Submitter No.	355	Issue Reference:	12000
Submitter Type	Individuals	TOR Category	Air Quality
Name	Names withheld	Relevant EIS Section	

DETAILS OF THE ISSUE

What happens to households who are impacted by coal dust past the buffer zone?

PROPONENT RESPONSE

Particulate matter from the coal mine will be continuously monitored. A reactive dust management plan will be prepared once the mine is operational that describes actions that must be taken when high dust levels are monitored near the mine boundary and at the closest sensitive receptors.

Management of dust impacts at sensitive receptors that are closer to the mine will ensure that air quality impacts experienced at residences further away will always be managed to acceptable levels.

Please refer to the response to Issue Reference 12014 for further detail on avoidance strategies proposed for sensitive receptors. More detail on the proposed air quality monitoring plan is provided in the response to Issue Reference 12026.

Submitter No.	443	Issue Reference:	12001
Submitter Type	Individual	TOR Category	Air Quality
Name	Name withheld	Relevant EIS Section	

DETAILS OF THE ISSUE

Impact of dust on people and cattle due to construction of rail line.

PROPONENT RESPONSE

Air emissions during the construction phase of the rail corridor will be primarily dust related, with some minor emissions of combustion pollutants such as nitrogen oxides due to diesel and petrol vehicles and construction equipment.

The sources of dust emission include:

- clearing of vegetation and topsoil
- excavation and transport of earth material
- blasting
- vehicles travelling on unpaved roads
- vehicles and machinery exhausts, and
- activities from temporary hard rock and gravel quarries situated along the alignment.

The impacts of dust emissions fall under two distinct categories, health and amenity.

Potential health impacts are attributable to the concentration of respirable particles in ambient air. Respirable particles of dust have an aerodynamic equivalent diameter of 10 microns or less and are otherwise known as PM_{10} with a finer fraction of $PM_{2.5}$ (an important subset of PM_{10}).

Maximum impact from PM_{10} emissions occur under light winds and stable atmospheric conditions, when atmospheric dispersion is poor. These conditions occur most frequently overnight and early in the morning. As the rail construction is restricted to daylight hours, these conditions usually occur outside periods of construction activity. Amenity impacts relate to visible dust plumes as well as deposition on buildings and materials. Amenity issues due to particulate matter emissions are associated with larger particles above 10μm as particles in this size range deposit out of the atmosphere in the vicinity of the point of emission.

The potential for air quality impact is greatest at receptors located at the edge of the rail corridor or at construction areas with the level of impact decreasing with distance from the construction areas.

Based on previous experience with similar construction projects, dust related impacts are unlikely to be significant at distances greater than 500m from the source. Enhanced mitigation measures may be required where sensitive receptors occur within 500m of the alignment, and particularly where sensitive receptors occur within 100m of the alignment.

There are two residential receptors within 500m of the alignment, with one located 70m from the proposed rail line (Receptor 4) and the other located between 400 and 500m from the proposed rail line (Receptor 5) (see Volume 5 Appendices, Appendix 18 *Air Quality Assessment*, Section 3.4.2.2 of the original EIS).

Without mitigation, both of these receptors may be adversely affected by dust levels, particularly from an amenity point of view. Health related impacts are unlikely given the relatively short term nature of construction activities in the vicinity of individual receptors.

Dust emissions during construction will be mitigated and managed by implementing the following strategies:

- Water sprays on unsealed roads
- Restricting vehicle speeds on unsealed haul roads to reduce dust generation (50km/hr)
- Minimising haul distances between construction sites to spoil stockpiles
- Treating or covering stockpiled material to prevent wind erosion
- Regularly cleaning machinery and vehicle tyres to prevent wheel entrained dust emissions
- Routing roads away from sensitive receptors wherever practical
- Minimise topsoil and vegetation removal and revegetate disturbed areas as soon as possible, and
- Ongoing visual monitoring of dust on a daily basis, with ramping down of activities in the instance of high dust emissions.

These strategies have been adapted from the dust management plan detailed in the Queensland Rail's Moura Link – Aldoga Rail Project Environmental Impact Assessment, which was approved in 2009, and will be incorporated into the Galilee Coal Project's Environmental Management Plan.

Enhanced mitigation measures to further reduce construction dust in areas of heightened sensitivity include:

- Reducing vehicle speeds on unpaved roads further in areas close to sensitive receptors (e.g. 30Km/hr), and
- Minimising soil stockpiles in areas close to sensitive receptors.

A line of communication will be established between the construction contractor and the local community prior to the start of construction as part of a complaints management system. All complaints lodged by nearby residents will be recorded on a complaints register, which will also document the investigation into the source of the emission giving rise to the complaint, as well as any corrective actions taken to rectify the cause of complaint.

SUBMITTER NO.	877	ISSUE REFERENCE:	12002
SUBMITTER TYPE	Individual	TOR CATEGORY	Air Quality
NAME	Name withheld	RELEVANT EIS SECTION	

DETAILS OF THE ISSUE

Water used to manage dust and the consequences of using saline water for this are also significant yet are not adequately explained or managed.

PROPONENT RESPONSE

Details of water usage for unpaved road dust suppression are provided in the response to Issue Reference 12008.

SUBMITTER NO.	417	ISSUE REFERENCE:	12003
SUBMITTER TYPE	Council	TOR CATEGORY	Air Quality
NAME	Isaac Regional Council	RELEVANT EIS SECTION	

DETAILS OF THE ISSUE

The mining operation shall not emit particulate dust contamination levels beyond the mining tenement lease above the existing pre-development background levels measured at the property boundary as the proposed operations cumulative effect will affect the health and wellbeing amenity of surrounding rural residents and is unsustainable without long term adverse effects on health and amenity. The reduction in dust emissions shall be focused on industry best practice by enclosing all the operational components of the mine including wash plant, crushing plants and conveyors to reduce dust inputs into the environment. A real time, on line integrated monitoring system of high volume air sampling and dust deposition will need to be established to ensure a scientific approach to the protection of human beings within the Region.

PROPONENT RESPONSE

Galilee Coal Project is committed to use industry best practice techniques to reduce dust emissions from the site. An extensive list of best practices were identified in the "*NSW Coal Mining Benchmarking Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining*", published in 2011[1] after the EIS Galilee Coal Project. The lists have been examined and many will be adopted. The priority is to control emissions from major sources.

The EIS has identified the major sources of PM_{10} emissions from the mine:

- Draglines contribute 38% of emissions
- Hauling overburden and coal contribute 15% of emissions, and
- Wind erosion of exposed area contributes 21% of emissions (the total contribution of the three sources are 74%).

The best practice control methods to minimise emissions adopted in the EIS include:

- "Level-2" watering of haul roads. The default rate for Level-2 road watering suggested in the NPI EET Manual for Mining is > 2 litres per square metre per hour
- Using large capacity trucks to haul overburden and coal. Using larger capacity haul trucks reduces the required kilometres to be travelled to transport the same amount of coal
- Using speed limits on haul roads

1 Katestone Environmental (2011) *NSW Coal Mining Benchmarking Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining*, Prepared for Office of Environment & Heritage NSW, Sydney, NSW, Australia.

- Water sprays at primary, secondary and tertiary sizing station stockpiles
- Enclosing conveyor systems
- Underground loading of coal at the preparation and preparation facilities
- Using a wet process for the coal handling facility, and
- Ongoing revegetation of stripped areas in the open-cut mine pits.

The additional best practices will be adopted. They are listed below, but note that they are not the complete list and further measures may be identified in the Dust Management Plan for the Mine.

For the draglines:

- Reduce dropping height of draglines from 33m to 6m
- Modify operations during adverse atmospheric and meteorological conditions
- Water sprays, and
- Eliminate side casting.

For the haul roads:

- Design haul roads to have a less erodible surface, such as using materials with a lower silt content. For example, adding gravel or slag in the construction material
- Haul roads that are redundant should be shut down and revegetated as soon as practical, and
- Chemical suppressants and paving may be used for semi-permanent haul roads (not for in-pit haul road)

For the exposed surfaces:

- Minimise pre-strip to a maximum of one block ahead
- Maximise rehabilitation works
- If exposed area is a potential source of particulate matter emissions and is likely to be exposed for more than three months, revegetation will take place
- Strategic use of watering, suppressants and hydraulic mulch seeding to minimise emissions of particulate matter depending on circumstances, and
- Pave areas where practical around offices, carparks, maintenance and storage areas.

A preliminary air quality monitoring plan incorporating high volume air sampling, dust deposition and meteorology monitoring is presented in the response to Issue Reference 12026.

Submitter No.	**420**	Issue Reference:	**12004 / 19001 / 17007**
Submitter Type	Government	TOR Category	**Air Quality**
Name	**Queensland Health (Health Protection Directorate)**	Relevant EIS Section	Vol 3 Chapter 10, (Railway)

DETAILS OF THE ISSUE

The proponent has satisfactorily demonstrated that air emissions from the railway would satisfy the requirements stipulated within the Environmental Protection (Air) Policy 2009, if appropriate mitigation measures are undertaken (as described within s10.2.4.2). The proponent however, within s10.4, has not adequately committed to undertaking such mitigation measures.

The proponent must commit to the appropriate mitigation measures which will ensure that air emissions generated by trains along the specified route, will be below the goals specified by Environmental Protection (Air) Policy 2009.

PROPONENT RESPONSE

In addition to the commitments presented in Section 10.4 of the EIS, Waratah Coal commits to the following dust control measures:

- Waratah Coal proposes to use tippler wagons (gondola) rather than the more traditional bottom dump coal wagons. With the use of tippler wagons, coal hang-up should be negligible or eliminated. Bottom dump wagons are more frequently associated with coal hang up, particularly in wet weather, and
- In addition to the tippler wagons, Waratah Coal's solution to mitigation of coal dust is to provide a cover to the top of the wagons. It is intended these covers will be made of fibreglass. These covers have been proven in service, operating in conditions ranging from –40°C to +40°C. The railcar cover system meets the criteria for a "closed transport vehicle" specified in the United States Code of Federation Regulations (CFR), Title 49, Transportation (Subsection 173.403(c)).

In addition to significantly reducing coal dust, these commitments provide:

- Reduction in emissions from fuel consumption as using covers provides better train aerodynamics, which reduces fuel consumption, and associated emissions
- Elimination of the need to use chemicals for veneering, and
- Elimination of the need for more than 50 million litres of water required to apply the chemical veneering.

Submitter No.	419	Issue Reference:	12005
Submitter Type	Government	TOR Category	Air Quality
Name	DERM	Relevant EIS Section	Volume 5 – Appendix 18: Air Quality Assessment, The Mine Site, Section 2.2.3, Emission Estimation Methods

DETAILS OF THE ISSUE

$PM_{2.5}$ emissions from diesel powered equipments and vehicles are not considered. Fine fugitive dust such as $PM_{2.5}$ is expected to be released from the mining activities. In the EIS $PM_{2.5}$ concentrations are estimated assuming a PM_{10} to $PM_{2.5}$ ratio of 100:12.5. According to the data published by Australian NPI, diesel combustion is a major source of $PM_{2.5}$ emissions in the coal mining industries. It is reported as the second highest source of $PM_{2.5}$ emissions in the industrial sector.

$PM_{2.5}$ emissions from the combustion of diesel powered mining equipments and vehicles are not considered in the EIS.

PROPONENT RESPONSE

Exhaust $PM_{2.5}$ emissions have been estimated using the estimated fuel consumption of diesel for the mine of 4,449,656GJ per year. Using the energy content of diesel fuel of 38.6MJ per litre, this equates to a total diesel consumption figure of 115,276kL/year. Using the NPI emission factor for miscellaneous industrial diesel vehicles of 0.0033kg/litre this results in an estimated emission of 380,411kg/year.

This has been included in the revised air quality model. Refer to the response to Issue Reference 12018 for further details.

Submitter No.	419	Issue Reference:	12006
Submitter Type	Government	TOR Category	Air Quality
Name	DERM	Relevant EIS Section	Volume 5 – Appendix 18: Air Quality Assessment, The Mine Site, s2.2.3, Emission Estimation Methods

DETAILS OF THE ISSUE

The air emission factors adopted by the proponent are inappropriate. The wind generated dust (wind erosion) emission factors from the stockpiles and exposed surface areas are provided in Table 2.2 of the EIS. According to the table the emission factors were sourced from USEPA AP-42 and NPI. It appears from the table that default constant emission factors were adopted for this study. The wind generated emission factors for TSP, PM_{10} and $PM_{2.5}$ are a function of wind speed, surface conditions and moisture contents. These are generally calculated by incorporating the wind speed in the emission factors. Similarly for wheel generated dust from the unpaved roads (a major emission source), the emission factor is a function of vehicle gross weight, silt content of road material and average vehicle speed. In a recent study on the evaluation of fugitive particulate matter emission estimation techniques, SKM (2005) recommended not to use the default emission factors in the NPI Mining Manual (2001). See the following document *http://www.npi.gov.au/publications/emission–estimation–technique/pubs/pm10may05.pdf.* Therefore, the adopted emission factors do not represent the best practice.

The EIS should apply appropriate emission factors based on best practice and modify the emission inventory in order to determine the impacts on the receiving environment.

PROPONENT RESPONSE

Wind Erosion

Emissions from wind erosion were estimated using the emission factors presented in Table 1.

Table 1: Summary of emission factors for wind erosion

Operation/Activity	Activity Data Required	Pollutant	Emission Factor [a]	Units	Default/Calculated
Wind erosion of exposed areas[d]	exposed area and total hours exposed	TSP	850	kg/ha/y	Default for overburden
		PM_{10}	425	kg/ha/y	
Wind erosion	exposed area and total hours exposed	TSP	0.4	kg/ha/h	Default
		PM_{10}	0.2	kg/ha/h	

a All emission factors sourced from *National Pollutant Inventory (NPI) Emissions Estimation Manual (EET) for Mining* v2.3 (2004), except where otherwise noted.

b,c,d Emission factors sourced from USEPA AP-42 – *Compilation of Air Pollutant Emission Factors*, Fifth Edition, Volume 1 (Chapter 11 for Western Surface Coal Mining).

In order to convert the emission factors to emission rates required by the CALPUFF model, emissions from wind erosion were related to wind speed using the well known cubic relationship. The cubic relationship of wind erosion rates to wind speed is based on the assumption that wind erosion is linearly related to the energy in the wind. There is a cubic relationship between wind energy and wind speed (Lyles, 1988)[2].

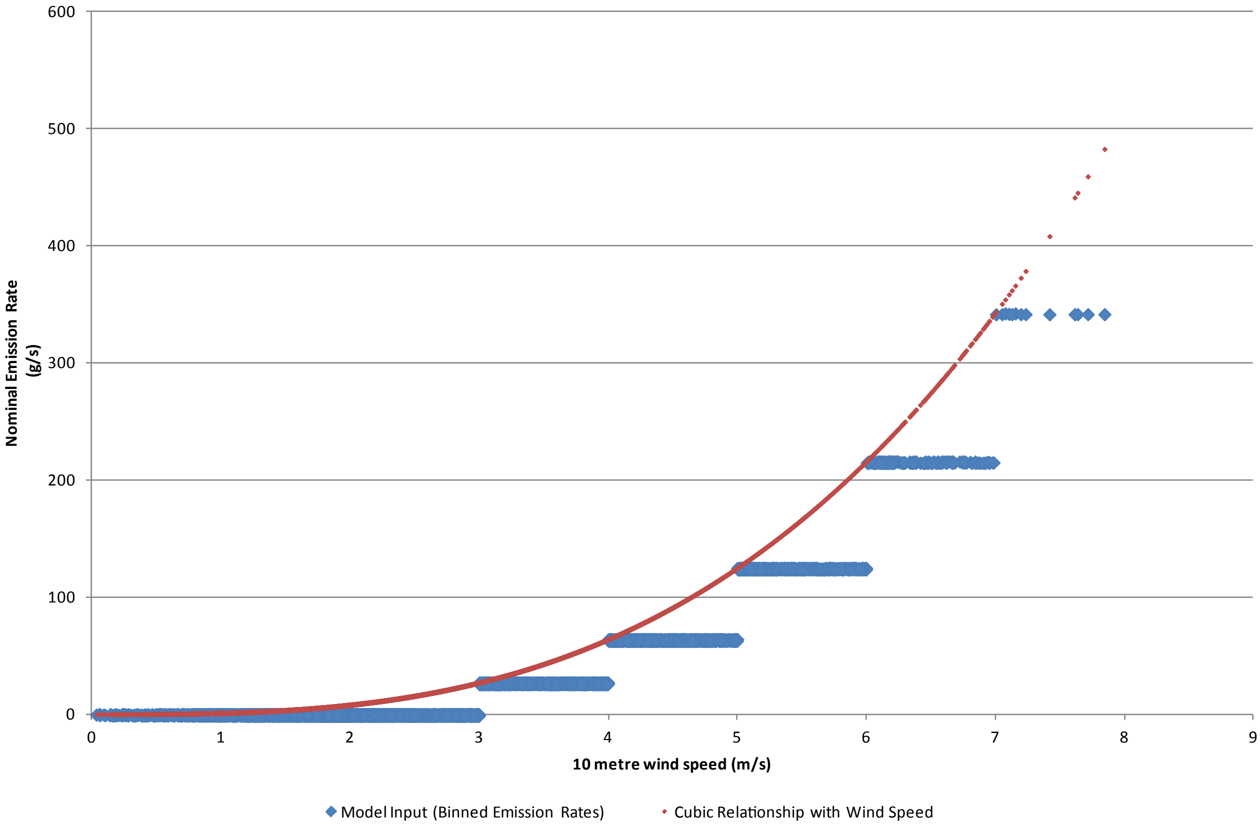
2 Lyles, L (1988) *The Basics of Wind Erosion, Agriculture, Ecosystems and Environment*, 22/23 (1988) 91–101 Elsevier Science Publishers B.V., Amsterdam.

The friction threshold velocity (wind velocity at which dust liftoff occurs) was set at 3.09m/s (at the 10m height). In order to input the cubic relationship into the model, emission rates were "binned" in three separate emission rate categories according to wind speed as follows:

- Wind speed below 3m/s – emission rates of 0
- Wind speed greater than 3m/s and less than 4m/s – equivalent wind speed of 3m/s
- Wind speed greater than 4m/s and less than 5m/s – equivalent wind speed 4m/s
- Wind speed greater than 5m/s and less than 6m/s – equivalent wind speed of 5m/s
- Wind speed greater than 6m/s and less than 7m/s – equivalent wind speed of 6m/s, and
- Wind speed greater than 7m/s – equivalent wind speed of 7m/s.

The cubic relationship between wind erosion and the 'emission bins' used in the air quality modelling is shown in The cubic relationship between wind erosion and the 'emission bins' used in the air quality modelling is shown in Figure 1.

Figure 1: Wind erosion emission rates used in the air quality modelling



Wheel Generated Dust

Emissions from wheel generated dust were estimated using the emission factors presented in Emissions from wheel generated dust were estimated using the emission factors presented in Table 2.

Table 2: Summary of emission factors for wheel generated dust

Operation/Activity	Activity Data Required	Pollutant	Emission Factor a	Units	Default/ Calculated
Unpaved roads	total VKT	TSP	3.88	kg/VKT	Default
		PM_{10}	0.96	kg/VKT	

The emission factors were sourced the NPI EET Manual for Mining v2.3 (Environment Australia, 2001)[3]. The Mining Manual was updated in 2011 and subsequently the emission estimation technique from the USEPA AP-42 has been adopted as follows:

$$EF_{TSP} = 0.2819 \times \left(4.9 \times \left(\frac{s}{12} \right)^{0.7} \times \left(\frac{(W \times 1.1023)}{3} \right)^{0.45} \right)$$

where:

EF_{TSP}	=	Uncontrolled TSP emission factor for wheel generated dust on unpaved roads	(kg/km)
s	=	Silt content of road surface	(%)
W	=	Average weight of vehicles travelling on the haul road	(tonnes/vehicle)

Using an average weight for a haul truck of 275 tonnes and a silt content of 4% for a coal mining haul road (as per Hancock Prospecting, 2010[4]), the uncontrolled TSP emission factor is 5.1kg per kilometre.

The USEPA equation for unpaved road emissions was developed for vehicles travelling at an average speed of 45 miles per hour (72km/h) (USEPA, 2006[5]; WRAP, 2007[6]). Mining trucks used on site will travel at a maximum average speed of 55km/h. It is noted that the top speed for a CAT 793F (payload capacity of 227 tonnes) when fully loaded is 60km/h (Caterpillar, 2012[7]). Therefore, using an average speed of 55km/h is considered conservative. Emissions from wheel generated dust are linearly related to vehicle speed. Therefore a speed corrected emission factor for wheel generated dust can be calculated as follows (USEPA, 2006; WRAP, 2006):

$$CEF_{TSP} = EF_{TSP} \times \left(1 - \left(\frac{(72 - S)}{72} \right) \right)$$

where:

CEF_{TSP}	=	Speed corrected emission factor for wheel generated dust	(kg/km)
EF_{TSP}	=	Uncontrolled TSP emission factor for wheel generated dust on unpaved roads	(kg/km)
S	=	Average speed of vehicles travelling on the haul road	(tonnes/vehicle)

3 Environment Australia (2001), *NPI EET Manual for Mining Version 2.3*, Environment Australia, Canberra, Australia.

4 Hancock Prospecting (2010). *Air Quality Assessment, Alpha Coal Project Mine*. 18 September 2010

5 USEPA (2006a), *AP 42*, Fifth Edition, Volume 1, Chapter 13: Miscellaneous Sources, 13.2.2 Unpaved Roads, Technology Transfer Network, Clearinghouse for Inventories & Emission Factors, United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC 27711, USA.

6 WRAP (2006) *Fugitive Dust Handbook*, Western Regional Air Partnership, Western Governors' Association 1515 Cleveland Place, Suite 200, Denver, Colorado 80202. *http://www.wrapair.org/forums/dejf/fdh/index.html*

7 Caterpillar (2012) *Engine Specification Sheet for CAT 793F Mining Truck*, Caterpillar, Australia. *http://australia.cat.com/cda/layout?m=413186&x=7*

Therefore, the uncontrolled (before road watering) TSP emission factor is 3.9 kg/km. This compares well with the default emission factor used in the air quality assessment and shows that the default emission factor used in the assessment incorporates vehicle weight, road surface silt content and vehicle speed and is therefore in line with best practice.

Submitter No.	419	Issue Reference:	12007
Submitter Type	Government	TOR Category	Air Quality
Name	DERM	Relevant EIS Section	2.2.3.6

DETAILS OF THE ISSUE

Dust emission factors are provided in Table 2.2 and total dust emissions are summarised in Table 2.3. However, it does not appear that all potential sources were considered in the development of the emissions inventory. Potential dust emission sources not listed in the tables include: the primary crusher, and secondary sizing and tertiary sizing equipment (see Section 2.2.3.6). These emission sources are not modelled for impact assessment.

The EIS should include estimates of likely air emissions and include these in air dispersion modelling calculations.

PROPONENT RESPONSE

In the initial air quality assessment emissions from primary crushing, secondary sizing and tertiary sizing were not specifically estimated. This assumption was based on data from the NPI EET Manual for Mining v2.3 which states that emissions from primary and secondary crushing contribute very little to overall particulate matter emissions at typical coal mines (Appendix A1.1.13), and as such, treating the primary crusher and secondary and tertiary sizing stations as 'miscellaneous' transfer points was considered to sufficiently cover their emissions.

A method for estimating emissions from coal crushers and screens (primary, secondary and tertiary) is presented in USEPA AP42 Chapter 12.2 Coke Production (USEPA, 2008). This chapter describes how emissions from coal crushers and screens can be estimated using the emission factors detailed in USEPA AP-42 Chapter 11.19 Crushed Stone Processing and Pulverized Mineral Processing (USEPA, 2004). (i.e. "emissions from material transfers between conveyors and from screening and crushing operations that are controlled by wet suppression techniques can be estimated using the procedures in Section 11.19.2" (USEPA, 2008).

Using the USEPA emission factors for coal crushing and screening, emissions are estimated using the following equation:

$$EF_i = A \times EF_i$$

where:

E_i	=	Emission rate of pollutant i	(kg/a)
A	=	Amount of coal handled	(tonnes/a)
EF_i	=	Emission factor for pollutant i	(kg/tonne)

Additional emissions, estimated using the USEPA method are summarised in Table 3.

Table 3: Additional emissions from crushing and screening processes

Location	Activity	Activity data		Emission factors			Emissions (kg/annum)	
		Value	Units	TSP	PM_{10}	Units	TSP	PM_{10}
OCM sizing station	Primary crushing	20,000,000	tonnes/a	0.0006	0.00027	kg/tonne	12,000	5,400
	Screen (primary)	20,000,000	tonnes/a	0.0011	0.00037	kg/tonne	22,000	7,400
	Secondary crusher	20,000,000	tonnes/a	0.0006	0.00027	kg/tonne	12,000	5,400
	Screen (secondary)	20,000,000	tonnes/a	0.0011	0.00037	kg/tonne	22,000	7,400
	Tertiary crusher	20,000,000	tonnes/a	0.0006	0.00027	kg/tonne	12,000	5,400
	Screen (tertiary)	20,000,000	tonnes/a	0.0011	0.00037	kg/tonne	22,000	7,400
UGM sizing station	Secondary crusher	36,000,000	tonnes/a	0.0006	0.00027	kg/tonne	21,600	9,720
	Screen (secondary)	36,000,000	tonnes/a	0.0011	0.00037	kg/tonne	39,600	13,320
	Tertiary crusher	36,000,000	tonnes/a	0.0006	0.00027	kg/tonne	21,600	9,720
	Screen (tertiary)	36,000,000	tonnes/a	0.0011	0.00037	kg/tonne	39,600	13,320
Total							224,400	84,480

This represents an increase in site emissions of 2% for both TSP and PM_{10}.

This additional emission source was included in the revised air quality model presented in the response to Issue Reference 12018.

Submitter No.	419	Issue Reference:	12008 / 17004 / 6001
Submitter Type	Government	TOR Category	Air Quality
Name	DERM	Relevant EIS Section	Section 2.2.3.2, Waste Transport and Dumping and Section 2.2.3.5, Haul Roads

DETAILS OF THE ISSUE

It is unclear how the dust control target of 75% can be achieved. The EIS describes how dust emissions from waste dump areas and haul roads would be reduced by 75%. It is proposed that this would be achieved by Level 2 watering of haul roads. According to Section 12.4.1 of "*NSW Coal Mining Benchmarking Study, 2011*", the Level 2 watering (greater than 2 L/m^2/hour watering) can achieve 75% control of dust emissions while Level 1 watering (2 L/m^2/hour watering) can achieve 50% control of dust emissions.

The EIS should clarify how the predicted 75% level of dust control of from haul roads would be achieved and how dust control water will be supplied. The EIS should also discuss how best practice dust control measures were considered in selecting the vehicles.

PROPONENT RESPONSE

Waratah Coal will use a dust management plan to control emissions and to mitigate impacts surrounding the mine once the mine is operational. The dust management plan will incorporate best practice measures to reduce emissions from wheel generated dust on haul roads. These measures will include road watering to suppress dust emissions equivalent to an efficiency of 75%.

The haul road dust control efficiency will be achieved by using road watering rates that are calculated to achieve at least 75% emission control. Level 2 watering control as quoted in Section 12.4.1 of "*NSW Coal Mining Benchmarking Study, 2011*" was sourced from the "*NPI EET Manual for Mining*" and is quoted as a watering rate of >2 L/m²/hour. The basis for the Level 2 control efficiency presented in the *NPI EET Manual for Mining i*s the following equation from the *Air Pollution Engineering Manual* (Bunicore and Davis, 1992[8])::

$$C = 100 - \frac{0.8pdt}{i}$$

where:

C	=	Control efficiency for road watering	(%)
p	=	Hourly daytime evaporation rate	(mm/hour)
d	=	Average hourly daytime traffic	(number of vehicles per hour)
t	=	Time between applications	(hours)
i	=	Application intensity	(L/m²)

In the maximum production year, Year 19, there are eight internal roads used for hauling material overburden and ROM coal as listed in Table 4.

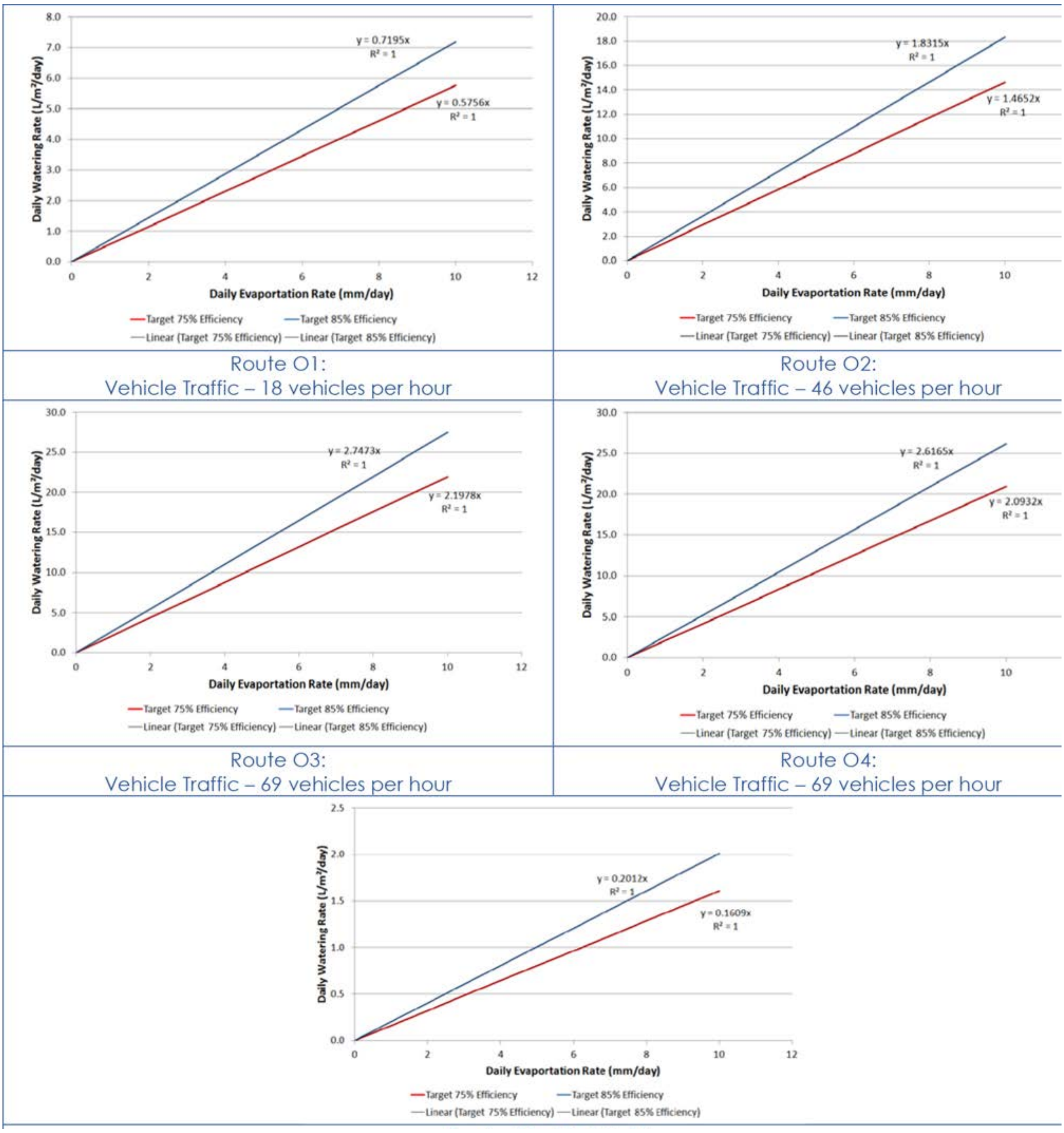
Table 4: Unpaved haul roads requiring dust suppression

Trip	Route	Length (km)	Material Transported (tpa)	Capacity (t)	Average hourly Vehicle Rate (vehicles/hour)	Width (m)	Area (m²)
Overburden to reject stockpile	O1	3	28,600,000	363	18	22	66,000
	O2	3	72,800,000	363	46	22	66,000
	O3	3	109,200,000	363	69	22	66,000
	O4	3	104,000,000	363	65	22	66,000
ROM coal to ROM sizing	C1	8.5	5,000,000	227	5	22	187,000
	C2	6	5,000,000	227	5	22	132,000
	C3	10.5	5,000,000	227	5	22	231,000
	C4	7.5	5,000,000	227	5	22	165,000
O1 – 4 refers to the four routes taken by overburden trucks to transport overburden to the reject stockpile C1 – 4 refers to the four routes taken to transport coal from the dragline to TOM sizing stations							

Using the relationship between control efficiency, water application intensity/frequency, vehicle traffic and evaporation rate, presented in the *Air Pollution Engineering Manual*, relationships between road watering rates and vehicle traffic were derived for a target emission control efficiency of 75% minimum control efficiency. The derived relationships are provided in Figure 2. To ensure that a minimum control efficiency of 75% would be achieved and that water requirements would not be underestimated, relationships were also derived for a theoretical 80% control efficiency.

8 Bunicore and Davis (1992) *Air Pollution Engineering Manual*, Air and Waste Management Association, Van Nostrand Reinhold, New York, U.S.A.

Figure 2: Relationships between required watering rates and each unpaved route (year 19)

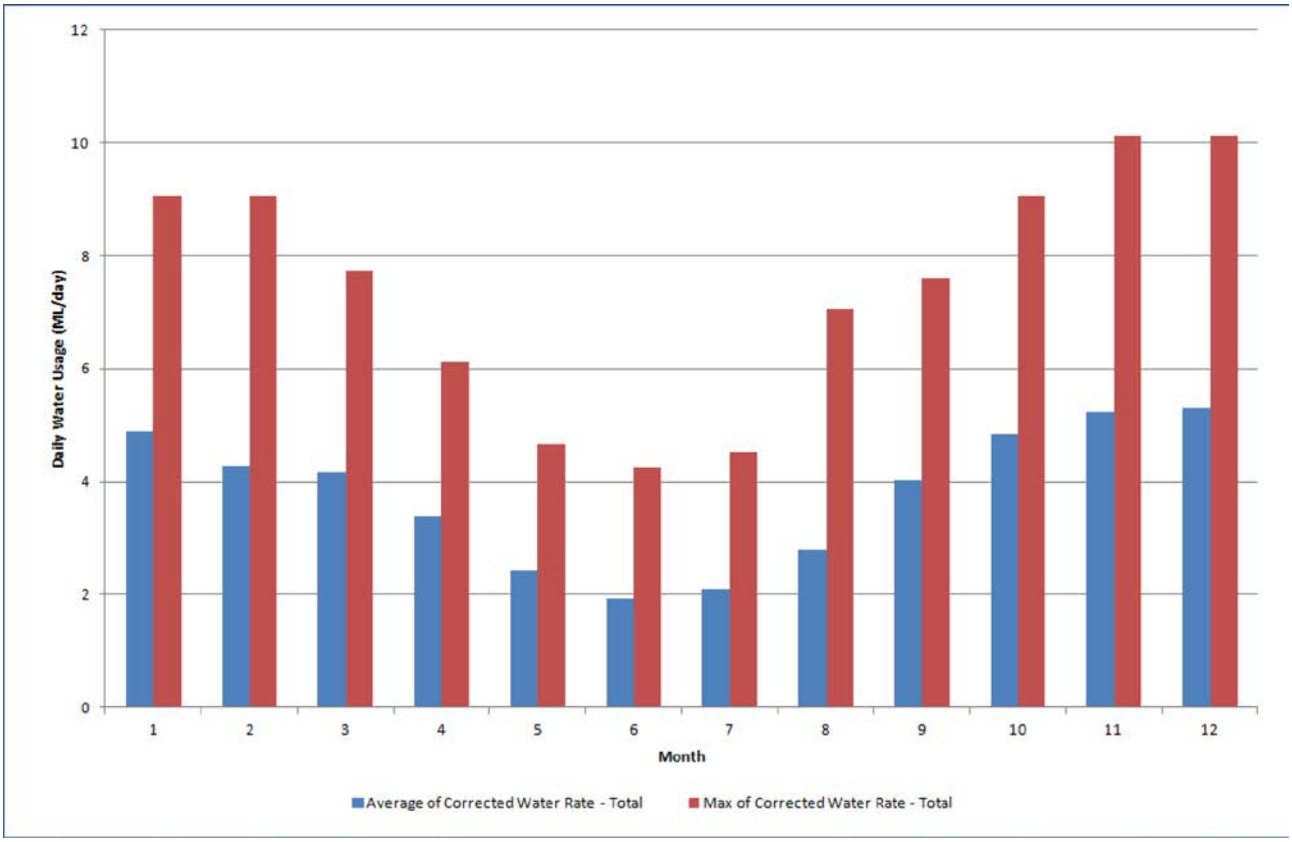


Meteorological data for the period January 1889 to November 2011 from the weather station located at Alpha Post Office were sourced. Daily evaporation rates and rainfall rates were taken from the long-term meteorological data set to estimate road watering requirements for each haul route.

The analysis shows that rate of road watering to achieve specific dust suppression control efficiencies is not constant and is dependent on the daily evaporation rate and rainfall rates experienced on the site as well as the daily traffic occurring on the haul road.

An example of calculated daily average and maximum road watering rates for the site are provided in Figure 3.

Figure 3: Calculated Daily Average and Maximum Road Watering Rates (Control Efficiency = 80%)



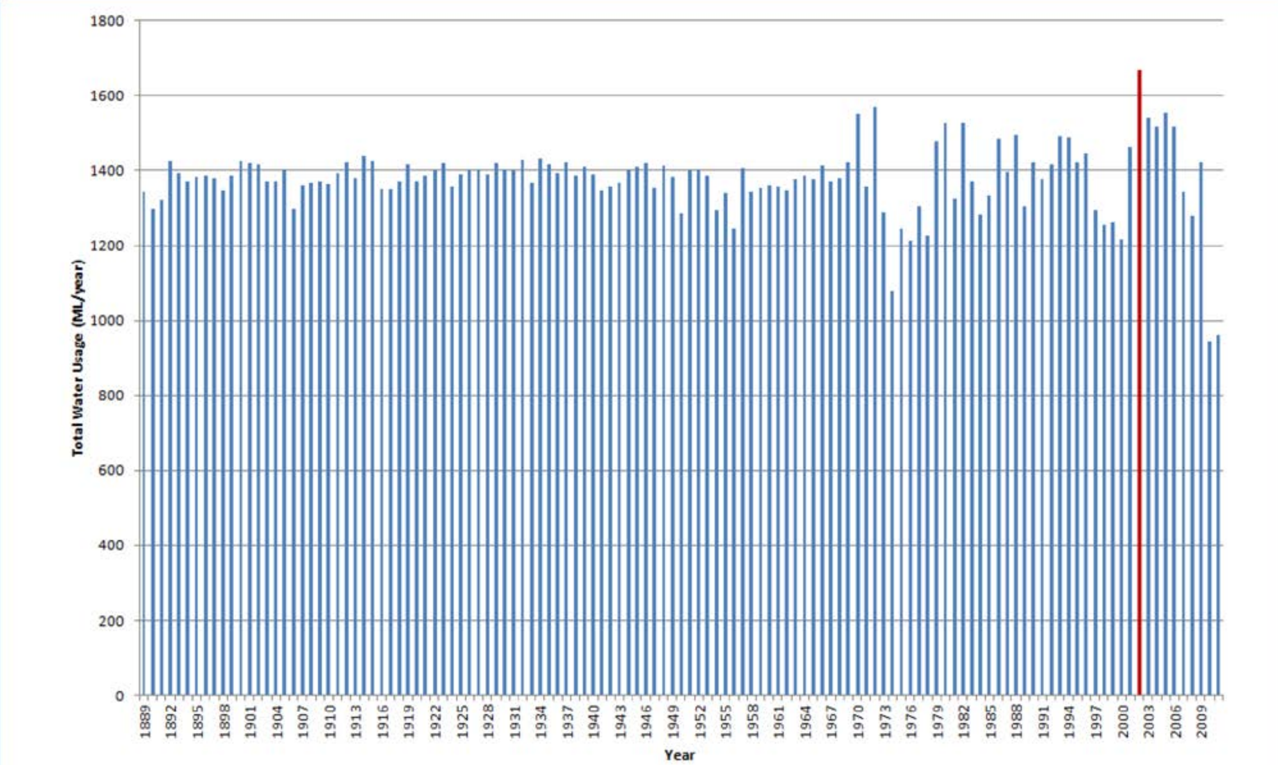
Calculated road watering rates for the Galilee Coal Project for Year 19 operations are provided in Table 5 for design control efficiencies of 75% and 80%.

Based on a conservative target control efficiency of 80%, the maximum calculated water required annually for dust suppression is calculated to be approximately 1,700ML per year. This watering rate is based on the worst case year from over 120 years of meteorological data (see Figure 4) and is therefore considered conservative.

Table 5: Calculated Road Watering Rates to Achieve the Required Dust Suppression Control Efficiency

Haul Road Parameters	Target Control Efficiency (%)	Overburden to reject stockpile – (D1)	Overburden to reject stockpile – (D2)	Overburden to reject stockpile – (D3)	Overburden to reject stockpile – (D4)	ROM coal to ROM sizing (HR1)	ROM coal to ROM sizing (HR2)	ROM coal to ROM sizing – (HR3)	ROM coal to ROM sizing – (HR4)	Totals
Total Length (km)	NA	3.00	3.00	3.00	3.00	8.50	6	10.5	7.5	**44.50**
Watered Road Width (m)	NA	22	22	22	22	22	22	22	22	
Total Area (m^2)	NA	66,000	66,000	66,000	66,000	187,000	132,000	231,000	165,000	**979,000**
Average Daily Dust Suppression (ML/d)	75	0.21	0.55	0.83	0.79	0.16	0.11	0.20	0.14	**3.00**
Average Annual Dust Suppression (ML/annum)	75	76.41	200.21	304.53	289.56	59.10	41.72	73.00	52.14	**1,097**
Maximum Daily Dust Suppression (ML/day)	75	0.58	1.47	2.2	2.10	0.46	0.32	0.56	0.40	**8.1**
Maximum Annual Dust Suppression (ML/annum)	75	93	242	367	349	72	51	89	64	**1,329**
Average Daily Dust Suppression (ML/d)	80	0.26	0.69	1.05	1.00	0.20	0.14	0.25	0.18	**3.78**
Average Annual Dust Suppression (ML/annum)	80	96.1	252.2	383.6	364.7	74.1	52.3	91.5	65.4	**1,380**
Maximum Daily Dust Suppression (ML/day)	80	0.72	1.84	2.76	2.62	0.57	0.40	0.71	0.50	**10.13**
Maximum Annual Dust Suppression (ML/annum)	80	117.2	304.7	461.2	438.8	90.8	64.1	112.1	80.1	**1,669**

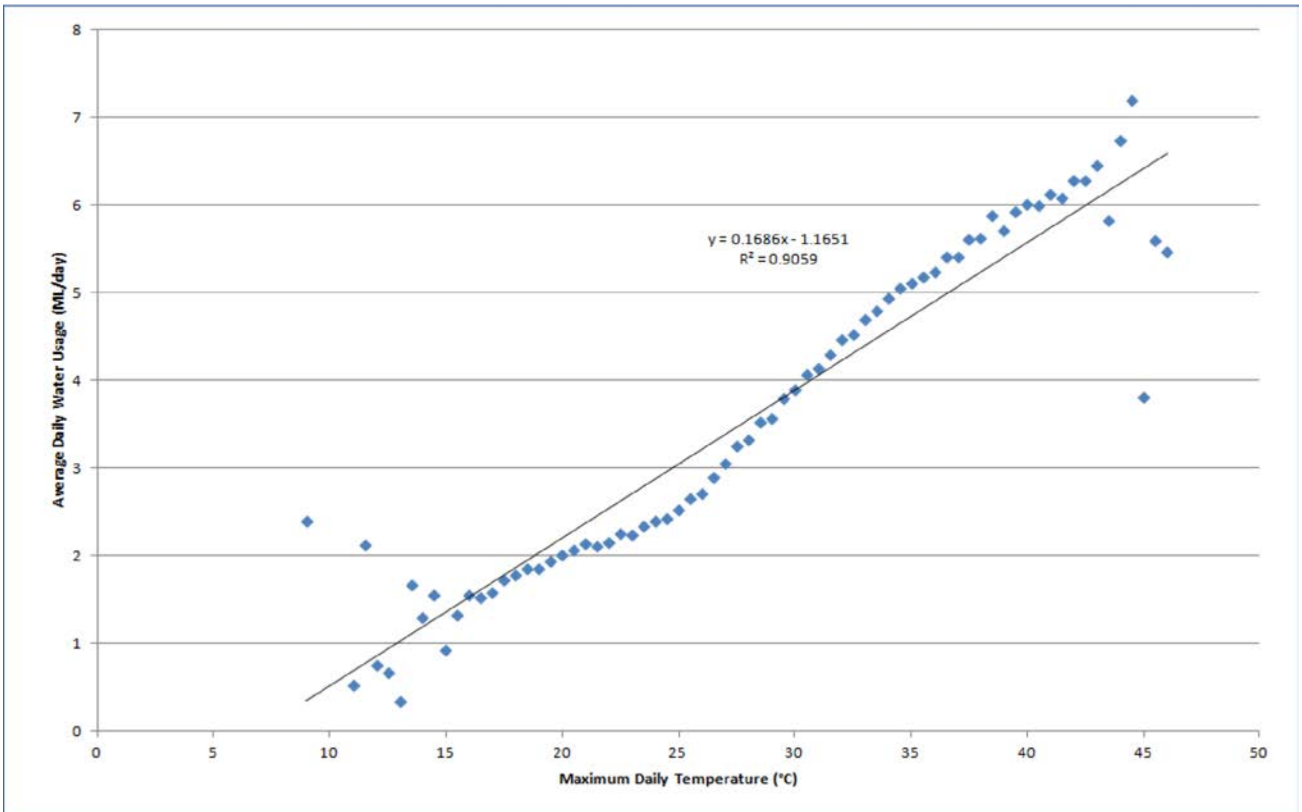
Figure 4: Estimated Annual Road Watering Rates (80% control efficiency)



(red line shows the maximum annual water requirement)

Further analysis of the data shows that the daily road watering rate can be linked to maximum daily temperature. The derived relationship between daily road watering rates and maximum daily temperature is shown in Figure 5. This relationship could be effectively incorporated into the dust management plan in order to ensure that the dust suppression control efficiency due to road watering is maintained at levels greater than 75% control efficiency at all times.

Figure 5: Relationship between daily water usage and maximum daily temperature



Submitter No.	419	Issue Reference:	12009a / 17005 / 6002
Submitter Type	Government	TOR Category	**Air Quality**
Name	**DERM**	Relevant EIS Section	Sections 2.2.5.1, Model Description and Configuration

DETAILS OF THE ISSUE

The most cost-effective dust control measure is the utilisation of larger-capacity vehicles, which can also produce operational cost savings due to the reduction in the number of vehicle trips required. The use of conveyors in place of haul roads can also help reduce dust emissions. It is not clear that the above best practice control measures have been considered in selecting the vehicles fleet and designing the mining activities for the site.

PROPONENT RESPONSE

The proposed haul trucks are Caterpillar 793 and Caterpillar 797. The Caterpillar 793 has a payload capacity of 227 tonnes and Caterpillar 797F has a payload capacity of 363 tonnes. These are some of the largest haul trucks available. The Caterpillar 797F is the largest haul truck manufactured by Caterpillar. The haul trucks proposed for the Galilee Coal Project are some of the largest available. Therefore, wheel generated dust is controlled using best practice techniques as described in the report: *NSW Coal Mining Benchmarking Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining* (Katestone Environmental, 2011)[9].

Coal conveyors are used to transport coal from the ROM stockpiles to the coal handling and preparation plant.

Submitter No.	419	Issue Reference:	12009b
Submitter Type	Government	TOR Category	**Air Quality**
Name	**DERM**	Relevant EIS Section	Sections 2.2.5.1, Model Description and Configuration

DETAILS OF THE ISSUE

It is unclear from the EIS documentation how emission sources were modelled using CALPUFF. According to Section 4.2.5, all air emissions from the coal terminal were modelled as a series of volume sources. The selection of the height for volume sources and the sensitivity of this in predicting ground level contaminant concentrations should also be explained.

The EIS should clarify how volume sources were modelled and provide a justification for the selection of heights for the volume sources. The EIS should also explain the sensitivity of the volume source height in the prediction of ground level concentrations.

PROPONENT RESPONSE

For the Galilee Coal Mine, emissions were modelled in the EIS as either volume, area, or point sources.

The point sources were only used to model emissions from the underground mine vents. The source characteristics from other underground mines were used.

To model coal mine activities, both volume and area sources were commonly used. In–house sensitive testing has shown that CALPUFF model results are not sensitive to the choice of volume or area sources if CALPUFF runs in

9 Katestone Environmental (2011) *NSW Coal Mining Benchmarking Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining*, Prepared for Office of Environment & Heritage NSW, Sydney, NSW, Australia.

the default "puff" mode). Both source types produced equivalent results if initial plume sizes are equivalent. The equivalence of both source types can be readily explained by that both sources are modelled in CALPUFF as upstream pseudo point sources.

Most sources from the mine were modelled as volume sources, such as draglines, blasting, drilling, coal excavation, and truck dumping coal and waste. For volume sources, the initial source height, horizontal spread and vertical spread were required for CALPUFF to characterise initial plumes. They were carefully decided in the EIS based on the machinery used to generate the dust.

For the dragline emissions in the EIS, the initial plumes were set to have a vertical size similar to the drop height. With dragline dropping height of 33m, the draglines were modelled as H = 20m, and σ_z = 7.5. In revised emission estimates provided herein, the dragline drop height was decreased to 6m to be in line with industry best practice, and dragline emissions were modelled as H = 4m, and σ_z = 2m (See response to Issue Reference 12011).

Wheel-generated dust along the haul road was modelled with a large number of volume sources, with the initial plume modelled as H = 5m, and σ_z = 2.5m, assuming the typical haul trucks to be 8m tall. This was based on US guidelines, but considering Australian practices. Air Dispersion Modeling Guidelines for Air Quality Permitting, by City of Albuquerque (2010[10]), and Quarry Guidance for Refined Modeling, by North Carolina Air Quality District (downloaded from its website in 2009[11]) recommended the initial plume height to be twice as high as the haul truck height; for this project, 8m x 2 = 16m. The Haul Road Workgroup Final Report Submission to EPA–OAQPS, March 2012 recommended an initial plume height of 1.7 times the haul truck height; that is 8m x 1.7 = 13.6m.

In Australia, the industrial best practice requires the truck driver to report and ask for water spraying if dust plumes are visible at the truck driver's platform. To be conservative, the haul road emissions were modelled with a lower initial plume height of 10m; the CALPUFF source height is hence 5m, half of that. To choose the spacing and initial horizontal spread of the volume sources, guidelines from Ausplume (Victorian EPA) manual on elevated line sources were used, which states that "volume sources must be arranged along the centreline of the real line source with separation distances for volume sources alone a line to be less than a quarter of the distance to the nearest receptor, results should be insensitive to horizontal spread"[12].

The wind erosion of exposed area and stockpiles were modelled as either area or volume sources. The initial plume height (H) and vertical spread (σ_z) were required for both area and volume sources in CALPUFF. It was reasonable to assume σ_z = 0.5H for a plume extending from ground to 2H. This left only H to be determined, to which modelling results are known to be sensitive. Little guidance was found in literature on how to model wind erosion from exposed areas. Consequently, H was determined from basic understanding of wind erosion and our experience. For wind erosion of exposed areas in the open–cut mines, a source height of 2m was used as open–cut mines are within a deep pit. For wind erosion of stockpiles, a source height of 35m was used; for wind erosion at out of pit waste dumps, a source height of 40m was used. Doing this, we considered that both stockpiles and waste dumps are tall structures out of pits.

The source characteristics modelled in CALPUFF in the EIS are listed in Table 6.

For coal mine dust assessments using CALPUFF, the modelling results are sensitive to the initial plume height (H). Most dust sources are ground-level sources, and we could assume σ_z =0.5H. For volume sources, the initial plume height and initial horizontal spread (σ_y) determine the initial plume sizes, generally as V_0 = 2H x 4 σ_y. For area sources, V_0 = 2H x A, where A is the area of an area source. The higher the V_0, the lower the maximum predicted impacts would be for nearby receptors. However, for far away receptors, the relationship is not this simple, as dust deposition would have significant effects. For dust deposition, the lower the dust plumes, the quicker dust would fall.

10 City of Albuquerque (2010) *Air Dispersion Modeling Guidelines for Air Quality Permitting*, City of Albuquerque, Environmental Health Department, Air Quality Division, Permitting & Technical Analysis Section. *http://www.cabq.gov/airquality/pdf/aqd_model_guidelines.pdf*

11 North Carolina Air Quality District (2009), *Quarry Guidance for Refined Modelling*, North Carolina Air Quality District. *http://www.ncair.org/permits/mets/quarry1.pdf*

12 EPAV (1999) *Ausplume Gaussian Plume Dispersion Model Technical User Manual*, EPA Victoria, Melbourne, Victoria.

Table 6: CALPUFF source parameters used in the EIS

Activities	Locations	Number of Sources	Source Type	Source Height	Initial Spread	
				(m)	Y	Z
Draglines	Open-cut mine	4	Volume	20	7.5	7.5
Shovel for overburden	Open-cut mine	4	Volume	5	2.5	2.5
Scrapers	Open-cut mine	4	Volume	5	2.5	2.5
Drill/blasting	Open-cut mine	4	Volume	100	85	50
Coal excavation	Open-cut mine	4	Volume	5	2.5	2.5
Waste (overburden) dumping	Open-cut mine	4	Volume	5	2.5	2.5
Reject coal dumping	Open-cut mine	4	Volume	5	2.5	2.5
Wheel-generated dust	Haul roads	57	Volume	5	Variable, in the range of 100 – 250	2.5
Underground mining sources (coal handling, sizing and bulldozers) and stockpile wind erosion	Underground mine	2	Area	5	Not applicable	2.5
Underground coal mining sources (coal handling, sizing, bulldozers) and stockpile wind erosion	Underground mining	4	Area	5	Not applicable	2.5
Wind erosion of stockpiles (ROM coal, product coal and reject coal stockpiles)	Coal handling and preparation plant	7	Area	35	Not applicable	17.5
Bulldozers (open-cut mining)	Open-cut mine	4	Area	2	Not applicable	1
Wind erosion of exposed mining pits	Open-cut mine	49	Volume	2	500	1
Wind erosion of exposed areas in out of pit waste dumps	Out of pit waste dumps	12	Area	40	Not applicable	20
Vents of underground mining	Underground mine	4	Point	5	3.5 m diameter	15m/s exit velocity

Submitter No.	**419**	Issue Reference:	**12010**
Submitter Type	Government	TOR Category	**Air Quality**
Name	**DERM**	Relevant EIS Section	Sections 2.2.5.2, Modelling Scenario

DETAILS OF THE ISSUE

Multiple potential 'worst case' emission scenarios were not considered in the air modelling section of the EIS. Rather, a single scenario was selected and modelled based on estimated maximum emissions from the mine. This was taken to be at year 19 of the mines life, as the total amount of waste moved per dragline system would peak in that year. However, the resultant predicted dust concentration at sensitive receptors may not actually represent the worst-case impact. When estimating the worst-case impact on sensitive receptors consideration should also be given to the proximity to activities such as haul roads, and draglines should also be considered, not just maximum emissions. Modelling a different year of mining activity involving activities closer to sensitive receptors may indicate a greater impact on these receptors than maximum mine emissions. Such scenarios were not modelled in the EIS.

The EIS should consider other worst-case emission scenarios based on proximity to sensitive receptors.

The EIS should also set out the assumed locations of dust emission sources (i.e. the configuration of modelling setup) for Year 19.

PROPONENT RESPONSE

The selection of one single modelling scenario, considered to be the worst case scenario, was based on the mining plan for the Galilee Coal Project. The plan, in Figure 6: Open-cut Mining Sequence by Year of Production, shows that the open-cut mining activities, as the main sources of dust emissions, will progress from east to the west. As the CHPP and rail loading facilities are to the east the mine pits, in the later production years, trucks will travel further to transport coals. Also with the production year progress, the coal layers are deeper and there is more overburden waste to dispose, as shown in Figure 7: Total Primary Waste by Year of Production. These are the major factors that lead to the selection of Year 19 as the modelling year, to model the worst annual dust emissions.

To show the compliance with the annual EPP guideline, it was considered that modelling Year 19 was sufficient to cover the worst emission year. During the early production years, emission sources such as excavating coal and draglines may occur slightly further east, but emissions rates are significantly less and the main haul roads will be still be in the same locations. Overall, any sensitive receptors to the east are not expected to be the most impacted during the early production years. This is confirmed by the multiple-year modelling assessment in the EIS conducted for Alpha Coal, which has similar mine progress schedule (such as from east to west) and mine layout.

During the modelling Year 19, there could be some short periods that activities are more concentrated near some sensitive receptors, but the large sizes of mining equipment such as draglines will generally ensure they are distributed in different locations of the mine faces. A mine dust management plan that ensures mining activities not concentrated near known sensitive receptors will be the additional measure. Hence additional model scenarios to account for short-term variations are unnecessary.

Figure 6: Open-cut Mining Sequence by Year of Production

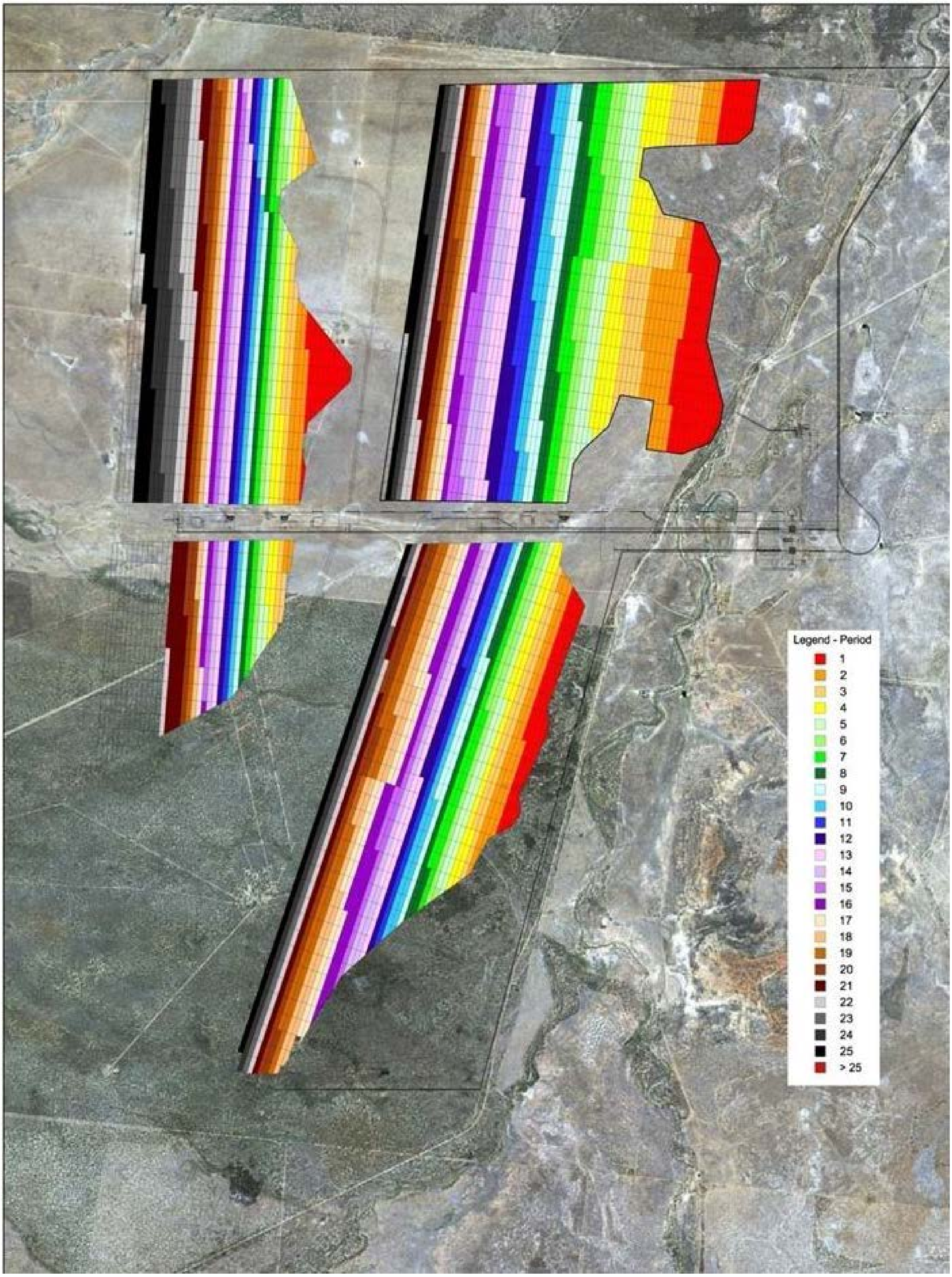
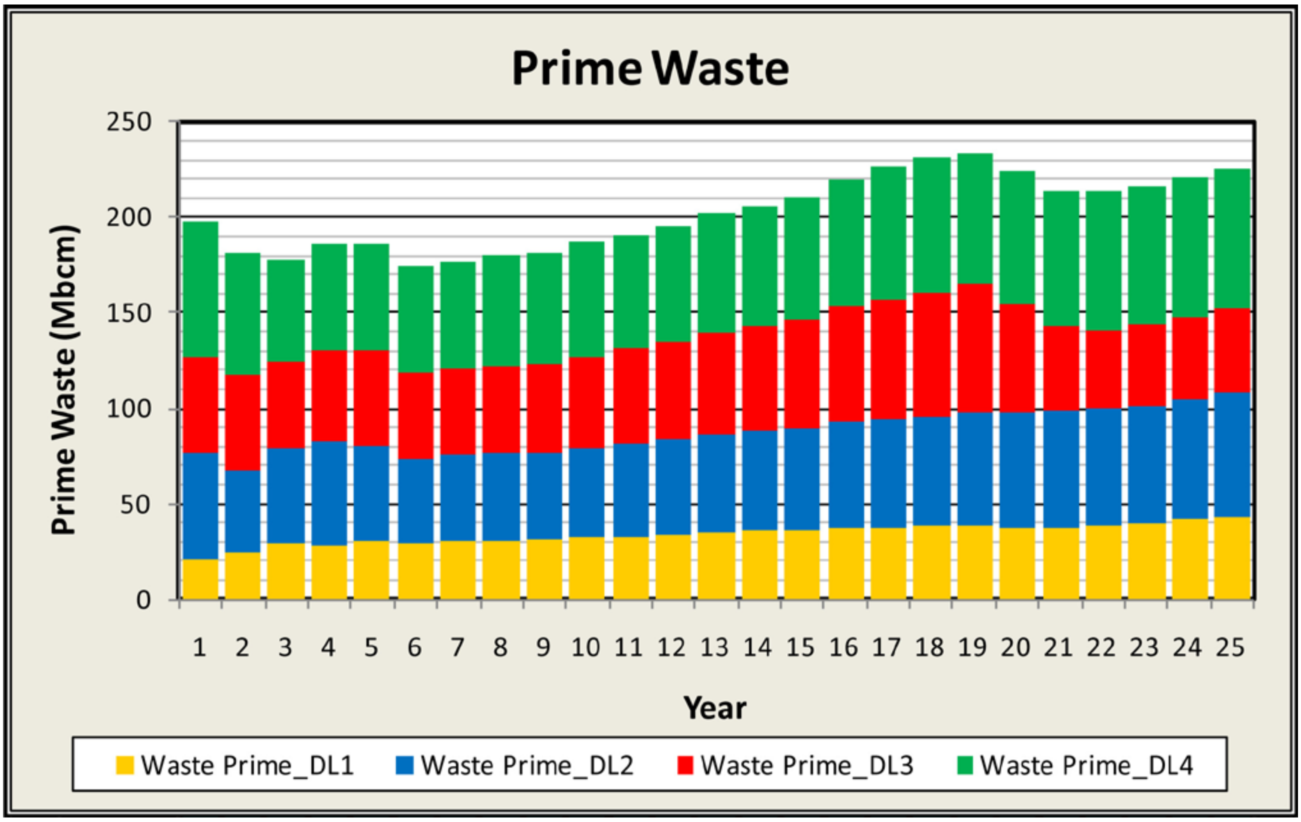


Figure 7: Total Primary Waste by Year of Production



Submitter No.	419	Issue Reference:	12011 / 17008
Submitter Type	Government	TOR Category	Air Quality
Name	DERM	Relevant EIS Section	Appendix A – Emission Estimation

DETAILS OF THE ISSUE

Some equations and parameters used in emission estimation need clarification and/or correction. The proponent should check the following equations:

- **Section A.1.1.1 – Scrapers:** The equation describing VKT and units used in the equation are weird (e.g. vehicle speed as kg/activity)
- **Section A.1.1.4 – Draglines:** The dragline drop height was adopted as 33m. This value seems to be very high and not a best practice
- **Section A.1.1.5 – Loading & unloading trucks handling waste:** There are typing errors in equation-1. This equation should be for TSP (not for PM_{10}) and the Mc value must be divided by 2. Are these emissions calculated on hourly bases (based on hourly wind data)?, and
- **Section A.1.1.12 – Wind erosion of Exposed areas:** Check equations and units. Units of exposed area (A) and uncontrolled emission factor (EF_i) are incorrect.

PROPONENT RESPONSE

Section A.1.1.1 – Scrapers: The equation describing VKT and units used in the equation are weird (e.g. vehicle speed as kg/activity).

This is a typographical error in the air quality assessment, the equation should be:

$$VKT = OpHrs \times VehicleSpeed \times 8760$$

where:

VKT	=	Total vehicle kilometres travelled	(km/a)
OpHrs	=	Operation hours per day	(h/d)
VehicleSpeed	=	Average vehicle speed	(km/hour)

Section A.1.1.4 – Draglines: The dragline drop height was adopted as 33m. This value seems to be very high and not a best practice.

The dragline height has been reduced to 6m which is in-line with best practice control methods for draglines.

The revised emissions from draglines are presented in Table 7.

Table 7: Revised emission estimates for draglines

Location	Activity data		Emission factors			Emissions (kg/annum)	
	Value	Units	TSP	PM_{10}	Units	TSP	PM_{10}
Dragline 1	28,000,000	bcm/a	0.015	0.0063	kg/bcm	407,900	175,400
Dragline 2	28,000,000	bcm/a	0.015	0.0063	kg/bcm	407,900	175,400
Dragline 3	28,000,000	bcm/a	0.015	0.0063	kg/bcm	407,900	175,400
Dragline 4	28,000,000	bcm/a	0.015	0.0063	kg/bcm	407,900	175,400

Reducing dragline drop heights from 33m to 6m reduces emissions by 23% for TSP and 26% for PM_{10} on a site wide basis as shown in Table 8.

Table 8: Comparison of dragline emissions

Emission Rate	Previously Assessed Rate (33 metre drop height) (kg/a)	Re–Assessed (6 metre drop height) (kg/a)	Reduction (kg/a) (% reduction in total site emissions)
TSP	5,380,505	1,631,433	3,749,072 (23%)
PM_{10}	2,313,617	701,516	1,612,101 (26%)

Section A.1.1.5 – Loading & unloading trucks handling waste: There are typing errors in equation-1. This equation should be for TSP (not for PM_{10}) and the Mc value must be divided by 2. Are these emissions calculated on hourly bases (based on hourly wind data)?

These are typographical errors in the air quality assessment, the equations should be:

$$EF_{TSP} = 0.74 \times 0.0016 \times \frac{\left(\frac{U^{1.3}}{2.2}\right)}{\left(\frac{M^{1.4}}{2}\right)} \qquad EF_{PM10} = 0.74 \times 0.0016 \times \frac{\left(\frac{U^{1.3}}{2.2}\right)}{\left(\frac{M^{1.4}}{2}\right)}$$

where:

EF_{TSP}	=	TSP emission factor for loading and unloading	(kg/tonne)
$EFPM_{10}$	=	PM_{10} emission factor for loading and unloading	(kg/tonne)
M	=	Moisture content of material being loaded	(%)
U	=	Mean wind speed	(m/s)

The emission rates are calculated using the annual average wind speed rather than hourly wind speed. This results in higher emission rates during atmospheric conditions that are less conducive to dispersion and thus resulting in conservative air quality modelling predictions.

Section A.1.1.12 – Wind erosion of Exposed areas: Check equations and units. Units of exposed area (A) and uncontrolled emission factor (EF_i) are incorrect.

There is a typographical error in the equation presented in the air quality assessment for wind erosion of exposed areas. The equation should be:

Emissions from wind erosion of exposed areas were estimated as follows:

$$EF_i = A \times EF_i \times \left(\frac{(100 - CE)}{100} \right)$$

where:

E_i	=	Emission rate of pollutant i from wind erosion of exposed areas	(kg/a)
A	=	Exposed area	(ha)
EF_i	=	Emission factor for pollutant i for wind erosion of exposed areas	(kg/ha/year)
CE	=	Control efficiency	(%)

Total exposed areas in each of the OCM pits was provided by Waratah Coal, and were 2000ha and 1500ha for OCM 1 and OCM 2 respectively. As the open-cut mines progress west, rehabilitation of the mined areas is expected to occur at approximately the same rate as the clearing of new areas of mining. The areas of exposed surfaces – 2000ha and 1500ha – have been conservatively estimated by Waratah Coal to account for any lag in the rate of rehabilitation.

Total exposed areas per OCM have been split into two areas – recently disturbed areas, and not recently disturbed areas. The size of the recently disturbed area per OCM was estimated based on the approximately size of the area mined per annum, as provided by Waratah Coal. The size of the not recently disturbed areas is the remainder of the total exposed areas. A control factor of 50% was assumed for the not recently disturbed areas to account for silt depletion, which cannot be considered to be unlimited.

Emission factors for TSP and PM_{10} were sourced from Table 11.9-4 of USEPA AP-42 (USEPA, 1998[13]). The emission factor presented is designed for 'seeded land, stripped overburden, and graded overburden' at a dry (rainfall 280-420mm/y), windy (average 4.8-6m/s) coal mine. This was considered to give a more accurate representation of wind erosion in the Galilee Coal Project open-cut mine pits than the default NPI emission factor, which does not specify the type of material that is exposed. A comparison with the meteorological conditions at the Galilee Coal Project site indicates that the mine site has slightly higher average rainfall and lower average wind speeds than the conditions for the USEPA emission factor, meaning that the emission factor is expected to be conservative.

A summary of the exposed areas, emission factors and emissions for wind erosion of exposed areas is provided in Table 9.

13 USEPA (1998) *AP 42, Fifth Edition, Volume 1, Chapter 11: Mineral Products Industry*, 11.9 Western Surface Coal Mining, Technology Transfer Network, Clearinghouse for Inventories & Emission Factors, United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC 27711, USA. *http://www.epa.gov/ttn/chief/ap42/ch11/final/c11s09.pdf*

Table 9: Summary of emissions from wind erosion of exposed areas

Location		Activity data		Emission factors			Control efficiency	Emissions (kg/annum)	
		Value	Units	TSP	PM_{10}	Units	(%)	TSP	PM_{10}
OCM 1	Recently disturbed	450	ha	850	425	kg/ha/y		382,500	191,250
	Not recently disturbed	1,550	ha	850	425	kg/ha/y	50%	658,750	329,375
OCM 2	Recently disturbed	150	ha	850	425	kg/ha/y		127,500	63,750
	Not recently disturbed	1,350	ha	850	425	kg/ha/y	50%	573,750	286,875
Out of pit spoil dumps (total)		993	ha	850	425	kg/ha/y		844,066	422,033

Submitter No.	419	Issue Reference:	12012
Submitter Type	Government	TOR Category	**Air Quality**
Name	**DERM**	Relevant EIS Section	Section 2.2.3, (p7) – Typographical error

DETAILS OF THE ISSUE

There is a typographical error in Section 2.2.3 of the EIS. Page 7 states that 'A summary of the emission factors used is provided in Figure 2.2.' The EIS should be reworded as 'A summary of the emission factors used is provided in Table 2.2.'

PROPONENT RESPONSE

Should any future reference be made to this table, it will note the typographical error as suggested.

Submitter No.	419	Issue Reference:	12013 / 17006 / 19000
Submitter Type	Government	TOR Category	**Air Quality**
Name	**DERM**	Relevant EIS Section	Section 3.5, Mitigation and Management – Rail

DETAILS OF THE ISSUE

Train speed limit for controlling dust is not specified in the EIS. Section 3.2.3, Emission Estimation' of the EIS discusses that dust emissions from the coal train decrease significantly as train speed decreases from 80km/hour to 60km/hour (see Figure 3.2). An average air velocity over surface of train (which is a function of train speed and the wind speed) of 80km/hour was used for the estimation of dust emissions from coal wagons. However, it in not clear what sort of speed limit will be implemented as a dust mitigation measure close to the sensitive receptors.

PROPONENT RESPONSE

It is not practical to slow trains in sensitive dust areas and there are inefficiencies in doing this that could create adverse environmental conditions.

The major sources of dust emissions from coal trains are from:

1. the bottom of the wagons where the 'bottom dump doors' are operating incorrectly
2. the top of the wagons in the empty trains particularly when the loaded train has not been fully unloaded, and
3. the top of the wagons in the loaded train.

In addition to the commitments presented in Section 10.4 of the EIS, Waratah Coal proposes to use tippler wagons (gondola) rather than the more traditional bottom dump coal wagons. Condition 1 will be eliminated and Condition 2 will be reduced due to the use of tippler wagons (gondola type) where coal hang-up should be negligible or eliminated compared with bottom dump wagons where this action occurs quite frequently, particularly in wet weather.

In addition to the tippler wagons, Waratah Coal's solution to mitigation of coal dust is to provide a cover to the top of the wagons. These covers will eliminate Condition 3 and reduce Condition 2. Waratah Coal has already had discussions with a large International company which specialises in providing covers to rail wagons. It is intended these covers will be made of fibreglass, similar to the ones that have been proven in service, operating in conditions ranging from −40°C to +40°C. The proposed coverw have certification from the USA Department of Transportation (DOT) that they meet the criteria for a closed transport vehicle specified in the United States Code of Federation Regulations (CFR) *Title 49, Transportation Subsection 173.403(c)*), which allows transportation of contaminated material.

Therefore reducing train speed will not be required as the rail wagons will be covered. The added benefit of this practice is to provide better train aerodynamics, particularly in the unloaded condition where considerable fuel savings are expected which in turn results in lower emissions.

Submitter No.	556	Issue Reference:	12014
Submitter Type	Individuals	TOR Category	Air Quality
Name	Names withheld	Relevant EIS Section	

DETAILS OF THE ISSUE

Dust impacts and air quality modelling suggests dust emissions will exceed guidelines.

PROPONENT RESPONSE

The mine incorporates best management practice (BMP) emission controls for managing particulate matter. The emissions after emission controls are applied, are predicted to impact sensitive receptors in the vicinity of the mine above regulated levels in the Queensland Environmental Protection (Air) Policy 2008 (EPP Air) criteria.

An air quality management plan will be designed once the mine becomes operational. This plan will incorporate proactive and reactive measures to be taken at the mine to ensure that air quality at surrounding sensitive receptors is maintained to levels that are acceptable under the EPP Air. The measures will need to be informed by the air quality monitoring plan. Measures may be proactive, such as rehabilitating mined land, reducing vehicle speeds on haulage roads, watering stockpiles or using chemical suppressants. Reactive measures may also be used, where operations are either relocated or cease altogether during adverse meteorological conditions.

It is noted that a preliminary air quality monitoring plan is proposed (see response to Issue Reference 12026) that will cover air quality monitoring requirements at all identified sensitive receptors that are closest to the Galilee Coal Project.

In other jurisdictions where coal mining impacts on residential sensitive receptors, air quality acquisition criteria exist in order to avoid adverse air quality impacts being experienced at sensitive receptors. These criteria are useful for management and project planning purposes in order to determine the best response to mitigate predicted or observed air quality impacts. The NSW Department of Planning and Infrastructure's (NSW DoPI) air quality acquisition criteria that are used for extractive industries in the Hunter Valley are provided in Table 10 .

Upon receiving a written request from the owner of any residence on privately–owned land where subsequent air quality monitoring shows the dust generated by the project is greater than or equal to the applicable criteria in Table 10 on a systemic basis, Waratah Coal shall implement additional dust mitigation measures (such as a first flush roof system, internal or external air filters, and/or air conditioning) at the residence in consultation with the owner.

If all reasonable and feasible avoidance and mitigation options are unable to reduce pollutant concentrations to levels where public health and amenity can be safeguarded, the following avoidance strategies will be taken:

- consult with affected landowners and provide them with all relevant information about air quality impacts of the coal mine, and
- make an offer in writing to acquire the land at any stage during the life of the proposal where the impact assessment indicates the acquisition criteria in Table 10 are likely to be exceeded.
- Table 10 includes the acquisition criteria that are typically used for the management of mining and extractive industry impacts. All criteria are consistent with criteria in the EPP Air with the following exceptions:
  - 24-hour average PM_{10} of 150μg/m^3 (total impact). This criterion is based on the United States Environmental Protection Agency National Ambient Air Quality Standard (USEPA NAAQS), and
  - 24-hour average PM_{10} of 50μg/m^3 (incremental impact). This criterion should be read in conjunction with the criterion above. It acknowledges that background air quality in the vicinity of the proposal may already exceed the assessment criteria due to existing local air pollution sources.

Table 10: Acquisition criteria

Pollutant	Averaging period	Acquisition criterion		Impact type
PM_{10}	24-hour	[b] 50μg/m^3		human health
PM_{10}	Annual	[a] 30μg/m^3		human health
PM_{10}	24-hour	[a] 150μg/m^3		human health
Total suspended particulates (TSP)	Annual	[a] 90μg/m^3		amenity
Deposited dust	Annual	[b] 2 g/m^2/month	[a] 4 g/m^2/month	amenity

a Total impact (incremental impact plus background)

b The incremental impact (predicted impacts due to the pollutant source alone)

It is recommended that approval conditions include the acquisition criteria in Table 10. Any landowner suspecting the acquisition criteria are being exceeded may request an independent review of impacts on their land, which is funded by Waratah Coal. Landowners may request Waratah Coal purchase the land if pollutant concentrations are above the acquisition criteria.

Submitter No.	1840	Issue Reference:	12015 / 17009
Submitter Type	Council	TOR Category	Air Quality
Name	Barcaldine Regional Council	Relevant EIS Section	3.1.14.2

DETAILS OF THE ISSUE

- What will be the parameters of the carefully designed dust monitoring program?
- What happens whilst we await the mine rehab and the subsequent growth period?
- Will all conveyors systems on the project site be fully enclosed?

PROPONENT RESPONSE

What will be the parameters of the carefully designed dust monitoring program?

Please refer to the response to Issue Reference 12026.

What happens whilst we await the mine rehabilitation and the subsequent growth period?

Dust emissions from wind erosion of exposed areas will be managed through a detailed mine rehabilitation plan. Any exposed areas that are left undisturbed for a period of more than three months will be progressively rehabilitated with vegetation to minimise dust emissions from wind erosion.

Will all conveyors systems on the project site be fully enclosed?

All conveyors will be partially enclosed. Access is maintained to the conveyor system in order for maintenance and repair work to be conducted. All conveyor transfer points and stockpile loading areas are controlled using water sprays. As the coal has a higher moisture content through the coal handling plant, emissions are controlled through the result of increased moisture content and partial enclosure of the conveyor system.

Submitter No.	787	Issue Reference:	12017
Submitter Type	NGO	TOR Category	Air Quality
Name	GVK Resources	Relevant EIS Section	

DETAILS OF THE ISSUE

Air emissions quantifies for Year 19 only.

PROPONENT RESPONSE

Year 19 was assessed to be the worst case operational year in terms of emissions and predicted impacts. Estimated annual emissions for operational years 5, 10, 15 and 19 are provided in Table 11 (See also response to Issue Reference 12010).

Table 11: Estimated particulate matter emissions for other operational years of the mine

Source of emissions			Estimated Emissions (kg/year)							
			Year 5		Year 10		Year 15		Year 19	
			TSP	PM10	TSP	PM10	TSP	PM10	TSP	PM10
Open-cut mines	Scrapers	OCM pits	365,018	117,963	385,175	124,477	414,344	133,904	459,725	148,570
	Truck shovels/truck excavators[a]	DL1	36,427	17,229	38,439	18,181	41,350	19,557	45,879	21,699
		DL2	92,724	43,856	97,844	46,278	105,254	49,782	116,782	55,235
		DL3	139,086	65,784	146,767	69,417	157,881	74,674	175,173	82,852
		DL4	132,463	62,651	139,778	66,111	150,363	71,118	166,832	78,907
	Blasting	OCMs	36,981	19,230	39,024	20,292	41,979	21,829	46,577	24,220
	Drilling	OCMs	146,783	77,123	154,889	81,382	166,619	87,546	184,868	97,134
	Draglines	All dragline systems	1,295,343	556,998	1,366,876	587,757	1,470,390	632,268	1,631,433	701,516
	Bulldozers	OCM pits	945,930	222,572	998,166	234,863	1,073,758	252,649	1,191,360	280,320
	Hauling – overburden	DL1	176,215	43,600	185,946	46,007	200,028	49,492	221,936	54,912
		DL2	448,548	110,981	473,318	117,110	509,163	125,978	564,928	139,776
		DL3	672,822	166,471	709,977	175,664	763,744	188,968	847,392	209,664
		DL4	640,783	158,544	676,169	167,299	727,375	179,969	807,040	199,680
	Waste dumping	DL1	36,427	17,229	38,439	18,181	41,350	19,557	45,879	21,699
		DL2	92,724	43,856	97,844	46,278	105,254	49,782	116,782	55,235
		DL3	139,086	65,784	146,767	69,417	157,881	74,674	175,173	82,852
		DL4	132,463	62,651	139,778	66,111	150,363	71,118	166,832	78,907
	Coal excavating/ loading	OCMs	486,322	78,188	513,178	82,506	552,042	88,754	612,503	98,475
	Hauling – coal	DL1	261,858	64,790	276,319	68,368	297,245	73,545	329,800	81,600
		DL2	184,841	45,734	195,049	48,259	209,820	51,914	232,800	57,600
		DL3	323,472	80,034	341,335	84,454	367,185	90,850	407,400	100,800
		DL4	231,052	57,167	243,811	60,324	262,275	64,893	291,000	72,000
	Coal handling/sizing[b]	OCM sizing stations	255,005	104,383	269,087	110,147	289,465	118,489	321,168	131,466
	Bulldozers	OCM sizing stations	165,454	52,742	174,590	55,655	187,812	59,870	208,382	66,427
	Reject coal dumping	OCM pits	127,039	53,356	134,054	56,303	144,206	60,567	160,000	67,200

Table 11: Continued

Source of emissions			Estimated Emissions (kg/year)							
			Year 5		Year 10		Year 15		Year 19	
			TSP	PM10	TSP	PM10	TSP	PM10	TSP	PM10
Underground mines	Coal handling/sizing[c]	UGM sizing stations	157,517	60,434	166,216	63,771	178,803	68,600	198,387	76,114
	Bulldozers	UGM sizing stations	94,286	30,056	99,493	31,716	107,027	34,118	118,749	37,854
	Wind erosion – coal stockpiles	UGM drift stockpiles	21,812	10,906	23,017	11,508	24,760	12,380	27,471	13,736
	Vents	UGMs	72,113	49,578	76,096	52,316	81,858	56,278	90,824	62,441
CHPP and stockpiles	Coal loading/ reclaiming[d]	Raw coal stockpiles	12,175	5,759	12,848	6,077	13,821	6,537	15,334	7,253
	Wind erosion – coal stockpiles	Raw coal stockpiles	30,882	15,441	32,587	16,294	35,055	17,528	38,894	19,447
	Coal loading/ reclaiming[e]	Product coal stockpiles	8,697	4,113	9,177	4,340	9,872	4,669	10,953	5,181
	Wind erosion – coal stockpiles	Product coal stockpiles	23,370	11,685	24,661	12,330	26,528	13,264	29,434	14,717
	Coal loading/ reclaiming[f]	Reject coal stockpiles	5,218	2,468	5,506	2,604	5,923	2,801	6,572	3,108
	Wind erosion – coal stockpiles	Reject coal stockpiles	15,024	7,512	15,853	7,927	17,054	8,527	18,922	9,461
	Bulldozers	CHPP	165,454	52,742	174,590	55,655	187,812	59,870	208,382	66,427
Wind erosion of exposed areas	Wind erosion – recently disturbed exposed areas	OCMs	404,936	202,468	427,297	213,649	459,657	229,828	510,000	255,000
	Wind erosion – not recently disturbed exposed areas	OCMs	978,594	489,297	1,032,635	516,318	1,110,837	555,418	1,232,500	616,250
	Wind erosion	Out of pit waste dumps	670,181	335,091	707,191	353,595	760,746	380,373	844,066	422,033
All	Diesel vehicle exhaust		312,351	304,854	329,600	321,689	354,560	346,051	393,393	383,952
Total Annual Emissions			**10,537,475**	**3,971,321**	**11,119,384**	**4,190,628**	**11,961,458**	**4,507,986**	**13,271,523**	**5,001,718**

Notes for Table 11:

a DL1-4 refers to dragline systems 1-4.

b Revised emission estimates are the sum of emission factors for 'trucks dumping coal' and 7 x miscellaneous transfer to account for material handling at OCM sizing stations (Refer to Section 2.2.3.6, Volume 5, Appendix 18 Air Quality Assessment (of the original EIS) for the emission estimation methodology). Also included are emissions for a primary crusher and associated screen, a secondary crusher and associated screen and a tertiary crusher and associated screen (please refer to the response to Issue Reference 12007 for further details).

c Revised emission estimates are the sum of emission factors for 3 x miscellaneous transfer to account for miscellaneous material handling at OCM sizing stations (Refer to Section 2.2.3.6, Volume 5, Appendix 18 Air Quality Assessment for the emission estimation methodology). Also included are emissions for a secondary crusher and associated screen, and a tertiary crusher and associated screen (please refer to the response to Issue Reference 12007 for further details).

d,e Emission factors presented are the sum of 2 x 'miscellaneous transfer' emission factors to account for coal loading and reclaiming. Refer to Section 2.2.3.8 Volume 5, Appendix 18 Air Quality Assessment (of the original EIS).

f Emission factors presented are the sum of 3 x 'miscellaneous transfer' emission factors to account for coal loading, reclaiming and loading to haul trucks. Refer to Section 2.2.3.8 (of the original EIS).

Submitter No.	**419**	Issue Reference:	**12018 / 4000**
Submitter Type	Government	TOR Category	**Air Quality** / Cumulative Impacts
Name	**DERM**	Relevant EIS Section	Section 2.2.6, Cumulative Impacts

DETAILS OF THE ISSUE

Predicted impacts in other EIS reports were not considered in predicting cumulative impacts. Section 2.2.6 stated that no EIS reports were available (in 2010) for Alpha Coal, Kevin's Corner and South Galilee Coal Projects, and their impacts would therefore not be assessed. This no longer correct as the Alpha Coal EIS has been published. The cumulative air quality assessment should be updated accordingly.

PROPONENT RESPONSE

Based on the comments received in submissions and consequential revisions to emission estimates for the Galilee Coal Project, the air quality model has been revised to incorporate the following changes:

- Revision to emission estimates for Galilee Coal Project:
  - Inclusion of emission estimates for the crushers and associated sizing equipment. Please refer to Issue Reference 12007 for further details
  - Reduction in emissions from the dragline resulting from lowering the dragline drop height from 33m to 6m, in line with industry best practice. Please refer to the response to Issue Reference 12011 for further details, and
  - Specifically including emission estimates for $PM_{2.5}$ from vehicle exhaust. Please refer to Issue Reference 12005 for further details.
- Inclusion of background particulate matter emission sources – surrounding proposed mines:
  - Inclusion of emission estimates for the Alpha Coal Mine and Kevin's Corner coal mine in a cumulative impact assessment model.

Revised emission estimates for Year 19 of the project are summarised in Table 12. Shaded cells indicate revised emission estimates included in the reassessment. $PM_{2.5}$ emissions from each source were estimated using source-specific $PM_{2.5}$:TSP ratios sourced from either the United States Environmental Protection Agency (USEPA AP42 documents) or the California Air Resources Board (CARB PM Size distributions).

Table 12: Revised Emission Estimation Rates for the Galilee Coal Project

Source of emissions			Year 19 Emissions (kg/year)					PM2.5 Scaling Factor (PM2.5/TSP)	Revised Air Quality Assessment		
			Original Air Quality Assessment		Revised Air Quality Assessment				% of total TSP	% of total PM_{10}	% of total $PM_{2.5}$
			TSP	PM_{10}	TSP	PM_{10}	$PM_{2.5}$				
Open-cut mines	Scrapers	OCM pits	459,725	148,570	459,725	148,570	48,271	0.105 [i]	3%	3%	4%
	Truck shovels/truck excavators[a]	DL1	45,879	21,699	45,879	21,699	872	0.019 [j]	3.8%	4.8%	0.8%
		DL2	116,782	55,235	116,782	55,235	2,219	0.019 [j]			
		DL3	175,173	82,852	175,173	82,852	3,328	0.019 [j]			
		DL4	166,832	78,907	166,832	78,907	3,170	0.019 [j]			
	Blasting	OCMs	46,577	24,220	46,577	24,220	1,397	0.03 [j]	0.4%	0.5%	0.1%
	Drilling	OCMs	184,868	97,134	184,868	97,134	5,546	0.03 [j]	1%	2%	0%
	Draglines	All dragline systems	5,380,505	2,313,617	1,631,433	701,516	27,734	0.017 [j]	12%	14%	2%
	Bulldozers	OCM pits	1,191,360	280,320	1,191,360	280,320	125,093	0.105 [j]	9%	6%	10%
	Hauling – overburden	DL1	221,936	54,912	221,936	54,912	6,794	0.03 [k]	18%	12%	6%
		DL2	564,928	139,776	564,928	139,776	17,294	0.03 [k]			
		DL3	847,392	209,664	847,392	209,664	25,941	0.03 [k]			
		DL4	807,040	199,680	807,040	199,680	24,705	0.03 [k]			
	Waste dumping	DL1	45,879	21,699	45,879	21,699	3,286	0.072 [l]	3.8%	4.8%	2.9%
		DL2	116,782	55,235	116,782	55,235	8,364	0.072 [l]			
		DL3	175,173	82,852	175,173	82,852	12,546	0.072 [l]			
		DL4	166,832	78,907	166,832	78,907	11,949	0.072 [l]			
	Coal excavating/ loading	OCMs	612,503	98,475	612,503	98,475	43,868	0.072 [l]	5%	2%	4%
	Hauling – coal	DL1	329,800	81,600	329,800	81,600	10,096	0.03 [k]	10%	6%	3%
		DL2	232,800	57,600	232,800	57,600	7,127	0.03 [k]			
		DL3	407,400	100,800	407,400	100,800	12,471	0.03 [k]			
		DL4	291,000	72,000	291,000	72,000	8,908	0.03 [k]			
	Coal handling/sizing	OCM sizing stations	227,383[b]	96,951[b]	321,168 [c]	131,466 [c]	23,003	0.072 [l]	2.4%	2.6%	1.9%
	Bulldozers	OCM sizing stations	208,382	66,427	208,382	66,427	21,880	0.105 [j]	1.6%	1.3%	1.8%
	Reject coal dumping	OCM pits	160,000	67,200	160,000	67,200	11,459	0.072 [l]	1.2%	1.3%	0.9%

Table 12: Continued

Source of emissions			Year 19 Emissions (kg/year)					$PM_{2.5}$ Scaling Factor ($PM_{2.5}$/TSP)	Revised Air Quality Assessment		
			Original Air Quality Assessment		Revised Air Quality Assessment				% of total TSP	% of total PM_{10}	% of total $PM_{2.5}$
			TSP	PM_{10}	TSP	PM_{10}	$PM_{2.5}$				
Underground mines	Coal handling/sizing	UGM sizing stations	24,644 [d]	11,656 [d]	198,387 [e]	76,114 [e]	14,209	0.072 [l]	1.5%	1.5%	1.2%
	Bulldozers	UGM sizing stations	118,749	37,854	118,749	37,854	12,469	0.105 [j]	0.9%	0.8%	1.0%
	Wind erosion – coal stockpiles	UGM drift stockpiles	27,471	13,736	27,471	13,736	3,297	0.12 [m]	0.2%	0.3%	0.3%
	Vents	UGMs	90,824	62,441	90,824	62,441	9,082	0.10 [n]	0.7%	1.2%	0.7%
CHPP and stockpiles	Coal loading/ reclaiming[f]	Raw coal stockpiles	15,334	7,253	15,334	7,253	1,098	0.072 [l]	0.1%	0.1%	0.1%
	Wind erosion – coal stockpiles	Raw coal stockpiles	38,894	19,447	38,894	19,447	4,667	0.12 [m]	0.3%	0.4%	0.4%
	Coal loading/ reclaiming[g]	Product coal stockpiles	10,953	5,181	10,953	5,181	784	0.072 [l]	0.08%	0.10%	0.1%
	Wind erosion – coal stockpiles	Product coal stockpiles	29,434	14,717	29,434	14,717	3,532	0.12 [m]	0.2%	0.3%	0.3%
	Coal loading/ reclaiming[h]	Reject coal stockpiles	6,572	3,108	6,572	3,108	471	0.072 [l]	0.05%	0.06%	0.04%
	Wind erosion – coal stockpiles	Reject coal stockpiles	18,922	9,461	18,922	9,461	2,271	0.12 [m]	0.1%	0.2%	0.2%
	Bulldozers	CHPP	208,382	66,427	208,382	66,427	21,880	0.105 [j]	1.6%	1.3%	1.8%
Wind erosion of exposed areas	Wind erosion – recently disturbed exposed areas	OCMs	510,000	255,000	510,000	255,000	61,200	0.12 [m]	4%	5%	5.0%
	Wind erosion – not recently disturbed exposed areas	OCMs	1,232,500	616,250	1,232,500	616,250	147,900	0.12 [m]	9%	12%	12.0%
	Wind erosion	Out of pit waste dumps	844,066	422,033	844,066	422,033	101,288	0.12 [m]	6%	8%	8.2%
All	Diesel vehicle exhaust	All diesel engines	Not estimated	Not estimated	393,393	383,952	380,411	0.97 [o]	3%	8%	30.9%
Total Emissions			**16,359,675**	**6,130,895**	**13,271,523**	**5,001,718**	**1,231,880**		**100%**	**100%**	**100%**

Notes for Table 12:

a DL1–4 refers to dragline systems 1–4.

b Emission factors presented are the sum of emission factors for 'trucks dumping coal' and 10 x 'miscellaneous transfer' to account for all steps of material handling at OCM sizing stations. Refer to Section 2.2.3.6, Volume 5, Appendix 18 Air Quality Assessment (of the original EIS).

c Revised emission estimates are the sum of emission factors for 'trucks dumping coal' and 7 x miscellaneous transfer to account for material handling at OCM sizing stations (Refer to Section 2.2.3.6, Volume 5, Appendix 18 Air Quality Assessment (of the original EIS) for the emission estimation methodology). Also included are emissions for a primary crusher and associated screen, a secondary crusher and associated screen and a tertiary crusher and associated screen (please refer to the response to Issue Reference 12007 for further details).

d Emission factors presented are the sum of 5 x 'miscellaneous transfer' emission factors to account for all steps of material handling at UGM sizing stations. Refer to Section 2.2.3.6, Volume 5, Appendix 18 Air Quality Assessment (of the original EIS).

e Revised emission estimates are the sum of emission factors for 3 x miscellaneous transfer to account for miscellaneous material handling at OCM sizing stations (Refer to Section 2.2.3.6, Volume 5, Appendix 18 Air Quality Assessment (of the original EIS) for the emission estimation methodology). Also included are emissions for a secondary crusher and associated screen, and a tertiary crusher and associated screen (please refer to the response to Issue Reference 12007 for further details).

f,g Emission factors presented are the sum of 2 x 'miscellaneous transfer' emission factors to account for coal loading and reclaiming. Refer to Section 2.2.3.8 Volume 5, Appendix 18 Air Quality Assessment (of the original EIS).

h Emission factors presented are the sum of 3 x 'miscellaneous transfer' emission factors to account for coal loading, reclaiming and loading to haul trucks. Refer to Section 2.2.3.8 (of the original EIS).

i Source: USEPA AP42 Chapter 11.9 (assumed to be the same as a bulldozer).

j Source: USEPA AP42 Chapter 11.9 (of the original EIS).

k Source: USEPA AP42 Chapter 13.2.2 (of the original EIS).

l Source: USEPA AP42 Chapter 13.2.4 (of the original EIS).

m Source: CARB (2012) – Windblown dust, California Emission Inventory and Reporting System (CEIDARS).

n Assumed ratio.

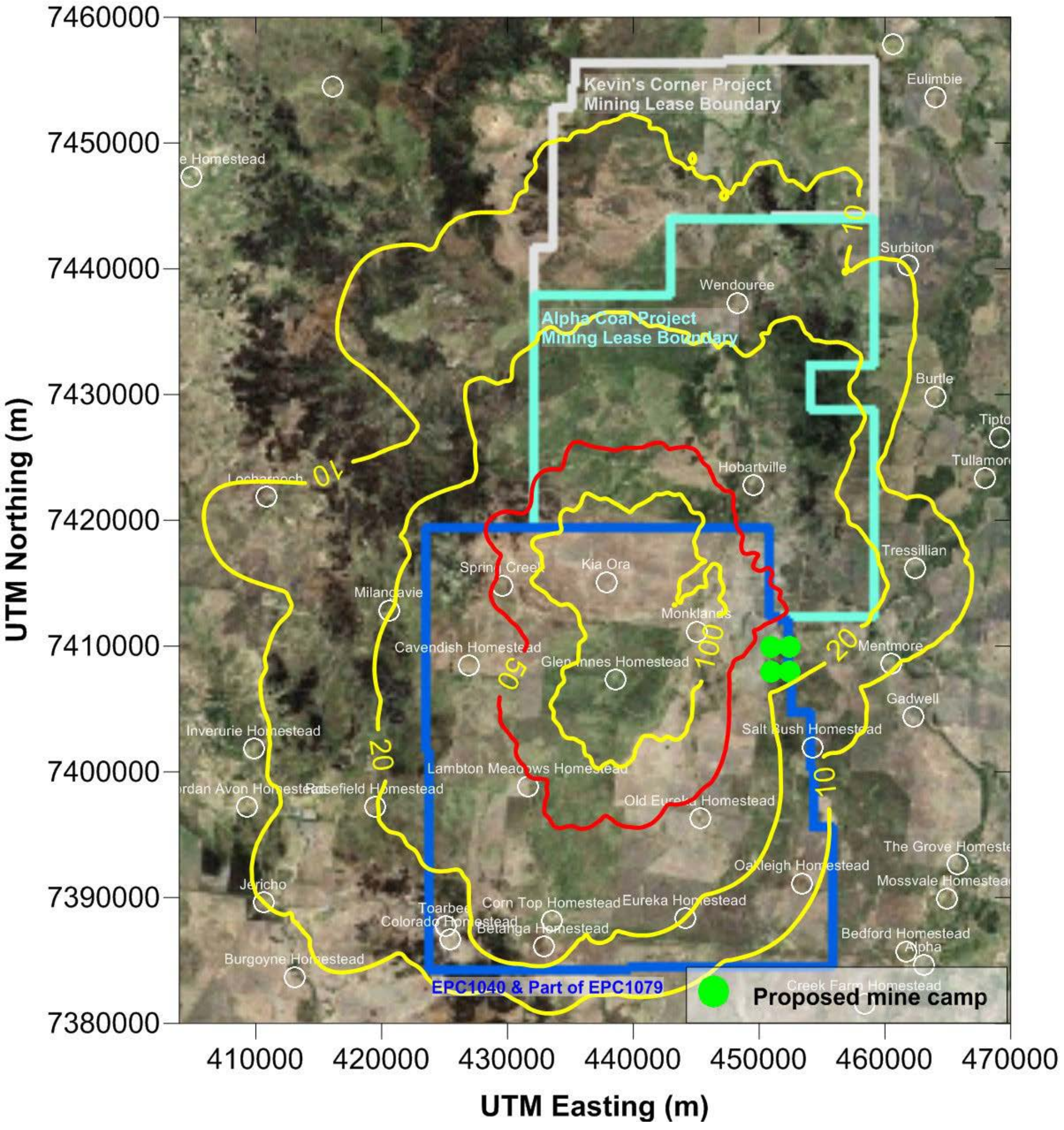
o CARB (2012) – liquid fuel combustion, California Emission Inventory and Reporting System (CEIDARS). TSP emissions are estimated based on the estimated $PM_{2.5}$ emissions and the CARB $PM_{2.5}$:TSP ratio for liquid fuel combustion of 96.7%. PM_{10} emissions are estimated based on the estimated PM_{10} emissions and the CARB PM_{10}:TSP ratio for liquid fuel combustion of 97.6%.
For further detail on the emission estimation technique for $PM_{2.5}$ from diesel combustion please refer to the response to Issue Reference 12005.

The revised emission estimates were included in a revised air quality model for the Galilee Coal Project using the same model set-up as previously assessed.

The air quality modelling results for the mine emissions only are shown in the following figures:

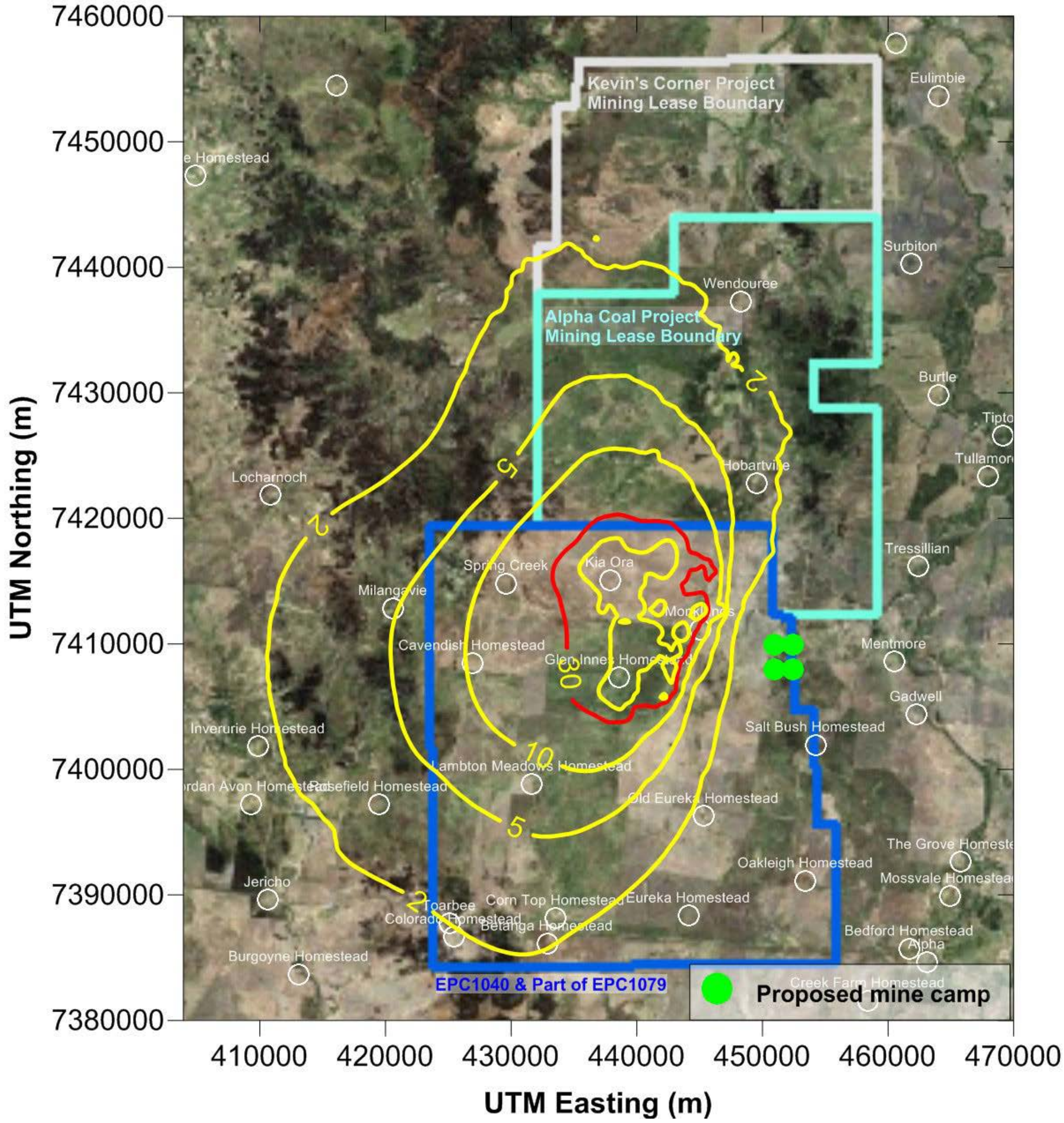
- Maximum 24-hour PM_{10} ground level concentrations (Figure 8)
- Annual average PM_{10} ground level concentrations (Figure 9)
- Annual average TSP ground level concentrations (Figure 10)
- Maximum 24-hour $PM_{2.5}$ ground level concentrations (Figure 11)
- Annual average $PM_{2.5}$ ground level concentrations (Figure 12), and
- Average monthly dust deposition (Figure 13).

Figure 8: Predicted maximum 24-hour ground-level concentrations of PM_{10} – Year 19 – maximum mine emissions



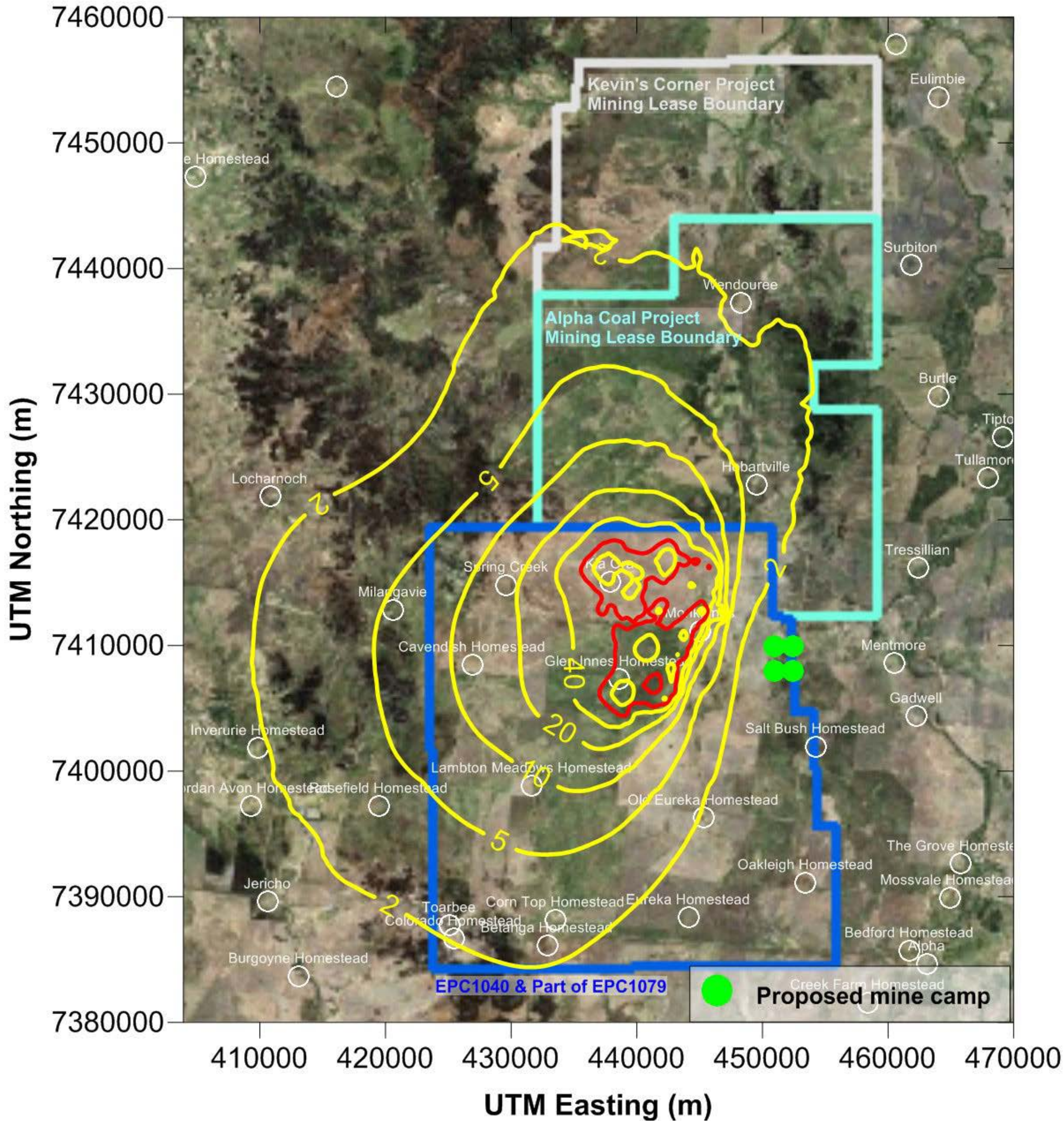
Species:	**Location:**	**Scenario:**	**Percentile:**	**Averaging Time:**
PM_{10}	Galilee Coal Project	Project emissions (Year 19) – maximum emissions	Maximum	24-hour
Model Used:	**Units:**	**Guideline:**	**Met Data:**	**Plot:**
CALPUFFv6	µg/m³	**EPP (Air) = 50µg/m³**	TAPM Generated	J Weidmann

Figure 9: Predicted annual average ground-level concentrations of PM_{10} – Year 19 – maximum mine emissions



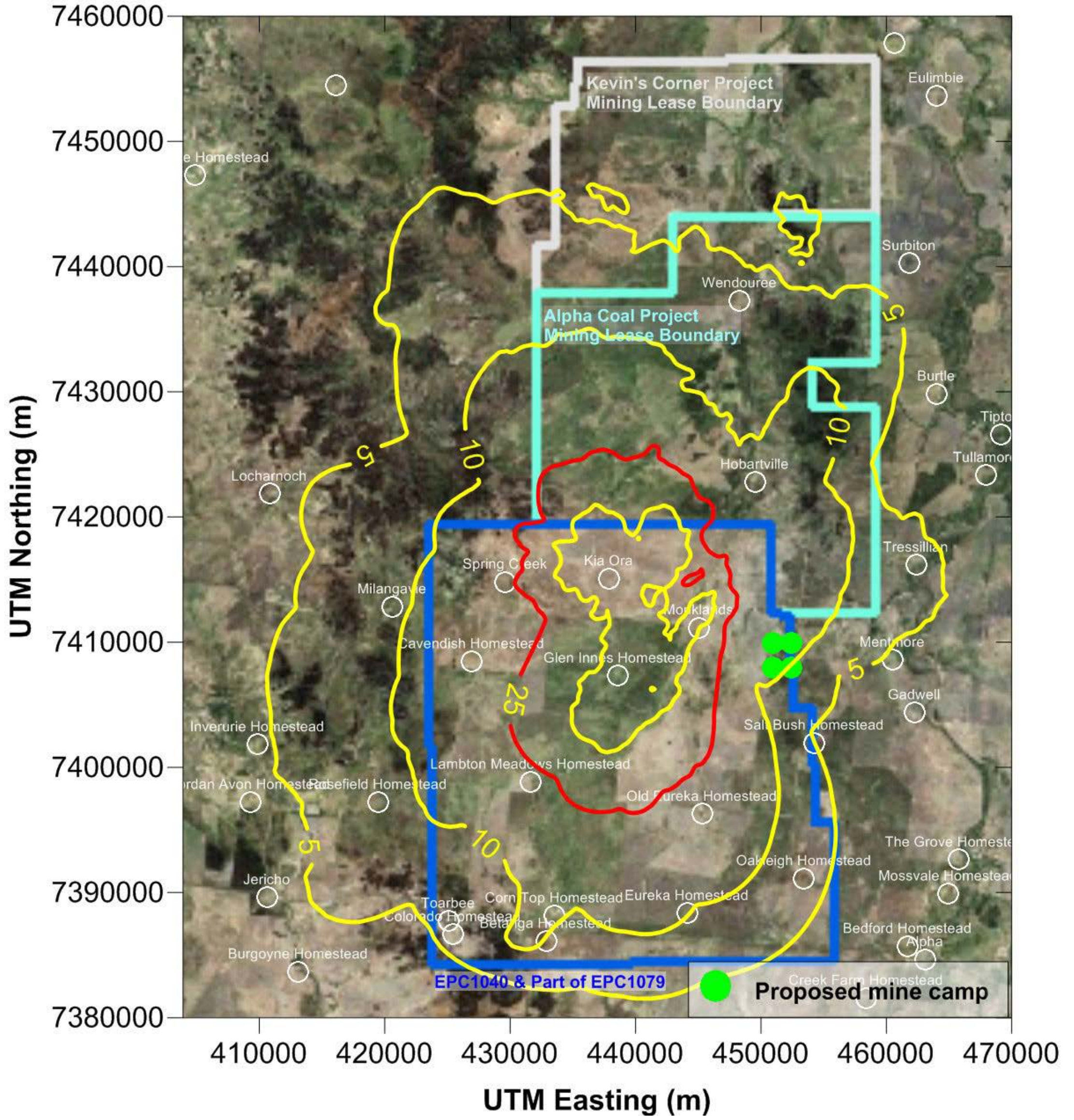
Species:	Location:	Scenario:	Percentile:	Averaging Time:
PM_{10}	Galilee Coal Project	Project emissions (Year 19) – maximum emissions	Average	Annual
Model Used:	**Units:**	**Guideline:**	**Met Data:**	**Plot:**
CALPUFFv6	µg/m³	**EPP (Air) = 30µg/m³**	TAPM Generated	J Weidmann

Figure 10: Predicted annual average ground-level concentrations of TSP – Year 19 – maximum mine emissions



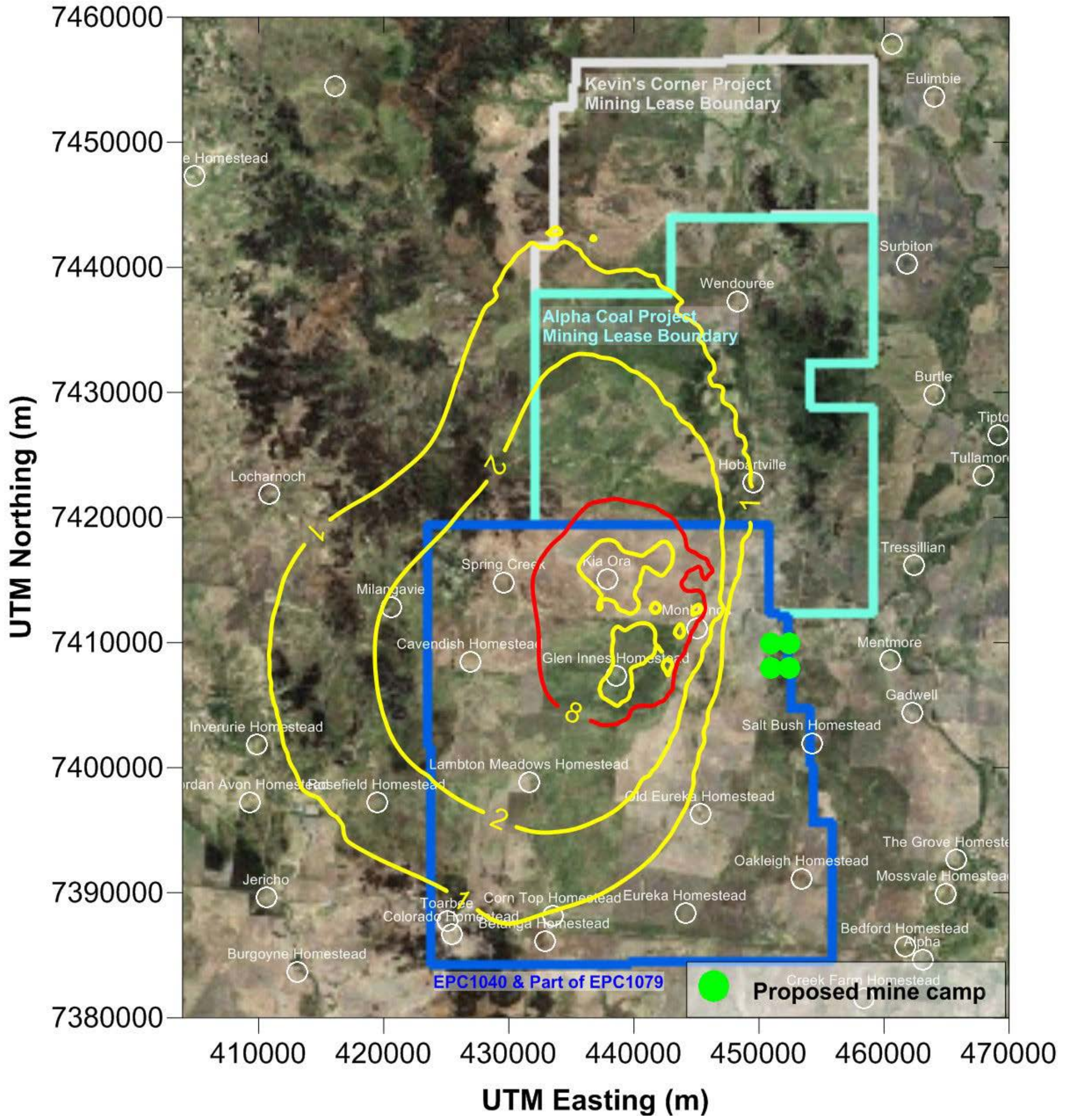
Species:	**Location:**	**Scenario:**	**Percentile:**	**Averaging Time:**
TSP	Galilee Coal Project	Project emissions (Year 19) – maximum emissions	Average	Annual
Model Used:	**Units:**	**Guideline:**	**Met Data:**	**Plot:**
CALPUFFv6	µg/m³	**EPP (Air) = 90µg/m³**	TAPM Generated	J Weidmann

Figure 11: Predicted maximum ground-level concentrations of $PM_{2.5}$ – Year 19 – maximum mine emissions



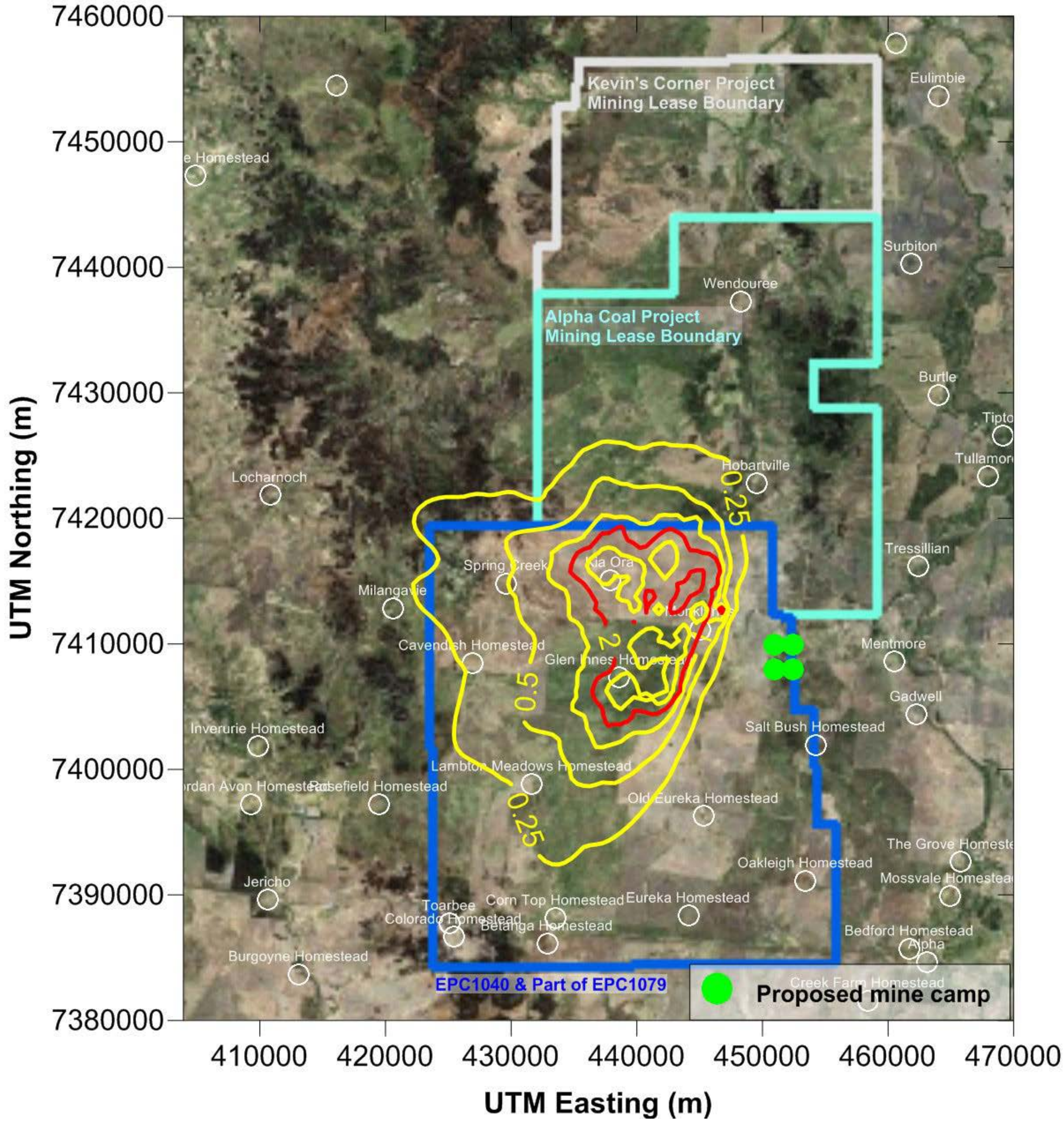
Species:	Location:	Scenario:	Percentile:	Averaging Time:
$PM_{2.5}$	Galilee Coal Project	Project emissions (Year 19) – maximum emissions	Maximum	24-hour
Model Used:	**Units:**	**Guideline:**	**Met Data:**	**Plot:**
CALPUFFv6	µg/m³	**EPP (Air) = 25µg/m³**	TAPM Generated	J Weidmann

Figure 12: Predicted annual average ground-level concentrations of $PM_{2.5}$ – Year 19 – maximum mine emissions



Species:	Location:	Scenario:	Percentile:	Averaging Time:
$PM_{2.5}$	Galilee Coal Project	Project emissions (Year 19) – maximum emissions	Average	Annual
Model Used:	**Units:**	**Guideline:**	**Met Data:**	**Plot:**
CALPUFFv6	µg/m³	**EPP (Air) = 8µg/m³**	TAPM Generated	J Weidmann

Figure 13: Predicted annual average dust deposition rates – Year 19 – maximum mine emissions



Species:	Location:	Scenario:	Percentile:	Averaging Time:
TSP (Dust deposition)	Galilee Coal Project	Project emissions (Year 19) – maximum emissions	Average	Annual
Model Used:	**Units:**	**Guideline:**	**Met Data:**	**Plot:**
CALPUFFv6	g/m²/month	**2 g/m²/month (project only)**	TAPM Generated	J Weidmann

Cumulative air quality impact assessment

A cumulative air quality assessment was conducted using estimated emission rates for the proposed Alpha Coal Mine and the proposed Kevin's Corner Coal Mine located immediately to the north of the Galilee Coal Project (at the time of assessment no information was available for the Carmichael Coal Mine or the South Galilee Coal Project).

Estimated emission rates for TSP and PM_{10} were sourced from the following:

- Report – *Alpha Coal Mine Project Air Quality Assessment* – Model Refinements – Report prepared for Hancock Coal Pty Ltd – 21 May 2012 (URS, 2012) *http://hancockcoal.com.au/index.cfm?objectid=7D6BCEBA–1372–5CE6–24482707D66C29AF, and*
- Report – *Air Quality Assessment for the Kevin's Corner EIS Project* – Report prepared for Hancock Coal Pty Ltd – 6 April 2011 (URS, 2011).

In order to model worst case cumulative impacts that best coincide with the worst case impacts for the Galilee Coal Project the following operational years were chosen for Alpha coal mine and Kevin's Corner coal mine:

- Alpha Coal Mine – Year 20, and
- Kevin's Corner – Year 25.

It is estimated that these years would most closely coincide with Year 19 emissions from the Galilee Coal Project and are also considered to be representative of worst case impacts from both surrounding proposed mines.

Estimated emissions (TSP, PM_{10}) for Year 20 operations at the Alpha Coal Mine are presented in Table 13.

Table 13: Modelled emissions for Alpha Coal Mine – Year 20

Emission Source Name	Estimated emissions (kg/year) year 20		Temporal variation
	TSP	PM_{10}	
Topsoil – Disturbance and Rehabilitation	65,264	32,632	Wind dependent
Overburden & In-Pit – IPCC	103,520	51,760	Wind dependent
Overburden & In-Pit – Drilling and Blasting	323,075	167,999	Constant
Overburden & In-Pit – Dragline	2,148,381	343,741	Wind dependent
Overburden & In-Pit – FEL of Overburden into Trucks	15,828	7,439	Constant
Overburden & In-Pit – Transport of Overburden to Dumps	5,444,220	1,361,055	Constant
Overburden & In-Pit – Truck Dumping at Overburden Dumps	1,388,364	499,811	Constant
Overburden & In-Pit – FEL coal trucks	276,765	132,847	Constant
Overburden & In-Pit – Dozers	136,738	35,552	Constant
Overburden & In-Pit – Graders	33,091	14,891	Constant
ROM Activities – Processing	0	0	Constant
ROM Activities – Truck Dumping at ROM	193,312	81,191	Constant
ROM Activities – FEL at ROM	55,352	26,569	Constant
ROM Activities – Dozer hours Coal at ROM total	18,752	5,438	Constant
ROM Activities – Wind Erosion from Stockpiles	1,458	729	Wind dependent
ROM to CHPP Conveyor – Conveyors	832	416	Wind dependent
ROM to CHPP Conveyor – Miscellaneous Transfer Points	8,966	4,214	Constant
CHPP Activities – Processing	5,359	2,090	Constant
CHPP Activities – FEL at CHPP	16,606	7,971	Constant
CHPP Activities – Dozer Hours Coal at CHPP	376	109	Constant
CHPP Activities – Loading Stockpiles	21,286	9,153	Constant
CHPP Activities – Unloading from Stockpiles	10,851	4,666	Constant
CHPP Activities – CHPP Conveyors	80	40	Wind dependent
CHPP Activities – Miscellaneous Transfer Points	1,734	815	Constant
CHPP Activities – Wind Erosion from Stockpiles	15,464	7,732	Wind dependent
Main Haul Roads – Transport of Coal to ROM	2,582,464	645,616	Constant
Main Haul Roads – Transport of Rejects to Dumps	0	0	Constant
Tailing Storage Facility – Wind Erosion	25,358	12,679	Wind dependent
Total Estimated Emissions:	**12,893,496**	**3,457,155**	

Source: Report – *Alpha Coal Mine Project Air Quality Assessment – Model Refinements* – Report prepared for Hancock Coal Pty Ltd – 21 May 2012 (URS, 2012).

Estimated emissions (TSP, PM_{10}) for Year 25 operations at the Kevin's Corner coal mine are presented in Table 14.

Table 14: Modelled emissions for Kevin's Corner Coal Mine – Year 25

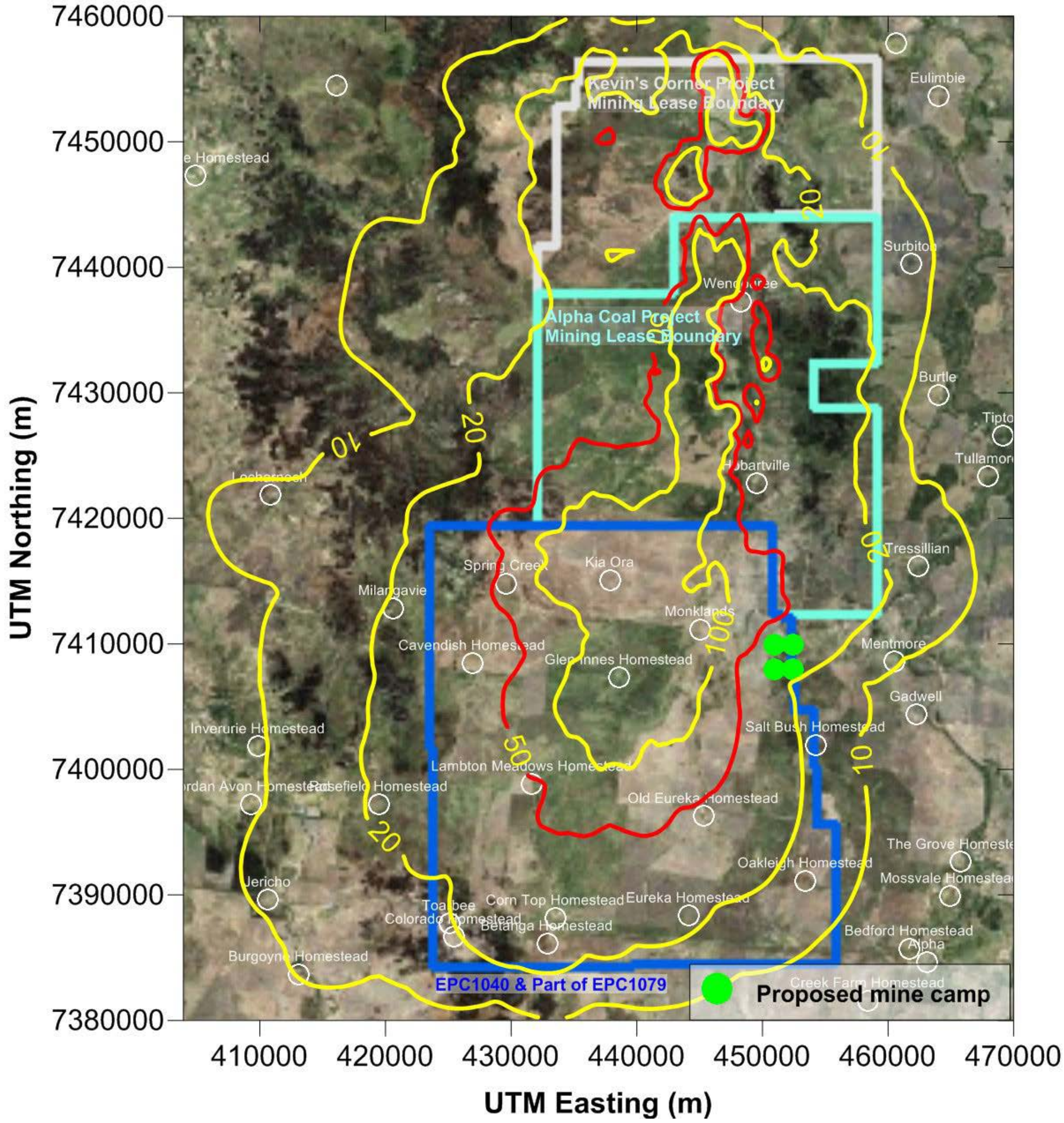
Emission Source Name	Estimated emissions (kg/year) year 25		Temporal variation
	TSP	PM_{10}	
Disturbance & rehabilitation	28,277	14,139	Wind dependent
Drilling and blasting	9,573	4,981	Constant
Dragline operation	1,818,745	294,442	Constant
FEL of overburden into trucks	34,977	16,543	Constant
Transport of overburden to trucks (level 2 watering)	883,365	193,509	Constant
Truck dumping at overburden dumps	861,788	361,951	Constant
FEL of coal trucks	359,479	172,827	Constant
Dozers	300,181	73,761	Constant
Graders	728,085	194,589	Constant
Wind erosion from pits	37,932	37,932	Wind dependent
Wind erosion from overburden stockpiles	215,942	107,971	Wind dependent
Processing	–	–	Constant
Truck dumping at ROM	175,042	38,240	Constant
Dozer – coal at ROM (total)	83,994	48,408	Constant
Coal conveyors	323	128	Wind dependent
Conveyor transfer points	91,059	43,069	Constant
Coal processing	173,442	68,375	Constant
Loading of coal stockpiles	22,270	10,067	Constant
Misc transfer points	60,691	28,705	Wind dependent
Wind erosion from stockpiles	6,163	3,082	Wind dependent
Transport of coal to ROM (level 2 watering)	552,923	103,710	Constant
Transport of rejects to dumps (level 2 watering)	92,912	30,655	Constant
Wind erosion from tailings storage facility	112,128	56,064	Wind dependent
Total (kg/year)	**6,649,291**	**1,903,148**	

Source: Report – *Air Quality Assessment for the Kevin's Corner EIS Project* – Report prepared for Hancock Coal Pty Ltd – 6 April 2011 (URS, 2011).

The air quality modelling results for the cumulative impact assessment are shown in the following figures:

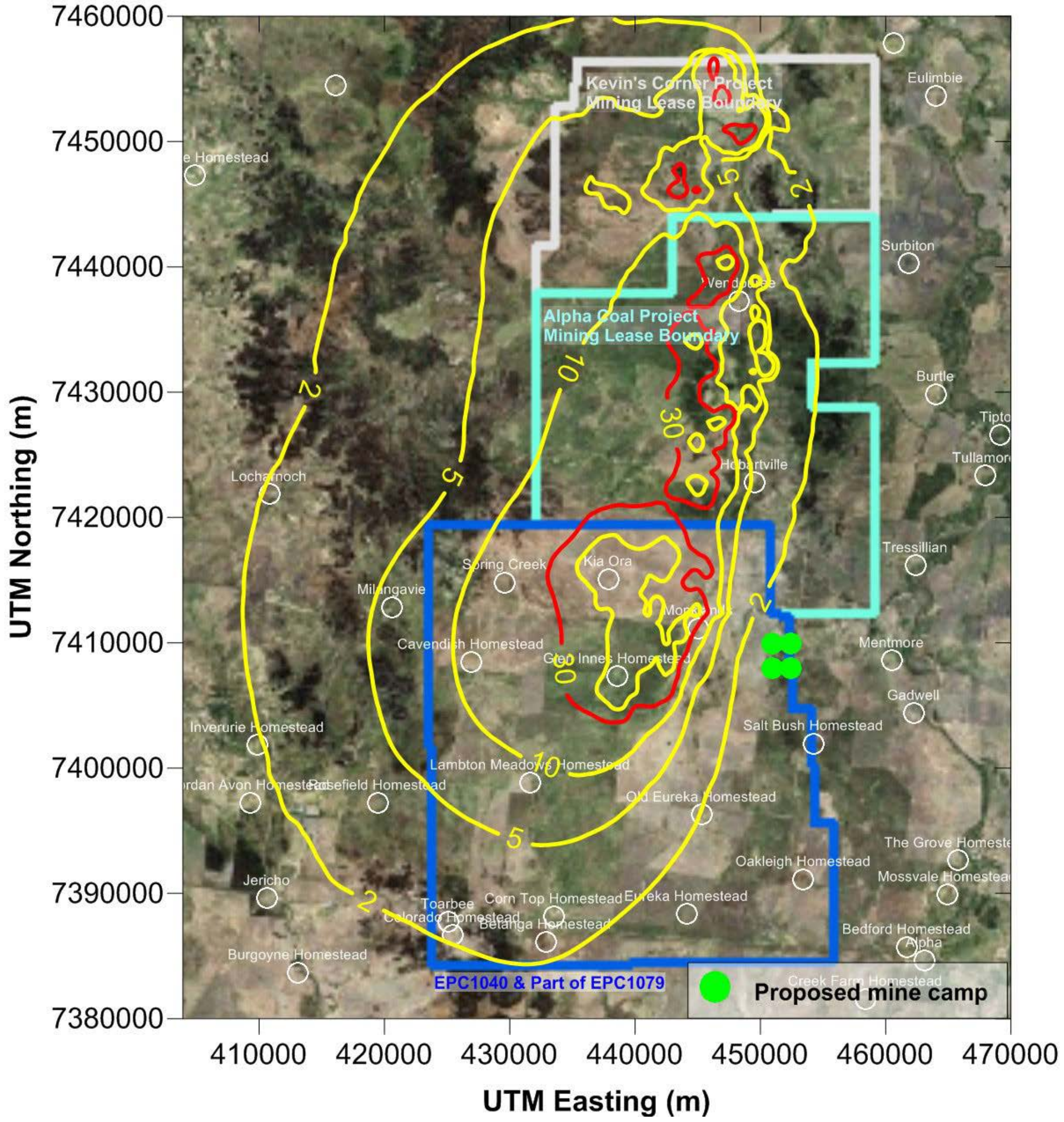
- Maximum 24–hour PM_{10} ground level concentrations (Figure 14)
- Annual average PM_{10} ground level concentrations (Figure 15)
- Annual average TSP ground level concentrations (Figure 16)
- Maximum 24-hour $PM_{2.5}$ ground level concentrations (Figure 17)
- Annual average $PM_{2.5}$ ground level concentrations (Figure 18), and
- Average monthly dust deposition (Figure 19).

Figure 14: Cumulative air quality impact assessment – Predicted maximum 24-hour ground-level concentrations of PM_{10} – Year 19 – maximum mine emissions



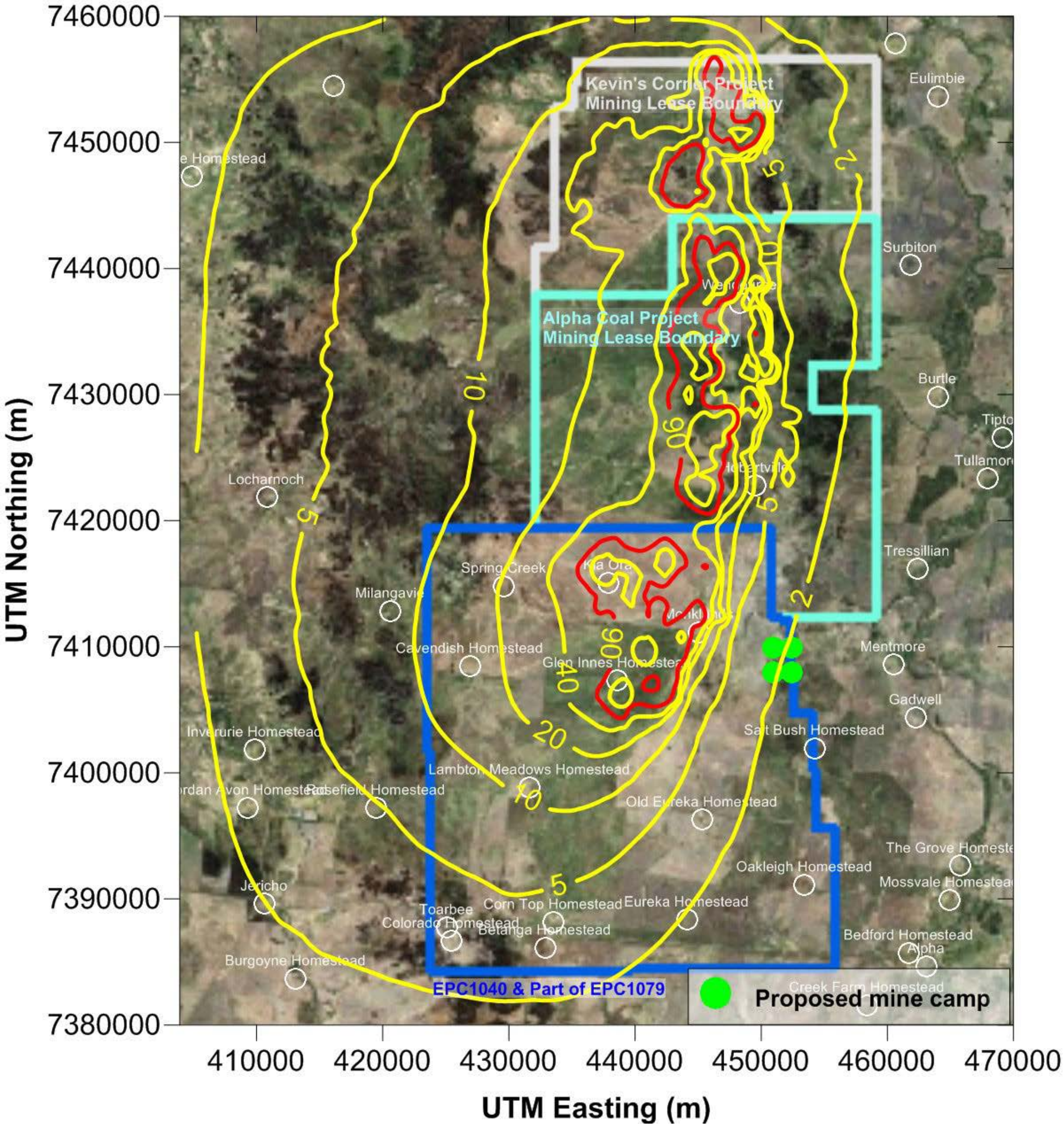
Species:	Location:	Scenario:	Percentile:	Averaging Time:
PM_{10}	Galilee Coal Project	Project emissions (Year 19) – maximum emissions and maximum emissions for the proposed Alpha coal mine and Kevin's Corner coal mine	Maximum	24-hour
Model Used:	**Units:**	**Guideline:**	**Met Data:**	**Plot:**
CALPUFFv6	µg/m³	**EPP (Air) = 50µg/m³**	TAPM Generated	J Weidmann

Figure 15: Cumulative air quality impact assessment – Predicted annual average ground-level concentrations of PM_{10} – Year 19 – maximum mine emissions



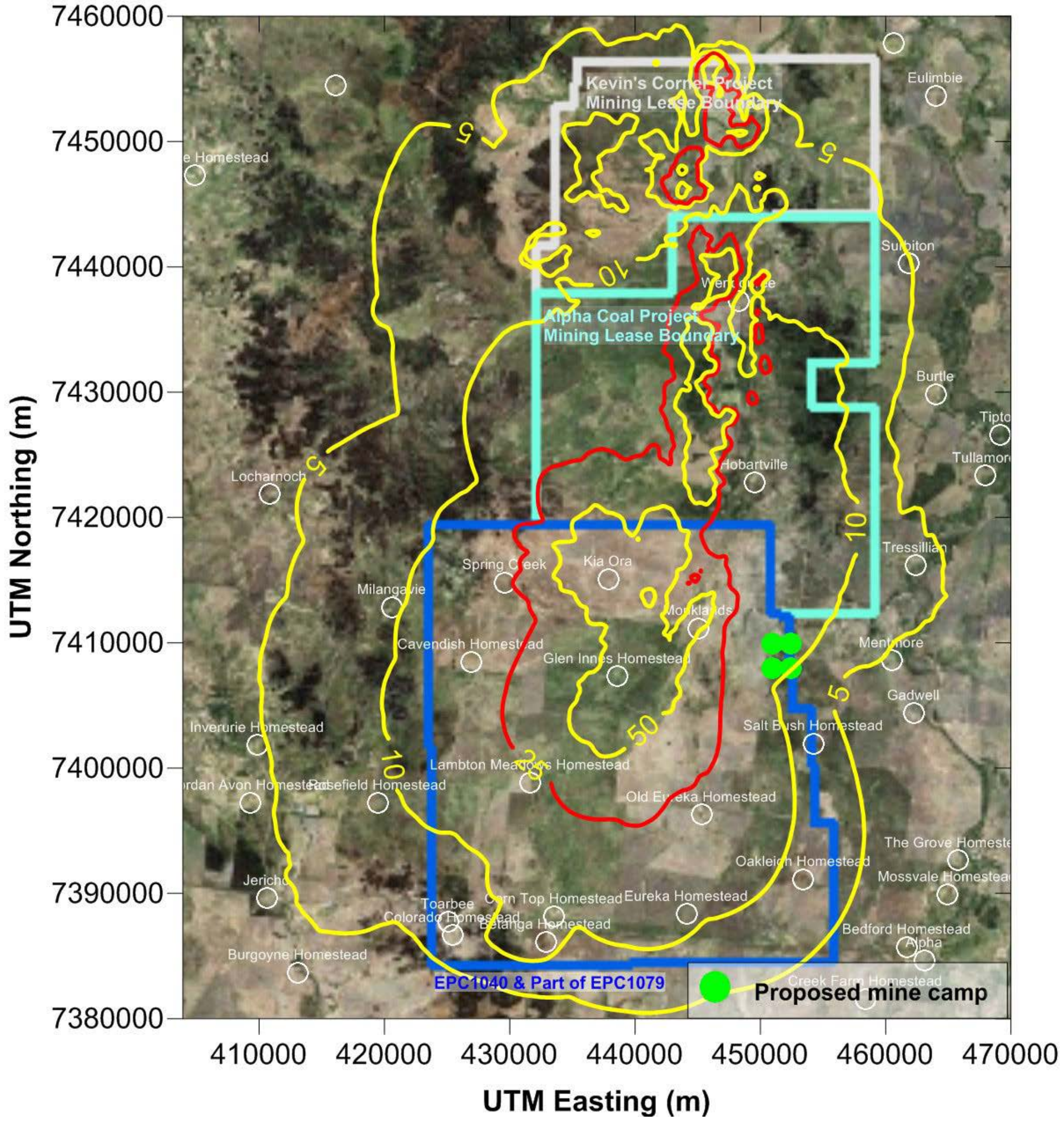
Species:	Location:	Scenario:	Percentile:	Averaging Time:
PM_{10}	Galilee Coal Project	Project emissions (Year 19) – maximum emissions and maximum emissions for the proposed Alpha coal mine and Kevin's Corner coal mine	Average	Annual
Model Used:	**Units:**	**Guideline:**	**Met Data:**	**Plot:**
CALPUFFv6	µg/m³	**EPP (Air) = 30µg/m³**	TAPM Generated	J Weidmann

Figure 16: Cumulative air quality impact assessment Predicted annual average ground-level concentrations of TSP – Year 19 – maximum mine emissions



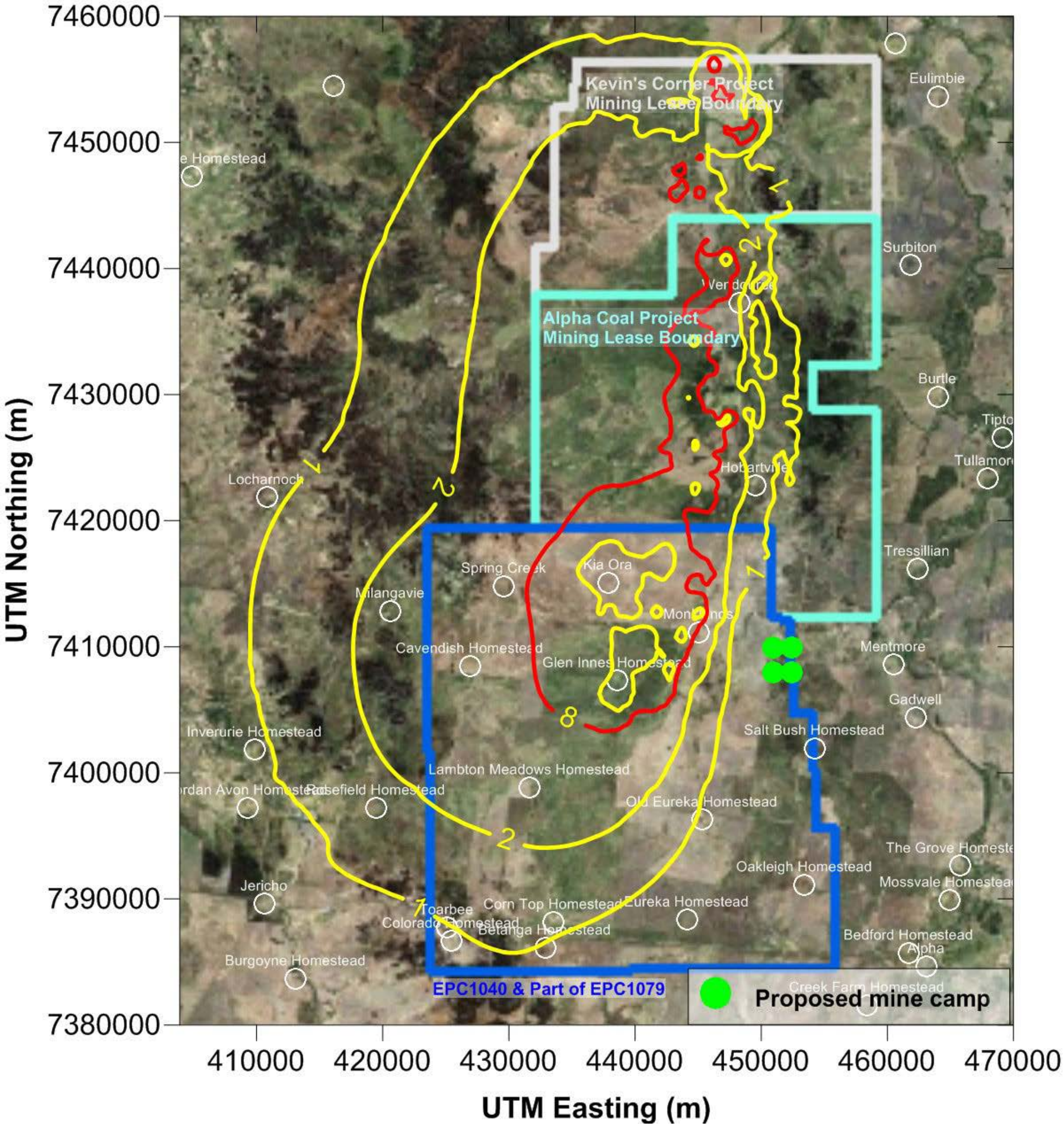
Species:	Location:	Scenario:	Percentile:	Averaging Time:
TSP	Galilee Coal Project	Project emissions (Year 19) – maximum emissions and maximum emissions for the proposed Alpha coal mine and Kevin's Corner coal mine	Average	Annual
Model Used:	**Units:**	**Guideline:**	**Met Data:**	**Plot:**
CALPUFFv6	μg/m³	**EPP (Air) = 90μg/m³**	TAPM Generated	J Weidmann

Figure 17: Cumulative air quality impact assessment – Predicted maximum ground-level concentrations of $PM_{2.5}$ – Year 19 – maximum mine emissions



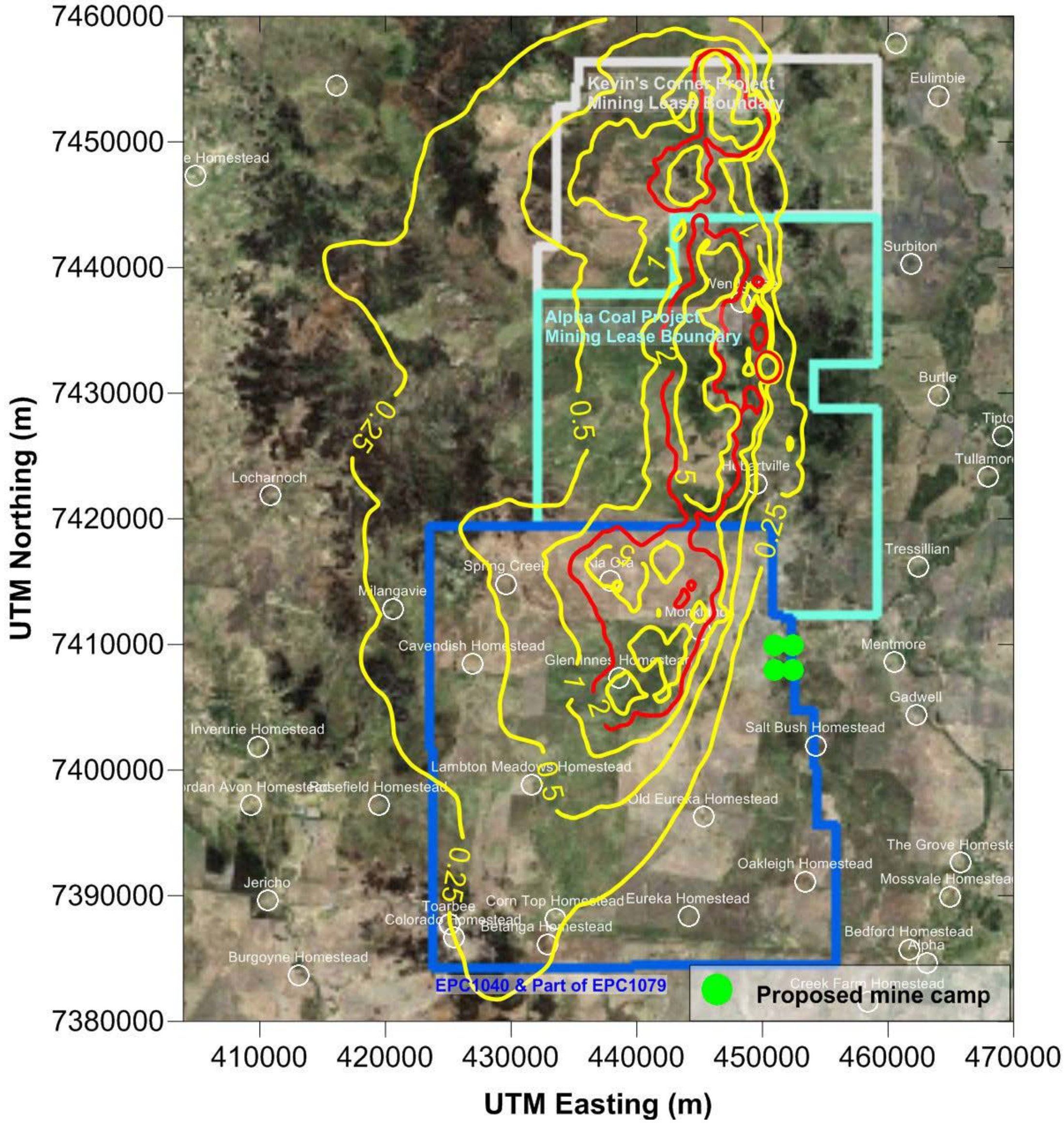
Species:	Location:	Scenario:	Percentile:	Averaging Time:
$PM_{2.5}$	Galilee Coal Project	Project emissions (Year 19) – maximum emissions and maximum emissions for the proposed Alpha coal mine and Kevin's Corner coal mine	Maximum	24-hour
Model Used:	**Units:**	**Guideline:**	**Met Data:**	**Plot:**
CALPUFFv6	μg/m³	**EPP (Air) = 25μg/m³**	TAPM Generated	J Weidmann

Figure 18: Cumulative air quality impact assessment – Predicted annual average ground-level concentrations of $PM_{2.5}$ – Year 19 – maximum mine emissions



Species:	Location:	Scenario:	Percentile:	Averaging Time:
$PM_{2.5}$	Galilee Coal Project	Project emissions (Year 19) – maximum emissions and maximum emissions for the proposed Alpha coal mine and Kevin's Corner coal mine	Average	Annual
Model Used:	**Units:**	**Guideline:**	**Met Data:**	**Plot:**
CALPUFFv6	µg/m³	**EPP (Air) = 8µg/m³**	TAPM Generated	J Weidmann

Figure 19: Cumulative air quality impact assessment – Predicted annual average dust deposition rates – Year 19 – maximum mine emissions



Species:	Location:	Scenario:	Percentile:	Averaging Time:
TSP (Dust deposition)	Galilee Coal Project	Project emissions (Year 19) – maximum emissions and maximum emissions for the proposed Alpha coal mine and Kevin's Corner coal mine	Average	Annual
Model Used:	**Units:**	**Guideline:**	**Met Data:**	**Plot:**
CALPUFFv6	g/m²/month	**2 g/m²/month (project only)**	TAPM Generated	J Weidmann

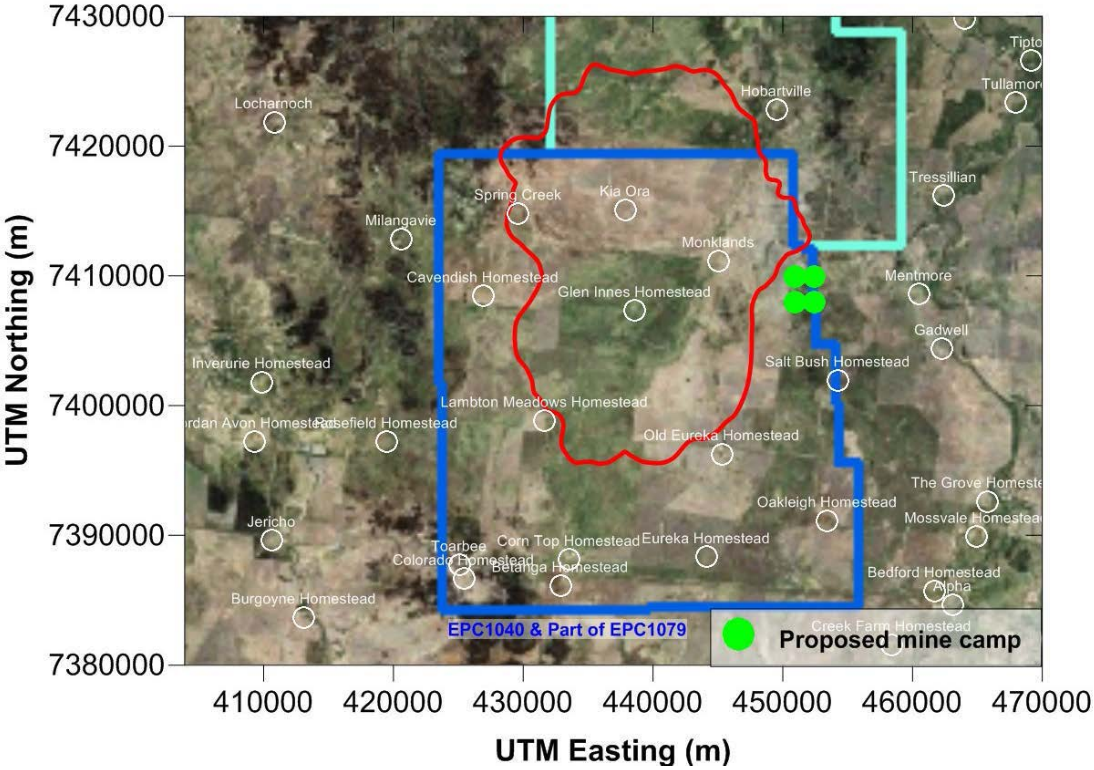
Analysis of Results

Based on the air quality modelling results and recommended acquisition criteria presented in Table 10, the following sensitive receptors will be acquired or relocated by the Galilee Coal Project in order to avoid significant air quality impacts:

- Kia Ora
- Monklands
- Spring Creek, and
- Glen Innes Homestead (Bimblebox Nature Reserve).

The affected sensitive receptors are shown in Figure 20.

Figure 20: Map of sensitive receptors and recommended acquisition criteria



The next highest air quality impacts are predicted for Lambton Meadows homestead, Hobartville and the Cavendish homestead.

Predicted daily PM_{10} concentrations for each receptor are shown in Figure 21, Figure 22 and Figure 23.

Figure 21: Predicted 24-hour PM_{10} concentration at Lambton Meadows homestead (cumulative impact)

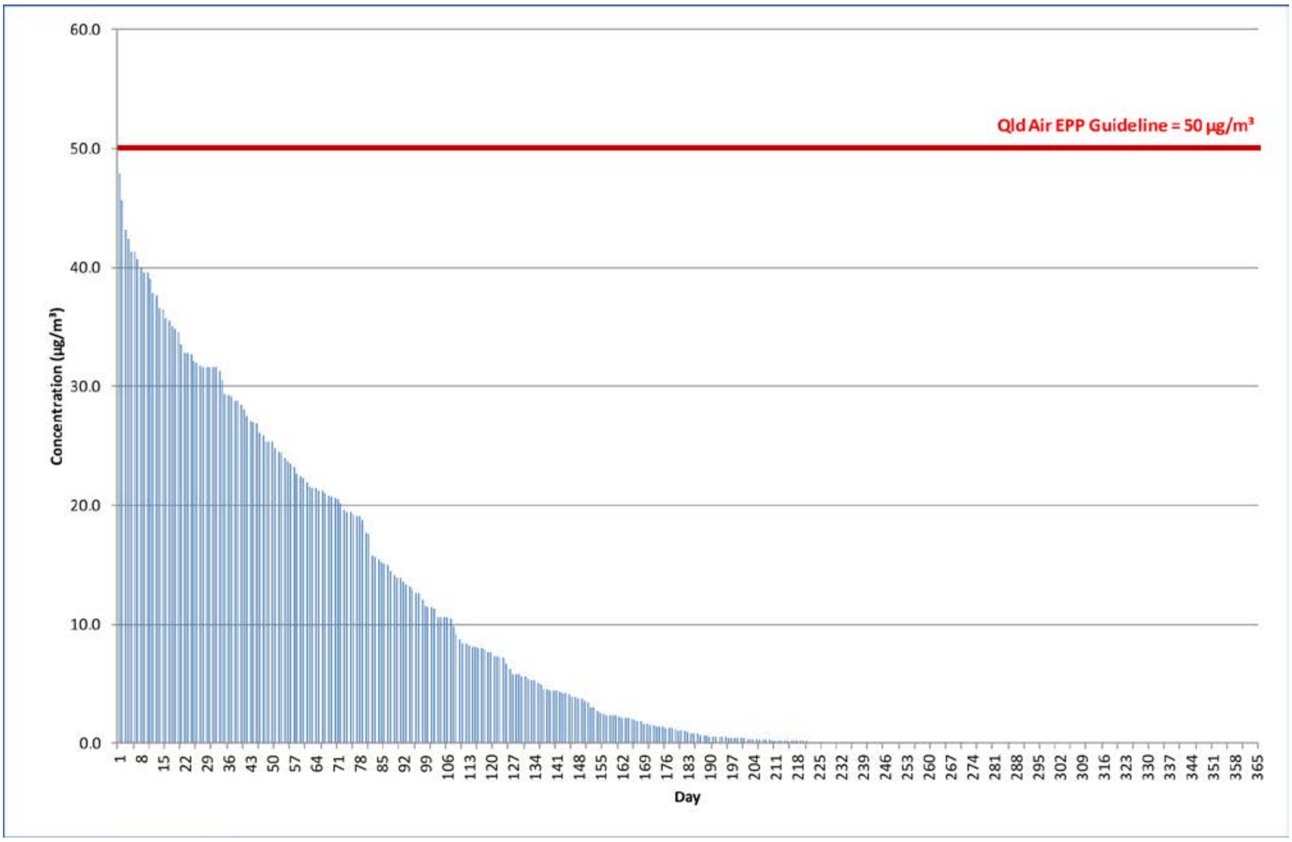


Figure 22: Predicted 24-hour PM_{10} concentration at Hobartville (cumulative impact)

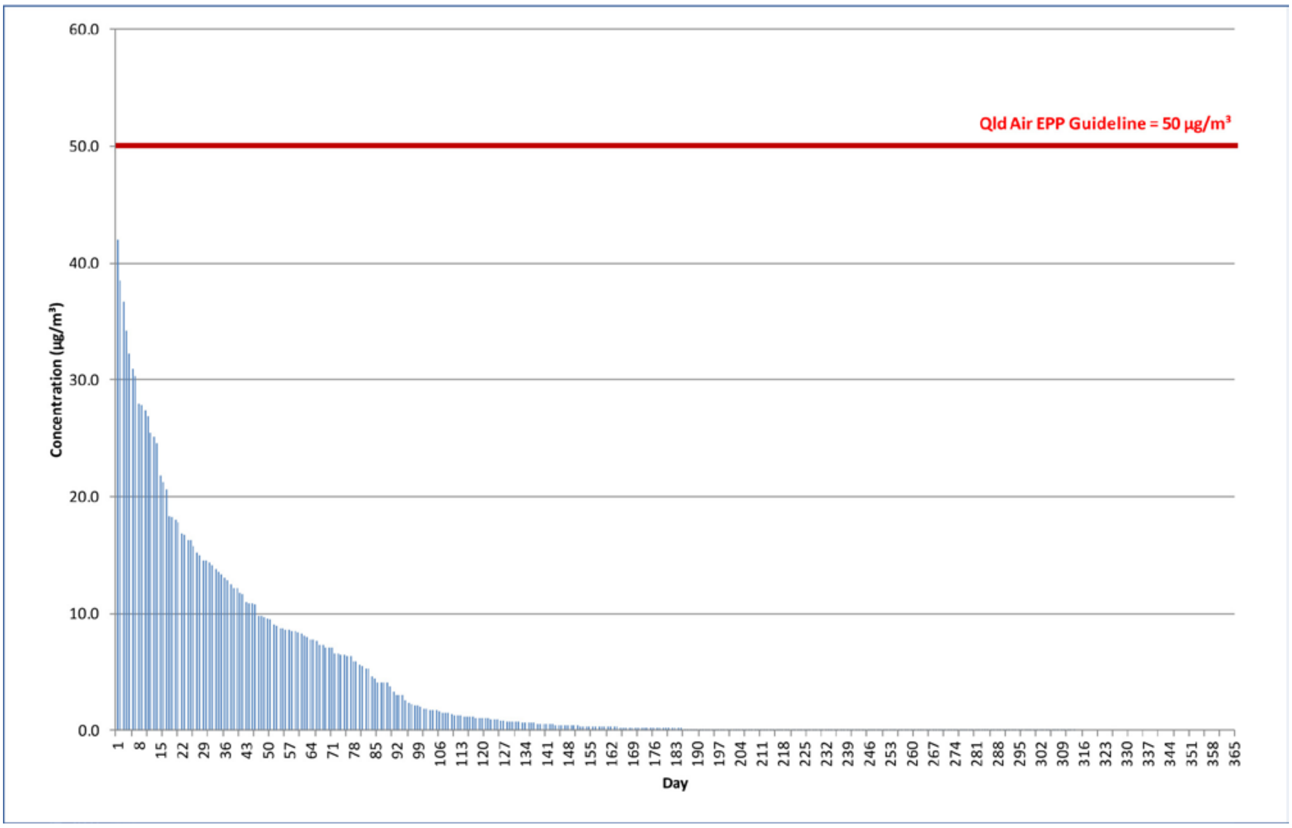
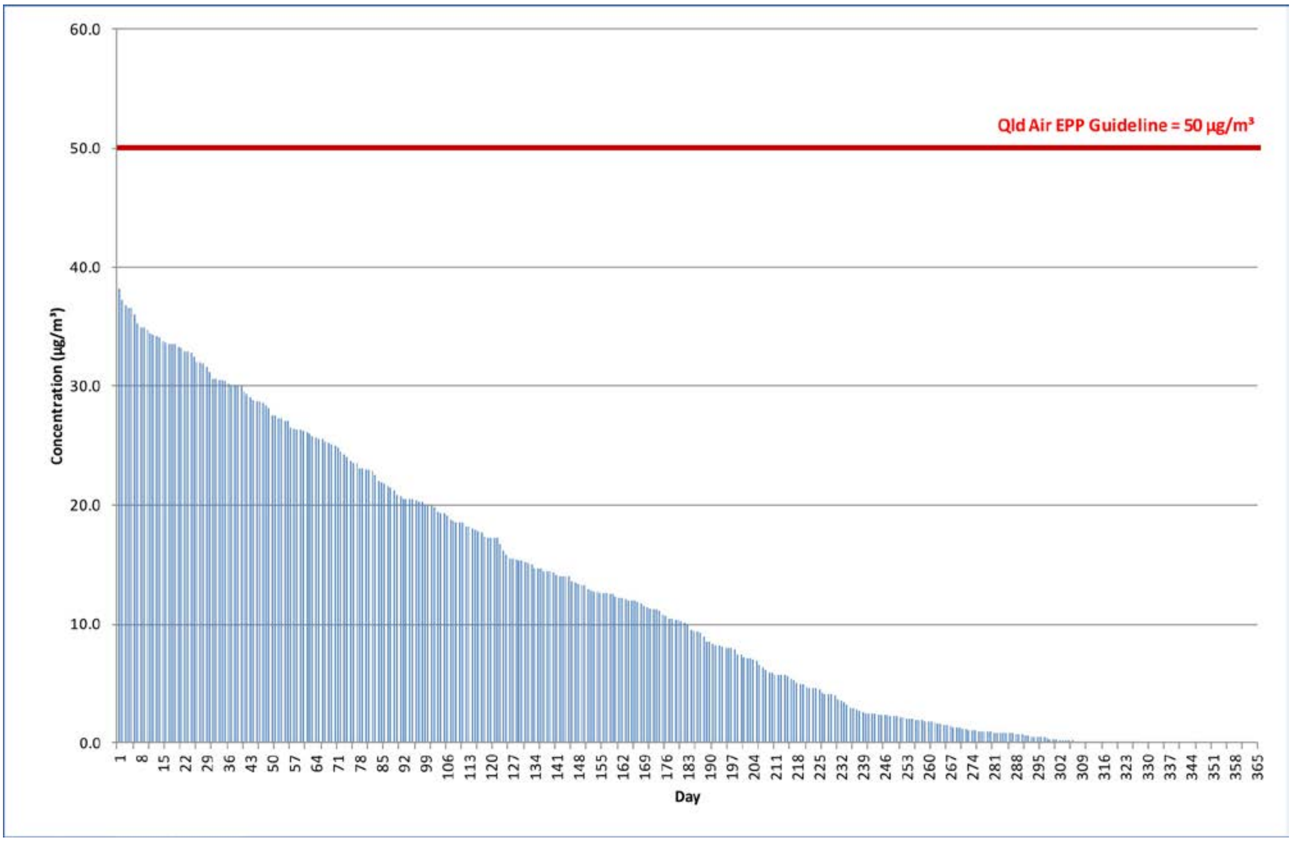


Figure 23: Predicted 24-hour PM_{10} concentration at Cavendish (cumulative impact)



The cumulative impact air quality model which includes maximum emissions from the Galilee Coal Project, Year 20 emissions from Alpha coal mine and Year 25 emissions from Kevin's Corner coal mine shows that air quality levels at these sensitive receptors is within Queensland air quality criteria.

However, it is important to note that background concentrations are not incorporated into the air quality modelling results for the cumulative air quality model. Background air quality was not incorporated into the cumulative air quality model as the model includes maximum emissions from the Galilee Coal Project, and the proposed Alpha and Kevin's Corner coal mines. During Year 19 of operation these emissions are estimated to account for over 95% of total particulate matter emission in the region. Elevated background events may occur on occasion due to regional events such as dust storms and bushfires. However, it is not possible to predict the occurrence of dust storms and bushfires accurately or meaningfully in a localised air quality model. For example, the 2009 dust storms experienced over much of eastern Australia were generated in South Australia and were transported through NSW and Queensland.

Furthermore, the *National Environment Protection (Ambient Air Quality) Measure* (Air NEPM) uses the 6^{th} highest 24-hour PM_{10} concentration in order to compare monitoring results to relevant air quality criteria. The Air NEPM 24-hour air quality guideline is consistent with the air quality criterion used in this air quality assessment. However, using the 6^{th} highest concentration under the Air NEPM for monitoring results was designed to eliminate the reporting of elevated monitored levels due to natural events, such as bushfires and dust storms. Recently, the Air NEPM was reviewed. A recommendation from the review was that the reporting of the 6^{th} highest concentration is removed from the Air NEPM and that all elevated ambient air quality levels events due to natural events are excluded from reporting and from comparison to the Air NEPM air quality guideline. Therefore, by including the large majority of particulate matter emissions in the region in the cumulative air quality model, and using the 1^{st} highest predicted 24-hour PM_{10} concentration, the model is considered to be representative of the cumulative impact from the surrounding mines in the region.

It is expected that on-going air quality monitoring at sensitive receptors will be required in order to manage air quality impacts on an on-going basis as part of a reactive air quality management plan. That plan will incorporate continuous air quality monitoring adjacent to sensitive receptors. Additional emission controls such as increased road watering and modifying operations is recommended when high particulate matter concentrations are recorded at sensitive receptors. More detail on the preliminary air quality monitoring plan is provided in the response to Issue Reference 12026.

Submitter No.	326	Issue Reference:	12019
Submitter Type	NGO	TOR Category	**Air Quality** / Health & Safety
Name	**Public Health Association of Australia**	Relevant EIS Section	

DETAILS OF THE ISSUE

There will be an increase in disease through coal combustion emissions and processing through contamination of air, water and soil.

PROPONENT RESPONSE

In order to manage adverse health effects and based on the air quality modelling results, it the following sensitive receptors will be acquired or relocated by the Galilee Coal Project in order to avoid significant air quality impacts:

- Kia Ora
- Monklands
- Spring Creek, and
- Glen Innes Homestead (Bimblebox Nature Reserve).

The revised air quality modelling shows that predicted concentrations at surrounding receptors are within the Queensland EPP Air guidelines which are designed to protect against adverse health impacts due to air pollution sources.

Waratah Coal is committed to ensuring that air quality at surrounding sensitive receptors is maintained throughout the life of the mine. Particulate matter from the coal mine will be continuously monitored. A reactive dust management plan will be prepared once the mine is operational that details actions that must be taken when high dust levels are monitored near the mine boundary and at the closest sensitive receptors (residences).

SUBMITTER NO.	420	ISSUE REFERENCE:	12020 / 19002 / 17010
SUBMITTER TYPE	Government	TOR CATEGORY	**Air Quality** / Health & Safety
NAME	**Queensland Health**	RELEVANT EIS SECTION	Air Quality, Vol 2 Chapter 10, (Mine) / Health / EMP

DETAILS OF THE ISSUE

Queensland Health is concerned that modelled PM_{10} air emissions exceed the goal specified by the Environmental Protection (Air) Policy 2009 of PM_{10} – 50 µg/m^3.

The highest exceedences of the goal were modelled at 199%, as specified within s10.2.4.5.1, Table 4. It is noted by Queensland Health that the modelling encapsulated the proposed mitigation measures as described by the NPI manual, however it was noted that not all proposed mitigation measures were able to be modelled.

Queensland Health is concerned that the proponent has not assessed the increase in risk to human health at the surrounding sensitive receivers of respiratory illnesses and symptoms due to exceedences in the air quality goal. Further details must be provided to quantify the risks and the implementation of the mitigation strategies to reduce these health risks.

The proponent should provide further assessment and clarification in relation to the air quality modelling and the proposed mitigation strategies to ensure the average concentrations for 24-hour PM_{10} air quality goals are achieved at all sensitive receptors.

PROPONENT RESPONSE

In order to manage adverse health effects and based on the air quality modelling results, the following sensitive receptors will be acquired or relocated by Galilee Coal Project in order to avoid significant air quality impacts:

- Kia Ora
- Monklands
- Spring Creek, and
- Glen Innes Homestead (Bimblebox Nature Reserve).

The cumulative impact air quality model which includes maximum emissions from the Galilee Coal Project, Year 20 emissions from Alpha coal mine and Year 25 emissions from Kevin's Corner coal mine shows that exceedances are not expected at any other sensitive receptor surrounding the mine.

However, air quality will be managed on an on-going basis by using a reactive air quality management plan that incorporates a continuous air quality monitor adjacent to nearby sensitive receptors. Additional emission controls such as increased road watering and modifying operations is recommended when high particulate matter concentrations are recorded at sensitive receptors. More detail on the preliminary air quality monitoring plan is provided in the response to Issue Reference 12026.

Waratah Coal is committed to ensuring that air quality at surrounding sensitive receptors is maintained throughout the life of the mine. Particulate matter from the coal mine will be continuously monitored. A reactive dust management plan will be prepared once the mine is operational that details actions that must be taken when high dust levels are monitored near the mine boundary and at the closest sensitive receptors (residences).

Submitter No.	1840	Issue Reference:	12021
Submitter Type	Council	TOR Category	**Air Quality** / Land
Name	**Barcaldine Regional Council**	Relevant EIS Section	Air Quality, Vol 2 Chapter 10

DETAILS OF THE ISSUE

Comment that '...CO_2 and methane CH_4 emitted from this project will not impact air quality as they have no adverse impact on human health and the environment' is misleading.

Note proposed improvements to energy efficiency.

The proponent noted that third party off-sets may be considered for emissions through investment. Council wish to discuss further potential for options for off-sets which may also support local community and mitigation of impacts occurring within the region.

Stockpile management, operations and decommissioning are all important factors to be considered in mitigation of impacts. The proposed method for extraction may also contribute to the impacts from mining activities with the open-cut long wall mining and underground mines and size/storage of stockpiles.

BRC note that the construction phase was not modelled for air quality impacts including cut/stripping and removal of topsoil.

PROPONENT RESPONSE

Comment that '...CO_2 and methane CH_4 emitted from this project will not impact air quality as they have no adverse impact on human health and the environment' is misleading.

This statement has been taken out of context. The original statement read (p273, Volume 2 – Mine, Chapter 10 – Air Quality and Greenhouse Gas):

> *"Greenhouse gases, carbon dioxide (CO_2) and methane (CH_4) emitted from this project will not impact air quality as they have no adverse impact on human health and the environment, except that they may lead to climate change. Even though methane is an organic component, it is very stable in the air and therefore has little impact on ozone formation or depletion. Therefore, the air quality impacts of greenhouse gases are not considered in this chapter."*

CO_2 and methane are greenhouse gases and are not relevant for air quality impact assessments.

The proponent noted that third party off-sets may be considered for emissions through investment. Council wish to discuss further potential for options for off-sets which may also support local community and mitigation of impacts occurring within the region.

Waratah Coal notes that Barcaldine Regional Council wishes to discuss the potential for options for offsets which may support local community. Waratah Coal is committed to investigating locally based projects for mitigation strategies, and welcome the opportunity to discuss this with BRC.

Stockpile management, operations and decommissioning are all important factors to be considered in mitigation of impacts. The proposed method for extraction may also contribute to the impacts from mining activities with the open-cut long wall mining and underground mines and size/storage of stockpiles.

A detailed air quality management plan will be developed once the project is approved that will include stockpile management, operations and decommissioning.

BRC note that the construction phase was not modelled for air quality impacts including cut/stripping and removal of topsoil.

One modelling scenario was considered in the air quality assessment to represent worst case air quality impacts. The air quality impact assessment considered worst case impact predicted by the proposed mine and surrounding proposed mines in the Galilee Basin.

Submitter No.	364	Issue Reference:	12025
Submitter Type	Government	TOR Category	Climate & Climate Change Adaptation / **Air Quality**
Name	**DEEDI (Fisheries Qld)**	Relevant EIS Section	Vol 2 Chap 10; 10.2.3.1

DETAILS OF THE ISSUE

Weather data – The lack of even one weather station on-site to provide base-line data on wind speed, rainfall behaviour and evaporation that affect dust generation and potential to establish rehabilitation is questioned.

Submitter suggests that collection of basic climatic data to inform future decision making in relation to rehabilitation planning should commence.

PROPONENT RESPONSE

A weather station has been installed and commenced collecting data on 27 April 2012. The following data is collected by the weather station:

- daily rainfall
- continuous wind speed, wind gust and direction
- continuous temperature
- continuous relative humidity
- continuous solar radiation, and
- continuous barometric pressure.

Evaporation rates are also monitored, parametrically using an Environdata FA056 Evaporation Calculation (EV30). Using this monitor, evaporation rates are calculated using monitored relative humidity, air temperature, wind speed and solar radiation. Evaporation rates will be used to inform the daily road watering requirements to control emissions from haul roads.

The weather station is currently located approximately 1km south south east from the sensitive receptor “Kia Ora”.

Submitter No.	420	Issue Reference:	12029 / 16032
Submitter Type	Government	TOR Category	Air Quality / Noise & Vibration
Name	Queensland Health	Relevant EIS Section	

DETAILS OF THE ISSUE

The EIS does not identify construction camps as sensitive receptors. The construction camps may be located in areas where the emissions from the project's construction may adversely affect the health and well-being of the workers. Queensland Health (QH) is therefore unable to assess whether the risks to workers involved in the project.

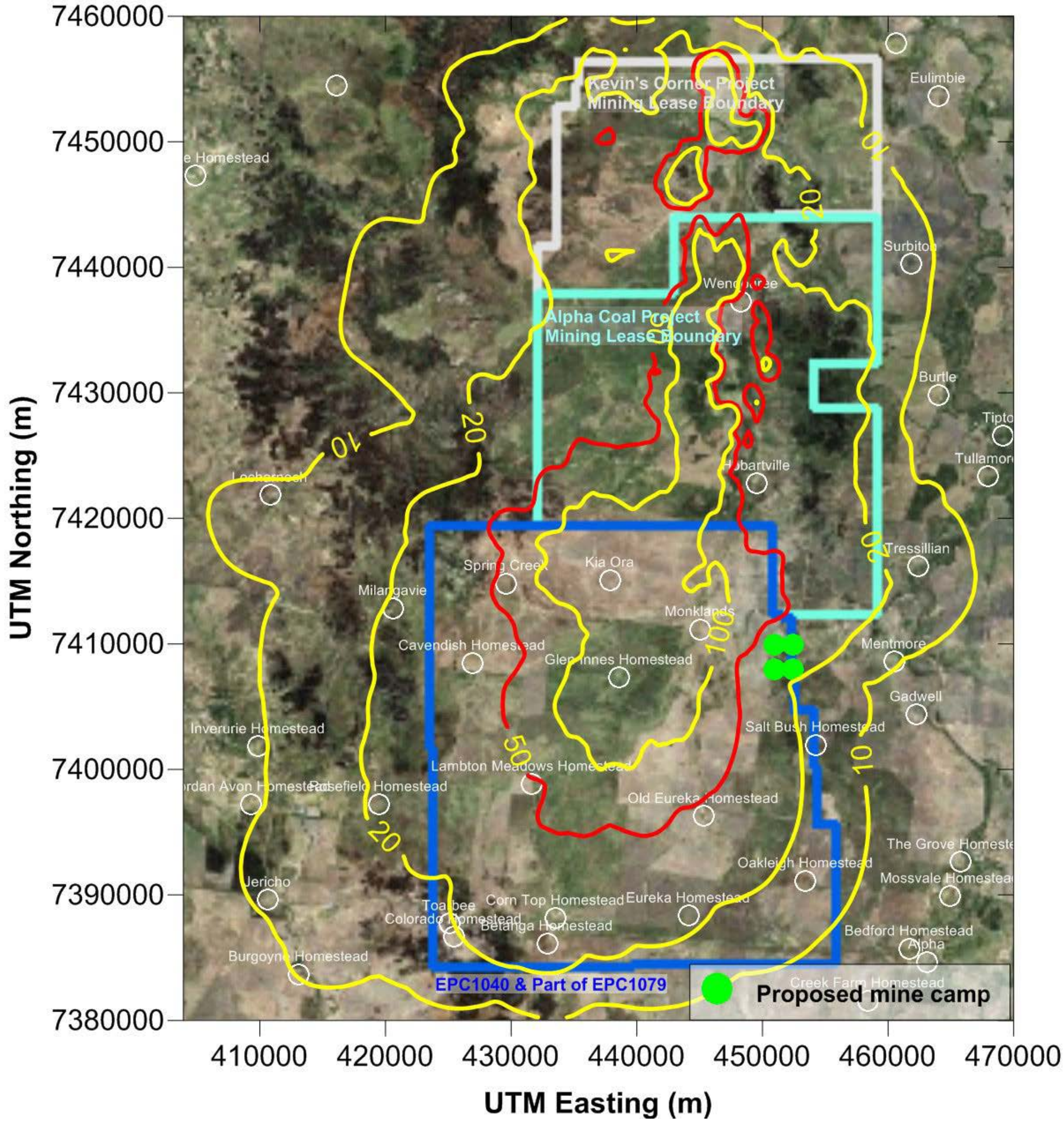
The proponent must assess the environmental values, incorporating human health and well–being as described in the Terms of Reference for the project, as they pertain to the proposed construction camps. In particular, assessments of the acoustic and air environments at the construction camps should be made, with appropriate mitigation measures put in place to ensure compliance with the relevant acoustic and air quality standards identified within the EIS.

PROPONENT RESPONSE

The location of the mine camp and the maximum predicted 24 hour PM_{10} concentration are shown in Figure 24. The concentration contour plot for the 24 hour PM_{10} is the most stringent in terms of the predicted area of impact surrounding the Galilee Coal Project. Therefore, Figure 24 shows that all relevant TSP, PM_{10} and $PM_{2.5}$ air quality guidelines are expected to be achieved at the mine camp location.

Final location, layout and design of the proposed construction camp is being finalised (see Figure 1: Mine Infrastructure Area at Issue Reference 6017 in Part C – 0A – Project Description) for proposed location of the mine construction and operation camp, with ground-truthing of the proposed area to be carried out in the near future. The proposed construction camp has been located at a suitable distance (and will be designed appropriately) to ensure that construction noise and vibration will achieve the noise criteria in the environmental management plan, specified in Table 1 in Section 2.0 the *Supplementary Noise Assessment Report* contained in *Appendices – Volume 2* of this SEIS.

Figure 24: Cumulative air quality impact assessment – Predicted 24 hour maximum PM_{10} concentrations and location of the mine camp



Species:	Location:	Scenario:	Percentile:	Averaging Time:
PM_{10}	Galilee Coal Project	Project emissions (Year 19) – maximum emissions and maximum emissions for the proposed Alpha coal mine and Kevin's Corner coal mine	Maximum	24 hour
Model Used:	**Units:**	**Guideline:**	**Met Data:**	**Plot:**
CALPUFFv6	µg/m³	**Qld EPP (Air) = 50 µg/m³**	TAPM Generated	J Weidmann

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