

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

IN THE MATTER OF The Resource Management
Act 1991

AND

IN THE MATTER OF Applications CRC192408,
CRC192409, CRC192410,
CRC192411, CRC192412,
CRC192413 and CRC192414
by Fulton Hogan Limited for a
suite of resource consents to
establish a quarry operation

SUMMARY STATEMENT

**SECTION 42A REPORTING OFFICER
CANTERBURY REGIONAL COUNCIL
AIR QUALITY – DEBORAH RYAN**

DATED: 11 DECEMBER 2019

1. INTRODUCTION

- 1.1 My name is Deborah Ryan. I am a Technical Director for Air Quality with Pattle Delamore Partners. An explanation of my qualifications and experience is provided in my section 42A Report.
- 1.2 While this is a Council Hearing, I acknowledge that I have read the Environment Court's Code of Conduct for Expert Witnesses as contained in section 7 of the Environment Court Practice Note 2014 and have complied with it in the preparation of this evidence.

2. SCOPE OF SUMMARY

- 2.1 The purpose of this statement is to update my air quality assessment provided in my section 42A Report in light of the Joint Witness Statements¹ for Air Quality and to respond to other matters that have arisen during the hearing.
- 2.2 In preparing this summary, I have relied on the documents listed in Paragraph 11 of my section 42A Report; the evidence (23rd September 2019) and rebuttal evidence of Mr Cudmore (21st October & 6th November); Ms

¹ Joint Witness Statements for Air Quality Referred to as "JWS"

Wickham's supplementary statement of 21 November 2019, the JWSs for Air Quality (11 November 2019 and 9 December 2019); and proposed conditions of permit number CRC192410 provided by the applicant on 2/12/19.

2.3 I provide comment on issues that have arisen during the hearing as below:

- (a) PM₁₀ monitoring location;
- (b) PM₁₀ monitoring trigger levels;
- (c) Scaling factor applied to incremental PM₁₀ from Yaldhurst;
- (d) Regulation 17(1) of the NESAQ;
- (e) NES for PM₁₀ of 50 µg/m³;
- (f) Short-term RCS exposure; and
- (g) Additional mitigation.

3. PM₁₀ MONITORING

- 3.1 I understand that the applicant has agreed to a semi-fixed/permanent location for a PM₁₀ monitor that meets the National Environmental Standards for Air Quality (NES) requirements for real-time continuous PM₁₀ monitoring, such as a Beta Attenuation Monitor or (BAM). There are also proposed to be at least two mobile monitors, to be used for monitoring short-term (hourly) PM₁₀ to be used with trigger levels for dust control.
- 3.2 The applicant has discussed whether the standard BAM measurement device should be located near to the community in Templeton rather than at the quarry site boundary. The reason for this would be to provide more meaningful information on the levels of PM₁₀ to people in the community. Analysis of the data according to wind direction could be used to differentiate the data that is representative of when the wind is blowing from the quarry, to compare with measured levels at other times/from other sources, which could demonstrate the relative impact of the quarry on total PM₁₀.
- 3.3 In my view, placing a monitor in Templeton could affect the ability to interpret the data, because the NES is as a 24-hour average. Correlations with wind directions would add complexity to interpretation particularly when wind is quite variable over a 24-hour period.

- 3.4 My preference would be for the BAM to be located at the quarry boundary, principally because there are likely to be fewer sources locally that could interfere with the maximum measurements. And also because there is a proposed requirement for the mobile monitors to be routinely calibrated against the BAM. If the BAM is not in the same general location as the mobile monitors i.e. if it is exposed to a different mix of PM₁₀ sources, then I understand that the BAM would not be (as) suitable for undertaking the calibrations for the quarry-based monitors.
- 3.5 I note that the proposed continuous mobile monitoring uses PM₁₀ as a surrogate for nuisance dust. While not intended to demonstrate compliance with the ambient air quality standards and guidelines for PM₁₀, these monitors should still undergo calibration to ensure reliable measurement.
- 3.6 I note that the applicant's proposed conditions of permit number CRC192410 accord with my views at paragraphs 3.4 and 3.5 (specifically proposed conditions 5 and 6).

4. TRIGGER LEVELS FOR DUST MANAGEMENT

- 4.1 In my S42A report I supported the monitoring trigger levels for dust (as PM₁₀) that were proposed by the applicant in the Air Quality Assessment, and as set out in paragraph 25 of my S42A. I considered that the proposed levels were appropriately conservative for proactive dust management and were similar to a recent consent granted by CRC for Road Metals Company Limited (CRC181274). The PM₁₀ monitoring trigger levels are intended for the purpose of alerting site staff to the need to investigate if dust mitigation measures should be increased; and/or if quarry activities should cease.
- 4.2 As discussed at paragraph 26 of my S42A report, the applicant has since proposed different trigger level values which are the same as those in the *Good Practice Guide for Assessing and Managing Dust* (MfE, 2016). The applicant advised that the originally proposed trigger levels are too restrictive. As part of the JWS of 11 November 2019, the air quality experts reviewed the background air quality measurement data for the Royden site and agreed that the originally proposed levels are essentially impractical, because background levels alone would trigger the dust management response relatively frequently i.e. without any quarry activities being undertaken.
- 4.3 At paragraph 29 of her Supplementary Statement, Ms Wickham discusses the trigger levels for hourly PM₁₀ concentrations. Ms Wickham has proposed

a set of trigger values at paragraph 30 of her Supplementary Statement, based on the measured background hourly data set for the Royden site. These proposals appear to be reasonable, given the analysis of the background data, including the recommendation to restart works if the action threshold to stop works is triggered. Condition 11 of the applicants' proposed conditions (2/12/2019) acknowledge there is a gap in the management framework for the applicable trigger levels. I support Ms Wickham's proposals and would recommend that these be adopted in the conditions.

5. SCALING FACTOR

- 5.1 The applicant has proposed a scaling factor be applied to incremental data for PM₁₀ concentrations in air, as measured across the Yaldhurst site over a short-term monitoring campaign (the Yaldhurst study). The applicant has suggested that the scaling factor would be of the order of 10-fold (or greater). Table 1 of the JWS of 9 December 2019, indicates that based on mass emission estimates for both Royden and Yaldhurst, a scale factor of at least 10 is supportable. The basis of this factor being, both the relative scale of the activities at Yaldhurst, and the additional (best practice features) that are proposed for the design and dust control at the Royden Quarry compared with Yaldhurst's operations.
- 5.2 While downwind concentrations are affected by the total mass emission discharged across a series of area and point sources, such as at Yaldhurst, they are also influenced by the relative distance to the boundary of activities that produce particulate matter. As noted by Ms Wickham at paragraph 20(iii), her understanding of the Yaldhurst data is that the maximum measurements (from incremental analysis) were at site 3, where dust tracking at the site entrance impacted the measurements (presumably disproportionately). This raises two points:
- (a) the maximum increments at site 3 are unlikely to be replicated at Royden due to the proposal for sealed access, sealed loop road, rumble strip and p-metal on unsealed areas; and
 - (b) local activities, such as bund construction, can impact beyond boundary concentrations disproportionate to the total mass emission from a site.
- 5.3 I note that for the incremental analysis undertaken by Ms Wickham, she used daily data from Royden as the background. In my view, Mr Cudmore's

approach to use data from the upwind locations is more meaningful for the incremental analysis, compared to data from 5 kilometres away². That aside, Ms Wickham’s worst case incremental concentration reported at paragraph 84(i) of her statement of 17th of October 2019, ranged from 21 – 37 µg/m³ at sites within 100 m of the quarry boundaries. I understand the value of 37 µg/m³ was associated with high dust levels at the site entrance as discussed above (paragraph 95(ii) of Ms Wickham’s statement), so in my view this impact level would not be relevant to the operations at Royden with fully sealed entrance and internal ring road, in addition to other mitigation measures.

5.4 Table 1 below presents the range of incremental effects on air quality based on the given range of scaling factors derived in the JWS, ranging from 12 to 22 times, and the range of incremental concentrations for Yaldhurst reported by Ms Wickham. Mr Cudmore states³ that increases are in the range 10 - 20 µg/m³, other than the northwest, which is in the range 30 - 45 µg/m³, which is again representative of Site 3. I have therefore included an indicative high value of 30 µg/m³ as an incremental concentration in the Table 1 estimates.

Table 1 Range of incremental concentrations based on scaling factors derived from 2nd JWS

Scaling factor based on Table 1, 2 nd JWS		Incremental concentration (µg/m ³ 24-hour average)		
		Yaldhurst		
		21	30	37
		Royden		
LW	12	1.7	2.4	3.0
CK	14	1.5	2.1	2.6
DR	17	1.2	1.8	2.2
RC	22	0.9	1.4	1.7

6. NESAQ REGULATION 17(1)

6.1 I have provided the data in Table 1 for illustrative purposes, the estimates are not intended to be absolute, but to provide an indication of the possible range of values relative to the threshold increase of 2.5 µg/m³ as a 24-hour average under the NESAQ Regulation 17(1).

² As described by Mr Cudmore at paragraphs 41 to 44 of his Supplementary Rebuttal Evidence, 6th November 2019.

³ Paragraph 46 of Supplementary Rebuttal, 6 November 2019.

- 6.2 This data is provided bearing in mind that the monitoring methods (and PM₁₀ mass emission estimate methods) are not precise. For example, the *Good Practice Guide for Air Quality Monitoring and Data Management* (MfE, 2009) recommends that PM₁₀ data should be reported as a whole number, i.e. 50.5 µg/m³ is rounded off to 51 µg/m³. The Monitoring GPG also states that for BAMs “regular maintenance in accordance with the operation manual is critical. Irregular and/or inadequate maintenance can result in up to 20 per cent variation”. This creates difficulty when the threshold for the assessment is essentially “within the noise” of the assessment tools.
- 6.3 For the range of data presented in Table 1, it is apparent that the incremental concentration of PM₁₀, based on the mass emissions scaling factor, will be less than 3 µg/m³ as a 24-hour average (at the conservative end). On balance, in my view, the data indicate that the threshold of the NESAQ Regulation 17(1) can be met. The question then arises under the Regulation, is the threshold likely to be met at any time, and in particular, when activities such as topsoil stripping and bund construction are occurring in close proximity to the airshed boundary.
- 6.4 The potential effects from bund construction will be minimised by Mr Cudmore’s recommendation to carry out construction outside of the summer period i.e. to the effect that construction shall only occur in the months of May to October as per proposed condition 17. In addition, I suggest incorporating a specific requirement to maintain exposed bare soil in a damp condition while bunds are being formed as per the Condition 23(f) for Road Metals Company Limited (CRC181274). Similar provisions would be needed for topsoil stripping and quarry excavations near the airshed boundary in order to maintain a high level of control, which would ensure likely compliance with the threshold increase of 2.5 µg/m³ as a 24-hour average at all times.
- 6.5 While there are limitations to the assessment, I agree that Mr Cudmore has used the best information available for his assessment in providing a quantitative basis for the emissions and potential impacts on air quality from the Royden Quarry.
- 6.6 In summary, in my view the range of values presented in the JWS can be considered as a sensitivity analysis, and a scaling factor of 10 applied to the incremental PM₁₀ measurement results can be considered conservative, such that it demonstrates the threshold increase of 2.5 µg/m³ as a 24-hour average can be complied with in numerical terms. This is provided those

activities undertaken at the boundary with the airshed are very well controlled at all times, and that the other monitoring and management measures are applied as proposed.

7. NESAQ FOR PM₁₀ of 50 µg/m³

7.1 At Table 1 of Ms Wickham's Supplementary Statement of 21 November 2019, she provides a summary of the years' worth of monitoring data for the Royden site, which was provided by the applicant after the 1st JWS, and is reproduced below for ease of reference.

Summary (BAM) PM₁₀ data from Royden Site (year ended 30 June 2019) (from Table 1, Ms Wickham)

PM ₁₀ Concentration	Daily (µg/m ³)	Hourly (µg/m ³)
Maximum	37	130
99%ile	32	42
95%ile	24	31
Annual average	14	14
Standard deviation	5.5	8.7
No. days > 50.5 µg/m ³	0	-
No. hrs > 65 µg/m ³	-	11
Valid data	97%	95%

- 7.2 In my view the background air quality data set shows that the ambient PM₁₀ is generally around 30 µg/m³ as 24-hour average or lower.
- 7.3 Given the data presented on the likely range of incremental PM₁₀ concentrations from the proposed Royden Quarry, air quality in the vicinity of the site will in the main remain at acceptable levels i.e. below the relevant air quality standard.
- 7.4 I note that the data set for the Yaldhurst study background monitoring site at Royden included a value of 45 µg/m³ as a 24-hour average during a north-easterly. I also note that this was an event that also caused a peak of 47 µg/m³ as a 24-hour average in the data set around Yaldhurst. In a situation such as this the quarry itself would not in my view be responsible for any exceedance that occurred (not being the principal source), and as stated in

paragraph 68 of my s42A report, the increase from the quarry itself would not affect human health in the surrounding community to more than a minor extent.

8. RESPIRABLE CRYSTALLINE SILICA (RCS)

- 8.1 I discuss RCS at paragraphs 69 to 72 of my S42A report, where I have relied on the data that was collected on RCS as part of the Yaldhurst study. This work showed a low level of measured RCS compared to the annual average assessment criteria of $3 \mu\text{g}/\text{m}^3$, which was confirmed as the appropriate criteria in the 1st JWS. I confirm my conclusion expressed at paragraph 71 of my S42A, that RCS exposure will not be an issue for people in the community around the Royden Quarry site.
- 8.2 Short-term exposures to RCS have also been raised as an issue. Starting at paragraph 113 of his primary evidence dated 23rd of September 2019, Mr Cudmore presented an analysis where he had correlated $\text{PM}_{2.5}$ hourly measurement data with $\text{PM}_{4.0}$ and RCS data to provide an indicative 1-hour average concentration for comparison with the assessment criteria from the Texas Commission for Environmental Quality (Texas guideline). Based on the Yaldhurst data the expected 1-hour average RCS reported at Table 3 (paragraph 115) of Mr Cudmore's evidence showed short-term RCS was acceptable compared to the Texas guideline. The appropriate criteria for acute (short-term) ambient exposures was discussed in the 1st JWS, with input from Ms Wagenaar, the Texas guideline was supported as an acute 1-hour criterion (paragraph 7).
- 8.3 In my view, Mr Cudmore's assessment utilises the best available data to inform the understanding of the potential for acute effects from RCS exposure. Given the data presented in Mr Cudmore's Table 3, and the lower levels of particulate matter generally expected from Royden compared to the Yaldhurst quarries, I expect the risk from short-term exposure to RCS be low.

9. ADDITIONAL MITIGATION

- 9.1 In his evidence dated 23rd of September 2019, at paragraphs 34 and 35, Mr Cudmore recommended additional monitoring and mitigation for properties downwind of the north westerly. I agree with Mr Cudmore and note that the applicant's proposed condition 12 provides a more generic condition relating to activities ceasing upon certain trigger points when receptors are within 250 m.

- 9.2 I consider that visual monitoring will be useful to control dust in all size fractions. I support that Condition 22(m) requires routine site inspections for monitoring visible dust. I would recommend that a procedure relating to routine/daily visual checks be incorporated into the requirements under the Dust Management Plan (Condition 26).
- 9.3 I note that the experts' assessments throughout the JWS process were closely linked to the nature of the aggregates to be processed. I therefore recommend that the aggregate grades be included under proposed condition 1(d) as being restricted to coarse aggregates, namely AP65, AP40 and AP20 (as per 2nd JWS, paragraph 13.3). In addition, the 2nd JWS assessment was based on an annual production rate of 625,000 tonnes per year. I recommend that this production level be reflected in the conditions.

10. CONCLUSION

- 10.1 With reference to the applicant's proposed conditions for permit number CRC192410, I support the monitoring location for the NES compliant PM₁₀ monitor as per condition 5.
- 10.2 I support Ms Wickham's proposals for monitoring trigger levels and recommend that these be adopted in the conditions.
- 10.3 I am satisfied that the best data available data has been used to provide quantification of the incremental concentration/s for assessment against Regulation 17(1). I am satisfied that the data have been sufficiently tested within a range of alternative assumptions through the JWS process, and that the values derived from the mass emission scaling factor are conservative enough so that meeting the 2.5 µg/m³ as a 24-hour average is theoretically achievable.
- 10.4 If the Regulation 17(1) threshold is likely to be met at any time then a very high level of control needs to be maintained, particularly for activities occurring near the airshed boundary.
- 10.5 For the most part, I consider air quality will remain at acceptable levels, well below the NESAQ for PM₁₀ of 50 µg/m³ as a 24-hour average. If the cumulative effects from the quarry, with the background, was to result in an exceedance, then the incremental effect from the contribution quarry would be minor.

- 10.6 I consider that both the long and short-term assessment criteria associated with ambient air exposures to RCS will be met around the proposed quarry.
- 10.7 I have reviewed the applicants' proposed conditions of permit number CRC192410 and agree that, with some minor amendment, they address the key design features and mitigation measures needed to address the potential adverse effects of the proposal on air quality.