Before the Hearing Panel appointed by Canterbury Regional Council

IN THE MATTER OF	The Resource Management Act 1991
AND	
IN THE MATTER OF	Applications CRC204106, CRC204107, CRC204143, CRC211629 and RC204105 to establish, operate, maintain and rehabilitate an aggregate quarry by Taggart Earthmoving Limited

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SUMMARY STATEMENT

SECTION 42A REPORTING OFFICER
CANTERBURY REGIONAL COUNCIL
AIR QUALITY – RICHARD CHILTON

DATED: 30 APRIL 2021

INTRODUCTION

1. My full name is Richard Leslie Chilton. I am employed by Tonkin & Taylor Limited ("T+T"), Environmental and Engineering Consultants. I hold the position of Principal Air Quality Scientist and Team Leader Air Quality.
2. I have been engaged by the Canterbury Regional Council (CRC) to undertake the technical review of the application by Taggart Earthmoving Limited (Taggart) for its proposed aggregate extraction activity.
3. 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 summary.

SCOPE OF REPORT

4. This report is an addendum to my primary Section 42A report which is included as Appendix 3 of the Section 42A Officer's Report circulated on 8 April 2021. The purpose of this addendum is to provide a summary of my report and respond to matters raised in the Applicant's evidence, submitter evidence and matters that have arisen during the hearing.
5. In preparing my report, I have reviewed the following information:
    a. PDP AEE (2020a). Assessment of Environmental Effects – Gravel Extraction and Backfilling at Rangiora Racecourse (Taggart Earthmoving Limited). Report prepared for Taggart by Pattle Delamore Partners (PDP), 6 October 2020. Job Reference C03633100.

b. PDP Air Quality Assessment (2020b). Rangiora Racecourse Quarry Air Quality Assessment. Report prepared for Taggart by Pattle Delamore Partners (PDP), 1 October 2020. Job Reference C03633100.

c. PDP section 92 response (2021). Taggart Earthmoving Ltd Applications – Response to S92 Requests. Letter from Pattle Delamore Partners to Incite dated 27 January 2021.

d. The expert evidence of Jeffrey Bluett and Mr Donovan Van Kekem.

SECTION 42A REPORT SUMMARY

6. The Applicant proposes to operate a gravel excavation activity within the Rangiora Racecourse on the western fringe of Rangiora township. The main discharge to air from the proposed quarry operation will include the following:

   a. Dust (particulate matter) is the main air contaminant emitted from quarry activities of this type. The dust emissions will be mainly comprised of coarse particulate matter, with the potential to result in nuisance or property soiling effects. Coarse dust is likely to settle out of the air and deposit close to the source.

   b. A small component of the dust emissions (including the fine PM_{10} fraction or hazardous components such as respirable crystalline silica (RCS)) have potential to cause adverse respiratory health effects with sufficient exposure.

   c. Combustion by-products will be emitted from stationary and mobile machinery, although impacts from these emissions will be negligible given the scale of activity.

7. The application is for the excavation of gravel for transport off-site. No processing of aggregate is to occur on site, which is a significant beneficial consideration for this application. This is because processing of aggregate is often a significant source of particulate matter emissions and respirable crystalline silica (RCS) associated with quarrying in general. Given this, the main sources of dust emissions will be limited to the stripping of overburden and formation of bunds, excavation of aggregate and, most significantly, dust entrained by the movement of vehicles (haul trucks) over unpaved surfaces.

8. A further important consideration for this application is that the exposed area of excavation and backfilling will also be relatively small (2 ha). This in turn limits the extent of dust generating activities and the exposed areas that could give rise to wind-blown dust.

9. **Assessment Method:** Taggart's consultant PDP has undertaken a qualitative assessment of the potential dust effects associated with the proposed gravel extraction activity. The approach is commensurate with the FIDOL[1] assessment approach recommended by the Ministry for the Environment (MfE 2016[2]) and set out in the Second Schedule of the Canterbury Air Regional Plan (CARP).

10. I generally agree with PDP's finding but would consider the characterisation of potential dust nuisance effects on surrounding sensitive locations to be 'less than minor', rather than negligible, in an RMA framework.

11. **Applicability of Regulation 17 of the NES_{AQ}:** The site is situated approximately 120 m west of the nearest point of the Rangiora Airshed. I agree with the PDP's assessment that the contribution from Taggarts proposed operation to 24-hour

[1] Frequency, Intensity, Duration, Offensiveness and Location.

[2] MfE 2016. Good Practice Guide for Assessing and Managing Dust. Ministry for the Environment

average PM_{10} concentrations in the Rangiora airshed is expected to be below 2.5 µg/m³. Given this I consider that the provisions of Regulation 17 of the National Environmental Standard for Air Quality (NES_{AQ}) do not apply to this application.

12. **Cumulative effects:** With regard to cumulative effects, I expect cumulative dust effects on sensitive locations to be minimal given the following considerations:

    a. The site is not situated near other quarry activities or other significant dust sources. The nearest quarry is Taggart's operation at the corner of River & Cones Roads (CRC970192), but that site is approximately 1 km from the Racecourse and too far away in my opinion to give rise to cumulative effects.

    b. The Ashley River, may be a source of wind-blown dust during periods of strong/dry west-northwest wind conditions. However, under such wind conditions, it is my experience that dust emissions will tend to be channelled along the length of the river. Given this, I would not expect there to be a significant potential for cumulative impacts of wind-blown dust from the riverbed and dust emissions form the site at sensitive locations surrounding the site.

13. **Health effects:** In the context of this application, I agree with PDP that it is very unlikely ambient concentrations of PM_{10}, $PM_{2.5}$ and RCS would approach relevant human health guidelines at sensitive receivers.

14. **Mitigation:** A key dust control method is the application of water to dampen surfaces and suppress dust. In this regard I am satisfied that there is sufficient water available for dust suppression via the Racecourse's water take permit. I comment on this further in relation to Mr Bluett's evidence

15. The proposed mitigation measures set out by the Applicant are generally appropriate. However, I have recommended the following additional measures:

    a. Requiring application of water on exposed surfaces for dust control on dry days.

    b. Sealing the site access road.

    c. Maintaining and regularly vacuum sweeping the sealed site access road to remove any build-up of potential dust material.

    d. The use of at least two continuous dust monitors (configured to measure PM_{10}) to be used for proactive management of dust emissions from the site via trigger concentrations. Regarding trigger concentrations, I have suggested values that reflect those recommendations of recent s42A report recommendations for Road Metals and SOL Quarry applications.

    e. Requiring haul trucks delivering cleanfill and transporting aggregate off site to have loads covered.

    f. Prohibiting on site processing of aggregate.

16. **Submissions:** A large portion of the submissions received raised a variety of concerns regarding air quality effects. I have set out responses to these matters in my report.

MATTERS RAISED IN EVIDENCE

Mr Bluett for Taggart

17. **Mr Jeffrey Bluett** has prepared expert evidence for Taggart in relation to discharges to air for the proposed quarry.

18. In response to a matter raised in submissions, Mr Bluett's discusses the time of year when bunds would be built at Paragraph 12.12 of his evidence. He notes that it is good practice for bunds to be built during wetter months of the year and grassed to ensure a minimum of at least 80% surface cover. He also explains that it is his understanding that this will be included as a condition of consent, which I support.

19. Mr Bluett discusses my recommendation for truck loads to be covered in Paragraph 13.8 of his evidence. In this regard he considers that covering loads is not necessary in this instance given the short distance to the Cones Road processing site, the 80 km/hr speed limit on the stretch of road between the two sites, and low fines content of material. While I accept these matters are the case, I note that Mr Bluett concurs with my view that covering loads is accepted industry practice and I consider it is not an unreasonable expectation that a new activity adopts such measures.

20. The number and location of continuous PM_{10} monitoring instruments is a further matter raised by Mr Bluett in Paragraph 13.11 of his evidence. My Bluett proposes that a single instrument be permanently established along the western boundary of the proposed site. While I agree that locating an instrument along this boundary will be useful for sensitive activities adjacent to the western boundary, it will be of no assistance for dust management purposes regarding sensitive activities close to the eastern boundary of the site. In particular, receptors R8 and R9 on the eastern side of the site are relatively close (around 160 m from the bund and 170 m from the site access road). Given the unpaved site access / haul road runs along the boundary adjacent to these residences I consider it will be important to have a second monitor for this location.

21. Mr Bluett's evidence describes two additional dust mitigation measures that would be useful to reflect by way of consent conditions or as a matter for inclusion in the dust management plan. These are as follows:

    a. The use of an automated irrigation systems that will operate to suppress dust on exposed surfaces. In practice I note that such a system is highly dependent on the design and location of the irrigation system, and that it should be used in conjunction with a water cart.

    b. The stripping of topsoil and construction of bunds during wetter months.

Mr Van Kekem

22. Mr Donovan Van Kekem has prepared expert evidence on behalf of the 'Rangiora Ashley Community Board' in relation to air discharges from the proposed quarry operation.

23. A number of the key matters raised by Mr Van Kekem have been the focus of expert conferencing[3] by Mr Bluett, Mr Van Kekem and myself. The outcome of the expert conferencing will be summarised in a joint witness statement to the Commissioners. The key issues covered in our discussions were as follows:

    a. Hours of operation

    b. Dust management plan

    c. Stockpiles

    d. Bund construction

    e. Access and internal haul roads

[3] Prehearing conferencing, as per the Hearing Panel instruction, took place on 28 April 2021.

f. Particulate monitoring

g. Regulation 17 of the NES_{AQ}

24. Of particular importance were discussions centred on the length of the unpaved site access road, which Mr Van Kekem describes at Paragraph 10 of his evidence as being approximately 450 m instead of 140 m described in the application and by Mr Bluett. In this regard I note the site plan provided with the application and referred to variously in evidence for the applicant is hard to interpret. However, this has now been clarified as being a distance of approximately 450 m.

25. The length of the haul road has implications in terms of the level of mitigation proposed, ambient monitoring requirements, and Regulation 17 of the NES_{AQ}, which are addressed in our joint witness statement.

26. To address these concerns, it is my preference is for the entire length of this haul road to be sealed. However, I understand that the Applicant proposes using milled asphalt on top of a suitable base to form the haul road. As a measure I am not familiar with its efficacy and I understand that Mr Bluett will provide the commissioners with further information in this regard. Notwithstanding this, I can appreciate in principle it should result in a substantial degree of dust control. Key considerations in my view will be the depth of milled asphalt, how it is compacted and maintained, and the removal of any build-up of dusty material. If adopted I consider that contingency measures, such as the use of a water suppression system along the length of the haul road, should be conditioned if the Commissioners were to grant the application.

27. With the sealing of the haul road, or use of milled asphalt, I consider it <u>unlikely</u> that PM_{10} emissions from the site would give rise to concentrations at the airshed boundary that would reach the threshold concentration limt of Regulation 17 of the NES_{AQ}. In this context I do not consider NES_{AQ} compliant regulatory standard monitoring for PM_{10} is required.

28. A further matter where Mr Van Kekem and I have differing opinions relates to the continuous monitoring of particulate matter for dust management purposes. The purpose of such monitoring simply seeks to broadly identify whether or not dust concentrations are increasing significantly so as to enable a management response to those increasing concentrations. I stress that the trigger levels are not values where an adverse effect will explicitly occur if that concentration is reached. They are simply a means of alerting the site operator that some action is needed to better control emissions. Accordingly, I consider there can be greater flexibility around instrumentation type and trigger levels because they do not explicitly relate to adverse effects monitoring.

29. Given this context, I consider the use of a lower cost nephelometer instrument, as proposed by the Applicant, entirely appropriate. These instruments are widely used throughout New Zealand as a <u>management tool</u> for controlling dust emissions, especially from quarries, earthworks and major construction projects.

30. The remaining issue relates to the particulate size fraction to be monitored for dust management purposes. Mr Van Kekem's prefers the size fraction to be 'total suspended particulate' (TSP). Mr Bluett and I favour monitoring of the PM_{10} size fraction. My opinion on this is due to:

a. Nephelometer instrumentation being better to suited to $PM_{10;}$

b. That dust emissions will include particles in the PM_{10} size fraction (i.e., from vehicle movements on unpaved roads, wind erosion from exposed surfaces, and aggregate excavation), making it a reasonable proxy for nuisance dust;

c. That the monitoring of PM_{10} for this purpose is widely and successfully undertaken elsewhere; and

d. That there is experience with suitable trigger levels for PM_{10} as a proxy for elevated dust.

31. On this last point, I note that the trigger levels given in the condition set appended to Ms Dawson's s42A report are substantially lower than the trigger concentration for PM_{10} recommended in MfE good practice guidance (that is 65 µg/m³ versus 150 µg/m³). That is to say that they are more conservative than anticipated by the MfE.

32. The CRC has prepared guidance on real time dust monitoring of this nature, which I have been provided during this hearing and given permission to make available to the commissioners and air quality experts (given as Attachment 1). This CRC guidance states that *"PM_{10} is the size fraction usually associated with dust monitoring."*

33. Finally, I note that wind monitoring combined with wind speed and direction trigger levels are also proposed and included in the condition set being developed. This wind monitoring has a similar purpose to the continuous dust monitoring, in that it seeks to warn operators of conditions that can exacerbate dust emissions from site operation. This provides a further level of redundancy in terms of the PM_{10} monitoring.

MATTERS THAT HAVE ARISEN IN THE HEARING

The use of wind data from the Rangiora EWS site

34. Mr Dickson has presented evidence on the use of the Rangiora EWS weather station and is concerned about its suitability for use in the PDP assessment, given its proximity to nearby tall trees and the low frequency of measured northwesterly winds. In his evidence, Mr Dickson correctly described that locations further inland from the coast experience a greater prevalence of northwesterly winds and lower frequency of northeasterly winds. I understand this is due to both the weakening effect of northeasterly see breeze and the lee trough effect for locations further inland.

35. Mr Dickson's key concern on this matter is that data from Rangiora EWS site is not reliable and is not sufficiently close or representative of the Racecourse location to inform the air quality assessment.

36. In my experience, the use of publicly available wind data from the National Climate Database for the nearest meteorological station is standard practice for air quality assessment, especially where there is a site within 5 km of a site. While there may be a small number of trees close to the Rangiora EWS site, I note it exhibits a very similar windrose to that from another nearby monitoring site at Ohoka (included as windroses in Attachment 2). Given this, I consider that the Rangiora EWS data seems reasonable for its location.

37. The key limitation of the Rangiora EWS data is that it may under-represent northwest wind conditions at the Racecourse site to some extent. In terms of the assessment, this mainly affects the frequency of locations to the southeast of the site being downwind. However, I consider the mitigation and monitoring/trigger provisions still recognise these as sensitive locations and mitigation is proposed to reflect this. Accordingly, I consider the potential effects on locations to the southeast are appropriately addressed.

CONCLUSIONS

38. I generally concur with the Applicant's findings that the potential air quality effects should be less than minor, given:

    a. The small scale of the activity;

    b. The small extent of exposed area (up to 2 ha) at any given time from which wind-blown dust may be generated;

    c. The absence of any aggregate processing (i.e., crushing and screening);

    d. The proposed controls being implemented; and

    e. monitored for their effectiveness and the proximity and exposure of sensitive activities.

39. However, my conclusions further predicated on the following basis:

    a. The entire site access/haul road along the easter boundary (approximately 450 m) being or . Alternatively, If it milled asphalt is used then details of its use should be set out as conditions within the consent.

    b. Two continuous PM_{10} nephelometer instruments being used for pro-active dust management for sensitive locations within 250 m of works being undertaken.

    c. The use of a water suppression system for the stockpiles during dry weather.

    d. Limiting the formation of bunds to winter months when ground conditions will be damp.

Signed: ______________ Date: 10 May 2021

Name: Richard Chilton

Principal Air Quality Scientist

Attachment 1 – ECan guidance

Choosing a PM_{10} boundary monitoring instrument

Introduction

Choosing the appropriate instrument to measure the particulate matter (PM) in air depends on the purpose of the monitoring. Other considerations include the type of particulate, the accuracy and time-resolution required, purchase cost and the costs of maintenance.

For operators of quarries, and other dust creating activities, the principle reason for boundary monitoring is to quantify the amount of dust leaving a worksite. (NB Monitoring may also be a requirement in a resource consent). As a tool, boundary monitoring can be used to make operational decisions on dust mitigation measures.

PM can be divided into three primary size fractions; $PM_{2.5}$ (particles which can reach the lungs, smaller than 2.5μm), PM_{10} (particles which can be inhaled past the nose, smaller than 10μm) and Total Suspended Particles (TSP) (all particles in the air or particles measurable by the instrument being used). PM_{10} is the size fraction usually associated with dust monitoring.

Types of PM instruments

PM instruments are generally used for either regulatory or non-regulatory monitoring. Regulatory instruments are certified to give 24-hr average concentrations for a wide variety of particulate compositions. They are used in regional or national air quality monitoring programmes. Regulatory methods tend to be expensive and have relatively high maintenance costs, but the data is more credible.

Non-regulatory methods cover a wide range of instrument types, but are generally thought of as used for anything other than regulatory monitoring. They typically have the advantages of better time resolution and installation flexibility but may not be considered accurate without a correction being applied to the output data. Non-regulatory methods are also typically cheaper and more easily deployed.

Beta Attenuation Monitors (BAMs) and optical based instruments will be the focus of this document, as these are the most common methods in use.

Lower cost technologies:

Beta Attenuation Monitor (BAM)

Utilises the relationship between Beta radiation absorption and particulate mass to report concentrations. Air is drawn through a size selective inlet at a constant rate and particulate matter accumulates on a glass fibre tape. Radiation, typically from Carbon-14, is measured to determine particulate increase on the tape.

Data resolution:	1 hour (typical)
Power:	240 V (some 12 V)
Pros:	Can be a regulatory method so data has more credibility
Cons:	1 hour data resolution
	Some susceptibility to variations in RH
	Typically requires 240 V power
	Inlet needs regular cleaning

Optical – single size fraction

Uses the effect of the particulate matter scattering a laser beam. Air is drawn through a size selective inlet and enters a sample chamber. The amount of the scatter is then used to determine the number of particles passing through the instrument. A calculation is then used to convert the particle count into a mass value. This calculation is only true for particles of similar size and reflectiveness. A correction factor may be required (for each reported size) to make values reported comparable to regulatory methods (see 'Correction factors'). This correction factor will also only be true for particles of similar size and reflectiveness.

Data resolution:	< 1 minute
Power:	12 - 24 V (some 240 V)
Pros:	Low purchase cost
	Low power needs
	High resolution data (can be 1 second)
Cons:	Low accuracy for changing particulate composition
	Susceptible to variations in RH
	Needs a correction factor to be determined
	Inlet needs regular cleaning

Optical - multi-size fractions

Uses the effect of the particulate matter scattering a laser beam. Air may be drawn through a size selective inlet (depends on design) and enters a sample chamber. The amount of the scatter is then used to determine the number and size of the particles passing through the instrument. A calculation is then used to convert the particle count of each size fraction into mass values. A correction factor is likely required to make the values reported comparable to regulatory methods (see 'Correction factors'). These instruments may not require a size selective inlet, so require less cleaning than other methods.

Data resolution:	< 1 minute
Power:	12 - 24 V (some 240 V)
Pros:	Low purchase cost
	Low power needs
	High resolution data (can be 1 second)
	Able to minimise the effect of changing particulate composition on readings
Cons:	Susceptible to variations in RH
	May need a correction factor to be determined

Correction factors

When running an instrument which measures a characteristic of the particulates, other than its mass, then a correction factor is likely needed. This factor is calculated from a relationship of the instrument against a reference instrument or regulatory monitor. The reported values from the instrument are then multiplied by the correction factor.

For optical single size fraction instruments, this correction factor is essential. Operators also need to be aware that if a different type of particulate than normal is measured by the instrument, then reported values will be incorrect. For example, if the instrument has a correction factor for measuring quarry dust, then smoke from a fire will report higher than the actual amount of smoke.

Making a choice

Certification

Instruments being used should be able to meet some basic performance standards, for example the MCerts Performance Standards for Indicative Ambient Particulate Monitors. Manufacturers should be able to supply certification documentation.

Relative Humidity

Relative Humidity (RH) can impact on the readings for PM, especially optical based instruments. Some lower cost instruments do not come equipped with a heated inlet as standard, however a heated inlet is required to reduce the impact of high RH or rain on PM measurements.

Servicing

All instruments require some degree of servicing; for example, size selective inlets need to be cleaned, filters replaced, sample lines and optics cleaned. The manufacturer should advise on maintenance required (this can be a significant ongoing cost).

Power requirements

Electrical power to run the instruments needs to be considered. Most optical based systems have an option to run from solar energy. This will increase purchase cost but makes deployment around operations easier.

Data availability

You will need to consider (i) how readings from the instruments will be obtained and stored; (ii) how alerts from the instruments be managed; and (iii) how long will the data be stored and available for reporting.

	BAM	Optical – single size	Optical – multi size
Purchase cost	$$	$	$$
Maintenance	$$	$$	$
Power	$$	$	$
Correction factor	No	Yes	Maybe
High resolution data (<1min)	No	Yes	Yes

Summary

There are a range of instruments that can be suitable as boundary dust monitors. Seek clarity from the instrument manufacturer as to the instrument's suitability for the type of particulate matter being measured, the required maintenance, how the effect of RH is managed and powering options.

Glossary

PM_{10}	Particulate matter less than 10µm in aerodynamic equivalent diameter
$PM_{2.5}$	Particulate matter less than 25µm in aerodynamic equivalent diameter
TSP	Total Suspended Particles in air
RH	Relative Humidity of air
Reference Instrument	Instruments designated as Reference Methods in the List of Designated Reference and Equivalent Methods found at **https://www.epa.gov/amtic/air-monitoring-methods-criteria-pollutants or certified to EN12341**. Reference instruments produce a 24-hr value only.
Regulatory monitor	Instruments designated as Equivalent Methods in the List of Designated Reference and Equivalent Methods found at **https://www.epa.gov/amtic/air-monitoring-methods-criteria-pollutants** or verified to AS/NZS Standard 3580.9.17
Size selective inlet	Inlet designed to mechanically remove particulate matter larger than the intended size fraction

Further reading

Ministry for the Environment – Good Practice Guide for Assessing and Managing Dust **https://www.mfe.govt.nz/publications/air/good-practice-guide-assessing-and-managing-dust**

MCerts Performance Standards for Indicative Ambient Particulate Monitors **https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/642895/LIT_7070.pdf**

US EPA Air Sensor Toolbox
https://www.epa.gov/air-sensor-toolbox

Air Quality Sensor Evaluation Center
http://www.aqmd.gov/aq-spec/

MCerts instruments

https://www.csagroupuk.org/services/mcerts/mcerts-product-certification/mcerts-certified-products/mcerts-certified-products-indicative-ambient-particulate-monitors/

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Attachment 2 – Rangiora and Ohoka windrose comparison

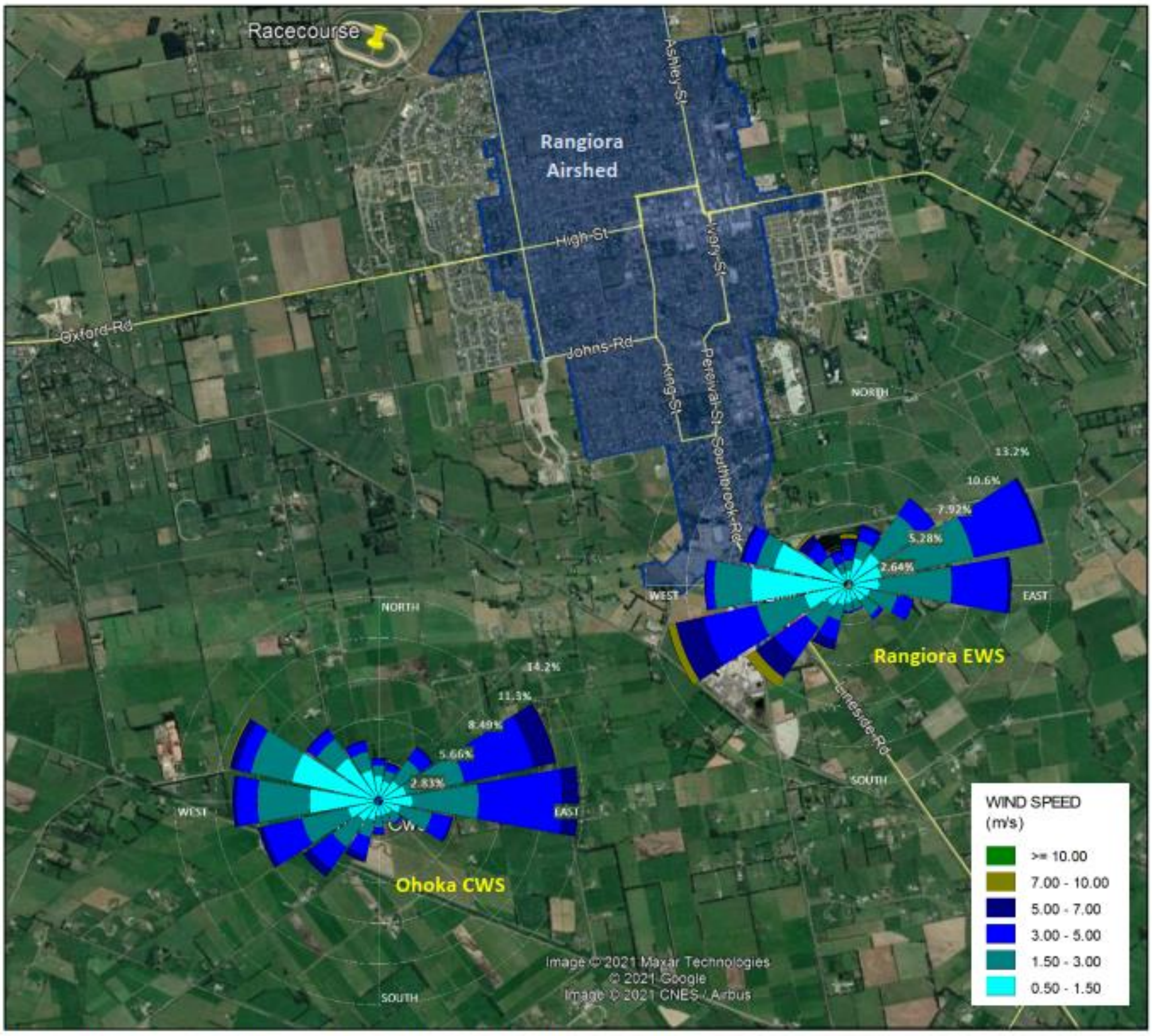

Figure 1: Rangiora EWS and Ohoka CWS for September 2017 to December 2019.