



Assessment of Separation Distances

Te Mata Mushrooms

Prepared for
Hastings District Council

Prepared by
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Table of contents

1	Introduction	1
2	Odour from Te Mata Mushrooms	2
3	Separation distances for industrial activities	3
3.1	Need for appropriate separation	3
3.2	New Zealand guidelines	3
3.3	Australian guidelines	3
3.4	Measuring separation distance	4
4	Sensitivity to amenity effects of odour and dust	6
4.1	Sensitive activities	6
4.2	Activities suitable for within buffer areas	6
5	Meteorological data	7
6	Previous site visit findings	9
7	Complaints records	10
8	Recommended separation distance	11
9	Applicability	12

Appendix A : Figure showing Recommended Buffer Area

1 Introduction

Tonkin & Taylor Ltd has been engaged by Hastings District Council to undertake an assessment of recommended separation distances between Te Mata Mushrooms (TMM) and future sensitive activities. This report has been prepared in accordance with our letter of engagement dated 8 March 2016. The purpose of this report is to:

- 1 A brief discussion of the need for separation distances between industrial facilities and sensitive activities to avoid adverse effects of emissions to air, including amenity effects of dust and odour.
- 2 A summary of published guidance on separation distances from mushroom farms to mitigate amenity effects of dust and odour and avoid reverse sensitivity effects. This will include identifying activities sensitive to amenity effects and discussion of amenity expectations in different zones;
- 3 A review of the Arataki extension meteorological data (provided by Hawkes Bay Regional Council);
- 4 A summary of the findings of the previous site visit;
- 5 Recommendation of appropriate separation distances to sensitive activities or zones providing for residential activities, from Te Mata Mushrooms; and
- 6 Preparation of maps showing the proposed separation distances overlaid on the aerial plan showing the proposed development areas.

2 Odour from Te Mata Mushrooms

A detailed discussion of the nature of TMM activities and potential for odour from TMM was included in the Reverse Sensitivity Assessment prepared by Jacobs.

The sources of odour were identified as:

- Storage of raw materials, particularly chicken litter and straw bales wetted with effluent;
- Manufacture, pasteurisation, transfer and storage of mushroom compost ;
- Mushroom growing;
- Storage and off-site disposal of spent compost;
- Management of wastewater/leachate; and
- Discharge of wastewater to land via travelling irrigator.

The odours from mushroom composting are typically referred to as musty/mouldy and compost/earthy but can also be described as rotting vegetation, rotten/dead animal, sulphurous or sewage odour.

The manufacture, pasteurisation, transfer and storage of mushroom compost is identified as the source with the highest potential for off-site odour.

3 Separation distances for industrial activities

3.1 Need for appropriate separation

The establishment of separation distances (also commonly referred to as buffer areas) which separate industrial activities from more sensitive activities, is a recognised land use planning tool. These separation distances serve both to protect industrial activities from encroachment and reverse sensitivity effects as well as to minimise potential effects on sensitive activities from the legitimate operation of industrial activities. In this context sensitive activities include activities with an expectation of high amenity or where there is a high density of people which increases the potential for amenity effects.

The maintenance of adequate separation distances is not intended to be a substitute for good on-site controls to minimise effects of air emissions and do not detract from resource consent conditions that require consent holders to manage effects beyond the boundary of their site. However, this approach recognises that even when industries adopt good pollution control technology and management measures, there may still be unintended emissions as a result of factors such as equipment failure, accidents or unusually adverse weather conditions.

In an existing developed area, it is likely that there will be pre-existing conflicts between incompatible land uses arising from historic development. The main purpose of considering recommended separation distances in relation to TMM is to inform decisions about changing the sensitivity of an area by re-zoning an area from Rural to Residential.

3.2 New Zealand guidelines

There are no relevant New Zealand guidelines for separation distances from industrial facilities to protect against air quality effects. The Auckland Council commissioned a discussion document on separation distances for industry that was published in July 2012¹. This discussion document was largely based on a review of Australian guidance (as discussed in the following section).

3.3 Australian guidelines

As discussed above there are a number of Australian guidelines for separation distances based on potential for amenity effects. The current Tasmanian guidance was prescribed in 1996 and because of its age has not been used in preference to the more recent guidance from other Australian states.

Table 3.1: Australian guidance documents on separation distances

Guidelines	State	Basis for guideline
South Australia EPA best guidance for separation distances (2007) (SA EPA)	South Australia	Odour and dust
Victorian EPA, Recommended Separation Distances for Industrial Residual Air Emissions – Guideline (March 2013) (Vic EPA)	Victoria	Odour and dust
Western Australia, Guidance for the Assessment of Environmental Factors, No. 3, Separation Distances between Industrial and Sensitive Land Uses (June 2005) (WA EPA)	Western Australia	Odour, dust, noise and vibration

¹ Emission Impossible Ltd. Separation distances for industry – a discussion document. July 2012

3.4 Measuring separation distance

The Vic EPA guidance document provides useful information on how the Victorian separation distance guidelines should be used and the approach to measuring the separation distance. The Vic EPA recommends two different approaches for measuring separation distances based on the property size of both the industrial site and sensitive land use. These methods are described as the 'Urban' method and the 'Rural' method. The Rural method is only recommended for rural areas with property sizes greater 4000 square metres.

In this report, it has been assumed that the separation distances will be used to inform decisions about re-zoning land to Residential zones, where the lot sizes will typically be less than 3000 square metres. Therefore the Vic EPA Urban method is considered to be the most appropriate.

Using the Urban method, the separation distance is measured from the "activity boundary"² of the industrial activity to the property boundary of the nearest sensitive land use, as illustrated in Figure 3.1. This approach means that the separation distance is achieved through a combination of "internal" and "external" separation, i.e. some of the required separation distance is internalised within the property boundary of the industrial site.

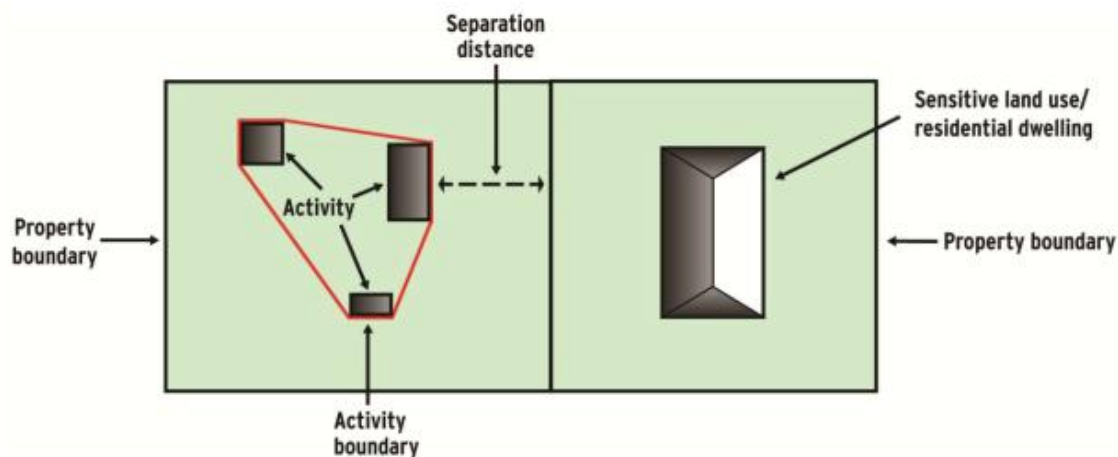


Figure 3.1: Measurement of separation distance (excerpt from Vic EPA Guidelines)

The measurement approach described above does not take account of the potential for expansion of an industrial activity in the future. However, if the separation distance were measured from the property boundary of the industrial site this would fully externalise the separation distance and could be seen as unnecessarily limiting the use of land outside the industrial site when the likelihood and nature/scale of any future expansion is unknown.

It is also noted that changes to the activity area on an industrial site such as TMM would require an amendment to the resource consent for discharges to air, which would trigger a full re-evaluation of the adequacy of site controls, and current separation distances to sensitive activities.

In the context of informing decisions about the appropriateness of re-zoning land, the recommended separation distances should be measured from the activity boundary (of the industrial site) to the proposed boundary of the more sensitive zone as this will become the boundary of the nearest sensitive land use.

Only two Australian states specifically identify relevant separation distance guidelines for mushroom farms. The Vic EPA guidance states that the separation distance needs to be determined on a case by

² The activity boundary of the industrial activity is the area that includes all current or proposed industrial activities with the potential to cause industrial residual air emissions.

case basis. The WA EPA guidance gives a recommended distance of 500 metres to 1 km depending on the size of the facility. No guidance is provided on what is considered a large or small mushroom farm to determine what distance would be appropriate for a facility the size of TMM.

The purpose of the Vic EPA and WA EPA guidelines also vary. The Vic EPA guidelines anticipate that the separation distances are met and maintained for all sites, with applications being made to reduce the separation distances in specific cases.

The WA EPA guidelines anticipate that a site specific assessment will be undertaken for most major sites and developments and that this will be used as the basis for establishing buffer distances. The generic separation guidelines assist in identifying when detailed site-specific assessments may not be necessary.

The WA EPA guidance provides an explanation of when the generic separation distances should be used including:

- to identify the need for specific buffer definition studies where:
 - a new industrial land use is proposed near an existing or proposed sensitive land use;
 - a new sensitive land use is proposed near an existing or proposed industrial land use; and
- to provide general guidance on separation distances in the absence of site specific technical studies, or, where only an estimation of the area that could be subject to land use conflicts is required.

The WA EPA guidance also highlights that the separation distances should be used with caution in strategic and structure planning exercises, and in situations where cumulative impacts may result.

Overall, we consider that the WA EPA generic guidelines do not by themselves provide a sound basis for establishing a separation distance to TMM. However, they do provide an indication of the distances within which odours from mushroom farms can have impacts if not appropriately managed or located.

4 Sensitivity to amenity effects of odour and dust

4.1 Sensitive activities

The recommended separation distances refer to the distance between an industrial activity and a sensitive land use. The Vic EPA guidance defines "sensitive land uses" as "*any land uses which require a particular focus on protecting the beneficial uses of the air environment relating to human health and wellbeing, local amenity and aesthetic enjoyment for example residential premises, child care centres, pre-schools, primary schools, education centres or informal outdoor recreation sites*".

Although the definition refers more broadly to human health and wellbeing, the Vic EPA guidance is clear that it has been developed in consideration of industries that emit odour or dust, and therefore potential health effects of other air emissions are not explicitly factored into the separation distances.

Residential dwellings (and their immediate environs) are identified as sensitive to amenity effects. This is because people can spend a significant portion of the day at home and also because of the nature of activities being undertaken (eating, entertaining, enjoying leisure time, etc.).

4.2 Activities suitable for within buffer areas

The buffer area (i.e. the area within the recommended separation distance) can be used for a range of activities with a reduced sensitivity to amenity effects. Activities may be less sensitive to reduced air quality amenity because of the nature of the activities themselves, because they are only occupied for part of the time or because there are practical means to minimise the impact on their activities (for example dust filters on air conditioning inlets).

Activities within the buffer area should also not have the potential to generate appreciable dust or odour emissions (i.e. require any further separation distance). Examples of activities that would be appropriate within a buffer area include (not an exhaustive list):

- Agricultural activities;
- Service stations;
- Warehousing and distribution;
- Indoor service-type activities such as veterinary clinics or fitness centres;
- Light engineering; and
- Light industrial or manufacturing activities (excluding activities such as food production that require high air quality amenity) that do not generate appreciable dust or odour emissions.

5 Meteorological data

The TMM site is located on the north eastern edge of Havelock North which is located at the base of Te Mata Peak.

The closest long term meteorological station is located at Whakatu, approximately 6km to north of the TMM site. The station is operated by NIWA as part of the national meteorological network.

In addition to the permanent meteorological station, Hawkes Bay Regional Council have operated a temporary meteorological station on Arataki Road, approximately 200 metres to the west of the site.

Wind roses for the two sites are presented below.

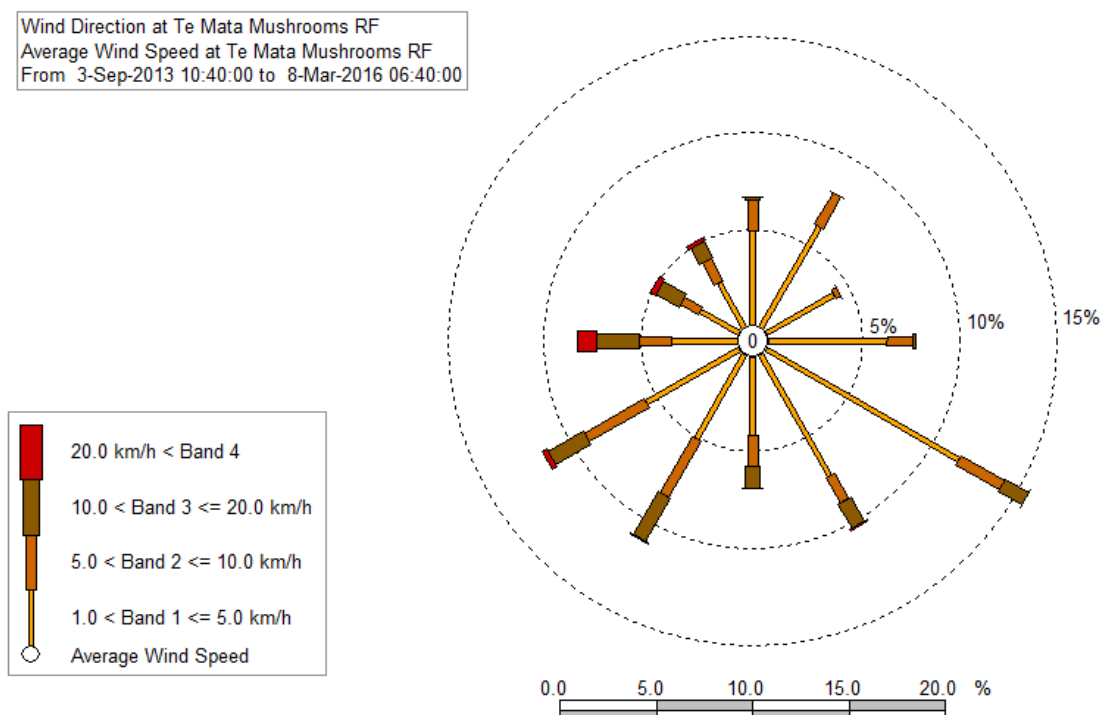


Figure 5.1: Wind rose Arataki Road

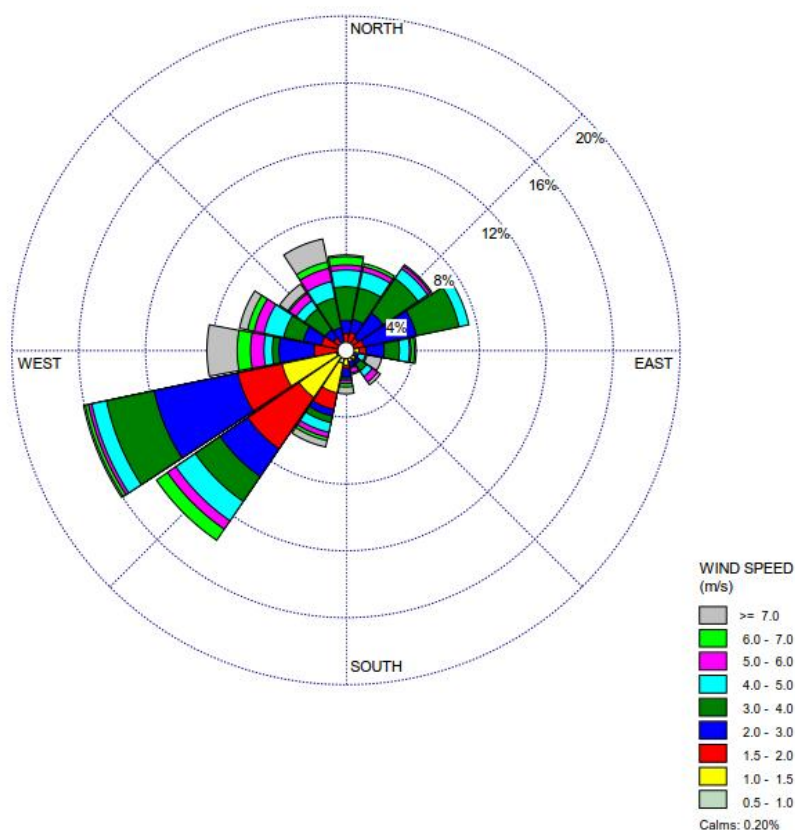


Figure 5.2: Wind rose Whakatu

While the two sites are only 6km apart, the Arataki Road site shows a significant proportion of winds from the south east quadrant, while the Whakatu site shows negligible winds from the same quadrant.

The large variation between the two windroses suggests that the northern area of Havelock North, including the TMM site area, experiences quite different meteorological conditions to the general prevailing conditions in Hawkes Bay (as indicated by the WHakatu data). During the site visit, the winds experienced at the TMM site was much lighter and blowing from different directions to those at Napier Airport and Whakatu.

A plausible explanation for this variation is the presence of Te Mata Peak, which lies immediately to the south of Havelock North and runs in SW to NE direction, with likely wind shear occurring around the terrain.

6 Previous site visit findings

A site visit was undertaken by Rob Van de Munckhof (T+T) on the 19 October 2015 as part of the scope of our review of potential reverse sensitivity effects on the proposed Arataki Extension dated (T+T report dated 22 October 2015). The site visit included a walk-over of the TMM site (accompanied by TMM staff) and the proposed Arataki Extension sites.

During the site walk-over at the TMM site, the phase one compost was being turned between two phase one bunkers. This involved using a front end loader to move the compost material from the first bunker and place the material into a compost turner located within the second bunker. No turning of material was being undertaken out on the open yard areas.

Two further odour sources were also identified while on-site. The first was the compost wastewater pond. Initially the pond aeration was not operating and there was an apparent cat pee type odour downwind of the pond. The aeration was turned on by TMM staff during the site visit which resulted in a hydrogen sulphide type odour. TMM staff advised that the aeration creates a heavy foam that minimises any odours from the pond, although this could not be confirmed during the site visit.

The second further source was from pigs on the adjacent property, which was apparent around 100 metres downwind of that source (not related to the TMM site).

TMM staff advised that the odours identified on-site were typical of those during turning of the phase one compost material.

The biofilter was also inspected, with a bark type odour apparent on the biofilter bed indicating that the biofilter is effectively treating any odours passed through the bed.

During the site walk-over odour from the turning of the phase one compost was identified on the TMM site, including immediately adjacent to the phase one bunkers, and up to 350 metres downwind of the bunkers on the main driveway to the site to the north west of the phase one bunkers. The on-site odour strength varied between 'very strong' to 'apparent' and had a chicken manure/ ammonia type character.

Gusting odours with the same character as those identified on-site from the phase one turning were identified on the land to the west on Arataki Road. The odours were present intermittently in short periods of around 10 seconds while walking around.

The distance between the phase one bunkers and the areas where odour was identified was approximately 130 to 170 metres. Discussions with landowners indicated that odour is present at their dwellings around one to two times a month, with the dwellings located between 200 and 400 metres from the phase one bunkers.

The wind speed and directions during the site visit also indicated that the meteorological conditions at the TMM site and surrounding area are heavily influenced by terrain. The closest meteorological site is located at Napier airport which reported strong winds from the west with gusts of up to 69 km/hr at the time of the site visit. In contrast, the wind at the TMM site and Arataki Extension area was a light wind from the south-east. The wind on the Arataki Extension area was shifting between south-east and east.

7 Complaints records

A review of the odour complaint history for TMM was undertaken by Jacobs as part of the Reverse Sensitivity Assessment for Arataki Re-zoning proposal dated April 2015. This review identified that the majority of complaints were located to the south west of the TMM site. The odour complaints records sourced from Hawkes Bay Regional Council are shown graphically in Figure 7.1 below. The area to the southwest of the TMM site has recently been developed for residential activities. Complaints have been received from properties up to 700 metres from the TMM site, however the majority of complaints (over 95%) were within 600 metres of the TMM site.

There have been no complaints recorded from the properties on the northern end of Arataki Road, even though they are within 400 to 500 metres from the site. The complaints records do not show any relationship with the predominant wind directions as identified by the wind rose for the met station on Arataki Road.



Figure 7.1: Complaints history

8 Recommended separation distance

Overall we recommend a separation distance of 600 metres from the active composting area on the TMM site and 500 metres from other operational areas. Based on these two distances, the recommended buffer area is shown on Figure 1 in Appendix A.

The recommended separation distances are based on the following key factors:

- TMM continues effective management of odours on-site and maintains compliance with the conditions of their resource consents;
- The level and potential effects of odour from different activities at TMM vary, with the active composting areas identified as the main source of odour, although other areas of the site have potential for odour during certain circumstances and if not well managed;
- Published recommended separation distances (WA guidelines) for mushroom farming are between 500 and 1,000 metres depending on the size of the operation;
- The complaints records for TMM show that odour has been reported up to 700 metres away from the site, but that over 95% of complaints have been received from properties within 600 metres of the TMM operational areas;
- During the site walkover, odour was identified up to 400 metres from the site with site staff indicating that the operations being undertaken at the time were representative of typical activity at the site;
- There is some uncertainty about meteorological conditions at the TMM site, with significantly different wind patterns recorded on Arataki Road compared to the conditions measured at the long term weather monitoring station at Whakatu. These differences could be explained by wind shear around Te Mata peak.

The buffer area shown on Figure 1 identifies the distance beyond which we consider there is a low risk of experiencing odours from TMM activities, based on consideration of the factors set out above. While we consider that the risk of odour effects on future residential properties outside this buffer area are low, this does not guarantee that no odour will be experienced beyond these distances (nor does it mean that the area within the separation distances will necessarily experience significant odours).

The proposed buffer area includes a small area to the west of Brookvale and Davidson Roads (shown in hatching on Figure 1). While this area is within the recommended separation distance, it may still be appropriate to provide for future residential in this area for practical land use planning reasons, such as contiguity of land uses. If this area were to be considered for residential development, we recommend:

- additional field odour monitoring to more accurately describe the actual level of odour effects at this location, and/or
- consideration of mechanisms such as 'no complaint' covenants on titles and/or development controls (such as controls on site layout or building design) to manage the potential for reverse sensitivity effects on TMM.

9 Applicability

This report has been prepared for the exclusive use of our client Hastings District Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Tonkin & Taylor Ltd

Report prepared by:



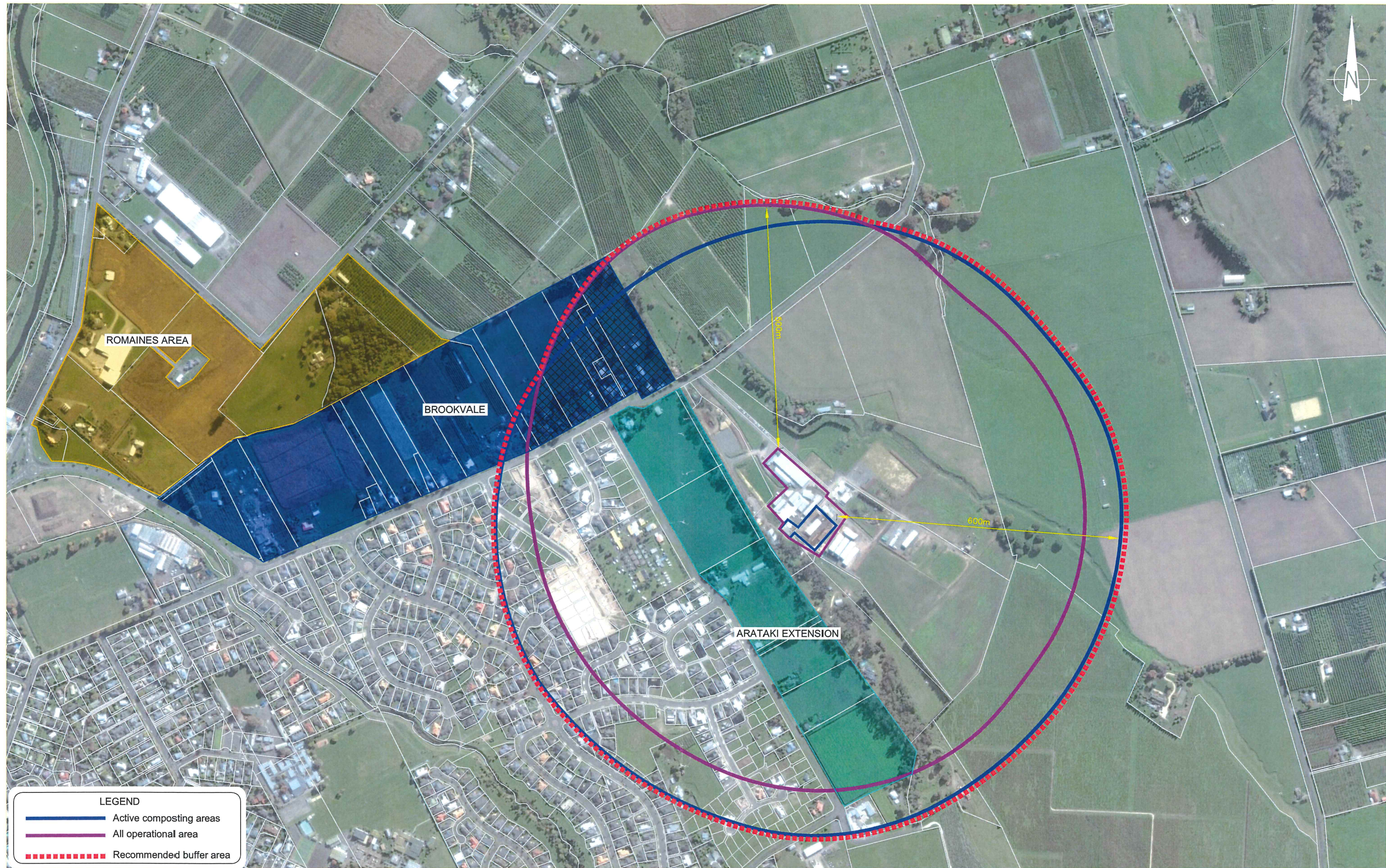
Rob Van de Munckhof
Senior Environmental Engineer

Authorised for Tonkin & Taylor Ltd by:



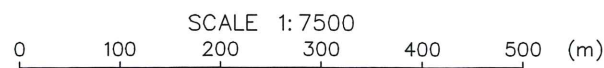
Jenny Simpson
Project Director

Appendix A: Figure showing Recommended Buffer Area



LEGEND

- Active composting areas
- All operational area
- Recommended buffer area



Aerial photo sourced from Google Earth. Copyright Image©2016 DigitalGlobe Imagery Date: 26-4-2014.
 Property boundaries sourced from Land Information New Zealand data as at 9-Feb-2016 (Crown Copyright Reserved).

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CADFILE : 29 125.003-F 1.dwg SCALES (AT A3 SIZE) 1: 7500			
PROJECT No. 29 125.003			FIG. No. Figure 1
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