Before the Independent Hearing Panel
appointed by the West Coast Regional Council

Under	the Resource Management Act 1991
In the matter of	a resource consent application by von Ah Contracting Limited for a section 15 discharge to air permit associated with the operation of a composting facility at 1047 Kaniere-Kowhitirangi Road, Kokatahi (RC-2024-0136)

Evidence of Donovan Van Kekem

19 February 2026

Qualifications and experience

1 My full name is Donovan Van Kekem.

2 I have the following qualifications:

(a) A Bachelor's Degree in Biochemistry from the University of Canterbury; and

(b) A Post Graduate Diploma in Forensic Science from the University of Auckland.

3 I am also a current member of the Clean Air Society of Australia and New Zealand and am a Certified Air Quality Professional.

4 I am the Managing Director of NZ Air Limited and have held that position since establishing NZ Air Limited in 2016.

5 Some of my work experience which is relevant to this application is as follows:

(a) I have been involved in writing and presenting expert air quality evidence for a number of air discharge consents and development projects containing nuisance odour and dust discharges including:

(i) An application for a replacement air discharge consent for Envirofert's Tuakau composting and landfill facility;

(ii) AB Lime's application for a replacement air discharge consent for discharges to air from its large landfill and lime quarry operation in Winton;

(iii) Proposed Private Plan Changes PC69, PC73, PC81 and PC82 to the Selwyn District Plan, as an expert assessing odour reverse sensitivity for wastewater treatment plants and composting operations;

(iv) The Ecogas organics processing facility and anaerobic digestion plant in Hornby on behalf of submitters;

(v) The expansion of Fonterra's Studholme milk processing plant and wastewater treatment plant on behalf of submitters; and

(vi) The Auckland Council Saint Mary's Bay/Masefield Beach Water Quality Improvement Project, on behalf of submitters.

(b) I have also acted as an independent processing officer for the Canterbury Regional Council (**CRC**), Waikato Regional Council, and Otago Regional Council assessing a number of complex air discharge consent applications,

a number of which have gone through to hearing at which I have attended as an air quality expert on behalf of Council.

(c) I have conducted air quality monitoring, technical peer review services and/or technical assessments at a number of composting facilities which undertake similar activities to that proposed by von Ah Contracting (**VAC**) including:

(i) Intelligro's Rolleston composting facility.

(ii) Judds Limited Gisborne composting facility

(iii) Daltons' McLeans Island composting facility.

(iv) The Taurapa Station composting facility.

(v) Meadow Mushrooms Greendale composting facility.

(vi) Selwyn District Council Rolleston composting facility.

Code of Conduct for Expert Witnesses

6 While this is not a hearing before the Environment Court, I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court of New Zealand Practice Note 2023 and that I have complied with it when preparing my evidence. Other than when I state I am relying on the advice of another person, this evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Scope of evidence

7 This evidence is provided in support of the Kokatahi Environment Group (**KEG**) which consists of a number of submitters who have made submissions on the application by VAC to discharge contaminants to air associated with the operation of a composting facility (**Application**) at 1047 Kaniere-Kowhitirangi Road, Kokatahi (**Application Site**).

8 The members of the KEG which I support include:

(a) Adam & Tinneke Wyatt – 30 Ford Road

(b) Phil & Charlotte Mitchell – 2 & 4 Upper Kokatahi Road

(c) Andrew & Julie Austin – 11 Mantell Street

(d) Adair Quaife – 19 Upper Kokatahi Road

(e) Warren & Russell Diedrich – 4 Bowen Street

(f) Shane Lang & Kim McPherson- 22 Upper Kokatahi Road

(g) George Tripe – 5 Murray Road

(h) David & Jane Hutchinson – 9 Mantell Street

(i) Phillip & Anne Molloy – Corner Upper Kokatahi & Acland Street

(j) Maurice Wright –

(k) Jeanna MacDonald – 4 Mantell Street

(l) Charles & Raewyn Patton – 12 Ackland Street

(m) Andrew Thompson – 10 Mantell Street

(n) Ashleigh Spiers - 10 Mantell Street

(o) Jacob McPherson – 22 Upper Kokatahi Road

9 I have undertaken a site visit to a number of the KEG's properties and the surrounds of the Application Site and am familiar with the local environment and surrounds.

10 In preparing this statement of evidence I have considered the following documents:

(a) the assessment of environmental effects (**AEE**)[1] accompanying the Application;

(b) the Mote odour assessment report (December 2024)[2] prepared by Paul Baynham and the subsequent Mote recommended odour notification zone report (May 2025)[3] also prepared by Mr Baynham;

(c) section 42A officer's report[4], prepared by Tony Ridge, dated 29 January 2026; and

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[1] Van Ah Contracting: *Composting Proposal and AEE*. Dated 29/08/2025

[2] Mote Limited Report: *Odour assessment report associated with von Ah Contracting composting proposal*. Dated December 2024

[3] Mote Limited Report: *Recommended odour notification zone associated with von Ah Contracting Composting Application*. Dated May 2025

[4] West Coast Regional Council Officer Report: *Officer Report for Resource Consent RC-2024-0136*. Dated 29 January 2026

(d) the submissions on the consent applications.

11 This evidence addresses the following:

(a) Existing environment;

(b) Recommended separation distances;

(c) Management and mitigation measures;

(d) Bioaerosol emissions; and

(e) Comments on the s42a report recommended conditions of consent;

Introduction

12 I have reviewed the application documents, Mote technical reports and s42a report and have a good understanding of the proposed infrastructure and processes on-site. I have also visited the site surrounds (on 13/2/26) and have a good understanding of the receiving environment.

13 The AEE and supporting documentation (namely the Compost Facility Management Plan (**CFMP**) and Compost Process Overview (**CPO**)) provide a detailed description of the proposed processes on the site. I note that there appears to have been some earlier versions of the application documents which were reviewed by Mote in their December 2024 odour assessment report. For the purposes of this evidence I have focused on the aspects of the application and reviews which appear to relate to the most recent proposal, being those prepared in August 2025.

14 Specifically, it appears that the proposed compost feedstocks no longer include deceased animals (and I believe that Karbon King may have also been removed from the application). However, I consider that it would be helpful for the applicant to confirm that this is the case.

15 VAC is proposing to establish and operate a turned windrow composting operation on a 4,200 m^2 water impervious pad. The pad will be sloped such that stormwater and associated compost leachate will be collected in a sump and transferred to a leachate collection pond (with a storages capacity of 840 m^3).

16 Whilst it appears that there was initially a wider range of proposed feedstocks (as listed in the 42a report), it appears that they have now been limited to:

(a) Paunch grass

(b) Bark chip/sawdust

(c) Old bailage/silage

(d) Used herd home and calf bedding (woodchips and manure)

(e) Abattoir DAF wastewater sludge

(f) Moss fines

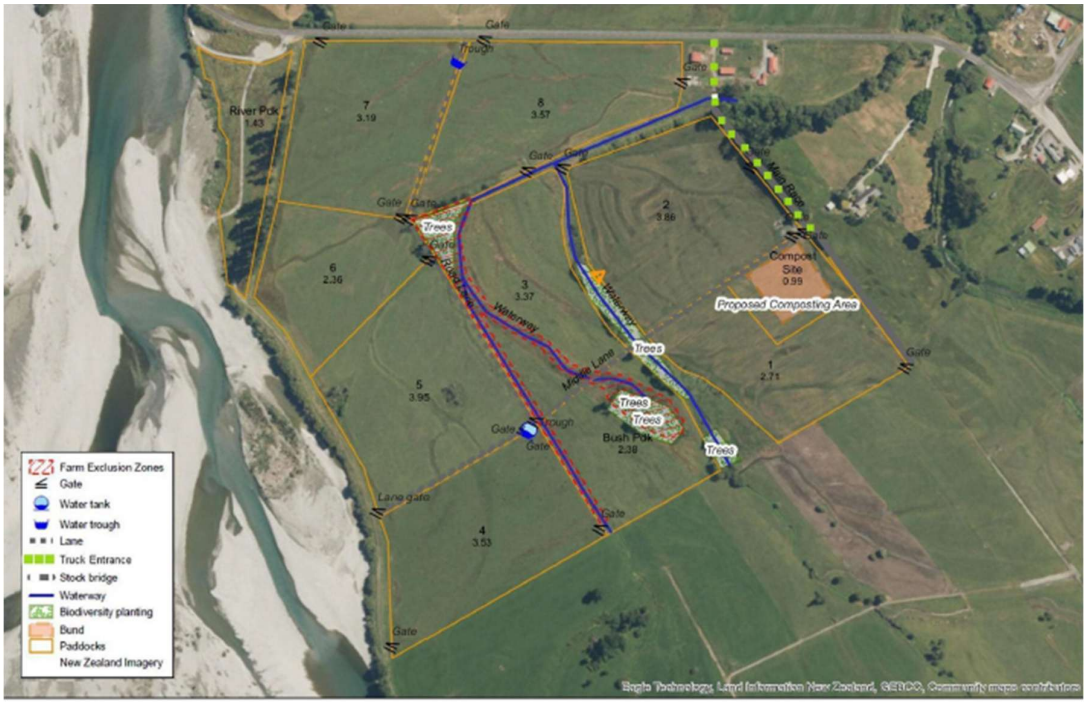
17 Likewise, the annual limit of the feedstocks to be composted has reduced and is now a total of 4,100 tonnes per year (from an earlier proposal of 12,310 t/yr referenced in the Dec 2024 Mote report). My evidence and expert opinions expressed below are based on these updated feedstocks and annual throughput.

18 The proposed site operations, air discharges and proposed mitigation and management procedures are detailed in the AEE and supporting CFMP and CPO. To remain concise, I do not repeat them in this evidence other than to note that there are some inconsistencies in the documentation which I comment on later.

19 The location of the composting operation is illustrated in Figure 1 of the AEE, reproduced below (Figure 1). However, it is not 100% clear where the leachate pond is proposed to be located and the separation distances between various proposed activities on-site and the nearest off-site sensitive receptors. I have estimated the separation distances referenced in my evidence below based on my interpretation of the location of these various elements, which I consider are likely to be accurate within +/- approximately 10 m).

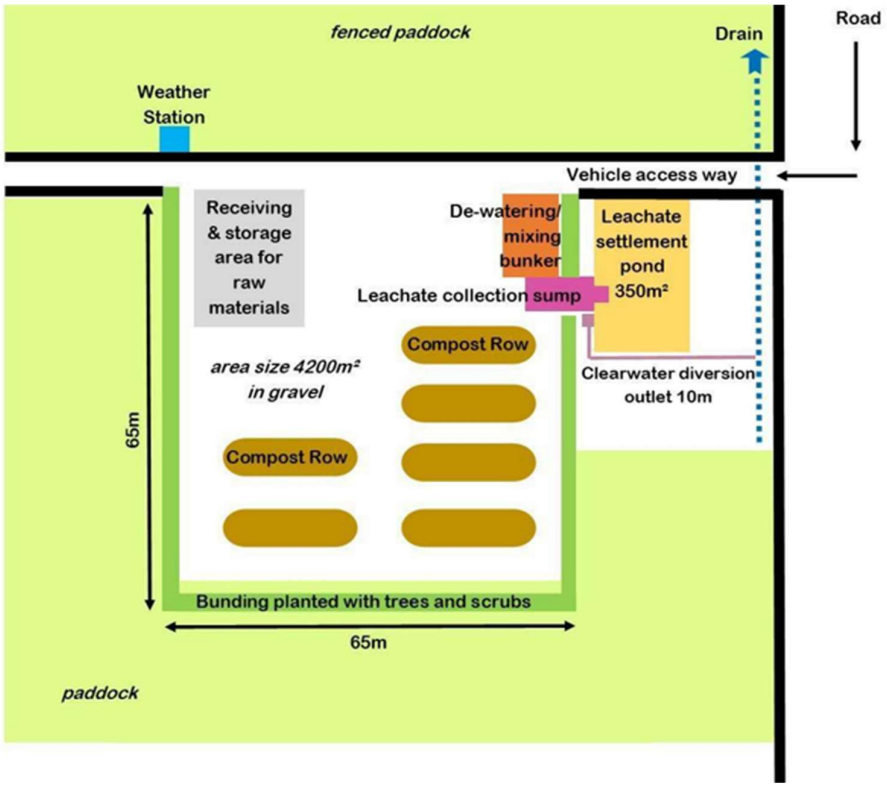
20 Note, for the purposes of this evidence a sensitive receptor is defined as a location where a sensitive activity occurs. Sensitive activity means an activity undertaken at a place or in an area where a person or persons are present and may be susceptible to the effects of air pollution and have a reasonable expectation that their enjoyment of the amenity values of that place or area will not be materially impaired by the effects of a discharge of odour or dust. Sensitive receptors may include places where people gather for recreation, education, worship, culture, or similar purposes, or where they reside, including outdoor living areas. This interpretation is consistent with that listed in various regional plans across New Zealand.

Figure 1. Location plan



21 The layout of the proposed composting operation appears to be better defined in the Site Map provided in the CFMP (reproduced below as Figure 2). For the purposes of this evidence I have assumed that vehicle accessway will come in the northern corner of the area indicated in the Figure and that the leachate storage pond will be located on the northern corner of the 'composting site'.

Figure 2. Proposed site layout



22 It is unusual that an air quality assessment prepared by a qualified air quality professional acting on behalf of the applicant has not been provided by the applicant. Rather the applicant/WCRC has relied on a review undertaken by Mote for air quality technical advice. Furthermore, it is even more unusual that the applicant does not have an air quality expert presenting evidence at this hearing. As such my evidence reviews the somewhat limited and piecemeal technical information supplied in the application and the Mote technical reports.

23 It is standard practice for applications for an air discharge consent of this nature to be prepared by a suitably qualified air quality professional using odour and dust assessment methodologies consistent with industry good practice guidance[5].

24 Commonly odour and dust emissions from a composting and leachate irrigation operation are qualitatively assessed using a frequency, intensity, duration, offensiveness, and location (**FIDOL**) assessment supported by a number of industry standard assessment tools. This level of assessment has not been provided here.

[5] i.e. The Ministry for the Environment Good Practice Guides for assessing odour and dust discharges 2016.

25 In my expert opinion the potential for adverse odour or dust effects to occur beyond the boundary of the site has been inadequately assessed by the applicant and lacks the detail which would normally be provided for an air discharge consent application of this nature. The conclusions with regards to the potential extent of air quality effects beyond the site boundary in the AEE are therefore fundamentally unsupported.

26 The Mote odour assessment report (December 2024) provides a more detailed assessment of the potential for adverse effects, but is more of a review of the application than an assessment of effects. This report also appears to have been based on site operations which are no longer proposed or altered from that which is currently proposed. For example, Table 1 of this Mote report includes animal carcasses and dairy farm manure as feedstocks. As noted above, proposed tonnes per annum to be composted are also much higher than that proposed in later documents. The Mote May 2025 report clarifies some of the inaccuracies/revisions in the proposal and presents a larger potentially affected area for odour discharges (870 m radius).

27 The Mote reports appear to have been used by WCRC to determine the notification radius, but do not provide a conclusion on whether or not the proposal will result in offensive or objectionable odour or dust effects beyond the boundary of the site. Nor do they provide an overall conclusion whether or not the potential air quality effects will be acceptable/unacceptable in this specific receiving environment.

28 The s42a reporting officer appears to have concluded that the proposed operation will not result in adverse air quality effects beyond the boundary of the site if it complies with a set of recommended consent conditions. It is difficult to know to what extent the reporting officer has relied on the Mote reports in coming to this conclusion.

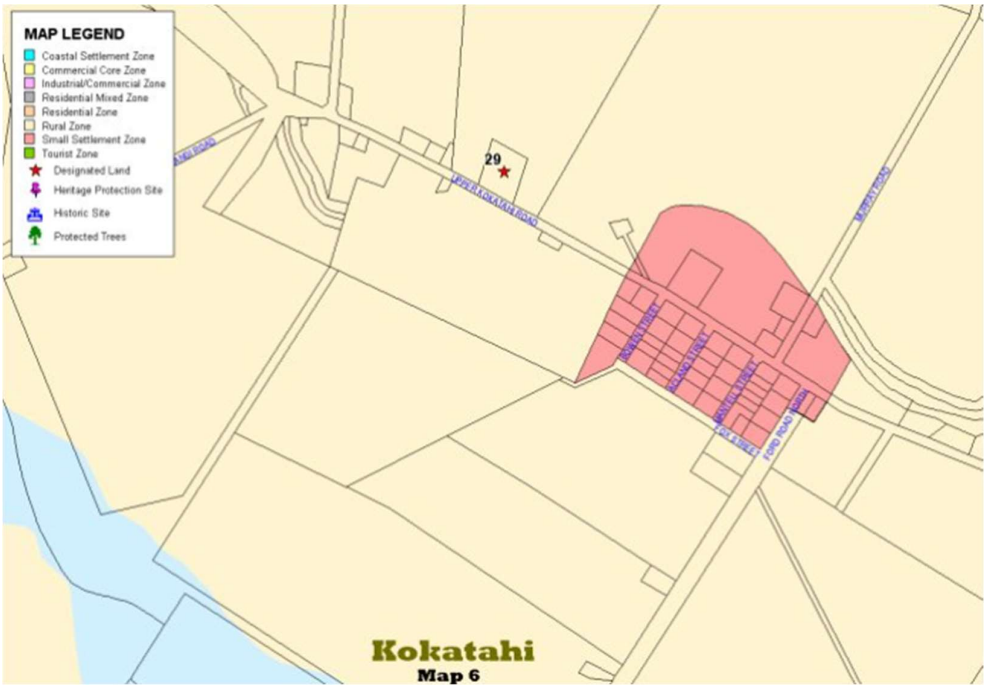
29 Despite this lack of information and detail, in this evidence I provide my expert opinions on the potential for adverse air quality effects beyond the boundary of the site from the proposed on-site activities, as I interpret them from the information provided.

Existing environment

30 The existing environment surrounding the proposed composting facility is partially described in Section 2 of the AEE and Section 2 and 3 in the Mote December 2024 report. The proposed composting site is located on Rural zoned land (shaded light tan in Figure 3 below), much of the submitters in opposition to the applications are located within the ‘Small Settlement Zone’ (shaded pink in Figure 3 below) which is approximately 650 m from the proposed composting operation.

Dwellings within this small settlement zone will have a higher expectation of air quality amenity effects given the nature and zoning of the area.

Figure 3. District Plan Zoning



31 There is also a primary school located on designated land (annotated by a red star in Figure 3) approximately 430 m from the proposed composting operation. This school environment will be particularly sensitive to observable odour associated with the composting operation due to larger number of people present and the nature of the receptor. I note that a number of the submissions raise particular concerns about effects at this location.

32 There are 11 dwellings located on rural zoned land within 500 m of the site (excluding the von Ah residence), the closest (1067 Kaniere Kowhitirangi Road) being approximately 190 m from the proposed composting facility (allowing for a 20 m cartilage area around the dwelling which is industry standard practice).

33 Unfortunately there is limited data on the wind patterns in the surrounding environments, wind data from the Hokitika airport has been provided in the AEE, but as is correctly surmised in the Mote report, this data is unlikely to be representative of the conditions at the proposed site due to the differences in terrain between the two sites and the coastal location of the Hokitika weather station.

34 Mote used the air dispersion model CALPUFF to model the extent of the potential odour plume from the proposed composting facility. As a part of this air dispersion modelling Mote developed a meteorological dataset representative of the site

using CALMET and TAPM. Unfortunately, Mote did not provide a windrose or wind frequency distribution Table for this modelled meteorological dataset in its report. However, Mote did provide a brief summary of the data stating that south westerly winds were dominant and that "*cold air katabatic drainage under low wind conditions was also observed with predominantly light easterly/northeasterly winds dominating under atmospheric inversion conditions*".

35 I have spoken with KEG members about local weather patterns and they state that south westerly winds are dominant. North-westerly winds are more common in spring and are associated with rainfall events. Easterly winds occur infrequently but when they do, they are commonly associated with very strong wind speeds.

36 One of the KEG members located at the end of Mantell St installed a low tech weather station in July 2025 pictured in Figure 4 below.

Figure 4. Mantell St weather station

37 I have downloaded the data collected between 21/7/25 and 14/2/26 and produced a windrose (Figure 5) and wind frequency table (Table 1) for this limited dataset (~6.5 months of data).

Figure 5. Mantell St weather station windrose - 21/7/25 and 14/2/26

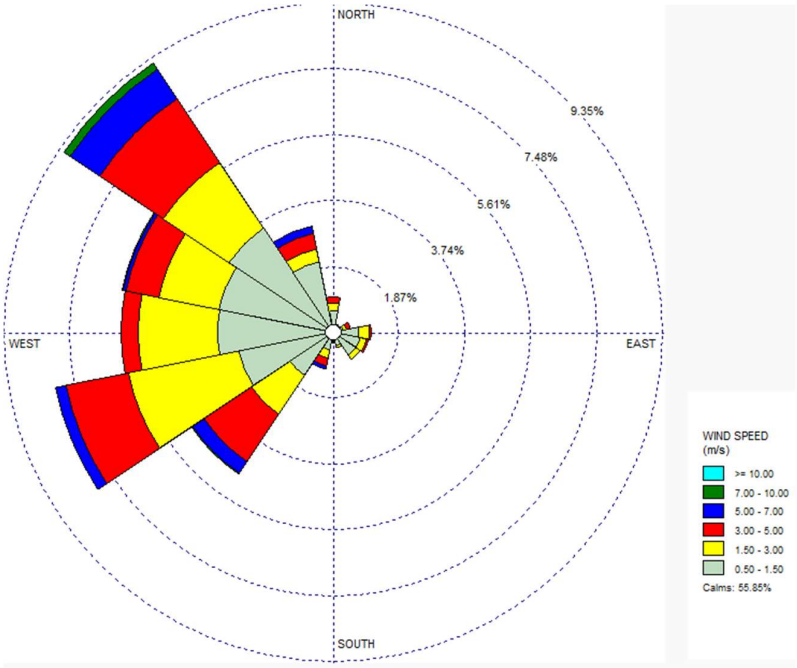


Table 1. Mantell St weather station wind frequency distribution - 21/7/25 and 14/2/26

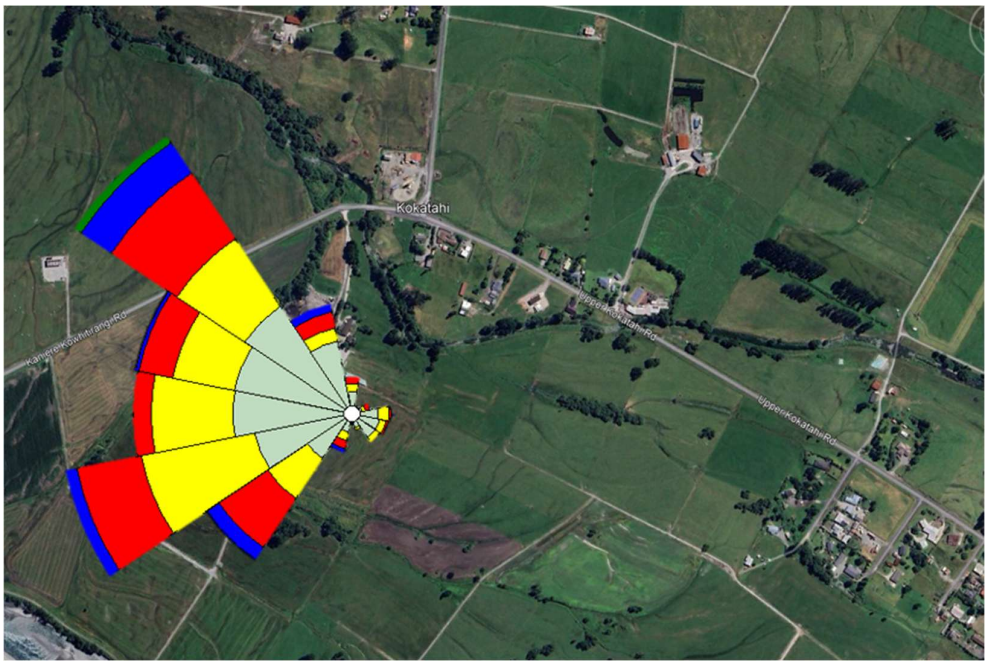
Wind Direction	Percentage of Winds from Wind Speed Bands						Total
	0.5 – 2.0 m/s	2.0 – 3.0 m/s	3.0 – 5.0 m/s	5.0 – 7.0 m/s	7.0 – 10.0 m/s	>10 m/s	
North	1.7%	0.4%	0.3%	0.0%	0.0%	0.0%	**2.5%**
Northeast	0.3%	0.1%	0.1%	0.0%	0.0%	0.0%	**0.5%**
East	1.1%	0.4%	0.1%	0.0%	0.0%	0.0%	**1.7%**
Southeast	1.6%	0.3%	0.0%	0.0%	0.0%	0.0%	**2.0%**
South	0.8%	0.1%	0.1%	0.0%	0.0%	0.0%	**1.0%**
Southwest	2.7%	3.1%	3.0%	0.7%	0.0%	0.0%	**9.5%**
West	6.4%	4.6%	1.3%	0.1%	0.0%	0.0%	**12.4%**
Northwest	6.4%	3.4%	3.2%	1.3%	0.2%	0.0%	**14.6%**
Sub Total	**21.2%**	**12.4%**	**8.2%**	**2.1%**	**0.3%**	**0.0%**	**44.1%**
Calms							55.85%
Missing Data							0.02%
Total							**100.00%**

38 Whilst the wind sensors on this weather station are only approximately 3 m above ground level and will potentially be affected by adjacent trees and building structures, this dataset provides an indication of actual local wind conditions. The

dataset is also limited in duration being dominated by spring and summer months and their associated wind patterns. According to locals these months have a higher proportion of north westerly winds (as indicated in the windrose). It is noted that there is a large portion of calms recorded which is consistent with the low mast height.

39 Figure 6 shows the windrose overlaid over the proposed composting site. The north westerly winds will blow any air discharges away from the nearest sensitive receptors, however the westerly and south westerly winds (which are described as being the dominant winds) will blow any air discharges from the site towards off-site sensitive receptors.

Figure 6. Mantell St weather station windrose overlaid over the VAC site



40 There are sensitive receptors downwind from the composting facility in winds ranging from south easterly winds through to west north-westerly winds which is a relatively large arc of wind directions.

41 Wind conditions are critical for determining the potential frequency, duration and intensity of odour effects on neighbouring receptors to a composting operation such as that proposed by VAC. Despite the limited data that is available to describe the local wind conditions, it is apparent that the nearest sensitive receptors will be downwind for a relatively large proportion of the time.

42 With regards to the topography, the site and surrounds are relatively flat sitting on the base of a broad valley. The Mote report correctly notes that cold air drainage effects would occur from the east falling towards the Kokatahi River.

43 With regards to background air quality, during my site visit I did not observe any existing odour or dust discharge sources outside of those which would normally be present in a rural environment.

Recommended Separation Distances

44 I consider that the potential for adverse dust effects associated with the proposed operations will be minimal given the proposed planting, limited number of dust emission sources, high rainfall rates, proposed dust emission controls and separation distances between the activity and the nearest off-site sensitive receptors.

45 There are a low number of dust emissions sources from turned windrow composting operation such as that proposed. They are generally limited to material disturbance activities. Turning of windrows has a low potential for dust emissions as the compose is damp (moisture content 45 and 60%) as is required for effective composting. Therefore, dust emissions are generally limited to vehicle movements on unsealed areas and the screening of mature compost (which has a low moisture content). Given the large particle size of mature compost dust emissions from this source are generally low and drop out of suspension in the air within a short distance of the emission point. As such my evidence focuses on odour emissions. I will cover the potential for airborne pathogen effects later.

46 Air quality separation or buffer distances are often used by regulatory bodies as an initial screening tool to assess if there is a potential for air quality related effects on neighbouring receptors/dwellings. If the nearest sensitive receptors are outside the separation/buffer distance, then it is unlikely that there will be any adverse air quality effects on these receptors. However, if they are within the distance then a detailed site specific assessment is required.

47 There are a number of published recommended separation distances from composting facilities of the nature and type proposed by VAC including :

(a) The South Australia (SA) Environmental Protection Agency (EPA) “Evaluation distances for effective air quality and noise management” August 2016.

- **1,000 m** for composting operations processing >200 tonnes /year

(b) Victoria EPA: “Separation distance guideline” August 2024

- **650 m** for composting up to 5,000 tonnes per annum, low risk waste, turned windrow with open air receivals**.**

(c) Tasmanian Planning Scheme. State Planning Provisions

- **1,000 m** composting animal wastes.

(d) Australian Capital Territory: “Separation Distance Guidelines for Air Emissions” 2018

- **1,000 m** for composting >200 tonnes per year.

(e) Netherlands Ministry of Infrastructure and Water: “Netherlands Emission Guidelines for Air” 2007

- **225 - 300 m** for composting up to 5,000 tonnes per year with conventional method of turning

(f) Emission Impossible report for Auckland Council: Air Quality Separation Distances for Industry 2012

- **500 m** for composting greenwaste

48 The separation distances between the proposed VAC composting operation and the nearest sensitive receptors are all well within these guidelines. There are a large number of dwellings and the local school which are within many of these guidelines. As such, a detailed site specific assessment of potential air quality effects should have been undertaken. As discussed earlier, in my opinion the applicant has not undertaken this.

49 Mote undertook air dispersion modelling to assess the extent of the odour plume which could occur. Whilst I have not had a chance to fully review the modelling approach and methodology due to the limited amount of detail provided in the Mote reports, the 870 m extent of the odour plume seems reasonable and consistent with my expectations.

50 I have undertaken and reviewed many detailed air discharge assessments of existing and proposed composting operations. I have also commissioned odour scout surveys around a number of different composting plants around New Zealand. In my experience the extent of the odour plume from well-run composting operations of a similar nature to that proposed by VAC can be out to approximately 400 m with more intense odours being out to approximately 200 m from the facility.

51 However, if industry standard controls are not tightly adhered to then odour can be observable much further from composting operations. I am aware of poorly run/controlled composting operations where odour has been observed out to 2 km from the site.

52 Some guidelines distinguish between the type of feedstocks and recommend larger separation distances for composting operations which are receiving ‘high

risk' feedstocks. Section 4.1 of the Mote report correctly categorises the different feedstocks risk profiles. I consider that it will be imperative for VAC to have a very high level of odour capture and control for some of the feedstocks proposed to be received and composted. In particular, abattoir DAF sludge, old silage (which may already be decomposing anaerobically on arrival), and the composting of paunch grass (which needs to remain in a fresh state to ensure foul odours are not emitted) are of particular concern.

53 The current proposed method of receiving these feedstock streams in a bunker and combining them in a 1:1 mix of wood chip is not consistent with best practice for high risk feedstocks. Best practice is for these feedstocks to be received in an enclosed building which is maintained under negative pressure via a foul air extraction and treatment system. I note that something similar has been recommended by Mote but does not appear to have been adopted by the applicant or the s42a reporting officer.

54 In my expert opinion and experience the proposed composting operation is situated too close to neighbouring sensitive receptors (the nearest being approximately 190 m from the facility). With the current proposed feedstocks, material receivals and blending processes, and composting methodology (turned windrows) it will be difficult for it to control odours such that they do not reach the nearest receptors. I consider that the character of some of the odours which will be released from the raw feedstocks are likely to be considered offensive even to rural residents and could result in offensive or objectionable effects at the nearest dwellings/off-site properties.

Management and mitigation measures

55 The composting process relies on the maintenance of desired aerobic microbial populations throughout the pasteurisation and maturation phases. These microbial populations need specific environmental conditions to thrive and stay alive. When these conditions are not maintained then anaerobic microbial populations take over and foul odours are released.

56 Given the poor quality of the application and technical assessment provided by the applicant I have concerns about the applicant's level of experience with composting. Having read through the various iterations of the application it is apparent to me that there are a number of aspects of the proposal which are not consistent with good practice or unlikely to be relevant/viable for the proposed location.

57 Whilst much of what the applicant is proposing is consistent with good practice, I have a number of concerns which I wish to raise.

Rainfall rates

58 Firstly, as is outlined in the soil report by Trevor Webb which I have attached as **Exhibit A** to this evidence and the applicants AEE, the site is subject to very high rainfall rates (can be in excess of 4,000 mm per year). Such high rainfall rates are likely to make it very difficult to maintain the correct moisture content within the compost windrows.

59 During certain stages of the composting process the windrows need to be turned relatively regularly. The recommendation in the New Zealand Standard 4454:2005 Composts, Soil Conditioners and Mulches are that a windrow is turned at least five times over the 15 day pasteurisation period. This recommendation has also been proposed in consent conditions.

60 With multiple windrows being at different stages in the composting process it may be difficult to be able to avoid turning the windrows during rainfall. Mr Webb's report presents local rainfall data which shows that there are some months of the year where rainfall occurs on most days and for multiple consecutive days.

61 If a windrow is turned during rainfall events the temperature profile and moisture content within the compost can stray outside the recommended parameters. Further to this, whist rainfall can slough off the side of the windrow some moisture will always be adsorbed into compost profile. When compost becomes too wet the ability for air and oxygen to be provided to the aerobic microbes is diminished and the aerobic microbial population dies off and anaerobic microbial populations begin to propagate within the compost, leading to the emission of foul odours.

62 There is also the issue of 'wet feet', this is where the base of the compost pile gets saturated and turns anaerobic. I have observed this problem at a number of composting operations which had poor drainage and compost pile management. VAC is proposing to use a layer of 100 mm of bark at the base of the windrow. VAC considers that this will 'help absorb leachate'. The opposite is required; it is good practice for a coarse layer of overs (large woody material screened out of mature compost) to be placed at the base of a windrow to facilitate airflow up through the base of the windrow and allow leachate to drain away from the compost. This procedure prevents wet feet and facilitates aerobic conditions within the compost pile.

63 During the very high rainfall events which occur at the proposed site, I consider that 100 mm of bark will not be sufficient to provide for effective leachate drainage and aeration of the base of the windrow.

64 There is also the issue of proposed feedstock bunker which in some instances includes reference to 'dewatering'. I assume that the applicant is proposing to dewater the DAF sludge as this is often supplied with a relatively high water

content. Given the very high rainfall rates it will be unlikely that these uncovered bunkers will be able to facilitate effective dewatering for extended periods of the year.

65 Screening wet compost is also very difficult. I am aware of an aerated static pile (more advanced composting method) composting operation in the Waikato operated by Waste Management which receives ~1,800 mm of rainfall per year and is struggling to produce a viable product due to the high rainfall rates. Based on this site's experiences I consider that the proposed VAC site will also struggle to produce a viable compost product.

66 Members of the KEG have supplied me with photos which show that the site and surrounds are subject to flooding. An example photo is presented in Figure 7 below. Should the proposed site be subject to flooding then the potential for the composting process to be interrupted and foul odours to be emitted is highly exacerbated.

Figure 7. Flooding

67 In short, I have concerns that the very high rainfall rates which are experienced at the proposed composting site are not conducive to good composting conditions and therefore make the proposed composting operation unfeasible. Alternate

composting methodologies such as covered operations, in vessel composting, or aerated static piles may be more viable.

Leachate collection and irrigation

68 Mr Webb's report (Exhibit A) details how the proposed area for which on-site irrigation of leachate to land is inadequate. Whilst I note that the applicant has proposed that leachate can be irrigated to alternate/additional properties, I suspect that these properties will also be under the same conditions and not have the soil moisture deficit to be able to receive the leachate produced on-site.

69 Mr Webb outlines how he considers that the proposed storage pond is too small to be able to cope with the rainfall conditions which occur at the proposed site. Whilst I understand that the applicant is proposing to operate a 'first flush' system whereby excess leachate is discharged via a wetland area then into the surrounding waterways I am unsure as to the viability of this practice and have not been able to find an assessment of potential effects on the stream/river water quality as a result of this proposal. I note that the submission letter provided by Ngai Waewae Arahura[6] shares these concerns. Furthermore, I note that it appears that the proposed consent condition 26 a in the s42a report appear to prohibit such a discharge.

70 Compost leachate storage ponds are a potential odour source and have been the cause of odour complaints at other composting operations across NZ. The applicant has not assessed the potential for odour discharges from this source.

71 Compost leachate ponds often contain a high biological oxygen demand (BOD). It is standard practice at other composting operations for compost leachate ponds to be mechanically aerated to ensure that the pond remains aerobic and foul odours associated with anaerobic conditions in the pond are prevented. Furthermore, monitoring of dissolved oxygen in these ponds is also best practice.

72 Whilst high rainfall rates may be sufficient to mitigate these issues, there has not been any assessment by a qualified professional to demonstrate that this will be the case.

73 Procedures for collecting and disposing of the sludge which accumulates at the base of the pond also need to be supplied. The mitigation measures to control potential odour emissions from this source are also required. These should have been supplied by the applicant and an assessed as to the extent of potential odour emission from this source undertaken and reported.

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[6] Letter from submitter Te Runanga o Ngato Waewae to be tabled at the hearing for von Ah Contraction Ltd – RC-2024-0136. Dated 17 February 2026

74 The irrigation of odorous leachate exacerbates the potential for adverse off-site odour effects, as during irrigation with a travelling irrigator the leachate is essentially aerosolised which more readily releases odorous gases generating an intensified odour plume.

75 Additionally, it is standard practice to have minimum setback distances for leachate/wastewater irrigation to land from the site boundary and neighbouring dwellings. Commonly the setback from the site boundary is in the order of 20 m and the setback from sensitive receptors is in the order of 150 m. Some examples of separation distances from other similar activities include:

(a) 150 m - Environment Canterbury, Rule 7.50 in the Canterbury Air Regional Plan, for spray irrigation and storage of effluent.

(b) 200 m – Western Australia Department of Water[7], for spray irrigation of treated sewage.

(c) 200 m – Tasmanian Planning Scheme – State Planning Provisions[8], for spray irrigation to land of treated sewage effluent.

(d) 200 m – EPA Victoria[9], for spray irrigation to land of treated sewage effluent.

(e) 50 m – New South Wales Department of Environment and Conservation[10], for where spray irrigation gives rise to aerosols near houses, schools, playing fields, roads, public open space and waterbodies.

(f) 120 m (400 feet) - New Jersey Department of Environmental Protection, for spray irrigation of effluent[11].

(g) 150 m - Washington State Department of Health[12], setback distance for spray irrigation effluent land treatment systems (note it does also stipulate a 300 m setback from schools).

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[7] Western Australia Department of Water and Environmental Regulation. (2019). Guideline: Odour Emissions.

[8] Tasmanian Planning Scheme – State Planning Provisions. Table C9.1 Attenuation Distances

[9]EPA Victoria. “Recommended Separation Distances for Industrial Residual Air Emissions. Publication 1517 March 2013.

[10] New South Wales Department of Environment and Conservation. “Environmental Guidelines – Use of Effluent by Irrigation. October 2004

[11] New Jersey Department of Environmental Protection. “Technical Guidance For Sizing and Positioning of: Spray Irrigation Systems Overland Flow Systems Infiltration/Percolation Lagoon Systems, and Surface Impoundments.

[12] Washington State Department of Health. “DESIGN CRITERIA FOR MUNICIPAL WASTEWATER LAND TREATMENT SYSTEMS FOR PUBLIC HEALTH PROTECTION” Feb 1994

(h) 60 m or more – US EPA[13], buffer distance from land treatment of municipal wastewater effluents.

76 It is noted that if the above leachate exclusion zones were to be applied to the proposed on-site irrigation, this would further reduce the available area for irrigation, further impairing the viability of leachate disposal via this method.

77 Spray drift from spray irrigation systems can result in nuisance effects associated with wetting/misting of outdoor living areas and/or health based effects associated with the inhalation of pathogens that may be entrained in the water droplets.

78 Aerosols released during spray irrigation can drift off-site, the distance that they drift is dependant on a wide range of factors including, emission height, size of the water droplet, windspeed, topography, vegetation, etc. The potential for viable pathogens to be inhaled decreases with distance from the emission point, factors influencing this include desiccation, temperature, deposition, solar radiation, etc.

79 For VAC's proposed leachate irrigation, it is important that there is an adequate separation/buffer distance to mitigate the potential for pathogens in the wastewater to become aerosolised and result in off-site health effects.

80 Once again, the applicant has not supplied any assessment of the potential for adverse effects associated with potential inhalation of pathogens from leachate irrigation (or from bioaerosols emitted during turning and screening of the compost itself).

81 I also have concerns with the proposed restriction on irrigation under wind conditions which blow towards neighbouring sensitive receptors. Given the location of the receptors relative to the proposed irrigation area and the prevailing wind directions (south westerlies) it is likely that the available times when irrigation can occur will be limited.

Avoidance of wind conditions

82 As I have outlined above, I have concerns about the practicality of the proposed restrictions on the irrigation of leachate to land during wind conditions that are blowing towards neighbouring sensitive receptors.

83 I share the same concerns about the proposed restriction on the turning of windrows during conditions when the wind is not blowing towards neighbouring off-site receptors. As I have discussed earlier there are sensitive receptors

[13] United Stated Environmental Protection Agency. "Process Design Manual – Land Treatment of Municipal Wastewater Effluents". Sept 2006

downwind from the composting facility in winds ranging from south easterly winds through to west north-westerly winds which is a relatively large arc of wind directions and encompasses a large portion of the predominant wind directions (as is illustrated in the Mantell Street windrose, Mote's CALMET modelling and locals observations).

84 Given that turning of windrows will also not be able to occur during rainfall events and the frequency of these rainfall events, the available time which a windrow can be turned is very restricted.

85 The turning of windrows is critical for the composting process and is often time sensitive. Having significant restrictions on the available time when windrows can occur may result in compost fires (as they become too hot), anaerobic conditions in the compost (as sufficient aeration is not provided), and ineffective pasteurisation of the windrow.

High risk feedstock management

86 As I have discussed earlier, the applicant appears to be proposing to dewater some feedstocks (which is likely to include high risk feedstocks) which will be very difficult in an open/uncovered bunker given the very high rainfall rates. Furthermore, dewatering of these feedstocks will result in higher organic/BOD loading on the leachate pond which has not been assessed.

87 During the dewatering process the high risk feedstocks (DAF solids are highly malodorous in their raw state) will likely be exposed to air (as they will not have been blended and incorporated into a windrow yet) and foul odour emissions from these products may be readily discharged to air. This is an uncontrolled odour source which has not been adequately assessed by the applicant. Mote has recommended that these high risk feedstock be stored within a building/structure under active air extraction which is treated by a biofilter. I agree that this would be a minimum requirement given the feedstocks proposed and the proposed dewatering activity.

88 The CFMP does not include a procedure for assessing the existing odour from feedstock on receipt, or a procedure for returning/rejecting excessively malodourous product. It is industry good practice for such procedures to be including in a CFMP.

89 The applicant does not appear to be proposing a time limit on integration of high risk feedstocks into windrows. Again it is standard practice for a minimum time limit to be applied for high risk feedstocks to be incorporated into a windrow as they can become progressively more malodorous if stored for extended periods of time due to progressive decay/putrefaction of the products.

90 The applicant has not outlined the process which is proposed for blending the feedstocks. Again, it is important for the feedstocks to be effectively blended to achieve the correct carbon to nitrogen ratio and avoid pockets of nitrogen rich material which can release malodours.

Temperature monitoring

91 Measuring the temperature in the windrows is a critical component of turned windrow composting.

92 The applicant appears to only be proposing to monitor temperature at one point in the windrow. Windrow temperature readings should be undertaken at three points along the windrow and every 300 mm in depth until you reach the centre of the pile. This is consistent with best practice and the requirements in AS/NZS 4324.3:2001.

Pad size

93 Based on the information supplied in the CFMP and site map provided I calculate that there will be enough space for approximately 1,600 m^3 of compost in windrows. At a density of approximately 600 kg/m^3 of compost this equates to approximately 960 tonnes of compost. The applicant is proposing to compost up to 4,100 tonnes per year of raw materials. For compost to become fully mature and be ready for sale it will need to be on-site for 6 to 12 months. Whilst there will be some loss in between the incoming weight of the raw materials and the end product, it appears that the proposed compost pad size would be too small to be able to accommodate the peak composting rates being applied for.

94 Therefore, a larger pad would be required to accommodate the proposed peak composting rates. A larger pad would collect more leachate, which has a number of knock on effects to the arguments relating to leachate collection, storage, and irrigation discussed above.

Bioaerosol Emissions

95 The applicant has not assessed the potential for adverse off-site effects from the emission of bioaerosols from the composting process or from the irrigation of leachate to land.

96 A number of submissions have raised concerns about the potential for adverse effects from bioaerosols as a result of direct inhalation or contamination of drinking water collected from roof rainwater collection systems.

97 I have already discussed recommended separation distances for leachate irrigation systems above with a number of the published separation distances being directly related to the potential for bioaerosol effects. In my expert opinion

a separation distance of 150 m should be adequate. This coupled with a restriction on wind directions will prevent the potential for adverse health effects associated with bioaerosol inhalation or contamination of drinking water.

98 With regards to potential bioaerosols being emitted from composting operations, this generally only occurs during activities which disturb the compost such as windrow turning and mature compost screening. Generally, the screening of mature compost is a low risk as if the compost has been effectively pasteurised pathogenic micro-organisms have been killed off. The higher risk is from windrow turning.

99 The potential for Legionella/pathogens to be transported off-site and be inhaled, is most likely in the form of a bioaerosol (dust particle with pathogenic micro-organisms attached). As discussed earlier I consider that dust emissions from the site will be low given the very high rainfall rates. The applicant has proposed the use of a watercart to facilitate dust suppression. These factors in combination with the restriction on turning windrows during winds which are blowing towards neighbouring receptors should be sufficient to mitigate the potential for adverse health effects associated with potential bioaerosol emissions from the site.

Comments on the Recommended Conditions of Consent

100 Whilst my ultimate expert opinion is that the proposed composting operation is inappropriately located and has a potential to generate more than minor effects beyond the boundary of the site, I provide the following commentary on the recommended consent conditions for procedural completeness.

101 I focus on the condition set in the s42a report as this is likely to be the most relevant and appears to be largely based on the conditions proposed by the applicant.

102 Condition 1. There is a high degree of variability in the application documents, as such I consider that it might be difficult for a consent compliance officer to determine whether or not VAC is compliant with this condition if consent was to be granted.

103 Condition 4. The proposed composting and leachate irrigation operations will not involve any appreciable discharges of air pollutants regulated in the National Environmental Standards for Air Quality. These standards primarily relate to pollutants emitted as products of combustion. Air discharges from the proposed composting and leachate irrigation operation primarily consist of odour and a small potential for dust/bioaerosols. As such I consider that this recommended condition can be removed.

104 Condition 5, 19 and 20 relate to complaints. I consider that these could be simplified into a single condition for ease of reference. I prefer the wording in 19 and 20 to that in Condition 5 as it is more prescriptive and consistent with industry standard conditions of this nature.

105 Conditions 3 and 7 are similar. Again, I consider that these could be simplified into a single condition for ease of reference.

106 Condition 10 is relatively broad in that it requires the consent holder to undertake compost activities (such as turning of windrows) with consideration to wind speed and direction. I consider that the wind speed and direction requirements should be specified for specific activities including windrow turning and leachate irrigation. As an example, "*windrows are not to be turned when winds are blowing from the southeast through west northwest at speeds of less than 3 m/s*".

107 Condition 11. It is standard practice to stipulate the minimum specifications for a weather station of this nature, including datalogging frequency, minimum sensor specifications, minimum mast height, minimum data retention time, requirement for the capability for the weather station to send automated alarms to site personnel, etc.

108 Condition 17 has a number of sub requirements (a. – e.) which appear to only be triggered when the parameters in Conditions 12 to 16 are exceeded. I consider that much of these sub conditions should be included as requirements for day to day monitoring, not only when the composting limits are exceeded.

109 Condition 21. It is now becoming standard practice for Councils to 'certify' management plans which are required by consent condition. I consider that this would be appropriate in this instance.

110 As I have outlined above, I consider that the management plan should include procedures for the inspection and rejection of feedstocks which are highly odorous on receipt.

111 Condition 21 k. requires a monitoring program for airborne spores/pathogens, but there are no specifics around this monitoring program. If this condition is to be retained I consider that there needs to be more detail on the minimum requirements of this monitoring program.

112 Condition 27. This condition is listed within the conditions for discharges from composting and leachate irrigation but appears to relate to testing requirements for the final compost product. This condition may need to move into the air discharge consent. Or alternatively if it relates to testing of the leachate prior to irrigation to land it may need to specify alternate limits.

113 Condition 28. I suggest removing the words "*Notwithstanding Condition 27*".

114 In addition to the above, I consider that should the commissioner be of the mind to grant the consent, given the very small separation distances, there would need to be much more restrictive consent conditions. As a minimum the composting operations would need to be fully enclosed with active air extraction and effective treatment of the air to remove odour emissions prior to discharge to ambient air. Additionally, I consider that the composting site should be moved as far as possible from the nearest neighbouring sensitive receptors, i.e. near the southern end of the property to reduce the risk for off-site effects.

Conclusion

115 I have undertaken a technical air quality review of the application and associated documentation in support of an air discharge consent for the proposed VAC composting operation at 1047 Kaniere-Kowhitirangi Road, Kokatahi. I have also reviewed and considered the s42a report and the associated technical reports prepared by Mote.

116 In this evidence I have assessed the existing environment surrounding the proposed VAC composting facility. I have discussed the local meteorological conditions and how they may affect the composting process and the ability for air discharges from the proposed site operations to travel to adjacent sensitive receptors.

117 I have provided my expert opinions regarding the applicant's assessment of effects. I consider that the assessment of air quality effects which has been undertaken by the applicant is inadequate and not consistent with industry good practice for a consent application of this nature.

118 I have concerns that the proposed wind direction restrictions on certain site activities such as windrow turning and leachate irrigation will inhibit the applicant's ability to effectively operate the site to the standards proposed.

119 In this evidence I have outlined a number of aspects of the proposed operations which are inconsistent with industry best practice and potential facility design oversights.

120 I consider that the separation distances between the proposed site operations are much too small for the proposed composting methodology and operations. They are much smaller than the published recommended separation distances for a composting operation of this nature and scale. In my expert opinion the applicant has not provided a sufficiently detailed site specific assessment of potential adverse air quality effects to justify the smaller separation distances proposed.

121 Composting is inherently an odorous activity. In my experience even a well run turned windrow composting operation following industry good practice is likely to produce odours which are observable, and could be considered offensive in some instances, at a sensitive receptor 190 m from the facility.

122 Based on my experience and the technical advice I have reviewed, the very high rainfall rates at the proposed site will impair the ability for the proposed turned windrow composting operation to effectively compost the feedstocks proposed. I consider that with the proposed composting methodology and associated controls there is a real risk that the applicant will not be able to maintain aerobic conditions within the compost windrows. This will result in malodour emissions.

123 Given the small separation distances between the proposed operations and neighbouring sensitive receptors I consider that there is a high risk of offensive or objectionable odour effects beyond the boundary of the site.

124 I consider that should VAC wish to compost the proposed feedstock volumes and types on this site, it would need to move the site operations to the furthest extent of the site such that the separation distances are ~600 m or more and use a more advanced composting methodology which includes full enclosure of the operations coupled with foul air extraction and treatment.

125 Given the lack of evidential basis supplied in the application I do not agree with the overall conclusion reached by the applicant in Section 5.1 of the AEE that "*the effects of discharges to air are entirely contained within the site and can be avoided, remedied or mitigated to the extent that they are less than minor*".

126 I have provided comment and suggested edits to the recommended consent conditions in the s42a report.

127 For the reasons I have outlined in this evidence I consider that it will be difficult for the applicant to comply with the proposed conditions of consent in the s42a report. As such I disagree with the s42a report conclusion that the proposal is unlikely to cause any significant adverse effects on the environment.

Donovan Van Kekem

Dated 19 February 2026

Exhibit A – Soil Report

Soil report on proposed compost recovery at Kokatahi

I have been invited to comment on the impacts related to soil characteristics at the compost recovery proposal.

I support the concept of converting waste organic material into usable compost provided the process does not result in significant negative environmental impacts.

Qualifications

I have a M.Agr.Sci degree in soil science from Lincoln University.

I have 43 years' experience in soil survey and land resource assessment as a pedologist employed by DSIR and thence Manaaki Whenua, Landcare Research.

I have authored scientific papers and reports including evaluation of land for rural use (Webb and Wilson 1994). Evaluating soils in relation to leaching of nutrients and microbes (Webb et al 2010).

Experience in mapping soils on the West Coast

In the 1970's I was part of team that mapped the soils in this region published in 'Soils of Greymouth-Hokitika Region' (Mew 1980). As part of that survey, I mapped the soils under the proposal.

The soil map and soil descriptions have subsequently been transferred to a soil database that is available online (S-map online). Descriptions in this report are derived from the S-map database.

Basis of evaluation

Comments in this report are solely based on information contained within the von Ah Contracting Composting Proposal and AEE, Final 29/08/2025. I am unaware of any other evaluations.

Soil map units

There are two soil map units at the site.

Paddocks 1, 2, 8 and 70% paddock 7 and 25% paddock 3 are mapped as:

- 70% Hinds moderately deep sandy loam, imperfectly drained
- 30% Karapoti moderately deep sand, imperfectly drained

(These soils were previously named Harihari soils.)

Paddocks 4, 5, 6, and 30% paddock 7 and 75% paddock 3, are mapped as:

- 60% Huangarua shallow silt loam, well drained
- 40% Rangitata very shallow sand, well drained

(These soils were previously named Hokitika soils.)

Soil descriptions

These descriptions record the layers of the soil from the soil surface to 100 cm depth.

Hinds

15 cm sandy loam topsoil, rapid permeability
30 cm sandy loam, moderate permeability
35 cm sand, rapid permeability
20 cm very stony sand, rapid permeability

Karapoti (Moderately deep, imperfectly drained)

10 cm sandy loam loamy silt topsoil, rapid permeability
50 cm loamy sand, rapid permeability
20 cm stony loamy sand, moderate permeability
20 cm very stony sand, rapid permeability

Huangarua

12 cm silt loam topsoil, rapid permeability
25 cm silt loam, moderate permeability
25 cm very stony loamy sand, rapid permeability
38 cm extremely stony sand, rapid permeability

Rangitata

15 cm very stony silt loam topsoil, rapid permeability
55 cm very stony sand, rapid permeability
30 cm extremely stony sand, rapid permeability

Soil characteristics

Table 1 records soil characteristics as recorded in the S-map database.

Soil type	Drainage	N leaching vulnerability	Water logging vulnerability	Profile available water[1]
Hinds	Imperfect	Low	Moderate	High
Karapoti	Imperfect	Low	Moderate	High
Huangarua	Well	High	V Low	Moderate
Rangitata	Well	V High	V Low	Moderate to Low

[1]Water stored within the soil between dry and wet soil conditions

Table 1. Soil characteristics.

Classification of soils for leaching vulnerability.

In the process of forming compost, the runoff is to be stored in a leachate pond. This water will contain significant amounts of nutrients and organic molecules plus unknown quantities of bacteria (such as E-Coli).

The applicant's report states

> 'Soils in the Kokatahi area are identified as Hinds and Karapoti, with both being moderately deep and imperfectly drained, with low leaching susceptibility (source S-maps Landcare Research).

This statement is not accurate. About half the site contains well drained shallow Huangarua and very stony Rangitata soils. Table 1 records that S-map rates these soils as having high or very high N-leaching vulnerability. The other half of the site contains imperfectly drained Hinds and Karapoti soils. Table 1 records that these soils as having low N-leaching vulnerability.

While S-map records that leaching potential is low in the imperfectly drained soils - this is for normal agricultural practices and does not take account of high rainfall, With around 3,000 mm of annual rainfall, the imperfectly drained soils would also have high leaching vulnerability. Under conditions within this proposal there will be high to extremely high leaching vulnerability.

Depth to water table

The applicant does not record the depth to the underlying water table. I estimate that in the imperfectly drained soils the water table will at times rise within 1m from the ground surface and that in the well-drained soils the water table is likely to often be within 150 cm from the soil surface. Water from the water table will drain into Duck Creek and the Kokatahi river.

When the river is high, the water table under the imperfectly drained soils will rise in harmony with the river. When this happens there will be limited drainage from the imperfectly drained soils and surface ponding is likely to occur. Extended times of ponding will stunt or kill plants.

Data should be provided on depth to the water table.

Climate data

There seems to be no evaluation of the practicality of irrigation of waste onto land under climatic conditions at the site. This needs to be done. So I have accessed climate data and have made assessment of climatic effects on leaching and ponding.

Figure 1 records monthly rainfall for 2024 and 2025. Rainfall exceeded 200 mm in 75% of months and exceeded 460 mm in August 2024 and October 2025.

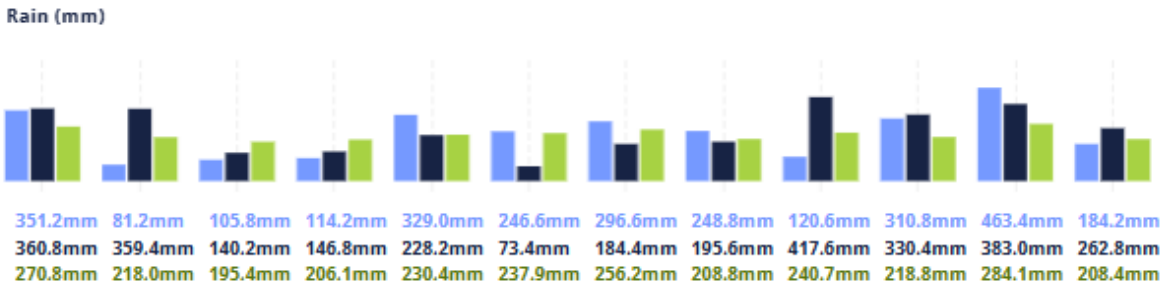

Figure 1 Monthly rainfall at Hokitika, December 2025 to November 2025. *Monthly rainfall for Hokitika from Metservice website, (http://metservice.com/towns-cities/regions/westland/locations/hokitika/past-weather). Green is long term average, Black is 2024, Blue is 2025.*

Figure 2 records daily rainfall at Hokitika. In October 2024 there was a daily rainfall event of around 140 mm of rain and 120 mm in September.

Daily rainfall data is from https://envirodata.wcrc.govt.nz/dashboards/rainfall/rainfall.php#1

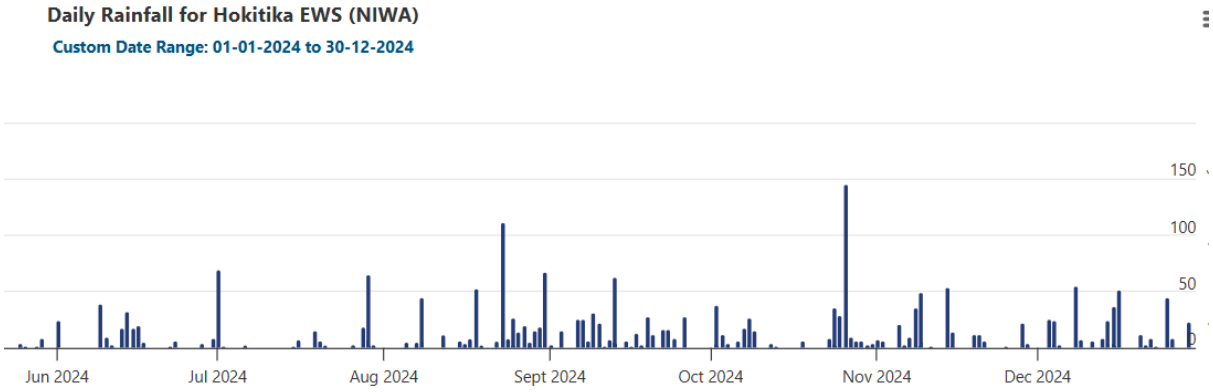

Figure 2 Daily rainfall in Hokitika in 2024

Table 2 tabulates recorded average monthly rainfall, evapo-transpiration and rain days over a 30 year period. It also records calculated runoff and soil moisture deficit based on a soil with 150 mm soil water storage capacity. NB a soil with 150 mm soil water storage relates to a soil with around 100 mm depth of fine texture.

> NB runoff is somewhat of a misnomer – most of this water will drain below the soil and a significantly lesser amount may runoff at the soil surface.

It is notable that (excepting February) every month, on average, estimates runoff of 130 to 230 mm and 7 to 14 days with 'runoff'.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
	Millimetres water												
Rainfall	211	204	184	203	246	267	183	243	221	273	197	301	2732
Evapo-treanspiration	120	93	72	38	21	14	18	28	46	73	97	112	732
Runoff	135	84	133	190	218	230	199	200	211	204	154	157	2116

Soil moisture deficit	2	2	1	0	0	0	0	0	0	0	0	0	4
							Days						
Rain days	12	10	13	13	15	14	13	15	17	17	15	16	170
Days with Runoff	7	5	8	11	14	13	13	13	14	13	9	9	127

Table 2 Monthly and annual rainfall and monthly distribution of annual climate data for Hokitika (average for 30 years from 1981–2010). (From NIWA 2016). *Estimation of runoff, soil moisture deficit and days with runoff are based on a soil with 150 mm soil water storage capacity.*

Figure 2 records monthly variation data of rainfall for all available data for Hokitika. This shows that five months have recorded monthly rainfall of 500 to 600 mm.

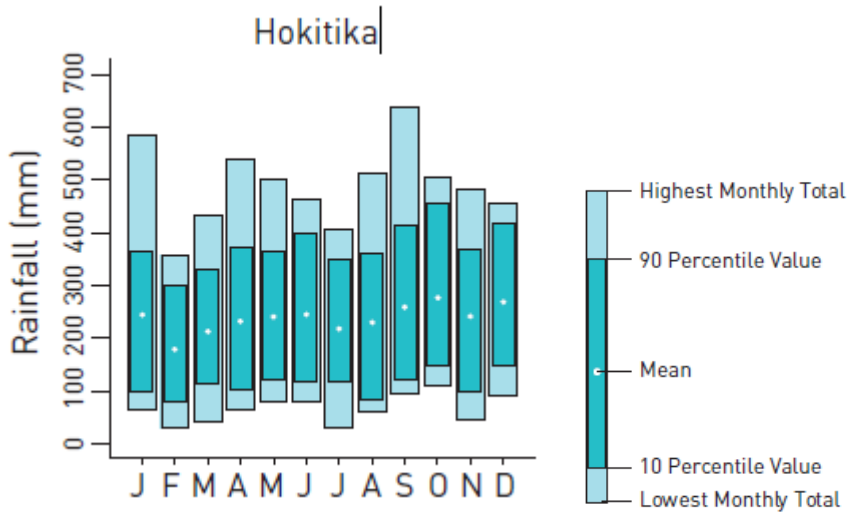

Figure 2. Monthly variation data of rainfall for all available data for Hokitika (From NIWA 2016).

Table 3 records the greatest rainfall to accumulate over 3 to 5 days at Kokatahi in 2025. On five occasion 3-day rainfall varied from 90 to 169 mm and on two occasions 4-5 day rainfall varied from 186 to 208 mm.

	April	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**
Monthly total	346	231	322	253	180	542	650	270
4 to 5 days						186	208	
3 days	161		108	90	98		169	
Rainfall days	14	14	16	15	9	27	26	18

Table 3 Data derived from daily rainfall records for April to November 2025, recorded by Hazel Hook at Kokatahi.

Implication of climate data

The applicant report is lacking in detail on the description of leachate disposal. The proposal describes irrigation of the leachate pond to be:

> ‘pumped out weekly (or as needed) by a sucker truck and irrigated to land via travelling irrigator’
>
> ‘in the case of high rainfall forecast, the leachate pond will be sucked out and irrigated to the land before the rainfall event’

The report does not specify the type of irrigator or the amount of leachate to be applied at each irrigation.

Table 2 indicates that, even with a deep soil, monthly drainage will generally average around 150-200 mm. On average there will be 5-14 days each month with drainage below the soil. These are 30-year average results – so there will be about 50% of months that exceed this amount of drainage. This is confirmed in Figure 2. Note that Figure 2 records ten months when rainfall exceeded 400 mm.

The report does not specify the area to be irrigated. The area will depend upon set-backs from Duck Creek and from other facilities and sensitive areas. I will assume that the irrigated area is 25 ha.

The paved pad area of 4,200 m^2 and an average annual rainfall of 2,732 mm (Table 2), will generate an annual runoff volume of 11,340 m^3. This would result in an annual application of 45 mm of leachate if irrigated is evenly over 25 hectares. In high rainfall years the annual load could amount to 50 mm.

At first glance, this seems to be a minimal depth when spread over the whole year. However, Table 2 indicates that most months do not have a soil moisture deficit and the annual soil moisture deficit is only 4 mm. So applying the 45 to 50 mm over the year may increase the drainage by 45 to 50 mm over the 25 ha of irrigated land. If irrigation application depth is 5 mm, this would entail 4 to 5 applications on the same area over a year.

In parts of the summer period, the soils will have a soil moisture deficit when the irrigated leachate can be absorbed into the soil. But a significant period of Summer, and all the rest of the year, the soil will be at, or close, to field capacity. In this condition, the additional irrigation water will cause an equivalent amount to drainage.

When soils are wet, they have limited capacity to absorb chemicals and bacteria etc. There will also be periods when applications will need to be made when it is raining, or will soon experience heavy rainfall, and this will exacerbate the amount of leaching.

In winter, the imperfectly drained areas are likely to be subject to ponding, particularly in hollows. This presents a significant risk of runoff of contaminants directly into water ways. In this condition these soils should not receive irrigation. This will result in more application of leachate to the well-drained shallow and stony soils, with less ability to absorb contaminants.

Storage Capacity

The storage pond is 840 m^3. The yard is 4,200 m^2. 200 mm of rain will fill the pond. From Figure 2 and Table 2 most months have greater than 200 mm of rain and would require the pond to be emptied at least once. Months with over 400 mm of rain (Figure 2) will require the pond to be emptied more than twice. During wet months, sustained rainfall

over several days presents a risk of exceeding the storage capacity of the pond, potentially causing leachate to overflow.

Land use issues

The report does not record what plants that are proposed to be grown, nor the method of harvesting. This is a necessary part of applications for disposing of wastewater.

There are high risks of causing compaction and rutting by wheel traffic when irrigating harvesting crops when soils have high water content. Indeed, this is inevitable because the soils are commonly at high water content.

The applicant does not know the composition of the wastewater (which is understandable) so there is no way to determine the balance of nutrients added against nutrients removed in the crop. This also means that there is no estimate of the kinds of organic chemicals and organisms likely to be present, or their concentration.

Conclusion

This proposal omits vital information needed to evaluate the sustainability and environmental impact of using this site for composting.

I calculate that the proposal requires application of 45 to 50 mm of leachate per annum, which may appear to have low environmental impact. However, when the climatic context is considered there may be significant environmental impacts that need to be assessed.

For most of the year, soils at the site will be wet when irrigated with leachate. Applying irrigation before predicted high rainfall will not change the leaching potential. Climatic calculations indicate that leaching of contaminants below the root zone will occur during all months of the year.

The environmental effects of this proposal need to be assessed having regard to the sensitivity of contaminants entering Duck Creek and Kokatahi and Hokitika Rivers.

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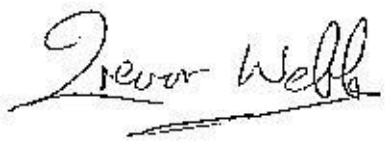

14 Jan 2025