Witness Statement

Mitchell Shire Council

Planning Scheme Amendment C 106

Planning Panel Hearing 20 July 2020

Tim Pollock

8 July 2020

1. Name and Address

Mr Tim Pollock, 54 Alto Avenue Croydon 3136.

2. Qualifications and Experience
   - BE (Hons) Monash 1968
   - M. Eng. Sci. Monash 1972
   - Member, Clean Air Society Australia and New Zealand
   - Professional Experience
     - March 2018 to present Principal, Pollock Environmental Consulting
     - 2002 – February 2018 Principal Environmental Engineer, GHD
     - 1988 – 2002 Principal Environmental Engineer, CSF, CMPS&F, Egis
     - 1985 – 1988 Research Fellow, Monash University
     - 1975 – 1985 Senior Environmental Engineer, Caldwell Connell Engineers
3. Areas of Expertise

I have specialised in dispersion modelling in marine and air environments, the latter for the last 25 years. In the past 20 years I have conducted many buffer distance assessments on industrial developments with potential off-site impact and have written technical papers on the subject.

4. Expertise to Prepare Report

I have reported on dust impact and buffer constraint assessments in many cases for Planning Panel and VCAT proceedings and have conducted such assessments for a range of industries with off-site dust impacts.

5. Instructions which defined the scope of Report

I received instructions from HWL Ebsworth, Lawyers acting for Crystal Group affected by Amendment C106, to conduct a buffer

assessment for a proposed basalt quarry and to prepare a witness statement relating to that assessment.

6. Facts, Matters and Assumptions Relied Upon
   - Review of plans and reports
   - My experience relevant to quarry impact and buffer assessments

7. Documents to be taken into account

PEC report # 0868-1 dated 7 July 2020.

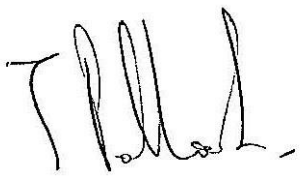
8. Identity of Persons Undertaking Work

Tim Pollock

9. Summary of Opinions

The substantive portion of my statement is given in the PEC report # 0868-1 attached.

10. My opinions are not provisional except where specifically qualified.
11. The analysis presented in this report is within my area of expertise.
12. I declare that I have made all enquiries that I believe are desirable and appropriate, and that no matters of significance have been withheld from the Panel.



T. Pollock

8 July 2020

P | E | C

HWL Ebsworth Lawyers

Amendment C106 Mitchell Planning Scheme

Appropriate Separation Distance

Proposed Quarry WA 1473

Conundrum Holdings

July 2020

Contents

1. Introduction

This report examines the basis for the EPA recommended separation distances for quarrying as specified in their guideline[1] and considers the site-specific factors that can be used to vary the default value. These distances are listed for a range of industries in *Table 1* of the guideline and are referred to as default values – that is the default value applies in the absence of site-specific factors

In particular the 500 m listed for 'hard rock quarrying with blasting' is focussed on as there is no explanation for the basis of the doubling of distance.

Information relevant to this report is given in a Protocol for Environmental Management (PEM) issued by EPA[2] governing the requirements for assessment and management of emissions to air from mining and extractive industries.

Note that in this report the terms 'buffer' distance and 'separation' distance are used interchangeably.

[1] EPA 2013 "Recommended separation distances for industrial residual air emissions", Pubn # 1518, March 2013

[2] EPA 2007 "PEM, SEPP-AQM, Mining and Extractive Industries", Pubn. 1191, Dec 2007

2. Context

This report is to be used to assess the prospects of a proposed quarry (named North Central Quarry) in the north east corner of the Beveridge North West PSP (BNW PSP). The quarry proponent Conundrum Holdings P/L (Conundrum) has commissioned work in the preparation of an application to DEDJTR[3] and has received a Work Authority WA 1473. The work plan was developed by Bell Cochrane & Associates and issued in July 2014[4]. However, Mitchell Shire Council (MSC) has refused the proposal in April 2016. Conundrum made submissions to the Victoria Planning Authority in relation to the BNW PSP but the PSP plan exhibited on 5 September 2019 as detailed in Amendment C106 did not include the proposed quarry.

The draft submission[5] of MSC to the imminent (20 July) Planning Panel hearings reaffirms its' categoric objection to the quarry, principally for the buffer constraints that the quarry would place on residential development in the northeast section of the PSP.

[3] DEDJTR- Department of Economic Development, Jobs, Transport and Resources – now renamed DJPR (Department of Jobs, Precincts and Regions) – both entities hold the competencies and responsibilities of the former Department of Industry, Technology and Resources in relation to mines and quarries.
[4] Bell Cochrane 2014 "Work Plan Application for WA 1473, North Central Quarry", July 2014
[5] Attachment #1, MSC Council Meeting Agenda, 21 October 2019

3. Separation Distances as a Planning Instrument

Separation (or buffer) distances (SDs) are recommendations only and are designed to reduce the off-site impact of “industrial residual air emissions” (IRAEs) at sensitive land uses (e.g. residences) to acceptable levels.

IRAEs are addressed in section 6 of the guideline and are described as ‘unintended’ and distinguished from ‘routine’ emissions. IRAEs are often intermittent and can result from equipment failure, accidents or abnormal weather events.

However, in practice fugitive emissions (which cannot be economically captured and treated, and are therefore ‘routine’) are also considered as IRAEs – examples are fugitive odour from kraft pulp mills, and oil refineries. Fugitive dust emissions from quarrying operations of handling, crushing and screening of rock also fit this category.

In the following sub-sections those criteria listed in the Guideline, *Section 9* and *Table 4* that are relevant to the proposed quarry are considered.

3.1 Effect of Meteorology

In practice the default SDs for a given industry are commonly scribed as a constant radius from the perimeter of all the significant dust (or odour) sources within the premises. But since this distance is designed to lower the dust/odour impact in the pollutant plume downwind of the source(s) to an acceptable level, a fixed radius is appropriate only where site-representative meteorological data is not available.

However, when meteorological data is available the directions of good and poor dispersion can be determined. In the former the default buffer can be reduced while in the latter the distance can be increased. In this manner the degree of protection in the event of an IRAE can be made the same independent of the direction of the sensitive land use from the source.

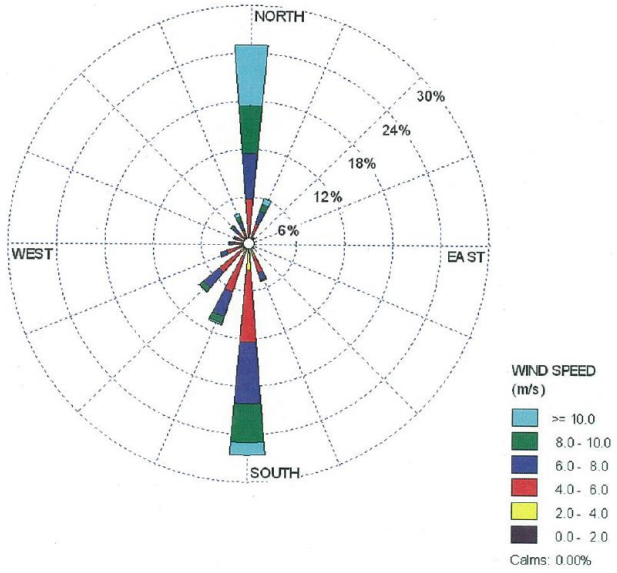
The guideline in *section 9* and *Table 4* list this as the fifth criterion as*” there are exceptional topographic or meteorological characteristics which will affect the dispersion of IRAEs”.*

At this site, the effect of the Kilmore Gap to the north has a major effect in channelling winds to the north/south axis. The figure below (taken from a GHD report

[6]for the Crystal Group) shows a windrose from a 12 month dataset at the BoM station at the BoM station at the Kilmore Gap. The preference for the N/S axis is marked. The effect persists to the south, as seen at Tullamarine airport, seen also in a figure from the GHD report.

A directional buffer that takes account of local meteorology has been developed by GHD[7] and that method was used by GHD to conduct a buffer assessment[8] commissioned by Places Victoria of industries attracting buffers that constrain sensitive land uses within FBURA.

Figure 5 Annual wind rose for Wallan (Kilmore Gap)

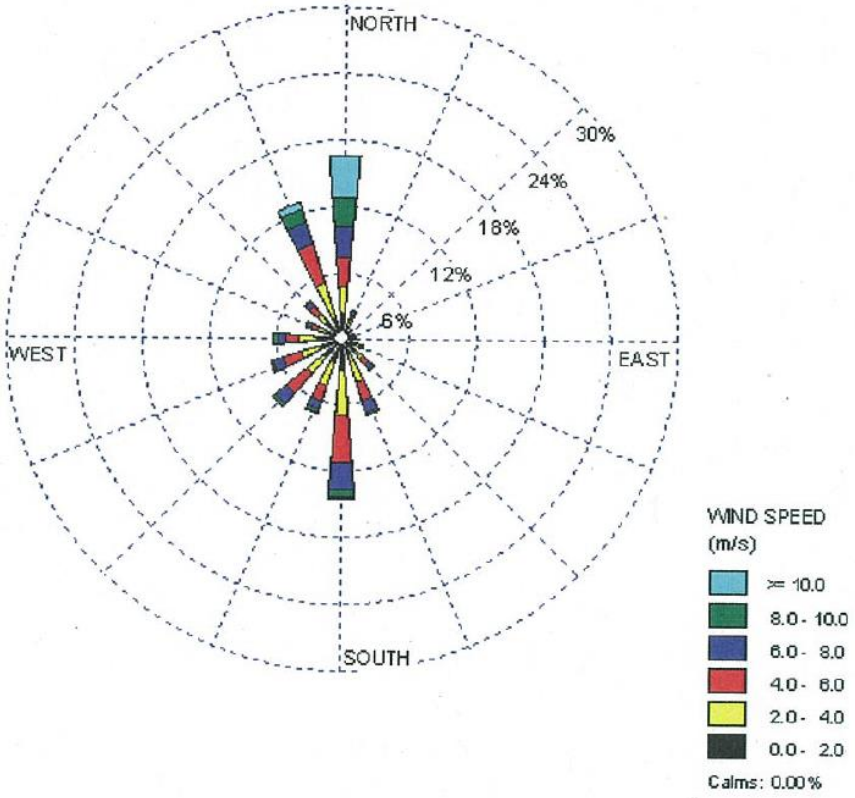


[6] GHD 2009 “Buffer,Odour Impact and Environmental Risk Assessments – Wallan Egg Farm” report # 171192, September 2009

[7] Clarey P, Pollock T “Integrating Separation Distances with Dispersion Modelling”, Enviro 04, 28 March – 1 April 2004, Darling Harbour, Sydney.

[8] GHD 2013 “Fishermans Bend Buffer Assessment”, report for Places Victoria June 2013

Figure 3 Annual wind rose for Tullamarine



3.2 Size of the Plant

The fourth criterion relates to the size of the industrial plant – if it is significantly smaller than a typical plant of that type then a case can be mounted to reduce the default buffer. This is explicitly done in the guideline for WWTPs where the buffer is determined as a function of the capacity of the plant (expressed as the 'equivalent population' served). It is also done for broiler farms, where the reference is to the Victoria Broiler Code, which gives a formula for SD as proportional to the square root of the farm capacity in thousands of birds.

As it happens the proposed quarry will work a basalt resource estimated at 10 million tonne and the work plan[9] estimates a quarry lifetime of 40 years with an annual production of from 100,000 to 350,000 tonnes. At this size the Mining and Extractive Industries PEM classifies the quarry as 'medium' and on this particular ground there is no basis to argue for a reduction in the default buffer.

[9] Bell Cochrane 2014 "Work Plan Application for WA 1473, North Central Quarry", July 2014

3.3 Environmental Risk Assessment (ERA)

This criterion provides a pathway to use site-specific and process-specific information on the proposed quarry to demonstrate that a lower SD than the default of 500 m for a 'hard rock quarry with blasting' is appropriate.

A methodology for an ERA in the broiler industry has been developed by EPA[10]. That ERA determines the risk of odour impact and is termed an OERA. The procedure is problematic in that it returns contours of risk that are significantly greater than the SDs given in the Broiler Code. PEC understands that EPA intend to provide guidance on an ERA methodology that can also be applied to dust impact but no drafts have been circulated to date.

[10] EPA 2017 "Odour environmental risk assessment for Victorian broiler farms"

4. Application to Proposed North Central Quarry

The Mining PEM identifies emission constituents from quarrying with potential off-site impacts and specifies assessment criteria to be met at the nearest sensitive location. Dispersion modelling using AERMOD and site-representative meteorological data (12 month dataset at hourly intervals) is to be used to determine predicted peak levels at the sensitive receptors. Compliance with relevant criteria (see *Table 2* in the PEM- shown below) is required.

Table 2: Assessment criteria for mining and extractive industries[2]

Indicator	Criteria	Averaging period
PM_{10}	60 µg/m^3	24-hour average
$PM_{2.5}$	36 µg/m^3	24-hour average
Respirable crystalline silica (as $PM_{2.5}$)	3µg/m^3	Annual average
Arsenic (total inorganic)	0.003 µg/m^3	Annual average
Hydrogen cyanide	340 µg/m^3 9 µg/m^3	1-hour average Annual average
Nitrogen dioxide	0.14 ppm	1-hour average
Carbon monoxide	29 ppm	1-hour average
PAHs (as BaP)	0.3 ng/m^3	Annual average
Asbestos	0.2 µg/m^3 or 0.05 PCM fibres/m^3	Annual average
[3]Radionuclides	As low as reasonably achievable	Annual average

For a basalt quarry the % RCS is ~ 1 % and experience with modelling and with direct measurements on quarry staff show[11] that the RCS criterion in *Table 2* is readily met. In practice the indicator PM 10 is the critical constituent for off-site impact followed by PM 2.5.

The basis for the PM10 criterion is the Intervention level (IL) given in Schedule B of SEPP- AQM and the 60 ug/m^3, 24 hr average IL is in turn taken from the Texas Resource &Conservation Commission Effects Screening Levels (ESLs). The PM10 criterion of 60 ug/m^3 is the no observed adverse effects level (NOAEL).

[11] A series of on-site measurements at Victorian quarries was conducted by Kilpatrick and Associates in the late 1990s.For basalt quarries the results returned negligible levels of RCS.

4.1 Comparison of 250 m SD to PM10 Criterion

Modelling of PM10[12] at the Tylden basalt quarry operated by Fulton Hogan when compared to the 250 m default buffer[13]showed that the 60 ug/m^3 contour is well within the 250 m separation distance and barely exceeds the southern boundary of the quarry. Note that the modelling included the dust emissions from drilling and blasting – these have little impact on the peak PM10 24 hr contour given that they are limited to one hour per blasting sequence, and that blasting is typically undertaken once per fortnight .

4.2 Effect of Blasting – Flyrock

Given that the contribution to PM10 emissions from drilling and blasting is small and that all PM10 emissions lead to an off-site impact at the 60 ug/m^3 criterion less than 250 m range, the only remaining mechanism to support the 500 m buffer is that of fly rock.

The calculations of blast effects focus on the following: blast overpressure, vibration and flyrock trajectories. These calculations are required in the Work Plan (developed by Bell Cochrane & Associates) and in the case of the Tylden quarry these were conducted by Terrock Consulting Engineers[14].

Blast overpressure and ground vibration have limits to be met at residences and the blast programme is designed to meet these limits. In PEC's view these were not contemplated to be the critical determinants of the 500 m SD set in the guideline. However the issue of flyrock could be the reason for the doubling of the SD from 250 m to 500 m. As a generic, conservative default value this value may be appropriate, but as the Terrock calculations of flyrock throw distance **L** for the Tylden quarry blast programme show, there are substantial factors of safety applied to throw distances in front and behind the quarry work face ($\mathbf{L_f}$ and $\mathbf{L_b}$) of 4:1 to personnel on site and to nearby residences.

The values arrived at for the Tyden quarry blast programme were 260 m and 208 m for $\mathbf{L_f}$ and $\mathbf{L_b}$ respectively.

While equivalent computations would need to be made for the North Central quarry, these quarries are similar in size, and similar values for $\mathbf{L_f}$ and $\mathbf{L_b}$ would be obtained.

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[12] Golder Associates 2016 "Air Quality Impact Assessment – Tylden Quarry Expansion",23 August 2016

[13] GHD 2017 "Tylden Quarry Conditions Appeal VCAT P982/2016 – Witness Statement" T. Pollock

[14] Terrock 2016 "Fulton Hogan – Tylden Quarry W.A. 463 – Effects of Blasting in the Eastern Extension",20 Dec. 2016

Note that the blast programme can reduce the throw distances by increasing the ‘stemming height’ (that is, the depth of fill above the explosive charge) in each drill hole.

In summary, site-specific calculations can be used to demonstrate that off-site risk from flyrock can be minimised by a SD of far less than 500 m.

5. Conclusions

The dispersion modelling of PM10 as required by the Mining PEM to ensure that the criterion is met at those land parcels surrounding the proposed North Central quarry to be zoned residential will effectively ensure that dust impacts from all quarry activities do not impact existing or future sensitive land uses. The extent of the PM10 criterion contour is likely to be less than the default 250 m in the east and west sectors, but may exceed this value in the north and south sectors.

The requirement of a doubling of the SD to account for blasting should not be given effect as a prohibition in the PSP. Rather, the results of detailed calculations of the blasting programme as outlined in the Work Plan for North Central Quarry should be assessed and used as a basis to develop a site-specific SD tailored to the operation of this quarry. That assessment would plot the flyrock trajectories with the 4:1 factor of safety for personnel for each of the stages of the quarry working life. The envelope of these trajectories can then be used as the separation distance to apply for future sensitive land use.