmconsulting.com.au

1 https://ageis.climatechange.gov.au/SGGI.aspx

References

Australian Greenhouse Office 2007, *National Greenhouse Gas Inventory: Analysis of Recent Trends and Greenhouse Gas Indicators (1995 to 2005)*.

Department of Environment and Energy 2020, *National Greenhouse Accounts Factors*, October 2020

Department of Industry, Science, Energy and Resources 2020, Australian Greenhouse Emissions Information System, State and National GHG Inventory. https://ageis.climatechange.gov.au/SGGI.aspx

EMM 2020, *Wongawilli Colliery MOD 2 NW Mains – Air quality and greenhouse gas assessment*.

Appendix A

Greenhouse gas emission calculations

A.1 Diesel consumption

GHG emissions from diesel consumption were estimated using the following equation:

$$E_{ij} = \frac{Q_i \times EC_i \times EF_{ijoxec}}{1000}$$

Where:

E_{ij}	=	Emissions of GHG from diesel combustion	(t CO_2-e)
Q_i	=	Quantity of fuel	(kL)
EC_i	=	Energy content of fuel	(GJ/kL)[2]
EF_{ijoxec}	=	Emission factor (scope 1 or 3) for diesel consumption	(kg CO_2-e/GJ)[3]

GHG emission factors and energy content for diesel were sourced from the NGAF (DISER 2021). These are presented in Table A.1. The quantity of diesel used is listed in Table A.2.

The estimated annual GHG emissions from diesel consumption are presented in Table A.2.

Table A.1 Diesel GHG emission factors

Fuel type	Energy content (GJ/kL)	Scope 1 Emission Factors (kg CO_2-e/GJ)			Scope 3 Emission Factor (kg CO_2-e/GJ)
		CO_2	CH_4	N_2O	CO_2
Non-road diesel	38.6	69.9	0.1	0.2	3.6

Table A.2 Estimated CO_2-e (tonnes) for diesel consumption per year

Diesel use (L/annum)	Emissions (t CO_2-e)		Total
	Scope 1	Scope 3	
50,000	135	7	142

[2] GJ = gigajoules

[3] kg CO_2-e/GJ = kilograms of carbon dioxide equivalents per gigajoule

A.2 Post-mining activities

Emissions for scope 1 post-mining activities were calculated using the 'post mining activities associated with gassy underground mines' per the NGAF (DISER 2021). The NGAF provides a CH_4 emission factor of 0.019 tonnes CO_2-e/tonne of ROM coal.

Annual ROM coal extraction is 486,000 tpa, while Wollongong Coal estimate that only 10% of extracted material would be stored in the ROM coal stockpile during a 12-month period. The estimated annual GHG emissions from post mining activities are presented in Table A.3.

Table A.3 Estimated CO_2-e (tonnes) for post-mining activities

ROM coal stockpiled (t/annum)	Scope 1 emissions (t CO_2-e)
48,600	923

A.3 Fugitive emissions from mine ventilation air

As presented in this report, a site specific emission factor of 0.084 t CO_2-e / t ROM coal extracted has been derived from Wollongong Coal NGER reporting data collated between 2012 and 2020.

The estimated annual GHG emissions from mine ventilation air are presented in Table A.4.

Table A.4 Estimated CO_2-e (tonnes) for mine ventilation air

Annual ROM coal (t)	Scope 1 emissions (t CO_2-e)
486,000	40,946

A.4 Electricity use

GHG emissions associated with electricity consumption were estimated using the following equation:

$$E_{CO_2-e} = \frac{Q \times EF}{1000}$$

Where:

E_{CO2-e}	=	Emissions of GHG from electricity consumption	(t CO_2-e)
Q_i	=	Quantity of electricity	(MWh)[4]
EF	=	Emission factor (scope 2 or 3) for electricity consumption	(kg CO_2-e/kWh)[5]

GHG emission factors for electricity use were sourced from the NGAF (DISER 2021). These are presented in Table A.5.

The estimated GHG emissions from electricity consumption are presented in Table A.6.

Table A.5 Electricity GHG emission factors

Use	Emission Factors (kg CO_2-e/kWh)	
	Scope 2	Scope 3
Electricity	0.78	0.07

Table A.6 Estimated CO_2-e (tonnes) for electricity consumption

Electricity use (MWh)	Emissions (t CO_2-e)	
	Scope 2	Scope 3
27,196	21,213	1,904

[4] kWh = kilowatt hours

[5] kg CO_2-e/kWh = kilograms of carbon dioxide equivalents per kilowatt hour

A.5 Energy production from coal (end use)

GHG emissions associated with energy production from coal were estimated using the following equation:

$$E_{CO_2-e} = \frac{Q \times EC \times EF}{1000}$$

Where:

E_{CO2-e}	=	Emissions of GHG from electricity consumption	(t CO_2-e)
Q	=	Quantity of coal burnt	(t)
EC	=	Energy Content Factor for bituminous coal	(GJ/t)
EF	=	Emission factor for bituminous coal combustion	(kg CO_2-e/GJ)

GHG emission factors for fuel combustion were sourced from the NGAF (DISER 2021). These are presented in Table A.7. The scope 1 emission factors for coking coal were used to calculate the scope 3 emissions from the burning of ROM coal by end users per Appendix 4 of the NGAF.

The estimated annual GHG emissions from coal combustion by end users are presented in Table A.8

Table A.7 Fuel combustion GHG emission factors

Fuel type	Energy content (GJ/t)	Scope 1 Emission Factors (kg CO_2-e/GJ)		
		CO_2	CH_4	N_2O
Coking coal	30	91.8	0.03	0.2

Table A.8 Estimated CO_2-e (tonnes) for energy production from coal

Product coal (t/annum)	Emissions (t CO_2-e)
	Scope 3
486,000	1,341,797

A.6 Transport of coal

GHG emissions associated with the transport of coal via rail and ship were estimated using the following equation:

$$E_{CO_2-e} = \frac{D \times Q \times EF}{1000}$$

Where:

E_{CO2-e}	=	Emissions of GHG from rail/shipping transport	(t CO_2-e)
D	=	Average distance travelled by rail/ship	(km)
Q	=	Quantity of coal transported	(t)
EF	=	Emission factor for rail/ship freight movement	(g CO_2/tonne-km)

GHG emission factors for rail and ship transport are not available in the NGAF. Therefore, these emission factors were sourced from various greenhouse gas assessments for coal mines. These assessments adopted the emission factors from AGO 2007 which are presented in Table A.9 below. The quantity of coal transported, and average distances travelled by rail and ship are listed in Table A.10.

The estimated annual GHG emissions from transport of coal are presented in Table A.10.

Table A.9 Rail and ship GHG emission factors

Use	Emission Factors (kg CO_2-e/tonne-km)
	Scope 3
Rail	0.0054
Ship	0.0126

Table A.10 Estimated CO_2-e (tonnes) for transport of coal

Transport type	Coal from the Colliery (t/annum)	Travel distance (return) (km)	Scope 3 emissions (t CO_2-e)
Rail	486,000	30	184
Ship	486,000	24,000	146,966

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Appendix C

Revised Statement of Commitments

With regard to the commitments already made in the Wongawilli Colliery Modification Report PA 09_0161 MOD 2 - North West Mains Development Volume 4 - Appendix F (November 2020) and in the Wongawilli Colliery Modification 2 – North West Mains Development Submissions Report September 2021 as detailed below WCL proposes no changes to those commitments as are detailed below.

- Monitoring and reporting - mine ventilation gas monitoring methodology and commitment to annual NGERs reporting;
- Mine ventilation - continue regular greenhouse gas monitoring at operating ventilation fan locations;
- Diesel fuel - ensure the efficiency of all upgraded mobile and fixed equipment has been considered during procurement for fuel-powered equipment;
- Diesel fuel - ensure all equipment is well maintained and operated to retain high levels of fuel efficiency;
- Electricity consumption - implement reasonable and feasible outcomes of any energy audits completed for the Colliery.
- Equipment sourced to support the activities proposed under MOD2 is to be selected taking into consideration GHG emission production potential.
- Source fuels which are both suitable for equipment and represent the lowest GHG emission potential.
- Investigate the utilisation of renewable energy to support mining activities to reduce GHG emissions associated with electricity consumption of operations.
- Tenders to provide substantive capital works and or equipment to Wollongong Coal will including a weighting in which GHG emissions are to be considered, by means of supplier policy and or proximity to the Wongawilli Colliery.

The Wongawilli Colliery Sustainability and Emission reduction strategy is expected to include measures such as:

- reduction of these scope 2 emissions via through efficient and sustainable electricity use,
- implementation of solar energy projects, and sourcing of electricity from sustainable sources.
- WCL will include WWC in its current commitment to reduce/abate/offset its carbon/GHG emissions by 4% each year starting at the 01 January 2022 with the intention to achieve Paris Climate Accord goal by 2050.
- the development of a Diesel Emission Reduction strategy to reduce diesel emissions
- Ongoing investigations of emissions capture technologies as they become available that would be suitable for low-emissions productions as may support future applications.

WWC will commit to measures to monitor the scope 1 emissions through scheduled monthly ventilation surveys and real time monitoring.