STRADEGY
Urban, Environmental & Strategic Planning

Resource Consent Application for Discharge of Contaminants to Air

464 Mt Herbert Road, Waipukurau

Te Mata Mushrooms Land Company Limited

17013AP3
23rd November 2020

APPLICATION DETAILS

Consent Authority:	Hawke's Bay Regional Council
The Applicant:	Te Mata Mushrooms Land Company Limited
Address for Service:	Stradegy Planning Limited, PO Box 239, Napier 4140
Address for Invoice:	PO Box 8137, Havelock North 4157

Site Details:

Street Address: .....464 Mt Herbert Road, Waipukurau
Legal Descriptions: .....Lot 1 DP 427319

Activity for which Consent is sought:

Resource consent is sought to discharge contaminants into air from a mushroom compost production facility and associated activities as a Discretionary Activity under Rule 28 of the Regional Resource Management Plan.

Prepared by:

Claire Price BRP(HONS) MNZPI
Senior Planner

Reviewed and Approved for Release by:

Cameron Drury BRP(HONS) MNZPI
Principal Planner I Director

TABLE OF CONTENTS

Appendices –

1. Site Plan
2. AQP: Odour Effects Assessment
3. Certificate of Titles

1. INTRODUCTION

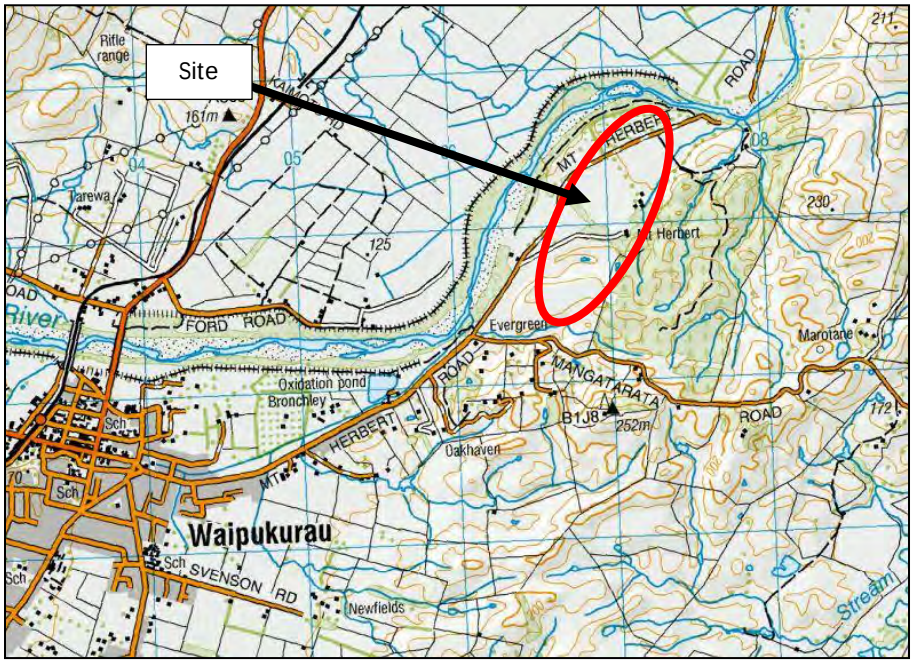
The applicant seeks to establish a compost production facility at 464 Mt Herbert Road, Waipukurau.

The composting operation will be designed as a modern "best practice" facility with automated machinery and extensive air extraction and treatment to help minimise odour emissions from the composting processes. Despite this design, there will be some residual or fugitive odour emissions from the composting facility, including some emissions that are present 24 hours per day (predominantly from the biofilter) and other emission sources that are present only for a few hours per week (during bale breaking, bunker-to-bunker transfers for mixing Phase 1 compost, and removal of completed Phase 1 compost from the bunkers).

The applicant searched for an appropriate site to establish a new compost production facility that enables efficient production, is in keeping with the surrounding character and amenity, and avoids adverse effects on sensitive activities beyond the site. The 464 Mt Herbert Road site is a Rural Zone property located at the end of Mt Herbert Road and fulfils these requirements. Refer to Figure 1 for the general location of the activity.

Based on expert input provided by Air Quality Professions following modelling of various odour sources and scenarios, together with considerations around the frequency, intensity, duration, offensiveness and location of odours that may occur, offensive and objectionable odour beyond the boundary is not anticipated and the effects of the proposal are considered less than minor.

Figure 1Figure 1: Location of Activity



1.1 Overview

Te Mata Mushrooms (TMM) is an established compost production and mushroom farm business in the Hawkes Bay. TMM seeks to establish and operate a new compost production facility and seeks resource consent to discharge contaminants (odour) into air as part of the processes involved in making compost at the scale proposed.

The applicant has considerable experience in the operational requirements of a commercial mushroom farm, particularly concerning the production of compost substrate and is very aware of reverse sensitivity matters. Consequently, the design and site planning of the proposed activity is well informed and reflects this experience. In addition, expert advice on environmental matters such as odour management is reflected in the design.

The application has been informed by the report prepared by Air Quality Professionals Party Limited (AQP) provided in Appendix 2.

Overall, it is considered that any actual and potential adverse odour effects can be either avoided through design and management of the composting processes and/or mitigated by way of distance from site and notional boundaries. Subject to good on site management, objectionable or offensive odours beyond the wider site boundary are not anticipated.

The following report has been prepared in accordance with Schedule 4 of the Resource Management Act (RMA) and meets the requirements of Form 9. The level of detail provided is commensurate to the scale and significance of effects that the activity may have on the environment.

1.2 Consents Required

The production of compost at a commercial scale involves the following key activities and processes:

- storage of raw materials (straw, gypsum and chicken litter),
- the development of compost from the raw materials, over two distinct phases/processes.

A site plan for the proposed activity is provided in Appendix 1 of this application.

A discharge of contaminants (odour) to air arise to varying degrees from the activities listed above.

Activities involving the discharge of contaminants into air derived from an industrial or trade premise are regulated by Rules 28 and 29 of the Regional Resource Management Plan (RRMP).

Rule 28 specifically accommodates composting activities where more than 100m^3 of raw material, composting material and compost is held on the premise(s) at any one time. As the operation is characterised by a volume of greater than 100m^3 of raw material, composting material and compost at any one time, it must be classified as a Discretionary Activity under Rule 28 of the RRMP.

1.3 Other Consents Required

To operate at the site, the proposed compost production facility and associated activities also requires a land use consent from the Central Hawkes Bay District Council (CHBDC). This application has been applied for concurrently.

Other discharge consents required under the Regional Resource Management Plan (RRMP) to be applied for at a later date may include:

- Discharge of stormwater a stormwater discharge permit; and
- Discharge of washdown/goodie water from the composing pad.

2. SITE AND SURROUNDS

The following provides a description of:

1) The subject site,
2) Surrounding environment,
3) Cultural Values,
4) Sensitivity of the Receiving Environment.

2.1 Subject Site

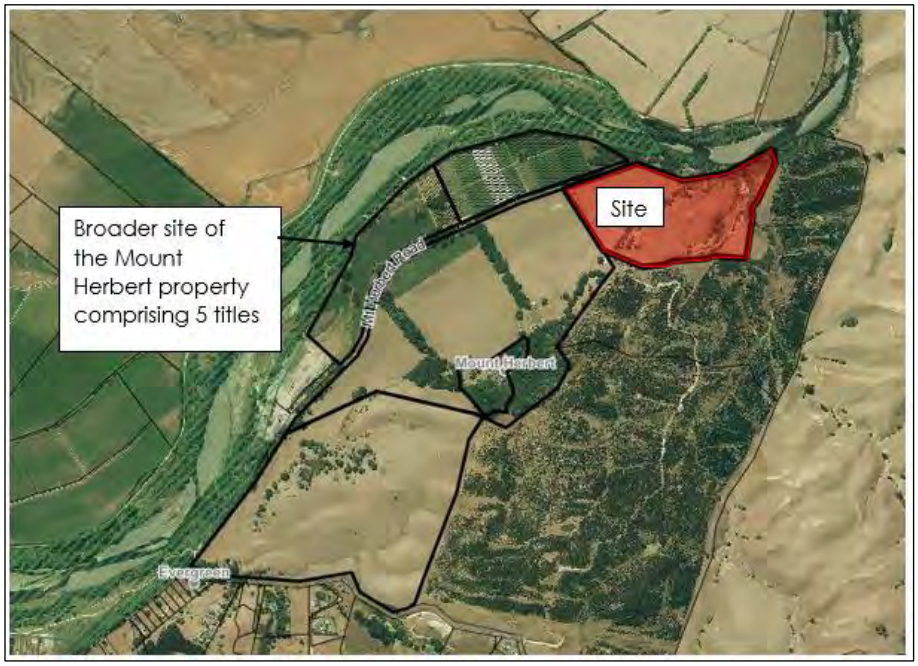
The subject site is 464 Mt Herbert Road (Lot 1 DP 427319) as shown in Figure 2 below. Although a separate site in itself, the following includes a description of the overall Mount Herbert property (the broader site) which comprises the following 5 parcels of land held in five separate titles with a total area of 114.9111 hectares (ha)

Legal Description	Area
Lot 1 DP 21840	9.8153ha
Lot 2 DP 21840	10.0113ha
Lot 1 DP 22481	39.4430ha
Lot 2 DP 401209	39.4946ha
Lot 1 DP 427319	16.1469ha
Total Area	114.9111ha

Certificate of Titles are provided in Appendix 1.

The site at 464 Mt Herbert Road is relatively isolated, as it is located at the end of a no exit road (Mt Herbert) and 'hidden' away due to the topography surrounding it.

Figure 2: Subject Site (464 Mt Herbert Road) and larger Mt Herbert Property (302, and 367 Mt Herbert Road) (Source: CHBDC GIS)



Existing Land use and buildings

The existing use of the broader site is a pastoral grazing farm east of Mt Herbert Road and there is an area of river flats to the west of the road. There are two residential dwellings and associated farm utility buildings within the broader site. These are positioned within the elevated hills, east of the site and described as follows:

- House and farm buildings at the far eastern side of 464 Mt Herbert Road, near the boundary with the Tukituki River esplanade, and
- House and farm buildings at the south-east side of 302 Mt Herbert Road, near the Mount Herbert homestead.

There is an irrigation bore shed close to the road boundary.

Road and Vehicular Access

There are existing vehicle accesses to the residential dwellings described above at 302 and 464 Mt Herbert Road. The river flats are accessed from Mt Herbert Road. Mt Herbert Road stops at the esplanade boundary of the Tukituki River.

Services

Water supply to the residential dwellings is rainwater. An existing bore and groundwater take supplies the orchard with water as provided for in the water permit from Hawkes Bay Regional Council (ref WP120270T, WP120270a). Further, WP170596T, WP120270Ta, LU170595C enables

works to construct a dam in the bed of an ephemeral water body and to take water at high flow and to dam the above water body at 302 Mt Herbert Road.

There is no connection to a wastewater system and existing residential dwellings would have an on-site system.

2.2 Surrounding Environment

The surrounding environment is a mix of rural, industrial and recreational characteristics and amenity.

Mt Herbert road commences from the township of Waipukurau and extends north-east towards the Tukituki River. The character of the road gets increasingly rural as the surrounding land uses move from urban to rural. At the subject site, Mt Herbert Road is a metal road that becomes a recreation track at the termination of the site and beginning of the Tukituki River esplanade. The Tukituki Trail comprises a formed bike track within the Tukituki River esplanade.

North of the subject site is the Tukituki River and its esplanade area, beyond that the land comprises open paddocks and is zoned Rural in the Central Hawkes Bay District Plan (CHBDP).

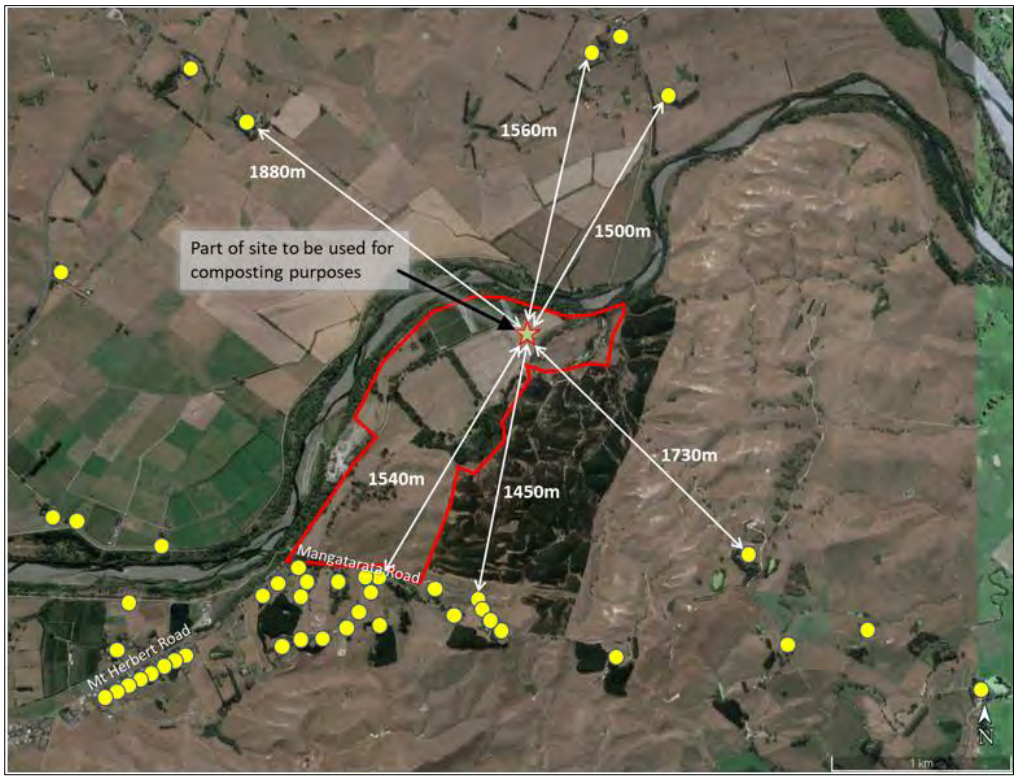
South west of the subject site, and accessed from Mt Herbert Road, is an operational gravel extraction facility. Further south-west, along Mt Herbert Road, is the Waipukurau wastewater treatment facility. East of the subject site is rolling hill country supporting forestry, and recreational activities.

South of Mangatarata Road are rural residential lifestyle activities, and strips of residential houses that line Mt Herbert Road at the Waipukurau township periphery. The nearest house is approximately 1.4km from the location of the proposed compost facility as shown on Figure 3 below.

The topography of the area is characterised by a mix of rolling hills, flat pastoral land, and a shallow valley system defined by the Tukituki River and the Waipawa River. The part of the site proposed for the compost and mushroom growing operation is on flat land at an elevation of about 120m above sea level, with the river to the immediate east and north, and rolling hills peaking at 250m above sea level to the immediate west and south. The houses to the south of the site on Mangatarata Road shown on Figure 3 are located along the higher slopes of these rolling hills.

While a number of subdivision proposals in accordance with the minimum lot size framework of the District Plan for the Rural Zone have been obtained, none have been exercised, thus the existing environment is as described above.

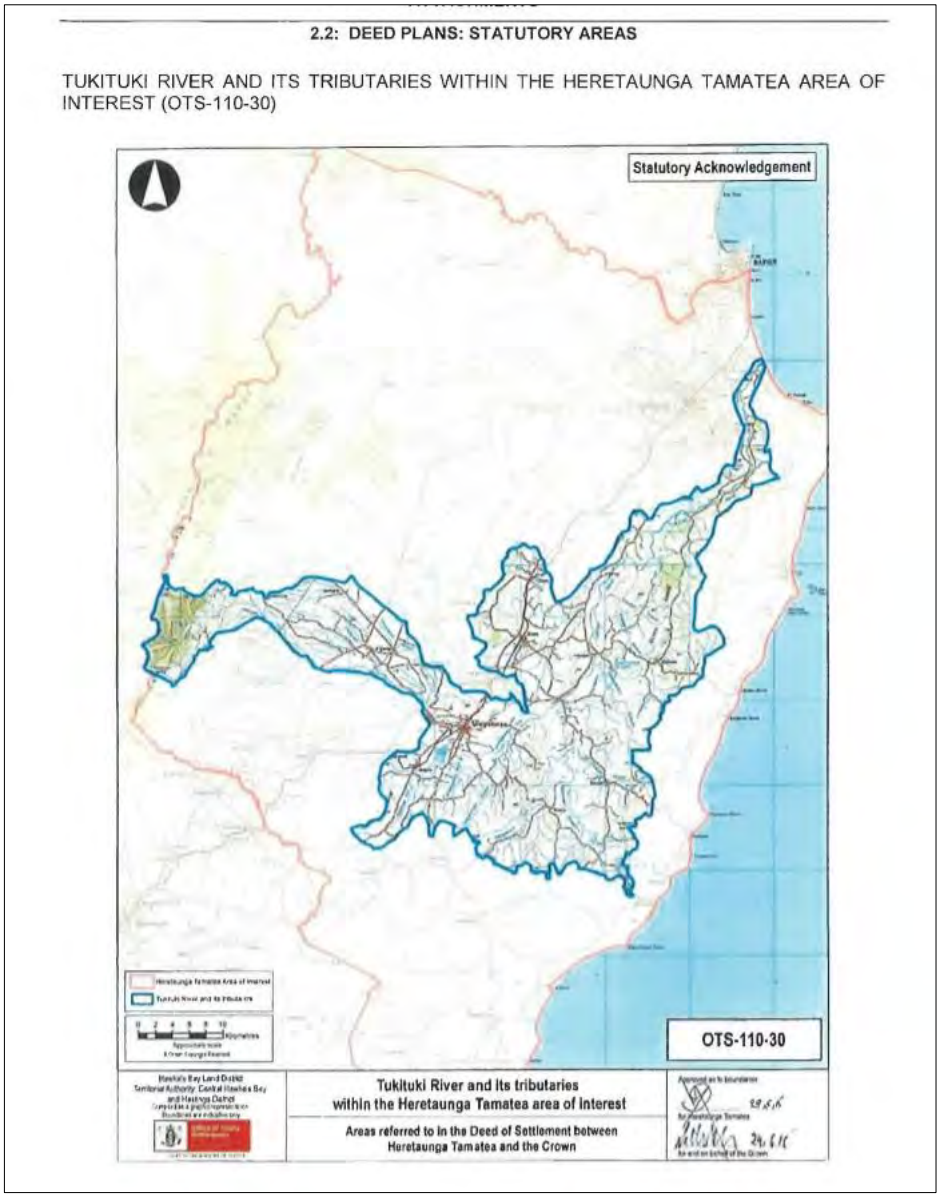
Figure 3: TMM Site (red outline) in relation to nearby residential dwellings (yellow circles), (Source: AQP Report, dated October 2020)



Cultural Values

The subject site is within the Statutory Acknowledgement Area associated with the Tukituki River and tributaries as part of the Heretaunga Tamatea Deed of Settlement, as shown on the Deed Plan OTS-110-30 for Statutory Areas. See Figure 4 below for a copy of the relevant Deed Plan.

Figure 4: Deed Plan OTS-110-30 for Statutory Areas, Heretaunga Tamatea Deed of Settlement



It is noted that Section 31 of the Heretaunga Tamatea Claims Settlement Bill sets out the application of the statutory acknowledgement and deed of recognition to a river or stream and states:

General provisions relating to statutory acknowledgement and deeds of recognition

Section 31 Application of statutory acknowledgement and deed of recognition to river or stream

(1) If any part of the statutory acknowledgement applies to a river or stream, including a tributary, that part of the acknowledgement—

(a) applies only to—

(i) *the continuously or intermittently flowing body of fresh water, including a modified watercourse, that comprises the river or stream; and*

(ii) *the bed of the river or stream, which is the land that the waters of the river or stream cover at their fullest flow without flowing over the banks of the river or stream; but*

(b) *does not apply to—*

(i) *a part of the bed of the river or stream that is not owned by the Crown; or*

(ii) *an artificial watercourse.*

(2) *If any part of a deed of recognition applies to a river or stream, including a tributary, that part of the deed—*

(a) *applies only to the bed of the river or stream, which is the land that the waters of the river or stream cover at their fullest flow without flowing over the banks of the river or stream; but*

(b) *does not apply to—*

(i) *a part of the bed of the river or stream that is not owned and managed by the Crown; or*

(ii) *the bed of an artificial watercourse.*

While the proposed site adjoins the Tukituki River esplanade, it is on private land and not within the bed of the Tukituki River, or any tributary. However, the proximity of the site to the river may still require consideration of the Statutory Acknowledgement.

The statement of association for each statutory area is set out in the Deed of Settlement Schedule Documents. In relation to the Tukituki River the following statement is made:

> *Tukituki River and its tributaries within Heretaunga Tamatea area of interest*
>
> *A narrative exists on the way in which the Tukituki River came into existence. A large lake was located in what is now the Ruataniwha Plains. Two taniwha lived in this lake. On one occasion a boy fell into the lake and the two taniwha fought over their prey. The resulting destruction on the landscape created breaks in the hills through which the lake drained away. One of the channels was the Tukituki River.*
>
> *After the arrival of the Ngati Kahungunu tIpuna to Heretaunga, the Tukituki River was established as the first boundary between Taraia, who took the land to the west of this river, and Te Aomatarahi who took the land to east and south of the river. The Tukituki is a significant waterway for the hapu of Heretaunga Tamatea. It was used extensively for mahinga kai, and for transporting people and goods.*
>
> *All along the Tukituki River are signs of occupation and sites that record key events in tribal history. On the lower section of river, there are a number of sites that relate to the actions of the ancient tipuna, Mahu. On the north bank is a white rock, Papaotihi. It is said the rock was once a man who was fishing in the river, but he was turned to stone by Mahu. A little further on is another rock, Tauhou, where Mahu turned another man to stone. Down river near Te Kauhanga pa is another spot touched by Mahu. Here he put a curse on the paepae and people died.*

The river mouth was renowned for the abundance of fish species that were taken there. These included; kahawai, patiki, kanae, kataha, kokopu, inanga and tuna. Near the river mouth is Whakamarino where a battle took place at which another iwi was defeated by Tamaiawhitia. The kainga of Haumoana is also located here. Another pa is Te Kauhanga which was occupied first by Taraia I and then Te Whatuiapiti. Further up the river there is a large cliff, Pariwaiehu. Here Te Waka's pa was located, later taken by Hawea.

In the lower reaches of the Tukituki, to the east of Havelock North, the pa Te Korokoro sits on a western bank. From here the river runs below Parikarangaranga, Te Mata-o-Rongokako, and the smaller peak of Te Hau. Below both these peaks there are pits, terraces and other indications that people once lived here. From the river a track led to the summit of the range.

Further upstream above Kaiwaka on the river's eastern bank looms Kahuranaki maunga, a site of special significance to all hapu of Heretaunga Tamatea. It is said that as he lay dying Te Hapuku asked to be placed at Kaiwaka so that Kahuranaki would be the last thing he saw. This is also the place at which Rongokako, the father of Tamatea-pokai-whenua, is said to have lived.

Some distance upstream an old pa called Ngawhakatatara was located on an island while opposite was a kainga and pa named KurTwaharoa. Other more recently built pa on the Tukituki include Patangata and Tamumu.

Across the Tukituki River from the subject site, a Site of Cultural Significance (ref 230), recorded as a wahi tapu site, is identified on the Central Hawkes Bay District Plan (CHBDP) Map 9. A recorded archaeological site (ref 161) is also located at the northern end of the subject site. These two sites are shown on Figure 5 below; a snippet of CHBDP Planning Map 9.

The New Zealand Archaeological Association records the site as V22/59 and describes the recorded features as terrace/midden/pit stating:

> *"A long bluff, terraced on the inland side. A few exposures of midden: fresh-water mussel, fire cracked rock, obsidian, charcoal. 6 terraces, largest 15x3m. Pit 5x4m by .7m deep"*.

This archaeological site is identified as Area B on the title of Lot 1 DP 427319, with the intent of Consent Notice 8401841.4 to ensure current and future owners are aware of their responsibilities under the Historic Places Act 1993[1]. Archaeological site V22/59 is not near any of the proposed activities and is on land higher up and away from the area to be used for the proposed composting activities (approximately 70m). Further, the Site of Significance is not within the subject site, but on the other side of the Tukituki River.

[1] Since superceded by the Heritage New Zealand Pouhere Taonga Act 2014

Figure 5: Insert of Planning Map 9 (Source: Central Hawkes Bay District Council)

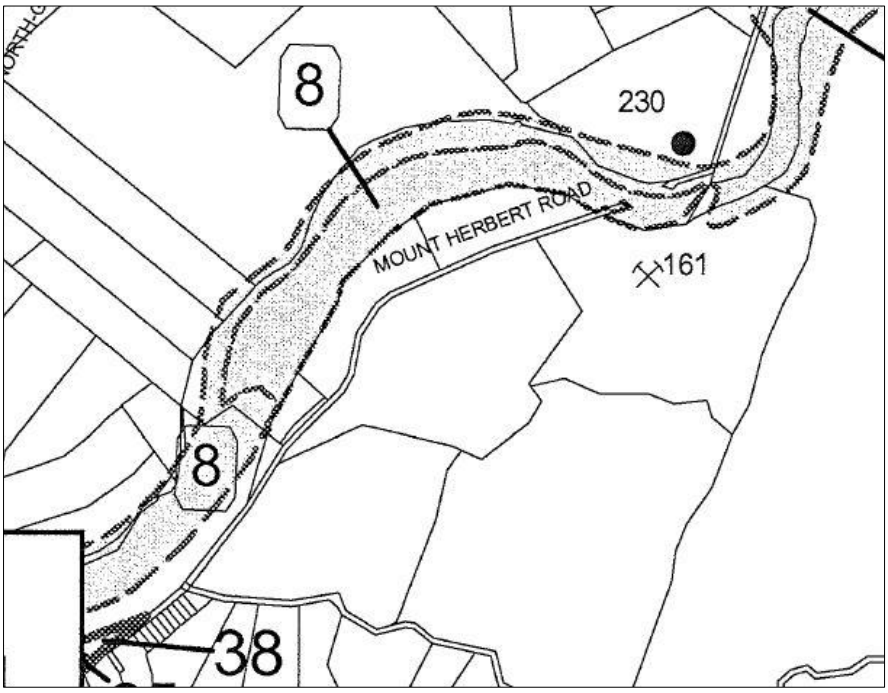
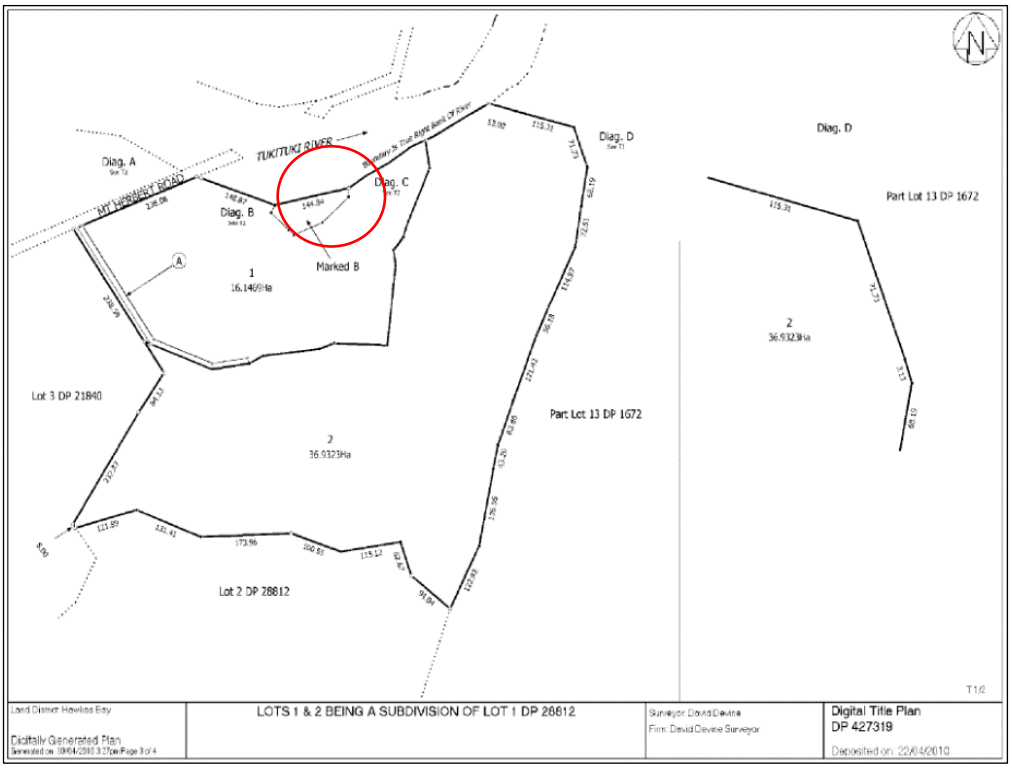


Figure 6: Copy of Lot 1 DP 427319 CT showing Area B (red circle)



2.3 Sensitivity of the Receiving Environment

The subject site is situated within a rural environment where the size and configuration of the overall site enables a separation distance of 1,400m between the proposed compost activities and the nearest existing house, south of the broader site on Mangatarata Road.

Beyond the site, to the north and west, the environment comprises the Tukituki River and rural farmland. The cycling and walking tracks of the Tukituki Trail follow the river esplanade to the north and west of the site, and the intermittent use by individuals or groups reduces the sensitivity of these activities. The farmland immediately beyond the river does not have any residential dwellings or marae or other sensitive activities. The exception is the wahi tapu site mentioned earlier in this application. The exact location of this site is not known, and maybe within the Tukituki River environment, and/or within adjoining farmland. Based on the approximate location shown on the District Planning Maps, the listed wahi tapu site (District Plan Ref #230) is 500m from the proposed compost facility.

To the east, land uses include a forestry plantation and mountain bike tracks within the plantation named Gum Tree Farm Mountain Bike Park. Like the Tukituki river esplanade, the recreational use of the area is an intermittent use by individuals, rather than a permanent use such as residential use.

There are non-rural production activities within the overall vicinity of the site that contribute to the wider environment. These include a gravel extraction industry and the Waipukarau wastewater treatment plant.

The AQP assessment concludes that the sensitivity of the receiving environment is "moderate" in terms of the MfE Odour Guide and states:

> *"…..due to the lack of sensitive receptors (in particular dwellings) very close to the TMM site and the rural nature of surrounding land use. The sensitivity of the receiving environment is regarded as "moderate" because the nearby residences are located in rural areas, and also because most of the odours discharged from the site (particularly from the biofilter and the pond) will be similar to background rural odours once diluted and dispersed.*[2]
>
> ….
>
> *For other potentially-sensitive land uses near the composting plant, such as the Wahi Tapu site, Tukituki Trail users, and Mountain Bike Park users, these locations are also considered to have "moderate" sensitivity with the 5 OU, 0.5th percentile guideline perhaps being applicable. However, for these land uses the interpretation of model results needs to take into account the low frequency and short duration of exposure to any odour that users at these locations would experience because of the nature of activities being carried out. The risk of odour being offensive or objectionable at these locations is much less than the risk of that same odour being offensive or objectionable at a residential dwelling."*

[2] Section 6.3, Page 27, AQP Report, Odour Assessment Te Mata Mushrooms Mt Herbert Road Site, dated 9th November 2020

Based on the sensitivity of the receiving environment, the appropriate odour modelling guideline for sensitive receptors (in this case, residential dwellings) is 5 OU, 0.5th percentile.

3. DESCRIPTION OF PROPOSAL

3.1 Scale of the Activity and Site Plan

The proposed activity comprises the establishment, operation and maintenance of a new compost making facility that is to produce 900 tonnes of finished compost for growing mushrooms per week ("Tpw"). The proposed compost facility is a comprehensive system of enclosed and semi-enclosed buildings, a working yard, a biofilter and ponds that collect, store and reuse water. The establishment of the development requires earthworks and other construction work activities. The proposed discharge of contaminants (odour) arising from the production of compost into air requires authorisation by way of resource consent.

The process of making compost at the site has three phases as demonstrated in Figure 7 below. Phase 1 takes the raw inputs (chicken litter, gypsum and soaked straw bales) from the Mixing Hall and are processed within the Phase 1 bunkers. At the end of Phase 1, a partially decomposed substrate is formed and this is then transported to an enclosed building housing the Phase 2 and 3 tunnels. The final compost that is used as a mushroom growing substrate is completed in the Phase 3 tunnels and ready for departure off site.

The proposed activity has five (5) Phase 1 bunkers and nine (9) Phase 2 and 3 tunnels, which enables 900 TpW of compost to be made.

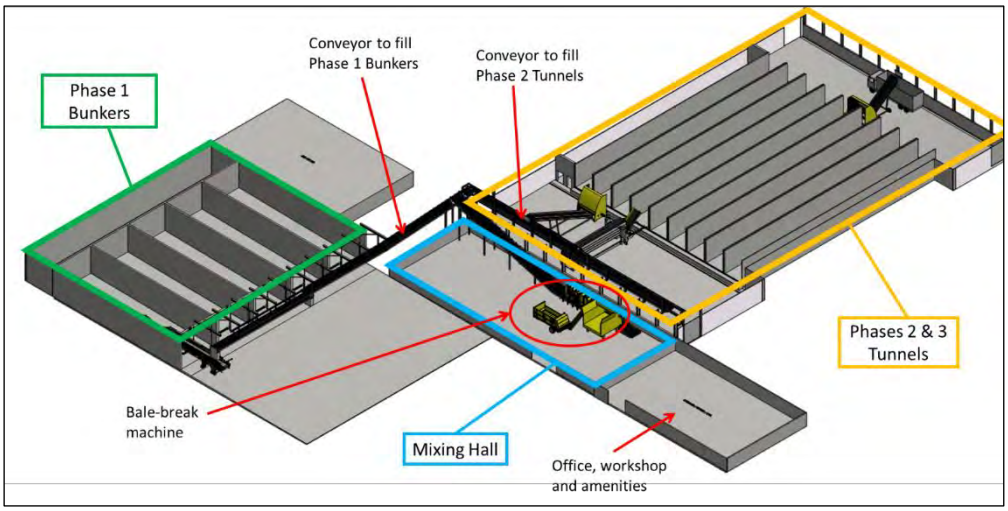
The Site Plan in Appendix 2 shows the layout of the buildings and facilities in relation to the site, along with access to Mt Herbert Road. The compost facility includes two ponds as shown on the Site Plan. These ponds are the:

- Freshwater runoff pond,
- Phase 1 compost leachate pond ("goodie water").

The goodie water is loaded with organic compounds leached during the composting process. It will be aerated and mixed to maintain aerobic conditions so as to control odour. The pond will be approximately 4m deep with a 500m^2 surface area, but will usually operate at lower levels with a surface area of only 240m^2 (except in extreme rainfall events).

As well as being a by-product of the composting operation, the goodie water is also an input - used to pre-wet the bales as part of the initial composting process. The pond will be topped up with fresh water when needed to maintain supply in this regard.

Figure 7: Schematic view of Phase 1 Bunkers, Mixing Hall, and Phase 2 and 3 Tunnels, Source, AQP report, Figure 6



3.2 The Composting Process

Section 3.1 of the Air Quality Professionals (AQP) Report provided in Appendix 7 provides a succinct explanation of the composting process which is reproduced below.

> *"Compost is an essential part of the mushroom growing process and is used as part of the substrate that the mushrooms are grown on. Compost consists of straw, chicken litter and gypsum. The key components of the composting process are described in this section.*
>
> *Composting occurs in three phases, transforming the raw materials into a medium suitable for growing mushrooms. Phase 1 composting starts with the mixing of pre-wetted straw and pre-mixed chicken litter and gypsum. The mix is then loaded into one of multiple Phase 1 bunkers. During the composting in Phase 1 air is blown through the newly mixed and composting material to maintain aerobic conditions. The bunkers are progressively emptied and filled to facilitate turning of compost via transferring the compost from one bunker to another (known as "bunker-to-bunker transfer"). These bunkers have a concrete floor, two concrete walls and insulated panel roof, and the end openings are closed with permanent sliding curtain doors when not in use. The Phase 1 bunker concrete floors have recessed lines which act in parallel as both aeration lines and a leachate collection system.*
>
> *The bunkers are operated under a slight vacuum or negative pressure compared to outside air to avoid leaking of odorous air from the bunkers. Foul air within the bunker is drawn from the top of each bunker and treated to remove odour before discharge to atmosphere.*

At the completion of the Phase 1 process, the compost is transferred removed from the Phase 1 bunkers and into Phase 2 tunnels. During the Phase 2 cycle, air in the bunker is recirculated at one end of the bunker, and a portion of the air is drawn from the bunker and treated to remove odour. After Phase 2, the compost is transferred to Phase 3, and then is used in the mushroom growing operation.

Phase 1 takes about 12 days to complete, and the whole process from pre-wetting of bales until the compost is ready to grow mushrooms is nearly four weeks. Multiple batches of compost are in various stages of production at any time so that fresh compost is always available for starting the mushroom spawning process."

3.3 Odour Source and Proposed Mitigation

Table 1 describes in more detail each part of the compost process and gives a rating of low-moderate-high of the potential for offensive or objectionable odours. This information demonstrates that with appropriate mitigation in place, all proposed activities involved in the production of compost at the subject site have a low rating for offensive or objectionable odours.

Table 1: Potential sources of odour, mitigation and rating of potential for odour to cause an offensive or objectionable effect

Composting Activity	Actions involved in activity / Potential Odour	Proposed Mitigation	Potential for Odour to cause an offensive or objectionable effect
Bale pre- wetting	Actions • Straw bales will be stored on site. • Bales dunked into a sump filled with goodie water[3] within working yard. • Bales stacked on an aerated pad outside the Phase 1 bunkers for about 9 days. If necessary, the bales may be occasionally irrigated with goodie water during this 9-day period. Potential Odour • Odour from bale pre-wetting is generated from presence of goodie water during dunking, bale draining, and supplementary irrigation if required. • The magnitude of odour emissions is highly dependent on the quality of the goodie water.	Mitigate the potential odour at source The proposed aeration of the goodie water pond will minimise the potential for odour emissions during the bale pre-wetting process, although some relatively minor odour emissions are likely.	Low
Chicken litter/gypsum storage and handling	Actions • Chicken litter will be delivered to the concrete pad outside the mixing hall, mixed immediately with gypsum, and then stored in an enclosed bunker within the Mixing Hall.	Avoid odour effects at source. The best way to minimise odour emissions from chicken litter is to keep the litter dry in storage, which is enabled through this design approach.	Low

[3] 'goodie water' is Phase 1 compost leachate pond

Composting Activity	Actions involved in activity / Potential Odour	Proposed Mitigation	Potential for Odour to cause an offensive or objectionable effect
	Potential Odour • Odour may occur if chicken litter and gypsum mix are not maintained in a dry state.		
Bale Break, mixing and material placement in bunkers	Actions • Within the Mixing Hall, a semi-enclosed building, a purpose-designed automated bale-break machine will break up the bales, mix in the correct amount of chicken litter/gypsum and water, and then deposit the mixed substrate directly onto a conveyor for transport into one of the five Phase 1 bunkers. • Compost is placed evenly into the bunker via a telescopic, automated filling line with a capacity of 200 tonnes per hour ("Tph"). • Timing: The process will occur over a period of up to 8 hours between the hours of 8am and 6pm The process will occur typically 1-2 days per week and will usually occur on weekdays, but may occur at weekends if necessary. Potential Odour • Fugitive odour emissions from bale breaking when Mixing Hall doors are open, and not captured by the point source extraction. • Some odour generated when compost leaves the Mixing Hall on the conveyors and transported to the Phase 1 Bunkers and deposited into a hopper for automatic	The design of the process and technology used minimises the generation of adverse odour effects. Design of Mixing Hall includes point source extraction above the bale break machine and hopper which will capture most of the odour emissions from the bale break process. Design of the bunker includes an air extraction system will operate at maximum capacity during the filling of compost into the Phase 1 bunkers and remove nearly all of the odour caused by the actual filling activity. Air extracted from the bunkers then passes through a custom designed biofilter. Minimising the generation of odour and the degree of unpleasantness of that odour during the bale break process involves the following: 1. Keeping the chicken litter/gypsum mix dry during storage and only accepting chicken litter onto site which has been appropriately stored off-site (i.e. not anaerobic upon delivery). 2. Keeping the recycled water aerobic so that odorous by-products of	Low

Composting Activity	Actions involved in activity / Potential Odour	Proposed Mitigation	Potential for Odour to cause an offensive or objectionable effect
	filling at the bunker, as the conveyors and hoppers are not covered.	anaerobic decomposition do not accumulate inside the bales. 3. Aerating the bales. Operating hours of the bale break process is to be restricted to 8am-6pm on any day to avoid potential odour emissions during stable atmospheric conditions in the early morning and evening.	
First and second turning of compost in Phase 1 bunkers	Actions • During Phase 1, the compost will be turned twice by removing the compost from the bunker using a front-end loader, mixing the material and adding moisture in the bale break machine, and then immediately returning the compost to a spare bunker via the conveyor system and bunker filling line; this is known as "bunker-to-bunker" transfer. • With five bunker operation (for 900 Tpw production) only four bunkers are used for composting and the fifth is kept available for turning operations. Potential Odour • Some odour will still emitted during the process due to the movement of front-end loaders in and out of the bunker, and from the compost in the bucket on the front-end loader whilst the loader is moving from the bunker back to the Mixing Hall.	Design of Mixing Hall includes point source extraction hoods over the bale mixing line during bunker to bunker transfer process. This extraction will remove most of the odour caused by the mixing process. Operating hours of the bale break process is to be restricted to 8am-6pm on any day to avoid potential odour emissions during stable atmospheric conditions in the early morning and evening.	Low

Composting Activity	Actions involved in activity / Potential Odour	Proposed Mitigation	Potential for Odour to cause an offensive or objectionable effect
	• Likely that some of the odour from within the mixing hall will escape as fugitive emissions through the open doorways.		
Phase 1 bunker	Actions • The automated bale-break machine (within the Mixing Hall) deposits the mixed substrate directly onto a conveyer for transport to one of the five Phase 1 bunkers. • During Phase 1, the compost will be turned twice by removing the compost from the bunker using a front-end loader, mixing the material and adding moisture in the bale break machine, and then immediately returning the compost to a spare bunker via the conveyor system and bunker filling line; this is known as "bunker-to-bunker" transfer. • The process takes about 8 hours, and will be conducted only during the hours of 8am to 6pm at the Mt Herbert site. • At the end of the Phase 1 composting period 12 days after initial mixing, the compost will be removed from the Phase 1 bunkers by front end loader and returned to the Mixing Hall. Potential Odour • Transporting substrate from Mixing Hall to Phase 1 bunkers. The conveyors and hopper will not be covered and therefore there will be some evolution of odour from this source.	Mitigate the potential odour at source • Air extracted from the bunkers holding Phase 1 compost will be passed through a biofilter custom-designed for the site by GTL Europe. • During the filling process, the Phase 1 bunker air extraction system will operate at maximum capacity and will remove nearly all of the odour caused by the actual filling activity. • During the bunker-to-bunker extraction process, the bunker air extraction system will operate at maximum capacity. • The mixing hall will be mechanically ventilated via point source extraction hoods over the bale mixing line during the bunker-to-bunker transfer process. This extraction will remove most of the odour caused by the mixing process. However, is it likely that some of the odour from within the mixing hall will escape as fugitive emissions through the open doorways. • The odour will be less offensive at the stage it is transferred from Phase 1 bunkers to Phase 2 tunnels, as the compost has completed the most active stage of biodegradation • Hours of operation of this process are 8am to 6pm.	Low

Composting Activity	Actions involved in activity / Potential Odour	Proposed Mitigation	Potential for Odour to cause an offensive or objectionable effect
	• Some odour will still emitted during the process due to the movement of front-end loaders in and out of the bunker, and from the compost in the bucket on the front-end loader whilst the loader is moving from the bunker back to the mixing hall. • There are likely to be some emissions of odour during the process of removing the finished Phase 1 compost from the bunkers by front-end loader and transferring it back to the mixing hall		
Removal of compost from Phase 1 bunkers and transfer to Phase 2 tunnels	Actions • At the end of the Phase 1 composting period, the compost will be removed from the Phase 1 bunkers by front end loader and returned to the Mixing Hall. • Within the Mixing Hall the compost will be turned again using the bale break machine. • The compost will then be transported using the same conveyor system into a fully-enclosed building housing the Phase 2 and 3 composting operations. Potential Odour • Likely to be some emissions of odour during the process of removing the finished Phase 1 compost from the bunkers by front-end loader and transferring it back to the Mixing Hall. • At this stage the odour will be less offensive than earlier in the Phase 1 composting	Operating hours to be restricted to 8am-6pm on any day to avoid potential odour emissions during stable atmospheric conditions in the early morning and evening.	Low

Composting Activity	Actions involved in activity / Potential Odour	Proposed Mitigation	Potential for Odour to cause an offensive or objectionable effect
	period, as the compost has completed the most active stage of biodegradation.		
Phase 2 and 3 of composting	Actions • The compost will then be transported using the bale break conveyor system into the fully-enclosed building housing the Phase 2 and 3 composting operations. • Phase 2 and 3 composting operations will be conducted in tunnels inside a fully-enclosed building. Potential Odour • No fugitive odour releases to the atmosphere without treatment are expected from this process.	Avoids the generation of adverse odour effects. All filling and emptying operations for the Phase 2 tunnels will be carried out in an enclosed building with air extracted to the biofilter for treatment. Similarly, all process air extracted from the Phase 2 tunnels will also be extracted and treated in the biofilter.	Low
Removal of end product and transportation off site.	Actions • Final product is fresh compost ready to cultivate mushroom spores. • Compost loaded into trucks within building and/or to the side of the building. Potential Odour • Process of loading product is mainly carried out within enclosed building. • Odours released when loading outside the building are low because the final product does not have objectionable or offensive odour.	The final product does not have an objectional or offensive odour so any odour released during the loading onto trucks can incorporated into a typical rural environment.	Low

Composting Activity	Actions involved in activity / Potential Odour	Proposed Mitigation	Potential for Odour to cause an offensive or objectionable effect
Goodie water storage pond (500m^2 surface area and 4m deep)	Actions • The goodie water is loaded with organic compounds leached during the composting process, and the goodie water pond will be aerated and mixed to maintain aerobic conditions. • The aeration design will be similar to the system currently used successfully at the Brookvale Road site, which uses an SAR™ Aerator from Hydro Processing and Mining Ltd (Canada), proven in the field for mushroom composting farms. • The aerator design recirculated recycled water through a land-mounted aerator, with the aerated water returned to the pond. Potential Odour • Odour emissions from this source are expected to minor, and no additional mitigation measures are proposed. • Dissolved oxygen concentration in the goodie water storage pond will be continuously monitored and logged.	Mitigate the potential odour at source through design of the pond.	Low

4. STATUTORY CONSIDERATIONS

Section 15(1) of the Resource Management Act 1991 states that no person may discharge any contaminant from any industrial or trade premises into air, unless the discharge is expressly allowed by a national environmental standard or other regulations a rule in a regional plan as well as a rule in a proposed regional plan for the same region (if there is one), or a resource consent.

The Hawkes Bay Regional Council's Regional Resource Management Plan regulates discharges into air from industrial and trade premises, and this statutory document requires a discretionary consent as it applies to the proposed compost production facility at 464 Mt Herbert Road.

It is noted that there is no relevant national environmental standard regulating odour discharges.

Section 88 of the RMA allows any person to make a resource consent application, provided it is in the prescribed form and includes, in accordance with Schedule 4, an assessment of environmental effects in such detail as corresponds with the scale and significance of the effects that the activity may have on the environment.

Schedule 4 of the Act lists those matters that should, and must be included in an assessment of environmental effects, as well those matters that should be considered. These matters are referenced throughout the body of this report confirming that the application meets all the requirements of Section 88.

Section 104 of the RMA requires (subject to Part II of the Act) a consent authority to have regard to the matters in section 104 when considering resource consent applications. Those parts of section 104 that are relevant are set out below:

a) Any actual and potential effects on the environment of allowing the activity; and

(ab) Any measure proposed or agreed to by the applicant for the purpose of ensuring positive effects on the environment to offset or compensate for any adverse effects on the environment that will or may result from allowing the activity; and

b) Any relevant provisions of:
   - i) a national environmental standard:
   - ii) other regulations:
   - iii) a national policy statement:
   - iv) a New Zealand coastal policy statement:
   - v) a regional policy statement or proposed regional policy statement:
   - vi) a plan or proposed plan; and

c) Any other matter the consent authority considers relevant and reasonably necessary to determine the application.

In addition, Section 105(1) of the RMA sets out further relevant matters for discharge permits and include:

a) *the nature of the discharge and the sensitivity of the receiving environment to adverse effects; and*
b) *the applicant's reasons for the proposed choice; and*
c) *any possible alternative methods of discharge, including discharge into any other receiving environment.*

A description of the nature of the discharge and sensitivity of the receiving environment (Section 105(1)(a)) is provided in Section 3 and 2.4 of this report.

An assessment of the activities actual or potential effects in terms of Section 104(1)(a) is undertaken in Section 7 of this report, the conclusions of which are considered in relation to notification in Section 8. The relevant provisions of the Regional Resource Management Plan in terms of Section 104(1)(b) are identified in Section 5 and considered in Section 9.

Part 2 of the Act contains Sections 5, 6, 7 and 8. Section 5 outlines the purpose of the Act, which is to "*promote the sustainable management of natural and physical resources*", and the meaning of the "sustainable management". Sections 6 and 7 contain "matters of national importance" and "other matters", while Section 8 provides for the principles of the Treaty of Waitangi. Part 2 of the Act is considered in Section 10 of this report where an overall assessment is arrived upon.

5. PLANNING DOCUMENTS

The relevant planning documents include the Regional Policy Statement and Regional Plan.

5.1 Regional Policy Statement

The Regional Policy Statement is contained in Chapters 2 and 3 of the Regional Resource Management Plan document which also contains the Regional Plan.

Chapter 3.5 is entitled 'Effects of Conflicting Land Use Activities' and contains three Objectives – Objective 16 pertaining to new activities and Objectives 17 and 18 to existing activities. Only Objective 16 is relevant, with it simply seeking the avoidance or mitigation of off site impacts or nuisance effects arising from the location of conflicting land use.

Policy 8 goes onto outline the factors to be given regard when considering conditions on resource consents where a discharge of odour to air occurs. These include:

(a) the likely frequency and duration of odour events,
(b) the nature of the odour,
(c) the nature of the local environment where odour may be experienced and the reasonable expectation of amenity within that environment given its zoning,
(d) any antecedent or contributing factors, including climatic or topographical features,

(e) *the extent to which lawfully established resource use activities operate in a manner that adopts the best practical option, or which is otherwise environmentally sound.*

Chapter 3.7 'Management of Organic Material' is also relevant. Policy 12 relates to discharges from the use of organic material, and while it seeks to provide for them, adverse effects on the environment are to be avoided or minimised. The Policy goes on to set out the circumstances where a Management Plan may be required. These include:

(a) *organic material is sourced from industrial or trade premises,*
(b) *there are residential properties in close proximity to the activity,*
(c) *large volumes of organic material are being stored and/or used,*
(d) *the organic material is likely to be malodorous in nature,*
(e) *nutrient loadings may exceed the natural uptake rate by grass or crops,*
(f) *the groundwater resource is particularly susceptible to contamination e.g. on the Heretaunga Plains unconfined aquifer, or on highly permeable soils,*
(g) *when organic material is stored in a position where it can potentially enter a surface water body.*

Policy 13 sets a specific policy requiring resource consent for composting activities of more than 100m³ of compost and raw material per industrial or trade premise.

Lastly, Policy 14 relates to separation distances, and in relation to odour, seeks to require the establishment and maintenance of separation distances in relation to the storage, use or disposal of organic material to ensure that there are no offensive or objectionable odours imposed on neighbouring properties. This has been a primary factor in selecting the site in the first instance.

5.2 Regional Resource Management Plan

Chapter 5 of the Regional Resource Management Plan contains the Regional Plan Objectives and Policies. Objectives 39, 39b, and 39c relate to the maintenance of ambient air quality with respect to managing air quality within identified airsheds and outside of these areas, while Objective 39a is that a standard of local air quality is maintained that is not detrimental to human health, amenity values or the life supporting capacity of air.

Policy 69 contains environmental guidelines and standards that activities affecting air quality are to be managed in accordance with. In terms of odour, Guideline 1 states "there should be no offensive or objectionable odour beyond the boundary of the subject property".

Chapter 6 contains the regional rules. Activities involving the discharge of contaminants into air derived from an industrial or trade premise are regulated by Rules 28 and 29 of the Regional Resource Management Plan.

Rule 28 relates to specific activities and classifies them as a Discretionary Activity. Rule 29 accommodates all other minor discharges not specifically regulated by any other rule in the

RRMP and classifies them as a Permitted Activity (provided a number of conditions, standards and terms can be complied with).

Rule 28 responds to Policy 13 of the RPS and specifically accommodates composting activities where more than 100m^3 of raw material, composting material and compost is held on the premise(s) at any one time. As the operation is characterised by a volume of greater than 100m^3 of raw material, composting material and compost at any one time, it must be classified as a Discretionary Activity under Rule 28 of the RRMP.

Without limiting section 88 of the RMA, or the Fourth Schedule to the Act, Chapter 7 of the Regional Plan sets out information requirements for a range of activities, including 7.4.1 'General Discharges to Air'. Section 7.4.1 has been used to structure the information and assessment provided in this consent application.

6. CONSULTATION

In accordance with Schedule 4 of the RMA, an application for resource consent should:

1. Identify the persons affected by the proposal,
2. The consultation undertaken,
3. Any response to the views of any person consulted.

In term sof (2) and (3), Consultation has been carried out with the Hawkes Bay Regional and Central Hawkes Bay District Councils in the early stages of scoping the proposed activity and understanding the respective Plans. Consultation with Taiwhenua o Tamatea Inc has also been initiated where a meeting was held in which the project was shared. Further, as part of the Provincial Growth Fund (PGF) process, it is understood that the CHBDC have informed Taiwhenua o Tamatea Inc of the project also. No formal responses have been provide.

In terms of (1), Section 7 below demonstrates that the effects on the environment are less than minor. As such, no parties are considered to be adversely affected, and to that end, no consultation was undertaken with any other parties.

7. ASSESSMENT OF ENVIRONMENTAL EFFECTS

The following assessment of environmental effects considers the singular issue of odour and uses the Section 7.4.1 'General Discharges into Air' matters as a baseline to assess the environmental effects.

Air Quality Professionals (AQP) have prepared a technical document provided in Appendix 2 that investigates the actual and potential adverse odour effects of the proposed activities associated with the proposed compost production facility. This::

- Describes the site and surrounds in Section 2,

- Explains the meteorology and topography of the area, and the implications of those on wind patterns for the Mt Herbert site in Section 4.
- Details all the composting activities over the three phases in Section 3 and provides commentary on the potential for odour to arise from these activities in Section 5.
- Determines the nature of the receiving environment in Section 6 and concludes that it is a moderately sensitive[4] receiving environment in terms of the Ministry for the Environment (MfE) guideline.
- Sets out four (4) modelling scenarios in Section 6 that predict ground level odour concentrations (GLCs) at the individual receptors set up as part of the model. The results analysis is focused on the (1) residential dwellings; (2) Wahi Tapu site; (3) Tukituki Trail; (4) Gum Tree Farm Mountain Bike Park.
- Contains a summary and conclusions in Section 7.

Overall, AQP has concluded that "with the odour sources described in this report, considering the conservatism in the model inputs and the frequency, intensity, duration, offensiveness and location of the odours that may occur, the potential for offensive or objectionable effects to occur due to that odour is less than minor for all land uses around the site."

7.1 Assessment Against Section 7.4.1 General Discharges into Air matters

Section 7.4.1 General Discharges into Air matters (a) – (q) are grouped and addressed below:

(a) Process (es) from which the discharge occurs.
(b) Nature of discharge, including details of contaminants (including hazardous contaminants).
(c) Any treatment prior to discharge.
(d) Discharge method.
(e) Discharge frequency.

Comments

The nature of the discharge in regard to (b) is not toxic or harmful, but rather involves odours which have different characteristics through the composting process.

In terms of (a), (c) and (d), being the processes from which the discharge occurs, any treatment prior to discharge and the method of the odour discharge, Figure 10 of the AQP Report illustrates the composting process and treatment of odour and the discharges to the air with the key discharges being:

- The residual discharge from the biofilter
- Fugitive discharges of odour to air.

[4] Ministry for the Environment (MfE) recommended Odour Modelling Guideline Values for a 'Moderate' receiving environment a concentration of 5 OU, 0.1% and 0.5%.

The introduction to Section 5 of the AQP Report summarises the odour control strategy for the proposed composting operation at the Mt Herbert site and is as follows:

- Extraction of odour from Phase 1 bunkers and Phase 2 tunnels and treatment of extracted air in biofilter to remove odour before discharge to air.
- Best practice design of bunker air extraction to minimise fugitive emissions during emptying of bunkers. Restriction of hours of operation to avoid fugitive odour emissions during worst case meteorological conditions.
- Point source extraction of odour from above the bale break machine for odour treatment in the biofilter.
- Some residual odour emissions and minor odour sources discharging to air without odour treatment.

Table 1 of this application sets out the proposed mitigation for each odour source, resulting in a rating of 'low' potential for objectionable and offensive odours for each activity.

The frequency (e) of the potential odour discharges relate to the different processes involved with the production of compost. A single batch of compost takes four weeks from the raw materials to a finished mushroom growing substrate. The proposed compost production facility will run multiple staggered batches, so that fresh compost substrate is always ready for mushroom spore inoculation, and to also ensure the investment in equipment and automation is utilised and therefore cost effective.

The approximate timing and duration of the potential odour sources involved in the compost process, are explained in the AQP Report, Sections 3 and 5.

(f) Neighbouring land uses and features and zoning of land.
(g) Actual or potential detrimental effects on the environment.
(h) Likelihood of odour emissions, and their effects beyond the boundary of the site.

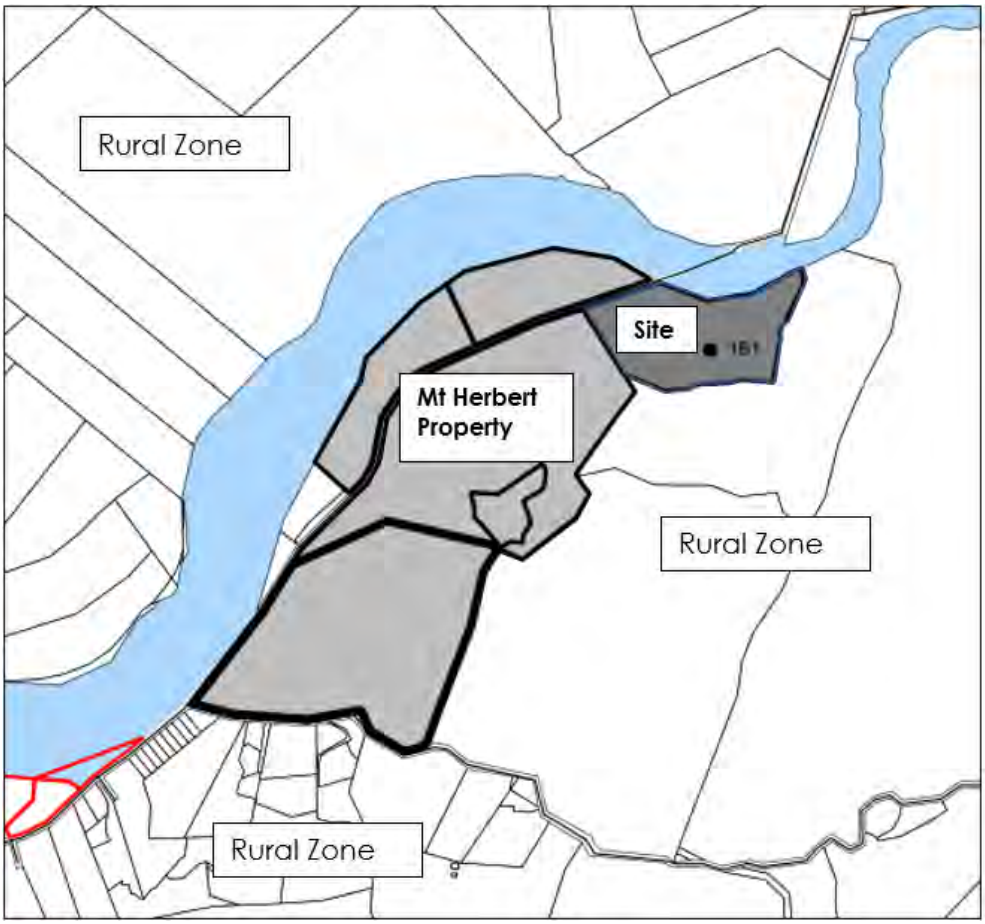
Comments

The site and surrounds in terms of features and land use have been well documented in the Section 3 of this report and also in Section 2 of the AQP report.

In summary, the subject site at 464 Mt Herbert Road (16ha) adjoins land to the west and south that is part of the broader Mt Herbert property, which in total, has an area of 115ha of rural land.

The characteristics of the site and the broader Mt Herbert property collectively isolate the proposed composting production facility from adjoining land uses. The site and surrounds are zoned Rural, as shown in Figure 8, which is a snippet of the CHBDC District Plan map for the area.

Figure 8: District Plan GIS Map of the area showing the zoning. Source CHBDC GIS

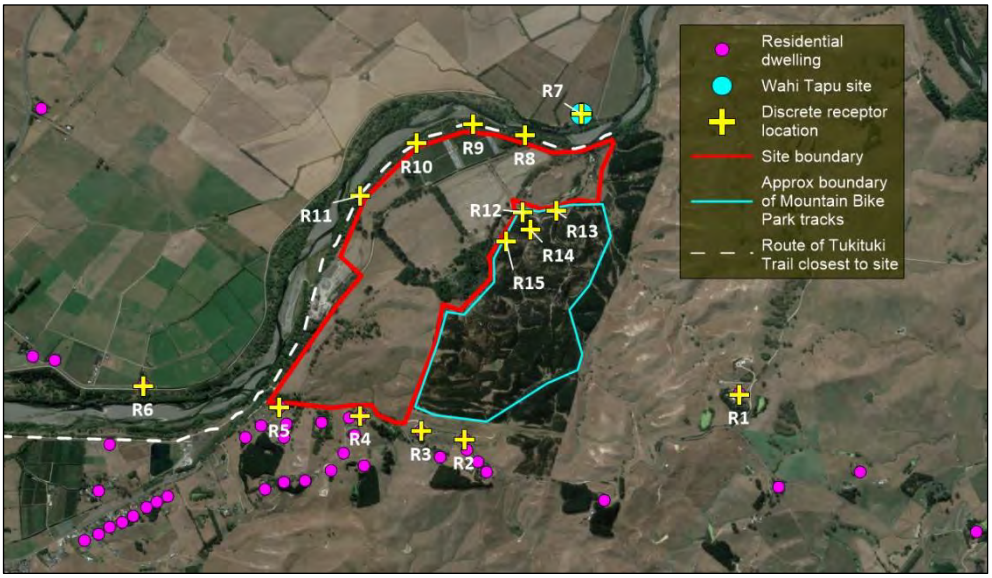


Within this rural environment the key features and land uses neighbouring the site include:

- South: The residential dwellings on smaller rural lifestyle properties on Mangatarata Rd (R1 – R6)
- West: The Tukituki River Esplanade (R8 – R11)
- East: The Gum Tree Farm Mountain Bike Park (R12 – R15)
- North: Rural farms and the listed Wahi Tapu (R7).

The above land uses relate to the location of the receptors (R1 – R15) used within the detailed modelling carried out and reported on by AQP (Section 6) to assess the frequency of highest ground level odour concentrations (GLCs) at these receptors. The AQP Figure 16 is reproduced below:

Figure 9: Location of discrete receptors used for detailed analysis of model results, Source Figure 16 of the AQP Report



Consideration of the actual and potential adverse odour effects detrimental to the environment are based on findings of the AQP report and as demonstrated in Table 1 are considered to be low.

In terms of the likelihood of odour emissions, and their effects beyond the boundary of the site, the AQP modelling analysis provides an assessment for each of the nearby sensitive land uses and concludes:

- The potential for offensive or objectionable odour effects to occur at nearby dwellings due to composting operations at the site is less than minor. Refer to Section 6.4.5 of the AQP report.
- The model results show that for people visiting [or as a feature in itself] the Wahi Tapu site, the potential for offensive or objectionable effects to occur due to that [compost] odour is less than minor. Refer to Section 6.4.6 of the AQP report.
- Considering the frequency, intensity, duration, offensiveness and location of the [composting] odours that may occur, the potential for offensive or objectionable effects to occur [along the Tukituki River trail] due to that odour is considered to be less than minor. Refer to Section 6.4.7 of the AQP report.
- Overall, considering the frequency, intensity, duration, offensiveness and location of the [composting] odours that may occur, the potential for offensive or objectionable effects to occur {at the Mountain Bike Park] due to that odour is considered to be less than minor. Refer to Section 6.4.8 of the AQP report.

With mitigation in place, together with good site management and maintenance of facilities, objectionable and offensive odours are not expected beyond the boundary of the site (whereby 'site' includes the broader Mt Herbert property).

(i) *Likelihood of particulate discharges, and their effects beyond the boundary of the site.*

Comments

The nature of the discharge is an odour, not a particulate so this assessment matter is not considered relevant.

(j) *Likely fate of discharged contaminants.*

Comments

Any residual odours or fugitive odours are to diffuse and disperse into the air.

(k) *Extent to which the Environmental Guidelines for Air (outlined in section 5.3 of this Plan) will be complied with.*

Comments

The Guideline set out in Section 5.3 for odour states "*there should be no offensive or objectionable odour beyond the boundary of the subject property*". The proposed compost production facility is designed in accordance with this guideline and has been validated via the modelling undertaken. Subject to the continued effective use of the proposed mitigation measures, offensive or objectionable odours are not anticipated beyond the boundary of the subject property.

(l) *Any proposed reduction of discharge at source.*

Comments

As discussed above, the odour control strategy is largely focused on minimising odour at the various sources and activities throughout the composting process.

(m) *Any influence of meteorology and topography on the discharge.*
(n) *Any proposed mitigation of detrimental effects.*
(o) *Alternative methods of discharge and treatment considered.*
(p) *Any proposed management plans or contingency plans.*
(q) *For discharges with potentially significant adverse effects arising from odour or particulate matter, any modelling of the effects of the activity.*

Comments

The AQP report covers the matters (m) and (q), with the results and analysis of the modelling demonstrating the actual and potential adverse odour effects on nearby sensitive land uses to be less than minor. The design and technology embedded into the proposed compost facility, as well as the location within the subject site and larger Mt Herbert property, manages potentially significant adverse odour effects arising from the production of compost at the scale proposed.

The AQP report does not comment on whether a management plan is required in terms of (p). In discussion with the author of the report however, should a management plan be considered necessary (as a condition of consent) the following matters would be the key topics to be covered:

- Prepare a contingency plan, should events such as a power cut or key equipment failure occur, to ensure ongoing operation of the odour control equipment.
- Prepare and implement a maintenance schedule, including ensuring the availability of spare parts given the equipment is imported from Germany.
- Prepare and implement a schedule for regular monitoring of the biofilter, with documented corrective actions if needed.
- Prepare and implement a schedule for regular monitoring of the dissolved oxygen concentration in the Goodie Water Pond, with documented corrective actions if needed.
- Gather and record site-specific meteorological data from wind monitoring station at the site.
- Ensuring the working hours for the following activities are between the hours of 8am and 6pm:
  - Bale Break, mixing and material placement in bunkers
  - First and second turning of compost in Phase 1 bunkers
  - Removal of compost from Phase 1 bunkers and transfer to Phase 2 tunnels
- Procedures for bale wetting and storage of wet bales to minimise odour emissions during storage and subsequent bale breaking.
- Chicken litter and gypsum delivery, mix and storage to minimise exposure to rainfall.
- Cleaning and use of the working yard.

7.2 Conclusion on Effects

The proposed compost production facility is located on a rural site, with a large buffer in place by way of the balance area of the Mt Herbert property. The design of the facility incorporates a high investment in technology and automation in order to manage the generation of objectionable and offensive odours at source. The system is not entirely closed, due to movement of materials in Phase 1, so fugitive odour emissions will be discharged into the air as part of the composting process. The odour control strategy and mitigation measures in place enable the best management of these fugitive emissions. The modelling demonstrates, in a worse-case scenario, that the MfE Odour guidelines for moderately sensitive environments can be achieved at nearby sensitive land uses. To that end, it is considered the actual and potential adverse odour effects generated from proposed compost production facility are less than minor on the environment.

8. NOTIFICATION

There is no presumption in the RMA itself as to whether or not an application will be notified and a consent authority has discretion in determining whether or not notification is necessary. This assessment is primarily governed by Section 95A and Section 95B of the RMA.

8.1 Section 95A Assessment – Wider Environmental Effects

Section 95A of the RMA considers the need for public notification and sets out four steps in a specific order to be considered in determining whether to publicly notify.

In terms of Step (1), public notification has not been requested, Section 95C pertaining to notification in the event that further information is not provided under Section 92 is not applicable, and the application is not being made jointly with an application to exchange recreation reserve land under Section 15AA of the Reserves Act 1977.

In terms of Step 2, none of the circumstances precluding notification are applicable.

Moving to Step 3, notification is not required by a rule in a Plan while the effects of the proposal have been demonstrated in Section 7 of this report to be less than minor or minor on the wider environment.

Lastly, as no special circumstances are considered to apply public notification is not required under any of the pathways in Section 95A.

8.2 Section 95B Assessment – Effects on the Local Environment and Particular Parties

While public notification is not necessary, any effects of the proposal on the local environment and upon particular parties must still be considered. This is addressed through Section 95B of the RMA.

In terms of Step 1, being outside the CMA we understand there are no protected customary right groups or customary marine title groups in terms of Section 95B(2).

With respect to Section 95B(3) the site may be within (or at least adjacent to) land that is the subject of the Statutory Acknowledgement Area associated with the Tukituki River and tributaries as part of the Heretaunga Tamatea Deed of Settlement (as shown on the Deed Plan OTS-110-30 for Statutory Areas).

Objectives 36 and 37, and Policies 64 of the RRMP have also been considered alongside our review of the Statements of Association with the Statutory Acknowledgment Area in determining the scale of effects on tangata whenua.

Objective 36 sets out to protect and where necessary aid the preservation of waahi tapu (sacred places) and tauranga waka (landings for waka). Objective 37 sets out to protect and where necessary aid the preservation of mahinga kai (food cultivation areas), mahinga mataitai (sea-food gathering places), taonga raranga (plants used for weaving and resources used for traditional crafts) and taonga rongoa (medicinal plants, herbs and resource).

The proposed activities involve air discharges, with no change to the water resource of the Tukituki River, or the use of places along the river. The proposal is not expected to compromise the preservation tauranga waka, mahinga mataitai, taonga raranga, taonga rongoa or mahinga kai.

Effects of odour have been specifically considered, particularly in regard to the wahi tapu site (the listed site of significance) and determined to be less than minor. On this basis, effects on the persons to whom the statutory acknowledgement is made are considered less than minor.

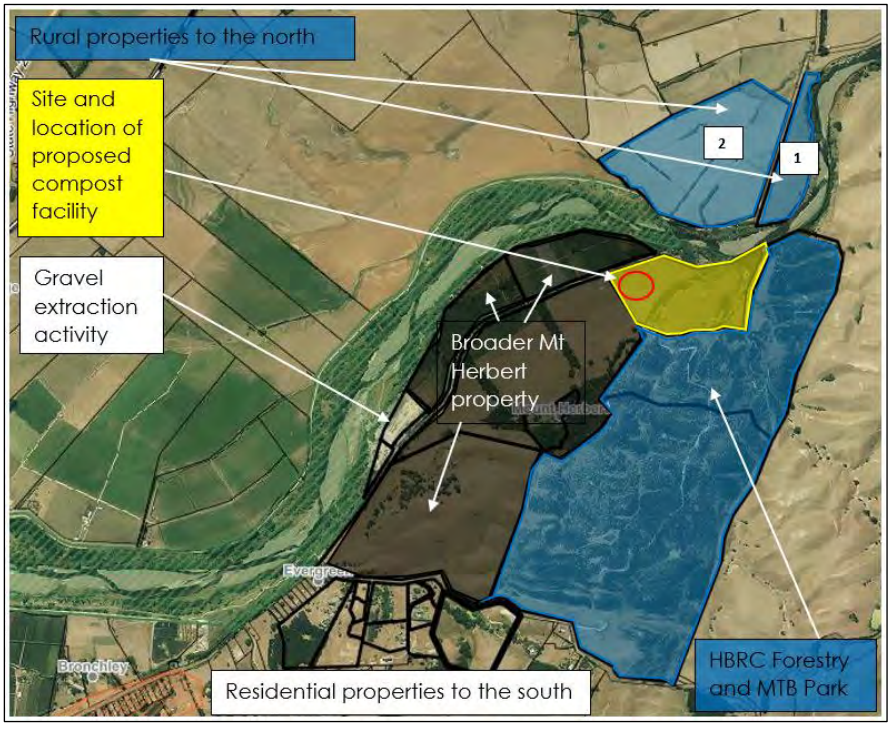
None of the matters precluding notification apply in terms of Step 2.

Having disregarded land adjacent to the subject site for the purposes of Section 95D(a)(ii), that land is now returned to under Step (3) of Section 95B, which requires the consent authority to determine, in accordance with Section 95E, whether there are any affected parties.

Section 95E states that a person is an affected person if the consent authority decides that the activity's adverse effects on the person are minor or more than minor (but are not less than minor).

Land adjacent to the subject site is identified in Figure 13 below, with an assessment of effects on those parties following. Although not in a Section 95B context, additional properties are also identified and considered.

Figure 13: Subject site (yellow) and adjacent properties. The Tukituki River is situated between the site and adjacent rural properties



Rural Properties to the north

This group of properties includes:

1. A 6.8ha property off Tapairu Road, immediately next to the Tukituki River (Lot 6 DP 525885).
2. A 29ha property at Tapairu Road (Part Tarewa A1 Block)

These rural properties are situated beyond the Tukituki River and are identified as being adjacent to the site because they are the nearest parcels of land. These rural properties do not have residential dwellings or other sensitive uses on them - except the identified wahi tapu site may extend into property 1 and 2 (identified above). Given the assessment made to the wahi tapu site (ref 230) the potential odour effects at this locality are less than minor (refer to Section 6.4.6 of the AQP report).

The Forestry and Recreation Block (the Gum Tree Farm Mountain Bike Park)

This property is situated at 302 Mangatarata Road (Lot 2 DP 28812 BLK XV Waipukurau SD) and extends back into the rear section of 464 Mt Herbert Road (Lot 1 DP 427319). It is a rural property, currently in forestry and also used for mountain biking tracks.

The actual and potential adverse effects on those occupying or using the property at 302 Mangatarata Road are considered to be less than minor for the reasons as summarised below:

- Cyclists using recreational areas in rural areas can expect rural odours and activities to be part of the environment that they are within. Passing rural and industrial activities comprising an element of odour is also not a foreign concept, and examples include the various activities at Awatoto, Napier.
- The use the Gum Tree Farm Mountain Bike Park by recreational cyclists is a transient use, rather than a permanent one.
- The proposed measures to avoid and mitigate significant odour effects from the proposed compost activities are wide ranging including the design of the facility, through to on-site management and hours of operation Section 6.4.8 of the AQP report provides results of the odour analysis and concludes that the potential for offensive or objectionable odour effects to occur will be less than minor.
- Any potential odour at the property would be infrequent and a short duration.

The Tukituki River Esplanade

The Tukituki River and its esplanade is considered to be part of the wider environment given it presents a corridor of green space and recreation that links to a network of recreation, rather than a having a stationery presence like an adjoining property. Taking a conservative approach however, specific consideration is given to this geographic feature and its potential users as adjoining land. The actual and potential adverse effects on those occupying or using the Tukituki River esplanade are considered to be less than minor for the following reasons:

- Cyclists using recreational areas in rural areas can expect rural odours and activities to be part of the environment that they are within. Passing rural and industrial

activities comprising an element of odour is also not a foreign concept, and examples include the various activities at Awatoto, Napier.

- The use the river esplanade by recreational cyclists is a transient use, rather than a permanent one.
- The proposed measures to avoid and mitigate significant odour effects from the proposed compost activities are wide ranging including the design of the facility, through to on-site management and hours of operation. Section 6.4.7 of the AQP report provides results of the odour analysis and concludes that the potential for offensive or objectionable odour effects to occur will be less than minor.
- Any potential odour at the river esplanade would be infrequent and a short duration.

Although not adjacent, and essentially considered in regard to Section 95A rather than Section 95B, the following provides specific consideration of the gravel extraction activity and residential properties to the south of Mangatarata Road.

The Gravel Extraction Activity

An existing gravel extraction activity operates at 302 Mt Herbert Road. This 2.8ha property adjoins the subject site to the south-west. With reference to the assessment made in Section 7 of this application, the actual and potential adverse effects on those at 302 Mt Herbert Road are considered to be less than minor for the following reasons:

- There is no sensitive activity (residential dwellings, marae, childcare, schools) located at the property, and therefore the odour effects are less than minor.

Residential Properties to the south

This group of properties includes:

- 4 Mangatarata Road, 0.5ha (Lots 49-50 DDP 354 BLK XV Waipukurau SD).
- 14 Mangatarata Road, 5.8ha (Lot 6 DP 14323 BLK XV Waipukurau SD)
- 22A Mangatarata Road, 0.4ha (Lot 4 DP 531809)
- 22B Mangatarata Road, 0.5ha (Lot 3 DP 531809)
- 22C Mangatarata Road, 0.4ha (Lot 2 DP 531809)
- 22D Mangatarata Road, 3.4ha (Lot 1 DP 531809)
- 32 Mangatarata Road, 2.5ha (Lot 1 DP 363555)
- 44 Mangatarata Road, 0.5ha (Lot 1 DP 402935)
- 44A Mangatarata Road, 1.1ha (Lot 1 DP 381744)
- 44B Mangatarata Road, 1.6ha (Lot 2 DP 402935)
- 44D Mangatarata Road, 1.5ha (Lot 3 DP 402935)
- 44E Mangatarata Road, 2.0ha (Lot 4 DP 402935)
- 44F Mangatarata Road, 0.6ha (Lot 5 DP 402935)
- 74 Mangatarata Road, 8.4ha (Lot 10 DP 14323)

This cluster of lifestyle properties range in size and all access from Mangatarata Road. Some sections are developed with residential dwellings while some are vacant. . The odour analysis demonstrates that the potential for offensive or objectionable odour effects to occur will be less than minor (Section 6.4.5 of the AQP report).

Conclusion

In considering the single and groups of properties above, the actual and potential adverse effects generated by proposed compost production activity are less than minor on persons at the identified parcels of land.

On the basis that no further special circumstances apply in terms of Step 4, the application may therefore be processed on a non-notified basis without the need for the approval of any specific parties.

9. RELEVANT OBJECTIVES AND POLICIES

In accordance with Section 104(1)(b) of the RMA, a consent authority must, subject to Part 2 of the RMA, have regard to the relevant provisions of any statutory plans and policy statements. This includes any relevant provisions of:

i) National Environmental Standards (NES)
ii) Other regulations
iii) National Policy Statements (NPS)
iv) The New Zealand Coastal Policy Statement (NZCPS)
v) Regional Policy Statements or proposed Regional Policy Statements (RPS)
vi) A Plan or Proposed Plan

Of these, only the Regional Resource Management Plan (RRMP) comprising the RPS and Regional Plan is relevant.

9.1 Regional Policy Statement

The Hawke's Bay Regional Policy Statement is contained in Chapters 2 and 3 of the Regional Resource Management Plan document, which also contains the Regional Plan. The relevant chapters within the RPS are as follows:

- Chapter 3.5 Effects of Conflicting Land Use Activities
- Chapter 3.7 Management of Organic Material

The provisions of each are considered below.

Chapter 3.5 Effects of Conflicting Land Use Activities

The relevant objective for a new activity is Objective 16, which is repeated below.

> *OBJ 16 - For future activities, the avoidance or mitigation of off site impacts or nuisance effects arising from the location of conflicting land use activities.*

To achieve the above objective, Policies 5 and 6 direct a collaborative approach between consent authorities to prevent or resolve incompatible land uses, particularly around environmental effects such as odour. A land use consent has been lodged with the Central

Hawkes Bay District Council (CHBDC) for the proposed activity and addresses the land use activity matters and includes the same AQP report on the assessment of odour. Lodging the applications concurrently will assist the Councils to work together in undertaking their respective functions.

Importantly, the proposed compost production facility at Mt Herbert Road represents a solution to an existing land use conflict at the original Te Mata Mushrooms site at Brookvale Road, Havelock North. The proposed activity at Mt Herbert would provide an opportunity for the applicant to undertake composting activities on a rural property that is isolated with no urban growth areas planned within its vicinity in as timelier manner as possible. The nearest existing residential dwellings are at least 1,400m distance. This opportunity would be of benefit to the region, as it maintains an important economic activity within the region, at a more appropriate location

Policy 8 'Decision making criteria – odour effects' is relevant and is repeated here:

> *To have regard to the following factors when considering conditions on resource consents where a discharge of odour to air occurs:*
>
> *(a) the likely frequency and duration of odour events*
> *(b) the nature of the odour*
> *(c) the nature of the local environment where odour may be experienced and the reasonable expectation of amenity within that environment given its zoning*
> *(d) any antecedent or contributing factors, including climatic or topographical features*
> *(e) the extent to which lawfully established resource use activities operate in a manner that adopts the best practical option, or which is otherwise environmentally sound.*

The assessment matters addressed in Section 7 of this report provide commentary around these matters and it not repeated here.

Chapter 3.7 Management of Organic Material

The relevant objective is Objective 20, which is repeated below.

> *OBJ 20 - The management and use of organic material derived from industries processing primary products in a manner that does not result in any adverse effects on humans or the environment.*

The objective and corresponding Policies 11 – 13 provide for the use of organic materials, and with good management, enable up to 100m³ of organic material to be composted from an industrial or trade premise as a Permitted Activity. Policy 13 directs the requirement for a resource consent to be obtained for the discharge of contaminants into air arising from the composting of more than 100m³ of compost and raw material per industrial or trade premise.

Policy 12 directs the provision for the discharge of contaminants into air, into land or onto land, from the use of organic material, in such a manner that any adverse effects on the environment are avoided or minimised.

The second part of to Policy 12 lists the circumstances where HBRC may request that a management plan is prepared. The circumstances are as follows:

(a) organic material is sourced from industrial or trade premises
(b) there are residential properties in close proximity to the activity
(c) large volumes of organic material are being stored and/or used
(d) the organic material is likely to be malodorous in nature
(e) nutrient loadings may exceed the natural uptake rate by grass or crops
(f) the groundwater resource is particularly susceptible to contamination e.g. on the Heretaunga Plains unconfined aquifer, or on highly permeable soils
(g) when organic material is stored in a position where it can potentially enter a surface water body

The proposed compost production facility is designed to avoid and minimise adverse odour effects. If HBRC consider the development of a detailed management plan to be an appropriate and necessary condition of consent, then the basis of the plan is to be based on the following:

- Prepare a contingency plan, should events such as a power cut or key equipment failure occur, to ensure ongoing operation of the odour control equipment.
- Prepare and implement a maintenance schedule, including ensuring the availability of spare parts given the equipment is imported from Germany.
- Prepare and implement a schedule for regular monitoring of the biofilter, with documented corrective actions if needed.
- Prepare and implement a schedule for regular monitoring of the dissolved oxygen concentration in the Goodie Water Pond, with documented corrective actions if needed.
- Gather and record site-specific meteorological data from wind monitoring station at the site.
- Ensuring the working hours for the following activities are between the hours of 8am and 6pm
    - Bale Break, mixing and material placement in bunkers
    - First and second turning of compost in Phase 1 bunkers
    - Removal of compost from Phase 1 bunkers and transfer to Phase 2 tunnels
- Procedures for bale wetting and storage of wet bales to minimise odour emissions during storage and subsequent bale breaking.
- Chicken litter and gypsum delivery, mix and storage to minimise exposure to rainfall.
- Cleaning and use of the working yard.

Policy 14 is relevant to the proposed compost facility and is repeated here:

POL 14 DECISION MAKING CRITERIA – SEPERATION DISTANCES
To require the establishment and maintenance of separation distances in relation to the storage, use or disposal of organic material to ensure that:

(a) there is no direct runoff of leachate into surface water
(b) there is adequate vertical separation from groundwater, such that the activity is consistent with Objectives 21 and 22, and

(c) there are no offensive or objectionable odours imposed on neighbouring properties.

Subclause (c) is relevant and the AQP report provides results of the odour analysis and concludes that the potential for offensive or objectionable odour effects to occur will be less than minor on neighbouring land uses with sensitive activities.

Chapter 3.14 – Recognition of Matters of Significance to Iwi/Hapu

The relevant objective is Objective 34, which is repeated below.

> *Obj 34 - To recognise tikanga Maori values and the contribution they make to sustainable* ***development and the fulfilment of HBRC's role as guardians, as established under the RMA, and*** *tangata whenua roles as kaitiaki, in keeping with Maori culture and traditions.*

Policy 57 (a) – (c) set out how various states of mauri and the effect on mauri from a development are to be considered.

Objective 35 sets out to consult with Maori in a manner that creates effective resource management outcomes. Policies 59 – 63 set out expectations for consultation.

Objectives 36 and 37 set out what values and areas and resources are to be protected, and the subsequent policies direct the effects considerations of those items, including Policy 64 which states:

> *POL 64 Activities should not have any significant adverse effects on waahi tapu, or tauranga waka.*

The wahi tapu site is located across on the other side of the Tukituki River from the subject site. The AQP analysis specifically reports on the odour effects at the wahi tapu site and concluded that the effects at the locality are less than minor (refer to Section 6.4.6 of the AQP report).

A meeting between the applicant and Taiwhenua o Tamatea Inc to share plans of the proposed activity and to gather more knowledge about the sites and their significance has occurred. Further, as part of the Provincial Growth Fund (PGF) process it is understood that the CHBDC have informed Taiwhenua o Tamatea Inc of the project also.

9.2 Regional Resource Management Plan

Chapter 5 contains the Regional Plan Objectives and Policies. Section 5.3 set out Air Quality objectives and policies. Objectives 39 and 39a are relevant to the application and are set out below:

> *OBJ 39 - A standard of ambient air quality is maintained at, or enhanced to, a level that is not detrimental to human health, amenity values or the life supporting capacity of air, and meets National Environmental Standards.*

OBJ 39a - A standard of local air quality is maintained that is not detrimental to human health, amenity values or the life supporting capacity of air.

Policy 69 directs the management of effects of activities affecting air quality and refers to odour. The guideline is that:

> ***"There should be no offensive or objection****able odour beyond the boundary of the subject property****".***

The AQP analysis and findings Appendix 2 that with the odour sources described in this report, considering the conservatism in the model inputs and the frequency, intensity, duration, offensiveness and location of the odours that may occur, the potential for offensive or objectionable effects to occur due to that odour is less than minor for all land uses around the site.

Based on expert input provided by Air Quality Professions following modelling of various odour sources and scenarios, together with considerations around the frequency, intensity, duration, offensiveness and location of odours that may occur, offensive and objectionable odour beyond the boundary is not anticipated and the effects of the proposal are considered less than minor.

Conclusion

The evaluation of the relevant Regional Policy Statement and Regional Resource Management Plan objectives and policies demonstrates that the proposed compost production facility is consistent with the direction provided in these statutory documents.

The Mt Herbert site is a rural property in a rural environment whereby the closest residential dwelling is at least 1400m away. The composting operation is to be designed as a modern "best practice" facility with automated machinery and extensive air extraction and treatment to help minimise odour emissions from the composting processes. Despite this design, there will be some residual or fugitive odour emissions from the composting facility, including some emissions that are present 24 hours per day (predominantly from the biofilter) and other emission sources that are present only for a few hours per week (during bale breaking, bunker-to-bunker transfers for mixing Phase 1 compost, and removal of completed Phase 1 compost from the bunkers). However, land use conflict can be avoided by implementing an odour control strategy, as set out in this application.

Overall, it is assessed that the standard of local air quality (amenity) will be maintained, as objectionable and offensive odour beyond the boundary is not anticipated – with any residual effects being of a less than minor scale.

10. PART 2 OF THE RESOURCE MANAGEMENT ACT 1991

The assessments contained in Sections 7 and 9 of this report are subject to the matters contained in Part 2 of the RMA, which contains Sections 5, 6, 7 and 8.

Section 5 sets out the purpose of the RMA, which is to promote the sustainable management of natural and physical resources and is supported by Sections 6, 7 and 8 of the RMA. Sections 6 and 7 contain the "matters of national importance" and "other matters" respectively and Section 8 provides for the principles of the Treaty of Waitangi. These sections are hierarchical and provide for a different level of consideration to be given to each.

The purpose of the RMA is set out in Section 5 of the Act as follows:

> *(1) The purpose of this Act is to promote the sustainable management of natural and physical resources.*
>
> *(2) In this Act, sustainable management means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while—*
>
> *(a) sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*
> *(b) safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and*
> *(c) avoiding, remedying, or mitigating any adverse effects of activities on the environment.*

The matters of national importance listed in Section 6 include:

> *In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall recognise and provide for the following matters of national importance:*
>
> *(a) the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development:*
> *(b) the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development:*
> *(c) the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna:*
> *(d) the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers:*
> *(e) the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga:*
> *(f) the protection of historic heritage from inappropriate subdivision, use, and development:*
> *(g) the protection of protected customary rights:*
> *(h) the management of significant risks from natural hazards.*

The proposed compost production facility is a best practice facility with automated machinery and extensive air extraction and treatment to help minimise odour emissions from the composting processes.

The site is ideally located in an isolated rural location, with the nearest residences over 1400m from the proposed location of the composting operation. The location of the site can effectively manage odour sources acknowledging some fugitive odour emissions will be dispersed into the air.

The proposed compost production facility brings a new industry to the Central Hawkes Bay District, of which the positive economic and social effects have been explored through the Provincial Growth Fund (PGF) process.

The subject site adjoins the Tukituki River esplanade. The proposed development is located away from the boundary with the river esplanade and is considered to be an appropriate addition to the rural amenity in which the activity will operate.

The subject site is not an identified outstanding natural feature or landscape, and there are no areas of significant indigenous vegetation or known habitats of indigenous fauna.

The proposed development may increase the current level of public access to Tukituki River due to the road improvements to Mt Herbert Road, which would be a benefit for recreational users of the river.

The Tukituki River is a Statutory Acknowledgement Area set out in the Heretaunga Tamatea Deed of Settlement, as shown on the Deed Plan OTS-110-30 for Statutory Areas. There is recognition and provision for potential cultural values associated with the wider environment in which the proposed activity sits. As presented in the assessment of effects Section of this application, it is considered any potential adverse odour effect at the wahi tapu site will be less than minor. As outlined in relation to notification , this party is not considered to affected in terms of S95B. Overall, the proposal has given due regard to the above provisions.

Other than the archaeological site identified on the site, there are no other known historic heritage values to be protected on the site.

In terms of natural hazards, according to the Hawke's Bay Natural Hazard Property Report, the site is characterised by the following hazards:

- Earthquake Amplification
- Flooding
- Moderate Earthflow

The applicant is aware of these risks, and noting the non-residential nature of the proposal, it is planned to address these through minimum floor levels (if required) and geotechnical assessment at the time of building consent.

The 'other matters' listed in Section 7 relevant to the proposal include:

> *In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall have particular regard to—*

(b) the efficient use and development of natural and physical resources:
(c) the maintenance and enhancement of amenity values:
(f) maintenance and enhancement of the quality of the environment:

The proposed development is a rural industry that can work alongside the traditional farming and horticultural activities of the existing rural environment and therefore can maintain amenity values anticipated in the Rural Zone. The site is isolated from urban areas. The proposed activity will incorporate the latest design and best practice techniques in the composting system to optimise the efficient use of the rurally zoned site while minimising adverse effects from compost production.

In summary, the proposed activity and the management of odour effects is considered to achieve the purpose and principles of the RMA and deserving of consent.

11. CONSENT DURATION

Section 123 of the RMA relates to consent duration, and subject to s123(d), allows a discharge permit to be granted for up to 35 years. Section 8.2.4 of the RRMP also relates to consent duration and that states resource consents will be granted for a period of 20 to 35 years unless one or more of the following exceptions apply:

a) The activity has duration of less than 20 years, in which case a consent will be granted for the duration of the activity.
b) There is a need to align the consent expiry date with others, in order that the cumulative effects of activities can be considered through a common consent renewal process.
c) The consent is for the allocation of gravel or another resource whose availability changes over time in an unpredictable manner.
d) The type of activity has effects that are unknown or potentially significant for the locality in which it is undertaken.

Matter (a) is not relevant as the proposed activity is intended to have a duration of greater than 20 years. In terms of matters (b) there is no need to align the consent expiry date with others to manage cumulative effects, and there are no allocation matters in terms of (c).

In terms (d), the effects of the activity are well understood, and any issue of uncertainty in this particular case could be just as well managed through review or enforcement processes rather than limiting consent duration. Indeed, establishment of the proposed activity requires considerable investment, thus optimal certainty is appropriate to provide economic certainty.

Taking this, the minor scale of effects, isolated nature of the site and the overall contribution to providing an opportunity to address a reserve sensitivity issue, which will have the flow on effect of also providing an opportunity for urban growth as envisaged under HPUDS into account, it is proposed that the consent be granted for a period of 35 years.

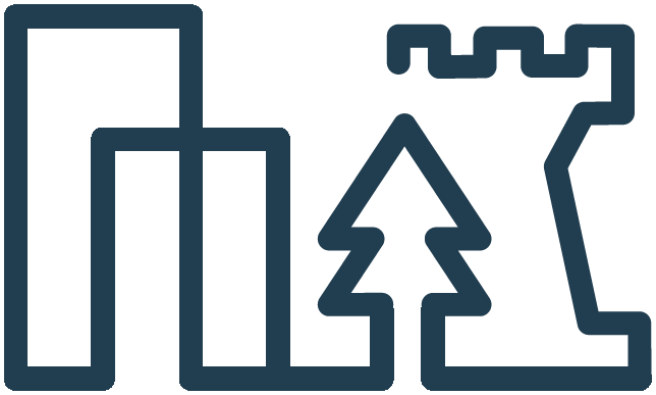
12. CONCLUSION

In summary, the proposal will result in less than minor effects and will not be contrary to the relevant Objectives and Policies of the Regional Policy Statement or the Regional Resource Management Plan.

Furthermore, having considered the proposal subject to Part 2 of the RMA, it is not expected to compromise the principles and purpose of the Act, and is subsequently considered deserving of consent pursuant to Sections 104 and 104B of the Resource Management Act 1991.

Appendix 1

Site Plan and drawings

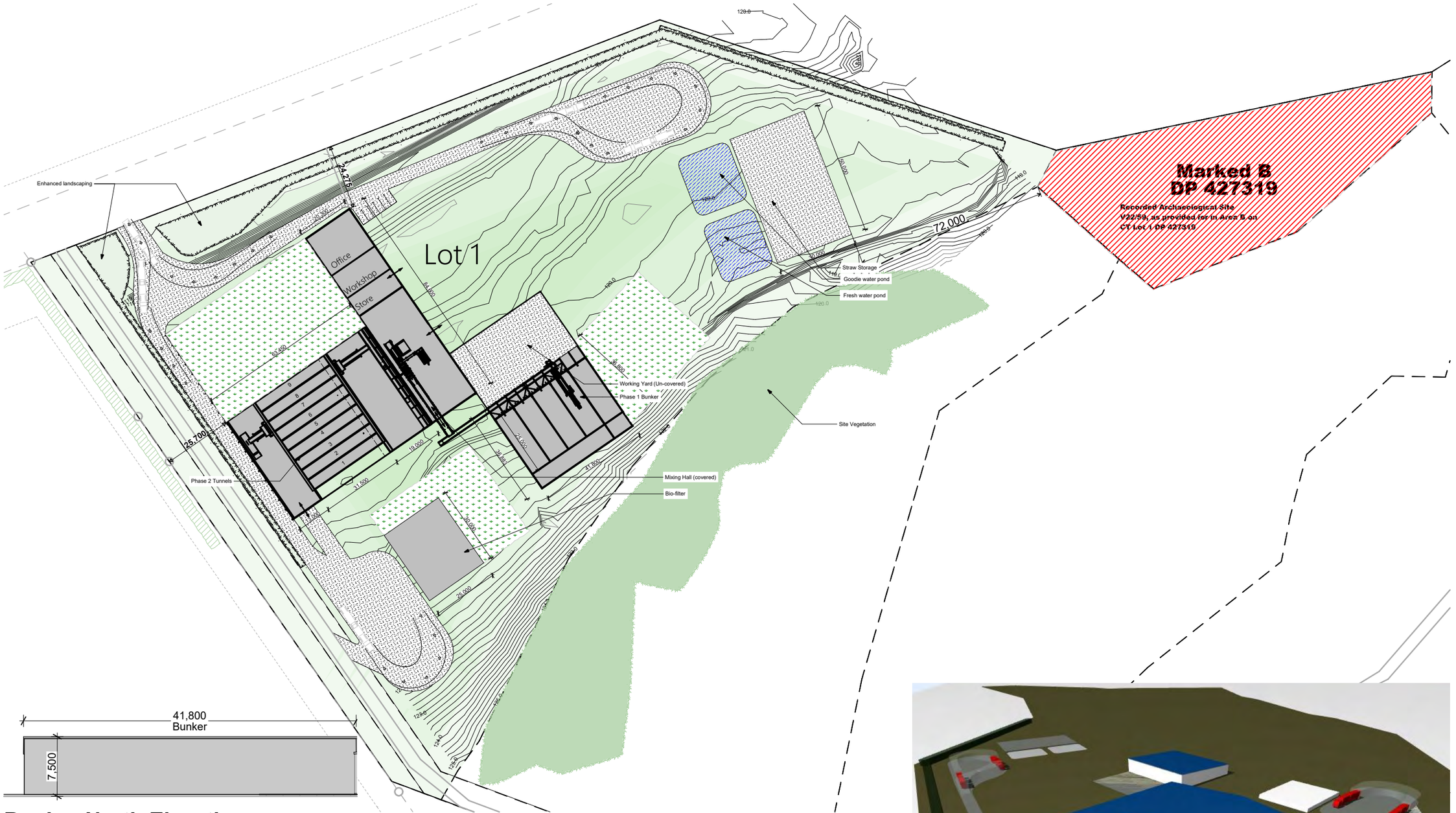


Appendix 2

AQP: Odour Assessment

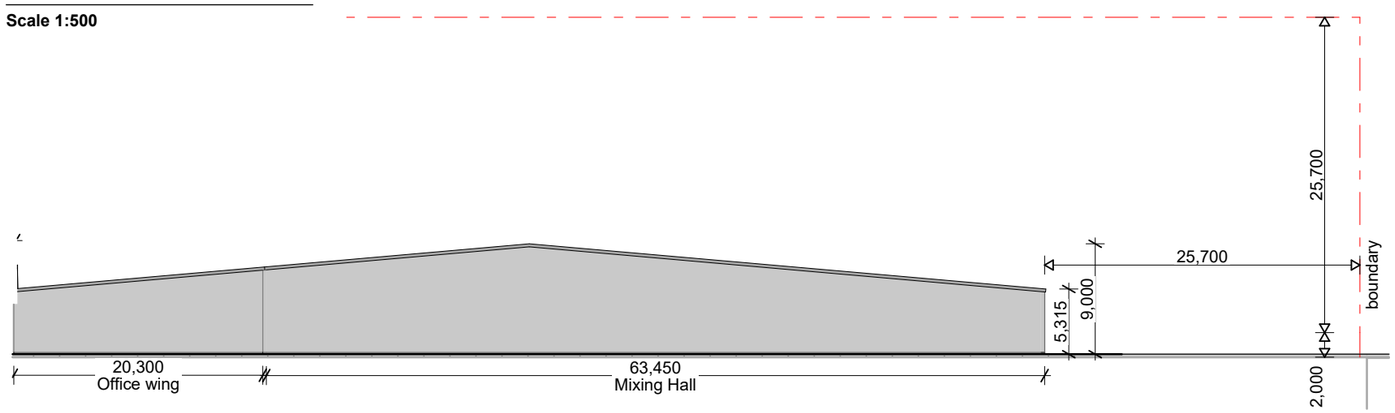
Appendix 3

Certificate of Titles



Bunker North Elevation

Scale 1:500



Mixing Hall North Elevation

Scale 1:500

Proposed view

201

Scheme Plan

Te Mata Mushrooms
Horticultural Hub
Mt Herbert Road
Revision:
Scale at A3: 1:1500, 1:500
Date Issued: 24/09/2020

Rev	Revision	Date

Site Scheme Plan

ATKINSON HARWOOD Architecture
sol@atkinsonharwood.co.nz
ph: 027 465 9236

ABN 92 160 694 011

Odour Assessment –

Te Mata Mushrooms Waipukurau Site

Report prepared for:
The Te Mata Mushroom Company Limited

9 November 2020







Table of Contents

Appendices

Appendix 1: **Site Layout Drawings**

Appendix 2: **Annual Windroses – Waipawa Meteorological Data Station, 2010 - 2019**

Appendix 3: **CALMET and CALPUFF Input File**

Appendix 4: **Windroses Extracted from CALMET Model**

1 Introduction

The Te Mata Mushroom Company (TMM) proposes to develop a compost making facility on Mt Herbert Road, 4km from Waipukurau (the "site"). The compost will be used as a substrate for growing mushrooms. The proposed compost throughput rate will be up to 900 tonnes per week ("Tpw").

The proposed composting plant is a new facility designed by GTL Europe (based in The Netherlands), using best practice processing equipment and odour control to minimise odour discharges. GTL Europe provides advisory and engineering services on installation technology, civil engineering, machine construction and automation for composting and mushroom cultivation[1].

The compost consists of straw, chicken litter and gypsum. Other additives such as maize are also used when available. The composting activity comprises three phases of compost production: (1) active aerated composting in closed bunkers; (2) maturation and pasteurisation in closed tunnels; and (3) mixing with mushroom spawn and incubation. All three phases of composting will be carried out at the new site.

The purpose of this report is to assess the potential odour impact arising from the proposed TMM operation at the site.

[1] http://www.gtl-europe.nl/en/about-us/engineering

2 Site Location

2.1 Neighbouring Land Uses

The site is located at 302-464 Mt Herbert Road, Waipukurau. The location is shown in Figure 1. Nearby houses and separation distances to the closest residences are also shown on Figure 1. The nearest residences are over 1400m from the proposed location of the composting operation.

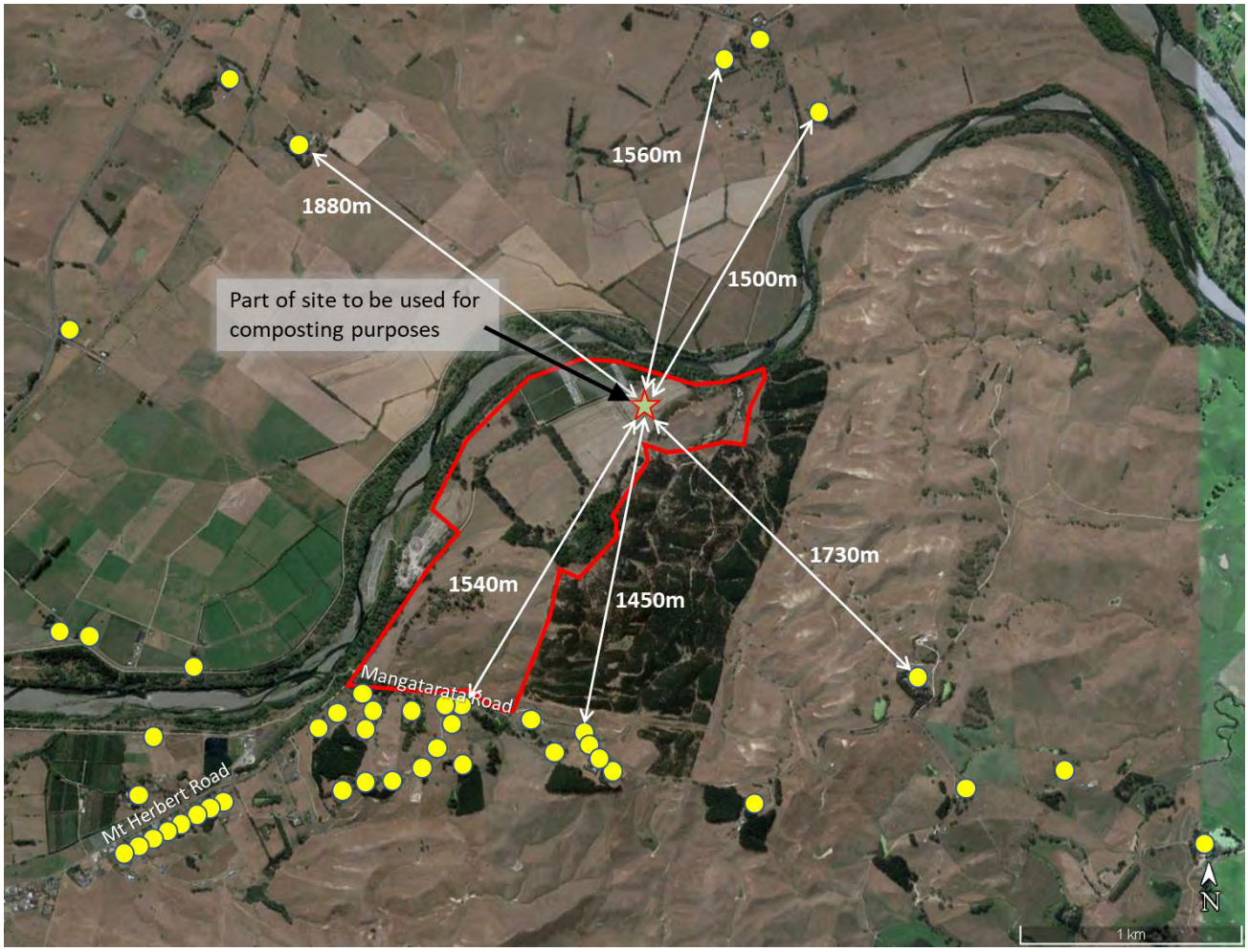


Figure 1: Site location (red outline). Image source: Google Earth Pro, image flown 4 September 2017. Nearby houses shown by yellow circles.

The site is bounded by farmland and forestry land uses, including some nearby walking and cycling tracks which are part of the Tukituki Trail (see Figure 2 and Figure 3). A local Wahi Tapu site of significance is located northeast of the TMM site, approximately 500 m from the proposed composting plant location (approximate location shown on Figure 5).

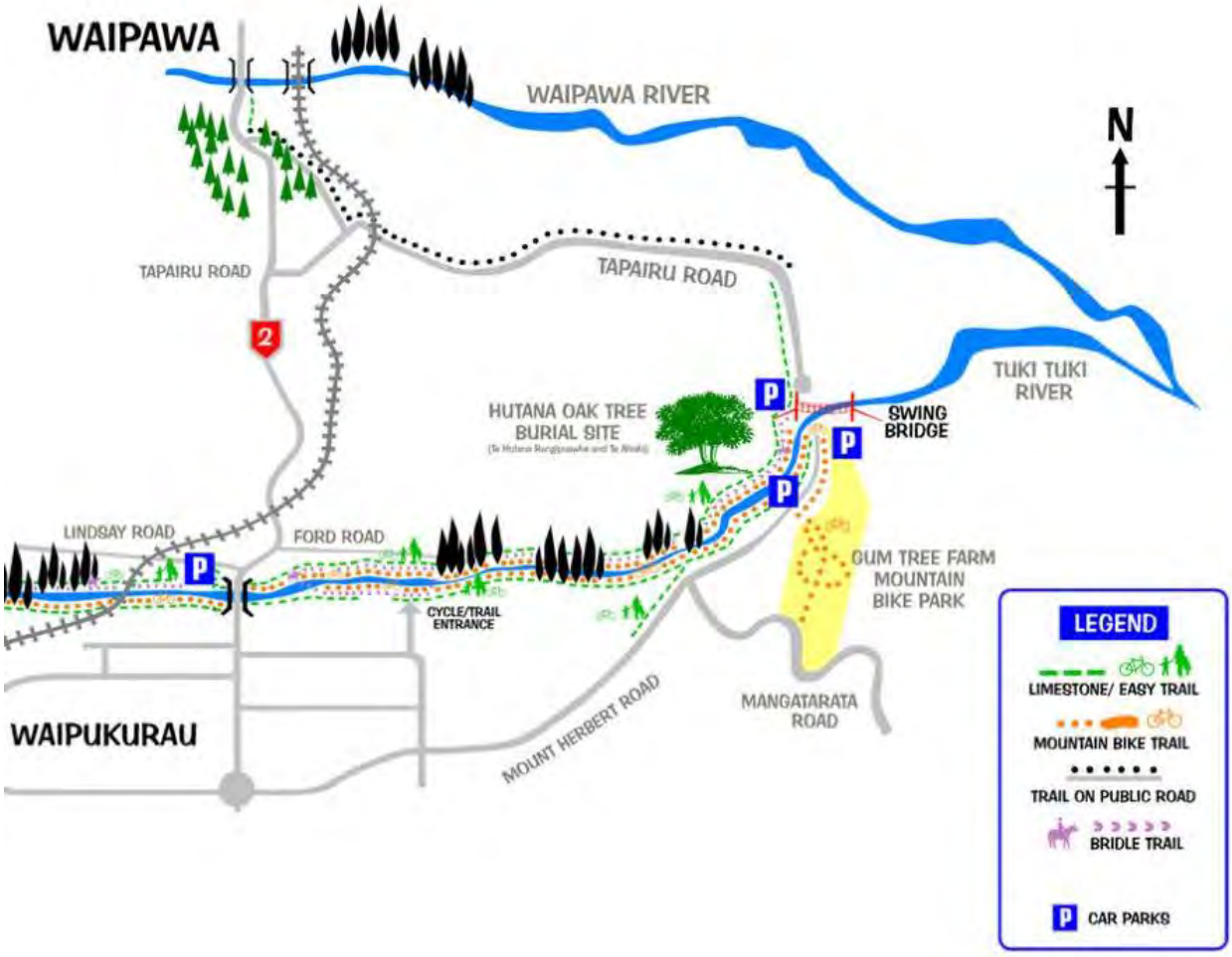


Figure 2: Schematic map of Tukituki Trail, edited from https://www.tukitukitrail.com/maps accessed 25/10/20.

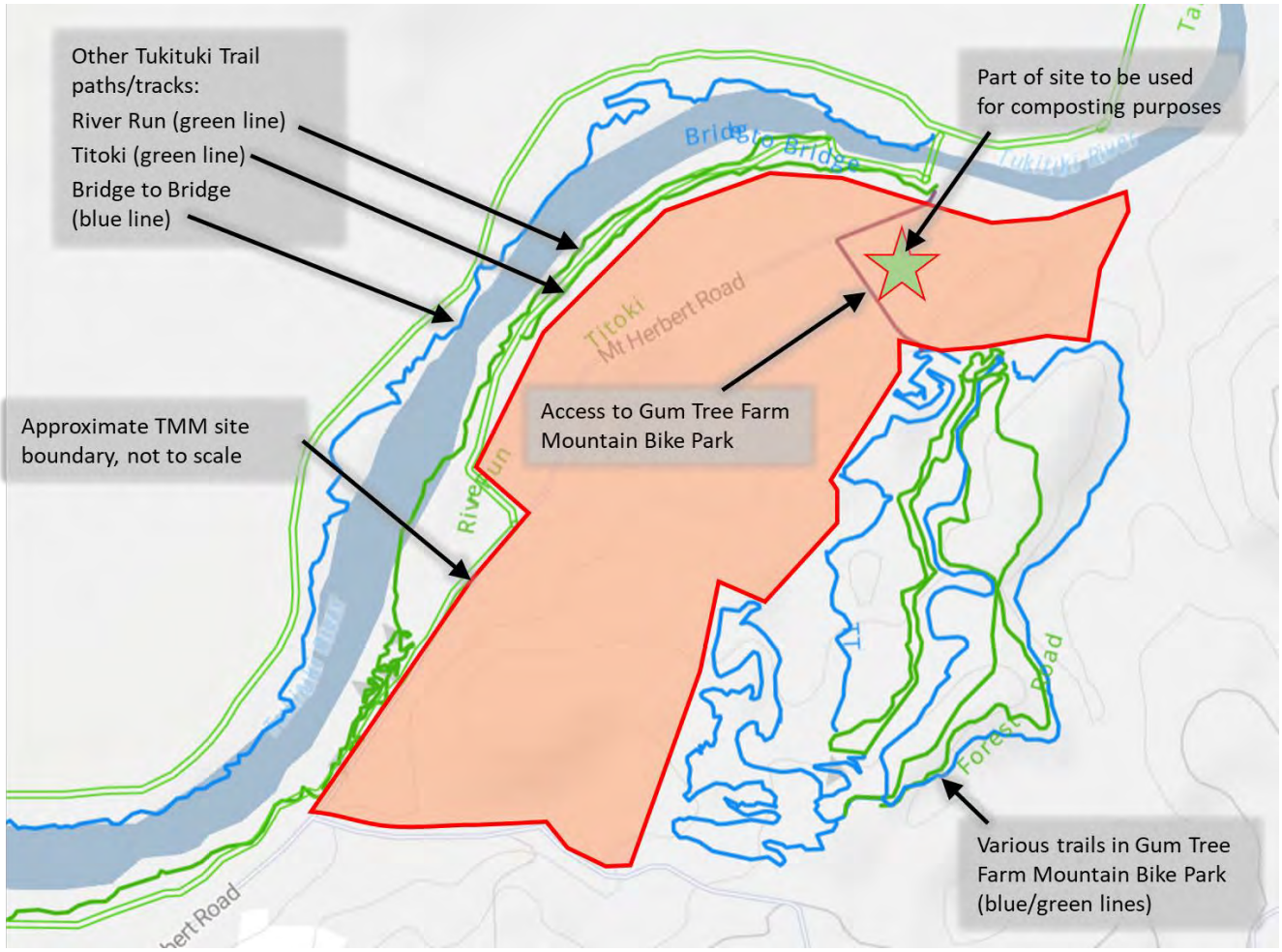


Figure 3: Location of Tukituki Trail paths and tracks near the site, from https://www.trailforks.com/region/the-tukituki-trail-18812/ accessed 25/10/20.

2.2 Topography

The Waipukurau area is characterised by a mix of rolling hills, flat pastoral land, and a shallow valley system defined by the Tukituki River and the Waipawa River. The regional topography is shown in Figure 4, with a closer view of the topography around the site shown in Figure 5. The black dashed line on Figure 5 following the south bank of the Tukituki River from Waipukurau to the north end of Mt Herbert Road indicates the location of the River Run and Titoki trails shown previously on Figure 3. The trails also passes adjacent to the Waipukurau Wastewater Treatment Plant which is located between the site and Waipukurau.

The part of the site proposed for the composting operation is on flat land at an elevation of about 120m above sea level, with the river to the immediate east and north, and rolling hills peaking at 250m above sea level to the immediate west and south. The houses to the south of the site on Mangatarata Road shown on Figure 1 are located along on the higher slopes of these rolling hills.

These terrain features will affect the direction of wind flows in the area around the site and assist with deflection of odour discharges away from the houses at elevated locations. This is discussed further in Section 4.

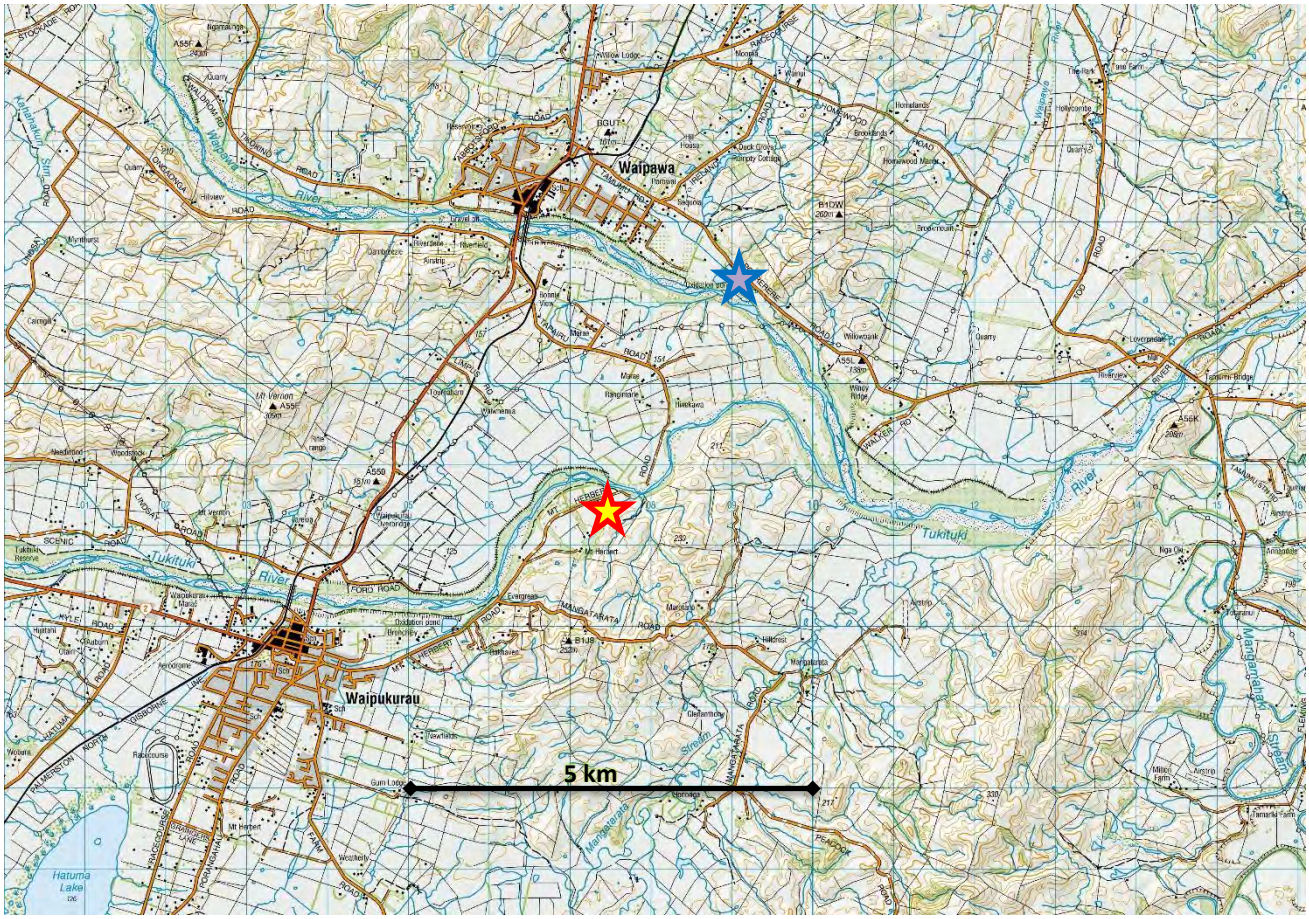


Figure 4: Regional topography. Image source: NZ Topo50 Map BL38. Downloaded from https://data.linz.govt.nz, April 2018. Red-outlined star marks location of proposed composting operation. Blue-outlined star marks location of Waipawa meteorological station (refer Section 4).

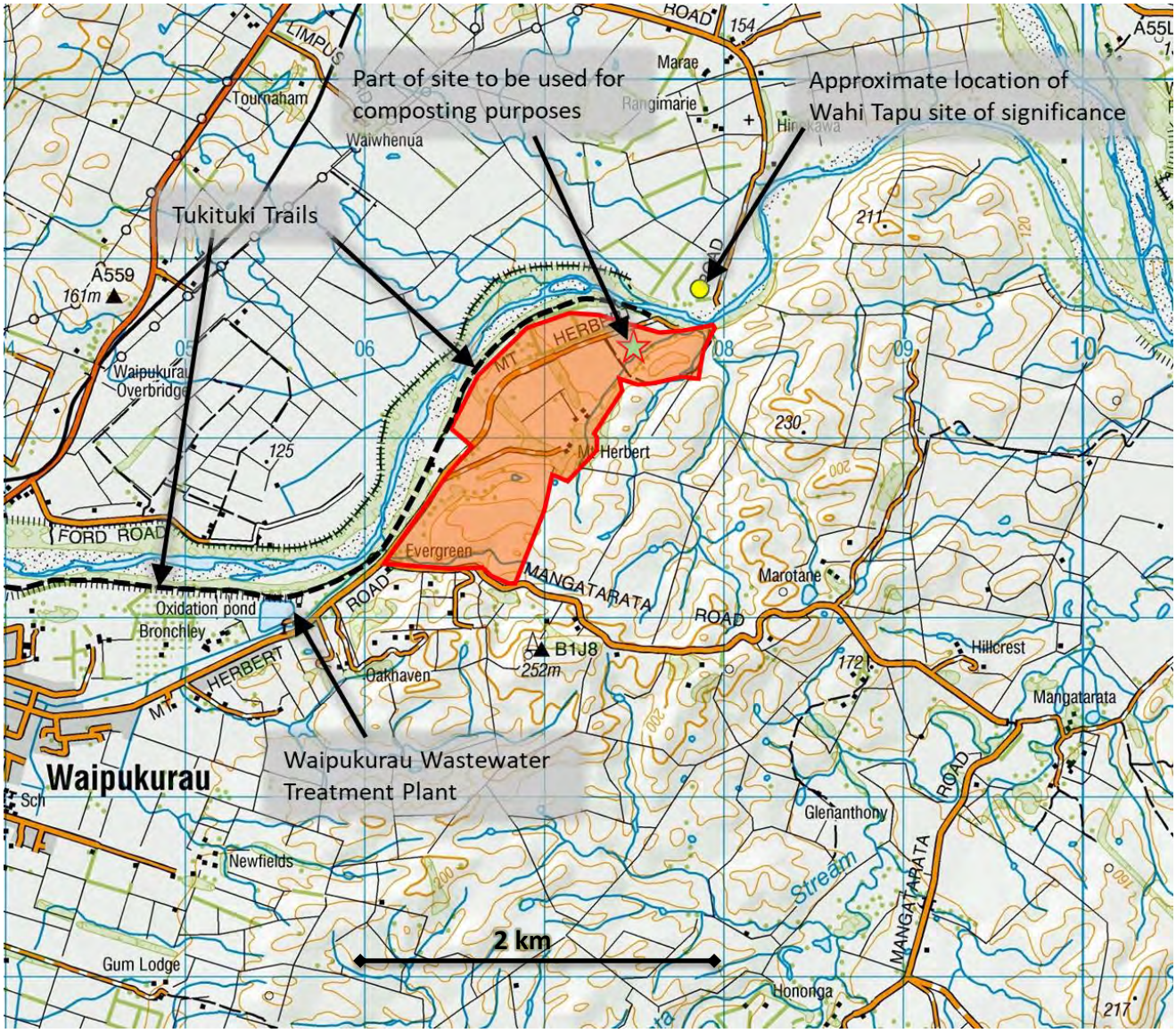


Figure 5: Topography and land use features near site, with site shown in red outline. Image source: NZ Topo50 Map BL38. Downloaded from https://data.linz.govt.nz, April 2018.

3 Description of Proposed Activities

3.1 Overview of Composting Process

Compost is an essential part of the mushroom growing process and is used as part of the substrate that the mushrooms are grown on. Compost consists of straw, chicken litter and gypsum. The key components of the composting process are described in this section.

Composting occurs in three phases, transforming the raw materials into a medium suitable for growing mushrooms. Phase 1 composting starts with the mixing of pre-wetted straw and pre-mixed chicken litter and gypsum. The mix is then loaded into one of multiple Phase 1 bunkers. During the composting in Phase 1 air is blown through the newly mixed and composting material to maintain aerobic conditions. The bunkers are progressively emptied and filled to facilitate turning of compost via transferring the compost from one bunker to another (known as "bunker-to-bunker transfer"). These bunkers have a concrete floor, two concrete walls and insulated panel roof, and the end openings are closed with solid sliding doors when not in use. The Phase 1 bunker concrete floors have recessed lines which act in parallel as both aeration lines and a leachate collection system.

The bunkers are operated under a slight vacuum or negative pressure compared to outside air to avoid leaking of odorous air from the bunkers. Foul air within the bunker is drawn from the top of each bunker and treated to remove odour before discharge to atmosphere.

At the completion of the Phase 1 process, the compost is transferred removed from the Phase 1 bunkers and into Phase 2 tunnels. During the Phase 2 cycle, air in the bunker is recirculated at one end of the bunker, and a portion of the air is drawn from the bunker and treated to remove odour. After Phase 2, the compost is transferred to Phase 3, and then is used in the mushroom growing operation.

Phase 1 takes about 12 days to complete, and the whole process from pre-wetting of bales until the compost is ready to grow mushrooms is nearly four weeks. Multiple batches of compost are in various stages of production at any time so that fresh compost is always available for starting the mushroom spawning process.

3.2 Proposed Composting Methods

An overview showing the layout of the site and a drawing of the processing buildings is provided in Appendix A. The 900 Tpw processing capacity will require a total of five bunkers for Phase 1, and nine tunnels for Phases 2 and 3 (four for Phase 2, and five for Phase 3). A description of each part of the process is provided below.

1. Bale pre-wetting

Bale pre-wetting will occur by dunking the bales into a sump filled with goodie water (see Section 3.3). The bales are then stacked on an aerated pad outside the Phase 1 bunkers for about 9 days. If necessary, the bales may be occasionally irrigated with goodie water during this 9-day period.

2. Chicken litter/gypsum storage and handling

Chicken litter will be imported to the site approximately once per week, mixed immediately with gypsum and then stored in a covered bunker in the same room as where bale break occurs (see below).

3. Bale break, mixing, and material placement in bunkers

The mixing process will occur in a purpose-designed automated bale-break machine within a semi-enclosed building called the "Mixing Hall". The machine will break up the bales, mix in the correct amount of chicken litter/gypsum and water, and then deposit the mixed substrate directly onto a conveyor for transport to one of five Phase 1 bunkers. Compost is placed evenly into the bunker via a telescopic, automated filling line with a capacity of 200 tonnes per hour ("Tph").

The process will occur over a period of up to 8 hours between the hours of 8am and 6pm to avoid potential odour emissions during stable atmospheric conditions in the early morning and evening. The process will occur typically 1-2 days per week and will usually occur on weekdays, but may occur at weekends if necessary.

4. First and second turning of compost in Phase 1 bunkers

During Phase 1, the compost will be turned twice by removing the compost from the bunker using a front-end loader, mixing the material and adding moisture in the bale break machine, and then immediately returning the compost to a spare bunker via the conveyor system and bunker filling line; this is known as "bunker-to-bunker" transfer. One bunker is always kept spare for this process; i.e. with five bunker operation (for 900 Tpw production) only four bunkers are used for composting and the fifth is kept available for turning operations. The process is illustrated in Figure 7.

The process takes about 8 hours, and will be conducted only during the hours of 8am to 6pm at the Mt Herbert site.

5. Removal of compost from Phase 1 bunkers, mixing and placement into Phase 2 tunnels

At the end of the Phase 1 composting period 12 days after initial mixing, the compost will be removed from the Phase 1 bunkers by front end loader and returned to the Mixing Hall. There, it will be turned again using the bale break machine. The compost will then be transported using the same conveyor system into a fully-enclosed building housing the Phase 2 and 3 composting operations.

6. Phase 2 and 3 composting

Phase 2 and 3 composting operations will be conducted in tunnels inside a fully-enclosed building. Compost will not be exposed outdoors again until after the compost has been turned into mushroom cultivation substrate.

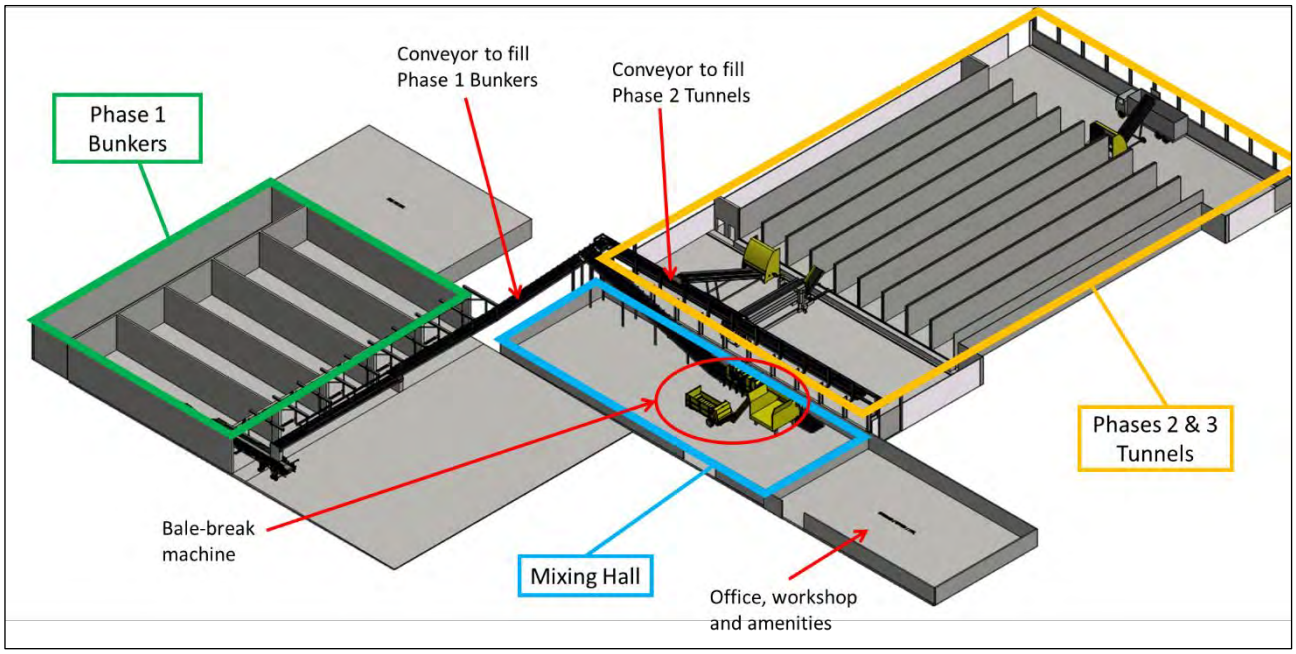


Figure 6: Schematic view of Phase 1 Bunkers, Mixing Hall, and Phase 2 Tunnels.

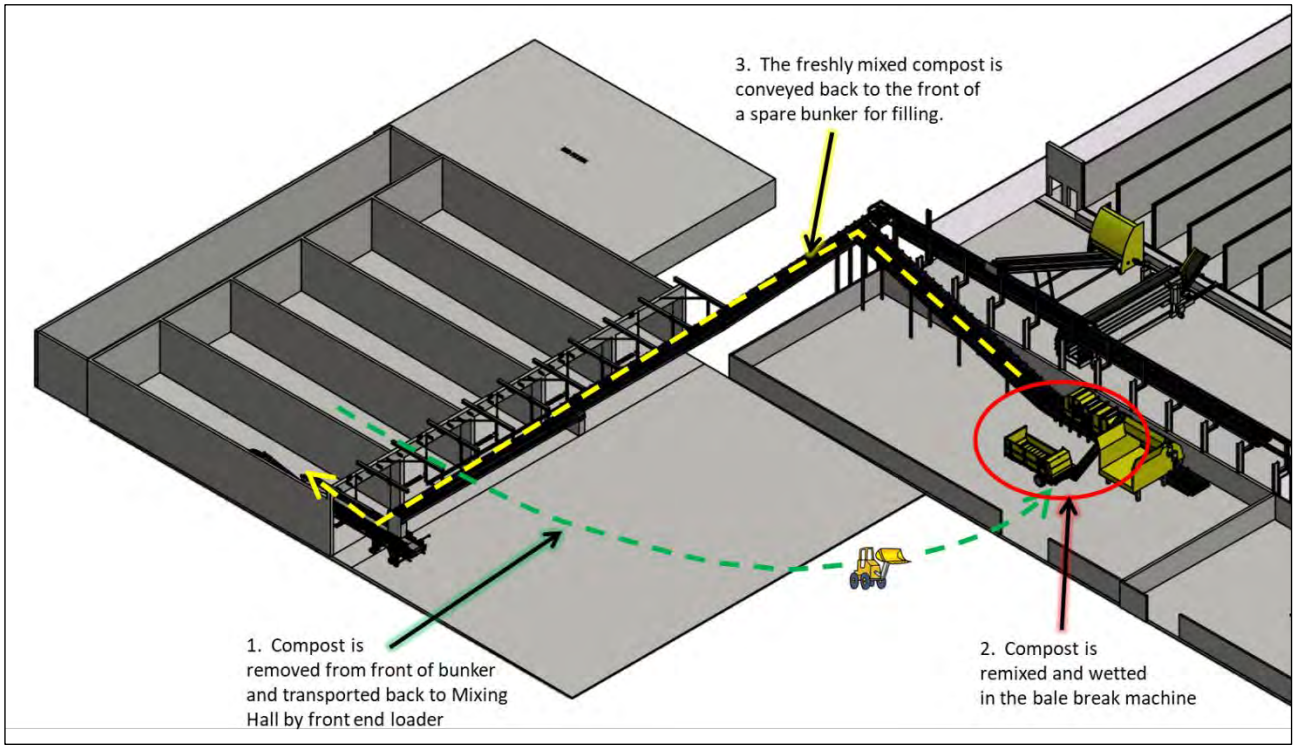


Figure 7: Illustration of bunker-to-bunker transfer process.

3.3 Recycled Water Collection and Storage

The site will include two ponds:

1. Freshwater runoff pond,
2. Phase 1 compost leachate pond ("goodie water").

The goodie water is loaded with organic compounds leached during the composting process, and the goodie water pond will be aerated and mixed to maintain aerobic conditions. The pond will be about 500 m^2 surface area and 4 m deep at full capacity, but will usually operate at about 240 m2 surface area except in extreme rainfall events. The aeration design will be similar to the system currently used successfully at TMM's Brookvale Road site, which uses an SAR™ Aerator from Hydro Processing and Mining Ltd (Canada)[2], proven in the field for mushroom composting farms. The aerator design recirculated recycled water through a land-mounted aerator, with the aerated water returned to the pond.

The goodie water is used to pre-wet the bales, and will be topped up with fresh water when needed.

[2] http://www.hpmltd.ca/Aeration.html

4 Meteorology

4.1 Influence of Meteorology in Odour Dispersion

The most important meteorological conditions affecting dispersion of odour after emission are wind speed and direction, and atmospheric stability.

Wind speed: For emissions occurring close to ground or entrained in building downwash eddies, low wind speeds (roughly less than about 2 - 3 metres per second, or 4 - 6 knots) tend to result in noticeable odour at greater downwind distances than at higher wind speeds.

Atmospheric stability: The atmospheric stability is a measure of the vertical mixing, or turbulence, of the atmosphere close to ground. During low wind speeds around sunset and sunrise, and overnight, the atmosphere can be very stable with "inversion" caps keeping pollutants emitted close to the ground from rising high into the atmosphere. If such conditions coincide with odour emissions from sources located close to the ground, such as the potential odour sources from the composting operations at the TMM site, the dispersion of odour downwind from the source can be slow with odour nuisance more likely to be noticed by downwind sensitive receptors.

4.2 Local Wind Records

The nearest long-term meteorological monitoring station with publicly available data is 2.5 km east of Waipawa at the Waipawa wastewater treatment plant, about 3.2 km north-northeast of the proposed composting location (location marked on Figure 4).

Wind patterns at the TMM site may differ somewhat to those at Waipawa because the TMM site will be sheltered from southerly and easterly winds by the hill features to the east and south of the site, whereas at the Waipawa meteorological station the terrain is flat to the south but rolling hills are quite close to the northeast and east.

Hourly wind speed and direction data between January 2010 and December 2019 for Waipawa was downloaded from the online National Climate Database (also known as the NIWA Cliflo Database)[3]. Station information provided with the Cliflo data indicates that wind records from this station are expressed as a one-hour average. A windrose for Waipawa for that period of ten years is shown in Figure 8. Low wind speeds are dominantly from the northwest quadrant, following the course of the river along the path of least terrain elevation.

Windroses for the individual calendar years within that 10-year period are provided in Appendix 1. Each year shows a similar overall trend of prevailing wind directions, but with varying frequency of low wind speeds, particularly from directions where low wind speeds are uncommon. A breakdown of wind speed frequencies by year is shown in Table 1. A similar analysis of wind speeds was also prepared for only winds from the less frequent northeast to south sector (specifically 40 degrees to 180 degrees) and is provided in Table 2 – these

[3] https://cliflo.niwa.co.nz/.

wind directions may also represent winds with the potential to carry odours from the composting operation towards sensitive receptors to the southwest on Mt Herbert Road, or towards the Tukituki River Esplanade.

Two calendar years were selected for the meteorological simulations described in Section 4.3; an "average" year, and a "worst case" year. The "average" year selected was 2014, based on the windrose for 2014 compared to the 10-year windrose, the speed distributions shown in Table 1 and Table 2, and the climate summary for 2014 from the NIWA website[4].

For the "worst case" year, the 2017 was selected as that year showed the largest proportions of low wind speeds, as well as the greatest proportion of those light winds coming from the northeast to south sector (as per Table 1 and Table 2). The climate summary for 2017 from the NIWA website[5] describes 2017 as a year with La Niña conditions (typically bringing more northeasterly winds and higher than normal temperatures[6]).

Table 1: Breakdown of wind speed frequency by year, Waipawa 2010-2019; all directions.

Wind speed, m/s	Percent of hourly-average records less than wind speed in year										
	2010-2019	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
0	1.8	0.1	0.4	1.9	2.0	2.4	0.2	1.7	3.7	3.2	1.8
<0.5	14.6	3.0	11.0	18.1	14.4	14.1	10.0	16.3	21.1	21.6	16.9
<1	33.5	15.6	31.3	37.7	37.3	35.0	34.3	35.2	37.9	37.3	34.0
<2	60.2	60.8	59.5	62.9	63.5	60.5	60.2	60.1	60.8	58.2	55.7
<3	78.6	82.5	78.9	80.6	81.6	78.4	80.6	78.9	76.5	74.4	73.7
<5	95.1	95.8	95.9	95.5	96.6	95.1	97.3	95.3	94.3	93.1	92.1
<8	99.4	99.3	99.5	99.4	99.5	99.1	99.9	99.0	99.4	99.6	99.7
>=8	0.6	0.7	0.5	0.6	0.5	0.9	0.1	1.0	0.6	0.4	0.3

Table 2: Breakdown of wind speed frequency by year, Waipawa 2010-2019; only winds coming from 40-180 degrees.

Wind speed, m/s	Percent of hourly-average records less than wind speed in year										
	2010-2019	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<0.5	12.7	2.3	8.9	12.3	11.3	12.2	11.2	17.3	21.6	17.1	15.6
<1	32.5	14.6	29.6	32.2	31.9	33.8	37.0	37.7	42.4	33.3	35.3
<2	64.3	63.4	61.9	63.2	61.2	66.0	67.4	68.7	72.2	56.8	64.5
<3	85.7	89.6	82.2	87.1	84.2	86.8	88.8	89.9	89.7	76.3	85.1
<5	98.1	99.3	97.2	98.3	98.4	98.1	99.4	99.2	99.4	94.0	98.0
<8	99.9	100.0	99.8	100.0	100.0	99.7	100.0	100.0	99.9	99.7	99.9
>=8	0.1	0.0	0.2	0.0	0.0	0.3	0.0	0.0	0.1	0.3	0.1

[4] https://niwa.co.nz/climate/summaries/annual/annual-climate-summary-2014
[5] https://niwa.co.nz/climate/summaries/annual-climate-summary-2017
[6] https://niwa.co.nz/climate/information-and-resources/elnino/elnino-impacts-on-newzealand

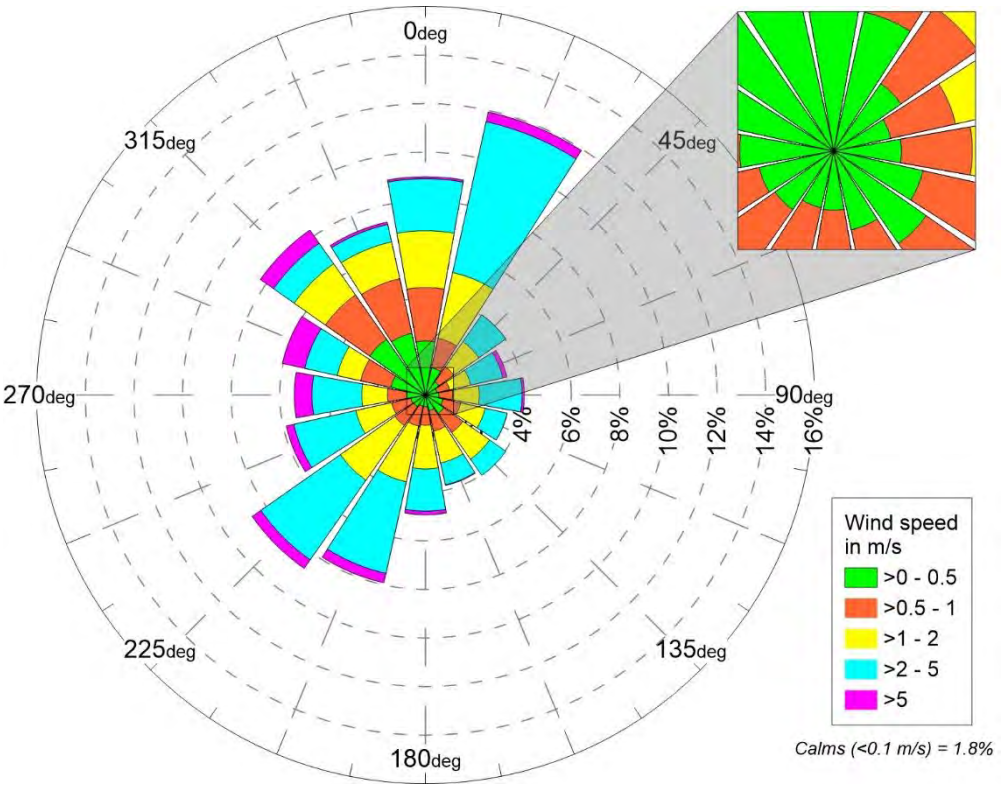


Figure 8: Windrose showing hourly-average wind observations from Waipawa meteorological data station, January 2010 to December 2019. Refer Appendix 1 for windroses for individual years.

4.3 Regional Windfield Simulation

To provide additional information about wind fields in the vicinity of the TMM site, particularly during low wind speeds, the CALMET meteorological model was used to simulate wind fields in the region. As described in the previous section, the years 2014 and 2017 were selected for processing. Outputs from the CALMET meteorological model for these two years were also used as an input to the CALPUFF atmospheric dispersion model to study dispersion patterns for potential odour emissions from the TMM site (refer Section 6).

Guidance on running CALMET and CALPUFF for modelling applications in New South Wales was prepared for the NSW EPA by TRC Environmental Corporation (OEH, 2011). Since its publication, the guidance in OEH (2011) has become widely adopted by consultants in Australia and New Zealand as a best practice guideline for CALMET and CALPUFF modelling. The guidance in that document was followed in the preparation of CALMET and CALPUFF models for this report.

The CALMET model was run in "NO-OBS" mode, following the guidelines in OEH (2011). In this mode, gridded numerical model output from the prognostic meteorological model TAPM is used as the input meteorological data in CALMET. This option was necessary due to the lack of local cloud cover observations, which is a required input for running CALMET with observations as a direct input. Waipawa observation records of wind speed and direction were therefore used as inputs to the TAPM model.

The parameters used for the TAPM model setup were as follows.

- Centre co-ordinate 39° 58.0'S, 176° 36.5'E
- Four nested grids, grid spacings 24000m, 8000m, 2400m, 700m.
- Number of grid nodes: 31 in both N-S and E-W directions, and 30 vertical levels.
- Waipawa observations included, with a radius of influence of 20km.
- Default advanced settings.

The CALMET model setup was as follows:

- Model executable version CALMET 6.5.0 (released June 22, 2015)
- Graphical user interface for model setup – Lakes Environmental CALPUFF View
- January - December 2014 and 2017 time periods; one-hour time step
- UTM Map Projection, zone 60S
- Grid spacing 0.125km with 112 grid cells in x-direction and 112 grid cells in y-direction, centred on the TMM Site (14km x 14km grid extent).
- 10 vertical levels used, with cell face heights from 20m to 4000m
- Geophysical data –
    - 3-second (approximately 90m interval) data loaded from global SRTM database module in CALPUFF View.
    - Land use data generated using "Land Use Creator" tool in CALPUFF View, referenced to aerial photograph of modelling domain from Google Earth.
- TAPM output used as initial guess field for CALMET grid, converted using "CALTAPM" processor.
- Radius of influence of terrain features (TERRAD) – 2.0km.

An input file for CALMET summarising key input and model settings is provided in Appendix 2.

Windroses were extracted for both years from the CALMET model at the location of the TMM site. These windroses are shown in Appendix 3 and show the wind patterns that would be experienced at the location shown in the figure in Appendix 3.

Due to the hills immediately to the east and southeast of the site, the extracted windrose varies quite significantly with the location from which the data is extracted from the model. For example, at the base of the hill at the alternative location shown on the figure in Appendix 3, the second pair of windroses provided in Appendix 3 shows that winds are highly dominated by northeast and southwest flows at that location, following the contour of the hill. This is to be expected, and shows the influence of terrain on wind vectors simulated by CALMET.

4.4 TMM Site Wind Monitoring

Establishment of a wind monitoring station at the site was recommended by AirQP to commence gathering of an onsite local wind dataset, and this was implemented by TMM in September 2020.

The wind sensor at the monitoring station is located on a mast 10m above ground, and the mast is located consistent with the recommendations of "AS NZS 3580.14-2014 Methods for sampling and analysis of ambient air - Meteorological monitoring" so that wind measurements at the site are not influenced by nearby obstacles such as tall trees or buildings. The mast location is shown in Figure 9.

The collection of wind data will serve three main purposes:

1. Future verification of potential causes of complaints, if any complaints arise.
2. Assessment and verification of odour risk through measurement of frequency and direction of wind patterns with the greatest potential to cause complaints due to offensive odour.
3. Measurement of data required for development of site-specific meteorological data files suitable for atmospheric dispersion modelling, if required in the future.

Figure 9: Location of on-site meteorological monitoring site installed and operated by TMM.

5 Description of Odour Sources

The odour control strategy for the composting operation is as follows:

- Extraction of odour from Phase 1 bunkers and Phase 2 tunnels and treatment of extracted air in biofilter to remove odour before discharge to air.
- Best practice design of bunker air extraction to minimise fugitive emissions during emptying of bunkers. Restriction of hours of operation to avoid fugitive odour emissions during worst case meteorological conditions.
- Point source extraction of odour from above the bale break machine for odour treatment in the biofilter.
- Some residual odour emissions and minor odour sources discharging to air without odour treatment.

The potential sources of odour are:

1. Bale pre-wetting.
2. Chicken litter mixing and storage.
3. Bale breaking.
4. First and second turning of compost in Phase 1 bunkers by bunker-to-bunker transfer.
5. Removal of compost from Phase 1 bunkers and transfer to Phase 2 tunnels.
6. Residual odour from biofilter after odour treatment.
7. Goodie water storage pond.

A summary of the composting process and the odour controls applied is provided in Figure 10 at the end of this section. The ways in which odour is generated and discharged from each of these sources of odour are explained below.

1. Bale pre-wetting

Odour from bale pre-wetting is generated from presence of goodie water during dunking, bale draining, and supplementary irrigation if required. The magnitude of odour emissions is highly dependent on the quality of the goodie water. The proposed aeration of the goodie water pond will minimise the potential for odour emissions during the bale pre-wetting process, although some relatively minor odour emissions are likely.

2. Chicken litter mixing and storage

Chicken litter will be delivered to the concrete pad outside the Mixing Hall, mixed immediately with gypsum, and then stored in an enclosed bunker within the Mixing Hall. The best way to minimise odour emissions from chicken litter is to keep the litter dry in storage, which is enabled through this design approach.

3. Bale breaking

The breaking and mixing of pre-wetted bales releases some odour. Bale break will occur in the Mixing Hall which is mostly enclosed except for doorways for movement of front end loaders and openings for the conveyors to transport the mixed raw materials to the Phase 1 bunkers.

The Mixing Hall will be fitted with point source extraction from above the bale break machine and associated hopper, which will capture most of the odour emissions from the bale break process. However, as the doors to the Mixing Hall will be open during the bale break process, odour which is not captured by the point source extraction may escape outside the Mixing Hall as "fugitive" emissions.

Minimising the generation of odour and the degree of unpleasantness of that odour during the bale break process involves the following:

1. Keeping the chicken litter/gypsum mix dry during storage and only accepting chicken litter onto site which has been appropriately stored off-site (i.e. not anaerobic upon delivery).
2. Keeping the recycled water aerobic so that odorous by-products of anaerobic decomposition do not accumulate inside the bales.
3. Aerating the bales.

These measures are all proposed to be implemented at the site. In addition, operating hours for the bale breaking process will be limited to between 8am and 5pm to avoid potential fugitive odour emissions during stable atmospheric conditions when odour dispersion is typically poor.

Once the compost leaves the Mixing Hall on the conveyors, it is transported to the Phase 1 bunker and deposited into a hopper for automated filling at the bunker. The conveyors and hopper will not be covered and therefore there will be some evolution of odour from this source. During the filling process, the bunker air extraction system will operate at maximum capacity and will remove nearly all of the odour caused by the actual filling activity.

4. First and second turning of compost in Phase 1 bunkers by bunker-to-bunker transfer

During the bunker-to-bunker extraction process, the bunker air extraction system will operate at maximum capacity. However, some odour will still emitted during the process due to the movement of front-end loaders in and out of the bunker, and from the compost in the bucket on the front-end loader whilst the loader is moving from the bunker back to the Mixing Hall.

As during the bale break operation, the Mixing Hall will be mechanically ventilated via point source extraction hoods over the bale mixing line during the bunker-to-bunker transfer process. This extraction will remove most of the odour caused by the mixing process. However, is it likely that some of the odour from within the Mixing Hall will escape as fugitive emissions through the open doorways.

Potential hours of operation of this process are 8am to 6pm.

5. Removal of compost from Phase 1 bunkers and transfer to Phase 2 tunnels

There are likely to be some emissions of odour during the process of removing the finished Phase 1 compost from the bunkers by front-end loader and transferring it back to the Mixing Hall, with the same potential odour sources as described above for bunker-to-bunker transfers. However, at this stage the odour will be less offensive than earlier in the Phase 1 composting period, as the compost has completed the most active stage of biodegradation. Potential hours of operation of this process are 8am to 6pm.

6. Residual odour from Phase 1 bunkers after odour treatment

Air extracted from the bunkers holding Phase 1 compost will be passed through a biofilter custom-designed for the site by GTL Europe. GTL Europe has recommended the design air flow volumes for the biofilter for the 900 Tpw operation shown in Table 4. When all bunkers and tunnels are closed and there are no yard operations requiring any bunkers or tunnels to be open for unloading/filling, the design air flow rate is at the baseline rate of 96,000 m^3/hr.

However, when any bunkers or tunnels are open higher air flow rates are required to contain odour emissions. The increased air flow rates during these times will increase the overall air flow delivered to the biofilter. The highest design ventilation demand occurs when two Phase 1 bunkers are open for bunker-to-bunker transfer (one bunker unloading, and one bunker filling). This rate of air flow is 216,000 m^3/hr, and would only occur for the duration of this scenario (up to a few hours per week during working hours); once the bunkers/tunnels are closed and operations in the Mixing Hall are finished the ventilation would return to the baseline ventilation rates.

Table 3: Baseline ventilation demand for biofilter sizing (no bunkers/tunnels open) – 900 Tpw operation.

Operation being ventilated	Basis of air flow calculation	Number of bunkers/tunnels	Air flow required
Phase 1 bunker process air (bunkers filled and undisturbed)	4,000 m^3/h per bunker	4	16,000 m^3/h
Phase 2 process air extraction	20,000 m^3/h per tunnel	4	80,000 m^3/h
TOTAL			**96,000 m^3/h**

Table 4: Summary of highest design ventilation demand for biofilter sizing – 900 Tpw operation.

Operation being ventilated	Basis of air flow calculation	Number of processes	Air flow required
Phase 1 bunker process air (bunkers filled and undisturbed)	4,000 m^3/h per bunker	2	8,000 m^3/h
Phase 1 exhaust bunker during emptying/filling	40,000 m^3/h per bunker	2	80,000 m^3/h
Mixing Hall point source extraction	48,000 m^3/hr	1	48,000 m^3/h
Phase 2 process air extraction	20,000 m^3/h per tunnel	4	80,000 m^3/h
TOTAL			**216,000 m^3/h**

The biofilter design will be based on a loading rate of 50 m^3/hr air per m^3 biofilter for the highest design ventilation demand. The proposed biofilter media depth is 1.8 m, and the media itself will be bark as has been used successfully at TMM's existing Brookvale Road site.

For an air flow of 216,000 m^3/hr, the required volume of biofilter media is 4,320 m^2 (= 216,000 ÷ 50). The corresponding surface area for a depth of 1.8 m is 2,400 m^2.

6. Goodie water storage pond

The design and operation of the goodie water storage pond was described earlier in Section 3.3. Odour emissions from this source are expected to minor, and no additional mitigation measures are proposed. Dissolved oxygen concentration in the goodie water storage pond will be continuously monitored and logged.

7. Residual odour from Phase 2

All filling and emptying operations for the Phase 2 tunnels will be carried out in an enclosed building with air extracted to the biofilter for treatment. Similarly, all process air extracted from the Phase 2 tunnels will also be extracted and treated in the biofilter. Therefore, no fugitive odour releases to the atmosphere without treatment are expected from this process.

There is no ventilation of odour from the Phase 3 tunnels as odour concentrations in the compost are very low.

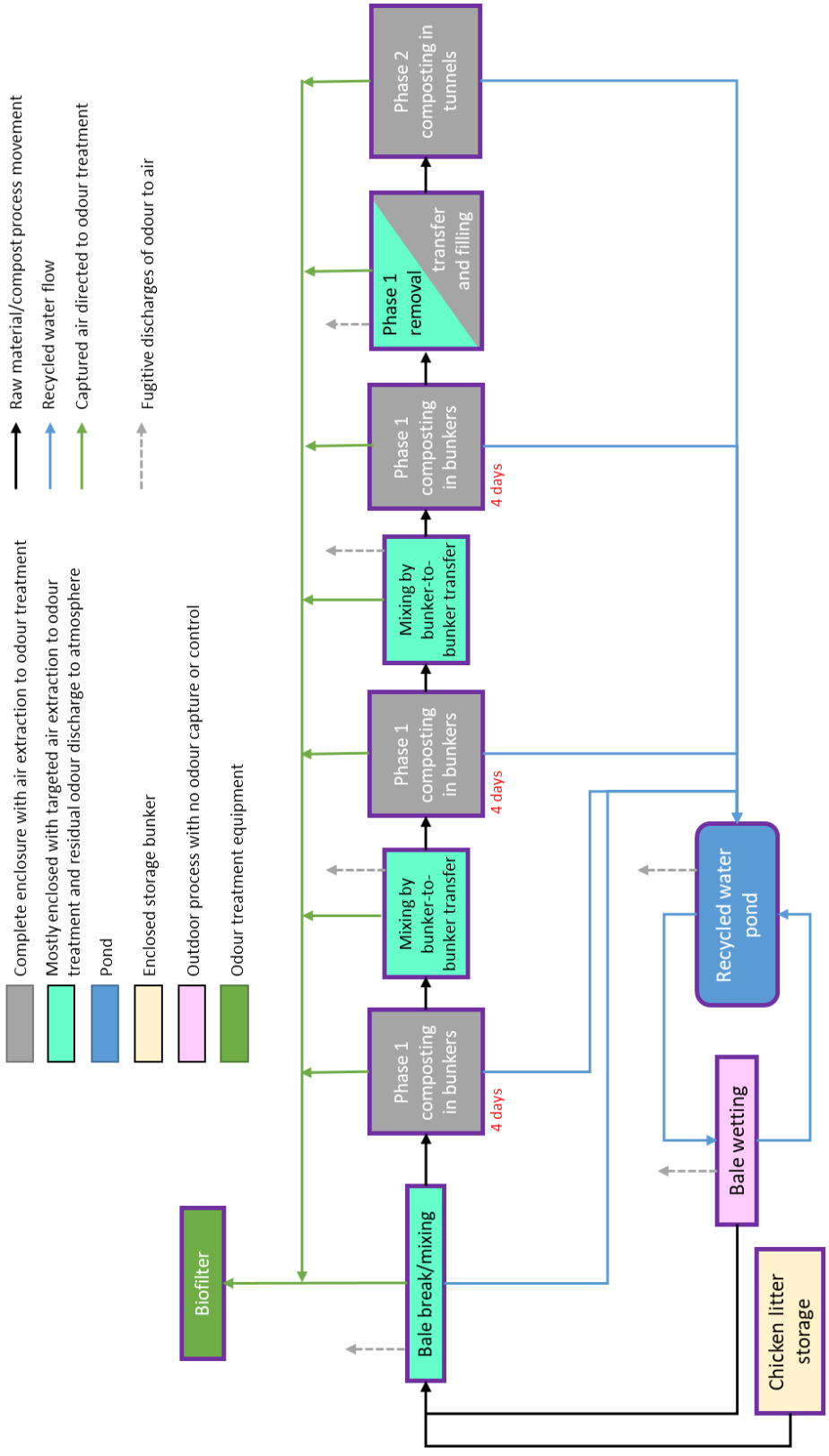


Figure 10: Summary of composting processes and odour control.

6 Odour Dispersion from TMM site

6.1 Approach and Set-Up

The behaviour of odour emissions at the TMM site once they are discharged from potential odour sources and dispersed with the wind was simulated with an atmospheric dispersion model, CALPUFF.

CALPUFF is an advanced "puff" dispersion model that can simulate dispersion in complex situations with very low wind speeds and non-uniform topography. In a "puff" model, pollutant releases are represented by a series of puffs of material which are transported by the winds across the modelling domain. CALPUFF is widely used in Australia and New Zealand in complex modelling situations where topography has a significant influence on dispersion patterns.

The meteorological simulation from CALMET, described in Section 4.3, was used as an input to the CALPUFF model.

Most of the potential odour sources at the proposed composting site at Mt Herbert Rd are "fugitive" sources, being odour emissions from spaces or processes that are very difficult to capture and quantify. Therefore, the dispersion modelling has not attempted to quantify these emission rates. Instead, the modelling has examined the dispersion patterns from these sources given the emission types and times of day when the emissions occur, and therefore considered the risk and potential frequency of offensive odour carrying beyond the site to both existing residences and to the Tukituki River Esplanade.

The CALPUFF model was run with the following settings:

- Model executable version CALPUFF 7.2.1
- Graphical user interface for model setup – Lakes Environmental CALPUFF View
- Time period January – December (both 2014 and 2017); one-hour time step
- Calm condition wind speed threshold = 0.2 m/s
- Minimum sigma-v: 0.2 m/s for all land stability classes
- Grid spacing: 125m
- Terrain adjustments included

A sample CALPUFF input file is provided in Appendix 3.

6.2 Emission Scenarios Tested in the Model

Several different emission scenarios were tested in the dispersion model:

1. Normal odour emissions, no site processing activities (i.e. no bale break, bunker-to-bunker transfers, or Phase 1 to Phase 2 transfers). Sources included were:
    a. Emission of odour from biofilter 24 hours per day, process air only (i.e. air flow 96,000 m^3/h).
    b. Emission of odour from goodie water pond, 500 m^2, at a nominal emission rate typical of an aerated bioreactor used for municipal wastewater treatment – 0.5 $OU.m^3/m^2/s$.
2. As per Scenario (1) but with biofilter operating at maximum output (216,000 m^3/h) during the hours of 8am to 6pm, 365 days per year.
3. Fugitive emissions from processing activities (such as bale breaking, or use of the Mixing Hall for bunker-to-bunker transfers). (No biofilter or pond emissions included in this scenario).
4. Cumulative worst case emissions – combining Scenarios 2 and 3 and assuming these activities occur 365 days per year.

For Scenarios 1 and 2, the odour concentration in the air discharged from the biofilter under baseline ventilation rates was assumed to be 500 OU which is a common performance criteria for biofilters.

For Scenario 3, the fugitive odour emissions were assumed to be equal to 10,000 $OU.m^3/s$. This estimate is a nominal "best guess" by AirQP and is considered to be an order-of-magnitude approximation – with the proposed odour extraction from the open bunkers and Mixing Hall it is considered that the likely fugitive emission rate will be more than 1000 $OU.m^3/s$, but certainly well less than 100,000 $OU.m^3/s$. It is not possible to accurately verify or calculate an OER for this type of fugitive odour source. The purpose of running this Scenario is to assess the potential frequency and intensity of odours occurring beyond the site boundary, and the uncertainty in the actual odour emission rate will be accounted for in the interpretation of model results.

The odour sources in the Scenarios are summarised in Table 5.

Table 5: Odour sources in Scenarios 1 - 5, 900 Tpw operation.

Source	Source dimensions	Odour emission rate basis	Odour emission rate
Scenario 1			
Biofilter, 24-hours per day	2,400 m^2	500 OU x 96,000 m^3/h (26.7 m^3/s)	13,333 $OU.m^3/s$
Goodie water pond	500 m^2	0.5 $OU.m^3/m^2/s$	250 $OU.m^3/s$
Scenario 2			
Biofilter, hours 8am to 6pm	2,400 m^2	500 OU x 216,000 m^3/h (60.0 m^3/s)	30,000 $OU.m^3/s$
Biofilter, hours 6pm to 8am	2,400 m^2	500 OU x 96,000 m^3/h (26.7 m^3/s)	13,333 $OU.m^3/s$
Goodie water pond	500 m^2	0.5 $OU.m^3/m^2/s$	250 $OU.m^3/s$
Scenario 3			
Fugitive emissions from processing activities, hours of 8am to 6pm only	Volume source, 40m x 40m centred over processing yard	Hours of 8am to 6pm only	10,000 $OU.m^3/s$
Scenario 4			
Biofilter, hours 8am to 6pm	2,400 m^2	500 OU x 216,000 m^3/h (60.0 m^3/s)	30,000 $OU.m^3/s$
Biofilter, hours 6pm to 8pm	2,400 m^2	500 OU x 96,000 m^3/h (26.7 m^3/s)	13,333 $OU.m^3/s$
Goodie water pond	500 m^2	0.5 $OU.m^3/m^2/s$	250 $OU.m^3/s$
Fugitive emissions from processing activities, hours of 8am to 6pm only	Volume source, 40m x 40m centred over processing yard		10,000 $OU.m^3/s$

In the dispersion model, the biofilter emission was simulated using point sources rather than area sources. This allowed the initial dilution of the emissions to be accounted for, as well as the buoyancy of the emission during cold ambient conditions. The temperature of the discharge air was assumed to be a constant 20°C due to the heat from the composting process – in summer the discharge temperature may be warmer than this but the dispersion model is insensitive to the assumption of constant discharge temperature in such conditions. The source characterisation settings used in the model for the biofilter were:

- Four point sources, each of diameter equivalent to 25% of the biofilter surface area.
    - Each source cross-sectional area: 600 m2.
    - Each source diameter: 27.6 m.
- Vertical exit velocity calculated from air flow rate delivered to biofilter
    - Scenario 1: 0.011 m/s.
    - Scenario 2: 0.025 m/s.
- Height of release: 2 m
- Building downwash included:

- Biofilter structure 2 m high
- Bunker building 7.5 m high
- Tiered structure for the tunnels/Mixing Hall building of 9.0m along the ridgeline and 5.3m at either end.

6.3 Odour Modelling Guidelines

Odour modelling guidelines are tools against which dispersion model results are compared to determine whether significant adverse are predicted to occur. They usually contain two components; a concentration, and a percentage compliance (for example, 'odour concentration shall exceed X OU/m^3 for less than Z% of the modelled hours"). X is the odour concentration predicted by the dispersion model. Z reflects the reliability of model results, and the probability of the model results giving an accurate representation, as well as a risk assessment approach for the very few highest odour concentrations that may occur infrequently.

The values of X and Z are set to represent the qualitative standard of 'no offensive or objectionable odour' and vary depending on the situation.

The Ministry for the Environment's Good Practice Guide for Assessing and Managing Odour in New Zealand (MfE, 2016) (herein referred to as the "MfE Odour Guide") gives general guidance for odour modelling guidelines, as summarised in Table 6.

Table 6: Recommended Odour Modelling Guideline Values (MfE, 2016).

Sensitivity of receiving location	Concentration	Percentile
High (worst case impacts during unstable to semi-unstable conditions)	1 OU	0.1% and 0.5%
High (worst case impacts during neutral to stable conditions)	2 OU	0.1% and 0.5%
Moderate (all conditions)	5 OU	0.1% and 0.5%
Low (all conditions)	5-10 OU	0.5%

Other background guidance to the MfE Odour Guide provides additional explanation of the selection of percentiles, stating that the 'baseline' percentile is 0.5%, although 0.1th percentile can also be used to assist in the evaluation of model results depending on the type of source and consistency of emission data.

In this case, the 0.5th percentile is appropriate, due to the lack of sensitive receptors (in particular dwellings) very close to the TMM site and the rural nature of surrounding land use. The sensitivity of the receiving environment is regarded as "moderate" because the nearby residences are located in rural areas, and also because most of the odours discharged from the site (particularly from the biofilter and the pond) will be similar to background rural odours once diluted and dispersed.

Therefore, the appropriate odour modelling guideline for sensitive receptors (in this case, residential dwellings) is 5 OU, 0.5th percentile.

For other potentially-sensitive land uses near the composting plant, such as the Wahi Tapu site, Tukituki Trail users, and Mountain Bike Park users, these locations are also considered to have "moderate" sensitivity with the 5 OU, 0.5th percentile guideline perhaps being applicable. However, for these land uses the interpretation of model results needs to take into account the low frequency and short duration of exposure to any odour that users at these locations would experience because of the nature of activities being carried out. The risk of odour being offensive or objectionable at these locations is much less than the risk of that same odour being offensive or objectionable at a residential dwelling.

The CALPUFF model calculates ground level odour concentrations (GLCs) at every receptor on the modelling domain for every hour of the meteorological data. For each year of meteorological data, the model stores 8760 concentration data points for each receptor. The model finally calculates the 99.5th percentile of the hourly concentration data at each receptor (i.e. the 43rd highest GLC at each point), and this is the output concentration for that receptor. This is the same as the concentration that is exceeded for less than 0.5% of the time – i.e. as required by the odour modelling guideline. A similar logic can be applied to determine the 0.1th percentile result.

The graphed model results in this report show the 99.5th percentile highest GLCs predicted at each receptor from both the full 2014 and 2017 years of hourly meteorological data.

6.4 Model Results and Discussion

6.4.1 Scenario 1

The 99.5th percentile dispersion model results for Scenario 1 are shown in Figure 11. This shows the dispersion of normal site odour emissions when no compost processing activities are occurring – i.e. emissions from biofilter with all bunkers and tunnels full and closed, emissions from pond, and no activities in Mixing Hall. The figure shows both 2014 and 2017 model results. The GLCs are very similar between the two years, and this is found in all the model results presented in this report.

The highest GLC at a residence is 0.74 OU, occurring in the 2017 year.

Figure 6 shows the dispersion of odour from the pond alone, illustrating the relatively small contribution of this source to predicted off-site odour GLCs.

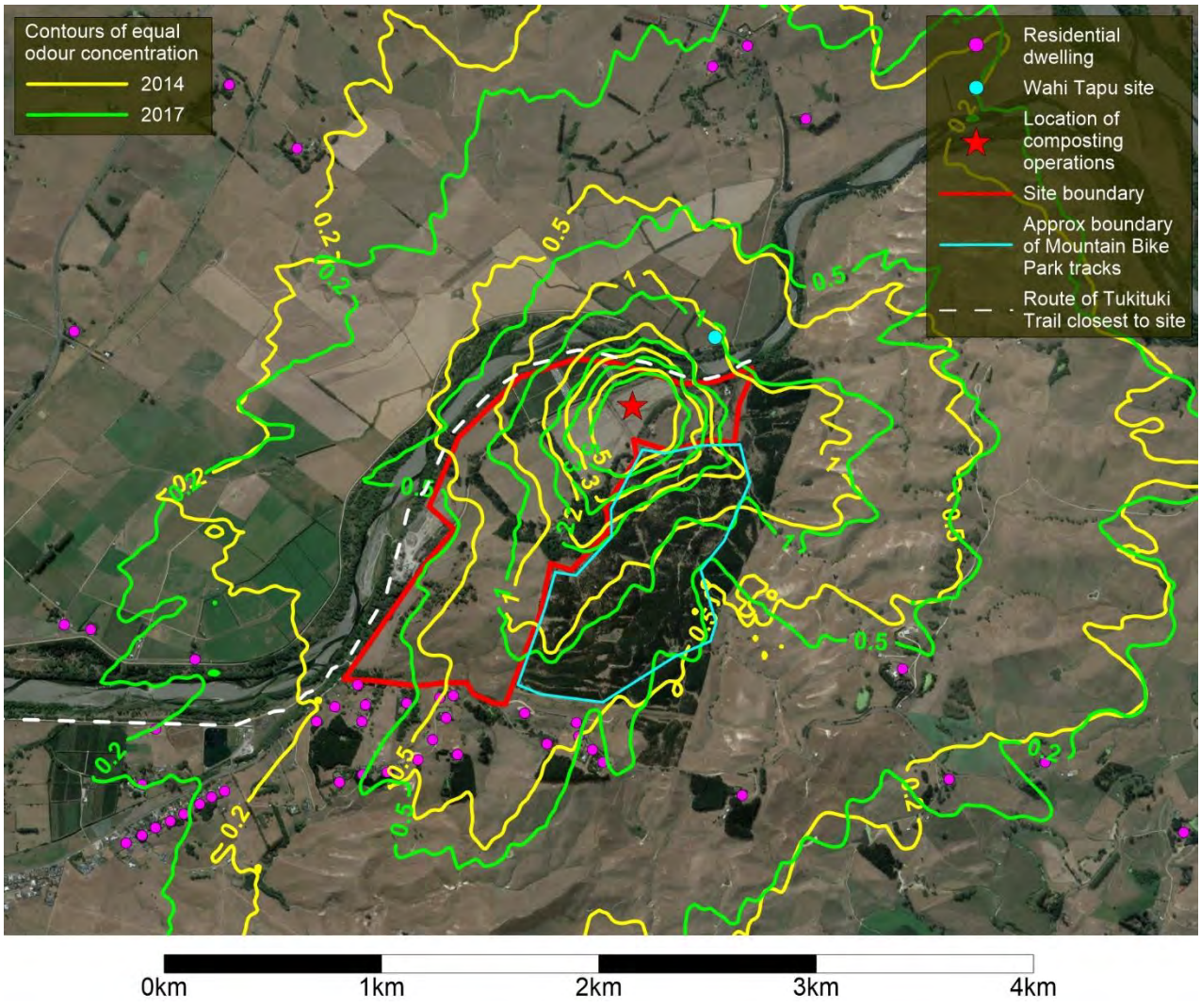


Figure 11: Model results for Scenario 1. Contours show 99.5th percentile, 1-hour average odour concentrations.

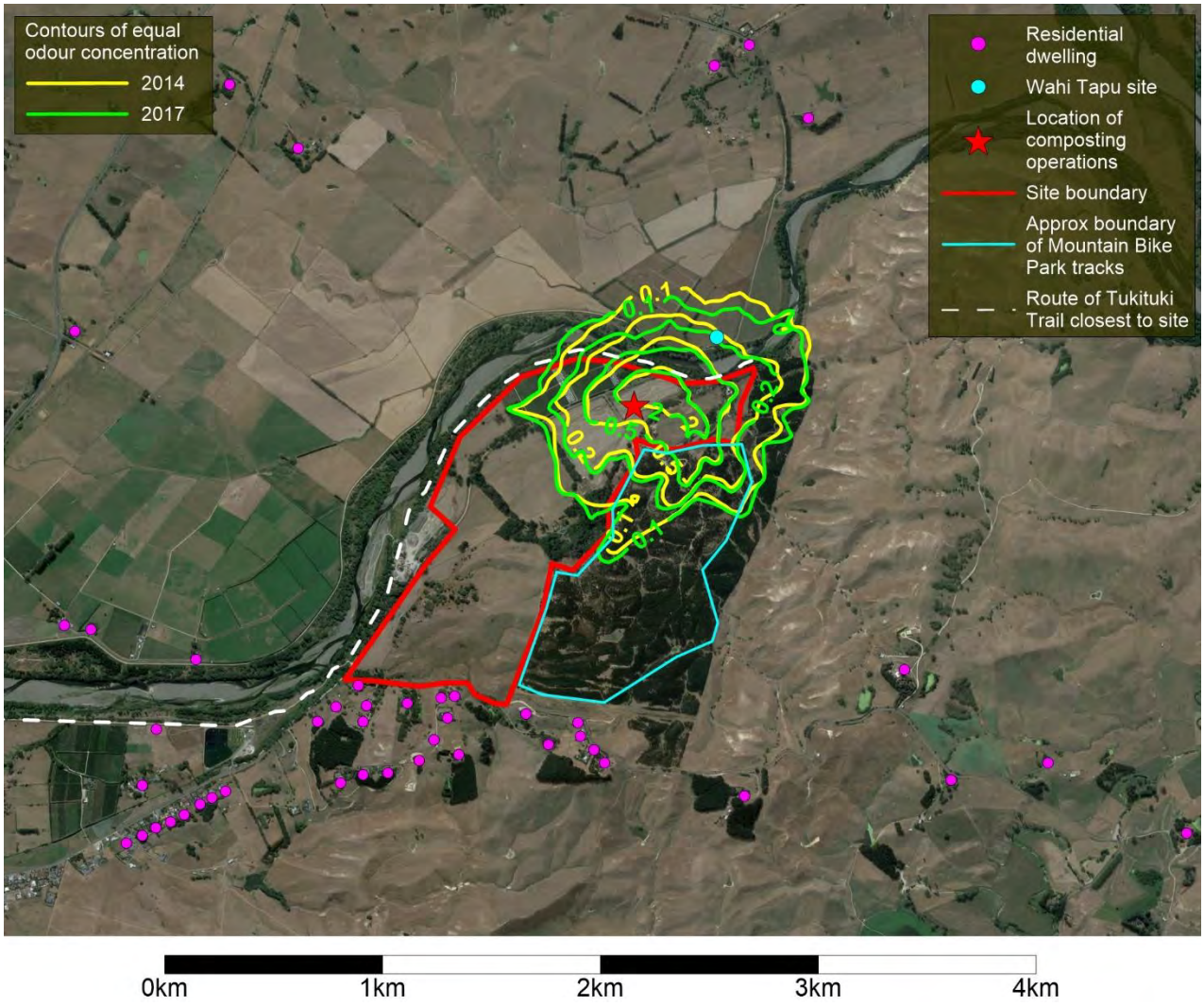


Figure 12: Model results for odour emissions from pond only. Contours show 99.5th percentile, 1-hour average odour concentrations.

6.4.2 Scenario 2

The 99.5th percentile dispersion model results for Scenario 2 are shown in Figure 13. This shows the dispersion of odour emissions from the biofilter and pond including the assumption that compost processing activities are occurring every day of the year between 8am and 6pm – i.e. emissions from biofilter at maximum design flow rate between 8am and 6pm. No fugitive emissions from the Mixing Hall or processing yard are included in this scenario.

The predicted GLCs are slightly higher than under Scenario 1, and the highest odour GLC at a residence is 0.77 OU, occurring in the 2017 year.

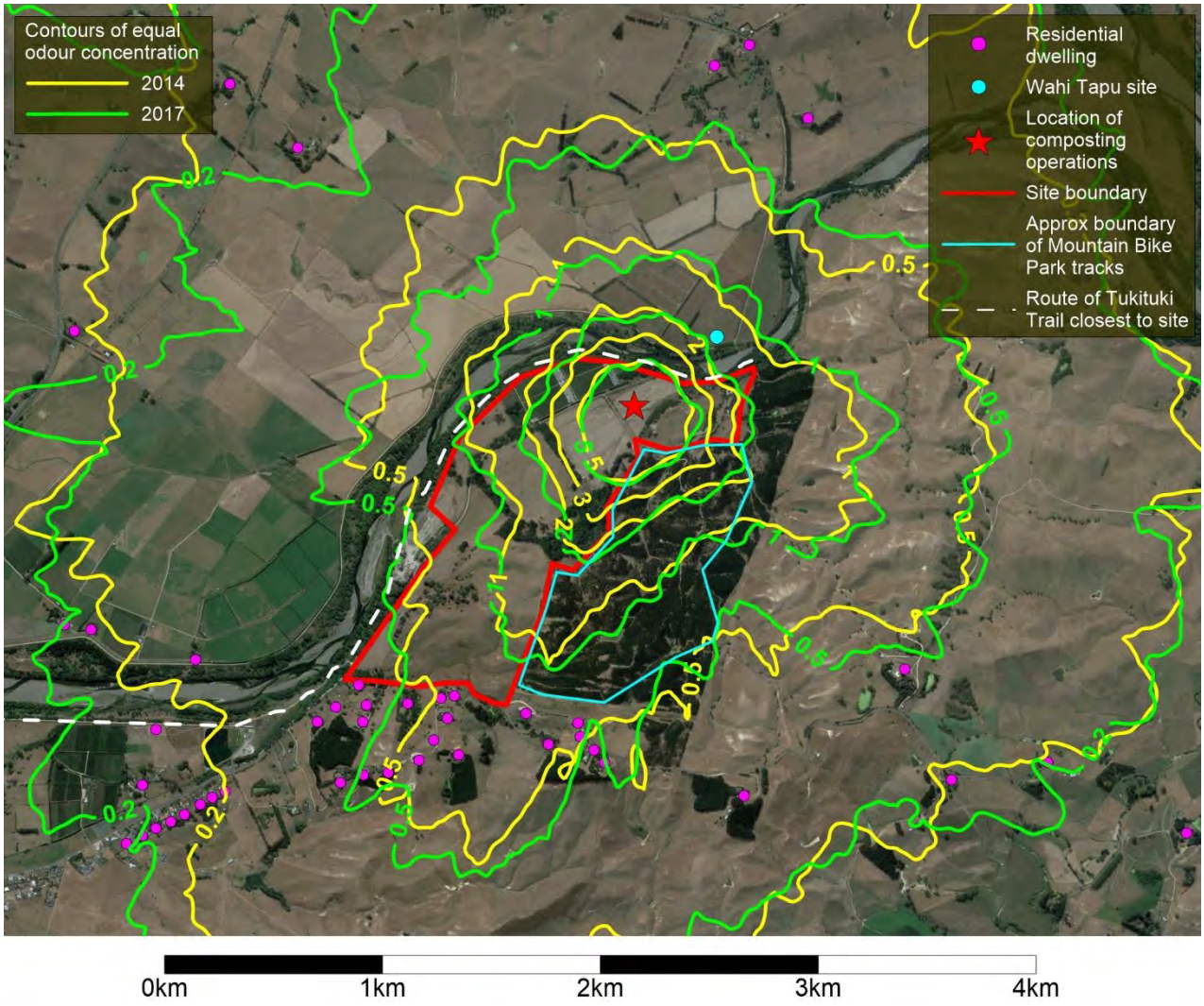


Figure 13: Model results for Scenario 2. Contours show 99.5th percentile, 1-hour average odour concentrations.

6.4.3 Scenario 3

The 99.5th percentile dispersion model results for Scenario 3 are shown in Figure 14. This shows the dispersion of odour emissions from a fugitive odour source representing residual odour emissions not captured by the bunker ventilation or Mixing Hall extraction systems during processing activities such as bale break, bunker-to-bunker transfers, or Phase 1 to Phase 2 transfers. It is assumed that these compost processing activities are occurring every day of the year between 8am and 6pm. The model does not include odour emissions from the biofilter or the pond.

The predicted GLCs in the vicinity of houses are low, with the highest odour GLC at a residence being 0.15 OU, occurring in the 2017 year. It is reiterated that the odour emission rate used with this source is at order-of-magnitude accuracy only. However, the low model results indicate that even if the odour emission rate was several times higher than the value of 10,000 OU.m^3/s used in the model, the potential for this odour source to cause offensive or objectionable effects for at dwellings is very low.

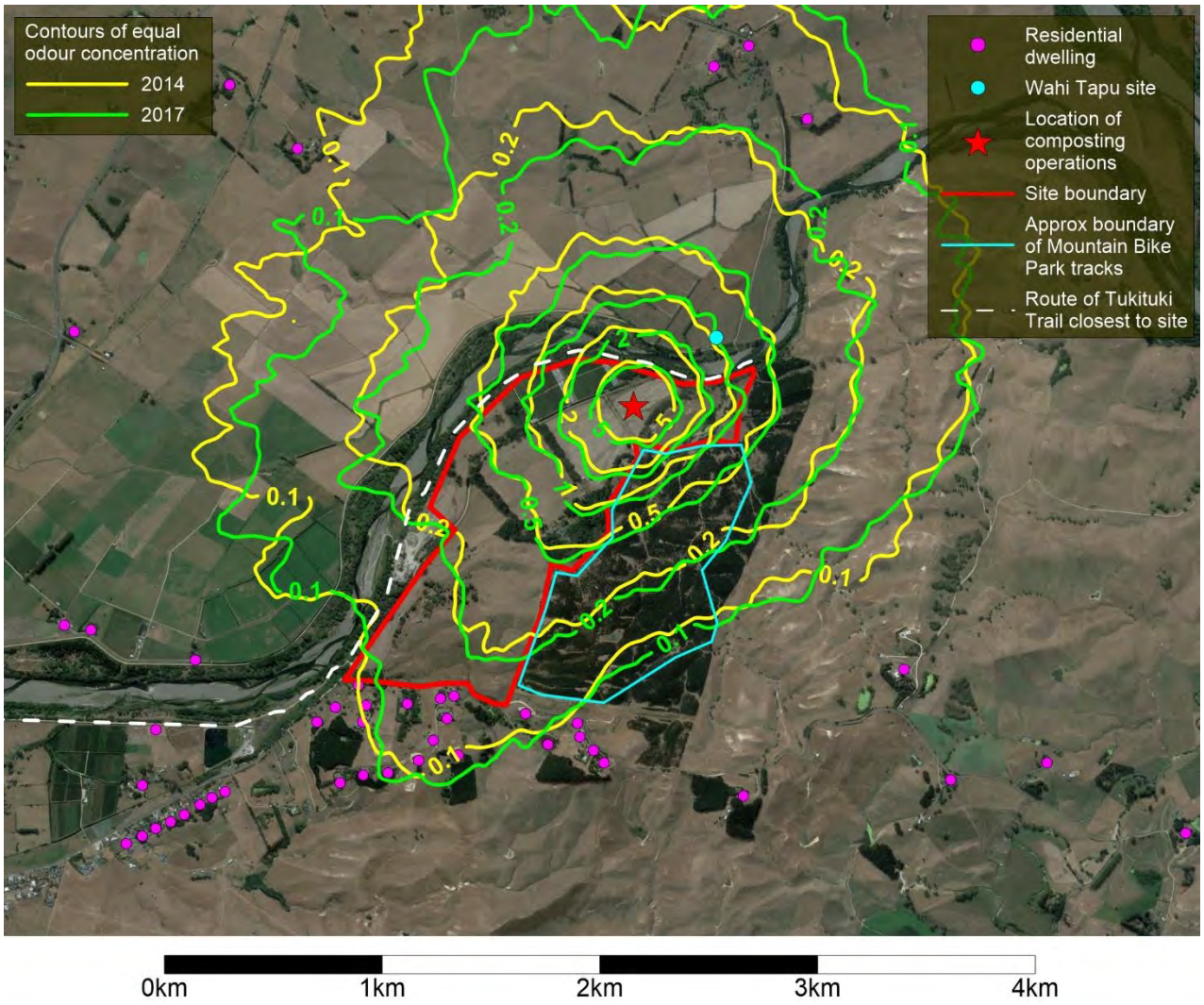


Figure 14: Model results for Scenario 3. Contours show 99.5th percentile, 1-hour average odour concentrations.

6.4.4 Scenario 4

The 99.5th percentile dispersion model results for Scenario 4 are shown in Figure 15. This is the worst case scenario for total odour emissions, with the combined emissions from the biofilter running at the "Scenario 2" odour emission rate, plus the fugitive odour source for processing emissions (operating from 8am to 6pm), plus the pond.

Even under this worst case scenario, the predicted GLCs in the vicinity of houses are low, with the highest odour GLC at a residence being 0.78 OU, occurring in the 2017 year. Most of this odour GLC is contributed by the biofilter. The GLCs in the vicinity of houses are much lower than the odour modelling guideline of 5 OU.

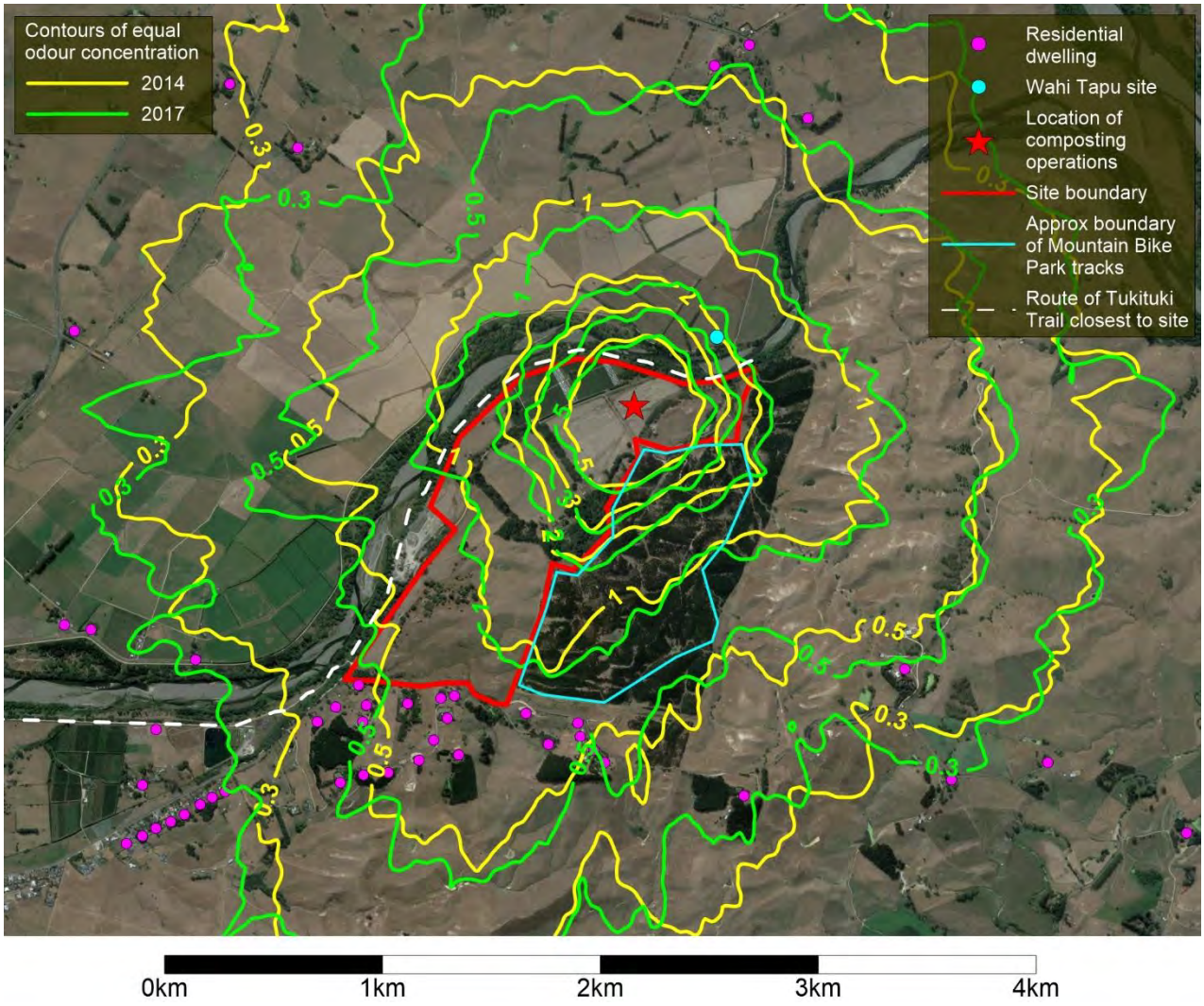


Figure 15: Model results for Scenario 4. Contours show 99.5th percentile, 1-hour average odour concentrations.

6.4.5 Results Analysis at Residential Locations

Assessment of the frequency of highest GLCs occurring at the closest residences and other nearby potentially-sensitive locations has been carried out. Figure 16 shows the location of 15 discrete receptors for which model results were extracted for further analysis. Receptors 1 to 6 are at dwellings, Receptor 7 is at the Wahi Tapu site, Receptors 8 to 11 are at locations along the Tukituki Trail on the south side of the river where people using the track for recreational purposes may encounter odour for brief periods, and Receptors 12 to 15 are in the Mountain Bike Park at the northwest end closest to the proposed composting site.

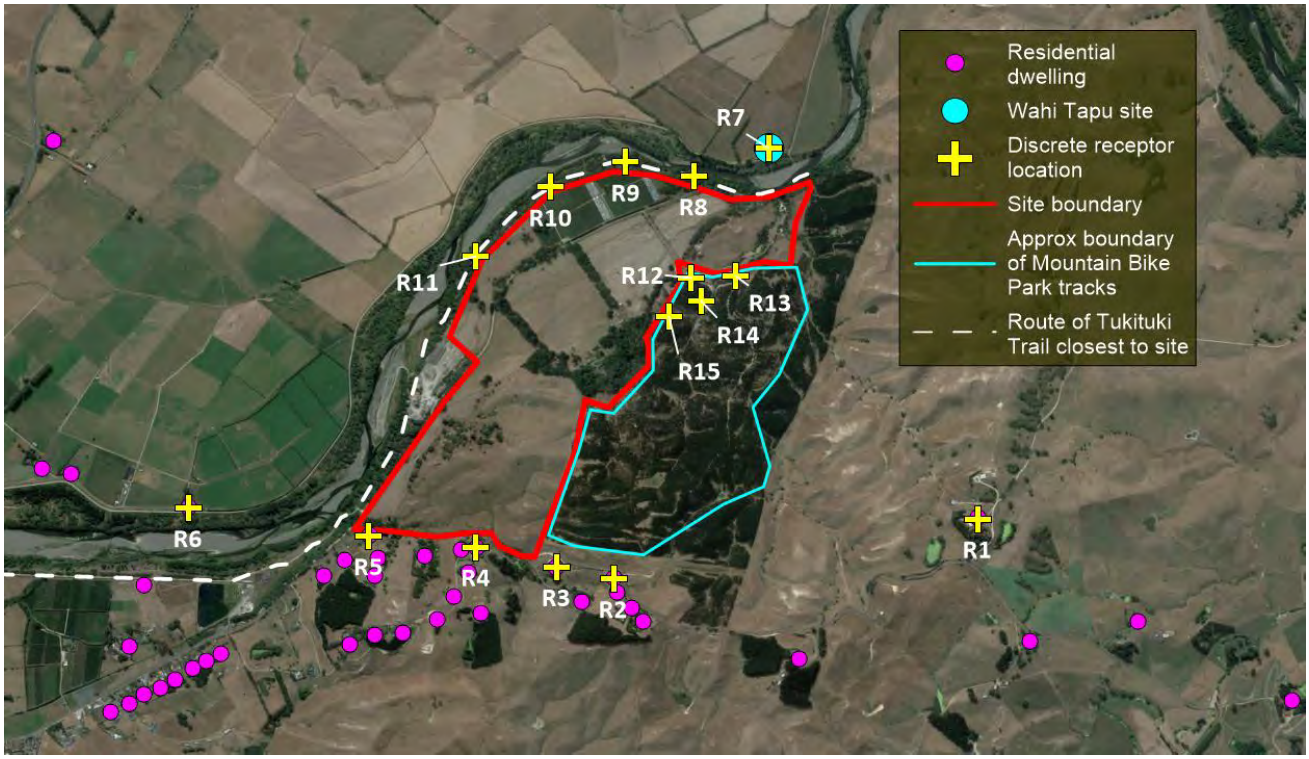


Figure 16: Location of discrete receptors used for detailed analysis of model results.

The cumulative percentiles of odour GLCs predicted at the residential receptors R1 to R6 for Scenario 4 are shown in Figure 17 for 2014 and Figure 18 for 2017. Note that the graphs use a logarithmic scale for the y-axis. The graphs show that the highest GLCs occur very infrequently. There is less than a factor of 2.5 between the 99.5th and 99.9th percentiles (in most cases, less than a factor of 2).

It is noted also that Scenario 4 assumes the worst case odour emission situation of compost-processing activities occurring in the Mixing Hall (with two open bunkers) 10 hours per day 365 days per year. Therefore, the GLCs shown in these cumulative percentile graphs significantly overstate the potential frequency of GLCs because of the following cumulative factors of conservatism:

- Compost processing activities occur constantly from 8am to 6pm – in reality the processing will not require 10 hours in a day.
- Compost processing activities occur every day – in reality these activities will occur 1-2 days per week, depending on site needs.

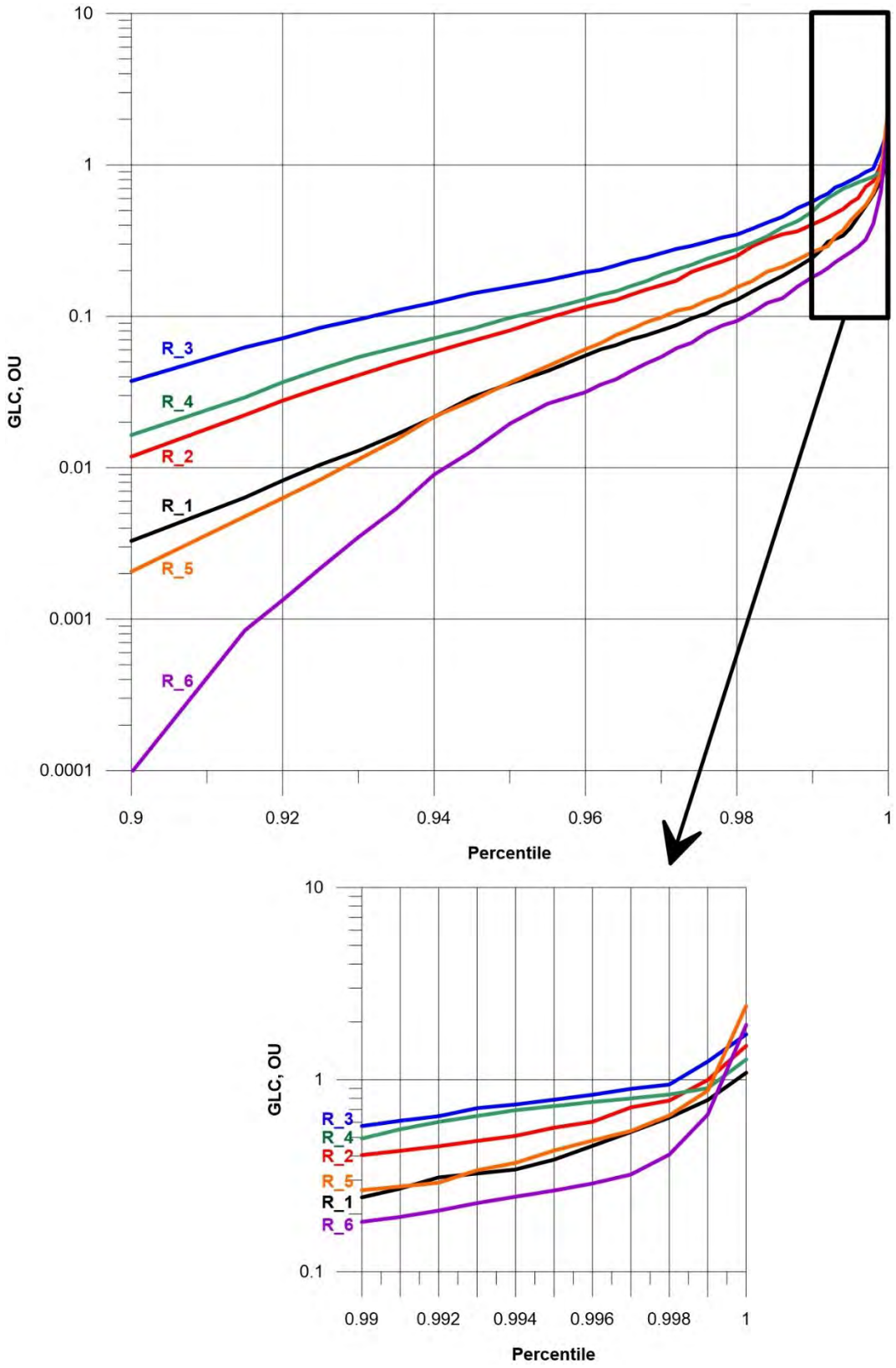


Figure 17: Cumulative percentiles of odour GLCs predicted for Scenario 4 at the residential receptors R1 to R6. 2014 meteorological dataset. Refer Figure 16 for receptor locations.

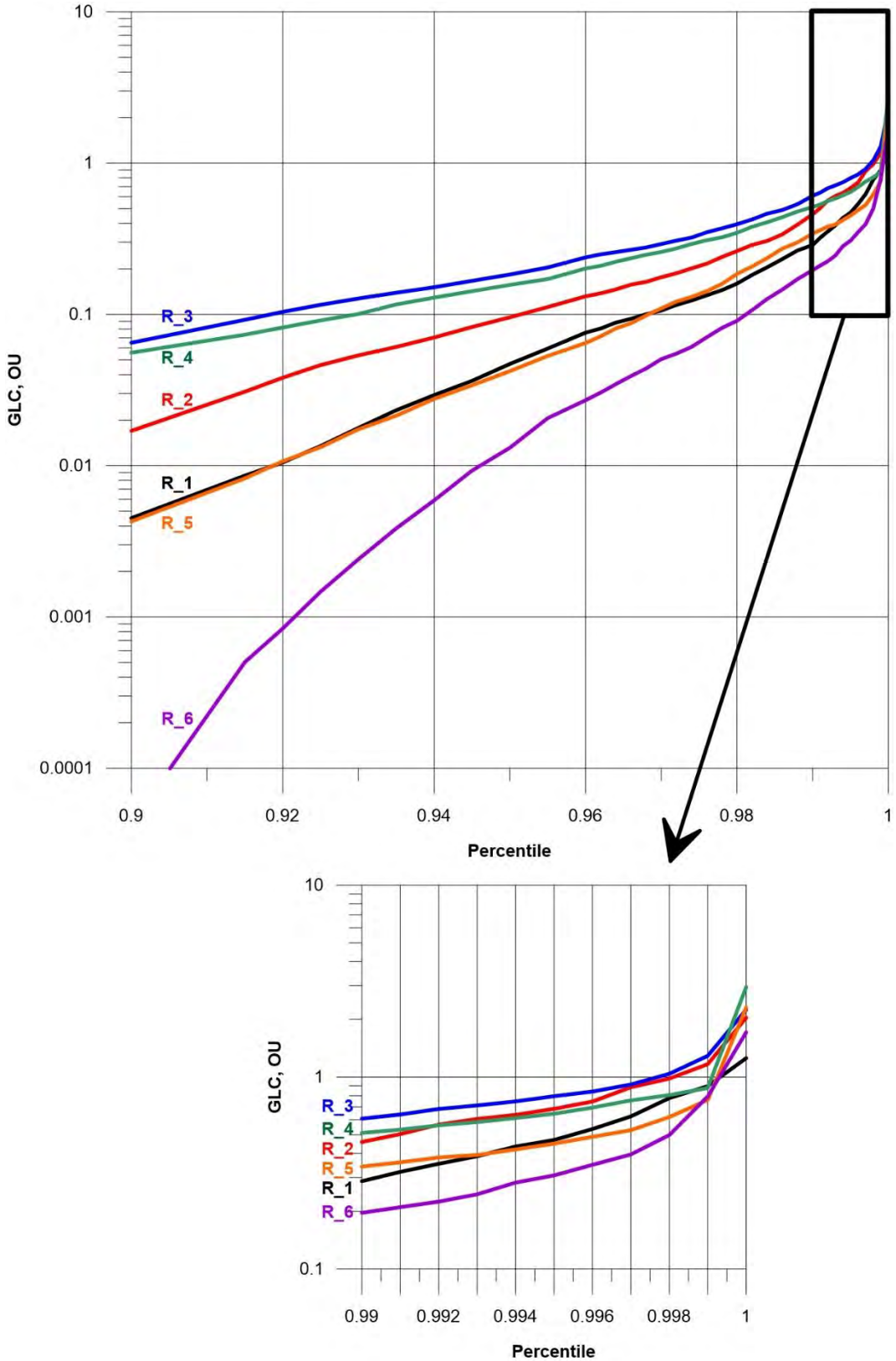


Figure 18: Cumulative percentiles of odour GLCs predicted for Scenario 4 at the residential receptors R1 to R6. 2017 meteorological dataset. Refer Figure 16 for receptor locations.

When these factors of conservatism are combined with the percentile frequency plots and the 99.5th percentile model plots in Figure 15, and compared to the odour modelling guideline of 5 OU, it is concluded that the potential for offensive or objectionable odour effects to occur at nearby dwellings due to composting operations at the site is less than minor.

6.4.6 Results Analysis at Wahi Tapu Site

The cumulative percentiles of odour GLCs for Scenarios 1 and 4 predicted at the receptor R7, representing the Wahi Tapu site, are shown in Figure 22 for both 2014 and 2017. The highest 99.5th percentile GLC occurring at the receptor is 1.3 OU for Scenario 1 (baseline scenario with no compost mixing/turning activities), and 2.3 OU for Scenario 4 (highest odour emission rates during compost mixing/turning). These concentrations are well below the suggested odour guideline of 5 OU. In addition, the graphs show that the highest GLCs occur very infrequently.

The model results show that for people visiting the Wahi Tapu site, the potential for offensive or objectionable effects to occur due to that odour is less than minor.

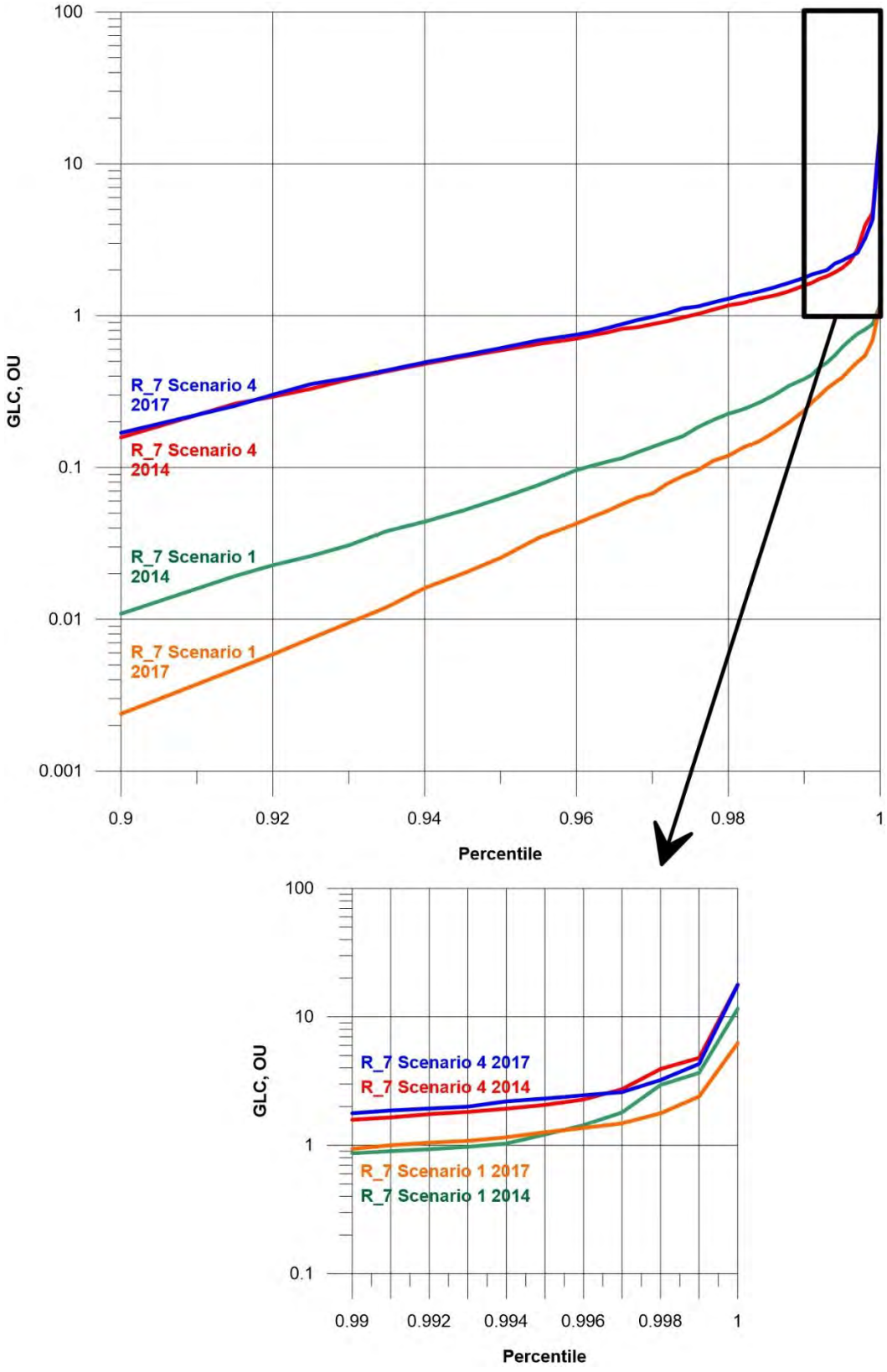


Figure 19: Cumulative percentiles of odour GLCs predicted for Scenario 4 at receptor R7. Both 2014 and 2017 meteorological datasets. Refer Figure 16 for receptor location.

6.4.7 Results Analysis at Tukituki Trail Receptors

The cumulative percentiles of odour GLCs predicted at the receptors R8 to R11 along the Tukituki Trail close to the compost processing area are shown in Figure 20 and Figure 21 for Scenario 1, and Figure 22 and Figure 23 for Scenario 4. Each pair of figures shows the 2014 and 2017 model results respectively.

The highest 99.5th percentile GLC occurs at R8; 5.4 OU for Scenario 1 and 10 OU for Scenario 4. At receptors R9-R11, the 99.5th percentile GLC are less than 2.1 OU for Scenario 1, and 4.5 OU for Scenario 4.

The graphs also show that the highest GLCs occur very infrequently.

These receptors along the Tukituki Trail are not sensitive receptors, as activities considered to be sensitive to odour are not carried out at these locations. However, the model results show that people using the track for walking, running, cycling etc may notice odour as they pass along the track downwind of the composting facility on a small number of hours per year – particularly where the odour concentration exceeds about 10 OU as shown in the cumulative percentile figures; i.e. in the vicinity of R8. However, this odour is not expected to be strong.

The figures for Scenario 4 significantly overstate the potential frequency of GLCs because of the same cumulative factors of conservatism listed in the Section 6.4.5. With the receptors along the Tukituki Trail, there are addition factors of conservatism due to the low probability that a person will be present downwind of the composting site at the same time as the worst case GLCs occur, and the duration of exposure will be very limited.

Overall, it is concluded that although users of the Tukituki Trail close to the composting site may at times be able to smell odour when close to the composting facility, this is likely to be infrequent and for short duration. Any odour is likely to be localised to the northeast end of the trail (in the vicinity of R8). Overall, considering the frequency, intensity, duration, offensiveness and location of the odours that may occur, the potential for offensive or objectionable effects to occur due to that odour is considered to be less than minor.

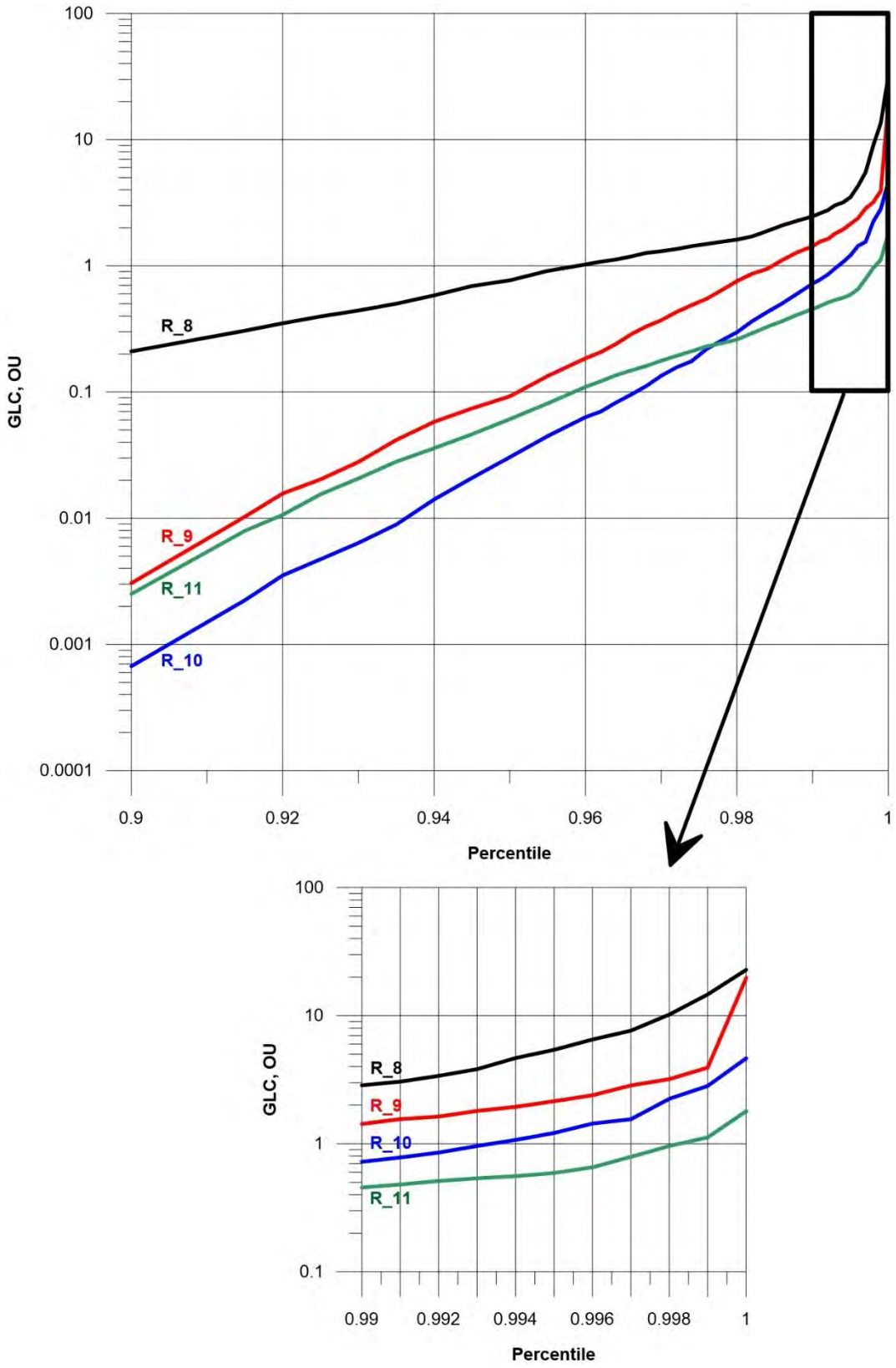


Figure 20: Cumulative percentiles of odour GLCs predicted for Scenario 1 at receptors R8 to R11. 2014 meteorological dataset. Refer Figure 16 for receptor locations.

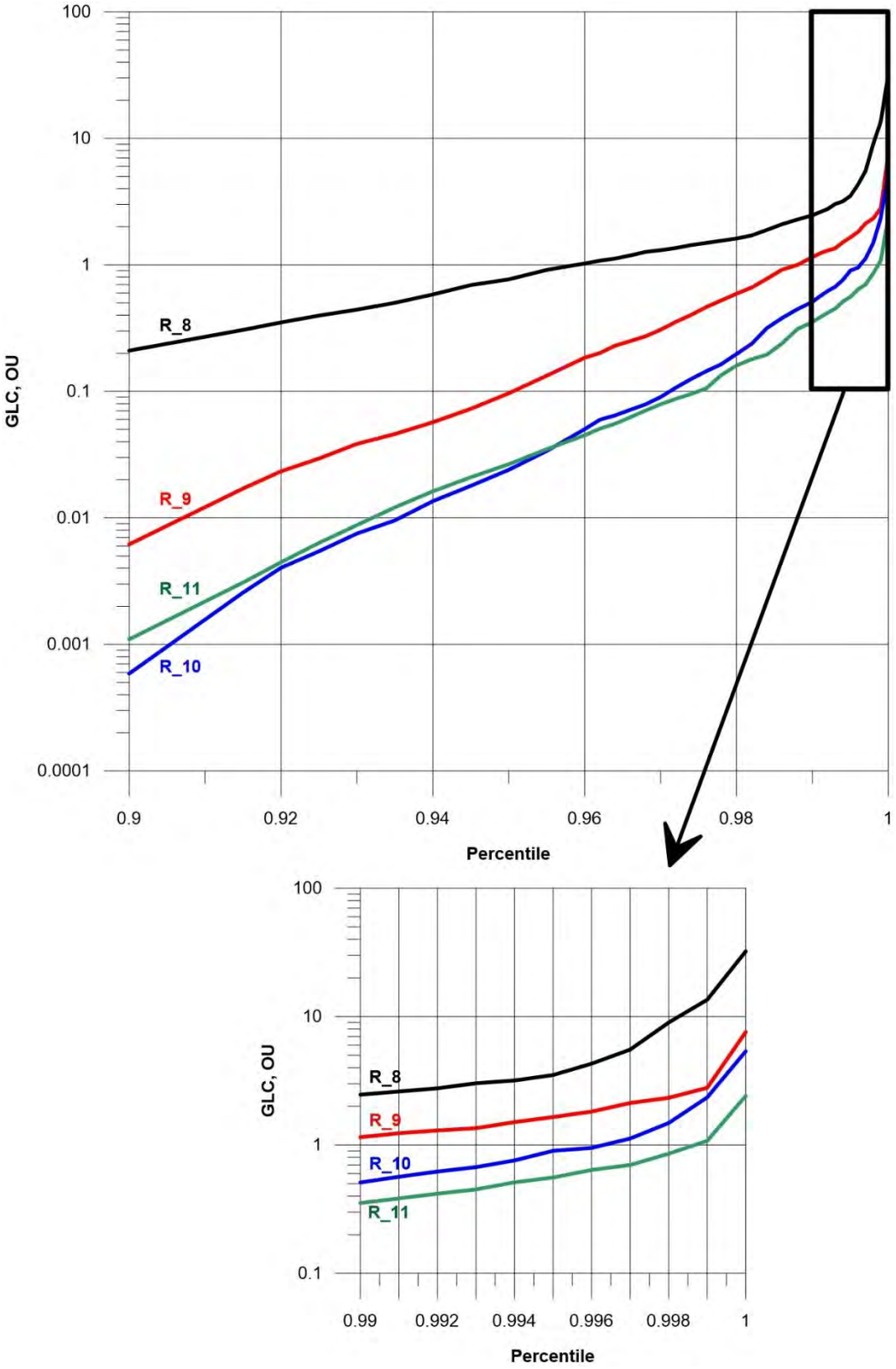


Figure 21: Cumulative percentiles of odour GLCs predicted for Scenario 1 at receptors R8 to R11. 2017 meteorological dataset. Refer Figure 16 for receptor locations.

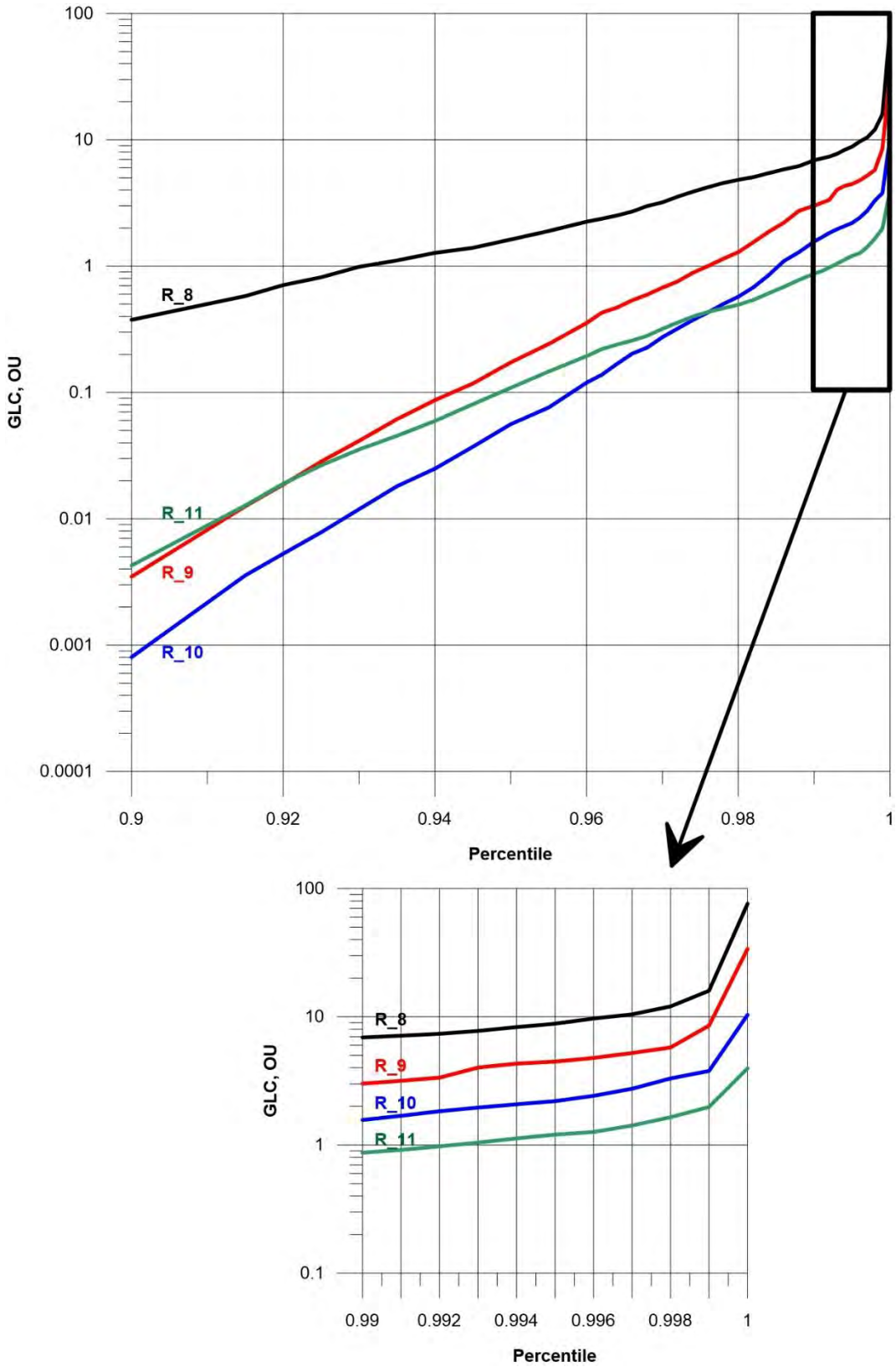


Figure 22: Cumulative percentiles of odour GLCs predicted for Scenario 4 at receptors R8 to R11. 2014 meteorological dataset. Refer Figure 16 for receptor locations.

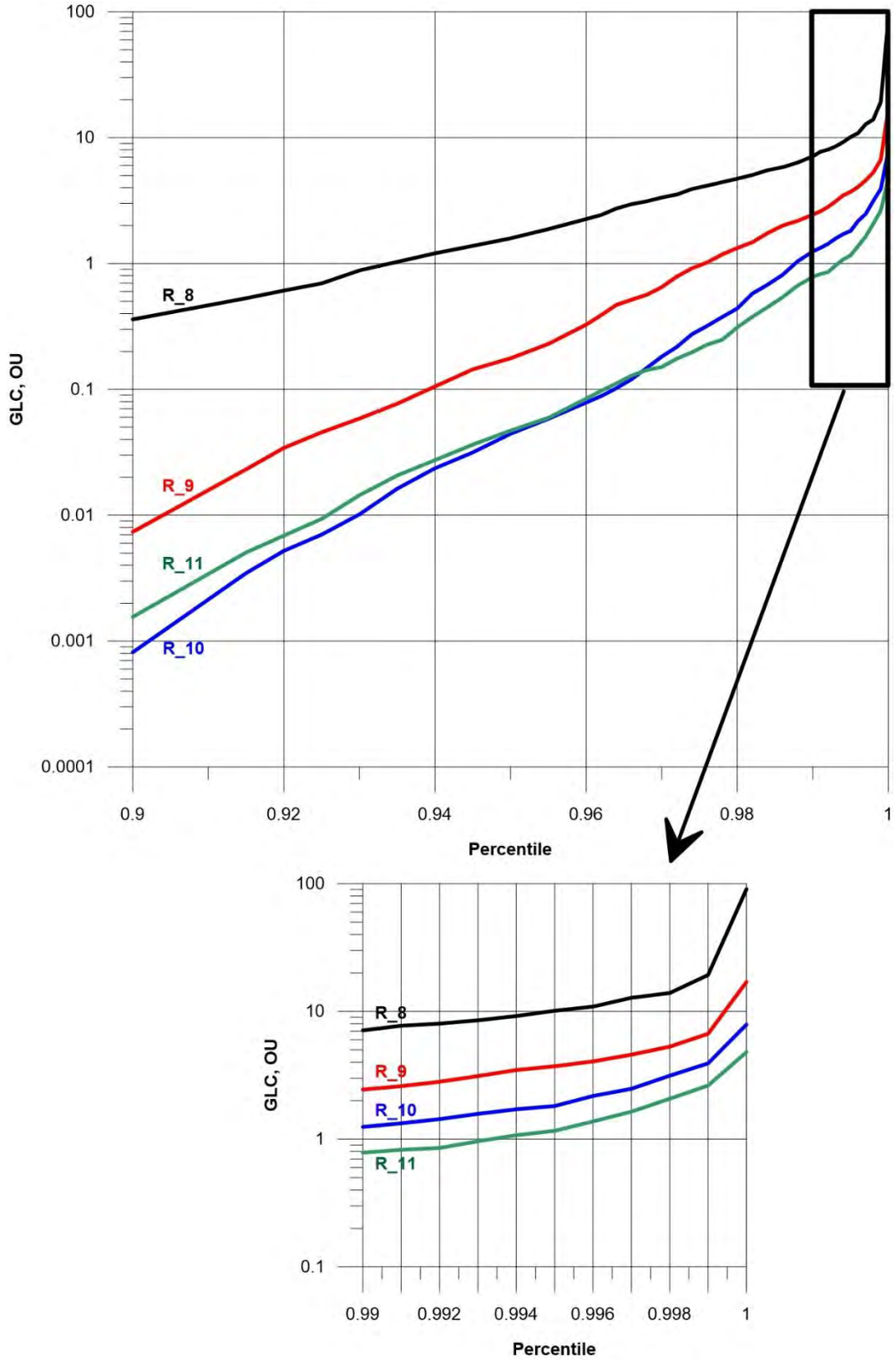


Figure 23: Cumulative percentiles of odour GLCs predicted for Scenario 4 at receptors R8 to R11. 2017 meteorological dataset. Refer Figure 16 for receptor locations. Results Analysis at Mountain Bike Park

6.4.8 Results Analysis at Mountain Bike Park

The cumulative percentiles of odour GLCs predicted at the receptors R12 to R15 at the northwest corner of the Mountain Bike Park are shown in Figure 24 and Figure 25 for Scenario 1, and Figure 26 and Figure 27 for Scenario 4. Each pair of figures shows the 2014 and 2017 model results respectively. These four receptor locations were chosen because the 5 OU contour in Scenario 4 (see Figure 15) extends to these locations in the northwest corner of the Park.

The highest 99.5th percentile GLC occurs at R12; 6.7 OU for Scenario 1 and 9.7 OU for Scenario 4. At receptors R13-R15, the 99.5th percentile GLC are less than 2.1 OU for Scenario 1, and 3.7 OU for Scenario 4.

The graphs also show that the highest GLCs occur very infrequently.

As in the previous section, the model results show that people using the Mountain Bike Park may notice odour as they pass along the tracks in the northwest corner of the Park on a small number of hours per year – particularly where the odour concentration exceeds about 10 OU. However, as with the analysis at the Tukituki Trail, this odour is not expected to be strong.

As discussed in the previous sections, the figures for Scenario 4 significantly overstate the potential frequency of GLCs because the activities included in the odour emissions under Scenario 4 do not occur all day every day. With the receptors in the Mountain Bike Park, there are addition factors of conservatism due to the low probability that a person will be present downwind of the composting site at the same time as the worst case GLCs occur, and the duration of exposure will be very limited.

Overall, it is concluded that although users of the Mountain Bike Park may at times be able to smell odour when close to the composting facility, this is likely to be infrequent and for short duration. Any odour will be localised to the northwest end of the Park. Overall, considering the frequency, intensity, duration, offensiveness and location of the odours that may occur, the potential for offensive or objectionable effects to occur due to that odour is considered to be less than minor.

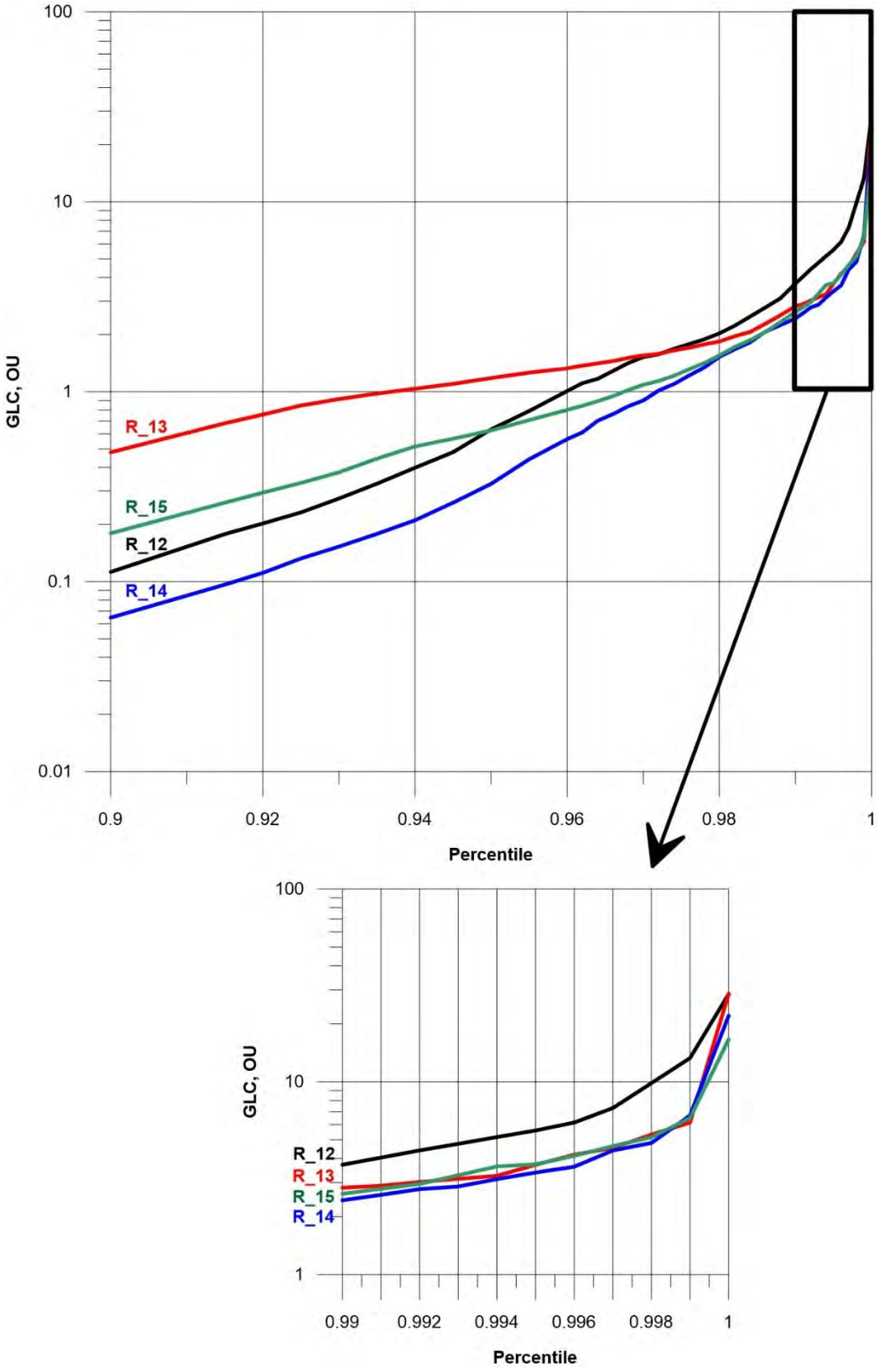


Figure 24: Cumulative percentiles of odour GLCs predicted for Scenario 1 at receptors R12 to R15. 2014 meteorological dataset. Refer Figure 16 for receptor locations.

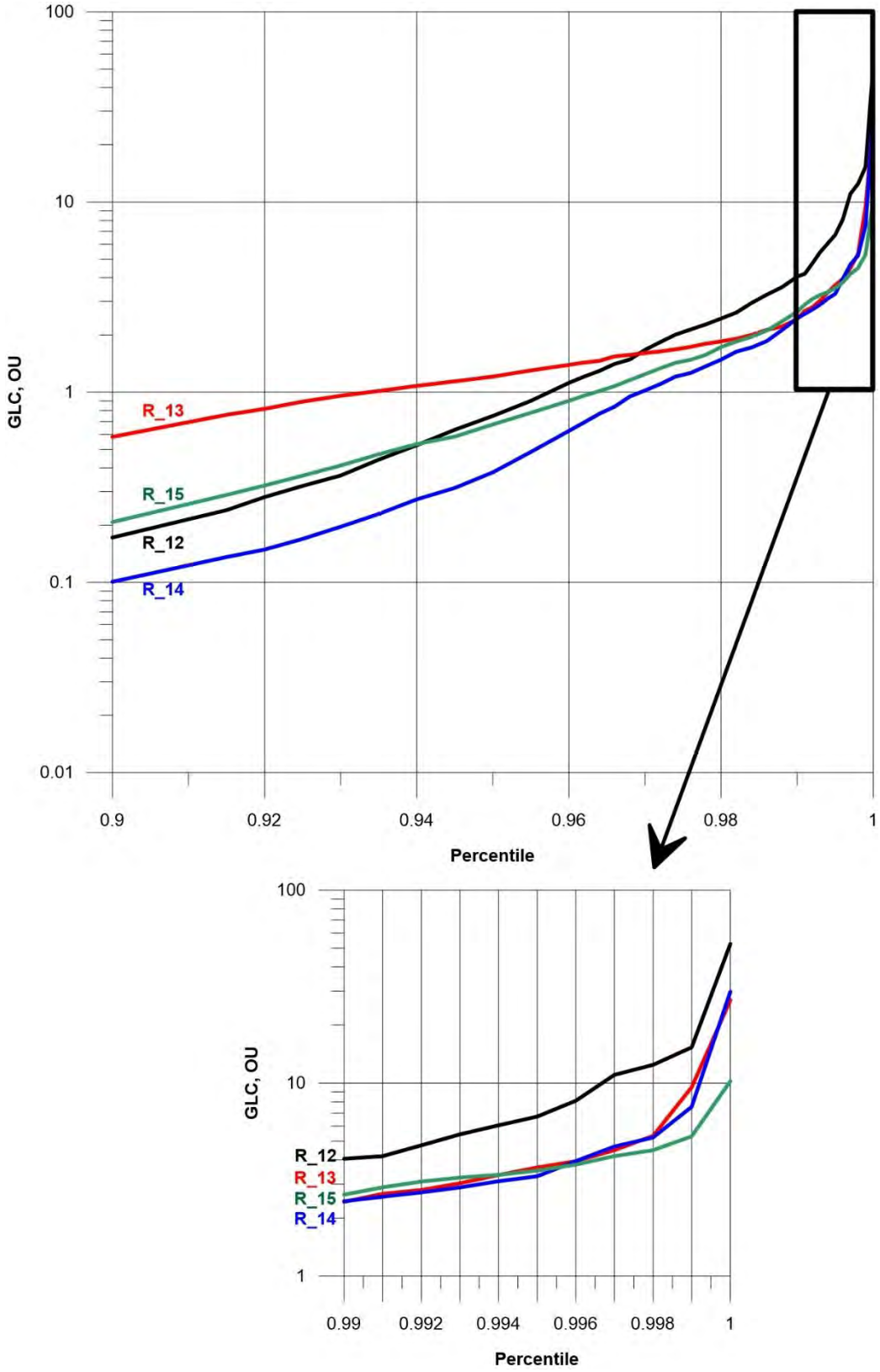


Figure 25: Cumulative percentiles of odour GLCs predicted for Scenario 1 at receptors R12 to R15. 2017 meteorological dataset. Refer Figure 16 for receptor locations.

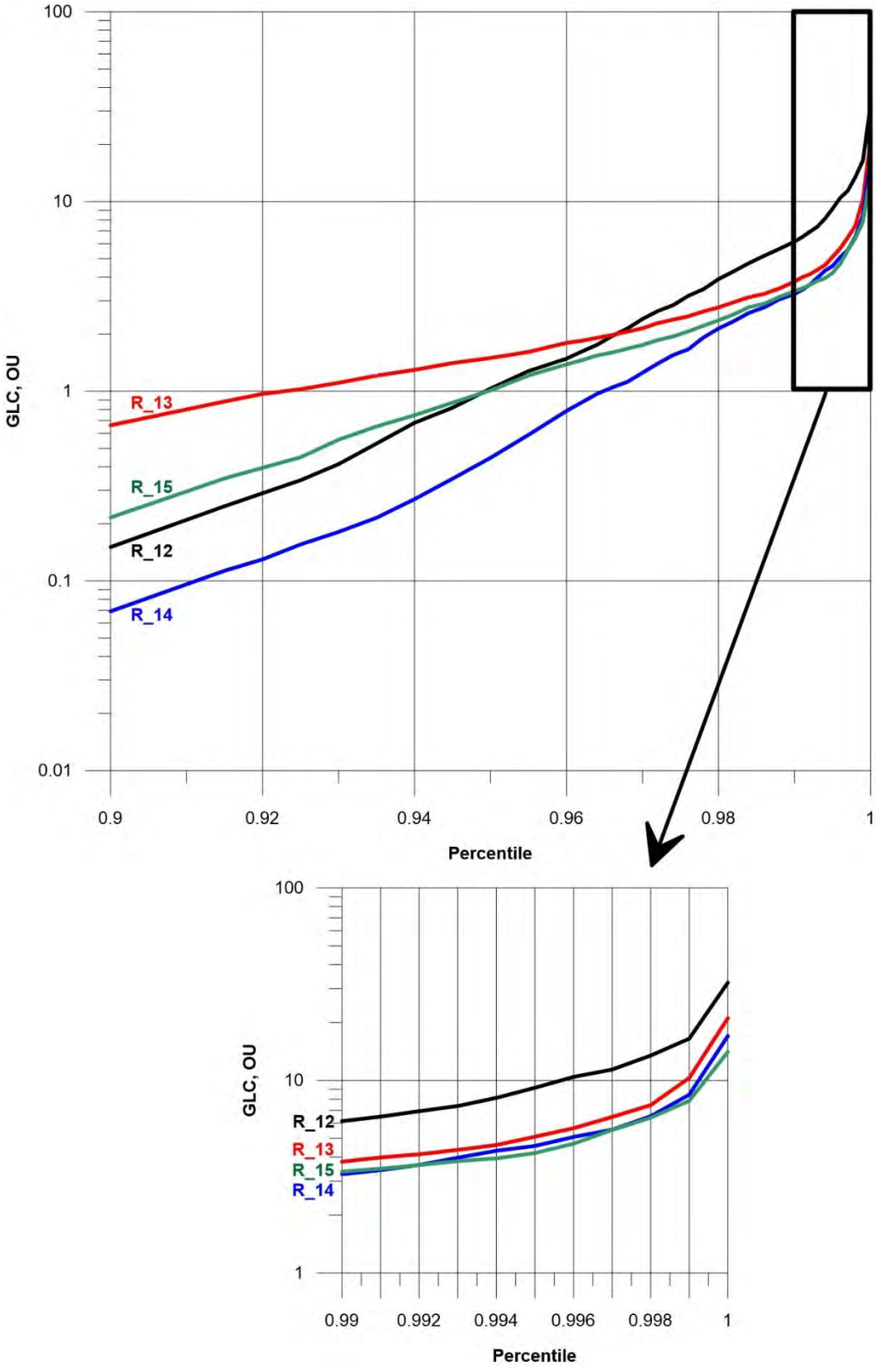


Figure 26: Cumulative percentiles of odour GLCs predicted for Scenario 4 at receptors R12 to R15. 2014 meteorological dataset. Refer Figure 16 for receptor locations.

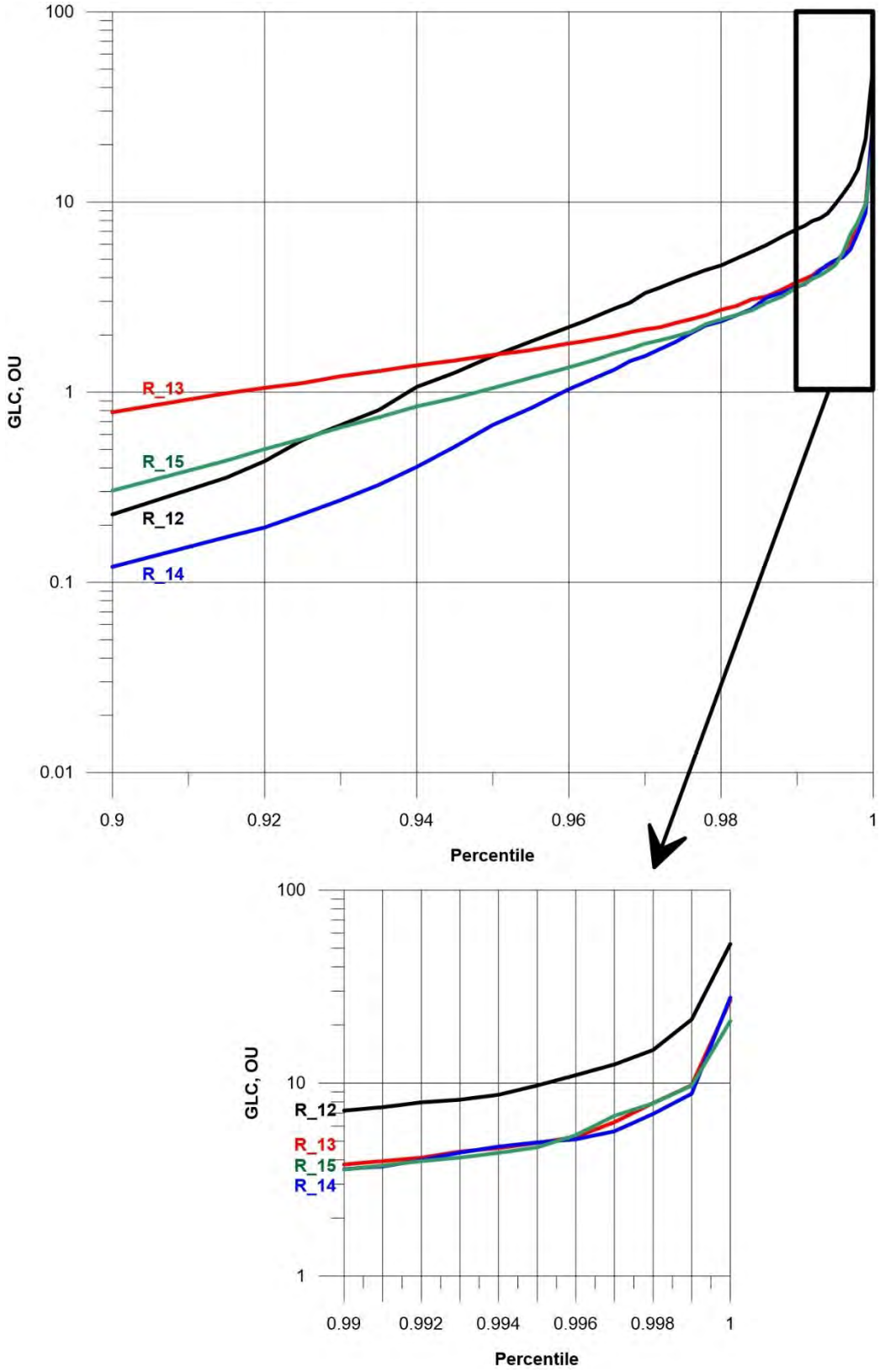


Figure 27: Cumulative percentiles of odour GLCs predicted for Scenario 4 at receptors R12 to R15. 2017 meteorological dataset. Refer Figure 16 for receptor locations.

7 Conclusion

TMM proposes development of a compost making facility on Mt Herbert Road, 4km from Waipukurau. The compost will be used as a substrate for growing mushrooms. The site is ideally located in an isolated rural location, with the nearest residences over 1400m from the proposed location of the composting operation.

The composting operation will be designed as a modern "best practice" facility with automated machinery and extensive air extraction and treatment to help minimise odour emissions from the composting processes. Despite this design, there will be some residual or fugitive odour emissions from the composting facility, including some emissions that are present 24 hours per day (predominantly from the biofilter) and other emission sources that are present only for a few hours per week (during bale breaking, bunker-to-bunker transfers for mixing Phase 1 compost, and removal of completed Phase 1 compost from the bunkers).

Meteorological modelling was conducted to simulate the movement of winds and atmospheric conditions around the site. This meteorological modelling was used to drive an atmospheric dispersion model for the odour emissions, to identify sensitive locations that could potentially be affected by offensive or objectionable odour effects. The modelling results were analysed using contour plots of the 99.5th percentile ground level concentrations, and also by examining cumulative percentile plots at individual receptor locations both at nearby dwellings and at other nearby land uses.

Overall, it was concluded that with the odour sources described in this report, considering the conservatism in the model inputs and the frequency, intensity, duration, offensiveness and location of the odours that may occur, the potential for offensive or objectionable effects to occur due to that odour is less than minor for all land uses around the site.

8 References

Ministry for the Environment (MfE), 2016. Good Practice Guide for Assessing and Managing Odour in New Zealand.

Office of Environment and Heritage (OEH) (2011), *Generic Guidance and Optimum Model Settings for the CALPUFF Modelling System for Inclusion into the 'Approved Methods for the Modelling and Assessments of Air Pollutants in NSW, Australia'*. Prepared for NSW Office of Environment and Heritage (now known as New South Wales Environment Protection Authority) by TRC Environmental Corporation. March 2011.

Appendix 1

Annual Windroses – Waipawa Meteorological Data Station, 2010 - 2019

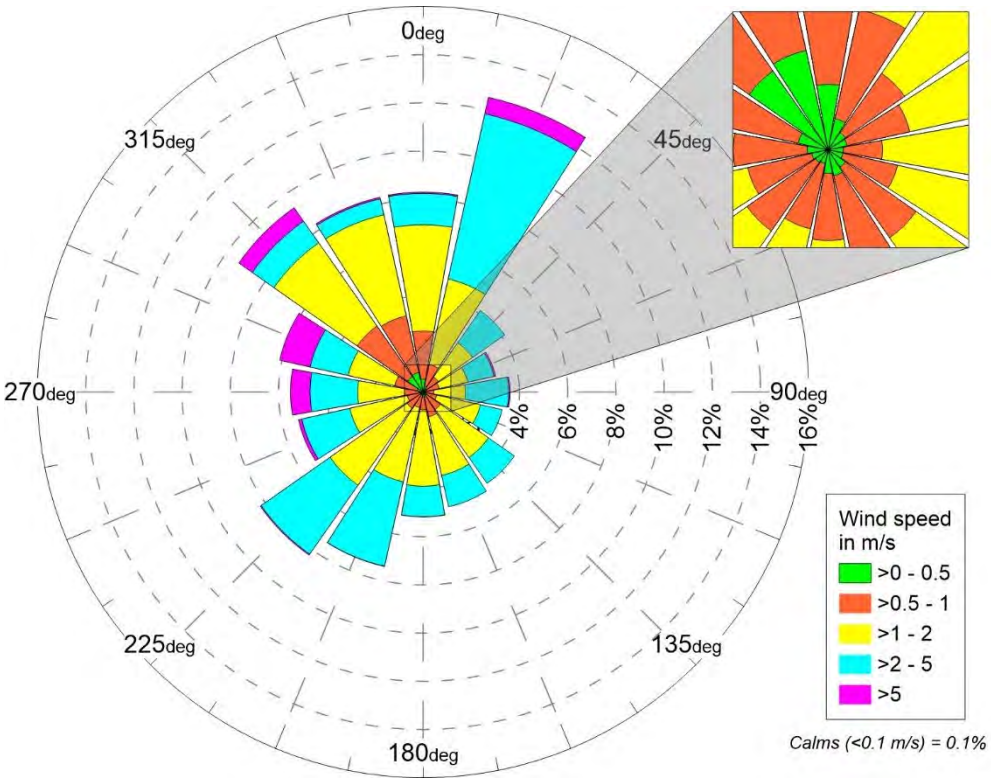


Figure A1.1: Hourly-average wind observations from Waipawa meteorological data station, January-December 2010.

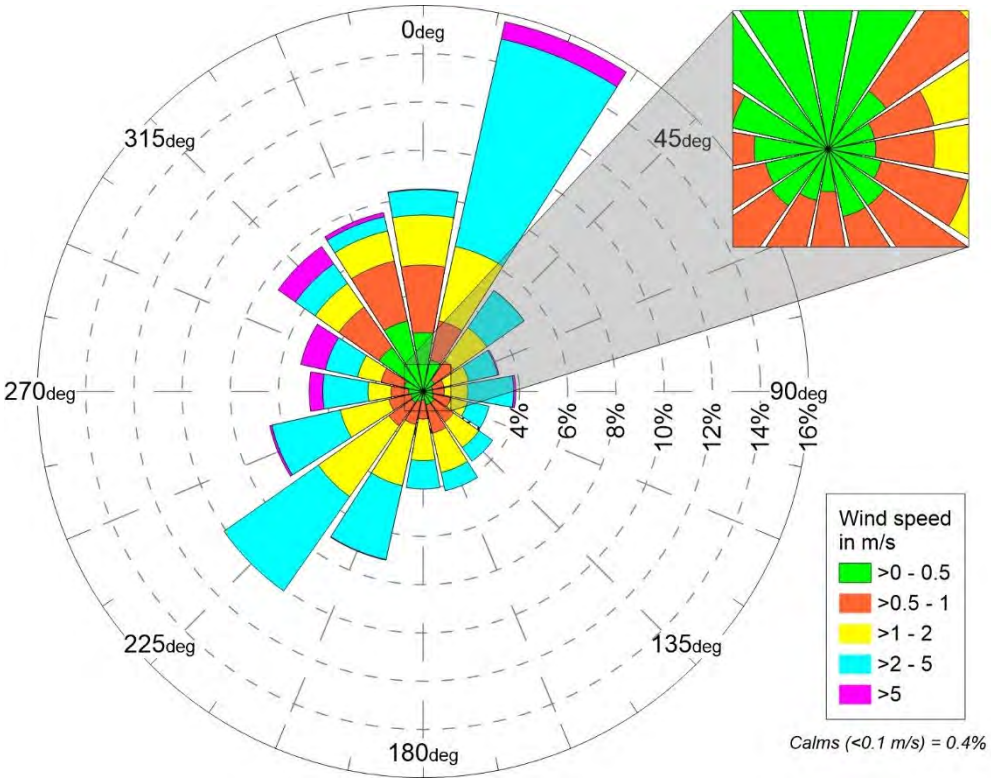


Figure A1.2: Hourly-average wind observations from Waipawa meteorological data station, January-December 2011.

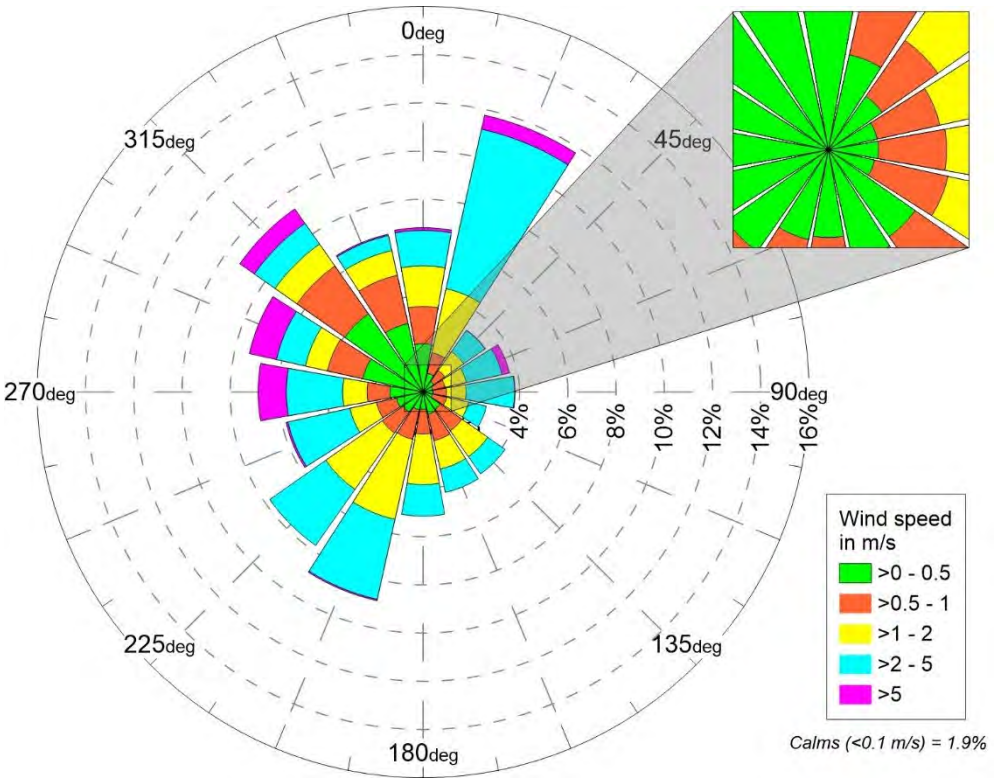


Figure A1.3: Hourly-average wind observations from Waipawa meteorological data station, January-December 2012.

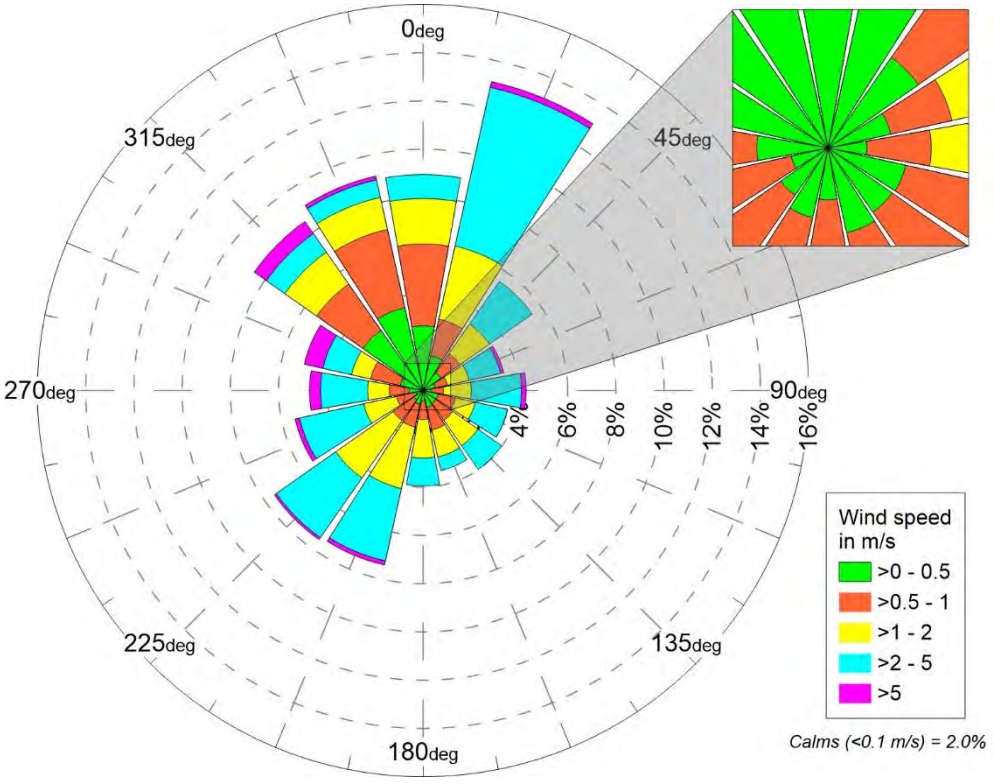


Figure A1.4: Hourly-average wind observations from Waipawa meteorological data station, January-December 2013.

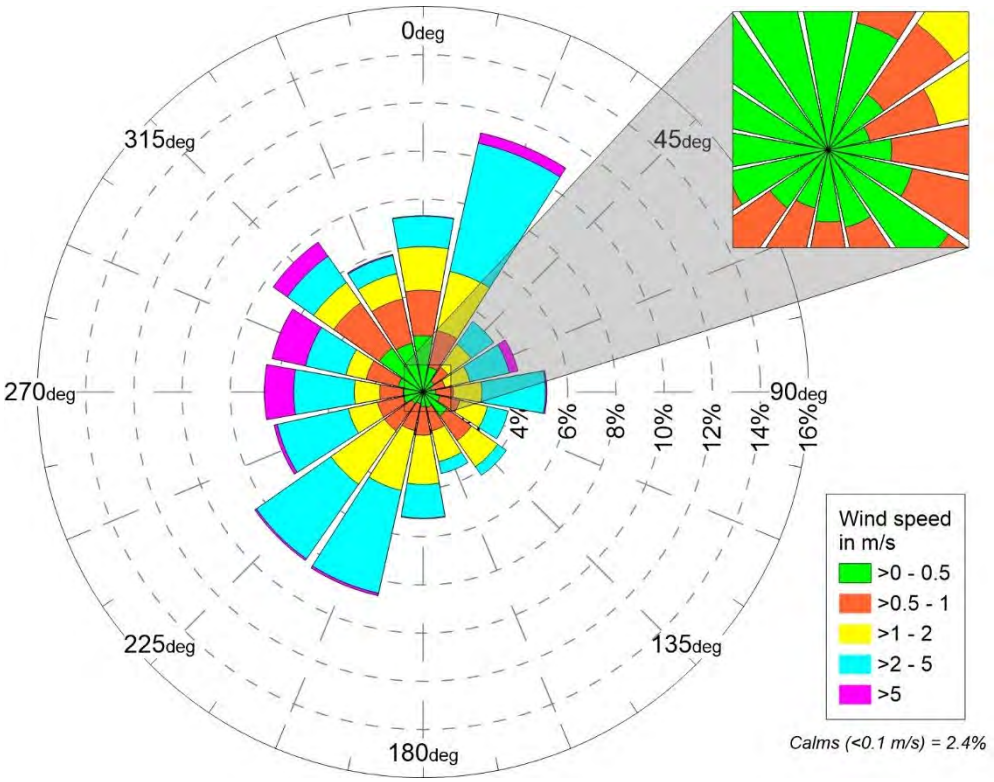


Figure A1.5: Hourly-average wind observations from Waipawa meteorological data station, January-December 2014.

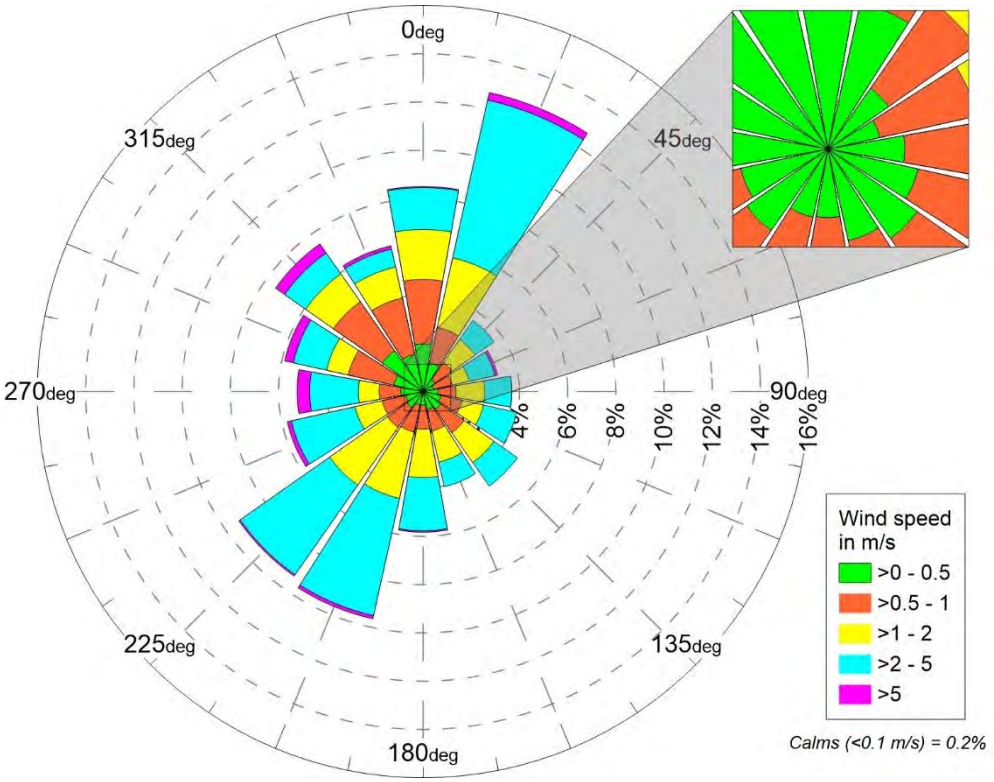


Figure A1.6: Hourly-average wind observations from Waipawa meteorological data station, January-December 2015.

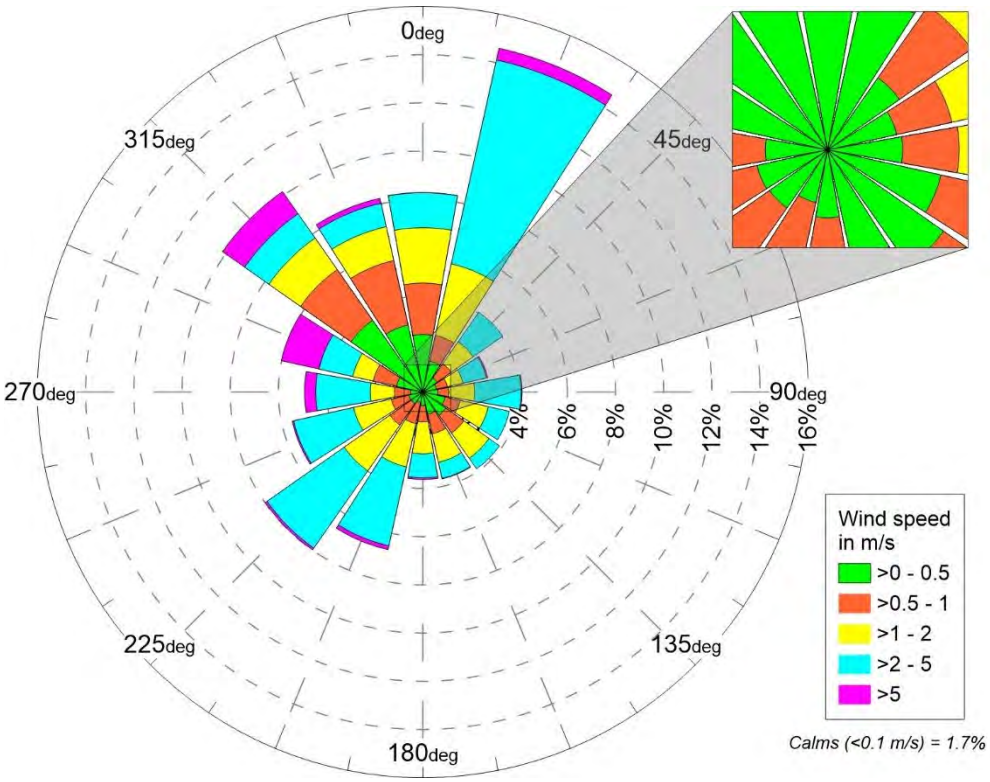


Figure A1.7: Hourly-average wind observations from Waipawa meteorological data station, January-December 2016.

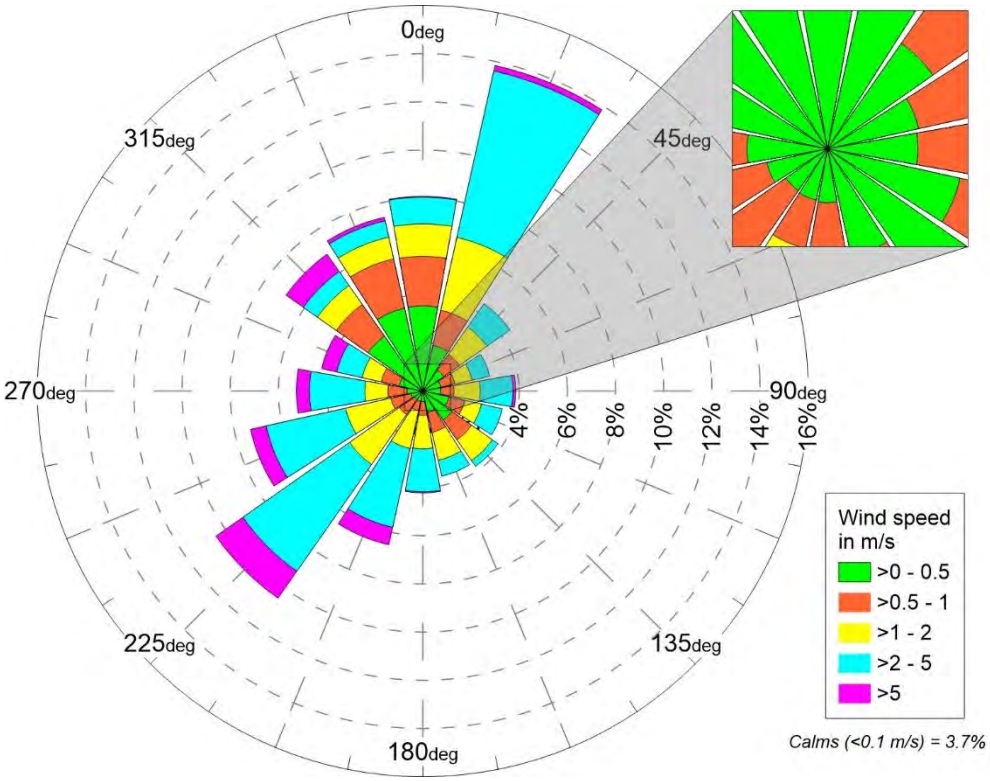


Figure A1.8: Hourly-average wind observations from Waipawa meteorological data station, January-December 2017.

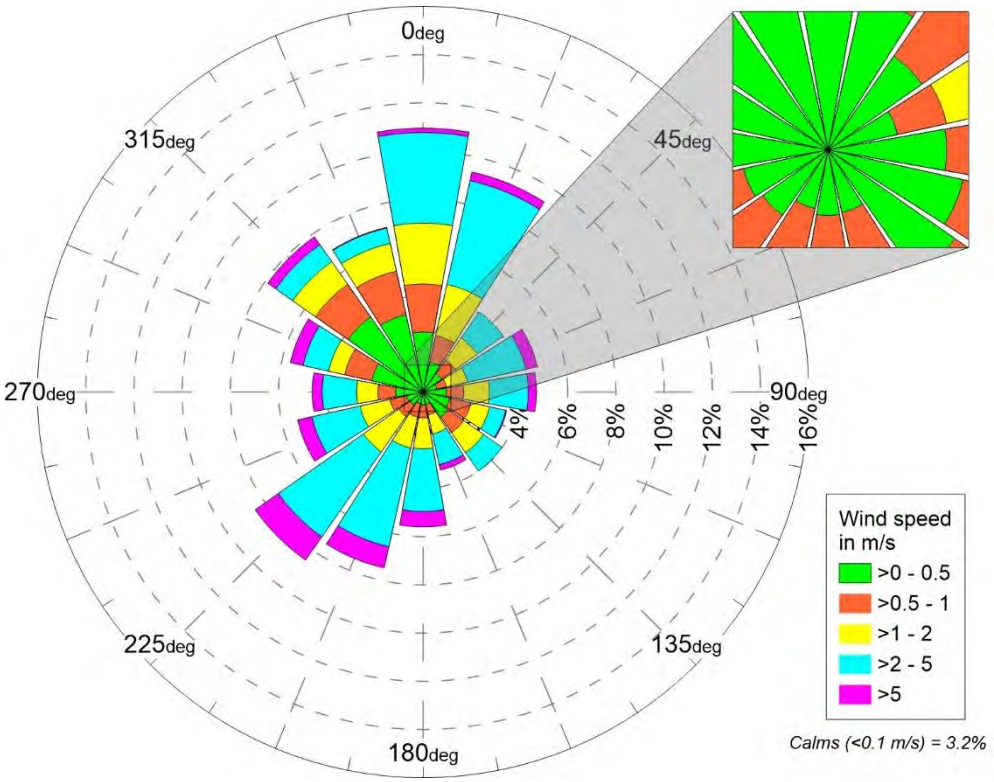


Figure A1.9: Hourly-average wind observations from Waipawa meteorological data station, January-December 2018.

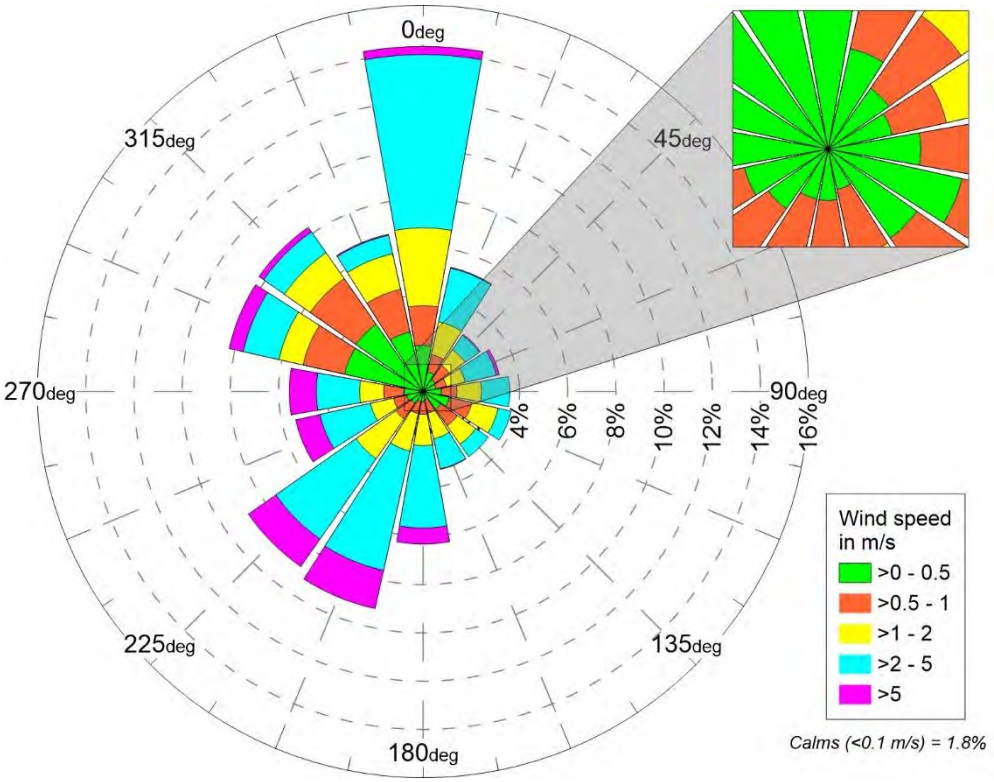


Figure A1.10: Hourly-average wind observations from Waipawa meteorological data station, Jan-Dec 2019.

Appendix 2

CALMET Input File

CALMET Parameters

TMM Mt Herbert site

Prognostic data only from TAPM, obs from Waipawa in TAPM input

125m Calmet grid resolution, 2014 year

INPUT GROUP: 0 -- Input and Output File Names		
Parameter	**Description**	**Value**
GEODAT	Input file of geophysical data (GEO.DAT)	GEO.DAT
METLST	Output file name of CALMET list file (CALMET.LST)	CALMET.LST
METDAT	Output file name of generated gridded met files (CALMET.DAT)	CALMET.DAT
LCFILES	Lower case file names (T = lower case, F = upper case)	F
NUSTA	Number of upper air stations	0
NOWSTA	Number of overwater stations	0
NM3D	Number of prognostic meteorological data files (3D.DAT)	3
NIGF	Number of IGF-CALMET.DAT files used as initial guess	0

INPUT GROUP: 1 -- General Run Control Parameters		
Parameter	**Description**	**Value**
IBYR	Starting year	2014
IBMO	Starting month	1
IBDY	Starting day	1
IBHR	Starting hour	0
IBSEC	Starting second	0
IEYR	Ending year	2015
IEMO	Ending month	1
IEDY	Ending day	1
IEHR	Ending hour	0
IESEC	Ending second	0
ABTZ	Base time zone	UTC+1200
NSECDT	Length of modeling time-step (seconds)	3600
IRTYPE	Output run type (0 = wind fields only, 1 = CALPUFF/CALGRID)	1
LCALGRD	Compute CALGRID data fields (T = true, F = false)	T
ITEST	Flag to stop run after setup phase (1 = stop, 2 = run)	2
MREG	Regulatory checks (0 = no checks, 1 = US EPA LRT checks)	0

INPUT GROUP: 2 -- Map Projection and Grid Control Parameters		
Parameter	**Description**	**Value**
PMAP	Map projection system	UTM
FEAST	False easting at projection origin (km)	0.0
FNORTH	False northing at projection origin (km)	0.0

INPUT GROUP: 2 -- Map Projection and Grid Control Parameters		
Parameter	**Description**	**Value**
IUTMZN	UTM zone (1 to 60)	60
UTMHEM	Hemisphere of UTM projection (N = northern, S = southern)	S
XLAT1	1st standard parallel latitude (decimal degrees)	30S
XLAT2	2nd standard parallel latitude (decimal degrees)	60S
DATUM	Datum-Region for the coordinates	WGS-84
NX	Meteorological grid - number of X grid cells	112
NY	Meteorological grid - number of Y grid cells	112
DGRIDKM	Meteorological grid spacing (km)	0.125
XORIGKM	Meteorological grid - X coordinate for SW corner (km)	458.8630
YORIGKM	Meteorological grid - Y coordinate for SW corner (km)	5568.6470
NZ	Meteorological grid - number of vertical layers	10
ZFACE	Meteorological grid - vertical cell face heights (m)	0.00,20.00,40.00,80.00,160.00,320.00,640.00,1200.00,2000.00,3000.00,4000.00

INPUT GROUP: 3 -- Output Options		
Parameter	**Description**	**Value**
LSAVE	Save met fields in unformatted output file (T = true, F = false)	T
IFORMO	Type of output file (1 = CALPUFF/CALGRID, 2 = MESOPUFF II)	1
LPRINT	Print met fields (F = false, T = true)	F
IPRINF	Print interval for output wind fields (hours)	1
STABILITY	Print gridded PGT stability classes? (0 = no, 1 = yes)	0
USTAR	Print gridded friction velocities? (0 = no, 1 = yes)	0
MONIN	Print gridded Monin-Obukhov lengths? (0 = no, 1 = yes)	0
MIXHT	Print gridded mixing heights? (0 = no, 1 = yes)	0
WSTAR	Print gridded convective velocity scales? (0 = no, 1 = yes)	0
PRECIP	Print gridded hourly precipitation rates? (0 = no, 1 = yes)	0
SENSHEAT	Print gridded sensible heat fluxes? (0 = no, 1 = yes)	0
CONVZI	Print gridded convective mixing heights? (0 = no, 1 = yes)	0
LDB	Test/debug option: print input met data and internal variables (F = false, T = true)	F
NN1	Test/debug option: first time step to print	1
NN2	Test/debug option: last time step to print	1
LDBCST	Test/debug option: print distance to land internal variables (F = false, T = true)	F
IOUTD	Test/debug option: print control variables for writing winds? (0 = no, 1 = yes)	0
NZPRN2	Test/debug option: number of levels to print starting at the surface	1
IPR0	Test/debug option: print interpolated winds? (0 = no, 1 = yes)	0
IPR1	Test/debug option: print terrain adjusted surface wind? (0 = no, 1 = yes)	0

INPUT GROUP: 3 -- Output Options		
Parameter	**Description**	**Value**
IPR2	Test/debug option: print smoothed wind and initial divergence fields? (0 = no, 1 = yes)	0
IPR3	Test/debug option: print final wind speed and direction? (0 = no, 1 = yes)	0
IPR4	Test/debug option: print final divergence fields? (0 = no, 1 = yes)	0
IPR5	Test/debug option: print winds after kinematic effects? (0 = no, 1 = yes)	0
IPR6	Test/debug option: print winds after Froude number adjustment? (0 = no, 1 = yes)	0
IPR7	Test/debug option: print winds after slope flow? (0 = no, 1 = yes)	0
IPR8	Test/debug option: print final winds? (0 = no, 1 = yes)	0

INPUT GROUP: 4 -- Meteorological Data Options		
Parameter	**Description**	**Value**
NOOBS	Observation mode (0 = stations only, 1 = surface/overwater stations with prognostic upper air, 2 = prognostic data only)	2
NSSTA	Number of surface stations	0
NPSTA	Number of precipitation stations	-1
ICLDOUT	Output the CLOUD.DAT file? (0 = no, 1 = yes)	0
MCLOUD	Method to compute cloud fields (1 = from surface obs, 2 = from CLOUD.DAT, 3 = from prognostic (Teixera), 4 = from prognostic (MM5toGrads)	4
IFORMS	Surface met data file format (1 = unformatted, 2 = formatted)	2
IFORMP	Precipitation data file format (1 = unformatted, 2 = formatted)	2
IFORMC	Cloud data file format (1 = unformatted, 2 = formatted)	1

INPUT GROUP: 5 -- Wind Field Options and Parameters		
Parameter	**Description**	**Value**
IWFCOD	Wind field model option (1 = objective analysis, 2 = diagnostic)	1
IFRADJ	Adjust winds using Froude number effects? (0 = no, 1 = yes)	1
IKINE	Adjust winds using kinematic effects? (0 = no, 1 = yes)	0
IOBR	Adjust winds using O'Brien velocity procedure? (0 = no, 1 = yes)	0
ISLOPE	Compute slope flow effects? (0 = no, 1 = yes)	1
IEXTRP	Extrapolation of surface winds to upper layers method (1 = none, 2 = power law, 3 = user input, 4 = similarity theory, - = same except layer 1 data at upper air stations are ignored)	-1
ICALM	Extrapolate surface winds even if calm? (0 = no, 1 = yes)	0
BIAS	Weighting factors for surface and upper air stations (NZ values)	0.0,0.0,0.0,0.0,0.0,0.0 ,0.0,0.0,0.0,0.0
RMIN2	Minimum upper air station radius of influence for surface extrapolation exclusion (km)	4
IPROG	Use prognostic winds as input to diagnostic wind model (0 = no, 13 = use winds from 3D.DAT as Step 1 field, 14 = use winds from 3D.DAT as initial guess field, 15 = use winds from 3D.DAT file as observations)	14
ISTEPPGS	Prognostic data time step (seconds)	3600

INPUT GROUP: 5 -- Wind Field Options and Parameters		
Parameter	**Description**	**Value**
IGFMET	Use coarse CALMET fields as initial guess? (0 = no, 1 = yes)	0
LVARY	Use varying radius of influence (F = false, T = true)	F
RMAX1	Maximum radius of influence in the surface layer (km)	0
RMAX2	Maximum radius of influence over land aloft (km)	0
RMAX3	Maximum radius of influence over water (km)	0
RMIN	Minimum radius of influence used in wind field interpolation (km)	0.1
TERRAD	Radius of influence of terrain features (km)	2
R1	Relative weight at surface of step 1 fields and observations (km)	0
R2	Relative weight aloft of step 1 field and observations (km)	0
RPROG	Weighting factors of prognostic wind field data (km)	0
DIVLIM	Maximum acceptable divergence	5E-006
NITER	Maximum number of iterations in the divergence minimization procedure	50
NSMTH	Number of passes in the smoothing procedure (NZ values)	2,9*4
NINTR2	Maximum number of stations used in each layer for interpolation (NZ values)	10*99
CRITFN	Critical Froude number	1
ALPHA	Empirical factor triggering kinematic effects	0.1
NBAR	Number of barriers to interpolation of the wind fields	0
KBAR	Barrier - level up to which barriers apply (1 to NZ)	10
IDIOPT1	Surface temperature (0 = compute from obs/prognostic, 1 = read from DIAG.DAT)	0
ISURFT	Surface station to use for surface temperature (between 1 and NSSTA)	-1
IDIOPT2	Temperature lapse rate used in the computation of terrain-induced circulations (0 = compute from obs/prognostic, 1 = read from DIAG.DAT)	0
IUPT	Upper air station to use for the domain-scale lapse rate (between 1 and NUSTA)	-1
ZUPT	Depth through which the domain-scale lapse rate is computed (m)	200
IDIOPT3	Initial guess field winds (0 = compute from obs/prognostic, 1 = read from DIAG.DAT)	0
IUPWND	Upper air station to use for domain-scale winds	-1
ZUPWND	Bottom and top of layer through which the domain-scale winds are computed (m)	1.0, 1.00
IDIOPT4	Read observed surface wind components (0 = from SURF.DAT, 1 = from DIAG.DAT)	0
IDIOPT5	Read observed upper wind components (0 = from UPn.DAT, 1 = from DIAG.DAT)	0
LLBREZE	Use Lake Breeze module (T = true, F = false)	F
NBOX	Lake Breeze - number of regions	0

INPUT GROUP: 6 -- Mixing Height, Temperature and Precipitation Parameters		
Parameter	**Description**	**Value**
CONSTB	Mixing height constant: neutral, mechanical equation	1.41

INPUT GROUP: 6 -- Mixing Height, Temperature and Precipitation Parameters		
Parameter	**Description**	**Value**
CONSTE	Mixing height constant: convective equation	0.15
CONSTN	Mixing height constant: stable equation	2400
CONSTW	Mixing height constant: overwater equation	0.16
FCORIOL	Absolute value of Coriolis parameter (1/s)	0.0001
IAVEZI	Spatial mixing height averaging? (0 = no, 1 = yes)	1
MNMDAV	Maximum search radius in averaging process (grid cells)	1
HAFANG	Half-angle of upwind looking cone for averaging (degrees)	30
ILEVZI	Layer of winds used in upwind averaging (between 1 and NZ)	1
IMIXH	Convective mixing height method (1 = Maul-Carson, 2 = Batchvarova-Gryning, - for land cells only, + for land and water cells)	1
THRESHL	Overland threshold boundary flux (W/m**3)	0
THRESHW	Overwater threshold boundary flux (W/m**3)	0.05
ITWPROG	Overwater lapse rate and deltaT options (0 = from SEA.DAT, 1 = use prognostic lapse rates and SEA.DAT deltaT, 2 = from prognostic)	0
ILUOC3D	Land use category in 3D.DAT	16
DPTMIN	Minimum potential temperature lapse rate (K/m)	0.001
DZZI	Depth of computing capping lapse rate (m)	200
ZIMIN	Minimum overland mixing height (m)	50
ZIMAX	Maximum overland mixing height (m)	3000
ZIMINW	Minimum overwater mixing height (m)	50
ZIMAXW	Maximum overwater mixing height (m)	3000
ICOARE	Overwater surface fluxes method	10
DSHELF	Coastal/shallow water length scale (km)	0
IWARM	COARE warm layer computation (0 = off, 1 = on)	0
ICOOL	COARE cool skin layer computation (0 = off, 1 = on)	0
IRHPROG	Relative humidity read option (0 = from SURF.DAT, 1 = from 3D.DAT)	1
ITPROG	3D temperature read option (0 = stations, 1 = surface from station and upper air from prognostic, 2 = prognostic)	2
IRAD	Temperature interpolation type (1 = 1/R, 2 = 1/R**2)	1
TRADKM	Temperature interpolation radius of influence (km)	500
NUMTS	Maximum number of stations to include in temperature interpolation	5
IAVET	Conduct spatial averaging of temperatures? (0 = no, 1 = yes)	1
TGDEFB	Default overwater mixed layer lapse rate (K/m)	-0.0098
TGDEFA	Default overwater capping lapse rate (K/m)	-0.0045
JWAT1	Beginning land use category for temperature interpolation over water	999
JWAT2	Ending land use category for temperature interpolation over water	999
NFLAGP	Precipitation interpolation method (1 = 1/R, 2 = 1/R**2, 3 = EXP/R**2)	2
SIGMAP	Precipitation interpolation radius of influence (km)	100.
CUTP	Minimum precipitation rate cutoff (mm/hr)	0.01

Appendix 3

Windroses extracted from CALMET model

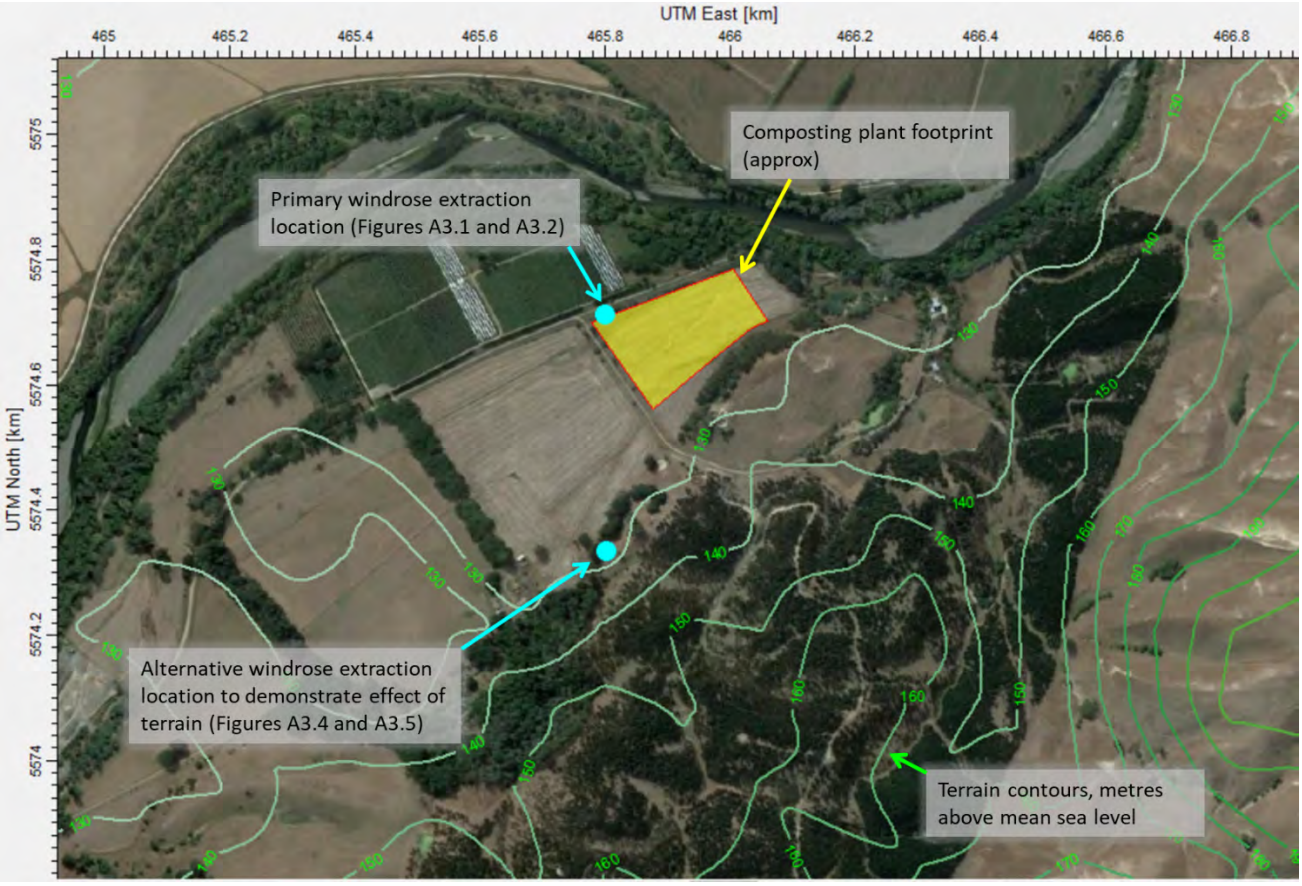


Figure A3.1: Locations for windrose extractions shown in Figures A3.2 to A3.5.

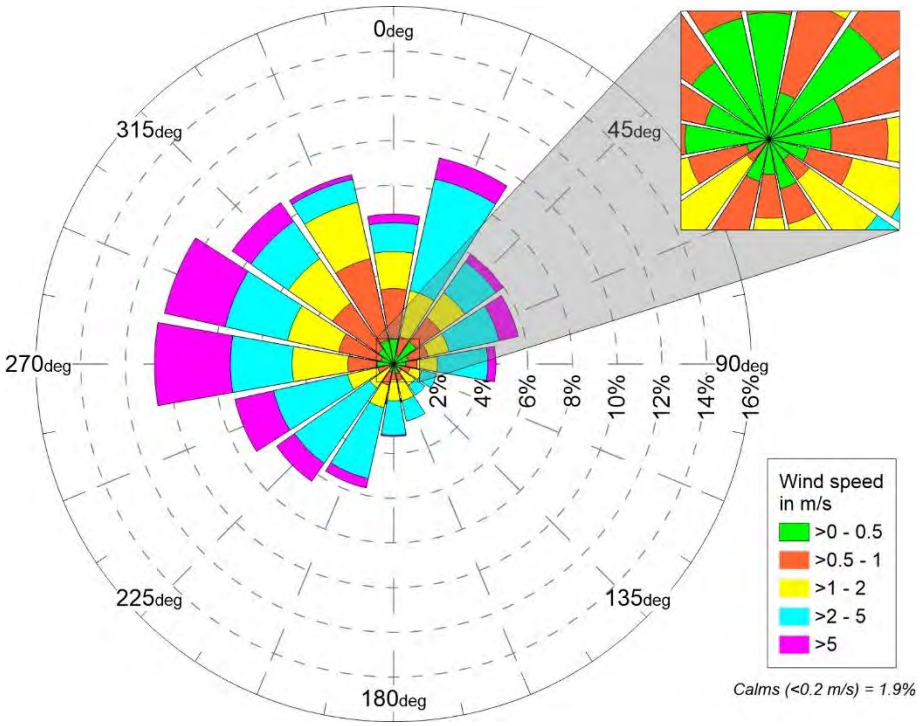


Figure A3.2: Windrose extracted from CALMET for TMM Site location, 2014 calendar year. Records show hourly average wind speed and direction 1 January to 31 December.

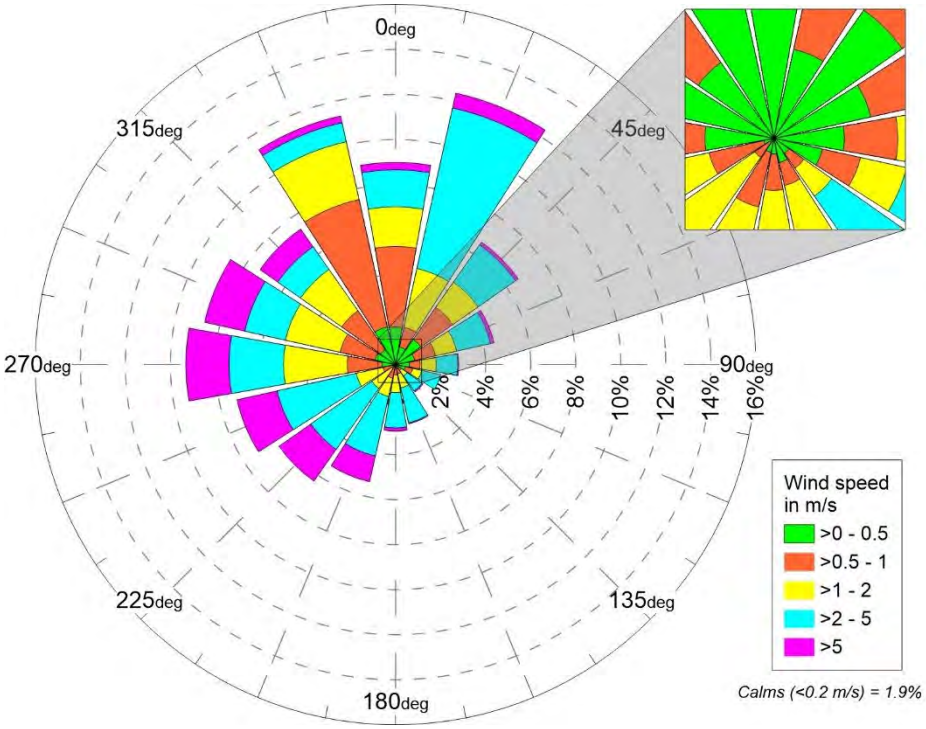


Figure A3.3: Windrose extracted from CALMET for TMM Site location, 2017 calendar year. Records show hourly average wind speed and direction 1 January to 31 December.

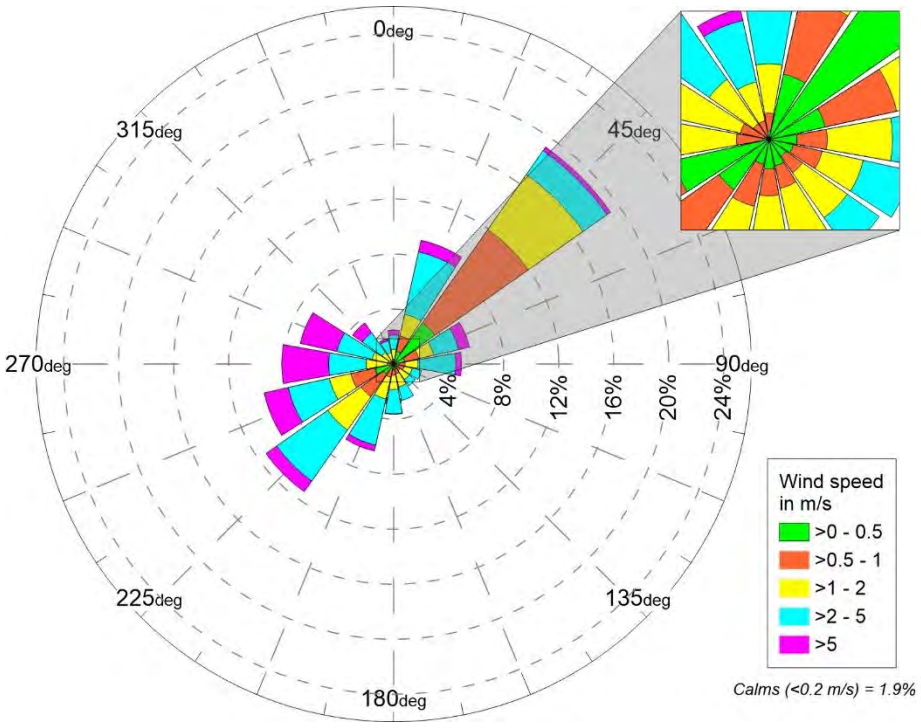


Figure A3.4: Windrose extracted from CALMET for alternate data extraction location shown on Figure A3.1, 2014 calendar year. Records show hourly average wind speed and direction 1 January to 31 December.

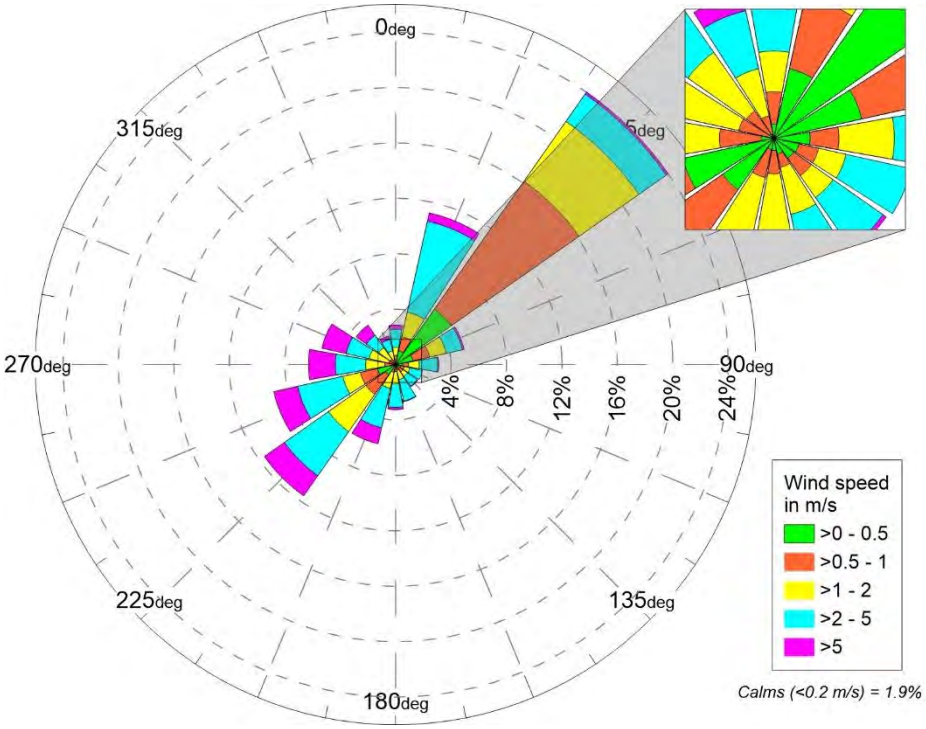


Figure A3.5: Windrose extracted from CALMET for alternate data extraction location shown on Figure A3.1, 2017 calendar year. Records show hourly average wind speed and direction 1 January to 31 December.

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier **507617**
Land Registration District **Hawkes Bay**
Date Issued 22 April 2010

Prior References
HBY3/379

Estate Fee Simple
Area 16.1469 hectares more or less
Legal Description Lot 1 Deposited Plan 427319
Registered Owners
Te Mata Mushroom Land Company Limited

Interests

8401841.4 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 22.4.2010 at 3:34 pm

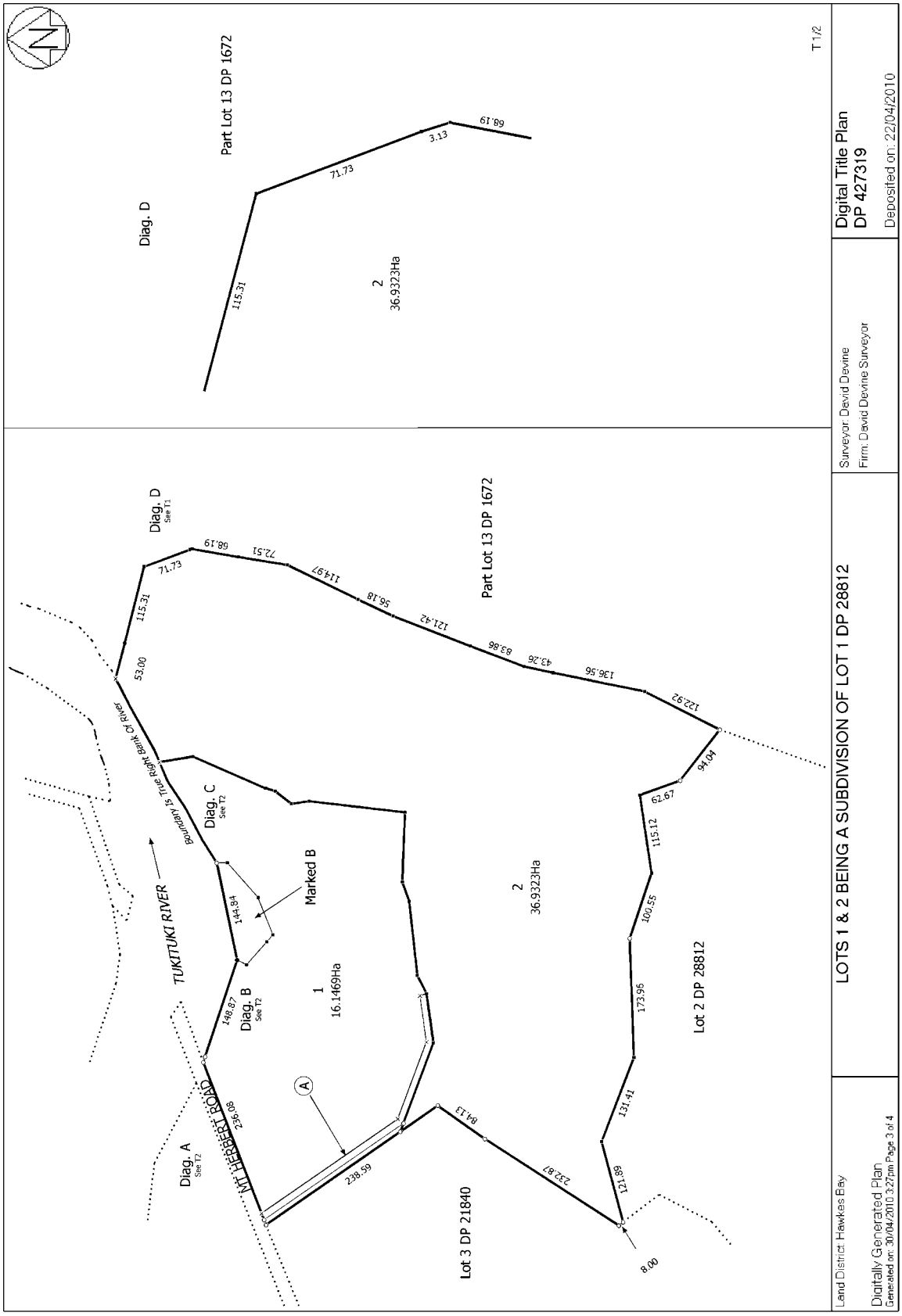
Subject to a right of way over part marked A on DP 427319 created by Easement Instrument 8401841.5 - 22.4.2010 at 3:34 pm

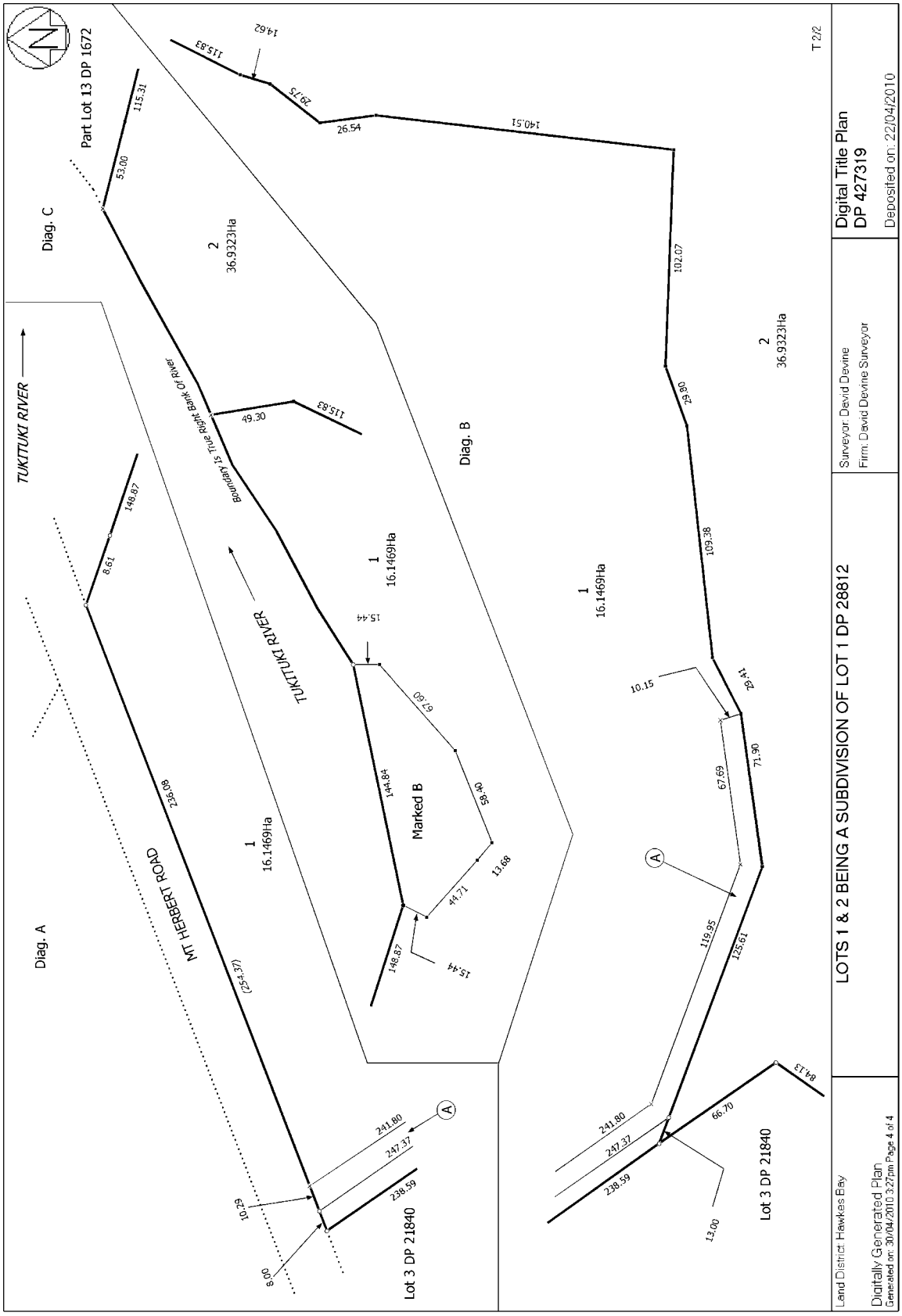
The easements created by Easement Instrument 8401841.5 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right (in gross) to a right of way over part marked A on DP 427319 in favour of Trustees of the Rotary River Pathways Trust created by Easement Instrument 11272558.2 - 5.2.2019 at 12:04 pm

11635827.3 Mortgage to Westpac New Zealand Limited - 13.12.2019 at 8:53 am

11635827.5 Mortgage to Due North Limited Partnership - 13.12.2019 at 8:53 am


Diag. D
Part Lot 13 DP 1672
68.19
3.13
71.73
115.31
2
36.9323Ha
T 1/2
Digital Title Plan
DP 427319
Deposited on: 22/04/2010
Surveyor: David Devine
Firm: David Devine Surveyor
LOTS 1 & 2 BEING A SUBDIVISION OF LOT 1 DP 28812
Land District: Hawkes Bay
Digitally Generated Plan
Generated on: 30/04/2010 3:27pm Page 3 of 4
Diag. D
See T1
Part Lot 13 DP 1672
68.19
72.51
114.97
56.18
121.42
83.86
43.26
136.56
122.92
94.04
62.67
115.12
100.55
173.96
131.41
121.89
8.00
232.87
84.13
Lot 2 DP 28812
Lot 3 DP 21840
238.59
236.08
MT HERBERT ROAD
Diag. A
See T2
148.87
Diag. B
See T2
144.84
Marked B
Diag. C
See T2
TUKITUKI RIVER
Boundary is True Right Bank Of River
53.00
115.31
71.73
1
16.1469Ha
2
36.9323Ha
A


Part Lot 13 DP 1672
Diag. C
Diag. A
Diag. B
TUKITUKI RIVER
Boundary is True Right Bank Of River
MT HERBERT ROAD
(254.37)
Marked B
LOTS 1 & 2 BEING A SUBDIVISION OF LOT 1 DP 28812
Digital Title Plan
DP 427319
Deposited on: 22/04/2010
Surveyor: David Devine
Firm: David Devine Surveyor
Land District: Hawkes Bay
Digitally Generated Plan
Generated on: 30/04/2010 3:27pm Page 4 of 4
Lot 3 DP 21840
T 2/2

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier **HBM4/1014**
Land Registration District **Hawkes Bay**
Date Issued 11 March 1991

Prior References
HBM4/617

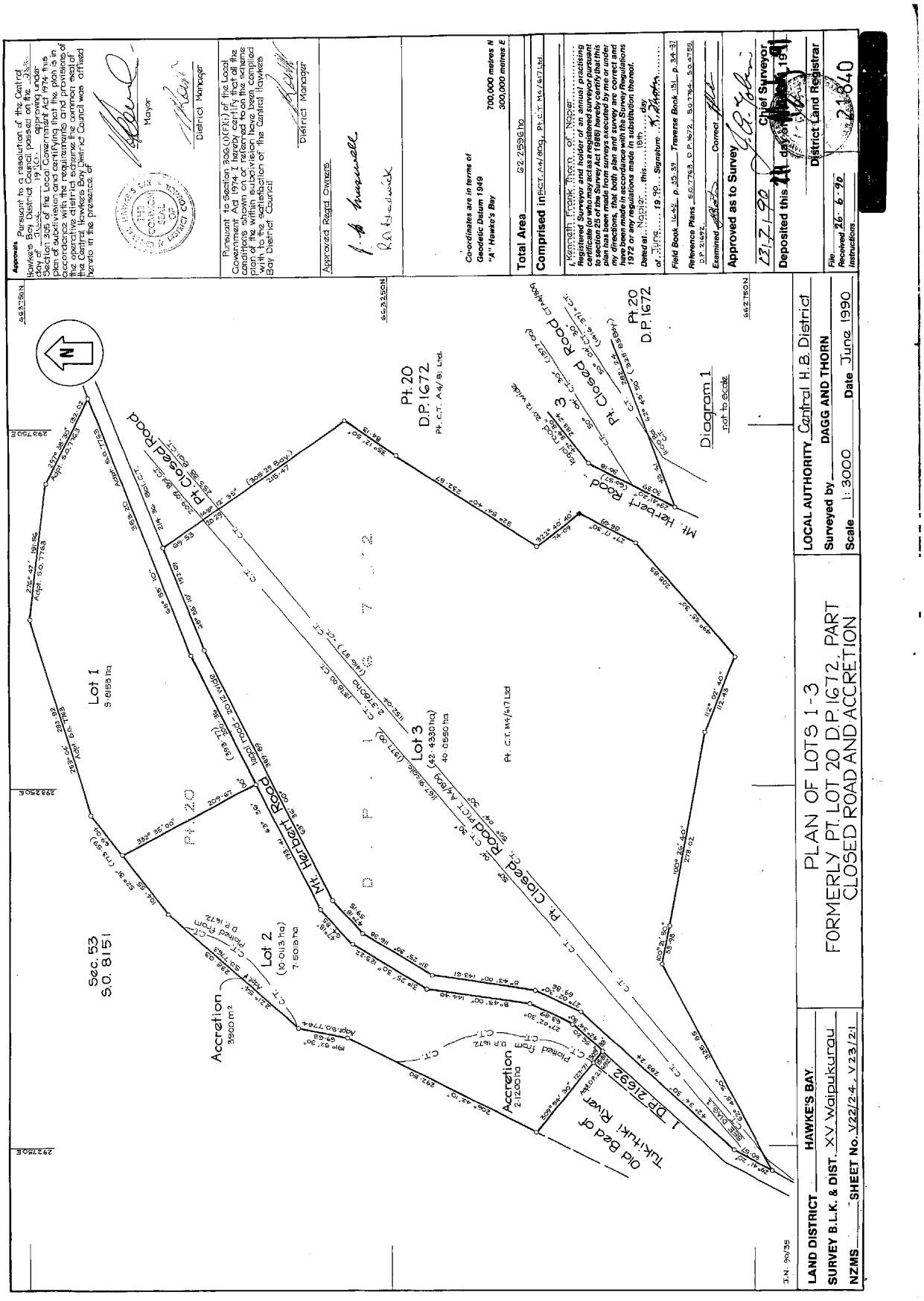
Estate Fee Simple
Area 9.8153 hectares more or less
Legal Description Lot 1 Deposited Plan 21840
Registered Owners
Te Mata Mushroom Land Company Limited

Interests

9126232.1 Notice pursuant to Section 195(2) Climate Change Response Act 2002 - - 18.7.2012 at 12:37 pm

11635827.4 Mortgage to Westpac New Zealand Limited - 13.12.2019 at 8:53 am

11635827.5 Mortgage to Due North Limited Partnership - 13.12.2019 at 8:53 am


PLAN OF LOTS 1-3
FORMERLY PT. LOT 20 D.P. 1672, PART
CLOSED ROAD AND ACCRETION
LAND DISTRICT HAWKE'S BAY
SURVEY B.L.K. & DIST. XV Waipukurau
NZMS SHEET No. V22/24, V23/21
LOCAL AUTHORITY Central H.B. District
Surveyed by DAGG AND THORN
Scale 1:3000 Date June 1990
Diagram 1
not to scale
Lot 1
9.8155 ha
Lot 2
10.0113 ha
7.5018 ha
Lot 3
42.4330 ha
40.0550 ha
Sec. 53
S.O. 8151
Pt. 20
D.P. 1672
Pt. C.T. A4/81 Ltd
Pt. C.T. M4/617 Ltd
Pt. Closed Road
Mt. Herbert Road
Accretion
3900 m²
Accretion
2.1200 ha
Old Bed of Tukituki River
1 DP 21692
Approved as to Survey
Chief Surveyor
Deposited this 11th day of July 1991
District Land Registrar
21840

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier	**HBM4/1015**
Land Registration District	**Hawkes Bay**
Date Issued	11 March 1991

Prior References
HBM4/617

Estate	Fee Simple
Area	10.0113 hectares more or less
Legal Description	Lot 2 Deposited Plan 21840
Registered Owners	

Te Mata Mushroom Land Company Limited

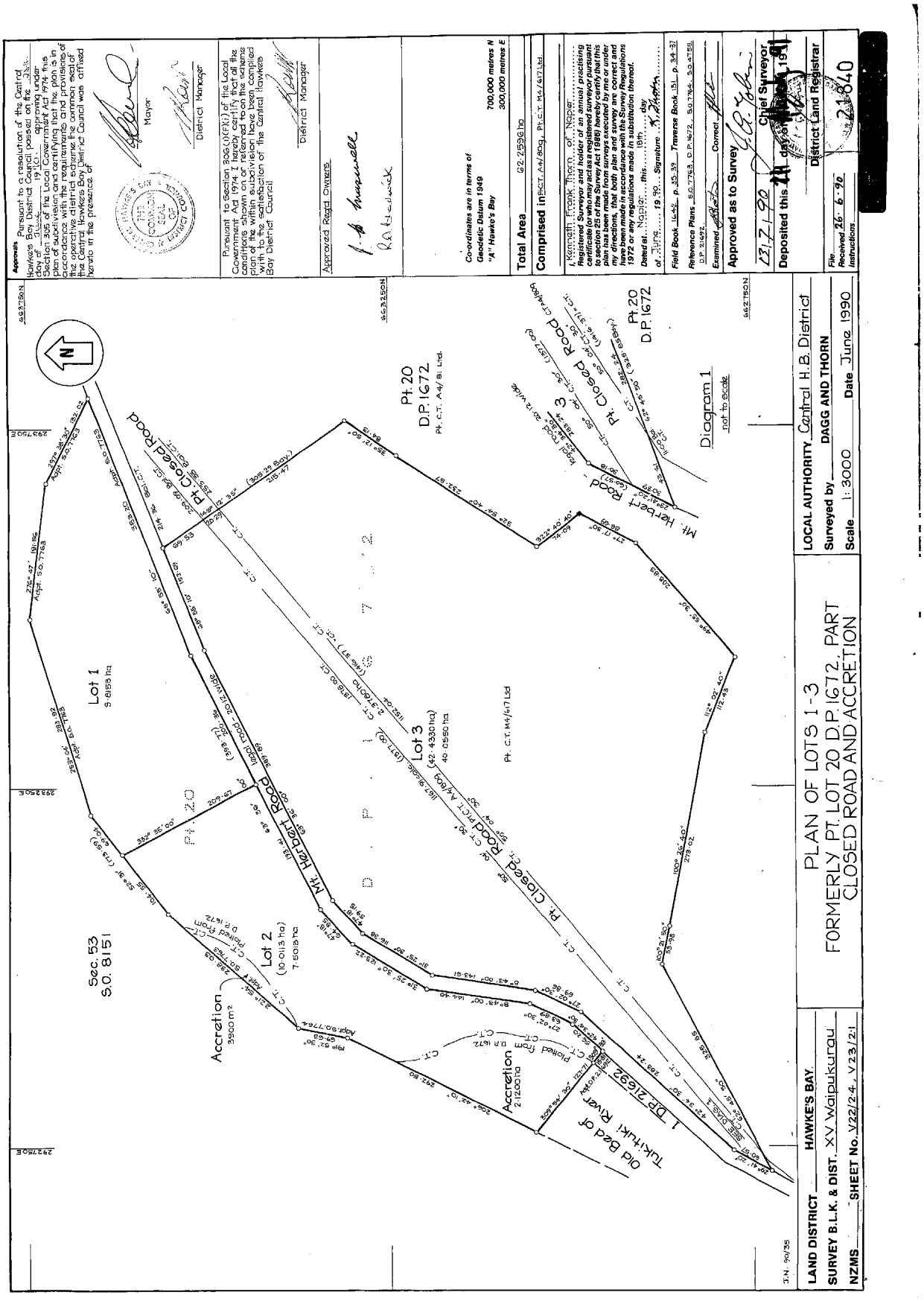
Interests

Land Covenant in Transfer 565848.1 - produced 29.1.1991 at 2.00pm and entered 11.3.1991

9126232.1 Notice pursuant to Section 195(2) Climate Change Response Act 2002 - - 18.7.2012 at 12:37 pm

11635827.4 Mortgage to Westpac New Zealand Limited - 13.12.2019 at 8:53 am

11635827.5 Mortgage to Due North Limited Partnership - 13.12.2019 at 8:53 am


PLAN OF LOTS 1-3
FORMERLY PT. LOT 20 D.P. 1672, PART
CLOSED ROAD AND ACCRETION
LAND DISTRICT HAWKE'S BAY
SURVEY B.L.K. & DIST. XV Waipukurau
NZMS SHEET No. V22/24, V23/21
LOCAL AUTHORITY Central H.B. District
Surveyed by DAGG AND THORN
Scale 1:3000 Date June 1990
Diagram 1
not to scale
Lot 1
9.8155 ha
Lot 2
10.0113 ha
7.5018 ha
Lot 3
42.4330 ha
40.0550 ha
Sec. 53
S.O. 8151
Accretion
3900 m²
Accretion
2.1200 ha
Pt. Closed Road
Pt. Closed Road
Mt. Herbert Road
Pt. Closed Road
Pt. Closed Road
Old Bed of Tukituki River
1 DP 21692
Pt. 20
D.P. 1672
Pt. C.T. A4/80
Pt. C.T. M4/617 Ltd
Pt. 20
D.P. 1672
Pt. C.T. M4/617 Ltd
Pt. 3
Pt. 2
Pt. 1
Approvals
Pursuant to a resolution of the Central Hawkes Bay District Council passed on the 3rd day of June 19 90, approving under Section 326 of the Local Government Act 1974 that the plan is in accordance with the requirements and provisions of the operative district scheme the common seal of the Central Hawkes Bay District Council was affixed hereto in the presence of
Mayor
District Manager
Pursuant to Section 306(1)(f)(i) of the Local Government Act 1974 I hereby certify that all conditions of consent imposed on the subdivision of the within subdivision have been complied with to the satisfaction of the Central Hawkes Bay District Council
District Manager
Approved Regd. Owners
Co-ordinates are in terms of Geodetic Datum 1949
"A" Hawke's Bay
700,000 metres N
300,000 metres E
Total Area 62.2596ha
Comprised in Sect. A4/80pt, Pt. C.T. M4/617 Ltd
I, Kenneth Frank Thorn of Napier
Registered Surveyor and holder of an annual practising certificate (or who may act as a registered surveyor pursuant to section 15 of the Surveyors Amendment Act 1969) hereby certify that this plan has been made from surveys executed by me or under my directions, that both plan and survey are correct and have been made in accordance with the Survey Regulations 1972 or any regulations made in substitution thereof.
Dated at Napier this 19th day of June 19 90 Signature K. Thorn
Field Book 16446 p. 35-39 Traverse Book 151 p. 34-37
Reference Plans S.O. 7763, D.P. 1672, S.O. 7764, S.O. 8151, D.P. 21692
Examined Correct
Approved as to Survey
13/7/90
Chief Surveyor
Deposited this 11th day of July 1990
District Land Registrar
File
Received 26/6/90
Instructions
21840

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier **HBP2/455**

Land Registration District **Hawkes Bay**

Date Issued 15 October 1991

Prior References

HBM4/1017 HBM4/1018

Estate Fee Simple

Area 39.4430 hectares more or less

Legal Description Lot 1 Deposited Plan 22481

Registered Owners

Te Mata Mushroom Land Company Limited

Interests

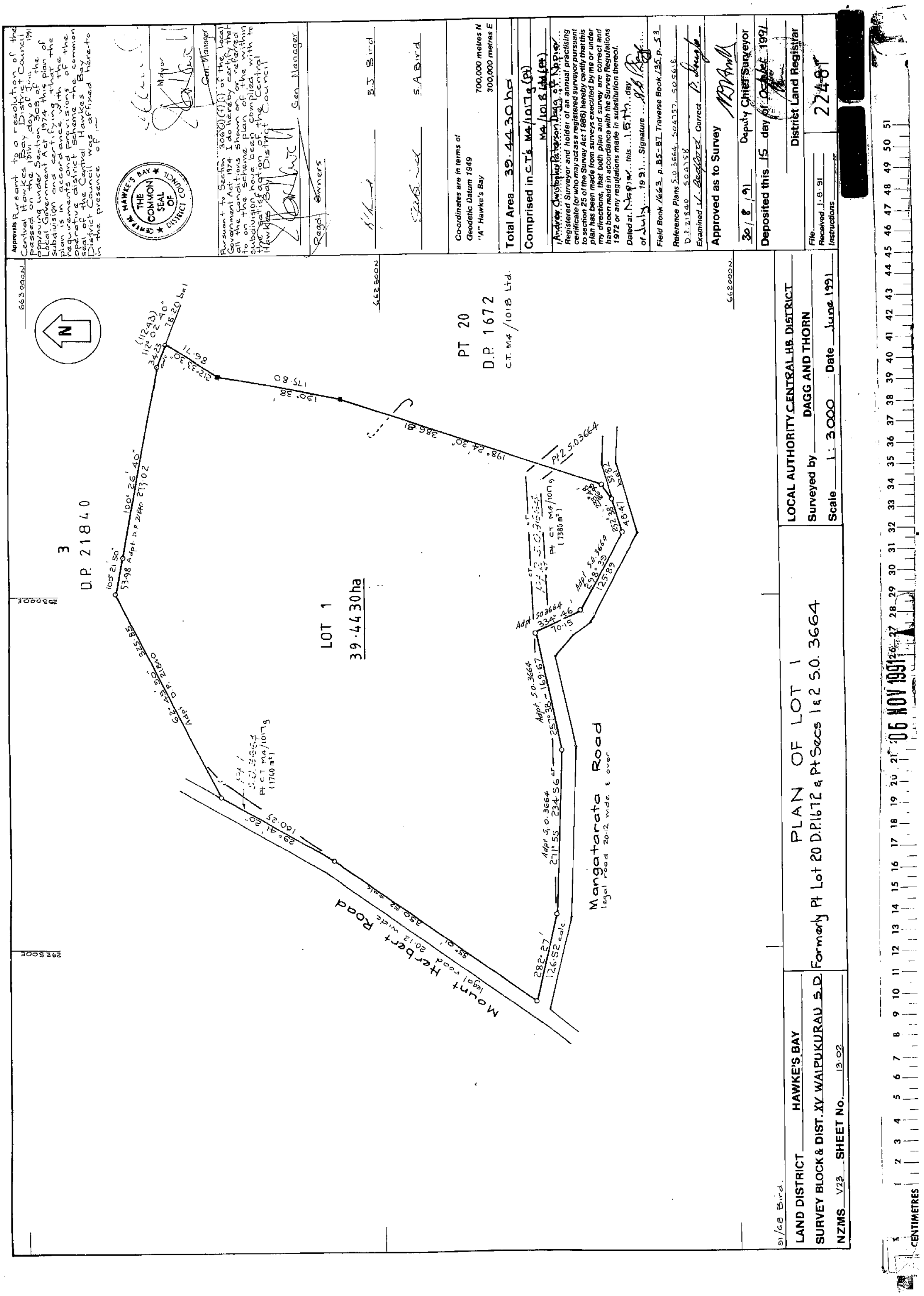
9126232.1 Notice pursuant to Section 195(2) Climate Change Response Act 2002 - - 18.7.2012 at 12:37 pm

Subject to a right to convey water over part marked F on DP 401209 created by Easement Instrument 9558935.4 - 18.12.2013 at 3:20 pm

Appurtenant hereto is a right to convey electricity and water created by Easement Instrument 9558935.4 - 18.12.2013 at 3:20 pm

11635827.4 Mortgage to Westpac New Zealand Limited - 13.12.2019 at 8:53 am

11635827.5 Mortgage to Due North Limited Partnership - 13.12.2019 at 8:53 am


PLAN OF LOT 1
Formerly Pt Lot 20 D.P.1672 & Pt Secs 1 & 2 S.O. 3664
LOT 1
39·4430ha
PT 20
D.P. 1672
3
D.P. 21840
Mangatarata Road
Mount Herbert Road
LAND DISTRICT HAWKE'S BAY
SURVEY BLOCK & DIST. XV WAIPUKURAU S.D
LOCAL AUTHORITY CENTRAL HB DISTRICT
Surveyed by DAGG AND THORN
Scale 1:3000 Date June 1991
Total Area 39.4430 ha
Approved as to Survey
Deputy Chief Surveyor
Deposited this 15 day of October 1991
District Land Registrar
06 NOV 1991
CENTIMETRES

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier **402779**

Land Registration District **Hawkes Bay**

Date Issued 18 December 2013

Prior References
HBM4/1016

Estate Fee Simple

Area 39.4946 hectares more or less

Legal Description Lot 2 Deposited Plan 401209

Registered Owners

Te Mata Mushroom Land Company Limited

Interests

9126232.1 Notice pursuant to Section 195(2) Climate Change Response Act 2002 - - 18.7.2012 at 12:37 pm

9558935.2 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 18.12.2013 at 3:20 pm

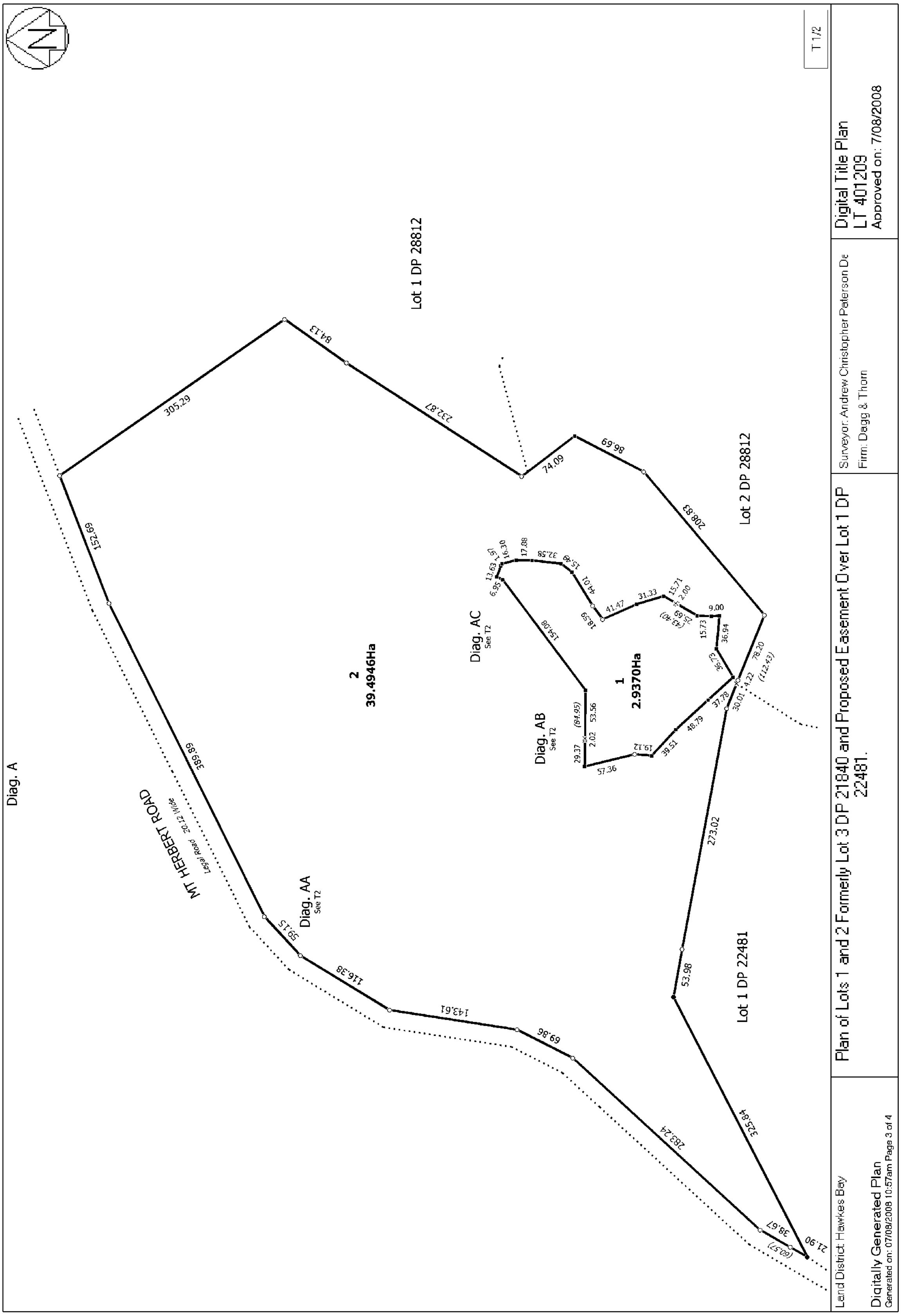
Subject to a right of way over part marked and A, and a right to convey electricity and water over part marked B, and to convey electricity over part marked C, and to convey water over part marked E and G all on DP 401209 created by Easement Instrument 9558935.4 - 18.12.2013 at 3:20 pm

Appurtenant hereto is a right to convey electricity and water created by Easement Instrument 9558935.4 - 18.12.2013 at 3:20 pm

Some of the easements created by Easement Instrument 9558935.4 are subject to Section 243 (a) Resource Management Act 1991 (see DP 401209)

11635827.4 Mortgage to Westpac New Zealand Limited - 13.12.2019 at 8:53 am

11635827.5 Mortgage to Due North Limited Partnership - 13.12.2019 at 8:53 am



T 1/2
Digital Title Plan
LT 401209
Approved on: 7/08/2008
Surveyor: Andrew Christopher Paterson De
Firm: Dagg & Thorn
Plan of Lots 1 and 2 Formerly Lot 3 DP 21840 and Proposed Easement Over Lot 1 DP 22481.
Land District: Hawkes Bay
Digitally Generated Plan
Generated on: 07/08/2008 10:57am Page 3 of 4
Lot 1 DP 28812
Lot 2 DP 28812
Lot 1 DP 22481
MT HERBERT ROAD
Legal Road 20.12 Wide
Diag. A
Diag. AA
See T2
Diag. AB
See T2
Diag. AC
See T2
2
39.4946Ha
1
2.9370Ha
305.29
84.13
232.87
74.09
86.69
208.83
152.69
389.89
59.15
116.38
143.61
69.86
283.24
38.67
(60.57)
21.90
325.84
53.98
273.02
78.20
(112.43)
30.01
37.78
48.79
39.51
19.12
57.36
29.37
2.02
53.56
(84.95)
154.08
6.95
13.63
16.30
17.88
32.58
15.49
44.01
18.59
41.47
31.33
15.71
2.00
15.69
(43.40)
9.00
15.73
36.94
36.72
4.22