Before the Selwyn District Council

*under:* the Resource Management Act 1991

*in the matter of:* Proposed Private Plan Changes 81 and 82 to the Operative District Plan: Dunns Crossing Road, Rolleston

*and:* **Rolleston Industrial Developments Limited** and **Brookside Road Residential Limited**
*Applicant*

# Statement of Evidence of Donovan Van Kekem (Odour)

Dated: 26 August 2022

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**STATEMENT OF EVIDENCE OF DONOVAN VAN KEKEM**

**INTRODUCTION**

1 My full name is Donovan van Kekem.

2 I have the following qualifications:

2.1 a Bachelor's Degree in Biochemistry from the University of Canterbury; and

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

4.1 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:

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

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

(c) The proposed Private Plan Change 50 to the Selwyn District Council;

(d) The Orini chicken egg layer farm on behalf of Mainland Poultry;

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

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

4.2 I have also acted as an independent processing officer for the Canterbury Regional Council (CRC) 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 CRC.

4.3 I have conducted air quality monitoring, technical peer review services and/or assessments at a number of composting plans including:

(a) Intelligro's Rolleston composting facility;

(b) Daltons' McLeans Island composting operation;

(c) The Taurapa Station composting plant; and

(d) The Rural Trees Limited Rangiora composting operation.

5 I am familiar with:

5.1 The plan change application by Rolleston Industrial Developments Limited to rezone approximately 28 hectares of rural land in Rolleston to Living MD (*PC81*); and

5.2 The plan change application by Brookside Road Residential Limited to rezone approximately 110 hectares of rural land in Rolleston to Living MD and Business 1 (*PC82*).

together the *Proposed Plan Changes*, and Rolleston Industrial Developments Limited and Brookside Road Residential Limited together the *Applicants*.

6 My evidence relates to the potential reverse sensitivity effects that might arise from the Proposed Plan Changes with regards to odour from the Pines Resource Recovery Plant (*PRRP*) and the Pines Wastewater Treatment Plant (*PWTP*).

**CODE OF CONDUCT**

7 Although this is not an Environment Court hearing, I note that in preparing my evidence I have reviewed the Code of Conduct for Expert Witnesses contained in Part 7 of the Environment Court Practice Note 2014. I have complied with it in preparing my evidence. I confirm that the issues addressed in this statement of evidence are within my area of expertise, except where relying on the opinion or evidence of other witnesses. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

## PREVIOUS INVOLVEMENT WITH PRRP'S AIR DISCHARGE APPLICATION

8 I was engaged in February 2021 by CRC to act as an air quality technical peer reviewer of the recent Selwyn District Council (SDC) application for an air discharge consent for the composting and waste transfer operation at the PRRP.

9 I was initially engaged by CRC to review a Section 127 application to amend Condition 1 in the historic air discharge consent (CRC190492) for the PRRP composting operation. The amendment to Condition 1 effectively sought to remove any numerical limit on the volume of compost that the PRRP facility can process on-site.

10 I reviewed the air quality technical assessment prepared by the Specialist Environmental Services (SES)[1] in support of the Section 127 application.

11 The SES assessment considered that the recommended buffer/separation distance of 500m for sensitive activities from the green waste composting operations, as set out in the Emission Impossible 2012 guidance document for Auckland Council,[2] was appropriate for the PRRP composting operation.

12 Note that the SES assessment took into consideration the existing environment including the Holmes Block subdivision as it is currently permitted under the zoning in the operative District Plan (Living 3).

13 Furthermore, the SES assessment considered that a numerical limit on the amount/volume of composting was not needed as long as the "*composting of greenwaste and kerbside organic material occurs within the area designated and in the manner prescribed by the ODMP*".

14 As a part of this work for CRC I undertook a site visit of the current PRRP operation. During this site visit I reviewed the current facility, its composting operation and waste transfer station. I had extensive discussions with the applicant and site operators about the current operations and potential future expansion of the plant over time.

15 During my site visit we identified all of the odour and dust emission points across the composting operation and discussed industry standard mitigation and management practices to minimise/control these air discharges.

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[1] Specialist Environmental Services letter report titled *Assessment of Effects of Odour and Dust from Windrow Composting at Pines RRP, Rolleston – Update to Consider any Requirement for Volume Restrictions*. 26 June 2020.

[2] Emission Impossible Ltd. *Separation Distances: A discussion Document.* Prepared for Auckland Council, July 2012.

16 As a part of my communications with the applicant (SDC), I provided advice on best practicable options (BPO) for a composting operation such as that which exists/is proposed to occur in the future.

17 Much of this advice was accepted by the applicant and incorporated into the current version of the site's Odour and Dust Management Plan (ODMP) and subsequent consent conditions.

18 Subsequent to my site visit SDC replaced the Section 127 application for consent condition amendment, with an application for a replacement air discharge consent.

19 It was my advice to CRC that the new consent should have a set of conditions which is consistent with other similar composting operations in the Canterbury region and which would provide clearer bounds to the activity which is consented and ensure that the activities on-site remain within that which had been assessed.

20 I had extensive involvement in the development and refining of the proposed consent conditions and the ODMP which forms part of the consent (CRC211594 Condition 20 requires the composting operation to be undertaken in accordance with the ODMP Revision C dated 12 April 2021).

21 One of the critical restrictions to the scale of the PRRP composting activity is the restriction of the area within which active composting and maturation can occur.

22 Based on the area marked in the site layout diagram which forms part of the consent (Plan CRC211594), I calculated that the conservative maximum volume of compost that could be processed on the site using the static windrow system consented was ~53,000 tonnes per year. This was calculated based on the following:

22.1 the area available was marked on the Figures in the application documents and ODMP;

22.2 windrows 3m high with a base of 6m and a spacing of 3m between windrows;

22.3 a bulk density of the compost raw materials of 0.6 t/$m^3$; and

22.4 an active composting period of 12 weeks (i.e. 4 cycles per year per windrow).

23 However, this calculation is conservative for the following reasons:

23.1 the area includes the area where stormwater soak pits and the receivals pad soak basin are located;

23.2 there is no allowance for internal roads; and

23.3 the maturation area is smaller so is likely to be the limiting factor in scale.

24 For this reason, the limiting factor on the volume of material which can be processed on-site is likely to be the areas marked in the Figure not the tonnes per annum consent condition limit (53,000 t/year).

25 Nonetheless, my conclusions below are not predicated on the fact that the site's processing capacity is likely to be less than 53,000 t/year.

**EXISTING ENVIRONMENT**

26 There are three existing odour discharge sources in the vicinity of the Proposed Plan Changes which I consider in this evidence:

a) the Tegel breeder farm (annotated with red markers in Figure 1, located at 243 Dunns Crossing Road);

b) the PWTP; and

c) the PRRP.

27 The location of the Proposed Plan Changes relative to the above odour discharging points is displayed in Figure 1 below. Also annotated in Figure 1 are the nearest existing residential receptors (R1 – R7 annotated with yellow markers).

**Figure 1. Location of odour discharge points, plan change areas and nearest exiting receptors**


28 There are currently two existing dwellings within 600m of the consented PRRP active composting operation. There is a rural dwelling located at 155 Burnham School Road (annotated as R1 in Figure 1) on land zoned Outer Plains. This dwelling is between the composting operation and the PC73 Holmes Block subdivision and is approximately 400 m from the active composting zone. There is also a dwelling at 362 Brookside Road (annotated as R2 in Figure 1) which is approximately 570 m from the active composting area.

29 Under the current Holmes Block ODP there could be up to four dwellings within 600 m of the PRRP active composting area.

30 The Applicant has confirmed to me that the Tegel breeder farm sheds will be decommissioned prior to any development of land. Therefore, I do not see any potential reverse sensitivity effects associated with this odour source and the proposed developments and have no further comments on this odour source.

31 The PWTP infrastructure is located approximately 1,050 m from the closest point of PC82.

32 As part of the PWTP operations there is irrigation of treated wastewater to land. This occurs on the land surrounding the PWTP infrastructure and in paddocks north of the site on the other side of

Burnham School Road. The closest point of this irrigation area to PC82 is approximately 580 m.

33 I understand the most contentious aspect of potential reverse sensitivity odour effects is potential odour emissions from the PRRP composting operation. For this reason, my evidence focuses on this source.

34 There is a 600 m odour setback from the PRRP active composting area proposed within the PC82 development. The closest point of PC82 is approximately 585 m from the active composting area. There is a very small area on the western corner of PC82 which is within the 600 m separation distance. It is proposed that no dwellings will be built in PC82 within 600 m of the PRRP active composting area.

35 The land on which PC81 and PC82 are located is currently zoned as Rural – Outer Plains in the SDP and General Rural Zone in the PDP.

36 The wind direction and speed conditions in the local environment will have an influence on the potential for adverse odour effects at PC82/PC81. In Figures 2, 3 and 4 I have provided windroses of data collected from Burnham, Lincoln and the Christchurch Airport.

**Figure 2. Burnham windrose June 2017 – May 2018**

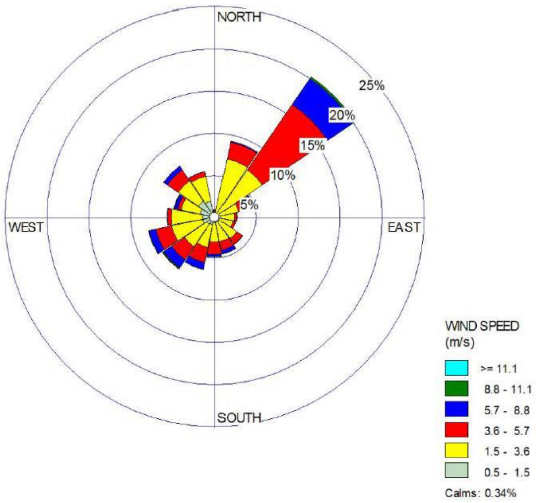



**Figure 3. Lincoln windrose 2010 –2018**

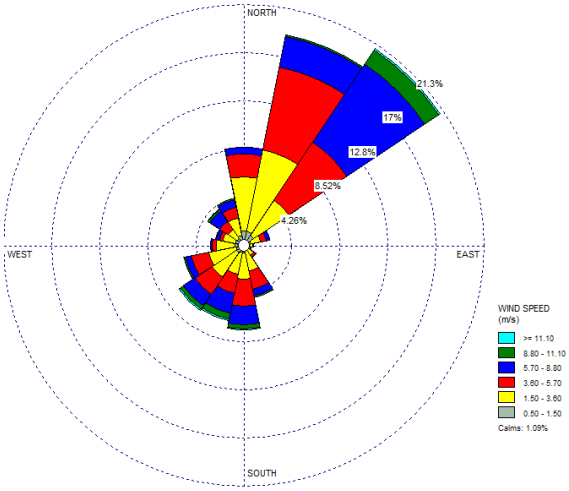
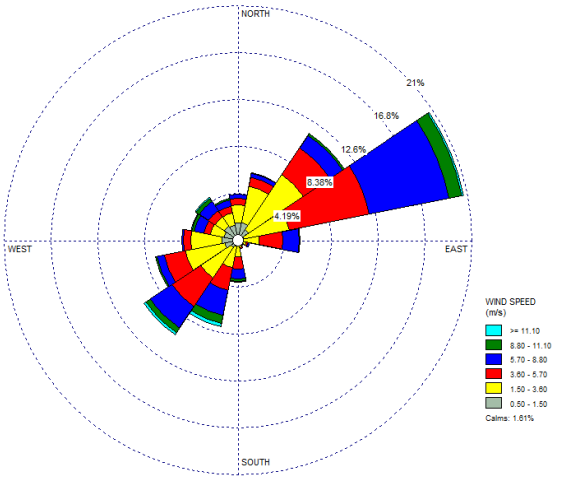



**Figure 4. CHCH aero windrose 2010 –2018**



37 Whilst there is some variance between the windroses, it is clear that the predominant wind directions are from the northeast followed by winds from the southwest (which would blow any odour from PRRP away from PC82/PC81). There is a relatively low percentage of the time that winds blow from the northwest which would blow any odour towards PC82/PC81.

38 The frequency of winds from the northwest are recorded at each weather station as:

a) Burnham ~18% of the time

b) Lincoln ~7% of the time

c) Christchurch Airport ~10% of the time

39 Mr Boyd supports the use of the Burnham dataset, as this is closer. However, this dataset is limited (only one year of data). The windspeeds recorded at Burnham are, on average, much lower which may be indicative of observations closer to ground level (i.e. a shorter mast). Shorter masts have a higher likelihood of being influenced by nearby buildings or vegetation.

40 Regardless of which dataset we use, there is a relatively low percentage of time under which winds blow from the northwest. Additionally, during north westerly winds the ambient temperatures in Rolleston are often elevated which promotes mixing and dispersion of the air due to thermal buoyancy and convection cells.

41 The dominant north easterly and south westerly wind directions would blow odour emissions from the PRRP composting operations and the PWTP away from PC82 and PC81.

**THE POTENTIAL FOR AN INCREASE IN POTENTIAL ADVERSE NUISANCE ODOUR EFFECTS FROM THE PINES WASTEWATER TREATMENT PLANT**

42 Golder Associates (now WSP) produced a report[3] (and subsequent responses to requests for further information[4]) assessing the consented air discharge activities in proximity to PC73. In Table 1 of this report, Ms Cathy Nieuwenhuijsen presented a range of appropriate setback distances from the various operational aspects of the PWTP. These separation distances were considered appropriate for a future WWTP capacity of up to 120,000 PE. At the PC73 hearing, there was agreement between the experts that the

[3] Golder letter report: *Review of odour effects relating to Holmes and Skellerup Blocks – Rolleston West Plan Change,* dated 11 November 2020.

[4] Golder letter: *Response to request for further information – PC00073 – Private Plan Change Request to the Operative Selwyn District Plan from Rolleston West Residential Limited in Rolleston,* dated 1 February 2021.

separation distances were appropriate for the existing consented PWTP and the proposed expanded facility.

43 The Golder report and subsequent reviews focused on the Holmes Block in the PC73 development. For completeness I note that the proposed PC81 and PC82 Plan Changes are further away from the PWTP and therefore reverse sensitivity odour effects are less likely than at the Holmes Block (which contains setback distances to accommodate the appropriate separation distances).

44 Whilst I consider that the international guidance for separation distances which Golder used are appropriate, I wish to point out that existing separation distances between WWTP infrastructure in New Zealand are often much smaller.

45 The following is a list of some of the separation distances between the WWTP treatment infrastructure and residential zoned land across NZ;

a) Christchurch WWTP – within 120m.

b) Wellington Moa Point WWTP – within 100m.

c) Wellington Seaview WWTP – within 500m.

d) Auckland Mangere WWTP – within 500m

e) Auckland Rosedale WWTP – within 400m.

f) Hamilton Fitzroy WWTP – within 100m.

g) Hamilton Pukete WWTP – within 250m.

46 Many of the above WWTP's are much larger than the PWTP (even at the proposed peak 120,000 PE capacity assessed) but have separation distances consistent with (or well below) the recommended separation distances recommended for PWTP.

47 The setback distances between the proposed PC82 dwellings and the PWTP infrastructure exceed 1,000 m and I consider this adequate for the management of reverse sensitivity effects from the PWTP.

48 I note that Mr Bender also agrees with my conclusions that the separation distances between PC82/PC81 and the PWTP operations are sufficient to avoid odour reverse sensitivity effects.

**SEPARATION DISTANCES**

49 Published recommended separation distances are often used as a planning tool to dictate appropriate separation/buffer zones between

odour producing activities/industries and more sensitive zoned land i.e. buffer distances between industrial zoned land and residential zoned land.

50 For example, the South Australia guideline for separation distances[5] states:

*"The recommended separation distances are to be applied in the assessment of development proposals to ensure that incompatible land uses are located in a way that minimises impacts caused by noise, odour, polluting air emissions and/or water polluting activities. While the guidelines will be used to assist in the siting of new developments, they may also be used to ensure that industrial activities in appropriate zones are protected from encroachment by residential and other sensitive land uses that would adversely affect industry viability.*

*Planning authorities are encouraged to use the guidelines when preparing Development Plan Amendments and Better Development Plan modules as one method of addressing potential conflicts between incompatible land uses."*

51 Most of the published guidelines state that the recommended separation distance are a guideline only, and that a site specific assessment can be used to calculate/determine a more appropriate separation/buffer distance on a case by case basis.

52 For example, the South Australia guideline states:

*"The distances quoted in the guidelines are recommended separation distances between various industrial uses and sensitive land uses. The guidelines include a mechanism for a developer to demonstrate that a separation distance, other than the recommended distances, is appropriate. Consequently, the distances quoted in the document should not be adopted as absolute criteria, but rather as indicative distances that may be adjusted having regard to specific site circumstances."*

53 Mr Chris Bender (SDC's air quality expert peer reviewer) has provided a summary of published separation distances from composting operations similar to that at PRRP in Table 2 (reproduced below) of his Plan Change 82 – Odour assessment Review dated 17 August 2022.

[5] South Australia Environment Protection Agency: *Guidelines for Separation Distances*. December 2007

**Table 2: Summary of Separation Distance Guidelines from Australian Jurisdictions for Odour from Composting Processes**

| Authority | Source | Criteria | Separation Distance |
|---|---|---|---|
| South Australia EPA | Unspecified composting works | <20 tonnes per year | 100 m |
| | | >20 and <200 tonnes per year | 300 m |
| | | >200 tonnes per year | 1,000 m |
| Victoria EPA | Waste acceptance type:<br>– Green waste<br>– Vegetable organics<br>– Grease inceptor trap waste<br>Treatment technology:<br>– Open air receival<br>– Enclosed aerobic composting with secondary odour capture and treatment equipment<br>– Open air maturation | 1,200 tonnes per annum | >300 m |
| | | 14,000 tonnes per annum | >500 m |
| | | 36,000 tonnes per annum | >800 m |
| | | 55,000 tonnes per annum | >1,000 m |
| | | 75,000 tonnes per annum | >1,200 m |
| | | 90,000 tonnes per annum | >1,400 m |
| | Waste acceptance type:<br>– Green wastes<br>Treatment technology:<br>– Open air receival<br>– Open turned windrow<br>– Open air maturation | 1,200 tonnes per annum | >600 m |
| | | 14,000 tonnes per annum | >1,100 m |
| | | 36,000 tonnes per annum | >2,000 m |
| | | 50,000 tonnes per annum | >2,000 m |
| Australian Capital Territory | Unspecified composting works | >20 and <200 tonnes per year | 300 m |
| | | >200 tonnes per year | 1,000 m |
| Nova Scotia Environment; Newfoundland-Labrador DMAE | Open windrow composting facilities | <1,000 tonnes per year food waste, and <10,000 tonnes per year total feedstock | >500 m from any structure |
| | | >1,000 tonnes per year food waste, or >10,000 tonnes per year total feedstock | >1,000 m from any structure |
| DEFRA | Open windrow composting facilities | >20,000 tonnes per year production rate | >700 m |

54 In addition to these international published separation distances, I note that there are two New Zealand based separation distance guidelines:

(a) Emission Impossible report for Auckland Council: Air Quality Separation Distances for Industry (2012) – **500 m** for composting greenwaste.

(b) Southland Regional Air Plan (2016) Appendix F – **300 m** for composting of refuse containing neither manure or faecal matter.

55 I also note that there is another international guidance not referenced in Mr Bender's Table.

(a) Netherlands Ministry of Infrastructure and Water: "Netherlands Emission Guidelines for Air" (2007) – **200 m** for composting >20,000 tonnes per year.

56 Mr Bender summarises that the majority of the applicable published separation distances in his Table 2 referred to a minimum separation distance of 1,000 m. However, he also noted that, as I have outlined above, these separation distances are guidelines only and that lower separation distances may be adequate depending on a number of factors.

57 There is a high degree of variation in the applicable published separation distances for the PRRP. For this reason (and others that I outline below) I consider that it is applicable to undertake a site specific assessment of what an appropriate separation/buffer for the PRRP should be.

**THE POTENTIAL FOR AN INCREASE IN POTENTIAL ADVERSE NUISANCE ODOUR EFFECTS FROM THE PINES RESOURCE RECOVERY PLAN COMPOSTING OPERATION**

58 I will now discuss the potential for reverse sensitivity odour effects on PC82/PC81 as a result of odour discharges from the PRRP composting operation.

59 This primarily concerns PC82 as this is the closest proposed development to the PRRP composting operation. Due to the progressive dispersion of the odour plume, the potential for effects on PC81 are lower than at PC82.

60 As I have discussed earlier, of the three odour discharging activities/sites identified, I consider that the PRRP composting facility has the highest potential for reverse sensitivity odour effects on the Proposed Plan Changes. This is in part due to the proximity of this source to the Proposed Plan Changes.

61 As outlined earlier, published recommended screening level separation distances for an open static windrow composting operation with regular turning such as that at the PRRP facility range from 200 m to 2,000 m. These separation distances are designed to be a starting point. Where an industrial air discharge is separated greater than the distances stipulated in the guidance document then no adverse air quality effects are predicted to occur. Where there are receptors within the published separation distances then a more detailed assessment of potential effects is required.

62 Static windrow composting is a higher risk composting methodology as compared with other composting methods such as aerated pile, in vessel, and fully/partially enclosed operations. However, the lower risk compost feedstocks consented at the PRRP, lack of the

requirement for leachate collection and treatment (due to the porous ground), and the industry standard management/mitigation methods stipulated in the consent, present the PRRP composting operation as a low risk odour discharge composting operation, despite the higher risk composting methodology.

63 I have visited and assessed a wide range of composting operations across New Zealand. In my experience one of the most significant odour discharge points from a composting operation is leachate storage and management. The nutrient rich leachate which is collected, treated and either re-used or irrigated to land tends to be a substantive odour discharge point in composting operations. The leachate must be maintained in an aerobic state to prevent foul odours (usually a rotten egg like odour) associated with anaerobic decomposition of the organic content in the water from occurring.

64 Once the leachate turns anaerobic it can take some time to restore aerobic conditions and traditional methods for promoting aerobic conditions involve aerating the leachate, which in turn disturbs the leachate and releases odour.

65 A major factor as to why the PRRP composting operation has a lower potential for odour generation/upset conditions is the fact that due to the porous ground, there is no requirement for leachate to be collected and treated. This removes one of the most significant potential odour sources from a composting operation such as that at the PRRP site.

66 The routine PRRP composting operation has the following odour emission points:

a) Feedstock receival and storage;

b) Shredding/mixing of feedstocks;

c) Formation of a fresh windrow;

d) Turning of windrows in the active composting area;

e) Management of any leachate present prior to discharge via soak pits; and

f) Minor odour emissions from activities within the maturation area.

67 Of the above sources the activities which have the highest potential for odour discharge are the feedstock receival/storage and shredding/mixing operations, followed by windrow turning in the active composting area.

68 The feedstock receival/storage and shredding/mixing operations are intentionally situated furthest from the nearest neighbouring receptors (on the south western boundary approximately 150 m further away from sensitive receptors than the nearest active composting area).

69 Within the PRRP ODMP there are specific mitigation/management measures for the feedstock receival/storage and shredding/mixing operations, particularly for higher risk feedstocks (kerbside collection waste and commercial food waste). These include minimum holding times before being incorporated into a windrow, requirements for enclosure of commercial food waste, acceptance criteria for commercial food waste, and contingency measures for instances when excessively odorous feedstock is received.

70 Also within the ODMP there are mitigation and management measures for the formation and turning of windrows in the active composting area, these include formation of fresh windrows in the southwestern corner of the site (once again furthest from the nearest neighbouring receptors) and restrictions on wind directions under which windrows can be turned.

71 For upset conditions to occur at the PRRP composting operation the compost itself would need to turn anaerobic. Then when it is turned/disturbed large volumes of intense offensive odour can be released. The character of the odour which is released from anaerobic decomposition is much more offensive than odour from normal aerobic conditions (most often described as an earthy musty odour). Odour discharged from anaerobic compost are often described like rotten eggs, putrid, foul and rotten.

72 I consider the current consent conditions and associated stipulated management practices for the PRRP operation will limit the potential for these upset conditions to occur. Specific management practices/limits which are stipulated in the air discharge consent and associated consent conditions and management plan include:

a) A limit on acceptable feedstocks – excluding most high risk odour discharging feedstocks;

b) Stipulated moisture content, temperature ranges, carbon:nitrogen ratios, windrow turning frequency and minimum raw material holding times in accordance with industry standards;

c) Prescribed regular windrow monitoring procedures (particularly for temperature and moisture);

d) The ODMP stipulates that windrows are not to be turned during south westerly, westerly or north westerly winds and to avoid calm or low windspeeds; and

e) Contingency measures should standard operating practices fail to control odour discharges.

73 There are a large portion of wind directions which blow away from the nearest receptors and the Proposed Plan Change areas (including the predominant north easterly winds in Canterbury). Therefore, the likelihood that these upset conditions occur at the same time as the wind is blowing towards the PC82 block (between 7% and 18% of the time depending on what dataset you use) is low. Furthermore, as high windspeeds tend to produce turbulent mixing of the odour plume, generally extended odour plumes only occur in lower wind speed conditions (which occur even less frequently).

74 In my experience with other composting activities, excessive odour emissions only occur when anaerobic compost is disturbed. Primarily this occurs when a windrow which has turned anaerobic is turned. SDC is required under its current consent conditions to only turn a windrow when the winds are blowing away from the nearest sensitive receptors. Therefore, odour discharges associated with upset conditions should not be directed towards PC82.

75 Therefore, the likelihood that there are upset conditions (i.e. the windrow turns anaerobic), that SDC turn the windrow during wind conditions which are prohibited in the ODMP (and would be a breach of consent), and that the odour volume/intensity is sufficient enough that the plume will extend beyond 600m from the source is considered to be very low/should not occur as it would be a breach of the consent conditions.

**DETAILED ASSESSMENT OF POTENTIAL EXTENT OF ODOUR DISCHARGES FROM THE PRRP**

76 I have used the following assessment tools to undertake a site specific assessment of the potential radius of odour effects from the PRRP composting activities:

a) An assessment of local terrain and meteorological conditions;

b) Industry experience of similar composting operations in New Zealand;

c) A comparison of the operations against best industry practise for a composting operation of this size and nature;

d) A community odour survey; and

e) An odour scout survey.

77 I have used the above lines of evidence to support my expert opinions on whether or not the proposed odour setback/separation distance of 600 m is appropriate for the PC82/PC81 developments.

**Community Odour Survey**

78 With regards to the extent of the existing odour plume/effects I note that during my site visit I was not able to observe odour from the composting operation more than ~50 m downwind of the active composting operations.

79 However, to get a better understanding of the extent of the existing odour plume/effects, I have interviewed the seven closest residents to the current PRRP composting operations. I asked each interviewee standardised questions relating to the FIDOL[6] factors which are outlined in the Minister for the Environment Good Practice Guide for Assessing and Managing Odour (2016) (MfE GPG Odour).

80 The location of each of these receptors (referred to as R1 – R7) is marked with yellow markers in Figure 1.

***R1 – 155 Burnham School Road – dwelling approximately 400 m from active composting area***

81 The resident at this address had lived and operated his business at this address for 18 years. The property extends along the entire north-eastern boundary of the PRRP and all the way through to Brookside Road.

82 Frequency: He stated that the frequency which he observes odour from the composting operation is dependent on weather conditions (i.e. wind direction, wind speed, cloud cover, etc). He also said that the odour varied depending on whether or not they (SDC) were "composting". He could not tell me how often he would observe the odour in any given month as he said it is highly variable.

83 Intensity: He would generally describe the odour as a 3 (distinct) on the six point odour intensity scale described in the MfE GPG Odour, reproduced below.

[6] Frequency, intensity, duration, offensiveness and location (FIDOL).

| Scale of Intensity | |
|---|---|
| 6 | Extremely Strong |
| 5 | Very strong |
| 4 | Strong |
| 3 | Distinct |
| 2 | Weak |
| 1 | Very weak |
| 0 | No odour |

84 Duration: He stated that the odour would only be present for one day at most, though it could be a much shorter duration at other times.

85 Offensiveness: He did not consider that the odour was offensive, he considered that the odour was similar to or consistent with odours in a rural environment such as that which he lived and worked in.

86 Location: This dwelling/property is on rural zoned land.

***R2 – 362 Brookside Road – dwelling approximately 570 m from active composting area***

87 This house has been sold recently and was vacant on the date of the survey.

***R3 – 348 Brookside Road – dwelling approximately 670 m from active composting area***

88 One resident at this address has lived and operated his business (storage business) at this address for ~4 years. The property extends between Brookside Road and Burnham School Road. This resident stated that he had never smelt odour from the composting plant.

89 On a later date (to that of the original survey) I visited this address and interviewed another resident at this address. He stated that he has never observed odour at the residence, but had observed odour in the paddock northwest of the house (approximately 610 m from the PRRP active composting area). Below were his responses to the FIDOL questions.

90 Frequency: He stated that he might notice the odour approximately once a month. When asked what weather/wind conditions he observed odour, he stated that it was generally when there was a stead breeze, not during "super windy" conditions.

91 Intensity: He stated that he would describe the odour as between a 2 (weak) and a 3 (distinct) on the six point odour intensity scale

92 Duration: The duration is difficult to answer as he doesn't usually spend much time in the paddock and the observations are infrequent.

93 Offensiveness: He stated that the odour was not offensive to him. When asked about the character of the odour he said it was difficult to describe, but that he considered it was likely to be more of a compost like smell.

94 Location: This area of the property is adjacent to the on-site storage business, which is located on rural zoned land. I note that at this location on their property the PRRP operations are no longer screened by the forest block, whereas the residence is. This provides support to my assertions that the forest block provides increased mixing and dispersion of the plume and reduces the distance that the plume travels downwind of the forest block.

95 Furthermore, neither of these interviewees had observed odour at the residence which is between the odour source and PC82. Therefore, based on these interviewee's observations, existing odour is unlikely to be travelling into PC82 in this wind direction.

***R4 – ~100 Burnham School Road – dwelling approximately 760 m from active composting area***

96 There is a house being built at this address. I interviewed two builders who have been building at his address on and off since December 2021.

97 Frequency: They stated that they tend to only smell odour from the composting plant when there are light south westerly winds. They estimated that they would smell the composting once or twice a month.

98 Intensity: They stated that they would describe the odour as mostly a 2 (weak) but on occasion it could be described as a 3 (distinct) on the six point odour intensity scale

99 Duration: The odour was described as only occurring during specific weather conditions which generally did not last long.

100 Offensiveness: They described the odour as an earthy/musty like odour and was generally not offensive in a rural area. However, on one occasion one of the interviewees observed odour that he would "not like to be sitting on a deck outside" at the time he experienced odour on that occasion. However, he noted that the weather conditions at which the odour occurs are generally cold so you wouldn't be sitting on your deck during these conditions anyway.

101 Location: This dwelling/property is on rural zoned land.

***R5 – 324 Brookside Road – dwelling approximately 830 m from active composting area.***

102 I interviewed a resident at this address who stated that they have been living at this address for ~five years.

103 Frequency: The resident stated that they smell odour almost every Friday afternoon when they get home from work "as Friday is rubbish day", on Saturdays and on some Sundays. The resident considers that odour can be present irrespective of weather conditions, to some extent.

104 Intensity: The resident stated that they would describe the odour as mostly a 5 (very strong) on the intensity scale and when the odour is present they want to stay indoors. At times it is so strong that the resident is dry retching.

105 Duration: The resident stated that the odour can be there all day.

106 Offensiveness: The resident described the odour as a "rotten rubbish, dead animal, putrid" like odour. The resident considers that the odour is very offensive and described concerns that proposed additional dwellings across the road would result in more rubbish at PRRP and stronger smells.

107 Location: This dwelling/property is on rural zoned land.

***R6 – 304 Brookside Road – dwelling approximately 1,100 m from active composting area***

108 I interviewed a resident at this address who said that he had been living at this address for 12 years. He said that he had not smelt odour from the composting operation or waste transfer station. He did say that he had smelt an odour late last week which he described as "like pig shit", but that this was very unusual as he couldn't think of where an odour of this character would come from.

***R7 – 286 Brookside Road – dwelling approximately 970 m from active composting area (and approximately 1,750 m from the PWTP)***

109 I interviewed two residents at this address who stated that they could smell odour consistent with that which they observed from the 'screening bin' at the Pines Wastewater Treatment Plant during an open day which they attended.

110 Frequency: One resident stated that they could smell the odour approximately once every two months. The other stated that for them it would be more like once a month at most. They stated that it was more likely that they would smell the odour during warmer weather. They stated that they tend to smell odour when there are light west - south westerly winds.

111 Intensity: They both stated that the odour could be described as a 3 (distinct) on the six point odour intensity scale, but at times could be weak.

112 Duration: One resident stated that the odour would only be present for approximately one hour, the other stated that it would be less than a few hours.

113 Offensiveness: They stated that the odour didn't bother them and that they didn't consider it to be overly offensive.

114 Location: This dwelling/property is on Living 2 zoned land.

***Summary of community odour survey findings***

115 In summary, the community survey demonstrated variable observations/opinions at neighbouring receptors.

116 The two receptors on Burnham School Road described odours consistent with the composting operation when winds are from the southwest. Whilst the observations of three individuals (one at R1 and two at R4) in this downwind direction do not represent a large sample group, and as such definitive conclusions cannot be made, the information provided indicates that distinct odours consistent with composting can be observed infrequently up to 760 m from the current composting operation in this direction.

117 The four receptors which were interviewed on Brookside Road (which are downwind during west northwest – westerly winds) had mixed responses. The observations at R5 were inconsistent with those of the neighbours either side of this receptor location.

118 Given that there can be three distinct odour sources upwind of these receptors (the composting operation, the waste transfer station, and the WWTP) it can be difficult to differentiate which source is the major contributor to observable odours at these locations. However, when asked, of the two receptors who smelt odours, only one of these interviewees stated that they have smelt an odour which could be categorised as being from the composting operation. I note that the other interviewee at this location (R3) had not smelt any odour at the property, this is indicative of the variation in olfactory response/perception in the population.

119 Therefore, I consider that any odours observed at residences along Brookside Road are unlikely to be associated with the composting operation. One interviewee said that he could infrequently smell odour which he perceived as being from the composting operation not at the dwelling, but out in the paddock closer to the PRRP operations.

120 Of the nine individuals interviewed, two did not smell any odours, four smelt odours which they attributed to the composting operation, two (at R7) smelt odour that they attributed to the PWTP, and the other (at R5) smelt odour which they appear to have attributed to the waste transfer station.

121 Only one interviewee considered the odour to be offensive, however this was inconsistent with the opinions/observations of two immediate neighbours.

122 Based on the limited number of survey participants, it appears that odours associated with the composting plant are primarily observed under south westerly wind conditions. Only one individual downwind during north west – westerly winds reported odours consistent with that from the composting plant, however this was out in the paddock (outside the influence of the forest block) and not at the residence.

123 I note that nearest point of PC82 which is downwind of the active composting operation when the odour plume would not travel through any part of the forest block is approximately 730 m away.

**Industry Experience**

124 I was the technical air quality reviewer on behalf of CRC for the initial air discharge consent application for Intelligro's composting operation in Rolleston in 2015 (which went to a hearing). I was also the technical reviewer for two subsequent consent condition changes.

125 Intelligro, undertakes a composting operation within a similar footprint to that currently undertaken at PRRP. The feedstock for its composting process includes bark and sawdust, chicken manure, spent mushroom substrate compost, paunch, and pig litter. The composting method is static windrow composting with regular turning (very similar to that at PRRP). This composting operation uses feedstocks which have a higher risk of generating adverse odour emissions (as described in the Composting New Zealand Consent Guide and the DEFRA Technical Guidance of Composting Operations).

126 The Intelligro site has 12 residential receptors/dwellings within 250 m of the composting operation, a number of these are within 150 m. These receptors essentially surround the site so there are limited wind directions during which turning can occur to avoid receptors being downwind during this higher risk activity.

127 Intelligro collect any leachate/stormwater which is generated on the compost processing pad in a sump and pump this to an aerated holding tank prior to irrigation to land directly adjacent to the site. As discussed above the collection, treatment and disposal of

leachate is considered to be a significant potential odour source from composting operations.

128 Based on the information I reviewed at the time of consenting there had been less than 10 odour complaints relating to Intelligro's composting operation and none of these had been verified by CRC. Several field odour survey[7] programs undertaken by two separate air quality consultancies have determined that odour from the composting operation does not extend beyond 200 m from the Intelligro operation.

129 Pattle Delamore Partners (PDP) has recently undertaken assessments of air quality effects from the Redruth Landfill and Hampton Downs landfill composting operations.

130 The Redruth landfill in Timaru has a composting operation which uses six positive vented Goretex pads. This composting operation has been in place for more than 13 years.

131 The Hampton Downs facility has an Engineered Compost System (ECS), which is a combination of positive and negative aeration with biofilter treatment. The composting methodology has also historically included positive vented Goretex composting pads. The Hampton Downs facility has a processing capacity of ~50,000 tonnes per annum and composts food waste and green waste (similar feedstocks to PRRP).

132 An aerated compost pile composting operation is a better controlled and lower odour emission composting methodology than a turned windrow system i.e. it is a lower odour discharge risk composting methodology.

133 Field odour surveys undertaken by PDP around both these facilities have not detected odour beyond 200 m from the composting operations (including all aspects of the operations, i.e. feedstock receival, mixing, material transfer, etc).

134 PDP has also recently undertaken an assessment of air quality effects from the Daltons Matamata and McLeans Island composting operations. These sites use a turned windrow composting methodology similar to that at PRRP. The feedstocks used at these facilities include bark, peat, chicken litter, and spent mushroom compost.

135 PDP undertook field odour surveys at both these facilities and no odour was detected beyond 100 m from the on-site activities. The

[7] Field odour surveys discussed in this evidence are as described in Appendix 3 of the Ministry for the Environment Good Practice Guide for Assessing and Managing Odour (2016)

closest sensitive receptor to the Daltons' Matamata composting operation is within 200 m of the site operations.

136 There is no record of complaints from the Matamata operation and full compliance has been demonstrated in recent consent compliance audits. In the most recent compliance report, the compliance officer noted "the volume of odour was very low and only just detectable".

137 NZ Air Limited has recently undertaken an assessment of the Judds turned windrow composting operation in Gisborne[8]. Judds currently compost approximately 25,000 tonnes of raw materials per year. Feedstocks include green waste, bark/woodchip, and paunch (a high risk feedstock). Currently there is no leachate collection and treatment system at Judds.

138 An extensive field odour survey was undertaken across nine separate days involving 74 ten minute observations. These observations were conducted across a wide range of higher risk odour discharging activities and meteorological conditions. The maximum extent of the observed odour plume from higher risk on-site odour discharging activities (i.e. shredding/blending raw materials, turning windrows, etc) was approximately 400 m from the source. At this extent the odour was generally 'very weak – weak', intermittent and of an earthy/musty character. More consistent and intense odour was only observed within 100 m of the sources.

139 The above case studies demonstrate that the odour effects radius from similar composting operations in New Zealand is generally contained within 400 m from the source. The above operations have similar source specific controls and mitigation measures in place to limit odour emissions and adverse off-site odour effects to that consented at PRRP. For these reasons, I consider that a similar radius of effects is applicable to the PRRP operation.

**Odour Scout Survey**

140 To assess the extent of the odour plume NZ Air has commissioned an odour scout survey. At the time of writing this evidence, there is data for surveys undertaken on 22nd – 25th August.

141 The methodology for making odour observations is based on the German reference method VDI 3940: 2006. The odour scout field observation methodology is also based on that described in Section 4 and Appendix 3 of the Ministry for the Environment Good Practice Guide for Assessing and Managing Odour (2016). At each odour observation location, the odour scout records the odour intensity (on a 0 – 6 scale) and character (from a list of 40 different odour

[8] NZ Air Report: *Air Discharge Assessment – Judds Compost and Contracting Yard, 164 MacDonald Road*. Dated 1 March 2022

descriptors) every 10 seconds for a period of 10 minutes. In addition to these observations, the following parameters are also recorded at each site:

a) A unique sample site ID along with the GPS co-ordinates of the assessment location.

b) The date and the time of the observation.

c) The wind direction, as observed at ground level (in cardinal directions).

d) The windspeed (using the Beaufort Scale).

e) The cloud cover (in octas).

f) The ambient temperature (as recorded by the MetService).

g) The overall hedonic tone (on a scale of -4 to +4).

142 At the start of each survey an upwind odour observation is made, upwind of the PRRP composting operation. This is followed by a series of downwind observations, starting at the furthest extend of the perceivable odour plume. Observations are then made in a zig zag pattern moving towards the source. In this way the odour scout can determine the extent and intensity of the odour plume being emitted from the PRRP composting operations. This zig zag plume mapping methodology is based on the 'dynamic downwind surveillance' methodology described in the Draft Odour Surveillance Guidance produced by EPA Victoria[9].

143 The field sheets used to record the observations at each monitoring location are included as Appendix A. The list of odour character descriptors, intensity scale descriptors, and hedonic tone scale descriptors are also included in Appendix A.

144 Where applicable, the odour scout also records further information to provide context to the observation. For example, "a loader was observed moving compost at the time of the survey" or "the wind direction changed part way through this observation". This information has been incorporated into the observation summaries below.

***22 August***

145 On this date, William P, Steve Pearce (of PDP) and myself attempted to undertake an odour survey at ~9am in the morning. However, it was foggy and there was almost no wind. Initially the air was drifting from the west and a weak intermittent compost like odour

[9] EPA Victoria "Odour Surveillance Method Draft" December 2019

was detected on the eastern boundary of the site. But then the wind drift shifted to an east – south easterly direction and the odour was lost. Given the conditions and lack of observable odour, this morning observation round was abandoned.

146 William P undertook a further observation round in the early evening. At this time there was an east – south easterly wind with variable speeds from a light drift to a gentle breeze. The recorded temperature was 9.7 deg C and is was overcast.

147 There was no odour observed upwind of the site.

148 North northwest of the site, on Burnham school road, approximately 350 m from the active composting windrows, weak intermittent 'musty earthy' odour was detected for 13% of the 10 minute observation. This was the edge of the plume.

149 The next observation was made on the directly downwind Burnham School Road site boundary, ~350m northwest of the composting operation. At this location distinct 'compost' odour was observed 5% of the time, weak odour was observed 67% of the time weak 'compost odour was observed, and 28% of the time no odour was observed. The hedonic tone was recorded as a -2 'unpleasant'.

***23 August***

150 On this date, William P undertook 10 observations between 8 – 11am. It was an overcast day with a moderate north easterly breeze and 8.2 deg C.

151 There was no odour recorded upwind of PRRP.

152 The extent of the compost like odour was out to 330 m downwind (southwest) of the composting operation. At this furthest extent of the plume the odour was brief and intermittent, recorded as distinct 3% of the time and weak 10% of the time. At this location the hedonic tone was recorded as -1 'mildly unpleasant'.

153 Slightly more consistent weak compost like odour was detected 230 m from the site, 33% of the time. Distinct odour was detected 5% of the time. Overall at this distance the hedonic tone was still rated at -1 'mildly unpleasant'.

154 The plume was mapped to be approximately 150 m wide (the length of the composting operation including the raw materials receival and blending area).

***24 August***

155 On this date, William P undertook observations at 13 locations between 8:40am and 12:20pm. For the locations on the PWTP site/land (11 observation locations), William P was accompanied by

Myles M (PWTP staff member). Myles M undertook observations side by side with William P to provide for a higher level data integrity as there is natural variation in the human perception of odour. Therefore, the more individuals who make objective observations the more robust the dataset is.

156 At the start of the survey it was sunny and there was a moderate northerly breeze and the temperature was 10 deg C.

157 Intermittent weak compost like odour was observed approximately 320 m downwind of the composting operation. William P observed weak odour 22.5% of the time and Myles M only observed weak odour for 2.5% of the time.

158 At observation locations 2 (200 m downwind) and 3 (130 m downwind), the wind was swirling and intermittent weak odour was observed by both scouts.

159 At observation location 4 (240 m downwind) there was a swirling light north easterly breeze, William P observed intermittent weak compost odour with a hedonic tone of -1 'mildly unpleasant'. At the same location Myles M observed weak compost odour for 10% of the time and considered the hedonic tone to be 0 'neutral'.

160 At approximately 60 m downwind from the composting operation, William P observed a distinct compost/sickening odour for 8% of the time. Then for 38% of the time he observed weak compost/musty earthy mouldy like odours. At this distance from the composting operation William P considered the hedonic tone to be -2 'unpleasant'. At the same location Myles observed a strong - distinct 'burning wood smell' 23% of the time. Myles M also observed a weak compost odour 18% of the time. Myles M considered the hedonic tone of the odour at this location to be -1 'mildly unpleasant'.

161 Whilst the plume moved around due to changing wind conditions on the 24th Aug, it was not observed more than 320 m downwind and was only recorded as having a negative hedonic tone within ~100 m (with one occasion at 240m).

162 An intermittent weak 'rubbish' like odour was detected by both scouts approximately 160m downwind of the waste transfer station.

163 On the 24th of August John Iseli and I also accompanied William P and Myles M at three locations. At approximately 150 m downwind of the compost mixing pad, John I briefly (5% of the time) smelt a weak 'green cut grass' like odour. At the same location I smelt a similar weak green cut grass odour 18% of the time, and weak silage like odour 3% of the time.

164 Approximately 60 m down wind of the composting operations, John I smelt a weak to distinct compost like odour for 15 % of the time, but the wind direction was variable and so the plume moved away. At the start of the observation a loader was moving compost approximately 80m from the observation location. I smelt distinct compost like odour 13% of the time and weak compost/musty earthy odour 20% of the time.

165 John and I also made an observation within 15 m of some static windrows and could not observe any odour, though the wind direction was highly variable.

***25 August***

166 On this date, William P and Myles M undertook observations at 7 locations between 8:50am and 11am. Initially there was a very light north westerly wind, then it was calm for a bit, later in the morning there were some south easterly winds. It was an overcast day and temperatures of about 8 deg C.

167 At observation location 1, the scouts were directly downwind from the wastewater irrigation field and smelt a constant strong to very strong 'sewer' odour that William P categorised as 'extremely unpleasant and Myles M categorised as 'very unpleasant' on the hedonic tone scale.

168 Odour associated with the composting operation was only observed within 100 m of the operation. Within 60m it was categorised as -1 'mildly unpleasant' by both scouts. Compost like odour intensities within 100 m ranged from very weak – strong (for brief periods).

169 On the 25th August the odour plume was approximately 100 m long and approximately 70 m wide.

***Odour Scout Survey Summary***

170 Based on this limited dataset over a few different days/wind conditions and observations made by four different individuals, the odour plume from the composting operation was not observed beyond 350 m downwind of the composting operations. The plume width was generally not more than ~150 m wide, and as low as 50 m wide when the plume length was short.

171 At the furthest extent of this plume the odour was intermittent and weak with a 'compost' or 'musty/earthy' like odour. Within ~100 – 200 m of the composting operation of the odour was more consistent and intense (mostly distinct), and the hedonic tone was generally characterised as -1 'mildly unpleasant'. The hedonic tone was generally only characterised as -2 'unpleasant' within ~60 m of the composting operation.

172 These odour scout observations/results are consistent with other odour scout surveys at other composting operations in New Zealand that I have assessed.

**POTENTIAL REVERSE SENSITIVITY ODOUR EFFECTS ON PC82 AND 81**

173 The Proposed Plan Changes are currently zoned Rural in the Selwyn District Plan, and are seeking to be rezoned Residential. This changes the sensitivity of this land, from 'low' to 'high' as defined in Table 4 of the MfE GPG Odour. Applicable excerpts from the MfE GPG Odour are reproduced below.

| Land use | Rating | Reasons for sensitivity |
|---|---|---|
| Rural | Low for rural activities; moderate or high for other activities | A low population density means there is a decreased risk of people being adversely affected.<br>People living in and visiting rural areas generally have a high tolerance for rural activities and their associated effects. Although these people can be desensitised to rural activities, they may still be sensitive to other types of activities (eg, industrial activities). |
| Residential | High | People of high sensitivity (including children and the elderly) are exposed.<br>People expect a high level of amenity in their home and immediate environs (ie, curtilage).<br>People may be present all times of the day and night, both indoors and outdoors.<br>Visitors to the area are unfamiliar with any discharges and are more likely to be adversely affected (which can cause embarrassment to residents and raise awareness of the problem). |

174 As described earlier, normal odour discharged from a composting operation can be described as a 'musty/earthy' like odour. In my opinion this type of odour is consistent with normal rural type odours. Therefore, people in rural areas tend to be less sensitive to odours associated with normal composting activities (note that I make a distinction between 'normal' composting odour and 'abnormal' composting odour later).

175 However, people in a residential zoned area will be more sensitive to this type of odour. A resident within residential zoned land would not expect that odour of this character would be regularly observable at this location, especially if it is attributed to a composting operation. Therefore, I consider that the proposed re-zoning of PC82 and PC81 will change the sensitivity of the land from 'low' to 'high' as defined in the MfE GPG Odour.

176 Section 3.2.4 of the MfE GPG Odour defines reverse sensitivity as:

*"Reverse sensitivity occurs when sensitive activities, such as residential properties, are allowed to locate where they may be adversely affected by industrial or noxious activities. This has the adverse effect of limiting the ability of the heavy industry or noxious activity to operate efficiently and with long-term certainty. Allowing sensitive activities to establish in close proximity to industry can have adverse effects on the health, safety or amenity values of people, as well as potentially adversely affecting the economic and safe operations of activities.*

*A number of regional and district plans include provisions to manage the effects of reverse sensitivity, for example by restricting the establishment of sensitive activities in certain zones. However, reverse sensitivity effects may continue to arise depending on land-use planning decisions. For individual sites that are not protected from the effects of reverse sensitivity through plan requirements, and cannot feasibly 'internalise' their effects, maintenance of an appropriate separation distance is the main option to manage reverse sensitivity effects."*

177 Based on this definition the key question is whether or not the proposed 600 m buffer/setback distance from the PRRP composting operation is appropriate/sufficiently large enough to avoid reverse sensitivity effects on SDC's critical operations.

178 As I have outlined above, based on my experience at composting operations around New Zealand, a well-run turned windrow composting operation such as that consented at PRRP can operate without generating observable odour beyond ~400 m.

179 Whilst the community survey identified some residents which could smell odour beyond 600 m on occasion (albeit infrequently and generally at low intensities), I am not aware of the activities which were occurring on-site during these instances.

180 Furthermore, the meteorological conditions which occur under south westerly breezes, under which compost like odour was observed out to 760 m from the site are different to those under which PC82 will be down wind. North westerly winds generally occur during warmer weather and there are a lower proportion of low windspeed conditions in this direction. Therefore, the community survey results along Brookside Road are most applicable for this case.

181 Based on my community survey, the residents currently residing across the road from the proposed PC82 development are not able to smell the current composting operation (potentially with the exception of R5 whose observations appear to be inconsistent with other neighbours and do not describe odours which I consider are consistent with composting operations).

182 The results of the odour scout survey indicate that the furthest extent of the odour plume is approximately 350 m from the existing PRRP composting operations.

183 The presence of the mature pine forest between the consented active composting area and the nearest point of PC82 will promote mixing and dispersion of any odour travelling in this direction. The nearest point of PC82 which would not have the benefit of this additional plume mixing is approximately 730 m from the nearest edge of the activity composting area and approximately 990 m from the nearest point of the feedstock receival and mixing area.

184 The current consent conditions/ODMP require higher risk odour producing activities (windrow turning) to not occur during westerly or north westerly winds which are the wind directions which PC82 is downwind. Therefore, PC82 will not be exposed to odours released during windrow turning activities.

185 PC82 will only be downwind from odours generated during other activities on site, i.e. feedstock receival and mixing, formation of new/fresh windrows, and odours generated during the composting/breakdown of the static windrows (and minor odour emissions from compost handling activities within the maturation area).

186 As discussed earlier, the higher risk activities (i.e. feedstock receival and mixing, formation of new/fresh windrows) are intentionally situated furthest from the nearest neighbouring receptors, which includes the nearest receptors along Brookside Road which are between the activities and PC82. These activities are approximately 150 m further away than the nearest point of the active composting area.

187 With regards to upset conditions, the likelihood that there are upset conditions (i.e. the windrow turns anaerobic), SDC turn the windrow during wind conditions which are prohibited in the ODMP, and the odour volume/intensity is sufficient enough that the plume will extend beyond 600 m from the source is considered to be very low to non-existent.

188 In conclusion, it is my professional opinion that the potential for reverse sensitivity effects within the proposed PC82 and PC81 developments is low. This is based on:

(a) The reduced potential for odour emissions from the PRRP composting operation as compared with other composting operations;

(b) The robust consent conditions and associated ODMP requirements which require industry best practice

management and mitigation measures, including restrictions on turning windrows during certain wind directions;

(c) The minimum separation distance of 600 m between the active composting area and the nearest proposed dwelling in PC82. And the minimum separation distance of approximately 750 m from the higher risk odour producing activities (feedstock receival, blending and fresh windrow formation and turning) at PRRP;

(d) The presence of a mature pine forest between the composting operation and the nearest areas of PC82, which will promote odour plume dispersion;

(e) The low proportion of winds which blow towards PC82 and PC81, which decreases the frequency and duration of potential exposure to odour discharges;

(f) The results of the community survey;

(g) The results of the odour scout survey; and

(h) Industry experience with other similar composting operations across New Zealand.

**BENEFIT OF REMOVING TEGEL BREEDER FARM**

189 It is proposed that should the Proposed Plan Changes be approved, the Tegel chicken breeder farm (parts of which are within 85m of existing residential zoned land) will be removed.

190 This provides an effective reduction in potential adverse odour effects on the existing environment and could be loosely considered as an odour offset associated with the proposal.

**RESPONSE TO OFFICER'S REPORT**

191 I have reviewed the appendices of the Section 42 report which apply to my evidence, specifically Mr Chris Bender's Memorandum dated 17 August 2022 and Mr Andrew Boyd's Officer Comments dated 11 August 2022.

192 I disagree with Mr Bender and Mr Boyd's assertions that any separation/buffer distance should include the maturation area. The compost maturation process has a much lower odour generation potential and intensity, also the character of the odour is generally less offensive (more musty earthy than like compost). The microbial breakdown of the organics within the compost is mostly complete. In my experience at other composting operations around New

Zealand the maturation stage of composting operations is not a significant source of odour.

193 Mr Bender appears to support a 1,000 m separation/buffer distance from the PRRP composting operation based on the published separation distances. However, he does state in paragraph 26 of his memorandum that separation distances can be lowered based on a site specific assessment. I have conducted such an extensive site specific assessment above and consider that the proposed 600 m setback is appropriate to avoid reverse sensitivity effects.

194 In paragraph 30 of his review, Mr Bender accepts that the PRRP composting operation should be able to operate without generating offensive odours beyond 600 m. However, he remains concerned that upset/abnormal conditions could result in additional odour complaints and hence a reverse sensitivity effect. As I have discussed earlier, I consider that there is a very low potential that upset conditions occur at the PRRP operation, and if they do occur they won't occur for long, due to the contingency measures in the ODMP, and the consent conditions which prohibit the windrows from being turned when the wind is blowing towards PC82. Hence odour from upset conditions should not extend beyond 600 m in the direction of PC82/PC81.

195 It appears that both Mr Bender and Mr Boyd consider that with the increase in the scale of the PRRP composting operation there will be an increase in the potential for adverse effects beyond 600 m. From personal communications with Mr Boyd, it is my understanding that the increase in scale is likely to result in the following additional activities on-site based on current forecast operations:

(a) Raw material will be delivered to the site more frequently i.e. more trucks will enter the site and dump their loads on the material receivals pad per day.

(b) The shredder/mixer will operate for a longer period of the day. There will be no requirement for an additional shredder as the current shredder has capacity to process the additional volume of waste. It is also predicted that there will not be a requirement for additional storage of unprocessed raw material as the shredder will be processing the increase in waste more frequently and for longer durations.

(c) There will be more frequent turning of the windrows (as there will be more of them), but it is my understanding that SDC do not plan to turn multiple windrows simultaneously.

(d) There will be a greater number of active windrows within the active composting and maturation areas.

196 Under these potential/likely additional site operations, there will be an increase in the frequency and duration of the current odour sources, but not the intensity. The only activity which would increase the intensity of the odour would be the increased number of static windrows. Based on my observations there is a very small amount of odour released from the undisturbed static windrows (it is generally not observable beyond 50 m from the source) and its character is less offensive (an earthy musty mouldy odour).

197 Whilst the frequency and duration of odour discharges from the site will increase, these are only appropriate/applicable if odour is able to be observed beyond 600 m from the source. The intensity of the odour discharge is the primary factor which influences the distance which an odour will travel from the source (i.e. the length of the plume). As the proposed increase in site operations over the term of the consent are unlikely to have a substantive increase in the intensity of the emissions, it is my expert opinion that the extent of the odour plume will not increase. Thus the proposed 600 m separation distance will not need to increase with the increase in site operations over time.

198 Mr Boyd prefers the use of the Burnham meteorological data to that from Lincoln or Christchurch Airport. I have analysed the differences between these data sets above and conclude that whilst there is some variation in the amount of time that north westerly winds are recorded by the different weather stations, these do not change my overall conclusions on the potential for reverse sensitivity effects at PC82/PC81.

199 Mr Boyd has raised concerns that dust emissions from the composting operations may adversely affect any future dwellings in PC82. I consider this extremely unlikely. Dust discharged from composting operations, such as screening of mature compost, generally doesn't travel more than 100m from the source, even in high wind conditions. Therefore, I consider it very unlikely that dust would travel in excess of 500 m into PC82.

200 I note that in paragraph 42 Mr Boyd notes that the PRRP composting operations which have been occurring on the site to date have not resulted in any validated complaints. It is my understanding that composting operations have been occurring on-site for over 10 years it has been in operation. This is consistent with the general feedback I received in my community survey.

201 In paragraph 45 of Mr Boyd's comments, he supports no complaints covenants should any part of PC82 proceed. I also support no complaints covenants for the same reasons that Mr Boyd has

outlined. It is my understanding that the applicant has offered no complaints covenants for all dwellings within 1,000 m of the PRRP active composting area. I consider that this is beneficial. In my opinion it dissuades individuals who are highly sensitive to compost like odour from purchasing properties within 1,000 m. To some extent this reduces the sensitivity of the receptors within this radius.

**CONCLUSION**

202 I have assessed the potential for odour reverse sensitivity as a result of the Proposed Plan Changes PC82 and PC81. Specifically, I have assessed the potential for odour discharged from the PWTP, PRRP composting operation and the Tegel breeder farm to result in adverse/nuisance odour effects within these proposed developments.

203 All of the experts agree that the presented published setback distances which are applicable to the PWTP are appropriate. As PC82 (and PC81) are well beyond these published setback distances I consider that there is no substantive odour reverse sensitivity effects on these developments associated with the existing and proposed PWTP operations (up to 120,000 PE).

204 I also note that for largest WWTP operations across New Zealand there are consistent or smaller setback distances to that proposed for these developments.

205 With regards to the Tegel breeder farm, should the proposed PC82 development be approved this odour source will be removed from the existing environment resulting in an improvement/reduction in potential adverse odour effects in the existing receiving environment.

206 When assessing the potential for odour reverse sensitivity effects as a result of the proposed PC82 and PC81 developments, the aspects to be considered are more substantive as this development is to change land zoned as rural to residential. This changes the sensitivity of the land from 'low' to 'high' (as defined in the MfE GPG).

207 Should odour be observable beyond 600 m from the PRRP composting operation within PC82, then the matter to be considered is whether or not this odour would be considered as offensive within this more sensitive zoning.

208 The air quality experts agree that the use of published separation distances is an appropriate method for determining the potential for reverse sensitivity effects on an existing industrial air pollutant emitter.

209 The published separation distance guidance documents state that these distances should be used as a conservative starting point and that a site specific assessment can be used to provide a more accurate/appropriate separation distance for any given case.

210 There is a high degree of variability in the published separation distances, and there are significant differences between the PRRP composting operation with regard to other composting operations (primarily the lack of leachate collection and treatment and the restriction on when windrows can be turned). Therefore, in my opinion, it is appropriate for a site specific assessment to be undertaken to define a more appropriate, site specific, separation distance.

211 I have used the following assessment tools to undertake a site specific assessment of the potential radius of odour effects from the PRRP composting activities:

a) An assessment of local terrain and meteorological conditions;

b) Industry experience of similar composting operations in New Zealand;

c) A comparison of the PRRP operations against best industry practise for a composting operation of this size and nature;

d) A community odour survey; and

e) An odour scout survey.

212 I have used the above lines of evidence to support my expert opinions on whether or not the proposed odour setback/separation distance of 600 m is appropriate for the PC82/PC81 developments.

213 The experts (Mr Bender, Mr Iseli and I) agree that under normal operating conditions the PRRP composting operation will not result in odour which is offensive or objectionable beyond 600 m.

214 Mr Iseli and my opinions differ from Mr Bender on whether or not reverse sensitivity effects could occur during upset conditions at the PRRP composting plant.

215 With regards to upset conditions in the composting operation, I consider that the likelihood that:

a) A windrow turns anaerobic (i.e. SDC fail to follow the BPO in the ODMP),

b) SDC turn the windrow during wind conditions which are prohibited in the ODMP;

c) The wind direction is blowing towards PC82; and

d) The odour volume/intensity is sufficient enough that the plume will extend beyond 600 m from the source,

is very low to non-existent.

216 Furthermore, as this situation would only occur when SDC is in breach of its consent conditions, I do not consider that this is a relevant situation which should be considered when assessing potential reverse sensitivity effects on the PC82 and PC81 developments.

217 After considering all of these lines of evidence I conclude that the potential for odour to be observable within PC82 is low and as such the potential that adverse odour effects to occur in PC82 is also low. For this reason, in my expert opinion there is no substantive odour reverse sensitivity effects on the Proposed Plan Changes associated with odour discharges from the PRRP composting operations or the PWTP operations.

218 Furthermore, I consider that should PC82 be approved, the removal of the Tegel breeder farm will provide a benefit/reduce the potential for odour effects in the existing environment.

Dated: 26 August 2022

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Donovan van Kekem

## APPENDIX 1

### Odour Diary Record Sheet

| **Name:** | **Sample site:** | |
|---|---|---|
| **Date (dd/mm/yy):** | **Sample Start Time (hh:mm):** | **Rain (Circle one):** None / Misty / Drizzle / Steady / Torrential |
| **Wind direction (coming from)[3]:** | **Wind Strength[4]:** | |
| **Hedonic Tone[5]:** | **Cloud Cover:** | **Temperature:** |
| **Approximate Plume Width[6]:** | **Approximate Plume Length[6]:** | |

| Sample number | Odour Intensity Level (1-6)[2] | Odour descriptor (1-40)[1] | Sample number | Odour Intensity Level (1-6)[2] | Odour descriptor (1-40)[1] | Sample number | Odour Intensity Level (1-6)[2] | Odour descriptor (1-40)[1] |
|---|---|---|---|---|---|---|---|---|
| 0:10 | | | 3:30 | | | 6:50 | | |
| 0:20 | | | 3:40 | | | 7:00 | | |
| 0:30 | | | 3:50 | | | 7:10 | | |
| 0:40 | | | 4:00 | | | 7:20 | | |
| 0:50 | | | 4:10 | | | 7:30 | | |
| 1:00 | | | 4:20 | | | 7:40 | | |
| 1:10 | | | 4:30 | | | 7:50 | | |
| 1:20 | | | 4:40 | | | 8:00 | | |
| 1:30 | | | 4:50 | | | 8:10 | | |
| 1:40 | | | 5:00 | | | 8:20 | | |
| 1:50 | | | 5:10 | | | 8:30 | | |
| 2:00 | | | 5:20 | | | 8:40 | | |
| 2:10 | | | 5:30 | | | 8:50 | | |
| 2:20 | | | 5:40 | | | 9:00 | | |
| 2:30 | | | 5:50 | | | 9:10 | | |
| 2:40 | | | 6:00 | | | 9:20 | | |
| 2:50 | | | 6:10 | | | 9:30 | | |
| 3:00 | | | 6:20 | | | 9:40 | | |
| 3:10 | | | 6:30 | | | 9:50 | | |
| 3:20 | | | 6:40 | | | 10:00 | | |

Odour samples every 10 seconds. The time between the 10 seconds is disregarded (interval method). Breath normally rather than sniffing.

If odour descriptor is 40 then please describe:

3 **Wind Direction Orientation Aid**


**Measuring Cloud Cover**

| Okta No. | Description |
|---|---|
| 0 | Clear Sky |
| 1 | Sunny |
| 2 | Mostly sunny |
| 3 | |
| 4 | Half the sky is covered in cloud |
| 5 | |
| 6 | Mostly cloudy |
| 7 | Considerable cloudiness |
| 8 | Overcast |
| F | Fog / Mist |

| [4] Wind Strength Scale | | |
|---|---|---|
| Beaufort Force | Descriptor | Specification on land |
| 0 | Calm | Smoke rises vertically. |
| 1 | Very Light | Direction of wind shown by smoke drift but not by wind vanes. |
| 2 | Light breeze | Wind felt on face, leaves rustle, ordinary wind vane moved by wind. |
| 3 | Gentle breeze | Leaves and small twigs in constant motion, wind extends light flag. |
| 4 | Moderate breeze | Wind raises dust and loose paper, small branches move. |
| 5 | Fresh breeze | Small trees in leaf start to sway, crested wavelets on inland waters. |
| 6 | Strong breeze | telegraph wires, umbrellas used with difficulty. |
| 7 | Near gale | Whole trees in motion, inconvenient to walk against wind. |
| 8 | Gale | Twigs break from trees, difficult to walk. |
| 9 | Strong gale | Slight structural damage occurs, chimney pots and slates removed. |
| 10 | Storm | Trees uprooted, considerable structural damage occurs. |
| 11 | Violent storm | Widespread damage. |
| 12 | Hurricane | Widespread damage. |

| [1] Odour Character Discriptors | | | |
|---|---|---|---|
| 1 | Fragrant | 21 | Like blood, raw meat |
| 2 | Perfumy | 22 | Rubbish |
| 3 | Sweet | 23 | Compost |
| 4 | Fruity | 24 | Silage |
| 5 | Bakery (fresh bread) | 25 | Sickening |
| 6 | Coffee-like | 26 | Musty, earthy, mouldy |
| 7 | Spicy | 27 | Sharp, pungent, acid |
| 8 | Meaty (cooked, good) | 28 | Metallic |
| 9 | Sea/marine | 29 | Tar-like |
| 10 | Herbal, green, cut grass | 30 | Oily, fatty |
| 11 | Bark-like, birch bark | 31 | Like gasoline, solvent |
| 12 | Woody, resinous | 32 | Fishy |
| 13 | Medicinal | 33 | Putrid, foul, decayed |
| 14 | Burnt, smoky | 34 | Paint-like |
| 15 | Soapy | 35 | Rancid |
| 16 | Garlic, onion | 36 | Sulphidic |
| 17 | Cooked vegetables | 37 | Dead animal |
| 18 | Chemical | 38 | Faecal (like manure) |
| 19 | Etherish, anaesthetic | 39 | Sewer odour |
| 20 | Sour, acrid, vinegar | 40 | Other(record description) |

| [2] Odour Intensity Scale | |
|---|---|
| Intensity Level | Odour intensity |
| 1 | Very Weak |
| 2 | Weak |
| 3 | Distinct |
| 4 | Strong |
| 5 | Very strong |
| 6 | Extremely Strong |

| [5] Hedonic Tone | |
|---|---|
| Rating | Descriptor |
| -4 | Extremely unpleasant |
| -3 | Very unpleasant |
| -2 | Unpleasant |
| -1 | mildly unpleasant |
| 0 | Neutral |
| 1 | Mildly pleasant |
| 2 | Pleasant |
| 3 | Very Pleasant |
| 4 | Extremely Pleasant |

Record hedonic tone at the end of the survey as an overall impression