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Warkworth PAC

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Table 5: AAQ NEPM air quality standards and associated goal

Pollutant	Averaging period	Standard	Goal max. allowable exceedances
Carbon monoxide	8 hours	9.0 ppm	1 day a year
Nitrogen dioxide	1 hour 1 year	0.12 ppm 0.03 ppm	1 day a year none
Ozone	1 hour	0.10 ppm	1 day a year
	4 hours	0.08 ppm	1 day a year
Sulfur dioxide	1 hour	0.20 ppm	1 day a year
	1 day	0.08 ppm	1 day a year
	1 year	0.02 ppm	none
Particles as PM_{10}	1 day	50 $\mu g/m^3$	5 days a year
Lead	1 year	0.50 $\mu g/m^3$	none
Particles as $PM_{2.5}$	1 day 1 year	25 $\mu g/m^3$ 8 $\mu g/m^3$	not applicable not applicable

Particulate air pollution NEPM revision August 2014

Particle size	Old standard	New standard	Allowed excedences
PM 10 daily	50 ug/m^3	40 or 50	5 / year
PM10 annual	none	20	Nil
PM2.5 daily	25 ug/m^3 advisory	25 compulsory	Nil
PM2.5 annual	8 ug/m^3 advisory	8 compulsory	Nil

Timeline of Annual pm10 standards

- 1983 California adopts limit of 30ug/m3, replacing a TSP limit
- 1998 NSW EPA copies the Californian standard
- 1998 Australian NEPM does not include an annual standard for pm10
- 2002 California revises down to 20ug/m3
- 2011 Australian NEPM review recommends a pm10 annual limit
- 2013 NSW writes 1983 standard into SEPP
- 2014, July, proposed NEPM amendment released, with annual pm10 standard of 12, 16 or 20 ug/m3

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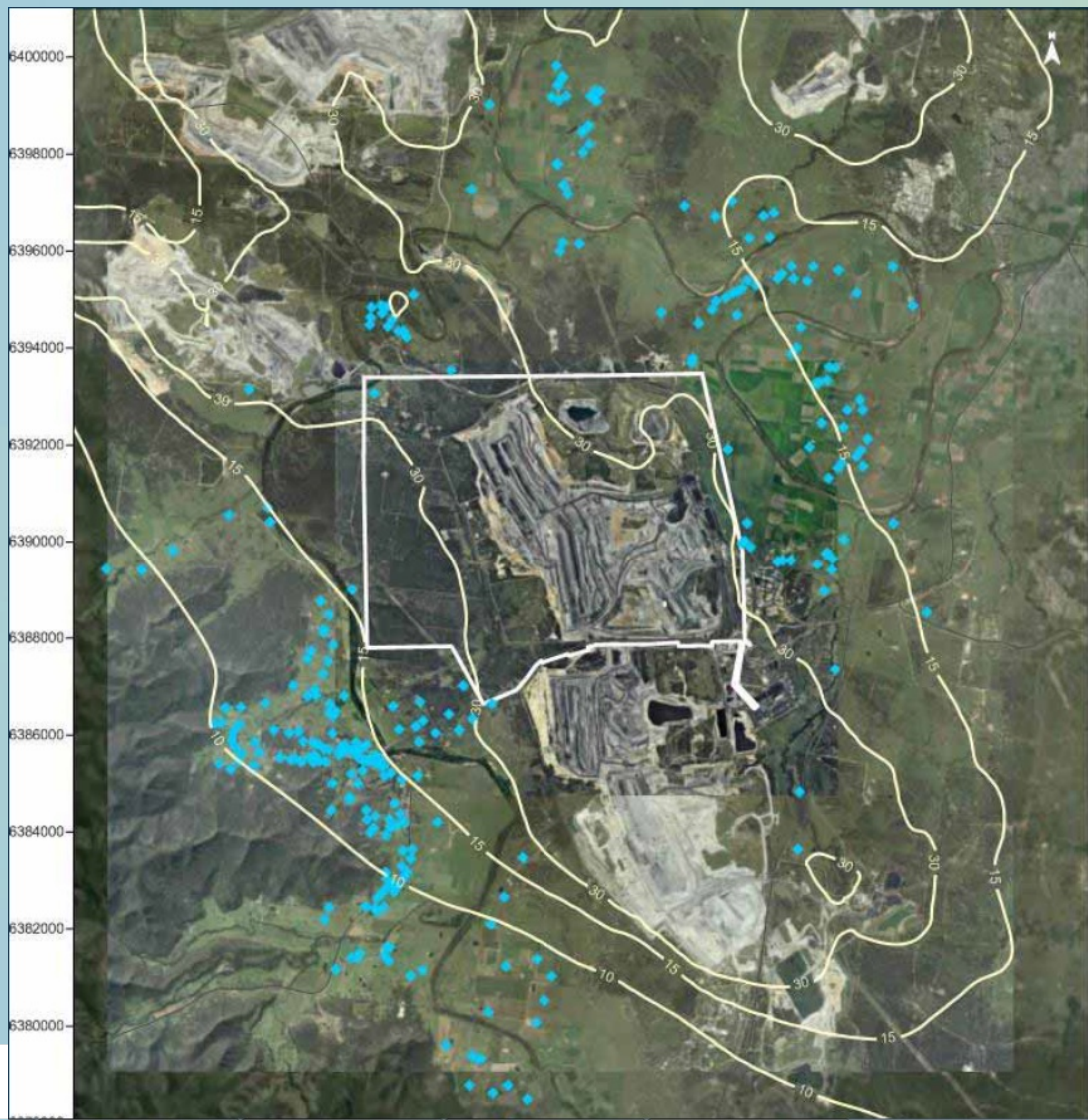
Locations affected by annual pm10

EIS appendix G identifies 12 properties with excessive annual PM10 exposure.

Applying the 20ug/m3 standard shows an extra 34 properties with pm10 at 20ug/m3 or greater.

46 properties affected.

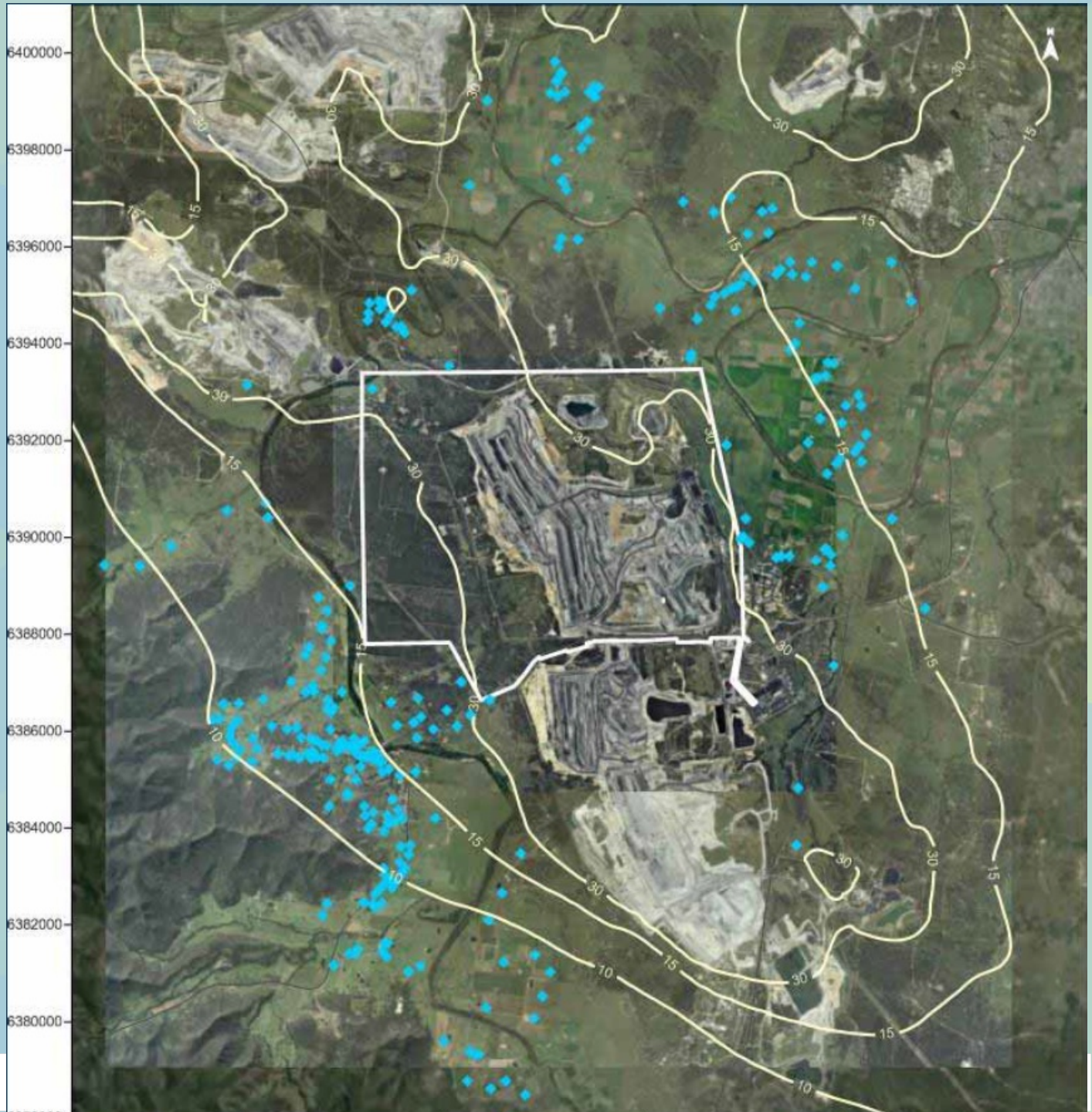
Remedy?



Is the modelling correct?

Annual PM10, EPA readings for Bulga	ug/m^3
2011	16.8
2012	18.7
2013	19.2
2014 year to March	23.9

Yr3 cumulative



Summary of PM10 effects

- The presented modelling of air quality has some identifiable faults and uses a criterion standard that is years out of date and not supported by current science.
- The practice of leasing homes in polluted areas to people with limited housing options goes against all principles of public health.

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Blast Plumes

NO2

- 5 minutes at 400 ppm can be fatal. Bronchiolitis fibrosa obliterans causes progressive respiratory failure for 4-8 weeks until death.
- Ambient air NEPM 0.12 ppm 1 hour average.
- Conversion at 25C and 1013 mb as used by WHO gives 226 ug/m3. Not 256 ug/m3
- 1 hour average is for ambient air, not blast plumes.

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Theory and issues

- Perfect chemistry/ reaction - 1 kilogram of ANFO would produce 1000 litres of CO_2, N_2 and H_2O during the blast.
- In reality, many factors at play and gasses including CO, NO, NO_2 are formed. At elevated concentrations, some of the gasses are toxic. (Some formulations can have lower NO2, but higher CO emissions; e.g. Flexigel.)
- Only limited reliable data exist for actual blast fume emissions (CSIRO and private data).
- Data indicate that actual emissions are highly variable.
- Desire to manage the risk of uncertain blast fume outcomes.

Non-Ideal Blasts

- Key factors – formulation of charge, blast design for conditions and physical & environmental factors (may strongly affect detonation/ explosion leading to high CO, NO_x.
- Many, many physical and environmental factors all lead to imperfect detonation and progression of blast and large variation in the amount of gas formed.
- Limited potential to consistently mange physical factors, hence always some residual risk of impact, which is managed using forecasting systems.
- Accuracy of forecasting system predictions depends on forecast weather conditions and input emission rate - can adjust to suit site practices.

Attalla, 2008
Blast plume dissipating as expected

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NO_2 blast plume MtArthur Mine Muswellbrook.

3pm

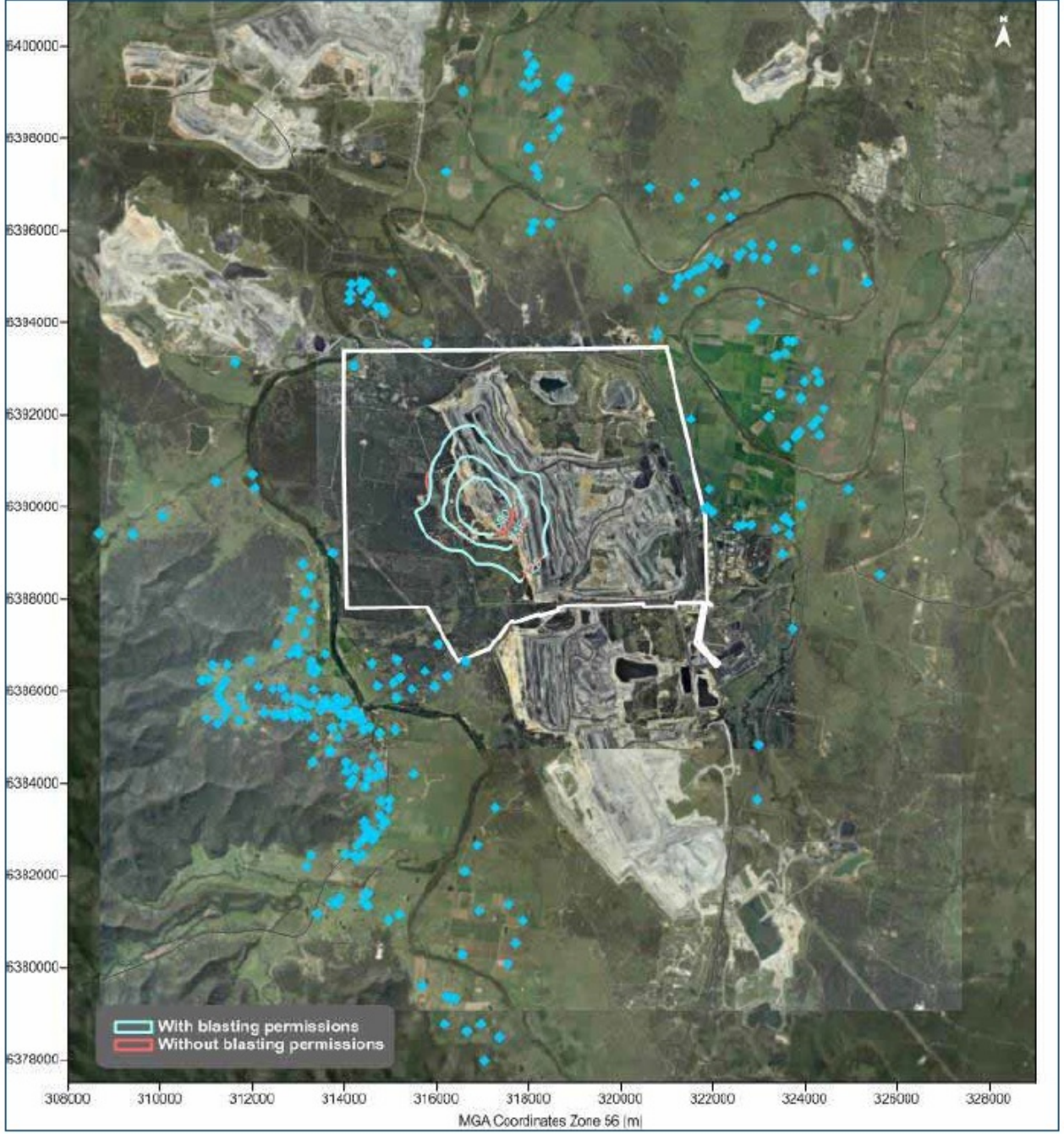

Figure H-7: Predicted maximum 1-hour average blast emissions from the proposal in Year 3 – 15:00 (NO_2 concentrations µg/m³)

4pm

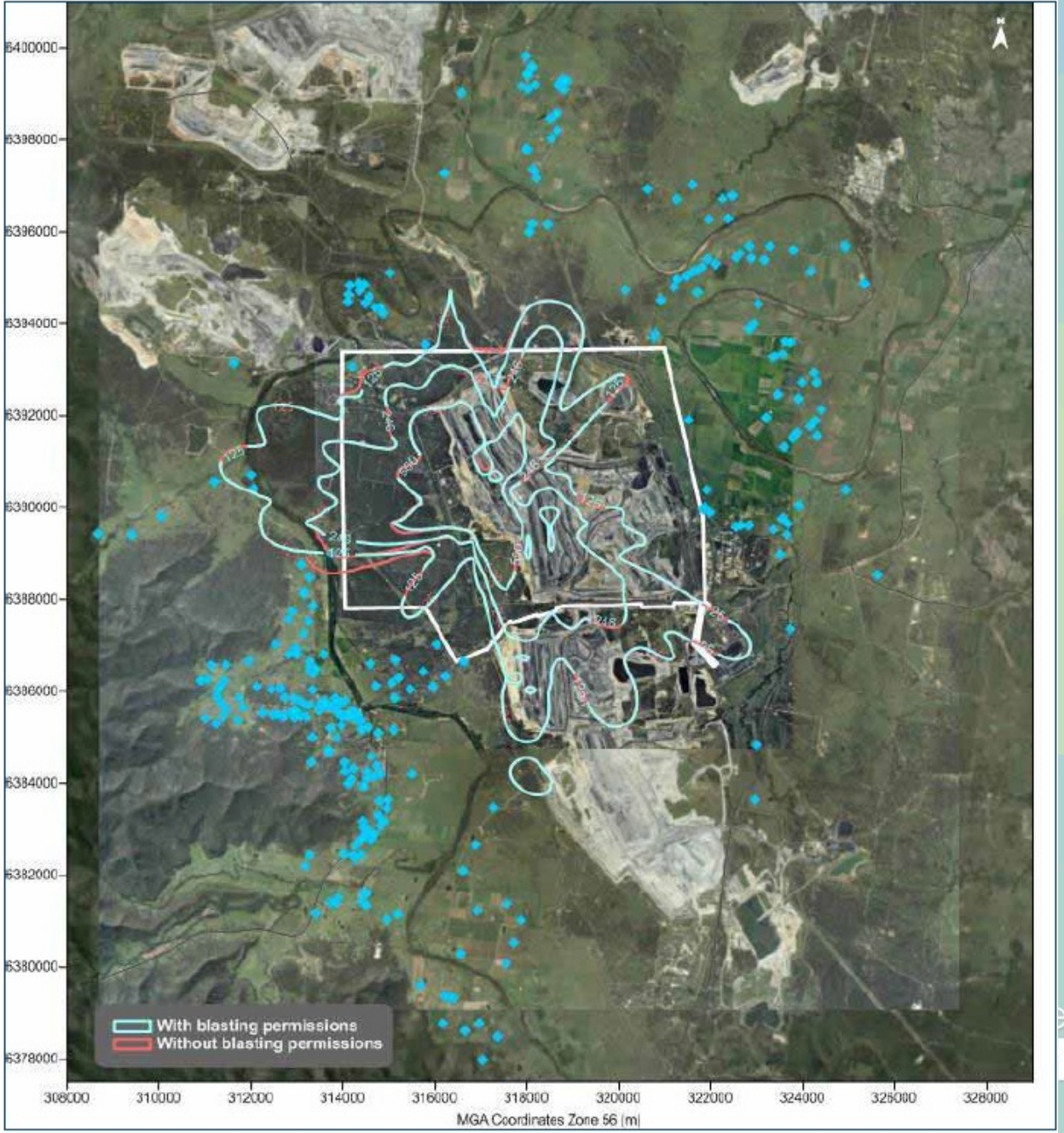

Figure H-8: Predicted maximum 1-hour average blast emissions from the proposal in Year 3 – 16:00 (NO_2 concentrations µg/m³)

5pm

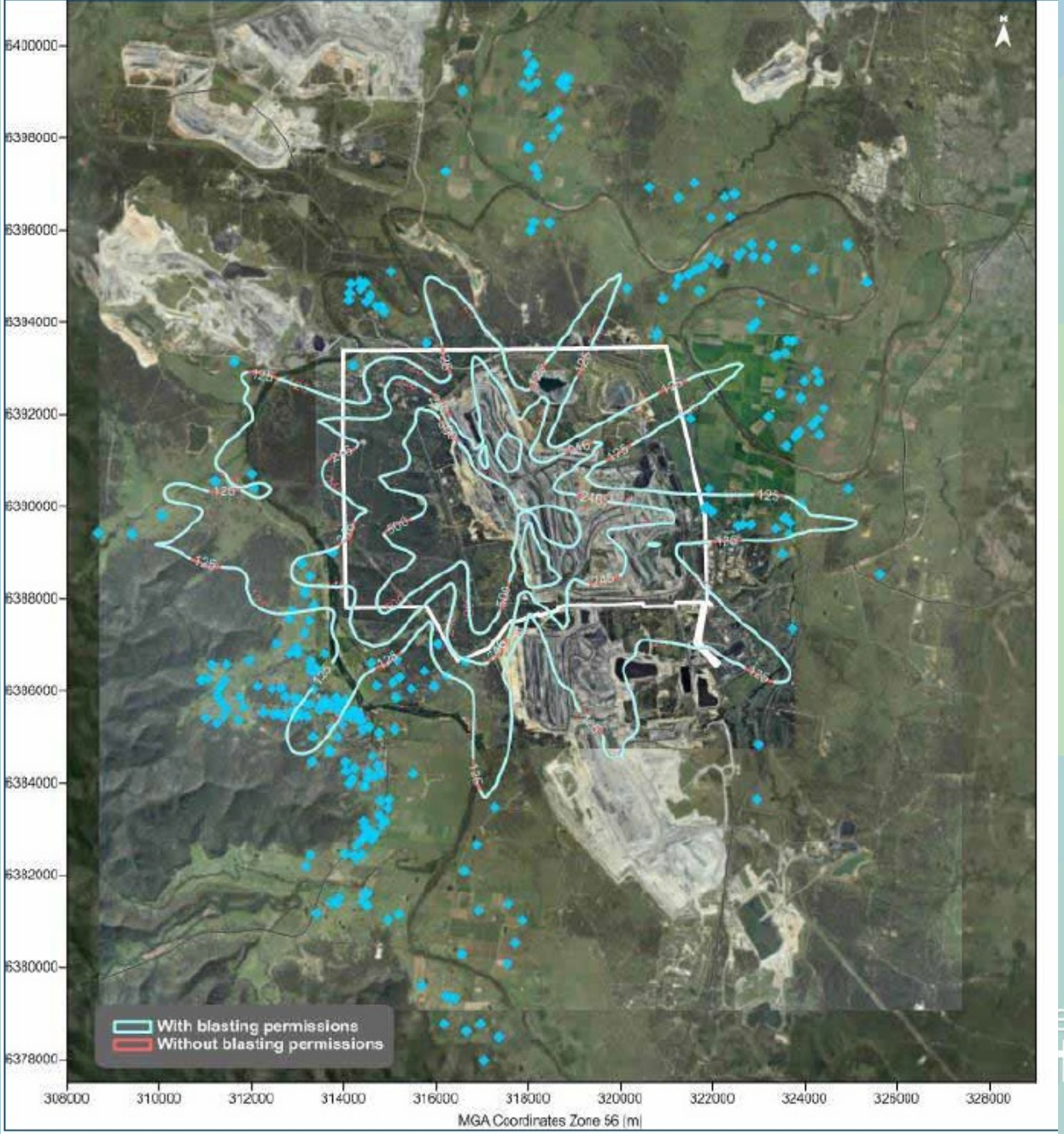

Figure H-9: Predicted maximum 1-hour average blast emissions from the proposal in Year 3 – 17:00 (NO_2 concentrations µg/m³)

Don’t drive through plumes
Go indoors, shut windows
Wash eyes, nose, mouth
Be alert for delayed effects

NSW Health

MINE BLAST FUMES AND YOU

The information below is for the general community. For assessment of occupational risks, and health impacts of blast fumes for mine workers, please refer to the relevant occupational health service for advice.

What are blast fumes?

Blasting is used to break up solid rock in open cut mines and quarries. Blast fumes are the gases that may be generated during blasting. Some of the gases are toxic and some are not. In terms of health impacts, the critical gases generated are oxides of nitrogen (NOx) - nitrogen dioxide (NO_2) and nitric oxide (NO).

Nitrogen dioxide gives blast gas plumes their characteristic reddish orange colour and pungent odour.

Gases produced during blasting usually disperse rapidly and pose no acute health risk. Under certain conditions the gas plume may persist and can affect nearby people or residents who are downwind of the blast site.

What are the potential health effects from exposure?

Exposure to the fumes in a blast plume is usually very brief – seconds to minutes. For most people, any health effects from exposure to a blast plume are short lived.

Symptoms from high level exposure may include:

- Eye, nose and throat irritation and coughing
- Dizziness and headache
- Shortness of breath
- Wheezing or exacerbation of asthma

Serious lung inflammation (pulmonary oedema) has been known to develop several hours after exposure to very high levels of NO_2.

What should I do if I see a plume?

1. Avoid exposure to the plume. If you see a plume, do not enter it (this includes driving through it) and move out of the plume's path if possible. If at home, head indoors, close all doors and windows. If you are in a car, wind up windows and close vents until the plume passes.
2. If you find yourself in a plume, try to move out of it as quickly as possible.
3. If you have been exposed, use water to thoroughly wash eyes, and to clear your nose and throat.
4. If you experience respiratory symptoms you should seek immediate medical attention and inform the doctor of possible NO_2 exposure. Be alert for possible delayed breathing problems. If you are an asthmatic, use your reliever medicine.

Who should I notify if I see a blast plume?

Throughout NSW blast fumes can be reported to the NSW Environment Protection Authority's environment line on **131 555**. In the Upper Hunter Valley, blast fumes should also be reported to the Department of Planning & Infrastructure compliance office on 6575 3405.

Blast plumes summary

- Dispersion is unreliable, and on rare occasions a plume will maintain its concentration and travel many Km.
- The modelling based on 27 blasts observed by Attalla is insufficient to predict rare events.
- The incorrect translation of the NEPM standard shows poor attention to detail.
- Blast plumes pose an unacceptable risk to residents of Bulga if the mine is allowed to come close to the village.

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