Appendix A

PHF Science Expert Evidence

Health New Zealand
Te Whatu Ora

FOR INFO: Duck Creek Farm Compost Consent Application

TO:	Dr Cheryl Brunton & Glynn O'Rourke, NPHS Te Waipounamu
FROM:	Dr Louise Weaver, PHF Science and Lou Wickham, Emission Impossible Ltd
DATE:	25 February 2026

1. Purpose

- The purpose of this memo is to provide you with advice on public health risks arising from discharges to air from the proposed composting operation at 1047 Kaniere-Kowhitirangi Road (**Duck Creek Farm**), Kokatahi.

2. Background/Context

2.1 The National Public Health Service (**NPHS**) Te Waipounamu requested advice from Dr Louise Weaver (PHF Science) and Lou Wickham (Emission Impossible Ltd) as an urgent priority to inform a Hearing to be held on Friday 27 February 2026. NPHS Te Waipounamu's primary public health concerns were:

a) Biohazards from leachate and spray irrigation of leachate; and

b) Odour and dust.

2.2 NPHS Te Waipounamu further queried the status of the proposal with respect to the offensive trade provisions of the Health Act 1956.

2.3 Dr Weaver will address leachate and stormwater matters, along with risks associated with pathogens in bioaerosols. Lou Wickham will address discharges to air of odour and dust from the proposal as well as the status of the process with respect to offensive trades.

2.4 Please note a significant limitation of this memo is that neither author has visited the site in person.

3. Proposal

3.1 von Ah Contracting Limited (the applicant) lodged an application with West Coast Regional Council in 2024 (date not specified). **Figure 1** (which follows) shows the proposal's site location and **Figure 2** shows the site location in relation to neighbouring houses.

3.2 An indicative site layout is provided in **Figure 3** from the Compost Management Plan (also 29 August 2025).

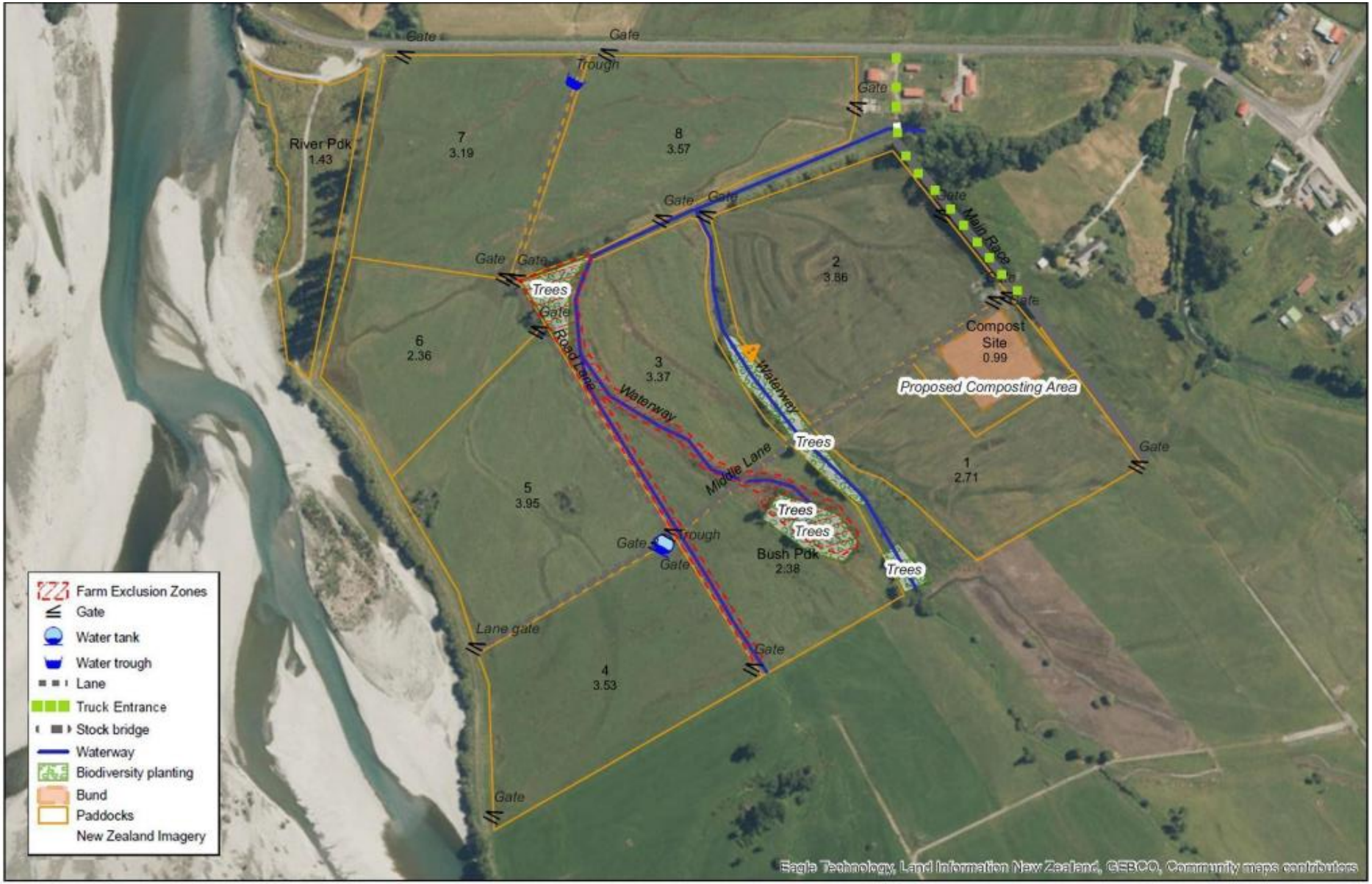

Figure 1. Proposed site location [Source: von Ah Contracting, 2025a]

Figure 2. Proposed site location and composting area – approximate only [Source: Google Earth 29Jan24]

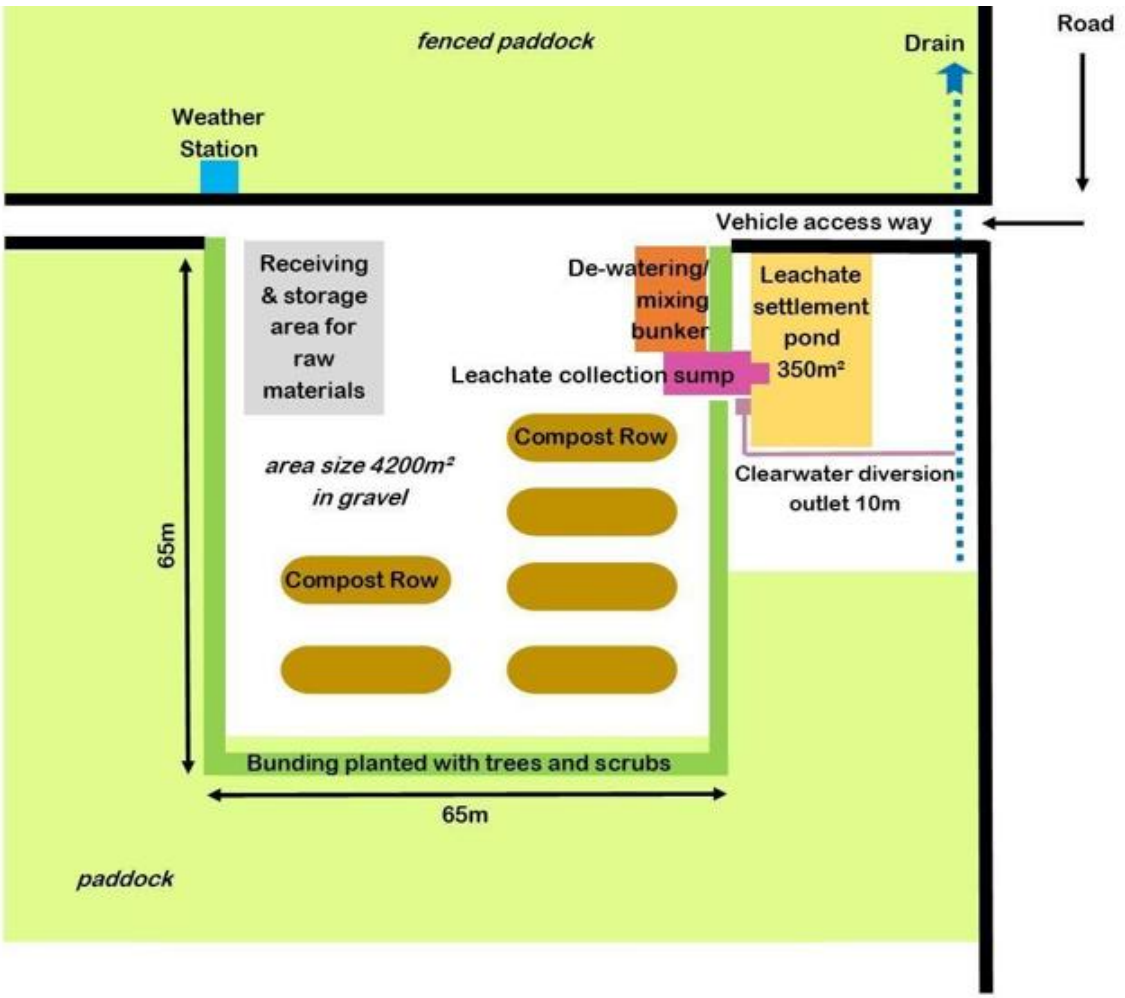

Figure 3. Layout of von Ah Composting Site Yard [Source: von Ah Contracting, 2025c]

3.3 An updated application dated 29 August 2025 describes the proposal as follows (von Ah Ltd 2025):

a) Organic waste material will be unloaded into a mixing bunker, mixed and blended with bark fines or woodchips for composting in static pile windrows (details not specified).

b) Raw material is to be blended with bark or wood chips at a minimum ratio of 1:1 and formed into windrows using excavators for mesophilic phase (temperatures 10 – 50°C) composting for approximately 2 – 7 days. Turning frequency, if any, during this period is unstated. The windrow is to be overlaid with a 150 – 300 mm 'cover blanket' of finished compost or bark to reduce potential odours.

c) Therein follows thermophilic phase composting with sustained periods at high temperatures (50-60°C) for approximately 2 weeks – 4 months (no turning).

d) The curing/maturation phase follows where compost is moved into large windrows (size not stated) for around 3 – 9 months (50 – 23°C) being turned every 2 – 4 weeks.

e) Compost is then screened to remove rubbish and gross solids (woodchip that has not broken down) prior to sale.

f) Leachate is directed to an irrigation pond for subsequent spray irrigation to land (some of which may be offsite). The proposed irrigation area is the yellow area shown in Figure 2.

3.4 Composting is proposed to be carried out on a compacted bed of gravel that is approximately 4200 m^2 in area (Figure 3). The applicant refers to dewatering of received materials but discusses only to mixing with bark or woodchip to reduce moisture in the proposal which is not dewatering.

3.5 The applicant further discusses 'consideration' of covering the windrows during high rainfall events. However, it appears that the applicant proposes to primarily undertake composting in the open air.

3.6 The scale of activity proposed is not clear; tabulated waste materials do not match the projected number of truck movements,[1] Mote's (2024) review and the (2026) s42A officers report are inconsistent with the (2025) application.[2] To understand scale and potential impact, it is critical to clarify the proposed feedstocks and their volume.

3.7 Two of the proposal documents refer to pasteurisation of the compost to meet NZ 4454:2005 guidelines.[3] Given the pathogens likely to be present in some of the feed materials (DAF sludge, paunch, animal manure) pasteurised compost is assumed to be the primary objective of composting (as opposed to thermophilic composting for the purpose of biological stabilisation).

4. Biohazards from feedstock and composting operation

4.1 Some of the feedstock listed as being used for the mixed composting application include meat-production derived wastes (paunch, abattoir DAF sludge, bedding material) will contain enteric pathogens that pose a risk to public health. This can be bacteria e.g., *Campylobacter*, *Salmonella*, pathogenic *E. coli*, protozoa e.g. *Cryptosporidium*, *Giardia*, helminth (Helminth ova), and viruses. Similarly, *Legionella longbeachae* is known to be present in wood and bark material.

4.2 The risks from the listed feedstocks are medium to high with respect to paunch, bedding and DAF sludge, but are not clearly recognised as such. The nature of the feedstock poses a risk while waiting to be mixed. The management plan does not clearly state the time between the arrival of feedstock and mixing. There is also a lack of information on the management of potential vector species (vermin, insects), although birds are mentioned.

4.3 The presence of the feedstock will be attractive to vermin such as rats, which poses an increased risk of transmission of disease to operators, such as Leptospirosis, as well as transport of pathogens present within the feedstock itself.

4.4 The collection of any leachate through the dewatering process is not described specifically, but it is assumed from the Composting Management Plan that the leachate will be collected by drainage to the leachate sump, as will the composting leachate. The leachate collected from the dewatering of the feedstock poses a

[1] For example, paunch is proposed to be delivered "daily during the season" yet the applicant states there will be only 5-6 truck movements per week in total.
[2] For example, Mote (2024) refers to animal mortalities (that are *not* in the updated application) and the s42A officer's report has no proposed consent conditions for coal boiler ash (which *are* included in the application).
[3] von Ah Contracting, 2025b. *Compost Process Overview.* At page 7.
von Ah Contracting, 2025c. *Von Ah Compost Facility Management Plan.* At page 15.

high risk to public health and will contain high levels of pathogens (enteric predominantly).

4.5 *E. coli*, *Salmonella* spp., and *Campylobacter* spp. are specifically identified as risks in the New Zealand biosolids guidelines (NZS 4454:2005). Thermal activation by prolonged **thermophilic** conditions is required to achieve inactivation. Although protozoan and viral pathogens are not specifically required to be tested, the composting process should ensure adequate conditions are met through rigorous recording of compost pile temperatures and moisture levels.

4.6 The composting management plan does include a description of the composting process, including a thermophilic phase and measurements to be taken daily. Note that the temperature measurement procedure described in the application is not sufficient to ensure that composting is occurring throughout the windrow.

4.7 There is mention of the requirement for adequate moisture, but no description of any moisture content measurements to be taken. Recordings will be made of adding water to the piles as an alternative.

4.8 Daily manual readings of temperature should be undertaken at a minimum of three depths along a minimum of three locations of each windrow (not one measurement as stated in the application). In addition, after each turn, the temperature should be measured again to ensure that the required temperatures for thermophilic activity are reached (within 2 hours).

4.9 To maintain conditions required for inactivation of pathogens, regular moisture and oxygen measurements should be taken to prevent anaerobic zones and failure in the aerobic composting process and inactivation of pathogens present.

4.10 The proposed open composting is unlikely to ensure adequate temperatures and moisture conditions are achieved for the required times.

4.11 It is suggested that an alternative composting procedure would be required, such as enclosed composting, to ensure effective temperatures and moisture levels are achieved and maintained.

4.12 There is a potential public health risk to operators at the site, both in the management of the feedstock and the management of the composting process. This is not described in the management plan, apart from the mention of training. There is a risk from the pathogens present in the feedstock material and the generation of additional pathogen risk from the composting process such as fungal spores, and environmental pathogens such as *Legionella*.

5. Biohazards from Leachate

5.1 Due to the composition of the feedstock there is a risk that pathogenic microorganisms will be present and will pose a risk from leaching water and the dewatering processes proposed.

5.2 The design of the yard describes construction to capture all leachate and stormwater run-off. The use of gravel topped with sand is aligned to on site wastewater management practices for disposal fields to minimise risk to groundwater.

5.3 The addition of an impermeable liner will further reduce this risk, as is described.

5.4 It is proposed that all stormwater and leachate will be directed to the leachate collection system and leachate pond (Section 4.3 of the Composting Management Plan Current 29.08.2025).

5.5 The mixing zone is sealed to prevent leaching of contaminants into groundwater or surface water that is connected to the leachate collection sump.

5.6 The main concerns over management of the leachate are:

a) Adequate consideration of the groundwater table present. The local groundwater levels are estimated to be shallow, ranging from 0 to 5 metres below ground (Westerhoff et al., 2018). The risk here is that the proposed application of leachate to land will exceed the soils' capacity to retain it, and given the high water table, there is a high risk of contamination of local groundwater.

b) Soil type is likely described as imperfectly draining with a risk of poorly drained soils (S-map, Manaaki Whenua). The soils in the region are likely to be at high risk of structural breakdown from increased irrigation with leachate (depending on the alkalinity/salinity). There is a high risk of contaminant transport (including pathogens) to groundwater from regular application of leachate, as described in a) above.

It is recognised that the application plans to rotate application of leachate across the whole farm (30 Ha, Duck Creek Farm) and application will be managed to prevent application of over 20 mm of leachate.

c) Climatic conditions, notably the high rainfall, posing a risk from flooding and inundation of the site and leachate collection pond. In addition, the proposed collection of all leachate and stormwater into the leachate pond will have increased risk of application of leachate to land which is at field capacity. The design of the leachate ponds volume is inadequate to ensure time for die off of any pathogens present through solar disinfection. It is likely that regular irrigation will occur, preventing natural disinfection to occur in the ponds.

As the application of the leachate will occur regularly, hence likely pathogens remain viable, there is a risk to farm management practices and cycling of diseases. Although, not within the remit of this advice, it is pertinent to recognise that the proposed application of leachate onto pasture which will then be grazed after two weeks is unlikely to minimise risk of disease transmission back into livestock. If pathogens present are zoonotic there is an increased risk of transmission to humans.

d) Necessity for continued treatment within the leachate pond and management of the sludge therein. As the feedstock will include high risk materials, there is a need to ensure continued treatment of the leachate occurs in the pond. The risk of not adequately managing the leachate pond will be increased organic loading, and addition of solubilised fats and grease which will lead to anaerobic conditions within the pond and increased odours. This can be managed by aeration in the pond and sufficient detention time for pathogen inactivation.

The sludge from the base of the pond will accumulate resistant pathogens, if present (e.g. *Cryptosporidium*), heavy metals and requires management. The sludge should be extracted and treated as a contaminated waste and processed before disposal on land.

There is no clear description of any monitoring of the leachate for pathogens, other contaminants or nutrient analysis, which would be important information, as the leachate application rate described could be high, reducing potential for treatment to occur in the leachate holding pond.

e) The proposal to divert post-first-flush stormwater on the site poses a risk as the stormwater flowing through the composting facility will still contain

biohazardous materials, and even if appearing "clear", it may still contain pathogens and other contaminants post-first-flush. No evidence is provided that the diverted stormwater would be adequately managed. The use of a planted wetland may reduce organic and nutrient loading but may not inactivate any pathogens present. There is a high risk that if the inundation of the site occurred during the initial phase of composting that the high level of nutrients, and potentially elevated levels of fats, oils and grease as are found in meat processing waste would clog the wetland system.

6. Biohazards from Spray Irrigation of Leachate

6.1 There are risks to operators and local residents from the spray irrigation of the leachate.

6.2 Operators have the highest risk due to proximity to the spray source.

6.3 Residents living close to the irrigation, especially downwind, are at risk as well. It is noted that the proximity of a school to the operation and farm may pose an elevated risk due to children's increased susceptibility.

6.4 There is a risk if any of the areas for spray irrigation include neighbouring walkways, cycle paths, or waterways, as the spray drift created increases the risk.

6.5 Research has shown that pathogens present in aerosols can travel substantial distances, with viruses being able to travel over 100 metres from wastewater spray irrigation (Wei et al., 2017). The actual risk to public health from aerosols containing pathogens remains uncertain; however, a precautionary approach is recommended, as the leachate from similar practices has been shown to contain pathogens that may survive extended periods in the environment (Liang et al., 2023, Yu et al., 2021, Dungan, 2010).

7. Offensive Trade

7.1 Section 54 of the Health Act 1956 provides:

54 Restrictions on carrying on offensive trade

(1) No person shall establish any offensive trade within the district of any local authority, or erect or extend any premises for the purposes of or in connection with any offensive trade, except with the prior consent in writing of the local authority and of the medical officer of health and subject to such conditions as the local authority or the medical officer of health may impose.

7.2 Offensive trades are listed in Schedule 3 of the Health Act 1956 and include "*Septic tank desludging and disposal of sludge*".

7.3 The proposal is to compost, amongst other materials, abattoir DAF sludge and may be reasonably described as an offensive trade. From an air quality perspective (i.e. not a legal basis), the discharges to air from composting DAF sludge certainly have significant potential to cause offensive and objectionable odour effects offsite.

7.4 NB: the authors cannot provide legal advice and this memorandum should not be construed as such.

8. Air Receiving Environment

8.1 West Coast Regional Council (**WCRC**) engaged an independent consultant (Mote Ltd) to review the application. Their report, prepared in December 2024, notes the receiving environment is predominantly rural with the following identified locations sensitive to odour and dust:

a) A single residential dwelling 240 metres to the northwest.

b) Nine residential dwellings between 260 – 460 metres to the northeast.

c) Two accommodation providers between 260 metres and 460 metres to the northeast.

8.2 It is also noted that the local school is less than 500 metres to the northeast.

8.3 The applicant provided meteorological data from Hokitika Airport but this is not considered representative of Kokatahi, being some 16 km to the northwest on the coast. By contrast Kokatahi is located in a floodplain, inland from the coast.

8.4 Mote generated meteorological data for the local area from using the TAPM modelling package (Mote 2024). A copy of this dataset was used to generate a windrose using OpenAir in R as shown in **Figure 4**.

8.5 Whilst this is the best available data, it may not be accurate. For example, the prevalence of easterly winds appears at odds with local terrain features. However, the prevalence of light to moderate southwest and light southeast winds look reasonable.

8.6 The data, such as it is, suggests the following:

a) winds directing discharges to air from the proposed composting operation towards neighbouring houses on Upper Kokatahi Road are relatively frequent; and

b) low wind speed conditions (<1 m/s), during which time wind direction matters little as dispersion is limited, occur around 14% (1,234 hours) of the year.

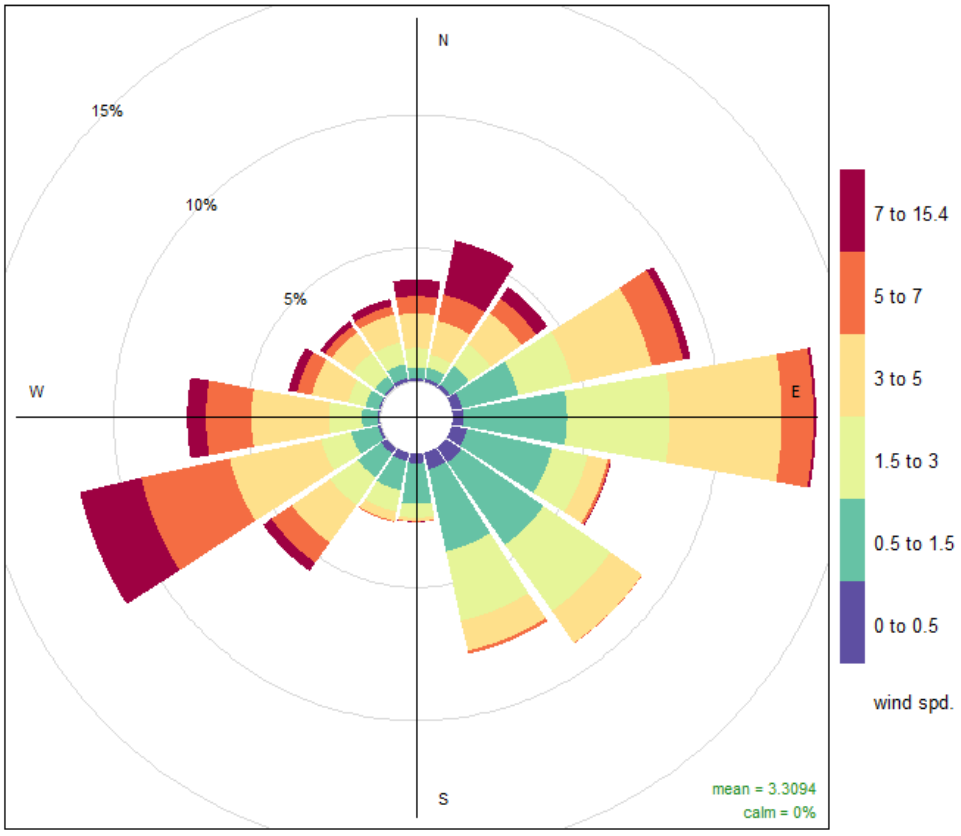

Figure 4. Frequency of Kokatahi wind directions (from °true) and wind speeds (m/s) [Source: Mote, 2024]

8.7 The West Coast is renowned for high rainfall and Kokatahi is no exception, measuring on average 3.4 metres of rain per year with a maximum recorded rainfall of 4.1 metres.[4] This is extraordinarily high rainfall and calls into question the feasibility of undertaking thermophilic composting in the open air. The sheer volume of rainfall is likely to reduce windrow temperatures and make maintaining pasteurisation temperatures problematic. It will further be extraordinarily difficult to maintain (reduced) moisture levels at the optimum levels (45-60%) required for New Zealand composting standards (NZ 4454:2005).

8.8 A key issue with open air composting is that the process can take longer than anticipated. This is especially true for the damp cool conditions on the West Coast and there is a real chance that processing could get very slow (thermophilically) in winter. This can result in more windrows onsite than predicted and a need for more space. The proposed composting pad is not large (4,200 square metres) and it is unclear if there will be sufficient room to form and regularly turn windrows to adequately pasteurise the compost.

8.9 By way of context, an open-air composting facility in Taranaki with around (only) 2 metres of rain a year proved infeasible, being subject to regular flooding issues.[5]

9. Air Discharges of Odour

9.1 Based on the tabulated feedstocks in the application dated 29 August 2025 it is assumed the applicant proposes to compost the following:

- *Paunch – 500 tonnes per year
- Bark chip – 3,000 tonnes per year
- Sawdust – unstated tonnes per year
- *Old baleage and silage – unstated tonnes per year
- *Used herd home and calf bedding – unstated tonnes per year
- *Abattoir Dissolved Aeration and Floatation (DAF) Sludge – 500 tonnes per year
- **Coal boiler ash – 50 tonnes per year
- Moss fines – 100 tonnes per year

9.2 It is noted that feedstocks marked * are potentially odorous or highly odorous materials.

9.3 ** It is further noted that fly ash from boilers may, or may not, be classified hazardous[6] and this requires representative testing to clarify (UNEP 2000). One sample of unknown origin or relevance, as provided by the applicant, is not adequate.

9.4 For a total of 4,100 tonnes per annum, a minimum 1:1 ratio (bark chip + sawdust to waste materials) as stated by the applicant suggests old baleage/sileage and used herd bedding would comprise no more than 1,850 tonnes per year.

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[4] Previous NIWA meteorological site (station 3993) for period 1981 – 1996 as described in Mote, 2024.

[5] *Remediation (NZ) Limited v Taranaki Regional Council [2024] NZEnvC 213* (30 August 2024). [Online] At [99]-[100]

[6] i.e., containing Annex I substances in concentrations sufficient to exhibit Annex III characteristics under the Basel Convention.

9.5 It is also noted that the application does not include an assessment of air quality effects of the proposal.

9.6 Despite this, the applicant has proposed that windrows will not be turned when the wind is towards the neighbours. This may not be practical, given the predominance of winds being directed from the proposed site location towards residences and the local school.

9.7 Good practice notes (MfE, 2016):

> *Under the RMA, the primary concern with odour is its ability to cause an effect that could be considered 'offensive or objectionable'. Whether an odour has an offensive or objectionable effect requires an overall judgement that considers the frequency, intensity, duration, offensiveness/character, and location of the odour event.*

9.8 An overall FIDOL odour assessment is provided in Table 1.

TABLE 1. FIDOL Assessment of Proposed Composting Operation

Parameter	Assessment
Frequency – *how often an individual is exposed to the odour*	• Good practice is to require odorous materials be covered immediately when being placed in windrows and this is proposed. However, this takes time. The process of bringing odorous feedstocks to site, unloading them and then forming windrows will result in fugitive odours being discharged to air until, and likely for some time after, the 'cover blanket' is applied. • Even when well-managed, turning the windrows will result in odours being discharged to air. This occurs frequently during the thermophilic composting phase, being mandated a minimum of five times during a 15-day period (NZ 4454:2005). • Winds directing discharges to air from the proposed composting operation towards neighbouring houses on Upper Kokatahi Road are relatively frequent. Further, low wind speed conditions (<1 m/s), during which time wind direction matters little as dispersion is limited, occur around 14% (1,234 hours) of the year.
Intensity – *the strength of the odour*	• Feedstock type – the majority of feedstocks proposed are potentially odorous (paunch, silage and herd bedding) or highly odorous (Abattoir DAF sludge) which increases the risk of offensive or objectionable offsite odours. • Feedstock volume – the annual throughput proposed is relatively small (<5,000 tonnes per year) and this will help reduce the risk of offensive or objectionable offsite odours. • The proposal is to undertake open-air composting which significantly increases the risk of offensive or objectionable offsite odours (as compared with an enclosed process). This is particularly acute for the West Coast where extraordinarily high rainfall increases the difficulties of achieving minimum temperature and optimum moisture levels.

Parameter	Assessment
Duration – *the length of exposure*	• No information is provided on this in the application. • The potential duration of odours discharged to air, as experienced offsite, will be influenced by local meteorology and site practices (e.g. how often windrows are turned). Experience with other composting facilities supports offsite odours from composting operations occurring for extended periods of time (hours to days).
Offensiveness (character) – *the 'hedonic tone' of the odour, which may be pleasant, neutral or unpleasant*	• Composting odours are generally agreed to be unpleasant to extremely unpleasant. This is likely to be exacerbated by the presence of odorous and highly odorous input materials.
Location – *the type of land use and nature of human activities in the vicinity of an odour source*	• The proposal is on land zoned rural under the District Plan and enjoys a low population density. However, there are around 30 houses and a school within 500 metres to 1.2 km of the site (Jarman 2026). These distances are indicative of the separation distances required for this scale (<5,000 tonnes per year) and type of process (open air receival, open turned windrow, open air maturation) with these types of feedstocks (odorous and highly odorous materials) (EPA Vic, 2017). This is because whilst the area is zoned rural, a residential population's tolerance for non-agricultural odours is typically low (MfE 2016). • Local climate – the ability of the applicant to achieve optimum temperature, oxygen and moisture levels in this environment is questionable given the extraordinarily high rainfall. This significantly increases the risk of offensive or objectionable offsite odours.
Overall	The proposal is at very high risk of causing offensive or objectionable offsite odours.

9.9 It is well established in New Zealand case law that offensive or objectionable odours are significant adverse effects. As such, it is concluded that the proposal has a high risk of causing significant adverse effects offsite.

10. Air Discharges of Dust

10.1 Dust may be generated at composting sites through (Vic EPA 2017):

- movement of materials by front-end loaders and delivery trucks;
- during storage, grinding, mixing and screening of feedstocks and products;
- from the turning of composting materials (although this is less likely due to the normally high moisture content of compost – dust in this case, but can however indicate insufficient moisture content in the composting mass, which may require adjustment)
- from stockpiles.

10.2 Given the high level of rainfall in the Kokatahi area, dust is not likely to be a significant issue. The exception to this is during occasional dry periods when trafficked surfaces may generate dust discharges to air during high wind speeds (> 5 m/s). This may be readily mitigated through the application of water sprays and well-designed wind breaks/bunkers.

11. Recommended Conditions of Consent

11.1 To minimise the potential for offensive and objectionable odours offsite, and to reduce the risk of pathogen transmission, it is critical that best practice composting is carried out. This requires careful monitoring and management of the compost, and appropriate quality assurance, to ensure that:

a) adequate temperatures, moisture, oxygen and pH are achieved and maintained so that every part of the material is effectively pasteurised; and

b) the product does not become re-contaminated.

11.2 We draw your attention to the following statement in the foreword to NZ 4454:2005:

> *During the development of the Standard there were some matters identified that require further consideration during future reviews, with possible inclusion in updated versions. At present the microbiological quality of pathogens in compost is to be determined using an indicator bacteria, E. coli, as used for the Guidelines for the Safe Application of Biosolids to Land in New Zealand (hereafter referred to as the Biosolids Guidelines). How this organism relates to the removal of specific pathogens, such as Campylobacter, Giardia, Cryptosporidium and Legionella in the composting process is unclear at this time and future work is required to confirm that the best indicator is being used to protect public health. The results of this work may require a different microbiological testing regime. In addition, if there was a particular health issue, which could be related to compost,* ***a Medical Officer of Health may require additional microbiological monitoring****.*

11.3 We have augmented the (sole) indicator limit for *E. coli* in NZ 4454:2005 with recommended limits for *Campylobacter* spp., *Salmonella* spp., enteric viruses and Helminth ova in accordance with the New Zealand Biosolids Guidelines (Wastewater New Zealand 2003).

11.4 Accordingly, the following conditions are recommended to "ensure the products produced … do not present a hazard to the environment nor to public health" (NZ 4454:2005). These draw directly from the New Zealand standards for composting (NZ 4454:2005) and the New Zealand Biosolids Guidelines.

a) A condition requiring shredding or chipping of all woody material to 12 – 40 mm in diameter and up to 400 mm in length. This will enable good structure for aeration during the compost process and to assist decomposition of 'woody' material.

b) A condition requiring thorough mixing of materials prior to forming windrows of a maximum height of 2 metres.

c) A condition requiring odorous materials to be mixed and formed into windrows with cover placed over them immediately (i.e. no standing in the open air).

d) A condition requiring the core of the compost mass to be maintained at 55°C, or higher, for 15 days or longer, during which the windrow must be turned a minimum of five times.

e) A condition requiring oxygen concentrations of at least 12-14%, and never less than 5%, be maintained throughout the pile.

f) A condition requiring a minimum curing period of 2 months.

g) A condition requiring the windrow moisture to be controlled to between 45-65% during the above composting period.

h) Conditions requiring daily measurement and recording of windrow temperature and oxygen profiles commencing 30 cm below the surface and every 30 cm to the centre of the pile at varying heights and sufficient locations along the length of windrow to be representative of the composting process.

i) Conditions requiring the finished product for any composting of material containing any animal manures, kitchen/food residues, meet processing residues and/or fish/shellfish as ingredients meets the limits in Table 2.

j) Conditions requiring statistical sampling for microbiological indicators and metals and reprocessing of compost that does not meet the requirements of Table 2 (Appendix M of NZ4454:2005).

k) Conditions requiring *verification* testing for pathogens in accordance with s2.6.3.1.1 of NZ 4454:2005 to ensure that the temperature-time control is adequate. This requires 15 grab samples to be taken over a month with individual samples to be sent to the laboratory immediately. There shall be 15 consecutive results that meet the value given in Table 2.

l) Conditions requiring *routine* testing for pathogens in accordance with s2.6.3.1.2 of NZ 4454:2005. Specifically, that after verification, routine testing shall be carried out weekly on grab samples, or more frequently under the manufacturer's testing programme. If there are any changes to the process or any failures to meet the stipulated value, the verification process must be repeated.

m) A condition requiring routine testing for metals in an annual sample composited from samples taken every two months (s2.6.2.2 of NZ 4454).

n) Conditions requiring records to be kept of volumes of materials received and composted including dates of processing and dates windrows turned.

o) A condition requiring separation of the feedstock and product handling equipment, vehicles and area to avoid reinfection.

p) A condition requiring washing of machinery between use for handling untreated feedstock and compost product to avoid reinfection.

q) A condition requiring no application of contact water to composted material after it has gone through the heat treatment stages for pathogen control (i.e. full enclosure of process or storing product undercover).

r) Conditions requiring regular testing the compost for pathogens (refer Table 2) including at the start of production of each new product type and every time there is a significant change in feedstock or processing procedures.

Table 2. Physical, chemical and biological requirements for compost [NZ 4454:2005] [1,2]

Characteristic and unit of measurement	Requirements				Test method Appendix / Notes
	Composted product		Pasteurised product		
	Compost, soil conditioners and mulch	Coarse mulch	Soil conditioners, mulch	Coarse mulch	
PHYSICAL REQUIREMENTS					
Particle size grading – using a 20 mm sieve (% by mass)	Compost and soil conditioner: Not more than 5% by mass to be retained by the sieve. Mulch: Less than 80 % by mass to be retained by the sieve	Equal to or more than 80 % by mass to be retained by the sieve	Soil conditioner: Not more than 5% by mass to be retained by the sieve. Mulch: Less than 80% by mass to be retained by the sieve.	Equal to or more than 80 % by mass to be retained by the sieve	Appendix E
CHEMICAL REQUIREMENTS					
pH max. pH units	5.0 to 8.5	5.0 to 8.5	5.0 to 8.5	5.0 to 8.5	Appendix A
Organic matter content % dry matter	≥ 25	≥ 25	≥ 25	≥ 25	Appendix B
Chemical contaminants (heavy metals expressed as mg/kg) (See Note 5)					
Cadmium (Cd)	3	3	3	3	See 2.6 & Note 6
Chromium (Cr)	600	600	600	600	
Arsenic (As)	20	20	20	20	
Lead (Pb)	250	250	250	250	
Nickel (Ni)	60	60	60	60	
Mercury (Hg)	2	2	2	2	
Zinc (Zn)	600	600	600	600	
Copper (Cu)	300	300	300	300	
Organic contaminants (heavy metals expressed as mg/kg) (See Note 3)					
DDT/DDD/DDE	0.5	0.5	0.5	0.5	See 2.6 & Note 6
Aldrin	0.02	0.02	0.02	0.02	
Dieldrin	0.05	0.05	0.05	0.05	
Chlordane	0.05	0.05	0.05	0.05	
Heptachlor and Heptachlor epoxide	0.02	0.02	0.02	0.02	
Hexachlorobenzene	0.02	0.02	0.02	0.02	See 2.6 & Note 6
Hexachlorocyclo-hexane (Lindane)	0.02	0.02	0.02	0.02	
Benzene hexachloride (BHC)	0.02	0.02	0.02	0.02	
Total PCBs	0.5	0.5	0.5	0.5	
Moisture content, %	≥ 25	No requirement	≥ 25	No requirement	Appendix F

Characteristic and unit of measurement	Requirements				Test method Appendix / Notes
	Composted product		Pasteurised product		
	Compost, soil conditioners and mulch	Coarse mulch	Soil conditioners, mulch	Coarse mulch	
LIMITS FOR PATHOGENS					
These requirements are applicable only to products containing: Animal manures; parts of animals or animal mortalities; kitchen / food residuals; meat processing residuals and fish / shellfish as ingredients					
E. coli or Faecal coliforms	<100 MPN/g				Routine and verification sampling See Note 6
Campylobacter spp.	< 1 per 25 g				Verification sampling NZ Biosolids Guidelines[7]
Salmonella spp.	< 1 per 25 g				
Enteric viruses	< 1 PFU per 4 g				
Helminth ova	< 1 per 4 g				
CONTAMINANTS					
Glass, metal and rigid plastics > 5 mm % dry matter, w/w	≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4	Appendix P
Stones and lumps of clay ≥ 5 mm % dry matter, w/w	≤ 5	≤ 15	≤ 5	≤ 15	
Plastics – light, flexible or film > 5 mm, % dry mass	≤ 0.04	≤ 0.04	≤ 0.04	≤ 0.04	
Suppliers and their customers are advised to agree upon an acceptable maximum level of visual contamination by lightweight plastic.					

NOTE –

MPN = most probable number. PFU = plaque-forming unit.

(1) Requirements for electrical conductivity, phosphorus (soluble and total), ammonium-N plus nitrate-N, Nitrogen (total), Boron and Biological parameters (toxicity, plant propagules, plant growth index) excluded.

(2) NB: Additional requirements for composite sampling from at least ten samples taken throughout the pile are outlined in Section 2 of NZS 4454:2005.

(3) For determination of organic contaminant levels, products should be collected in glass jars and be refrigerated to avoid inadvertent secondary contamination.

(5) Compliance with the Biosolids Guidelines – "Grade a" interim values for heavy metals and organic contaminants in table 4.2 of the Biosolids Guidelines until December 2012 (see Foreword). Composts with biosolids as an ingredient shall also comply with "Grade A" of table 4.1 of the Biosolids Guidelines for pathogens.

(6) Product testing for pathogens, heavy metals and organic contaminants shall be carried out according to accredited test methodology in laboratories accredited to NZS ISO/IEC 17025 and/or recognised by IANZ. Other tests shall be carried out according to the test methodology prescribed in NZS 4454:2004 or according to alternate accredited test methodology in accredited laboratories. No test methods have been specified for metals, persistent organochlorine pesticides, PCBs or dioxins since there are a number of methods that can be used. It is recommended the USEPA methods are used (modified from the Biosolids Guidelines) or determined using IANZ/AOAC accredited methods. The method used shall be described in the test report.

(7) In the event that one of the samples fails to meet the product verification standards specified, all of the pathogen tests for that sample must be repeated. One hundred percent compliance must be achieved in order to meet the stabilisation grade standard.

11.1 It is noted that some, but not all, of the above conditions have been included by the applicant through reference to a (yet to be prepared) Composting Site Management Plan (CSMP). Management Plan requirements as condition of consent can be less effective in practice than explicit conditions requiring explicit performance outcomes (e.g. demonstrate minimum core compost temperature of 55°C for 15 days or longer, during which the windrow must be turned a minimum of five times). Good practice is to have clear, enforceable conditions of consent and not to rely on (yet to be prepared) management plans.

11.2 If the decision is made to grant consent, the following conditions of consent are also considered necessary to reduce the risk of offensive or objectionable odours offsite.

a) Conditions limiting the materials to be processed at the site to the type and volumes in tonnes per annum described in the application.

b) Conditions requiring enclosing the entire composting operation and installing a biofilter (this will further assist with moisture control and the feasibility of attaining sufficient temperatures to achieve pasteurisation in practice).

c) Conditions for minimum performance requirements for the biofilter including:

(i) Media composition, depth, porosity and pH range

(ii) Moisture content

(iii) Bed temperatures

(iv) Residence time

d) Conditions requiring the installation, calibration and operation of a meteorological monitoring station (wind speed, wind direction, rainfall and air temperature) with a (minimum) 10 metre meteorological mast located and operated in accordance, as far as practicable, with the requirements of AS/NZS 3580.14-2014 (*Methods for sampling and analysis of ambient air – Part 14 Meteorological monitoring for ambient air quality monitoring applications*).

e) Conditions requiring recording of meteorological conditions to inform investigations into odour complaints.

f) Conditions requiring the consent holder to keep a record any odour complaints along with relevant details including meteorological conditions and site activities at the time of the complaint.

12. Note on Abnormal Discharges to Air

12.1 Fires pose obvious risks to local air quality and the public. Fires at composting operations are not uncommon and can arise from several sources including spontaneous combustion (occurring as a result of the piles overheating), a spark igniting the piles (e.g. from cigarettes, lightning strikes, wildfires) or fragments and shards of glass acting like a magnifying lens.

12.2 Accordingly, the following conditions are also recommended (Vic EPA 2017):

a) Condition requiring a fire contingency plan be prepared for the composting operations. The plan should, at a minimum, identify the areas where a fire might occur, conditions that might lead to a fire and measures to prevent and control fires.

b) Conditions requiring appropriate fire control equipment and water supplies be maintained at the premises as well as consultation with the local fire

service on facility layout, suitable fire prevention and control measures and to agree on a plan of action to be followed in the event of a fire.

13. Limitations

13.1 Please note the following important limitations apply to this advice. The authors have not been to visit the site, or Kokatahi, in person and are not familiar with the general topography of this local area.

13.2 Documents reviewed to prepare this advice:

a) Mote Ltd, 2024. *Odour assessment report associated with von Ah Contracting Composting Proposal.* Prepared for West Coast Regional Council. Mote Limited 2024/029. December 2024. Auckland. [Online]

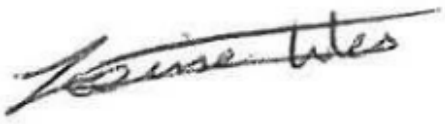
b) von Ah Contracting, 2025a. *Composting Proposal and AEE.* Dated 29 August 2025. [Online] Accessed 19 Feb 2026.

c) von Ah Contracting, 2025b. *Compost Process Overview.* Dated 29 August 2025. [Online] Accessed 19 Feb 2026.

d) von Ah Contracting, 2025c. *Von Ah Compost Facility Management Plan.* Final. Dated 29 August 2025. [Online] Accessed 19 Feb 2026.

e) Ridge, T., 2026. *Officer Report for Resource Consent RC-2024-0136*. Prepared by Tony Ridge and dated 29 January 2026.

f) Jarman, J., 2026. *Public Health Odour Assessment of Proposed Composting Operation at Kokatahi*. [Online] Accessed 23 Feb 2026.



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Health Act 1956.

Ministry for the Environment, 2016. *Good Practice Guide for Assessing and Managing Odour.* Wellington. [Online]. Accessed 20 Feb 2026.

New Zealand Water and Wastes Association, 2003. *Guidelines for the Safe Application of Biosolids to Land in New Zealand*. Wellington: New Zealand Water and Wastes Association.

NZS 4454:2005. *Composts, Soil Conditioners and Mulches.*

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United Nations Environment Programme, 2000. *Methodological Guide for the Undertaking of National Inventories of Hazardous Wastes Within the Framework of the Basel Convention.* First Version. Secretariat for the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal. Geneva. May. [Online] Refer A2060 / B 2050.