

**Before Independent Hearings Commissioners Appointed by Canterbury
Regional Council and Selwyn District Council**

In the matter of The Resource Management Act 1991

And

In the matter of Applications by **Fulton Hogan Limited** for all
resource consents necessary to establish, operate,
maintain and close an aggregate quarry (**Roydon
Quarry**) between Curraghs, Dawsons, Maddisons
and Jones Roads, Templeton

**SUMMARY STATEMENT OF ROGER STEVEN CUDMORE
ON BEHALF OF FULTON HOGAN LIMITED**

AIR QUALITY

DATED: 13 NOVEMBER 2019

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Introduction

1. My name is Roger Steven Cudmore. I have been engaged by Fulton Hogan Limited to provide evidence on air quality management and related impact assessments associated with the proposed Roydon quarry (the Proposal).
2. In this summary of my evidence, I summarise:
 - (a) My evidence in chief (dated 23 September 2019) - which focuses on matters within my expertise, including a discussion on further mitigation of air quality effects via proactive dust suppression controls and monitoring, implemented through a Dust Management Plan (DMP) and the proposed consent conditions;
 - (b) My rebuttal evidence (dated 21 October 2019); and
 - (c) My supplementary rebuttal evidence of Louise Wickham's evidence (dated 6 November 2019).
3. In doing so, I present the key conclusions of my evidence.

Summary of my Evidence in Chief

4. The primary air contaminant discharges that are associated the Proposal include Total Suspended Particulate (**TSP**) and respirable particulate sub-fractions. These include PM₁₀, PM_{2.5} and Respirable Crystalline Silica (**RCS**).
5. My assessments of potential dust effects due to the Proposal take into account the Roydon quarry design, proposed dust controls, and available receiving environment information that were specified within the application and the attached assessment of air quality effects prepared by Golder (2018). I was not the author of the 2018 report.
6. I conclude that that Golder (2018) report provided a qualitative mitigation/controls-based assessment of potential dust related nuisance and health effects likely to be associated with the Proposal. Furthermore, that this assessment was comprehensive and consistent with good practice as outlined in current Ministry for the Environment guidance for the assessment of fugitive dust discharges to air.
7. My primary evidence was based on further analysis of the available raw PM₁₀ and RCS monitoring data which was generated for the Yaldhurst Study as reported by Mote (2018). It also accounted for my assessment of the

comparative magnitude in fugitive dust emissions (mass of dust per unit time) from the proposed Roydon quarry versus those generated by the multiple conventional quarry sites operated at Yaldhurst. This was based on a comparison of areas, quarrying volumes, and design differences between the Proposal and the existing quarries at Yaldhurst.

8. Finally, my primary evidence was also supported by my additional analysis of existing background PM₁₀ monitoring data and recently generated PM₁₀ and PM_{2.5} data at the proposed site. In particular this analysed how background PM₁₀ levels vary for different types of wind conditions (southerlies, north westerlies etc) that dominate on a particular day.
9. I conclude that these additional assessments (in addition to the original assessment of air quality effects by Golder (2018)) have enabled a robust mitigation/controls-based assessment of potential nuisance effects of the Proposal. More specifically these have enabled me to provide a more quantitative assessment of potential PM₁₀, PM_{2.5} and RCS impacts of the Proposal.
10. I also conclude that any attempt to quantify PM₁₀ emissions from the Proposal in absolute terms (grams/second), which should vary with wind speed, temperature and quarry operational status, would not have enabled a reliable air dispersion modelling based assessment of PM₁₀ effects of the Proposal.
11. From the assessments I completed, I conclude the following with respect to fugitive dust discharges associated with the Proposal:
 - (a) There is likely to be minor, or less than minor dust nuisance effects (therefore, not objectionable or offensive dust effects) beyond the boundary of the site.
 - (b) The background levels of PM₁₀ and PM_{2.5} are not typical of polluted airsheds, which would otherwise justify inclusion within gazetted airshed boundaries under the NES. Instead, these levels are consistent with rural environments in Canterbury that are occasionally degraded in isolated areas by agricultural activities such as ploughing.
 - (c) The NES for ambient 24 hour PM₁₀ is likely to be complied with (where the NES applies) beyond the site boundary. Likewise PM₁₀ impacts due the Proposal are likely to cause a minor, or less than minor potential for any adverse effects beyond the site boundary.

- (d) The World Health Guidelines for annual and daily PM_{2.5} exposure are likely to be readily complied with beyond the site boundary.
 - (e) Increases in hourly RCS levels downwind of the Proposal would be very low against the Texas criterion discussed in the evidence of Ms Wagenaar.
 - (f) There is likely to be negligible increases in annual ambient RCS levels beyond the site boundary.
12. Finally, I conclude that the proposed avoidance and mitigation of fugitive dust emissions from the Proposal – as a result of its design and proposed controls - represents a new level of best practice for New Zealand quarries and is a considerable improvement on the level on control that is typically achieved by conventional gravel quarries in Canterbury.

Summary of my Rebuttal Evidence

13. In my rebuttal evidence (dated 21 October 2019), I address the evidence of a number of submitters and expert witnesses including Messrs Kirkby, Boswell, Westley, Mitchell, Reddington and Ms Cartwright.
14. Mr Kirkby and I seem to agree on many substantive matters. Our main disagreement is regards to the extent to which the Proposal will achieve lower PM₁₀ impacts than those measured by the Yaldhurst Study and therefore meet the requirements of Regulation 17 of the NES.
15. I conclude that the Proposal can achieve in excess of a 10-fold reduction in PM₁₀ impacts beyond the site boundary compared to those that can be attributed to the multiple conventional quarry sites at Yaldhurst (employed by myself by applying a scale factor of 0.1 to the measured impacts at Yaldhurst). I conclude that Mr Kirkby has not provided his own analysis of what the likely reduction factor would be, to support his concerns that the actual reduction may be much less.
16. As such, Mr Kirkby's evidence is that the applicant has not demonstrated the Proposal will comply with the requirements of Regulation 17. I conclude Mr Kirkby had not accounted for the differences in potential PM₁₀ emissions between Yaldhurst and the Proposal to substantiate his assertions.

17. Mr Kirkby did recommend a number of adjustments to the proposed conditions of the air discharge consent which I agreed with and I understand these are now incorporated into the proposed consent conditions.
18. Messrs Westley and Mitchell both provided evidence that expressed concerns about potential adverse dust deposition effects on the Southern Woods Nursery, which is approximately 300 south to southwest of future active quarry areas.
19. In response I concluded that because of the distance of Southern Woods Nursery downwind from the active quarry, the quarry design, mitigation proposed and real-time monitoring, that there would be a low potential for plants at the nursery to receive significant dust deposition (4 g/m²/month above background levels) effects. Any such deposition effects are likely to be no more than minor.
20. The evidence of Ms Cartwright and Mr Reddington relates to concerns about the adverse effects of dust impacts on people living at the Brackenridge care facility and at Templeton. However, given the distance between the Proposal, Templeton and Brackenridge (700 m and 1.15 km respectively) and the proposed design and mitigation, I conclude the risk to Brackenridge and Templeton residents as a result of dust discharges caused by the Proposal would be negligible in practice.

Supplementary Rebuttal Evidence

21. I addressed the evidence of Ms Louise Wickham in my supplementary rebuttal evidence (dated 6 November 2019). In that evidence I identify and expand on a number of areas of disagreement between us. I note that Ms Wagenaar's supplementary evidence (dated 5 November 2019) complements my evidence in addressing the human health issues which Ms Wickham raises in her statements.
22. The evidence of Ms Wickham questions the sufficiency and reliability of the air quality assessments provided with the application and via my own primary evidence. I disagree with her criticisms as to the approach, adequacy and accuracy of the assessments provided by myself and set out in the original application. For example, I disagree that any of my analysis of different wind conditions was not comprehensive or in any way understated potential PM₁₀ impacts.

23. My primary evidence provided further assessment and more extensive use of the available effects-based PM₁₀ and background PM₁₀ information, than the original assessment provided by Golder (2018). In my experience it is not uncommon for evidence to enhance material included with the original application. As concluded in paragraph 8 above, the evidence I have provided serves to be both a review of the material in the application and a bolstering of its conclusions by taking a more quantitative approach to potential PM₁₀, PM_{2.5} and RCS impacts.
24. Ms Wickham's evidence clearly infers that dispersion modelling for PM₁₀ emissions should have been done. I disagree, and maintain my opinion that the assessments I have provided make the best use of available information to establish the likely air quality and dust nuisance effects of the Proposal.
25. Ms Wickham's assessment of existing background PM₁₀ information concludes it to be degraded and there is little room for additional discharges at the Proposal site. My rebuttal to Ms Wickham's evidence effectively concludes that the level of any degradation does not preclude the Proposal being able to proceed and the Proposal would only have minor effects on air quality. In particular I disagree with the conclusion of Ms Wickham that the NES for PM₁₀ is unlikely to be complied with within several hundred metres of the site boundary.
26. I also disagree with Ms Wickham that elevated levels of short-term RCS may be an issue for local residents, however I do agree that a limited monitoring campaign is justified should the quarry become operational. This would provide some further assurance to local residents that there is no material health risk associated with RCS emissions from the operating quarry.
27. Consistent with my rebuttal of Mr Kirkby, I conclude that Ms Wickham had not accounted for the differences in potential PM₁₀ emissions between Yaldhurst and the Proposal to substantiate her views.
28. Ms Wickham's evidence is that the reduction factor of 10 (that I estimated for PM₁₀ impacts due to the Proposal compared to those measured downwind of multiple quarry sites at Yaldhurst) is not based on science. I disagree and consider that my original assessment of differences in exposed areas, scale and design changes were based on accepted science.
29. In my rebuttal evidence of 6 November 2019, I provide a detailed summary of theoretical annual PM₁₀ emission rates calculated using US EPA equations.

The resultant numbers are unreliable in absolute terms, however they can be used to make relative comparisons between the Yaldhurst quarries (cumulative PM₁₀ emissions), the proposed Roydon quarry and existing Fulton Hogan sites. I conclude the comparison of these numbers indicates that existing consented emission from Fulton Hogan quarry sites within the Christchurch airshed boundary are higher than the those estimated for the Proposal. As such there appears to be sufficient options for offsets to be available should this be required.

30. Ms Wickham has provided her own estimated emissions for the Proposal, but has given these values weight in absolute terms and suggests the values are not conservative. I consider that both these assumptions are incorrect and further consider that many of the input assumptions for these calculations are also incorrect. As such I reiterate that theoretically calculated PM₁₀ emissions using US EPA or similar equations can only be used reliably for making comparisons of relative magnitude of emissions from different sites, or different sources within a site. This is how I used these equations and they have the effect of demonstrating more clearly why my key assessment assumptions are robust.
31. In conclusion, I consider Ms Wickham's criticisms of the Golder (2018) assessment and my subsequent evidence are not sound. Furthermore, I conclude that Ms Wickham's evidence tends to consistently overstate the potential for the various type of potential air quality effects of the Proposal.

Conclusions of my briefs of evidence

32. Having considered the potential nuisance effects from the Proposal, and having taken account of the proposed design and mitigation measures, it is my opinion that the potential dust nuisance effects are likely to be minor and therefore not objectionable or offensive at the nearest sensitive receptors and less than minor for those beyond a distance of 200 m from the proposed site.
33. With regards to key air contaminant discharges arising from the Proposal (including RCS, PM_{2.5} and PM₁₀), I conclude that these are likely to increase by extremely low to low levels beyond the site boundary. As such the cumulative ambient levels of respirable crystalline silica are likely to be negligible and PM_{2.5} levels are likely to be well within relevant World Health guidelines for acute and long-term exposure.

34. Furthermore, I conclude that PM₁₀ levels beyond the site boundary are likely to fully comply with the relevant regulations and ambient PM₁₀ targets under the National Environmental Standards for Air Quality (NESAQ). Given this and having considered Ms Wagenaar's primary evidence (her paragraphs 36 to 50), I conclude the potential for health effects on the nearest sensitive receptors is likely to be low/acceptable and negligible for people living in built up areas including Templeton and Brackenridge.
35. Importantly, in my opinion, is the fact the proposed mitigation and the advanced quarry design means the Proposal has the ability to minimise dust emissions and effects to an extent that represents a new level of practice in New Zealand. This proposed new level of design and management of dust goes well beyond what I have observed in New Zealand quarry sites to date.
36. Overall, it is my view that the air quality and health effects of the Proposal are able to be mitigated to an acceptable level.

Roger Cudmore

14 November 2019