

BEFORE THE INDEPENDENT HEARINGS COMMISSIONERS

APPOINTED BY CANTERBURY REGIONAL COUNCIL

TABLED AT HEARING

Application:

.....
Date: 7/3/2018

In the matter of

The Resource Management Act 1991

And

The Resource consent Applications by Canterbury Landscape Supplies Ltd:

**CRC 175344 Discharge permit for the discharge of contaminants
(including odour and dust) into air from a composting
operation.**

**CRC175345 Discharge permit for the discharge of contaminants to
land that may enter water, as a result of composting and
stockpiling of compost on land.**

6 March 2018 - 9 March 2018

Statement of GRAHAM ROUSE and ROSINA ROUSE

Introduction

1. My name is Rosina Rouse, and I reside on a lifestyle block at 86 Harrs Rd, where I have lived for more than 41 years. This is approximately 2 kms east (downgradient) of the Applicant's Site at 97 Diversion Road.
2. I am have worked as a teacher, and as an Advisor to teachers.
3. I am a member of the:
 - Eyre District Environmental Association Incorporated (EDEAI)
 - Mandeville Residents' Association - Committee member
(has a support base of 200 people)
 - Eyreton Hall Committee
 - Eyre Action Group (EAG - 2001-2002) which successfully opposed the spraying of partially-treated sewage from Rangiora, Woodend and Kaiapoi on land adjacent to the Diversion Road site.
4. My name is Graham Rouse, and I also reside on the lifestyle block at 86 Harrs Rd, where I have lived for more than 41 years..
5. I grew up on a high country station (Lake Heron), at the headwaters of the Rakaia and Ashburton rivers. I worked as:
 - a representative for National Mortgage (PGG Wrfghtson),
 - Territory Manager for 28 years for the Animal Health Division of Merck Sharp and Dohme, (MSD Agvet – area serviced: north from the Rakaia River, including Canterbury, North Canterbury, Marlborough, Nelson, and the West Coast from Karamea to the Haast.
 - Sales Manager, North Canterbury Veterinary Clinics 18 years (from Kowhai River in the south, Conway River to the north, and Lewis Pass to the west.

During my career, not only was I dealing with farmers, I was also visiting their properties and understood and discussed many of their environmental issues.
6. I am a member of the:
 - Eyre District Environmental Association Incorporated (EDEAI)
 - Mandeville Residents' Association, (which has a support base of 200 people).
 - Eyreton Hall Committee
7. When we became residents more than 40 years ago, visitors often commented on the taste, clarity, and freshness of our drinking water. It's devastating to see how much it has been degraded. We now have been put in the position of having to seek advice and information about ways to remediate this situation and take appropriate action. We're both retired, and aging as we speak, so, as the negative effects of high Nitrate levels on the very young, and the elderly are well documented, we are very concerned for our well-being. We are both environmentally conscious. We have planted over 3000 trees and shrubs, are using a shredder /chipper.

8. We both strongly oppose Canterbury Landscape Supplies Ltd's (CLS's) applications for the two consents:

CRC 175344 Discharge permit for the discharge of contaminants
(including odour and dust) into **air** from a composting operation.

CRC175345 Discharge permit for the discharge of contaminants to **land** that
may enter water, as a result of composting and stockpiling of
compost on land.

9. A duration of 35 years is inappropriate and unacceptable to us.
10. As members of the Eyre District Environmental Association Incorporated (EDEAI) and the Mandeville Residents' Association, we strongly support the presentations made by Noel Fraser and Tom McBrearty on behalf of these Groups, at this Hearing.
11. To ensure that our concerns are well founded, and in our determination to identify 'Best Practice,' we have read many of the emailed Reports, plus a wide variety of appropriate information and relevant reports, as well as visiting composting plants at;

Bromley –Living Earth Rolleston –Intelligro Timaru Eco Compost Facility

12. In our submission we stated concerns about:

Water issues
health issues
odour issues
general effects on the community
fire risk issues
fire-fighting issues
operating issues

We give some reasons for our concerns in this document.

Trust

13. Because of the concealed location of the site, and lack of communication /information provided by the Applicant, there has been fear and anxiety about the potential impacts on residents. This has lead to a lack of trust, which has only been partly addressed after the visits to the site that were a direct outcome of the Mediation. The duration and unpredictability of objectionable odour discharges have contributed to adverse physical and mental health for some residents.
14. A climate of trust has not been established between the Applicant and residents. We have listed 3 examples below:

- [1] In the annexure to BAL2 *Informing Neighbours*
'CLS management will contact and visit, if the owners/occupiers wish, the owners occupiers of residences on South Eyre Road and HARRIS Road, to explain the proposed management of the material. CLS will provide these neighbours with a contact phone number to call if they are being affected by odours from the CLS

site.'

We have not been visited or given a contact phone number

The Applicant was directed to allow site visits after mediation, we, as residents of Halls Rd, were not contacted prior to this.

- [2] 1st Affidavit of Phillip Wylie (22) 'CLS commenced operating at the Site in September 2016'

Hill Laboratory test of 'compost leachate' sample was collected 27 July 2016, so there must have been compost on the site in a sufficient amount to enable a suitable quantity of leachate to be collected for analysis prior to this date.

Therefore the statement detailing the time of commencement must be incorrect.

- [3] According to the Application for Resource Consent BAL1 Barry Loe page 8
'The site is flat. Rainfall will soak into the land, and there will be no run-off. There will be no stormwater generated from the site.'

This statement is not correct.

Refer Appendix 2: photo dated 22 February 2018 taken 2 days after 75mm rainfall.

Water:

15. The area has been defined as a Red Nutrient Allocation Zone in the LWRP. This means that groundwater quality outcomes are not currently being met. Current levels of Nitrogen are concerningly high.

16. We have a well on which we are dependent for our drinking water, household needs, olive trees and for livestock, as there is no reticulated water scheme in the area. Our well is 11.3 metres deep. It is a shallow well similar to many in the area. The present water level is 1.2 metres below ground level.

Because we are concerned about the quality of our drinking water, water from this well has been tested by Hill Laboratories on:

21 October 2014. Nitrate-N g/m³ was 11.0

16 February 2018 Nitrate-N g/m³ was 11.2

Our well is downgradient of the site.

17. Our immediate neighbours, to the south, Jill and Wayne Randle at 68 Halls Rd, Eyreton, have also had their household well tested: It is at a depth of 15.3m. The water level is at 1.1 metres below ground level.

16 February 2018 Nitrate-N g/m³ was 10.4

This well is downgradient of the site.

18. We have also included a Test Result by Hill Laboratories for the well of Stuart Paull who lives at 1029 South Eyre Road, Swananoa.

11 August 2016 Nitrate-N g/m³ was 8.6

This well is upgradient of the site.

This represents one well upgradient of the site, and two wells downgradient of the site. The downgradient wells have higher levels of nitrate.

19. In the past 3 years 4 months, the level of Nitrate-N g/m^3 in our well has risen by 0.2 g/m^3 .
Our result of Nitrate-N g/m^3 at 11.2 is of absolute concern to us, as the Maximum Acceptable Value (MAV) is 11.3 g/m^3 . We are currently only 0.1 below maximum.
(This has occurred at the Applicant's current level of operation. Their proposed level would be much greater than this. We don't know how long we can expect it will take to reach the Maximum_Acceptable Value, irrespective of the Applicant's operation on the Site.)
20. There is a well, on Diversion Road, approximately 350m directly to the East and downgradient of the site, where the water level is currently 3.3m below the ground surface.
21. The Applicant's Site is located on unsuitable land. Currently there is no impermeable barrier to prevent leachates from compost, or stormwater contaminated by leachates, from entering the aquifers beneath the site, and therefore no certainty of protection.
22. In the Applicant's *Statement of Evidence* (49.)
The Applicant proposes to establish a 'composting pad on which all composting windrows in the first 12 week, active composting phase will be undertaken.
This composting pad will be approximately 2500 m^2 in area (less than 2.5% of the site), and will be constructed of compacted gravel aggregate to a depth of 400 mm over a lining of filter fabric.
It would provide a raised platform on which to place the active compost windrows to ensure that the potential effects on groundwater are minimized. This pad sits above ground level. What prevents leachate or stormwater runoff?
23. We consider that the mitigation measures proposed would be inadequate, based on the solutions we have observed at the 3 composting sites we have visited, All three sites operate on completely sealed surfaces with efficient methods of collecting and storing leachates and stormwater runoff for further monitoring and assessment. We submit that the Applicant's proposed mitigation method doesn't go far enough towards protecting the land, waterways and environment from contamination.
24. Sawdust/ bark is another proposed mitigation solution, but to date is unproven. It was not used by any of the 3 sites we visited. It does not provide adequate certainty that contamination will not occur.

25. In our opinion, to conform with best practice, as observed when we visited 3 other composting sites ;
Living Earth at Bromley, Intelligro at Rolleston, and Timaru Eco Compost at Redruth.

the installation of an impermeable barrier would be required;

- at, and around the receiving pad,
- mixing site,
- under and between the windrows at all stages of compost production and storage,
- under the materials to be stored onsite,
- where leachate is to be collected and treated,
- the areas where stormwater lies,
- all areas where there is movement of traffic.

This is essentially for the entire site.

All of the composting production sites visited operate on sealed surfaces, regardless of their quantity of production.

26. In Loe Pearce and Associates BAL1- *Application For Resource Consents From The Canterbury Regional Council*: it is stated: (5.0 Regional Plans 5.1 page 8)
The site is flat. Rainfall will soak into the land, and there will be no runoff. There will be no stormwater generated from the site. (Appendix 2 photos of pooled water.)

27. In the Section 42A Officer's Report *Discharge of Stormwater* (44.) 'the Applicant states the land is slightly modified by human action—vehicle movement can create shallow depressions in which rainfall collects, but runoff is not generated.'

28. During our first visit to the Site, Thursday 9th November 2017, post Mediation, we were surprised to see the large amount of ponded water, after heavy rain, lying on the surface of the site, filling the ruts made by vehicles, and also in depressions made by vehicular activity.

29. The avoidance of excessive ponding of water is purported to be able to be addressed with use of a trash pump to vacuum up any excess water as appropriate. In the Applicant's *Statement of Evidence* there is a pump: 'having a 7 horsepower motor and a capacity of 360 litres per minute.' The Applicant's *Second Affidavit* states that the trash pump can deliver 550 litres of water per minute.

No matter which statement is correct, if the site were located on a sloping surface, and completely sealed, with proper collection and provision for the storage, monitoring and treatment of leachates and stormwater (as well as contaminated stormwater,) surplus water would be adequately, and almost completely controlled. Use of sucker trucks or the pumps mentioned would only need to be used as a last resort.

30. According to *Composting and related Organics Processing Facilities*- prepared by the Waste Management Section of the Department of Environment and Conservation (NSW) prepared (NSW) where organics are categorized in 3 categories according to their potential to have environmental impact:

Category 1: having the lowest potential environmental impact

Category 2: having greater potential environmental impact than Category 1, but less potential environmental impact than Category 3.

Category 3: having the greatest potential environmental impact.

Category 3.

<u>TYPE</u>	<u>EXAMPLES OF ORGANICS</u>	<u>COMPONENTS LISTED By the Applicant</u>
Meat, fish & fatty foods	carcasses & parts of carcasses; blood & bone; fish; fatty processing or food.	de-watered paunch grass
Fatty & oily Sludges & Organics of animal & vegetable origin	de-watered grease-trap; fatty oil & sludges of animal & vegetable origin.	grease-trap waste
Mixed residual waste containing putrescible organics	Wastes containing putrescible organics, including household domestic waste that is set aside for kerbside collection or delivered by the householder directly to a processing facility, and waste from commerce & industry.	scoured wool fragments eggshell

31. As de-watered paunch grass comprises between 40%-50% of the production of compost at the Applicant's site we felt it was imperative to comment on this component.
32. According to information documented in *Paunch Contents Land Spreading Management Guidelines* EPA (Environmental Protection Authority Tasmania 2017 pages 4-6

Regulatory Requirements (22)

- Paunch contents contain high levels of microorganisms, potentially including pathogens.
The main pathogens could be carried and impact upon human or animal health include *Salmonella spp*, *Yersinia spp*, *Camylobacter spp*, *Leptospirosis spp*, *E coli*, *Cryptosporidia*, and agents causing *Toxoplasmosis*, *Johnes Disease* and *Transmissible Spongiform Encephalopathies (TSEs)*

Paunch Characteristics (3)

- A well-managed treatment process is essential to ensuring that the final product is safe for use.

Transport 4.3.1

- Risks: potential to cause odour nuisance and nutrient contamination via spills to roads property and waterways. Spillage may also present a risk to human, and animal health.

Storage Risks 4.5.1

- Risks: if not stored appropriately, may contaminate waterways or groundwater and potentially cause public nuisance, particularly with respect to odour and attracting vermin.

Risk Management 4.4.1

- Risk Management: the material should preferably be stored in a bunker with a sealed floor, in which any leachate or rainwater is collected and directed to appropriate, and approved wastewater facilities.

33. The Applicant is using two recipes. Both include de-watered paunch grass.
- (1)
20% scoured wool blended 50/50 with bark fines
40% dewatered paunch grass
40% bark fines, sawdust and wood shavings
- (2)
50% dewatered paunch grass
50% bark, sawdust and wood shavings.
34. Whichever recipe is used, the proportion of paunch grass is 40%-50%. This is a large amount for an item that other composting plants refuse to use.
None of the composting sites we visited take this product.
35. The use of Rotocom or Hot Rot machines for pre-treatment might be a possible way of destroying pathogens, minimizing environmental problems such as nutrient-rich leachates reaching soil, surface water or groundwater, and minimising odour or vermin problems.
36. The site management plan should specify methods for the capture and treatment and/or reuse of contaminated stormwater and leachate. We can't find evidence of this in Appendix 1 BAL1 Report Management Plan for Organic Waste Compost – Loe Pearce & Associates Ltd.

Odour and Health

37. The number of complaints to the ECan Pollution Hotline and the wide location of people affected, indicate that odour is not being contained within the boundary of the site as is required. The proposed mitigation measures don't provide enough certainty that these objectionable and offensive odours will be contained onsite.

(Affidavit of Nathan Dougherty -15. One complainant's location was on tram Road approximately 6.5kms from the downwind boundary of the Applicant's site),

38. Objectionable odours have caused us, and visitors, feelings of nausea and great discomfort, the necessity of having to close doors and windows to keep the odour out of our house. These odours have curtailed activities which we generally enjoy on our property, and have necessitated of moving inside, even on beautiful days. The odours are unpredictable as they tend to come and go. They can last from 20-30 minutes to 3-4 hours. Since the 6500m³ of anaerobic compost has been removed from the site, we have experience fewer problems with odour emissions. The removal was a directed outcome of mediation.
39. Mitigation methods such as covering odorous material with covers such as GoreTM gortex cover system are a possible partial solution but are not part of current management practice. GoreTM covers are very successful in Timaru.
40. Components listed for composting or storage, such as de-watered paunch grass has the potential to be high odour producing, so it requires excellent management systems.
41. Adequate information regarding the short-term or long-term effects that these odours potentially present to health, has not been provided to give certainty regarding safety.

Dust

42. The potential dangers from dust generated from the unsealed site, particularly in dry conditions are uncertain. We understand that the heavier particles would not travel for great distances, but the very small particles that are much more difficult to detect and mitigate, could cause potential long term and short term adverse effects on the health of residents and livestock. In strong winds these particles could travel long distances and potentially affect environments far from the site.
This would be unacceptable for all people especially those whose health is already compromised.
43. The production of dust from unsealed access roads, vehicular movements, cartage of feedstock, and the processes inherent in the production of compost could cause large amounts of nuisance dust soiling the environment and causing hazards.
44. If the bund around the site is breached to allow contaminated water to drain into the pine trees surrounding the site, which are apparently very important for mitigation of dust and odours, the ground may become acidic. This would cause the trees to die, and new plantings would be unlikely to grow in acidic soil.

45. Section 42A Officer's Report

(79.) 'The Applicant proposes to use water sprinklers to keep the surface of stockpiles damp when necessary to control dust from the stockpiles of material. We don't believe that there is an adequate supply of water. Wheel washing should also be included to ensure any contamination doesn't go off-site.

46. The Applicant does not produce sufficient information to show how the site would be effectively managed to control and contain dust.

Fire Risk issues

47. Because compost production sites have the potential to self-combust, or to smoulder, causing smoke, and therefore the discharge of unknown, potentially dangerous contaminants, into the air, we are concerned about the potential impacts on our health, well being, livelihoods, property and livestock should self-combustion occur. In addition to this we have no idea of the potential size and possible duration of any such event. The large pine trees surrounding the site are very dry and covered with dust, and they would readily ignite.

Fire-fighting issues

48. FENZ have expressed concerns regarding their ability to deal with a wildfire at Diversion Road. Their concerns include whether they would be able to pull up the fire down wind, and what the effects of discharges to air from a fire might be, downwind. They doubt their ability to contain the operation due to the location of Transpower pylons, and insufficient ability to manoeuvre for fixed wing aircraft, as well as the conditions being too dangerous for the use of helicopters with monsoon buckets.

49. They are concerned that there is limited supply of water at the site and there is no adequate access to the large volumes of water that would be required. There is a 25,000L water tank which is refilled from the lessee of the adjoining land, from a 35mm pipe. If the trash pump (550 litres per minute) is used to pump water from this tank, it would be emptied in 45 minutes, and would take a long time to refill.

50. Diversion Rd is not well used by the general public. Any fire after hours could be well under way before being detected, particularly as the site is unmanned after hours from 12:30 pm Saturday until 6:30am on Mondays, and during this time the access gate is locked. There are no contact details on the gate.

51. We have concerns about how potentially affected residents would be notified of any fire or danger. It is terrifying to think of the speed at which any potential fire would progress. We were living here during the galeforce winds of September 2013 when the wind sounded like a revving jumbo jet and blew our plantation of 1000 gum trees down.

52. It is not appropriate to compare the winds at Christchurch Airport, 7.5kms distant because the trees west of the airport, and on McLeans Island were not as adversely affected as they were here.

Operating issues

53. Ref Annexure marked BAL2 referred to in the annexed Affidavit of Barry Anthony Loe which was sworn at Christchurch on 29th August 2017
The Site at Division Road was set up in September 2016.
According to the Hill Laboratory Test Report BAL1 Loe Pearce & Associates for

compost leachate, dated 11 August 2016, the test sample was collected, for analysis, on 27th July 2016. We ask how the sample could be collected prior to the setting up of the site?

The site must have been set up prior to 27 July 2016, and therefore must have been operating for a minimum of 18 months without Consents.

54. '*Consent Guide For Composting Operations in New Zealand*' Waste Management Institute of New Zealand. New Zealand Standard NZ4454, is considered to be a guide to best practice. It was updated in 2009.
Surely this would have been an appropriate benchmark to be used when setting up the new site.

Statement of Evidence Phillip Wylie page 13

55. 'a number of submitters have suggested that the composting operation be fully enclosed and bunded.'

We agree that the Applicant's site should be fully bunded. Living Earth is an enclosed operation and rather expensive to set up. Having visited both sites, we consider the example of Timaru to be more appropriate to use as a comparison.

56. The Timaru system is sited on a fully sealed, sloping surface. Each windrow is placed on a concrete pad that has two perforated tracks running the full length of each windrow. Below each of these tracks is a chamber facilitating the blowing of air up through the bottoms of the windrows. At the uphill end of each windrow is a computer-assisted monitoring system which monitors the temperature and moisture content of each pile 24 /7. Automatic pumping of air takes place as required. Windrows are 50m in length. The 4 rows in the active compost stage are covered with Gortex (GoreTM) covers. If the pumping of air through the bases of the windrows is insufficient, an alarm sounds and the covers are removed. There is an efficient system where leachates and run-off are collected in an underground sump. Refer to photos -Appendix 2

57. This is an example of an Aerated Covered Windrow system as outlined in *Introduction to Composting Science and Management for Industry Training-2007*- Ministry for the Environment, ROU, Zero Waste Academy.
- medium capital costs
 - medium operating costs
 - cover for windrows reusable
 - forced aeration; computer control of composting possible
 - Reduced flexibility –careful preparation of feedstock essential
 - space efficient
 - Improved control of temperature and aeration resulting in faster composting (3-6 weeks); further curing usually required.
58. Close monitoring of temperature and moisture content is essential. We consider that once a week monitoring as stated in *The Statement of Evidence – Phillip Wylie* (35.) 'Temperature monitoring is conducted after each windrow is turned, and again a week later' is inadequate for safety, and quality control of the finished product.

Only 24/7 monitoring is appropriate on this site, the same as is implemented on all other sites we visited.

59. Some Improvements or mitigation measures have generally been implemented in re-active rather than pro-active way.

Conclusion

60. This new site provided an opportunity to set up in accordance with best practice. This did not happen.
61. It is noted that with all of the experience indicated, (*Statement of Evidence – Phillip Wylie* -points 1-6), combined with the length of time in the industry, availability of the national and international publications/information, knowledge of other compost operations, and links with personnel involved in the industry, we cannot understand why this new, industrial enterprise would be established in 2016 on inappropriate land in a sensitive environment, without paying due diligence to current Best Practice, and without obtaining the appropriate consents.
62. There have been major changes in this growing industry but the Applicant is operating this plant at lower end of the spectrum.
The fact that in excess of 197 complaints have been made to the ECan Pollution Hotline about odour traveling beyond the boundaries of the site, is just one way this is demonstrated. All other sites visited are operating with all of the required consents (66 in one case). It appears that the playing field isn't level.
63. The site is not suitable, especially for an industrial and trade composting operation, as it is sited on a Red Nutrient Zone above shallow aquifers.

64. The Applicant's management has not been able to demonstrate, since setting up over 18 months ago, that the impact of discharges to air and to land, that may enter water, will not have potential adverse effects in the present and for the foreseeable future.
65. The Applicant's Hill Laboratory test results of July 2016 for compost leachate (BAL1-Appendix 2) showing 52 gms/m³ of Nitrogen (TKN), indicates that this would contribute to the cumulative effects on the concentration of Nitrate-Nitrogen in the aquifers.
66. Our drinking water quality is already compromised by the nitrate levels and the recent test 16/02 /2018 confirms that.
At 11.2 g/m³ it is only 0.1 below the Maximum Allowable Values (MAV) of 11.3.
67. We maintain the outcome sought by the Applicant that CRC 175344 to discharge odour and dust into air, *and* CRC175345 to discharge contaminants onto land where contaminants may enter groundwater are **refused**.

Signed:

Rosina Rouse

Graham Rouse

APPENDIX 1

- [1] Section 42A Officer's Report- Tegan Wadsworth

- [2] Affidavits: P Wylie M Dyer -N Dougherty

- [3] Statements of Evidence- P Wylie

- [4] Consent Guide for Composting Operations in New Zealand - prepared by Sinclair Knight Merz on behalf of the Waste Management Institute New Zealand (WasteMINZO)

- [5] Introduction to Composting Science and Management for Industry Training- Ministry for the Environment NZ, ROU, Zero Waste

- [7] Canterbury Landscape Supplies –Assessment of Environmental Effects of Discharges to Air- (annexure marked 'BAL2'-Beca

- [8] Application for a Resource Consent Under The Resource Management Act 1991 (BAL1)- Loe Pearce & Associates Ltd

- [9] Composting and related Organics Processing Facilities- prepared by the Waste Management Section of the Department of Environment and Conservation (NSW)

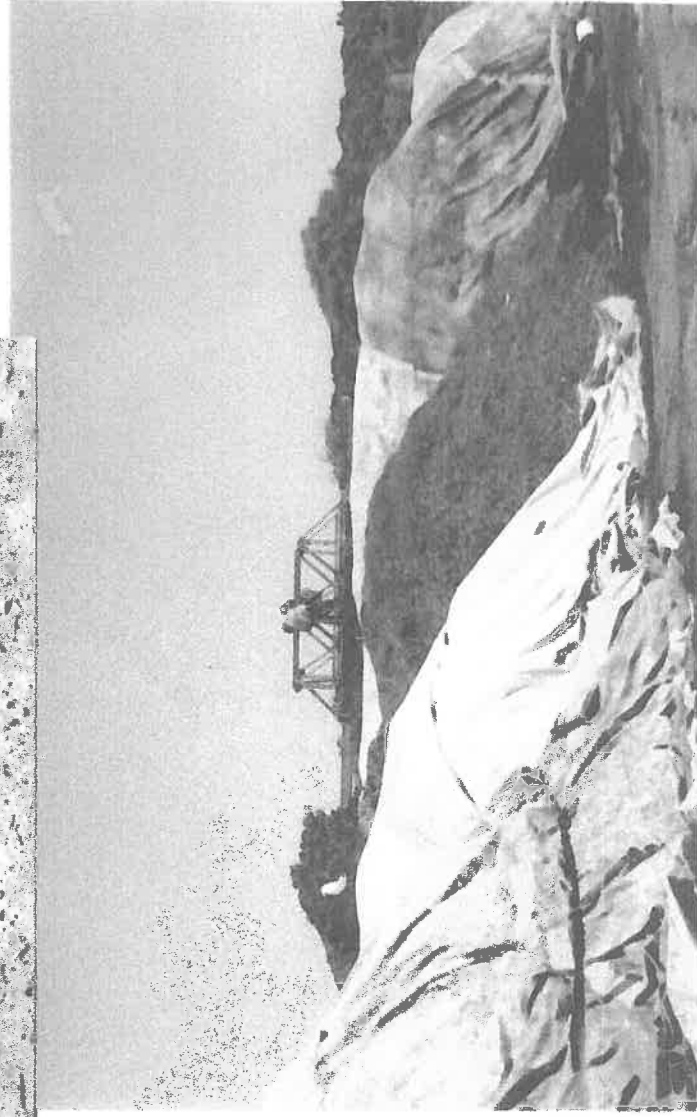
- [10] Paunch Contents Land Spreading Management Guidelines – EPA-Tasmania- March, 2017

APPENDIX 2

Partial overview of
Timaru composting
plant.



Monitoring & air pumping
equipment on upgradient
ends of windrows.
(site is sloping)

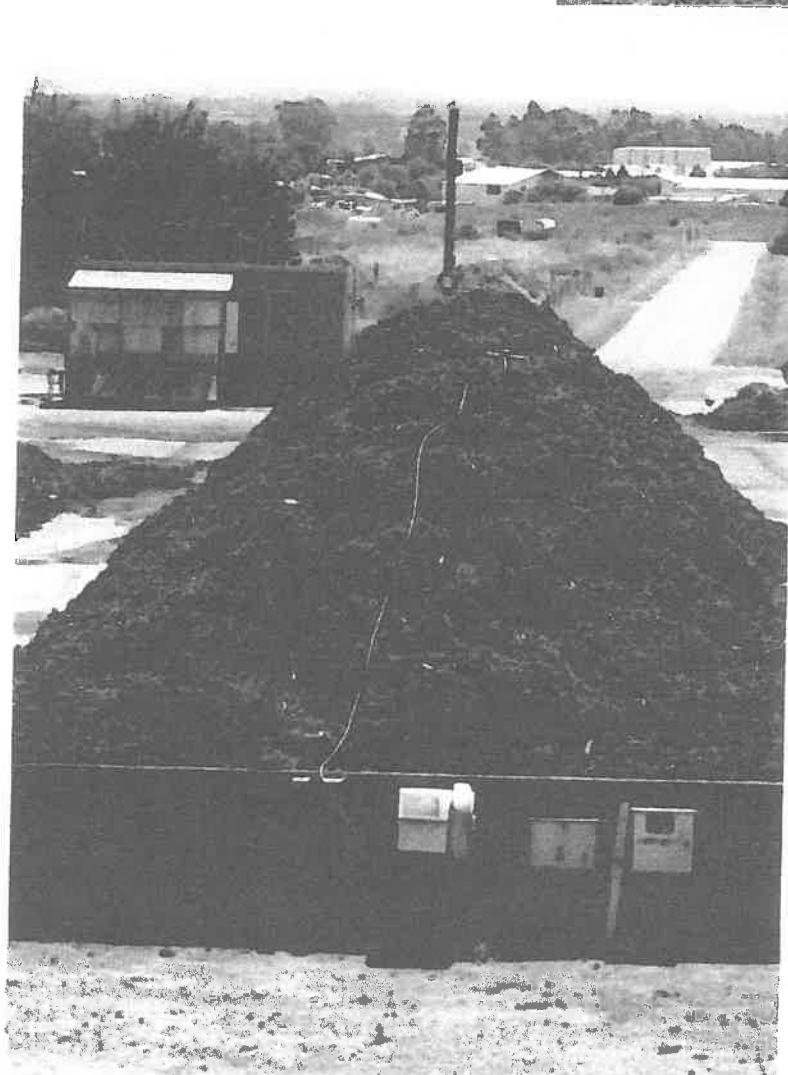


Windrows Covered
with Gort™ covers.



Partial overview of
Timaru composting
plant.

Sump for collection
of leachate.



Probes inserted into windrows,
Connected to computer-assisted
monitoring equipment 24/7 to
monitor temperature and moisture
content. Pumps are automatically
activated to pump air from the
bottoms of the windrows as
necessary. An alarm also sounds

ANALYSIS REPORT

Page 1 of 2

Client: Canterbury Landscape Supplies Limited
Contact: P Wyle
C/- Canterbury Landscape Supplies Limited
PO Box 275
Kaiapoi 7644

Lab No: 1626597
Date Received: 04-Aug-2016
Date Reported: 11-Aug-2016
Quote No:
Order No:
Client Reference: Compost Leachate
Submitted By: P Wyle

started Sept or
Oct. 16

Sample Name:	Compost Leachate
Lab Number:	1626597
pH	7.4
Electrical Conductivity (EC)	150 µS/cm
Total Calcium	128 mg/L
Total Magnesium	21 mg/L
Total Potassium	405 mg/L
Total Sodium	33 mg/L
Total Ammoniacal-N	3.2 mg/L
Total Kjeldahl Nitrogen (TKN)	5.2 mg/L
Dissolved Reactive Phosphorus	2.2 mg/L
Total Phosphorus	9.4 mg/L

SUMMARY OF METHODS

The following table gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those obtained in a laboratory clean state. Detection limits may be higher for individual samples should significant sample size or other factors require that different methods be performed during analysis.

Test	Method Description	Default Detection Limit	Sample No
Filtration Unpreserved	Sample filtered through 0.45 µm membrane filter. Performed at Hill Laboratories, Chemistry, 1616 Waterloo Road, Christchurch.		1
Total Digestion	Boiling nitric acid digestion APHA 9550 E 22nd ed. 2012 (modified)		1
Total Kjeldahl Digestion	Sulphuric acid digestion with copper sulphate catalyst		1
Total Phosphorus Digestion	Ascorbic acid digestion		1
pH	pH meter. Analyzed at Hill Laboratories, Chemistry, 1616 Waterloo Road, Christchurch APHA 4500 H+ B 22nd ed. 2012. Note: It is not possible to achieve the APHA Maximum Storage Recommendation for this test (15 min) when samples are analysed upon receipt at the laboratory and not in the field.	0.1 pH Units	1
Electrical Conductivity (EC)	Conductivity meter. 25°C. Analyzed at Hill Laboratories, Chemistry, 1616 Waterloo Road, Christchurch APHA 2510 B 22nd ed. 2012	0.1 µS/cm	1
Total Calcium	Nitric acid digestion ICP MS, trace level APHA 31.5 B 22nd ed. 2012	0.01 µg/L	1
Total Magnesium	Nitric acid digestion ICP MS, trace level APHA 31.2 B 22nd ed. 2012	0.01 µg/L	1
Total Potassium	Nitric acid digestion ICP MS, trace level APHA 31.1 B 22nd ed. 2012	0.01 µg/L	1
Total Sodium	Nitric acid digestion ICP MS, trace level APHA 31.0 B 22nd ed. 2012	0.01 µg/L	1



This laboratory is accredited by International Association of New Zealand (IANZ) which represents the Department of the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (MRA) IANZ fully participates in international measurement.

Test	Method Description	Default Detection Limit	Sample No
Total Ammoniacal-N	Filtered sample from Christchurch. Phenol/hypochlorite colorimetry. Discrete Analyser, (NH ₄ -N = NH ₄ -N + NH ₃ -N). APHA 4500-NH ₃ F (modified from manual analysis) 22nd ed. 2012.	0.010 g/m ³	1
Total Kjeldahl Nitrogen (TKN)	Total Kjeldahl digestion, phenol/hypochlorite colorimetry. Discrete Analyser, APHA 4500-NH ₃ D, (modified) 4500 NH ₃ F (modified) 22nd ed. 2012.	5 g/m ³	1
Dissolved Reactive Phosphorus	Filtered sample from Christchurch. Molybdenum blue colorimetry. Discrete Analyser, APHA 4500-P E (modified from manual analysis) 22nd ed. 2012.	0.004 g/m ³	1
Total Phosphorus	Total phosphorus digestion, ascorbic acid colorimetry. Discrete Analyser, APHA 4500-P B & E (modified from manual analysis) 22nd ed. 2012. Also modified to include the use of a reductant to eliminate interference from arsenic present in the sample. NWASCA, Water & soil Miscellaneous Publication No. 38, 1982.	0.2 g/m ³	1

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

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Peter Robinson
Peter Robinson MSc (Hons), PhD, FNZIC
Client Services Manager - Environmental



Hill Laboratories

BETTER TESTING BETTER RESULTS

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ANALYSIS REPORT

Client: GJ & RH Rouse
Contact: GJ & RH Rouse
86 Harris Road
RD 2
KAIAPOI 7692

Lab No: 1339248
Date Registered: 15-Oct-2014
Date Reported: 21-Oct-2014
Quote No:
Order No:
Client Reference:
Submitted By: GJ & RH Rouse

Sample Name:		Rouse - G + R 15-Oct-2014 7:20 am	Guideline Value
Lab Number:		1339248.1	
Routine Water + E.coli profile Kit			
Escherichia coli	MPN / 100mL	1	-
Routine Water Profile			
pH	pH Units	7.0	7.0 - 8.5
Total Alkalinity	g/m³ as CaCO₃	53	-
Free Carbon Dioxide	g/m³ at 25°C	9.5	-
Total Hardness	g/m³ as CaCO₃	101	< 200
Electrical Conductivity (EC)	mS/m	27.5	-
Electrical Conductivity (EC)	µS/cm	275	-
Approx Total Dissolved Salts	g/m³	184	< 1000
Total Boron	g/m³	0.0176	-
Total Calcium	g/m³	25	-
Total Copper	g/m³	0.182	< 1
Total Iron	g/m³	0.036	< 0.2
Total Magnesium	g/m³	9.5	-
Total Manganese	g/m³	0.0067	< 0.04 (Staining) < 0.10 (Taste)
Total Potassium	g/m³	1.41	-
Total Sodium	g/m³	14.2	< 200
Total Zinc	g/m³	0.033	< 1.5
Chloride	g/m³	13.3	< 250
Nitrate-N	g/m³	11.0	-
Sulphate	g/m³	18.7	< 250

Note: The Guideline Values and Maximum Acceptable Values (MAV) are taken from the publication 'Drinking-water Standards for New Zealand 2005 (Revised 2008)', Ministry of Health. Copies of this publication are available from <http://www.health.govt.nz/publication/drinking-water-standards-new-zealand-2005-revised-2008>

The Maximum Acceptable Values (MAVs) have been defined by the Ministry of Health for parameters of health concern and should not be exceeded. The Guideline Values are the limits for aesthetic determinands that, if exceeded, make the water unattractive to consumers.

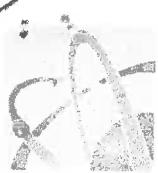
Note that the units g/m³ are the same as mg/L and ppm.

15/10/14 - 16/2/18

Nitrate level has gone up 0.2.



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ANALYSIS REPORT

Page 1 of 4

Client:	GJ & RH Rouse	Lab No:	1921573	DWAP.1
Contact:	GJ & RH Rouse 86 Hairs Road RD 2 Kaiapoi 7692	Date Received:	08-Feb-2018	
		Date Reported:	16-Feb-2018	
		Quote No:		
		Order No:		
		Client Reference:		
		Submitted By:	GJ & RH Rouse	

Sample Type: Aqueous

Sample Name:		Rouse 08-Feb-2018 9:30 am		Guidellne Value	Maximum Acceptable Values (MAV)
Lab Number:		1921573.1			
Routine Water + E.coli profile Kit					
Escherichia coli	MPN / 100mL	< 1		-	< 1
Routine Water Profile					
pH	pH Units	7.2		7.0 - 8.5	-
Total Alkalinity	g/m³ as CaCO₃	53		-	-
Free Carbon Dioxide	g/m³ at 25°C	6.5		-	-
Total Hardness	g/m³ as CaCO₃	99		< 200	-
Electrical Conductivity (EC)	mS/m	28.9		-	-
Electrical Conductivity (EC)	µS/cm	289		-	-
Approx Total Dissolved Salts	g/m³	194		< 1000	-
Total Boron	g/m³	0.0121		-	1.4
Total Calcium	g/m³	25		-	-
Total Copper	g/m³	0.076		< 1	2
Total Iron	g/m³	< 0.021		< 0.2	-
Total Magnesium	g/m³	8.8		-	-
Total Manganese	g/m³	< 0.00053		< 0.04 (Staining) < 0.10 (Taste)	0.4
Total Potassium	g/m³	1.46		-	-
Total Sodium	g/m³	13.7		< 200	-
Total Zinc	g/m³	0.0119		< 1.5	-
Chloride	g/m³	14.5		< 250	-
Nitrate-N	g/m³	11.2		-	11.3
Sulphate	g/m³	15.1		< 250	-

Note: The Guideline Values and Maximum Acceptable Values (MAV) are taken from the publication 'Drinking-water Standards for New Zealand 2005 (Revised 2008)', Ministry of Health. Copies of this publication are available from <http://www.health.govt.nz/publication/drinking-water-standards-new-zealand-2005-revised-2008>

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Note that the units g/m³ are the same as mg/L and ppm.



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ANALYSIS REPORT

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Client:	Mr W Randle	Lab No:	1921572	DW/AP/1
Contact:	Mr W Randle	Date Received:	08-Feb-2018	
	Harris Road	Date Reported:	15-Feb-2018	
	RD 2	Quote No:		
	Kaipoi 7692	Order No:		
		Client Reference:		
		Submitted By:	Mr W Randle	

Sample Type: Aqueous

Sample Name:		Randle 08-Feb-2018 8:15 am	Guideline Value	Maximum Acceptable Values (MAV)
Lab Number:		1921572.1		
Routine Water + E.coli profile Kit				
Escherichia coli	MPN / 100mL	< 1	-	< 1
Routine Water Profile				
pH	pH Units	7.0	7.0 - 8.5	-
Total Alkalinity	g/m³ as CaCO₃	57	-	-
Free Carbon Dioxide	g/m³ at 25°C	11.2	-	-
Total Hardness	g/m³ as CaCO₃	102	< 200	-
Electrical Conductivity (EC)	mS/m	28.8	-	-
Electrical Conductivity (EC)	µS/cm	288	-	-
Approx Total Dissolved Salts	g/m³	193	< 1000	-
Total Boron	g/m³	0.0127	-	1.4
Total Calcium	g/m³	26	-	-
Total Copper	g/m³	0.040	< 1	2
Total Iron	g/m³	< 0.021	< 0.2	-
Total Magnesium	g/m³	9.0	-	-
Total Manganese	g/m³	< 0.00053	< 0.04 (Staining) < 0.10 (Taste)	0.4
Total Potassium	g/m³	1.50	-	-
Total Sodium	g/m³	13.5	< 200	-
Total Zinc	g/m³	0.0081	< 1.5	-
Chloride	g/m³	13.6	< 250	-
Nitrate-N	g/m³	10.4	-	11.3
Sulphate	g/m³	15.4	< 250	-

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ANALYSIS REPORT

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Client:	S Paull	Lab No:	1626982	DW/SP-1
Contact:	S Paull	Date Received:	05-Aug-2016	
	C/- Fruited Supplies	Date Reported:	11-Aug-2016	
	PO Box 3100	Quote No:		
	Riccarton	Order No:	54049501	
	Christchurch 8042	Client Reference:		
		Submitted By:	S Paull	

Sample Type: Aqueous				
Sample Name:		S Paull 05-Aug-2016 7:00 am		
Lab Number:		1626982.1		
Routine Water + E.coli profile Kit			Guideline Value	Maximum Acceptable Values (MAV)
Escherichia coli	MPN / 100mL	< 1	-	< 1
Routine Water Profile				
pH	pH Units	7.7	7.0 - 8.5	-
Total Alkalinity	g/m ³ as CaCO ₃	53	-	-
Free Carbon Dioxide	g/m ³ at 25°C	2.2	-	-
Total Hardness	g/m ³ as CaCO ₃	81	< 200	-
Electrical Conductivity (EC)	mS/m	22.2	-	-
Electrical Conductivity (EC)	µS/cm	222	-	-
Approx Total Dissolved Salts	g/m ³	149	< 1000	-
Total Boron	g/m ³	0.0148	-	1.4
Total Calcium	g/m ³	21	-	-
Total Copper	g/m ³	0.0111	< 1	2
Total Iron	g/m ³	< 0.021	< 0.2	-
Total Magnesium	g/m ³	7.2	-	-
Total Manganese	g/m ³	< 0.00053	< 0.04 (Staining) < 0.10 (Taste)	0.4
Total Potassium	g/m ³	1.31	-	-
Total Sodium	g/m ³	11.9	< 200	-
Total Zinc	g/m ³	0.086	< 1.5	-
Chloride	g/m ³	9.9	< 250	-
Nitrate-N	g/m ³	8.6	-	11.3
Sulphate	g/m ³	12.3	< 250	-

Note: The Guideline Values and Maximum Acceptable Values (MAV) are taken from the publication 'Drinking-water Standards for New Zealand 2005 (Revised 2008)', Ministry of Health. Copies of this publication are available from <http://www.health.govt.nz/publication/drinking-water-standards-new-zealand-2005-revised-2008>

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1029 SOUTH EYRE ROAD



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Diversion Road site

22/02/2018

Two days after
rainfall of 75mm