Brandy hill quarry appendix 11- Air quality EIS response Comments

Page 14

4.3 Project Criteria

From all of the regulations the strictest applicable criteria have been selected for this assessment and are presented in ***Table 4-1***.

Table 4-1: Project Air Quality Goals

Pollutant	Basis	Criteria	Averaging Time	Source
TSP	Human Health	90 µg/m^3	Annual	Approved Methods
PM_{10}	Human Health	50 µg/m^3	24-hour	Approved Methods
	Human Health	30 µg/m^3	Annual	Approved Methods
$PM_{2.5}$	Human Health	25 µg/m^3	24-hour	Air NEPM
	Human Health	8 µg/m^3	Annual	Air NEPM
Dust deposition	Amenity	Maximum incremental increase of 2 g/m^2/month	Annual	Approved Methods
	Amenity	Maximum total of 4 g/m^2/month	Annual	Approved Methods
Silica	Human Health	3 µg/m^3	Annual	VIC EPA

Comment: Table 4-1 (PM10 annual criteria value is incorrect. 25 ug/m3 is the NEPM correct value.

Page 16

TAPM was configured as follows:-

- Centre coordinates – 32° 42.0 S, 151° 41.5 E;
- Dates modelled – 1st January 2013 to 31st December 2013;
- Four nested grid domains of 30 km, 10 km, 3 km and 1 km;
- 30 x 30 grid points for all modelling domains;
- 25 vertical levels from 10 m to an altitude of 8000 m above sea level; and
- The default TAPM databases for terrain, land use and meteorology were used in the model;

Comment: TAPM model setup detail not detailed. Data set is now 5 years old. No comparison with other yearly datasets to verify data is a valid representative data set . 2013 was year of bushfire emergency. Elevated PM2.5 and PM10 baseline results in October- November 2013.

Page 8

Ancillary plant such as mobile pre-coat plant for asphalts will also form part of the proposed Project to assist in meeting industry demands for these products. The existing office block, quarry crib room, amenities block and transport crib room block have been on site for 20 years and are proposed to be replaced.

The proposal will also be incorporating a new concrete batch plant within the quarry site. The concrete plant will supply concrete within the local markets. The plant will produce approximately 15,000 m^3 of concrete each year and will have a fleet of approximately two twin steer trucks with average load-size of approximately 5.5 m^3. The batch plant will produce approximately 2,700 additional trips per annum.

The plant infrastructure will be constructed on a concrete hard stand area and water runoff will be managed on site. The plant would consist of an upright silo, incline conveyor belt, load bin, admixture bunded area, and

Comments: Cannot see any pollution inventory for the 850 trucks daily which are proposed to travel the haulage route of Brandy Hill Drive 24 hrs /7 days per week. Oxides of nitrogen/CO and PM2.5 data should be include because of the impacts to human health. Increased particulate levels have not been taken into account for the crushing plant.

Page 12

3 POLLUTANTS OF CONCERN

The main emissions to air from quarrying operations are caused by wind-borne dust, vehicle usage, materials handling and transfers. Fugitive air emissions can be estimated using emission factors combined with site-specific information such as the silt and moisture content of material being handled.

Comment: Site specific information has not been used in the modelling process

.Page 13

4 REGULATORY FRAMEWORK

4.1 National Legislation

4.1.1 National Environment Protection Measure for Ambient Air Quality

Australia's first national ambient air quality standards were outlined in 1998 as part of the National Environment Protection Measure for Ambient Air Quality (National Environment Protection Council , 1998).

The Ambient Air Measure (referred to as Air NEPM) sets national standards for the key air pollutants; carbon monoxide, ozone, sulfur dioxide, nitrogen dioxide, lead and particles (PM_{10}). A revision to the Measure was issued in 2003 with the inclusion of advisory $PM_{2.5}$ standards. The Air NEPM requires the State's governments to monitor air quality and to identify potential air quality problems.

Comment: The last NEPM revision was in February 2016 and the standards are not advisory. They are now standards with no maximum exceedences allowable.

Page 13

4.2 State Legislation and Guidelines

4.2.1 Department of Environment and Conservations (NSW) Approved Methods

The *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (Department of Environment & Conservation, 2005) detail both the assessment methodology and criteria for air quality assessments. Due to the type of industry and proximity to sensitive receptors, the requirements for a Level 2 assessment have been followed.

The criteria within the Approved Methods have been used for this assessment with the exception of $PM_{2.5}$, which has been derived from the Air NEPM.

Comment: This has been repealed, 2016 version now current.

Page 17-18

6 EXISTING CONDITIONS

6.1 Existing Sources of Air Pollutants

Aside from the existing quarry activities the surrounding land is forest with some commercial chicken farms located at Mooghin Road and south of Clarence Town Road.

6.2 Background Dust Deposition

Dust deposition monitoring is conducted at three locations as detailed in the Environment Protection Licence (number 1879 dated 29th April 2013). These locations are shown in ***Figure 6-1*** and the monthly results for insoluble solids are presented in ***Figure 6-2***.

Figure 6-1: Approximate Dust Deposition Monitoring Locations [Hanson, 2014]

The dust deposition levels for the monitoring period Sept 2013 to August 2014 can be summarised as follows:

- Giles Road – the average deposition was 0.5 g/m^2/month with the highest monthly rate of 0.9 g/m^2/month, which occurred in January 2014 with a recorded rainfall of 42 mm;
- Front Gate – the average deposition was 2.1 g/m^2/month with the highest monthly rate of 6.3 g/m^2/month, which occurred in December 2013 with a recorded rainfall of 6 mm; and
- Cattle Yards – the average deposition was 0.5 g/m^2/month with the highest monthly rate of 6.0 g/m^2/month, which occurred in November 2013 with a recorded rainfall of 52 mm.

The dust deposition criterion is 4 g/m^2/month.

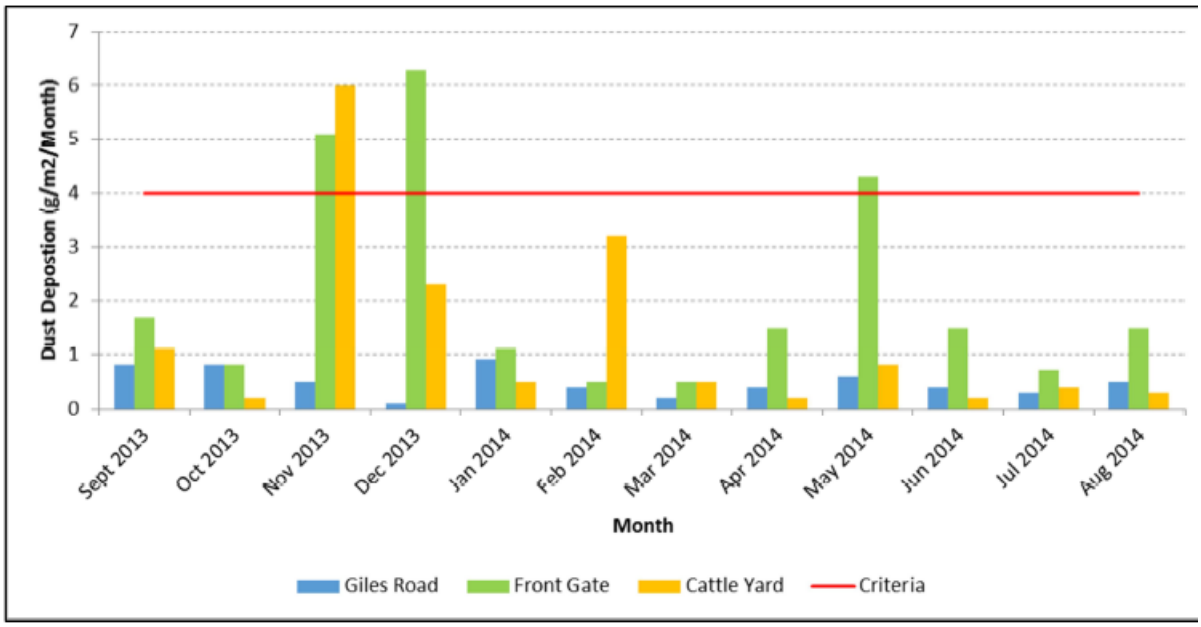


Figure 6-2: Dust Deposition (Insoluble Solids) Results [Hanson, 2014]

The dust deposition data presented in ***Figure 6-2*** is collected and managed by an external consultant. Th dust values are usually accompanied with basic comments regarding the condition of the gauge exceedances are detected. The commentary attributed to exceedances suggests that samples were affecte by bird droppings or the gauge was compromised. There is no commentary relating to weather conditions c operational activities; therefore in the circumstances where no commentary is given, it is difficult to identify th corresponding operational or climatic drivers which may cause an exceedance of the criterion due to th month long exposure period.

Comment: This data is not based on a calendar year like inputs into the TAPM-CALMET-CALPUFF models. The Air quality model is based on 2013 calendar year data. It is from Sept 2013 to August 2014. Every exceedance is blamed on bird droppings, no inorganic value is stated which would give a dust particulate value. There is no commentary on operational activities and weather conditions. Without these parameters and the fact that dust gauges are easily tampered with and provide a 30 day average result, the validity of the data is questionable.

Page 18

6.3 Ambient Particulate Monitoring

6.3.1 PM_{10}

PM_{10} is not currently monitored for compliance in the vicinity of the BHQ site. As a substitute, data is available from the closest Office of Environment and Heritage's (OEH) Beresfield monitoring station. This air quality monitoring site is located at Francis Greenway High School, Beresfield, approximately 14.2 km SSW of the BHQ. Whilst this monitoring location is not wholly representative of the conditions of the local area surround BHQ, it is considered to be more representative than the other OEH monitoring stations. ***Figure 6-3*** illustrates the locations of the current Newcastle Air Monitors operated by OEH and it can clearly be seen that the Beresfield location is not only closer but also more representative of rural locations than the other stations.

In order to obtain an indication of likely PM_{10} concentrations in the region of the BHQ, the daily-varying (24-hour average) PM_{10} concentrations recorded at this station in 2013 has been analysed;

- The highest 24-hour concentration was 55.3 µg/m^3 on 17th and 18th October 2013, with five exceedances of the criteria during the year. The sixth highest value was 48.8 µg/m^3;
- The annual average excluding the exceedances was 20.9 µg/m^3; and
- The 90th percentile was 33.8 µg/m^3 and the 70th percentile was 23.8 µg/m^3.

Level 2 air quality assessments require ambient monitoring data for at least one year of continuous measurements be used in the dispersion modelling process (Department of Environment & Conservation 2005). The 24-hour average PM_{10} concentrations recorded at the Beresfield monitoring station for the perio 1st January 2013 to 31st December 2013 are presented in ***Figure 6-4***.

Comment: Site specific data would have been much more valuable. The cost of a Tapered Element oscillating microbalance is approx. $35,000. Real time data back ground values in ug/m3 would provide a much better data set than an Air quality model based on non specific site data with assumptions based on 1 year of data. This data was also from a period of extensive bushfires which leads to elevated background levels of PM10 and PM2.5. See excerpt below.

Office of Environment & Heritage

New South Wales Air Quality Statement 2013

Bushfires lead to poorer air quality in NSW during 2013

Compared with previous years, NSW experienced poorer air quality during 2013, due mainly to drier and hotter weather through the middle of the year and the impacts of bushfires in September, October and November.

Air quality in NSW is generally good by international standards and has been steadily improving over time.

While levels of nitrogen dioxide, sulfur dioxide and carbon monoxide continue to be well below national standards, levels of ozone and particles (PM_{10} and $PM_{2.5}$) can exceed the standards from time to time.

Ozone and fine particle pollution levels are affected by:

- the annual variability in the weather
- natural events such as bushfires and dust storms
- the location and intensity of local emission sources, such as coal mines, wood heaters, transport and industry.

After several years of very good air quality across much of the state, air quality in 2013 was poorer due mainly to warmer and drier conditions and severe bushfires. The year began with above-average temperatures and increased bushfire activity (RFS 2013). January 2013 saw the warmest maximum temperatures on record in Sydney and across the state, followed by above-average temperatures during July–October and long periods of little or no rain (BOM 2014).

Warm, dry and windy conditions in September and October led to severe early season bushfire activity in western Sydney, the Blue Mountains, Wollondilly and the Hunter Valley.

During the bushfire emergency, NSW Health issued a number of Air Pollution Health Alerts.

Page 22

Table 6-1: Assigned Project Background Concentrations

Parameter	Air Quality Objective	Period	Applied Background	Comments
TSP	90 µg/m^3	**Annual**	41.8 µg/m^3	Double annual average PM_{10}
PM_{10}	50 µg/m^3	**24 Hour**	Varies	Daily Beresfield Data for 2013
	30 µg/m^3	**Annual**	20.9 µg/m^3	Annual Average Beresfield Data
$PM_{2.5}$	25 µg/m^3	**24 Hour**	Varies	Daily Beresfield Data for 2013
	8 µg/m^3	**Annual**	8.1 µg/m^3	Annual Average Beresfield Data
Dust Deposition	4 g/m^2/month	**24 Hour**	2.1 g/m^2/month	BHQ data
Silica	3 µg/m^3	**Annual**	0.7 µg/m^3	No local data – VIC data used

It should be noted that the annual PM2.5 annual average already exceeds the 8 µg/m^3 criterion and the highest 24-hour PM10 concentration is 48.8 µg/m^3, which is just below the PM10 criterion of 50 µg/m^3.

Comment: Again PM10 NEPM exceedance is value is 25 ug/m3 with no exceedences throughout the year. The use of 2013 data with no comparisons to other yearly data sets is questionable especially considering dry conditions with extensive bush fires present in 2013.

Page 23

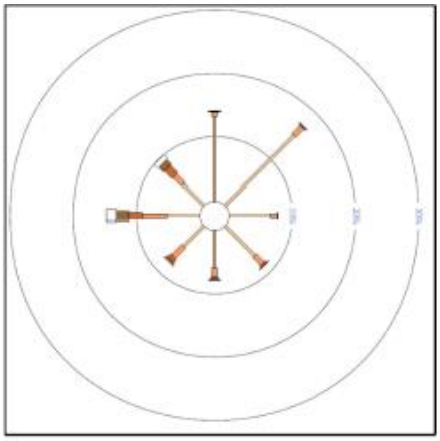
7.1 TAPM Meteorological Data

Meteorological data for the site was generated using meteorological data using The Air Pollution Model (TAPM) at the site for 2013. TAPM was configuration is presented in ***Section 5.2.1***.

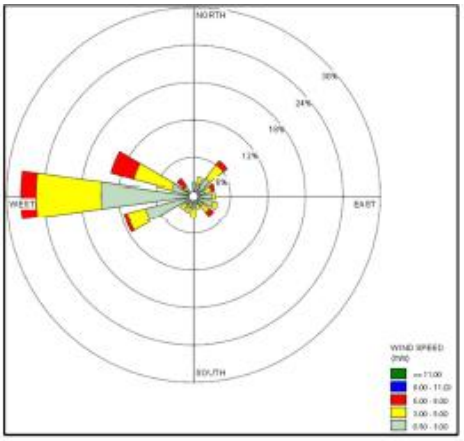
A comparison of the AWS wind roses and the TAPM generated wind roses for 09:00 and 15:00 hours are presented in ***Figure 7-1***. The Patterson AWS is located approximately 10 km west and 4 km north of the Project site and is influenced by mountains immediately to the west and north-west. The TAPM wind roses were extracted from the 1 km grid, therefore the overall location does not align with the AWS location. The wind rose could not be extracted from CALMET as the grid did not extend wide enough.

It can be seen from the figure that the 09:00 hour wind rose has more dominant winds from the west, however the 15:00 hours wind roses are very similar. The terrain between the AWS and the quarry is generally flat; however the quarry sits in a 'bowl' with the mountains on the west, north and east. Any differences in the wind fields will be addressed in the CALMET model.

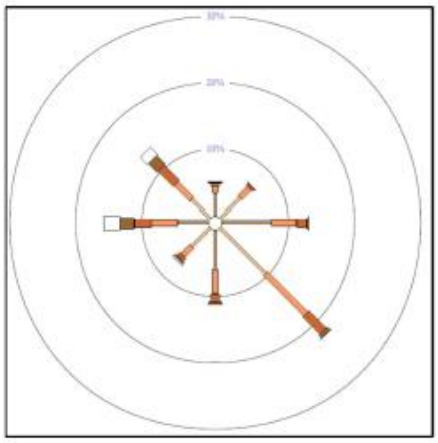
Comment: Why are these wind roses considered valid when the overall location does not align with the AWS location (Tocal). The wind rose could also not be extracted from the calmet model.



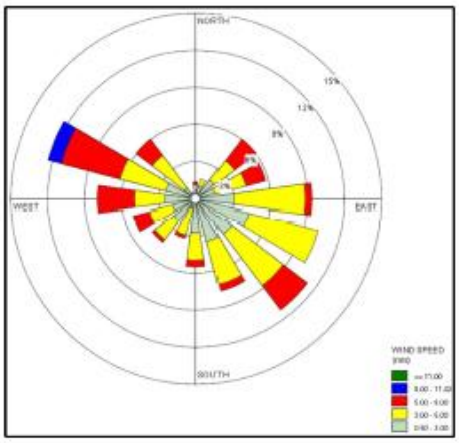
)M Wind rose for Patterson 09:00 hours



TAPM extracted wind rose 09:00 hours



)M Wind rose for Patterson 15:00 hours



TAPM extracted wind rose 15:00 hours

Figure 7-1: Comparison of Patterson AWS Wind roses and TAPM Wind roses

Comment: **are these seasonal or annual wind roses no explanation given.**

Page 27

Table 8-1: Comparison of Currently Approved Brandy Hill Quarry and the Proposed Project [Hanson, 2014]

Components	Current Operations	Proposed Operations
Quarry Life	No limit prescribed in existing consent. EIS states in excess of 30 years.	Approval is sought for 30 years.
Limits on Production	No Limit set by PSSC. Currently 0.7 Mtpa.	1.5 Mtpa
Quarry Footprint	Refer to ***Figure 2-1***	Extension of quarry pit and relocation of quarry infrastructure. Refer to ***Figure 8-1***
Operational Hours	No Limit set by PSSC	Sales, Production & Maintenance: 24 hours Mon. – Sun., Blasting: 8am - 5pm Mon - Fri.
Concrete Production	Not currently operating	15,000 m^3 per year
Concrete Recycling	Not currently operating	20,000 tonnes per year

Comment: Hours of operation stated in original EIS by Resource planning 1983 which states that hours of operations are 6am to 6pm Monday to Saturday.

Page 38

Table 9-6: Predicted Total Annual Average PM_{10} Concentrations ($\mu g/m^3$) [Criteria - 30 $\mu g/m^3$]

Receptor	Predicted Total Annual Average PM_{10} Concentrations with Background Concentrations ($\mu g/m^3$)							
	Current Scenario		Stage 1 Scenario		Stage 2 Scenario		Stage 4 Scenario	
	Total	Background	Total	Background	Total	Background	Total	Background
122B Duns Creek Road	21.0	20.9	21.0	20.9	21.0	20.9	21.0	20.9
16 Uffington Road	20.9	20.9	21.0	20.9	21.0	20.9	20.9	20.9
60 Green Wattle Creek Road	21.0	20.9	21.1	20.9	21.1	20.9	21.0	20.9
34 Timber Top Road	21.0	20.9	21.0	20.9	21.0	20.9	20.9	20.9
35 Timber Top Road	20.9	20.9	21.0	20.9	21.0	20.9	20.9	20.9
36 Timber Top Road	20.9	20.9	21.0	20.9	21.0	20.9	20.9	20.9
13 Mooghin Rd	21.7	20.9	22.6	20.9	22.6	20.9	21.6	20.9
14 Mooghin Rd	21.5	20.9	22.2	20.9	22.2	20.9	21.4	20.9
13 Giles Road	21.4	20.9	22.1	20.9	22.2	20.9	21.4	20.9
13B Giles Road	21.5	20.9	22.3	20.9	22.5	20.9	21.5	20.9
866 Clarence Town Road	21.5	20.9	22.3	20.9	22.4	20.9	21.6	20.9
888 Clarence Town Road	21.6	20.9	22.6	20.9	22.7	20.9	21.7	20.9
994 Clarence Town Road	21.5	20.9	22.3	20.9	22.6	20.9	22.2	20.9
1034 Clarence Town Road	21.6	20.9	22.4	20.9	22.6	20.9	22.2	20.9
1060 Clarence Town Road	21.5	20.9	22.3	20.9	22.5	20.9	22.0	20.9
1094 Clarence Town Road	21.4	20.9	22.1	20.9	22.3	20.9	21.9	20.9
1189 Clarence Town Road	23.5	20.9	26.5	20.9	26.9	20.9	22.8	20.9
1203 Clarence Town Road	23.1	20.9	25.6	20.9	25.9	20.9	22.5	20.9

It can be seen from Table 9-6 that the total PM_{10} concentration will be less than the 30 $\mu g/m^3$ criterion at all sensitive receptor locations. The highest annual average PM_{10} concentration is 26.9 $\mu g/m^3$ which will occur at 1189 Clarence Town Road during Stage 2. **As such the annual PM_{10} emissions from BHQ are not predicted to adversely impact upon the sensitive receptors.** A contour plot is presented in ***Appendix C***.

Comments: This statement is incorrect as there has never been a 30 ug/m3 criterion. It is 25 ug/m3, therefore are 4 exceedences at these sensitive receptor locations.

Page 52

11.4 Air Monitoring Network

The current environment licence (licence number 1879 dated 29th April 2013) stipulates three dust deposition monitoring locations are sufficient.

In the Director General Requirements (DGR's) for this Project, the EPA state that they are moving away from dust deposition monitoring due to a more proactive real-time data collection methods for PM_{10}. The EPA has requested that the cost benefit analysis of Hi Volume Sampling and Tapered Element Oscillating Microbalance (TEOM) is undertaken, as shown in ***Table 11-3***. Additionally, dust deposition monitoring has also been included to outline the differences in measurement techniques.

Table 11-3: PM_{10} Measurement Technique Cost Benefit Analysis

Measurement Technique	Benefits	Disadvantages	Australian Standard
Hi Volume Sampler	The particulate concentration is calculated at a laboratory based on the total mass of the sample divided by the volume of air drawn through the filter paper. The filter can be analysed for further analysis such as RCS.	Time resolution is limited to 24 hour and the results are only available several days after the measurement. Estimated precision - ±2 µg/m^3	AS/NZS 3580.9.6:2003
TEOM	Provide real-time data with short resolution (<1 hour) that can be used for proactive particulate control. Estimated precision - ±0.5 µg/m^3	High capital costs.	AS/NZS 3580.9.8-2001
Dust Deposition Gauges	Low capital costs	30 day average deposition to determine nuisance	AS/NZS 3580.10.1-2003

Based on this assessment, consideration should be given to the installation of particulate monitoring equipment as recommended in the NSW Approved Methods for the Sampling and Analysis of Air Pollution or as otherwise agreed by the DP&E at the fence-line of the quarry (as close to Clarence Town Road as possible). Additionally, the installation of a meteorological station at BHQ would be beneficial to provide more accurate wind conditions at the site rather than using the Tocal AWS which is not considered to be representative of local wind conditions.

Comments: Standard is outdated TEOM should be AS/NZS 3580.9.8-2008

Tocal AWS is not considered to be representative of local wind conditions but it is considered to be a satisfactory input into an air quality model for EIS approval in this instance. Should not a real time Air quality/ climatic data source have been installed for baseline data before construction and operation.