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Leanne Cross
Senior Environmental Planner
KDC
Via email: Leanne@kdc.com.au

RE: Air Quality Assessment – Proposed Mt Piper Rail Loop Modification

Dear Leanne,

Todoroski Air Sciences has assessed the potential for air quality impacts to arise due to the proposed modifications to the Mt Piper Rail Loop (hereafter referred to as the proposed modifications). This assessment investigates the likely change in dust emissions associated with the proposed modifications relative to the approved operations.

Project background

The approved Mt Piper Rail Loop Project essentially involves the construction and operation of a rail loop, coal unloader facility and an overland conveyor to enable the supply of coal by rail to Mt Piper Power Station. The approved operation allows for an annual throughput of eight million tonnes of coal per annum (Mtpa) via the coal unloader facility.

Potential air quality impacts due to the construction and operation of the Mt Piper Rail Loop have been assessed in the *Western Rail Coal Unloader Environmental Assessment Air Quality Assessment* (**SKM, 2007**).

The assessment identified that for the construction phase, particulate matter (dust) associated with the import of fill material presents the greatest risk to air quality however with implementation of dust mitigation measures would not result in adverse air quality impacts. Locomotive emissions and the transfer and handling of coal at the site were identified as the primary sources of air emissions during the operational phase. Air dispersion modelling of the operational activities predicted no exceedances of the project specific air quality criteria at the nearby receptor locations.

Proposed modifications

The key features associated with the proposed modifications include:

- Realignment of the rail loop and coal unloader facility;
- Removal of a transfer station on the overland conveyor;
- Design of infrastructure suitable for 4-5Mtpa of coal from 8Mtpa; and,

- Reduction in the amount of fill material required for the construction of the rail loop from 600,000 cubic metres (m^3) to 100,000m^3.

An overview of the proposed modification feature is presented in **Figure 1**.

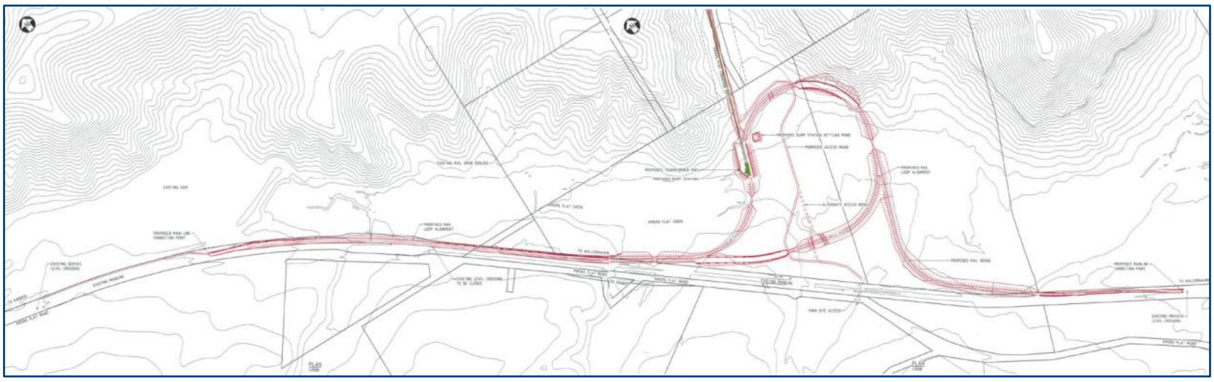

Figure 1: Indicative modification overview – subject to detail design

This assessment focuses on the change in key air emissions, arising from activity associated with the proposed modification during the construction phase and operational phase compared with the approved operations.

Local setting

The Mt Piper Rail Loop site is located at Blackmans Flat, approximately 25 kilometres (km) northwest of Lithgow in New South Wales (NSW) Central West region west of the Blue Mountains. The main settlements near the Mt Piper Rail Loop are Blackmans Flat, Cullen Bullen, Portland, Lidsdale and Wallerawang. Surrounding these settlements are various rural residential, agricultural properties, coal mining operations and the Mt Piper Power Station.

Figure 2 presents the location of the Mt Piper Rail Loop and nearby sensitive receptors considered in this study. An indicative layout of the approved and proposed modifications is also shown in **Figure 2**.

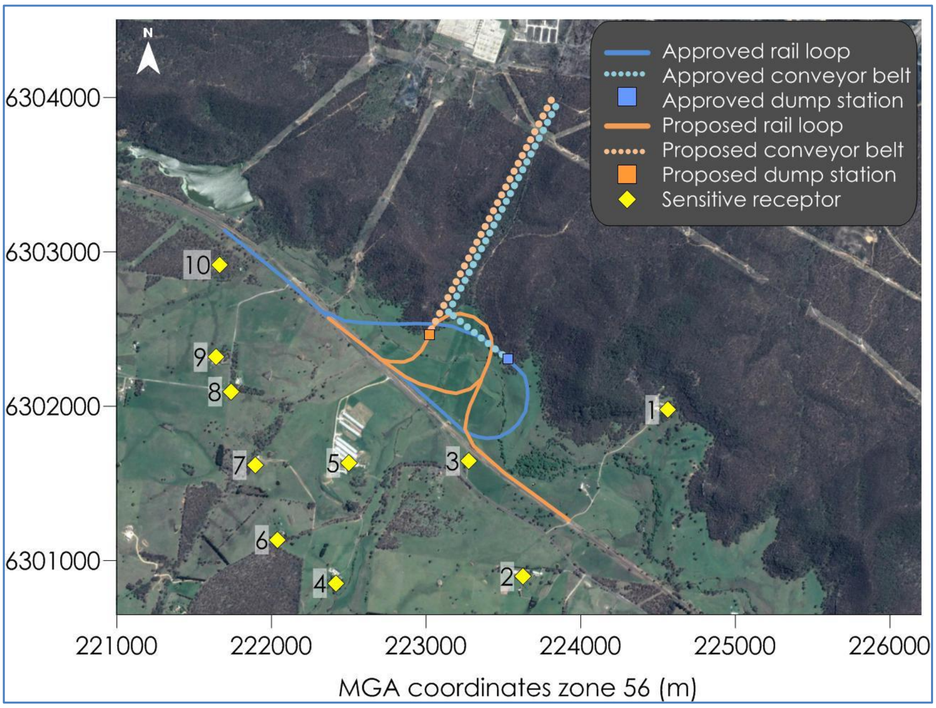

Figure 2: Project setting and indicative layout (subject to detailed design)

Existing environmental conditions

Local climatic conditions

Long-term climatic data from the closest Bureau of Meteorology (BoM) weather station at Bathurst Airport AWS (Automatic Weather Station) (Site No. 63291) were analysed to characterise the local climate in the proximity of the project. The Bathurst Airport AWS weather station is located approximately 34km west-southwest of the proposed modifications.

Table 1 and **Figure 3** present a summary of data from the Bathurst Airport AWS weather station collected over an 18 to 27 year period for the various meteorological parameters.

The data indicate that January is the hottest month with a mean maximum temperature of 28.7 degrees Celsius (°C) and July is the coldest month with a mean minimum temperature of 0.8°C.

Rainfall is higher during the warmer months of the year and declines during the colder months, with an annual average rainfall of 607.6 millimetres (mm) over 69.9 days. The data indicate that December is the wettest month with an average rainfall of 74.2mm over 7 days and May is the driest month with an average rainfall of 32.5mm over 4.5 days.

Relative humidity increases during the warmer months and decreases during the colder months. Mean 9am relative humidity ranges from 66% in December to 91% in June. Mean 3pm relative humidity levels range from 40% in January and December to 64% in June.

Wind speeds are higher during the second half of the year. Mean 9am wind speeds range from 8.1 kilometres per hour (km/h) in May to 12.5km/h in September and October. Mean 3pm wind speeds range from 15.9km/h in May to 21km/h in September.

Table 1: Monthly climate statistics summary – Bathurst Airport AWS weather station

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann.
Temperature													
Mean max. temp (°C)	28.7	27.6	24.8	20.9	16.3	12.6	11.9	13.8	17.1	20.4	23.7	26.6	20.4
Mean min. temp (°C)	13.7	13.5	10.7	6.5	3.0	1.9	0.8	1.2	3.6	6.2	9.3	11.7	6.8
Rainfall													
Rainfall (mm)	58.5	57.3	55.7	33.1	32.5	39.7	43.6	40.2	47.0	52.8	64.3	74.2	607.6
No. of rain days	5.8	5.5	5.2	4.0	4.5	6.4	6.5	6.0	5.3	6.4	7.3	7.0	69.9
9am conditions													
Mean temp (°C)	19.4	18.2	15.3	12.4	8.0	5.2	4.4	6.0	9.9	13.5	15.6	18.1	12.2
Mean R.H. (%)	67	75	78	78	88	91	90	84	77	69	71	66	78
Mean W.S. (km/h)	10.7	10.1	9.0	8.6	8.1	8.8	9.1	10.9	12.5	12.5	11.8	10.8	10.2
3pm conditions													
Mean temp (°C)	26.8	25.6	23.4	19.5	15.2	11.5	10.8	12.5	15.6	18.7	21.6	24.7	18.8
Mean R.H. (%)	40	46	44	44	54	64	62	53	50	47	47	40	49
Mean W.S. (km/h)	18.6	17.7	17.3	16.6	15.9	16.6	17.3	20.1	21.0	19.9	19.4	19.5	18.3

Source: Bureau of Meteorology, 2018

R.H. – Relative Humidity, W.S. – wind speed

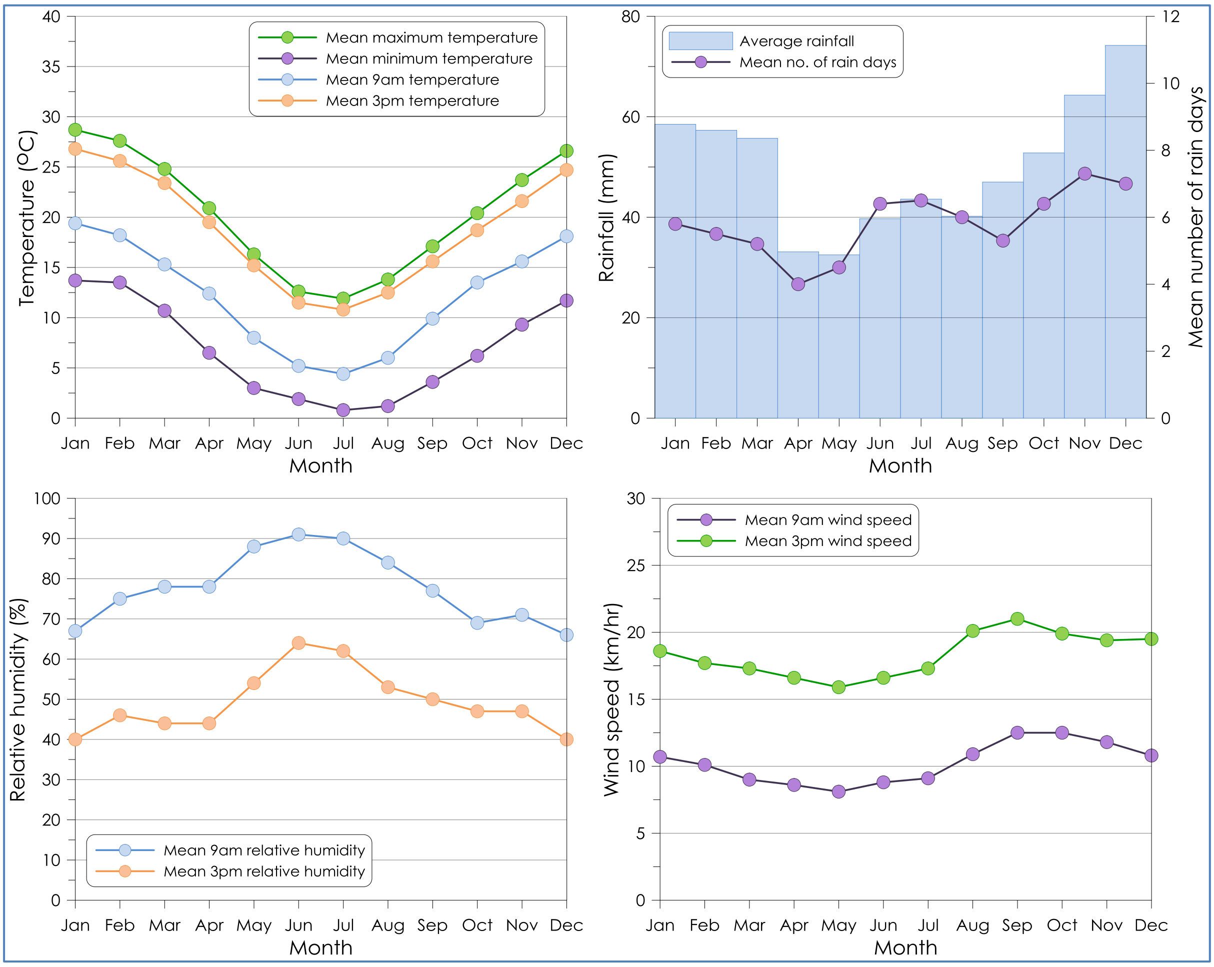

Figure 3: Monthly climate statistics summary – Bathurst Airport AWS weather station

Annual and seasonal windroses for the Bathurst Airport AWS weather station during the 2017 calendar period are presented in **Figure 4**.

On an annual basis, the most frequent winds come from the west-southwest and the east-northeast. In summer, winds typically come from the east-northeast. The autumn distribution indicates the most frequent winds coming from the east-southeast and the southeast. During winter, winds are typically from the southwest quadrant. Spring experiences frequent winds from the west-southwest, east and the east-northeast.

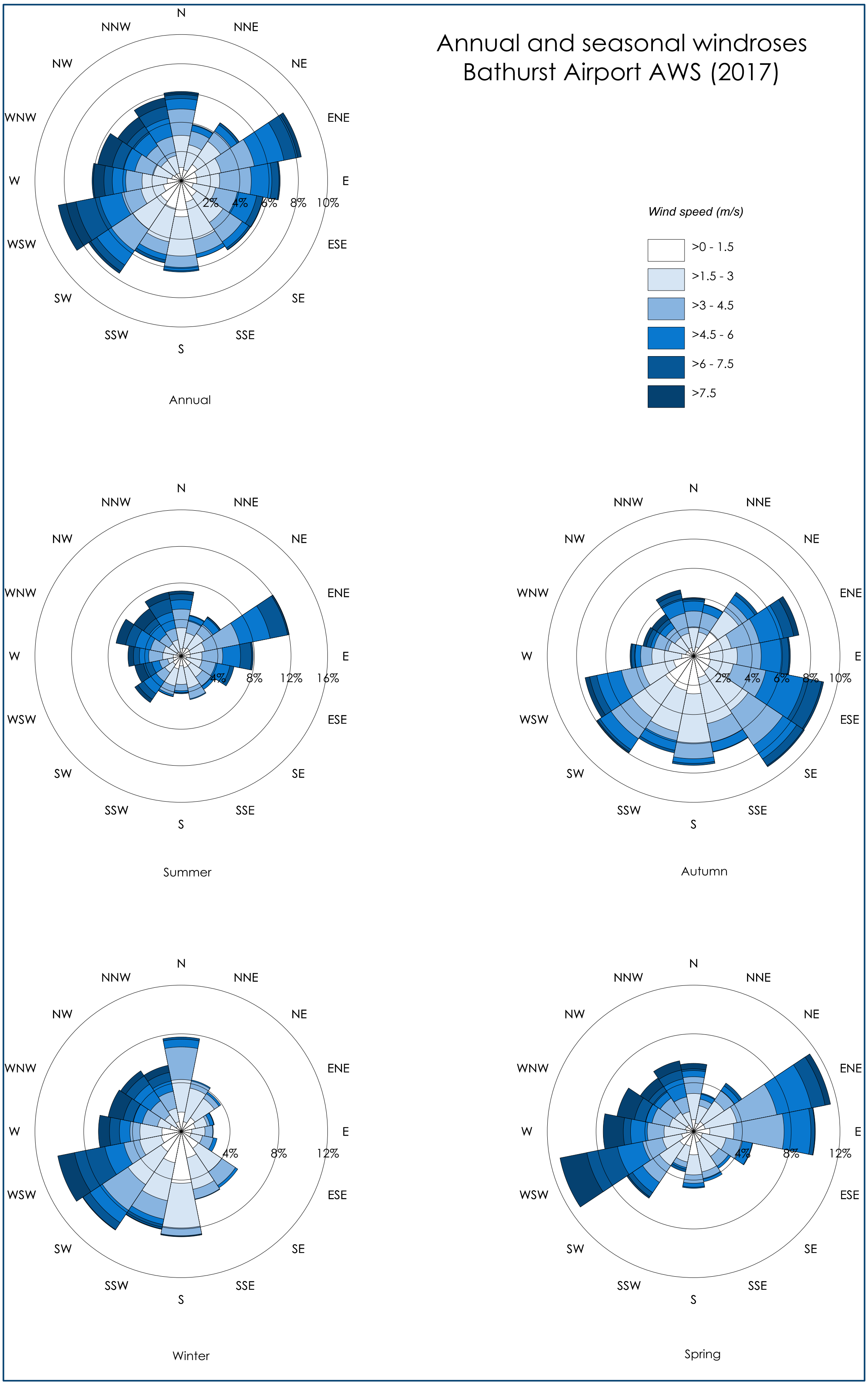

Figure 4: Annual and seasonal windroses – Bathurst Airport AWS weather station (2017)

Local air quality monitoring

The main sources of air pollutants in the area surrounding the Project would include emissions from local anthropogenic activities such as electricity production, motor vehicle exhaust and domestic wood heaters.

Ambient air quality monitoring data from the nearest air quality monitor operated by the NSW Office of Environment and Heritage (OEH) in Bathurst have been reviewed. A summary of the available PM_{10} and $PM_{2.5}$ data from the Bathurst monitoring station is presented in **Table 2**. Recorded 24-hour average PM_{10} and $PM_{2.5}$ concentrations are presented in **Figure 5** and **Figure 6**, respectively.

A review of **Table 2** indicates that the annual average PM_{10} and $PM_{2.5}$ concentrations were below the relevant criteria of 25µg/m^3 and 8µg/m^3, respectively. The maximum 24-hour average PM_{10} and $PM_{2.5}$ concentrations recorded at the station were also found to be below the relevant criteria of 50µg/m^3 and 25µg/m^3, respectively.

Table 2: Summary of PM_{10} and $PM_{2.5}$ levels from NSW OEH Bathurst monitoring (µg/m^3)

Year	PM_{10}	$PM_{2.5}$
	Annual average	
	Impact assessment criteria	
	25	8
2016	13.3	-
2017	14.1	6.1
	Maximum 24-hour average	
	Impact assessment criteria	
	50	25
2016	34.1	-
2017	49.9	17.5

It can be seen from **Figure 5** that PM_{10} concentrations are nominally highest in the spring and summer months with the warmer weather raising the potential for drier ground, elevating the occurrence of windblown dust, bushfires and increased pollen levels.

The $PM_{2.5}$ concentrations in **Figure 6** are relatively constant during the monitoring period, being slightly higher in spring and winter, which may be attributed to the contribution of wood smoke emitted by wood heaters and other combustion sources.

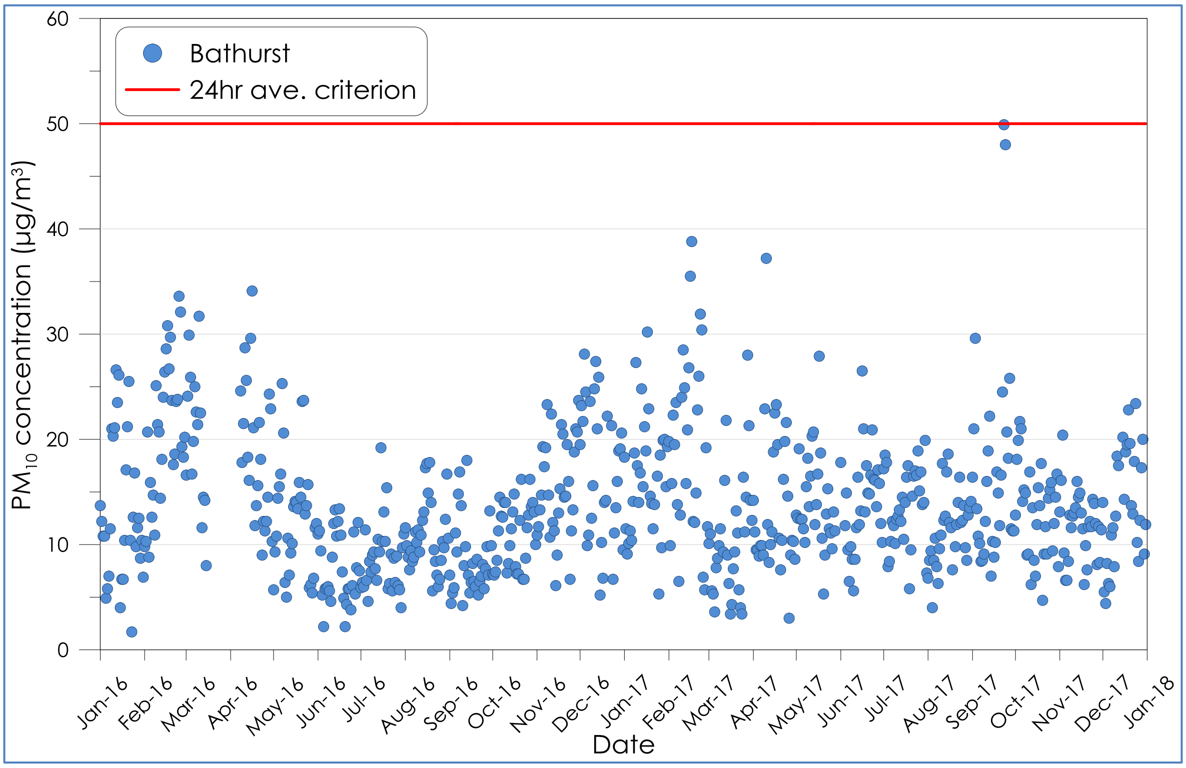

Figure 5: 24-hour average PM_{10} concentrations

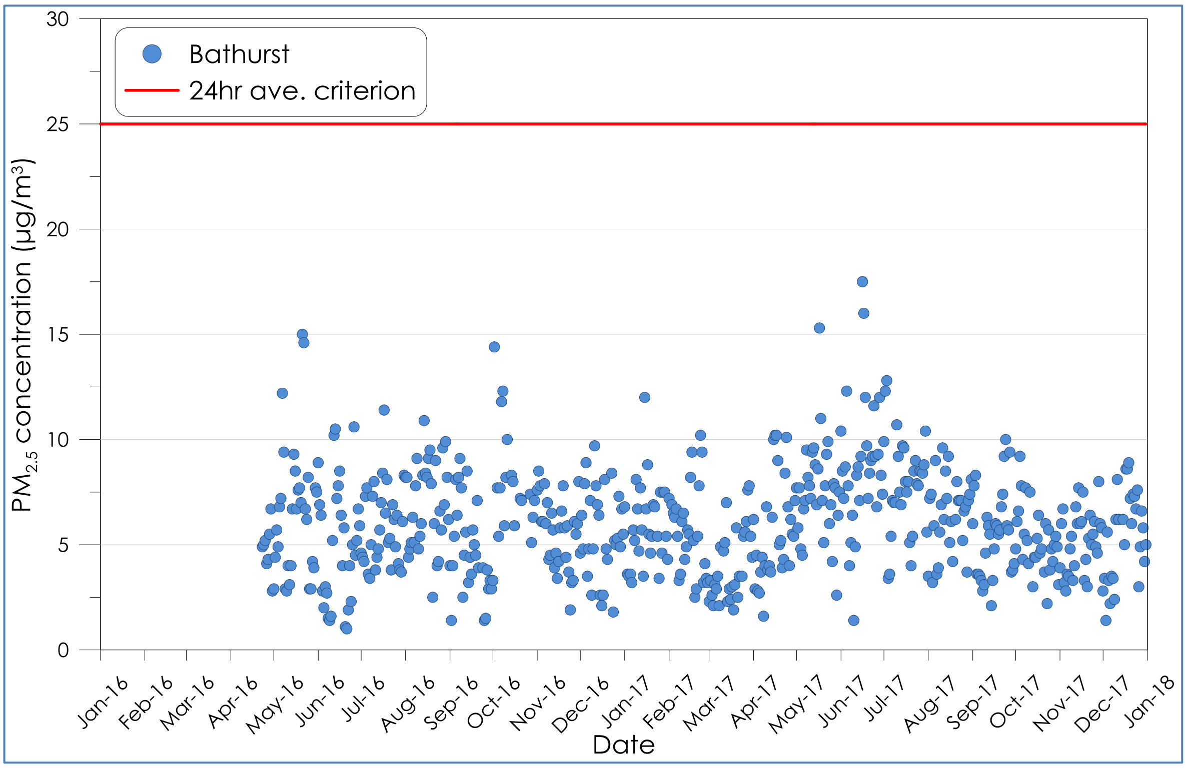

Figure 6: 24-hour average $PM_{2.5}$ concentrations

Assessment of potential air quality impacts

To investigate the potential effect that the proposed modifications may have on dust levels in the surrounding environment, a qualitative analysis is made of the proposed change in dust levels associated with the proposed modifications relative to the approved dust levels and impacts assessed as part of the *Western Rail Coal Unloader Environmental Assessment Air Quality Assessment* (**SKM, 2007**).

Aspects of the proposed modifications which would generate dust emissions include the construction and the operational activities and have been assessed in the following sections.

Potential construction dust emissions

The construction phase elements include the formation of the rail embankment, rail track construction and signalling, the erection of the coal unloader facility and conveyor, and other associated features. Construction activities have the potential to generate air pollutants in the form of dust emissions and exhaust emissions due to earthworks, excavation, filling and the operation of construction vehicles and plant.

To develop the rail embankment for the proposed modifications, there is expected to be a cut-fill balance across the site with material obtained from the rock cutting for the conveyor to be used. The required fill material is anticipated to be 100,000m^3 and is less than the original amount of fill estimated for the approved project of 600,000m^3. The reduction in fill material would remove the need to source additional material from the Lamberts Gully Coal Mine.

A comparison of the estimated dust emissions for the approved and proposed modifications is conducted based on analysing the various dust generating activities and applying suitable emission factors. A summary of the likely dust emissions due to significant construction phase activity for the approved project and the proposed modifications is presented **Table 3**.

Table 3: Estimated dust emissions for the construction phase – approved and proposed modifications

Construction activity	Approved	Proposed modification	Percent change in dust emissions
Hauling fill to site	12,005	2,001	-83%
Unloading fill material	2,574	429	-83%
Rehandle fill material	2,574	429	-83%
Bulldozing	8,033	8,033	-
Grading	2,363	2,363	-
Wind erosion	26,988	11,475	-57%
Total TSP emissions (kg/year)	**54,538**	**24,730**	**-55%**

TSP – total suspended particulates

Table 3 indicates that the estimated change in dust emissions due to the proposed modifications would see a decrease in dust emissions of approximately 55% of the approved project.

The estimated reduction in dust emissions due to the proposed modifications is largely influenced by the reduction in required fill material and associated transport and handling of material during the construction phase.

Therefore, the potential change in construction dust emissions arising from the proposed modifications relative to the approved project is not expected to result in any additional impact beyond what is already predicted in the *Western Rail Coal Unloader Environmental Assessment Air Quality Assessment* (**SKM, 2007**) in relation to the approved project.

Potential operational dust emissions
The following components of the proposed modifications that would likely affect the quantum of dust emissions produced include:

- Removal of a transfer station on the overland conveyor; and,
- Reduction in the maximum annual coal throughput from 8Mtpa to 4-5Mtpa of coal.

The relocation of the coal unloader facility associated with the proposed modifications results in the removal of a transfer station and a reduction in the overall conveyor travel distance compared to the approved operations. These changes effectively eliminate a handling step and reduce the overall potential for dust emissions during the transport of coal to the power station.

The reduction in the annual coal throughput from 8Mtpa to 5Mtpa would see a 38% reduction in total dust emissions proportional to the reduction in material handled during the operational phase. Overall, the proposed modifications are estimated to therefore result in a greater than 38% reduction in total dust emissions generated and hence would also result in a reduction in potential air quality impacts in the surrounding environment.

It is noted that the coal unloader facility is proposed to be located further from the nearest identified sensitive receptor (Receptor 3 – see **Figure 2**) by approximately 150m. This relocation would see the major dust sources located further from this sensitive receptor and with the expected overall reduction in total dust emissions would further reduce the potential for any adverse impacts associated with the relocation.

With the reduction in the annual coal throughput there would also be a reduction in the number of trains delivering coal and hence there would be less emissions arising from locomotives.

Mitigation and management measures
As required by the conditions of approval the project must be constructed in a manner that minimises dust emissions from the site, take all practicable measures to ensure loaded vehicles entering and exiting the site are covered and control dust on all trafficable areas.

The approved project must also be operated in a manner that minimises potential dust generation and include a floor sweep system for the collection of dust from the unloader, spray dust supressing system for minimising dust generation at the interface of the coal bin and rail wagon, dust extraction and ventilation system for the unloader and physical enclosure of the conveyor system.

In addition to these measures the following additional measures are recommended:

<u>Construction</u>

- Restrict project related traffic to defined roads.
- Maintain low vehicle speeds on unsealed roads (e.g. 40km/h).
- Ensure no incineration or burning of any material on the premises.
- Prompt action would be taken to extinguish any fire.

Operation

- Equipment will be maintained to ensure the best environmental performance in terms of air emissions.

Summary and conclusions

This assessment has examined the likely air quality effects resulting from the proposed modifications.

The proposed modifications are estimated to result in a reduction in total dust emissions generated for the construction and operational phases of the Mt Piper Rail Loop. During the construction phase, the likely dust emissions are estimated to reduce by approximately 55% and dust emissions during the operational phase are estimated to reduce by greater than 38%.

The previous air quality modelling for the approved project predicted that there would be no exceedances of project specific air quality criteria (**SKM, 2007**). Based on the comparison of the estimated dust emissions for the approved project and the proposed modifications, it is anticipated that there would also be no exceedances of project specific air quality criteria.

Therefore, provided that the use of proposed dust control measures and containment and suppression measures are implemented and managed, there would be no adverse impacts expected to arise.

Please feel free to contact us if you would like to clarify any aspect of this report.

Yours faithfully,
Todoroski Air Sciences

Philip Henschke

References

Bureau of Meteorology (2018)

Climate Averages Australia, Bureau of Meteorology website, accessed June 2018. <http://www.bom.gov.au/climate/averages>

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"Western Rail Coal Unloader Environmental Assessment" prepared for Delta Electricity by Sinclair Knight Merz, April 2007.